.1 Vehicle interior and exterior

1 Exterior

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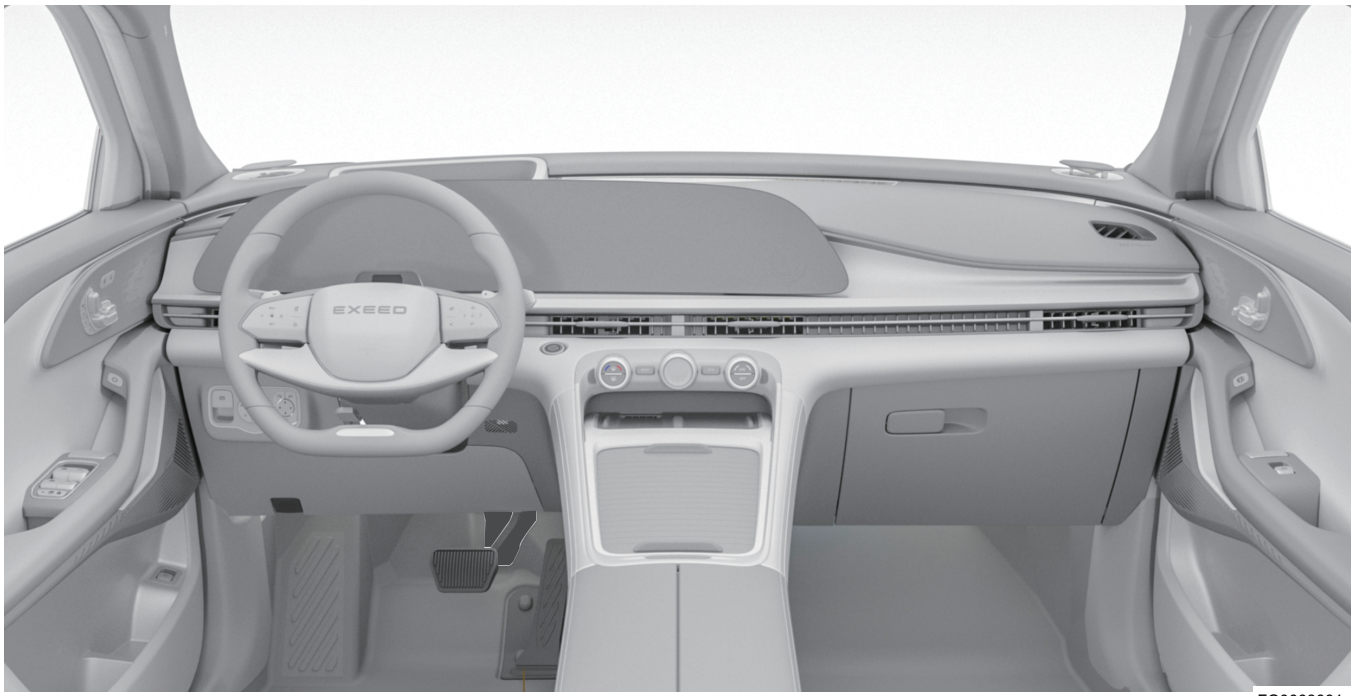
2 Interior



FO0003001

EXEED M38T Service Manual 2023

FOREWORD

This manual contains on-vehicle diagnosis and service procedures for EXEED M38T.

It is very important to read and be familiar with this manual thoroughly for proper repair and maintenance. This manual should be kept in a handy place for quick and easy reference.

The contents in this manual, including all illustrations and specifications, are current at the time of printing. As modifications affecting repair and maintenance occur, relevant information supplementary to this volume will be made available at EXEED dealers.

This manual only applies
to models listed below:
M38T 2.0T+740DCT

CAUTION:
This manual is only for specialized technicians. If non-specialized or uncertified individuals perform repairs and maintenance privately only referring to this manual or without proper equipment and tools, it may cause damage to customer's vehicle and injury to you and other persons nearby.

In order to prevent dangerous operation and damage to vehicle, be sure to follow the instructions shown below:

- Contents in this manual must be read thoroughly. Have a good understanding of all the contents written in "PRECAUTION" of "INTRODUCTION" section.
- Before performing repair procedures, be sure to put on protective tools properly to avoid personal injury.
- When performing repair procedures, be sure to use specified and recommended tools to prevent damage to customer's vehicle. Before operating, be sure to confirm the safety of technicians to avoid personal injury.
- If a part needs to be replaced, use EXEED genuine part with the same part number. Do not use any inferior quality part.
- Observe WARNING and CAUTION in this manual carefully, in order to effectively avoid the risk of personal injury and vehicle damage due to improper operation during service and maintenance.

CONTENTS

GENERAL INFORMATION

1.1 HOW TO USE THIS MANUAL

1 How to Use This Manual

1.1 Manual Content

This manual describes the repair process of the whole vehicle in 11 major sections such as introduction, general information, maintenance, engine, drive train, suspension and axle, brake, steering, heating and air conditioning system, supplemental restraint system, electrical and body, etc. Each chapter describes one special part of vehicle components.
The first page of this manual contains the contents of all chapters. Each specific chapter generally includes the following contents: Warnings and precautions, general information (system overview, component operation description, fasteners torque list, module pin definition, etc.), diagnosis & test (problem symptoms table, matching and learning, DTC diagnosis procedure, etc.), on-vehicle service (special tool and equipment, inspection and adjustment, removal and installation).

(1) This manual includes all necessary procedures for service operations.

These procedures can be divided into following three categories:

- Diagnosis.
- Removal and installation, replacement, disassembly and assembly, inspection and adjustment.
- Inspection.

Following procedures are omitted from this manual. However, they must be performed:

- Use a transmission tray or lifter to perform operations.
- Clean all removed parts.
- Perform a visual check.

(2) Service procedure

Illustrations for service procedures are used to identify components, show the assembling relevance of parts, and explain the visual check for parts. Removal and installation procedures are explained in words.

Service procedures include:

- Detailed removal and installation instruction
- Illustration
- Torque specifications
- Technical specifications

Sometimes, the illustrations of similar models are used. In this case, minor details may be different from actual vehicle.

(3) Diagnosis procedure

Diagnosis procedures are divided as below:

- Diagnostic Trouble Code (DTC)

  DTC is an important hint when troubleshooting is difficult to simulate. The malfunction can be diagnosed quickly and accurately by performing specified DTC diagnosis and check.

- Problem symptoms table

  Malfunction locations can be determined quickly by troubleshooting in accordance with symptom type.

(4) Specifications

This manual categorizes specifications as below:

- Torque specifications
- Clearance specifications
- Capacity specifications

2 Warnings and Precautions

2.1 Definition

The diagnostic and service procedures in this repair manual include general and specific "Warning," "-Caution," and "Hint". Chery is committed to providing repair information to help the after-sales service technician in diagnosing and repairing the system so that the vehicle can operate normally. However, if technician does not follow the recommended methods, certain procedures may pose risks to them. “Warning”, “Caution” and “Hint” are prepared to prevent the occurrence of above danger, but not all dangers are foreseeable. This type of information is prominently located in the repair manual. This type of information is prepared to prevent the following situations from occurring:

- Causing serious injury to personnel;
- Vehicle damage;
- Unnecessary vehicle service;
- Unnecessary components replacement;
- Improper repair or replacement of vehicle components.

■ Definition of "Warning"

When encountering a "Warning", it requires you to take necessary action or prohibited action. If "Warning" is ignored, it may lead to the following consequences:

- Causing serious injury to personnel;
- If the vehicle is not repaired properly, it can cause serious personal injury to driver and/or passengers of vehicle.

■ Definition of "Caution"

"Caution" requires that special attention be paid to measures that are required or prohibited. If "Caution" is ignored, it can lead to the following consequences:

- Vehicle damage;
- Unnecessary vehicle service;
- Unnecessary components replacement;
- The operation or performance of the repaired system or component is abnormal;
- Damage to relevant systems or components;
- Damage to fastener, basic tool or special tool;
- Leakage of engine coolant, lubricant or other major oil.

■ Definition of "Hint"

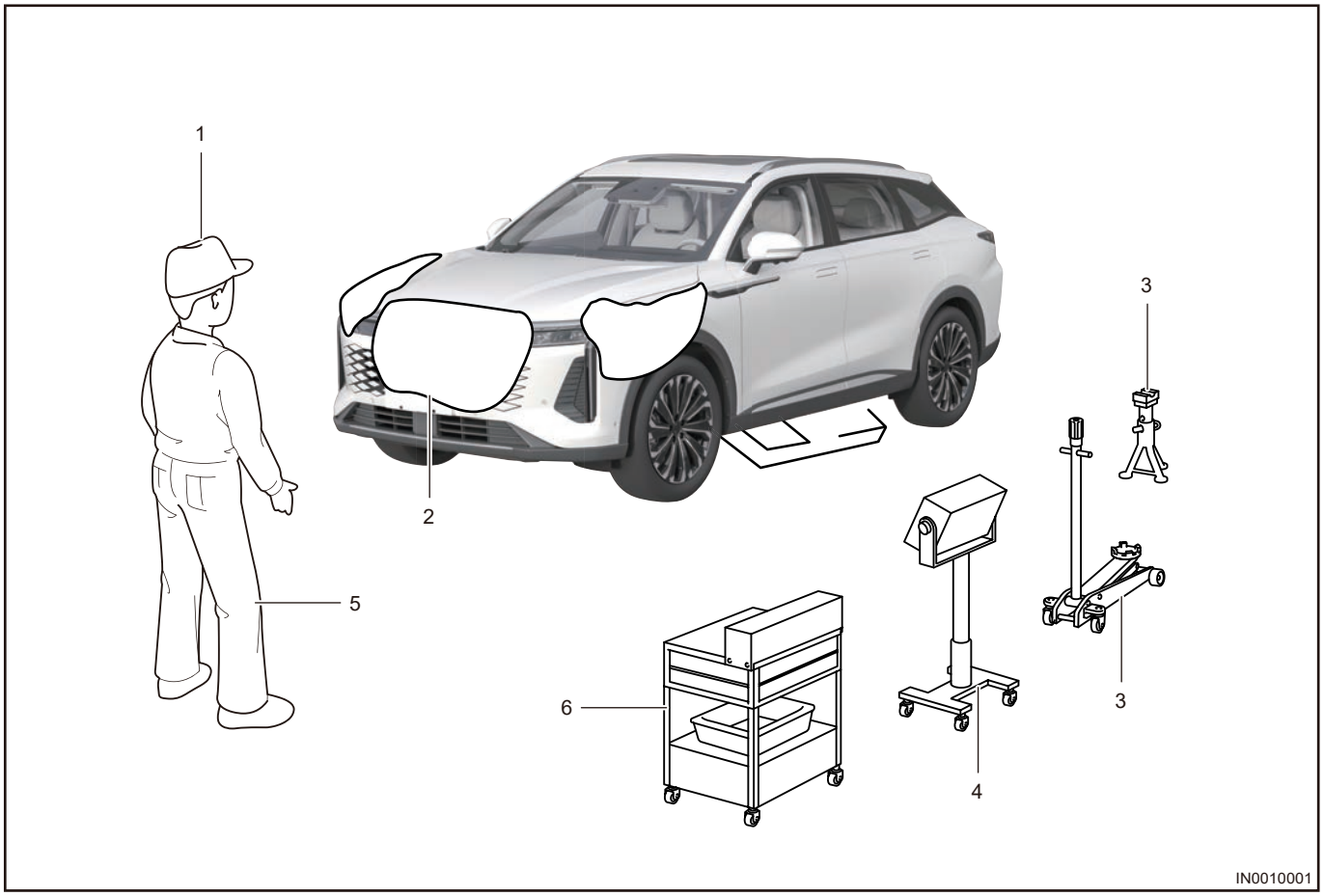
"Hint" statement emphasizes the necessity of a certain diagnostic or repair procedure, and the purpose of "-Hint" statement is as follows:

- Clarify the procedures;
- Provide supplementary information for completing a procedure;
- Explain the reasons for following the recommended procedure;
- Provide information that helps to complete the procedure in a more effective manner;
- Provide past experience information to technician to make it easier to complete the procedure.

1.2 Vehicle Inspection

1 Preparation before Vehicle Inspection

1.1 Vehicle inspection schematic diagram



1	Attire	• Always wear a clean uniform. • A hat and safety shoes must be worn.
2	Vehicle Protection	• Before starting work, prepare radiator grille cover, wing cover, seat cover and floor mat.
3	Safety Operation	• When working with two or more persons, be sure to check safety each other. • When working with engine running, make sure to provide ventilation for exhausting gas in the workshop. • When repairing high temperature, high pressure, rotating, moving, or vibrating parts, be sure to wear appropriate safety equipment and take extra care not to injure yourself or others. • When jacking up vehicle, be sure to support specified location with a safety stand. • Use appropriate safety equipment to lift vehicle.
4	Preparation for Tools and Measuring Gauge	• Before starting work, prepare a tool stand, special tools, gauge, oil and replacement parts.

5	Removal and Installation, Disassembly and Assembly Operations	• Diagnose after thoroughly understanding proper service procedures and reported problem. • Before removing parts, inspect general condition of assembly to check for deformation or damage. • Take notes for complicated assembly. For example, record total number of electrical connections, bolts or hoses that are removed. • Add matchmarks to ensure that each component is assembled to its original position. Temporarily mark hoses and their joints if necessary. • Clean and wash removed parts if necessary and assemble them after a thorough inspection.
6	Removed Parts	• Place removed parts in a separate box to avoid mixing them up with new parts or contaminating new parts. • For non-reusable parts (such as gaskets, O-rings, and self-locking nuts), replace them with new ones as instructed in this manual. • Retain removed parts for inspection, if requested by customers.

2 Repair Operation Precautions

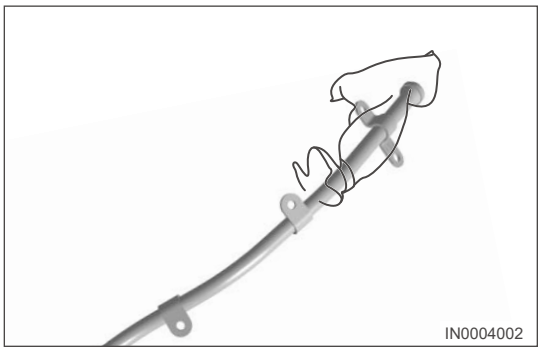
2.1 How to use fasteners

Warning
Using incorrect fasteners may cause damage to components. Injury and death may occur without observing the instructions below.

- Reference values of fasteners and torque specifications in this service manual use metric unit.
- Recycling all fasteners (nuts, bolts, etc.) during maintenance and service operation is important for assembly.

2.2 Remove parts

When repairing malfunction, try to determine the cause. Before starting work, parts or sub-assemblies that have to be removed and replaced should be confirmed first. After removing parts, block all holes and ports to prevent foreign objects from entering.



2.3 Disassemble components

If disassembly procedures are complicated and multiple parts need to be disassembled, make sure that disassembly methods won't affect the performance or appearance of parts. Identify each part for assembly.

2.4 Installation check

After removal, it is necessary to check if there is foreign matter that enters new or used parts when installing new part or resetting used part, preventing unnecessary damage to the vehicle.

2.5 Arrange parts

Carefully arrange all disassembled parts to make assembly easier.
Always separately arrange replaced parts and reusable parts, and make marks on them.

2.6 Clean parts

⚠ Warning
Blowing out the dirt or other particles with compressed air may hurt your eyes. Be sure to wear goggles during operation.

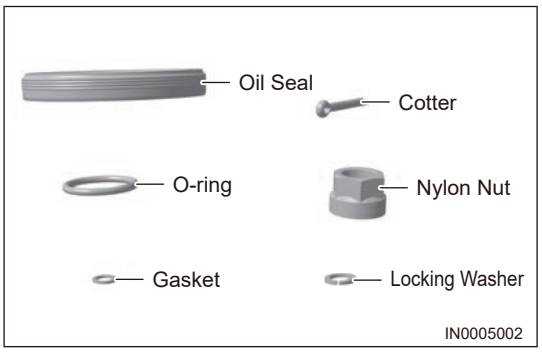
Make a thorough and careful cleaning for reusable parts.

2.7 Assemble components

When assembling parts, always strictly use standard values (tightening torque and clearance value, etc.).

If following parts need to be replaced, replace them with new ones.

- Oil seal
- Gasket
- O-ring
- Locking washer
- Cotter pin
- Nylon nut



2.8 Lubrication and seal

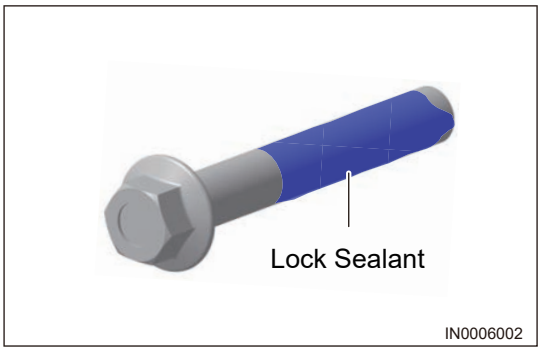
Use seal gum and gasket based on position.
If seal gum is applied, install components before the seal gum dries to prevent leakage.
Apply lubricant to the movable area and friction area of components.
During assembly, apply permitted lubricant or grease to the specified area (such as oil seal).

2.9 Adjustment

Use proper meter and tester for adjustment.

2.10 Pre-coated parts

Pre-coated parts are bolts and nuts that are coated with seal lock adhesive in the factory. If a pre-coated part is retightened, loosened, or moved in any way, be sure to reapply the specified adhesive.



2.11 Rubber parts and rubber hoses

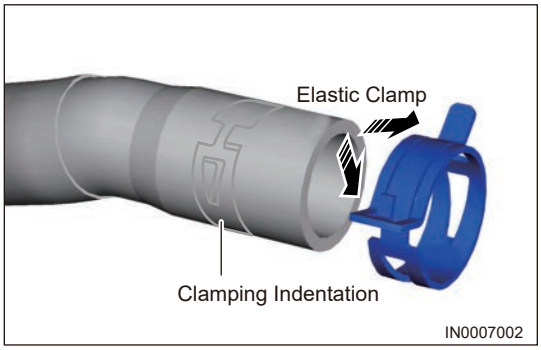
Avoid gasoline or oil dripping on rubber parts or rubber hoses.

2.12 Hose clamp

Before removing a hose, observe the position Jam so as to reinstall it to the same position.

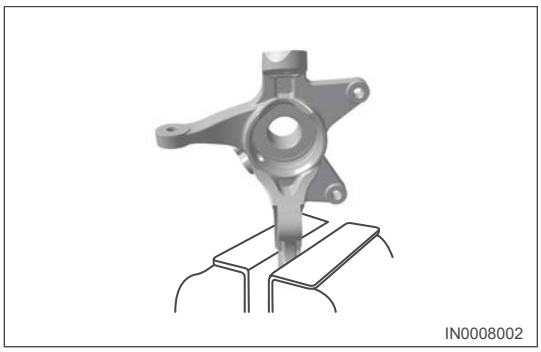
Replace deformed or dented clamps with new ones. When reusing a hose, fix the clamp on the clamp track portion of hose.

For elastic clamp, push tabs in direction of arrow as shown in illustration after installation to widen the tabs slightly.



2.13 Vise

When using a vise, install protective plates on jaws of vise to prevent parts from being damaged.



2.14 Dynamometer

When testing vehicle on dynamometer, pay attention to the following:

- Place a fan in front of vehicle. It is best to use a fan of which the power changes in proportion to vehicle speed.
- Connect an exhaust gas ventilator.

⚠ Caution

- **Exhaust gas may cause injury and death. There is odorless, colorless Carbon Oxide (CO) in the exhaust gas. People will faint and get poisoned after inhaling it.**

- Cool the exhaust pipe with a fan.
- Keep the area around vehicle clean and tidy.
- Monitor engine coolant temperature.

1.3 Raising Vehicle

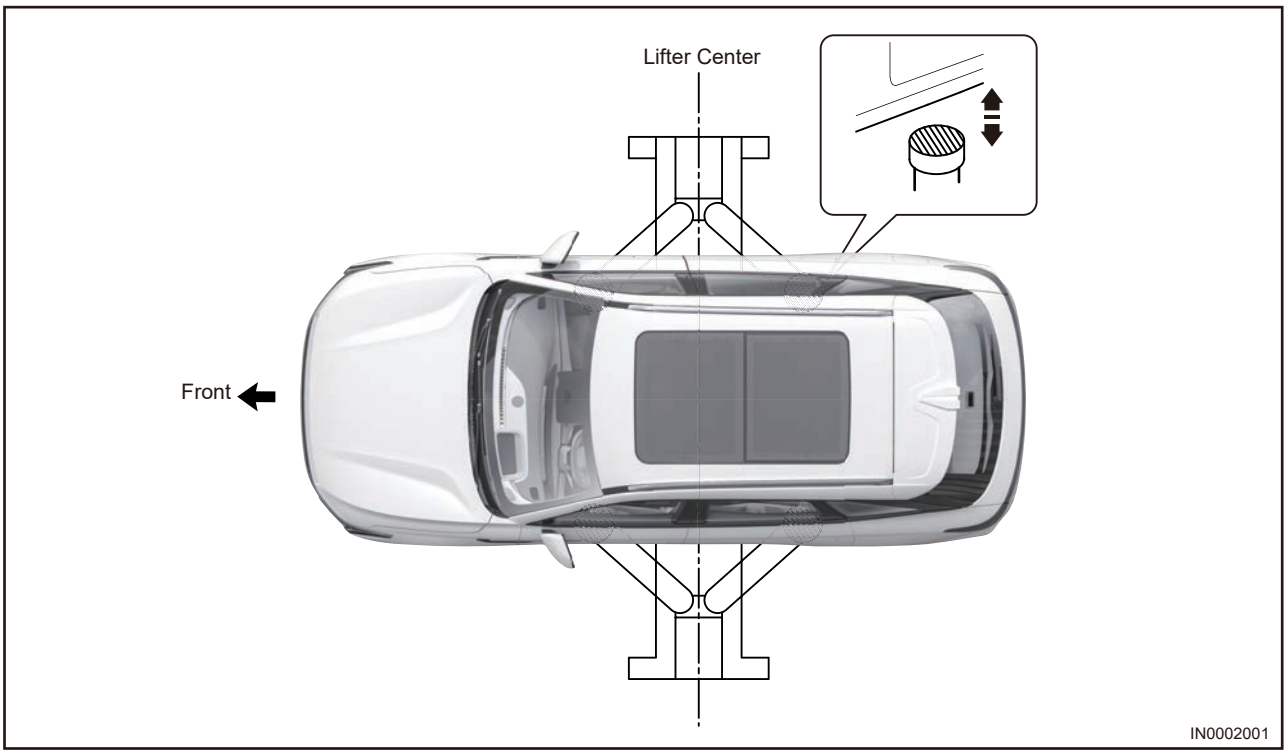
1 Raising Vehicle

1.1 Swing arm type lift

⚠ Caution

Precautions for using a swing arm type lift

- **Follow safety procedures described in the instruction manual.**
- **Keep vehicle stable when using a lift to prevent vehicle from tilting during operation. Stabilize vehicle by adjusting the length of lift arm and vehicle position.**



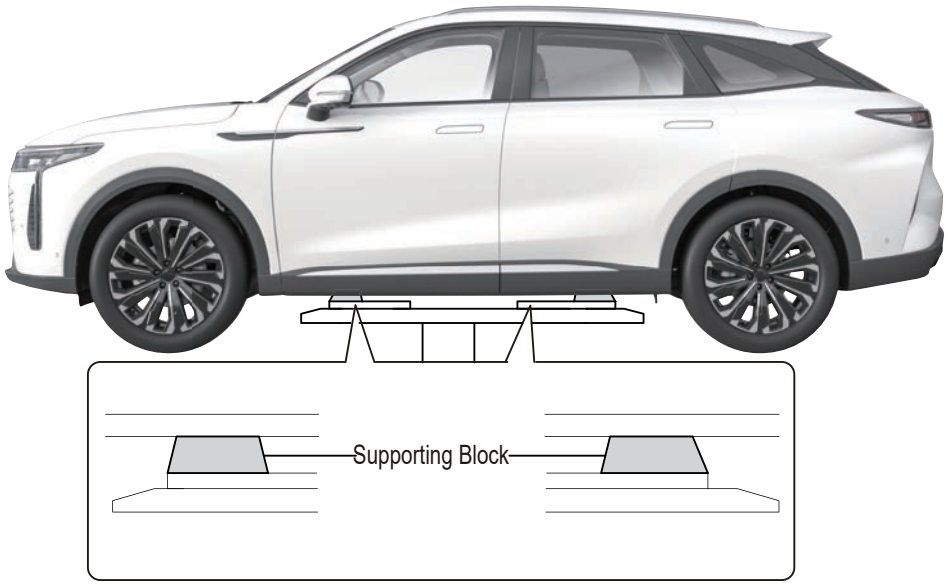
Care must be taken when jacking up and supporting vehicle; Be sure to jack up and support vehicle at proper locations.
Sometimes, similar illustrations may be used. In this case, minor details may be different from actual vehicle.

1.2 Plate type lift

⚠ Caution

Precautions for using a plate type lift

- **Follow safety procedures described in the instruction manual.**
- **Use plate type lift attachments (rubber lifting blocks) on the plate surface.**


Supporting Block
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1.4 Maintenance

1 Maintenance Items

1.1 Maintenance schedule table

The maintenance schedule lists vehicle maintenance items that need to be carried out. Please go to EXEED authorized service station for maintenance according to mileage in maintenance schedule.
For general area, maintenance interval is 10,000 km or 12 months (whichever comes first) after first maintenance is performed.
If your vehicle is often used in severe driving conditions, you should follow the maintenance requirement each 5,000 km or 6 months (whichever comes first). Only Castrol oil (SN 5W-30; SP 5W-30) and Fuchs (C5 0W-20) can reach the maintenance requirement every 15,000 km or 1 year, Please follow the recommendation of EXEED authorized service station.
I: Inspect, adjust, clean or replace if necessary; R: Replace.

For general driving conditions*											
Maintenance Items	**Months**	**12**	**24**	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**
	Km × 1,000	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
For general driving conditions*											
Maintenance Items	**Months**	**6**	**12**	**18**	**24**	**30**	**36**	**42**	**48**	**54**	**60**
	Km × 1,000	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
Meter Indicating System		I	I	I	I	I	I	I	I	I	I
Video and Entertainment System		I	I	I	I	I	I	I	I	I	I
Diagnostic Tester Inspection		I	I	I	I	I	I	I	I	I	I
Front Wiper Blades		I	I	I	I	I	I	I	I	I	I
Rear Wiper Blades		I	I	I	I	I	I	I	I	I	I
Wiper System		I	I	I	I	I	I	I	I	I	I
Cooling Effect		I	I	I	I	I	I	I	I	I	I
Air Conditioning System		I	I	I	I	I	I	I	I	I	I
Air Conditioning Filter		I	I	I	I	I	I	I	I	I	I
Coolant Level		I	I	I	I	I	I	I	I	I	I
Freezing Point of Coolant		I	I	I	I	I	I	I	I	I	I
Brake Fluid		It is recommended to replace every 2 years or 40,000 km (whichever comes first).									
Brake Fluid Level		I	I	I	I	I	I	I	I	I	I
Water Content of Brake Fluid		I	I	I	I	I	I	I	I	I	I

For general driving conditions*											
Maintenance Items	**Months**	**12**	**24**	**36**	**48**	**60**	**72**	**84**	**96**	**108**	**120**
	Km × 1,000	**10**	**20**	**30**	**40**	**50**	**60**	**70**	**80**	**90**	**100**
For general driving conditions*											
Maintenance Items	**Months**	**6**	**12**	**18**	**24**	**30**	**36**	**42**	**48**	**54**	**60**
	Km × 1,000	**5**	**10**	**15**	**20**	**25**	**30**	**35**	**40**	**45**	**50**
Engine Oil and Oil Filter		R	R	R	R	R	R	R	R	R	R
Engine Oil Level		I	I	I	I	I	I	I	I	I	I
Transmission Fluid (740DHA/DHB)		Replace every 60,000 km.									
Transfer/Rear Final Drive		Maintenance-free (except for the cause of failure).									
Transmission Fluid Level		I	I	I	I	I	I	I	I	I	I
Fuel Filter		Maintenance-free (except for the cause of failure).									
Battery Voltage		I	I	I	I	I	I	I	I	I	I
Shock Absorber		I	I	I	I	I	I	I	I	I	I
Propeller Shaft and Boot		I	I	I	I	I	I	I	I	I	I
Torque of Chassis Bolt		I	I	I	I	I	I	I	I	I	I
Steering Gear		I	I	I	I	I	I	I	I	I	I
Steering Column		I	I	I	I	I	I	I	I	I	I
Steering Link, Ball and Boot		I	I	I	I	I	I	I	I	I	I
Tire Appearance		I	I	I	I	I	I	I	I	I	I
Tire Pattern		I	I	I	I	I	I	I	I	I	I
Tire Inflation Pressure		I	I	I	I	I	I	I	I	I	I
Spare Tire Inflation Pressure		I	I	I	I	I	I	I	I	I	I
Torque of Wheel Bolt		I	I	I	I	I	I	I	I	I	I
Tire Rotation		It is recommended to rotate your tires every 10,000 km (the optimal adjustment range is 5,000 - 7,000 km).									
Spark Plug		I	I	I	I	I	I	I	I	I	I
Brake Plate		I	I	I	I	I	I	I	I	I	I
Air Filter		I	I	I	I	I	I	I	I	I	I

For general driving conditions*											
Maintenance Items	Months	12	24	36	48	60	72	84	96	108	120
	Km × 1,000	10	20	30	40	50	60	70	80	90	100
For general driving conditions*											
Maintenance Items	Months	6	12	18	24	30	36	42	48	54	60
	Km × 1,000	5	10	15	20	25	30	35	40	45	50
Drive Belt		I	I	I	I	I	I	I	I	I	I
Engine Oil Pan and Drain Bolt		I	I	I	I	I	I	I	I	I	I
Transmission Housing Body		I	I	I	I	I	I	I	I	I	I
Related Fluid Line (- such as Steering, Brake, Fuel etc.) and Wire Harness		I	I	I	I	I	I	I	I	I	I
Charcoal Canister Filter (If Equipped)		Replace every 3 years or 60,000 km (whichever comes first).									
Timing Belt (If Equipped)		Replace every 3 years or 100,000 km (whichever comes first).									
Timing Chain		Maintenance-free (except for the cause of failure).									
Battery		Maintenance-free (except for the cause of failure).									
Throttle Valve		It is recommended to clean every 15,000 km.									
Four-wheel Alignment		Check four-wheel alignment every 20,000 km and adjust if necessary.									
Fuel Vapor Rubber Pipe		It is recommended to replace every 10 years or 500,000 km (whichever comes first).									
Refueling Hose of Fuel		It is recommended to replace every 5 years or 200,000 km for products made of ordinary rubber (- such as NBR+PVC/CSM, etc.) (whichever comes first); It is recommended to replace every 10 years or 500,000 km for products made of fluororubber (- whichever comes first). It is recommended to replace the above hoses timely which may cause performance defect such as crack.									
*: We recommend that you ask your EXEED authorized service station for the actual maintenance schedule applied to your vehicle.											

Hint:

- The frequency of scheduled inspection and maintenance services in the table is minimal. However, it may be necessary that they be performed more frequently depending on road conditions, weather, atmospheric conditions and vehicle usage. These conditions may differ from one country to another. Therefore, there may be special requirement in your country. We recommend that you ask your EXEED authorized service station for the actual maintenance schedule applied to your vehicle.
- Continue periodic maintenance beyond 100,000 km or 120 months by returning to the third column of the maintenance schedule and adding 100,000 km or 120 months to the column headings.
- For special area, there may be special maintenance specifications. We recommend that you ask your EXEED authorized service station for the actual maintenance specifications applied to your vehicle.

⚠ Caution

- **The engine oil and oil filter should be replaced more frequently if the vehicle is driven under severe conditions mentioned in the following examples*.**
- **It should be checked every 5,000 km or 6 months (whichever comes first) if the vehicle is driven under severe conditions mentioned in the following examples*.**
- **The lubricant should be replaced every 5,000 km or 6 months (whichever comes first) if the vehicle is driven in the following areas.**
  - **High humidity areas.**
  - **Mountainous areas.**
  - **Extremely cold and hot areas.**
  - **Drive on rough roads (bumpy roads, gravel roads, snow, etc.) for a long time.**
  - **Drive on mountain roads, uphill/downhill for a long time.**
  - **Drive the vehicle for a short distance frequently.**
  - **In many cases, drive in high temperature (higher than 32℃), heavy traffic urban road.**
  - **When used as a police car, taxi, commercial vehicle, trailer, etc.**
- **The air filter and air conditioning filter should be replaced more frequently if the vehicle is driven under severe conditions mentioned in the following examples*.**

***Examples of severe driving conditions:**

- **Drive in extremely cold and hot weather (only for engine oil, engine oil level, steering and suspension system).**
- **Drive the vehicle for a short distance frequently (only for engine oil, engine oil level, disc brake pads and discs /front and rear axle boots and axle shaft joint portions, brake lining and drums).**
- **Drive on dusty roads (only for air cleaner element, disc brake pads and discs/front and rear axle boots and axle shaft joint portions, brake lining and drums, air filter element for the climate control system).**
- **Drive on rough and/or muddy roads (only for disc brake pads and discs /front and rear axle boots and axle shaft joint portions, brake lining and drums, air filter element for the climate control system).**
- **Drive in areas where road salt or other corrosive materials are used (only for fuel system, lines and connections, disc brake pads and discs/front and rear axle boots and axle shaft joint portions, brake lining and drums,inspect brake lines and check operations of parking and service brake system, steering and suspension system).**
- **In the coastal areas (only for fuel system, lines and connections, disc brake pads and discs /front and rear axle boots and axle shaft joint portions, brake lining and drums, inspect brake lines and check operations of parking and service brake system, steering and suspension system).**

2 Inspection Items

2.1 Off-vehicle inspection

- Wiper and washer
  - (1) Check if wiper blade is deformed.
  - (2) Check if wiper nozzle sprays water.
- Tire pressure
  - (1) Check if tire pressure is normal.
- Tire bolt
  - (1) Check the tire bolt torque.
  - (2) Check tire bolt for looseness or missing.

2.2 On-vehicle inspection

- Horn

(1) Check if horn sounds normally.

- Light

(1) Check if headlight (low beam light / high beam light), turn signal light, daytime running light, position light, brake light and back-up light illuminate normally.

(2) Check if brightness of headlight (low beam light / high beam light), turn signal light, daytime running light, position light, brake light and back-up light is normal.

- Seat

(1) Check that the adjustment of front seat is smooth without obstruction.

- Seat belt

(1) Pull out the seat belt quickly and repeatedly when the seat belt is static. If the seat belt retractor cannot lock the seat belt at one time during inspection, replace the seat belt assembly.

(2) Engage the tab on the seat belt buckle, and pull the seat belt by hand repeatedly to check the engagement. If the buckle cannot lock the seat belt at one time, replace the seat belt assembly.

Hint:
When checking impacted vehicle, be sure to check seat belt.

(3) If seat belt is broken, torn or worn, replace seat belt assembly.

- Windshield

(1) Check windshield for scratches, dents, cracks and other abnormalities. If so, replace windshield.

- Brake pedal

(1) Check if brake pedal free travel is normal.

(2) Check that brake pedal can be depressed smoothly without obstruction and pedal return is normal.

- Electronic accelerator pedal

(1) Check that electronic accelerator pedal can be depressed smoothly without obstruction and pedal return is normal.

2.3 Engine compartment inspection

- Battery

(1) Check if battery appearance is normal.

(2) Check if battery voltage (vehicle is not started) is normal.

- Windshield washer fluid

(1) Check if windshield washer fluid level is normal.

- Coolant

(1) Check if coolant level is normal.

- Brake fluid

(1) Check if brake fluid level is normal.

- Engine oil

(1) Check if engine oil level is normal.

(2) Check if engine oil quality is normal (such as turbidity, whitening and other abnormalities). If it is abnormal, replace it.

- Transmission oil

(1) Check if transmission oil level is normal.

(2) Check if transmission oil quality is normal (such as turbidity, whitening and other abnormalities). If it is abnormal, replace it.

1.5 Health and Safety

1 Health and Safety

1.1 Brake fluid

Brake fluid is corrosive. Do not touch it directly by hand. If brake fluid splashes on hands or eyes, wash it with clean water immediately. If you experience discomfort, get medical attention immediately.

1.2 Coolant

When coolant (ethylene glycol) is heated, vapor may be generated, please avoid inhaling the vapor. Antifreeze absorbed through skin may reach toxic or harmful dose.

1.3 Lubricant and grease

Avoid long-term contact with lubricant and grease. Lubricant and grease are irritating to eyes and skin, which will cause loss of natural oil on skin, leading to dryness, inflammation and dermatitis.

■ **Health protection safety rule:**

(1) Wear protective clothing including impermeable gloves.

(2) Open wounds should be treated immediately.

(3) After operation, clean the skin with soap and water. After that, apply moisturizer containing lanolin to supplement the lost natural oil on skin.

(4) Do not use gasoline, kerosene, diesel, thinner or solvent to clean skin.

(5) If skin lesion occurs, get medical attention immediately.

(6) Remove grease from components before operation as much as possible.

(7) When there is a possibility of contact with eyes, protective glasses, such as goggles or face mask, should be worn, and eye flushing equipment should be equipped.

1.4 A/C refrigerant

A/C refrigerant is a high combustible material, so keep away from fire source during operation. If it contacts with skin, it may cause frostbite.

■ **Health protection safety rule:**

(1) Be sure to follow instructions provided by manufacturer and wear appropriate protective gloves and goggles.

(2) If skin or eyes come into contact with refrigerant, immediately flush the affected area with water. Flush the eyes with appropriate flushing solution without friction. Seek medical assistance as needed.

(3) Do not expose refrigerant bottle to sunlight or heat source.

(4) When filling, do not keep refrigerant bottles upright and keep the valves facing down.

(5) Do not expose refrigerant bottle to frost and snow.

(6) Do not drop the refrigerant bottle.

(7) Do not discharge refrigerant into atmosphere under any circumstances.

(8) Do not mix different refrigerants.

2 Environmental protection

2.1 Land pollution

Oil and coolant will pollute all the land in contact, so they cannot be poured on the soil for treatment. Be careful not to allow spilled substances to flow to ground. Waste stored on open land can also leak or pollute the land due to pollutants wash away. Be sure to store the materials in suitable and durable containers.

2.2 Waste management

Careful handling, storage and disposal of factory waste is a method to reduce pollution. This means that we should not only know what kind of waste it is, but also have necessary documents and understand applicable local regulations.

Waste disposal and storage should be stored properly to avoid loss to soil, water, or air. Waste should be separated according to types, such as oil, metal, battery and disused auto parts. This will prevent reactions between different materials and assist in disposal.

2.3 Waste disposal

Waste disposal must be given to holders who have a license to handle such special materials, and the relevant documents must be complete. They are responsible for transporting the waste to special treatment sites. Waste disposal should follow the following instructions:

(1) Refrigerant: Collect or reuse it with special equipment.
(2) Washer fluid: After dilution, it can be safely dumped in sewer.
(3) Paint and thinner: After separation, it should be handled by special contractor.
(4) Parts: Return to supplier for treatment, or disassemble and reuse remaining parts that still can be used. The remaining part is treated as general waste.
(5) Small parts: Reuse all appropriate parts and dispose of remaining parts.
(6) Metal: Separate it from general waste and then perform treatment.
(7) Tires: After separation, it should be handled by special contractor.
(8) Package: Compress the package as much as possible and dispose of it as general waste.
(9) Asbestos containing substances: After separation, it should be handled by special contractor.
(10) Oily waste and fuel waste (such as rags, spilled tools and materials after use): After separation, it should be handled by special contractor.
(11) Rubber/plastic: Dispose of it as general waste.
(12) Water pipe: Dispose of it as general waste.
(13) Battery: After separation, it should be handled by special contractor.
(14) Airbag: After separation, it should be handled by special contractor.
(15) Electronic components: Return to supplier for treatment, or disassemble and reuse remaining parts that still can be used; The remaining part is treated and disposed as general waste.
(16) Catalyst: Separate it from general waste and then perform treatment.
(17) Spilled absorbate after use: After separation, it should be handled by special contractor.

3 Repair Precautions

3.1 Repair precautions

(1) Cover all painted surfaces and seats with clean cloth or plastic cover to avoid dust and scratches.
(2) Pay attention to operation safety and focus on your work. When lifting front or rear wheels, the rest wheels should be blocked firmly. When operation needs to be completed by two or more persons, communicate with each other as often as possible. Only when workshop or work area is well ventilated, the vehicle can be operated.
(3) Before removing or disassembling parts, they must be carefully checked to find out why repairs are needed. Please observe all safety instructions and precautions and follow the corresponding steps.
(4) Mark all removed parts or place them in order in the parts rack so that they can be reassembled to their original positions.
(5) If special tools are required, they must be used.
(6) Parts must be assembled with appropriate torque according to established maintenance standards. When tightening a set of bolts or nuts, start from the center or large diameter bolts and tighten them in two or more steps with a cross pattern.
(7) When reassembling parts, new washers, gaskets, O-rings and cotter pins must be used.
(8) Use genuine parts and lubricants. When reusing parts, these parts must be carefully inspected to ensure that they are not damaged or degraded in quality and in good condition.
(9) Apply or fill specified grease on parts as specified. Clean all removed parts with solvent after disassembly.
(10) When filling system with brake fluid, pay special attention to prevent dust and dirt from entering system.
(11) During maintenance, foreign matters such as water are prohibited from entering engine compartment.
(12) Avoid dropping lubricant or grease on rubber parts and pipelines.

(13) After assembly, check if installation and operation of each part are correct.

1.6 Standard and Measurement

1 International System of Units List

1.1 International System of Units List

The units used in this manual meet International System of Units (SI) standard.

Name of Measurement	Unit Name	Unit Symbol
Length	Millimeter	mm
Mass	Kilogram (Kilo)	kg
Current	Ampere	A
Voltage	Volt	V
Resistance	Ω	Ω
Torque	Newton Meter	N·m
Pressure	Pascal	Pa
Celsius Temperature	Celsius	℃

2 Module Abbreviation

2.1 Module Abbreviation Chinese Meaning List

Module Name	Abbreviation
Adaptive Cruise Control	ACC
Airbag Module	ABM
Automatic Emergency Braking System	AEB
Full Automatic Parking Assist System	APA
Panoramic Control System	AVM
Body Domain Controller System	BDM
Blind Spot Detection System	BSD
Auto Air Conditioning System	CLM
Central Gateway	CGW
Auto Air Conditioning System	CLM
Wireless Charging Module	CWC
Door Control Module	DCM
Drive Recorder	DVR
Engine Control Module	ECU
Engine Control System	EMS
Electronic Parking Brake	EPB
Electronic Power Steering System	EPS

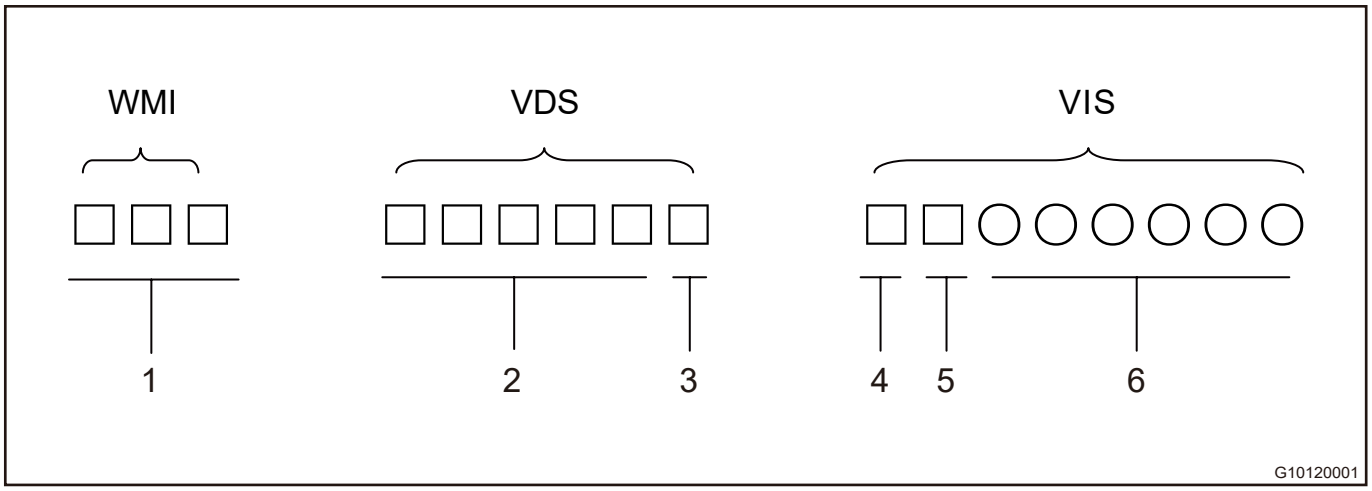
Module Name	Abbreviation
Electronic Driving Stability Control Module (Integrated Electronic Parking Brake)	ESP (iEPB)
Front Camera Module	FCM
Front Radar Module	FRM
Integrated Brake Control System	IPB
Instrument Cluster System	ICM
Engine Immobilizer System	IMMO
Ignition Power Supply	KL15
Constant Power Supply	KL30
Motor Control Unit	MCU
Passive Entry & Passive Start	PEPS
Power Back Door Module	PLG
Parking Radar Assist System	RADAR
Audio Entertainment System	RRM
Steering Angle System	SAM
Seat Control Module	SCU
Airbag System	SRS
Wireless Communication System	TBOX
Transmission Control Unit	TCU
Tire Pressure Monitoring System	TPMS

1.7 Vehicle Identification Number

1 Identification Number Position

1.1 VIN name plate

Vehicle Identification Number (VIN) consists of World Manufacturer Identifier (WMI), Vehicle Descriptor Section (VDS) and Vehicle Indicator Section (VIS), with a total of 17-digit characters.



□: represents a letter or a number (letters I, O and Q cannot be used); ○: represents a number.

No.	Definition
1	World Manufacturer Identifier
2	Vehicle Features
3	Accuracy Check Digit
4	Model Year
5	Production Plant
6	Sequential Number

- The first three digits of VIN represent World Manufacturer Identifier (WMI).

World Manufacturer Identifier (WMI)	Vehicle Category
LVV	Category M1 (for vehicle type number started with 7)

- Fourth digit of VIN represents vehicle type.
  Letter “D” means all vehicles in category M1.
- Fifth digit of VIN represents vehicle body type and drive type.
  Letter "B" means 5-door 2-box 4 × 2 type.
- Sixth digit of VIN represents transmission type.
  “1” means manual transmission.
  “2” means automatic transmission.
- Seventh digit of VIN represents dynamic characteristics.
  “1” means gasoline engine that is 1.5 - 2.0 L (2.0 L excluded).
- Eighth digit of VIN represents restraint system.
  “B” means seat belt and airbag.
- Ninth digit of VIN represents check digit.

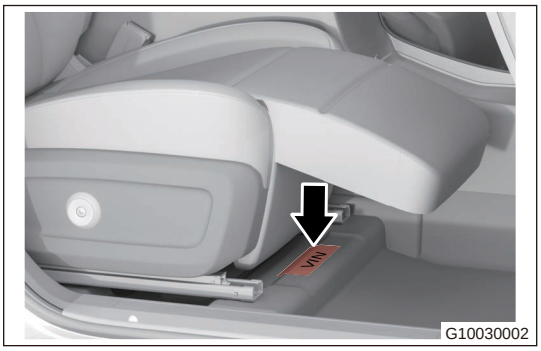
It is used to check the accuracy of VIN record, and made out through computation after confirming the other sixteen digits of VIN.

- Tenth digit of VIN represents model year.
  "K" represents 2019.
- Eleventh digit of VIN represents assembly plant code.
  "D" represents "Chery Automobile Co., Ltd".
- Last six digits of VIN represent production sequence number.
  This number means real production serial number of this model.

Vehicle Identification Number (VIN) label is located on the upper left of instrument panel on driver side (1), and can be seen from the outside through windshield.
Vehicle Identification Number (VIN) label is printed on the engine hood inner panel (2).

Vehicle Identification Number (VIN) label is located on back door as shown in illustration.

Vehicle Identification Number (VIN) label is located on the front right seat crossmember as shown in illustration. (Due to regional differences, VIN code location is subject to the actual vehicle).

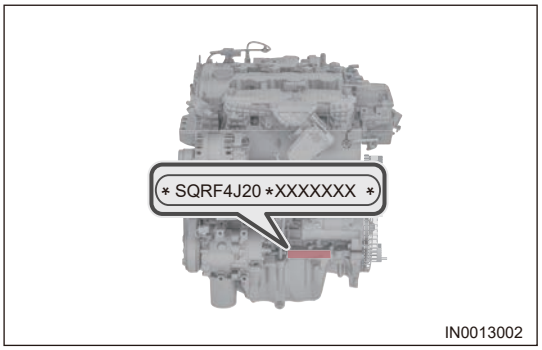


1.2 Vehicle parameter name plate

The vehicle name plate is fixed on right quarter outer panel.

1.3 Engine number

Engine number is located at cylinder block.



1.8 Noise, Vibration and Abnormal Noise

1 Vehicle Sound Source

1.1 Vehicle sound source

The relative motion between components during driving will form a sound source. Vehicle sound source is mainly composed of: The sound generated when engine and drive train mechanical components operate, the friction sound between tire and ground, the airflow sound generated when vehicle is moving or the sound introduced into vehicle from the external environment (such as the sound of truck passing by), and the internal sound generated by the vibration of components such as driver cabin and interior etc.

■ Engine

During the cold start of vehicle, due to the gap between components and a certain time needed for establishing good lubrication, a slight louder sound than warming up will be generated. Sound level is higher when engine speed and load are increased. The use of turbocharger also generates extra sound.

■ Transmission

The torque increases rapidly when engine is accelerating. The force is transmitted to transmission. There is slight knocking sound when removing the gear clearance.

■ Tire

The level of tire sound depends on the tire pattern, hardness, structure and road conditions. At the same time, the humidity of road will also affect the level of tire sound.

■ Airflow

High-speed air strikes the vehicle body surface and generates airflow in the convex part of vehicle body (-especially the rear view mirror, door handle, etc.). The wind noise becomes louder as the vehicle speed increases, and the wind resistance coefficient of vehicle also has some impact on the sound level.

Hint:
The vehicle body structure is like a box, and the sound has the nature of refraction and overlap. The product design generally uses sound insulating cotton and rubber pads and other materials to seal the vehicle and suppress vehicle sound production and transmission, as well as reduce the impact on occupants and environment. However, the current technology cannot completely eliminate the production and transmission of vehicle sound source.

1.9 Water Leakage

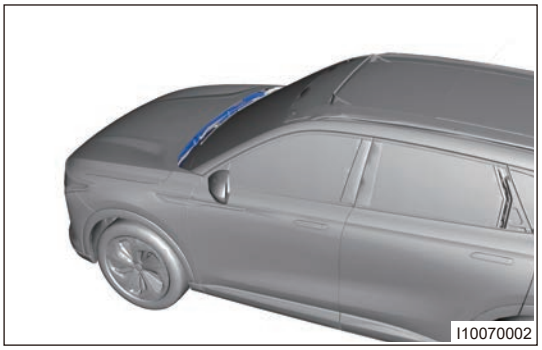
1 Common Water Leakage

1.1 Four common conditions for water leakage

(1) The door window weatherstrip is deteriorated;

(2) Drain pipe under the front windshield is blocked;

- The vehicle is not washed frequently and often parked under trees. Dust, leaves, mud etc. are easily washed into the drain pipe by rain. If it is not cleaned for a long time, the pipe will be blocked, resulting in poor drainage, rainwater flowing back into the vehicle and causing water leakage.



(3) Drain pipe is blocked and sliding roof water leakage occurs;

(4) Luggage compartment water leakage occurs.

2 Troubleshooting Method for Water Leakage

2.1 Diagnosis procedure

Hint:
Use following procedures to troubleshoot the water leakage.

1	**Vehicle brought to workshop**

Next

2	**Customer problem analysis**

The examination should cover: The service life period of vehicle, the usual parking position, weather conditions and the vehicle parking position when water leakage occurs, etc.

⚠ Caution

It should be avoided to misjudge the water leakage fault caused by the improper parking position. For example, when the vehicle across the curb and it is raining heavily, only one side of the left and right drain pipes can drain water due to vehicle inclination.

NG → **Focus on checking the water leakage caused by A/C line blockage**

OK

3	**Locate water leakage position**

Check the water leakage position.

NG → **Clean up the residual water and check again**

OK

4	Check if door window weatherstrip is deteriorated or damaged

NG → Analysis, confirm, and replace the weatherstrip

OK

5	Check if pipeline is blocked or damaged

NG → Clean or replace pipeline

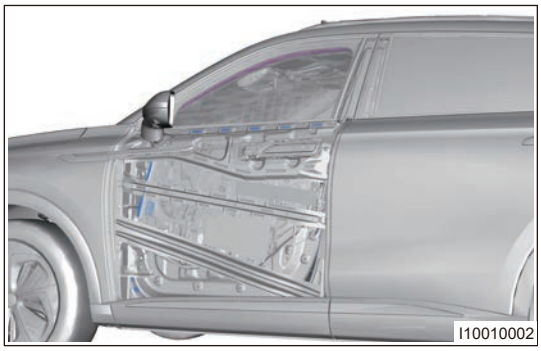
OK

6	Perform water pouring test and confirm whether the problem is solved

2.2 On-vehicle Inspection

(1) Check if door side seal is deteriorated, damaged, distorted or deformed, etc. Check if bonding area is loose and if sealing performance can ensure waterproof.

- Door frame weatherstrip.
- Door opening weatherstrip.
- Door inner weather bar.
- Door outer weather bar.
- Door glass run.

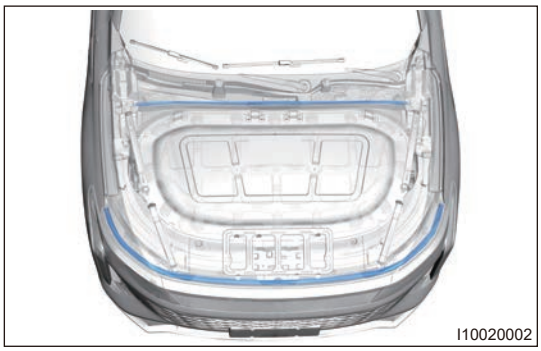


⚠ Caution

- **If water leakage is caused by deteriorated components, it is recommended to replace the whole set of seals.**

(2) Check if engine hood seal is deteriorated, damaged, distorted or deformed, etc.

- Engine hood rear weatherstrip.
- Engine hood front weatherstrip.



⚠ Caution

- **If water leakage is caused by deteriorated components, it is recommended to replace the whole set of seals.**

(3) Check if back door seal is deteriorated, damaged, distorted or deformed, etc.

- Back door weatherstrip.

⚠ Caution

- **If water leakage is caused by deteriorated components, it is recommended to replace the whole set of seals.**

(4) Check if front sliding roof drain hose assembly is leaked or blocked.
Two drain hoses are installed to the front top of sliding roof, and the water is drained through the drain channel that is connected to the left and right A-pillar protector drain hoses. Those two drain hoses are easily blocked by foreign matters such as mud or small leaves, etc., which needs to be checked and dredged usually.

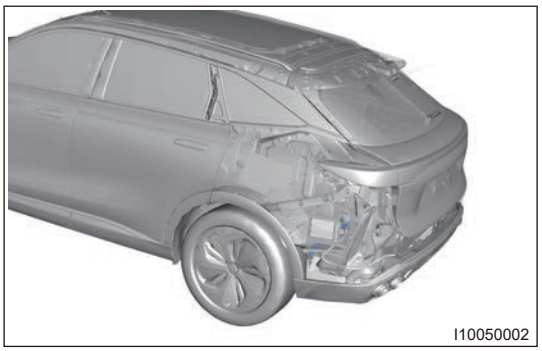
- Check if the drain hose is cracked/blocked.
- Check if the drain hose interface is disconnected.
- Check if the outlet of drain hose is blocked.

⚠ Caution

- **If water leakage is caused by deteriorated components, it is recommended to replace the whole set of seals.**

(5) Check if rear sliding roof drain hose assembly is leaked or blocked.
Two drain hoses are installed to the rear top of sliding roof, and the water is drained through the drain channel that is connected to the left and right C-pillar protector drain hoses.

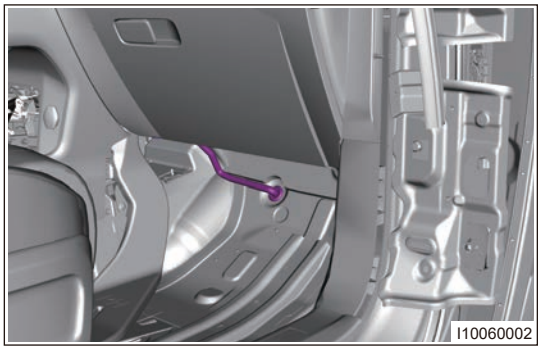
- Check if the drain hose is cracked/blocked.
- Check if the drain hose interface is disconnected.
- Check if the outlet of drain hose is blocked.



⚠ Caution

- **If water leakage is caused by deteriorated components, it is recommended to replace the whole set of seals.**

(6) Check if air conditioning drain hose assembly is leaked or blocked.



- Deteriorated and loose drain pipe causes pipe bending, resulting in poor drainage.
- When air conditioning is not secured during installation and displacement occurs after a long-term usage, that will cause the drain pipe position to change, resulting in difficult drainage.
- A/C element is extremely dirty and do not clean it in time or the strainer is damaged, that causes the deformation of evaporator, so the condensation can not drop into the channel in time; The evaporator is frozen and water droplet cannot drop into the water catcher.
- Check if the drain hose is cracked/blocked.
- Check if the drain hose interface is disconnected.
- Check if the outlet of drain hose is blocked.

⚠ Caution

- **If water leakage is caused by deteriorated components, it is recommended to replace the whole set of seals.**

2.1 ENGINE ELECTRONIC CONTROL SYSTEM

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Digital multimeter can only be used to perform inspection for electronic injection system.

(2) Use genuine components to perform service work, otherwise appropriate electronic injection system operation cannot be guaranteed.

(3) Only use unleaded gasoline during service.

(4) Please observe normative service and diagnostic flowchart to perform service work.

(5) Never disassemble or remove components of electronic injection system during service.

(6) When holding electronic elements (electronic control unit, sensor etc.), take extra care not to drop them on the ground.

(7) Set up a consciousness of environmental protection and dispose of waste effectively that is produced during service.

(8) Never use an needle multimeter to check electronic fuel injection system circuit.

(9) Never use high power test light to measure when testing each pin voltage signal of sensor.

(10) It is recommended that the measurement status when testing each pin voltage signal of sensor is on-line measurement.

(11) It is recommended to use voltage drop method when measuring sensor, actuator connecting wire harness.

(12) Do not causally remove any electronic injection system component or its connector from its installation position to prevent damaging accidentally, or foreign matter, such as moisture, oil from entering connectors, which will affect the normal operation of electronic injection system.

(13) Be sure to turn ENGINE START STOP switch off when disconnecting and connecting connectors. Otherwise electronic elements may be damaged.

(14) When simulating hot operating condition of malfunction and performing other service work that may cause temperature to rise, never allow temperature of electronic control unit to exceed 80°C.

(15) As the supplying pressure of electronic injection system is high, high pressure resistant fuel pipes are adopted for all fuel lines. Fuel pressure in fuel lines is still high even when the engine is not running. Therefore, be careful not to casually remove fuel pipes during service; When it is necessary to service fuel system, discharge pressure in the fuel system before removing fuel pipes. The way to discharge pressure is as follows: After removing fuel pump controller power supply fuse, start engine and idle it until the engine stops running by itself. Removal of fuel pipes should be performed in a well-ventilated area by professional service men.

(16) Do not energize electric fuel pump when removing it from fuel tank to prevent electric sparks, which will cause a fire.

(17) It is not allowed to perform running test for fuel pump under dry state or in water. Otherwise service life will be reduced. In addition, do not inversely connect fuel pump positive and negative poles.

(18) When performing inspection to ignition system, perform spark jump test only when necessary and make sure that the test time is as short as possible. Do not open the throttle during detection, otherwise a large amount of unburned gasoline will enter the exhaust pipe, thus damaging the three-way catalytic converter.

(19) Since the adjustment of idle speed is completely completed by electronic injection system, manual adjustment is not required. Throttle limit screw of throttle body has been adjusted properly at the factory, and users are not allowed to change its original position at will.

(20) Do not connect battery with its polarity reversed to prevent damage to electronic elements. This system adopts negative ground.

(21) Never remove battery cable when engine is running.

(22) The positive, negative battery cable wires and electronic control unit must be removed before performing welding on vehicle.

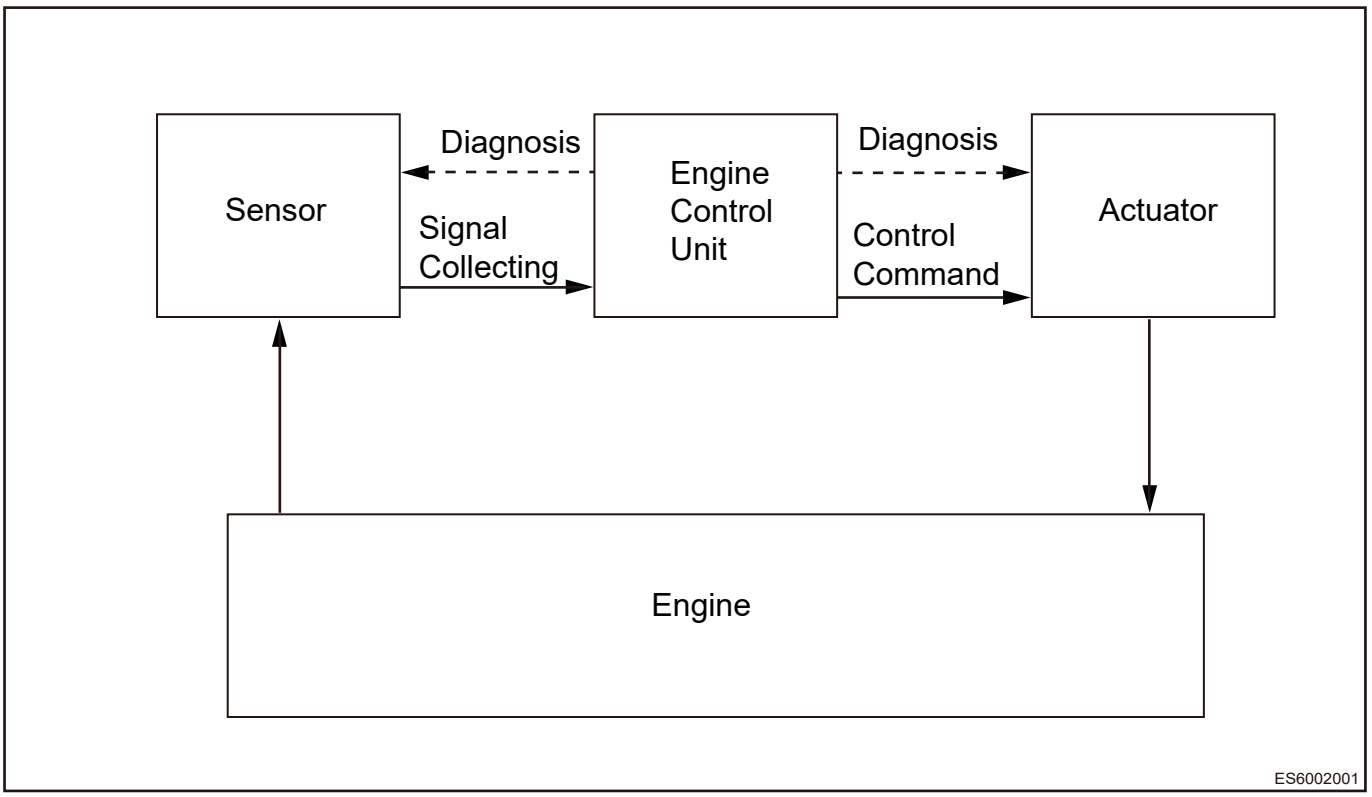
(23) Do not puncture wire outer coat to detect electric signals input and output by components.

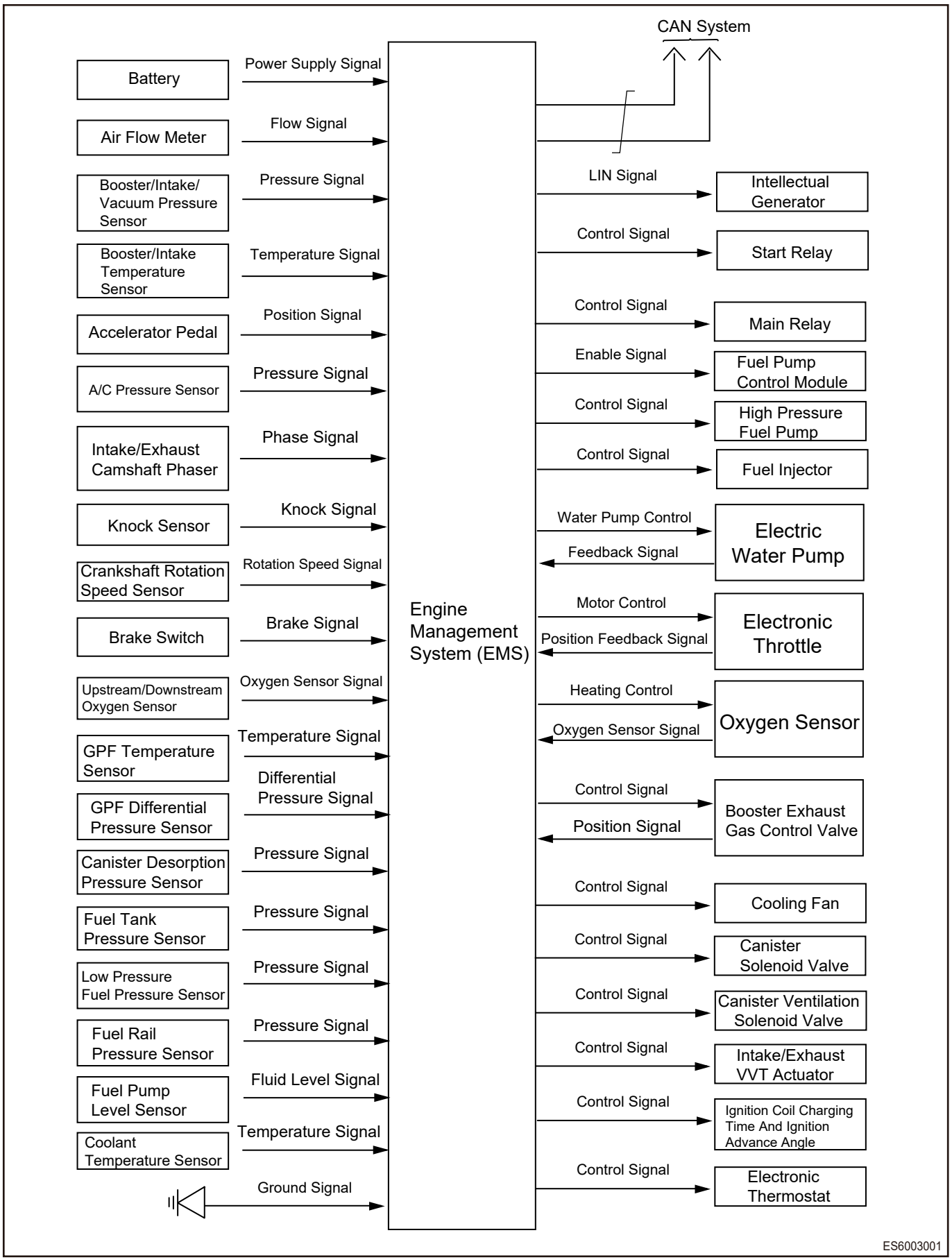
2 System Overview

2.1 System Description

Engine Management System mainly consists of Engine Control Module (ECU), sensors and actuators, which controls intake air amount, injection volume and ignition timing, etc. when engine is operating.
In the engine management system, sensors are used as the input part to measure various physical signals (-temperature and pressure, etc.), and converts them into corresponding electrical signals; the function of ECU is to receive the input signals from sensors and perform calculation according to set procedure, producing corresponding control signals and outputting them to power drive circuit. The power drive circuit drives each actuator to perform various actions, thus making the engine run according to the preset program. Also, the trouble diagnosis system of ECU monitors each component and control function in this system. Once detecting and confirming a fault, it will store the trouble code. When detecting that fault has been eliminated, it will return to use normal value.
UAES GDI (Gasoline Direct Injection) system is a torque control-based system developed on the MG1US008 ECU platform. Its main purpose is to link a large number of different control objectives together and convert various engine requirements into torque or efficiency control variables.
MG1US008 system can prioritize these requirements and execute the highest priority requirement. Obtain engine control variables such as intake air volume, injection volume, ignition timing. The execution of each control variable has no effect on other variables. This is the advantage of the torque-based control system.

2.2 System Schematic Diagram




CAN System
Battery
Power Supply Signal
Air Flow Meter
Flow Signal
Booster/Intake/ Vacuum Pressure Sensor
Pressure Signal
Booster/Intake Temperature Sensor
Temperature Signal
Accelerator Pedal
Position Signal
A/C Pressure Sensor
Pressure Signal
Intake/Exhaust Camshaft Phaser
Phase Signal
Knock Sensor
Knock Signal
Crankshaft Rotation Speed Sensor
Rotation Speed Signal
Brake Switch
Brake Signal
Upstream/Downstream Oxygen Sensor
Oxygen Sensor Signal
GPF Temperature Sensor
Temperature Signal
GPF Differential Pressure Sensor
Differential Pressure Signal
Canister Desorption Pressure Sensor
Pressure Signal
Fuel Tank Pressure Sensor
Pressure Signal
Low Pressure Fuel Pressure Sensor
Pressure Signal
Fuel Rail Pressure Sensor
Pressure Signal
Fuel Pump Level Sensor
Fluid Level Signal
Coolant Temperature Sensor
Temperature Signal
Ground Signal
Engine Management System (EMS)
LIN Signal
Intellectual Generator
Control Signal
Start Relay
Control Signal
Main Relay
Enable Signal
Fuel Pump Control Module
Control Signal
High Pressure Fuel Pump
Control Signal
Fuel Injector
Water Pump Control
Feedback Signal
Electric Water Pump
Motor Control
Position Feedback Signal
Electronic Throttle
Heating Control
Oxygen Sensor Signal
Oxygen Sensor
Control Signal
Position Signal
Booster Exhaust Gas Control Valve
Control Signal
Cooling Fan
Control Signal
Canister Solenoid Valve
Control Signal
Canister Ventilation Solenoid Valve
Control Signal
Intake/Exhaust VVT Actuator
Control Signal
Ignition Coil Charging Time And Ignition Advance Angle
Control Signal
Electronic Thermostat
ES6003001

2.3 System Function Description

MG1US008-Motronic engine management system is an electronically controlled gasoline engine control system, which provides many control features related to the operator and vehicle or equipment. The system adopts a combination of open loop and closed loop (feedback) control to provide various control signals for engine operation. The basic functions of the system include: start control, warm-up and three-way catalytic converter heating control, acceleration/deceleration and motored fuel cut-off control, idle control, λ closed loop control, air-fuel mixture control function, evaporative emission control, knock control, OBD diagnostic control, etc. In addition, additional functions include engine control anti-theft function, start and stop control, fan control, A/C control, VVT control, turbocharger control and so on.

■ Start control

(1) Start control: During starting, special calculation methods are used to control the filling, fuel injection and ignition timing. At the beginning of the process, the air in intake manifold is still, and the internal pressure of intake manifold is shown to be ambient pressure. The electronic throttle specifies a fixed opening parameter based on the current starting temperature. The fuel injection mode and injection changed according to engine temperature to promote better mixing of oil and gas in the cylinder. In order to form a reliable combustible mixture near the spark plug, the mixture should be enriched when the engine reaches a certain speed. Once the engine starts to run, the system starts to gradually reduce the fuel injection volume immediately, until the start condition ends to completely cancel the start and thicken. Ignition angle is constantly adjusted with starting conditions. It varies with engine temperature, intake air temperature and engine speed. High-pressure start is usually used. In failure mode or extremely low temperature, low-voltage start is used.

■ Heating control of engine warm-up and three-way catalytic converter

(1) For a period of time after the engine has been started at low temperature, additional injections are still required to be supplied, there may be several times depending on the operating conditions, and cylinder filling amount and ignition angle are adjusted to compensate for the higher torque requirements of engine; And this process continues until temperature rises to a proper threshold. In this stage, rapid heating of three-way catalytic converter is the most important, since rapid transition to operation of three-way catalytic converter can greatly reduce exhaust emissions. Under this operating condition, use exhaust gas to perform “three-way catalytic converter heating” by adopting methods of appropriate fuel injection mode (multiple injections) and a moderate delay in the ignition advance angle.

■ Acceleration/deceleration and motored fuel cut-off control

(1) In fact, a small part of the fuel injected into the cylinder will not be combusted in time. Conversely, it forms a layer of oil film on the cylinder wall or piston. When the throttle opening increases, a small part of the injected fuel is absorbed by the oil film. Therefore, it is necessary to inject the corresponding fuel amount to compensate and prevent the mixture from becoming lean during acceleration. Once the load factor is reduced, the additional fuel contained in the oil film will be released again, so the corresponding injection duration must be reduced during deceleration.

(2) Wheel drag or traction condition indicates that the power provided by engine at the flywheel is negative. In this case, engine friction and pump air loss can be used to slow down the vehicle. When the engine is in wheel drag or traction condition, the fuel is cut off to reduce fuel consumption and exhaust emissions, and more importantly to protect the three-way catalyst. Once the speed has been reduced to a set recovery of the fuel supply speed above idle speed, the fuel injection system is resupplied. In fact, the ECU program has a range of recovery speed. They vary according to dynamic changes of parameters such as engine temperature, gear position and engine speed, and prevent the speed from falling to the specified minimum threshold by calculation. Once the injection system is resupplied, the system begins to use the initial injection pulse to supply the fuel. After recovery of fuel injection, the torque-based control system increases the engine torque slowly and smoothly (smooth transition).

■ Idle control

(1) Engine does not provide torque to the flywheel at idle. To ensure stable operation of the engine at as low an idle speed as possible, the closed-loop idle speed control system must maintain the balance between the generated torque and the engine power consumption. The idle speed requires a certain amount of power to meet the load requirements of all aspects. They include internal friction from the engine crankshaft and valve gear and auxiliary components such as the water pump. MG1US008 system uses torque based control strategy to determine engine output torque requested by maintaining required idling speed in all working conditions according to closed loop idle control. This output torque increases as engine speed reduces, and reduces as engine speed increases. System responses to the new "-interference factor" through requesting higher torque, such as turning on/off air conditioning compressor or shifting of automatic transmission. When engine temperature is low, torque is also needed to be increased to compensate higher internal friction and/or maintain higher idling speed. The sum of these

required output torque will be transmitted to torque coordinator which will process, calculate and obtain corresponding volumetric density, mixture contents and ignition timing.

■ **Closed-loop control**

(1) Exhaust aftertreatment in three-way catalytic converter between an effective method for reducing concentration of harmful substance in exhaust gas. Three-way catalytic converter can reduce hydrocarbon (HC), carbon monoxide (CO) and nitric oxide (NO_x) up to 98% or more, and convert them into water (H_2O), carbon dioxide (CO_2) and nitrogen (N_2). However, such high efficiency can be achieved only within small range of engine excess air coefficient λ=1, λ closed loop control is aimed to ensure mixture concentration within this range. λ closed loop control system functions only when oxygen sensor is equipped. Oxygen sensor on side of three-way catalytic converter monitors oxygen content in exhaust gas, lean mixture (λ > 1) will generate about 100 mV sensor voltage, and rich mixture (λ < 1) will generate about 800 mV sensor voltage. When λ = 1, sensor voltage will jump. l closed loop control responses to input signal (λ > 1 = lean mixture, l < 1 = rich mixture) to correct control variable, a correction factor is generated as a multiplier to correct the fuel injection duration.

■ **Evaporative emission control**

(1) Due to external transfer of radiant heat and returned fuel heat, the fuel in fuel tank is heated and forms fuel vapor. Due to limits of evaporative emission regulations, these vapors containing a large amount of HC components are not allowed to be discharged directly into the atmosphere. In system, fuel vapor will be collected in activated carbon canister through guide pipe and enters into engine and participates in the combustion process through scour at the right moment. Flow rate of scour airflow is realized by ECU controlling canister control valve. This control operates only under closed loop working condition of l closed loop control system.

■ **Knock control**

(1) System detects characteristic vibration at moment knock occurs through knock sensor installed in proper position of engine, and converts it into electrical signal to transmit it to ECU for processing. ECU uses special processing method to detect if knock occurs in each combustion cycle in each cylinder. Once knock is detected, knock closed loop control is triggered. After knock danger is eliminated, ignition of affected cylinder will be gradually advanced to predetermined ignition advance angle.

■ **OBD trouble diagnosis**

(1) Electronic control unit constantly monitors sensors, actuators, related circuits, malfunction indicator light, battery voltage and so on, and even electronic control unit itself. And it performs rationality detection for sensor output signal, actuator drive signal and internal signals (such as l closed loop control, coolant temperature, knock control, idle speed control and battery voltage control, etc.). Once a certain step failure or unreasonable signal value is found, electronic control unit will immediately set malfunction information record in RAM malfunction memory. Malfunction information record is stored in the form of trouble code and displays in the order in which malfunctions occurred.

■ **Idle start and stop**

(1) Idle automatic start and stop function can realize the automatic start-stop function when the vehicle stops briefly (such as red traffic light) during driving. The system can judge whether the driver has parking or driving intention according to the information of vehicle speed, engine speed, transmission chain state and vehicle body state, and automatically controls the starting and stopping of engine. So as to achieve the purposes of fuel saving and emission reduction, and fuel consumption reduction of end users.

2.4 Introduction to National VI OBD Diagnostic Control

■ **Catalytic converter monitor**

(1) The catalytic converter is equipped with two main components of cerium oxide and precious metals (-platinum, rhodium, palladium). The former is a container for storing and releasing oxygen and is used to oxidize CO and HC in the concentrated gas mixture, while the latter is a catalyst to promote oxidation and reduction reactions. Under the premise that the aging speed of the two is basically the same, because the damage degree of precious metals cannot be accurately assessed, and the aging degree of cerium oxide can be expressed by the amount of oxygen storage, research shows that there is a nonlinear relationship between the conversion efficiency and oxygen storage capacity of catalytic converter. The oxygen storage capacity of the catalytic converter, that is, the oxidation capacity of the catalytic converter, decreases over time. Therefore, the current catalytic converter diagnosis strategy is realized by evaluating the oxygen storage capacity of catalytic converter.

(2) During the measurement of oxygen storage, first use the concentrated gas mixture to completely empty the residual oxygen in catalytic converter, and the oxygen in the catalytic converter is considered to be completely empty when the downstream oxygen indicates rich, and then use the lean mixture to oxygenate the catalytic converter, and the oxygen in catalytic converter is considered to be full when the

downstream oxygen iindicates lean. Through this process, the oxygen storage capacity of the catalytic converter can be calculated to evaluate the conversion capacity of the catalytic converter. Before the decrease of catalytic converter conversion capacity causes the emission of non-methane hydrocarbons + nitrogen oxides (NMHC + NOx) in the exhaust pollutants of the vehicle to exceed the OBD threshold, The OBD system alarms and illuminates MIL light.

(3) The catalytic converter is monitored by directly measuring the oxygen storage capacity during the transition process of the gas mixture from rich to lean. In this process, the upstream oxygen sensor accurately controls the air-fuel ratio, and the downstream oxygen sensor is used to measure the oxygen storage capacity of the catalytic converter.

■ **Overview of misfire monitoring**

(1) The basic principle of engine misfire monitoring is based on calculating the crankshaft acceleration during each individual combustion process.

(2) In order to calculate the crankshaft acceleration, a toothed sensor signal wheel with a reference mark is installed on the crankshaft. The sensor signal wheel is divided into several segments, the segment number is equal to half of cylinder number in an engine with even number of cylinder, and the cylinder number is the number of cylinders in an engine with odd-number of cylinder. Each time the combustion pushes the crankshaft to accelerate rotation and generate a certain crankshaft acceleration. The engine speed sensor is used to calculate the time for crankshaft to rotate around each segment window, and the crankshaft acceleration corresponding to each cylinder can be calculated from the relative segment time.

(3) When a cylinder is unburned or not fully burned, it will take longer for the corresponding segment window to pass the crankshaft position sensor, the corresponding segment window acceleration will exceed the matching threshold, and the system will diagnose a misfire.

■ **Evaporation system monitoring (dual lines, DTEV + DTESK)**

Evaporation system monitor includes two parts:

(1) Monitor the desorption flow of evaporation system. When the desorption flow from the fuel evaporation system to the engine cannot be monitored, the OBD system should detect a fault, **that is, the desorption flow monitor.** Related faults: P0497 (EVAP System Low Purge Flow) P04F0 (EVAP System High Pressure Purge).

(2) Monitor the integrity of the entire evaporation system except for the lines and connectors between canister valve and the intake manifold to prevent fuel vapor from leaking into the atmosphere, that is, **leakage monitor**. Related faults: P2422 (EVAP System Vent Valve Stuck Closed), P0455 (EVAP System Leak Detected (Large Leak)), P0442 (EVAP System Leak Detected (Small Leak)).

(3) Pressure sensor-based desorption flow monitoring (DTEV) and fuel tank pressure sensor-based leakage monitoring (DTESK).

- DTEV actively controls the opening and closing of the canister valve, and detects the desorption flow of the evaporation system according to the pressure fluctuations in desorption line during the canister valve opening; DTESK controls the canister valve and canister vent valve to create the vacuum degree, and detects the leakage of evaporation system based on the vacuum attenuation gradient. The system can also monitor the canister valve and canister vent valve. The canister vent valve is used to control the communication between evaporation system and atmosphere, and the canister valve is used to control the communication between evaporation system and engine intake line. If the system leaks, it is recommended to use a smoke-type leak detector for troubleshooting.

■ **Fuel system monitoring**

(1) Adaptive feedback monitoring based on upstream oxygen:

- P2177 (System Too Lean Off Idle Bank 1).
- P2178 (System Too Rich Off Idle Bank 1).
- P2187 (System Too Lean at Idle Bank 1).
- P2188 (System Too Rich at Idle Bank 1).
- The fuel injection time of the injector is mainly calculated according to the engine load signal, additive correction factor of mixture adaptive feedback, the multiplicative correction factor of mixture adaptive feedback and the mixture closed-loop adjustment factor.
- Considering that different fault sources have different effects on engine operating conditions and have different meanings for mixture correction, the system divides the self-learning region of mixture according to engine speed and load and carries out corresponding correction. Therefore, adaptive feedback learning is divided into two types: (1) Additive self-learning (such as air leakage in intake manifold); (2) Multiplicative self-learning (such as fuel pressure signal error). The corresponding fault

types are also divided into: additive self-learning over-limit fault (P2187/P2188) and multiplicative self-learning over-limit fault (P2177/P2178).

- Under idling conditions, the additive self-learning plays the main role of fuel correction, while under relatively high speed and load conditions, the multiplicative self-learning plays the main role of fuel correction.
- Additive self-learning is carried out under idling conditions, and multiplicative self-learning is carried out under relatively high speed and load conditions. Only when the engine is running to corresponding self-learning operating area, the corresponding self-learning of mixture will be activated.

(2) Fuel correction monitoring based on downstream oxygen:

- P2097 (Post Catalyst Fuel Trim System Too Rich Bank 1).
- P2096 (Post Catalyst Fuel Trim System Too Lean Bank 1).
- Downstream oxygen closed loop correction principle.
- There are two main functions and meanings of installing the downstream oxygen sensor behind the catalytic converter: One is to monitor the failure of catalytic converter according to the signal of downstream oxygen sensor; the other is to further correct the closed-loop adjustment deviation of upstream oxygen according to the signal feedback of downstream oxygen sensor to ensure that the mixture lambda is always within the catalytic converter optimal conversion window.
- For closed-loop adjustment based on downstream oxygen, the principle is to compare the downstream oxygen voltage signal with the target voltage under steady condition. If the downstream oxygen voltage deviates from the target voltage, the system will perform self-learning correction according to the degree of deviation and determine fault based on the self-learning value.

■ Exhaust sensor monitoring

The exhaust sensor system monitors the working status of upstream oxygen sensor and upstream oxygen sensor, including oxygen sensor circuit monitoring, heating performance monitoring, responsive monitoring, and upstream oxygen sensor characteristic deviation monitoring.Oxygen sensor circuit monitoring (upstream and downstream oxygen sensors).Oxygen sensor heating monitoring (upstream and downstream oxygen sensors).Upstream oxygen sensor responsive monitoring.Upstream oxygen sensor characteristic deviation monitoring.Downstream oxygen sensor aging monitoring.

(1) Upstream oxygen sensor responsive monitoring:

- P0133 (O2 Sensor Circuit Slow Response Bank 1 Sensor 1).
- Aging and pollution will cause the responsiveness of the oxygen sensor to become sluggish, and an upstream oxygen sensor signal with a slower dynamic response will cause emissions to deteriorate. The system response monitoring function can monitor the symmetry response failure of upstream oxygen sensor when the monitoring conditions are met.
- The system monitors the responsiveness of upstream oxygen sensor by adjusting the required air-fuel ratio. When the air-fuel ratio changes, it performs fault monitoring by comparing the reversed actual oxygen sensor signal and the target oxygen sensor signal.

(2) Upstream oxygen sensor characteristic deviation monitoring:

- The measured air-fuel ratio signal deviates from the actual value when the characteristics of upstream oxygen sensor deviate. The deviation of the positive or lean side can cause the measured value of the excess air coefficient to be too large (lean). The deviation of the negative or rich side can cause the measured value of the excess air coefficient to be too small (rich). The system monitors the characteristic deviation of upstream oxygen sensor through the fuel self-learning integral value in closed-loop control of downstream oxygen. When the characteristic of upstream oxygen sensor is deviation, the air-fuel ratio indication will be lean or rich, which will cause the downstream oxygen self-learning integral value is too large or too small.
- Malfunction detection standard.
- P2195 O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1.
- P2196 O2 Sensor Signal Biased/Stuck Rich Bank 1 Sensor 1.
- When the characteristics of upstream oxygen sensor deviate to the lean side, the upstream oxygen signal will always be lean compared to the actual air-fuel ratio, which leads to the enrichment of upstream oxygen closed-loop control, the mixture will be rich, and downstream oxygen signal will continue to be high and deviate from the target voltage level. At this time, the closed-loop correction factor of downstream oxygen closed-loop control based on the downstream oxygen signal will be

corrected by feedback. When the self-learning integral value of correction factor exceeds the upper fault threshold, the system will report P2195 Lean Side Fault (Lean Side Deviation Fault).

(3) Upstream oxygen sensor voltage range monitoring:

- If the upstream oxygen sensor is installed incorrectly, the sensor is likely to be in communication with atmosphere and cannot accurately reflect the oxygen concentration in exhaust gas. Generally, when the oxygen sensor is placed in a mixture with an air-fuel ratio around 1.0, its output voltage is much lower than the output voltage when upstream oxygen sensor is in the air. When upstream oxygen sensor is not correctly installed in the exhaust system, it will be report the fault.
- P2414 O2 Sensor Exhaust Sample Error Bank 1 Sensor 1
- Generally, when the oxygen sensor is placed in a mixture with an air-fuel ratio around 1.0, its output voltage is much lower than the output voltage when upstream oxygen sensor is in the air. When upstream oxygen sensor is not correctly installed in the exhaust system, it will report P2414. Since an empty fuel tank may lead to misdiagnosis, it is necessary to add an empty fuel tank verification before fault confirmation.

(4) Downstream oxygen sensor aging monitoring:

- Downstream oxygen sensor signal continues to be rich.
- P2271 O2 Sensor Signal Biased&Stuck Rich Bank 1 Sensor 2.
- When downstream oxygen sensor signal is always rich, under the action of fuel cut-off condition or the active adjustment of the air-fuel ratio, when the downstream oxygen voltage still cannot drop to the setting threshold after a certain period of time (considering the oxygen storage factor of catalytic converter), it will report P2271.
- Downstream oxygen sensor signal continues to be lean.
- P2270 O2 Sensor Signal Biased&Stuck Lean Bank 1 Sensor 2.
- When downstream oxygen sensor signal is always lean, under the action of purging oxygen condition or the active adjustment of the air-fuel ratio, when the downstream oxygen voltage still cannot rise to the setting threshold after a certain period of time (considering the oxygen storage factor of catalytic converter), it will report P2270.
- Responsive monitoring of downstream oxygen sensor under fuel cut-off conditions.
- P013A O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2.
- In the fuel cut-off condition that meets the diagnostic conditions, when the output voltage time constant of downstream oxygen sensor exceeds the setting threshold, it will report P013A.

(5) Downstream oxygen sensor circuit monitoring:

- Downstream Oxygen Sensor Signal Circuit Is Short to Power Supply.
- P0138 O2 Sensor Circuit High Voltage Bank 1 Sensor 2.
- When all monitoring conditions are met, if the output voltage of oxygen sensor is greater than threshold, it will report P0138.
- Downstream oxygen sensor signal circuit is short to ground.
- P0137 O2 Sensor Circuit Low Voltage Bank 1 Sensor 2.
- When all monitoring conditions are met, if the output voltage of oxygen sensor is less than threshold, it will report P0137.
- Downstream oxygen sensor signal circuit open.
- P0136 O2 Sensor Circuit Bank 1 Sensor 2.
- When all monitoring conditions are met, if the output voltage of downstream oxygen sensor stays within the set threshold interval, it will report P0136.
- Unreasonable monitoring of downstream oxygen sensor signal.
- P2232 O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2.
- When all monitoring conditions are met, if downstream oxygen sensor signal circuit is coupled with heating line, it will report P2232.

(6) Upstream oxygen sensor heating monitoring:

- When the exhaust temperature is not enough to heat the oxygen sensor to a suitable working temperature, the internal heating circuit of oxygen sensor can auxiliary heating. When the heating circuit of oxygen sensor fails, the oxygen sensor will not work reliably and needs to be monitored for failure.
- P0053 HO2S Heater Resistance Bank 1 Sensor 2.

- After engine is started, if the temperature of upstream oxygen ceramic body cannot exceed the setting threshold within a certain period of time, it will report P0053.
- When the heating control circuit is heated at full-power and temperature of upstream oxygen ceramic body cannot exceed the setting threshold, it will report P0053.

(7) Downstream oxygen sensor heating monitoring:

- P0054 HO2S Heater Resistance Bank 1 Sensor 2.
- Under high temperature exhaust and circuit heating, the internal resistance of two-point oxygen sensor decreases and the temperature increases. If the circuit heating of oxygen sensor fails, the internal resistance of oxygen sensor is higher than the normal value. Nernst internal resistance monitoring of oxygen sensor.
- When the Nernst internal resistance of oxygen sensor is higher than the normal value, it will report P0054.

■ Engine cooling monitoring

(1) Engine coolant temperature sensor monitoring:

- The engine coolant temperature sensor measures the engine coolant temperature, and its monitoring includes circuit monitoring, various signal rationality monitoring, and cold start rationality monitoring.

(2) Thermostat monitoring:

- The system uses a thermal management module to control the temperature of engine coolant, so the thermal management module is required to monitor in accordance with the thermostat monitoring specification. The cooling system is equipped with an engine coolant temperature sensor (ECT sensor) in the small circulation water circuit, which is used to measure the water temperature of small circulation water circuit, and a coolant temperature sensor (ECT sensor 2) is installed in the large circulation water circuit, which is used to measure the water temperature of large circulation water circuit. In the normal state of thermal management module, when the coolant does not reach the regulating temperature, the large circulation water circuit of cooling system is in the closed state, the coolant flows in the small circulation, and the ECT sensor 2 is cold coolant. When the coolant reaches the regulating temperature, the large circulation water circuit of cooling system is in an open state, and the hot coolant flows to the radiator to dissipate heat, and the ECT sensor 2 is the hot coolant that passes through the radiator to dissipate heat. When the thermal management module is stuck in the fully open position, the coolant flows to the radiator to dissipate heat, and the ECT sensor 2 always senses the hot coolant that passes through the radiator to dissipate heat.
- P0128 Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)
- If the water temperature of small circulation water circuit is higher than the threshold, the thermal management module is determined to be normal; if the water temperature of small circulation water circuit is lower than the threshold and the water temperature of large circulation water circuit reaches a certain threshold, it is determined that the thermostat is stuck in the fully open position, and the performance of thermostat module is considered unreasonable.

■ Cold Start Emission Reduction Strategy (CSERS) monitoring

(1) System overview:

- The cold start emission reduction strategy is generally catalytic converter heating, that is, by increasing the engine idle speed, delayed ignition angle, adjusting the variable valve timing, multiple injections and other strategies to achieve the goal of quick ignition of catalytic converter during the warm-up. Cold start emission reduction strategy diagnosis is not a diagnosis of a specific function, but a monitoring and diagnosis of the above strategies, and corresponding diagnosis of key engine parameters corresponding to these strategies.
- Before the failure or deterioration of cold start emission reduction strategy relevant parts or components causes the vehicle emissions to exceed OBD threshold, the OBD system should detect a failure. If the failure of strategy does not lead to emission exceeding the OBD threshold, the corresponding faults should be diagnosed when the function control reaches the adjustment limit. The strategy corresponding to the cold start emission reduction strategy of this project is to increase engine idle speed, delay ignition angle, adjust variable valve timing, perform multiple injection, and increase high pressure fuel rail pressure. Details are as follows:

(2) Engine idle speed control monitoring in catalytic converter heating:

- P050A 21 (Cold Start Idle Control System Performance)
- P050A 22 (Cold Start Idle Control System Performance)
- P050D (Cold Start Rough Idle)

- Similar to the normal phase (catalytic converter heating does not work), the engine idle speed control and diagnosis principle is the same in catalytic converter heating. The idle speed uses PID to adjust the engine torque to achieve the actual idle speed consistent with the target idle speed; Idle speed diagnosis is a corresponding diagnosis based on the difference between the target speed and actual speed, and the performance of actual idle speed.

(3) Ignition angle efficiency monitoring when catalytic converter is heated:

- P050B 00 (Cold Start Ignition Timing Performance).
- P050B 20 (Cold Start Ignition Timing Performance).
- The important measures of delaying the ignition angle and the quick ignition of catalytic converter are used to shorten the ignition time of catalytic converter, thereby greatly reducing exhaust emissions. This diagnostic function monitors the ignition angle efficiency during catalytic converter heating. The diagnostic principle diagram is as follows, by calculating the deviation of actual ignition angle efficiency and target ignition angle efficiency, considering that the catalytic converter heating is a process, the system obtains the average efficiency difference of the entire catalytic converter heating process, and compares it with the matching threshold at the corresponding operating point.
- Theoretically, only when the actual ignition angle is greater than the set optimal ignition angle (ignition angle delayed when the catalytic converter is heated in the normal state), that is, the ignition angle is not delayed or delayed not enough, the quick ignition of catalytic converter will be adversely affected, therefore, the system only performs the diagnosis, that is, when the average deviation between actual ignition angle efficiency and target ignition angle efficiency is greater than the setting threshold (-ignition angle is not delayed or delayed not enough), and the duration exceeds the setting threshold, it will report P050B 00 (it will report P050B 20 when part load).

(4) Variable valve timing monitoring when catalytic converter heating:

- P052A (Cold Start “A” Camshaft Position Timing Over-Advanced Bank 1)
- P054A (Cold Start “B” Camshaft Position Timing Over-Advanced Bank 1)
- The diagnostic method of variable valve timing in catalytic converter heating is to monitor the effective difference between actual position and the expected position of intake and exhaust VVT, and detect the accuracy and timeliness of required valve timing.
- If the catalytic converter heating is activated after the engine is cold-started, and all the secondary factors are satisfied, the VVT diagnosis is performed by comparing the target camshaft angle with the actual camshaft angle.
- If the deviation between expected angle and actual angle is greater than the matching fault threshold within the specified time, the fault will be detected and the P052A/P054A will be confirmed. The fault threshold is obtained based on the engine speed and oil temperature at this time.
- When the deviation between expected angle and actual angle is within the specified range, and the camshaft phase adjustment range exceeds the threshold, no fault diagnosis is completed.

(5) Multi-injection monitoring when catalytic converter heating:

- P05EC (Cold Start Injection Timing Performance).
- One of the advantages of a direct injection engine is that it can effectively carry out multiple injections such as two injections, especially by activating the multiple injection mode, greatly delays the ignition angle to achieves the quick ignition of catalytic converter during the heating process, thus effectively reduce emission pollution. Therefore, just as the ignition angle is an important factor in the catalytic converter heating, the fuel injection pulse width and fuel injection phase corresponding to multiple injections are all important control parameters, that is, corresponding diagnosis is required.
- Monitor the injection pulse width, injection angle, and injection times of the multiple injection control parameters. When the absolute value of difference between expected value and actual value exceeds the setting threshold, it will report P05EC.

(6) High pressure oil passage pressure monitoring when catalytic converter heating:

- P053F21 (Cold Start Fuel Pressure Performance).
- P053F22 (Cold Start Fuel Pressure Performance).
- In the catalytic converter heating process of high pressure direct injection engine, it can reduce the emission pollution by increasing the high pressure oil passage pressure, that is, it is also an important control parameter for cold start to reduce the emission pollution, so effective diagnosis is required. Diagnosis principle for this part is the same as the high pressure oil passage diagnosis when the catalytic converter heating, that is, the expected pressure is compared with the actual pressure, and the corresponding fault is reported when the difference exceeds the setting threshold.

■ Gasoline Particulate Filter (GPF) monitoring

(1) Gasoline particulate filter (GPF) is installed on engine exhaust pipe to trap particulate in exhaust gas. According to the provisions of the National VI Emission Regulation J.4.13.2.1, it is necessary to monitor the GPF to remove the failure.

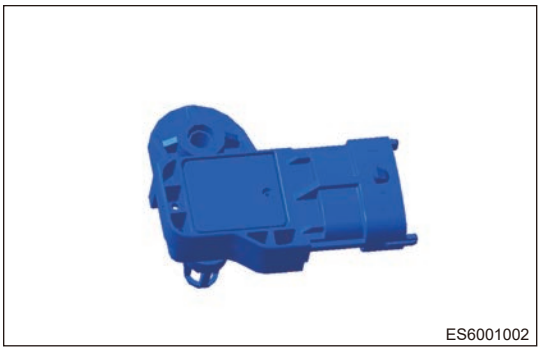
(2) When the particulate trapped in GPF is too much, causing GPF back pressure is too high, it will cause the engine exhaust back pressure to rise, which will affect the engine power performance. Therefore, it is necessary to monitor the fault of high GPF back pressure.

(3) In order to realize the monitoring of GPF removal and high back pressure failure, it is necessary to install a differential pressure sensor on GPF to measure the pressure drop generated when the exhaust gas flows through GPF.

2.5 System Components Description

■ Intake pressure sensor

Intake manifold absolute pressure sensing element consists of a piece of silicon chip. Etch a piece of pressure diaphragm on silicon chip. There are 4 piezoresistors on pressure diaphragm, and the 4 piezoresistors form a Wheatstone bridge as strain element. Except for the pressure diaphragm, silicon chip is also integrated with signal processing circuit. Active surface of the silicon chip is subjected to a pressure close to zero, and its surface is subjected to the absolute pressure of the intake manifold to be measured. Thickness of silicon chip is only several micrometer, so the silicon chip will deform mechanically as intake manifold absolute pressure changes, and 4 piezoresistors will also deform, thus changing the resistance. Voltage signal linearly related to the pressure is generated after processing by signal processing circuit of silicon chip.
Intake temperature sensing element is a negative temperature coefficient (NTC) resistor, whose resistance changes with the intake temperature. This sensor transfers a voltage of intake temperature change to controller.


ES6001002

(1) Pressure sensor limit parameter

Parameters	Value		
	Minimum	Representative	Maximum
Power Supply Voltage	/	/	16 V
Pressure	/	/	500 kpa
Operating Temperature	-40℃	/	+130℃

(2) Pressure sensor characteristic parameters

Parameters	Value		
	Minimum	Representative	Maximum
Pressure Measurement Range	10 kpa	/	300 kpa
Operating Temperature	-40℃	/	130℃
Power Supply Voltage	4.75 V	5.0 V	5.25 V
Power Supply Current When U_S = 5.0 V	/	/	12.5 mA
Output Terminal Load Current	-1.0 mA	/	0.5mA

Parameters		Value		
		Minimum	Representative	Maximum
Load Resistance to Voltage U_S or to Ground	Pull-up resistor	5 kΩ	/	/
	Pull-down resistor	10 kΩ	/	/
Response Time $t_{10/90}$		/	/	1.0 ms
Weight		/	24 g	/

(3) Temperature sensor limit parameters

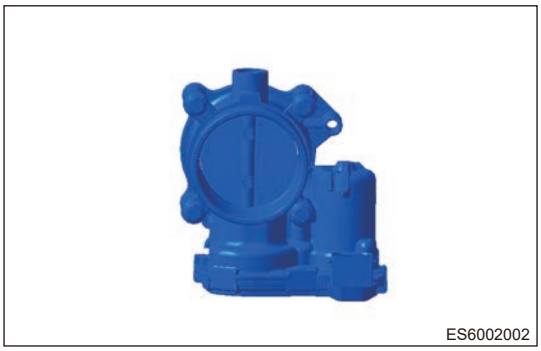
- Storage temperature: -40/+130°C;
- Maximum power at 25℃: 100 mW.

(4) Temperature sensor characteristic parameters

- Operating temperature: -40/+130°C;
- Rated voltage: Pull-up resistor (power is 1 kW) operates at 5 V or operates at a constant current of £1mA;
- Rated resistance at 20°C: 2.5 kΩ ± 5%;

■ Electronic throttle body

Electronic throttle body is a critical part for engine intake system in EGAS system. Its main function is to control intake air volume by adjusting intake passage area according to driver’ s driving intention to meet intake requirements in different engine operating conditions, and send back position signals of throttle valve plate to control unit to achieve accurate control.
DVE consists of four parts: Drive module, train module, executive module and feedback module, and all components are integrated into the same throttle valve housing. Throttle feedback module uses two redundant structures. When malfunction occurs, throttle valve plate will stop at the limp home position (NLP) determined by mechanical way, which is located above mechanical bottom dead center. DVE performs control only by corresponding electronic control unit or electronic test circuit. In principle, it is necessary to ensure that the throttle valve plate does not operate dynamically to the mechanical dead center.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(1) Basic performance parameters:

Test Item	Potentiometer Voltage				Response Time (ms)		Return Time (ms)
	Mechanical Bottom Dead Center (%)		Mechanical Top Dead Center (%)				
	IP1S	IP2S	IP1S	IP2S	Open	Close	
Parameter Range	10 ± 4	90 ± 4	93 ± 4	7 ± 4	⩽ 100	⩽ 100	⩽ 300

■ Knock sensor

Knock sensor is installed on cylinder block, and used to detect engine vibration caused by detonation. You can install one or more.
The sensitive element of sensor is a piezoelectric ceramic. Vibration of engine cylinder block is transferred to the piezoelectric ceramic through a mass block in the sensor. Due to the pressure generated by vibration of mass block, the piezoelectric ceramic generates a voltage at both electrode faces, and converts the vibration signal to an A/C voltage signal to output it.
Because intensity of vibration signal caused by engine knocking is far more than that of normal engine vibration signal, ECU can distinguish between knock or non-knock signals by processing these signals from knock sensor.


ES6003002

(1) Limit data

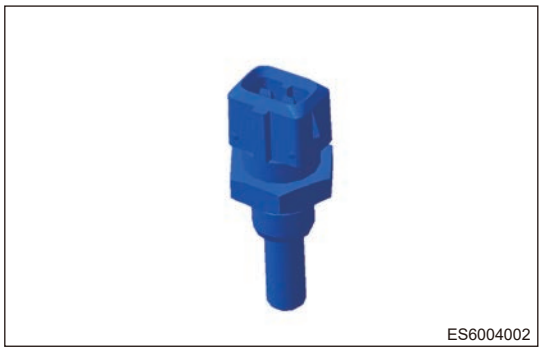
Type	Value		
	Minimum	Representative	Maximum
Operating Temperature	-40˚C	/	130˚C

(2) Characteristic data (cable type)

Type		Value
Sensitivity of New Sensor to 7 kHz Signal		23.6 ~ 35.4 mV/g
Sensitivity of New Sensor to 19 kHz Signal		28.3 ~ 42.4 mV/g
Linearity between 5 and 15 kHz		±10% of 5 kHz (based on 10m/s^2)
Main Resonance Frequency		> 30 kHz
Impedance	Resistance (terminal and copper bush)	> 1 MΩ
	Capacitance (probe)	1150 ± 200 pF
Leakage Resistance (Resistance between Two Output Terminals of Sensor)		4.9 ± 20% MΩ
Variation in Sensitivity Due to Temperature (9 kHz)		⩽ -0.04 mV/g°C

■ Coolant temperature sensor

Temperature sensor function is used to monitor engine coolant temperature, On the one hand, it makes the electronic system judge the engine operating condition by outputting resistance signal; On the other hand, it also outputs signals to relevant instrument cluster, so that operators can directly judge the engine operating condition through visual inspection. Coolant temperature sensor encapsulates NTC thermistor in temperature sensor, its resistance varies in accordance with ambient temperature, so that the small change of outside temperature can be measured accurately and timely. Temperature of contact medium can be reflected by measuring its output resistance.


ES6004002

(1) Limit data

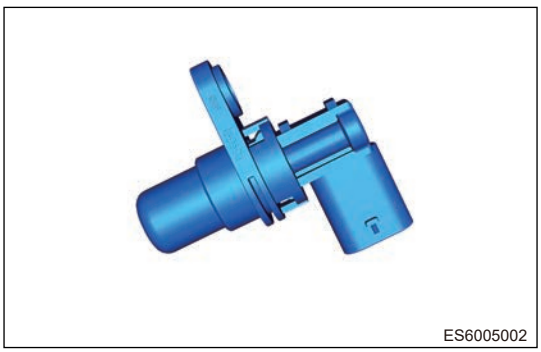
Type	Value
Rated Voltage	Operates with ECU connected, standard operating condition is 5 V (power of pull-up resistor is 1 kW)
Rated Resistance at 20°C	2.5 ± 5% kΩ
Operating Temperature Range	-40 ~ +130°C
Vibration Level	⩽ 600 m/s²

(2) Characteristic data

Temperature (°C)	Resistance (Ω)
-40	45313
-30	26114
-20	15462
-10	9397
0	5896
10	3792
20	2500
30	1707
40	1175
50	833.9
60	595.5
70	435.7
80	322.5
90	243.2
100	186.6
110	144.2
120	112.7
130	89.30

■ Speed sensor

Speed sensor is a component of the engine management system. This sensor is installed on engine block, which used to detect crankshaft position and speed. Rotation of the signal plate causes the magnetic field at the induction point inside the speed sensor to alternate. The alternating magnetic field is induced by the differential Hall chip, and the induced alternating magnetic signal is converted into an electrical signal by the internal processing circuit of the sensor and output.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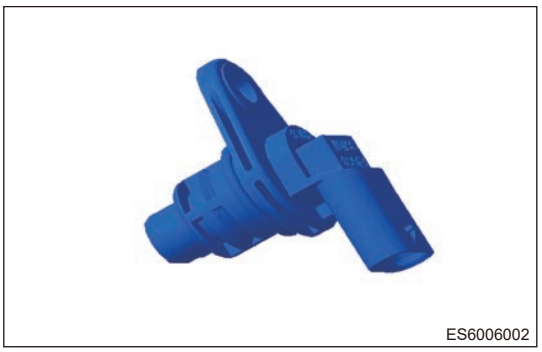
(1) Technical characteristic parameters

Parameters	Minimum	Representative	Maximum
Storage Temperature	-40 ˚C	/	+80 ˚C
Speed Range	20 rpm	/	8000 rpm
Air Clearance	0.2 mm	1.0 mm	1.8 mm
Phase Accuracy (Falling Edge of 800 rpm)	-1 deg	/	+1 deg
Operating Temperature (-Plug Area)	-40 ˚C	/	+150 ˚C
Operating Temperature (Sensor)	-40 ˚C	/	+150 ˚C
Power Supply Voltage Range	4.75 V	5.0 V	16 V
Power Supply Current	/	4.2 mA	10 mA
Output Signal Rising Time (Low - High)	/	/	25 us
Output Signal Falling Time (High - Low)	/	/	1 us
Output Signal Power Supply Voltage	/	/	18 V
Output Current	/	/	20 mA
Output Signal Low Voltage	/	/	0.5 V
Output Signal High Voltage	$U_{S,0}$ - 0.5 V	$U_{S,0}$ - 0.3 V	/
Power-on Time	/	/	250 ms
n: Repeated Accuracy at 800 rpm	-0.1 deg	+0.1 deg	/

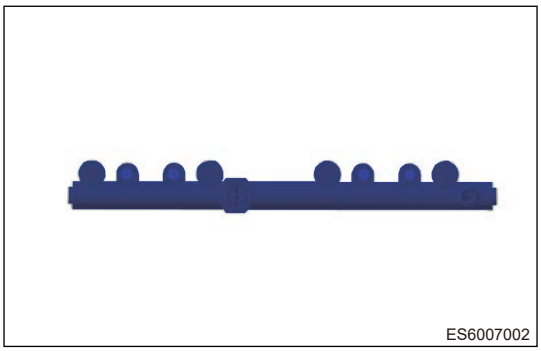
■ Camshaft position sensor

Camshaft position sensor is a Hall type sensor. A phaser is installed on camshaft. When phaser is in high teeth, the applicable circuit outputs low voltage; when phaser is in missing teeth, the applicable circuit outputs high voltage. As a result, the crankshaft phase information will is provided to Engine Control Unit (ECU), so that the compression top dead center and exhaust top dead center of crankshaft can be distinguished.


ES6006002

■ High pressure fuel distribution pipe assembly

The high pressure fuel distribution pipe assembly is integrated with high pressure fuel distribution pipe (fuel rail), high pressure fuel injector and high pressure sensor. Its operation principle is to optimize design through structure of high pressure fuel distribution pipe, the accurate fuel rail pressure signal feedback can uniformly and precisely distribute fuel for engine through injector.



(1) Technical characteristic parameters

Items	Target Specifications
System Pressure	35 MPa
Target Life	10/160,000 y/km
Temperature Condition	-40 ~ 130°C

■ High pressure fuel injector

Operation principle of solenoid valve type high pressure fuel injector: When the electricity is applied, electromagnetic coil generates magnetic force, and the needle valve set is sucked up, and separated from valve seat, so that fuel is injected. When the power is off, compression spring returns and needle valve set moves downwards, so that it contacts valve seat eventually to seal the fuel.

(1) Technical characteristic parameters

Electronic Control Fuel Injection	High pressure direct injection system
Fuel Entering Direction	Injector axial
System Pressure	35 Mpa
Maximum Operating Voltage	65 V
Target Life	240,000 kilometers, up to 15 years

■ Ignition coil

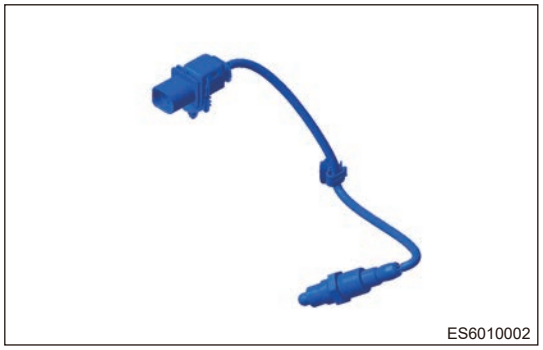
Ignition coil consists of primary winding, secondary winding, iron core and housing etc. When the ground passage of a primary winding is on, this primary winding is charged. If ECU cuts off the primary winding circuit, the charging will be suspended, and a high voltage will be induced in the secondary winding at same time, cause spark plugs to discharge.

(1) Technical parameters

Primary Current	8.5A X (1 ± 8%)
Secondary Voltage	⩾ 37 KV (40 pF ± 5 pF of load)
Load (Zener Diode)	1000 ± 20 V
Ignition Energy	⩾ 90 mJ

■ Upstream oxygen sensor

LSU oxygen sensor is much more advanced than LSH and LSF in function. It is a ceramic body principle and a "micro pump" for oxygen ion transportation. Pump provides enough oxygen to the electrodes on the contact side of the exhaust to maintain a constant voltage on both sides, about 450 mV. Electric energy consumption of the pump is converted into the excess air coefficient by the electronic controller, output current is almost linear with λ. λ = 0.65 ~ ∞, so it is also called linear oxygen sensor. It can not only determine whether λ is greater than 1 or less than 1, but also measure in the thin and thick areas The specific value of λ can be determined, so the excess air coefficient in a wide range (broadband) can be measured, and the continuous control of λ < 1 to λ > 1 can be realized.



(1) Characteristic data

Description	New	After Platform Test
λ Signal When λ = 1.7	1.70 ± 0.077	1.70 ± 0.132
λ Signal When λ = 0.8	0.80 ± 0.012	0.80 ± 0.020

(2) Sensor electrical data

Description		Value
Resistance between Housing and Each Flat Insert Pieces	Room temperature, 800V DC	⩾ 10 MΩ
Power Supply Voltage on Connector	Rated voltage	6.8 V
	Continuous operating voltage	⩽ 12 V
	Maximum system power supply voltage	⩽ 16.5 V

Description		Value
	Short time voltage peak value within 60 ms (10 times in life cycle, ceramic temperature ⩾ 20℃)	⩽ 28 V
	Minimum system power supply voltage	⩾ 9.8 V
Heating Power for 6.8 V of Operating Voltage		8.1 W

■ Downstream oxygen sensor

Sensing element of LSF oxygen sensor is a ceramic planar body with pores, and the outside of ceramic body is surrounded by engine exhaust, and the inside is ventilated. Sensing ceramic body wall is a type of solid electrolyte with heating electrodes inside. Operation of oxygen sensor is realized by converting the concentration difference of oxygen ions inside and outside the sensing ceramic body into voltage signals for output. When the temperature of sensing ceramic body reaches 350°C, it will have the characteristics of solid electrolyte. Oxygen ions can freely pass through it due to special material of ceramic body. It is precisely by taking advantage of this characteristic, it converts the concentration difference into the potential difference, thus forming the electrical signal output. If the gas mixture is rich, oxygen ion concentration difference in and out of the ceramic is high, electric potential difference is high, a large number of oxygen ions move from the inside to the outside, and the output voltage is higher (approximately 800mV-1000mV); If the mixture concentration is too lean, oxygen ion concentration difference in and out of the ceramic is low, electric potential difference is low, only a small amount of oxygen ion moves from the inside to the outside, and the output voltage is lower (approximately 100mV). Signal voltage changes abruptly at about the theoretical equivalent air fuel ratio (λ=1).


ES6011002

(1) Characteristic data

Description	New		After 500 Hours of Platform Test	
Exhaust Temperature When Characteristic Data Is Established	350°C	850°C	350°C	850°C
When l=0.97 (CO= 1%): Sensing Element Voltage (mV)	800 ± 55	700 ± 55	800 ± 60	700 ± 60
When l=1.10: Sensing Element Voltage (mV)	50 ± 30	50 ± 30	50 ± 40	50 ± 40
Sensing Element Internal Resistance (kΩ)	⩽ 0.5	⩽ 0.25	⩽ 1	⩽ 0.5

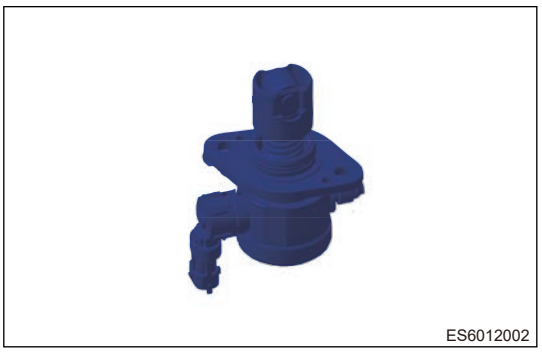
Description	New		After 500 Hours of Platform Test	
Response Time (ms) (600 mV to 300 mV)	< 250	< 250	< 400	< 250
Response time (ms) (300 mV to 600 mV)	< 100	< 60	< 200	< 60

(2) Sensor electrical data

Description		Value
Between Heating Circuit and Signal Circuit	Room temperature, 800V DC	⩾ 30
Power Supply Voltage on Connector	Rated voltage	12 V
	Continuous operating voltage	12 to 14 V
	Operating voltage which can be maintained 1% of the total life at most (exhaust temperature ⩽ 850° C)	15 V
	Operating voltage which can be maintained 75 seconds at most (- exhaust temperature ⩽ 350°C)	18 V
	Test voltage	13 V
Heating Power for 13 V of Operating Voltage, and 350°C of Exhaust Temperature		7 W
Short Time Heating Current at 13 V of Operating Voltage and -40˚C of Ambient Temperature		⩽ 2.1 A

■ High pressure fuel pump

High pressure fuel pump is an element specially used for direct injection engine. It functions to increase the system pressure and provide high pressure fuel for the fuel rail assembly. High pressure fuel pump supplies fuel for system as demands, thus providing a better fuel economy. It is made of stainless steel material and has a wide fuel application; also, it has the advantages of light weight, small volume, zero evaporative emission, etc. At present, high pressure fuel pump of the main vehicle factory widely used in the world adopts the single plunger pump design of integrated voltage regulator, flow control valve, relief valve, its working principle is through cam drive high pressure pump plunger movement up and down to achieve fuel absorption and fuel discharge. ECU controls high pressure fuel flow via flow control valve according to the set control program through pressure sensor on fuel rail, thus performing closed loop control for pressure in high pressure fuel rail. Regulator functions to suppress the pressure pulsation at the low pressure end and improve the stability of system. Pressure relief valve will turn on when high pressure fuel rail pressure exceeds the safety limit, so as to protect the system.

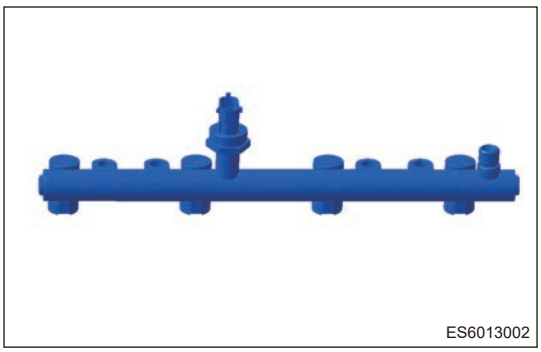

ES6012002

(1) Characteristic parameters

Items	Target Specifications
Mass	Approx. 083 kg
Fuel Outlet Pressure	2-20 MPa
Maximum Fuel Inlet Pressure	9.0 bar
Relief Valve Opening Pressure	35 MPa system: 39.9-41.4 for new parts, 36.5-42.4 MPa for durable parts
Drive Voltage	10.8 - 16 V
Control Type	Applied to ECU, which adopts current control

■ High pressure fuel rail pressure sensor

Fuel pressure acts on metal diaphragm of pressure sensor to deform the diaphragm. There is a Wheatstone bridge composed of 4 metal strain gauges on diaphragm. The deformation of diaphragm causes a change in the resistance of strain gauge. After the signal processing of peripheral circuit, form the voltage signal that is linearly related to the pressure.



(1) Limit data

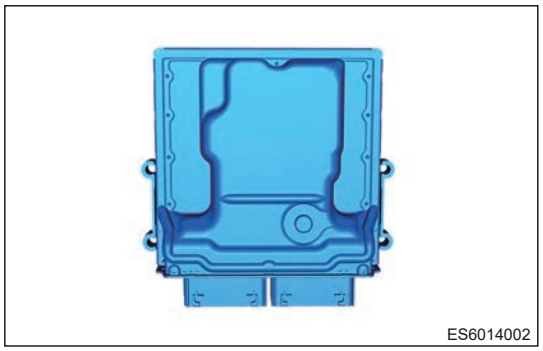
Parameters	Value		
	Minimum	Representative	Maximum
Power Supply Voltage (Max. 1 h)	/	/	18 V
Pressure	/	/	32 Mpa
Burst Pressure	/	/	375 Mpa
Operating Temperature	/	/	150 ˚C

(2) Characteristic data

Parameters	Value		
	Minimum	Representative	Maximum
Pressure Measurement Range	0 Mpa	/	42 Mpa
Operating Temperature	-40 ˚C	/	140 ˚C
Power Supply Voltage	4.75 V	5.0 V	5.25 V
Power Supply Current When U_S = 5.0 V	9 mA	12 mA	15 mA
Response Time $t_{10/90}$	/	/	1.0 mS

■ Electronic controller unit

Engine Control Unit (ECU) is a pre-programmed microprocessor digital computer, which is used to adjust ignition timing, air-fuel ratio, emission control device, speed control, A/C compressor and idle speed etc. Engine Control Unit (ECU) enables the program to suit ever-changing operation conditions.

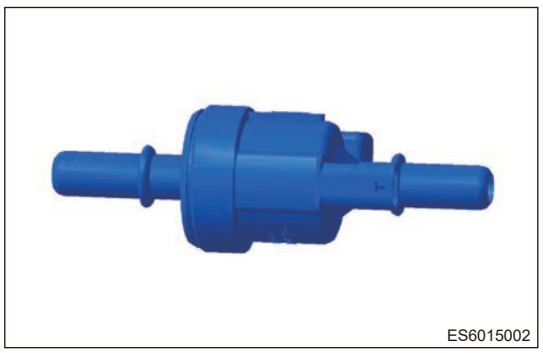


(1) Limit data

Type		Value	
		Minimum	Maximum
Battery Voltage	Normal operation	10.8 V	16 V
	Limit function	6.5 to 9 V	16 to 28 V
Limits and Time for Withstanding Battery Overvoltage	24 V	Keep starting some functions	60 s

■ Canister solenoid valve

Charcoal canister control valve consists of solenoid coil, armature, valve body and other parts.
Air volume through canister control valve is related to the electric pulse duty ratio output from ECU to canister control valve and the differential pressure between canister control valve inlet and outlet. When there is no electric pulse, charcoal canister control valve closes.



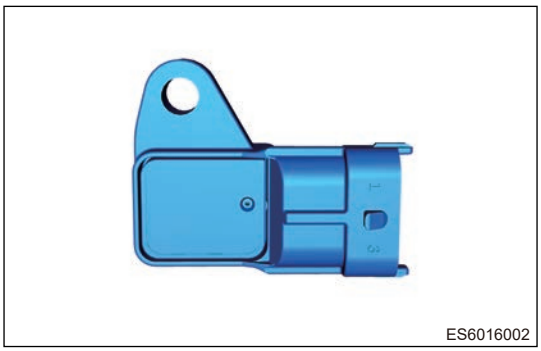
(1) Technical characteristic parameters

Type	Value		
	Minimum	Representative	Maximum
Rated Voltage	10 V	13.5 V	16 V
Resistance at +20°C	14 Ω	16 Ω	18 Ω
Current under Rated Voltage	/	0.85 A	/
Frequency of Control Pulse	5 Hz	/	30 Hz
Rate of Flow When Differential Pressure Is 700 Mbar and Duty Ratio Is 100%	6 m^3/h	6.5 m^3/h	7 m^3/h

Type	Value		
	Minimum	Representative	Maximum
Permitted Operating Temperature	-40 °C	/	140 °C
Allowable Differential Pressure between Inlet and Outlet	/	/	-800 mbar
Permitted Vibration Acceleration Marked on Products	/	/	300 m/s^2
Leakage Amount When Differential Pressure Is 700 mbar	/	/	33 mL/min

■ **Brake vacuum pressure sensor**

Absolute pressure sensing element consists of a piece of silicon chip. Etch a piece of pressure diaphragm on silicon chip. There are 4 piezoresistors on pressure diaphragm, and the 4 piezoresistors form a Wheatstone bridge as strain element. Except for the pressure diaphragm, silicon chip is also integrated with signal processing circuit. Active surface of the silicon chip is subjected to a pressure close to zero, and its surface is subjected to the absolute pressure of the intake manifold to be measured. Thickness of silicon chip is only several micrometer, so the silicon chip will deform mechanically as line absolute pressure changes, and 4 piezoresistors will also deform, thus changing the resistance. Voltage signal linearly related to the pressure is generated after processing by signal processing circuit of silicon chip.


ES6016002

(1) Limit parameters

Parameters	Value		
	Minimum	Representative	Maximum
Power Supply Voltage	/	/	16 V
Pressure	/	/	500 kpa
Operating Temperature	-40 ˚C	/	+130 ˚C

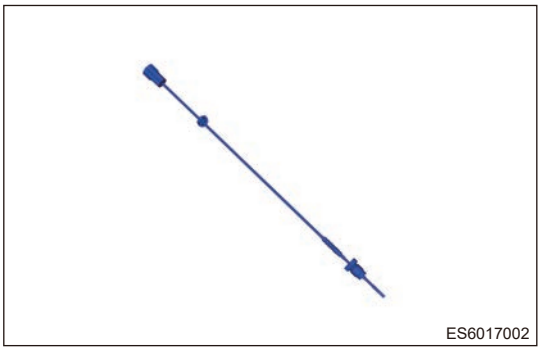
(2) Characteristic parameters

Parameters	Value		
	Minimum	Representative	Maximum
Pressure Measurement Range	20 kpa	/	115 kpa
Operating Temperature	-40 ˚C	/	130 ˚C
Power Supply Voltage	4.75 V	5.0 V	5.25 V
Power Supply Current When U_S = 5.0 V	/	/	12.5 mA
Output Terminal Load Current	-1.0 mA	/	0.5 mA

Parameters		Value		
		Minimum	Representative	Maximum
Load Resistance to Voltage U_S or to Ground	Pull-up resistor	5 kΩ	/	/
	Pull-down resistor	10 kΩ	/	/
Response Time $t_{10/90}$		/	/	1.0 ms
Weight		/	17 g	/

■ GPF temperature sensor

The temperature sensor uses Pt200 type thermal-sensitive platinum resistor sensing element as the temperature sensing element. The outside of the sensing element is encapsulated by a stainless steel shell with high temperature resistance and corrosion resistance. The sensing element and the stainless steel shell are filled with heat conduction materials to facilitate the timely transfer of exhaust gas heat to the surface of sensing element. During operation, the sensor head is placed inside the engine exhaust pipe, and the high temperature airflow transmits heat to the sensing element, so that the temperature of the sensing element interior platinum resistor changes accordingly, and the resistance value of platinum resistor varies with the temperature. Through a specific monitoring circuit, the engine controller (ECU) monitors the resistance signal output by the sensor to calculate the corresponding exhaust gas temperature signal.



(1) Signal accuracy

Signal accuracies of sensor (new parts) are shown as follows:

Temperature Range	Signal Accuracy
-40°C ~ 300°C	± 2.5°C
301 ˚C ~ 900 ˚C	± 1.0 % of temperature in ˚C
901 ˚C ~ 950 ˚C	± 2.0 % of temperature in °C

Signal accuracies of sensor (deteriorated parts) are shown as follows:

Temperature Range	Signal Accuracy
10 ˚C	± 3.8 Ω (± 5˚C)
650 ˚C	± 8 Ω (± 13 ˚C)

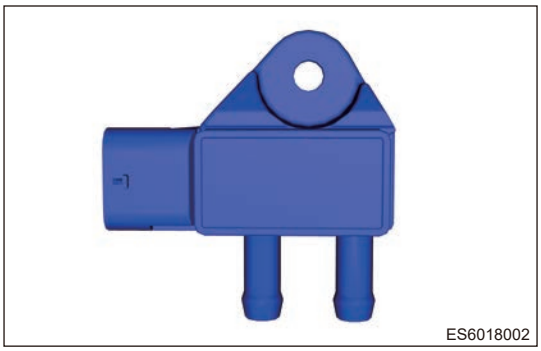
(2) Dynamic response performance

Dynamic response performance of the exhaust temperature sensor is based on the change speed of output signal when the ambient temperature changes abruptly, which should meet the requirements of the following table

Temperature Jump	Air-flow Velocity	Response Time
300 ˚C	11 m/s	< 12 s

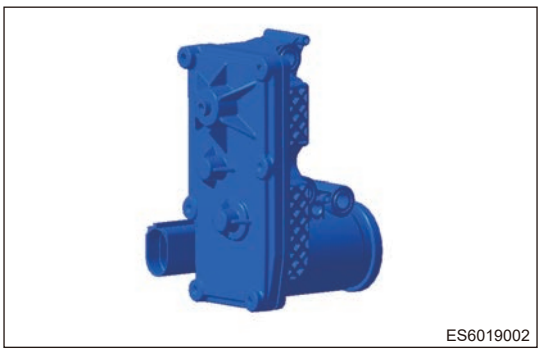
■ GPF differential pressure sensor

Differential pressure sensor (double membrane) unit consists of housing, two same LGA (Land Grid Array) sensing element modules, cover plate, sealing glue, connecting glue, bonding wire and other sub components. The values measured by sensor are upstream gas absolute pressure and downstream gas absolute pressure of GPF.
Differential pressure sensor (double membrane) unit consists of housing, two same LGA (Land Grid Array) sensing element modules, cover plate, sealing glue, connecting glue, bonding wire and other sub components. The values measured by sensor are upstream gas absolute pressure and downstream gas absolute pressure of GPF. Sensing element module of differential pressure sensor (LPS4-2ABS) consists of a piece of silicon chip. Etch a piece of pressure diaphragm on silicon chip. There are 4 piezoresistors on pressure diaphragm, and the 4 piezoresistors form a Wheatstone bridge as strain element. Silicon chip will deform mechanically as emission gas pressure changes, and 4 piezoresistors will also deform, thus changing the resistance. Output the information in SENT signal format to ECU after processing by signal processing circuit of silicon chip.


ES6018002

■ Electronic control actuator

Electronic control actuator is used to drive exhaust gas by-pass valve of turbocharger. Its main function is to adjust waste gate opening angle and control rotation speed of turbocharger according to driver’ s driving intention, so as to control intake air demand when the intake air amount meets different engine operating conditions, and feed back the position signal of waste gate to control unit to realize accurate control.
Electronic control actuator consists of four parts: drive module, train module, executive module and feedback module, and all sub components of drive module, train module and feedback module are integrated into the same housing. Feedback module contains non-contact type sensors, which can accurately feedback the valve position according to Hall principle. Electronic control actuator performs control only by corresponding electronic control unit or electronic test circuit. In principle, it is necessary to ensure that the actuator connecting rod does not operate dynamically to the mechanical dead center.


ES6019002

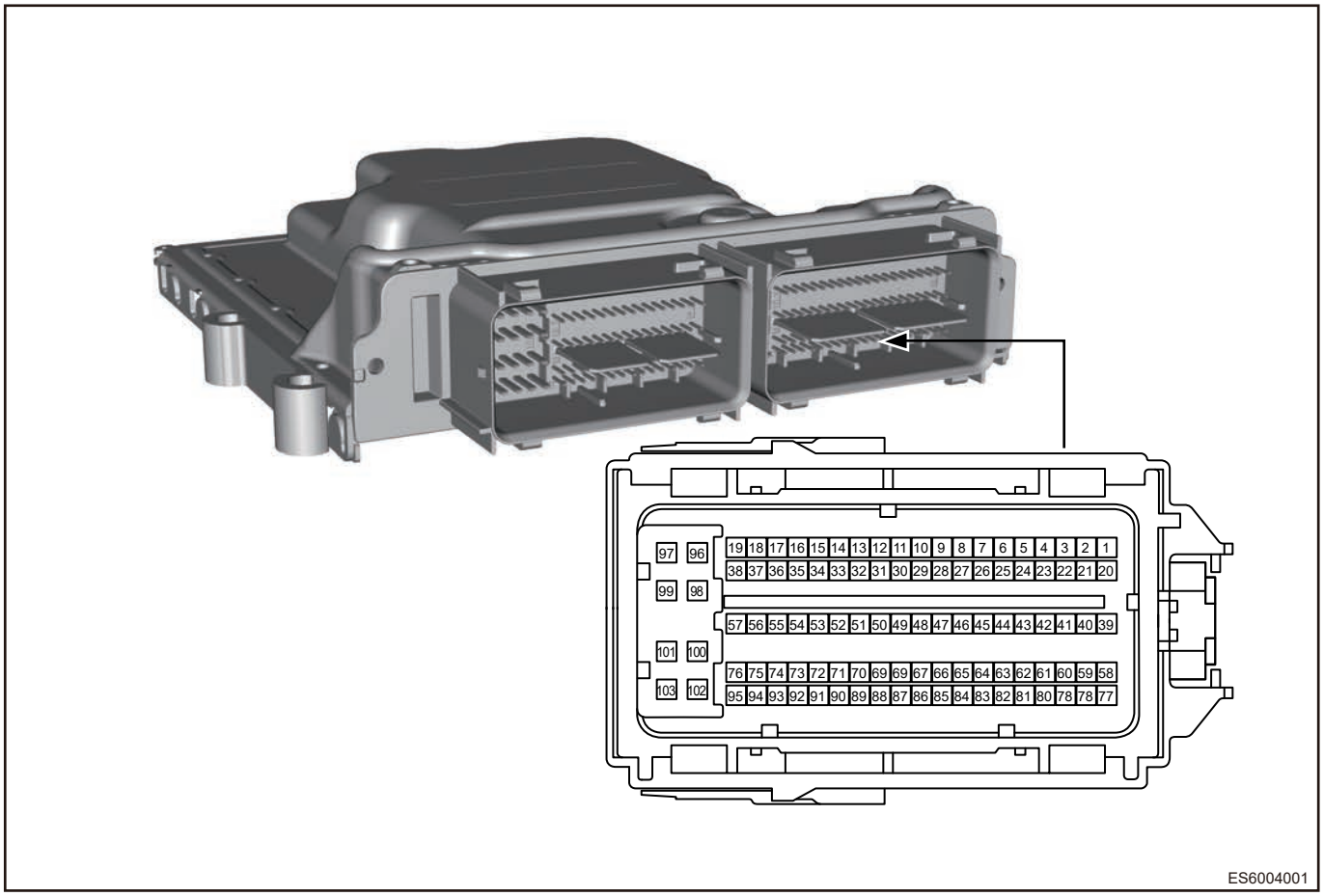
(1) Technical characteristic parameters

Test Item	Potentiometer Voltage		Response Time (ms)		Driving Torque (New Parts) (Nm)
	Mechanical Top Dead Center (%)	Mechanical Bottom Dead Center (%)	Open	Close	
Parameter Range	5 +/- 2.2	95 +/- 2.2	⩽ 200	⩽ 200	⩾ 0.8

3 System Circuit Diagram

3.1 Module Terminal Definition

■ Terminal A Definition

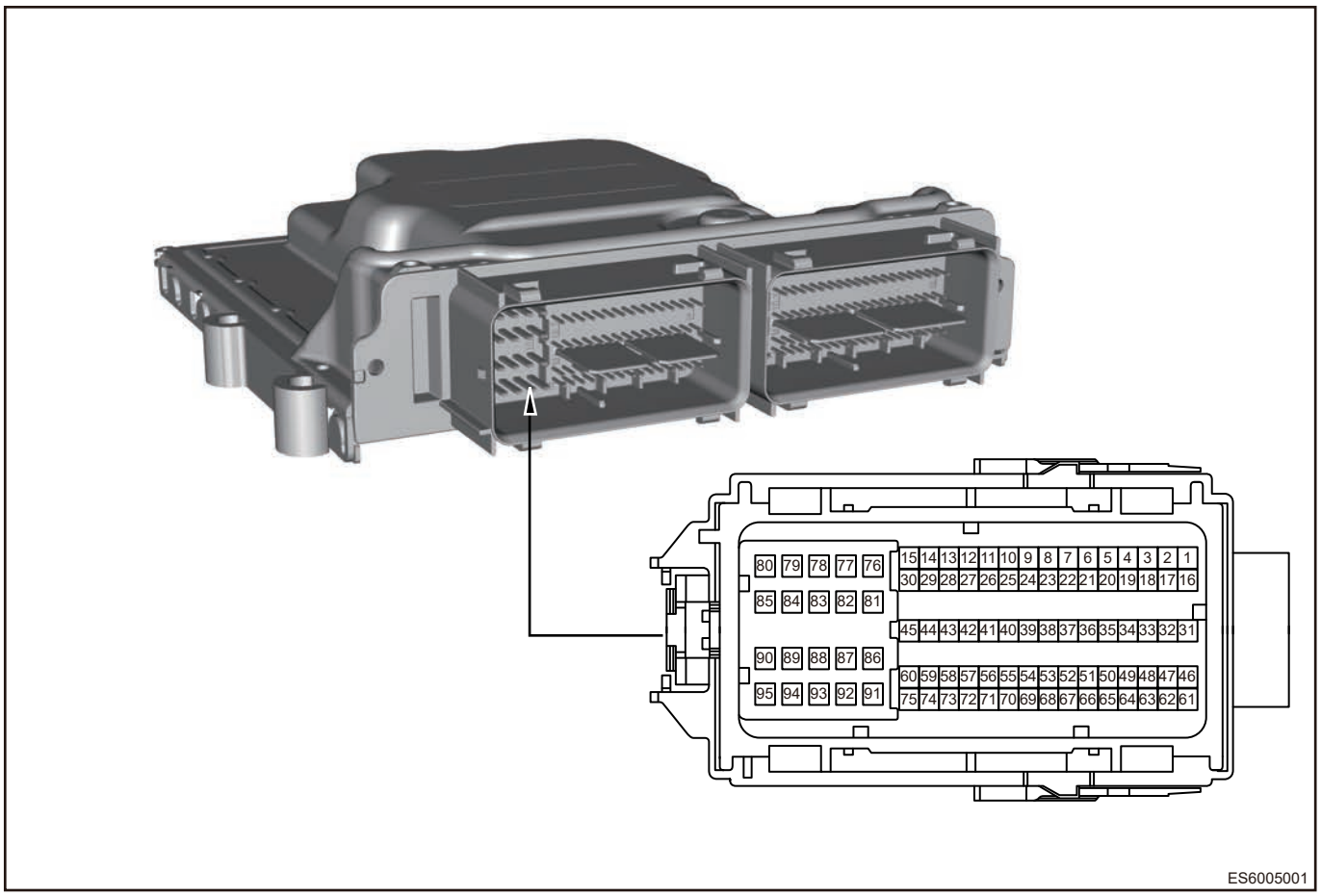


Pin	Definition	Pin	Definition
A1	Starter Control LSD	A53	-
A2	-	A54	-
A3	-	A55	Brake Light Switch Signal
A4	-	A56	Brake Switch
A5	Starter Relay	A57	Starter State Feedback Signal
A6	Main Relay	A58	Canister Ventilation Valve
A7	Crankshaft Ventilation Tank Heating Signal	A59	Variable Oil Pump
A8	Downstream Oxygen Sensor Signal	A60	Electronic Thermostat
A9	Analog Sensor Ground 5	A61	Downstream Oxygen Sensor Heater
A10	-	A62	Upstream Oxygen Sensor Heater
A11	Analog Sensor Ground 7	A63	Continuous Power Supply
A12	Analog Sensor Ground 8	A64	Refresh and Body CAN Low

Pin	Definition	Pin	Definition
A13	Electronic Accelerator Pedal 1 Ground	A65	Refresh and Body CAN High
A14	Analog Sensor Power Supply 1	A66	Upstream Oxygen IA
A15	Electronic Accelerator Pedal Signal 1	A67	Upstream Oxygen VN
A16	Electronic Accelerator Pedal Signal 2	A68	-
A17	-	A69	-
A18	Sensor Power Supply (5 V)	A70	CAN H
A19	-	A71	CAN L
A20	-	A72	-
A21	Electronic Vacuum Pump	A73	-
A22	-	A74	-
A23	AWD Relay	A75	-
A24	A/C Compressor Relay	A76	-
A25	Pressure Discharge Control Valve	A77	-
A26	Fuel Control Enable Signal	A78	-
A27	Brake Vacuum Sensor	A79	-
A28	Downstream Oxygen Sensor Ground	A80	-
A29	Electronic Accelerator Pedal 2 Ground	A81	-
A30	-	A82	-
A31	Electronic Accelerator Pedal Power Supply 1	A83	-
A32	-	A84	-
A33	-	A85	-
A34	A/C Pressure Sensor	A86	-
A35	-	A87	-
A36	-	A88	-
A37	-	A89	-
A38	-	A90	-
A39	Stepless Cooling Fan	A91	-
A40	Variable Valve Timing - Exhaust	A92	-
A41	Variable Valve Timing - Intake	A93	-
A42	Canister Control Valve	A94	-
A43	-	A95	-
A44	-	A96	ECU Ground 4
A45	-	A97	ECU Ground 3
A46	ENGINE START STOP switch	A98	ECU Ground 2

Pin	Definition	Pin	Definition
A47	LIN Bus	A99	ECU Ground 1
A48	Upstream Oxygen IP	A100	Main Relay Power Supply 1
A49	Upstream Oxygen VM	A101	Main Relay Power Supply 2
A50	-	A102	Main Relay Power Supply 3
A51	Electronic Accelerator Pedal Power Supply 2	A103	Main Relay Power Supply 4
A52	GPF Front Temperature Sensor		

■ **B Terminal Definition**

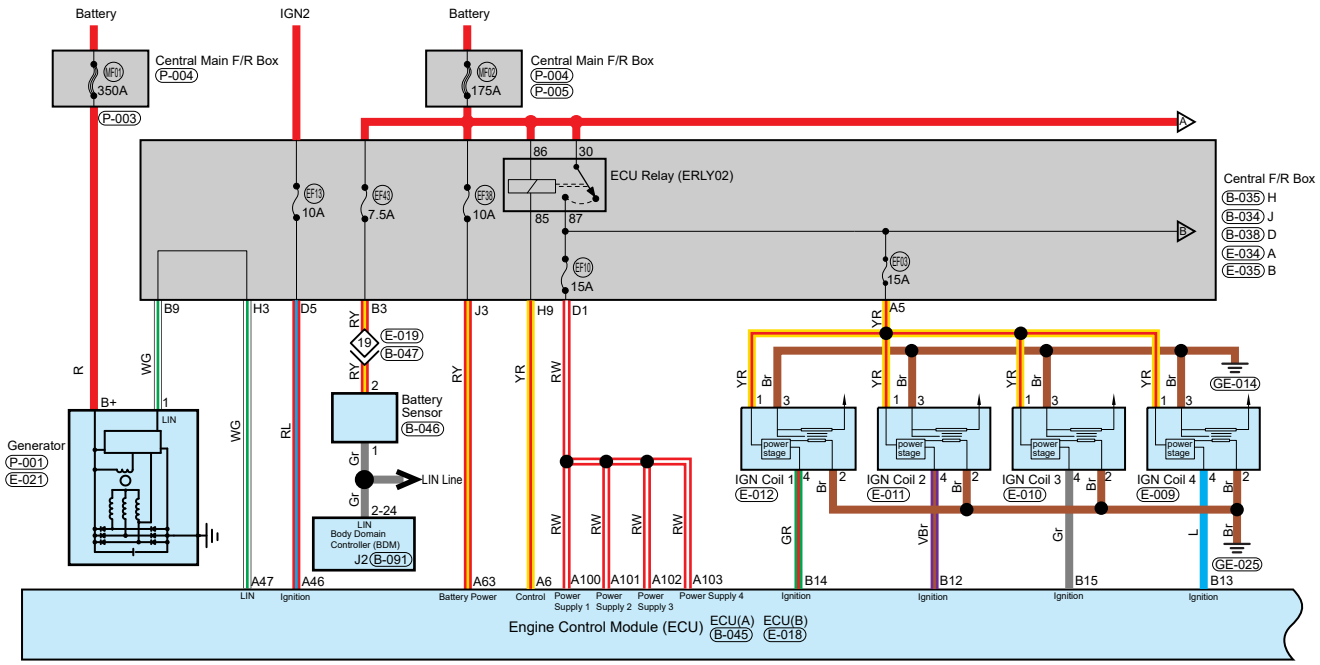


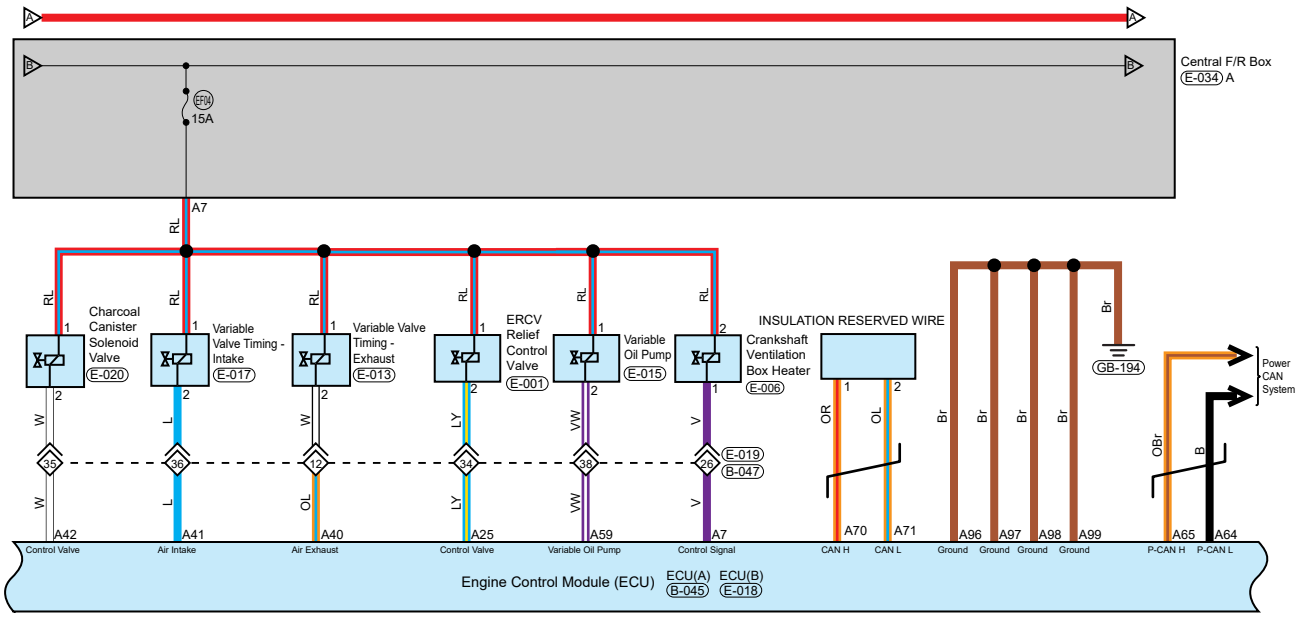
Pin	Definition	Pin	Definition
B1	Sensor Power Supply (5 V)	B49	-
B2	Sensor Power Supply (5 V)	B50	-
B3	Sensor Power Supply (5 V)	B51	-
B4	-	B52	-
B5	Digital Sensor Ground 2	B53	-
B6	Analog Sensor Ground 1	B54	Electronic Waste Gate Position Signal
B7	Analog Sensor Ground 2	B55	-

Pin	Definition	Pin	Definition
B8	Analog Sensor Ground 3	B56	-
B9	Analog Sensor Ground 4	B57	Engine Speed Sensor Signal
B10	Exhaust Phase Sensor Ground	B58	-
B11	Intake Phase Sensor Ground	B59	-
B12	2nd Cylinder Ignition	B60	-
B13	4th Cylinder Ignition	B61	-
B14	1st Cylinder Ignition	B62	-
B15	3rd Cylinder Ignition	B63	-
B16	Sensor Power Supply (5 V)	B64	-
B17	Exhaust Phase Sensor Power Supply	B65	-
B18	Speed Sensor Power Supply	B66	-
B19	-	B67	-
B20	Speed Sensor Ground	B68	-
B21	-	B69	-
B22	Engine Coolant Temperature Sensor Signal 1	B70	-
B23	-	B71	-
B24	Cruise Control Signal	B72	-
B25	Low Pressure Fuel Rail Pressure Sensor	B73	-
B26	Charcoal Canister Desorption Pressure Sensor Signal	B74	-
B27	Boost Pressure Sensor Pressure Signal	B75	-
B28	Intake Temperature/Pressure Sensor Pressure Signal	B76	4th Cylinder Injector-
B29	Boost Pressure Sensor Temperature Signal	B77	4th Cylinder Injector+
B30	Intake Camshaft Phaser Sensor Signal	B78	1st Cylinder Injector+
B31	Fuel Tank Pressure Sensor Signal	B79	3rd Cylinder Injector-
B32	-	B80	2nd Cylinder Injector-
B33	-	B81	Electronic Wastegate Control-
B34	Electronic Throttle Feedback Signal 2	B82	Electronic Waste Gate Control +
B35	Engine Coolant Temperature Sensor Signal 2	B83	1st Cylinder Injector-
B36	High Pressure Fuel Rail Sensor Signal	B84	3rd Cylinder Injector+
B37	-	B85	2nd Cylinder Injector+

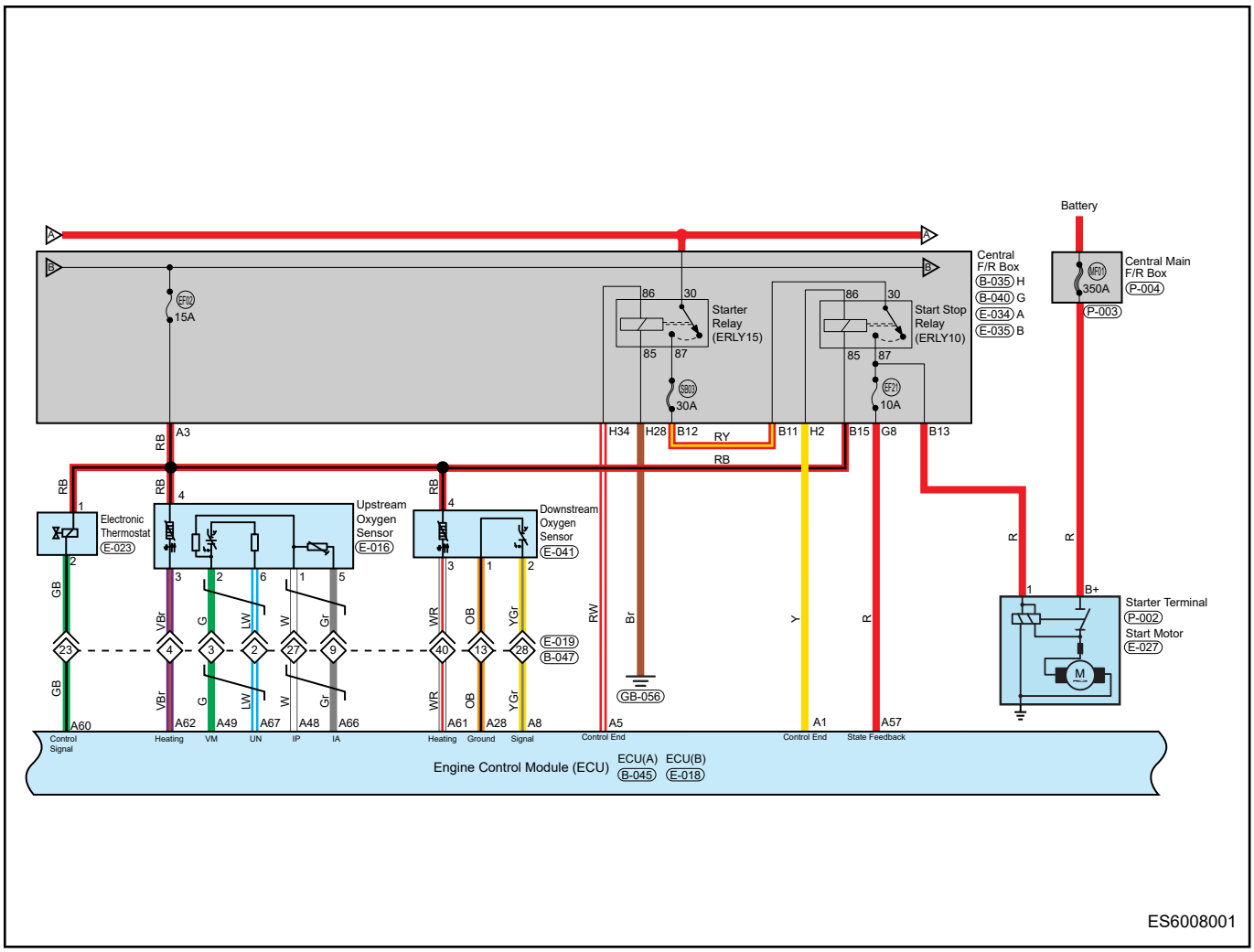
Pin	Definition	Pin	Definition
B38	Intake Temperature Sensor Signal	B86	Electronic Throttle Control-
B39	-	B87	-
B40	Electronic Throttle Feedback Signal 1	B88	-
B41	Dual-mode GPF Differential Pressure Sensor Signal 2	B89	-
B42	Dual-mode GPF Differential Pressure Sensor Signal 1	B90	Fuel Pressure Control Valve-
B43	-	B91	Electronic Throttle Control+
B44	-	B92	-
B45	Exhaust Camshaft Phaser Sensor Signal	B93	-
B46	Knock Sensor Signal A	B94	-
B47	Knock Sensor Signal B	B95	Fuel Pressure Control Valve+
B48	-		

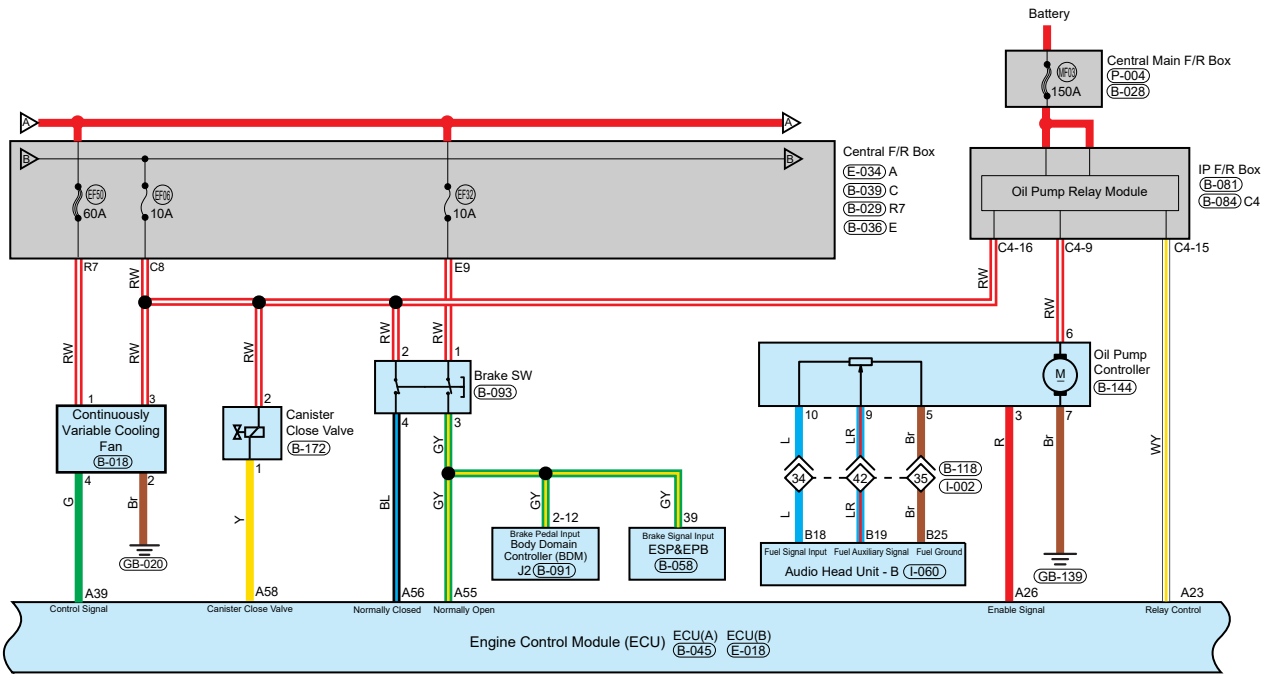
3.2 Circuit Diagram



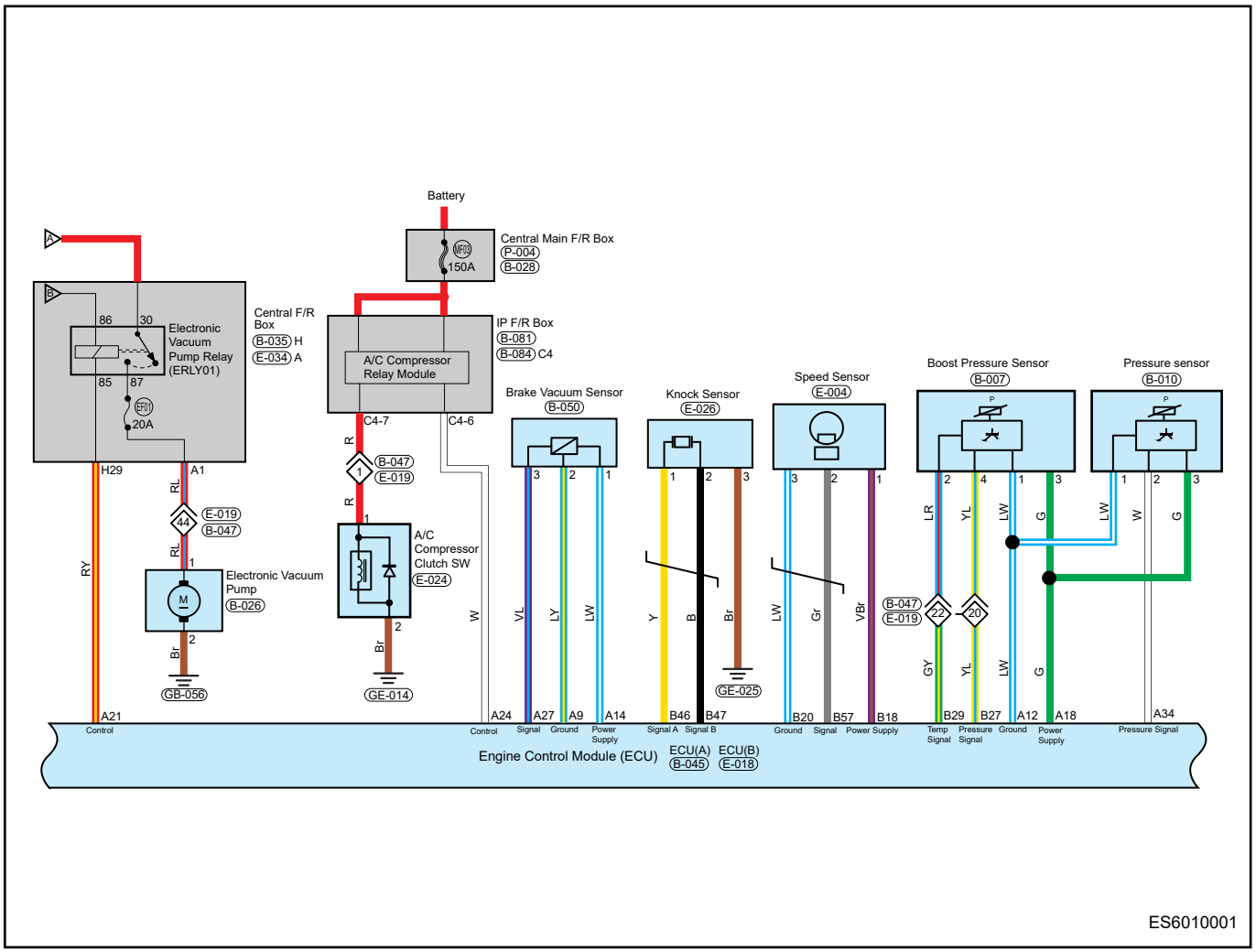

Central F/R Box
E-034 A
EF04
15A
A7
RL
Charcoal Canister Solenoid Valve
E-020
Variable Valve Timing - Intake
E-017
Variable Valve Timing - Exhaust
E-013
ERCV Relief Control Valve
E-001
Variable Oil Pump
E-015
Crankshaft Ventilation Box Heater
E-006
INSULATION RESERVED WIRE
GB-194
Power CAN System
W
L
OL
LY
VW
V
OR
Br
OBr
B
E-019
B-047
A42
A41
A40
A25
A59
A7
A70
A71
A96
A97
A98
A99
A65
A64
Control Valve
Air Intake
Air Exhaust
Control Valve
Variable Oil Pump
Control Signal
CAN H
CAN L
Ground
Ground
Ground
Ground
P-CAN H
P-CAN L
Engine Control Module (ECU)
ECU(A) B-045
ECU(B) E-018

ES6007001

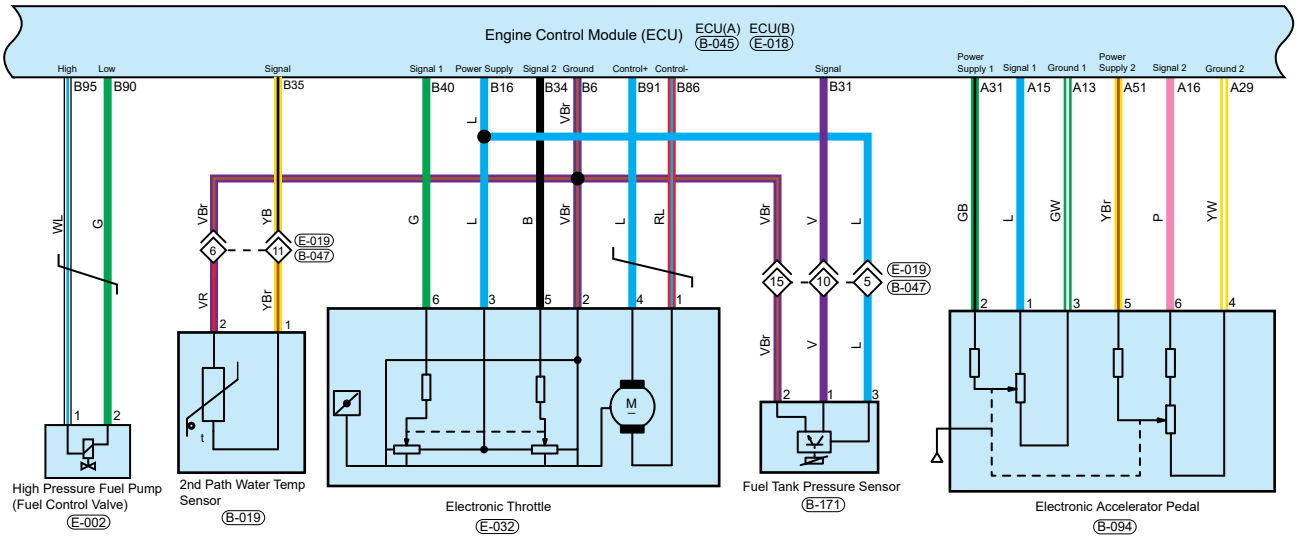

Battery
Central F/R Box
B-035 H
B-040 G
E-034 A
E-035 B
Central Main F/R Box
P-004
350A
P-003
EF10
15A
Starter Relay (ERLY15)
Start Stop Relay (ERLY10)
30A
EF21
10A
A3
H34
H28
B12
RY
B11
H2
B15
G8
B13
RB
Electronic Thermostat
E-023
Upstream Oxygen Sensor
E-016
Downstream Oxygen Sensor
E-041
GB
VBr
G
LW
W
Gr
WR
OB
YGr
RW
Br
Y
R
E-019
B-047
A60
A62
A49
A67
A48
A66
A61
A28
A8
A5
A1
A57
Control Signal
Heating
VM
UN
IP
IA
Ground
Signal
Control End
State Feedback
GB-056
Starter Terminal
P-002
Start Motor
E-027
B+
Engine Control Module (ECU)
ECU(A)
B-045
ECU(B)
E-018
ES6008001

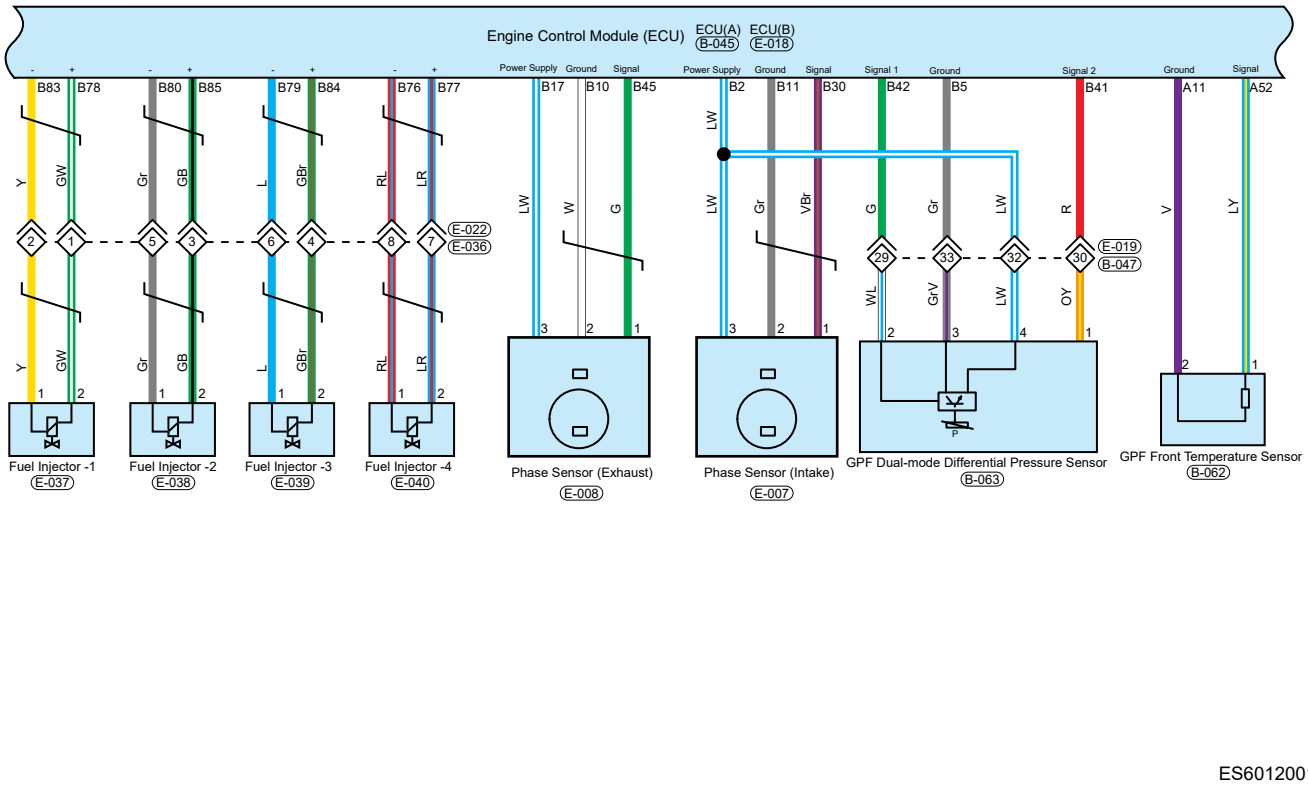

Battery
Central Main F/R Box
P-004
B-028
MF01
150A
Central F/R Box
E-034 A
B-039 C
B-029 R7
B-036 E
EF50
60A
EF16
10A
EF12
10A
IP F/R Box
B-081
B-084 C4
Oil Pump Relay Module
C4-16
C4-9
C4-15
R7
C8
E9
RW
Continuously Variable Cooling Fan
B-018
G
Br
GB-020
A39
Control Signal
Canister Close Valve
B-172
Y
A58
Canister Close Valve
Brake SW
B-093
BL
GY
A56
Normally Closed
A55
Normally Open
Brake Pedal Input
Body Domain Controller (BDM)
J2 B-091
2-12
Brake Signal Input
ESP&EPB
B-058
39
Oil Pump Controller
B-144
M
L
LR
Br
R
WY
34
42
35
B-118
I-002
B18
B19
B25
Fuel Signal Input
Fuel Auxiliary Signal
Fuel Ground
Audio Head Unit - B I-060
GB-139
A26
Enable Signal
A23
Relay Control
Engine Control Module (ECU)
ECU(A) B-045
ECU(B) E-018

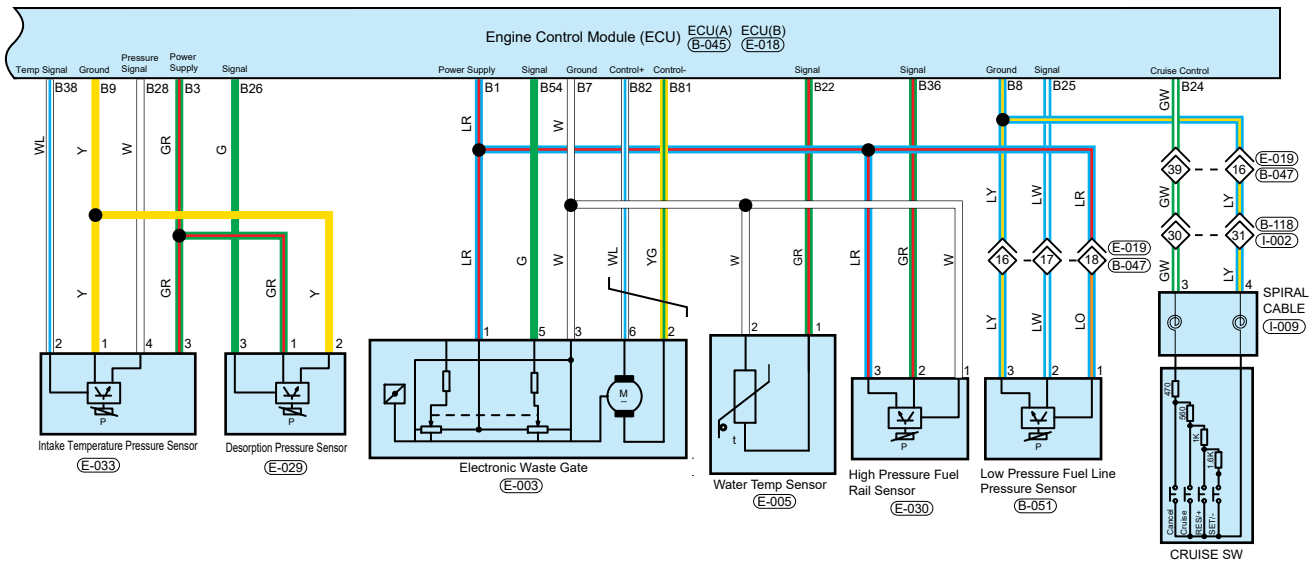
ES6009001


Battery
Central Main F/R Box
P-004
B-028
150A
Central F/R Box
B-035 H
E-034 A
Electronic Vacuum Pump Relay (ERLY01)
86
30
85
87
20A
IP F/R Box
B-081
B-084 C4
A/C Compressor Relay Module
C4-7
C4-6
H29
A1
RY
RL
E-019
B-047
44
Electronic Vacuum Pump
B-026
GB-056
A/C Compressor Clutch SW
E-024
GE-014
Brake Vacuum Sensor
B-050
Knock Sensor
E-026
GE-025
Speed Sensor
E-004
Boost Pressure Sensor
B-007
Pressure sensor
B-010
A21
Control
A24
Control
A27
Signal
A9
Ground
A14
Power Supply
B46
Signal A
B47
Signal B
B20
Ground
B57
Signal
B18
Power Supply
B29
Temp Signal
B27
Pressure Signal
A12
Ground
A18
Power Supply
A34
Pressure Signal
Engine Control Module (ECU)
ECU(A) B-045
ECU(B) E-018

ES6010001


Engine Control Module (ECU)
ECU(A) B-045
ECU(B) E-018
High
Low
Signal
Signal 1
Power Supply
Signal 2
Ground
Control+
Control-
Signal
Power Supply 1
Signal 1
Ground 1
Power Supply 2
Signal 2
Ground 2
B95
B90
B35
B40
B16
B34
B6
B91
B86
B31
A31
A15
A13
A51
A16
A29
WL
G
VBr
YB
VR
YBr
L
B
RL
V
GB
GW
YBr
P
YW
E-019
B-047
High Pressure Fuel Pump (Fuel Control Valve)
E-002
2nd Path Water Temp Sensor
B-019
Electronic Throttle
E-032
Fuel Tank Pressure Sensor
B-171
Electronic Accelerator Pedal
B-094
ES6011001


Engine Control Module (ECU)
ECU(A) B-045
ECU(B) E-018
Power Supply
Ground
Signal
Signal 1
Signal 2
B83
B78
B80
B85
B79
B84
B76
B77
B17
B10
B45
B2
B11
B30
B42
B5
B41
A11
A52
Y
GW
Gr
GB
L
GBr
RL
LR
LW
W
G
Gr
V/Br
WL
GrV
R
OY
V
LY
E-022
E-036
E-019
B-047
Fuel Injector -1
E-037
Fuel Injector -2
E-038
Fuel Injector -3
E-039
Fuel Injector -4
E-040
Phase Sensor (Exhaust)
E-008
Phase Sensor (Intake)
E-007
GPF Dual-mode Differential Pressure Sensor
B-063
GPF Front Temperature Sensor
B-062
ES6012001



4 Diagnosis & Testing

4.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
Engine does not crank or cranks slowly while starting	Battery
	Starter
	Wire harness or ENGINE START STOP switch
	Starter relay
	ECU, TCU
	Engine mechanical
Engine cranks normally but cannot start successfully while starting	No fuel in tank
	Fuel pump
	Fuel injector

Symptom	Possible Cause
	Engine speed sensor
	Ignition coil
	Engine immobilizer
	ECU
	Engine mechanical
Difficult to start with hot engine	Engine speed sensor
	Ignition coil
	Fuel pump
	Coolant temperature sensor
	Engine mechanical
	Camshaft sensor
Difficult to start with cold engine	Fuel pump
	Coolant temperature sensor
	Fuel injector
	Ignition coil
	Engine mechanical
Engine speed is normal, but it is difficult to start at anytime	Fuel quality
	Fuel pump
	Coolant temperature sensor
	Fuel injector
	Ignition coil
	Intake passage
	Ignition timing
	Spark plug
	Engine mechanical
Engine starts normally, but idles roughly at anytime	Fuel quality
	Fuel pump
	Coolant temperature sensor
	Fuel injector
	Electronic throttle body
	Intake passage
	Ignition timing
	Spark plug

Symptom	Possible Cause
	Engine mechanical
Engine starts normally, but idles roughly after warming up	Fuel quality
	Coolant temperature sensor
	Electronic throttle body
	Intake manifold
	Spark plug
	Engine mechanical
Engine starts normally, but idles roughly or stalls with part load (for example, A/C is ON)	Electronic throttle
	Generator
Engine starts normally, but idle speed is too high	Electronic throttle body
	Intake pipe air leaked
	Coolant temperature sensor
Low engine speed or stalls when accelerating	Intake pressure sensor
	Intake pipe
	Exhaust pipe
	Ignition timing
	Throttle position sensor
	Fuel injector
	Spark plug
Slow response when accelerating	Intake pressure sensor
	Intake pipe
	Exhaust pipe
	Ignition timing
	Throttle position sensor
	Fuel injector
	Spark plug
Lack of power and poor performance when accelerating	Intake pressure sensor
	Intake pipe
	Exhaust pipe
	Ignition timing
	Throttle position sensor
	Fuel injector
	Spark plug

4.2 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the engine control system.

1	**Vehicle brought to workshop**

Next

2	**Examine vehicle and check basic items**

Check system power supply voltage, and check that fuse, wire harness and connector are connected normally.

OK

Standard voltage: Not less than 12 V.

NG → **Check and replace malfunctioning parts.**

OK

3	**Using a diagnostic tester, read related DTC and data stream information**

Result

Result	Proceed to
No DTC	A
DTC occurs	B

A → **Perform troubleshooting procedure without DTCs according to malfunction symptom.**

B

4	**Troubleshoot according to DTCs troubleshooting procedure**

Result

Result	Proceed to
Problem is not resolved	A
Problem is resolved	B

A → **Return to procedure 1 and troubleshoot the process again.**

B

5	**According to airbag system malfunction repair completion inspection and delivery, confirm that malfunction is resolved**

Result

Result	Proceed to
Delivery inspection is failed	A
Delivery inspection is qualified	B

A

Return to procedure 1 and troubleshoot the process again.

B

6	**Finished**

4.3 DTC Confirmation Procedure

Confirm that battery voltage is normal before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in engine system.
- Turn ENGINE START STOP switch to OFF and wait for several seconds.
- Turn ENGINE START STOP switch to "ON", and then select read DTC.
- If DTC is detected, it indicates current malfunction. Go to inspection procedure - Step 1.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.4 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Check engine system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.5 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.6 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P000A00	"A" Camshaft Position Slow Response Bank 1	The actual position of VVT has poor follow-up to the target position	1. Insufficient OCV oil valve pressure 2. OCV oil valve is blocked or leaking	1. Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking) 2. Check if operating condition of OCV oil control valve is normal
P003C00	"A" Camshaft Profile Control Performance/ Stuck Off Bank 1	The actual position of VVT cannot be moved to the vicinity of the target position	1. Insufficient OCV oil valve pressure 2. OCV oil valve is blocked or leaking	1. Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking) 2. Check if operating condition of OCV oil control valve is normal
P000B00	"B" Camshaft Position Slow Response Bank 1	The actual position of VVT has poor follow-up to the target position	1. Insufficient OCV oil valve pressure 2. OCV oil valve is blocked or leaking	1. Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking) 2. Check if operating condition of OCV oil control valve is normal
P005A00	"B" Camshaft Profile Control Performance/ Stuck Off Bank 1	The actual position of VVT cannot be moved to the vicinity of the target position	1. Insufficient OCV oil valve pressure 2. OCV oil valve is blocked or leaking	1. Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking) 2. Check if operating condition of OCV oil control valve is normal
P001000	“A” Camshaft Position Actuator Control Circuit Open Bank 1	Drive channel self-diagnosis is malfunctioning	1. Open circuit in intake VVT control circuit corresponding pin 2. Connector looseness or open 3. Actuator side circuit is damaged	1. Open in intake VVT control circuit corresponding pin 2. Connector looseness or poor contact 3. Intake VVT circuit is damaged 4. ECU control pin corresponding to VVT is malfunctioning
P001300	“B” Camshaft Position Actuator	Drive channel self-diagnosis is malfunctioning	1. Open circuit in exhaust VVT control circuit	1. Open circuit in exhaust VVT control circuit

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Control Circuit Open Bank 1		corresponding pin 2. Connector looseness or open 3. Actuator side circuit is damaged	corresponding pin 2. Connector looseness or poor contact 3. Intake VVT circuit is damaged 4. ECU control pin corresponding to VVT is malfunctioning
P001676	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A	Relative position self-learning deviation absolute value of intake camshaft and crankshaft is greater than 20 degrees of crankshaft angle	1. Installation deviation	1. Check if relative installation position of crankshaft and intake camshaft is correct
P001678	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A	Absolute value of offset deviation between intake camshaft and crankshaft is greater than 15 degrees of crankshaft angle	1. Intake camshaft is aging and twisted	1. Check whether the position of intake camshaft has a large deviation from the installation
P001776	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B	Relative position self-learning deviation absolute value of exhaust camshaft and crankshaft is greater than 20 degrees of crankshaft angle	1. Installation deviation	1. Check if relative installation position of crankshaft and exhaust camshaft is correct
P001778	Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B	Absolute value of offset deviation between exhaust camshaft and crankshaft is greater than 15 degrees of crankshaft angle	1. Exhaust camshaft is aging and twisted	1. Check if exhaust camshaft position has a large deviation from that during installation.
P003000	HO2S Heater Control Circuit Bank 1 Sensor 1	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Open circuit exists in upstream oxygen sensor heater control circuit pin terminal 3. Upstream oxygen sensor heater control circuit power supply terminal is not connected to main relay 4. Sensor is damaged 5. Open or internal circuit damage in upstream oxygen sensor heater pin circuit corresponding to ECU terminal	1. Check connector for looseness or poor contact 2. Open circuit in upstream oxygen sensor heater control circuit pin terminal 3. Upstream oxygen sensor heater control circuit power supply terminal is not connected to main relay 4. Sensor is damaged 5. Open circuit or internal circuit damage in upstream oxygen sensor heater pin circuit corresponding to ECU terminal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P003100	HO2S Heater Control Circuit Low Bank 1 Sensor 1	Drive channel self-diagnosis is malfunctioning	1. Upstream oxygen sensor heater control circuit pin terminal is short to ground 2. Upstream oxygen sensor heater control circuit power supply terminal is grounded 3. Upstream oxygen sensor heater pin corresponding to ECU terminal is short to ground	1. Check if upstream oxygen sensor heater control circuit pin terminal is short to ground 2. Check if upstream oxygen sensor heater control circuit power supply terminal is grounded 3. Check if upstream oxygen sensor heater pin corresponding to ECU terminal is short to ground
P003200	HO2S Heater Control Circuit High Bank 1 Sensor 1	Drive channel self-diagnosis is malfunctioning	1. Upstream oxygen sensor heater control circuit pin terminal is short to power supply 2. Upstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply	1. Check if upstream oxygen sensor heater control circuit pin terminal is short to power supply 2. Check if upstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply
P003313	Boost Discharge Control Valve Drive Circuit Open	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Open in boost discharge control valve drive circuit pin 3. Open or internal circuit damage in boost discharge control valve drive circuit pin corresponding to ECU terminal	1. Check connector for looseness or poor contact 2. Check for open in boost discharge control valve drive circuit pin 3. Check for open or internal circuit damage in boost discharge control valve drive circuit pin corresponding to ECU terminal
P003411	Boost Discharge Control Valve Drive Circuit Short to Ground	Drive channel self-diagnosis is malfunctioning	1. Short to ground in boost discharge control valve drive circuit 2. Short to ground in boost discharge control valve drive circuit	1. Check for short to ground in boost discharge control valve drive circuit 2. Check for short to ground in boost discharge control valve drive circuit corresponding to ECU terminal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			corresponding to ECU terminal	
P003512	Boost Discharge Control Valve Drive Circuit Short to Power Supply	Drive channel self-diagnosis is malfunctioning	1. Short to power supply in boost discharge control valve drive circuit 2. Short to power supply in boost discharge control valve drive circuit corresponding to ECU terminal	1. Check for short to power supply in boost discharge control valve drive circuit 2. Check for short to power supply in boost discharge control valve drive circuit corresponding to ECU terminal
P003600	HO2S Heater Control Circuit Bank 1 Sensor 2	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Open in downstream oxygen sensor heater control pin 3. Downstream oxygen sensor heater power supply terminal is not connected to main relay 4. Sensor is damaged 5. Open or internal circuit damage in downstream oxygen sensor heater pin corresponding to ECU terminal	1. Check connector for looseness or poor contact 2. Check for open in downstream oxygen sensor heater control pin 3. Check if downstream oxygen sensor heater power supply terminal is not connected to main relay 4. Check if sensor is damaged 5. Check for open or internal circuit damage in downstream oxygen sensor heater pin corresponding to ECU terminal
P003700	HO2S Heater Control Circuit Low Bank 1 Sensor 2	Drive channel self-diagnosis is malfunctioning	1. Downstream oxygen sensor heater control circuit pin terminal is short to ground 2. Downstream oxygen sensor heater control circuit power supply terminal is ground 3. Downstream oxygen sensor heater pin corresponding to ECU terminal is short to ground	1. Check if downstream oxygen sensor heater control circuit pin terminal is short to ground 2. Check if downstream oxygen sensor heater control circuit power supply terminal is grounded 3. Check if downstream oxygen sensor heater pin corresponding to ECU terminal is short to ground

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P003800	HO2S Heater Control Circuit High Bank 1 Sensor 2	Drive channel self-diagnosis is malfunctioning	1. Downstream oxygen sensor heater control circuit pin terminal is short to power supply 2. Downstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply	1. Check if downstream oxygen sensor heater control circuit pin terminal is short to power supply 2. Check if downstream oxygen sensor heater pin corresponding to ECU terminal is short to power supply
P003A22	Turbocharger/ Supercharger Boost Control "A" Position Exceeded Learning Limit	The zero point voltage learned for the first time exceeds the upper limit	1. Actuator status is inconsistent with SPEC 2. Closed position of actuator is blocked by foreign objects	1. Push the turbocharger to closed position manually, read position voltage to check if it is out of the range of SPEC 2. Check for foreign matter near turbocharger closed position
P003A21	Turbocharger/ Supercharger Boost Control "A" Position Exceeded Learning Limit	The zero point voltage learned for the first time exceeds the lower limit	1. Actuator status is inconsistent with SPEC 2. Closed position of actuator is blocked by foreign objects	1. Push the turbocharger to closed position manually, read position voltage to check if it is out of the range of SPEC 2. Check for foreign matter near turbocharger closed position
P003A72	Turbocharger/ Supercharger Boost Control "A" Position Exceeded Learning Limit	The zero point voltage learned exceeds the upper limit	1. Actuator status is inconsistent with SPEC 2. Closed position of actuator is blocked by foreign objects	1. Push the turbocharger to closed position manually, read position voltage to check if it is out of the range of SPEC 2. Check for foreign matter near turbocharger closed position
P003A73	Turbocharger/ Supercharger Boost Control "A" Position Exceeded Learning Limit	The zero point voltage learned exceeds the lower limit	1. Actuator status is inconsistent with SPEC 2. Closed position of actuator is blocked by foreign objects	1. Push the turbocharger to closed position manually, read position voltage to check if it is out of the range of SPEC 2. Check for foreign matter near turbocharger closed position
P024477	Turbocharger/ Supercharger Wastegate Actuator "A" Range/ Performance	The deviation between target position of turbocharger electronic waste gate and actual position exceeds the threshold	1. Actuator status is inconsistent with SPEC 2. Closed position of actuator is blocked by foreign objects	1. Check if electronic waste gate is stuck 2. Check if wire harness and connector are aging
P024437	Turbocharger/ Supercharger	The duty ratio of turbocharger electronic	1. Actuator status is	1. Check if electronic waste gate is stuck 2. Check if wire

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Wastegate Actuator "A" Range/ Performance	waste gate control exceeds the limit	inconsistent with SPEC 2. Closed position of actuator is blocked by foreign objects	harness and connector are aging
P256400	Turbocharger Boost Control Position Sensor "A" Circuit Low	The voltage of turbocharger electronic waste gate position sensor is below the limit	1. Sensor circuit short to ground 2. Pin corresponding to ECU short to ground	1. Check if electronic waste gate position sensor wire harness is short to ground
P256500	Turbocharger Boost Control Position Sensor "A" Circuit High	The voltage of turbocharger electronic waste gate position sensor is higher than the limit	1. Sensor circuit short to power supply or open 2. Pin corresponding to ECU short to power supply or open	Check electronic waste gate position sensor wire harness for short to power supply
P170300	Communication Failure of Supercharger Waste Gate Control Circuit	Communication failure of supercharger waste gate control circuit SPI	1. Communication failure of supercharger waste gate control circuit SPI	1. Check electronic waste gate control circuit for problem
P005300	HO2S Heater Resistance Bank 1 Sensor 1	Current internal resistance value is higher than the threshold value of corresponding working condition	1. Heating circuit failure 2. Oxygen sensor resistor deteriorated	1. Do not disconnect oxygen sensor connector, measure if voltage of oxygen sensor terminal No.1 wire of upstream oxygen sensor wire harness (white, heater power supply positive) is 12 V. 2. Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V. 3. Disconnect upstream oxygen sensor wire connector to remove upstream oxygen sensor. Place the oxygen sensor at room temperature to cool it down. Measure if resistance between sensor terminal No.1 interface (white, heater power supply positive) and No.2 interface (white, heater power supply grounded) is higher than 15 Ω with a multimeter when temperature of oxygen

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				sensor cools down to room temperature. (Oxygen sensor resistance measurement must be performed when temperature of oxygen sensor cools down to room temperature, as resistance is related to temperature.)
P005400	HO2S Heater Resistance Bank 1 Sensor 2	Current internal resistance value is higher than the threshold value of corresponding working condition	1. Heating circuit failure 2. Oxygen sensor resistor deteriorated	1. Do not disconnect oxygen sensor connector, measure if voltage of oxygen sensor terminal No.1 wire of upstream oxygen sensor wire harness (white, heater power supply positive) is 12 V. 2. Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V. 3. Disconnect upstream oxygen sensor wire connector to remove upstream oxygen sensor. Place the oxygen sensor at room temperature to cool it down. Measure if resistance between sensor terminal No.1 interface (white, heater power supply positive) and No.2 interface (white, heater power supply grounded) is higher than 15 Ω with a multimeter when temperature of oxygen sensor cools down to room temperature. (Oxygen sensor resistance measurement must be performed when temperature of oxygen sensor cools down to room temperature, as resistance is related to temperature.)
P222900	Barometric Pressure Sensor "A" Circuit High	The sensor sends fault information by itself	1. The built-in ambient pressure sensor in ECU fails	1. Check if ambient pressure sensor signal valve is too high or low
P222800	Barometric Pressure Sensor "A" Circuit Low Problem			
P222722	Barometric Pressure Sensor	The sensor sends fault information by itself	1. The built-in ambient	1. Check if ambient pressure sensor signal valve is

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	"A" Circuit Range/ Performance		pressure sensor in ECU fails	significantly different from the current atmospheric pressure
P222721	Barometric Pressure Sensor "A" Circuit Range/ Performance			
P222785	Barometric Pressure Measurement System - Multiple Sensor Correlation Bank 1			
P222784	Barometric Pressure Measurement System - Multiple Sensor Correlation Bank 1			
P120200	Barometric Pressure Sensor "A" Circuit Range/ Performance			
P120300	Barometric Pressure Sensor "A" Circuit Range/ Performance			
P008985	Fuel Pressure Regulator 1 Performance-Pressure Too Low	PID control deviation of high pressure oil supply is higher than 5MPa	1. Oil passage leaks 2. Fuel is insufficient 3. Low pressure oil pump is damaged 4. The working capacity of high pressure oil pump is reduced	1. Check oil passage for leakage 2. Check if fuel is insufficient 3. Check if low pressure oil pump is damaged 4. Check if the working capacity of high pressure oil pump is reduced
P008984	Fuel Pressure Regulator 1 Performance-Pressure Too High	PID control deviation of high pressure oil supply is lower than -5MPa	1. High pressure oil pump control failure 2. Pressure relief valve blocked	1. Check if high pressure oil pump control is normal 2. Check relief valve for blockage or abnormal operation
P008700	Fuel Rail/System Pressure - Too Low	High pressure fuel rail pressure control deviation is lower than -3MPa	1. Oil passage leaks 2. Fuel is insufficient 3. Low pressure oil pump is damaged 4. The working capacity of high pressure	1. Check oil passage for leakage 2. Check if fuel is insufficient 3. Check if low pressure oil pump is damaged 4. Check if the working capacity of high pressure oil pump is reduced

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			oil pump is reduced	
P008800	Fuel Rail/System Pressure - Too High	High pressure fuel rail pressure control deviation is higher than 3MPa	1. High pressure oil pump control failure 2. Pressure relief valve blocked	1. Check if high pressure oil pump control is normal 2. Check relief valve for blockage or abnormal operation
P009000	Short Circuit in High Side Control Circuit and Low Side Control Circuit of Flow Control Valve	Drive channel self-diagnosis is malfunctioning	1. Short circuit in high side and low side control circuits of flow control valve	1. Check for short circuit in high side and low side control circuits of flow control valve
P009626	Intake Air Temp. Circ. Performance Non-plausible	The measured value of boost temperature sensor remains unchanged	1. Sensor aging deviation	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. With engine not started, observe if “Intake Temperature Sensor Measured Value” in data flow is too high. If value is higher than normal condition, observe maximum boost temperature range. You can also use a multimeter to measure if boost temperature sensor signal terminal voltage is close to or equal to 0 V. 2. Sensor aging deviation
P009800	Intake Air Temperature Sensor 2 Circuit High Bank 1	Temperature sensor voltage is higher than 4.9 V	1. Boost temperature sensor signal terminal is short to power supply or open 2. Open circuit in sensor reference ground 3. Short to power supply, open circuit or internal circuit damage in boost temperature sensor signal pin corresponding to ECU terminal 4. Sensor is damaged	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum intake manifold temperature range. You can also use a multimeter to measure if voltage between boost temperature sensor signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if sensor signal terminal is short to power supply or open 4. Check if sensor reference ground is open 5. Check if sensor is damaged 6. Check for short to power

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				supply, open circuit or internal circuit damage in boost temperature sensor signal pin corresponding to ECU terminal
P009700	Intake Air Temperature Sensor 2 Circuit Low Bank 1	Temperature sensor voltage is lower than 0.1 V	1. Boost temperature sensor signal terminal is short to ground 2. Boost temperature sensor signal pin corresponding to ECU terminal is short to ground	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum intake manifold temperature range. You can also use a multimeter to measure if voltage between boost temperature sensor signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if sensor signal terminal is short to ground 4. Check if boost temperature sensor signal pin corresponding to ECU terminal is short to ground
P009900	Intake Air Temperature Sensor 2 Circuit Intermittent/ Erratic Bank 1	Boost temperature sensor voltage discontinuity is higher than 4.9 V	1. Boost temperature sensor signal terminal is in poor contact 2. Connector is in poor contact 3. Boost temperature sensor signal pin corresponding to ECU terminal is in poor contact	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine, and observe if “Intake Temperature Sensor Measured Value” in data flow is too low. If value is lower than normal condition, observe minimum boost temperature range. You can also use a multimeter to measure if voltage between boost temperature sensor signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check sensor signal terminal for poor contact 4. Check boost temperature sensor signal pin corresponding to ECU terminal for poor contact
P01062A	Manifold Absolute	The difference between intake pressure value and	1. Sensor is icing and oily 2.	1. Do not start engine, and observe if “Intake

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Pressure Sensor Circuit Range/ Performance	initial pressure value at startup is always less than 20 hPa	Sensor installation position is incorrect 3. Intake line is detached or leaks air seriously	Pressure” item in data flow is seriously deviated from ambient pressure by about 101 kpa (specific value is related to current pressure). 2. Turn ENGINE START STOP switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of sensor, which will affect normal measurement. 3. Check if intake pressure sensor installation position is incorrect, intake line is detached or seriously air leaked.
P010622	Manifold Absolute Pressure Sensor Circuit Range/ Performance	The intake pressure value exceeds the reasonableness threshold	1. Sensor is icing and oily 2. Sensor is aging 3. Intake line is detached or leaks air seriously	1. Do not start engine, and observe if “Intake Pressure” item in data flow is seriously deviated from ambient pressure by about 101 kpa (specific value is related to current pressure). 2. Turn ENGINE START STOP switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of sensor, which will affect normal measurement. 3. Check if intake pressure sensor installation position is incorrect, intake line is detached or seriously air leaked.
P010621	Manifold Absolute Pressure Sensor Circuit Range/ Performance			
P120000	Manifold Absolute Pressure Sensor Circuit Range/ Performance			
P120100	Manifold Absolute Pressure Sensor Circuit Range/ Performance			
P00C721	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1			
P00C722	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1			
P120400	Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance	The boost pressure value exceeds the reasonableness threshold	1. Sensor is icing and oily 2. Sensor is aging 3. Intake line is detached or	1. Turn ENGINE START STOP switch to “OFF”, check if there is any freeze, oil stain, etc. on measurement terminal of

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P120500	Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance		leaks air seriously	sensor, which will affect normal measurement. 2. Check if boost pressure sensor installation position is incorrect, intake line is detached or seriously air leaked.
P023622	Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance			
P023621	Turbocharger/ Supercharger Boost Sensor "A" Circuit Range/ Performance			
P010700	Manifold Absolute Pressure Sensor Circuit Low	Sensor voltage is lower than the threshold	1. Intake pressure sensor signal terminal is short to ground 2. 5 V reference voltage of sensor is open 3. Short to ground in intake pressure sensor signal pin corresponding to ECU terminal	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine, use a multimeter to measure if voltage of intake manifold pressure sensor signal terminal is close to or equal to 0 V. 2. Turn ENGINE START STOP switch to “OFF”, check if pressure sensor signal terminal is short to ground 3. Check if sensor 5 V reference voltage terminal is open 4. Check if intake pressure sensor signal pin terminal corresponding to ECU terminal is short to ground
P010800	Manifold Absolute Pressure Sensor Circuit High	Sensor voltage is higher than the threshold	1. Intake manifold pressure sensor signal terminal is short to power supply or open 2. Sensor reference ground terminal is open 3. Short circuit to power supply or open circuit in intake pressure sensor signal pin terminal corresponding to ECU terminal 4. Sensor is damaged	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine, use a multimeter to measure if voltage between intake manifold pressure sensor signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if intake manifold pressure sensor signal terminal is short to power supply or open 4. Check if sensor reference ground terminal is open 5. Check if sensor is damaged 6. Check for short to power supply, open circuit or internal circuit damage in intake pressure sensor

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				signal pin terminal corresponding to ECU terminal
P011126	Improper Intake Temperature Sensor 1 Signal (Stuck)	No fluctuations in intake temperature sensor measured value	1. Intake manifold temperature sensor signal terminal circuit interference 2. Sensor is damaged	1. Check whether there is interference or contact resistance in signal end circuit of intake manifold temperature sensor 2. Sensor is damaged
P011200	Intake Air Temperature Sensor 1 Circuit Low Bank 1	Temperature sensor voltage is lower than 0.1 V	1. Intake manifold temperature sensor signal terminal short to ground 2. Sensor is damaged	1. Use a multimeter to measure if intake temperature sensor signal terminal voltage is close to or equal to 0 V. 2. Turn ENGINE START STOP switch “OFF”, and check if intake manifold temperature sensor signal terminal is short to ground. 3. Sensor is damaged 4. Intake manifold temperature sensor signal pin corresponding to ECU terminal is short to ground.
P011300	Intake Air Temperature Sensor 1 Circuit High Bank 1	Temperature sensor voltage is higher than 4.9 V	1. Intake manifold temperature sensor signal terminal is short to power supply or open 2. Open circuit in sensor reference ground 3. Short circuit to power supply, open circuit or internal circuit damage in intake manifold temperature sensor signal pin corresponding to ECU terminal 4. Sensor is damaged	1. Use a multimeter to measure if voltage between intake manifold temperature sensor signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if sensor signal terminal is short to power supply or open 4. Check if sensor reference ground is open 5. Check if sensor is damaged 5. Check for short to power supply, open circuit or internal circuit damage in intake manifold temperature sensor signal pin corresponding to ECU terminal
P011400	Intake Air Temperature Sensor 1 Circuit Intermittent/ Erratic Bank 1	Temperature sensor voltage discontinuity is higher than 4.9 V	1. Poor contact in intake manifold temperature sensor signal terminal 2. Poor contact in connector 3.	1. Use a multimeter to measure if voltage between intake manifold temperature sensor signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			Poor contact in intake manifold temperature sensor signal pin corresponding to ECU terminal	for looseness or poor contact 3. Check sensor signal terminal for poor contact 4. Check intake manifold temperature sensor signal pin corresponding to ECU terminal for poor contact
P00CE23	Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 1	The intake air temperature sensor deviates too much from the average model during cold start	1. Internal resistance of intake air temperature sensor is unreasonable	1. Check wire harness for contact resistance 2. Check if internal resistance value of sensor greatly deviates from the normal value
P00CE24	Intake Air Temperature Sensor 1 Multiple Check Bank1			
P138024	Intake Air Temperature Sensor 2 Multiple Check Bank1			
P138023	Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 2			
P011623	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	Coolant temperature sensor 1 signal is less than 30℃ of lowest model value	1. Internal resistance of coolant temperature sensor is unreasonable	1. Check wire harness for contact resistance 2. Check if internal resistance value of sensor greatly deviates from the normal value
P011626	Engine Coolant Temperature Sensor 1 Circuit Range/ Performance	Coolant temperature sensor 1 signal remains unchanged		
P050C24	Cold Start Engine Coolant Temperature Performance	Deviation of coolant temperature sensor 1 cold start and the model value is too large		
P050C23	Cold Start Engine Coolant Temperature Performance	Deviation of coolant temperature sensor 1 cold start and the model value is too large		
P011700	Engine Coolant Temperature Sensor 1 Circuit Low	Coolant temperature sensor 1 voltage is lower than 0.09 V	1. Coolant temperature sensor 1 signal terminal is short to ground 2. Short to ground	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. With engine not started, observe if "Coolant Temperature Sensor Measured Value" in

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			in coolant temperature sensor 1 signal pin corresponding to ECU terminal 3. Sensor is damaged	data flow is much higher than proper temperature range. You can also use a multimeter to measure if coolant temperature sensor 1 signal terminal voltage is close to or equal to 0 V. 2. Turn ENGINE START STOP switch to “OFF”, check if coolant temperature sensor 1 signal terminal is short to ground 3. Check if sensor is damaged 4. Check if coolant temperature sensor 1 signal pin terminal corresponding to ECU is short to ground
P011800	Engine Coolant Temperature Sensor 1 Circuit High	Coolant temperature sensor 1 voltage is higher than 4.9 V	1. Connector looseness or poor contact 2. Short to power supply or open in coolant temperature sensor signal terminal 3. Short to power supply or open in coolant temperature sensor signal pin corresponding to ECU terminal 4. Sensor is damaged	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine and observe if "-Intake Temperature Sensor Measured Value" in data flow is much lower than current ambient temperature. You can also use a multimeter to measure if voltage between coolant temperature sensor 1 signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if sensor signal terminal is short to power supply or open 4. Check if sensor reference ground is open 5. Check if sensor is damaged 6. Short to power supply, open circuit or internal circuit damage in coolant temperature sensor signal pin terminal corresponding to ECU
P011900	Engine Coolant Temperature Sensor 1 Circuit Intermittent	Coolant temperature sensor voltage jumps	1. Coolant temperature sensor signal terminal circuit is in poor contact	1. Check signal terminal circuit of coolant temperature sensor for poor contact
P012800	Coolant Thermostat (-Coolant Temperature Below Thermostat	Coolant temperature below thermostat regulating temperature	1. Thermostat normally open 2. Coolant temperature sensor measurement value offset	1. Check if thermostat is normally open or damaged 2. Coolant temperature sensor signal pin terminal corresponding to ECU is short to power supply, open

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Regulating Temperature)			or there is an internal circuit damage
P013100	Upstream Oxygen Sensor Signal Circuit Voltage Too Low (APE IPE RE Wire Short to Ground)	Upstream oxygen sensor signal line IA, IP, UN, VM signal is zero	1. The signal circuit voltage of upstream oxygen sensor is too low (APE IPE RE circuit is short to ground)	1. Start vehicle, idle it and slightly change accelerator pedal opening for a period of time, pierce wire harness connector with red tip of a multimeter to close to red (IP), yellow (VM), green (IA), and black (UN) wire insulation layer of ECU terminal, connect black tip to ground, and check if voltage is short. 2. Replace LSU oxygen sensor, check if failure will continue to be reported. 3. Check for abnormality in processing circuit of LSU in ECU.
P013200	Upstream Oxygen Sensor Signal Circuit Voltage Too High (APE IPE RE Wire Short to Power Supply)	Upstream oxygen sensor signal line IA, IP, UN, VM signal is always high	1. Upstream oxygen sensor signal circuit voltage is too high (APE IPE RE wire is short to power supply)	1. Start the vehicle, keep it idling and slightly change the accelerator pedal to run for a period of time, puncture the red (IP), yellow (VM), green (IA), and black (UN) wire insulation layer of wire harness connector near ECU terminal with the red probe of a multimeter, ground the black probe, and check whether the voltage is always high and has small changes. 2. Replace LSU oxygen sensor, check if failure will continue to be reported. 3. Check for abnormality in processing circuit of LSU in ECU.
P013300	O2 Sensor Circuit Slow Response Bank 1 Sensor 1	The dynamic factor of upstream oxygen sensor is less than the threshold	1. The oxygen sensor is aging and the response becomes slow	1. Check intake system and exhaust system for air leakage. 2. Replace upstream LSU oxygen sensor, return vehicle to the customer, and check whether fault reappears.
P013600	O2 Sensor Circuit Bank 1 Sensor 2	The voltage range of downstream oxygen sensor exceeds the limit	1. Oxygen sensor signal wire is short to heating power supply ground wire 2. Oxygen sensor is damaged	1. Do not disconnect oxygen sensor connector, measure if voltage of oxygen sensor terminal No.1 wire of downstream oxygen sensor wire harness (white, heater power supply positive) is 12 V. 2. Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire harness oxygen sensor

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				terminal No.2 wire (white, heater power supply grounded) is 12 V. 3. Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is about 0.45 V. 4. Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.4 wire (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal grounded) is changed between 0 V and 1 V. 5. Start and keep vehicle idling until coolant temperature reaches normal value. Disconnect downstream oxygen sensor connector, and check for short circuit between oxygen sensor terminal No.2 wire (white, heater power grounded) and No.4 wire (black, oxygen sensor signal wire). 6. Connect downstream oxygen sensor connector properly, repeat steps 5-6 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.
P013700	Downstream Oxygen Sensor Signal Circuit Short to Ground	The downstream oxygen sensor voltage range is less than 0.06 V	1. Downstream oxygen sensor signal circuit is short to ground	1. Do not disconnect oxygen sensor connector, measure if voltage between ECU terminal No.2 wire of downstream oxygen sensor wire harness (black, oxygen sensor signal wire) and No.1 wire (gray, oxygen sensor signal ground) is about 0.45 V. 2. Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.2 wire

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				(black, oxygen sensor signal wire) and No.1 wire (gray, oxygen sensor signal grounded) is changed between 0 V and 1 V. 3. Disconnect downstream oxygen sensor connector and measure if sensor terminal No.1 wire (gray, oxygen sensor signal ground) and No.2 wire (-black, oxygen sensor signal wire) are short with a multimeter. 4. Connect downstream oxygen sensor connector properly, repeat steps 3-4 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.
P013800	Downstream Oxygen Sensor Signal Circuit Short to Power Supply	The downstream oxygen sensor voltage range is higher than 1.2 V	1. Downstream oxygen sensor signal circuit is short to power supply	1. Do not disconnect oxygen sensor connector, measure if voltage of oxygen sensor terminal No.4 wire of downstream oxygen sensor wire harness (white, heater power supply positive) is 12 V. 2. Do not disconnect oxygen sensor connector and measure if voltage of downstream oxygen sensor wire harness oxygen sensor terminal No.3 wire (white, heater power supply grounded) is 12 V. 3. Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.2 wire (black, oxygen sensor signal wire) and No.1 wire (gray, oxygen sensor signal ground) is about 0.45 V. 4. Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector, measure if voltage between downstream oxygen sensor wire ECU terminal No.2 wire (black, oxygen sensor signal wire) and No.1 wire (gray, oxygen sensor signal grounded) is changed between 0 V and 1 V. 5. Disconnect downstream oxygen sensor connector and measure if there is short

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				circuit between sensor terminal No.4 wire (white, heater power supply positive) and No.2 wire (- black, oxygen sensor signal wire) with a multimeter. 6. Connect downstream oxygen sensor connector properly, repeat steps 5-6 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.
P019200	High Pressure Fuel Rail Pressure Sensor Circuit Voltage Too Low	Fuel rail pressure sensor circuit voltage is lower than 0.2 V	1. Fuel rail pressure sensor circuit is short to ground 2. Fuel rail pressure sensor pin corresponding to ECU is short to ground	1. Check if sensor signal terminal is short to ground 2. Check if sensor is damaged 3. Check for short circuit to power supply, open circuit or internal circuit damage in fuel rail pressure sensor signal pin corresponding to ECU terminal
P019300	High Pressure Fuel Rail Pressure Sensor Circuit Voltage Too High	Fuel rail pressure sensor circuit voltage is higher than 4.8 V	1. Fuel rail pressure sensor circuit is short to power supply 2. Fuel rail pressure sensor pin corresponding to ECU is short to power supply	1. Check if sensor signal terminal is short to power supply or open 2. Check if sensor is damaged 3. Check for short circuit to power supply, open circuit or internal circuit damage in fuel rail pressure sensor signal pin corresponding to ECU terminal
P019400	Fuel Rail Pressure Sensor Circuit Intermittent/ Erratic Bank 1	The maximum fluctuation value of fuel rail pressure sensor signal voltage before and after fuel injection is lower than the threshold	1. Fuel rail pressure sensor is damaged 2. Injector is blocked or damaged 3. High pressure fuel rail is abnormal	1. Replace the fuel rail pressure sensor, start vehicle for 10 minutes and check if the fault reappears 2. Replace the fuel injector, start vehicle for 10 minutes and check if the fault reappears 3. Check if high pressure fuel rail system is abnormal 4. Repair or replace the corresponding components, start vehicle for 10 minutes and check if the fault reappears
P020113	Cylinder 1 Fuel Injector Control Circuit Open	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Open in fuel injector 3. Open in fuel injector power supply terminal or fuel injector damage 4. Open or internal circuit	1. Check connector for looseness or poor contact 2. Check for open in corresponding fuel injector circuit 3. Check for open in corresponding fuel injector power supply terminal or fuel injector damage 4. Check for open or internal circuit damage in injector
P020213	Cylinder 2 Fuel Injector Control Circuit Open			
P020313	Cylinder 3 Fuel Injector Control Circuit Open			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P020413	Cylinder 4 Fuel Injector Control Circuit Open		damage in injector control pin corresponding to ECU terminal	control pin corresponding to ECU
P230112	Ignition Coil "A" Primary Control Circuit High	Drive channel self-diagnosis is malfunctioning	1. Short circuit to power supply in ignition coil circuit 2. Short circuit to power supply in ignition coil power supply terminal 3. Short to power supply in ignition coil control pin corresponding to ECU	1. Check for short circuit to power supply in corresponding ignition coil circuit 2. Check for short circuit to power supply in ignition coil control pin corresponding to ECU
P230412	Ignition Coil "B" Primary Control Circuit High			
P230712	Ignition Coil "C" Primary Control Circuit High			
P231012	Ignition Coil "D" Primary Control Circuit High			
P230011	Ignition Coil "A" Primary Control Circuit Low	Drive channel self-diagnosis is malfunctioning	1. Connector is short to ground 2. Short to ground in ignition coil circuit 3. Short to ground in ignition coil control pin corresponding to ECU terminal	1. Check if connector is short to ground 2. Check for short circuit to ground in corresponding ignition coil circuit 3. Check for short circuit to ground in ignition coil control pin corresponding to ECU
P230311	Ignition Coil "B" Primary Control Circuit Low			
P230611	Ignition Coil "C" Primary Control Circuit Low			
P230911	Ignition Coil "D" Primary Control Circuit Low			
P026200	Cylinder 1 Fuel Injector Control Circuit Short to Power Supply	Drive channel self-diagnosis is malfunctioning	1. Injector circuit is short to power supply 2. Injector power supply terminal is short to power supply 3. Injector control pin corresponding to ECU is short to power supply	1. Check for short circuit to power supply in corresponding injector circuit 2. Check for short circuit to power supply in injector control pin corresponding to ECU
P026800	Cylinder 3 Injector "A" Circuit High			
P027100	Cylinder 4 Fuel Injector Control Circuit Short to Power Supply			
P026500	Cylinder 2 Injector "A" Circuit High			
P025100	Injection Pump Fuel Metering Control “A” (Cam/Rotor/ Injector)	Hardware circuit self-diagnostic	1. Open circuit in positive or negative control circuit of flow control valve 2. Open circuit in positive or	1. Check for open in actuator terminal 2. Check for open or internal circuit damage in actuator pin corresponding to ECU terminal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			negative control circuit of flow control valve corresponding to ECU	
P025400	Flow Control Valve High Side Control Circuit Voltage Too High or Too Low	Hardware circuit self-diagnostic	1. Flow control valve high side control circuit short to power supply or ground 2. Short to power supply or ground in high side control valve circuit corresponding to ECU	1. Check for short to power supply or ground in actuator terminal 2. Check for short to power supply or ground in actuator pin corresponding to ECU terminal
P025900	Injection Pump Fuel Metering Control "A" Low (Cam/Rotor/ Injector)	Hardware circuit self-diagnostic	1. Flow control valve low side control circuit short to power supply or ground 2. Short to power supply or ground in low side control valve circuit corresponding to ECU	1. Check for short to power supply or ground in actuator terminal 2. Check for short to power supply or ground in actuator pin corresponding to ECU terminal
P030000	Random/Multiple Cylinder Misfire Detected	Misfire counter exceeds threshold	1) Injector circuit failure 1) Ignition coil circuit failure 1) Injector control pin or ignition coil pin corresponding to ECU failure	1. Check for DTCs related to injector in corresponding cylinder 2. Check if connector is connected securely or detached 3. Check for open or short to ground or power supply in ignition coil signal terminal 4. Check for open or short to ground in ignition coil power supply terminal 5. Check for open or short to power supply in ignition coil grounded terminal 6. Check ignition coil itself for fault 7. Check if spark plug is abnormal 8. Check for open or internal circuit damage in ignition coil control pin corresponding to ECU
P030100	Cylinder 1 Misfire Detected			
P030200	Cylinder 2 Misfire Detected			
P030300	Cylinder 3 Misfire Detected			
P030400	Cylinder 4 Misfire Detected			
P036300	Misfire Detected - Fueling Disabled			
P033900	Crankshaft Position Sensor "A" Circuit Intermittent	Speed sensor signal failure counter exceeds the threshold	1. Connector looseness or disengagement 2. Open circuit in signal terminal 3. Sensor damage	1. Connector looseness or poor contact 2. Speed sensor signal terminal is open 3. Sensor signal terminal pin is short to power supply or ground, or short circuit between pins 4. Sensor is damaged 5. Pin
P261700	Crankshaft Position Signal Output Circuit Open			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				corresponding to speed sensor signal on ECU is faulty
P032700	Knock Sensor Signal Short to Ground (A)			1. Connector looseness or poor contact 2. Check knock sensor signal terminal pin for short to ground or open 3. Replace knock sensor, reconnect it, and check whether the fault is eliminated 4. Check for short to ground or open in knock sensor signal terminal pin corresponding to ECU terminal
P032714	Knock Sensor Signal Short to Ground (B)			
P032800	Knock Sensor Signal Short to Power Supply (A)			1. Connector looseness or poor contact 2. Check knock sensor signal terminal pin for short to power supply 3. Replace knock sensor, reconnect it, and check whether the fault is eliminated 4. Check for short to power supply in knock sensor signal terminal pin corresponding to ECU terminal
P032815	Knock Sensor Signal Short to Power Supply (B)			
P032500	Knock Sensor Signal Circuit Voltage Too Low	The average value of knock sensor port voltage is less than 0.7 V	1. Connector looseness or disengagement 2. Open circuit in signal terminal 3. Sensor damage	1. Check connector for looseness or poor contact 2. Check for short to ground or open in knock sensor signal terminal 3. Check if knock sensor connecting wire harness is non-standard shielding wire and is subjected to electromagnetic interference 4. Check if knock sensor is damaged 5. Check for damage in knock sensor pin or circuit corresponding to ECU terminal
P151000	Knock Control System Failure	The number of window length errors is higher than 4, and the number of non-measurement window output is higher than 28	1. Sensor is damaged 2. ECU is damaged	1. Check if knock sensor is damaged 2. Check if ECU is damaged
P032600	Knock/ Combustion Vibration Sensor 1 Circuit Bank 1 or Single Sensor	Knock background noise is greater than the maximum noise signal threshold	1. Sensor is damaged 2. ECU is damaged 3. Engine is abnormal	1. Check if knock sensor is damaged 2. Check if ECU is damaged 3. Check if engine is abnormal
P034100	Camshaft Position Sensor "A" Circuit	Sensor signal failure counter of intake camshaft phase	1. Connector looseness or disengagement	1. Check connector for looseness or poor contact 2. Check wire harness for

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Range/ Performance Bank 1 or Single Sensor	sensor exceeds the threshold	2. Relative installation position between intake phase sensor and its signal plate do not meet the installation requirements 3. Intake phase signal plate teeth mechanical malfunction	external interference 3. Check if relative installation position between intake phase sensor and its signal plate does not meet the installation requirements (- such as too far, misaligned, etc.) 4. Check for mechanical malfunction in intake phase signal plate teeth
P034200	Camshaft Position Sensor "A" Circuit Low Bank 1 or Single Sensor	Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold	1. Intake phase sensor power supply failure 2. Intake phase sensor signal terminal is short to ground 3. Intake phase sensor signal terminal ECU pin is short to ground	1. Unplug connector from intake phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V. 2. Check if the voltage between intake phase sensor signal terminal pin and ground terminal pin is 0 V 3. Check if intake phase sensor power supply terminal pin is open or short to ground, and if ground terminal pin is in poor contact 4. Check if intake phase sensor signal terminal pin is short to ground 5. Check if intake phase sensor signal terminal pin corresponding to ECU is short to ground
P034300	Camshaft Position Sensor "A" Circuit High Bank 1 or Single Sensor	Sensor signal failure counter of intake camshaft phase sensor exceeds the threshold	1. Intake phase sensor ground terminal failure 2. Intake phase sensor signal terminal is short to power supply 3. Intake phase sensor signal terminal ECU pin is short to power supply	1. Unplug connector from intake phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V. 2. Check if the voltage between intake phase sensor signal terminal pin and ground terminal pin is 12 V 3. Check if intake phase sensor ground terminal pin is open or short to power supply 4. Check if intake phase sensor signal terminal pin is short to power supply or open 5. Check for short to power supply, open circuit or internal circuit damage in intake phase

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				sensor signal terminal pin corresponding to ECU
P035113	Ignition Coil "A" Primary Control Circuit Failure	Drive channel self-diagnosis is malfunctioning	1. Short circuit to ground or open circuit in ignition coil circuit 2. Short circuit to ground or open circuit in ignition coil control pin corresponding to ECU	1. Check for short circuit to ground or open circuit in ignition coil circuit 2. Check for short circuit to ground or open circuit in ignition coil control pin corresponding to ECU
P035213	Ignition Coil "B" Primary Control Circuit Failure			
P035313	Ignition Coil "C" Primary Control Circuit Failure			
P035413	Ignition Coil "D" Primary Control Circuit Failure			
P036600	Exhaust Camshaft Phaser Sensor Signal Improper	Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold	1. Connector looseness or disengagement 2. Relative installation position between exhaust phase sensor and its signal plate do not meet the installation requirements 3. Exhaust phase signal plate teeth mechanical malfunction	1. Check connector for looseness or poor contact 2. Check wire harness for external interference 3. Check if relative installation position between intake phase sensor and its signal plate does not meet the installation requirements (- such as too far, misaligned, etc.) 4. Check for mechanical malfunction in exhaust phase signal plate teeth
P036700	Camshaft Position Sensor "B" Circuit Low (- Bank 1)	Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold	1. Exhaust phase sensor power supply failure 2. Exhaust phase sensor signal terminal is short to ground 3. Exhaust phase sensor signal terminal ECU pin is short to ground	1. Unplug connector from exhaust phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V. 2. Check if the voltage between exhaust phase sensor signal terminal pin and ground terminal pin is 0 V 3. Check for open or short to ground in exhaust phase sensor power supply terminal pin, and check if ground terminal pin is in poor contact 4. Check for short to ground in exhaust phase sensor signal terminal pin 5. Check for short to ground in exhaust phase sensor signal terminal pin corresponding to ECU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P036800	Camshaft Position Sensor "B" Circuit High (-Bank 1)	Sensor signal failure counter of exhaust camshaft phase sensor exceeds the threshold	1. Exhaust phase sensor ground terminal failure 2. Exhaust phase sensor signal terminal is short to power supply 3. Exhaust phase sensor signal terminal ECU pin is short to power supply	1. Unplug connector from exhaust phase sensor on wire harness, and use a multimeter to check if the voltage between power supply terminal and ground terminal pin of phase sensor is about 12 V. 2. Check if the voltage between signal terminal and power supply terminal pin of exhaust phase sensor is 12 V 3. Check if exhaust phase sensor ground terminal pin is open or short to power supply 4. Check if exhaust phase sensor signal terminal pin is short to power supply or open 5. Check for short to power supply, open circuit or internal circuit damage in exhaust phase sensor signal terminal pin corresponding to ECU
P06DA00	Engine Oil Pressure Control Circuit Open	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Secondary oil pump drive circuit pin is open 3. Open or internal circuit damage in secondary oil pump drive circuit pin corresponding to ECU terminal	1. Check connector for looseness or poor contact 2. Check for open in secondary oil pump drive circuit pin 3. Check for open or internal circuit damage in secondary oil pump drive circuit pin corresponding to ECU terminal
P06DB00	Engine Oil Pressure Control Circuit Low	Drive channel self-diagnosis is malfunctioning	1. Short to ground in secondary oil pump drive circuit 2. Short to ground in secondary oil pump drive circuit corresponding to ECU terminal	1. Check for short circuit to ground in secondary oil pump drive circuit pin 2. Check for short circuit to ground in secondary oil pump drive circuit pin corresponding to ECU terminal
P06DC00	Engine Oil Pressure Control Circuit High	Drive channel self-diagnosis is malfunctioning	1. Secondary oil pump drive circuit short to power supply 2. Short to power supply in secondary oil pump drive circuit	1. Check for short circuit to power supply in secondary oil pump drive circuit pin 2. Check for short circuit to power supply in secondary oil pump drive circuit pin corresponding to ECU terminal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			corresponding to ECU terminal	
P042000	Catalyst System Efficiency Below Threshold Bank 1	Calculated oxygen storage capacity of catalyst converter is lower than the threshold	1. Check exhaust system for leakage, gasket for damage 2. Catalytic converter is aging	1. Check exhaust system for air leakage, gasket for damage. 2. Replace the catalytic converter, return vehicle to the customer, and check whether fault reappears.
P044413	Evaporative Emission System Purge Control Valve Circuit Open	Drive channel self-diagnosis is malfunctioning	3. Connector looseness or poor contact 2. Canister control valve circuit is open 3. Charcoal canister control valve circuit corresponding to ECU terminal is open	1. Connector looseness or poor contact 2. Charcoal canister control valve signal terminal pin is open 3. Charcoal canister control valve power supply terminal pin is open 4. Charcoal canister control valve is damaged 5. Charcoal canister control terminal pin corresponding to ECU terminal is open, or there is an internal circuit damage
P045811	Evaporative Emission System Purge Control Valve Circuit Low	Drive channel self-diagnosis is malfunctioning	1. Canister control valve signal terminal is short to ground 2. Canister control terminal pin corresponding to ECU terminal is short to ground	1. Canister control valve signal terminal short to ground 2. Canister control valve power supply terminal pin short to ground 3. Canister control terminal pin corresponding to ECU terminal short to ground
P045912	Evaporative Emission System Purge Control Valve Circuit High	Drive channel self-diagnosis is malfunctioning	1. Canister control valve signal terminal is short to power supply 2. Canister control terminal pin corresponding to ECU terminal is short to power supply	1. Canister control valve signal terminal is short to power supply 2. Canister control terminal pin corresponding to ECU terminal is short to power supply
P050600	Idle Control System RPM - Lower Than Expected	Idle speed control speed is lower than the target idle speed 100r/min	1. Electronic throttle is stuck in a position with a small opening. 2. Check if intake manifold is leakage, injector is blocked, exhaust resistance is too	1. Check if electronic throttle is stuck in smaller opening position due to ice or oil. 2. Check if intake manifold is leakage, injector is blocked, exhaust resistance is too large, oil supply pressure is too low
P050A21	Cold Start Idle Control System Performance			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			large, oil supply pressure is too low	
P050700	Idle Control System RPM - Higher Than Expected	Idle speed control speed is higher than the target idle speed 200r/min	1. Electronic throttle is stuck in a position with a large opening 2. Check if system is air leaked, injector is leaked, oil supply pressure is too high	1. Check if electronic throttle is stuck in larger open position due to ice or oil. 2. Check if system is air leaked, fuel injector is leaked, oil supply pressure is too high
P050500	Idle Control System	Idle control speed fluctuates too much		
P050A22	Cold Start Idle Control System Performance	Idle control speed is higher than the target idle 200r/min during the heating process of catalytic converter		
P050D00	Cold Start Rough Idle	Engine idle fluctuates too much during the heating process of catalytic converter		
P056200	System Voltage Low	Power supply voltage is lower than 6 V	1. Open circuit in all ECU pins which are connected to battery or main relay 2. Battery electric leakage or damage	1. Connect diagnostic tester, turn ENGINE START STOP switch “OFF”. Measure battery voltage with a multimeter and check if it is too low. 2. Check for open circuits in all ECU pins which are connected to battery or main relay 3. Check if engine wire harness ground point is malfunctioning 4. Regulator is invalid 5. Battery leaks or is damaged 6. Alternator is malfunctioning
P056300	System Voltage High	Power supply voltage is higher than 20 V	1. Engine wire harness ground point is malfunction 2. Alternator regulator malfunction, motor power generation cannot be controlled effectively	1. Connect diagnostic tester, turn ENGINE START STOP switch “OFF”. Measure battery voltage with a multimeter and check if it is too high 2. Check engine wire harness ground point for malfunction 3. Generator regulator malfunction, motor power generation cannot be controlled effectively
P061500	Starter Relay "A" Circuit	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Starter relay control high terminal is open 3. Starter control high terminal pin corresponding to ECU terminal	1. Connector looseness or poor contact 2. Starter relay control high terminal is open 3. Starter relay 1 fuse is blown or damaged 4. Starter control high terminal pin corresponding to ECU terminal is open or damaged

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			is open or damaged	
P061600	Starter Relay “A” High Circuit Low	Drive channel self-diagnosis is malfunctioning	1. Starter control circuit high terminal is short to ground 2. Starter control high terminal pin corresponding to ECU is short to ground	1. Starter control circuit high terminal is short to ground 2. Starter control high terminal pin corresponding to ECU is short to ground
P061700	Starter Relay “A” Circuit High	Drive channel self-diagnosis is malfunctioning	1. Starter control circuit high terminal is short to power supply 2. Starter control high terminal pin corresponding to ECU is short to power supply	1. Starter relay control circuit high terminal is short to power supply 2. Starter control high terminal pin corresponding to ECU is short to power supply
P055700	Brake Booster Pressure Sensor Circuit Low	Sensor voltage is lower than the threshold	1. Brake vacuum sensor signal terminal is short to ground 2. 5 V reference voltage of sensor is open 3. Short to ground in brake vacuum sensor signal pin corresponding to ECU terminal	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine, use a multimeter to measure if voltage of brake vacuum sensor signal terminal is close to or equal to 0 V. 2. Turn ENGINE START STOP switch to “OFF”, check if brake vacuum sensor signal terminal is short to ground. 3. Check if sensor 5 V reference voltage terminal is open 4. Check if brake vacuum sensor signal pin terminal corresponding to ECU terminal is short to ground
P055800	Brake Booster Pressure Sensor Circuit High	Sensor voltage is higher than the threshold	1. Brake vacuum sensor signal terminal is short to power supply or open 2. Brake vacuum sensor reference ground terminal is open 3. Short to power supply or open in brake vacuum sensor signal pin terminal corresponding to ECU terminal	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start engine, use a multimeter to measure if voltage between brake vacuum sensor signal terminal and ground is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if brake vacuum sensor signal terminal is short to power supply or open 4. Check if sensor reference ground terminal is open 5. Check if

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			4. Sensor is damaged	sensor is damaged 6. Check for short to power supply, open circuit or internal circuit damage in brake vacuum sensor signal pin corresponding to ECU terminal
P064500	A/C Compressor Relay Control Circuit	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Open in A/C compressor relay control circuit 3. Open or short to ground in A/C compressor relay control circuit power supply terminal 4. A/C compressor relay fuse is blown or damaged 5. Open or internal circuit damage in A/C compressor control pin corresponding to ECU terminal	1. Connector looseness or poor contact 2. Open in A/C compressor relay control circuit 3. Open or short to ground in A/C compressor relay control circuit power supply terminal 4. A/C compressor relay fuse is blown or damaged 5. Open or internal circuit damage in A/C compressor control pin corresponding to ECU terminal
P064600	A/C Compressor Relay Circuit Low	Drive channel self-diagnosis is malfunctioning	1. A/C compressor relay control circuit is short to ground 2. A/C compressor relay pin corresponding to ECU terminal is short to ground	1. A/C compressor relay control circuit is short to ground 2. A/C compressor relay pin corresponding to ECU terminal is short to ground
P064700	A/C Compressor Relay Control Circuit High	Drive channel self-diagnosis is malfunctioning	1. A/C compressor relay circuit is short to power supply 2. A/C compressor relay pin corresponding to ECU terminal is short to power supply	1. A/C compressor relay circuit is short to power supply 2. A/C compressor relay pin corresponding to ECU terminal is short to power supply
P208800	"A" Camshaft Position Actuator	Drive channel self-diagnosis is malfunctioning	1. Intake VVT control solenoid valve signal	1. Intake VVT control solenoid valve signal terminal is short to ground 2.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Control Circuit Low Bank 1		terminal is short to ground 2. Intake VVT control solenoid valve power supply terminal is short to ground 3. Intake VVT control solenoid valve signal terminal pin corresponding to ECU is short to ground	Intake VVT control solenoid valve power supply terminal is short to ground 3. Intake VVT control solenoid valve signal terminal pin corresponding to ECU is short to ground
P208900	"A" Camshaft Position Actuator Control Circuit High Bank 1	Drive channel self-diagnosis is malfunctioning	1. Intake VVT control solenoid valve signal terminal is short to power supply 2. Intake VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply	1. Intake VVT control solenoid valve signal terminal is short to power supply 2. Intake VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply
P209000	"B" Camshaft Position Actuator Control Circuit Low Bank 1	Drive channel self-diagnosis is malfunctioning	1. Exhaust VVT control solenoid valve signal terminal is short to ground 2. Exhaust VVT control solenoid valve power supply terminal is short to ground 3. Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU is short to ground	1. Exhaust VVT control solenoid valve signal terminal is short to ground 2. Exhaust VVT control solenoid valve power supply terminal is short to ground 3. Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU is short to ground
P209100	"B" Camshaft Position Actuator Control Circuit High Bank 1	Drive channel self-diagnosis is malfunctioning	1. Exhaust VVT control solenoid valve signal terminal is short to power supply 2. Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU terminal	1. Exhaust VVT control solenoid valve signal terminal is short to power supply 2. Exhaust VVT control solenoid valve signal terminal pin corresponding to ECU terminal is short to power supply

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			is short to power supply	
P217700	System Too Lean Off Idle Bank 1	Self-learning factor exceeds the threshold	1. Oil passage system hardware leakage or blockage 2. Intake pipe failure 3. Oxygen sensor wire harness connector circuit failure 4. Oxygen sensor failure	1. Connect fuel pressure gauge (the connection position is the front end of fuel distribution pipe assembly inlet pipe), start engine and check if fuel pressure is normal when fuel pressure is under idling conditions and when fuel pressure regulator vacuum tube is removed. 2. Check fuel injector for leakage or blockage with special tool. 3. Check fuel condition and ask customer if specified number of gasoline is filled. After refueling, does the vehicle work abnormally? 4. If intake pipe is blocked, leaking, squashed or damaged; if canister control valve is stuck; if valve clearance is abnormal; if throttle body is contaminated, causing the air passage to be blocked. 5. Check if ignition coil, cylinder wire, and spark plug work abnormally. 6. Do not disconnect oxygen sensor connector, measure if voltage of oxygen sensor terminal No.1 wire of upstream oxygen sensor wire harness (white, heater power supply positive) is 12 V. 7. Do not disconnect oxygen sensor connector and measure if voltage of upstream oxygen sensor wire harness oxygen sensor terminal No.2 wire (white, heater power supply grounded) is 12 V. 8. Puncture wire harness connector near ECU terminal No.1 wire insulation layer (white, heater power source positive) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.2 wire insulation layer (white, heater power source grounded) with black pole of multimeter. Check if voltage between two ends is
P217800	System Too Rich Off Idle Bank 1			
P218700	System Too Lean at Idle Bank 1			
P218800	System Too Lean at Idle Bank 1			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				about 12 V 9. With oxygen sensor connector connected, measure if voltage between ECU terminal No.4 wire of downstream oxygen sensor wire harness (black, oxygen sensor signal wire) and No.3 wire (gray, oxygen sensor signal ground) is about 0.45 V. 10. Start and keep vehicle idling until coolant temperature reaches normal value. Puncture wire harness connector near ECU terminal No.4 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.3 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is between 0 V and 1 V. 11. Disconnect upstream oxygen sensor connector and check for short circuit between sensor terminal No.3 connector (gray, oxygen sensor signal ground) and No.4 connector (black, oxygen sensor signal wire) with a multimeter. Connect upstream oxygen sensor connector properly, repeat step 6-7 and check if voltage signal is changed in range of 0.44 V- 0.46 V and 0 V - 1 V respectively.
P219500	O2 Sensor Signal Biased/ Stuck Lean Bank 1 Sensor 1	Downstream oxygen control integral value exceeds the upper limit	1. Air leakage in exhaust system 2. Oxygen sensor is aging	1. Check intake system and exhaust system for air leakage. 2. Replace upstream LSU oxygen sensor, return vehicle to the customer, and check whether fault reappears.
P219600	O2 Sensor Signal Biased/ Stuck Rich Bank 1 Sensor 1	Downstream oxygen control integral value exceeds the lower limit	1. Air leakage in exhaust system 2. Oxygen sensor is aging	1. Check intake system and exhaust system for air leakage. 2. Replace upstream LSU oxygen sensor, return vehicle to the customer, and check whether fault reappears.
P227000	O2 Sensor Signal Stuck Lean	Downstream oxygen voltage continues to be high	1. Air leakage in exhaust system	1. Check exhaust system for air leakage, gasket for damage. 2. Downstream

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	(Downstream of the Catalyzer)		2. Oxygen sensor is aging	oxygen sensor: Puncture wire harness connector near ECU terminal No.2 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.1 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is in range of 0.44 V - 0.46 V. 3. Start and keep vehicle idling until coolant temperature reaches normal value. Downstream oxygen sensor: Puncture wire harness connector near ECU terminal No.2 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.1 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage changes in range of 0 V - 1 V. 4. Start and keep vehicle idling until coolant temperature reaches normal value. Depress and release accelerator pedal frequently and alternately for 90 s, at the same time, puncture downstream oxygen sensor wire harness connector near ECU terminal No. 2 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No. 1 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage changes in range of 0.55 V - 0.65 V.
P227100	O2 Sensor Signal Stuck Rich (-Downstream of the Catalyzer)	Downstream oxygen voltage continues to be low	1. Air leakage in exhaust system 2. Oxygen sensor is aging	1. Check exhaust system for air leakage, gasket for damage. 2. Downstream oxygen sensor: Puncture wire harness connector near ECU terminal No.2 wire insulation layer (black, oxygen sensor signal wire)

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				with red pole of multimeter, and puncture wire harness connector near ECU terminal No.1 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage is in range of 0.44 V - 0.46 V. 3. Start and keep vehicle idling until coolant temperature reaches normal value. Downstream oxygen sensor: Puncture wire harness connector near ECU terminal No.2 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No.1 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage changes in range of 0 V - 1 V. 4. Start and keep vehicle idling until coolant temperature reaches normal value. Depress and release accelerator pedal frequently and alternately for 90 s, at the same time, puncture downstream oxygen sensor wire harness connector near ECU terminal No. 2 wire insulation layer (black, oxygen sensor signal wire) with red pole of multimeter, and puncture wire harness connector near ECU terminal No. 1 wire insulation layer (gray, oxygen sensor signal grounded) with black pole of multimeter. Check if voltage changes in range of 0.55 V - 0.65 V.
P023400	Turbocharger Boost Pressure Too High	The boost pressure is higher than the target pressure plus a certain offset	1. Turbocharger relief valve is damaged 2. Exhaust gas by-pass valve is damaged (- normally closed)	1. Turbocharger relief valve is damaged 2. Exhaust gas by-pass valve is damaged (- normally closed)
P023700	Turbocharger/ Supercharger Boost Sensor "A" Circuit Low	Boost pressure sensor voltage is lower than 0.15 V	1. Sensor signal terminal pin is short to ground 2. Short to ground in	1. Sensor signal terminal pin is short to ground 2. Sensor power supply terminal pin is short to ground 3. Offset or damage to sensor

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			sensor signal terminal pin corresponding to ECU	resistance and other characteristics 4. Sensor signal terminal pin corresponding to ECU is short to ground
P023800	Turbocharger/ Supercharger Boost Sensor "A" Circuit High	Boost pressure sensor voltage is higher than 4.85 V	1. Sensor signal terminal pin is short to power supply or open 2. Connector looseness or disengagement 3. Short circuit to power supply or open in sensor signal terminal pin corresponding to ECU	1. Connector looseness or poor contact 2. Sensor signal terminal pin is short to power supply or open 3. Sensor power supply terminal and ground terminal pin are open 4. Offset or damage to sensor resistance and other characteristics 5. Sensor signal terminal pin corresponding to ECU is short to power supply or open, or there is an internal circuit damage
P024300	Booster Exhaust Gas Control Circuit Open	Drive channel self-diagnosis is malfunctioning	1. Control valve drive circuit is open 2. Connector looseness or disengagement 3. Pin corresponding to ECU is open	1. Connector looseness or poor contact 2. Exhaust gas control valve drive circuit pin is open 3. Exhaust gas control valve power supply terminal is open 4. Drive pin corresponding to ECU is open, or there is an internal circuit damage
P024600	Booster Exhaust Gas Control Circuit Voltage Too High or Too Low	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Exhaust gas control valve drive circuit pin is short to power supply or ground 3. Short to power supply or ground in drive circuit pin corresponding to ECU terminal	1. Connector looseness or poor contact 2. Exhaust gas control valve drive circuit pin is short to power supply or ground 3. Short to power supply or ground or internal circuit damage in drive pin corresponding to ECU terminal
P029900	Turbocharger Boost Pressure Too Low	The actual boost pressure is higher than the target boost pressure minus a certain offset	1. The line between compressor outlet and throttle valve leaks 2. Leakage between turbine and exhaust pipe 3. Waste gate valve or discharge valve is faulty 4. Turbocharger is	1. There is air leakage in line between compressor outlet and throttle 2. There is air leakage in line between turbine and exhaust pipe 3. Exhaust manifold leaks or is blocked 4. Air filter is dirty 5. Exhaust by-pass valve or discharge valve is failed and it is in normally open status 6. Working parts such as compressor impeller are dirty or damaged 7. Turbocharger is damaged

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			damaged 5. Working parts such as compressor impeller are dirty or damaged 6. Exhaust manifold leaks or is blocked 7. Air filter is dirty	
P226100	Turbocharger/ Supercharger Bypass Valve "A" - Mechanical	Number of pressure fluctuations front of throttle is greater than a certain threshold	1. Discharge control valve wire harness interrupted 2. Discharge control valve is damaged 3. Discharge control valve pin corresponding to ECU terminal is damaged	1. Discharge control valve wire harness interrupted 2. Discharge control valve is damaged 3. Discharge control valve pin corresponding to ECU terminal is damaged
P224300	O2 Sensor Reference Voltage Circuit Open Bank 1 Sensor 1	After the heating control of oxygen sensor starts, the internal resistance of LSU is unreasonably high	1. Upstream oxygen sensor RE wire is open	1. Check for poor contact in pin corresponding to black wire at oxygen sensor connector 2. Check for continuity of oxygen sensor wire harness to check if the line is open 3. Check for abnormal pin at connector between wire harness and ECU, which may result in poor contact 4. Clear DTC, start and keep vehicle idling until coolant temperature reaches normal value. Check if malfunction is reported again. 5. Check for abnormality in processing circuit of LSU oxygen sensor in ECU
P225100	O2 Sensor Negative Current Control Circuit Open Bank 1 Sensor 1	After the heating control of oxygen sensor starts, the internal resistance of LSU is high and signal terminal voltage remains 1.5 V	1. Upstream oxygen sensor IPE wire is open	1. Check for poor contact in pin corresponding to yellow wire at oxygen sensor connector 2. Check for continuity of oxygen sensor wire harness to check if the line is open 3. Check for abnormal pin at connector between wire harness and ECU, which may result in poor contact 4. Clear DTC, start and keep vehicle idling until coolant temperature reaches normal value. Check if malfunction is reported again. 5. Check for abnormality in processing

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				circuit of LSU oxygen sensor in ECU
P241400	O2 Sensor Exhaust Sample Error Bank 1 Sensor 1	LSU is sensing lean, no circuit failure and target air-fuel ratio is lean	1. Expose LSU in the air or LSU connector is in poor connection	1. Check if oxygen sensor is not installed correctly, installed outside the exhaust manifold and exposed into air 2. Check the regulating resistance in oxygen sensor connector for failure or infinity 3. Check if resistance between IA and IP circuit in oxygen sensor processing circuit inside of ECU is infinite
P019128	Fuel Rail Pressure Sensor Circuit Bank 1-Negative Offset	After fully cold soaking, the start fuel rail pressure is higher than the threshold, and the oil passage self-learning failure is reported in this driving cycle.	1. Fuel rail pressure sensor internal circuit and wire harness are deteriorated	1. Check whether there is gas in the fuel rail, causing the rail pressure to fail to build up quickly. 2. Replace the fuel rail pressure sensor, return the vehicle to customer, and check whether the fault will be reported again.
P019129	Fuel Rail Pressure Sensor Circuit Bank 1-Positive Offset	After fully cold soaking, the start fuel rail pressure is lower than the threshold, and the oil passage self-learning failure is reported in this driving cycle.	1. Fuel rail pressure sensor internal circuit and wire harness are deteriorated	1. Check whether there is a large contact resistance at the connector of fuel rail pressure sensor or in the wire harness. 2. Replace the fuel rail pressure sensor, return the vehicle to customer, and check whether the fault will be reported again.
U014687	Lost Communication with GW (Gateway)	ECU receiving GW information timed out	1. GW connector looseness or disengagement 2. Transmission line between GW and ECU damaged or interrupted 3. GW is damaged and signal cannot be transmitted to ECU normally	1. GW connector is not connected securely or disconnected 2. There is wire harness signal interference 3. Transmission line between GW and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. GW is damaged and signal cannot be transmitted to ECU normally
U012687	Lost Communication with SAS (-Steering Angle)	ECU receiving SAS information timed out	1. SAS connector looseness or disengagement 2. Transmission line between SAS and ECU damaged or interrupted 3. SAS is	1. SAS connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between SAS and ECU is damaged or interrupted 4. Check if there is SAS hardware circuit fault 5. SAS is damaged and signal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			damaged and signal cannot be transmitted to ECU normally	cannot be transmitted to ECU normally
U010187	Lost Communication with TCM (-Transmission Controller)	ECU receiving TCM information timed out	1. TCM connector looseness or disengagement 2. Transmission line between TCM and ECU damaged or interrupted 3. TCM is damaged and signal cannot be transmitted to ECU normally	1. TCM connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between TCM and ECU damaged or interrupted 4. Check if there is TCM hardware circuit fault 5. TCM is damaged and signal cannot be transmitted to ECU normally
U110017	CAN Module Input Power Voltage High	CAN communication voltage is higher than the threshold	1. CAN bus interface looseness or poor contact 2. Short circuit to power supply / ground or open circuit in CAN bus interface pin 3. Short circuit to power supply / ground, open circuit or internal circuit damage in CAN bus interface pin corresponding to ECU terminal	1. CAN bus interface looseness or poor contact 2. Short circuit to power supply / ground or open circuit in CAN bus interface pin 3. There is wire harness signal interference 4. Short circuit to power supply / ground, open circuit or internal circuit damage in CAN bus interface pin corresponding to ECU terminal
P141500	Response Reception Time Out Error of LIN Bus (Contact Between EMS and Intellectual Generator)	ECU receives LIN communication and sends fault information	1. Alternator LIN bus interface looseness or poor contact 2. LIN wire interference 3. LIN line is broken or interrupted 4. Generator is damaged and cannot normally transmit signals to ECU	1. Alternator LIN bus interface looseness or poor contact 2. There is wire harness signal interference 3. Alternator LIN line is broken or interrupted 4. Alternator is damaged and cannot normally transmit signals to ECU
P141700	Checksum Error of LIN Bus (-Contact Between EMS and Intellectual Generator)	ECU receives LIN communication and sends fault information	1. LIN communication version of intelligent alternator is inconsistent with ECU	1. Whether the LIN communication version of intelligent alternator is consistent with ECU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P051300	Immobilizer Malfunction	Anti-theft data authentication failed	1. ECM does not perform anti-theft matching or anti-theft status is wrong	1. Immobilizer connector looseness or disengagement 2. Immobilizer circuit fault 3. If ECU has been replaced, check if anti-theft authentication code is incorrect or not updated 4. Immobilizer fault 5. Immobilizer module circuit corresponding to ECU terminal is malfunctioning
P063300				
P161000				
P161400				
P161200				
P161300				
P161100				
P242200	Canister Vent Valve Stuck Normally Closed	Fuel tank pressure is below the threshold	1. Canister vent valve pin is low, which makes the canister vent valve close 2. Canister vent valve is stuck in the normally closed position and cannot be opened 3. Canister vent valve line is blocked 4. Canister valve stuck in normally open position 5. Fuel tank pressure sensor is damaged	1. Keep the sensor connector normal, use a multimeter to check whether the canister vent valve pin voltage is low and whether it is short to ground 2. Remove canister vent valve pipe and observe if it is blocked 3. Check if canister vent valve hardware is stuck at closed position 4. Check if canister valve is stuck at normally open position 5. Replace the fuel tank pressure sensor, start vehicle for 10 minutes, and check if the fault reappears
P045300	Fuel Tank Pressure Sensor Signal Short to Power Supply	Pressure sensor voltage signal is higher than 4.8 V	1. Fuel tank pressure sensor signal terminal is short to power supply 2. Fuel tank pressure sensor signal pin corresponding to ECU terminal is short to power supply	1. Use a multimeter to measure if fuel tank pressure signal circuit voltage is close to or equal to 5 V 2. Measure whether the wire harness terminal voltage corresponding to fuel tank pressure signal is close to or equal to 5 V 3. Check for short to power supply or internal circuit damage in intake pressure sensor signal pin corresponding to ECU terminal.
P045200	Fuel Tank Pressure Sensor Signal Short to Ground	Boost sensor voltage signal is lower than 0.2 V	1. Fuel tank pressure sensor signal terminal is short to ground 2. Fuel tank pressure sensor signal pin corresponding to ECU terminal	1. Use a multimeter to measure if fuel tank pressure signal circuit voltage is close to or equal to 0 V 2. Measure whether the wire harness terminal voltage corresponding to fuel tank pressure signal is close to or equal to 0 V 3. Check for short to ground or

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			is short to ground	internal circuit damage in intake pressure sensor signal pin corresponding to ECU terminal.
P128200	EVAP System Pressure Sensor/ Switch Circuit Range Performance	Fuel tank pressure sensor pressure signal is continuously higher than the threshold	1. Canister vent valve closed 2. Line from fuel tank to canister is blocked 3. Fuel tank pressure sensor is damaged	1. Check if canister vent valve is closed 2. Check if pipe from fuel tank to canister is blocked 3. Replace fuel tank pressure sensor. Start vehicle for 10 minutes, and check whether the fault reappears
P128300	EVAP System Pressure Sensor/ Switch Circuit Range Performance	Fuel tank pressure sensor pressure signal is continuously lower than the threshold	1. Canister vent valve closed 2. Line from fuel tank to canister is blocked 3. Fuel tank pressure sensor is damaged 4. Canister valve stuck in normally open position	1. Check if canister vent valve is closed 2. Check if pipe from fuel tank to canister is blocked 3. Replace fuel tank pressure sensor. Start vehicle and run it for 10 minutes to check if fault reappears 4. Check if canister valve is stuck at normally open position
P04512A	EVAP System Pressure Sensor&Switch Circuit Range Performance	Difference between maximum and minimum fuel tank pressure is below the threshold	1. Canister solenoid valve stuck in normally closed or normally open position 2. Line from fuel tank to canister is blocked or disconnected 3. Line from canister to canister valve is blocked or disconnected 4. Fuel tank pressure sensor is damaged	1. Check if canister solenoid valve stuck in normally closed or normally open position 2. Check if the line from fuel tank to canister is blocked/disconnect 3. Check if the line from canister to canister valve is blocked/disconnected 4. Replace fuel tank pressure sensor. Start vehicle for 10 minutes, and check whether the fault reappears
P045125	EVAP System Pressure Sensor&Switch Circuit Range Performance	Fluctuating amount of fuel tank pressure continues to exceed the threshold	1. Fuel tank pressure sensor is damaged 2. Canister valve is damaged	1. Replace fuel tank pressure sensor, start vehicle again, wait for 10 minutes to check if fault reappears 2. Replace ECU. Start vehicle again, wait for 10 minutes to check if fault reappears. 3. Check canister valve wire harness and replace canister valve, start vehicle again, wait for 10 minutes to check if fault reappears

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P045128	EVAP System Pressure Sensor/ Switch Circuit Range Performance	Difference between fuel tank pressure value and reference fuel tank pressure value during cold start exceeds the threshold	1. Fuel tank pressure sensor is damaged 2. Line from fuel tank to canister is blocked	1. Replace fuel tank pressure sensor, check if fault reappears 2. Check if the line from fuel tank to canister is blocked 3. Replace ECU, check if fault reappears
P046300	Fuel Level Sensor "A" Circuit High	Self-diagnosis of fuel level signal circuit connectivity	1. Abnormal connection of fuel level sensor wire harness 2. Abnormal connection of fuel level sensor wire harness 3. Abnormal ECU internal circuit	1. Using a multimeter, check if sensor pin voltage is normal 2. Check if CAN signal is normal 3. Check if wire harness is normal 4. Replace ECU, check if fault reappears
P046200	Fuel Level Sensor "A" Circuit Low	Self-diagnosis of fuel level signal circuit connectivity	1. Abnormal connection of oil level sensor wire harness 2. Fuel level sensor is damaged 3. ECU internal circuit abnormal	1. Using a multimeter, check if sensor pin voltage is normal 2. Check if CAN signal is normal 3. Check if wire harness is normal 4. Replace ECU, check if fault reappears
P25B000	Fuel Level Sensor "A" Stuck	Fuel level signal change does not exceed the threshold	1. ECU CAN signal is abnormal 2. Fuel level sensor is damaged 3. Fuel level float inside fuel tank is stuck	1. Replace fuel level sensor, check if fault reappears 2. Check if fuel level float in fuel tank is stuck 3. Replace ECU, check if fault reappears
P046129	Fuel Level Sensor Unreasonable	There is a big difference between liquid level change and the calculated fuel consumption	1. ECU CAN signal is abnormal 2. Fuel level sensor is damaged	1. Check if CAN signal is normal 2. Replace ECU, check if fault reappears 3. Replace fuel level sensor, check if fault reappears
P044200	EVAP System Leak Detected (- Small Leak)	The vacuum attenuation gradient of evaporation system exceeds the threshold	1. Fuel tank cap is not tightened or there is a leak 2. Canister vent valve cannot be completely closed 3. There is leakage in fuel tank - line - canister valve - canister solenoid valve - canister vent valve 4. Canister solenoid valve	1. Check if fuel tank cap is tightened 2. Check for leakage/blockage in fuel tank - pipeline - canister valve - canister solenoid valve - canister ventilation valve, and if connector is installed correctly 3. Check if canister vent valve can be completely closed, which can be achieved by shorting to pin 4. Check if canister solenoid valve is completely closed with power ON

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			cannot be completely closed	
P045500	EVAP System Leak Detected (-Large Leak)	The vacuum degree of evaporation system cannot reach the target vacuum degree during the vacuuming process	1. Fuel tank cap is not tightened or there is a leak 2. Canister vent valve cannot be completely closed 3. There is leakage in fuel tank - line - canister valve - canister solenoid valve - canister vent valve 4. Canister solenoid valve cannot be completely closed	1. Check if fuel tank cap is tightened 2. Check for leakage/blockage in fuel tank - pipeline - canister valve - canister solenoid valve - canister ventilation valve, and if connector is installed correctly 3. Check if canister vent valve can be completely closed, which can be achieved by shorting to pin. 4. Check if canister solenoid valve is completely closed with power ON
P049700	EVAP System Low Purge Flow	The pressure fluctuation of low load desorption line does not reach the threshold	1. Low load desorption line, check valve and connection between canister valve and engine are blocked or disconnected 2. Canister valve stuck in normally closed or normally open position	1. Check whether the desorption line, check valve (if equipped) and connection between canister valve and engine are blocked or disconnected. 2. Replace the corresponding line 3. Check if canister valve hardware is stuck at normally closed/normally open position. 4. Replace canister valve.
P04F000	EVAP System High Pressure Purge	The pressure fluctuation of high load desorption line does not reach the threshold	1. High load desorption line, check valve, venturi tube and connection between canister valve and engine are blocked or disconnected 2. The check valve of low load line is damaged and cannot function correctly 3. Canister valve stuck in normally open or normally closed position	1. Check if desorption line, check valve (if equipped), venturi tube (if equipped) and connection between canister valve and engine are blocked or disconnected. 2. Replace the corresponding line. 3. Check if low load pipeline check valve is damaged and cannot function properly 4. Check if canister valve hardware is stuck at normally closed/normally open position. 5. Replace canister valve.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P046800	EVAP Purge Flow Sensor Circuit High	High load desorption line pressure sensor voltage signal is higher than 4.88 V	1. Pressure sensor signal terminal is short to power supply 2. High load desorption line voltage sensor signal corresponding to ECU terminal is short to power supply	1. Use a multimeter to measure if high load desorption line pressure sensor signal line voltage is close to or equal to 5 V 2. Measure if pressure sensor wire harness terminal voltage is close to or equal to 5 V 3. Check for short to power supply or internal circuit damage in high load desorption line pressure sensor signal pin corresponding to ECU terminal.
P046700	EVAP Purge Flow Sensor Circuit Low	High load desorption line pressure sensor voltage signal is lower than 0.2 V	1. Pressure sensor signal terminal is short to ground 2. High load desorption line voltage sensor signal corresponding to ECU terminal is short to ground	1. Use a multimeter to measure if high load desorption line pressure sensor signal line voltage is close to or equal to 0 V 2. Measure if pressure sensor wire harness terminal voltage is close to or equal to 0 V 3. Check for short to ground or internal circuit damage in high load desorption line voltage sensor signal pin corresponding to ECU terminal.
P128500	EVAP Purge Flow Sensor Circuit Range Performance	High load desorption line pressure sensor pressure signal exceeds the threshold	1. Pressure sensor signal terminal is short to power supply 2. High load desorption line voltage sensor signal corresponding to ECU terminal is short to power supply 3. High load desorption line pressure sensor is damaged 4. Check valve of low load desorption line is damaged and cannot function correctly 5. Venturi tube is disconnected	1. Use a multimeter to measure if high load desorption line pressure sensor signal line voltage is close to or equal to 5 V 2. Measure if pressure sensor wire harness terminal voltage is close to or equal to 5 V 3. Check for short to power supply or internal circuit damage in high load desorption line pressure sensor signal pin corresponding to ECU terminal. 4. Replace high load desorption line pressure sensor, start vehicle and drive with a heavy load, check if fault reappears 5. Replace low load desorption line check valve, start vehicle and drive with a heavy load, check if fault reappears 6. Check if venturi tube is disconnected
P128600	EVAP Purge Flow Sensor	High load desorption line pressure sensor pressure	1. Pressure sensor signal terminal is short	1. Use a multimeter to measure if high load desorption line pressure

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Circuit Range Performance	signal is lower than the threshold	to ground 2. High load desorption line voltage sensor signal corresponding to ECU terminal is short to ground 3. High load desorption line pressure sensor is damaged 4. Venturi tube or check valve of high load desorption line is blocked	sensor signal line voltage is close to or equal to 0 V 2. Measure if pressure sensor wire harness terminal voltage is close to or equal to 0 V 3. Check for short to ground or internal circuit damage in high load desorption line voltage sensor signal pin corresponding to ECU terminal. 4. Replace high load desorption line pressure sensor, start and drive vehicle, check if fault reappears 5. Replace high load desorption line check valve or venturi tube, start and drive the vehicle, check if fault reappears
P019000	Fuel Rail Pressure Sensor Circuit Bank 1	Fuel rail pressure sensor circuit voltage is lower than 0.2 V or higher than 4.8 V	1. Fuel rail pressure sensor signal terminal is short to ground or power supply 2. Short to power or ground in fuel rail pressure sensor pin corresponding to ECU	1. Check if sensor signal terminal is short to power supply or ground 2. Check if sensor is damaged 3. Check for short circuit to power supply or ground, or internal circuit damage in fuel rail pressure sensor signal pin corresponding to ECU terminal
P209700	Post Catalyst Fuel Trim System Too Rich Bank 1	The offset value of upstream oxygen characteristic based on downstream oxygen exceeds the upper threshold	1. Upstream oxygen has a negative characteristic deviation (rich) 2. A certain degree of aging occurs in downstream oxygen 3. Leakage in intake and exhaust system 4. Catalytic converter is seriously degraded	1. Check intake system and exhaust system for air leakage 2. Replace upstream LSU oxygen sensor, return vehicle to the customer, and check whether fault reappears 3. Replace the downstream oxygen sensor, and check whether fault reappears 4. Check if catalytic converter is deteriorated 5. Replace catalytic converter, and check whether fault reappears
P209600	Post Catalyst Fuel Trim System Too Lean Bank 1	The offset value of upstream oxygen characteristic based on downstream oxygen is lower than the lower threshold	1. Upstream oxygen has a positive characteristic deviation (lean) 2. A certain degree of aging occurs in downstream	1. Check intake system and exhaust system for air leakage 2. Replace upstream LSU oxygen sensor, return vehicle to the customer, and check whether fault reappears 3. Replace the downstream oxygen sensor, and check

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			oxygen 3. Leakage in intake and exhaust system 4. Catalytic converter is seriously degraded	whether fault reappears 4. Check if catalytic converter is deteriorated 5. Replace catalytic converter, and check whether fault reappears
P223200	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2	Within a certain number of times that the downstream oxygen sensor is heated and turned off, the change in voltage of downstream oxygen sensor is higher than the threshold	1. Downstream oxygen sensor wire harness and connector are abnormal 2. Oxygen sensor terminal heater power supply ground is short to oxygen sensor signal line	1. Do not disconnect oxygen sensor connector, measure if voltage of heater power supply positive of downstream oxygen sensor wire harness oxygen sensor terminal is 12 V. 2. Do not disconnect oxygen sensor connector and measure if heater power supply ground voltage of downstream oxygen sensor wire harness oxygen sensor terminal is 12 V. 3. Do not disconnect oxygen sensor connector and measure if voltage between downstream oxygen sensor wire harness ECU terminal oxygen sensor signal line and oxygen sensor signal ground is about 0.45 V. 4. Start and keep vehicle idling until coolant temperature reaches normal value. Do not disconnect oxygen sensor connector and measure if voltage between oxygen sensor signal line and oxygen sensor signal ground of upstream oxygen sensor wire harness ECU terminal jumps between 0 V and 1 V. 5. Start and keep vehicle idling until coolant temperature reaches normal value. Disconnect downstream oxygen sensor connector and check for short circuit between oxygen sensor terminal heater power supply ground and oxygen sensor signal line. 6. Connect downstream oxygen sensor connector properly, repeat steps 5-6 and check if voltage signal changes between 0.44 V and 0.46 V, 0 V and 1 V respectively.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P013A00	O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2	The transition time from rich to lean of downstream oxygen sensor voltage signal exceeds the threshold	1. Downstream oxygen sensor is aging	1. Replace downstream oxygen sensor and connect wire harness properly. Start and keep vehicle idling until coolant temperature reaches normal value. Release accelerator pedal to coast after vehicle speed reaches about 70 many times, the fault reappears.
P064D00	LSU Integrated Ship Failure	Chip communication self-diagnostic	1. LSU oxygen sensor is damaged 2. ECU internal communication is abnormal	1. Replace oxygen sensor, and check if fault reappears 2. Replace ECU, and check if fault reappears
P064D13	Upstream Oxygen Sensor Sensing Element Failure			
P223700	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1 (Close to ECU)	Chip fault memory diagnosis	1. Open circuit in LSU oxygen sensor APE line, which is close to ECU terminal 2. ECU internal circuit is abnormal	1. Replace oxygen sensor, and check if fault reappears 2. Replace ECU, and check if fault reappears
P223713	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1	Before and after applying the pump current, the current difference between APE wire and IPE wire is lower than threshold, and current difference between RE wire and IPE wire is higher than threshold	1. LSU oxygen sensor APE wire is disconnected	1. Check if oxygen sensor wire harness and connector are disconnected or poorly connected. 2. Replace the upstream oxygen sensor. Start and keep vehicle idling until coolant temperature reaches normal value. The fault reappears.
P053F21	Cold Start Fuel Pressure Performance	During the catalytic converter is heating, the deviation between target fuel rail pressure of high pressure fuel rail and the actual fuel rail pressure exceeds the threshold	1. Oil passage leaks 2. Fuel is insufficient 3. Low pressure oil pump is damaged 4. The working capacity of high pressure oil pump is reduced	1. Check oil passage for leakage 2. Check if fuel is insufficient 3. Check if low pressure oil pump is damaged 4. Check if the working capacity of high pressure oil pump is reduced
P053F22	Cold Start Fuel Pressure Performance	During the catalytic converter is heating, the deviation between target fuel rail pressure of high pressure fuel rail and the actual fuel rail pressure is lower than the threshold	1. High pressure oil pump control failure 2. Pressure relief valve blocked	1. Check if high pressure oil pump control is normal 2. Check relief valve for blockage or abnormal operation
P00C600	Fuel Rail Pressure Too Low - Engine Cranking Bank 1	The fuel rail pressure is low when starting and the high pressure starting is unsuccessful	1. Oil passage leaks 2. Fuel is insufficient 3. Low pressure oil pump is	1. Check for leakage in oil passage 2. Check if fuel is insufficient 3. Check if low pressure oil pump is damaged 4. Check if

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			damaged 4. The working capacity of high pressure oil pump is reduced 5. Injector is damaged 6. Replace the new fuel pipe or new vehicle has just off the production line, the oil passage pressure has not been established yet, and a malfunction may be reported	working capacity of high pressure oil pump is reduced 5. Check if injector is damaged 6. Check if new oil pipe has been replaced or new vehicle has just off the production line 7. Clear fault, drive vehicle for 10 minutes, allow oil pressure to be established fully, turn off the engine and start it again, check if fault reappears
P02CD00	Cylinder 1 Fuel Injector Offset Learning At Max Limit	CVO self-learning value of cylinder 1 injector exceeds the upper threshold	1. Cylinder 1 injector is damaged	1. Check cylinder 1 injector for damage
P02D100	Cylinder 3 Fuel Injector Offset Learning At Max Limit	CVO self-learning value of cylinder 3 injector exceeds the upper threshold	1. Cylinder 3 injector is damaged	1. Check cylinder 3 injector for damage
P02D300	Cylinder 4 Fuel Injector Offset Learning At Max Limit	CVO self-learning value of cylinder 4 injector exceeds the upper threshold	1. Cylinder 4 injector is damaged	1. Check cylinder 4 injector for damage
P02CF00	Cylinder 2 Fuel Injector Offset Learning At Max Limit	CVO self-learning value of cylinder 2 injector exceeds the upper threshold	1. Cylinder 2 injector is damaged	1. Check cylinder 2 injector for damage
P02CC00	Cylinder 1 Fuel Injector Offset Learning At Min Limit	CVO self-learning value of cylinder 1 injector is lower than the lower threshold	1. Cylinder 1 injector is damaged	1. Check cylinder 1 injector for damage
P02D000	Cylinder 3 Fuel Injector Offset Learning At Min Limit	CVO self-learning value of cylinder 3 injector is lower than the lower threshold	1. Cylinder 3 injector is damaged	1. Check cylinder 3 injector for damage
P02D200	Cylinder 4 Fuel Injector Offset Learning At Min Limit	CVO self-learning value of cylinder 4 injector is lower than the lower threshold	1. Cylinder 4 injector is damaged	1. Check cylinder 4 injector for damage
P02CE00	Cylinder 2 Fuel Injector Offset Learning At Min Limit	CVO self-learning value of cylinder 2 injector is lower than the lower threshold	1. Cylinder 2 injector is damaged	1. Check cylinder 2 injector for damage
P02EE00	Cylinder 1 Fuel Injector Control Circuit Short	Drive channel self-diagnosis is malfunctioning	1. Injector high side control circuit is short to	1. Check if corresponding fuel injector high-side control

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P02EF00	Cylinder 2 Injector Circuit Range/ Performance		low side control circuit	circuit is short to low-side control circuit
P02F000	Cylinder 3 Injector Circuit Range/ Performance			
P02F100	Cylinder 4 Fuel Injector Control Circuit Short			
P062B9A	Internal Control Module Fuel Injector Control Performance - Component Internal Failure	All cylinders have CVO self-learning values that exceed the threshold or have unreasonable circuit signals	1. Injector wire harness for all cylinders are abnormal 2. ECU internal circuit is abnormal	1. Check whether all cylinder injector wire harness connections are normal 2. Replace the injectors of all cylinders, start the vehicle, and check whether the fault reappears 3. After replacing ECU, start the vehicle, and check whether the fault reappears
P062B64				
P062B96				
P012200	Electronic Throttle 1st Path / 2nd Path Signal Voltage Minimum	The voltage value of a certain path of throttle signal is lower than a certain value and lasts for a period of time	1. The first/ second signal line of the electronic throttle is open 2. The first/ second signal wire of electronic throttle is short to GND 3. An open circuit of electronic throttle 5 V power supply line will cause two faults to be reported at the same time	1. Collect the both paths signal voltage values ThrVlv_uRawSens1B1, ThrVlv_uRawSens2B1 of electronic throttle valve and check whether it drops to near zero. 2. The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults 3. Verify if wire harness resistance is the cause by electronic throttle flying wire connection 4. Replace the throttle body to determine whether there is an internal problem of throttle. 5. Clear DTC, restart vehicle and check if DTC is cleared
P022200				
P012300	Electronic Throttle 1st Path / 2nd Path Signal Voltage Maximum	The voltage value of a certain path of throttle signal is higher than a certain value and lasts for a period of time	1. The first/ second signal wire of the electronic throttle is short to 5 V 2. An open circuit of electronic throttle signal ground wire cause two faults to be reported at the same time	1. Collect the both paths signal voltage values ThrVlv_uRawSens1B1, ThrVlv_uRawSens2B1 of electronic throttle valve and check whether it drops to near zero. 2. The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults 3. Verify if wire harness resistance is the cause by electronic throttle flying wire connection 4.
P022300				

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				Replace the throttle body to determine whether there is an internal problem of throttle. 5. Clear DTC, restart vehicle and check if DTC is cleared
P012100 P022100	Electronic Throttle 1st Path / 2nd Path Signal Voltage Improper	Compare the first path signal of electronic throttle body with 5 V minus the second path signal. When the deviation exceeds threshold and after a period of time, compare the both paths signals with the signal after inflation pressure conversion, the signal that deviates from the main inflation pressure signal exceeds a certain value and is confirmed after a period of time reports a failure	1. The first path signal of electronic throttle is short to the second path signal 2. There is resistance on electronic throttle 5 V power supply wire or GND wire, causing the pedal voltage to drop by 5 V or the zero voltage to be raised	1. Collect and observe whether the voltage value of the two DVE signals ThrVlv_uRawSens1B1 and ThrVlv_uRawSens2B1 deviate from 5 V in addition 2. The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults 3. Measure the voltage drop of each section on wire harness by AD-Scan. If the wire harness is normal, there is no voltage drop, and if there is a voltage drop, it means that there is resistance in wire harness or connector 4. Verify if wire harness is the cause by electronic throttle flying wire connection 5. Replace the throttle body to determine whether there is an internal problem of throttle 6. Clear DTC, restart vehicle and check if DTC is cleared
P155400 P155500 P156100	Max Error of DV-E Return Spring Check Failure	After ENGINE START STOP switch is turned to ON, the system will command DVE to open to a certain opening by ECU, and check if DVE can be reached within the specified time, and then check if DVE can be returned within the specified time; if it cannot reach the specified position within the specified time, it is determined as P1555; if it cannot return to the specified range within the specified time after opening, it is determined as P1554. When ECU drives the throttle, the ECU will always compare the target opening with the actual throttle feedback opening. When deviation between the target and the actual exceeds a certain value and it is	1.The PIN of electronic throttle drive motor is open or short 2. Electronic throttle body valve plate is dirty or there are foreign matters, which makes the valve plate stuck	1. Check if the actual opening ThrVlv_ratActIntB1 is consistent with the target opening ThrVlv_ratDesB1 2. The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults 3. Verify if wire harness is the cause by electronic throttle flying wire connection 4. Replace the throttle body to determine whether there is an internal problem of throttle 5. Clear DTC, restart vehicle and check if DTC is cleared

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		confirmed after a period of time, it will be judged as P1561		
P156000	Electronic Throttle PID Adjustment Malfunction	When the duty ratio that ECU output to the throttle valve continues to exceed 80% and maintains for 5 seconds, P1560 (DFC_ ThrVlvDycB1) is reported	1.The PIN of electronic throttle drive motor is open or short 2. Electronic throttle body valve plate is dirty or there are foreign matters, which makes the valve plate resistance large and sticky 3. Throttle drive chip in ECU is abnormal	1. It may be caused by foreign matter sticking on throttle valve plate (the possibility is greater); it may be caused by the failure of throttle drive motor pin; or it may be also caused the DVE drive module inside ECU may have a hardware failure (the possibility is less) 2. Replace throttle body to determine if there is an internal problem in throttle 3. Replace ECU to determine if there is a throttle drive module failure in ECU 4. Clear DTC, restart vehicle and check if DTC is cleared
P155000	Electronic Throttle Self-learning Unable to Complete / Throttle Initial Self-learning Unable to Complete	Throttle self-learning must meet 7 conditions at the same time: no DVE or monitoring failure; speed is 0; vehicle speed is 0; pedal is 0; battery voltage is higher than 10 V; engine coolant temperature is higher than 5℃; intake air temperature is higher than 5℃. When the above 7 conditions cannot be met at the same time, P155000 will be reported. ECU will report P1551 if the conditions are not met during the first self-learning	1. The conditions of DVE self-learning are not met, please refer to the above 7 conditions 2. When the coolant temperature or intake air temperature sensor is faulty, the temperature condition will not be met because the correct temperature is not collected. 3. Some vehicle assembly factories do not turn on the heater in workshop in winter, and the fault may be caused when the temperature is too low	1. Compare the above 7 conditions and find out whether there are any unsatisfied ones one by one 2. Clear DTC, restart vehicle and check if DTC is cleared
P155100				
P210000	Electronic Throttle Drive Level Malfunction	Monitor DVE power driver stage-SPI bus or signal failure	1. Throttle valve failure (valve plate stuck or motor failure) 2. Throttle drive	1. Replace throttle body to determine if there is an internal problem in throttle 2. Replace ECU to determine if there is a throttle drive module failure in ECU 3.
P210300				
P210600				
P211800				

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			module failure in ECU	Clear DTC, restart vehicle and check if DTC is cleared
P155800 P155900 P155A00 P155B00	Not Plausible Error of DV-E Limphome Learning Position	The NLP position learned by throttle is out of the reasonable range, and a fault is reported	1. Throttle valve or ECU is abnormal during throttle self-learning	In an environment with a temperature higher than 5℃, ignition ON again, use the diagnostic tester to trigger throttle self-learning once, and observe whether the throttle can successfully complete the self-learning 2. Clear DTC, restart vehicle and check if DTC is cleared
P155600 P155700	Electronic Throttle Lower Mechanic Stop Re-learning Error	When the bottom dead center position learned by throttle is out of the reasonable range, and a fault is reported	1. Throttle valve or ECU is abnormal during throttle self-learning	1. In an environment with a temperature higher than 5℃, ignition ON again, use the diagnostic tester to trigger throttle self-learning once, and observe whether the throttle can successfully complete the self-learning 2. Clear DTC, restart vehicle and check if DTC is cleared
P15A000	CPU0: MPU Error (Memory, DSPR, PSPR)	ECU chip hardware premier error	ECU hardware fault	1. Replace ECU 2. Clear DTC, restart vehicle and check if DTC is cleared
P15A100	CPU0: DCACHE/DSPR ECC Uncorrectable Error			
P15A200	CPU0: DCACHE/ DSPR Address Error			
P15A300	CPU0:DCACHE TAG SRAM ECC Uncorrectable Error			
P15A400	CPU0:DCACHE TAG SRAM Address Error			
P15A500	CPU0:PCACHE TAGRAM ECC Uncorrectable Error			
P15A600	CPU0:PCACHE TAGRAM Address Error			
P15A700	CPU0: PCACHE/ PSPR ECC Uncorrectable Error			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P15A800	CPU0:PCACHE/ PSPR Address Error			
P15A900	CPU1:Lockstep Comparator Error			
P15AA00	CPU1:MPU Error (Memory, DSPR, PSPR)			
P15AB00	CPU1:DCACHE/ DSPR ECC Uncorrectable Error			
P15AC00	CPU1:DCACHE/ DSPR Address Error			
P15AD00	CPU1:DCACHE TAGRAM ECC Uncorrectable Error			
P15AE00	CPU1:DCACHE TAGRAM Address Error			
P15AF00	CPU1:PCACHE TAGRAM ECC Uncorrectable Error			
P15B000	CPU1:PCACHE TAGRAM Address Error			
P15B100	CPU1:PCACHE/ PSPR ECC Uncorrectable Error			
P15B200	CPU1:PCACHE/ PSPR Address Error			
P15B300	LMU:SRAM ECC Monitoring Error			
P15B400	LMU:SRAM ECC Uncorrectable Error			
P15B500	LMU:SRAM Address Error			
P15B600	SMU: Recover Timer 0 Timeout Error			
P15B700	SMU: Recover Timer 1 Timeout Error			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P15B800	PMU:PFLASH ECC Uncorrectable Multi-bit Error			
P15B900	PMU:PFLASH Address Error			
P15BA00	PMU: PFLASH ECC Monitoring Error (Cover All ECC Module)			
P15BB00	PMU: PFLASH EDC Comparator Error (Cover All PFLASH Instances)			
P15BC00	SCU/CGU: System PLL OSC_WDT: Input Clock Exceeds Limit Error			
P15BD00	SCU/CGU: System PLL VCO Clock Event Loss Error			
P15BE00	SCU/EVR: EVR 1.3 V Digital Undervoltage Error			
P15BF00	SCU/EVR: EVR 3.3 V Overvoltage Error			
P15C000	SCU/EVR: External Power Supply Overvoltage Error			
P15C100	SCU/WDTS: Safety Watchdog Timeout Error			
P15C200	SCU/WDTCPU0: Watchdog CPU0 Timeout Error			
P15C300	SCU/WDTCPU1: Watchdog CPU1 Timeout Error			
P15C400	SCU/CGU: PLL_ERAY VCO Clock Event Loss Error			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P15C500	SCU/WDTCPU2: Watchdog CPU2 Timeout Error			
P15C600	SCU/DTS: Temperature Sensor Overflow Error			
P15C700	Registers: Register Monitor Detects Error			
P15C800	SCU/LSCU: SCU Configuration Error: Monitor Dual-track Properties (-Inverted Signal) Alarm from Lockstep Comparator (LSCU)			
P15C900	SCU/CGU: Clock Monitoring: STM Exceed Frequency Range Error			
P15CA00	SCU/CGU: Clock Monitoring: PLL_ERAY Exceed Frequency Range Error			
P15CB00	SCU/CGU: Clock Monitoring: PLL Exceed Frequency Range Error			
P15CC00	SCU/CGU: Clock Monitoring: SRI Exceed Frequency Range Error			
P15CD00	SCU/CGU: Clock Monitoring: SPB Exceed Frequency Range Error			
P15CE00	SCU/CGU: Clock Monitoring: GTM Exceed Frequency Range Error			
P15CF00	SCU/CGU: Clock Monitoring: ADC Exceed			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Frequency Range Error			
P15D000	GTM: SRAMs Uncorrectable Error			
P15D100	FLEXRAY:SRAM Address Error			
P15D200	Misc SRAMs: SRAM ECC Uncorrectable Error			
P15D300	Misc SRAMs: SRAM Address Error			
P15D400	GTM: SRAMs Address Error			
P15D500	CAN: SRAM Uncorrectable Error			
P15D600	CAN: SRAM Address Error			
P15D700	FLEXRAY:SRAM ECC Uncorrectable Error			
P15D800	CPU2:MPU Error (Memory, DSPR, PSPR)			
P15D900	CPU2: DCACHE/ DSPR ECC Uncorrectable Error			
P15DA00	CPU2: DCACHE/ DSPR Address Error			
P15DB00	CPU2: DCACHE TAG SRAM ECC Uncorrectable Error			
P15DC00	CPU2:DCACHE TAG SRAM Address Error			
P15DD00	CPU2:121 PCACHE TAGRAM ECC Uncorrectable Error			
P15DE00	CPU2:PCACHE TAGRAM Address Failure			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P15DF00	CPU2: PCACHE/ PSPR ECC Uncorrectable Error			
P15E000	CPU2: PCACHE/ PSPR Address Error			
P061A00	Safely Monitor Torque Exceeds Limit	In the 2nd layer monitoring, when the actual torque calculated by ECU exceeds the 2nd layer allowable torque and the duration exceeds 520 ms, a fault is reported	1. ECU data settings are wrong, usually because the EGAS safety monitoring function is not matched or preset 2. The external torque increase request was not considered during the data setting process	1. Communicate with EGAS security monitoring matching engineer to confirm if it is necessary to perform security monitoring presets or matching 2. Confirm if there is an external torque increase request with the customer (ESP torque increase request, TCU torque increase request, etc.) 3. Clear DTC, restart vehicle and check if DTC is cleared
P060D00	Accelerator Pedal 2nd Layer Monitoring Error	In the 2nd layer of monitoring, when the deviation of pedal two signals exceeds the limit, a fault will be reported	1. ECU data settings are wrong, usually because the EGAS safety monitoring function is not matched or preset 2. The application layer data of pedal module does not match the monitoring layer data during the data setting process	1. Communicate with EGAS security monitoring matching engineer to confirm if it is necessary to perform security monitoring presets or matching 2. Confirm if pedal model has been changed with the customer 3. Clear DTC, restart vehicle and check if DTC is cleared
P152000	Function Monitoring: Check of Predicted Air Mass Failed	In the 2nd layer of monitoring, when recognizing that there is a deviation between the calculation of load to fuel injection volume and calculation of monitoring layer in the calculation of ECU application layer, the fault is reported	1. ECU data settings are wrong, usually because the EGAS safety monitoring function is not matched or preset 2. The calculation of application layer from load to fuel injection volume is wrong	1. Communicate with EGAS security monitoring matching engineer to confirm if it is necessary to perform security monitoring presets or matching 2. Check if calculation process of load to fuel injection in the calculation of application layer is incorrect 3. Clear DTC, restart vehicle and check if DTC is cleared
P152100	Function Monitoring: Fault of ECU Check of Injection Cut-off			
P152200	Function Monitoring: Fault of ECU in Check of Cylinder Individual Fuel Corrections			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P153900	Synchronization Process Rationality Check (Based On Speed and Synchronization Count)			
P153700	Function Monitoring: Fault of ECU or Sensor in RI-Comparison			
P153500	Function Monitoring: Fault of ECU or Sensor in Mixture Check			
P153600	Function Monitoring: Fault of ECU Comparison of Lambda and Operation Mode			
P153800	Electronic Throttle Safety Monitoring Function Error (-Ignition Angle Signal, Wire Harness or ECM Error)	ECU bottom fault response measure error	1. ECU Internal Malfunction	1. Replace ECU 2. Clear DTC, restart vehicle and check if DTC is cleared
P152700	Function Monitoring: Monitoring of ICO From Level1	Monitoring layer recognizes an abnormal safety oil cut-off	1. ECU Internal Malfunction	1. Replace ECU 2. Clear DTC, restart vehicle and check if DTC is cleared
P152800	Function Monitoring: Monitoring of ICO From Level2			
P061C00	Safety Monitoring Function Error (2nd Layer Engine Speed Monitoring Error)	The monitoring layer speed signal is inconsistent with the application layer speed signal	1. ECU Internal Malfunction	1. Replace ECU 2. Clear DTC, restart vehicle and check if DTC is cleared
P152900	Function Monitoring: Fault of Starter Control	2nd layer of monitoring identified an abnormal start-stop function	1. ECU Internal Malfunction	1. Replace ECU 2. Clear DTC, restart vehicle and check if DTC is cleared
P153000	Function Monitoring: Fault of ECM ADC - Null Load Test Pulse	Hardware bottom data error	1. ECU Internal Malfunction	1. Replace ECU 2. Clear DTC, restart vehicle and check if DTC is cleared
P153100	Function Monitoring: Fault			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	of ECM ADC - Test Voltage			
P157100	Closed Path Checking, Driver Level Check Error or Communication Error			
P157200	Under Normal Voltage, ABE Activated			
P157300	Diagnostic Fault Check to Report "WDA active" Due to Errors in Query/Response Communication			
P157400	Errorpin Activated and Monitoring Communication Normal			
P157500	Diagnostic Fault Check to Report "WDA active" Due to Overvoltage Detection			
P213800	Deviation Between Both Paths Signal of Accelerator Pedal Out of Limit	Both paths signal of accelerator pedal are compared. When the deviation exceeds the threshold and confirmed after a period of time, the fault will be reported.	1. There is a short circuit or resistance between first path and second path signal wires of accelerator pedal 2. There is resistance on first path/second path 5 V power supply wire of accelerator pedal or GND wire, causing the pedal terminal voltage to drop by 5 V or the zero voltage to be raised	1. Collect two paths of accelerator pedal voltage values APP_uRaw1, APP_uRaw2, and observe if the relationship between them is twice at the moment the fault reappears 2. The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults 3. Measure the voltage drop of each section on wire harness by AD-Scan. If the wire harness is normal, there is no voltage drop, and if there is a voltage drop, it means that there is resistance in wire harness or connector 4. Verify if wire harness resistance is the cause by accelerator pedal flying wire connection 5. Replace pedal to determine if there is an internal problem in pedal 6. Clear DTC, restart vehicle and check if DTC is cleared

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P212300 P212800	Accelerator Pedal 1st Path / 2nd Path Signal Voltage High	The voltage value of one path of pedal is higher than APP_uRaw1SRCHigh_C / APP_uRaw2SRCHigh_C and continues for TUPWGO time	1. The first path /second path signal ground wire GND of accelerator pedal is open 2. First path /- second path signal wire of accelerator pedal is short to 5 V	1. Collect two paths of accelerator pedal voltage values APP_uRaw1, APP_ uRaw2, and observe if it is pulled near 5 V when fault reappears 2. The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults 3. Verify if wire harness is the cause by accelerator pedal flying wire connection 4. Replace pedal, check if it is caused by pedal 5. Clear DTC, restart vehicle and check if DTC is cleared
P212200 P212700	Accelerator Pedal 1st Path / 2nd Path Signal Voltage Low	The voltage value of one path of pedal is lower than APP_uRaw1SRCLow_C / APP_uRaw2SRCLow_C and continues for TUPWGU time	1. The 5 V power supply line of the first path / second path signal of accelerator pedal is open 2. The first path /- second path signal wire of accelerator pedal is open 3. First path /- second path signal wire of accelerator pedal is short to GND	1. Collect two paths of accelerator pedal voltage values APP_uRaw1, APP_ uRaw2, and observe if it drops near zero when fault reappears 2. The actions such as unplugging and plugging connector, shaking wire harness, etc. will affect the occurrence frequency of faults 3. Verify if wire harness is the cause by accelerator pedal flying wire connection 4. Replace pedal, check if it is caused by pedal 5. Clear DTC, restart vehicle and check if DTC is cleared
P049900	EVAP System Vent Control Circuit Short to Power Supply	Drive channel self-diagnosis is malfunctioning	1. Canister vent valve control circuit is short to power supply 2. Canister vent valve control circuit pin corresponding to ECU terminal is short to power supply	1. Canister vent valve control circuit is short to power supply 2. Canister vent valve control circuit pin corresponding to ECU terminal is short to power supply
P049800	EVAP System Vent Control Circuit Short to Ground	Drive channel self-diagnosis is malfunctioning	1. Canister vent valve control circuit is short to ground 2. Canister vent valve control circuit pin is short to ground	1. Canister vent valve control circuit is short to ground 2. Canister vent valve control circuit pin is short to ground
P044700	EVAP System Vent Control	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or	1. Connector looseness or poor contact 2. Canister

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Circuit Short to Ground		poor contact 2. Canister vent valve control circuit is open 3. Canister vent valve control circuit power supply terminal is open or short to ground 4. Canister vent valve control circuit fuse is blown or damaged 5. Open or internal circuit damage in canister vent valve control circuit pin corresponding to ECU terminal	vent valve control circuit is open 3. Canister vent valve control circuit power supply terminal is open or short to ground 4. Canister vent valve control circuit fuse is blown or damaged 5. Open or internal circuit damage in canister vent valve control circuit pin corresponding to ECU terminal
P069100	Cooling Fan 1 Control Circuit Low	Drive channel self-diagnosis is malfunctioning	1. Cooling fan relay control circuit is short to ground 2. Cooling fan relay control pin corresponding to ECU terminal is short to ground	1. Cooling fan relay control circuit is short to ground 2. Cooling fan relay control pin corresponding to ECU terminal is short to ground
P069200	Cooling Fan 1 Control Circuit High	Drive channel self-diagnosis is malfunctioning	1. Cooling fan relay control circuit is short to power supply 2. Cooling fan relay control pin corresponding to ECU terminal is short to power supply	1. Cooling fan relay control circuit is short to power supply 2. Cooling fan relay control pin corresponding to ECU terminal is short to power supply
P048000	Cooling Fan 1 Control Circuit	Drive channel self-diagnosis is malfunctioning	1. Cooling fan relay control circuit is open 2. Cooling fan relay control circuit pin corresponding to ECU terminal is open	1. Connector looseness or poor contact 2. Cooling fan relay circuit signal terminal is open 3. Cooling fan relay is malfunctioning (fuse is blown or damaged) 4. Open or internal circuit damage in cooling fan relay pin corresponding to ECU terminal
P063400	Cooling Fan 1 Drive Chip Overheating	Drive channel self-diagnosis is malfunctioning	1. Cooling fan relay control circuit is short to power supply 2. Cooling fan	1. Cooling fan relay control circuit is short to power supply 2. Whether there is a fault in internal chip of ECU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			relay control pin corresponding to ECU terminal is short to power supply	
P214800	Cylinder 1 or Cylinder 4 Fuel Injector Control Circuit Short to Power Supply	Drive channel self-diagnosis is malfunctioning	1. Injector high side control circuit is short to power supply 2. Injector high side control pin corresponding to ECU is short to power supply	1. Check if corresponding fuel injector high side control circuit is short to power supply 2. Check if fuel injector high side control circuit pin corresponding to ECU is short to power supply
P215100	Cylinders 2, 3 Fuel Injector High-side Control Circuit Voltage Too High or Too Low or Cylinder 2 Fuel Injector Low-side Control Circuit Voltage Too Low or Too High			
P070000	TCU Requests to Illuminate MIL Light	TCU requests to illuminate MIL light	1. TCU fault	1. Check whether TCU fault memory is faulty
P145000	Brake Booster Pressure Sensor Circuit Range/ Performance (High)	The brake chamber pressure is higher than the possible limit	1. Deviation in brake vacuum sensor characteristics 2. Brake vacuum chamber leakage	1. Check whether there is contact resistance in brake vacuum sensor wire harness 2. Check if sensor is damaged 3. Check for leakage in brake vacuum chamber
P145100	Brake Booster Pressure Sensor Circuit Range/ Performance (Low)	The brake chamber pressure is lower than the possible limit		
P121200	Vehicle Speed Sensor Performance Failure (Vehicle Speed Exceed Maximum Range)	Vehicle speed signal exceeds maximum possible value	1. ESP sends wrong speed signal	1. Check whether the CAN signal sent by ESP is too high
P050184	Vehicle Speed Sensor Performance Failure (Vehicle Speed Exceed Minimum Range)	Vehicle speed signal exceeds minimum possible value	1. ESP sends wrong speed signal 2. Vehicle speed signal frame communication between ESP and ECU is lost	1. Check if communication between ESP and ECU is lost 2. Check if CAN signal sent by ESP is always 0
P050165	Vehicle Speed Sensor Performance Failure (Vehicle Speed Too Low	Vehicle speed signal exceeds minimum possible value		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	When Oil Cut-Off During Coasting)			
P050166	Vehicle Speed Sensor "A" Circuit Range/ Performance	Vehicle speed signal exceeds minimum possible value		
P050000	Vehicle Speed Sensor Input Signal Fault	CAN speed signal received by ECU is wrong		
P050B00	Cold Start Ignition Timing Performance	The ignition angle efficiency exceeds the setting threshold during heating of parking idle catalytic converter	1. There are other DTC such as throttle valve failure or misfire failure, resulting in a decrease in intake air flow and abnormal ignition angle efficiency 2. Electronic throttle is stuck in a position with a small opening 3. Check if intake manifold is air leaked, exhaust resistance is too large, and the oil supply pressure is too low 4. ECU is faulty	1. Using a diagnostic tester, check if there are other faults such as misfire faults and throttle faults 2. Electronic throttle is stuck in a position with a small opening 3. Check if intake manifold is air leaked, exhaust resistance is too large, and the oil supply pressure is too low 4. Whether ECU is malfunctioning
P050B20	Cold Start Ignition Timing Performance	The ignition angle efficiency exceeds the setting threshold during heating of running catalytic converter	1. There are other DTC such as throttle valve failure or misfire failure, resulting in a decrease in intake air flow and abnormal ignition angle efficiency 2. Electronic throttle is stuck in a position with a small opening 3. Electronic throttle is stuck in a position with a small opening 4. ECU is faulty	1. Using a diagnostic tester, check if there are other faults such as misfire faults and throttle faults 2. Electronic throttle is stuck in a position with a small opening 3. Check if intake manifold is air leaked, exhaust resistance is too large, oil supply pressure is too low, and whether the boost system has insufficient supercharging 4. Whether ECU is malfunctioning
P057100	Brake Pedal Signal Synchronization Malfunction	When both paths of brake signal Brk_stMn and Brk_ stRed are out of synchronization for more than 1 second, and the	1. The brake switch or the brake light switch is open or short circuit 2.	1. Collect brake switch main signal Brk_stMn and brake redundancy signal Brk_ stRed, and check if they meet the requirements of

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		number of consecutive times exceeds Brk_ cntrSynErrThd_C, a fault will be reported	The switch in brake pedal has a mechanical failure	UMC: Stroke of two asynchronous sections cannot be too long 2. Check if brake pedal wire harness is connected reliably and if mechanical structure of brake pedal is abnormal 3. Clear DTC, restart vehicle and check if DTC is cleared
P142000	CAN Hardware Memory Response Timeout	CAN module initialization failed	1. CAN module of MCU initialization failed	1. Turn key to OFF position until the ECM is completely powered off, then turn key to ON to check whether the fault is eliminated
P142100	LIN Hardware Memory Response Timeout	LIN module initialization failed	1. LIN module of MCU initialization failed	1. Turn key to OFF position until the ECM is completely powered off, then turn key to ON to check whether the fault is eliminated
P142800	LIN1 Bus Massage Receiving Time Out of Limit			
P064100	5 V Power Supply Module 1 Fail	5 V power supply module 1 has an overvoltage or undervoltage problem	1.5 V power supply module 1 has an overvoltage or undervoltage problem	1. There is wire harness signal interference
P065100	5 V Power Supply Module 2 Fail	5 V power supply module 2 has an overvoltage or undervoltage problem	1.5 V power supply module 2 has an overvoltage or undervoltage problem	1. There is wire harness signal interference
P069700	5 V Power Supply Module 3 Fail	5 V power supply module 3 has an overvoltage or undervoltage problem	1.5 V power supply module 3 has an overvoltage or undervoltage problem	1. There is wire harness signal interference
P068500	Main Relay Open Circuit Error	When ECU is powered on, the main relay is open	1. Open circuit in main relay	1. There is wire harness interference 2. The transmission line between main relay and ECU is damaged or interrupted
P068700	Main Relay Short to Power Supply	When ECU is powered on, the main relay is short to power supply	1. Open circuit in main relay	1. There is wire harness interference 2. Transmission line between main relay and ECU is damaged, resulting in short to power supply

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P068600	Main Relay Short to Ground	When ECU is powered on, the main relay is short to ground	1. Short to ground in main relay	1. There is wire harness interference 2. Transmission line between main relay and ECU is damaged, resulting in short to ground
P06869E	ECM/PCM Power Relay Control Circuit Low	When ECU is powered off, the UBR voltage is greater than the reasonable range after main relay is disconnected	1. When ECU is powered off, the UBR voltage is greater than the reasonable range after main relay is disconnected	1. Main relay is stuck 2. There is interference in BR wire harness, and it is short to UBD
P261000	Unreasonable Shutdown Timing	When ECU is powered on, shutdown timing data is unreasonable	1. Shutdown timing data is unreasonable	1. Turn key to OFF position until the ECM is completely powered off, then turn key to ON to check whether the fault is eliminated
P06B842	Error when Reading/Writing Flash Block	When ECU is powered on, failure occurs when reading/ writing Flash Block	1. Failure occurs when reading/ writing Flash Block	1. Turn key to OFF position until the ECM is completely powered off, then turn key to ON to check whether the fault is eliminated
P06B843				
P126100	Cylinder 1 Injector Circuit Range/ Performance - Signal Plausibility Failure	The first five times the voltage signal value of cylinder 1 injector is lower than the lower threshold, or the last three times the voltage signal value exceeds the upper threshold	1. Injector wire harness for cylinder 1 is abnormal 2. ECU internal circuit is abnormal	1. Check whether cylinder 1 injector wire harness connection is normal 2. Replace the injector of cylinder 1, start the vehicle, and check whether the fault reappears 3. After replacing ECU, start the vehicle, and check whether the fault reappears
P126300	Cylinder 3 Injector Circuit Range/ Performance - Signal Plausibility Failure	The first five times the voltage signal value of cylinder 3 injector is lower than the lower threshold, or the last three times the voltage signal value exceeds the upper threshold	1. Injector wire harness of cylinder 3 is abnormal 2. ECU internal circuit is abnormal	1. Check whether cylinder 3 injector wire harness connection is normal 2. Replace the injector of cylinder 3, start the vehicle, and check whether the fault reappears 3. After replacing ECU, start the vehicle, and check whether the fault reappears
P126400	Cylinder 4 Injector Circuit Range/ Performance - Signal Plausibility Failure	The first five times the voltage signal value of cylinder 4 injector is lower than the lower threshold, or the last three times the voltage signal value exceeds the upper threshold	1. Injector wire harness of cylinder 4 is abnormal 2. ECU internal circuit is abnormal	1. Check whether cylinder 4 injector wire harness connection is normal 2. Replace the injector of cylinder 4, start the vehicle, and check whether the fault reappears 3. After replacing ECU, start the vehicle, and check whether the fault reappears
P126200	Cylinder 2 Injector Circuit	The first five times the voltage signal value of	1. Injector wire harness of	1. Check whether cylinder 2 injector wire harness

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Range/ Performance - Signal Plausibility Failure	cylinder 2 injector is lower than the lower threshold, or the last three times the voltage signal value exceeds the upper threshold	cylinder 2 is abnormal 2. ECU internal circuit is abnormal	connection is normal 2. Replace the injector of cylinder 2, start the vehicle, and check whether the fault reappears 3. After replacing ECU, start the vehicle, and check whether the fault reappears
P143000	Battery Has Been Changed and Long Time No Tester Confirmation	ECU receives LIN communication and sends fault information	1. The battery type has changed	1. Check whether the battery type has changed
P143100	EBS or Battery Error	ECU receives LIN communication and sends fault information	1. EBS circuit is open 2. EBS is damaged	1. Check if EBS circuit is open 2. EBS is damaged
P143200	EBS Temporary Error	ECU receives LIN communication and sends fault information	1. Wire harness interference in EBS LIN communication	1. Check whether there is wire harness interference in EBS LIN communication
P144200	Communication Fault of Generator	ECU receives LIN communication and sends fault information	1. Interference or damage in alternator LIN wire harness	1. Check whether there is interference or damage in alternator LIN communication module
P144100	Mechanical Fault of Generator	ECU receives LIN communication and sends fault information	1. Mechanical part of alternator is stuck or damaged	1. Check whether the mechanical part of alternator is stuck or damaged
P144000	Alternator Circuit Error	ECU receives LIN communication and sends fault information	1. Electronic part of alternator is damaged	1. Check whether the electronic part of alternator is damaged
P001100	"A" Camshaft Position - Timing Over-Advanced or System Performance Bank 1	When the engine starts, the intake camshaft is not in the locked position and exceeds the calibrated threshold	1. Intake VVT phase regulator and oil control valve failure	1. Check the operating status of intake VVT phase regulator and oil control valve (Blocked by dirt, stuck, oil pressure not completely relieved, lock pin invalid, etc.)
P001400	"B" Camshaft Position - Timing Over-Advanced or System Performance Bank 1	When the engine starts, the exhaust camshaft is not in the locked position and exceeds the calibrated threshold	1. Exhaust VVT phase regulator and oil control valve are failure	1. Check the operating status of intake VVT phase regulator and oil control valve (Blocked by dirt, stuck, oil pressure not completely relieved, lock pin invalid, etc.)
P062700	Fuel Pump “A” Control Circuit Open	Hardware circuit self-diagnostic	1. Open circuit in fuel pump relay control circuit 2. Open circuit in fuel pump relay control terminal	1. Check for open circuit in fuel pump relay control circuit 2. Check for open circuit in fuel pump relay control pin corresponding to ECU terminal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			corresponding to ECU	
P062800	Fuel Pump "A" Control Circuit Low	Hardware circuit self-diagnostic	1. Fuel pump relay control circuit is short to ground 2. Fuel pump relay control terminal corresponding to ECU is short to ground	1. Check if fuel pump relay control circuit is short to ground 2. Check if fuel pump relay control pin corresponding to ECU terminal is short to ground
P062900	Fuel Pump "A" Control Circuit High	Hardware circuit self-diagnostic	1. Fuel pump relay control circuit is short to power supply 2. Fuel pump relay control terminal corresponding to ECU is short to power supply	1. Check if fuel pump relay control circuit is short to power supply 2. Check if fuel pump relay control pin corresponding to ECU terminal is short to power supply
P05BD00	Start and Stop Main Switch is Stuck Failure	The sticky time of start and stop main switch exceeds the threshold	1. The start and stop main switch is damaged 2. The corresponding pin of the start and stop main switch is short to power supply	1. Check whether the start and stop main switch is damaged, whether it cannot be reset for a long time after being pressed 2. Check whether the corresponding pin of the start and stop main switch is short to power supply
P26F100	Starter Relay R1 (Crank Relay) or Starter (Drive Chain) Relay R2 (Pt State Relay) Cannot Be Combined	There is a start request but no starter feedback signal	1. Start relay R1 is damaged 2. Starter (drive chain) relay R2 is damaged	1. Check whether the start relay R1 is damaged 2. Check whether the starter (-drive chain) relay R2 is damaged
P26F200	Starter (Drive Chain) Status Relay R2 (PT State Relay) Cannot Be Disconnected	The starter feedback signal can be detected by sending the start test pulse when the drive chain is locked	1. Starter (drive chain) relay R2 switch adhesion damage	1. Check starter (drive chain) relay R2 switch for adhesion
P26F000	Starter Relay R1 (Crank relay) Cannot Be Disconnected	After the start, the starter feedback signal is detected when there is no start request	1. Starter relay R1 switch adhesion damage	1. Check starter relay R1 switch for adhesion
P14AD00	Engine Block or Starter is not Engaged	There is voltage drop and start feedback signal when starting, but the engine does not turn	1. Engine crankshaft or flywheel is stuck 2. Starter and flywheel cannot be meshed	1. Check whether the engine crankshaft and flywheel are blocked by foreign matters 2. Turn the key to "start", and check whether the starter and flywheel can mesh normally

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P14AF00	KL50r Wire Short Circuit to Ground	The engine can start normally, but there is no starter feedback voltage signal	1. Start feedback signal circuit is open 2. Start feedback signal circuit is short to ground	1. Check whether the starter feedback voltage signal circuit is short to ground or open
P14AE00	KL50r Wire Short Circuit to Battery	No start request, but the starter feedback voltage signal setting time exceeds the threshold	1. Start feedback signal circuit is short to power supply	1. Check whether the start switch feedback signal circuit is short to power supply
P14AC00	Starter Damaged or Wire Dropped	There is no voltage drop and start feedback signal when starting, and engine does not turn	1. The starter power supply circuit is disconnected or damaged and power supply is short 2. The starter body is damaged or cannot work normally	1. Check whether the starter power supply circuit is disconnected or damaged 2. Check whether the starter body is damaged or not working properly
P138824	Ambient Air Temperature Sensor "A" Multiple Check		1. The initial value of ambient temperature is much higher than the basic calibration value (main water temperature, average intake air temperature) 2. The initial value of ambient temperature is much lower than the basic calibration value (main water temperature, average intake air temperature)	
P138823	Ambient Air Temperature Sensor "A" Multiple Check			
P007000	Ambient Air Temperature Sensor Circuit "A"		1. ECU fails to normally receive the ambient temperature status transmitted from CAN 2. The transmitter of ambient temperature fails to send signal normally	1. Read ambient temperature value on CAN and check if it is reasonable 2. Read ambient temperature value on CAN and check if it is reasonable 3. Read ambient temperature status on CAN and check if it is reasonable
U012887	Lost Communication with EPB Module	ECU receiving EPB information timed out	1. EPB connector looseness or	1. EPB connector looseness or disengagement 2. There is wire harness signal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			disengagement 2. Transmission line between EPB and ECU damaged or interrupted 3. EPB is damaged and signal cannot be transmitted to ECU normally	interference 3. Transmission line between EPB and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. EPB is damaged and signal cannot be transmitted to ECU normally
U013187	Lost Communication with EPS (HS CAN)	ECU receiving EPS information timed out	1. EPS connector looseness or disengagement 2. Transmission line between EPS and ECU damaged or interrupted 3. EPS is damaged and signal cannot be transmitted to ECU normally	1. EPS connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between EPS and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. EPS is damaged and signal cannot be transmitted to ECU normally
U015187	Lost Communication with Airbag Module (SDM) (HS CAN)	ECU receiving SDM information timed out	1. SDM connector looseness or disengagement 2. Transmission line between SDM and ECU damaged or interrupted 3. SDM is damaged and signal cannot be transmitted to ECU normally	1. SDM connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between SDM and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. SDM is damaged and signal cannot be transmitted to ECU normally
P150100	Airbag Communicate Message Unplausible	The signal sent by airbag controller to engine ECU has not passed the verification	1. There is wire harness interference or unreliable signal transmission 2. The signal sent by airbag controller to engine ECU has not passed the verification, check whether the signal is abnormal	1. There is wire harness interference or unreliable signal transmission 2. The signal sent by airbag controller to engine ECU has not passed the verification, check whether the signal is abnormal
P150000	EMS Received Crash Signal	CAN information is unreasonable	1. The vehicle crashes and airbag pops up 2. There is	1. The vehicle crashes and airbag pops up 2. There is electromagnetic interference in the connection wire

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			electromagnetic interference in the connection wire harness between airbag and ECU 3. There is electromagnetic interference in the connection wire harness between airbag and ECU	harness between airbag and ECU 3. The signal sent by airbag to ECU is error and unreasonable
P053300	A/C Refrigerant Pressure Sensor "A" Circuit High	Sensor voltage is higher than the threshold	1. Intake manifold pressure sensor signal terminal is short to power supply or open 2. Sensor reference ground terminal is open 3. Short circuit to power supply or open circuit in intake pressure sensor signal pin terminal corresponding to ECU terminal 4. Sensor is damaged	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. With engine not started, use a multimeter to measure if voltage between intake manifold pressure sensor signal terminal and ground is close to or equal to 5 V 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if intake manifold pressure sensor signal terminal is short to power supply or open 4. Check if sensor reference ground terminal is open 5. Check if sensor is damaged 6. Check for short circuit to power supply, open circuit or internal circuit damage in intake pressure sensor signal pin terminal corresponding to ECU terminal
P053200	A/C Refrigerant Pressure Sensor "A" Circuit Low	Sensor voltage is lower than the threshold	1. A/C pressure sensor signal terminal is short to ground 2. 5 V reference voltage of sensor is open 3. Short to ground in A/C pressure sensor signal pin corresponding to ECU terminal	1. Connect diagnostic tester, turn ENGINE START STOP switch to “ON”. Do not start the engine, use a multimeter to measure if the voltage of air conditioning pressure sensor signal terminal is close to or equal to 0 V. 2. Turn ENGINE START STOP switch to “OFF”, check if pressure sensor signal terminal is short to ground 3. Check if sensor 5 V reference voltage terminal is open 4. Check if intake pressure sensor signal pin terminal corresponding to ECU terminal is short to ground

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P050F00	Brake Assist Vacuum Too Low	When the vacuum pump is working, the differential pressure between front and rear of brake disc vacuum is lower than the setting threshold within a certain period of time (such as 1 second)	1. There is a problem with the sealing characteristics of brake booster system 2. Vacuum pump is damaged	1. Check whether the sealing characteristics of brake booster system are abnormal 2. Check whether the vacuum pump is damaged
P258A00	Vacuum Pump Control Circuit Open	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Brake vacuum pump relay control circuit is open 3. Brake vacuum pump relay control circuit power supply terminal is open or short to ground 4. Brake vacuum pump relay fuse is blown or damaged 5. Open or internal circuit damage in brake vacuum pump control pin corresponding to ECU terminal	1. Connector looseness or poor contact 2. Brake vacuum pump relay control circuit is open 3. Brake vacuum pump relay control circuit power supply terminal is open or short to ground 4. Brake vacuum pump relay fuse is blown or damaged 5. Open or internal circuit damage in brake vacuum pump control pin corresponding to ECU terminal
P258C00	Vacuum Pump Control Circuit "A" Low	Drive channel self-diagnosis is malfunctioning	1. Brake vacuum pump relay control circuit is short to ground 2. Brake vacuum pump relay pin corresponding to ECU terminal is short to ground	1. Brake vacuum pump relay control circuit is short to ground 2. Brake vacuum pump relay pin corresponding to ECU terminal is short to ground
P258D00	Vacuum Pump Control Circuit "A" High	Drive channel self-diagnosis is malfunctioning	1. Brake vacuum pump relay circuit is short to power supply 2. Brake vacuum pump relay pin corresponding to ECU terminal is short to power supply	1. Brake vacuum pump relay circuit is short to power supply 2. Brake vacuum pump relay pin corresponding to ECU terminal is short to power supply
U015187 U010387	Lose Communication with ABM/EGS/ EPB/MFS/PEPS/	ECU receiving ABM/EGS/ EPB/MFS/PEPS/SAM/EBS/ DECOS information timed out	1. ABM/EGS/ EPB/MFS/ PEPS/SAM/ EBS/DECOS	1. ABM/EGS/EPB/MFS/ PEPS/SAM/EBS/DECOS connectors looseness or disengagement 2. There is

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U012887 U118787 U024887 U021287 U01B000 U010987	SAM/EBS/ DECOS or Signal Abnormal		connectors looseness or disengagement 2. Transmission line between ABM/EGS/EPB/ MFS/PEPS/ SAM/EBS/ DECOS and ECU damaged or interrupted 3. ABM/EGS/EPB/ MFS/PEPS/ SAM/EBS/ DECOS are damaged and signal cannot be transmitted to ECU normally	wire harness signal interference 3. Transmission line between ABM/EGS/ EPB/MFS/PEPS/SAM/EBS/ DECOS and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. ABM/EGS/ EPB/MFS/PEPS/SAM/EBS/ DECOS are damaged and signal cannot be transmitted to ECU normally
U041681 U040281 U045281 U042281 U042481 U040481 U041781 U041081 U042381 U059B81 U042681 U042981	Data Received by ECU from ESP/TCM/ABM/ BCM/CLM/EGS/ EPB/FPC/ICM/ MFS/PEPS/SAM Module Not Reliable	Data from ESP/TCM/ABM/ BCM/CLM/EGS/EPB/FPC/ ICM/MFS/PEPS/SAM module is invalid	1. The checksum value sent by ESP/ TCM/ABM/ BCM/CLM/EGS/ EPB/FPC/ICM/ MFS/PEPS/ SAM module is abnormal 2. The Alive counter value sent by ESP/TCM/ABM/ BCM/CLM/EGS/ EPB/FPC/ICM/ MFS/PEPS/ SAM module is abnormal 3. The value sent by ESP/TCM/ABM/ BCM/CLM/EGS/ EPB/FPC/ICM/ MFS/PEPS/ SAM module contains an Invalid value	1.ESP/TCM/ABM/BCM/ CLM/EGS/EPB/FPC/ICM/ MFS/PEPS/SAM connectors looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between ESP/TCM/ ABM/BCM/CLM/EGS/EPB/ FPC/ICM/MFS/PEPS/SAM and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. ESP/TCM/ABM/BCM/ CLM/EGS/EPB/FPC/ICM/ MFS/PEPS/SAM are damaged and signal cannot be transmitted to ECU normally
P059700	Thermostat Heater Control Circuit Open	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Open in electronic thermostat drive circuit pin 3. Open or internal circuit damage in electronic thermostat drive circuit pin corresponding to ECU terminal	1. Check connector for looseness or poor contact 2. Check for open in electronic thermostat drive circuit pin 3. Check for open or internal circuit damage in electronic thermostat drive circuit pin corresponding to ECU terminal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P059800	Thermostat Heater Control Circuit Low	Drive channel self-diagnosis is malfunctioning	1. Electronic thermostat drive circuit short to ground 2. Short to ground in electronic thermostat drive circuit corresponding to ECU terminal	1. Check if electronic thermostat drive circuit is short to ground 2. Check for short circuit to ground in electronic thermostat drive circuit pin corresponding to ECU terminal
P059900	Thermostat Heater Control Circuit High	Drive channel self-diagnosis is malfunctioning	1. Electronic thermostat drive circuit short to power supply 2. Short to power supply in electronic thermostat drive circuit corresponding to ECU terminal	1. Check for short circuit to power supply in electronic thermostat drive circuit pin 2. Check for short circuit to power supply in electronic thermostat drive circuit corresponding to ECU terminal
U007388	CAN1 Bus OFF (Communication Closed)	CAN1 bus off	1. CAN1 bus interface looseness or poor contact 2. Short circuit to power supply / ground or open circuit in CAN1 bus interface pin 3. Short circuit to power supply / ground, open circuit or internal circuit damage in CAN1 bus interface pin corresponding to ECU terminal	1. CAN1 bus interface looseness or poor contact 2. Short circuit to power supply / ground or open circuit in CAN1 bus interface pin 3. There is wire harness signal interference 4. Short circuit to power supply / ground, open circuit or internal circuit damage in CAN1 bus interface pin corresponding to ECU terminal
P007200	Ambient Air Temperature Sensor Circuit "A" Low	Ambient temperature sensor circuit connectivity self-diagnosis	1. Wire harness of ambient temperature sensor is abnormally connected 2. Ambient temperature sensor is damaged	1. Using a multimeter, check if sensor pin voltage is normal 2. Check if CAN signal is normal 3. Check if wire harness is normal 4. Replace ECU, check if fault reappears
P007300	Ambient Air Temperature Sensor Circuit "A" High	Ambient temperature sensor signal circuit connectivity self-diagnosis	1. Wire harness of ambient temperature sensor is abnormally connected 2. Ambient temperature	1. Using a multimeter, check if sensor pin voltage is normal 2. Check if CAN signal is normal 3. Check if wire harness is normal 4. Replace ECU, check if fault reappears

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			sensor is damaged	
P254200	DECOS Oil Passage Pressure Sensor Circuit High Voltage	Fuel rail pressure sensor circuit voltage is higher than 4.8 V	1. Fuel rail pressure sensor circuit is short to power supply 2. Fuel rail pressure sensor pin corresponding to ECU is short to power supply	1. Check if sensor signal terminal is short to power supply or open 2. Check if sensor is damaged 3. Check for short circuit to power supply, open circuit or internal circuit damage in fuel rail pressure sensor signal pin corresponding to ECU terminal
P254100	DECOS Oil Passage Pressure Sensor Circuit Low Voltage	Fuel rail pressure sensor circuit voltage is lower than 0.2 V	1. Fuel rail pressure sensor circuit is short to ground 2. Fuel rail pressure sensor pin corresponding to ECU is short to ground	1. Check if sensor signal terminal is short to ground 2. Check if sensor is damaged 3. Check for short circuit to power supply, open circuit or internal circuit damage in fuel rail pressure sensor signal pin corresponding to ECU terminal
P254029	DECOS Oil Passage Pressure Sensor Circuit Bank 1-Positive Offset	The low pressure fuel rail pressure signal during the end of engine operation is higher than the upper threshold	1. Low pressure oil passage sensor internal circuit and wire harness are deteriorated	1. Check whether there is a large contact resistance at the connector of DECOS pressure sensor or in the wire harness. 2. Replace the DECOS pressure sensor, return the vehicle to customer, and check whether the fault will be reported again.
P254028	DECOS Oil Passage Pressure Sensor Circuit Bank 1-Negative Offset	The low pressure fuel rail pressure signal during the end of engine operation is lower than the threshold	1. Low pressure oil passage sensor internal circuit and wire harness are deteriorated	1. Check whether there is a large contact resistance at the connector of DECOS pressure sensor or in the wire harness. 2. Replace the DECOS pressure sensor, return the vehicle to customer, and check whether the fault will be reported again.
P137000	DECOS Oil Passage Pressure Sensor Relative Pressure Too Low	The relative pressure of pressure sensor is lower than the fault threshold	1. Oil passage leaks 2. Fuel is insufficient 3. Check valve is damaged 4. Low pressure oil pump is damaged	1. Check if oil passage is leaked 2. Check if fuel is insufficient 3. Check if check valve is damaged 4. Check if low pressure oil pump is damaged
P137100	DECOS Oil Passage Pressure Sensor Relative Pressure Too High	The low pressure fuel rail pressure signal is higher than the upper threshold	1. Relief valve is blocked 2. Low pressure oil pump is damaged	1. Check if relief valve of low pressure oil circuit is blocked 2. Check if low pressure oil pump is damaged

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P025D00	Fuel Pump Module "A" Control Circuit High	Hardware circuit self-diagnostic	1. Low pressure oil pump control circuit short to power supply 2. Short to power supply in low pressure oil pump pin corresponding to ECU	1. Check for short to power supply in actuator terminal 2. Check for short to power supply in actuator pin corresponding to ECU terminal
P025A00	Fuel Pump Module "A" Control Circuit Open	Hardware circuit self-diagnostic	1. Low pressure oil pump control circuit is open 2. Open circuit in low pressure oil pump pin corresponding to ECU	1. Check for open in actuator terminal 2. Check for open in actuator pin corresponding to ECU terminal
P008A00	DECOS Low Pressure Oil Passage Pressure Too Low	The low pressure fuel rail pressure is lower than the expected value	1. Oil passage leaks 2. Fuel is insufficient 3. Check valve is damaged 4. Low pressure oil pump is damaged	1. Check if oil passage is leaked 2. Check if fuel is insufficient 3. Check if check valve is damaged 4. Check if low pressure oil pump is damaged
P008B00	DECOS Low Pressure Fuel System Pressure Too High	The low pressure fuel rail pressure is higher than the expected value	1. Low pressure oil pump is damaged 2. Relief valve is blocked	1. Check if damage to low pressure oil pump is normal 2. Check relief valve for blockage or abnormal operation
P016F00	DECOS Low Pressure Oil Passage PWM Control Deviation Too Large	Control deviation exceeds the maximum	1. Relief valve is blocked 2. Low pressure oil pump is damaged	1. Check if relief valve of low pressure oil circuit is blocked 2. Check if low pressure oil pump is damaged
P062A00	Fuel Pump Module Control Circuit High	Drive channel self-diagnosis is malfunctioning	1. Fuel pump relay control circuit is short to power supply 2. Fuel pump relay control pin corresponding to ECU is short to power supply	1. Check if oil pump relay terminal is short to power supply 2. Whether there is a fault in internal chip of ECU
P013000	Upstream Oxygen Sensor Compensating Circuit Open	Under the condition of low exhaust temperature and oil cut-off, the oxygen sensor voltage signal is high for a long time	1. Upstream oxygen sensor compensation circuit is open	1. Check for poor contact in pin corresponding to green wire at oxygen sensor connector 2. Check for continuity of oxygen sensor wire harness to check if the line is open 3. Check for abnormal pin at connector between wire harness and ECU, which may result in poor contact 4. Clear DTC,

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				start and keep vehicle idling until coolant temperature reaches normal value. Check if malfunction is reported again. 5. Check for abnormality in LSU processing circuit in ECU
P223700	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1 (Close to ECU)	Chip fault memory diagnosis	1. Open circuit in LSU oxygen sensor APE line, which is close to ECU terminal 2. ECU internal circuit is abnormal	1. Replace oxygen sensor, and check if fault reappears 2. Replace ECU, and check if fault reappears
P208062	Excessive Deviation Between Particulate Filter Upstream Temperature Sensor Signal Model and Actual	The measured value of upstream temperature sensor of particulate filter is too different from the model value	1. There is interference in upstream temperature sensor circuit of particulate filter 2. The particulate filter upstream temperature sensor characteristic is aging and deviation	1. Check the upstream temperature sensor circuit of particulate filter for interference 2. Check whether the upstream temperature sensor of particulate filter is aging and deviation
P20802A	Particulate Filter Upstream Temperature Sensor Signal Stuck	The signal of upstream temperature sensor of particulate filter is sticky	1. There is interference in upstream temperature sensor circuit of particulate filter 2. The particulate filter upstream temperature sensor characteristic is aging and deviation	1. Check the GPF temperature sensor circuit for interference 2. Check whether the GPF temperature sensor is aging and deviation
P054500	Particulate Filter Upstream Temperature Sensor Circuit Voltage Low	The voltage of upstream temperature sensor circuit of particulate filter is below the limit	1. The upstream temperature sensor signal terminal of particulate filter is short to ground	1. Use a multimeter to measure if upstream temperature sensor signal terminal voltage of particulate filter is close to or equal to 0 V 2. Turn ENGINE START STOP switch to “OFF”, and check if particulate filter upstream temperature sensor signal terminal is short to ground 3. Check if sensor is damaged 4. Particulate filter upstream

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				temperature sensor signal pin terminal corresponding to ECU terminal is short to ground
P054600	Particulate Filter Upstream Temperature Sensor Circuit Voltage High	The voltage of upstream temperature sensor circuit of particulate filter is higher than the limit	1. Particulate filter upstream temperature sensor signal terminal is short to power supply or open 2. Short to power supply, open or internal circuit damage in particulate filter upstream temperature sensor signal pin corresponding to ECU terminal	1. Use a multimeter to measure if the voltage between particulate filter upstream temperature sensor signal terminal and ground is close to or equal to 5 V 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if sensor signal terminal is short to power supply or open 4. Check if sensor reference ground is open 5. Check if sensor is damaged 6. Check for short to power supply, open or internal circuit damage in particulate filter upstream temperature sensor signal pin terminal corresponding to ECU terminal
P20E224	Particulate Filter Upstream Temperature Sensor Cold Start Correction Improper (- Positive Deviation)	The particulate filter upstream temperature sensor signal is too high for cold start calibration	1. There is interference in upstream temperature sensor circuit of particulate filter 2. The particulate filter upstream temperature sensor characteristic is aging and deviation	1. Check the upstream temperature sensor circuit of particulate filter for interference 2. Check whether the upstream temperature sensor of particulate filter is aging and deviation
P20E223	Particulate Filter Upstream Temperature Sensor Cold Start Correction Improper (- Negative Deviation)	The particulate filter upstream temperature sensor signal is too low for cold start calibration		
P218324	Cold Start Engine Coolant Temperature Performance	Deviation of coolant temperature sensor 2 cold start and the model value is too large	1. Internal resistance of coolant temperature sensor 2 is unreasonable	1. Check wire harness for contact resistance 2. Check if internal resistance value of sensor greatly deviates from the normal value
P218323	Cold Start Engine Coolant Temperature Performance			
P12A300	Particulate Filter Differential Pressure Sensor Rear Pipe Connecting Line	The measured value of particulate filter differential pressure sensor is unreasonable	1. The front/rear differential pressure sensor line falls off or leaks 2. The	1. Check whether the front and rear differential pressure sensor lines fall off or leak 2. Check whether there is a reverse

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Abnormal / Completely Blocked / Sensor Stuck		front and rear differential pressure sensor lines are reversed	connection between the front and rear differential pressure sensor lines
U060100	Particulate Filter Differential Pressure Sensor Sent Communication Failure (Upstream)	Sent message indicates communication failure	1. Differential pressure sensor itself failure	1. Check whether the differential pressure sensor circuit wire harness is faulty 2. Check whether the sensor itself is faulty
U060141	Particulate Filter Differential Pressure Sensor Data Inspection Non-plausible (Upstream)	Sent information indicates that the data check is unreasonable		
P129300	Particulate Filter Differential Pressure Sensor Channel 1 Digital Signal Non-plausible (SENT Signal High or Low)	Channel 1 digital signal is unreasonable		
P245500	Particulate Filter Differential Pressure Sensor Circuit Voltage High (Upstream)	Particulate filter differential pressure sensor circuit voltage high	1. The differential pressure sensor circuit is short to power supply	1. Check whether the wire harness of differential pressure sensor circuit is short to power supply 2. Check whether the sensor itself is short
P245400	Particulate Filter Differential Pressure Sensor Circuit Voltage Low (Upstream)	Particulate filter differential pressure sensor circuit voltage low	1. The differential pressure sensor circuit is short to ground	1. Check whether the wire harness of differential pressure sensor circuit is short to ground 2. Check whether the sensor itself is short
P129100	GPF Dynamic Response Performance of Particulate Filter Differential Pressure Sensor Non-plausible / Line Abnormal	The measured value of particulate filter differential pressure does not match the flow model	1. Differential pressure sensor failure 2. Frozen in the sampling line	1. Check whether the differential pressure sensor line is frozen 2. Replace the sensor and check if the fault is repaired
P226D00	Particulate Filter Removed / Pressure Sensor / Line Abnormal Fault	The calculation amount of particulate filter differential pressure model is lower than the threshold	1. The particulate filter is removed 2. Particulate filter is burnt	1. Check whether the particulate filter has been removed 2. Check whether the particulate filter is burnt
P129000	Offset Check Value After Running Particulate Filter	The running learning value of particulate filter differential pressure sensor exceeds the limit	1. The zero offset of differential	1. Check whether there is contact resistance in differential pressure sensor circuit wire harness 2.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Differential Pressure Sensor Unreasonable		pressure sensor is too large	Check whether the characteristic deviation of sensor itself is too large
P054A00	Exhaust VVT Actual Position Deviation Fault During Catalytic Converter Heating	The actual position of exhaust VVT during the heating process of catalytic converter is too different from the target position	1. Insufficient OCV oil valve pressure 2. OCV oil valve is blocked or leaking	1. Check if operating condition of cam phase regulator is normal (dirt blockage, oil leakage, sticking) 2. Check if operating condition of OCV oil control valve is normal
P048371	Cooling Fan Rationality Check Error (Type 1)	The fan feedback signal type is fault type 1	1. Fan blocking	1. Check if cooling fan is blocked
P048372	Cooling Fan Rationality Check Error (Type 2)	The fan feedback signal type is fault type 2	1. Fan overload	1. Check whether the cooling fan load is too high
P048373	Cooling Fan Rationality Check Error (Type 3)	The fan feedback signal type is fault type 3	1. Fan power supply is too high or too low	1. Check if cooling fan power supply is too high or too low
P048374	Cooling Fan Rationality Check Error (Type 4)	The fan feedback signal type is fault type 4	1. Fan control circuit over temperature	1. Check if cooling fan control circuit is short or overloaded
U012287	Lost Communication with ESP (-Electronic Stability Program)	ECU receiving ESP information timed out	1. ESP connector looseness or disengagement 2. Transmission line between ESP and ECU damaged or interrupted 3. ESP is damaged and signal cannot be transmitted to ECU normally	1. ESP connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between ESP and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. ESP is damaged and signal cannot be transmitted to ECU normally
P218400	Engine Coolant Temperature Sensor 2 Circuit Low	Coolant temperature sensor 2 voltage is lower than 0.09 V	1. Coolant temperature sensor 2 signal terminal is short to ground 2. Short to ground in coolant temperature sensor 2 signal pin corresponding to ECU terminal 3. Sensor is damaged	1.Use a multimeter to measure if coolant temperature sensor 2 signal terminal voltage is close to or equal to 0 V 2. Turn ENGINE START STOP switch to “OFF”, check if coolant temperature sensor 2 signal terminal is short to ground 3. Check if sensor is damaged 4. Check if coolant temperature sensor 2 signal pin terminal corresponding to ECU is short to ground
P218500	Engine Coolant Temperature Sensor 2 Circuit High	Coolant temperature sensor 2 voltage is higher than 4.9 V	1. connector looseness or poor contact 2. Coolant	1. Use a multimeter to measure if voltage between coolant temperature sensor 2 signal terminal and ground

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			temperature sensor 2 signal terminal is short to power supply or open 3. Short to power supply or open in coolant temperature sensor 2 signal pin corresponding to ECU terminal 4. Sensor is damaged	is close to or equal to 5 V. 2. Turn ENGINE START STOP switch to “OFF”, check connector for looseness or poor contact 3. Check if sensor signal terminal is short to power supply or open 4. Check if sensor reference ground is open 5. Check if sensor is damaged 6. Short to power supply, open circuit or internal circuit damage in coolant temperature sensor 2 signal pin terminal corresponding to ECU
U015587	Lost Communication with IP (-Instrument Cluster)	ECU receiving IP information timed out	1. IP connector looseness or disengagement 2. Transmission line between IP and ECU damaged or interrupted 3. IP is damaged and signal cannot be transmitted to ECU normally	1. IP connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between IP and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. IP is damaged and signal cannot be transmitted to ECU normally
U016487	Communication Between ECU and AC Control Module Failure	ECU receiving AC information timed out	1. AC connector looseness or disengagement 2. Transmission line between AC and ECU damaged or interrupted 3. AC is damaged and signal cannot be transmitted to ECU normally	1. AC connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between AC and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. AC is damaged and signal cannot be transmitted to ECU normally
U014087	Lost Communication with BCM (Body Control Module)	ECU receiving BCM information timed out	1. BCM connector looseness or disengagement 2. Transmission line between BCM and ECU damaged or interrupted 3. BCM is damaged and signal cannot be transmitted to ECU normally	1. BCM connector looseness or disengagement 2. There is wire harness signal interference 3. Transmission line between BCM and ECU damaged or interrupted 4. Check if there is CAN hardware circuit fault 5. BCM is damaged and signal cannot be transmitted to ECU normally
P12E000	Particle Trap Differential	The running learning value of particulate filter differential	1. The zero offset of	1. Check whether there is contact resistance in

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Pressure Sensor Post-running Offset Check Value Unreasonable (Downstream)	pressure sensor exceeds the limit	differential pressure sensor is too large	differential pressure sensor circuit wire harness 2. Check whether the characteristic deviation of sensor itself is too large
P12E100	GPF Dynamic Response Performance of Particulate Filter Differential Pressure Sensor Non-plausible / Line Abnormal (Downstream)	The measured value of particulate filter differential pressure does not match the flow model	1. Differential pressure sensor failure 2. Frozen in the sampling line	1. Check whether the differential pressure sensor line is frozen 2. Replace the sensor and check if the fault is repaired
P12E300	Particulate Filter Differential Pressure Sensor Channel 1 Digital Signal Non-plausible (SENT Signal High or Low)	Channel 1 digital signal is unreasonable	1. Differential pressure sensor itself failure	1. Check whether the differential pressure sensor circuit wire harness is faulty 2. Check whether the sensor itself is faulty
P12A200	Particulate Filter Differential Pressure Sensor Line Connection Error	The measured value of particulate filter differential pressure sensor is unreasonable	1. The front/rear differential pressure sensor line falls off or leaks 2. The front and rear differential pressure sensor lines are reversed	1. Check whether the front and rear differential pressure sensor lines fall off or leak 2. Check whether there is a reverse connection between the front and rear differential pressure sensor lines
P246100	Particulate Filter Differential Pressure Sensor Circuit Voltage High (Downstream)	Particulate filter differential pressure sensor circuit voltage high	1. The differential pressure sensor circuit is short to power supply	1. Check whether the wire harness of differential pressure sensor circuit is short to power supply 2. Check whether the sensor itself is short
P246000	Particulate Filter Differential Pressure Sensor Circuit Voltage Low (Downstream)	Particulate filter differential pressure sensor circuit voltage low	1. The differential pressure sensor circuit is short to ground	1. Check whether the wire harness of differential pressure sensor circuit is short to ground 2. Check whether the sensor itself is short
U060200	Particulate Filter Differential Pressure Sensor Sent Communication Failure (Downstream)	Sent message indicates communication failure	1. Differential pressure sensor itself failure	1. Check whether the differential pressure sensor circuit wire harness is faulty 2. Check whether the sensor itself is faulty
U060241	Particulate Filter Differential Pressure Sensor	Sent information indicates that the data check is unreasonable	1. Differential pressure sensor itself failure	1. Check whether the differential pressure sensor circuit harness is faulty

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Data Inspection Non-plausible (Downstream)			
P025C00	Fuel Pump Module "A" Control Circuit Low	Hardware circuit self-diagnostic	1. Low pressure oil pump control circuit short to ground 2. Short to ground in low pressure oil pump pin corresponding to ECU	1. Check for short to ground in actuator terminal 2. Check for short to ground in actuator pin corresponding to ECU terminal
P016E00	Closed Loop Fuel Pressure Control At Limit - Pressure Too High	Control deviation is below minimum	1. Low pressure oil pump is damaged 2. Relief valve is blocked	1. Check if damage to low pressure oil pump is normal 2. Check relief valve for blockage or abnormal operation
P053A00	Crankcase Heating Line Circuit Open	Drive channel self-diagnosis is malfunctioning	1. Connector looseness or poor contact 2. Open in crankcase line heater control circuit pin terminal 3. Crankcase line heater control circuit power supply terminal is not connected to main relay 4. Sensor is damaged 5. Open or internal circuit damage in crankcase line heater pin circuit corresponding to ECU terminal	1. Check connector for looseness or poor contact 2. Open circuit in crankcase line heater control circuit pin terminal 3. Crankcase line heater control circuit power supply terminal is not connected to main relay 4. Sensor is damaged 5. Open circuit or internal circuit damage in crankcase line heater pin circuit corresponding to ECU terminal
P053C00	Crankcase Heating Line Circuit Voltage Too High	Drive channel self-diagnosis failure	1. Short to power supply in crankcase line heater control circuit pin terminal	1. Check for short circuit to power supply in crankcase line heater control circuit pin terminal 2. Check for short circuit to power supply in crankcase line heater pin corresponding to ECU terminal
P053B00	Crankcase Heating Line Circuit Voltage Too Low	Drive channel self-diagnosis is malfunctioning	1. Crankcase line heater control circuit pin terminal is short to ground 2. Crankcase line heater control circuit power supply	1. Check connector for looseness or poor contact 2. Open circuit in crankcase line heater control circuit pin terminal 3. Crankcase line heater control circuit power supply terminal is not connected to main relay

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
			terminal is grounded 3. Crankcase line heater pin corresponding to ECU terminal is short to ground	
P121B00	Front Left Wheel Speed Sensor Signal Abnormal	ABS-ECU sends the front left wheel speed sensor fault flag bit	1. The front left wheel speed sensor is faulty	1. Check if there is a fault in the ABS-ECU fault memory
P121C00	Front Right Wheel Speed Sensor Signal Abnormal	ABS-ECU sends the front right wheel speed sensor fault flag bit	1. The front right wheel speed sensor is faulty	1. Check if there is a fault in the ABS-ECU fault memory
P121D00	Rear Left Wheel Speed Sensor Signal Abnormal	ABS-ECU sends the rear left wheel speed sensor fault flag bit	1. The rear left wheel speed sensor is faulty	1. Check if there is a fault in the ABS-ECU fault memory
P121E00	Rear Right Wheel Speed Sensor Signal Abnormal	ABS-ECU sends the rear right wheel speed sensor fault flag bit	1. The rear right wheel speed sensor is faulty	1. Check if there is a fault in the ABS-ECU fault memory
P063449	Brake Vacuum Pump Drive Chip Overheat	Drive channel self-diagnosis is malfunctioning	1. Short circuit to power supply in brake vacuum pump control circuit 2. Brake vacuum pump control pin corresponding to ECU terminal is short to power supply	1. Short circuit to power supply in brake vacuum pump control circuit 2. If there is a fault in the internal chip of ECU

4.7 DTC Diagnosis Procedure

■ Intake/exhaust phaser operation (slow, stuck) malfunctions

DTC	**P000A00**	**"A" Camshaft Position Slow Response Bank 1**
DTC	**P003C00**	**"A" Camshaft Profile Control Performance/Stuck Off Bank 1**
DTC	**P000B00**	**"B" Camshaft Position Slow Response Bank 1**
DTC	**P005A00**	**"B" Camshaft Profile Control Performance/Stuck Off Bank 1**
DTC	**P001100**	**"A" Camshaft Position - Timing Over-Advanced or System Performance Bank 1**
DTC	**P001400**	**"B" Camshaft Position - Timing Over-Advanced or System Performance Bank 1**
DTC	**P054A00**	**Exhaust VVT Actual Position Deviation Fault During Catalytic Converter Heating**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check phaser solenoid valve, valve body bolt components state**

(a) Disconnect the negative battery cable.
(b) Remove intake/exhaust phaser solenoid valve; Check for blockage or dirt.
(c) Remove intake/exhaust phaser valve body bolts; Check for blockage or dirt.

NG → **Clean or replace phaser solenoid valve and valve body bolts**

OK

2	**Check engine maintenance condition**

(a) Check if engine oil level is normal, and check for oil leakage and oil seepage.
(b) Remove valve trim cover, and check engine lubrication and cleaning conditions, and check for wear or sludge dirty.

NG → **Clean and maintain the engine, replace the damaged components**

OK

3	**Check engine oil pressure**

(a) Remove oil pressure sensor; Connect oil pressure tester to test oil pressure.

Main oil passage pressure: Limit pressure range (0.9 - 10 bar)

NG → **Check or replace oil pump assembly**

OK

4	**Check intake/exhaust phaser assembly**

(a) Check if operating condition of cam phase regulator is normal (dirt blocked, oil leaked, stuck, etc.).

NG	**Replace intake/exhaust phaser assembly**

OK

5	**Reconfirm DTCs**

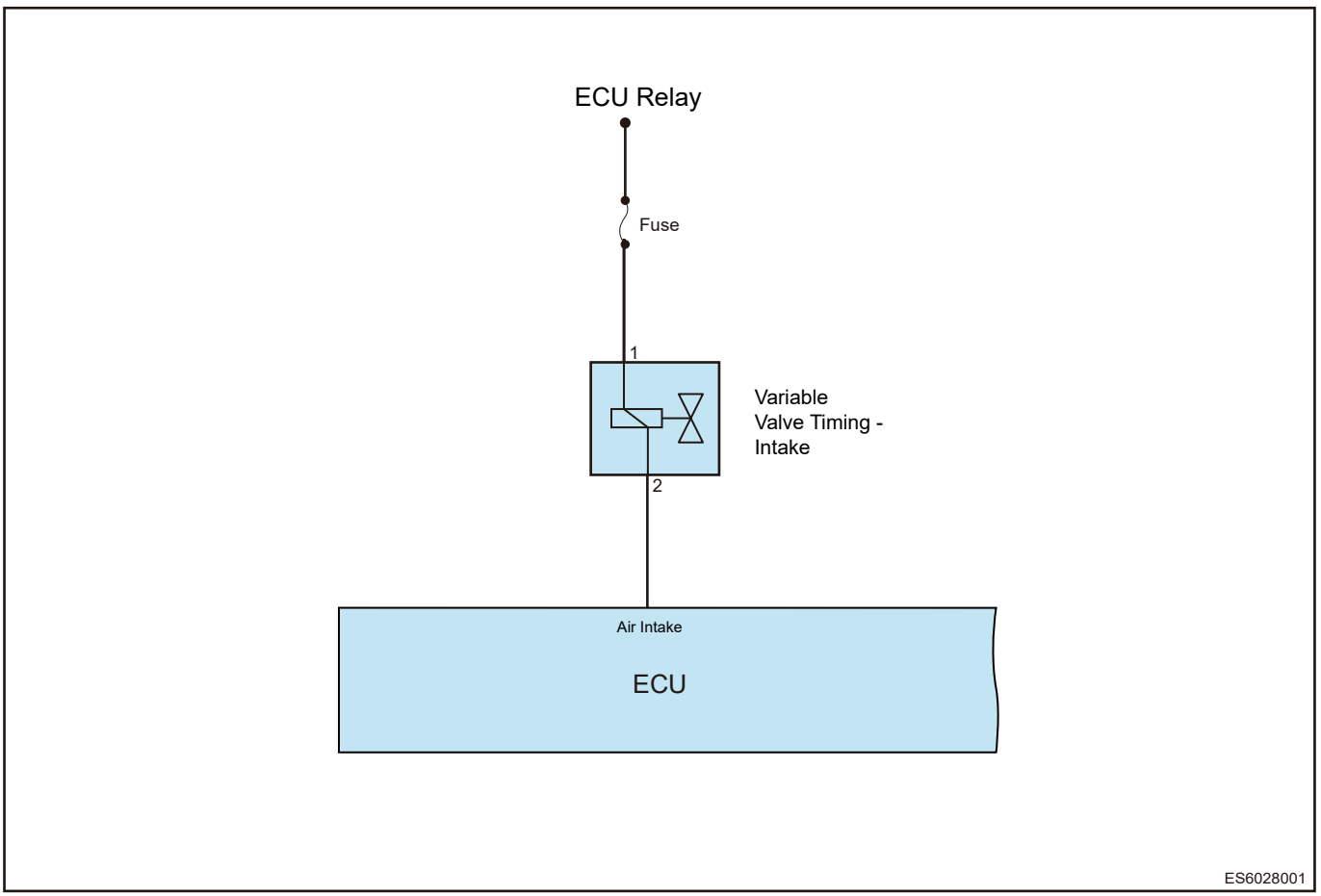
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**

■ Intake phaser solenoid valve control circuit open

DTC	**P001000**	**“A” Camshaft Position Actuator Control Circuit Open Bank 1**

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check intake phaser solenoid valve connector**

(a) Disconnect the negative battery.
(b) Unplug intake phaser solenoid valve connector, check this connector for looseness or poor contact.

NG → **Repair connector or replace intake phaser solenoid valve**

OK ↓

2	**Check intake phaser solenoid valve internal resistance**

(a) Using ohm band of multimeter, measure if internal resistances of intake phaser solenoid valve (1-2) are normal with red and black probes respectively.

Resistance at ambient temperature: 6 Ω

NG → **Replace intake phaser solenoid valve assembly**

OK ↓

3	**Check intake phaser solenoid valve power supply fuse**

(a) Turn ENGINE START STOP switch to ON.
(b) Check "intake phaser solenoid valve" fuse in engine compartment fuse and relay box.

NG → **Replace fuse, check if circuit is short**

OK ↓

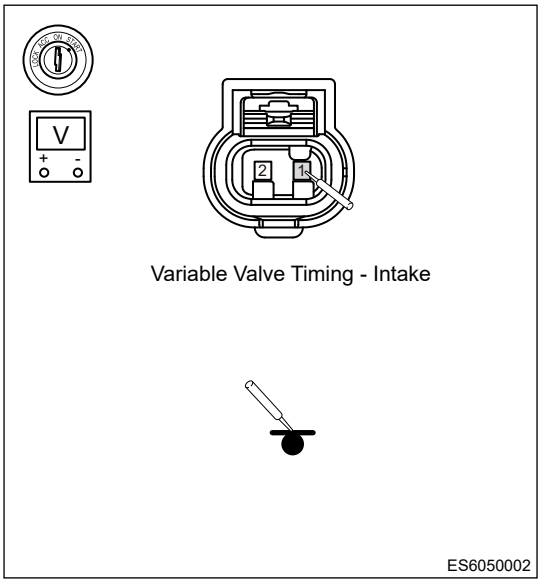
4	**Check intake phaser solenoid valve power supply and control terminal**

(a) Connect intake phaser solenoid valve connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of intake phaser solenoid valves (1) with red probe.

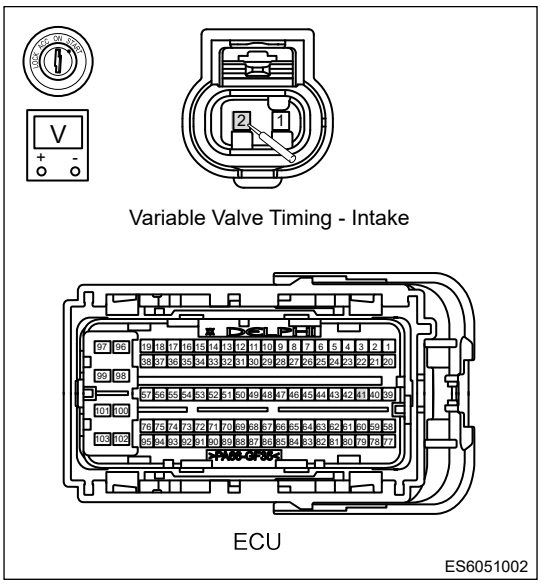
Test voltage is current battery voltage



(d) Start the engine.

(e) Refer to circuit diagram, using voltage band of multimeter (-voltage drop method), connect black probe to ECU end corresponding terminal, connect red probe to intake phaser solenoid valve (2).

The tested voltage drop value should be less than approximately 0.2 V



NG	**Repair or replace wire harness**

OK

5	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

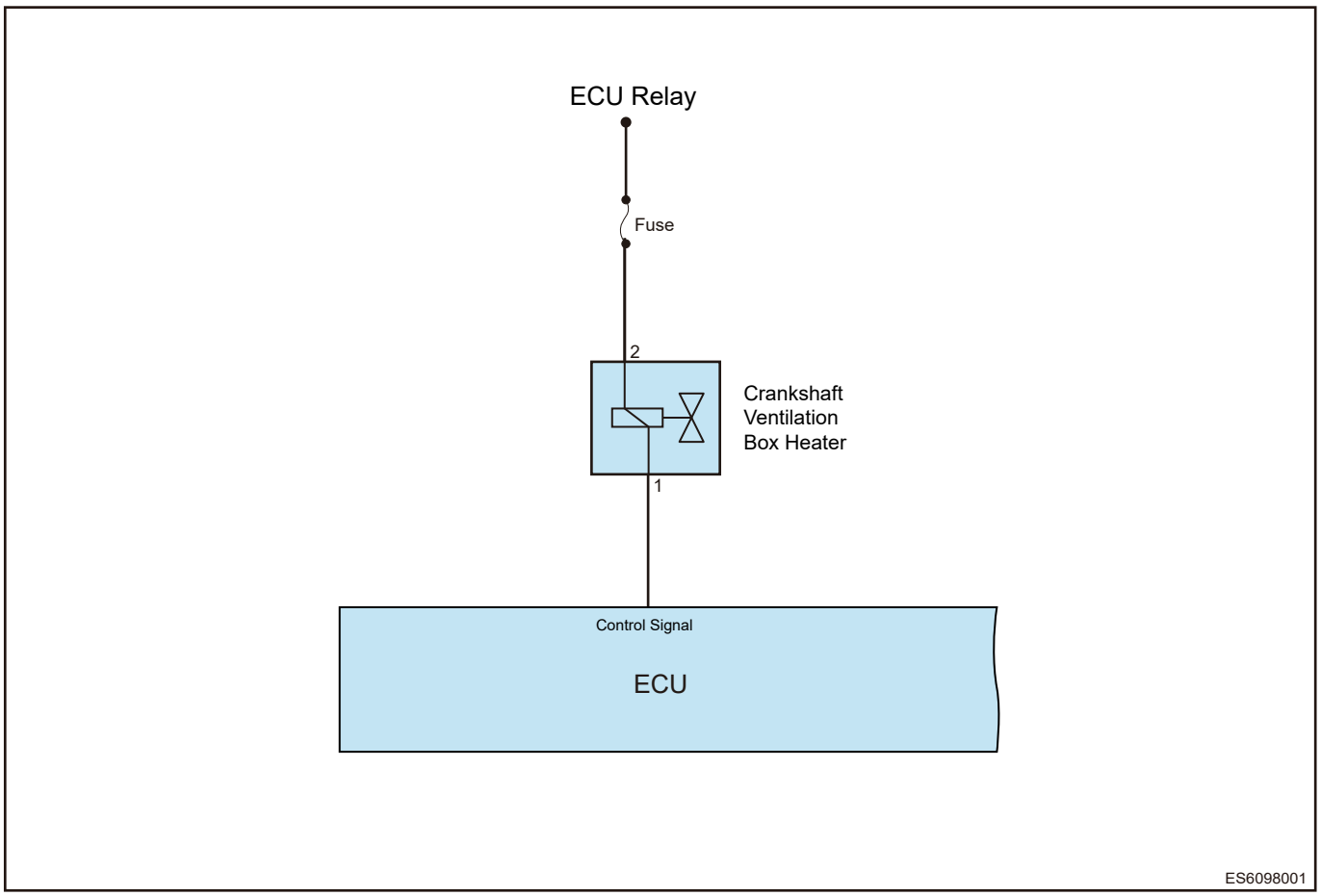
OK	**Conduct test and confirm malfunction has been repaired**

NG	Replace Engine Control Module (ECU)

■ **Crankcase heating line circuit open**

DTC	P053A00	Crankcase Heating Line Circuit Open

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check crankcase heater connector

(a) Disconnect the negative battery.
(b) Unplug crankcase heater connector, check this connector for looseness or poor contact.

NG	Repair connector or replace crankcase heater

OK

2	Check internal resistance of crankcase heater

(a) Using ohm band of multimeter, measure if internal resistances of intake phaser solenoid valve (1-2) are normal with red and black probes respectively.

NG → **Replace crankcase heater**

OK

3	Check crankcase heater power supply fuse

(a) Turn ENGINE START STOP switch to ON.
(b) Check "crankcase heater" fuse in engine compartment fuse and relay box.

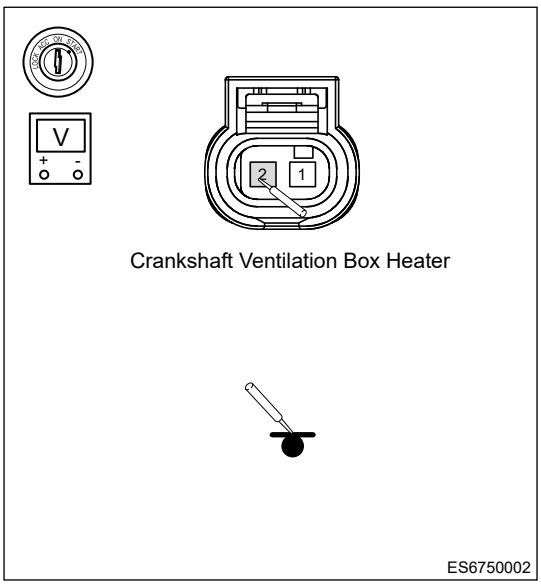
NG → **Replace fuse, check if circuit is short**

OK

4	Check crankcase heater power supply and control terminal

(a) Connect crankcase heater connector.
(b) Turn ENGINE START STOP switch to ON.
(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure crankcase heater (2) voltage with red probe.

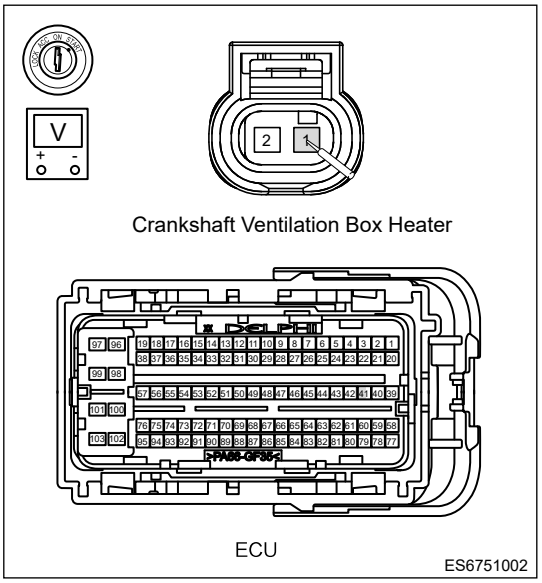
Test voltage is current battery voltage



(d) Start the engine.

(e) Refer to circuit diagram, using voltage band of multimeter (-voltage drop method), connect black probe to ECU end corresponding terminal, connect red probe to crankcase heater (1).

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

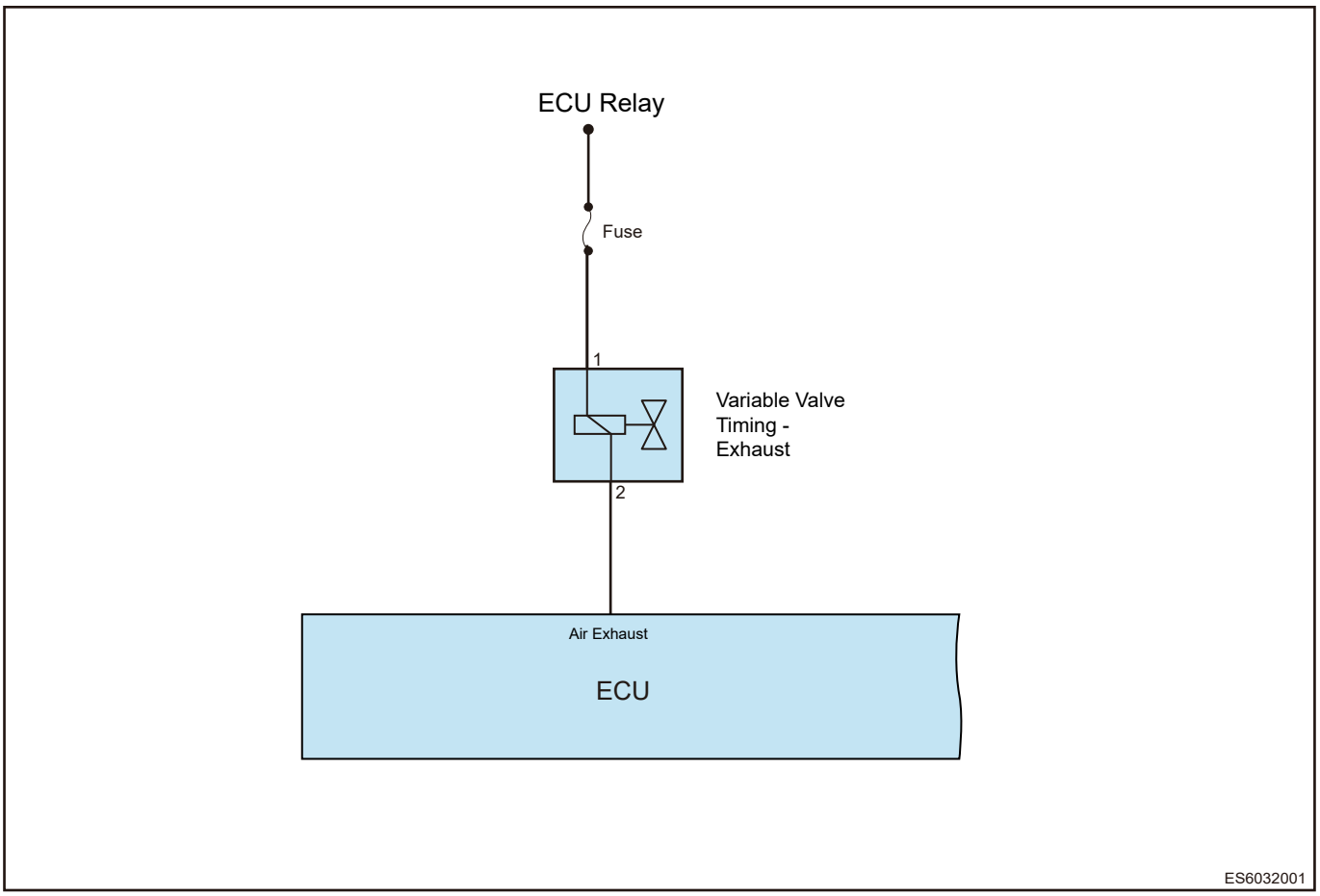
OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace Engine Control Module (ECU)**

■ Exhaust phaser solenoid valve control circuit open

DTC	P001300	“B” Camshaft Position Actuator Control Circuit Open Bank 1

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check exhaust phaser solenoid valve connector**

(a) Disconnect the negative battery.
(b) Unplug exhaust phaser solenoid valve connector, check this connector for looseness or poor contact.

NG → **Repair connector or replace exhaust phaser solenoid valve**

OK

2	**Check exhaust phaser solenoid valve internal resistance**

(a) Using ohm band of multimeter, measure if internal resistances of exhaust phaser solenoid valve (1-2) are normal with red and black probes respectively.

Resistance at ambient temperature: 6 Ω

NG → **Replace exhaust phaser solenoid valve assembly**

OK

3	Check exhaust phaser solenoid valve power supply fuse

(a) Turn ENGINE START STOP switch to ON.
(b) Check "exhaust phaser solenoid valve" fuse in engine compartment fuse and relay box.

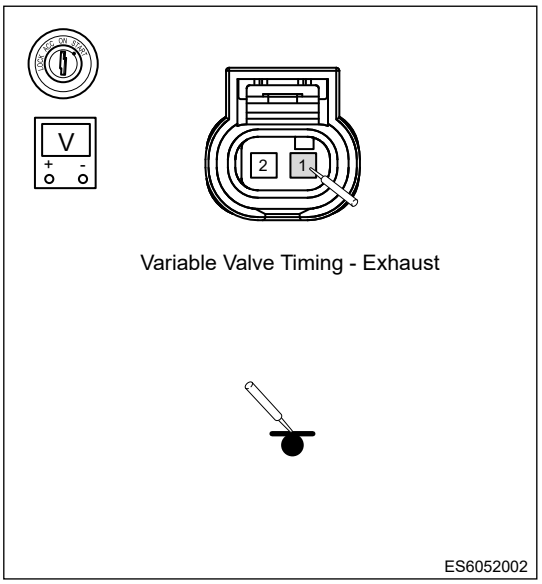
NG → **Replace fuse, check if circuit is short**

OK

4	Check exhaust phaser solenoid valve power supply and control terminal

(a) Connect exhaust phaser solenoid valve connector.
(b) Turn ENGINE START STOP switch to ON.
(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of exhaust phaser solenoid valve (terminal 1) with red probe.

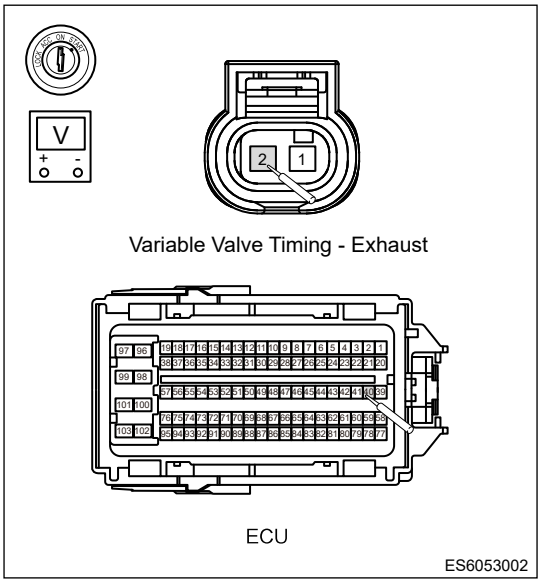
Test voltage is current battery voltage



(d) Start the engine.

(e) Using voltage band of multimeter (voltage drop method), connect black probe to ECU end corresponding terminal, and measure exhaust phaser solenoid valve (2) with red probe.

The tested voltage drop value should be less than approximately 0.2 V



NG	**Repair or replace wire harness**

OK

5	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace Engine Control Module (ECU)**

■ Crankshaft - intake/exhaust camshaft installation position non-plausible/deviation excessive malfunction

DTC	**P001676**	**Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A**
DTC	**P001678**	**Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor A**
DTC	**P001776**	**Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B**
DTC	**P001778**	**Crankshaft Position - Camshaft Position Correlation Bank 1 Sensor B**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check phaser solenoid valve, valve body bolt components state

(a) Disconnect the negative battery cable.
(b) Remove intake/exhaust phaser solenoid valve; Check for blockage or dirt.
(c) Remove intake/exhaust phaser valve body bolts; Check for blockage or dirt.

NG → **Clean or replace phaser solenoid valve and valve body bolts**

OK ↓

2	Check engine maintenance condition

(a) Check if engine oil level is normal, and check for oil leakage and oil seepage.
(b) Remove valve trim cover, and check engine lubrication and cleaning conditions, and check for wear or sludge dirty.

NG → **Clean and maintain the engine, replace the damaged components**

OK ↓

3	Check engine oil pressure

(a) Remove oil pressure sensor; Connect oil pressure tester to test oil pressure.

Main oil passage pressure: Limit pressure range (0.9 - 10 bar)

NG → **Check or replace oil pump assembly**

OK ↓

4	Check valve mechanism timing

(a) Check if valve mechanism timing is normal, and check timing chain for teeth skipping, misalignment, elongation, etc.
(b) Check camshaft signal plate for misalignment, looseness, etc.

NG → **Replace timing chain or camshaft assembly**

OK

5	Check intake/exhaust phaser assembly

(a) Check if operating condition of cam phase regulator is normal (dirt blocked, oil leaked, stuck, etc.).

NG → **Replace intake/exhaust phaser assembly**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

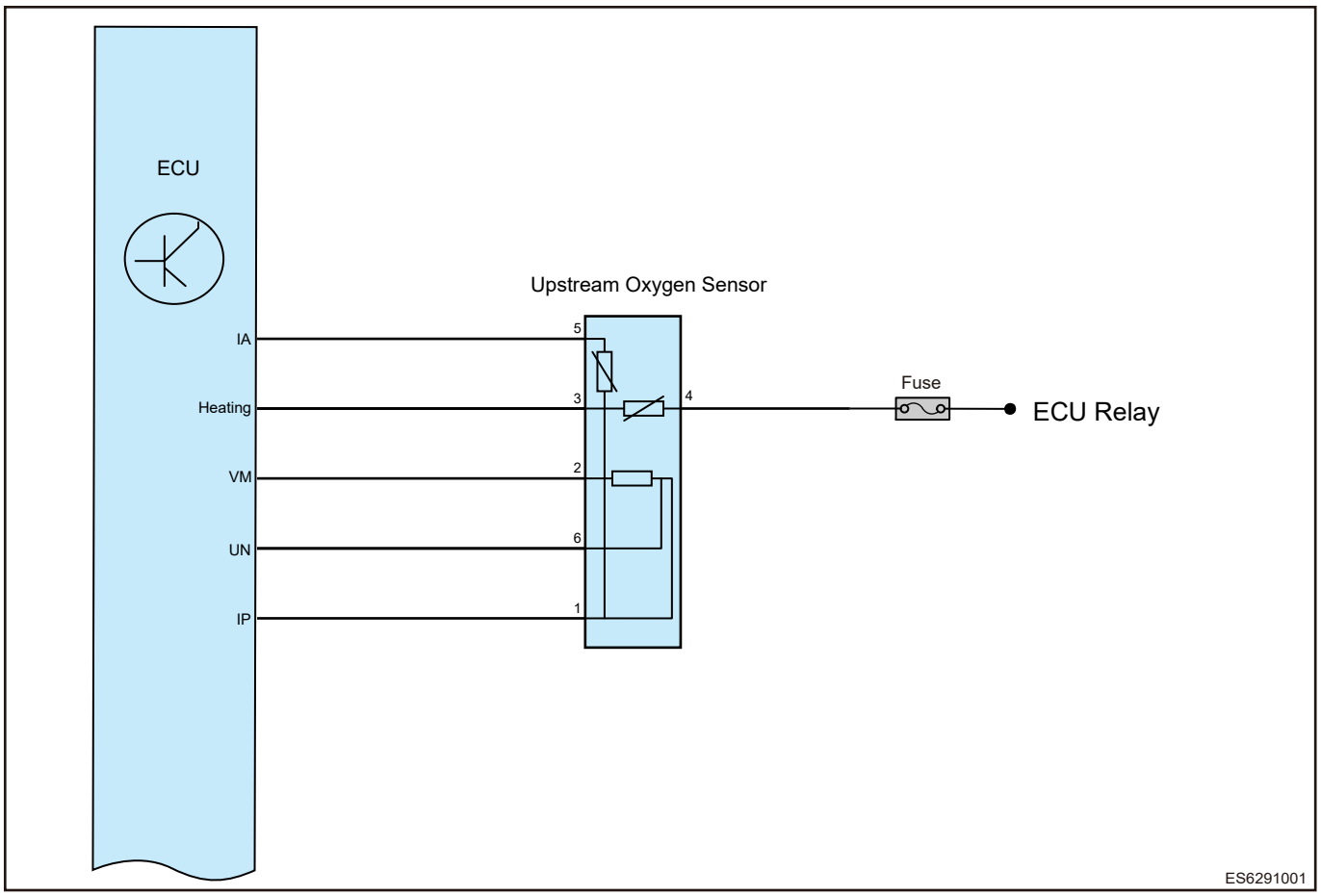
OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace Engine Control Module (ECU)**

■ **Downstream oxygen sensor heater control circuit open/low/high/faulty**

DTC	P003000	HO2S Heater Control Circuit Bank 1 Sensor 1
DTC	P003100	HO2S Heater Control Circuit Low Bank 1 Sensor 1
DTC	P003200	HO2S Heater Control Circuit High Bank 1 Sensor 1
DTC	P005300	HO2S Heater Resistance Bank 1 Sensor 1
DTC	P064D00	LSU Integrated Ship Failure
DTC	P064D13	Upstream Oxygen Sensor Sensing Element Failure

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check upstream oxygen sensor connector**

(a) Disconnect the negative battery.
(b) Unplug upstream oxygen sensor connector, check this connector for looseness or poor contact.

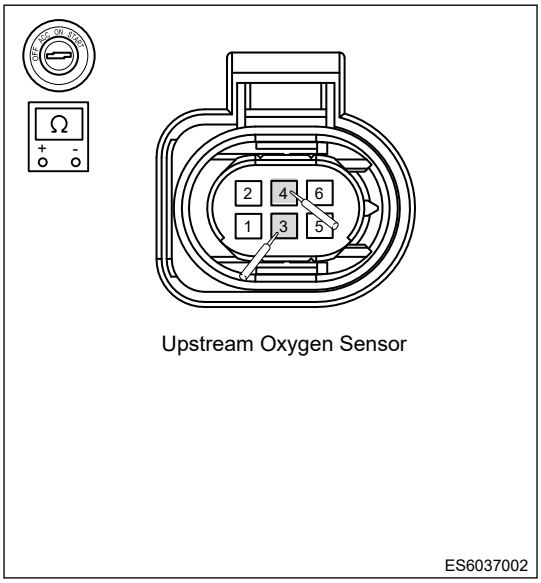
NG → **Repair and adjust connector, or replace upstream oxygen sensor**

OK

2	**Check upstream oxygen sensor heater internal resistance**

(a) Place the oxygen sensor at room temperature to cool it down.

(b) Using ohm band of multimeter, measure if internal resistances of upstream oxygen sensor (3-4) are normal with red and black probes respectively.



Upstream Oxygen Sensor

NG → **Replace upstream oxygen sensor assembly**

OK

3	**Check upstream oxygen sensor heater power supply fuse**

(a) Turn ENGINE START STOP switch to ON.

(b) Check "upstream oxygen sensor heater power supply" fuse in engine compartment fuse and relay box.

NG → **Replace fuse, check if circuit is short**

OK

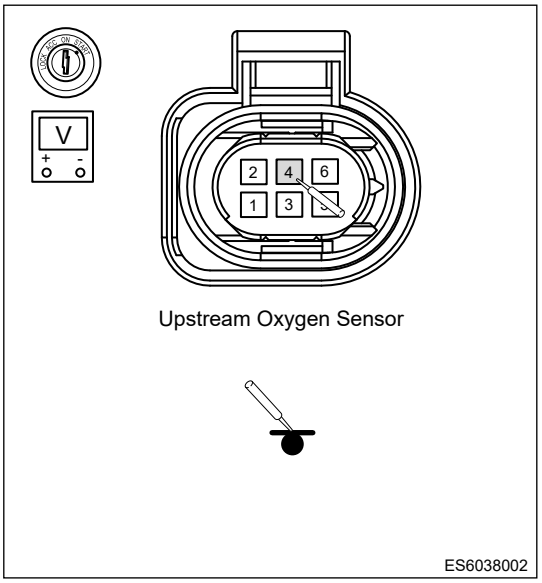
4	**Check upstream oxygen sensor heater power supply and heater control terminal**

(a) Connect the upstream oxygen sensor connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of upstream oxygen sensor (4) with red probe.

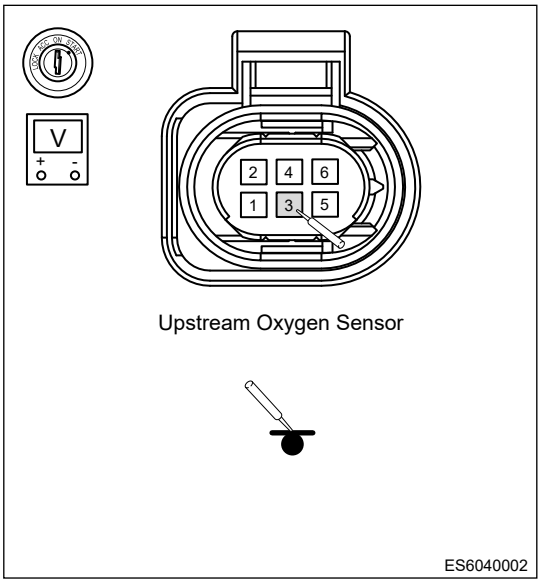
Test voltage is current battery voltage



(d) Start the engine.

(e) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of upstream oxygen sensor (3) with red probe.

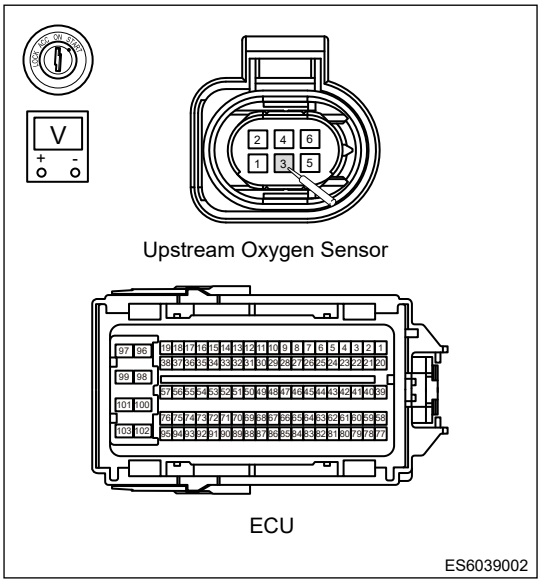
Control heating voltage should be within 0 V and current battery voltage



(f) Start the engine.

(g) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure upstream oxygen sensor (3) with red probe.

The tested voltage drop value should be less than approximately 0.2 V



NG	**Repair or replace wire harness**

OK

5	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK	**Repair or replace new module**

NG

6	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

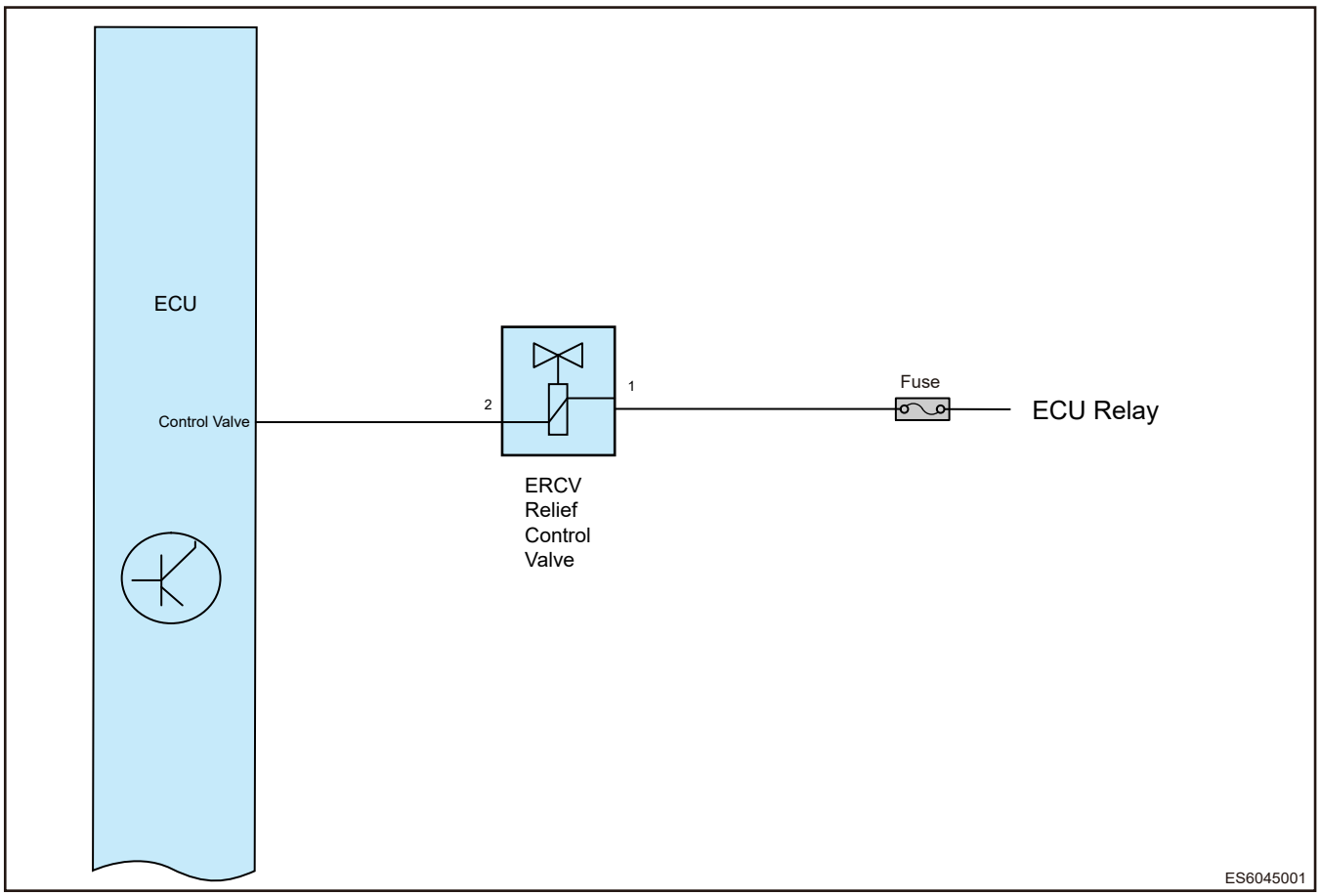
(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**

■ **Boost discharge control valve drive circuit short to ground/power supply**

DTC	**P003411**	**Boost Discharge Control Valve Drive Circuit Short to Ground**
DTC	**P003512**	**Boost Discharge Control Valve Drive Circuit Short to Power Supply**
DTC	**P003313**	**Dump Valve Control Circuit Open**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check boost discharge control valve connector**

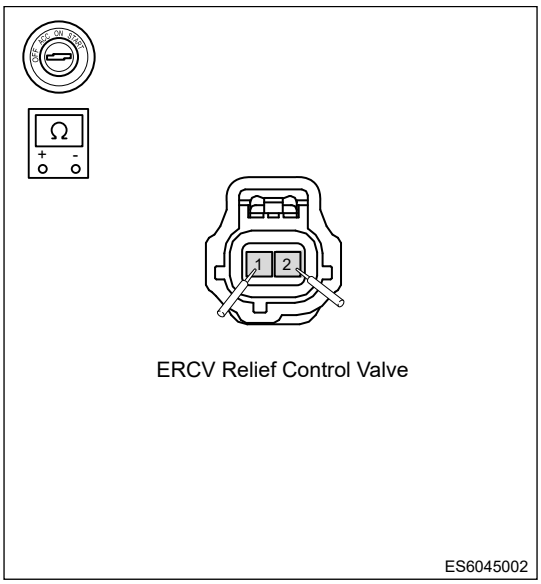
(a) Disconnect the negative battery.
(b) Unplug boost discharge valve connector, check this connector for looseness or poor contact.

NG	**Repair and adjust connector, or replace boost discharge valve connector**

OK

2	Check boost discharge valve internal resistance

(a) Using ohm band of multimeter, measure if internal resistances of boost discharge valve (1-2) are normal with red and black probes respectively.



NG → Replace boost discharge valve assembly

OK

3	Check boost discharge valve power supply fuse

(a) Turn ENGINE START STOP switch to ON.
(b) Check "boost discharge valve" fuse in engine compartment fuse and relay box.

NG → Replace fuse, check if circuit is short to ground

OK

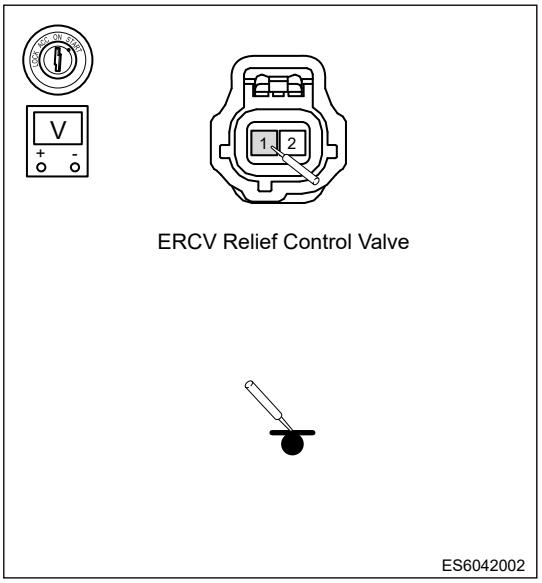
4	Check boost discharge valve power supply and heater control terminal

(a) Connect the boost discharge valve connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltage of boost discharge valve (1) with red probe.

Test voltage is current battery voltage

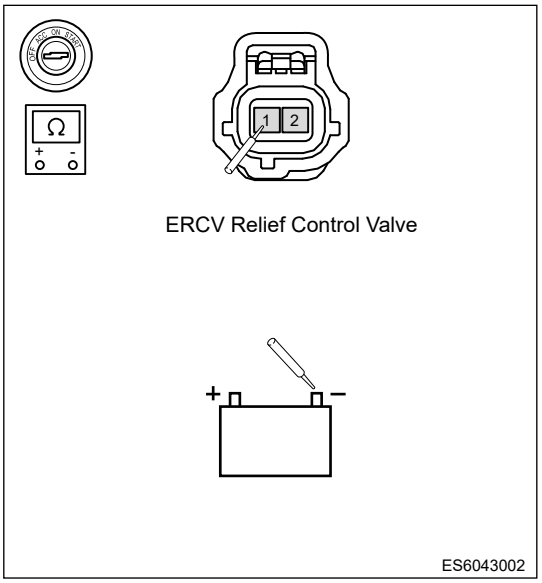


(d) Turn ENGINE START STOP switch to OFF.

(e) Disconnect the boost discharge valve connector.

(f) Disconnect the ECU connector.

(g) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure boost discharge valves (1, 2) with red probe respectively; Check if circuit is short to ground.



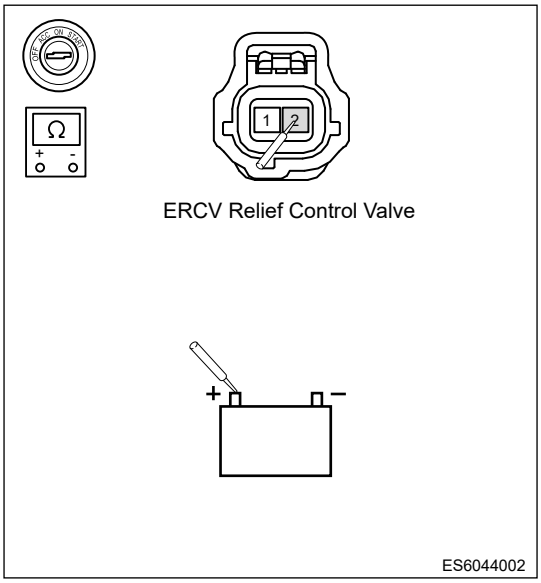
(h) Turn ENGINE START STOP switch to OFF.

(i) Disconnect the boost discharge valve connector.

(j) Disconnect the ECU connector.

(k) Turn ENGINE START STOP switch to ON.

(l) Using ohm band of multimeter, connect black probe to battery positive terminal, measure boost discharge valve (2) with red probe. Check if circuit is shored to power supply.



NG → **Repair or replace wire harness**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

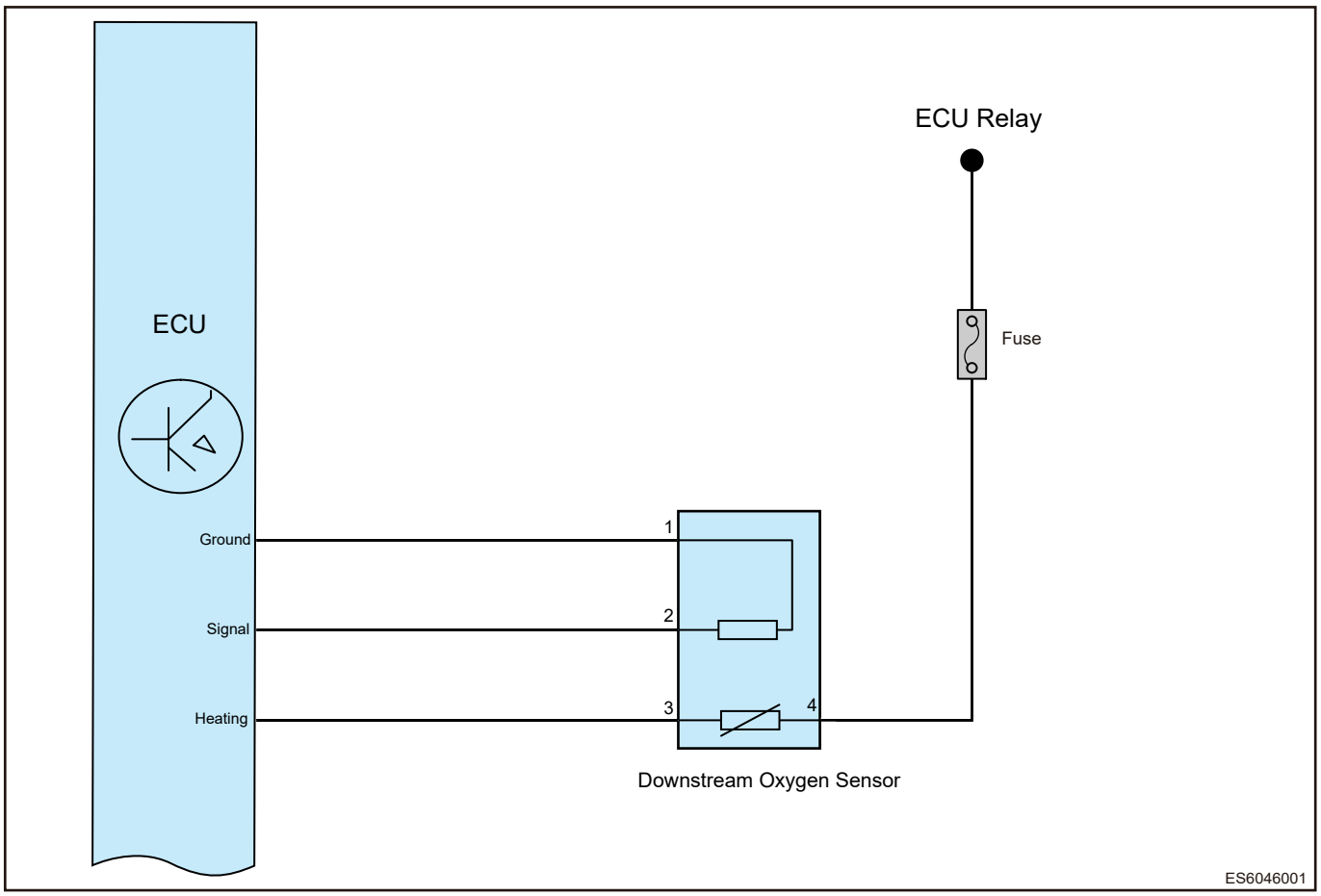
OK → **Conduct test and confirm malfunction has been repaired**

■ Downstream oxygen sensor heater control circuit open/low/high/heater internal resistance non-plausible

DTC	**P003600**	**HO2S Heater Control Circuit Bank 1 Sensor 2**
DTC	**P003700**	**HO2S Heater Control Circuit Low Bank 1 Sensor 2**

DTC	P003800	HO2S Heater Control Circuit High Bank 1 Sensor 2
DTC	P005400	HO2S Heater Resistance Bank 1 Sensor 2
DTC	P223200	O2 Sensor Signal Circuit Shorted to Heater Circuit Bank 1 Sensor 2

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check downstream oxygen sensor connector**

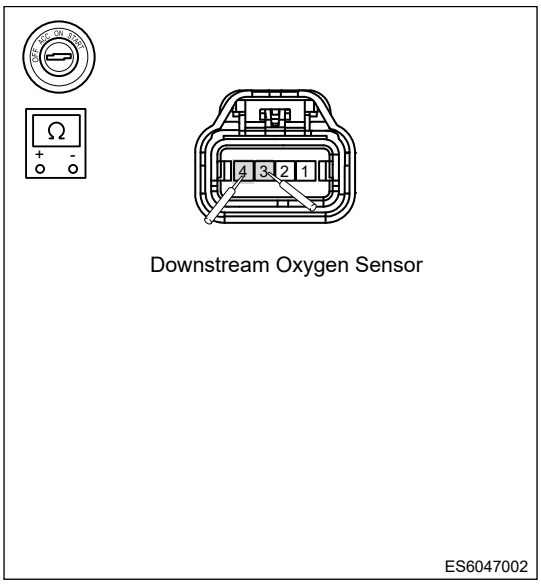
(a) Disconnect the negative battery.
(b) Unplug downstream oxygen sensor connector, check this connector for looseness or poor contact.

NG	**Repair and adjust connector, or replace downstream oxygen sensor**

OK

2	Check downstream oxygen sensor heater internal resistance

(a) Using ohm band of multimeter, measure if internal resistances of downstream oxygen sensor (3-4) are normal with red and black probes respectively.



Downstream Oxygen Sensor

ES6047002

NG

Replace downstream oxygen sensor assembly

OK

3	Check downstream oxygen sensor heater power supply fuse

(a) Turn ENGINE START STOP switch to ON.

(b) Check "downstream oxygen sensor heater power supply" fuse in engine compartment fuse and relay box.

NG

Replace fuse, check if circuit is short to ground

OK

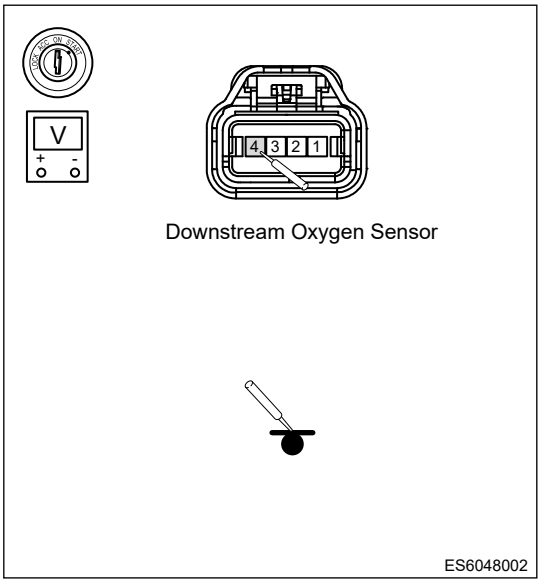
4	Check downstream oxygen sensor heater power supply and heater control terminal

(a) Connect the upstream oxygen sensor connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltage of downstream oxygen sensor (4) with red probe.

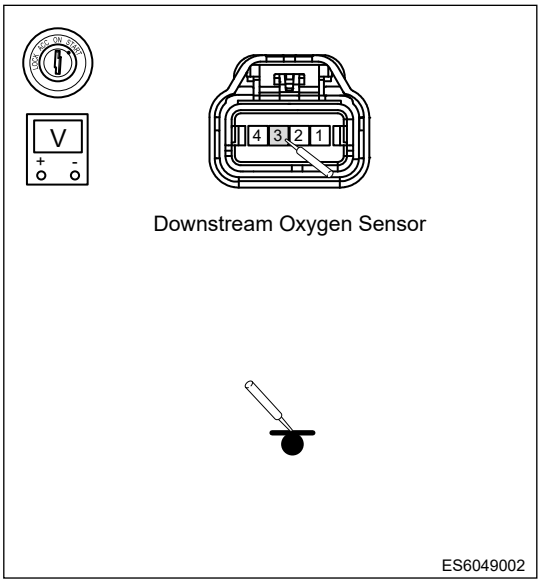
Test voltage is current battery voltage



(d) Start the engine.

(e) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltage of downstream oxygen sensor (3) with red probe.

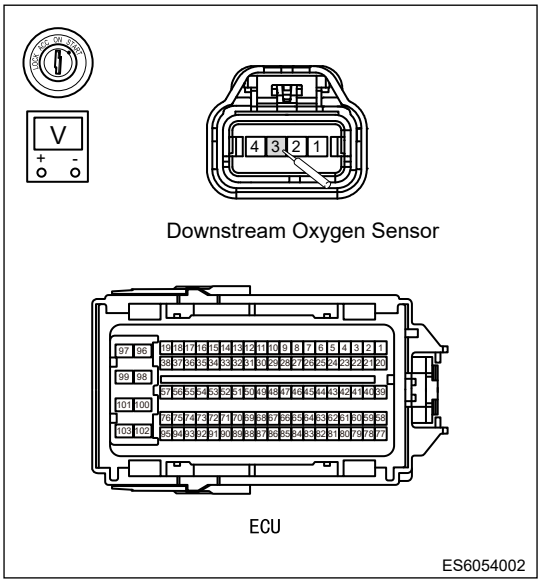
Control heating voltage should be within 0 V and current battery voltage



(f) Start the engine.

(g) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure downstream oxygen sensor (3) with red probe.

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Turbocharger electronic waste gate self-learning/duty ratio out of limit**

DTC	**P003A22**	**Turbocharger/Supercharger Boost Control "A" Position Exceeded Learning Limit**
DTC	**P003A21**	**Turbocharger/Supercharger Boost Control "A" Position Exceeded Learning Limit**
DTC	**P003A72**	**Turbocharger/Supercharger Boost Control "A" Position Exceeded Learning Limit**
DTC	**P003A73**	**Turbocharger/Supercharger Boost Control "A" Position Exceeded Learning Limit**
DTC	**P024437**	**Turbocharger/Supercharger Wastegate Actuator "A" Range/ Performance**
DTC	**P024477**	**Turbocharger/Supercharger Wastegate Actuator "A" Range/ Performance**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check by-pass valve actuator conditions**

(a) Check for foreign matter near turbocharger closed position.
(b) Check if electronic waste gate is stuck.
(c) Push the turbocharger to closed position manually, read position voltage to check if it is within the proper range.

NG → **Clean up foreign matter or replace turbocharger assembly**

OK

2	**Check by-pass valve actuator connector**

(a) Check if connector and wire harness are deteriorated.

NG → **Repair or replace wire harness**

OK

3	**Reconfirm DTCs**

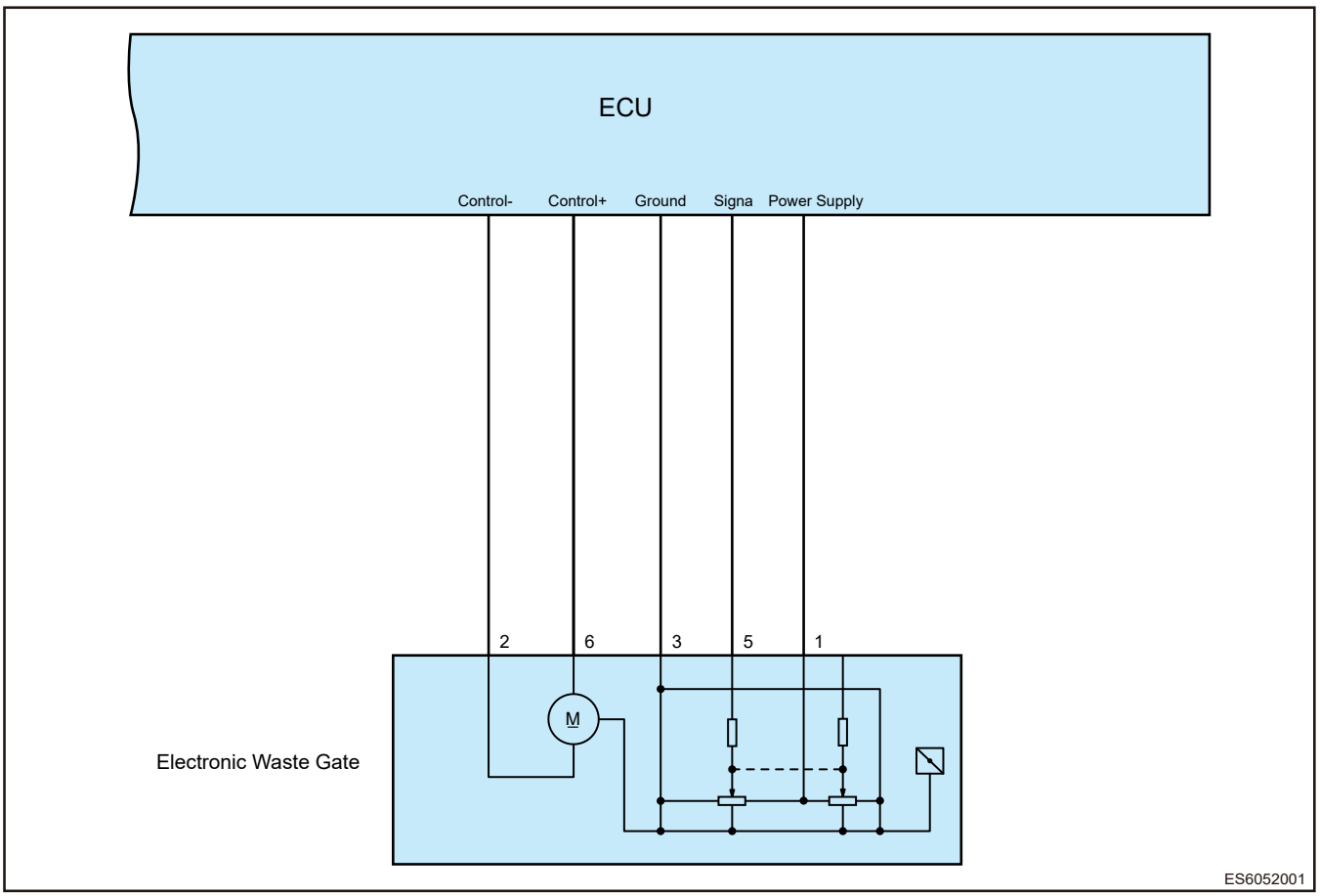
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace Engine Control Module (ECU)**

■ Turbocharger electronic waste gate position sensor voltage low/high

DTC	**P256400**	**Turbocharger Boost Control Position Sensor "A" Circuit Low**
DTC	**P256500**	**Turbocharger Boost Control Position Sensor "A" Circuit High**

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check electronic waste gate connector

(a) Disconnect the negative battery.
(b) Unplug electronic waste gate connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

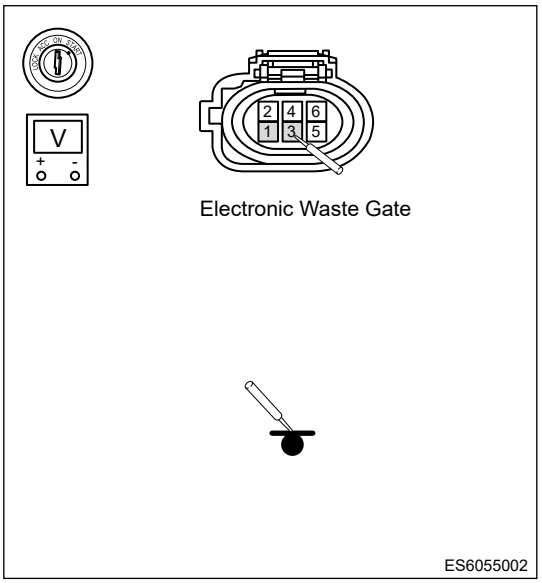
OK

2	Check electronic waste gate position sensor power supply and ground

(a) Connect the electronic waste gate connector.
(b) Turn ENGINE START STOP switch to ON.
(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltages of electronic waste gate position sensor (1, 3) with red probe.

Reference power supply: 5 V

Ground: 0 V



NG → **Repair wire harness or replace engine control unit**

OK

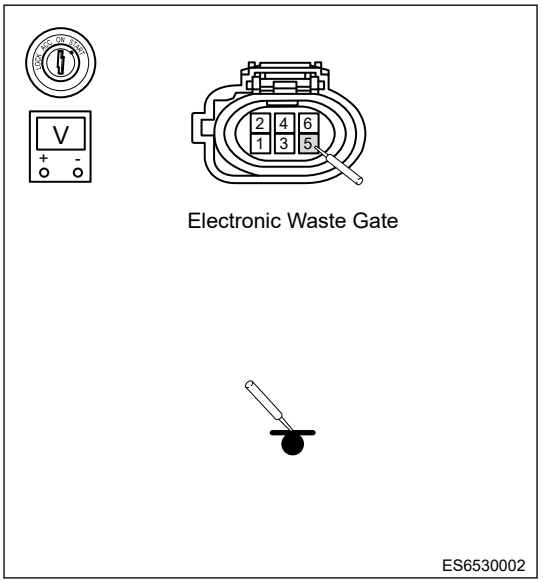
3	Check electronic waste gate position sensor signal terminal

(a) Connect the boost discharge valve connector.

(b) Start the engine.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure if voltage of electronic waste gate position sensor (5) varies according to opening angle with red probe.

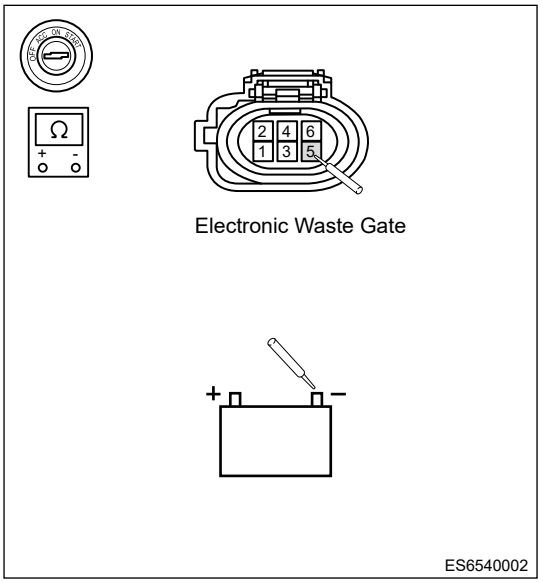
Test voltage is current battery voltage



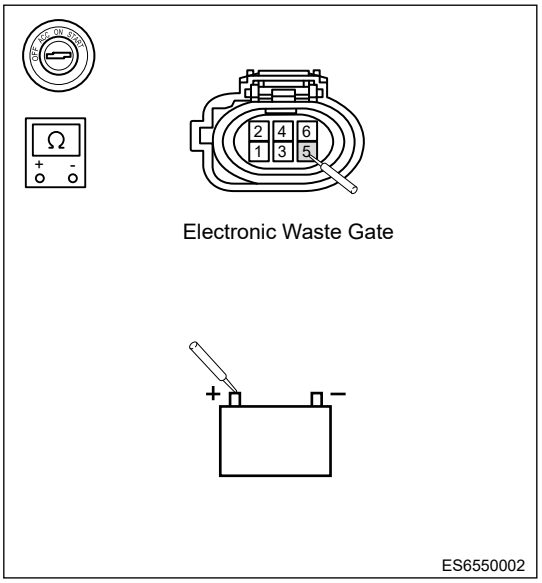
(d) Disconnect the electronic waste gate connector.

(e) Disconnect the ECU connector.

(f) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistance of electronic waste gate position sensor (5) with red probe; Check if circuit is short to ground.



(g) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistance of electronic waste gate position sensor (5) with red probe; Check if circuit is short to power supply.



NG → **Repair or replace wire harness or replace turbocharger assembly**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

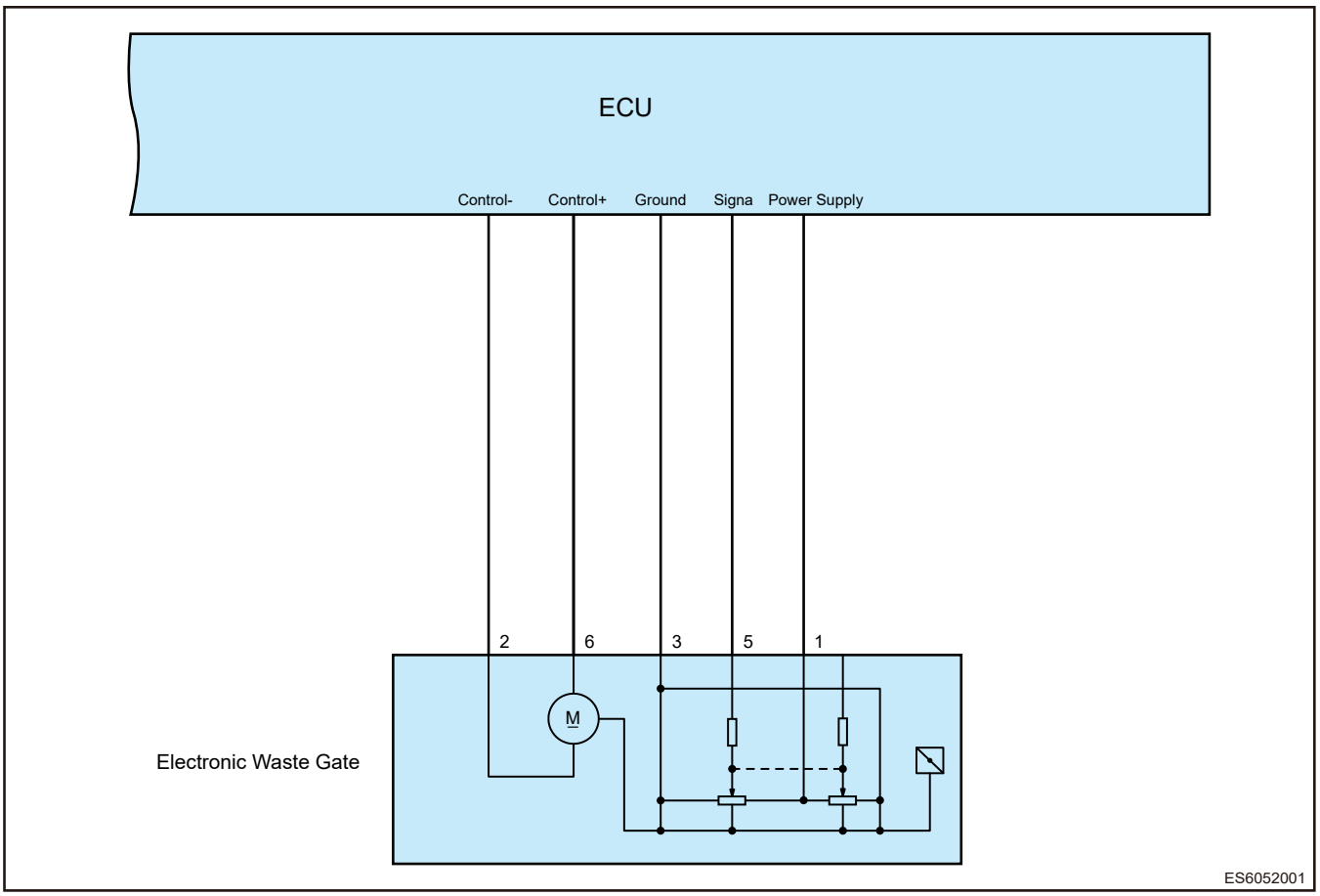
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Communication failure of supercharger waste gate control circuit**

DTC	P170300	Communication Failure of Supercharger Waste Gate Control Circuit

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic waste gate connector**

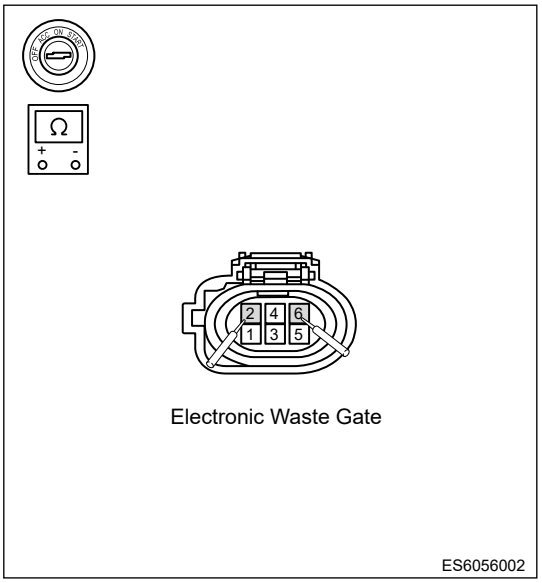
(a) Disconnect the negative battery.
(b) Unplug electronic waste gate connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check electronic waste gate internal resistance**

(a) Using ohm band of multimeter, measure if internal resistances of boost discharge valve (6-2) are normal with red and black probes respectively.



NG → **Replace turbocharger assembly**

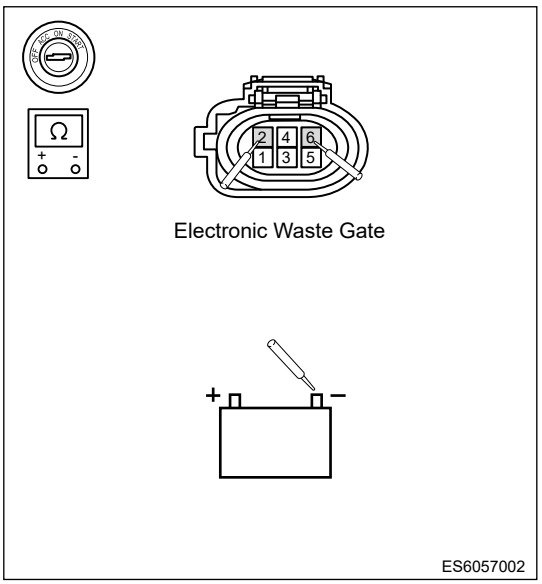
OK

3	**Check for short circuit to ground / power supply in electric waste gate control circuit**

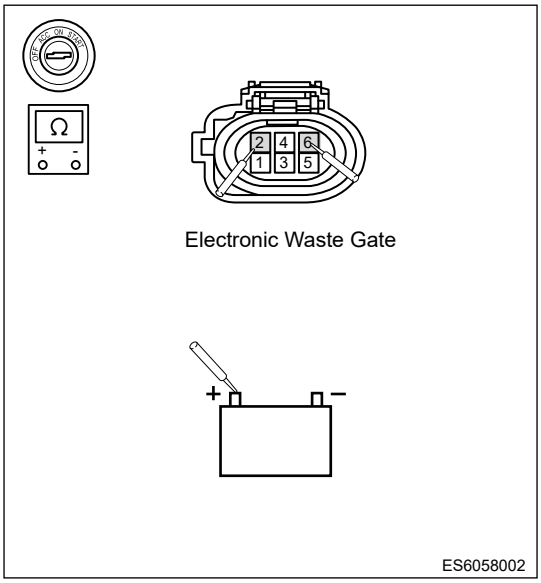
(a) Disconnect the electronic waste gate connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of waste gate (6, 2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of electronic waste gates (6, 2) with red probe respectively; Check if circuit is short to power supply.



NG → **Repair or replace wire harness**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Ambient pressure sensor malfunction**

DTC	**P222900**	**Barometric Pressure Sensor "A" Circuit High**
DTC	**P222800**	**Barometric Pressure Sensor "A" Circuit Low Problem**

DTC	P222722	Barometric Pressure Sensor "A" Circuit Range/Performance
DTC	P222721	Barometric Pressure Sensor "A" Circuit Range/Performance
DTC	P222785	Barometric Pressure Measurement System - Multiple Sensor Correlation Bank 1
DTC	P222784	Barometric Pressure Measurement System - Multiple Sensor Correlation Bank 1
DTC	P120200	Barometric Pressure Sensor "A" Circuit Range/Performance
DTC	P120300	Barometric Pressure Sensor "A" Circuit Range/Performance

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check Engine Control Module (ECU)**

(a) The built-in ambient pressure sensor in ECU is malfunctioning.
(b) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(c) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **High pressure fuel supply control deviation too high/too low/fuel rail pressure too low/too high**

DTC	P008985	Fuel Pressure Regulator 1 Performance-Pressure Too Low
DTC	P008984	Fuel Pressure Regulator 1 Performance-Pressure Too High
DTC	P008700	Fuel Rail/System Pressure - Too Low
DTC	P008800	Fuel Rail/System Pressure - Too High

DTC	P053F21	Cold Start Fuel Pressure Performance
DTC	P053F22	Cold Start Fuel Pressure Performance
DTC	P00C600	Fuel Rail Pressure Too Low - Engine Cranking Bank 1

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check if fuel is insufficient**

(a) Check that fuel in fuel tank is sufficient.

NG → **Fuel Filling**

OK

2	**Check fuel connecting line for leakage**

(a) Check low pressure/high pressure fuel connecting lines for squash, leakage.

NG → **Replace the corresponding line**

OK

3	**Check low pressure fuel pressure**

(a) Connect fuel pressure gauge to test if low pressure fuel pressure is met the standard.

NG → **Replace fuel pump assembly**

OK

4	**Check high pressure fuel pump**

(a) Remove the high pressure fuel pump.
(b) Check high pressure fuel pump for fuel leakage.
(c) Check relief valve for blockage or abnormal operation.

NG → **Replace high pressure fuel pump assembly**

OK

5	Reconfirm DTCs

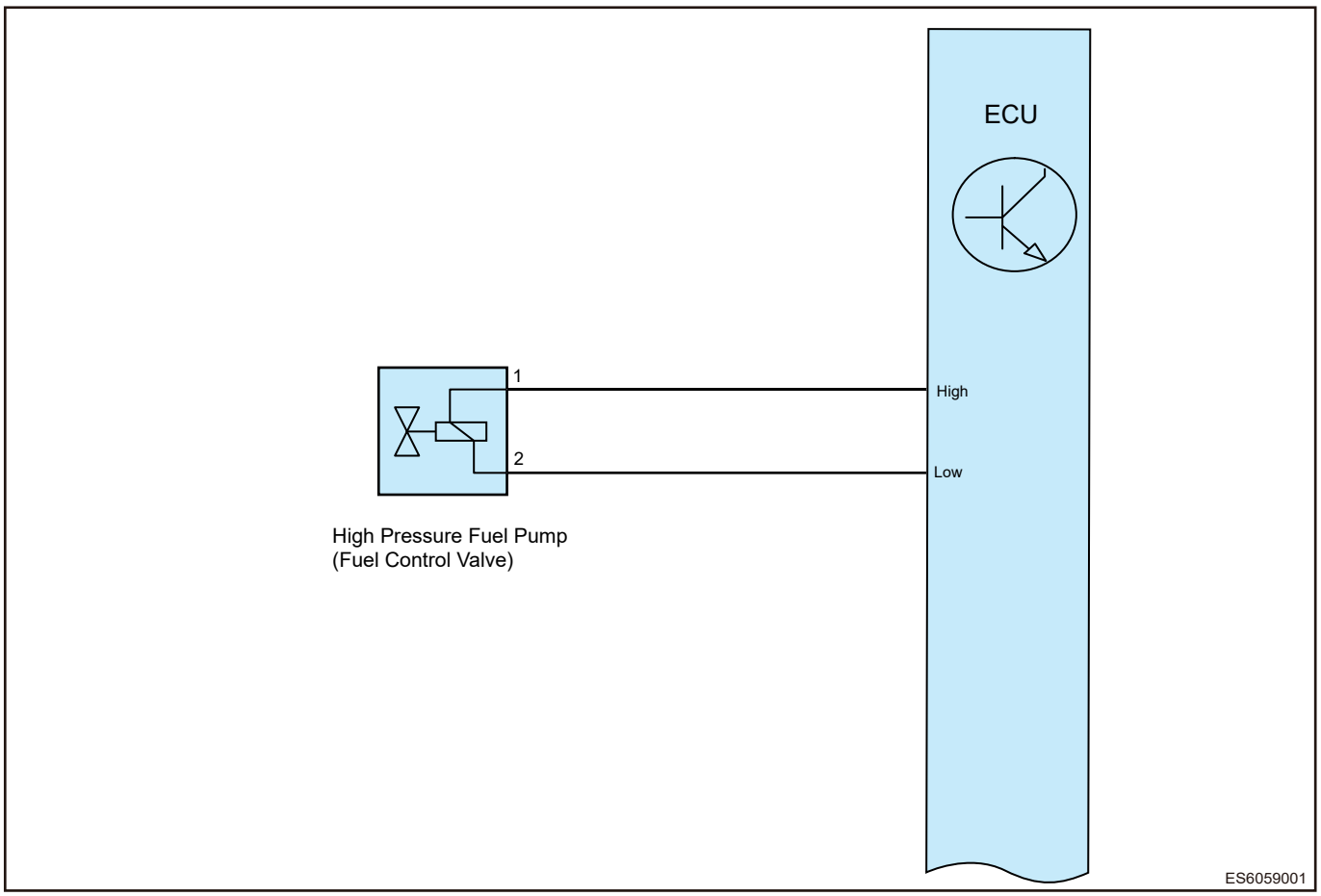
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Short circuit in high side and low side control circuit of flow control valve**

DTC	P009000	Short Circuit in High Side Control Circuit and Low Side Control Circuit of Flow Control Valve

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check flow control valve connector**

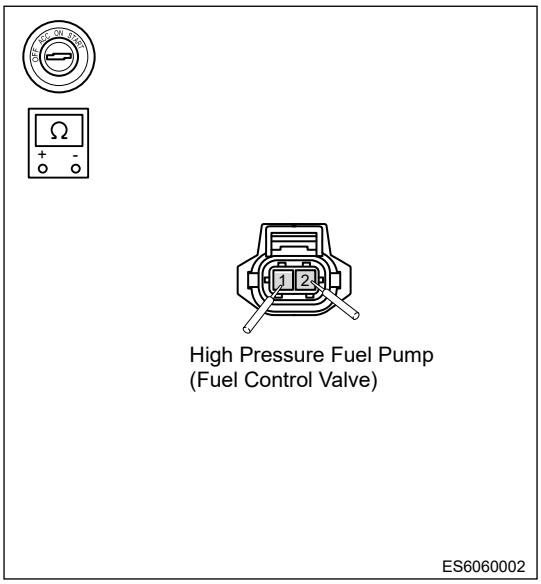
(a) Disconnect the negative battery.
(b) Unplug flow control valve connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check flow control valve internal resistance**

(a) Using ohm band of multimeter, measure if internal resistances of flow control valve (1-2) are normal with red and black probes respectively.



NG → **Replace high pressure fuel pump assembly**

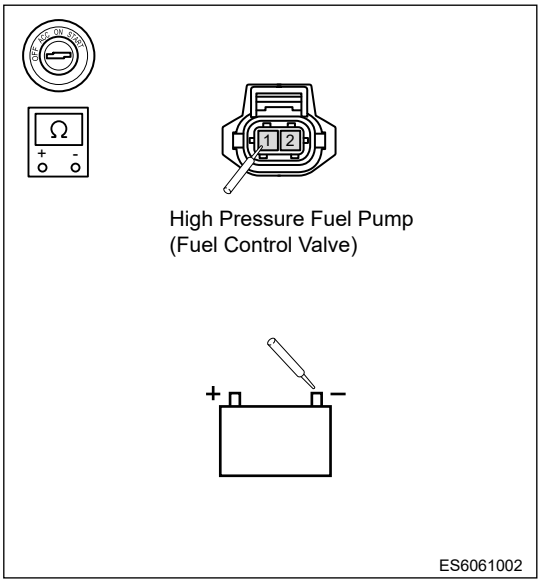
OK

3	**Check for short circuit to ground / power supply in flow control valve control circuit**

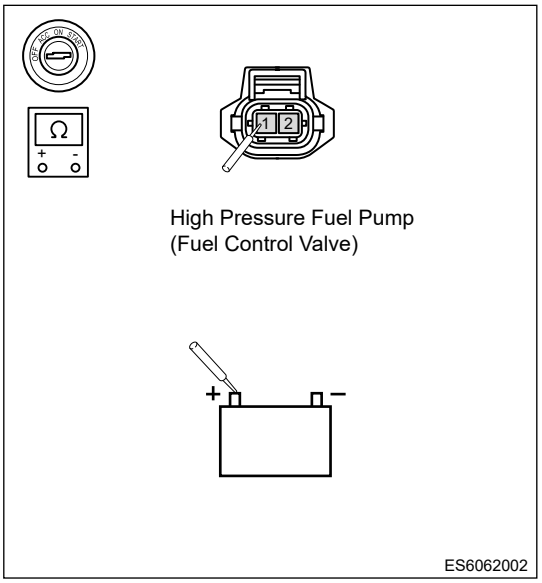
(a) Disconnect the high pressure fuel pump connector.

(b) Disconnect the ECU connector.

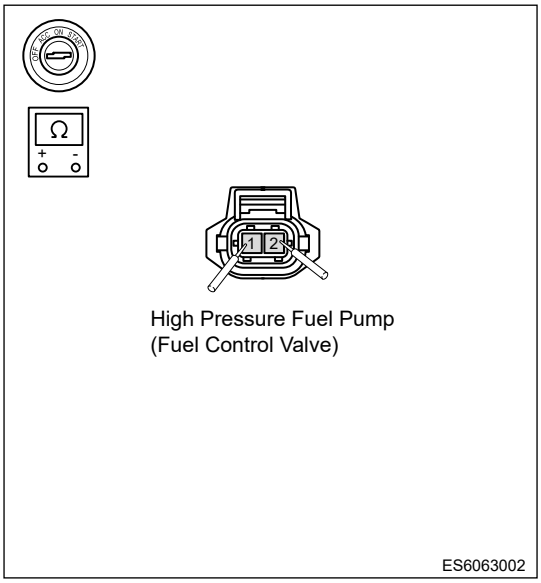
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure high pressure fuel pump connectors (1, 2) with red probe respectively, check resistance between battery negative terminal and high pressure fuel pump connector, and check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure high pressure fuel pump connectors (1, 2) with red probe respectively, check resistance between battery positive terminal and high pressure fuel pump connector, and check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of high pressure oil pump connectors (1, 2) with red and black probes respectively; Check control circuit if they are short to each other.



NG → **Repair or replace wire harness**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

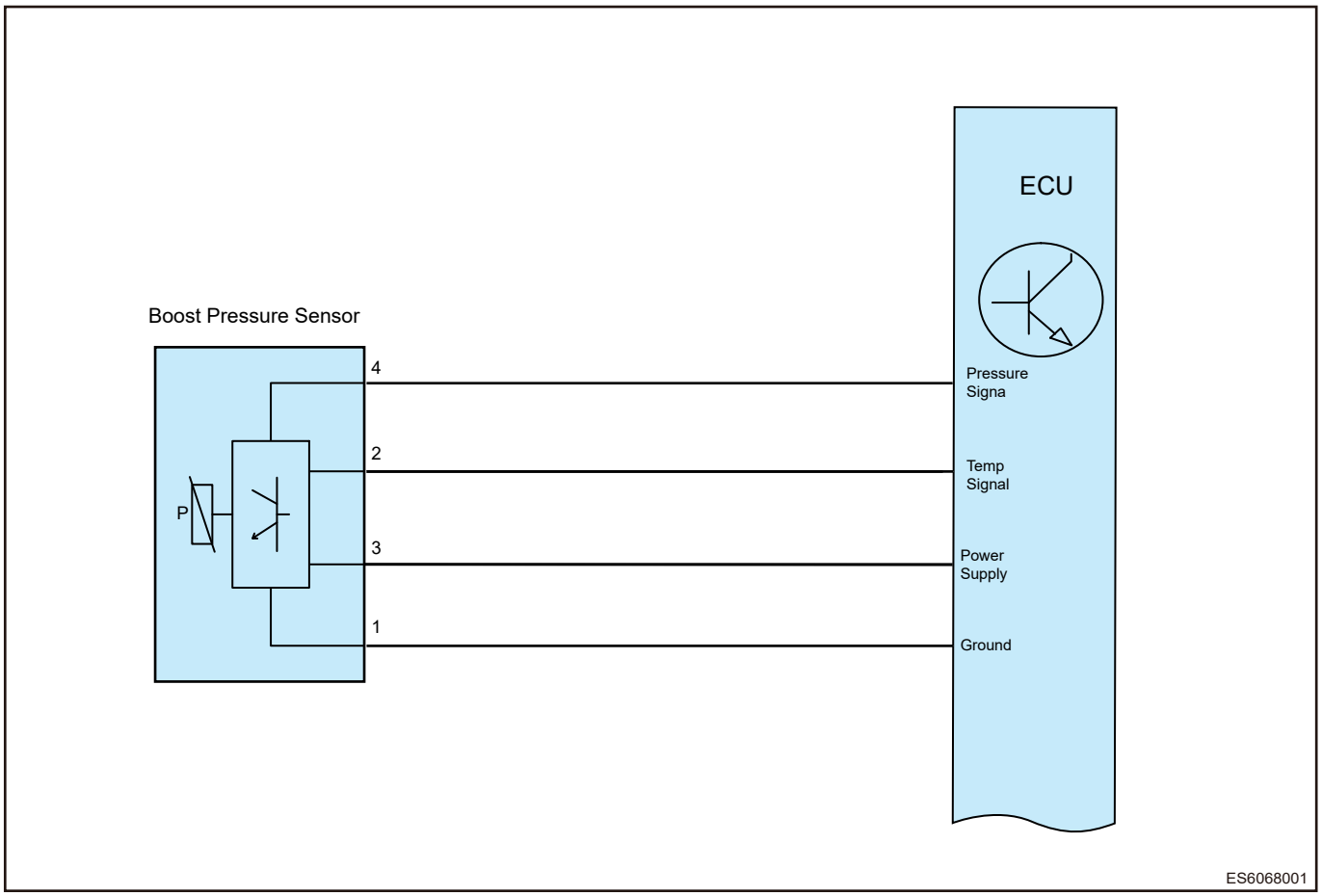
OK → **Conduct test and confirm malfunction has been repaired**

■ **Intake air sensor 2 voltage too high/too low/signal non-plausible**

DTC	P009626	Intake Air Temp.Circ. Performance Non-plausible
DTC	P009800	Intake Air Temperature Sensor 2 Circuit High Bank 1

DTC	P009700	Intake Air Temperature Sensor 2 Circuit Low Bank 1
DTC	P009900	Intake Air Temperature Sensor 2 Circuit Intermittent/Erratic Bank 1
DTC	P138024	Intake Air Temperature Sensor 2 Multiple Check Bank1
DTC	P138023	Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 2

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check boost pressure/temperature sensor connector**

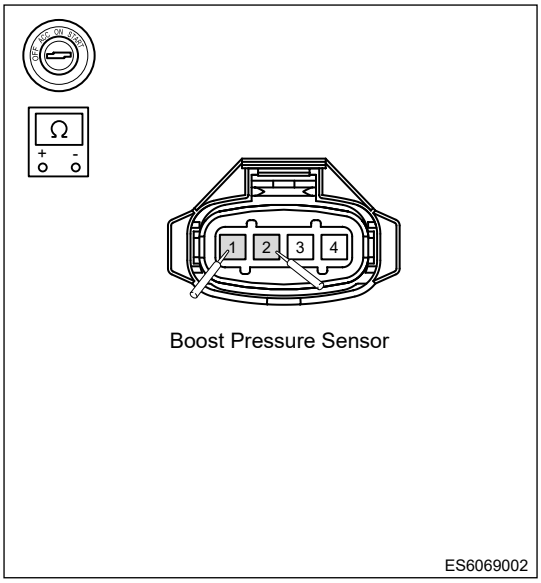
(a) Disconnect the negative battery.
(b) Unplug boost pressure/temperature sensor connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace boost pressure/temperature sensor**

OK

2	**Check boost pressure/temperature sensor internal resistance**

(a) Using ohm band of multimeter, measure if resistance of boost pressure/temperature sensor terminals (1 - -2) are normal. They should vary in accordance with intake temperature.



NG → **Replace boost pressure/temperature sensor assembly**

OK

3	**Check boost pressure/temperature sensor signal terminal and ground terminal**

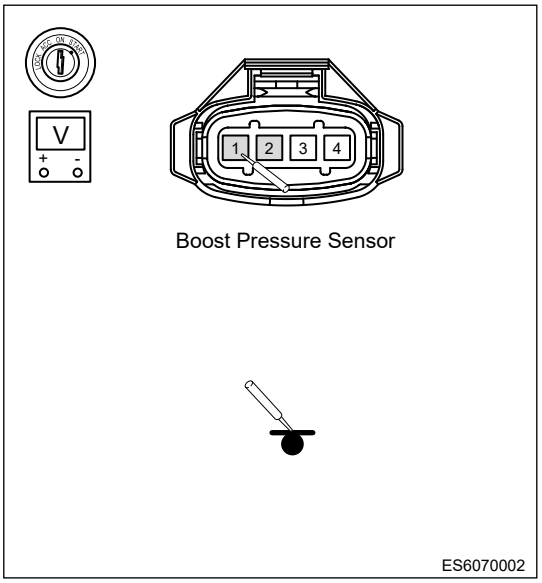
(a) Connect boost pressure/temperature sensor connector.

(b) Start the engine.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of boost pressure/temperature sensors (1, 2) with red probe.

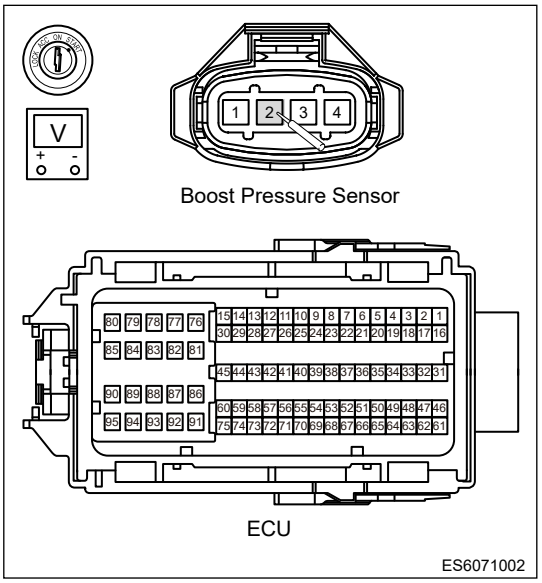
Signal terminal: Voltage signal should vary in accordance with intake temperature.

Ground terminal: Voltage < 0.2 V



(d) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (corresponding terminal), and measure boost pressure/temperature sensor (2) with red probe.

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

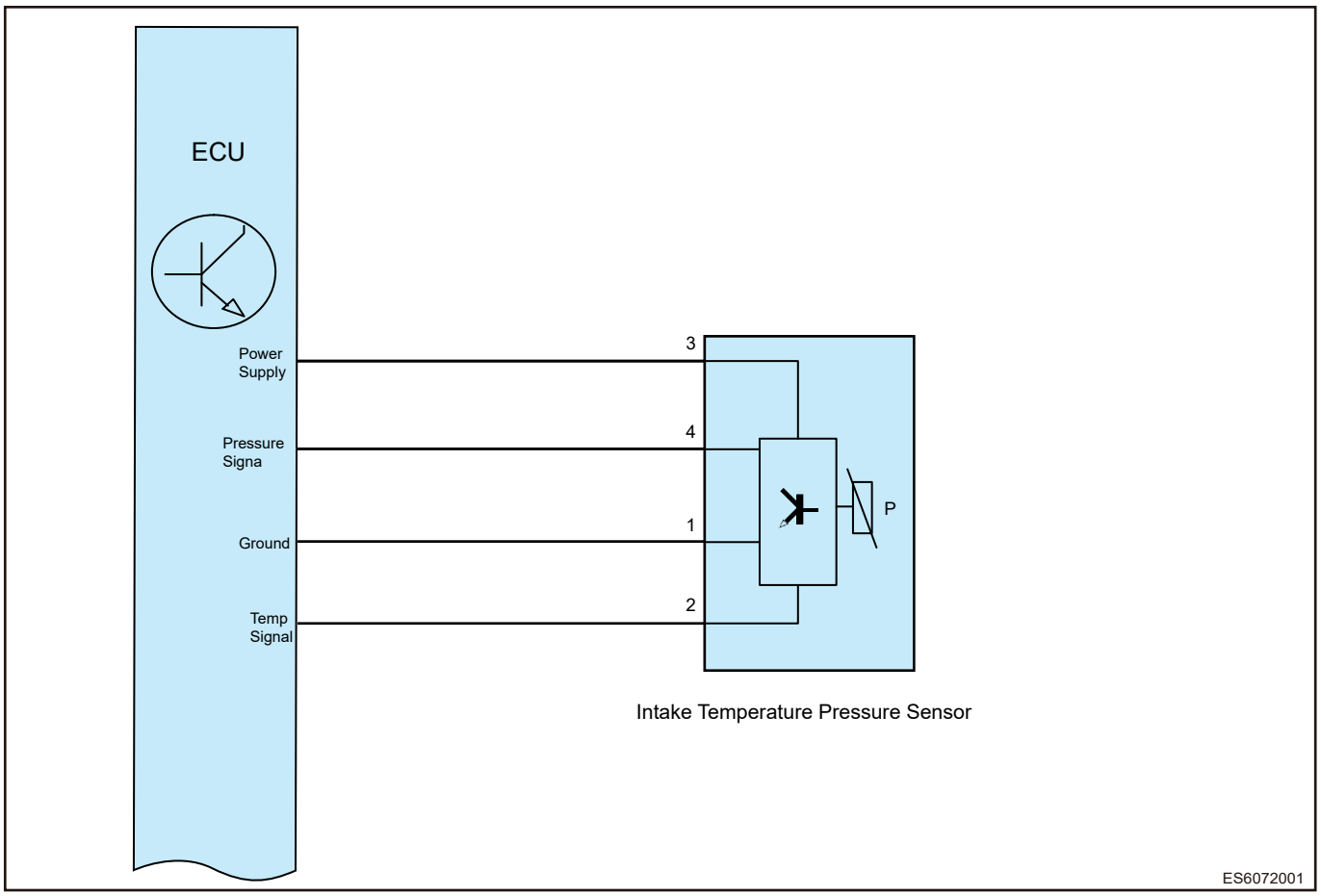
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Intake pressure/temperature sensor fault**

DTC	P01062A	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P010622	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P010621	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P120000	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P120100	Manifold Absolute Pressure Sensor Circuit Range/Performance
DTC	P00C721	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1
DTC	P00C722	Intake Air Pressure Measurement System - Multiple Sensor Correlation Bank 1
DTC	P010700	Manifold Absolute Pressure Sensor Circuit Low
DTC	P010800	Manifold Absolute Pressure Sensor Circuit High

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check intake pressure/temperature sensor connector**

(a) Disconnect the negative battery.
(b) Unplug intake pressure sensor connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace intake pressure sensor**

OK

2	**Check intake pressure/temperature sensor power supply and ground terminals**

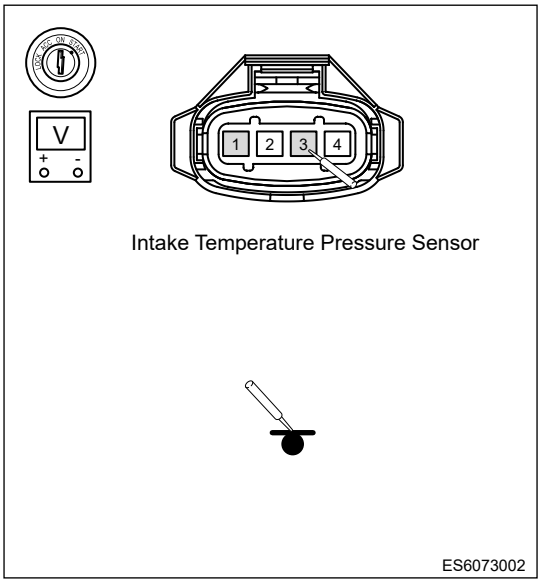
(a) Connect boost pressure/temperature sensor connector.

(b) Start the engine.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of intake pressure/temperature sensors (1, 3) with red probe.

Power supply terminal: 5 V

Ground terminal: Voltage < 0.2 V



NG → **Repair or replace wire harness**

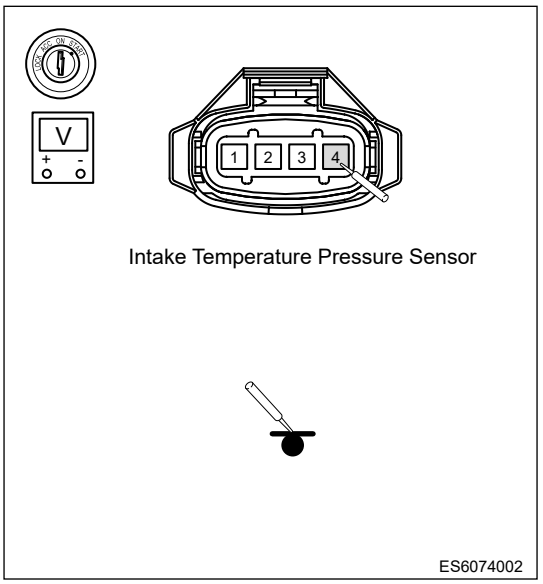
OK

3	**Check intake pressure/temperature sensor signal terminal**

(a) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of intake pressure/temperature sensor (4) with red probe.

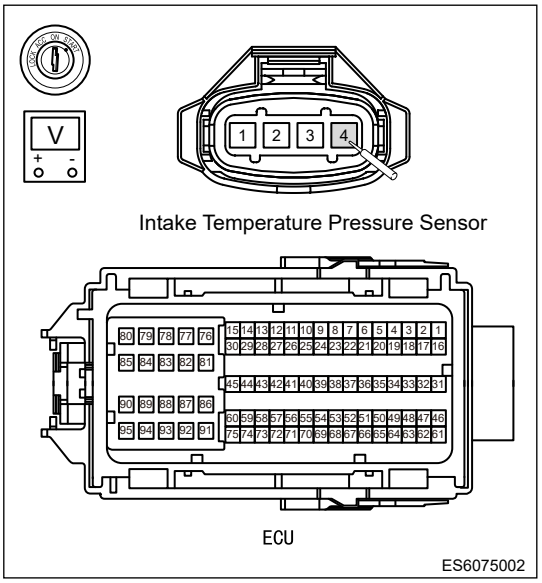
Under idling state: 1 V

When the vehicle accelerates rapidly, voltage can instantly reach 4 V, and then drop to 1.7 V



(b) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure intake pressure/temperature sensor (4) with red probe.

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair and replace wire harness, or replace intake pressure/temperature sensor**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Boost pressure out of range high/low/non-plausible**

DTC	**P120400**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**
DTC	**P120500**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**
DTC	**P023622**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**
DTC	**P023621**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Range/ Performance**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check intake line condition**

(a) Check if intake line is detached or seriously air leaked.

NG → **Repair, adjust or replace related connecting lines**

OK

2	**Check boost pressure/temperature sensor**

(a) Check boost pressure/temperature sensor connector for looseness or poor contact.
(b) Check if there is any freeze, oil stain, etc. on measurement terminal of boost pressure/temperature sensor, which will affect normal measurement.

NG → **Adjust connector, or replace boost pressure/ temperature sensor**

OK

3	**Reconfirm DTCs**

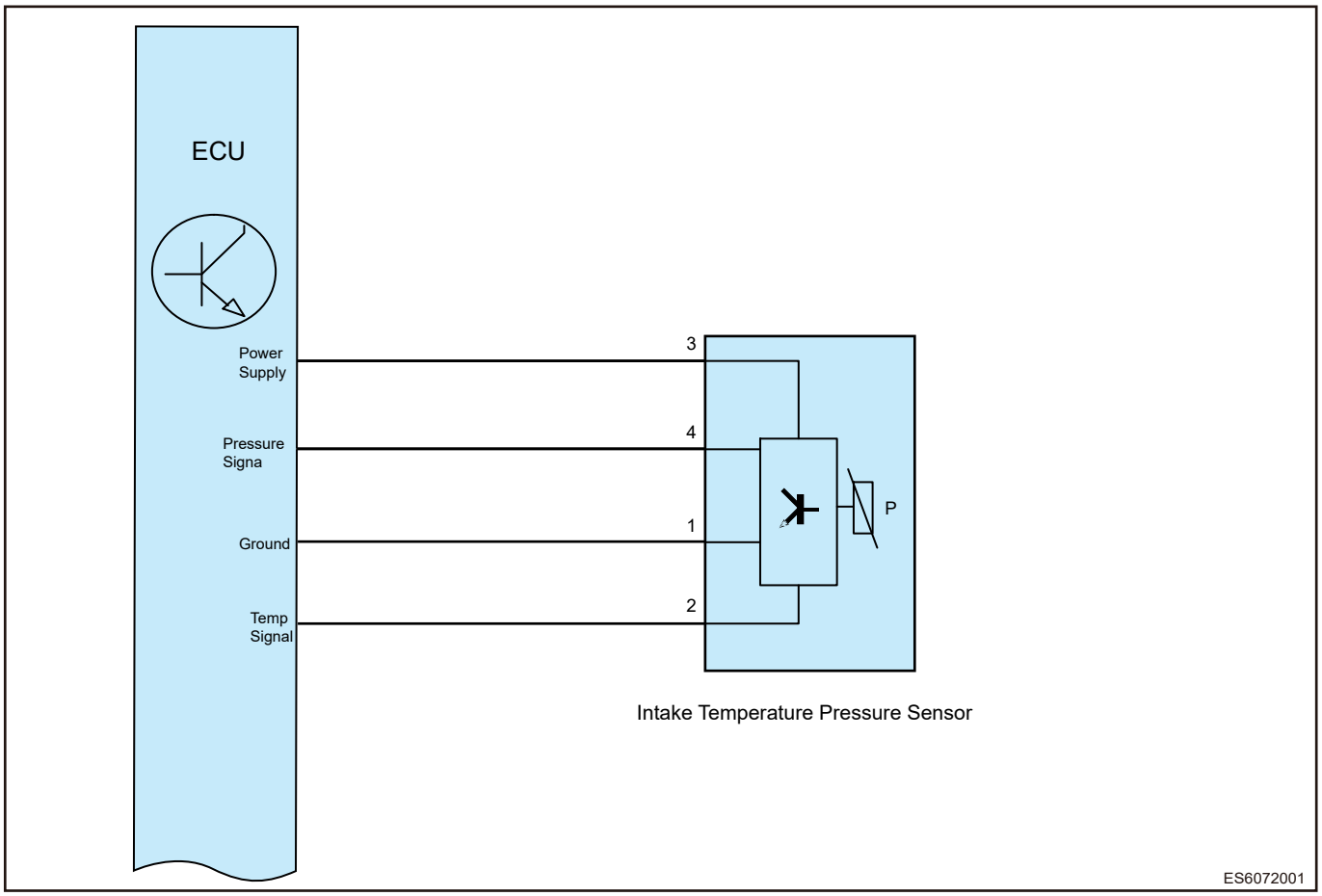
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired

■ **Intake pressure sensor malfunction**

DTC	P011126	Improper Intake Temperature Sensor 1 Signal (Stuck)
DTC	P011200	Intake Air Temperature Sensor 1 Circuit Low Bank 1
DTC	P011300	Intake Air Temperature Sensor 1 Circuit High Bank 1
DTC	P011400	Intake Air Temperature Sensor 1 Circuit Intermittent/Erratic Bank 1
DTC	P00CE23	Intake Air Temperature Measurement System - Multiple Sensor Correlation Bank 1
DTC	P00CE24	Intake Air Temperature Sensor 1 Multiple Check Bank1

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check intake pressure/temperature sensor connector

(a) Disconnect the negative battery.
(b) Unplug intake pressure/temperature sensor connector, check this connector for looseness or poor contact.

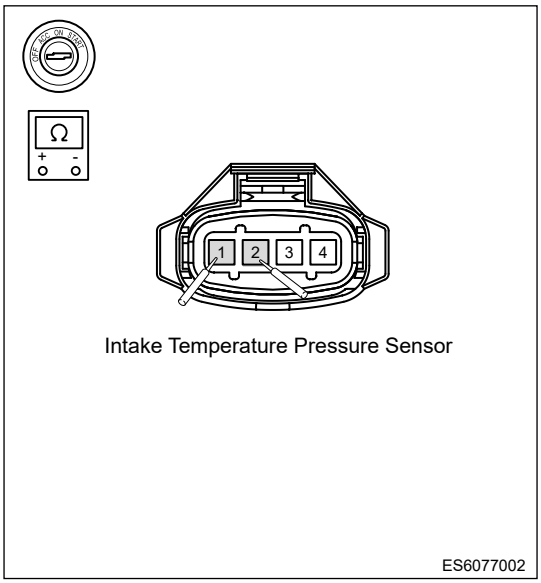
NG → **Repair and adjust connector, or replace intake pressure/temperature sensor**

OK

2	Check intake pressure/temperature sensor resistance

(a) Using ohm band of multimeter, measure if resistances of intake pressure/temperature sensor (1-2) are normal with red and black probes respectively.

Rated resistance at 20℃: 2.5 KΩ ± 5%



Intake Temperature Pressure Sensor
ES6077002

NG → **Replace intake pressure/temperature sensor assembly**

OK

3	Check intake pressure/temperature sensor signal and ground terminals

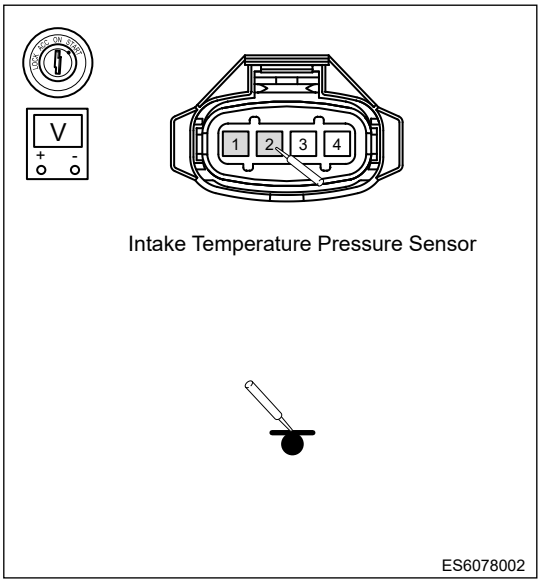
(a) Connect the intake pressure/temperature sensor connector.

(b) Start the engine.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of intake pressure/temperature sensors (1, 2) with red probe.

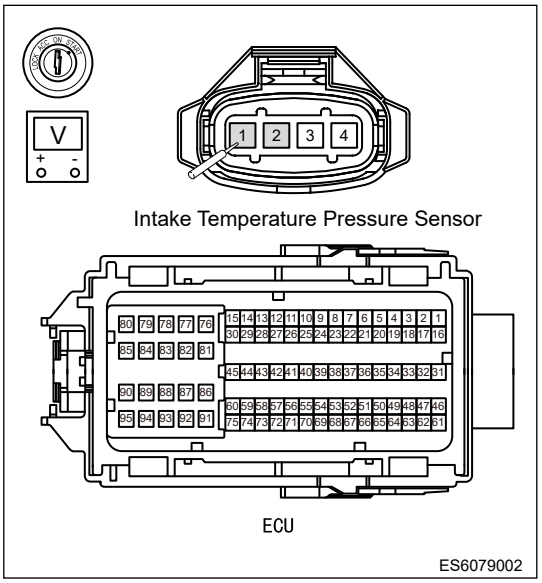
Signal terminal: Signal voltage should vary in accordance with temperature.

Ground terminal: Voltage < 0.2 V



(d) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure intake pressure/temperature sensors (1, 2) with red probe.

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

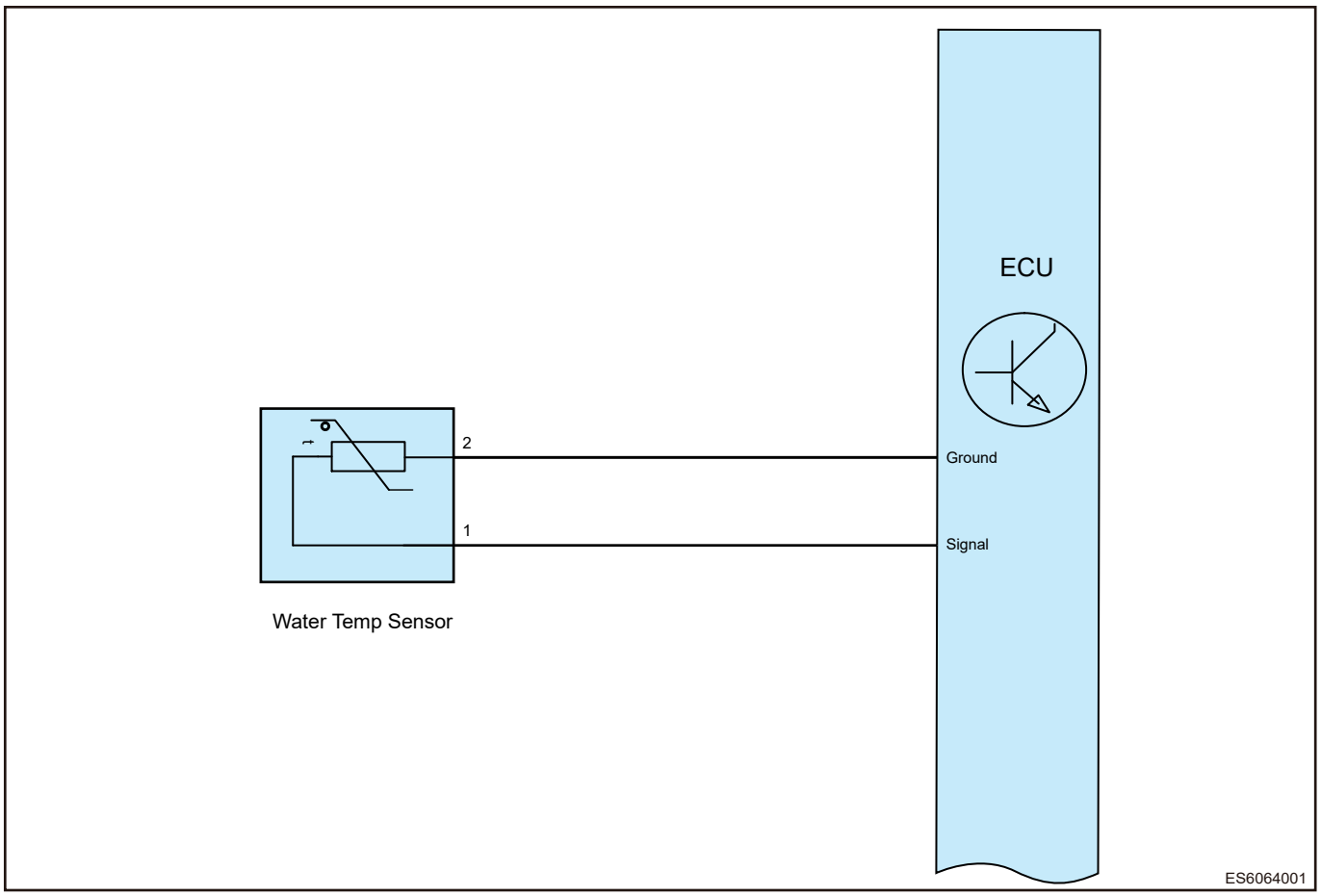
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Coolant temperature sensor 1 malfunction**

DTC	P011623	Engine Coolant Temperature Sensor 1 Circuit Range/Performance
DTC	P011626	Engine Coolant Temperature Sensor 1 Circuit Range/Performance
DTC	P050C24	Cold Start Engine Coolant Temperature Performance
DTC	P050C23	Cold Start Engine Coolant Temperature Performance
DTC	P011700	Engine Coolant Temperature Sensor 1 Circuit Low
DTC	P011800	Engine Coolant Temperature Sensor 1 Circuit High
DTC	P011900	Engine Coolant Temperature Sensor 1 Circuit Intermittent

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check coolant temperature sensor 1 connector**

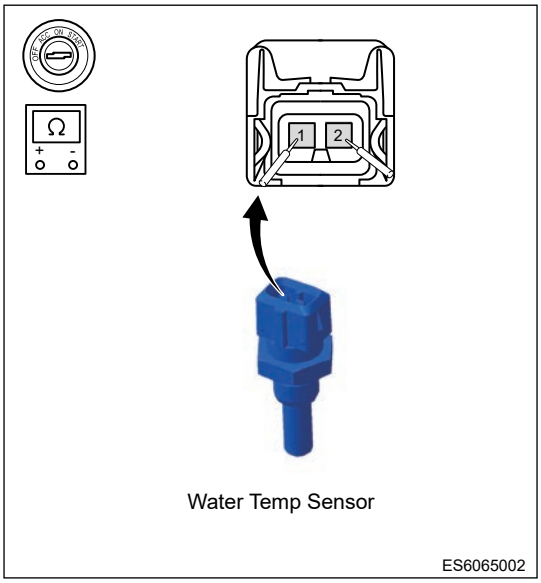
(a) Disconnect the negative battery.
(b) Unplug coolant temperature sensor 1 connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace coolant temperature sensor 1**

OK

2	**Check coolant temperature sensor internal resistance**

(a) Using ohm band of multimeter, connect red and black probes to coolant temperature sensor 1 terminals (1, 2) respectively, measure if internal resistance of coolant temperature sensor 1 is normal; It should vary in accordance with coolant temperature.



NG → **Replace coolant temperature sensor 1 assembly**

OK

3	**Check coolant temperature sensor 1 signal terminal and ground terminal**

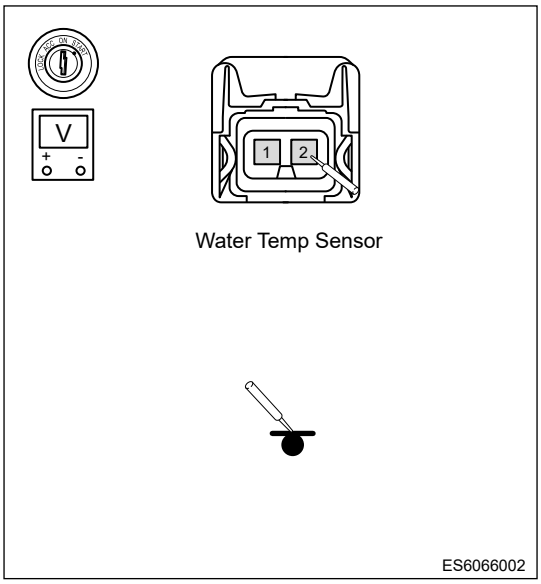
(a) Connect the coolant temperature sensor 1 connector.

(b) Start the engine.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltages of coolant temperature sensor 1 (1, 2) with red probe.

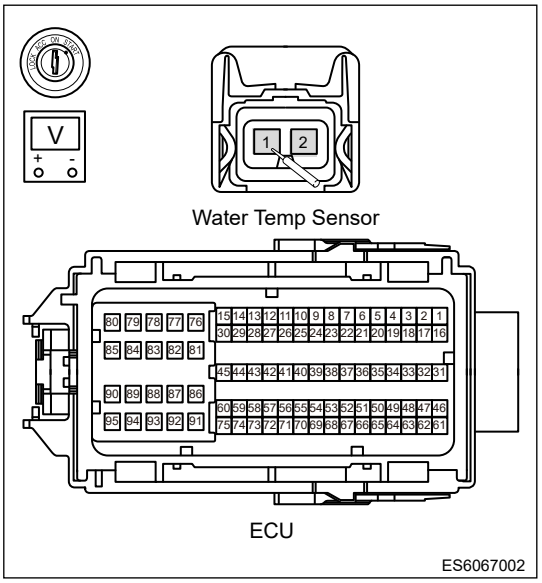
Signal terminal: Voltage signal should vary in accordance with temperature.

Ground terminal: Voltage < 0.2 V



(d) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure coolant temperature sensors (1, 2) with red probe

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

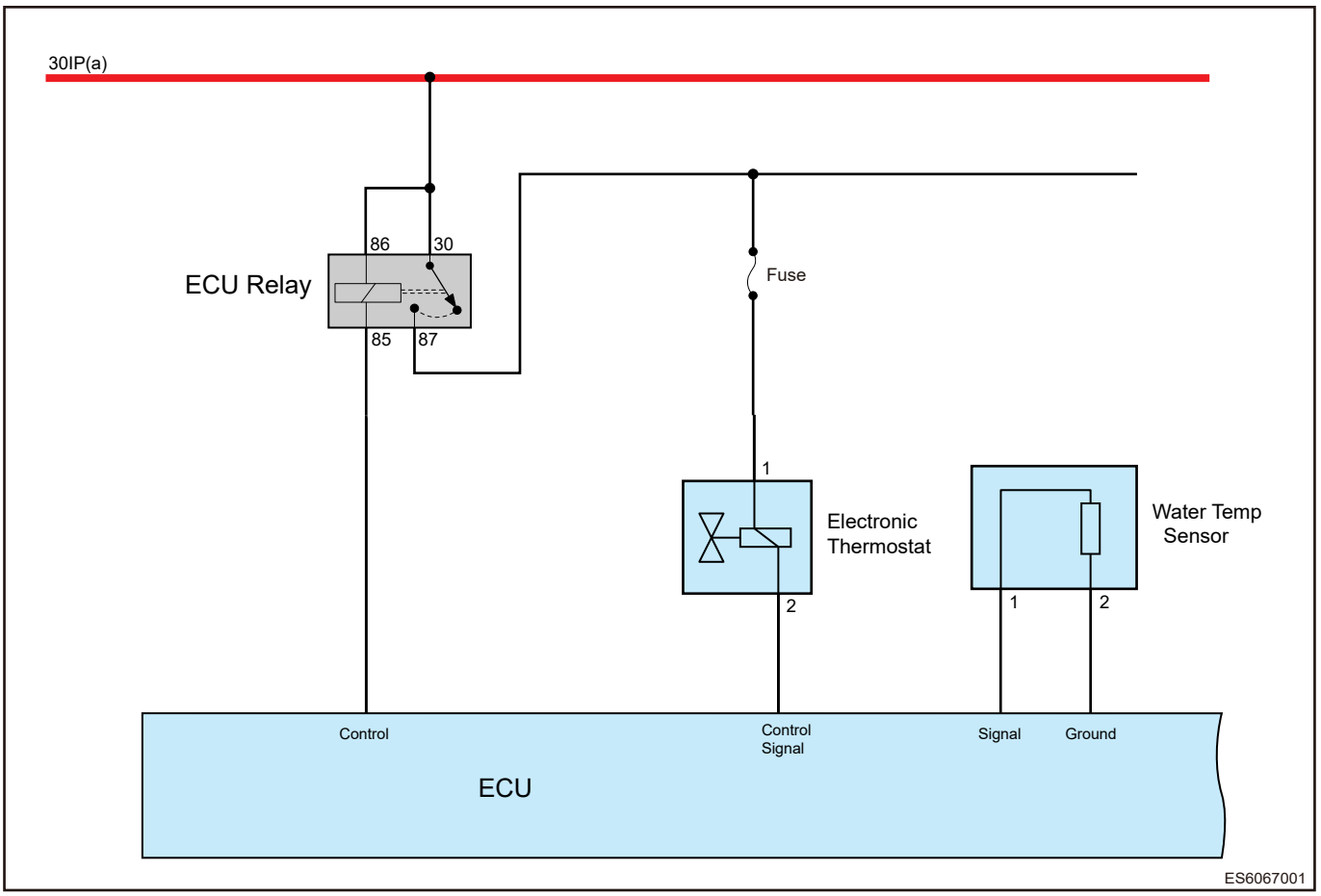
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Thermostat performance unreasonable**

DTC	P012800	Coolant Thermostat (Coolant Temperature Below Thermostat Regulating Temperature)

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic thermostat**

(a) Check if electronic thermostat is normally open or damaged

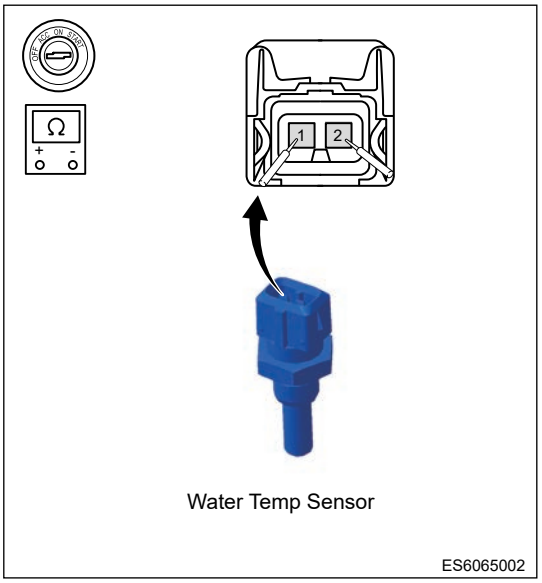
NG → **Replace electronic thermostat assembly**

OK

2	**Check coolant temperature sensor 1 resistance**

(a) Using ohm band of multimeter, measure if internal resistances of coolant temperature sensor 1 (1-2) are normal with red and black probes respectively. They should vary in accordance with coolant temperature.

Rated resistance at 20°C: 2.5 KΩ ± 10%



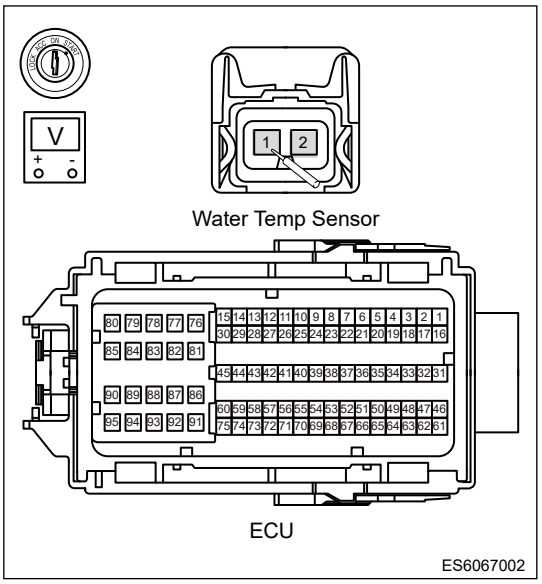
NG → **Replace coolant temperature sensor 1 assembly**

OK

3	Check coolant temperature sensor 1 connecting wire voltage drop value

(a) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure coolant temperature sensors (1, 2) with red probe

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

4	Reconfirm DTCs

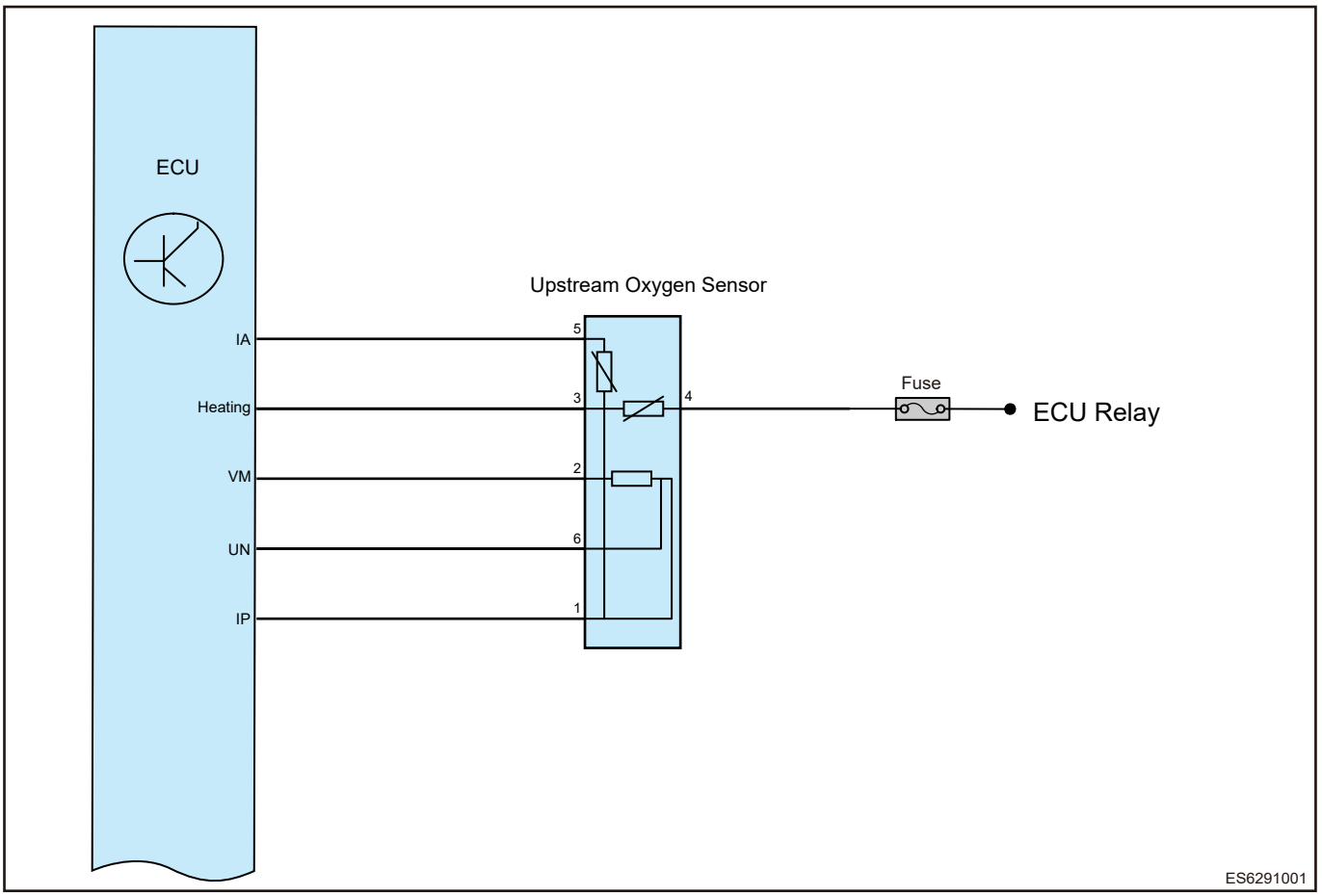
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired
NG	Replace Engine Control Module (ECU)

■ Upstream oxygen sensor signal circuit voltage low/high (APE IPE RE line short to ground/power supply)

DTC	P013100	Upstream Oxygen Sensor Signal Circuit Voltage Too Low (APE IPE RE Wire Short to Ground)
DTC	P013200	Upstream Oxygen Sensor Signal Circuit Voltage Too High (APE IPE RE Wire Short to Power Supply)
DTC	P223700	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1 (-Close to ECU)
DTC	P223713	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check upstream oxygen sensor connector**

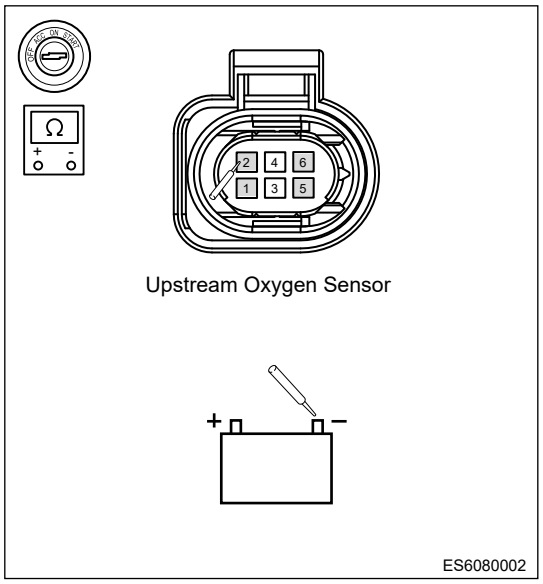
(a) Disconnect the negative battery.
(b) Unplug upstream oxygen sensor connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

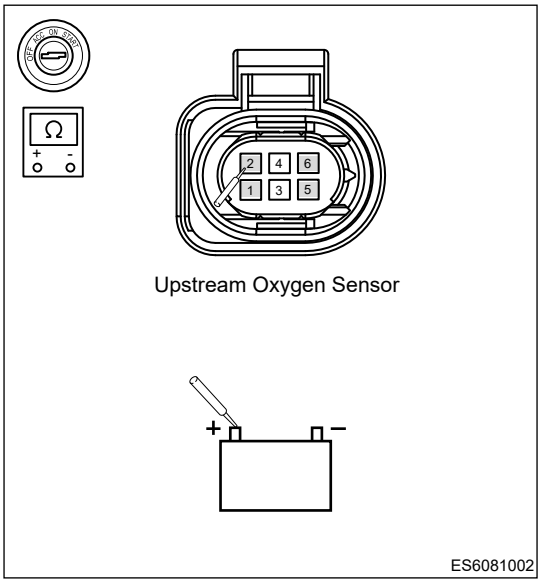
OK

2	**Check for short circuit to ground / power supply in upstream oxygen sensor circuit**

(a) Disconnect the upstream oxygen sensor connector.
(b) Disconnect the ECU connector.
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of upstream oxygen sensor (2, 6, 1, 5) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of upstream oxygen sensor (2, 6, 1, 5) with red probe respectively; Check if circuit is short to power supply.

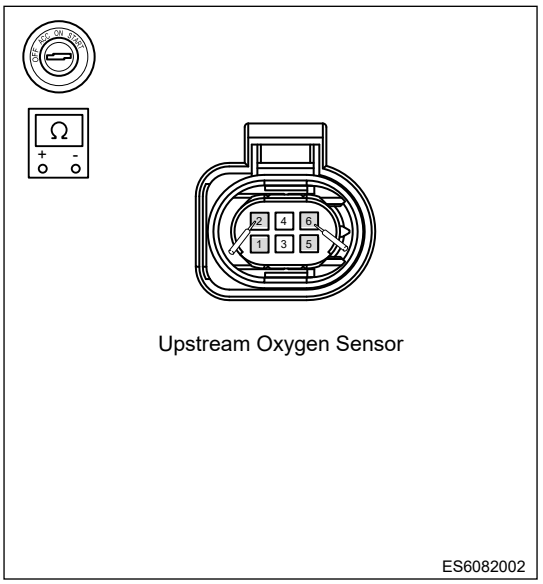


NG → **Repair or replace wire harness**

OK

3	**Check if circuits of upstream oxygen sensor themselves are short to each other**

(a) Using ohm band of multimeter, measure resistances of upstream oxygen sensor (2, 6, 1, 5) with red and black probes respectively; Check if internal circuits are short to each other.



NG → **Replace upstream oxygen sensor assembly**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **O2 sensor circuit slow response bank 1 sensor 1**

DTC	P013300	O2 Sensor Circuit Slow Response Bank 1 Sensor 1

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check intake/exhaust air for leakage

(a) Check intake system for air leakage.
(b) Check exhaust system for air leakage.

NG → **Repair and handle parts related to air leakage**

OK

2	Check upstream oxygen sensor

(a) Check if upstream oxygen sensor is deteriorated; Check if response speed is slow.

NG → **Replace upstream oxygen sensor assembly**

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

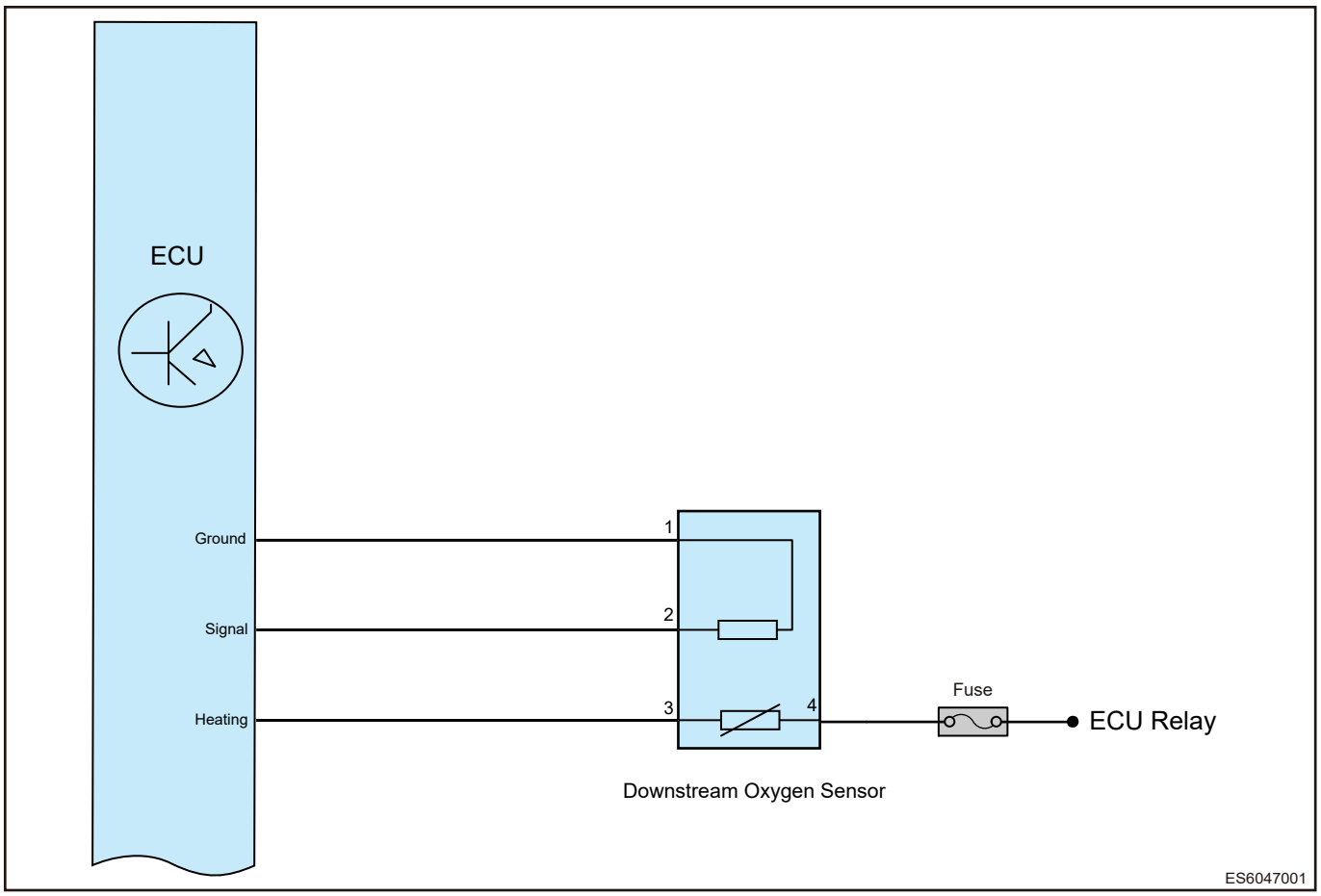
OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace Engine Control Module (ECU)**

■ **Downstream oxygen sensor signal improper/signal wire short to ground/power supply**

DTC	P013600	O2 Sensor Circuit Bank 1 Sensor 2
DTC	P013700	Downstream Oxygen Sensor Signal Circuit Short to Ground
DTC	P013800	Downstream Oxygen Sensor Signal Circuit Short to Power Supply

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check downstream oxygen sensor connector**

(a) Disconnect the negative battery.
(b) Unplug downstream oxygen sensor connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

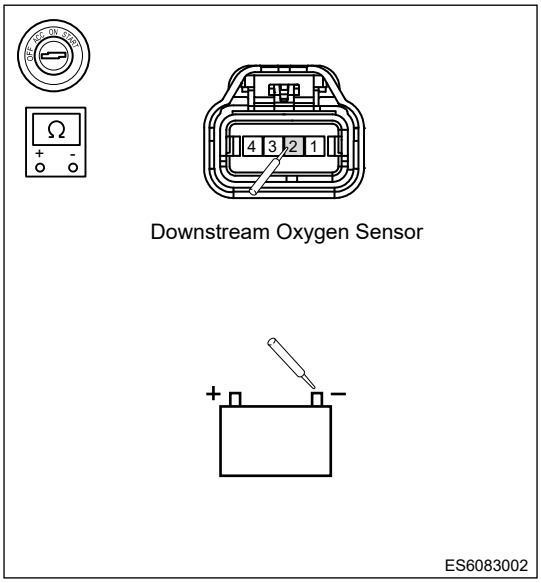
OK

2	**Check for short circuit to ground / power supply in downstream oxygen sensor signal**

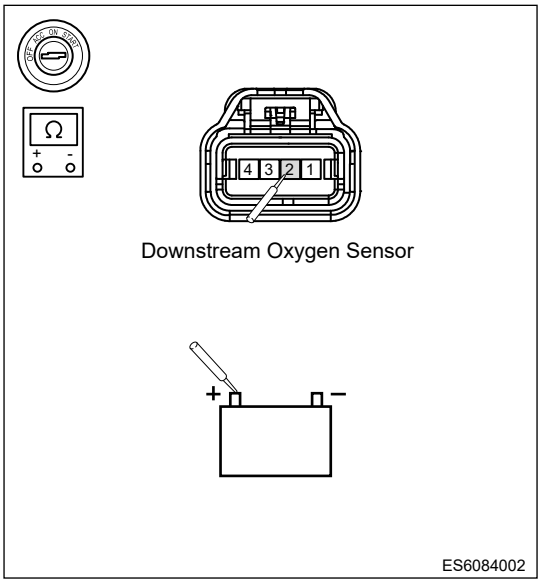
(a) Disconnect the downstream oxygen sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of downstream oxygen sensor (2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistance of downstream oxygen sensor (2) with red probe respectively. Check if circuit is shored to power supply.

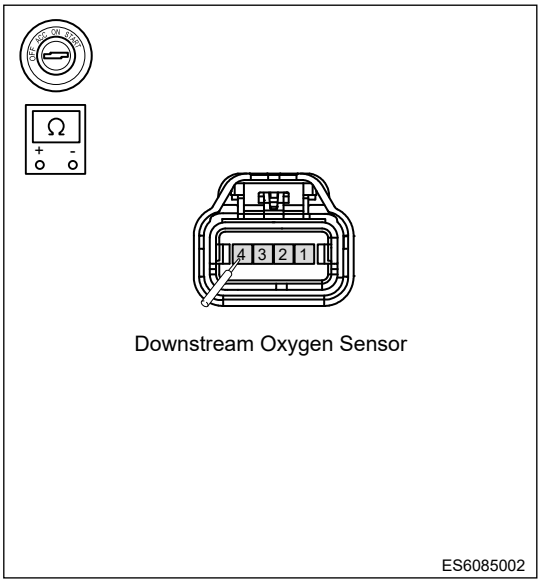


NG	**Repair or replace wire harness**

OK

3	**Check if downstream oxygen sensor themselves are short to each other**

(a) Using ohm band of multimeter, measure resistances of upstream oxygen sensor (1, 2, 3, 4) with red and black probes respectively. Check if internal circuits are short to each other.



NG → **Replace downstream oxygen sensor assembly**

OK →

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG →

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

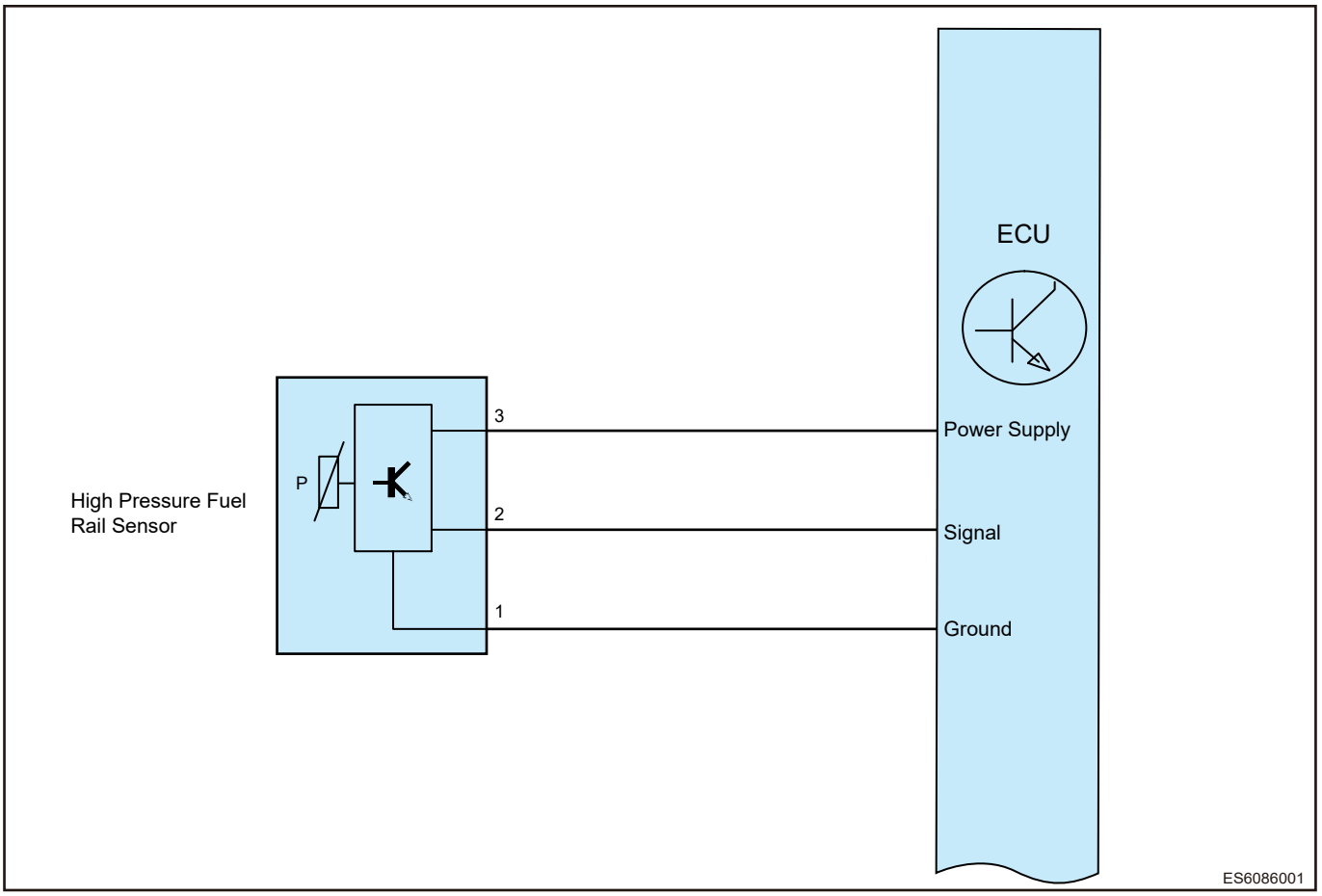
OK → **Conduct test and confirm malfunction has been repaired**

■ **Fuel rail pressure sensor circuit short to ground/power supply/signal stuck/signal non-plausible**

DTC	**P019200**	**High Pressure Fuel Rail Pressure Sensor Circuit Voltage Too Low**
DTC	**P019300**	**High Pressure Fuel Rail Pressure Sensor Circuit Voltage Too High**

DTC	P019400	Fuel Rail Pressure Sensor Circuit Intermittent/Erratic Bank 1
DTC	P019128	Fuel Rail Pressure Sensor Circuit Bank 1-Negative Offset
DTC	P019129	Fuel Rail Pressure Sensor Circuit Bank 1-Positive Offset
DTC	P019000	Fuel Rail Pressure Sensor Circuit Bank 1
DTC	P254200	DECOS Oil Passage Pressure Sensor Circuit High Voltage
DTC	P254100	DECOS Oil Passage Pressure Sensor Circuit Low Voltage

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuel rail pressure sensor connector**

(a) Disconnect the negative battery.
(b) Unplug fuel rail pressure sensor connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check fuel rail pressure sensor circuit**

(a) Connect the fuel rail pressure sensor connector.

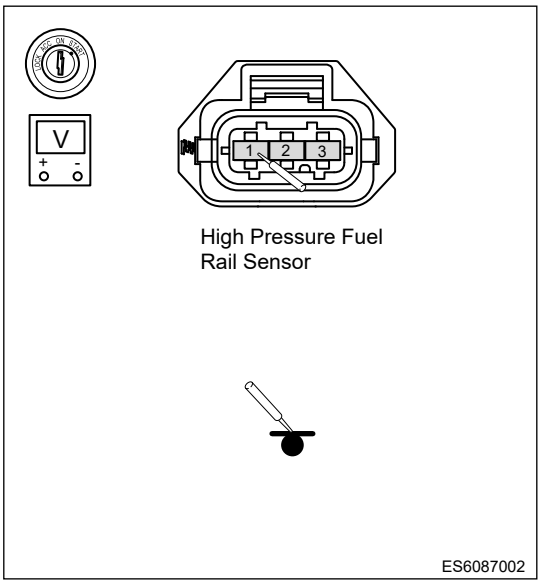
(b) Turn ENGINE START STOP switch to ON.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, measure voltages of fuel rail pressure sensor (1, 2, 3) with red probe respectively.

Power supply: 5 V

Ground: ＜ 0.2 V

Signal: Under atmospheric pressure (100 Kpa), signal output is 0.500 ± 0.048 V



NG → **Check and repair wire harness, or replace fuel rail pressure sensor**

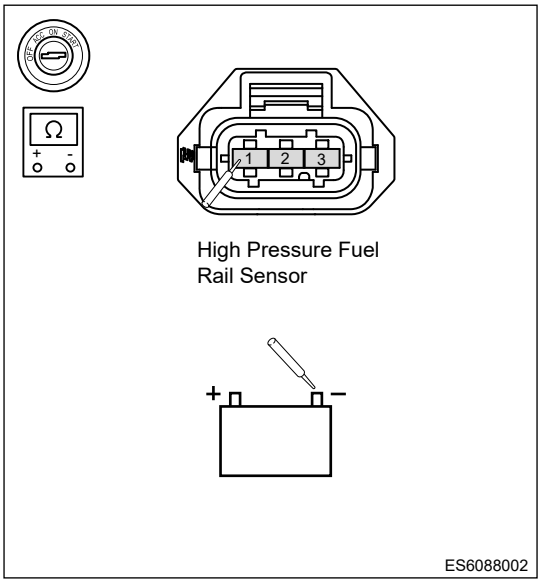
OK

3	**Check for short circuit to ground / power supply in fuel rail pressure sensor**

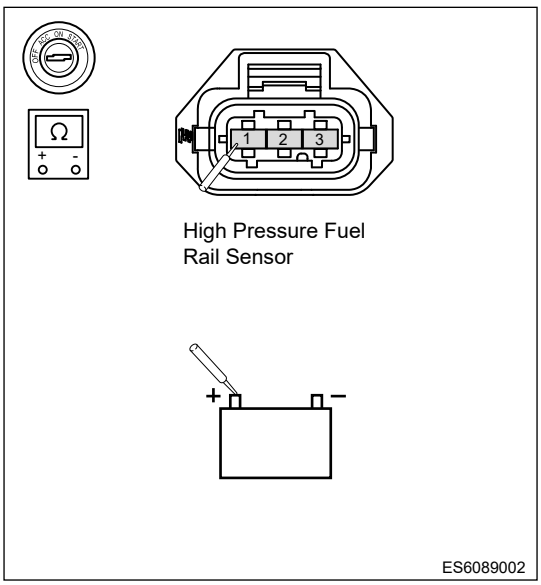
(a) Disconnect the fuel rail pressure sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of fuel rail pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of fuel rail pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to power supply.

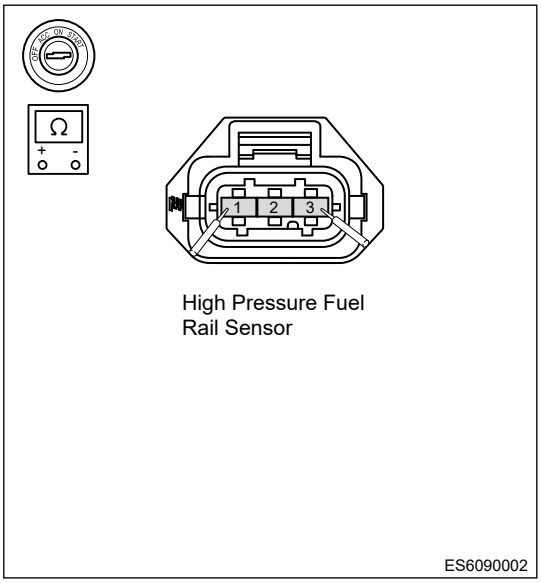


NG	**Check and repair wire harness**

OK

4	**Check if circuits of fuel rail pressure sensor themselves are short to each other**

(a) Using ohm band of multimeter, measure resistances of fuel rail pressure sensor (1, 2, 3) with red and black probes respectively; Check if internal circuits are short to each other.



NG → **Replace fuel rail pressure sensor assembly**

OK →

5	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG →

6	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

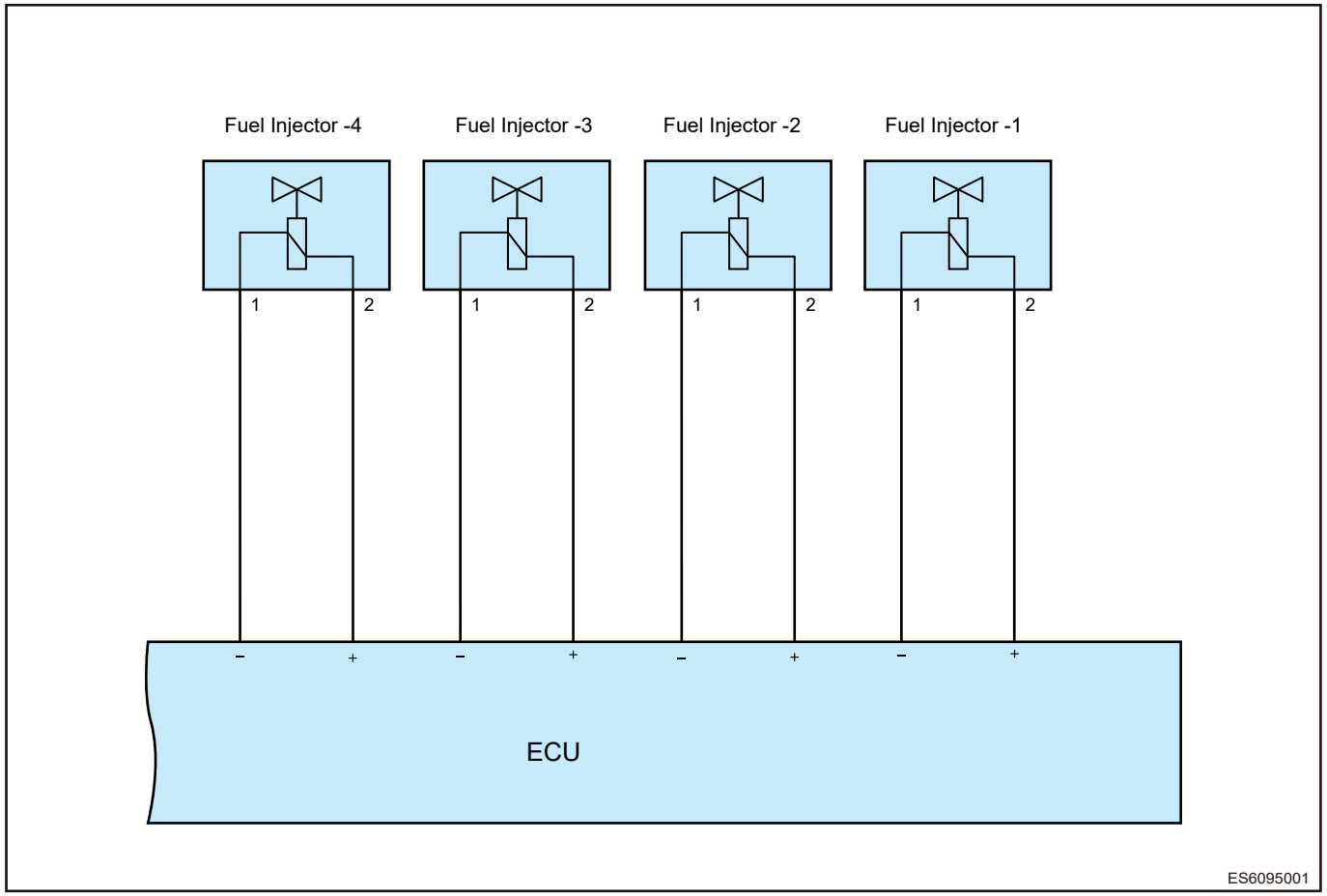
OK → **Conduct test and confirm malfunction has been repaired**

■ **Cylinder 1 / cylinder 2 / cylinder 3 / cylinder 4 fuel injector control circuit open**

DTC	**P020113**	**Cylinder 1 Fuel Injector Control Circuit Open**
DTC	**P020213**	**Cylinder 2 Fuel Injector Control Circuit Open**

DTC	P020313	Cylinder 3 Fuel Injector Control Circuit Open
DTC	P020413	Cylinder 4 Fuel Injector Control Circuit Open

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Take troubleshooting of cylinder 1 fuel injector as an example.

1	**Check injector connector**

(a) Disconnect the negative battery.
(b) Check injector connector for looseness or poor contact.

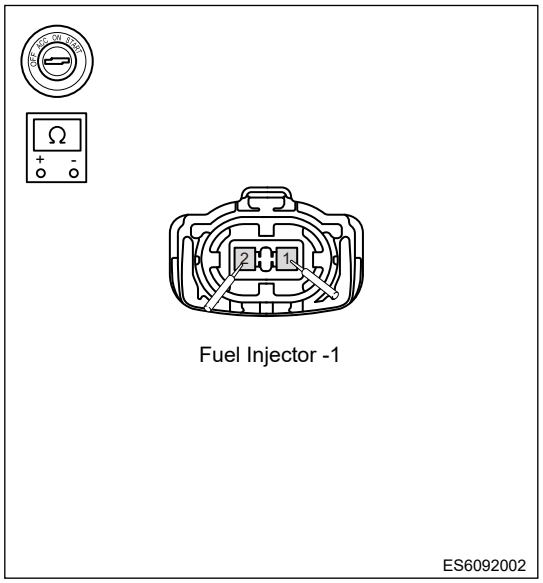
NG → **Repair and adjust connector, or replace it**

OK

2	Check internal resistance of fuel injector

(a) Disconnect the injector connector.

(b) Using ohm band of multimeter, measure resistances of injector terminals (1, 2) with red and black probes respectively.



NG → **Replace fuel injector assembly**

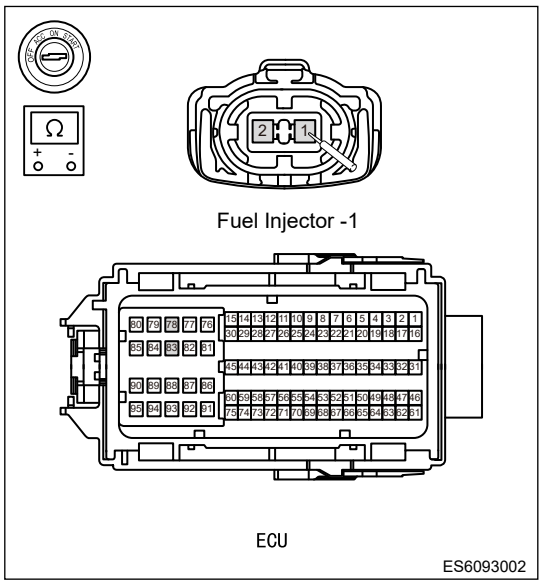
OK

3	Check fuel injector control circuit

(a) Disconnect the injector connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to ECU (-connected terminal), and measure for continuity between fuel injector (1, 2) with red probe respectively.



NG → **Check and repair circuit**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

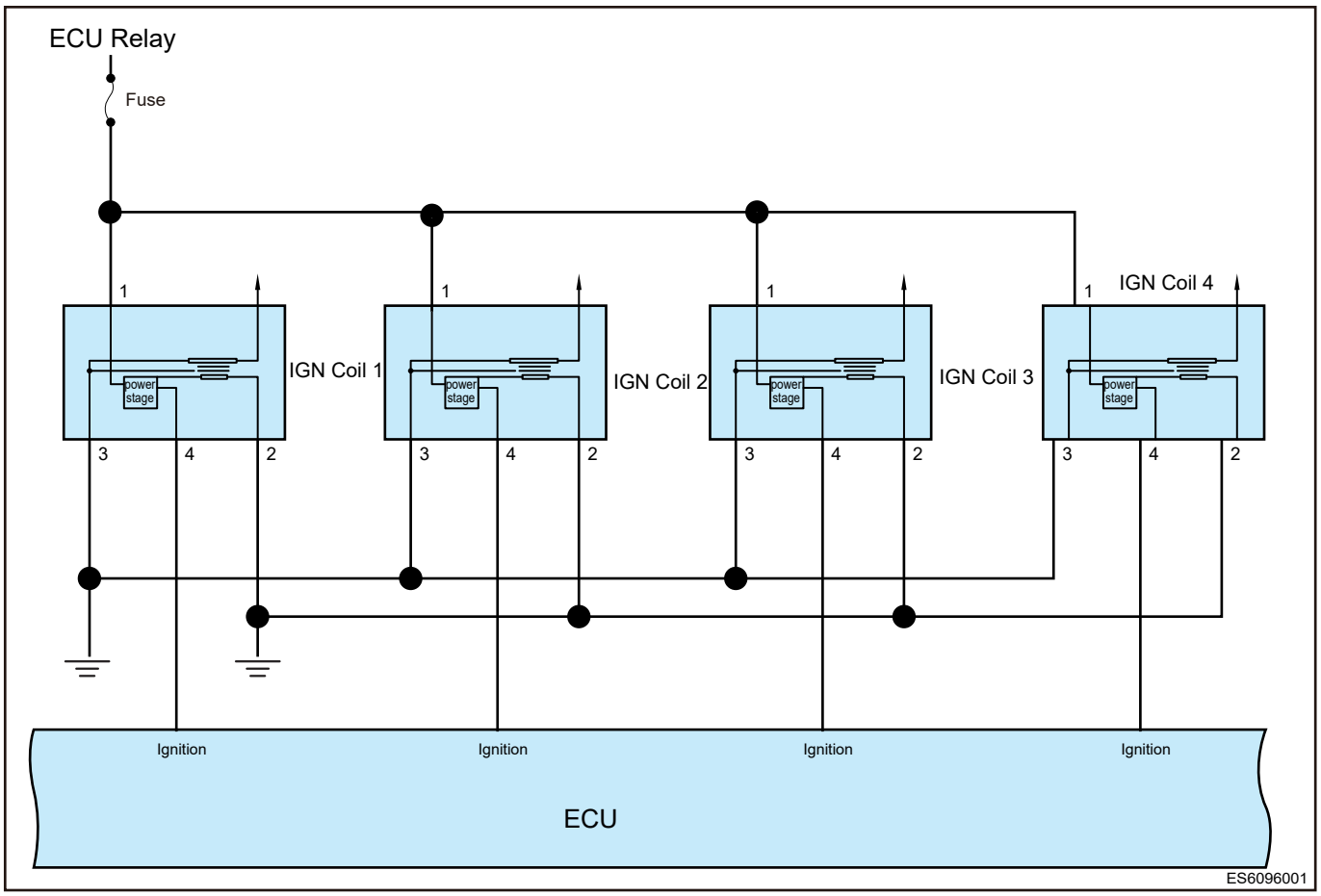
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ Cylinder 1 / cylinder 2 / cylinder 3 / cylinder 4 ignition coil control circuit voltage high/low

DTC	P230112	Ignition Coil "A" Primary Control Circuit High
DTC	P230412	Ignition Coil "B" Primary Control Circuit High
DTC	P230712	Ignition Coil "C" Primary Control Circuit High
DTC	P231012	Ignition Coil "D" Primary Control Circuit High
DTC	P230011	Ignition Coil "A" Primary Control Circuit Low
DTC	P230311	Ignition Coil "B" Primary Control Circuit Low
DTC	P230611	Ignition Coil "C" Primary Control Circuit Low
DTC	P230911	Ignition Coil "D" Primary Control Circuit Low
DTC	P035113	Ignition Coil "A" Primary Control Circuit Failure
DTC	P035213	Ignition Coil "B" Primary Control Circuit Failure
DTC	P035313	Ignition Coil "C" Primary Control Circuit Failure
DTC	P035413	Ignition Coil "D" Primary Control Circuit Failure

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Take troubleshooting of cylinder 1 ignition coil as an example.

1	**Check ignition coil connector**

(a) Disconnect the negative battery.
(b) Unplug ignition coil connector, check this connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check ignition coil power supply fuse**

(a) Check if ignition coil power supply fuse in engine compartment fuse and relay box is blown.

NG → **There short circuit in circuit or ignition coil**

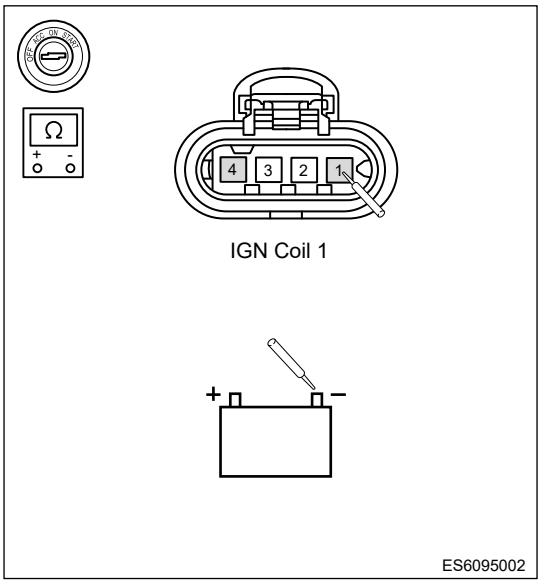
OK

3	**Check for short circuit to ground / power supply in ignition coil circuit**

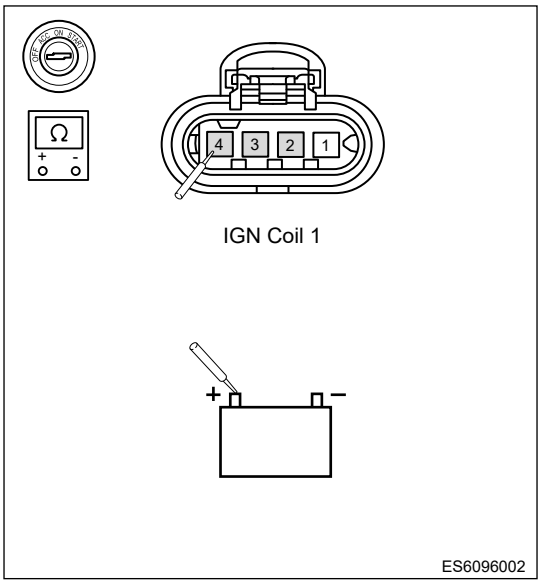
(a) Disconnect the ignition coil connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of ignition coil (1, 4) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of ignition coil (2, 3, 4) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair wire harness**

OK

4	Check ignition coil control circuit

(a) Connect the ignition coil connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure voltages of ignition coil (1, 2, 3) with red probe respectively.

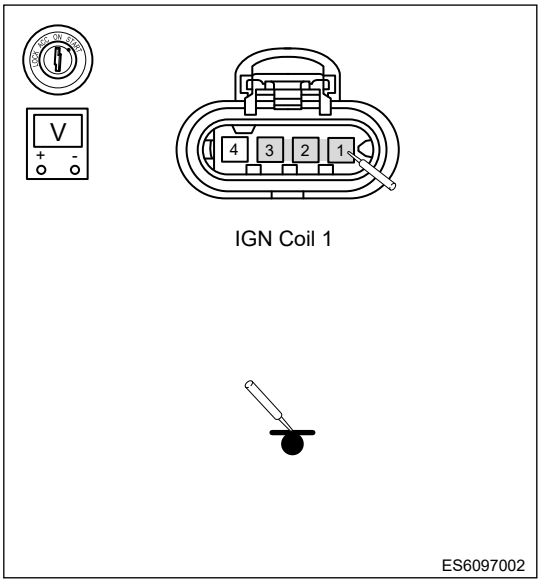
Power supply: 12V

Ground: ＜ 0.2 V

(d) Start the engine.

(e) Using the LED test light, connect clip to battery negative terminal, measure ignition coil (4) with another end.

Under normal conditions, test light should flash

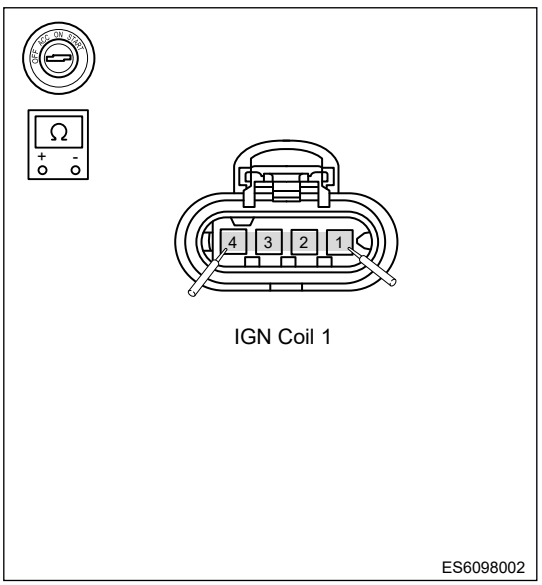


NG → **Check and repair wire harness**

OK

5	Check if circuits of ignition coil themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of ignition coil (1, 2, 3, 4) with red and black probes respectively; Check if internal circuits are short to each other.



NG → **Replace ignition coil assembly**

OK

6	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

7	Reconfirm DTCs

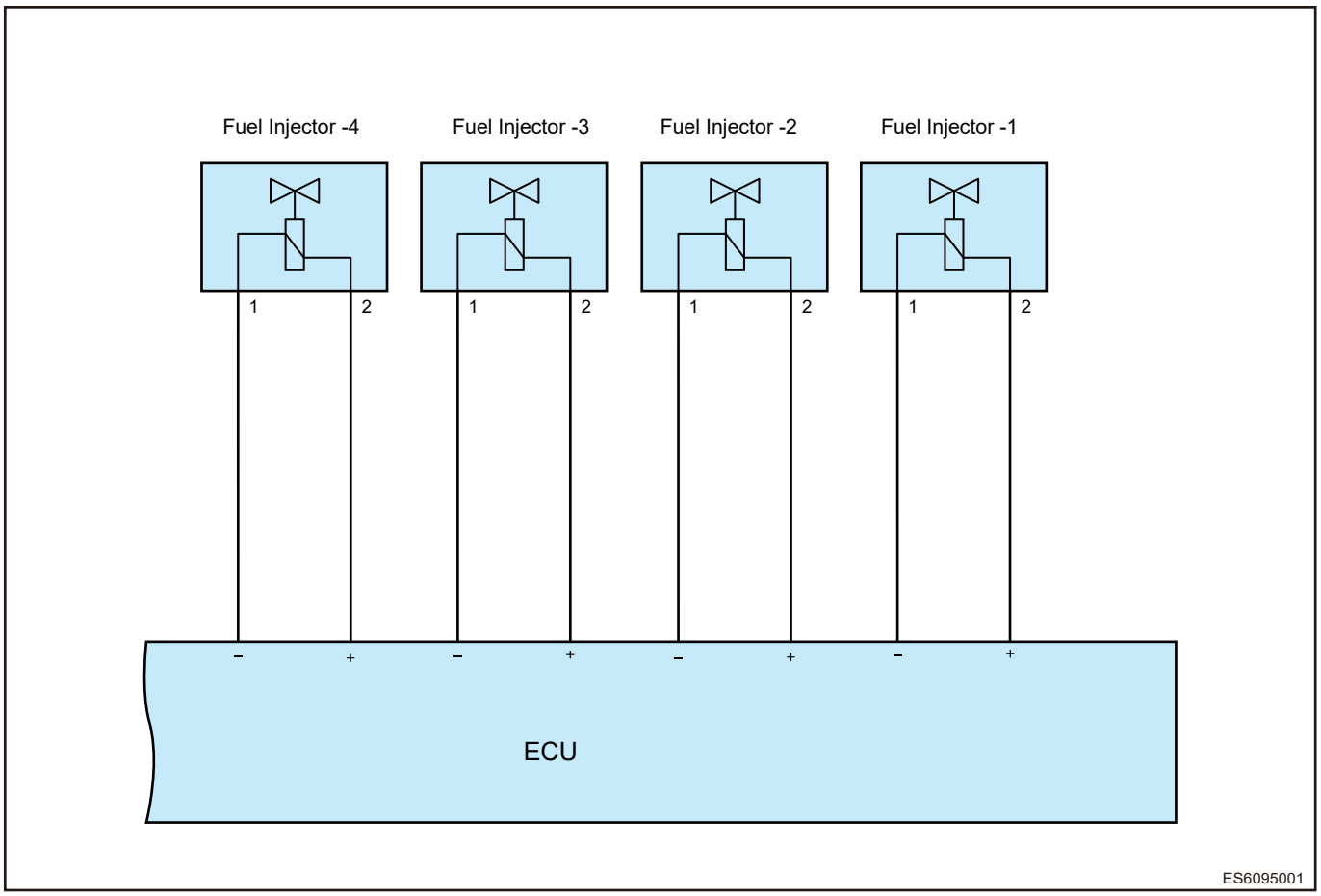
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ Cylinder 1 / cylinder 2 / cylinder 3 / cylinder 4 fuel injector control circuit short to power supply

DTC	P026200	Cylinder 1 Fuel Injector Control Circuit Short to Power Supply
DTC	P026800	Cylinder 3 Injector "A" Circuit High
DTC	P027100	Cylinder 4 Fuel Injector Control Circuit Short to Power Supply
DTC	P026500	Cylinder 2 Injector "A" Circuit High

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Take troubleshooting of cylinder 1 fuel injector as an example.

1	**Check injector connector**

(a) Disconnect the negative battery.
(b) Check injector connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

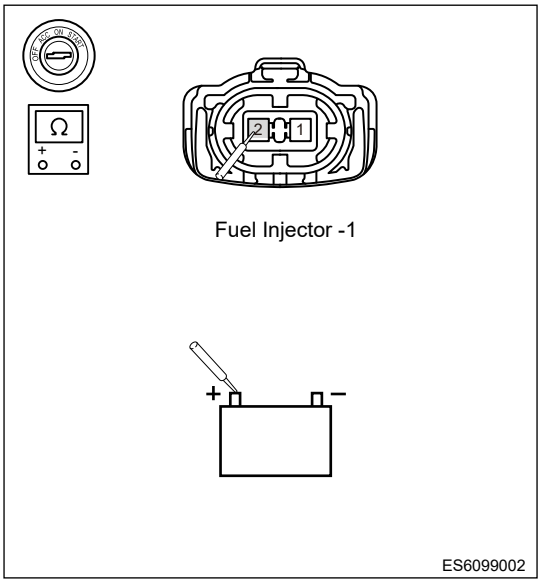
OK

2	**Check if fuel injector control terminal is short to power supply**

(a) Disconnect the injector connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of injector (2) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair circuit**

OK

3	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

4	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

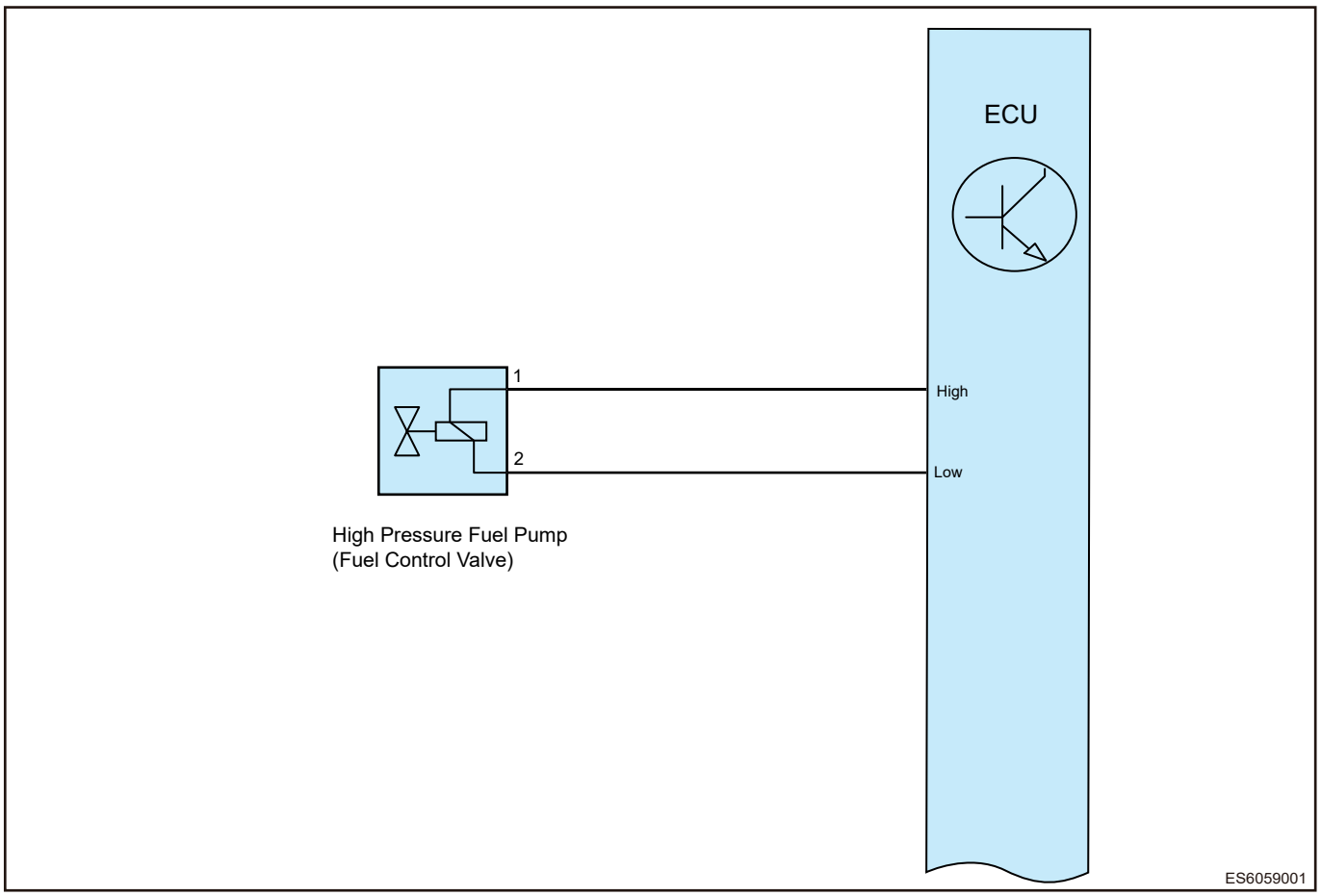
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Flow control valve control circuit open/too high/too low**

DTC	**P025100**	**Injection Pump Fuel Metering Control “A” (Cam/Rotor/Injector)**
DTC	**P025400**	**Flow Control Valve High Side Control Circuit Voltage Too High or Too Low**
DTC	**P025900**	**Injection Pump Fuel Metering Control “A” Low (Cam/Rotor/Injector)**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check high pressure fuel pump connector**

(a) Disconnect the negative battery.

(b) Unplug high pressure fuel pump connector, check this connector for looseness or poor contact.

NG	**Repair and adjust connector, or replace it**

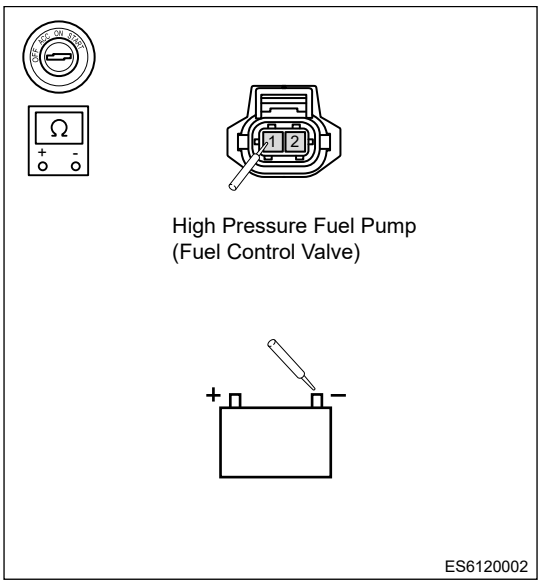
OK

2	Check for short circuit to ground / power supply in high pressure fuel pump circuit

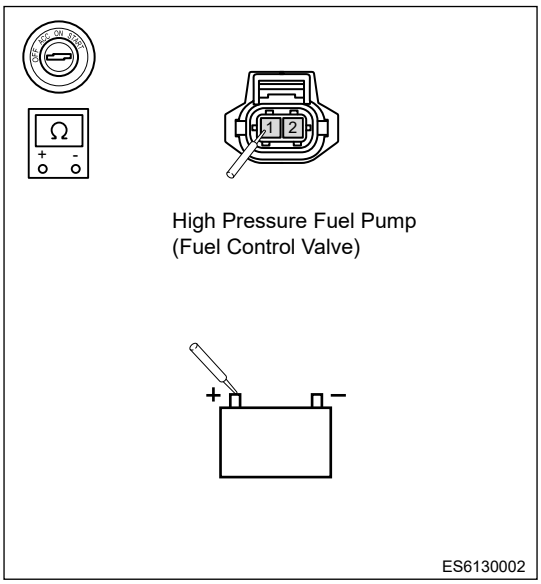
(a) Disconnect the high pressure fuel pump connector.

(b) Disconnect the ECU connector.

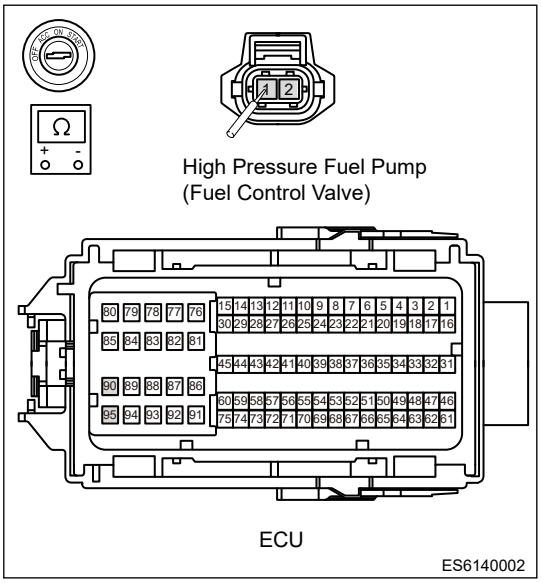
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of high pressure fuel pump (1, 2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of high pressure fuel pump (1, 2) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, connect black probe to ECU (-connected terminal), measure for continuity between high pressure fuel pump (1, 2) with red probe respectively; Check for open circuit.

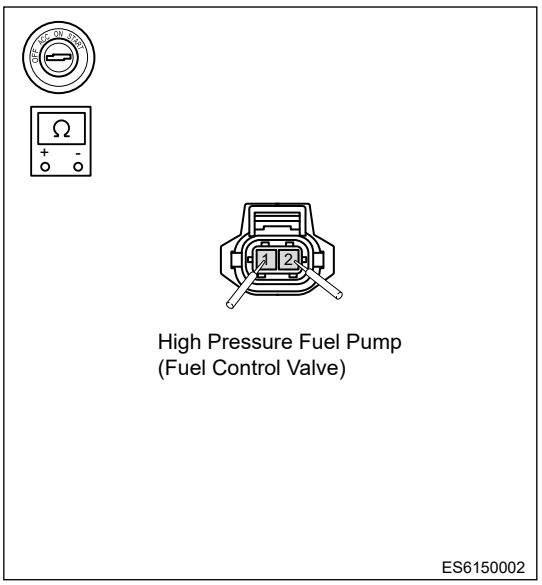


NG → **Check and repair wire harness**

OK

3	**Check if circuits of flow control valve themselves are short to each other**

(a) Using ohm band of multimeter, measure resistances of high pressure oil pump (1, 2) with red and black probes respectively; Check if internal circuits are short to each other.



NG → **Replace high pressure fuel pump assembly**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Multiple cylinder misfire detected**

DTC	P030000	Random/Multiple Cylinder Misfire Detected
DTC	P030100	Cylinder 1 Misfire Detected
DTC	P030200	Cylinder 2 Misfire Detected
DTC	P030300	Cylinder 3 Misfire Detected
DTC	P030400	Cylinder 4 Misfire Detected
DTC	P036300	Misfire Detected - Fueling Disabled

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fuel injector, ignition coil connector

(a) Disconnect the negative battery.
(b) Check fuel injector, ignition coil connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	Check if ignition coil control circuit is abnormal

(a) Check if ignition coil control circuit is abnormal.
(b) Under normal conditions of control circuit, replace ignition coil and perform test.

NG → **Check and repair circuit, or replace ignition coil assembly**

OK

3	Check spark plug

(a) Check spark plug insulating ceramic for cracks;
(b) Check spark plug head electrode for corrosion, damage;
(c) Check if clearance between spark plug head side electrode and center electrode is normal.

NG → **Replace spark plug assembly**

OK

4	Check if fuel injector control circuit is abnormal

(a) Check if fuel injector control circuit is abnormal.
(b) Under normal conditions of control circuit, replace fuel injector and perform test.

NG → **Check and repair circuit, or replace fuel injector assembly**

OK

5	Check fuel quality

(a) Check if fuel quality is abnormal.

NG → **Replace fuel**

OK

6	Check engine system for serious carbon deposition

(a) Check if fuel injector is dirty or blocked.
(b) Check if electronic throttle is dirty.
(c) Check intake valve for serious carbon deposition.

NG → Clean engine system

OK

7	Test engine cylinder pressure

(a) Test if cylinder pressure of each cylinder is met standard with the cylinder pressure gauge.

NG → Repair engine

OK

8	Reconfirm DTCs

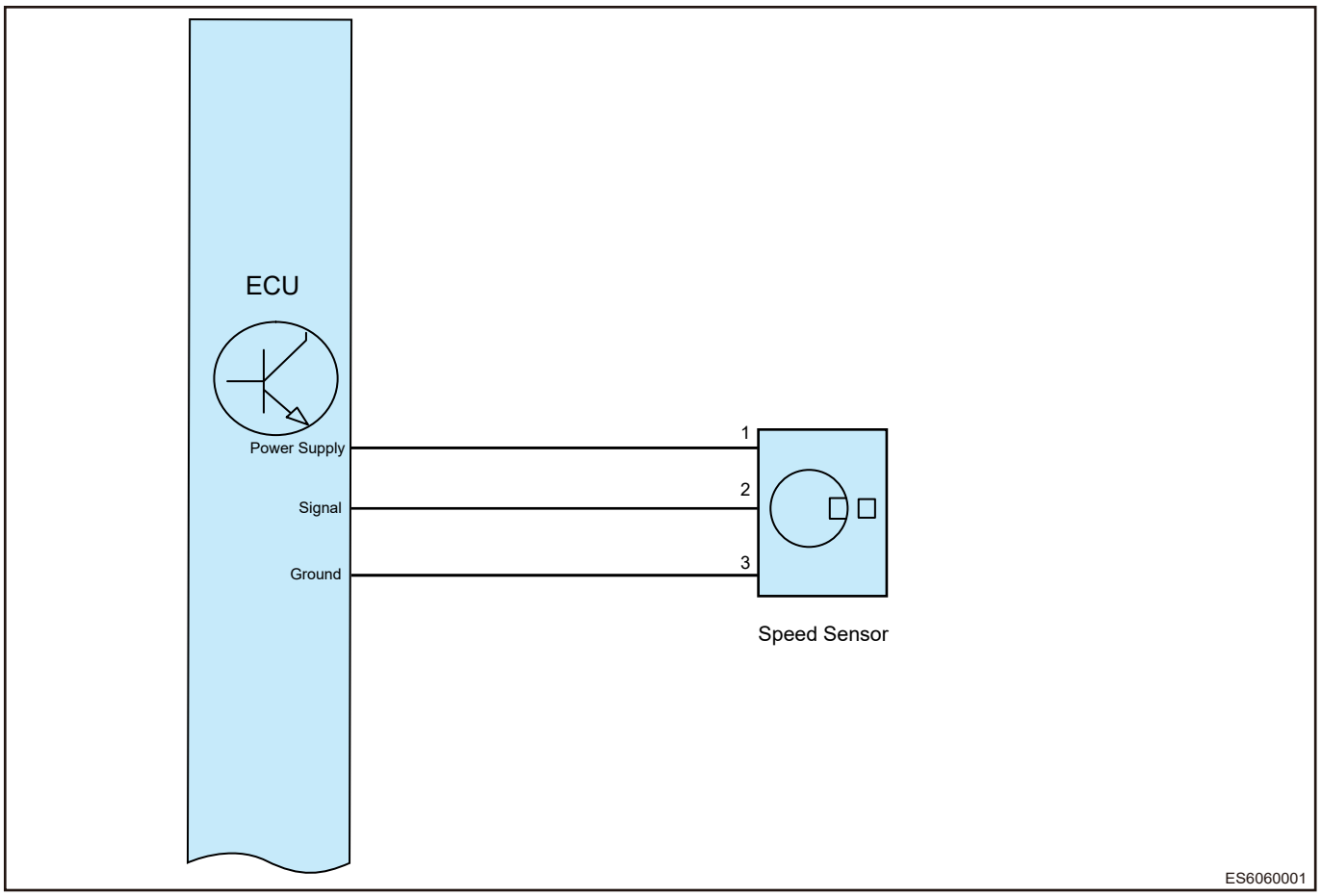
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ Crankshaft position sensor signal improper/missing

DTC	P033900	Crankshaft Position Sensor "A" Circuit Intermittent
DTC	P261700	Crankshaft Position Signal Output Circuit Open

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check speed sensor connector**

(a) Disconnect the negative battery.
(b) Check speed sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check speed sensor and signal gear ring condition**

(a) Remove the speed sensor.
(b) Check head of speed sensor for a large amount of iron chips.
(c) Check signal gear ring for tooth missing, damage or iron chips adhesion.

NG → **Clean up iron chips or replace damaged flywheel**

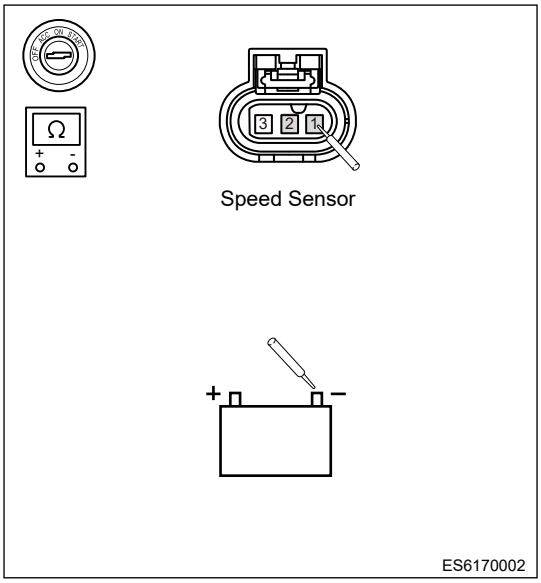
OK

3	**Check for short circuit to ground/power supply in speed sensor circuit**

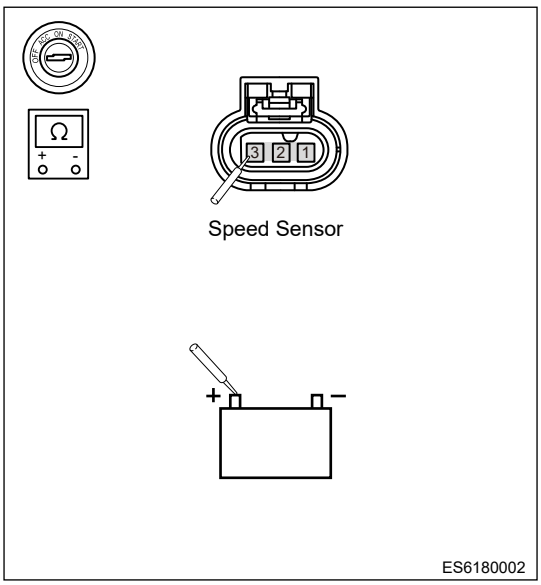
(a) Disconnect the speed sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of speed sensor (1, 2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of speed sensor (1, 2, 3) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair wire harness**

OK

4	Check speed sensor signal circuit

(a) Connect the speed sensor connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, measure voltage of speed sensor (1, 3) with red probe respectively.

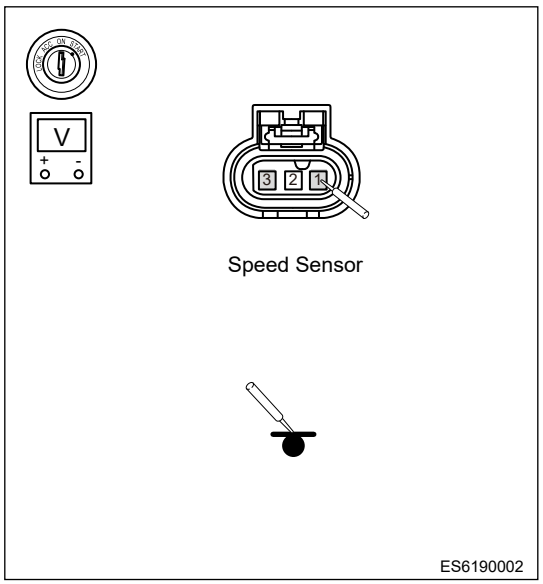
Power supply: 5 V

Ground: < 0.2 V

(d) Start the engine.

(e) Using the LED test light, connect clip to battery negative terminal, measure speed sensor (2) with another end.

Under normal conditions, test light should flash.



NG → **Check and repair wire harness**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

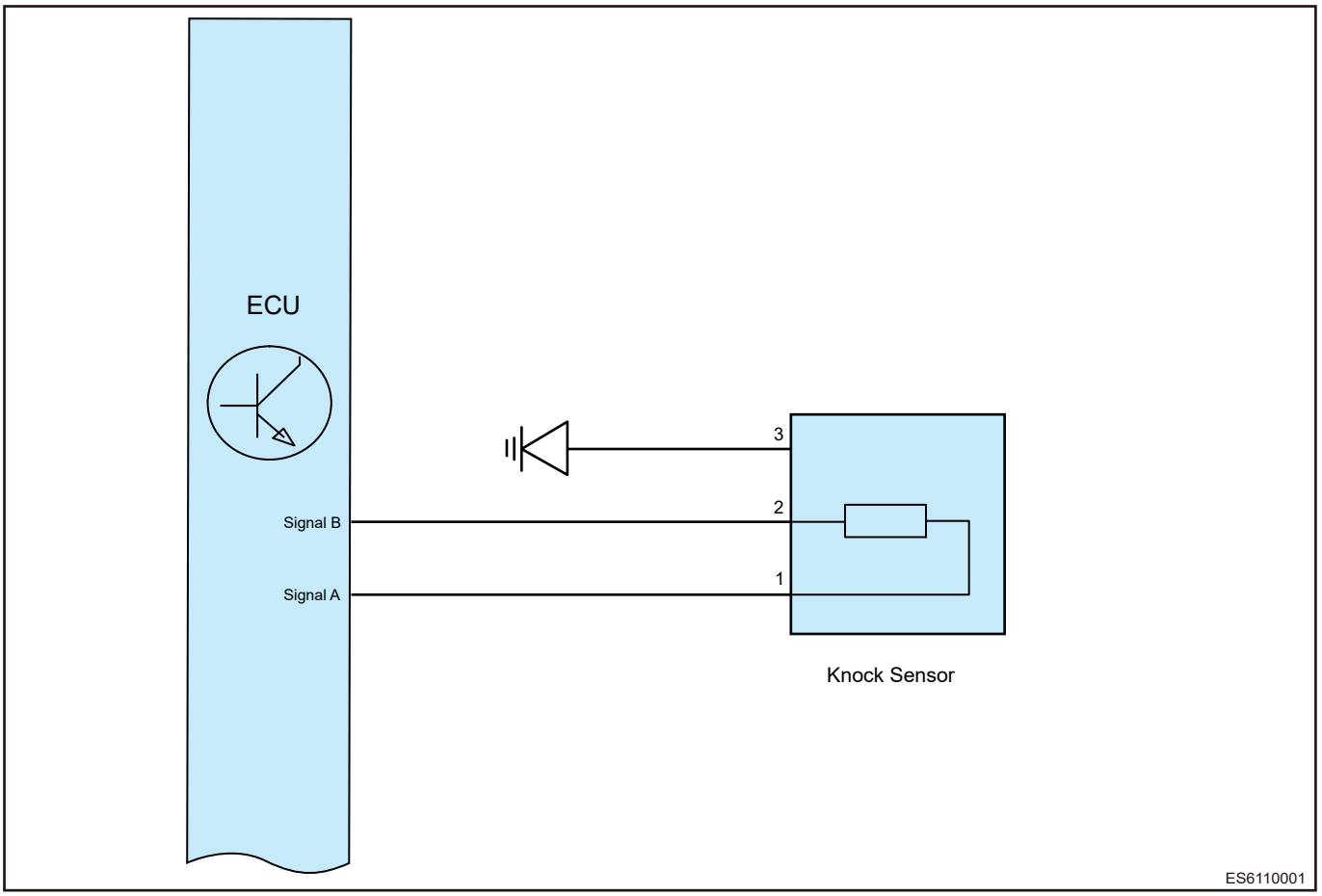
(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired

■ **Knock sensor (terminal A/B) signal short to ground/power supply/voltage too high/too low**

DTC	P032700	Knock Sensor Signal Short to Ground (A)
DTC	P032714	Knock Sensor Signal Short to Ground (B)
DTC	P032800	Knock Sensor Signal Short to Power Supply (A)
DTC	P032815	Knock Sensor Signal Short to Power Supply (B)
DTC	P032500	Knock Sensor Signal Circuit Voltage Too Low
DTC	P151000	Knock Control System Failure
DTC	P032600	Knock/Combustion Vibration Sensor 1 Circuit Bank 1 or Single Sensor

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check knock sensor connector**

(a) Disconnect the negative battery.
(b) Check knock sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check knock sensor condition**

(a) Check if knock sensor is exposed to oil, coolant, water, etc. for a long time; Avoid corrosion to sensor.
(b) Check knock sensor fixing bolts for looseness.

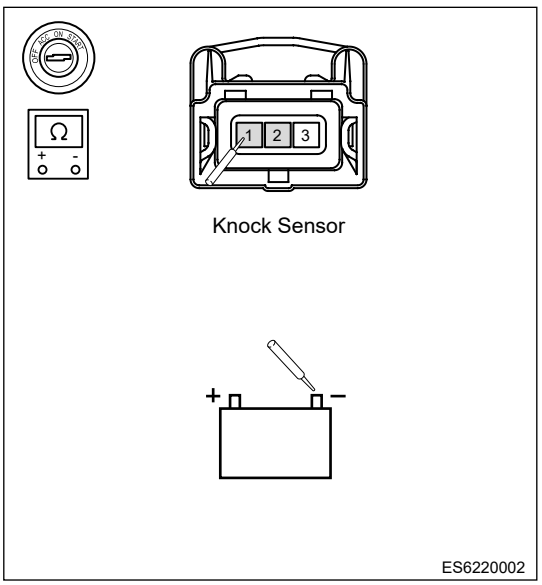
Tightening torque: 20 ± 5 N · m

NG → **Clean and tighten fixing bolts to specified torque**

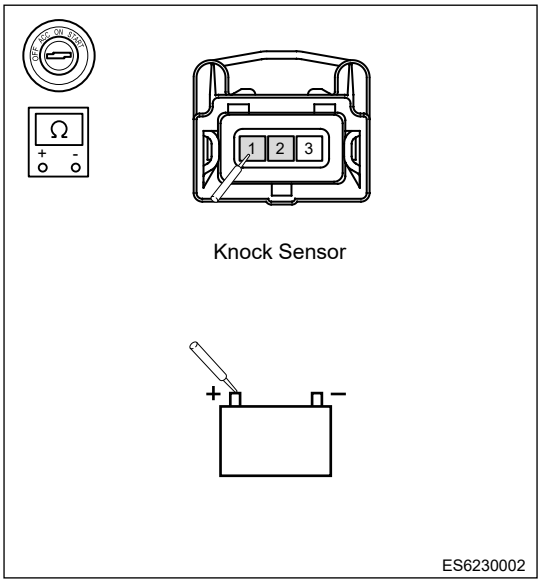
OK

3	**Check for short circuit to ground / power supply in knock sensor circuit**

(a) Disconnect the knock sensor connector.
(b) Disconnect the ECU connector.
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of knock sensor (1, 2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of knock sensor (1, 2) with red probe respectively; Check if circuit is short to power supply.



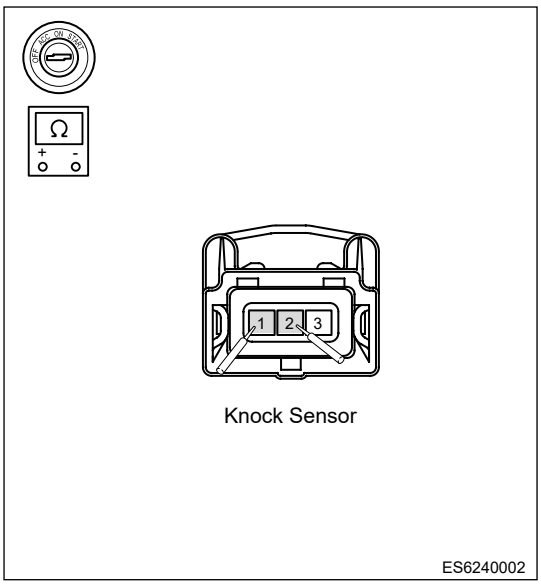
NG → **Check and repair wire harness**

OK

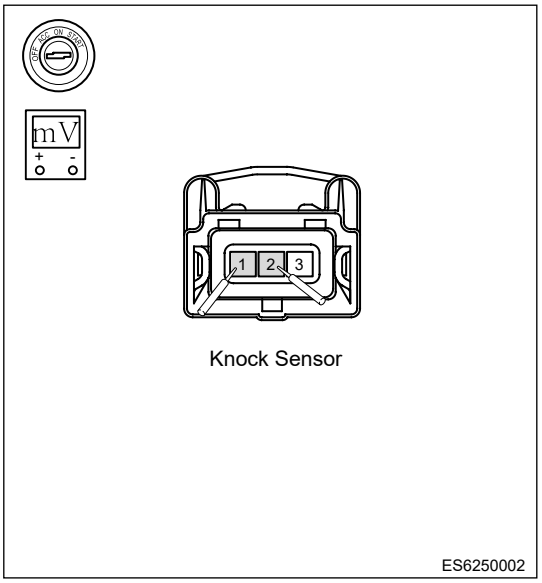
4	**Check knock sensor itself**

(a) Using ohm band of multimeter, measure resistances of knock sensor (1, 2) with red and black probes respectively.

Resistance at ambient temperature should be 4.9 MΩ ± 20%



(b) Using mV band of multimeter, measure voltages of knock sensors (1, 2) with red and black probes respectively; Using a small hammer to tap near knock sensor, there should be a voltage signal output at this time.



Knock Sensor

NG → **Replace knock sensor assembly**

OK →

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG →

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Intake/exhaust camshaft phaser sensor signal improper**

DTC	**P034100**	**Camshaft Position Sensor "A" Circuit Range/Performance Bank 1 or Single Sensor**
DTC	**P036600**	**Exhaust Camshaft Phaser Sensor Signal Improper**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check phaser solenoid valve, valve body bolt components state**

(a) Disconnect the negative battery cable.
(b) Remove intake/exhaust phaser solenoid valve; Check for blockage or dirt.
(c) Remove intake/exhaust phaser valve body bolts; Check for blockage or dirt.

NG → **Clean or replace phaser solenoid valve and valve body bolts**

OK ↓

2	**Check engine maintenance condition**

(a) Check if engine oil level is normal, and check for oil leakage and oil seepage.
(b) Remove valve trim cover, and check engine lubrication and cleaning conditions, and check for wear or sludge dirty.

NG → **Clean and maintain the engine, replace the damaged components**

OK ↓

3	**Check valve mechanism timing**

(a) Check if valve mechanism timing is normal, and check timing chain for teeth skipping, misalignment, elongation, etc.
(b) Check camshaft signal plate for misalignment, looseness, etc.

NG → **Replace timing chain or camshaft assembly**

OK ↓

4	**Check intake/exhaust phaser assembly**

(a) Check if operating condition of cam phase regulator is normal (dirt blocked, oil leaked, stuck, etc.).

NG → **Replace intake/exhaust phaser assembly**

OK

5	Reconfirm DTCs

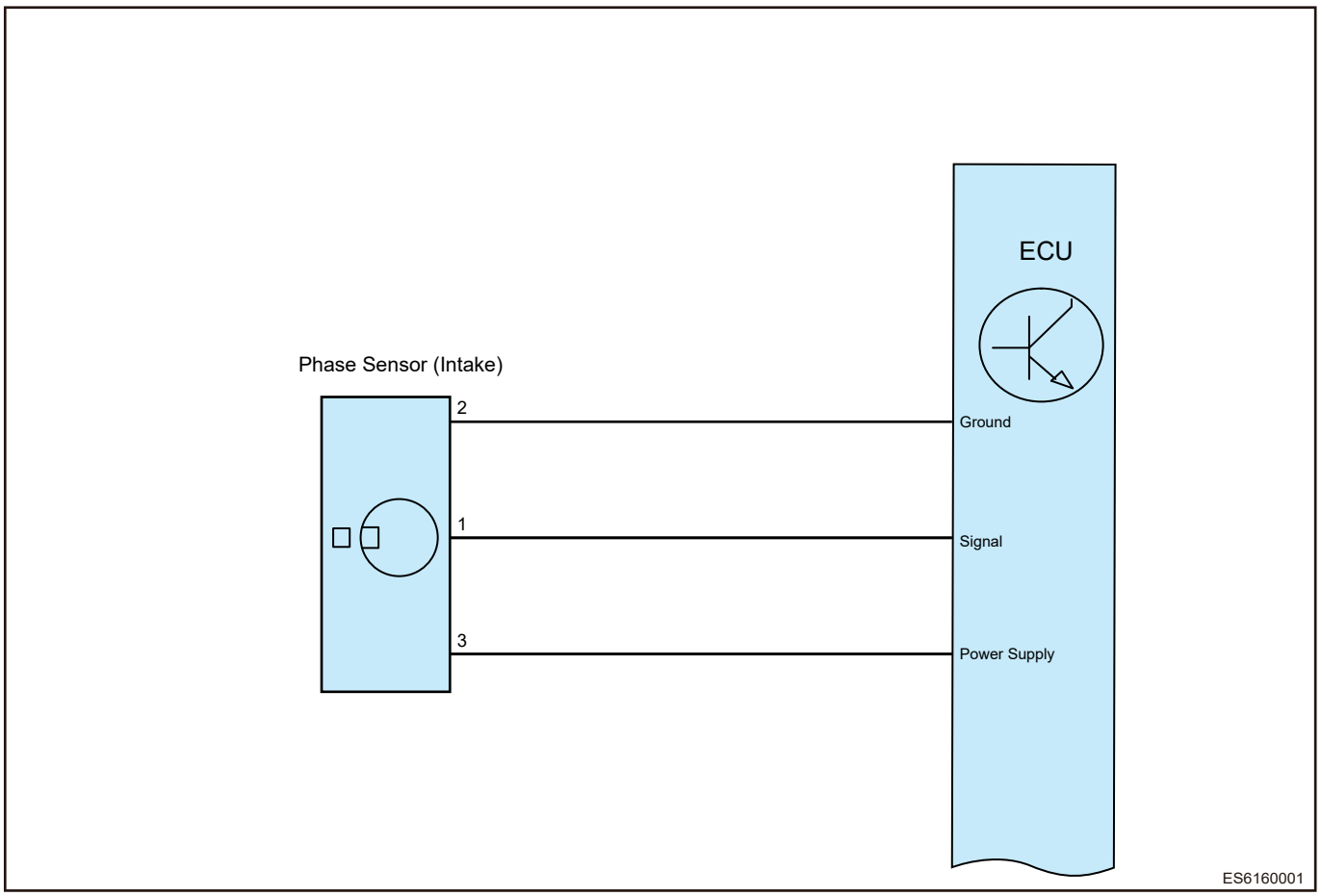
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Exhaust camshaft phase signal circuit voltage low/high**

DTC	**P034200**	**Camshaft Position Sensor "A" Circuit Low Bank 1 or Single Sensor**
DTC	**P034300**	**Camshaft Position Sensor "A" Circuit High Bank 1 or Single Sensor**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check intake camshaft phaser sensor connector**

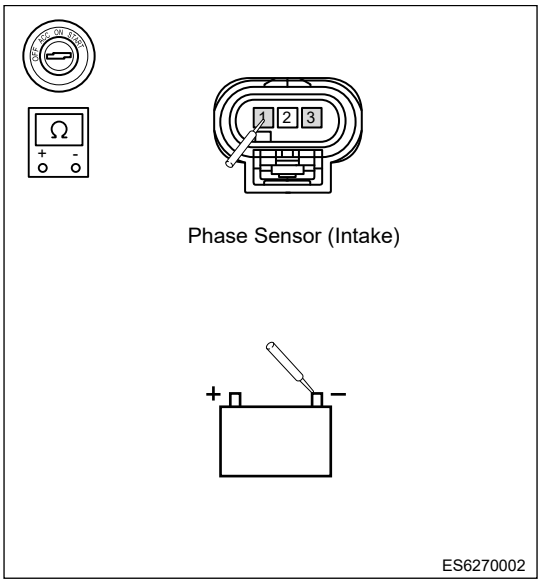
(a) Disconnect the negative battery.
(b) Check intake camshaft phaser sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

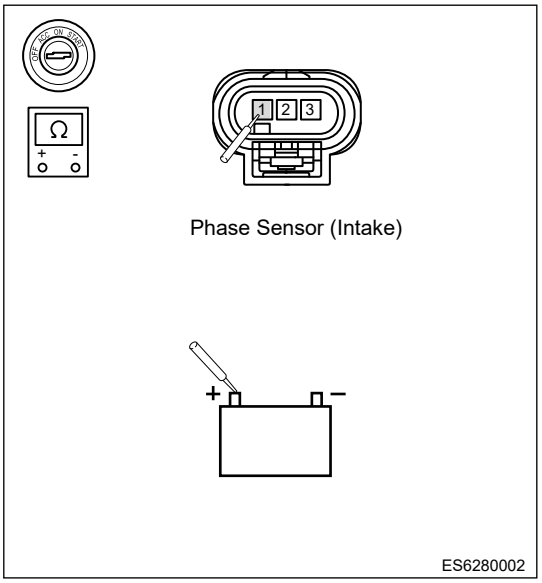
OK

2	**Check for short circuit to ground / power supply in intake camshaft phaser sensor circuit**

(a) Disconnect the intake camshaft phaser sensor connector.
(b) Disconnect the ECU connector.
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of intake camshaft phaser sensor (1, 3) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure intake camshaft phaser sensor (1) with red probe; Check if circuit is short to power supply.



NG → **Check and repair wire harness**

OK

3	**Check intake camshaft phaser sensor circuit**

(a) Connect the intake camshaft phaser sensor connector.

(b) Start the engine.

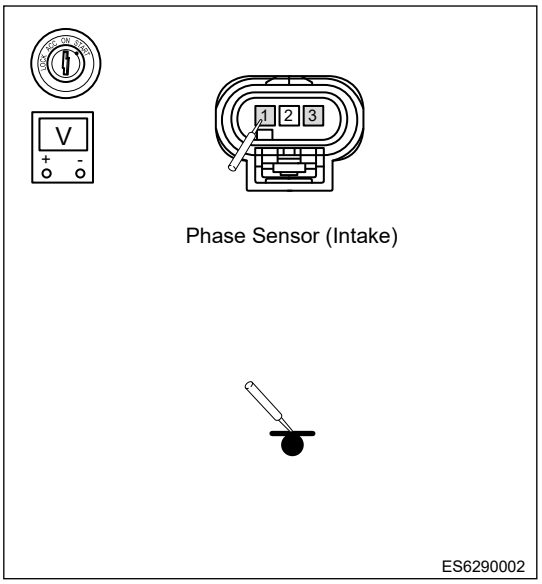
(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of intake camshaft phaser sensors (1, 3) with red probe respectively.

Power supply: 12V

Ground: ＜ 0.2 V

(d) Using the LED test light, connect clip to battery negative terminal, measure intake camshaft phaser sensor (1) with another end.

Under normal conditions, test light should flash.



NG → **Check wire harness or replace intake camshaft phaser sensor assembly**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

5	Reconfirm DTCs

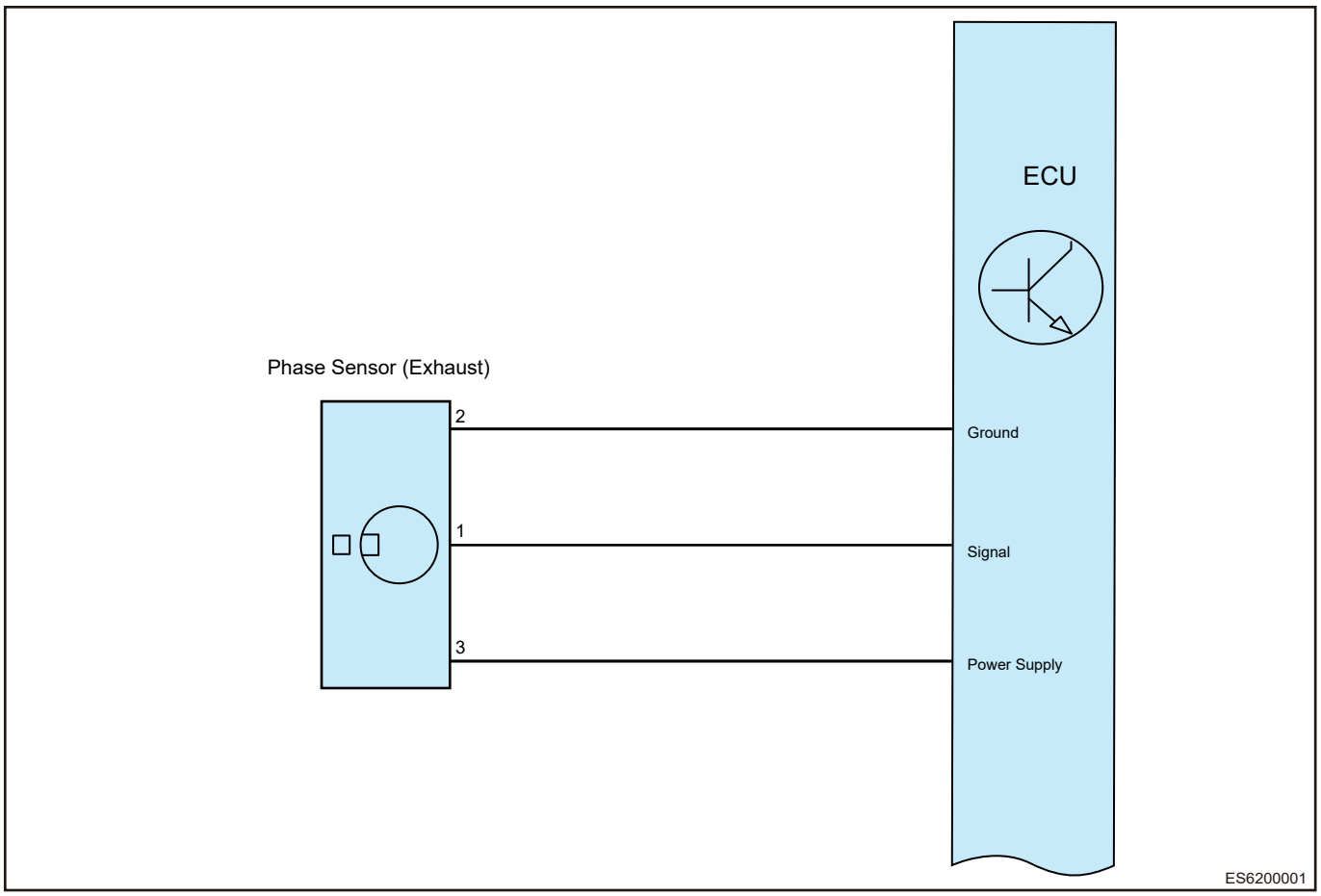
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Exhaust camshaft phaser signal circuit voltage low/high**

DTC	P036700	Camshaft Position Sensor "B" Circuit Low (Bank 1)
DTC	P036800	Camshaft Position Sensor "B" Circuit High (Bank 1)

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check exhaust camshaft phaser sensor connector**

(a) Disconnect the negative battery.
(b) Check exhaust camshaft phaser sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

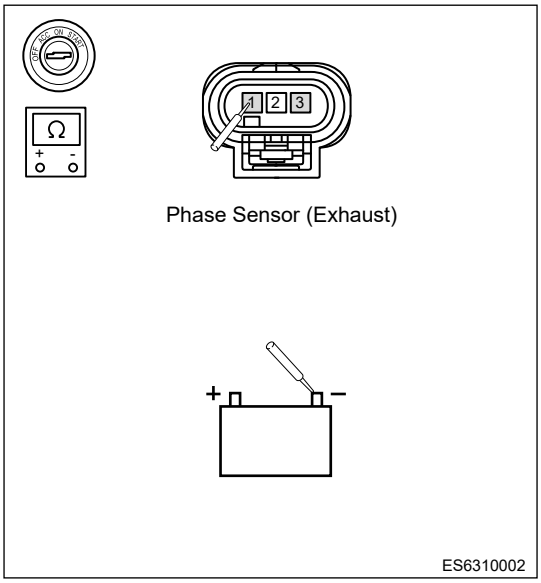
OK

2	**Check for short circuit to ground / power supply in exhaust camshaft phaser sensor circuit**

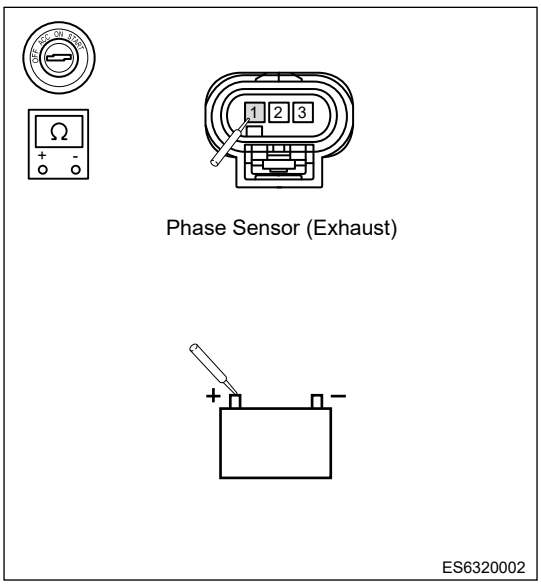
(a) Disconnect the exhaust camshaft phaser sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of exhaust camshaft phaser sensor (1, 3) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure exhaust camshaft phaser sensor (1) with red probe; Check if circuit is short to power supply.



NG	**Check and repair wire harness circuit**

OK

3	**Check exhaust camshaft phaser sensor circuit**

(a) Connect the exhaust camshaft phaser sensor connector.

(b) Start the engine.

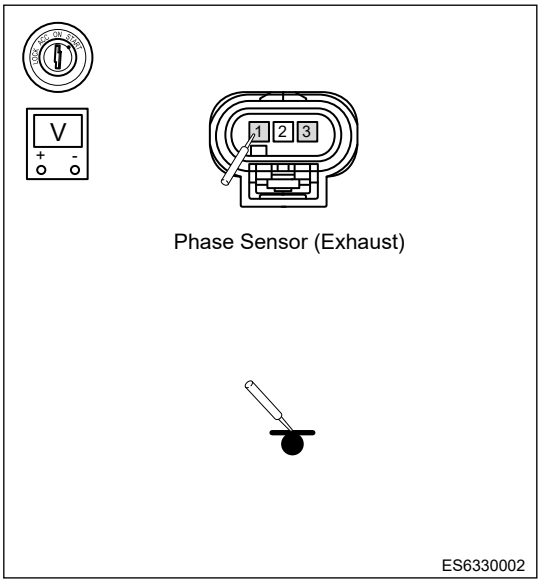
(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of exhaust camshaft phaser sensors (1, 3) with red probe respectively.

Power supply: 12V

Ground: ＜ 0.2 V

(d) Using the LED test light, connect clip to battery negative terminal, measure exhaust camshaft phaser sensor (1) with another end.

Under normal conditions, test light should flash.



NG → **Check wire harness or replace exhaust camshaft phaser sensor assembly**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

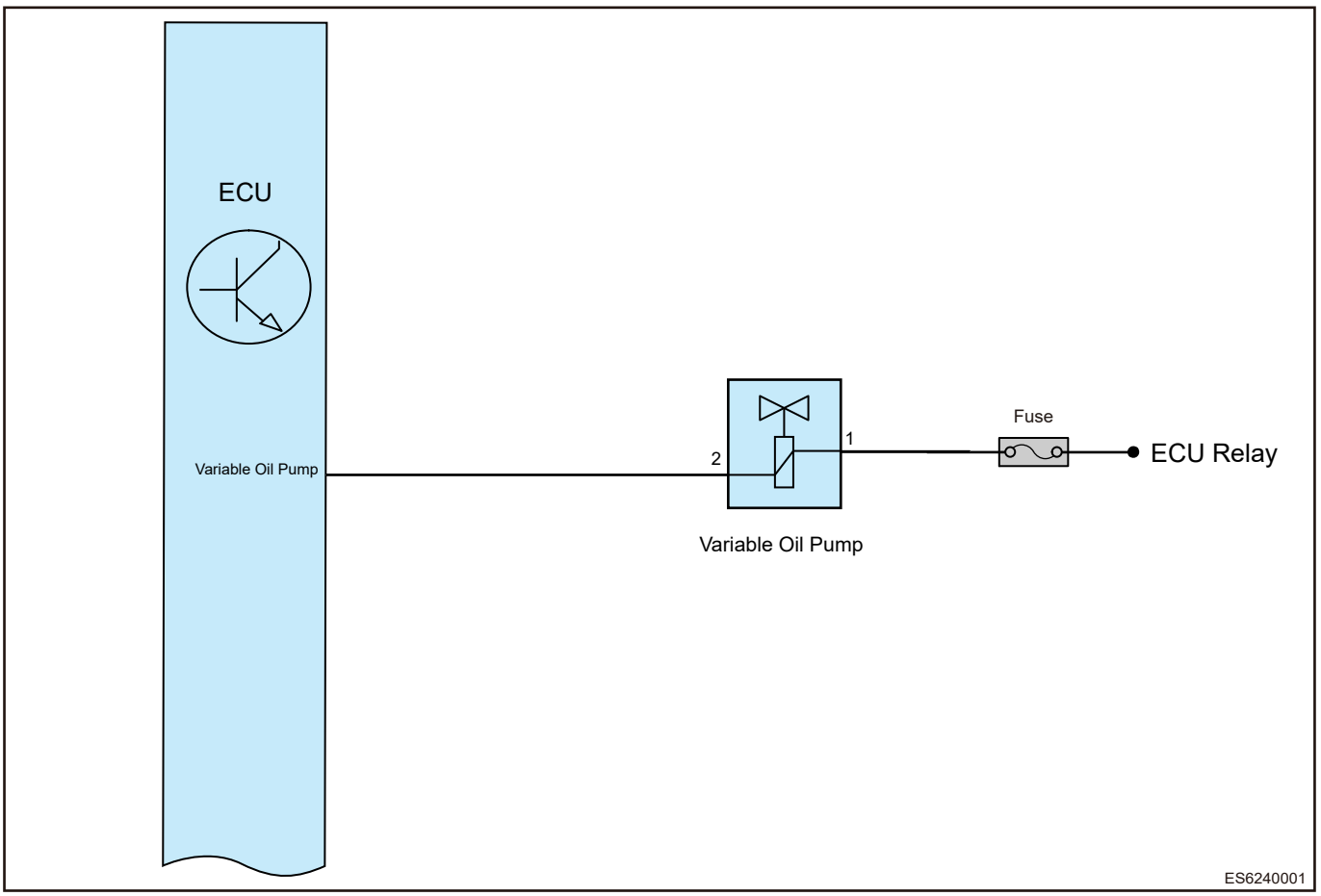
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Secondary oil pump drive circuit open/short to ground/power supply**

DTC	**P06DA00**	**Engine Oil Pressure Control Circuit Open**
DTC	**P06DB00**	**Engine Oil Pressure Control Circuit Low**
DTC	**P06DC00**	**Engine Oil Pressure Control Circuit High**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check variable oil pump connector**

(a) Disconnect the negative battery.
(b) Check variable oil pump connector for looseness or poor contact.

NG	**Repair and adjust connector, or replace it**

OK

2	Check variable oil pump power supply fuse

(a) Check if "variable oil pump power supply" fuse in engine compartment fuse and relay box is damaged.

NG → **Check and repair short circuit malfunction of circuit**

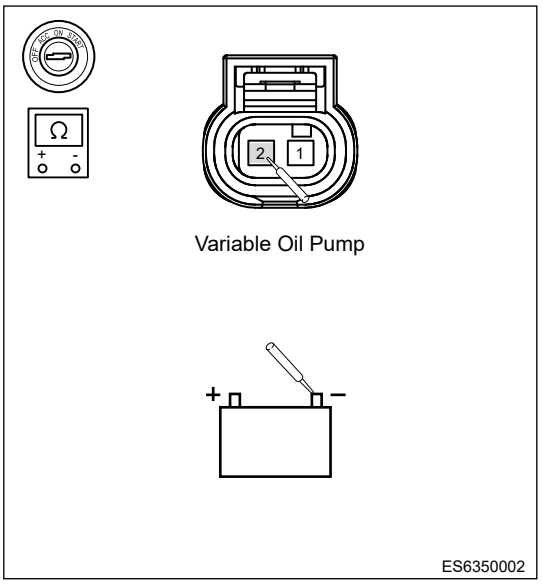
OK

3	Check for short circuit to ground / power supply in variable oil pump circuit

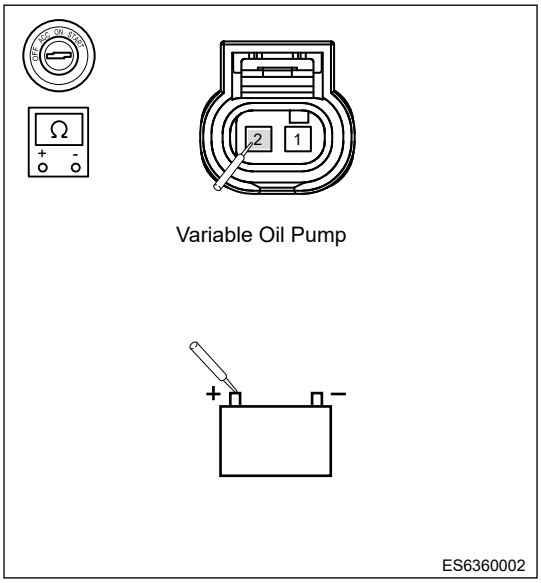
(a) Disconnect the variable oil pump connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of the variable oil pump (2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure the variable oil pump (2) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

4	Check if circuits of variable oil pump themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of variable oil pump (1, 2) with red and black probes respectively; Check if they are short to each other.

NG → **Replace variable oil pump assembly**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired

■ **Catalyst system efficiency below threshold bank 1**

DTC	P042000	Catalyst System Efficiency Below Threshold Bank 1

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check pre-catalytic converter

(a) Check pre-catalytic converter for mechanical damage.
(b) Check pre-catalytic converter for lead intoxication.

NG	Replace pre-catalytic converter assembly

OK

2	Reconfirm DTCs

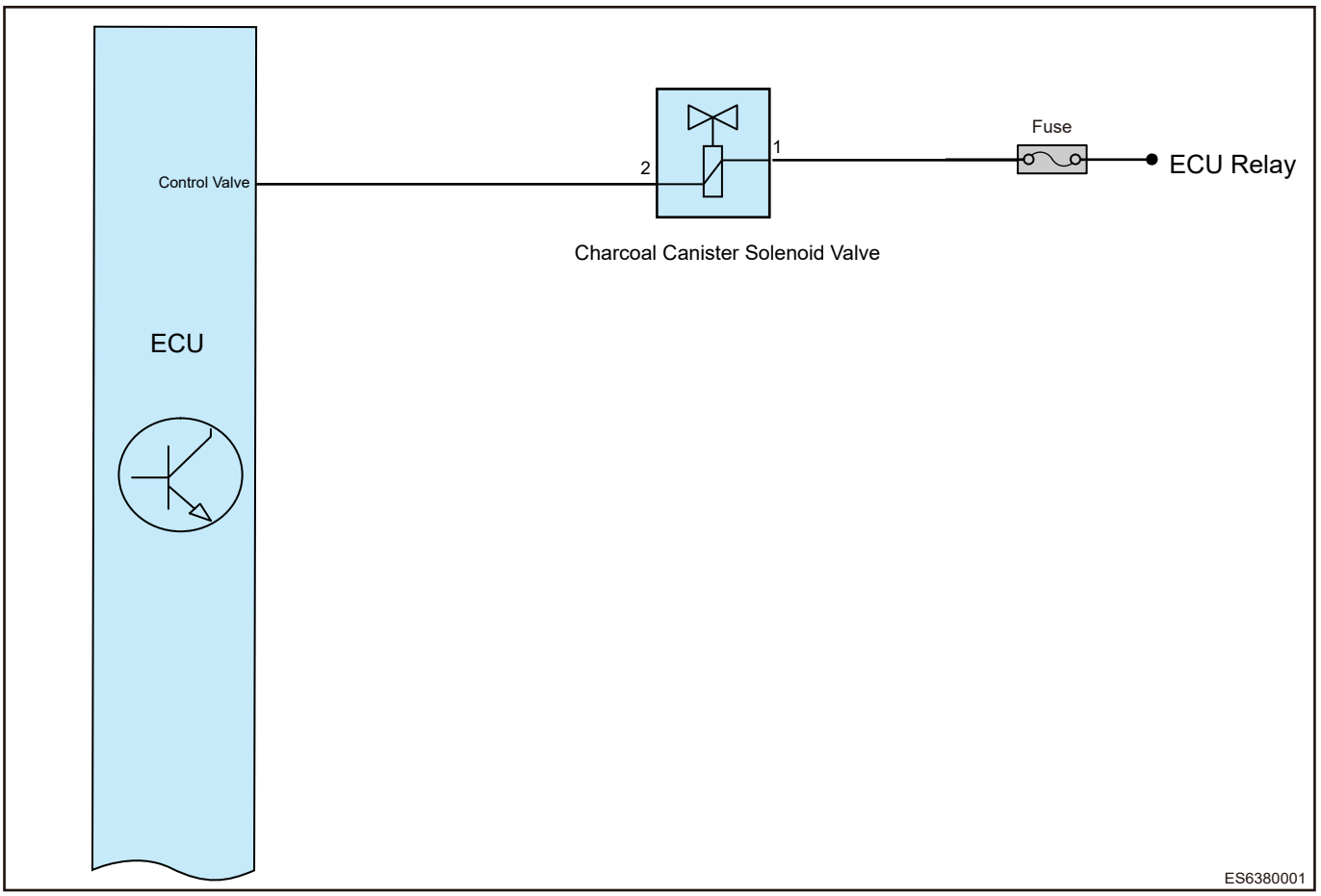
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired

■ **Canister control valve control circuit open/low/high**

DTC	P044413	Evaporative Emission System Purge Control Valve Circuit Open
DTC	P045811	Evaporative Emission System Purge Control Valve Circuit Low
DTC	P045912	Evaporative Emission System Purge Control Valve Circuit High

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check canister solenoid valve connector**

(a) Disconnect the negative battery.
(b) Check canister solenoid valve connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check canister solenoid valve power supply fuse**

(a) Check if canister solenoid valve power supply fuse in engine compartment fuse and relay box is damaged.

NG → **Check and repair short circuit malfunction of circuit**

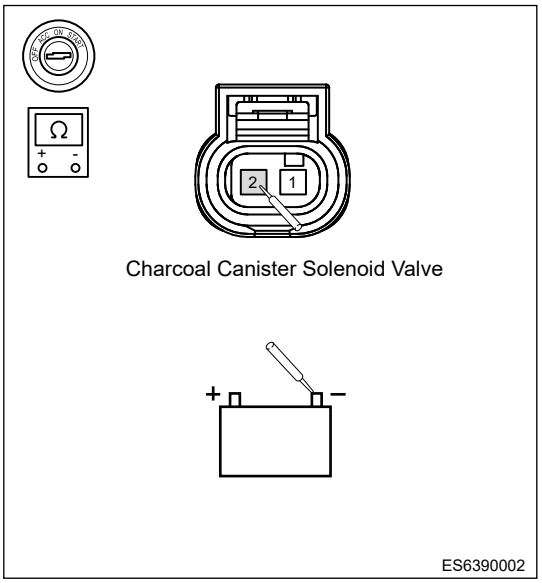
OK

3	**Check for short circuit to ground / power supply in canister solenoid valve circuit**

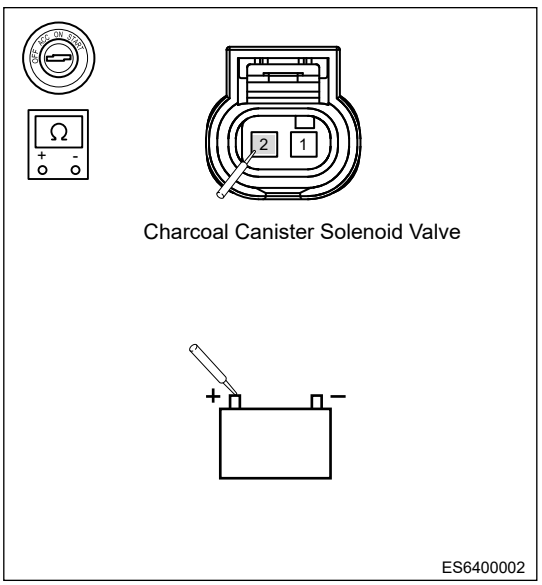
(a) Disconnect the variable oil pump connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of the canister solenoid valve (2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure the canister solenoid valve (2) with red probe respectively; Check if circuit is short to power supply.

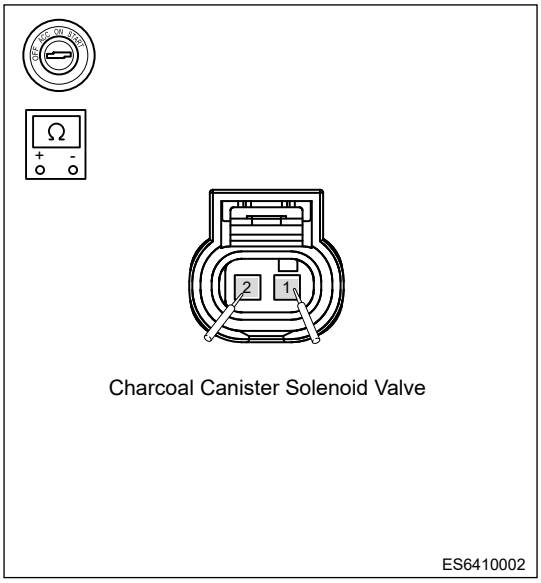


NG → **Check and repair control circuit**

OK

4	Check if circuits of canister solenoid valve themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of canister solenoid valve (1, 2) with red and black probes respectively; Check if they are short to each other.



NG → **Replace canister solenoid valve assembly**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Idling too high/too low**

DTC	**P050600**	**Idle Control System RPM - Lower Than Expected**
DTC	**P050A21**	**Cold Start Idle Control System Performance**
DTC	**P050700**	**Idle Control System RPM - Higher Than Expected**
DTC	**P050500**	**Idle Control System**
DTC	**P050A22**	**Cold Start Idle Control System Performance**
DTC	**P050D00**	**Cold Start Rough Idle**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic throttle connector**

(a) Disconnect the negative battery.
(b) Check electronic throttle connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check electronic throttle condition**

(a) Check if electronic throttle is stuck.
(b) Check if electronic throttle is dirty.

NG → **Clean or replace electronic throttle**

OK

3	**Check intake manifold for air leakage**

(a) Check intake manifold or connecting lines for air leakage.

NG → **Replace parts related to air leakage**

OK

4	Check if fuel pressure too low

(a) Check if low/high pressure fuel pressure is too low.

NG → **Replace parts cause low fuel pressure**

OK

5	Check injector for blockage

(a) Check fuel injector for blockage or leakage.

NG → **Clean or replace fuel injector assembly**

OK

6	Check if exhaust back pressure is too high

(a) Check pre-catalytic converter for blockage.
(b) Check GPF converter for blockage.

NG → **Replace blocked parts or perform regeneration function**

OK

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Battery voltage low malfunction**

DTC	P056200	System Voltage Low

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Check that battery voltage should not be lower than 12 V.

NG → **Recharge or replace battery assembly**

OK

2	**Check generating capacity of alternator**

(a) Check if generating capacity of alternator is normal.
Alternator output voltage: 15V ＞XX ＞ 13.5V

NG → **Replace generator assembly**

OK

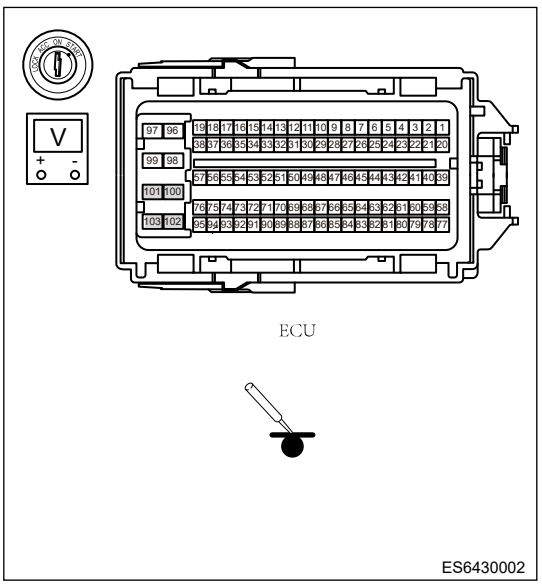
3	**Check ECU power supply circuit**

(a) Disconnect the ECU connector.

(b) Short the main relay switch side with wire harness.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltage of ECU (-connected terminal) with red probe respectively.

(d) Or use test light to measure ECU (corresponding terminal); Test light should be bright.



(e) Connect the ECU connector.
(f) Using voltage band of multimeter, connect black probe to engine compartment fuse and relay box (1), measure ECU (-connected terminal) with red probe respectively; Check if circuit voltage drop value is too large.

NG → **Check and repair control circuit**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ System battery voltage too high

DTC	P056300	System Voltage High

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check generating capacity of alternator

(a) Check if generating capacity of alternator is normal.

Alternator output voltage: 15V ＞XX ＞ 13.5V

NG → **Replace generator assembly**

OK ↓

2	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG ↓

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ Starter relay control terminal circuit low/high

DTC	P061500	Starter Relay "A" Circuit
DTC	P061600	Starter Relay “A” High Circuit Low
DTC	P061700	Starter Relay “A” Circuit High

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check starter relay coil terminal power supply fuse

(a) Check if starter relay coil terminal power supply fuse in engine compartment fuse and relay box is blown.

NG → **Check and repair short circuit malfunction of circuit**

OK

2	**Check starter relay**

(a) Replace the starter relay.

NG → **Replace starter relay**

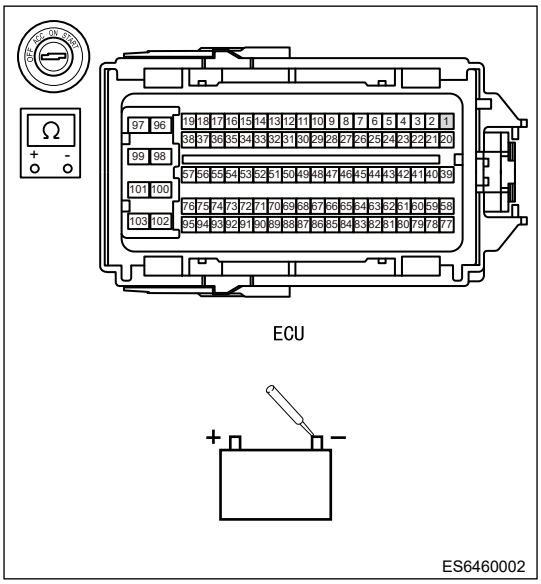
OK

3	**Check for short circuit to ground / power supply in ECU control circuit**

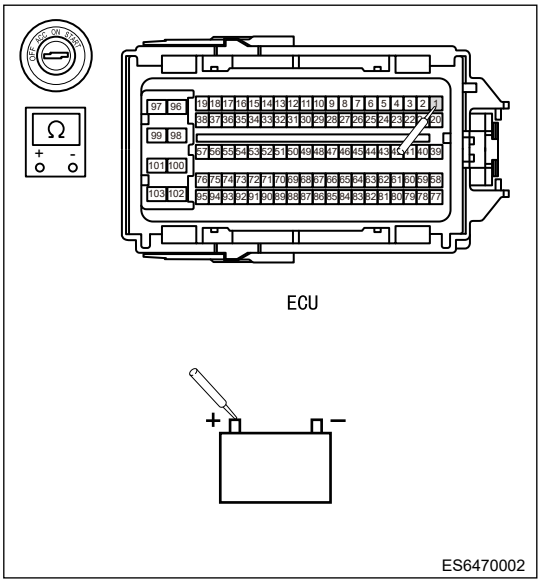
(a) Disconnect the engine compartment fuse and relay box connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of ECU (starter relay control terminal) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure ECU (starter relay control terminal) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

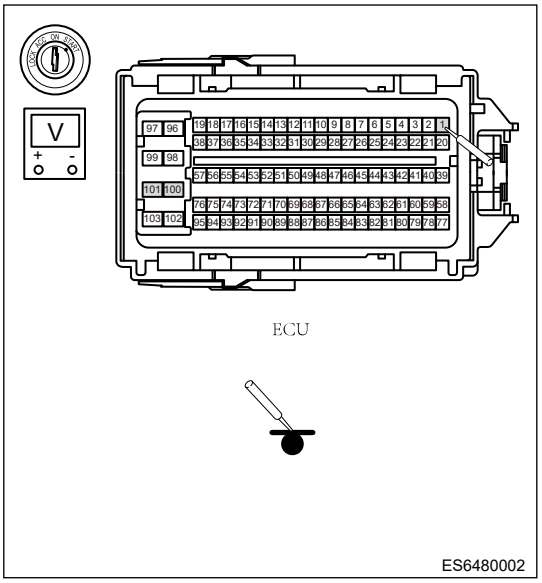
4	**Check ECU control circuit**

(a) Connect the engine compartment fuse and relay box connector.

(b) Short the main relay switch side with wire harness.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltage of ECU (starter relay control terminal) with red probe respectively.

(d) Or use test light to measure ECU (starter relay control terminal); Test light should come on.



NG → **Check and repair control circuit**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

6	Reconfirm DTCs

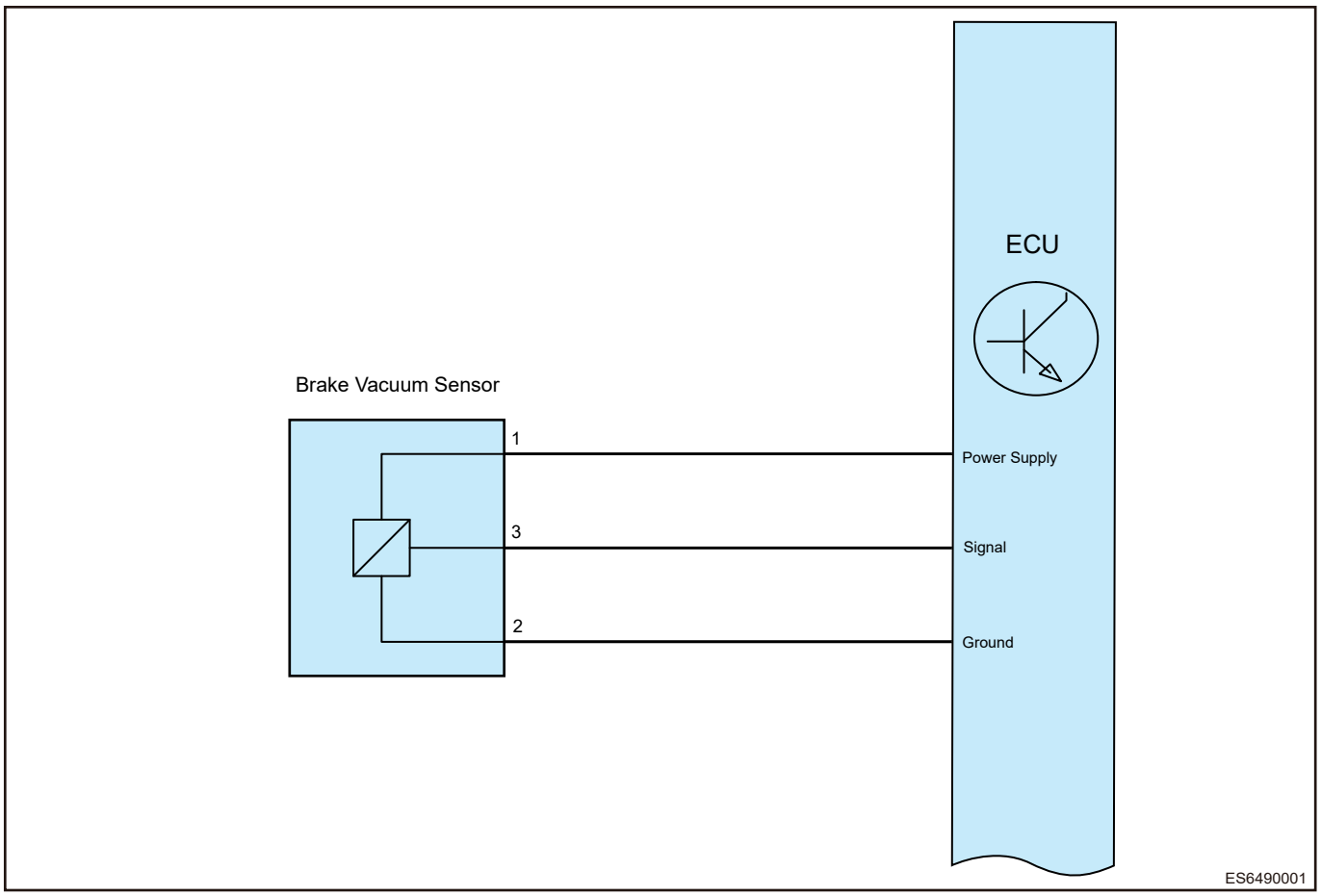
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Brake chamber vacuum pressure sensor voltage high/low**

DTC	P055800	Brake Booster Pressure Sensor Circuit High
DTC	P055700	Brake Booster Pressure Sensor Circuit Low
DTC	P145000	Brake Booster Pressure Sensor Circuit Range/Performance (High)
DTC	P145100	Brake Booster Pressure Sensor Circuit Range/Performance (Low)

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check vacuum pressure sensor connector**

(a) Disconnect the negative battery.
(b) Check vacuum pressure sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check brake vacuum booster system for damage or air leakage**

(a) Check brake vacuum booster system each line for damage, or connecting pipe port for air leakage; Vacuum pump for abnormal operation, etc.

NG → **Repair or replace damaged parts related to brake booster system**

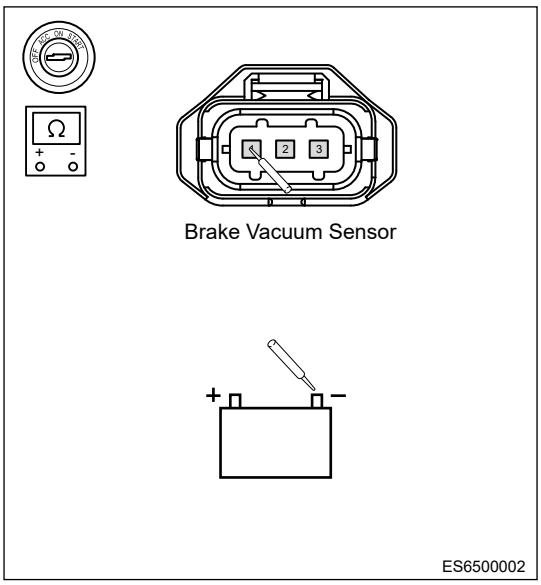
OK →

3	**Check for short circuit to ground / power supply in vacuum pressure sensor**

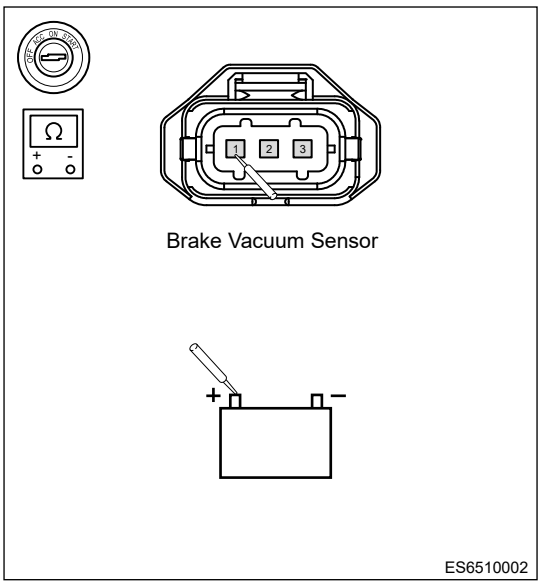
(a) Disconnect the vacuum pressure sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of vacuum pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of vacuum pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair wire harness**

OK

4	Check vacuum pressure sensor voltage signal

(a) Connect vacuum pressure sensor and ECU connectors.

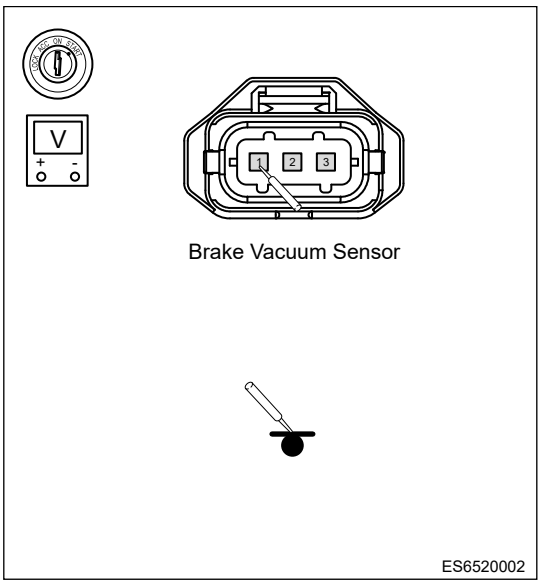
(b) Turn ENGINE START STOP switch to ON.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, measure voltage of vacuum pressure sensor (1, 2, 3) with red probe respectively.

Power supply: 5 V

Ground: ＜ 0.2 V

Depress brake pedal consecutively; Signal voltage should vary in accordance with pressure.



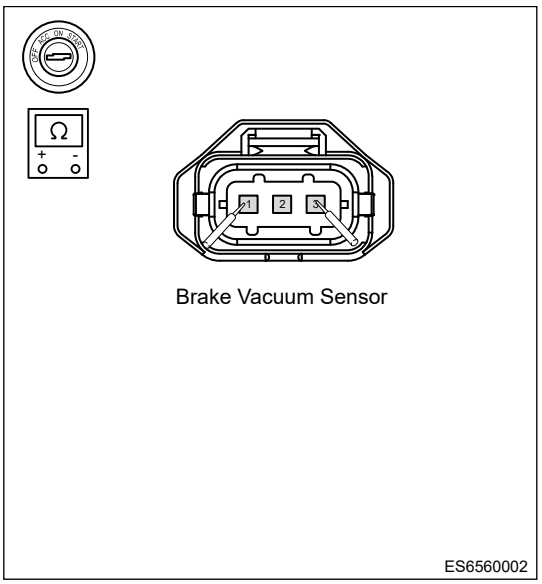
NG → **Check and repair wire harness, or replace vacuum pressure sensor**

OK

5	Check vacuum pressure sensor itself

(a) Using ohm band of multimeter, measure resistances of vacuum pressure sensor (1, 3) and (1, 2) with red and black probes respectively; Check if internal circuits are short to each other.

Resistance at ambient temperature: 1 KΩ ~ 2 KΩ



NG → Replace vacuum pressure sensor assembly

OK

6	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ A/C pressure sensor voltage high/low malfunction

DTC	P053200	A/C Pressure Sensor Circuit Voltage Too Low
DTC	P053300	A/C Pressure Sensor Circuit Voltage Too High

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check A/C pressure sensor connector

(a) Disconnect the negative battery.
(b) Check A/C pressure sensor connector for looseness or poor contact.

NG → Repair and adjust connector, or replace it

OK

2	Check for short circuit to ground/power supply in A/C pressure sensor

(a) Disconnect the A/C pressure sensor connector.
(b) Disconnect the ECU connector.
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of A/C pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to ground.

(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of A/C pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to power supply.

NG → **Check and repair wire harness**

OK

3	Check A/C pressure sensor itself

(a) Using ohm band of multimeter, measure resistances of A/C pressure sensor (1, 3) and (1, 2) with red and black probes respectively; Check if internal circuits are short to each other.

NG → **Replace A/C pressure sensor assembly**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**

■ **A/C compressor circuit voltage too low/too high**

DTC	**P064500**	**A/C Compressor Relay Control Circuit**
DTC	**P064600**	**A/C Compressor Relay Control Circuit Low**
DTC	**P064700**	**A/C Compressor Relay Control Circuit High**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check A/C compressor relay coil terminal power supply fuse**

(a) Check if fuse of engine compartment fuse and relay box "A/C compressor relay power supply" is blown.

NG	**Check and repair short circuit malfunction of circuit**

OK

2	**Check A/C compressor relay**

(a) Replace A/C compressor relay.

NG	**Replace A/C compressor relay**

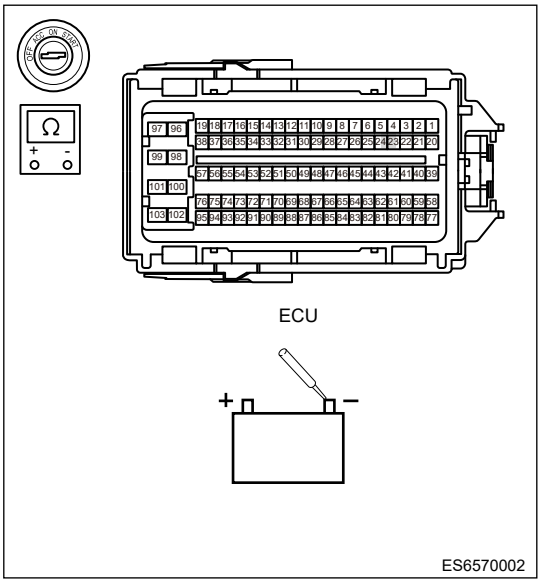
OK

3	**Check for short circuit to ground / power supply in ECU control circuit**

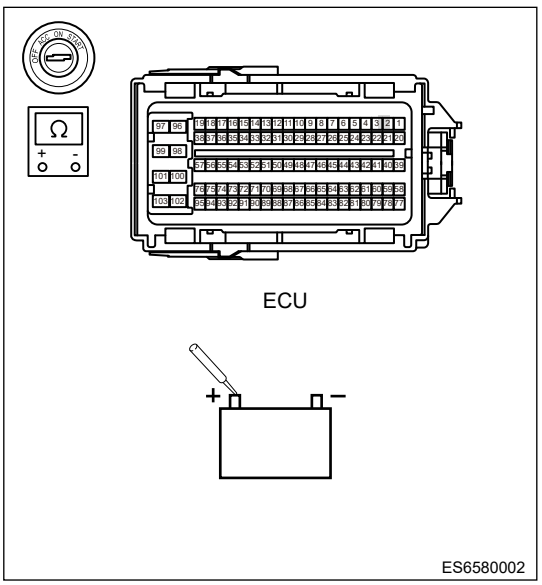
(a) Unplug the A/C compressor relay.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of ECU (A/C compressor relay controller terminal) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure ECU (A/C compressor relay controller terminal) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

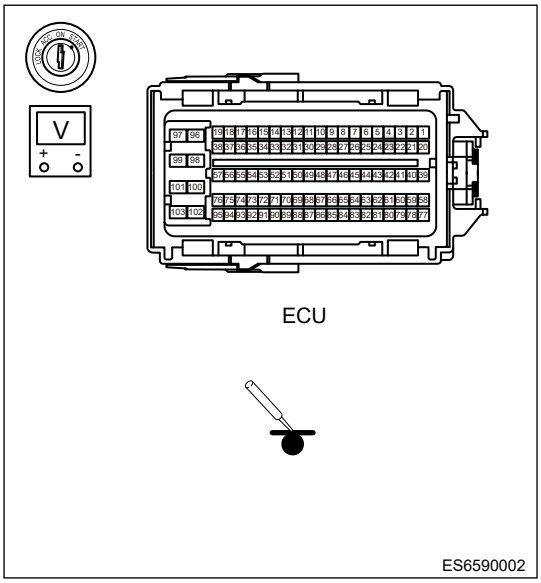
4	**Check ECU control circuit**

(a) Connect the A/C compressor relay.

(b) Short the main relay switch side with wire harness.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltage of ECU (A/C compressor relay controller terminal) with red probe respectively.

(d) Or use test light to measure ECU (A/C compressor relay controller terminal); Test light should come on.



NG	**Check and repair control circuit**

OK

5	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK	**Repair or replace new module**

NG

6	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

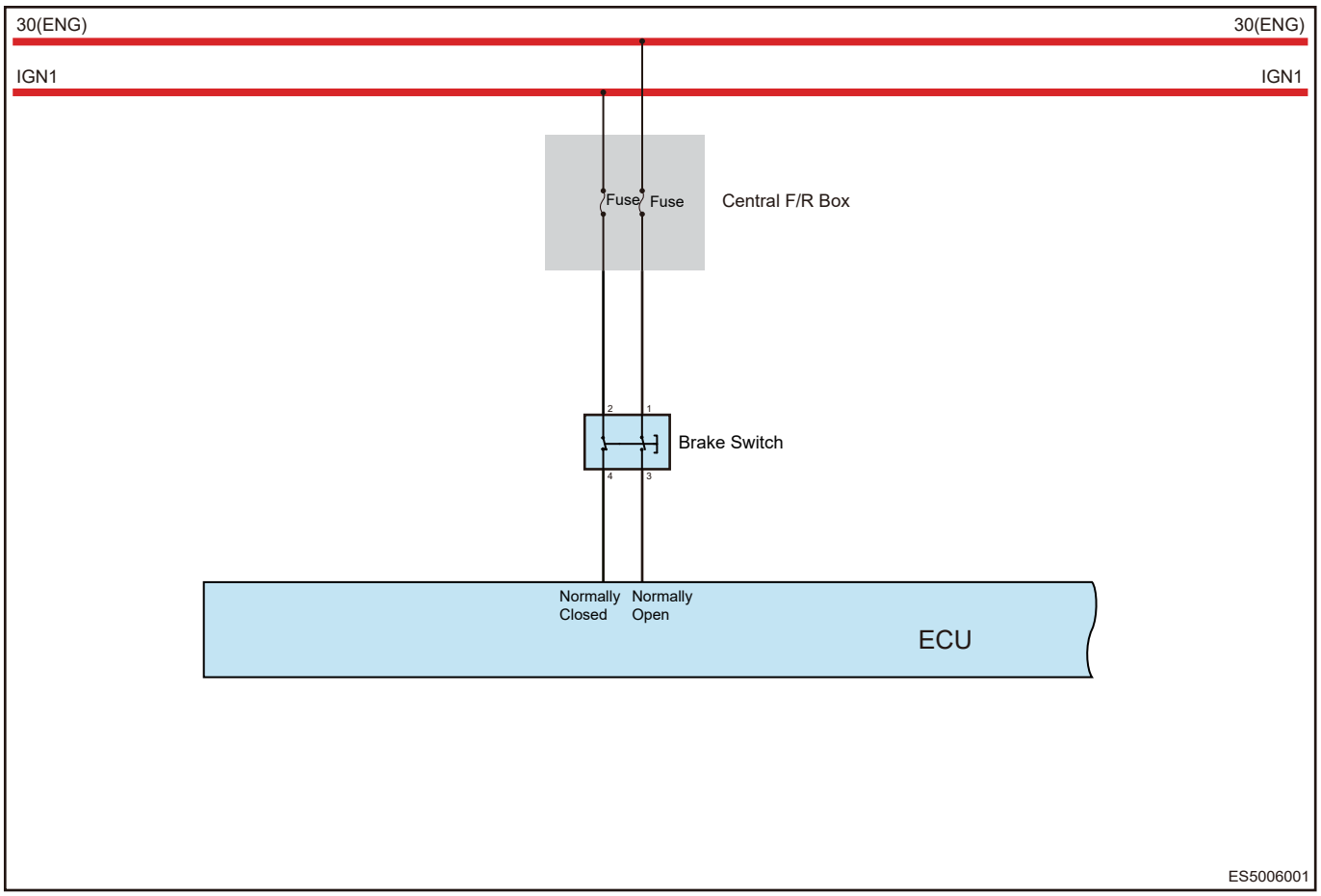
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**

DTC	P057100	Brake Signal Synchronization Error

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if “brake switch” fuse of center fuse and relay box is blown or no power.

NG → **Replace fuse or check the cause for no power**

OK

2	**Check brake switch connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Check connector for bad contact, bending, distortion, poor contact, etc.

NG → **Repair or replace connector**

OK

3	Check mechanical structure of brake pedal

(a) Check if mechanical structure of brake pedal is abnormal.

NG → **Repair or replace faulty components as needed**

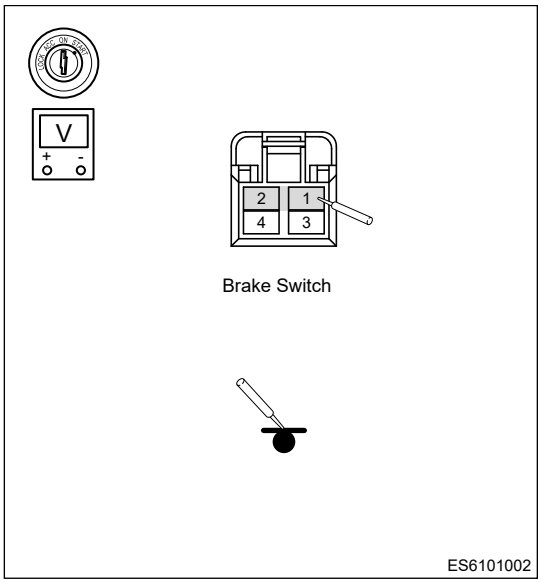
OK

4	Check brake switch power supply circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Check voltage

Multimeter Connection	Condition	Specified Condition
Brake switch (1) - Body ground	ENGINE START STOP switch ON	12 V
Brake switch (2) - Body ground	ENGINE START STOP switch ON	12 V



NG → **Repair open in brake switch power supply circuit**

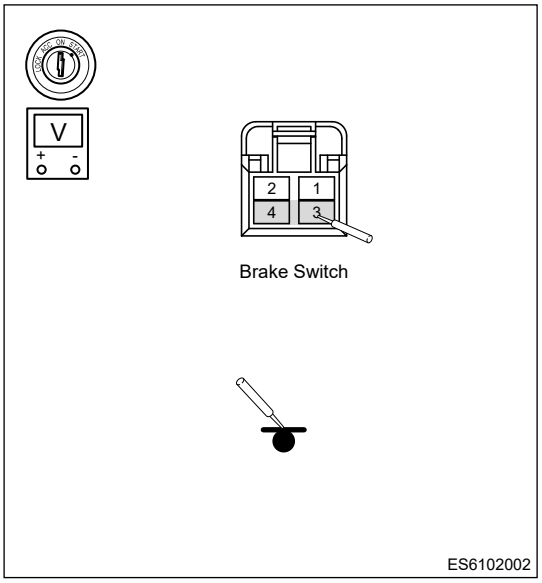
OK

5	Check voltage of brake switch signal circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Check voltage

Multimeter Connection	Condition	Specified Condition
Brake switch (3) - Body ground	ENGINE START STOP switch ON	0 V
Brake switch (4) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair short to power supply in brake switch signal circuit**

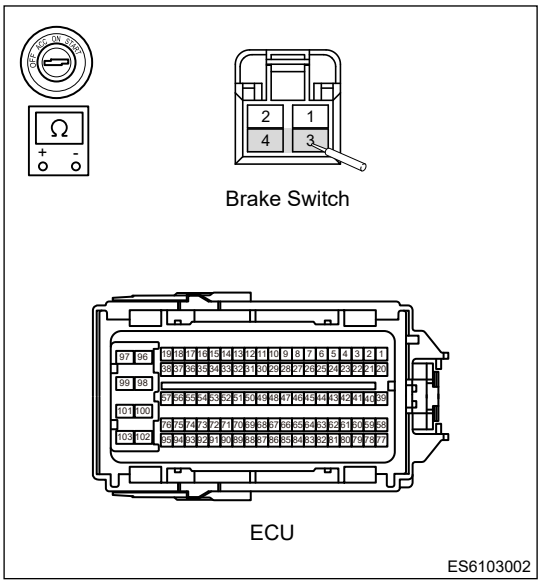
OK

6	Check circuit resistance of brake switch signal

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection

Multimeter Connection	Condition	Specified Condition
Brake switch (3) - ECU (- corresponding terminal)	Always	< 1 Ω
Brake switch (4) - ECU (- corresponding terminal)	Always	< 1 Ω



NG → **Repair open in brake switch signal circuit**

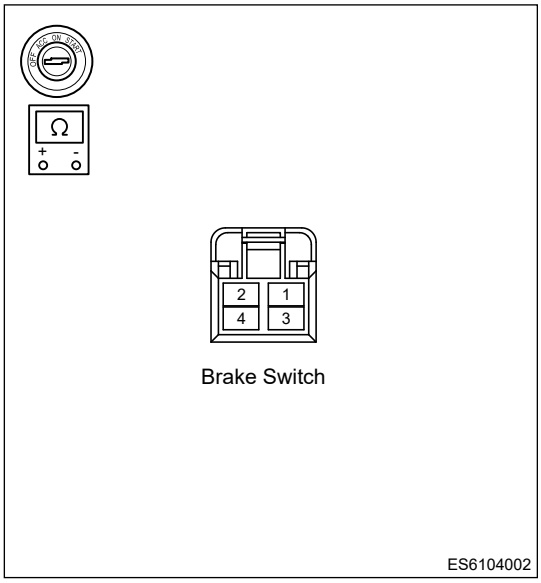
OK

7	Check brake switch

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect brake switch connector and check resistance.

Multimeter Connection	Condition	Specified Condition
Brake switch pin 1 - Brake switch pin 3	Not depressed	∞
	Depressed	< 1 Ω
Brake switch pin 2 - Brake switch pin 4	Not depressed	< 1 Ω
	Depressed	∞



NG → **Replace brake switch**

OK

8	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

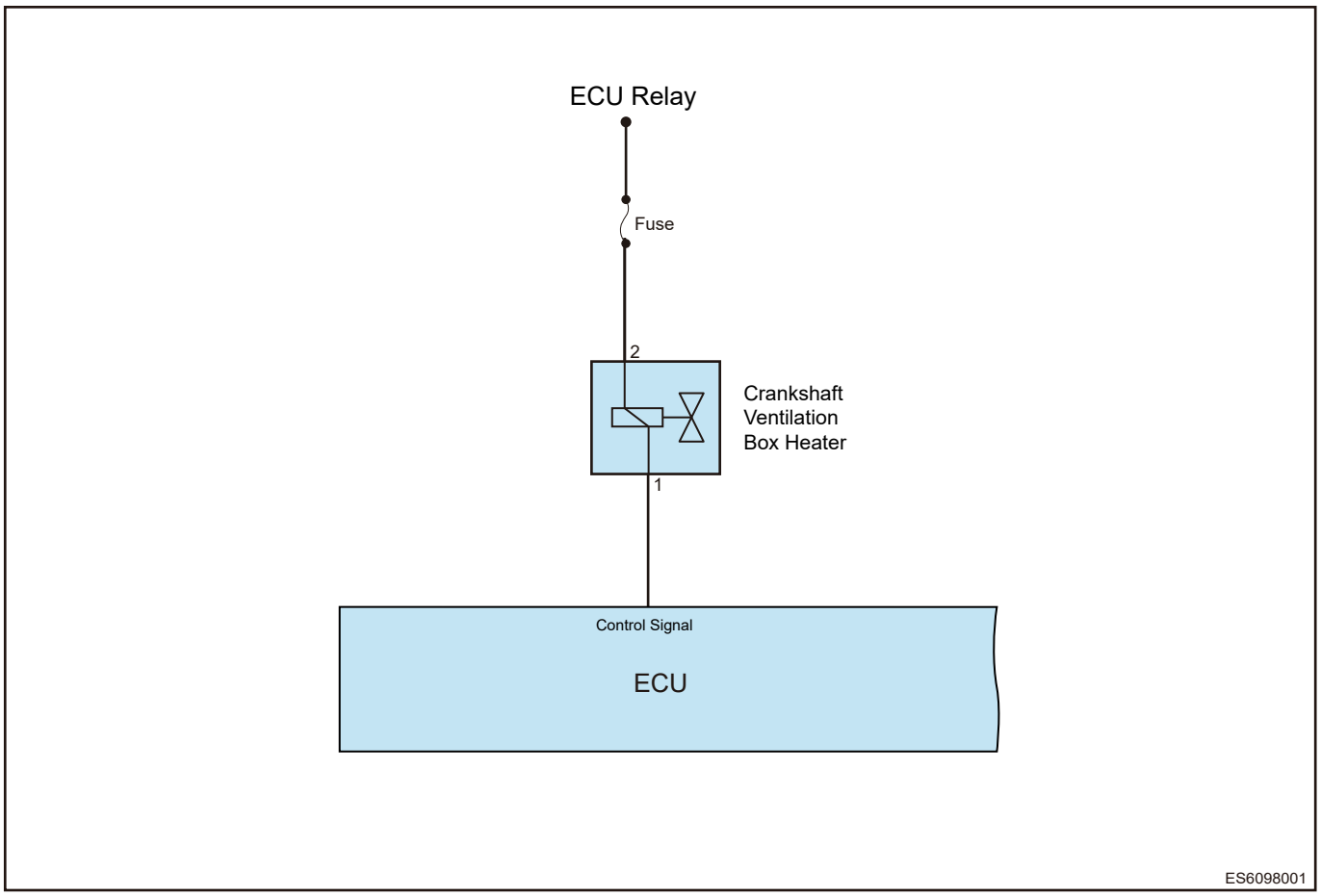
NG → **Replace Engine Control Module**

OK → **Conduct test and confirm malfunction has been repaired**

■ **Crankcase heating line circuit voltage too low/too high**

DTC	**P053B00**	**Crankcase Heating Line Circuit Voltage Too Low**
DTC	**P053C00**	**Crankcase Heating Line Circuit Voltage Too High**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check crankcase heater connector**

(a) Disconnect the negative battery.
(b) Check crankcase heater connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check crankcase heater power supply fuse**

(a) Check if "crankcase heater" fuse in engine compartment fuse relay box is blown.

NG → **Check and repair short circuit malfunction of circuit**

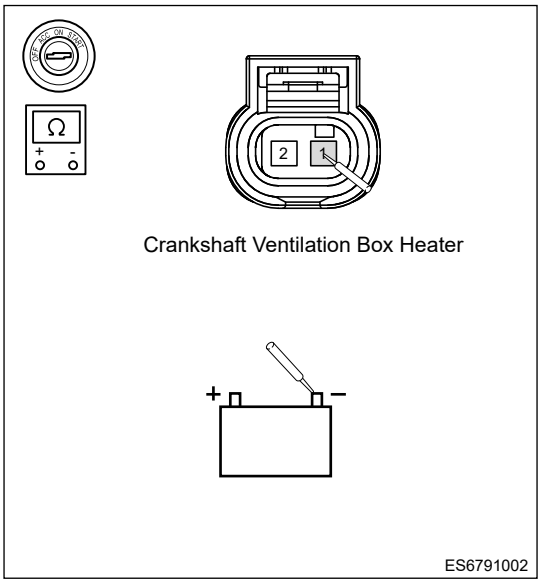
OK

3	**Check for short to ground/power supply in crankcase heater circuit**

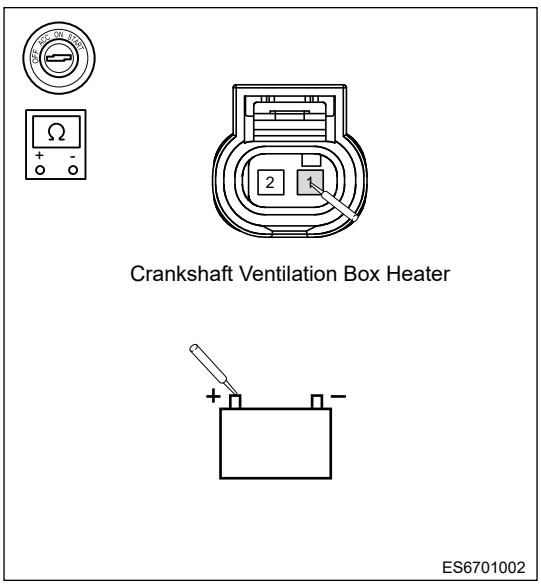
(a) Disconnect the intake phaser solenoid valve connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, measure resistances of crankcase heater (1) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, measure resistances of crankcase heater (1) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

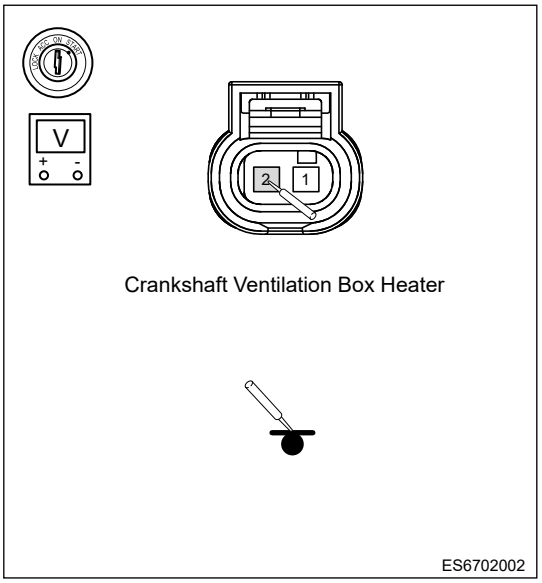
4	Check crankcase heater control Circuit

(a) Connect crankcase heater connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, measure crankcase heater (2) voltage with red probe.

(d) Or use test light to measure crankcase heater (2); Test light should come on.



NG → **Check and repair control circuit**

OK

5	Check if circuits of crankcase heater themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of crankcase heater (1, 2) with red and black probes respectively; Check if they are short to each other.

NG → **Replace crankcase heater**

OK

6	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

7	Reconfirm DTCs

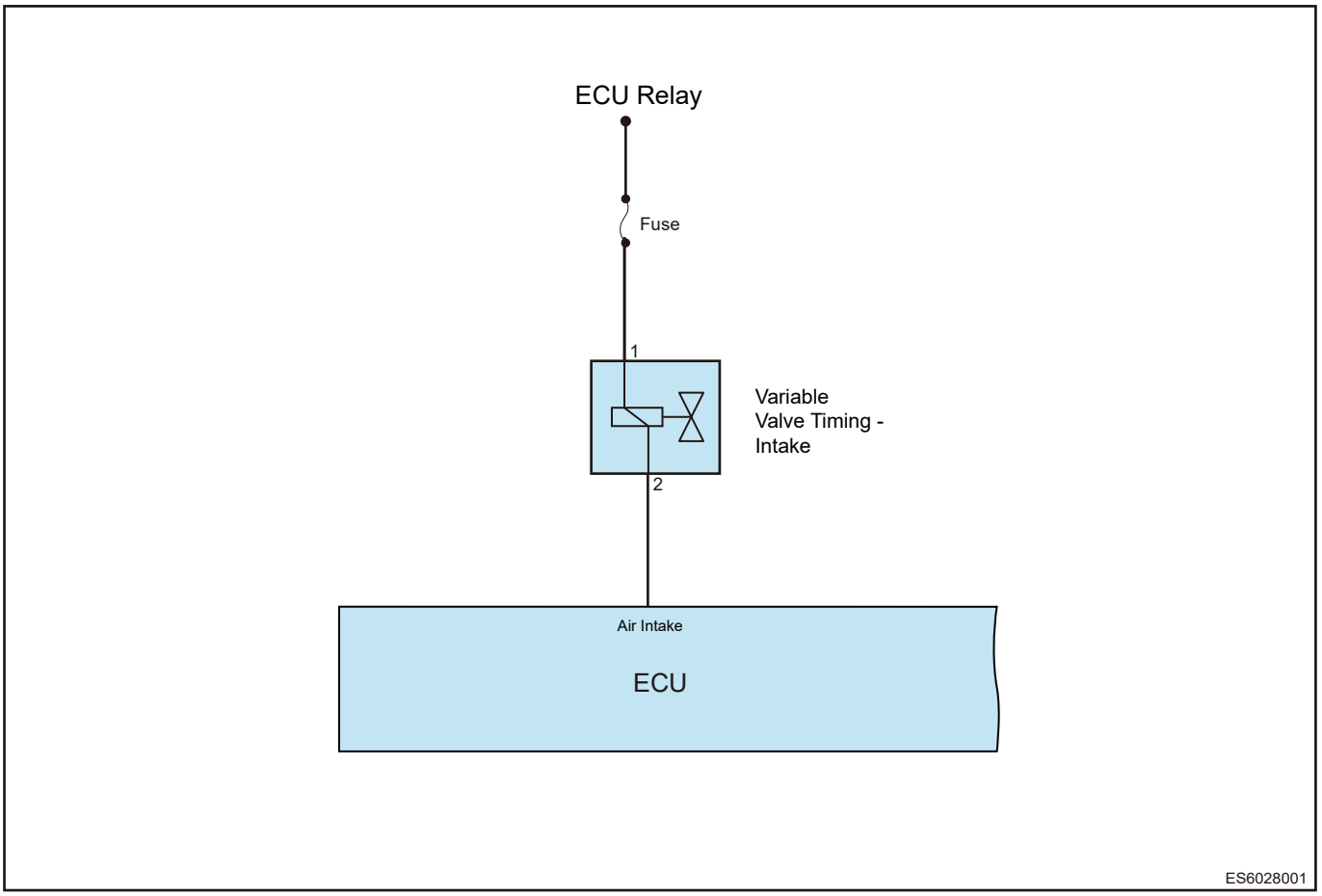
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**

■ Intake VVT control circuit voltage too low/too high

DTC	**P208800**	**"A" Camshaft Position Actuator Control Circuit Low Bank 1**
DTC	**P208900**	**"A" Camshaft Position Actuator Control Circuit High Bank 1**

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check intake phaser solenoid valve connector**

(a) Disconnect the negative battery.
(b) Check intake phaser solenoid valve connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check intake phaser solenoid valve power supply fuse**

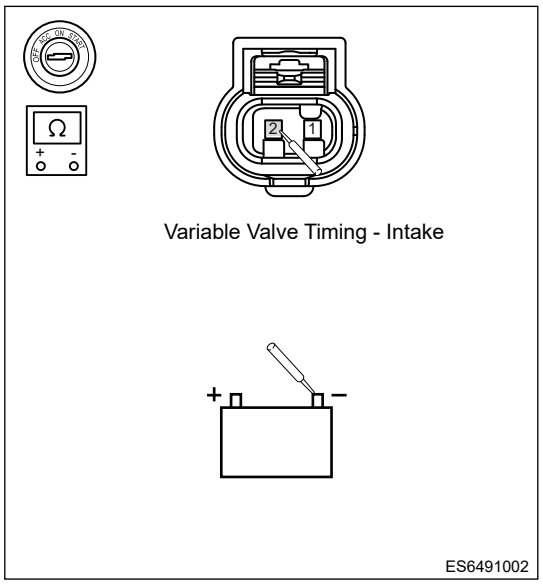
(a) Check if "intake phaser solenoid valve power supply" fuse in engine compartment fuse and relay box is blown.

NG → **Check and repair short circuit malfunction of circuit**

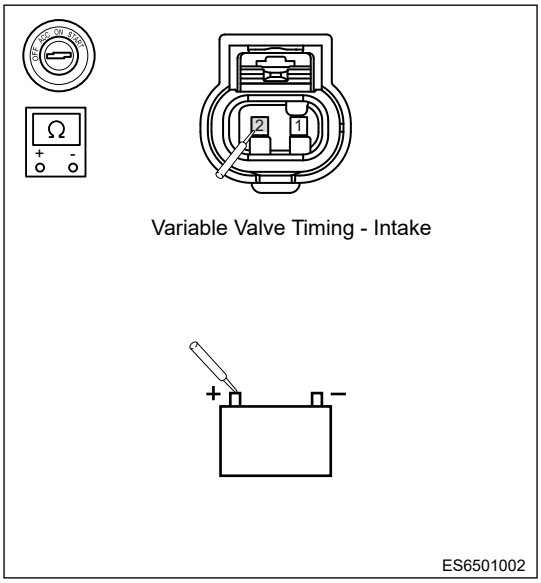
OK

3	**Check for short circuit to ground / power supply in intake phaser solenoid valve circuit**

(a) Disconnect the intake phaser solenoid valve connector.
(b) Disconnect the ECU connector.
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of intake phaser solenoid valve (2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of intake phaser solenoid valve (2) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

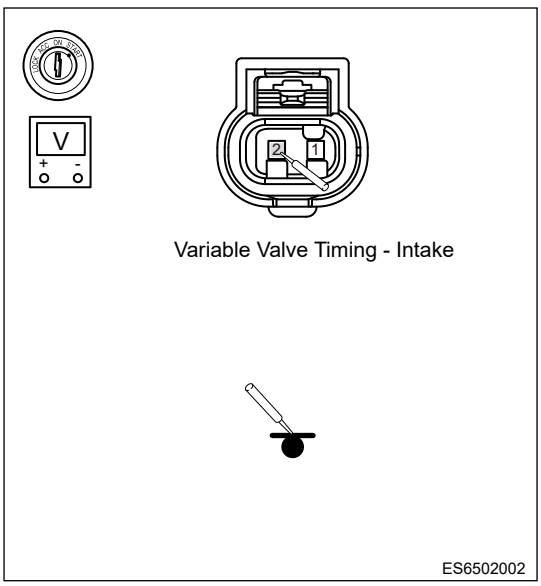
4	**Check intake phaser solenoid valve control circuit**

(a) Connect the intake phaser solenoid valve connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and respectively measure voltages of intake phaser solenoid valve (2) with red probe respectively.

(d) Or use test light to measure intake phaser solenoid valve (2); Test light should come on.

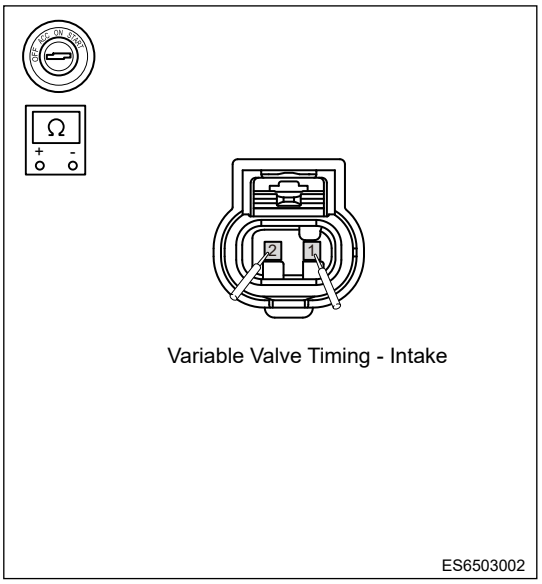


NG → **Check and repair control circuit**

OK

5	Check if circuits of intake phaser solenoid valve themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of intake phaser solenoid valve (1, 2) with red and black probes respectively; Check if they are short to each other.



NG → **Replace intake phaser solenoid valve assembly**

OK →

6	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG →

7	Reconfirm DTCs

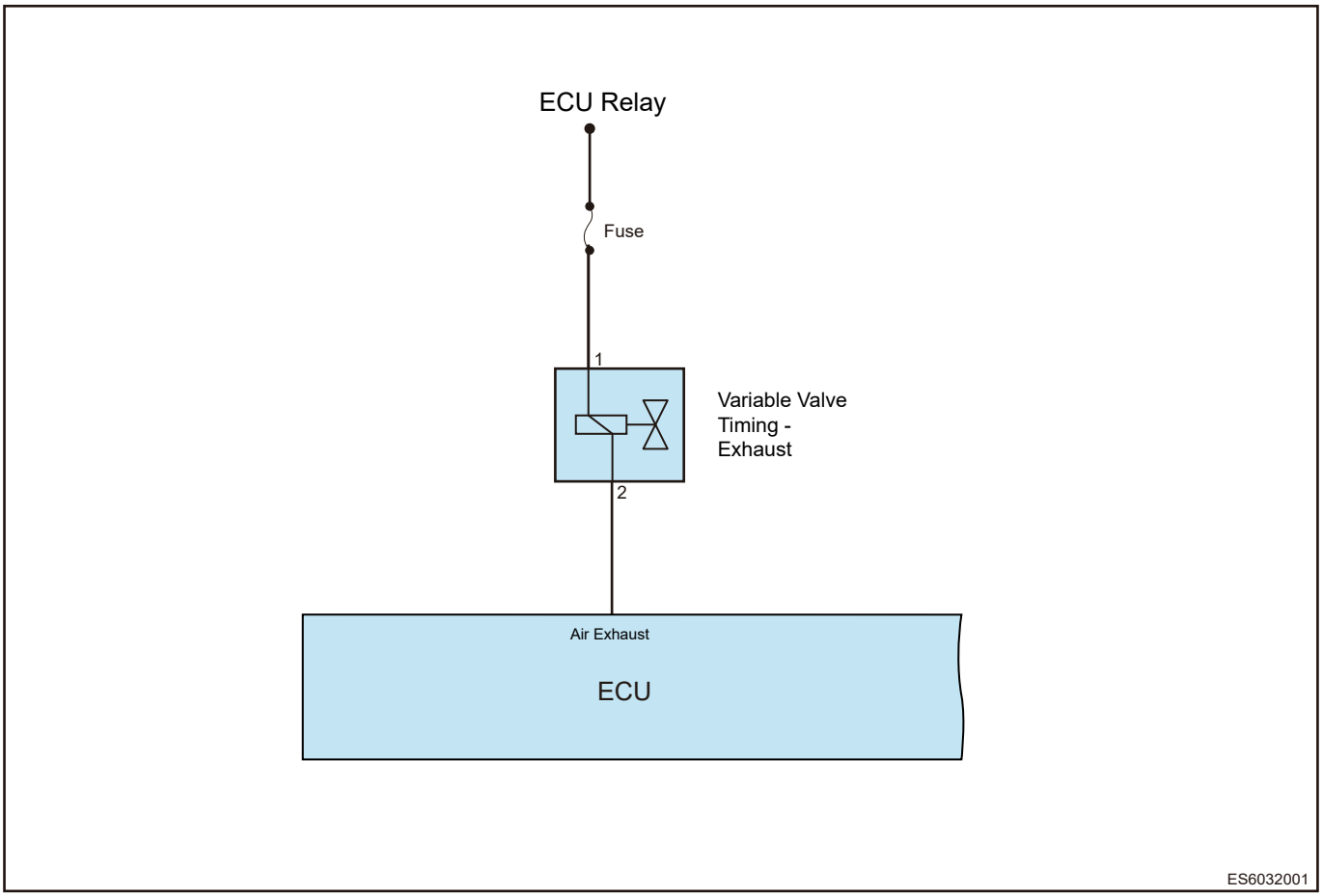
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Exhaust VVT control circuit voltage too low/too high**

DTC	**P209000**	**"B" Camshaft Position Actuator Control Circuit Low Bank 1**
DTC	**P209100**	**"B" Camshaft Position Actuator Control Circuit High Bank 1**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check exhaust phaser solenoid valve connector**

(a) Disconnect the negative battery.
(b) Check exhaust phaser solenoid valve connector for looseness or poor contact.

NG	**Repair and adjust connector, or replace it**

OK

2	Check exhaust phaser solenoid valve power supply fuse

(a) Check if "exhaust phaser solenoid valve power supply" fuse in engine compartment fuse and relay box is blown.

NG → **Check and repair short circuit malfunction of circuit**

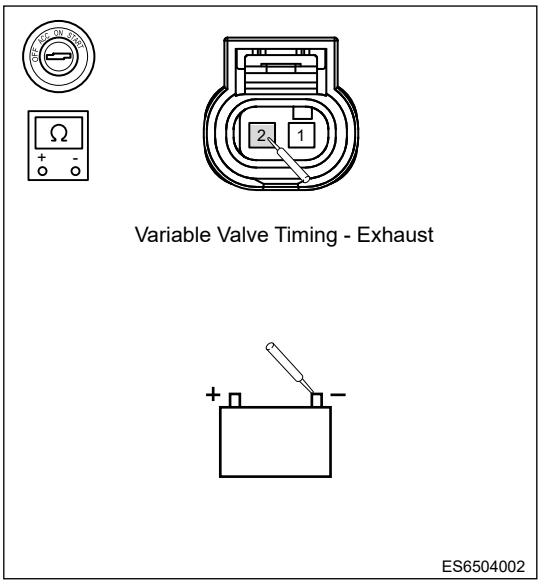
OK

3	Check for short circuit to ground / power supply in exhaust phaser solenoid valve circuit

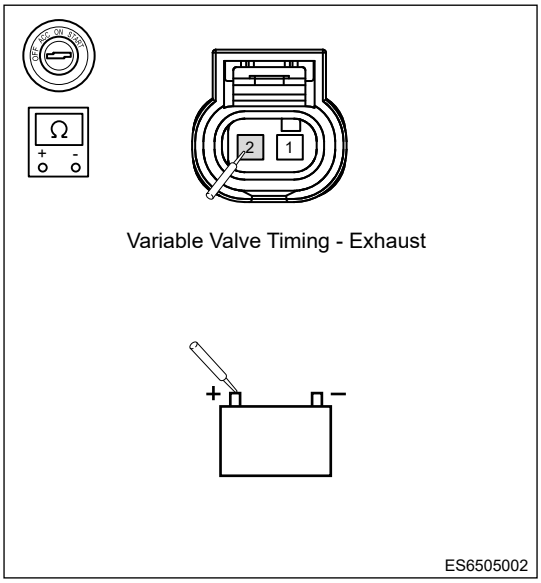
(a) Disconnect the exhaust phaser solenoid valve connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of exhaust phaser solenoid valve (2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of exhaust phaser solenoid valve (2) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

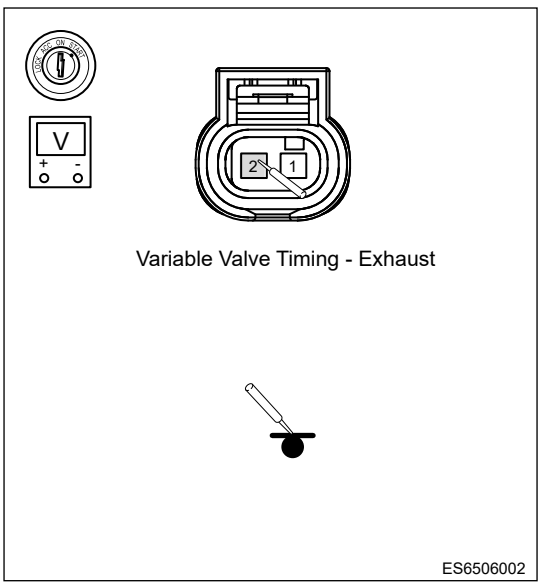
4	**Check exhaust phaser solenoid valve control circuit**

(a) Connect exhaust phaser solenoid valve connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of exhaust phaser solenoid valve (2) with red probe respectively.

(d) Or use test light to measure exhaust phaser solenoid valve (2); Test light should come on.



NG → **Check and repair control circuit**

OK

5	Check if circuits of exhaust phaser solenoid valve themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of exhaust phaser solenoid valve (1, 2) with red and black probes respectively; Check if they are short to each other.

NG → **Replace exhaust phaser solenoid valve assembly**

OK ↓

6	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG ↓

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Air-fuel ratio closed loop control correction**

DTC	P217700	System Too Lean Off Idle Bank 1
DTC	P217800	System Too Rich Off Idle Bank 1
DTC	P218700	System Too Lean at Idle Bank 1
DTC	P218800	System Too Lean at Idle Bank 1
DTC	P219500	O2 Sensor Signal Biased/Stuck Lean Bank 1 Sensor 1
DTC	P219600	O2 Sensor Signal Biased/Stuck Rich Bank 1 Sensor 1
DTC	P241400	O2 Sensor Exhaust Sample Error Bank 1 Sensor 1
DTC	P209700	Post Catalyst Fuel Trim System Too Rich Bank 1
DTC	P209600	Post Catalyst Fuel Trim System Too Lean Bank 1

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check upstream oxygen sensor**

(a) Depress the accelerator pedal sharply under idling condition, oxygen pump control voltage of oxygen sensor should be lower than 2.5 V at this time.

(b) Oxygen pump control voltage of oxygen sensor should be higher than 2.5 V when releasing the accelerator pedal quickly.

NG → **Replace upstream oxygen sensor assembly**

OK

2	**Check intake pressure/temperature sensor**

(a) Check intake pressure/temperature sensor (pressure signal).

Under idling state: Approximately 1 V

When the vehicle accelerates rapidly, voltage can instantly reach 4 V, and then drop to approximately 1.7 V

NG → **Replace intake pressure/temperature sensor**

OK

3	**Check fuel system**

(a) Check if low/high pressure fuel pressure is within the proper range.

(b) Check if fuel injector is dirty.

NG → **Replace fuel system damaged parts or clean fuel injector**

OK

4	Check intake system

(a) Check intake manifold, etc. to determine each line for air leakage.

NG → **Replace leaked damaged parts**

OK

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Downstream oxygen sensor deteriorated**

DTC	**P227000**	**O2 Sensor Signal Stuck Lean (Downstream of the Catalyzer)**
DTC	**P227100**	**O2 Sensor Signal Stuck Rich (Downstream of the Catalyzer)**
DTC	**P013A00**	**O2 Sensor Slow Response - Rich to Lean Bank 1 Sensor 2**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check downstream oxygen sensor

(a) Check if downstream oxygen sensor heating resistance is normal.

Resistance at ambient temperature: 7 ~ 11 Ω

(b) Check if downstream oxygen sensor signal voltage is normal.

It is normal when signal voltage fluctuates slightly from 0.55 to 0.65 V

NG → **Replace downstream oxygen sensor assembly**

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired

■ **Turbocharger boost pressure too high**

DTC	P023400	Turbocharger Boost Pressure Too High

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check turbocharger relief valve

(a) Check turbocharger relief valve connector for looseness or poor contact.
(b) Check if turbocharger relief valve stuck.

NG	Replace turbocharger relief valve assembly

OK

2	Check exhaust gas by-pass valve

(a) Pull exhaust gas by-pass valve pulling rod with hand to check that it can move smoothly and there is no stuck.

NG	Replace turbocharger assembly

OK

3	Reconfirm DTCs

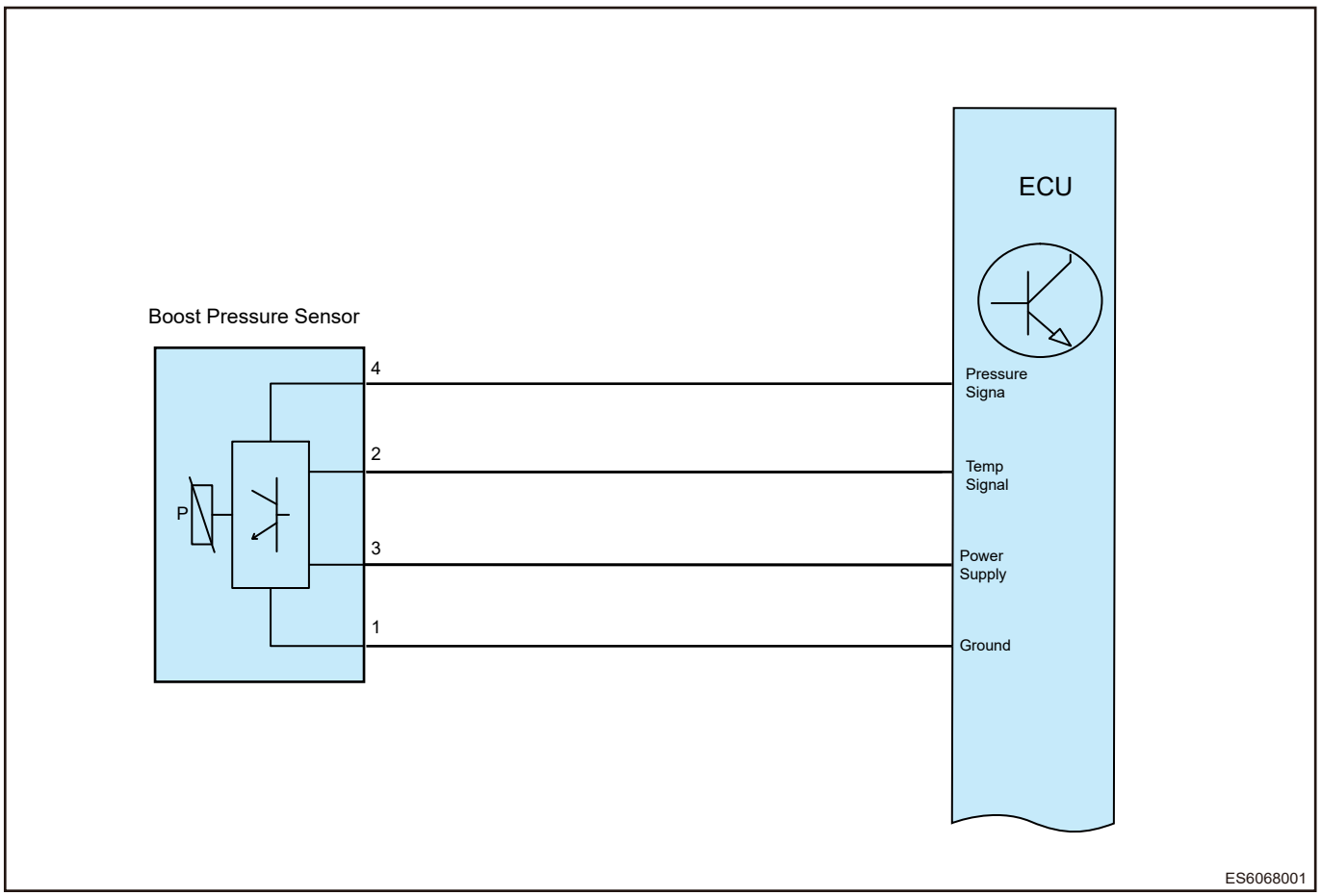
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired

■ **Turbocharger pressure sensor short to ground/power supply**

DTC	**P023700**	**Turbocharger/Supercharger Boost Sensor "A" Circuit Low**
DTC	**P023800**	**Turbocharger/Supercharger Boost Sensor "A" Circuit High**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check boost pressure/temperature sensor connector**

(a) Disconnect the negative battery.
(b) Check boost pressure/temperature sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

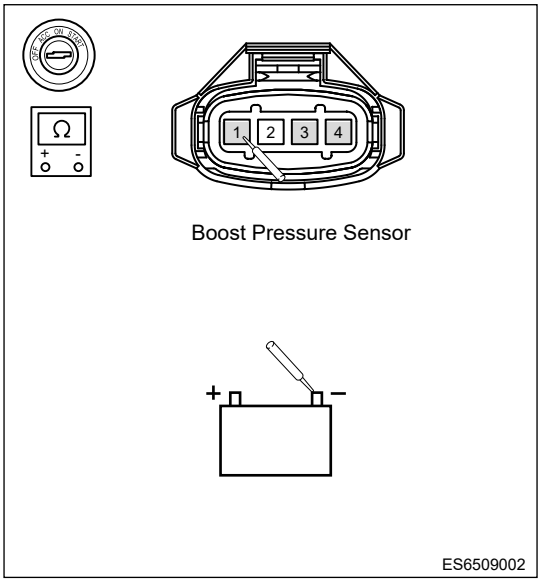
OK

2	**Check for short circuit to ground / power supply in boost pressure/temperature sensor circuit**

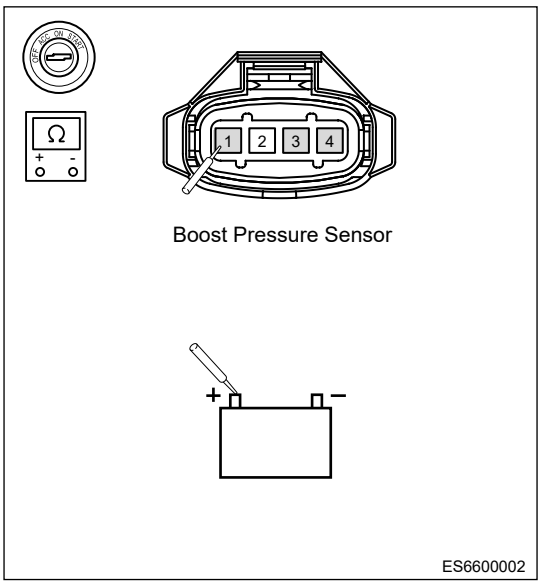
(a) Disconnect the boost pressure/temperature sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of boost pressure/temperature sensor (1, 3, 4) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of boost pressure/temperature sensor (1, 3, 4) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

3	Check boost pressure/temperature sensor control circuit

(a) Connect boost pressure/temperature sensor connector.

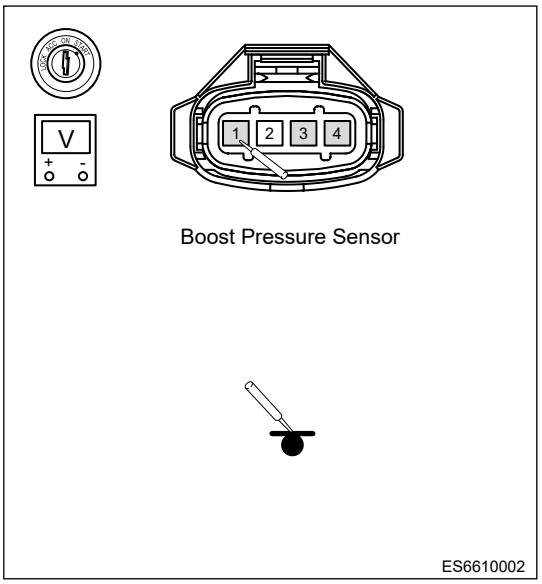
(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of boost pressure/temperature sensors (1, 3, 4) with red probe respectively.

Power supply terminal: 5 V

Ground terminal: < 0.2 V

Signal voltage varies in accordance with turbocharger line pressure

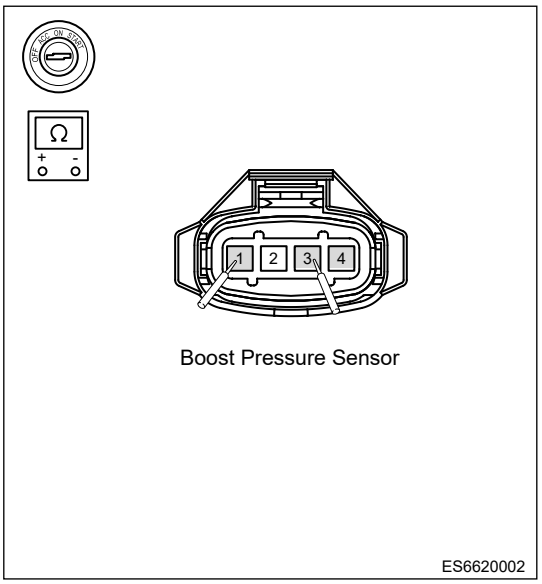


NG → **Check and repair control circuit, or replace boost pressure/temperature sensor**

OK

4	Check if circuits of boost pressure/temperature sensor themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of boost pressure/temperature sensor (1, 3, 4) with red and black probes respectively; Check if they are short to each other.



NG → **Replace boost pressure/temperature sensor assembly**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Booster exhaust gas control circuit open, voltage too high or too low**

DTC	P024300	Booster Exhaust Gas Control Circuit Open
DTC	P024600	Booster Exhaust Gas Control Circuit Voltage Too High or Too Low

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check electronic waste gate connector

(a) Disconnect the negative battery.
(b) Check electronic waste gate connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

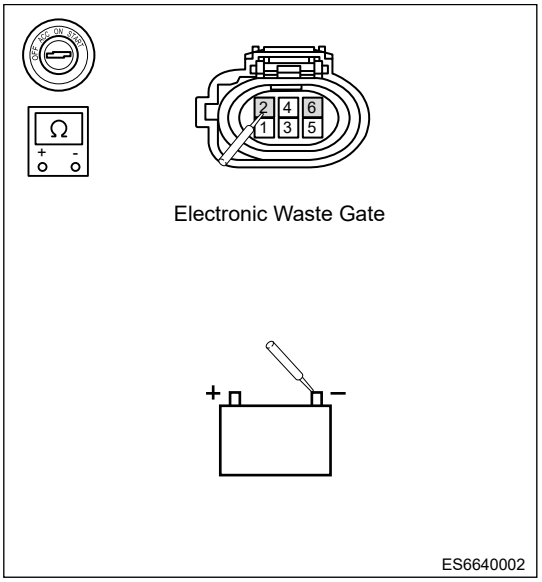
OK

2	Check for short to ground/power supply in electronic waste gate circuit

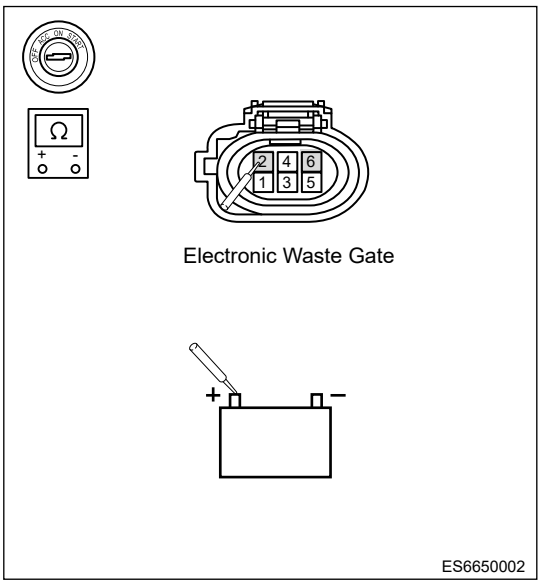
(a) Disconnect the electronic waste gate connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of waste gate (2, 6) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of electronic waste gates (2, 6) with red probe respectively; Check if circuit is short to power supply.

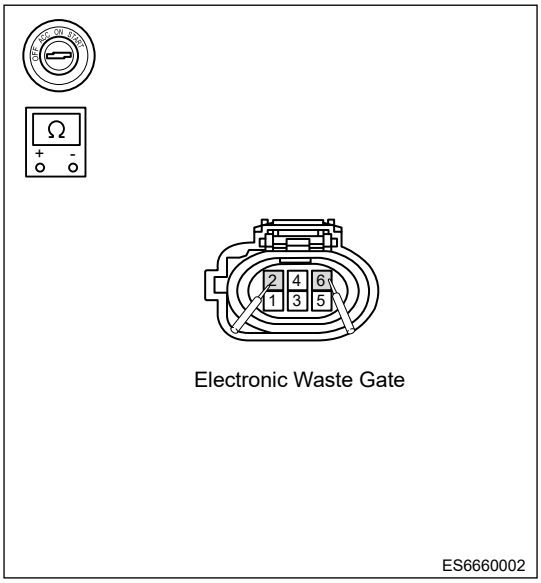


NG → Check and repair control circuit

OK

3	Check if electronic waste gates themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of electronic waste gates (2, 6) with red and black probes respectively; Check if they are short to each other.



NG	**Replace electronic waste gate assembly**

OK

4	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK	**Repair or replace new module**

NG

5	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**

■ Turbocharger boost pressure too low

DTC	**P029900**	**Turbocharger Boost Pressure Too Low**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check air filter**

(a) Check if air filter is dirty, blocked, etc.

NG → **Replace air filter assembly**

OK ↓

2	**Check each connecting line of turbocharger**

(a) Check each connecting line of turbocharger for falling off, damage or air leakage, etc.

NG → **Replace damaged line**

OK ↓

3	**Check exhaust gas by-pass valve**

(a) Pull exhaust gas by-pass valve pulling rod with hand, there should be no stuck.

NG → **Replace turbocharger assembly**

OK ↓

4	**Check relief solenoid valve**

(a) Check that relief solenoid valve connector is not loose or does not fall off.

(b) Check if relief solenoid valve is stuck at normally open position.

NG → **Replace relief solenoid valve assembly**

OK ↓

5	Check turbocharger

(a) Check operation parts such as turbine, impeller for damage or blade missing.

NG → **Replace turbocharger assembly**

OK

6	Check if exhaust back pressure is too high

(a) Check pre-catalytic converter for blockage.
(b) Check GPF particulate filter for blockage.

NG → **Replace pre-catalytic converter assembly or perform GPF regeneration**

OK

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ Turbocharger/supercharger bypass valve "A" - mechanical

DTC	P226100	Turbocharger/Supercharger Bypass Valve "A" - Mechanical

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check relief solenoid valve

(a) Check that relief solenoid valve connector is not loose or does not fall off.
(b) Check if relief solenoid valve is not stuck.

NG → Replace relief solenoid valve assembly

OK

2	Reconfirm DTCs

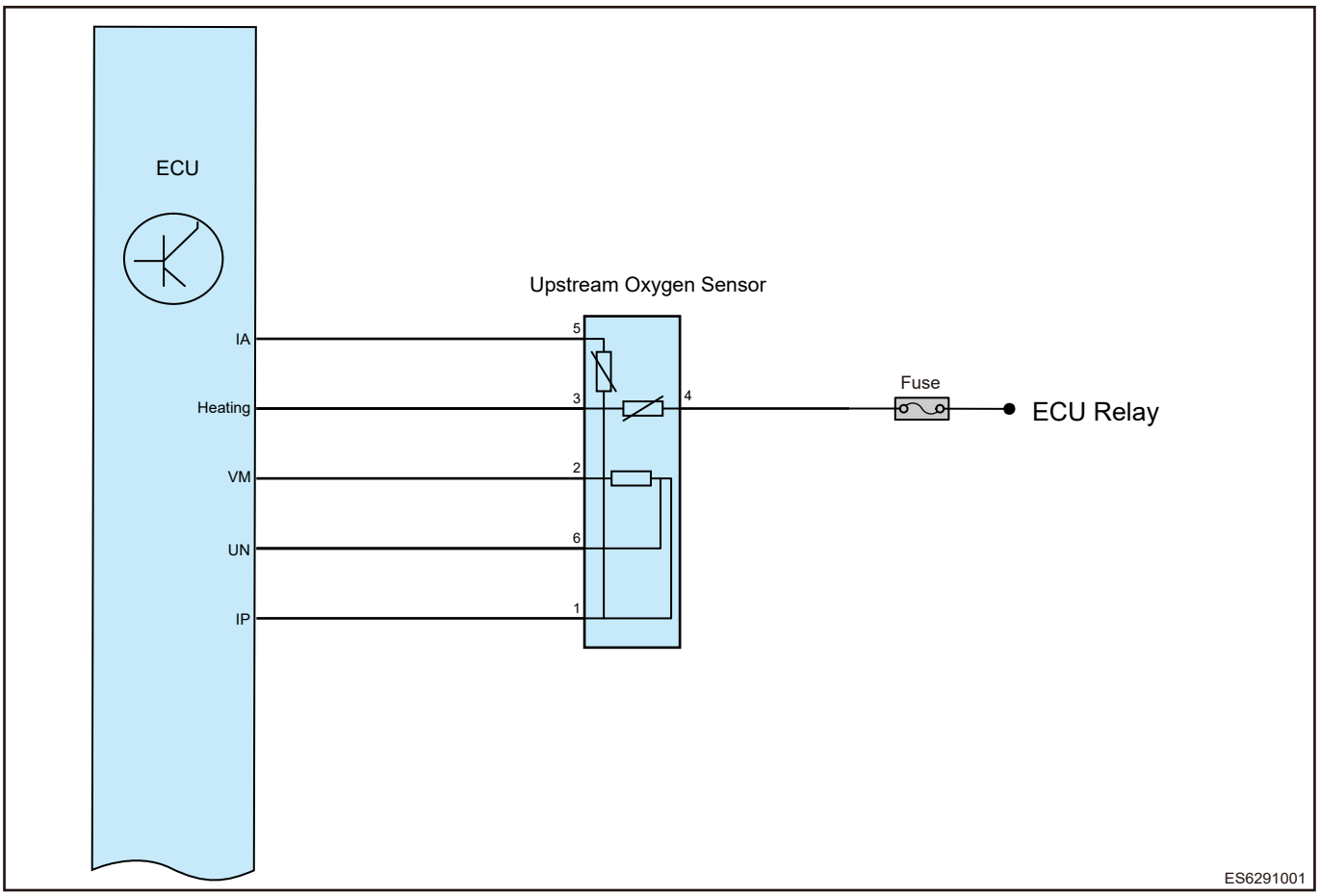
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Upstream oxygen sensor RE line, IPE line open**

DTC	P224300	O2 Sensor Reference Voltage Circuit Open Bank 1 Sensor 1
DTC	P225100	O2 Sensor Negative Current Control Circuit Open Bank 1 Sensor 1
DTC	P013000	Upstream Oxygen Sensor Compensating Circuit Open
DTC	P223700	O2 Sensor Positive Current Control Circuit Open Bank 1 Sensor 1 (-Close to ECU)

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check upstream oxygen sensor connector**

(a) Disconnect the negative battery.
(b) Check upstream oxygen sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

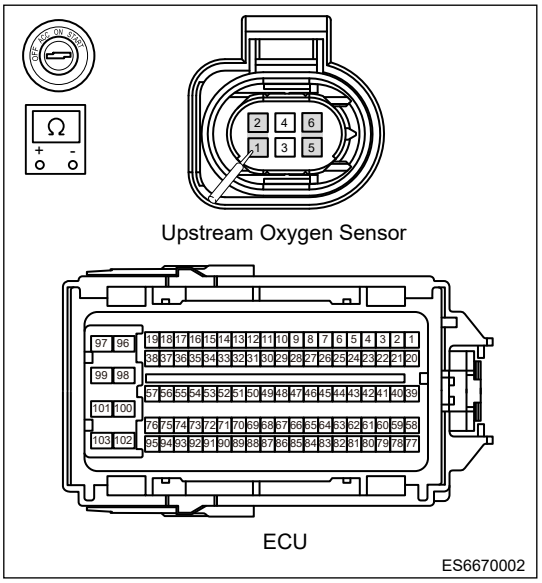
OK

2	**Check upstream oxygen sensor circuit for open**

(a) Disconnect the upstream oxygen sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to ECU (-connected terminal) and measure resistances of upstream oxygen sensor (1, 2, 5, 6) with red probe respectively. Check the circuit for open.



NG → **Check and repair control circuit**

OK

3	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

4	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Ambient temperature sensor fault**

DTC	**P138824**	**Ambient Air Temperature Sensor "A" Multiple Check**
DTC	**P138823**	**Ambient Air Temperature Sensor "A" Multiple Check**
DTC	**P007000**	**Ambient Air Temperature Sensor Circuit "A"**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check ambient temperature**

(a) Read ambient temperature value on CAN and check if it is reasonable.

NG → **Replace ambient temperature generator node**

OK

2	**Check ambient temperature status**

(a) Read ambient temperature status on CAN and check if it is reasonable.

NG → **Replace ambient temperature generator node**

OK

3	**(Refer to CAN system)**

■ **Network fault**

DTC	**U012287**	**Lost Communication with ESP (Electronic Stability Program)**
DTC	**U014687**	**Lost Communication with GW (Gateway)**
DTC	**U012687**	**Lost Communication with SAS (Steering Angle)**
DTC	**U010187**	**Lost Communication with TCM (Transmission Controller)**
DTC	**U110017**	**CAN Module Input Power Voltage High**
DTC	**U012887**	**Lost Communication with EPB Module**
DTC	**U013187**	**Lost Communication with EPS (HS CAN)**
DTC	**U015187**	**Lost Communication with Airbag Module (SDM) (HS CAN)**
DTC	**U007388**	**Control Module Communication Bus 1 Off (CAN1 Bus off)**
DTC	**P150000**	**EMS Received Crash Signal**

DTC	U015187	Lose Communication with ABM/EGS/EPB/MFS/PEPS/SAM/EBS/ DECOS or Signal Abnormal
DTC	U010387	
DTC	U012887	
DTC	U118787	
DTC	U024887	
DTC	U021287	
DTC	U01B000	
DTC	U010987	
DTC	U041681	Data Received by ECU from ESP/TCM/ABM/BCM/CLM/EGS/EPB/FPC/ ICM/MFS/PEPS/SAM Module Not Reliable
DTC	U040281	
DTC	U045281	
DTC	U042281	
DTC	U042481	
DTC	U040481	
DTC	U041781	
DTC	U041081	
DTC	U042381	
DTC	U059B81	
DTC	U042681	
DTC	U042981	
DTC	U007388	CAN1 Bus OFF (Communication Closed)
DTC	U015587	Lost Communication with IP (Instrument Cluster)
DTC	U016487	Communication Between ECU and AC Control Module Failure
DTC	U014087	Lost Communication with BCM (Body Control Module)

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to diagnosis in CAN network section.

DTC	P150000	EMS Received Crash Signal

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check airbag control unit**

(a) Check if airbag control unit has collision information.

NG → **Replace airbag control unit**

OK

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new airbag control unit to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	P150100	Airbag Communicate Message Unplausible

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for wire harness interference**

(a) Check for wire harness interference.

NG → **Interference is shielded**

OK

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new airbag control unit to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

■ **Response reception time out/error of LIN bus (contact between EMS and intellectual alternator)**

DTC	**P141500**	**Response Reception Time Out Error of LIN Bus (Contact Between EMS and Intellectual Generator)**
DTC	**P141700**	**Checksum Error of LIN Bus (Contact Between EMS and Intellectual Generator)**
DTC	**P144200**	**Communication Fault of Generator**
DTC	**P144100**	**Mechanical Fault of Generator**
DTC	**P144000**	**Alternator Circuit Error**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check generator connector**

(a) Disconnect the negative battery.
(b) Check alternator connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check LIN line voltage**

(a) Disconnect the alternator connector.
(b) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltage of alternator LIN line with red probe respectively.

Equivalent voltage: Approximately 10 V

OK → **Replace alternator**

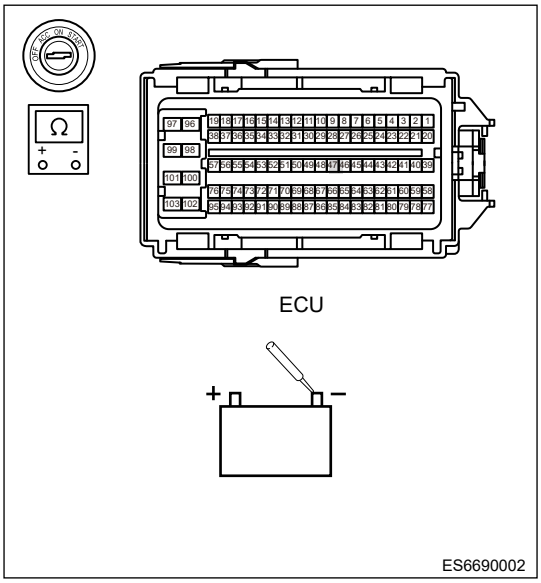
NG

3	**Check for short circuit to ground / power supply in LIN line**

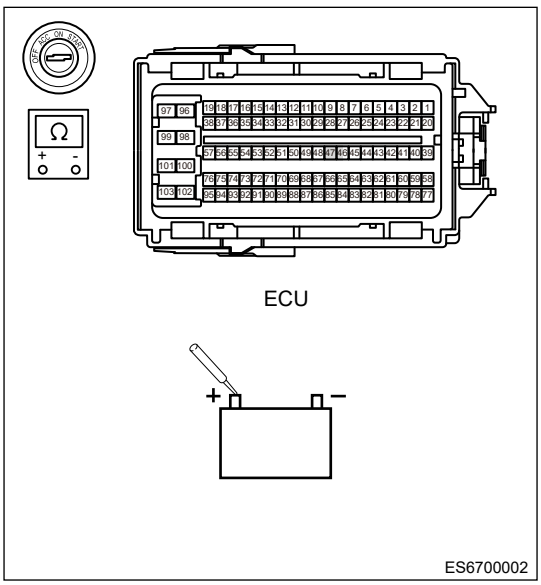
(a) Disconnect the alternator connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of ECU (LIN) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of ECU (LIN) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair control circuit**

OK

4	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Immobilizer malfunction**

DTC	P051300	Immobilizer Malfunction
DTC	P063300	
DTC	P161000	
DTC	P161400	
DTC	P161200	
DTC	P161300	
DTC	P161100	

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to diagnosis in immobilizer system section.

■ **Canister vent valve stuck normally closed**

DTC	P242200	Canister Vent Valve Stuck Normally Closed

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check canister vent valve

(a) Check if line or charcoal canister filter at canister vent valve is blocked.
(b) Check if canister vent valve is stuck closed position.

NG → **Replace charcoal canister filter or canister vent valve**

OK

2	Reconfirm DTCs

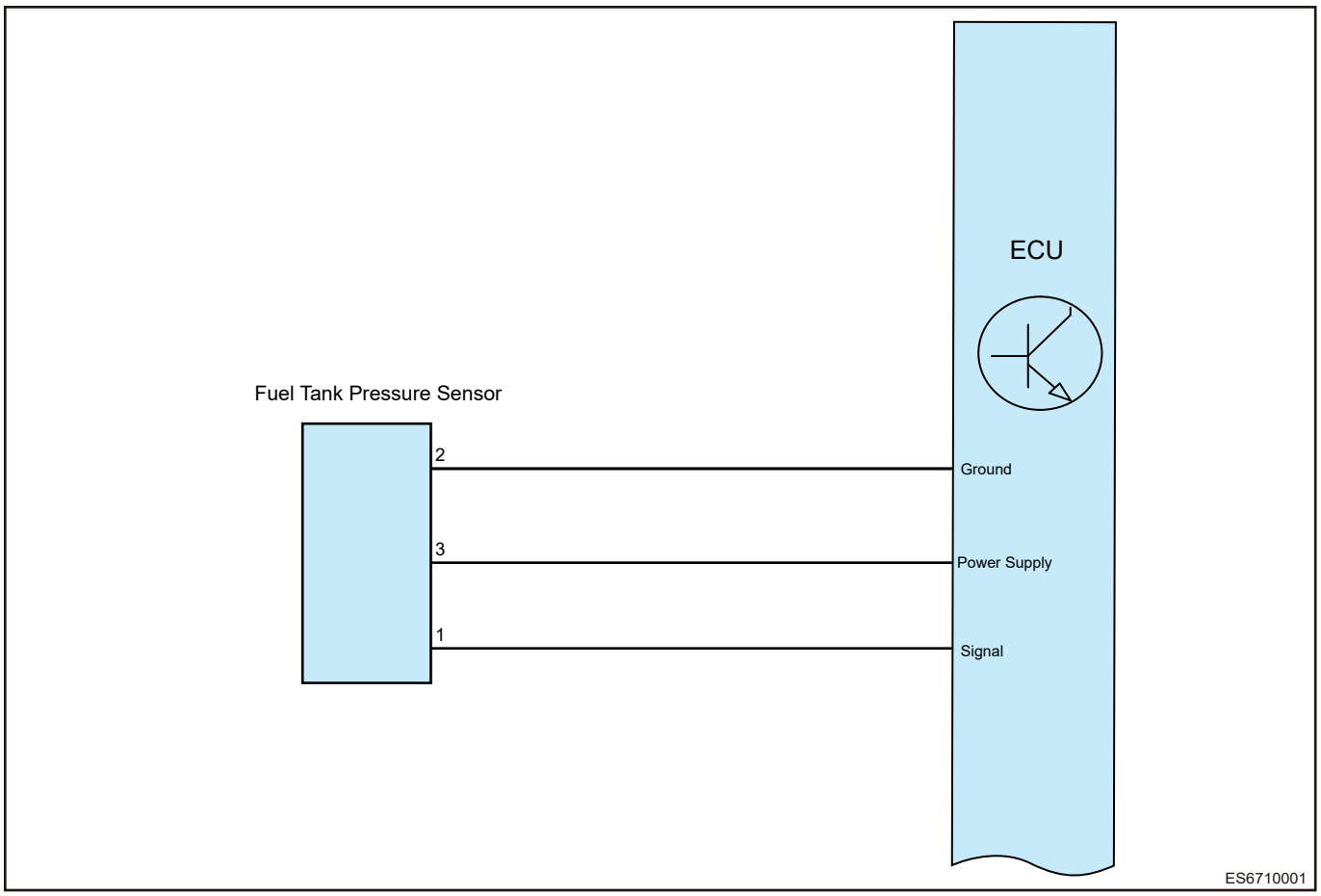
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Fuel tank pressure sensor malfunction**

DTC	P045300	Fuel Tank Pressure Sensor Signal Short to Power Supply
DTC	P045200	Fuel Tank Pressure Sensor Signal Short to Ground
DTC	P128200	EVAP System Pressure Sensor/Switch Circuit Range Performance
DTC	P128300	EVAP System Pressure Sensor/Switch Circuit Range Performance
DTC	P04512A	EVAP System Pressure Sensor&Switch Circuit Range Performance
DTC	P045125	EVAP System Pressure Sensor&Switch Circuit Range Performance
DTC	P045128	EVAP System Pressure Sensor/Switch Circuit Range Performance

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuel tank pressure sensor connector**

(a) Disconnect the negative battery.
(b) Check fuel tank pressure sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check canister vent valve**

(a) Check if line or charcoal canister filter at canister vent valve is blocked.

(b) Check if canister vent valve is stuck closed or normally open position.

NG → **Replace charcoal canister filter or canister vent valve**

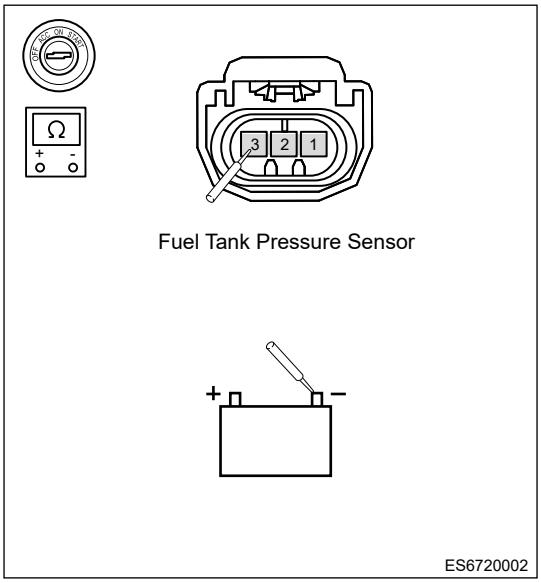
OK

3	**Check for short circuit to ground / power supply in fuel tank pressure sensor circuit**

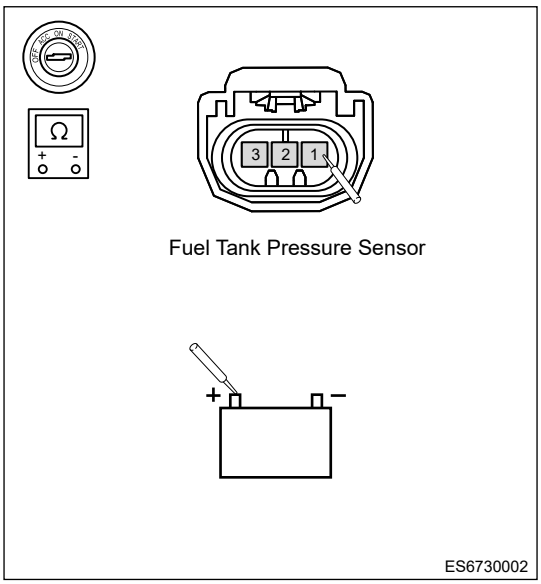
(a) Disconnect fuel tank pressure sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of fuel tank pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of fuel tank pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to power supply.

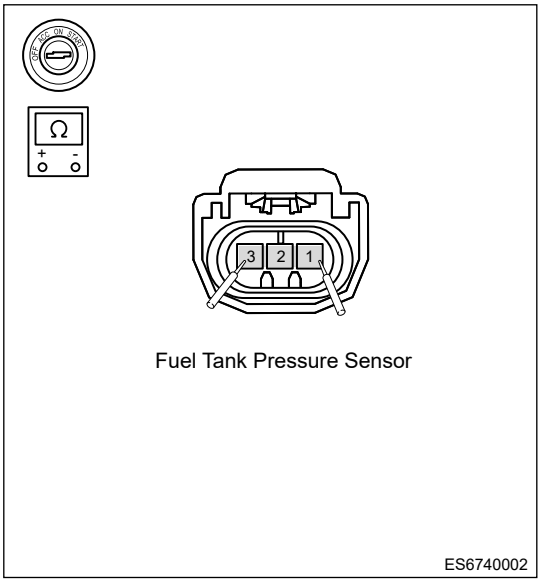


NG → **Check and repair control circuit**

OK

4	Check if circuits of fuel tank pressure sensor themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of fuel tank pressure sensor (1, 2, 3) with red and black probes respectively; Check if they are short to each other.



NG → **Replace fuel tank pressure sensor assembly**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Fuel level sensor malfunction**

DTC	**P046300**	**Fuel Level Sensor "A" Circuit High**
DTC	**P046200**	**Fuel Level Sensor "A" Circuit Low**
DTC	**P25B000**	**Fuel Level Sensor "A" Stuck**
DTC	**P046129**	**Fuel Level Sensor Unreasonable**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuel pump connector**

(a) Disconnect the negative battery.
(b) Check fuel pump connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check for short circuit to ground / power supply in fuel level sensor circuit**

(a) Disconnect the fuel level sensor connector.
(b) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of fuel pump (9, 10) with red probe respectively; Check if circuit is short to ground.

(c) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of fuel level sensor (9, 10) with red probe respectively; Check if circuit is short to power supply.

NG → **Check and repair control circuit**

OK

3	**Check if circuits of fuel level sensor themselves are short to each other or opened**

(a) Using ohm band of multimeter, measure resistances of fuel pump (9, 10) with red and black probes respectively; Check if they are short to each other or opened.

NG → Replace electric fuel pump assembly

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Evaporation system leakage malfunction**

DTC	P044200	EVAP System Leak Detected (Small Leak)
DTC	P045500	EVAP System Leak Detected (Large Leak)

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fuel tank cap

(a) Check if fuel tank cap is tightened, and check if internal seal ring is deformed.
(b) Check fuel tank cap for damage or leaked port.

NG → Repair and adjust or replace fuel tank assembly

OK

2	Check evaporation system connecting line

(a) Check each line for damage or small hole, etc.
(b) Check each line joint is clamped into place and check if worm clamp is tightened.

NG → **Repair and adjust or replace the damaged parts**

OK

3	Activated Charcoal Canister Inspection

(a) Check charcoal canister for damage or small hole, etc.
(b) Check if connecting pipe joint is clamped into place.

NG → **Repair and adjust or replace charcoal canister assembly**

OK

4	Check canister vent valve

(a) Check if canister vent valve is not closed tightly or stuck.

NG → **Replace canister vent valve assembly**

OK

5	Check canister solenoid valve

(a) Check if canister solenoid valve is not closed tightly or stuck.

NG → **Replace canister solenoid valve assembly**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK	**Conduct test and confirm malfunction has been repaired**

■ High/low load desorption line malfunction - canister solenoid valve

DTC	**P049700**	**EVAP System Low Purge Flow**
DTC	**P04F000**	**EVAP System High Pressure Purge**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check low/high load desorption line**

(a) Check each connecting line for breakage, damage or small hole, etc.
(b) Check if line check valve is damaged or inoperative.
(c) Check connection position between intake hose and desorption line for blockage.

NG	**Repair and adjust or replace the damaged parts**

OK

2	**Check canister vent valve**

(a) Check if canister vent valve is stuck closed position.

NG	**Replace canister vent valve assembly**

OK

3	**Check canister solenoid valve**

(a) Check if canister solenoid valve is stuck closed position.

NG → Replace canister solenoid valve assembly

OK

4	Reconfirm DTCs

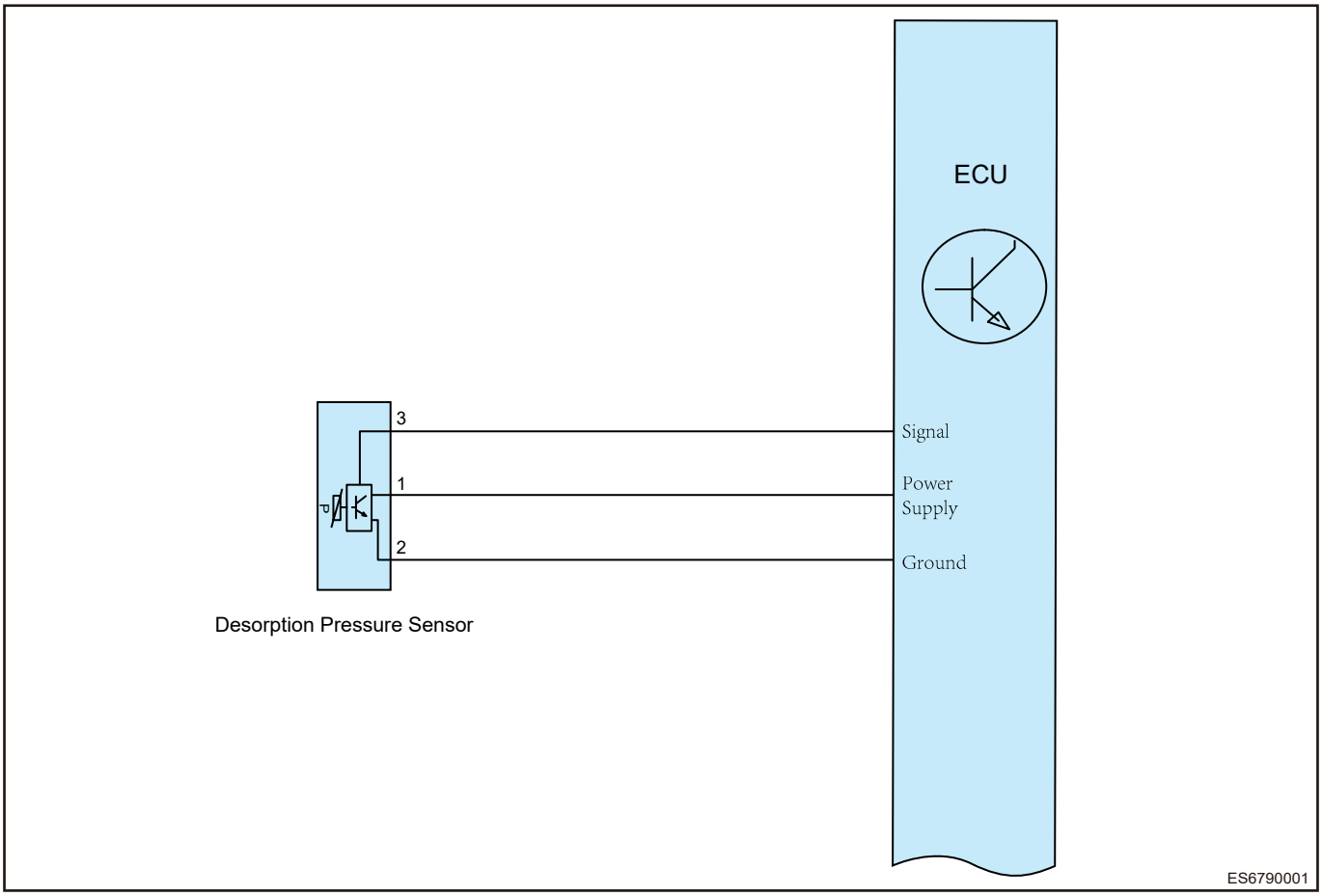
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Desorption pressure sensor malfunction**

DTC	P046800	EVAP Purge Flow Sensor Circuit High
DTC	P046700	EVAP Purge Flow Sensor Circuit Low
DTC	P128500	EVAP Purge Flow Sensor Circuit Range Performance
DTC	P128600	EVAP Purge Flow Sensor Circuit Range Performance

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check desorption pressure sensor connector**

(a) Disconnect the negative battery.
(b) Check desorption pressure sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK ↓

2	**Check high load desorption line**

(a) Check each connecting line for breakage, damage or small hole, etc.
(b) Check if line check valve is damaged or inoperative.
(c) Check connection position between intake hose and desorption line for blockage.

NG → **Repair and adjust or replace the damaged parts**

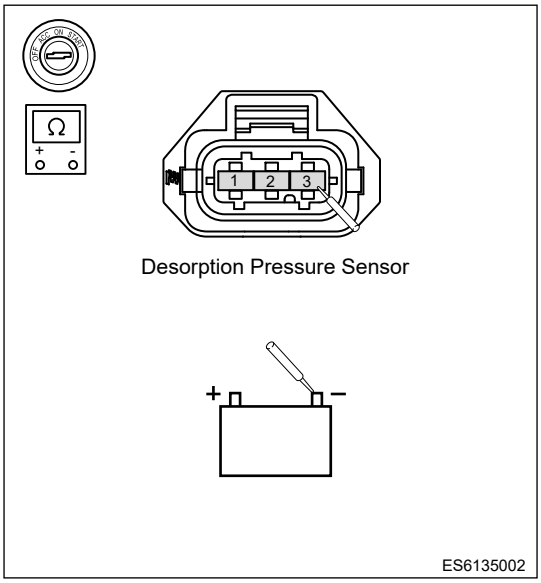
OK ↓

3	**Check for short circuit to ground / power supply in desorption pressure sensor circuit**

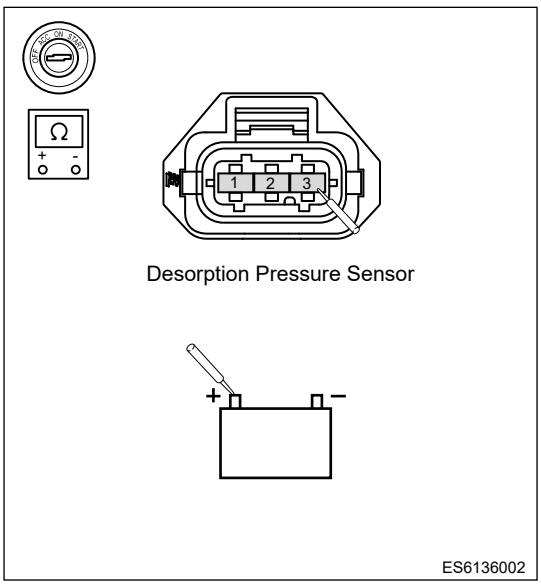
(a) Disconnect the desorption pressure sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of desorption pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of desorption pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to power supply.



NG	**Check and repair control circuit**

OK

4	**Check if circuits of desorption pressure sensor themselves are short to each other or opened**

(a) Using ohm band of multimeter, measure resistances of desorption pressure sensor (1, 2, 3) with red and black probes respectively; Check if they are short to each other or open.

NG	**Replace desorption pressure sensor assembly**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ Cylinder 1 / cylinder 2 / cylinder 3 / cylinder 4 CVO self-learning adjustment reach upper limit/lower limit malfunction

DTC	P02CD00	Cylinder 1 Fuel Injector Offset Learning At Max Limit
DTC	P02D100	Cylinder 3 Fuel Injector Offset Learning At Max Limit
DTC	P02D300	Cylinder 4 Fuel Injector Offset Learning At Max Limit
DTC	P02CF00	Cylinder 2 Fuel Injector Offset Learning At Max Limit
DTC	P02CC00	Cylinder 1 Fuel Injector Offset Learning At Min Limit
DTC	P02D000	Cylinder 3 Fuel Injector Offset Learning At Min Limit
DTC	P02D200	Cylinder 4 Fuel Injector Offset Learning At Min Limit
DTC	P02CE00	Cylinder 2 Fuel Injector Offset Learning At Min Limit
DTC	P062B9A	Internal Control Module Fuel Injector Control Performance - Component Internal Failure
DTC	P062B64	
DTC	P062B96	
DTC	P126100	Cylinder 1 Injector Circuit Range/Performance - Signal Plausibility Failure
DTC	P126300	Cylinder 3 Injector Circuit Range/Performance - Signal Plausibility Failure

DTC	P126400	Cylinder 4 Injector Circuit Range/Performance - Signal Plausibility Failure
DTC	P126200	Cylinder 2 Injector Circuit Range/Performance - Signal Plausibility Failure

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check injector connector**

(a) Disconnect the negative battery.
(b) Check fuel injector connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check fuel injector**

(a) Remove the fuel injector assembly.
(b) Check fuel injector for blockage or leakage.

NG → **Clean or replace fuel injector assembly**

OK

3	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

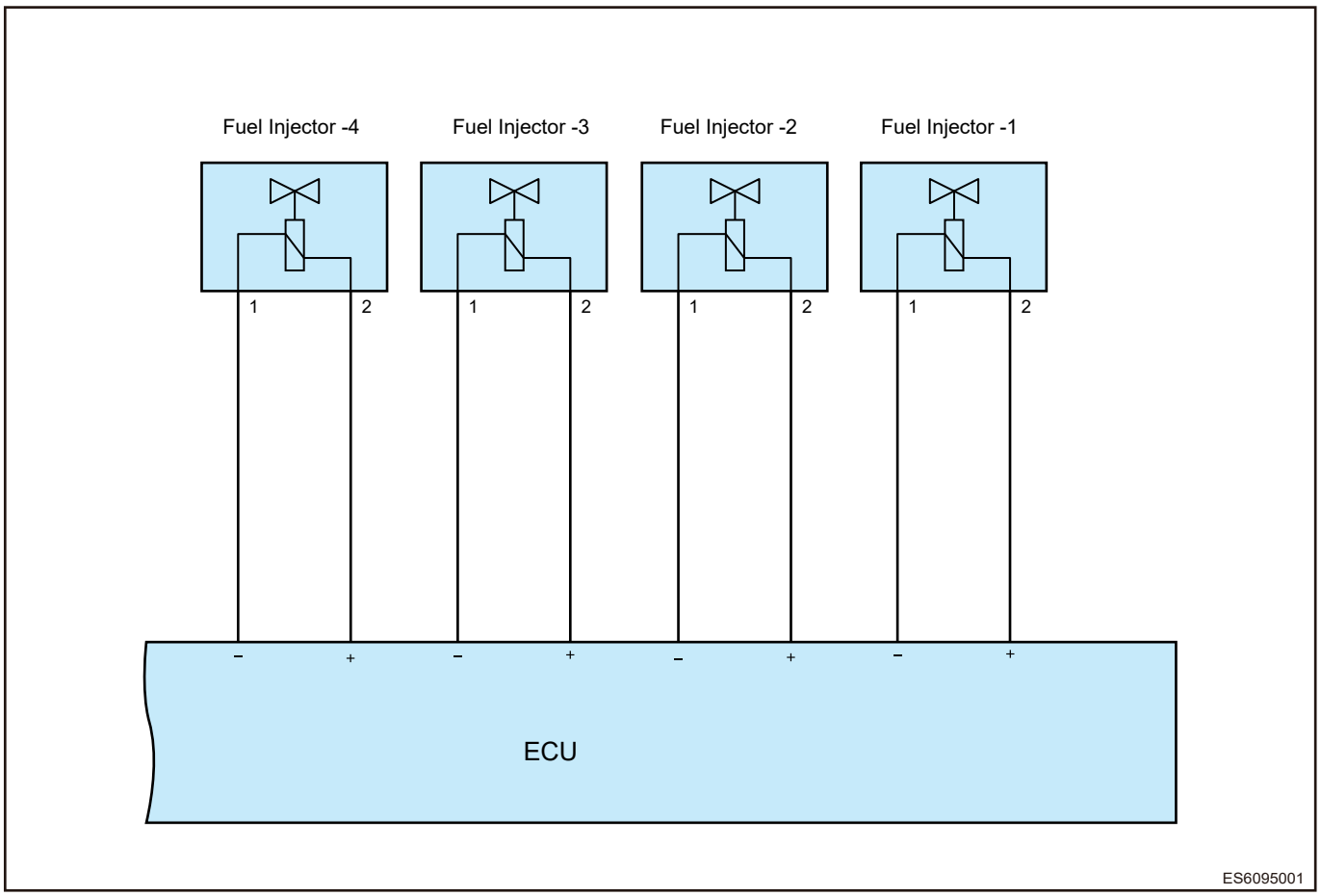
OK → **Conduct test and confirm malfunction has been repaired**

■ **Cylinder 1 / cylinder 2 / cylinder 3 / cylinder 4 fuel injector control circuit short**

DTC	P02EE00	Cylinder 1 Fuel Injector Control Circuit Short
DTC	P02EF00	Cylinder 2 Injector Circuit Range/Performance

DTC	P02F000	Cylinder 3 Injector Circuit Range/Performance
DTC	P02F100	Cylinder 4 Fuel Injector Control Circuit Short
DTC	P214800	Cylinder 1 or Cylinder 4 Fuel Injector Control Circuit Short to Power Supply
DTC	P215100	Cylinders 2, 3 Fuel Injector High-side Control Circuit Voltage Too High or Too Low or Cylinder 2 Fuel Injector Low-side Control Circuit Voltage Too Low or Too High

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Take troubleshooting of cylinder 1 fuel injector as an example.

1	**Check injector connector**

(a) Disconnect the negative battery.
(b) Check injector connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

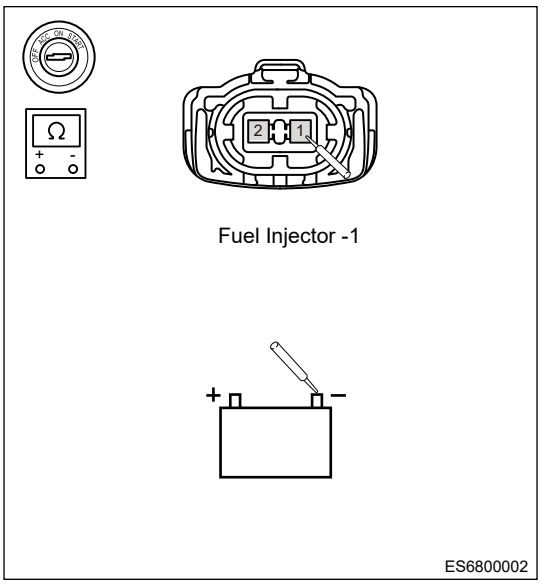
OK

2	**Check if fuel injector control terminal is short to ground/power supply or short to each other**

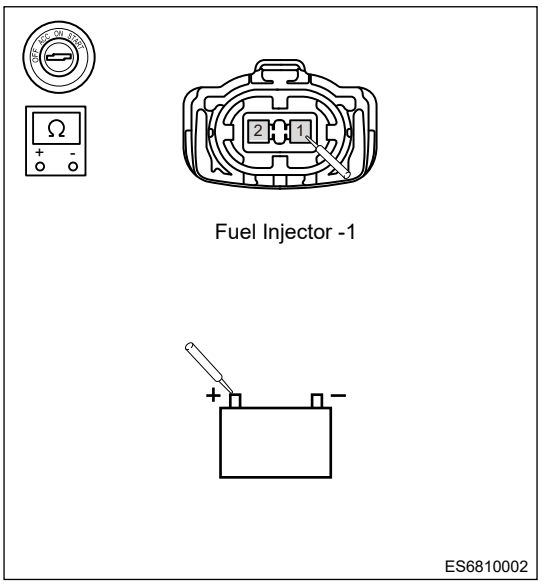
(a) Disconnect the injector connector.

(b) Disconnect the ECU connector.

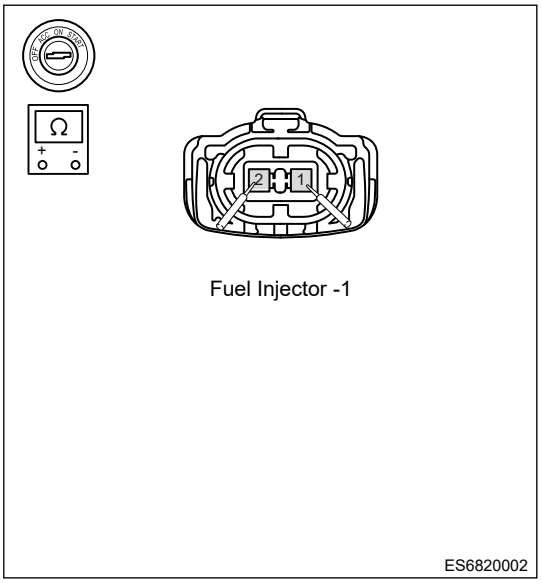
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of injector (1, 2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of injector (1, 2) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of injector (1, 2) with red and black probes respectively; Check if circuits are short to each other.



NG → **Check and repair circuit**

OK

3	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

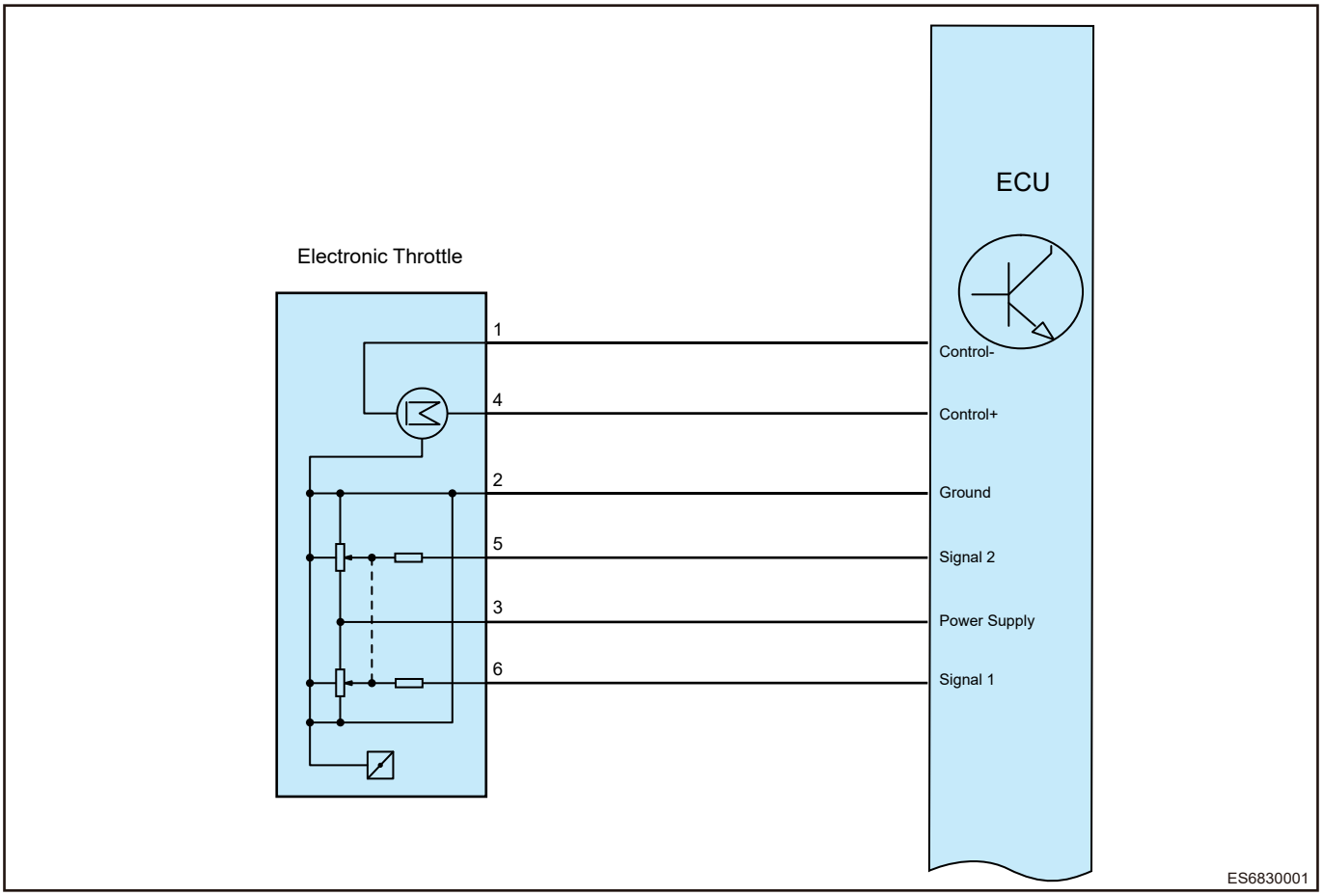
OK → **Conduct test and confirm malfunction has been repaired**

■ **Electronic throttle 1st path / 2nd path signal voltage minimum / maximum / improper**

DTC	**P012200**	**Electronic Throttle 1st Path / 2nd Path Signal Voltage Minimum**
DTC	**P022200**	

DTC	P012300	Electronic Throttle 1st Path / 2nd Path Signal Voltage Maximum
DTC	P022300	
DTC	P012100	Electronic Throttle 1st Path / 2nd Path Signal Voltage Improper
DTC	P022100	

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic throttle connector**

(a) Disconnect the negative battery.
(b) Check electronic throttle connector for looseness or poor contact.

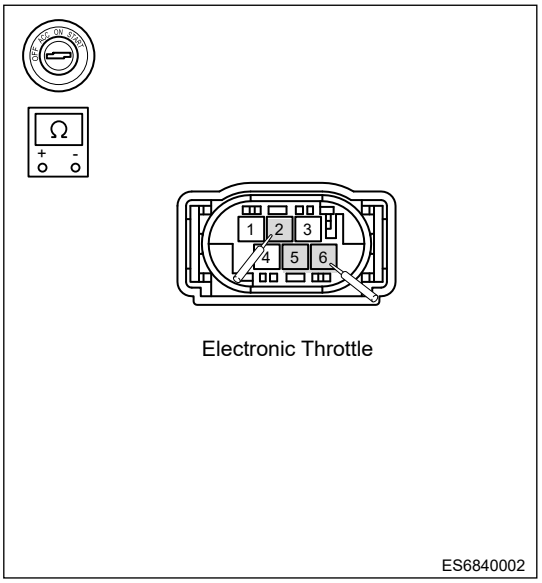
NG	**Repair and adjust connector, or replace it**

OK

2	Check electronic throttle internal resistance

(a) Using ohm band of multimeter, measure if resistances of electronic throttle (2-6) and (2-5) are normal with red and black probes respectively.

Resistance values should change continuously when the valve plate is toggled by hand



NG → **Replace electronic throttle assembly**

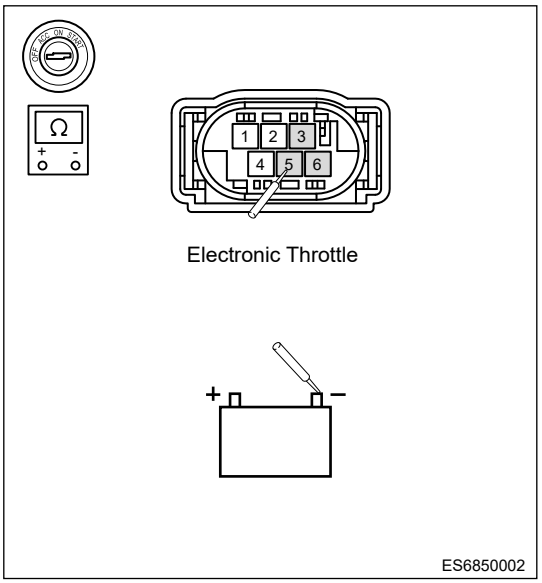
OK

3	Check for short circuit to ground / power supply or short to each other in electronic throttle line

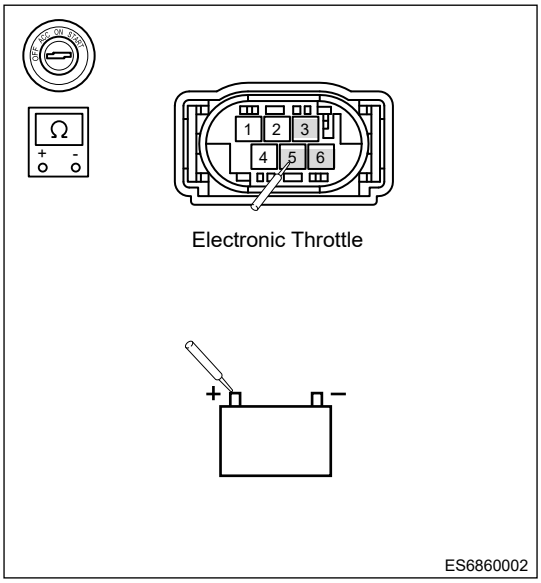
(a) Disconnect the electronic throttle connector.

(b) Disconnect the ECU connector.

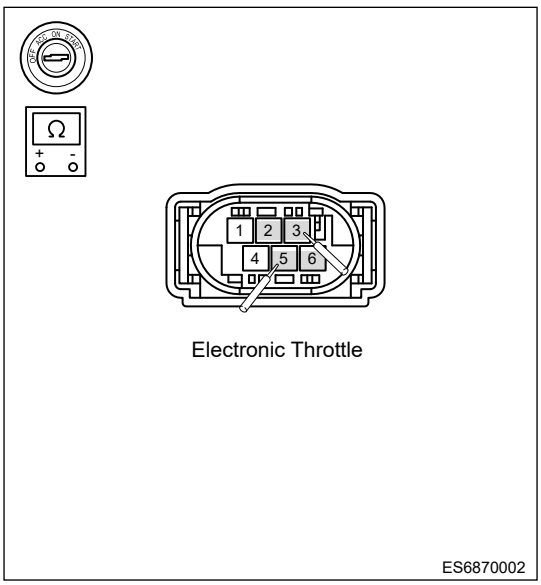
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of electronic throttle (3, 5, 6) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of electronic throttle (3, 5, 6) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of electronic throttle (2, 3, 5, 6) with red and black probes respectively; Check if circuits are short to each other.



NG	**Check and repair circuit**

OK

4	**Check electronic throttle position sensor power supply / ground / signal**

(a) Connect electronic throttle and ECU connector

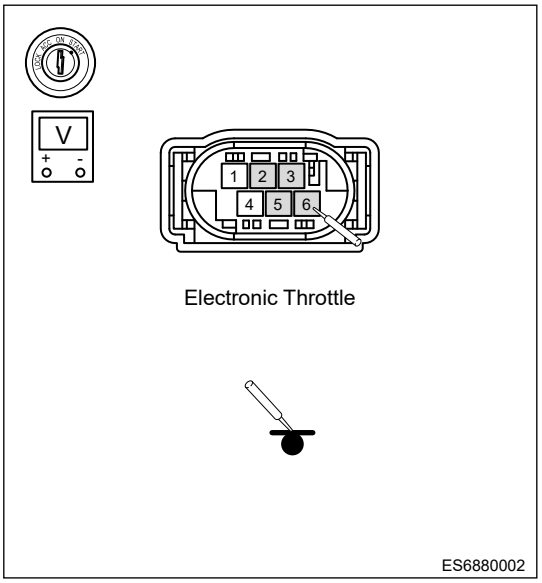
(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of electronic throttle (2, 3, 5, 6) with red probe.

Power supply terminal: 5 V

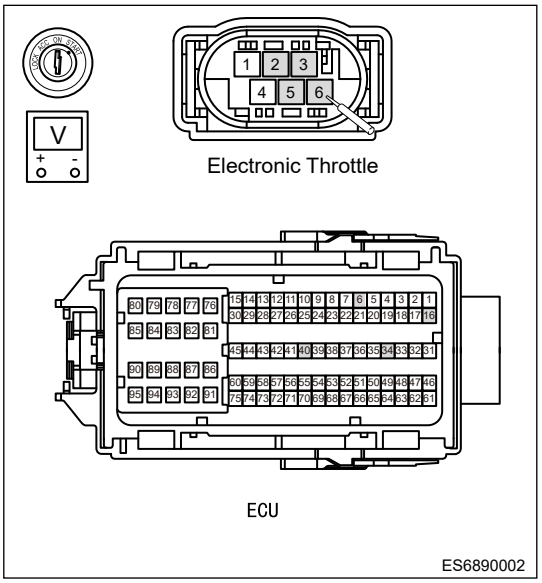
Ground terminal: < 0.2 V

The sum of signal 1 voltage and signal 2 voltage is approximately 5 V



(d) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure electronic throttle (2, 3, 5, 6) with red probe.

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

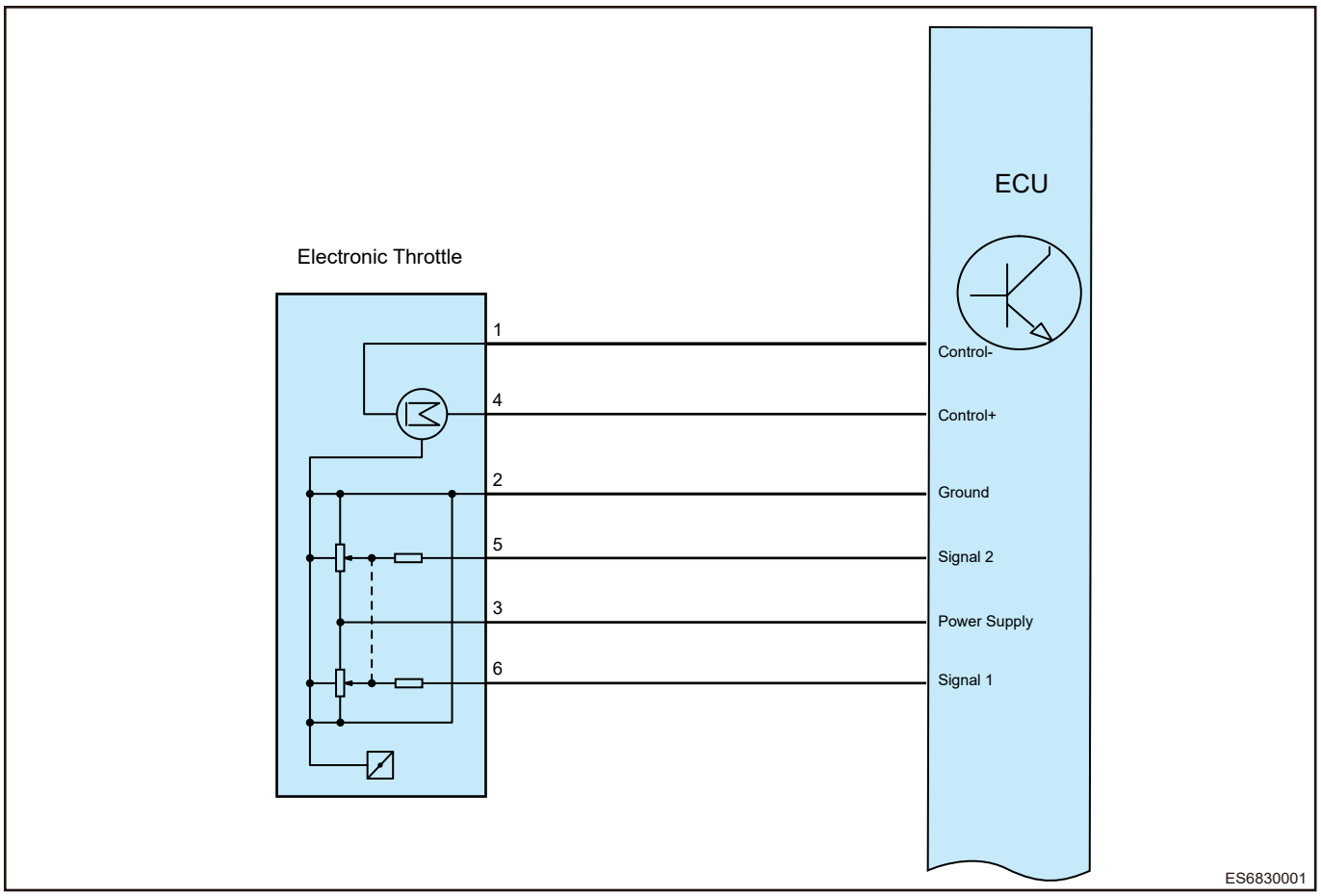
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ Electronic throttle spring inspection malfunction minimum, maximum / deviation between throttle target opening angle and actual opening angle / adjustment / drive level malfunction

DTC	P155400	Max Error of DV-E Return Spring Check Failure
DTC	P155500	
DTC	P156100	
DTC	P156000	Electronic Throttle PID Adjustment Malfunction
DTC	P210000	Electronic Throttle Drive Level Malfunction
DTC	P210300	
DTC	P210600	
DTC	P211800	

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic throttle connector**

(a) Disconnect the negative battery.
(b) Check electronic throttle connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check electronic throttle condition**

(a) Electronic throttle body valve plate is dirty or there are foreign matters, so that the valve plate resistance is large or valve plate is stuck.

NG → **Clean or replace electronic throttle assembly**

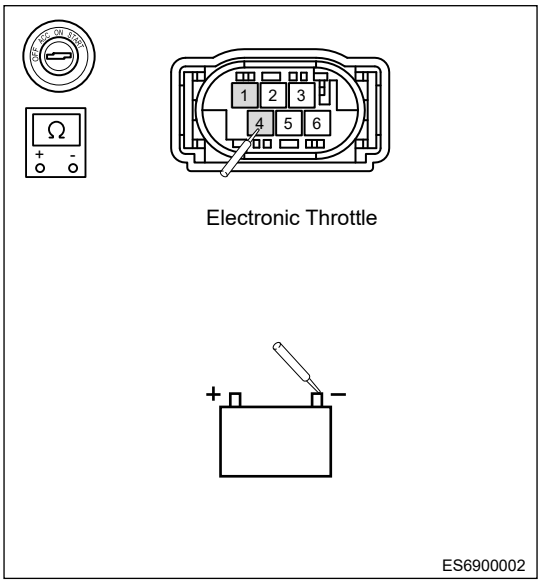
OK

3	**Check for short circuit to ground / power supply or short to each other in electronic throttle line**

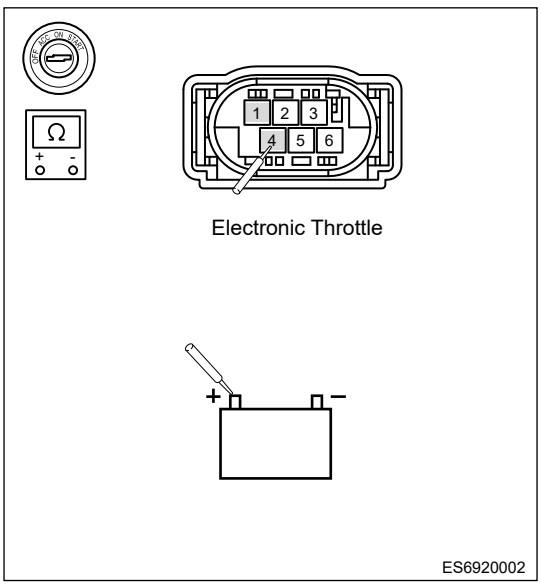
(a) Disconnect the electronic throttle connector.

(b) Disconnect the ECU connector.

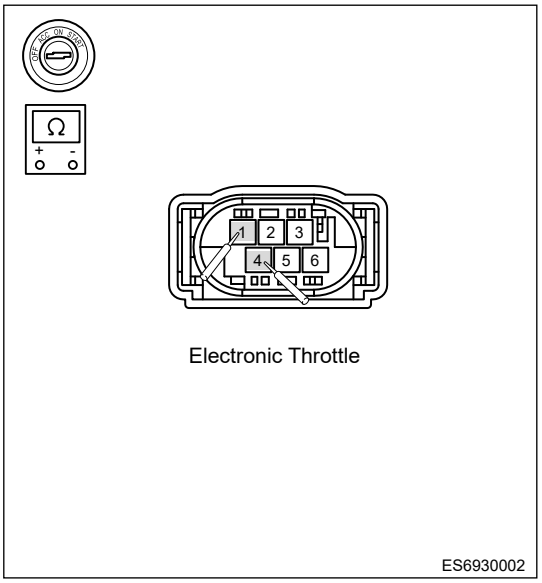
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of electronic throttle (4, 1) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of electronic throttle (4, 1) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of electronic throttle (4, 1) with red and black probes respectively; Check if circuits are short to each other.



NG → **Check and repair circuit**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

DTC	P062700	Fuel Pump “A” Control Circuit Open
DTC	P062800	Fuel Pump "A" Control Circuit Low

DTC	P062900	Fuel Pump "A" Control Circuit High
DTC	P062A00	Fuel Pump Relay Control Circuit Over Temperature

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery.
(c) Disconnect the ECU connector.
(d) Disconnect center fuse and relay box (corresponding fuel pump relay) connector.
(e) Check connector for looseness or poor contact.

NG → **Repair, adjust or replace connector**

OK ↓

2	**Check relay control circuit**

(a) Using ohm band of multimeter, check for continuity between center fuse and relay box connector (fuel pump relay terminal) and ECU connector (corresponding terminal) to check for open circuit.

(b) Using ohm band of multimeter, measure resistance between ECU connector (fuel pump relay terminal) and body ground to check for short to ground.

(c) Turn ENGINE START STOP switch to ON.
(d) Using multimeter, measure voltage between ECU connector (-fuel pump relay terminal) and body ground to check for short to power supply.

NG → **Repair or replace fuel pump replay control wire harness**

OK ↓

3	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace Engine Control Module**
OK	**Conduct test and confirm malfunction has been repaired**

■ Electronic throttle self-learning unable to complete / throttle initial self-learning unable to complete problem

DTC	**P155000**	**Electronic Throttle Self-learning Unable to Complete / Throttle Initial Self-learning Unable to Complete**
DTC	**P155100**	
DTC	**P155800**	**Not Plausible Error of DV-E Limphome Learning Position**
DTC	**P155900**	
DTC	**P155A00**	
DTC	**P155B00**	
DTC	**P155600**	**Electronic Throttle Lower Mechanic Stop Re-learning Error**
DTC	**P155700**	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check if electronic throttle self-learning condition is met**

(a) No malfunctions related to DVE or monitoring;
(b) Rotation speed is 0.
(c) Vehicle speed is 0;
(d) Pedal opening angle is 0;
(e) Battery voltage is higher than 10 V;
(f) Engine coolant temperature is higher than 5℃;
(g) Intake temperature is higher than 5℃;

NG	**Handle the malfunctions of failing to meet the self-learning conditions**

OK

2	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ ECU internal fault

DTC	P15A000	CPU0: MPU Error (Memory, DSPR, PSPR)
DTC	P15A100	CPU0: DCACHE/DSPR ECC Uncorrectable Error
DTC	P15A200	CPU0: DCACHE/DSPR Address Error
DTC	P15A300	CPU0:DCACHE TAG SRAM ECC Uncorrectable Error
DTC	P15A400	CPU0:DCACHE TAG SRAM Address Error
DTC	P15A500	CPU0:PCACHE TAGRAM ECC Uncorrectable Error
DTC	P15A600	CPU0:PCACHE TAGRAM Address Error
DTC	P15A700	CPU0: PCACHE/PSPR ECC Uncorrectable Error
DTC	P15A800	CPU0:PCACHE/PSPR Address Error
DTC	P15A900	CPU1:Lockstep Comparator Error
DTC	P15AA00	CPU1:MPU Error (Memory, DSPR, PSPR)
DTC	P15AB00	CPU1:DCACHE/DSPR ECC Uncorrectable Error
DTC	P15AC00	CPU1:DCACHE/DSPR Address Error
DTC	P15AD00	CPU1:DCACHE TAGRAM ECC Uncorrectable Error
DTC	P15AE00	CPU1:DCACHE TAGRAM Address Error
DTC	P15AF00	CPU1:PCACHE TAGRAM ECC Uncorrectable Error
DTC	P15B000	CPU1:PCACHE TAGRAM Address Error
DTC	P15B100	CPU1:PCACHE/PSPR ECC Uncorrectable Error
DTC	P15B200	CPU1:PCACHE/PSPR Address Error
DTC	P15B300	LMU:SRAM ECC Monitoring Error

DTC	P15B400	LMU:SRAM ECC Uncorrectable Error
DTC	P15B500	LMU:SRAM Address Error
DTC	P15B600	SMU: Recover Timer 0 Timeout Error
DTC	P15B700	SMU: Recover Timer 1 Timeout Error
DTC	P15B800	PMU:PFLASH ECC Uncorrectable Multi-bit Error
DTC	P15B900	PMU:PFLASH Address Error
DTC	P15BA00	PMU: PFLASH ECC Monitoring Error (Cover All ECC Module)
DTC	P15BB00	PMU: PFLASH EDC Comparator Error (Cover All PFLASH Instances)
DTC	P15BC00	SCU/CGU: System PLL OSC_WDT: Input Clock Exceeds Limit Error
DTC	P15BD00	SCU/CGU: System PLL VCO Clock Event Loss Error
DTC	P15BE00	SCU/EVR: EVR 1.3 V Digital Undervoltage Error
DTC	P15BF00	SCU/EVR: EVR 3.3 V Overvoltage Error
DTC	P15C000	SCU/EVR: External Power Supply Overvoltage Error
DTC	P15C100	SCU/WDTS: Safety Watchdog Timeout Error
DTC	P15C200	SCU/WDTCPU0: Watchdog CPU0 Timeout Error
DTC	P15C300	SCU/WDTCPU1: Watchdog CPU1 Timeout Error
DTC	P15C400	SCU/CGU: PLL_ERAY VCO Clock Event Loss Error
DTC	P15C500	SCU/WDTCPU2: Watchdog CPU2 Timeout Error
DTC	P15C600	SCU/DTS: Temperature Sensor Overflow Error
DTC	P15C700	Registers: Register Monitor Detects Error
DTC	P15C800	SCU/LSCU: SCU Configuration Error: Monitor Dual-track Properties (-Inverted Signal) Alarm from Lockstep Comparator (LSCU)
DTC	P15C900	SCU/CGU: Clock Monitoring: STM Exceed Frequency Range Error
DTC	P15CA00	SCU/CGU: Clock Monitoring: PLL_ERAY Exceed Frequency Range Error
DTC	P15CB00	SCU/CGU: Clock Monitoring: PLL Exceed Frequency Range Error
DTC	P15CC00	SCU/CGU: Clock Monitoring: SRI Exceed Frequency Range Error
DTC	P15CD00	SCU/CGU: Clock Monitoring: SPB Exceed Frequency Range Error
DTC	P15CE00	SCU/CGU: Clock Monitoring: GTM Exceed Frequency Range Error
DTC	P15CF00	SCU/CGU: Clock Monitoring: ADC Exceed Frequency Range Error
DTC	P15D000	GTM: SRAMs Uncorrectable Error
DTC	P15D100	FLEXRAY:SRAM Address Error
DTC	P15D200	Misc SRAMs:SRAM ECC Uncorrectable Error
DTC	P15D300	Misc SRAMs:SRAM Address Error
DTC	P15D400	GTM: SRAMs Address Error
DTC	P15D500	CAN: SRAM Uncorrectable Error

DTC	P15D600	CAN: SRAM Address Error
DTC	P15D700	FLEXRAY:SRAM ECC Uncorrectable Error
DTC	P15D800	CPU2:MPU Error (Memory, DSPR, PSPR)
DTC	P15D900	CPU2: DCACHE/DSPR ECC Uncorrectable Error
DTC	P15DA00	CPU2: DCACHE/DSPR Address Error
DTC	P15DB00	CPU2: DCACHE TAG SRAM ECC Uncorrectable Error
DTC	P15DC00	CPU2:DCACHE TAG SRAM Address Error
DTC	P15DD00	CPU2:121 PCACHE TAGRAM ECC Uncorrectable Error
DTC	P15DE00	CPU2:PCACHE TAGRAM Address Failure
DTC	P15DF00	CPU2: PCACHE/PSPR ECC Uncorrectable Error
DTC	P15E000	CPU2: PCACHE/PSPR Address Error
DTC	P061A00	Safely Monitor Torque Exceeds Limit
DTC	P060D00	Accelerator Pedal 2nd Layer Monitoring Error
DTC	P152000	Function Monitoring: Check of Predicted Air Mass Failed
DTC	P152100	Function Monitoring: Fault of ECU Check of Injection Cut-off
DTC	P152200	Function Monitoring: Fault of ECU in Check of Cylinder Individual Fuel Corrections
DTC	P153900	Synchronization Process Rationality Check (Based On Speed and Synchronization Count)
DTC	P153700	Function Monitoring: Fault of ECU or Sensor in RI-Comparison
DTC	P153500	Function Monitoring: Fault of ECU or Sensor in Mixture Check
DTC	P153600	Function Monitoring: Fault of ECU Comparison of Lambda and Operation Mode
DTC	P153800	Electronic Throttle Safety Monitoring Function Error (Ignition Angle Signal, Wire Harness or ECM Error)
DTC	P152700	Function Monitoring: Monitoring of ICO From Level1
DTC	P152800	Function Monitoring: Monitoring of ICO From Level2
DTC	P061C00	Safety Monitoring Function Error (2nd Layer Engine Speed Monitoring Error)
DTC	P152900	Function Monitoring: Fault of Starter Control
DTC	P153000	Function Monitoring: Fault of ECM ADC - Null Load Test Pulse
DTC	P153100	Function Monitoring: Fault of ECM ADC - Test Voltage
DTC	P157100	Closed Path Checking, Driver Level Check Error or Communication Error
DTC	P157200	Under Normal Voltage, ABE Activated
DTC	P157300	Diagnostic Fault Check to Report "WDA active" Due to Errors in Query/Response Communication
DTC	P157400	Errorpin Activated and Monitoring Communication Normal

DTC	P157500	Diagnostic Fault Check to Report "WDA active" Due to Overvoltage Detection
DTC	P142000	CAN Hardware Memory Response Timeout
DTC	P142100	LIN Hardware Memory Response Timeout
DTC	P142800	LIN1 Bus Massage Receiving Time Out of Limit
DTC	P064100	5 V Power Supply Module 1 Fail
DTC	P065100	5 V Power Supply Module 2 Fail
DTC	P069700	5 V Power Supply Module 3 Fail
DTC	P261000	Unreasonable Shutdown Timing
DTC	P06B842	Error when Reading/Writing Flash Block
DTC	P06B843	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

2	**Reconfirm DTCs**

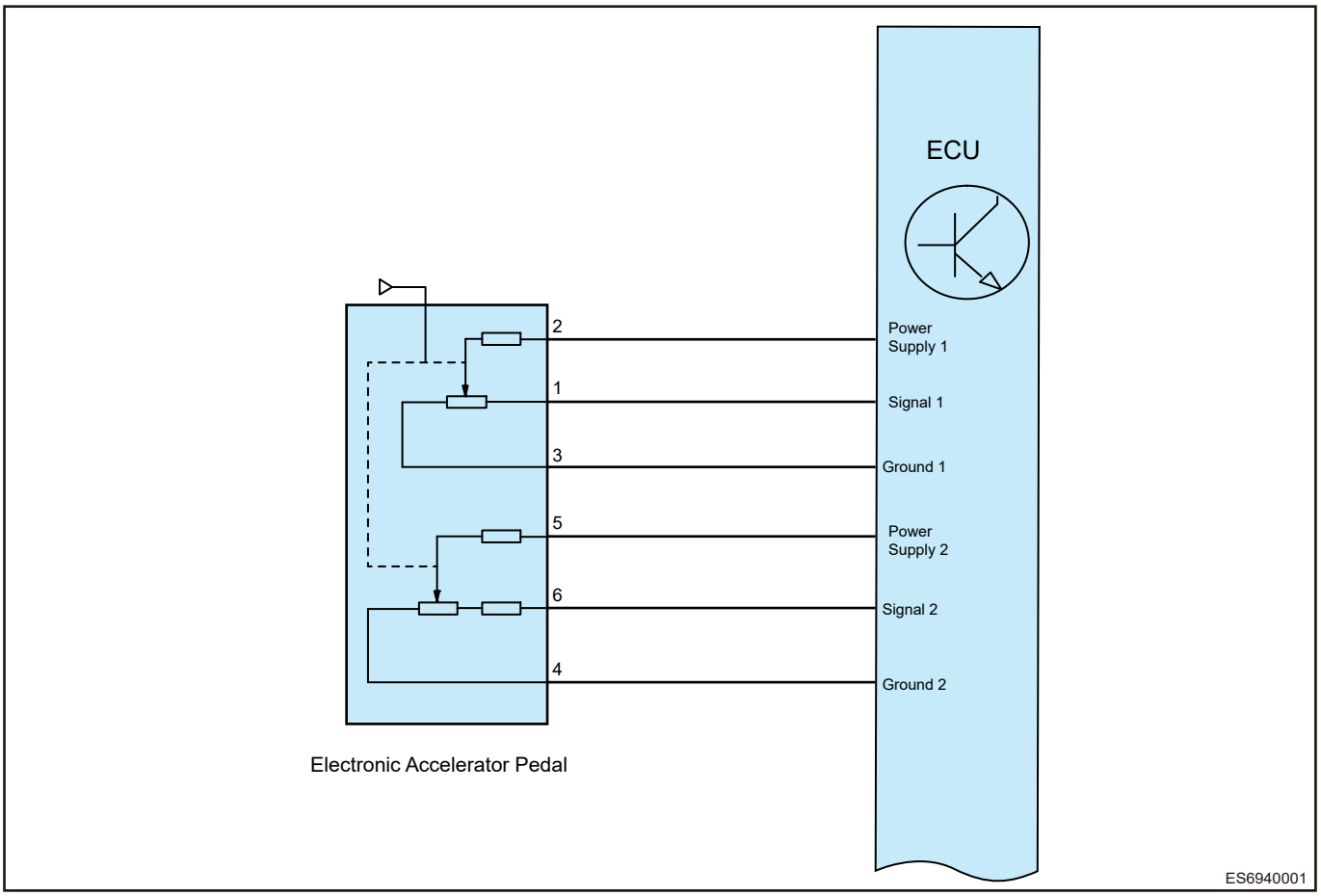
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Deviation between both paths signal of accelerator pedal out of limit/voltage too high/too low**

DTC	**P213800**	**Deviation Between Both Paths Signal of Accelerator Pedal Out of Limit**
DTC	**P212300**	**Accelerator Pedal 1st Path / 2nd Path Signal Voltage High**
DTC	**P212800**	
DTC	**P212200**	**Accelerator Pedal 1st Path / 2nd Path Signal Voltage Low**
DTC	**P212700**	

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic accelerator pedal connector**

(a) Disconnect the negative battery.
(b) Check electronic accelerator pedal connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

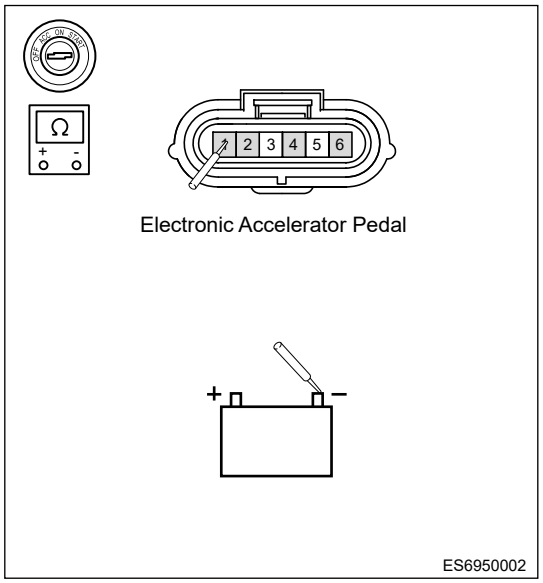
OK

2	**Check for short circuit to ground / power supply or short to each other in electronic accelerator pedal line**

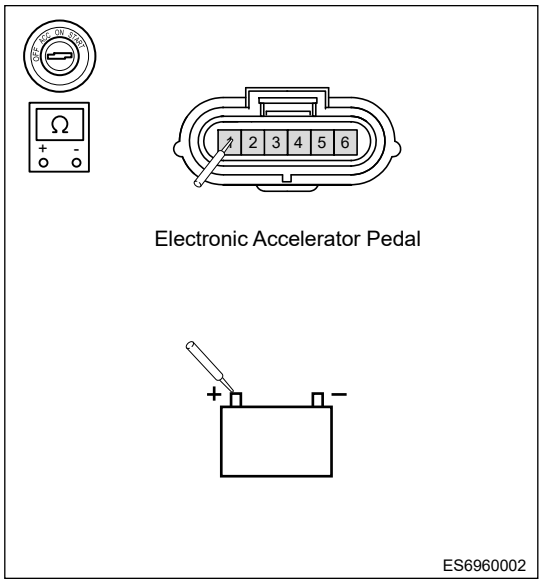
(a) Disconnect the electronic accelerator pedal connector.

(b) Disconnect the ECU connector.

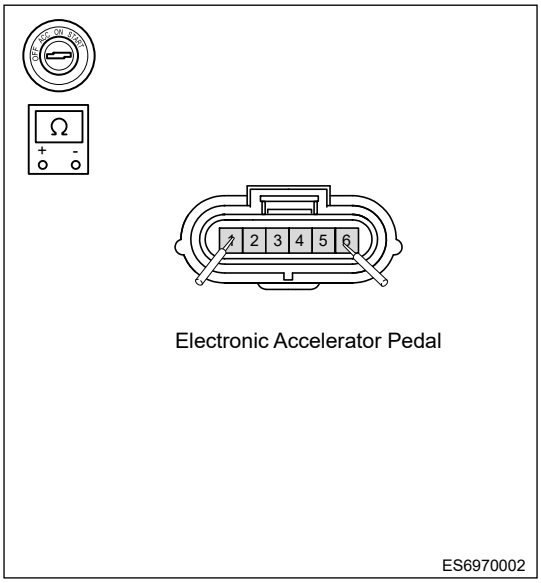
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of electronic accelerator pedal (1, 2, 4, 6) with red probe respectively. Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of electronic accelerator pedal (1, 2, 3, 4, 5, 6) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of electronic accelerator pedal (1, 2, 3, 4, 5, 6) with red and black probes respectively; Check if circuits are short to each other.



NG → **Check and repair circuit**

OK

3	**Check electronic accelerator pedal position sensor power supply / ground / signal**

(a) Connect the electronic accelerator pedal, ECU connector

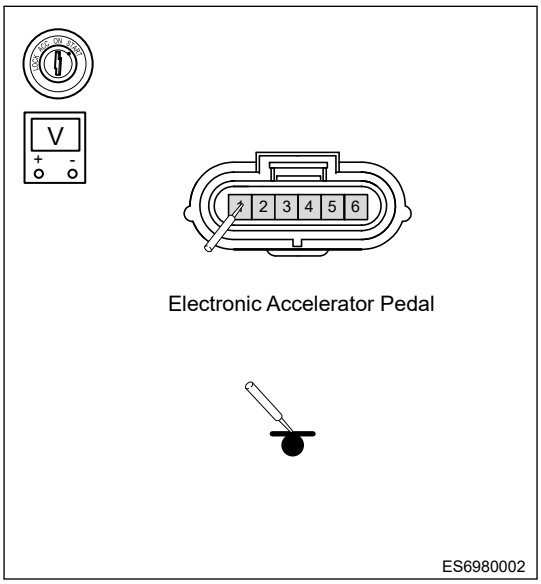
(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of electronic accelerator pedal (1, 2, 3, 4, 5, 6) with red probe.

Power supply terminal: 5 V

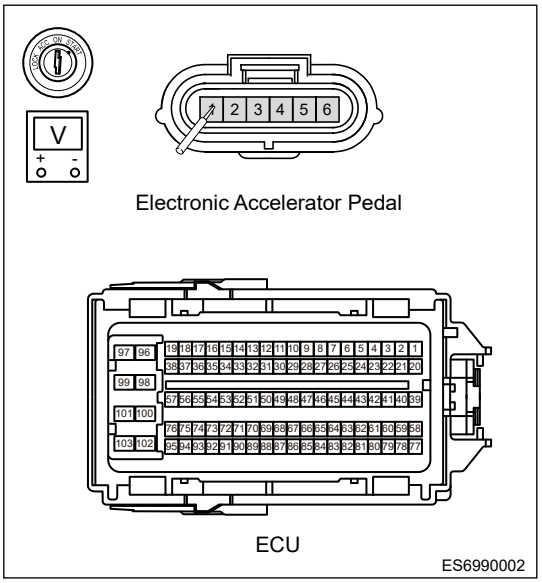
Ground terminal: < 0.2 V

Signal 1 voltage value and signal 2 voltage value maintain a voltage multiplying relationship



(d) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure electronic accelerator pedal (1, 2, 3, 4, 5, 6) with red probe

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

4	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	**Reconfirm DTCs**

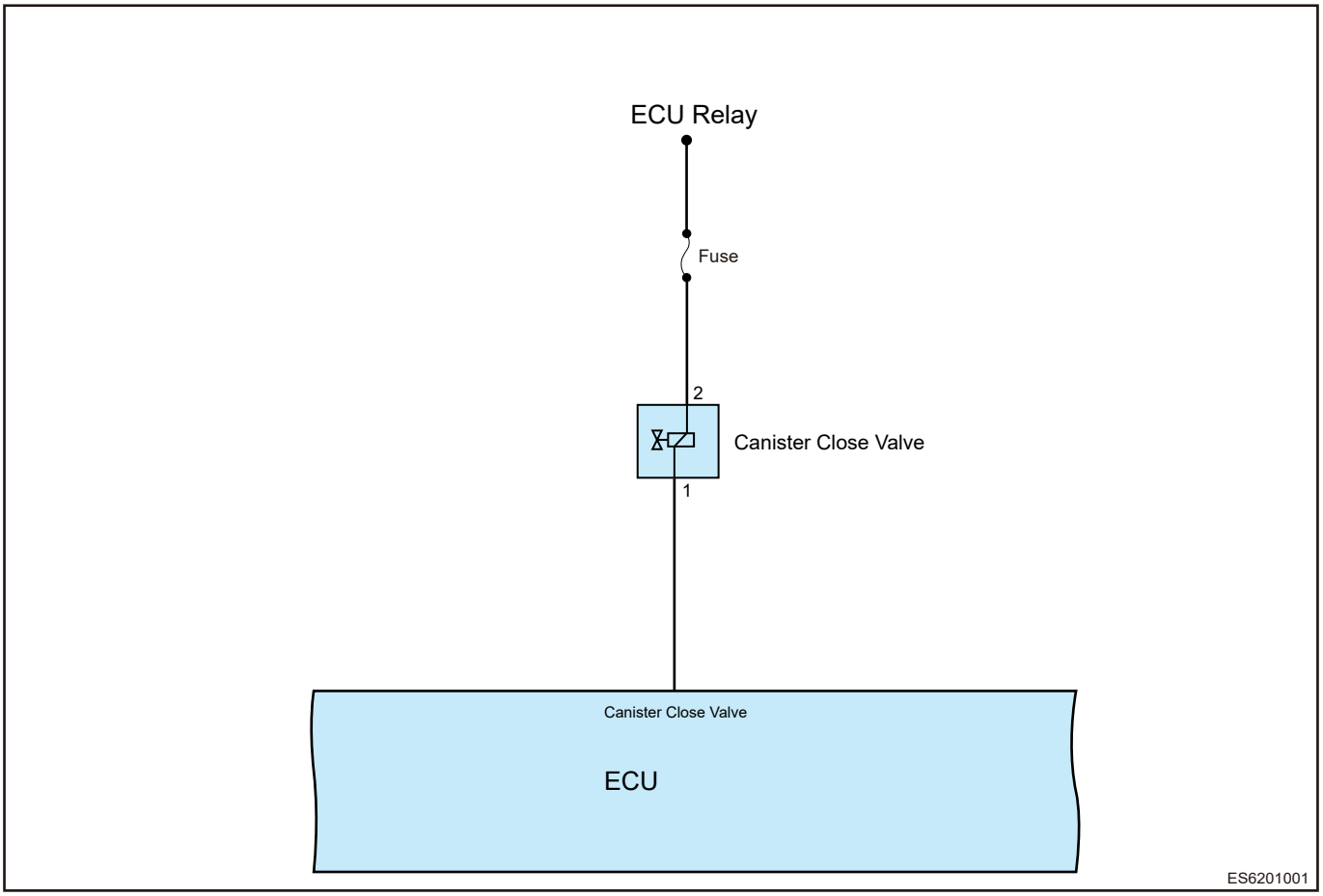
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **EVAP system vent control circuit short to ground or power supply**

DTC	**P049900**	**EVAP System Vent Control Circuit Short to Power Supply**
DTC	**P049800**	**EVAP System Vent Control Circuit Short to Ground**
DTC	**P044700**	**EVAP System Vent Control Circuit Short to Ground**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check canister vent valve connector**

(a) Disconnect the negative battery.
(b) Check canister vent valve connector for looseness or poor contact.

NG	**Repair and adjust connector, or replace it**

OK

2	**Check canister vent valve power supply fuse**

(a) Check if "canister vent valve" fuse in engine compartment fuse and relay box is blown.

NG → **Check and repair short circuit malfunction and replace fuse**

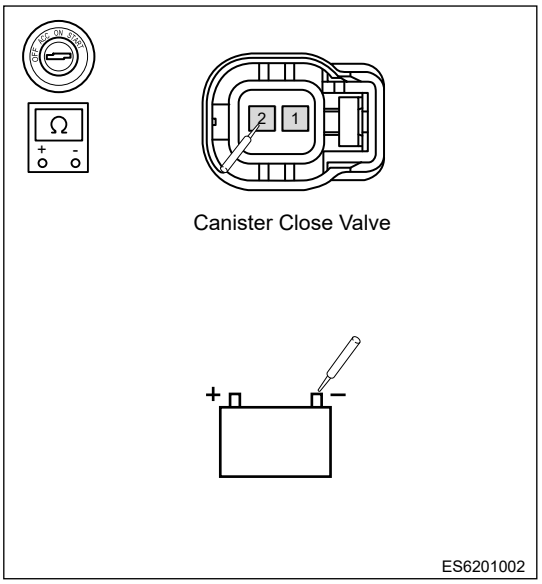
OK

3	**Check for short circuit to ground / power supply or short to each other in canister vent valve line**

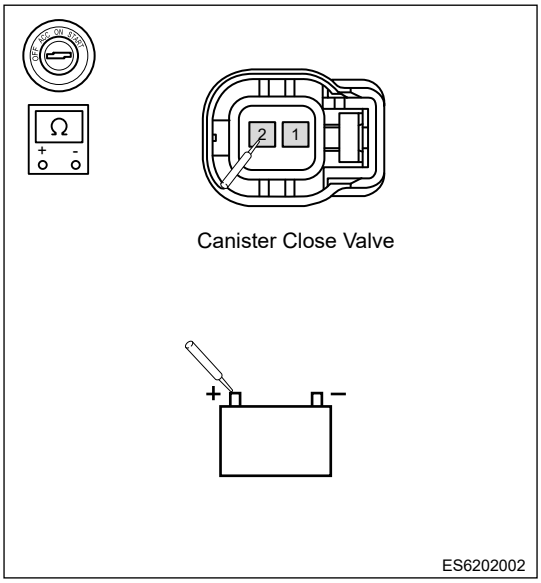
(a) Disconnect the canister vent valve connector.

(b) Disconnect the ECU connector.

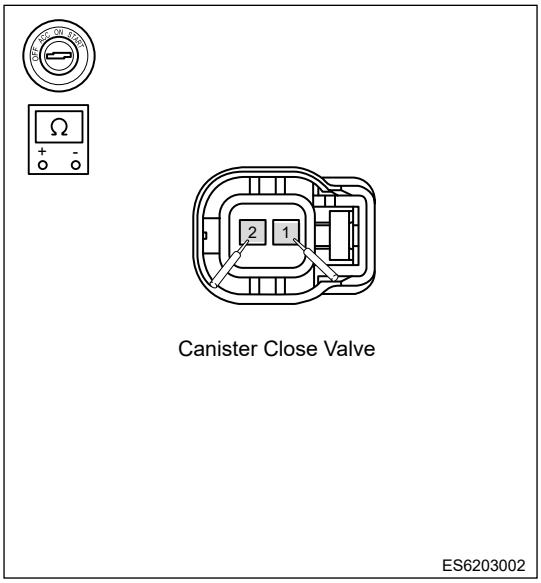
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of canister vent valve (1, 2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of canister vent valve (1, 2) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of canister vent valve (1, 2) with red and black probes respectively; Check if circuits are short to each other.



NG	**Check and repair circuit**

OK

4	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK	**Repair or replace new module**

NG

5	Reconfirm DTCs

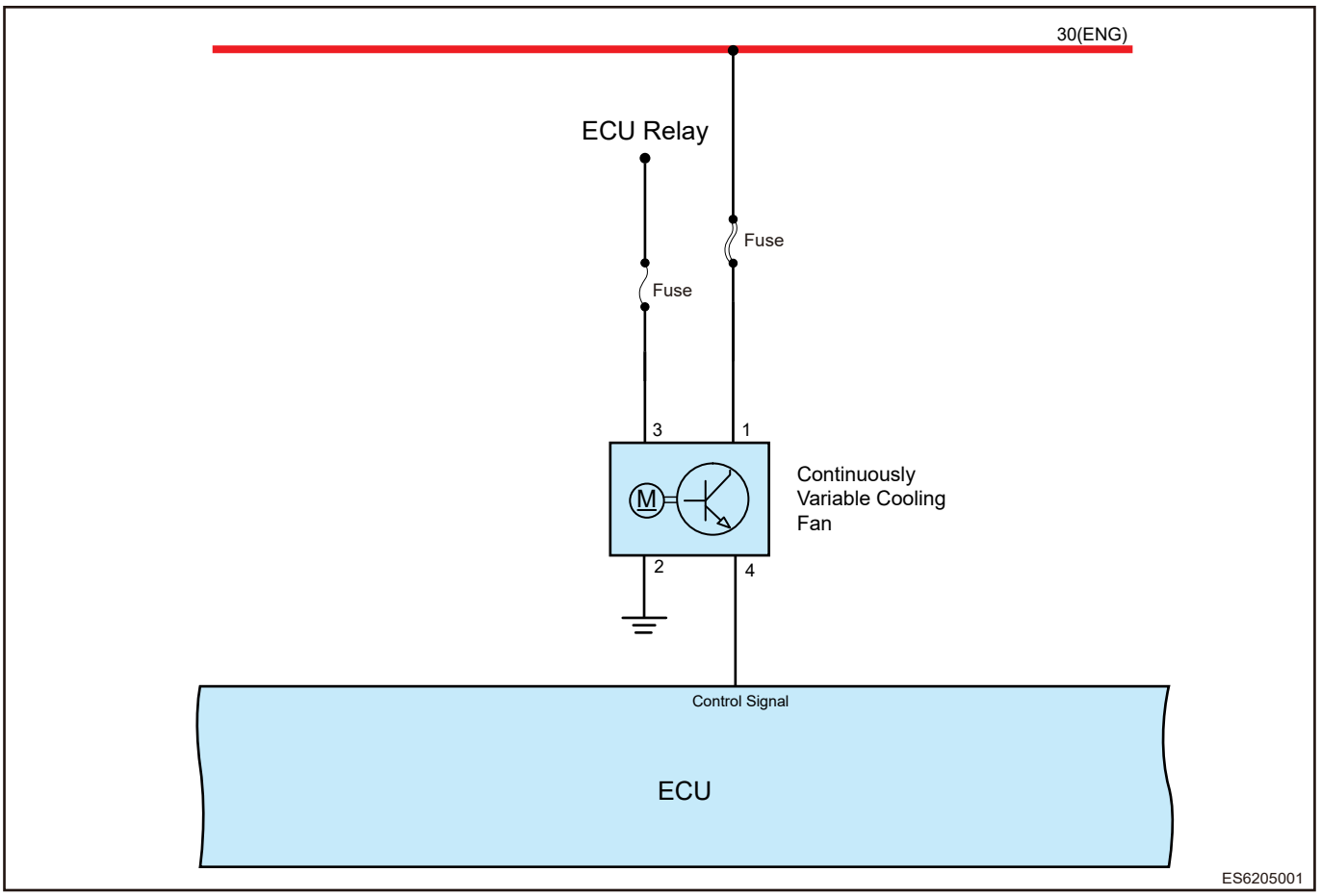
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Cooling fan control circuit voltage too low/too high**

DTC	P069100	Cooling Fan 1 Control Circuit Low
DTC	P069200	Cooling Fan 1 Control Circuit High
DTC	P048000	Cooling Fan 1 Control Circuit
DTC	P063400	Cooling Fan 1 Drive Chip Overheating
DTC	P048371	Cooling Fan Rationality Check Error (Type 1)
DTC	P048372	Cooling Fan Rationality Check Error (Type 2)
DTC	P048373	Cooling Fan Rationality Check Error (Type 3)
DTC	P048374	Cooling Fan Rationality Check Error (Type 4)

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check cooling fan connector**

(a) Disconnect the negative battery.
(b) Check cooling fan connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check cooling fan power supply fuse**

(a) Check if "cooling fan power supply" fuse in engine compartment fuse and relay box is blown.

NG → **Check and repair short circuit malfunction of circuit**

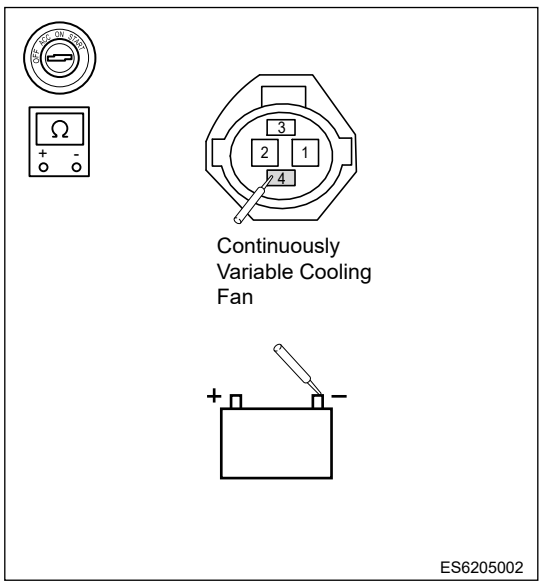
OK

3	**Check for short circuit to ground / power supply in cooling fan control circuit**

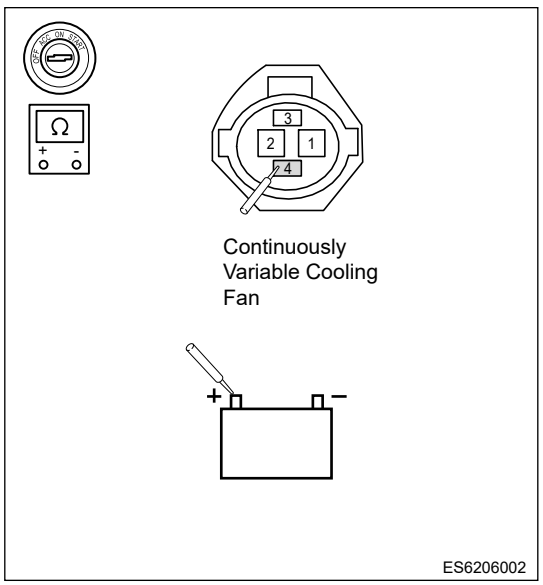
(a) Disconnect the cooling fan connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of cooling fan (4) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of cooling fan (4) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair circuit**

OK

4	Check cooling fan power supply / ground / control signal

(a) Connect the cooling fan, ECU connector

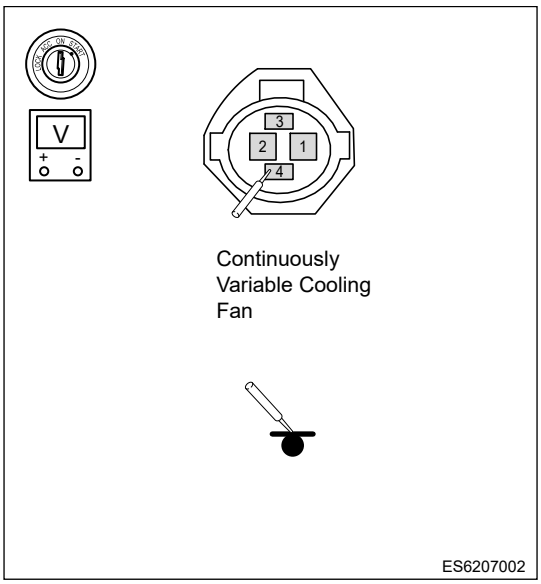
(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, connect black probe to battery negative terminal, and measure voltages of cooling fan (1, 2, 3, 4) with red probe.

Power supply terminal: 12V

Ground terminal: < 0.2 V

The control signal adopts duty ratio control (high level is effective)



NG → **Repair or replace wire harness**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **TCU requests to illuminate MIL light**

DTC	P070000	TCU Requests to Illuminate MIL Light

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Read transmission system DTCs and refer to transmission system diagnosis.

■ **Vehicle speed sensor performance / improper / input signal fault**

DTC	**P121200**	**Vehicle Speed Sensor Performance Failure (Vehicle Speed Exceed Maximum Range)**
DTC	**P050184**	**Vehicle Speed Sensor Performance Failure (Vehicle Speed Exceed Minimum Range)**
DTC	**P050165**	**Vehicle Speed Sensor Performance Failure (Vehicle Speed Too Low When Oil Cut-Off During Coasting)**
DTC	**P050166**	**Vehicle Speed Sensor "A" Circuit Range/Performance**
DTC	**P050000**	**Vehicle Speed Sensor Input Signal Fault**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Read brake control system DTCs and refer to brake control system diagnosis.

■ **Ignition angle efficiency monitoring during catalytic converter heating**

DTC	**P050B00**	**Cold Start Ignition Timing Performance**
DTC	**P050B20**	**Cold Start Ignition Timing Performance**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic throttle condition**

(a) Check if electronic throttle is dirty or is stuck at position with a small opening angle.

NG → Clean or replace electronic throttle assembly

OK

2	Check ignition system

(a) Check engine for DTCs related to ignition.
(b) Check ignition coil and spark plug for damage.

NG → Replace the damaged parts

OK

3	Check intake system

(a) Check intake manifold or each connecting line for air leakage.

NG → Replace leaked damaged parts

OK

4	Check fuel system

(a) Check if low/high pressure fuel pressure is too low.

NG → Replace the damaged parts

OK

5	Check if exhaust back pressure is too high

(a) Check pre-catalytic converter for blockage.
(b) Check GPF particulate filter for blockage.

NG → Replace pre-catalytic converter assembly or perform GPF regeneration

OK

6	Check boost system

(a) Check each connecting line of boost system for falling off.
(b) Check if turbocharger can boost normally and each actuator can operate normally.

NG → **Replace turbocharger assembly**

OK ↓

7	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG ↓

8	Reconfirm DTCs

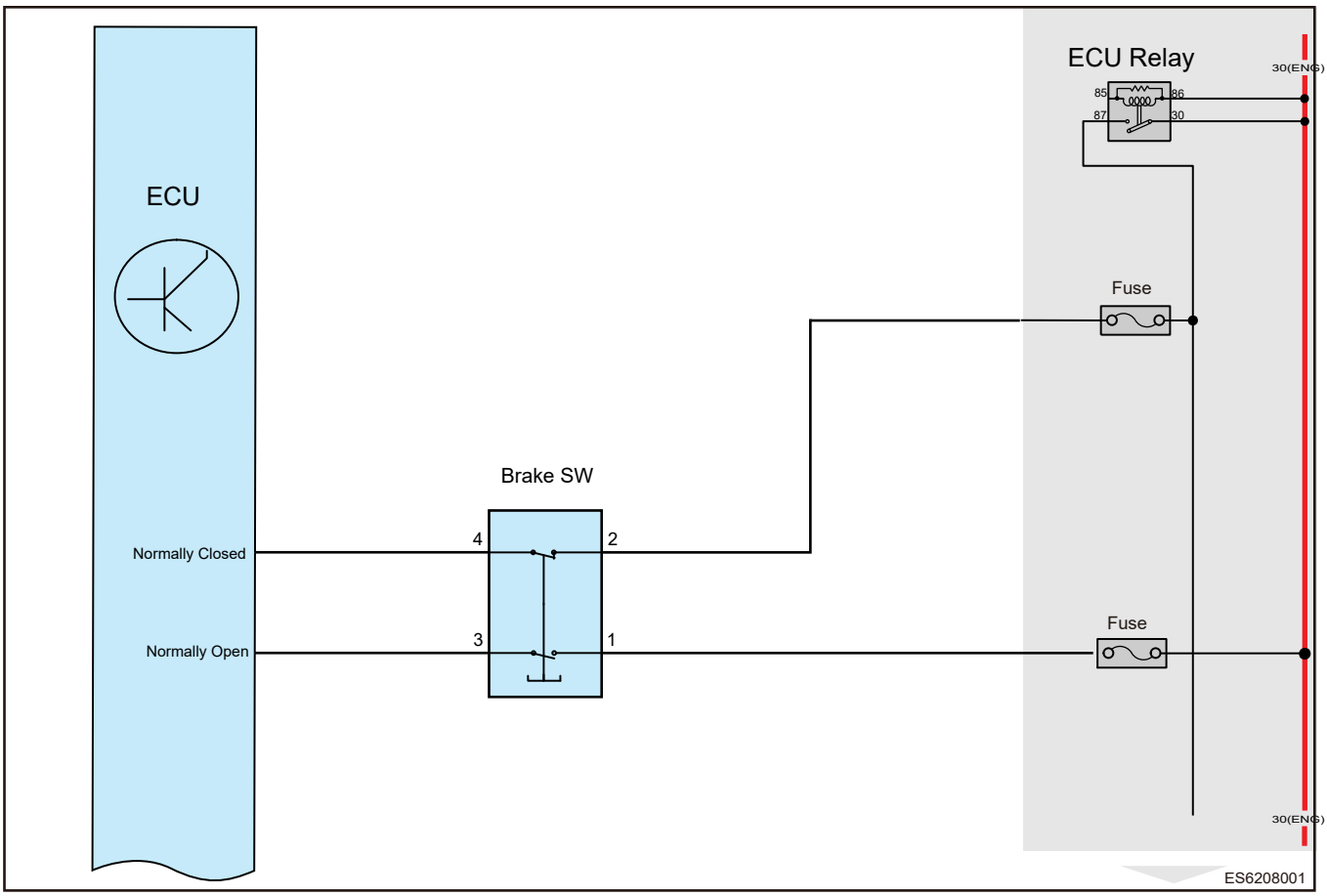
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ Brake pedal signal synchronization malfunction

DTC	P012200	Brake Pedal Signal Synchronization Malfunction

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check brake switch connector**

(a) Disconnect the negative battery.
(b) Check brake switch connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check brake switch power supply fuse**

(a) Check if "brake switch" power supply fuse in instrument panel fuse box is blown.

NG → **Check and repair short circuit malfunction of circuit**

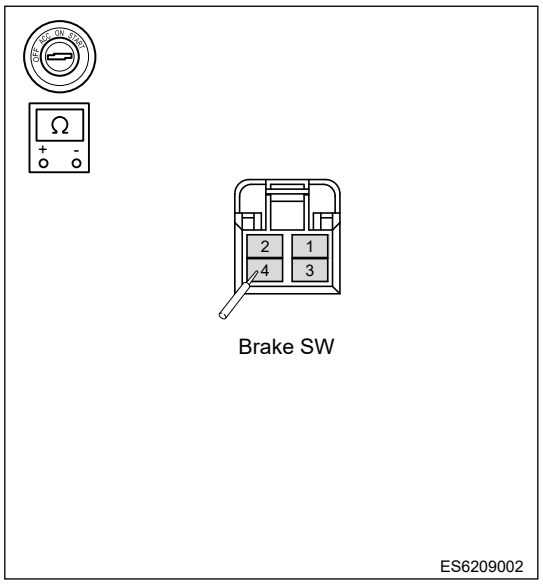
OK

3	**Check brake switch condition**

(a) Unplug the brake switch connector.

(b) Using ohm band of multimeter, measure brake switch (1, 3) with red and black probes; There should be continuity without brake pedal depressed and no continuity with brake pedal depressed.

(c) Using ohm band of multimeter, measure brake switch (2, 4) with red and black probes; There should be no continuity without brake pedal depressed and there should be continuity with brake pedal depressed.



NG → **Replace brake switch assembly**

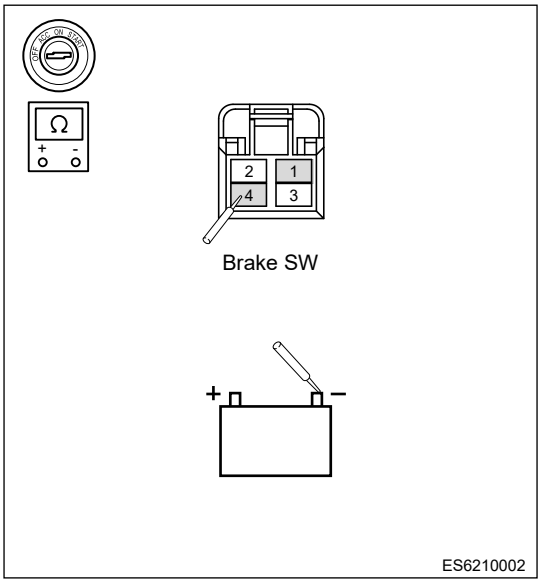
OK

4	**Check for short circuit to ground / power supply or short to each other in brake switch line**

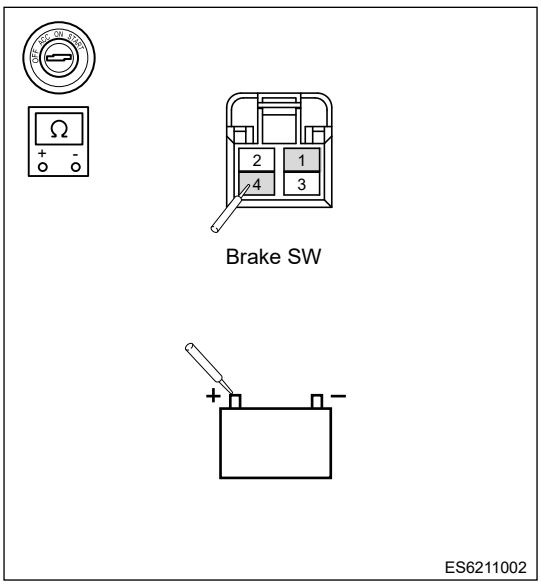
(a) Disconnect the brake switch connector.

(b) Disconnect the ECU connector.

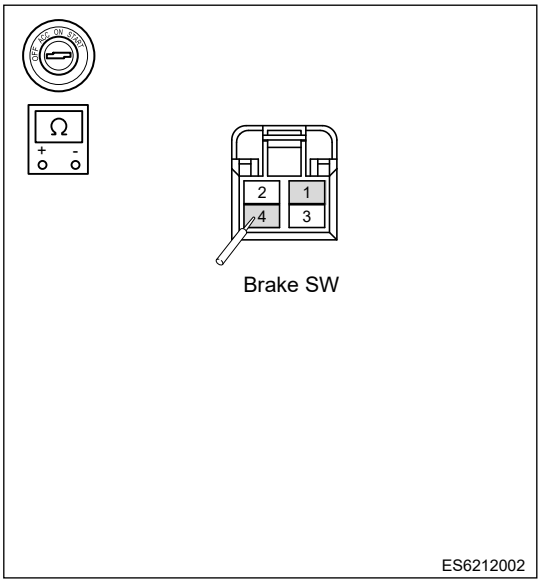
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of brake switch (1, 4) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of brake switch (1, 4) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of brake switch (1, 4) with red and black probes respectively; Check if circuits are short to each other.



NG → **Check and repair circuit**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Main relay open / short to ground / power supply**

DTC	**P068500**	**Main Relay Open Circuit Error**
DTC	**P068700**	**Main Relay Short to Power Supply**

DTC	P068600	Main Relay Short to Ground
DTC	P06869E	ECM/PCM Power Relay Control Circuit Low

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check main relay**

(a) Replace the main relay in engine compartment fuse and relay box.

NG → **Replace main relay**

OK

2	**Check main relay coil terminal power supply fuse**

(a) Check if "main relay coil terminal" power supply fuse in engine compartment main fuse box is blown.

NG → **Check and repair short circuit malfunction of circuit**

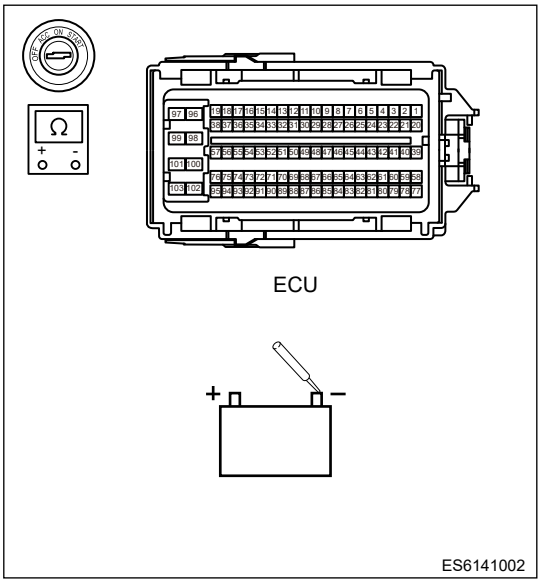
OK

3	**Check for short circuit to ground / power supply in main relay control circuit**

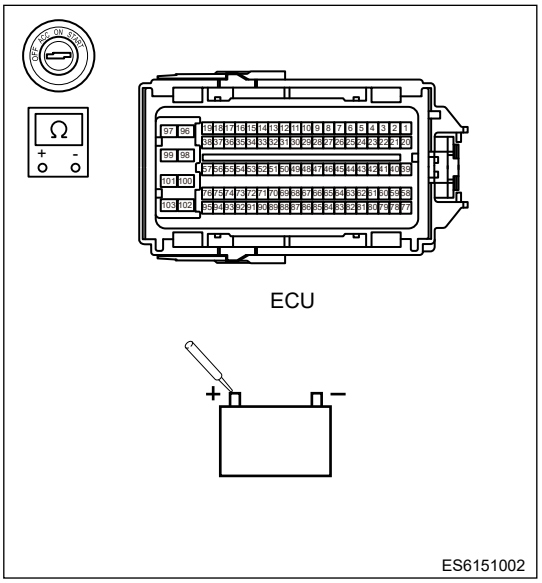
(a) Disconnect the engine compartment fuse and relay box connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of ECU (main relay control) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of ECU (main relay control) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair circuit**

OK

4	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Response reception time out/error of LIN bus (contact between EMS and intellectual alternator)**

DTC	P143000	Battery Has Been Changed and Long Time No Tester Confirmation
DTC	P143100	EBS or Battery Error
DTC	P143200	EBS Temporary Error

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery model

(a) Check if battery model is in agreement with genuine battery.
Specification: 12 V 70 AH

NG → **Replace with genuine battery**

OK

2	Check battery sensor connector

(a) Disconnect the negative battery.
(b) Check battery sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

3	Check LIN line voltage

(a) Disconnect the battery sensor connector.
(b) Using voltage band of multimeter, connect black probe to battery negative terminal, measure voltage of battery sensor LIN line with red probe respectively.

Equivalent voltage: Approximately 10 V

NG → **Check and repair LIN line**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Starter relay / drive chain state relay fault**

DTC	**P26F100**	**Starter Relay R1 (Crank Relay) or Starter (Drive Chain) Relay R2 (Pt State Relay) Cannot Be Combined**
DTC	**P26F200**	**Starter (Drive Chain) Status Relay R2 (PT State Relay) Cannot Be Disconnected**
DTC	**P26F000**	**Starter Relay R1 (Crank relay) Cannot Be Disconnected**
DTC	**P14AD00**	**Engine Block or Starter is not Engaged**
DTC	**P14AF00**	**KL50r Wire Short Circuit to Ground**
DTC	**P14AE00**	**KL50r Wire Short Circuit to Battery**
DTC	**P14AC00**	**Starter Damaged or Wire Dropped**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check drive chain state relay

(a) Replace the drive chain state relay in engine compartment fuse and relay box.

NG → **Replace drive chain state relay**

OK

2	Check drive chain state relay feedback terminal power supply fuse

(a) Check if fuse of engine compartment fuse and relay box "drive chain state relay feedback terminal power supply" is blown.

NG → **Check and repair short circuit malfunction of circuit**

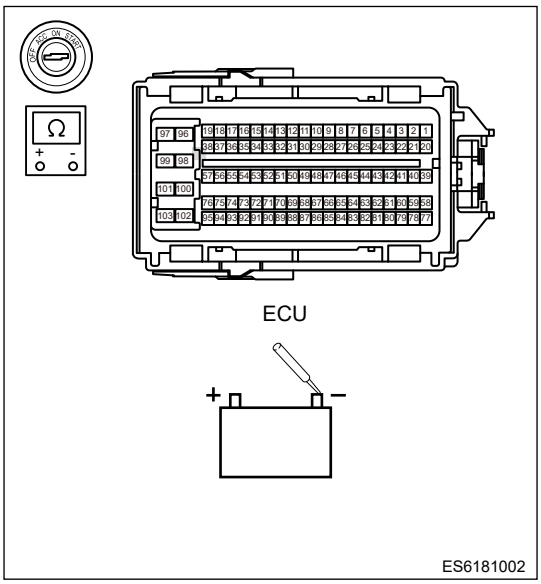
OK

3	Check for short circuit to ground / power supply in drive chain state relay feedback circuit

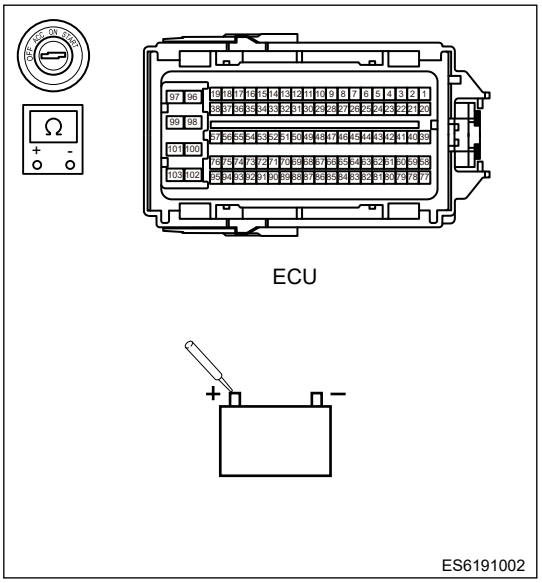
(a) Disconnect the engine compartment fuse and relay box connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, measure resistance of ECU (starter relay control) with red probe respectively. Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, measure resistance of ECU (starter relay control) with red probe respectively. Check if circuit is shored to power supply.



NG	**Check and repair circuit**

OK

4	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK	**Repair or replace new module**

NG

5	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

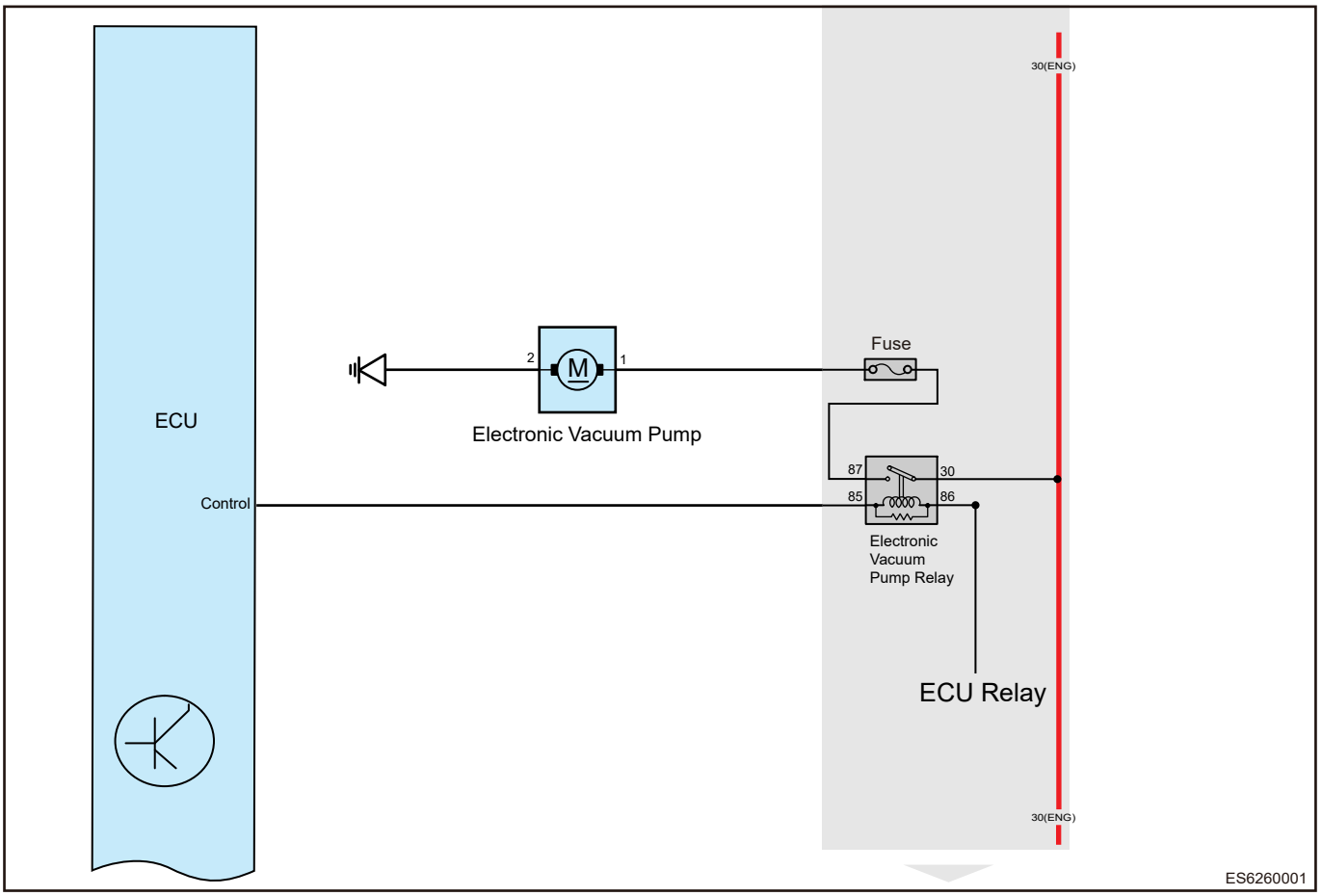
OK	**Conduct test and confirm malfunction has been repaired**

■ Brake vacuum pump control circuit open / voltage too low / too high

DTC	**P050F00**	**Brake Assist Vacuum Too Low**
DTC	**P258A00**	**Vacuum Pump Control Circuit Open**

DTC	P258C00	Vacuum Pump Control Circuit "A" Low
DTC	P258D00	Vacuum Pump Control Circuit "A" High
DTC	P063449	Brake Vacuum Pump Drive Chip Overheat

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electric vacuum pump connector**

(a) Disconnect the negative battery.
(b) Check electric vacuum pump connector for looseness or poor contact.

NG	**Repair and adjust connector, or replace it**

OK

2	Check electric vacuum pump relay

(a) Replace the electric vacuum pump relay in engine compartment fuse and relay box.

NG → Replace electric vacuum pump relay

OK

3	Check electric vacuum pump relay coil terminal power supply fuse

(a) Check if "electric vacuum pump relay coil terminal" fuse in engine compartment fuse and relay box is blown.

NG → Check and repair short circuit malfunction of circuit

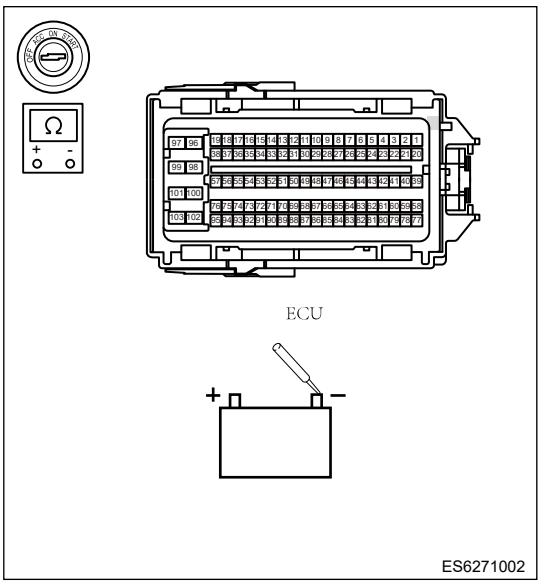
OK

4	Check for short circuit to ground / power supply in electric vacuum pump relay control circuit

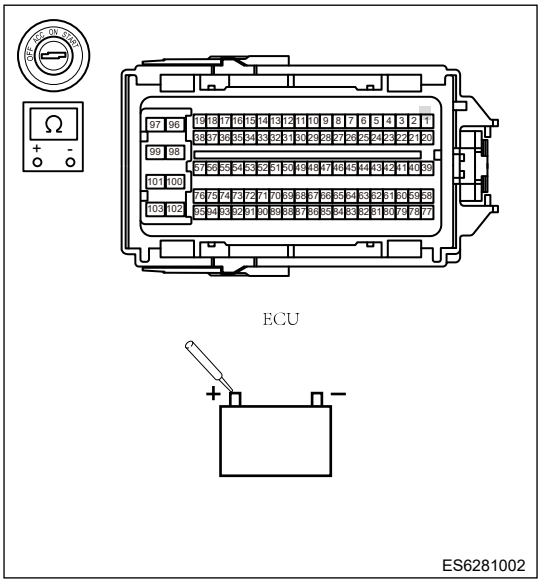
(a) Unplug the electric vacuum pump relay.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of ECU (vacuum pump relay control) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of ECU (vacuum pump relay control) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair circuit**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

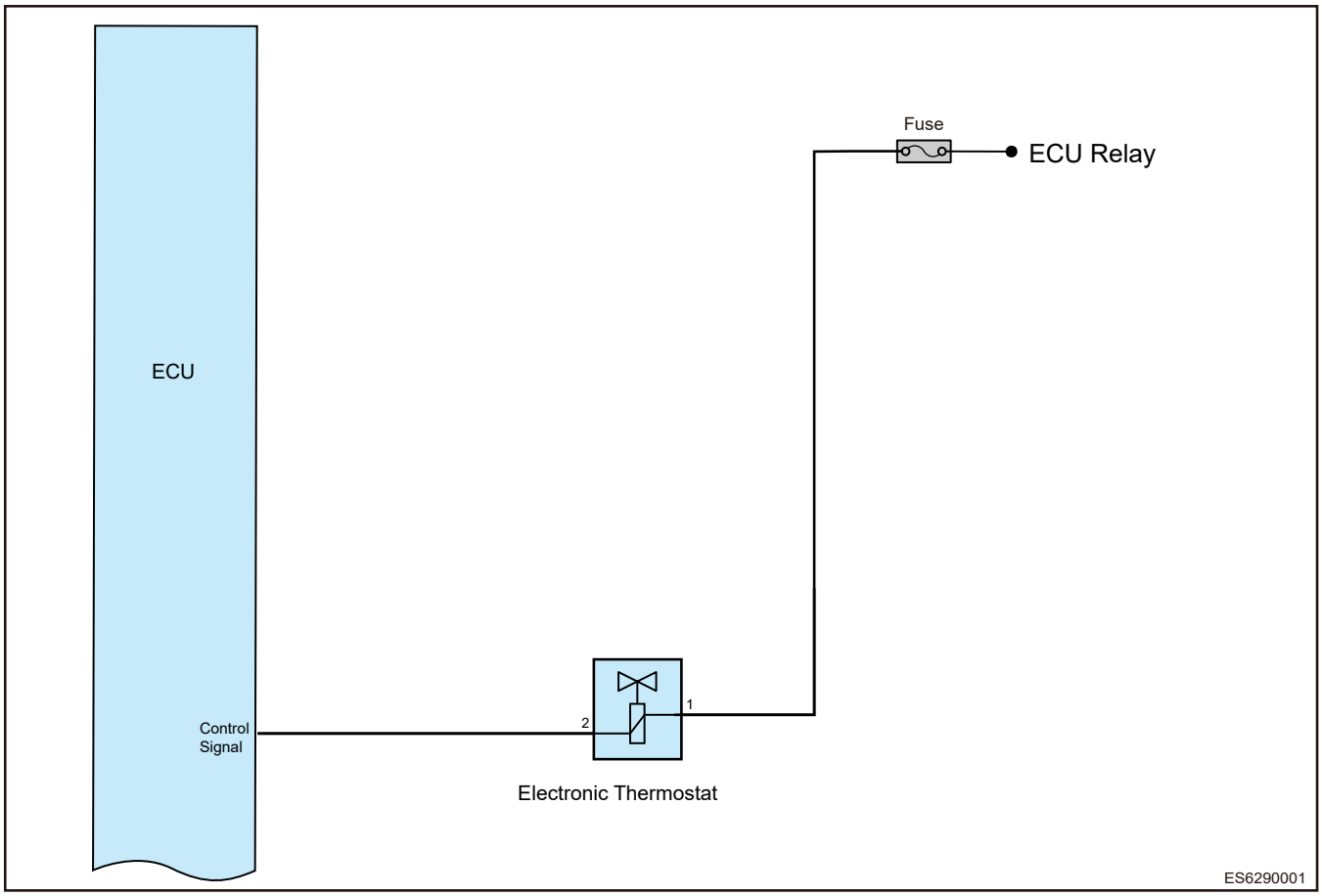
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Electronic thermostat control circuit open / voltage too low / too high**

DTC	**P059700**	**Thermostat Heater Control Circuit Open**
DTC	**P059800**	**Thermostat Heater Control Circuit Low**
DTC	**P059900**	**Thermostat Heater Control Circuit High**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check electronic thermostat connector**

(a) Disconnect the negative battery.
(b) Check electronic thermostat connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	Check electronic thermostat power supply fuse

(a) Check if "electronic thermostat" power supply fuse in engine compartment fuse and relay box is blown.

NG → **Check and repair short circuit malfunction of circuit**

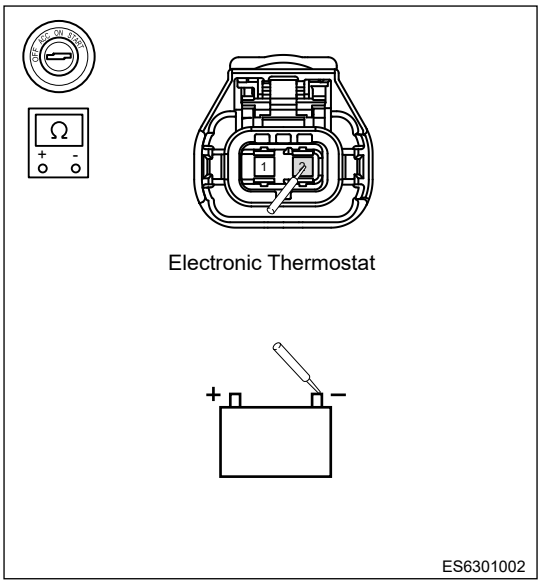
OK

3	Check for short circuit to ground / power supply in electronic thermostat control circuit

(a) Disconnect the electronic thermostat connector.

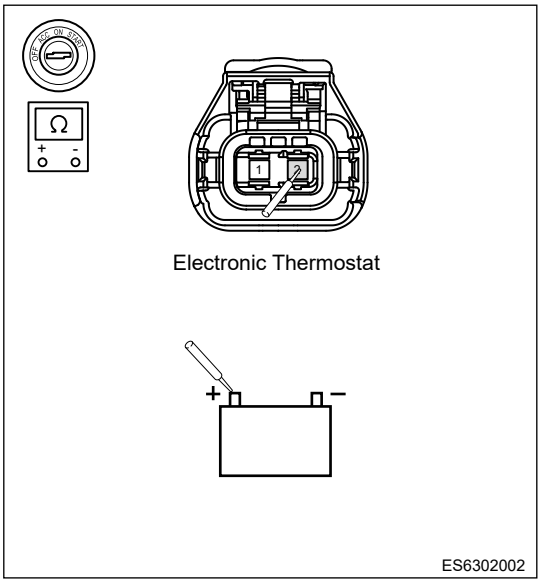
(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of electronic thermostat (2) with red probe respectively; Check if circuit is short to ground.



Electronic Thermostat

(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of electronic thermostat (2) with red probe respectively; Check if circuit is short to power supply.

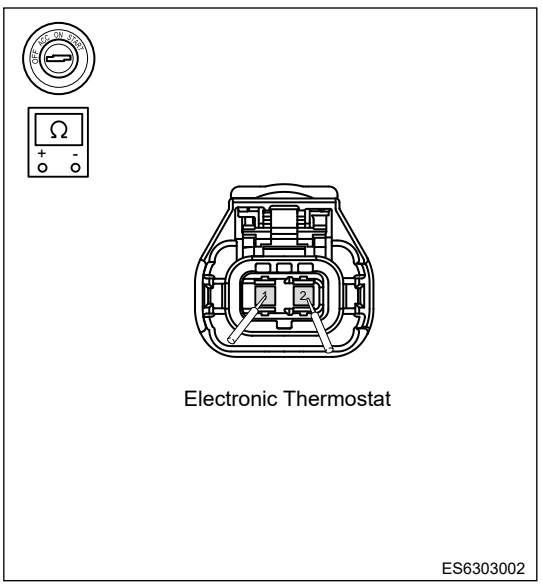


NG → **Check and repair circuit**

OK →

4	**Check if circuits of electronic thermostat themselves are short to each other or opened**

(a) Using ohm band of multimeter, measure resistances of electronic thermostat (1, 2) with red and black probes respectively; Check if they are short to each other or open.



NG → **Replace electronic thermostat assembly**

OK →

5	**Check Engine Control Module (ECU)**

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ Ambient temperature sensor circuit voltage too low / too high

DTC	**P007200**	**Ambient Air Temperature Sensor Circuit "A" Low**
DTC	**P007300**	**Ambient Air Temperature Sensor Circuit "A" High**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

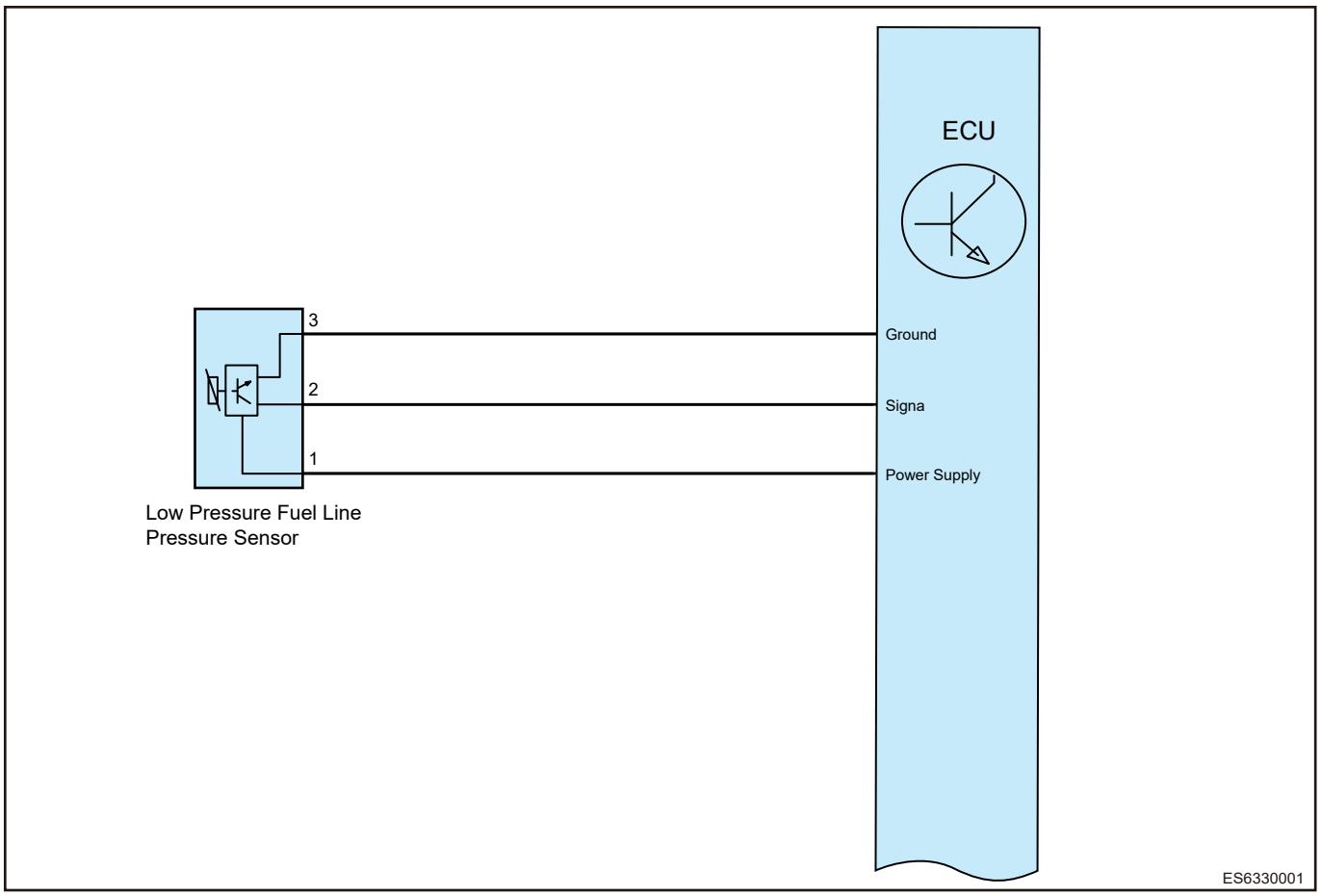
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Read A/C system DTCs and refer to A/C system diagnosis.

■ Low pressure fuel pressure sensor malfunction

DTC	**P254029**	**DECOS Oil Passage Pressure Sensor Circuit Bank 1-Positive Offset**
DTC	**P254028**	**DECOS Oil Passage Pressure Sensor Circuit Bank 1-Negative Offset**
DTC	**P137000**	**DECOS Oil Passage Pressure Sensor Relative Pressure Too Low**
DTC	**P137100**	**DECOS Oil Passage Pressure Sensor Relative Pressure Too High**
DTC	**P008A00**	**DECOS Low Pressure Oil Passage Pressure Too Low**
DTC	**P008B00**	**DECOS Low Pressure Fuel System Pressure Too High**
DTC	**P016F00**	**DECOS Low Pressure Oil Passage PWM Control Deviation Too Large**
DTC	**P016E00**	**Closed Loop Fuel Pressure Control At Limit - Pressure Too High**

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check low pressure fuel pressure sensor connector**

(a) Disconnect the negative battery.
(b) Check low pressure fuel pressure sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check low pressure end fuel pressure**

(a) Using the fuel pressure gauge to test if low pressure end fuel pressure is met the standard.

NG → **Replace electric fuel pump assembly**

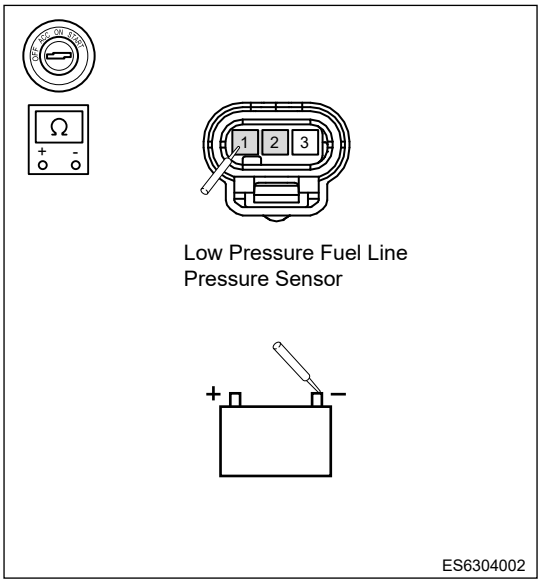
OK

3	**Check for short circuit to ground / power supply or short to each other in low pressure fuel pressure sensor**

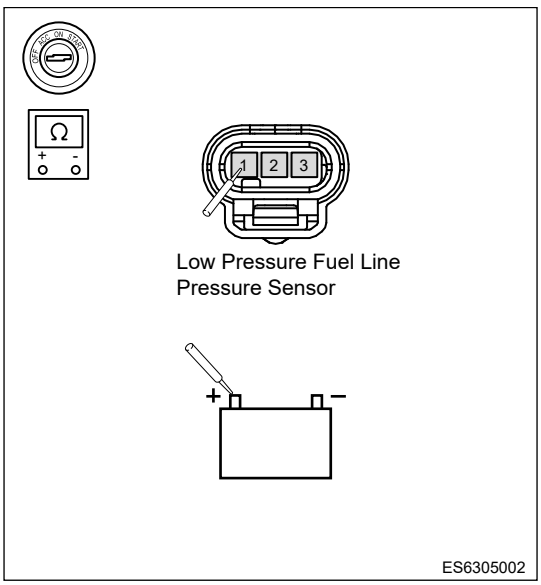
(a) Disconnect the low pressure fuel pressure sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of low pressure fuel pressure sensor (1, 2) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of low pressure fuel pressure sensor (1, 2, 3) with red probe respectively; Check if circuit is short to power supply.

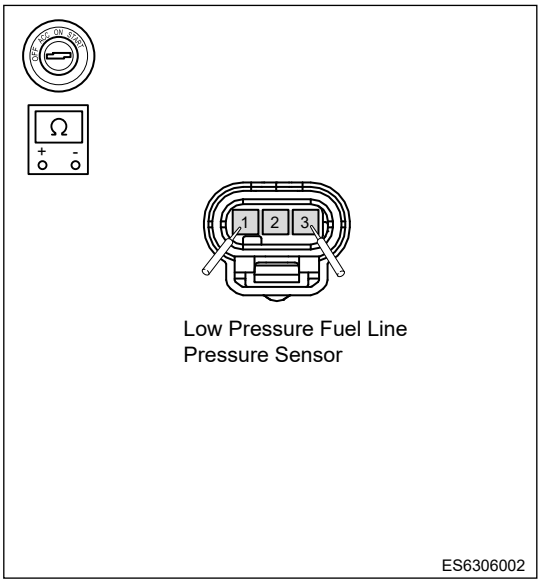


NG → **Check and repair circuit**

OK

4	Check if circuits of low pressure fuel pressure sensor themselves are short to each other or opened

(a) Using ohm band of multimeter, measure resistances of low pressure fuel pressure sensor (1, 2, 3) with red and black probes respectively; Check if they are short to each other or opened.



NG → **Replace low pressure fuel pressure sensor assembly**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired

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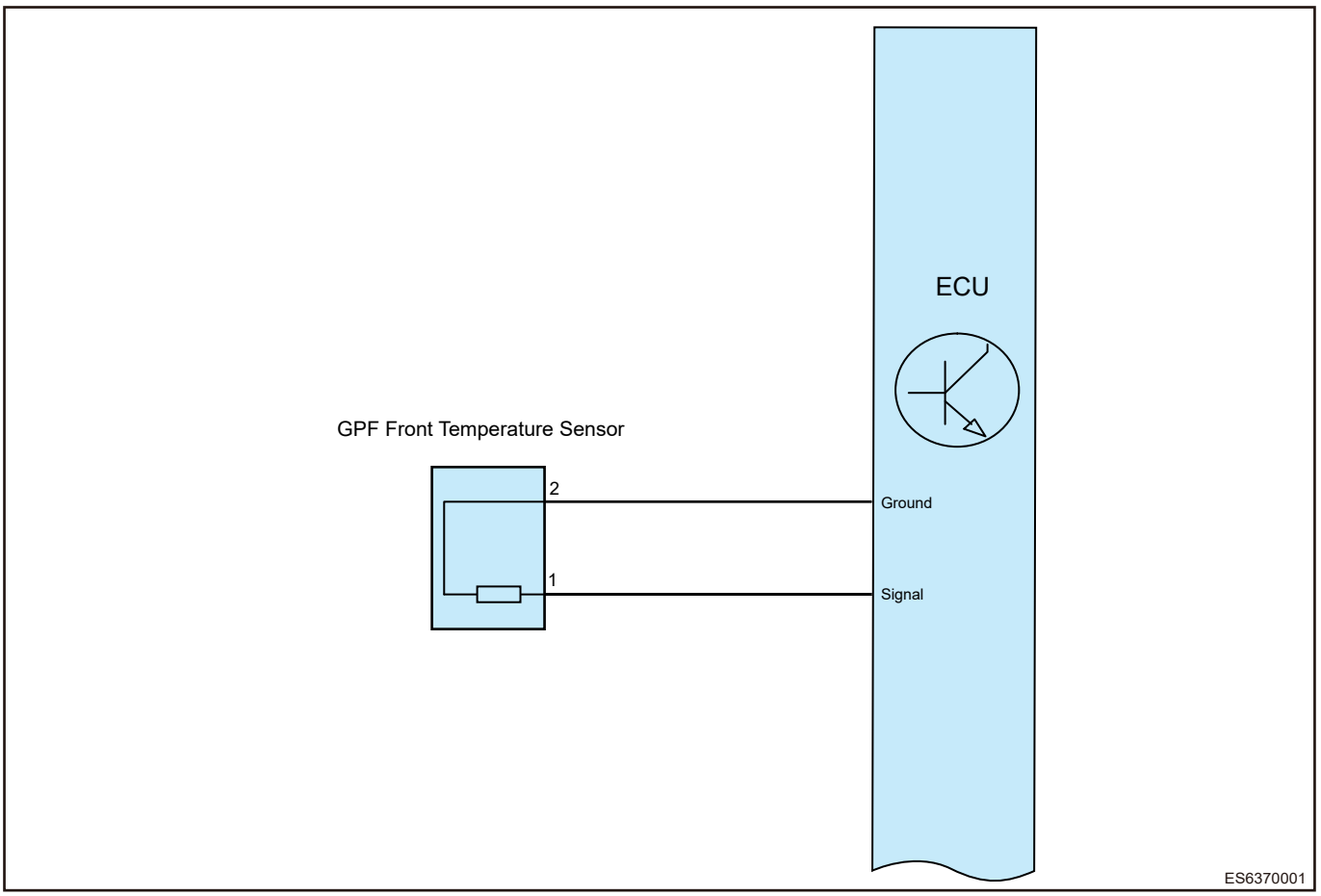
■ **Particulate filter upstream temperature sensor error**

DTC	**P208062**	**Excessive Deviation Between Particulate Filter Upstream Temperature Sensor Signal Model and Actual**
DTC	**P20802A**	**Particulate Filter Upstream Temperature Sensor Signal Stuck**
DTC	**P054500**	**Particulate Filter Upstream Temperature Sensor Circuit Voltage Low**
DTC	**P054600**	**Particulate Filter Upstream Temperature Sensor Circuit Voltage High**
DTC	**P20E224**	**Particulate Filter Upstream Temperature Sensor Cold Start Correction Improper (Positive Deviation)**
DTC	**P20E223**	**Particulate Filter Upstream Temperature Sensor Cold Start Correction Improper (Negative Deviation)**

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check GPF temperature sensor connector**

(a) Disconnect the negative battery.
(b) Check GPF temperature sensor connector for looseness or poor contact.

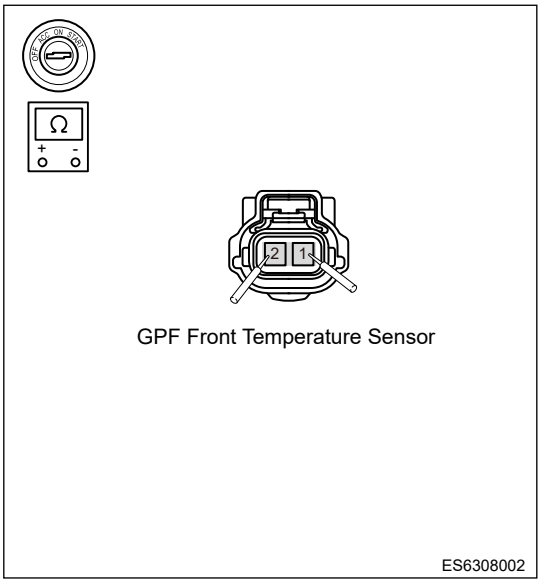
NG → **Repair and adjust connector, or replace it**

OK

2	**Check GPF temperature sensor internal resistance**

(a) Disconnect the GPF temperature sensor connector.
(b) Using ohm band of multimeter, measure if resistances of GPF temperature sensor (1, 2) are normal with red and black probes respectively.

Normal resistance value at ambient temperature (10 ~ 30°C) should be: 200 ~ 230 Ω.



NG → **Replace GPF temperature sensor assembly**

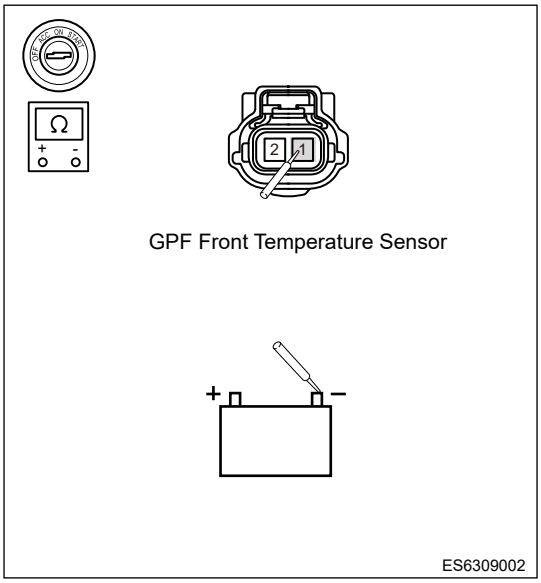
OK

3	**Check for short circuit to ground / power supply or short to each other in GPF temperature sensor circuit**

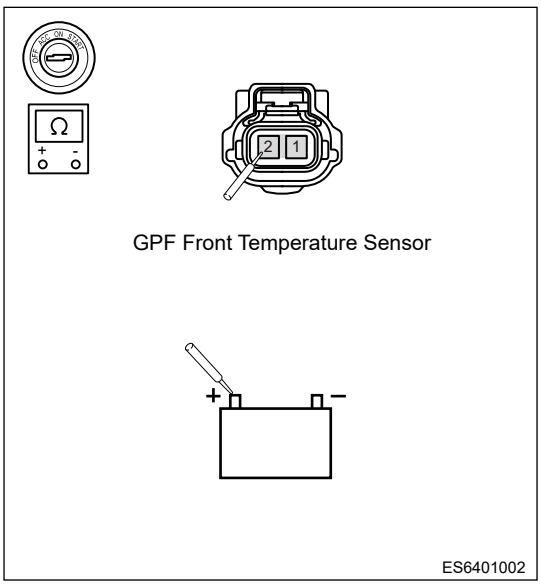
(a) Disconnect the GPF temperature sensor connector.

(b) Disconnect the ECU connector.

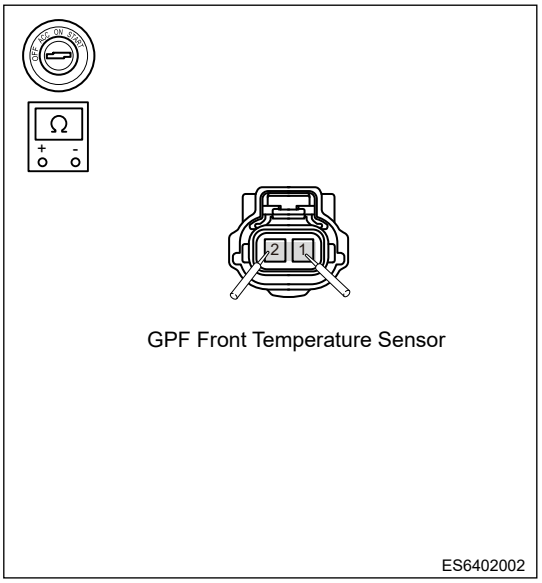
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of GPF temperature sensor (1) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of GPF temperature sensor (1, 2) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of GPF temperature sensor (1, 2) with red and black probes respectively; Check if circuits are short to each other.



NG → **Check and repair circuit**

OK

4	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

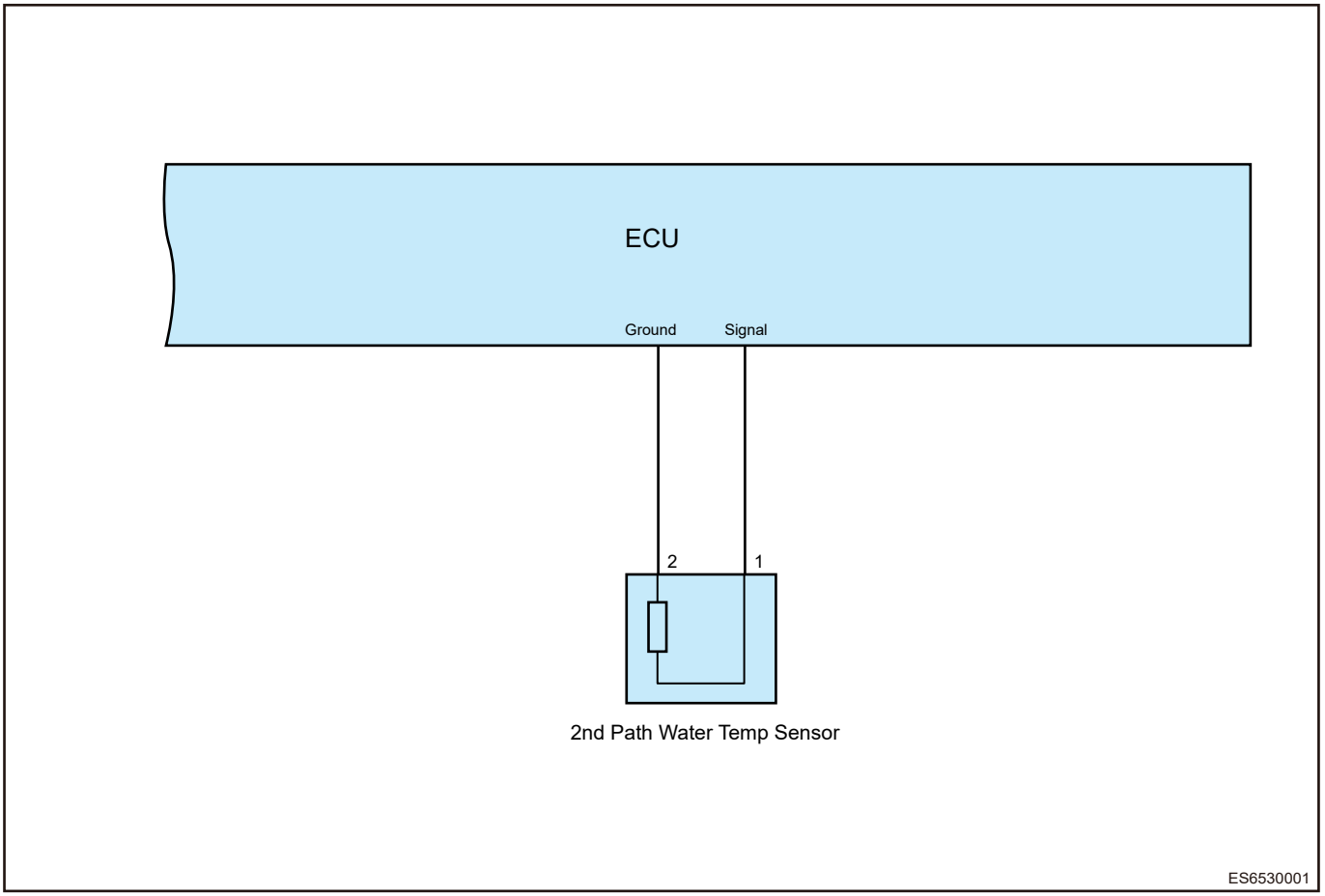
OK → **Conduct test and confirm malfunction has been repaired**

■ Engine coolant temperature sensor 2 cold start calibration unreasonable (positive deviation)/ (negative deviation)

DTC	**P218324**	**Cold Start Engine Coolant Temperature Performance**
DTC	**P218323**	**Cold Start Engine Coolant Temperature Performance**

DTC	P218400	Engine Coolant Temperature Sensor 2 Circuit Low
DTC	P218500	Engine Coolant Temperature Sensor 2 Circuit High

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check coolant temperature sensor 2 connector**

(a) Disconnect the negative battery.
(b) Check coolant temperature sensor 2 connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

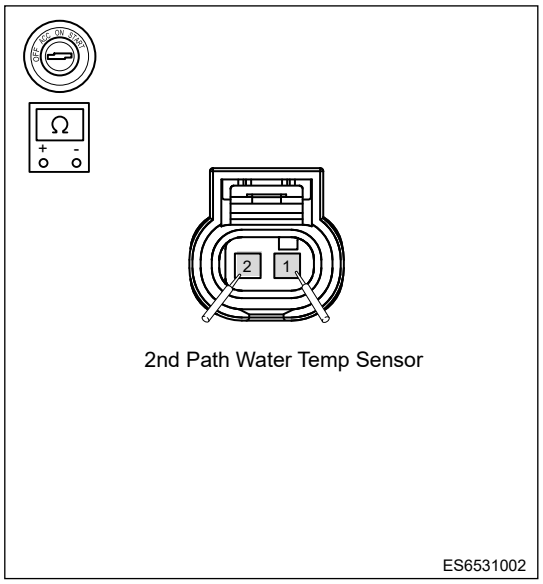
OK

2	Check coolant temperature sensor 2 internal resistance

(a) Disconnect the coolant temperature sensor 2 connector

(b) Using ohm band of multimeter, measure if resistances of coolant temperature sensor 2 (1, 2) are normal with red and black probes respectively.

Rated resistance at 20℃: 2.5 KΩ ± 5%



NG → **Replace coolant temperature sensor 2 assembly**

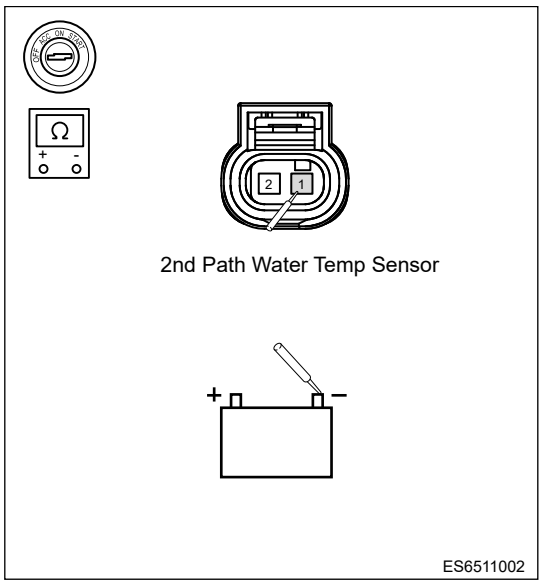
OK

3	Check for short circuit to ground / power supply or short to each other in coolant temperature sensor 2 circuit

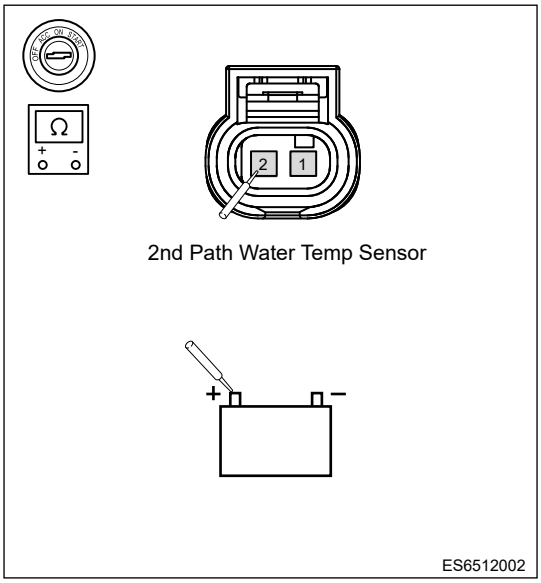
(a) Disconnect the coolant temperature sensor 2 connector.

(b) Disconnect the ECU connector.

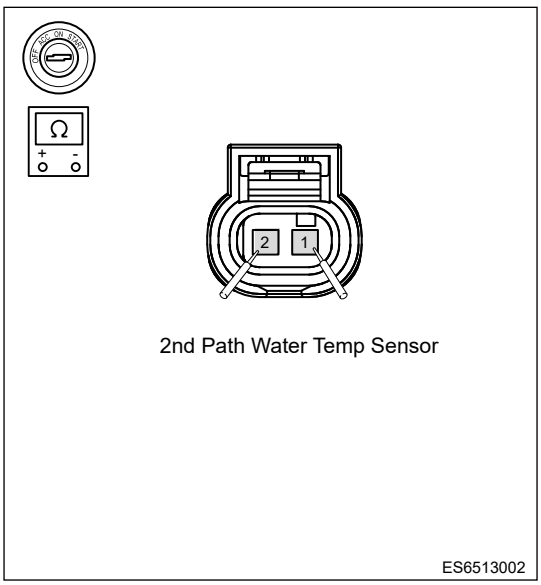
(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of coolant temperature sensor 2 (1) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of coolant temperature sensor 2 (1, 2) with red probe respectively; Check if circuit is short to power supply.



(e) Using ohm band of multimeter, measure resistances of coolant temperature sensor 2 (1, 2) with red and black probes respectively; Check if circuits are short to each other.



NG	**Check and repair circuit**

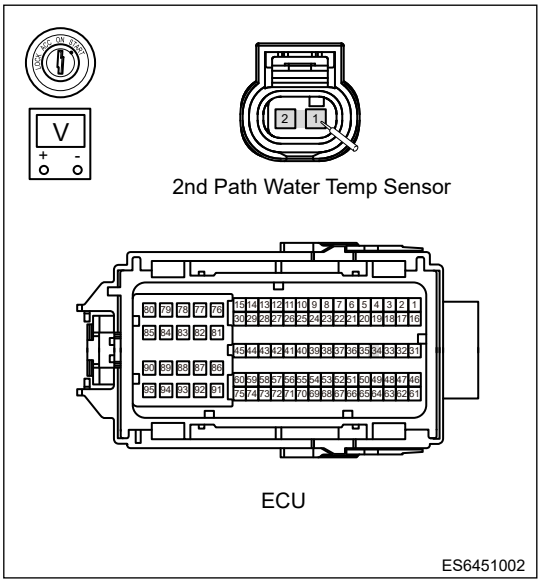
OK

4	**Check whether there is contact resistance in coolant sensor 2 circuit**

(a) Connect the coolant temperature sensor 2, ECU connector.

(b) Using voltage band of multimeter (voltage drop method), connect black probe to ECU (connected terminal), and measure coolant temperature sensors 2 (1, 2) with red probe

The tested voltage drop value should be less than approximately 0.2 V



NG → **Repair or replace wire harness**

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.

(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

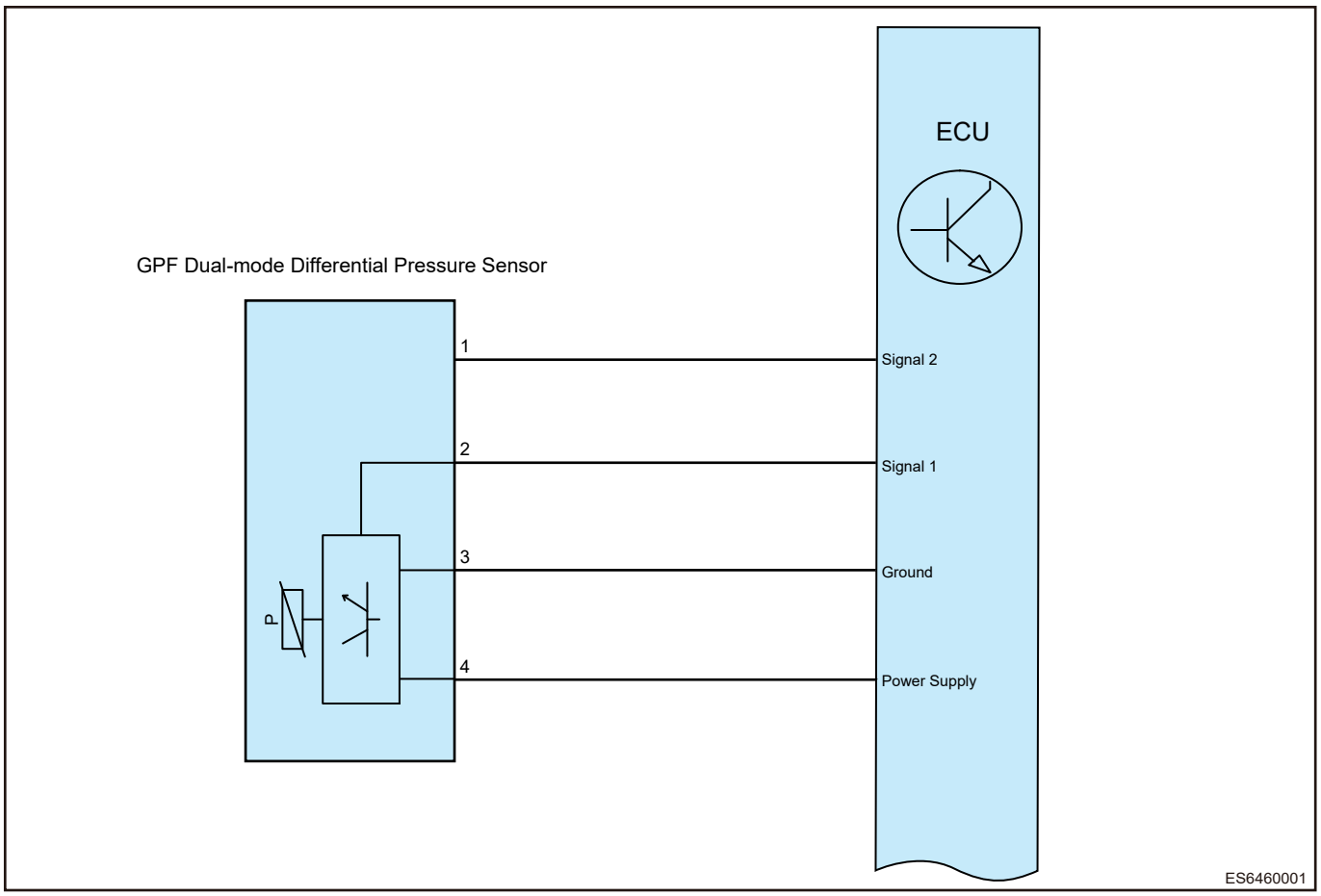
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Particulate filter differential pressure sensor malfunction**

DTC	P12A300	Particulate Filter Differential Pressure Sensor Rear Pipe Connecting Line Abnormal / Completely Blocked / Sensor Stuck
DTC	U060100	Particulate Filter Differential Pressure Sensor Sent Communication Failure (Upstream)
DTC	U060141	Particulate Filter Differential Pressure Sensor Data Inspection Non-plausible (Upstream)
DTC	P129300	Particulate Filter Differential Pressure Sensor Channel 1 Digital Signal Non-plausible (SENT Signal High or Low)
DTC	P245500	Particulate Filter Differential Pressure Sensor Circuit Voltage High (Upstream)
DTC	P245400	Particulate Filter Differential Pressure Sensor Circuit Voltage Low (Upstream)
DTC	P129100	GPF Dynamic Response Performance of Particulate Filter Differential Pressure Sensor Non-plausible / Line Abnormal
DTC	P129000	Offset Check Value After Running Particulate Filter Differential Pressure Sensor Unreasonable
DTC	P12E000	Particle Trap Differential Pressure Sensor Post-running Offset Check Value Unreasonable (Downstream)
DTC	P12E100	GPF Dynamic Response Performance of Particulate Filter Differential Pressure Sensor Non-plausible / Line Abnormal (Downstream)
DTC	P12E300	Particulate Filter Differential Pressure Sensor Channel 1 Digital Signal Non-plausible (SENT Signal High or Low)
DTC	P12A200	Particulate Filter Differential Pressure Sensor Line Connection Error
DTC	P246100	Particulate Filter Differential Pressure Sensor Circuit Voltage High
DTC	P246000	Particulate Filter Differential Pressure Sensor Circuit Voltage Low (Downstream)
DTC	U060200	Particulate Filter Differential Pressure Sensor Sent Communication Failure (Downstream)
DTC	U060241	Particulate Filter Differential Pressure Sensor Data Inspection Non-plausible (Downstream)

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check GPF pressure sensor connector**

(a) Disconnect the negative battery.
(b) Check GPF pressure sensor connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

OK

2	**Check GPF pressure sensor connecting line**

(a) Check if GPF pressure sensor connecting line falls off or is connected incorrectly.

NG → **Adjust connecting line**

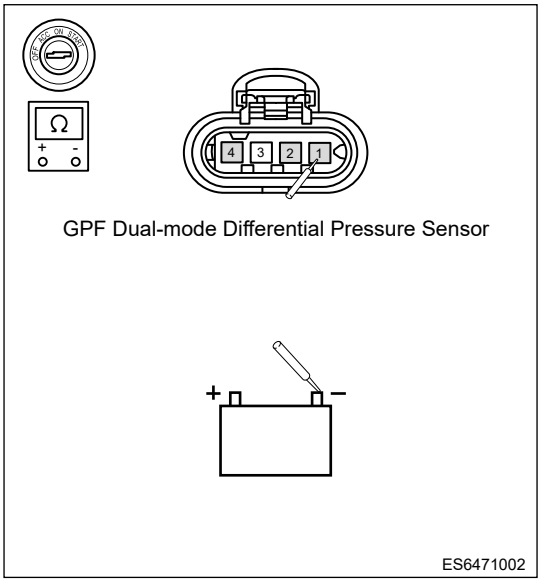
OK

3	**Check for short circuit to ground / power supply or short to each other in GPF pressure sensor circuit**

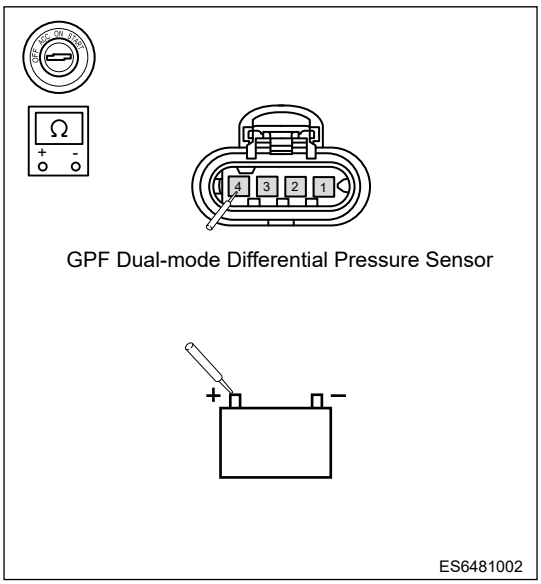
(a) Disconnect the GPF pressure sensor connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of GPF pressure sensor (1, 2, 4) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of GPF pressure sensor (1, 2, 3, 4) with red probe respectively; Check if circuit is short to power supply.

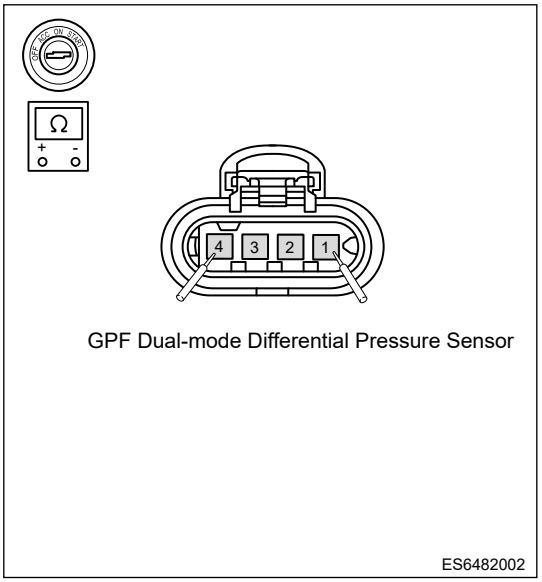


NG → **Check and repair circuit.**

OK

4	Check if circuits of GPF pressure sensor themselves are short to each other

(a) Using ohm band of multimeter, measure resistances of GPF pressure sensor (1, 2, 3, 4) with red and black probes respectively; Check if circuits are short to each other.



GPF Dual-mode Differential Pressure Sensor

NG → Replace GPF pressure sensor assembly

OK

5	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → Repair or replace new module

NG

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

■ **Particulate filter removed fault**

DTC	**P226D00**	**Particulate Filter Removed / Pressure Sensor / Line Abnormal Fault**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check GPF particulate filter**

(a) Check if GPF particulate filter is removed.
(b) Check if GPF particulate filter is melted.

NG → **Replace GPF particulate filter**

OK

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ **Fuel pump enable control circuit open/voltage too high/too low**

DTC	**P025D00**	**Fuel Pump Module "A" Control Circuit High**
DTC	**P025A00**	**Fuel Pump Module "A" Control Circuit Open**
DTC	**P025C00**	**Fuel Pump Module "A" Control Circuit Low**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuel pump controller connector**

(a) Disconnect the negative battery.
(b) Check fuel pump controller connector for looseness or poor contact.

NG → **Repair and adjust connector, or replace it**

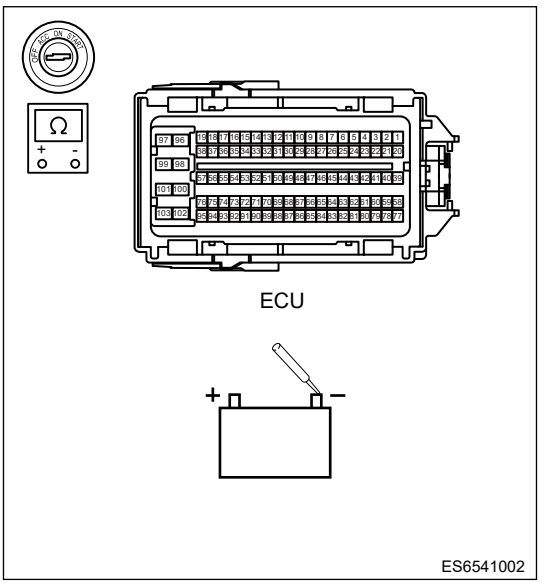
OK

2	**Check whether the fuel pump enable signal circuit is short to ground/power supply**

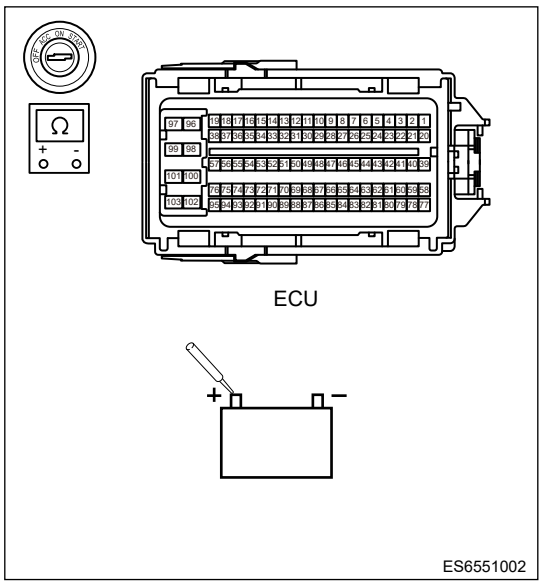
(a) Disconnect the fuel pump controller connector.

(b) Disconnect the ECU connector.

(c) Using ohm band of multimeter, connect black probe to battery negative terminal, and measure resistances of ECU (enable signal) with red probe respectively; Check if circuit is short to ground.



(d) Using ohm band of multimeter, connect black probe to battery positive terminal, and measure resistances of ECU (enable signal) with red probe respectively; Check if circuit is short to power supply.



NG → **Check and repair circuit**

OK

3	Check Engine Control Module (ECU)

(a) Remove Engine Control Module (ECU) from malfunctioning vehicle.
(b) Install a new engine control module to malfunctioning vehicle.

OK → **Repair or replace new module**

NG

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **Conduct test and confirm malfunction has been repaired**

■ Ambient temperature sensor circuit voltage too low / too high

DTC	**P121B00**	**Front Left Wheel Speed Sensor Signal Abnormal**
DTC	**P121C00**	**Front Right Wheel Speed Sensor Signal Abnormal**
DTC	**P121D00**	**Rear Left Wheel Speed Sensor Signal Abnormal**
DTC	**P121E00**	**Rear Right Wheel Speed Sensor Signal Abnormal**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

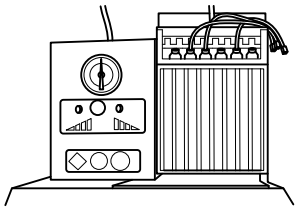
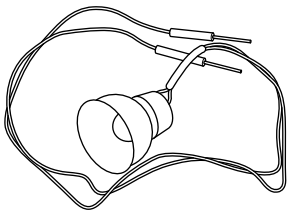
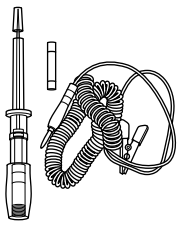
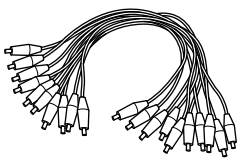
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

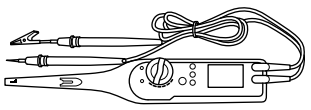
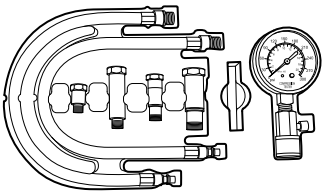
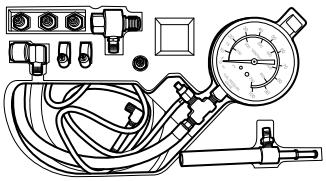
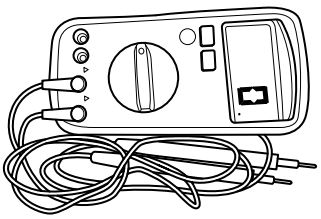
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Read brake control system DTCs and refer to brake control system diagnosis.

5 On-vehicle Service

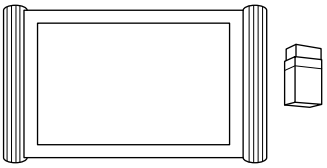
5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Fuel Injector Cleaning Analyzer	 S00043
21 W Test Light	 S00061
LED Test Light	 S00077
Jumper Wire	 S00062

Tool Name	Tool Drawing
Diode Test Light	 S00078
Cylinder Pressure Gauge	 S00033
Fuel Pressure Gauge	 S00035
Digital Multimeter	 S00002

■ **Special Tools**

Tool Name	Tool Drawing
Diagnostic tester	 S00001

5.2 Intake Pressure/Temperature Sensor

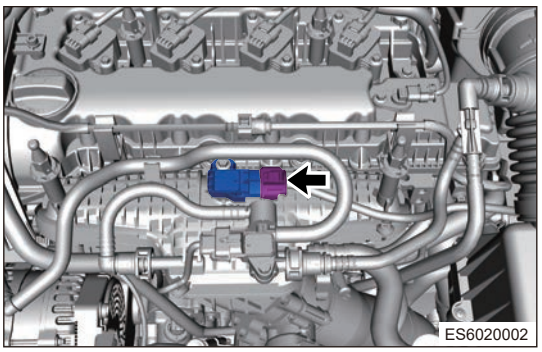
■ Removal

⚠ Warning

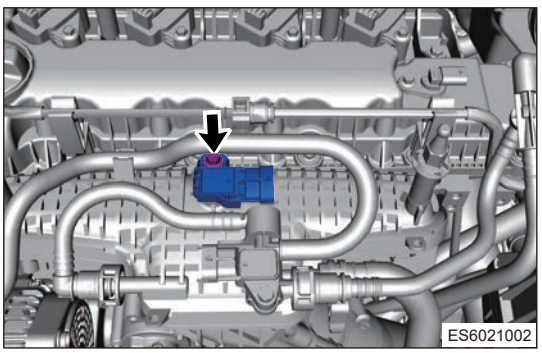
- **Be sure to wear safety equipment to prevent accidents, when removing intake pressure/temperature sensor.**
- **Appropriate force should be applied, when removing intake pressure/temperature sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the intake pressure/temperature sensor connector.



(5) Remove the intake pressure/temperature sensor fixing bolt and take it out carefully.



■ Inspection

(1) **Temperature sensor part:** (Remove the connector) Turn digital multimeter to ohm band, connect two probes to sensor pins 1# and 2# respectively, the rated resistance is 2.5 kΩ ± 5% at 20℃. Measurement can also be performed by simulating. Specific operations are to send wind to the sensor with blow drier (be careful that blow drier shouldn't be too close to the sensor) and observe the changes of sensor resistance. The resistance should reduce at the moment.

(2) **Pressure sensor part:** (Connect the connector) Turn digital multimeter to DC voltage band, ground the black probe, connect red probe to pins 3# and 4# respectively. Under idling status, there should be 5 V of reference voltage at pin 3#, and about 1 V of voltage at pin 4#; Under unloaded status, slowly open the throttle, the voltage of pin 4# has not changed too much; Quickly open the throttle, the voltage of pin 4# can reach about 4 V instantaneously (value changes with model), and then drops to about 1.7 V (value changes with model).

■ **Installation**

(1) Install the intake pressure/temperature sensor fixing bolt.

Torque: 6 ± 1 N · m

(2) connector and intake pressure/temperature sensor connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.3 Electronic Throttle

■ **Removal**

(1) For details about removal methods, refer to removal steps of electronic throttle assembly in intake system.

■ **Inspection**

(1) Judgment methods for specific mechanical damage: Valve plate should be in NLP position with power off and can rotate smoothly when flipping it by hand. If stuck occurs, it indicates that internal components may be damaged.
(2) Simple measurement of internal sensors: (remove the connector) Turn digital multimeter to ohm band.
   1) Connect two probes to pin IP1S and pin IPM respectively, flip valve plate by hand, and resistance should change continuously.
   2) Connect two probes to pin IP2S and pin IPM respectively, flip valve plate by hand, and resistance should change continuously.
   3) If there are conditions, you can fully close or fully open throttle body with constant current source [fully close throttle body with 3A current (UMA), fully open throttle body with 2A current (OMA)], connect 5 V constant voltage source to pins UIP and IPM simultaneously, measure the output voltage values of IP1S and IP2S at fully close and fully open positions.

■ **Installation**

(1) For details about installation methods, refer to the installation steps of electronic throttle assembly in intake system.

5.4 Knock Sensor

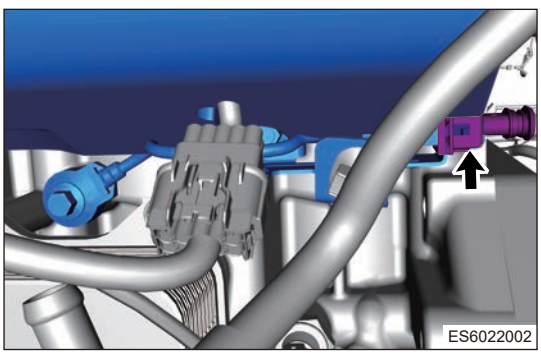
■ **Removal**

⚠ Warning

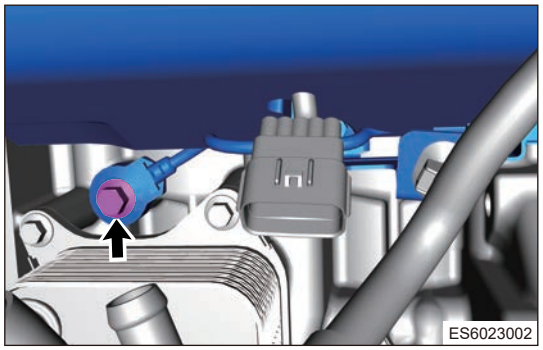
- **Be sure to wear safety equipment to prevent accidents, when removing knock sensor.**
- **Appropriate force should be applied, when removing knock sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the intake hose assembly.

(5) Disconnect the knock sensor connector.



(6) Remove the knock sensor fixing bolt and take it out carefully.



■ **Inspection**

(1) Simple measurement method:(Remove the connector) Turn digital multimeter to ohm band, connect two probes to the pins of sensor type knock sensor 1#, 2# or cable type knock sensor 1#, 2#, and their resistance value at normal temperature should be (4.9±20%) MΩ. Turn digital multimeter to mV band, use a small hammer to tap near knock sensor, there should be output a voltage signal.

■ **Installation**

⚠ Caution

- **Be careful not to allow liquids such as oil, coolant, brake fluid and water to contact the sensor for a long periods of time.**
- **Do not use any type of gasket during installation. The sensor must be pressed against the cylinder block with its metal surface.**
- **When routing the sensor signal cable, you should pay attention not to make the signal cable resonate, so as not to break.**

(1) Install the knock sensor fixing bolt.

Torque: 20 ± 5 N · m

(2) Connect the knock sensor connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.5 Coolant Temperature Sensor

■ **Removal**

(1) For details about removal methods, refer to removal steps of coolant temperature sensor assembly in cooling system.

■ **Inspection**

Step	Operation	Test Value	Test Result	Subsequent Step
1	Remove coolant temperature sensor wire harness connector, use a multimeter to measure if resistance between two terminals of sensor is normal.	Rated resistance is 2.5 kΩ ± 10% at 20℃. Measurement can also be performed by simulation method. The specific operation is to place the working area of sensor into 100℃ of boiled water (note that the soaking time must be sufficient), and observe the changes of sensor resistance. At this time, the resistance should drop to 170 Ω ~ 200 Ω.	Yes	Next
			No	Replace coolant temperature sensor
2	Connect coolant temperature sensor wire harness connector, turn ENGINE START STOP switch to ON, measure the voltage between two pins of coolant temperature sensor wire harness.	5 ± 0.5 V	Yes	Diagnostic help
				Check for continuity and ground of wire harness

■ **Installation**

(1) For details about installation methods, refer to installation steps of coolant temperature sensor assembly in cooling system.

5.6 Speed Sensor

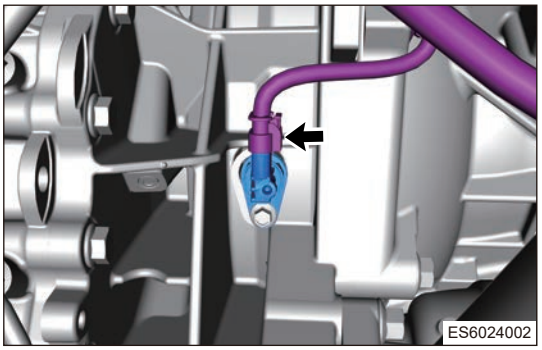
■ **Removal**

⚠ Warning

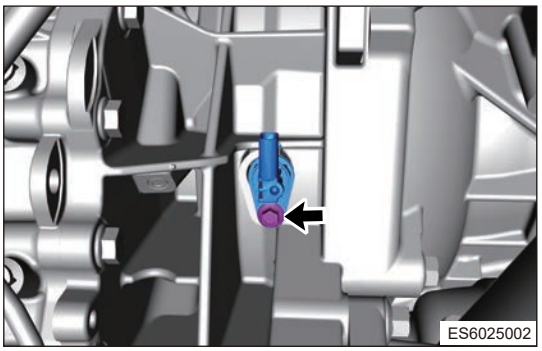
- **Be sure to wear safety equipment to prevent accidents, when removing speed sensor.**
- **Appropriate force should be applied, when removing speed sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the speed sensor connector.



(5) Remove the speed sensor fixing bolt and take it out carefully.



■ **Inspection**

(1) Simple measurement method: (Remove the connector) Turn LCR meter to ohm band (in-line mode, test frequency is 10 kHz), connect two probes to sensor connector terminals 1 and 3, rated resistance is 33 Ω ± 20%; Turn LCR meter to capacitance band (in-parallel mode, est frequency is 1 kHz), connect two probes to sensor connector terminals 1 and 3, rated capacitance is 100 nF ± 20%;Turn LCR meter to capacitance band (in-parallel mode, est frequency is 1 kHz), connect two probes to sensor connector terminals 2 and 3, rated capacitance is 4.7 nF ± 20%.

■ **Installation**

⚠ Caution

- **Ensure that the sensor is clean and the sensor is allowed to be removed from the package before it is installed in the engine or test bench. Users with cardiac pacemakers should take precautions before operation.**
- **The sensor is only allowed to be pressed into installation hole by press-in. It is not allowed to install the sensor with a tapping tool (such as hammer).**

(1) Install the speed sensor fixing bolt.

Torque: 7 ± 1 N · m

(2) Connect the speed sensor connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.7 Camshaft Position Sensor

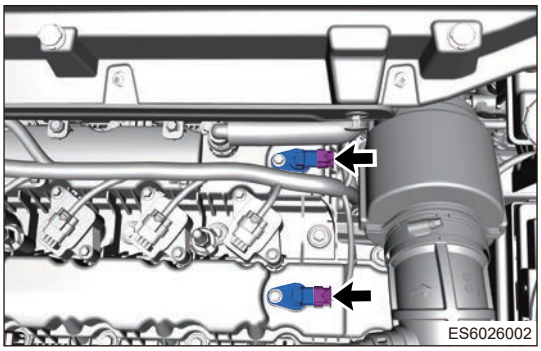
■ **Removal**

⚠ Warning

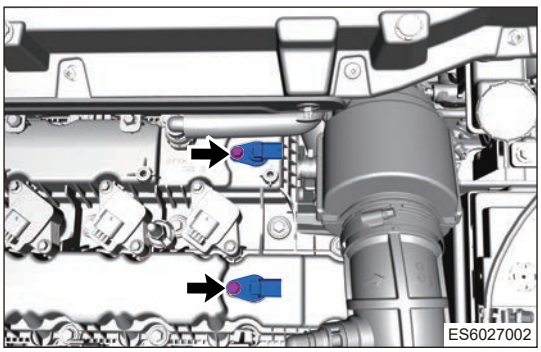
- **Be sure to wear safety equipment to prevent accidents, when removing camshaft position sensor.**
- **Appropriate force should be applied, when removing camshaft position sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the intake/exhaust phaser sensor connectors.



(5) Remove the intake/exhaust phaser sensor and take it out carefully.



■ **Installation**

⚠ Caution

- **The sensor is only allowed to be pressed into installation hole by press-in. It is not allowed to install the sensor with a tapping tool (such as hammer).**

(1) Install the intake/exhaust phaser sensor fixing bolts.
Torque: 8 ± 3 N · m

(2) Connect the phaser sensor connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.8 Boost Pressure/Temperature Sensor

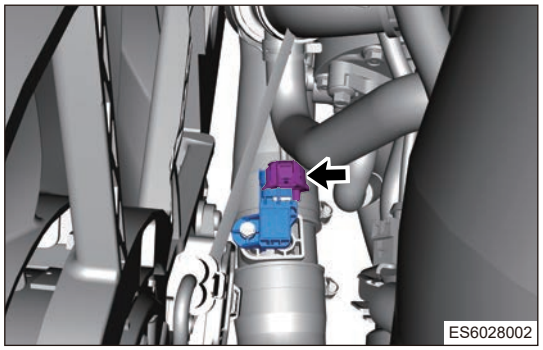
■ **Removal**

⚠ Warning

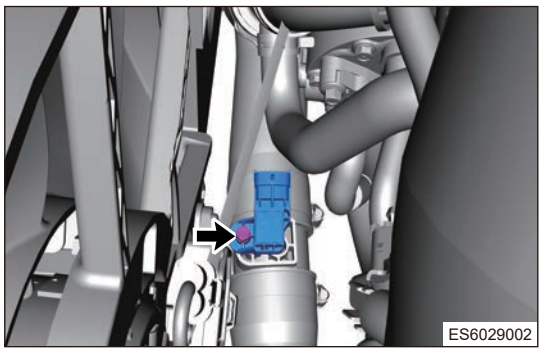
- **Be sure to wear safety equipment to prevent accidents, when removing boost pressure/temperature sensor.**
- **Appropriate force should be applied, when removing boost pressure/temperature sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the boost pressure/temperature sensor connector.



(5) Remove the boost pressure/temperature sensor fixing bolt and take it out carefully.



■ **Installation**

(1) Install the boost pressure/temperature sensor fixing bolt.

Torque: 9 ± 1.5 N · m

(2) Connect the boost pressure/temperature sensor connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.9 VVT Control Valve

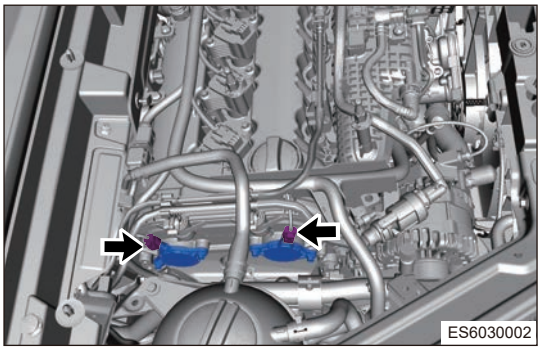
■ **Removal**

⚠ Warning

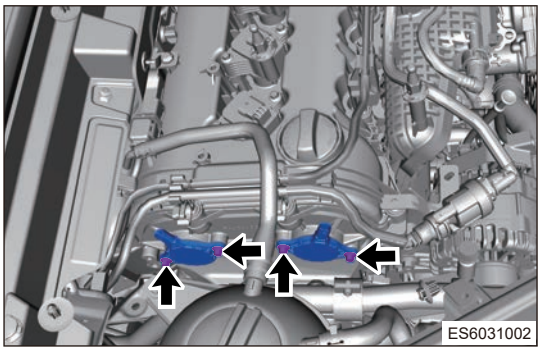
- **Be sure to wear safety equipment to prevent accidents, when removing VVT control valve.**
- **Appropriate force should be applied, when removing VVT control valve. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the intake/exhaust VVT control valve connectors.



(5) Remove the intake/exhaust VVT control valve fixing bolts respectively and take them out carefully.



■ **Inspection**

Step	Operation	Test Value	Test Result	Subsequent Step
1	Remove VVT control valve wire harness connector, use a multimeter to measure if resistance between two terminals of sensor is normal.	Resistance at ambient temperature: 6 Ω	Yes	Next
			No	Replace VVT control valve
2	Remove VVT control valve, and check if foreign matter is stuck or there is internal leakage.	/	Yes	Replace VVT control valve
			No	Diagnostic help

■ **Installation**

⚠ Caution
· **Control valve is only allowed to be pressed into installation hole by press-in. It is not allowed to install the sensor with a tapping tool (such as hammer).**

(1) Install the intake/exhaust VVT control valve fixing bolt.
(2) Connect the intake/exhaust VVT control valve connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.10 Fuel Rail Injector

■ **Removal**

(1) For details about removal methods, refer to removal steps of fuel rail injector assembly in fuel system.

■ **Inspection**

(1) Simple measurement method: (Remove the connector) Turn digital multimeter to ohm band, connect two probes to two terminals of fuel injector respectively, the rated resistance is 1.83 Ω at 20℃.

■ **Installation**

(1) For details about installation methods, refer to installation steps of fuel rail injector assembly in fuel system.

5.11 High Pressure Fuel Rail Pressure Sensor

■ **Removal**

(1) For details about removal methods, refer to removal steps of high pressure fuel rail pressure sensor assembly in fuel system.

■ **Inspection**

(1) Simple measurement method: Remove the sensor, connect 5 V power supply at normal temperature and atmospheric pressure, pressure signal output is 0.500 ± 0.048 V at this time.

■ **Installation**

(1) For details about installation methods, refer to installation steps of high pressure fuel rail pressure sensor in fuel system.

5.12 Canister Control Valve

■ **Removal**

(1) For details about removal methods, refer to removal steps of charcoal canister control valve assembly in fuel system.

■ **Inspection**

(1) Simple measurement method: (Remove the connector) Turn digital multimeter to ohm band, connect two probes to two terminals of charcoal canister control valve respectively, resistance is 14~ 18 Ω at 20℃. Replace it if the resistance does not meet the specification.

■ **Installation**

(1) For details about installation methods, refer to installation steps of charcoal canister control valve assembly in fuel system.

5.13 Brake Vacuum Pressure Sensor

■ **Removal**

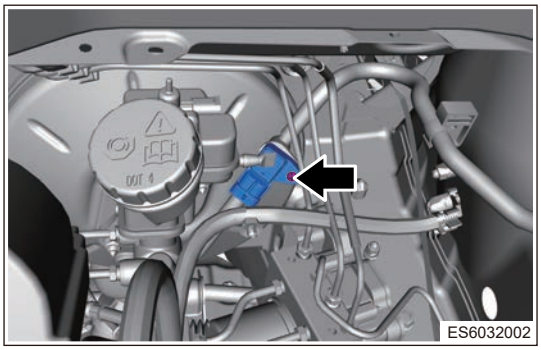
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing brake vacuum pressure sensor.**
- **Appropriate force should be applied when removing brake vacuum pressure sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the brake vacuum pressure sensor connector.

(5) Press brake vacuum pressure sensor fixed clamping area and take out sensor carefully.



■ **Inspection**

(1) Simple measurement method: (Remove the connector) Turn digital multimeter to ohm band, you can perform the following simple measurements respectively:

1) Connect two probes to sensor pins 1# and 2# respectively, the resistance is 1 kΩ ~ 2 kΩ at normal temperature. There may be short or open circuit in power supply circuit if the resistance is abnormal;

2) Connect two probes to sensor pins 1# and 3# respectively, the resistance is 1 kΩ ~ 2 kΩ at normal temperature. There may be short or open circuit in output circuit if the resistance is abnormal.

■ **Installation**

⚠ Caution

- **Always make sure the O-ring is not damaged during installation. Apply a light coat of oil (such as 5W20) to O-ring surface before installation, and do not use silicon grease.**
- **Press sensor detecting sleeve into installation hole manually during installation, and do not install sensor with striking tool.**

(1) Insert the brake vacuum pressure sensor into installation hole carefully, and make sure that fixing clip has been fully clamped.
(2) Connect the brake vacuum pressure sensor connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.14 Engine Control Unit (ECU)

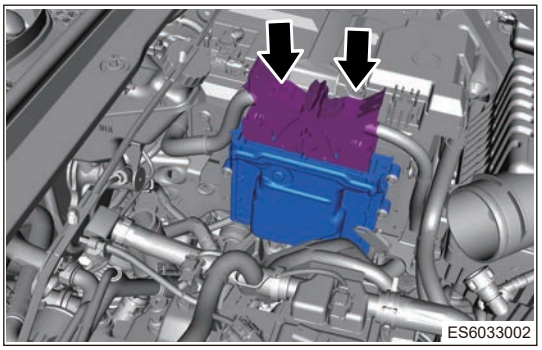
■ **Removal**

⚠ Warning

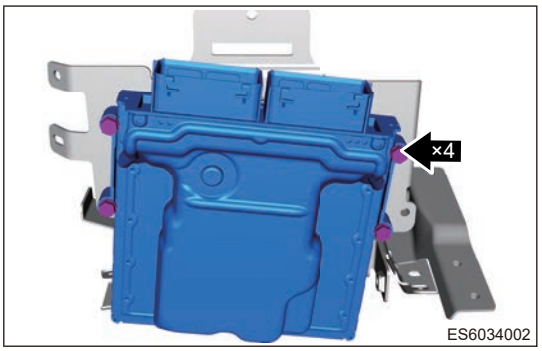
- **Be sure to wear safety equipment to prevent accidents, when removing engine control unit.**
- **Appropriate force should be applied, when removing engine control unit. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the engine control module connector.



(5) Remove 4 fixing bolts from engine control module, and take out engine control module assembly carefully.



■ Inspection

(1) Simple measurement method: 1. (Connect the connector) Use engine data CAN line to read engine trouble records; 2. (Remove the connector) Check if ECU connecting wire is in good condition, focusing on if ECU power supply and ground line are normal; 3. Check if the external sensor is operating properly, output signal is reliable and its circuit is in good condition; 4. Check if the actuator is operating properly and its circuit is in good condition; 5. Finally replace ECU and perform test.

■ Installation

⚠ Caution

- **Pay attention to static electricity protection during installation; Pay attention to the protection of the connector pin.**

(1) Install 4 fixing bolts to engine control unit.

Torque: 9 ± 1.5 N · m

(2) Connect the engine control unit connector.
(3) Install the negative battery cable.
(4) Install the engine trim cover.

5.15 Diagnostic Tester Functional Requirements

■ Self-diagnostic

(1) Mainly include: read DTC, clear DTC; freeze frame, DTC extended information, DTC failure type (DTC low byte).

■ System parameter display - data flow collection based on CAN UDS protocol

(1) Mainly include: Coolant temperature, intake temperature, intake pressure, boost, throttle opening, engine speed, ignition angle, air-fuel radio short term correct, air-fuel radio long term addition and multiplication correct, intake pressure, intake flow, oxygen sensor signal, system voltage, torque demand value, etc.

■ **System condition**

(1) Mainly include: It displays 10 conditions such as program condition, cooling system, stable condition, dynamic condition, emission control, oxygen sensor, idle speed, malfunction indicator, emergency condition, A/C, etc.

■ **Actuator test**

(1) Mainly include: Charcoal canister control valve control, fuel pump relay control, cooling fan control, electronic throttle control, PWM fan control, DVE self-learning, DVE first self-learning, conventional idle control, high speed idle control, CVO self-learning test.

■ **System initialization reset (adaptive reset)**

(1) After the engine stalling, initialization command is sent and system resets the previous self-adaption. The functions involved are: VVT learning, anti-theft learning after-sales, EBS battery data reading and writing, and command to replace GPF.

■ **Odometer**

(1) Mainly include: Display of vehicle driving distance and driving time.

■ **Version information**

(1) Mainly include: Display of Vehicle Identification Number (VIN), ECU hardware number, ECU software number.

■ **Write VIN code**

(1) After replacing ECU, rewrite the VIN.

■ **Refresh (optional)**

5.16 Matching Learning

Hint:

- Before performing matching and learning of vehicle module, be sure to carefully read the related precautions and perform the operation strictly according to standard working procedures.

For details of matching and learning of engine management system (EMS) module performed under different situations, see table below:

<table>
<tr><th>Items</th><th>Applicable Situations</th><th>Actions Required by Diagnostic Tester</th><th>Note</th></tr>
<tr><td rowspan="6">Module Replacement</td><td rowspan="6">• Module failure
• Module damaged</td><td>Write VIN code</td><td rowspan="6">If it is a bare spare part (module has no basic program and software), after writing the VIN code, the software must first enter the "Integrated Service" to refresh the control software, and write the control software into the module</td></tr>
<tr><td>CVO self-learning</td></tr>
<tr><td>VVT self-learning</td></tr>
<tr><td>Throttle self-learning</td></tr>
<tr><td>Replace EMS (Engine Management System) - GPF (Gasoline Particulate Filter) related</td></tr>
<tr><td>Program ECM</td></tr>
<tr><td>Software Upgrading</td><td>• Low software version
• Software error</td><td>Controller software refreshing</td><td>Refresh data can be requested from EXEED after-sales service department</td></tr>
<tr><td>Write VIN Code</td><td>Replacement of module</td><td>Write VIN code</td><td>/</td></tr>
<tr><td rowspan="2">Learn</td><td>• Replacement of module
• Vehicle battery powered off</td><td>Throttle self-learning</td><td>/</td></tr>
<tr><td>• Removal, installation or replacement of phaser sensor or speed sensor</td><td>VVT self-learning</td><td>/</td></tr>
</table>

Items	Applicable Situations	Actions Required by Diagnostic Tester	Note
	• Removal/installation of camshaft/phaser sensor signal plate/phaser • Removal/installation of crankshaft/flywheel • Replace the timing chain • Readjust the timing • Replace ECU		
	Replace GPF	Replace EMS (Engine Management System) - GPF (Gasoline Particulate Filter) related	/
		Replace GPF(Gasoline Particulate Filter) learning	
	Replace GPF pressure sensor	Replace GPF (Gasoline Particulate Filter) pressure sensor learning	/
		Replace EMS (Engine Management System) - GPF (Gasoline Particulate Filter) related	/

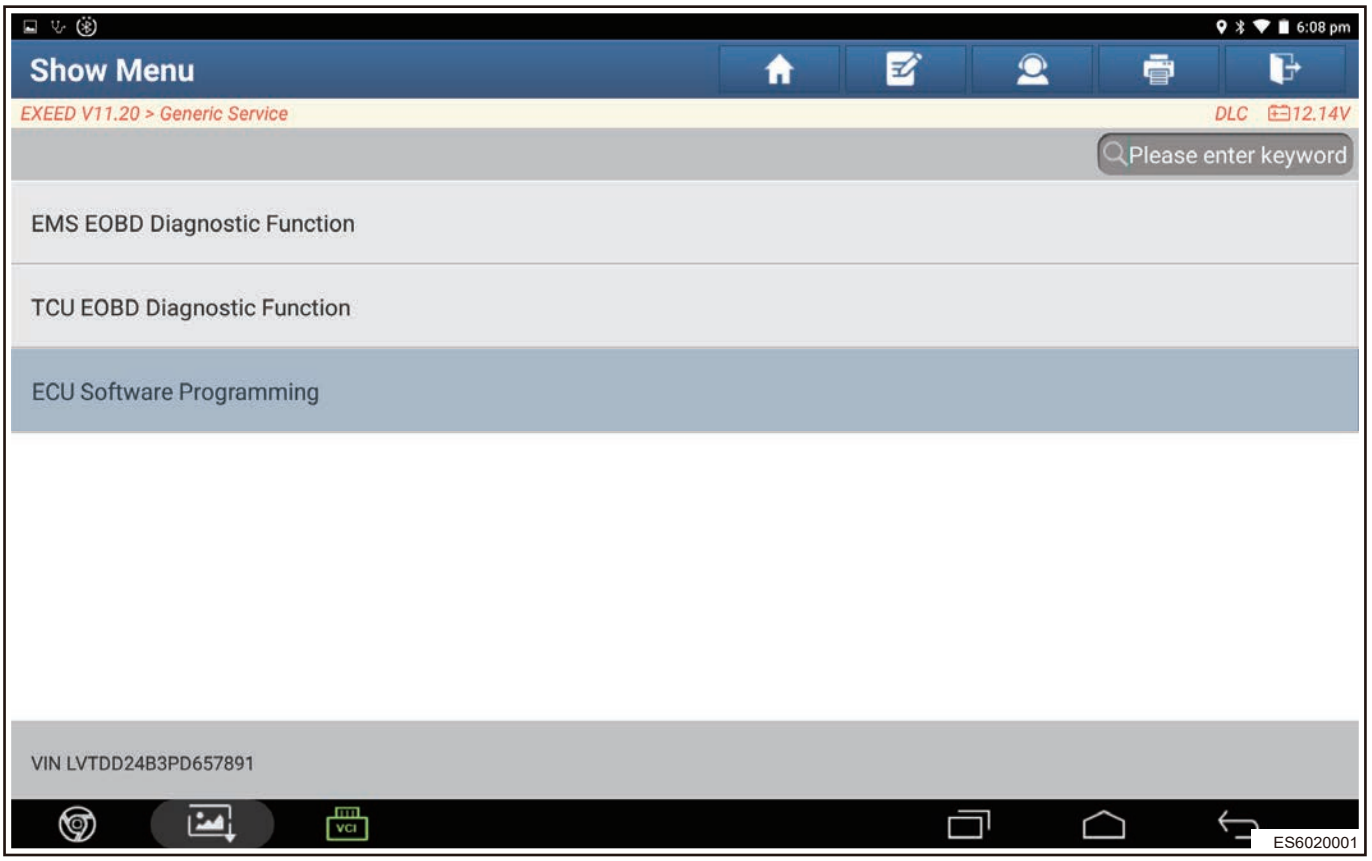
■ **EMS software refresh**

Warning

- **For the acquisition of refreshed files, contact EXCEED after-sales service department.**
- **After the refreshed files are acquired, do not modify the files.**
- **It is necessary to check vehicle battery power before perform refreshing, as the process of refreshing is long, connect the charger if necessary.**

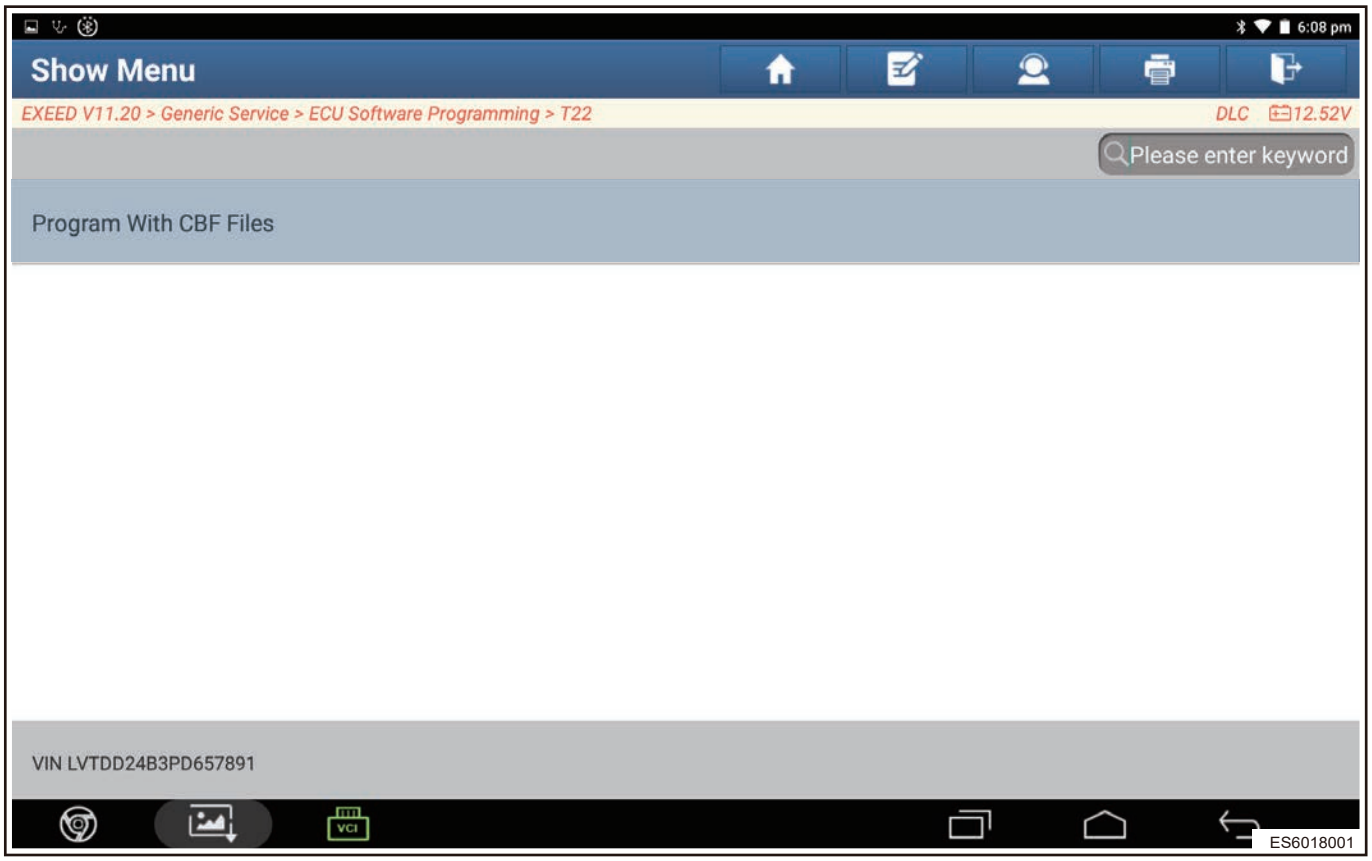
(1) Connect the diagnostic tester and select “Generic Service”.

(2) Click “ECU Software Programming”.

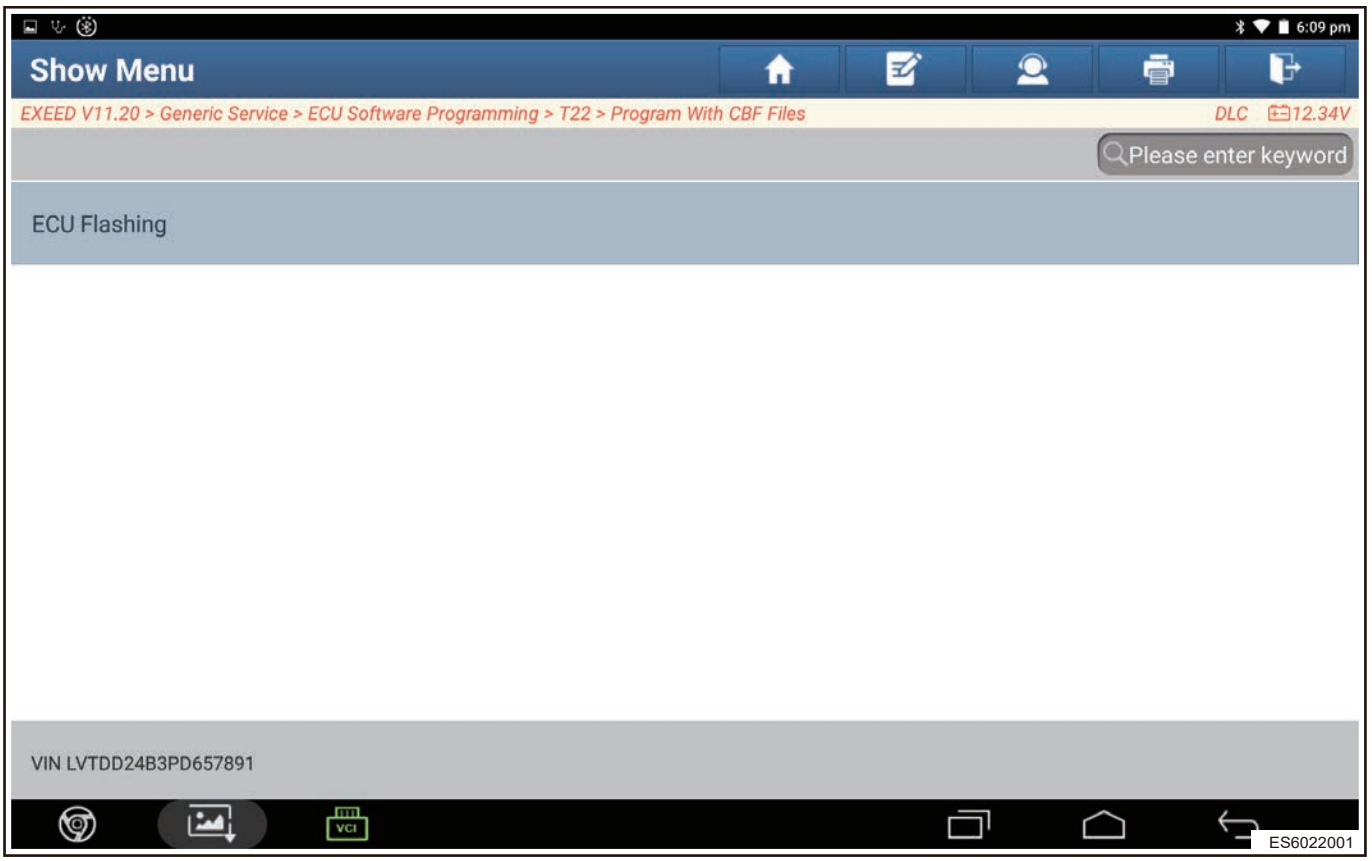


(3) Select the model.

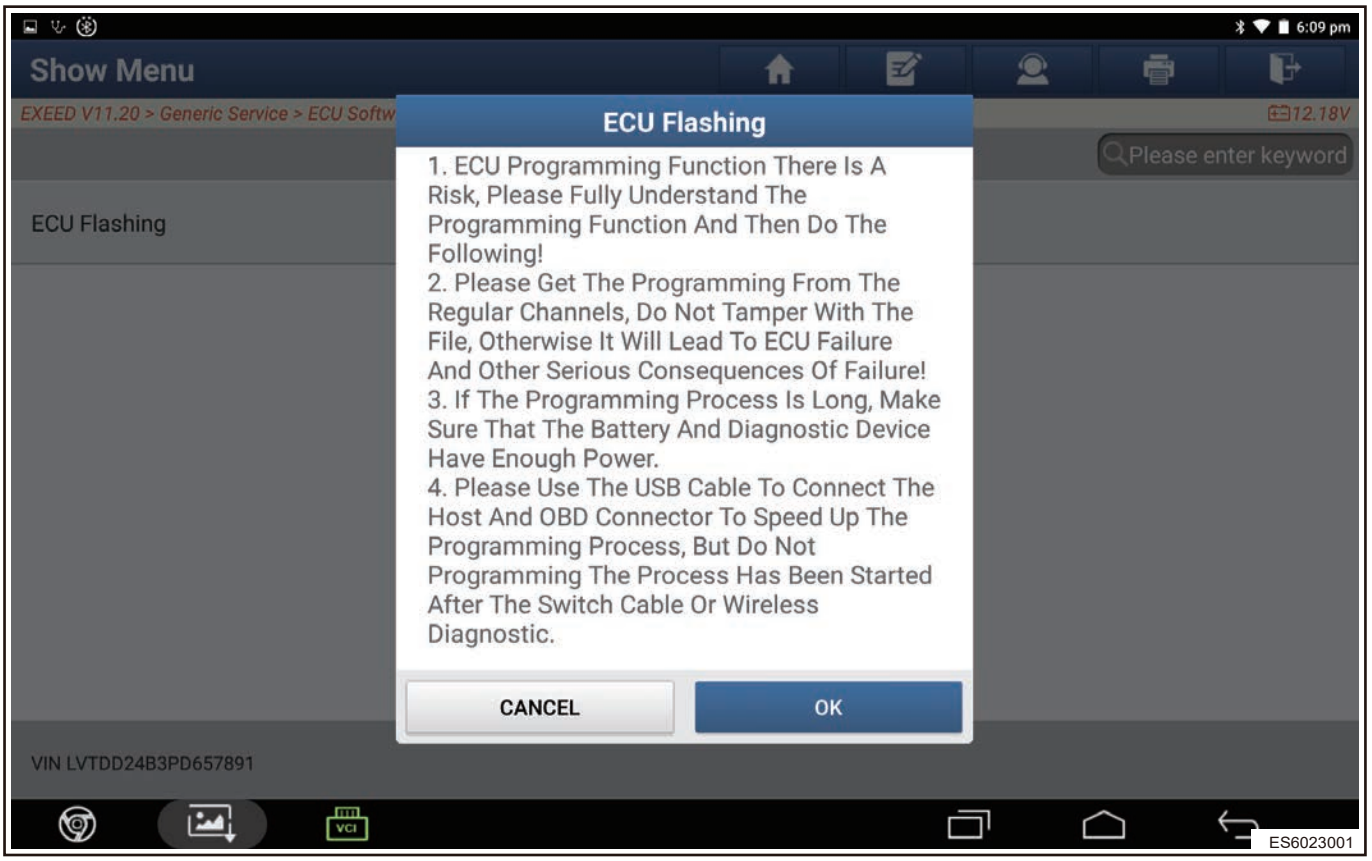
(4) Select “Program With CBF Files”.



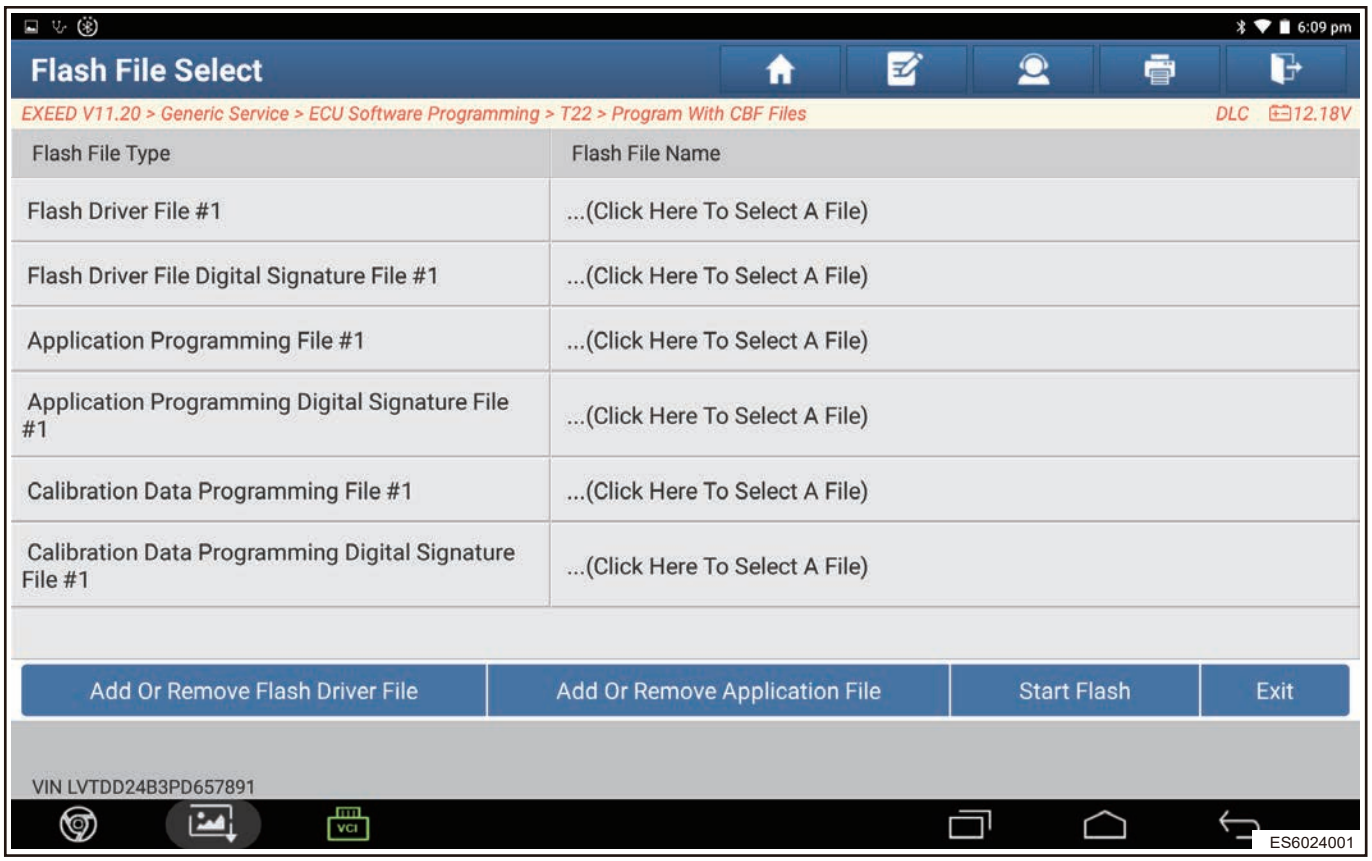
(5) Click “ECU Flashing”.



(6) Confirm and click “OK”.



(7) Click “Flash File Type”, and select the corresponding files in order.



(8) After selecting the corresponding files, click “Start Flash”.

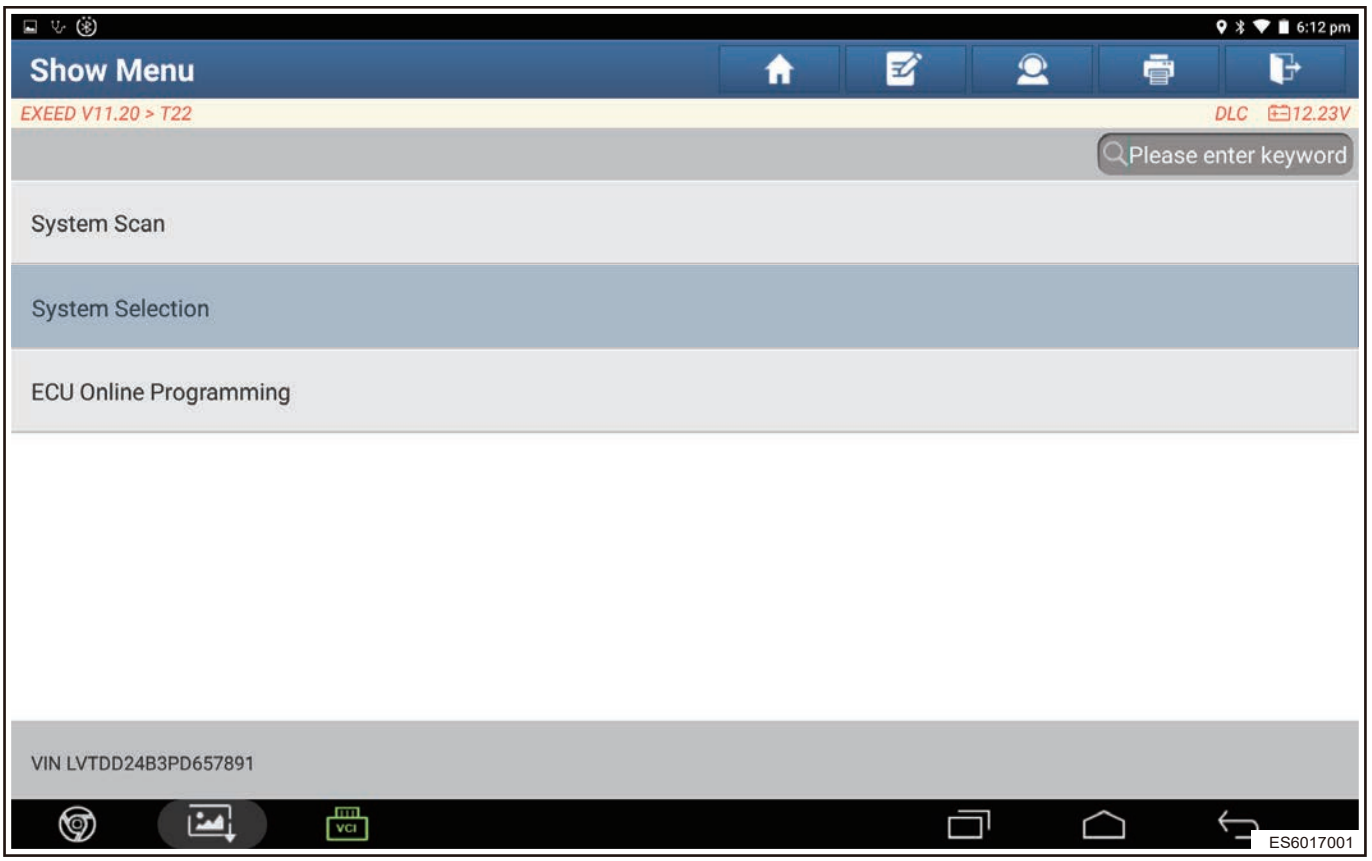
(9) After confirming the refreshed date is correct, click “YES”, diagnostic tester will refresh automatically.

(10) After waiting for a period of time, interface shows “ECU writing-in is successful”, click “OK”.

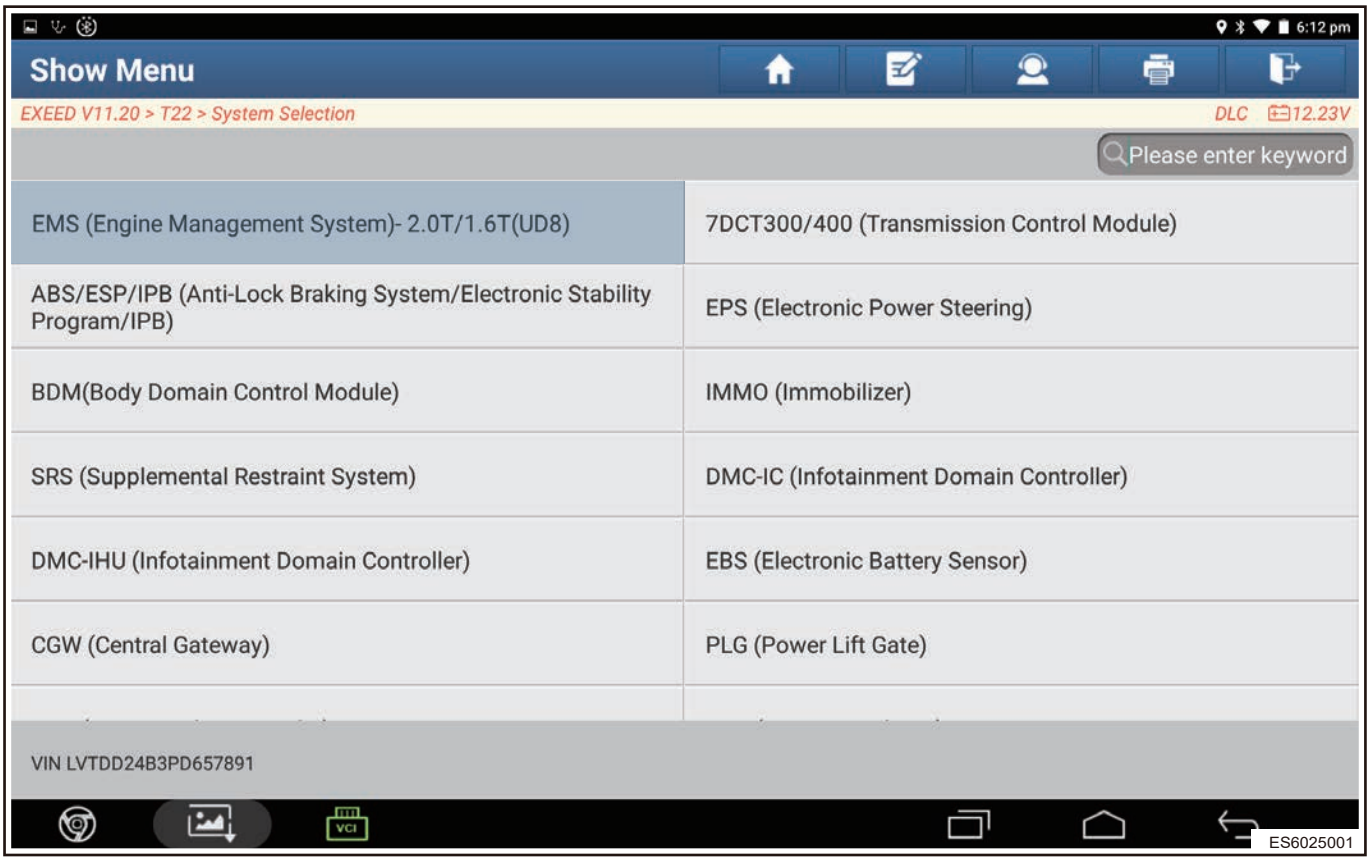
■ Write VIN code

(1) Connect diagnostic tester, and select corresponding model.

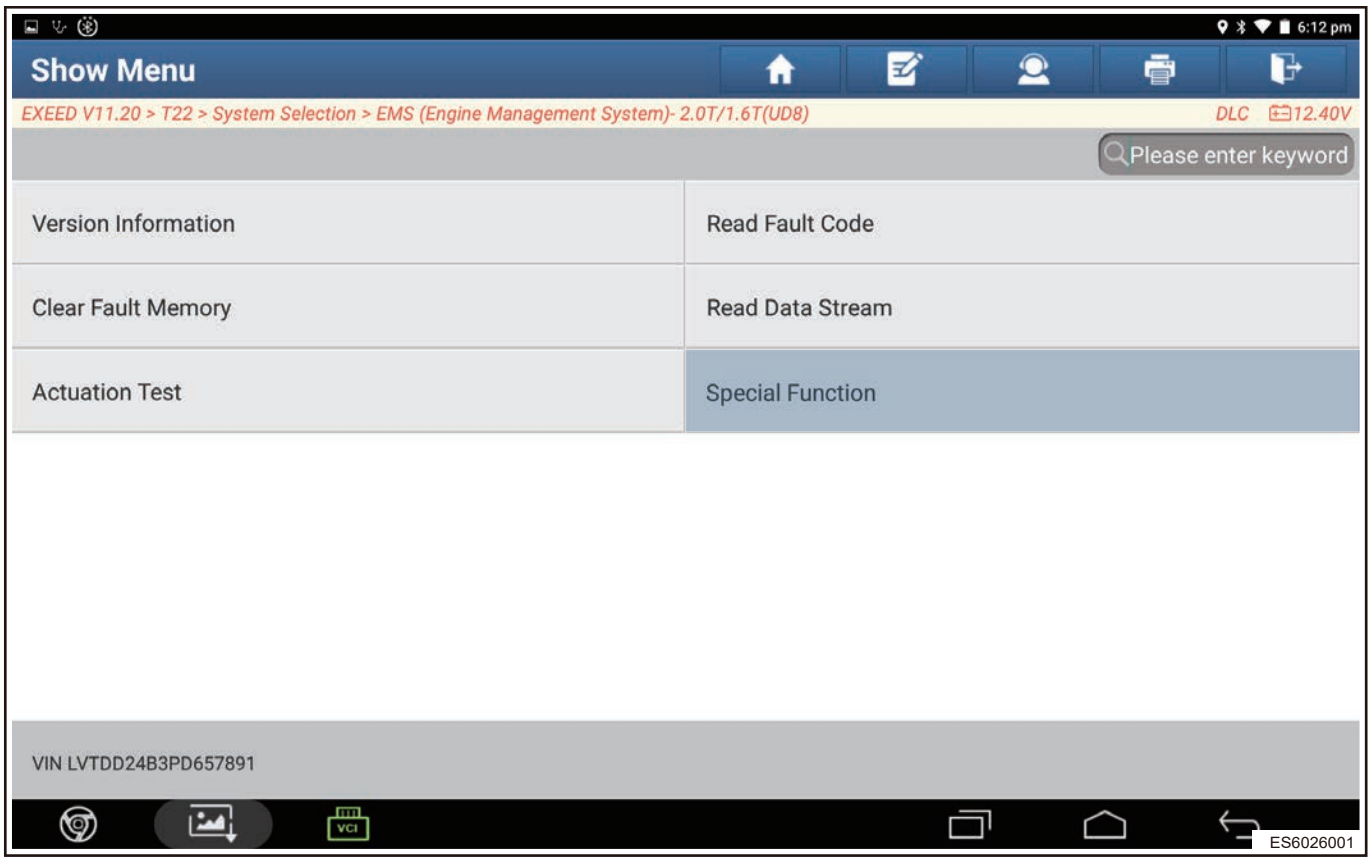
(2) Click “System Selection”.



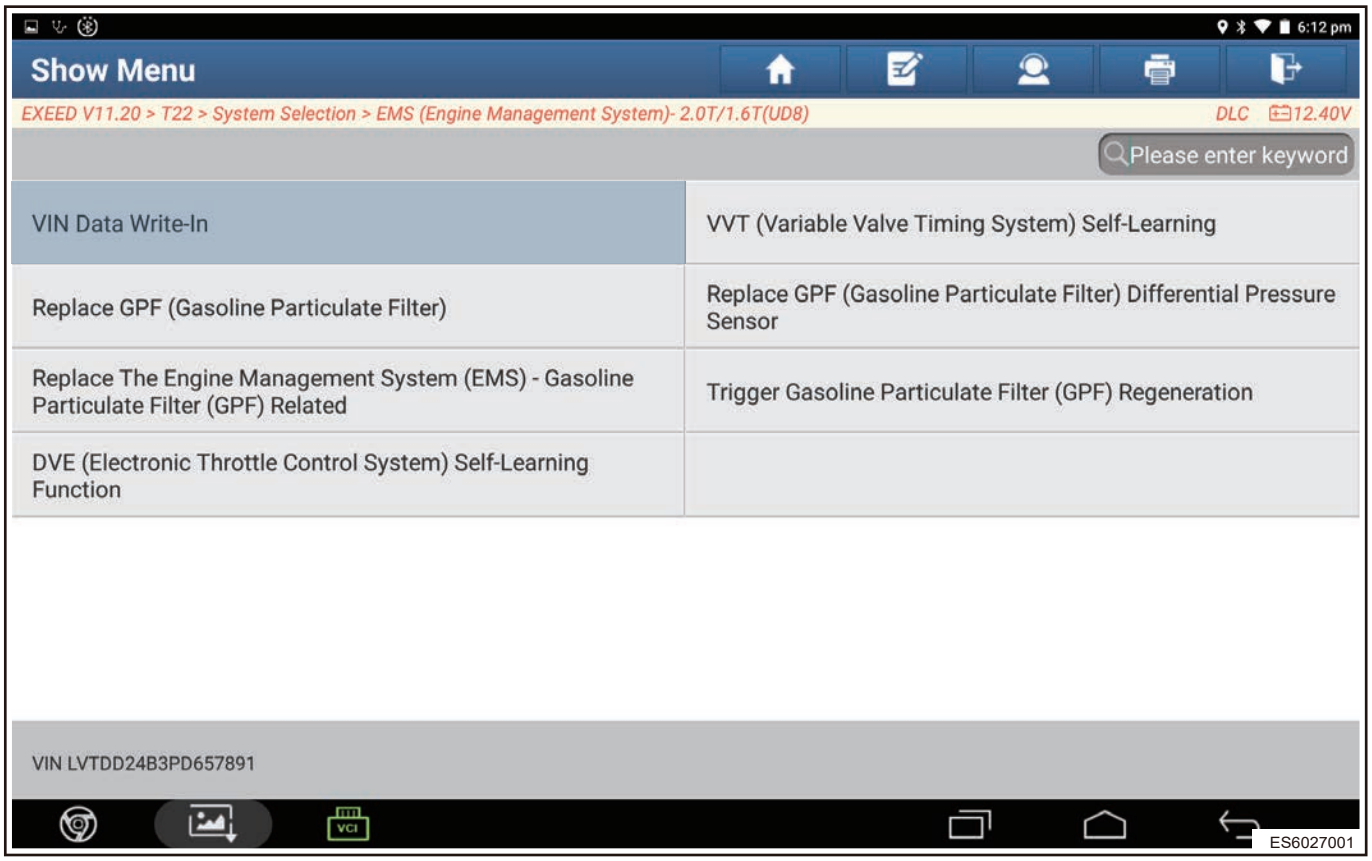
(3) Click “EMS (Engine Management System)”.



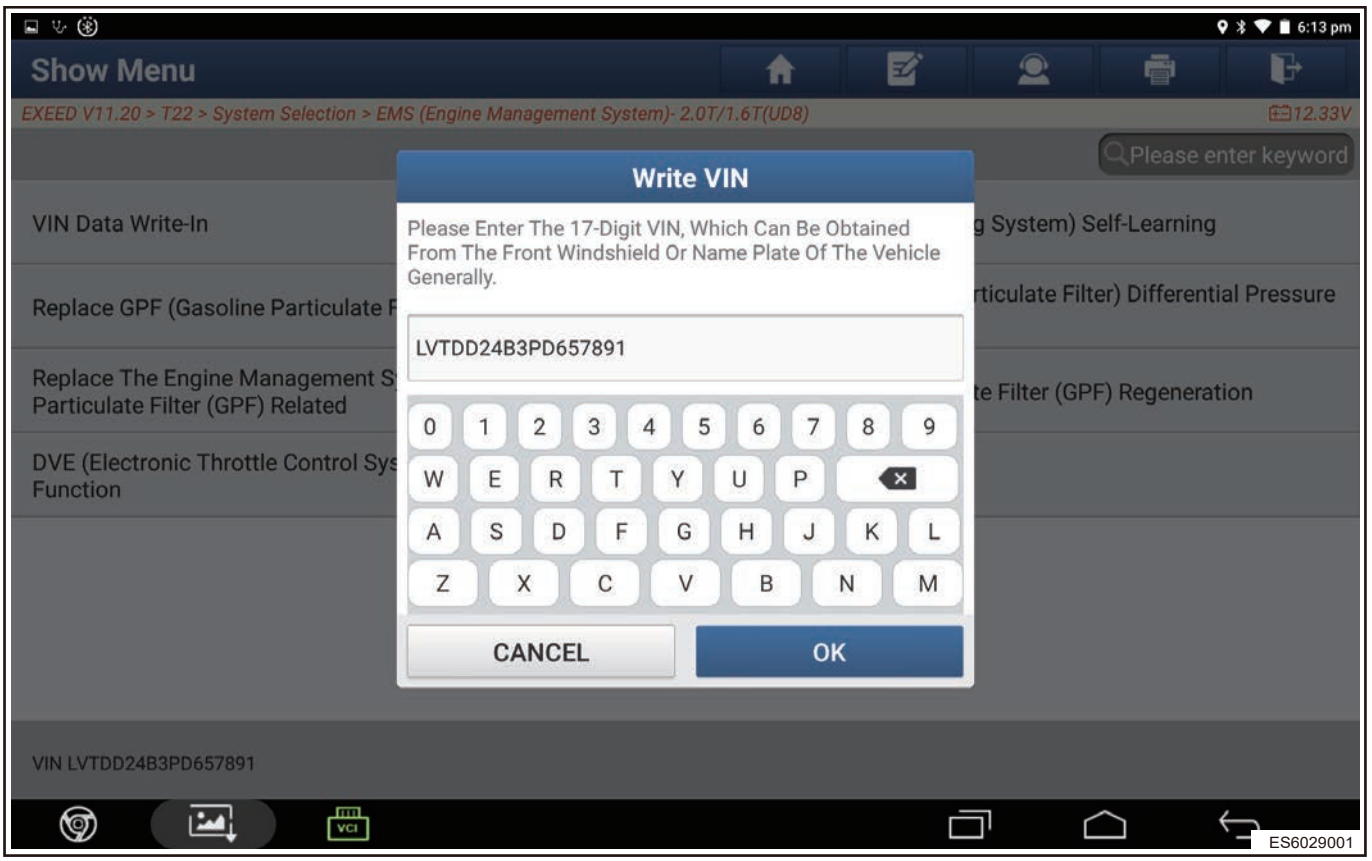
(4) Click "Special Function".



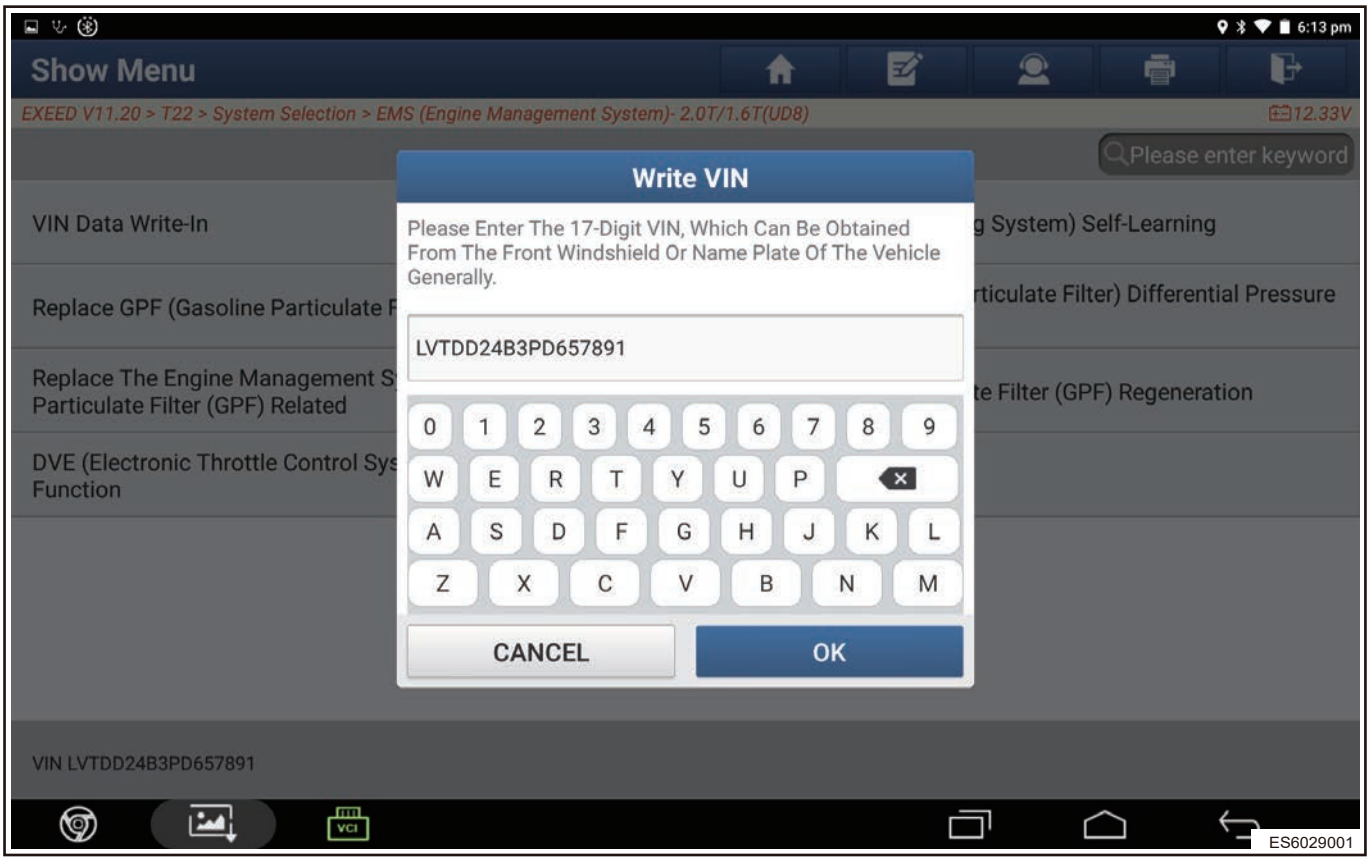
(5) Click "VIN Data Write-In".



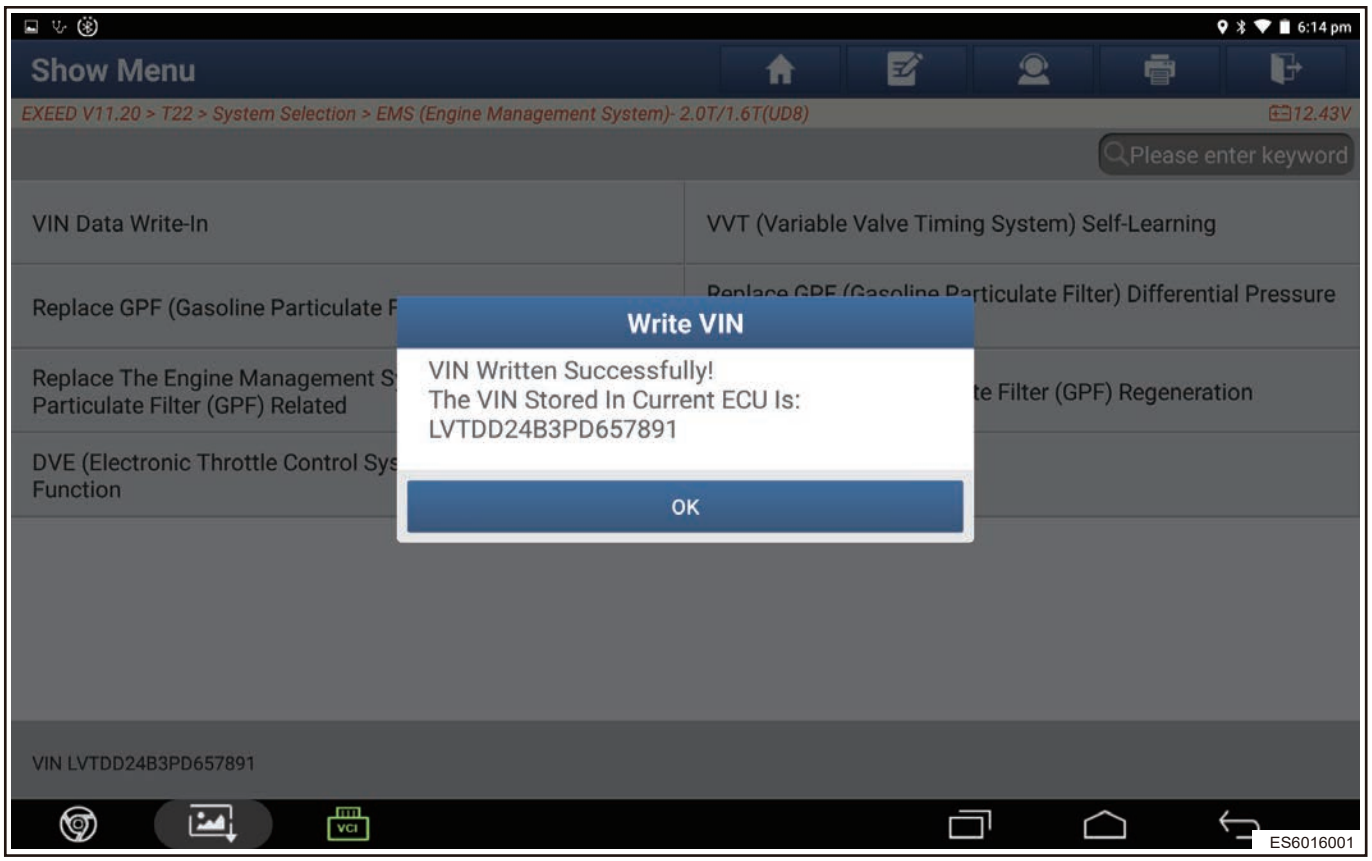
(6) Input VIN code, and click “OK”.



(7) Input VIN code again, and click “OK”.



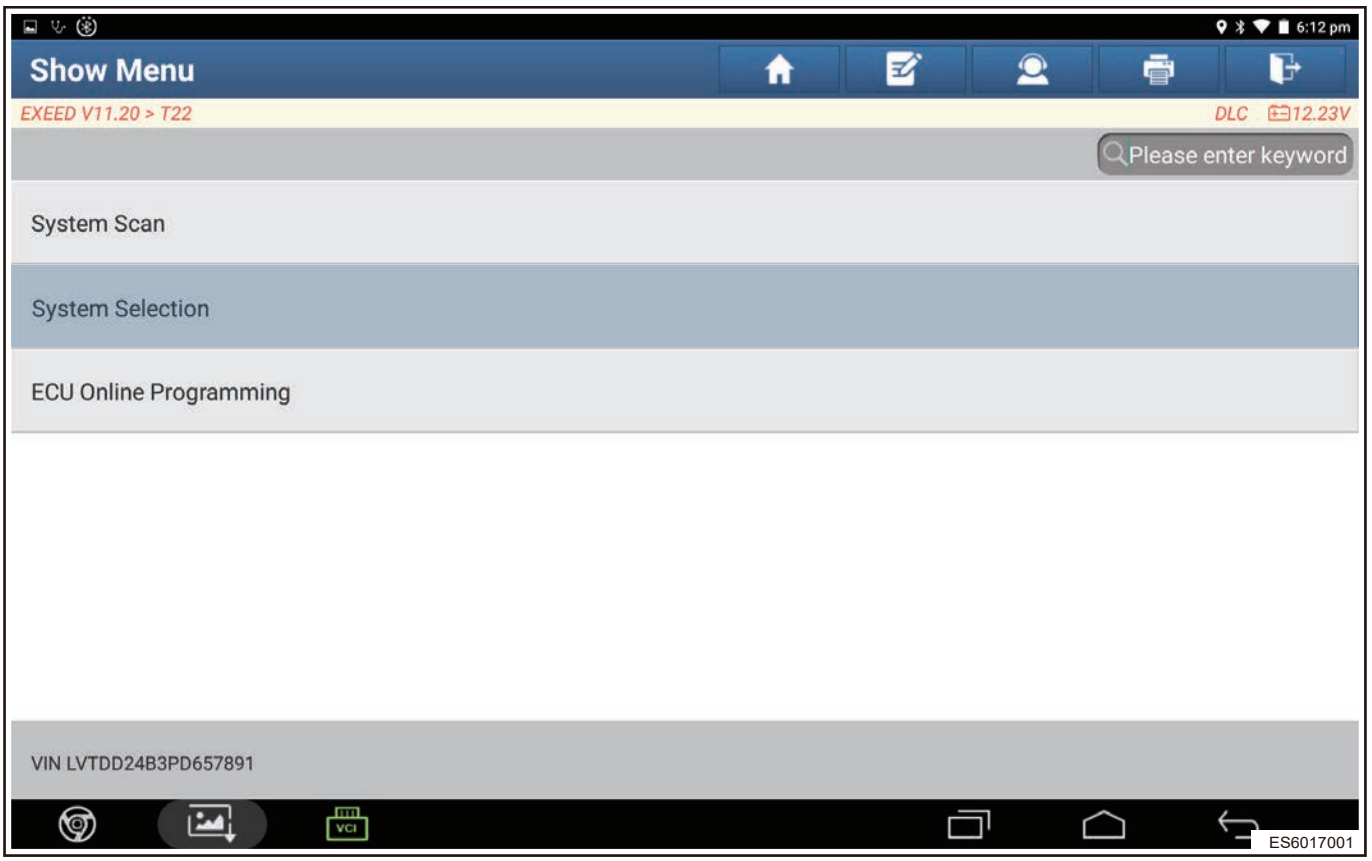
(8) It is written successfully.



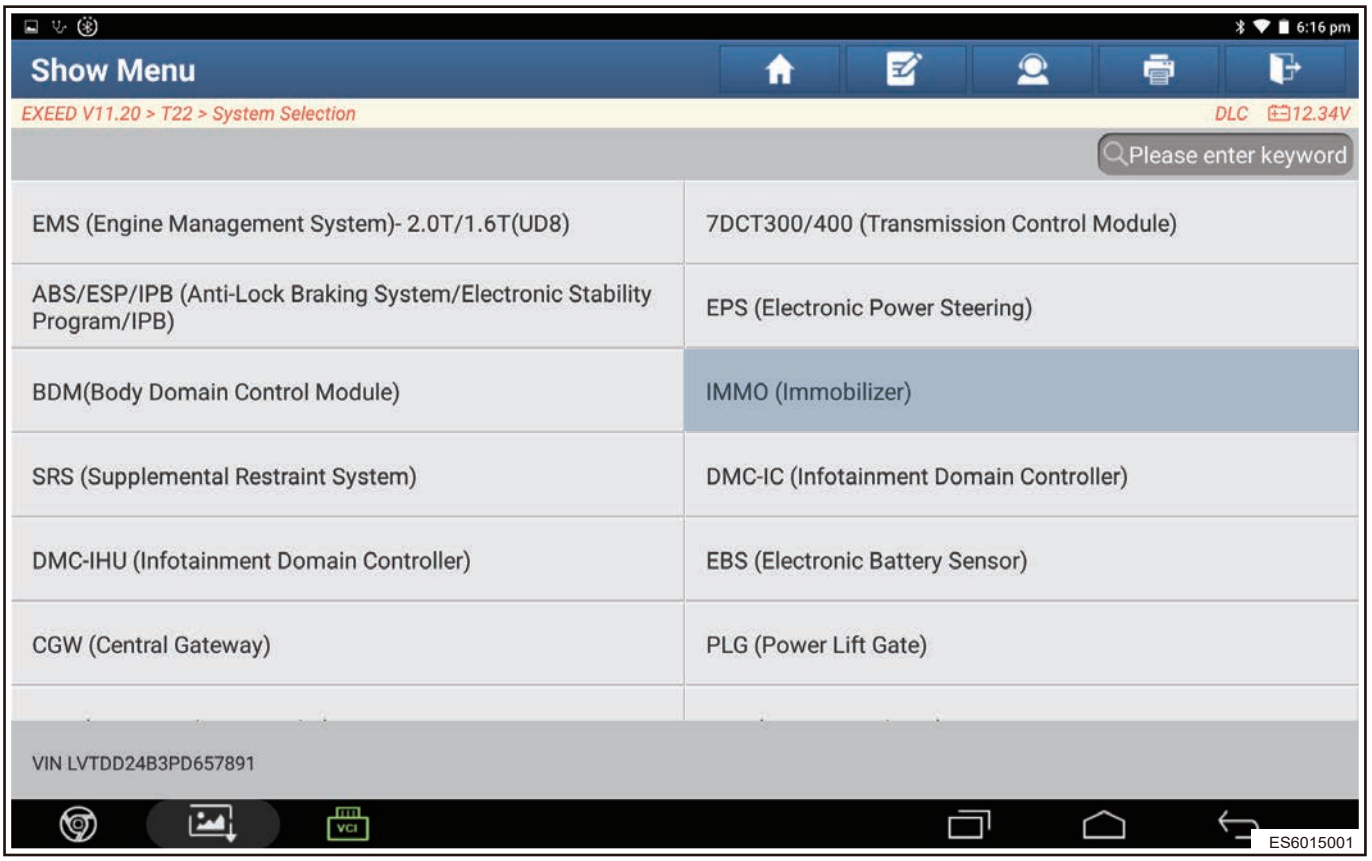
■ **Program ECM**

(1) Connect diagnostic tester, and select corresponding model.

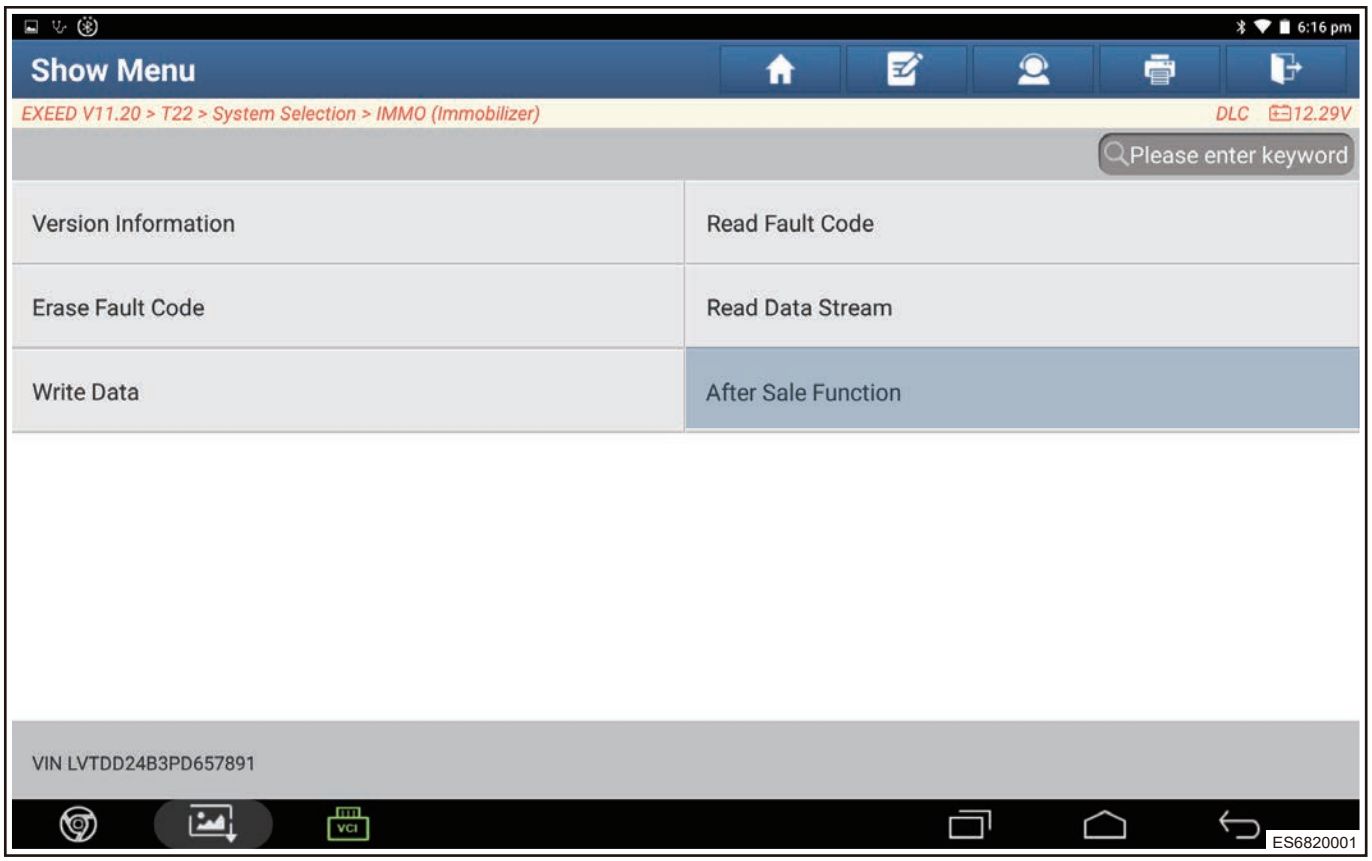
(2) Click “System Selection”.



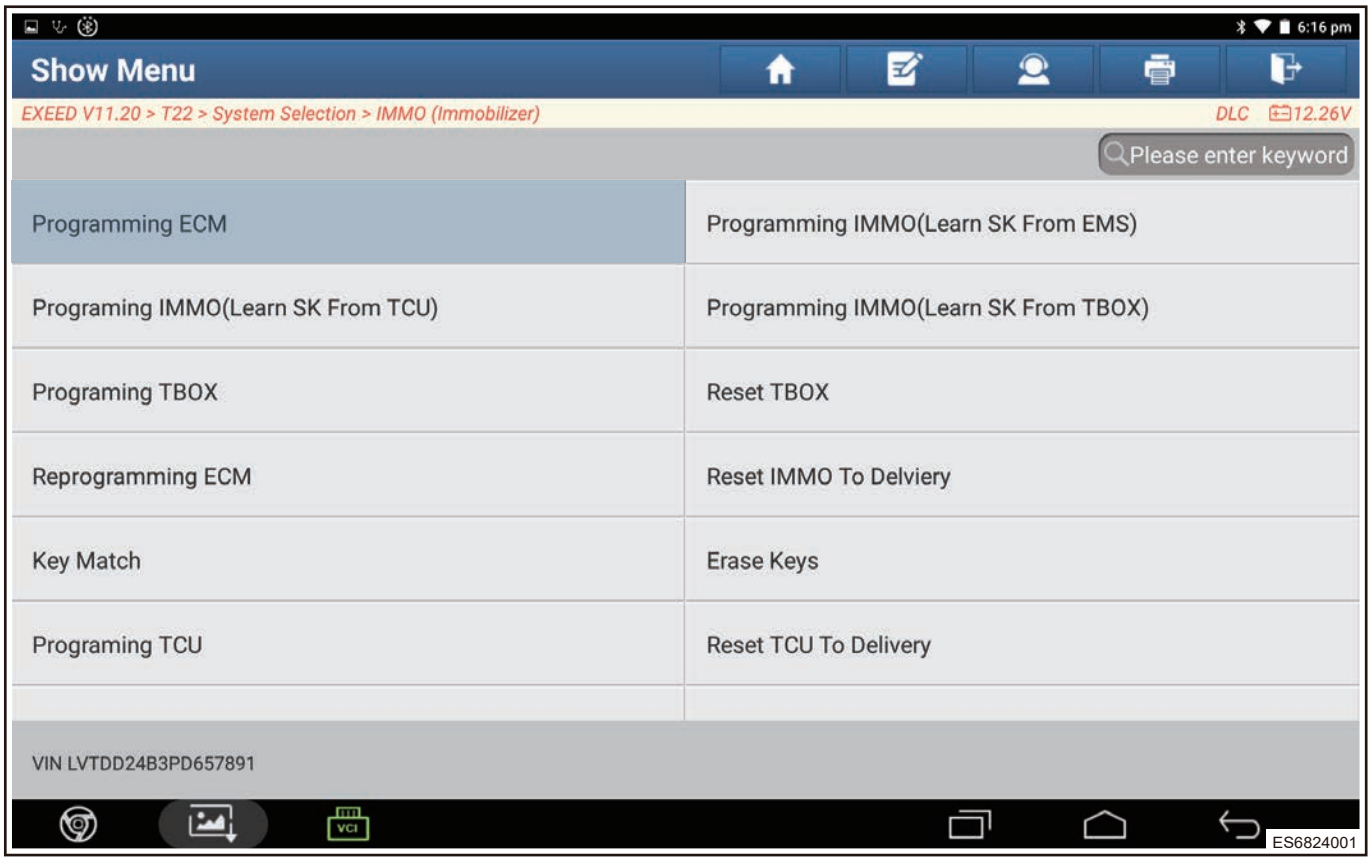
(3) Click “IMMO (Immobilizer)”.



(4) Click “After Sale Function”.

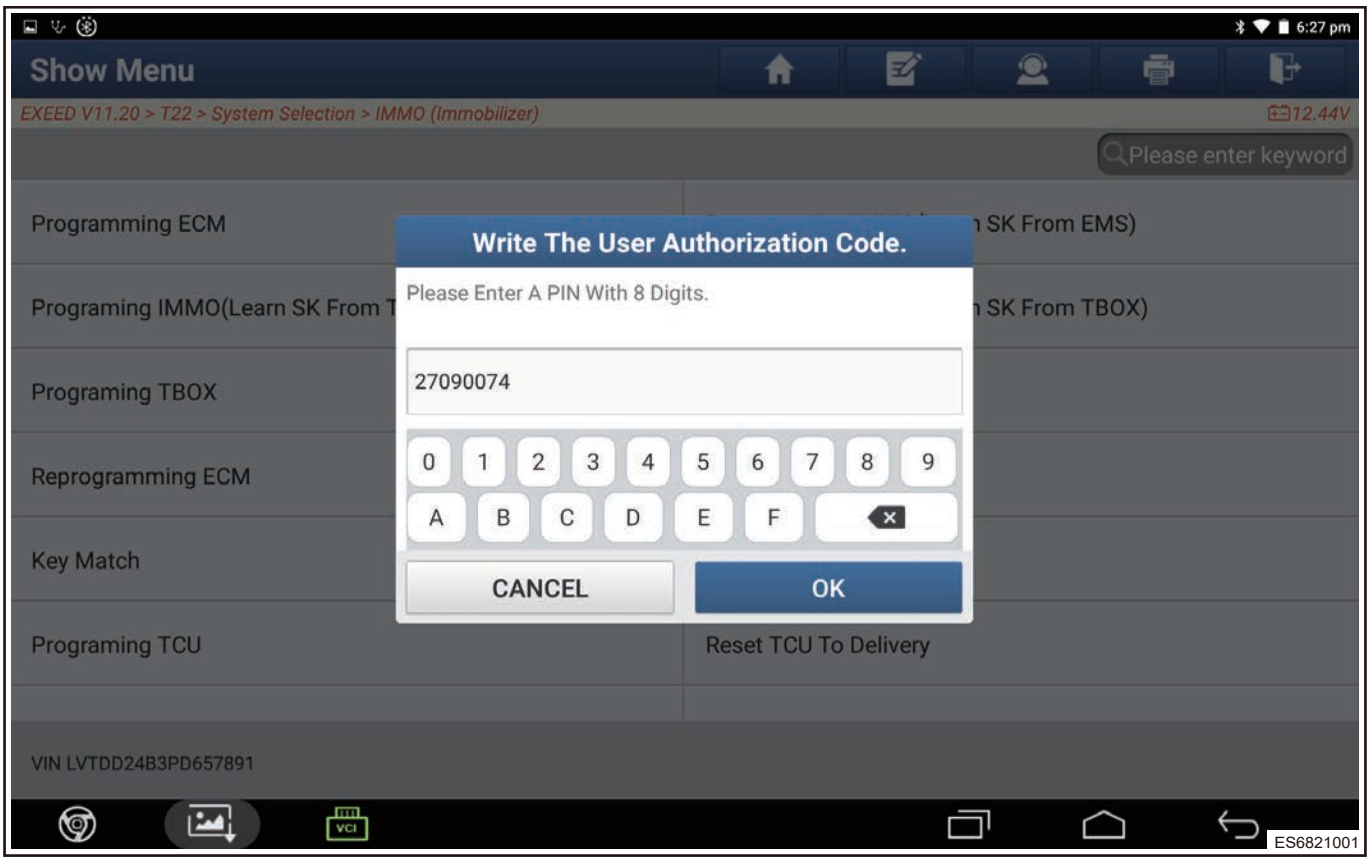


(5) Click “Programming ECM”.

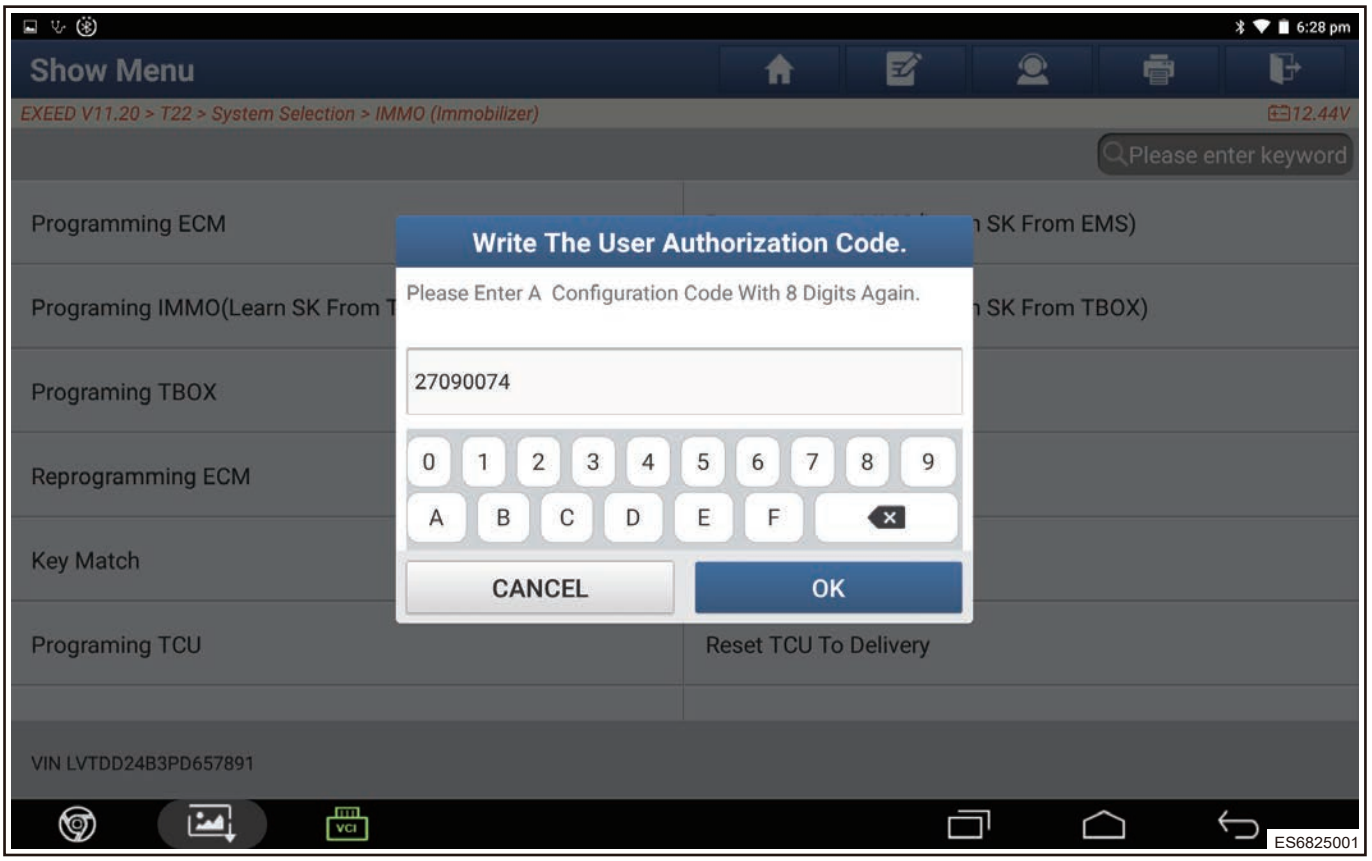


(6) After VIN code is input, click “OK”.

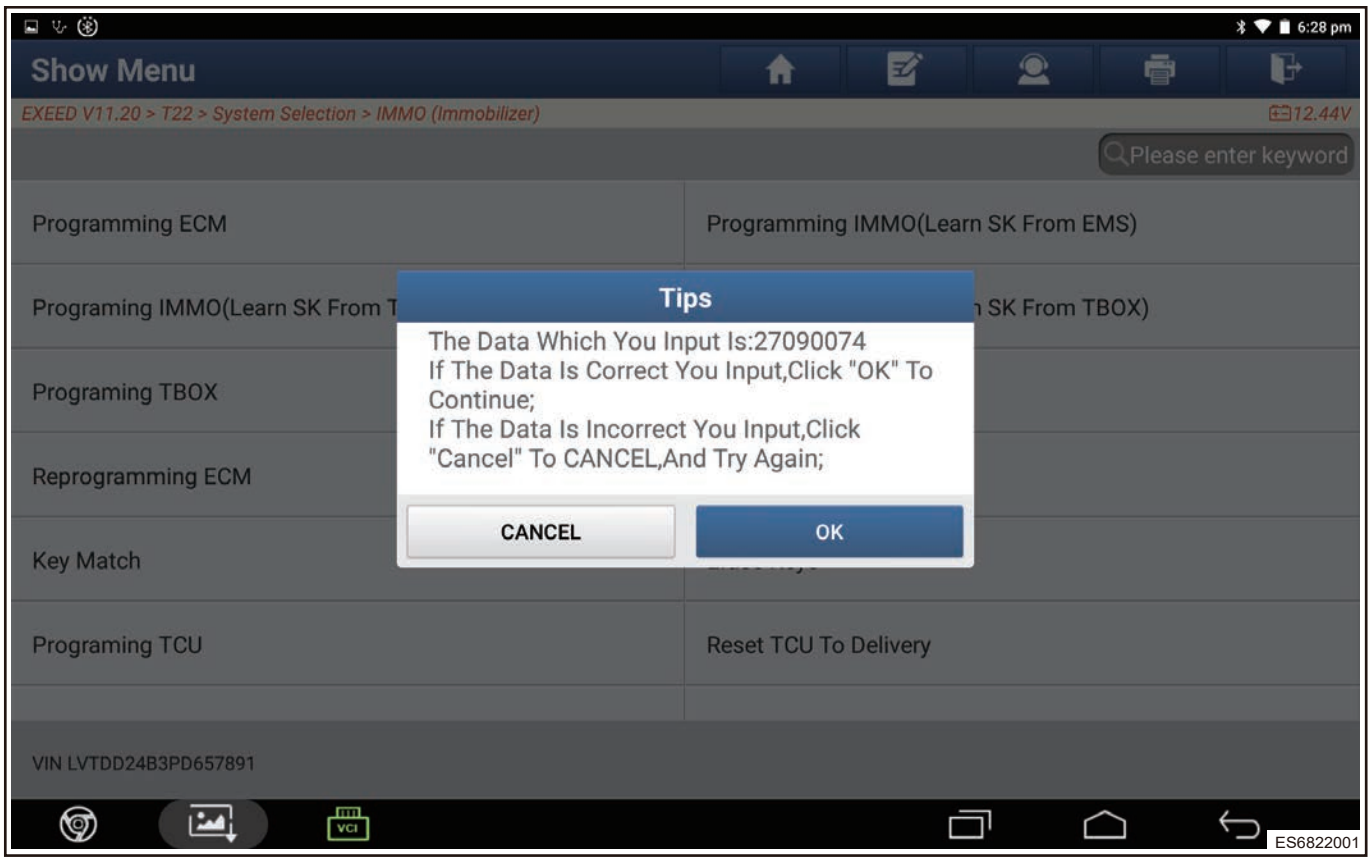
(7) After entering anti-theft security code, click "OK".



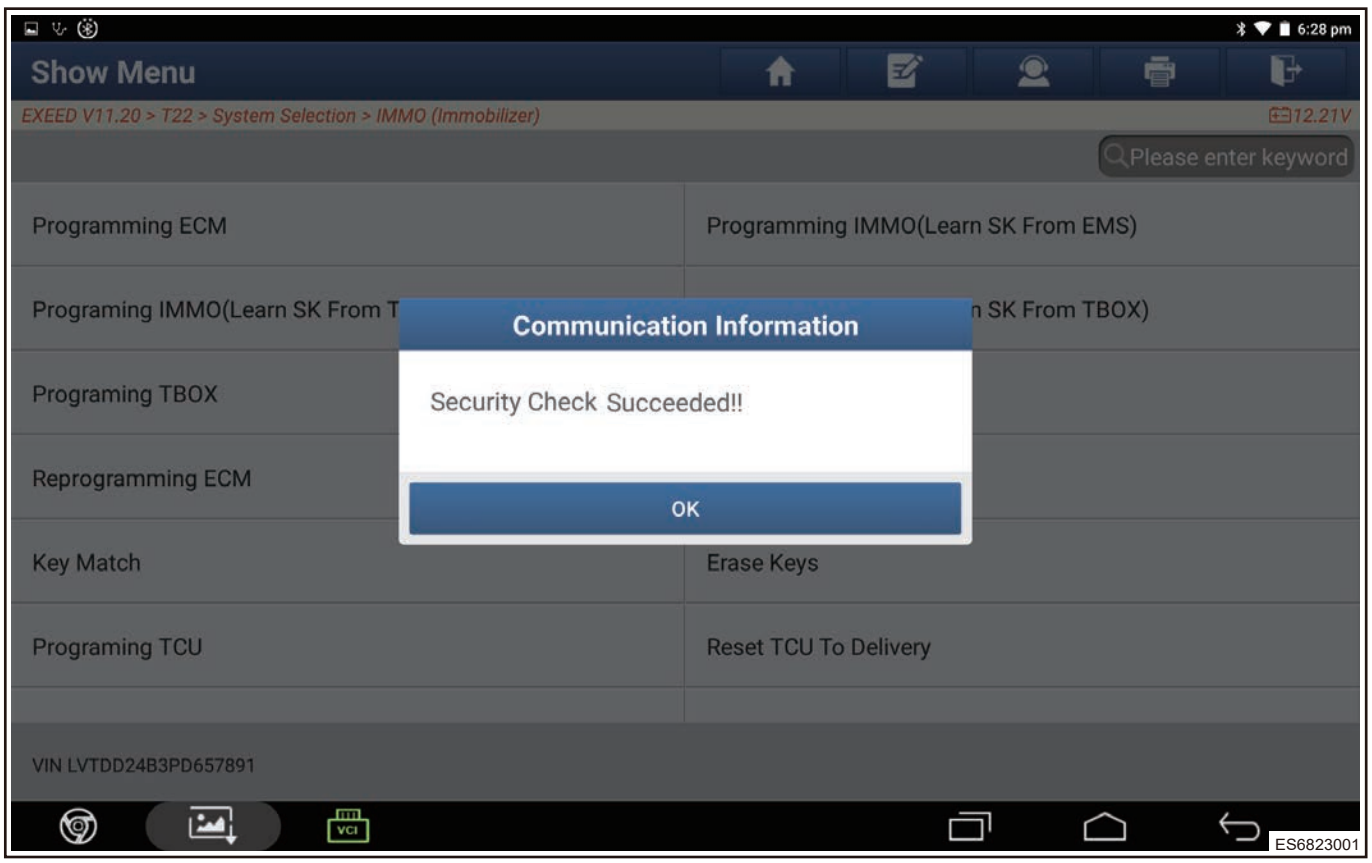
(8) After entering anti-theft security code again, click “OK”.



(9) Verify that the anti-theft security code entered is correct, confirm and click “OK”.

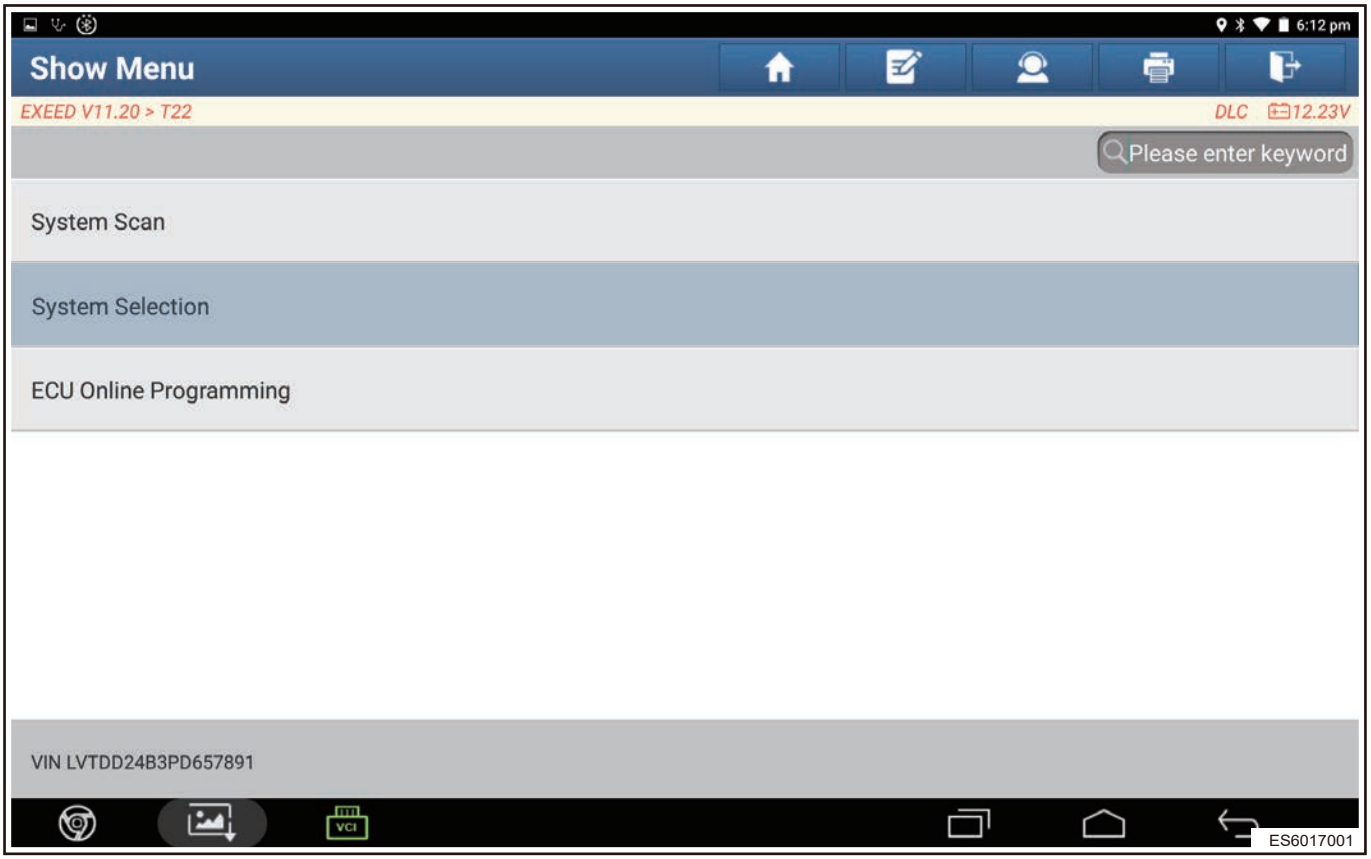


(10) Diagnostic tester interface shows “Security Check Succeeded!!”, click “OK”.

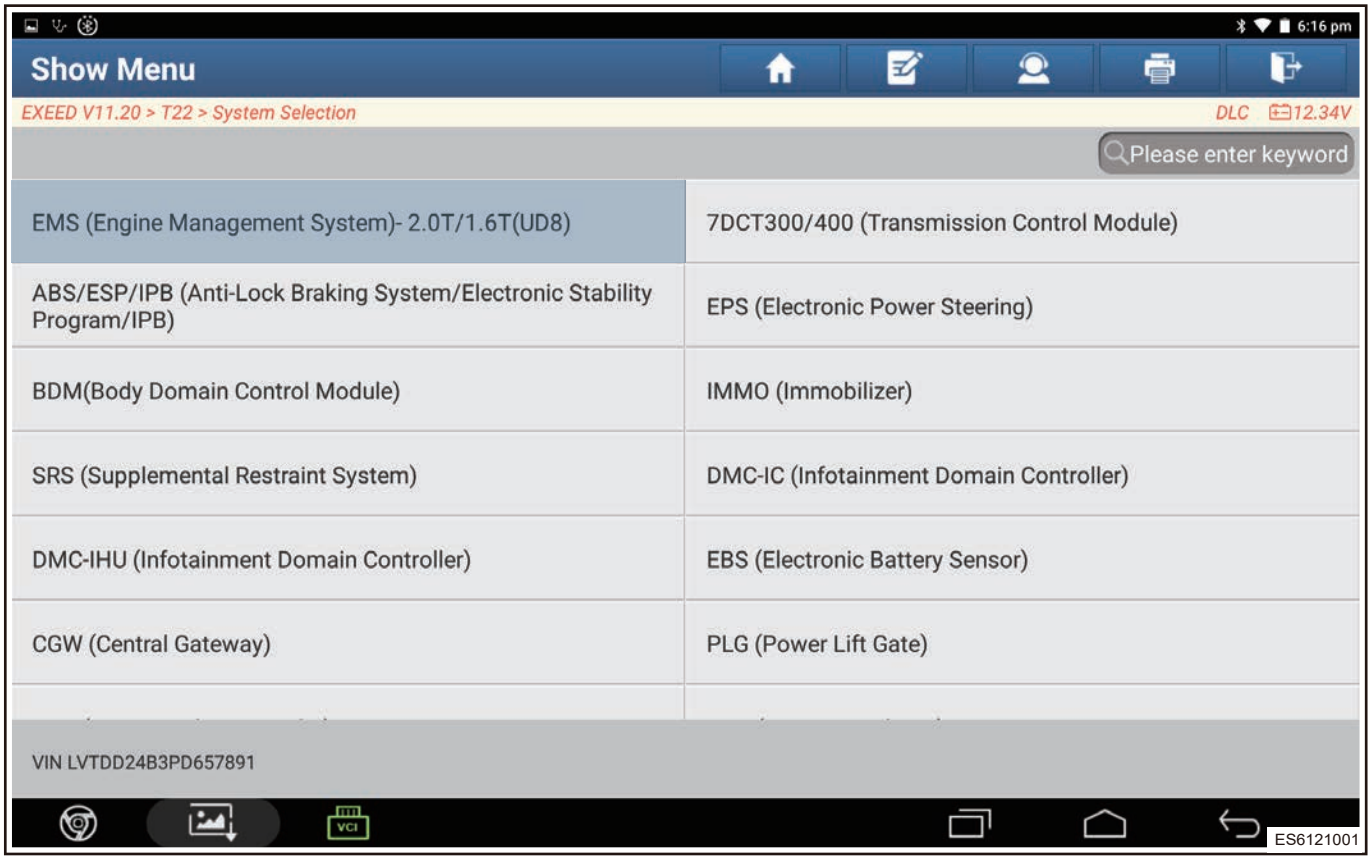


■ **VVT (Variable Valve Timing System) position learning**

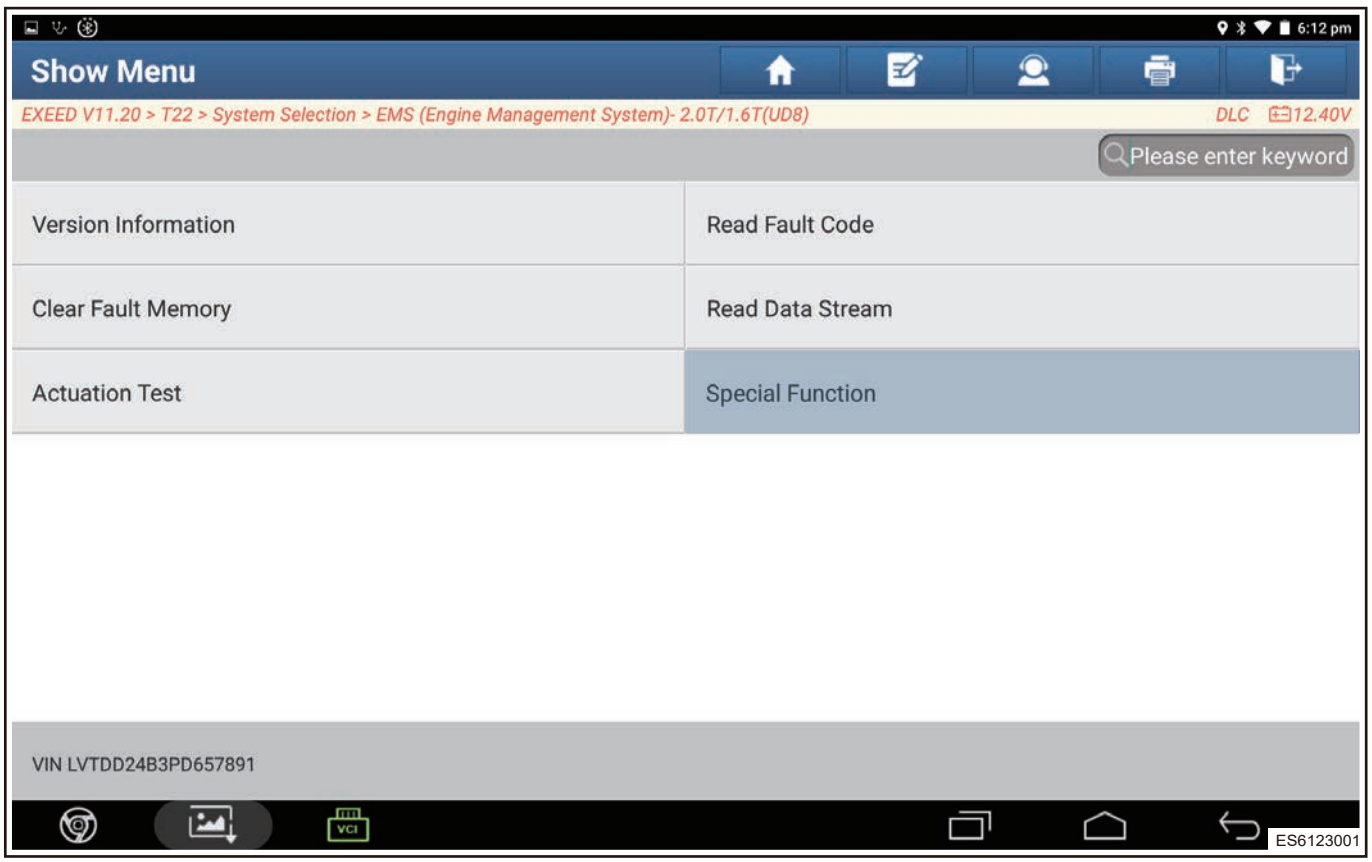
(1) Connect the diagnostic tester.
(2) Select the corresponding model.
(3) Click “System Selection”.



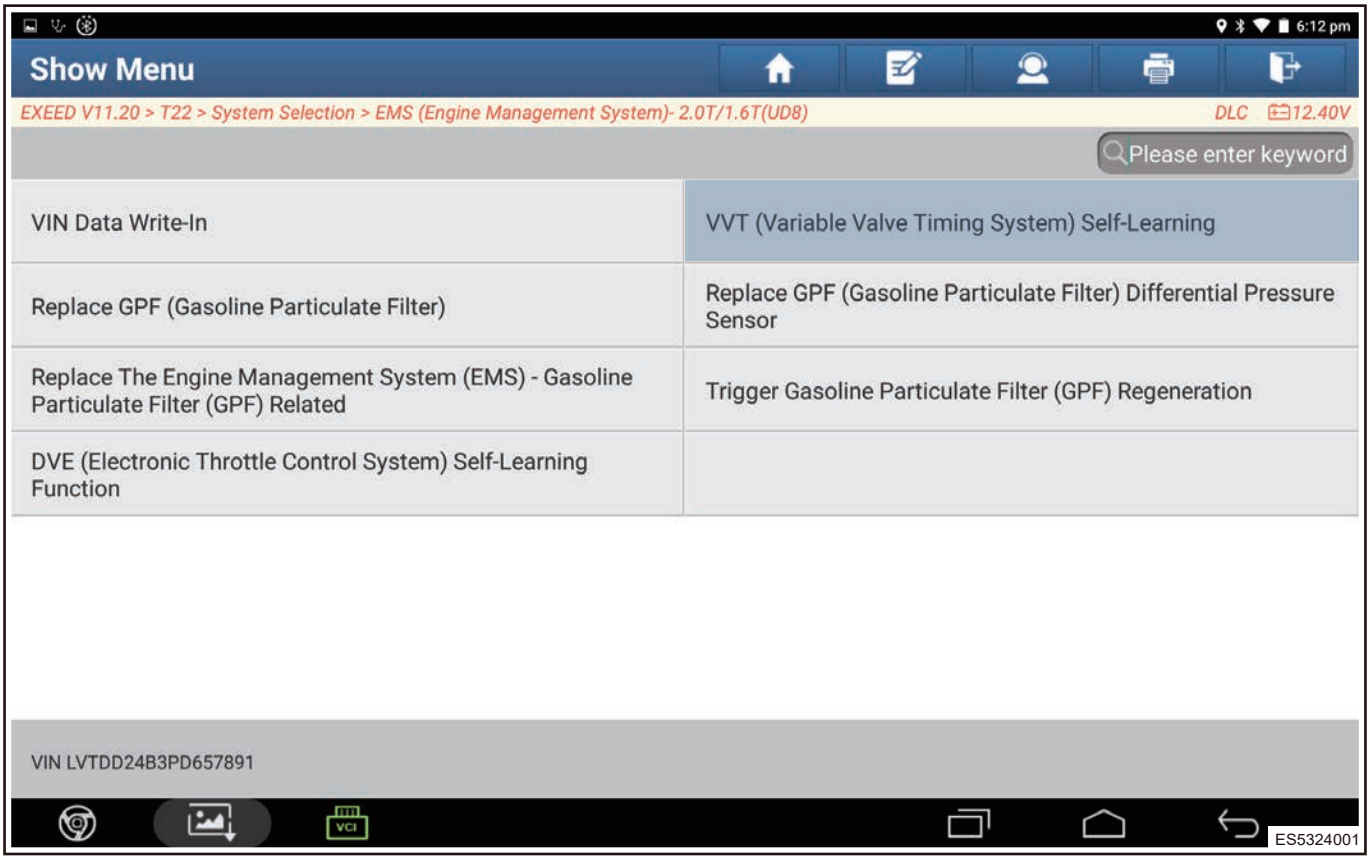
(4) Click "EMS (Engine Management System)"



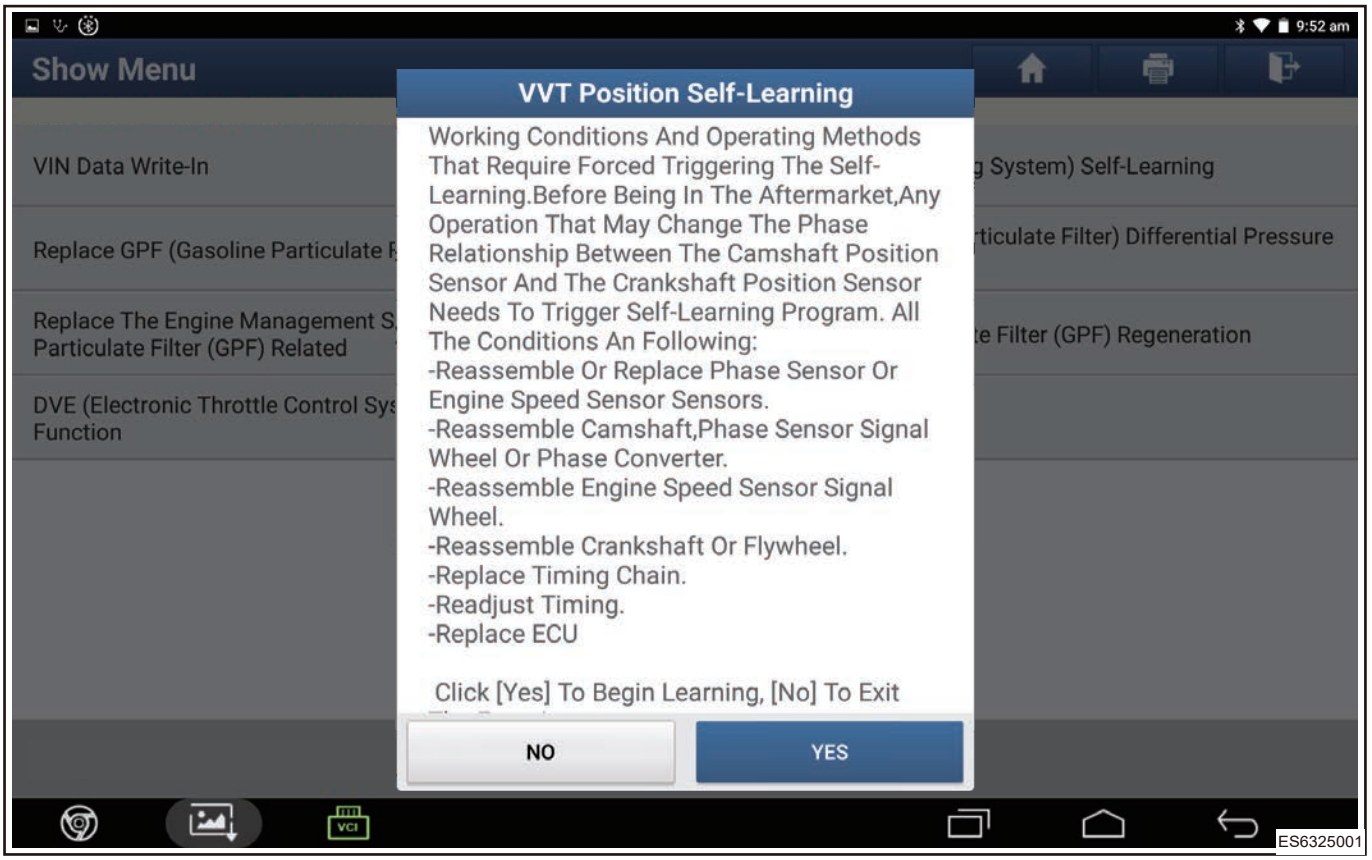
(5) Click "Special Function".



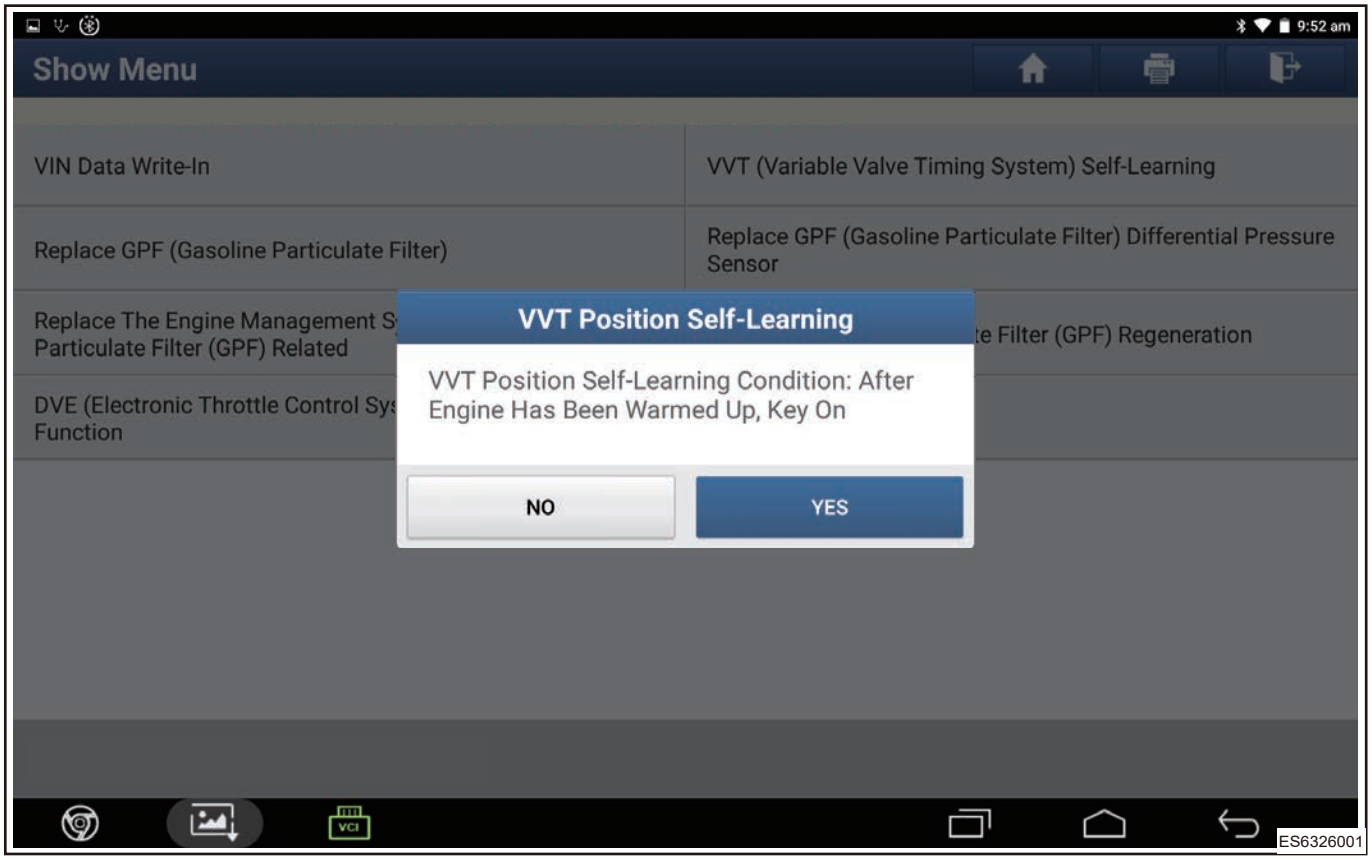
(6) Click “VVT (Variable Valve Timing System) Self-Learning”.



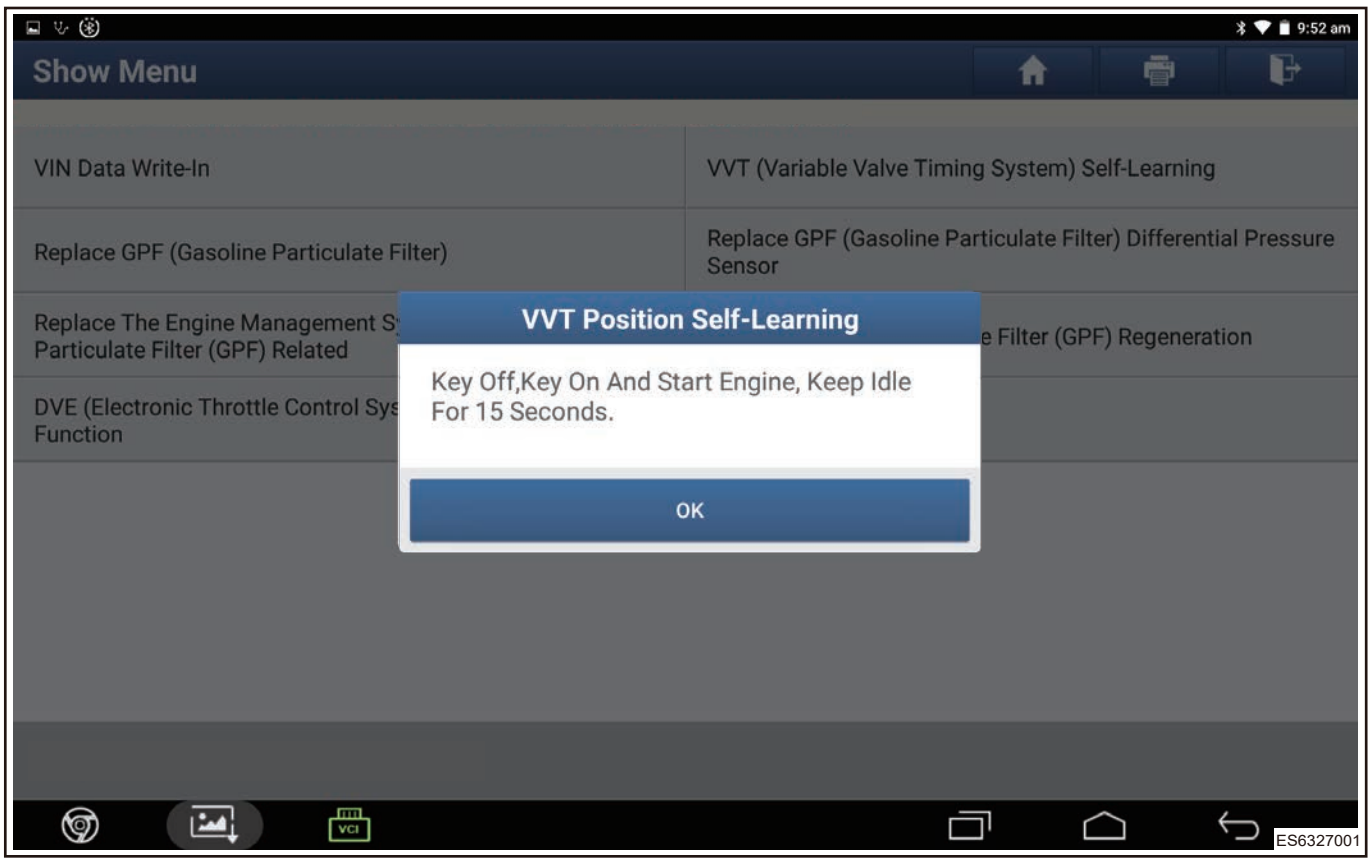
(7) After system prompts are confirmed, click “YES”.



(8) After system prompts are confirmed, click “YES”.



(9) System prompts that “VVT (Variable Valve Timing System)” position self-learning is successfully completed, then click "OK".



■ Triggering CVO self-learning guidance when replacing high pressure injector

Working conditions and operating methods that need to trigger self-learning.
During after-sales service, CVO self-learning needs to be triggered when replacing injector and ECU.

(1) Operation step:

1) Start engine, and send 1031 command by diagnostic tester under idling operation condition.
2) Keep idling for 120 seconds.
3) Wait for 12 minutes after being powered off.
4) End.

■ VVT self-learning guide

Working conditions and operating methods that need to be forced to trigger self-learning.
During off-line or after-sales maintenance, any operation that may change the phase relationship between camshaft position sensor and crankshaft position sensor must perform the first VVT self-learning.

(1) The first self-learning of VVT includes the following situations:

1) Removal, installation or replacement of PG or DG sensor
2) Removal/installation of camshaft/PG signal plate/phaser
3) Removal and installation of DG signal plate
4) Removal/installation of crankshaft/flywheel
5) Replace the timing chain
6) Readjust the timing
7) Replace ECU

(2) Operation step:

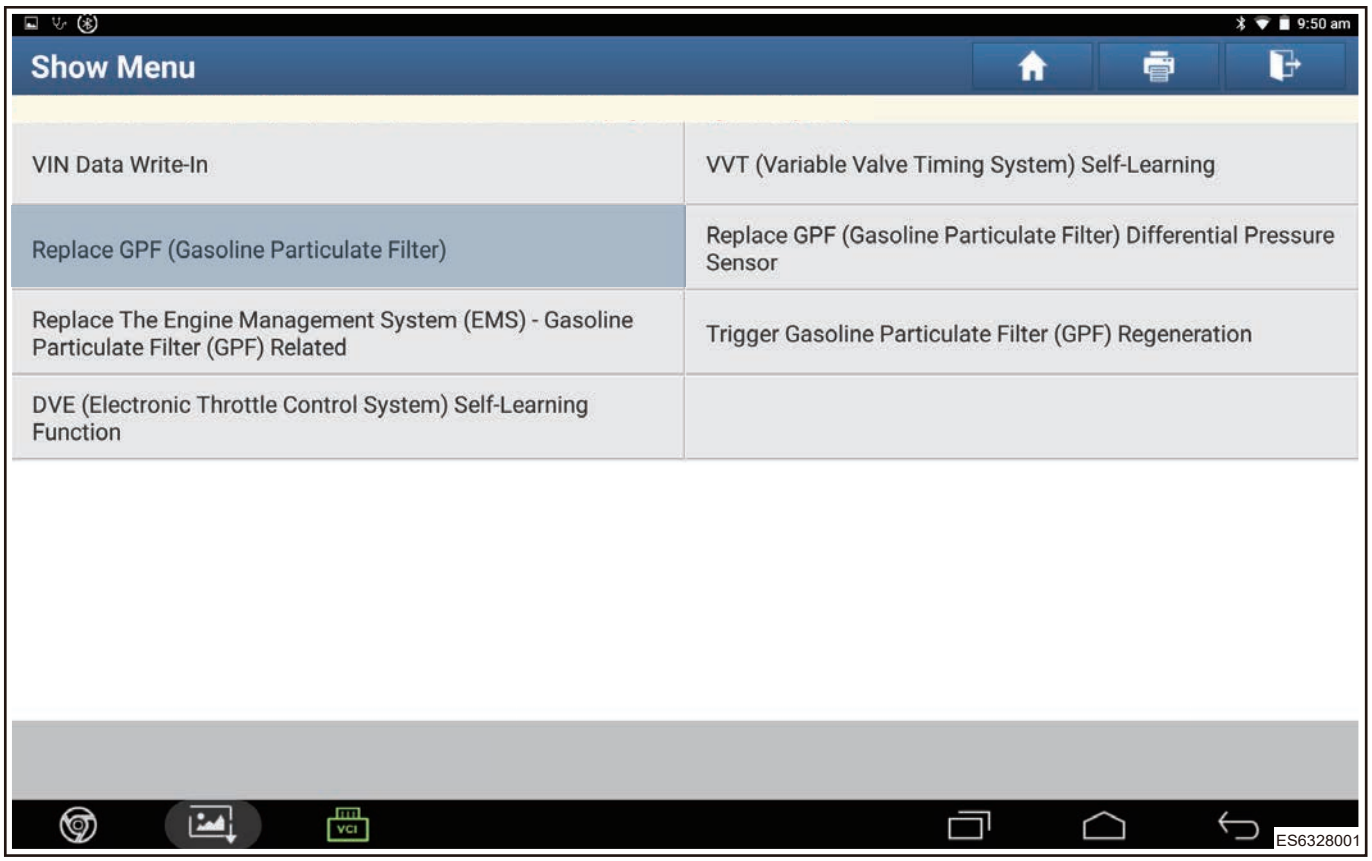
1) When the ECU is powered on, the AE09 command is sent by UDS service of diagnostic tester without starting the engine, and the command lasts for more than 1 second;
2) Power off, waiting for 720 seconds;
3) Power on and start again, idling for 15 seconds;
4) Power off, waiting for 720 seconds

■ GPF information writing

In the following cases, GPF information needs to be written.

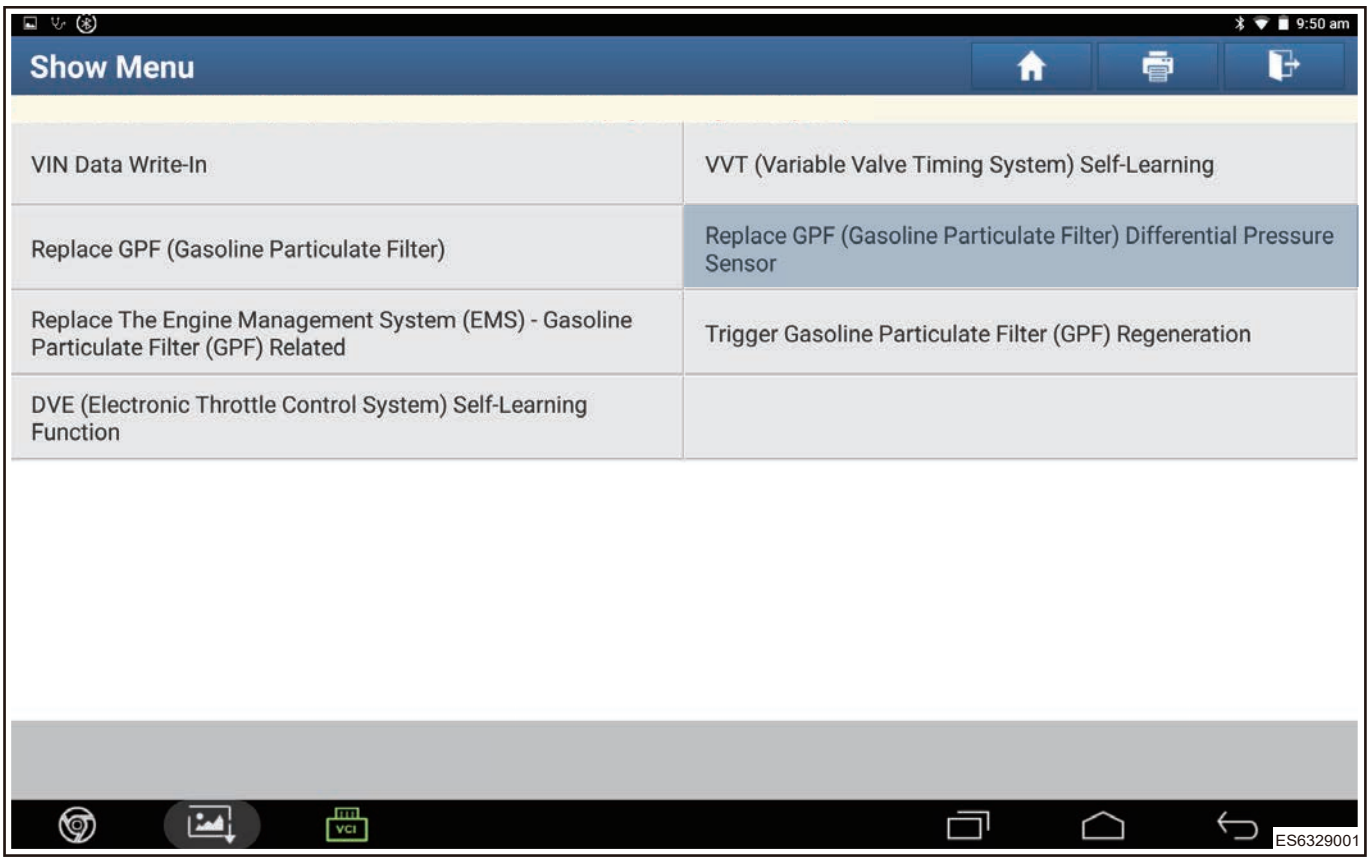
(1) Replace GPF

1) Stop the vehicle in a safe place;
2) The engine stops, after the GPF temperature has cooled to room temperature, replace GPF with a new one;
3) When the engine is powered on and not started, the command will be sent by UDS service of diagnostic tester;
4) Power off, wait for 720 seconds, power on again to read the current model carbon value is not higher than 0.6, the corresponding fuel cumulative value is 0, that is, write to EEPROM is successful;
5) Replacement of GPF is complete.



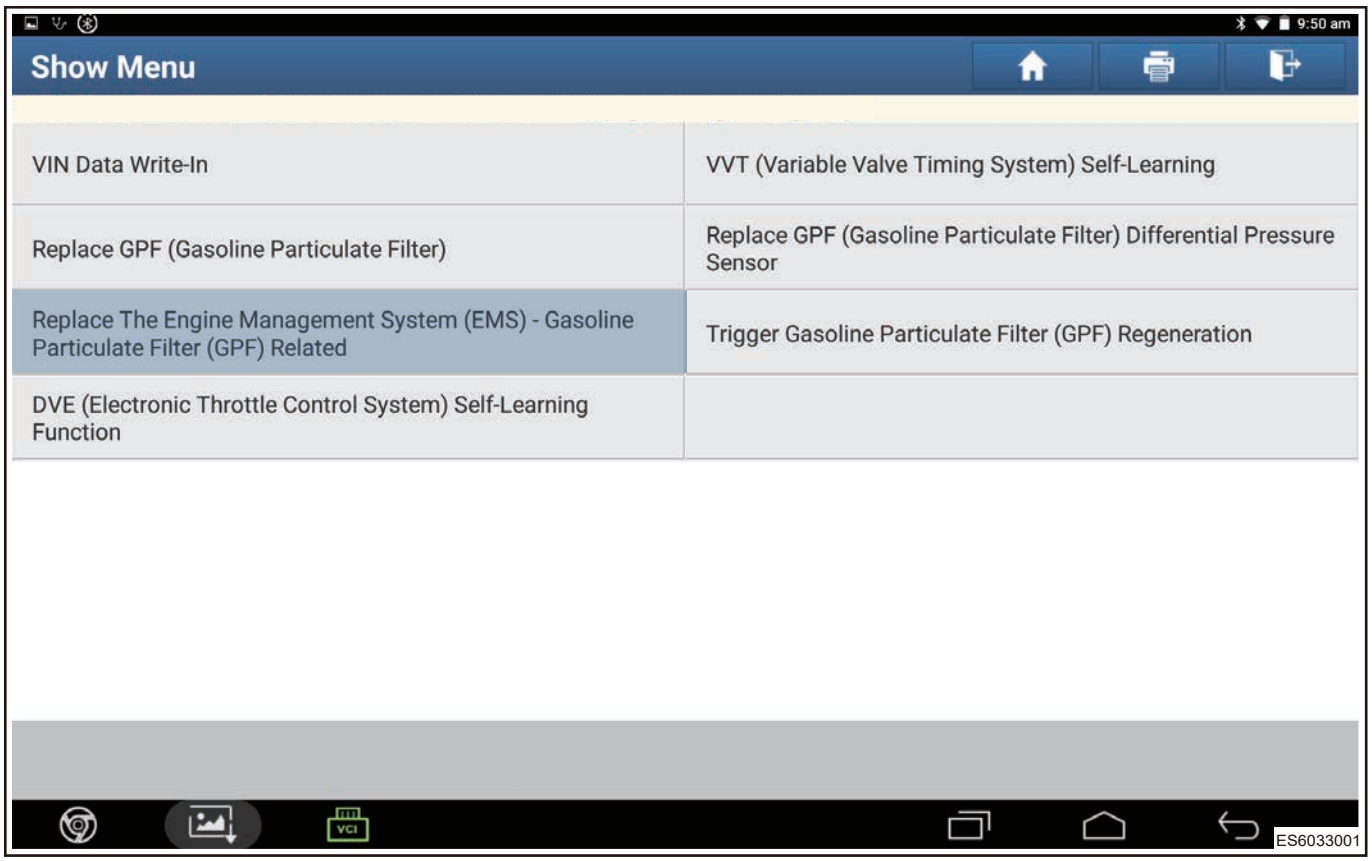
(2) Replace differential pressure sensor

1) Stop the vehicle in a safe place;
2) The engine stops, after the GPF temperature has cooled to room temperature, replace differential pressure sensor with a new one and ensure that the upstream and downstream lines are installed correctly;
3) When the engine is powered on and not started, the command will be sent by UDS service of diagnostic tester;
4) Power off, wait for 720s, power on again to read the learning value of differential pressure sensor as 0, that is, write to EEPROM successfully;
5) Replacement of differential pressure sensor is complete.



(3) Replace ECU

1) Stop the vehicle in a safe place;
2) When the engine is stopped, power on and use the UDS service of diagnostic tester to read out the expected rewritten amount (if the diagnostic tester has a storage function, store it in the diagnostic tester; if not, you need to manually record each EEP value);
3) Power off the engine, after the ECU is cooled to room temperature, replace it with a new one;
4) When the engine is powered on and not started, send commands by UDS service, and send (flag bit + value) fields to new ECU one by one;
5) Power off, wait for 720 seconds, power on again to read the current model carbon value is not higher than 0.6, the corresponding fuel cumulative value is not 0, that is, write to EEPROM is successful;
6) Replacement of ECU is complete.



(4) Parking service regeneration

1) Stop vehicle in a safe place, avoid exposure to the sun and around inflammables, do not open the hood, if there is a blower, it can be placed in front of the intake grille to blow;

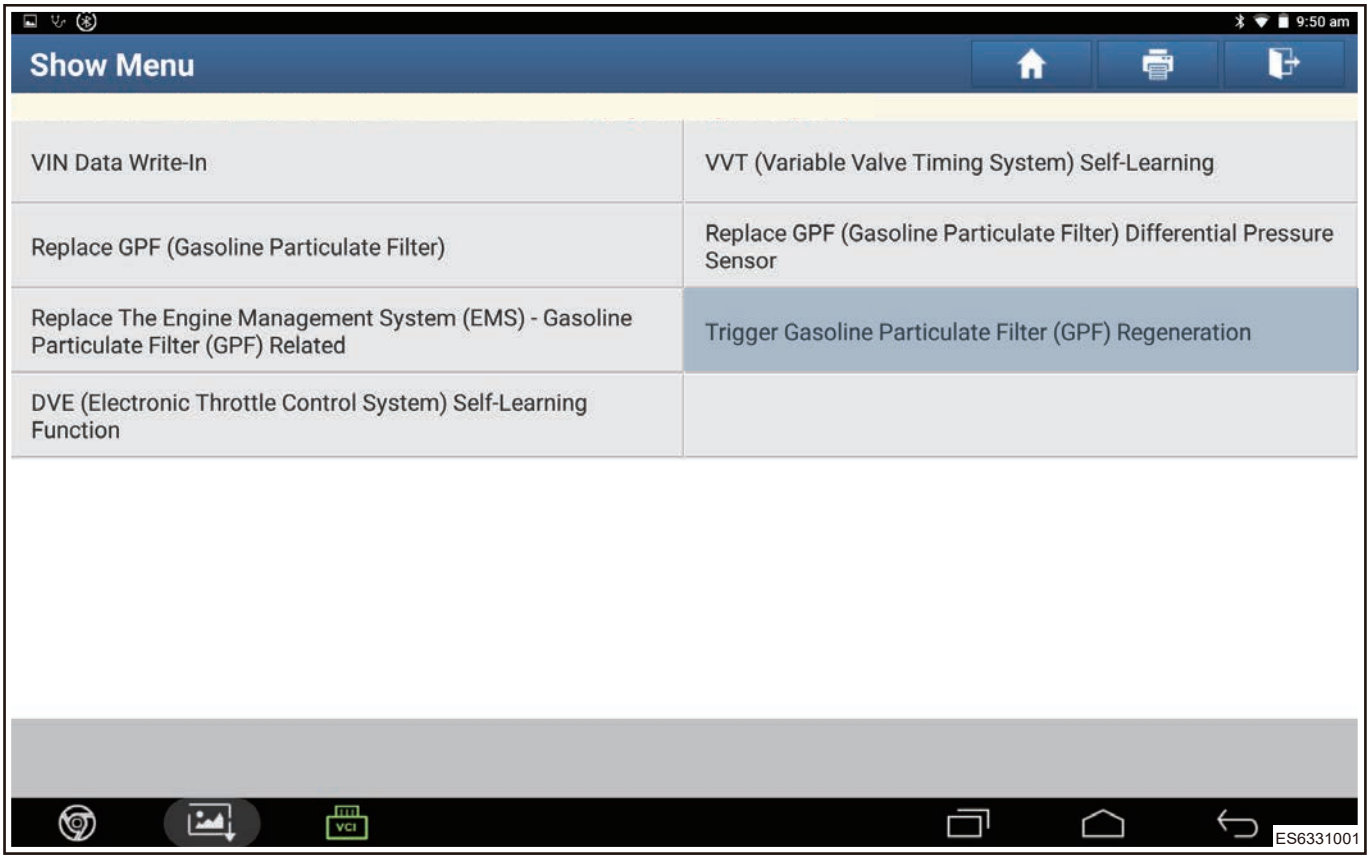
2) Power on and shift to P, start the engine, idle until the coolant temperature exceeds 60℃, turn off the air conditioning, turn on the vehicle heater, turn the target temperature to maximum, and make the wind speed to maximum;

3) Send the command by the UDS service of diagnostic tester, and the engine speed reaches 3900 rpm, then the parking regeneration is triggered successfully;

4) Within 1 hour after triggering regeneration, the engine returns to normal idle speed;

5) Use the diagnostic tester to read the current model carbon value ⩽ 1.5g, and the mileage value since the last fully successful regeneration is 0, the regeneration is successful, if not, turn the engine OFF and power off. Restart the engine and trigger the parking regeneration again according to the above steps.

6) Service regeneration is complete.



⚠ Caution

- **Before performing parking regeneration, all DTC of vehicle engine should be repaired according to the regulations.**
- **Non-related personnel should not approach the regenerative vehicle.**
- **During the regeneration process, there are the following possibilities to interrupt the process:**
  - **(1) GPF temperature is too high**
  - **(2) Regeneration time is too long**
  - **(3) The remaining gasoline is too low**
  - **(4) Vehicle movement**
  - **(5) Engine knock**
  - **(6) Enriched with air-fuel ratio**
  - **(7) Shifting**
  - **(8) Accelerator pedal depressed**
  - **(9) Brake pedal depressed**
  - **(10) Coolant temperature is too high or too low**
  - **(11) Misoperation of diagnostic tester**

2.2 ENGINE MECHANICAL

1 Warnings

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.

2 System Overview

2.1 Description

SQRF4J20C engine has the following features

(1) DVVT

(2) In-line DOHC with 4 cylinders

(3) Four valves per cylinder

(4) Aluminum cylinder head

(5) Aluminum cylinder block

(6) Supercharged intercooler

(7) Equipped with balance shaft

2.2 System Principle

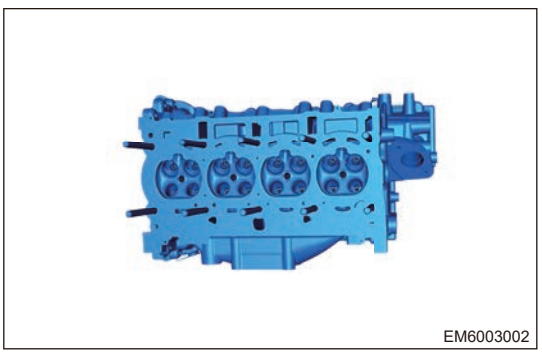
(1) SQRF4J20C engine adapts a design of transverse, direct injection, in-line 4-cylinder, 4-stroke, four valves per cylinder, DOHC, supercharged intercooler, VVT and electronic controlled multi-port fuel injection, the engine adapts independent ignition.

(2) SQRF4J20C engine adapts aluminum cylinder block. Aluminum oil pan is fixed to aluminum frame with bolts. The aluminum cylinder head is secured to the cylinder block with bolts. The camshaft is installed on cylinder head. Power output from crankshaft drives camshaft by crankshaft sprocket through timing belt to rotate, thus making camshaft interact with rocker arm lifter to open and close valve. Piston assembly is an aluminum piston with cast iron connecting rod. This engine has the characteristics of reliable structure and excellent performance.

2.3 System Components Description

■ Cylinder head

The upper part of the cylinder is closed to form a combustion chamber, and as the support of the camshaft, rocker arm, intake pipe and exhaust pipe. It mainly sucks air into the cylinder, the spark plug ignites the combustible gas mixture to drive the piston, and the exhaust gas is discharged from the exhaust pipe.



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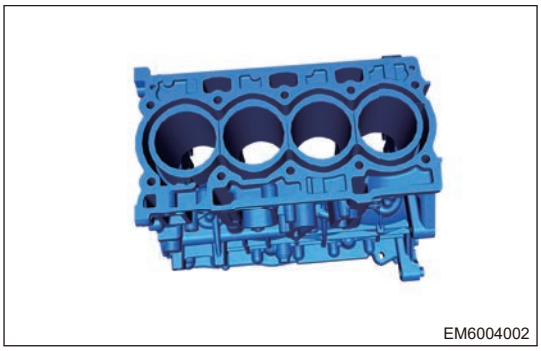
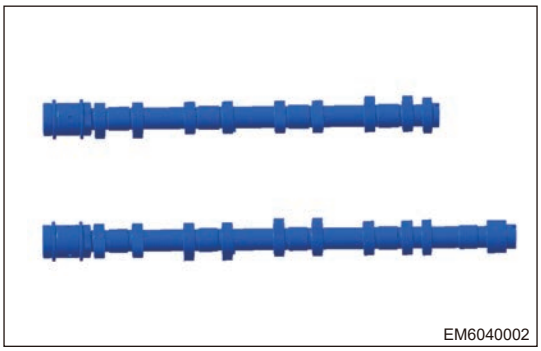
■ Cylinder block

The main body of the engine, which connects each cylinder and crankcase into a whole, is the support frame for installing piston, crankshaft, other parts and accessories.


EM6004002

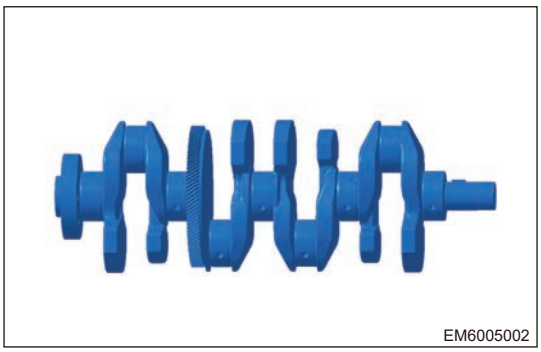
■ Camshaft

Camshaft is a component located inside engine, which is used to control valve opening and closing operations.


EM6040002

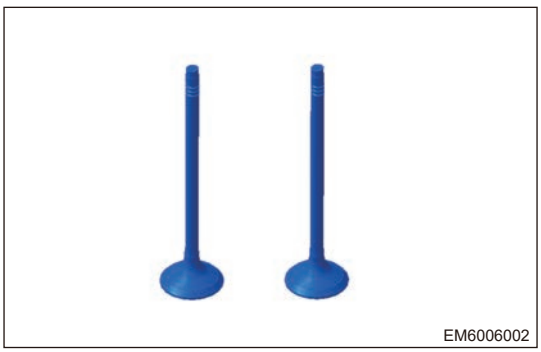
■ Crankshaft

Crankshaft is an important component in engine, which bears force from connecting rod and transfers it into rotation torque and outputs it through crankshaft to drives other accessories of engine.


EM6005002

■ Valve

Valve is used to allow air to flow in engine and bleed exhausted air after combustion; Intake valve is used to absorb air in engine and mix it with fuel for combustion; Exhaust valve is used to bleed exhausted air after combustion for radiation.


EM6006002

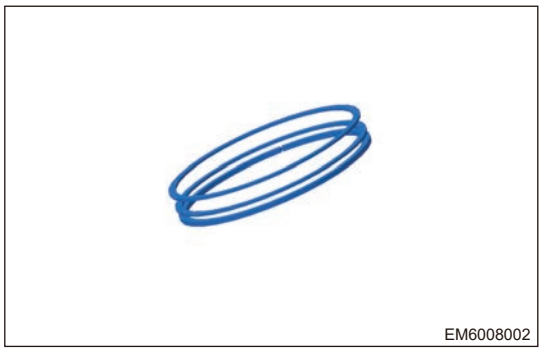
■ Piston

Piston is used to bear combustion compression from cylinder and transfer it to the crankshaft through piston pin and connecting rod.


EM6007002

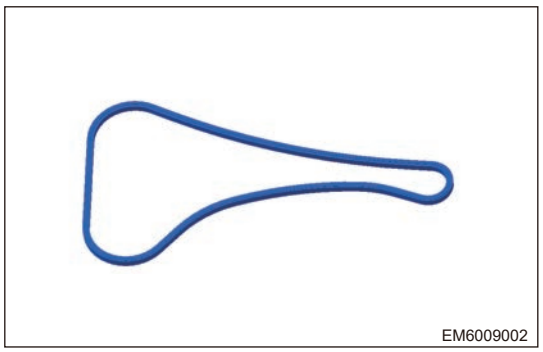
■ Piston ring

Piston ring has two types of air ring and oil ring.
Air ring is used to keep air tightness between cylinder and piston to avoid air leakage. Also it transmits most heat to cylinder wall which is carried away by coolant; Oil ring is used to apply and scrape the oil. Excessive oil can be scraped when oil ring moves downward and a layer of even oil can be applied to cylinder wall when oil ring moves upward. It not only can prevent oil entering the cylinder for combustion and also can reduce friction resistance between piston and cylinder. Furthermore, oil ring helps in air tightness.


EM6008002

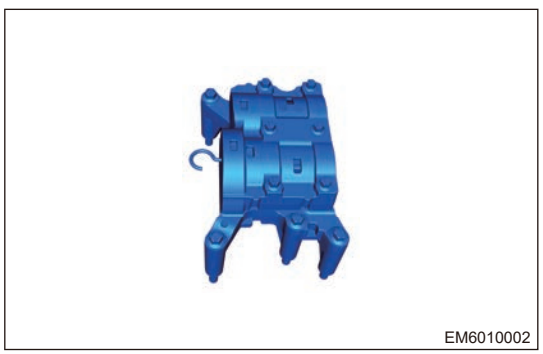
■ Engine timing chain

Engine timing chain is mainly used to drive valve mechanism, which allows intake valve and exhaust valve to open and close in proper time so that engine cylinder can absorb and exhaust air normally.


EM6009002

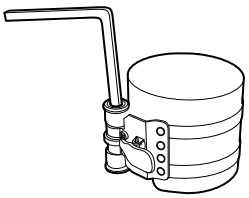
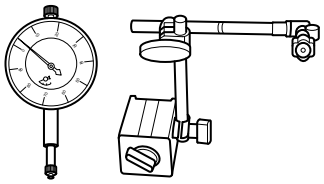
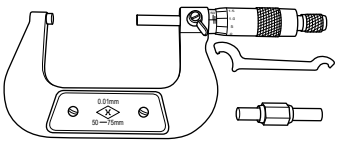
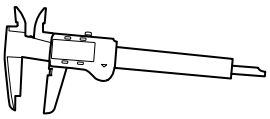
■ Balance shaft assembly

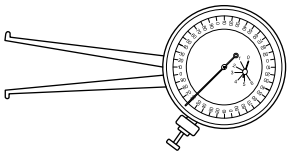
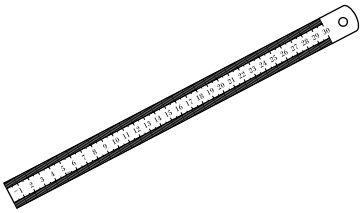
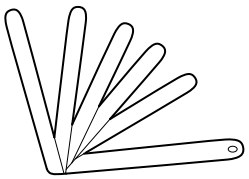
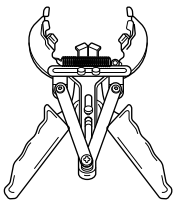
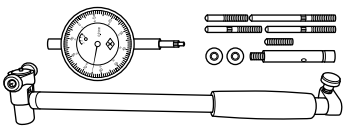
In order to balance the speed difference of piston at the top and bottom dead centers, the vibration of the engine is significantly improved, allowing engine to work more smoothly.

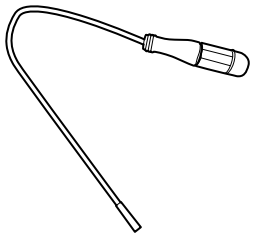
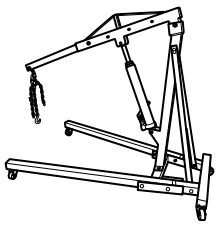
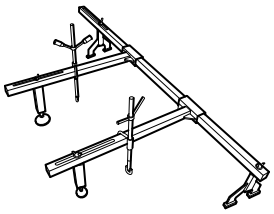
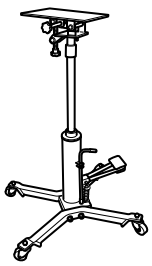
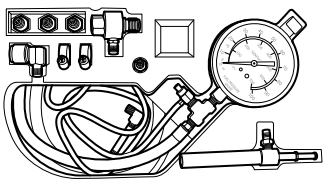

EM6010002

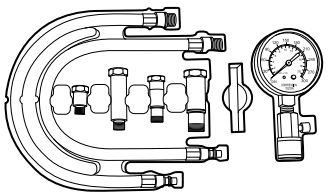
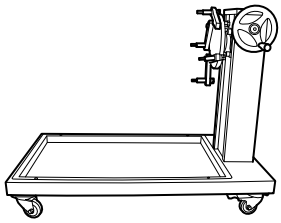
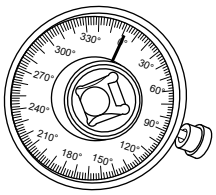
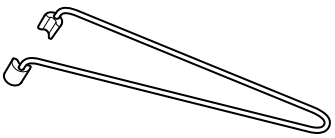
3 Special Tool and Equipment

3.1 General Tools

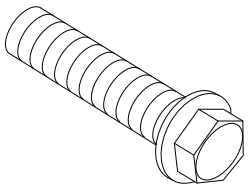
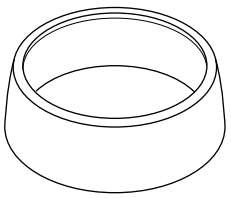
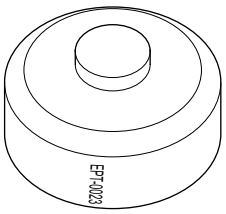
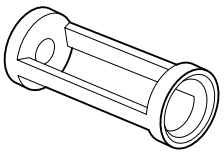
Tool Name	Tool Drawing
Piston Installer	 S00030
Dial Indicator and Magnetic Holder	 S00018
External Micrometer	 S00045
Vernier Caliper	 S00051

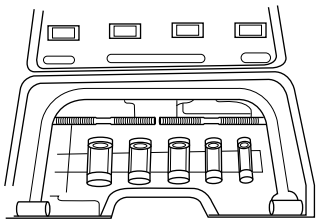
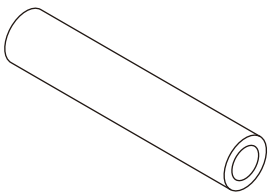
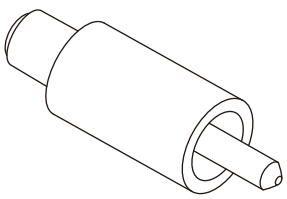
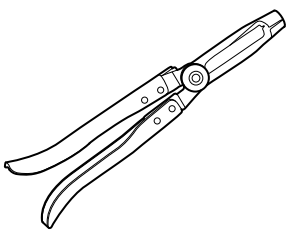
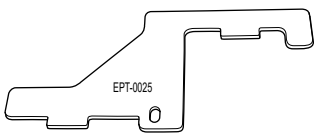
Tool Name	Tool Drawing
Inner Diameter Micrometer	 S00049
Precision Straightedge	 S00044
Feeler Gauge	 S00041
Piston Ring Remover	 S00047
Cylinder Gauge	 S00046

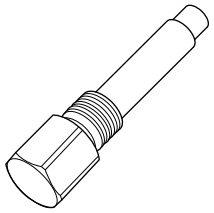
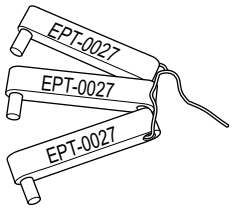
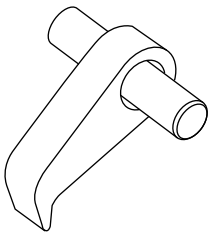
Tool Name	Tool Drawing
Flexional Magnetic Rod	 S00031
Engine Hoist	 S00032
Engine Equalizer	 S00021
Transmission Carrier	 S00004
Fuel System Pressure Tester	 S00035

Tool Name	Tool Drawing
Cylinder Pressure Gauge	 S00033
Engine Service Platform	 S00039
Angle Gauge	 S00065
Valve Cotter Installer	 S00024

3.2 Special Tools

Tool Name	Part No.	Tool Drawing
Crankshaft Front Oil Seal Guide Tool	EPT-0021	 S00088
Crankshaft Front Oil Seal Installer	EPT-0022	 S09037
Crankshaft Rear Oil Seal Guide Tool	EPT-0024	 S00091
Crankshaft Rear Oil Seal Installer	EPT-0023	 S09038
Valve Spring Compression Adapter	EPT-0001	 S00037

Tool Name	Part No.	Tool Drawing
Valve Spring Compressor	EPT-0002	 S00087
Valve Oil Seal Installer	EPT-0010	 S00093
Valve Oil Seal Guide Sleeve	EPT-0009	 S00092
Valve Oil Seal Remover	EPT-0003	 S00029
Camshaft Timing Tool	EPT-0025	 S09039

Tool Name	Part No.	Tool Drawing
Crankshaft Timing Tool	EPT-0026	 S09041
Balance Shaft Locking Special Fixture	EPT-0027	 S09042
Flywheel Holding Tool	EPT-0008	 S00099

4 Parameters

4.1 Engine Specifications

Items	Specifications
Type	Vertical, direct injection, in-line 4-cylinder, water-cooled, 4-stroke, DOHC
Type	SQRF4J20C
Valve Number Per Cylinder	4
Cylinder Diameter (mm)	80.5
Piston Stroke (mm)	98.12
Displacement (ml)	1998
Compression Ratio	10.2:1
Ignition Type	Independent
Rated Power (kw)	192
Rated Power Speed (r/min)	5500

Items	Specifications
Max. Net Power (kW)	183
Max. Net Power Speed (r/min)	5500
Max. Torque (N·m)	400
Max. Torque Speed (r/min)	1750 - 4000
Min. Fuel Consumption Rate (g/kW·h)	258
Fuel Octane Number	Unleaded gasoline, octane number 95 or above
Oil Grade	C5 0W-20
Starting Type	Electric starting
Cooling Type	Forced circulation type antifreeze cooling
Lubrication Type	Compound type (pressure, splash lubrication)
Cylinder Compression Pressure (bar) (180 - 250) r/min	7 + -10

4.2 Tolerance Matching Between Engine Main Components

Series Number	Part Name	Size and Tolerance	Matching Clearance
1	Intake Side 1st Bearing Hole	Φ33 (0, +0.025)	0.050 - 0.91
	Intake Camshaft Assembly 1st Journal	Φ33 (-0.066, -0.050)	
	Intake Side 2nd-6th Bearing Holes	Φ24 (0, +0.021)	0.040 - 0.074
	Intake Camshaft Assembly 2nd-6th Journals	Φ24 (-0.053, -0.040)	
2	Exhaust Side 1st Bearing Hole	Φ33 (0, +0.025)	0.050 - 0.91
	Exhaust Camshaft Assembly 1st Journal	Φ33 (-0.066, -0.050)	
	Exhaust Side 2nd-5th Bearing Holes	Φ24 (0, +0.021)	0.040 - 0.074
	Exhaust Camshaft Assembly 2nd-5th Journals	Φ24 (-0.053, -0.040)	
3	Cylinder Head Intake Side Camshaft Thrust Gear Width	23.85 (-0.1, 0)	0.15 - 0.275
	Intake Camshaft Assembly Thrust Gear Width	24 (0, +0.025)	
4	Cylinder Head Exhaust Side Camshaft Thrust Gear Width	23.85 (-0.1, 0)	0.15 - 0.275
	Exhaust Camshaft Assembly Thrust Gear Width	24 (0, +0.025)	
5	Hydraulic Lifter Assembly Outer Diameter	Φ11.994 ± 0.006	0.006 - 0.036
	Cylinder Head Hydraulic Lifter Hole Diameter	Φ12 (+0.006, +0.024)	

Series Number	Part Name	Size and Tolerance	Matching Clearance
6	Valve Guide Hole Diameter	Φ6 (0, +0.015)	0.013 - 0.042
	Intake Valve Stem Diameter	Φ5.98 ± 0.007	
7	Valve Guide Hole Diameter	Φ6 (0, +0.015)	0.033 - 0.062
	Exhaust Valve Stem Diameter	Φ5.96 ± 0.007	
8	Valve Guide Mounting Hole	Φ11 (0, +0.018)	-0.051 ~ -0.022
	Valve Guide Outer Diameter	Φ11 (+0.040, +0.051)	
9	Intake Valve Retainer Mounting Hole	Φ31.9 (0, +0.016)	-0.1 ~ -0.068
	Intake Valve Retainer Outer Diameter	Φ32 (-0.016, 0)	
10	Exhaust Valve Retainer Mounting Hole	Φ27.2 (0, +0.013)	-0.1 ~ -0.071
	Exhaust Valve Retainer Outer Diameter	Φ27.3 (-0.016, 0)	
11	Cylinder Block Bore	Φ80.5 (+0.013/0)	0.04 - 0.063
	Piston Skirt	80.455 ± 0.005	
12	Piston Pin Hole	Φ22 (+0.009/+0.004)	0.004 - 0.014
	Piston Pin	Φ22 (0/-0.005)	
13	Connecting Rod Small End Bore	Φ22 (+0.018/+0.010)	0.010 - 0.023
	Piston Pin	Φ22 (0/-0.005)	

4.3 Valve Timing

■ Intake (180.5° wrapped angle)

	Angle (°)	Valve Lift (mm)
Valve Opening 0 mm	346.5	0
Valve Opening 0.5 mm	377.5	0.49
Valve Opening 1 mm	385	0.99
Maximum Valve Lift	475.5	9.49
Valve Closed 1 mm	565.5	0.99
Valve Closed 0.5 mm	573.5	0.50
Valve Closed 0 mm	614.5	0

■ Exhaust (180.5° wrapped angle)

	Angle (°)	Valve Lift (mm)
Valve Opening 0 mm	107.5	0
Valve Opening 0.5 mm	137	0.49
Valve Opening 1 mm	144.5	0.99

	Angle (°)	Valve Lift (mm)
Maximum Valve Lift	234	8.5
Valve Closed 1 mm	325	0.99
Valve Closed 0.5 mm	333	0.50
Valve Closed 0 mm	370	0

4.4 Lubrication Area

Lubrication Area	Type
Valve Guide Bottom Hole	Use same type of lubricant as engine
Intake Valve Retainer Bottom Hole	Use same type of lubricant as engine
Exhaust Valve Retainer Bottom Hole	Use same type of lubricant as engine
Valve Stem and Valve Guide Hole	Use same type of lubricant as engine
Valve Oil Seal Lip	Use same type of lubricant as engine
Hydraulic Lifter Assembly External Circular Surface and Hydraulic Lifter Hole	Use same type of lubricant as engine
Camshaft Assembly Journal and Bearing Seat Hole	Use same type of lubricant as engine
Roller Rocker Arm Assembly Bearing	Use same type of lubricant as engine
Phaser Solenoid Valve Seal Ring (O-ring)	Use same type of lubricant as engine
Upper and Lower Connecting Rod Bearing Shell and Connecting Rod Journal	Use same type of lubricant as engine
Upper and Lower Main Bearing Shell and Main Journal	Use same type of lubricant as engine
Thrust Washer (Oil Rail Side) and Crankshaft Thrust Surface	Use same type of lubricant as engine
Front and Rear Oil Seal Inner Lip and Crankshaft Oil Seal Journal	Use same type of lubricant as engine
Piston Pin Hole	Use same type of lubricant as engine
Piston Ring Groove	Use same type of lubricant as engine
Cylinder Bore Inner Wall	Use same type of lubricant as engine
Crankshaft Front and Rear Oil Seal External Circular Surface	Use same type of lubricant as engine
Timing System	Use same type of lubricant as engine

4.5 Area with Seal Gum Applied

Seal Gum Application Area	Seal Gum Type
Bowl Plug - Front and Rear End	Loctite 11747
Bowl Plug - Exhaust Side	Loctite 121078
Top and Bottom Sides of Cylinder Head Front End (T-shaped Area)	Loctite 5900H

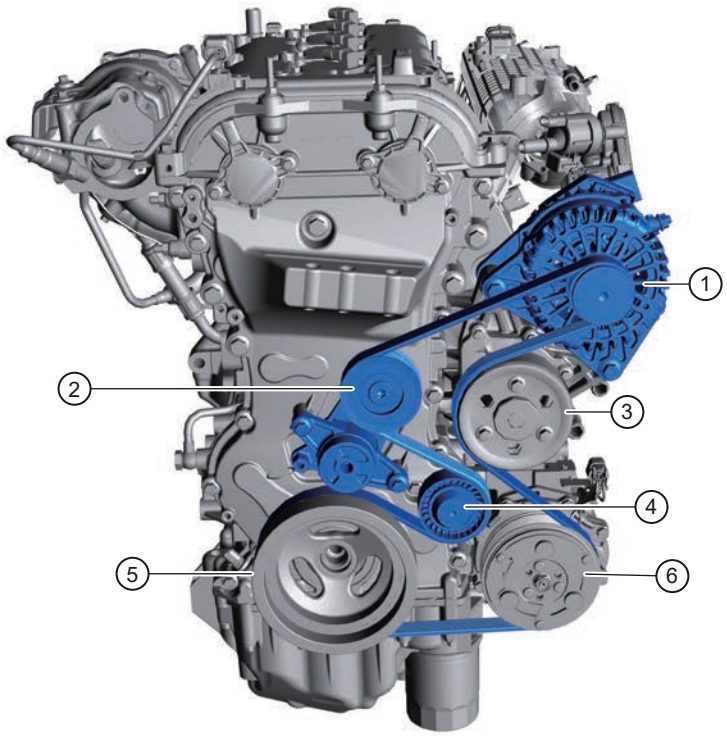
Seal Gum Application Area	Seal Gum Type
"T" Shaped Area Between Timing Chain Cover and Cylinder Head	Loctite 5900H
Timing Chain Cover Frame Bottom Arc Part	Loctite 5900H
Timing Chain Cover Seal Surface	Loctite 5900H/Loctite 5900HA
Upper Guide Rail Assembly Bolt	Loctite 243

4.6 Non-reusable Part

Non-reusable Part	
Cylinder Head Fixing Bolt	Replace it
Valve Oil Seal	Replace it
Crankshaft Front Oil Seal	Replace it
Crankshaft Rear Oil Seal	Replace it
Cylinder Head Gasket	Replace it
Connecting Rod Bearing Cap Fixing Bolt	Replace it
Flywheel Fixing Bolt	Replace it
Main Bearing Cap Fixing Bolt	Replace it

5 On-vehicle Service

5.1 Accessory Pulley



EM6012001

1	Alternator Assembly	4	Idler Pulley Assembly
2	Tensioner Assembly	5	Torsion Shock Absorber Assembly
3	Water Pump Pulley	6	Compressor Assembly

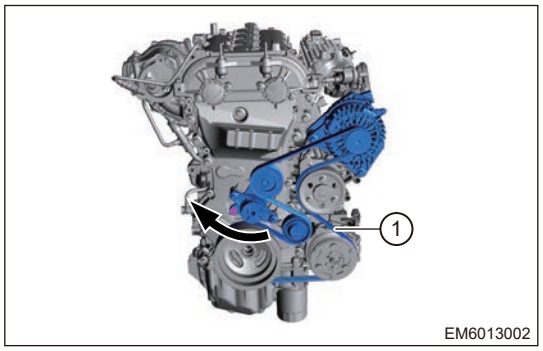
■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing accessory drive belt.**
- **Appropriate force should be applied when removing accessory drive belt. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the engine trim cover assembly.

(4) Insert tool into tensioner and pull it upward in direction of arrow as shown in illustration, then remove accessory drive belt assembly (1).



⚠ Warning

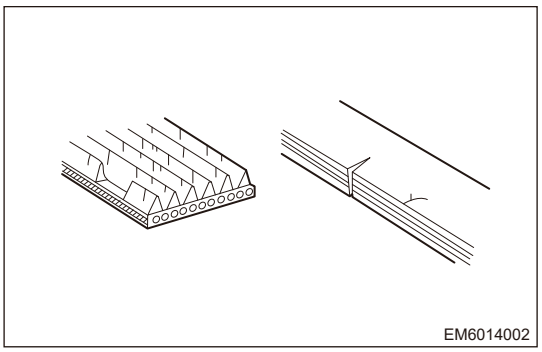
Prevent hand from contacting belt tensioner when raising it upward, so as to avoid damage.

■ Inspection

(1) Visually check accessory drive belt for excessive wear and cords for wear, etc. If any of these defects is found, replace accessory drive belt.

Hint:

- If accessory drive belt has chunks missing from ribs, it should be replaced.
- After installing accessory drive belt, check that it fits properly in the ribbed grooves. Check that belt has not slipped out of grooves on bottom of the crankshaft pulley by hand.



■ Installation

⚠ Caution

- **Before installation, remove the dirt from accessory drive belt.**
- **After installation, check if scale on tensioner arm is almost corresponding to the middle scale of tensioner base.**
- **Check that belt fits well to grooves on bottom of pulley properly. Avoid improper installation and misalignment.**

(1) Install the accessory drive belt properly according to its moving direction.
(2) Install drive belt on each pulley to operate tensioner freely.

■ **Adjustment**

(1) Rotate crankshaft pulley 2 turns, so that belt tension between each pulley is even.
(2) Apply 100 N of force to center part of the belt between alternator and tensioner pulley with your thumb. Check that displacement of belt is within 5 - 6 mm. If displacement is too large or too small, adjust, check or repair.

5.2 Idler Pulley Assembly

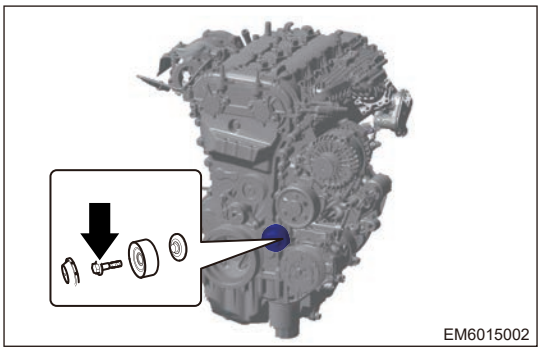
■ **Removal**

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing idler pulley assembly.**
- **Appropriate force should be applied, when removing idler pulley assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the engine trim cover assembly.
(4) Remove the accessory drive belt.

(5) Remove the idler pulley assembly dust boot.
(6) Remove fixing bolt and idler pulley assembly.



■ **Inspection**

(1) Rotate idler pulley by hands and check if rotation is smooth and if abnormal noise occurs.
(2) Wiggle idler pulley in axial and radial directions to check bearing for looseness.
(3) Check if there is damage on idler pulley assembly operating surface.

■ **Installation**

⚠ Caution

- **Pretighten it by 2 to 3 threads first.**
- **After installation, turn crankshaft to run accessory drive belt several circles, and check if crankshaft turns smoothly and belt runs well. If it cannot turn smoothly, reinstall accessory drive belt.**
- **Make sure to correctly install accessory drive belt, and it does not interfere with other components.**

(1) Install the idler pulley assembly fixing bolt.

Torque: 47 + 5 N · m

(2) Install the idler pulley assembly dust boot.
(3) Install the accessory drive belt.
(4) Install the engine trim cover.
(5) Install the engine compartment trim cover.

5.3 Tensioner Assembly

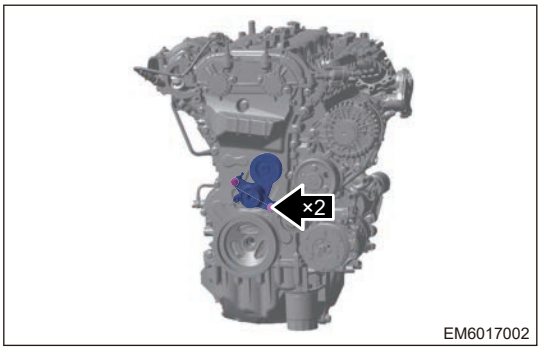
■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing tensioner assembly.**
- **Appropriate force should be applied, when removing the tensioner assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the engine trim cover assembly.
(4) Remove the accessory drive belt.

(5) Remove 2 fixing bolts from tensioner assembly.



(6) Remove the tensioner assembly.

■ Inspection

(1) Rotate tensioner pulley assembly by hands and check if rotation is smooth and if abnormal noise occurs.
(2) Wiggle tensioner pulley assembly in axial and radial directions to check for looseness.
(3) Check if there is damage on tensioner pulley operating surface.

■ Installation

(1) Install 2 tensioner assembly fixing bolts.

Torque: 20 + 5 N · m

(2) Install the accessory drive belt.
(3) Install the engine trim cover.
(4) Install the engine compartment trim cover.

5.4 Cylinder Head Cover

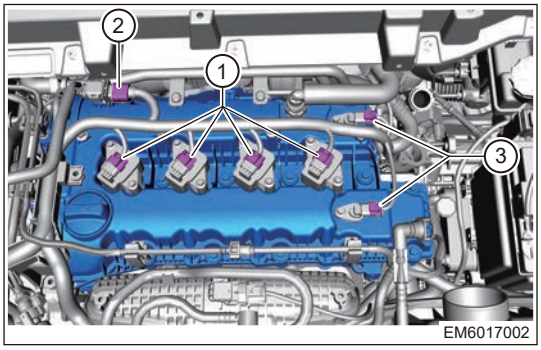
■ Removal

⚠ Warning

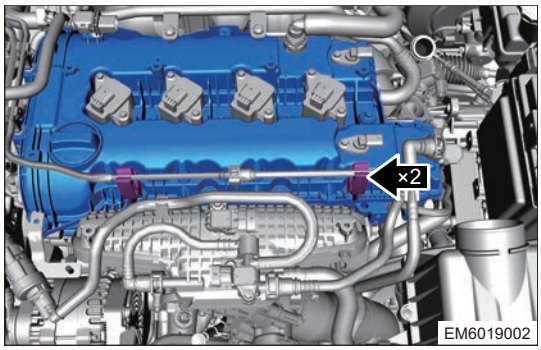
- **Blow dirt and debris away from surface of cylinder head cover with compressed air.**
- **Be sure to wear safety equipment to prevent accidents, when removing cylinder head cover.**
- **Appropriate force should be applied when removing cylinder head cover. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the engine trim cover.
(4) Remove the intake hose.

(5) Disconnect ignition coil connector (1), upstream oxygen sensor connector (2), and camshaft position sensor connector (3).

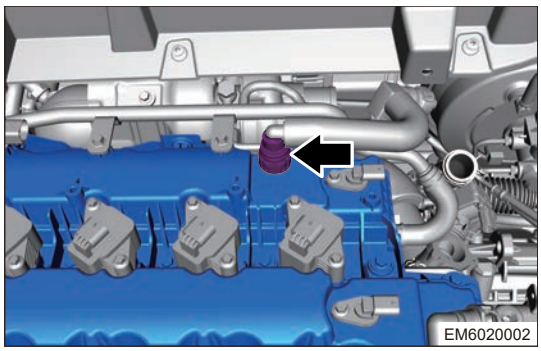


(6) Remove 2 oil inlet pipe single tube clamps from cylinder head cover.

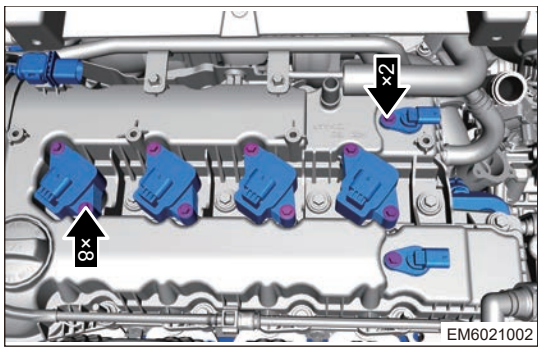


(7) Disconnect the hose - intake hose from cylinder head cover.

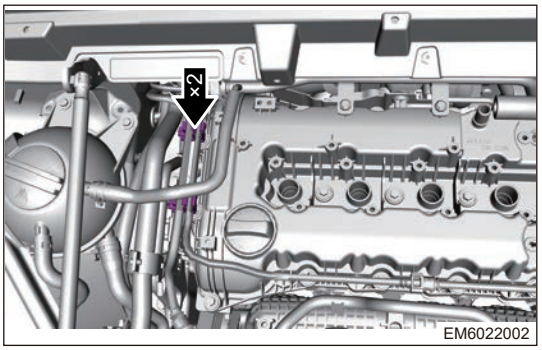
Hint:
This hose clip is non-reusable part.



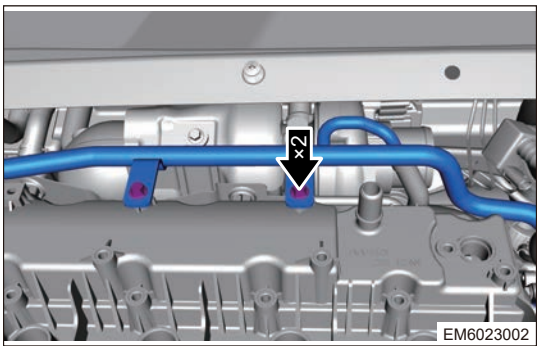
(8) Remove 8 fixing bolts and ignition coil.
(9) Remove 2 fixing bolts and camshaft position sensor.



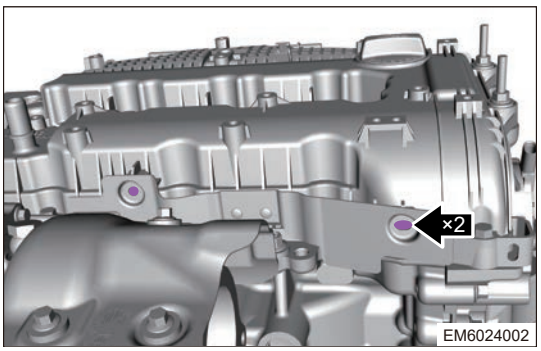
(10) Remove 2 three-tube clamps from cylinder head cover.



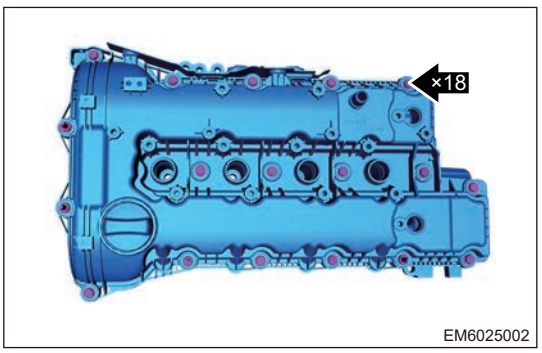
(11) Remove 2 fixing bolts from cooling pipe assembly.



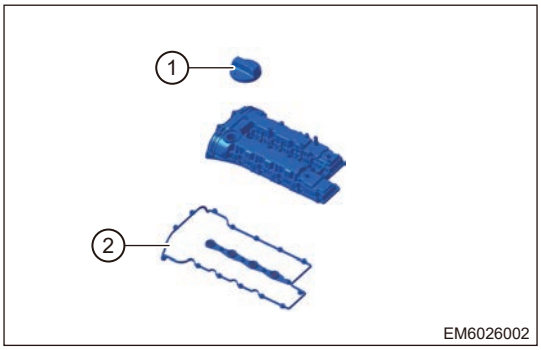
(12) Remove 2 fixing bolt from heat insulator.



(13) Remove 18 fixing bolts cylinder and cylinder head cover.



(14) Remove fuel filler cap (1) and gasket (2) from cylinder head cover assembly.



■ Inspection

(1) Check the appearance of the cylinder head cover for cracks, and replace the assembly if necessary.

■ Installation

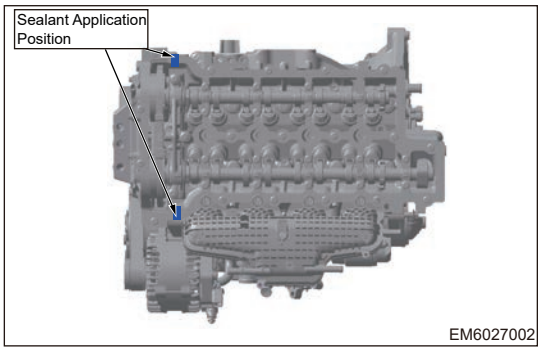
⚠ Caution

- **Remove oil dirt and sealant on cylinder head cover and cylinder head before installation.**
- **Check if gasket is damaged or loses elasticity. If so, replace gasket.**

(1) As shown in illustration, apply seal gum (Loctite 5900H) to “T” position of junction area between timing chain cover and cylinder head.

Hint:

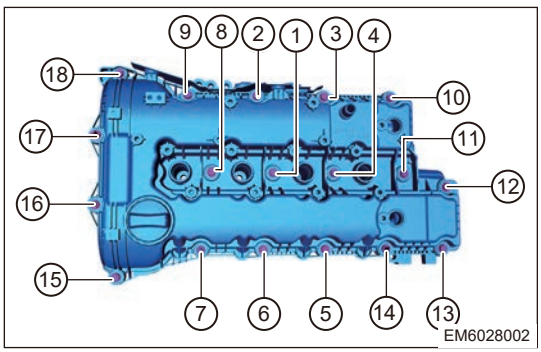
- Note that the sealant should not be too thick, to prevent excess sealant into the engine when the valve chamber cover is pressed.
- Install the cylinder head cover assembly and wait for 15 minutes to apply seal gum.



(2) Install cylinder head cover and first manually install fixing bolts by 1 to 2 threads.

(3) Tighten 18 cylinder head cover fixing bolts in order shown in illustration.

Torque: 10.5 - 12.5 N·m



(4) Install the fuel filler door.

(5) Install 2 fixing bolts to heat insulator.

Torque: 8 + 3 N·m

(6) Install the cooling pipe assembly.
(7) Install the camshaft position sensor.
(8) Install the ignition coil.
(9) Install the intake hose.
(10) Connect the wire harness connector.
(11) Install the oil inlet pipe tube clamp.
(12) Install the engine trim cover.

5.5 Crankshaft Front Oil Seal

■ Removal

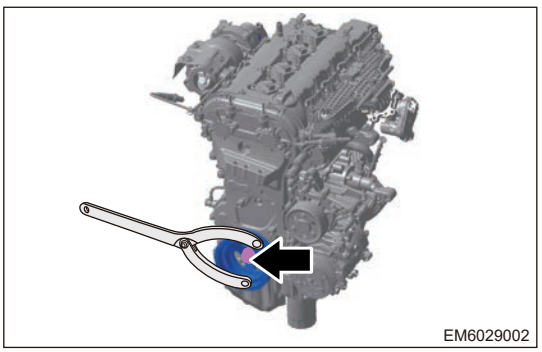
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing crankshaft front oil seal.**
- **Appropriate force should be applied when removing crankshaft front oil seal. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover.
(3) Disconnect the negative battery cable.
(4) Remove the accessory drive belt.

(5) Remove fixing bolt from torsion absorber assembly.

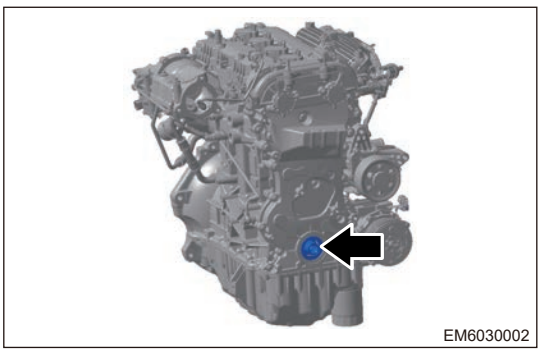
Hint:
Use tool to lock torsion absorber assembly and fixing bolt.


EM6029002

(6) Remove the torsion shock absorber assembly.

(7) Carefully remove the crankshaft front oil seal with proper tool.

Hint:
Be careful not to scratch junction surface, when removing crankshaft front oil seal.


EM6030002

■ **Installation**

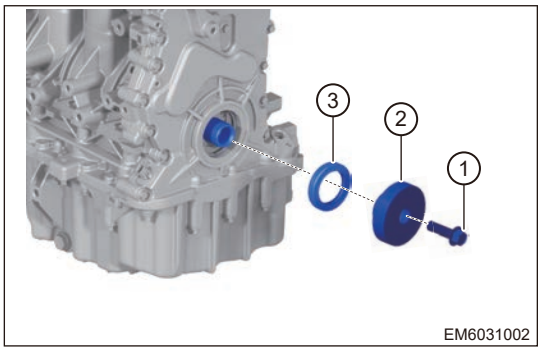
⚠ Caution

- **Apply a small amount of engine oil to the crankshaft front oil seal guide tool before installing a new oil seal.**
- **Remove dirt on junction surface and apply a small amount of engine oil to oil seal external circular surface and oil seal guide tool (except the oil seal with surface applied wax) before assembly.**
- **Be sure to prevent the lip of crankshaft front oil seal from being scratched during installation; If it is damaged, replace it immediately.**

(1) Install crankshaft front oil seal (3) to crankshaft front oil seal installer (2), then install crankshaft front oil seal in place with crankshaft front oil seal guide tool (1).

Hint:

- Make sure oil seal surface is 0 to 0.5mm lower than end surface of timing chain cover oil seal hole.
- Never allow tilting it by more than 5°, oil seal external rubber breakage or flanges during oil seal press fitting.



(2) Install fixing bolt of torsion shock absorber assembly.

Torque: 1st step: 180 ± 10 N · m, 2nd step: 150 ± 5°

(3) Install the accessory drive belt.

(4) Install the engine compartment trim cover assembly.

5.6 Crankshaft Rear Oil Seal

■ **Removal**

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing crankshaft rear oil seal.**
- **Appropriate force should be applied when removing crankshaft rear oil seal. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

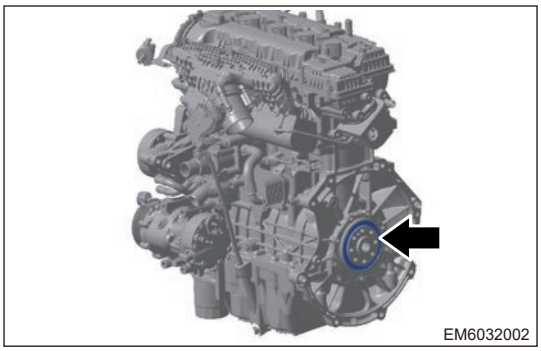
(2) Remove the engine compartment trim cover.

(3) Disconnect the negative battery cable.

(4) Remove the transmission assembly.

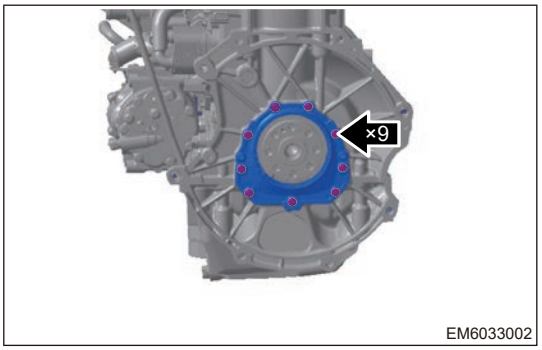
(5) Remove the flywheel assembly.

(6) Remove the crankshaft rear oil seal with proper tool carefully.



(7) Remove the crankshaft rear oil seal.

(8) Remove 9 fixing bolts from rear oil seal bracket.



(9) Remove the rear oil seal bracket.

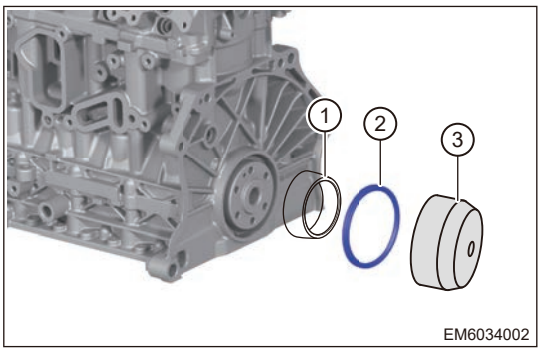
■ **Installation**

⚠ Caution

- **Be sure to clean dirt around oil seal retainer and on inside wall before installation.**
- **Check oil seal for damage before installation. If there is any damage, replace it.**
- **Be sure to prevent the lip of crankshaft rear oil seal from being scratched during installation.**
- **Be careful not to damage oil seal retainer during installation.**

(1) Install guide tool (1) to crankshaft.

(2) Install new oil seal (2) to crankshaft rear oil seal guide tool, then install new oil seal evenly and fully into oil seal retainer with a crankshaft rear oil seal installer (3).



⚠ Caution

- **Make sure oil seal surface is 0.5 to 1 mm lower than end surface of timing chain cover oil seal hole.**
- **Ensure that oil seal lip has no damage during assembly.**
- **Never allow tilting it by more than 5°, oil seal external rubber breakage or flanges during oil seal press fitting.**

(3) Install the flywheel assembly.

(4) Install the transmission assembly.

5.7 Flywheel Assembly

■ **Removal**

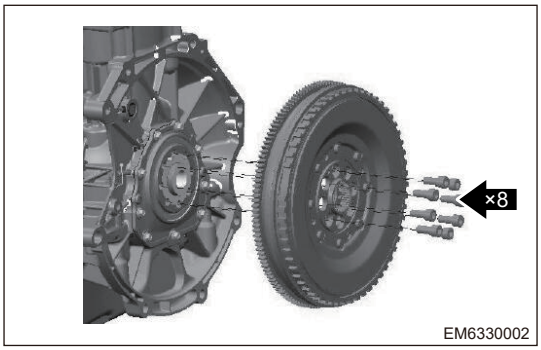
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when installing flywheel assembly.**
- **Appropriate force should be applied, when removing flywheel assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the transmission assembly.

(4) Remove 8 fixing bolts and flywheel assembly.

Hint:
Flywheel assembly fixing bolts must be disposed after removal. Never reuse them.



■ Inspection

(1) Check if crankshaft position signal gear is distorted or deformed. If damaged, replace flywheel. Clean signal gear before installation.

■ Installation

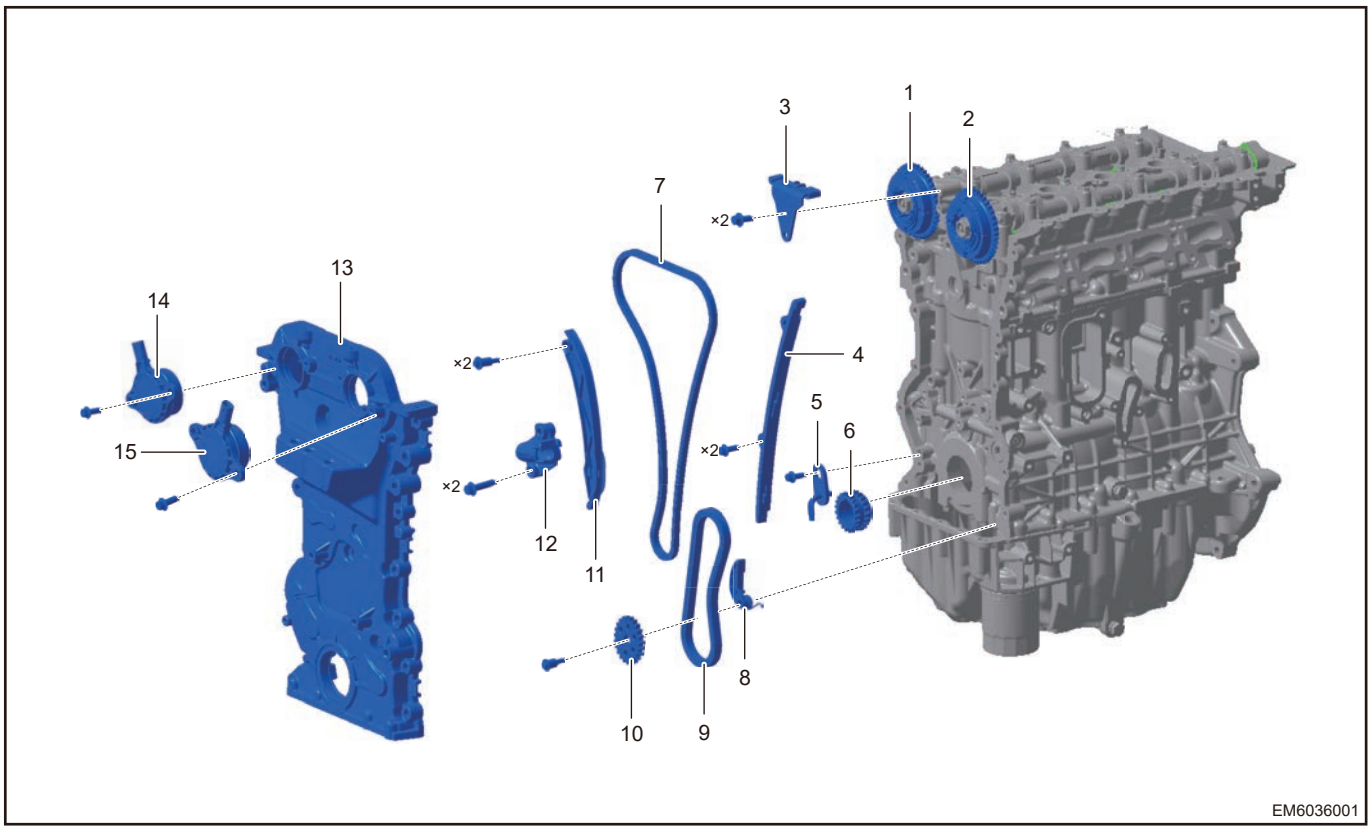
⚠ Caution

- **Lightly push flywheel after alignment during assembly. Do not tap flywheel with a hammer.**
- **Replace flywheel fixing bolts with new ones.**

(1) Install 8 fixing bolts to flywheel assembly, and pretighten the bolts.
(2) Installing flywheel holding tool, then tighten each flywheel bolt diagonally in order.

Torque: 1st step: 35 ± 5 N · m, 2nd step: 30 ± 5°

5.8 Engine Timing Chain



1	Exhaust Phaser Assembly	9	Oil Pump Chain Assembly
2	Intake Phaser Assembly	10	Oil Pump Sprocket
3	Upper Chain Guide Rail Assembly	11	Movable Guide Rail Assembly
4	Fixing Guide Rail Assembly	12	Hydraulic Tensioner Assembly
5	Nozzle - Timing Chain	13	Timing Chain Cover
6	Crankshaft Timing Sprocket	14	Exhaust Phaser Solenoid Valve
7	Timing Chain Assembly	15	Intake Phaser Solenoid Valve
8	Oil Pump Movable Rail Assembly		

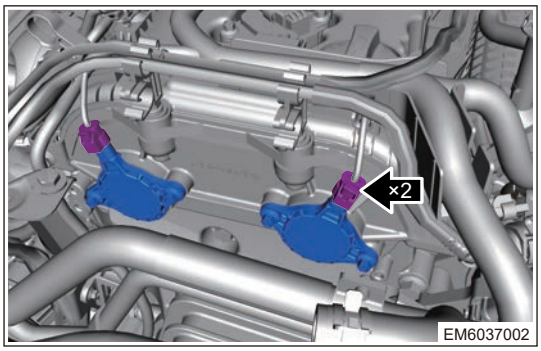
■ Removal

⚠ Warning

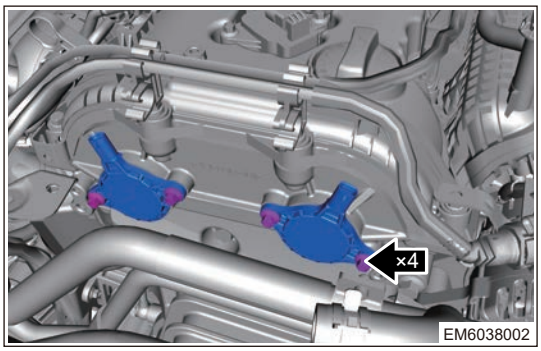
- **Be sure to wear necessary safety equipment to prevent accidents, when removing engine timing chain.**
- **Appropriate force should be applied when removing engine timing chain. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine trim cover assembly.
(4) Remove the cylinder head cover.
(5) Remove the engine lower protector assembly.
(6) Remove the accessory drive belt.
(7) Remove the accessory drive belt tensioner assembly.
(8) Remove the idler pulley assembly.
(9) Remove the torsion shock absorber assembly.
(10) Use an engine equalizer to hang engine assembly.
(11) Remove the engine right mounting cushion assembly.

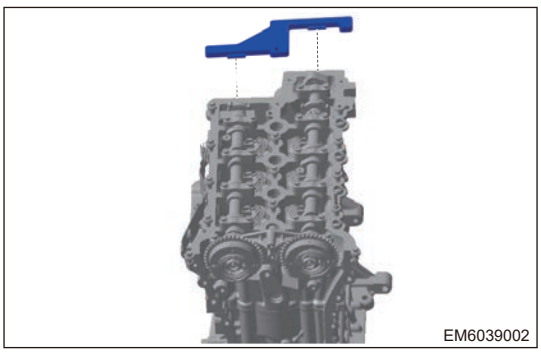
(12) Disconnect the intake/exhaust phaser solenoid valve connector.



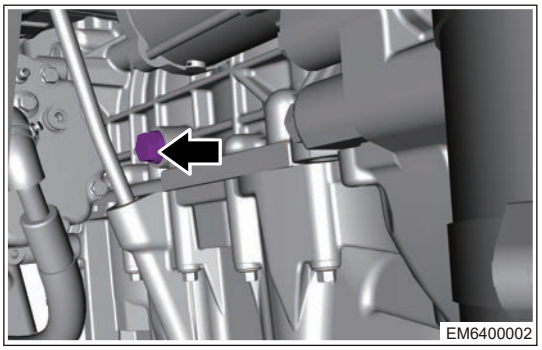
(13) Remove 4 fixing bolts and intake/exhaust phaser solenoid valve.



(14) Place camshaft timing positioning special tool on the back of cylinder head upper plane, rotate intake and exhaust camshafts separately in order to clamp the special tool into slots on rear end of both camshafts.

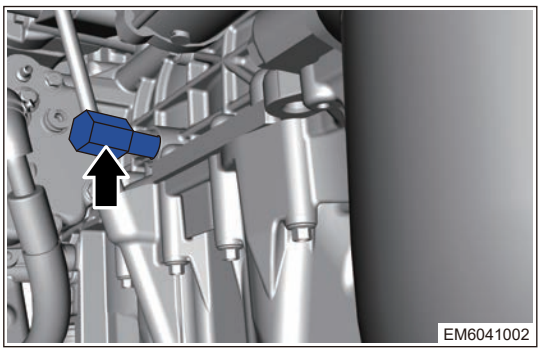


(15) Remove crankshaft balancer locating hole fixing bolt from engine block.

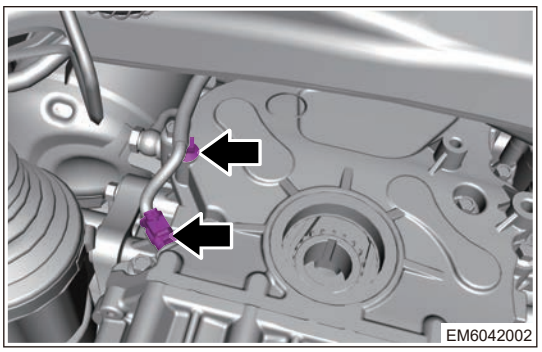


(16) Install crankshaft timing positioning pin to cylinder block through thread hole on intake side of cylinder block, and insert front end of positioning pin into positioning hole of crankshaft balancer (each cylinder piston should be in the same plane).

Hint:
It takes patience to perform this operation and pay more attention to avoid damage to crankshaft.



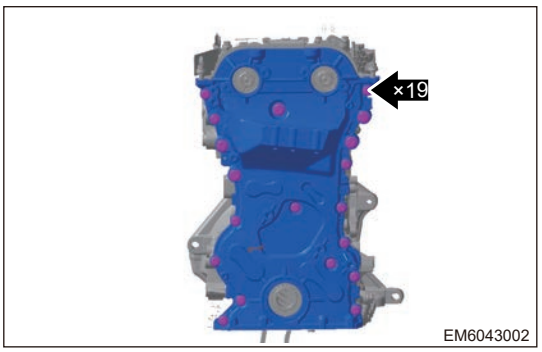
(17) Disconnect oil pump assembly connector and detach wire harness fixing clip.



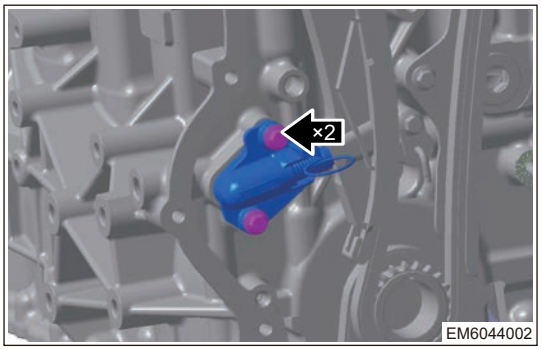
(18) Remove the oil pan assembly.

(19) Remove 19 fixing bolts from timing chain cover and remove timing chain cover.

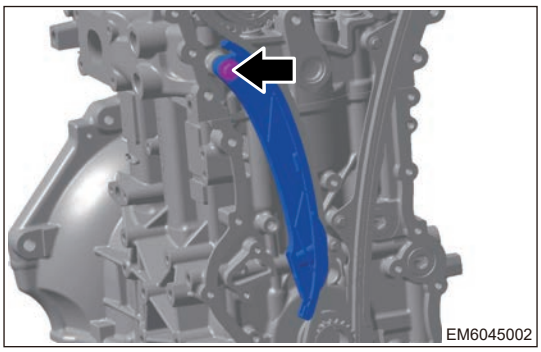
Hint:
Carefully observe timing chain cover for cracks or oil leakage; If exists, replace timing chain cover assembly.



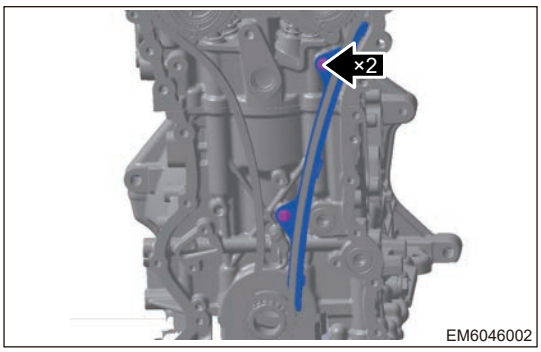
(20) Remove 2 fixing bolts and hydraulic tensioner assembly.



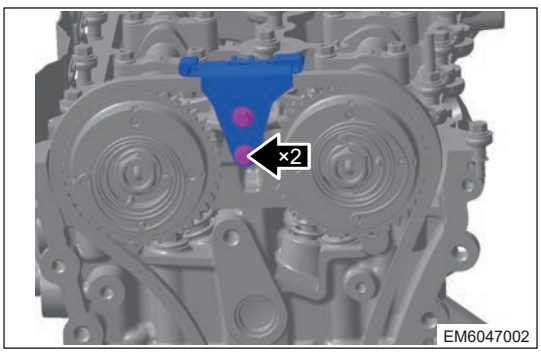
(21) Remove 1 fixing bolt and movable guide rail assembly.



(22) Remove 2 fixing bolts and fixing guide rail assembly.

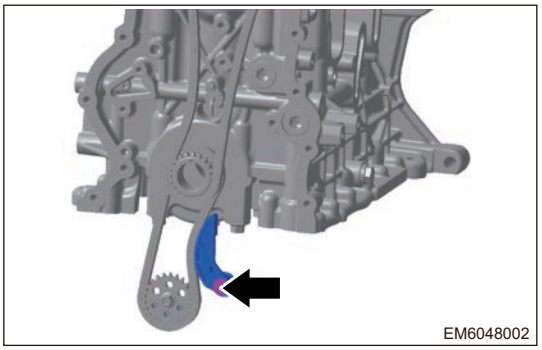


(23) Remove 2 fixing bolts and upper chain guide rail assembly.



(24) Remove the engine timing chain.

(25) Remove 1 fixing bolt from oil pump movable guide rail, and remove oil pump chain.

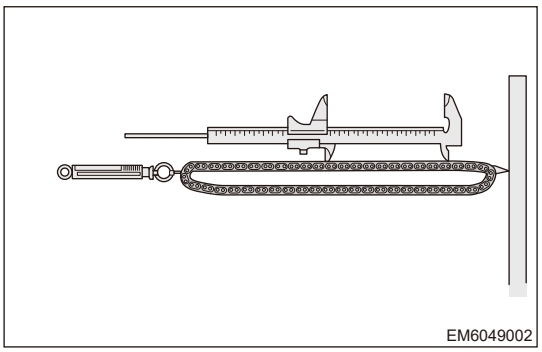


■ Inspection

(1) Carefully check if timing chain is seriously worn or cracked If exists, replace timing chain assembly.

(2) Use a force of 147 N to pull the chain. Take 15 links from chain and perform measurement with a vernier caliper. Max. elongation: 120.6 mm.

Hint:
Take 3 positions for measurement. If the average value is larger than max. elongation ratio, replace timing chain assembly. If it is not as specified, replace timing chain cover assembly.

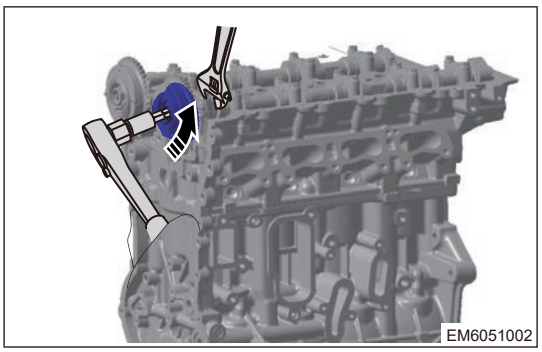


(3) Measure depth of movable guide rail with a vernier caliper.

Hint:
If wear limit is beyond 2 mm, replace movable guide rail assembly.

■ Installation

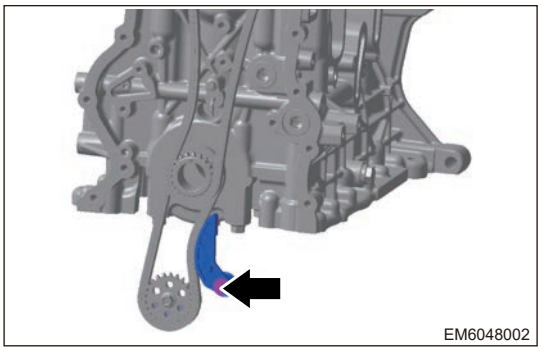
(1) Use a proper wrench to hold intake camshaft loosen fixing bolt from intake phaser assembly.



(2) Install oil pump chain and 1 movable guide rail fixing bolt.

Torque: 9 + 3 N · m

Hint:
The movable guide rail should rotate smoothly around the bolt after assembling and either end of spring should hook the oil pump housing.



(3) Install 2 fixing bolts to upper chain guide rail assembly.

Torque: 8 + 3 N · m

(4) Install 2 fixing bolts from fixing guide rail assembly.

Torque: 8 + 3 N · m

(5) Install 1 fixing bolt to movable guide rail assembly.

Torque: 20 + 5 N · m

Hint:
The movable guide rail should rotate smoothly around the bolt after installation.

(6) Install the timing chain.

Hint:
Ensure timing chain is set to intake and exhaust phasers and crankshaft sprocket. Make sure that timing chain and upper guide rail are in level.

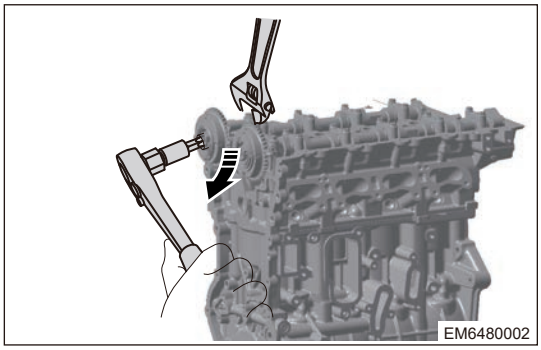
(7) Install hydraulic tensioner assembly, and tighten 2 fixing bolts.

Torque: 8 + 3 N · m

Hint:
Pull up hydraulic tensioner upper steal ring pin after installation and tightening.

(8) Use a proper wrench to hold intake camshaft and tighten fixing bolt of intake and exhaust phaser valve body.

Torque: 1st step: 30 ± 1.5 N · m, 2nd step: clockwise rotation angle 34° ± 2°


EM6480002

Hint:
- Tighten exhaust phase valve body bolt first, and then tighten intake phaser valve body bolt. Failure to tighten in order may cause "tooth missing" phenomenon in timing chain.
- The accumulative tightening times of the phaser valve body bolts shall not exceed three times.

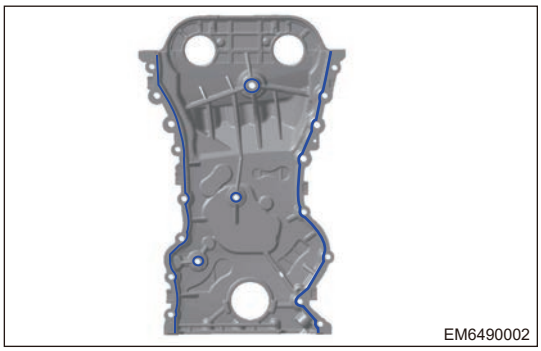
(9) Remove crankshaft timing tool and camshaft timing tool, then rotate crankshaft clockwise 2 turns at least to check if timing system can operate normally.

⚠ Caution

- **Never rotate crankshaft counterclockwise.**

(10) Apply seal gum to inside of timing chain cover mounting bolt hole.

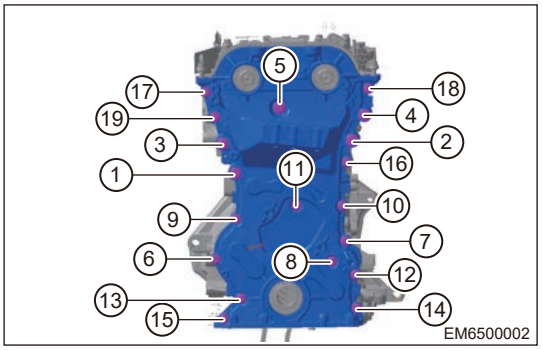
Seal gum: Loctite 5900H


EM6490002

(11) Install and tighten 19 cylinder head cover fixing bolts in order shown in illustration.

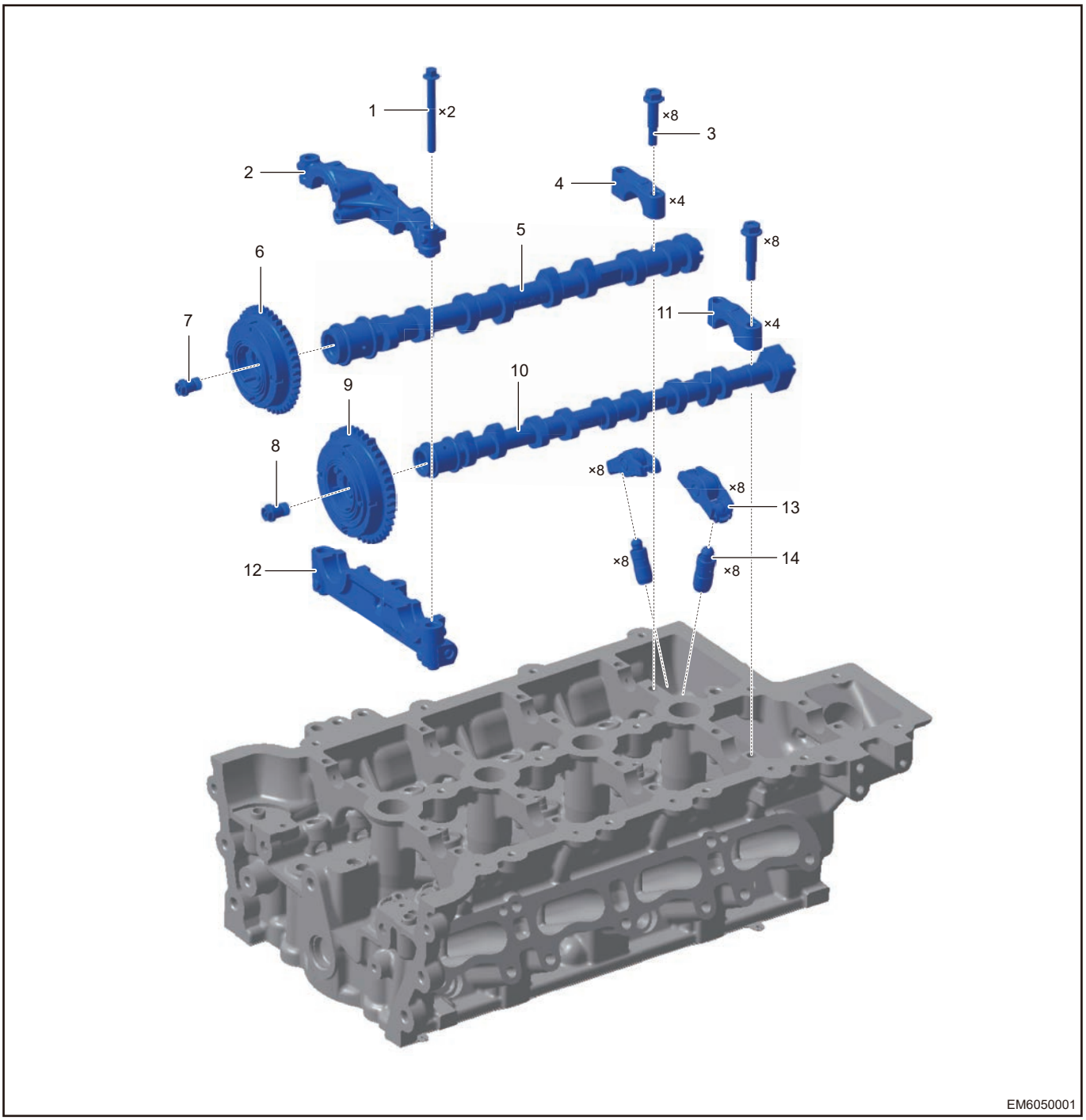
M8x35 Torque: 25 + 5 N · m

M10x45 Torque: 40 + 5 N · m



(12) Connect the oil pump assembly connector.
(13) Install the idler pulley assembly.
(14) Install the torsion shock absorber assembly.
(15) Install the accessory drive belt tensioner assembly.
(16) Install the accessory drive belt.
(17) Install the right mounting cushion assembly.
(18) Install the engine lower protector assembly.
(19) Install the phaser magnet.
(20) Install the cylinder head cover assembly.
(21) Install the engine trim cover assembly.
(22) Connect the negative battery cable assembly.

5.9 Camshaft and Rocker Arm



1	1st Bearing Cap Fixing Bolt	8	Intake Phaser Valve Body Bolt
2	1st Bearing Upper Cap	9	Intake Phaser Assembly
3	Exhaust Camshaft Bearing Cap Fixing Bolt	10	Intake Camshaft Assembly
4	Exhaust Camshaft Bearing Cap	11	Intake Camshaft Bearing Cap
5	Exhaust Camshaft Assembly	12	1st Bearing Lower Cap
6	Exhaust Phaser Assembly	13	Roller Rocker Arm Assembly
7	Exhaust Phaser Valve Body Bolt	14	Hydraulic Lifter Assembly

■ Removal

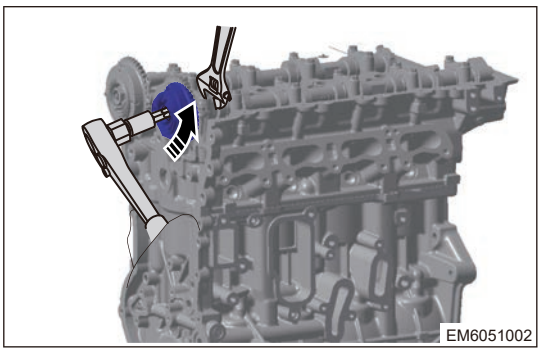
⚠ Warning

- **Blow dirt and debris away from surface of cylinder head cover with compressed air.**
- **Be sure to wear necessary safety equipment to prevent accidents, when removing camshaft and rocker arm.**
- **Appropriate force should be applied when removing camshaft and rocker arm. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the engine trim cover assembly.
(4) Remove the cylinder head cover.
(5) Remove the accessory drive belt.
(6) Remove the engine timing chain.

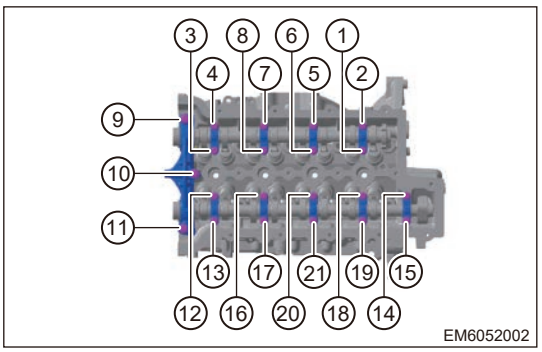
(7) Use a proper wrench to hold intake camshaft, and remove fixing bolt from intake phaser in direction of arrow, remove intake phaser.

Hint:
Removal method for exhaust phaser is the same as that of intake phaser.



(8) Remove intake and exhaust camshaft bearing cap fixing bolts.

Hint:
During removal, loosen fixing bolts in order shown in illustration first, and then remove bolts thoroughly in order.



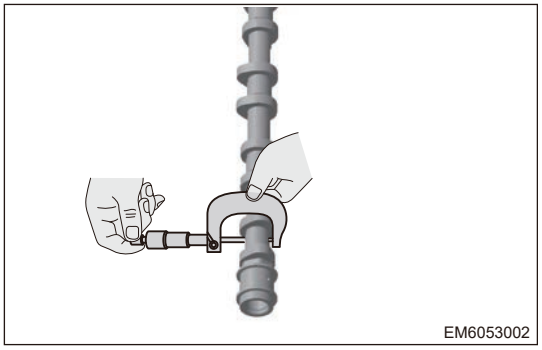
(9) Remove the camshaft bearing caps.
(10) Remove intake and exhaust camshaft.
(11) Remove rocker arm and hydraulic lifter component.

■ Camshaft appearance inspection

(1) Check if there are scratches on camshaft surface. If there are scratches, replace camshaft.
(2) Check if there are leaking holes and cracks on camshaft bearing caps. If so, replace camshaft.

■ **Measure camshaft journal diameter with a micrometer**

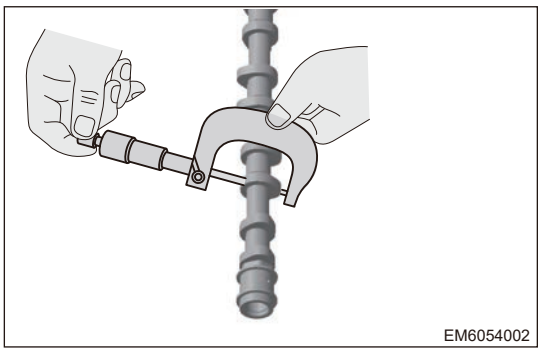
Measurement Item	Specification (mm)
1st Journal Diameter (Same for Intake and Exhaust Sides)	Φ30 (-0.066 - 0.050)
2nd - 5th Journal Diameter (-Same for Intake and Exhaust Sides)	Φ24 (-0.053 - 0.040)


EM6053002

Hint:
If camshaft journal diameter is not within specified range, replace intake/exhaust camshaft assembly.

■ **Measure the highest point of cam lobe with a micrometer**

Measurement Item	Specification (mm)
Cam Flange Height (Highest Point)	Intake: 37.07 - 37.31
	Exhaust: 36.94 - 37.18


EM6054002

Hint:
If cam height is not within specified range, replace intake/exhaust camshaft assembly.

■ **Check camshaft axial clearance**

(1) Perform measurement with roller rocker arm and intake and exhaust phasers not installed.
(2) Place dial indicator on cylinder head body. Press indicator tip on front end of camshaft, and push camshaft forward and backward. The difference between the two limit reading equals to camshaft axial clearance. It is normal if the difference is between 0.15 and 0.275 mm.

■ **Check hydraulic lifter**

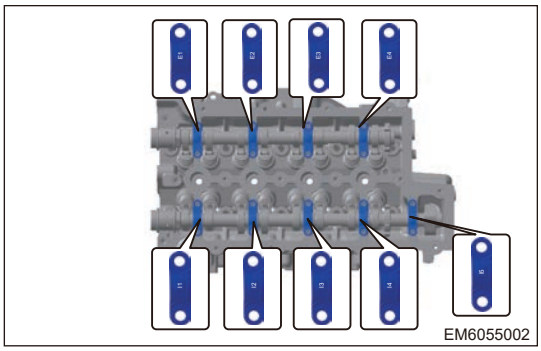
(1) Check if end surface and cylindrical operating surface of hydraulic lifter are normal.
(2) Check if hydraulic lifter slides smoothly in cylinder head guide hole.
(3) Check each hydraulic lifter for weakness. If exists, remove and soak it for 24 hours, then press the hydraulic lifter plunger. If the plunger can be clearly pushed, it means that the tappet is “soft” and the hydraulic tappet can be replaced.

■ **Installation**

(1) Clean intake and exhaust camshafts and camshaft bearing caps.
(2) Apply engine oil to camshaft cam surface and add a proper amount of engine oil to camshaft bearing hole.
(3) Install intake, exhaust camshaft assemblies and intake and exhaust camshaft bearing caps.

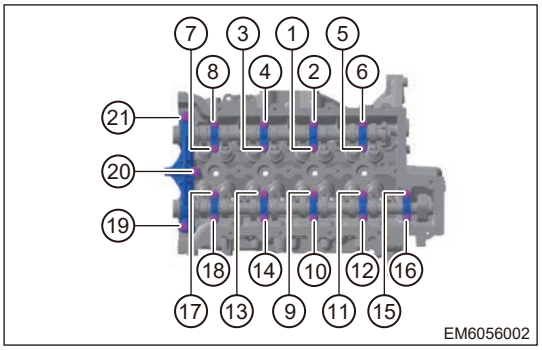
Hint:

- Install according to marks on bearing cap: “I” indicates intake camshaft bearing cap and “E” indicates exhaust camshaft bearing cap.


EM6055002

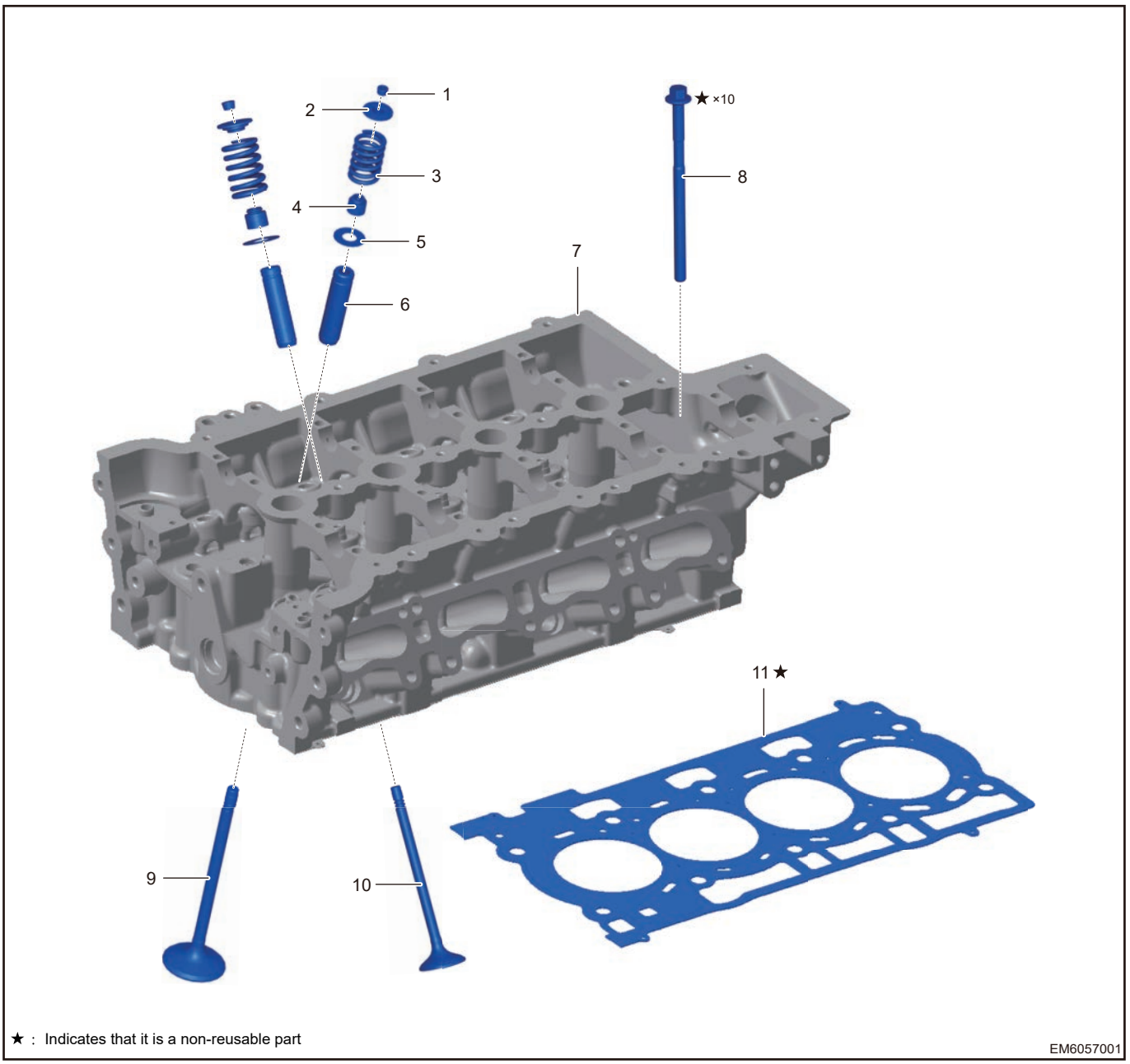
(4) Tighten the camshaft bearing cap fixing bolt manually then tighten camshaft bearing cap fixing bolt.

Torque: For the 1st bearing cap fixing bolt 20 + 3 N · m, for bearing cap bolt 8 + 3 N · m



(5) Install the engine timing chain.
(6) Install the accessory drive belt.
(7) Install the cylinder head cover.
(8) Install the engine trim cover assembly.
(9) Install the engine compartment trim cover assembly.

5.10 Cylinder Head



★ : Indicates that it is a non-reusable part

EM6057001

1	Valve Cotter	7	Cylinder Head
2	Valve Spring Upper Seat	8	Cylinder Head Bolt
3	Valve Spring	9	Exhaust Valve
4	Valve Oil Seal	10	Intake Valve
5	Valve Spring Lower Seat	11	Cylinder Gasket
6	Valve Guide	★	Non-reusable Part

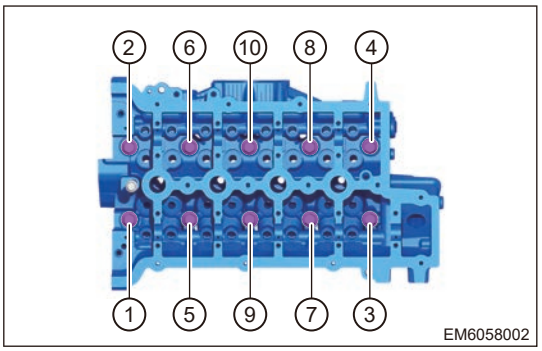
■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing cylinder cover.**
- **Appropriate force should be applied when removing cylinder cover. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the engine trim cover assembly.
(4) Drain engine oil.
(5) Drain the coolant.
(6) Remove the battery assembly.
(7) Remove the battery tray assembly.
(8) Remove the intake hose assembly.
(9) Remove the air filter assembly.
(10) Remove the cooling pipe assembly.
(11) Remove expansion tank inlet pipe assembly.
(12) Remove the intake manifold assembly.
(13) Remove the fuel rail injector assembly.
(14) Remove the precatalytic converter assembly.
(15) Remove the turbocharger assembly.
(16) Remove the accessory drive belt.
(17) Remove the tensioner assembly.
(18) Remove the idler pulley assembly.
(19) Remove the cylinder head cover.
(20) Remove the timing chain cover.
(21) Remove the engine timing chain.
(22) Remove camshaft and rocker arm.

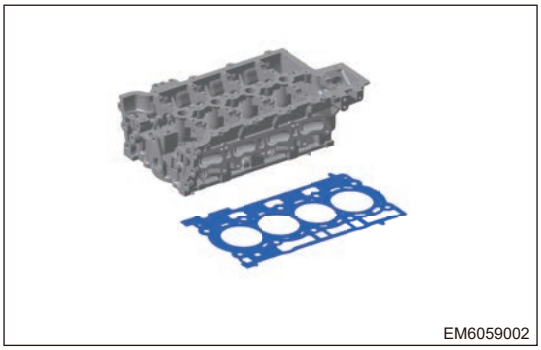
(23) Remove 10 fixing bolts from cylinder cover in order shown in illustration.



⚠ Caution

- **When engine is in high temperature, removal and installation may cause deformation to cylinder head, so perform removal and installation at normal temperature.**
- **Failure to remove cylinder head bolts in order may cause cylinder head deformation.**
- **Make scraping marks on removed cylinder head bolts, and they cannot be reused.**

(24) Remove cylinder head assembly and cylinder head gasket.

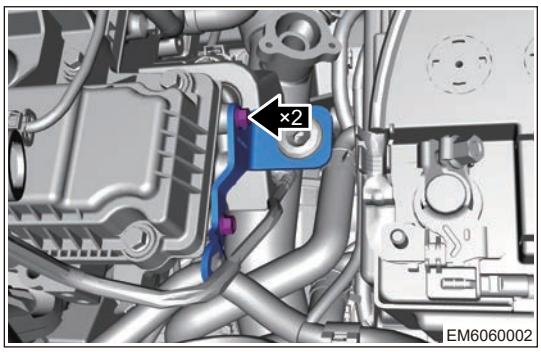


⚠ Caution

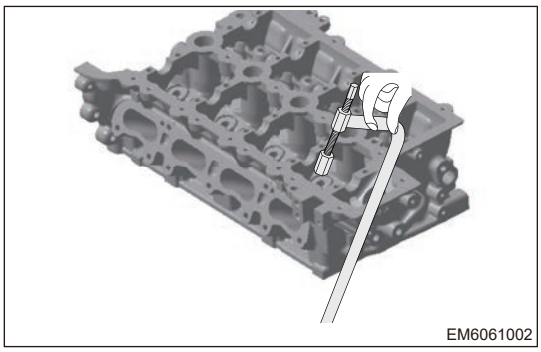
- **DO NOT reuse the removed cylinder head gasket, and it is necessary to replace with a new one.**
- **Be careful not to lose cylinder head mounting dowel pin during removal.**

■ Disassembly

(1) Remove 2 fixing bolts and bracket.

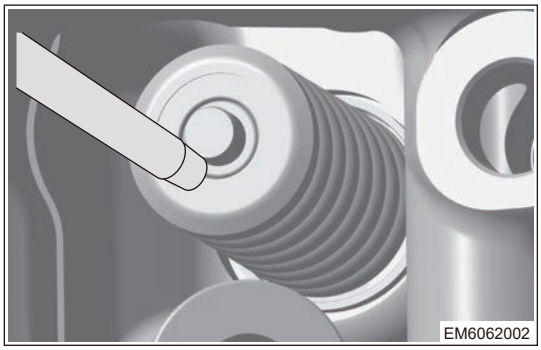


(2) Using a valve spring compressor, compress valve spring to a position so that valve cotter can be removed.

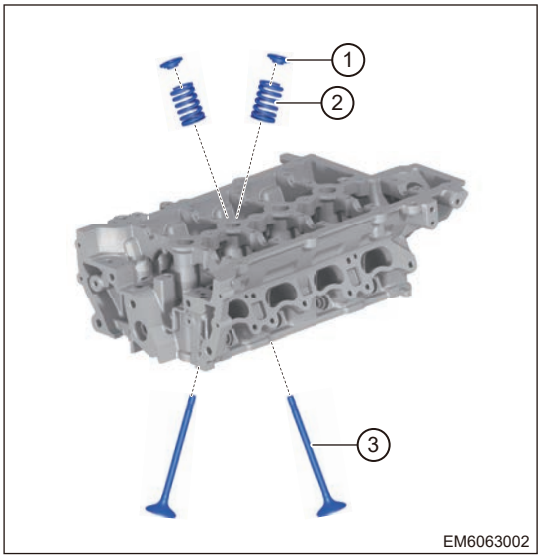


(3) Using a magnetic rod, remove valve cotter.

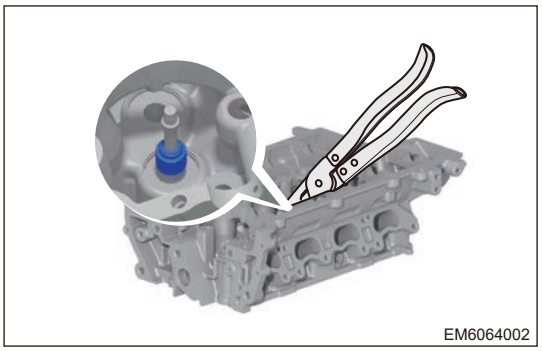
Hint:
Due to the valve cotter is small, please operate carefully when operating it, so as to avoid loss.



(4) Remove valve spring upper seat (1), valve spring (2) and intake and exhaust valve (3) from cylinder head.



(5) Using a valve oil seal remover, remove the valve oil seal.



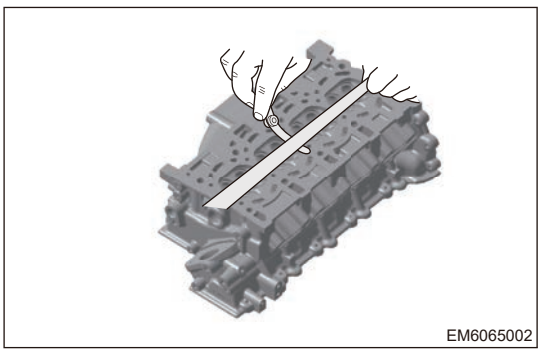
(6) Using a magnetic rod, remove valve spring lower seat.

■ Cylinder head inspection

(1) Check the appearance.

1) Remove carbon deposits inside valve guides with cleaner.
2) Make sure valve stem can move and rotate freely in its mounting hole.

(2) Using a precision straightedge and feeler gauge, check cylinder head flatness.

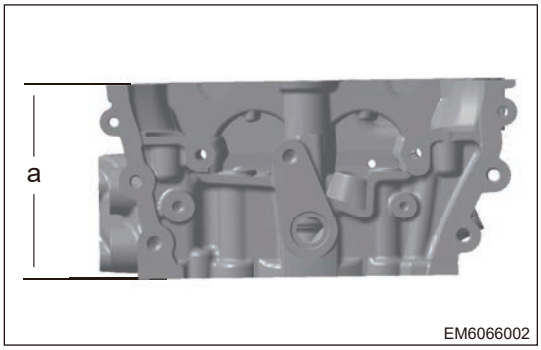


Measurement Item	Specification (mm)
Cylinder Head Flatness	0.04

Hint:
If cylinder head flatness is not within specified range, replace cylinder head assembly.

(3) Using a precision straightedge, measure cylinder head height a.

Measurement Item	Specification (mm)
Cylinder Head Height	136.9

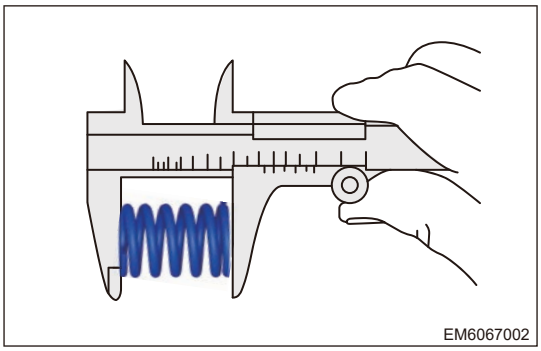


Hint:
If cylinder head height is not within specified range, replace cylinder head assembly.

■ Valve spring inspection

(1) Using a vernier caliper, measure free length of valve spring and length of valve spring under the pre-pressure of (230 ± 11 N).

Measurement Item	Specification (mm)
Valve Spring Free Length	45.4 ± 2
Valve Spring Length Under Pre-pressure	Intake: 36.5
	Exhaust: 34.8

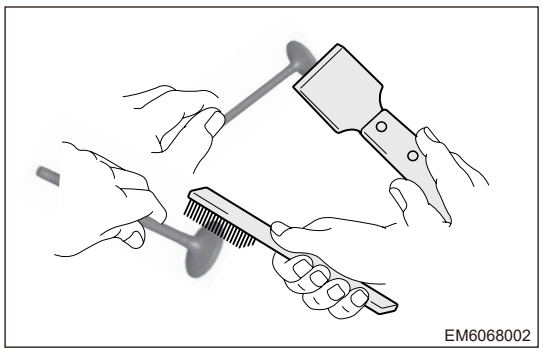


Hint:
If valve spring length is not within specified range, replace valve spring.

■ Check valve

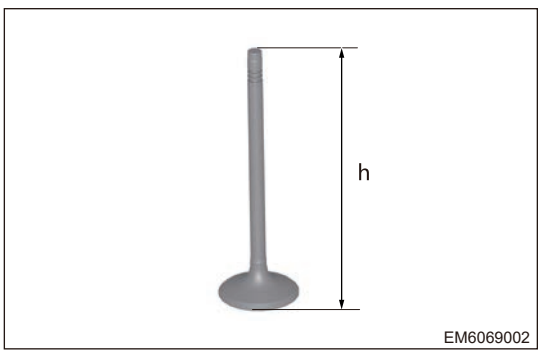
(1) Clean the valve.

1) Using a scraper, remove carbon deposited on valve head.
2) Using a thin and soft wire brush, clean the valve thoroughly.



(2) Using a micrometer, measure the valve height h.

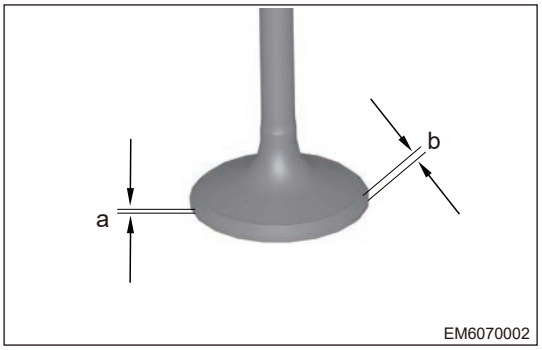
Measurement Item	Specification (mm)
Intake Valve	107.86 ± 0.25
Exhaust Valve	109.06 ± 0.25



Hint:
If valve height is less than specified value, replace valve.

(3) Check the valve head.

1) Measure margin thickness (a) of valve head.
2) Measure width (b) of valve face.

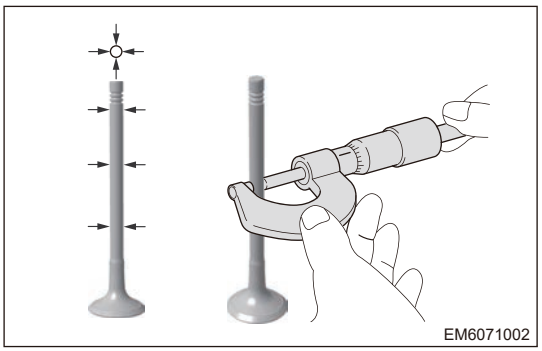


Measurement Item	Specification (mm)
Valve Head Margin Thickness (Intake)	1.3 ± 0.15
Valve Head Margin Thickness (Exhaust)	1.4 ± 0.15
Valve Face Width (Intake)	2.12
Valve Face Width (Exhaust)	3.12

Hint:
If valve head margin thickness and face width are not within specified range, replace valve.

(4) Using a micrometer, measure the valve stem diameter.

1) Measure margin thickness (a) of valve head.
2) Measure width (b) of valve face.

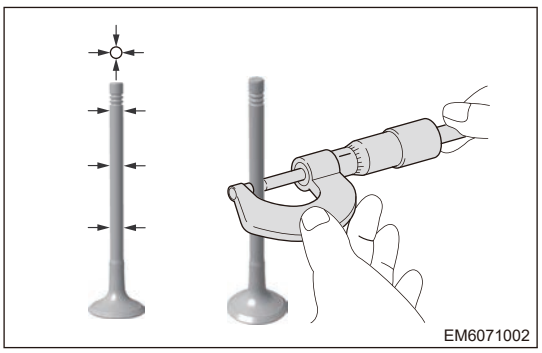


Measurement Item	Size and Tolerance (mm)
Valve Stem Diameter (Intake)	Φ5.98 ± 0.007
Exhaust Valve Stem Diameter (Exhaust)	Φ5.96 ± 0.007

Hint:
If valve stem diameter is not within specified range, check clearance between valve stem and valve guide.

(5) Check clearance between valve stem and valve guide.

1) Using a caliper gauge, measure inner diameter of valve guide.



Measurement Item	Size and Tolerance (mm)
Valve Guide Inner Diameter	Φ6 (0, +0.015)

2) Clearance between valve stem and valve guide = Valve guide inner diameter - Valve stem diameter.

Measurement Item	Specification (mm)
Clearance Between Intake Valve and Valve Guide	0.013 - 0.042
Clearance Between Exhaust Valve and Valve Guide	0.033 - 0.062

Hint:
If clearance between valve and valve guide is not within specified range, replace valve or valve guide.

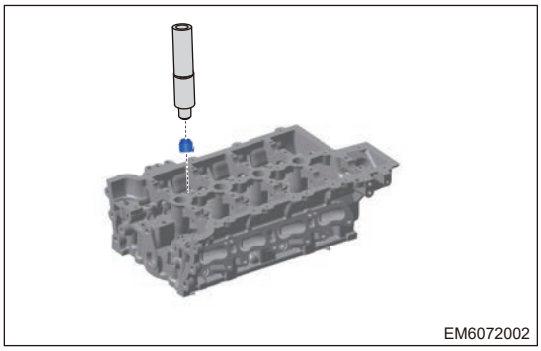
■ Assembly

⚠ Caution

- **Apply lubricant to valve oil seal lip before installing valve oil seal.**
- **Before installing valve spring, check valve spring lower seat for proper installation.**
- **Clean all components to be assembled thoroughly before assembly.**

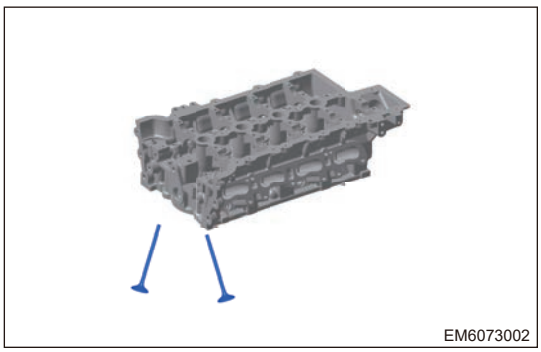
(1) Install valve spring lower seat to valve guide end to fit it with cylinder head.

(2) Install valve oil seal to valve oil seal special tool and press it on valve guide. Tap the tool end with a hammer to press in oil seal.

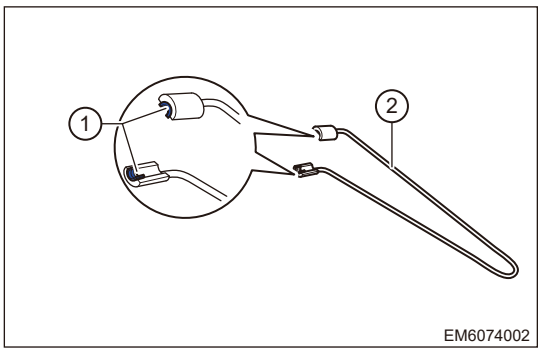

EM6072002

(3) Clean valve surface, install exhaust valve into cylinder head guide hole.

Hint:
Slightly rotate valve collar until valve conical face fully contacts retainer conical face.

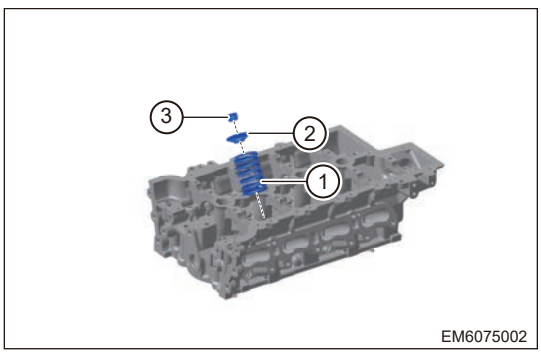

EM6073002

(4) Install valve cotter (1) to valve cotter installer (2).



EM6074002

(5) Install valve spring (1) and valve spring upper seat (2). Using a valve spring compressor, compress valve spring to a position so that valve cotter can be installed; Using a valve cotter installer, install valve cotter (3) in place.



EM6075002

(6) Tap tip of valve stem lightly with a rubber hammer to make sure valve cotter is installed in place after assembly.

■ Installation

⚠ Caution

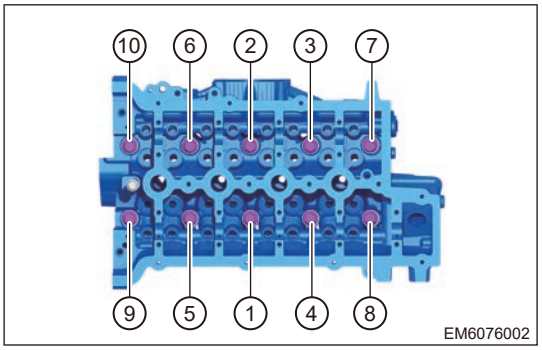
- **DO NOT damage or lose dowel pin on cylinder block.**
- **Remove residual oil on cylinder head and cylinder block.**
- **Replace cylinder head gasket with a new one.**
- **Check that cylinder head gasket is neat and clean without any chips and scratches.**
- **Clean junction surface between cylinder head and combustion chamber, and remove any accumulated oil at bottom of cylinder block thread.**
- **Replace cylinder head fixing bolt, and make scraping marks on removed cylinder head bolt.**

(1) Tighten bolts in place by hands.

(2) 1st step: Tighten bolts to 55 ± 5 N·m in order from (1) to (10) shown in illustration.

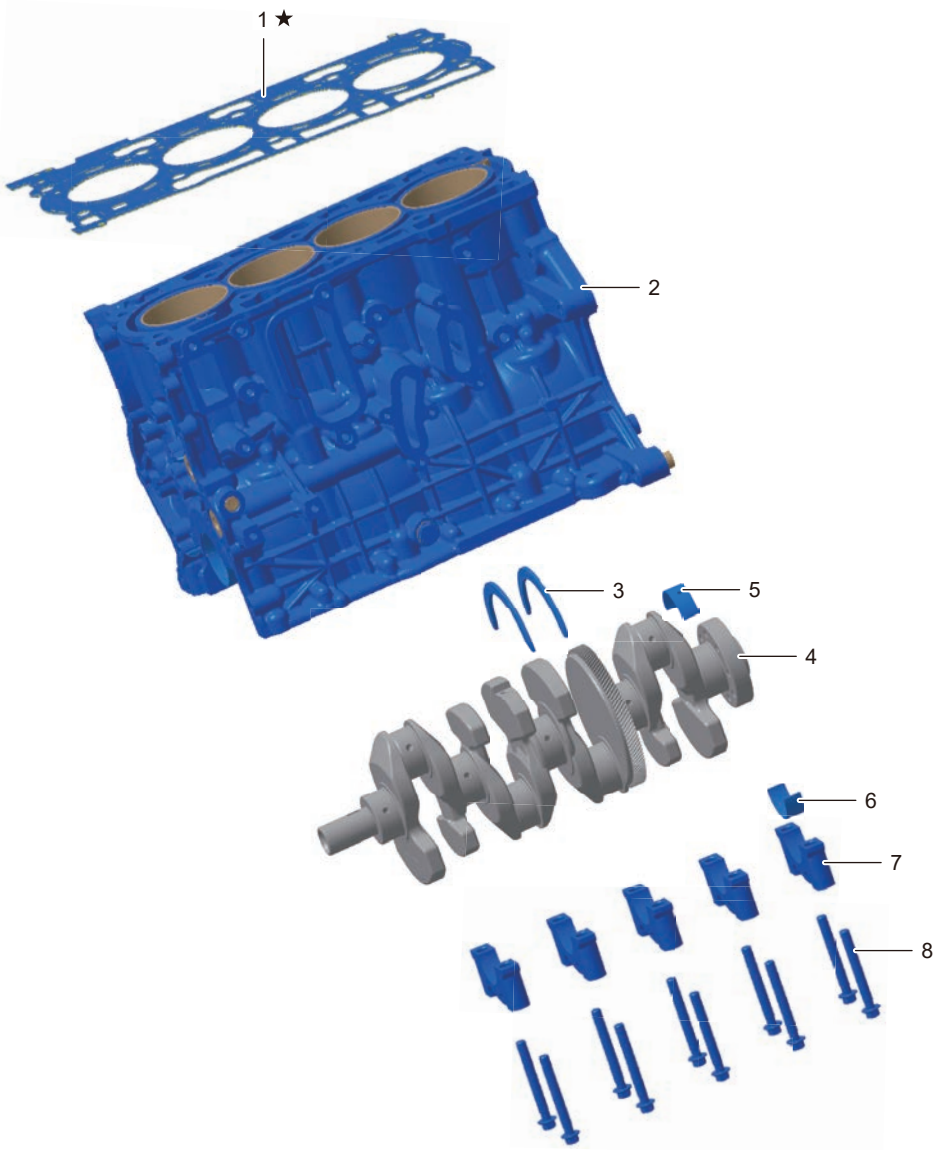
(3) 2nd step: Rotate bolts clockwise by 100° ± 5° in tightening order.

(4) 3rd step: Rotate bolts clockwise by 70° ± 5° in tightening order again.



(5) Install the camshaft and rocker arm.
(6) Install the engine timing chain.
(7) Install the cylinder head cover.
(8) Install the idler pulley assembly.
(9) Install the tensioner assembly.
(10) Install the accessory drive belt.
(11) Install the turbocharger assembly.
(12) Install the precatalytic converter assembly.
(13) Install the fuel rail injector assembly.
(14) Install the intake manifold assembly.
(15) Install the cooling pipe assembly.
(16) Install the intake hose assembly.
(17) Install the battery tray.
(18) Install the battery assembly.
(19) Install the air filter assembly.
(20) Add the coolant as specified.
(21) Add the engine oil as specified.
(22) Install the engine trim cover assembly.
(23) Install the engine compartment trim cover assembly.

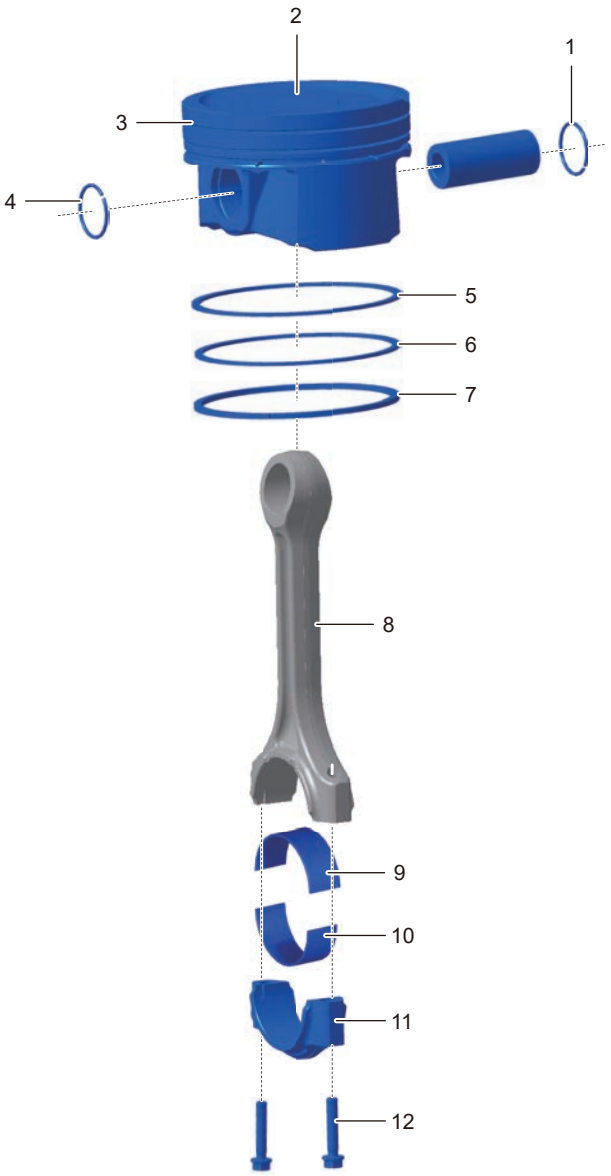
5.11 Cylinder Block



★ : Indicates that it is a non-reusable part

EM6077001

1	Cylinder Gasket	5	Crankshaft Main Bearing Upper Shell
2	Cylinder Block	6	Crankshaft Main Bearing Lower Shell
3	Thrust Washer	7	Main Bearing Cap
4	Crankshaft	8	Main Bearing Cap Fixing Bolt



1	Elastic Circlip	7	Oil Ring Assembly
2	Piston Pin	8	Connecting Rod Assembly
3	Piston	9	Connecting Rod Bearing Upper Shell
4	Elastic Circlip	10	Connecting Rod Bearing Lower Shell
5	First Compression Ring - Piston	11	Connecting Rod Bearing Cap
6	Second Compression Ring - Piston	12	Connecting Rod Bearing Cap Fixing Bolt

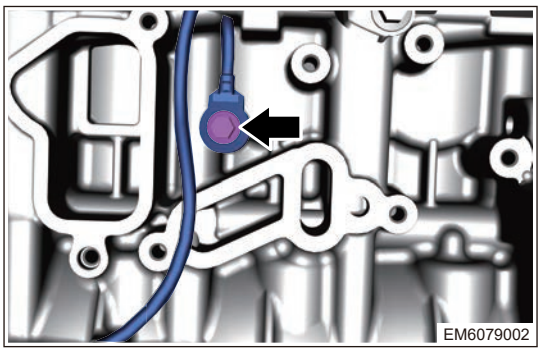
■ Removal

⚠ Warning

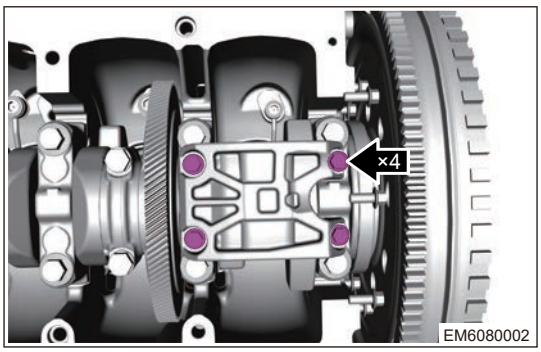
- **Be sure to wear safety equipment to prevent accidents, when removing cylinder block.**
- **Appropriate force should be applied, when removing cylinder block. Be careful not to operate roughly.**

(1) Remove engine assembly from vehicle.
(2) Separate transmission from engine.
(3) Remove the flywheel assembly.
(4) Remove the turbocharger assembly.
(5) Remove the turbocharger oil inlet pipe.
(6) Remove the turbocharger oil return pipe.
(7) Remove the intake manifold assembly.
(8) Remove the accessory drive belt.
(9) Remove the idler pulley assembly.
(10) Remove the tensioner assembly.
(11) Remove the torsion shock absorber.
(12) Remove the water pump module assembly.
(13) Remove the oil filter.
(14) Remove the A/C compressor bracket.
(15) Remove the oil pan assembly.
(16) Remove the engine timing chain.
(17) Remove the oil pump chain.
(18) Remove the cylinder head assembly.
(19) Remove the oil pump assembly.

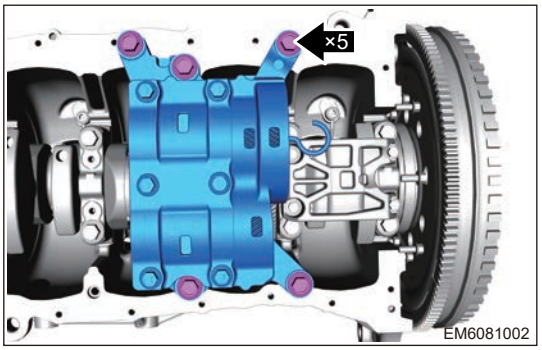
(20) Remove fixing bolt and knock sensor.



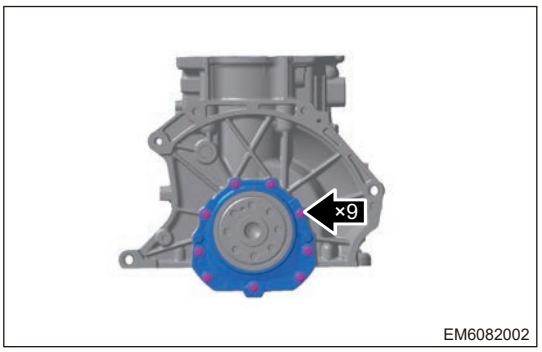
(21) Remove 4 fixing bolts and connecting bracket.



(22) Remove 5 fixing bolts and balance shaft with housing assembly.

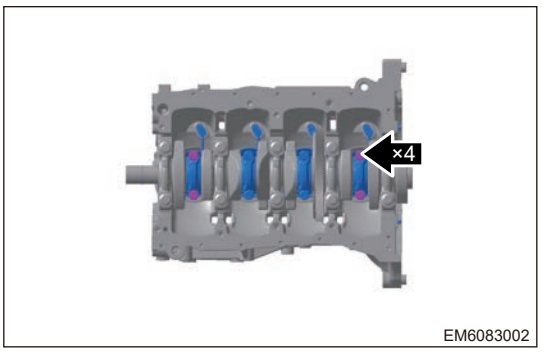


(23) Remove 9 fixing bolts and crankshaft rear oil seal bracket.



(24) Turn crankshaft, so that of cylinders 1 and 4 are at bottom dead center, remove fixing bolts from connecting rod bearing caps of cylinders 1 and 4, and remove connecting rod bearing caps of cylinders 1 and 4.

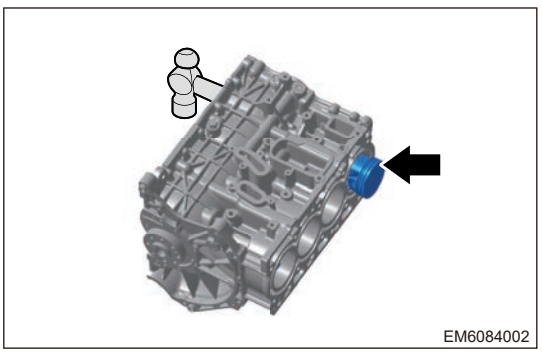
Hint:
Removal procedures of cylinders 2 and 3 are the same as cylinders 1 and 4.



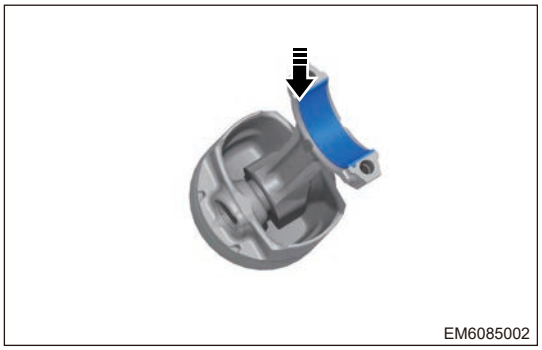
(25) Using a hammer handle, push out piston connecting rod assembly from cylinder block.

Hint:

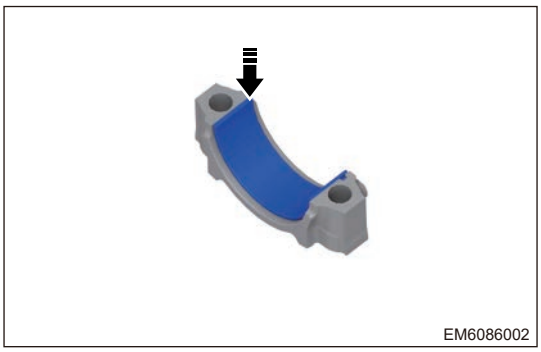
- Please operate carefully when pushing out piston, to avoid cylinder liner damage.
- Mark the removed piston connecting rod assemblies, so as to distinguish them.
- Replace with new connecting rod bearing cap bolts during assembly.



(26) Push out upper shell from connecting rod body slightly in direction of arrow to remove it.

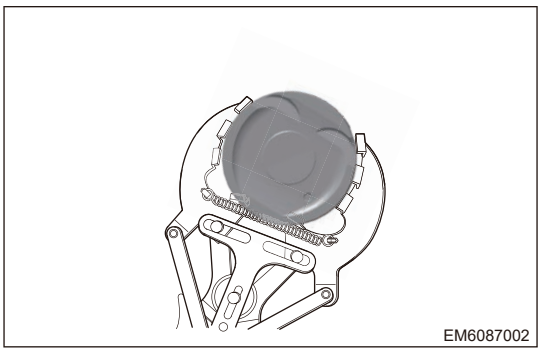


(27) Push out bearing lower shell slightly from connecting rod bearing cap in direction of arrow to remove it.



(28) Using a piston ring remover, remove first compression ring and second compression ring.

Hint:
Before removing piston ring, check piston ring side clearance; If it is necessary to be reused, be sure to mark piston ring position.

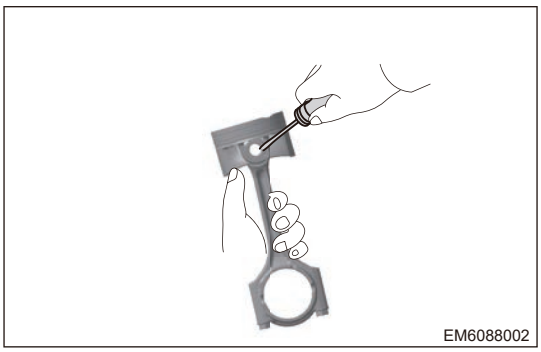


(29) Remove oil ring rail and expander.

(30) Using a flat tip screwdriver, pry out elastic circlips at both sides of piston pin carefully from notch.

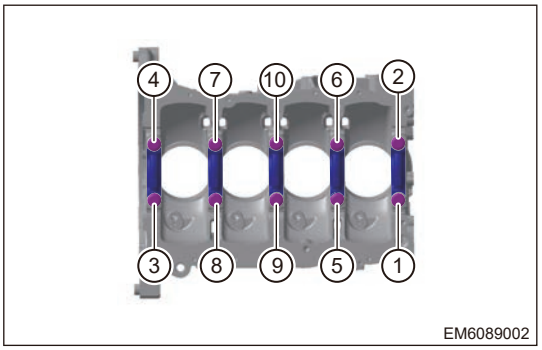
⚠ Caution

- **Elastic circlip has a large tensile force. Be careful during removal to prevent personal injury.**



(31) Remove the piston pin assembly.

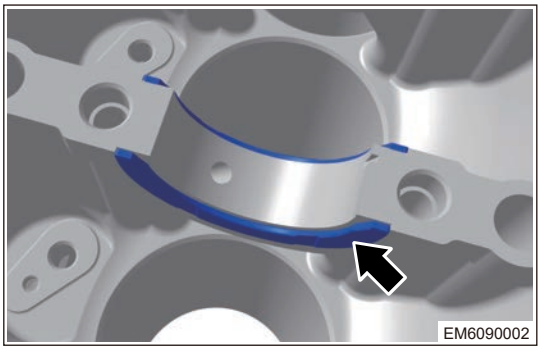
(32) Remove 10 fixing bolts from crankshaft main bearing cap in order as shown in illustration.



(33) Remove the crankshaft assembly.

Hint:
Take care when removing crankshaft, ask other operators to assist when necessary. Avoid scratching contact surfaces between crankshaft and bearing shell.

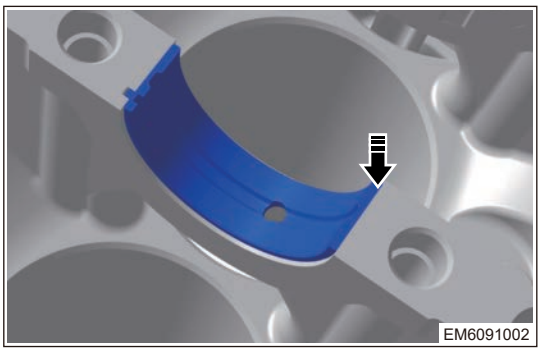
(34) Remove crankshaft thrust washers from cylinder block.



(35) Push out main bearing upper shell slightly from cylinder block in direction of arrow to remove it.

⚠ Caution

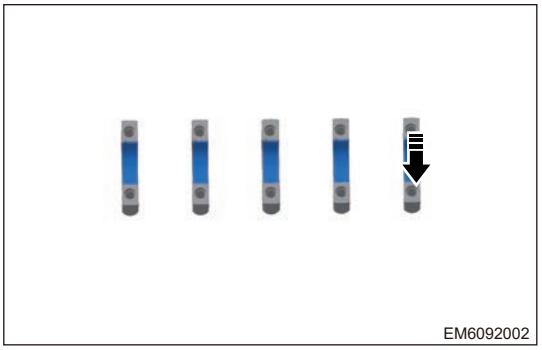
- **Pay attention to the notch position. Push out bearing shell carefully. It is difficult to push out bearing shell and parts may be damaged if pushing in opposite direction.**



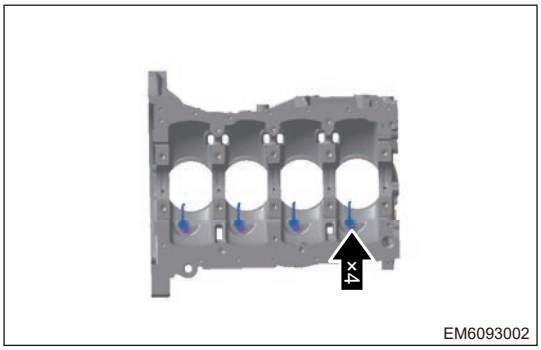
(36) Push out main bearing lower shell slightly from main bearing cap in direction of arrow to remove it.

⚠ Caution

- **Pay attention to the notch position. Push out bearing shell carefully. It is difficult to push out bearing shell and parts may be damaged if pushing in opposite direction.**



(37) Remove 4 fixing bolts and piston cooling nozzles.



■ Inspection

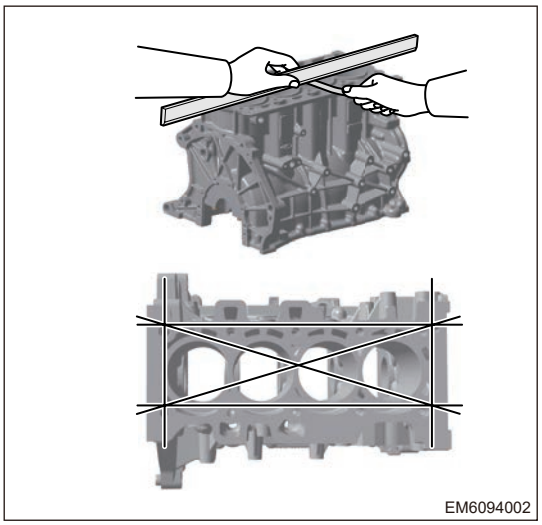
(1) Check the cylinder block appearance.

1) Clean engine block thoroughly and check all hole passages for leakage.
2) Check cylinder liner for cracks.
3) Check cylinder block for cracks.

Hint:
DO NOT wash cylinder at high temperature; otherwise, cylinder liner will stick out beyond cylinder block.

(2) Check the cylinder block upper surface flatness.

1) Clean the cylinder block upper surface, using precision straightedge and feeler gauge, measure cylinder block upper surface flatness.

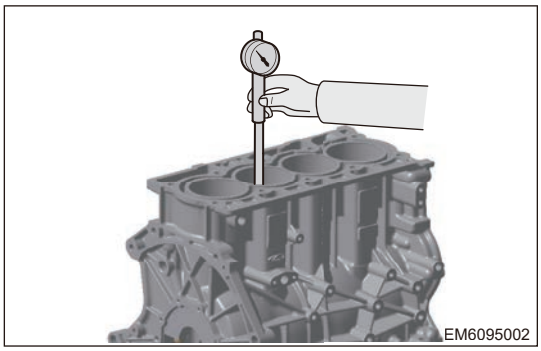


Measurement Item	Specification (mm)	Limit Value (mm)
Cylinder Block Upper Surface Flatness	0.04	0.1

Hint:
Never grind the cylinder block upper surface. If the engine block upper surface flatness is above the limit, replace the engine block.

(3) Check cylinder diameter and piston clearance.

1) Using a cylinder gauge, measure cylinder diameter and calculate the and gap between cylinder and piston.

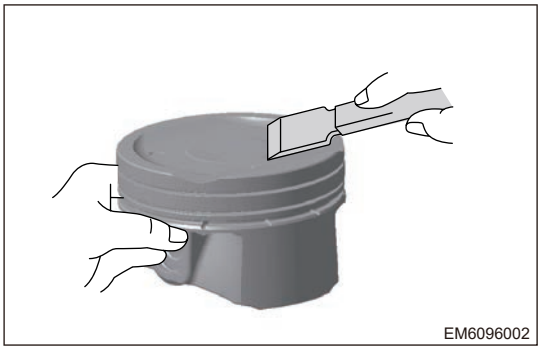


Measurement Item	Specification (mm)	Limit Value (mm)
Cylinder Diameter	80.5	80.513
Clearance Between Piston and Cylinder	0.04	0.063

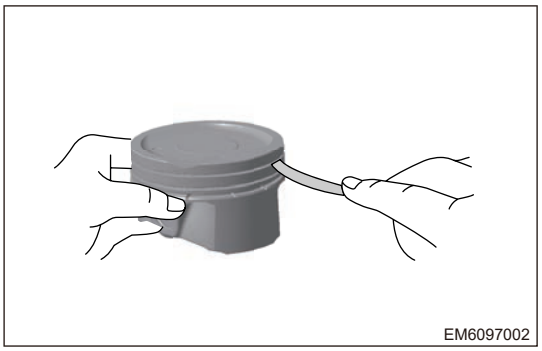
Hint:
If the cylinder diameter is beyond the limit, replace the cylinder block. If the clearance between piston and cylinder is beyond the specified value, check cylinder diameter and piston diameter. Replace as necessary.

(4) Check the piston.

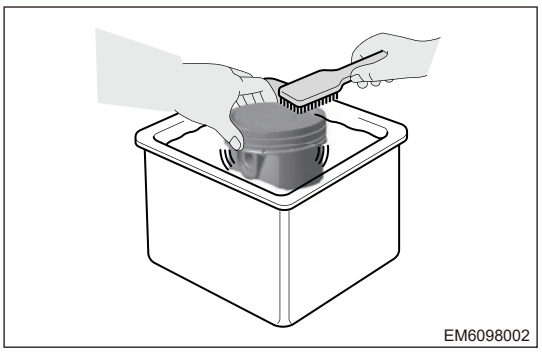
1) Using a scraper, remove carbon deposits on piston top.



2) Using a piston ring, remove carbon deposits from piston ring grooves.



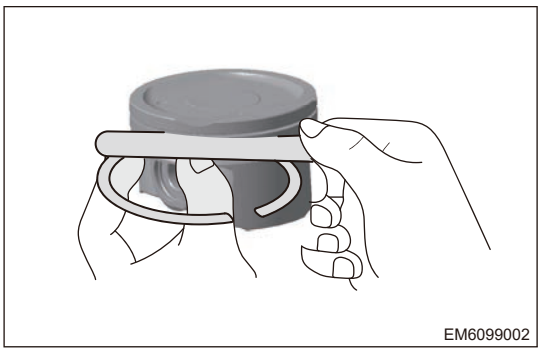
3) Using a brush and solvent, thoroughly clean piston.



(5) Check the piston ring.

1) Using a feeler gauge, measure clearance between new piston ring and ring groove side.

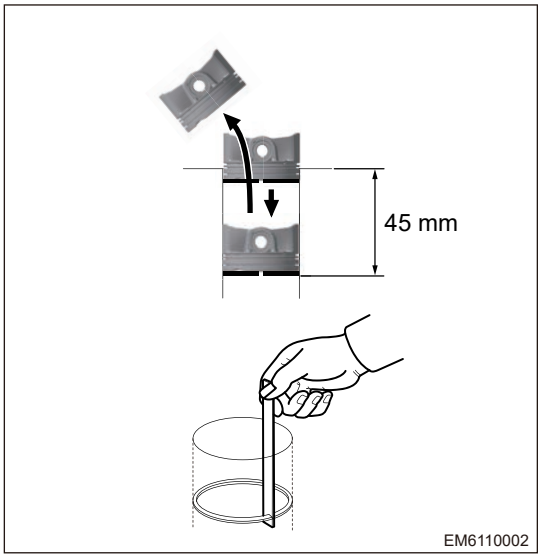
Measurement Item	Specification (mm)
First Compression Ring Groove Side Clearance	0.035 - 0.075
Second Compression Ring Groove Side Clearance	0.03 - 0.07



Hint:
If piston ring side clearance exceeds specified range, replace piston ring and piston assembly.

2) Using a piston, from top of cylinder to bottom of cylinder bore, that is 45 mm from bottom of cylinder bore. Keep the piston ring level.

3) Measure at the specified position, which has the minimum piston ring wear with a feeler gauge.



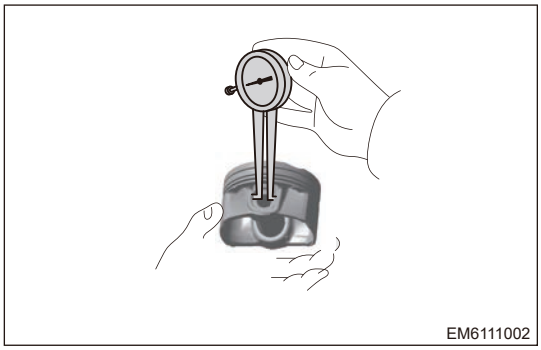
Measurement Item		Limit Value (mm)
Piston Ring End Gap	First ring	0.2 - 0.39
	Second ring	0.4 - 0.6

Hint:

- If piston ring end gap is not within specified range, replace piston ring with a new set.
- If end gap is still not within specified range after replacement, replace cylinder block assembly.

(6) Check the piston pin.

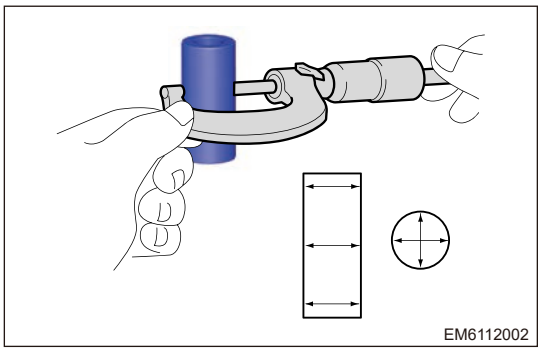
1) Using a feeler gauge, measure diameter of piston pin hole.



Measurement Item	Specification (mm)
Piston Pin Hole Diameter	22.004 - 22.009

Hint:
If piston pin hole diameter is not within specified range, replace piston.

2) Using an external micrometer, measure diameter of piston pin.

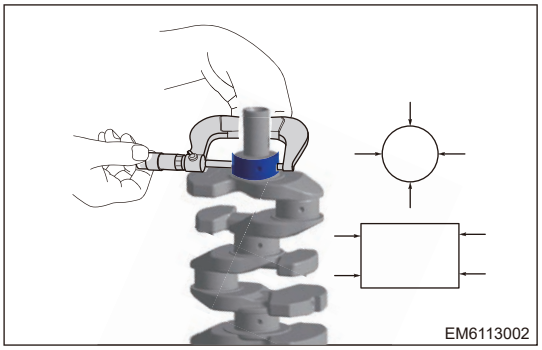


Measurement Item	Specification (mm)
Piston Pin Diameter	21.995 - 22

Hint:
If piston pin diameter is not within specified range, replace piston.

(7) Check the crankshaft main journal diameter.

1) Measure crankshaft main bearing diameter with an outer micrometer, and measure again after rotating the crankshaft 90°.



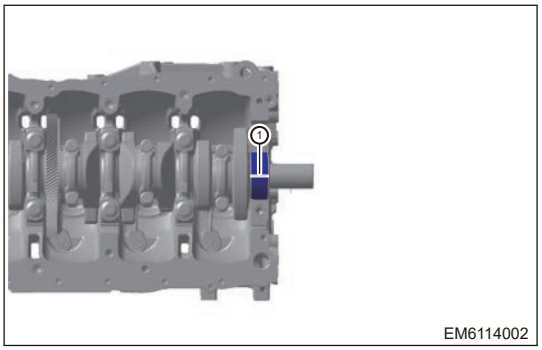
Measurement Item	Specification (mm)	Limit Value (mm)
Crankshaft Main Journal Diameter	52	51.981

Hint:

- If crankshaft main journal diameter is not within specified range, replace main bearing shells with new ones and check matching clearance of crankshaft main bearing.
- If matching clearance of main bearing is still not within specified range after replacing with new main bearing shells, replace crankshaft.

(8) Check matching clearance of crankshaft main bearing.

1) Clean crankshaft main journals and main bearing shells.

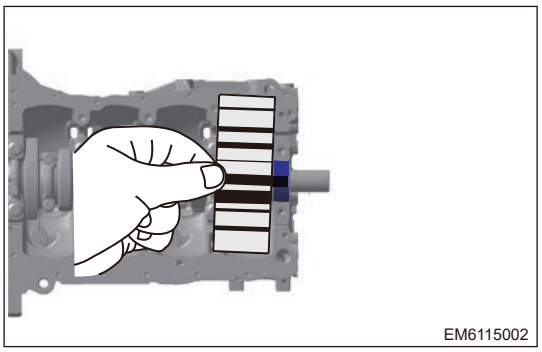


2) Install the crankshaft. Place feeler gauge (1) on crankshaft main journal, parallel to crankshaft center axis and as wide as distance covered by main bearing cap.

3) Install main bearing cap and tighten main bearing cap fixing bolts to specified torque.

Torque: 1st step: 60 ± 5 N · m, 2nd step: 120° ± 5°

4) Remove the main bearing cap; Using a feeler gauge, measure widest part of compressed feeler gauge. Measured value is matching clearance of crankshaft main bearing.



Measurement Item	Specification (mm)
Matching Clearance of Crankshaft Main Bearing	0.020 - 0.048

Hint:

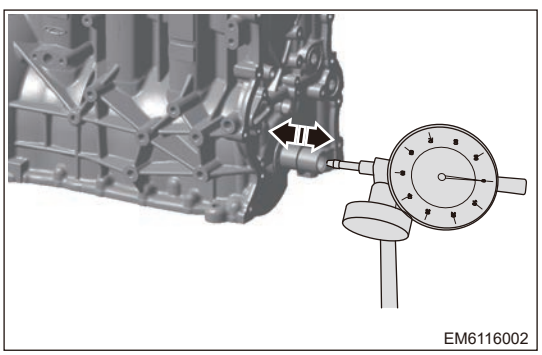
- If matching clearance of crankshaft main bearing is not within specified range, install new main bearing shells; Replace crankshaft assembly if necessary.
- Replace bearing shells in pairs.

(9) Check the crankshaft axial clearance.

1) Clean crankshaft main journals and main bearing shells.

2) Install main bearing cap and tighten main bearing cap fixing bolts to specified torque.

Torque: 1st step: 60 ± 5 N · m, 2nd step: 120° ± 5°

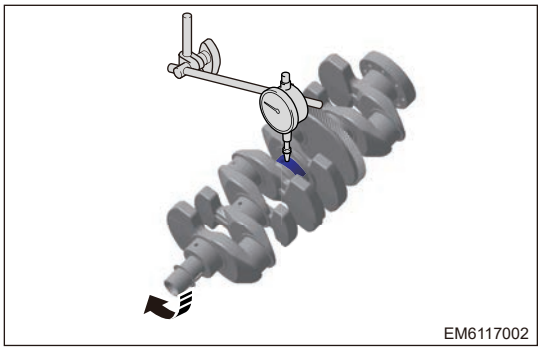


3) Using a flat tip screwdriver, pry crank position left and right, and read value on dial indicator.

Measurement Item	Specification (mm)	Limit Value (mm)
Crankshaft Axial Clearance	0.120 - 0.315	0.315

(10) Check the crankshaft main journal coaxiality.

1) Install crankshaft onto tester and keep it level.
2) Rotate crankshaft slowly and read maximum change value from dial indicator. (Readings on dial indicator)/ 2 is the coaxiality of crankshaft main journal.

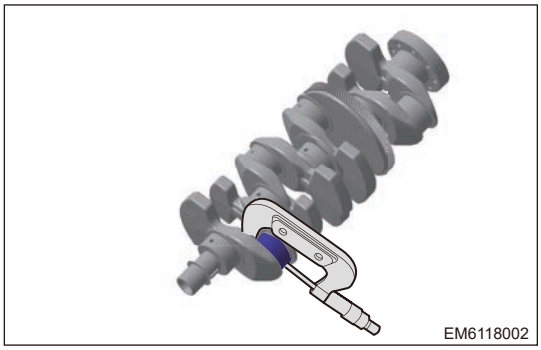

EM6117002

Measurement Item	Specification (mm)	Limit Value (mm)
Crankshaft Main Journal Coaxiality	0	0.05

Hint:
If crankshaft main journal coaxiality is not within specified range, replace crankshaft assembly.

(11) Detect diameter of crankshaft connecting rod journal.

1) Using an external micrometer, measure diameter of crankshaft connecting rod journal.


EM6118002

Measurement Item	Specification (mm)	Limit Value (mm)
Crankshaft Connecting Rod Journal Diameter	50	49.984

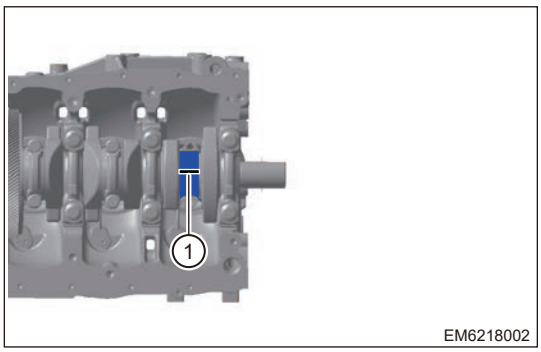
Hint:
- If connecting rod journal diameter is not within specified range, replace connecting rod bearing shells with new ones, and check radial clearance of connecting rod bearing shell.
- If radial clearance of connecting rod bearing shell is still not within specified range after replacement, replace crankshaft.

(12) Check radial clearance of crankshaft connecting rod bearing shell.

1) Clean connecting rod journals and connecting rod bearing shells.
2) Place a feeler (1) on connecting rod journal.
3) Install connecting rod bearing caps, and tighten connecting rod bearing cap fixing bolts to specified torque.

   Torque: 1st step: 25 ± 3 N · m, 2nd step: 90° ± 5°

   Hint:
   DO NOT turn crankshaft during installation.
4) Remove the connecting rod bearing cap.



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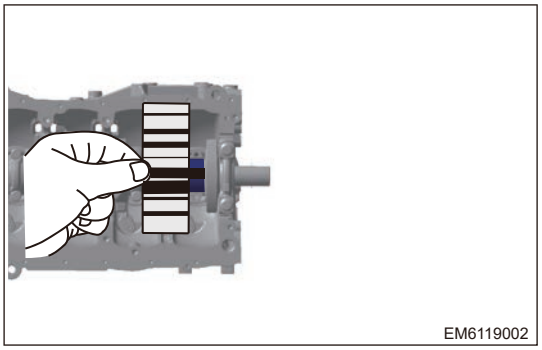
5) Using gauge scale of feeler gauge, measure the widest part of compressed feeler gauge to obtain radial clearance of connecting rod bearing shell.



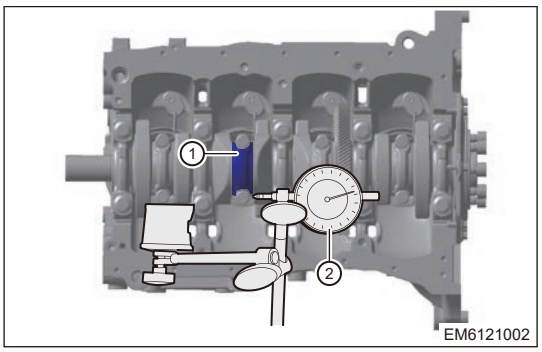
Measurement Item	Specification (mm)
Connecting Rod Bearing Shell Radial Clearance	0.035 - 0.067

Hint:
If radial clearance of connecting rod outer diameter is not within specified range, replace connecting rod bearing shells. Replace crankshaft assembly if necessary.

(13) Check axial clearance of connecting rod.

1) Install connecting rod bearing caps, and tighten connecting rod bearing cap fixing bolts to specified torque.

Torque: 1st step: 25 ± 3 N · m, 2nd step: 90° ± 5°



2) Install a dial indicator (2) with its plunger contacting the side of connecting rod cap (1) Reset dial of dial indicator to zero.

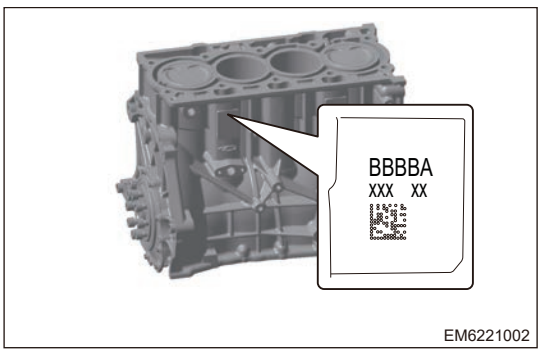
3) Push connecting rod bearing cap forward and backward (do not move crankshaft forward and backward) and read value on dial indicator.

Measurement Item	Specifications
Connecting Rod Axial Clearance	0.15 - 0.40

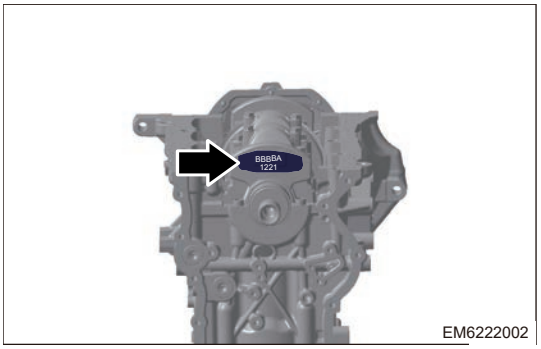
Hint:
If axial clearance of connecting rod is not within specified range, replace piston connecting rod assembly. Replace crankshaft assembly if necessary.

■ Selection of main bearing shell

(1) Related letter marks are available on cylinder block (- consisting of A, B, C, D). Such as “BBBBA” in illustration, each letter from left to right is corresponding to the size of each cylinder block main bearing hole. First letter "B" indicates the first main bearing hole and the fifth letter "A" indicates the fifth main bearing hole.



(2) Related letter marks are available on first balancer at front end of crankshaft (consisting of A, B, C, D). Such as “BBBBA” in illustration, each letter from left to right is corresponding to the size of each crankshaft main journal. First letter "B" indicates the first main journal and the fifth letter “A” is the fifth main journal.



(3) Classification Method.

No.	Name	Color	Level	Size (mm)
1	Main Bearing Hole	Red	A	57.000 - 57.005
2	Main Bearing Hole	Blue	B	57.005 - 57.010
3	Main Bearing Hole	Yellow	C	57.010 - 57.015
4	Main Bearing Hole	Black	D	57.015 - 57.019
5	Main Bearing Upper Shell	Red	/	2.489 - 2.493
6	Main Bearing Upper Shell	Blue	/	2.493 - 2.497
7	Main Bearing Upper Shell	Yellow	/	2.497 - 2.501
8	Main Bearing Upper Shell	Black	/	2.501 - 2.505
9	Main Journal	Red	A	51.995 - 52.000
10	Main Journal	Blue	B	51.990 - 51.995
11	Main Journal	Yellow	C	51.985 - 51.990
12	Main Journal	Black	D	51.981 - 51.985
13	Main Bearing Lower Shell	Red	/	2.489 - 2.493
14	Main Bearing Lower Shell	Blue	/	2.493 - 2.497
15	Main Bearing Lower Shell	Yellow	/	2.497 - 2.501
16	Main Bearing Lower Shell	Black	/	2.501 - 2.505

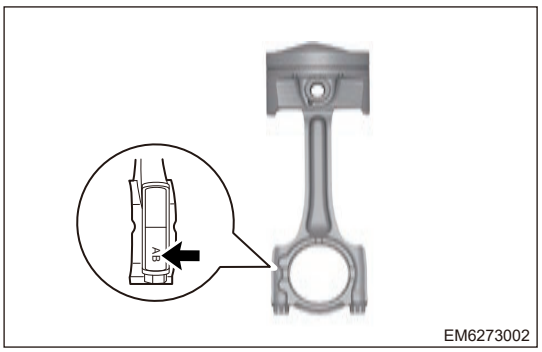
(4) Selection Method

No.	Main Bearing Hole	Main Journal	Main Bearing Upper Shell	Main Bearing Lower Shell
1	A Red	A Red	A Red	A Red
2	A Red	B Blue	A Red	B Blue
3	A Red	C Yellow	A Red	C Yellow
4	A Red	D Black	A Red	D Black
5	B Blue	A Red	B Blue	A Red
6	B Blue	B Blue	B Blue	B Blue
7	B Blue	C Yellow	B Blue	C Yellow
8	B Blue	D Black	B Blue	D Black
9	C Yellow	A Red	C Yellow	A Red
10	C Yellow	B Blue	C Yellow	B Blue
11	C Yellow	C Yellow	C Yellow	C Yellow
12	C Yellow	D Black	C Yellow	C Yellow
13	D Black	A Red	D Black	A Red
14	D Black	B Blue	D Black	B Blue
15	D Black	C Yellow	D Black	C Yellow
16	D Black	D Black	D Black	D Black

■ **Selection of connecting rod bearing shell**

(1) Connecting rod bearing upper shells are divided into red shell and blue shell. Related letter marks are available on connecting rod bearing shell cap (consisting of A, B, C, D).

(2) As shown in illustration, mark "A" on connecting rod indicates red shell, "B" indicates blue shell, "C" indicates yellow shell, and "D" indicates black shell.



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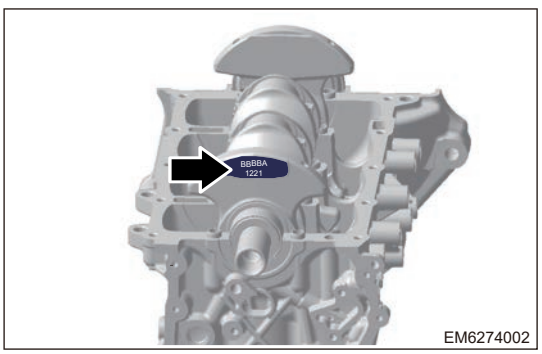
Name	Type	Letter Mark
Connecting Rod Upper Shell	Red shell	A
	Blue shell	B
	Yellow shell	C
	Black shell	D

(3) Related digital marks are available on first balancer at front end of crankshaft (consisting of 1, 2, 3, 4); Such as “4434” on first balancer at front end of crankshaft shown in illustration, first digit “1” is for lower shell type of cylinder 1 piston connecting rod bearing, and so on; fourth digit “1” is for lower shell type of cylinder 4 piston connecting rod bearing.



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Name	Type	Letter Mark
Connecting Rod Lower Shell	Red shell	1
	Blue shell	2

Name	Type	Letter Mark
	Yellow shell	3
	Black shell	4

(4) Classification Method.

No.	Name	Color	Level	Size (mm)
1	Connecting Rod Big End Hole	Red	A	53.000 - 53.005
2	Connecting Rod Big End Hole	Blue	B	53.005 - 53.010
3	Connecting Rod Big End Hole	Yellow	C	53.010 - 53.015
4	Connecting Rod Big End Hole	Black	D	53.015 - 53.019
5	Connecting Rod Upper Shell	Red	/	1.483 - 1.487
6	Connecting Rod Upper Shell	Blue	/	1.487 - 1.491
7	Connecting Rod Upper Shell	Yellow	/	1.491 - 1.495
8	Connecting Rod Upper Shell	Black	/	1.495 - 1.499
9	Connecting Rod Journal	Red	1	49.996 - 50.000
10	Connecting Rod Journal	Blue	2	49.992 - 49.996
11	Connecting Rod Journal	Yellow	3	49.988 - 49.992
12	Connecting Rod Journal	Black	4	49.984 - 49.988
13	Connecting Rod Lower Shell	Red	/	1.483 - 1.487
14	Connecting Rod Lower Shell	Blue	/	1.487 - 1.491
15	Connecting Rod Lower Shell	Yellow	/	1.491 - 1.495
16	Connecting Rod Lower Shell	Black	/	1.495 - 1.499

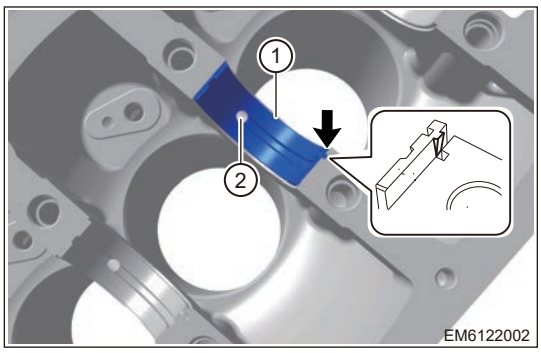
No.	Connecting Rod Big End Hole	Connecting Rod Upper Shell	Connecting Rod Journal	Connecting Rod Lower Shell
1	A Red	A Red	1 Red	A Red
2	A Red	A Red	2 Blue	B Blue
3	A Red	A Red	3 Yellow	C Yellow
4	A Red	A Red	4 Black	D Black
5	B Blue	B Blue	1 Red	A Red
6	B Blue	B Blue	2 Blue	B Blue
7	B Blue	B Blue	3 Yellow	C Yellow
8	B Blue	B Blue	4 Black	D Black
9	C Yellow	C Yellow	1 Red	A Red
10	C Yellow	C Yellow	2 Blue	B Blue
11	C Yellow	C Yellow	3 Yellow	C Yellow
12	C Yellow	C Yellow	4 Black	D Black
13	D Black	D Black	1 Red	A Red
14	D Black	D Black	2 Blue	B Blue
15	D Black	D Black	3 Yellow	C Yellow
16	D Black	D Black	4 Black	D Black

■ Installation

(1) Install 4 fixing bolts to piston cooling nozzles.

Torque: 20 - 25 N · m

(2) Carefully install crankshaft main bearing upper shell (1) in direction of arrow, and notch of each main bearing upper shell should be aligned with cylinder block. Oil passage hole (2) on crankshaft main bearing upper shell should be aligned with passage hole on cylinder block after installation.

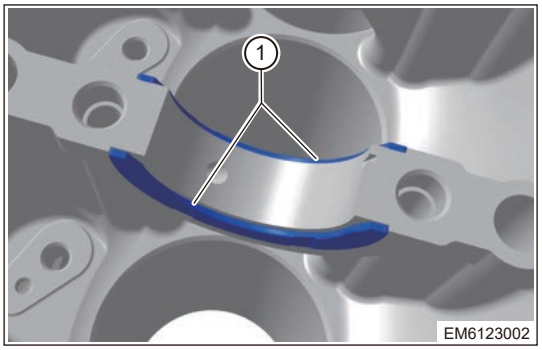


⚠ Caution

- **Apply a proper amount of engine oil to inner surface of main bearing shell before installation.**
- **Install main bearing lower shell in the same way of crankshaft main bearing upper shell.**

(3) Install crankshaft thrust washer to front and rear thrust surfaces of 3rd main bearing seat respectively.

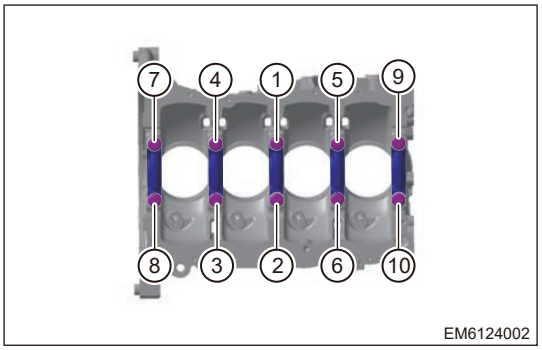
Hint:
The side of crankshaft thrust washers (1) without groove should face cylinder block side while the other side with groove should face crankshaft side.



(4) Place crankshaft on cylinder block carefully.

(5) Install the crankshaft main bearing cap. Install crankshaft main bearing cap fixing bolts in place by hands, and then tighten 10 crankshaft main bearing cap fixing bolts in order shown in illustration.

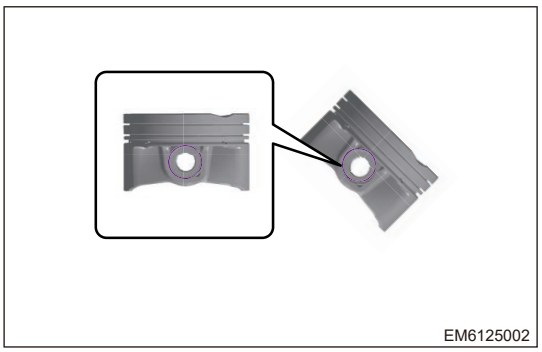
Torque: 1st step: 60 ± 5 N · m, 2nd step: 120° ± 5°



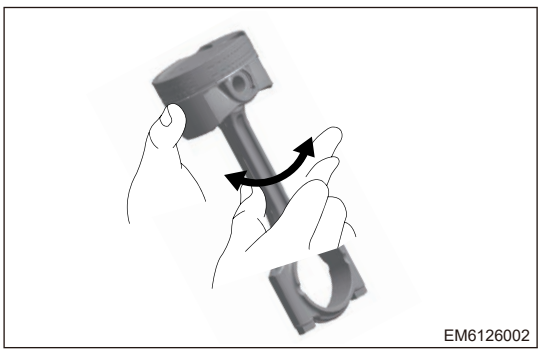
(6) Using a small screwdriver, install new elastic circlip to one end of piston pin hole.

Hint:
Relative angle between elastic circlip opening and removed notch is 180° ± 40°

(7) Align front marks on piston and connecting rod, push piston pin with thumb until it contacts with elastic circlip.

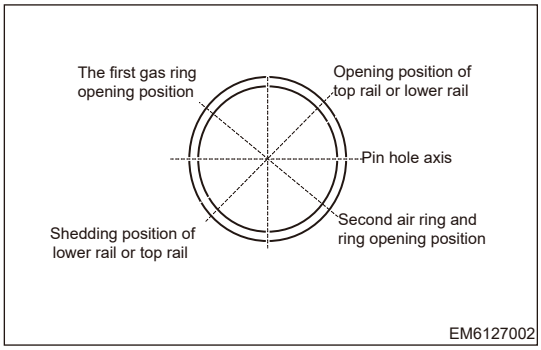


(8) Install elastic circlip to the other end of piston pin hole, and check for free rotation between piston and connecting rod assembly.



(9) Apply a small amount of engine oil to piston ring groove and piston. Pay attention that the sides with words of first compression ring (1) and second compression ring (2) should face upward.

(10) When installing the oil ring, first install the expander into oil groove, then install upper and lower rails with opening staggered by 90° from the expander, and the upper and lower rails at 180°. Then install the second compression ring, and install the first compression ring finally with two compression rings staggered by 90° from upper rail opening; The piston ring should rotate in the ring groove freely without any stuck condition.

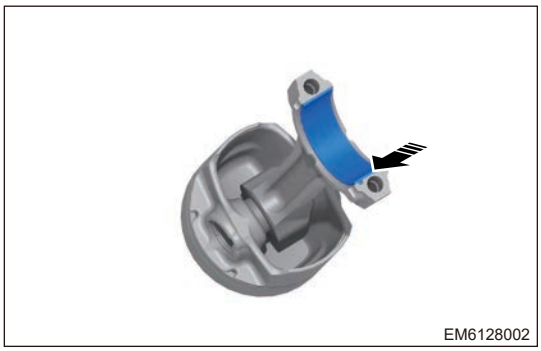


(11) Rotate piston ring several turns after addling engine oil to piston ring groove, and note that the position of ring notch should be the same with that described above; clean crankshaft connecting rod journal and cylinder with a non-woven fabric cloth.

(12) Carefully install connecting rod bearing upper shell in direction of arrow, and keep notch of each connecting rod bearing upper shell is aligned with cutout of connecting rod bearing cap.

Hint:

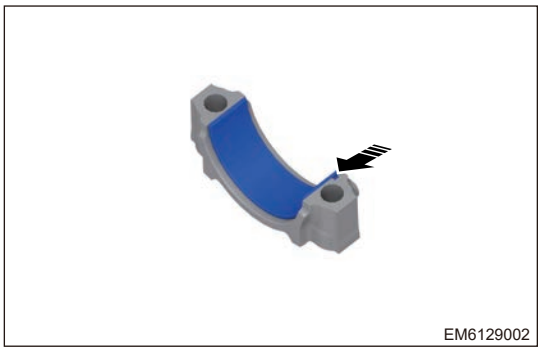
Apply a proper amount of engine oil to connecting rod bearing shell inner surface before installation.



(13) Carefully install connecting rod bearing lower shell in direction of arrow, and keep notch of each connecting rod bearing lower shell face the cutout of connecting rod bearing cap.

Hint:

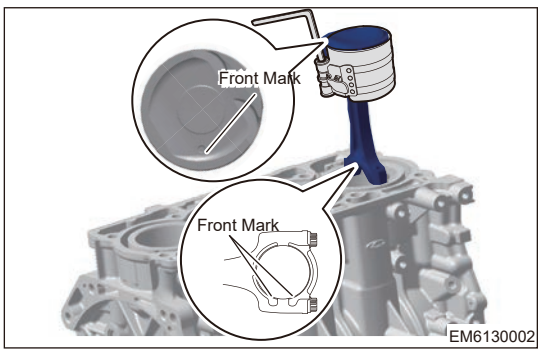
Back side of connecting rod bearing shell should be clean without any foreign matter during assembly.



(14) Rotate crankshaft to top dead center of cylinder 1 and cylinder 4.

(15) Apply a coat of engine oil to piston surface and cylinder inner wall.

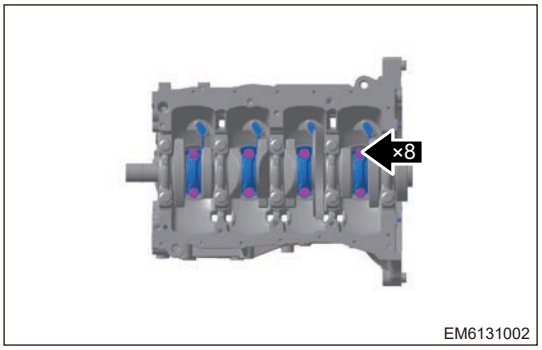
(16) As shown in illustration, install piston connecting rod assembly to cylinder with piston installer; Pay attention to front marks on piston and connecting rod during assembly, without being reversed.



(17) Install connecting rod bearing caps in place, install connecting rod bearing cap fixing bolts and tighten connecting rod bearing cap fixing bolts to specified torque.

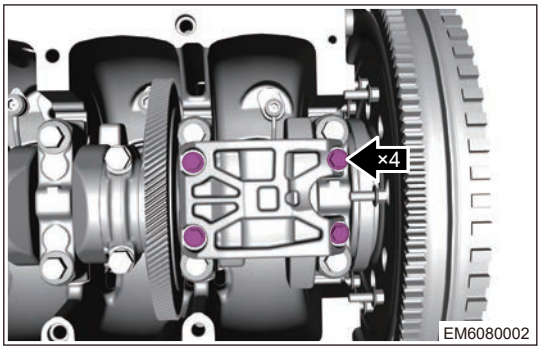
Torque: 1st step: 25 ± 3 N · m, 2nd step: 90° ± 5°

Hint:
Apply a small amount of engine lubricant to connecting rods, connecting rod bearing caps and thread joint surfaces.



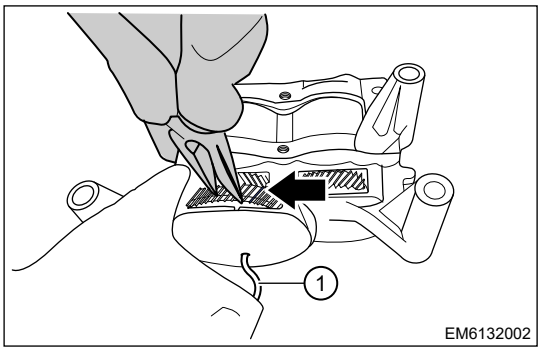
(18) Install the connecting bracket and tighten 4 fixing bolts.

Torque: 8 + 3 N · m



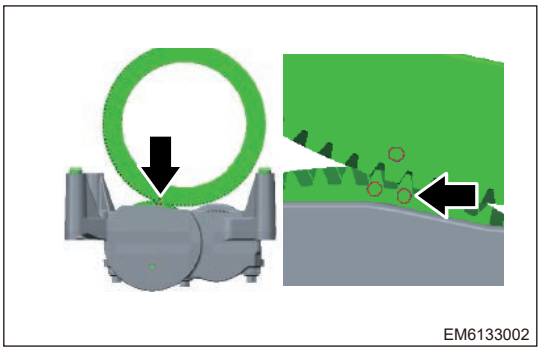
(19) Install the balance shaft with housing assembly

1) After aligning the balance shaft gears, insert the locking fixture (1) and reset the balance shaft.



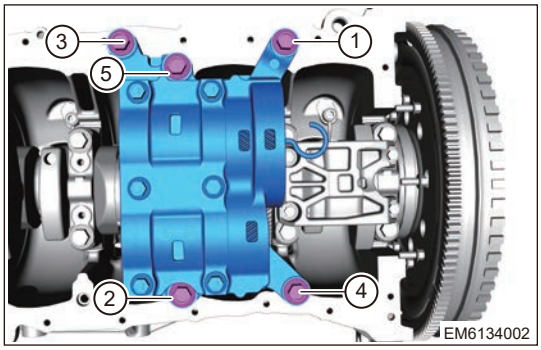
2) Align the pin sleeve hole of the balance shaft with housing assembly with the pin sleeve, assemble the balance shaft with housing assembly, slightly turn the balance shaft assembly locking fixture on the left and right to make the balance shaft gear mesh with the crankshaft gear ring.

3) Check the gear timing mark, and three mark points are required to be aligned as shown in illustration.



4) Press the balance shaft housing firmly and make it is closed to the lower end surface of cylinder block, install 5 fixing bolts, and tighten them to the specified torque in sequence.

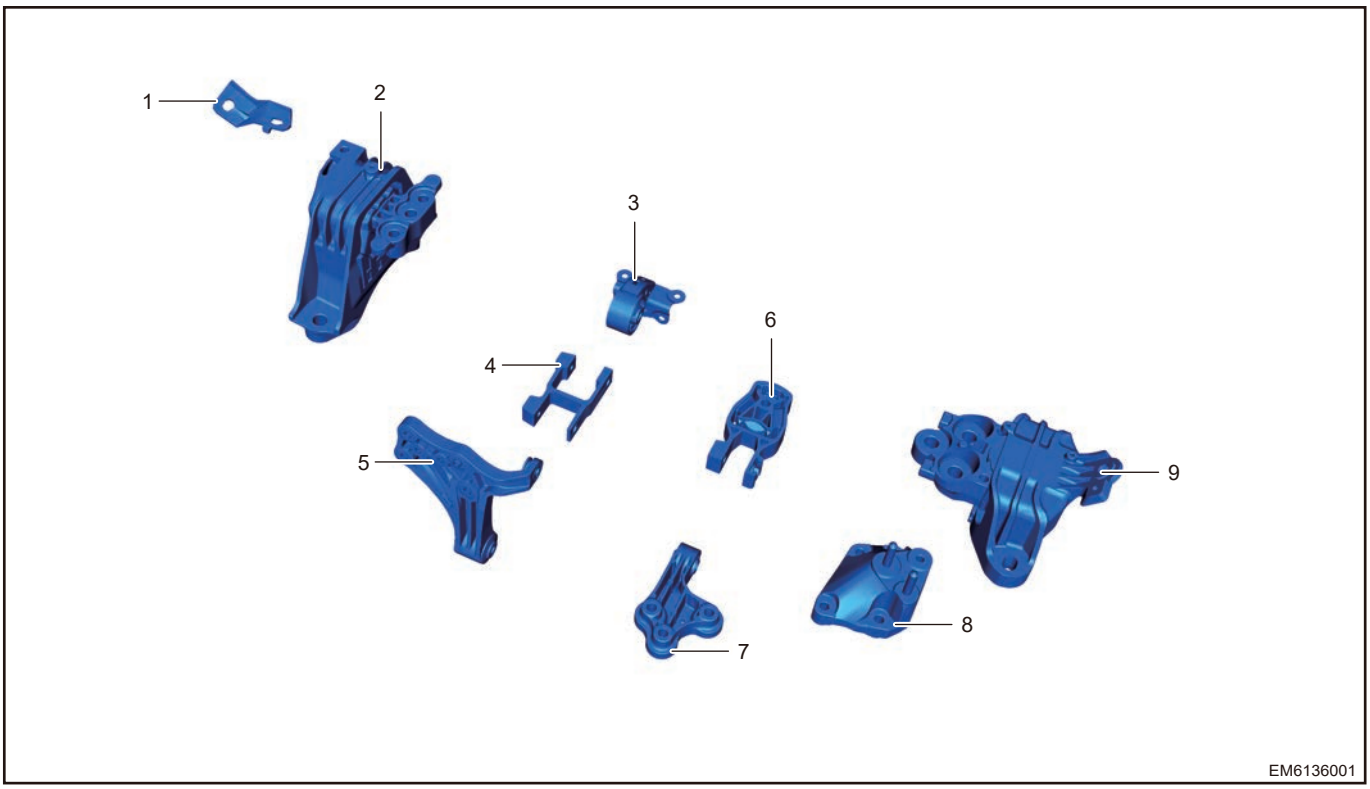
   Torque: 45 ± 5 N · m



5) After the installation is complete, the balance shaft locking fixture needs to be removed.

(20) Install the knock sensor.
(21) Install the oil pump assembly.
(22) Install the oil pump chain.
(23) Install the oil pan assembly.
(24) Install the cylinder cover assembly.
(25) Install the engine timing chain.
(26) Install the A/C compressor bracket and A/C compressor.
(27) Install the oil filter.
(28) Install the water pump assembly.
(29) Install the alternator assembly.
(30) Install the timing chain cover.
(31) Install the torsion shock absorber.
(32) Install the tensioner assembly.
(33) Install the idler pulley assembly.
(34) Install the engine accessory drive belt.
(35) Install the intake manifold assembly.
(36) Install the turbocharger assembly.
(37) Install the flywheel assembly.
(38) Install the transmission assembly.
(39) Install the engine assembly to vehicle body.

5.12 Engine Mounting Assembly



1	Right Mounting Bracket	6	Rear Lower Mounting Cushion Assembly
2	Right Mounting Cushion Assembly	7	Rear Upper Mounting Cushion Assembly
3	Rear Right Mounting Cushion Assembly	8	Left Mounting Bracket
4	Rear Right Mounting Connecting Rod	9	Left Mounting Cushion Assembly
5	Rear Right Mounting Bracket		

■ Removal of rear mounting assembly

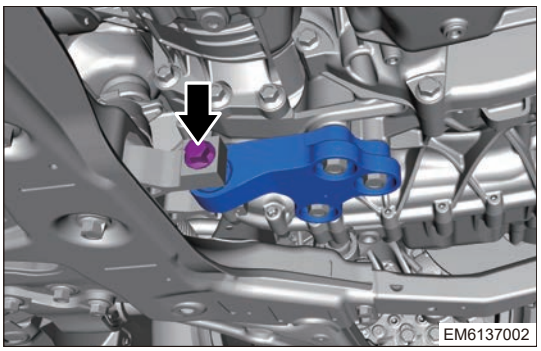
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing rear mounting assembly.**
- **Appropriate force should be applied when removing rear mounting assembly. Be careful not to operate roughly.**

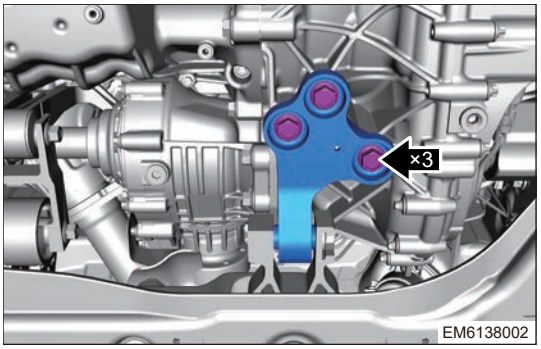
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Raise the vehicle to a proper position.

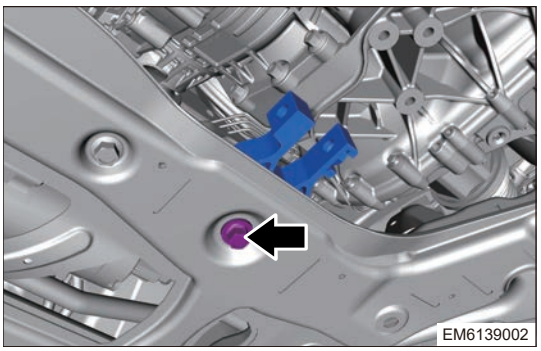
(3) Remove fixing bolt between rear lower mounting cushion assembly and rear upper mounting cushion assembly.



(4) Remove 3 fixing bolts between rear upper mounting cushion assembly and transmission assembly and remove rear upper mounting cushion assembly.



(5) Remove 1 fixing bolt between rear lower mounting cushion assembly and front sub frame and remove rear lower mounting cushion assembly.



■ Inspection

(1) Check rubber part on rear lower mounting cushion assembly for damage or deformation. Replace rear lower mounting cushion assembly as necessary.

(2) Check rear upper mounting cushion assembly for deformation or cracks. Replace rear upper mounting cushion assembly as necessary.

■ Installation

⚠ Caution

- **Pre-tighten 2 to 3 threads manually first during assembly of bolts, then pre-tighten and tighten it to specified torque with a tool.**

(1) Install 1 fixing bolt between rear lower mounting cushion assembly and front sub frame.

Torque: 200 ± 20 N·m

(2) Install 3 fixing bolts between rear upper mounting cushion assembly and transmission assembly.

Torque: 110 ± 11 N·m

(3) Install 1 fixing bolt between rear lower mounting cushion assembly and rear upper mounting cushion assembly.

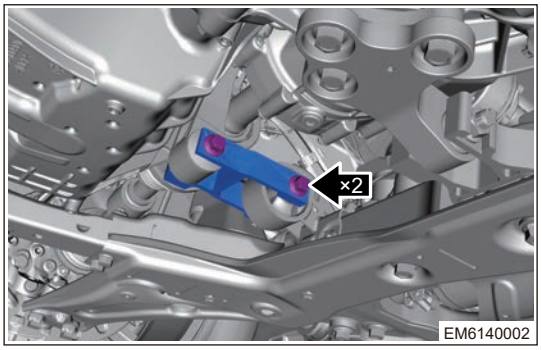
Torque: 150 ± 15 N·m

■ Removal of rear right mounting assembly

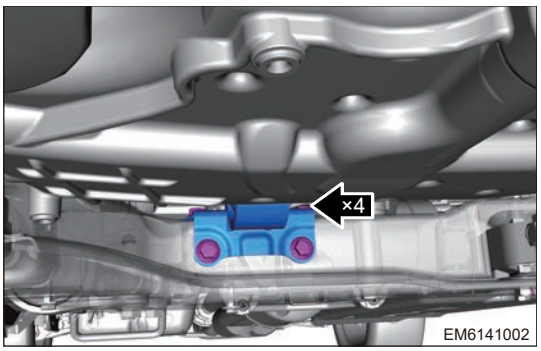
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing rear right mounting assembly.**
- **Appropriate force should be applied, when removing rear right mounting assembly. Be careful not to operate roughly.**

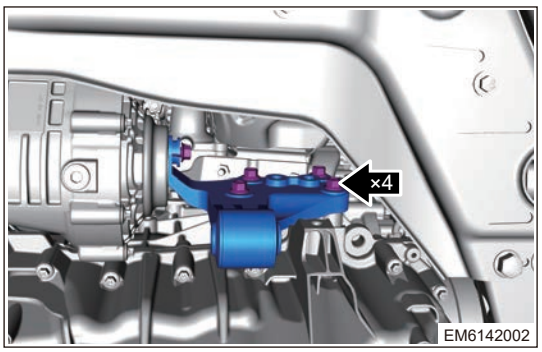
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Raise the vehicle to a proper position.
(3) Remove the drive shaft.
(4) Remove the transfer case assembly.
(5) Remove 1 fixing bolt between rear right mounting connecting rod and rear right mounting bracket.
(6) Remove 1 fixing bolt between rear right mounting connecting rod and rear right mounting cushion assembly.
(7) Remove the rear right mounting connecting rod.



(8) Remove 4 fixing bolts between rear right mounting cushion assembly and front sub frame and remove rear right mounting cushion assembly.



(9) Remove 4 fixing bolts between rear right mounting bracket and cylinder block and remove rear right mounting bracket.



■ Inspection

(1) Check rubber part on rear right mounting pull rod for damage or deformation. Replace rear right mounting pull rod as necessary.
(2) Check rear right mounting bracket for deformation or cracks. Replace rear right mounting bracket as necessary.

■ Installation

⚠ Caution

- **Pre-tighten 2 to 3 threads manually first during assembly of bolts, then pre-tighten and tighten it to specified torque with a tool.**

(1) Install 4 fixing bolts between rear right mounting bracket and cylinder block.

Torque: 70 ± 7 N·m

(2) Install 4 fixing bolts between rear right mounting cushion and front sub frame.

Torque: 60 ± 6 N · m

(3) Installation 1 fixing bolt between rear right mounting connecting rod and rear right mounting bracket.

Torque: 110 ± 11 N · m

(4) Install 1 fixing bolt between rear right mounting connecting rod and rear right mounting cushion assembly.

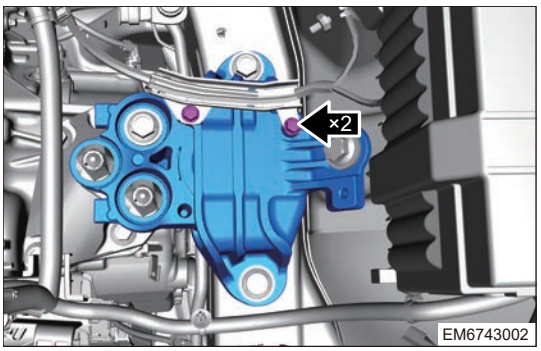
Torque: 110 ± 11 N · m

■ Removal of left mounting assembly

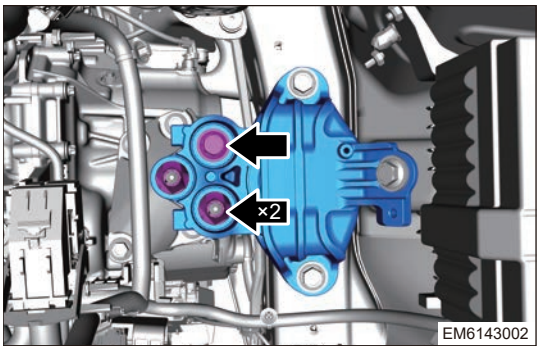
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing left mounting assembly.**
- **Appropriate force should be applied when removing left mounting assembly. Be careful not to operate roughly.**

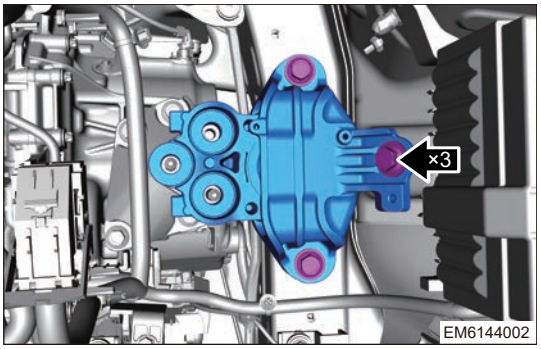
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.
(5) Remove the battery assembly.
(6) Remove the battery tray.
(7) Remove 2 fixing bolts from electric power steering wire harness and remove wire harness.



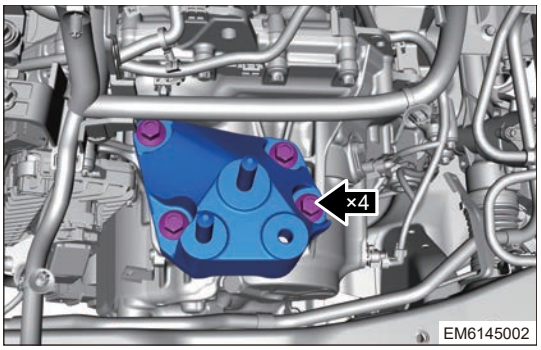
(8) Remove 2 fixing nuts and 1 fixing bolt between left mounting cushion assembly and left mounting bracket.



(9) Remove 3 fixing bolts between left mounting cushion assembly and body and remove left mounting cushion assembly.



(10) Remove 4 fixing bolts between left mounting bracket and transmission assembly and remove left mounting bracket.



■ Inspection

(1) Check rubber part on left mounting cushion assembly for damage or deformation. Replace left mounting cushion as necessary.
(2) Check left mounting bracket for deformation or cracks. Replace left mounting bracket as necessary.

■ Installation

⚠ Caution

- **Pre-tighten 2 to 3 threads manually first during assembly of bolts, then pre-tighten and tighten it to specified torque with a tool.**

(1) Install 4 fixing bolts between left mounting bracket and transmission assembly.

Torque: 110 ± 11 N·m

(2) Install 3 fixing bolts between left mounting cushion assembly and body.

Torque: 110 ± 11 N·m

(3) Install 2 fixing nuts and 1 fixing bolt between left mounting cushion assembly and left mounting bracket.

Torque: 110 ± 11 N·m

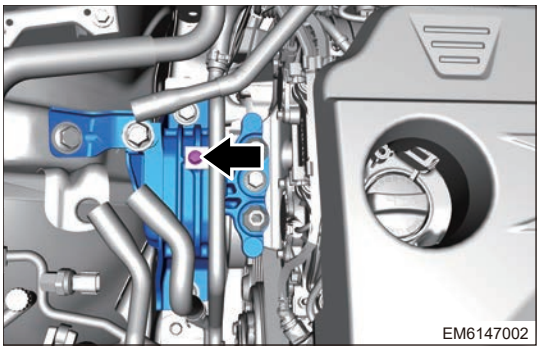
(4) Install the battery tray.
(5) Install the battery assembly.
(6) Install the air filter assembly.
(7) Install the engine compartment trim cover.

■ Removal of right mounting cushion assembly

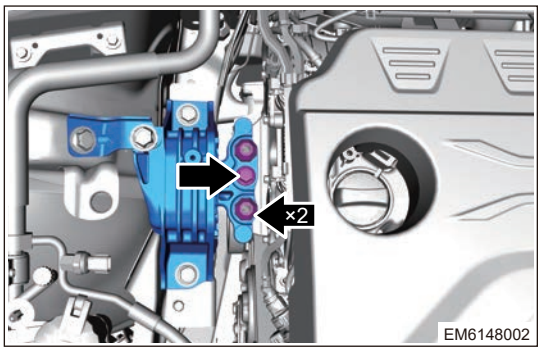
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing right mounting cushion assembly.**
- **Appropriate force should be applied, when removing right mounting cushion assembly. Be careful not to operate roughly.**

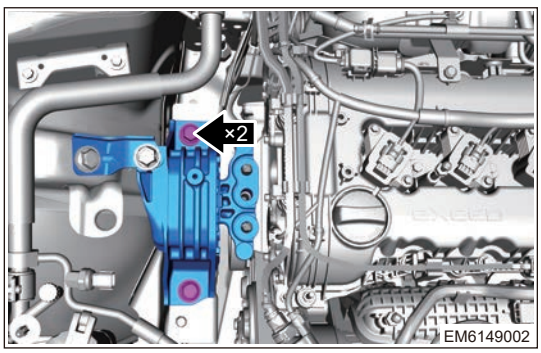
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Move the expansion tank to proper position.
(4) Remove 1 fixing bolt from water pipe.

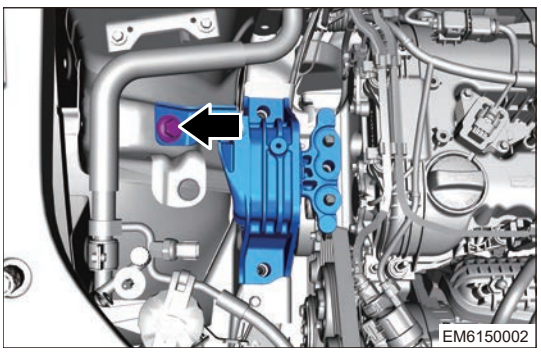


(5) Remove 2 fixing nuts and 1 fixing bolt between right mounting cushion assembly and timing chain cover assembly.



(6) Remove 3 fixing bolts between right mounting cushion assembly and right side rail.





(7) Remove the right mounting cushion assembly.

■ Inspection

(1) Check rubber part on right mounting cushion assembly for damage or deformation. Replace right mounting cushion as necessary.

■ **Installation**

⚠ Caution

- **Pre-tighten 2 to 3 threads manually first during assembly of bolts, then pre-tighten and tighten it to specified torque with a tool.**

(1) Install 3 fixing bolts between right mounting cushion assembly and right side rail.

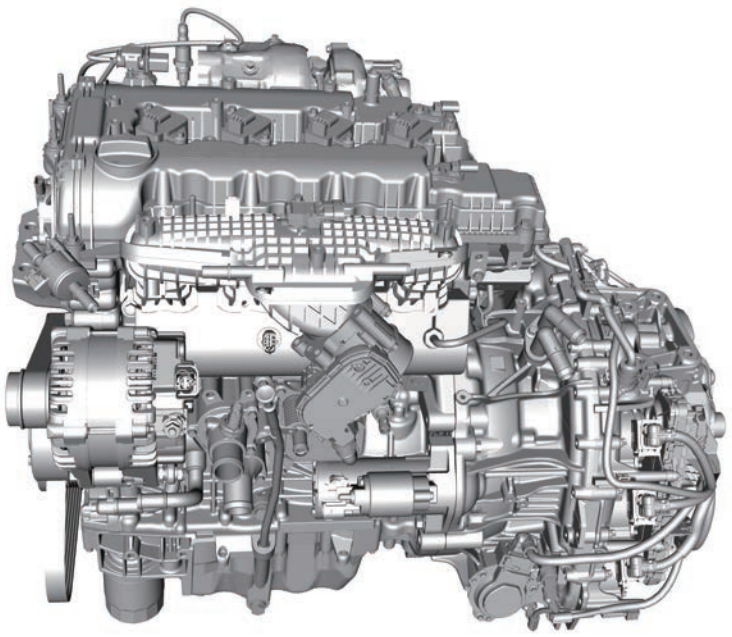
Torque: 110 ± 11 N · m

(2) Install 2 fixing nuts and 1 fixing bolt on right mounting cushion assembly and timing chain cover assembly.

Torque: 110 ± 11 N · m

(3) Fix the cooling pipe.
(4) Install the expansion tank.
(5) Install the engine compartment trim cover.

5.13 Engine Assembly



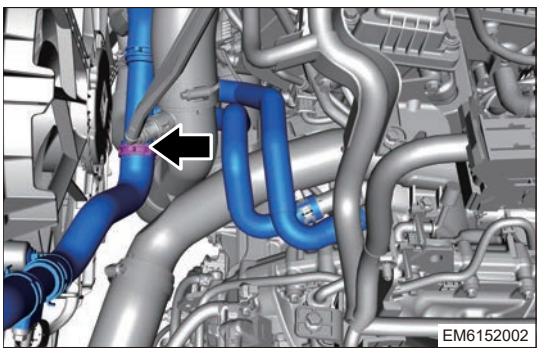
EM6151001

■ **Removal**

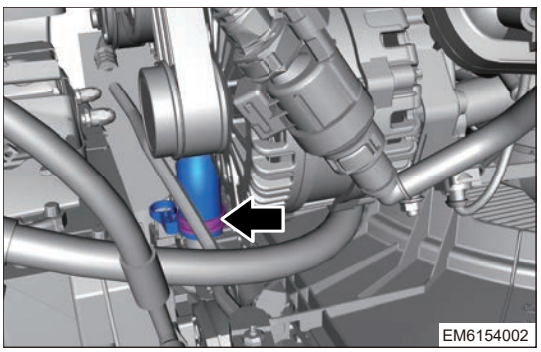
⚠ Caution

- **Remove engine and transmission as an assembly.**
- **Install protector to prevent body from being scratched.**
- **Plug inlet port of intake pipe to prevent foreign matter from entering after removing intake system components. Or the foreign matter will block cylinder intake passage when starting to seriously damage the engine.**

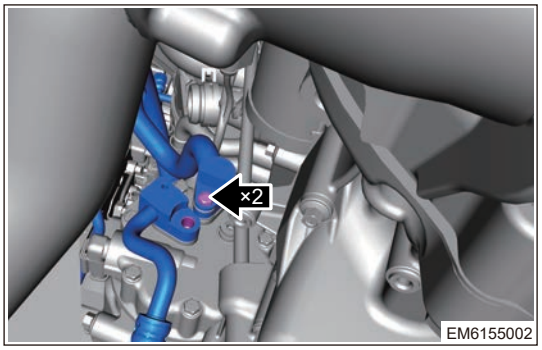
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the engine trim cover assembly.
(4) Disconnect the negative battery cable.
(5) Drain the coolant.
(6) Recover/Drain the refrigerant.
(7) Drain the transmission oil.
(8) Drain the transfer oil.
(9) Remove the air filter assembly.
(10) Remove the intake hose assembly.
(11) Remove the battery assembly.
(12) Remove the battery tray.
(13) Remove the engine compartment lower protector assembly.
(14) Remove the intercooler outlet pipe assembly Ⅱ.
(15) Remove the intercooler inlet pipe assembly Ⅰ.
(16) Remove the front wheel tire.
(17) Remove the left/right side rail assembly.
(18) Remove the front left drive shaft assembly.
(19) Remove the front right drive shaft assembly.
(20) Remove the transfer case assembly.
(21) Remove the precatalytic converter assembly.
(22) Remove the front sub frame assembly.
(23) Loosen elastic clamps and disconnect engine inlet pipe connection.


EM6152002

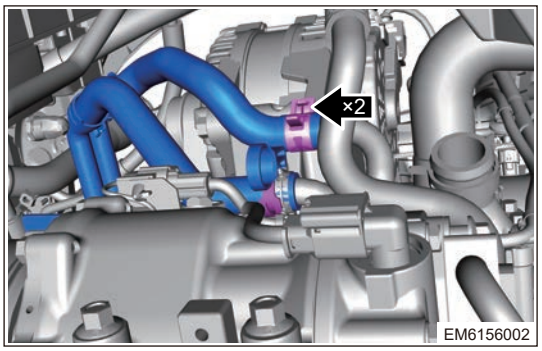
(24) Loosen 2 elastic clamps and remove the intercooler outlet pipe assembly Ⅰ.
(25) Loosen elastic clamps and disconnect engine outlet pipe connection.


EM6154002

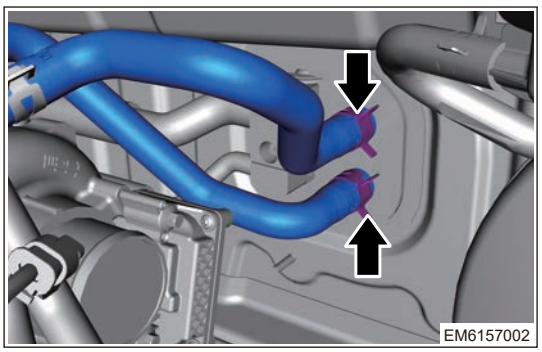
(26) Remove 2 fixing bolts from A/C pipes, and disconnect compressor.



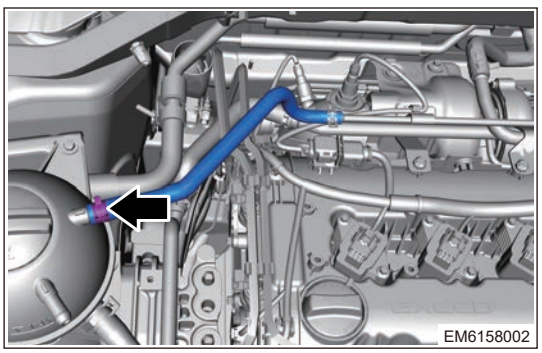
(27) Loosen 2 elastic clamps and disconnect the expansion tank inlet pipe.



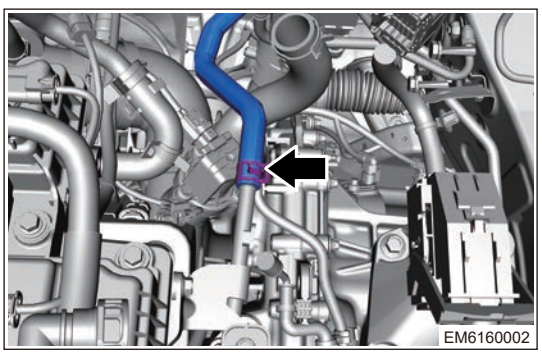
(28) Loosen elastic clamps and disconnect heater inlet/outlet pipe.



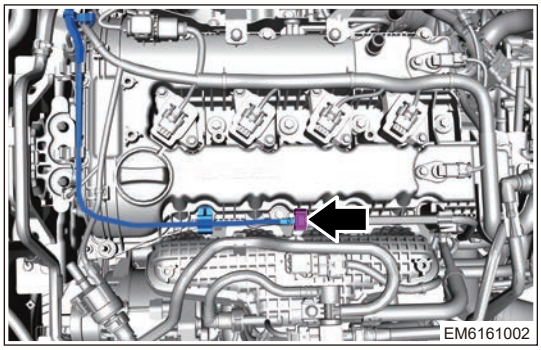
(29) Loosen elastic clamps and disconnect engine discharge pipe.



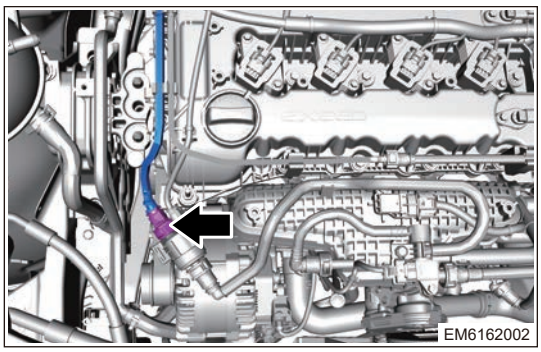
(30) Loosen elastic clamps and disconnect vacuum pipe (if equipped).



(31) Disconnect the oil inlet pipe Ⅱ.



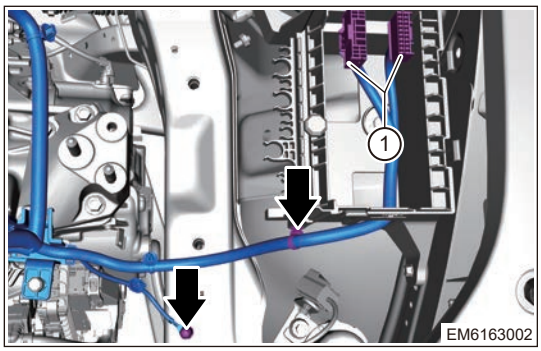
(32) Disconnect the fuel vapor pipe Ⅴ.



(33) Disconnect connector (1) between engine electronic injection wire harness and engine compartment wire harness.

(34) Disengage the engine electronic injection wire harness fixing clip.

(35) Remove the fixing bolt from ground wire harness.

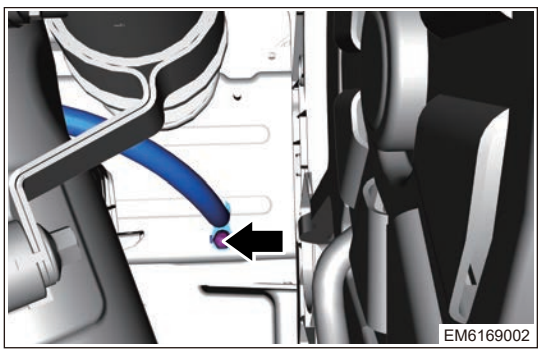


(36) Disconnect the coolant temperature sensor connector.

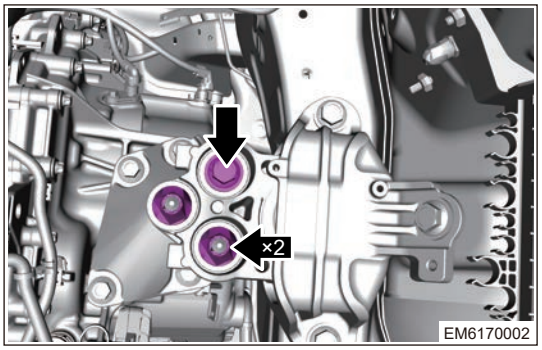
(37) Disconnect the boost pressure sensor connector.

(38) Disconnect connector between engine electronic injection wire harness and front compartment fuse and relay box.

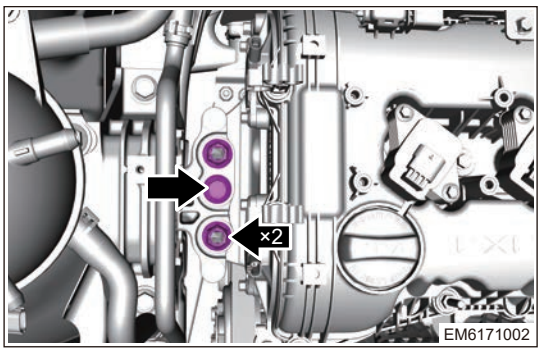
(39) Remove fixing nuts from ground wire harness and remove ground wire.



(40) Remove 1 fixing bolt and 2 fixing nuts from left mounting cushion assembly.



(41) Remove 2 fixing nuts and 1 fixing bolt from right mounting cushion assembly.

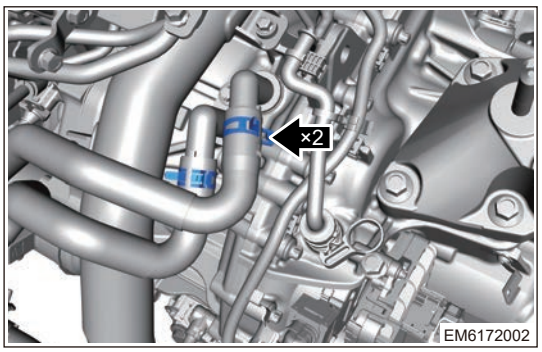


(42) Check that engine assembly is separated with external components.

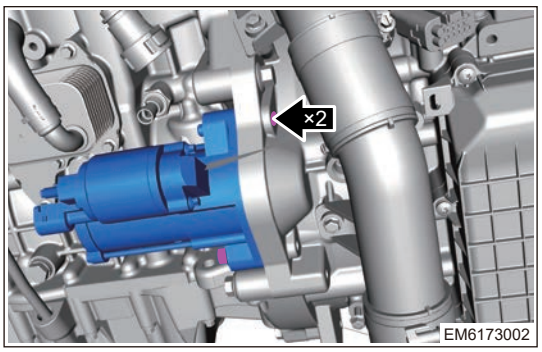
(43) Remove engine and transmission assembly.

(44) Remove engine electronic injection wire harness from engine assembly.

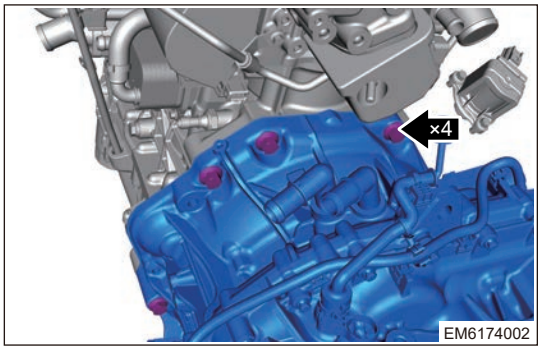
(45) Loosen 2 elastic clamps and disconnect engine inlet pipe assembly - rear connections.



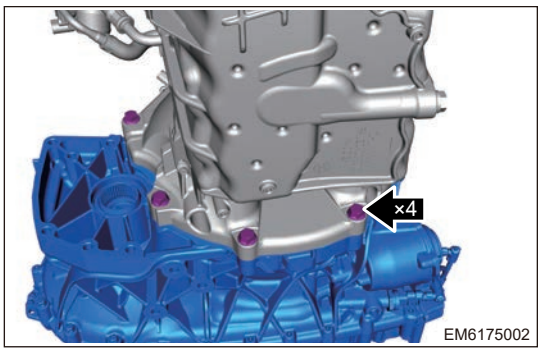
(46) Remove 2 fixing bolts and starter assembly.



(47) Remove 4 fixing bolts from upper part of transmission assembly.



(48) Remove 4 fixing bolts from lower part of transmission assembly.



(49) Separate transmission assembly from engine assembly.

(50) Install engine assembly to engine service platform.

■ Installation

(1) Install the transmission assembly.
(2) Install engine electronic injection wire harness to engine.
(3) Install 2 fixing nuts and 1 fixing bolt to right mounting cushion assembly.
(4) Install 2 fixing nuts and 1 fixing bolt to left mounting cushion assembly.
(5) Fix the connecting clip between interior floor wire harness and right mounting cushion assembly.
(6) Connect the engine ground wire harness and tighten fixing nut.
(7) Connect the ECU connector.
(8) Connect connector between engine compartment wire harness and engine electronic injection wire harness.
(9) Connect the coolant temperature sensor.
(10) Connect boost pressure sensor.
(11) Connect fuel vapor pipe Ⅴ.
(12) Connect oil inlet pipe Ⅱ.
(13) Connect vacuum tube and install elastic clamps.
(14) Connect engine outlet pipe and install elastic clamp.
(15) Connect heater inlet/outlet pipe assembly and install elastic clamp.
(16) Connect expansion tank inlet pipe assembly and install elastic clamp.
(17) Connect compressor A/C line and tighten fixing bolts.
(18) Connect engine inlet pipe and install elastic clamp.
(19) Install the front sub frame assembly.
(20) Install the precatalytic converter assembly.
(21) Install the transfer case assembly.
(22) Install the front left drive shaft assembly.
(23) Install the front right drive shaft assembly.
(24) Install the left/right side rail assembly.
(25) Install the battery tray and battery assembly.
(26) Install the intake hose assembly.
(27) Install the air filter assembly.
(28) Add transmission oil to specified position.
(29) Add transfer oil to specified position.
(30) Add coolant to specified value.
(31) Connect the negative battery cable.
(32) Add refrigerant to specified value.
(33) Install the engine trim cover assembly.
(34) Install the engine compartment trim cover assembly.
(35) Install the engine compartment lower protector assembly.

2.3 INTAKE SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Wasted air filter element should be handled by the specialized department according to local laws and regulations. Never discard it at will.

(2) Check for foreign matter in air filter and hose when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.

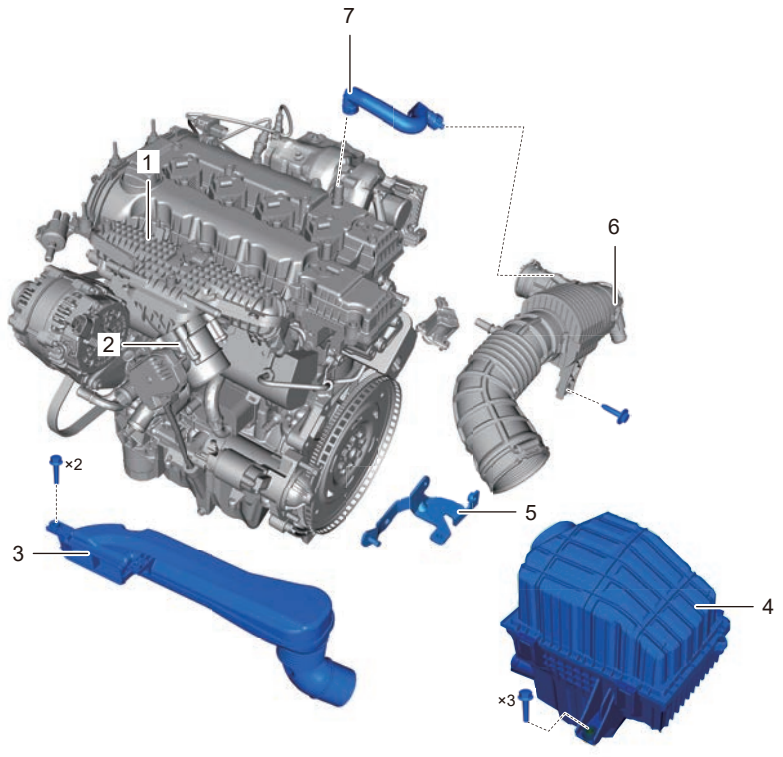
(3) After removing electronic throttle, block intake manifold intake port with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.

2 System Overview

2.1 System Description

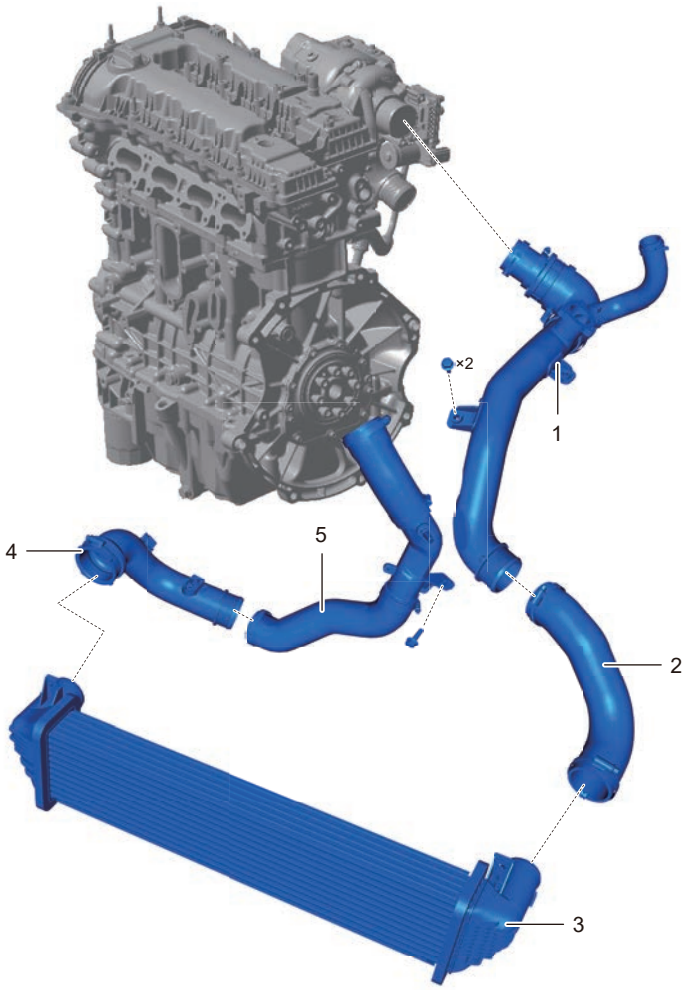
Intake system uses air filter to remove particulates and dust in the air, the air is pressurized by the turbocharger and cooled by the intercooler, then flows into the intake manifold assembly through the electronic throttle assembly, and the cooled fresh air is evenly delivered to each cylinder by the intake manifold to cooperate with the engine.

2.2 System Components Diagram



IT6010001

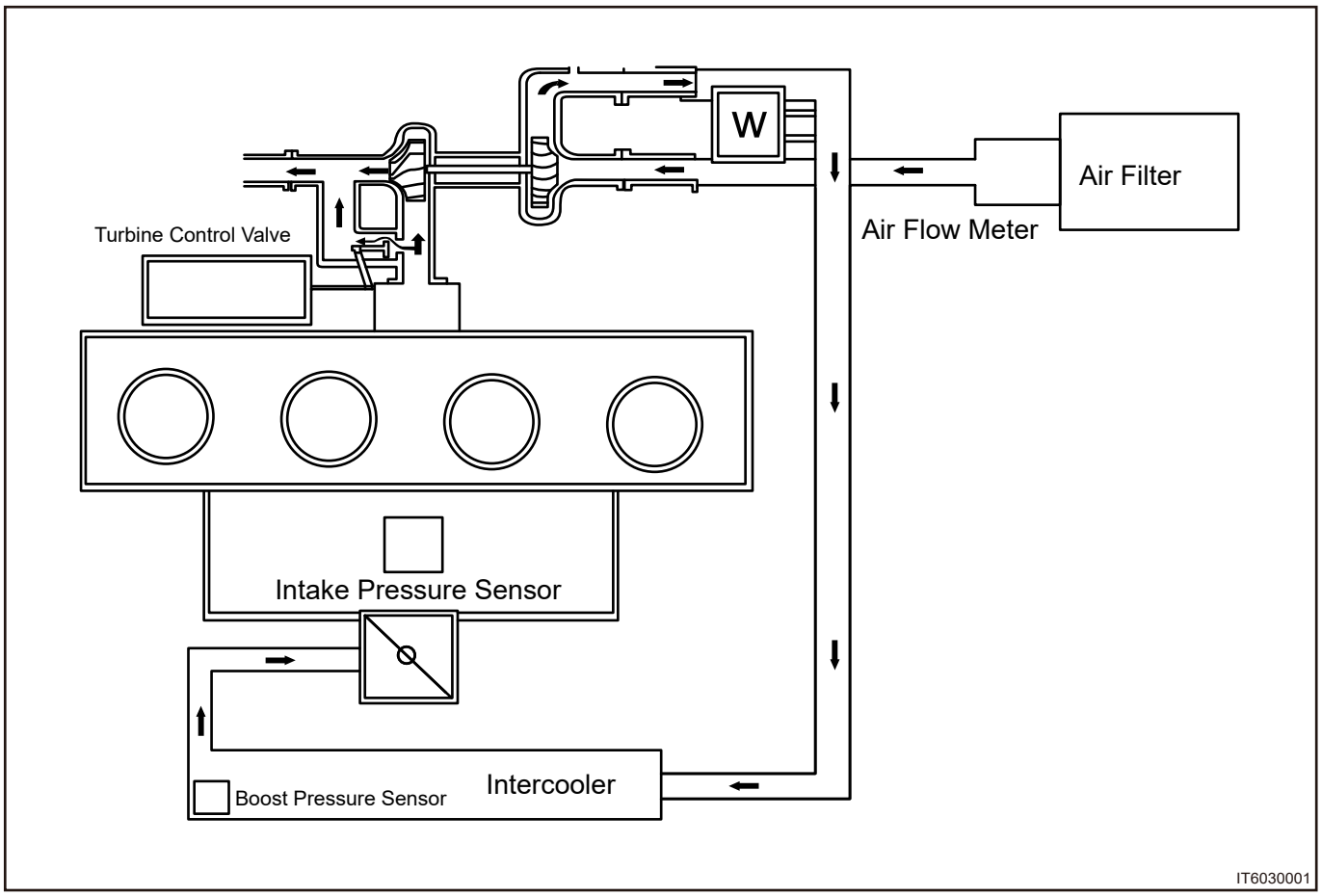
1	Intake Manifold Assembly	5	Intake Hose Bracket
2	Electric Throttle Assembly	6	Intake Hose Assembly
3	Air Direct Pipe Assembly	7	Hose - Intake Hose
4	Air Filter Assembly		



IT6020001

1	Intercooler Inlet Pipe Assembly I	4	Intercooler Outlet Pipe Assembly I
2	Intercooler Inlet Pipe Assembly II	5	Intercooler Outlet Pipe Assembly II
3	Intercooler Assembly		

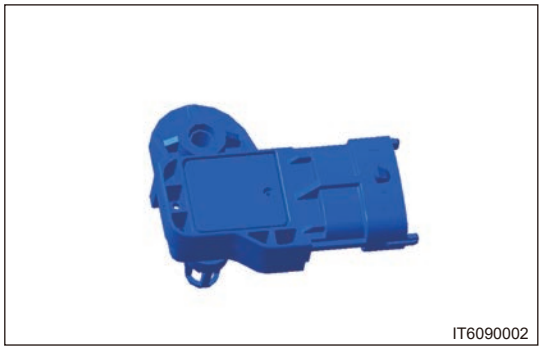
2.3 System schematic diagram



2.4 System Components Description

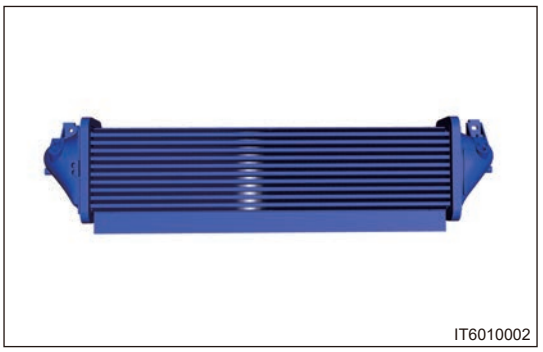
■ Intake pressure/temperature sensor

Intake pressure sensor: monitor absolute pressure changes of the intake manifold, send reference signal to ECU for calculating the duration of fuel injection.
Intake temperature sensor: monitor intake temperature, provide it to ECU as the basis for calculating air density.



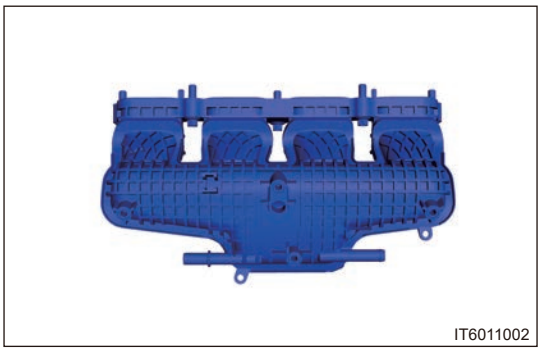
■ Intercooler

Its function is to reduce the high temperature air temperature after supercharging, so as to reduce the heat load of engine, increase the intake air volume, and then increase the engine power; For the engine, intercooler is an important component of supercharging system.



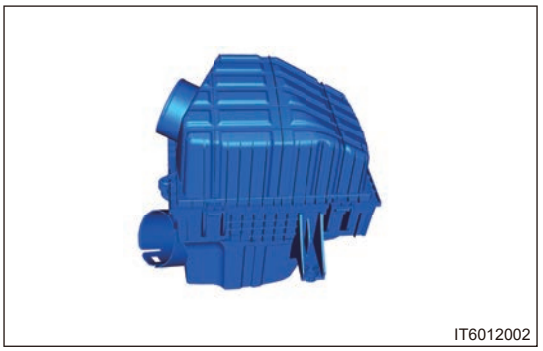
■ Intake manifold assembly

Distribute the fresh air cooled by intercooler to each cylinder.



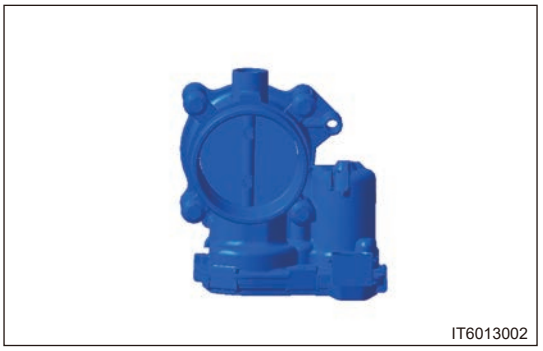
■ Air filter assembly

The air filter is mainly used to remove particulate impurities in the air.



■ Electronic throttle

It consist of four parts: drive module, train module, executive module and feedback module, and all components are integrated into the same throttle valve housing. Throttle feedback module uses two redundant structures. When malfunction occurs, throttle valve plate will stop at the limp home position (above mechanical bottom dead center) determined by mechanical way. Electronic throttle performs control only by corresponding electronic control unit or electronic test circuit. In principle, it is necessary to ensure that the throttle valve plate does not operate dynamically to the mechanical dead center.



■ Electronic accelerator pedal

There are two identical potentiometer type sensors in the electronic accelerator pedal, which provide the driving demand signal of driver to the ECU. This process is exactly the same as the current mechanical pedal in operation to adapt to the driver’ s driving habits for many years. Two identical sensors provide accelerator signals to ECU respectively, thus ensuring the safety and reliability of this system.

3 Diagnosis & Testing

3.1 Problem Symptoms Table

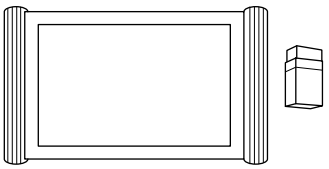
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Intake System

Symptom	Possible Cause
Engine idles roughly	Electronic throttle assembly (dirty)
	Intake manifold assembly (broken, leaked)
	Activated charcoal canister solenoid valve (remains on)
	Intake pressure sensor
	Electronic throttle assembly gasket (damaged)
	Fuel rail injector assembly (installed incorrectly)

4 On-vehicle Service

4.1 Tools

■ Special Tools

Tool Name	Tool Drawing
Diagnostic tester	 S00001

4.2 Air Filter Element

■ Removal

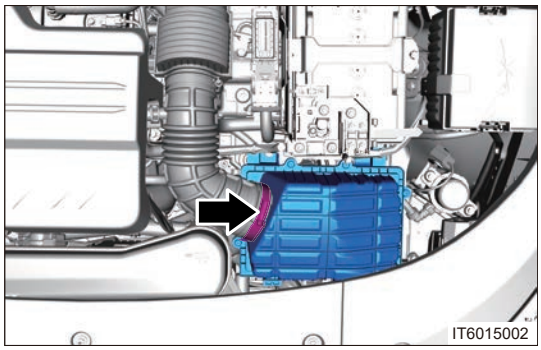
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing air filter element.**
- **Appropriate force should be applied when removing air filter element. Be careful not to operate roughly.**

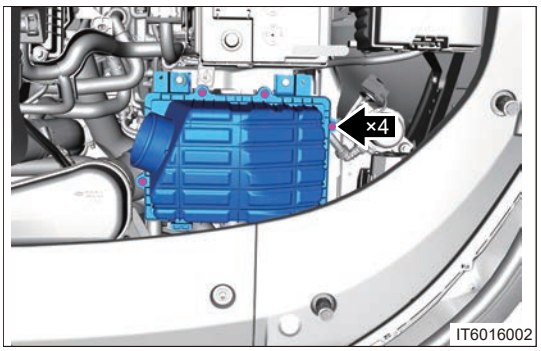
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Remove the engine compartment trim cover assembly.

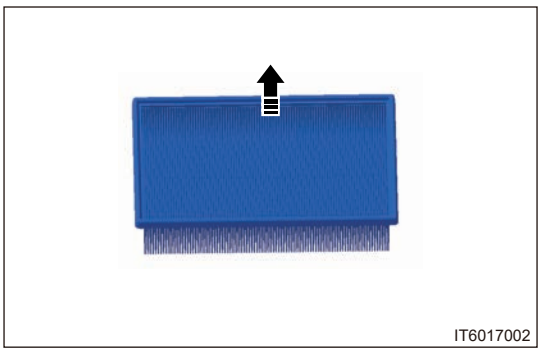
(3) Loosen worm clamp and disconnect intake hose assembly.



(4) Remove 4 fixing screws between air filter upper housing and lower housing (with cross screwdriver), and remove upper housing carefully.



(5) Remove the air filter element in the direction of arrow.



■ Inspection

(1) Check if air filter is dirty, if it is dirty severely, it is required to replace new air filter.

■ **Installation**

⚠ Caution

- **Clean the air filter upper housing and lower housing.**
- **Wasted air filter element should be handled by the specialized department according to local laws and regulations. Never discard it at will.**

(1) Install 4 fixing screws between air filter upper housing and lower housing.

Torque: 1.3 ± 0.2 N · m

(2) Connect intake hose, and tighten worm clamp.

Torque: 3.5 ± 0.5 N · m

(3) Install the engine compartment trim cover assembly.

4.3 Air Filter Assembly

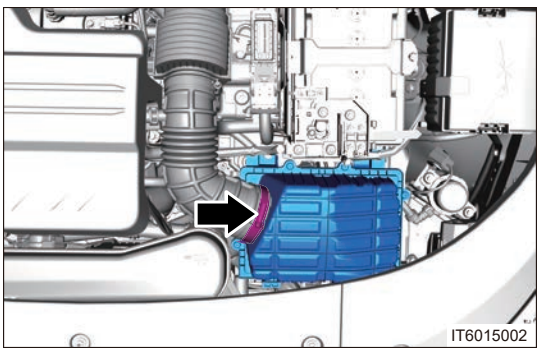
■ **Removal**

⚠ Caution

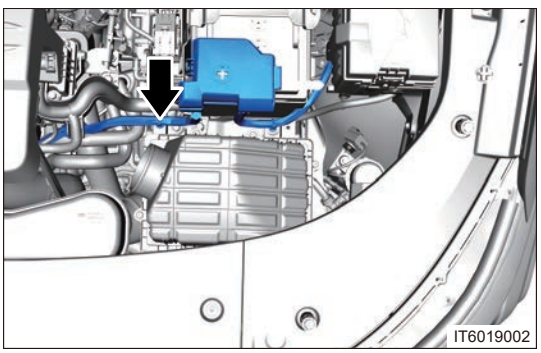
- **Be sure to wear safety equipment to prevent accidents, when removing air filter assembly.**
- **Appropriate force should be applied, when removing air filter assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.

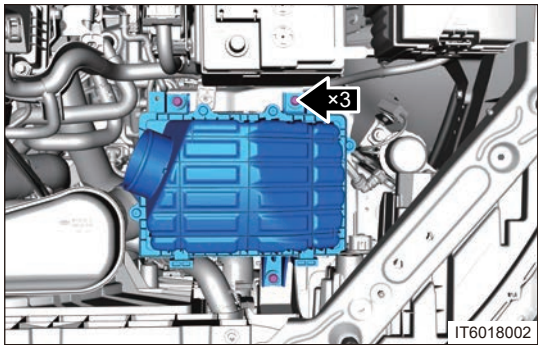
(4) Loosen worm clamp and disconnect intake hose.



(5) Disconnect battery positive wire harness and air filter assembly.



(6) Remove 3 fixing bolts from air filter assembly (10# socket wrench).



(7) Separate air direct pipe and air filter assembly carefully with flat tip screwdriver, and remove air filter assembly carefully.

■ **Installation**

⚠ Caution

- **Check for foreign matter in air filter and hose when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.**

(1) Insert air direct pipe into air filter assembly, and install 3 fixing bolts to air filter assembly.

Torque: 7 ± 1.5 N · m

(2) Connect intake hose, and tighten worm clamp.

Torque: 3.5 ± 0.5 N · m

(3) Install the engine compartment trim cover assembly.

4.4 Air Direct Pipe

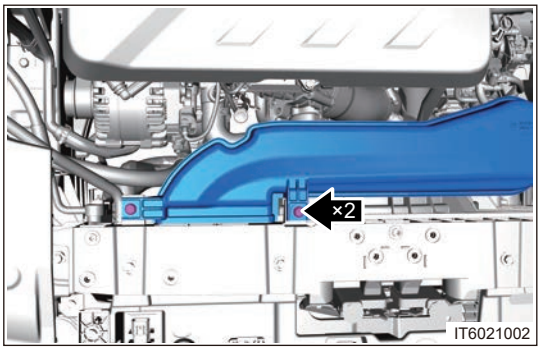
■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing air direct pipe assembly.**
- **Appropriate force should be applied, when removing air direct pipe assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.

(5) Remove 2 fixing bolts from air direct pipe. And remove air direct pipe assembly carefully.



■ **Installation**

⚠ Caution

- **Check for foreign matter in air filter and related lines when installing. Avoid inhaling foreign matter after engine running, causing damage to the components.**

(1) Install 2 fixing bolts to air direct pipe.

Torque: 7 ± 1.5 N · m

(2) Install the engine compartment trim cover assembly.

4.5 Intake Hose Assembly

■ **Removal**

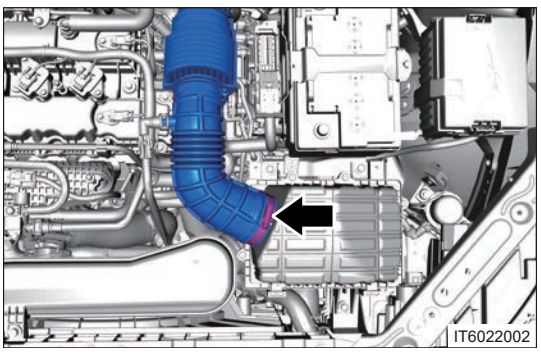
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing intake hose assembly.**
- **Appropriate force should be applied, when removing intake hose assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing intake hose assembly.**

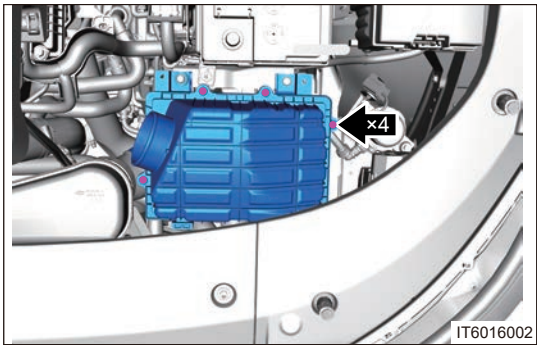
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Remove the engine compartment trim cover assembly.

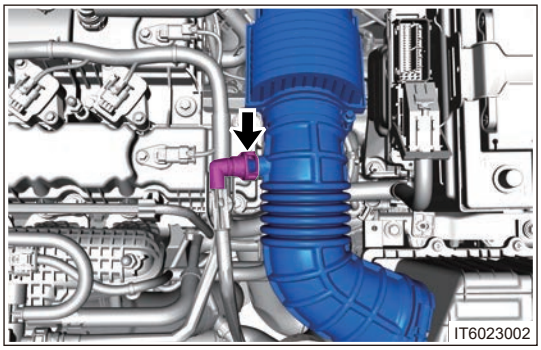
(3) Loosen worm clamp and disconnect connection between intake hose assembly and air filter assembly upper housing.



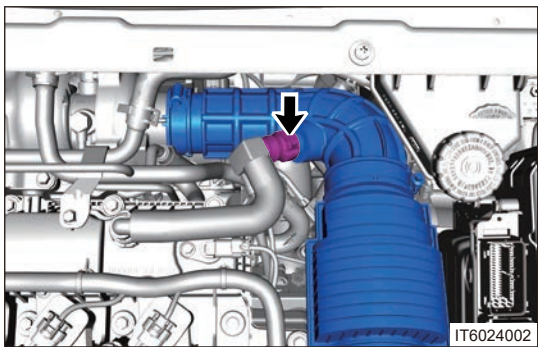
(4) Remove 4 fixing screws and air filter assembly upper housing.



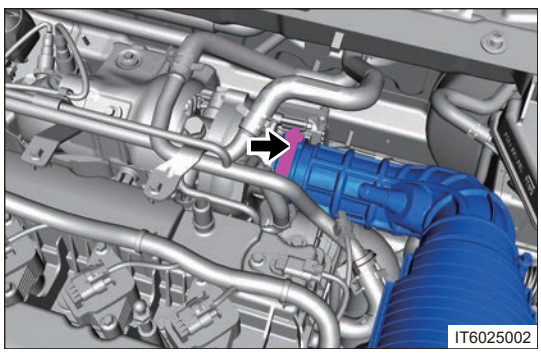
(5) Disconnect the connection between charcoal canister solenoid valve outlet pipe and intake hose assembly.



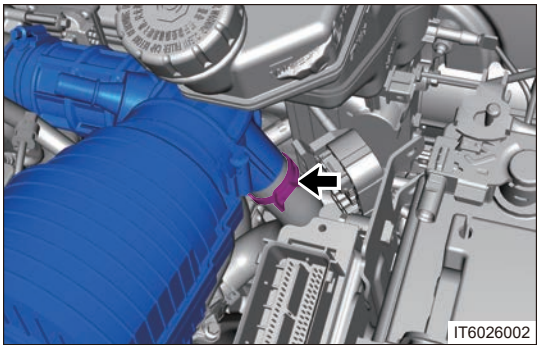
(6) Disconnect the connection between crankcase ventilation tube and intake hose assembly.



(7) Loosen worm clamp and disconnect the connection between intake hose assembly and turbocharger.



(8) Loosen elastic clamp (slip joint pliers) and disconnect the connection between intercooler intake pipe - hose and intake hose assembly.



(9) Remove 1 fixing bolt and intake hose assembly carefully.

■ **Installation**

(1) Connect intercooler intake pipe - hose and intake hose assembly. Using slip joint pliers, return the elastic clamp to its original position.

(2) Install intake hose outlet to turbocharger inlet. And tighten the worm clamp.

Torque: 3.5 ± 0.5 N · m

(3) Insert intake hose assembly muffler lower bracket into rubber cushion.

(4) Install 1 fixing bolt to intake hose assembly.

Torque: 7 ± 1.5 N · m

(5) Install the air filter upper housing. and fix 4 screws.

Torque: 1.3 ± 0.2 N · m

(6) Install intake hose inlet to air filter assembly, and tighten the worm clamp.

Torque: 3.5 ± 0.5 N · m

(7) Connect charcoal canister solenoid valve outlet pipe and crankcase ventilation tube to intake hose separately. After connection, lock the quick port buckle.

⚠ Caution

- **When pipe is connected using quick connector, pay attention to the fitting size and direction of the connector. During assembly, install the connector into place along the axis direction of quick connector until it is bounced into mechanically and a "click" sound is heard. In order to check if the installation is in good condition, pull it forcibly in reverse direction to make sure it will not fall off.**

(8) Install the engine compartment trim cover assembly.

4.6 Intake Hose Bracket

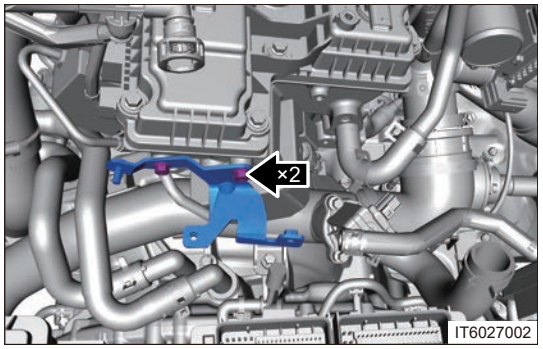
■ **Removal**

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing intake hose bracket assembly.**
- **Appropriate force should be applied, when removing intake hose bracket assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the intake hose assembly.

(4) Remove 2 fixing bolts from intake hose bracket.



(5) Remove the intake hose bracket assembly carefully.

■ **Installation**

(1) Align intake hose bracket with engine bolt mounting hole, and tighten 2 fixing bolts.
Torque: 9 ± 1.5 N · m

(2) Install the intake hose assembly.
(3) Install the engine compartment trim cover assembly.

4.7 Electronic Throttle

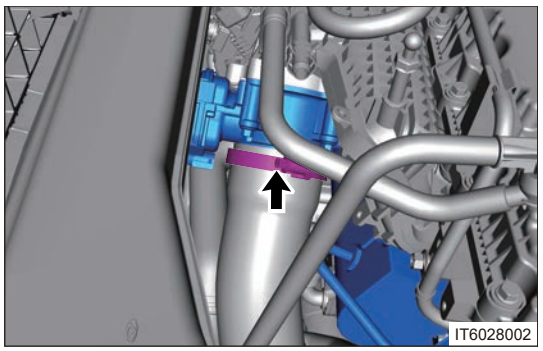
■ **Removal**

⚠ Warning

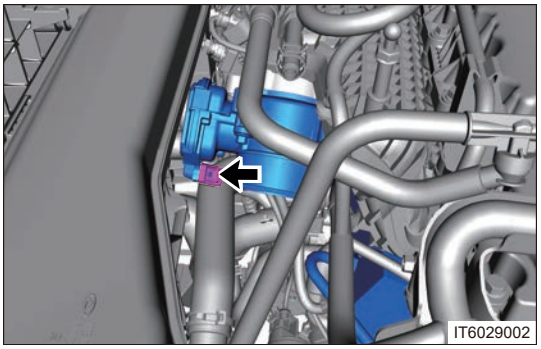
- **Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing electronic throttle.**
- **Appropriate force should be applied, when removing electronic throttle. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.

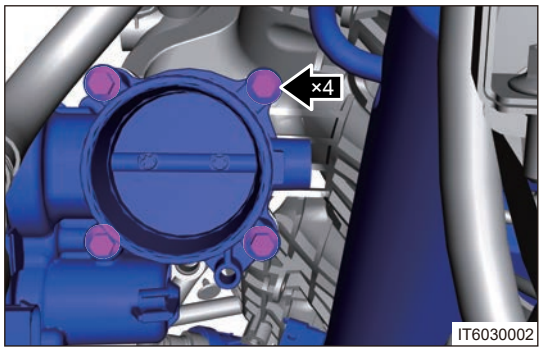
(4) Loosen worm clamp and disconnect the connection between electronic throttle and intercooler outlet pipe assembly Ⅱ.



(5) Disconnect the electronic throttle connector.

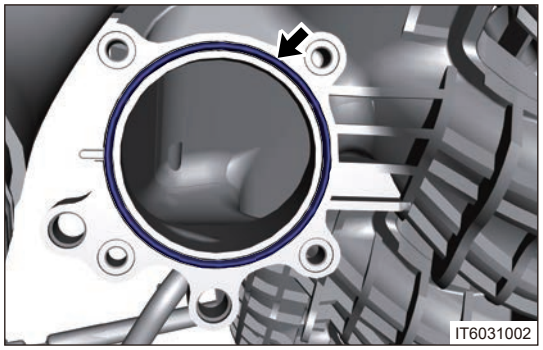


(6) Remove 4 fixing bolts from electronic throttle (8# socket wrench).



(7) Remove the electronic throttle assembly.

(8) Remove electronic throttle gasket from intake manifold.



⚠ Caution

- **After removing electronic throttle, block intake manifold intake port with suitable blocking pieces to prevent foreign matter from entering, causing damage to the components.**

■ Throttle cleaning

(1) Cleaning tools.

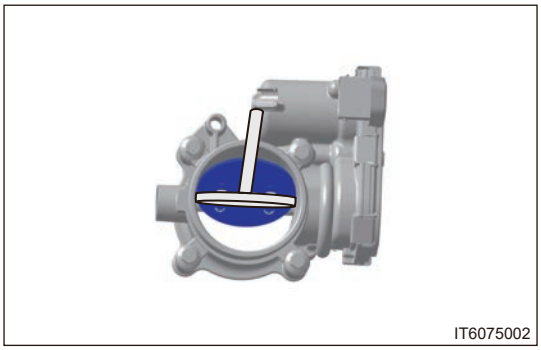
- Thin stick: Used to support throttle valve plate for cleaning the carbon deposited on contact wall between valve plate and throttle. Please use plastic, wooden or bamboo thin stick. Do not use metal thin stick to avoid scratching or deforming the valve plate.
- Clean cloth or paper towel.

■ Cleaning process

(1) Remove electronic throttle assembly, and make the valve plate face upward in free condition. Avoid cleaner flowing into electronic element through valve plate shaft, resulting in functional failure.

(2) Apply appropriate amount of cleaner to the inner wall of throttle valve body, and wipe off the carbon with clean cloth.

(3) Support the throttle valve plate with a thin stick, and clean the carbon on valve plate and throttle valve body inner wall.



(4) Turn over the throttle 90°, and clean with the same procedures as above. Repeat several times until it is clean.

(5) Push the valve plate by hand, and check if it rotates smoothly. If it is stuck, clean again according to the cleaning procedures.

(6) After cleaning, wipe off the cleaner in throttle valve body with absorbent paper.

⚠ Warning

- **Cleaner is a kind of flammable and corrosive fluid. Follow safety cautions to prevent accidents, and avoid skin contacting with cleaner.**
- **Pay attention to that the amount of cleaner should not be too much, so as to overflows into sensor and motor, resulting in functional failure.**

■ Check electronic throttle

(1) Judgment methods for specific mechanical damage

- Valve plate should be in default position with power off and can rotate smoothly when flipping it by hand. If catching occurs, it indicates that internal components may be damaged.

(2) Perform the simple measurement for throttle internal sensor in following steps:

Step	Operation	Test Value	Test Result	Subsequent Step
1	Apply 5 V direct current to terminal 3 (+) and 2 (-), close valve plate to full close manually, and measure voltages between terminals 5 and 2, and between terminals 6 and 2 with voltage band of multimeter. Voltage between terminals 6 and 2 is within 0.25 V and 0.75 V, voltage between terminals 5 and 2 is within 4.25 V and 4.75 V, and the sum of both voltages is about 5 V.	/	Yes	Next
		/	No	Replace throttle body
2	Apply 5V direct current to terminal 3 (+) and 2 (-), turn valve plate to full open manually, and measure voltages between terminals 5 and 2, and between terminals 6 and 2 with voltage band of multimeter. Voltage between terminals 6 and 2 is within 4.4 V and 4.9 V, voltage between terminals 5 and 2 is within 0.1 V and 0.6 V, and the sum of both voltages is about 5 V.	/	Yes	Next
		/	No	Replace throttle body

Step	Operation	Test Value	Test Result	Subsequent Step
3	Turn the digital multimeter to ohm band, directly measure resistance of copper windings on DC motor between terminals 1 and 4. It is usually between 1.5 and 3.0 Ω at normal temperature, this value does not change with the valve plate opening.	/	Yes	Check wire harness or perform diagnostic help
		/	No	Replace throttle body

■ **Electronic throttle learning method**

(1) Perform throttle body self-learning once after installing electronic throttle body (turn ENGINE START STOP switch to ON and then to OFF after waiting for 30 seconds, and then perform ignition normally). Start vehicle and observe if it operates normally after self-learning is finished.

■ **Installation**

⚠ Caution

- **Clean fitting surface of electronic throttle.**
- **Check if O-ring in the manifold fitting surface groove is in good condition has no damage.**
- **Perform electronic throttle self-learning procedures after installation.**
- **After self-learning is completed, start the vehicle and check for proper operation.**

(1) Install 4 fixing bolts to electronic throttle. Tighten in diagonally installation order.

Torque: 8 + 3 N · m

(2) Connect intercooler outlet pipe assembly Ⅱ, and tighten worm clamp.

Torque: 5 ± 1 N · m

(3) Connect electronic throttle assembly connector.

(4) Install the engine compartment trim cover assembly.

4.8 Intake Manifold Assembly

■ **Removal**

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing intake manifold assembly.**
- **Appropriate force should be applied, when removing intake manifold assembly. Be careful not to operate roughly.**

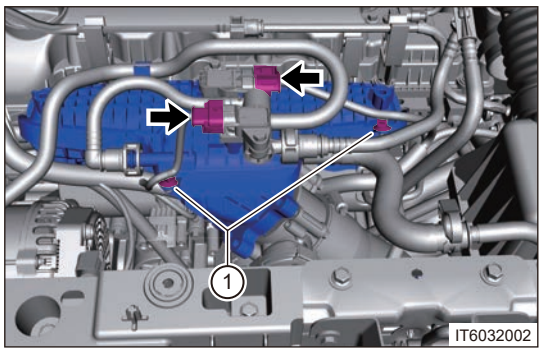
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Remove the engine compartment trim cover assembly.

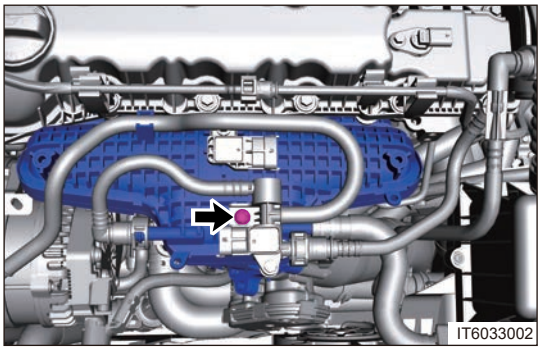
(3) Disconnect the negative battery cable.

(4) Disconnect intake pressure temperature sensor connector and disengage wire harness fixing clips (1).

(5) Disconnect the desorption pressure sensor connector. And disengage the wire harness fixing clips (1).

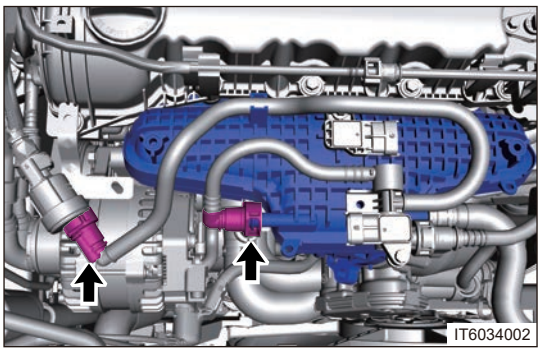


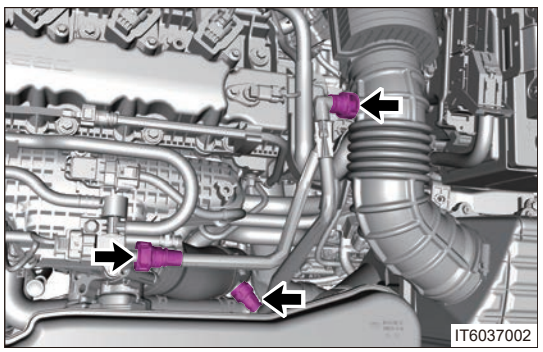
(6) Remove 1 fixing bolt from charcoal canister solenoid valve outlet pipe assembly.



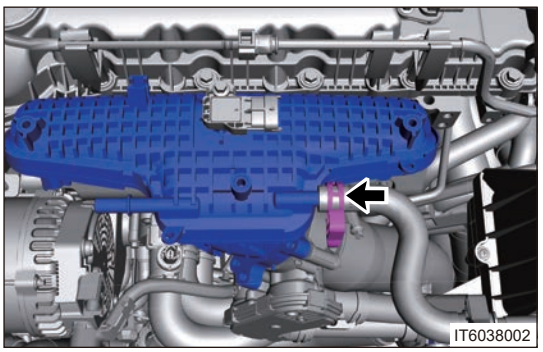
(7) Disconnect 4 line connections between charcoal canister solenoid valve outlet pipe and charcoal canister solenoid valve, intake manifold, intake hose, intercooler outlet pipe Ⅱ separately.

(8) Separate charcoal canister solenoid valve outlet pipe from fixing clips, and remove charcoal canister solenoid valve outlet pipe assembly.



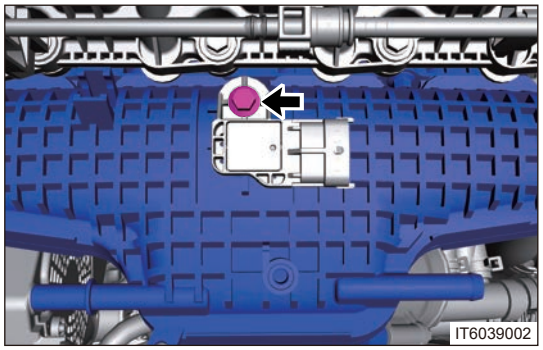


(9) Loosen elastic clamp and disconnect the connection between brake vacuum pipe and intake manifold assembly.

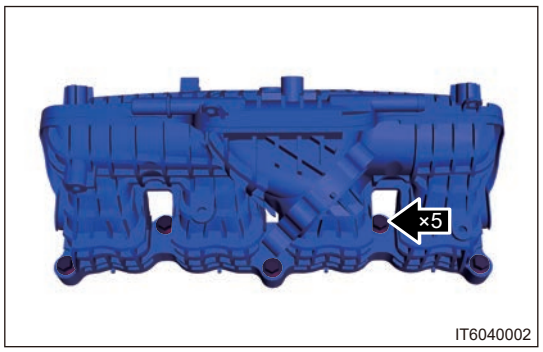


(10) Remove the electronic throttle assembly.

(11) Removal 1 fixing bolt and intake pressure/ temperature sensor.



(12) Remove 5 fixing bolts from intake manifold assembly.



(13) Remove the intake manifold assembly.

■ Inspection

(1) Clean and check contact surface between intake manifold assembly and cylinder head. If warpage on surface is greater than 0.8 mm, replace intake manifold assembly.

(2) Check the appearance of intake manifold assembly for damage and cracks.

(3) Check the intake manifold gasket, and replace if it is deteriorated or damaged.

■ Installation

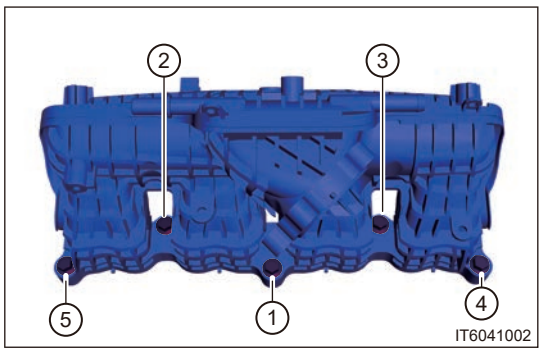
⚠ Caution

- **Before assembly, visually check that intake manifold surface is free of collision, and the sealing rings on the flange surface of the intake manifold are free of mistakes, omissions, damages, etc.**

(1) Align 2 dowel pins on intake manifold and press them into the locating hole of cylinder head.

(2) Install 5 fixing bolts separately, tighten them in corresponding order as shown in illustration.

Torque: 20 + 5 N · m



(3) Fix the engine wire harness clip and bracket.
(4) Install the intake pressure temperature sensor.
(5) Connect the brake vacuum line.
(6) Install the charcoal canister solenoid valve outlet pipe assembly.
(7) Install the A/C filter assembly.
(8) Install the engine compartment trim cover assembly.

4.9 Electronic Accelerator Pedal

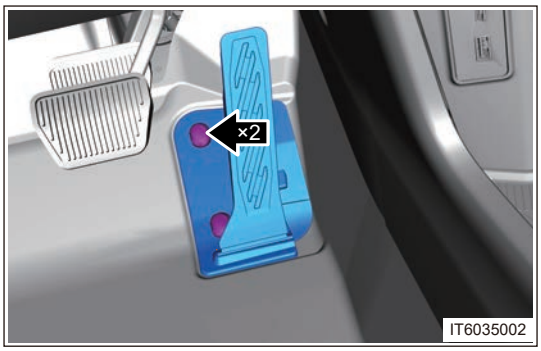
■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing electronic accelerator pedal.**
- **Appropriate force should be applied, when removing electronic accelerator pedal. Be careful not to operate roughly.**
- **Try to prevent interior from being scratched during removal and installation.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.

(3) Remove 2 nut block covers carefully.



(4) Remove 2 fixing nuts from electronic accelerator pedal.

(5) Disconnect the electronic accelerator pedal connector and remove electronic accelerator pedal.

■ Inspection

(1) Press the electronic accelerator pedal by hand, If it is stuck, it indicates that internal components may be damaged.

■ Installation

(1) Connect the electronic accelerator pedal connector.
(2) Install 2 fixing nuts to electronic accelerator pedal.
(3) Install 2 nut block covers in place.

4.10 Intercooler Assembly

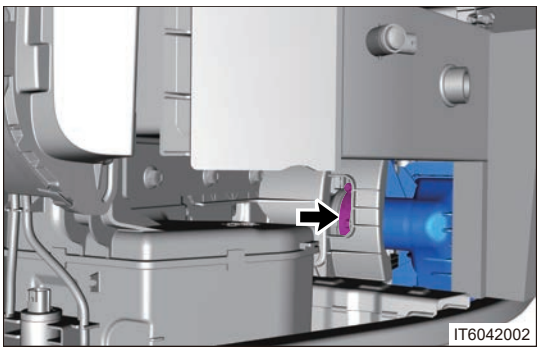
■ Removal

⚠ Warning

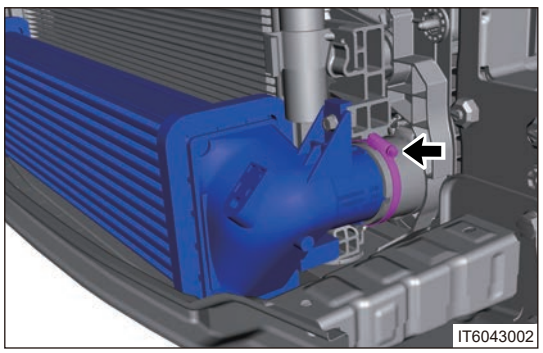
- **Be sure to wear safety equipment to prevent accidents, when removing intercooler assembly.**
- **Appropriate force should be applied, when removing the intercooler assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine compartment lower protector assembly.
(4) Remove the front bumper assembly.
(5) Remove the front upper impact beam assembly.
(6) Remove the left and right air deflector assemblies.

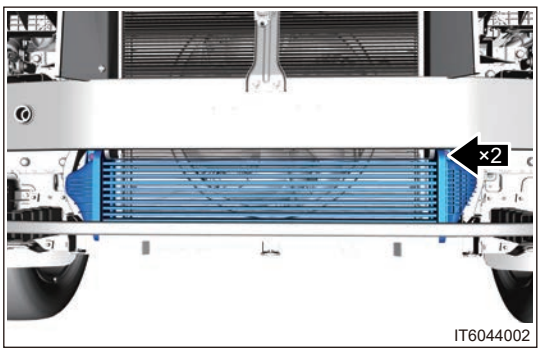
(7) Loosen worm clamp and disconnect the connection between intercooler outlet pipe assembly I and intercooler.



(8) Loosen worm clamp and disconnect connection between intercooler inlet pipe assembly Ⅱ and intercooler.



(9) Remove 2 fixing bolts from intercooler assembly.



(10) Remove the intercooler assembly.

■ **Cleaning**

(1) Exterior cleaning: Use a water gun with a low pressure to spray water from top to bottom and from left to right at an angle perpendicular to the intercooler plane. Never flush the intercooler at an angle, it will damage the intercooler.

(2) Interior cleaning: Fill into the intercooler with water solution containing 2% soda ash at 80 ℃. After waiting for half an hour, check for leaks. Replace intercooler as necessary. If not, shake it back and forth several times, and then pour out the sewage. Then fill with water solution containing 2% soda ash again until it is washed out. Increase water temperature to 90 ℃ properly at the last washing. Wash out with same method and water solution.

■ **Installation**

(1) Install 2 fixing bolts on intercooler assembly.

Torque: 5 ± 1 N·m

(2) Connect intercooler inlet pipe assembly Ⅱ, and tighten worm clamp after aligned and connected.

Torque: 5 ± 1 N·m

(3) Connect intercooler outlet pipe assembly Ⅰ, and tighten worm clamp after aligned and connected.

Torque: 5 ± 1 N·m

⚠ **Caution**
• **The connection clearing between rubber pipe and plastic should not exceed 3 mm.**

(4) Install the left and right air deflectors assembly.
(5) Install the front upper impact beam assembly.
(6) Install the front bumper assembly.
(7) Install the engine compartment lower protector assembly.

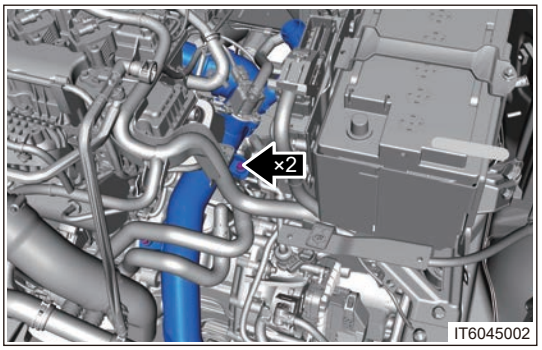
4.11 Intercooler Inlet Pipe Assembly I

■ **Removal**

⚠ **Warning**
• **Be sure to wear safety equipment to prevent accidents, when removing intercooler intake pipe assembly Ⅰ.** • **Appropriate force should be applied, when removing the intercooler intake pipe assembly Ⅰ. Be careful not to operate roughly.**

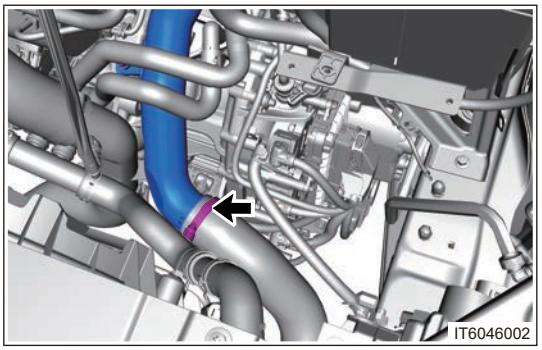
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the air filter assembly.
(4) Remove the intake hose assembly.

(5) Remove 2 fixing bolts between intercooler intake pipe assembly Ⅰ and transmission.

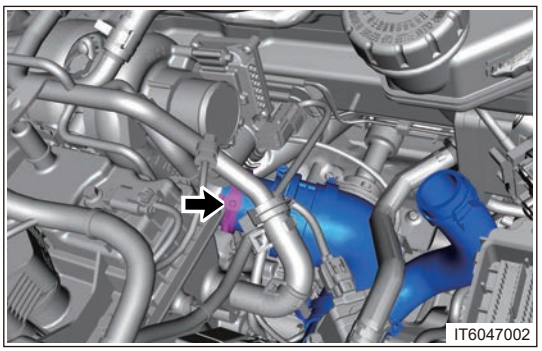


(6) Disconnect the relief solenoid valve connector.

(7) Loosen worm clamp and disconnect the connection between intercooler intake pipe assembly Ⅱ and intercooler intake pipe assembly Ⅰ.



(8) Loosen worm clamp and disconnect connection between intercooler inlet pipe assembly Ⅰ and turbocharger intake port.



(9) Remove the intercooler inlet pipe assembly Ⅰ carefully.

(10) Remove the relief solenoid valve assembly from intercooler inlet pipe assembly Ⅰ.

■ Inspection

(1) Check if the appearance of intercooler inlet pipe assembly Ⅰ is damaged.

(2) Check if the inner of intercooler inlet pipe assembly Ⅰ is dirty.

■ Installation

(1) Install the relief solenoid valve assembly.

(2) Connect intercooler inlet pipe assembly Ⅰ to turbocharger intake port and intercooler inlet pipe assembly Ⅱ separately, and tighten worm clamp after connected and aligned.

Torque: 5 ± 1 N·m

⚠ Caution

- **The connection clearing between rubber pipe and plastic should not exceed 3 mm.**

(3) Connect the relief solenoid valve connector.

(4) Fix intercooler inlet pipe assembly Ⅰ on transmission with 2 bolts.
Torque: 9 ± 1.5 N·m

(5) Install the intake hose assembly.
(6) Install the air filter assembly.
(7) Install the engine compartment trim cover assembly.

4.12 Intercooler Inlet Pipe Assembly Ⅱ

■ Removal

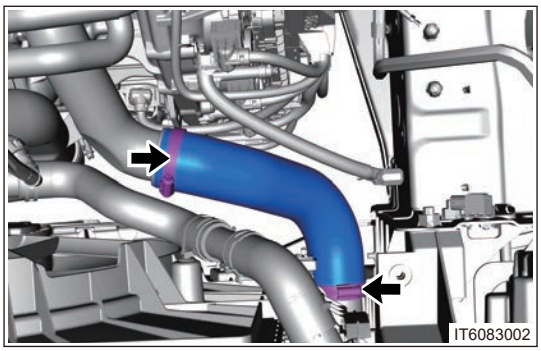
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing intercooler inlet pipe assembly Ⅱ.**
- **Appropriate force should be applied, when removing the intercooler inlet pipe assembly Ⅱ. Be careful not to operate roughly.**

(1) Raise the vehicle to a proper position.
(2) Remove the engine compartment lower protector assembly.

(3) Loosen worm clamp and disconnect connection between intercooler inlet pipe assembly Ⅱ and intercooler inlet pipe assembly Ⅰ.

(4) Loosen worm clamp and disconnect connection between intercooler inlet pipe assembly Ⅱ and intercooler assembly.



(5) Remove the intercooler inlet pipe assembly Ⅱ carefully.

■ Installation

(1) After aligning and connecting intercooler inlet pipe Ⅲ and intercooler assembly, tighten worm clamp.
Torque: 5 ± 1 N·m

(2) After aligning and connecting intercooler inlet pipe Ⅲ and intercooler inlet pipe Ⅱ, tighten worm clamp.
Torque: 5 ± 1 N·m

⚠ Caution

- **The connection clearing between rubber pipe and plastic should not exceed 3 mm.**

(3) Install the engine compartment lower protector assembly.

4.13 Intercooler Outlet Pipe Assembly Ⅰ

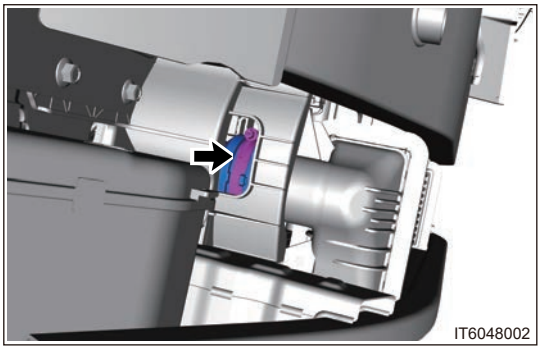
■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing intercooler outlet pipe assembly Ⅰ.**
- **Appropriate force should be applied, when removing the intercooler outlet pipe assembly Ⅰ. Be careful not to operate roughly.**

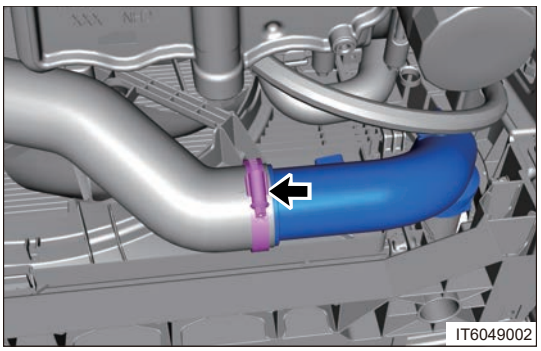
(1) Raise the vehicle to a proper position.
(2) Remove the engine compartment lower protector assembly.
(3) Remove the front bumper assembly.

(4) Loosen worm clamp and disconnect the connection between intercooler outlet pipe assembly I and intercooler assembly.


IT6048002

(5) Disconnect the boost pressure sensor connector.

(6) Loosen worm clamp and disconnect the connection between intercooler outlet pipe assembly I and intercooler outlet pipe assembly Ⅱ.


IT6049002

(7) Remove the intercooler outlet pipe assembly Ⅰ carefully.

(8) Remove boost pressure/temperature sensor from intercooler outlet pipe assembly Ⅰ.

■ Installation

(1) Install boost pressure/temperature sensor to intercooler outlet pipe assembly Ⅰ.

(2) After aligning and connecting intercooler outlet pipe assembly Ⅰ and intercooler assembly, tighten worm clamp.

Torque: 5 ± 1 N·m

(3) After aligning and connecting intercooler outlet pipe assembly Ⅰ and intercooler outlet pipe assembly Ⅱ, tighten worm clamp.

Torque: 5 ± 1 N·m

(4) Connect the boost pressure/temperature sensor connector.

⚠ Caution

- **The connection clearing between rubber pipe and plastic should not exceed 3 mm.**

(5) Install the engine compartment lower protector assembly.

4.14 Intercooler Outlet Pipe Assembly Ⅱ

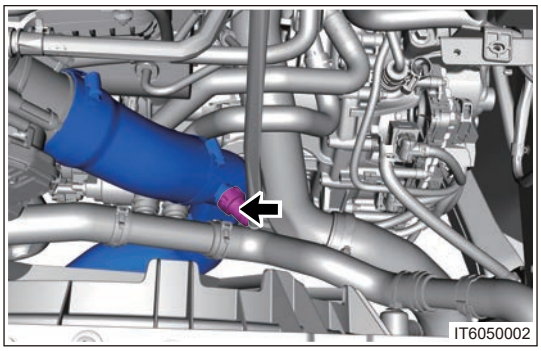
■ Removal

⚠ Warning

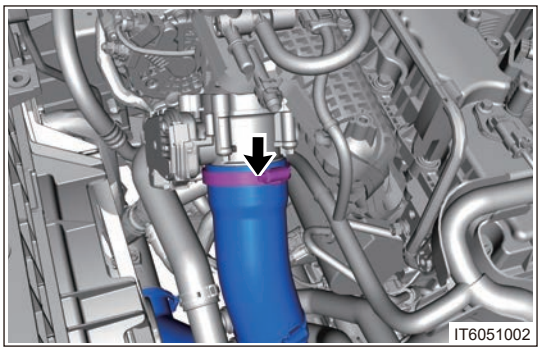
- **Be sure to wear safety equipment to prevent accidents, when removing intercooler outlet pipe assembly Ⅱ.**
- **Appropriate force should be applied, when removing the intercooler outlet pipe assembly Ⅱ. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the engine compartment lower protector assembly.

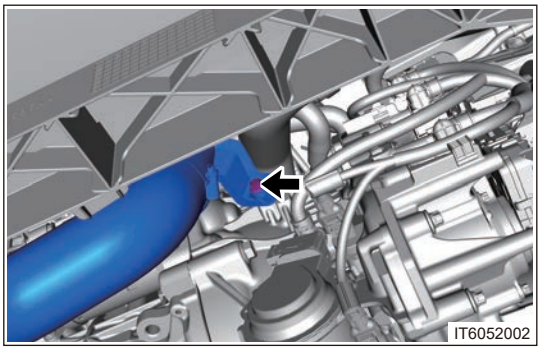
(5) Disconnect charcoal canister solenoid valve outlet pipe and intercooler outlet pipe assembly Ⅱ.



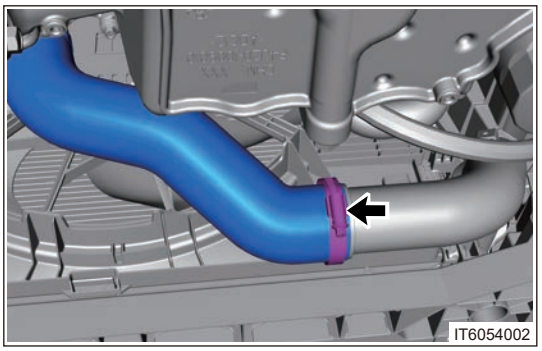
(6) Loosen worm clamp and disconnect connection between intercooler outlet pipe assembly Ⅱ and throttle assembly.



(7) Remove 1 bolt on transmission from intercooler outlet pipe assembly Ⅱ.



(8) Loosen worm clamp and disconnect the connection between intercooler outlet pipe assembly I and intercooler outlet pipe assembly Ⅱ.



(9) Remove the intercooler outlet pipe assembly Ⅱ carefully.

■ Installation

(1) After aligning and connecting intercooler outlet pipe assembly Ⅱ and intercooler outlet pipe assembly Ⅰ, tighten worm clamp.

Torque: 5 ± 1 N·m

⚠ Caution
· **The connection clearing between rubber pipe and plastic should not exceed 3 mm.**

(2) Connect intercooler outlet pipe assembly Ⅱ and throttle assembly, and tighten worm clamp.

Torque: 5 ± 1 N·m

(3) Connect charcoal canister solenoid valve outlet pipe and intercooler outlet pipe assembly Ⅱ.

(4) Install 1 fixing bolt and tighten it.

Torque: 9 ± 1.5 N·m

(5) Install the engine compartment lower protector assembly.

2.4 EXHAUST SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Before repairing the exhaust system, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) If exhaust gasket is damaged, replace it, and remove foreign matters on joints and threads.

(2) Check exhaust gas for leakage. If gas leaks, tighten malfunctioning part to prevent leakage. Replace damaged parts as necessary.

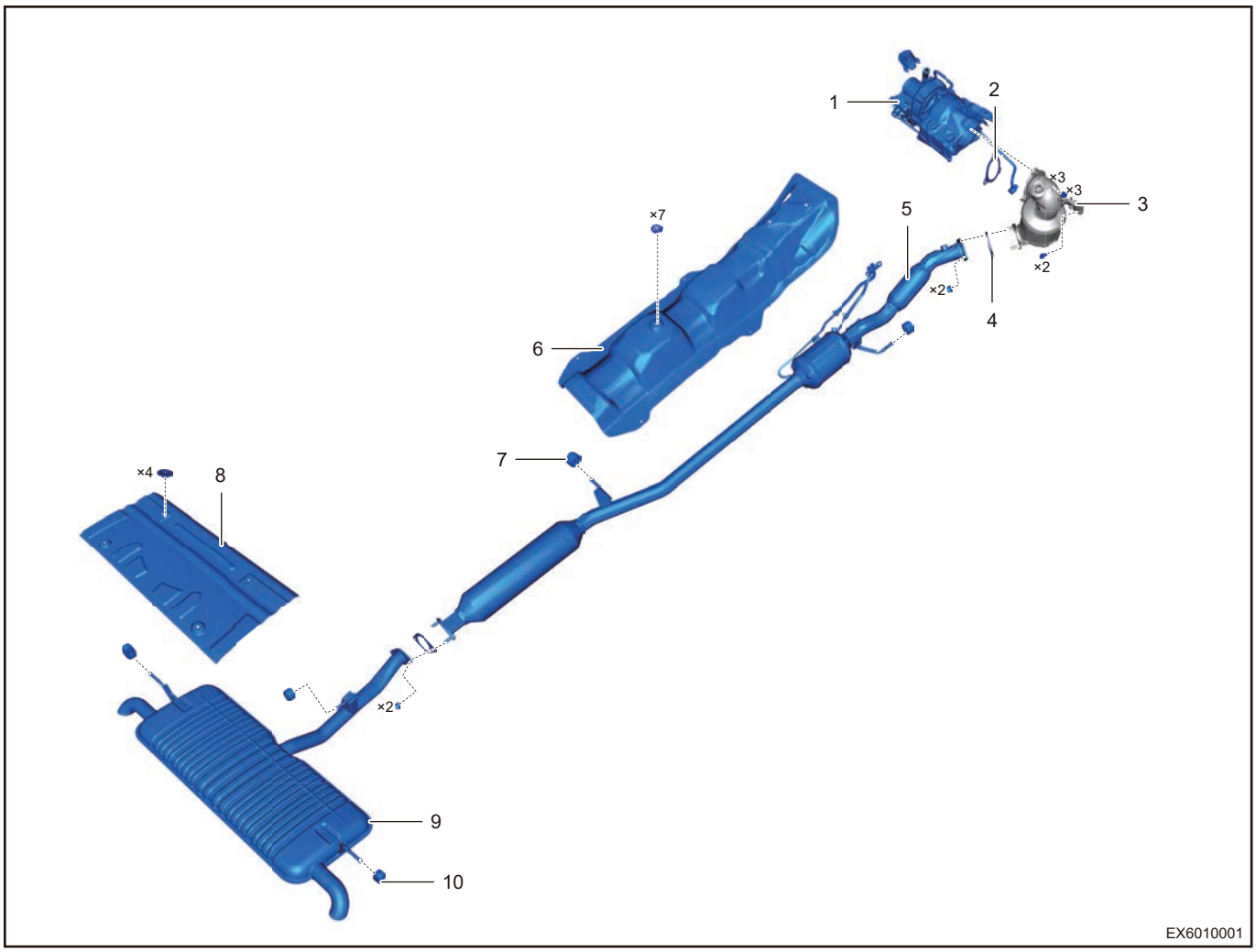
2 System Overview

2.1 System Description

Exhaust system controls engine exhaust, reducing vehicle emissions by precatalytic converter and main catalytic converter, and eliminating exhaust noise by muffler. When exhaust system discharges exhaust gas, oxygen sensor monitors oxygen content in exhaust gas. Engine control module adjusts air-fuel ratio of combustible gas mixture to control vehicle emissions and achieve optimal fuel economy and satisfy the emissions standard of regulation according to feedback signals of oxygen sensor and combining with other sensor signals.

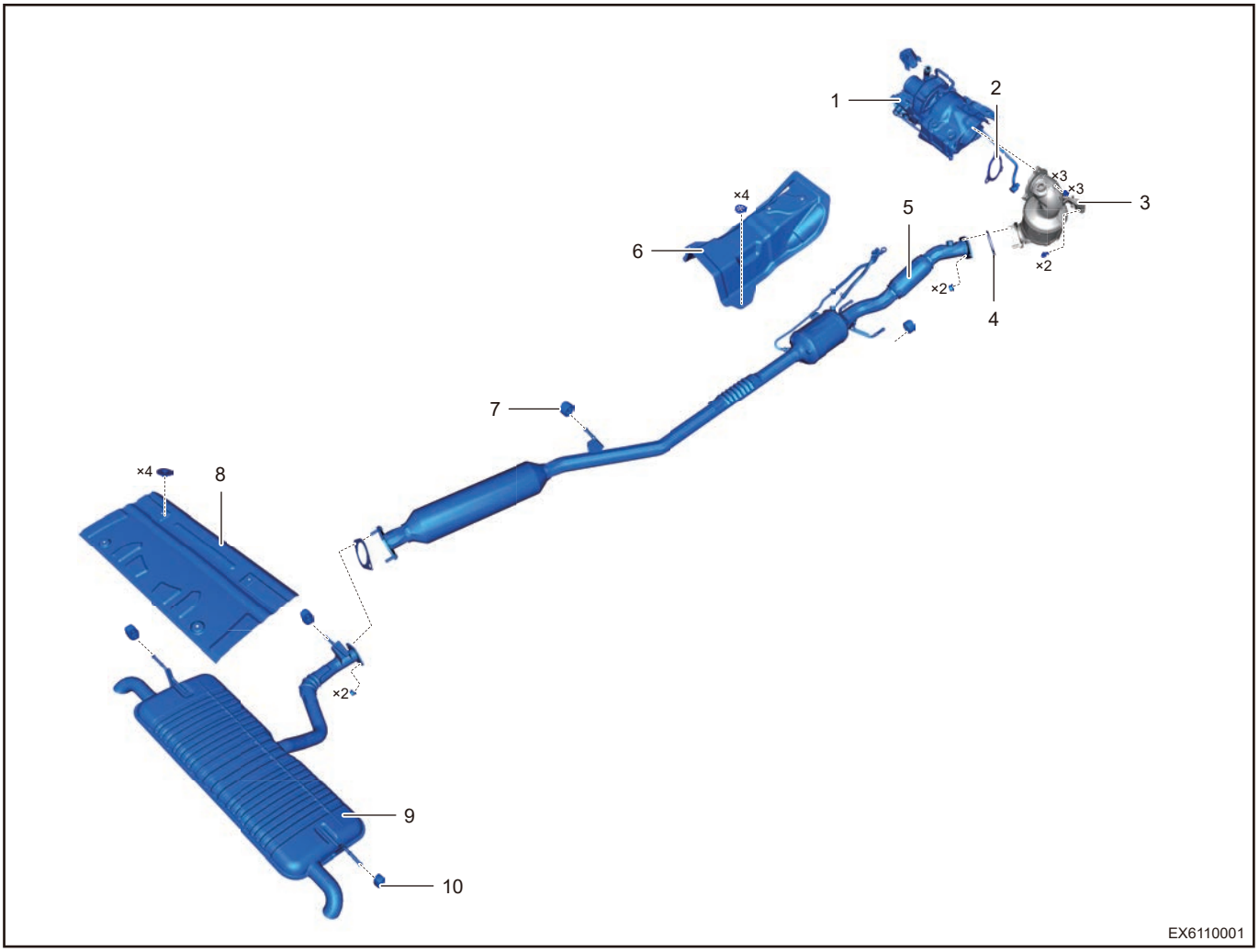
2.2 System Components Diagram

2WD Model

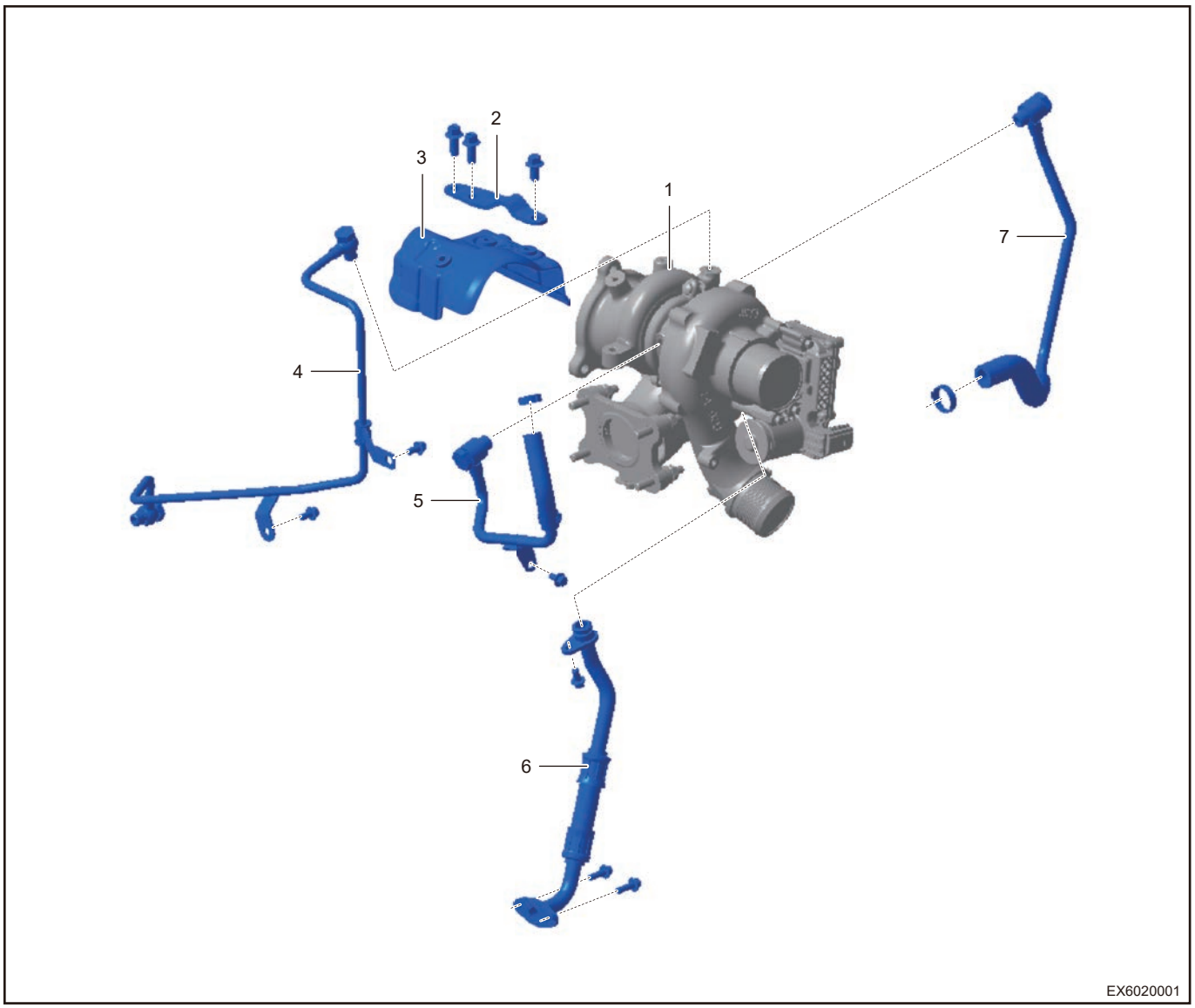


1	Turbocharger Assembly	6	Center Passage Heat Insulator
2	Washer Between Turbocharger and Precatalytic Converter	7	Hanger Block 2
3	Precatalytic Converter Assembly	8	Rear Muffler Heat Insulator
4	Washer	9	Rear Muffler Assembly
5	Particulate Filter and Front Muffler Assembly	10	Hanger Block 2

4WD Model

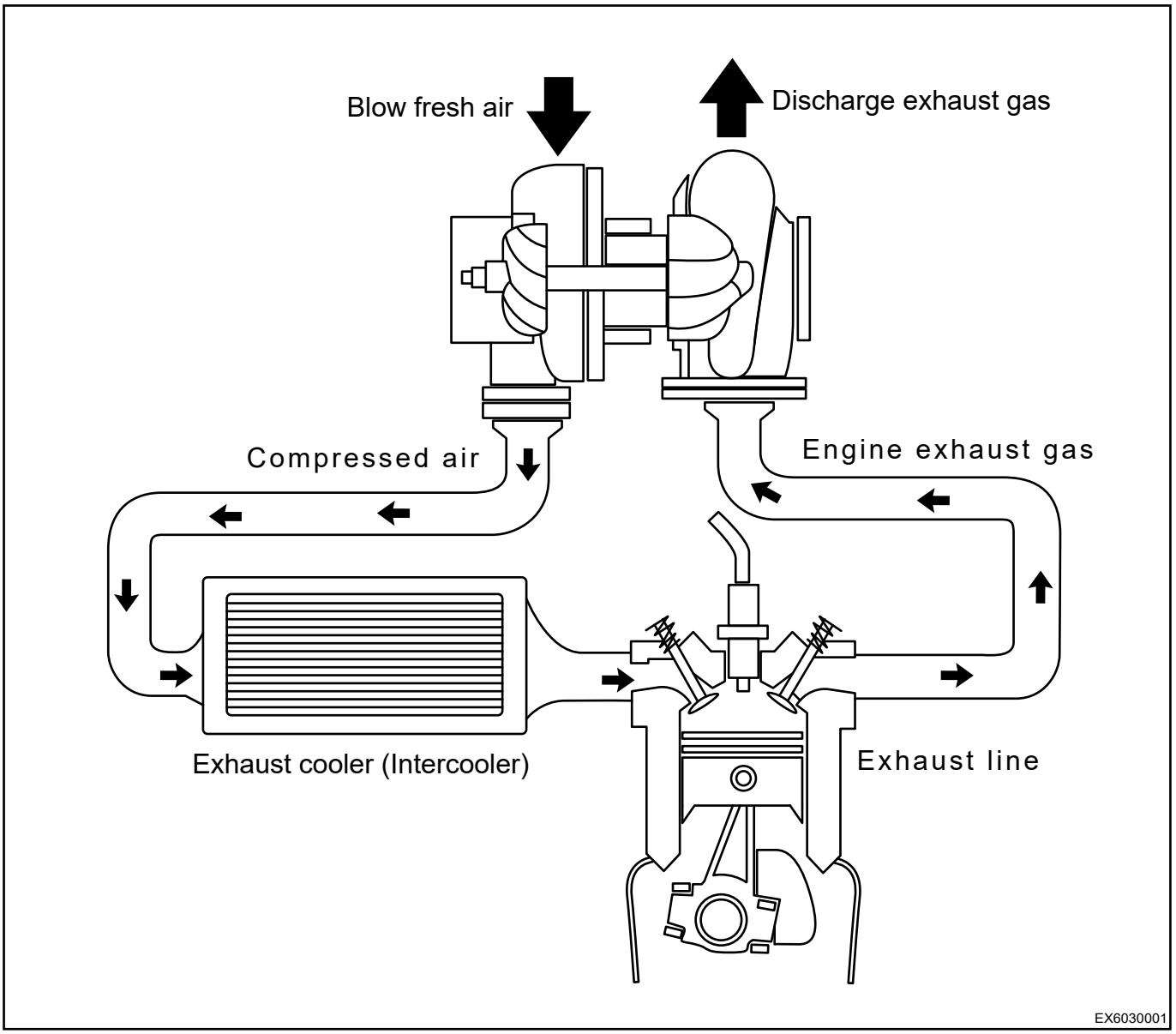


1	Turbocharger Assembly	6	Center Passage Heat Insulator
2	Washer Between Turbocharger and Precatalytic Converter	7	Hanger Block 2
3	Precatalytic Converter Assembly	8	Rear Muffler Heat Insulator
4	Washer	9	Rear Muffler Assembly
5	Particulate Filter and Front Muffler Assembly	10	Hanger Block 2



1	Turbocharger Assembly	5	Turbocharger Cooling Water Outlet Pipe
2	Turbocharger Bracket	6	Turbocharger Oil Return Pipe Assembly
3	Turbocharger Heat Insulator	7	Turbocharger Water Inlet Pipe Assembly
4	Turbocharger Oil Inlet Pipe Assembly		

2.3 System Schematic Diagram

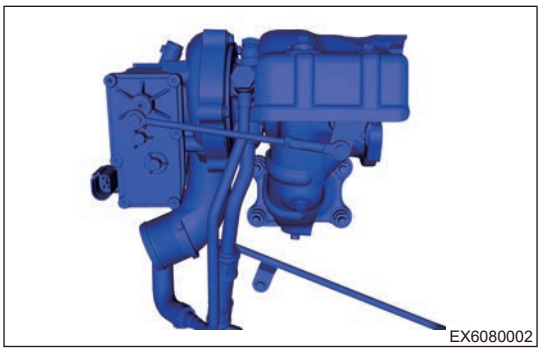


The fresh air filtered by the air filter enters the intercooler after being pressed by the turbocharger, and then enters the cylinder after being cooled by the intercooler. The exhaust gas drives turbo impeller to rotate, and then drives compressor impeller to press the inlet fresh air.

2.4 System Components Description

■ Turbocharger

Turbocharger uses the exhaust gas discharged from the engine to push the turbine impeller to rotate, and then drives the compressor impeller to pressurize the air filtered by the air filter and send it to the cylinder. As more air enters into cylinder, more fuel is allowed to be injected, which results in higher engine power. In addition, the turbocharger can also make the engine obtain power compensation when working at high altitude.



■ Precatalytic converter

Precatalytic converter is the most important external purification device fixed in vehicle exhaust system, which can convert harmful gases such as carbon monoxide, hydrocarbons and nitrogen oxides from exhaust gas into carbon dioxide, water and nitrogen by oxidation and reduction.

3 Diagnosis & Testing

3.1 Problem Symptoms Table

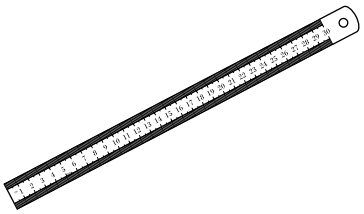
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Exhaust System

Symptom	Possible Cause
Excessive exhaust noise	Exhaust pipe (loose connection)
	Turbocharger (damaged)
	Muffler assembly (damaged or leaked)
	Main catalytic converter assembly (damaged or leaked)
	Exhaust pipe gasket (damaged)
Excessive exhaust temperature	Inadequate gas mixture combustion
	Main catalytic converter assembly (blocked)
	Precatalytic converter assembly (blocked)
	Turbocharger (blocked)
Exhaust pipe leakage	Main catalytic converter assembly (damaged or leaked)
	Muffler assembly (damaged or leaked)
	Precatalytic converter assembly (damaged or leaked)

4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Precision Straightedge	 S00044

4.2 Turbocharger Heat Insulator

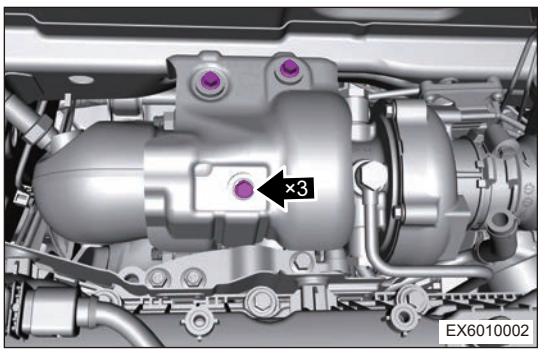
■ Removal

⚠ Warning

- **Before removing turbocharger heat insulator assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing turbocharger heat insulator assembly.**
- **Appropriate force should be applied, when removing the turbocharger heat insulator assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the negative battery cable.

(4) Remove 3 fixing bolts from turbocharger heat insulator assembly.



(5) Remove turbocharger heat insulator assembly carefully.

■ Installation

(1) Install 3 fixing bolts on turbocharger heat insulator assembly.

Torque: 8 + 3 N · m

(2) Install the engine compartment trim cover assembly.

4.3 Turbocharger Bracket

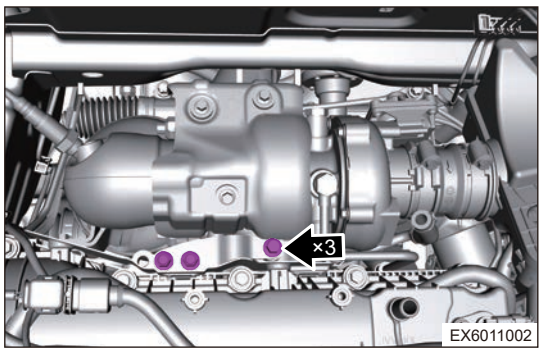
■ Removal

⚠ Warning

- **Before removing turbocharger bracket assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing turbocharger bracket assembly.**
- **Appropriate force should be applied, when removing turbocharger bracket assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the negative battery cable.

(4) Remove 3 fixing bolts from turbocharger bracket assembly.

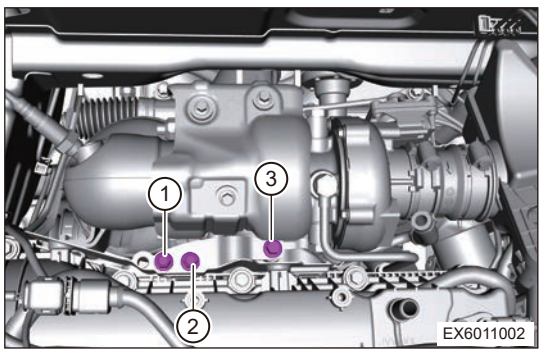


(5) Remove turbocharger bracket assembly carefully.

■ Installation

(1) Tighten 3 mounting bolts in order shown in illustration.

Torque: 1st step: 6 ± 2 N · m, 2nd step: 30 + 5 N · m



(2) Install the engine compartment trim cover assembly.

4.4 Turbocharger Assembly

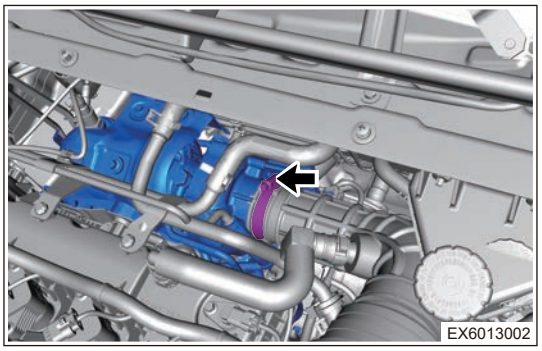
■ Removal

⚠ Warning

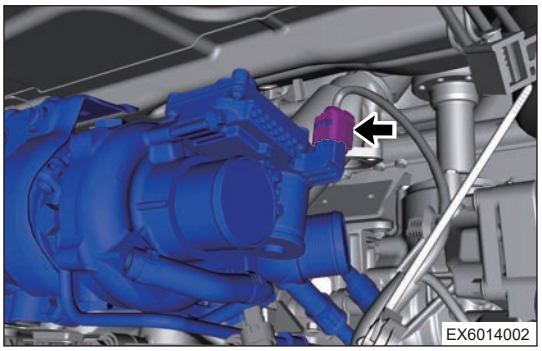
- **Before removing turbocharger assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing turbocharger assembly.**
- **Appropriate force should be applied, when removing turbocharger assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.
(5) Remove the intake hose assembly.
(6) Drain the coolant.
(7) Removal turbocharger heat insulator assembly.
(8) Remove the turbocharger bracket.
(9) Remove the precatalytic converter assembly.

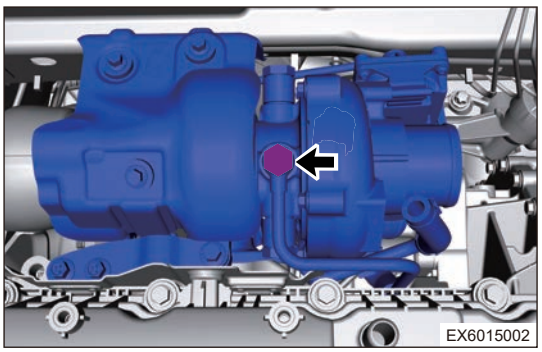
(10) Loosen worm clamp and disconnect connection between intercooler intake pipe 1 and turbocharger assembly.



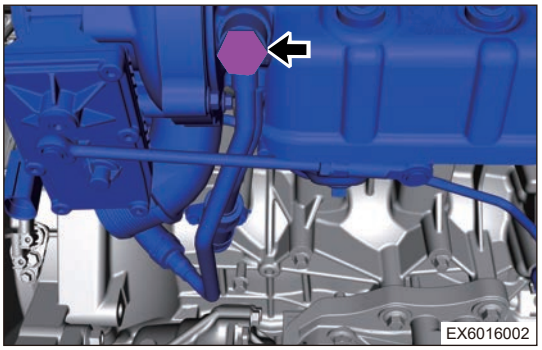
(11) Disconnect turbocharger electronic waste gate connector.



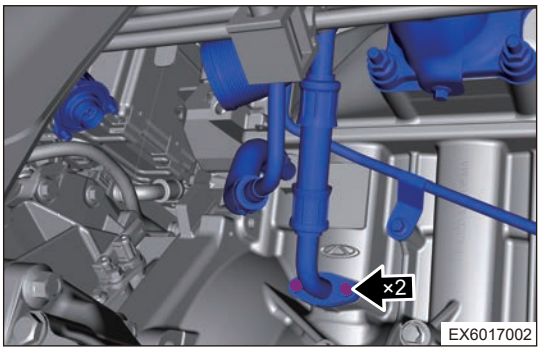
(12) Remove 1 hollow bolt between oil inlet pipe assembly and turbocharger. And remove copper gasket carefully.



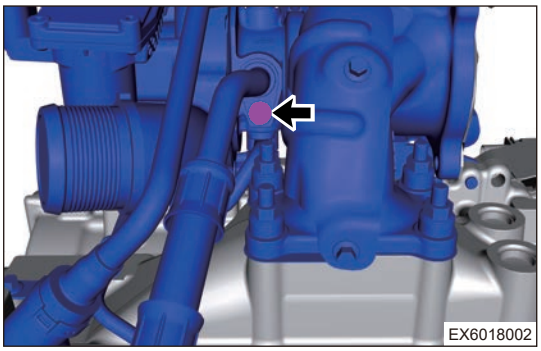
(13) Remove 1 hollow bolt between water inlet pipe assembly and turbocharger. And remove copper gasket carefully.



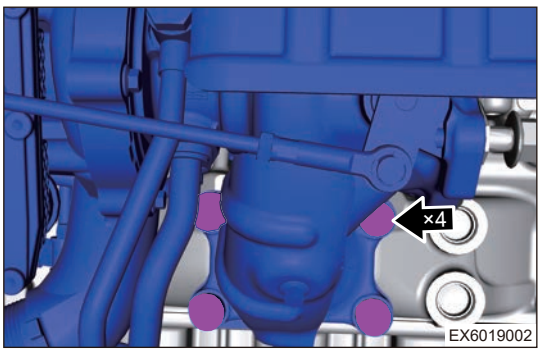
(14) Remove 2 fixing bolts between oil return pipe assembly and cylinder block. And remove gasket carefully.



(15) Remove 1 fixing bolt between oil return pipe assembly and turbocharger. And remove oil return pipe assembly from turbocharger oil return hole carefully.

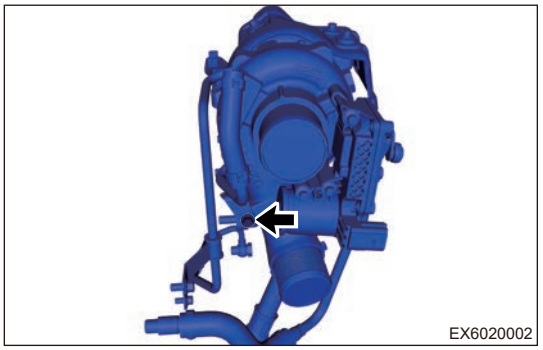


(16) Remove 4 high temperature nuts between turbocharger and cylinder head, and remove the cushion from each bolt carefully.

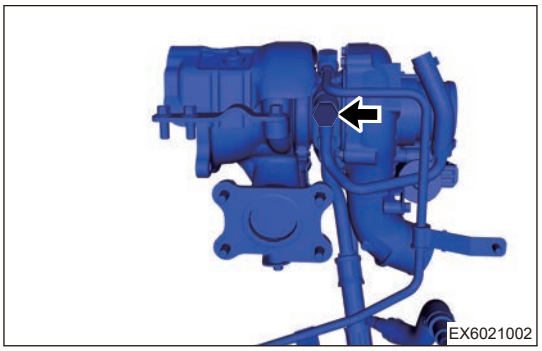


(17) Remove the turbocharger assembly carefully. And remove gasket from cylinder head flange.

(18) Remove 1 bolt between water outlet pipe bracket and turbocharger.



(19) Remove 1 hollow bolt between water outlet pipe assembly and turbocharger. And remove gasket carefully.



■ Daily inspection of turbocharger

(1) Check the sealing and tightness of connecting lines between air filter and turbocharger, turbocharger and engine intake/exhaust pipe.

(2) Check if turbocharger oil inlet pipe and return pipe are damaged or throttling, and if the connecting bolts of joints are loose.

(3) Check the air filter and clean or replace the element regularly.

(4) Check if engine crankcase blow-by gas is too large, breather is smooth, ensure crankcase pressure is normal.

■ Other requirements of turbocharger

(1) Avoid low engine idle for long time (maximum should not exceed 20 minutes).

(2) Never use the operation with "Accelerate - Stall - Neutral coasting", before the engine lubricating oil pressure is established engine must be kept in idling condition (3 - 5 minutes).

(3) Before stopping the engine, let it gradually decrease its temperature and speed from maximum value (3 - 5 minutes).

■ Firstly perform basic inspection to turbocharger system when DTC indicating too high or too low boost pressure occurs or when power decreases.

(1) Check there are no cranks causing by overheating, biting, deformation or other damage on exhaust turbocharger turbo housing, otherwise, replace exhaust turbocharger.

(2) Check there are no deposition and blocking on turbo oil hole.

(3) Check there are no blockage, squash, deformation or other damage on oil inlet and return pipes of exhaust turbocharger.

(4) Check there is no sticking in actuator mechanism, and if actuator connector is connected normally.

(5) Check there is no obvious deformation in turbocharger impeller, and the rotation is normal without blocking.

(6) Check if each actuator connector is connected reliably (intake relief valve and exhaust gas bypass electric valve) and check for no damage of appearance.

■ Installation

⚠ Caution

- **Do not pull the turbocharger actuator rod by hand, and avoid impacting the turbocharger during assembly.**
- **Check for foreign matter in turbocharger and line when installing. Avoid inhaling foreign matter after turbocharger running, causing damage to the components.**

(1) If 4 high temperature studs on the flange of the cylinder head are removed, the bolts need to be replaced. Before installing the bolts, apply high temperature resistance thread adhesive to one end of the short thread of the high temperature studs, and retighten them into the cylinder head threaded hole according to the corresponding torque.

Torque: 14 + 3 N · m

Thread adhesive: Loctite 2422

⚠ Caution

- **Apply adhesive only when using, and the studs need to be tightened within 5 minutes after applying adhesive. If the bolt needs to be replaced, it must be re-applied adhesive and tightened.**

(2) Pass the gasket through the high temperature studs and cover the exhaust flange of the cylinder head.

⚠ Caution

- **As shown in illustration, pay attention to the direction of the error-proof identification point after installation.**

(3) Install a washer on the hollow bolt, insert it into the ball joint of the water outlet pipe, and install another washer on the hollow bolt, then screw it into the corresponding thread hole on turbocharger; Screw in at least 3 teeth and do not tighten.

Torque: 40 ± 2 N · m

(4) Screw 1 fixing bolt into the turbocharger thread hole to install the water outlet pipe bracket, screw in at least 3 teeth, and do not tighten.

Torque: 8 + 3 N · m

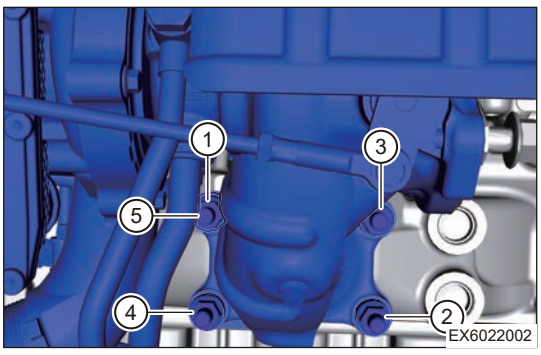
⚠ Caution

- **First tighten the hollow bolt according to the torque requirement, and then tighten the bracket fixing bolt.**

(5) Install the turbocharger mounting hole on the cylinder head exhaust flange stud. Install a cushion on each bolt. Install 4 high temperature nuts, and tighten them diagonally and crosswise in the order shown in illustration.

Hint:
The number 5 is to retighten the position 1 once.

Torque: 33 ± 3 N · m



(6) Apply a small amount of oil on the seal ring of oil return pipe (the oil type is the same as the engine oil), insert the end of seal ring into the oil return hole in the middle of the turbocharger, and screw in 1 fixing bolt, at least 3 teeth, do not tighten it.

Torque: 8 + 3 N · m

(7) Insert 2 bolts into the mounting holes of oil return pipe, then install the gasket, and screw 2 bolts into the mounting holes of the oil return flange on cylinder block. Screw in at least 3 teeth and do not tighten.

Torque: 8 + 3 N · m

⚠ Caution

- **First tighten 2 fixing bolts between oil return pipe and cylinder block side according to the torque requirements, and then tighten 1 fixing bolt between oil return pipe and turbocharger side.**

(8) Loosen 2 fixing bolts on oil inlet pipe assembly bracket.

Torque: 8 + 3 N · m

(9) Loosen the hollow bolt between oil inlet pipe assembly and cylinder block.

Torque: 25 + 5 N · m

Hint:
Loosen the bolt to install the oil inlet pipe assembly to turbocharger side conveniently.

(10) Install a washer on the hollow bolt, insert it into the ball joint of the oil inlet pipe, and install another washer on the hollow bolt, then screw it into the corresponding thread hole on turbocharger. Then perform tightening.

Torque: 25 + 5 N · m

⚠ Caution

- **First tighten the hollow bolts on both ends of oil inlet pipe assembly according to the torque requirement, and then tighten 2 fixing bolts of oil inlet pipe bracket.**

(11) Install a washer on the hollow bolt, insert it into the ball joint of the water inlet pipe, and install another washer on the hollow bolt, then screw it into the corresponding thread hole on turbocharger. Then perform tightening.

Torque: 40 ± 2 N · m

(12) Connect intercooler inlet pipe assembly Ⅰ and turbocharger, and tighten worm clamp.

Torque: 5 ± 1 N · m

(13) Connect turbocharger exhaust gas electric valve connector.
(14) Install the precatalytic converter assembly.
(15) Install the turbocharger bracket.
(16) Install the turbocharger heat insulator assembly.
(17) Install the intake hose assembly.
(18) Install the air filter assembly.
(19) Add the coolant.
(20) Add oil to a proper position.
(21) Install the engine compartment trim cover assembly.

4.5 Turbocharger Cooling Water Outlet Pipe

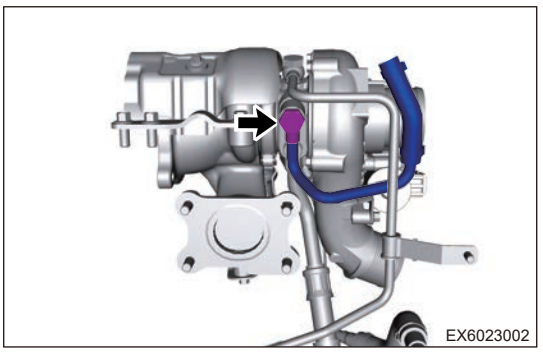
■ Removal

⚠ Warning

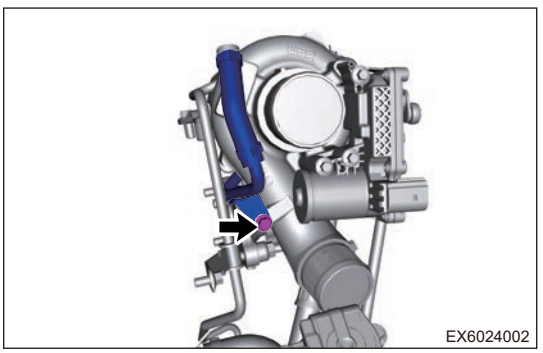
- **Before removing turbocharger cooling water outlet pipe assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing turbocharger cooling water outlet pipe assembly.**
- **Appropriate force should be applied, when removing turbocharger cooling water outlet pipe assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.
(5) Remove the intake hose assembly.
(6) Drain the coolant.
(7) Remove the turbocharger assembly.

(8) Remove 1 hollow bolt between water outlet pipe and turbocharger water outlet, and remove copper washer carefully.


EX6023002

(9) Remove 1 fixing bolt from water outlet pipe bracket.


EX6024002

(10) Remove the turbocharger water outlet pipe assembly.

■ Installation

(1) Install a washer on the hollow bolt, insert it into the ball joint of the water outlet pipe, and install another washer on the hollow bolt, then screw it into the corresponding thread hole on turbocharger. Screw in at least 3 teeth and do not tighten.

Torque: 40 ± 2 N · m

(2) Screw 1 fixing bolt into the turbocharger thread hole to install the water outlet pipe bracket, screw in at least 3 teeth, and do not tighten.

Torque: 8 + 3 N · m

⚠ Caution

- **First tighten the hollow bolt according to the torque requirement, and then tighten the bracket fixing bolt.**

(3) Install a clamping ring on water outlet pipe and insert it into the corresponding branch pipe of the heating pipe. Adjust the position of clamping ring so that the center of the clamping ring is aligned with the center of the "T" shape of water outlet pipe, and clamp it with clamp plier.

⚠ Caution

- **When the turbocharger cooling water outlet pipe is connected with the heating pipe, a small amount of lubricant can be applied if necessary. The lubricant can be selected as the same type of coolant used by the engine.**

(4) Install the turbocharger.
(5) Install the intake hose assembly.
(6) Install the air filter assembly.
(7) Add the antifreeze.
(8) Install the engine compartment trim cover assembly.

4.6 Turbocharger Water Inlet Pipe Assembly

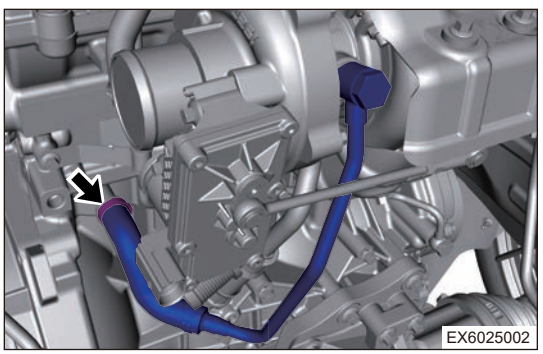
■ Removal

⚠ Warning

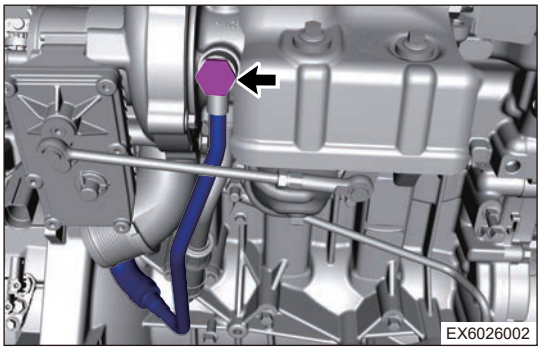
- **Before removing turbocharger water inlet pipe assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing turbocharger water inlet pipe assembly.**
- **Appropriate force should be applied, when removing turbocharger water inlet pipe assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the intercooler inlet pipe assembly Ⅰ.
(5) Drain the coolant.

(6) Loosen clamping ring and disconnect connection between water inlet pipe and cylinder block pipe joint.



(7) Remove 1 hollow bolt between water inlet pipe and turbocharger water inlet, and remove copper washer carefully.



(8) Remove the turbocharger water inlet pipe assembly carefully.

■ **Installation**

(1) Install a clamping ring on the cylinder body pipe joint, insert the hose of water inlet pipe until it reaches the limit drum of the cylinder body pipe joint, and adjust the water pipe so that the "T"-shaped mark faces the rear end of the body, and then adjust the clamping ring position so that the center of it is aligned with the "T" center of the water inlet pipe, and then clamp it with clamp plier.

⚠ Caution

- **When the turbocharger water inlet pipe is connected with the cylinder body pipe joint, a small amount of lubricant can be applied if necessary. The lubricant can be selected as the same type of coolant used by the engine.**

(2) Install a washer on the hollow bolt, insert it into the ball joint of the water inlet pipe, and install another washer on the hollow bolt, then screw it into the corresponding thread hole on turbocharger. Then perform tightening.

Torque: 40 ± 2 N · m

(3) Install the intercooler inlet pipe Ⅰ assembly.
(4) Add the coolant.
(5) Install the engine compartment trim cover assembly.

4.7 Turbocharger Oil Inlet Pipe Assembly

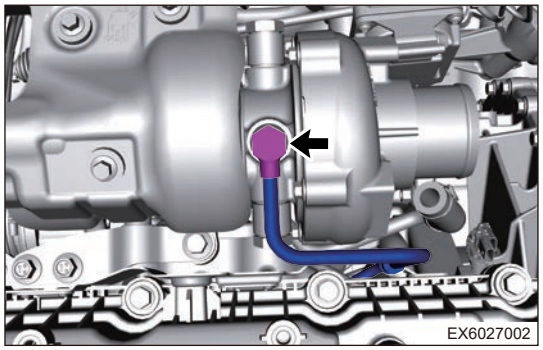
■ **Removal**

⚠ Warning

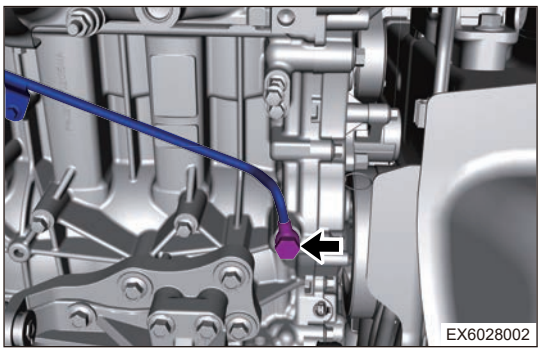
- **Before removing turbocharger oil inlet pipe assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing turbocharger oil inlet pipe assembly.**
- **Appropriate force should be applied, when removing turbocharger oil inlet pipe assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.
(5) Remove the intake hose assembly.
(6) Remove the rear right mounting connecting rod assembly.
(7) Remove the rear right mounting cushion assembly.

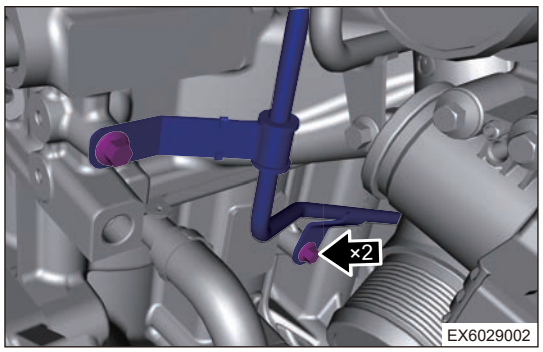
(8) Remove 1 hollow bolt between oil inlet pipe and turbocharger oil inlet, and remove copper washer carefully.



(9) Remove 1 hollow bolt between oil inlet pipe and cylinder block, and remove copper washer carefully.



(10) Remove 2 fixing bolts from oil inlet pipe assembly bracket.



(11) Remove the turbocharger oil inlet pipe assembly carefully.

■ Installation

(1) Install a washer on the hollow bolt, insert it into the ball joint of the oil inlet pipe, and install another washer on the hollow bolt, then screw it into the corresponding thread hole on turbocharger. Screw in at least 3 teeth and do not tighten.

Torque: 25 + 5 N · m

(2) Install 2 fixing bolts on oil inlet pipe assembly bracket, screw in at least 3 teeth and do not tighten.

Torque: 8 + 3 N · m

(3) Install a washer on the hollow bolt, insert it into the ball joint of the oil inlet pipe, and install another washer on the hollow bolt, then screw it into the corresponding thread hole on cylinder block. Screw in at least 3 teeth and do not tighten.

Torque: 25 + 5 N · m

⚠ Caution

- **First tighten the hollow bolts on both ends of oil inlet pipe assembly according to the torque requirement, and then tighten 2 fixing bolts of oil inlet pipe bracket.**

(4) Install the rear right mounting cushion assembly.
(5) Install the rear right mounting connecting rod assembly.
(6) Install the intake hose assembly.
(7) Install the air filter assembly.
(8) Add oil to a proper position.
(9) Install the engine compartment trim cover assembly.

4.8 Turbocharger Oil Return Pipe Assembly

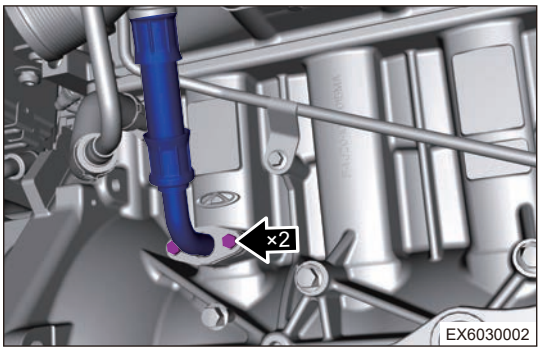
■ Removal

⚠ Warning

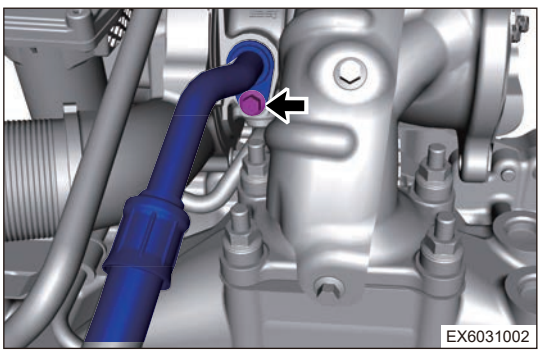
- **Before removing turbocharger oil return pipe assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing turbocharger oil return pipe assembly.**
- **Appropriate force should be applied, when removing turbocharger oil return pipe assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine lower protector assembly.
(3) Remove the rear right mounting connecting rod assembly.
(4) Remove the rear right mounting cushion assembly.

(5) Remove 2 fixing bolts between oil return pipe assembly and cylinder block, and remove washer carefully.



(6) Remove 1 fixing bolt between oil return pipe assembly and turbocharger, and remove oil return pipe assembly from turbocharger oil return hole carefully.



■ **Installation**

(1) Apply a small amount of oil on the seal ring of oil return pipe (the oil type is the same as the engine oil), insert the end of seal ring into the oil return hole in the middle of the turbocharger, and screw in 1 fixing bolt, at least 3 teeth, do not tighten it.

Torque: 8 + 3 N · m

(2) Insert 2 bolts into the mounting holes of oil return pipe, then install the gasket, and screw 2 bolts into the mounting holes of the oil return flange on cylinder block. Screw in at least 3 teeth and do not tighten.

Torque: 8 + 3 N · m

⚠ Caution

- **First tighten 2 fixing bolts between oil return pipe and cylinder block side according to the torque requirements, and then tighten 1 fixing bolt between oil return pipe and turbocharger side.**

(3) Install the rear right mounting cushion assembly.
(4) Install the rear right mounting connecting rod assembly.
(5) Add oil to a proper position.
(6) Install the engine lower protector assembly.

4.9 Relief Control Solenoid Valve

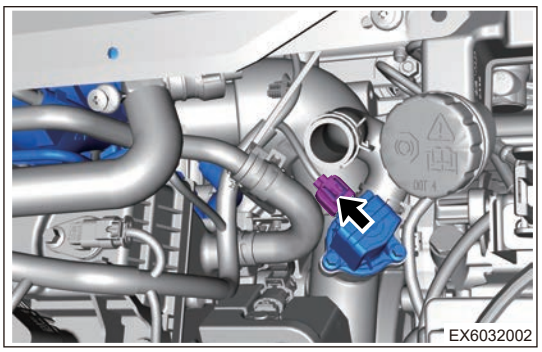
■ **Removal**

⚠ Warning

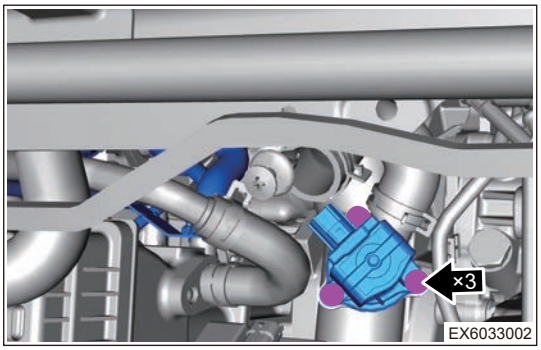
- **Before removal of relief control solenoid valve assembly, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing relief control solenoid valve assembly.**
- **Appropriate force should be applied, when removing relief control solenoid valve assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine compartment trim cover assembly.
(4) Remove the intake hose assembly.

(5) Disconnect the relief control solenoid valve connector.



(6) Remove 3 fixing bolts from relief control solenoid valve.



(7) Remove the relief solenoid valve assembly.

■ **Installation**

(1) Install relief control solenoid valve and tighten 3 fixing bolts.

Torque: 8 + 3 N · m

(2) Connect the relief control solenoid valve connector.
(3) Install the intake hose assembly.
(4) Install the engine compartment trim cover assembly.

4.10 Precatalytic Converter Assembly

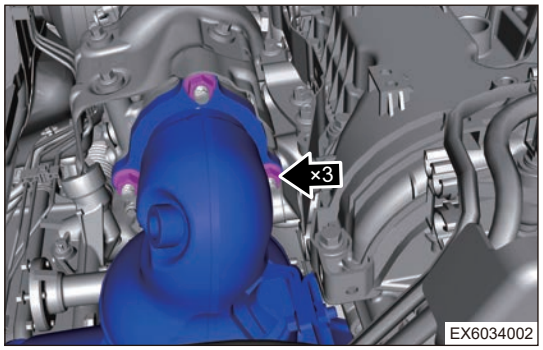
■ **Removal**

⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing precatalytic converter assembly.**
- **Appropriate force should be applied, when removing precatalytic converter assembly. Be careful not to operate roughly.**

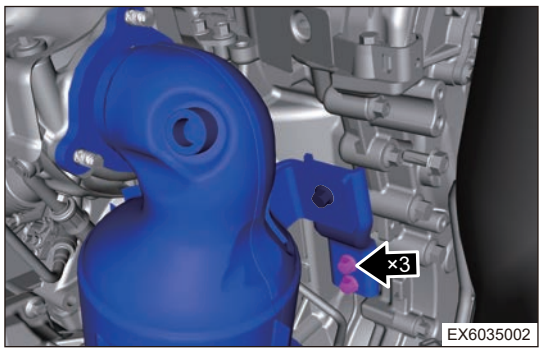
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine compartment trim cover assembly.
(4) Remove the engine lower protector assembly.
(5) Remove the rear right mounting connecting rod.
(6) Remove the rear right mounting cushion assembly.
(7) Remove the front right drive shaft assembly.
(8) Remove the propeller intermediate shaft assembly (if equipped).
(9) Remove the front wheel drive transfer (if equipped).
(10) Remove the upstream oxygen sensor.

(11) Remove 3 fixing nuts between precatalytic converter and turbocharger.

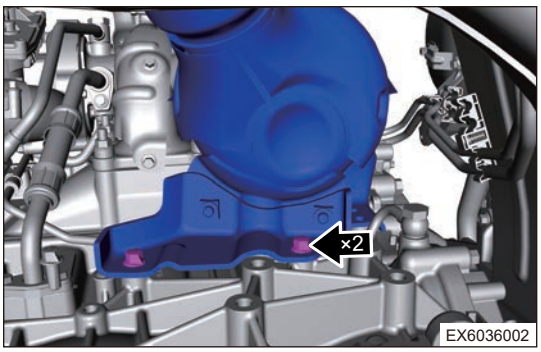


(12) Remove 1 bolt between precatalytic converter upper bracket and precatalytic converter.

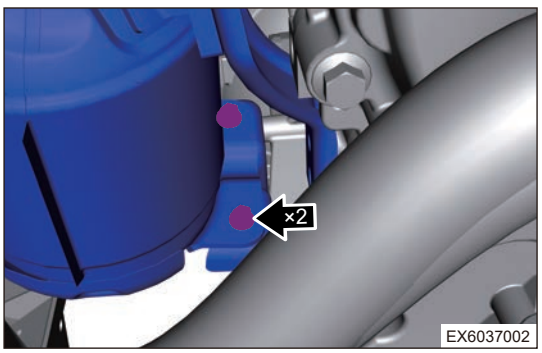
(13) Remove 2 fixing bolts between precatalytic converter upper bracket and cylinder block, and remove precatalytic converter upper bracket.



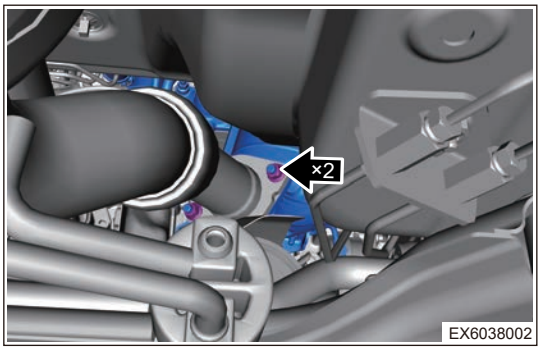
(14) Remove 2 coupling bolts between bracket and cylinder block.



(15) Remove 2 coupling bolts between bracket and precatalytic converter, and remove bracket.



(16) Remove 2 coupling nuts between precatalytic converter and particulate filter and front muffler assembly.



(17) Remove the precatalytic converter assembly carefully and slowly.

■ Installation

(1) Install the precatalytic converter, move it to a suitable position, and insert three holes on precatalytic converter into the corresponding studs of the turbocharger. Insert into two mounting holes of front muffler at the same time. And install nuts on both ends for pre-tightening.

(2) Install precatalytic converter upper bracket and tighten 2 bolts between it and cylinder block.
Torque: 25 ± 3.5 N · m

(3) Install the bracket and pre-tighten 2 fixing bolts to cylinder block.

(4) Tighten 3 coupling nuts between precatalytic converter and turbocharger.
Torque: 45 ± 5 N · m

(5) Tighten 2 coupling bolts between precatalytic converter and bracket.
Torque: 25 ± 3.5 N · m

(6) Tighten 1 coupling bolt between precatalytic converter and upper bracket.
Torque: 25 ± 3.5 N · m

(7) Tighten 2 coupling bolts between bracket and cylinder block.
Torque: 25 ± 3.5 N · m

(8) Tighten 2 coupling nuts between precatalytic converter and particulate filter and front muffler assembly.
Torque: 45 ± 5 N · m

(9) Install the upstream oxygen sensor.
(10) Install the front wheel drive transfer.
(11) Install the propeller intermediate shaft assembly.
(12) Install the front right drive shaft assembly.
(13) Install the rear right mounting cushion assembly.
(14) Install the rear right mounting connecting rod.
(15) Install the engine lower protector assembly.
(16) Install the engine compartment trim cover assembly.

4.11 Particulate Filter and Front Muffler Assembly (2WD Model)

■ Removal

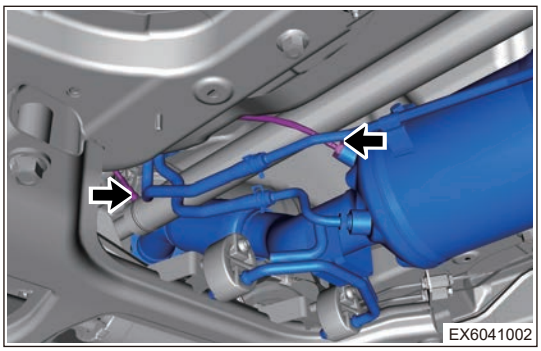
⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing particulate filter and front muffler assembly.**
- **Appropriate force should be applied, when removing particulate filter and front muffler assembly. Be careful not to operate roughly.**

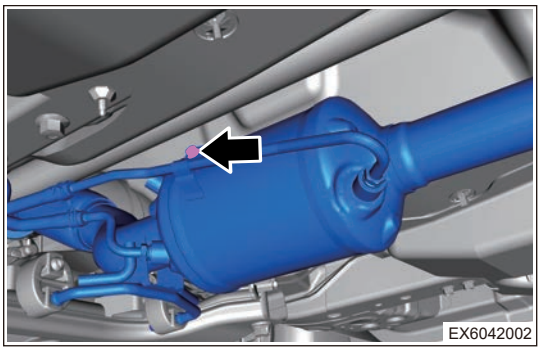
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Raise the vehicle to a proper position.

(4) Disconnect the downstream oxygen sensor connector.
(5) Disconnect the GPF exhaust temperature sensor connector.

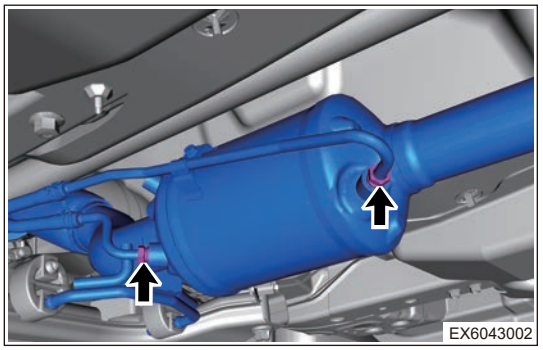
(6) Remove the downstream oxygen sensor and GPF exhaust temperature sensor.



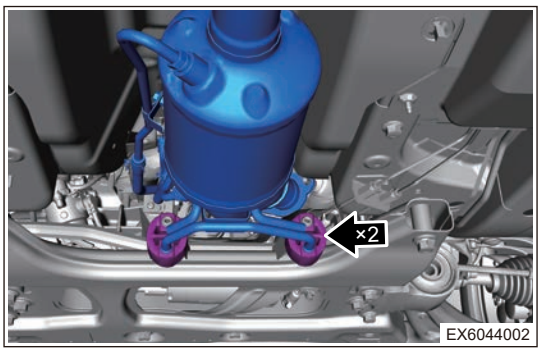
(7) Remove the fixing bolt from differential sampling pipe bracket.

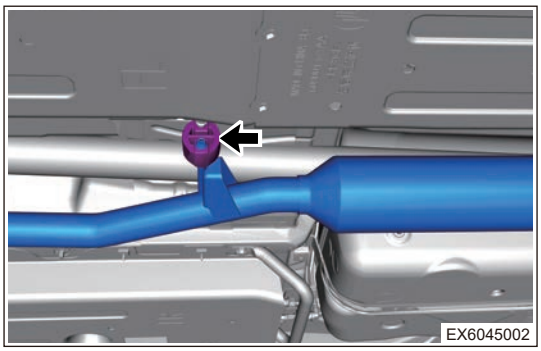


(8) Remove 2 fixing bolts from differential sampling pipe, separate pipe joint and GPF.

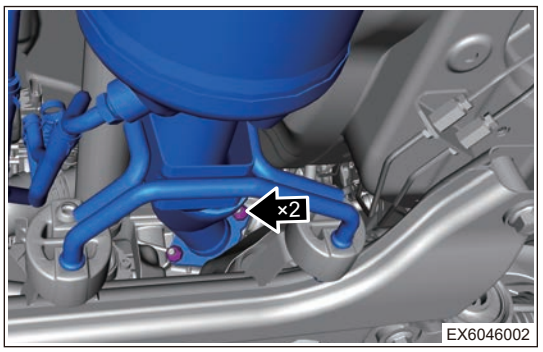


(9) Separate 3 hanger blocks from particulate filter and front muffler assembly.

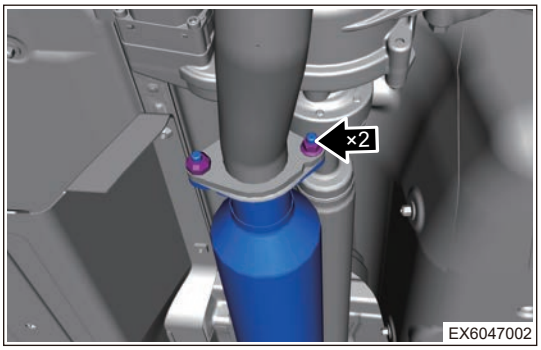




(10) Remove 2 fixing nuts between precatalytic converter and particulate filter and front muffler assembly.



(11) Remove 2 fixing nuts between particulate filter and front muffler assembly and rear muffler.



(12) Remove the particulate filter and front muffler assembly carefully.

■ Installation

(1) Install particulate filter and front muffler assembly, move particulate filter and front muffler assembly to a proper position, insert 2 holes of particulate filter and front muffler assembly into corresponding precatalytic converter mounting holes, and insert into two mounting holes of rear muffler at the same time. And install nuts on both ends for tightening.

Torque: 45 ± 5 N · m

(2) Connect the particulate filter and front muffler assembly to vehicle body hanger block.

(3) Install the differential sampling pipe joint and fixing bracket.
(4) Install the GPF exhaust temperature sensor.
(5) Install the downstream oxygen sensor.

4.12 Particulate Filter and Front Muffler Assembly (4WD Model)

■ Removal

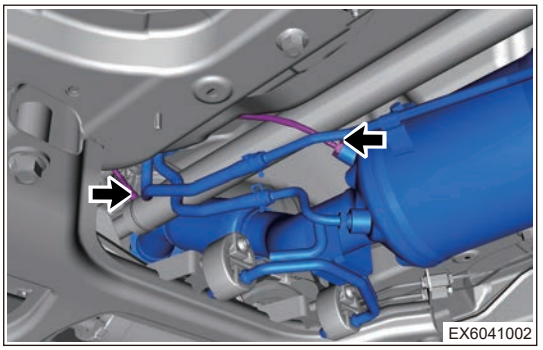
⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing particulate filter and front muffler assembly.**
- **Appropriate force should be applied, when removing particulate filter and front muffler assembly. Be careful not to operate roughly.**

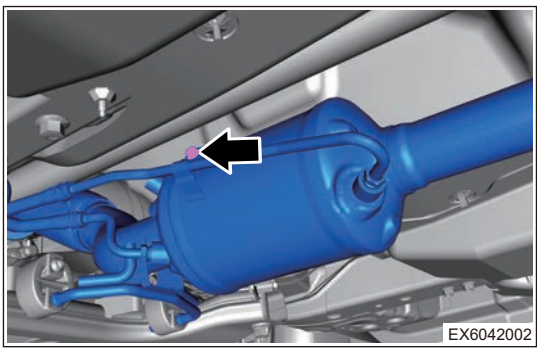
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Raise the vehicle to a proper position.

(4) Disconnect the downstream oxygen sensor connector.
(5) Disconnect the GPF exhaust temperature sensor connector.

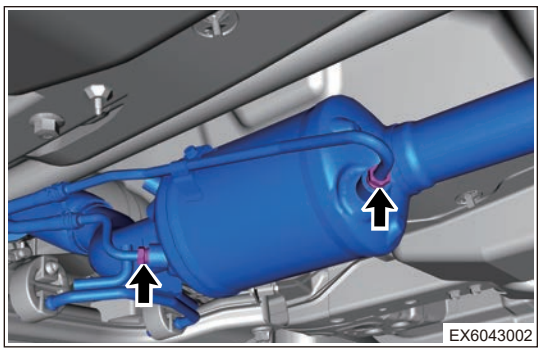
(6) Remove the downstream oxygen sensor and GPF exhaust temperature sensor.



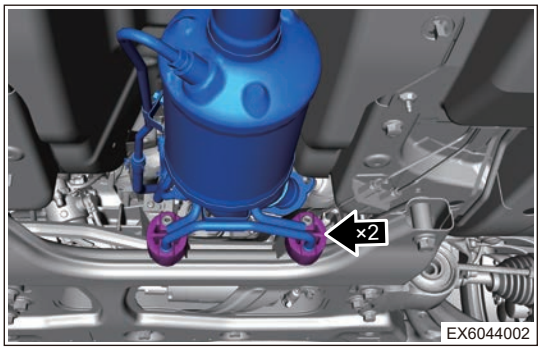
(7) Remove the fixing bolt from differential sampling pipe bracket.

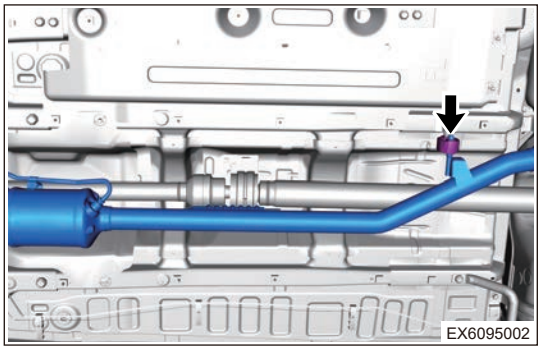


(8) Remove 2 fixing bolts from differential sampling pipe, separate pipe joint and GPF.

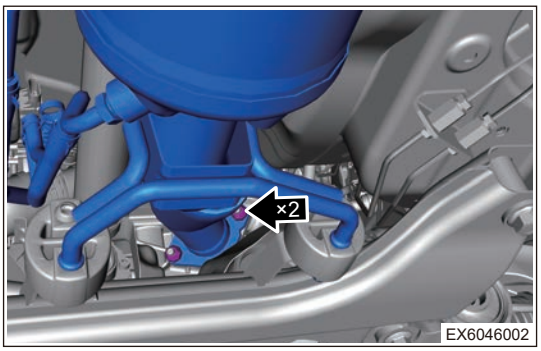


(9) Separate 3 hanger blocks from particulate filter and front muffler assembly.

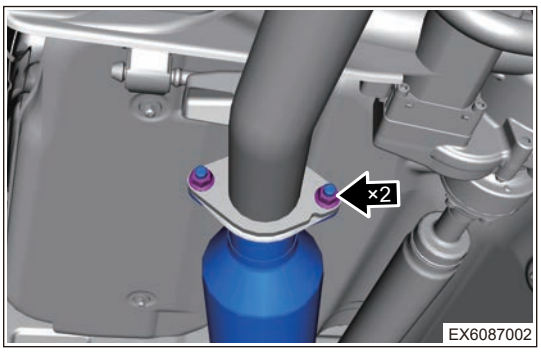




(10) Remove 2 fixing nuts between precatalytic converter and particulate filter and front muffler assembly.



(11) Remove 2 fixing nuts between particulate filter and front muffler assembly and rear muffler.



(12) Remove the particulate filter and front muffler assembly carefully.

■ Installation

(1) Install particulate filter and front muffler assembly, move particulate filter and front muffler assembly to a proper position, insert 2 holes of particulate filter and front muffler assembly into corresponding precatalytic converter mounting holes, and insert into two mounting holes of rear muffler at the same time. And install nuts on both ends for tightening.

Torque: 45 ± 5 N · m

(2) Connect the particulate filter and front muffler assembly to vehicle body hanger block.

(3) Install the differential sampling pipe joint and fixing bracket.
(4) Install the GPF exhaust temperature sensor.
(5) Install the downstream oxygen sensor.

4.13 Rear Muffler Assembly (2WD Model)

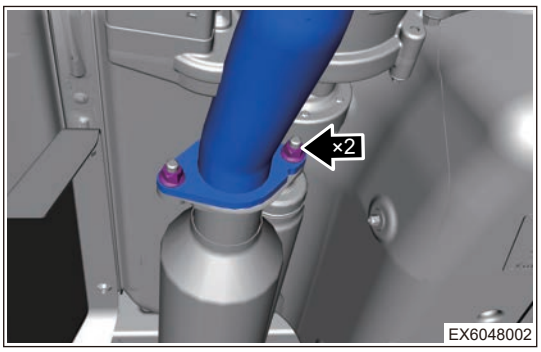
■ Removal

⚠ Warning

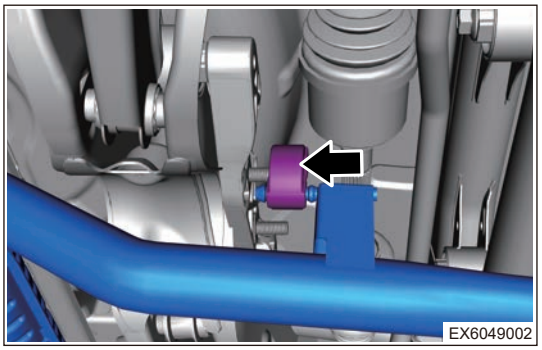
- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing rear muffler assembly.**
- **Appropriate force should be applied, when removing rear muffler assembly. Be careful not to operate roughly.**

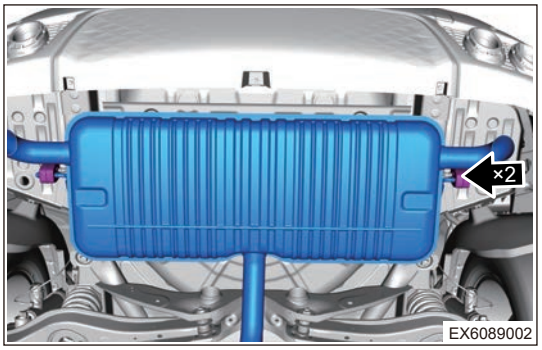
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.

(3) Remove 2 fixing nuts between particulate filter and front muffler assembly and rear muffler.



(4) Disengage 3 fixing hanger blocks from rear muffler assembly.





(5) Carefully remove the rear muffler assembly.

■ Installation

(1) Install 3 fixing hanger blocks on rear muffler.

(2) Tighten 2 fixing nuts between rear muffler and particulate filter and front muffler assembly.
Torque: 45 ± 5 N · m

4.14 Rear Muffler Assembly (4WD Model)

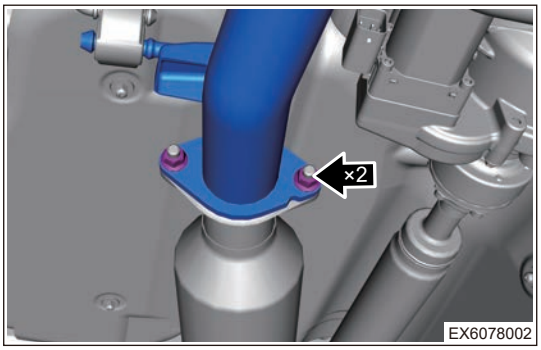
■ Removal

⚠ Warning

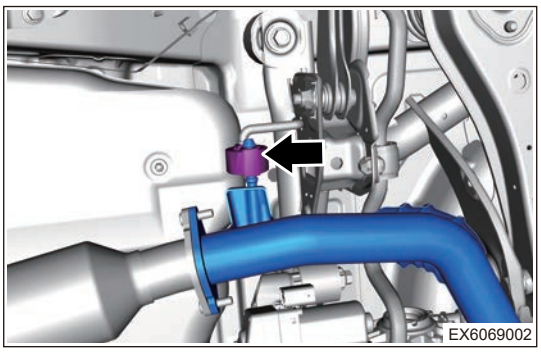
- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing rear muffler assembly.**
- **Appropriate force should be applied, when removing rear muffler assembly. Be careful not to operate roughly.**

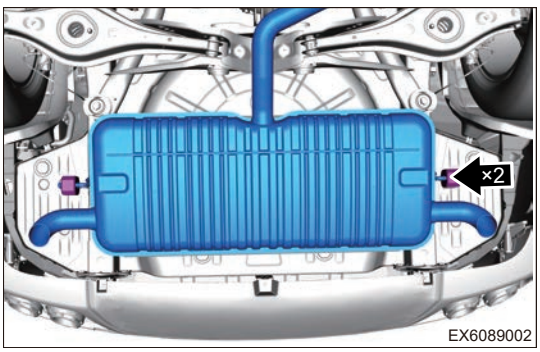
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.

(3) Remove 2 fixing nuts between particulate filter and front muffler assembly and rear muffler.



(4) Disengage 3 fixing hanger blocks from rear muffler assembly.





(5) Carefully remove the rear muffler assembly.

■ Installation

(1) Install 3 fixing hanger blocks on rear muffler.

(2) Tighten 2 fixing nuts between rear muffler and particulate filter and front muffler assembly.
Torque: 45 ± 5 N · m

4.15 Center Passage Heat Insulator

■ Removal

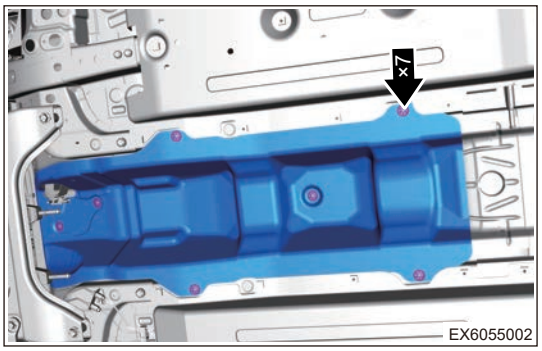
⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing center passage heat insulator assembly.**
- **Appropriate force should be applied, when removing center passage heat insulator assembly. Be careful not to operate roughly.**

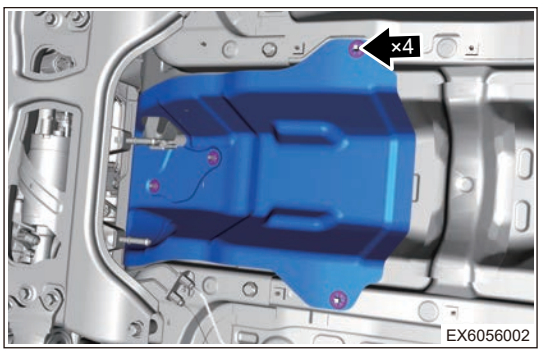
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front muffler assembly.
(4) Remove the propeller intermediate shaft assembly. (If equipped)

(5) Disconnect the differential sensor connector.
(6) Disengage differential sensor connector wire harness fixing clip.

(7) Remove 7 clamping washers from center passage heat insulator (2WD model).



(8) Remove 4 clamping washers from center passage heat insulator (4WD model).



(9) Remove center passage heat insulator carefully.

■ Installation

(1) Install 7 clamping washers to tighten center passage heat insulator (2WD model).
(2) Install 4 clamping washers to tighten center passage heat insulator (4WD model).
(3) Connect the differential sensor connector, and fasten wire harness fixing clip.
(4) Install the propeller intermediate shaft assembly. (If equipped)
(5) Install the front muffler assembly.

4.16 Rear Muffler Heat Insulator

■ Removal

⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing rear muffler heat insulator.**
- **Appropriate force should be applied when removing rear muffler heat insulator. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear muffler assembly.

(4) Remove 4 hexagon nuts and bowl washer set from rear muffler heat insulator.

(5) Remove the rear muffler heat insulator carefully.

■ Installation

(1) Install 4 hexagon nuts and bowl washer set.
(2) Install the rear muffler assembly

2.5 IGNITION SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) It is prohibited to use short circuit spark test to test ignition function during repair, otherwise it may damage the module.

(2) During using, do not remove ignition coil from spark plug with bare hands with power on, and do not contact the metal part and rubber guide rod directly, to avoid electric shock.

(3) Make sure that ground wire of ignition coil assembly is short to the nearest GND separately from ECU and other electrical device to reduce signal interfere as possible.

(4) Ensure that connector or wire harness has no damage; the wire harness connector is connected correctly. Ensure that wire harness and connector have no short circuit or poor contact.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) DO NOT remove the spark plugs when engine is hot; failure to do this may cause damage to the spark plug thread holes on cylinder head.

(2) When installing spark plug and ignition coil, check if there are impurities in cylinder head mounting holes, and if the inner wall is smooth.

(3) Do not make paint mark on spark plug assembly ceramic body. If there is paint or other organic mark, it is necessary to clean. Never apply grease such as lubricant and anti-rust oil etc. on spark plug assembly. If so, it is required to clean it.

(4) Before removal, remove the dirt and foreign matter around ignition coil and ignition coil mounting hole to prevent them from dropping into cylinders.

(5) After removing or when replacing ignition coil, do not place ignition coil on the ground or other dusty places, otherwise, dust or foreign matter may enter rubber guide and lead to ignition coil failure.

(6) When replacing spark plug, remove and install ignition coil carefully. Do not rotate ignition coil (avoid scratching rubber guide).

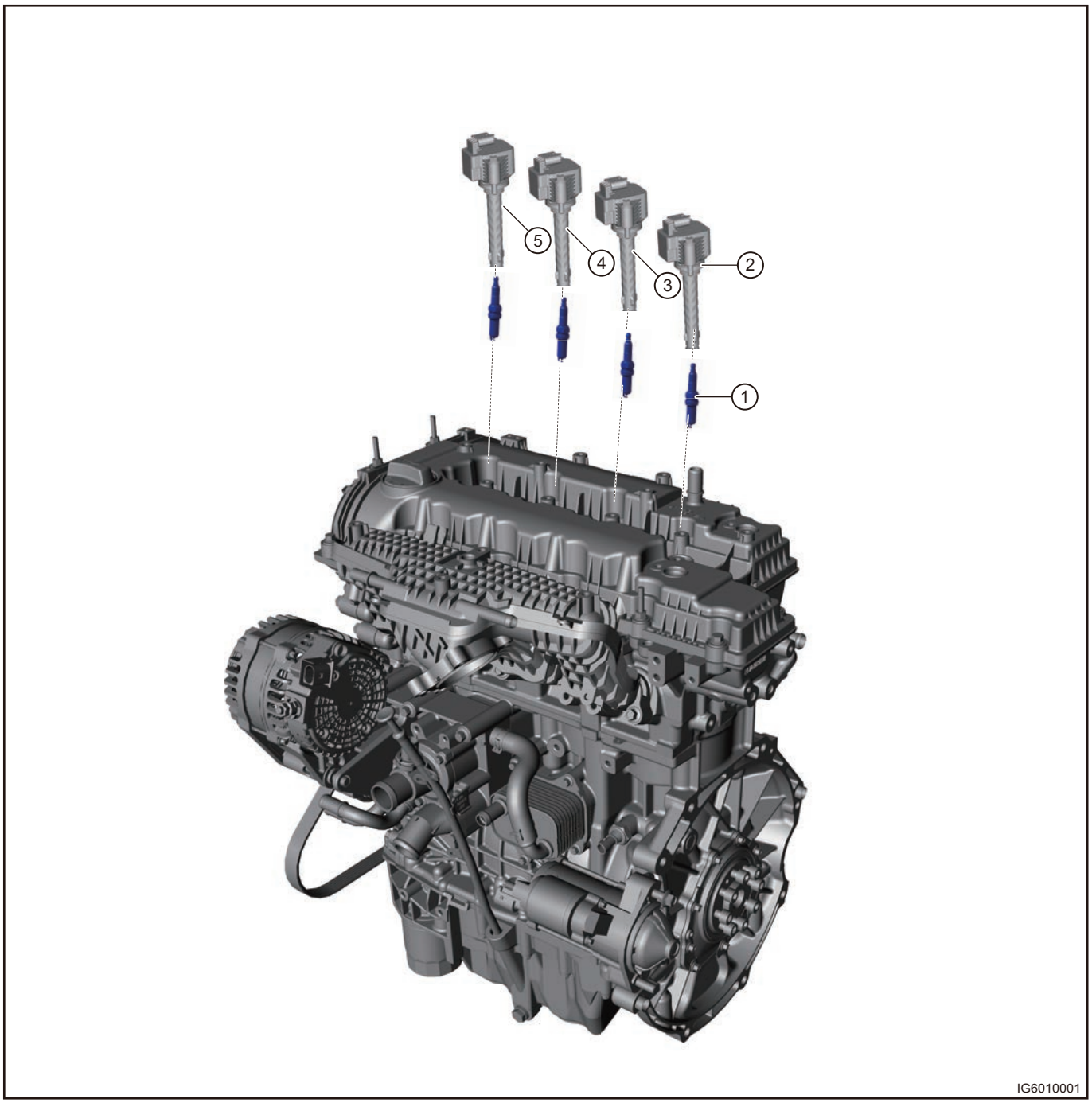
(7) Do not separate ignition coil rubber guide and ignition coil body. If so, it may cause the decrease of seal performance and fuel gas enter and corrode inner structure when reinstalling.

2 System Overview

2.1 System Description

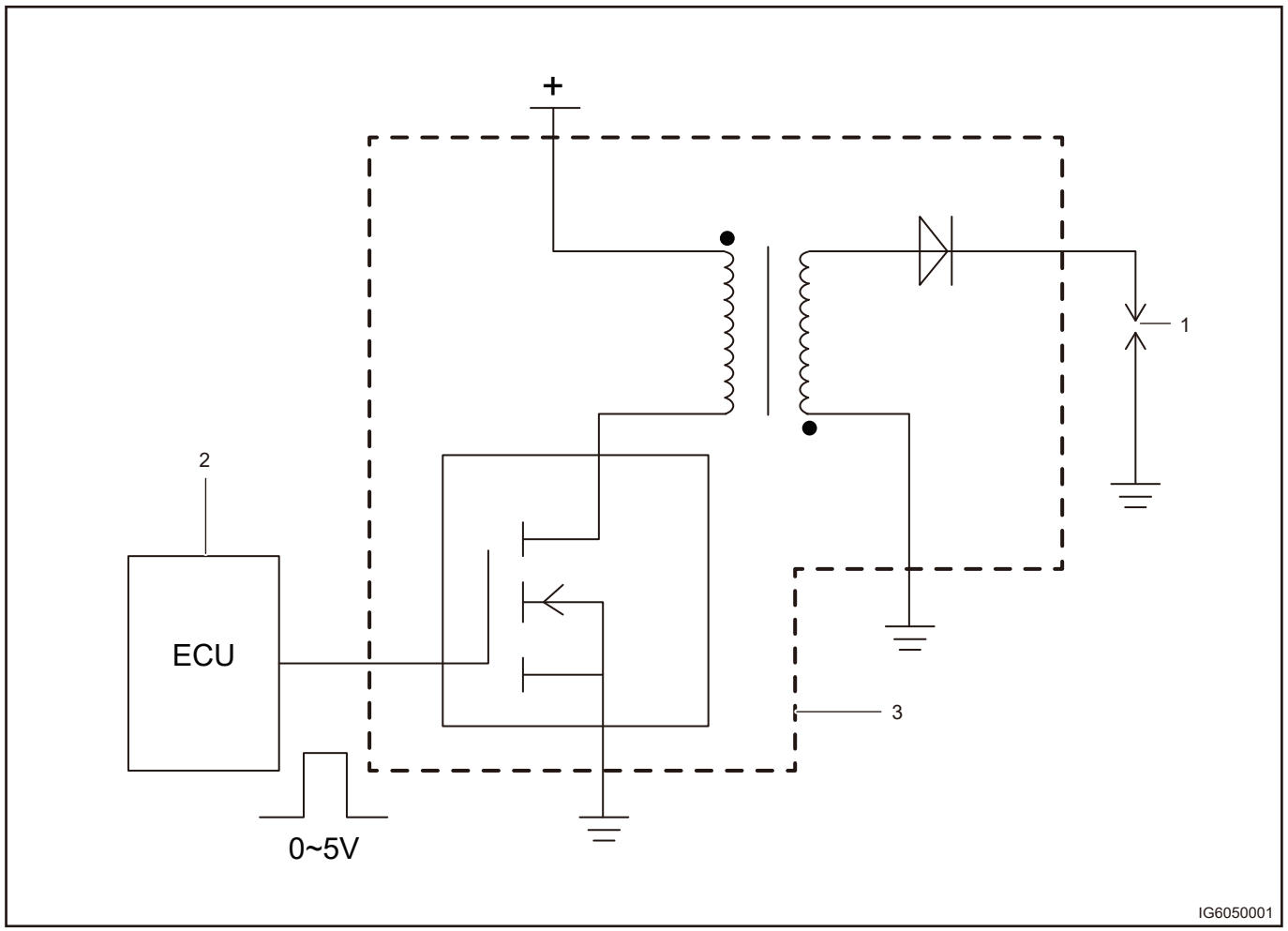
Ignition system mainly consists of sensors, engine control module, ignition coils (integrated drive module can not be disassembled), spark plugs, etc.
Ignition coil integrated drive module uses 4-line coil-on-plug system, and has over current and overtime protection function.
The secondary (secondary high-voltage terminal) of each ignition coil is connected to spark plugs in engine cylinder respectively via high-voltage damping anti-interference rubber connecting rod. Ignition coil primary (-original low-voltage terminal) is controlled by the internal integrated drive module via the pulse signal command issued by the engine control module (working state: power on, power off).
Engine control module receives the top dead center position of each cylinder piston via camshaft position sensor, and uses the speed sensor signal to issue pulse drive command. Correct ignition advance angle according to knock sensor signal. Make ignition system operate normally.

2.2 System Components Diagram



1	Spark Plug	4	Cylinder 2 Ignition Coil Assembly
2	Cylinder 4 Ignition Coil Assembly	5	Cylinder 1 Ignition Coil Assembly
3	Cylinder 3 Ignition Coil Assembly		

2.3 System Schematic Diagram



1	Spark Plug	3	Ignition Coil
2	Engine Control Unit		

2.4 Components Description

■ Ignition coil

Ignition coil consists of primary winding, secondary winding, integrated module, iron core and housing etc. When the ground circuit of a primary winding is on, this primary winding starts charging (magnetizing). When ECU cut off pulse signal (high level to low level) circuit, charging (magnetizing) is terminated. At this time, high voltage will be induced in the secondary winding by the magnetic field coupling. In the process of passing the spark plug circuit, the spark plug will discharge (ignition).

■ Spark plug

Spark plug consists of wired nut, insulator ceramic body, wired screw, central electrode, side electrode (the side electrode is wield to case) and case.
The high-voltage current passes through the center electrode of the spark plug to the side electrode ,which forms a circuit. In this process, the high-voltage current break through the air to produce sparks, that is, ignite the combustible mixture in the cylinder.

3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Ignition System

Symptom	Possible Cause
Stall	Ignition coil
	Camshaft position sensor
	Spark plug
	Intake camshaft phaser control valve
	Exhaust camshaft phaser control valve
	Wire harness
	ECU
Knock	Ignition coil
	Knock sensor
	ECU
Difficult to start	Battery
	Ignition coil
	Spark plug
	Engine speed sensor
Engine hesitation, power drop, unstable performance	Ignition coil
	Intake camshaft phaser control valve
	Exhaust camshaft phaser control valve
	Engine speed sensor
	Spark plug
	Camshaft position sensor

Symptom	Possible Cause
	ECU

3.2 Spark Plug Common Problems

■ OK

Spark plug porcelain small end is between white and yellowish, gray or brownish.
Air-fuel ratio and ignition time are normal, there is no misfire, and cold-start enriching function is normal.

■ Carbon accumulation

A layer of velvety black charcoal smoke attaches on the insulator small end, electrode and spark plug body		
Cause	Result	Treatment
Mixture is excessively rich due to improper adjustment of air fuel mixture.	Poor starting ability	Check air filter and adjust air-fuel ratio and cold starting system.
Traveling distance of vehicle is too short, engine temperature is low, and combustion is incomplete.		
Fuel quality is poor or fuel deteriorates, fuel is abnormal.		
Spark plug type is incorrect.		

■ Oil dirt

A layer of black oily charcoal smoke and dirt attach on the insulator small end, electrode and spark plug body		
Cause	Result	Treatment
Piston ring has bad elasticity or is worn excessively, and oil breaks into combustion chamber.	Difficult to start.	Check and repair engine, or replace spark plug.
Excessive matching clearance between piston skirt and cylinder wall causes oil breaking and air leakage.		
Air leakage occurs due to incorrect installation of piston ring in direction of inside and outside tangent angle, causing oil breaking into combustion chamber.		
Excessive clearance occurs between valve stem and valve guide due to excessive wear, or valve guide oil seal fails, causing oil leakage.		
Oil level is too high and oil breaks into combustion chamber.		

■ Lead deposits

Brownish yellow enamels or greenish deposits exist on the insulator small end		
Cause	Result	Treatment
The fuel additive contains lead, when engine runs under high load conditions with throttle partially opened for a long time, enamel is formed.	Causing misfire	Replace spark plug

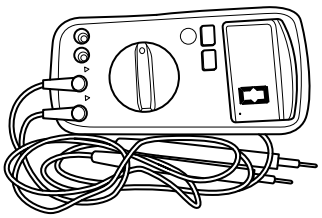
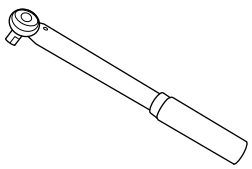
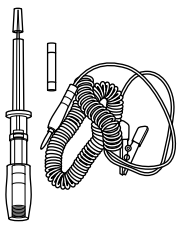
■ **Red deposits**

There are severe red brown deposits on insulator skirt and electrodes, and clear radial discharge traces can be seen on the surface of insulator small end		
Cause	Result	Treatment
In the unleaded gasoline, Mn-based anti-riot agent MMT is used instead of lead tetraethyl, the oxide of Mn after combustion adheres on the surface of insulator and electrode.	At high temperature, these deposits are easily conductive, resulting in flashover on insulator skirt surface, unstable combustion, high engine speed, and jitter under heavy load conditions.	Use qualified fuel, replace spark plug.

4 On-vehicle Service

4.1 Tools

■ **General Tools**

Tool Name	**Tool Drawing**
Digital Multimeter	 S00002
5 - 25 N·m Torque Wrench	 S00079
LED Test Light	 S00077

4.2 Ignition Coil Assembly

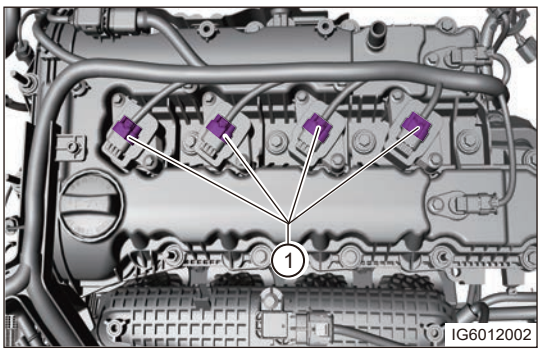
■ Removal

⚠ Warning

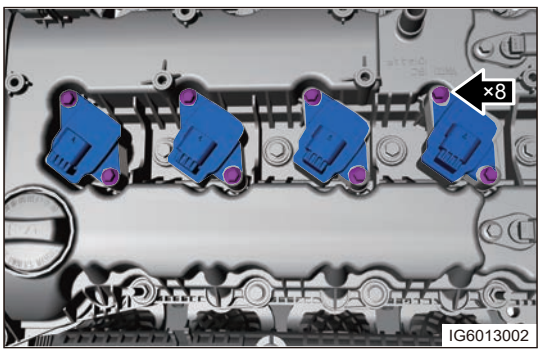
- **Appropriate force should be applied, when removing ignition coil assembly. Be careful not to operate roughly.**
- **It is prohibited to use short circuit spark test to test ignition function during repair, otherwise it may damage the module.**
- **During using, do not remove ignition coil from spark plug with bare hands with power on, and do not contact the metal part and rubber guide rod directly, to avoid electric shock.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the engine trim cover.

(5) Disconnect the ignition coil assembly connectors (1), and move away the wire harness connectors from ignition coil.



(6) Remove 8 fixing bolts from ignition coil assembly (8# socket wrench).



(7) Remove the ignition coil assembly.

⚠ Caution

- **After removing ignition coil, do not place ignition coil on the ground or other dusty places, otherwise, dust or foreign matter may enter rubber guide and torsion ignition coil failure.**
- **Remove ignition coil carefully without rotating ignition coil (avoid scratching rubber guide).**
- **Do not separate ignition coil rubber guide and ignition coil body. If so, it may cause the decrease of seal performance and air oil enter and corrode inner structure when reinstalling.**

■ Inspection

⚠ Caution

- **It is prohibited to use short circuit spark test to test ignition coil performance, otherwise it may cause damage to electronic controller.**
- **During inspection, do not remove ignition coil from spark plug with bare hands with power on, and do not contact the metal part and rubber guide rod directly, to avoid electric shock.**

Terminal	Terminal Definition
1	Ground
2	Ground
3	Power Supply
4	Pulse Drive Signal

(1) Use a digital multimeter to measure if ignition coil power supply/ground is normal.

(2) Use LED test light to measure the pulse drive signal of ignition coil and obverse if LED test light flashes.

(3) The ignition coil assembly can be exchanged for each cylinder to judge if the ignition coil assembly is in good condition.

■ Installation

⚠ Caution

- **Make sure that ground wire of ignition coil assembly is short to the nearest GND separately from ECU and other electrical device to reduce signal interfere as possible.**
- **Ignition coil assembly rubber guide rod end is applied with specified grease of its self, which can help in assembly of ignition coil assembly and spark plug assembly. Do not remove it arbitrarily.**
- **Make sure that the connection of ignition coil high-voltage output terminal and spark plug is reliable, or it may cause high-voltage leakage, resulting in poor ignition.**
- **Before installation, check the mounting hole of cylinder head spark plug, and no impurities can be brought in during assembly.**
- **Install the ignition coil into cylinder head cover mounting hole and press it to close to mounting boss on cylinder head cover. Never turn ignition coil to left/right after pressing and do not tap ignition coil with a hammer etc.**
- **To prevent accidental scratches to ignition coil assembly, do not allow sharp edge to contact with rubber guide rod under ignition coil assembly during installation.**

(1) Install 8 fixing bolts on ignition coil assembly.

Torque: 8 ± 3 N · m

(2) Connect the ignition coil assembly connector.

(3) Install the engine trim cover.

(4) Install the engine compartment trim cover assembly.

4.3 Spark Plug Assembly

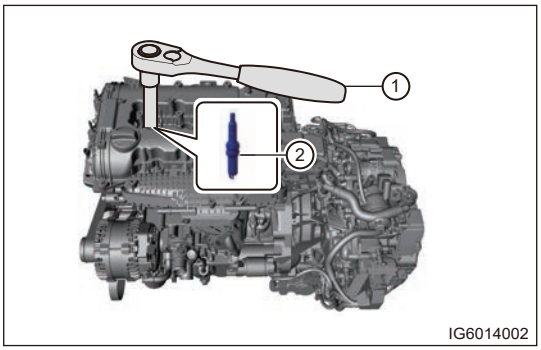
■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing spark plug.**
- **Appropriate force should be applied when removing spark plug. Be careful not to operate roughly.**
- **DO NOT remove the spark plugs when engine is hot; failure to do this may cause damage to the spark plug thread holes on cylinder head.**
- **Before removal, remove the dirt and foreign matter around spark plug holes to prevent them from dropping into cylinders.**

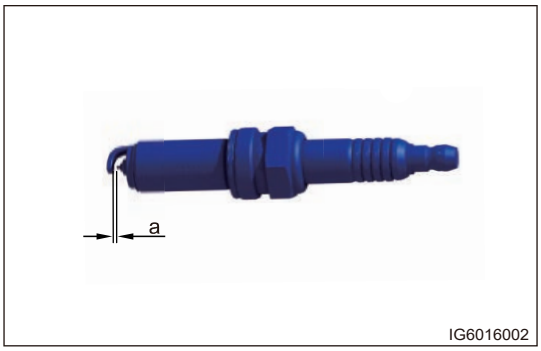
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the engine trim cover.
(5) Remove the ignition coil assembly.

(6) Using a special spark plug socket ratchet wrench (1), loosen the spark plug.
(7) Remove the spark plug (2).



■ Inspection

(1) Check the spark plug gap a: 0.7 - 0.8 mm
  - It is not necessary to adjust the gap.



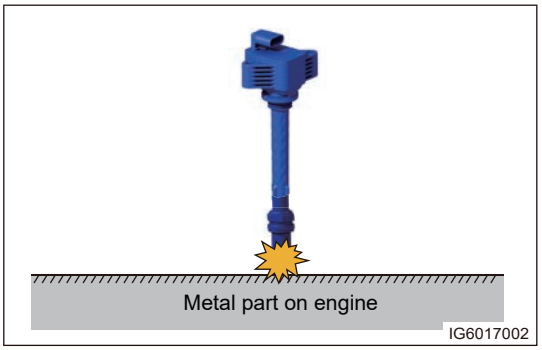
■ Spark jump test method

(1) Remove the spark plug from engine and connect it to high-voltage cable, put the spark plug case 5 - 7 mm away from engine body and start vehicle to check the spark jump.

⚠ Warning

- **Always disconnect the injector circuit before test to avoid injection during spark jump test.**

(2) If there is a thick spark with blue-white color and popping occurs between spark plug and engine body and also spark generated between center electrode and side electrode, that indicates ignition system is normal.



(3) If the spark is red and short or there is no spark, check ignition coil wire and ECU.

■ **Installation**

⚠ Caution

- **Check the spark plug type to confirm if it is suitable.**
- **Check if there is impurities in cylinder head mounting holes, the inner wall is smooth.**
- **Do not make paint mark on spark plug assembly ceramic body. If there is paint or other organic mark, it is necessary to clean. Never apply grease such as lubricant and anti-rust oil on spark plug assembly. If so, it is required to clean it.**
- **Please install spark plug with a special spark plug socket, and never damage the normal spark plug gap.**
- **Avoid to install the spark plug from higher position from mounting hole during installation to prevent spark plug side electrode gap from damaging, resulting in poor ignition.**
- **Always tighten the spark plug according to specified torque using a torque wrench when installing it.**

(1) Install 4 spark plugs respectively into the cylinder head mounting holes for pre-tightening tighten, and then retighten the spark plugs with a torque wrench.

Torque: 20 ± 3 N · m

(2) Install the ignition coil assembly.

(3) Install the engine trim cover.

(4) Install the engine compartment trim cover assembly.

2.6 EMISSION CONTROL SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.

(2) Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Specified grease must be used and use of other grease will lead to oxygen sensor poisoning. New parts has been applied with grease and grease must be applied on mounting threads during assembling.

(2) Wasted activated canister assembly should be handled by the specialized department according to local laws and regulations. Never discard it at will.

(3) If oxygen sensor falls, never pick it up to install and it need to return to factory for testing.

2 System Overview

2.1 System Description

Emission control system includes: Fuel vapor recovery/leakage diagnosis system, exhaust emission conversion system, Gasoline Particulate Filter (GPF) system and crankcase forced ventilation system.

(1) The function of fuel vapor recovery/leakage diagnosis system: Fuel vapor (HC) is recovered and inhaled into engine cylinder for combustion, which can reduce emission and improve fuel economy. According to National VI regulation, fuel vapor recovery system adds leakage diagnosis function, the generated fuel vapor is not allowed to leak into atmosphere in the process of recovery, desorption and refilling etc. The system judge whether it leaks according to leakage diagnosis test. Once leakage occurs, the system will turn on malfunction light to warn and avoid polluting environment.

(2) The function of exhaust emission conversion system: Through front and rear oxygen sensors determine whether oxygen is excess (namely oxygen content) in exhaust gas after engine combustion, convert oxygen content into voltage signal and transmit to alternator computer, then engine can realize closed-loop control which aims at excess air coefficient. Make sure three-way catalytic converter can convert harmful gases such as CO, HC and NOX from exhaust gas into harmless carbon dioxide, water and nitrogen by oxidation and reduction. Avoid polluting environment.

(3) The function of Gasoline Particulate Filter (GPF) system: According to National VI regulation, GPF is added in order to avoid the emission of gasoline particulates, which can reduce the particulates leaked into the air and avoid polluting environment.

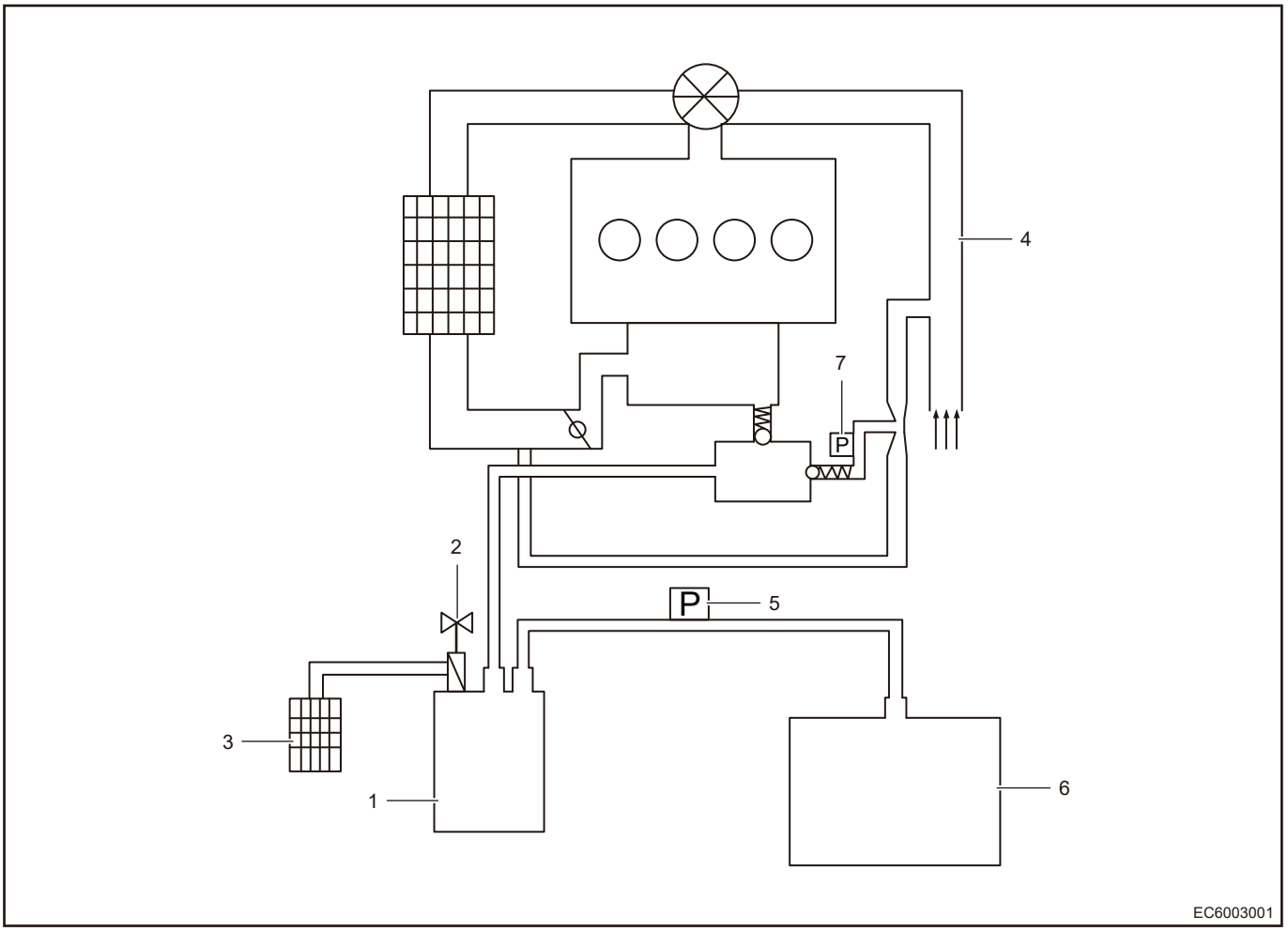
(4) The function of crankcase forced ventilation system: The air in cylinder leaks into crankshaft space during normal engine operation. The leaked air contains unburned fuel and all exhaust air contents, which will cause the deterioration of lubricant and increase of crankshaft pressure and temperature. In order to avoid this, the gas leaked into crankshaft is inhaled into cylinder for combustion and recover HC, which reduces the air pollution.

2.2 System Components Diagram

1	Canister Solenoid Valve Assembly	6	Exhaust Temperature Sensor
2	Upstream Oxygen Sensor	7	Activated Canister Cut-off Valve
3	Charcoal Canister Solenoid Valve Outlet Pipe	8	Activated Charcoal Canister Breather Pipe
4	Downstream Oxygen Sensor	9	Activated Canister Assembly
5	Pressure Difference Sensor	10	Dust Filter

2.3 System Schematic Diagram

■ Fuel vapor recovery/leakage diagnosis system

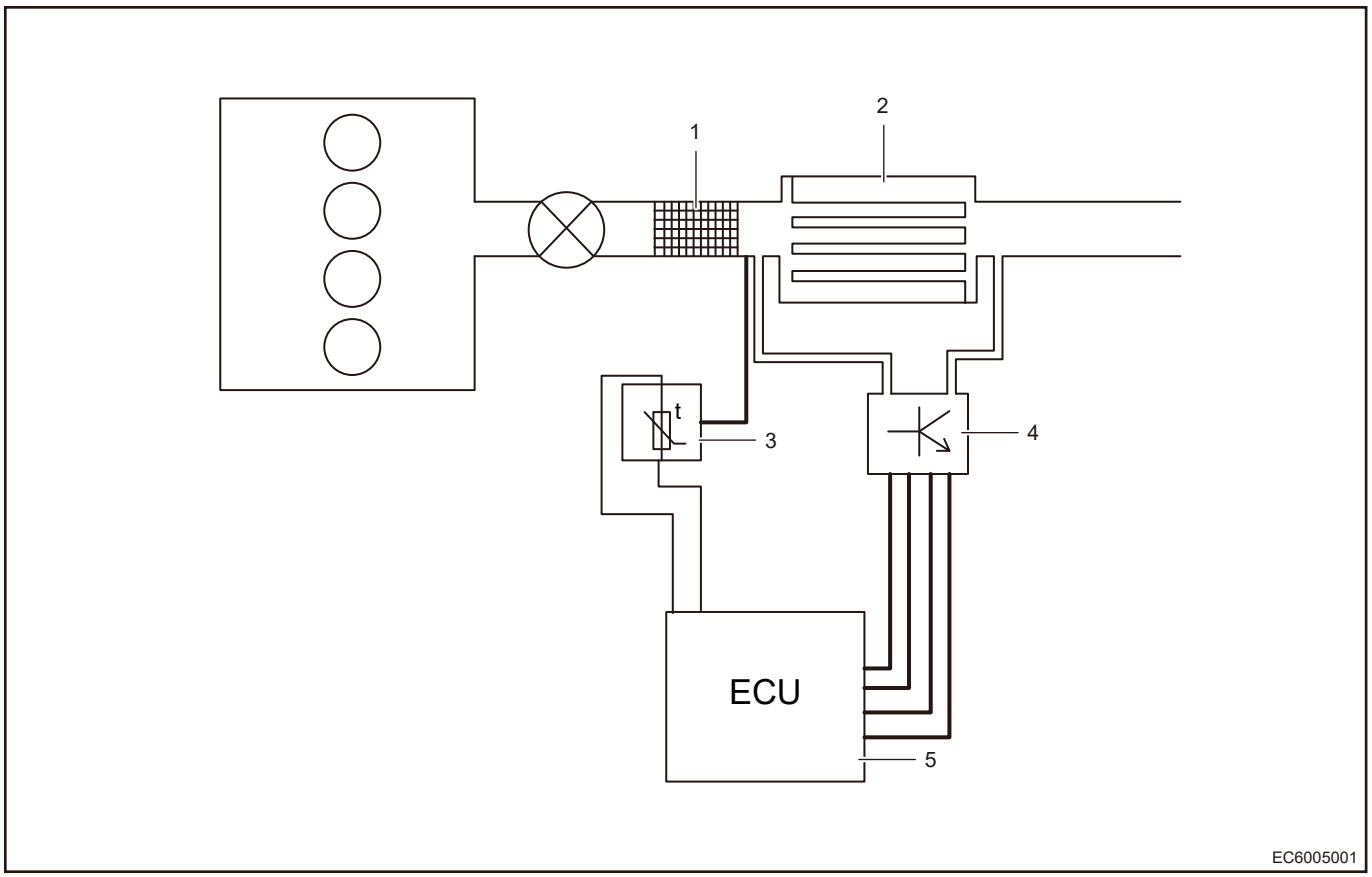


1	Activated Canister Assembly	5	Fuel Tank Pressure Sensor
2	Activated Canister Cut-off Valve	6	Fuel Tank Assembly
3	Dust Filter	7	Canister Desorption Pressure Sensor
4	Intake Hose Assembly		

Two desorption pipelines are equipped in fuel vapor recovery system. One desorption pipeline is connected to intake manifold through charcoal canister solenoid valve, which is low load desorption pipeline. Another desorption pipeline is connected to intake hose through canister solenoid valve pipeline (venturi tube), which is high load desorption pipeline.

Principle of fuel vapor leakage diagnosis: After closing the charcoal canister ventilation valve, pump the fuel tank into a certain negative pressure through the intake manifold vacuum degree. If the negative pressure cannot be established, it is considered that there is a large leakage, i.e. a coarse leakage. Then close the charcoal canister solenoid valve, and form a closed space between charcoal canister solenoid valve rear pipe and fuel tank. When there are holes and no holes, the attenuation gradient of vacuum degree in this closed space is different, so it can be judged whether there is leakage.

■ **Gasoline Particulate Filter (GPF) system**



1	Precatalytic Converter Assembly	4	Pressure Difference Sensor
2	Gasoline Particulate Filter	5	Engine Control Unit
3	Exhaust Temperature Sensor		

GPF is a ceramic filter installed in gasoline engine emission system, which can capture gasoline particulates before they enter the atmosphere.
Although GPF can capture the gasoline particulates in exhaust gas effectively, with the increase of captured gasoline particulates, exhaust back pressure will increase, which will effect the vehicle power and economy. When particulates in GPF are accumulated to a certain extent, particulates in GPF will be oxidized and burned by adjusting engine operation condition (such as fuel cut-off, delayed ignition angle), ECU controls the regeneration of GPF and remove particulates in GPF, and finally realize positive cycle of “capture-regeneration-capture”.

2.4 System Components Description

■ **Canister desorption pressure sensor**

As a varistor type, the sensor mainly detects whether the pressure (negative pressure) in high load desorption pipeline meets charcoal canister desorption requirement. Thereby complete high load desorption.

■ Fuel tank pressure sensor

As a varistor type, the sensor mainly detects the pressure change in the fuel tank to determine whether the fuel vapor in the charcoal canister is absorbed and saturated, and whether there is leakage in the fuel vapor system.

■ Canister solenoid valve outlet pipe (Venturi tube)

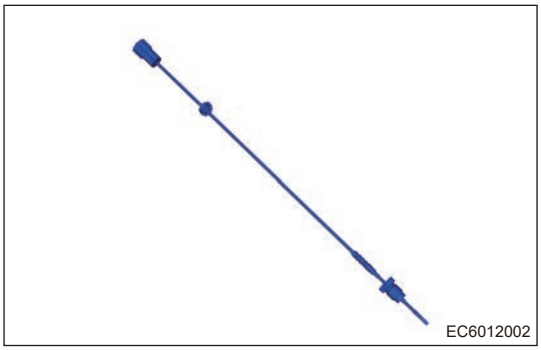
Venturi effect is adopted in the venturi tube. The principle of venturi tube is to change the air flow from coarse to fine, so as to speed up the air flow rate and form a "vacuum area" at the rear side of venturi tube outlet; this vacuum area will produce certain adsorption to the outside. Thereby complete high load desorption.

■ Pressure difference sensor

The sensor is a dual-mode differential pressure sensor, and the output dual-mode signals are digital signals, which mainly detects pressure difference between the two ends of GPF, so as to indirectly judges the amount of captured particulates. Realize the “regeneration” condition.

■ Exhaust temperature sensor

The sensor is a positive temperature coefficient thermistor (PTC) whose resistance value becomes larger as the temperature increases and becomes smaller as the temperature decreases; It mainly detects GPF inlet temperature and make sure GPF can regenerate safely.



■ Canister solenoid valve

Canister caniste solenoid valve consists of solenoid coil, armature, valve body and other parts, and it is controlled by ECU by means of duty ratio control.

■ Activated canister assembly

The inside of charcoal canister is filled with active carbon with strong adsorption. The excess fuel vapor in fuel tank is no longer discharged into the atmosphere, but introduced into the charcoal canister by hose. The active carbon absorbs the fuel vapor. When it meets engine desorption conditions, the charcoal canister solenoid valve is opened, and the absorbed fuel vapor is poured into the intake manifold for combustion, so as to achieve the purpose of fuel saving and environmental protection.

■ Activated canister cut-off valve

This valve is a normally open valve, which closed when energized. When it is closed while performing fuel vapor leakage diagnosis, the vent of charcoal canister to the atmosphere is cut off.

■ Upstream oxygen sensor

The upstream oxygen sensor is a ceramic body and is integrated with a micro pump for oxygen ion transportation. The pump supplies enough oxygen to the electrode on the exhaust gas contact side to keep the voltage on both sides constant, about 450 mV. The electronic controller converts the power consumption of pump into excess air coefficient. The output current is almost linearly related to λ, and λ = 0.65 ~ infinity, so it is also called a linear oxygen sensor. It can not only determine whether λ is greater than 1 or less than 1. Moreover, the specific value of λ can be measured in the lean and rich regions, so that the excess air coefficient in a larger range (i.e. broadband) can be measured, and continuous control of λ < 1 to λ > 1 can be realized.

■ **Downstream oxygen sensor**

The sensing element of downstream oxygen sensor is a ceramic flat body with pores. The outer side of ceramic is surrounded by engine exhaust, and the inner side is open to atmosphere. Sensing ceramic body wall is a type of solid electrolyte with heating electrodes inside. Operation of oxygen sensor is realized by converting the concentration difference of oxygen ions inside and outside the sensing ceramic body into voltage signals for output. When the temperature of sensing ceramic body reaches 350 ˚C, it has the characteristic of solid electrolyte. Oxygen ions can freely pass through it due to special material of ceramic body. It is precisely by taking advantage of this characteristic, it converts the concentration difference into the potential difference, thus forming the electrical signal output. If the gas mixture is rich, the concentration difference of oxygen ions inside and outside of ceramics body is higher, potential difference is higher, a large amount of oxygen ions move from inside to outside, and the output voltage is higher (-approximately 800 mV - 1000 mV); If the gas mixture is lean, the concentration difference of oxygen ions inside and outside of ceramics body is lower, potential difference is lower, only a few oxygen ions move from inside to outside, and the output voltage is lower (approximately 100 mV). Signal voltage changes suddenly when near the theoretical equivalent air-fuel ratio (λ = 1).

3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Emission Control System

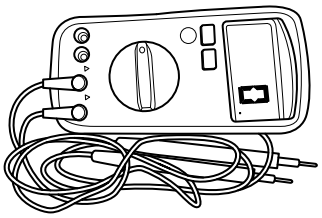
Symptom	Possible Cause
Fuel tank flat	Canister closed valve (damaged)
	Activated canister (blocked)
	Activated canister filter (blocked)
Lean mixture	Intake pressure sensor
	Oxygen sensor invalid
	Low fuel pressure in electric fuel pump
	Fuel injector blocked
Rich mixture	Fuel injector leakage
	Air filter blocked
	Oxygen sensor invalid
Lack of power	Oxygen sensor invalid
	Air flow meter malfunction
	Fuel pressure too low

Symptom	Possible Cause
	Cylinder compression pressure drop

4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002

4.2 Canister Solenoid Valve

■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing charcoal canister solenoid valve.**
- **Appropriate force should be applied, when removing charcoal canister solenoid valve. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the negative battery cable.

(4) Disconnect the charcoal canister solenoid valve connector.

(5) Disconnect the connection between fuel vapor pipe Ⅲ, charcoal canister solenoid valve outlet pipe and charcoal canister solenoid valve assembly.

(6) Remove the charcoal canister solenoid valve assembly.

■ **Inspection**

(1) Measure the resistance value of canister solenoid valve with a digital multimeter.

Measurement Temperature	Specification (Ω)
20 ℃	16 ± 2

Hint:
If resistance is not as specified, replace the canister solenoid valve assembly.

(2) Connect the positive battery to canister solenoid valve No. 1 pin and connect the negative battery to canister solenoid valve No. 2 pin. Check if the canister solenoid valve can open. After it opened, bleed air to direction of canister solenoid valve (arrow), and air flows easily.

■ **Installation**

(1) Install charcoal canister solenoid valve, and connect fuel vapor pipe Ⅲ and charcoal canister solenoid valve outlet pipe to both ends of charcoal canister solenoid valve.
(2) Connect the canister solenoid valve connector.
(3) Install the engine compartment trim cover assembly.

4.3 Canister Solenoid Valve Outlet Pipe Assembly

■ **Removal**

⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing charcoal canister solenoid valve outlet pipe assembly.** • **Appropriate force should be applied, when removing charcoal canister solenoid valve outlet pipe assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the charcoal canister desorption pressure sensor connector.

(5) Remove 1 fixing bolt from charcoal canister solenoid valve outlet pipe three way bracket.

(6) Disconnect the connection between charcoal canister solenoid valve outlet pipe and charcoal canister solenoid valve.

(7) Disconnect the connection between charcoal canister solenoid valve outlet pipe and intake manifold.

(8) Disconnect the connection between charcoal canister solenoid valve outlet pipe and charcoal canister solenoid valve outlet pipe Ⅱ.

(9) Take out the charcoal canister solenoid valve outlet pipe assembly and remove 1 fixing bolt from charcoal canister desorption pressure sensor to separate it.

■ **Installation**

(1) Install charcoal canister desorption pressure sensor and fix 1 bolt.

Torque: 8 + 3 N · m

(2) Install 1 fixing bolt to charcoal canister solenoid valve outlet pipe three way bracket.

Torque: 7 ± 1 N · m

(3) Connect the charcoal canister solenoid valve outlet pipe to charcoal canister solenoid valve.
(4) Connect the charcoal canister solenoid valve outlet pipe to intake manifold.
(5) Connect the charcoal canister solenoid valve outlet pipe Ⅱ to charcoal canister solenoid valve outlet pipe.
(6) Connect the desorption pressure sensor connector.
(7) Install the engine compartment trim cover assembly.

4.4 Charcoal Canister Solenoid Valve Outlet Pipe Ⅱ Assembly

■ **Removal**

⚠ **Caution**

- **Be sure to wear safety equipment to prevent accidents, when removing charcoal canister solenoid valve outlet pipe Ⅱ assembly.**
- **Appropriate force should be applied, when removing charcoal canister solenoid valve outlet pipe Ⅱ assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.

(3) Disconnect the connection between charcoal canister solenoid valve outlet pipe Ⅱ and charcoal canister solenoid valve outlet pipe.

(4) Disconnect the connection between charcoal canister solenoid valve outlet pipe Ⅱ and intercooler outlet pipe Ⅱ.

(5) Disconnect the connection between charcoal canister solenoid valve outlet pipe Ⅱ and intake hose.

(6) Remove canister solenoid valve outlet pipe Ⅱ assembly.

■ **Installation**

(1) Connect the charcoal canister solenoid valve outlet pipe Ⅱ to charcoal canister solenoid valve outlet pipe.
(2) Connect the charcoal canister solenoid valve outlet pipe Ⅱ to intercooler outlet pipe Ⅱ.
(3) Connect the charcoal canister solenoid valve outlet pipe Ⅱ to intake hose.
(4) Install the engine compartment trim cover assembly.

4.5 Upstream Oxygen Sensor

■ Removal

⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Appropriate force should be applied, when removing upstream oxygen sensor. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched when removing upstream oxygen sensor.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Remove the upstream oxygen sensor connector from fixing bracket and disconnect the connector.

(5) Remove the upstream oxygen sensor from front part of precatalytic converter assembly.

Hint:

- Remove it with special oxygen sensor socket.

■ **Inspection**

(1) Measure the resistance of upstream oxygen sensor with a digital multimeter.

Multimeter Connection	Pin Definition
Terminal 1	Controlled by oxygen pump
Terminal 2	(Reference ground) analog ground
Terminal 3	Heater power supply
Terminal 4	Heater control
Terminal 5	Correction resistance
Terminal 6	Reference signal

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 4	Normal temperature	4 - 5 Ω
Terminal 1 - Terminal 5	Normal temperature	114 Ω

Hint:

- If result is not as specified, replace the upstream oxygen sensor.

■ **Installation**

⚠ Caution

- **Specified grease must be used and use of other grease will lead to oxygen sensor poisoning. New parts have been applied with grease and grease must be applied on mounting threads during reassembly.**

  Material No.: 5964080112 (120 g/pot) or 5964080145 (450 g/pot)

⚠ Warning

- **If oxygen sensor falls, never install it directly.**

(1) Install upstream oxygen sensor with special oxygen sensor socket.

Torque: 45 ± 5 N · m

(2) Connect the upstream oxygen sensor connector.

(3) Install the engine compartment trim cover assembly.

4.6 Downstream Oxygen Sensor

■ Removal

⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Appropriate force should be applied when removing downstream oxygen sensor. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched when removing downstream oxygen sensor.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Raise the vehicle to a proper position.

(4) Disconnect the downstream oxygen sensor connector.

(5) Remove the downstream oxygen sensor.

Hint:

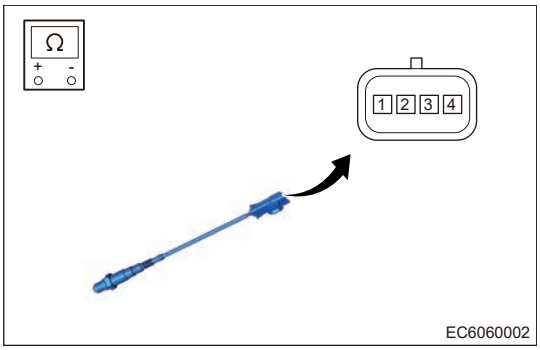
- Remove it with special oxygen sensor socket.

■ Inspection

(1) Measure the resistance of upstream oxygen sensor with a digital multimeter.

Multimeter Connection	Pin Definition
Terminal 1	Ground
Terminal 2	Signal
Terminal 3	Heating control
Terminal 4	Heater power supply

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 4	Normal temperature	5 - 22 Ω
Terminal 1 - Terminal 2	Always	No continuity
Terminal 1 - Terminal 4		
Terminal 2 - Terminal 3		
Terminal 2 - Terminal 4		



Hint:

- If result is not as specified, replace the downstream oxygen sensor.

■ Installation

⚠ Caution

- **Specified grease must be used and use of other grease will lead to oxygen sensor poisoning. New parts have been applied with grease and grease must be applied on mounting threads during reassembly.**

  Material No.: 5964080112 (120 g/pot) or 5964080145 (450 g/pot)

⚠ Warning

- **If oxygen sensor falls, never install it directly.**

(1) Install downstream oxygen sensor with special oxygen sensor socket.

Torque: 45 ± 5 N · m

(2) Install the downstream oxygen sensor connector.

4.7 Activated Canister Assembly

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when removing activated canister assembly.**
- **Appropriate force should be applied when removing activated canister assembly. Be careful not to operate roughly.**

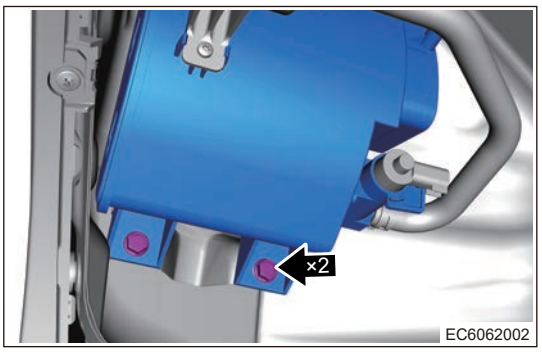
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the rear right wheel.
(5) Remove the rear right wheel house protector assembly.

(6) Disconnect the activated charcoal canister cut-off valve connector.

(7) Disconnect connection between activated charcoal canister assembly and fuel vapor pipe.

(8) Disconnect connection between activated charcoal canister assembly and charcoal canister desorption pipe.

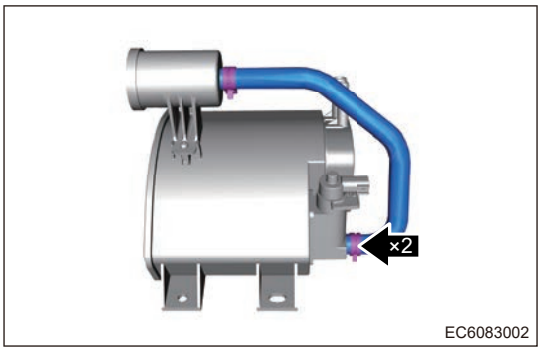
(9) Remove 2 fixing bolts and activated charcoal canister assembly.



⚠ Caution

- **Wasted activated charcoal canister assembly should be handled by the specialized department according to local laws and regulations. Never discard it at will.**

(10) Loosen 2 elastic clamps, and remove activated charcoal canister breather pipe.



(11) Remove 1 fixing bolt and remove dust filter from activated charcoal canister assembly.

(12) Remove activated charcoal canister cut-off valve from activated charcoal canister assembly.

■ Installation

(1) Install activated charcoal canister cut-off valve to activated charcoal canister assembly.
(2) Install dust filter to activated charcoal canister assembly.
(3) Connect activated charcoal canister breather pipe and install elastic clamp.
(4) Install activated charcoal canister assembly to body and tighten fixing bolt.
(5) Connect fuel vapor pipe to activated charcoal canister assembly.
(6) Connect charcoal canister desorption pipe to activated charcoal canister assembly.
(7) Connect the activated charcoal canister cut-off valve connector.
(8) Install rear right wheel house protector assembly.
(9) Install the rear right wheel.

4.8 Exhaust Temperature Sensor

■ Removal

⚠ Warning

- **Temperature of exhaust system is very high when engine is running. Before removal, make sure that engine has stopped running and exhaust system has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Appropriate force should be applied when removing exhaust temperature sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Raise the vehicle to a proper position.

(4) Disconnect the exhaust temperature sensor connector.

(5) Remove exhaust temperature sensor from front end of GPF.

■ Cleaning

(1) Heating the front end of sensor, measure resistance with multimeter ohm band. The resistance should change in accordance with temperature.
(2) Turn digital multimeter to ohm band, connect two probes to two terminals of sensor (no polarity) respectively, the normal resistance should be 200 - 230 Ω at normal temperature (0 - 40℃). If the resistance is abnormal (out of range), the performance is invalid. Abnormal conditions usually include open (resistance is ∞) or short (resistance is 0).

Temperature (°C)	Resistance (Ω)
-40	170.68
0	201.50
10	209.15
50	239.49
100	276.90

Temperature (°C)	Resistance (Ω)
150	313.72
200	349.96
250	385.61
300	420.68
350	455.16
400	489.06
450	522.37
500	555.10
550	587.24
600	618.80
650	649.77
700	680.16
750	709.96
800	739.18
850	767.81
900	795.86

■ **Installation**

(1) Install the exhaust temperature sensor.

Torque: 35 ± 5 N · m

(2) Connect the exhaust temperature sensor connector.

4.9 Pressure Difference Sensor

■ **Removal**

⚠ Warning

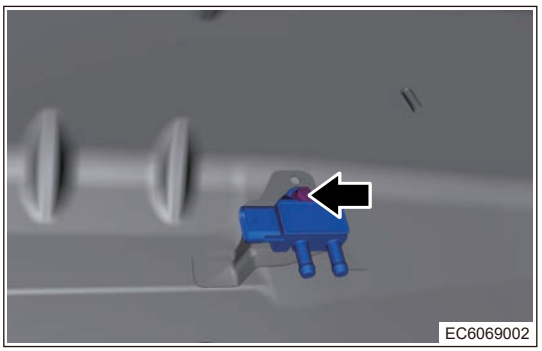
- **Be sure to wear safety equipment to prevent accidents, when removing differential pressure sensor.**
- **Appropriate force should be applied when removing pressure difference sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Raise the vehicle to a proper position.

(4) Loosen 2 elastic clamps and disconnect the connection between hose and pressure difference sensor.

(5) Disconnect the differential sensor connector.

(6) Remove 1 fixing bolt from differential sensor.



(7) Remove the pressure difference sensor assembly carefully.

■ Inspection

(1) Turn digital multimeter to ohm band, ground the black probe 3#, connect red probe to pins 1# and 2# respectively. It is normal that resistance is greater than 2.5 MΩ.

(2) Connect pin 4# VDD of sensor to 5 V power supply, pin 3# GND to ground, and connect output pins 1# and 2# through SENT signal collector (oscilloscope). At normal temperature (30 ± 10º) and normal pressure (101 kpa ± 5 kpa), the output value in decimal number 1184 ~ 1423 is normal.

Hint:
SENT is the abbreviation of Single Edge Nibble Transmission. As a point-to-point and one-way transmission scheme launched by Society of Automotive Engineers (SAE), it is used to transmit HD sensor data between vehicle sensor and electronic control unit (ECU). Sensor data is transmitted through a series of pulse sequence between two falling periods. SENT provides a reference calibration pulse at the beginning of signal and provides a check bit at the end. The length of message varies with half bit value. As a new interface standard of vehicle sensor, compared with analog output and PWM output, SENT (SAE J2716) has a good EMC performance with low cost which saves wire harness and pin connector, and it can transmit DTC, so that sensor system has an excellent malfunction diagnosis ability.

■ **Installation**

(1) Install 1 fixing bolt to pressure difference sensor.

Torque: 9 ± 1.5 N · m

(2) Connect the differential difference sensor connector.
(3) Connect hose to pressure difference sensor and install elastic clamp.

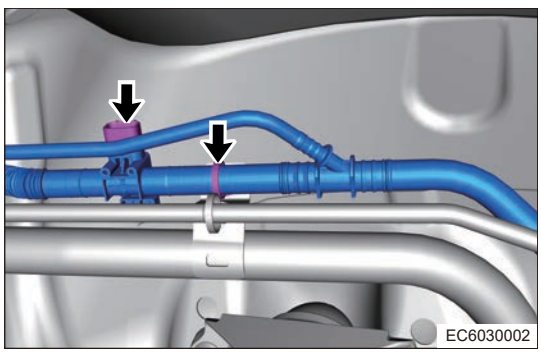
4.10 Fuel Tank Pressure Sensor

■ **Removal**

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing fuel tank pressure sensor.**
- **Appropriate force should be applied when removing fuel tank pressure sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear right wheel.
(4) Remove the rear right wheel house protector.
(5) Disconnect connection with activated charcoal canister assembly.
(6) Disconnect connection with filler tube assembly.
(7) Disconnect fuel tank pressure sensor connector.
(8) Disengage fixing clip with filler pipe assembly.



(9) Disconnect connection with fuel vapor pipe, and disengage fixing clip.

(10) Remove the fuel vapor pipe with fuel tank pressure sensor assembly.

■ **Installation**

⚠ Caution

- **Before connecting the hose, check if there is any damage or foreign matter on the hose or joint.**
- **When pipe is connected using quick connector, pay attention to the fitting size and direction of the connector. During assembly, install the male connector into place along the axis direction of quick connector until it is bounced into mechanically and a "click" sound is heard. In order to check if the installation is in good condition, pull it forcibly in reverse direction.**

(1) Connect the fuel tank pressure sensor connector.
(2) Install rear right wheel house protector.
(3) Install the rear right wheel.

2.7 COOLING SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. Otherwise, the high-pressurized hot engine coolant and steam may flow out and cause serious burns.

(2) If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) When testing cooling system, please pressurize the system to specified pressure. Otherwise, system components may be damaged.

(2) DO NOT mix different colors or types of coolant.

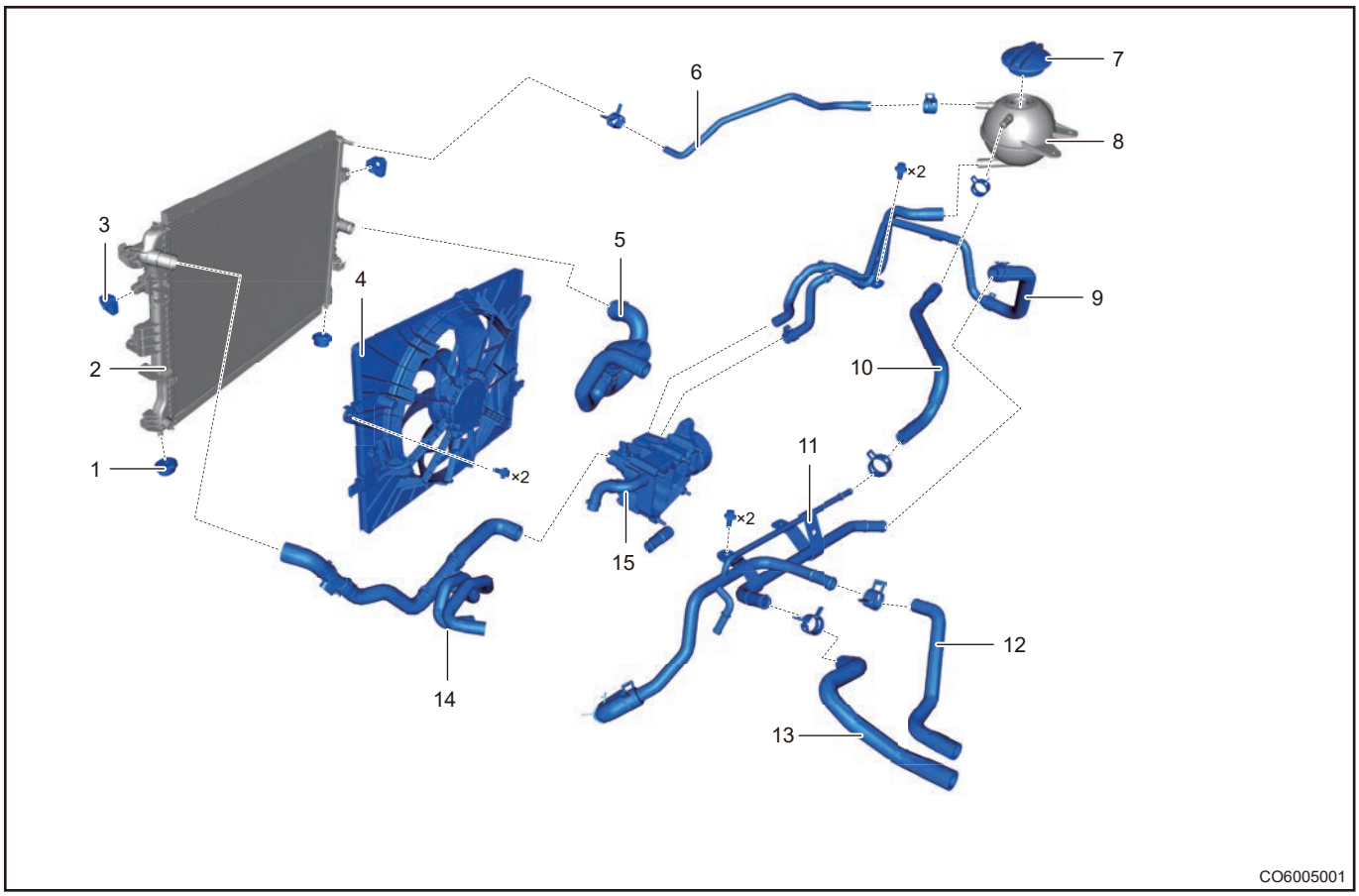
(3) Please select coolant which is suitable for local climate in different areas.

2 System Overview

2.1 System Description

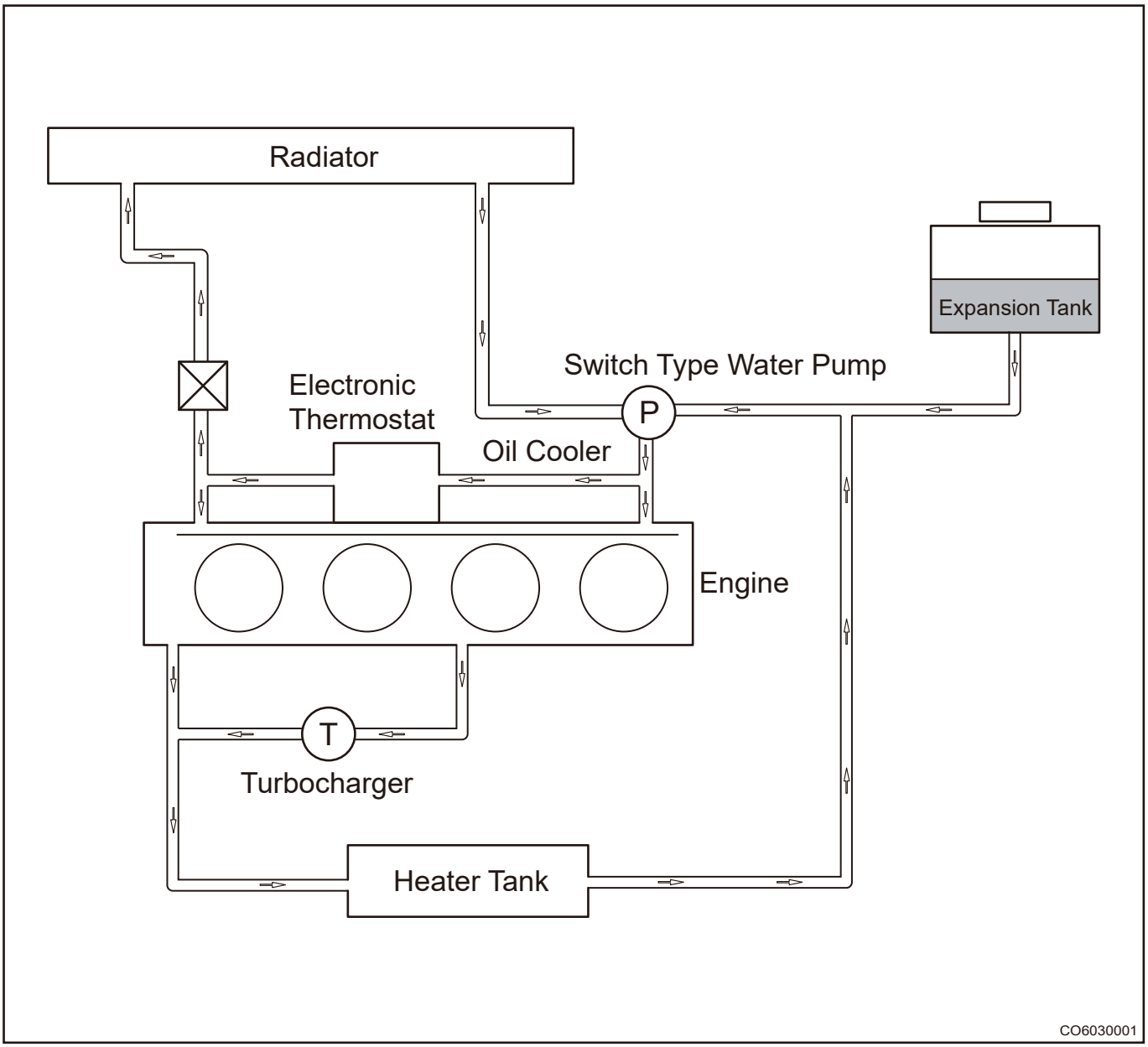
Engine cooling system adjusts engine operating temperature by the flow of coolant and makes engine operate normally under various operating conditions. And effectively improve the service life and fuel economy of the engine.

2.2 System Components Diagram



1	Rubber Cushion	9	Expansion Tank Inlet Pipe Assembly
2	Radiator Assembly	10	Water Pipe - Engine to Expansion Tank
3	Rubber Bush	11	Cooling Pipe Assembly
4	Cooling Fan Assembly	12	Heating Inlet Pipe
5	Engine Outlet Pipe - Front/Rear	13	Heating Outlet Pipe
6	Water Pipe - Radiator to Expansion Tank	14	Engine Inlet Pipe
7	Expansion Tank Cap	15	Water Pump Module
8	Expansion Tank Body		

2.3 System Schematic Diagram



After engine operates, the water pump starts operating. Coolant begins to flow circularly. Displacement of water pump depends on engine speed. The higher the speed, the larger the displacement, and vice versa. When the coolant temperature does not reach the opening temperature of electronic thermostat, the engine coolant circulates in cylinder block, the cylinder head, turbocharger and warm air water tank under the operation of water pump, and the coolant does not radiate through the radiator.
When coolant temperature reaches the opening temperature of electronic thermostat, coolant flowing out of cylinder block enters radiator for radiating. It then returns to cylinder block for circulation by water pump. Due to radiating in radiator, engine coolant temperature decreases quickly to prevent engine from overheating.

2.4 System Components Description

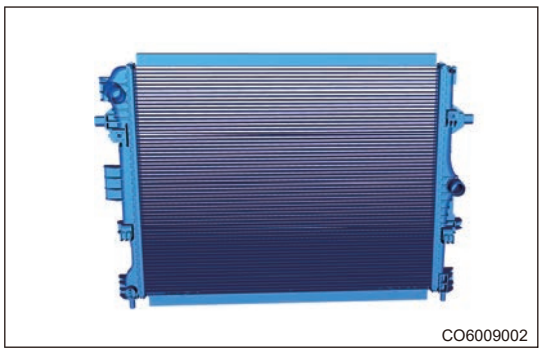
■ Expansion tank body

The expansion tank is an integral part of the vehicle cooling system. When the engine is running, the coolant will circulate continuously in the cooling water channel, and will flow through the expansion tank at halfway. If the pressure is too high or the coolant is too much, the excess gas and coolant will flow out of the bypass water channel of the expansion tank to avoid the high pressure of the cooling system.


CO6008002

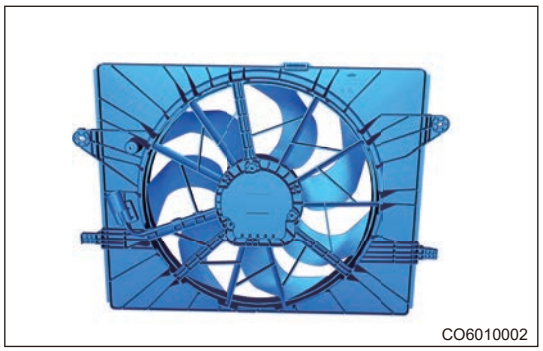
■ Radiator assembly

The radiator is composed of three parts: Inlet chamber, outlet chamber and radiator core. The coolant flows in the radiator core and the air flows outside the radiator core. The hot coolant cools down because radiating heat to air, and the cold air heats up because absorbing the heat from the coolant, so the radiator is a heat exchanger.


CO6009002

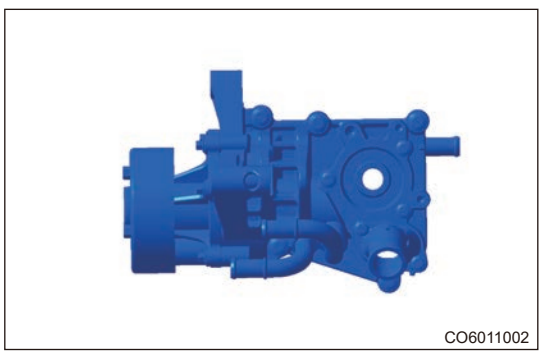
■ Cooling fan assembly

The rotation of radiator fan helps to radiate the radiator. Fan speed is controlled by ECU according to coolant temperature.


CO6010002

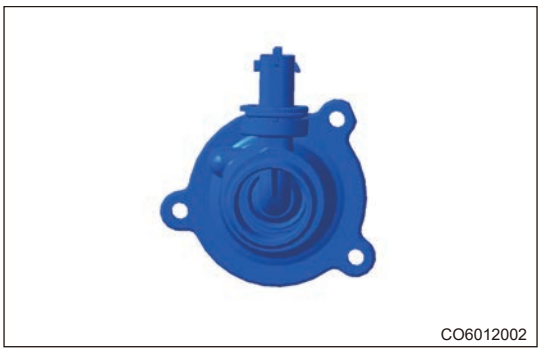
■ Water pump assembly

Pressurize coolant to ensure it can circulate in cooling system. Its displacement varies with engine speed.


CO6011002

■ Electronic thermostat

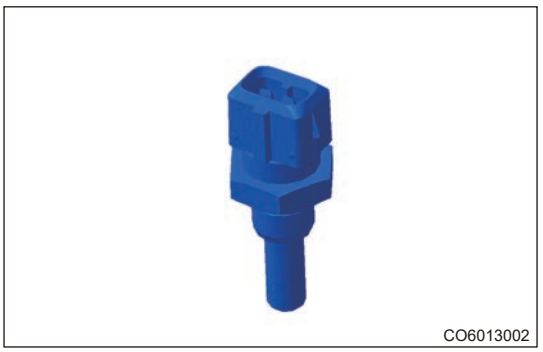
The electronic thermostat can calculate the target temperature according to engine running speed, load state, intake air temperature, coolant temperature, etc., accurately regulate the coolant temperature to ensure that the engine always works at a reasonable temperature. According to the calculated value of the sensor signal, ECU provides the signal working voltage to heating resistance element in electronic thermostat, which makes the paraffin expand and displace. Through this displacement, the temperature regulating unit mechanically adjusts the large circulation and small circulation of water temperature.
The operation of electronic thermostat shall meet the following conditions at the same time:


CO6012002

(1) Under low speed and low load, electronic thermostat controls to open at 105 ˚C to improve fuel economy.
(2) Under high speed and high load, electronic thermostat controls to open at 90 ˚C to ensure engine safety.
(3) If there is fault in line, electronic thermostat can be opened mechanically. Initially opening temperature: 100 ˚C ± 2 ˚C, fully opening temperature: 110 ˚C ± 2 ˚C.
(4) Opening stroke of thermostat: 8mm.

■ Coolant temperature sensor

NTC thermistor packaged inside temperature sensor is used for coolant temperature sensor, its resistance changes in accordance with ambient temperature, thus accurately reflecting the small changes in coolant temperature. The temperature of contact medium can be reflected by measuring its output resistance, and the signals from both terminals of resistor are output to ECU. Engine coolant temperature can be obtained by ECU according to output signal of the sensor, thus judging the engine operating condition.


CO6013002

3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Cooling System

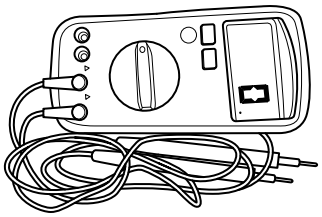
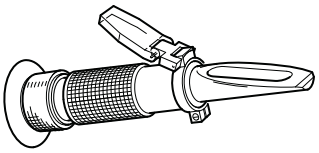
Symptom	Possible Cause
Insufficient coolant	Coolant pipe (deteriorated and leaks)
	Expansion tank (leakage)
	Radiator assembly (leakage)
	Heater core (leakage)
	Electronic thermostat improperly sealed

Symptom	Possible Cause
	Water pump (improperly sealed)
	Engine cylinder head gasket (damaged)
	Engine cylinder head (cracked and Leakage)
	Engine cylinder block (water jacket leaks and cylinder block cracked)
Engine overheating	Low coolant level
	Air resistance exists in cooling pipe
	Expansion luggage cap damaged
	ECU fault
	Cooling fan assembly
	Electronic thermostat
	Radiator assembly
	Coolant temperature sensor
Engine overcooling	Electronic thermostat
	Cooling fan
Unable to reach normal engine temperature	Cooling fan (constantly operating)
	Electronic thermostat
Cooling fan does not operate or operate abnormally	Cooling fan
	Cooling fan controller
	Fan controller wire harness
	ECU fault

4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Freezing Point Tester	 S00005

4.2 Cooling System Leakage Test

■ Test procedures

⚠ Warning

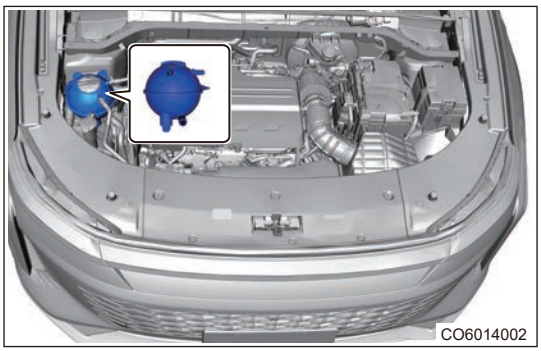
- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**

⚠ Caution

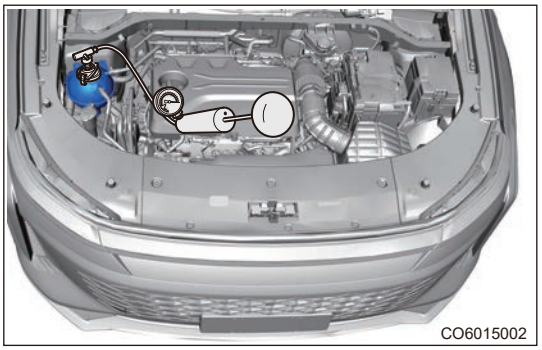
- **When testing cooling system, please pressurize the system to specified pressure. Otherwise, system components may be damaged.**
- **Before testing cooling system, do not perform operation until coolant temperature drops to normal level. Otherwise, it may cause scald.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Check if coolant level is between "MAX" and "MIN" lines. If coolant level is below "MIN" line, add coolant.


CO6014002

(3) Connect cooling system pressure tester to coolant pressure release cap opening (expansion tank body cap opening) and tighten it slowly.


CO6015002

⚠ Caution

- **Make sure there is no leakage in connecting part of coolant system pressure tester, in order to avoid pressure leakage during test.**

(4) Pressurize cooling system to 1.2 bar with the cooling system pressure tester, and then observe the pressure changes. If system pressure does not drop within 2 minutes, it indicates there is no leakage in system. If pressure changes greatly, it indicates that there is a leakage in system; find the leaking area and perform troubleshooting.

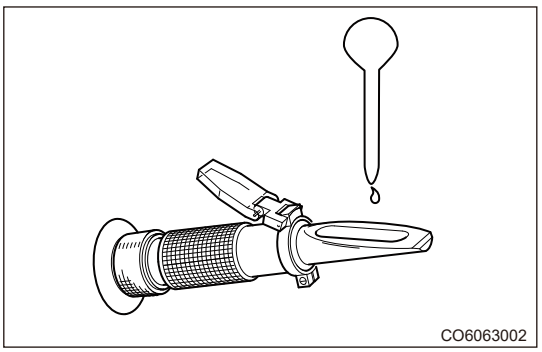
4.3 Coolant Freezing Point Test

■ Test procedures

⚠ Caution

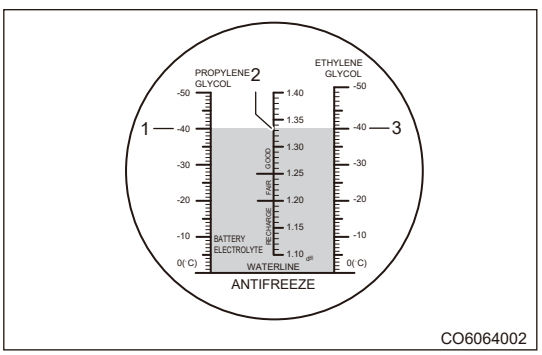
- **DO NOT mix different colors or types of coolant.**
- **Please select coolant which is suitable for local climate in different areas.**
- **Please read measured value at the scale line. In order to distinguish the scale line more clearly, drip a drop of water on the glass of freezing point tester with a pipette, then the scale line can be clearly distinguished via a "waterline".**

(1) As shown in illustration, drip a drop of coolant on the glass of freezing point tester with a pipette, and then observe freezing point value of coolant.


CO6063002

(2) As shown in illustration, observe scale 3 of freezing point tester to read ethylene glycol coolant freezing point value. The freezing point value must be kept at -40 °C (value varies with geography, climate or freezing point).

Hint:
Scale 1 is used to measure the freezing point value of propylene glycol coolant, and scale 2 is used to measure the battery electrolyte concentration.



CO6064002

(3) If freezing point is beyond the specified value, replace the coolant.

4.4 Draining and Adding Coolant

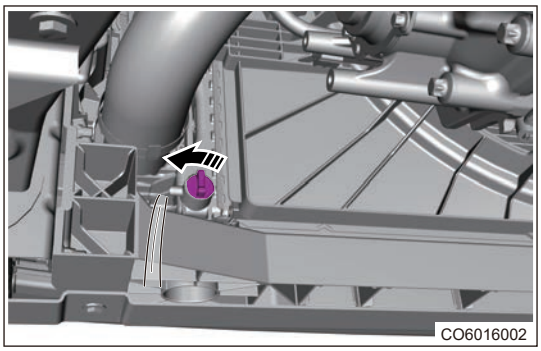
■ Drain coolant

⚠ Warning

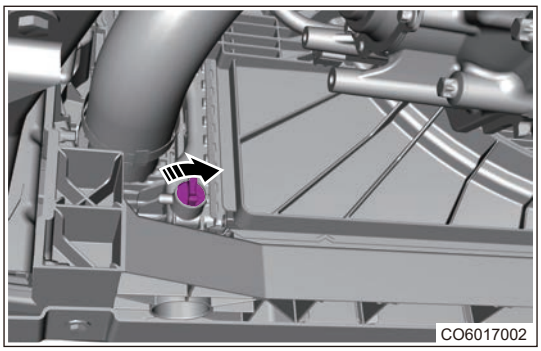
- **Never open expansion tank cap when engine is operating or temperature is high. Otherwise, it may cause scald.**
- **Be careful when opening expansion tank cap, the high-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **Wait until the engine has cooled down, and then cover the expansion tank cap with a piece of damp cloth and turn it one turn slowly (counterclockwise). Step back when releasing cooling system pressure. After confirming that all pressure has been released, turn the pressure release cap with cloth covered and remove it.**
- **Violating above descriptions may cause serious personal injury.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the expansion tank cap when engine temperature is low.
(4) Remove the engine lower protector assembly.

(5) Put a coolant collector under the vehicle, rotate the radiator drain cock plug counterclockwise as shown in figure and drain the coolant in radiator and expansion tank.


CO6016002

(6) After coolant stops flowing, re-tighten the radiator drain cock plug.


CO6017002

⚠ Caution

- **Tighten drain cock plug to prevent leakage.**
- **Wasted coolant should be handled by the specialized department according to local laws and regulations. Never discard it at will.**

■ **Adding coolant**

⚠ Warning

- **If it is necessary to add coolant when engine is hot, loosen expansion tank cap slightly first to release internal pressure and loosen the cap completely after waiting for a while, and then add coolant.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**

Coolant capacity

Type	Capacity (L)
Coolant	7.5 L

(1) Open expansion tank body cap until add coolant until coolant level reaches the “MAX” line.

(2) Tighten expansion tank body cap, start and run engine. Maintain engine speed between 2000 and 2500 rpm to warm up the engine until cooling fan operates.

⚠ Caution

- **If there is no coolant in expansion tank body after engine just starts, perform the followings: Stop the engine; wait until coolant cools down; add coolant to "MAX" line on expansion tank; run the engine at 2500 rpm until coolant level becomes stable.**

(3) Stop engine and wait until coolant temperature drops to the ambient temperature. Check that coolant level is between "MAX" and "MIN" lines. If coolant level is below the "MIN" line, repeat all the above procedures. Keep the coolant level between “MAX” and “MIN” lines.

(4) Check each pipe for leaks, lack of antifreeze, if so, handle it.

⚠ Caution

- **Do not open the expansion tank cap at high engine temperature to prevent burns.**

4.5 Expansion Tank Body

■ **Removal**

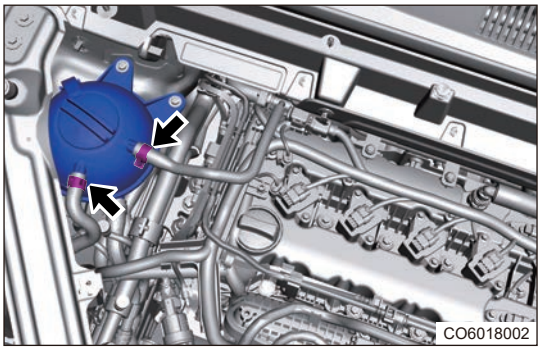
⚠ Warning

- **Always make sure engine is cold before operating cooling system. Never open expansion tank body cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**

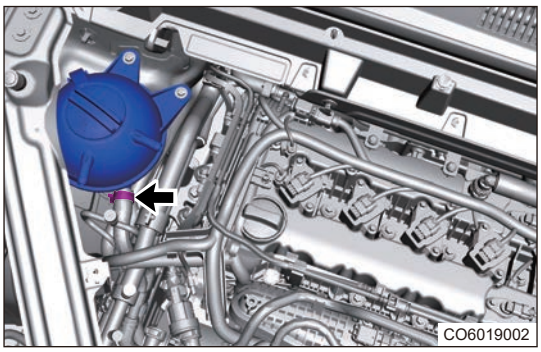
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Drain the coolant.

(5) Loosen the elastic clamp and disconnect the connection between engine water pipe and expansion tank.

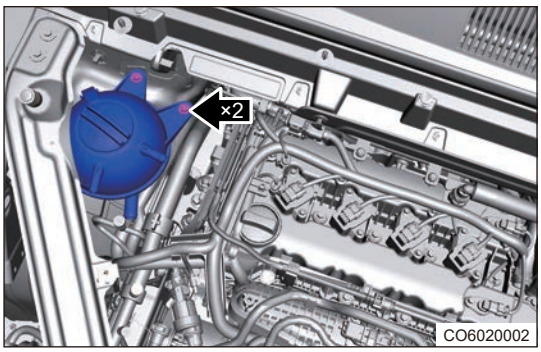
(6) Loosen the elastic clamp and disconnect the connection between radiator water pipe and expansion tank.



(7) Loosen elastic clamp and disconnect the connection between expansion tank inlet pipe and expansion tank.



(8) Remove 2 fixing bolts from expansion tank body.



(9) Remove the expansion tank body assembly carefully.

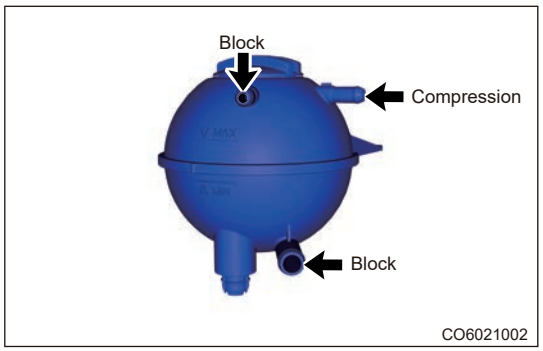
■ Expansion tank body inspection

(1) Check that the expansion tank is welded firmly, and there are no defects such as fractures and cracks at the weld.

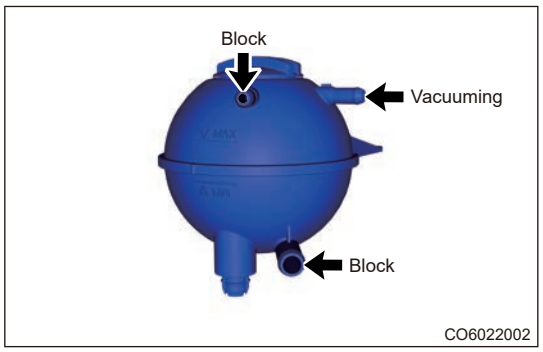
(2) The expansion tank should be colorless and transparent. During use of vehicle, expansion tank assembly is not allowed to have discoloration that affects the appearance and function, and scale line should be clearly visible.

■ Expansion tank cap inspection

(1) Block two holes of expansion tank and pressurize one of them. When pressure reaches the opening pressure of relief valve (120 - 150 kpa), the pressure in expansion tank should be maintained at the relief valve opening pressure value.



(2) Block two holes of expansion tank and vacuumize one of them. When vacuum pressure reaches the opening pressure of vacuum valve (-2 - 10 kpa), vacuum pressure in expansion tank should be maintained at the vacuum valve opening pressure value.



■ Installation

⚠ Caution

- **When connecting engine discharge pipe and expansion tank body, align the "土" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of "土" mark, align the edge of elastic clamp with lower edge of "二" position of "土" mark.**
- **When connecting engine inlet pipe and expansion tank body, align the "土" mark on pipe port with boss, and align center position of elastic clamp tab with "I" position of "土" mark, align the edge of elastic clamp with lower edge of "二" position of "土" mark.**
- **When connecting radiator discharge pipe Ⅰ and expansion tank body, align the "工" mark on pipe port with boss, and align center position of elastic clamp tabs with "I" position of "工" mark, align the edge of elastic clamp with lower edge of "二" position of "工" mark.**
- **Check that coolant has been added to the specified level after installation.**

(1) Connect inlet pipe to expansion tank body and install elastic clamp.

(2) Install 2 fixing bolts to expansion tank body.

Torque: 5 ± 1 N·m

(3) Connect engine water pipe to expansion tank and install elastic clamp.

(4) Connect radiator water pipe to expansion tank body and install elastic clamp.

(5) Add the coolant.

(6) Install the engine compartment trim cover assembly.

4.6 Expansion Tank Inlet Pipe Assembly

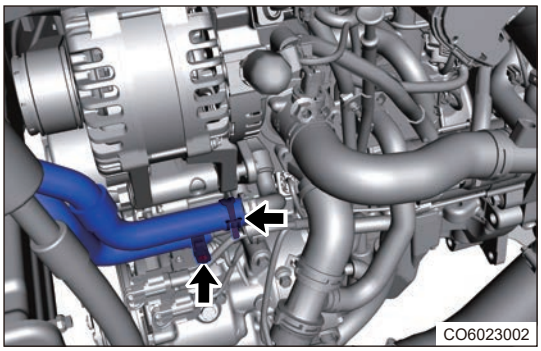
■ Removal

⚠ Warning

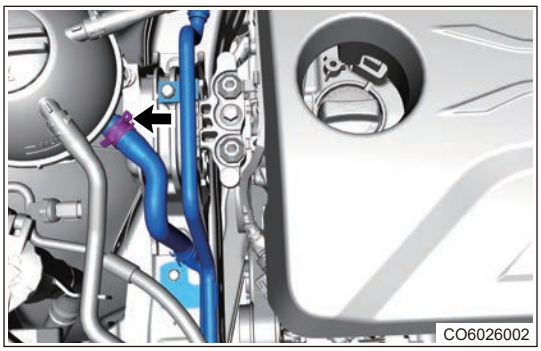
- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Drain the coolant.

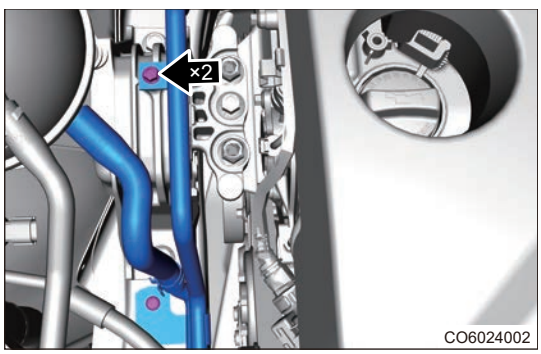
(4) Loosen elastic clamp and disconnect the connection between expansion tank inlet pipe assembly and water pump module.



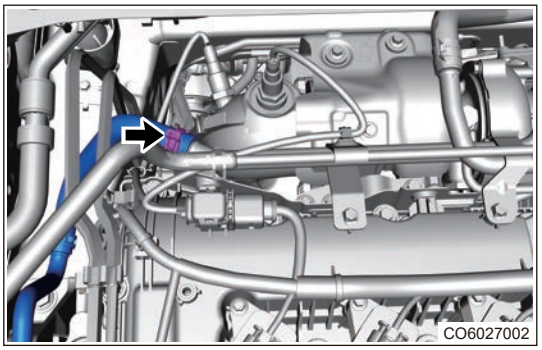
(5) Loosen elastic clamp and disconnect the connection between expansion tank inlet pipe assembly and expansion tank.



(6) Remove 2 fixing bolts from inlet pipe assembly.



(7) Loosen elastic clamp and disconnect the connection between expansion tank inlet pipe assembly and cooling pipe assembly.



(8) Remove expansion tank inlet pipe assembly carefully.

■ **Installation**

(1) Install 2 fixing bolts to expansion tank inlet pipe assembly.

Torque: 5 ± 1 N · m

(2) Connect expansion tank inlet pipe to water pump module assembly and install elastic clamp.
(3) Connect expansion tank inlet pipe to cooling pipe assembly and install elastic clamp.
(4) Add coolant to specified position.
(5) Install the engine compartment trim cover assembly.

4.7 Cooling Pipe Assembly

■ **Removal**

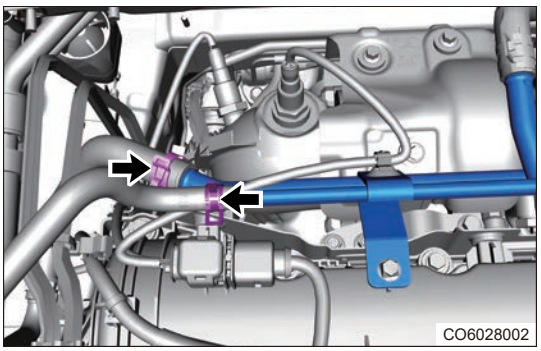
⚠ Warning

- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**

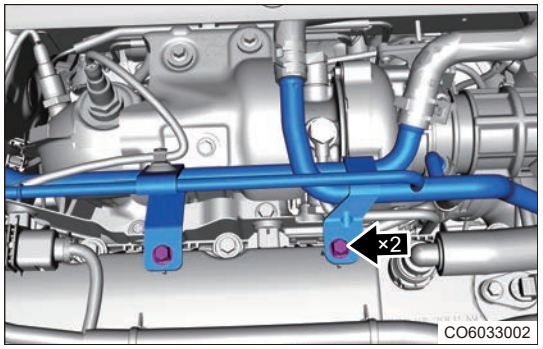
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the intake hose assembly.
(4) Drain the coolant.

(5) Loosen the elastic clamp and disconnect the connection between engine water pipe to expansion tank and cooling pipe assembly.

(6) Loosen elastic clamp and disconnect the connection between expansion tank inlet pipe and cooling pipe assembly.

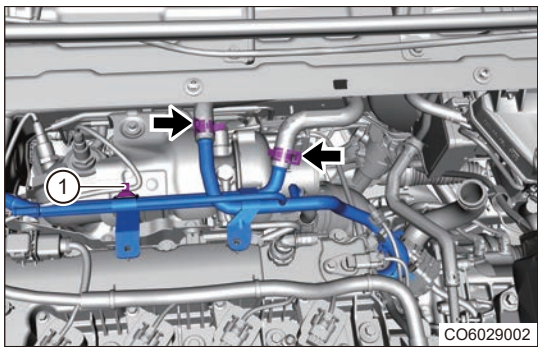


(7) Remove 2 fixing bolts from cooling pipe assembly.

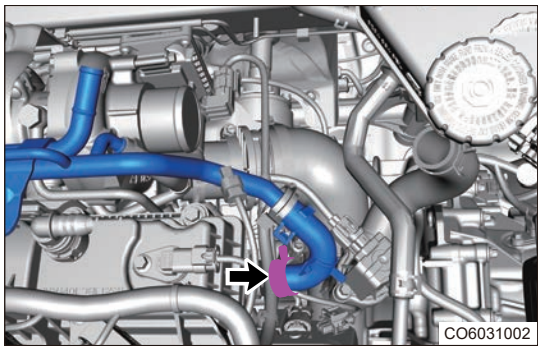


(8) Loosen 2 elastic clamps and disconnect the connection between heater inlet/outlet pipe and cooling pipe assembly.

(9) Disengage fixing clip (1) of upstream oxygen sensor from cooling pipe assembly.



(10) Loosen elastic clamp and disconnect the connection between cylinder head and cooling pipe assembly.



(11) Remove cooling pipe assembly carefully.

■ Installation

(1) Install 2 fixing bolts to cooling pipe assembly.

Torque: 5 ± 1 N · m

(2) Connect cooling pipe assembly to cylinder head and install elastic clamp.
(3) Connect heater inlet/outlet pipe assembly and install elastic clamp.
(4) Connect engine water pipe to expansion tank and install elastic clamp.
(5) Connect expansion tank inlet pipe assembly and install elastic clamp.
(6) Add the coolant.
(7) Install the engine compartment trim cover assembly

4.8 Front Plastic End Assembly

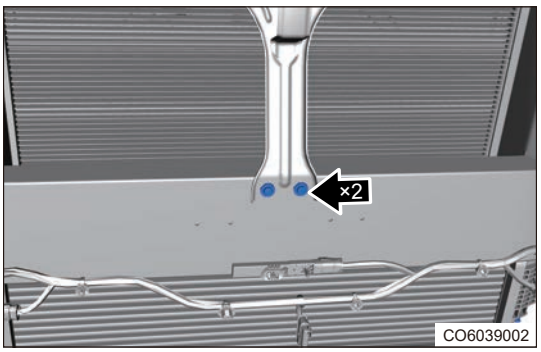
■ Removal

⚠ Warning

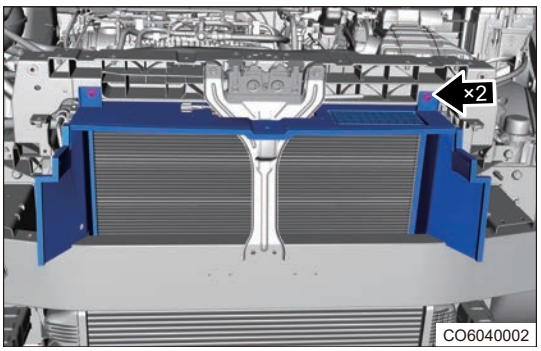
- **Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear necessary safety equipment to prevent accidents, when removing the front plastic end.**
- **Appropriate force should be applied when removing the front plastic end. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.
(5) Remove the front bumper assembly.
(6) Remove the right headlight assembly.
(7) Remove the left headlight assembly.
(8) Remove the right headlight crossmember assembly.
(9) Remove the left headlight crossmember assembly.
(10) Drain the coolant.
(11) Recover the refrigerant.

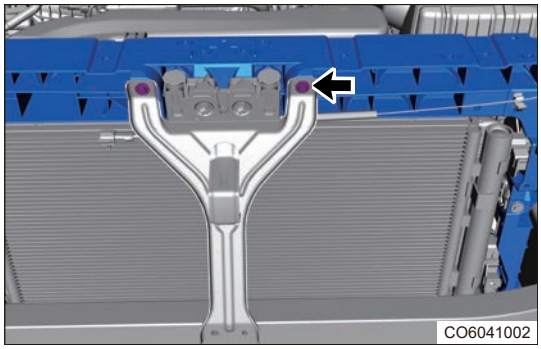
(12) Remove 2 fixing bolts between center support and front impact beam assembly.



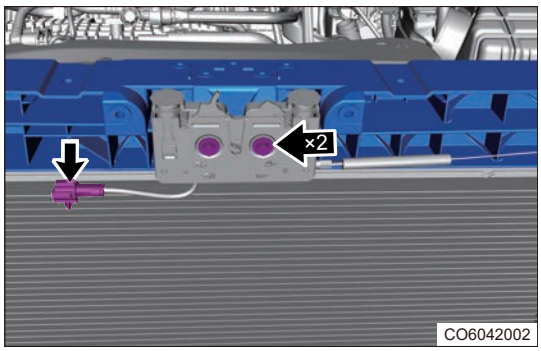
(13) Remove 2 snap fasteners from air deflector.



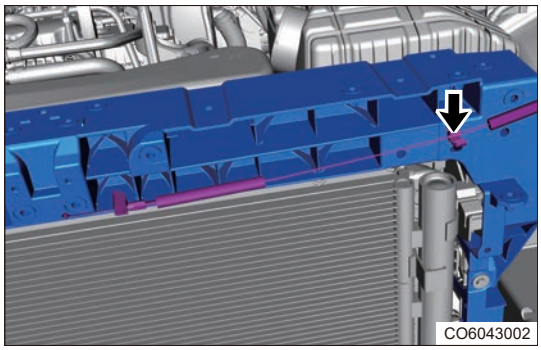
(14) Remove 2 fixing bolts between center support and front plastic end.



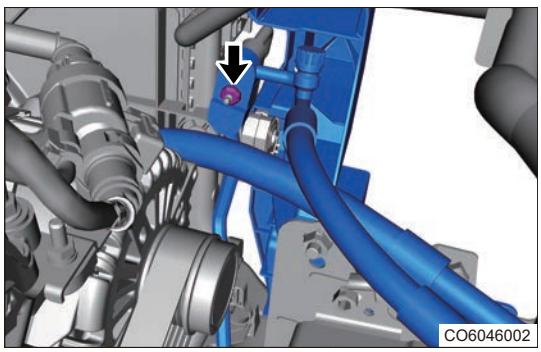
(15) Disconnect engine hood lock connector and remove 2 fixing bolts from engine hood lock.



(16) Disengage 1 fixing clip of engine hood lock cable from front plastic end, and move engine hood lock assembly aside.

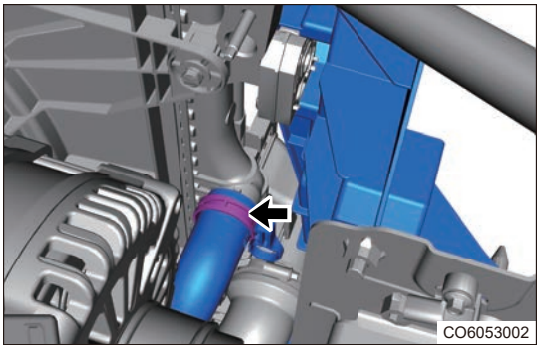


(17) Remove 1 fixing nut and disconnect condenser line.

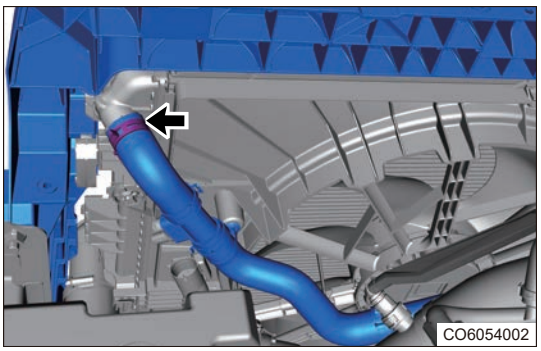


(18) Disconnect cooling fan connector and fixing clip of connector wire harness.

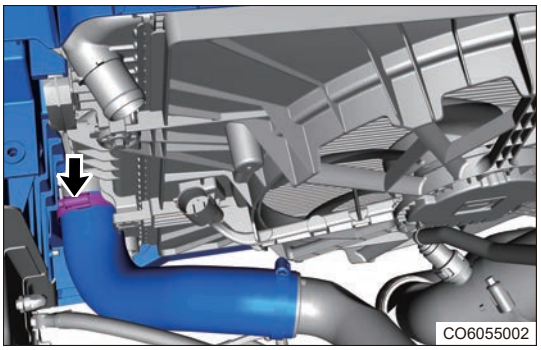
(19) Loosen elastic clamp and disconnect the connection between engine outlet pipe assembly and radiator assembly.



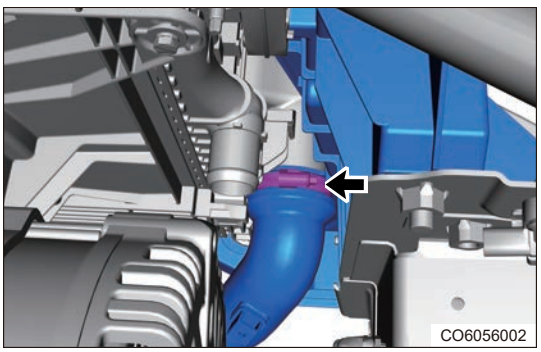
(20) Loosen elastic clamp and disconnect the connection between engine inlet pipe and radiator assembly.



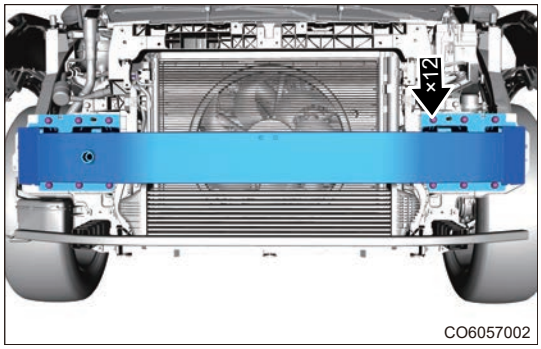
(21) Loosen worm clamp and disconnect connection between intercooler inlet pipe assembly Ⅱ and intercooler.



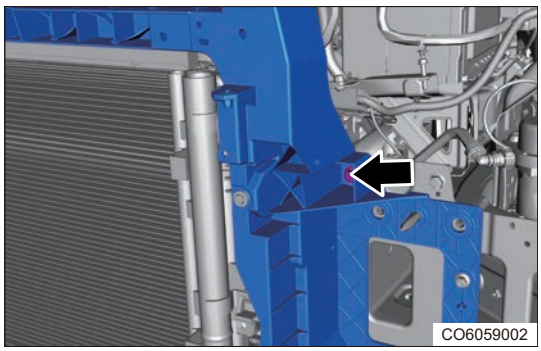
(22) Loosen worm clamp and disconnect the connection between intercooler outlet pipe assembly I and intercooler.

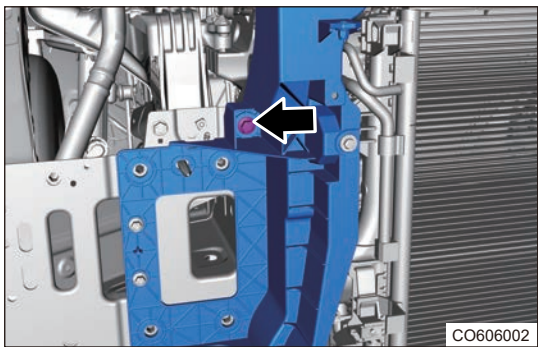


(23) Remove 12 fixing bolts from front impact beam.

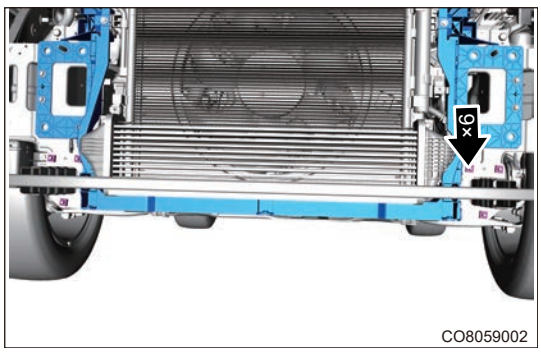


(24) Remove 2 fixing bolts between front plastic end and front bumper crossmember mounting board.





(25) Remove 6 fixing nuts from lower impact beam.

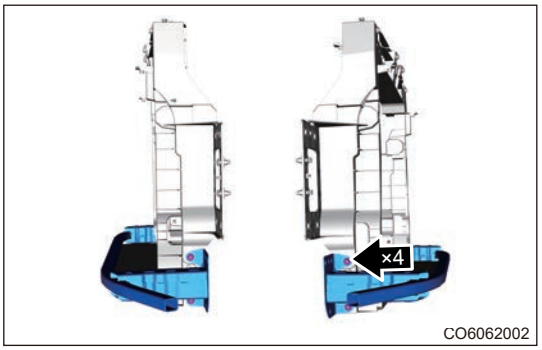


(26) Carefully remove the front structure assembly.

⚠ Caution

- **Since the front structure assembly is heavy, it needs to be carefully removed by more than one person, so be careful when operating to avoid accidents.**

(27) Remove 4 fixing bolts between lower impact beam and front plastic end, and remove lower impact beam.



■ Installation

(1) Install lower impact beam to front plastic end and tighten fixing bolts.
(2) Install 2 fixing bolts between front plastic end and front bumper crossmember mounting board.
(3) Install the engine compartment lock.
(4) Connect intercooler pipeline.
(5) Connect radiator pipeline.
(6) Fix each wire harness/connector clip.
(7) Connect the cooling fan connector.
(8) Install the condenser line.
(9) Install the front impact beam assembly.
(10) Install the center support.
(11) Install the left and right headlight crossmember assembly respectively.
(12) Install the left and right headlight assembly respectively.
(13) Install the front bumper assembly.
(14) Install the A/C filter assembly.
(15) Add the coolant.
(16) Pump vacuum/recharge refrigerant.
(17) Install the engine compartment trim cover assembly.

4.9 Radiator Assembly

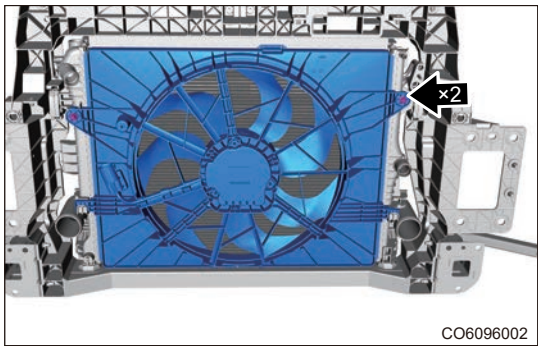
■ Removal

⚠ Warning

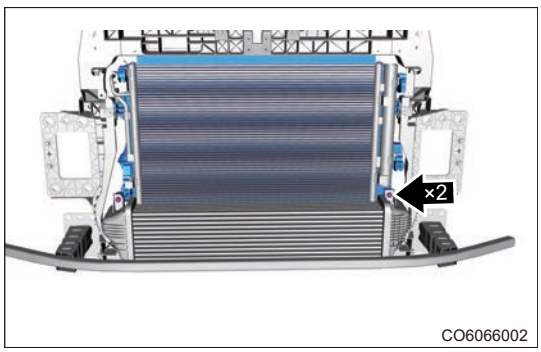
- **Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing radiator assembly.**
- **Appropriate force should be applied, when removing the radiator assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.
(5) Remove the front bumper assembly.
(6) Remove the right headlight assembly.
(7) Remove the left headlight assembly.
(8) Remove the right headlight crossmember assembly.
(9) Remove the left headlight crossmember assembly.
(10) Drain the coolant.
(11) Recover the refrigerant.
(12) Remove the front impact beam assembly.
(13) Remove the front plastic end assembly.

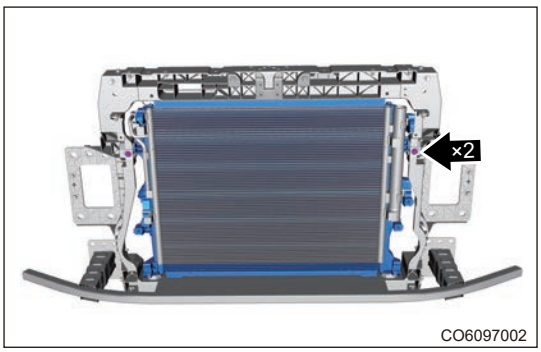
(14) Remove 2 fixing bolts and cooling fan assembly.



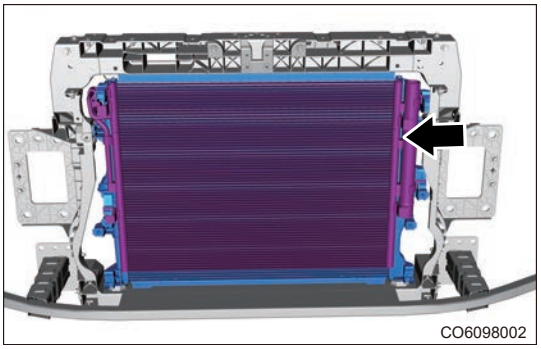
(15) Remove 2 fixing bolts between intercooler assembly and radiator assembly.



(16) Remove 2 fixing bolts between radiator rubber bushing and front plastic end.



(17) Remove condenser assembly from radiator assembly.



(18) Remove radiator assembly from front plastic end.

■ Inspection

(1) Appearance inspection: Radiator is not allowed to be impacted and damaged, the fins are not allowed to be lodged and deformed. No residue is allowed inside the assembly and its section should smooth and flat.

(2) Sealing inspection: Block water inlet and water outlet with expansion rubber plug, inject 30 - 80 KP compressed air to radiator. Soak radiator assembly into water tank, if there are bubbles, it indicates there is leakage in radiator assembly.

■ Installation

(1) Install radiator assembly to front plastic end and tighten 2 fixing bolts of rubber bushing.
(2) Install condenser assembly to radiator assembly.
(3) Remove 2 fixing bolts to cooling fan assembly.

Torque: 5 ± 1 N · m

(4) Install the intercooler assembly.
(5) Install the lower impact beam assembly.
(6) Install the front plastic end assembly.
(7) Install the air deflector assembly.
(8) Install the front impact beam assembly.
(9) Install the left and right headlight crossmember assembly respectively.
(10) Install the left and right headlight assembly respectively.
(11) Install the front bumper assembly.
(12) Install the A/C filter assembly.
(13) Add the coolant.
(14) Pump vacuum/recharge refrigerant.
(15) Install the engine compartment trim cover assembly.

4.10 Cooling Fan Assembly

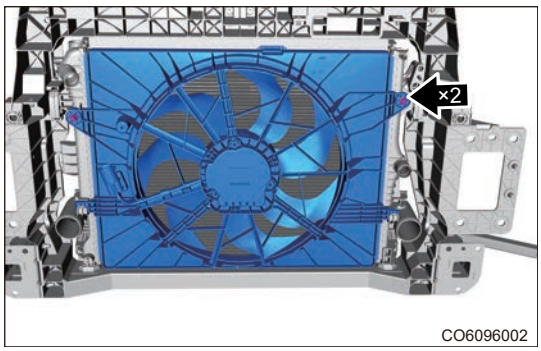
■ Removal

⚠ Warning

- **Temperature in engine compartment is very high when engine is running. Before removal, you must make sure that engine has shut off, and engine compartment has cooled down sufficiently, otherwise, there is a risk of scald injury.**
- **Be sure to wear safety equipment to prevent accidents, when removing cooling fan assembly.**
- **Appropriate force should be applied, when removing cooling fan assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the air filter assembly.
(5) Remove the front bumper assembly.
(6) Remove the right headlight assembly.
(7) Remove the left headlight assembly.
(8) Remove the right headlight crossmember assembly.
(9) Remove the left headlight crossmember assembly.
(10) Drain the coolant.
(11) Recover the refrigerant.
(12) Remove the front impact beam assembly.
(13) Remove the air deflector assembly.
(14) Remove the front plastic end assembly.

(15) Remove 2 fixing bolts and cooling fan assembly.



■ Installation

(1) Remove 2 fixing bolts to cooling fan assembly.
Torque: 5 ± 1 N · m

(2) Install the front plastic end assembly.
(3) Install the air deflector assembly.
(4) Install the front impact beam assembly.
(5) Install the left and right headlight crossmember assembly respectively.
(6) Install the left and right headlight assembly respectively.
(7) Install the front bumper assembly.
(8) Install the A/C filter assembly.
(9) Add the coolant.
(10) Pump vacuum/recharge refrigerant.
(11) Install the engine compartment trim cover assembly.

4.11 Water Pump Module Assembly

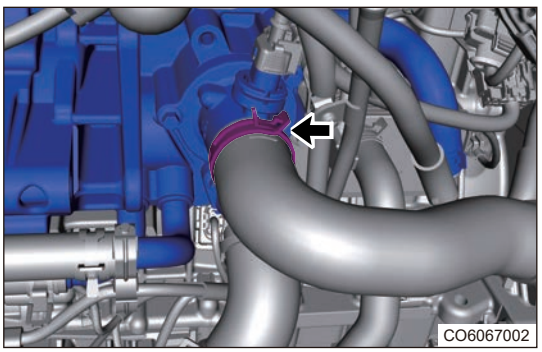
■ Removal

⚠ Warning

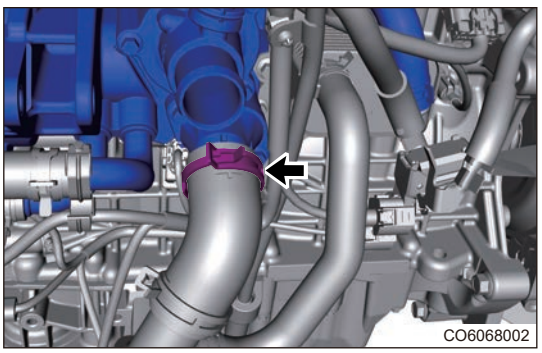
- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear necessary safety equipment to prevent accidents, when removing water pump module.**
- **Appropriate force should be applied when removing water pump module. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the engine compartment lower protector assembly.
(5) Remove the engine accessory belt.
(6) Drain the coolant.
(7) Remove the alternator assembly.
(8) Remove the oil dipstick tube assembly.

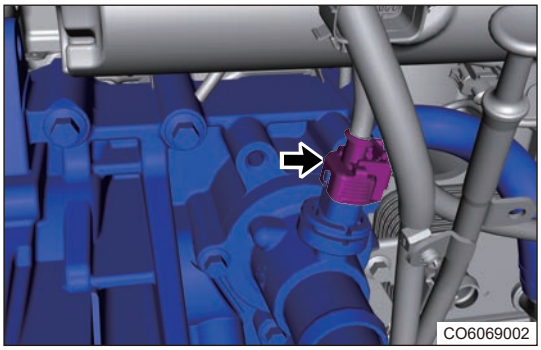
(9) Loosen elastic clamp and disconnect the connection between water pump module assembly and engine inlet pipe.



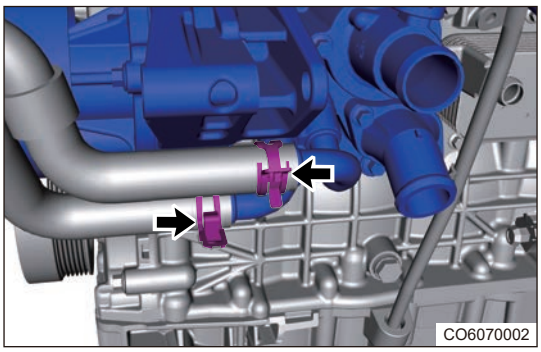
(10) Loosen elastic clamp and disconnect connection between water pump module assembly and engine outlet pipe.



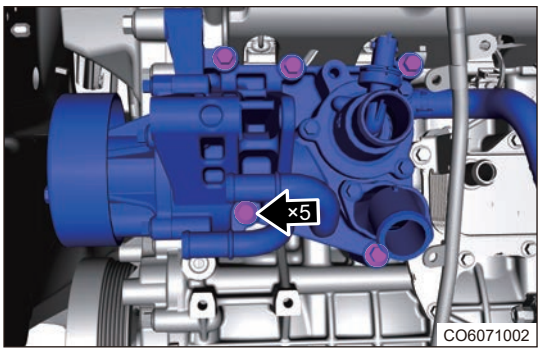
(11) Disconnect the electronic thermostat connector.



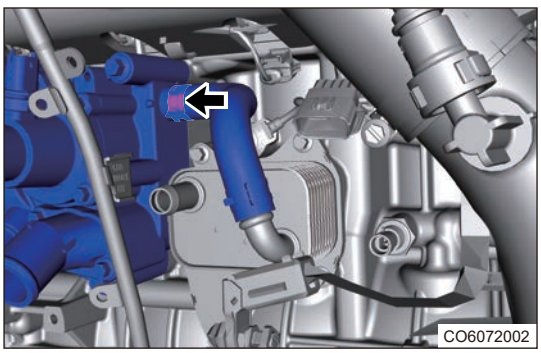
(12) Loosen elastic clamps and disconnect connection between water pump module assembly and inlet pipe.



(13) Remove 5 fixing bolts from water pump module.



(14) Loosen clamping ring and disconnect connection between water pump module assembly and oil filter module inlet pipe.



(15) Remove the water pump module assembly carefully.

■ Installation

(1) Connect oil filter module inlet pipe to water pump module, and tighten clamping ring.

(2) Install water pump module assembly on the surface of cylinder block, install 5 bolts at the corresponding position, then pre-tighten them to press water pump module tightly and tighten them to specified torque.

Torque: 20 + 5 N · m

(3) Connect inlet pipe to water pump module, and install elastic clamp.
(4) Connect engine outlet pipe to water pump module, and install elastic clamp.
(5) Connect the engine inlet pipe to water pump module, and install elastic clamp.
(6) Connect the electronic thermostat connector.
(7) Install the oil dipstick tube assembly.
(8) Install the alternator assembly.
(9) Add the coolant.

4.12 Electronic Thermostat Assembly

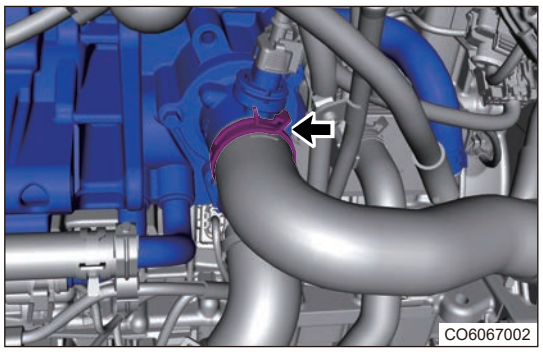
■ Removal

⚠ Warning

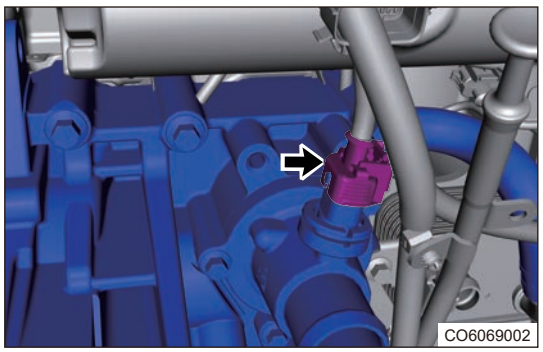
- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear necessary safety equipment to prevent accidents, when removing water pump module.**
- **Appropriate force should be applied when removing water pump module. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Drain the coolant.

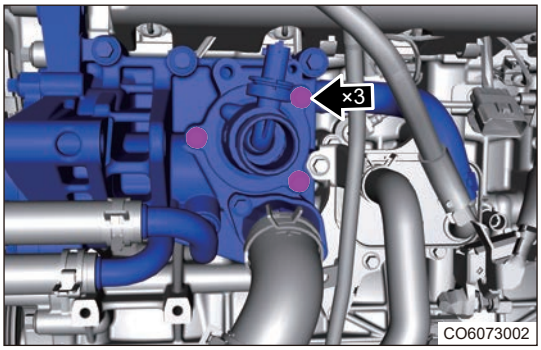
(5) Loosen elastic clamp and disconnect the connection between water pump module assembly and engine inlet pipe.



(6) Disconnect the electronic thermostat connector.



(7) Remove 3 fixing bolts from electronic thermostat.



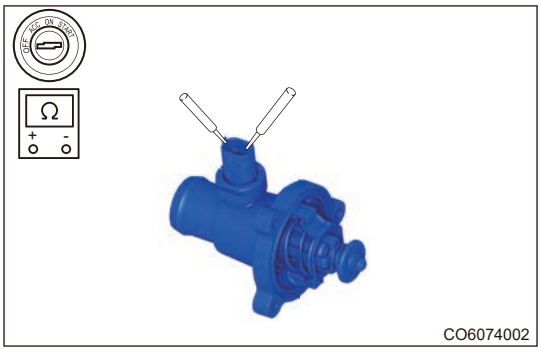
(8) Remove the electronic thermostat.

■ Inspection

(1) Check electronic thermostat assembly grommet for damage.

(2) As shown in illustration, check the electronic thermostat heating resistance with ohm band of multimeter.

Multimeter Connection	Specified value (Ω)
Terminal 1 - Terminal 2	15.3



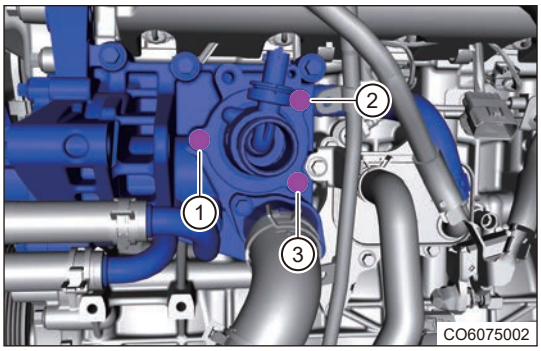
⚠ Caution

- **If resistance is not as specified, replace the electronic thermostat.**

■ Installation

(1) Install electronic thermostat to water pump module, after pre-tightening 3 fixing bolts, tighten them in order (1-2-3-1) with a tool as shown in illustration.

Torque: 8 + 3 N · m



(2) Connect the engine inlet pipe to water pump module, and install elastic clamp.
(3) Connect the electronic thermostat connector.
(4) Add the coolant.

4.13 Engine Outlet Port Cover Assembly

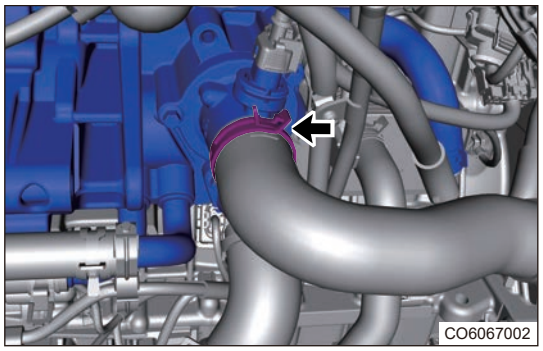
■ Removal

⚠ Warning

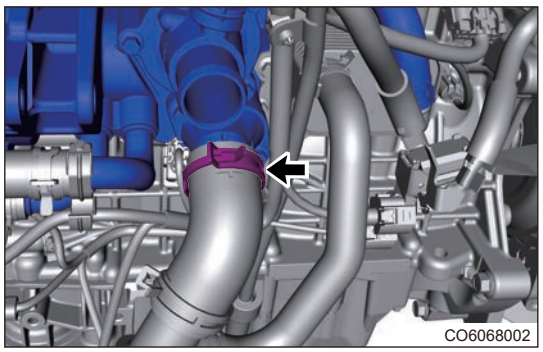
- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear safety equipment to prevent accidents, when removing engine outlet cover.**
- **Appropriate force should be applied, when removing engine outlet cover. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Drain the coolant.

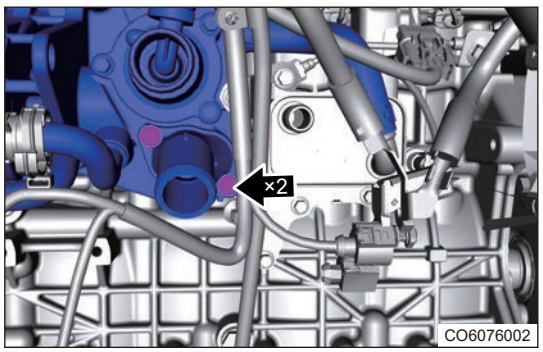
(5) Loosen elastic clamp and disconnect the connection between water pump module assembly and engine inlet pipe.



(6) Loosen elastic clamp and disconnect connection between water pump module assembly and engine outlet pipe.



(7) Remove 2 fixing bolts from engine outlet cover.



(8) Remove the engine outlet port cover.

■ **Inspection**

(1) Check engine outlet port cover grommet for damage.
(2) Install grommet to engine outlet port cover, and check if it is installed in place.

■ **Installation**

(1) Install engine outlet port cover to water pump module, pre-tighten 2 fixing bolts first and then tighten.

Torque: 8 + 3 N · m

(2) Connect engine outlet pipe to water pump module, and install elastic clamp.
(3) Connect the engine inlet pipe to water pump module, and install elastic clamp.
(4) Add the coolant.
(5) Install the engine compartment trim cover assembly.

4.14 Coolant Temperature Sensor Ⅰ

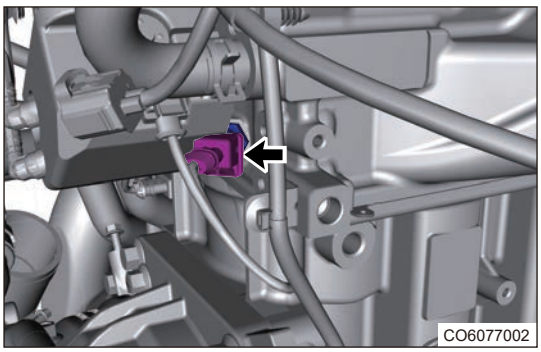
■ **Removal**

⚠ Warning

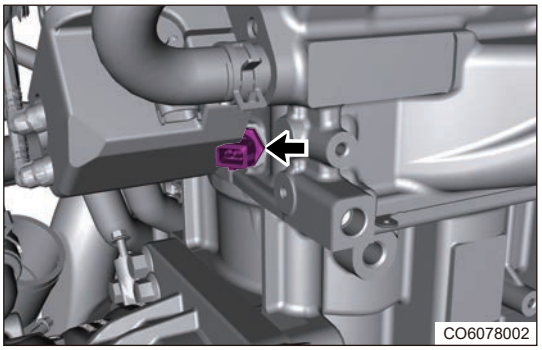
- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear safety equipment to prevent accidents, when removing coolant temperature sensor Ⅰ.**
- **Appropriate force should be applied, when removing coolant temperature sensor Ⅰ. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the intake hose assembly.
(5) Remove the intercooler inlet pipe.

(6) Disconnect the coolant temperature sensor Ⅰ connector.



(7) Remove the coolant temperature sensor Ⅰ.



■ **Installation**

(1) Install the coolant temperature sensor.

Torque: 15 ± 1 N·m

Seal gum: Loctite 577

(2) Connect the coolant sensor connector.
(3) Install the intercooler inlet pipe.
(4) Install the intake hose assembly.
(5) Add the coolant.
(6) Install the engine compartment trim cover assembly.

4.15 Coolant Temperature Sensor

■ **Removal**

⚠ Warning

- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear necessary safety equipment to prevent accidents, when removing coolant temperature sensor.**
- **Appropriate force should be applied when removing coolant temperature sensor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.

(4) Disconnect the coolant temperature sensor connector.

(5) Remove 1 fixing bolt of coolant temperature sensor from engine inlet pipe.

(6) Carefully remove the coolant temperature sensor.

■ Installation

(1) Install the coolant temperature sensor.

Torque: 7 ± 1 N · m

(2) Connect the coolant temperature sensor connector.
(3) Add the coolant.
(4) Install the engine compartment trim cover assembly.

2.8 LUBRICATION SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Prolonged and repeated contact with engine oil will result in the removal of natural oils from skin, leading to dryness, irritation and dermatitis. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer.

(2) Wear protective clothing and gloves before operation.

(3) When your skin comes into contact with engine oil, wash your skin thoroughly with soap and water, or use waterless hand cleaner to remove any used engine oil.

(4) Wait for the engine cool down completely before operation.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Wasted engine oil should be handled by specialized department according to local laws and regulations. Never discard it at will.

(2) DO NOT use inferior engine oil.

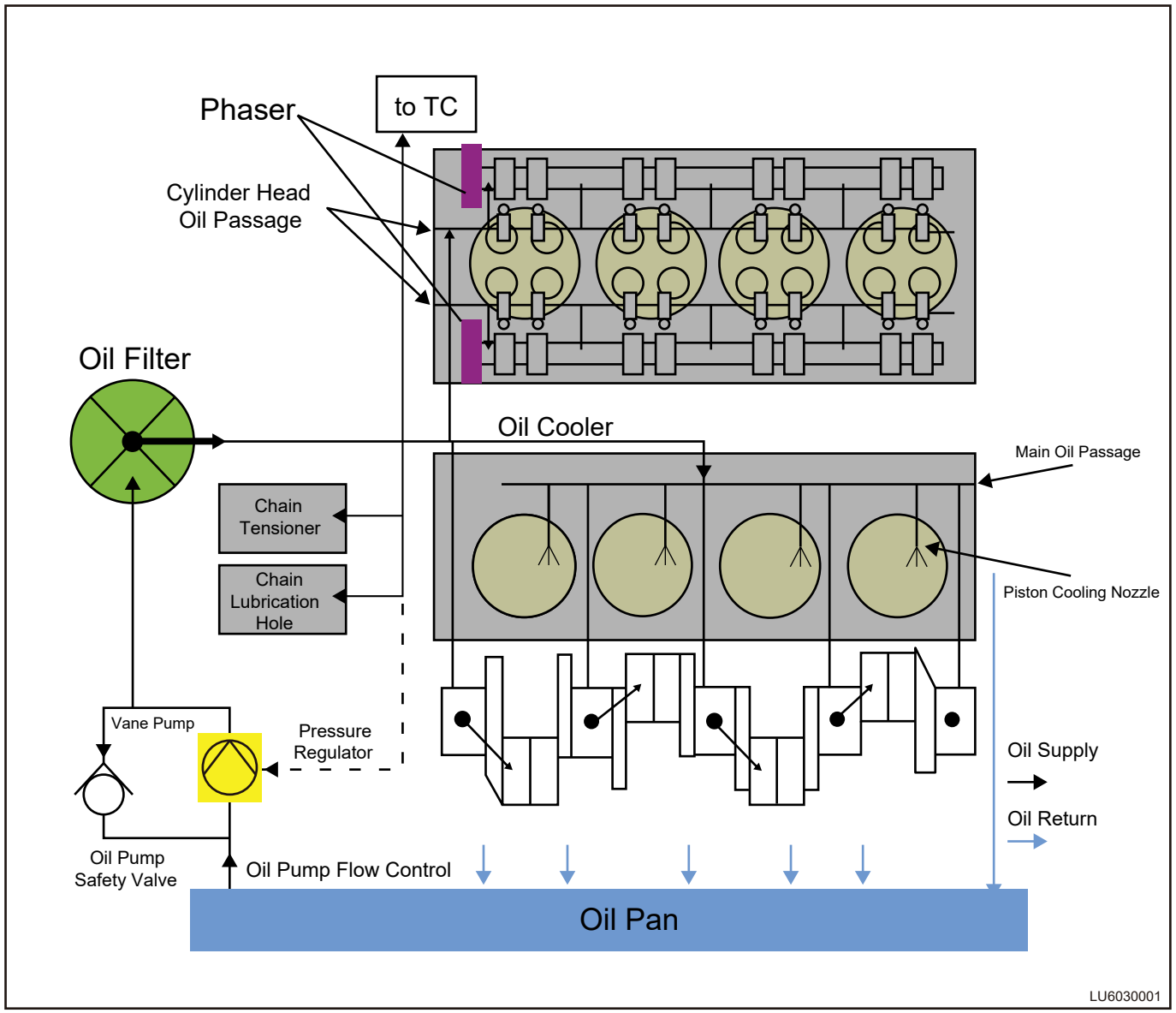
(3) DO NOT mix different types of engine oil.

2 System Overview

2.1 System Description

When engine is operating, an oil pump driven by crankshaft, sucks oil from oil pan and pumps it at pressure through an oil filter. This filtered oil then flows through oil passages, to moving surfaces of all engine through chain drive parts and forms oil films between moving surfaces to reduce friction and finally returns to the oil pan. thus reducing friction resistance between drive parts, power consumption and increasing reliability and durability of engine operation.
Oil pump of SQRF4J20C engine is installed in oil pan. Crankshaft transmits power to it through chain. Oil pump is a two-stage variable displacement pump, and its displacement is controlled by ECU through oil pressure regulating solenoid valve.

2.2 System Schematic Diagram



Crankshaft drives oil pump to sucks oil from oil pan. The oil is filtered by oil filter and delivered to crankshaft connecting rod mechanism and cam valve mechanism, including some accessories such as turbocharger through main oil passage.

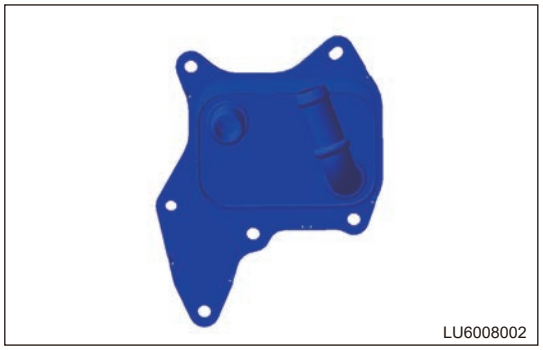
2.3 System Components Description

■ Oil pump assembly

Oil pump of SQRF4J20C engine is installed in oil pan. Crankshaft transmits power to it through chain. Oil pump is a two-stage variable displacement pump, and its displacement is controlled by ECU through oil pressure regulating solenoid valve. Oil pump adopts vane type variable displacement structure, and main structure is stator and rotor; There are two oil pressure chambers on the outer ring of stator to apply pressure control to the stator, so that it can deflect clockwise or counterclockwise around the fulcrum, changing the eccentricity ratio of vane pump and adjusting displacement.

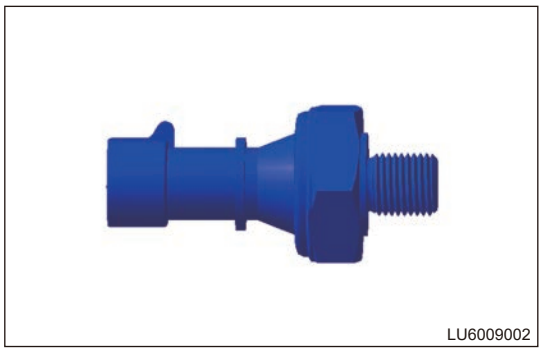
■ Oil cooler assembly

Oil cooler is on the circulation oil passage of lubrication system. During engine running, as oil viscosity becomes lean with temperature increasing , lubricating ability is reduced. Oil cooler is used to cool the lubricant, keep the oil temperature within normal operating range, reduce oil temperature and maintain a certain viscosity of lubricant.



■ Oil pressure switch

Oil pressure switch is installed on the main oil passage of engine block and used to detect the value of engine oil pressure. When the value is lower than the specified value, oil pressure warning light is turned on.



■ Oil filter

It is used to remove impurities such as dust, metal particles, carbon deposits and soot particles in oil to protect the engine.

■ Oil collector

In order to make oil pump work well, filter large particle impurities in lubricant before entering oil pump.

3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Lubrication System

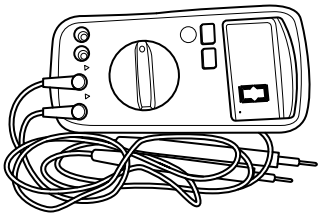
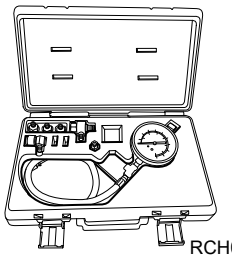
Symptom	Possible Cause
Low pressure in lubrication system	Oil pan (dirty, leaky)

Symptom	Possible Cause
	Oil collector (mesh dirty, blocked)
	Spark plug
	Line blocked
High pressure in lubrication system	Oil with high viscosity
	Oil passage blocked
	Oil pump (non-variable displacement)
Mix oil with water	Oil filter module assembly internal leakage
	Cylinder head gasket improperly sealed
	Cylinder block cracks
High oil consumption	Engine oil (excessive filling capacity)
	Oil filter module assembly (leaky)
	Crankshaft front oil seal (damaged)
	Crankshaft rear oil seal (damaged)
	Oil pressure switch (leaky)
	Oil drain plug (leaky)
	Oil pan (leaked)
	Cylinder head gasket (damaged)
	Piston ring (damaged)
	Each engine seal surface leakage
Oil pressure warning light comes on	Engine oil (insufficient oil, low oil viscosity)
	Oil filter element (blocked)
	Oil strainer (blocked)
	Crankshaft front oil seal (damaged)
	Crankshaft rear oil seal (damaged)
	Oil pressure switch (damaged)
	Instrument cluster (oil pressure warning light)
	Cylinder block (cracks occur in water jacket, resulting in coolant leaking into oil pan, which will cause oil dilution)
	Line (blocked)

4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Oil Pressure Tester	 RCH0220006

4.2 Specifications

■ Lubrication areas on engine

No.	Lubrication Area	Lubricant Type	Note
1	Oil Collector O-ring	Same type as engine oil	/
2	Oil Filter O-ring	Same type as engine oil	Operation during maintenance
4	Dipstick Tube O-ring	Same type as engine oil	/
5	Dipstick Handle O-ring	Same type as engine oil	/
6	Oil Pump Rotor Cavity	Same type as engine oil	/
7	Oil Filter Inlet Port	Same type as engine oil	/

■ Seal gum application areas on engine

No.	Area with Seal Gum Applied	Seal Gum Type	Note
1	Mounting Flange Face Between Oil Pan and Cylinder Block, Timing Chain Cover	Loctite 5900H	/
2	Oil Pressure Switch Thread	Loctite 577	/
3	Oil Pump Mounting Bolt	Loctite 243	/
4	Collector Mounting Bolt	Loctite 243	/
5	Oil Cooler Mounting Bolt	Loctite 243	/

4.3 Engine Oil Draining, Adding and Inspection

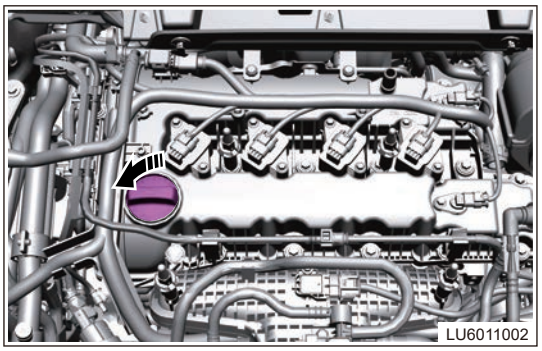
■ Drain engine oil

⚠ Warning

- **Wait for the engine cool down completely before operation.**
- **Prolonged and repeated contact with engine oil will result in the removal of natural oils from skin, leading to dryness, irritation and dermatitis. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, Always take proper skin protection measures when performing vehicle service.**

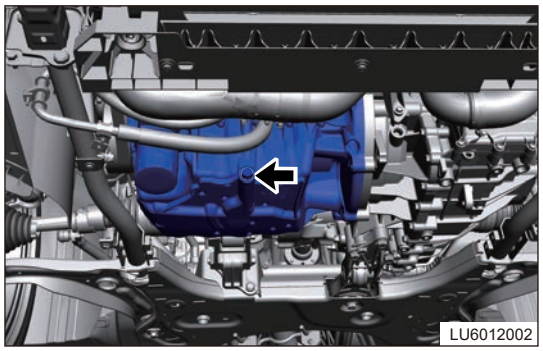
(1) Remove the engine compartment trim cover assembly.

(2) Turn the oil filler door counterclockwise to open.



(3) Raise the vehicle to a proper position.

(4) Remove drain plug (17# socket wrench) and drain oil into a container.



⚠ Caution

- **Apply a certain pushing force to drain plug while loosening the plug by hand, and have the drain plug attached to thread tightly to prevent oil from overflowing in advance. Move away your hand quickly to prevent burn by oil with a certain temperature.**
- **Wasted engine oil should be handled by specialized department according to local laws and regulations. Never discard it at will.**

(5) Wipe off the drain plug and tighten it.

Torque: 35 ± 3 N · m

⚠ Caution

- **The drain plug gasket must be replaced each time the drain plug is removed.**

■ **Engine oil adding**

⚠ Caution
• **DO NOT use inferior engine oil.** • **DO NOT mix different types of engine oil.** • **Be careful not to spill engine oil on any part of the engine when adding engine oil.**

(1) It is recommended to add lubricant to upper center of dipstick, there are several situations:

Charging Capacity	Engine Status	Recommended Value
	Replace oil filter assembly and lubricant at same time	4.0 L
Oil Type	C5 0W - 20	
Others	1. If lubricant needs to be added during maintenance, it is recommended to add to upper center of dipstick measurement part. 2. Do not exceed upper line of dipstick while adding lubricant, or it will affect the engine performance.	

(2) Start engine, and check the vehicle for leakage after replacing oil.

■ **Inspection method of lubricant level**

(1) Park the vehicle in a relatively horizontal position.

(2) Keep engine running at least 2 minutes and leave is stopped for 3 ~ 5 minutes.

(3) Pull out the dipstick, wipe off the measurement part and insert it into dipstick tube, then leave it for 3 ~ 5 s.

(4) Pull out the dipstick steady and place the measurement part horizontally. Visually check that oil level of measurement part is within upper mark and lower mark, it indicates oil level is normal.

⚠ Caution
• **Do not start the engine during the measurement.**

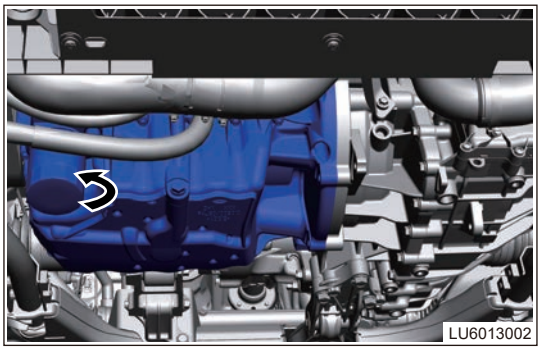
4.4 Oil Filter

■ **Removal**

⚠ Warning
• **DO NOT remove oil filter until engine cools down, avoiding being burned by high temperature lubricant and parts.** • **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine lower protector assembly.
(3) Drain engine oil.

(4) Use special tool to rotate oil filler counterclockwise until it is removed.



(5) After removing oil filter, there may be residual oil in oil filter. Place oil filter with outlet face upward and discard the used oil filter assembly in environmentally friendly way.

■ **Installation**

⚠ Caution

- **Check installation surface of oil pan for foreign matters before installation. For example: Seal ring of used filter.**
- **Check oil filter seal ring for defect or foreign matter. When assembling, seal ring needs to be lubricated.**

(1) Tighten the pipe joint with tool again.

Torque: 50 ± 5 N · m

(2) Clean the mounting surface of oil filter, fill the oil filter with an appropriate amount of engine oil (5 mL is recommended), and evenly apply a little lubricating oil on the sealing ring of mounting surface of oil filter.

(3) Install oil filter manually until sealing ring contacts with mounting surface, and then turn and tighten it with a special wrench tool.

Torque: 22 ~ 25 N · m

(4) After installation, add lubricant to engine according to recommended oil quantity.

4.5 Oil Pressure Switch

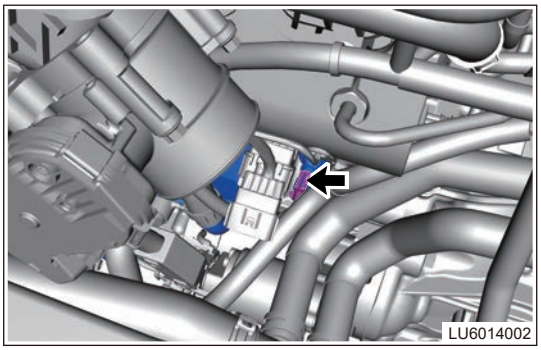
■ **Removal**

⚠ Caution

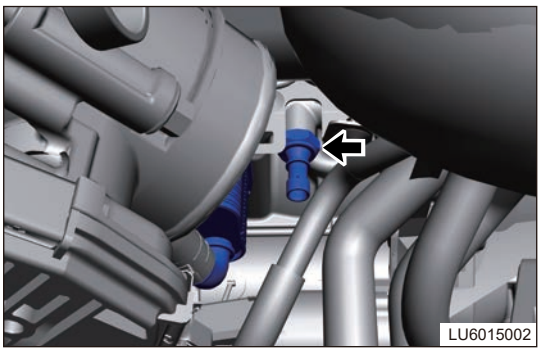
- **DO NOT remove oil pressure switch until engine cools down, avoiding being burnt by high temperature lubricant and parts.**
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover.
(3) Disconnect the negative battery cable.
(4) Disconnect the connection between intercooler outlet pipe assembly Ⅱ and electronic throttle.

(5) Disconnect the oil pressure switch connector.



(6) Remove the oil pressure switch.

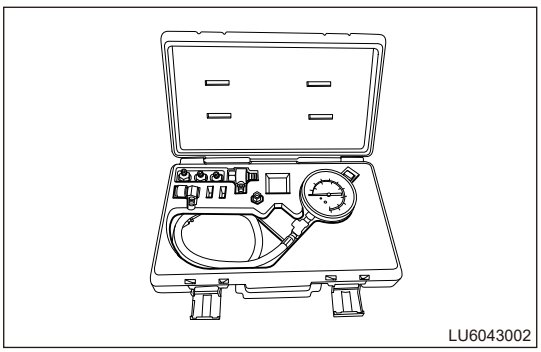


■ Inspection

⚠ Caution

- **Before inspecting oil pressure switch, please make sure that oil level is proper and coolant temperature is above 90℃, and that oil filter is used within 5000 Km.**

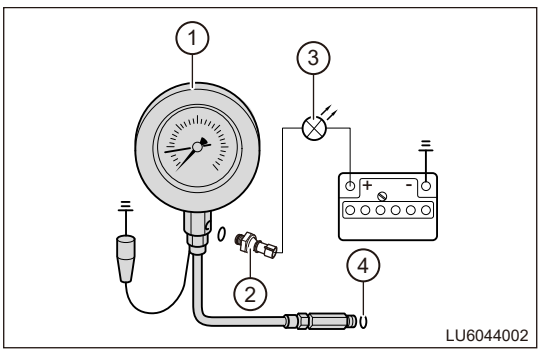
(1) Use an oil pressure gauge as shown in the illustration.



(2) Install the oil pressure gauge into the threaded hole (4) of oil pressure switch as shown in the illustration.

(3) Install the oil pressure switch (2) to the gauge (1), and connect the LED light (3).

(4) When engine is not started, observe the pressure reading on gauge. Oil pressure alarm value is 30 - 50 kPa.



■ **Installation**

⚠ Caution
• **Apply seal gum (Loctite 577) to threads when assembling oil pressure switch.**

(1) Evenly apply a circle of sealant to the thread head of oil pressure switch (2nd ~ 5th teeth).

(2) Install oil pressure switch to cylinder block and tighten it with extension sleeve tool.
Torque: 12 ~ 15 N · m

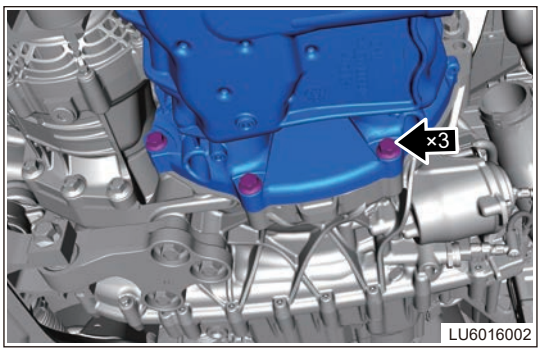
4.6 Oil Pan Assembly

■ **Removal**

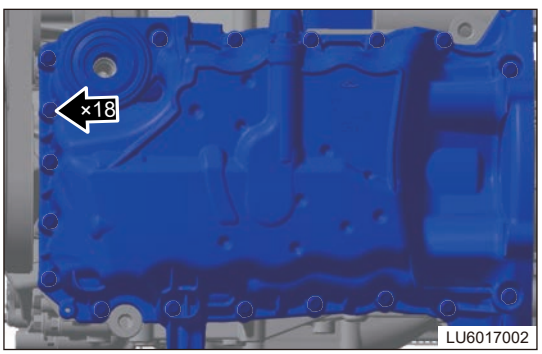
⚠ Warning
• **DO NOT drain oil and remove oil pan until engine cools down.** • **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Drain engine oil.
(4) Remove the engine compartment lower protector assembly.
(5) Remove the engine accessory belt.
(6) Remove fixing bolts from compressor assembly, and move compressor assembly to a proper position.
(7) Remove the oil filter assembly.
(8) Remove the pipe joint.

(9) Remove 3 fixing bolts between oil pan and transmission assembly.



(10) Remove 18 fixing bolts from oil pan assembly.



(11) Clamp the oil pan special tool into joint, and tap all around oil pan slightly with a rubber hammer to remove oil pan assembly.

⚠ Caution

- **Because the seal gum is sealed between oil pan and cylinder block, never use hard objects, such as a hammer, to tap it during removal, but it can be tapped slowly from left and right with a rubber hammer.**
- **A transmission carrier can be used to support the oil pan during removal, to prevent personal injury from sudden dropping of oil pan.**
- **DO NOT damage or miss dowel pin when removing oil pan.**

(12) Remove the residual seal gum on oil pan and engine frame with flat scraper.

⚠ Caution

- **Remove residue of seal gum on installation surface between oil pan and engine frame. Threaded hole can be cleaned with cleaner properly.**

■ Inspection

(1) Check the appearance of oil pan assembly for damage.
(2) Check if the oil pan installation surface is within the specified range.

■ Installation

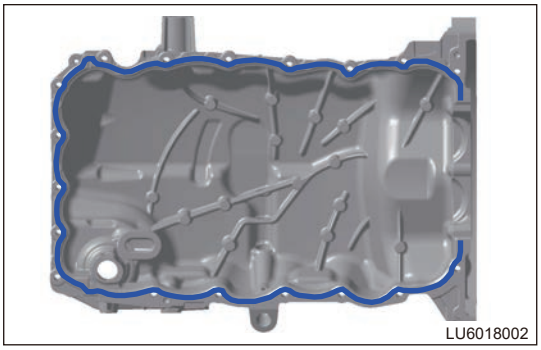
⚠ Caution

- **When applying seal gum, check the type and expiration date of seal gum.**
- **Check installation surface for impact or damage.**
- **Remove impurities, iron chips and residue of seal gum on oil pan.**
- **Remove oil stain and residue of seal gum on the threaded hole of cylinder block and oil pan.**
- **Seal gum should not be applied too thick; otherwise it will overflow into oil pan due to squeezing, which will block the oil collector.**
- **Add engine oil until seal gum solidifies after installing oil pan.**

(1) As shown in illustration, apply seal gum to inside of oil pan installation bolt hole evenly.

Recommended seal gum: Loctite 5900H

Seal gum line diameter: 2 - 3 mm



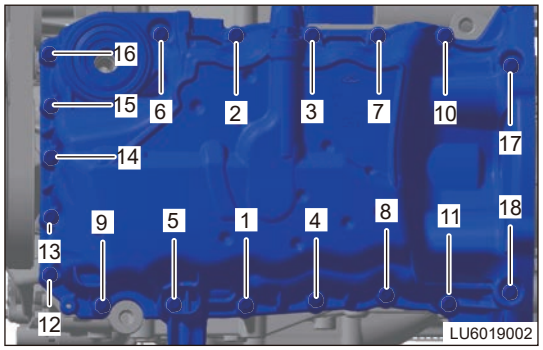
⚠ Caution

- **The applied gum line should be continuous without broken.**
- **The assembly of oil pan must be finished within 10 minutes after applying gum.**

(2) Align oil pan with frame dowel pin, assemble oil pan and tap it slightly to fit it with frame closely.

(3) As shown in illustration, pre-tighten oil pan fixing bolts until oil pan is pressed tightly. Then tighten bolts in order.

Torque: 8 + 3 N · m



(4) Install the pipe joint assembly.
(5) Install the oil filter assembly.
(6) Install 1 fixing bolt to oil pan and drive shaft bracket.
(7) Install 3 fixing bolts between oil pan and transmission assembly.
(8) Install the compressor assembly.
(9) Install the engine lower protector assembly.
(10) Add engine oil to specified value.

4.7 Oil Collector

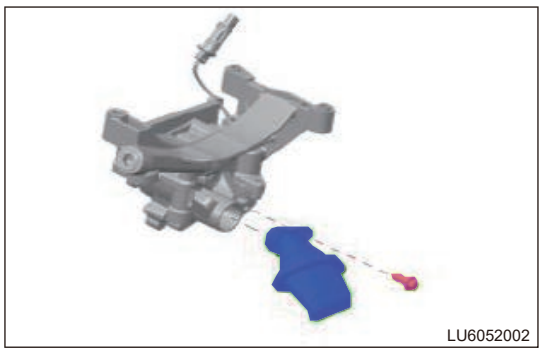
■ Removal

⚠ Warning

- **DO NOT drain oil and remove oil pan until engine cools down.**
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Drain engine oil.
(4) Remove the oil pan assembly.

(5) Remove 1 fixing bolt from oil collector.



(6) Remove the oil collector carefully.

■ Inspection

(1) Check collector O-ring for damage or cracks.
(2) Check oil collector for dirty or blockage, and clean or replace it as necessary.

■ Installation

⚠ Caution

- **Add a certain amount of lubricant to oil collector mounting hole of oil pump before installing, so that oil pump rotor cavity can be lubricated. Recommended adding amount is: 5 mL.**

(1) Apply a small amount of lubricant to O-ring surface of the oil collector.

(2) Install oil collector to oil pump mounting hole, and align the fixing bolt hole.

(3) Apply a circle of lock adhesive to fixing bolt threads head evenly. Ensure application amount for (3 - 5) teeth. Insert bolts into holes and tighten them.

Recommended lock adhesive: Loctite 243

Torque: 8 + 3 N · m

(4) Install the oil pan assembly.

(5) Add engine oil to specified value.

4.8 Oil Pump Assembly

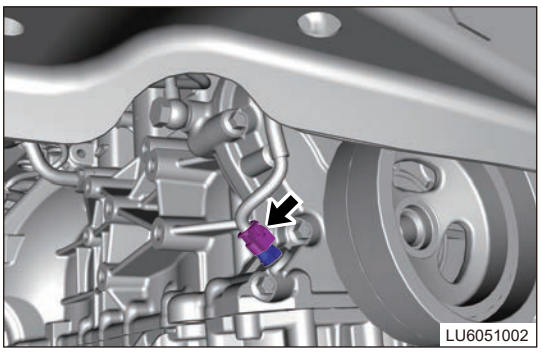
■ Removal

⚠ Warning

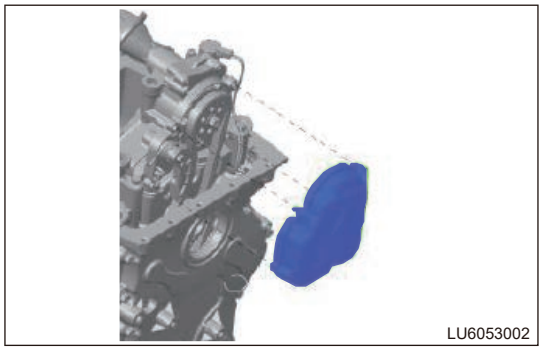
- **DO NOT drain oil and remove oil pan until engine cools down.**
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

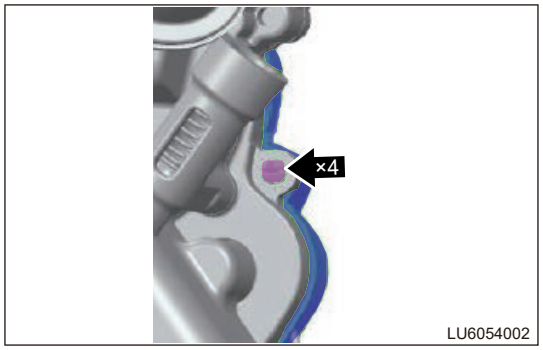
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Drain engine oil.
(4) Remove the oil pan assembly.
(5) Remove the oil collector assembly.

(6) Disconnect the oil pump solenoid valve connector.



(7) Use a flat tip screwdriver to retract all four buckles of sprocket cover into mounting hole, and then pull it out smoothly.

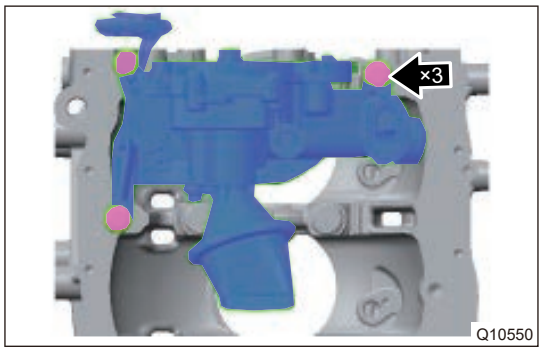




⚠ Caution

- **During installation and removal, the insertion and removal direction of sprocket cover buckle shall be operated along the axis of installation hole as much as possible. If it is operated in a seriously skewed way, it will be difficult to assemble and even damage the buckle.**

(8) Remove 3 fixing bolts from oil pump assembly, and carefully disengage lock buckle of connector to remove connector.



(9) Push chain movable rail, move away chain from oil pump assembly, remove oil pump assembly carefully.

■ Inspection

(1) Rotate oil pump shaft, check if rotation of oil pump is smooth.

■ Installation

⚠ Caution

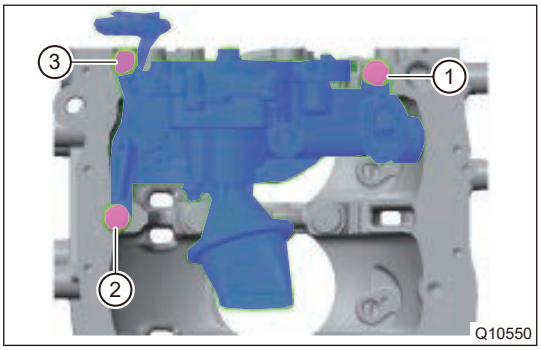
- **Wasted engine oil pump assembly should be handled by specialized department according to local laws and regulations. Never discard it at will.**

(1) Align oil pump set sleeve with the locating hole on cylinder block and insert it, fit oil pump mounting surface with cylinder block mounting surface, and place the oil pump solenoid valve connector on the outside.

(2) Apply a circle of lock adhesive to 3 bolts threads head evenly. Ensure application amount for (3 - 5) teeth. Insert bolts into holes and tighten them in order shown in illustration.

Recommended lock adhesive: Loctite 243

Torque: 20 + 5 N · m



(3) Insert the connector of solenoid valve into mating hole from the inside of cover outside. After insertion, a "click" sound is heard from buckle or lock buckle is seen to be stuck on the outer edge of mounting hole. Surface assembly is completed.

(4) Push chain movable rail, hang the chain onto oil pump sprocket. And slowly loosen movable rail until chain is tensioned.

(5) Align four buckles on sprocket cover with buckle hole of oil pump and insert them smoothly and forcibly into hole. Hearing "click" sound means that they are assembled in place.

⚠ Caution

- **After four buckles are fully in place, complete the assembly, and check if the fitting condition between sprocket cover and oil pump is abnormal.**

(6) Install the oil collector.
(7) Install the oil pan assembly.
(8) Connect the oil pump solenoid valve connector.
(9) Add engine oil to specified value.

4.9 Oil Dipstick Tube (Dipstick) Assembly

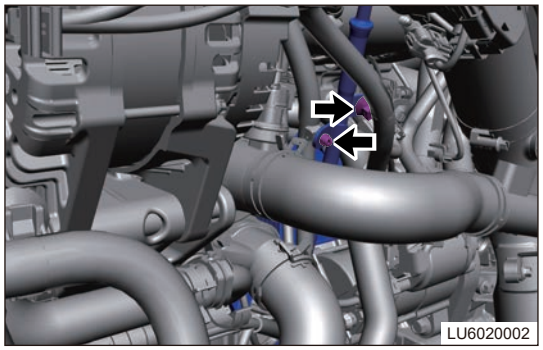
■ Removal

⚠ Warning

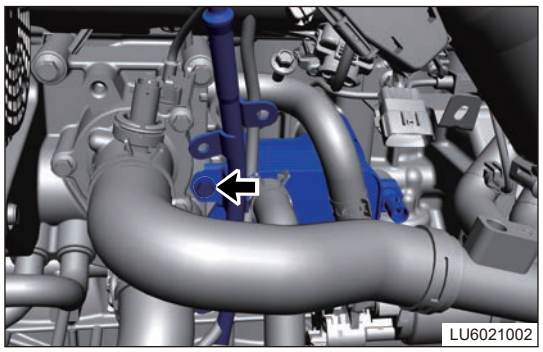
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine compartment trim cover assembly.
(4) Remove the engine trim cover assembly.

(5) Remove wire harness clips from oil dipstick tube.



(6) Remove 1 fixing bolt between oil dipstick tube and water pump module mounting hole.



(7) Remove the oil dipstick tube assembly carefully.

■ Installation

⚠ Caution

- **Check O-ring before assembly to make sure it is not damaged, otherwise replace with a new one.**
- **Apply a small amount of lubricant to dipstick tube and dipstick handle O-ring before assembly.**
- **When inserting dipstick tube into timing chain cover mounting hole, insert lower end as far as possible along shaft line direction. If it tilts, it may be difficult to assemble O-ring, even damage O-ring.**

(1) Insert dipstick tube into oil pan installation hole along the axis of installation hole.

(2) Install 1 fixing bolt between oil dipstick tube and water pump module installation hole.

Torque: 8 + 3 N · m

(3) Fix wire harness clip on oil dipstick tube.

(4) Install the engine compartment trim cover.

4.10 Oil Cooler Assembly

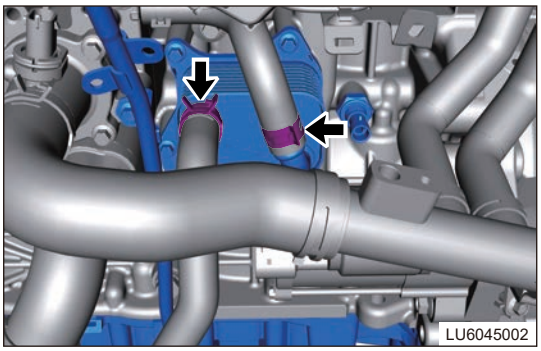
■ Removal

⚠ Warning

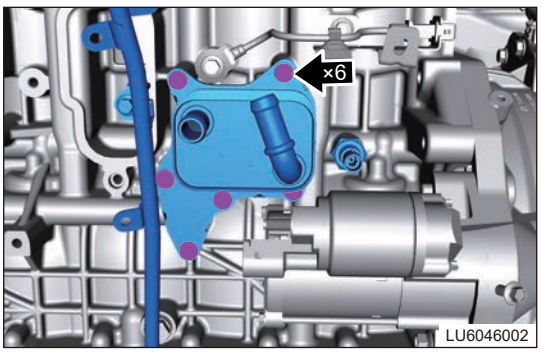
- **DO NOT remove oil cooler assembly until engine cools down.**
- **Prolonged and repeated contact with engine oil will be harmful to your skin. If engine oil spills on your skin, wash it off immediately with water. In addition, the used engine oil contains potentially harmful contaminants, which may cause skin cancer. Therefore, always take proper skin protection measures when performing vehicle service.**
- **Always make sure engine is cold before operating cooling system. Never open expansion tank cap or remove drain cock plug, when engine is operating or cooling system temperature is high. High-pressurized hot engine coolant and steam may flow out and cause serious burns.**
- **If your body contacts coolant accidentally, clean it with water immediately. If it is serious, please go to hospital.**
- **Be sure to wear safety equipment to prevent accidents, when removing oil cooler assembly.**
- **Appropriate force should be applied, when removing the oil cooler assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the starter assembly.
(5) Remove the engine lower protector assembly.
(6) Drain the coolant.

(7) Loosen elastic clamp and clamping ring, and disconnect water outlet pipeline and water inlet pipeline from oil cooler assembly.



(8) Removal 6 fixing bolts from oil cooler assembly.

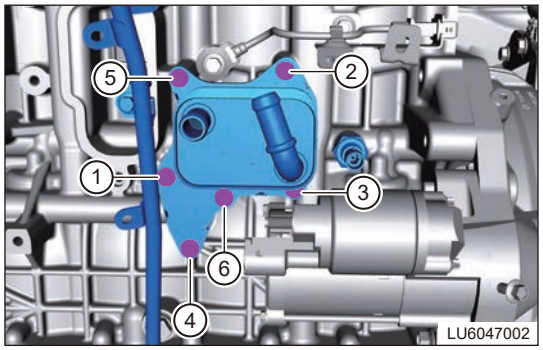


(9) Carefully remove the oil cooler assembly.

■ Installation

(1) Align bolt installation hole of oil cooler with the corresponding bolt hole on cylinder block, install 6 fixing bolts, and tighten bolts in order shown in illustration.

Torque: 8 + 3 N · m



(2) Connect water outlet pipeline and water inlet pipeline with oil cooler assembly.
(3) Install the starter assembly.
(4) Add the coolant.
(5) Add engine oil to a proper position.

2.9 STARTING AND CHARGING SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Battery acid is highly corrosive, so it is necessary to wear protective gloves or goggles when working.

(2) Do not dump the battery, because acid may spill from vent hole.

(3) Never throw the used battery into household garbage. There is risk of explosion.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Deliver the used battery to designated recycling site.

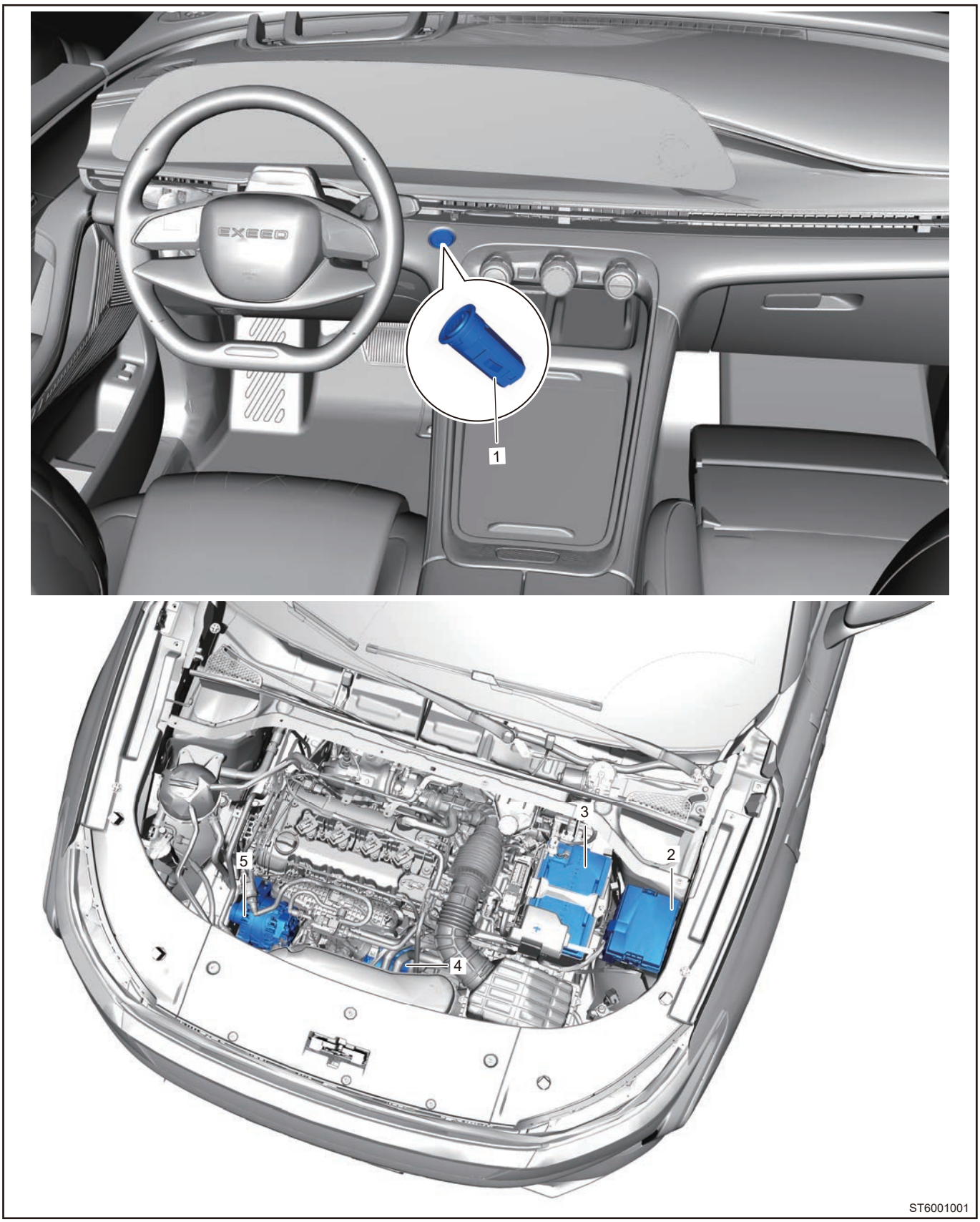
(2) Never allow the children approaching acid and battery.

2 System Overview

2.1 System Description

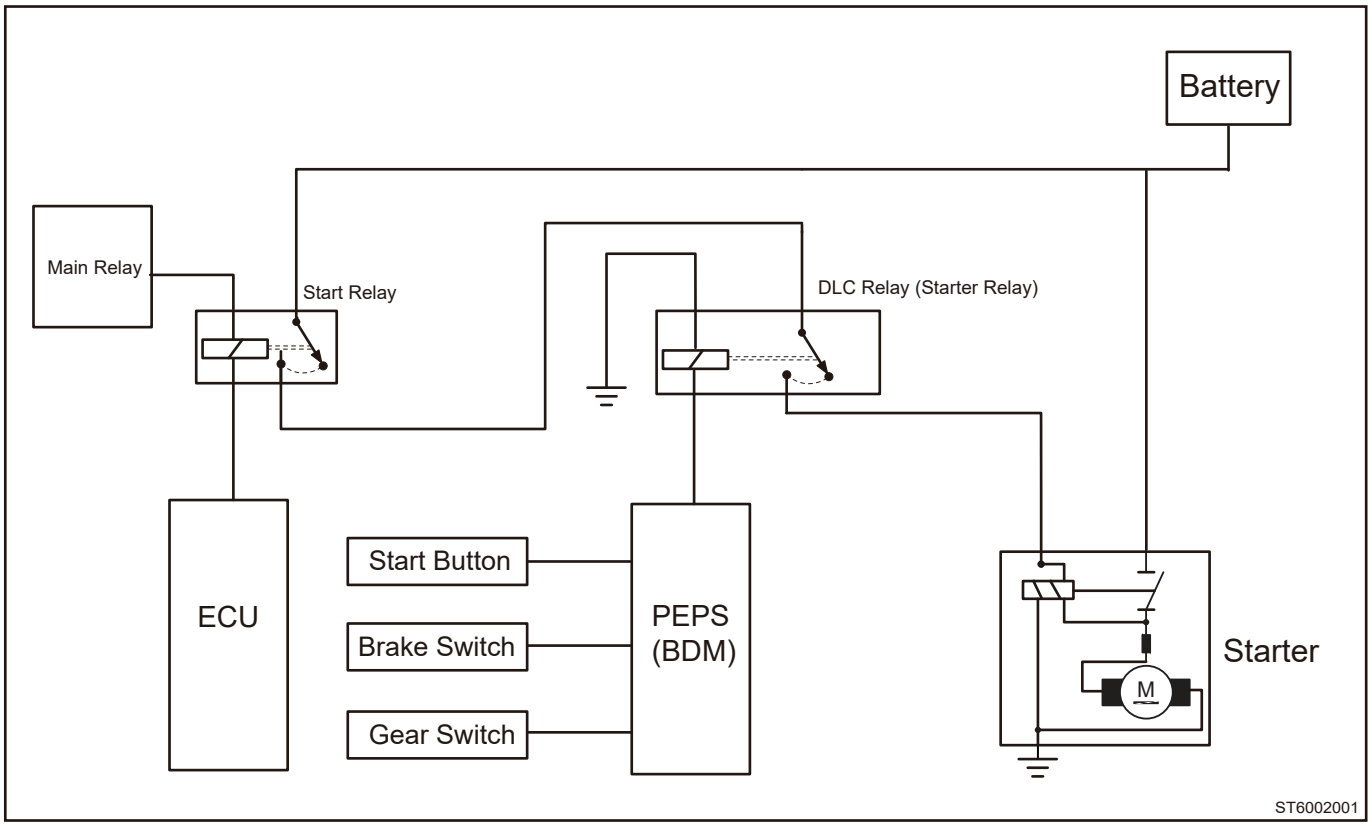
Starting system consists of battery, starting switch and starter, etc. Starting system converts electrical energy from battery into mechanical energy, allowing engine to crank initially, and disconnects power transmission between starter and engine when engine starts successfully.
Charging system consists of battery, alternator and charging state indicator. Alternator is the main power supply component while vehicle is operating. It is used to supply power to all the electric equipment (except for the starting system) and charge the battery. Since alternator is rotated through drive belt which is driven by the engine, voltage will changes depending on engine speed. To meet electric device power supply and battery charging requirements, voltage regulator is equipped in charging system (inside alternator). The voltage regulator maintains voltage output stability of alternator by adjusting exciting current in alternator while engine speed and load is changing. Charging state indicator is used to show the charging system operation and indicate whether the battery is in a charging or discharging state.

2.2 System Components Diagram

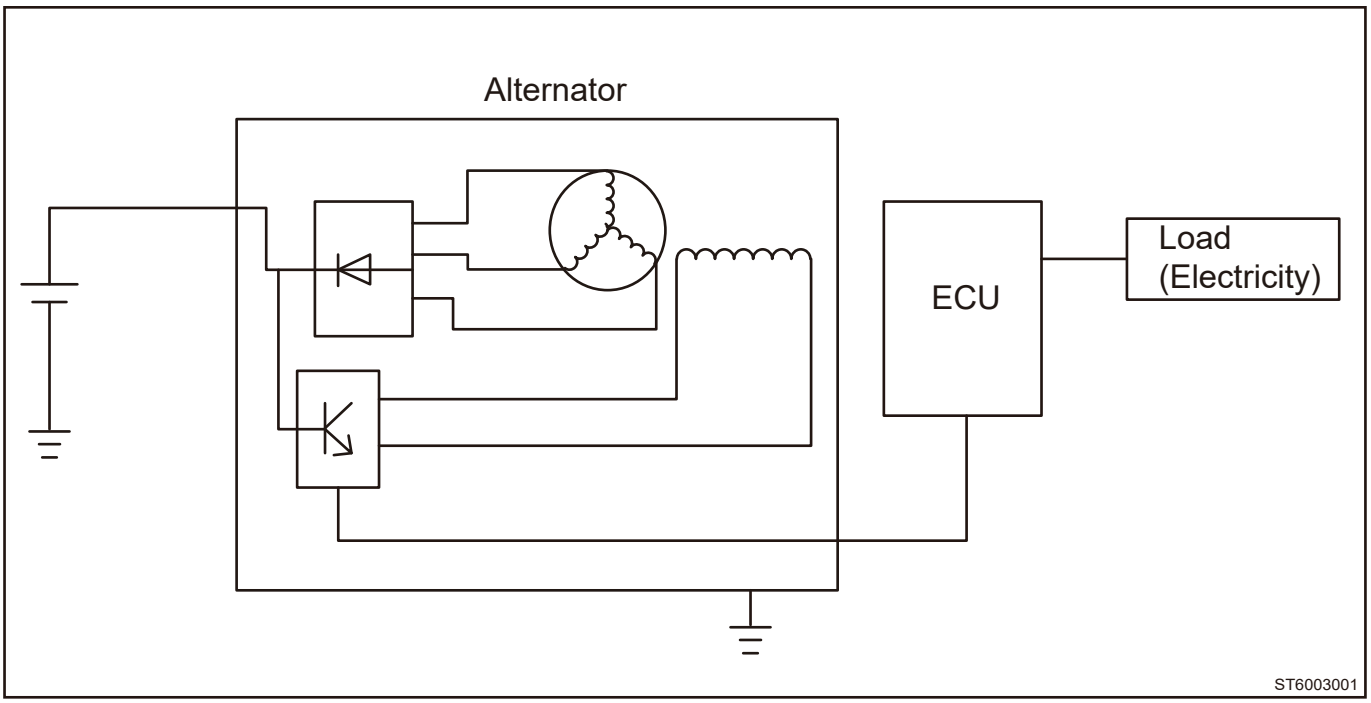


1	ENGINE START STOP Switch	4	Starter Assembly
2	Engine Compartment Fuse and Relay Box	5	Alternator Assembly
3	Battery Assembly		

2.3 System Schematic Diagram



When battery voltage is normal starting voltage and transmission is in P position, press ENGINE START STOP switch while depressing brake pedal. When PEPS receives signal, it controls the starter relay to engage, then the starter runs normally.



Three-phase alternating current generated by alternator is converted to direct current from alternating current by rectifier, and direct current is transmitted to the vehicle electrical system and battery.

2.4 Components Description

■ Battery assembly

Main function

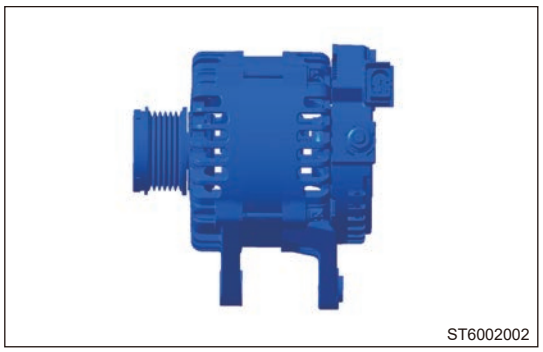
When starting the engine, it is responsible for providing the working current required by the starter; When engine is running, it can help alternator to supply power to electric device; When engine is stationary, it can supply power to electric device separately; Moreover, battery is a large capacity capacitor which protects vehicle electrical device.

Battery Model

Description	Specifications
F4J20C	12 V 70 Ah

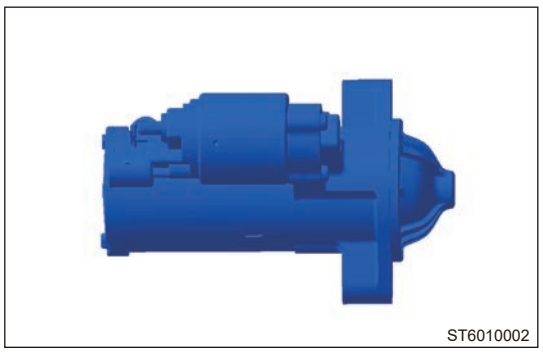
■ Alternator assembly

Alternator is a silicon rectifying alternator, which mainly consists of rotor, stator and rectifier.
When excitation direct current flows to rotor winding, rotor winding establishes a magnetic field and magnetizes the rotor claw poles, forming the corresponding poles.
The three-phase stator coil is installed on the outside of rotor, which is secured together with the front and rear end covers of alternator.
When the rotor of the generator is rotated by the drive belt, the magnetic pole lines cut the stator winding, causing a change in the magnetic flux in the stator winding, and an alternating induced electromotive force is generated in the stator winding, thereby generating alternating current. The generated three-phase alternating current is converted to direct current by rectifier, and direct current is transmitted to the electrical system and battery of vehicle by further adjusting by regulator.


ST6002002

■ Starter assembly

Starter consists of three parts: control mechanism, drive train mechanism and DC motor.
Control mechanism (solenoid switch): Controls engagement and disengagement between starter drive gear and engine flywheel gear and switches on/off the DC circuit.
Drive train mechanism: When engine starts, it engages starter drive gear with flywheel gear ring and transmits starter torque to the engine crankshaft; after engine starts, drive gear will automatically disengage from the flywheel gear ring, so that engine cannot drive starter at high speed in reverse direction, avoiding damage to the starter.
DC motor: converts electrical energy from battery into electromagnetic moment.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3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Starting and Charging system

Symptom	Possible Cause
Housing is cracked	Housing cracked is the most serious and destructive malfunction. When vehicle is subjected to strong vibration, lead acid battery overheating, too high pressure or electrolyte frozen expansion, the housing of lead acid battery will be damaged. For such malfunction, replacing battery is the sole way for treatment.
Electrode is loose	The cause of loosen electrode is that excessive force is applied during removal and installation of wire harness and inspection of contact. It is necessary to replace the battery assembly.

Symptom	Possible Cause
Connecting part of electrode is corroded or burnt	Check if the generated electricity is normal and if the charging voltage is too high.
Battery swells	The causes are that battery is aging and resistance is excessively high. It is necessary to replace the battery.

3.2 Common Trouble Diagnosis

Operation Content	Operation Description
Appearance inspection: Confirm if there is any washer fluid, coolant, oil, sludge and other foreign matters adhered.	If the washer fluid, coolant, oil enters rotor slip ring, brush holder, it will cause oxidization to alternator rotor slip ring and poor contact to brush, resulting in charging light remaining on or flashing.
Turn over the center of alternator belt by hand and observe if the max. turning angle is over 90°.	Loose belt will cause low alternator speed, resulting in low electric energy production or failing to generate energy; if the angle is over 90°，check the belt tension.
Measure battery voltage with a multimeter.	Confirm if the battery is depleted (more than 12 V). If so, unplug the generator excitation coil connector and retest the battery voltage (more than 12 V). If such condition still exists, charge the battery.
Confirm if there is any looseness, short circuit, dirt on alternator B+, excitation end, battery pile line and ground line and also confirm if the connectors are connected firmly.	Confirm if the wire harness is connected normally. Poor contact will cause that the alternator voltage is high, the indicator light doesn’t come on, remains on or flashes. If there is any looseness, please tighten it firmly.

Charging indicator light remains on (do not generate electricity or power is low, vehicle cannot start, etc.)	
Operation Content	Operation Description
Unplug the alternator connector, start the engine and depress the accelerator (engine speed is above 1500rpm), turn off the vehicle load, measure B+ voltage to ground with multimeter and observe 2-3 minutes.	If B+ voltage is about 13.8 V, the alternator is normal. If B+ voltage is the battery voltage, it indicates alternator malfunction. Replace the alternator.
If the alternator operates normally, reconnect the alternator connector, start the engine and keep it idling, turn on some electrical load on vehicle, such as A/C, headlight, etc. Meanwhile, depress the accelerator pedal or decelerate the vehicle. Measure B+ voltage to ground with multimeter and observe 2 - 3 minutes.	When vehicle load or speed changes, the alternator normal voltage should change within 10.6 - 16 V. If the charging indicator remains on, check if communication is normal with an oscilloscope or other test software.

Charging indicator (unstable electricity generation)	
Operation Content	Operation Description
Start the engine and keep it idling, remove alternator excitation coil and observe if the meter indicator flashes.	If the light flashes, it indicates that some excitation coil has outer leakage and intermittently ground. Check the circuit malfunction.

Indicator does not come on during self-check	
Operation Content	Operation Description
Turn ENGINE START STOP switch to “ON” position, remove the engine excitation coil and measure the alternator excitation coil terminal voltage to ground with multimeter.	If the light flashes, it indicates that some excitation coil has outer leakage and intermittently ground. Check the circuit malfunction.

Adjusting voltage is high (headlight and other electrical appliances used on vehicle are burnt out)	
Operation Content	Operation Description
Start the engine and keep it idling, measure B+ voltage to ground with multimeter and observe 2 - 3 minutes to check if the max. value exceeds 16 V.	If so, it indicates that the regulator in alternator is damaged which causes voltage out of control. Replace the alternator.

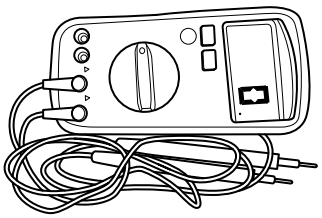
Instrument indicator or headlight dims and then goes off during vehicle driving (fail to generate energy, low electric energy production)	
Operation Content	Operation Description
Start the engine and keep it idling for 5 minutes (turn off the electrical appliances with large power, test with light load as possible), measure the alternator B+ voltage.	If the measured voltage is 13 V - 14.8 V, the alternator is normal; if not, the alternator is abnormal. Replace the alternator.

Abnormal noise occurs in alternator	
Operation Content	Operation Description
Check if the alternator mounting bolt is installed in place and tightened with specified torque.	Improper installation of bolt will cause pulley jumps as alternator operate, resulting in abnormal noise. Tighten the bolt.
Remove the alternator belt, and rotate the alternator pulley by hand. Listen and observe near the motor if there is any abnormal noise during alternator rotation.	Excessive belt tension or dirt in alternator will cause alternator baring failure or poor rotor dynamic balance which causing abnormal noise. Replace the alternator.

4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Battery Tester	 S00064

4.2 Battery Assembly

■ Check charging system voltage

⚠ Warning

- **Following the related specifications on appliances connected with battery, in repair manual and owner’ s manual.**
- **Battery acid is highly corrosive, so it is necessary to wear protective gloves or goggles when working.**
- **Keep away from open fire, spark, light devices without protective measures and no smoking. Never generate any sparks when operating cable/wire and electrical devices. Avoid short circuit in battery.**
- **Wear eye protective mask/glasses.**
- **Never allow the children approaching acid and battery.**
- **Deliver the used battery to designated recycling site. Never throw the used battery into household garbage.**

(1) Leave vehicle under no load test condition and idle the engine. Measure battery voltage with a digital multimeter.

Standard voltage: 13.5V - 14.8V

Hint:
If result is not as specified, replace the alternator.

(2) Leave vehicle under load test condition and idle the engine. Measure battery voltage with a digital multimeter.

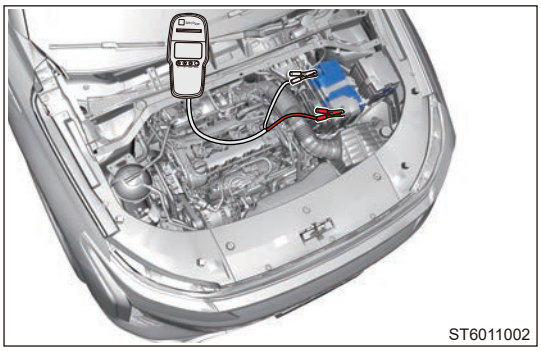
1) Set headlight to high beam.
2) Turn on blower and adjust blower speed to the highest.
3) Turn on the "A/C" switch.

Standard voltage: 13.2V - 14.8 V.

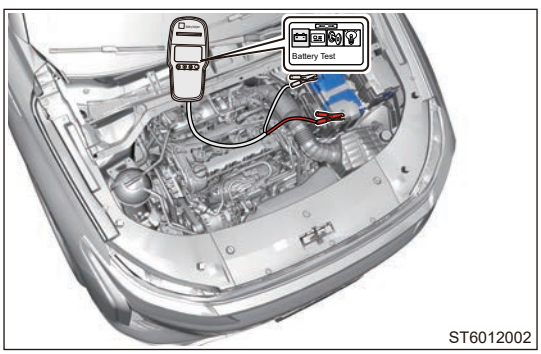
■ Usage of battery tester

(1) Connect the battery tester to battery.

Hint:
Connect red tube clamp to battery positive terminal while black tube clamp to battery negative terminal.


ST6011002

(2) Operate tester to select “Battery Test” and click “OK”.



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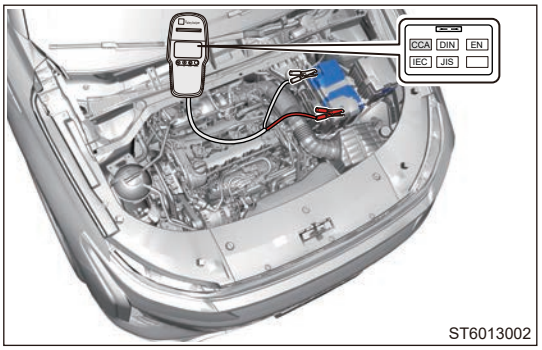
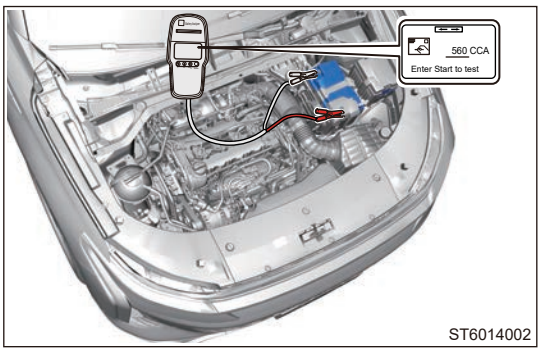
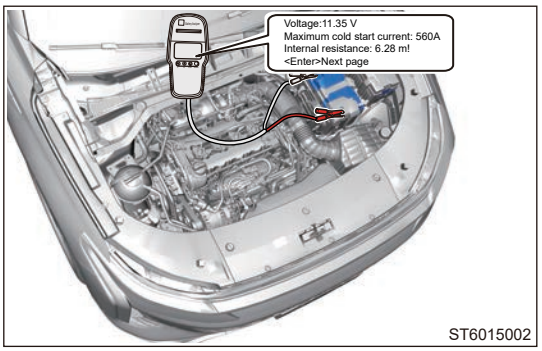
(3) Select “CCA” and click “OK”.



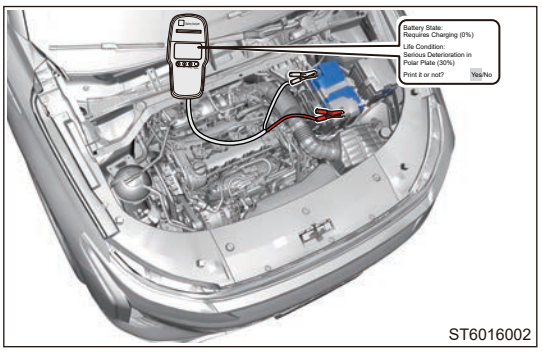
(4) Operate “L and R” on tester to adjust and set the battery capacity (such as 560CCA, this value indicates the battery low temperature starting performance) and click “OK”.





(5) The battery condition is displayed on tester.

Hint:
Recharge or replace battery according to the tested data.



■ Removal

⚠ Warning

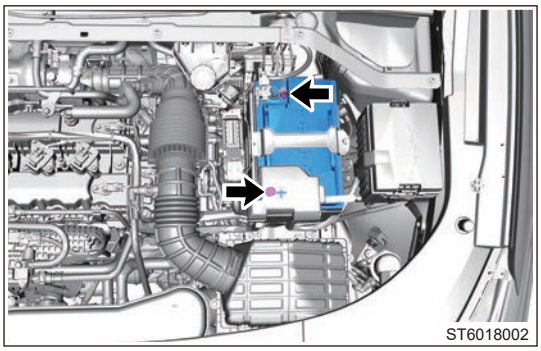
- **Be sure to wear safety equipment to prevent accidents, when removing battery assembly.**
- **Appropriate force should be applied, when removing battery assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.

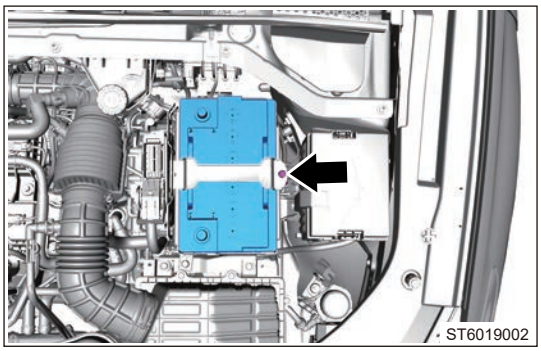
(3) Remove the air filter assembly.

(4) Loosen the locking nuts of positive and negative battery terminals (10# socket wrench), and remove the positive and negative battery cables (1) (2).

Hint:
When removing the battery positive and negative battery terminals, remove negative terminal before positive terminal.



(5) Remove 1 fixing bolt (10# socket wrench) and battery pressure plate.



(6) Remove the battery assembly from protective cover carefully.

⚠ Caution

- **When removing battery, be careful to prevent metal tools from contacting both electrodes of battery at the same time or touching the positive electrode and vehicle body.**

■ Battery fluid leakage test

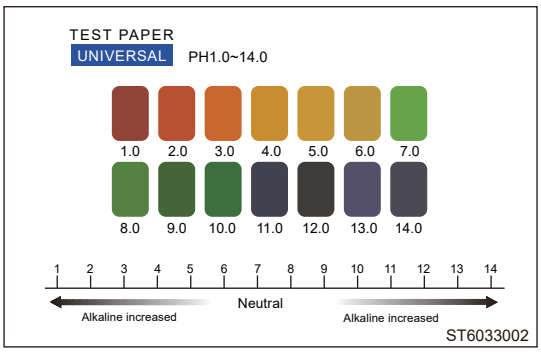
(1) PH test paper is used for judgment.

Hint:
Test paper model: PH 1 - 14.

(2) Take a piece of PH test paper (never allow it contacting with other fluid before test) to wipe the leaking area, so as to make the fluid adhere on the PH test paper. Then compare it with the color bar to judge the PH value.

(3) If the PH value is less than 7, it is an acidic liquid, which indicates battery leakage.

(4) If the PH value is 7 or higher, it is non-acidic liquid (-neutral or alkaline) which indicates “Petroleum jelly” fluid or other fluids leakage on battery surface.



■ **Battery (off-vehicle) charging**

(1) Because the battery has the characteristic of self-discharging, even if the battery is not in use, it is necessary to perform regular charging maintenance. When the discharging ratio for battery capacity is lower than 50%, the capacity cannot restore to 100% if charging with small current while the battery temperature increases and the plate active material will fall off easily if charging with large current, affecting the performance and life of battery.

- Charging with constant voltage: Voltage is limited at 14.40 V. During charging, make sure the charger is connected to the maximum charging current so as to get the preset voltage value (14.40 V) according to the current battery status and temperature. After the voltage reaches the limiting value, the charging current will drop gradually until it closes to 0 A (maintain the condition charging current).

■ **Battery (on-vehicle) external power supply charging**

(1) If battery external power supply charging is necessary, it’ s important to keep external charger is properly connected. If charging process is not correct, the sensor cannot recognize the charging current, and SOC value cannot be calculated correctly. Positive clamp of external charging device must clamp positive terminal of battery, and negative clamp must be ground instead of negative terminal of battery. Battery sensor only properly balances the charge when there is a continuous current through it.

■ **Installation**

⚠ Caution

- **Replace battery with a new one which conforms to the specifications.**
- **During installation, make sure the directions of positive and negative terminals are correct.**
- **Used battery contains sulfuric acid and lead, so never discard it at will. Please dispose of it at a qualified local waste treatment station.**
- **When installing the battery positive and negative battery terminals, install negative terminal before positive terminal.**

(1) Place the battery into battery tray carefully.

(2) Install fixing bolt to battery pressure plate.

(3) Install and tighten battery positive and negative battery terminals.

Torque: 5 ± 1 N·m

(4) Install engine compartment fuse and relay box upper cover.
(5) Install the engine compartment trim cover assembly.

4.3 Battery Tray

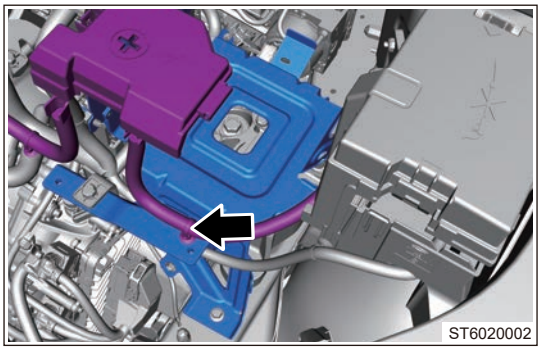
■ **Removal**

⚠ Warning

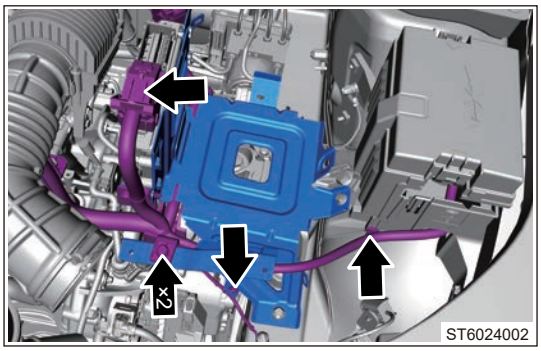
- **Be sure to wear safety equipment to prevent accidents, when removing battery tray.**
- **Appropriate force should be applied, when removing battery tray. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the air filter assembly.
(4) Remove the battery assembly.

(5) Disengage the battery positive wire harness fixing clip from battery tray.

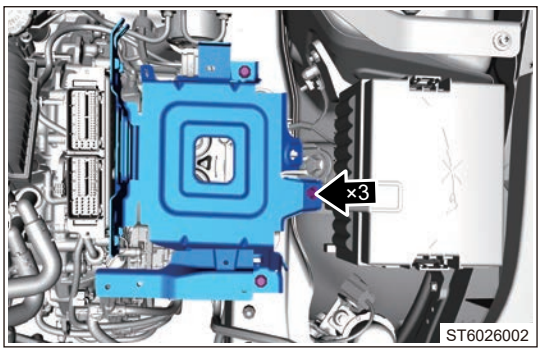


(6) Disconnect ECU connector, remove 2 fixing bolts from engine electronic injection wire harness, and disengage wire harness fixing clip.



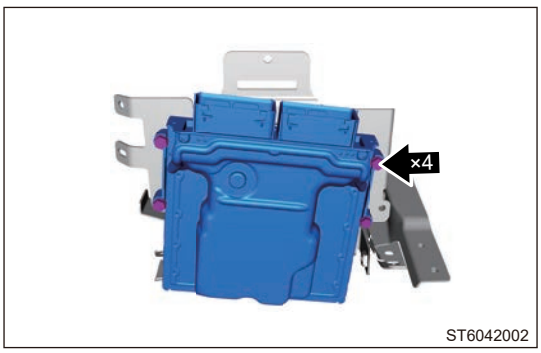
(7) Disconnect the connection between engine electronic injection wire harness and engine compartment fuse and relay box.

(8) Remove 3 fixing bolts from battery tray assembly.



(9) Remove the battery tray with ECU assembly.

(10) Remove 4 fixing bolts of ECU assembly from battery tray, and remove ECU.



■ Installation

(1) Install ECU assembly to battery tray.

(2) Install 3 fixing bolts to battery tray assembly.

(3) Connect engine electronic injection wire harness and engine compartment fuse and relay box.

(4) Install 2 fixing bolts to engine electronic injection wire harness, connect ECU connector and install wire harness fixing clip.

(5) Fix battery positive wire harness to battery tray.

(6) Install the battery assembly.

(7) Install the air filter assembly.

(8) Install the engine compartment trim cover assembly.

4.4 Alternator Assembly

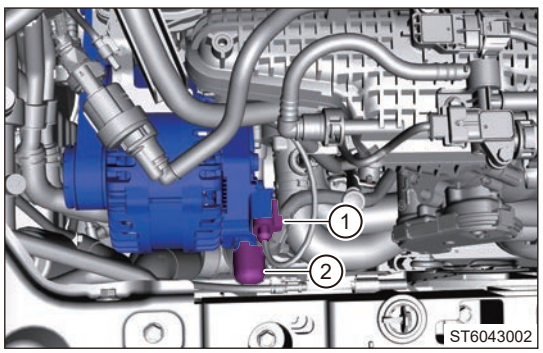
■ Removal

⚠ Warning

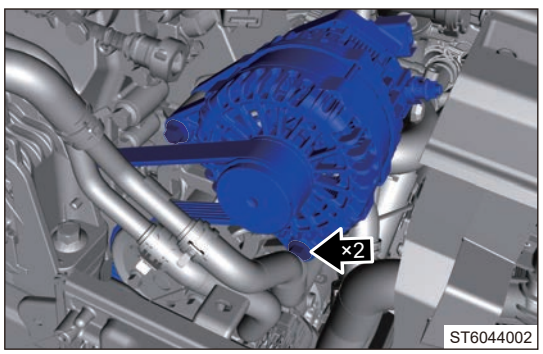
- **When removing alternator assembly, be sure to wear safety equipment to prevent accidents.**
- **Appropriate force should be applied, when removing alternator assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the engine trim cover.
(5) Remove the engine accessory belt.

(6) Disconnect the alternator assembly connector (1) and remove alternator positive cable harness fixing nut (2).



(7) Remove 2 fixing bolts from alternator assembly.



(8) Remove the alternator assembly carefully.

■ **Installation**

(1) Install the alternator assembly to the corresponding position of the water pump module, install 2 fixing bolts and tighten them in order after pre-tightening 2 - 3 teeth with hand.

Torque: 40 + 5 N · m

⚠ Caution

- **After alternator bolt is tightened, visually check for clearance between two sliding sleeves as well as between module sliding sleeve and the module. If clearance exists, it meets the installation requirement.**

(2) Install alternator positive wire harness port and secure the nut.

Torque: 13 ± 2 N · m

(3) Connect the alternator assembly connector.
(4) Install the alternator accessory belt.
(5) Install the engine compartment trim cover.

4.5 ENGINE START STOP Switch

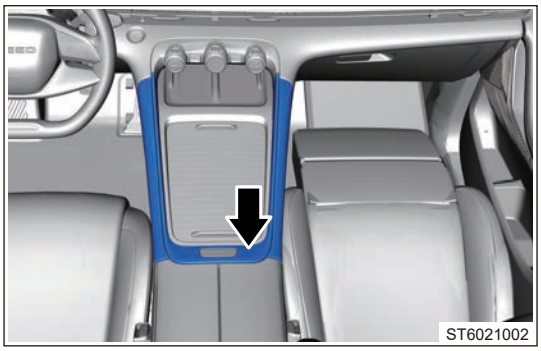
■ **Removal**

⚠ Warning

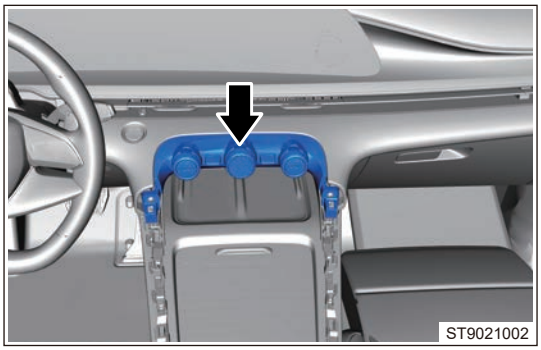
- **Be sure to wear necessary safety equipment to prevent accidents, when removing ENGINE START STOP switch.**
- **Try to prevent interior protector from being scratched during removal and installation.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.

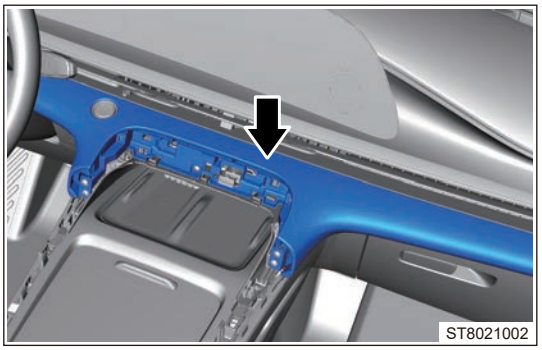
(3) Remove auxiliary fascia console trim strip assembly with interior crow plate.



(4) Remove the automatic A/C control panel assembly.

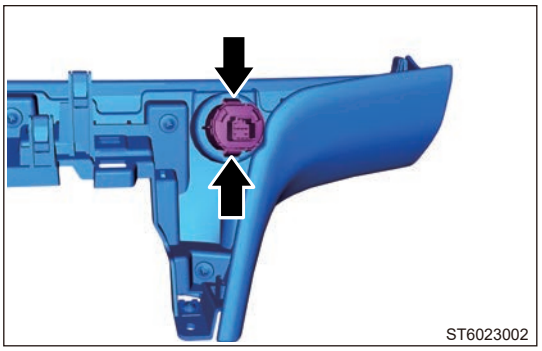


(5) Remove the right instrument panel trim panel assembly.



(6) Disconnect ENGINE START STOP switch connector.

(7) Squeeze/Push fixing clips on both sides of ENGINE START STOP switch and remove ENGINE START STOP switch assembly.



■ Inspection

(1) Using a digital multimeter, check the continuity of ENGINE START STOP switch according to the table below.

Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 2	Not pressed	No continuity
Terminal 3 - Terminal 2	Not pressed	No continuity
Terminal 1 - Terminal 2	Pressed	Continuity
Terminal 3 - Terminal 2	Pressed	Continuity

⚠ Caution

- **If measure result is not as specified, replace the ENGINE START STOP switch assembly.**

■ Installation

(1) Install ENGINE START STOP switch to right instrument panel trim panel assembly.

(2) Connect ENGINE START STOP switch connector.

(3) Install the right instrument panel trim panel assembly.

(4) Install the automatic A/C control panel assembly.

(5) Install the auxiliary fascia console trim strip assembly.

4.6 Starter Assembly

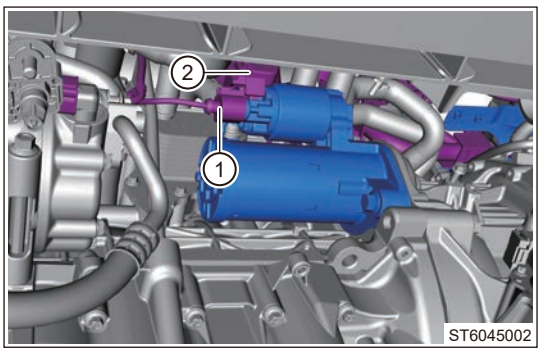
■ Removal

⚠ Warning

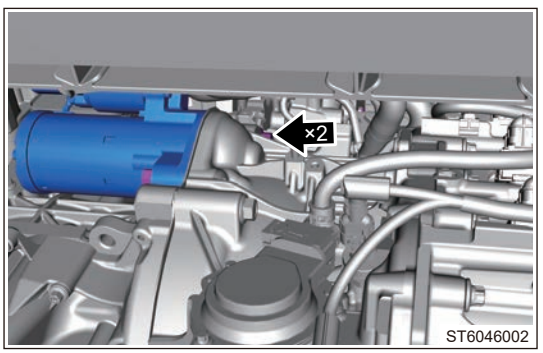
- **Be sure to wear safety equipment to prevent accidents, when removing starter assembly.**
- **Appropriate force should be applied, when removing starter assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the air filter assembly.
(4) Remove the intercooler inlet pipe Ⅰ assembly.
(5) Remove the engine lower protector assembly.
(6) Remove the intercooler outlet pipe Ⅱ assembly.

(7) Disconnect the starter assembly connector (1) and remove positive cable fixing nut (2).



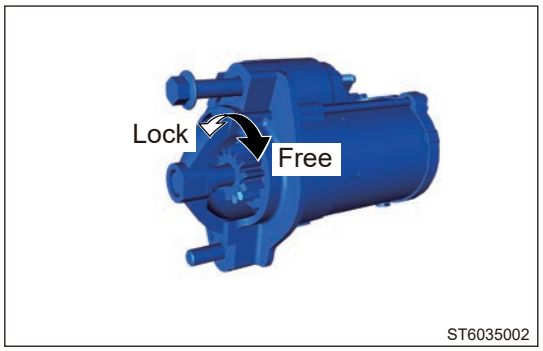
(8) Remove 2 fixing bolts between starter assembly and transmission case.



(9) Remove the starter assembly carefully.

■ Check starter clutch

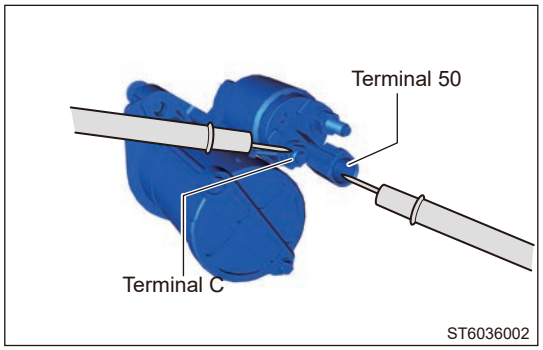
(1) Rotate the clutch pinion gear clockwise to check that it rotates freely. Rotate the clutch pinion gear counterclockwise to check that it locks. If result is not as specified, replace the starter.



■ Check pull-in coil

(1) Measure the resistance between terminal 50 and terminal C.

Hint:
Standard resistance should be below 2 Ω. If the resistance is abnormal, replace the starter assembly.



■ Check starter assembly

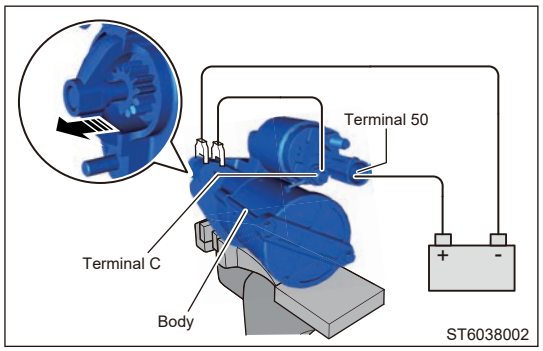
⚠ Caution

- **These measurements must be performed within 3 to 5 seconds to avoid coil burnout.**
- **Place the starter assembly onto a vise. The jaws of vise should be covered by aluminum sheet or brass plate; otherwise, the starter assembly will be easily damaged when clamping it.**

(1) Perform pull-in test.

- Remove the nut and disconnect the field coil lead from terminal C.
- As shown in illustration, connect battery to solenoid switch, and check that starter clutch pinion sticks out normally.

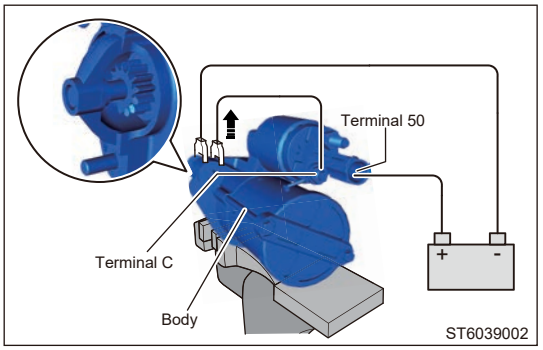
Hint:
If starter clutch pinion does not move, replace the starter assembly.



(2) Perform pull-in test.

- Keep the starter clutch pinion sticking out and the connection condition of battery mentioned above, and disconnect the negative battery cable from terminal C.
- Check if starter clutch pinion keeps sticking out.

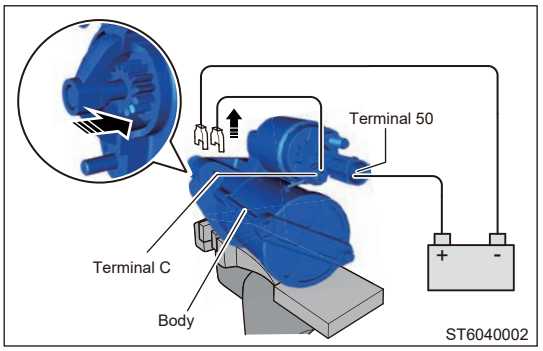
Hint:
If starter clutch pinion moves inward, replace the starter assembly.



(3) Check if starter clutch pinion returns back.

- Disconnect negative battery cable from starter body and check that starter clutch pinion returns back.

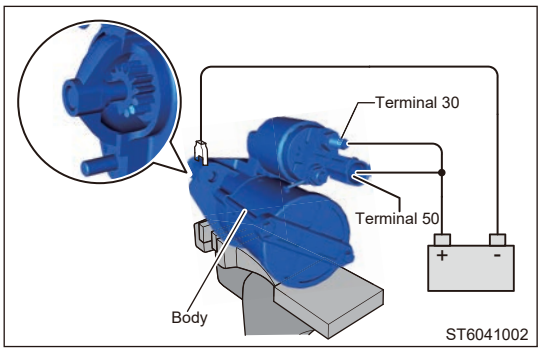
Hint:
If starter clutch pinion moves inward, replace the starter assembly.



(4) Check if starter rotates smoothly.

- Connect the field coil lead to terminal C, and tighten it with a nut.
- As shown in illustration, connect battery to starter; And check that starter rotates smoothly when the starter clutch pinion moves outward.

Hint:
The lead to be connected should avoid the pinion side to prevent lead stuck as pinion rotates.
If result is not as specified, replace the starter assembly.



■ Installation

(1) Align starter with the corresponding holes on transmission, install 2 bolts and tighten it in order after pre-tightening 2-3 teeth with hand.

Torque: 40 + 5 N · m

(2) Install positive wire harness port and secure the nut.

Torque: 13 ± 2 N · m

(3) Connect starter assembly connector.
(4) Install the intercooler inlet pipe Ⅰ assembly.
(5) Install the air filter assembly.
(6) Install engine lower protector assembly.
(7) Install intercooler outlet pipe Ⅱ assembly.

2.10 FUEL SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) As the pressure of high pressure fuel system is high, the pressure must be released before removal.

(2) During removal, make sure the areas near stored parts are clean and free of dirt.

(3) Perform removal after engine cools down.

(4) Operation staff should wear protective glasses and rubber gloves during repair and avoid inhaling much fuel gas.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.

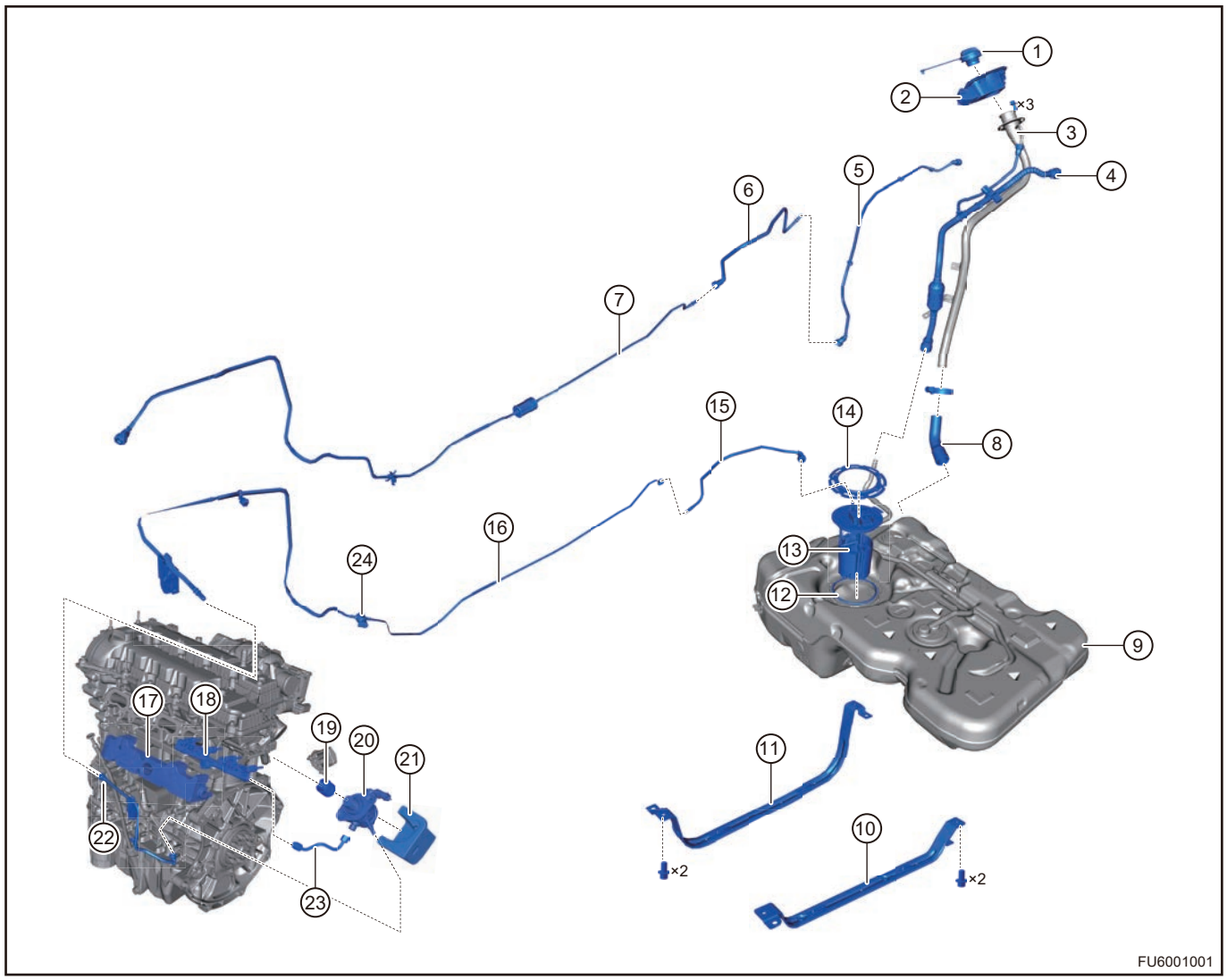
(2) When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.

2 System Overview

2.1 System Description

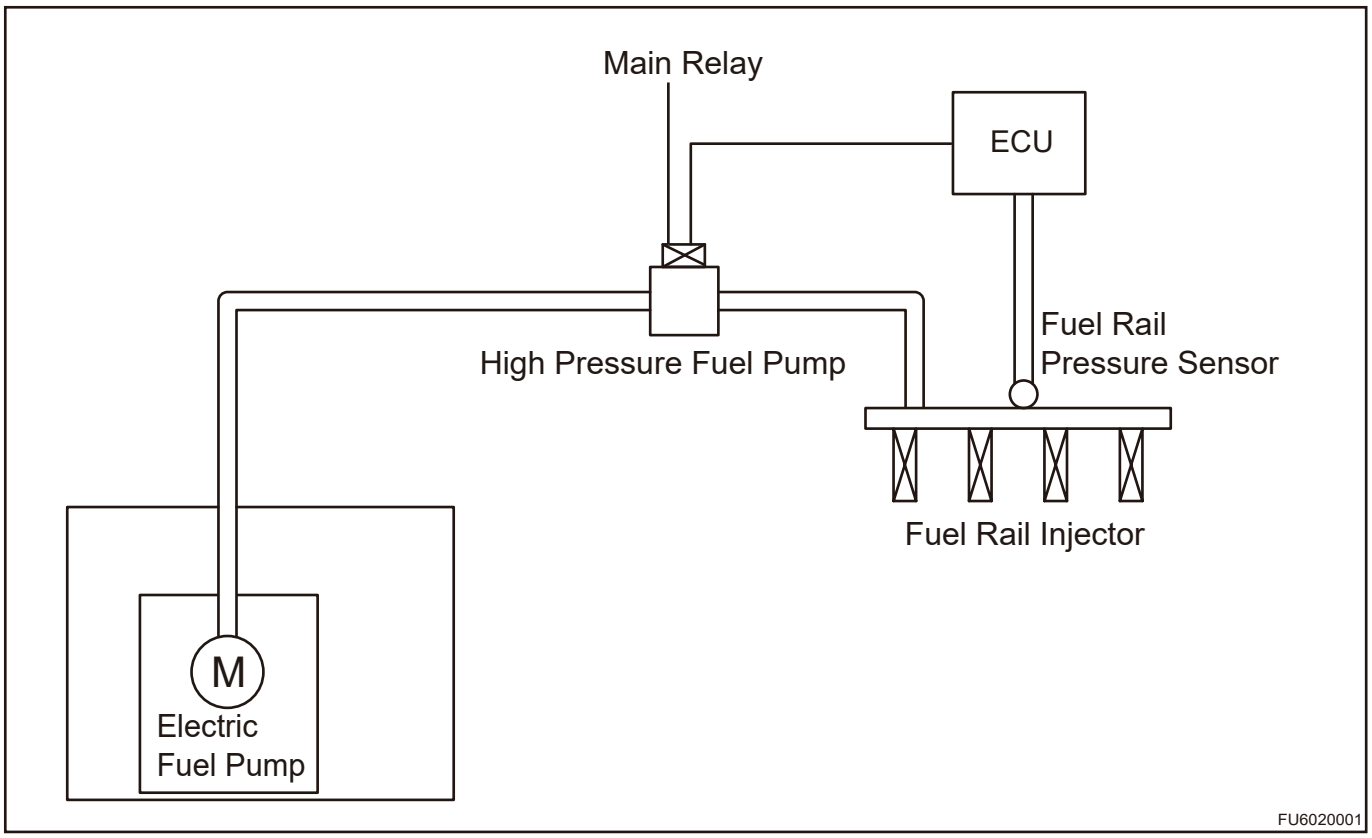
Fuel supply system uses direct injection in cylinder. The high pressure fuel pump is driven by square cam on intake camshaft, thus sucking fuel from the low-pressure end for compression and boosting, and the pressure can be raised up to 350 bar. ECU monitors fuel rail pressure through oil pressure sensor. Fuel is sent to fuel rail after further adjustment by the fuel pressure regulator. The vehicle adopts a direct injection system with Bosch 4-hole nozzle and a side nozzle layout; According to the control signal of ECU, fuel is injected into the combustion chamber and mixed with gas for combustion.
In low pressure fuel system, fuel pump is controlled by individual fuel pump control module by means of duty ratio control, and monitors the low-pressure end pressure through low pressure fuel pressure sensor realizing closed-loop control.

2.2 System Components Diagram



1	Fuel Tank Cap Assembly	13	Electric Fuel Pump Assembly
2	Fuel Filler Cap Assembly	14	Fuel Tank Seal Cover
3	Filler Tube Assembly	15	Inlet Pipe Ⅰ Assembly
4	Fuel Vapor Pipe Ⅱ Assembly	16	Inlet Pipe II Assembly
5	Fuel Vapor Pipe III Assembly	17	Fuel Rail Injector Sound Insulator
6	Fuel Vapor Pipe Ⅳ Assembly	18	Fuel Rail Injector Assembly
7	Fuel Vapor Pipe Ⅴ Assembly	19	Roller Tappet
8	Fuel Filler Hose	20	High Pressure Oil Pump
9	Fuel Tank Assembly	21	High Pressure Fuel Pump Sound Insulator
10	Fuel Tank Fixing Strap Assembly Ⅰ	22	Oil Inlet Pipe Ⅲ Assembly
11	Fuel Tank Fixing Strap Assembly Ⅱ	23	High Pressure Fuel Pipe
12	Fuel Tank Seal Ring	24	Low Pressure Fuel Pressure Sensor

2.3 System Schematic Diagram



2.4 System Components Description

■ Electric fuel pump

Electric fuel pump consists of pump body, DC motor and housing. Its basic operation principle is that DC motor drives the rotor in pump housing to rotate at high speed after it is energized. The section at lower end of rotor shaft combines with the section at the inner hole of impeller, so that rotor shaft drives impeller to rotate as rotor rotates. During high speed rotation of impeller, the low pressure vacuum is created at the inlet part, and then the filtered fuel is sucked from the inlet of pump cover. The sucked fuel enters the pump housing after being pressurized by fuel pump impeller and then it is pushed out of outlet to provide fuel with a certain pressure for the fuel system.

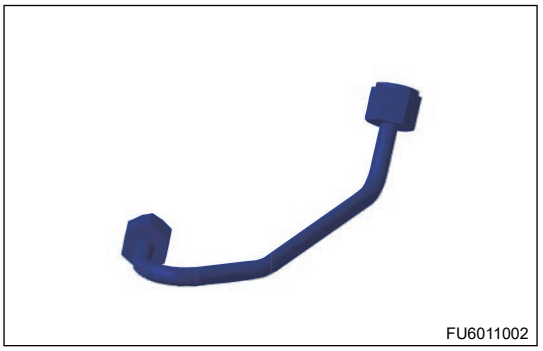
■ High pressure oil pump

High pressure fuel pump is an element specially used for direct injection engine. It functions to increase the system pressure and provide high pressure fuel for the fuel rail assembly. High pressure fuel pump supplies fuel for system as demands, thus providing a better fuel economy. It is made of stainless steel material and has a wide fuel application; also, it has the advantages of light weight, small volume, zero evaporative emission, etc.
The high pressure fuel pump uses a single plunger pump design integrated with regulator, flow control valve and pressure relief valve. Its operation principle is to drive high pressure pump plunger to move up and down by cam, thus achieving oil suction and outlet. ECU controls high pressure fuel flow via flow control valve according to the set control program through pressure sensor on fuel rail, thus performing closed loop control for pressure in high pressure fuel rail. Regulator functions to suppress the pressure pulsation at the low pressure end and improve the stability of system. Pressure relief valve will turn on when high pressure fuel rail pressure exceeds the safety limit, so as to protect the system.


FU6010002

■ High pressure fuel pipe

High pressure fuel pipe connects the high pressure fuel pump with the fuel rail injector assembly and delivers high pressure fuel to fuel rail injector assembly.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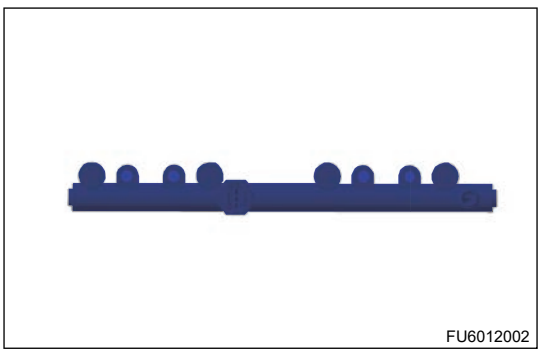
■ Fuel rail injector

The high pressure fuel distribution pipe assembly is integrated with high pressure fuel distribution pipe (fuel rail), high pressure fuel injector and high pressure sensor. Its operation principle is to optimize design through structure of high pressure fuel distribution pipe, the accurate fuel rail pressure signal feedback can uniformly and precisely distribute fuel for engine through injector.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3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Fuel System

Symptom	Possible Cause
Fuel pressure in fuel supply system is too low	Electric fuel pump assembly (strainer blocked or fuel pressure regulator damaged)
	Low fuel level
Fuel pressure in fuel supply system is too high	Fuel injector (clogged)
	Electric fuel pump assembly (fuel pressure regulator damaged)
Electric fuel pump assembly has loud noise or a delay in operating	Low fuel level
	Electric fuel pump assembly
Fuel injector is clogged or leaks	Fuel injector
	Poor fuel quality
	Excessive impurities in fuel tank
Fuel injector does not work	Fuel supply system line (broken)
	Fuel injector (short in coil)
	Electric fuel pump assembly (damaged)
	Wire harness

■ Lubrication areas during assembly

Lubrication Area	Note
High Pressure Fuel Pump O-ring	Engine oil

■ Non-reusable part

Non-reusable Part	Note
High Pressure Fuel Pipe	Replace it
Teflon Grommet of Fuel Injector	Replace it

■ High pressure fuel system pressure release

(1) Method 1: Stop vehicle for 8 hours or more.

(2) Method 2: Unplug high pressure fuel pump connector, and idle the engine for 10 seconds. In this case, the malfunction light on instrument cluster of vehicle will come on. After repair, connect high pressure fuel pump connector and operate it again for a period of time, then the fault will disappear.

■ Low pressure fuel system pressure release

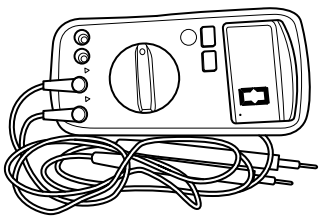
(1) Method 1: Turn ENGINE START STOP switch OFF and leave vehicle for 30 minutes.

(2) Method 2: Turn ENGINE START STOP switch OFF, remove fuel pump control module power supply fuse, start engine and make it stop automatically in Idling condition, then start engine twice or three times again, and release pressure residuals from fuel pipe by starting injection.

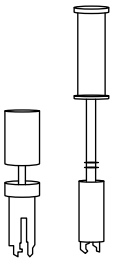
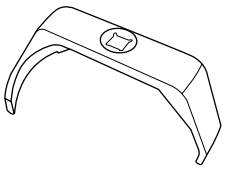
4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ Special Tools

Tool Name	Part No.	Tool Drawing
Fuel Injector Remover	EPT-0020	 S00084
Fuel Tank Pressure Cap Remover	ECH-0006	 S00083

4.2 Fuel Rail Injector Assembly

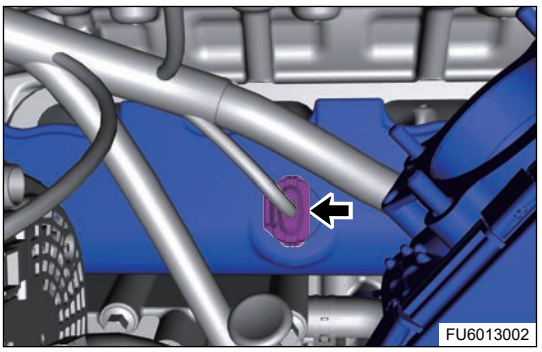
■ Removal

⚠ Warning

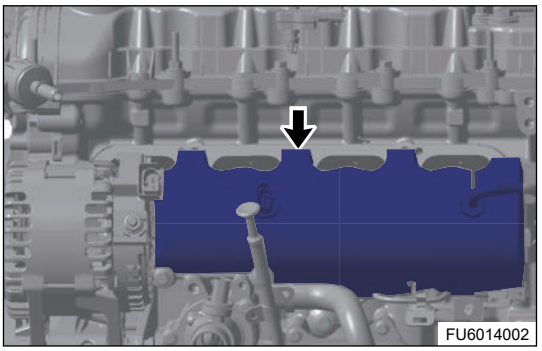
- **As the pressure of high pressure fuel system is high, the pressure must be released before removal.**
- **During removal, make sure the areas near stored parts are clean and free of dirt.**
- **Teflon grommet at injector head cannot be reused after fuel rail injector is removal, and it must be replaced with a new one during installation, therefore, be sure to confirm if removal is necessary before removal.**
- **Perform removal after engine cools down.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Remove the negative battery cable.
(4) Remove the intake manifold assembly.

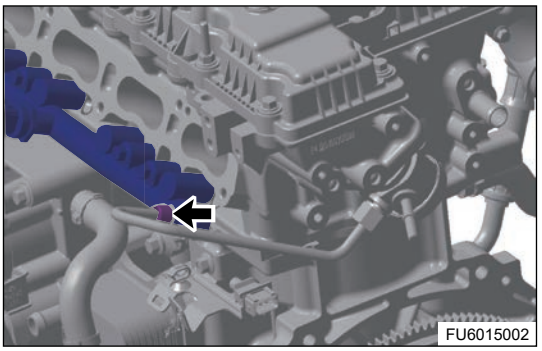
(5) Disconnect the fuel rail pressure sensor connector.



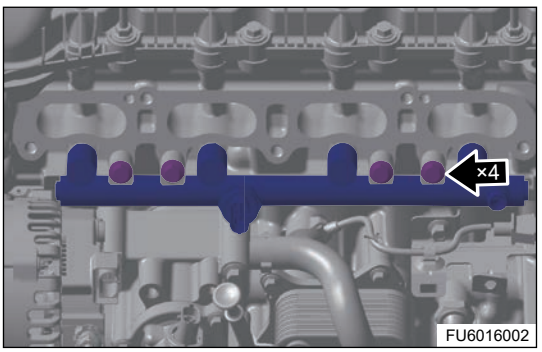
(6) Remove the fuel rail injector sound insulator.



(7) Loosen coupling nut between high pressure fuel pipe and fuel rail injector pipe joint.



(8) Remove 4 fixing bolts from fuel rail injector, and remove fuel rail injector assembly carefully.



■ Inspection

(1) Check if wire harness connector of fuel rail injector assembly is abnormal.

(2) Check connection part between fuel rail and injector for oil leakage, and check injector mounting holes for air or oil leakage.

(3) Use ohm band of multimeter to measure resistance between both pins of injector.

Normal value: 1.5 Ω ± 5 % (at 23℃)

■ Installation

⚠ Caution

- **If it is necessary to reassemble injector, assemble it after Teflon grommet at injector head is replaced.**
- **Before installation, make sure injector mounting hole on engine cylinder head is clean and free of foreign matters.**
- **Never lubricate Teflon grommet at injector head.**
- **During installation, align injector with mounting hole on cylinder head, and press it into mounting hole in axis direction of injector at a constant speed. If a press-fitting device is used, keep the force balance when pressing to prevent system from being damaged due to the unbalanced stress. The maximum pressing force should not be greater than 800 N. After fuel rail is pressed into place, loosen the press-fitting device and insert bolt into the mounting hole on fuel rail injector, and screw 3-5 teeth into the screw hole on cylinder head.**
- **If no press-fitting device is available and fuel rail cannot be pressed into place, it is allowed to use a fuel rail bolt to bring it in, and tighten it several times in sequence of 3-2-4-1. It is not allowed to tighten an individual bolt directly. Tighten until fuel rail and cylinder head fit, then loosen all fuel rail bolts, and tighten fuel rail fixing bolts after fuel pipe is installed and tightened.**

(1) Pre-tighten 2 - 3 teeth between high pressure fuel pipe and fuel rail injector pipe joint.

(2) Install 4 fixing bolts to fuel rail and loosen all fuel rail bolts after fuel rail and cylinder head fit.

⚠ Caution

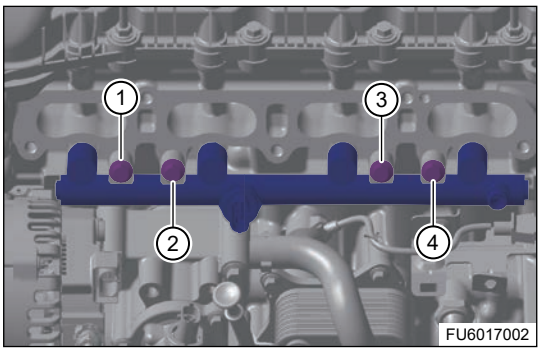
- **Tightening sequence of bolts: 3-2-4-1.**

(3) Tighten high pressure fuel pipe nuts.

Torque: 20 ± 2 N·m

(4) Tighten fuel rail fixing bolts several times in sequence of 3-2-4-1.

Torque: 25 ± 3 N·m



(5) Tighten high pressure fuel pipe nuts again.

Torque: 30 ± 2 N·m

(6) Install the fuel rail injector sound insulator.
(7) Connect the fuel rail pressure sensor connector.
(8) Install the intake manifold assembly.
(9) Install the engine compartment trim cover assembly.

4.3 High Pressure Fuel Pump Assembly

■ Removal

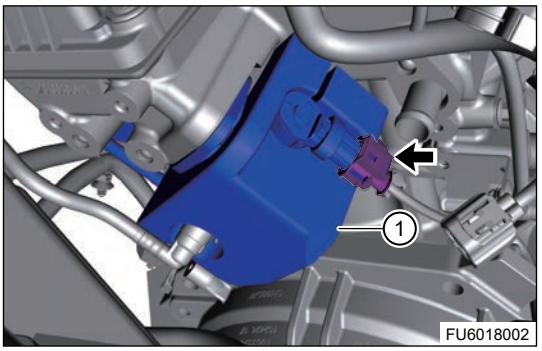
⚠ Warning

- **As the pressure of high pressure fuel system is high, the pressure must be released before removal.**
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During removal, make sure the areas near stored parts are clean and free of dirt.**
- **There is residual fuel in high pressure fuel pump. Please pay attention to the leakage of fuel during removal to avoid fire.**
- **Perform removal after engine cools down.**

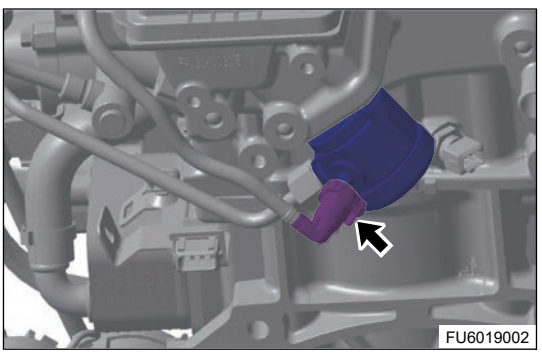
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the engine compartment trim cover assembly.
(3) Disconnect the negative battery cable.
(4) Remove the intake hose assembly.

(5) Disconnect the high pressure fuel pump (fuel pressure regulating solenoid valve) connector.

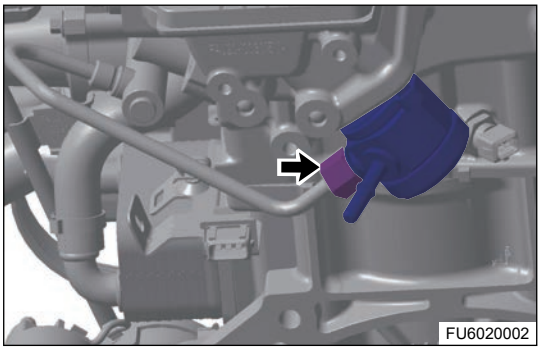
(6) Remove the high pressure fuel pump sound insulator (1) carefully.



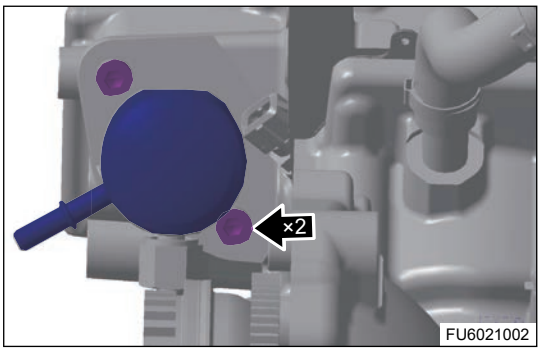
(7) Disconnect connection between oil inlet pipe Ⅲ and high pressure fuel pump



(8) Loosen high pressure fuel pipe joint, and disconnect connection between high pressure fuel pipe and high pressure fuel pump.



(9) Remove 2 fixing bolts from high pressure fuel pump.



⚠ Caution

- **During removal, loosen fixing bolts in turn, and then remove bolts completely. Never remove a bolt completely in one time.**

(10) Rotate high pressure fuel pump gently and pull it outwards. Never swing high pressure fuel pump in radial direction.

⚠ Caution

- **When pulling out high pressure fuel pump, the roller tappet may fall naturally. In order to prevent damage in falling, hold it by hand when pulling out the high pressure fuel pump.**

■ Check high pressure fuel pump

(1) Check if high pressure fuel pump connector is abnormal.

(2) Check resistance between both pins of high pressure fuel pump connector.

(3) Measure resistance of high pressure fuel pump (fuel pressure regulating solenoid valve) coil.

Measurement Temperature (℃)	Coil Resistance (0 Mileage) (Ω)		Coil Resistance (After Driving) (Ω)	
	Minimum	Maximum	Minimum	Maximum
-40	0.379	0.417	0.372	0.426
20	0.495	0.545	0.485	0.556
160	0.765	0.843	0.750	0.859

■ Check the roller tappet

(1) Check if appearance of roller tappet is complete, if wear is serious, and if roller bearing can rotate smoothly.

(2) Check if roller tappet diameter is obviously out of tolerance. If it is out of tolerance, replacement is recommended. Diameter: 26mm (-0.020, 0.055)

Hint:
If above problems occur, replacing with a new roller tappet is recommended.

■ **Installation**

⚠ Caution

- **Before installation, make sure the part model of high pressure fuel pump is correct and available.**
- **Before installation, make sure sealing caps of high pressure fuel pump joint are complete. Never use high pressure fuel pump without sealing cap.**
- **High pressure fuel pump O-ring must be lubricated with lubricating oil before installation.**
- **During installation of high pressure fuel pump, never tighten a bolt firmly in one time, and they must be tightened in turn.**

(1) Apply a coat of oil to O-ring of high pressure fuel pump, install roller tappet and high pressure fuel pump and then place them into mounting hole. When replacing, be sure to align anti-rotating pin of roller tappet with anti-rotating groove in mounting hole.

(2) Pre-tighten fixing bolts of high pressure fuel pump several turns in order, and never tighten a bolt completely in one time. Do not use sharp tools or tap components during installation to avoid damaging high pressure fuel pipe.

Torque: 27 + 3 N · m

(3) Do not allow skin to contact the roller tappet directly during installation. During the operation, it is necessary to wear cleaning gloves to prevent roller tappet surface from being contaminated by sweat and foreign matters.

4.4 High Pressure Fuel Pipe

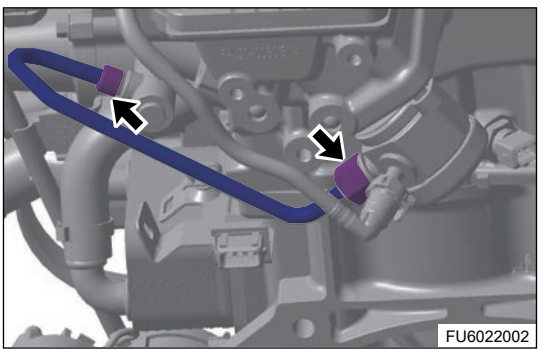
■ **Removal**

⚠ Warning

- **As the pressure of high pressure fuel system is high, the pressure must be released before removal.**
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During removal, make sure the areas near stored parts are clean and free of dirt.**
- **Perform removal after engine cools down.**

(1) Release the high pressure fuel system pressure.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Remove the intake hose assembly.
(4) Remove the high pressure fuel pump sound insulator.

(5) After pressure of high pressure fuel system is released completely, use a wrench to remove nuts on both sides of high pressure fuel pipe completely.



(6) Remove high pressure fuel pipe.

⚠ Caution

- **The removed high pressure fuel pipe should be marked with scraping marks and cannot be reused.**

■ Installation

⚠ Caution

- **High pressure fuel pipe is a non-reusable part, never reassemble it for a secondary use.**
- **Before installing high pressure fuel pipe, make sure that the part model is correct, the sealing caps on both ends of high pressure fuel pipe are intact. Never use any high pressure fuel pipe without sealing cap.**
- **Do not use sharp tools during installation to avoid scratching high pressure fuel pipe joint.**
- **During installation of high pressure fuel pipe, pay attention to avoid collision with the fuel rail injector joint and end of high pressure fuel pump joint.**
- **Before installing high pressure fuel pipe, confirm if fixing bolts of fuel rail injector are tightened. If they are tightened completely, loosen all of them and then install the high pressure fuel pipe.**

(1) Unplug protective cap of high pressure fuel pipe, and pre-tighten both ends of high pressure fuel pipe to high pressure fuel pump and fuel rail joint respectively in correct direction.

Torque: 20 + 2 N · m

(2) Tighten fuel rail fixing bolts several times in sequence of 3-2-4-1.

Torque: 25 ± 3 N · m

⚠ Caution

- **Tightening sequence of bolts: 3-2-4-1.**

(3) Tighten high pressure fuel pipe nuts again.

Torque: 30 ± 2 N · m

4.5 Fuel Filler Cap Body Assembly

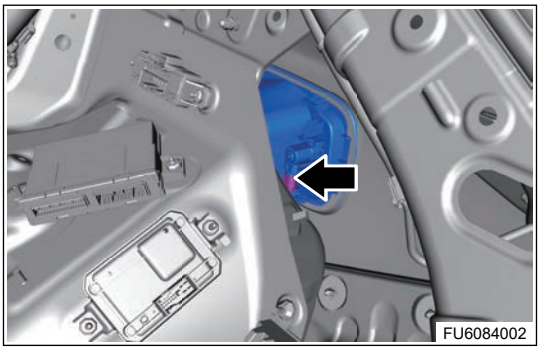
■ Removal

⚠ Warning

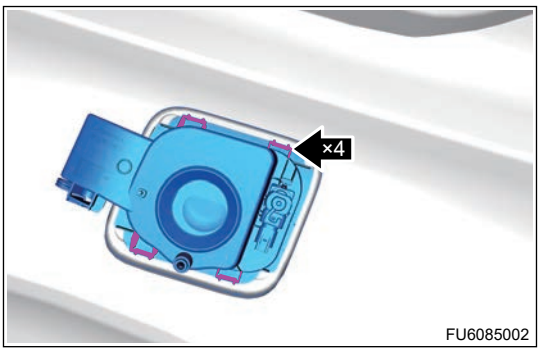
- **Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.**
- **When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.**
- **If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear right wheel.
(4) Remove the rear right luggage compartment wheel house assembly.

(5) Disconnect the fuel filler cap body actuator connector.



(6) Insert hand into and press 4 fixing clips of electric fuel filler cap assembly from interior, push them out and remove fuel filler cap body assembly.



■ Installation

(1) Install fuel filler cap assembly, press fuel filler cap assembly to secure the clips in place.
(2) Connect fuel filler cap body actuator connector.
(3) Install the rear right luggage compartment wheel house assembly.
(4) Install the rear right wheel.

4.6 Filler Tube Assembly

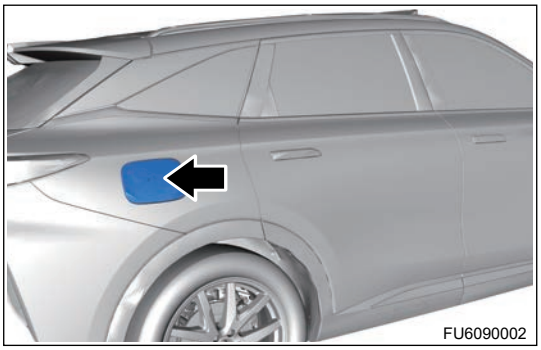
■ Removal

⚠ Warning

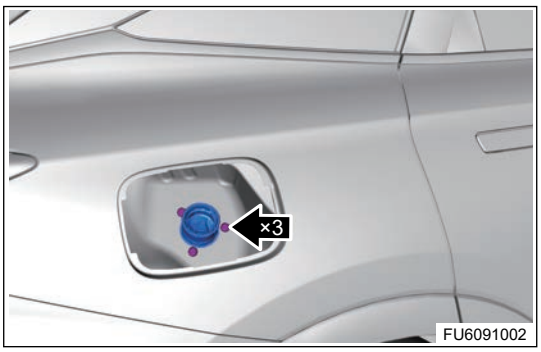
- **Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.**
- **When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.**
- **If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear right wheel.
(4) Remove the rear right luggage compartment wheel house assembly.

(5) Remove the fuel filler cap body assembly.

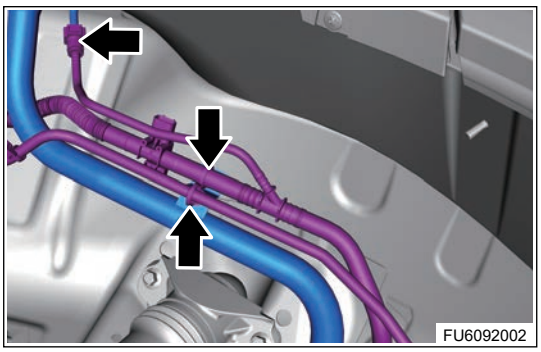


(6) Remove 3 fixing bolts between filler tube assembly and body.



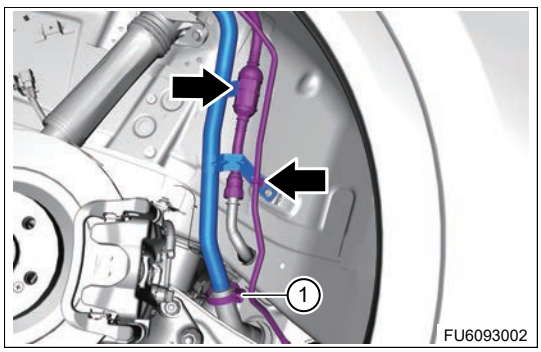
(7) Disconnect connection between fuel vapor pipe II assembly and filler tube assembly.

(8) Disengage fixing clip from upper part of fuel vapor pipe and filler tube assembly.

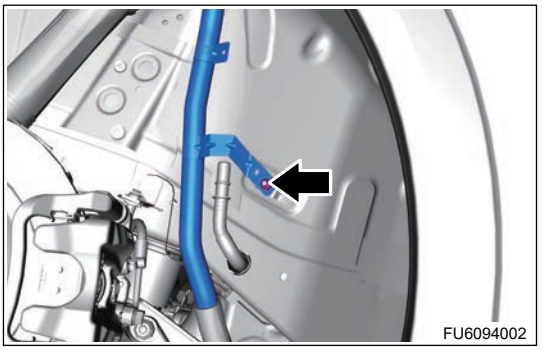


(9) Loosen elastic clamp (1) and disconnect fuel filler hose.

(10) Disengage fixing clip from lower part of fuel vapor pipe and filler tube assembly.



(11) Remove 1 fixing nut between filler tube assembly and body, and remove filler tube assembly.



■ **Installation**

(1) Install filler tube assembly to body, tighten 3 fixing bolts and 1 fixing nut.
(2) Connect fixing clip between fuel vapor pipe and filler tube assembly.
(3) Connect fuel vapor pipe Ⅱ assembly.
(4) Install fuel filler cap assembly, press fuel filler cap assembly to secure the clips in place.
(5) Install the fuel filler cap body assembly.
(6) Install the rear right luggage compartment wheel house assembly.
(7) Install the rear right wheel.

4.7 Electric Fuel Pump Assembly

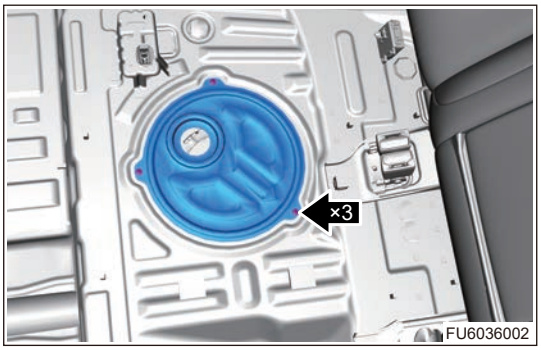
■ **Removal**

⚠ Warning

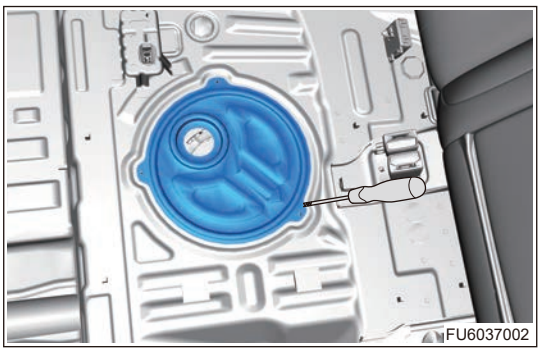
- **Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.**
- **When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.**
- **If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.**
- **Operation staff should wear protective glasses and rubber gloves during repair and avoid inhaling much fuel gas.**
- **Only use parts approved by Chery Automobile Co., Ltd. to replace the electric fuel pump assembly.**
- **Keep electric fuel pump assembly and work area clean when replacing electric fuel pump assembly; otherwise the electric fuel pump assembly element will be clogged.**
- **DO NOT damage the disconnected fuel system line or connectors. Cover the line joints or connectors with plastic bags or equivalent, preventing foreign matter from entering.**
- **Keep fuel tank and line clean.**

(1) Release the low pressure fuel system pressure.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the rear seat cushion assembly.

(5) Remove 3 fixing screws from electric fuel pump assembly protective cap with a cross screwdriver.

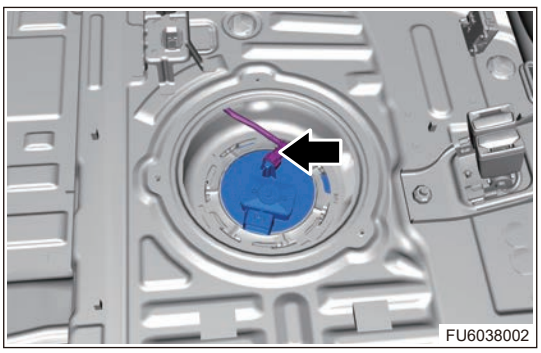


(6) Using a flat tip screwdriver, remove electric fuel pump assembly protective cap.

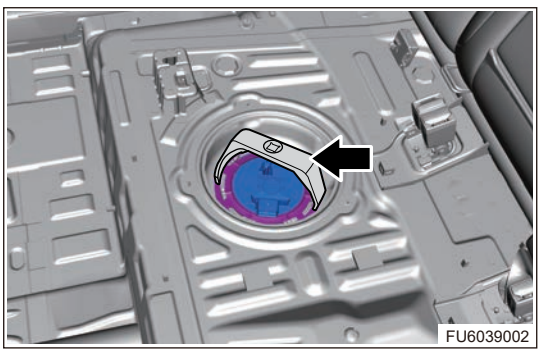


(7) Disconnect the electric fuel pump assembly connector.

(8) Disconnect connection between oil inlet pipe and electric fuel pump assembly.



(9) Using a fuel tank pressure cap special tool, remove fuel tank pressure cap.



(10) Remove electric fuel pump assembly from fuel tank, and dispose of fuel in electric fuel pump assembly.

⚠ Caution

- **Operate carefully when taking the electric fuel pump assembly out of fuel tank, preventing damaging lines and floats.**
- **Cover the electric fuel pump assembly completely with a plastic bag or equivalent to prevent foreign matter from entering.**
- **Electric fuel pump assembly can be put into a container and taken out of the cabin, thus preventing fuel in the pump from dropping into the cabin.**
- **It is not allowed to perform running test for electric fuel pump assembly under dry state or in water. Otherwise service life will be reduced. In addition, do not inversely connect electric fuel pump assembly positive and negative poles.**

■ Installation

⚠ Caution

- **Replace fuel tank seal ring with a new one when installing electric fuel pump assembly, align it with installation position of fuel tank and do not run the electric fuel pump assembly with no fuel in fuel tank, preventing damaging electric fuel pump assembly.**
- **Before connecting the hose, check if there is any damage or foreign matter on the hose or joint.**
- **During installation, push in fuel pipe connector until a click sound is heard, then check that fuel pipe joint clip is on the collar of fuel pipe joint. After installing the pipe joint clip, check that fuel pipe joint cannot be pulled out. Be careful not to damage joint. If clip is damaged, replace it.**
- **Turn ENGINE START STOP switch to ON (without starting engine) to apply fuel pressure to fuel supply system, and then check connections for leakage.**

(1) Using a fuel tank pressure cap special tool, install fuel tank pressure cap.

Torque: 400 N · m.

(2) Connect inlet pipe.
(3) Connect the electric fuel pump assembly connector.
(4) Install the rear seat cushion assembly.

4.8 Fuel Tank Assembly

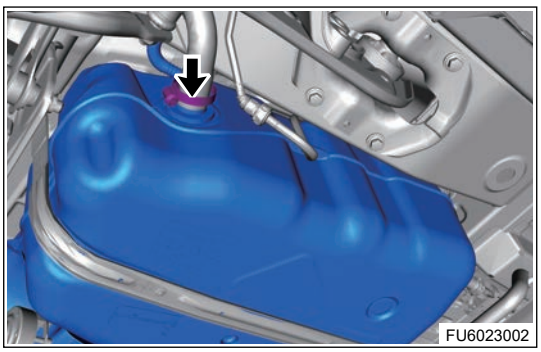
■ Removal

⚠ Warning

- **Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.**
- **When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.**
- **If fuel leakage occurs when operating the fuel supply system, please handle the leaked fuel in time.**
- **Operation staff should wear protective glasses and rubber gloves during repair and avoid inhaling much fuel gas.**
- **DO NOT damage the disconnected fuel system line or connectors. Cover the line joints or connectors with plastic bags or equivalent, preventing foreign matter from entering.**
- **Keep fuel tank and line clean.**

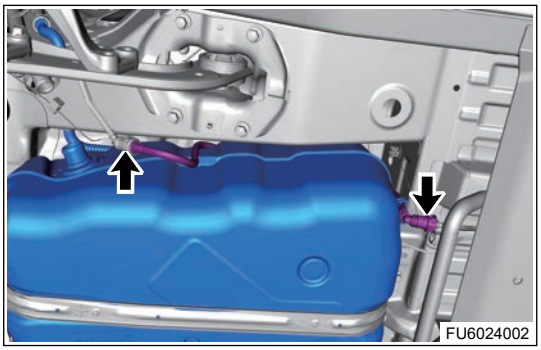
(1) Release the low pressure fuel system pressure.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the propeller intermediate shaft (if equipped).
(5) Remove the front muffler assembly.
(6) Remove the rear right wheel.
(7) Remove the rear right wheel house protector.

(8) Loosen elastic clamp and disconnect connection between fuel filler hose and fuel tank assembly.

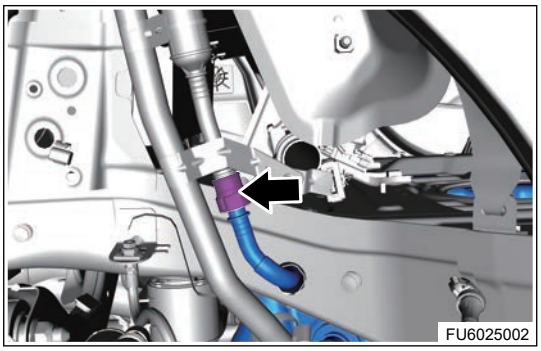

FU6023002

(9) Disconnect connection between fuel vapor pipe Ⅳ and fuel vapor pipe Ⅲ.

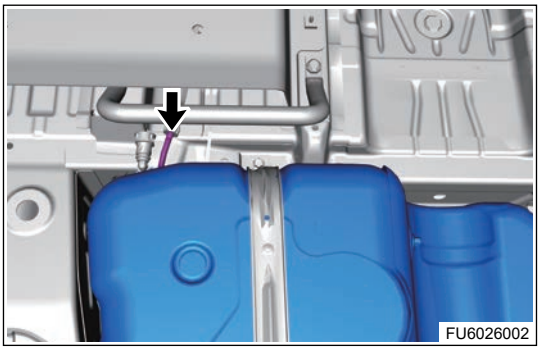
(10) Disconnect connection between fuel vapor pipe Ⅳ and fuel vapor pipe Ⅴ.


FU6024002

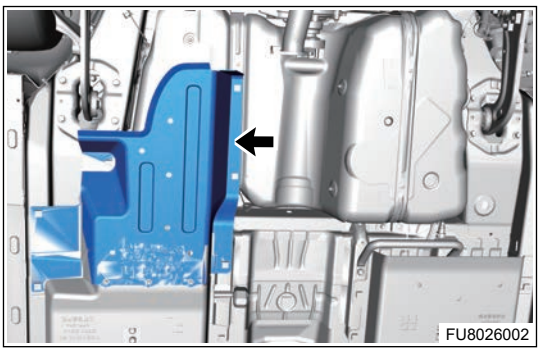
(11) Disconnect connection with fuel vapor pipe Ⅱ.


FU6025002

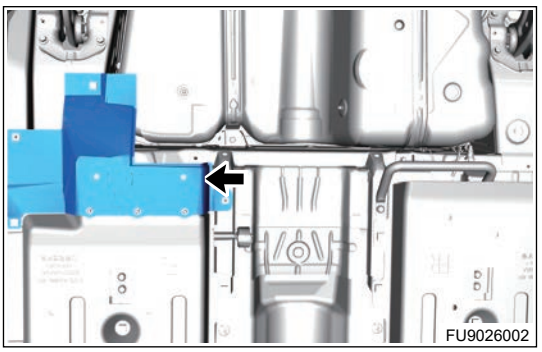
(12) Disconnect connection between oil inlet pipe Ⅰ and oil inlet pipe Ⅱ.



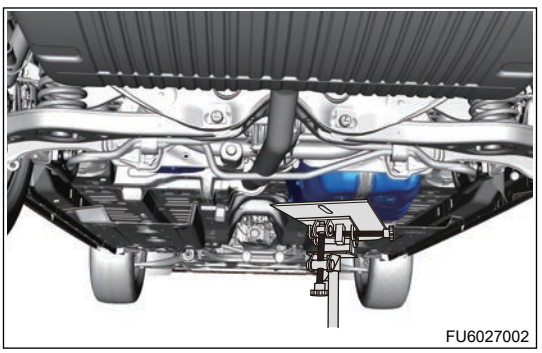
(13) Remove rear left bottom panel protector (2WD model).



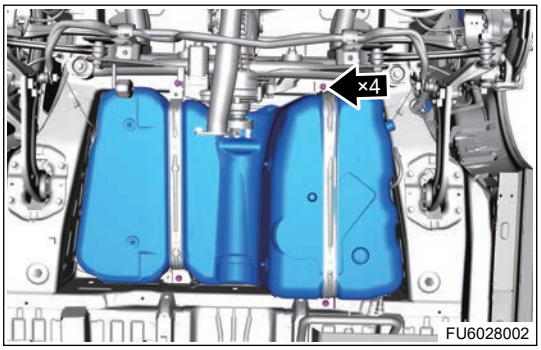
(14) Remove rear left bottom panel protector (4WD model).



(15) Support fuel tank assembly with a transmission carrier.



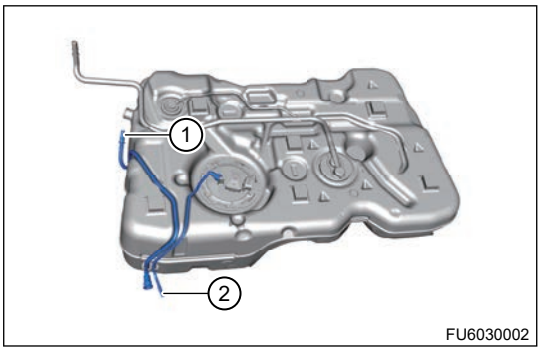
(16) Remove 4 fixing bolts between fuel tank assembly fixing straps and body connection.



(17) Carefully disconnect the fuel pump assembly connector.

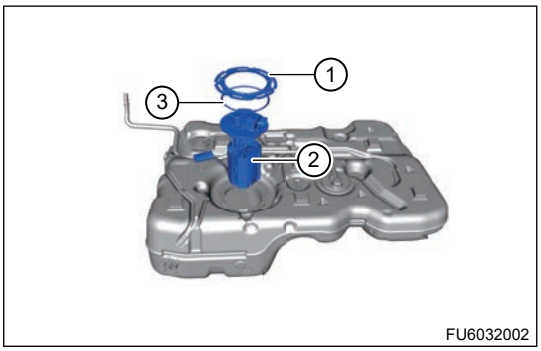
(18) Lower lift to a proper position slowly, and remove fuel tank assembly carefully.

(19) Remove fuel vapor pipe Ⅲ (1) and oil inlet pipe Ⅰ (2) from fuel tank assembly.



(20) Using a special tool, remove electric fuel pump pressure cap (1).

(21) Remove electric fuel pump assembly (2) and seal ring (3) from fuel tank assembly.



■ Installation

⚠ Caution

- **Before connecting the hose, check if there is any damage or foreign matter on the hose or joint.**
- **During installation, push in fuel pipe connector until a click sound is heard, then check that fuel pipe joint clip is on the collar of fuel pipe joint. After installing the pipe joint clip, check that fuel pipe joint cannot be pulled out. Be careful not to damage joint. If clip is damaged, replace it.**
- **Turn ENGINE START STOP switch to ON (without starting engine) to apply fuel pressure to fuel supply system, and then check connections for leakage.**

(1) Install electric fuel pump assembly and tighten fuel tank pressure cap.

Torque: 400 N·m.

(2) Connect the electric fuel pump assembly connector.
(3) Install 4 fixing bolts to fuel tank assembly fixing strap.
Torque: 23 ± 4 N · m

(4) Connect each pipeline to corresponding joint.
(5) Install rear right wheel house protector.
(6) Install the rear right wheel.
(7) Install the propeller intermediate shaft (if equipped).
(8) Install the front muffler assembly.

4.9 Fuel Rail Pressure Sensor

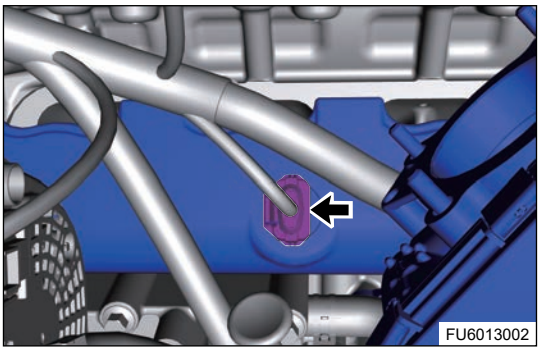
■ Removal

⚠ Warning

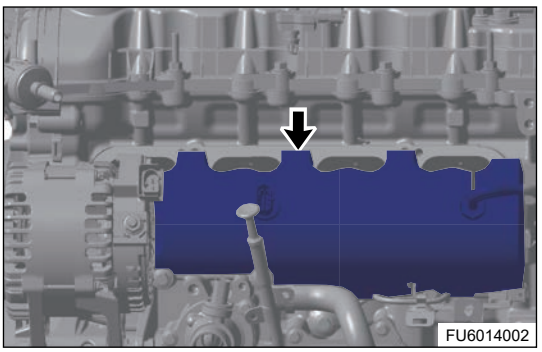
- **Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.**
- **When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.**

(1) Release the high pressure fuel system pressure.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the intake manifold assembly.

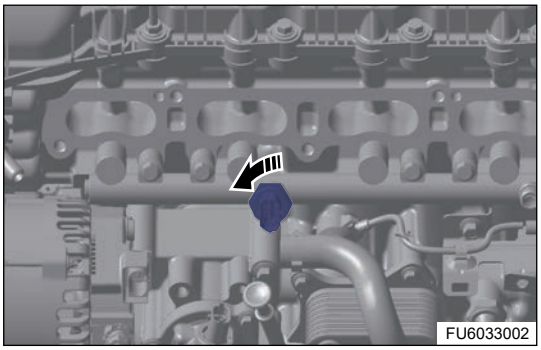
(5) Disconnect the fuel rail pressure sensor connector.



(6) Remove the fuel rail injector sound insulator.



(7) Removal fuel rail pressure sensor counterclockwise in direction of arrow as shown in illustration.



■ Inspection

Use ohm band of multimeter to measure resistance among 3 pins of fuel rail pressure sensor (pay attention to the positive and negative orders).

Sensor Pin (corresponding to positive and negative poles of multimeter in front-and-rear sequence)	Normal Value
1 - 2	301 ± 100 kΩ
1 - 3	24 ± 1 kΩ
2 - 1	∞
2 - 3	∞
3 - 1	24 ± 1 kΩ
3 - 2	301 ± 100 kΩ

■ Installation

(1) Install the fuel rail pressure sensor.
(2) Install the fuel rail injector sound insulator.
(3) Install the intake manifold assembly.

4.10 Low Pressure Fuel Pressure Sensor

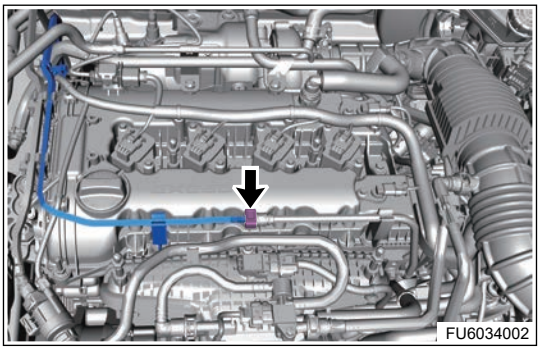
■ Removal

⚠ Warning

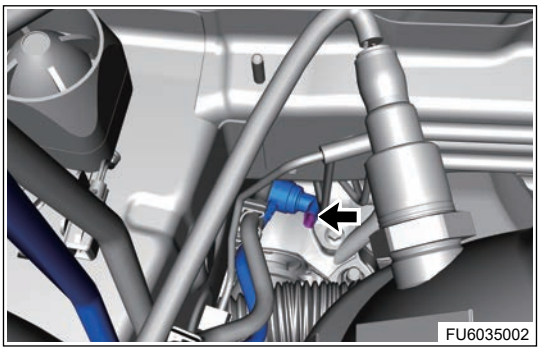
- **Before operating the fuel supply system, please touch the vehicle body to discharge static electricity; failure to do so will cause a fire, even result in an explosion.**
- **When operating the fuel supply system, work area should be in good ventilation and keep fire sources or open flames away from the work area, in which fire extinguisher should be equipped.**

(1) Release the high pressure fuel system pressure.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.

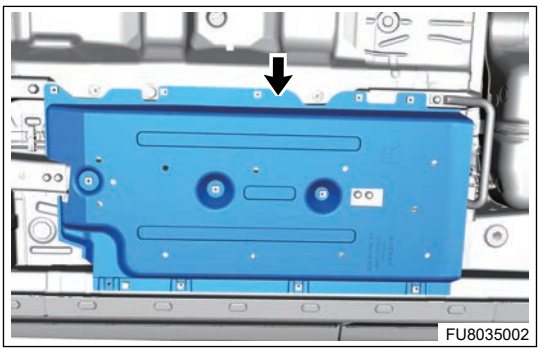
(4) Disconnect connection between oil inlet pipe Ⅱ and oil inlet pipe Ⅲ.



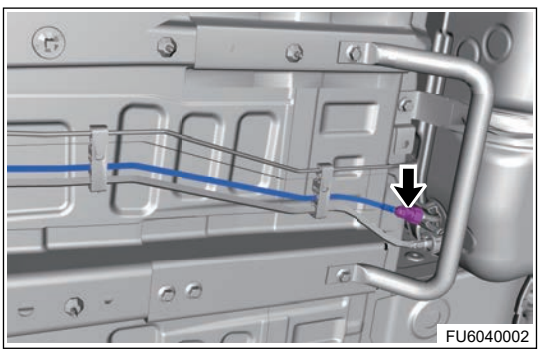
(5) Disconnect the low pressure fuel pressure sensor connector.



(6) Remove front right bottom panel protector.



(7) Disconnect connection between oil inlet pipe Ⅱ and oil inlet pipe Ⅰ.



(8) Remove the oil inlet pipe Ⅱ assembly from pipe clamp with 2 grooves carefully.

■ Installation

(1) Fix oil inlet pipe Ⅱ to pipe clamp with 2 grooves.
(2) Connect the low pressure fuel pressure sensor connector.
(3) Connect pipe joints to oil inlet pipe Ⅰ and oil inlet pipe Ⅲ respectively.

740DCT TRANSMISSION

3.1 740DCT TRANSMISSION CONTROL SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Be sure to read precautions for SRS airbag before removing steering wheel.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(4) TCU bolts are non-reusable parts, which must be replaced after each removal.

(5) TCU bolts are pre-coated parts. Residual sealant should be cleaned from threaded hole of housing before assembly.

(6) If TCU is replaced with a new one, fresh correct TCU software with diagnostic tester.

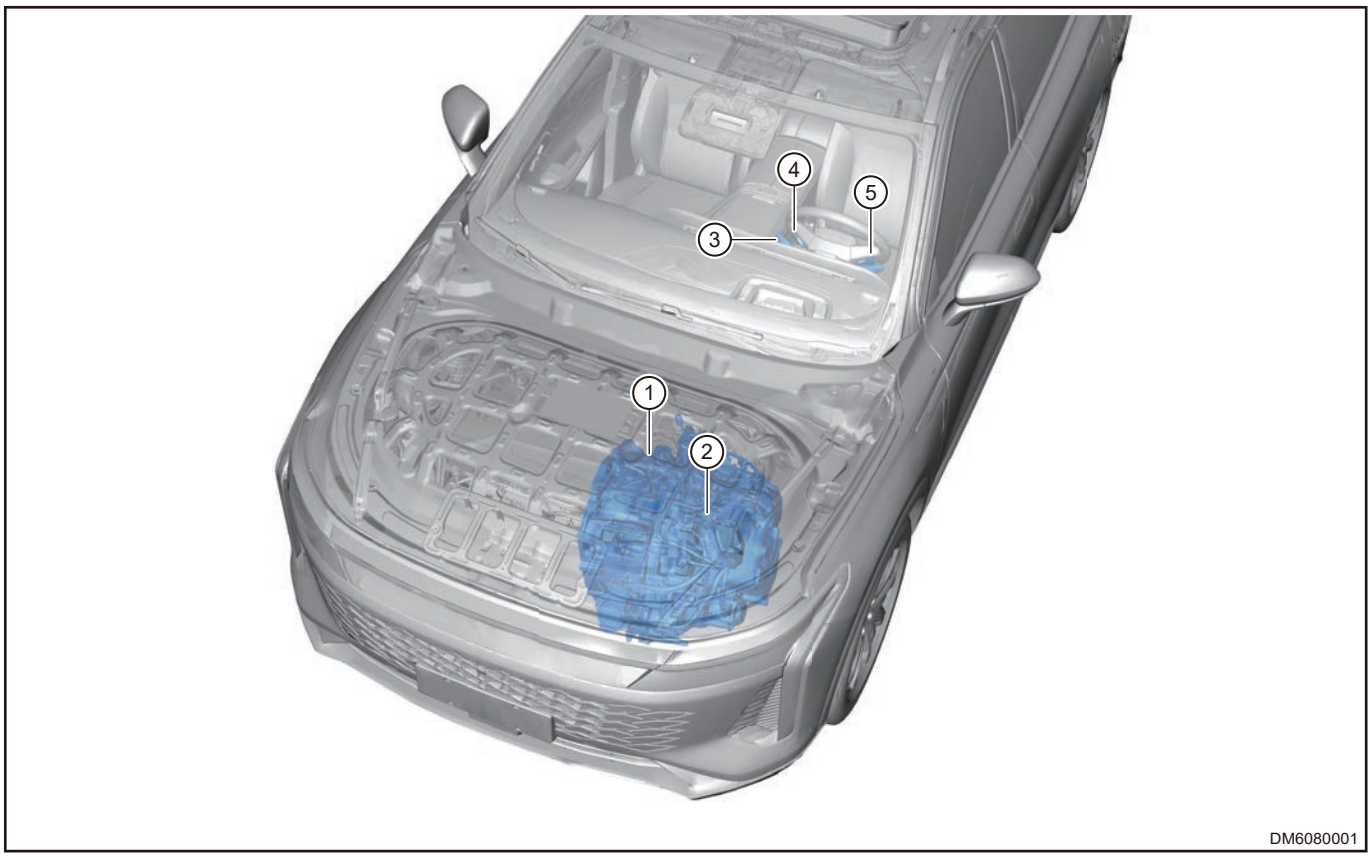
(7) During removal and installation of TCU, antistatic equipment should be worn to avoid damage to electronic components in TCU.

2 Overview

2.1 Description

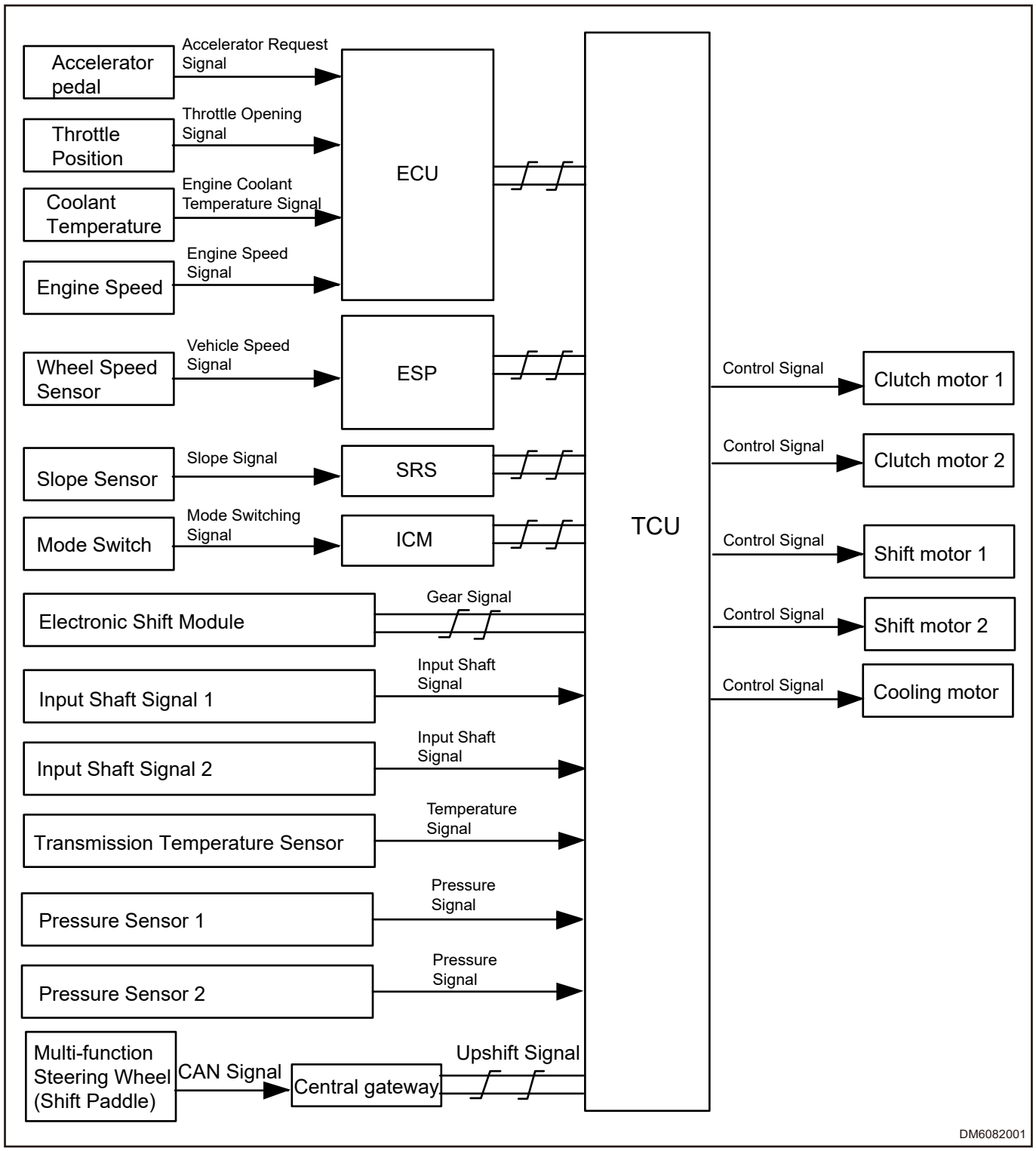
The transmission control system (dual clutch transmission (DCT)) is composed of Transmission Control Module (TCU), clutch motor, shift motor and electronic shift switch, etc. Electronic shift switch and the transmission is not the traditional mechanical way, but safer and faster electronic control mode, eliminating the traditional mechanical shift mode, all using electronic signals to substitute. Its advantage is that the driver's wrong shift operation will be judged by the computer to see if it will cause damage to the transmission, so as to better protect the transmission and correct the bad shift habits. However, if there is a fault or short circuit, the electronic shifting mechanism is unable to release the current gear, we can only rely on the trailer and rescue.

2.2 System Components Diagram



1	Transmission Assembly	2	Transmission Control Module
3	Electronic Shift Switch (Combination Switch)	4	Right Shift Paddle
5	Left Shift Paddle		

2.3 System Schematic Diagram

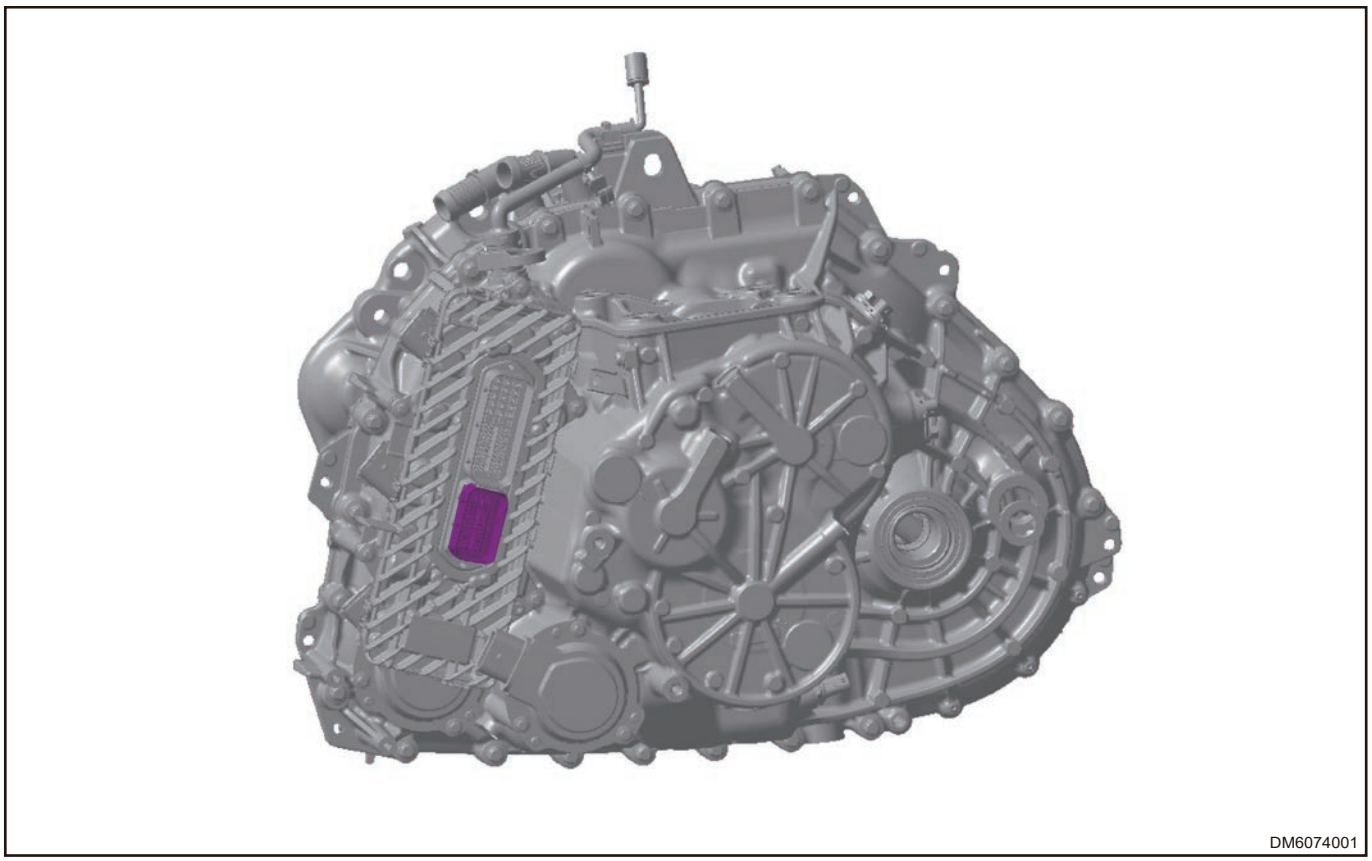


- The transmission control module collects signals from ECU (accelerator pedal, throttle opening, engine temperature, speed and other signals), ESP (wheel speed signal, etc.), SRS (gradient signal, etc.), electronic shift module (gear position signal) through CAN network, TCU collects input signals from sensors and other devices to operate transmission.

3 System Circuit Diagram

3.1 TCU Connector Terminal Definition

TCU－A

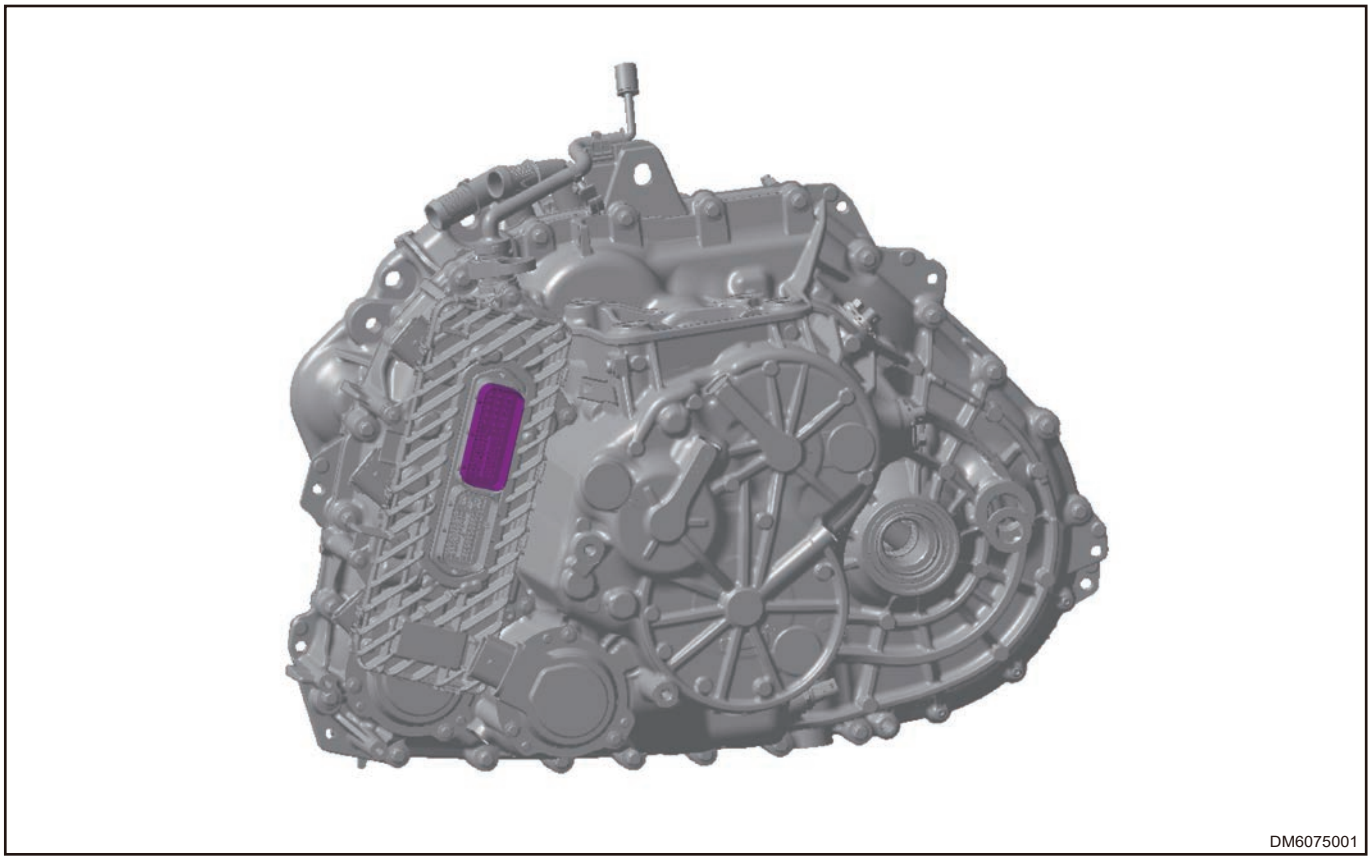


Terminal Inspection		Pin Definition	Detection Condition	Measured Value
Multimeter Positive	Multimeter Negative			
A1	Body ground	KL30 power supply	Power supply state "ON"	12 V
A2	Body ground	Ground	Power supply state "ON"	0 V
A3	/	/	/	/
A4	/	/	/	/
A5	/	/	/	/
A6	/	/	/	/
A7	/	/	/	/
A8	/	/	/	/
A9	/	/	/	/
A10	/	/	/	/
A11	/	/	/	/
A12	/	/	/	/

A13	/	/	/	/
A14	/	/	/	/
A15	/	/	/	/
A16	/	/	/	/
A17	/	/	/	/
A18	Body ground	KL30 power supply	Power supply state "ON"	12 V
A19	/	/	/	/
A20	/	/	/	/
A21	/	/	/	/
A22	/	/	/	/
A23	/	/	/	/
A24	/	/	/	/
A25	/	/	/	/
A26	/	/	/	/
A27	/	/	/	/
A28	/	/	/	/
A29	/	/	/	/
A30	/	/	/	/
A31	Body ground	KL15 Power Supply	Power supply state "ON"	12 V
A32	/	/	/	/
A33	/	/	/	/
A34	Body ground	P－CAN-H	Power supply state "ON"	2.7 V
A35	Body ground	P－CAN-L	Power supply state "ON"	2.3 V
A36	/	CAN-H insulation wire	/	/
A37	/	CAN-L insulation wire	/	/
A38	/	/	/	/
A39	/	/	/	/
A40	/	/	/	/
A41	/	/	/	/
A42	/	/	/	/
A43	/	/	/	/
A44	/	/	/	/
A45	/	/	/	/

A46	/	/	/	/
A47	/	/	/	/
A48	/	/	/	/
A49	/	/	/	/
A50	/	/	/	/
A51	/	/	/	/
A52	/	/	/	/
A53	/	/	/	/
A54	/	/	/	/
A55	/	/	/	/
A56	/	/	/	/
A57	/	/	/	/
A58	/	/	/	/

TCU－B



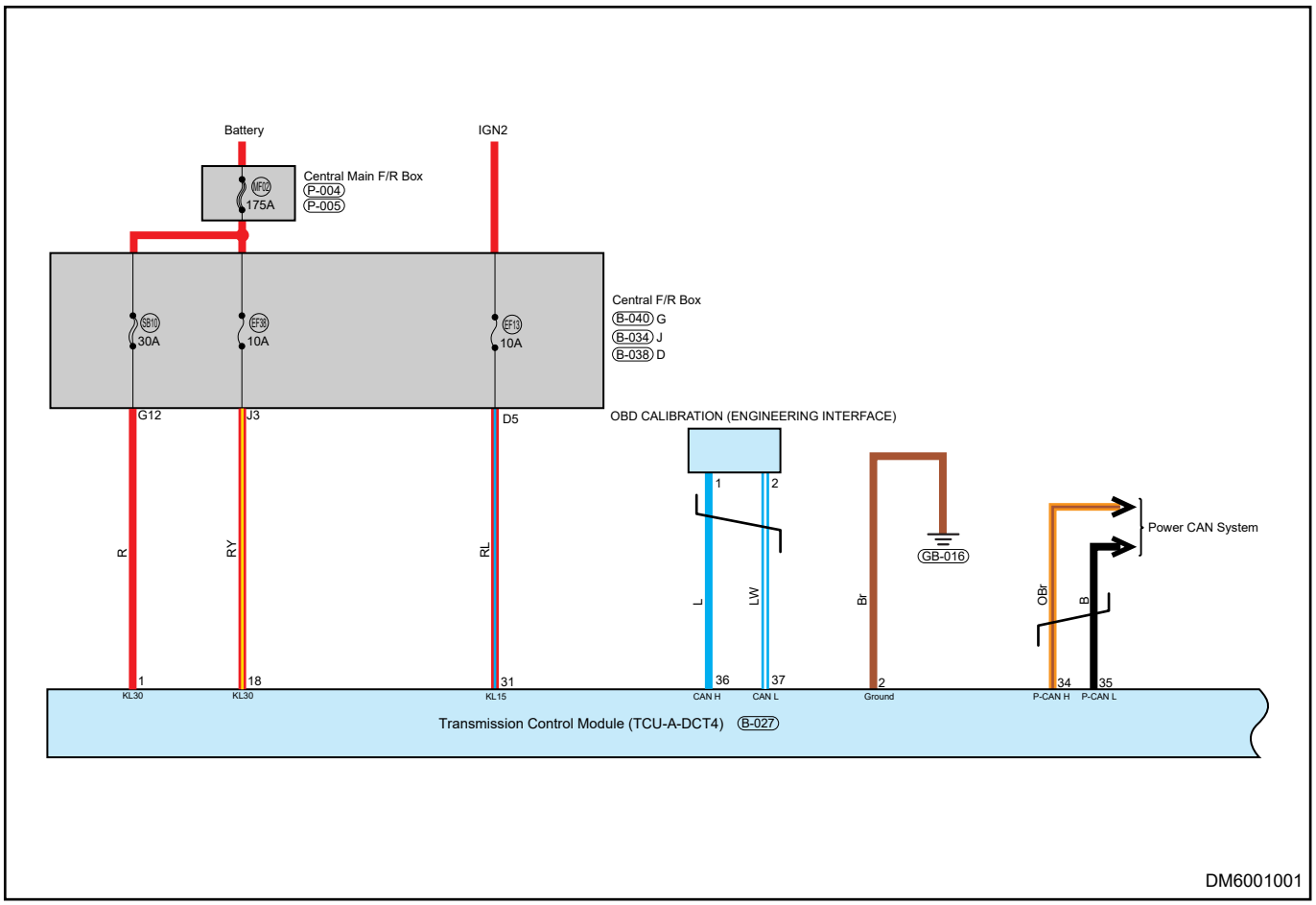
Terminal Inspection		Pin Definition	Detection Condition	Measured Value
Multimeter Positive	Multimeter Negative			
B1	Body ground	Clutch motor 2 phase U	Power supply state "ON"	0.3 V
B2	Body ground	Clutch motor 2 phase V	Power supply state "ON"	0.3 V

B3	Body ground	Clutch motor 2 phase W	Power supply state "ON"	0.3 V
B4	Body ground	Clutch motor 1 phase U	Power supply state "ON"	0.3 V
B5	Body ground	Clutch motor 1 phase V	Power supply state "ON"	0.3 V
B6	Body ground	Shift motor 1 phase U	Power supply state "ON"	9 V
B7	Body ground	Shift motor 1 phase V	Power supply state "ON"	9 V
B8	Body ground	Shift motor 1 phase W	Power supply state "ON"	9 V
B9	Body ground	Shift motor 2 phase U	Power supply state "ON"	9 V
B10	Body ground	Clutch motor 1 phase W	Power supply state "ON"	0.3 V
B11	Body ground	Cooling motor phase U	Power supply state "ON"	0 V
B12	Body ground	Cooling motor phase V	Power supply state "ON"	0 V
B13	Body ground	Cooling motor phase W	Power supply state "ON"	0 V
B14	Body ground	Shift motor 2 phase V	Power supply state "ON"	9 V
B15	Body ground	Shift motor 2 phase W	Power supply state "ON"	9 V
B16	Body ground	Cooling motor signal	Power supply state "ON"	0.5 V
B17	Body ground	Shift motor 2 signal	Power supply state "ON"	5 V
B18	Body ground	Shift motor 1 signal	Power supply state "ON"	0.5 V
B19	Body ground	Clutch motor 2 signal	Power supply state "ON"	2.8 V
B20	Body ground	Clutch motor 1 signal	Power supply state "ON"	2.8 V
B21	Body ground	Clutch motor 1 sensor power supply	Power supply state "ON"	5 V
B22	/	/	/	/
B23	Body ground	Temperature sensor signal	Power supply state "ON"	0 V
B24	Body ground	Pressure sensor 2 signal	Power supply state "ON"	0 V
B25	Body ground	Pressure sensor 1 signal	Power supply state "ON"	0 V

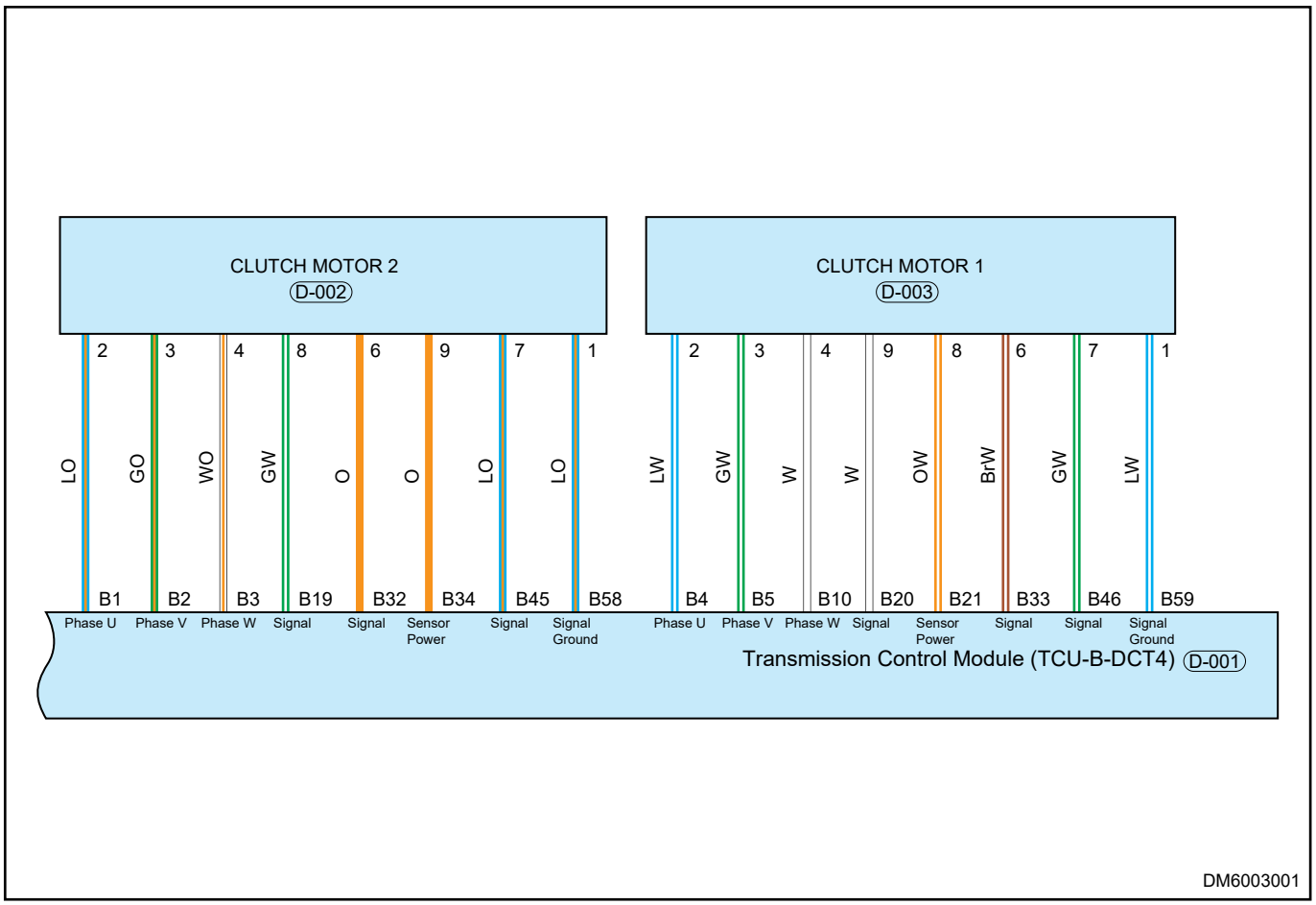
B26	/	/	/	/
B27	Body ground	Input shaft speed sensor 2 signal	Power supply state "ON"	9 V
B28	Body ground	Input shaft speed sensor 1 signal	Power supply state "ON"	9 V
B29	Body ground	Cooling motor signal	Power supply state "ON"	5 V
B30	Body ground	Shift motor 2 signal	Power supply state "ON"	0 V
B31	Body ground	Shift motor 1 signal	Power supply state "ON"	0 V
B32	Body ground	Clutch motor 2 signal	Power supply state "ON"	0 V
B33	Body ground	Clutch motor 1 signal	Power supply state "ON"	0 V
B34	Body ground	Clutch motor 2 sensor power supply	Power supply state "ON"	5 V
B35	/	/	/	/
B36	Body ground	Temperature sensor ground	Power supply state "ON"	0 V
B37	Body ground	Pressure sensor 2 ground	Power supply state "ON"	0 V
B38	Body ground	Pressure sensor 1 ground	Power supply state "ON"	0 V
B39	/	/	/	/
B40	Body ground	Input shaft speed sensor 2 power supply	Power supply state "ON"	0 V
B41	Body ground	Input shaft speed sensor 1 power supply	Power supply state "ON"	9 V
B42	Body ground	Cooling motor signal	Power supply state "ON"	0.5 V
B43	Body ground	Shift motor 2 signal	Power supply state "ON"	0.5 V
B44	Body ground	Shift motor 1 signal	Power supply state "ON"	0.5 V
B45	Body ground	Clutch motor 2 signal	Power supply state "ON"	2.8 V
B46	Body ground	Clutch motor 1 signal	Power supply state "ON"	5 V
B47	Body ground	Shift motor 1 sensor power supply	Power supply state "ON"	0 V
B48	Body ground	Shift motor 1 signal	Power supply state "ON"	0 V

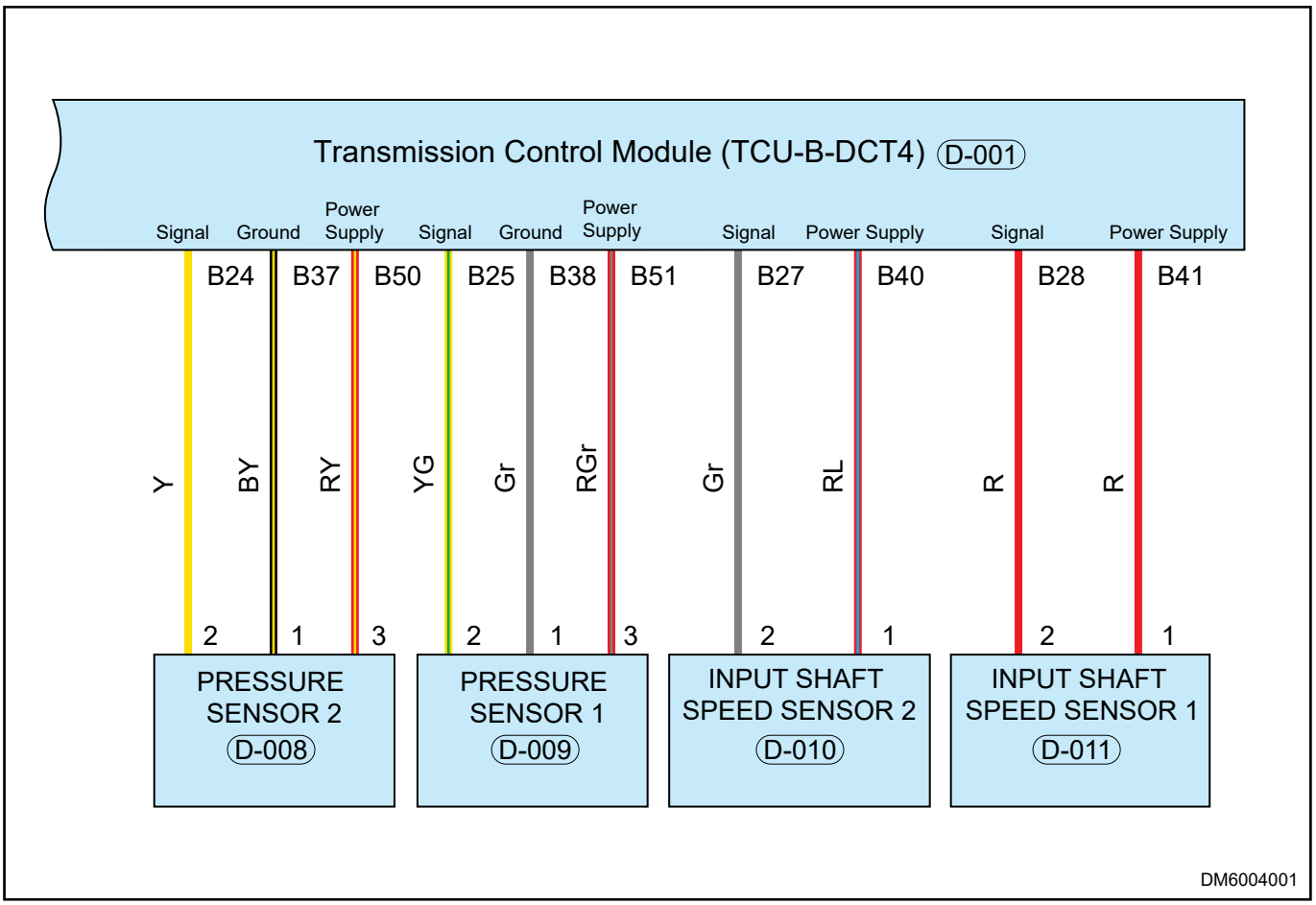
B49	Body ground	Shift motor 2 signal	Power supply state "ON"	5 V
B50	Body ground	Pressure sensor 2 power supply	Power supply state "ON"	5 V
B51	Body ground	Pressure sensor 1 power supply	Power supply state "ON"	5 V
B52	/	/	/	/
B53	Body ground	Range sensor power supply	Power supply state "ON"	5 V
B54	Body ground	Range sensor-PWM1	Power supply state "ON"	5 V
B55	Body ground	Cooling motor sensor ground	Power supply state "ON"	0 V
B56	Body ground	Shift motor 2 signal ground	Power supply state "ON"	0 V
B57	Body ground	Shift motor 1 signal ground	Power supply state "ON"	0 V
B58	Body ground	Clutch motor 2 signal ground	Power supply state "ON"	0 V
B59	Body ground	Clutch motor 1 signal ground	Power supply state "ON"	0 V
B60	Body ground	Cooling motor sensor power supply	Power supply state "ON"	0 V
B61	Body ground	Shift motor 2 position signal	Power supply state "ON"	2 V
B62	/	/	/	/
B63	/	/	/	/
B64	/	/	/	/
B65	/	/	/	/
B66	Body ground	Range sensor ground	Power supply state "ON"	0 V
B67	Body ground	Range sensor-PWM2	Power supply state "ON"	-

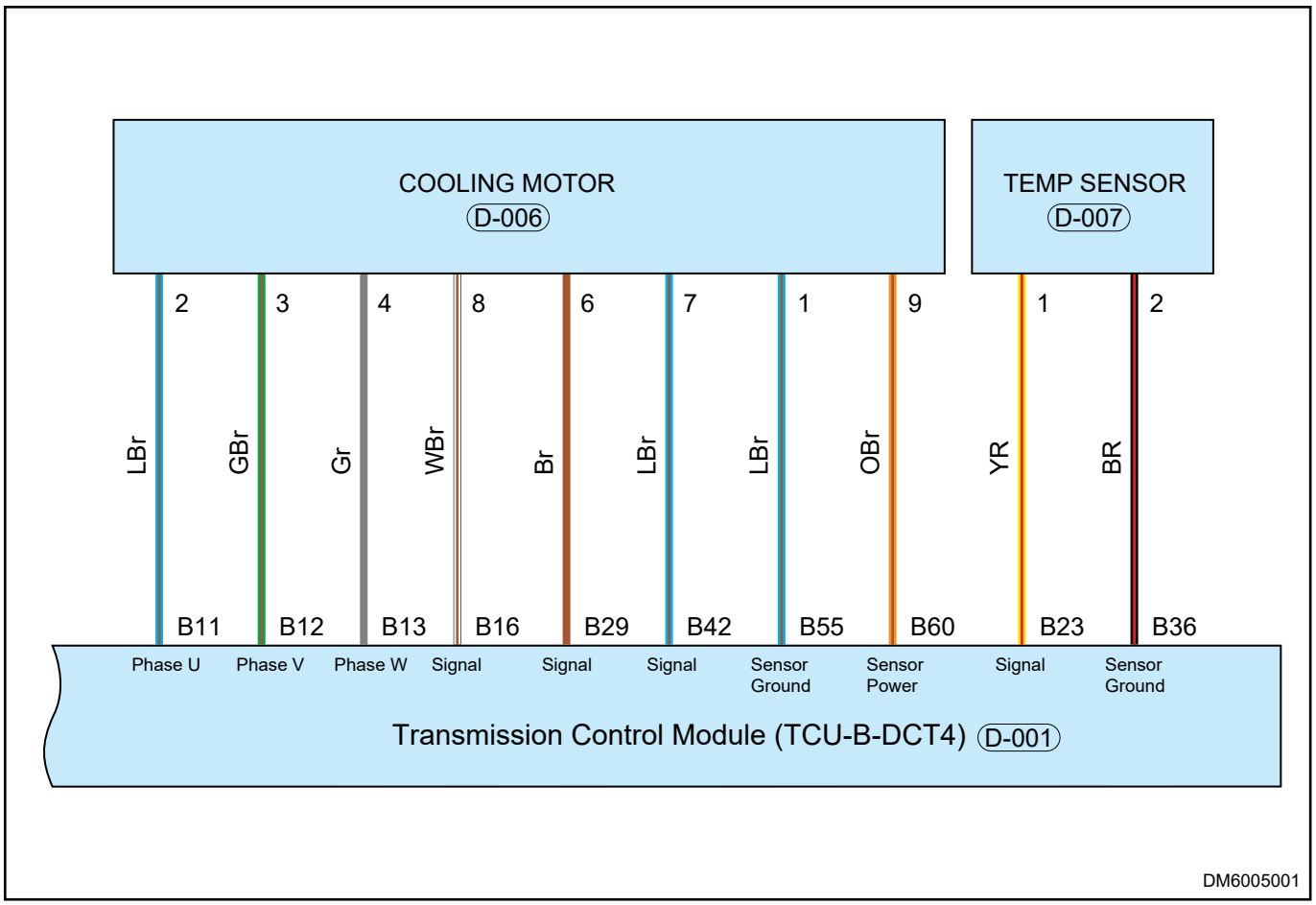
3.2 Circuit Diagram




Transmission Control Module (TCU-B-DCT4) D-001
Signal Ground
Signal
Signal
Signal
Signal
Sensor Power
Phase W
Phase V
Phase U
Phase U
Phase V
Phase W
Signal
Signal
Signal
Signal
Signal Ground
Position Signal
B57
B44
B31
B18
B48
B47
B8
B7
B6
B9
B14
B15
B17
B30
B43
B49
B56
B61
L
G
BrG
GW
OL
OG
GW
G
L
L
GL
LB
LW
RL
LG
OL
L
GrL
1
7
6
8
5
9
4
3
2
2
3
4
8
6
7
9
1
5
SHIFT MOTOR 1
D-004
SHIFT MOTOR 2
D-005
DM6002001


CLUTCH MOTOR 2
D-002
CLUTCH MOTOR 1
D-003
2 3 4 8 6 9 7 1
LO GO WO GW O O LO LO
LW GW W W OW BrW GW LW
2 3 4 9 8 6 7 1
B1 B2 B3 B19 B32 B34 B45 B58
B4 B5 B10 B20 B21 B33 B46 B59
Phase U Phase V Phase W Signal Signal Sensor Power Signal Signal Ground
Phase U Phase V Phase W Signal Sensor Power Signal Signal Signal Ground
Transmission Control Module (TCU-B-DCT4) D-001
DM6003001


Transmission Control Module (TCU-B-DCT4) D-001
Signal
Ground
Power Supply
Signal
Ground
Power Supply
Signal
Power Supply
Signal
Power Supply
B24
B37
B50
B25
B38
B51
B27
B40
B28
B41
Y
BY
RY
YG
Gr
RGr
Gr
RL
R
R
2
1
3
2
1
3
2
1
2
1
PRESSURE SENSOR 2
D-008
PRESSURE SENSOR 1
D-009
INPUT SHAFT SPEED SENSOR 2
D-010
INPUT SHAFT SPEED SENSOR 1
D-011
DM6004001



4 Diagnostic Information and Steps

4.1 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check transmission control system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.

- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.3 Ground Inspection

Ground points are very important to normal operation of circuit, which are normal or not can seriously affect the entire circuit system. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. In such cases, the circuit operation will be seriously affected. Circuit is sensitive to ground. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.4 Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the transmission control system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

Standard Condition

Standard voltage: Not less than 12 V.

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	**Read DTCs**

NG → **Perform repair according to problem symptoms table**

OK

5	**Read DTCs (current DTC and history DTC)**

NG → Troubleshoot according to Intermittent DTC malfunction procedures

OK

6	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

7	Adjust, repair or replace

Next

8	Conduct test and confirm malfunction has been repaired

Next → End

4.5 Diagnostic Trouble Code (DTC) Chart

Hint:

- History trouble code cannot be reported, otherwise it will affect the use by customer.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U007388h	Vehicle CAN Bus Off	/	• Wire harness and connector fault • TCU power supply fault • Check the error memory information of all electronic control units • Check TCU	• Check wire harness and connector • Check TCU power supply • Check the error memory information of all electronic control units • Replace TCU
P180812h	Monitoring Voltage of Input Shaft 1 Speed Sensor: Electrical Signal Short to Power Supply	Detected signal voltage is higher than threshold	• Wire harness or connector failure • TCU power supply fault • Input shaft speed sensor fault • TCU fault	• Check wire harness and connector • Check TCU power supply • Replace input shaft speed sensor • Replace TCU
P180811h	Monitoring Voltage of Input Shaft 1 Speed Sensor: Signal Short to Ground	Detected signal voltage is lower than threshold		
P180813h	Monitoring Voltage of Input Shaft 1 Speed Sensor: Signal Circuit Open	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180837h	Monitoring Frequency of Input Shaft 1 Speed Sensor: Frequency Failure	/		
P180894h	Monitoring Jump of Input Shaft 1 Speed Sensor	/		
P180829h	Monitoring Speed: Input Shaft Odd Gear Position Speed Sensor Value Unreliable	/	• Input shaft 1 speed sensor wire harness or connector fault • Input shaft 1 speed sensor fault • ABS wheel speed fault	• Check input shaft 1 speed sensor wire harness or connector • Replace input shaft 1 speed sensor • Check if ABS wheel speed has fault

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180911h	Monitoring Voltage of Input Shaft 2 Speed Sensor: Signal Short to Ground	/	• Wire harness or connector failure • TCU power supply fault • Input shaft speed sensor fault • TCU fault	• Check wire harness and connector • Check TCU power supply • Replace input shaft speed sensor • Replace TCU
P180912h	Monitoring Voltage of Input Shaft 2 Speed Sensor: Electrical Signal Short to Power Supply	/		
P180913h	Monitoring Voltage of Input Shaft 2 Speed Sensor: Signal Circuit Open	/		
P180937h	Monitoring Frequency of Input Shaft 2 Speed Sensor: Frequency Failure	/		
P180994h	Monitoring Jump of Input Shaft 2 Speed Sensor	/		
P180929h	Monitoring Speed of Input Shaft 2 Speed Sensor	/	• Input shaft 2 speed sensor wire harness or connector fault • Input shaft 2 speed sensor fault • ABS wheel speed fault	• Check input shaft 2 speed sensor wire harness or connector • Replace input shaft 2 speed sensor • Check if ABS wheel speed has fault

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181015h	Monitoring Voltage of Pressure Sensor 1: Signal Short to Power Supply or Open	/	• Wire harness or connector failure • Sensor failure • TCU fault	• Check wire harness and connector • Replace sensor • Replace TCU
P181011h	Monitoring Voltage of Pressure Sensor 1: Signal Short to Ground			
P18101Ch	Monitoring Voltage of Pressure Sensor 1: Signal Higher than Range			
P18101Dh	Monitoring Voltage of Pressure Sensor 1: Signal Lower than Range	/		
P181215h	Monitoring Voltage of Pressure Sensor 2: Signal Short to Power Supply or Open	/		
P181211h	Monitoring Voltage of Pressure Sensor 2: Signal Short to Ground			
P18121Ch	Monitoring Voltage of Pressure Sensor 2: Signal Higher than Range			
P18121Dh	Monitoring Voltage of Pressure Sensor 2: Signal Lower than Range	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181415h	Monitoring Voltage of Oil Temperature Sensor: Signal Short to Power Supply or Open	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P181411h	Monitoring Voltage of Oil Temperature Sensor: Signal Short to Ground	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180512h	Monitoring Pressure Sensor Power Supply A: Short to Power Supply	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P180511h	Monitoring Pressure Sensor Power Supply A: Short to GND	/		
P18051Ch	Monitoring Pressure Sensor Power Supply A: Voltage Higher than Threshold	/		
P18051Dh	Monitoring Pressure Sensor Power Supply A: Voltage Lower than Threshold	/		
P180592h	Monitoring Pressure Sensor Power Supply A: Performance or Incorrect Operation	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180612h	Monitoring Pressure Sensor Power Supply B: Short to Power Supply	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P180611h	Monitoring Pressure Sensor Power Supply B: Power Supply Short to Ground	/		
P18061Ch	Monitoring Pressure Sensor Power Supply B: Voltage Higher than Threshold	/		
P18061Dh	Monitoring Pressure Sensor Power Supply B: Voltage Lower than Threshold	/		
P180692h	Monitoring Pressure Sensor Power Supply B: Performance or Incorrect Operation	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180712h	Monitoring Pressure Sensor Power Supply C: Short to Power Supply	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P180711h	Monitoring Pressure Sensor Power Supply C: Power Supply Short to Ground	/		
P18071Ch	Monitoring Pressure Sensor Power Supply C: Voltage Higher than Threshold	/		
P18071Dh	Monitoring Pressure Sensor Power Supply C: Voltage Lower than Threshold	/		
P180792h	Monitoring Pressure Sensor Power Supply C: Performance or Incorrect Operation	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181C2Ah	Pressure Sensor 1 Output Stuck at Specific Value	/	• Wire harness or connector failure • Pressure sensor failure • Clutch failure • Transmission failure	• Check wire harness or connector • Replace pressure sensor • Replace clutch • Replace transmission
P181C92h	Compare to Pressure Sensor 1: Pressure too High	/		
P181D92h	Compare to Pressure Sensor 1: Pressure too Low	/		
P181C28h	Pressure Sensor 1 Offset too High	/		
P181C27h	Pressure Sensor 1 Pressure Gradient too High	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181E92h	Compare to Pressure Sensor 2: Pressure too High	/	• Wire harness or connector failure • Pressure sensor failure • Clutch failure • Transmission failure	• Check wire harness or connector • Replace pressure sensor • Replace clutch • Replace transmission
P181E2Ah	Pressure Sensor 2 Output Stuck at Specific Value	/		
P181F92h	Compare to Pressure Sensor 2: Pressure too Low	/		
P181E28h	Pressure Sensor 2 Offset too High	/		
P181E27h	Pressure Sensor 2 Pressure Gradient too High	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181B22h	Oil Temperature Value Jump Monitoring	/	• Wire harness or connector failure • Transmission oil loss • TCU fault	• Check wire harness or connector • Check transmission oil • Replace TCU
P181B2Ah	Oil Temperature Value Stuck Detected	/		
P181B64h	Oil Temperature Value Offset Monitoring	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P183E92h	Shift Motor 1 Hall Monitoring	/	• Wire harness or connector failure • TCU power supply fault • Shift motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replacement of Shift Motor • Replace TCU
P182035h	Monitoring High Resolution Sensor Shift Actuator 1: Duty Ratio Signal Out of Range	/		
P182038h	Monitoring High Resolution Sensor Shift Actuator 1: Frequency Signal Out of Range	/		
P182015h	Monitoring High Resolution Sensor Shift Actuator 1: Short or Open in Power Supply Signal	/	• Wire harness or connector failure • Sensor power supply voltage fault • TCU fault	• Check wire harness or connector • Check sensor power supply voltage • Replace TCU
P182011h	Monitoring High Resolution Sensor	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Shift Actuator 1: Signal Short to GND			
P180213h	Monitoring Shift Motor 1 Phase: Open	/	• Wire harness or connector failure • TCU power supply fault • Shift motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replacement of Shift Motor • Replace TCU
P180292h	Monitoring Shift Motor 1: Performance or Incorrect Operation	/		
P180212h	Monitoring Shift Motor 1 Phase: Short to Power Supply	/		
P180211h	Monitoring Shift Motor 1 Phase: Short to GND	/		
P180247h	Drive Control Shift Actuator Mechanism 1: Defects in Control Path	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P184192h	Shift Motor 2 Hall Monitoring	/	• Wire harness or connector failure • TCU power supply fault • Shift motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replacement of Shift Motor • Replace TCU
P182135h	Monitoring High Resolution Sensor Shift Actuator 2: Duty Ratio Signal Out of Range	/		
P182138h	Monitoring High Resolution Sensor Shift Actuator 2: Frequency Signal Out of Range	/		
P182115h	Monitoring High Resolution Sensor Shift Actuator 2: Short or Open in Power Supply Signal	/	• Wire harness or connector failure • Sensor power supply voltage fault • TCU fault	• Check wire harness or connector • Check sensor power supply voltage • Replace TCU
P182111h	Monitoring High Resolution Sensor Shift Actuator 2: Signal Short to GND	/		
P180311h	Monitoring Shift Motor 2: Short to GND	/	• Wire harness or connector failure • TCU power supply fault • Shift motor fault	• Check wire harness or connector • Check TCU power supply • Replacement of Shift Motor
P180312h	Monitoring Shift Motor 2: Short to Power Supply	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180313h	Monitoring Shift Motor 2: Open	/	• TCU fault	• Replace TCU
P180392h	Monitoring Shift Motor 2: Performance or Incorrect Operation	/		
P180347h	Drive Control Shift Actuator Mechanism 2: Defects in Control Path	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180A92h	Clutch 1 Position Signal	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU
P180D92h	Clutch 2 Position Signal	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180013h	Monitoring Clutch Motor 1: Open	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Check sensor • Replace TCU
P180012h	Monitoring Clutch Motor 1: Short to Power Supply	/		
P180011h	Monitoring Clutch Motor 1: Short to GND	/		
P180092h	Monitoring Clutch Motor 1 Phase: Performance or Incorrect Operation	/	• Wire harness or connector failure • TCU power supply fault • Clutch actuator mechanism fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Check clutch actuator mechanism • Replace TCU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180047h	Drive Control Clutch Brake 1: Defects in Control Path	/	• Wire harness or connector failure • TCU fault	• Check wire harness or connector • Replace TCU
P180147h	Drive Control Clutch Brake 2: Defects in Control Path	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180111h	Monitoring Clutch Motor 2: Short to GND	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU
P180112h	Monitoring Clutch Motor 2: Short to Power Supply	/		
P180113h	Monitoring Clutch Motor 2: Open	/		
P180192h	Monitoring Clutch Motor 2 Phase: Performance or Incorrect Operation	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181192h	Clutch Cooling Motor Hall Monitoring	/	• Wire harness or connector failure • TCU power supply fault • Cooling motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace cooling motor fault • Replace TCU
P180411h	Monitoring Cooling Motor: Short to GND	/	• Wire harness or connector failure • TCU power supply fault • Cooling motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replacement of Cooling Motor • Replace TCU
P180412h	Monitoring Cooling Motor: Short to Power Supply	/		
P180413h	Monitoring Cooling Motor: Open	/		
P180447h	Drive Control Clutch Cooling Brake: Defects in Control Path	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180492h	Monitoring Cooling Motor: Performance or Incorrect Operation	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180229h	Shift Actuator 1 Motor Speed Inspection	/	• Wire harness or connector failure • Shift motor fault • TCU fault • Transmission failure	• Check wire harness or connector • Replacement of Shift Motor • Replace TCU • Replace transmission
P180329h	Shift Actuator 2 Motor Speed Inspection	/	• Wire harness or connector failure • Shift motor fault • TCU fault • Transmission failure	• Check wire harness or connector • Replacement of Shift Motor • Replace TCU • Replace transmission
P1804F1h	Clutch Cooling Pump Motor Speed Inspection (Speed too Low)	/	• Wire harness or connector failure • Cooling motor fault • Cooling actuator fault • TCU fault	• Check wire harness or connector • Replacement of Cooling Motor • Replace cooling actuator • Replace TCU
P1804F2h	Clutch Cooling Pump Motor Speed Inspection (-Unexpected Zero or Negative Response Value)	/		
P18004Bh	Clutch Actuator Mechanism 1 Power Level Temperature Monitoring (Overheated)	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P18014Bh	Clutch Actuator Mechanism 2 Power Level Temperature Monitoring (Overheated)	/		
P18044Bh	Cooling Actuator Mechanism 2 Power Level Temperature Monitoring (Overheated)	/		
P18024Bh	Shift Mechanism 1 Temperature Monitoring (Overheated)	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P18034Bh	Shift Mechanism 2 Temperature Monitoring (Overheated)	/		
P183B4Bh	TCU Temperature Monitoring (Overheated)	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P183817h	Voltage Monitoring: High Power Supply Overvoltage First Threshold	/	• Battery failure • Wire harness or connector failure • TCU power supply fault • TCU fault	• Check and repair battery • Check wire harness or connector • Check TCU power supply • TCU fault
P183917h	Voltage Monitoring: High Power Supply Overvoltage Second Threshold	/		
P183816h	Voltage Monitoring: High Power Supply Undervoltage First Threshold	/		
P183916h	Voltage Monitoring: High Power Supply Undervoltage Second Threshold	/		
P183A17h	Voltage Monitoring: Low Power Supply Overvoltage	/		
P183A16h	Voltage Monitoring: Low Power Supply Undervoltage	/		
P182B62h	Clutch 1 Torque Too Low (GETRAG)	/	• Clutch failure	• Check clutch
P182C62h	Clutch 2 Torque Too Low (GETRAG)	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182394h	Gear Jump Detection Odd Transmission Path	/	• Wire harness or connector failure • Input speed sensor fault • TCU fault	• Check wire harness or connector • Replace input speed sensor • Replace TCU • Check ABS unit for DTCs • Replace transmission
P182494h	Gear Jump Detection Even Transmission Path	/	• Wire harness or connector failure • Input speed sensor fault • TCU fault	• Check wire harness or connector • Replace input speed sensor • Replace TCU • Check ABS unit for DTCs • Replace transmission

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182707h	Transmission Odd Gear Position Synchronization Failed	/	• Wire harness or connector failure • Input speed sensor fault • TCU fault	• Check wire harness or connector • Replace input speed sensor • Replace TCU • Check ABS unit for DTCs • Replace transmission
P182807h	Transmission Even Gear Position Synchronization Failed		• Wire harness or connector failure • Input speed sensor fault • TCU fault	• Check wire harness or connector • Replace input speed sensor • Replace TCU • Check ABS unit for DTCs • Replace transmission

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182577h	Shift Drum 1 Rotation Monitoring (Unexpected Stationary of Shift Drum 1)	/	• Wire harness or connector failure • Shift motor fault • TCU fault • Transmission failure	• Check wire harness or connector • Replacement of Shift Motor • Replace TCU • Perform EOL routine self-learning • Replace transmission
P182677h	Shift Drum 2 Rotation Monitoring (Unexpected Stationary of Shift Drum 2)			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182372h	Transmission Odd Gear Combination Fault Monitoring	/	• Wire harness or connector failure • Shift motor fault • TCU fault • Transmission failure	• Check wire harness or connector • Replacement of Shift Motor • Replace TCU • Perform EOL routine self-learning • Replace transmission
P182373h	Transmission Odd Shaft Impossible to Shift			
P182472h	Transmission Even Gear Combination Fault Monitoring			
P182473h	Transmission Even Shaft Impossible to Shift			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182929h	Continuous Monitoring of Shift Hub 1 Mechanical Stop Loss	/	• Wire harness or connector failure • Shift motor fault • Transmission self-learning incomplete fault • Shift drum motor self-learning incomplete fault • TCU fault • Transmission failure	• Check wire harness or connector • Perform shift hub self-learning • Replacement of Shift Motor • Perform transmission self-learning • Replace TCU • Replace transmission
P182A29h	Continuous Monitoring of Shift Hub 2 Mechanical Stop Loss			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P183592h	Shift Drum 1 Self-learning Failed	/	• Wire harness or connector failure • Shift motor fault • TCU fault • Transmission failure	• Check for wire harness or connector fault • Replacement of Shift Motor • Replace TCU • Replace transmission
P183692h	Shift Drum 2 Self-learning Failed			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182D98h	Clutch 1 Temperature Monitoring	/	• Cooling system fault • Transmission oil fault • Wire harness or connector failure • TCU fault • Transmission failure	• Check cooling system • Check transmission oil • Check wire harness or connector • Replace TCU • Replace transmission
P182E98h	Clutch 2 Temperature Monitoring			
P183277h	Monitoring Park Lock Position	/	• Wire harness or connector failure • Shift motor fault • TCU fault • Transmission failure	• Check wire harness or connector • Replacement of Shift Motor • Replace TCU • Replace transmission

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P182F98h	Oil Pan Oil Temperature Monitoring	/	• Cooling system fault • Transmission oil fault • Wire harness or connector failure • TCU fault • Transmission failure	• Check for wire harness or connector fault • Replacement of Shift Motor • Replace TCU • Replace transmission
P183098h	Clutch1, Clutch2 and Oil Temperature Monitoring First Level Alarm	/		
P183198h	Clutch1, Clutch2 and Oil Temperature Monitoring Second Level Alarm	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P183796h	Welding Fracture Monitoring	/	Clutch failure	Replacement of Clutch
P18A047h	Level 2 Safety Goal SZ1: Unexpected Engine Torque Increase	/	• Wire harness or connector failure • TCU fault	• Check wire harness or connector • Replace TCU
P18A147h	Level 2 Safety Goal SZ2: Unexpected Start in Wrong Direction	/		
P18A247h	Level 2 Safety Goal SZ3: Unexpected	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Shift to R During Driving			
P18A347h	Level 2 Safety Goal SZ4: Unexpected Start	/		
P18A447h	Level 2 Safety Goal SZ6a: Unexpected Downshift (Within Allowed Input Shaft Speed Range)	/		
P18A547h	Level 2 Safety Goal SZ6b: Unexpected Downshift (Out of Allowed Input Shaft Speed Range)	/		
P18A647h	Level 2 Safety Goal SZ7: Clutch Stuck	/	• Wire harness or connector failure • TCU fault	• Check wire harness or connector • Replace TCU
P18A747h	Level 2 Safety Goal SZ8: Clutch Overspeed	/		
P18A847h	Level 2 Safety Goal SZ13: Unexpected Shift from P Gear	/		
P18A947h	Level 2 Safety Goal SZ14: Not in P Position	/		
P18AA47h	Level 2 Safety Goal SZ16: Unexpected Shift to P Gear	/		
P18AB47h	Level 2 Safety Goal SZ19a: Wrong Display of P Position	/		
P18AC47h	Level 2 Safety Goal SZ19b: Wrong Display of D/R Position	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P18AD47h	Level 2 Safety Goal SZ19c: Wrong Display of N/P Position	/	• Wire harness or connector failure • TCU fault	• Check wire harness or connector • Replace TCU
P18B147h	Level 2 Safety Goal Calibration Pointer Protection	/		
P18B047h	Level 2 Safety Goal Memory Protection	/		
P18C047h	Level 3 Safety Function Activated	/		
P183D42h	Internal Control Module EEPROM Error	/	• TCU power supply fault • TCU fault	• Check TCU power supply • Replace TCU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180A15h	Clutch 1 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 1	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU
P180A11h	Clutch 1 Hall Sensor: Short to Ground in Signal Line 1	/		
P180B15h	Clutch 1 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 2	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU
P180B11h	Clutch 1 Hall Sensor: Short to Ground in Signal Line 2	/		
P180C15h	Clutch 1 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 3	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU
P180C11h	Clutch 1 Hall Sensor: Short to Ground in Signal Line 3	/		
P180D15h	Clutch 2 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 1	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P180D11h	Clutch 2 Hall Sensor: Short to Ground in Signal Line 1	/	• TCU fault	
P180E15h	Clutch 2 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 2	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU
P180E11h	Clutch 2 Hall Sensor: Short to Ground in Signal Line 2	/		
P180F15h	Clutch 2 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 3	/	• Wire harness or connector failure • TCU power supply fault • Clutch motor fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace clutch motor • Replace TCU
P180F11h	Clutch 2 Hall Sensor: Short to Ground in Signal Line 3	/		
P183E15h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Power Supply or Open Circuit in Signal Line 1	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P183E11h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Ground in Signal Line 1	/		
P183F15h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Power Supply or Open Circuit in Signal Line 2	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P183F11h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Ground in Signal Line 2	/		
P184015h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Power Supply or Open Circuit in Signal Line 3	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P184011h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Ground in Signal Line 3	/		
P184115h	Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Power Supply or Open Circuit in Signal Line 1	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P184111h	Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Ground in Signal Line 1	/		
P184215h	Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Power Supply or Open Circuit in Signal Line 2	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P184211h	Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Ground in Signal Line 2	/		
P184315h	Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Power Supply or Open Circuit in Signal Line 3	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P184311h	Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Ground in Signal Line 3	/		
P181115h	Clutch Cooling Motor Hall Sensor: Short to Battery or Open Circuit in Signal Line 1	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P181111h	Clutch Cooling Motor Hall Sensor: Short to Ground in Signal Line 1	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181315h	Clutch Cooling Motor Hall Sensor: Short to Battery or Open Circuit in Signal Line 2	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P181311h	Clutch Cooling Motor Hall Sensor: Short to Ground in Signal Line 2	/		
P181915h	Clutch Cooling Motor Hall Sensor: Short to Battery or Open Circuit in Signal Line 3	/	• Wire harness or connector failure • TCU power supply fault • TCU fault	• Check wire harness or connector • Check TCU power supply • Replace TCU
P181911h	Clutch Cooling Motor Hall Sensor: Short to Ground in Signal Line 3	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181516h	Monitoring Temperature Sensor 1 Voltage: Circuit Voltage Lower Than Threshold	Signal voltage is lower than sensor lower limit	• TCU fault	• Check TCU
P181616h	Monitoring Temperature Sensor 2 Voltage: Circuit Voltage Lower Than Threshold			
P181716h	Monitoring Temperature Sensor 3 Voltage: Circuit Voltage Lower Than Threshold			
P181517h	Monitoring Temperature Sensor 1 Voltage: Circuit Voltage Lower Higher Threshold	Signal voltage is higher than sensor upper limit		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P181617h	Monitoring Temperature Sensor 2 Voltage: Circuit Voltage Lower Higher Threshold			
P181717h	Monitoring Temperature Sensor 3 Voltage: Circuit Voltage Lower Higher Threshold			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U040181h	Engine Speed Signal Invalid	/	• Wire harness or connector failure • Related module fault	• Check wire harness or connector • Check related module
U040181h	Engine Start/Stop Status Signal Invalid			
U040181h	Engine Idling Signal Invalid			
U040181h	Engine Temperature Signal Invalid			
U040181h	Accelerator Pedal Signal Invalid			
U040181h	Driver Expected Torque Signal Invalid			
U040181h	Invalid Engine Torque Signal			
U040181h	Maximum Instantaneous Torque Signal invalid			
U040181h	Minimum Instantaneous Torque Signal invalid			
U040281h	Environment Temperature Signal Invalid			
U040181h	Brake Pedal Signal Invalid			
U041881h	Brake Pressure Signal Invalid			
U042381h	Hand Brake Signal Invalid			
U041881h	Front Left Wheel Speed Signal Invalid			

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U041881h	Front Right Wheel Speed Signal Invalid			
U041881h	Rear Left Wheel Speed Signal Invalid			
U041881h	Rear Right Wheel Speed Signal Invalid			
U040481h	Shift Lever Signal Invalid	/	• Wire harness or connector failure • Related module fault	• Check wire harness or connector • Check related module
U040481h	Parking (P Position) Button Signal Invalid	/		
U010087h	Engine Node 1 Timeout	/		
U040181h	Engine Node 1 Alive Counter Fault	/		
U040181h	Engine Node 1 Checksum Error	/		
U012987h	Brake System Node 1 Timeout	/		
U041881h	Brake System Node 1 Alive Counter Fault	/		
U041881h	Brake System Node 1 Checksum Error	/		
U015587h	Instrument Panel Node 1 Timeout	/		
U119387h	Shift Node 1 Timeout	/		
U040481h	Shift Node 1 Alive Counter Fault	/		
U040481h	Shift Node 1 Checksum Error	/		
U014087h	Body Control System Node 1 Timeout	/		
U016487h	Clutch System Node 1 Fault	/		

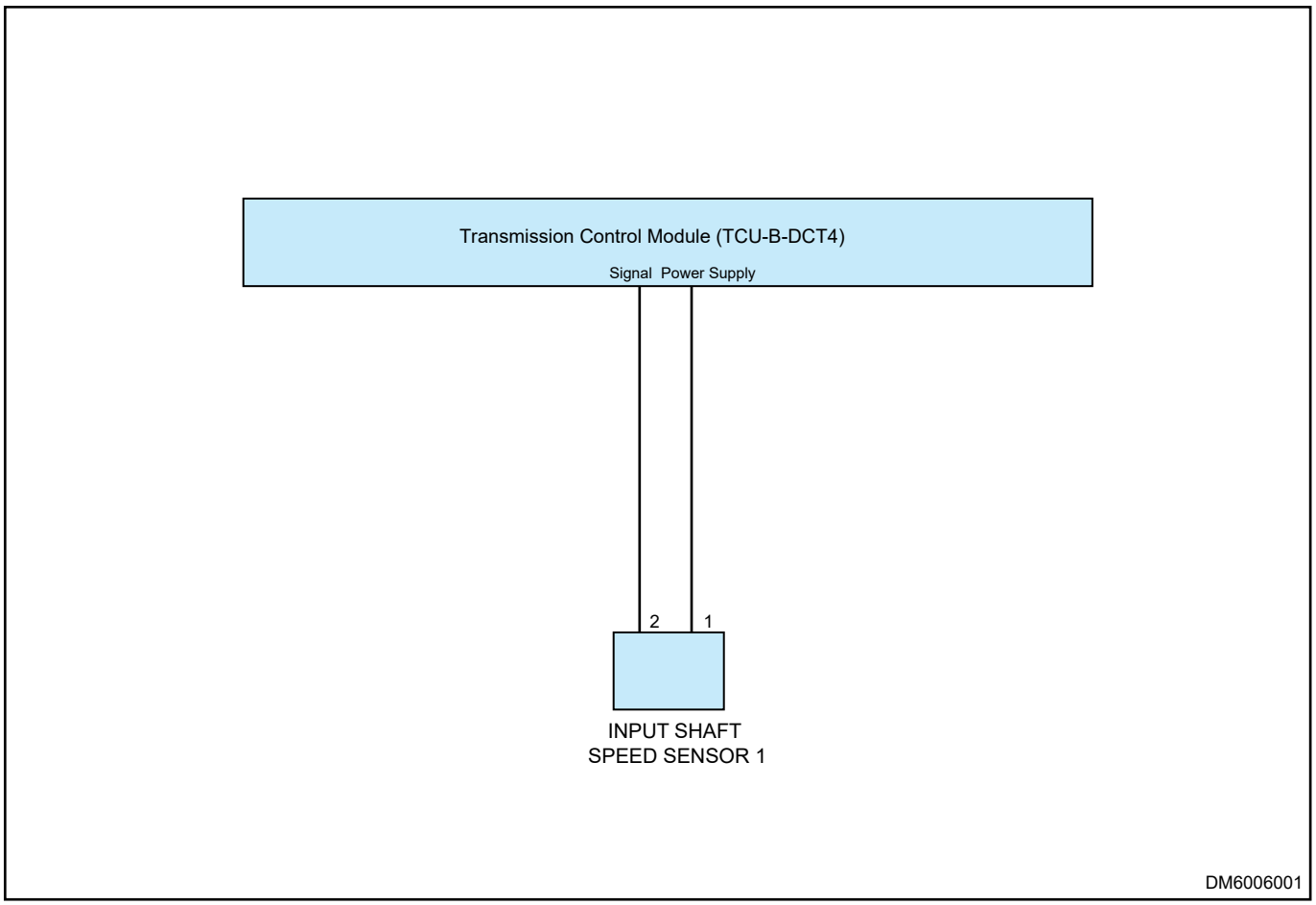
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P1880F3h	TCU Authentication Failed: EEPROM Updating Error	/	• TCU fault	• Replace TCU
P1880F6h	TCU Authentication Failed: SK or PIN Not Programmed	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
P1880F5h	TCU Authentication Failed: Authentication Fails Between TCU and IMMO	/		
P1880F4h	TCU Authentication Failed: No Response from IMMO	/		
P181892h	Target Position Not Reached in a Defined Time, Changed Position to N or P	/		
P183307h	Clutch 1 Torque Monitoring	/	• Clutch self-learning is incompleted • Clutch failure	• Clutch Self-learning • Replace clutch
P183407h	Clutch 2 Torque Monitoring	/		

4.6 DTC Trouble Diagnosis Flow

DTC	**P180811h**	**Monitoring Voltage of Input Shaft 1 Speed Sensor: Signal Short to Ground**
DTC	**P180812h**	**Monitoring Voltage of Input Shaft 1 Speed Sensor: Electrical Signal Short to Power Supply**
DTC	**P180813h**	**Monitoring Voltage of Input Shaft 1 Speed Sensor: Signal Circuit Open**
DTC	**P180837h**	**Monitoring Frequency of Input Shaft 1 Speed Sensor: Frequency Failure**
DTC	**P180894h**	**Jump of Input Shaft 1 Speed Sensor Detected**

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check battery**

(a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG → **Replace battery**

OK

2	Check alternator

(a) Check generating capacity of alternator.

NG → Replace alternator

OK

3	Check fuse

(a) Check if TCU fuse is blown.

NG → Replace fuse and check the cause for no power

OK

4	Check TCU and input shaft speed sensor 1 connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the input shaft speed sensor 1 connector, TCU connector.
(d) Check connector for poor connection or contact.

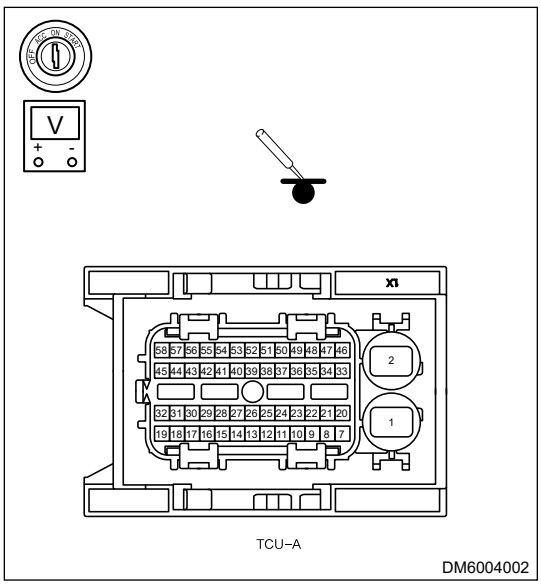
NG → Reinstall or repair, replace connector

OK

5	Check TCU power supply voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Use a digital multimeter (online detection) to measure voltage between power supply terminals of TCU A and body ground, detected voltage should be not less than 12 V.



NG → **Check and repair TCU power supply line or connector**

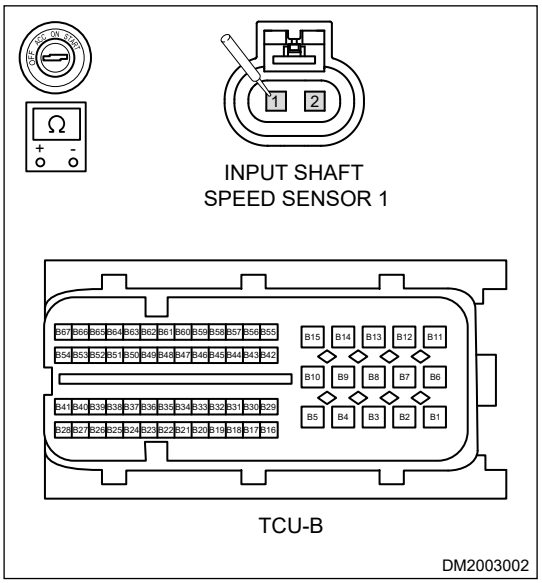
OK

6	Check input shaft speed sensor 1 circuit

(a) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable.

(b) Disconnect the input shaft speed sensor 1 connector and TCU B connector.

(c) Using ohm band of multimeter, measure wire harness resistance between input shaft speed sensor 1 terminals (1, 2) and TCU B (connected terminals) to check wire harness for open.



NG → **Replace or repair wire harness or connector (-Input shaft speed sensor - TCU)**

OK

7	Replace input shaft speed sensor 1

(a) Disconnect the negative battery cable.

(b) Replace input shaft speed sensor 1 to compare and verify, and check if the same DTC appears.

NG → **Replace input shaft speed sensor 1**

OK

8	Reconfirm DTCs

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTC.

(c) Start the engine.

(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	U007388h	Vehicle CAN Bus Off

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery

(a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG → **Replace battery**

OK ↓

2	Check alternator

(a) Check generating capacity of alternator.

NG → **Replace alternator**

OK ↓

3	Check fuse

(a) Check if TCU fuse is blown.

NG → **Replace fuse and check the cause for no power**

OK ↓

4	Check TCU connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Check connector for poor connection or contact.

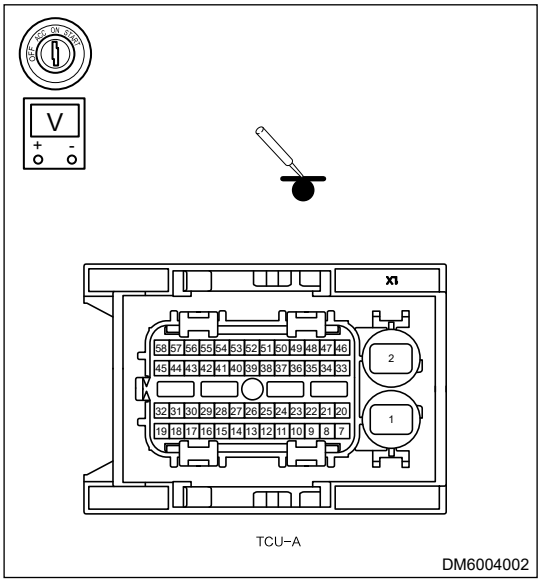
NG → Reinstall or repair, replace connector

OK

5	Check TCU power supply voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Use a digital multimeter (online detection) to measure voltage between TCU A (power supply terminals) and body ground, detected voltage should be not less than 12 V.



NG → Check and repair TCU power supply line or connector

OK

6	Reconfirm DTCs

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTC.

(c) Start the engine.

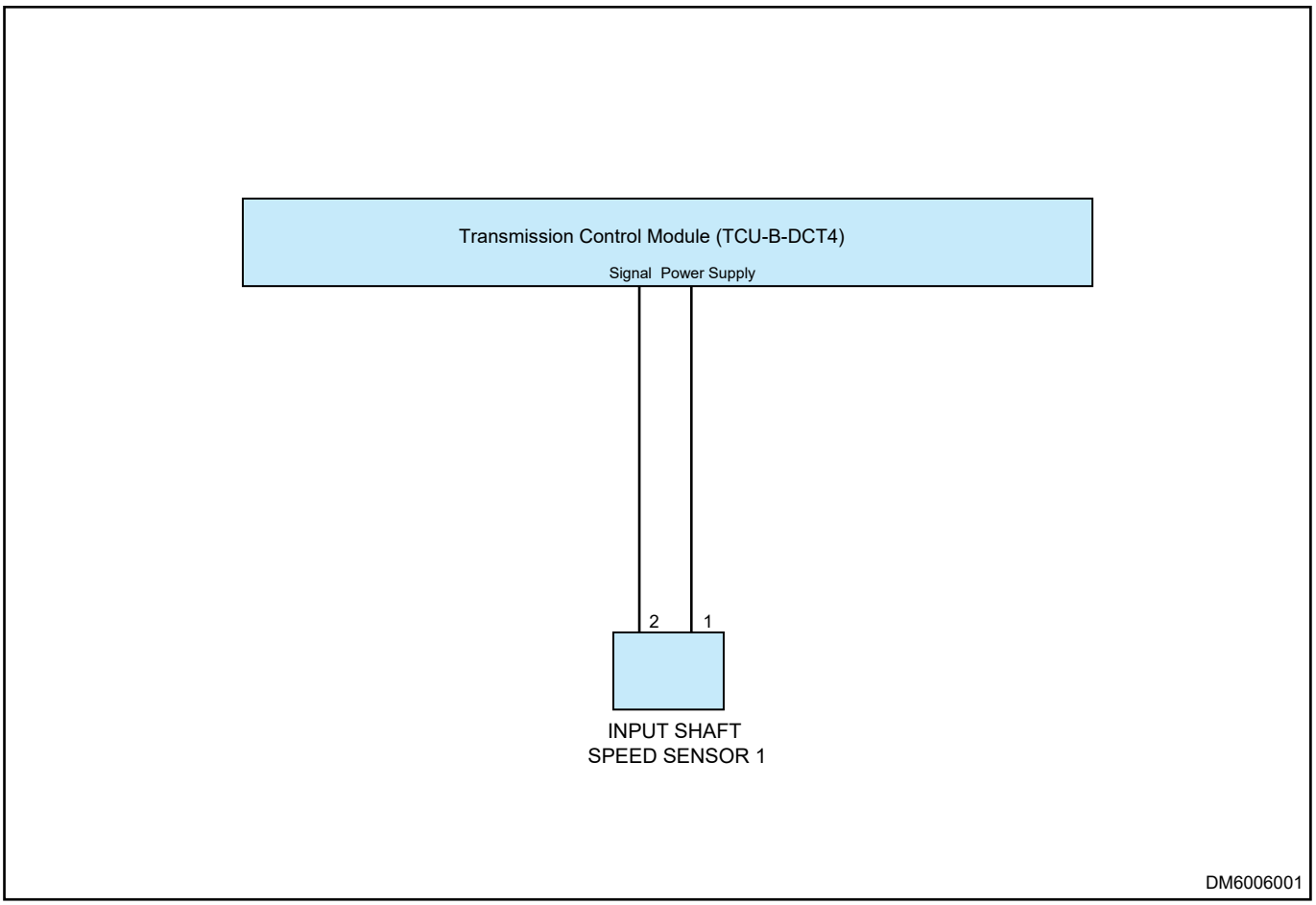
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace TCU control module assembly and perform self-learning

DTC	P180829h	Monitoring Speed: Input Shaft Odd Gear Position Speed Sensor Value Unreliable

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the input shaft sensor 1 connector and TCU connector.
(d) Check connector for poor connection or contact.

NG	**Reinstall or repair, replace connector**

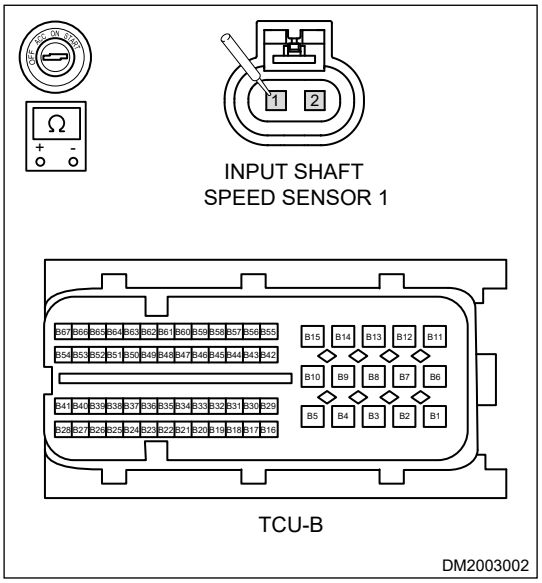
OK

2	Check input shaft speed sensor 1 circuit

(a) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable.

(b) Disconnect the TCU B connector.

(c) Using ohm band of multimeter, measure wire harness resistance between input shaft speed sensor 1 terminals (1, 2) and TCU B (connected terminals) to check wire harness for open.



NG → **Replace or repair wire harness or connector (- Input shaft sensor - TCU)**

OK

3	Check if ABS system has fault

(a) Using diagnostic tester to check if ABS system has fault.

NG → **Check and repair ABS system fault**

OK

4	Replace input shaft speed sensor 1

(a) Disconnect the negative battery cable.

(b) Replace input shaft speed sensor 1 to compare and verify, check if the same DTC appears.

NG → **Replace input shaft speed sensor 1**

OK

5	Reconfirm DTCs

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTC.

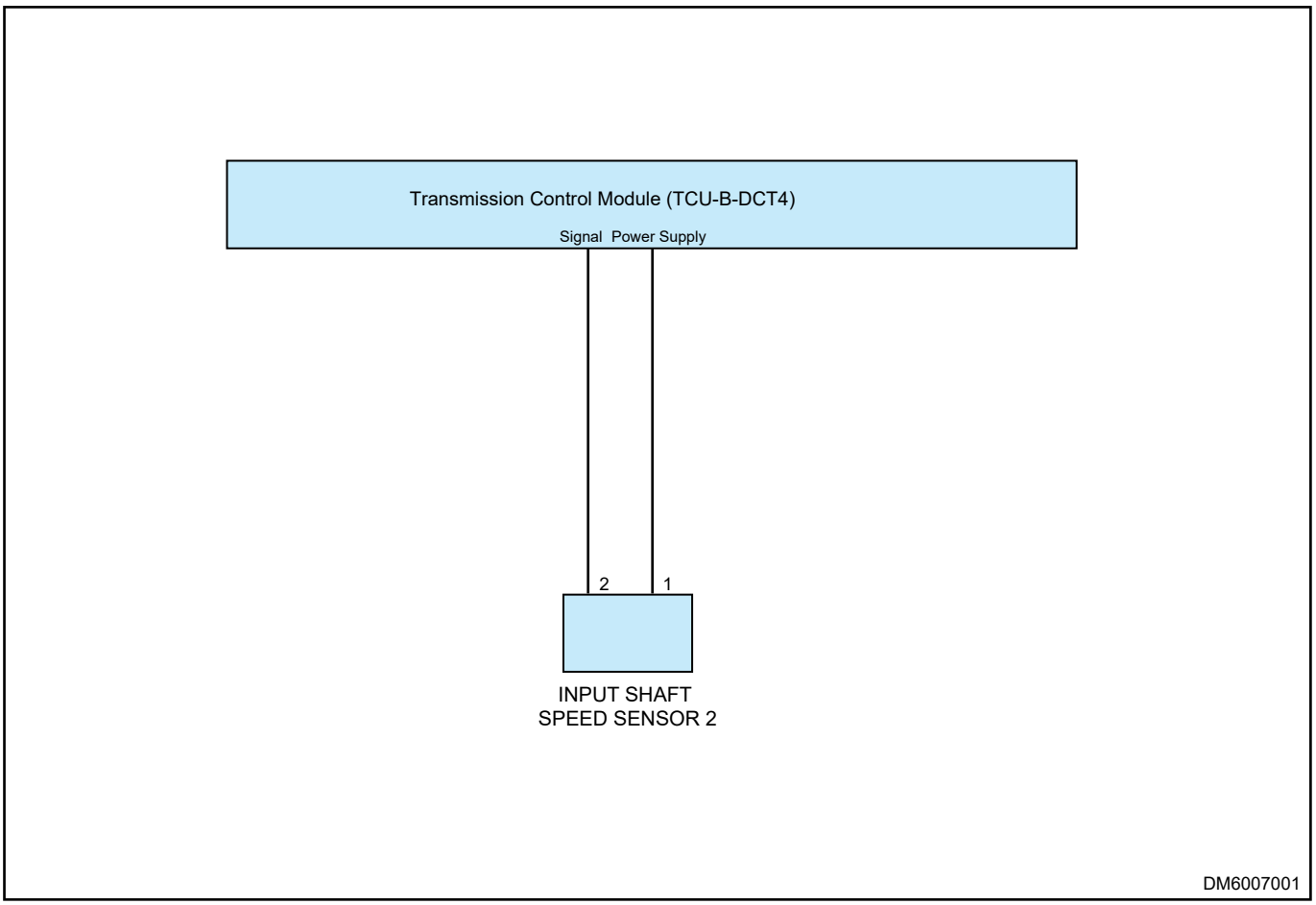
(c) Start the engine.

(d) Check if the same DTCs are output.

OK	System operates normally
NG	Replace TCU control module assembly and perform self-learning

DTC	P180911h	Monitoring Voltage of Input Shaft 2 Speed Sensor: Signal Short to Ground
DTC	P180912h	Monitoring Voltage of Input Shaft 2 Speed Sensor: Electrical Signal Short to Power Supply
DTC	P180913h	Monitoring Voltage of Input Shaft 2 Speed Sensor: Signal Circuit Open
DTC	P180937h	Monitoring Frequency of Input Shaft 2 Speed Sensor: Frequency Failure
DTC	P180994h	Jump of Input Shaft 2 Speed Sensor Detected

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery

(a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG → **Replace battery**

OK ↓

2	Check alternator

(a) Check generating capacity of alternator.

NG → **Replace alternator**

OK ↓

3	Check fuse

(a) Check if TCU fuse is blown.

NG → **Replace fuse and check the cause for no power**

OK ↓

4	Check connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the input shaft speed sensor 2 connector and TCU connector.
(d) Check connector for poor connection or contact.

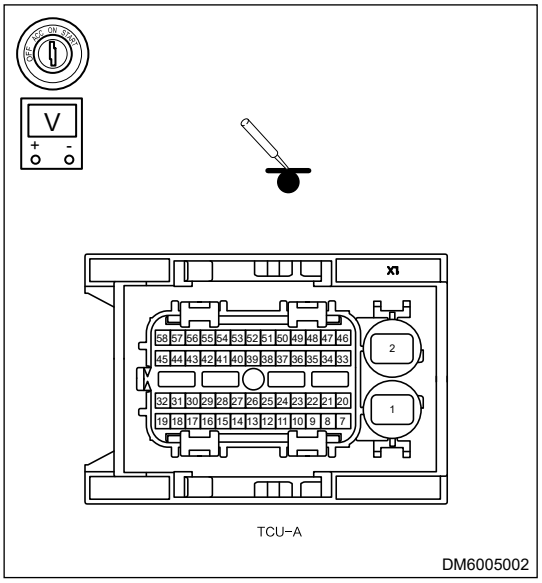
NG → **Reinstall or repair, replace connector**

OK ↓

5	Check TCU power supply voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Use a digital multimeter (online detection) to measure voltage between TCU A connector (power supply terminals) and body ground, detected voltage should be not less than 12 V.



NG → **Check and repair TCU power supply line**

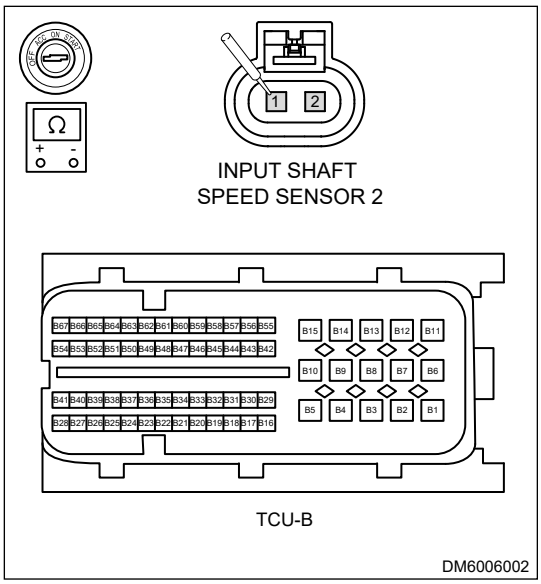
OK

6	Check input shaft speed sensor 2 circuit

(a) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable.

(b) Disconnect the TCU B connector.

(c) Using ohm band of multimeter, measure wire harness resistance between input shaft speed sensor 2 terminals (1, 2) and TCU B (connected terminals) to check wire harness for open.



NG → **Replace wire harness or connector (Input shaft speed sensor - TCU)**

OK

7	Replace input shaft speed sensor 2

(a) Disconnect the negative battery cable.

(b) Replace input shaft speed sensor 2 to compare and verify, check if the same DTC appears.

NG	Replace input shaft speed sensor 2

OK

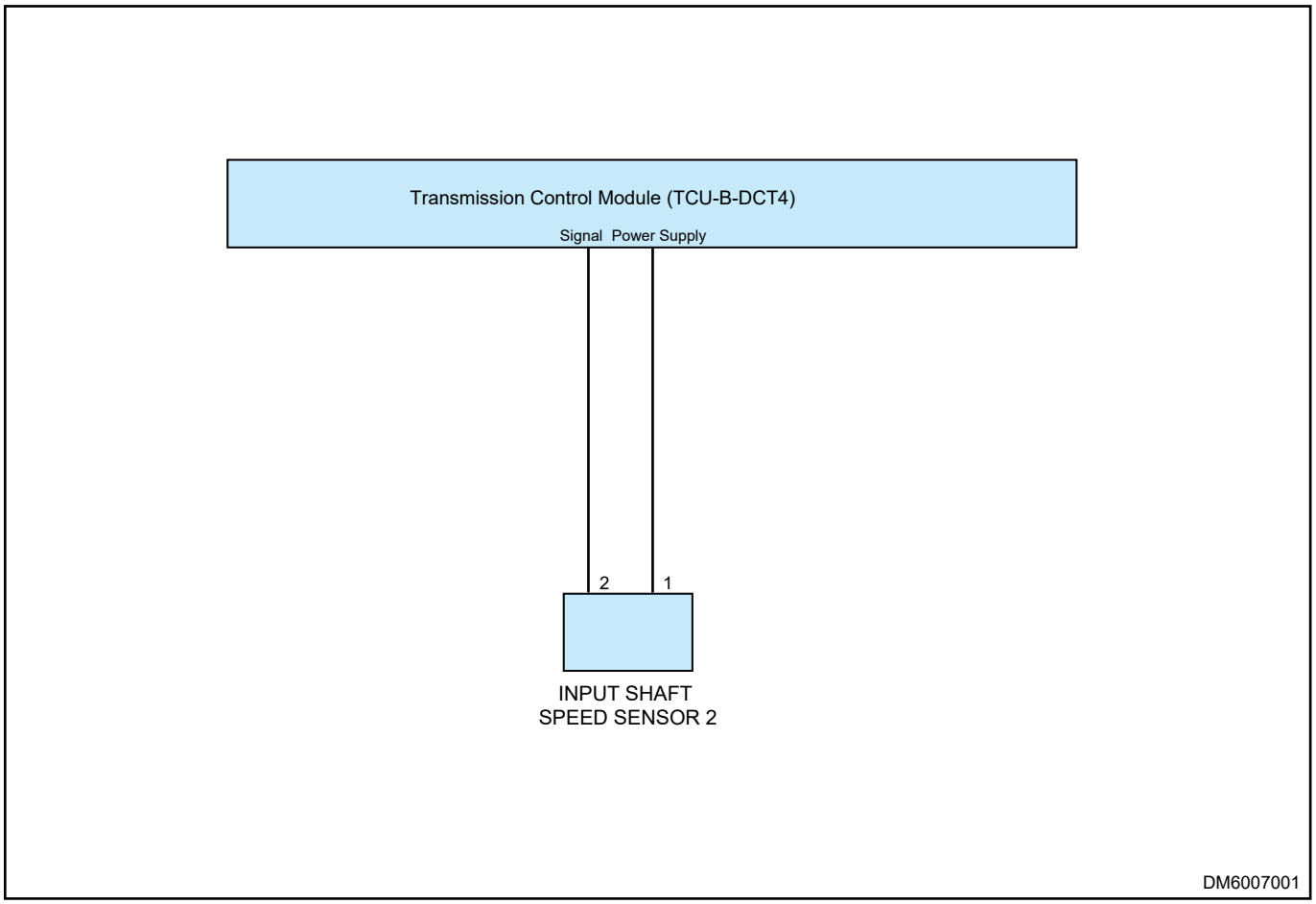
8	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	System operates normally
NG	Replace TCU control module assembly and perform self-learning

DTC	P180929h	Speed Detection of Input Shaft 2 Speed Sensor

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check connector

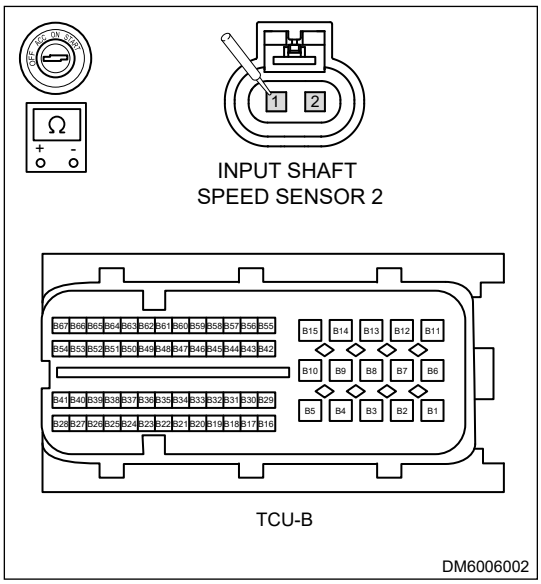
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the input shaft sensor 2 connector and TCU B connector.
(d) Check connector for poor connection or contact.

NG → **Reinstall or repair, replace connector**

OK

2	Check input shaft speed sensor 2 circuit

(a) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable.
(b) Disconnect the input shaft speed sensor 2 connector and TCU B connector.
(c) Using ohm band of multimeter, measure wire harness resistance between input shaft speed sensor 2 terminals (1, 2) and TCU B (connected terminals) to check wire harness for open.



NG → **Replace wire harness or connector (Input shaft speed sensor - TCU)**

OK

3	Check if ABS system has fault

(a) Using diagnostic tester to check if ABS system has fault.

NG → **Check and repair ABS system fault**

OK

4	Replace input shaft speed sensor 2

(a) Disconnect the negative battery cable.
(b) Replace input shaft speed sensor 2 to compare and verify, check if the same DTC appears.

NG → Replace input shaft speed sensor 2

OK

5	Reconfirm DTCs

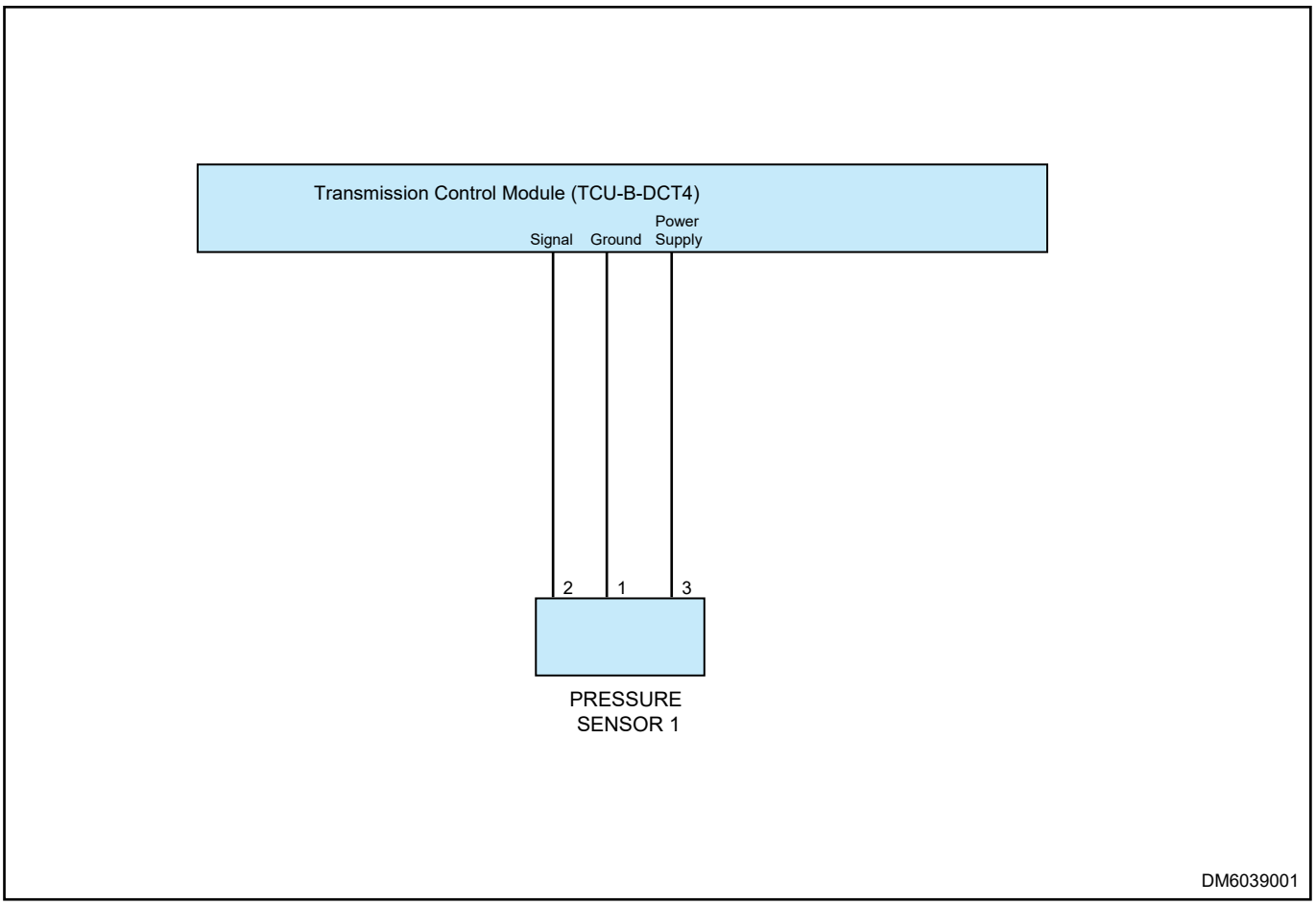
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace TCU control module assembly and perform self-learning

DTC	P181011h	Monitoring Voltage of Pressure Sensor 1: Signal Short to Ground
DTC	P181015h	Monitoring Voltage of Pressure Sensor 1: Signal Short to Power Supply or Open
DTC	P18101Ch	Monitoring Voltage of Pressure Sensor 1: Signal Higher than Range
DTC	P18101Dh	Monitoring Voltage of Pressure Sensor 1: Signal Lower than Range

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Turn ENGINE START STOP switch to ON.
(4) Using a diagnostic tester, record and clear DTCs.
(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.
(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check pressure sensor 1 connector**

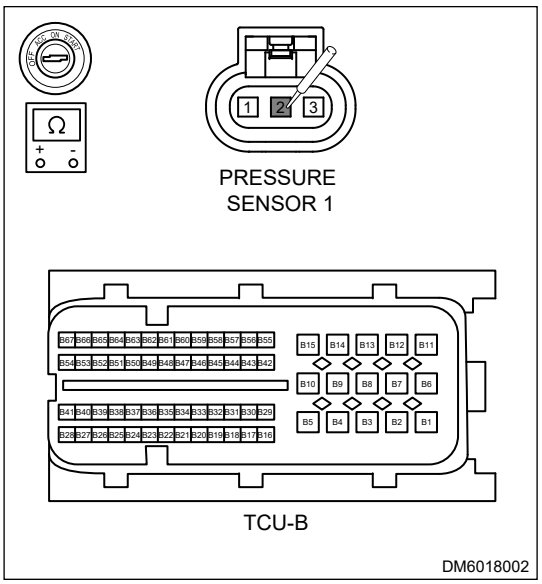
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the pressure sensor 1 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector or wire harness**

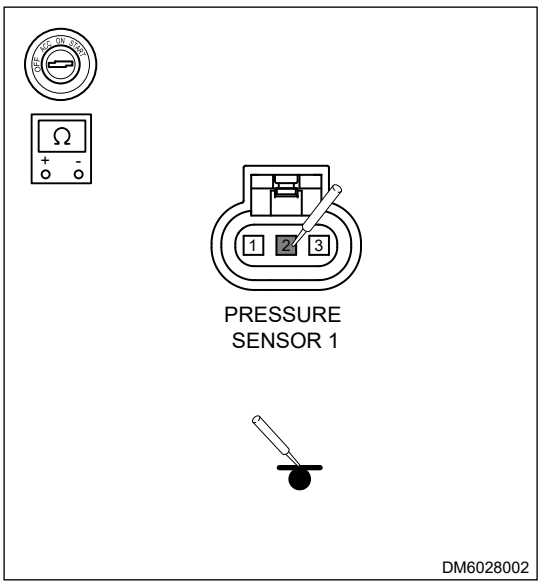
OK

2	Check pressure sensor 1 signal circuit

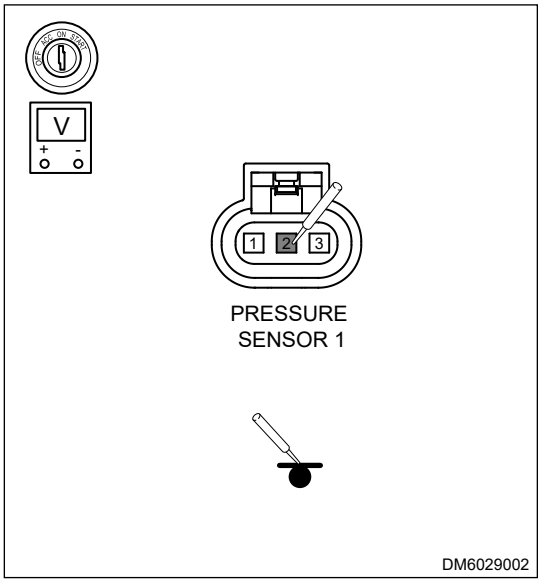
(a) Using ohm band of multimeter, check resistance between pressure sensor 1 connector terminal (2) and TCU B (connected terminals) to check circuit for open.



(b) Using ohm band of multimeter, check resistance between pressure sensor 1 connector terminal (2) and body ground (- standard resistance should be ∞) to check circuit for short to ground.



(c) Using voltage band of multimeter, check voltage between pressure sensor 1 connector terminal (2) and body ground (- standard voltage should be 0 V) to check circuit for short to power supply.



NG → **Replace wire harness or connector (Pressure sensor 1 - TCU)**

OK

3	Check pressure sensor 1

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check sensor connection part for debris, ice, oil and damage.
(d) Replace pressure sensor with a new one to compare and verify.

NG → **Replace pressure sensor 1**

OK

4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read system DTC.
(d) Check if DTC still exists.

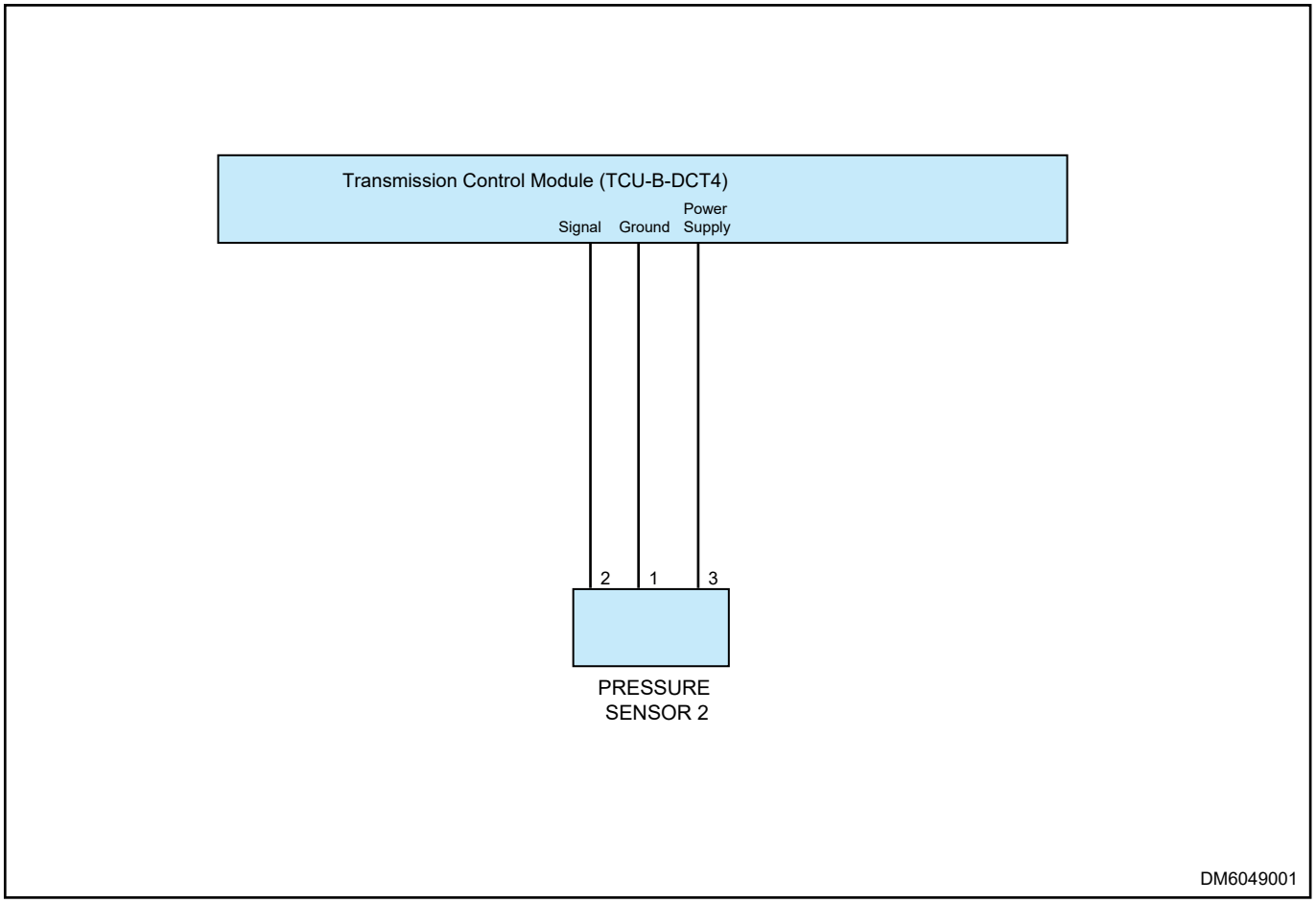
OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P181211h	Monitoring Voltage of Pressure Sensor 2: Signal Short to Ground
DTC	P181215h	Monitoring Voltage of Pressure Sensor 2: Signal Short to Power Supply or Open

DTC	**P18121Ch**	**Monitoring Voltage of Pressure Sensor 2: Signal Higher than Range**
DTC	**P18121Dh**	**Monitoring Voltage of Pressure Sensor 2: Signal Lower than Range**

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Turn ENGINE START STOP switch to ON.

(4) Using a diagnostic tester, record and clear DTCs.

(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.

(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check pressure sensor 2 connector**

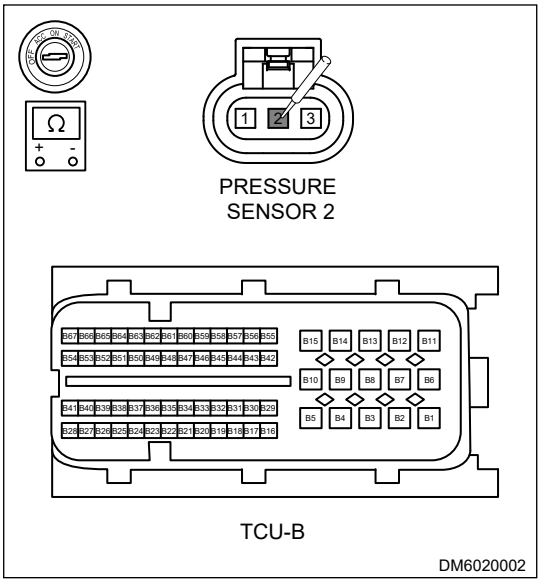
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the pressure sensor 2 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector**

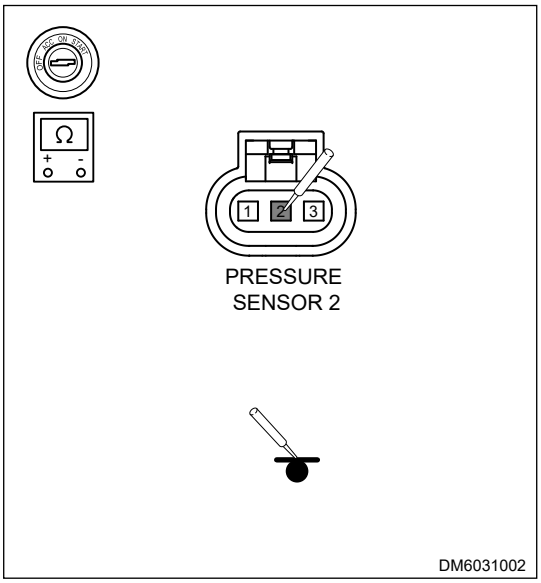
OK

2	**Check pressure sensor 2 signal circuit**

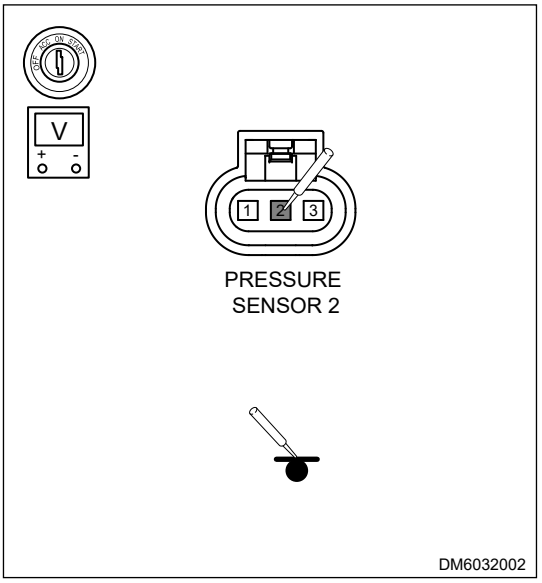
(a) Using ohm band of multimeter, check resistance between pressure sensor 2 connector signal terminal (2) and TCU B (-connected terminals) to check circuit for open.



(b) Using ohm band of multimeter, check resistance between pressure sensor 2 connector signal terminal (2) and body ground to check circuit for short to ground.



(c) Using voltage band of multimeter, check voltage between pressure sensor 2 connector signal terminal (2) and body ground (standard voltage should be 0 V) to check circuit for short to power supply.



NG → **Replace wire harness or connector (Pressure sensor 2 - TCU)**

OK

3	Check pressure sensor 2

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check sensor connection part for debris, ice, oil and damage.
(d) Replace pressure sensor with a new one to compare and verify.

NG → **Replace pressure sensor 2**

OK

4	Reconfirm DTCs

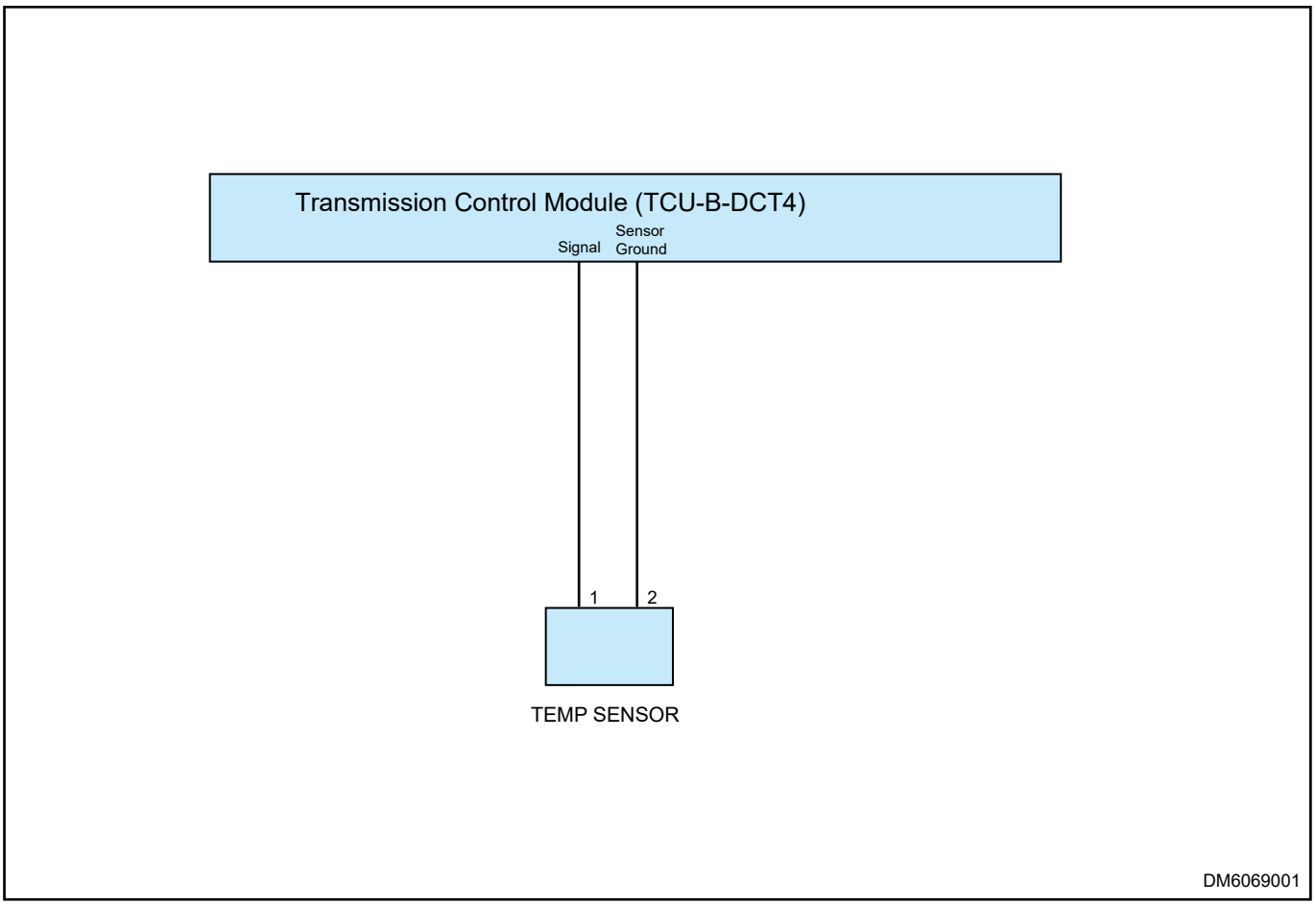
(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read system DTC.
(d) Check if DTC still exists.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	**P181415h**	**Monitoring Voltage of Oil Temperature Sensor: Signal Short to Power Supply or Open**
DTC	**P181411h**	**Monitoring Voltage of Oil Temperature Sensor: Signal Short to Ground**

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Turn ENGINE START STOP switch to ON.

(4) Using a diagnostic tester, record and clear DTCs.

(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.

(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check oil temperature sensor connector**

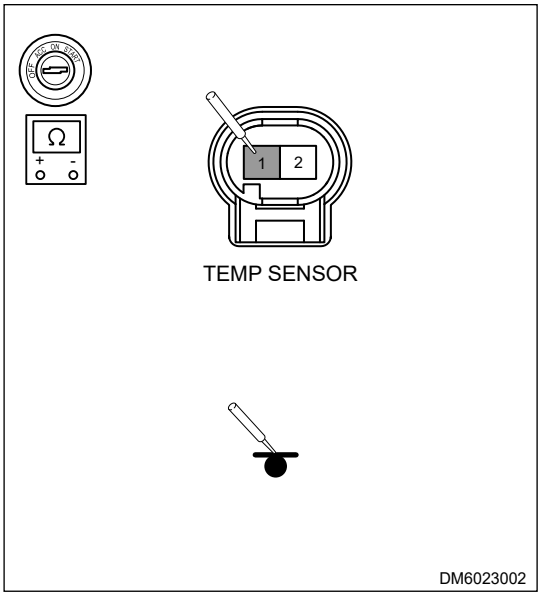
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the oil temperature sensor connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG	**Reinstall or repair, replace connector**

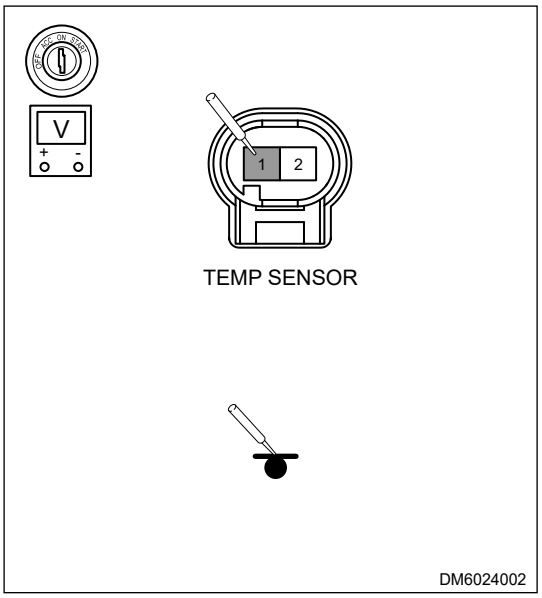
OK

2	Check oil temperature sensor signal circuit

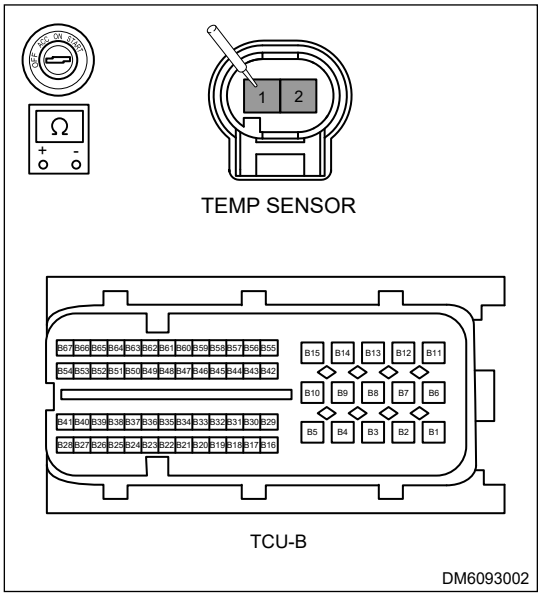
(a) Using ohm band of multimeter, check resistance between oil temperature sensor connector terminal (1) and body ground to check circuit for short to ground.



(b) Using voltage band of multimeter, check voltage between oil temperature sensor connector terminal (1) and body ground to check circuit for short to power supply.



(c) Using ohm band of multimeter, check resistance between oil temperature sensor connector terminals (1, 2) and TCU B (-connected terminals) to check circuit for open.



NG → **Replace wire harness or connector (Oil temperature sensor - TCU)**

OK

3	Check oil temperature sensor

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check oil temperature sensor connection part for debris, ice, oil or damage.

NG → **Replace oil temperature sensor**

OK

4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read system DTC.
(d) Check if DTC still exists.

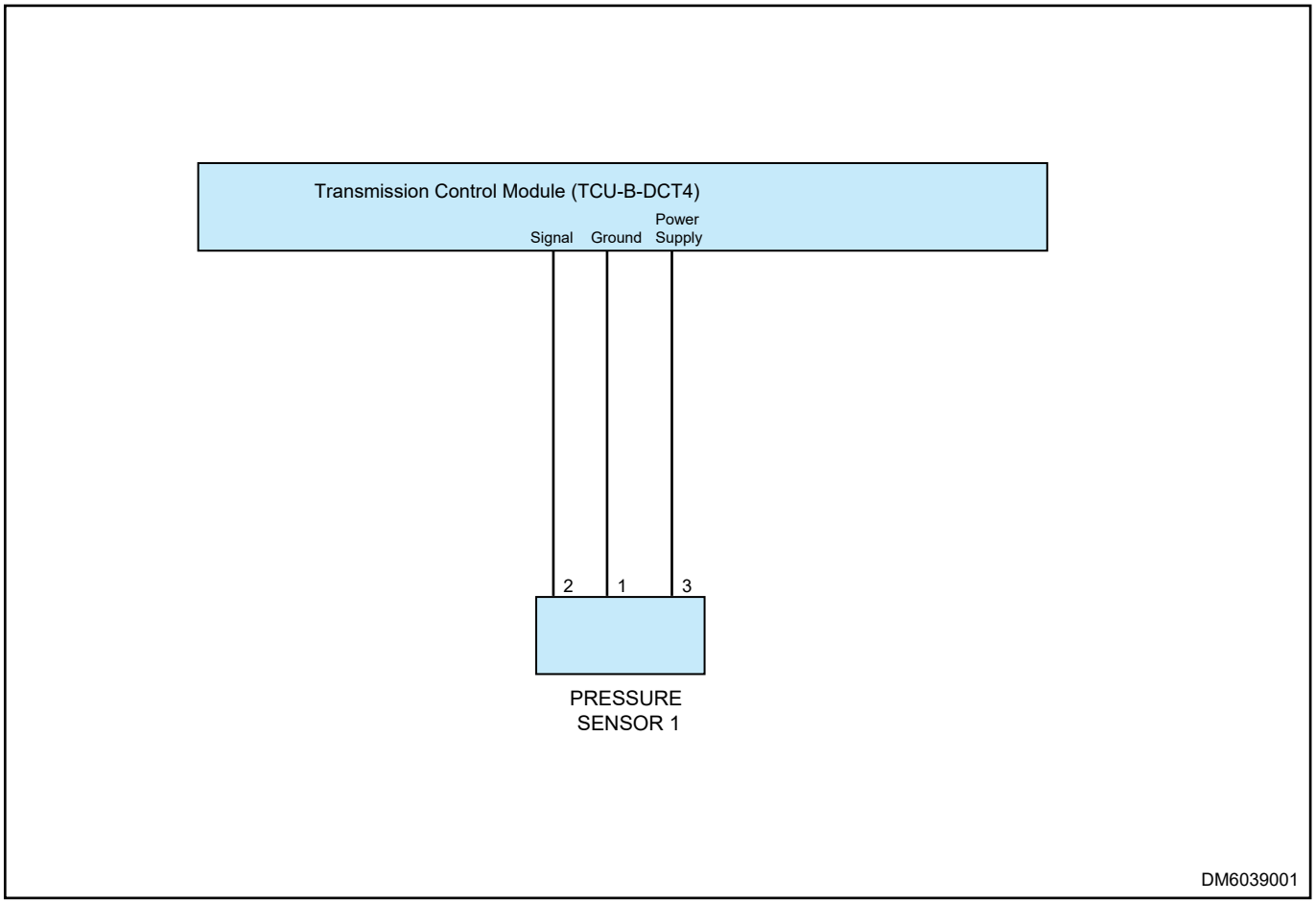
OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P181C2Ah	Pressure Sensor 1 Output Stuck at Specific Value
DTC	P181C92h	Comparison Target to Current Pressure Sensor 1, Pressure too High
DTC	P181D92h	Comparison Target to Current Pressure Sensor 1, Pressure too Low

DTC	**P181C28h**	**Pressure Sensor 1 Offset too High**
DTC	**P181C27h**	**Pressure Sensor 1 Pressure Gradient too High**

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Turn ENGINE START STOP switch to ON.

(4) Using a diagnostic tester, record and clear DTCs.

(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.

(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check pressure sensor 1 connector**

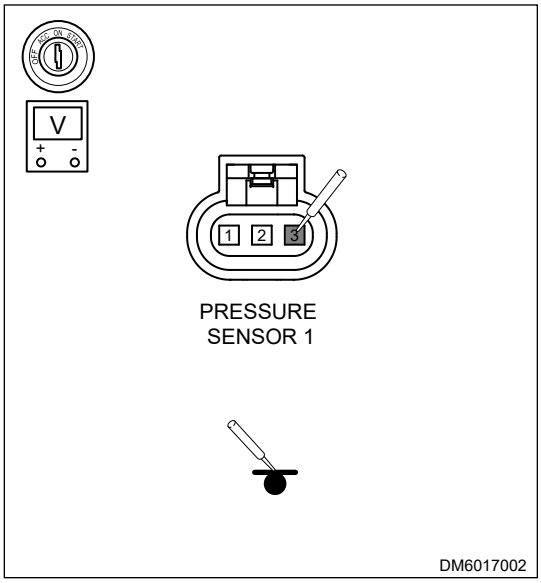
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the pressure sensor 1 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector**

OK

2	**Check pressure sensor 1 power supply voltage**

(a) Connect TCU B connector.
(b) Turn ENGINE START STOP switch to ON.
(c) Using voltage band of multimeter, check voltage between pressure sensor 1 connector terminal (3) and body ground, it should be 5 V.

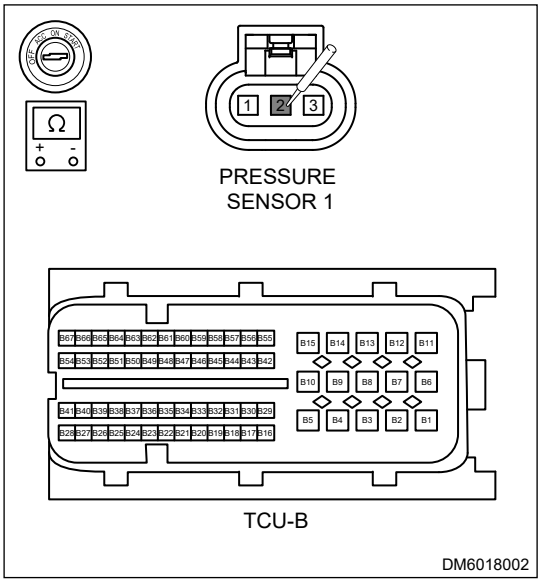


NG → **Replace or repair pressure sensor power supply wire harness**

OK

3	**Check pressure sensor 1 signal circuit**

(a) Using ohm band of multimeter, check resistance between pressure sensor 1 connector terminal (2) and TCU B (connected terminals) to check circuit for open.



NG → **Replace wire harness or connector (Pressure sensor 1 - TCU)**

OK ↓

4	Check pressure sensor 1

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check sensor connection part for debris, ice, oil and damage.

NG → **Replace pressure sensor 1**

OK ↓

5	Replace TCU

(a) Replace TCU to compare and verify. Check if the same DTC appears.

NG → **Replace TCU control module assembly and perform self-learning**

OK ↓

6	Check clutch

(a) Check clutch for abnormal wear conditions etc.

NG → **Replacement of Clutch**

OK ↓

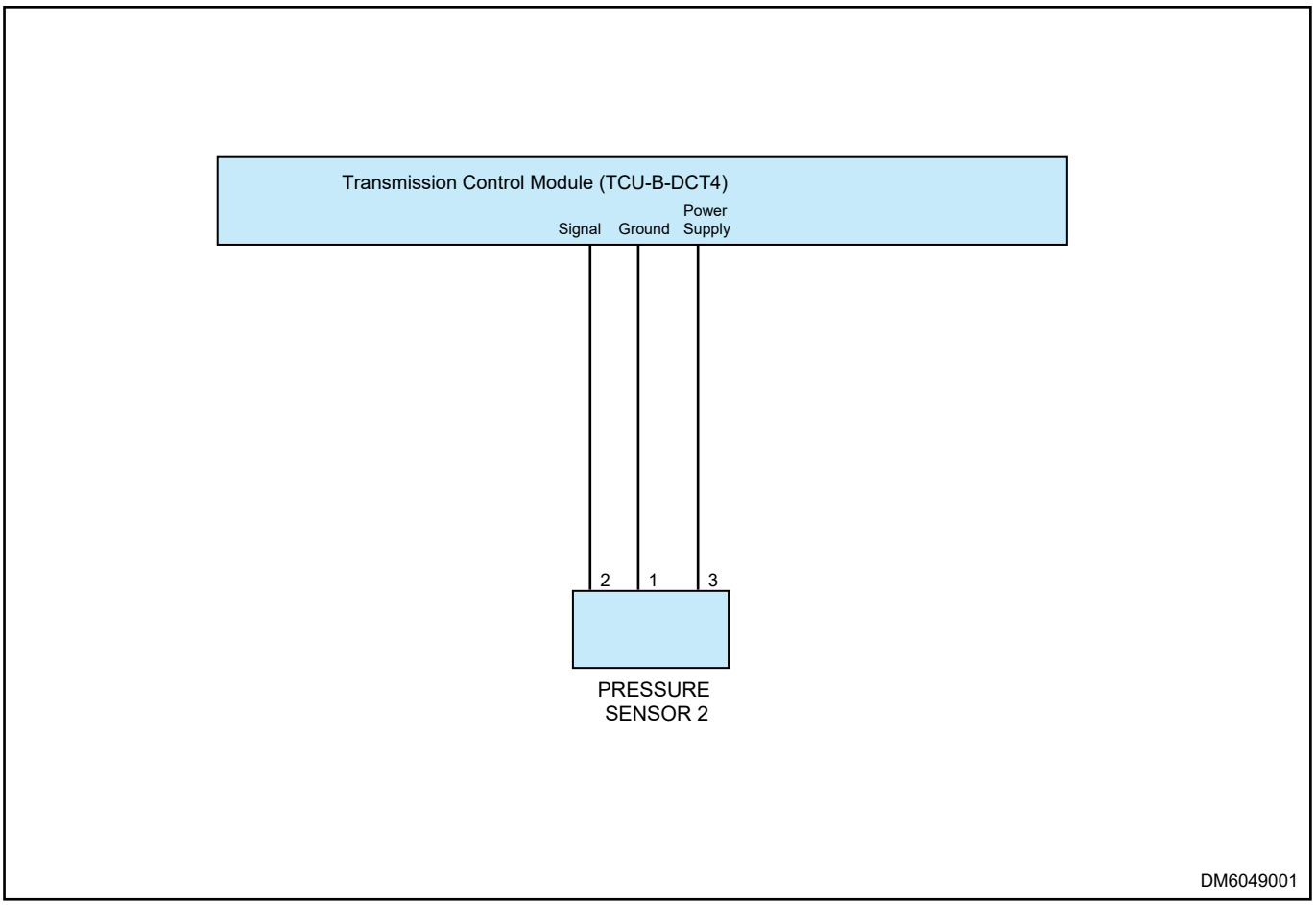
7	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read system DTC.
(d) Check if DTC still exists.

OK	System operates normally
NG	Replace transmission assembly

DTC	P181E92h	Comparison Target to Current Pressure Sensor 2, Pressure too High
DTC	P181E2Ah	Pressure Sensor 2 Output Stuck at Specific Value
DTC	P181F92h	Comparison Target to Current Pressure Sensor 2, Pressure too Low
DTC	P181E28h	Pressure Sensor 2 Offset too High
DTC	P181E27h	Pressure Sensor 2 Pressure Gradient too High

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Turn ENGINE START STOP switch to ON.

(4) Using a diagnostic tester, record and clear DTCs.

(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.

(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check pressure sensor 2 connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the pressure sensor 2 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector**

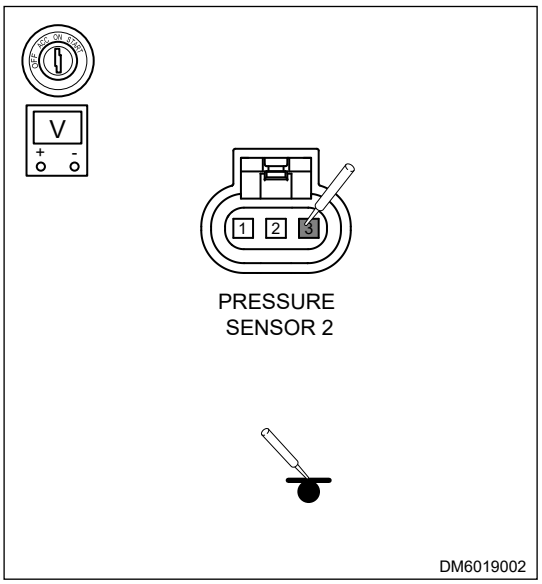
OK

2	Check pressure sensor 2 power supply voltage

(a) Connect TCU B connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, check voltage between pressure sensor 2 connector terminal (3) and body ground, it should be 5 V.

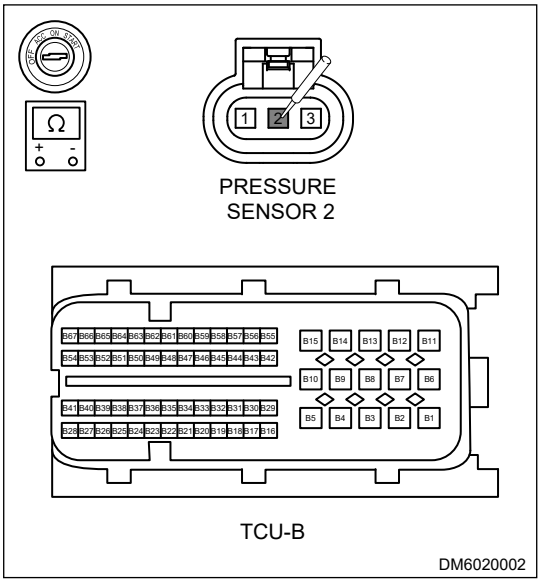


NG → **Replace or repair pressure sensor power supply circuit**

OK

3	Check pressure sensor 2 signal circuit

(a) Using ohm band of multimeter, check resistance between pressure sensor 2 connector terminal (2) and TCU B (connected terminals) to check circuit for open.



NG → **Replace wire harness or connector (Pressure sensor 2 - TCU)**

OK

4	**Check pressure sensor 2**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check sensor connection part for debris, ice, oil and damage.

NG → **Replace pressure sensor 2**

OK

5	**Replace TCU**

(a) Replace TCU to compare and verify. Check if the same DTC appears.

NG → **Replace TCU control module assembly and perform self-learning**

OK

6	**Check clutch**

(a) Check clutch for abnormal wear conditions etc.

NG → **Replacement of Clutch**

OK

7	**Reconfirm DTCs**

(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read system DTC.
(d) Check if DTC still exists.

OK	System operates normally
NG	Replace transmission assembly

DTC	P181B22h	Oil Temperature Value Jump Detection
DTC	P181B2Ah	Oil Temperature Value Stuck Detected
DTC	P181B64h	Oil Temperature Value Offset Detection

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Power-off and reset

(a) Stop the vehicle and engine. After ENGINE START STOP switch is turned off for 10 minutes, disconnect the battery power supply, then power on again, and depress the brake pedal for 15 seconds to read the DTC with a diagnostic tester to check if the fault still exists.

No fault	System is normal and there is no fault

DTC is output

2	Check transmission oil

(a) Check if the transmission oil is insufficient or dirty.

NG	Replace transmission oil

OK

3	Check oil temperature sensor

(a) Check oil temperature sensor connection part for debris, ice, oil or damage.
(b) Replace oil pressure sensor to compare and verify.

NG → **Replace oil temperature sensor**

OK

4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P183E92h	Shift Motor 1 Hall Detection
DTC	P182035h	Monitoring High Resolution Sensor Shift Actuator 1: Duty Ratio Signal Out of Range
DTC	P182038h	Monitoring High Resolution Sensor Shift Actuator 1: Frequency Signal Out of Range
DTC	P182015h	Monitoring High Resolution Sensor Shift Actuator 1: Short or Open in Power Supply Signal
DTC	P182011h	Monitoring High Resolution Sensor Shift Actuator 1: Signal Short to GND
DTC	P180213h	Monitoring Shift Motor 1 Phase: Open
DTC	P180292h	Monitoring Shift Motor 1: Performance or Incorrect Operation
DTC	P180212h	Monitoring Shift Motor 1 Phase: Short to Power Supply
DTC	P180211h	Monitoring Shift Motor 1 Phase: Short to GND
DTC	P180247h	Drive Control Shift Actuator Mechanism 1: Defects in Control Path

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery

(a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG → **Replace battery**

OK ↓

2	Check alternator

(a) Check generating capacity of alternator.

NG → **Replace alternator**

OK ↓

3	Check fuse

(a) Check if TCU fuse is blown.

NG → **Replace fuse and check the cause for no power**

OK ↓

4	Check TCU connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector**

OK ↓

5	Check shift motor 1 connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Remove the TCU.
(d) Disconnect the shift motor 1 connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector**

OK

6	Check shift motor 1

(a) Replace shift motor 1, shift gear several times, read diagnostic information again. Check if the same DTC appears.

No DTC → **Replace shift motor 1**

DTC occurs

7	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P184192h	Shift Motor 2 Hall Monitoring
DTC	P182135h	Monitoring High Resolution Sensor Shift Actuator 2: Duty Ratio Signal Out of Range
DTC	P182138h	Monitoring High Resolution Sensor Shift Actuator 2: Frequency Signal Out of Range
DTC	P182115h	Monitoring High Resolution Sensor Shift Actuator 2: Short or Open in Power Supply Signal
DTC	P182111h	Monitoring High Resolution Sensor Shift Actuator 2: Signal Short to GND
DTC	P180311h	Monitoring Shift Motor 2: Short to GND
DTC	P180312h	Monitoring Shift Motor 2: Short to Power Supply
DTC	P180313h	Monitoring Shift Motor 2: Open
DTC	P180392h	Monitoring Shift Motor 2: Performance or Incorrect Operation
DTC	P180347h	Drive Control Shift Actuator Mechanism 2: Defects in Control Path

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG → **Replace battery**

OK ↓

2	Check alternator

(a) Check generating capacity of alternator.

NG → **Replace alternator**

OK ↓

3	Check fuse

(a) Check if TCU fuse is blown.

NG → **Replace fuse and check the cause for no power**

OK ↓

4	Check TCU connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the TCU connector.

(d) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector**

OK ↓

5	Check shift motor 2 connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Remove the TCU.
(d) Disconnect the shift motor 2 connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector**

OK

6	Check shift motor 2

(a) Replace shift motor 2, shift gear several times, read diagnostic information again. Check if the same DTC appears.

No DTC → **Replace shift motor 2**

DTC occurs

7	Reconfirm DTCs

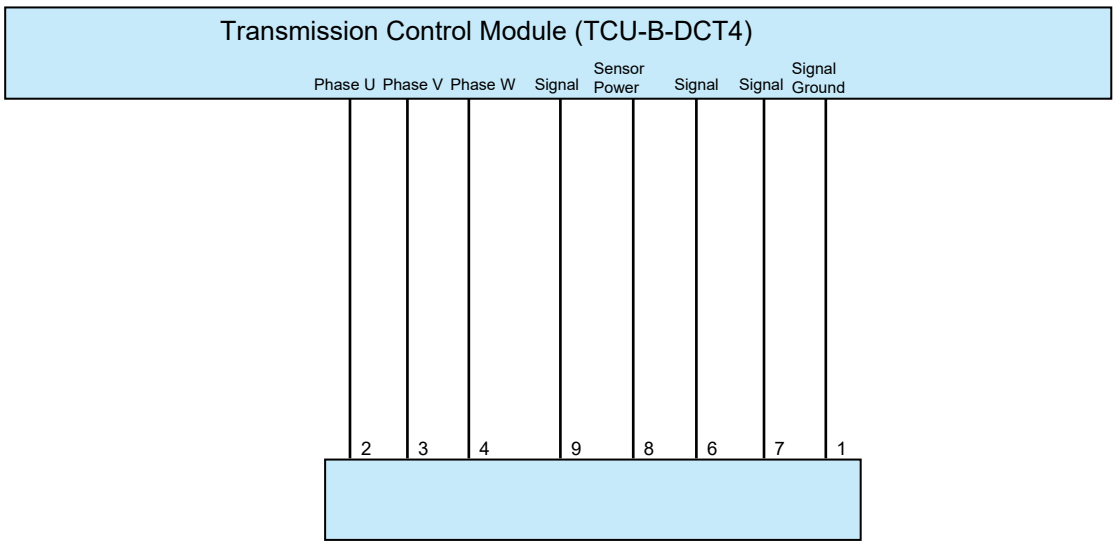
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P180011h	Monitoring Clutch Motor 1: Short to GND
DTC	P180012h	Monitoring Clutch Motor 1: Short to Power Supply
DTC	P180013h	Monitoring Clutch Motor 1: Open
DTC	P180092h	Monitoring Clutch Motor 1 Phase: Performance or Incorrect Operation
DTC	P180A92h	Clutch 1 Position Signal

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check clutch actuator motor 1 connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the clutch motor 1 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector**

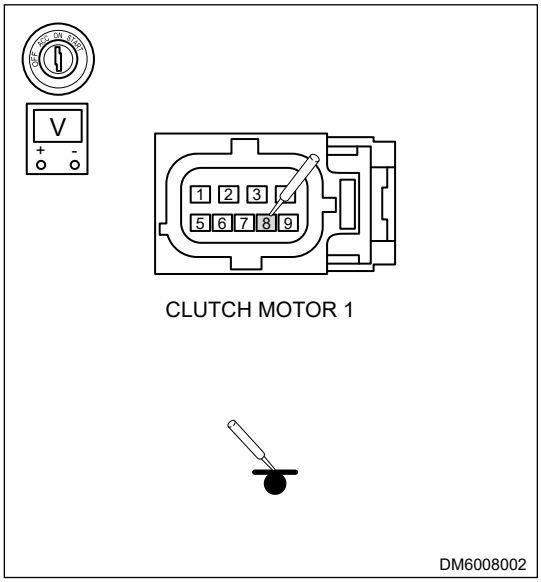
OK

2	Check clutch actuator motor 1 power supply voltage

(a) Connect TCU B connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, check voltage between clutch actuator motor 1 connector terminal (8) and body ground. Standard voltage is 5 V.

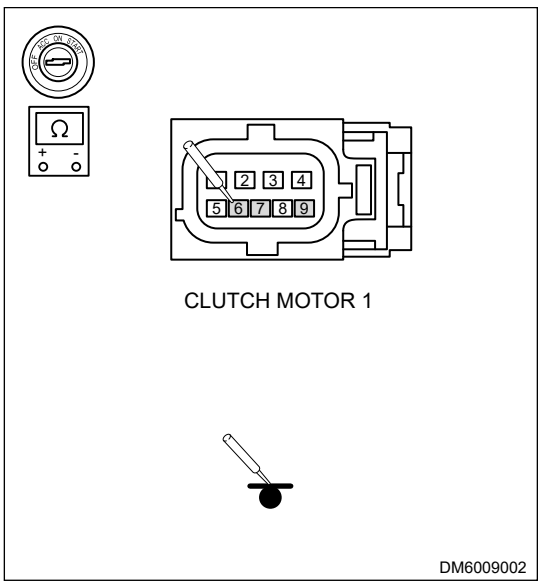


NG → **Repair or replace power supply wire harness between clutch actuator motor 1 and TCU**

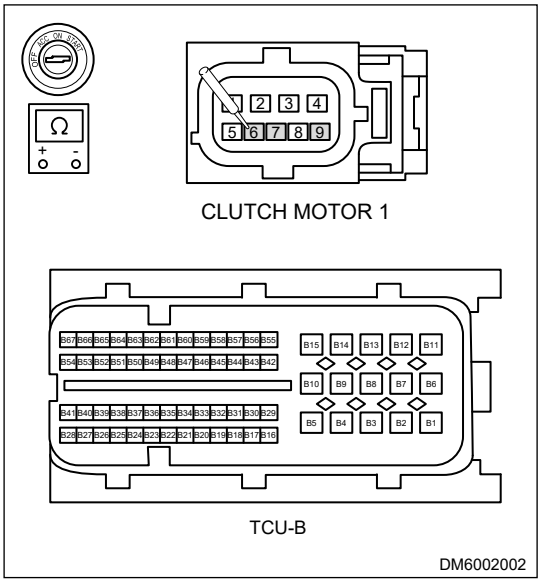
OK

3	Check clutch actuator motor 1 signal circuit

(a) Using ohm band of multimeter, check resistance between clutch actuator motor 1 connector terminals (6, 7, 9) and body ground to check circuit for short to ground.



(b) Using ohm band of multimeter, check resistance between clutch actuator motor 1 connector terminals (6, 7, 9) and TCU B (- connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (- Clutch actuator motor 1 - TCU)**

OK

4	Replace clutch actuator motor 1

(a) Replace clutch actuator motor 1 to compare and verify.

NG → **Replace clutch actuator motor 1**

OK

5	Reconfirm DTCs

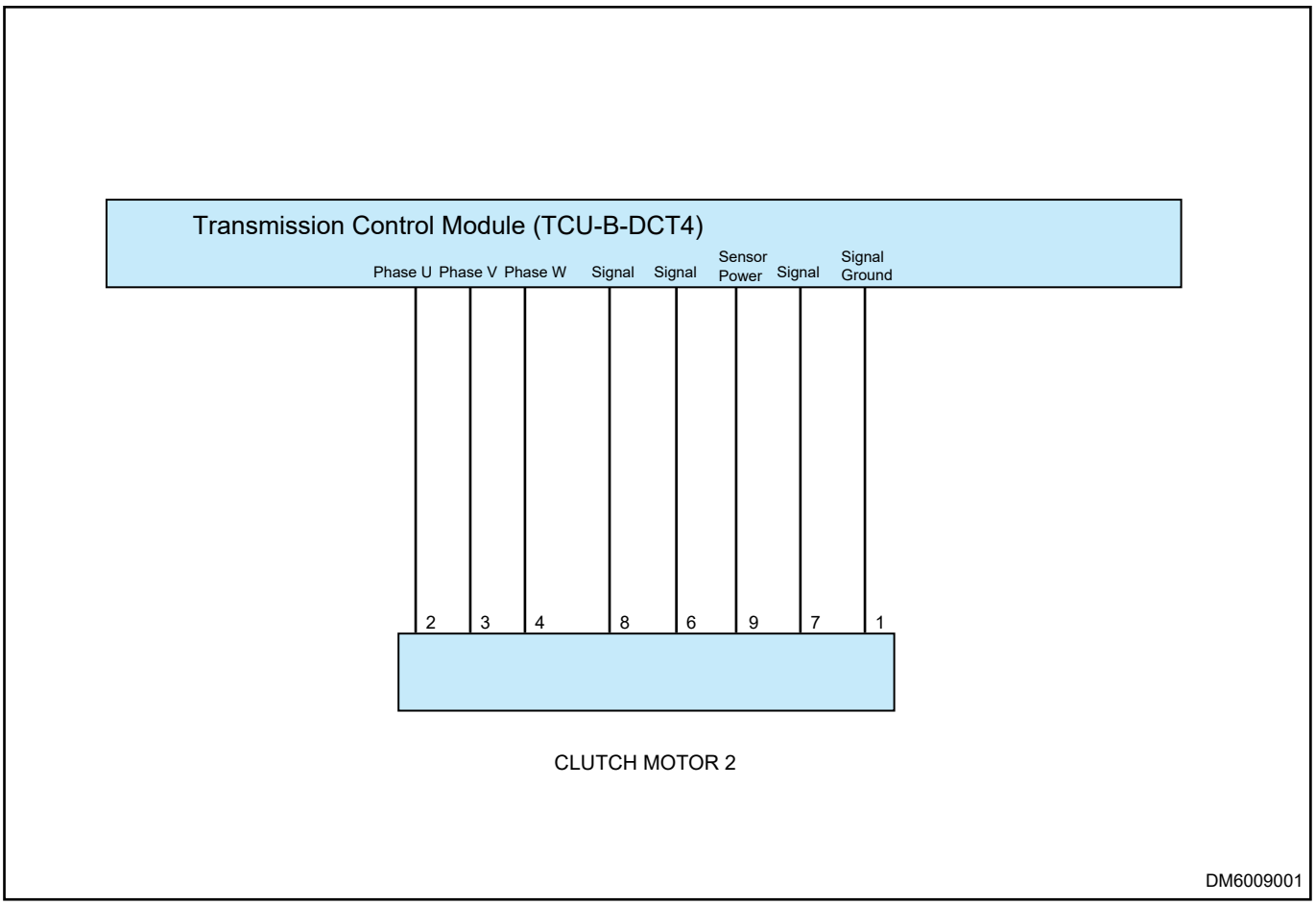
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	**P180111h**	**Monitoring Clutch Motor 2: Short to GND**
DTC	**P180112h**	**Monitoring Clutch Motor 2: Short to Power Supply**
DTC	**P180113h**	**Monitoring Clutch Motor 2: Open**
DTC	**P180192h**	**Monitoring Clutch Motor 2 Phase: Performance or Incorrect Operation**
DTC	**P180D92h**	**Clutch 2 Position Signal**

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check clutch actuator motor 2 connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the clutch motor 2 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector or wire harness**

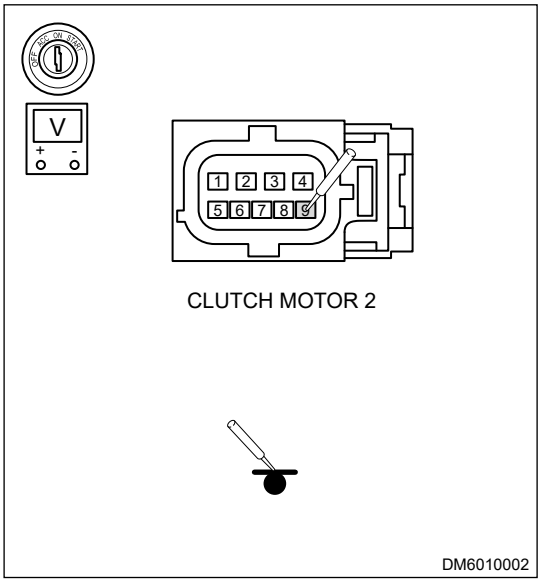
OK

2	Check clutch actuator motor 2 power supply voltage

(a) Connect TCU B connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using voltage band of multimeter, check voltage between clutch actuator motor 2 connector terminal (9) and body ground. Standard voltage is 5 V.

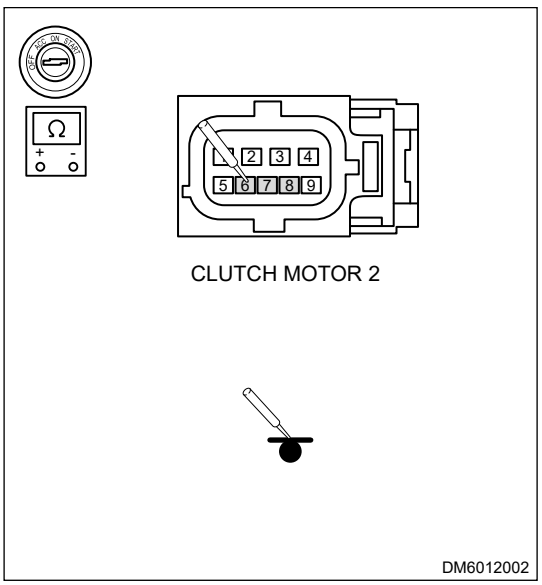


NG → **Repair or replace power supply wire harness between clutch actuator motor 2 and TCU**

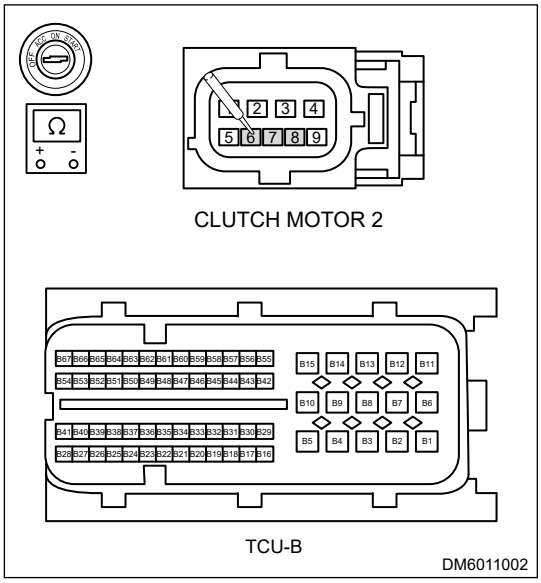
OK

3	Check clutch actuator motor 2 signal circuit

(a) Using ohm band of multimeter, check resistance between clutch actuator motor 2 connector terminals (6, 7, 8) and body ground to check circuit for short to ground.



(b) Using ohm band of multimeter, check resistance between clutch actuator motor 2 connector terminals (6, 7, 8) and TCU B (- connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (- Clutch actuator motor 2 - TCU)**

OK

4	Check clutch actuator motor 2

(a) Replace clutch actuator motor 2, drive a certain distance and shift gear several times, read diagnostic information again. Check if the same DTC appears.

No DTC → **Replace clutch actuator motor 2**

DTC occurs

5	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

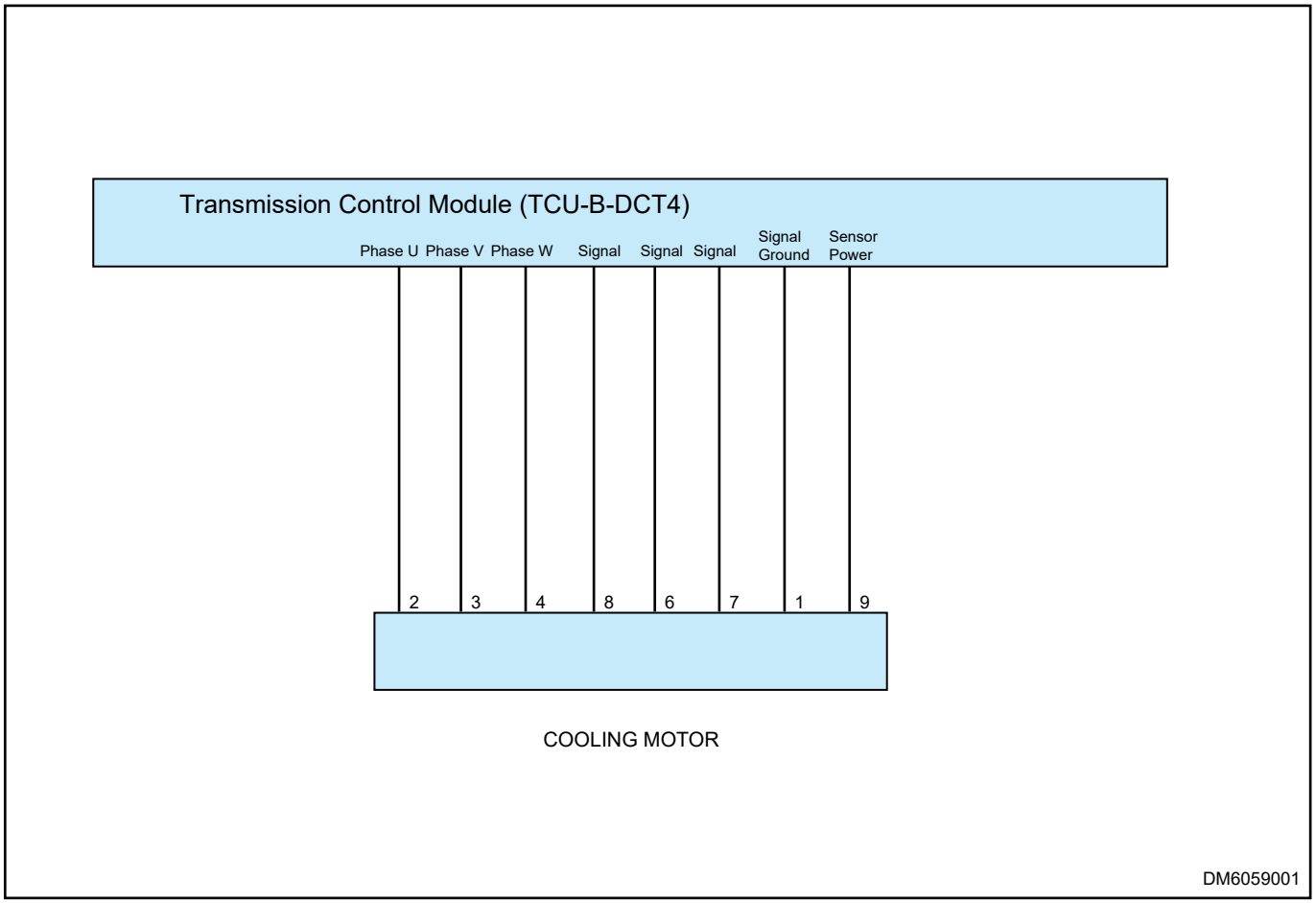
OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P180411h	Monitoring Cooling Motor: Short to GND
DTC	P180412h	Monitoring Cooling Motor: Short to Power Supply
DTC	P180413h	Monitoring Cooling Motor: Open
DTC	P180447h	Drive Control Clutch Cooling Brake: Defects in Control Path

DTC	P180492h	Monitoring Cooling Motor: Performance or Incorrect Operation
DTC	P181192h	Clutch Cooling Motor Hall Detection

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Turn ENGINE START STOP switch to ON.

(4) Using a diagnostic tester, record and clear DTCs.

(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.

(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check cooling motor connector

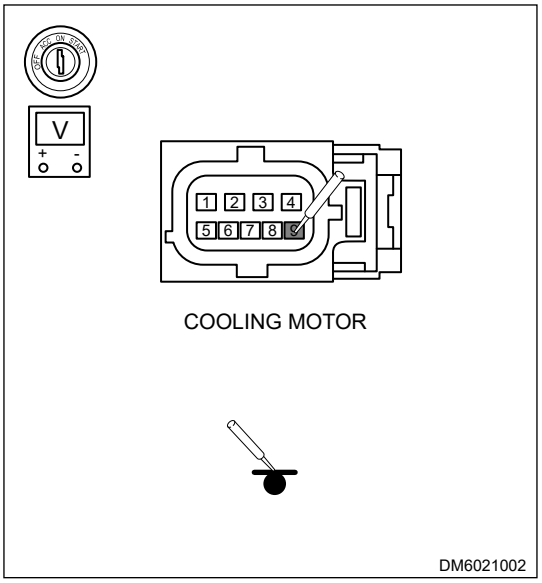
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the cooling motor connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace wire harness or connector**

OK

2	**Check cooling motor power supply voltage**

(a) Connect TCU B connector.
(b) Turn ENGINE START STOP switch to ON.
(c) Using voltage band of multimeter, check voltage between cooling motor connector terminal (9) and body ground. It is 5 V.

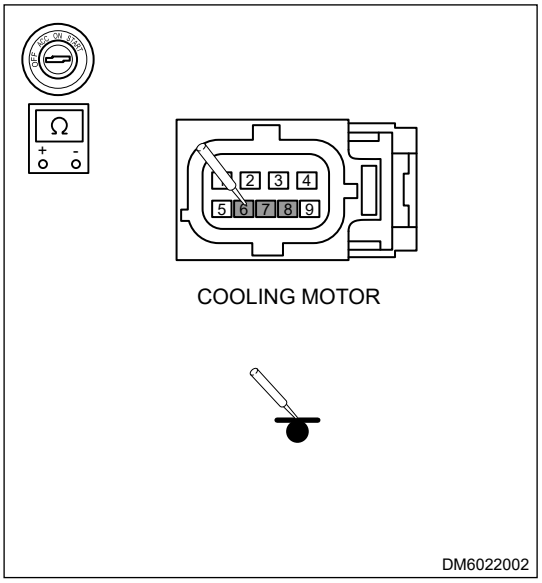


NG → **Repair or replace power supply wire harness between cooling motor and TCU**

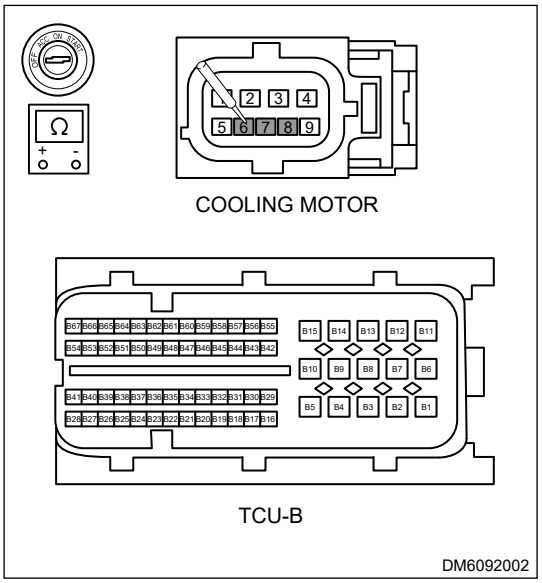
OK

3	**Check cooling motor signal circuit**

(a) Using ohm band of multimeter, check resistance between cooling motor connector terminals (6, 7, 8) and body ground to check circuit for short to ground.



(b) Using ohm band of multimeter, check resistance between cooling motor connector terminals (6, 7, 8) and TCU B (-connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (-Cooling motor - TCU)**

OK

4	**Replacement of Cooling Motor**

(a) Replace cooling motor to compare and verify.

NG → **Replacement of Cooling Motor**

OK

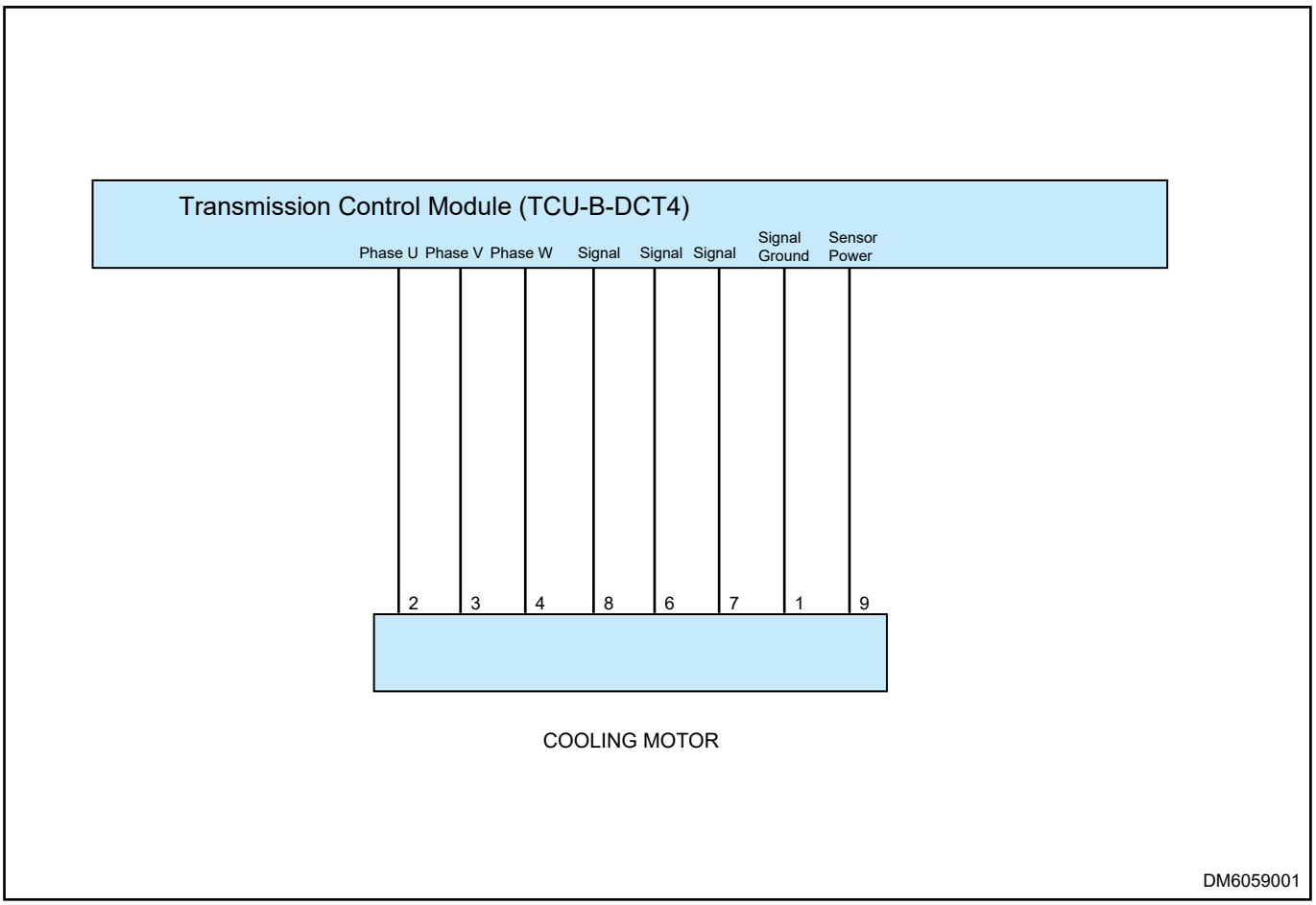
5	**Reconfirm DTCs**

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	System operates normally
NG	Replace TCU control module assembly and perform self-learning

DTC	P1804F1h	Clutch Cooling Pump Motor Speed Inspection (Speed too Low)
DTC	P1804F2h	Clutch Cooling Pump Motor Speed Inspection (Unexpected Zero or Negative Response Value)

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Turn ENGINE START STOP switch to ON.
(4) Using a diagnostic tester, record and clear DTCs.
(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.
(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check cooling motor connector

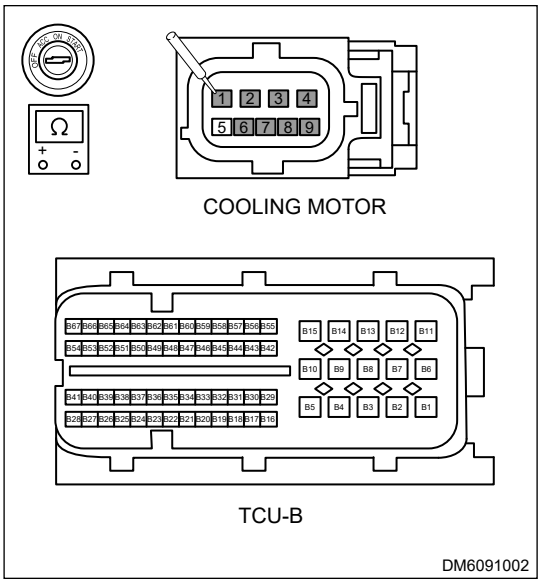
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the cooling motor connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace wire harness or connector**

OK

2	Check cooling motor circuit

(a) Using ohm band of multimeter, check resistance between cooling motor connector terminals (1, 2, 3, 4, 6, 7, 8, 9) and TCU B (connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (- Cooling motor - TCU)**

OK

3	Replacement of Cooling Motor

(a) Replace cooling motor to compare and verify. Check if the same DTC appears.

NG → **Replacement of Cooling Motor**

OK

4	Replace cooling actuator

(a) Replace cooling actuator to compare and verify. Check if the same DTC appears.

NG → Replace cooling actuator

OK

5	Reconfirm DTCs

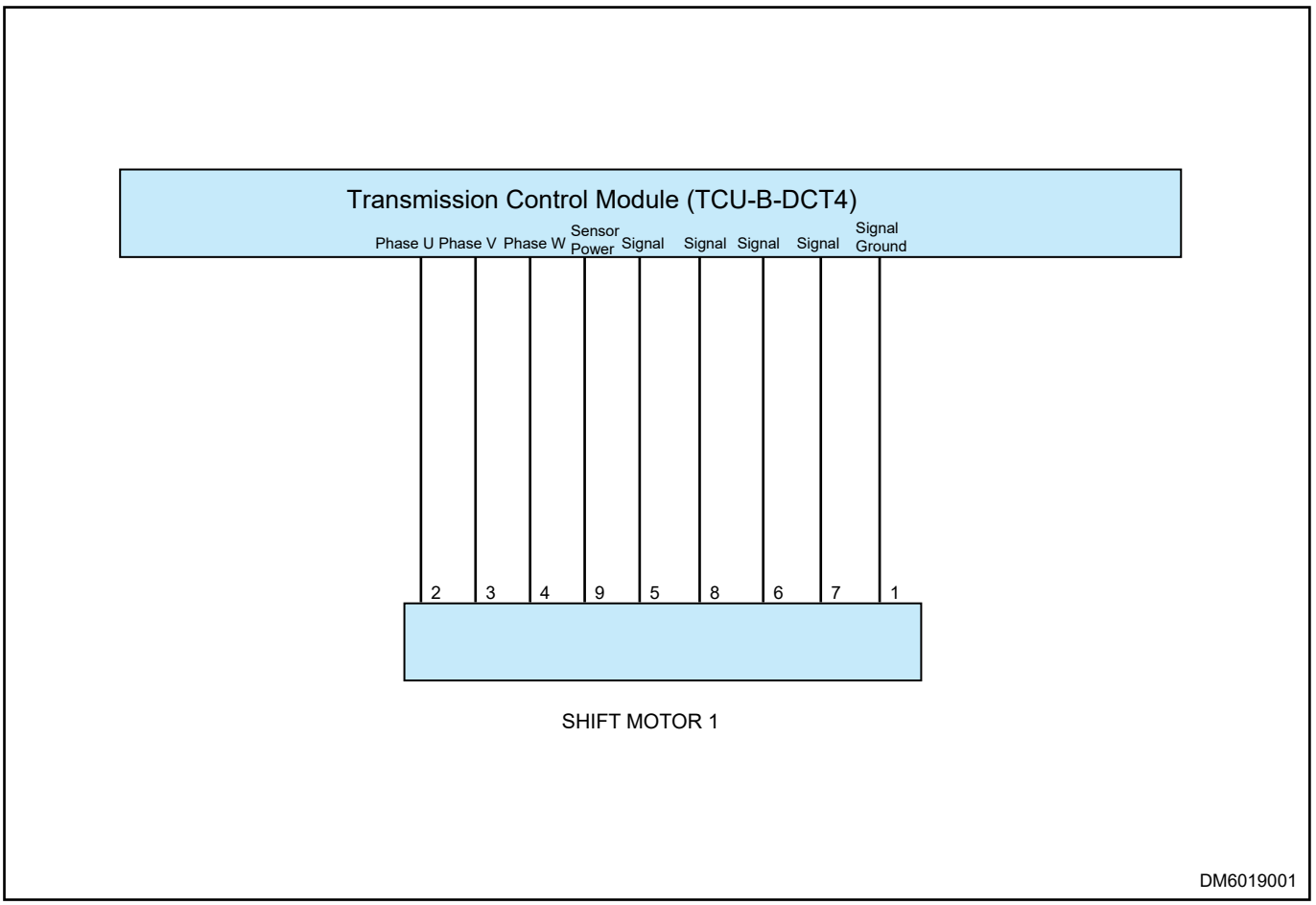
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace TCU control module assembly and perform self-learning

DTC	P180229h	Shift Actuator 1 Motor Speed Inspection

Circuit Diagram



⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check shift motor 1 connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Remove the TCU.
(e) Disconnect the shift motor 1 connector.
(f) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector or wire harness**

OK ↓

2	Check shift motor 1

(a) Replace shift motor 1 to compare and verify. Use diagnostic tester to check if the same DTC appears.

No DTC → **Replace shift motor 1**

DTC occurs ↓

3	Replace TCU

(a) Replace TCU to compare and verify. Use diagnostic tester to check if the same DTC appears.

No DTC → **Replace TCU**

DTC occurs

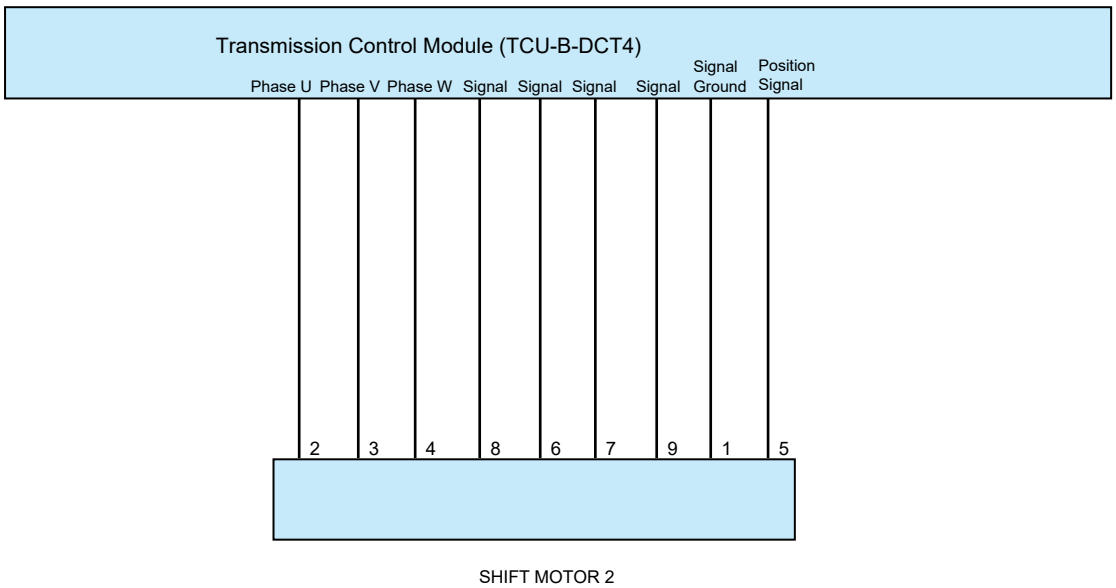
4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	System operates normally
NG	Replace transmission assembly

DTC	P180329h	Shift Actuator 2 Motor Speed Inspection

Circuit Diagram



DM6029001

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check shift motor 2 connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Remove the TCU.
(e) Disconnect the shift motor 2 connector.
(f) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector or wire harness**

OK ↓

2	Check shift motor 2

(a) Replace shift motor 2, drive a certain distance and shift gear several times, read diagnostic information again. Check if the same DTC appears.

No → **Replace shift motor 2**

Yes ↓

3	Replace TCU

(a) Replace TCU to compare verify. Use diagnostic tester to check if the same DTC appears.

No → **Replace TCU**

Yes ↓

4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	System operates normally
NG	Replace transmission assembly

DTC	P18004Bh	Clutch Actuator Mechanism 1 Power Level Temperature Monitoring (Overheated)
DTC	P18014Bh	Clutch Actuator Mechanism 2 Power Level Temperature Monitoring (Overheated)
DTC	P18044Bh	Cooling Actuator Mechanism 2 Power Level Temperature Monitoring (Overheated)
DTC	P18024Bh	Shift Mechanism 1 Temperature Monitoring (Overheated)
DTC	P18034Bh	Shift Mechanism 2 Temperature Monitoring (Overheated)
DTC	P183B4Bh	TCU Temperature Monitoring (Overheated)

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery

(a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG	Replace battery

OK

2	Check alternator

(a) Check generating capacity of alternator.

NG	Replace alternator

OK

3	Check fuse

(a) Check if TCU fuse is blown.

NG → **Replace fuse and check the cause for no power**

OK

4	Check related connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Remove the TCU.
(e) Disconnect the shift motor connector.
(f) Disconnect the clutch motor connector.
(g) Disconnect the cooling motor connector.
(h) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector or wire harness**

OK

5	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P183816h	Voltage Monitoring: High Power Supply Undervoltage First Threshold
DTC	P183817h	Voltage Monitoring: High Power Supply Overvoltage First Threshold
DTC	P183916h	Voltage Monitoring: High Power Supply Undervoltage Second Threshold
DTC	P183917h	Voltage Monitoring: High Power Supply Overvoltage Second Threshold
DTC	P183A16h	Voltage Monitoring: Low Power Supply Undervoltage
DTC	P183A17h	Voltage Monitoring: Low Power Supply Overvoltage

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check battery**

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG → **Replace battery**

OK

2	**Check fuse**

(a) Check if TCU fuse in engine compartment fuse and relay box is normal.

NG → **Replace fuse**

OK

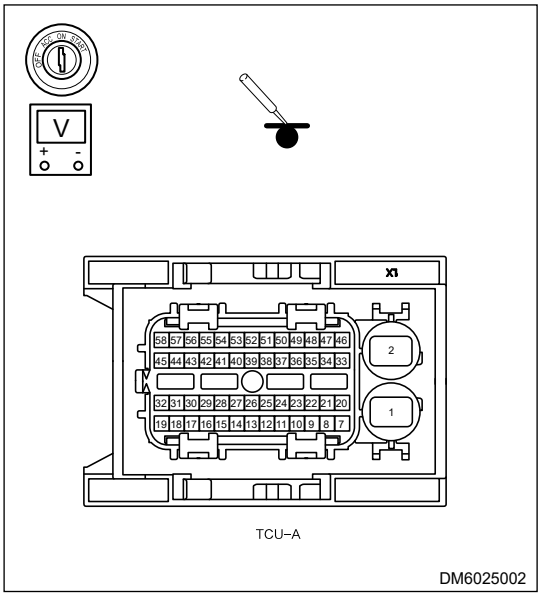
3	**Check TCU power supply circuit**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the TCU connector.

(c) Turn ENGINE START STOP switch to ON.

(d) Using a multimeter, measure voltage between TCU A connector (power supply terminal) and body ground. (Standard voltage should be battery voltage)



NG → **Check and repair TCU power supply circuit**

OK

4	Reconfirm DTCs

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTC.

(c) Start the engine.

(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	**P182B62h**	**Clutch 1 Torque Too Low (GETRAG)**
DTC	**P182C62h**	**Clutch 2 Torque Too Low (GETRAG)**

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check clutch system

(a) Check the clutch system.

NG → **Replace clutch assembly**

OK →

2	Reconfirm DTCs

(a) Turn ENGINE START STOP switch to ON.

(b) Use diagnostic tester to clear DTC.

(c) Start the engine.

(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P182394h	Gear Jump Detection Odd Transmission Path
DTC	P182494h	Gear Jump Detection Even Transmission Path
DTC	P182707h	Transmission Odd Gear Position Synchronization Fault
DTC	P182807h	Transmission Even Gear Position Synchronization Failed

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**
- **The diagnostic methods for odd gear faults and even gear faults in the transmission are the same. The following uses odd gear faults as an example for diagnosis.**

1	Check odd input shaft speed sensor connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the odd input shaft sensor connector and TCU connector.
(d) Check connector for poor connection or contact.

NG → **Reinstall or repair, replace connector**

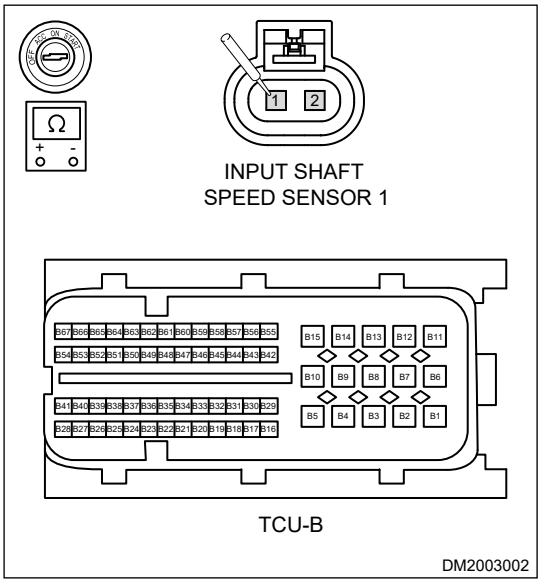
OK

2	Check odd input shaft speed sensor circuit

(a) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable.

(b) Disconnect the TCU B connector.

(c) Using ohm band of multimeter, measure wire harness resistance between input shaft speed sensor 1 terminals (1, 2) and TCU B (connected terminals) to check wire harness for open.



NG → **Replace or repair wire harness or connector (-Input shaft sensor - TCU)**

OK

3	Check odd input shaft speed sensor

(a) Disconnect the negative battery cable.
(b) Replace input shaft speed sensor to compare and verify, check if the same DTC appears.

NG → **Replace odd input shaft speed sensor**

OK

4	Check TCU

(a) Replace TCU to compare and verify. Use diagnostic tester to check if the same DTC appears.

No → **Replace TCU**

Yes

5	Check ABS unit for DTCs

(a) Check ABS unit for DTCs.

NG → Repair according to DTC

OK

6	Reconfirm DTCs

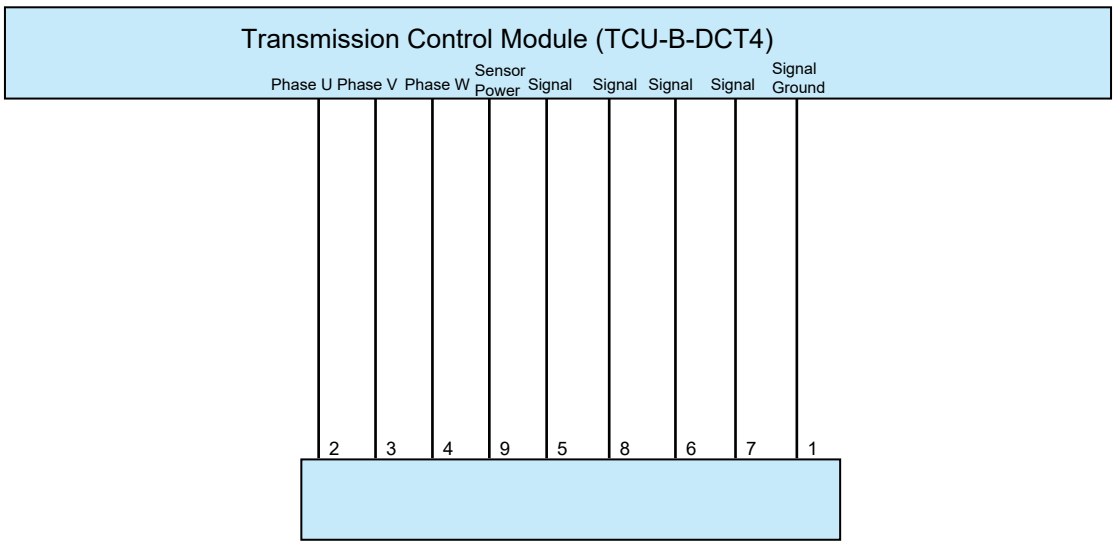
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace transmission assembly

DTC	P182372h	Transmission Odd Gear Combination Fault Monitoring
DTC	P182373h	Transmission Odd Shaft Impossible to Shift
DTC	P182577h	Shift Drum 1 Rotation Monitoring (Unexpected Stationary of Shift Drum 1)
DTC	P182929h	Continuous Monitoring of Shift Hub 1 Mechanical Stop Loss

Circuit Diagram



DM6019001

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Perform shift drum self-learning**

(a) Use diagnostic tester to perform shift drum self-learning. After learning, use diagnostic tester to check if the same DTC appears.

No fault → **System is normal and there is no fault**

DTC is output

2	Check shift motor 1 connector

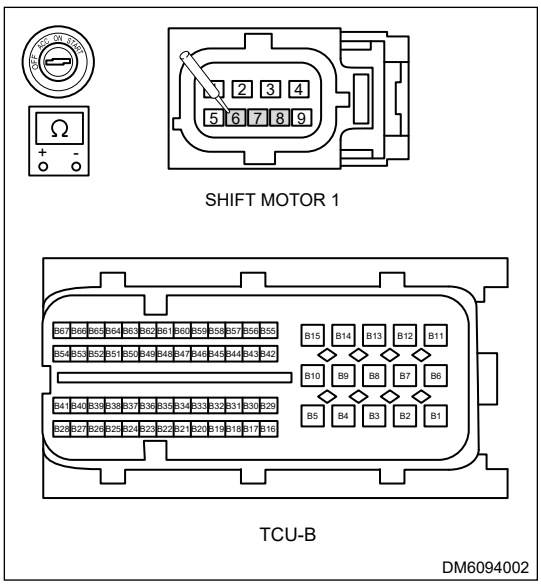
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the shift motor 1 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector**

OK

3	Check shift motor 1 circuit

(a) Using ohm band of multimeter, check resistance between shift motor 1 connector terminals (6, 7, 8) and TCU B (connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (-Shift motor 1 - TCU)**

OK

4	Check shift motor 1

(a) Replace shift motor 1, drive a certain distance and shift gear several times, read diagnostic information again. Check if the same DTC appears.

No → **Replace shift motor 1**

Yes

5	Check TCU

(a) Replace TCU to compare verify. Use diagnostic tester to check if the same DTC appears.

No → Replace TCU

Yes

6	Reconfirm DTCs

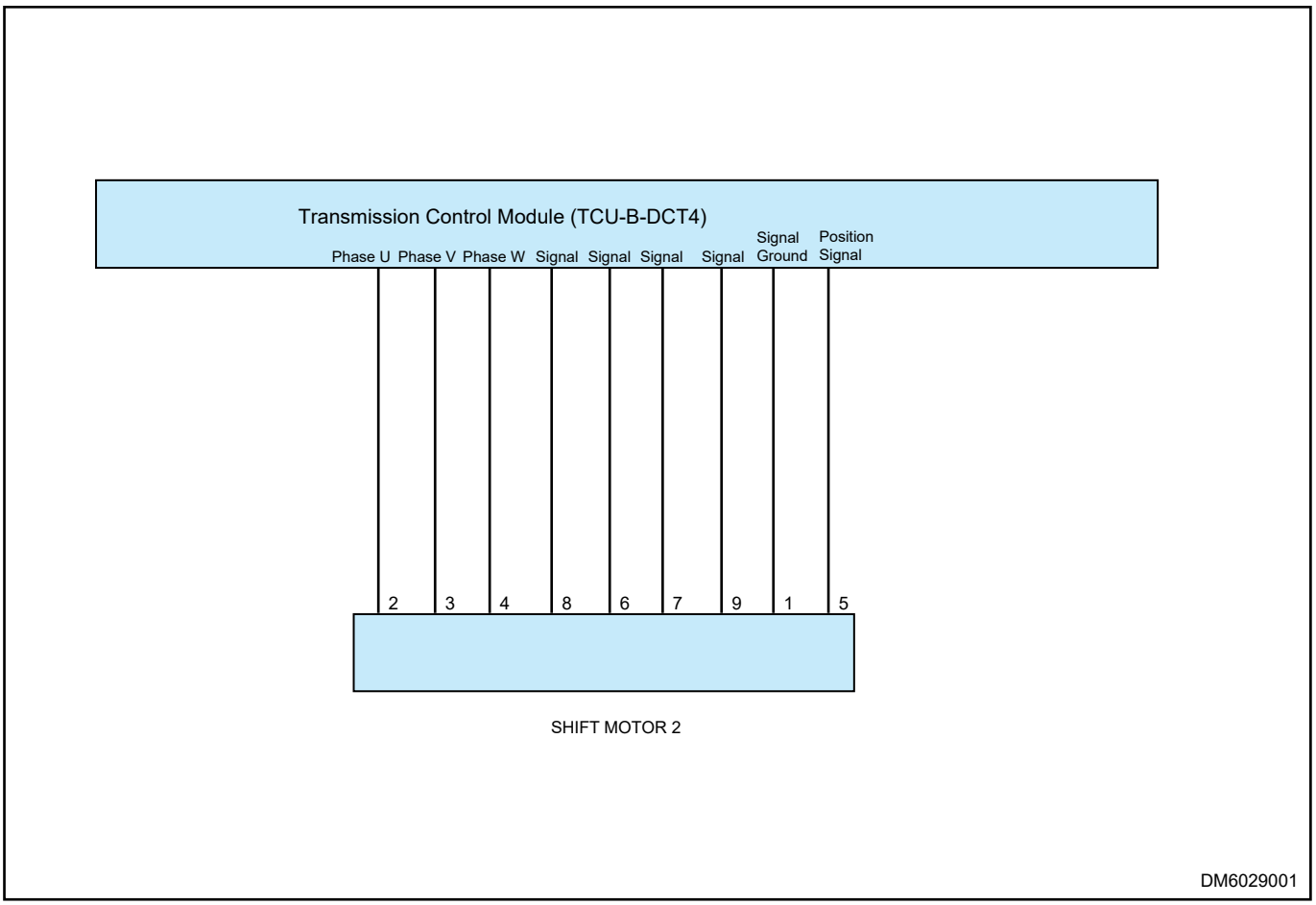
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace transmission assembly

DTC	P182472h	Transmission Even Gear Combination Fault Monitoring
DTC	P182473h	Transmission Even Shaft Impossible to Shift
DTC	P182677h	Shift Drum 2 Rotation Monitoring (Unexpected Stationary of Shift Drum 2)
DTC	P182A29h	Continuous Monitoring of Shift Hub 2 Mechanical Stop Loss

Circuit Diagram



⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Perform shift drum self-learning**

(a) Use diagnostic tester to perform shift drum self-learning. After learning, use diagnostic tester to check if the same DTC appears.

No fault → **System is normal and there is no fault**

DTC is output

2	Check shift motor 2 connector

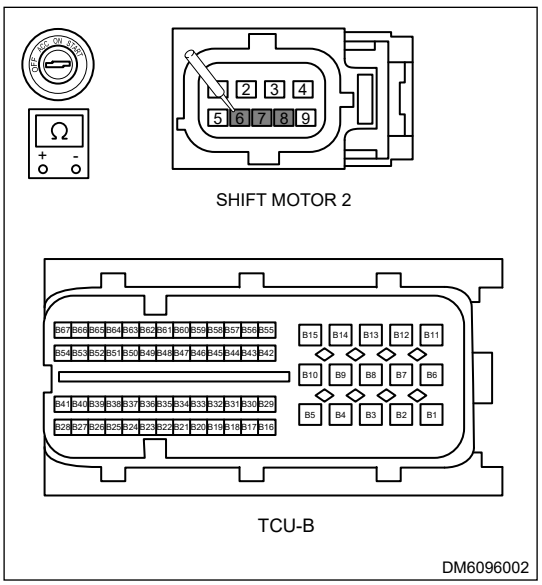
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the shift motor 2 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector**

OK

3	Check shift motor 2 signal circuit

(a) Using ohm band of multimeter, check resistance between shift motor 2 connector terminals (6, 7, 8) and TCU B (connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (- Shift motor 2 - TCU)**

OK

4	Check shift motor 2

(a) Replace shift motor 2, drive a certain distance and shift gear several times, read diagnostic information again. Check if the same DTC appears.

No → **Replace shift motor 2**

Yes

5	Check TCU

(a) Replace TCU to compare an verify. Use diagnostic tester to check if the same DTC appears.

No → Replace TCU

Yes

6	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace transmission assembly

DTC	P183592h	Shift Drum 1 Self-learning Failed
DTC	P183692h	Shift Drum 2 Self-learning Failed

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check shift drum self-learning

(a) Use a diagnostic tester to check the self-learning condition of shift drum and perform shift drum self-learning again.
(b) After shift drum self-learning, use a diagnostic tester to check if DTC exists.

No → System is normal and there is no fault

Yes

2	Check shift motor wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Remove the TCU.
(e) Disconnect the shift motor connector.
(f) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → Repair or replace wire harness or connector as needed

OK

3	Check shift motor

(a) Replace shift motor to compare and verify. Use diagnostic tester to check if the same DTC appears.

No → Replacement of Shift Motor

Yes

4	Check TCU

(a) Replace TCU to compare and verify. Use diagnostic tester to check if the same DTC appears.

No → Replace TCU

Yes

5	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace transmission assembly

DTC	P182D98h	Clutch 1 Temperature Monitoring
DTC	P182E98h	Clutch 2 Temperature Monitoring
DTC	P182F98h	Oil Pan Oil Temperature Monitoring

DTC	P183098h	Clutch1, Clutch2 and Oil Temperature Monitoring First Level Alarm
DTC	P183198h	Clutch1, Clutch2 and Oil Temperature Monitoring Second Level Alarm

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check vehicle cooling system**

(a) Check if the coolant is insufficient, if the coolant is leaking, and if the vehicle cooling system is functioning properly.

NG → **Repair or replace faulty area as needed**

OK

2	**Check transmission oil**

(a) Check if the transmission oil is insufficient, dirty and other abnormal condition.

NG → **Refill or replace transmission oil as needed**

OK

3	**Check TCU**

(a) Replace TCU to compare an verify. Use diagnostic tester to check if the same DTC appears.

No → **Replace TCU**

Yes

4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	System operates normally
NG	Replace transmission assembly

DTC	P183277h	Monitoring Park Lock Position

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check shift motor wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Remove the TCU.
(e) Disconnect the shift motor connector.
(f) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG	Repair or replace wire harness or connector as needed

OK

2	Check shift motor

(a) Replace shift motor to compare and verify. Use diagnostic tester to check if the same DTC appears.

No → **Replacement of Shift Motor**

Yes

3	Check TCU

(a) Replace TCU to compare and verify. Use diagnostic tester to check if the same DTC appears.

No → **Replace TCU**

Yes

4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace transmission assembly**

DTC	P183796h	Welding Fracture Monitoring

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	System operates normally and there is no fault
NG	Replace clutch assembly

DTC	P18A047h	Level 2 Safety Goal SZ1: Unexpected Engine Torque Increase
DTC	P18A147h	Level 2 Safety Goal SZ2: Unexpected Start in Wrong Direction
DTC	P18A247h	Level 2 Safety Goal SZ3: Unexpected Shift to R During Driving
DTC	P18A347h	Level 2 Safety Goal SZ4: Unexpected Start
DTC	P18A447h	Level 2 Safety Goal SZ6a: Unexpected Downshift (Within Allowed Input Shaft Speed Range)
DTC	P18A547h	Level 2 Safety Goal SZ6b: Unexpected Downshift (Out of Allowed Input Shaft Speed Range)
DTC	P18A647h	Level 2 Safety Goal SZ7: Clutch Stuck
DTC	P18A747h	Level 2 Safety Goal SZ8: Clutch Overspeed
DTC	P18A847h	Level 2 Safety Goal SZ13: Unexpected Shift from P Gear
DTC	P18A947h	Level 2 Safety Goal SZ14: Not in P Position
DTC	P18AA47h	Level 2 Safety Goal SZ16: Unexpected Shift to P Gear
DTC	P18AB47h	Level 2 Safety Goal SZ19a: Wrong Display of P Position
DTC	P18AC47h	Level 2 Safety Goal SZ19b: Wrong Display of D/R Position
DTC	P18AD47h	Level 2 Safety Goal SZ19c: Wrong Display of N/P Position
DTC	P18B147h	Level 2 Safety Goal Calibration Pointer Protection
DTC	P18B047h	Level 2 Safety Goal Memory Protection
DTC	P18C047h	Level 3 Safety Function Activated

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check TCU wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace wire harness as needed**

OK

2	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P183D42h	Internal Control Module EEPROM Error

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery

(a) Turn ENGINE START STOP switch to OFF.
(b) Using a multimeter, measure voltage between positive and negative battery terminals.

NG → **Replace battery**

OK

2	Check fuse

(a) Check if TCU fuse in engine compartment fuse and relay box is normal.

NG → Replace fuse

OK

3	Check TCU wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the TCU connector.
(d) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → Repair or replace wire harness as needed

OK

4	Reconfirm DTCs

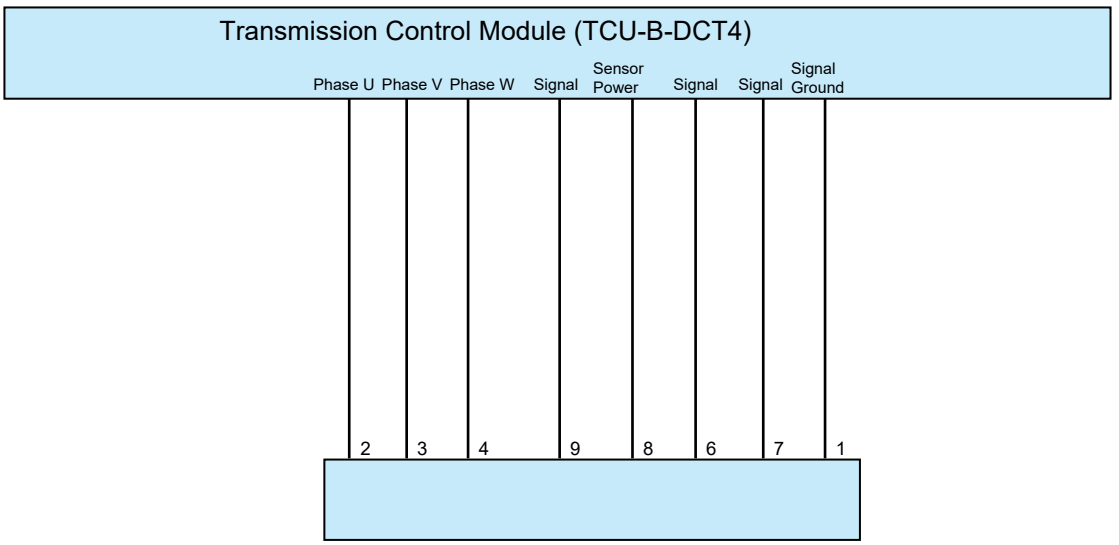
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace TCU control module assembly and perform self-learning

DTC	P180A11h	Clutch 1 Hall Sensor: Short to Ground in Signal Line 1
DTC	P180A15h	Clutch 1 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 1
DTC	P180B11h	Clutch 1 Hall Sensor: Short to Ground in Signal Line 2
DTC	P180B15h	Clutch 1 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 2
DTC	P180C11h	Clutch 1 Hall Sensor: Short to Ground in Signal Line 3
DTC	P180C15h	Clutch 1 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 3

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check battery**

(a) Check if battery voltage is normal.

NG → **Check and repair battery**

OK

2	Check TCU fuse

(a) Check if TCU fuse in engine compartment fuse and relay box is normal.

NG → Replace fuse

OK

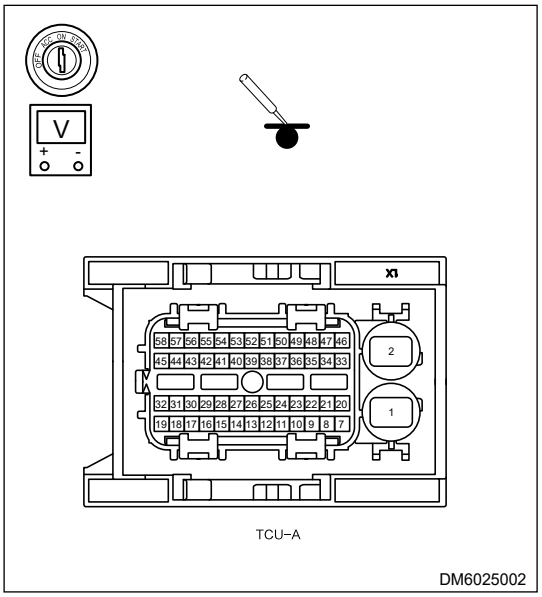
3	Check TCU power supply circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the TCU connector.

(c) Turn ENGINE START STOP switch to ON.

(d) Using a multimeter, measure voltage between TCU connector (- power supply terminal) and body ground. (Standard voltage should be battery voltage)



NG → Check and repair TCU power supply circuit

OK

4	Check clutch actuator motor 1 connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the clutch motor 1 connector.

(d) Disconnect the TCU B connector.

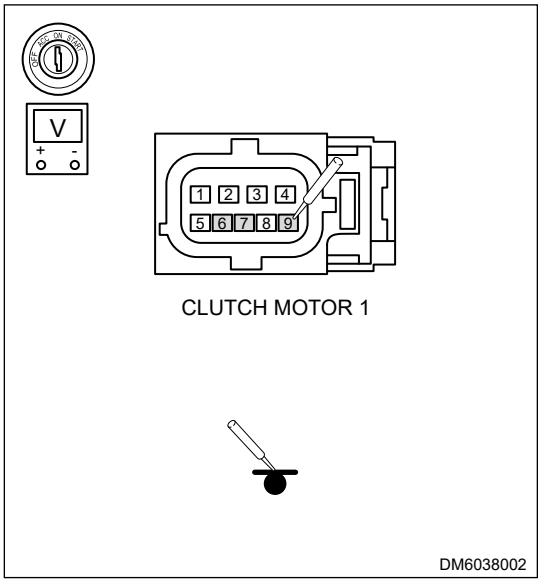
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → Repair or replace connector

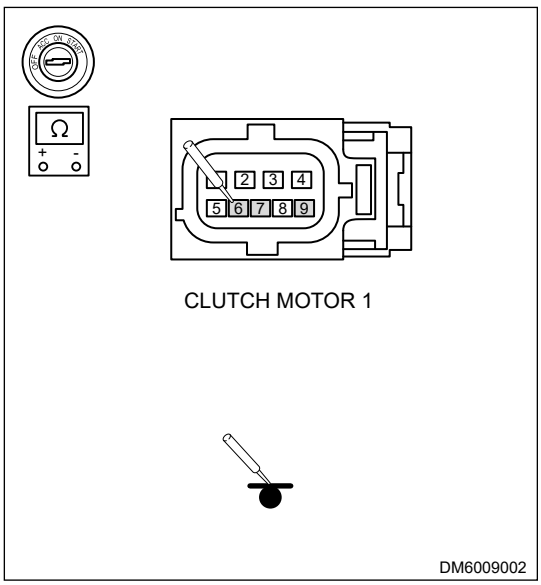
OK

5	Check clutch actuator motor 1 signal circuit

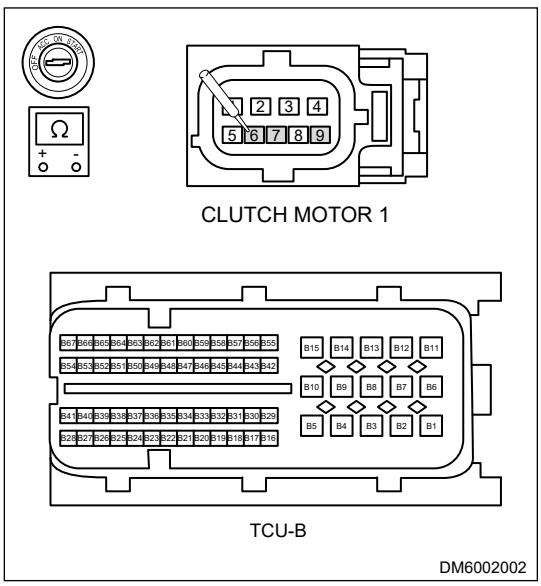
(a) Using voltage band of multimeter, check voltage between clutch actuator motor 1 connector signal terminals (6, 7, 9) and body ground to check circuit for short to power supply.



(b) Using ohm band of multimeter, check resistance between clutch actuator motor 1 connector signal terminals (6, 7, 9) and body ground to check circuit for short to ground.



(c) Using ohm band of multimeter, check resistance between clutch actuator motor 1 connector signal terminals (6, 7, 9) and TCU B (connected terminals) to check circuit for open.



NG → Repair or replace wire harness or connector (-Clutch actuator motor 1 - TCU)

OK

6	Replace clutch actuator motor 1

(a) Replace clutch actuator motor 1 to compare and verify.

NG → Replace clutch actuator motor 1

OK

7	Reconfirm DTCs

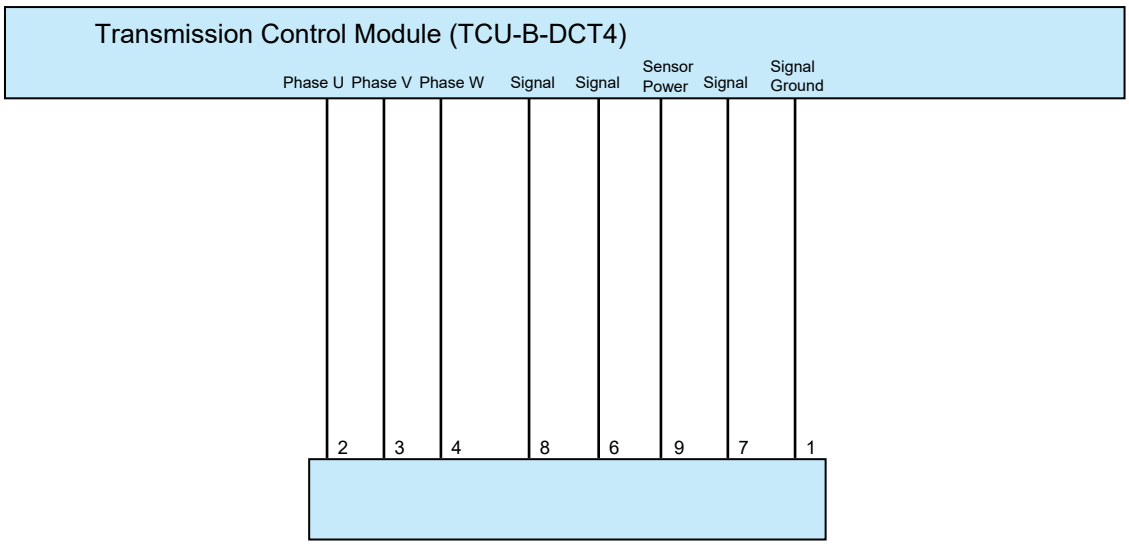
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace TCU control module assembly and perform self-learning

DTC	P180D11h	Clutch 2 Hall Sensor: Short to Ground in Signal Line 1
DTC	P180D15h	Clutch 2 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 1
DTC	P180E11h	Clutch 2 Hall Sensor: Short to Ground in Signal Line 2
DTC	P180E15h	Clutch 2 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 2
DTC	P180F11h	Clutch 2 Hall Sensor: Short to Ground in Signal Line 3
DTC	P180F15h	Clutch 2 Hall Sensor: Short to Power Supply or Open Circuit in Signal Line 3

Circuit Diagram



Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to ON.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check battery**

(a) Check if battery voltage is normal.

NG → **Check and repair battery**

OK

2	Check TCU fuse

(a) Check if TCU fuse in engine compartment fuse and relay box is normal.

NG → **Replace fuse**

OK

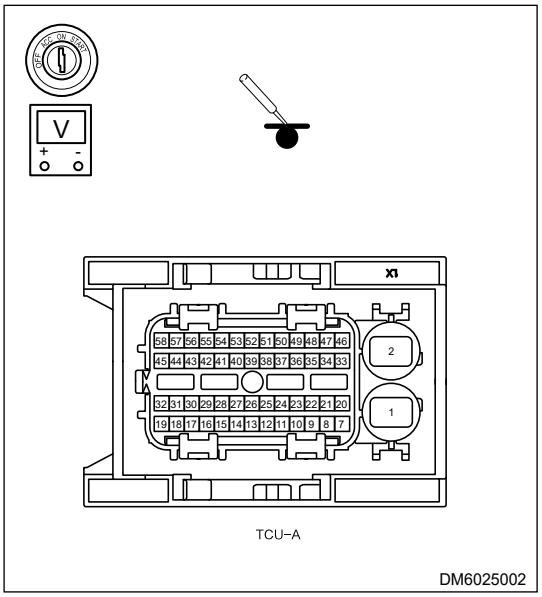
3	Check TCU power supply circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the TCU connector.

(c) Turn ENGINE START STOP switch to ON.

(d) Using a multimeter, measure voltage between TCU connector (- power supply terminal) and body ground. (Standard voltage should be battery voltage)



NG → **Check and repair TCU power supply circuit**

OK

4	Check clutch actuator motor 2 connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the clutch motor 2 connector.

(d) Disconnect the TCU B connector.

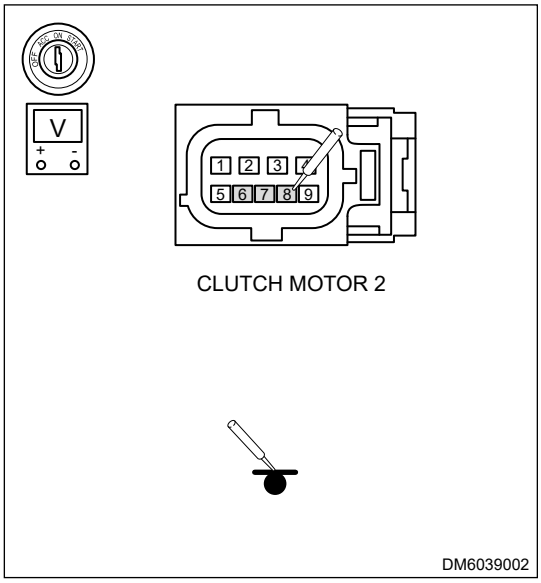
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector or wire harness**

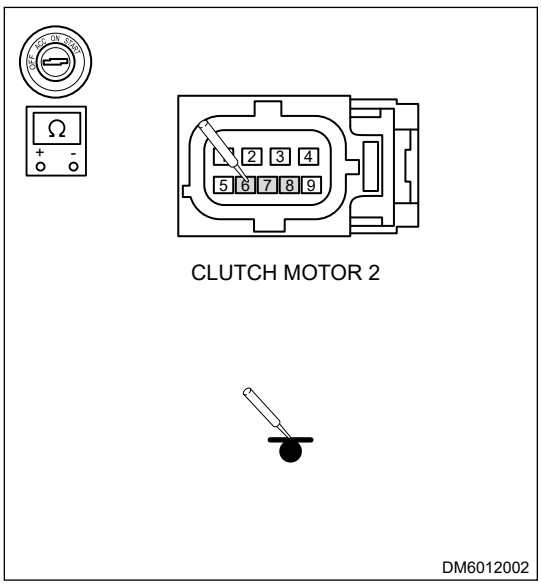
OK

5	Check clutch actuator motor 2 signal circuit

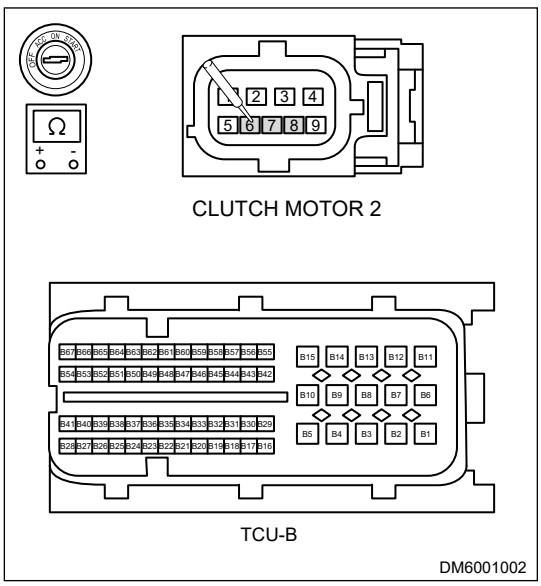
(a) Using voltage band of multimeter, check voltage between clutch actuator motor 2 connector signal terminals (6, 7, 8) and body ground to check circuit for short to power supply.



(b) Using ohm band of multimeter, check resistance between clutch actuator motor 2 connector signal terminals (6, 7, 8) and body ground to check circuit for short to ground.



(c) Using ohm band of multimeter, check resistance between clutch actuator motor 2 connector signal terminals (6, 7, 8) and TCU B (connected terminals) to check circuit for open.



NG → Repair or replace wire harness or connector (-Clutch actuator motor 2 - TCU)

OK

6	Replace clutch actuator motor 2

(a) Replace clutch actuator motor 2, drive a certain distance and shift gear several times, read diagnostic information again. Check if the same DTC appears.

No DTC → Replace clutch actuator motor 2

DTC occurs

7	Reconfirm DTCs

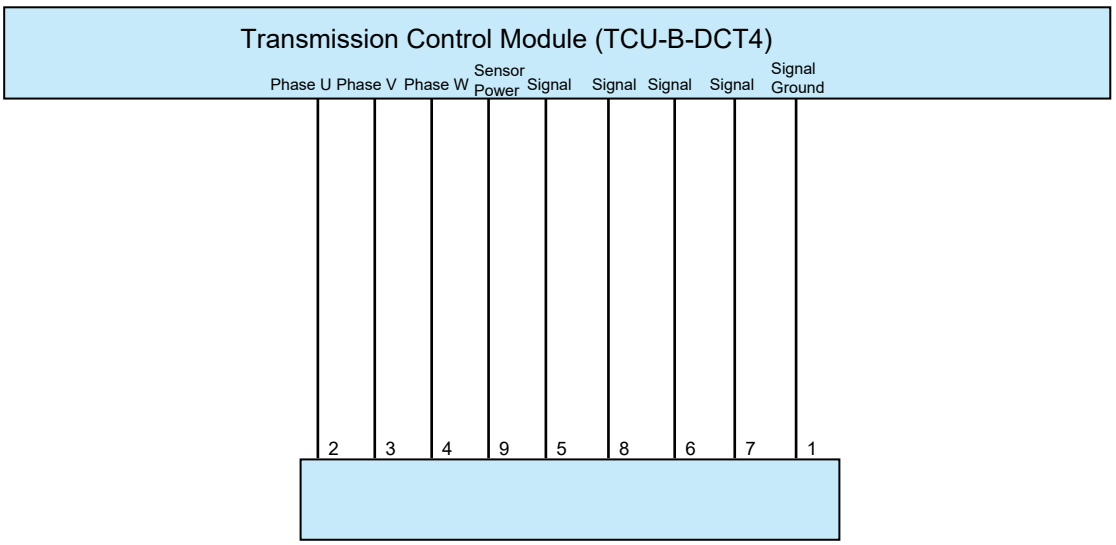
(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → System operates normally

NG → Replace TCU control module assembly and perform self-learning

DTC	P183E11h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Ground in Signal Line 1
DTC	P183E15h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Power Supply or Open Circuit in Signal Line 1
DTC	P183F11h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Ground in Signal Line 2
DTC	P183F15h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Power Supply or Open Circuit in Signal Line 2
DTC	P184011h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Ground in Signal Line 3
DTC	P184015h	Monitoring Voltage of HALL Position Sensor Shift Motor 1: Short to Power Supply or Open Circuit in Signal Line 3

Circuit Diagram



SHIFT MOTOR 1

DM6019001

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check shift motor 1 connector**

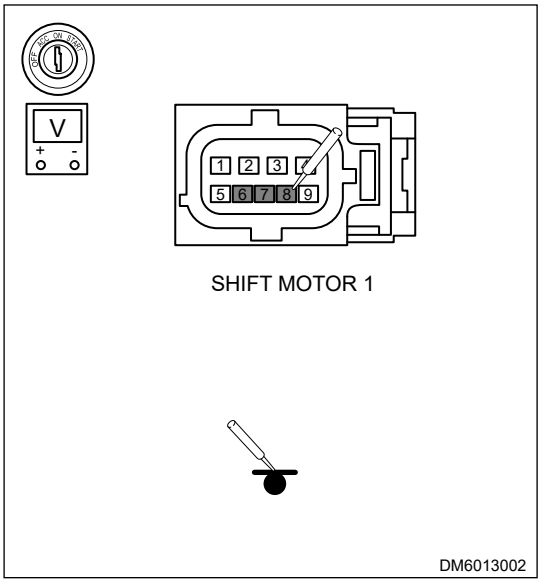
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the shift motor 1 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector or wire harness**

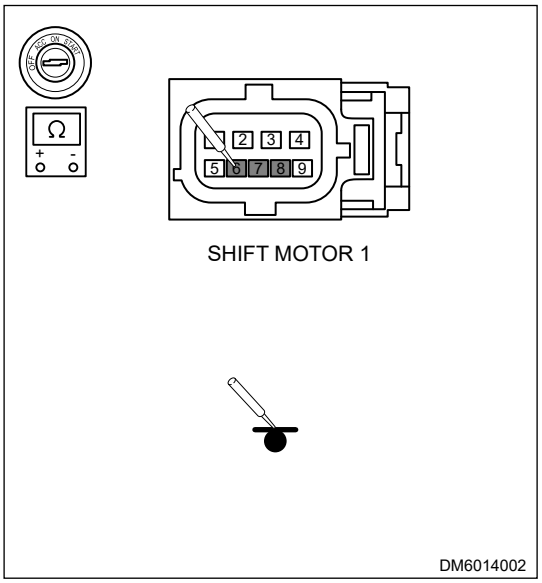
OK

2	**Check shift motor 1 signal circuit**

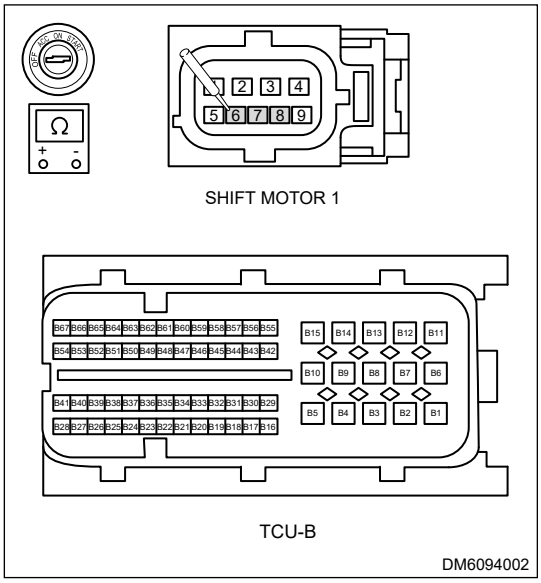
(a) Using voltage band of multimeter, check voltage between shift motor 1 connector signal terminals (6, 7, 8) and body ground to check circuit for short to power supply.



(b) Using ohm band of multimeter, check resistance between shift motor 1 connector signal terminals (6, 7, 8) and body ground to check circuit for short to ground.



(c) Using ohm band of multimeter, check resistance between shift motor 1 connector signal terminals (6, 7, 8) and TCU B (-connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (-Shift motor 1 - TCU)**

OK

3	Check shift motor 1

(a) Replace shift motor 1, drive a certain distance and shift gear several times, read diagnostic information again. Check if same DTC outputs.

NG → **Replace shift motor 1**

OK

4	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

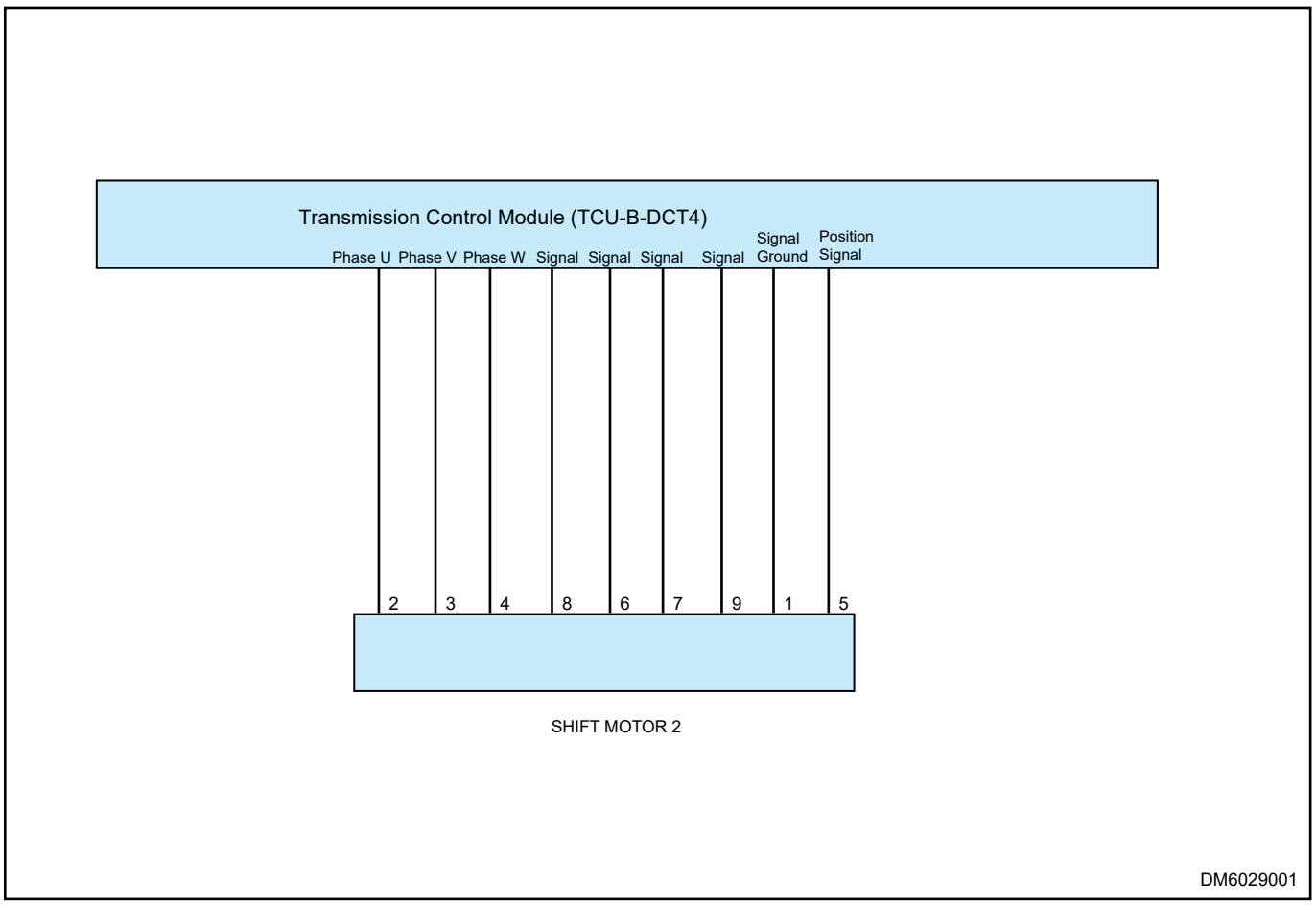
OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	**P184111h**	**Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Ground in Signal Line 1**
DTC	**P184115h**	**Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Power Supply or Open Circuit in Signal Line 1**
DTC	**P184211h**	**Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Ground in Signal Line 2**

DTC	**P184215h**	**Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Power Supply or Open Circuit in Signal Line 2**
DTC	**P184311h**	**Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Ground in Signal Line 3**
DTC	**P184315h**	**Monitoring Voltage of HALL Position Sensor Shift Motor 2: Short to Power Supply or Open Circuit in Signal Line 3**

Circuit Diagram



⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(5) Only use a digital multimeter to measure voltage of electronic system.

(6) Refer to any Technical Bulletin that may apply to this malfunction.

(7) Visually check the related wire harness.

(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.

(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check shift motor 2 connector

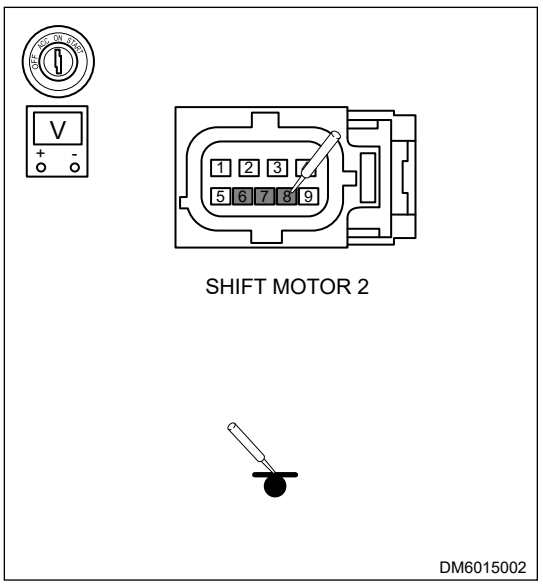
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the shift motor 2 connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace connector**

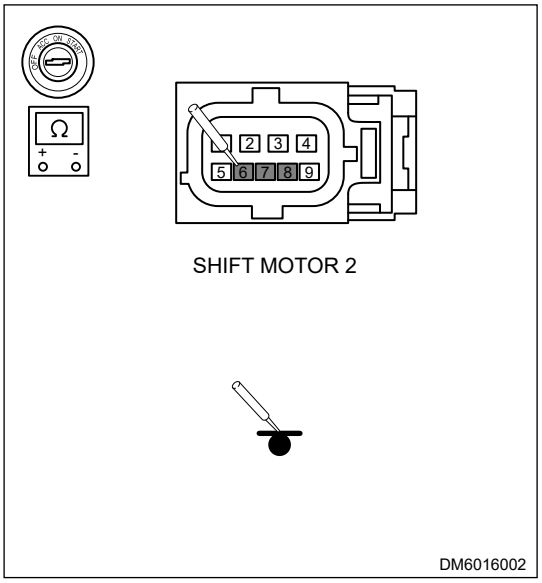
OK

2	Check shift motor 2 signal circuit

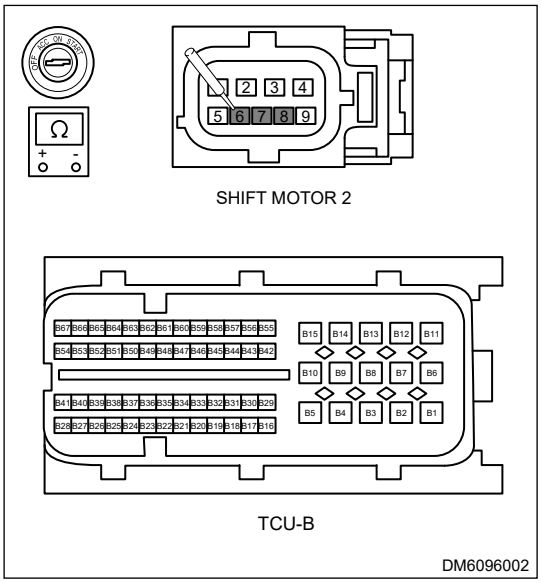
(a) Using voltage band of multimeter, check voltage between shift motor 2 connector signal terminals (6, 7, 8) and body ground to check circuit for short to power supply.



(b) Using ohm band of multimeter, check resistance between shift motor 2 connector signal terminals (6, 7, 8) and body ground to check circuit for short to ground.



(c) Using ohm band of multimeter, check resistance between shift motor 2 connector signal terminals (6, 7, 8) and TCU B (- connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (- Shift motor 2 - TCU)**

OK

3	**Check shift motor 2**

(a) Replace shift motor 2, drive a certain distance and shift gear several times, read diagnostic information again. Check if the same DTC appears.

No → **Replace shift motor 2**

Yes

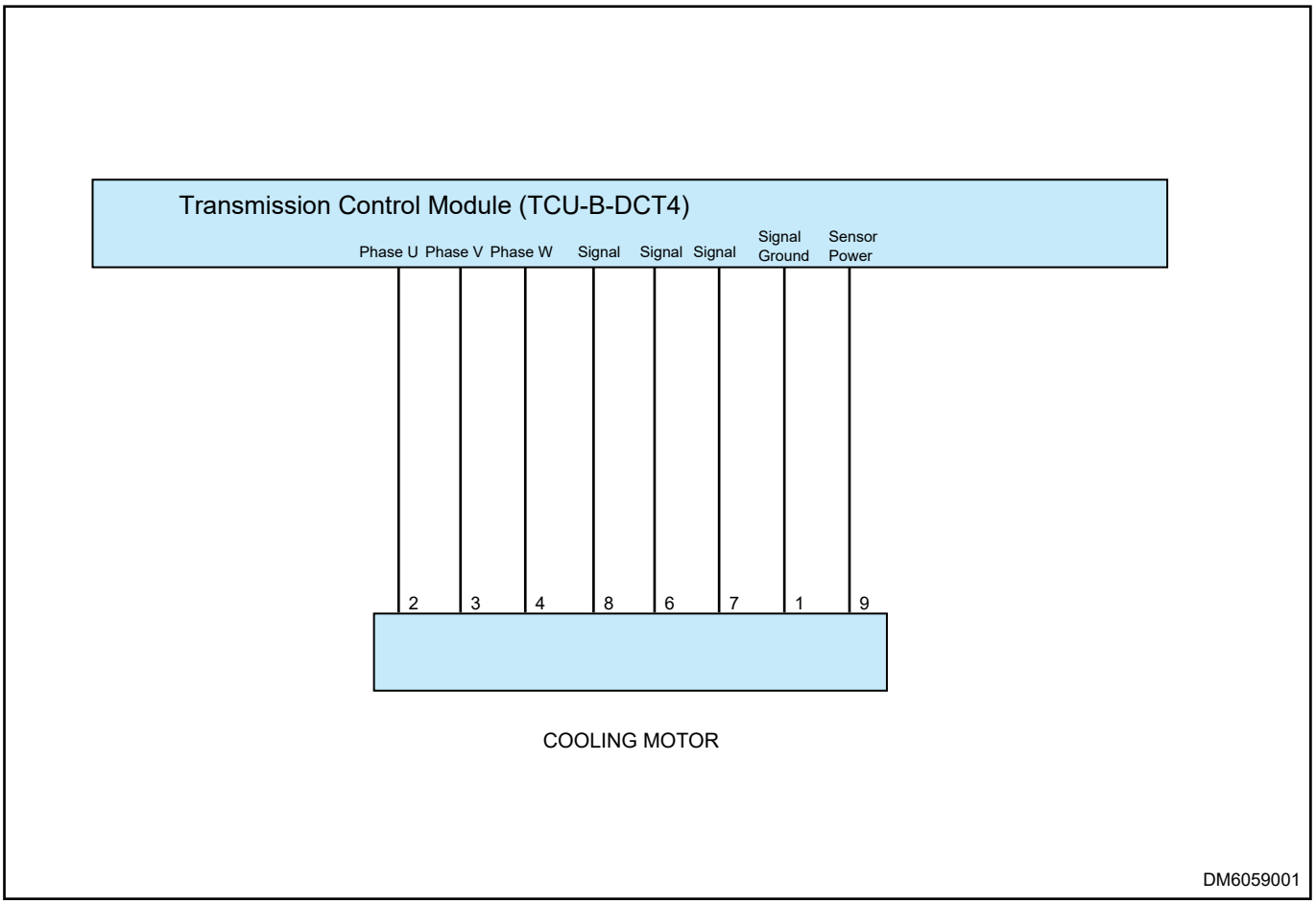
4	**Reconfirm DTCs**

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	**System operates normally**
NG	**Replace TCU control module assembly and perform self-learning**

DTC	**P181111h**	**Clutch Cooling Motor Hall Sensor: Short to Ground in Signal Line 1**
DTC	**P181115h**	**Clutch Cooling Motor Hall Sensor: Short to Battery or Open Circuit in Signal Line 1**
DTC	**P181311h**	**Clutch Cooling Motor Hall Sensor: Short to Ground in Signal Line 2**
DTC	**P181315h**	**Clutch Cooling Motor Hall Sensor: Short to Battery or Open Circuit in Signal Line 2**
DTC	**P181911h**	**Clutch Cooling Motor Hall Sensor: Short to Ground in Signal Line 3**
DTC	**P181915h**	**Clutch Cooling Motor Hall Sensor: Short to Battery or Open Circuit in Signal Line 3**

Circuit Diagram



Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.

(3) Turn ENGINE START STOP switch to ON.

(4) Using a diagnostic tester, record and clear DTCs.

(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.

(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check cooling motor connector

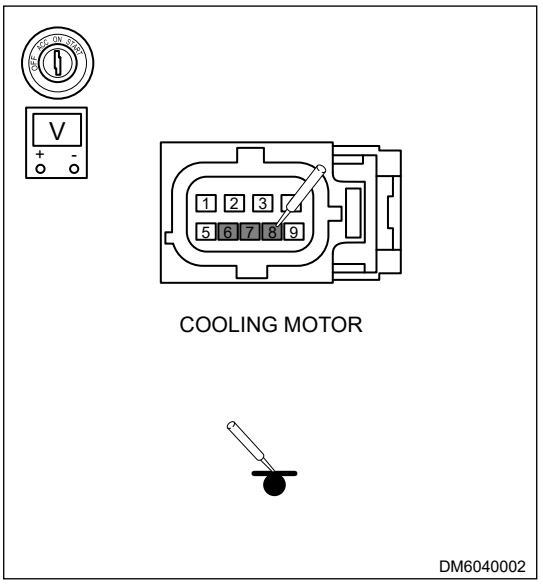
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the cooling motor connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace wire harness or connector**

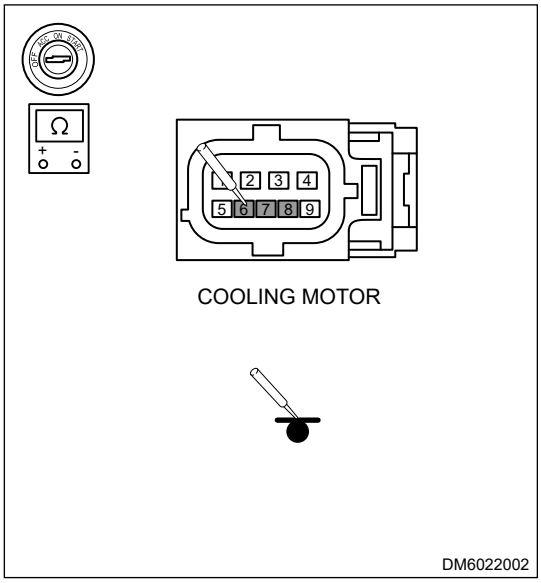
OK

2	Check cooling motor signal circuit

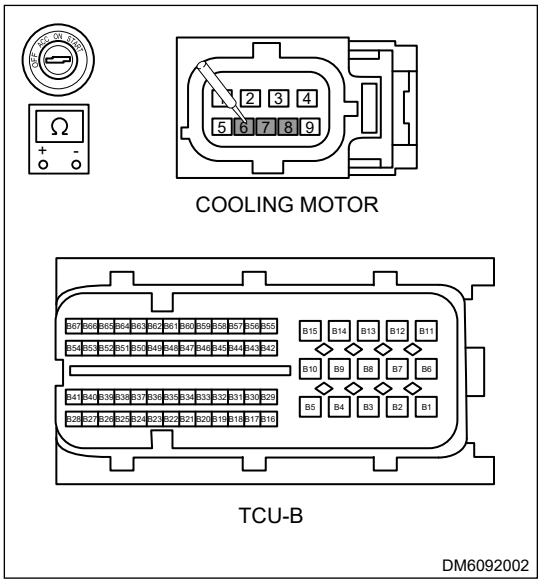
(a) Using voltage band of multimeter, check voltage between cooling motor connector signal terminals (6, 7, 8) and body ground to check circuit for short to power supply.



(b) Using ohm band of multimeter, check resistance between cooling motor connector signal terminals (6, 7, 8) and body ground to check circuit for short to ground.



(c) Using ohm band of multimeter, check resistance between cooling motor connector signal terminals (6, 7, 8) and TCU B (-connected terminals) to check circuit for open.



NG → **Repair or replace wire harness or connector (-Cooling motor - TCU)**

OK

3	**Replacement of Cooling Motor**

(a) Replace cooling motor to compare and verify.

NG → **Replacement of Cooling Motor**

OK

4	**Reconfirm DTCs**

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK	System operates normally
NG	Replace TCU control module assembly and perform self-learning

DTC	P181516h	Monitoring Temperature Sensor 1 Voltage: Circuit Voltage Lower Than Threshold
DTC	P181517h	Monitoring Temperature Sensor 1 Voltage: Circuit Voltage Lower Higher Threshold
DTC	P181616h	Monitoring Temperature Sensor 2 Voltage: Circuit Voltage Lower Than Threshold
DTC	P181617h	Monitoring Temperature Sensor 2 Voltage: Circuit Voltage Lower Higher Threshold
DTC	P181716h	Monitoring Temperature Sensor 3 Voltage: Circuit Voltage Lower Than Threshold
DTC	P181717h	Monitoring Temperature Sensor 3 Voltage: Circuit Voltage Lower Higher Threshold

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Turn ENGINE START STOP switch to ON.
(4) Using a diagnostic tester, record and clear DTCs.
(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.
(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Confirm fault after power-off

(a) Using diagnostic tester, clear DTCs. Disconnect the battery power supply, then power on again. Read the DTC with a diagnostic tester to check if the fault still exists.

Not exist	System is normal and there is no DTC

Exist

2	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read DTC.
(d) Check if DTC still exists.

OK	System operates normally
NG	Replace TCU control module assembly and perform self-learning

DTC	U040181h	Engine Speed Signal Invalid
DTC	U040181h	Engine Start/Stop Status Signal Invalid
DTC	U040181h	Engine Idling Signal Invalid
DTC	U040181h	Engine Temperature Signal Invalid
DTC	U040181h	Accelerator Pedal Signal Invalid
DTC	U040181h	Driver Expected Torque Signal Invalid
DTC	U040181h	Invalid Engine Torque Signal
DTC	U040181h	Maximum Instantaneous Torque Signal invalid
DTC	U040181h	Minimum Instantaneous Torque Signal invalid
DTC	U040281h	Environment Temperature Signal Invalid
DTC	U040181h	Brake Pedal Signal Invalid
DTC	U041881h	Brake Pressure Signal Invalid
DTC	U042381h	Hand Brake Signal Invalid
DTC	U041881h	Front Left Wheel Speed Signal Invalid
DTC	U041881h	Front Right Wheel Speed Signal Invalid
DTC	U041881h	Rear Left Wheel Speed Signal Invalid
DTC	U041881h	Rear Right Wheel Speed Signal Invalid
DTC	U040481h	Shift Lever Signal Invalid
DTC	U040481h	Parking (P Position) Button Signal Invalid
DTC	U010087h	Engine Node 1 Timeout
DTC	U040181h	Engine Node 1 Alive Counter Fault
DTC	U040181h	Engine Node 1 Checksum Error
DTC	U012987h	Brake System Node 1 Timeout
DTC	U041881h	Brake System Node 1 Alive Counter Fault
DTC	U041881h	Brake System Node 1 Checksum Error
DTC	U015587h	Instrument Panel Node 1 Timeout
DTC	U119387h	Shift Node 1 Timeout

DTC	U040481h	Shift Node 1 Alive Counter Fault
DTC	U040481h	Shift Node 1 Checksum Error
DTC	U014087h	Body Control System Node 1 Timeout
DTC	U016487h	Clutch System Node 1 Fault

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Turn ENGINE START STOP switch to ON.
(4) Using a diagnostic tester, record and clear DTCs.
(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.
(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check wire harness connector**

(a) Disconnect the related module connector.
(b) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Repair or replace wire harness or connector**

OK

2	**Reconfirm DTCs**

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally and there is no fault**

NG → **Replace related module and perform self-learning**

DTC	P183307h	Clutch 1 Torque Detection
DTC	P183407h	Clutch 2 Torque Detection

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(4) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(5) Only use a digital multimeter to measure voltage of electronic system.
(6) Refer to any Technical Bulletin that may apply to this malfunction.
(7) Visually check the related wire harness.
(8) Check and clean all Transmission Control Unit (TCU) grounds related to latest DTC.
(9) If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check clutch self-learning

(a) Use a diagnostic tester to check clutch self-learning condition and perform shift drum self-learning again.
(b) After clutch self-learning, use a diagnostic tester to check if DTC exists.

No → **System is normal and there is no fault**

Yes

2	Check TCU

(a) Replace TCU to compare and verify. Use diagnostic tester to check if the same DTC appears.

No → **Replace TCU**

Yes

3	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Use diagnostic tester to clear DTC.
(c) Start the engine.
(d) Check if the same DTCs are output.

OK → **System operates normally**

NG → **Replace clutch assembly**

DTC	P1880F3h	TCU Authentication Failed: EEPROM Updating Error
DTC	P1880F6h	TCU Authentication Failed: SK or PIN Not Programmed
DTC	P1880F5h	TCU Authentication Failed: Authentication Fails Between TCU and IMMO
DTC	P1880F4h	TCU Authentication Failed: No Response from IMMO

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.
(1) Turn ENGINE START STOP switch to OFF.

(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Turn ENGINE START STOP switch to ON.
(4) Using a diagnostic tester, record and clear DTCs.
(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.
(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check the related wire harness connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the shift module connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector or wire harness**

OK

2	**Check engine immobilizer system**

(a) Check engine immobilizer system DTC.

NG → **Repair according to DTC**

OK

3	**Reconfirm DTCs**

(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read system DTC.
(d) Check if DTC still exists.

OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

DTC	P181892h	Target Position Not Reached in a Defined Time, Changed Position to N or P

Confirmation Procedure
Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to data link connector.
(3) Turn ENGINE START STOP switch to ON.
(4) Using a diagnostic tester, record and clear DTCs.

(5) Start engine and warm it up to normal operating temperature, and then select Read DTC.

(6) Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

(7) If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check the related wire harness connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the shift module connector.
(d) Disconnect the TCU B connector.
(e) Check the connector for symptoms such as poor connection, poor contact, damage or crack etc.

NG → **Reinstall or repair, replace connector or wire harness**

OK

2	Check shift module

(a) Replace shift module to compare verify. Use diagnostic tester to check if the same DTC appears.

No → **Replace shift module**

Yes

3	Reconfirm DTCs

(a) Connect the negative battery cable.
(b) Turn ENGINE START STOP switch to ON.
(c) Using diagnostic tester, read system DTC.
(d) Check if DTC still exists.

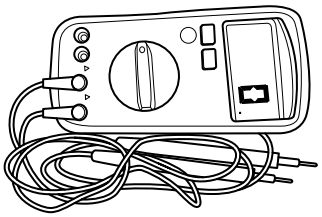
OK → **System operates normally**

NG → **Replace TCU control module assembly and perform self-learning**

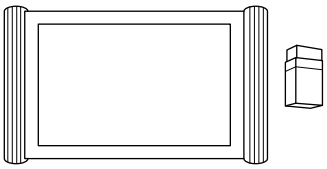
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ Special Tools

Tool Name	Tool Drawing
Diagnostic tester	 S00001

5.2 Transmission Control Unit

■ Removal

⚠ Warning

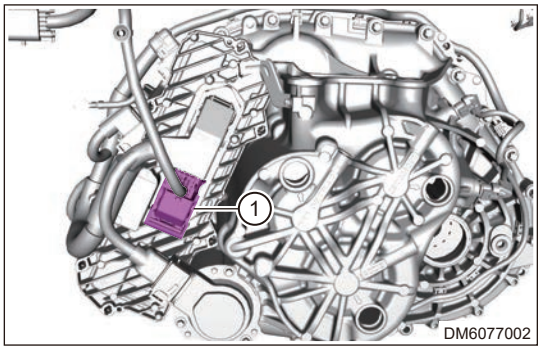
- **During removal and installation of TCU, antistatic equipment should be worn to avoid damage to electronic components in TCU.**
- **TCU bolts are non-reusable parts, which must be replaced after every removal.**
- **TCU bolts are pre-coated parts. Residual sealant should be cleaned from threaded hole of housing before assembly.**
- **If TCU is replaced with a new one, fresh correct TCU software with diagnostic tester, and complete transmission self-learning.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

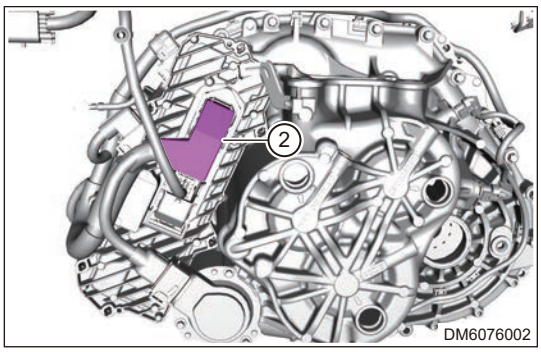
(2) Disconnect the negative battery cable.

(3) Remove the engine compartment lower protector assembly.

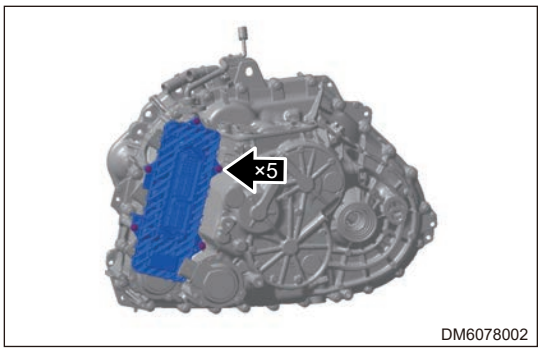
(4) Disconnect the transmission control unit connector (1).



(5) Disconnect the transmission control unit connector (2).



(6) Remove 5 fixing bolts from transmission control unit.



(7) Remove the transmission control unit.

■ Installation

⚠ Caution

- **TCU bolts are pre-coated parts. Residual sealant should be cleaned from threaded hole of housing before assembly.**
- **TCU bolts are non-reusable parts, which must be replaced after each removal.**
- **If TCU If replaced with a new one, fresh correct TCU software with diagnostic tester, and complete transmission self-learning.**

(1) Install the transmission control unit.
(2) Install 5 fixing bolts to transmission control unit.

Tightening torque: 8.5- 9.5 N·m

(3) Connect the transmission control unit connector.
(4) Install the engine compartment lower protector assembly.
(5) Connect the negative battery cable.
(6) Connect diagnostic tester, read and clear DTCs.

5.3 Matching Learning

Hint:

- If TCU is replaced with a new one, fresh correct TCU software with diagnostic tester, and complete transmission self-learning.

■ Shift Hub Self-learning

(1) Learning triggering conditions (the relationship): Vehicle is powered on; engine shuts down; shift lever is in P; brake pedal is depressed; vehicle is stationary; clutch is disengaged; battery Pressure is sufficient (at least over 10 V).

(2) Self-learning process: Generally speaking, after transmission software is written, keep vehicle in power ON status and depress brake pedal to complete the shift drum self-learning automatically. In addition, the self-learning process is completed through the services in the diagnostic tester.

■ Clutch Self-learning

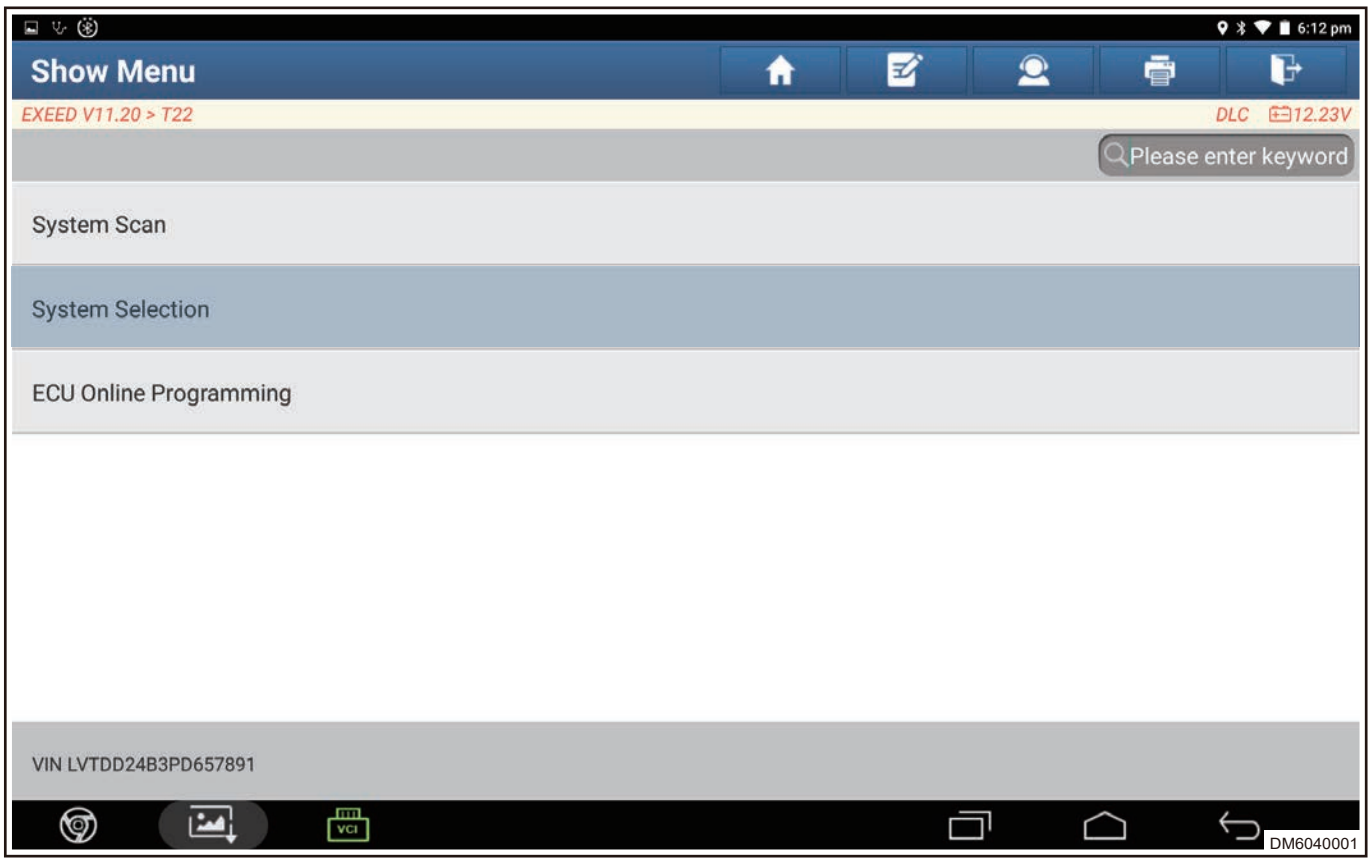
Self-learning triggering conditions (the relationship): Vehicle is stationary; engine runs; shift lever is in N; brake pedal is depressed.

■ Writing VIN Code

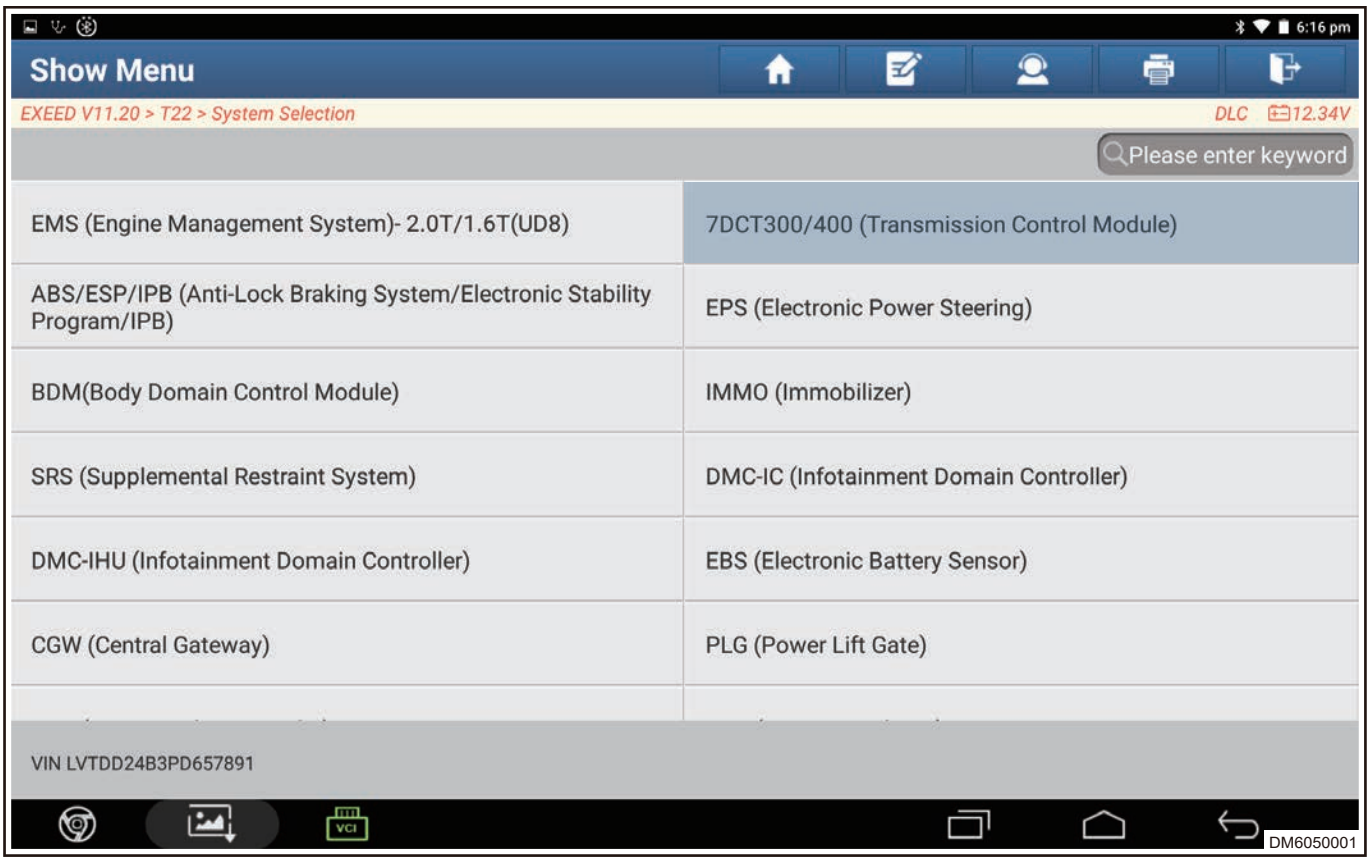
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

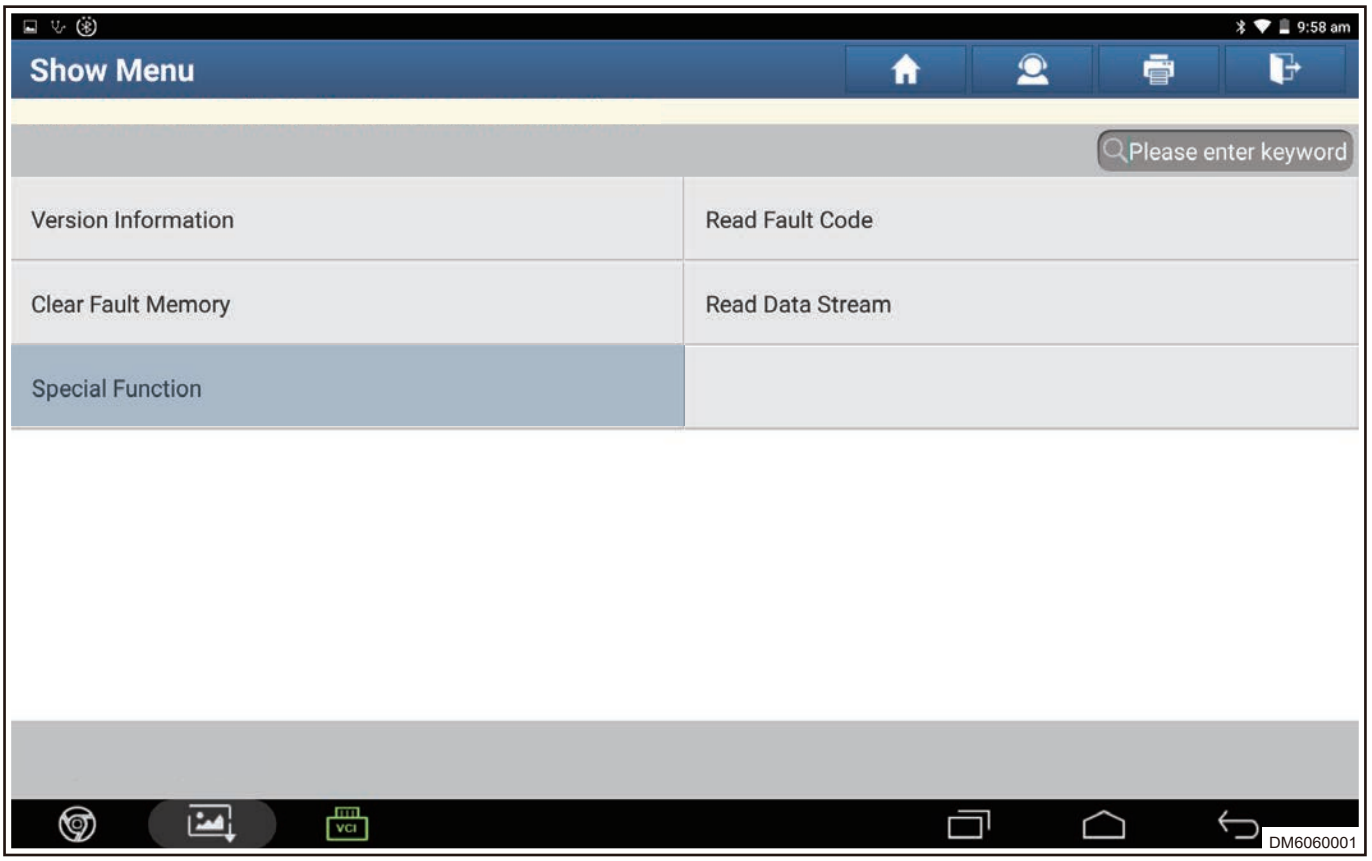
(3) Enter next screen and click “System Selection”.



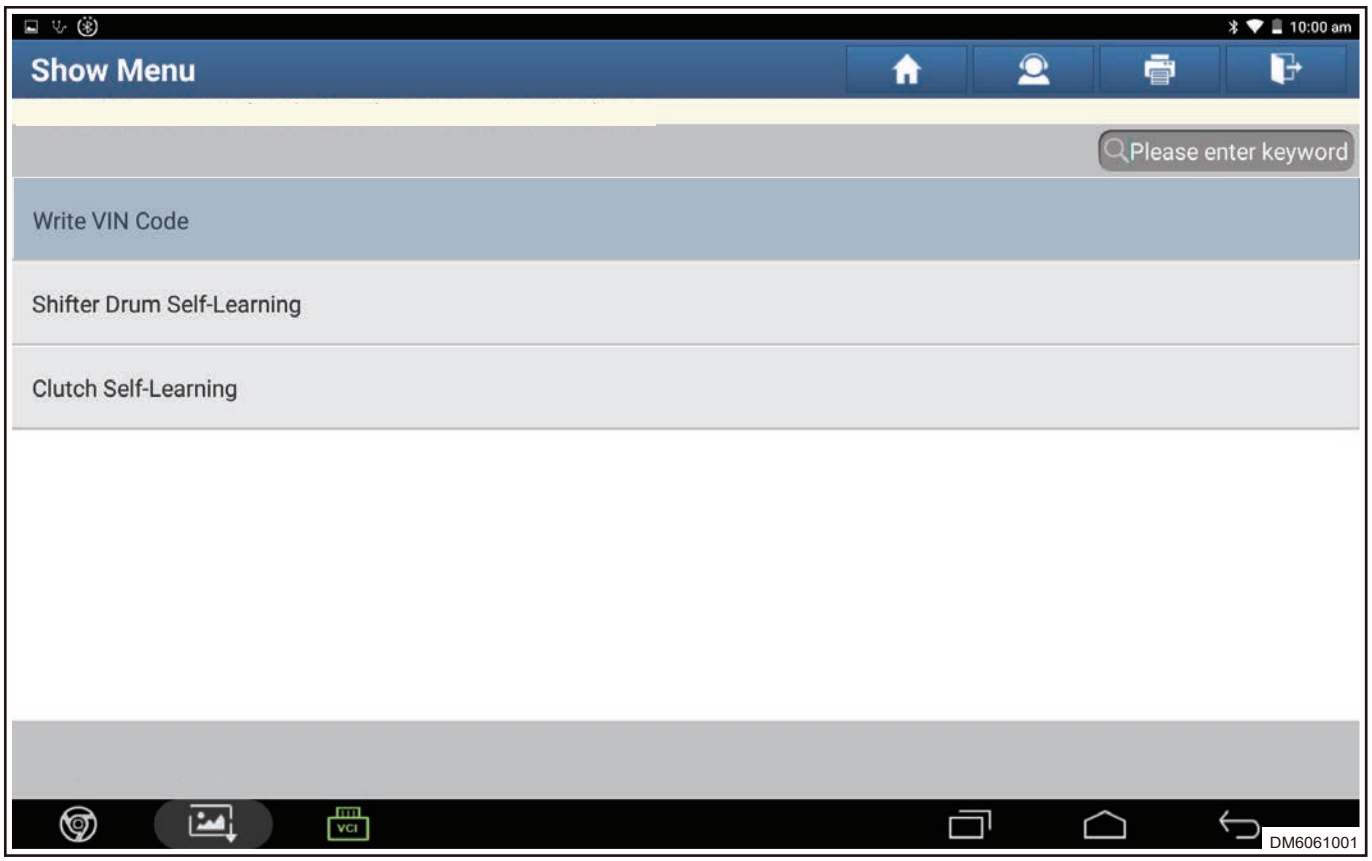
(4) Enter next screen and click "7DCT300/400 (Transmission Control Module)".



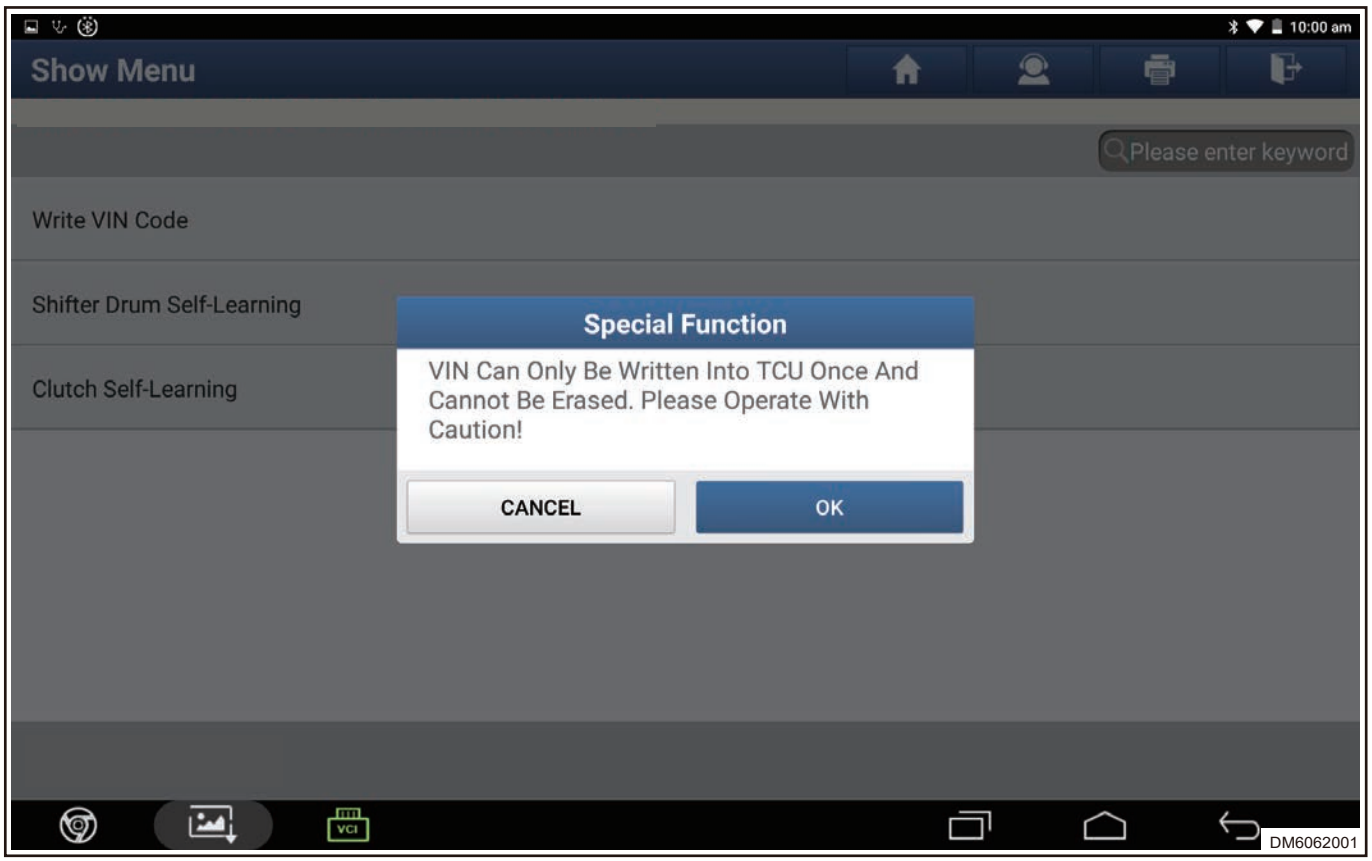
(5) Enter next screen and click “Special Function”.



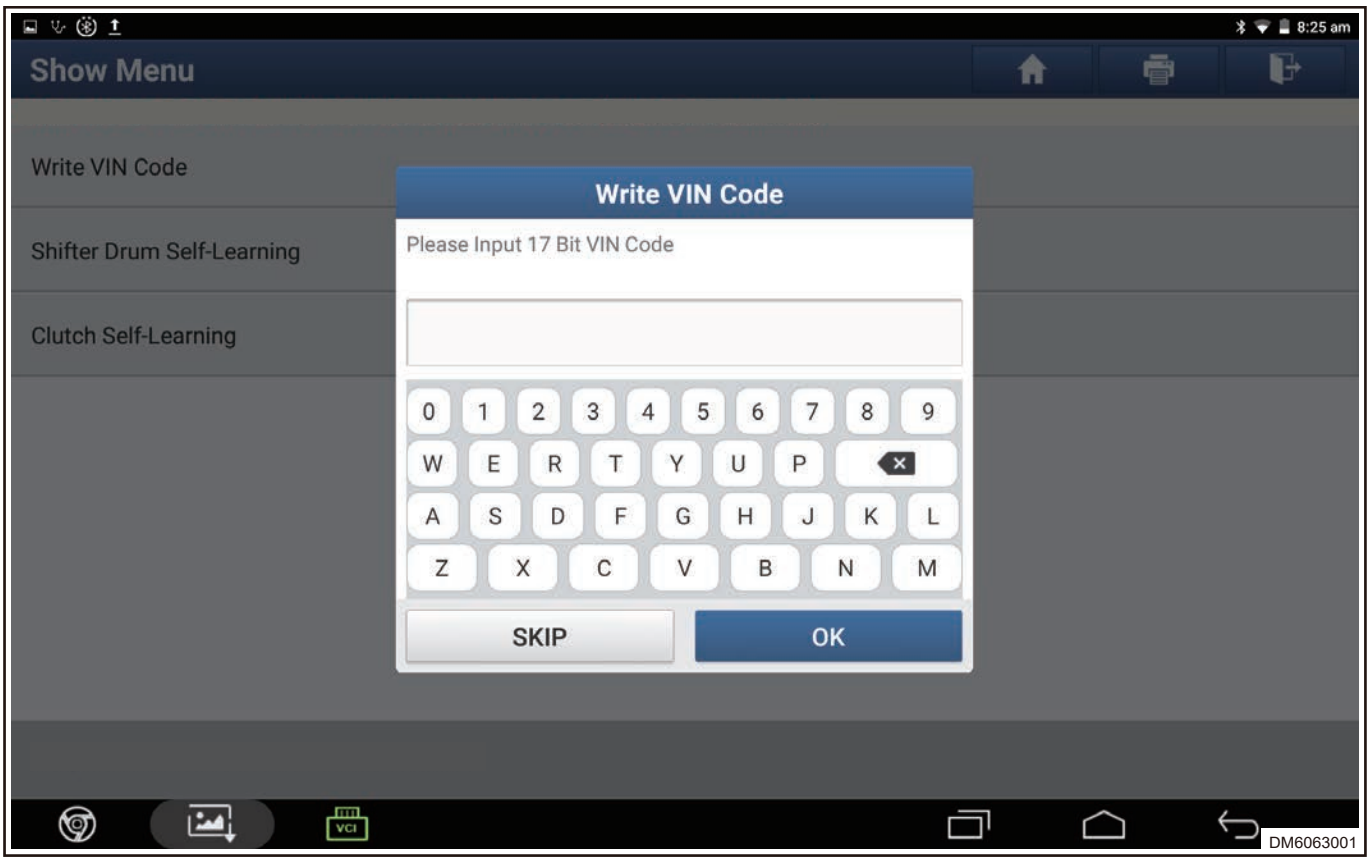
(6) Enter next screen and click “Write VIN Code”.



(7) Note that "TCU (automatic transmission control unit) VIN code can only be written once and cannot be cleared, please operate carefully!" .

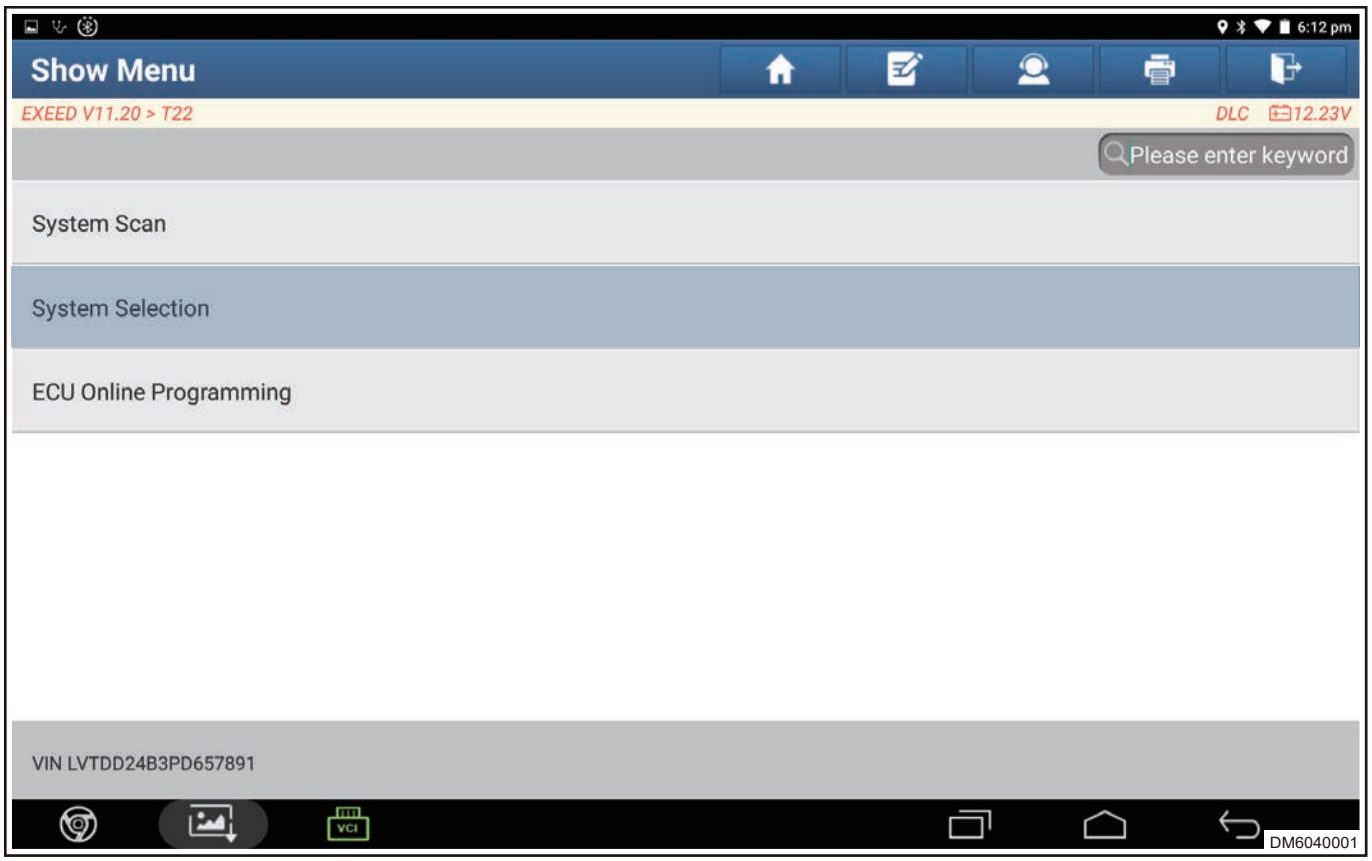


(8) Input a 17 bit VIN code.

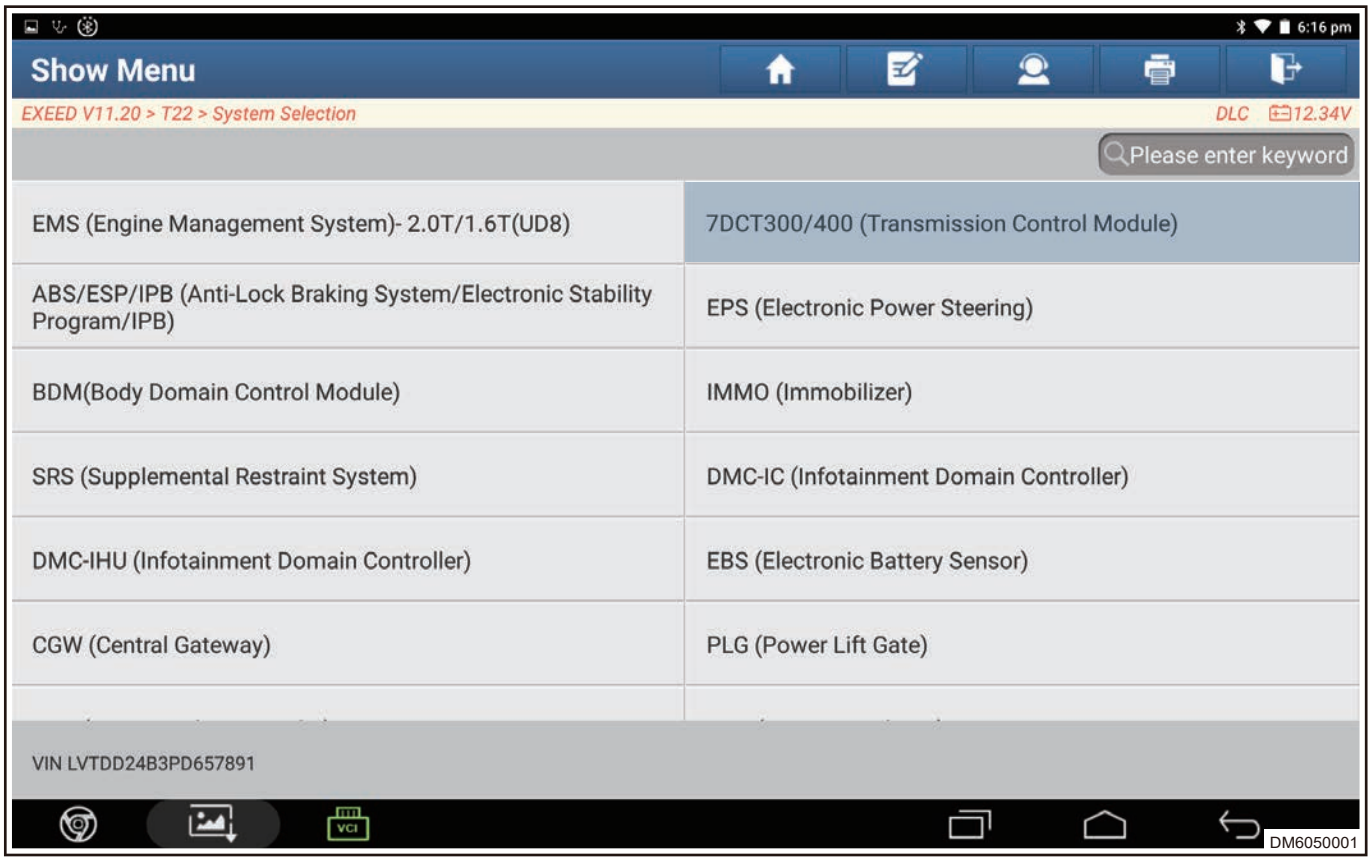


■ **Shifter Drum Self-learning**

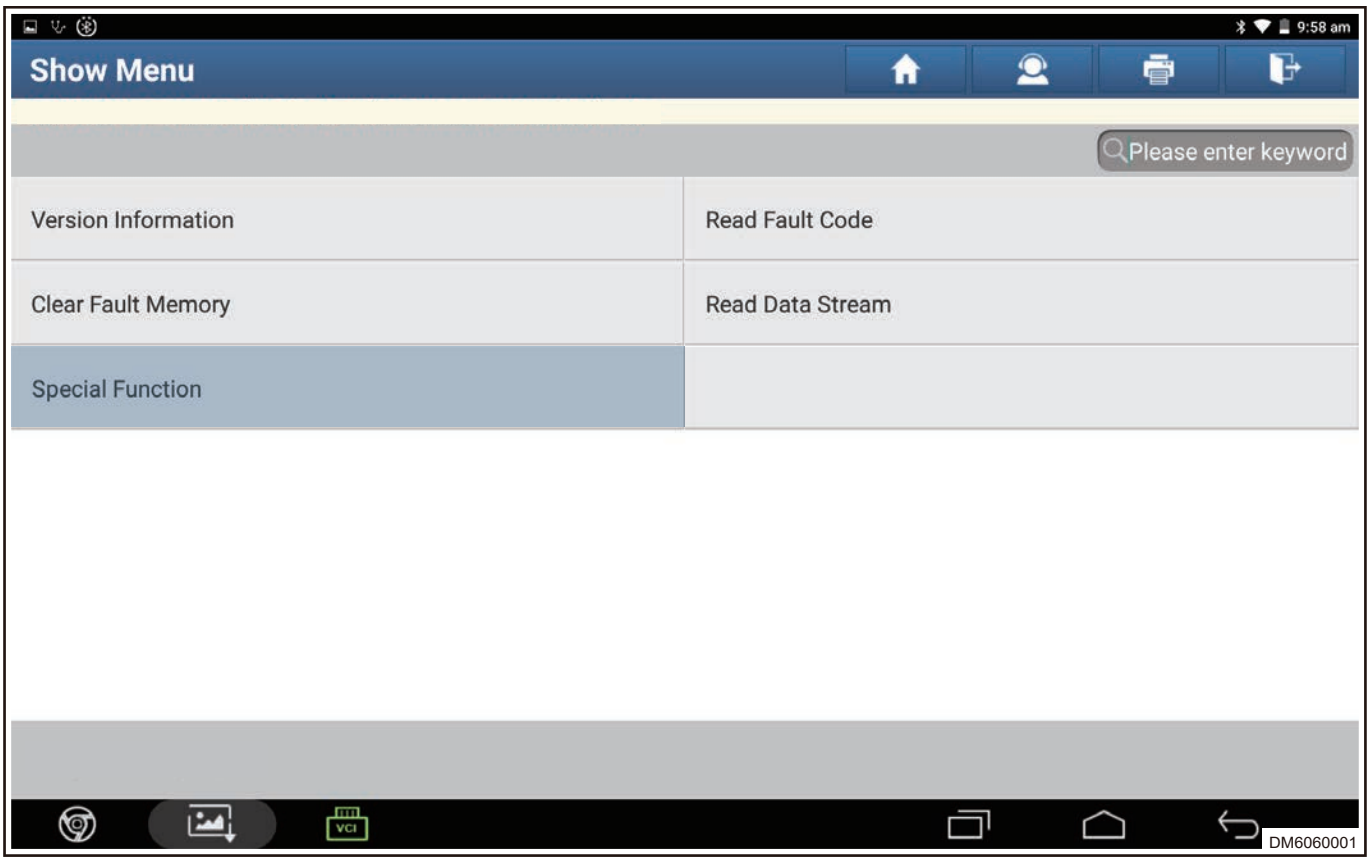
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.
(2) Select “T22” model.
(3) Enter next screen and click “System Selection”.



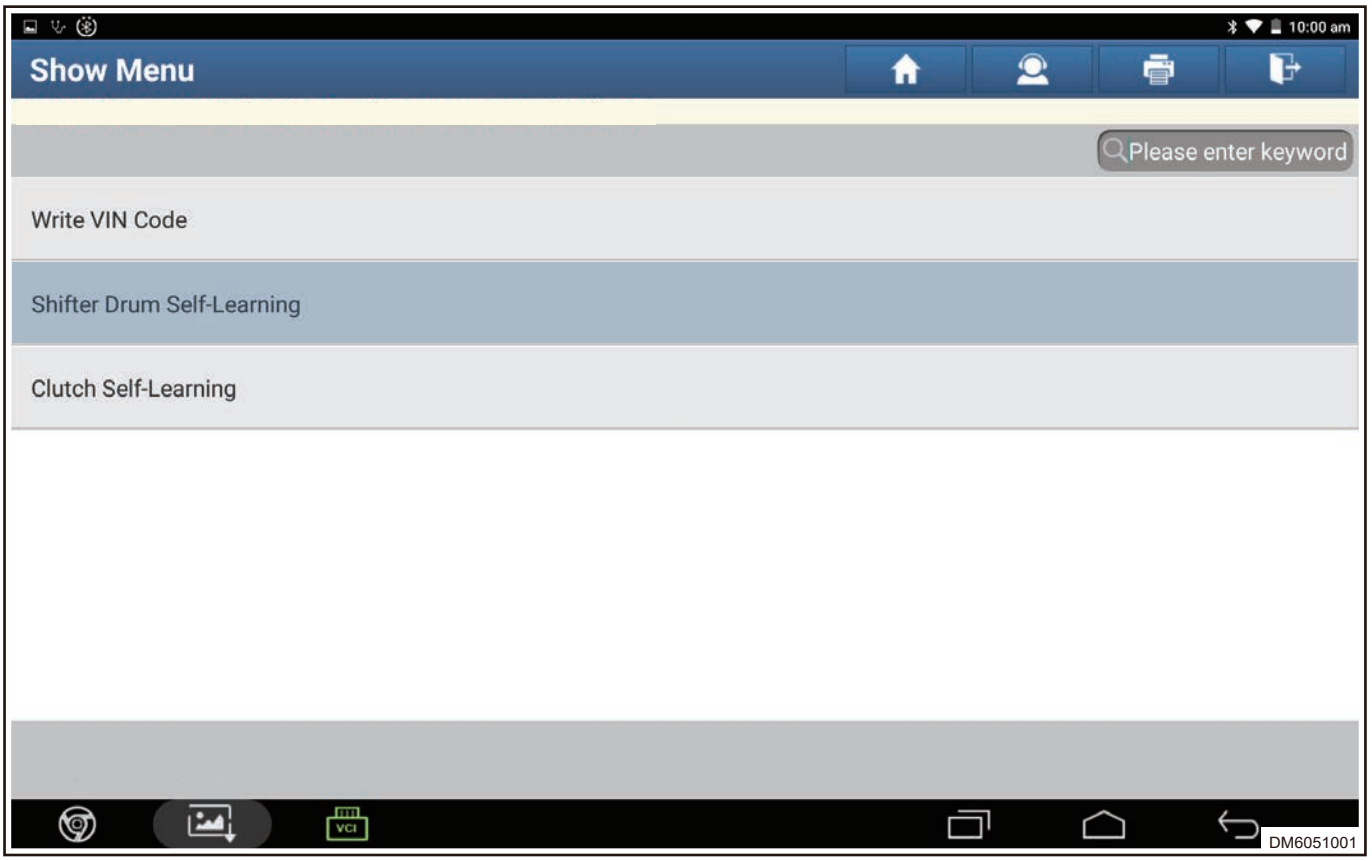
(4) Enter next screen and click "7DCT300/400 (Transmission Control Module)".



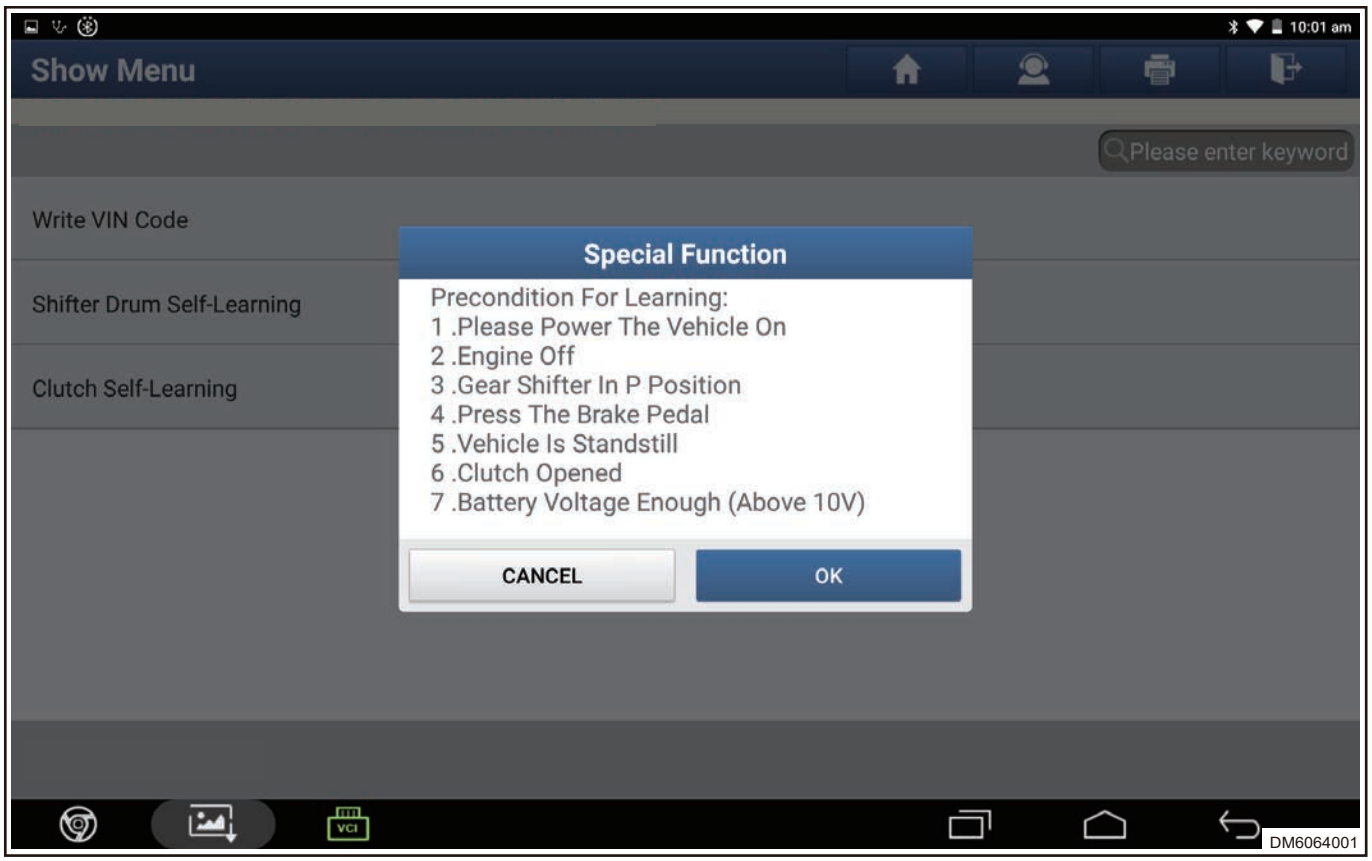
(5) Enter next screen and click “Special Function”.



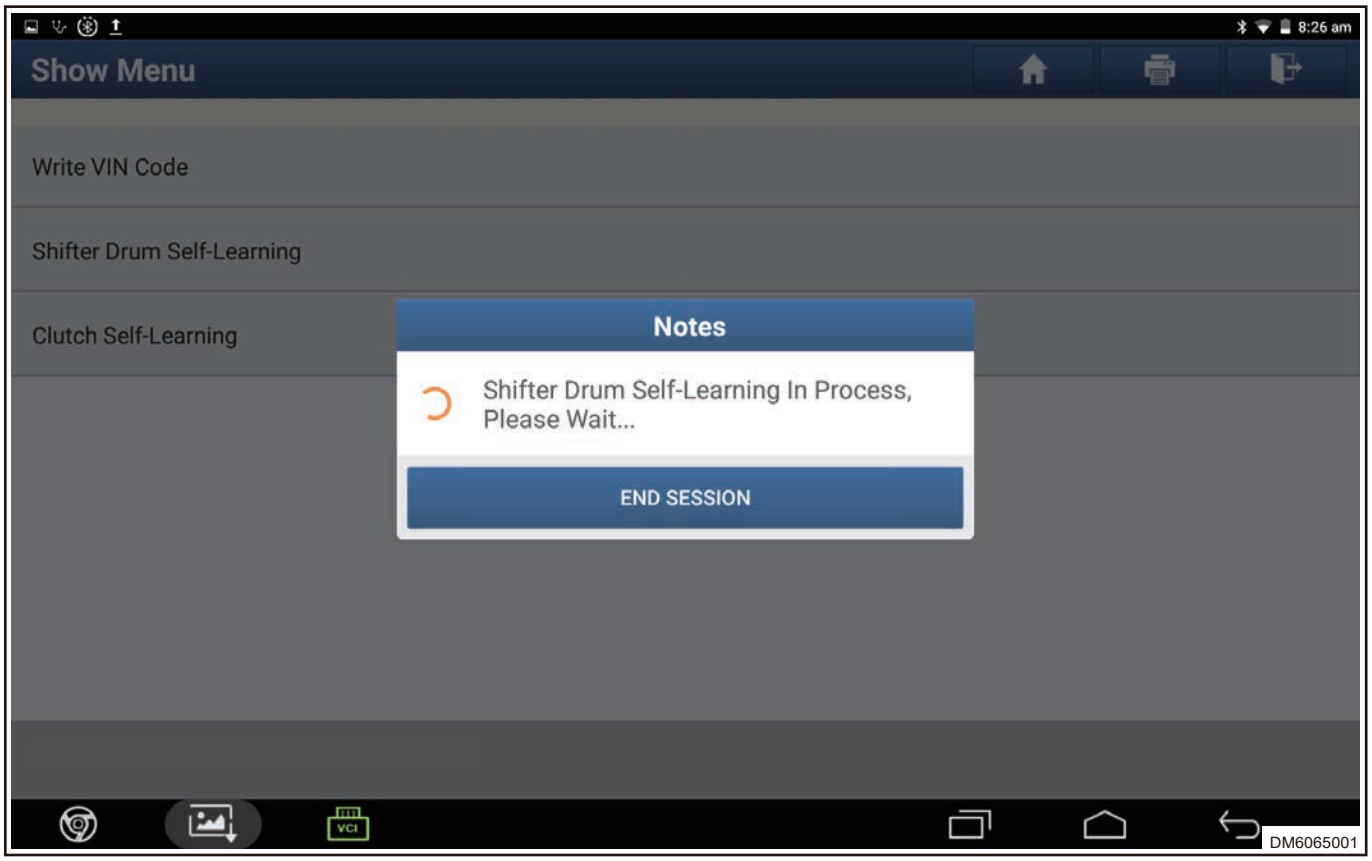
(6) Enter next screen and click “Shifter Drum Self-Learning”.

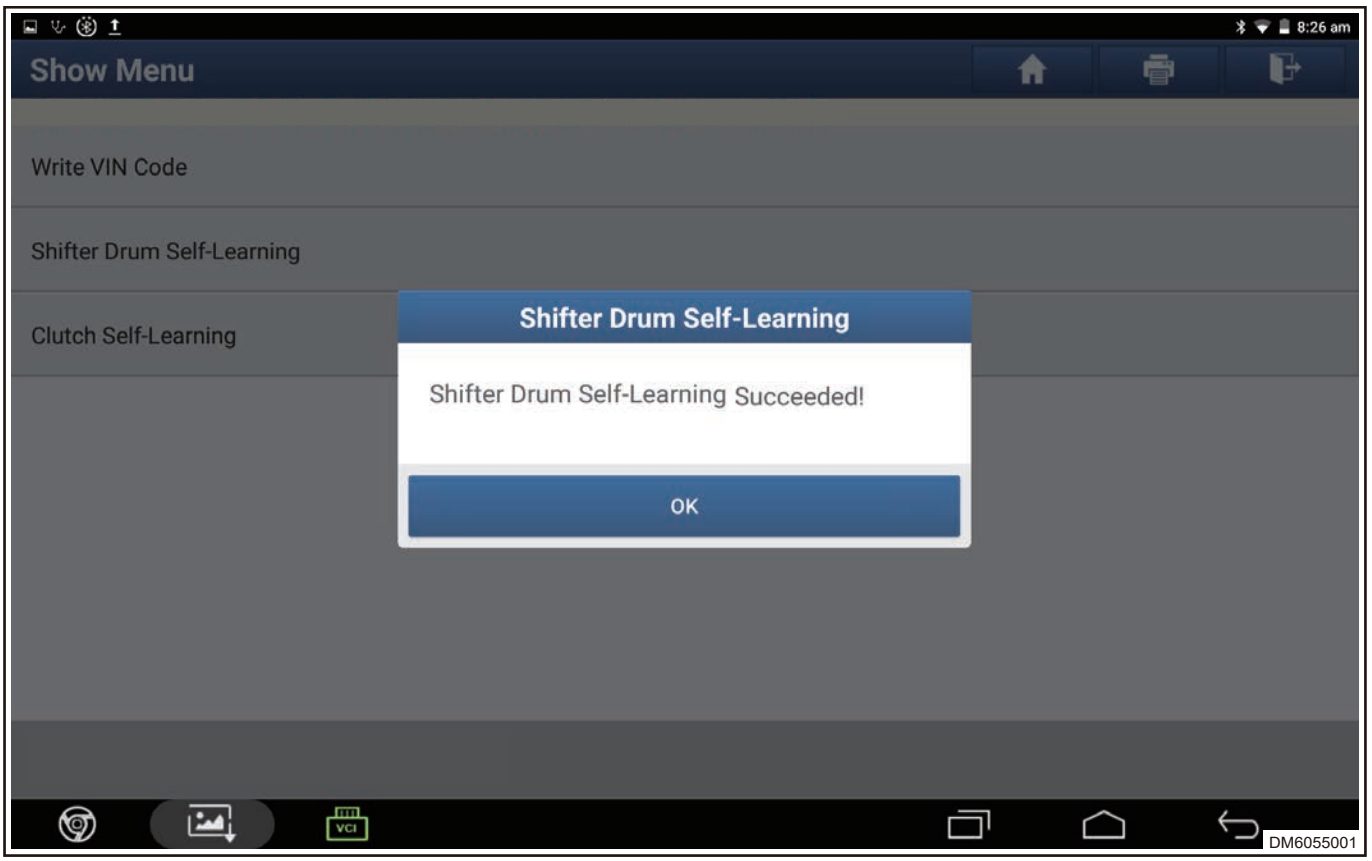


(7) Learning conditions (perform self-learning at N position).



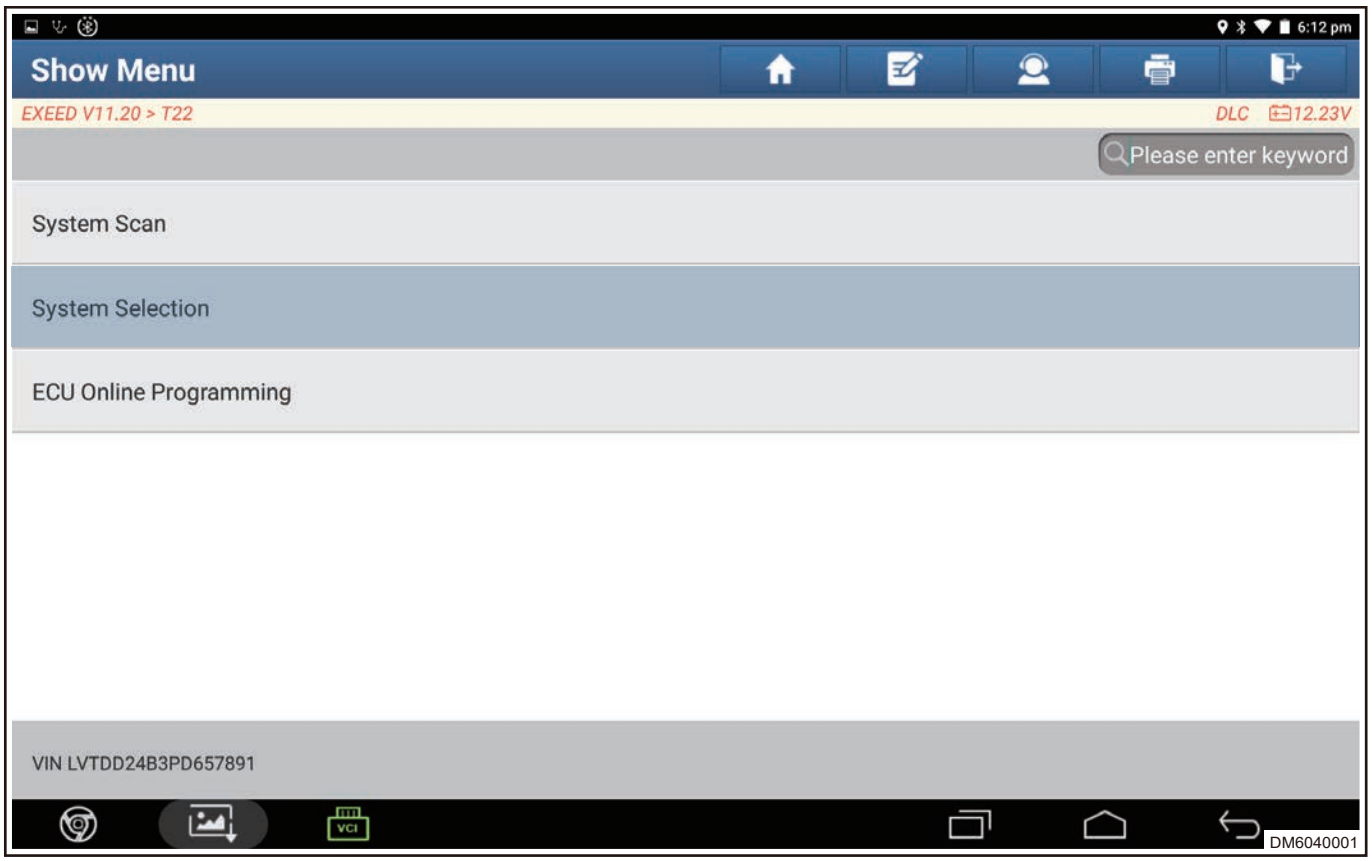
(8) Click “OK” to perform shift drum self-learning.



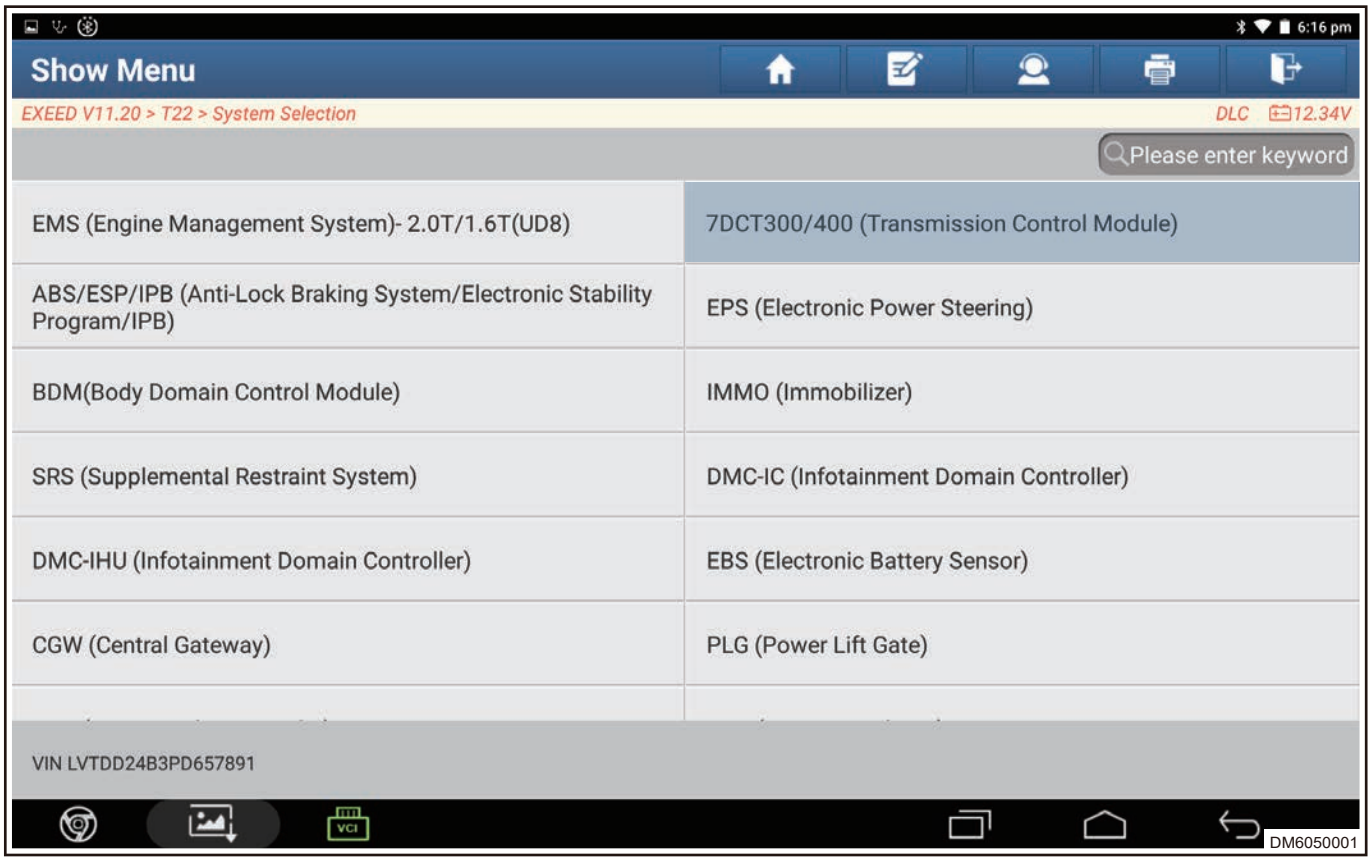


■ **Clutch Self-learning 1**

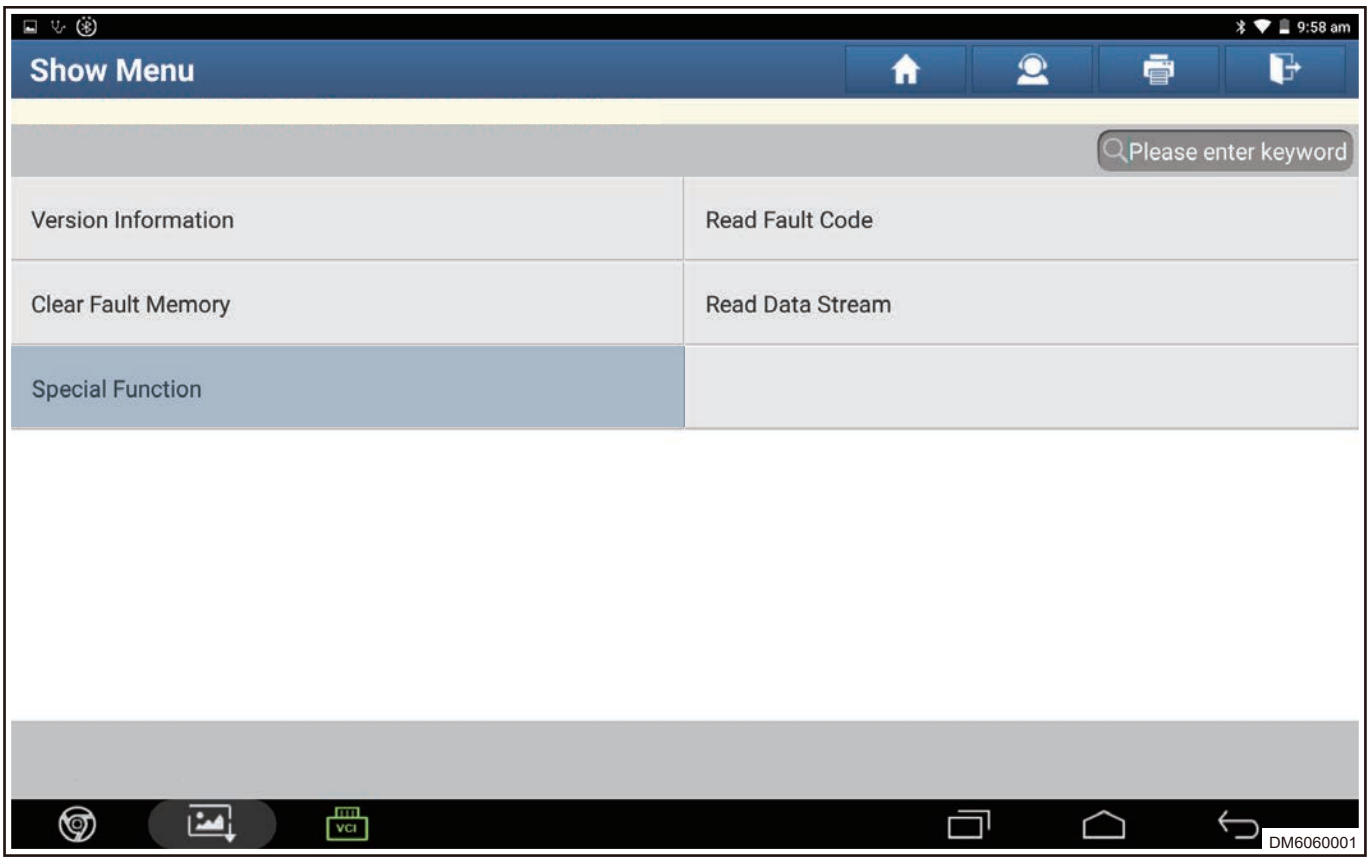
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.
(2) Select “T22” model.
(3) Enter next screen and click “System Selection”.



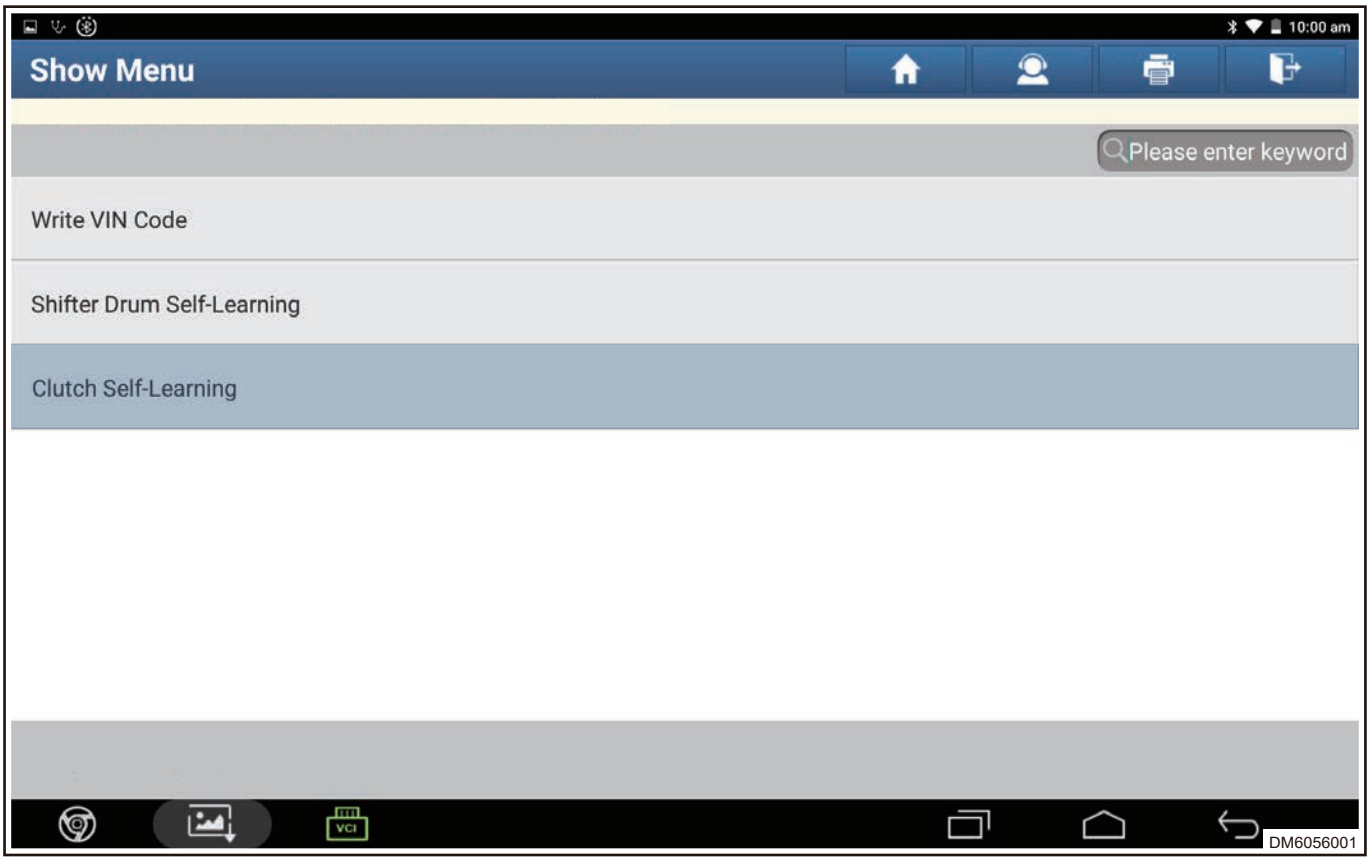
(4) Enter next screen and click "7DCT300/400 (Transmission Control Module)".



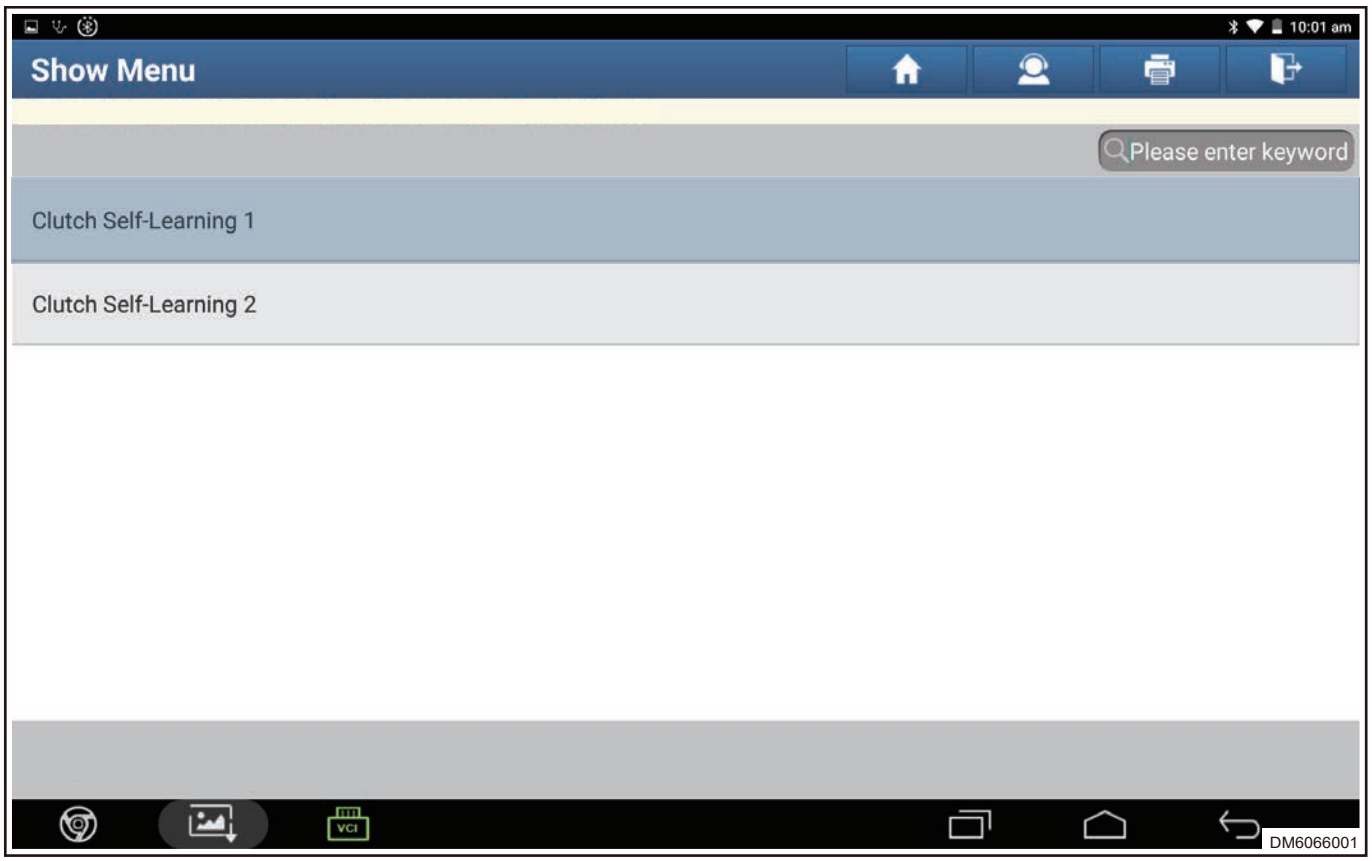
(5) Enter next screen and click “Special Function”.



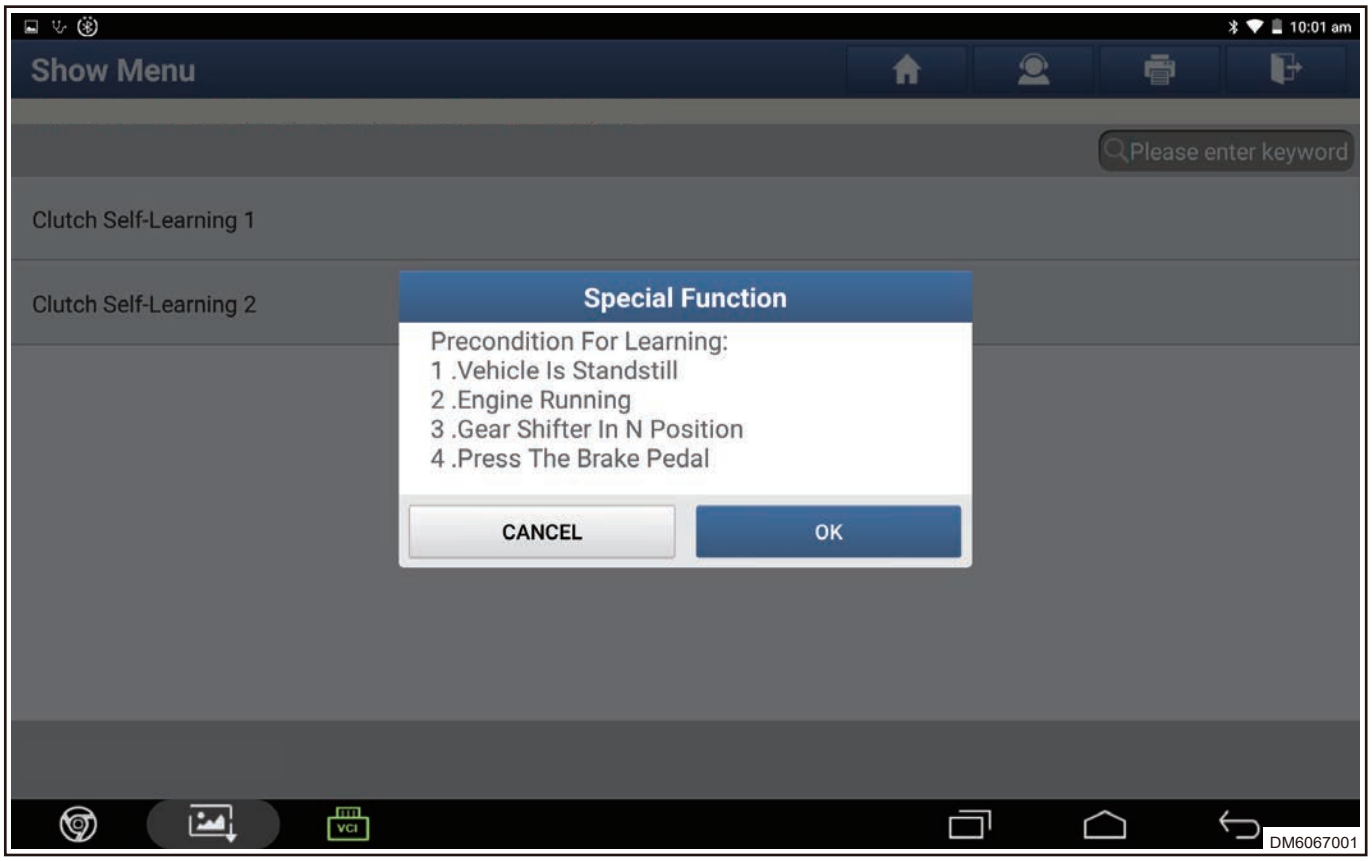
(6) Enter next screen and click “Clutch Self-Learning”.



(7) Click "Clutch Self-Learning 1".



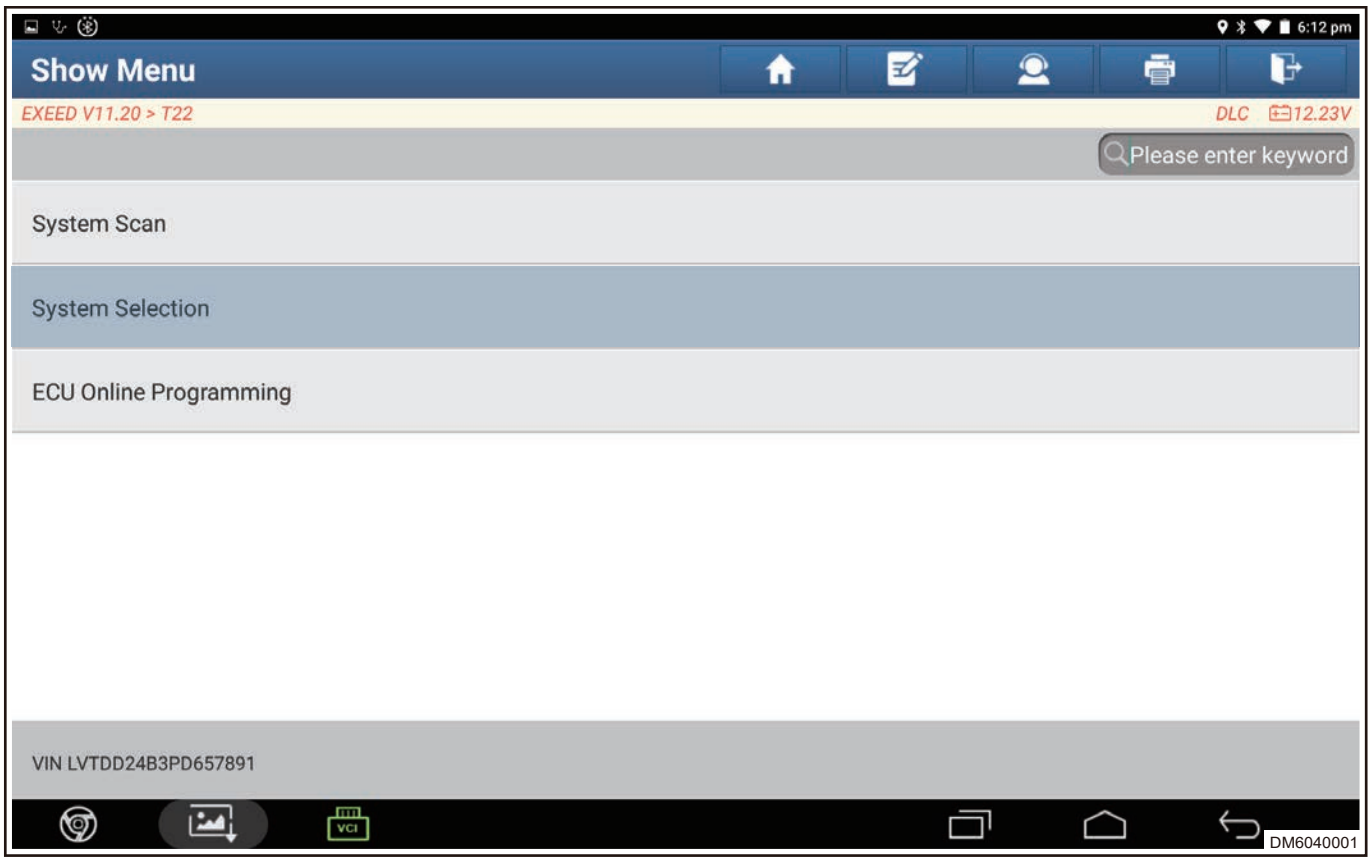
(8) Precondition for learning.



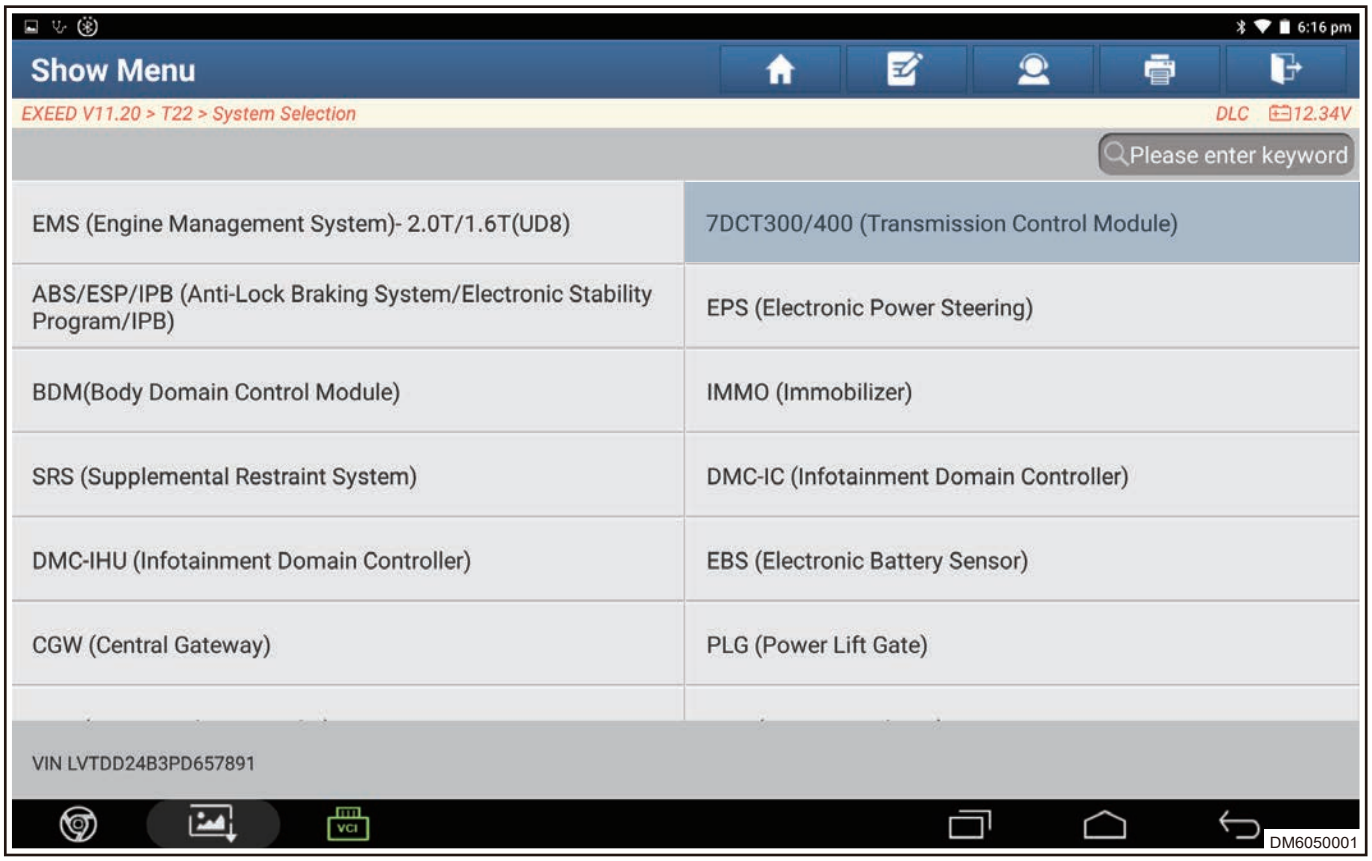
(9) Click “OK” to perform clutch self-learning 1.

■ **Clutch Self-learning 2**

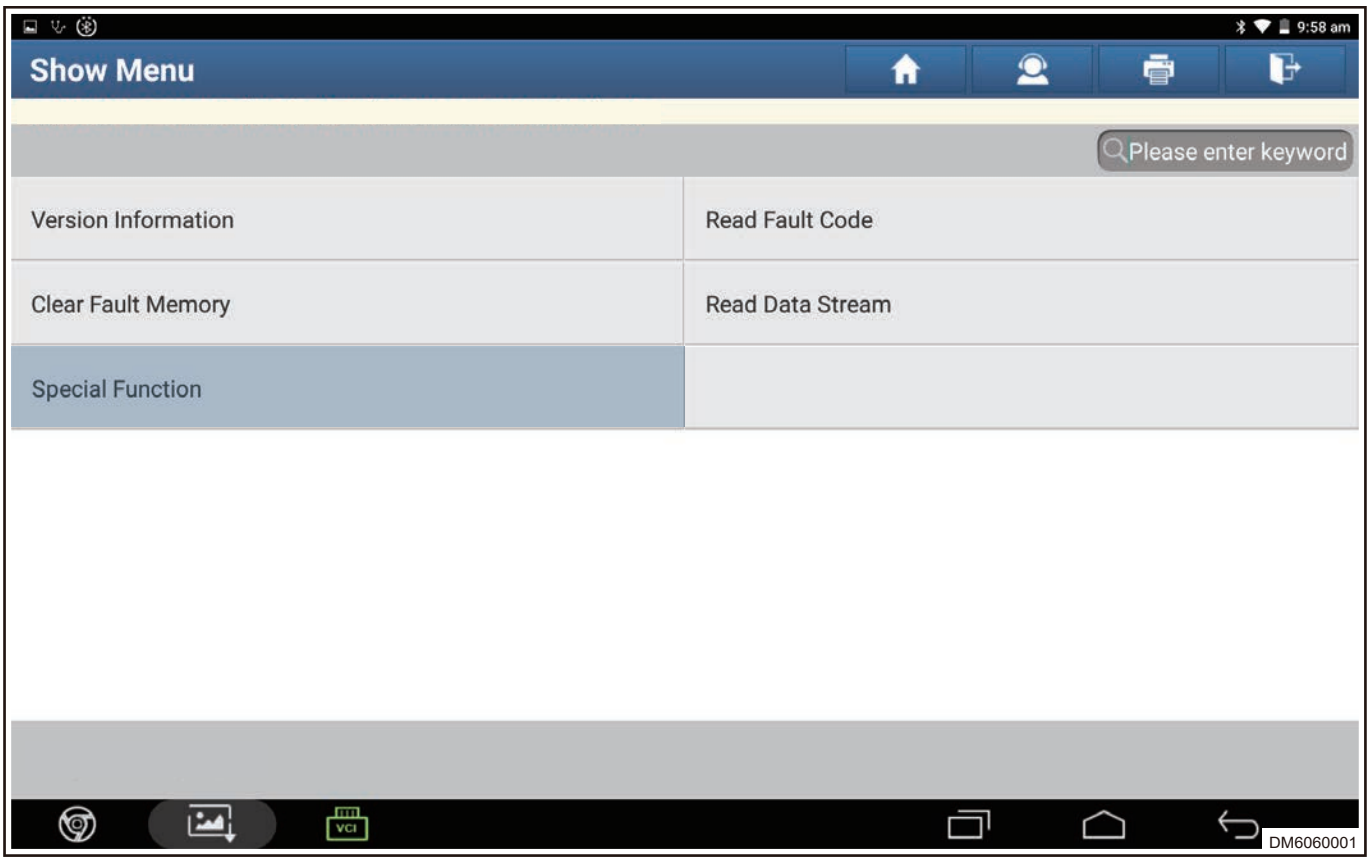
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.
(2) Select “T22” model.
(3) Enter next screen and click “System Selection”.



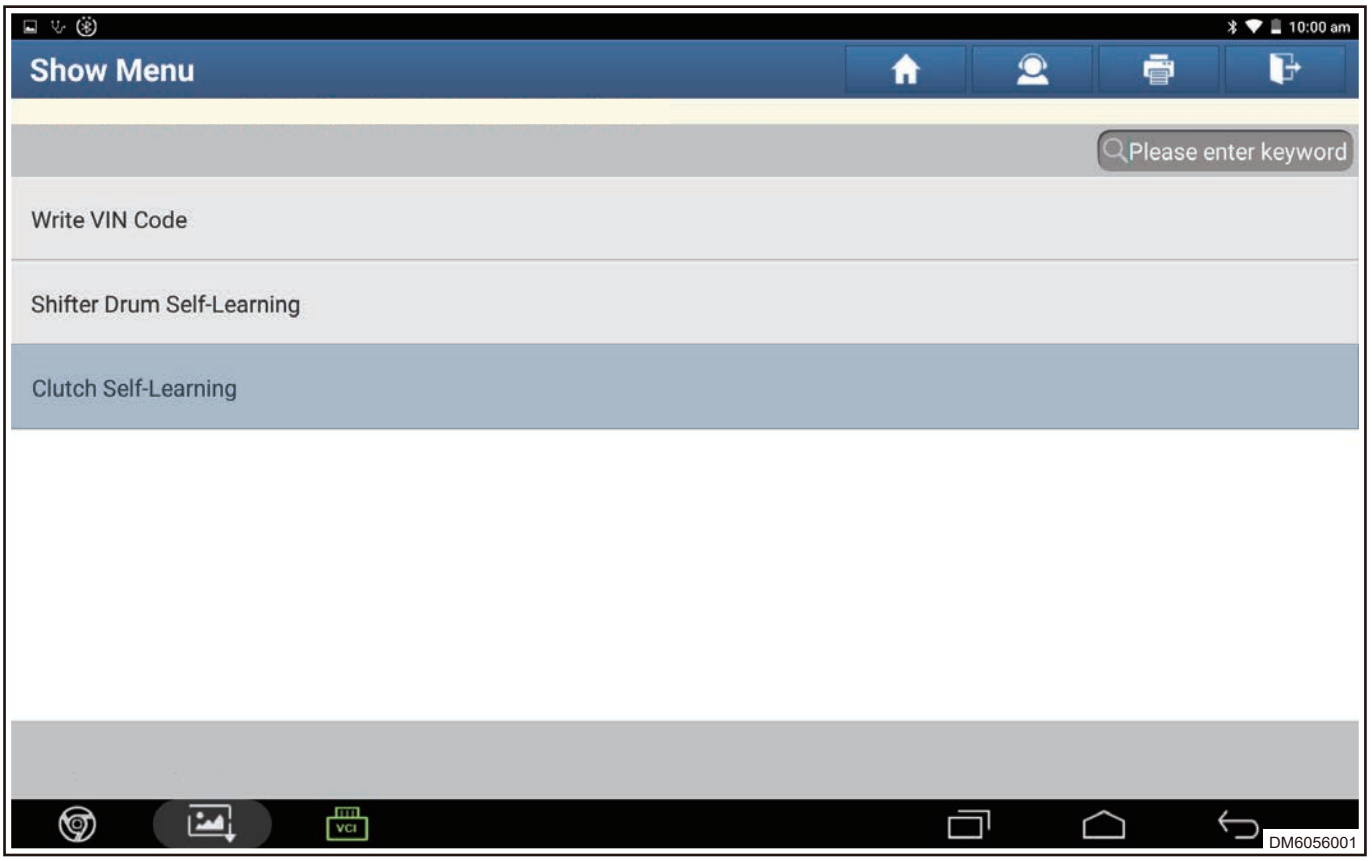
(4) Enter next screen and click "7DCT300/400 (Transmission Control Module)".



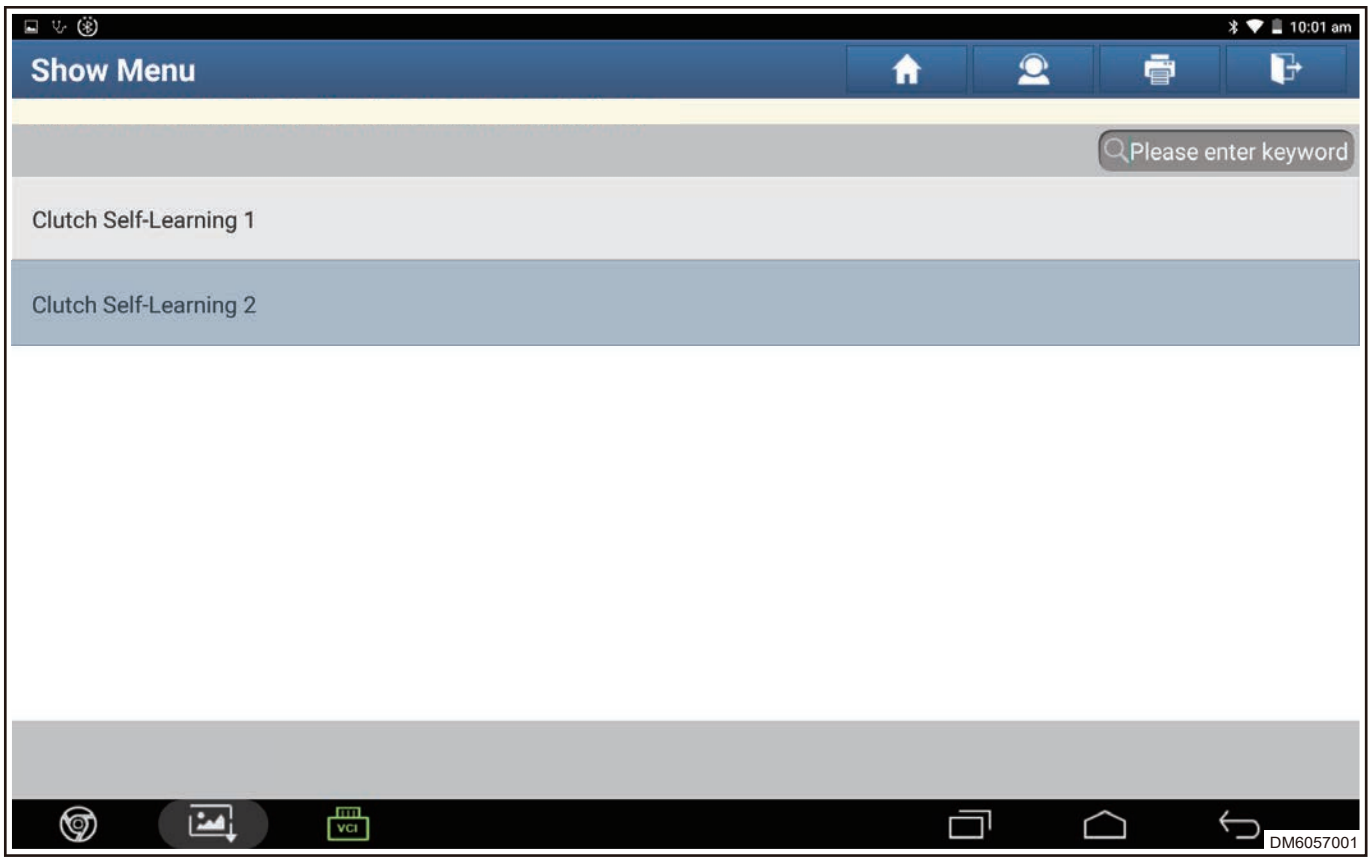
(5) Enter next screen and click “Special Function”.



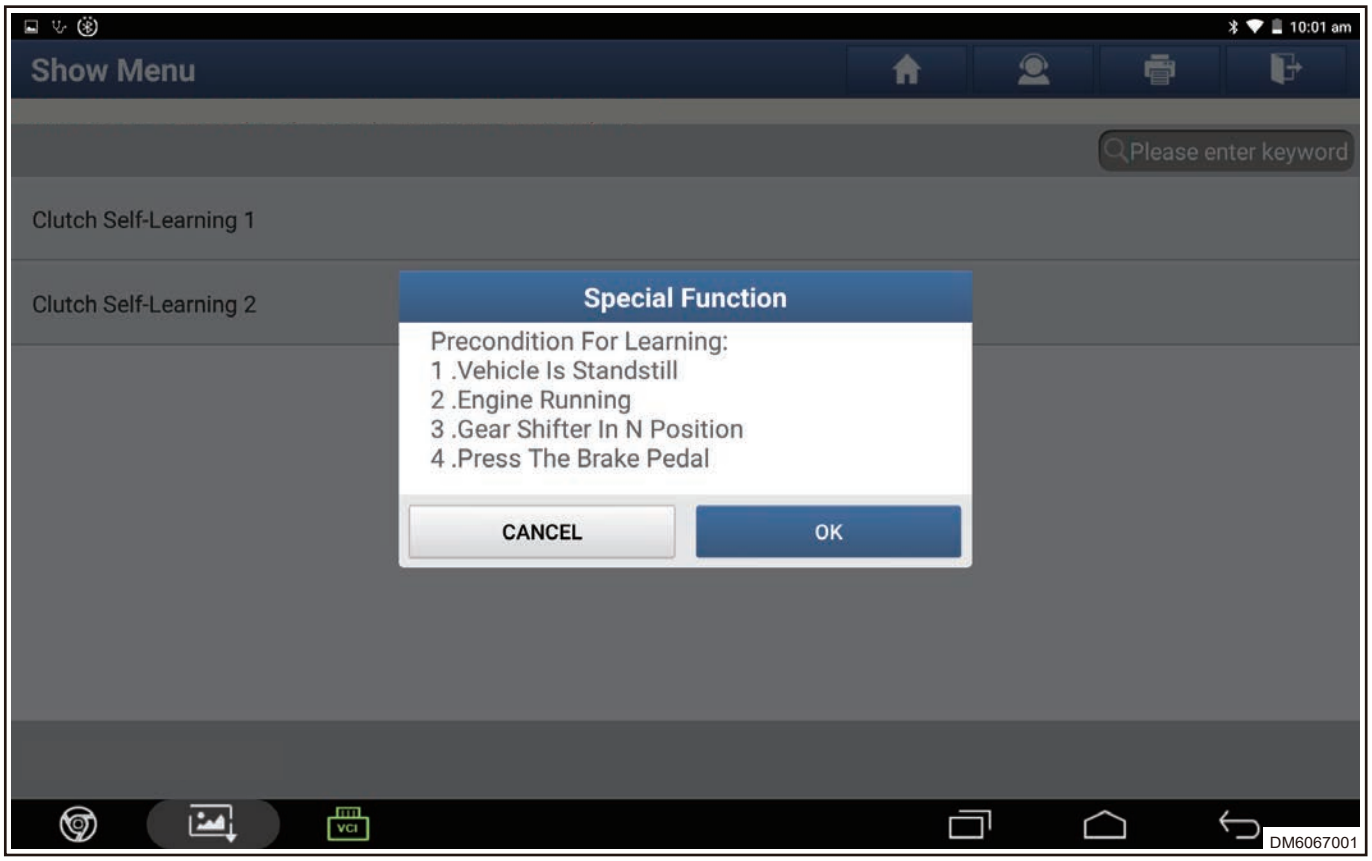
(6) Enter next screen and click “Clutch Self-Learning”.



(7) Click "Clutch Self-Learning 2".



(8) Precondition for learning.



(9) Click “OK” to perform clutch self-learning 2.

■ P Gear Self-check Operation after Online Refresh OF Transmission

In order to ensure that the 7DCT transmission can complete the self-check of clutch and shift drum, as well as the normal communication between the TCU and various associated controllers of vehicle, after refreshing the data online, please follow the following steps to operate:
Step 1: Power on the vehicle battery for the first time, ensuring that the positive and negative of bolts are tightened. Connect online refresh device via driver OBD.
Step 2: Power on the ignition switch and refresh online.
Step 3: After the refresh is completed, depress the brake pedal and hold it still. The transmission starts self-check, and the normal self-check completion time is < 20 s; (During the self-check process, the instrument cluster prompts: ① The yellow indicator light of transmission is on; ② The text prompt "Please depress the brake pedal until P gear appears"; ③ There is a "click" self-check sound in the engine compartment);
Step 4: After the self-check is completed, the instrument cluster displays P gear, the transmission yellow indicator goes out, and the text indication disappears;
Step 5: Turn off the ENGINE START STOP switch, complete the self-check of the transmission clutch and shift drum, and communicate with all associated controllers of the vehicle;
Step 6: Turn on the ENGINE START STOP switch, and the vehicle can start and drive normally.

⚠ Caution

- **During the self-check process, it is not allowed to power off the battery and ENGINE START STOP switch.**
- **If there is an abnormal power off during the self-check process, resulting in the transmission self-check not being completed, the battery needs to be disconnected again and wait for more than 5 minutes to ensure that the TCU is completely powered off and sleeping, and then follow the above 6 steps to carry out the self-check again.**

3.2 740DCT TRANSMISSION ASSEMBLY

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Be sure to wear necessary safety equipment to prevent accidents when removing and repairing.

(2) Appropriate force should be applied when removing transmission. Be careful not to operate roughly.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Drain bolt and oil inspection bolt are both non-reusable parts, and replace them with new ones after removal.

(2) Transmission lubricant has a service life of 60,000 km.

(3) The vehicle must be kept level during refilling.

(4) To avoid oil contamination, the container used to store transmission oil must be a special container for oil fluid (the container must not be used to store other liquids or items), and the container must be kept clean.

(5) In case of oil spillage, the transmission oil needs to be added depends on the actual situation, but it must be ensured that the filled oil can make the position of oil in transmission higher than that of oil inspection bolt before adjusting oil level.

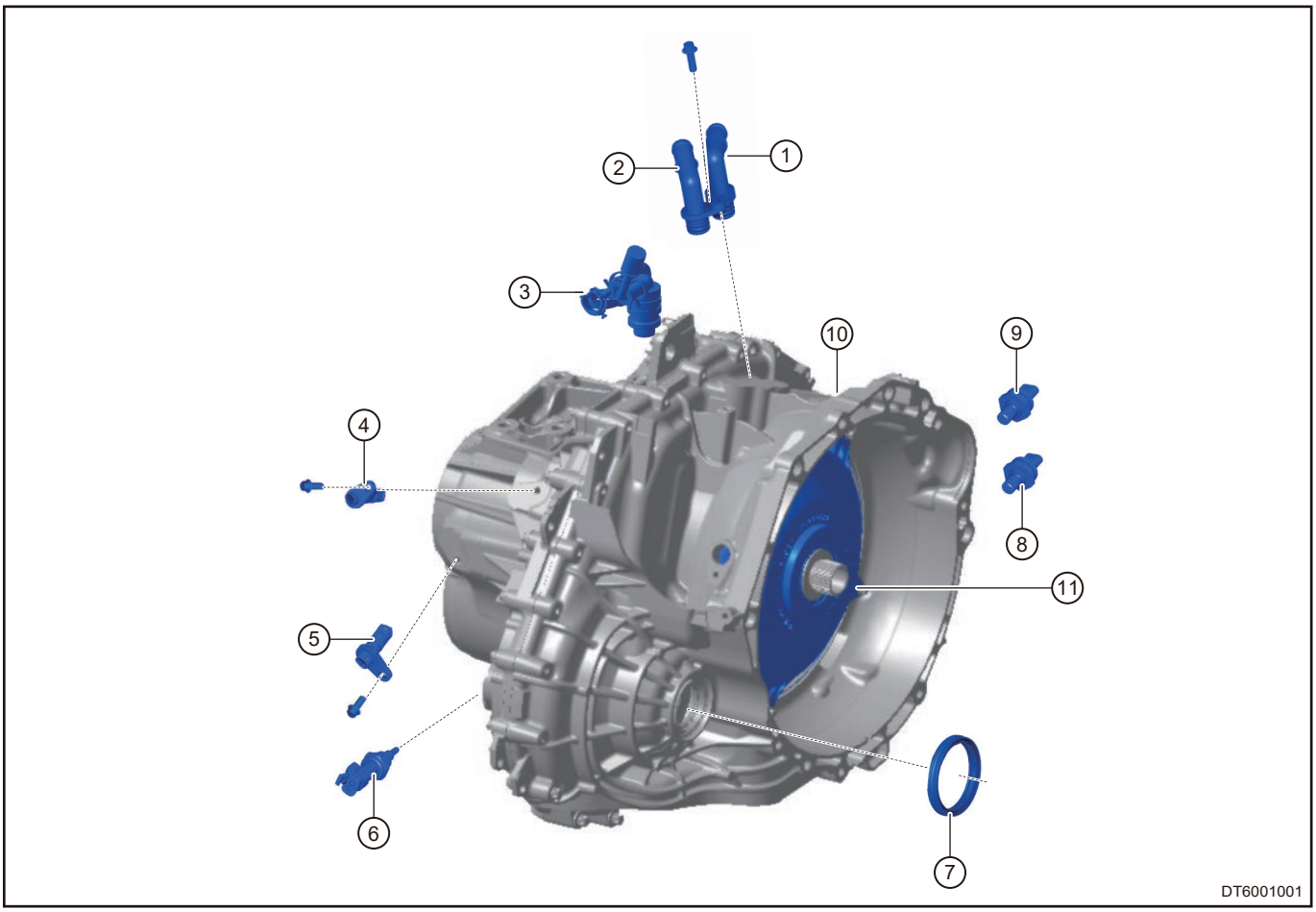
(6) Transmission oil should be stored under 20°C ± 10°C.

(7) The oil is a part of transmission system. It must be sent back to manufacturer together with transmission for further analysis if required.

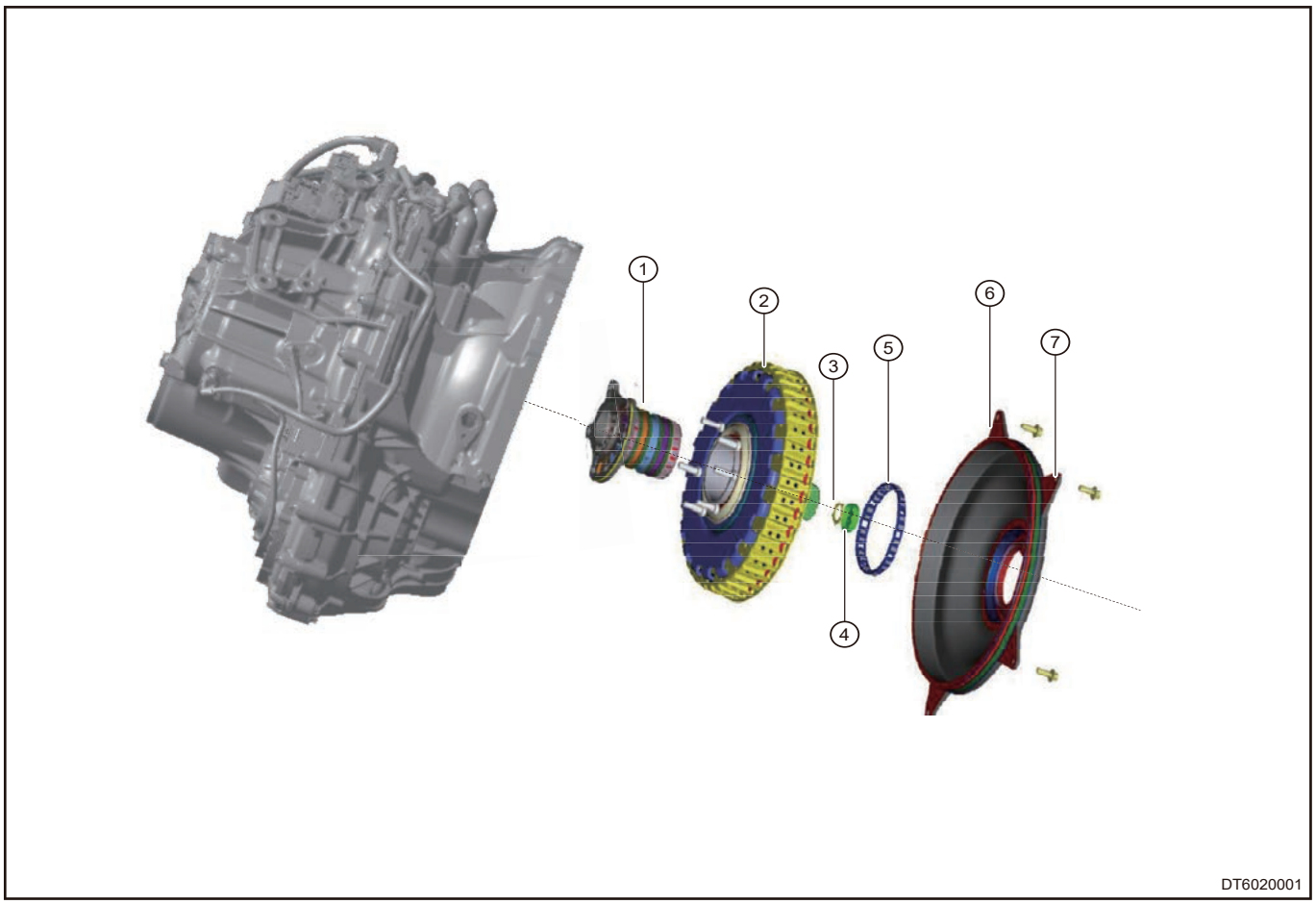
(8) During replacement of sensor, it is necessary to wear anti-static equipment.

2 System Overview

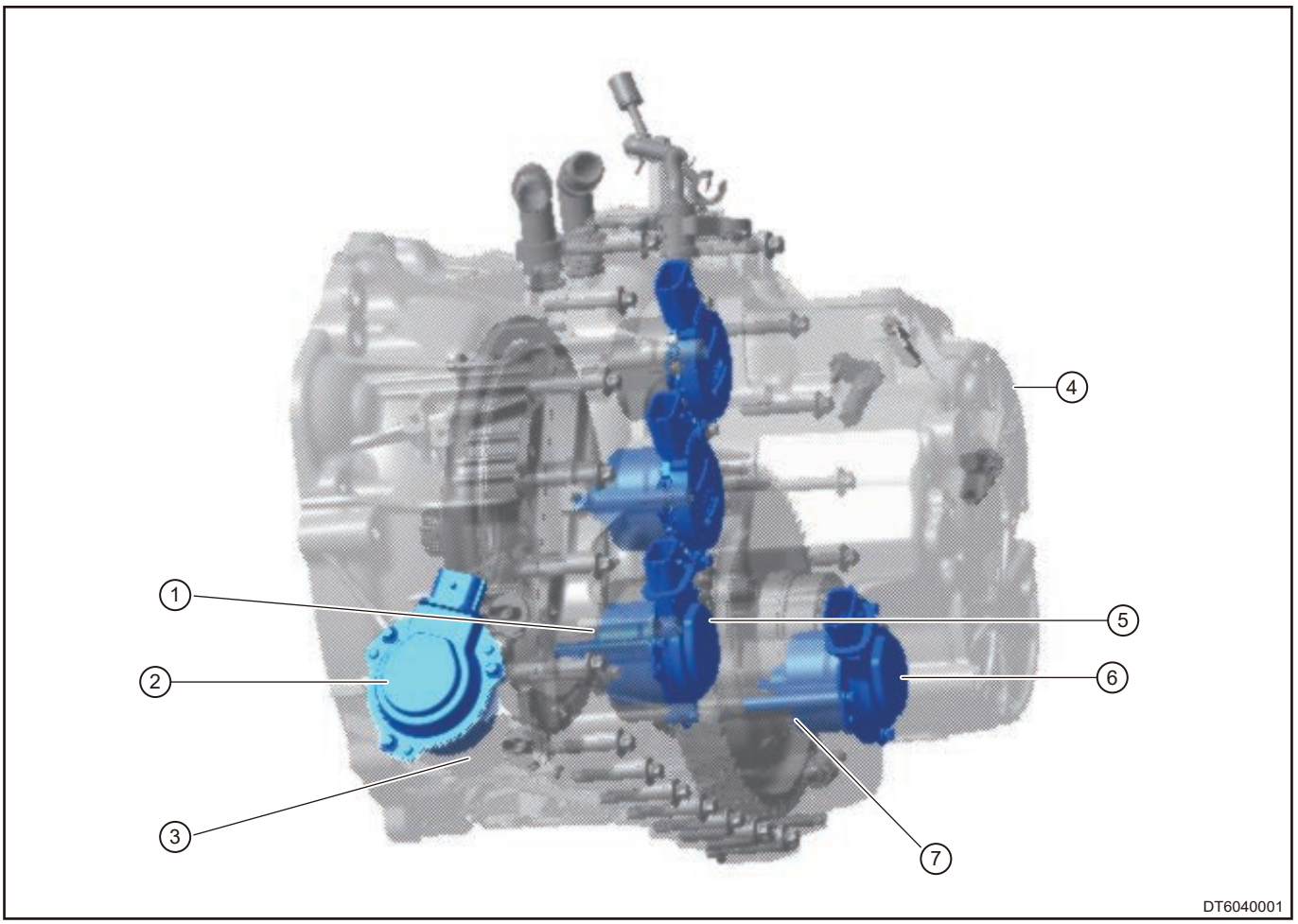
2.1 System Components Diagram



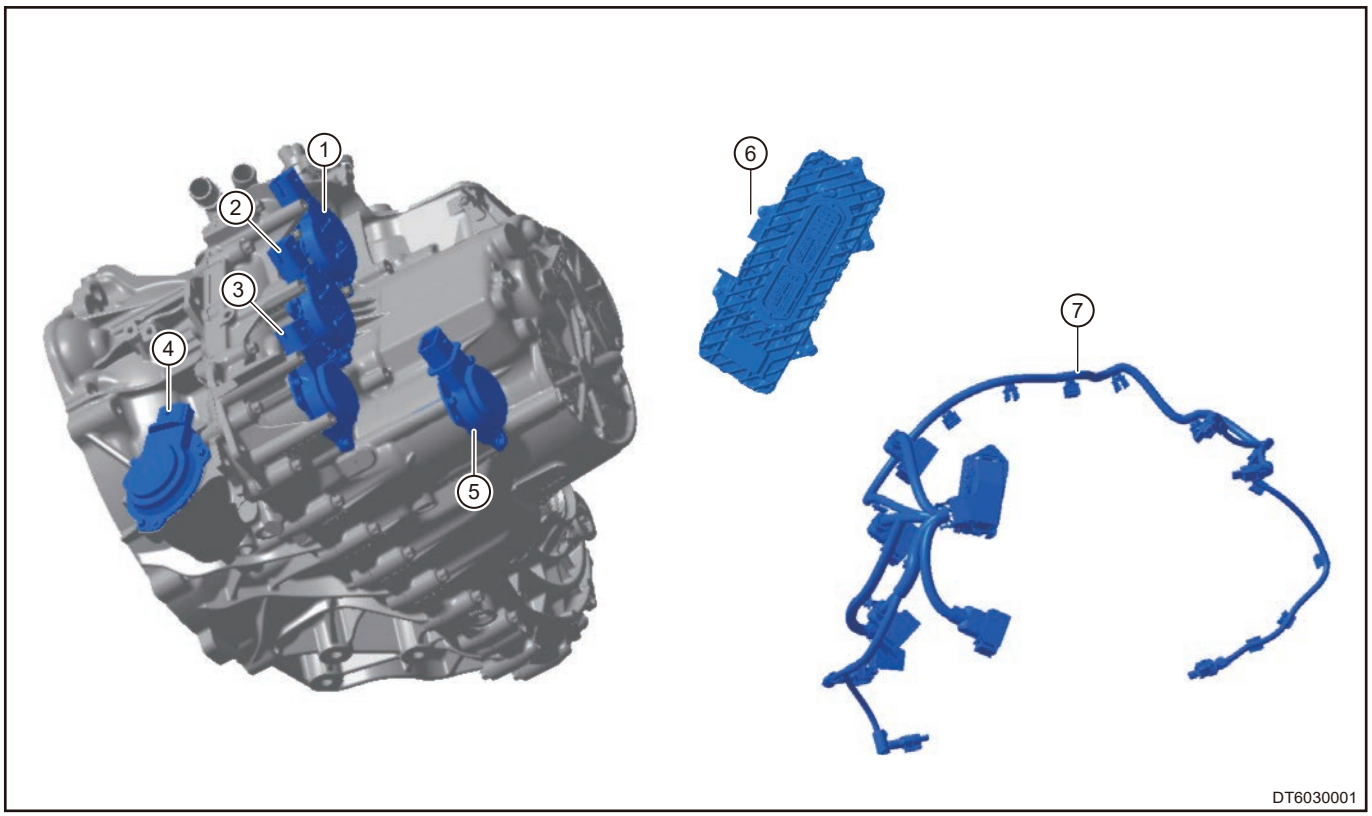
1	Transmission Outlet Pipe Joint	7	Drive Shaft Oil Seal
2	Transmission Inlet Pipe Joint	8	Pressure Sensor 1
3	Transmission Breather Cap	9	Pressure Sensor 2
4	Input Shaft Speed Sensor 2	10	Transmission Assembly
5	Input Shaft Speed Sensor 1	11	Clutch Assembly
6	Temperature Sensor		



1	Clutch Support Set	5	Clutch Cover Cylindrical Roller Bearing
2	Wet Dual Clutch Assembly	6	Clutch Cover O-ring
3	Clutch Snap Ring	7	Clutch Cover Assembly
4	Seal Cover		



1	Clutch Actuator Pump 2 (CAP2)	5	Clutch Motor 2
2	Clutch Motor 1	6	Clutch Cooling Motor
3	Clutch Actuator Pump 1 (CAP1)	7	Clutch Cooling Pump (CCP)
4	Transmission Assembly		



1	Shift Motor 2	5	Cooling Motor
2	Shift Motor 1	6	Transmission Control Module
3	Clutch Motor 2	7	Transmission Wire Harness
4	Clutch Motor 1		

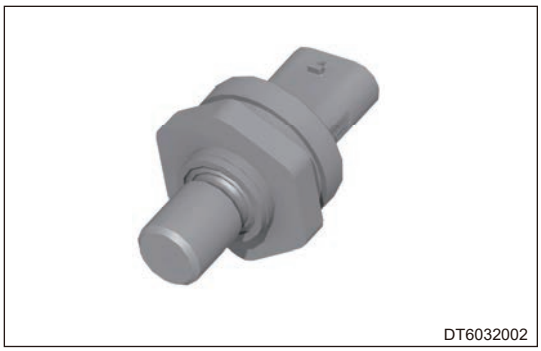
2.2 Component Operation Description

■ Input Shaft Speed Sensor

(1) The sensor is a Hall sensor that can identify the actual speed of both input shafts, and it is one of data used to determine whether the clutch is slipped.

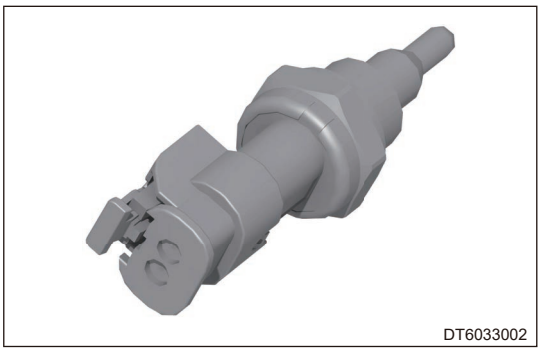
■ **Pressure Sensor**

(1) It is used to detect the clutch pressing force, which is one of feedback slipping data. It is a varistor type sensor, the greater the pressure, the greater the deformation of the varistor diaphragm, the higher the voltage output.



■ **Temperature Sensor**

(1) It is used to detect the transmission oil temperature, and it will enter fail-safe mode when temperature is too high. This is a negative temperature coefficient resistor. The resistance becomes smaller as the temperature increases.



2.3 Repairable List

Transmission Control Unit	Transmission control unit fixing bolt is a non-reusable part, which must be replaced after each removal
Drive Shaft Oil Seal	Drive shaft oil seal is a non-reusable part, which must be replaced after each removal
Transmission Oil	Drain bolt and oil inspection bolt are non-reusable parts, which must be replaced after each removal
Shift Motor	O-ring and shift motor bolt are non-reusable parts, which must be replaced after each removal
Sensors (Pressure Sensor 1, Pressure Sensor 2, Temperature Sensor, Input Speed Sensor 1 and Input Speed Sensor 2)	Sensor and its bolts are non-reusable parts, which must be replaced after each removal.
Wire harness	If wire harness clip, wire harness connector and wire harness itself are not damaged, the wire harness can be reused
Differential Inner Oil Seal	Differential inner oil seal is a non-reusable part, which must be replaced after each removal

3 On-vehicle Service

3.1 Specifications

■ **Gear Ratio Parameters**

Type		**740DHA**	**740 DHB**
Gear Position	1st	4.308	

Type		740DHA	740 DHB
	2nd	2.684	
	3rd	1.594	
	4th	1.114	
	5th	0.894	
	6th	0.829	
	7th	0.638	
	Reverse	3.678	
	Final Drive Ratio 1	1st/2nd/6th/7th: 3.944	
	Final Drive Ratio 2	3rd/4th/5th/R: 4.438	

■ **Torque Specifications**

Description	Torque (N · m)
Transmission Drain Plug	43 ± 4
Transmission Control Unit Fixing Bolt	8.5-9.5
Fixing Bolt Between Upper of Transmission and Engine	95 ± 10
Fixing Bolt Between Engine and Transmission Positioning Pin Hole	50 ± 5
Fixing Bolt Between Lower of Transmission and Engine	50 ± 5

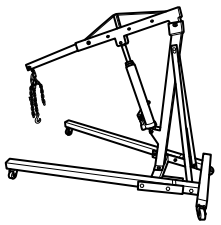
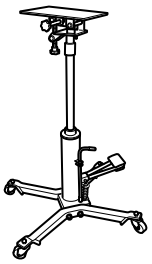
■ **Transmission Oil Specifications**

Transmission Model	Oil Type	Total Capacity
7DCT400	Sinopec DCTF-GS	5 ± 0.2 L

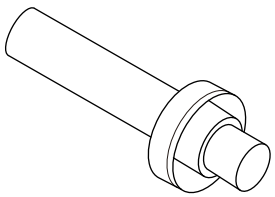
Transmission lubricant has a service life of 60,000 km.

3.2 Tools

■ General Tools

Tool Name	Tool Drawing
Engine Hoist	 RCH0043006
Transmission Carrier	 RCH0005006

■ Special Tool

Tool Name	Part No.	Tool Drawing
Differential Oil Seal Assembly Fixture	EPT-0013	 S00096

3.3 Transmission Oil Replacement

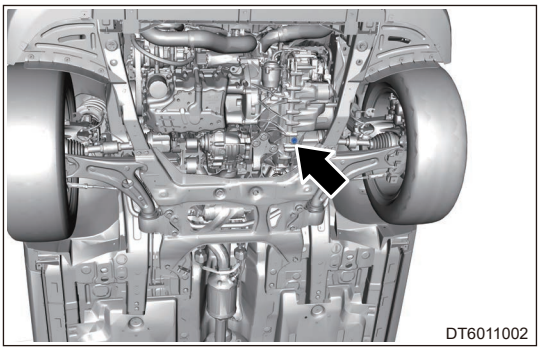
■ Draining/Refilling

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lift is locked when repairing or inspecting the lifted vehicle.**

(1) Raise vehicle with a lift.
(2) Remove the engine lower protector assembly.

(3) Remove the transmission drain bolt (arrow).



⚠ Caution

- **Drain plug with seal ring is non-reusable component, and replace it after each removal.**

(4) Drain the transmission oil.

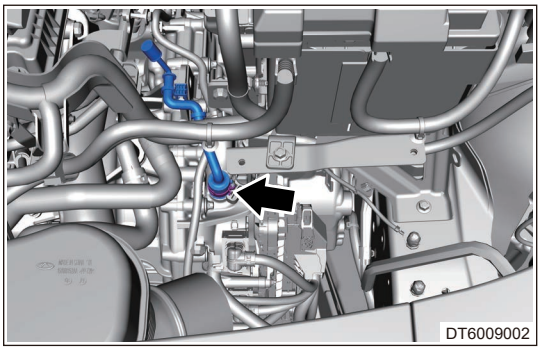
(5) Replace drain bolt with a new one and tighten it.

Tightening torque: 43 ± 4 N · m

(6) Remove the air filter assembly.

(7) Remove the battery and tray assembly.

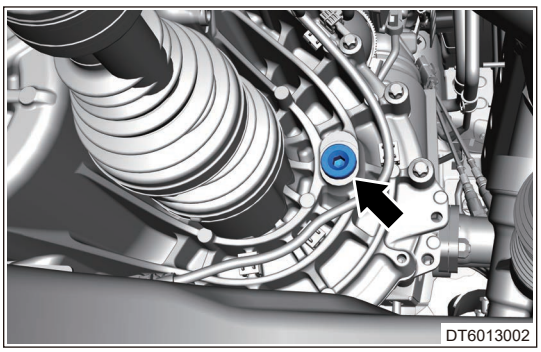
(8) Remove transmission breather pipe and fill new transmission oil from breather pipe port (the added amount is discharged amount).



(9) After waiting for 30 minutes, unscrew oil inspection bolt near differential on clutch case side and adjust oil level until no oil is spilled from oil inspection port.

(10) Replace oil inspection bolt with a new one and tighten it.

Tightening torque: 43 ± 4 N · m



(11) Install the engine lower protector.

(12) Install the battery and tray assembly.

(13) Install the air filter assembly.

⚠ Caution

- **Drain bolt and oil inspection bolt are both non-reusable parts, and replace them with new ones after removal.**
- **Transmission lubricant has a service life of 60,000 km.**
- **The vehicle must be kept level during refilling.**
- **To avoid oil contamination, the container used to store transmission oil must be a special container for oil fluid (the container must not be used to store other liquids or items), and the container must be kept clean.**
- **In case of oil spillage, the transmission oil needs to be added depends on the actual situation, but it must be ensured that the filled oil can make the position of oil in transmission higher than that of oil inspection bolt before adjusting oil level.**
- **Transmission oil should be stored under 20 ℃ ± 10 ℃.**
- **The oil, a part of 7DCT400 transmission system, must be sent back to manufacturer together with transmission for further analysis if required.**

Transmission oil capacity and type are shown in the table below

Type	Oil Type	Total Capacity
7DCT400	Sinopec DCTF-GS	5 ± 0.2 L

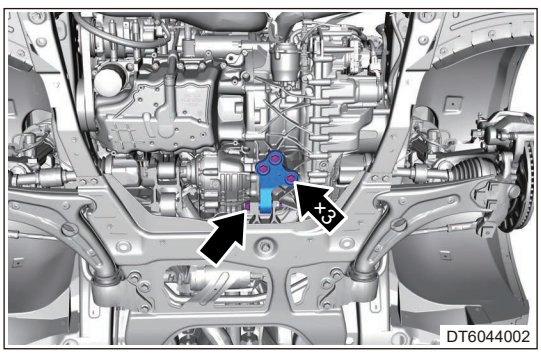
3.4 Transmission Assembly

■ Removal

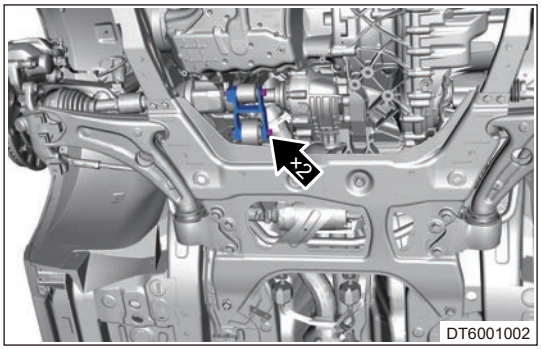
⚠ Caution

- **Before removal of power assembly, first drain transmission oil.**
- **During separation of engine and transmission, pay attention not to damage the peripheral accessories of transmission, such as rubber cooling pipe, pressure sensor, etc. If there is any damage, it is necessary to replace it according to requirements.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine trim cover assembly.
(4) Remove the air filter assembly.
(5) Remove the battery.
(6) Remove the battery tray.
(7) Remove the engine lower protector.
(8) Drain the coolant.
(9) Drain the transmission oil.
(10) Remove the front left wheel.
(11) Remove the front right wheel.
(12) Remove the front left drive shaft assembly.
(13) Remove the front right drive shaft with bearing bracket assembly.
(14) Raise vehicle to a proper height, remove 4 fixing bolts (-arrow) from rear upper mounting cushion and then remove rear upper mounting cushion assembly.



(15) Remove 2 fixing bolts (arrow) from rear right mounting connecting rod, and then remove rear right mounting connecting rod assembly.

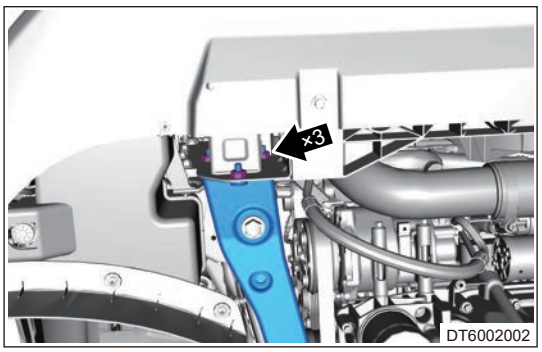


(16) Remove front left/right lower impact crossmember.

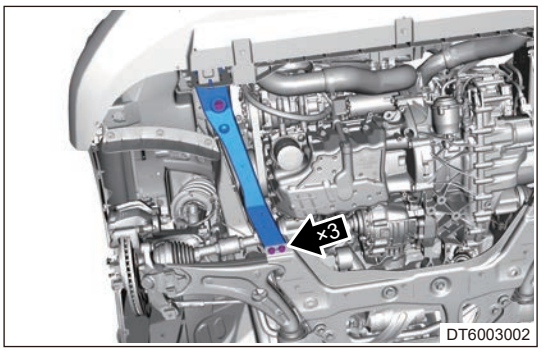
Hint:

- Use same removal procedures for left and right sides, here is front right lower impact crossmember.

(17) Remove 3 fixing nuts (arrow) between front right impact and front lower impact.

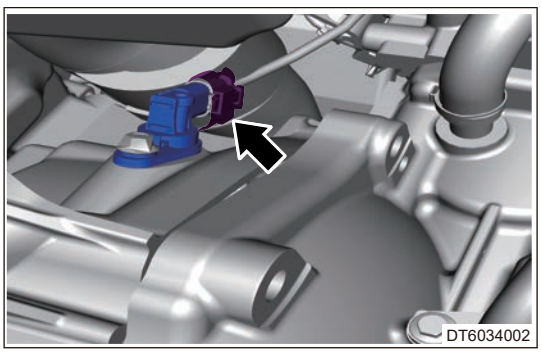


(18) Remove 3 fixing bolts (arrow) between front right impact as well as front sub frame and vehicle body, remove front right impact.

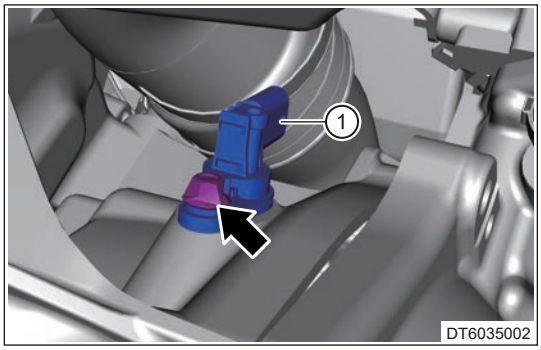


(19) Remove the front sub frame assembly.

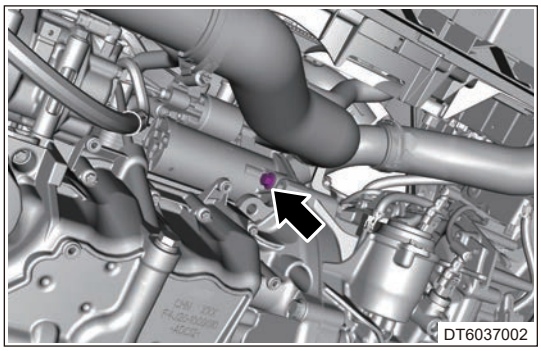
(20) Disconnect the engine speed sensor connector.



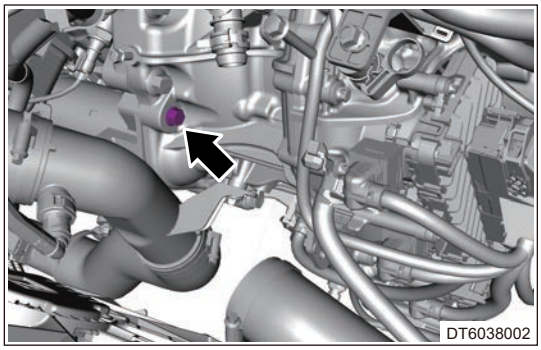
(21) Remove 1 fixing bolt and engine speed sensor (1).



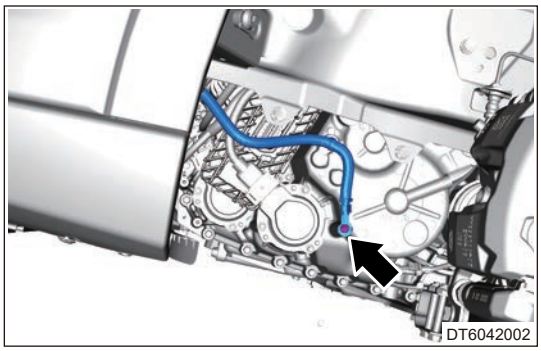
(22) Remove 1 fixing bolt from starter.



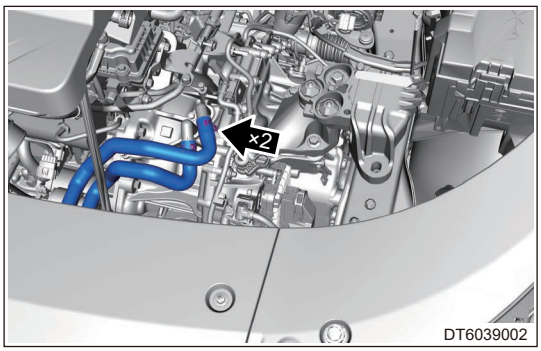
(23) Remove 1 fixing bolt from starter.



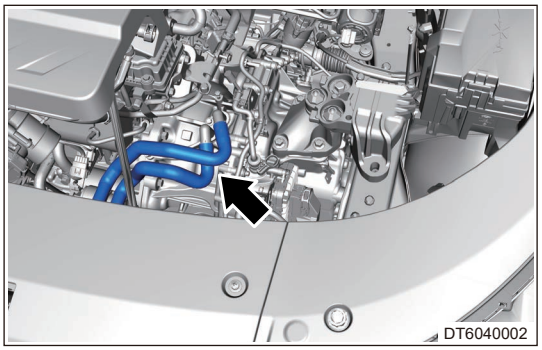
(24) Remove the transmission ground wire.



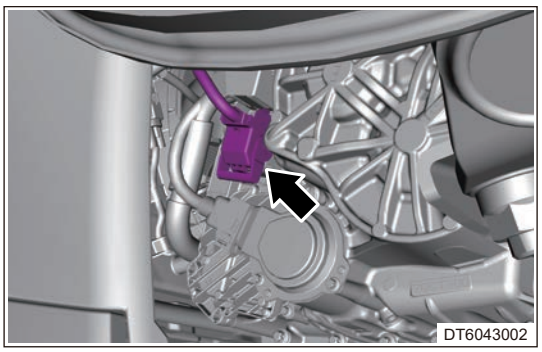
(25) Remove transmission inlet and outlet pipe clamps.



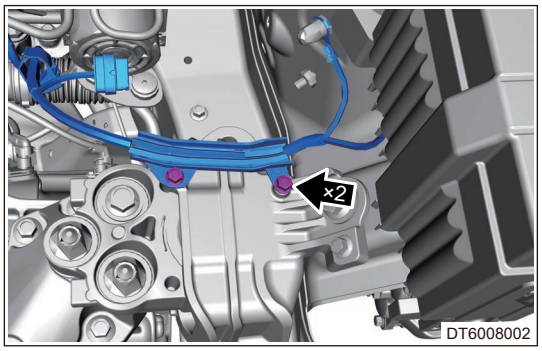
(26) Disengage transmission inlet and outlet pipes.



(27) Disconnect the transmission control unit connector.



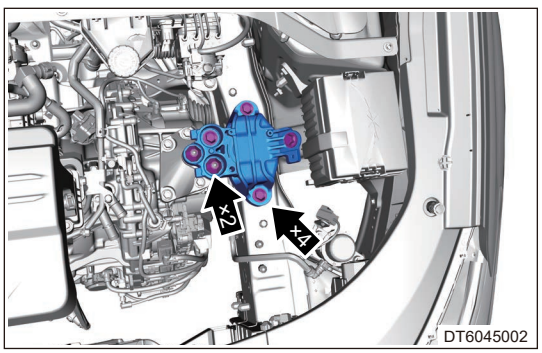
(28) Remove 2 coupling bolts (arrow) between electronic power pump wire harness and left mounting cushion, separate electronic power pump wire harness and left mounting cushion.



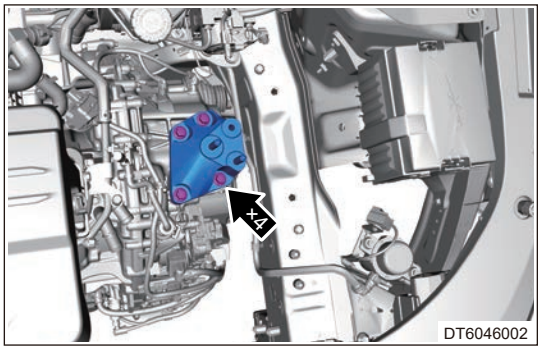
(29) Install the engine hoist.

(30) Install the transmission carrier.

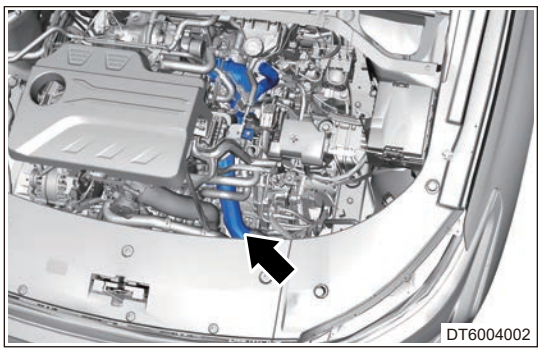
(31) Remove 2 fixing nuts and 4 fixing bolts from left mounting cushion assembly and remove left mounting cushion.



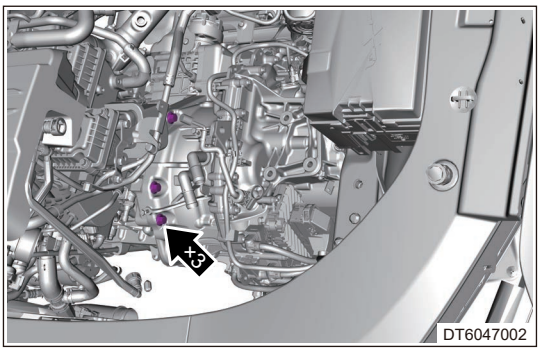
(32) Remove 4 fixing bolts and left mounting bracket.



(33) Remove the intercooler inlet pipe assembly I.

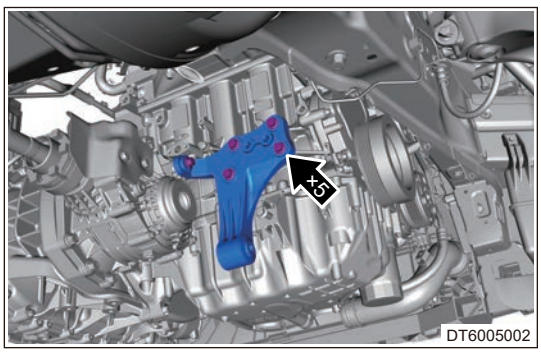


(34) Remove 3 coupling bolts between upper part of transmission and engine.

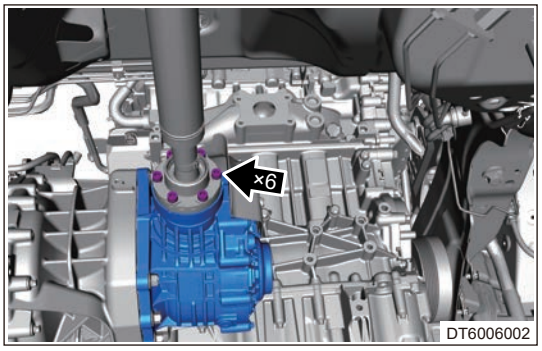


(35) Remove the precatalytic converter assembly (4WD).

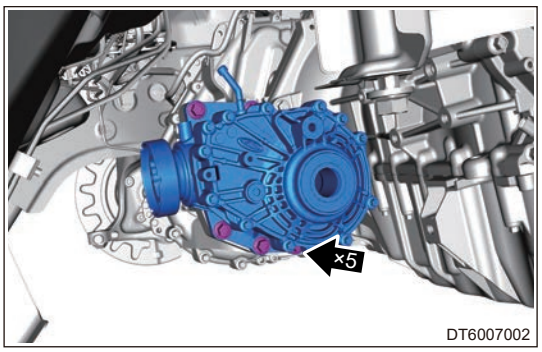
(36) Remove 5 fixing bolts (arrow) and rear right mounting bracket.



(37) Remove 6 coupling bolts (arrow) between propeller shaft and transfer output flange surface.



(38) Remove 5 fixing bolts (arrow) between transfer and transmission.

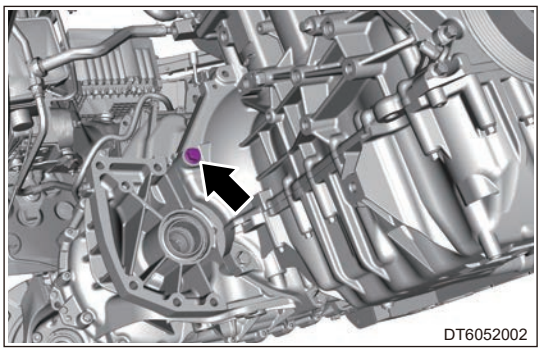


(39) Remove the transfer assembly.

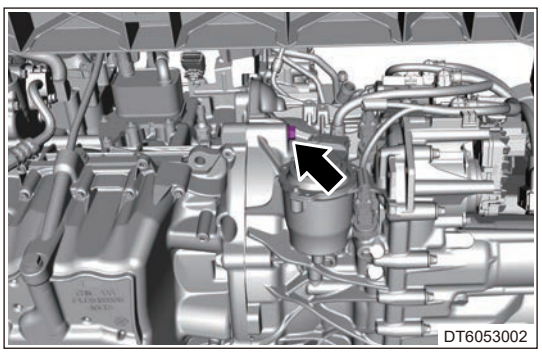
⚠ Warning

- **When operating transfer, pay attention to flange surface connected to intermediate shaft and spline connected to transmission differential. Pay attention to whether O-ring is intact and whether the oil seal is intact to avoid touching the lip of oil seal. Operate transfer case carefully. Do not lay transfer case upside down.**

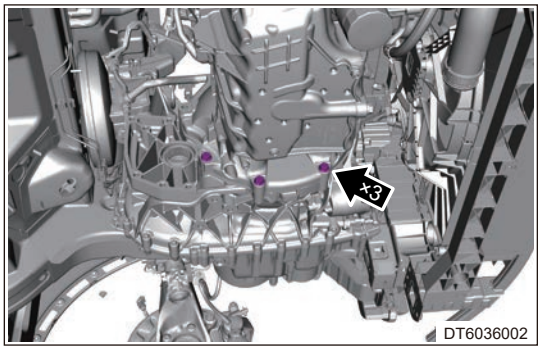
(40) Remove 1 coupling bolt between rear part of transmission and engine.



(41) Remove 1 coupling bolts between front part of transmission and engine.



(42) Remove 3 fixing bolts between lower part of transmission and engine.



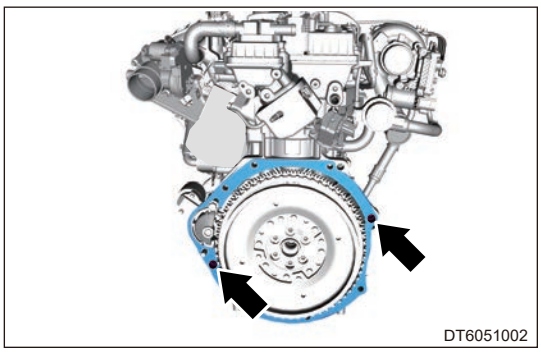
(43) Use tool to separate transmission and engine assembly, and remove transmission assembly.

■ Installation

⚠ Caution

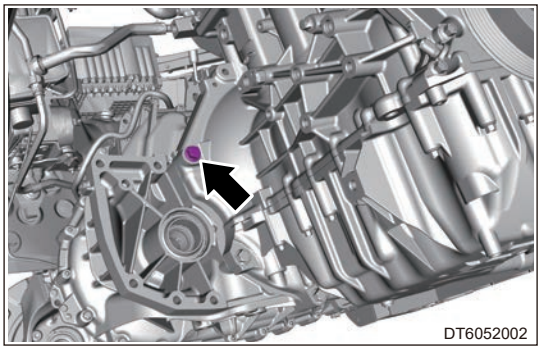
- **Before assembly, the engine cannot be missed to install or sealing plate cannot be bent.**
- **When assembling transmission and engine, the joint surfaces between transmission and engine must be fully contacted before installing coupling bolts between transmission and engine, and then tighten them diagonally and alternately, otherwise it is easy to loose thread of bolt hole on the transmission clutch case.**
- **Teeth-to-teeth (dual clutch spline teeth and dual mass flywheel spline teeth) will occur when transmission and engine are assembled. It can not install assembling bolts or manually press to assemble forcibly. The transmission must be completely disengaged and re-assembled, otherwise it will easily cause the clutch adjusting spring position to deviate, clutch half-clutch point value does not match the joint point value stored in the transmission control unit, and also, vehicle is moved when shifting to driving position, vehicle does not move when depressing accelerator pedal, vehicle jitter will occur when reversing or engine stall will occur when releasing brake pedal in reverse gear.**

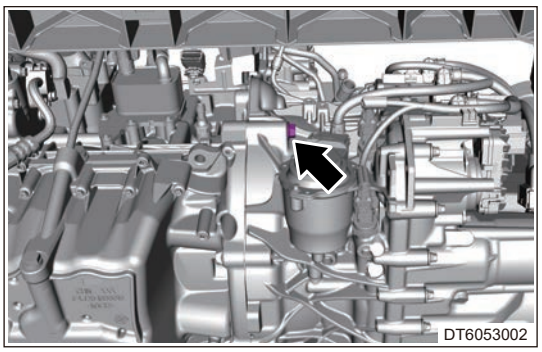
(1) As shown in the illustration below, install sealing plate to engine and ensure that dowel pin holes on engine are inserted into the corresponding holes of the sealing plate.



(2) Align the dowel pin hole of transmission with the dowel pin hole of engine, push the transmission so that the joint surfaces between engine and transmission can be contacted well, and install 2 coupling bolts to front and rear parts of transmission as shown in the illustration.

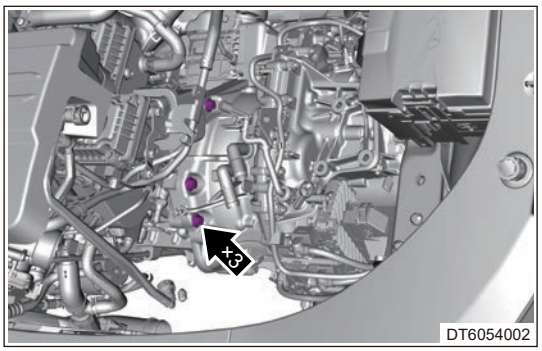
Tightening torque: 50 ± 5 N · m


DT6052002


DT6053002

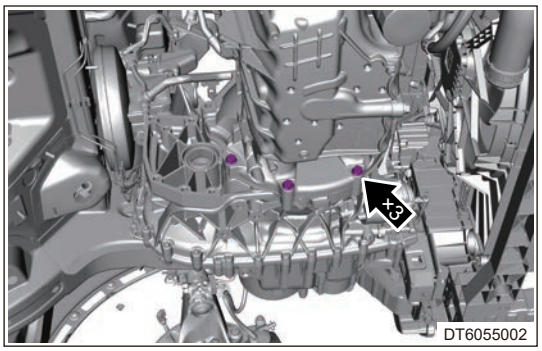
(3) Install 3 coupling bolts to transmission side.

Tightening torque: 95 ± 10 N · m


DT6054002

(4) Install 3 coupling bolts to lower part of transmission.

Tightening torque: 50 ± 5 N · m


DT6055002

(5) Install the transfer assembly.

⚠ Caution

- **Install transfer spline to differential by turning it left and right, and align the transfer case dowel pin with positioning hole of differential case simultaneously.**
- **When installing 5 tightening bolts between transfer and transmission, tighten diagonally in order of top, bottom, left, and right.**

(6) Install 5 fixing bolts between transfer and transmission.

Tightening torque: 120 ± 12 N · m

(7) Install 4 fixing bolts between drive shaft and transfer output flange.

Tightening torque: 30 ± 3 N · m

(8) Install rear right mounting bracket and tighten 5 fixing bolts (arrow).

Tightening torque: 70 ± 7 N · m

(9) Install the precatalytic converter assembly.

(10) Install 4 fixing bolts to left mounting bracket.

Tightening torque: 110 ± 11 N · m

(11) Install 2 fixing nuts and 4 fixing bolt to left mounting cushion assembly.

Tightening torque: 110 ± 11 N · m

(12) Install 2 fixing bolts between electronic power pump wire harness and left mounting cushion assembly.
(13) Install the front sub frame welding assembly.
(14) Install 3 fixing bolts between rear upper mounting cushion assembly and transmission case.

Tightening torque: 110 ± 11 N · m

(15) Install 1 fixing bolt between rear upper mounting cushion assembly and rear lower mounting cushion assembly.

Tightening torque: 150 ± 15 N · m

(16) Install 2 fixing bolts to right rear mounting connecting rod.

Tightening torque: 110 ± 11 N · m

(17) Install left and right impact beams.
(18) Connect the transmission control unit connector.
(19) Install the engine inlet pipe.
(20) Install clamps to engine inlet pipe.
(21) Install the intercooler inlet pipe assembly II.
(22) Install the transmission ground wire fixing bolt.
(23) Install 1 fixing bolt to starter.
(24) Install 1 fixing bolt to starter.
(25) Install engine speed sensor and 1 fixing bolt.
(26) Connect the engine speed sensor wire harness connector.
(27) Install the front right drive shaft with bearing bracket assembly.
(28) Install the front left drive shaft assembly.
(29) Install the front right wheel.
(30) Install the front left wheel.
(31) Fill the transmission oil.
(32) Install the battery tray.
(33) Install the battery.
(34) Install the air filter assembly.
(35) Add the coolant.
(36) Install the engine trim cover assembly.
(37) Install the engine lower protector.
(38) Connect the negative battery cable.

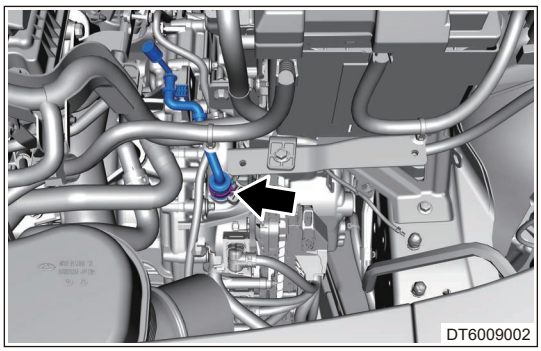
3.5 Breather Plug Assembly

■ Removal

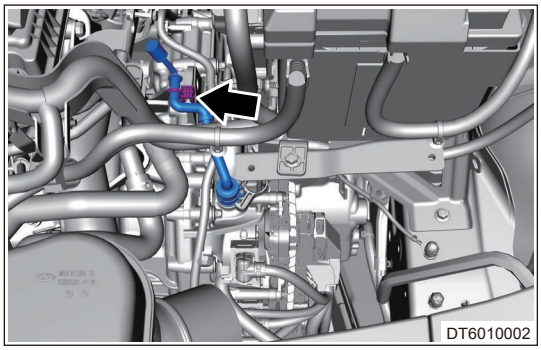
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **It must be performed in the clean environment to prevent any liquid or foreign matters from entering the transmission.**
- **It can be only use original parts when it is necessary to replace parts.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove battery and battery tray.
(4) Remove the air filter assembly.
(5) Remove fixing clamp (arrow) between breather plug assembly and transmission, disconnect connection between breather plug assembly and transmission.



(6) Remove clip fixed on transmission from breather plug assembly, remove breather plug.



■ Installation

(1) Install breather plug to a proper position on transmission.
(2) Install connecting clamp between breather plug and transmission.
(3) Secure breather plug clip on transmission case.
(4) Install battery and battery tray.
(5) Install the air filter assembly.
(6) Connect the negative battery cable.

3.6 Transmission Wire Harness Assembly

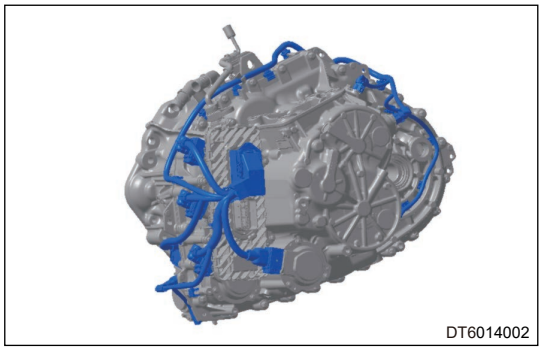
■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement, it is necessary to wear anti-static equipment.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the air filter assembly.
(4) Remove the battery.
(5) Remove the battery tray.
(6) Remove the engine lower protector assembly.

(7) Disconnect each connector from transmission wire harness, disassemble wire harness clip, slowly remove clip, and then remove transmission wire harness assembly.



⚠ Caution

- **When removing the clip, be careful not to use too much force to cause the clip to be deformed and not to be tightened.**

■ Installation

⚠ Caution

- **If wire harness clip, wire harness connector and wire harness itself are not damaged, the wire harness can be reused.**

(1) Connect each connector and clip to transmission wire harness, make sure that each connector is installed in place, and each wire harness clip is installed in the correct position.
(2) Install the engine lower protector assembly.
(3) Install the battery tray.
(4) Install the battery.
(5) Install the air filter assembly.
(6) Connect the negative battery cable.

3.7 Shift Motor

Hint:

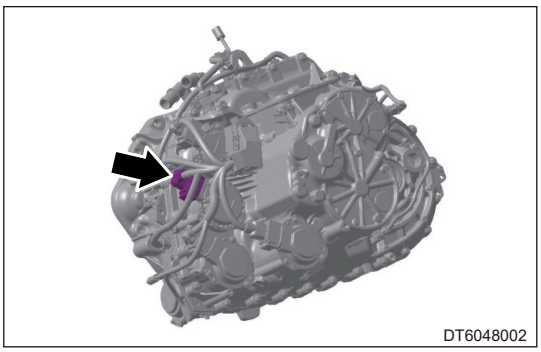
- Use same removal and installation procedures for shift motor 1 and shift motor 2. The following takes removal and installation of shift motor 1 as an example.

■ Removal

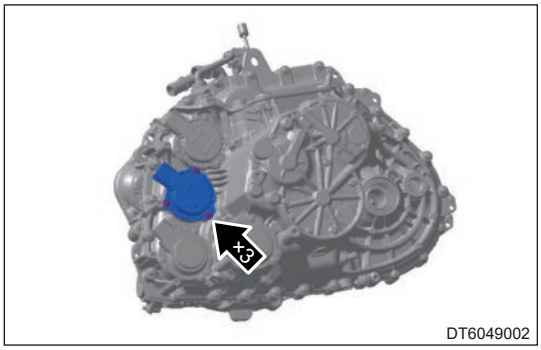
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of shift motor, it is necessary to wear anti-static equipment.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Drain the transmission oil.
(3) Remove the engine lower protector assembly.
(4) Remove the transmission control unit.
(5) Disconnect the shift motor 1 wire harness connector.



(6) Remove 3 fixing screws from shift motor.



(7) Remove the shift motor.

■ **Installation**

⚠ Caution

- **O-ring and shift motor bolts are both non-reusable parts, which must be replaced after each removal.**
- **It is necessary to remove TCU before shift motor is replaced (drain bolt, oil inspection bolt and TCU bolt must be replaced after removal).**
- **During replacement of shift motor, it is necessary to wear anti-static equipment.**

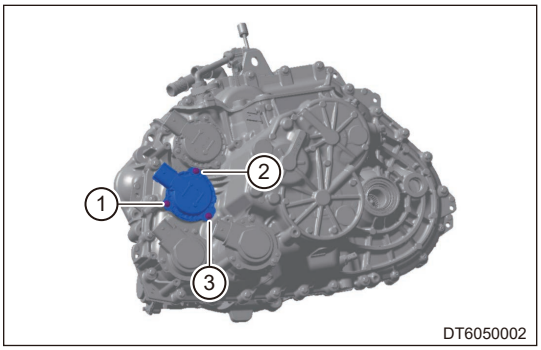
(1) Install O-ring into grooves of shift motor housing.

(2) Install shift motor to a proper position on transmission. Shift motor needs to be installed from transmission case side. When installing, it is necessary to ensure that motor spline shaft is inserted vertically into gear.

(3) Tighten 3 bolts on shift motor in sequence ①②③ as shown in the illustration below.

Pre-tightening torque: 1.5 - 2 N·m

Finally torque: 5 - 6 N·m



(4) Connect the shift motor wire harness connector.

(5) Install the transmission control unit.

(6) Install the engine lower protector assembly.

(7) Fill the transmission oil.

3.8 Temperature Sensor

■ **Removal**

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

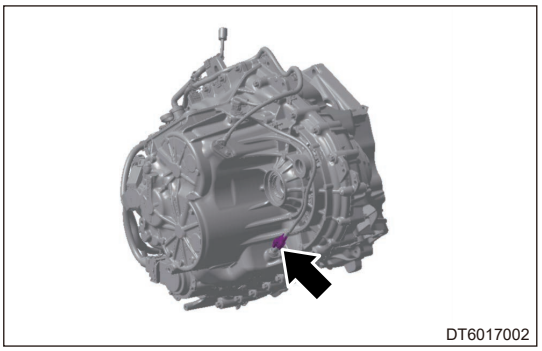
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

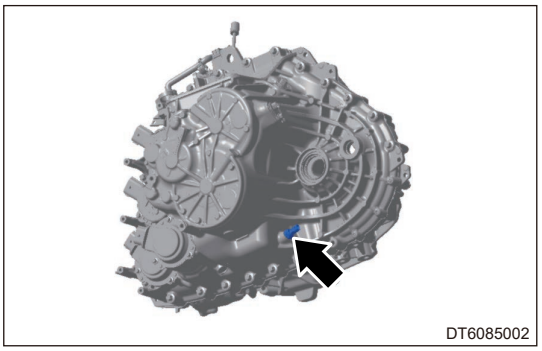
(3) Remove the engine lower protector assembly.

(4) Drain the transmission oil.

(5) Disconnect the temperature sensor connector.



(6) Remove temperature sensor from transmission case.



■ **Installation**

⚠ Caution

- **Sensor and its bolts are non-reusable parts, which must be replaced after each removal.**
- **Drain the transmission oil and remove wire harness before replacing the sensor (drain Buckle bolt and oil inspection bolt must be replaced).**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

(1) Install temperature sensor to a proper position on transmission.

Tightening torque: 14.5 - 16 N·m

(2) Connect the temperature sensor connector.
(3) Add the specified transmission oil.
(4) Install the engine lower protector assembly.
(5) Connect the negative battery cable.

3.9 Pressure Sensor

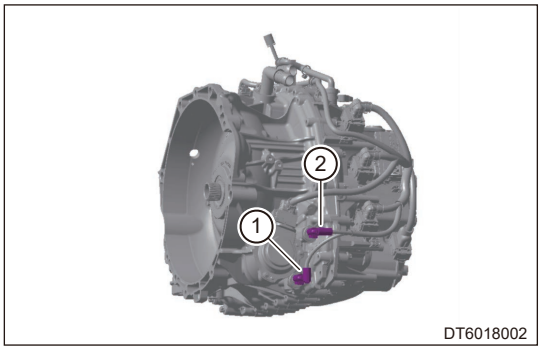
■ **Removal**

⚠ Warning

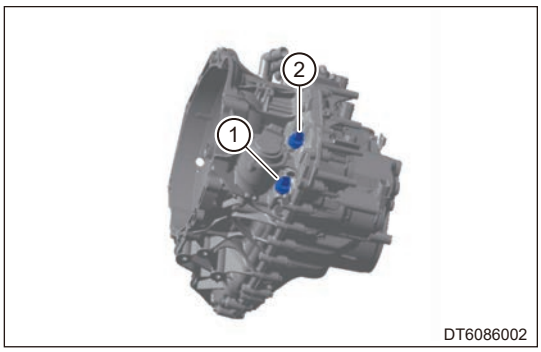
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine lower protector assembly.
(4) Drain the transmission oil.

(5) Disconnect the pressure sensor connectors (1) and (2).



(6) Remove pressure sensor 1 and pressure sensor 2 from transmission case.



■ **Installation**

⚠ Caution

- **Sensor and its bolts are non-reusable parts, which must be replaced after each removal.**
- **Drain the transmission oil and remove wire harness before replacing the sensor (drain bolt and oil inspection bolt must be replaced).**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

(1) Install pressure sensor to a proper position on transmission.

Tightening torque: 20 - 24 N·m

(2) Connect the pressure sensor connector.
(3) Add the specified transmission oil.
(4) Install the engine lower protector assembly.
(5) Connect the negative battery cable.

3.10 Input Speed Sensor 1

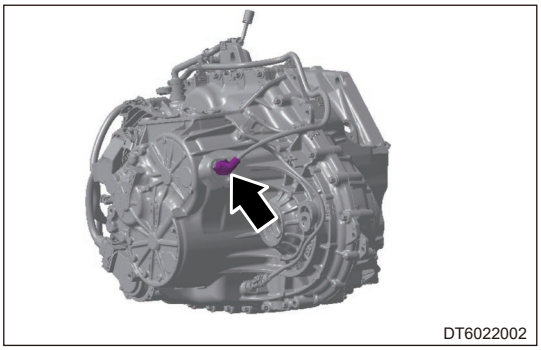
■ **Removal**

⚠ Warning

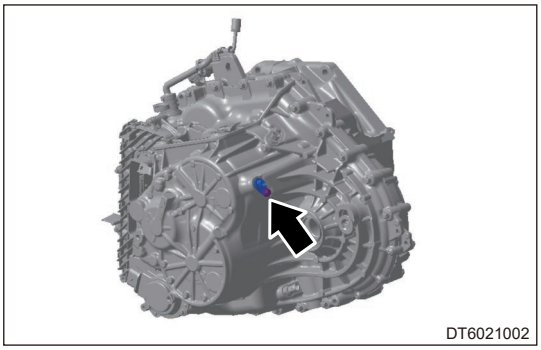
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the air filter assembly.
(4) Remove the battery.
(5) Remove the battery tray.
(6) Drain the transmission oil.

(7) Disconnect the input speed sensor 1 connector.



(8) Remove fixing bolt from input speed sensor 1.



(9) Remove the input speed sensor 1.

■ **Installation**

⚠ **Caution**
• **Sensor and its bolts are non-reusable parts, which must be replaced after each removal.** • **Drain the transmission oil and remove wire harness before replacing the sensor (drain bolt and oil inspection bolt must be replaced).** • **During replacement of sensor, it is necessary to wear anti-static equipment.**

(1) Install input speed sensor 1 to a proper position on transmission.
(2) Install fixing bolt to input speed sensor 1.

Tightening torque: 9 - 11 N·m

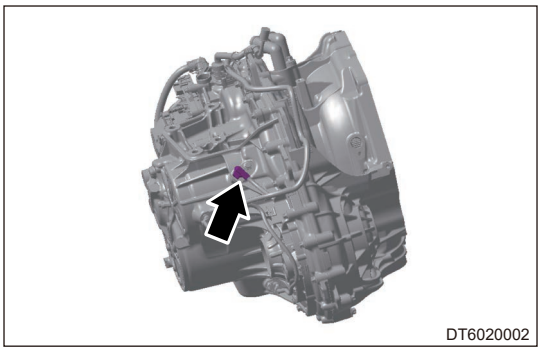
(3) Connect the input speed sensor 1 connector.
(4) Fill the transmission oil.
(5) Install the battery tray.
(6) Install the battery.
(7) Install the air filter assembly.
(8) Connect the negative battery cable.

3.11 Input Speed Sensor 2

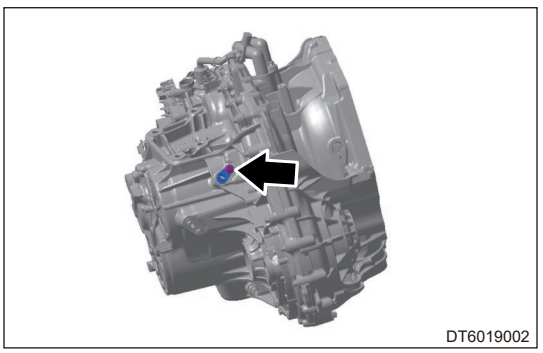
■ **Removal**

⚠ **Warning**
• **Be sure to wear necessary safety equipment to prevent accidents when repairing.** • **During replacement of sensor, it is necessary to wear anti-static equipment.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the air filter assembly.
(4) Remove the battery.
(5) Remove the battery tray.
(6) Drain the transmission oil.
(7) Disconnect the input speed sensor 2 connector.


DT6020002

(8) Remove fixing bolt from input speed sensor 2.


DT6019002

(9) Remove the input speed sensor 2.

■ Installation

⚠ Caution

- **Sensor and its bolts are non-reusable parts, which must be replaced after each removal.**
- **Drain the transmission oil and remove wire harness before replacing the sensor (drain bolt and oil inspection bolt must be replaced).**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**

(1) Install input speed sensor 2 to a proper position on transmission.
(2) Install fixing bolt to input speed sensor 2.

Tightening torque: 9 - 11 N·m

(3) Connect the input speed sensor 2 connector.
(4) Fill the transmission oil.
(5) Install the battery tray.
(6) Install the battery.
(7) Install the air filter assembly.
(8) Connect the negative battery cable.

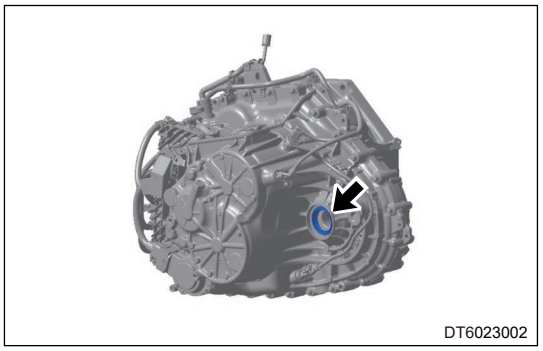
3.12 Drive Shaft Oil Seal

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **Try to prevent body paint surface from being scratched during removal.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine lower protector assembly.
(4) Drain the transmission oil.
(5) Remove the front left wheel.
(6) Remove the front left drive shaft assembly.
(7) Remove left drive shaft oil seal from transmission assembly.

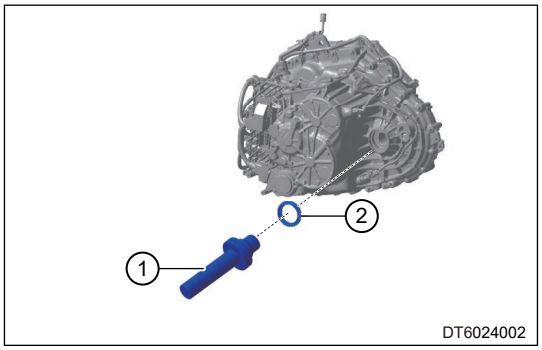

DT6023002

■ Installation

⚠ Caution

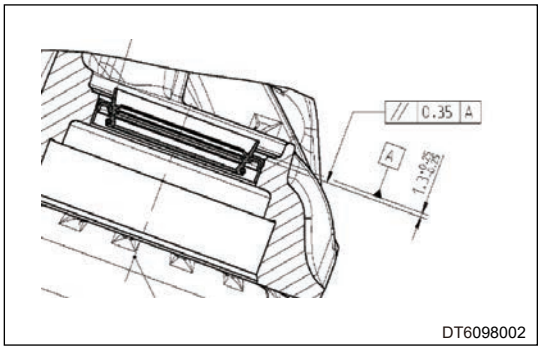
- **Ensure that the transmission oil has been drained before removing oil seal.**
- **Be sure to avoid scratching the mating surface between transmission case and clutch housing during removal of drive shaft oil seal.**
- **Drive shaft oil seal is a non-reusable part, which must be replaced after each removal.**

(1) Using a special tool (1), install drive shaft oil seal (2) into place.



DT6024002

(2) Installation standard is as shown in the illustration



⚠ Caution

- **Apply a proper amount of MP grease to new oil seal lip.**
- **Do not damage oil seal lip during installation.**

(3) Install the front left drive shaft assembly.
(4) Install the front left wheel.
(5) Fill the transmission oil.
(6) Install the engine lower protector.
(7) Connect the negative battery cable.

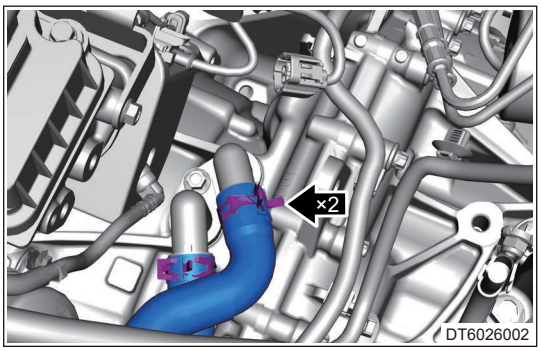
3.13 Coolant Connecting Pipe Assembly

■ Removal

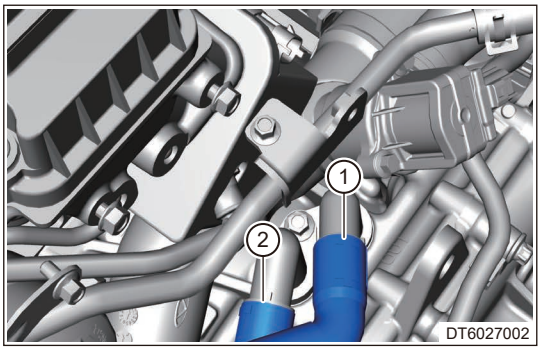
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **When removing coolant pipe from coolant connecting pipe assembly, be careful not to splash the coolant on electronic parts and the inside of transmission to contaminate transmission oil.**

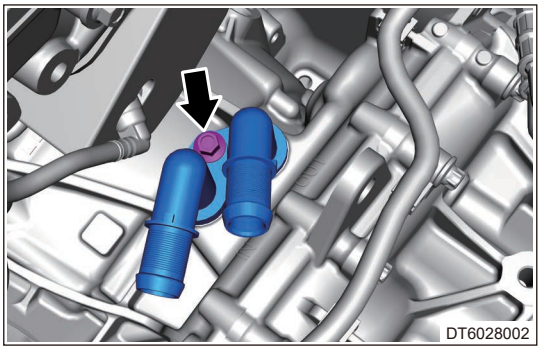
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the air filter assembly.
(4) Remove the battery.
(5) Remove the battery tray.
(6) Remove the intercooler inlet pipe assembly II.
(7) Drain the coolant.
(8) Remove inlet and outlet pipe clamps from connecting pipe.



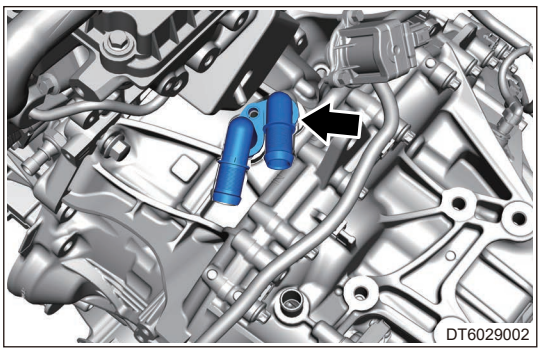
(9) Detach inlet and outlet pipes (1) and (2) from connecting pipe.



(10) Remove fixing bolt from coolant connecting pipe assembly.



(11) Remove inlet and outlet pipes from coolant connecting pipe.



■ Installation

⚠ Caution

- **Bolts are non-reusable parts, which must be replaced after each removal.**

(1) Install coolant connecting pipe into hole, align bolt holes of coolant connecting pipe, and tighten bolts.

Tightening torque: 18 - 20 N·m

(2) Connect inlet and outlet pipes to connecting pipe.
(3) Install inlet and outlet pipe clamps to connecting pipe.
(4) Add the coolant.
(5) Install the intercooler inlet pipe assembly II.
(6) Install the battery tray.
(7) Install the battery.
(8) Install the air filter assembly.
(9) Connect the negative battery cable.

3.14 Clutch Motor 1

■ Removal

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of sensor, it is necessary to wear anti-static equipment.**
- **When replacing components, it must be performed in the clean environment.**
- **Only use original accessories when parts are required to be replaced.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Lift the vehicle and remove the engine lower protector assembly.

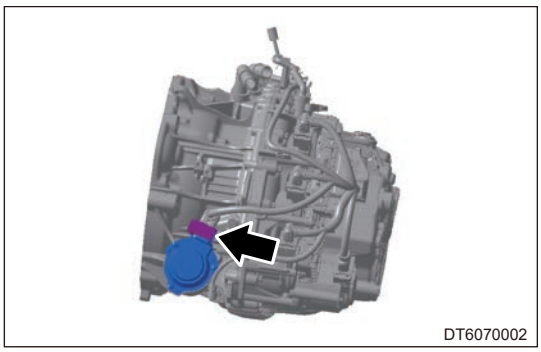
(3) Thoroughly clean the periphery of transmission, especially the area around clutch motor 1. In these areas, remove loose particles and clean them with dust-free cloth and cleaner to prevent dirt from entering the transmission.

(4) Remove drain plug to drain transmission oil (approximately 4.5 L), and contain it in a clean and dry container for reuse.

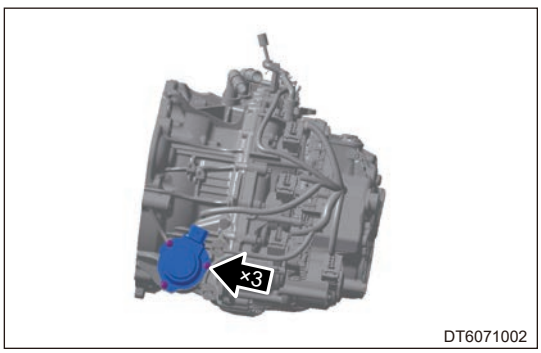
(5) Retighten the new drain plug.

Tightening torque: 43 ± 4 N·m

(6) Disconnect the clutch motor 1 wire harness connector.


DT6070002

(7) Remove 3 fixing bolts from clutch motor 1.



DT6071002

(8) Remove motor from housing gently.

■ Installation

⚠ Caution

- **O-ring and motor bolts are both non-reusable parts, which must be replaced after each removal.**
- **Carefully check the condition of clutch case motor cavity to ensure that there are no impurities and no bumps, etc.**
- **Alway clean remaining oil in motor cavity to avoid oil leakage after replacing motor with a new one.**

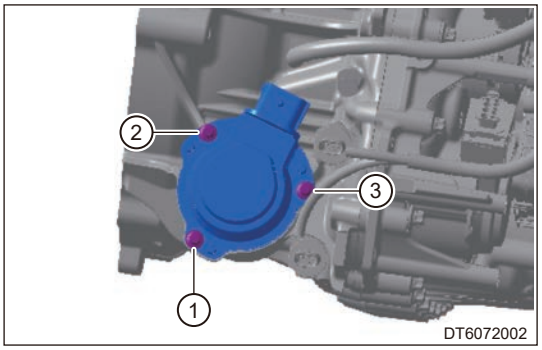
(1) Install new O-ring to new motor. Make sure that the O-ring is installed at the bottom of motor wall and there is no distortion for O-ring.

(2) Clean the wall of housing motor cavity with a dust-free cloth, and gently install new motor into housing clutch motor cavity, ensuring that the motor spline shaft is installed in place.

(3) Tighten 3 bolts on clutch motor 1 in sequence ①②③ as shown in the illustration below.

Pre-tightening torque: 1.5 - 2 N·m

Tightening torque: 5 - 6 N m



(4) Connect connector to clutch motor 1 wire harness.

(5) Add transmission oil (oil judging standard: Unscrew the filler plug next to differential, and leave it for 30 minutes after filling until the oil overflows).

(6) Install the engine lower protector assembly.

■ **Detection**

Driving performance test: Drive the vehicle for 10 minutes, raise the temperature of transmission, and then test the following items:

(1) When moving slowly, the accelerator pedal opening is less than 5%, and the vehicle has no jitter.

(2) When driving, depress and hold brake pedal and the vehicle has no jitter.

(3) Check forward and reverse gear conditions.

3.15 Clutch Motor 2

■ **Removal**

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of shift motor, it is necessary to wear anti-static equipment.**
- **When replacing components, it must be performed in the clean environment.**
- **Only use original accessories when parts are required to be replaced.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Lift the vehicle and remove the engine lower protector assembly.

(3) Thoroughly clean the periphery of transmission, especially the area around clutch motor 2 and TCU. In these areas, remove loose particles and clean them with dust-free cloth and cleaner to prevent dirt from entering the transmission.

(4) Remove drain plug to drain transmission oil (approximately 4.5 L), and contain it in a clean and dry container for reuse.

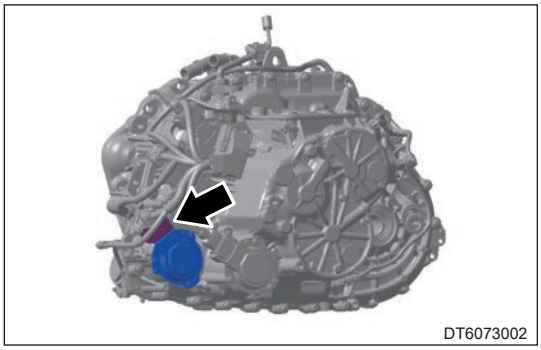
(5) Retighten the new drain plug.

Tightening torque: 43 ± 4 N·m

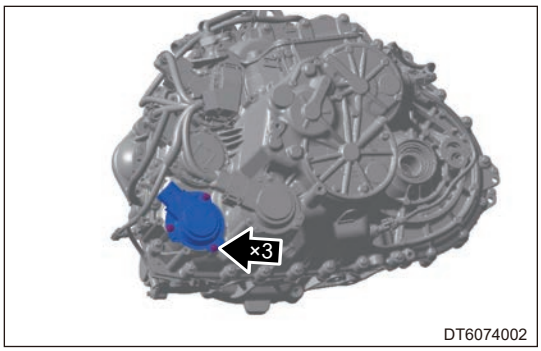
(6) Disconnect the transmission control unit connector.

(7) Remove the transmission control unit.

(8) Disconnect the clutch motor 2 wire harness connector.



(9) Remove 3 fixing bolts from clutch motor 2.



(10) Remove motor from housing gently.

■ Installation

⚠ Caution

- **O-ring and motor bolts are both non-reusable parts, which must be replaced after each removal.**
- **Carefully check the condition of clutch case motor cavity to ensure that there are no foreign matter and no bumps, etc.**
- **Alway clean remaining oil in motor cavity to avoid oil leakage after replacing motor with a new one.**

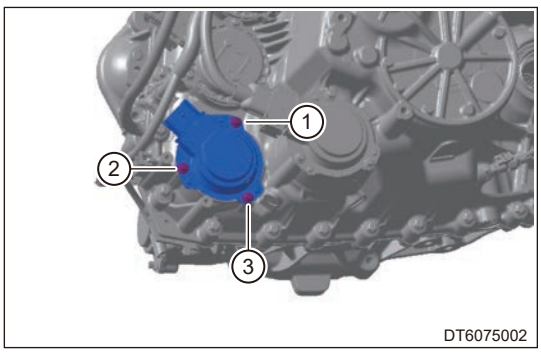
(1) Install new O-ring to new motor. Make sure that the O-ring is installed at the bottom of motor wall and there is no distortion for O-ring.

(2) Clean the wall of housing motor cavity with a dust-free cloth, and gently install new motor into housing clutch motor cavity, ensuring that the motor spline shaft is installed in place.

(3) Tighten 3 bolts on clutch motor 2 in sequence ①②③ as shown in the illustration below.

Pre-tightening torque: 1.5 - 2 N·m

Tightening torque: 5 - 6 N m



(4) Connect connector to clutch motor 2 wire harness.

(5) Install transmission control unit and connect wire harness connector.

(6) Add transmission oil (oil judging standard: Unscrew the filler plug next to differential, and leave it for 30 minutes after filling until the oil overflows).

(7) Install the engine lower protector assembly.

■ Detection

Driving performance test: Drive the vehicle for 10 minutes, raise the temperature of transmission, and then test the following items:

(1) When moving slowly, the accelerator pedal opening is less than 5%, and the vehicle has no jitter.

(2) When driving, depress and hold brake pedal and the vehicle has no jitter.

(3) Check forward and reverse gear conditions.

3.16 Cooling Motor

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **During replacement of cooling motor, it is necessary to wear anti-static equipment.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Lift the vehicle and remove the engine lower protector assembly.

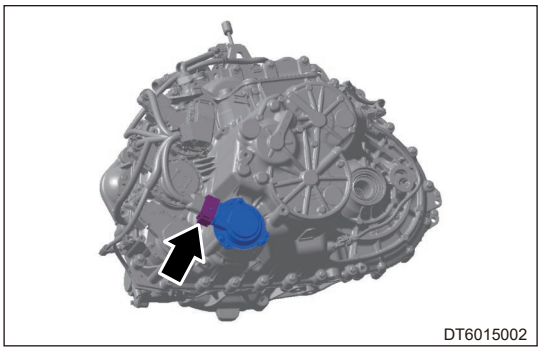
(4) Thoroughly clean periphery of transmission, especially the area around cooling motor. Remove loose particles and clean them with dust-free cloth and cleaner to prevent dirt from entering the transmission.

(5) Remove drain plug to drain transmission oil (approximately 4.5 L), and contain it in a clean and dry container for reuse.

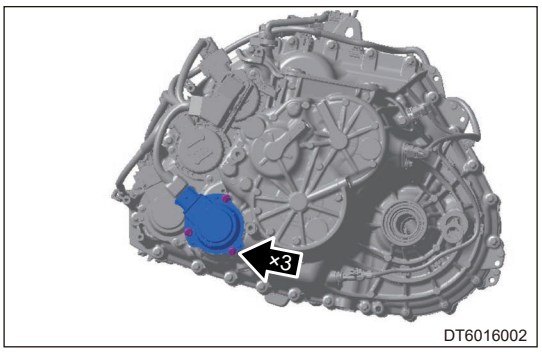
(6) Retighten the new drain plug.

Tightening torque: 43 ± 4 N·m

(7) Disconnect the cooling motor wire harness connector.



(8) Remove 3 fixing screws from cooling motor.



(9) Remove cooling motor from housing gently.

■ Installation

⚠ Caution

- **O-ring and cooling motor bolts are both non-reusable parts, which must be replaced after each removal.**
- **Carefully check the condition of clutch case motor cavity to ensure that there are no foreign matter and no bumps, etc.**
- **Alway clean remaining oil in motor cavity to avoid oil leakage after replacing motor with a new one.**

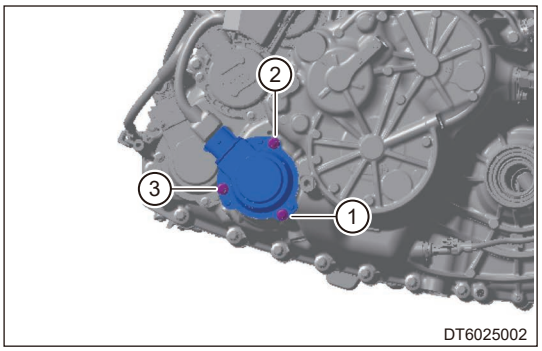
(1) Install new O-ring to new motor. Make sure that the O-ring is installed at the bottom of motor wall and there is no distortion for O-ring.

(2) Install cooling motor to a proper position on transmission. Cooling motor needs to be installed from transmission case side. When installing, it is necessary to ensure that motor spline shaft is inserted vertically into gear.

(3) Tighten 3 bolts on cooling motor in sequence ①②③ as shown in the illustration below.

Pre-tightening torque: 1.5 - 2 N·m

Tightening torque: 5 - 6 N·m



(4) Connect the cooling motor wire harness connector.

(5) Install the engine lower protector assembly.

(6) Add transmission oil (oil judging standard: Unscrew the filler plug next to differential, and leave it for 30 minutes after filling until the oil overflows).

(7) Connect the negative battery cable.

■ Detection

Driving performance test: Drive the vehicle for 10 minutes, raise the temperature of transmission, and then test the following items:

(1) When moving slowly, the accelerator pedal opening is less than 5%, and the vehicle has no jitter.

(2) When driving, depress and hold brake pedal and the vehicle has no jitter.

(3) Check forward and reverse gear conditions.

3.17 Clutch and Support

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **When replacing components, it must be performed in the clean environment.**
- **Only use original accessories when parts are required to be replaced.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Lift the vehicle and remove engine lower protector assembly.

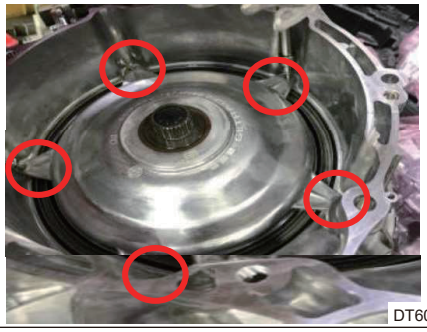
(3) Remove drain plug to drain transmission oil (approximately 4.5 L), and contain it in a clean and dry container for reuse.

(4) Retighten the new drain plug.

Tightening torque: 43 ± 4 N·m

(5) Remove transmission assembly from vehicle.

(6) Remove the 5 fixing bolts from clutch cover.


DT6076002

(7) Gradually pry off it around connection blocks of 5 bolts for clutch cover, remove clutch cover assembly.


DT6077002

⚠ Caution

- **Replace 5 bolts on clutch cover after each removal.**
- **When removing clutch cover, make sure that clutch cover and clutch cover oil seal are not damaged or twisted, and replace them if so.**

(8) Remove the clutch manually.

DT6078002


DT6079002

(9) 6 fixing bolts on clutch support.

⚠ Caution

- **Replace clutch support fixing bolt after removal.**
- **Prevent bolts from falling into the case during removal and installation.**

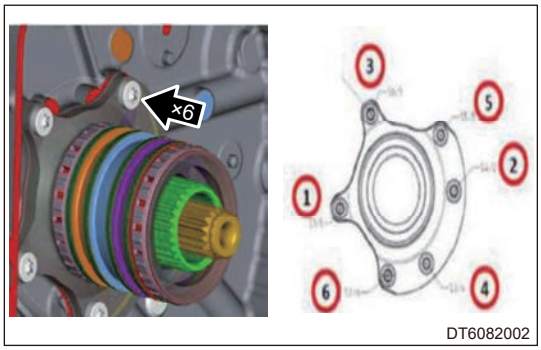
(10) Remove the clutch support

■ Installation

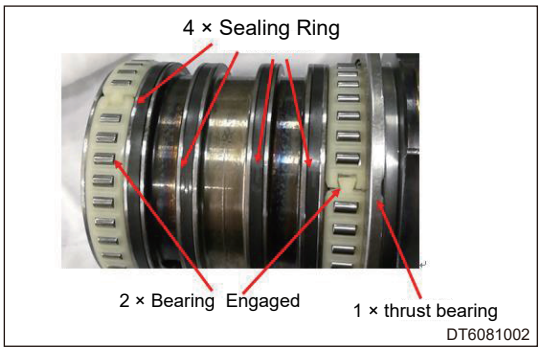
(1) Install clutch support, tighten 6 fixing bolts on support in sequence 1 - 6 as shown in the illustration below.

Pre-tightening torque: 5 N·m

Tightening torque: 9 ± 0.5 N·m



(2) Before installing clutch on support, please check as follows: make sure that needle roller bearing, seal ring and thrust bearing are present and undamaged as shown in the illustration.



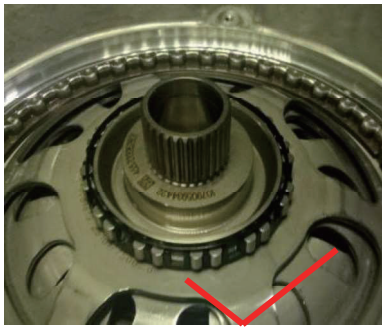
(3) Install the clutch.

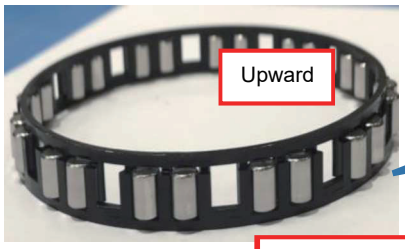
⚠ Caution

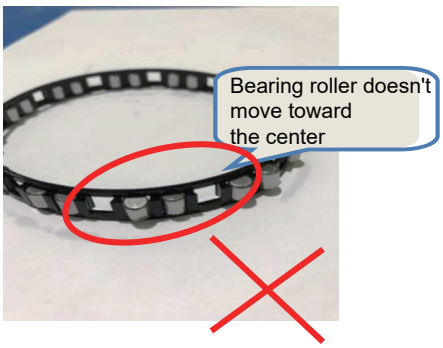
- **When installing clutch, gently rotate it.**

(4) Apply grease to drive disc or manually turn bearing rolling body to the center of cage, prevent bearing rolling body from damage when clutch cover is pressed.

Caution: Bearing orientation as shown in the illustration

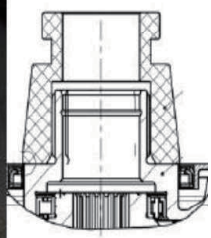






DT6085001

(5) Insert oil seal protective sleeve fixture into drive plate to prevent oil seal lip from flanging.

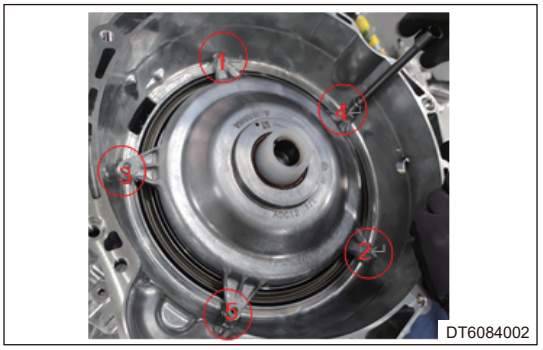


DT6086001

(6) Replace the clutch cover O-ring.

(7) Install clutch cover, tighten 5 fixing bolts on clutch cover in order shown in illustration.

Tightening torque: 5.5 ± 0.5 N·m



DT6084002

⚠ Caution

- **In the process of tightening, pay attention to ensure that clutch cover is in horizontal direction to avoid crushing needle bearing due to imbalanced bolt tightening force.**
- **Pay attention to whether the process of tightening bolts is not smooth due to the interference of roller bearings.**

⚠ Warning

- **During and after the installation of clutch cover, ensure that the oil seal lip is not flanged. If the oil seal lip is damaged, it will definitely cause oil leakage.**
- **Ensure that the O-ring is not damaged, otherwise, it may cause oil leakage.**

(8) .

■ Detection

Test Function After Assembly

(1) Manually rotate the clutch drive disc shaft input spline to ensure smooth rotation.


DT6088002

Inspection of Differential Oil Seal

(1) After the clutch is installed, please check the differential oil seal carefully. When disassembling clutch from vehicle, if any damage is found, please replace oil seal with differential oil seal assembly fixture.

Applying Grease to Shaft Spline

(1) Apply M- setra1-43N grease to drive disc spline.


DT6089002

Install transmission to the vehicle.

(1) Install transmission to the vehicle as required.

- Ensure that the vehicle wire harness connector is installed in place.
- Park the vehicle horizontally and fill it with enough transmission oil.
- Refill the coolant.

⚠ Caution

- **Prevent coolant from entering transmission through breather pipe during installing transmission into the vehicle.**

■ Follow-up Operation

(1) Refer to clutch self-learning method for clutch self-learning.

⚠ Caution

- **During clutch self-learning, the transmission oil temperature is 40 - 60 ℃.**

(2) Check transmission and driving performance, check driving condition under forward and reverse gears.

3.18 Clutch Actuator Pump 1

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **When replacing components, it must be performed in the clean environment to prevent any liquid or foreign matters from entering the transmission.**
- **Only use original accessories when parts are required to be replaced.**

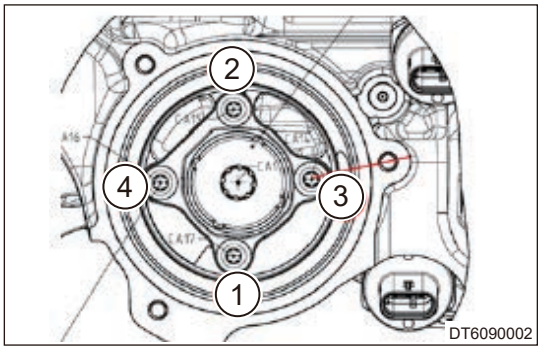
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine lower protector.
(4) Thoroughly clean the periphery of transmission, especially the filler plug and drain plug areas. Remove loose particles from these areas, and clean them with dust-free cloth and cleaner.
(5) Remove drain plug to drain transmission oil (approximately 4.5 L), and contain it in a clean and dry container for reuse.
(6) Retighten the new drain plug.

Tightening torque: 43 ± 4 N·m

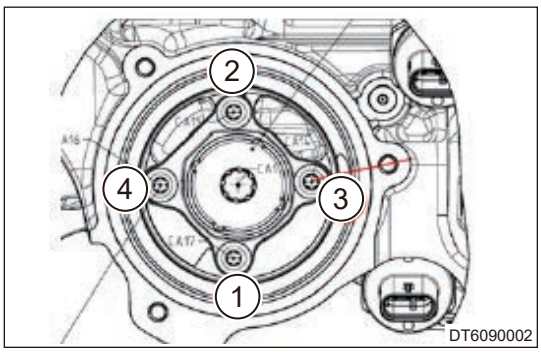
(7) Disconnect the clutch motor 1 connector.
(8) Remove the clutch motor 1.

(9) Remove 4 fixing bolts from actuator pump 1 and remove actuator pump, washer and bolt.



■ Installation

(1) Connect actuator pump 1 and washer with 4 bolts in series (washer hole is aligned with pump hole), and then install them to transmission. Tightening sequence of bolts is as follows:



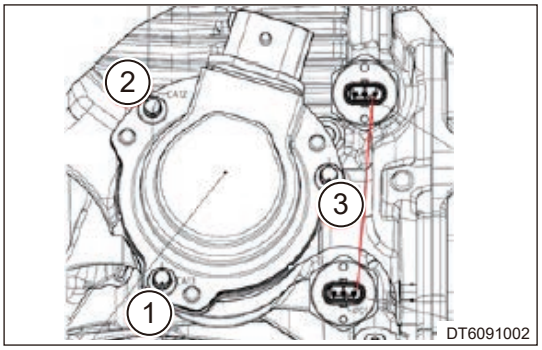
Step	Bolt No.	Torque (N·m)	Note
1	1	1.5-2	Pre-tightening
2	2	5-6	Final tightening
3	1	5-6	Final tightening
4	3	5-6	Final tightening
5	4	5-6	Final tightening

⚠ Caution

- **No. 3 bolt on right side of pump is close to motor bolt.**

(2) Install the clutch motor 1. Tightening sequence of motor 1 bolts is as follows:

Step	Bolt No.	Torque (N·m)	Note
1	1	1.5-2	Pre-tightening
2	2	1.5-2	Pre-tightening
3	3	1.5-2	Pre-tightening
4	1	5-6	Final tightening
5	2	5-6	Final tightening
6	3	5-6	Final tightening



⚠ Caution

- **No. 3 motor bolt is between two pressure sensors.**

(3) Connect connector to clutch motor 1.
(4) Fill the transmission oil.
(5) Connect the negative battery cable.
(6) Install the engine lower protector.
(7) After installation, perform test in different oil temperature as required.

3.19 Clutch Actuator Pump 2

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **When replacing components, it must be performed in the clean environment to prevent any liquid or foreign matters from entering the transmission.**
- **Only use original accessories when parts are required to be replaced.**

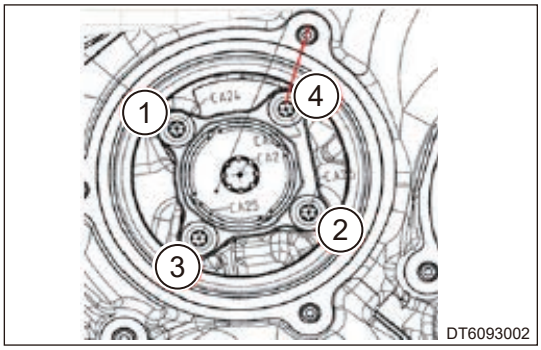
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Disconnect the transmission control unit connector.
(4) Remove the transmission control unit.
(5) Remove the engine lower protector.
(6) Thoroughly clean the periphery of transmission, especially the filler plug and drain plug areas. Remove loose particles from these areas, and clean them with dust-free cloth and cleaner.
(7) Remove drain plug to drain transmission oil (approximately 4.5 L), and contain it in a clean and dry container for reuse.
(8) Retighten the new drain plug.

Tightening torque: 43 ± 4 N·m

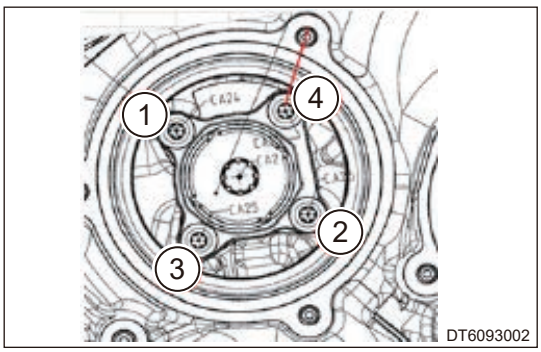
(9) Disconnect the clutch motor 2 connector.
(10) Remove the clutch motor 2.

(11) Remove 4 fixing bolts from actuator pump 2 and remove actuator pump, washer and bolt.



■ Installation

(1) Connect actuator pump 2 and washer with 4 bolts in series (washer hole is aligned with pump hole), and then install them to transmission. Tightening sequence of bolts is as follows:



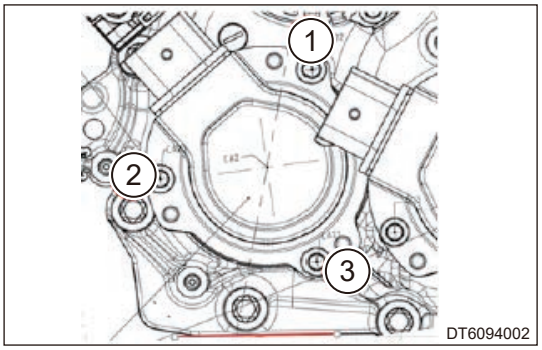
Step	Bolt No.	Torque (N·m)	Note
1	1	1.5-2	Pre-tightening
2	2	5-6	Final tightening
3	1	5-6	Final tightening
4	3	5-6	Final tightening
5	4	5-6	Final tightening

⚠ Caution

- **No. 4 bolt on upper right side of pump is close to motor bolt.**

(2) Install clutch motor 2, tightening sequence of clutch motor 2 bolts is as follows:

Step	Bolt No.	Torque (N·m)	Note
1	1	1.5-2	Pre-tightening
2	2	1.5-2	Pre-tightening
3	3	1.5-2	Pre-tightening
4	1	5-6	Final tightening
5	2	5-6	Final tightening
6	3	5-6	Final tightening



(3) Connect connector to clutch motor 2.
(4) Install the transmission control unit.
(5) Connect the transmission control unit connector.
(6) Fill the transmission oil.
(7) Connect the negative battery cable.
(8) Install the engine lower protector.
(9) After installation, perform test as required when oil temperature is higher than 60°.

3.20 Clutch Cooling Pump

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **When replacing components, it must be performed in the clean environment to prevent any liquid or foreign matters from entering the transmission.**
- **Only use original accessories when parts are required to be replaced.**

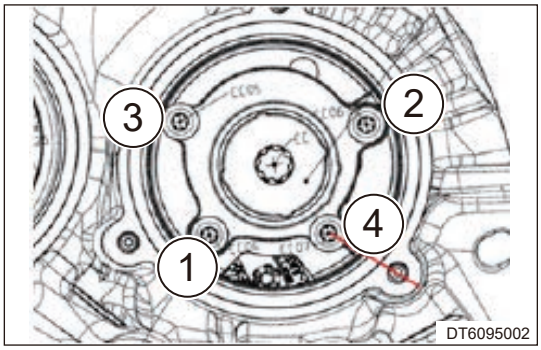
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Remove the negative battery cable.
(3) Remove the engine lower protector assembly.
(4) Thoroughly clean the periphery of transmission, especially the filler plug and drain plug areas. Remove loose particles from these areas, and clean them with dust-free cloth and cleaner.
(5) Remove drain plug to drain transmission oil (approximately 4.5 L), and contain it in a clean and dry container for reuse.
(6) Retighten the new drain plug.

Tightening torque: 43 ± 4 N·m

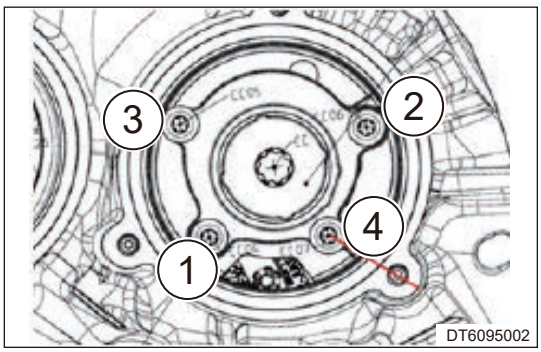
(7) Disconnect the clutch cooling motor connector.
(8) Remove the clutch cooling motor.

(9) Remove 4 fixing bolts from cooling pump and remove cooling pump, washer and bolt.



■ Installation

(1) Connect cooling pump with 4 bolts in series, and then install it to transmission. Tightening sequence of bolts is as follows:

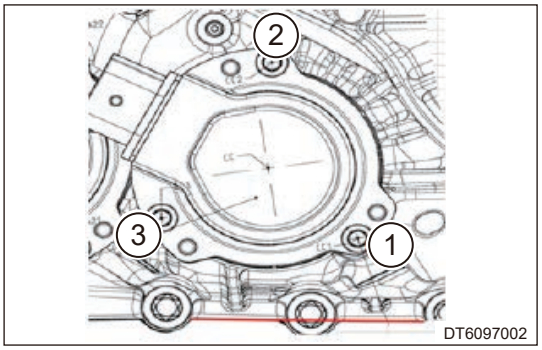


Step	Bolt No.	Torque (N · m)	Note
1	1	1.5-2	Pre-tightening
2	2	5-6	Final tightening
3	1	5-6	Final tightening
4	3	5-6	Final tightening
5	4	5-6	Final tightening

⚠ Caution

- **Align No. 4 bolt on right lower side of cooling pump with motor bolt.**

(2) Install the cooling motor. Tightening sequence of motor bolts is as follows:



Step	Bolt No.	Torque (N·m)	Note
1	1	1.5-2	Pre-tightening
2	2	1.5-2	Pre-tightening
3	3	1.5-2	Pre-tightening
4	1	5-6	Final tightening
5	2	5-6	Final tightening
6	3	5-6	Final tightening

(3) Connect the cooling motor connector.
(4) Fill the transmission oil.
(5) Connect the negative battery cable.
(6) Install the engine lower protector.
(7) After installation, perform test as required when oil temperature is higher than 60°.

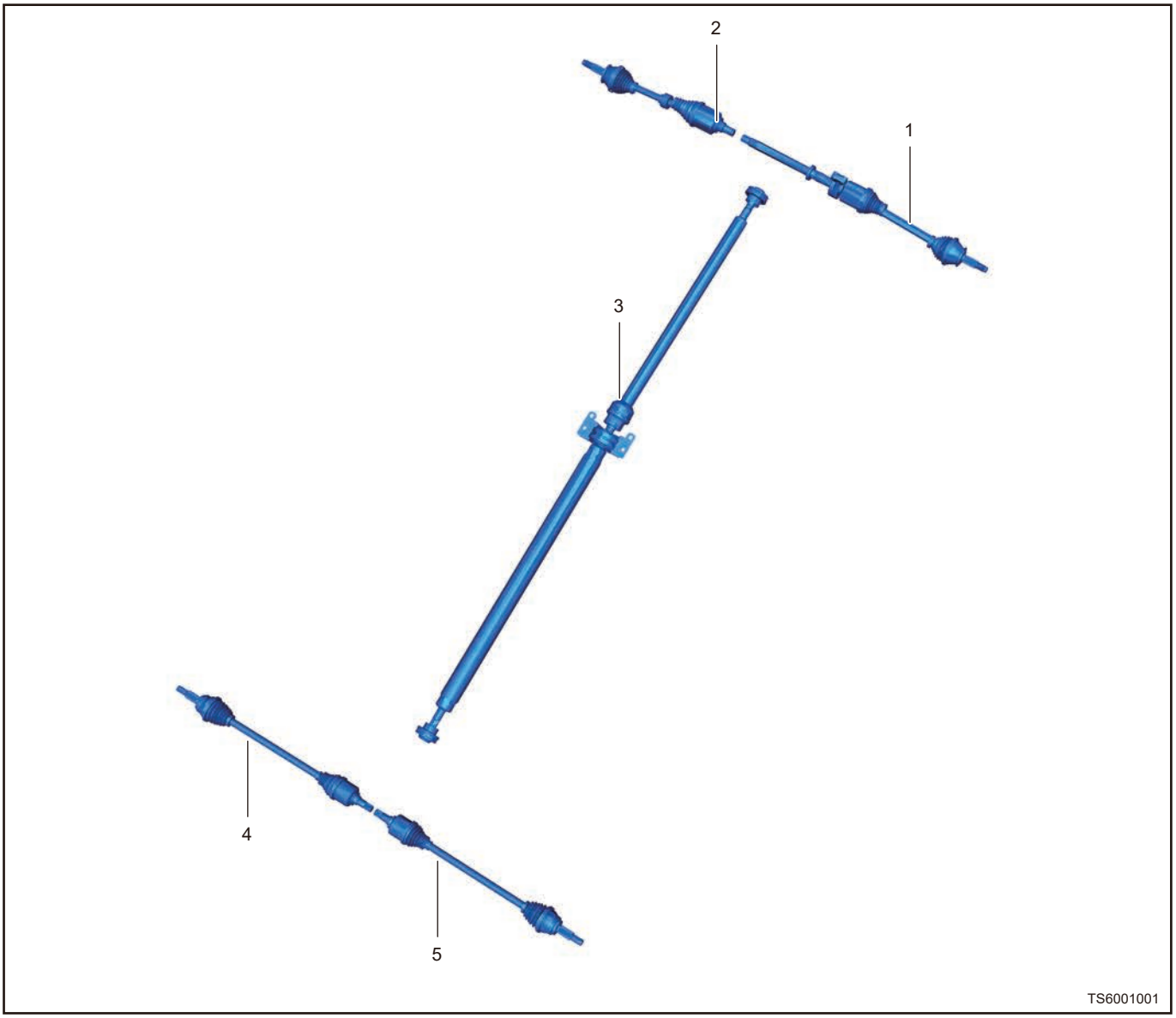
3.3 DRIVE SHAFT

1 System Overview

1.1 System Description

Drive shaft, which is a solid shaft, transmits torque between differential and drive wheels. Generally, the inner end of drive shaft is connected with drive shaft gear by spline, and the outer end is connected with wheel hub. Drive shaft transmits torque from differential to wheels, thus rotating the wheels to run vehicle.

1.2 System Components Diagram



1	Front Right Drive Shaft Assembly	2	Front Left Drive Shaft Assembly
3	Propeller Intermediate Shaft Assembly	4	Rear Left Drive Shaft Assembly
5	Rear Right Drive Shaft Assembly		

Propeller intermediate shaft is the shaft which transmits rotation of transmission to main final drive through transfer.

2 On-vehicle Service

2.1 Specifications

■ Torque Specifications

Description	Torque (N · m)
Tightening Bolt between Propeller Intermediate Shaft Bracket and Body	60 ± 6
Tightening Bolt between Propeller Intermediate Shaft and Torque Manager	30 ± 3
Tightening Bolt Between Propeller Intermediate Shaft and Transfer Output Flange	30 ± 3
Drive Shaft Self-lock Nut	270 ± 20
Fixing Bolt Between Front Right Drive Shaft Bracket and Engine	60 ± 6

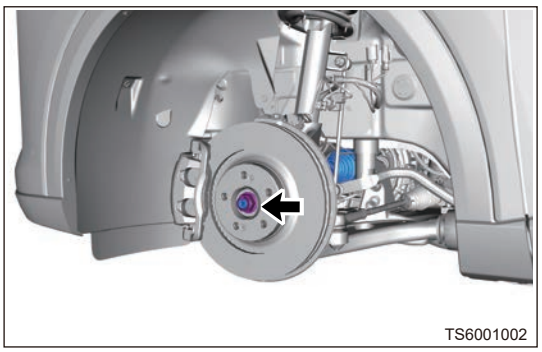
2.2 Front Drive Shaft Assembly

■ Removal

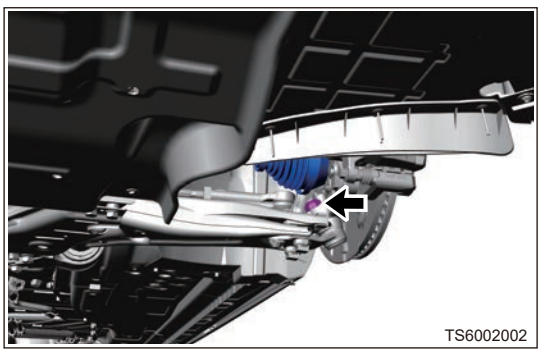
(1) Remove the front left wheel.
(2) Remove the front right wheel.
(3) Drain the transmission oil.

(4) Remove the front left drive shaft assembly.

1) Remove fixing nut (arrow) from front left drive shaft.

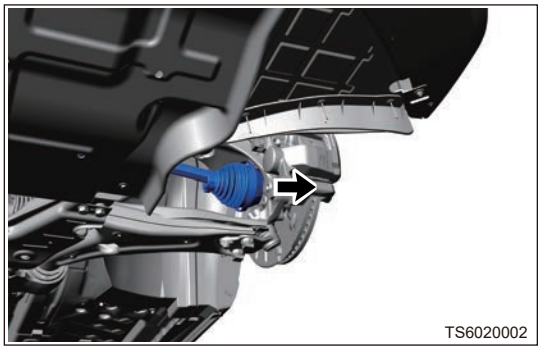

TS6001002

2) Remove fixing nut (arrow) between front left lower control arm ball joint and steering knuckle.

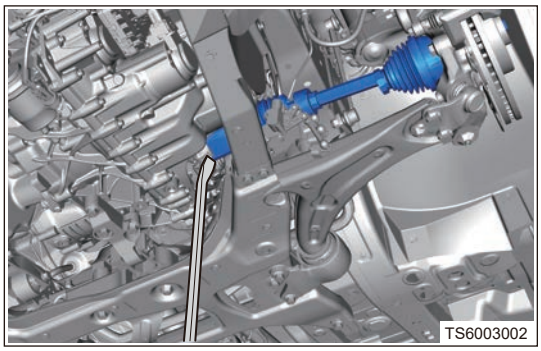

TS6002002

3) Disconnect the connection between front left lower control arm ball joint and steering knuckle.

4) Push front left brake assembly, remove outside ball cage from steering knuckle.



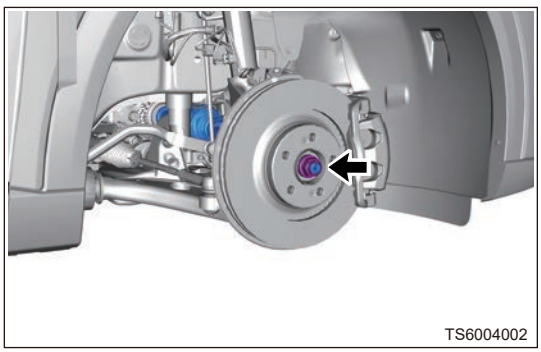
5) Use crowbar to pry out inner ball cage spline inserted into transmission end.



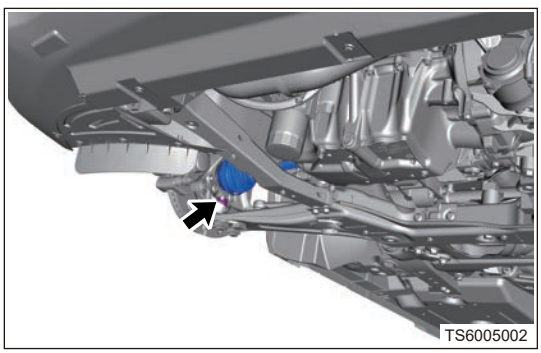
6) Remove the front left drive shaft.

(5) Remove the front right drive shaft assembly.

1) Remove fixing nut (arrow) from front right drive shaft.

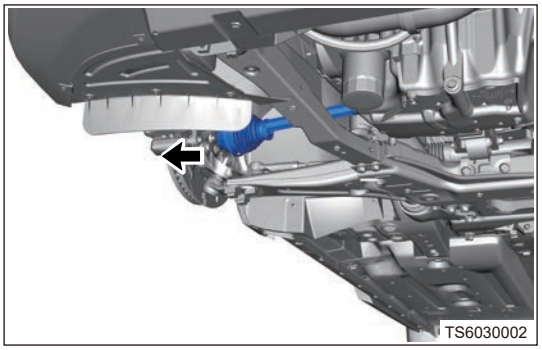


2) Remove fixing nut (arrow) between front right lower control arm ball joint and steering knuckle.

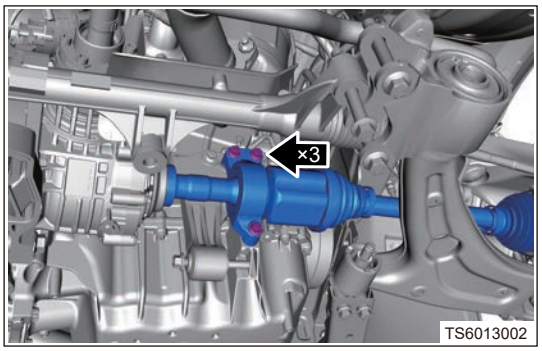


3) Disconnect the connection between front right lower control arm ball joint and steering knuckle.

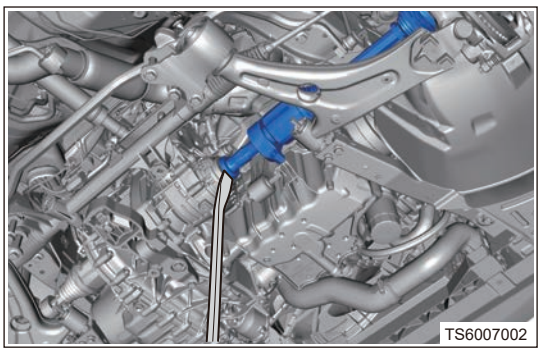
4) Push front right brake assembly, remove outside ball cage from steering knuckle.



5) Remove 3 fixing bolts (arrow) from front right drive shaft bracket.



6) Use crowbar to pry out inner ball cage spline inserted into transfer case.



7) Remove the front right drive shaft assembly.

■ Installation

(1) Install the front right drive shaft.

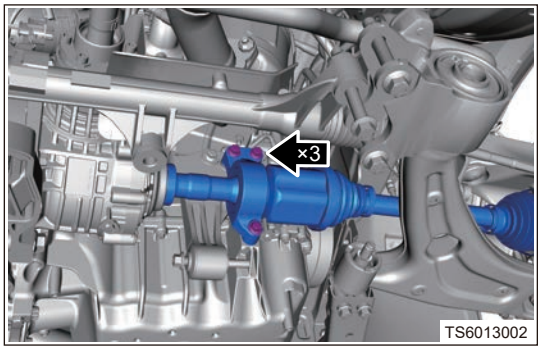
⚠ Caution

- **It is necessary to use oil seal mounting fixture to ensure that transmission output shaft oil seal is not scratched during installation. Remove fixture after drive shaft spline is passed through fixture, and do not remove it forcibly.**
- **It is necessary to align drive shaft spline with spline hole when assembling drive shaft. Drive shaft can be pushed firmly and smoothly only drive shaft spline is aligned with spline hole.**

1) Raise the right drive shaft first until drive shaft spline end axis centering is flush with the transfer hole center.
2) Insert oil seal protection fixture into transfer output shaft oil seal.
3) Push drive shaft into fixture, and remove fixture after drive shaft spline passes through fixture.
4) Finally, push the drive shaft to bottom.

5) Install 3 fixing bolts (arrow) to front right drive shaft bracket.

Tightening torque: 60 ± 6 N·m



(2) Install connection nut between front right lower control arm ball joint and steering knuckle.

Tightening torque: 95 ± 10 N·m

(3) Install fixing nut to front right drive shaft.

Tightening torque: 270 ± 20 N·m

(4) Install the front right wheel.

(5) Install the front left drive shaft.

⚠ Caution

- **It is necessary to use oil seal mounting fixture to ensure that transmission output shaft oil seal is not scratched during installation. Remove fixture after drive shaft spline is passed through fixture, and do not remove it forcibly.**
- **It is necessary to align drive shaft spline with spline hole when assembling drive shaft. Drive shaft can be pushed firmly and smoothly only drive shaft spline is aligned with spline hole.**

1) Raise the left drive shaft first until drive shaft spline end axis centering is flush with transmission differential hole center.
2) Insert oil seal protection fixture into transmission output shaft oil seal.
3) Push drive shaft into fixture, and remove fixture after drive shaft spline passes through fixture.
4) Finally, push the drive shaft to bottom.

(6) Install the connection between front left lower control arm and steering knuckle.

Tightening torque: 95 ± 10 N·m

(7) Install fixing nut to front left drive shaft.

Tightening torque: 270 ± 20 N·m

(8) Install the front left wheel.

(9) Fill the transmission oil.

2.3 Rear Drive Shaft Assembly (4WD)

■ Removal

⚠ Caution

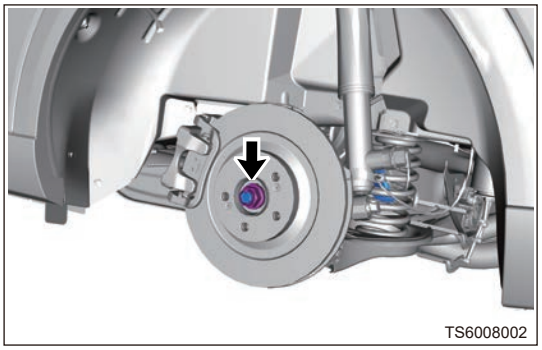
- **Use same removal and installation procedures for left drive shaft and right drive shaft assembly.**
- **Removal procedures listed below are for left drive shaft.**

(1) Remove the rear left wheel.

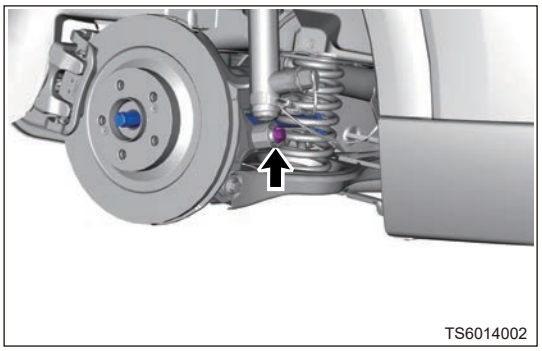
(2) Drain the final drive oil.

(3) Remove the rear left drive shaft assembly.

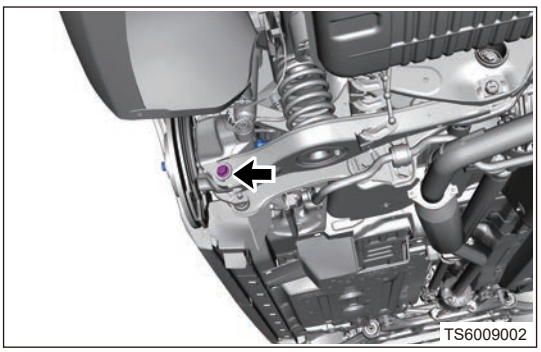
1) Remove fixing nut (arrow) from rear left drive shaft.


TS6008002

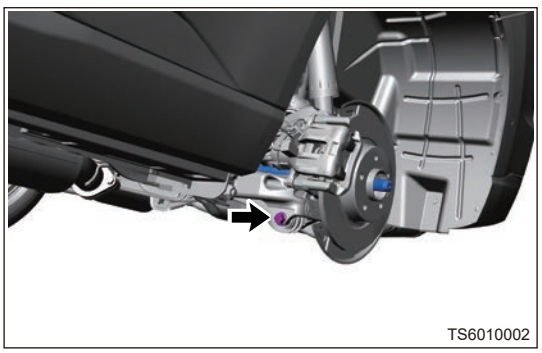
2) Remove connecting bolt and nut (arrow) between rear left shock absorber and steering knuckle.


TS6014002

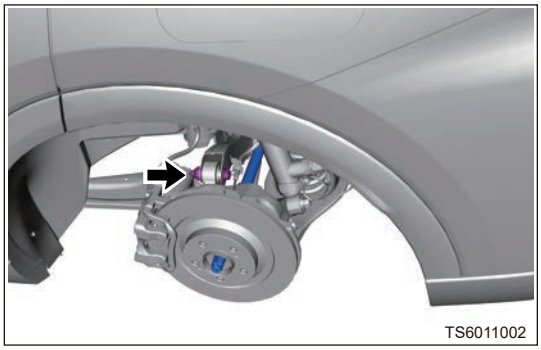
3) Remove coupling bolt and nut (arrow) between rear left lower control arm and steering knuckle.


TS6009002

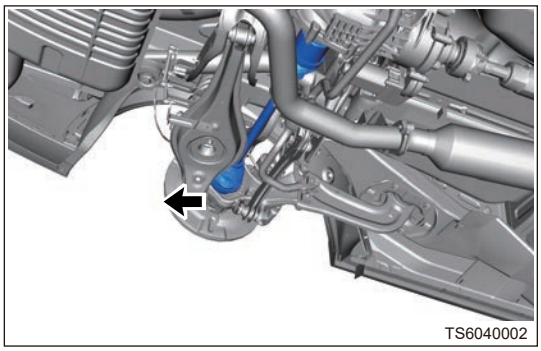
4) Disconnect the connection between rear left lower control arm and steering knuckle, and remove coil spring.
5) Remove connecting bolt and nut (arrow) between left pull rod and steering knuckle.


TS6010002

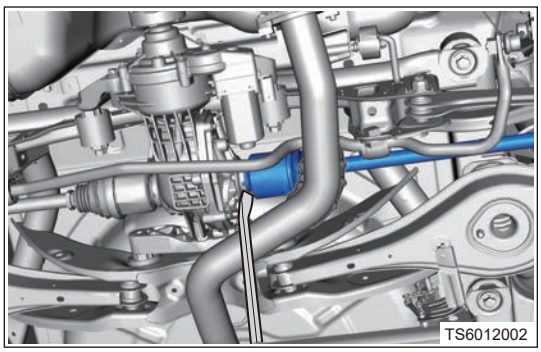
6) Remove coupling bolt and nut (arrow) between upper left control arm and steering knuckle.


TS6011002

7) Push rear left steering knuckle assembly, separate rear left outside ball cage from rear left steering knuckle.


TS6040002

8) Use crowbar to pry out the rear left drive shaft assembly.


TS6012002

9) Remove the rear left drive shaft assembly.

■ Installation

⚠ Caution

- **Use same installation procedures for left drive shaft and right drive shaft assembly.**
- **Installation procedures listed below are for left drive shaft.**

(1) Install the rear left drive shaft assembly.
(2) Install coupling bolt and nut between upper left control arm and steering knuckle.
Tightening torque: 180 ± 18 N·m

(3) Install coupling bolt and nut between left pull rod and steering knuckle.
Tightening torque: 180 ± 18 N·m

(4) Install the coil spring.
(5) Install coupling bolt and nut between lower left control arm and steering knuckle.
Tightening torque: 180 ± 18 N·m

(6) Install connecting bolt and nut between rear left shock absorber and steering knuckle.
Tightening torque: 180 ± 18 N·m

(7) Install fixing nut to rear left drive shaft.

Tightening torque: 270 ± 20 N·m

(8) Install the rear left wheel.

(9) Fill the final drive oil.

⚠ Caution

- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

2.4 Propeller Intermediate Shaft Assembly (4WD)

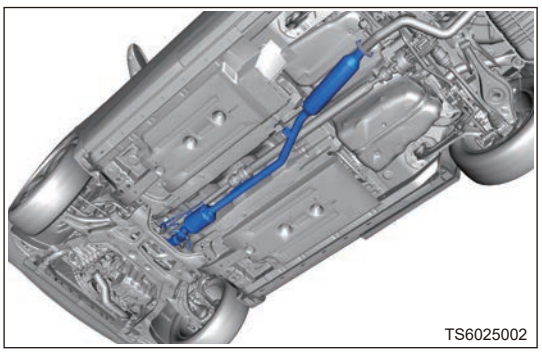
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

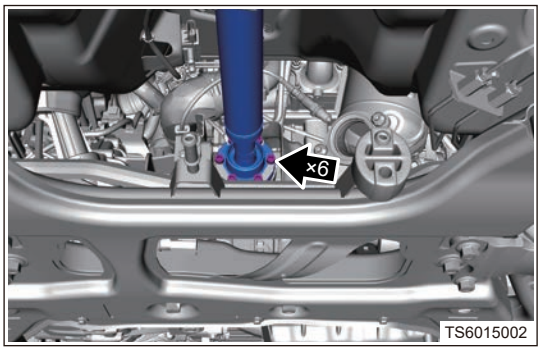
(2) Disconnect the negative battery cable.

(3) Remove the propeller intermediate shaft assembly.

1) Remove particulate filter and front muffler assembly.

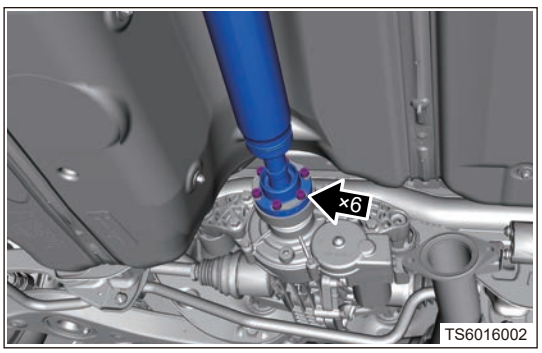

TS6025002

2) Remove 6 inner hexagon socket cap screws (arrow) between propeller shaft and transfer output flange surface, remove 3 washers.



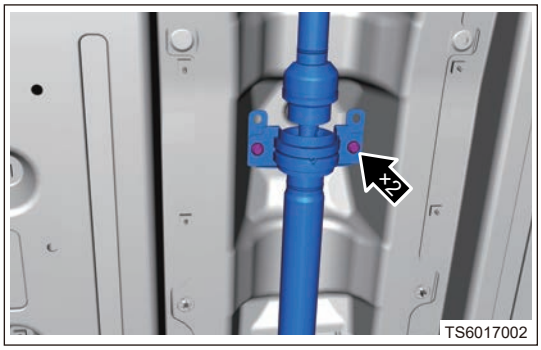
TS6015002

3) Remove 6 inner hexagon socket cap screws (arrow) between propeller shaft and torque manager flange surface, remove 3 washers.



TS6016002

4) Remove 2 fixing bolts (arrow) from intermediate bracket.



5) Remove the propeller intermediate shaft assembly.

■ **Installation**

(1) Install the propeller intermediate shaft assembly.

(2) Install 2 fixing bolts to intermediate shaft.

Tightening torque: 60 ± 6 N·m

(3) Install 6 fixing screws and 3 washers between propeller shaft and torque manager flange surface.

Tightening torque: 30 ± 3 N·m

(4) Install 6 fixing bolts and 3 washers between drive shaft and transfer output flange surface.

Tightening torque: 30 ± 3 N·m

(5) Install the particulate filter and front muffler assembly.

(6) Install the negative battery cable.

⚠ Caution

- **When installing, transmission shaft light point mark position should be aligned with transfer flange heavy point mark position.**
- **When installing, transmission shaft light point mark position should be aligned with rear final drive flange heavy point mark position.**

2.5 Inner Ball Cage

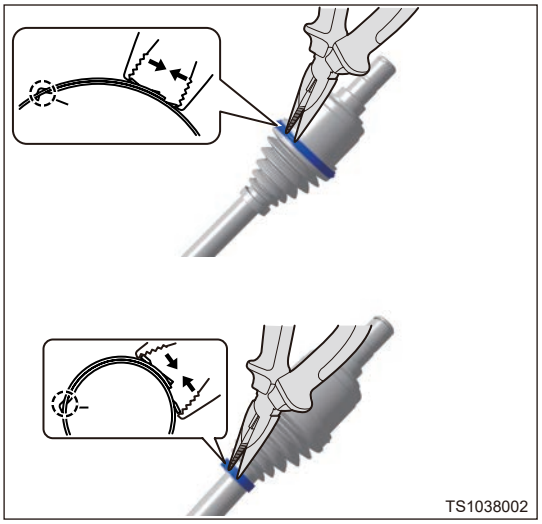
■ **Removal**

⚠ Warning

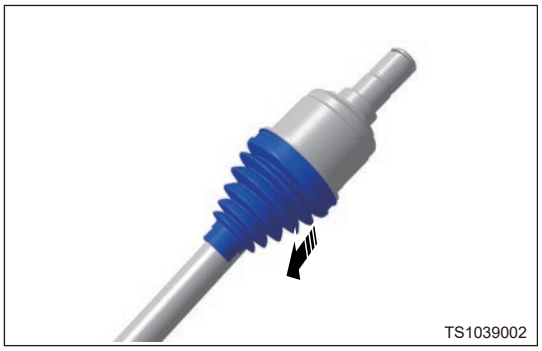
- **DO NOT put matchmarks on the rotating surface of rotary drum.**
- **Operate carefully to prevent dust boot from being damaged.**

(1) Remove the drive shaft assembly.

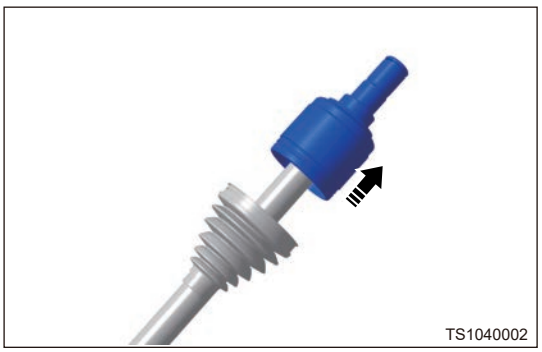
(2) Using needle nose pliers, remove the inner ball cage dust boot clamps.



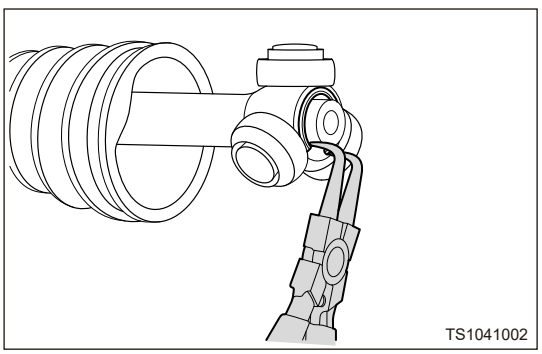
(3) Separate the dust boot from inner ball cage in direction of arrow.



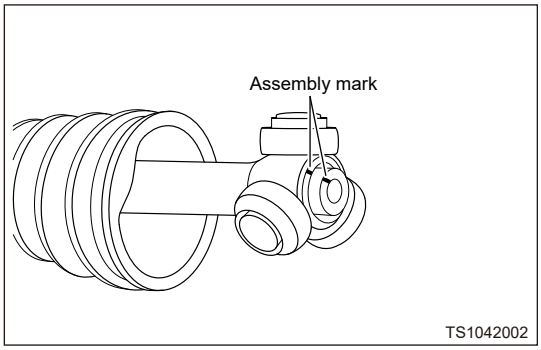
(4) Remove the inner ball cage in direction of arrow, and place it on a piece of clean cloth.



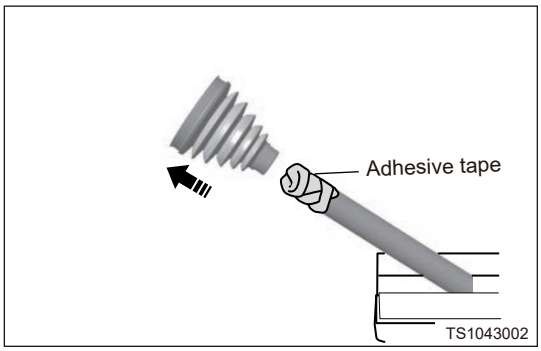
(5) Using snap spring calipers, remove the positioning snap spring of tripod.



(6) Put matchmarks on the tripod and drive shaft, and remove the tripod.



(7) Wrap tape on the spline of drive shaft, and remove dust boot.



(8) Remove the tape.

■ **Installation**

⚠ Caution

- **Check if spline of drive shaft is in good condition. If it is deformed or damaged, replace it.**
- **Check if dust boot is in good condition. If it is scratched or broken, replace it.**
- **Check if positioning snap spring of tripod is deformed. If it is deformed, replace it.**
- **Reapply grease during installation, and install with a new clamp.**

(1) Wrap tape on the spline of drive shaft, and install dust boot.
(2) Install the tripod based on matchmarks on the tripod and drive shaft.
(3) Using snap spring calipers, install the positioning snap spring of tripod.
(4) Install the inner ball cage.
(5) Using needle nose pliers, install the inner ball cage dust boot clamps.

2.6 Outer Ball Cage

Hint:

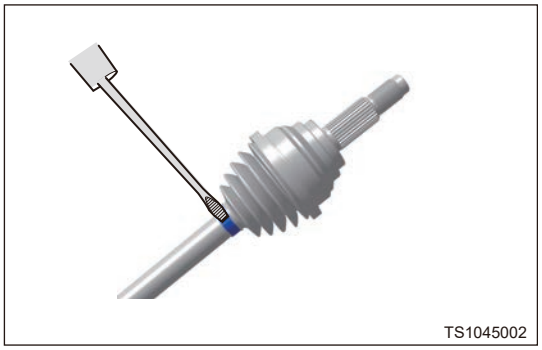
- Use same disassembly and assembly procedures for outer ball cage of left / right drive shaft assemblies.

■ **Removal**

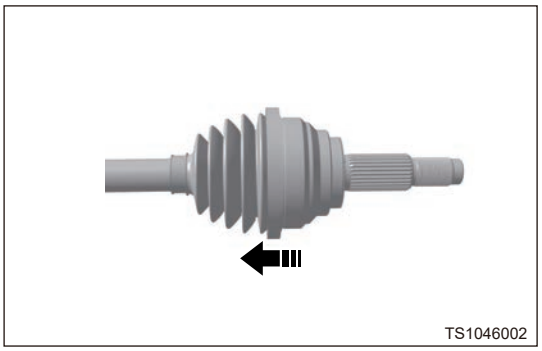
(1) Remove the drive shaft assembly.

(2) Using a screwdriver, pry out striker of outer ball cage dust boot outer clamp and remove outer ball cage dust boot outer clamp.

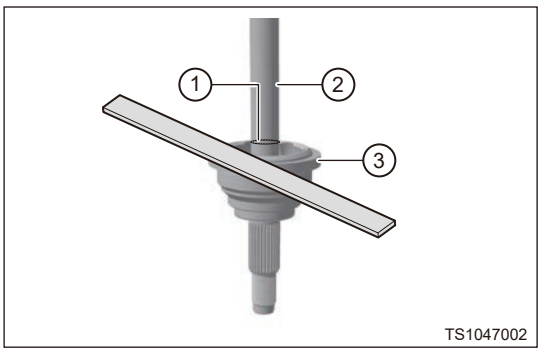
(3) Using a screwdriver, pry out striker of outer ball cage dust boot inner clamp and remove outer ball cage dust boot inner clamp.



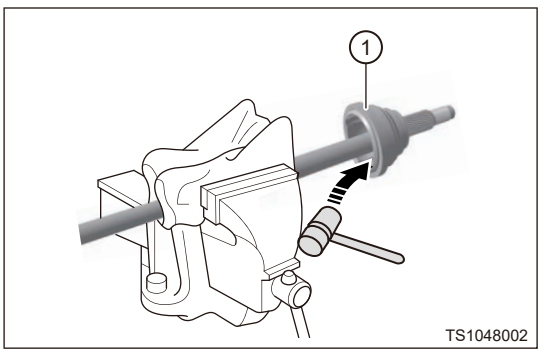
(4) Slide the outer dust boot carefully into the inner ball cage side in direction of arrow.



(5) Put matchmarks (1) on area at same height as drive shaft assembly (2) and edge of outer ball cage (3) for correct installation.



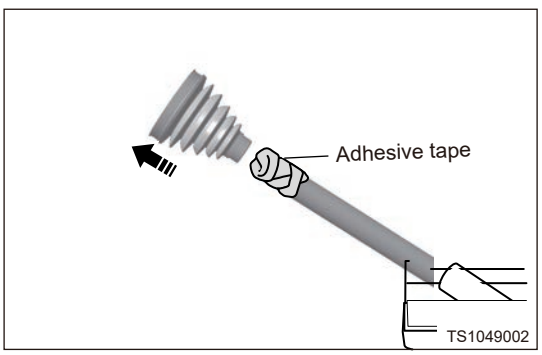
(6) Wrap the drive shaft assembly with a piece of cloth and put it onto a vise. Secure the vise to prevent drive shaft assembly from shaking. Expand the internal positioning snap spring of outer ball cage with snap spring calipers, then tap outer ball cage with a hammer and remove outer ball cage (1).



(7) Remove the left drive shaft from vise.

(8) Remove the internal positioning snap spring of outer ball cage.

(9) Wrap tape on the spline of drive shaft, and remove dust boot.



(10) Remove the tape.

■ **Installation**

⚠ **Caution**
• **Check if spline of drive shaft is in good condition. If it is deformed or damaged, replace it.** • **Check if dust boot is in good condition. If it is scratched or broken, replace it.** • **Reapply grease during installation, and install with a new clamp.**

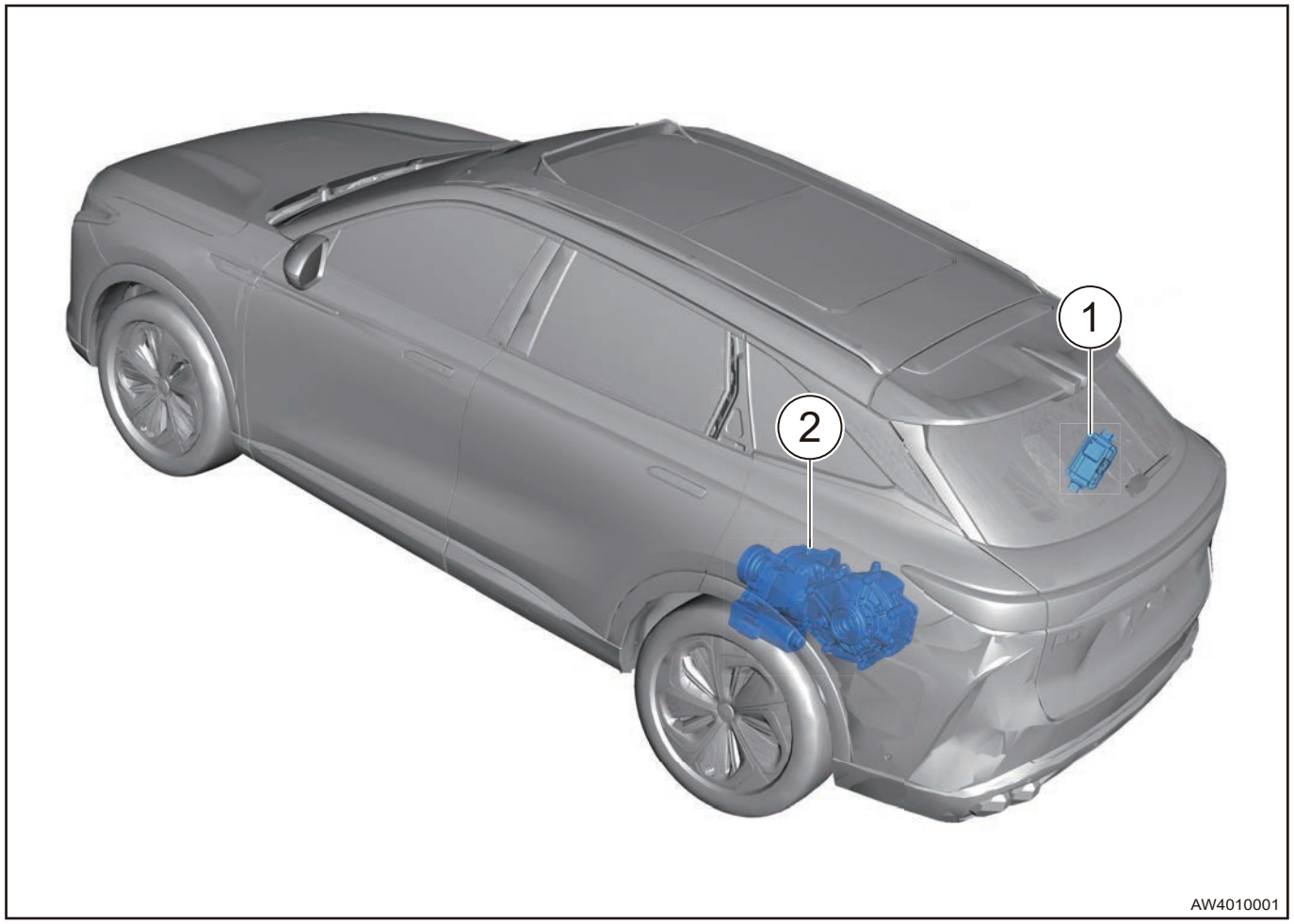
(1) Wrap tape on the spline of drive shaft, and install dust boot.
(2) Install outer ball cage and internal positioning snap spring.
(3) Install the outer ball cage dust boot.
(4) Install the outer ball cage dust boot inner clamp.
(5) Install the outer ball cage dust boot outer clamp.

4WD SYSTEM

4.1 4WD CONTROL SYSTEM

1 System Overview

1.1 System Components Diagram

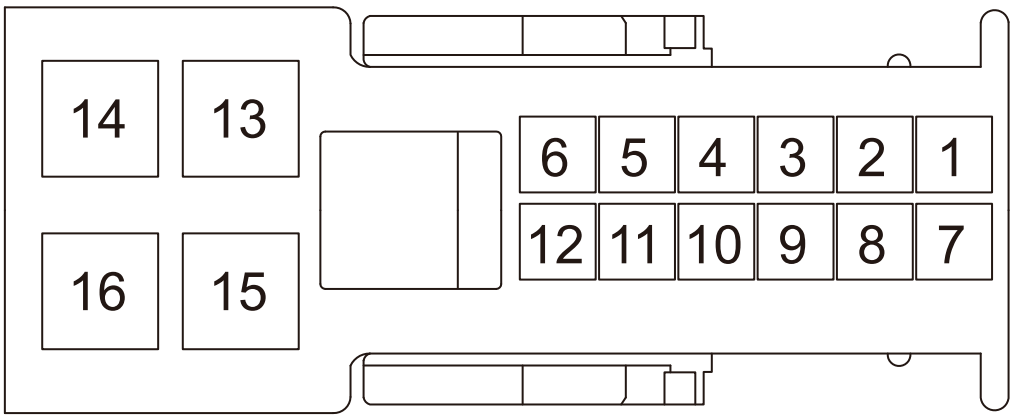


1	Torque Manager Control Unit	2	Rear Final Drive Assembly

2 System Circuit Diagram

2.1 Terminal Definition

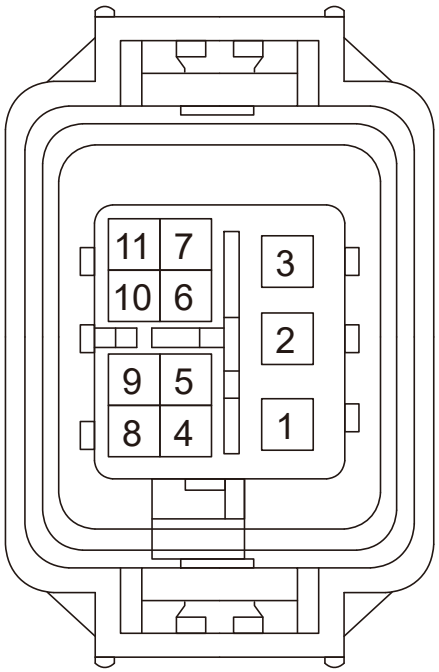
■ 4WD Module Terminal Definition



AW4020001

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Hall Sensor Power Supply	9	S - CAN H
2	-	10	Temperature Sensor -
3	-	11	Hall Sensor Signal 2
4	Temperature Sensor +	12	Hall Sensor Ground
5	Hall Sensor Signal 1	13	Motor +
6	KL15	14	Motor -
7	Shielding Signal	15	KL30
8	S - CAN L	16	Ground

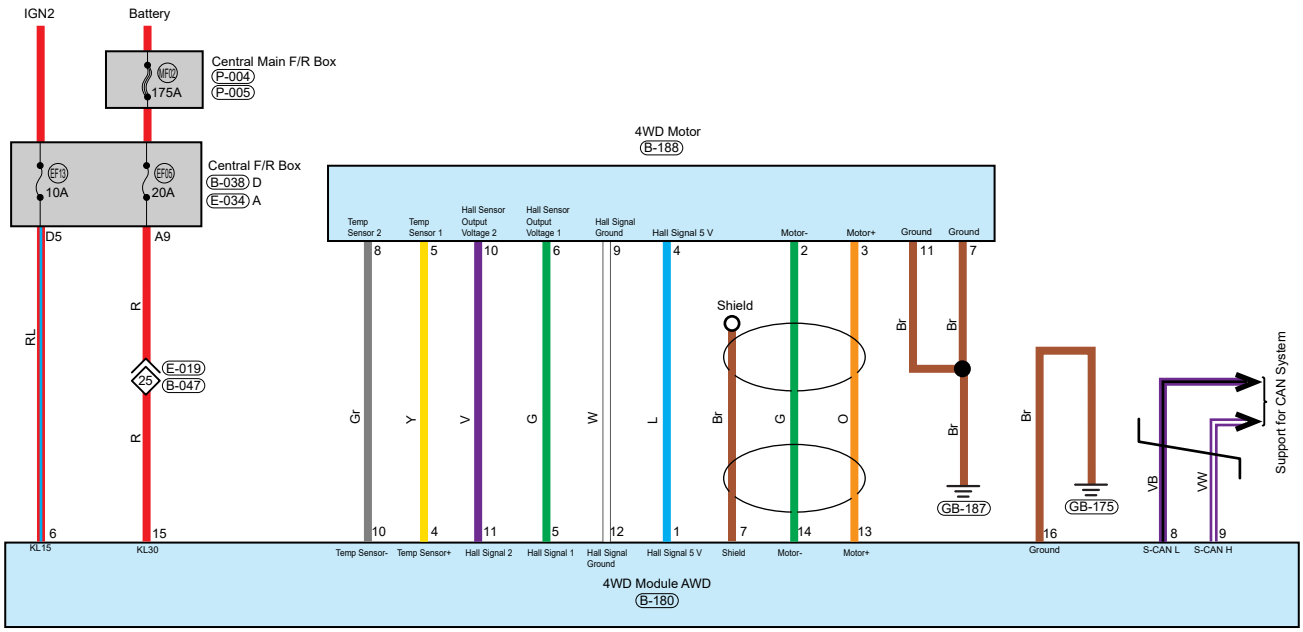
■ 4WD Motor Terminal Definition



AW4030001

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	-	7	Ground
2	Motor -	8	Temperature Sensor -
3	Motor +	9	Hall Sensor Ground
4	Hall Sensor Power Supply	10	Hall Sensor Signal 2
5	Temperature Sensor +	11	Ground
6	Hall Sensor Signal 1		

2.2 AWD Control System Circuit Diagram



AW4002001

3 Diagnosis Contents

3.1 Problem Symptoms Table

Hint:

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
AWD malfunction indicator ON	Motor is damaged
	AWD module damage
	Abnormal control circuit
	Abnormal vehicle speed signal
	Clutch failure

3.2 Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the 4WD control system.

1	**Vehicle brought to workshop**

Next

2	Check battery voltage

Check if battery voltage is normal.

NG → Replace battery

OK

3	Customer problem analysis

Next

4	Read DTCs

Check if battery voltage is normal.

NG → Perform repair according to problem symptoms table

OK

5	Read DTCs (current DTC and history DTC)

Check if battery voltage is normal.

NG → Troubleshoot according to Intermittent DTC malfunction procedures

OK

6	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

7	Adjust, repair or replace

Next

8	Conduct test and confirm malfunction has been repaired

Check if battery voltage is normal.

Next → End

3.3 DTC Confirmation Procedure

Confirm that battery voltage is normal before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect diagnostic tester (the latest software) to diagnostic interface.
- Turn ENGINE START STOP switch to ON.
- Using diagnostic tester, record and clear DTCs stored in 4WD control module assembly.
- Turn ENGINE START STOP switch to OFF and wait for several seconds.
- Using the diagnostic tester, select Read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to DTC chart, and perform troubleshooting.
- If no DTC is detected, malfunction indicated by DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

3.4 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check and clean all wire harness connectors and body ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common body ground circuit or power supply circuit applied for this DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.5 Body Ground Inspection

Body ground points are very important to the proper operation of circuits. Body ground points are often exposed to moisture, dirt and other corrosive enviroN·ments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper body grounding. A loose or corroded body ground can affect the control circuit. Check body ground points as follows:

(1) Remove body ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall body ground bolt or nut securely.
(5) Check if any additional accessories interfere with body ground circuit.
(6) If several wire harnesses are crimped into one body ground terminal, check for proper crimp condition. Make sure all wire harnesses are clean, securely fastened with providing a good body ground path.

3.6 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
P1FC004	ACM Internal Error
P1FC109	Motor Output Error
P1FC24B	Motor Driver Temperature Too High
P1FC34B	Motor Temperature Too High
P1FC44B	Oil Temperature Too High
P1FC54B	Clutch Over Temperature
P1FC600	4WD System Actuator Initialization Failed

DTC	DTC Definition
P1FC792	4WD System Position Sensor Circuit Performance Fault
P1FC811	Motor Temperature Sensor Short to Ground
P1FC915	Motor Temperature Sensor Short to Power Supply or Open
P1FCA11	Motor Position Sensor Power Supply Voltage Short to Ground or UnderVoltage
P1FCB12	Motor Position Sensor Power Supply Voltage Short to Power Supply
P1FCC15	Motor Position Sensor Signal Wire 1: Short to Power Supply or Open
P1FCD14	Motor Position Sensor Signal Wire 1: Short to Ground or Open
P1FCE15	Motor Position Sensor Signal Wire 2: Short to Power Supply or Open
P1FCF14	Motor Position Sensor Signal Wire 2: Short to Ground or Open
P1FD064	Motor Position Sensor Circuit Signal Unreliable
P1FD112	Motor Control Circuit Short to Power Supply
P1FD211	Motor Control Circuit Short to Ground
P1FD313	Motor Control Circuit Open
P1FD419	Motor Control Circuit Over Current
P1FD51D	Motor Circuit Current or Motor Position Out of Range
P1FD707	Clutch Overrun
P1FD84B	Controller Overheating
P1FD916	Voltage too Low
P1FDA17	Voltage too High
P1FDB16	Function Voltage too Low
P1FDC17	Function Voltage too High
U007388	Control Unit Communication Bus OFF
U010087	Lost Communication with EMS
U010187	Lost Communication with TCU
U012687	Lost Communication with SAM
U012987	Lost Communication with BSM
U014087	Lost Communication with BCM
U024587	Lost Communication with IHU
U040181	ESM Invalid Data
U040281	TCU Invalid Data
U041881	BSM Invalid Data
U042281	BCM Invalid Data
U042481	CLM Invalid Data
U042881	SAM Invalid Data

DTC	DTC Definition
U054681	IHU Invalid Data
U130055	Software Configuration Error

3.7 DTC Diagnosis Procedure

DTC	P1FC004	ACM Internal Error

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FC004	ACM Internal Error	View DTC extension information: 71: adc error module 75: BIOS not ready	• Power supply system failure • Wire harness or connector failure • Controller failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check battery

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK ↓

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

OK ↓

3	Check fuse

(a) Check if fuse in engine compartment fuse and relay box is normal.

NG → Replace fuse

OK

4	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect 4WD module connector and disconnect the instrument panel fuse and relay box connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

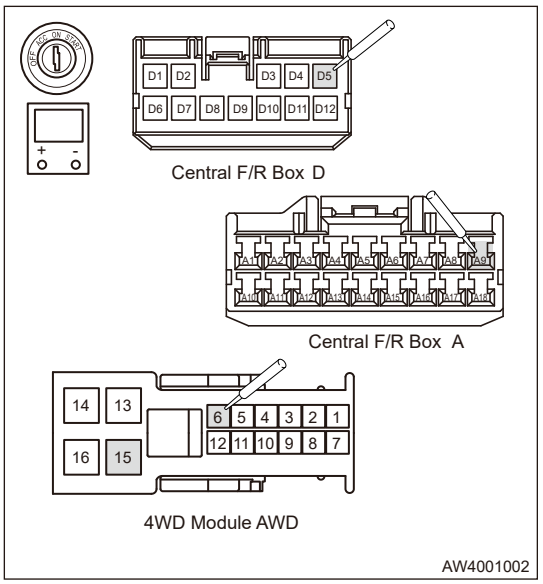
(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

(f) Check for continuity between instrument panel fuse and relay box connector (connected terminals) and 4WD module connector (power supply terminal) (using a digital multimeter).

Standard Resistance

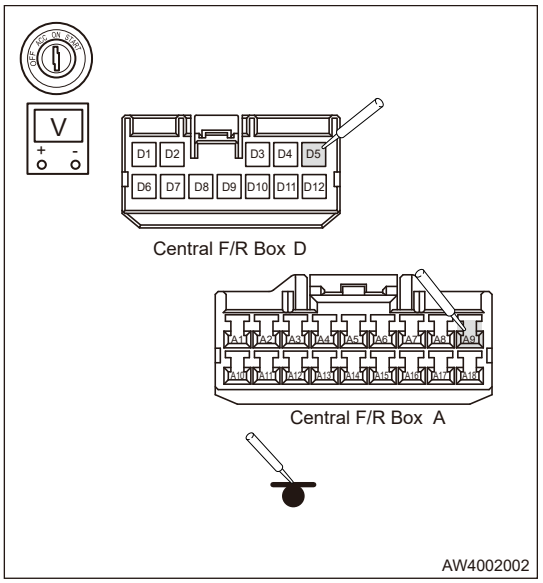
Multimeter Connection	Condition	Specified Condition
4WD module connector (- power supply terminal) - Instrument panel fuse and relay box connector (- connected terminal)	Always	⩽ 1 Ω



(g) Turn ENGINE START STOP switch to ON.

(h) Check for voltage between instrument panel fuse and relay box connector and 4WD module connector (power supply terminal) and body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
Engine compartment fuse and relay box connector and 4WD module connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	⩾ 12 V



NG → Repair or replace wire harness or connector

OK

5	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace 4WD module**

DTC	**P1FD916**	**Voltage too Low**
DTC	**P1FDA17**	**Voltage too High**
DTC	**P1FDB16**	**Function Voltage too Low**
DTC	**P1FDC17**	**Function Voltage too High**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FD916	Voltage too High	When power supply voltage is lower than 8.5 V, fault generates	• Power supply system failure • Wire harness or connector failure • Controller failure
P1FDA17	Voltage too Low	When power supply voltage is higher than 16 V, fault generates	
P1FDB16	Function Voltage too High	When power supply voltage is higher than 16 V, fault generates	
P1FDC17	Function Voltage too Low	When power supply voltage is lower than 8.5 V, fault generates	

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check battery**

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

OK

3	Check fuse

(a) Check if fuse in engine compartment fuse and relay box is normal.

NG → **Replace fuse**

OK

4	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect 4WD module connector and engine compartment fuse and relay box connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

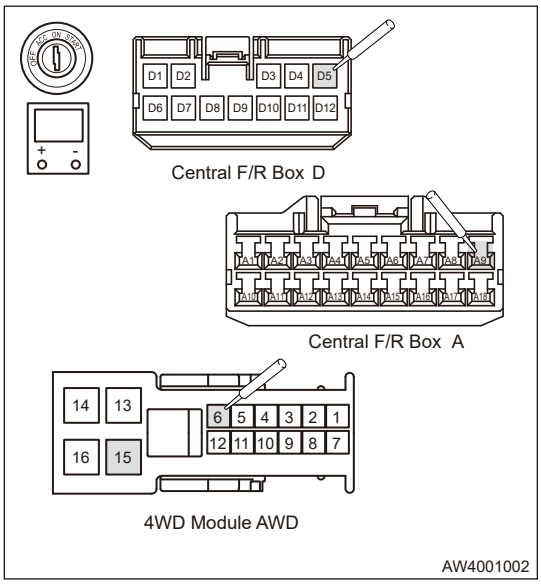
(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

(f) Check for continuity between engine compartment fuse and relay box connector (connected terminals) and 4WD module connector (power supply terminal) (using a digital multimeter).

Standard Resistance

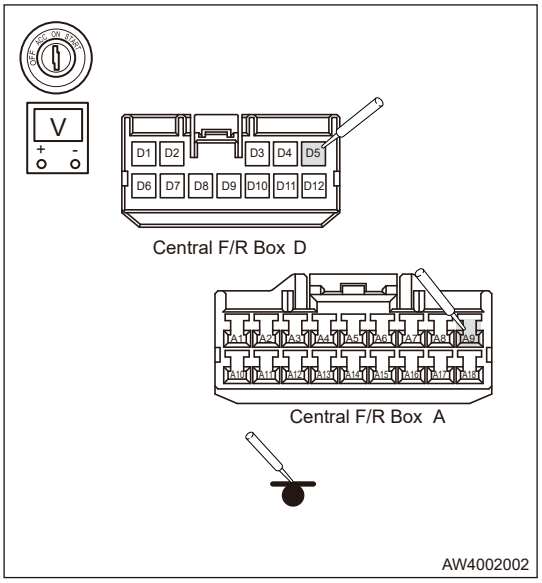
Multimeter Connection	Condition	Specified Condition
4WD module connector (- power supply terminal) - Instrument panel fuse and relay box connector (- connected terminal)	Always	⩽ 1 Ω



(g) Turn ENGINE START STOP switch to ON.

(h) Check for voltage between instrument panel fuse and relay box connector and 4WD module connector (power supply terminal) and body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
Instrument panel fuse and relay box connector and 4WD module connector (-power supply terminal) - Body ground	ENGINE START STOP switch ON	⩾ 12V



NG → **Repair or replace wire harness or connector**

OK

5	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	P1FC600	4WD System Actuator Initialization Failed

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FC600	4WD System Actuator Initialization Failed	During initialization, if the position changes too small (0 °) or too high (500 °) for more than 3 times, fault generates	• Power supply system failure • Wire harness or connector failure • Actuator failure • Final drive mechanical failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check battery**

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK

2	**Check charging system**

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

OK

3	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect 4WD module connector and 4WD motor connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

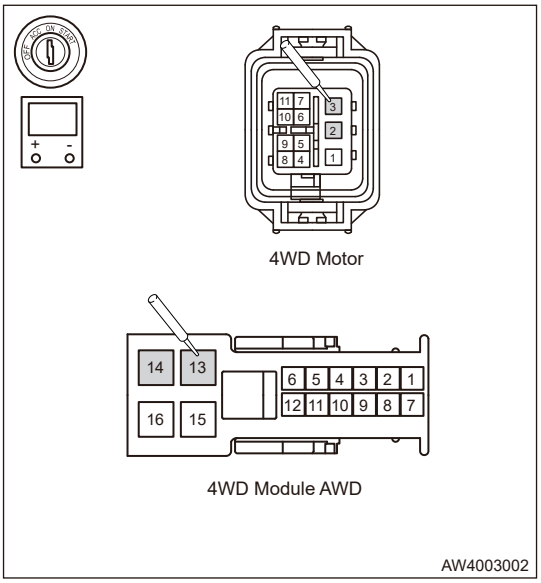
(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

(f) Check for continuity between 4WD motor connector terminals (2 and 3) and 4WD module connector terminals (14 and 13) (using a digital multimeter).

Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD module connector (13) - 4WD motor connector (3)	Always	⩽ 1 Ω
4WD module connector (14) - 4WD motor connector (2)	Always	⩽ 1 Ω

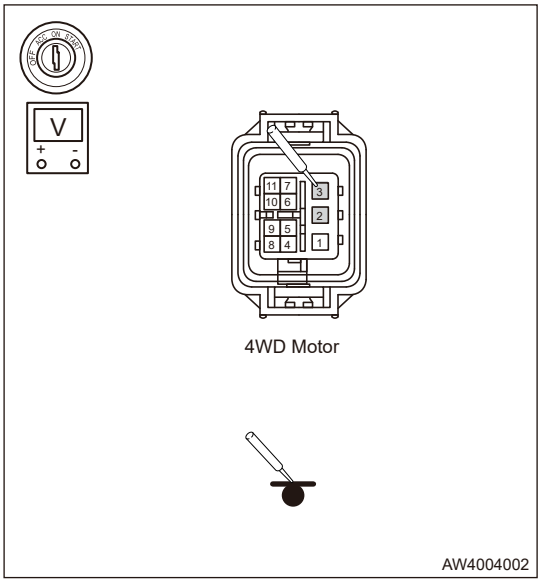


(g) Connect the negative battery cable.

(h) Turn ENGINE START STOP switch to ON.

(i) Check voltage between 4WD motor connector terminals (3 and 2) and body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD motor connector (3) - Body ground	ENGINE START STOP switch ON	⩾ 12 V
4WD motor connector (2) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace wire harness or connector**

OK ↓

4	Check 4WD motor

- Check if 4WD motor operates normally.

NG → **Replace 4WD motor**

OK ↓

5	Check final drive mechanical part

- Check if final drive mechanical part is normal.

NG → **Replace or repair final drive mechanical part**

OK ↓

6	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	P1FC811	Motor Temperature Sensor Short to Ground

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FC811	Motor Temperature Sensor Short to Ground	When input voltage is lower than 1.9 V, fault generates	• Wire harness or connector failure • 4WD motor failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

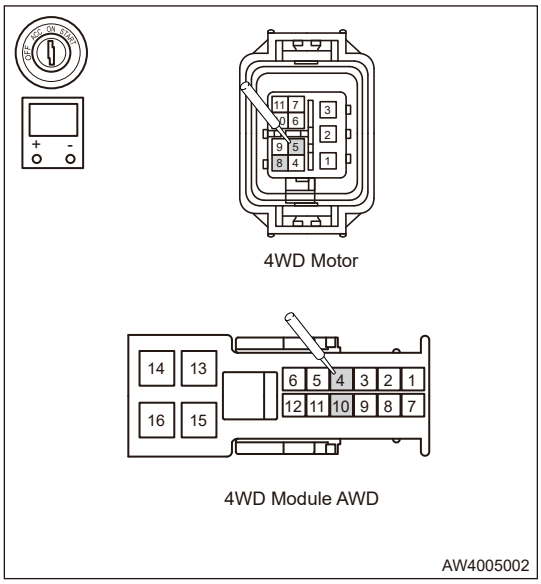
- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.
(g) Check for continuity between 4WD motor connector terminals (5 and 8) and 4WD module connector terminals (4 and 10) (using a digital multimeter).

Standard Resistance

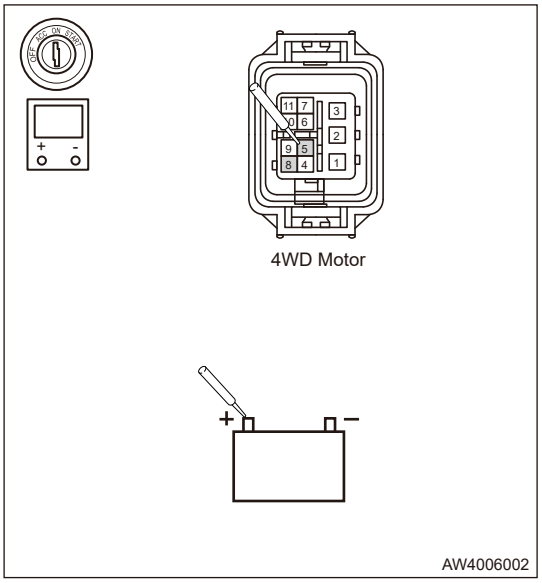
Multimeter Connection	Condition	Specified Condition
4WD module connector (4) - 4WD motor connector (5)	Always	⩽ 1 Ω
4WD module connector (10) - 4WD motor connector (8)	Always	⩽ 1 Ω



(h) Connect 4WD module connector, disconnect 4WD motor connector.

(i) Check for continuity between 4WD motor connector terminals (5 and 8) and positive and battery negative (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD motor connector (5) - Battery positive	Always	∞
4WD motor connector (5) - Battery negative	Always	∞
4WD motor connector (8) - Battery positive	Always	∞
4WD motor connector (8) - Battery negative	Always	∞



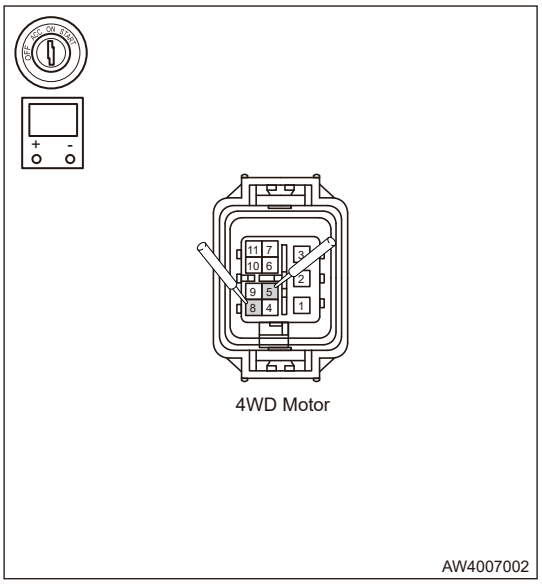
NG → **Repair or replace wire harness or connector**

OK

2	Check motor temperature sensor

- Disconnect the battery negative.
- Disconnect the 4WD motor connector.
- Measure resistance between 4WD motor connector terminals 5 and 8.

Multimeter Connection	Condition	Specified Condition
4WD motor connector (5) - 4WD motor connector (8)	Always	Resistance ⩽ 1.5 KΩ at maximum temperature of 50 ˚C



NG → **Replace 4WD motor**

OK

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace 4WD module**

DTC	P1FC915	Motor Temperature Sensor Short to Power Supply or Open

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FC915	Motor Temperature Sensor Short to Power Supply or Open	When input voltage is higher than 4.96 V, fault generates	• Wire harness or connector failure • 4WD motor failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

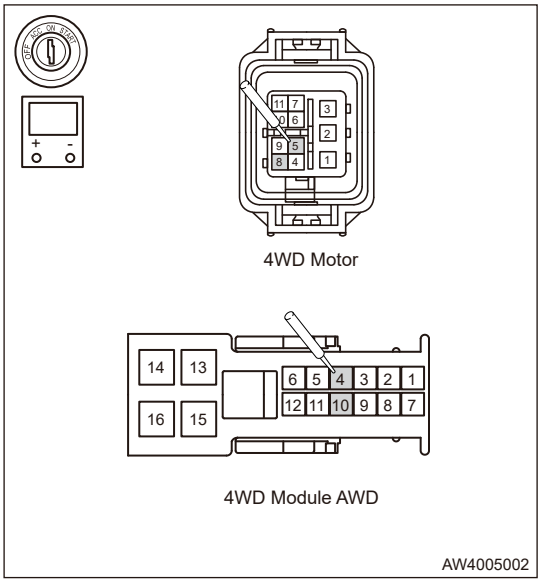
- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.
(g) Check for continuity between 4WD motor connector terminals (5 and 8) and 4WD module connector terminals (4 and 10) (using a digital multimeter).

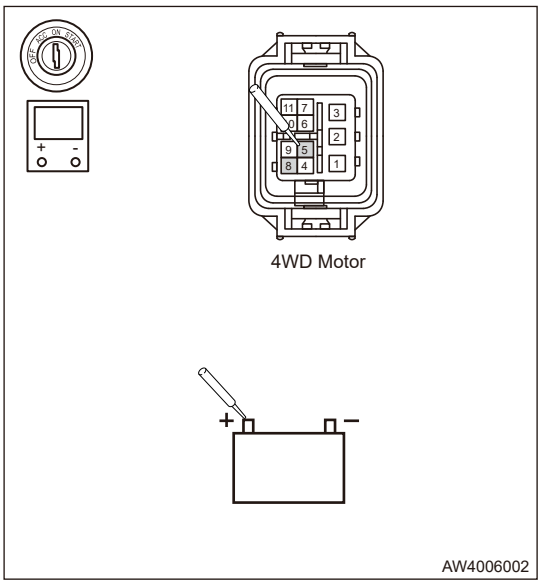
Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD module connector (4) - 4WD motor connector (5)	Always	⩽ 1 Ω
4WD module connector (10) - 4WD motor connector (8)	Always	⩽ 1 Ω



(h) Connect 4WD module connector, disconnect 4WD motor connector.
(i) Check for continuity between 4WD motor connectors (5 and 8) and positive and battery negative (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD motor connector (5) - Battery positive	Always	∞
4WD motor connector (5) - Battery negative	Always	∞
4WD motor connector (8) - Battery positive	Always	∞
4WD motor connector (8) - Battery negative	Always	∞



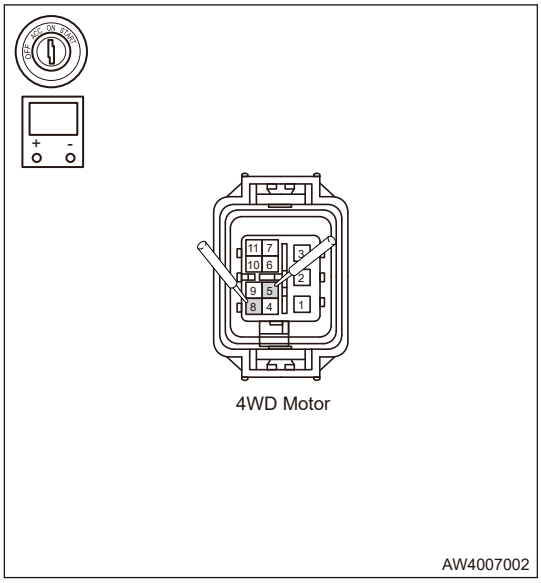
NG → **Repair or replace wire harness or connector**

OK

2	**Check motor temperature sensor**

- Disconnect the battery negative.
- Disconnect the 4WD motor connector.
- Measure resistance between 4WD motor connector terminals 5 and 8.

Multimeter Connection	Condition	Specified Condition
4WD motor connector (5) - 4WD motor connector (8)	Always	The resistance is 5 KΩ at a temperature of 20 ˚C and 1.7 KΩ at a temperature of 50 ˚C



NG → **Replace 4WD motor**

OK

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK
Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	P1FCA11	Motor Position Sensor Power Supply Voltage Short to Ground or UnderVoltage

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FCA11	Motor Position Sensor Power Supply Voltage Short to Ground or UnderVoltage	When input voltage is lower than 5.1 V, fault generates	• Power supply system failure • Wire harness or connector failure • 4WD motor failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check battery

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK ↓

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

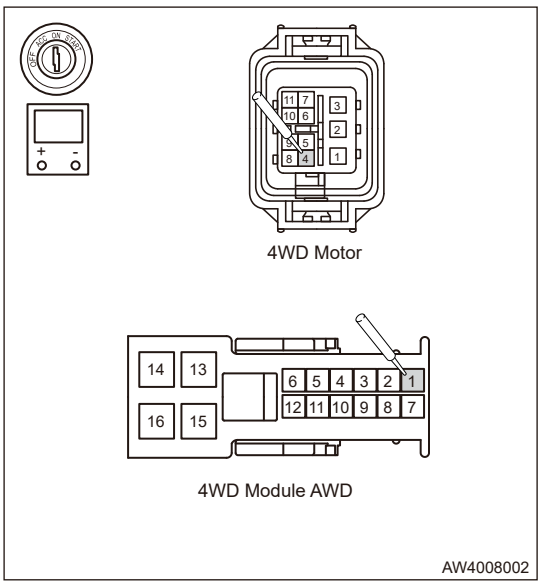
OK ↓

3	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.
(g) Check for continuity between 4WD motor connector terminal (4) and 4WD module connector terminal (1) (using a digital multimeter).

Standard Resistance

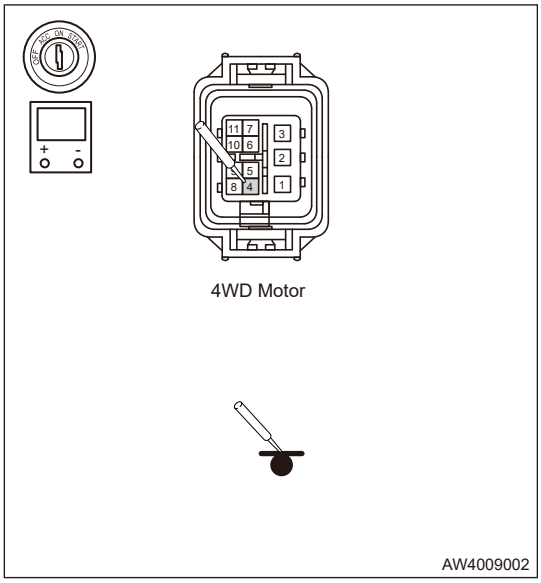
Multimeter Connection	Condition	Specified Condition
4WD module connector (1) - 4WD motor connector (4)	Always	⩽ 1 Ω



(h) Connect 4WD module connector, disconnect 4WD motor connector.

(i) Check for continuity between 4WD motor connector terminal 4 and body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD motor connector (4) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

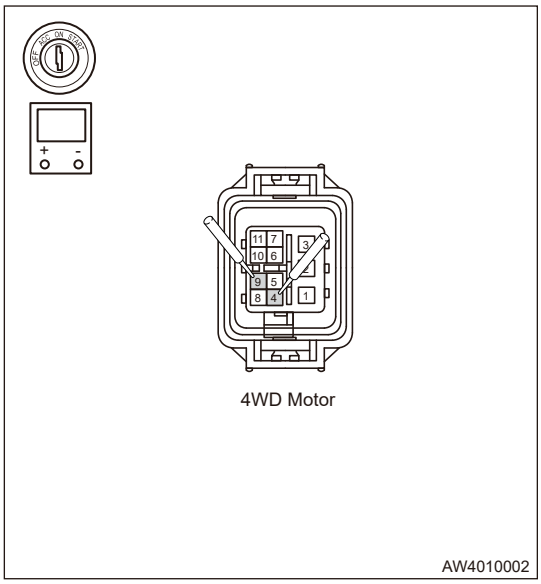
OK

4	Check motor position sensor

- Disconnect the battery negative.
- Disconnect the 4WD motor connector.
- Check resistance between 4WD motor connector terminals 4 and 9.

  Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD motor connector (4) - 4WD motor connector (9)	Always	Approximately 4.5 KΩ



NG → **Replace 4WD motor**

OK

5	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace 4WD module**

DTC	P1FCB12	Motor Position Sensor Power Supply Voltage Short to Power Supply

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FCB12	Motor Position Sensor Power Supply Voltage Short to Power Supply	When input voltage is higher than 9 V, fault generates	• Wire harness or connector failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the battery negative.

(c) Disconnect 4WD module connector and 4WD motor connector.

(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

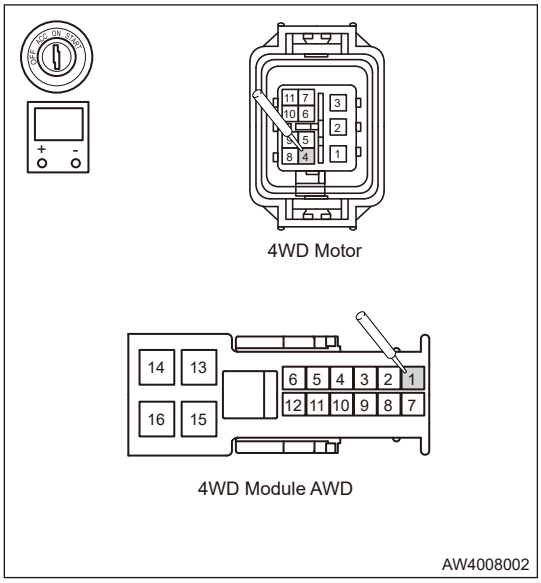
(e) Check for broken, bent, protruded or corroded terminals.

(f) Check if related connector pins are in good condition.

(g) Check for continuity between 4WD motor connector terminal (4) and 4WD module connector terminal (1) (using a digital multimeter).

Standard Resistance

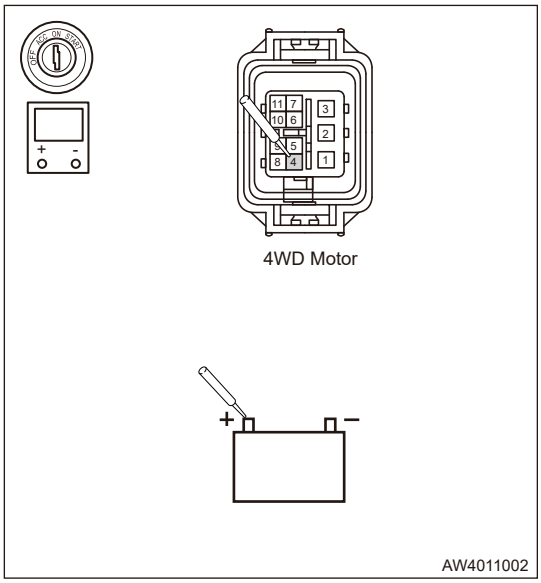
Multimeter Connection	Condition	Specified Condition
4WD module connector (1) - 4WD motor connector (4)	Always	⩽ 1 Ω



(h) Connect the 4WD module connector.

(i) Check for continuity between 4WD module connector terminal 4 and battery positive (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD module connector (4) - Battery positive	Always	∞



NG → **Repair or replace wire harness or connector**

OK

2	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	P1FCC15	Motor Position Sensor Signal Wire 1: Short to Power Supply or Open
DTC	P1FCD14	Motor Position Sensor Signal Wire 1: Short to Ground or Open

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FCC15	Motor Position Sensor Signal Wire 1: Short to Power Supply or Open	When input voltage is higher than 3.42V, fault generates	• Wire harness or connector failure • 4WD module failure
P1FCD14	Motor Position Sensor Signal Wire 1: Short to Ground or Open	When input voltage is lower than 1.9V, fault generates	

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the battery negative.

(c) Disconnect 4WD module connector and 4WD motor connector.

(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

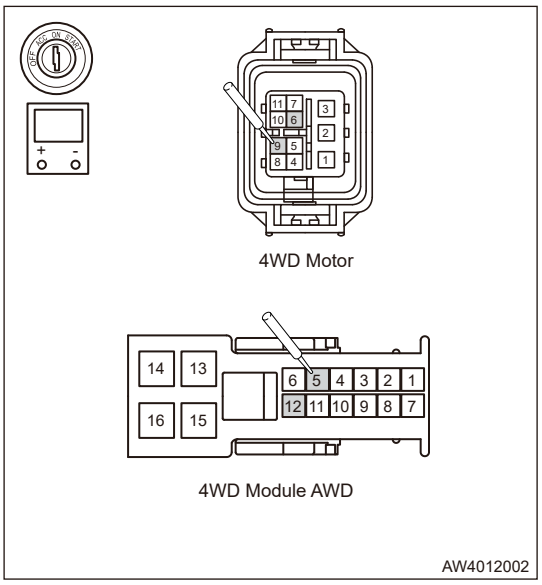
(e) Check for broken, bent, protruded or corroded terminals.

(f) Check if related connector pins are in good condition.

(g) Check for continuity between 4WD motor connector terminals (6 and 9) and 4WD module connector terminals (5 and 12) (using a digital multimeter).

Standard Resistance

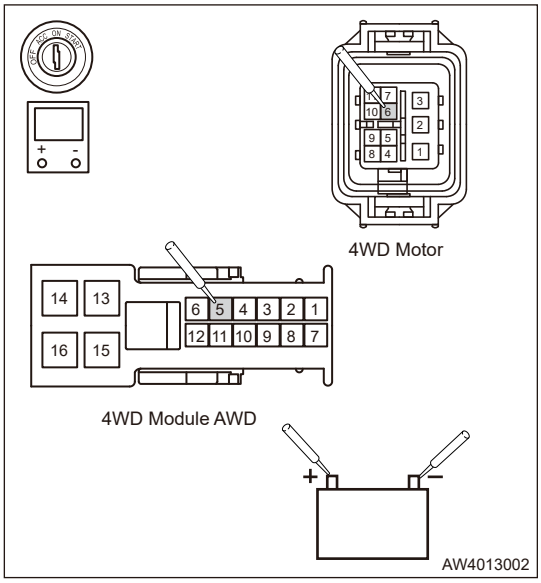
Multimeter Connection	Condition	Specified Condition
4WD module connector (5) - 4WD motor connector (6)	Always	⩽ 1 Ω
4WD module connector (12) - 4WD motor connector (9)	Always	⩽ 1 Ω



(h) Connect 4WD module connector and 4WD motor connector.

(i) Check for continuity between 4WD module connector terminal 5 and battery positive, body ground, 4WD module connector terminal 6 and battery positive, body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD module connector (5) - Battery positive	Always	∞
4WD module connector (5) - Body ground	Always	∞
4WD motor connector (6) - Battery positive	Always	∞
4WD motor connector (6) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

2	Check 4WD motor

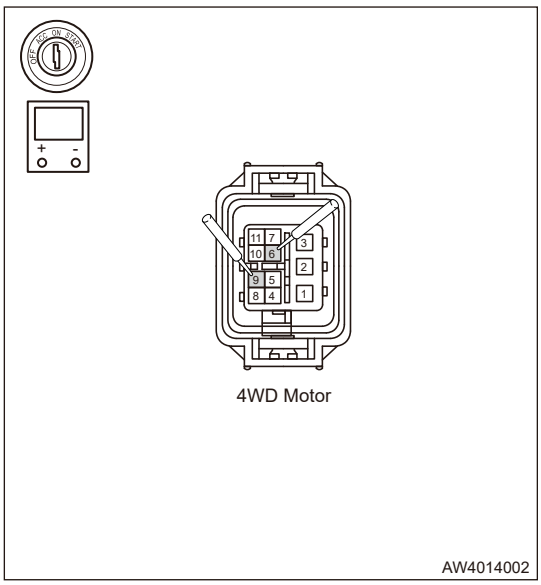
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the battery negative.

(c) Disconnect the 4WD motor connector.

(d) Check for continuity between 4WD motor connector terminals 6 and 9 (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD motor connector (6) - 4WD motor connector (9)	Always	Approximately 4.3 KΩ



NG → **Replace 4WD motor**

OK

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace 4WD module**

DTC	**P1FCE15**	**Motor Position Sensor Signal Wire 2: Short to Power Supply or Open**
DTC	**P1FCF14**	**Motor Position Sensor Signal Wire 2: Short to Ground or Open**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FCE15	Motor Position Sensor Signal Wire 2: Short to Power Supply or Open	When input voltage is higher than 3.42V, fault generates	• Wire harness or connector failure • 4WD module failure
P1FCF14	Motor Position Sensor Signal Wire 2: Short to Ground or Open	When input voltage is lower than 1.9V, fault generates	

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the battery negative.

(c) Disconnect 4WD module connector and 4WD motor connector.

(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

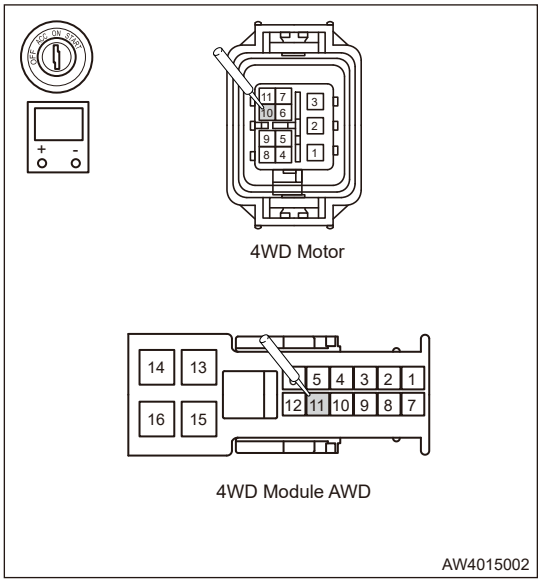
(e) Check for broken, bent, protruded or corroded terminals.

(f) Check if related connector pins are in good condition.

(g) Check for continuity between 4WD motor connector terminal (10) and 4WD module connector terminal (11) (using a digital multimeter).

Standard Resistance

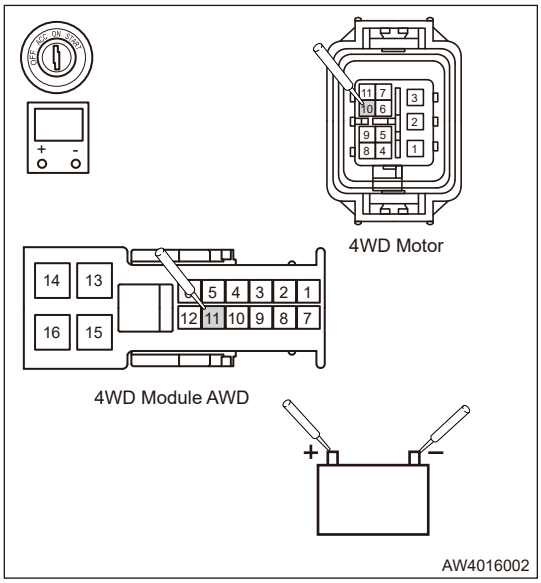
Multimeter Connection	Condition	Specified Condition
4WD module connector (11) - 4WD motor connector (10)	Always	⩽ 1 Ω



(h) Connect 4WD module connector and 4WD motor connector.

(i) Check for continuity between 4WD module connector terminal 11 and battery positive, body ground, 4WD module connector terminal 10 and battery positive, body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD module connector (11) - Battery positive	Always	∞
4WD module connector (11) - Body ground	Always	∞
4WD motor connector (10) - Battery positive	Always	∞
4WD motor connector (10) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

2	**Check 4WD motor**

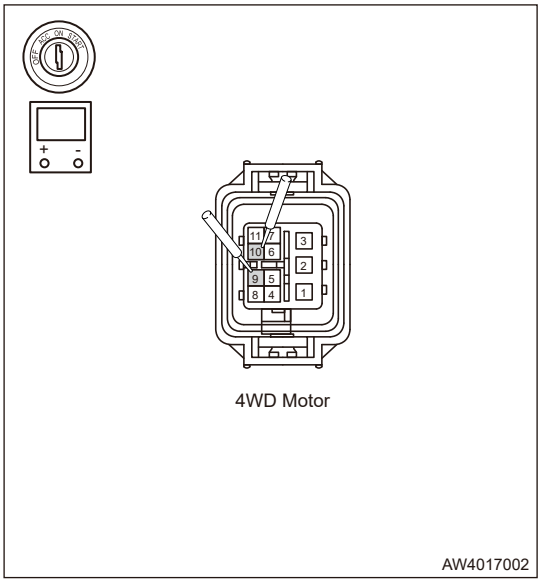
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the battery negative.

(c) Disconnect the 4WD motor connector.

(d) Check for continuity between 4WD motor connector terminals 9 and 10 (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD motor connector (9) - 4WD motor connector (10)	Always	Approximately 4.3 KΩ



NG → **Replace 4WD motor**

OK

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	P1FC972	4WD Module Position Sensor Circuit Performance Fault

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FC972	4WD Module Position Sensor Circuit Performance Fault	Deviation between the measured position of 4WD module position sensor and theoretical position is +360°/-800°	• Power supply system failure • Wire harness or connector failure • Motor failure • 4WD module failure • Final drive mechanical failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check battery

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK ↓

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

OK ↓

3	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the battery negative.

(c) Disconnect 4WD module connector and 4WD motor connector.

(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

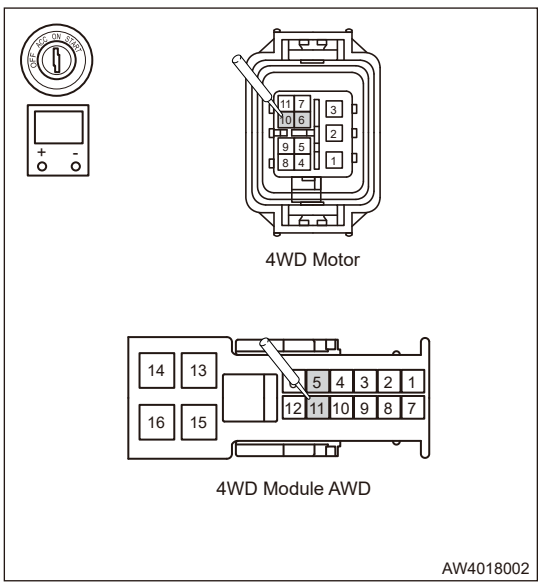
(e) Check for broken, bent, protruded or corroded terminals.

(f) Check if related connector pins are in good condition.

(g) Check for continuity between 4WD motor connector terminals (6 and 10) and 4WD module connector terminals (5 and 11) (using a digital multimeter).

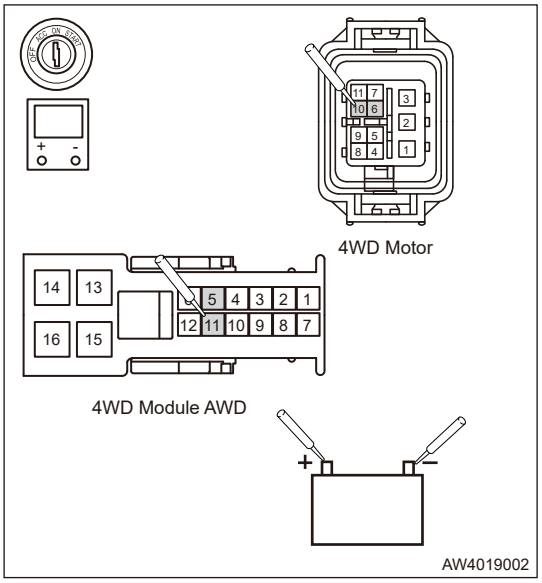
Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD module connector (5) - 4WD motor connector (6)	Always	⩽ 1 Ω
4WD module connector (11) - 4WD motor connector (10)	Always	⩽ 1 Ω



(h) Check for continuity between 4WD motor connector terminals (6 and 10) and 4WD module connector terminals (5 and 11) and battery positive, body ground respectively (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD module connector (5) - Battery positive	Always	∞
4WD module connector (11) - Body ground	Always	∞
4WD motor connector (6) - Battery positive	Always	∞
4WD motor connector (10) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

4	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace motor**

NG → **Replace 4WD module**

NG → **Repair final drive**

DTC	P1FD064	Motor Position Sensor Circuit Signal Unreliable

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FD064	Motor Position Sensor Circuit Signal Unreliable	When invalid Hall signal state is detected, gradient speed not reasonable, gradient position not reasonable, range speed not reasonable, interruption is lost, fault generates	• Wire harness or connector failure • Motor failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

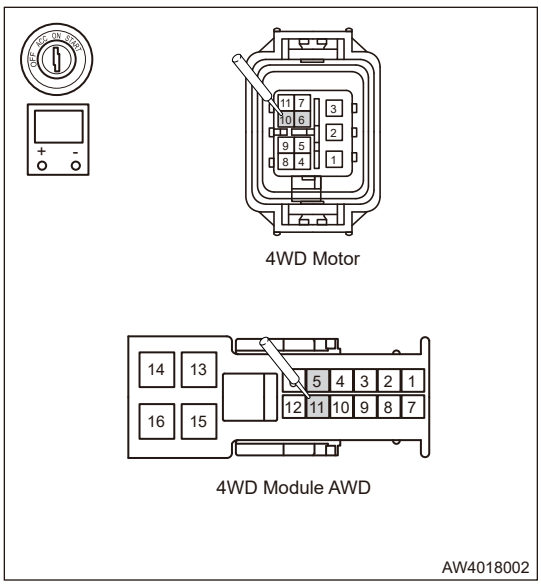
Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

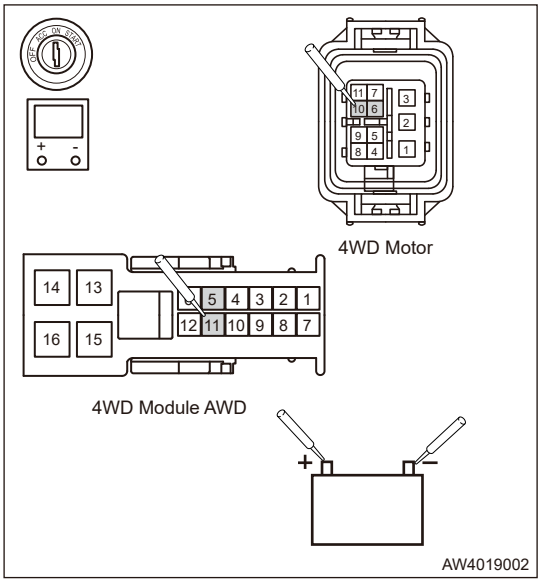
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
Check for broken, bent, protruded or corroded terminals.
(e) Check if related connector pins are in good condition.
(f) Check for continuity between 4WD motor connector terminals (6 and 10) and 4WD module connector terminals (5 and 11) (using a digital multimeter).
Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD module connector (5) - 4WD motor connector (6)	Always	⩽ 1 Ω
4WD module connector (11) - 4WD motor connector (10)	Always	⩽ 1 Ω



(g) Check for continuity between 4WD motor connector terminals (6 and 10) and 4WD module connector terminals (5 and 11) and battery positive, body ground respectively (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD module connector (5) - Battery positive	Always	∞
4WD module connector (11) - Body ground	Always	∞
4WD motor connector (6) - Battery positive	Always	∞
4WD motor connector (10) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

2	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace motor**

NG → **Replace 4WD module**

DTC	P1FD707	Clutch Overrun

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FD707	Clutch Overrun	Clutch position exceeding limit position is detected	• Clutch failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.

- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.

NG → **Repair or replace wire harness or connector**

OK

2	Check clutch

(a) Check clutch lining for wear.

NG → **Replace clutch lining**

OK

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	**P1FC24B**	**Motor Driver Temperature Too High**
DTC	**P1FC34B**	**Motor Temperature Too High**
DTC	**P1FC44B**	**Oil Temperature Too High**
DTC	**P1FC54B**	**Clutch Over Temperature**
DTC	**P1FD84B**	**Controller Overheating**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FC24B	Motor Driver Temperature Too High	When it is detected that motor driver temperature is higher than 125˚C, fault generates	• Wire harness or connector failure • 4WD module failure
P1FC34B	Motor Temperature Too High	When it is detected that motor temperature is higher than 140˚C, fault generates	
P1FC44B	Oil Temperature Too High	When it is detected that oil temperature is higher than 150˚C, fault generates	
P1FC54B	Clutch Over Temperature	When it is detected that clutch temperature is higher than 250˚C, fault generates	
P1FD84B	Controller Overheating	It is detected that controller temperature is not lower than 85˚C	

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.

NG → **Repair or replace wire harness or connector**

OK

2	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace 4WD module**

DTC	**P1FD112**	**Motor Control Circuit Short to Power Supply**
DTC	**P1FD211**	**Motor Control Circuit Short to Ground**
DTC	**P1FD313**	**Motor Control Circuit Open**
DTC	**P1FD419**	**Motor Control Circuit Over Current**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FD112	Motor Control Circuit Short to Power Supply	It is detected that motor control circuit is short to power supply	• Power supply system failure • Wire harness or connector failure • 4WD module failure
P1FD211	Motor Control Circuit Short to Ground	It is detected that motor control circuit is short to ground	
P1FD313	Motor Control Circuit Open	It is detected that motor control circuit is open	
P1FD419	Motor Control Circuit Over Current	When input current is higher than 43.8 A, fault generates	

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check battery**

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

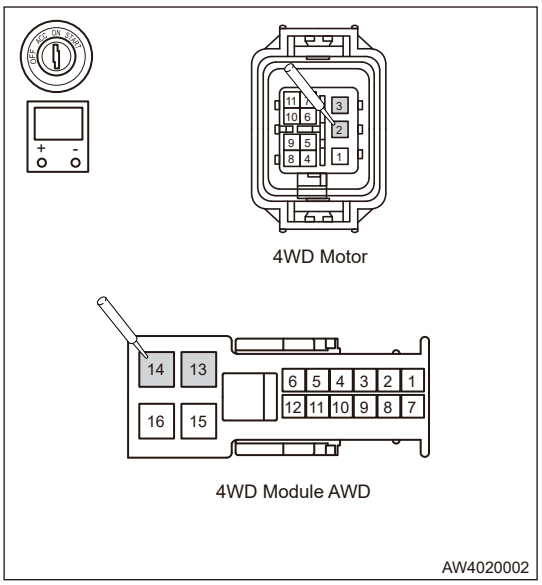
OK

3	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.
(g) Check for continuity between 4WD motor connector terminals (3 and 2) and 4WD module connector terminals (13 and 14) (using a digital multimeter).

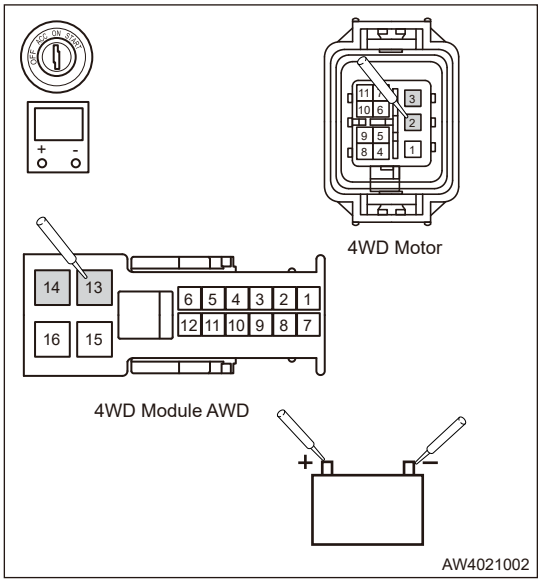
Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD module connector (13) - 4WD motor connector (3)	Always	⩽ 1 Ω
4WD module connector (14) - 4WD motor connector (2)	Always	⩽ 1 Ω



(h) Check for continuity between 4WD module connector terminals (13 and 14) and 4WD motor connector terminals (3 and 2) and battery positive, body ground respectively (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD module connector (13) - Battery positive	Always	∞
4WD module connector (14) - Body ground	Always	∞
4WD motor connector (3) - Battery positive	Always	∞
4WD motor connector (2) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

4	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	P1FD51D	Motor Circuit Current or Motor Position Out of Range

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FD51D	Motor Circuit Current or Motor Position Out of Range	Torque rationality checksum error (current - position - checksum)	• Power supply system failure • Wire harness or connector failure • 4WD motor failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check battery

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK ↓

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

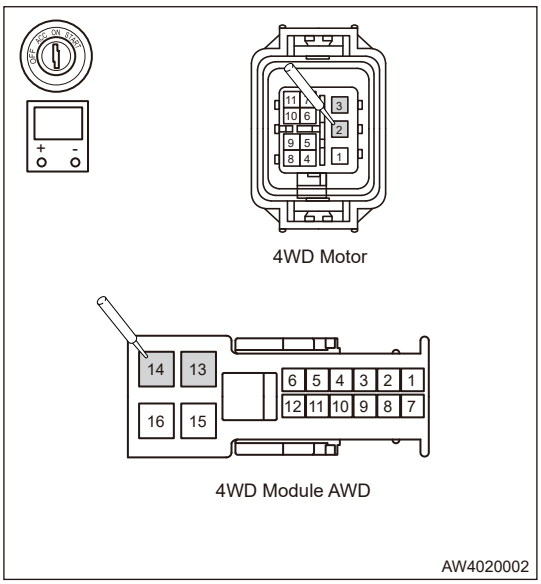
OK ↓

3	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.
(g) Check for continuity between 4WD motor connector terminals (3 and 2) and 4WD module connector terminals (13 and 14) (using a digital multimeter).

Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD module connector (13) - 4WD motor connector (3)	Always	⩽ 1 Ω
4WD module connector (14) - 4WD motor connector (2)	Always	⩽ 1 Ω



NG → **Repair or replace wire harness or connector**

OK

4	Check 4WD motor

(a) Check if 4WD motor operates normally.

NG → Replace 4WD motor

OK

5	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → System operates normally

NG → Replace 4WD module

DTC	P1FC109	Motor Output Error

Description

DTC	DTC Definition	Detection Condition	Possible Cause
P1FC109	Motor Output Error	When an error (undervoltage, overvoltage, over temperature, communication error) is identified during motor output, fault generates	• Power supply system failure • Wire harness or connector failure • 4WD module failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground points related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check battery

(a) Check if battery voltage is normal.

NG → **Replace battery**

OK

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

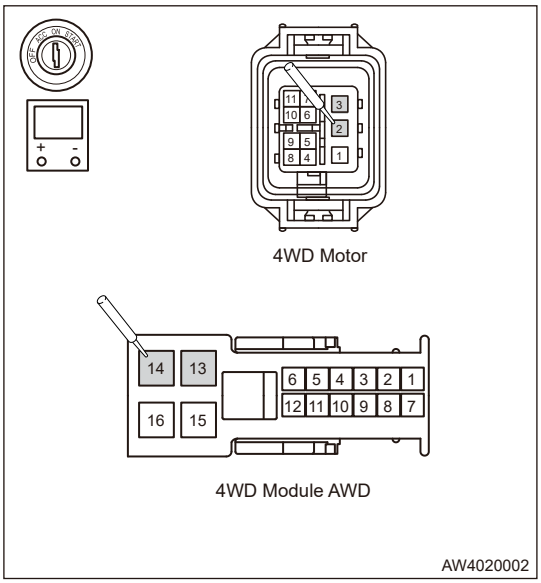
OK

3	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the battery negative.
(c) Disconnect 4WD module connector and 4WD motor connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.
(g) Check for continuity between 4WD motor connector terminals (3 and 2) and 4WD module connector terminals (13 and 14) (using a digital multimeter).

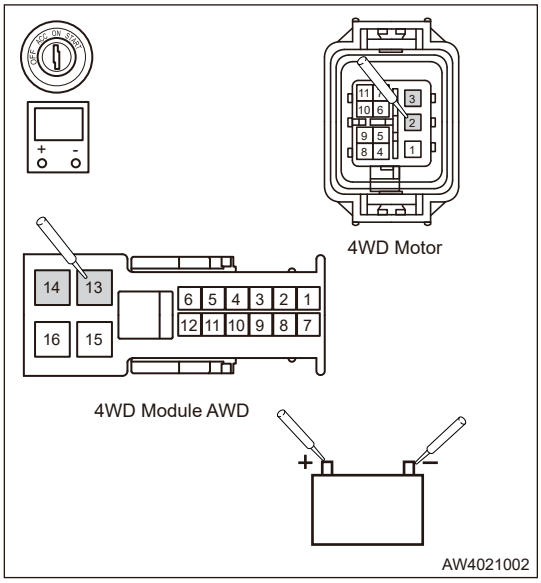
Standard Resistance

Multimeter Connection	Condition	Specified Condition
4WD module connector (13) - 4WD motor connector (3)	Always	⩽ 1 Ω
4WD module connector (14) - 4WD motor connector (2)	Always	⩽ 1 Ω



(h) Check for continuity between 4WD module connector terminals (13 and 14) and 4WD motor connector terminals (3 and 2) and battery positive, body ground respectively (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
4WD module connector (13) - Battery positive	Always	∞
4WD module connector (14) - Body ground	Always	∞
4WD motor connector (3) - Battery positive	Always	∞
4WD motor connector (2) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

4	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace 4WD module**

DTC	U007388	Control Unit Communication Bus Offline
DTC	U010087	Lost Communication with EMS
DTC	U010187	Lost Communication with TCU
DTC	U012687	Lost Communication with SAM
DTC	U012987	Lost Communication with BSM
DTC	U014087	Lost Communication with BCM
DTC	U016487	Lost Communication with CLM
DTC	U024587	Lost Communication with IHU
DTC	U040181	ESM Invalid Data
DTC	U040281	TCU Invalid Data
DTC	U041881	BSM Invalid Data
DTC	U042281	BCM Invalid Data

DTC	**U042481**	**CLM Invalid Data**
DTC	**U042881**	**SAM Invalid Data**
DTC	**U054681**	**IHU Invalid Data**
DTC	**U130055**	**Software Configuration Error**

Description

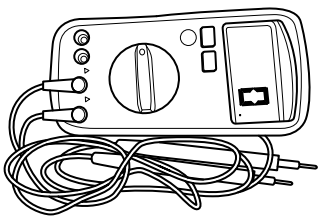
DTC	DTC Definition
U007388	Control Unit Communication Bus Offline
U010087	Lost Communication with EMS
U010187	Lost Communication with TCU
U012687	Lost Communication with SAM
U012987	Lost Communication with BSM
U014087	Lost Communication with BCM
U024587	Lost Communication with IHU
U040181	ESM Invalid Data
U040281	TCU Invalid Data
U041881	BSM Invalid Data
U042281	BCM Invalid Data
U042481	CLM Invalid Data
U042881	SAM Invalid Data
U054681	IHU Invalid Data
U130055	Software Configuration Error

1	**Refer to "CAN Network System" for troubleshooting**

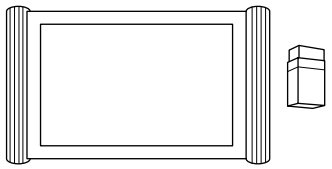
4 On-vehicle Service

4.1 Tools

■ General Tool

Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ **Special Tool**

Tool Name	Tool Drawing
Diagnostic tester	 S00001

4.2 Specifications

■ **Torque Specifications**

Part Name	Torque (N · m)	Quantity
Torque Manager Control Unit Fixing Nut	8 ± 1.5	2

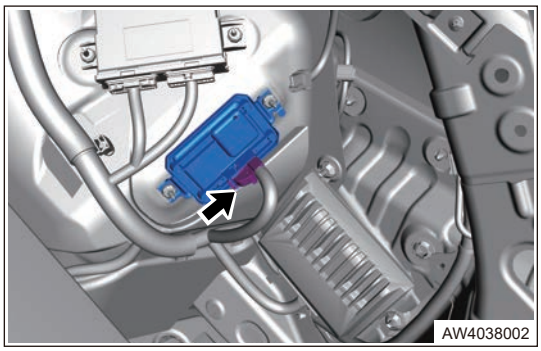
4.3 Torque Manager Control Unit

■ **Removal**

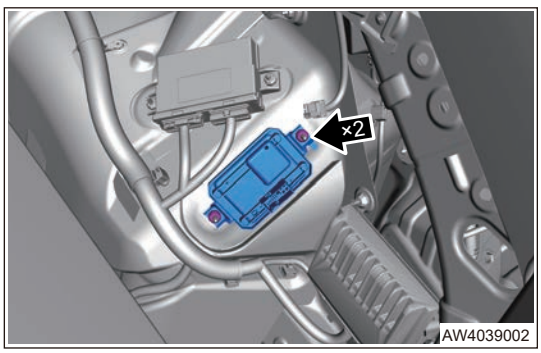
(1) Disconnect the negative battery cable.

(2) Remove the right luggage compartment wheel house assembly.

(3) Disconnect the torque manager control unit connector (arrow).



(4) Remove 2 fixing nuts (arrow) from torque manager control unit.



(5) Remove the torque manager control unit.

■ **Installation**

(1) Install the torque manager control unit.

(2) Install 2 fixing nuts to torque manager control unit.

Tightening torque: 8 ± 1.5 N·m

(3) Install the torque manager control unit connector.

(4) Install the right luggage compartment wheel house assembly.

(5) Connect the negative battery cable.

4.2 TRANSFER

1 Warnings and Precautions

1.1 Warnings

(1) It is not recommended to use non-original replacement parts, because they may damage to some units and affect vehicle safety.

(2) When operating with locking plates and spring load retaining devices, it is recommended to be very careful. For personal safety, it is recommended to wear safety glasses that meet industrial strength when working in vehicles or areas where vehicle parts are assembled.

1.2 Precautions

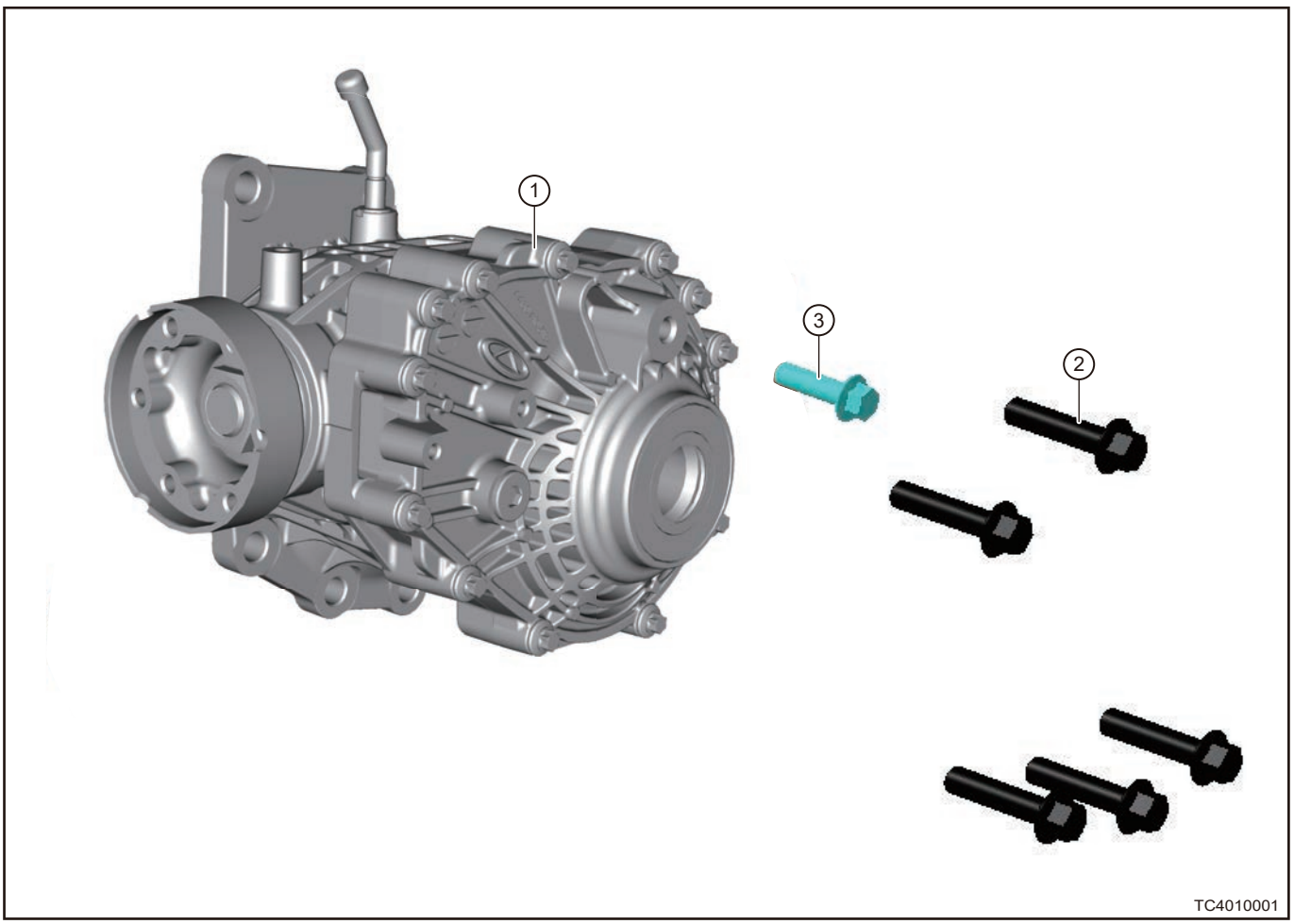
(1) In order to ensure safe and reliable operation of vehicle and drive shaft, the correct repair and maintenance is very important. Some of these operations need to use some special designed tools, and these tools can only be used in the corresponding repair and maintenance operations.

2 Overview

2.1 Description

The function of transfer is to distribute the power output from the transmission to each drive axle and further increase the torque.

2.2 System Components Diagram



1	Transfer Case Assembly	2	Hexagon Flange Bolt
3	Hexagon Flange Bolt		

Transfer case refers to a device that distributes the power of engine, which can output power to the rear shaft.

2.3 Specifications

■ Torque Specifications

Description	Torque (N · m)
Fixing bolts (5) between transfer and transmission	120 ± 10
Fixing bolt (1) between rear mounting bracket and transfer	70 ± 10
transfer heat insulator fixing bolts (3)	9 ± 1.5

2.4 Maintenance of transfer

The transfer oil is maintenance free for lifelong without replacement. The oil standard is:

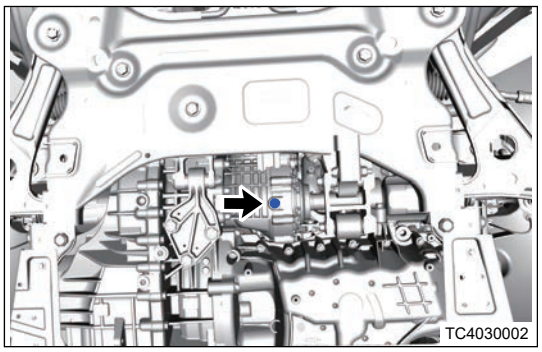
Oil Type	Total Capacity (After-sales Maintenance Oil Capacity)
Castrol SAF PD	0.4 L ± 0.02 L

3 On-vehicle Service

3.1 Draining and Refilling of Transfer Oil

(1) Raise the vehicle.

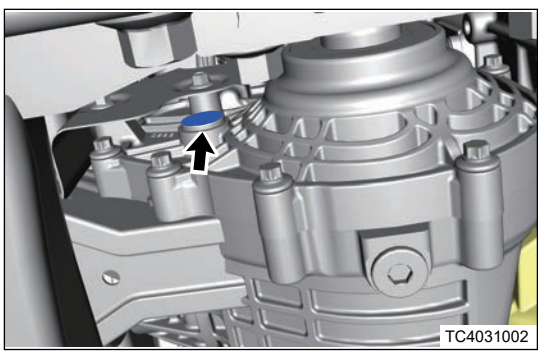
(2) Remove drain bolt (arrow) of transfer and drain the transfer oil.



(3) Install and tighten drain bolt.

Tightening torque: 35 ± 3.5 N·m

(4) Remove filler bolt (arrow) of transfer.



(5) Add new Castrol SAF PD oil until the oil level reaches the bottom of filler bolt hole.
(6) Install and tighten filler bolt.

Tightening torque: 35 ± 3.5 N·m

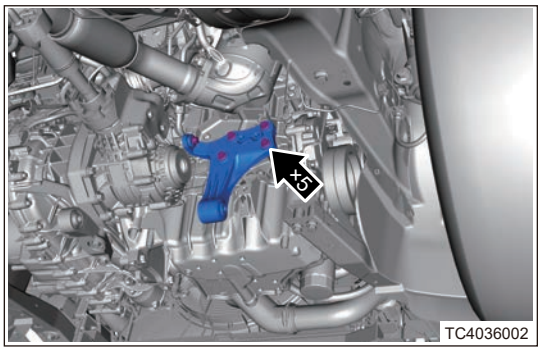
3.2 Transfer assembly

■ Removal

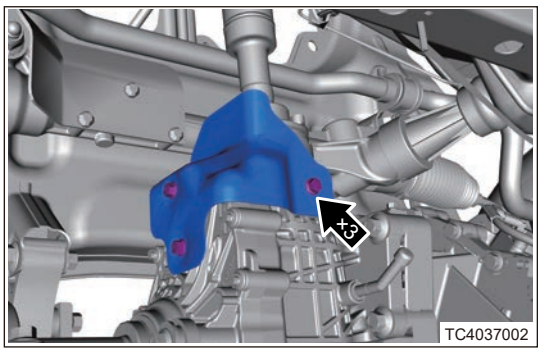
(1) Remove the front right wheel.
(2) Drain the transmission oil.
(3) Drain the transfer oil.
(4) Remove the front right drive shaft assembly.
(5) Remove the front sub frame assembly.
(6) Remove the precatalytic converter assembly.

(7) Remove the transfer case assembly.

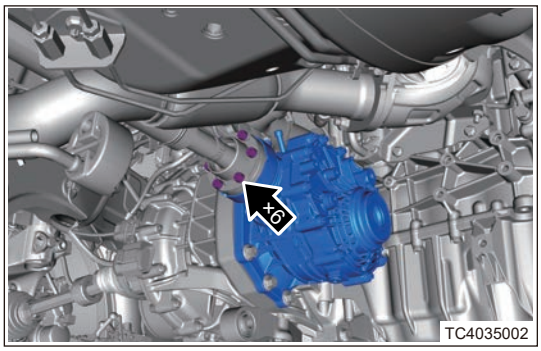
1) Remove 5 fixing bolts (arrow) and rear right mounting bracket.



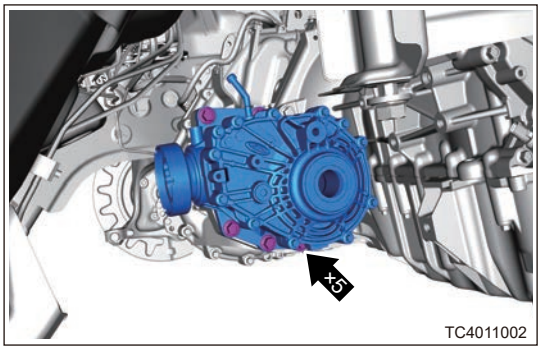
2) Remove 3 fixing bolts (arrow) and transfer heat insulator.



3) Remove 6 fixing screws (arrow) between propeller shaft and transfer output flange, and remove 3 washers.



4) Remove 5 fixing bolts (arrow) between transfer and transmission.



5) Remove the transfer assembly.

⚠ Warning

- **When handling the transfer, please pay attention to the flange surface connected with intermediate shaft and spline connected with transmission differential. Please pay attention to whether O-ring is intact and whether the oil seal is intact to avoid touching the lip of oil seal. Please handle the transfer case with care during whole operation, and do not move the transfer case upside down.**

■ Installation

⚠ Warning

- **Install transfer spline to differential by turning it left and right, and align the transfer case dowel pin with positioning hole of differential case simultaneously.**
- **When installing 5 tightening bolts between transfer and transmission, follow the order of up, down, left and right and tighten diagonally.**

(1) Install the transfer assembly.
(2) Install 5 fixing bolts between transfer and transmission.
Tightening torque: 120 ± 12 N·m

(3) Install 6 fixing screws and 3 washers between propeller shaft and transfer output flange.
Tightening torque: 30 ± 3 N·m

(4) Install transfer heat insulator and tighten 3 fixing bolts.
Tightening torque: 9 ± 1.5 N·m

(5) Install rear right mounting bracket, and tighten 1 coupling bolt between bracket and transfer.
Tightening torque: 70 ± 10 N·m

(6) Tighten 4 coupling bolts between rear right mounting bracket and engine.
Tightening torque: 70 ± 7 N·m

(7) Install the precatalytic converter assembly.
(8) Install the front sub frame assembly.
(9) Install the front right drive shaft assembly.
(10) Add the transfer oil.
(11) Fill the transmission oil.
(12) Install the front right wheel.

4.3 REAR FINAL DRIVE

1 Warnings and Precautions

1.1 Warnings

(1) It is not recommended to use non-original replacement parts, because they may damage to some units and affect vehicle safety.

(2) Do not use non-standard final drive oil to avoid damaging final drive.

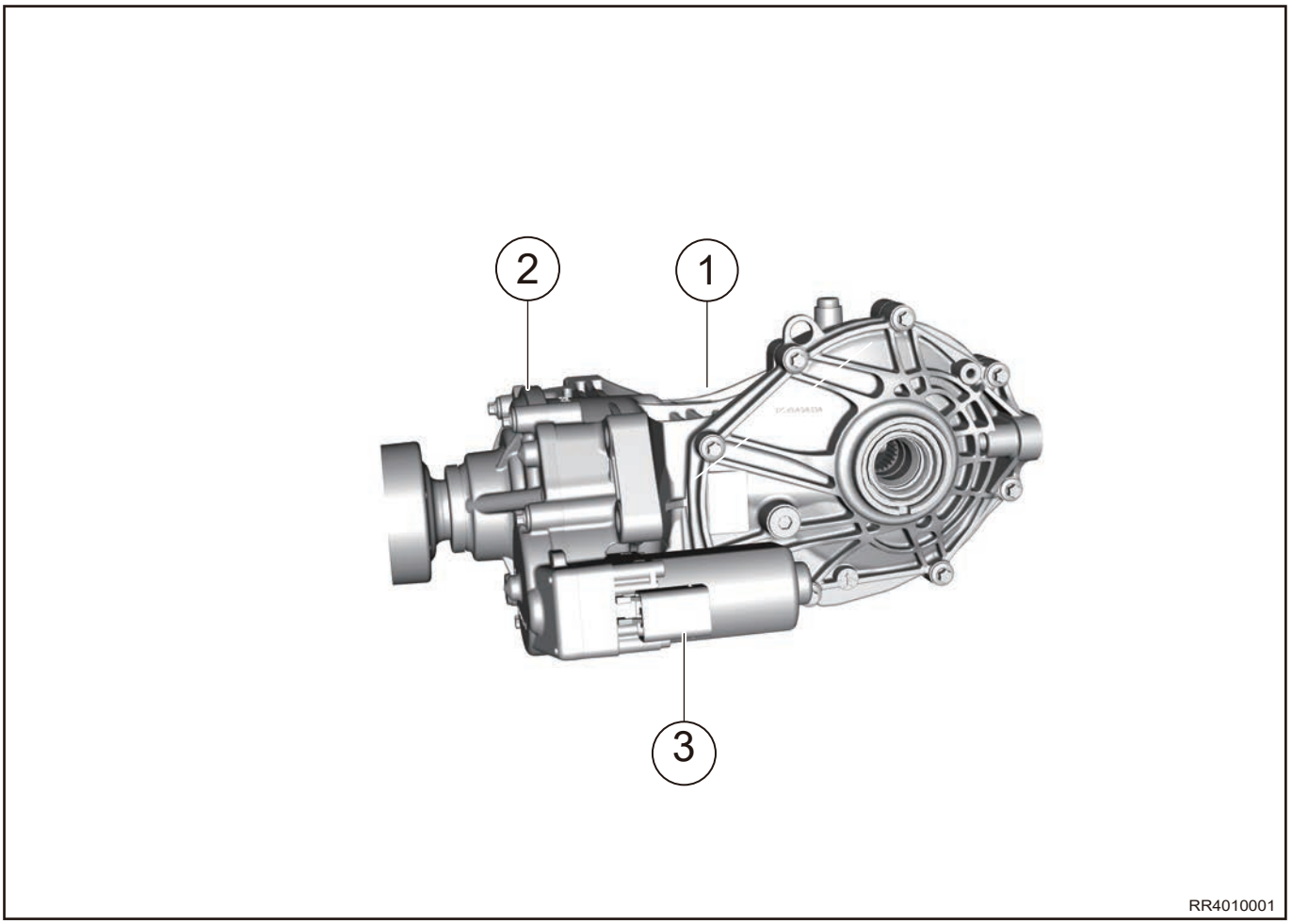
1.2 Precautions

In order to ensure safe and reliable operation of vehicle and drive shaft, the correct repair and maintenance is very important. Some of these operations need to use some special designed tools, and these tools can only be used in the corresponding repair and maintenance operations.

2 System Overview

2.1 System Components Diagram

■ **Rear final drive assembly**

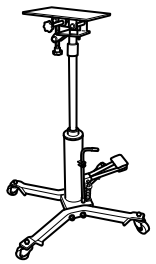


1	Rear Final Drive	2	Clutch Assembly
3	Motor Assembly		

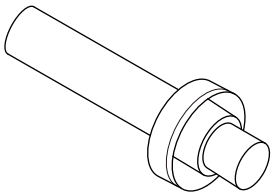
3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Transmission Carrier	 S00004

■ Special Tools

Tool Name	Tool Drawing
Final Drive Oil Seal Assembly Fixture	 S00096

3.2 Specifications

■ Torque Specifications

Part Name	Torque (N · m)	Quantity
Rear Final Drive Fixing Bolt	140 ± 15	4
Front and Rear Bracket Fixing Bolt	Pre-tightening: 25 ± 2.5 Continuing rotation angle: 100° ± 5°	6
Drive Shaft Self-locking Nut	270 ± 20	2
Flange Coupling Bolt between Intermediate Propeller Shaft and Rear Final Drive Input End	30 ± 3	6
Filler Plug/Drain Plug	35 ± 3.5	1
Motor Fixing Bolt	8 ± 0.8	4
Front Clutch Cover Bolt	Torque: 30-50 (Pre-tightening: 10 ± 2 Continuing rotation angle: 90° ± 5°)	5

■ Fluid specifications

The final drive oil is maintenance free for lifelong without replacement. The oil standard is:

Oil Type	Total Capacity (After-sales Maintenance Oil Capacity)
SAF CARBON MOD	0.6 L ± 0.02 L

3.3 Rear final drive oil

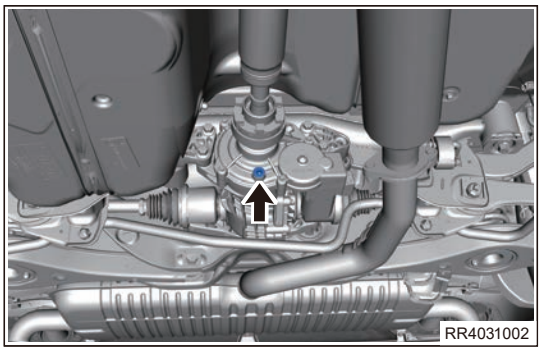
⚠ Caution

- **Replace rear final drive oil only when engine stops and rear final drive cools down.**

■ Rear final drive oil draining

(1) Park vehicle on a level ground.
(2) Start the vehicle and heat the final drive to operating temperature.
(3) Turn off all electrical equipment and the ENGINE START STOP switch.
(4) Raise the vehicle to a proper height.
(5) Place a recovering container under final drive drain hole.
(6) Remove the drain plug (with magnet) (arrow).

Tightening torque: 35 ± 3.5 N·m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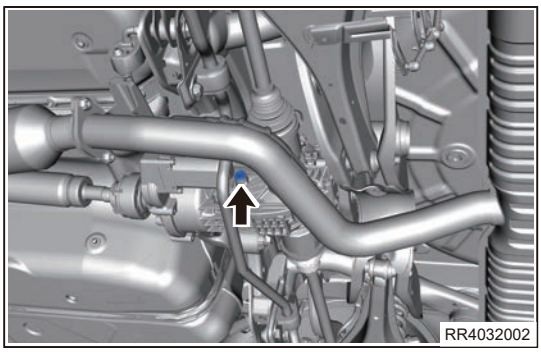
■ Adding rear final drive oil

⚠ Caution

- **Gear oil type: SAF CARBON MOD, Volume: 0.6 L.**

(1) After draining the final drive oil, make sure that drain plug of rear final drive is secured in place.
(2) Remove the filler plug (with magnet) (arrow).

Tightening torque: 35 ± 3.5 N·m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(3) Fill new SAF Carbon Mod oil from fuel filler until the oil level reaches the bottom of filler plug hole.

⚠ Caution

- **After 5 minutes of filling, wait for the oil to fully flow into RDU, check the oil level, and observe if it is necessary to add more oil to meet the requirements.**

(4) After adding, tighten the filler plug.

Tightening torque: 35 ± 3.5 N·m

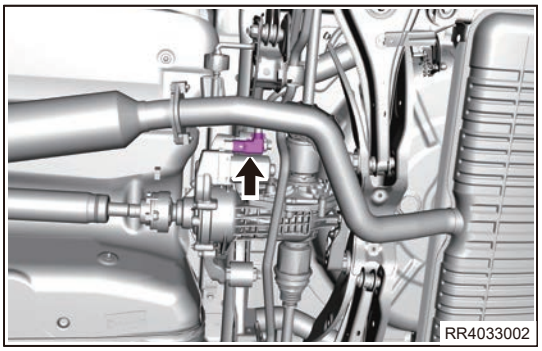
3.4 Rear final drive assembly

■ Removal

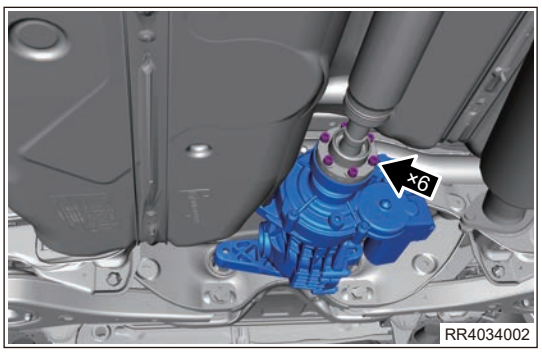
⚠ Caution

- **If gear loaded housing is submerged in water, especially if it exceeds the breather valve, it is recommended to drain gear lubricant daily and check internal components for any damage and/or contamination caused by water.**
- **Clean, test and replace damaged parts before assembly and refilling of specified gear lubricant.**

(1) Disconnect the negative battery cable.
(2) Remove the rear left and rear right wheels.
(3) Drain the rear final drive oil.
(4) Remove the rear stabilizer bar assembly.
(5) Remove the rear muffler assembly.
(6) Remove the rear left drive shaft assembly.
(7) Remove the rear right drive shaft assembly.
(8) Disconnect the motor connector (arrow).

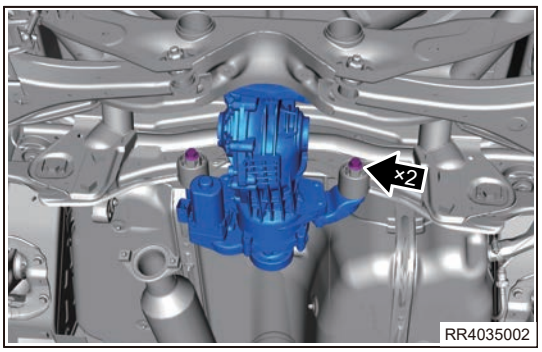

RR4033002

(9) Remove 6 fixing bolts (arrow) between propeller shaft and final drive flange, and separate the connection between them.



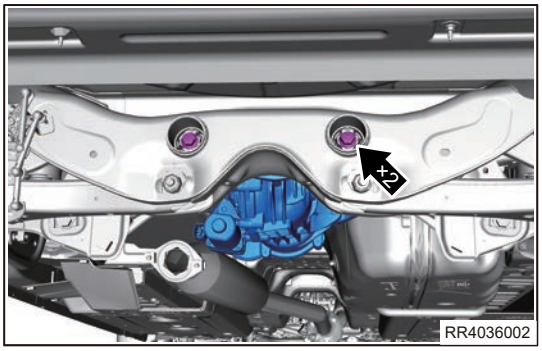
RR4034002

(10) Place transmission carrier firmly in a proper position under rear final drive assembly.
(11) Remove 2 fixing bolts (arrow) between rear final drive front left/right brackets and rear sub frame.



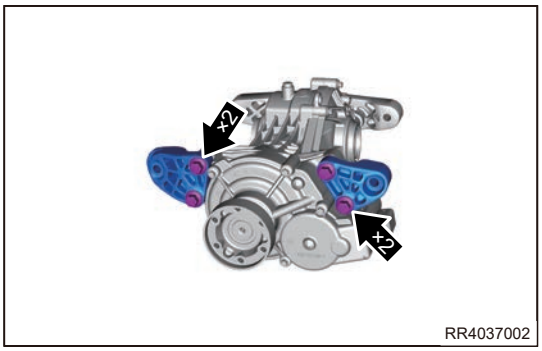
RR4035002

(12) Remove 2 fixing bolts (arrow) between rear final drive rear bracket and rear sub frame.

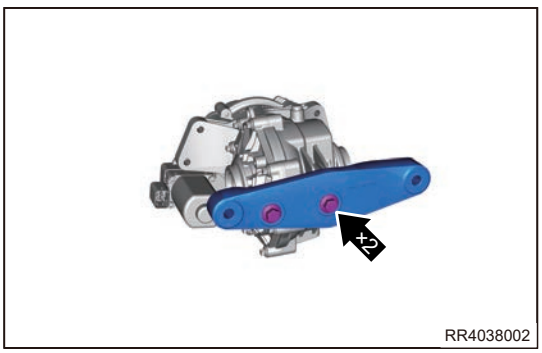


(13) Remove the rear final drive with bracket assembly.

(14) Remove 4 coupling bolts (arrow) between rear final drive front left/right bracket and final drive.



(15) Remove 2 coupling bolts (arrow) between rear final drive rear bracket and final drive.



(16) Remove the rear final drive assembly.

■ Installation

⚠ Caution

- **When installing the intermediate propeller shaft, the green "dark point" mark on flange should match the "light point" mark on propeller shaft.**

(1) Install the rear final drive rear bracket and tighten 2 coupling bolts.
Pre-tightening: 25 ± 2.5

Continuing rotation angle: 100° ± 5°

(2) Install the rear final drive front left/right bracket and tighten 4 coupling bolts.
Pre-tightening: 25 ± 2.5

Continuing rotation angle: 100° ± 5°

(3) Install the rear final drive assembly.
(4) Install 2 fixing bolts between rear final drive front left/right bracket and rear sub frame.
Tightening torque: 140 ± 15 N·m

(5) Install 2 fixing bolts between rear final drive rear bracket and rear sub frame.
Tightening torque: 140 ± 15 N·m

(6) Connect the motor connector.
(7) Install 6 fixing bolts between propeller shaft and final drive flange.
Tightening torque: 30 ± 3 N·m

(8) Install left and right drive shafts.
(9) Install the rear stabilizer bar assembly.
(10) Install the rear muffler assembly.
(11) Install left and right drive shaft self-locking nuts and washers.
Tightening torque: 270 ± 20 N·m

(12) Fill proper amount of final drive oil.
(13) Install the rear left and rear right wheels.

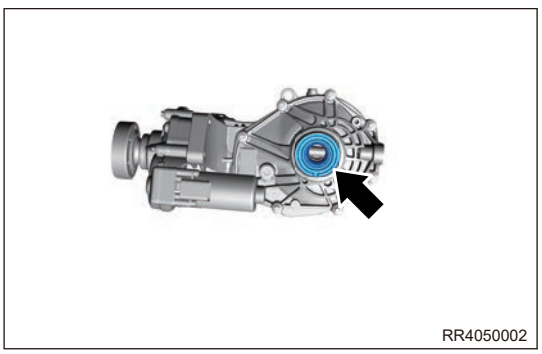
3.5 Final drive oil seal

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**

(1) Turn ENGINE START STOP switch to OFF.
(2) Disconnect the negative battery.
(3) Drain the rear final drive oil.
(4) Remove the rear final drive assembly.
(5) Remove the rear final drive oil seal (arrow).

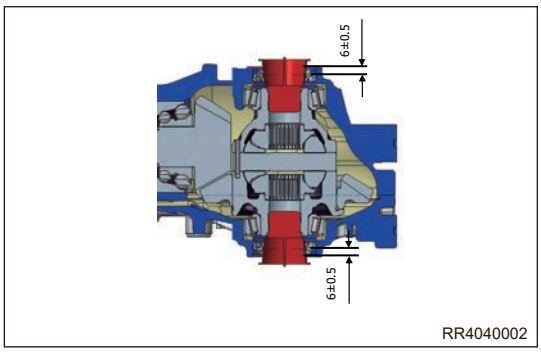

RR4050002

⚠ Caution

- **Do not reuse the oil seal after removal.**

■ Installation

(1) Clean the mounting surface of housing oil seal with alcohol.
(2) Apply Fuchs RENOLIT 283 EP2 Fuchs grease to the new oil seal (apply approximately 50% grease between oil seal lip and dust lip).
(3) Install the new oil seal.
(4) The oil seal installation should be flat, with a depth of 6 ± 0.5 mm.



(5) Install the rear final drive.
(6) Fill proper amount of final drive oil.

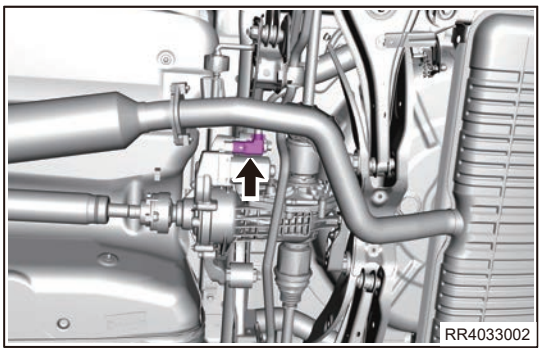
⚠ Caution

- **When installing the intermediate propeller shaft, the green "dark point" mark on flange should match the "light point" mark on propeller shaft.**
- **Make sure that all sealing surfaces are clean and free from burrs or damage, and do not use sharp installer during the installation.**

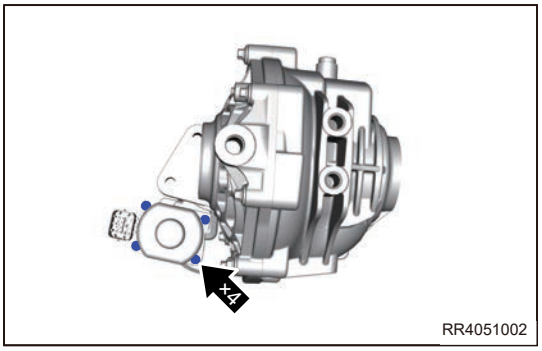
3.6 4WD motor

■ Removal

(1) Turn ENGINE START STOP switch to OFF.
(2) Disconnect the negative battery.
(3) Drain the final drive oil.
(4) Disconnect the motor connector (arrow).



(5) Remove 4 fixing bolts (arrow) between motor and final drive.



(6) Remove the motor and O-ring.

■ **Installation**

(1) Install motor to a proper position, and tighten 4 fixing bolts.

Tightening torque: 8 ± 0.8 N·m

(2) Connect the motor connector.
(3) Fill the final drive oil.
(4) Connect the negative battery cable.

⚠ Caution

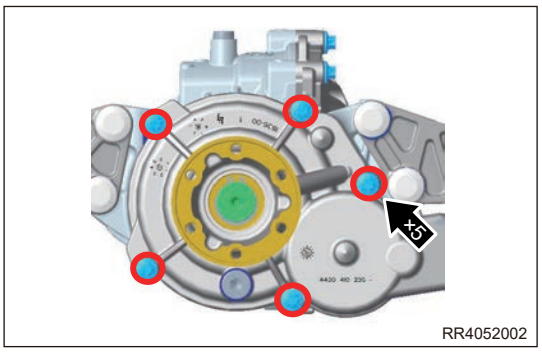
- **The motor O-ring needs to be replaced during removal and cannot be reused.**
- **Before installing motor O-ring, apply SAF CARBON MOD oil to the new O-ring to prevent damage to the O-ring.**
- **Before installing the motor, make sure that all sealing surfaces are clean and free from burrs or damage, and do not use sharp installer during the installation.**

3.7 Clutch disc group

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**

(1) Turn ENGINE START STOP switch to OFF.
(2) Disconnect the negative battery.
(3) Drain the rear final drive oil.
(4) Remove the rear final drive assembly.
(5) Remove the motor assembly.
(6) Remove 5 clutch end cover bolts (arrow).



⚠ Caution

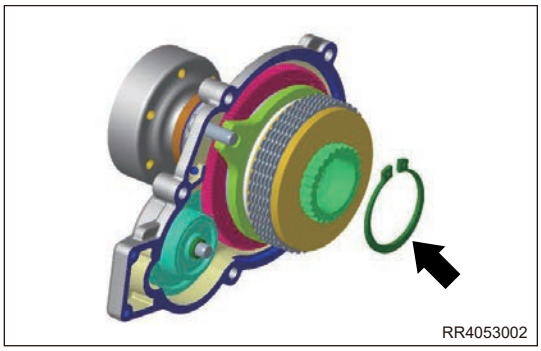
- **Clutch end cover bolt cannot be reused.**

(7) Remove the clutch assembly.

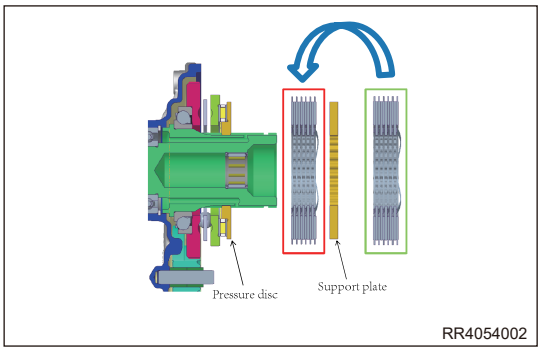
⚠ Caution

- **During the removal, it may be necessary to lightly tap and pay attention to the force.**

(8) Remove the clutch disc fixing snap spring (arrow).


RR4053002

(9) Remove the lining group.



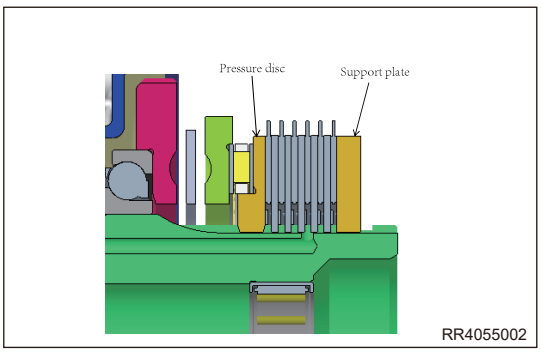
RR4054002

(10) Replace the lining group (including 6X outer lining, 5X inner lining, and 6X waveform spring) with new ones.

⚠ Caution

- **Check if the pressure plate and supporting plate are in good condition and not damaged, otherwise replace them together.**

(11) Assemble the new lining to the inner cage.



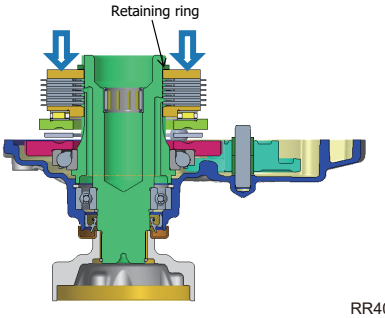
RR4055002

⚠ Caution

- **Apply SAF Carbon mod oil when installing the lining.**
- **The correct installation sequence: pressure plate, (outer lining + waveform spring + inner lining) X5 + outer lining + waveform spring, supporting plate.**

(12) Install the snap spring to the groove.

Pressure preload: 500 N

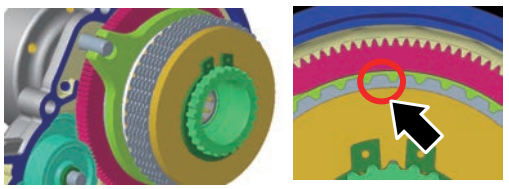


RR4056002

⚠ Caution

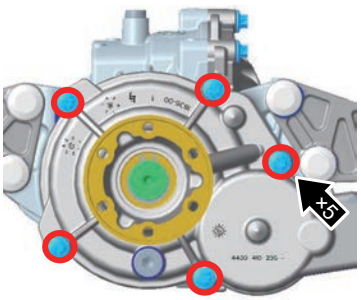
- **When installing the snap spring, select snap spring with the maximum thickness that can be installed:**
  0730.304.912 h = 2.3 mm
  0730.304.914 h = 2.5 mm
  0730.304.916 h = 2.7 mm
  0730.304.918 h = 2.9 mm

(13) Move the outer lining teeth to a consistent position (as shown in illustration).


RR4057002

(14) Install the clutch assembly to rear final drive, and tighten 5 fixing bolts (arrows) (with a preload of 10 ± 2 N m, then continue to rotate by 90° ± 5°).

Tightening torque: 30 - 50 N·m


RR4052002

⚠ Caution

- **Before installing the clutch cover, it is necessary to clean the sealant on the sealing surfaces between clutch cover and final drive case.**
- **Before installing the clutch cover, make sure that the sealing surface is not damaged.**
- **Before installing the clutch cover, apply Loctite 5910 adhesive to the sealing surface.**
- **The clutch end cover bolt cannot be reused and need to be replaced after removal.**
- **The clutch cover needs to be assembled back to the final drive within 15 minutes after applying adhesive.**
- **Pay attention to the position of outer lining during assembly to make sure that it is correctly installed into the outer cage.**

(15) Install motor assembly, and tighten 4 fixing bolts.

Tightening torque: 8 ± 0.8 N·m

⚠ Caution

- **After installation, it is necessary to wait for 15 minutes for the Loctite adhesive to dry thoroughly before perform an air tightness test: the pressure should be 0.4 bar for 7.5 seconds, and the leakage amount should be less than 15 ml/min.**

(16) Install the rear final drive to vehicle.

⚠ Caution

- **Wait for 2 hours before installation until the Loctite adhesive is completely dry.**
- **When installing the rear final drive, the green "dark point" mark on flange should match the "light point" mark on propeller shaft.**

(17) Fill proper amount of final drive oil.

SUSPENSION SYSTEM

SUSPENSION SYSTEM

SUSPENSION SYSTEM

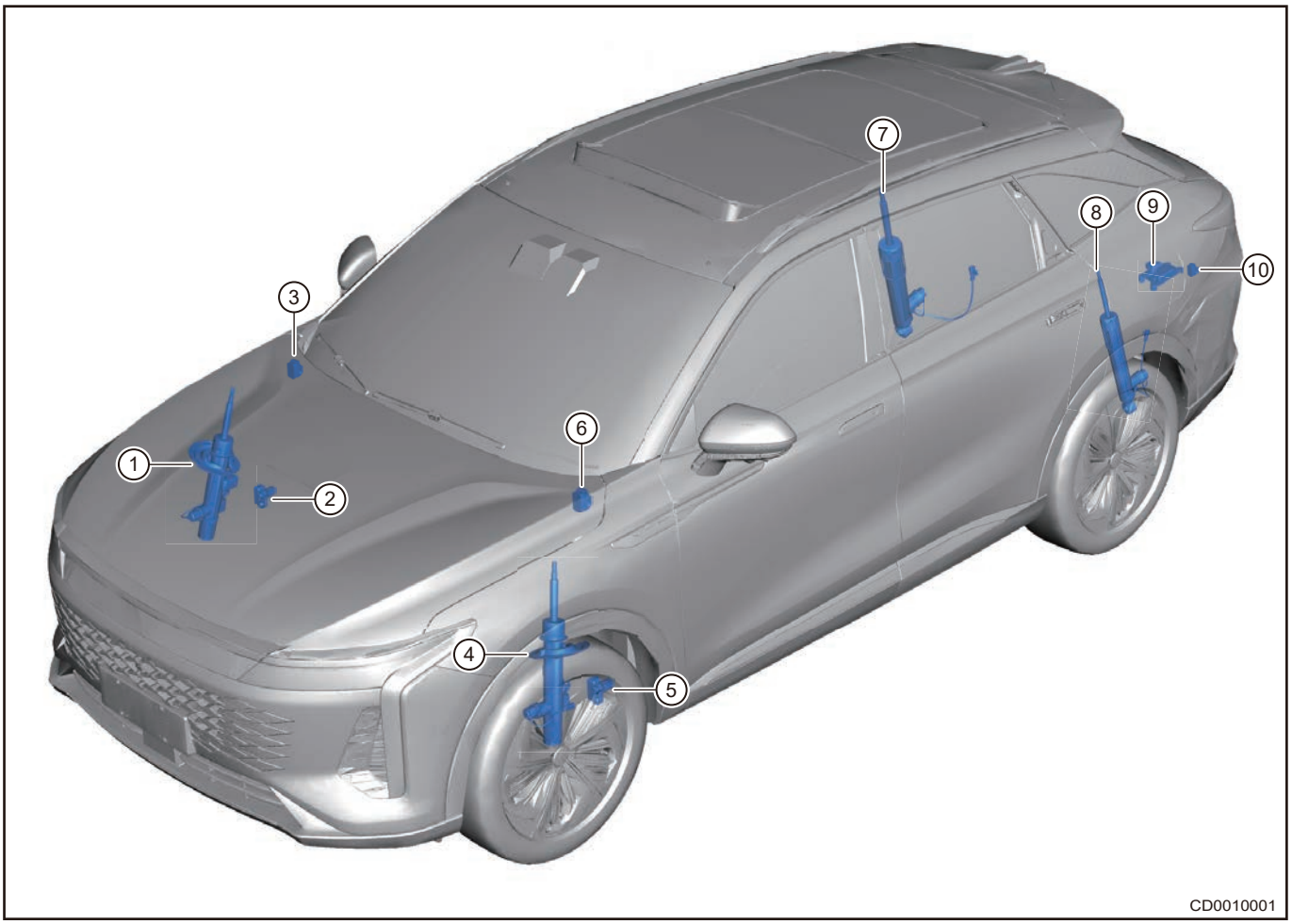
5.1 INTELLIGENT A/C CONTROL SYSTEM

1 System Overview

1.1 System Description

T22 model intelligent suspension control system mainly consists of intelligent suspension control module, body sensor (three), wheel sensor (two), electronic control shock absorber (four). Electronic control shock absorber adjusts damper force automatically according to vehicle conditions, so as to satisfy requirements of controllability and smoothness for vehicle, realizing a better compromise of comfort and sport.

1.2 System Components Diagram



1	Front Right Electronic Control Absorber	2	Front Right Wheel Sensor
3	Front Right Body Sensor	4	Front Left Electronic Control Absorber
5	Front Left Wheel Sensor	6	Front Left Body Sensor
7	Rear Right Electronic Control Absorber	8	Rear Left Electronic Control Absorber
9	Intelligent Suspension Control Module (ECU)	10	Rear Left Body Sensor

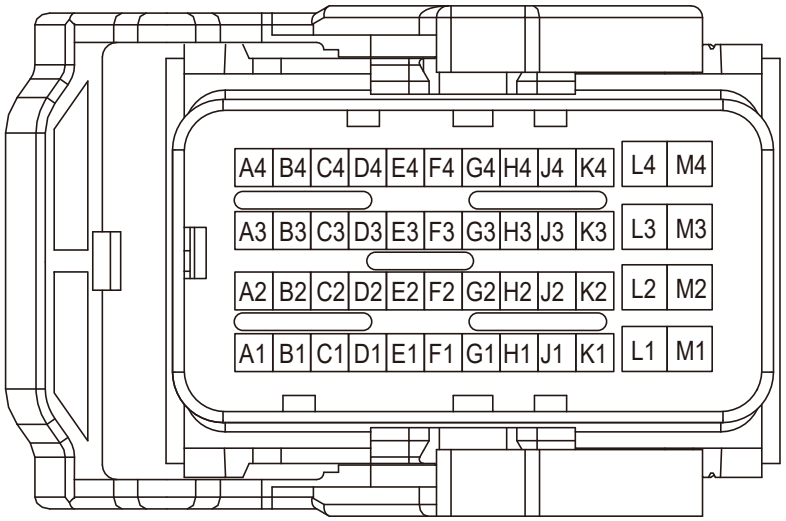
1.3 Operation

Vehicle analyzation is performed according to CAN signal and wheel / body acceleration signal, and it controls vehicle posture, driving performance, non-spring loaded vibration, limit position and damper

deviation, the four wheels electric control damper current is input by ECU. According to input current of ECU, solenoid valve adjusts cross-sectional area of shock absorber fluid passage to output required damper force.

2 System Circuit Diagram

2.1 Terminal Definition

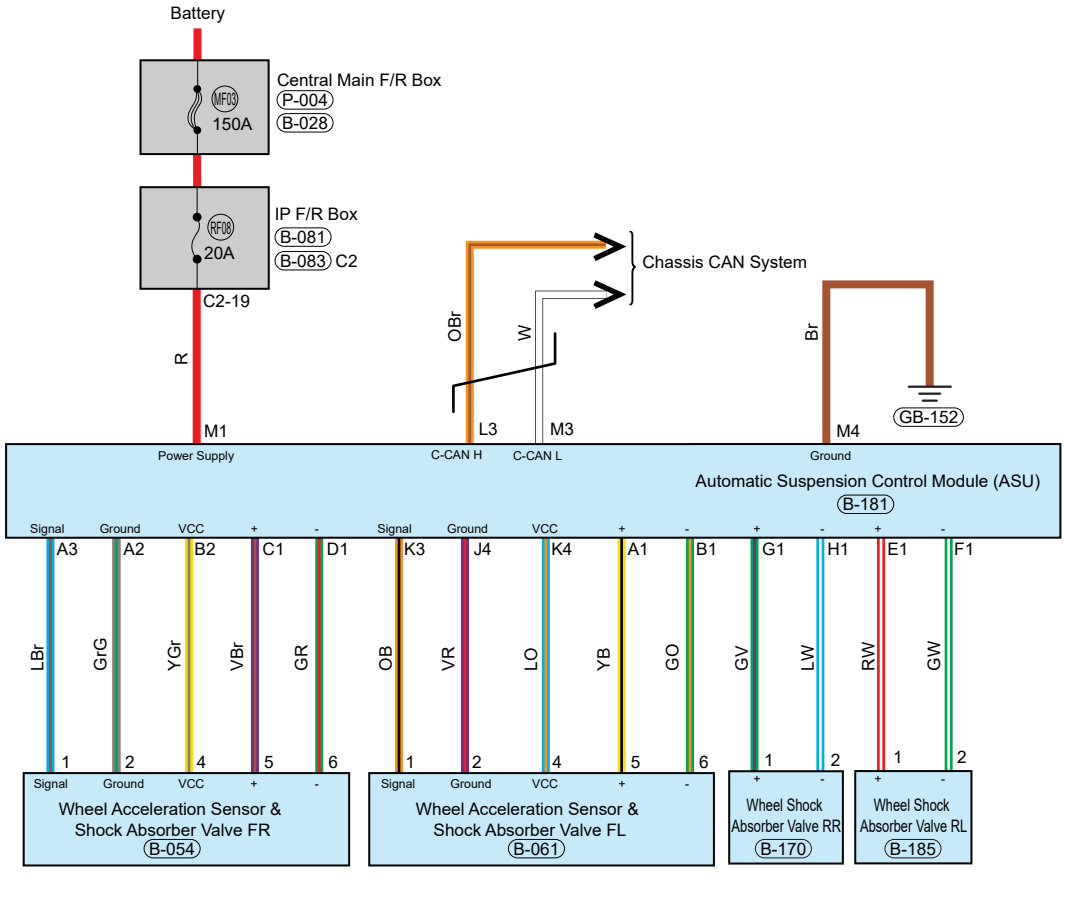


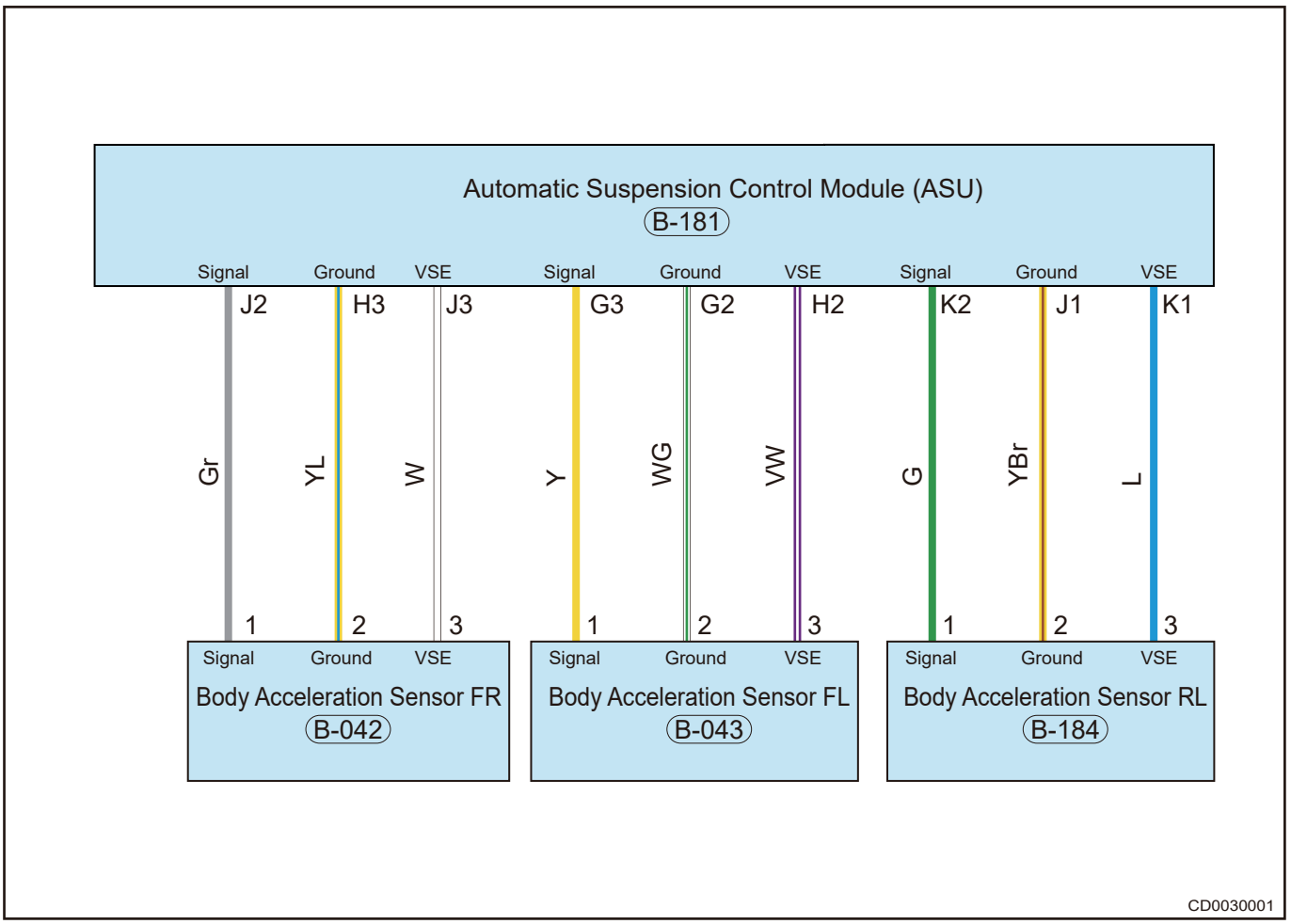
CD0020001

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
A1	Front Left Wheel Absorber Valve +	G1	Rear Right Wheel Absorber Valve +
A2	Front Right Wheel Acceleration Sensor Ground	G2	Front Left Body Acceleration Sensor Ground
A3	Front Right Wheel Acceleration Sensor Signal	G3	Front Left Body Acceleration Sensor Signal
A4	-	G4	-
B1	Front Left Wheel Absorber Valve -	H1	Rear Right Wheel Absorber Valve -
B2	Front Right Wheel Acceleration Sensor VCC	H2	VSE
B3	-	H3	Front Right Body Acceleration Sensor Ground
B4	-	H4	-
C1	Front Right Wheel Absorber Valve +	J1	Front Right Body Acceleration Sensor Ground

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
C2	-	J2	Front Right Body Acceleration Sensor Signal
C3	-	J3	VSE
C4	-	J4	Front Left Wheel Acceleration Sensor Ground
D1	Front Right Wheel Absorber Valve -	K1	VSE
D2	-	K2	Rear Left Body Acceleration Sensor Signal
D3	-	K3	Front Left Wheel Acceleration Sensor Signal
D4	-	K4	Front Left Wheel Acceleration Sensor VCC
E1	Rear Left Wheel Absorber Valve +	L1	-
E2	-	L2	-
E3	-	L3	C-CAN H
E4	-	L4	-
F1	Rear Left Wheel Absorber Valve -	M1	Power Supply
F2	-	M2	-
F3	-	M3	C-CAN L
F4	-	M4	Ground

2.2 System Circuit Diagram





3 Diagnosis Contents

3.1 Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the suspension control system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	Read DTCs

Check if battery voltage is normal.

NG → Perform repair according to problem symptoms table

OK

5	Read DTCs (current DTC and history DTC)

Check if battery voltage is normal.

NG → Troubleshoot according to Intermittent DTC malfunction procedures

OK

6	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

7	Adjust, repair or replace

Next

8	Conduct test and confirm malfunction has been repaired

Check if battery voltage is normal.

Next → End

3.2 DTC Confirmation Procedure

Confirm that battery voltage is normal before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect diagnostic tester (the latest software) to diagnostic interface.
- Turn ENGINE START STOP switch to ON.
- Using diagnostic tester, record and clear DTCs stored in suspension control module assembly.
- Turn ENGINE START STOP switch to OFF and wait for several seconds.
- Using the diagnostic tester, select Read DTCs.
- If DTC is detected, malfunction indicated by DTC is current. Go to DTC chart, and perform troubleshooting.
- If no DTC is detected, malfunction indicated by DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

3.3 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.

- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check and clean all wire harness connectors and body ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common body ground circuit or power supply circuit applied for this DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.4 Body Ground Inspection

Body ground points are very important to the proper operation of circuits. Body ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper body grounding. A loose or corroded body ground can affect the control circuit. Check body ground points as follows:

(1) Remove body ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall body ground bolt or nut securely.
(5) Check if any additional accessories interfere with body ground circuit.
(6) If several wire harnesses are crimped into one body ground terminal, check for proper crimp condition. Make sure all wire harnesses are clean, securely fastened with providing a good body ground path.

3.5 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C220016	ECU Power Supply (Battery) - Voltage Too Low
C220017	ECU Power Supply (Battery) - Voltage Too High
C221004	ACM Internal Error
C221116	Sensor 1 Power Supply Error - Voltage Too Low
C221117	Sensor 1 Power Supply Error - Voltage Too High
C221216	Sensor 2 Power Supply Error - Voltage Too Low
C221217	Sensor 2 Power Supply Error - Voltage Too High
C221301	Fuse - Relay Error - OFF Terminal Stuck
C221311	Fuse - Relay Error - Short to Circuit
C221312	Fuse - Relay Error - ON Terminal Stuck
C223114	Front Left Absorber Control Error - Short To Ground / Open
C223112	Front Left Absorber Control Error - Short To Ground
C223113	Front Left Absorber Control Error - Open
C22311E	Front Left Absorber Control Error - Circuit Resistance Out of Range
C223314	Front Right Absorber Control Error - Short To Ground / Open
C223312	Front Right Absorber Control Error - Short To Ground
C223313	Front Right Absorber Control Error - Open
C22331E	Front Right Absorber Control Error - Circuit Resistance Out of Range

DTC	DTC Definition
C223514	Rear Left Absorber Control Error - Short To Ground / Open
C223512	Rear Left Absorber Control Error - Short To Ground
C223513	Rear Left Absorber Control Error - Open
C22351E	Rear Left Absorber Control Error - Circuit Resistance Out of Range
C223714	Rear Right Absorber Control Error - Short To Ground / Open
C223712	Rear Right Absorber Control Error - Short To Ground
C223713	Rear Right Absorber Control Error - Open
C22371E	Rear Right Absorber Control Error - Circuit Resistance Out of Range
C225012	Front Left Body Acceleration Sensor Signal Error - Short to Battery
C225014	Front Left Body Acceleration Sensor Signal Error - Short To Ground / Open
C225013	Front Left Body Acceleration Sensor Ground Wire Error - Open
C225112	Front Right Body Acceleration Sensor Signal Error - Short to Battery
C225114	Front Right Body Acceleration Sensor Signal Error - Short To Ground / Open
C225113	Front Right Body Acceleration Sensor Ground Wire Error - Open
C225212	Front Right Body Acceleration Sensor Signal Error - Short To Battery
C225214	Rear Left Body Acceleration Sensor Signal Error - Short To Ground / Open
C225213	Rear Left Body Acceleration Sensor Ground Wire Error - Open
C225312	Front Left Wheel Acceleration Sensor Signal Error - Short to Battery
C225314	Front Left Wheel Acceleration Sensor Signal Error - Short To Ground / Open
C225313	Front Left Wheel Acceleration Sensor Ground Wire Error - Open
C225412	Front Right Wheel Acceleration Sensor Signal Error - Short to Battery
C225414	Front Right Wheel Acceleration Sensor Signal Error - Short To Ground / Open
C225413	Front Right Wheel Acceleration Sensor Ground Wire Error - Open
U007388	Vehicle CAN Bus Error - Bus Off
U012987	Message Error - Missing Message
U015587	Message Error - Missing Message
U024587	Message Error - Missing Message
U010187	Message Error - Missing Message
U010087	Message Error - Missing Message

3.6 DTC Diagnosis Procedure

DTC	C220016	ECU Power Supply (Battery) - Voltage Too Low
DTC	C220017	ECU Power Supply (Battery) - Voltage Too High

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C220016	ECU Power Supply (Battery) - Voltage Too Low	/	• Power supply system failure • Wire harness or connector failure • ECU fault
C220017	ECU Power Supply (Battery) - Voltage Too High	/	

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check battery

(a) Check if battery voltage is normal.

NG → **Recharge or replace battery**

OK ↓

2	Check charging system

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

OK ↓

3	Check fuse

(a) Check if fuse in instrument panel fuse and instrument panel fuse and relay box fuse is normal.

NG → **Replace fuse**

OK ↓

4	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect suspension control module connector, and disconnect instrument panel fuse and relay box connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

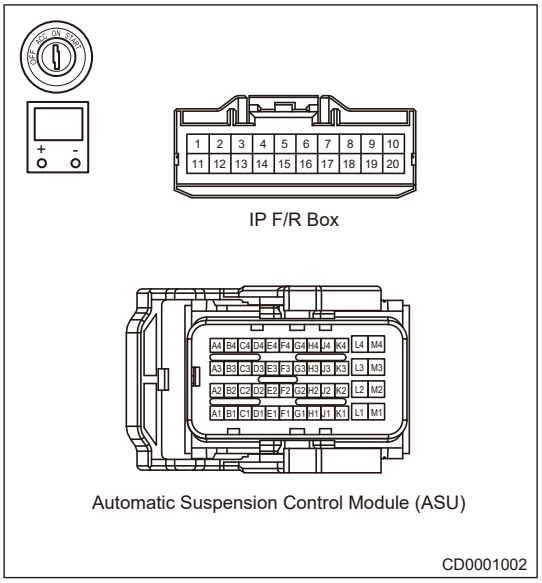
(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

(f) Check for continuity (using a digital multimeter) between instrument panel fuse and relay box connector (connected terminal) and suspension control module connector (power supply terminal).

Standard Resistance

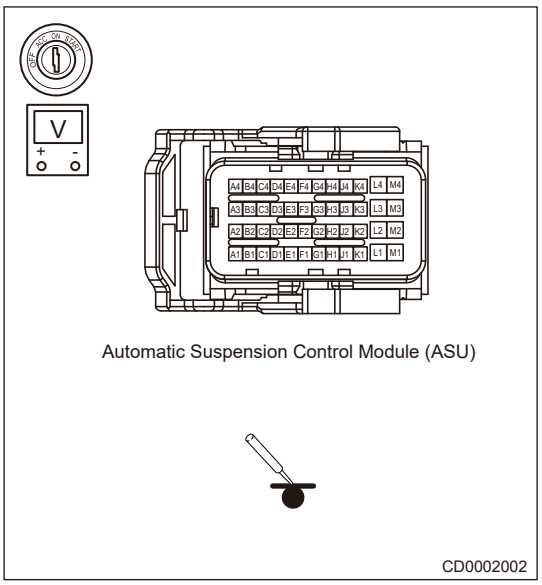
Multimeter Connection	Condition	Specified Condition
Suspension control module connector (power supply terminal) - instrument panel fuse and relay box connector (- connected terminal)	Always	⩽ 1 Ω



(g) Turn ENGINE START STOP switch to ON.

(h) Check voltage between suspension control module connector (- power supply terminal) and body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
Suspension control module connector (power supply terminal) - Body ground	Ignition switch ON	⩾ 9.8 V



NG → **Repair or replace wire harness or connector**

OK

5	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	C221004	Controller Internal Fault

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221004	Controller Internal Fault	/	• ECU fault

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Confirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	C221116	Sensor 1 Power Supply Error - Voltage Too Low
DTC	C221117	Sensor 1 Power Supply Error - Voltage Too High
DTC	C221216	Sensor 2 Power Supply Error - Voltage Too Low
DTC	C221217	Sensor 2 Power Supply Error - Voltage Too High

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221116	Sensor 1 Power Supply Error - Voltage Too Low	/	• Power supply system failure • Wire harness or connector failure • ECU fault
C221117	Sensor 1 Power Supply Error - Voltage Too High	/	

DTC	DTC Definition	Detection Condition	Possible Cause
C221216	Sensor 2 Power Supply Error - Voltage Too Low	/	
C221217	Sensor 2 Power Supply Error - Voltage Too High	/	

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check battery**

(a) Check if battery voltage is normal.

NG → **Recharge or replace battery**

OK

2	**Check charging system**

(a) Check if charging system is normal.

NG → **Repair or replace alternator or charging wire harness**

OK

3	**Check fuse**

(a) Check if fuse in instrument panel fuse and instrument panel fuse and relay box fuse is normal.

NG → **Replace fuse**

OK

4	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect suspension control module connector, and disconnect instrument panel fuse and relay box connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

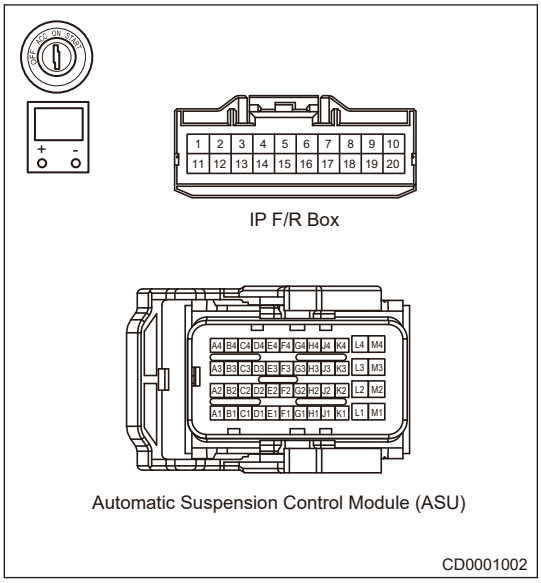
(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

(f) Check for continuity (using a digital multimeter) between instrument panel fuse and relay box connector (connected terminal) and suspension control module connector (power supply terminal).

Standard Resistance

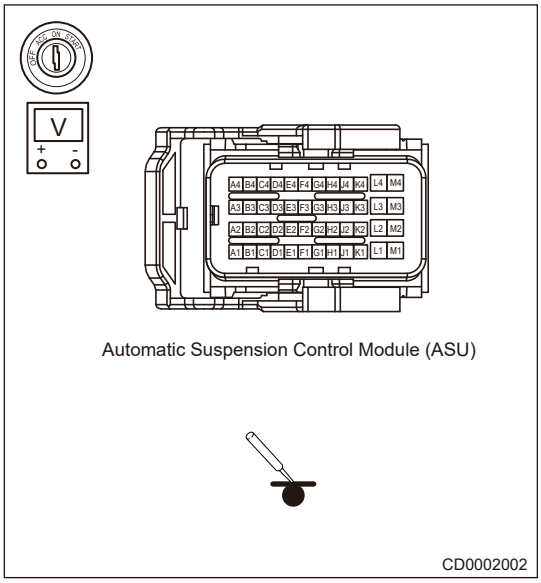
Multimeter Connection	Condition	Specified Condition
Suspension control module connector (power supply terminal) - instrument panel fuse and relay box connector (- connected terminal)	Always	⩽ 1 Ω



(g) Turn ENGINE START STOP switch to ON.

(h) Check voltage between suspension control module connector (- power supply terminal) and body ground (using a digital multimeter).

Multimeter Connection	Condition	Specified Condition
Suspension control module connector (power supply terminal) - Body ground	Ignition switch ON	⩾ 9.8 V



NG → **Repair or replace wire harness or connector**

OK

5	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG	**Replace suspension control module**

DTC	C221301	Fuse - Relay Error - OFF Terminal Stuck

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221301	Fuse - Relay Error - OFF Terminal Stuck	/	• ECU fault

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Confirm DTCs**

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace suspension control module**

DTC	C221311	Fuse - Relay Error - Short to Circuit

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221311	Fuse - Relay Error - Short to Circuit	/	• Wire harness or connector failure • ECU fault • Shock absorber failure

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

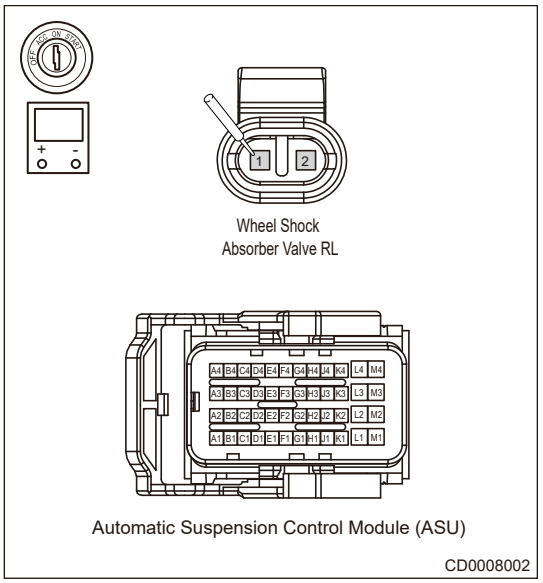
- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.
- Take the rear left shock absorber detection as an example.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery.
(c) Disconnect suspension control module connector, and disconnect rear left shock absorber connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.
(g) Check for continuity (using a digital multimeter) between rear left shock absorber connector terminal and suspension control module connector (connected terminal).

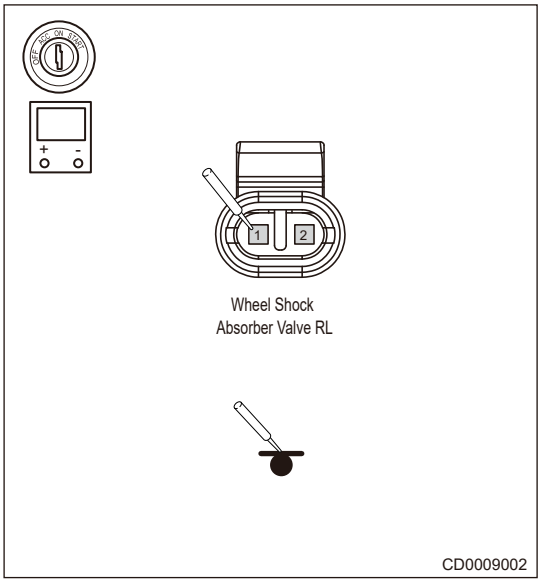
Standard Resistance

Multimeter Connection	Condition	Specified Condition
Rear left shock absorber connector terminal (1) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω
Rear left shock absorber connector terminal (1) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω



(h) Check for continuity (using a digital multimeter) between rear left shock absorber connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Rear left shock absorber connector terminal (1) - Body ground	Always	∞
Rear left shock absorber connector terminal (2) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

2	Check the rear left shock absorber

- Check the rear left shock absorber valve internal for short to shock absorber case.

NG → **Replace the rear left shock absorber**

OK

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	C221312	Fuse - Relay Error - ON Terminal Stuck

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C221312	Fuse - Relay Error - ON Terminal Stuck	/	• Wire harness or connector failure • ECU fault

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery.
(c) Disconnect the suspension control module connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG → **Repair or replace wire harness or connector**

OK

2	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK
Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	**C223114**	**Front Left Absorber Control Error - Short To Ground / Open**
DTC	**C223112**	**Front Left Absorber Control Error - Short To Ground**
DTC	**C223113**	**Front Left Absorber Control Error - Open**
DTC	**C22311E**	**Front Left Absorber Control Error - Circuit Resistance Out of Range**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C223114	Front Left Absorber Control Error - Short To Ground / Open	/	• Wire harness or connector failure • ECU fault • Front left shock absorber failure
C223112	Front Left Absorber Control Error - Short To Ground		
C223113	Front Left Absorber Control Error - Open		
C22311E	Front Left Absorber Control Error - Circuit Resistance Out of Range		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery.

(c) Disconnect suspension control module connector, and disconnect connector between front left wheel acceleration sensor and front wheel shock absorber valve assembly.

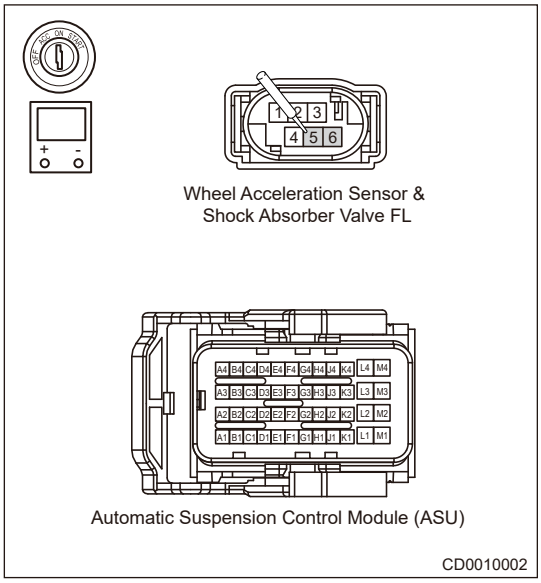
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

(e) Check for broken, bent, protruded or corroded terminals.

(f) Check for continuity (using a digital multimeter) between front left wheel acceleration sensor and front left wheel shock absorber valve assembly connector terminals (5, 6) and suspension control module connector (connected terminal).

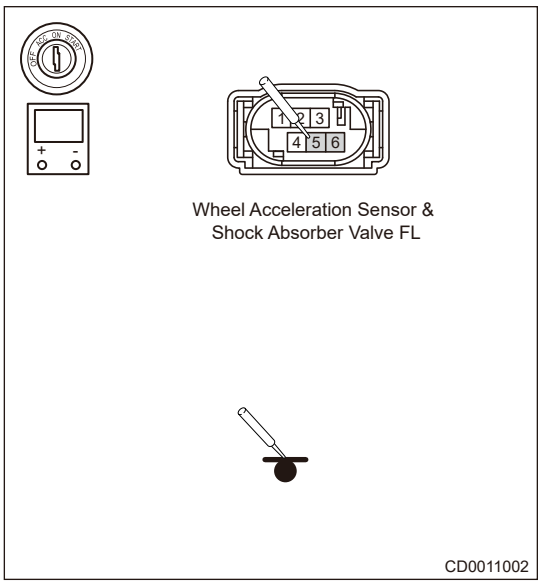
Standard Resistance

Multimeter Connection	Condition	Specified Condition
Front left wheel acceleration sensor and front left absorber valve assembly connector terminal (5) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Front left wheel acceleration sensor and front left absorber valve assembly connector terminal (6) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω



(g) Check for continuity between front left wheel acceleration sensor and front left wheel shock absorber valve assembly connector terminals (5) and body ground, and check for resistance (using a digital multimeter) between front left wheel acceleration sensor and front left wheel shock absorber valve assembly connector terminal (6) and body ground, to determine if wire harness is short to ground.

Multimeter Connection	Condition	Specified Condition
Front left wheel acceleration sensor and front left wheel shock absorber valve assembly connector terminal (5) - body ground	Always	∞
Front left wheel acceleration sensor and front left wheel shock absorber valve assembly connector terminal (6) - body ground	Always	∞



NG	**Repair or replace wire harness or connector**

OK

2	Check the front left wheel sensor wire harness

(a) Replace front left wheel sensor wire harness to compare and verify.
(b) Clear DTC and check if the same DTC appears.

OK → Replace the front left wheel sensor wire harness

NG

3	Check shock absorber

(a) Replace front left shock absorber to compare and verify.
(b) Clear DTC and check if the same DTC appears.

OK → Replace the shock absorber

NG

4	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → System operates normally

NG → Replace suspension control module

DTC	**C223314**	**Front Right Absorber Control Error - Short To Ground / Open**
DTC	**C223312**	**Front Right Absorber Control Error - Short To Ground**
DTC	**C223313**	**Front Right Absorber Control Error - Open**
DTC	**C22331E**	**Front Right Absorber Control Error - Circuit Resistance Out of Range**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C223314	Front Right Absorber Control Error - Short To Ground / Open	/	• Wire harness or connector failure • ECU fault • Front right shock absorber failure
C223312	Front Right Absorber Control Error - Short To Ground		
C223313	Front Right Absorber Control Error - Open		

DTC	DTC Definition	Detection Condition	Possible Cause
C22331E	Front Right Absorber Control Error - Circuit Resistance Out of Range		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery.

(c) Disconnect suspension control module connector, and disconnect connector between front right wheel acceleration sensor and front wheel shock absorber valve assembly.

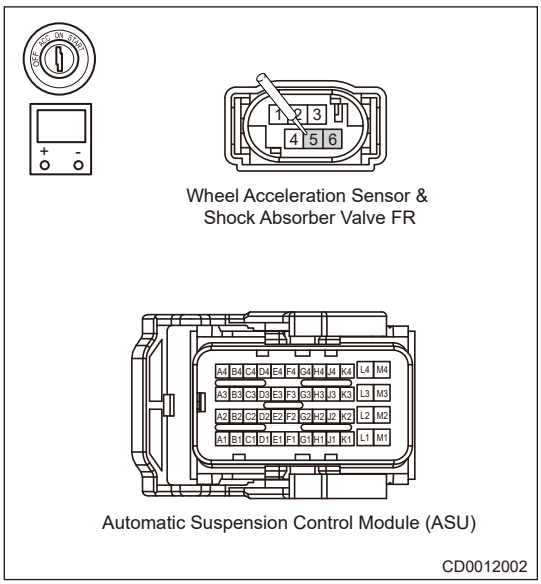
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

(e) Check for broken, bent, protruded or corroded terminals.

(f) Check for continuity (using a digital multimeter) between front right wheel acceleration sensor and front right wheel shock absorber valve assembly connector terminals (5, 6) and suspension control module connector (connected terminal).

Standard Resistance

Multimeter Connection	Condition	Specified Condition
Front right wheel acceleration sensor and front right absorber valve assembly connector terminal (5) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Front right wheel acceleration sensor and front right absorber valve assembly connector terminal (6) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω



(g) Check for continuity between front right wheel acceleration sensor and front right wheel shock absorber valve assembly connector terminals (5) and body ground, and check for resistance (using a digital multimeter) between front right wheel acceleration sensor and front right wheel shock absorber valve assembly connector terminal (6) and body ground, to determine if wire harness is short to ground.

Multimeter Connection	Condition	Specified Condition
Front right wheel acceleration sensor and front right wheel shock absorber valve assembly connector terminal (5) - body ground	Always	∞
Front right wheel acceleration sensor and front right wheel shock absorber valve assembly connector terminal (6) - body ground	Always	∞

NG → **Repair or replace wire harness or connector**

OK ↓

2	Check the front right wheel sensor wire harness

(a) Replace front right wheel sensor wire harness to compare and verify.
(b) Clear DTC and check if the same DTC appears.

OK → **Replace the front right wheel sensor wire harness**

NG ↓

3	Check shock absorber

(a) Replace front right shock absorber to compare and verify.
(b) Clear DTC and check if the same DTC appears.

OK → **Replace the shock absorber**

NG ↓

4	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	System operates normally
NG	Replace suspension control module

DTC	C223514	Rear Left Absorber Control Error - Short To Ground / Open
DTC	C223512	Rear Left Absorber Control Error - Short To Ground
DTC	C223513	Rear Left Absorber Control Error - Open
DTC	C22351E	Rear Left Absorber Control Error - Circuit Resistance Out of Range

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C223514	Rear Left Absorber Control Error - Short To Ground / Open	/	• Wire harness or connector failure • ECU fault • Front right shock absorber failure
C223512	Rear Left Absorber Control Error - Short To Ground		
C223513	Rear Left Absorber Control Error - Open		
C22351E	Rear Left Absorber Control Error - Circuit Resistance Out of Range		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

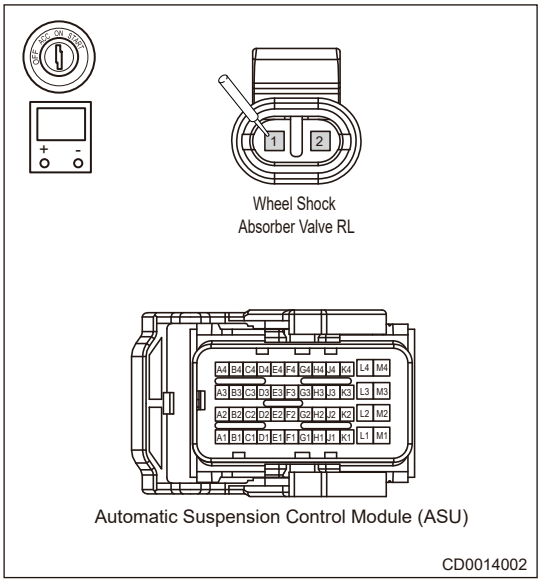
- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery.
(c) Disconnect suspension control module connector, and disconnect rear left wheel shock absorber valve connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check for continuity (using a digital multimeter) between rear left wheel shock absorber valve connector terminals (1, 2) and suspension control module connector (connected terminal).

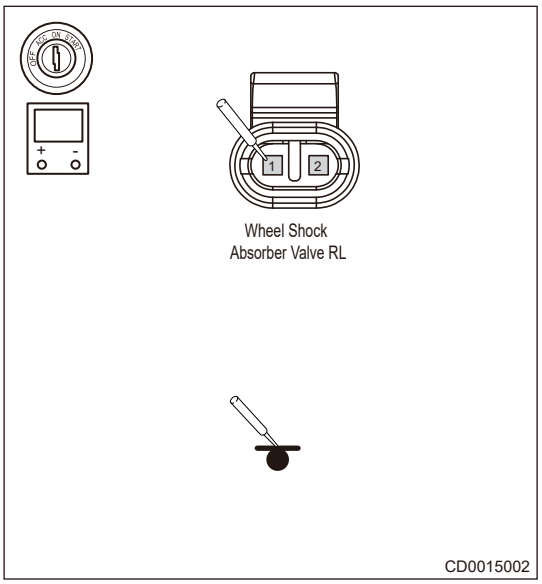
Standard Resistance

Multimeter Connection	Condition	Specified Condition
Rear left wheel shock absorber connector terminal (1) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Rear left wheel shock absorber connector terminal (2) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω



(g) Check for continuity between rear left wheel shock absorber connector terminal (1) and body ground, and check for resistance (using a digital multimeter) between rear left wheel shock absorber valve connector terminal (2) and body ground, to determine if wire harness is short to ground.

Multimeter Connection	Condition	Specified Condition
Rear left wheel shock absorber valve connector terminal (1) - Body ground	Always	∞
Rear left wheel shock absorber valve connector terminal (2) - Body ground	Always	∞



NG → **Repair or replace wire harness or connector**

OK

2	Check shock absorber

(a) Replace rear left shock absorber to compare and verify.
(b) Clear DTC and check if the same DTC appears.

OK → **Replace the shock absorber**

NG

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace suspension control module**

DTC	**C223714**	**Rear Right Absorber Control Error - Short To Ground / Open**
DTC	**C223712**	**Rear Right Absorber Control Error - Short To Ground**
DTC	**C223713**	**Rear Right Absorber Control Error - Open**
DTC	**C22371E**	**Rear Right Absorber Control Error - Circuit Resistance Out of Range**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C223714	Rear Right Absorber Control Error - Short To Ground / Open	/	• Wire harness or connector failure • ECU fault • Rear right shock absorber failure
C223712	Rear Right Absorber Control Error - Short To Ground		
C223713	Rear Right Absorber Control Error - Open		
C22371E	Rear Right Absorber Control Error - Circuit Resistance Out of Range		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.

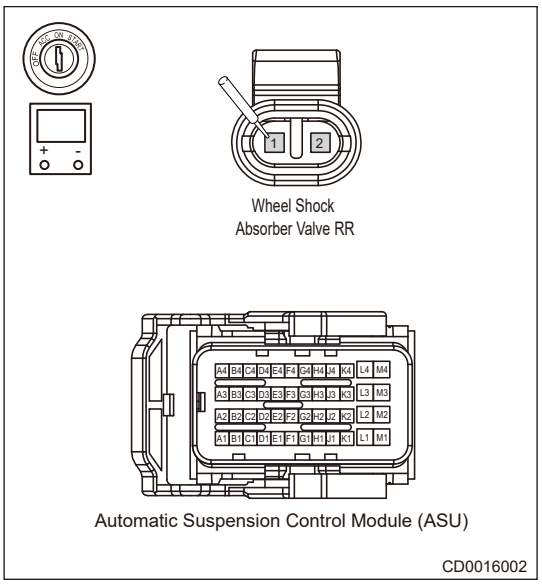
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery.
(c) Disconnect suspension control module connector, and disconnect rear right wheel shock absorber valve connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check for continuity (using a digital multimeter) between rear right wheel shock absorber valve connector terminals (1, 2) and suspension control module connector (connected terminal).

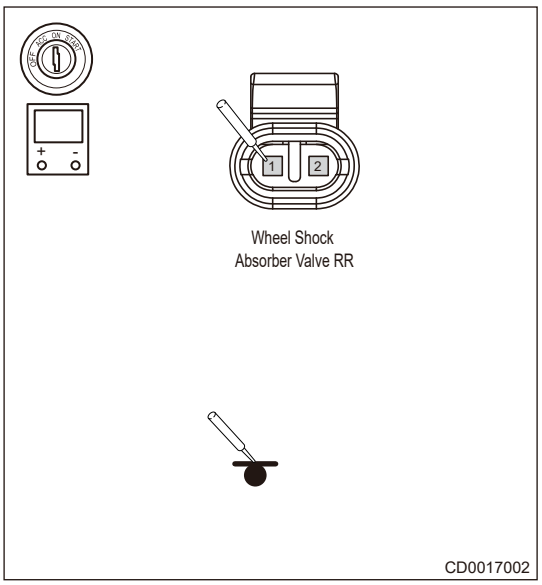
Standard Resistance

Multimeter Connection	Condition	Specified Condition
Rear right wheel shock absorber connector terminal (1) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Rear right wheel shock absorber connector terminal (2) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω



(g) Check for continuity between rear right wheel shock absorber connector terminal (1) and body ground, and check for resistance (using a digital multimeter) between rear right wheel shock absorber valve connector terminal (2) and body ground, to determine if wire harness is short to ground.

Multimeter Connection	Condition	Specified Condition
Rear right wheel shock absorber valve connector terminal (1) - Body ground	Always	∞
Rear right wheel shock absorber valve connector terminal (2) - Body ground	Always	∞



NG → Repair or replace wire harness or connector

OK

2	Check shock absorber

(a) Replace rear right shock absorber to compare and verify.
(b) Clear DTC and check if the same DTC appears.

OK → **Replace the shock absorber**

NG

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	**C225012**	**Front Left Body Acceleration Sensor Signal Error - Short to Battery**
DTC	**C225014**	**Front Left Body Acceleration Sensor Signal Error - Short To Ground / Open**
DTC	**C225013**	**Front Left Body Acceleration Sensor Ground Wire Error - Open**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C225012	Front Left Body Acceleration Sensor Signal Error - Short to Battery	/	• Wire harness or connector failure • ECU fault • Body acceleration sensor failure
C225014	Front Left Body Acceleration Sensor Signal Error - Short To Ground / Open		
C225013	Front Left Body Acceleration Sensor Ground Wire Error - Open		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.

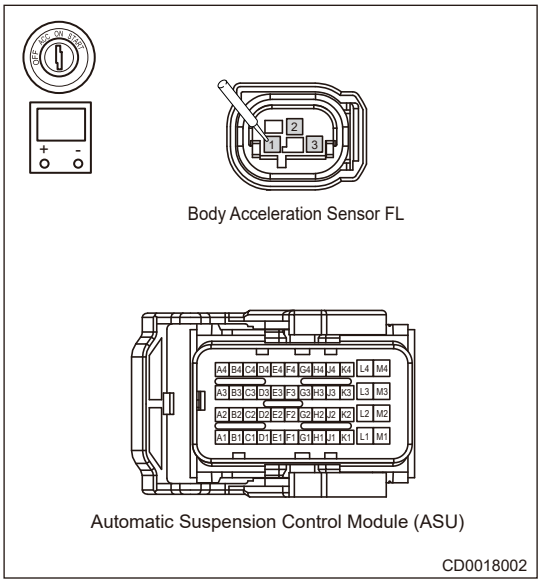
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery.
(c) Disconnect suspension control module connector, and disconnect connector from front left body acceleration sensor.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check for continuity (using a digital multimeter) between front left body acceleration sensor connector terminals (1, 2, 3) and suspension control module connector (connected terminal), to determine if wire harness is short to ground.

Standard Resistance

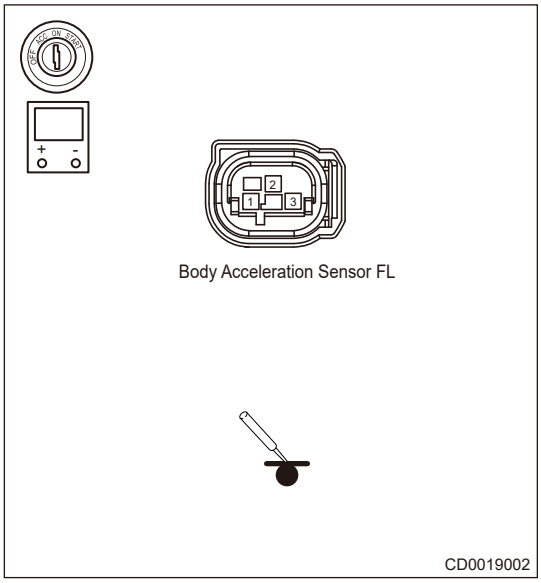
Multimeter Connection	Condition	Specified Condition
Front left body acceleration sensor connector terminal (1) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω
Front left body acceleration sensor connector terminal (2) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω
Front left body acceleration sensor connector terminal (3) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω



(g) Connect the suspension control module connector.

(h) Check for resistance (using a digital multimeter) between front left body acceleration sensor connector (signal terminal) and body ground, to determine if wire harness is short to ground.

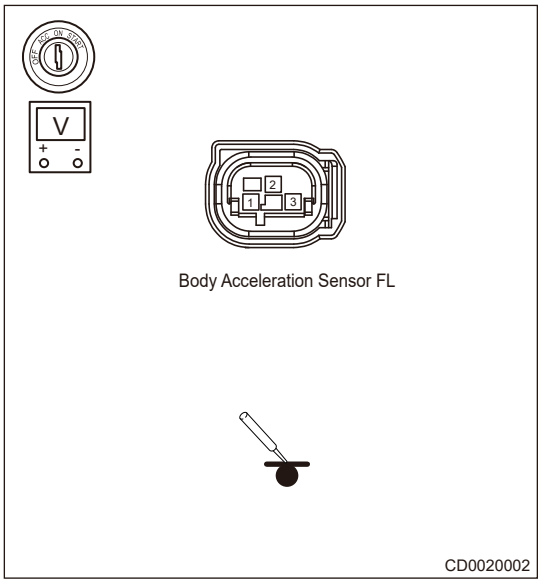
Multimeter Connection	Condition	Specified Condition
Front left body acceleration sensor connector (signal terminal) - body ground	Always	∞



(i) Turn ignition switch to ON.

(j) Check for the voltage between front left wheel speed sensor connector (signal terminal) and body ground to determine if sensor signal wire harness is short to power supply.

Multimeter Connection	Condition	Specified Condition
Front left body acceleration sensor connector (signal terminal) - Body ground	Turn ignition switch to ON.	0 V



NG → **Repair or replace wire harness or connector**

OK

2	Check sensor

(a) Replace front left body acceleration sensor to compare and verify.

(b) Clear DTC and check if the same DTC appears.

OK → **Replace sensor**

NG

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK	**System operates normally**
NG	**Replace suspension control module**

DTC	**C225112**	**Front Right Body Acceleration Sensor Signal Error - Short to Battery**
DTC	**C225114**	**Front Right Body Acceleration Sensor Signal Error - Short To Ground / Open**
DTC	**C225113**	**Front Right Body Acceleration Sensor Ground Wire Error - Open**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C225112	Front Right Body Acceleration Sensor Signal Error - Short to Battery	/	• Wire harness or connector failure • ECU fault • Body acceleration sensor failure
C225114	Front Right Body Acceleration Sensor Signal Error - Short To Ground / Open		
C225113	Front Right Body Acceleration Sensor Ground Wire Error - Open		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery.

(c) Disconnect suspension control module connector, and disconnect connector from front right body acceleration sensor.

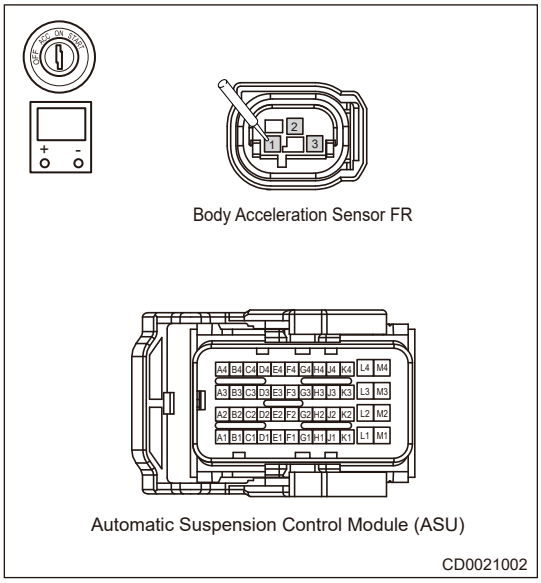
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

(e) Check for broken, bent, protruded or corroded terminals.

(f) Check for continuity (using a digital multimeter) between front right body acceleration sensor connector terminals (1, 2, 3) and suspension control module connector (connected terminal), to determine if wire harness is short to ground.

Standard Resistance

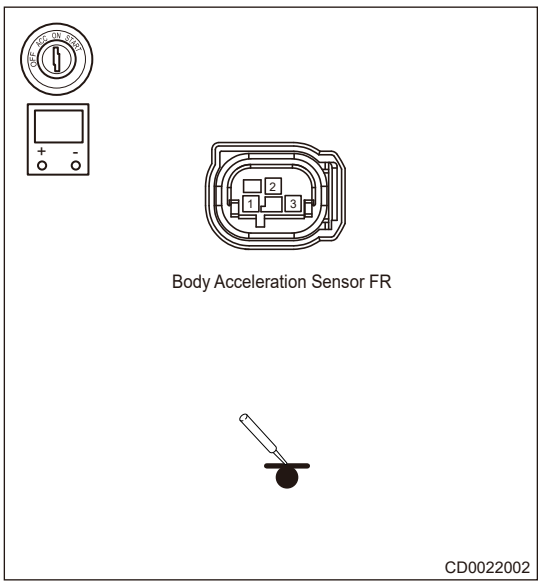
Multimeter Connection	Condition	Specified Condition
Front right body acceleration sensor connector terminal (1) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω
Front right body acceleration sensor connector terminal (2) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω
Front right body acceleration sensor connector terminal (3) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω



(g) Connect the suspension control module connector.

(h) Check for the resistance (using a digital multimeter) between front right wheel speed sensor connector (signal terminal) and body ground to determine if wire harness is short to ground.

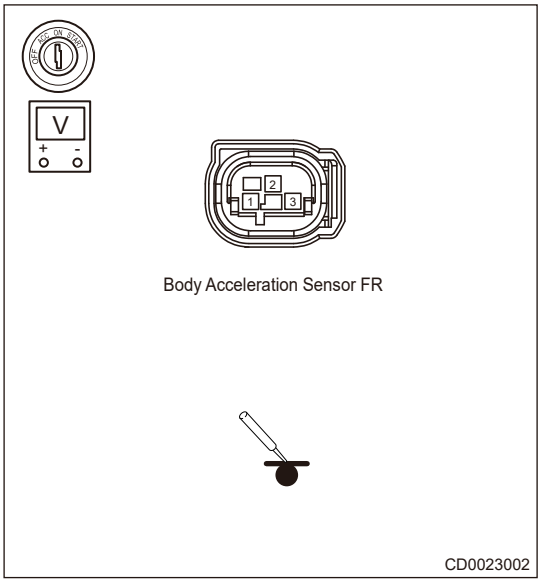
Multimeter Connection	Condition	Specified Condition
Front right body acceleration sensor connector (signal terminal) - Body ground	Always	∞



(i) Turn ignition switch to ON.

(j) Check for the voltage between front right wheel speed sensor connector (signal terminal) and body ground to determine if sensor signal wire harness is short to power supply.

Multimeter Connection	Condition	Specified Condition
Front right body acceleration sensor connector (signal terminal) - Body ground	Turn ignition switch to ON.	0 V



NG → **Repair or replace wire harness or connector**

OK

2	Check sensor

(a) Replace front right body acceleration sensor to compare and verify.

(b) Clear DTC and check if the same DTC appears.

OK → **Replace sensor**

NG

3	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	**C225212**	**Front Right Body Acceleration Sensor Signal Error - Short To Battery**
DTC	**C225214**	**Rear Left Body Acceleration Sensor Signal Error - Short To Ground / Open**
DTC	**C225213**	**Rear Left Body Acceleration Sensor Ground Wire Error - Open**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C225212	Front Right Body Acceleration Sensor Signal Error - Short To Battery	/	• Wire harness or connector failure • ECU fault • Body acceleration sensor failure
C225214	Rear Left Body Acceleration Sensor Signal Error - Short To Ground / Open		
C225213	Rear Left Body Acceleration Sensor Ground Wire Error - Open		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery.

(c) Disconnect suspension control module connector, and disconnect connector from rear left body acceleration sensor.

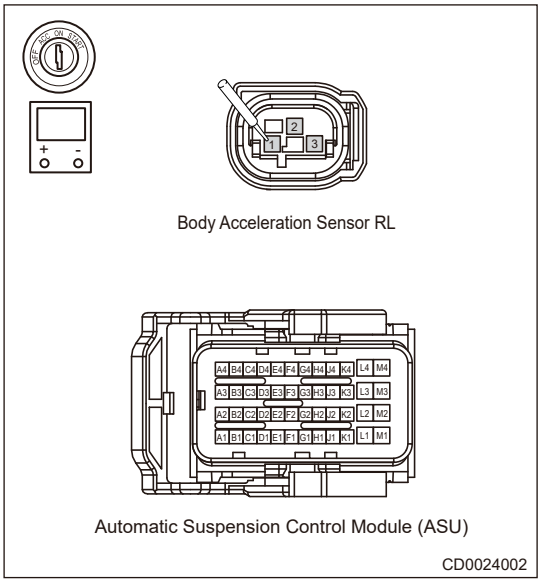
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

(e) Check for broken, bent, protruded or corroded terminals.

(f) Check for continuity (using a digital multimeter) between rear left body acceleration sensor connector terminals (1, 2, 3) and suspension control module connector (connected terminal), to determine if wire harness is short to ground.

Standard Resistance

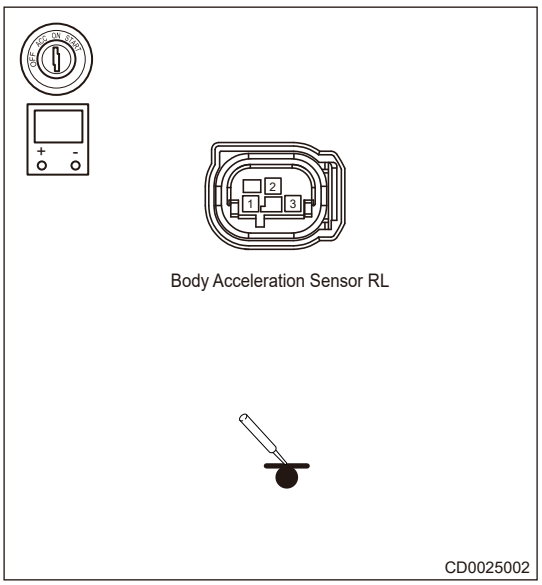
Multimeter Connection	Condition	Specified Condition
Rear left body acceleration sensor connector terminal (1) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω
Rear left body acceleration sensor connector terminal (2) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω
Rear left body acceleration sensor connector terminal (3) - suspension control module connector (- connected terminal)	Always	⩽ 1 Ω



(g) Connect the suspension control module connector.

(h) Check for resistance (using a digital multimeter) between rear left body acceleration sensor connector (signal terminal) and body ground, to determine if wire harness is short to ground.

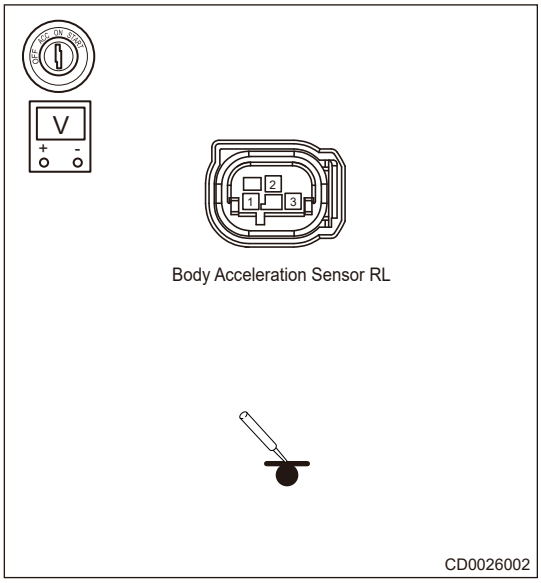
Multimeter Connection	Condition	Specified Condition
Rear left body acceleration sensor connector (signal terminal) - body ground	Always	∞



(i) Turn ignition switch to ON.

(j) Check for the voltage between rear left wheel speed sensor connector (signal terminal) and body ground to determine if sensor signal wire harness is short to power supply.

Multimeter Connection	Condition	Specified Condition
Rear left body acceleration sensor connector (signal terminal) - body ground	Turn ignition switch to ON.	0 V



NG → **Repair or replace wire harness or connector**

OK

2 Check sensor

(a) Replace rear left body acceleration sensor to compare and verify.

(b) Clear DTC and check if the same DTC appears.

OK → **Replace sensor**

NG

3 Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	**C225312**	**Front Left Wheel Acceleration Sensor Signal Error - Short to Battery**
DTC	**C225314**	**Front Left Wheel Acceleration Sensor Signal Error - Short To Ground / Open**
DTC	**C225313**	**Front Left Wheel Acceleration Sensor Ground Wire Error - Open**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C225312	Front Left Wheel Acceleration Sensor Signal Error - Short to Battery	/	• Wire harness or connector failure • ECU fault • Wheel acceleration sensor failure
C225314	Front Left Wheel Acceleration Sensor Signal Error - Short To Ground / Open		
C225313	Front Left Wheel Acceleration Sensor Ground Wire Error - Open		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery.

(c) Disconnect suspension control module connector, and disconnect connector between front left wheel acceleration sensor with front shock absorber valve assembly connector.

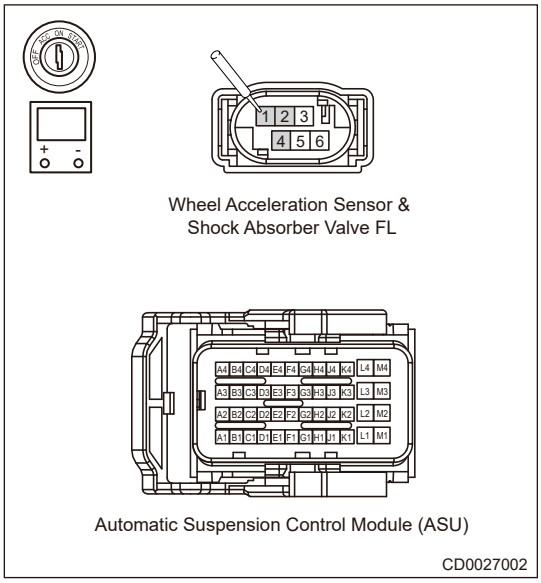
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

(e) Check for broken, bent, protruded or corroded terminals.

(f) Check for continuity (using a digital multimeter) between front left wheel acceleration sensor connector terminals (1, 2, 4) and suspension control module connector (connected terminal), to determine if wire harness is short to ground.

Standard Resistance

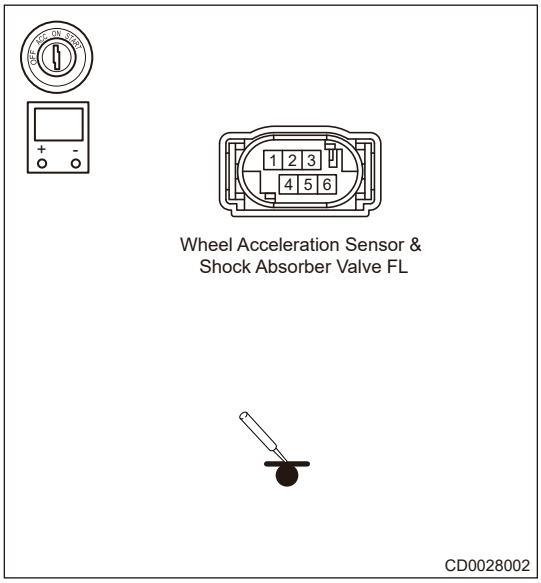
Multimeter Connection	Condition	Specified Condition
Front left wheel acceleration sensor with front left absorber valve assembly connector terminal (1) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Front left wheel acceleration sensor with front left absorber valve assembly connector terminal (2) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Front left wheel acceleration sensor with front left absorber valve assembly connector terminal (4) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω



(g) Connect the suspension control module connector.

(h) Check for resistance (using a digital multimeter) between front left wheel acceleration sensor with front left shock absorber valve assembly connector (sensor signal terminal) and body ground, to determine if wire harness is short to ground.

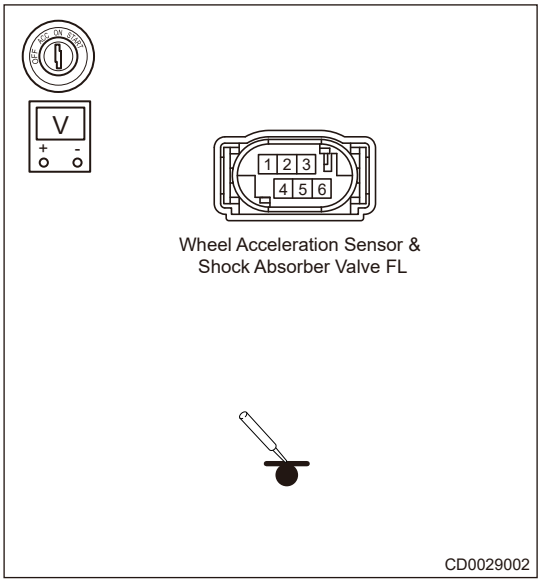
Multimeter Connection	Condition	Specified Condition
Front left wheel acceleration sensor with front left wheel shock absorber valve assembly connector (sensor signal terminal) - body ground	Always	∞



(i) Turn ignition switch to ON.

(j) Check for voltage (using a digital multimeter) between front left wheel acceleration sensor with front left shock absorber valve assembly connector (sensor signal terminal) and body ground, to determine if wire harness is short to power supply.

Multimeter Connection	Condition	Specified Condition
Front left wheel acceleration sensor with front left wheel shock absorber valve assembly connector (sensor signal terminal) - body ground	Turn ignition switch to ON.	0 V



NG → **Repair or replace wire harness or connector**

OK ↓

2	Check the front left wheel sensor wire harness

(a) Replace front left wheel sensor wire harness to compare and verify.

(b) Clear DTC and check if the same DTC appears.

OK → **Replace the front left wheel sensor wire harness**

NG ↓

3	Check sensor

(a) Replace front left wheel acceleration sensor to compare and verify.

(b) Clear DTC and check if the same DTC appears.

OK → **Replace sensor**

NG ↓

4	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → **System operates normally**

NG → **Replace suspension control module**

DTC	**C225412**	**Front Right Wheel Acceleration Sensor Signal Error - Short to Battery**
DTC	**C225414**	**Front Right Wheel Acceleration Sensor Signal Error - Short To Ground / Open**
DTC	**C225413**	**Front Right Wheel Acceleration Sensor Ground Wire Error - Open**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C225412	Front Right Wheel Acceleration Sensor Signal Error - Short to Battery	/	• Wire harness or connector failure • ECU fault • Wheel acceleration sensor failure
C225414	Front Right Wheel Acceleration Sensor Signal Error - Short To Ground / Open		
C225413	Front Right Wheel Acceleration Sensor Ground Wire Error - Open		

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean ground point related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery.

(c) Disconnect suspension control module connector, and disconnect connector between front right wheel acceleration sensor with front right shock absorber valve assembly connector.

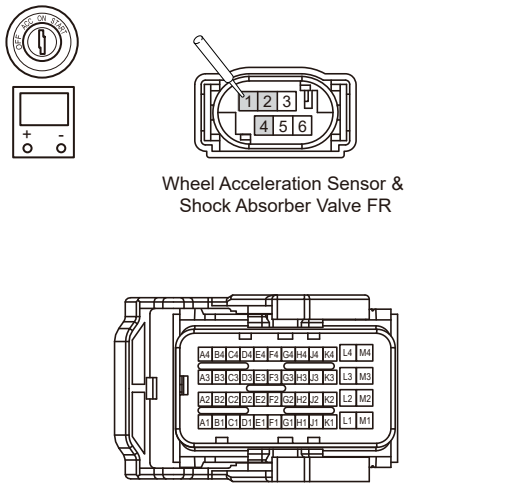
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

(e) Check for broken, bent, protruded or corroded terminals.

(f) Check for continuity (using a digital multimeter) between front right wheel acceleration sensor with front right wheel shock absorber valve assembly connector (1, 2, 4) and suspension control module connector (connected terminal), to determine if wire harness is short to ground.

Standard Resistance

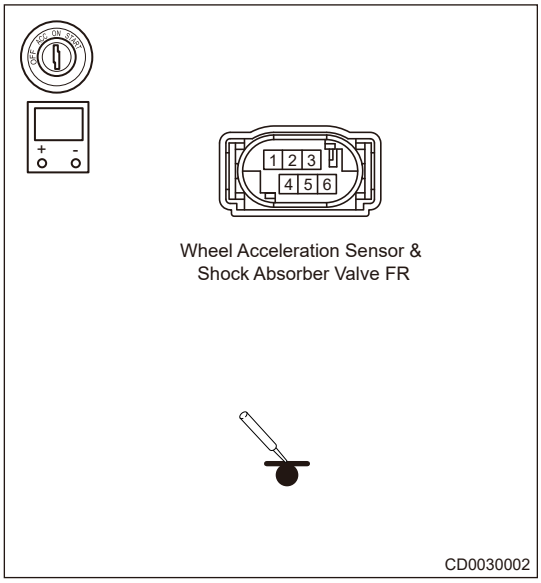
Multimeter Connection	Condition	Specified Condition
Front right wheel acceleration sensor with front right absorber valve assembly connector terminal (1) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Front right wheel acceleration sensor with front right absorber valve assembly connector terminal (2) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω
Front right wheel acceleration sensor with front right absorber valve assembly connector terminal (4) - suspension control module connector (connected terminal)	Always	⩽ 1 Ω



(g) Connect the suspension control module connector.

(h) Check for resistance (using a digital multimeter) between front right wheel acceleration sensor with front right shock absorber valve assembly connector (sensor signal terminal) and body ground, to determine if wire harness is short to ground.

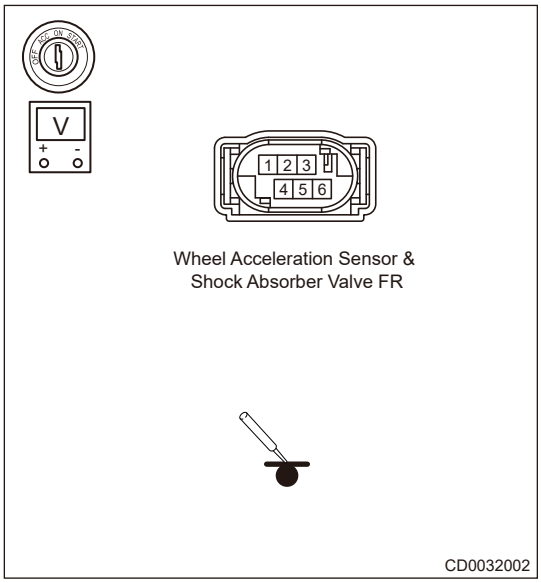
Multimeter Connection	Condition	Specified Condition
Front right wheel acceleration sensor with front right wheel shock absorber valve assembly connector (sensor signal terminal) - body ground	Always	∞



(i) Turn ignition switch to ON.

(j) Check for voltage (using a digital multimeter) between front right wheel acceleration sensor with front right shock absorber valve assembly connector (sensor signal terminal) and body ground, to determine if wire harness is short to power supply.

Multimeter Connection	Condition	Specified Condition
Front right wheel acceleration sensor with front right wheel shock absorber valve assembly connector (sensor signal terminal) - body ground	Turn ignition switch to ON.	0 V



NG → **Repair or replace wire harness or connector**

OK

2	Check the front right wheel sensor wire harness

(a) Replace front right wheel sensor wire harness to compare and verify.

(b) Clear DTC and check if the same DTC appears.

OK → **Replace the front right wheel sensor wire harness**

NG

3	Check sensor

(a) Replace front right wheel acceleration sensor to compare and verify.
(b) Clear DTC and check if the same DTC appears.

OK → Replace sensor

NG

4	Reconfirm DTCs

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- Check if the same DTCs are output.

OK

Same DTCs are not output

OK → System operates normally

NG → Replace suspension control module

DTC	U007388	Vehicle CAN Bus Error - Bus Off
DTC	U012987	Message Error - Missing Message
DTC	U015587	Message Error - Missing Message
DTC	U024587	Message Error - Missing Message
DTC	U010187	Message Error - Missing Message
DTC	U010087	Message Error - Missing Message

Description

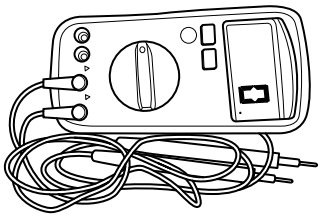
DTC	DTC Definition
U007388	Vehicle CAN Bus Error - Bus Off
U012987	Message Error - Missing Message
U015587	Message Error - Missing Message
U024587	Message Error - Missing Message
U010187	Message Error - Missing Message
U010087	Message Error - Missing Message

1	Refer to "CAN Network System" for troubleshooting

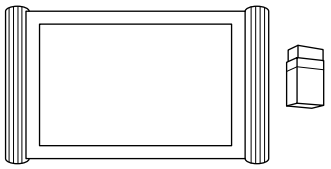
4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ Special Tools

Tool Name	Tool Drawing
Diagnostic tester	 S00001

4.2 Specifications

■ Torque Specifications

Part Name	Torque (N · m)	Quantity
Intelligent Suspension Control Module Fixing Nut	7 ± 1.5	4
Vehicle Body Fixing Bolt	9 ± 1.5	1
Wheel Sensor Fixing Bolt	9 ± 1.5	1

4.3 Intelligent Suspension Control Module

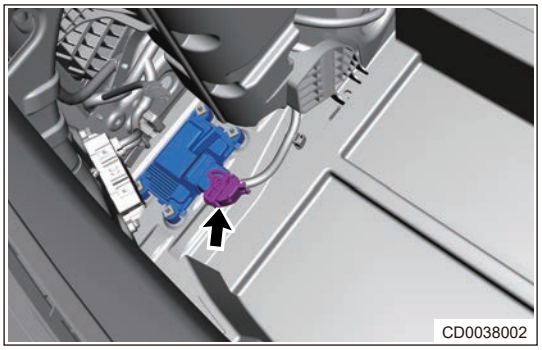
■ Removal

(1) Disconnect the negative battery cable.

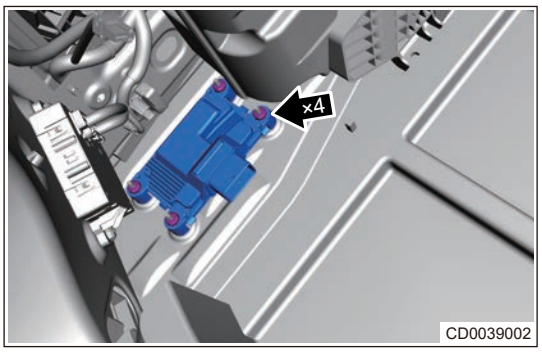
(2) Remove the luggage compartment carpet assembly.

(3) Remove the left luggage compartment wheel house assembly.

(4) Disconnect the intelligent suspension control module connector (arrow).



(5) Remove 4 fixing nuts (arrow) from intelligent suspension control module.



(6) Remove the intelligent suspension control module.

■ Installation

(1) Install the intelligent suspension control module.
(2) Install 4 fixing nuts (arrow) to intelligent suspension control module.

Tightening torque: 7 ± 3.5 N·m

(3) Install the intelligent suspension control module connector.
(4) Install the left luggage compartment wheel house assembly.
(5) Install the luggage compartment carpet assembly.
(6) Connect the negative battery cable.

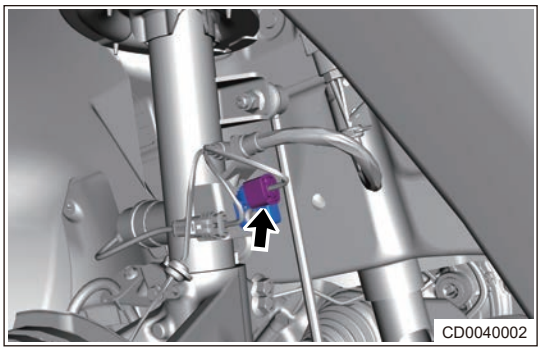
4.4 Wheel Sensor

Hint:

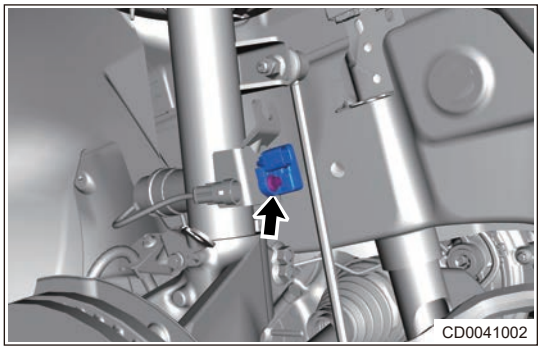
- Removal and installation procedure of left and right wheel sensor are the same. Take removal and installation procedure of left side as an example below.

■ Removal

(1) Disconnect the negative battery cable.
(2) Remove the front left wheel.
(3) Disconnect the front left wheel sensor connector (arrow).



(4) Remove fixing bolt (arrow) from front left wheel speed sensor.



(5) Remove the front left wheel sensor.

■ **Installation**

(1) Insert the wheel sensor dowel pin into wheel sensor bracket hole of shock absorber assembly, and align the sensor installation hole with the front shock absorber installation hole.

(2) Install 1 fixing bolt of front left wheel sensor.

Tightening torque: 9 ± 3.5 N·m

(3) Install the front left wheel sensor connector.

(4) Install the front left wheel.

(5) Connect the negative battery cable.

4.5 Body Sensor (Front)

Hint:

- Removal and installation procedure of front left and right body sensor are the same. Take removal and installation procedure of left side as an example below.

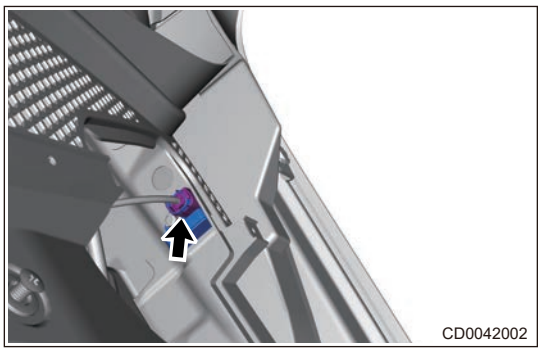
■ **Removal**

(1) Disconnect the negative battery cable.

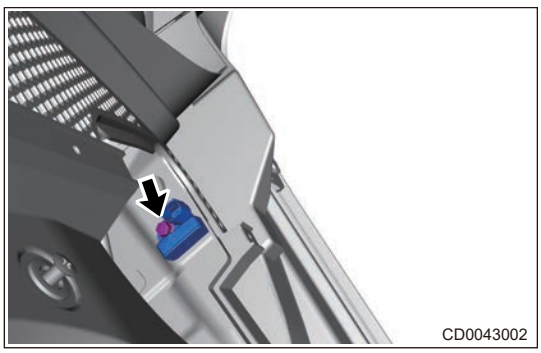
(2) Remove the engine hood rear weatherstrip.

(3) Remove front windshield lower trim board left block cover.

(4) Disconnect the front left body sensor connector (arrow).



(5) Remove fixing bolt (arrow) from front left body sensor.



(6) Remove the front left body sensor.

■ **Installation**

(1) Insert the body sensor dowel pin into engine compartment riser upper body, and align the sensor installation hole with the front shock absorber installation hole.

(2) Install 1 fixing bolt of front left body sensor.

Tightening torque: 9 ± 3.5 N·m

(3) Install the front left body sensor connector.

(4) Install the front windshield lower trim board left block cover.

(5) Install the engine hood rear weatherstrip.

(6) Connect the negative battery cable.

4.6 Body Sensor (Rear)

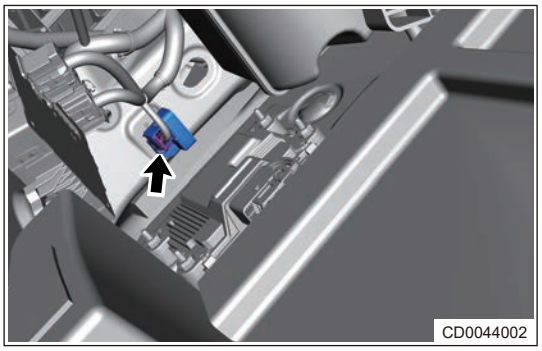
■ **Removal**

(1) Disconnect the negative battery cable.

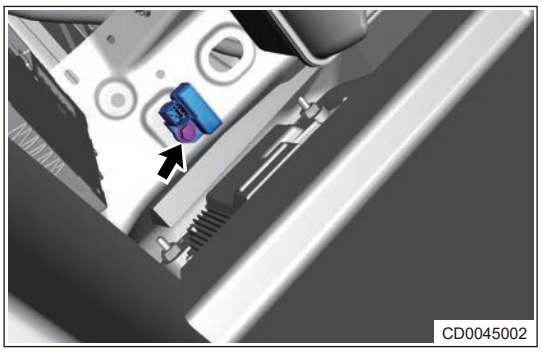
(2) Remove the luggage compartment carpet assembly.

(3) Remove the left luggage compartment wheel house assembly.

(4) Disconnect the body sensor connector (arrow).



(5) Remove the vehicle body fixing bolt (arrow).



(6) Remove the body sensor.

■ **Installation**

(1) Insert the body sensor dowel pin into C and D pillar bodies on the left side, and align the sensor installation hole with the engine compartment riser upper body installation hole.

(2) Install 1 fixing bolt of body sensor.

Tightening torque: 9 ± 3.5 N·m

(3) Install the body sensor connector.

(4) Install the left luggage compartment wheel house assembly.

(5) Install the luggage compartment carpet assembly.

(6) Connect the negative battery cable.

5.2 FRONT SUSPENSION (PASSIVE SHOCK ABSORBER)

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Be sure to wear necessary safety equipment to prevent accidents.

(2) Check if safety lock of lifter is locked when repairing chassis parts.

(3) It is not allowed to weld or modify suspension loading parts and guide parts.

(4) When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.

(5) Operate carefully when removing and installing coil spring, to prevent spring from jumping out and causing personal injury.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Be sure to tighten coupling bolts and nuts to specified torques.

(2) Make sure that ball pin assembly rotates smoothly without any sticking after installation.

(3) Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.

(4) Before pressing in, apply grease on the outside of front control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.

(5) Align dowel pin of top end connecting plate with body positioning hole when installing front left shock absorber assembly.

(6) Please note that opening of retainer must face opening of front wheel speed sensor, when installing front hub bearing retainer.

(7) When removing front sub frame welding assembly, it is necessary to securely support engine and transmission assembly with engine equalizer to avoid damage.

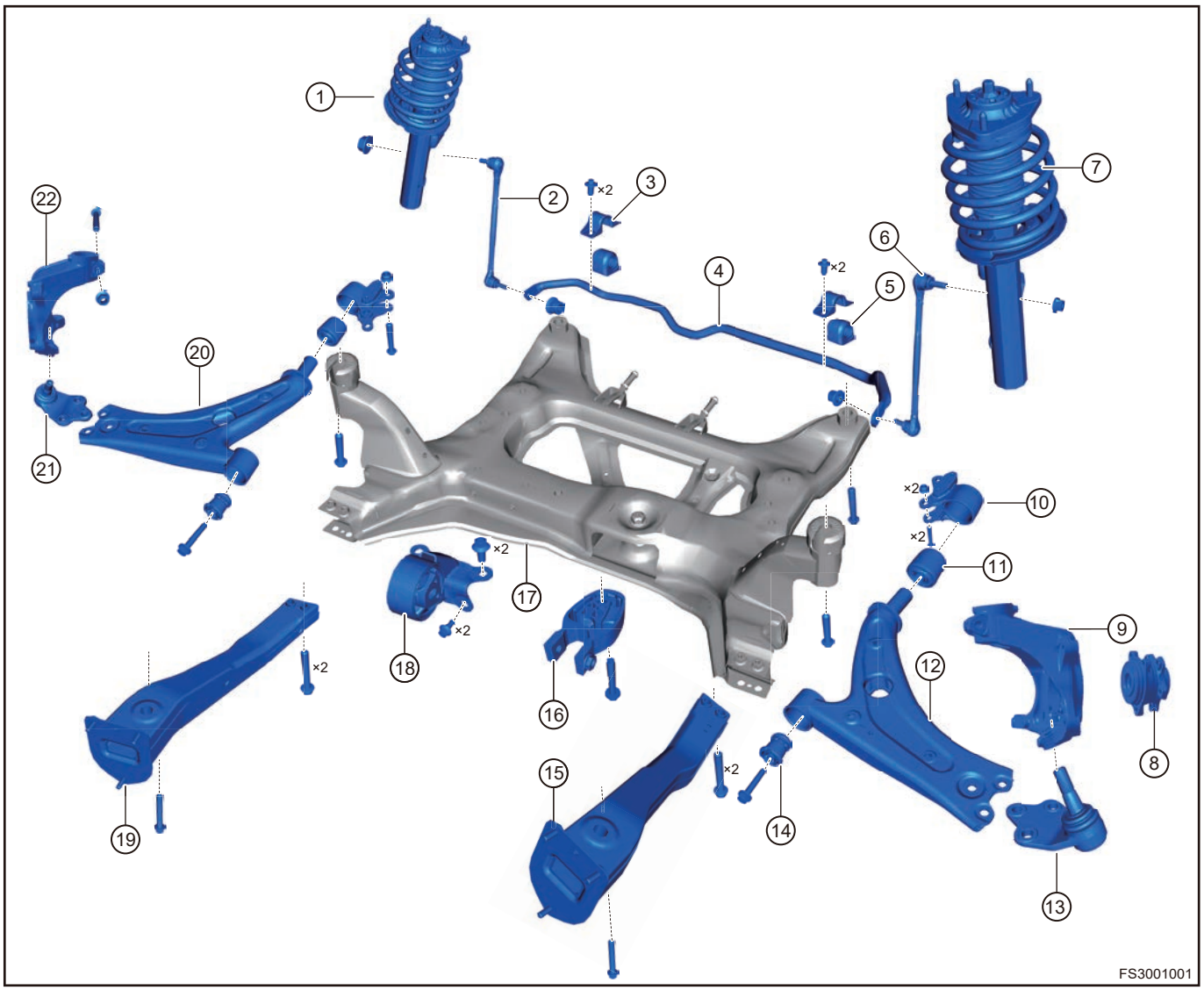
(8) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

Front suspension of this model uses Macpherson independent suspension (toe-in is adjustable and height is non-adjustable), which is equipped with lateral stabilizer, cylindrical coil spring, double action telescopic shock absorber. The upper end of shock absorber is connected to vehicle body, and lower end is connected to steering knuckle. One end of control arm assembly is connected to the sub frame, and the other end is connected to the steering knuckle.

2.2 System Components Diagram

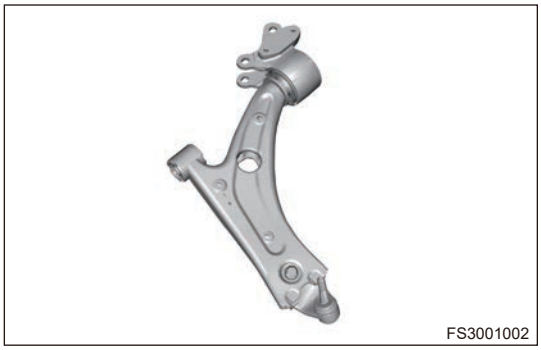


1	Front Right Strut Assembly	12	Front Left Control Arm Welding Assembly
2	Front Connecting Rod Assembly	13	Control Arm Ball Pin
3	Front Stabilizer Bar Clamp	14	Control Arm Front Bushing Assembly
4	Front Stabilizer Bar	15	Left Side Rail Assembly
5	Front Stabilizer Bar Bushing	16	Rear Lower Mounting Cushion Assembly
6	Front Connecting Rod Assembly	17	Front Sub Frame Assembly
7	Front Left Strut Assembly	18	Rear Right Mounting Cushion Assembly
8	Front Hub Bearing	19	Right Side Rail Assembly
9	Front Left Steering Knuckle Control Arm Ball Pin	20	Front Right Control Arm Welding Assembly
10	Front Left Control Arm Rear Bushing Bracket	21	Control Arm Ball Pin
11	Control Arm Rear Bushing Assembly	22	Front Right Steering Knuckle

2.3 Component Operation Description

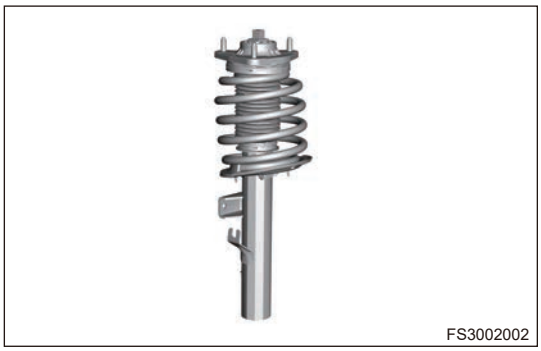
■ Front control arm assembly

As a guide and power transmission element for suspension system of vehicle, control arm transmits various power acting on wheels to vehicle body and keeps wheels moving in a certain trail. Control arm elastically connects wheels and vehicle body together with ball joint or bushing.


FS3001002

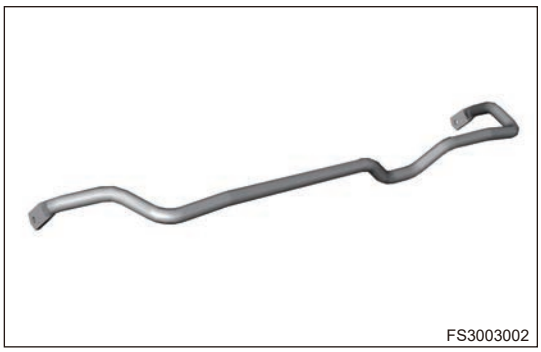
■ Front Strut Assembly

It filters and eliminates vibration from roads to improve driving stability and bring people a sense of comfort and stability.


FS3002002

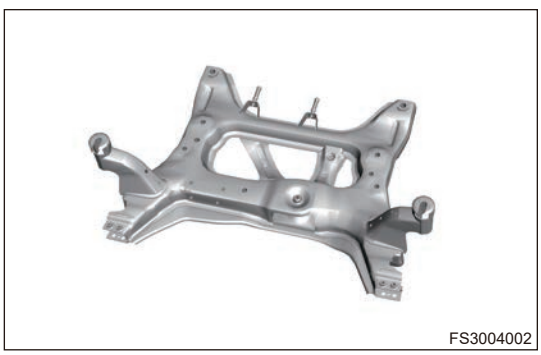
■ Front Stabilizer Bar

Lateral stabilizer bar functions to prevent excessive lateral incline while vehicle is turning and keeps vehicle body in balance as much as possible. It aims to reduce lateral incline level of vehicle and improve smoothness. When vehicle is turning, vehicle body inclines and suspension on both sides have inconsistent bounce. The outer suspension will press against stabilizer bar to twist it, then elastic force from bar body will prevent wheel from lifting, so that vehicle body can be kept in balance as much as possible, thus realizing the lateral stability function.


FS3003002

■ Front Sub Frame Assembly

Sub frame can reduce impact on vehicle body due to road shock and enhance connection rigid of suspension system and improve driving comfort and stability, making a strong and compact chassis during driving. It bears the deformation conditions such as loaded bend, longitudinal torsion, lateral bend and horizontal lozenging, etc. in place of vehicle body, which improves torsion resistance ability of vehicle body. Also, the force will be directly applied on it in a collision to improve vehicle safety performance.


FS3004002

3 Diagnosis & Testing

3.1 Problem Symptoms Table

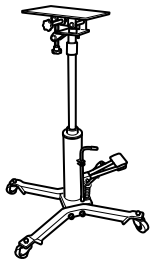
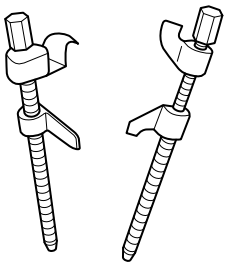
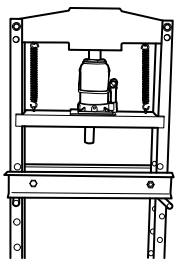
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Running deviation	Tire (worn or improperly inflated)
	Front wheel alignment (incorrect)
	Control arm ball pin assembly (loose)
	Steering tie rod (loose or worn)
	Front hub bearing (excessively worn)
	Steering gear (misaligned or damaged)
	Suspension component (worn)
Droop	Vehicle (overloaded)
	Front coil spring (too soft)
	Front shock absorber assembly (worn or damaged)
	Front suspension components (excessively worn or deformed)
	Front tire (improperly inflated)
	Front wheel alignment (incorrect)
Sways/pitches	Front tire (worn or improperly inflated)
	Front stabilizer bar assembly (bent or broken)
	Front shock absorber assembly (worn or damaged)
Wheel shimmy	Front tire (worn or improperly inflated)
	Front wheel (out of balance)
	Front shock absorber assembly (worn or damaged)
	Front wheel alignment (incorrect)
	Control arm ball pin assembly (loose)
	Front hub bearing (excessively worn)
	Steering gear (misaligned or damaged)
Abnormal tire wear	Front tire (improperly inflated)
	Front wheel alignment (incorrect)
	Front shock absorber assembly (worn or deformed)
	Front suspension components (worn or deformed)

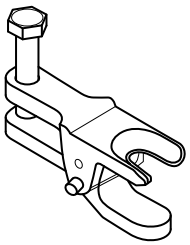
4 On-vehicle Service

4.1 Tools

■ General Tools

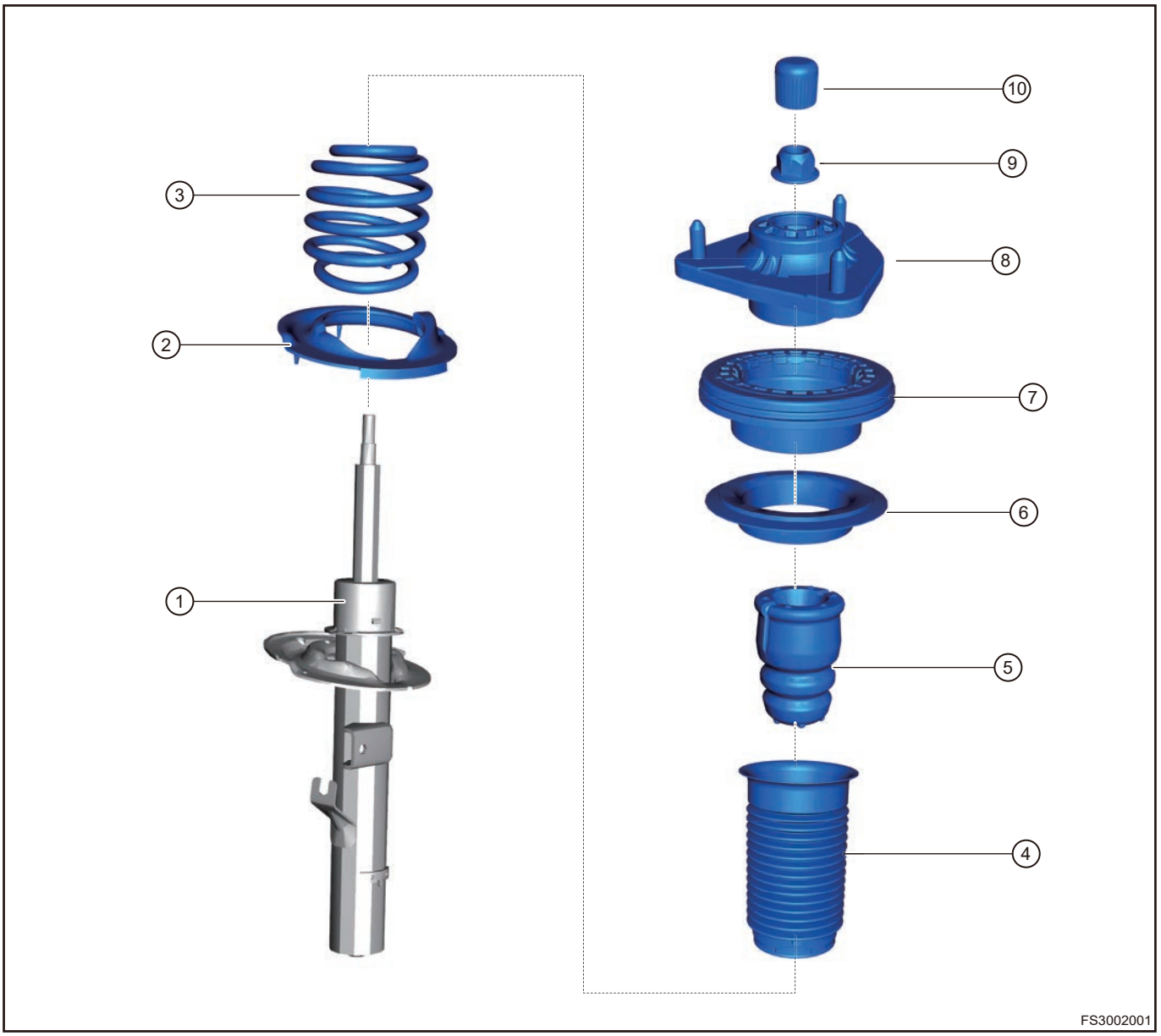
Tool Name	Tool Drawing
Transmission Carrier	 S00004
Spring Compressor	 S00016
Hydraulic Press	 S00010

■ Special Tools

Tool Name	Part No.	Tool Drawing
Front Shock Absorber Nut Remover	ECH-0001	 S00160
Ball Separator	ECH-0002	 S00019

4.2 Front Strut Assembly

■ Description



1	Front Left Shock Absorber Assembly	6	Front Spring Upper Cushion
2	Lower Spring Cushion	7	Bearing Assembly
3	Front Coil Spring	8	Upper Connecting Plate Assembly
4	Front Dust Boot	9	Hexagon Flange Locking Nut
5	Front Buffer Block	10	Front Shock Absorber Cover Cap

■ On-vehicle Inspection

Check the front shock absorber assembly

(1) Park vehicle on level ground, and bounce vehicle up and down, then check if vehicle shakes up and down when body bounds. If vehicle shakes up and down consecutively, shock absorber assembly may be damaged and should be replaced.

Check front shock absorber assembly for leakage

(1) As shock absorber assembly operates frequently during vehicle driving, oil gas is formed due to temperature rise of shock absorber, which then adheres to dust boot. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.

(2) When any of the following conditions occurs:

- Oil traces in circumferential direction are uneven;
- Oil traces reach lower connecting positions.

Above conditions indicate that there may be leakage in shock absorber assembly, and it is necessary to replace the shock absorber assembly.

(3) If it is difficult to accurately judge shock absorber assembly for leakage from appearance. Perform road test after wiping off oil on the surface of malfunctioning shock absorber. Under normal road conditions, drive vehicle for 5 to 10 minutes and perform inspection. If there are oil traces at the shock absorber assembly surface, it indicates that oil leakage exists, and it is necessary to replace the shock absorber assembly.

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

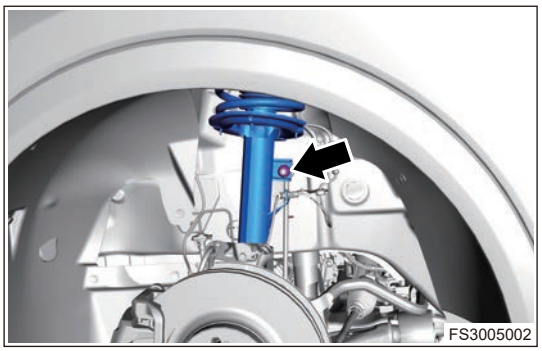
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.**
- **Operate carefully when removing and installing coil spring, to prevent spring from jumping out and causing personal injury.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

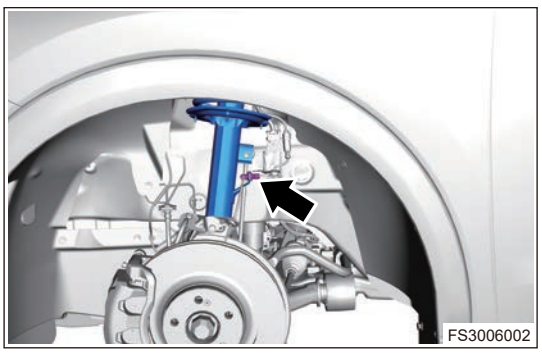
(2) Disconnect the negative battery cable.

(3) Remove the front left wheel.

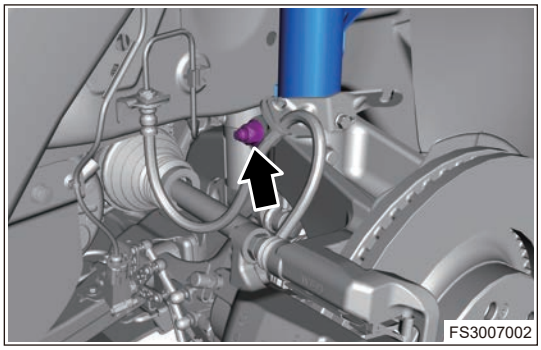
(4) Remove coupling nut (arrow) between front left connecting rod assembly and front left shock absorber assembly.


FS3005002

(5) Disengage front left wheel speed sensor wire harness (-arrow) from front left shock absorber assembly.


FS3006002

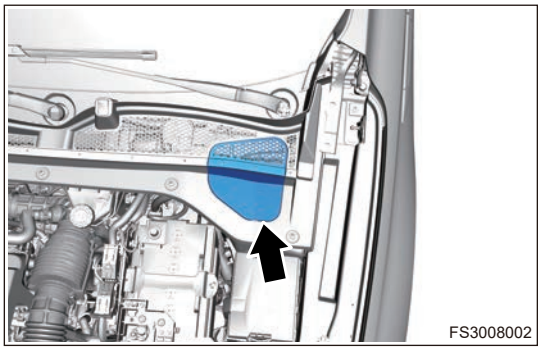
(6) Remove fixing bolt and nut (arrow) between front left shock absorber assembly and front left steering knuckle assembly.



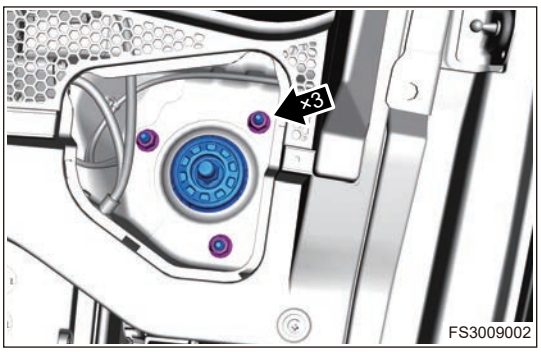
(7) Separate the connection between front left shock knock assembly and front left steering knuckle assembly.

(8) Remove the engine hood rear weatherstrip.

(9) Remove the front windshield lower support left cover plate (arrow).



(10) Remove 3 coupling nuts (arrow) between front left shock absorber assembly upper connecting plate and vehicle body.



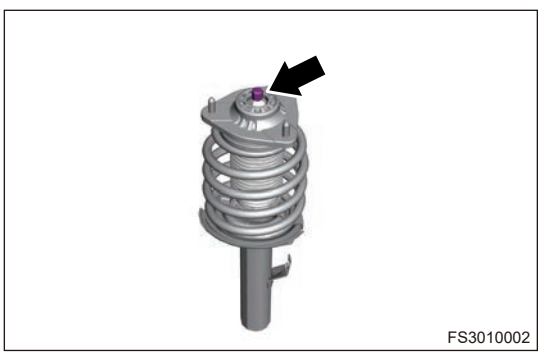
(11) Remove the front left shock absorber assembly with front coil spring.

■ Disassembly

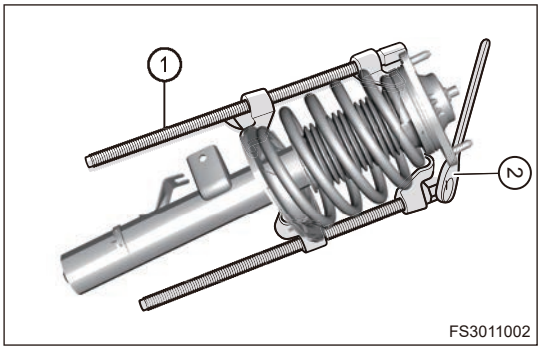
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Remove the front left shock absorber cover cap (arrow).



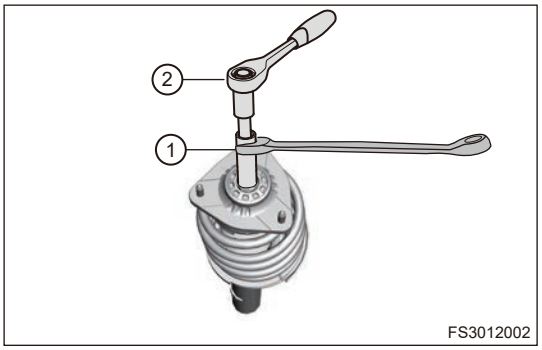
(2) Using spring compressor (1) and wrench (2), tighten the end lever of spring compressor to compress the front coil spring.



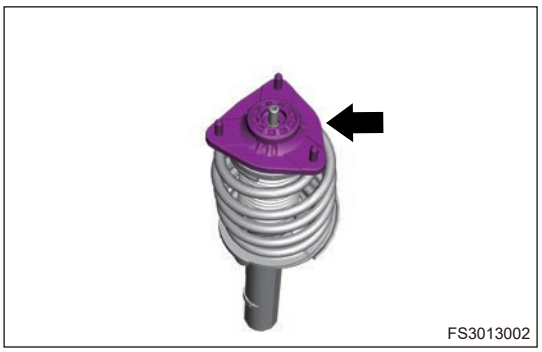
Warning

- **When removing front coil spring, compress spring until locking nut can be rotated. DO NOT compress spring more than necessary, avoid damaging spring and personal injury.**

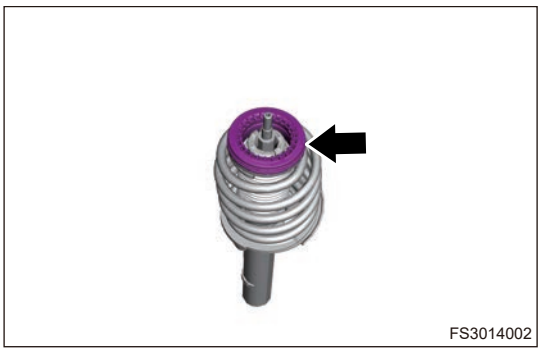
(3) Hold the end of front left shock absorber assembly lever with shock absorber nut remover (1), and then remove locking nut from front left shock absorber assembly with wrench (2).



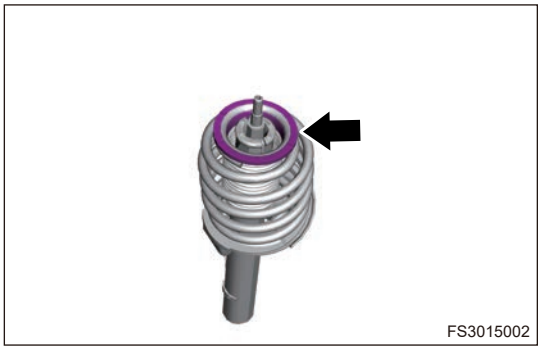
(4) Remove front shock absorber upper connecting plate assembly from front left shock absorber assembly.



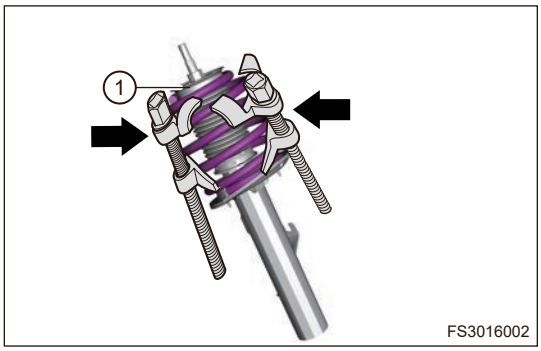
(5) Remove bearing assembly from front left shock absorber assembly.



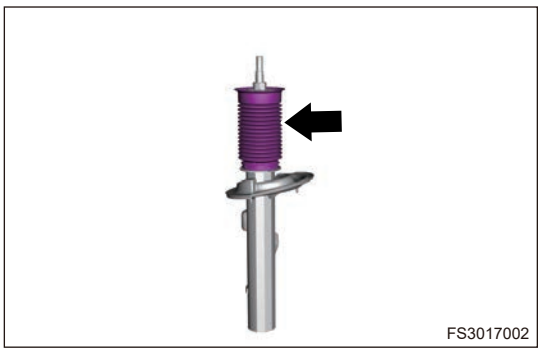
(6) Remove spring upper cushion from upper part of front left shock absorber assembly.



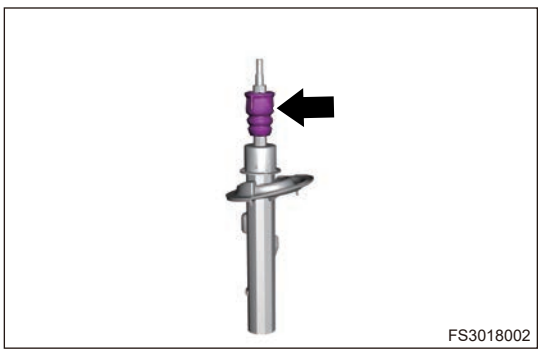
(7) Remove front coil spring (1) with spring compressor from front left shock absorber assembly.



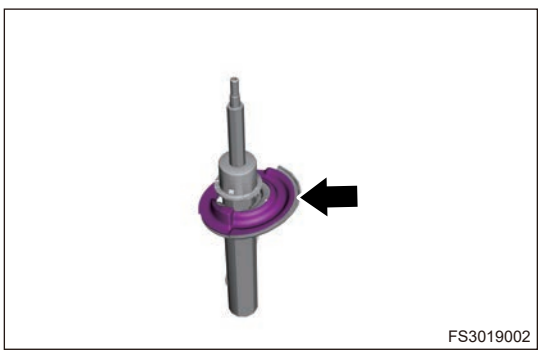
(8) Remove front dust boot from upper part of front left shock absorber assembly.



(9) Detach front buffer block from front left shock absorber assembly, and remove it.



(10) Remove spring lower cushion from lower end of front left shock absorber assembly strut.



■ Assembly

⚠ Caution

- **Be sure to tighten bolts to specified torque.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**
- **Please note that opening of retainer must face opening of front wheel speed sensor, when installing front hub bearing retainer.**

(1) Install the spring lower cushion.

(2) Install the front buffer block.

(3) Install the front dust boot.

(4) Install the front coil spring.

(5) Using spring compressor (1) and wrench (2), tighten the end lever of spring compressor to compress the front coil spring.

(6) Install the spring upper cushion.

(7) Install the bearing assembly.

(8) Install the front strut upper connecting plate assembly (w/ insulator).

(9) Hold the end of front left shock absorber assembly lever with shock absorber nut remover (1), and then tighten locking nut of front left shock absorber assembly with wrench (2).

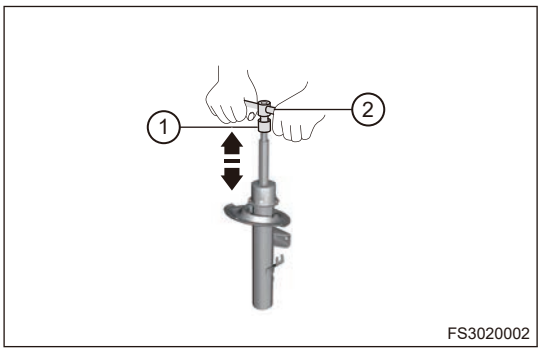
Torque: 70 ± 3 N · m

■ Inspection

(1) Check the front shock absorber assembly

Manual inspection

1) Install the locking nut (1) to the upper end of front shock absorber assembly strut, and then install the T-wrench (2) or equivalent.



2) Compress and extend the front shock absorber assembly strut several times by hands in direction of arrow as shown in illustration. Check that there is no abnormal resistance or unusual sound during operation. If there is any abnormality, replace the front shock absorber assembly with a new one.

(2) Check the other components of front shock absorber assembly

1) Check front shock absorber cover cap, front spring upper cushion, front dust boot, front buffer block and front spring lower cushion for cracks, wear or deformation. Replace it as necessary.

2) Check front strut upper connecting plate assembly (w/ insulator) and bearing assembly for damage. Replace it as necessary.

3) Check front coil spring for wear, cracks or deformation. Replace it as necessary.

(3) Check the front shock absorber spring.

1) Check front coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Align dowel pin of top end connecting plate with body positioning hole when installing front left shock absorber assembly.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install front left shock absorber assembly to a proper position on vehicle body.

(2) Install 3 coupling nuts between front left shock absorber assembly upper connecting plate and vehicle body.

Torque: 60 ± 6 N · m

(3) Install the front left shock absorber assembly to front left steering knuckle assembly.

(4) Install fixing bolt and nut between front left shock absorber assembly and front left steering knuckle assembly.

Torque: 120 ± 12 N · m

(5) Install front left wheel speed sensor wire harness to clip of front left shock absorber assembly.

(6) Install coupling nut between front left connecting rod assembly and front left shock absorber assembly.

Torque: 60 ± 6 N · m

(7) Install the front windshield lower trim panel left block cover.

(8) Install the engine hood rear weatherstrip.

(9) Install the front left wheel.

(10) Connect the negative battery cable.

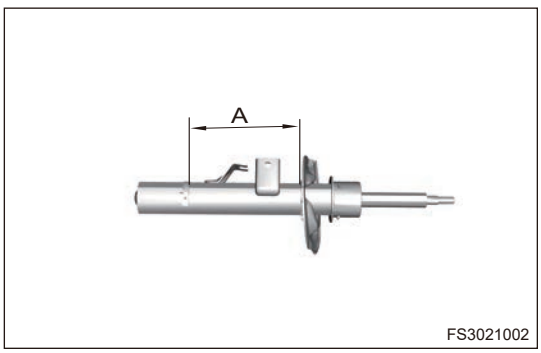
■ **Disposal**

⚠ Warning

- **Do not drill at high temperature and heat, and be sure to pay attention to safety!**
- **Shock absorber assembly contains nitrogen and oil, which are under high pressure. As hydraulic oil is explosive easily when exposed to heat, the surface is wet with water first before drilling or cutting.**
- **Be careful when drilling or cutting, because mental chips may fly about. Always perform operations with proper safety equipment to avoid personal injury.**
- **Before handling, be sure to wear goggles and release pressure inside shock absorber assembly to avoid personal injury.**

(1) Extend the front shock absorber assembly strut fully, and clamp it in a vise at an angle.

(2) Using a drill or equivalent, make a hole slowly at area A shown in the illustration, to discharge gas and hydraulic oil in the front shock absorber assembly.



(3) Handle front shock absorber assembly properly after discharging gas and hydraulic oil.

Hint:
Recycle disposed front shock absorber assembly according to local environmental regulations.

4.3 Front Control Arm Assembly

■ Removal

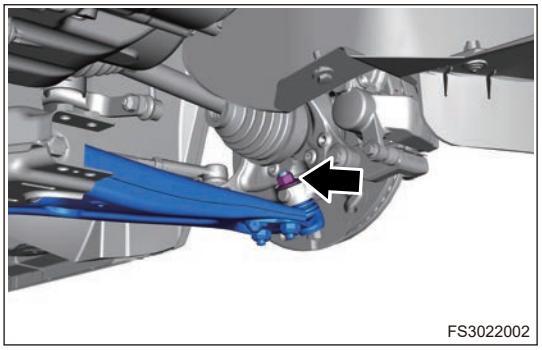
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

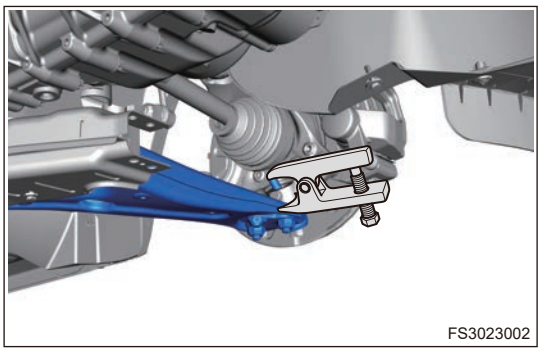
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

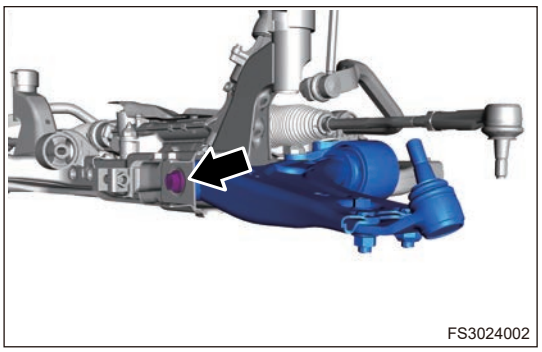
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left wheel.
(4) Remove the engine lower protector assembly.
(5) Remove the left and right side rail assemblies.
(6) Remove coupling nut between front left control arm ball pin and front left steering knuckle.


FS3022002

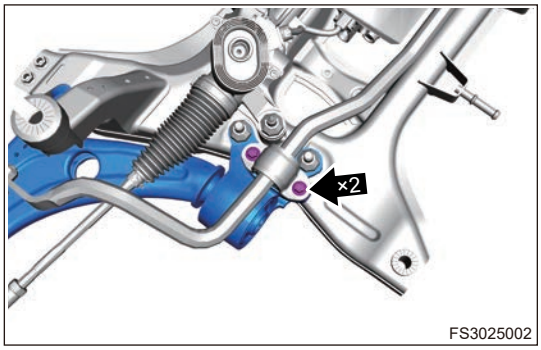
(7) Separate the connection between front left control arm ball pin and front left steering knuckle with a ball separator.


FS3023002

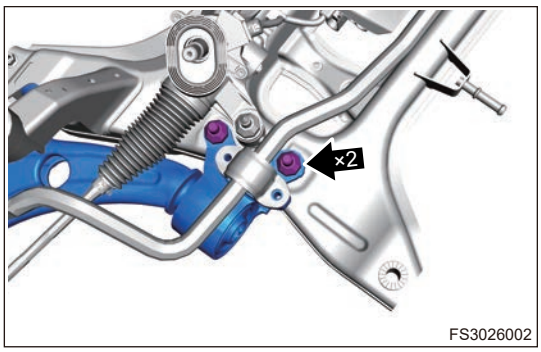
(8) Remove the front sub frame with front control arm assembly.
(9) Remove coupling bolt between front part of front left control arm assembly and front sub frame welding assembly.


FS3024002

(10) Remove 2 coupling bolts between front left stabilizer bar clamp and front left control arm rear bushing bracket.



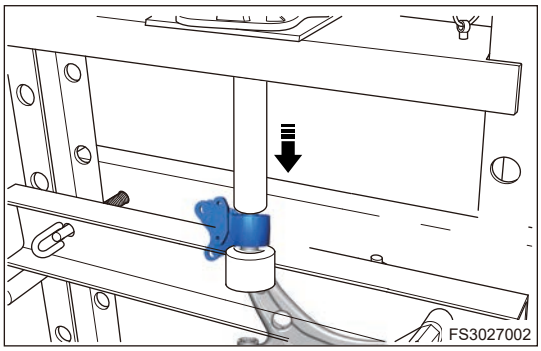
(11) Remove 2 coupling bolts and nuts between front left control arm rear bushing bracket and front sub frame welding assembly.



(12) Remove the front left control arm assembly.

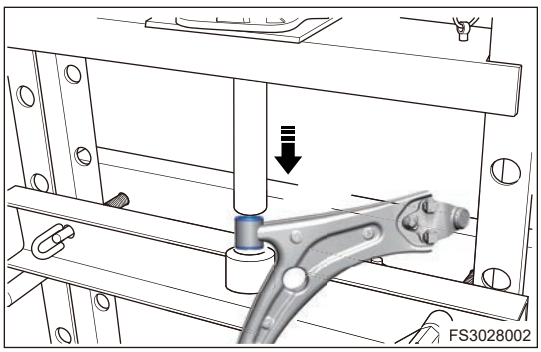
(13) Remove the front control arm rear rubber bushing assembly.

1) Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out and remove front control arm rear rubber bushing with bracket assembly with hydraulic press.



(14) Remove the front control arm front rubber bushing assembly.

1) Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out and remove front control arm front rubber bushing assembly with hydraulic press.



■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Make sure that ball pin assembly rotates smoothly without any sticking after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Place the front control arm assembly on a hydraulic press, and install front control arm front, rear rubber bushing assemblies with hydraulic press.

⚠ Caution

- **Before pressing in, apply grease on the outside of front control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.**

(2) Install 2 coupling bolts and nuts between front left control arm assembly rear bushing bracket and front sub frame welding assembly.

Torque: 150 ± 15 N · m

(3) Install coupling bolt between front part of front left control arm assembly and front sub frame welding assembly.

Torque: 200 ± 20 N · m

(4) Install 2 coupling bolts between front left stabilizer bar clamp and front left control arm rear bushing bracket.

Torque: 60 ± 6 N·m

(5) Install the front sub frame assembly.

(6) Install nut between front left control arm ball pin and front left steering knuckle.

Torque: 95 ± 10 N · m

(7) Install left and right side rail assemblies.

(8) Install the engine lower protector assembly.

(9) Install the front left wheel.

(10) Connect the negative battery cable.

4.4 Front Side Rail Assembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ **Removal**

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

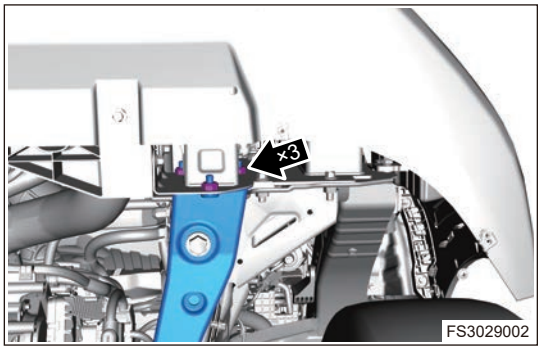
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

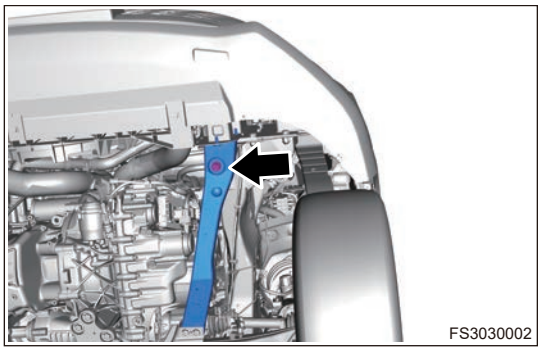
(3) Remove the engine lower protector assembly.

(4) Remove the front left wheel house protector assembly.

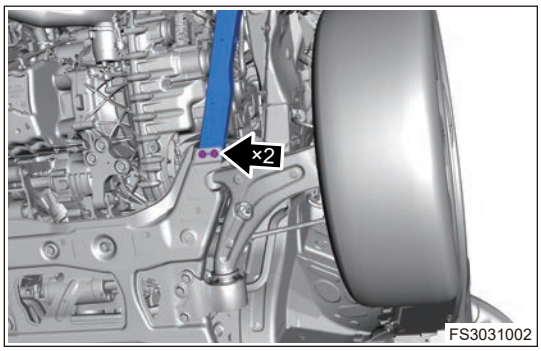
(5) Remove 3 fixing nuts (arrow) between front end of left side rail assembly and lower impact beam.



(6) Remove coupling bolt (arrow) between left side rail assembly and body.



(7) Remove 2 coupling bolts (arrow) between left side rail assembly and front sub frame assembly.



(8) Remove the left side rail assembly.

■ Installation

(1) Install 2 coupling bolts between left side rail assembly and front sub frame assembly.

Torque: 60 ± 6 N·m

(2) Install coupling bolt between left side rail assembly and body.

Torque: 220 ± 22 N · m

(3) Install 3 coupling nuts between front end of left side rail assembly and lower impact beam.

(4) Install the front left wheel house protector assembly.

(5) Install the engine lower protector assembly.

(6) Connect the negative battery cable.

4.5 Front Connecting Rod Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

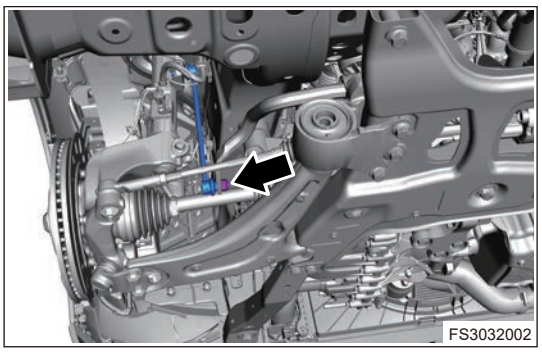
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

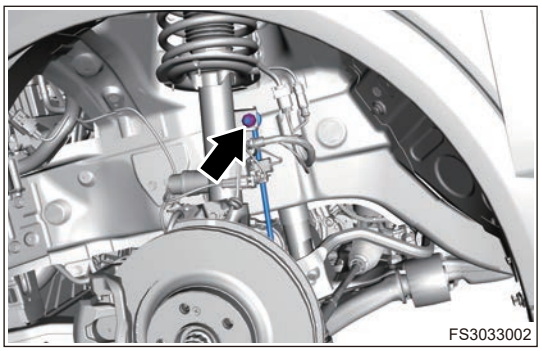
(2) Disconnect the negative battery cable.

(3) Remove the front left wheel.

(4) Remove coupling nut (arrow) between front left stabilizer bar assembly and lower part of front left connecting rod assembly.


FS3032002

(5) Remove coupling nut (arrow) between front left connecting rod assembly and front left shock absorber assembly, and remove front left connecting rod assembly.


FS3033002

■ Inspection

(1) Check front connecting rod assembly bush for wear, cracks, deformation, damage or grease leakage. Replace it as necessary.

(2) Check if end of front connecting rod assembly rotates smoothly. Replace it as necessary.

■ Installation

(1) Install coupling nut between front left connecting rod assembly and front left shock absorber assembly.

Torque: 60 ± 6 N · m

(2) Install coupling nut between front left stabilizer bar assembly and front left connecting rod assembly.

Torque: 60 ± 6 N · m

(3) Install the front left wheel.

(4) Connect the negative battery cable.

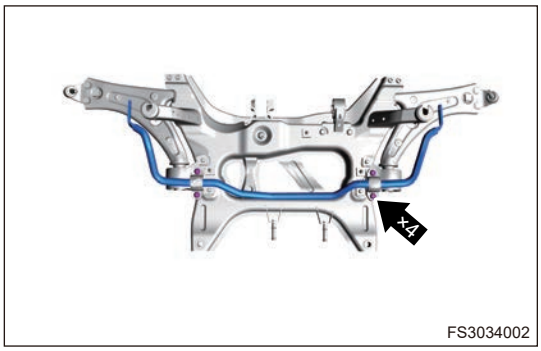
4.6 Front Stabilizer Bar Assembly

■ Removal

⚠ Warning

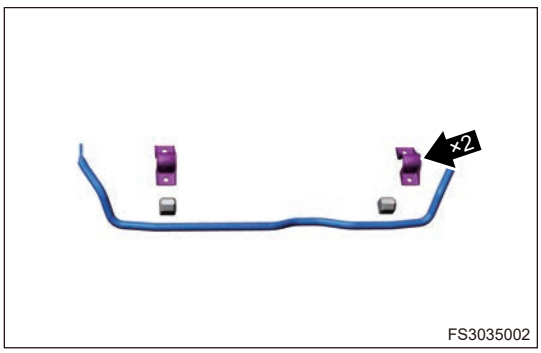
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front bumper assembly.
(4) Remove the front left wheel.
(5) Remove the front right wheel.
(6) Remove the engine lower protector assembly.
(7) Remove the left side rail assembly.
(8) Remove the right side rail assembly.
(9) Remove the front sub frame welding assembly.
(10) Remove 4 fixing bolts between front stabilizer bar and sub frame.



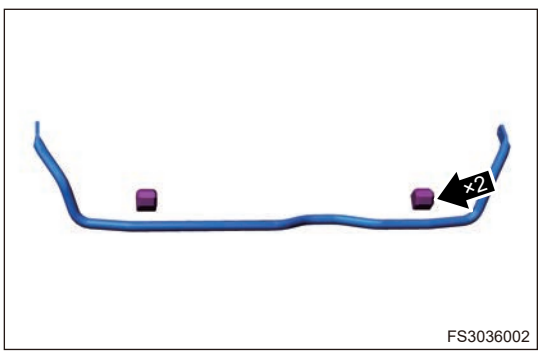
FS3034002

(11) Detach left and right fixing clamps from front stabilizer bar assembly.



FS3035002

(12) Detach left and right rubber supports from front stabilizer bar assembly.



FS3036002

■ **Inspection**

(1) Check front stabilizer bar assembly fixing clamps for wear, cracks, deformation or damage. Replace it as necessary.

(2) Check front stabilizer bar assembly rubber supports for dirt, wear, cracks, deformation or damage. Replace it as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install left and right rubber supports to front stabilizer bar assembly.

(2) Install 2 fixing clamps between front stabilizer bar assembly and front sub frame assembly.

(3) Install 4 fixing bolts between front stabilizer bar and sub frame.

Torque: 60 ± 6 N · m

(4) Install the front sub frame welding assembly.

(5) Install the right side rail assembly.

(6) Install the left side rail assembly.

(7) Install the engine lower protector assembly.

(8) Install the front wheels.

(9) Install the front bumper assembly.

(10) Connect the negative battery cable.

4.7 Front Steering Knuckle

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

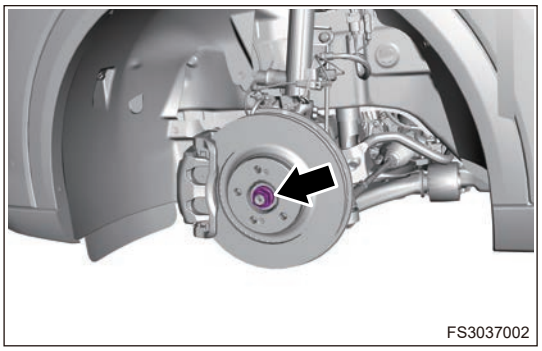
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front left wheel.

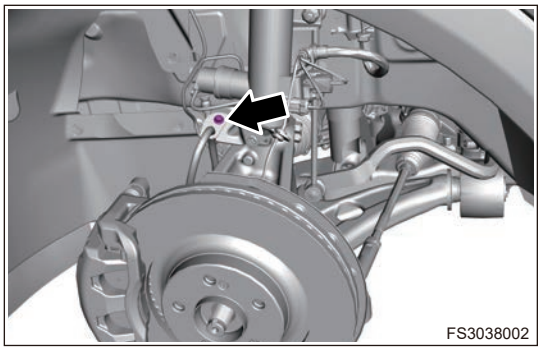
(4) Remove fixing nut from front left drive shaft.



⚠ Caution

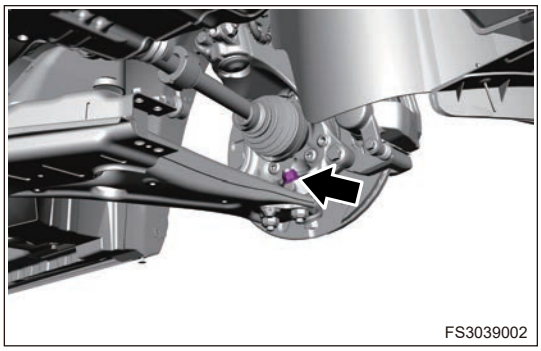
- **Loosen staked part of nut completely, otherwise it will damage threads of drive shaft assembly.**
- **The structure of drive shaft nut is a self-locking nut, and repeated use will reduce the locking performance. It needs to be replaced after each removal.**

(5) Remove fixing bolt between front left brake hose and hose bracket.

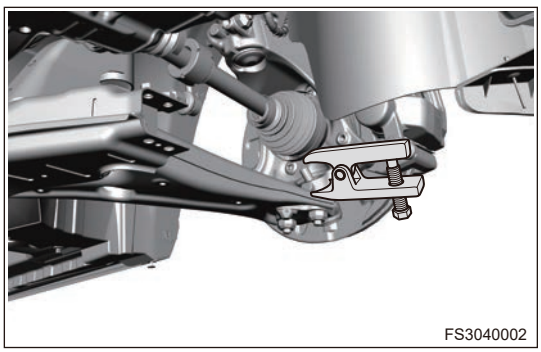


(6) Remove the front left brake caliper assembly.

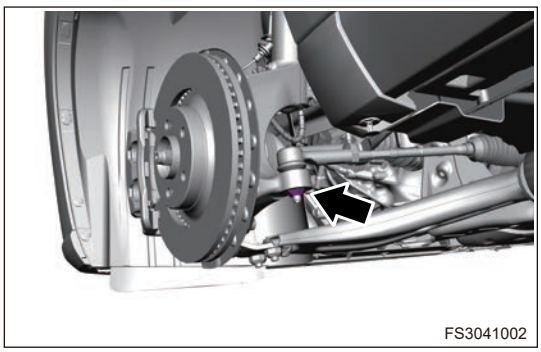
(7) Remove fixing nut between front left control arm assembly ball pin and front left steering knuckle assembly.



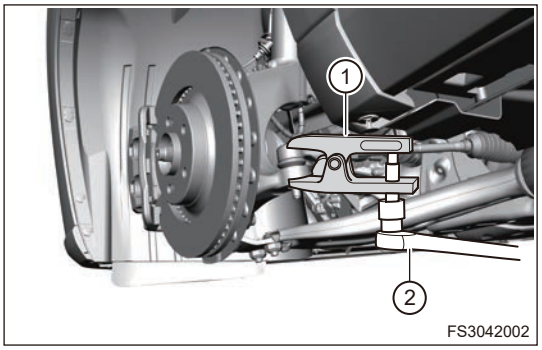
(8) Separate the connection between front left control arm assembly ball pin and front left steering knuckle assembly with a ball separator.



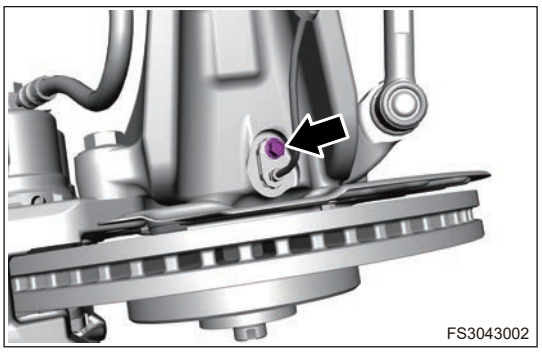
(9) Remove fixing nut between left steering tie rod outer ball assembly and front left steering knuckle assembly.



(10) Install ball pin separator (1), and tighten ball pin separator bolt with wrench (2) to separate steering tie rod ball pin from steering knuckle assembly.



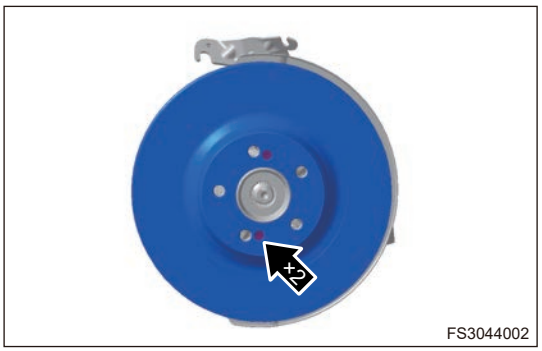
(11) Remove fixing bolt between front left wheel speed sensor and front left steering knuckle assembly, and disengage front left wheel speed sensor carefully.



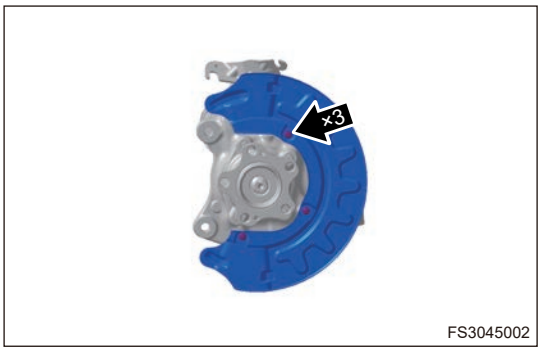
⚠ Caution

- **Keep head and installation hole of sensor free of foreign matter.**

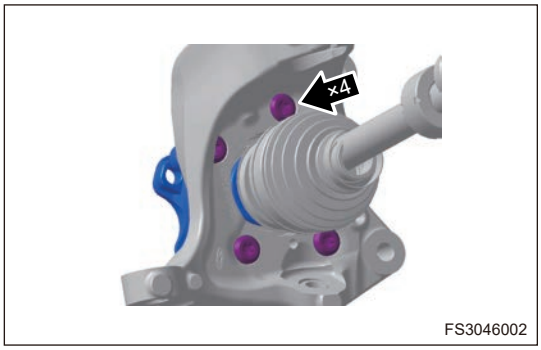
(12) Remove 2 fixing screw and front left brake disc.



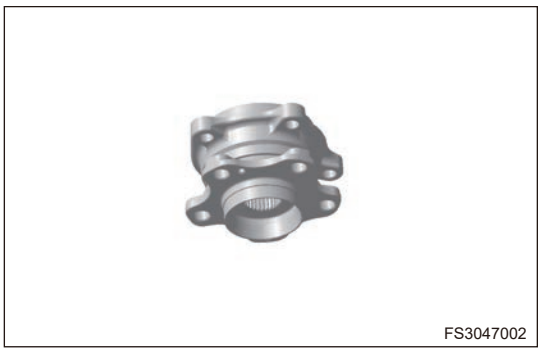
(13) Remove 3 fixing bolts between front left dust guard and front left steering knuckle assembly, and remove front left dust guard.



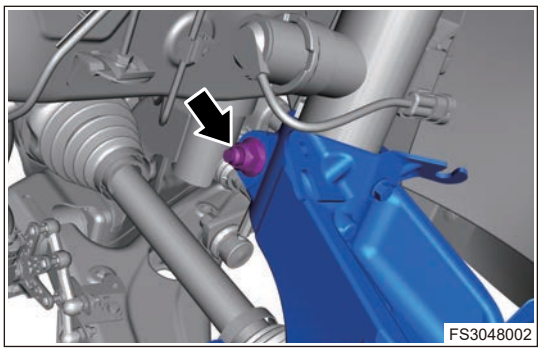
(14) Remove 4 fixing bolts between front hub bearing and steering knuckle.



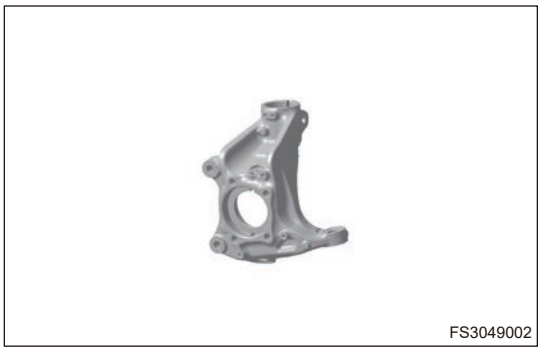
(15) Remove the front hub bearing.



(16) Remove coupling bolt and nut between front left shock absorber assembly and front left steering knuckle assembly.



(17) Disengage the left drive shaft and remove the front left steering knuckle assembly.



■ Inspection

(1) Check front steering knuckle for wear, cracks, deformation or damage. Replace as necessary.

(2) Check dust guard for dirt, wear, cracks, deformation or damage. Replace as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check that hub assembly rotates smoothly without any sticking after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install the front steering knuckle.
(2) Install fixing bolt and nut between front steering knuckle and front left shock absorber assembly.
Torque: 120 ± 12 N · m

(3) Install fixing nut between front left control arm assembly ball pin and front left steering knuckle assembly.
Torque: 95 ± 10 N · m

(4) Install fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.
Torque: 60 ± 6 N · m

(5) Install front hub bearing, tighten 4 fixing bolts between front hub bearing and steering knuckle.
Torque: 110 ± 10 N · m

(6) Install 3 fixing bolts between front left dust guard and front left steering knuckle assembly.
Torque: 10 ± 1 N·m

(7) Install front left brake disc, and install 2 fixing screw.
Torque: 8 ± 1 N·m

(8) Install fixing bolt between front left wheel speed sensor and front left steering knuckle assembly.
Torque: 9 ± 1.5 N · m

(9) Install the front left brake caliper assembly.
(10) Install fixing bolt between front left brake hose and hose bracket.
Torque: 9 ± 1.5 N · m

(11) Install fixing nut to front left drive shaft.
Torque: 270 ± 20 N · m

(12) Install the front left wheel.
(13) Connect the negative battery cable.

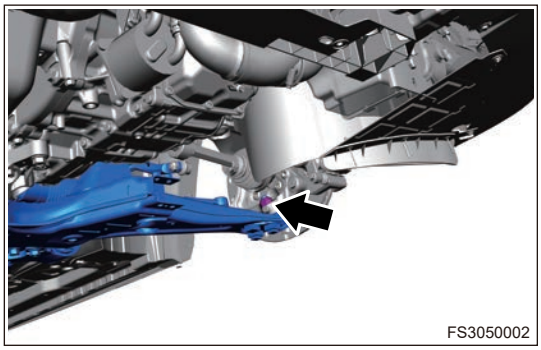
4.8 Front Sub Frame Assembly

■ **Removal**

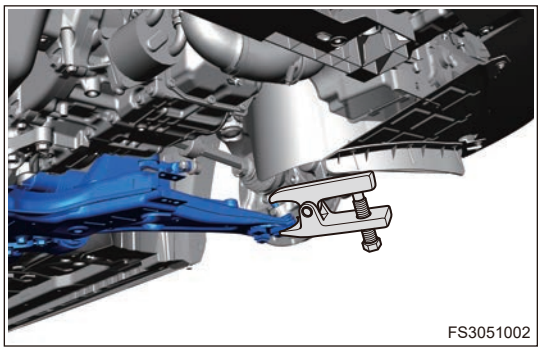
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**
- **When removing front sub frame assembly, it is necessary to securely support engine and transmission assembly with engine equalizer to avoid damage.**

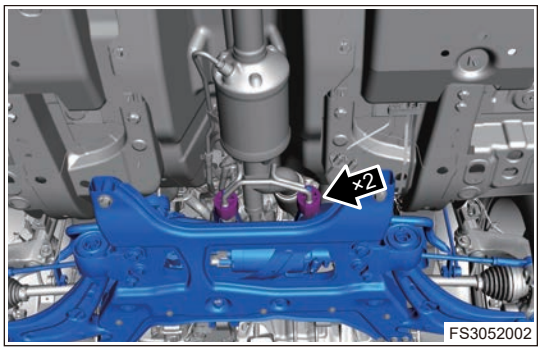
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front wheel.
(4) Remove the engine lower protector assembly.
(5) Remove the left side rail assembly.
(6) Remove the right side rail assembly.
(7) Using an engine equalizer, support engine and transmission assembly securely.
(8) Remove the coupling nut between left control arm ball and steering knuckle (Use same procedures for right side).


FS3050002

(9) Separate steering knuckle and control arm ball with a ball separator (Use same procedures for right side).

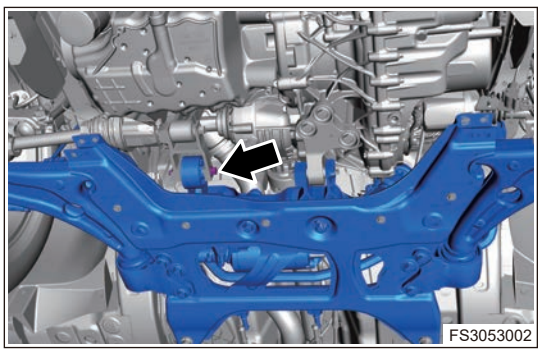

FS3051002

(10) Detach the precatalytic converter hanger block.

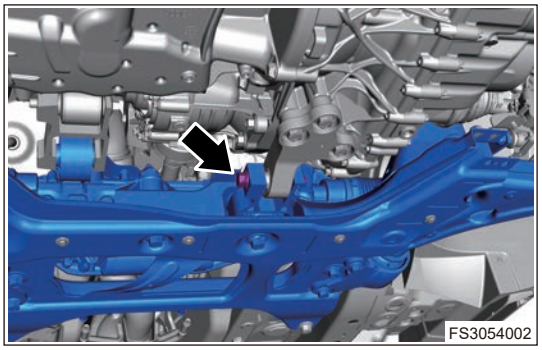


FS3052002

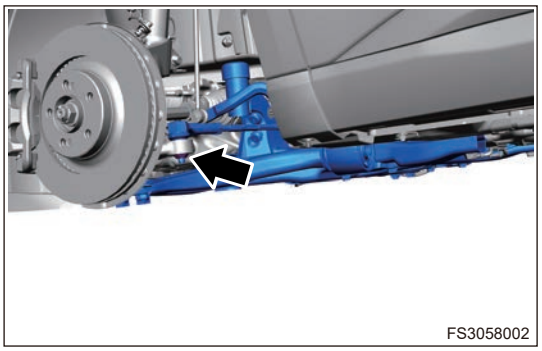
(11) Remove the coupling bolt between rear right mounting cushion and rear mounting connecting rod.


FS3053002

(12) Remove the coupling bolt between lower rear mounting cushion and upper rear mounting cushion.



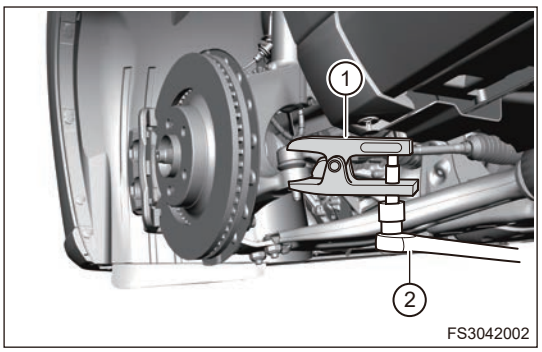
(13) Remove fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.



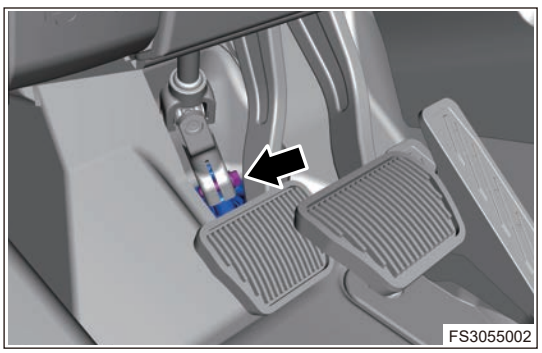
(14) Install ball pin separator (1), and tighten ball pin separator bolt with wrench (2) to separate steering tie rod outer ball pin from steering knuckle assembly. The removal method of right tie rod outer ball pin is the same as that of left side.

Hint:

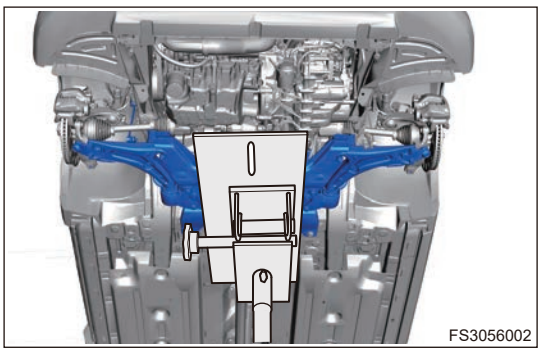
If it is difficult to remove tie rod outer ball pin end from steering knuckle, detach ball pin by striking the end of steering knuckle uniformly and slightly with a hammer or equivalent.



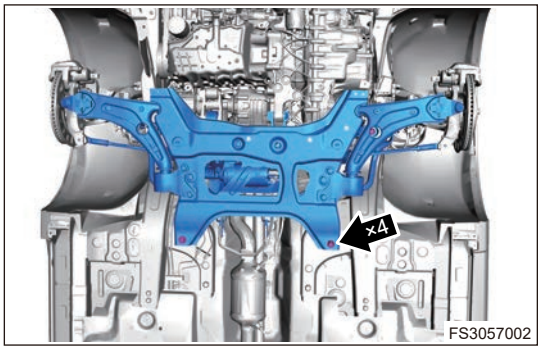
(15) Remove coupling bolt between steering column assembly and steering gear, separate steering column from steering gear.



(16) Using a transmission carrier, support the sub frame assembly.



(17) Remove 4 fixing bolts between front sub frame and body.



(18) Slowly lower the sub frame assembly with stabilizer bar.
(19) Remove the steering gear assembly.
(20) Remove the stabilizer bar assembly.
(21) Remove the left and right control arms.
(22) Remove the lower rear mounting cushion assembly.
(23) Remove the rear right mounting cushion.
(24) Remove the front sub frame assembly.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install left and right control arms.
(2) Install stabilizer bar assembly to front sub frame.
(3) Install steering gear assembly to front sub frame.
(4) Install the lower rear mounting assembly.
(5) Install the rear right mounting cushion.
(6) Install sub frame welding assembly with stabilizer bar to transmission carrier, and raise it to a proper position.
(7) Install 2 fixing bolts between right side of front sub frame and vehicle body.

Torque: 220 ± 22 N · m

(8) Install 2 fixing bolts between left side of front sub frame and vehicle body.

Torque: 220 ± 22 N · m

(9) Install coupling nuts between front left and front right control arm balls and steering knuckle.

Torque: 95 ± 10 N · m

(10) Install coupling bolt between steering column assembly and steering gear.

Torque: 55 ± 5 N · m

(11) Install fixing nuts between left and right steering tie rod outer ball assemblies and front steering knuckle assembly.

Torque: 60 ± 6 N · m

(12) Install the coupling bolt between rear right mounting cushion and rear mounting connecting rod.

Torque: 110 ± 11 N · m

(13) Install the coupling bolt between lower rear mounting cushion and upper rear mounting cushion.

Torque: 150 ± 15 N · m

(14) Install the precatalytic converter hanger block.
(15) Install the left side rail assembly.
(16) Install the right side rail assembly.
(17) Install the front height sensor.
(18) Install the engine lower protector assembly.
(19) Install the front wheel.
(20) Connect the negative battery cable.

5.3 FRONT SUSPENSION (SHOCK ABSORBER WITH CONTINUOUSLY ADJUSTABLE DAMPER)

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Be sure to wear necessary safety equipment to prevent accidents.

(2) Check if safety lock of lifter is locked when repairing chassis parts.

(3) It is not allowed to weld or modify suspension loading parts and guide parts.

(4) When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.

(5) Operate carefully when removing and installing coil spring, to prevent spring from jumping out and causing personal injury.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Be sure to tighten coupling bolts and nuts to specified torques.

(2) Make sure that ball pin assembly rotates smoothly without any sticking after installation.

(3) Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.

(4) Before pressing in, apply grease on the outside of front control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.

(5) Align dowel pin of top end connecting plate with body positioning hole when installing front left shock absorber assembly.

(6) Please note that opening of retainer must face opening of front wheel speed sensor, when installing front hub bearing retainer.

(7) When removing front sub frame welding assembly, it is necessary to securely support engine and transmission assembly with engine equalizer to avoid damage.

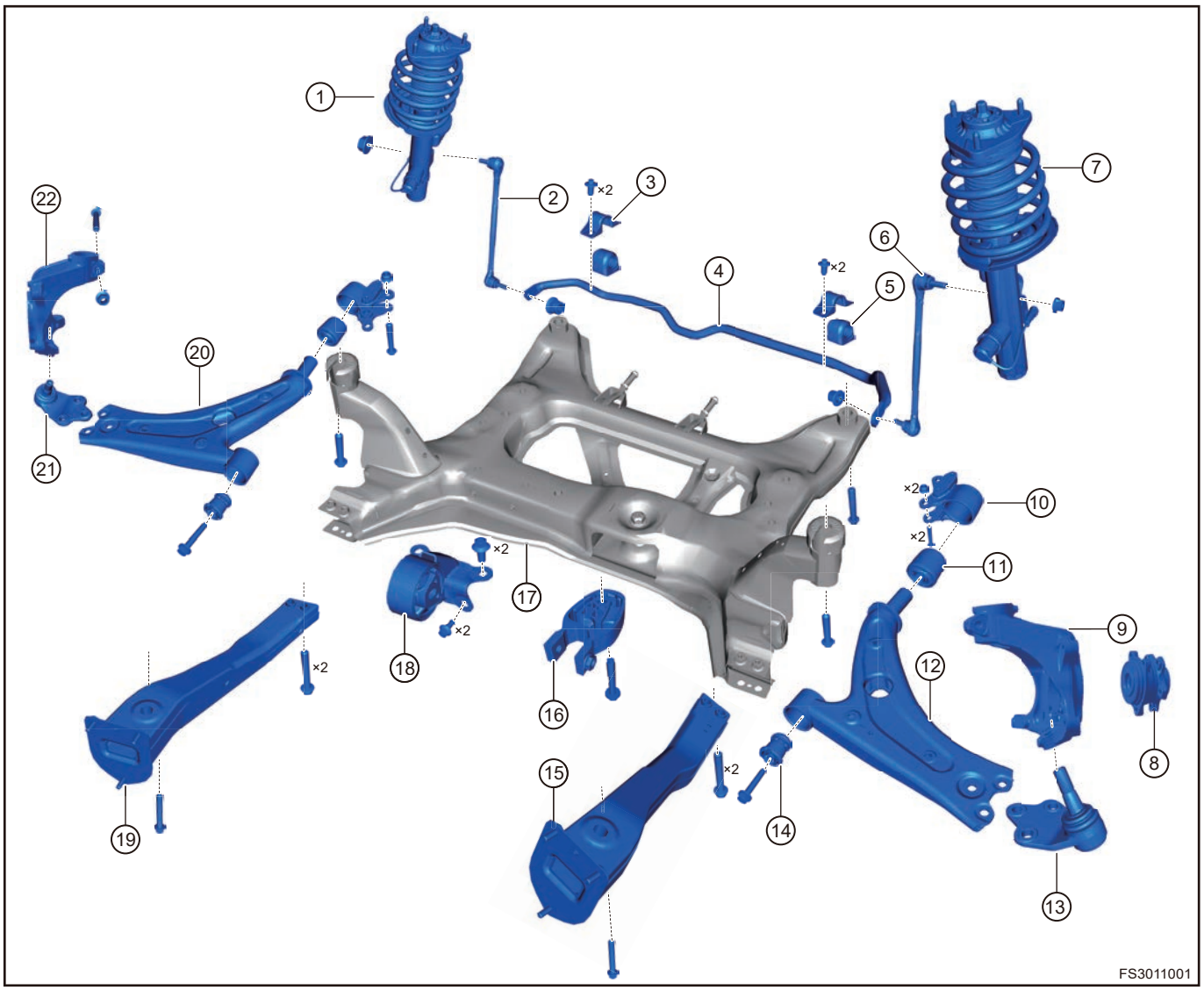
(8) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

Front suspension of this model uses Macpherson independent suspension (toe-in is adjustable and height is non-adjustable), which is equipped with lateral stabilizer, cylindrical coil spring, double action telescopic shock absorber. The equipped electronic shock absorber can automatically adjust the damping force according to the operating conditions of vehicle, making it easier to meet both the vehicle's requirements for handling and smoothness. The upper end of shock absorber is connected to vehicle body, and lower end is connected to steering knuckle. One end of control arm assembly is connected to the sub frame, and the other end is connected to the steering knuckle.

2.2 System Components Diagram

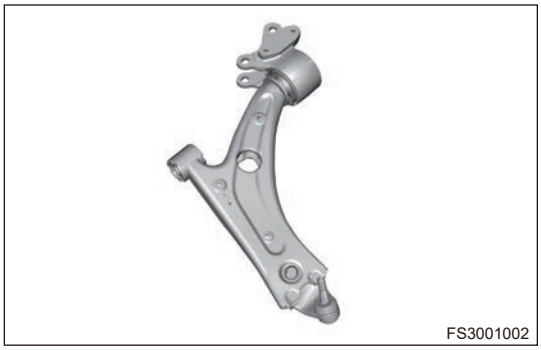


1	Front Right Strut Assembly	12	Front Left Control Arm Welding Assembly
2	Front Connecting Rod Assembly	13	Control Arm Ball Pin
3	Front Stabilizer Bar Clamp	14	Control Arm Front Bushing Assembly
4	Front Stabilizer Bar	15	Left Side Rail Assembly
5	Front Stabilizer Bar Bushing	16	Rear Lower Mounting Cushion Assembly
6	Front Connecting Rod Assembly	17	Front Sub Frame Assembly
7	Front Left Strut Assembly	18	Rear Right Mounting Cushion Assembly
8	Front Hub Bearing	19	Right Side Rail Assembly
9	Front Left Steering Knuckle Control Arm Ball Pin	20	Front Right Control Arm Welding Assembly
10	Front Left Control Arm Rear Bushing Bracket	21	Control Arm Ball Pin
11	Control Arm Rear Bushing Assembly	22	Front Right Steering Knuckle

2.3 Component Operation Description

■ Front control arm assembly

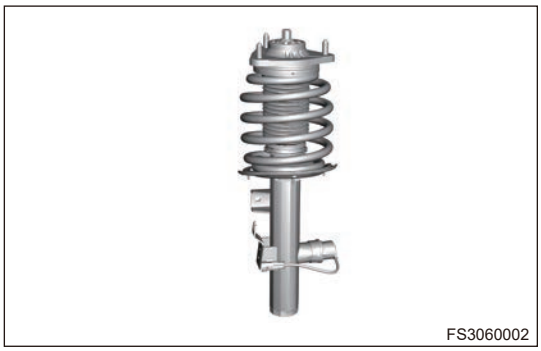
As a guide and power transmission element for suspension system of vehicle, control arm transmits various power acting on wheels to vehicle body and keeps wheels moving in a certain trail. Control arm elastically connects wheels and vehicle body together with ball joint or bushing.


FS3001002

■ Front Strut Assembly

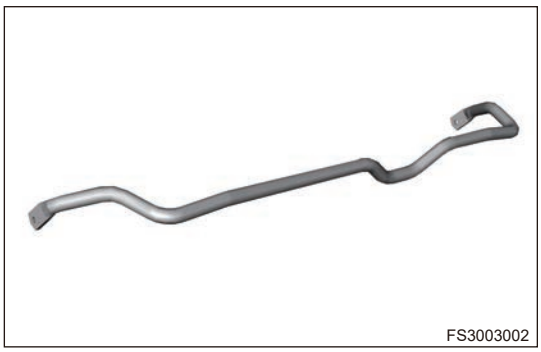
It filters and eliminates vibration from roads to improve driving stability and bring people a sense of comfort and stability.

The vehicle is evaluated based on CAN signals and wheel/ body acceleration signals, controlling the body posture, driving performance, non spring vibration, limit position, and damping offset. The ECU outputs a 4-wheel electric shock absorber current input. According to the current input by ECU, the solenoid valve adjusts the cross-sectional area of shock absorber oil channel to output the required damping force.


FS3060002

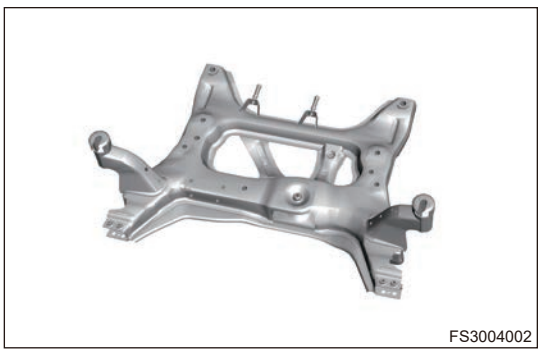
■ Front Stabilizer Bar

Lateral stabilizer bar functions to prevent excessive lateral incline while vehicle is turning and keeps vehicle body in balance as much as possible. It aims to reduce lateral incline level of vehicle and improve smoothness. When vehicle is turning, vehicle body inclines and suspension on both sides have inconsistent bounce. The outer suspension will press against stabilizer bar to twist it, then elastic force from bar body will prevent wheel from lifting, so that vehicle body can be kept in balance as much as possible, thus realizing the lateral stability function.


FS3003002

■ Front Sub Frame Assembly

Sub frame can reduce impact on vehicle body due to road shock and enhance connection rigid of suspension system and improve driving comfort and stability, making a strong and compact chassis during driving. It bears the deformation conditions such as loaded bend, longitudinal torsion, lateral bend and horizontal lozenging, etc. in place of vehicle body, which improves torsion resistance ability of vehicle body. Also, the force will be directly applied on it in a collision to improve vehicle safety performance.


FS3004002

3 Diagnosis & Testing

3.1 Problem Symptoms Table

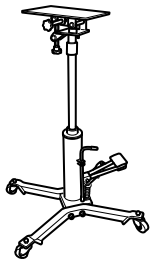
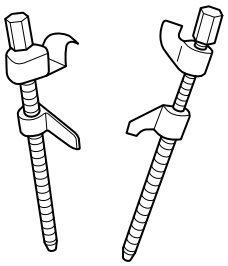
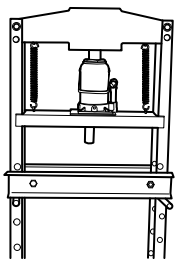
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Running deviation	Tire (worn or improperly inflated)
	Front wheel alignment (incorrect)
	Control arm ball pin assembly (loose)
	Steering tie rod (loose or worn)
	Front hub bearing (excessively worn)
	Steering gear (misaligned or damaged)
	Suspension component (worn)
Droop	Vehicle (overloaded)
	Front coil spring (too soft)
	Front shock absorber assembly (worn or damaged)
	Front suspension components (excessively worn or deformed)
	Front tire (improperly inflated)
	Front wheel alignment (incorrect)
Sways/pitches	Front tire (worn or improperly inflated)
	Front stabilizer bar assembly (bent or broken)
	Front shock absorber assembly (worn or damaged)
Wheel shimmy	Front tire (worn or improperly inflated)
	Front wheel (out of balance)
	Front shock absorber assembly (worn or damaged)
	Front wheel alignment (incorrect)
	Control arm ball pin assembly (loose)
	Front hub bearing (excessively worn)
	Steering gear (misaligned or damaged)
Abnormal tire wear	Front tire (improperly inflated)
	Front wheel alignment (incorrect)
	Front shock absorber assembly (worn or deformed)
	Front suspension components (worn or deformed)

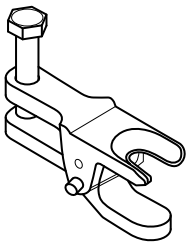
4 On-vehicle Service

4.1 Tools

■ General Tools

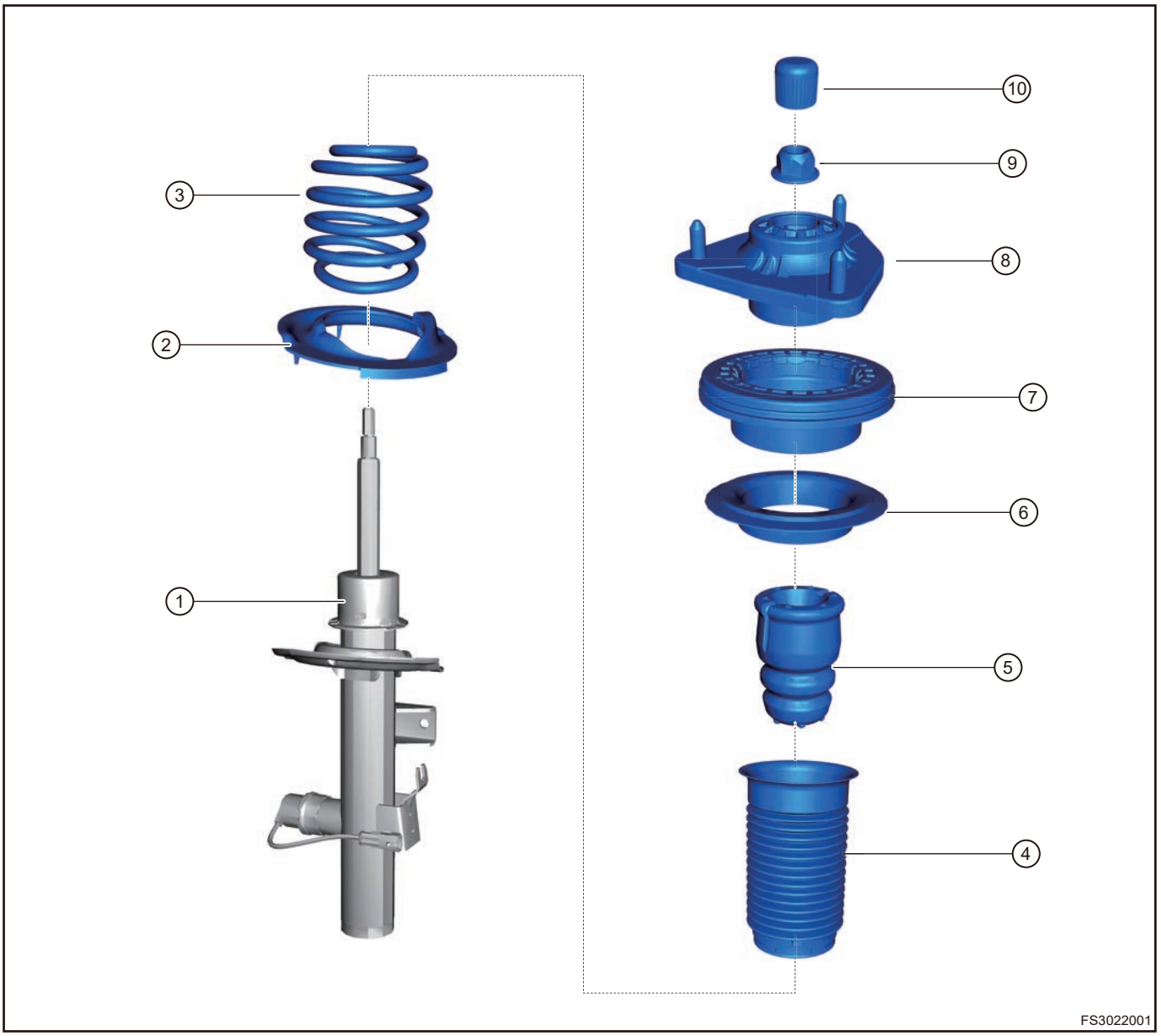
Tool Name	Tool Drawing
Transmission Carrier	 S00004
Spring Compressor	 S00016
Hydraulic Press	 S00010

■ Special Tools

Tool Name	Part No.	Tool Drawing
Front Shock Absorber Nut Remover	ECH-0001	 S00160
Ball Separator	ECH-0002	 S00019

4.2 Front Strut Assembly

■ Description



1	Front Left Shock Absorber Assembly	6	Front Spring Upper Cushion
2	Lower Spring Cushion	7	Bearing Assembly
3	Front Coil Spring	8	Upper Connecting Plate Assembly
4	Front Dust Boot	9	Hexagon Flange Locking Nut
5	Front Buffer Block	10	Front Shock Absorber Cover Cap

■ On-vehicle Inspection

Check the front shock absorber assembly

(1) Park vehicle on level ground, and bounce vehicle up and down, then check if vehicle shakes up and down when body bounds. If vehicle shakes up and down consecutively, shock absorber assembly may be damaged and should be replaced.

Check front shock absorber assembly for leakage

(1) As shock absorber assembly operates frequently during vehicle driving, oil gas is formed due to temperature rise of shock absorber, which then adheres to dust boot. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.

(2) When any of the following conditions occurs:

- Oil traces in circumferential direction are uneven;
- Oil traces reach lower connecting positions.

Above conditions indicate that there may be leakage in shock absorber assembly, and it is necessary to replace the shock absorber assembly.

(3) If it is difficult to accurately judge shock absorber assembly for leakage from appearance. Perform road test after wiping off oil on the surface of malfunctioning shock absorber. Under normal road conditions, drive vehicle for 5 to 10 minutes and perform inspection. If there are oil traces at the shock absorber assembly surface, it indicates that oil leakage exists, and it is necessary to replace the shock absorber assembly.

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

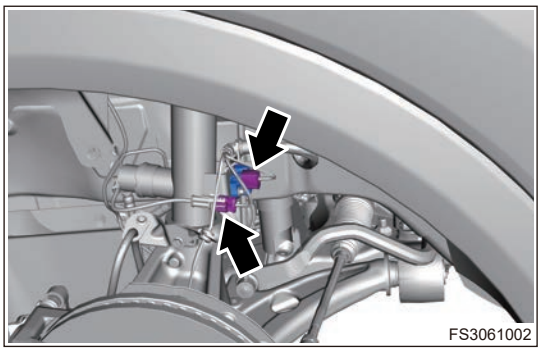
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.**
- **Operate carefully when removing and installing coil spring, to prevent spring from jumping out and causing personal injury.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

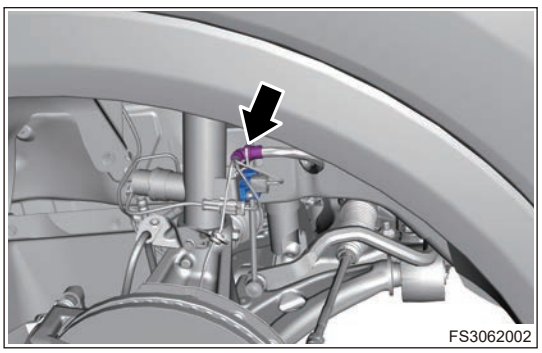
(2) Disconnect the negative battery cable.

(3) Remove the front left wheel.

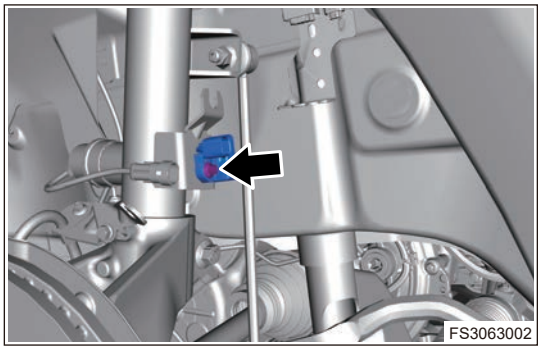
(4) Disconnect connector (arrow) between front left wheel sensor wire harness and wheel sensor, disconnect connector (arrow) between front left wheel sensor wire harness and shock absorber.



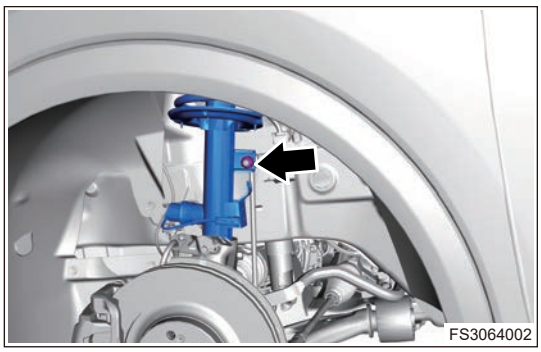
(5) Separate the connection (arrow) between front left wheel sensor wire harness and shock absorber.



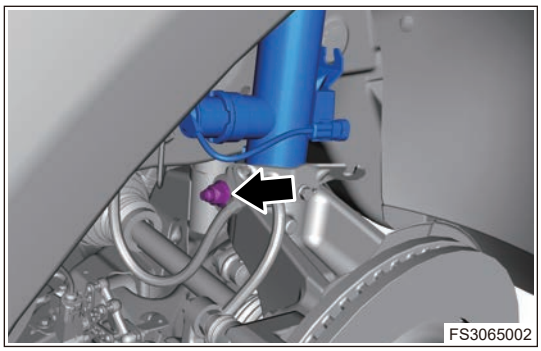
(6) Remove fixing bolt (arrow) and front left wheel sensor.



(7) Remove coupling nut (arrow) between front left connecting rod assembly and front left shock absorber assembly.



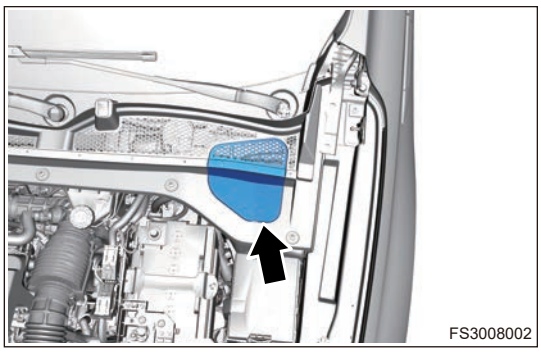
(8) Remove fixing bolt and nut (arrow) between front left shock absorber assembly and front left steering knuckle assembly.



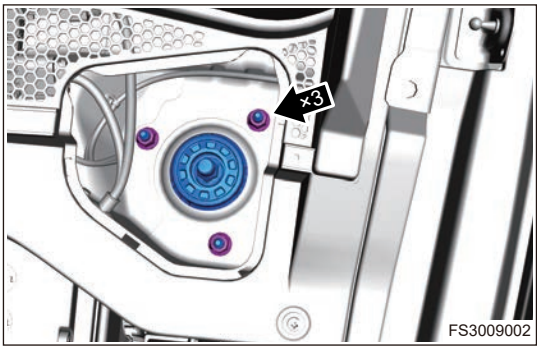
(9) Separate the connection between front left shock knock assembly and front left steering knuckle assembly.

(10) Remove the engine hood rear weatherstrip.

(11) Remove the front windshield lower support left cover plate (arrow).



(12) Remove 3 fixing nuts (arrow) between front left shock absorber assembly upper connecting plate and vehicle body.



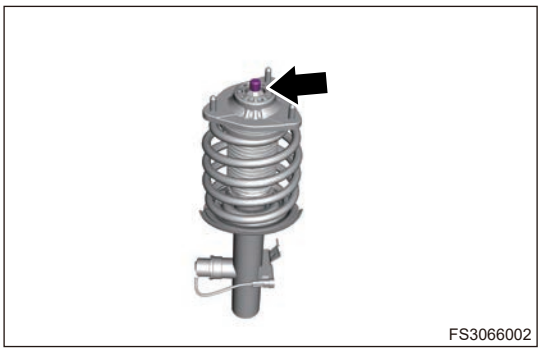
(13) Remove the front left shock absorber assembly with front coil spring.

■ Disassembly

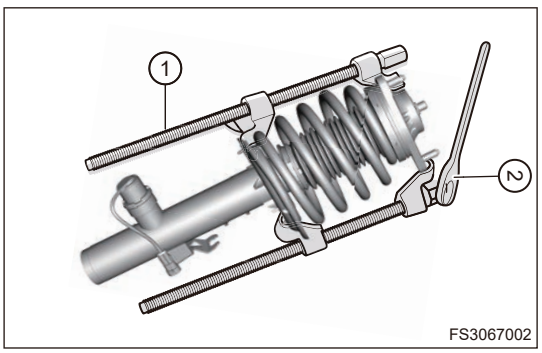
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Remove the front left shock absorber cover cap (arrow).



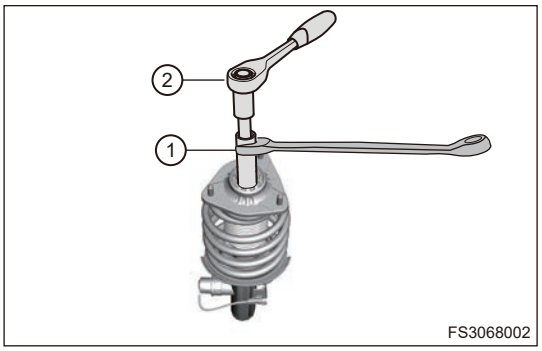
(2) Using spring compressor (1) and wrench (2), tighten the end lever of spring compressor to compress the front coil spring.



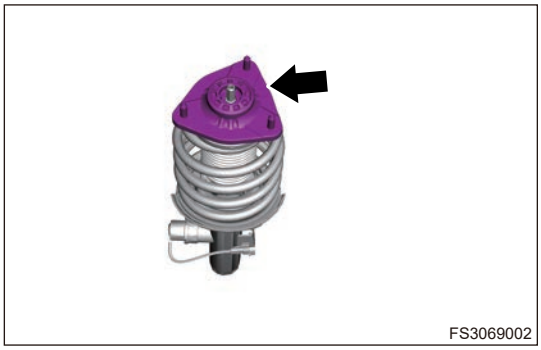
⚠ Warning

- **When removing front coil spring, compress spring until locking nut can be rotated. DO NOT compress spring more than necessary, avoid damaging spring and personal injury.**

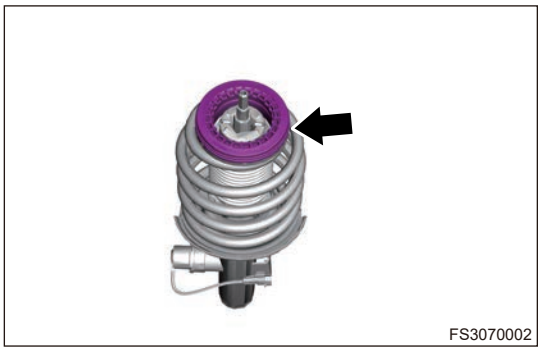
(3) Hold the end of front left shock absorber assembly lever with shock absorber nut remover (1), and then remove locking nut from front left shock absorber assembly with wrench (2).



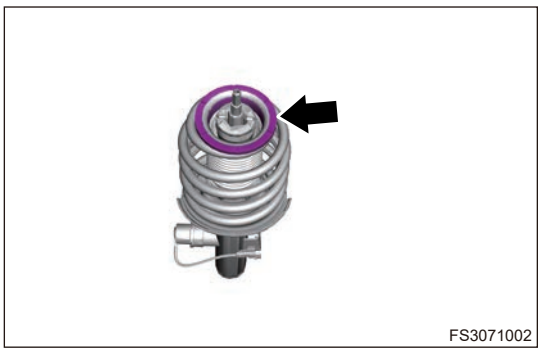
(4) Remove front shock absorber upper connecting plate assembly from front left shock absorber assembly.


FS3069002

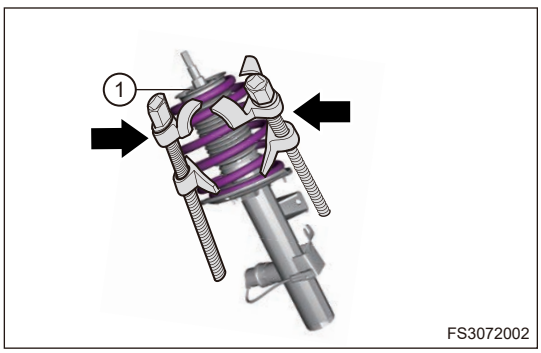
(5) Remove bearing assembly from front left shock absorber assembly.


FS3070002

(6) Remove spring upper cushion from upper part of front left shock absorber assembly.

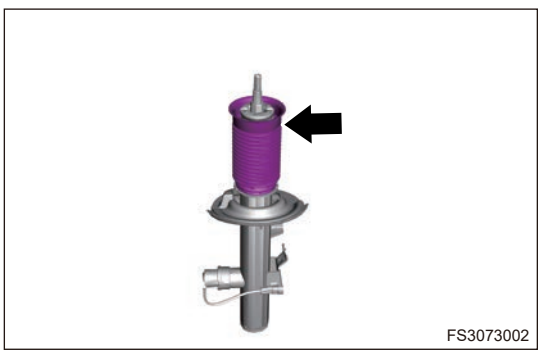

FS3071002

(7) Remove front coil spring (1) with spring compressor from front left shock absorber assembly.

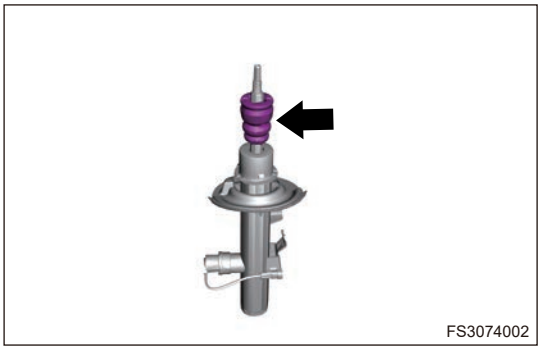


FS3072002

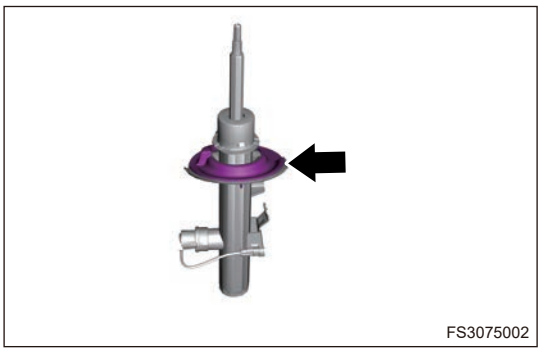
(8) Remove front dust boot from upper part of front left shock absorber assembly.


FS3073002

(9) Detach front buffer block from front left shock absorber assembly, and remove it.


FS3074002

(10) Remove spring lower cushion from lower end of front left shock absorber assembly strut.


FS3075002

■ Assembly

⚠ Caution

- **Be sure to tighten bolts to specified torque.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**
- **Please note that opening of retainer must face opening of front wheel speed sensor, when installing front hub bearing retainer.**

(1) Install the spring lower cushion.
(2) Install the front buffer block.
(3) Install the front dust boot.
(4) Install the front coil spring.
(5) Using spring compressor (1) and wrench (2), tighten the end lever of spring compressor to compress the front coil spring.
(6) Install the spring upper cushion.
(7) Install the bearing assembly.
(8) Install the front strut upper connecting plate assembly (w/ insulator).
(9) Hold the end of front left shock absorber assembly lever with shock absorber nut remover (1), and then tighten locking nut of front left shock absorber assembly with wrench (2).

Torque: 70 ± 3 N · m

■ Inspection

(1) Check the components of front shock absorber assembly
  1) Check front shock absorber cover cap, front spring upper cushion, front dust boot, front buffer block and front spring lower cushion for cracks, wear or deformation. Replace it as necessary.
  2) Check front strut upper connecting plate assembly (w/ insulator) and bearing assembly for damage. Replace it as necessary.
  3) Check front coil spring for wear, cracks or deformation. Replace it as necessary.
(2) Check the front shock absorber spring.

1) Check front coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Align dowel pin of top end connecting plate with body positioning hole when installing front left shock absorber assembly.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install front left shock absorber assembly to a proper position on vehicle body.

(2) Install 3 fixing nuts between front left shock absorber assembly upper connecting plate and vehicle body.

Torque: 60 ± 6 N · m

(3) Install the front left shock absorber assembly to front left steering knuckle assembly.

(4) Install fixing bolt and nut between front left shock absorber assembly and front left steering knuckle assembly.

Torque: 120 ± 12 N · m

(5) Install the front left wheel sensor.

Torque: 9 ± 1.5 N·m

(6) Install front left wheel speed sensor wire harness to clip of front left shock absorber assembly.

(7) Connect connector between front left wheel sensor wire harness and wheel sensor, connect connector between front left wheel sensor wire harness and shock absorber.

(8) Install coupling nut between front left connecting rod assembly and front left shock absorber assembly.

Torque: 60 ± 6 N · m

(9) Install the front windshield lower trim panel left block cover.

(10) Install the engine hood rear weatherstrip.

(11) Install the front left wheel.

(12) Connect the negative battery cable.

4.3 Front Control Arm Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

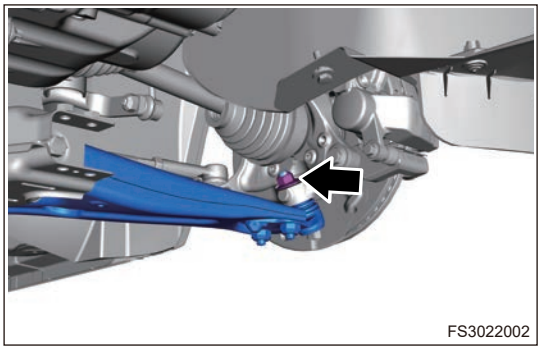
(2) Disconnect the negative battery cable.

(3) Remove the front left wheel.

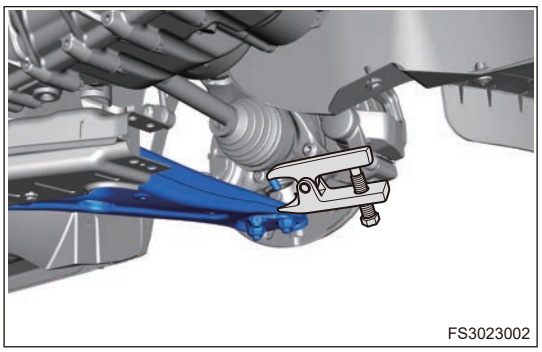
(4) Remove the engine lower protector assembly.

(5) Remove the left and right side rail assemblies.

(6) Remove coupling nut between front left control arm ball pin and front left steering knuckle.

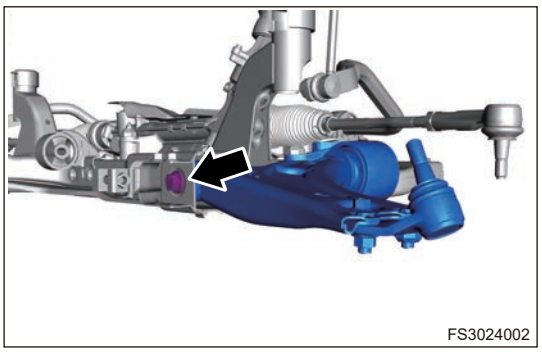


(7) Separate the connection between front left control arm ball pin and front left steering knuckle with a ball separator.

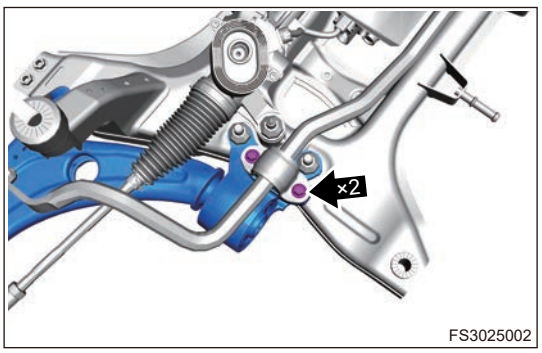


(8) Remove the front sub frame with front control arm assembly.

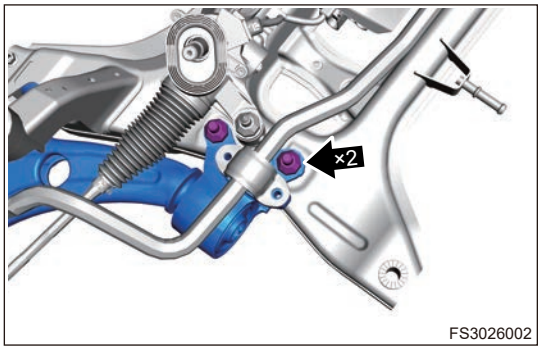
(9) Remove coupling bolt between front part of front left control arm assembly and front sub frame welding assembly.



(10) Remove 2 coupling bolts between front left stabilizer bar clamp and front left control arm rear bushing bracket.



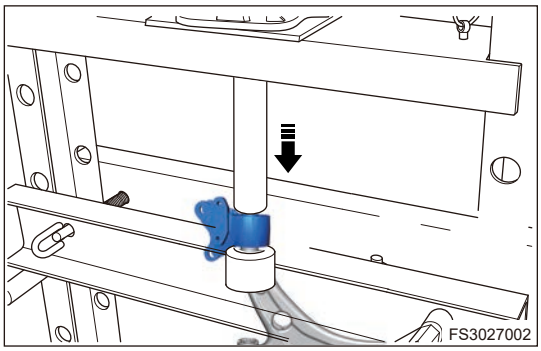
(11) Remove 2 coupling bolts and nuts between front left control arm rear bushing bracket and front sub frame welding assembly.



(12) Remove the front left control arm assembly.

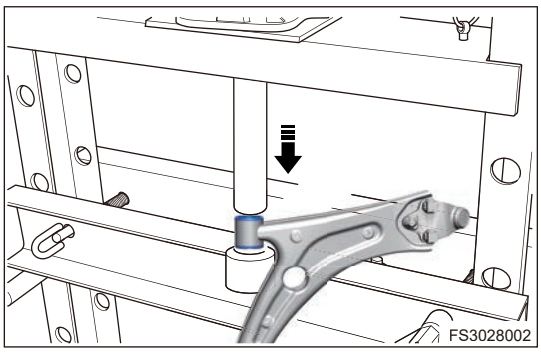
(13) Remove the front control arm rear rubber bushing assembly.

1) Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out and remove front control arm rear rubber bushing with bracket assembly with hydraulic press.



(14) Remove the front control arm front rubber bushing assembly.

1) Place the front control arm assembly on a hydraulic press, install front control arm remover and adapter, and press out and remove front control arm front rubber bushing assembly with hydraulic press.



■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Make sure that ball pin assembly rotates smoothly without any sticking after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Place the front control arm assembly on a hydraulic press, and install front control arm front, rear rubber bushing assemblies with hydraulic press.

⚠ Caution

- **Before pressing in, apply grease on the outside of front control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.**

(2) Install 2 coupling bolts and nuts between front left control arm assembly rear bushing bracket and front sub frame welding assembly.

Torque: 150 ± 15 N · m

(3) Install coupling bolt between front part of front left control arm assembly and front sub frame welding assembly.

Torque: 220 ± 22 N · m

(4) Install 2 coupling bolts between front left stabilizer bar clamp and front left control arm rear bushing bracket.

Torque: 60 ± 6 N·m

(5) Install the front sub frame assembly.

(6) Install nut between front left control arm ball pin and front left steering knuckle.

Torque: 95 ± 10 N · m

(7) Install left and right side rail assemblies.

(8) Install the engine lower protector assembly.

(9) Install the front left wheel.

(10) Connect the negative battery cable.

4.4 Front Side Rail Assembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

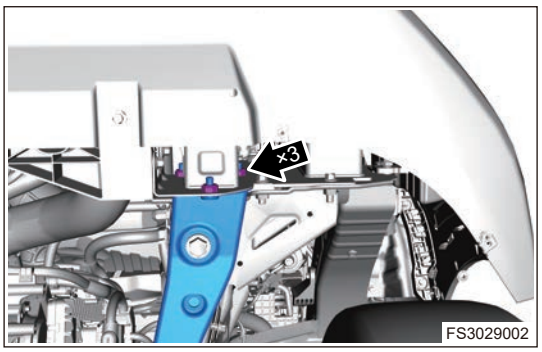
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

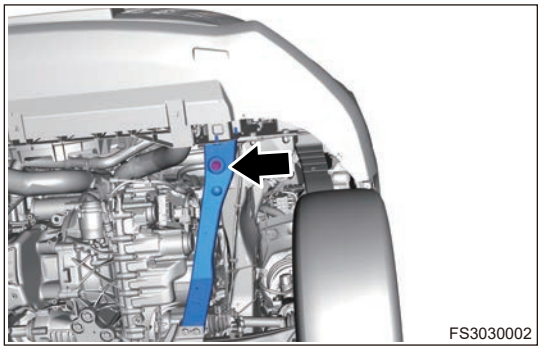
(3) Remove the engine lower protector assembly.

(4) Remove the front left wheel house protector assembly.

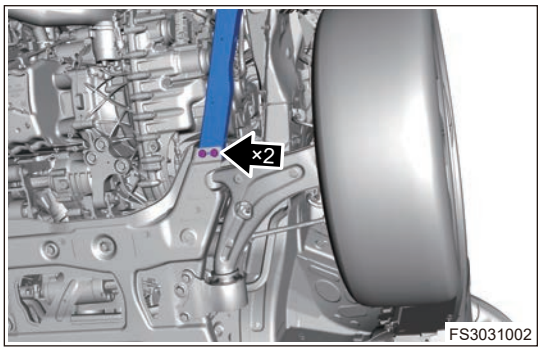
(5) Remove 3 fixing nuts (arrow) between front end of left side rail assembly and lower impact beam.



(6) Remove coupling bolt (arrow) between left side rail assembly and body.



(7) Remove 2 coupling bolts (arrow) between left side rail assembly and front sub frame assembly.



(8) Remove the left side rail assembly.

■ Installation

(1) Install 2 coupling bolts between left side rail assembly and front sub frame assembly.

Torque: 60 ± 6 N·m

(2) Install coupling bolt between left side rail assembly and body.

Torque: 220 ± 22 N · m

(3) Install 3 coupling nuts between front end of left side rail assembly and lower impact beam.

(4) Install the front left wheel house protector assembly.

(5) Install the engine lower protector assembly.

(6) Connect the negative battery cable.

4.5 Front Connecting Rod Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

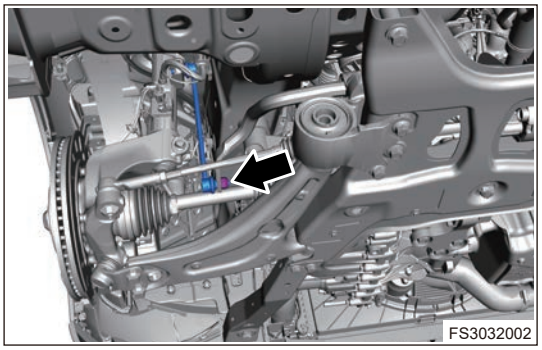
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

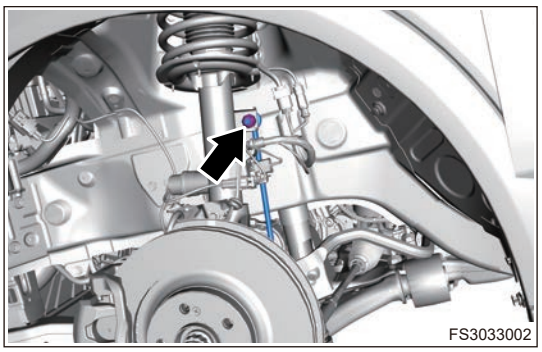
(2) Disconnect the negative battery cable.

(3) Remove the front left wheel.

(4) Remove coupling nut (arrow) between front left stabilizer bar assembly and lower part of front left connecting rod assembly.



(5) Remove coupling nut (arrow) between front left connecting rod assembly and front left shock absorber assembly, and remove front left connecting rod assembly.



■ **Inspection**

(1) Check front connecting rod assembly bush for wear, cracks, deformation, damage or grease leakage. Replace it as necessary.

(2) Check if end of front connecting rod assembly rotates smoothly. Replace it as necessary.

■ **Installation**

(1) Install coupling nut between front left connecting rod assembly and front left shock absorber assembly.

Torque: 60 ± 6 N · m

(2) Install coupling nut between front left stabilizer bar assembly and front left connecting rod assembly.

Torque: 60 ± 6 N · m

(3) Install the front left wheel.

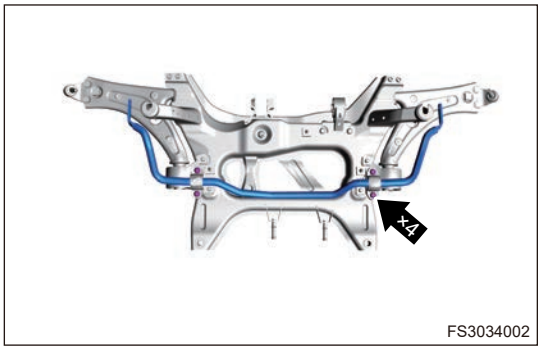
(4) Connect the negative battery cable.

4.6 Front Stabilizer Bar Assembly

■ **Removal**

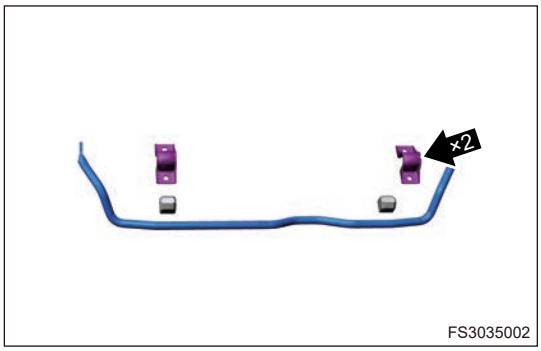
⚠ **Warning**
• **Be sure to wear necessary safety equipment to prevent accidents.** • **Check if safety lock of lifter is locked when repairing chassis parts.** • **It is not allowed to weld or modify suspension loading parts and guide parts.** • **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front bumper assembly.
(4) Remove the front left wheel.
(5) Remove the front right wheel.
(6) Remove the engine lower protector assembly.
(7) Remove the left side rail assembly.
(8) Remove the right side rail assembly.
(9) Remove the front sub frame welding assembly.
(10) Remove 4 fixing bolts between front stabilizer bar and sub frame.



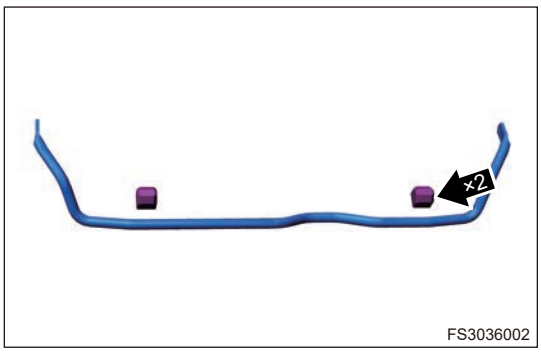
FS3034002

(11) Detach left and right fixing clamps from front stabilizer bar assembly.



FS3035002

(12) Detach left and right rubber supports from front stabilizer bar assembly.



FS3036002

■ Inspection

(1) Check front stabilizer bar assembly fixing clamps for wear, cracks, deformation or damage. Replace it as necessary.
(2) Check front stabilizer bar assembly rubber supports for dirt, wear, cracks, deformation or damage. Replace it as necessary.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install left and right rubber supports to front stabilizer bar assembly.

(2) Install 2 fixing clamps between front stabilizer bar assembly and front sub frame assembly.

(3) Install 4 fixing bolts between front stabilizer bar and sub frame.

Torque: 60 ± 6 N · m

(4) Install the front sub frame welding assembly.

(5) Install the right side rail assembly.

(6) Install the left side rail assembly.

(7) Install the engine lower protector assembly.

(8) Install the front wheels.

(9) Install the front bumper assembly.

(10) Connect the negative battery cable.

4.7 Front Steering Knuckle

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

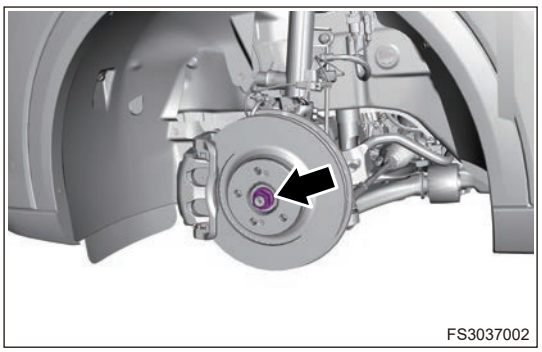
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front left wheel.

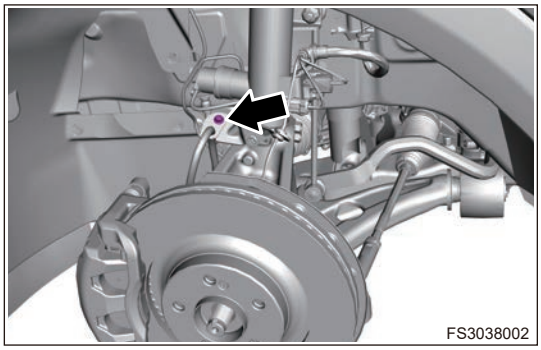
(4) Remove fixing nut from front left drive shaft.


FS3037002

⚠ Caution

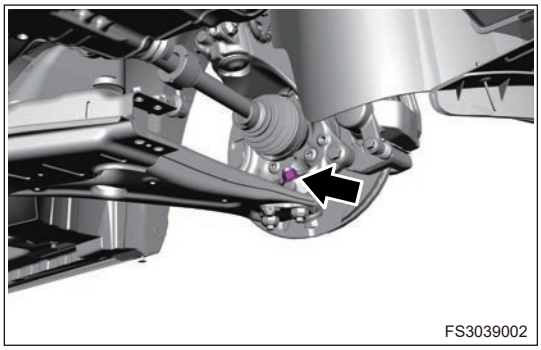
- **Loosen staked part of nut completely, otherwise it will damage threads of drive shaft assembly.**
- **The structure of drive shaft nut is a self-locking nut, and repeated use will reduce the locking performance. It needs to be replaced after each removal.**

(5) Remove fixing bolt between front left brake hose and hose bracket.

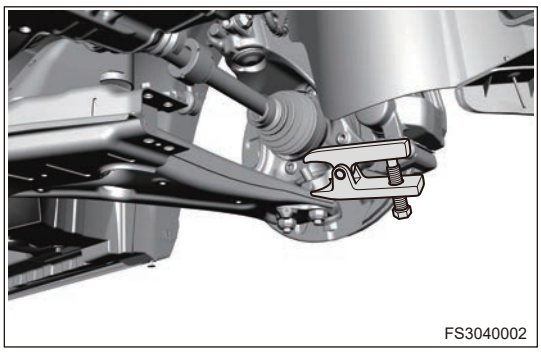


(6) Remove the front left brake caliper assembly.

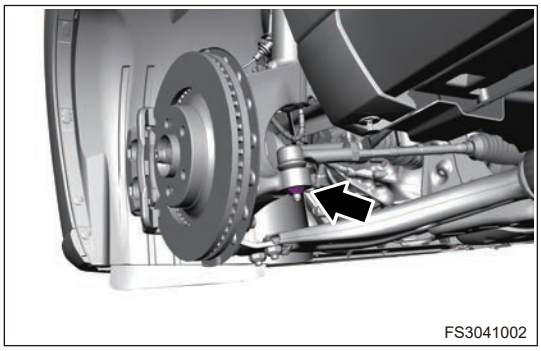
(7) Remove fixing nut between front left control arm assembly ball pin and front left steering knuckle assembly.



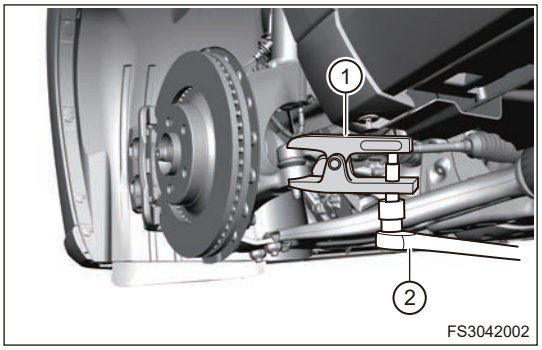
(8) Separate the connection between front left control arm assembly ball pin and front left steering knuckle assembly with a ball separator.



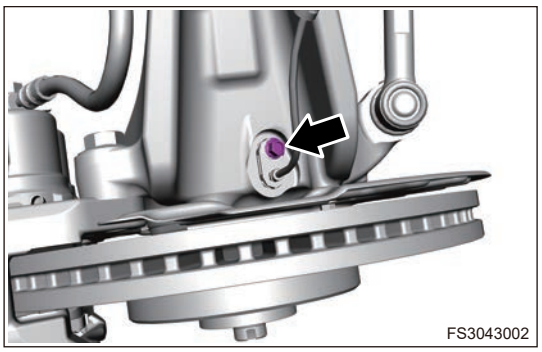
(9) Remove fixing nut between left steering tie rod outer ball assembly and front left steering knuckle assembly.



(10) Install ball pin separator (1), and tighten ball pin separator bolt with wrench (2) to separate steering tie rod ball pin from steering knuckle assembly.



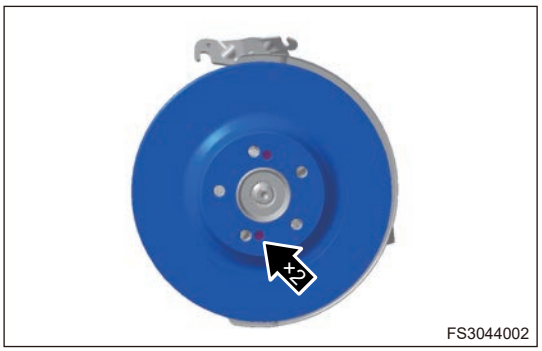
(11) Remove fixing bolt between front left wheel speed sensor and front left steering knuckle assembly, and disengage front left wheel speed sensor carefully.



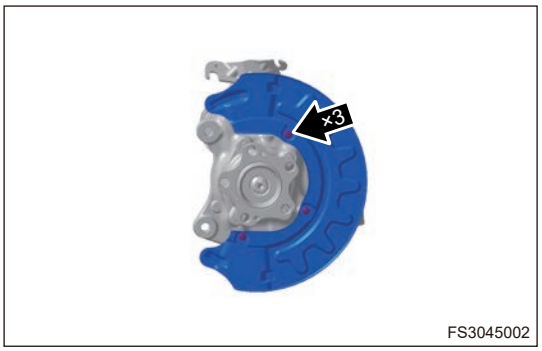
⚠ Caution

- **Keep head and installation hole of sensor free of foreign matter.**

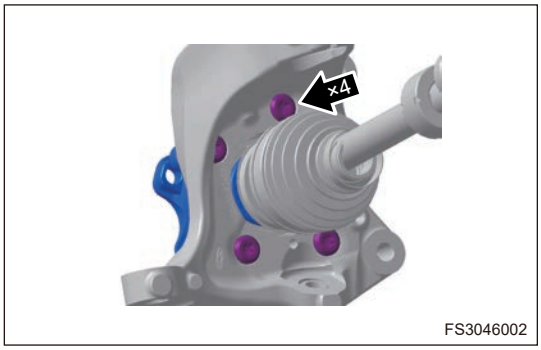
(12) Remove 2 fixing screw and front left brake disc.



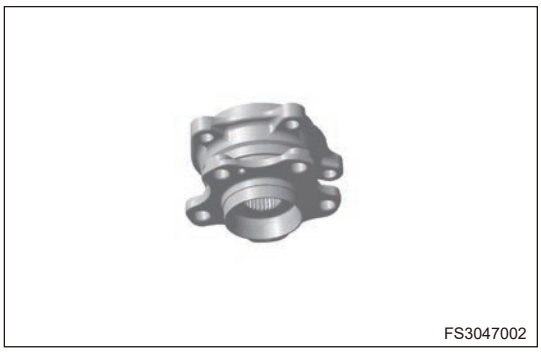
(13) Remove 3 fixing bolts between front left dust guard and front left steering knuckle assembly, and remove front left dust guard.



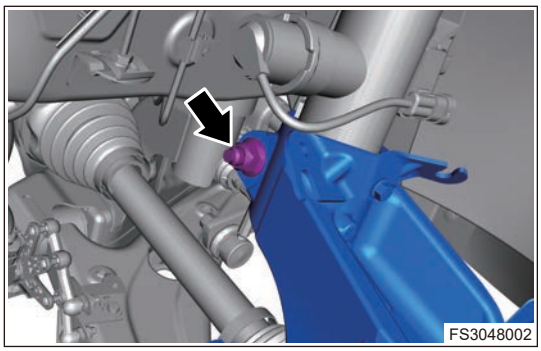
(14) Remove 4 fixing bolts between front hub bearing and steering knuckle.



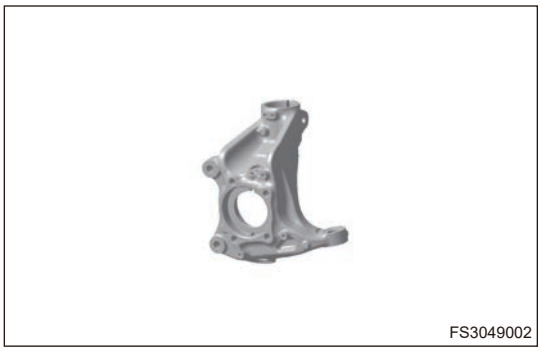
(15) Remove the front hub bearing.



(16) Remove coupling bolt and nut between front left shock absorber assembly and front left steering knuckle assembly.



(17) Disengage the left drive shaft and remove the front left steering knuckle assembly.



■ Inspection

(1) Check front steering knuckle for wear, cracks, deformation or damage. Replace as necessary.

(2) Check dust guard for dirt, wear, cracks, deformation or damage. Replace as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check that hub assembly rotates smoothly without any sticking after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install the front steering knuckle.
(2) Install fixing bolt and nut between front steering knuckle and front left shock absorber assembly.
Torque: 120 ± 12 N · m

(3) Install fixing nut between front left control arm assembly ball pin and front left steering knuckle assembly.
Torque: 95 ± 10 N · m

(4) Install fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.
Torque: 60 ± 6 N · m

(5) Install front hub bearing, tighten 4 fixing bolts between front hub bearing and steering knuckle.
Torque: 110 ± 10 N · m

(6) Install 3 fixing bolts between front left dust guard and front left steering knuckle assembly.
Torque: 10 ± 1 N·m

(7) Install front left brake disc, and install 2 fixing screw.
Torque: 8 ± 1 N·m

(8) Install fixing bolt between front left wheel speed sensor and front left steering knuckle assembly.
Torque: 9 ± 1.5 N · m

(9) Install the front left brake caliper assembly.
(10) Install fixing bolt between front left brake hose and hose bracket.
Torque: 9 ± 1.5 N · m

(11) Install fixing nut to front left drive shaft.
Torque: 270 ± 20 N · m

(12) Install the front left wheel.
(13) Connect the negative battery cable.

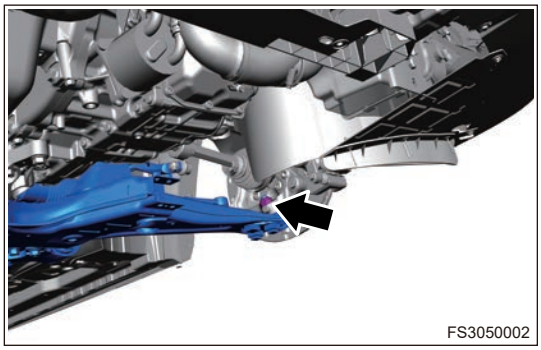
4.8 Front Sub Frame Assembly

■ **Removal**

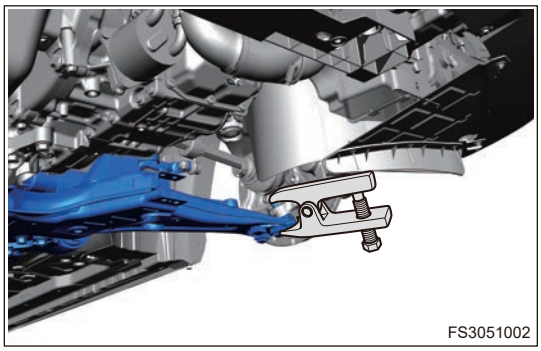
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**
- **When removing front sub frame assembly, it is necessary to securely support engine and transmission assembly with engine equalizer to avoid damage.**

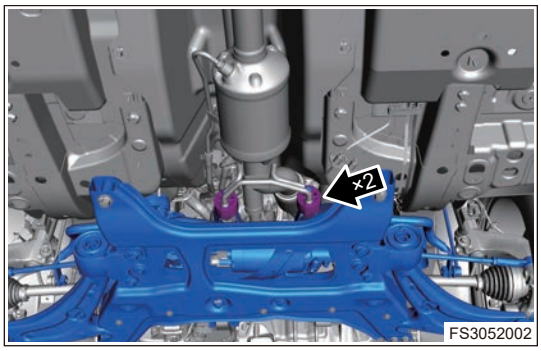
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front wheel.
(4) Remove the engine lower protector assembly.
(5) Remove the left side rail assembly.
(6) Remove the right side rail assembly.
(7) Using an engine equalizer, support engine and transmission assembly securely.
(8) Remove the coupling nut between left control arm ball and steering knuckle (Use same procedures for right side).


FS3050002

(9) Separate steering knuckle and control arm ball with a ball separator (Use same procedures for right side).

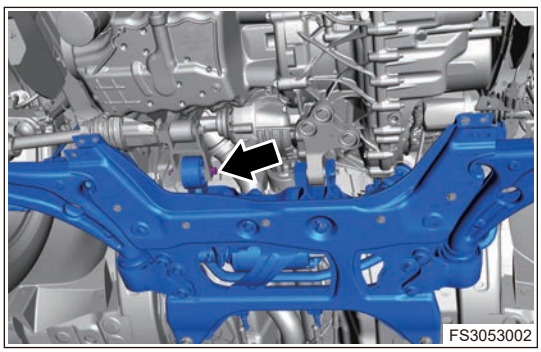

FS3051002

(10) Detach the precatalytic converter hanger block.

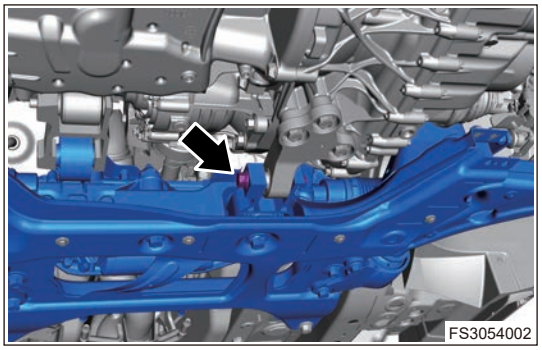


FS3052002

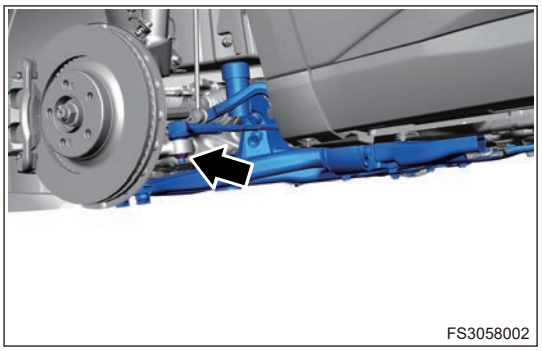
(11) Remove the coupling bolt between rear right mounting cushion and rear mounting connecting rod.


FS3053002

(12) Remove the coupling bolt between lower rear mounting cushion and upper rear mounting cushion.



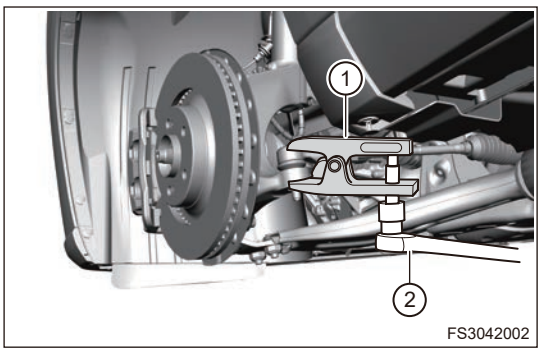
(13) Remove fixing nut between left steering tie rod outer ball pin assembly and front left steering knuckle assembly.



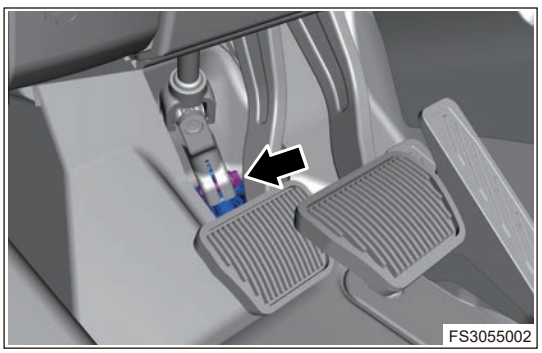
(14) Install ball pin separator (1), and tighten ball pin separator bolt with wrench (2) to separate steering tie rod outer ball pin from steering knuckle assembly. The removal method of right tie rod outer ball pin is the same as that of left side.

Hint:

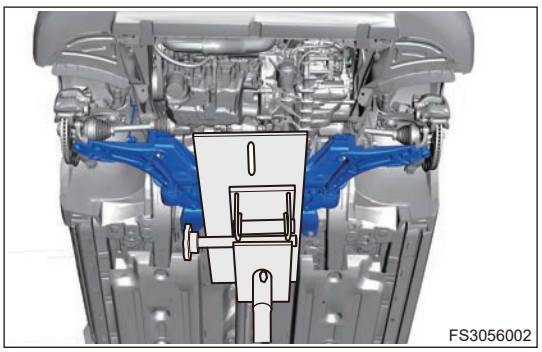
If it is difficult to remove tie rod outer ball pin end from steering knuckle, detach ball pin by striking the end of steering knuckle uniformly and slightly with a hammer or equivalent.



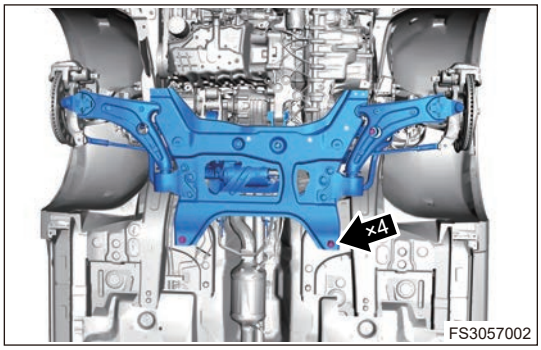
(15) Remove coupling bolt between steering column assembly and steering gear, separate steering column from steering gear.



(16) Using a transmission carrier, support the sub frame assembly.



(17) Remove 4 fixing bolts between front sub frame and body.



(18) Slowly lower the sub frame assembly with stabilizer bar.
(19) Remove the steering gear assembly.
(20) Remove the stabilizer bar assembly.
(21) Remove the left and right control arms.
(22) Remove the lower rear mounting cushion assembly.
(23) Remove the rear right mounting cushion.
(24) Remove the front sub frame assembly.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install left and right control arms.
(2) Install stabilizer bar assembly to front sub frame.
(3) Install steering gear assembly to front sub frame.
(4) Install the lower rear mounting assembly.
(5) Install the rear right mounting cushion.
(6) Install sub frame welding assembly with stabilizer bar to transmission carrier, and raise it to a proper position.
(7) Install 2 fixing bolts between right side of front sub frame and vehicle body.

Torque: 220 ± 22 N · m

(8) Install 2 fixing bolts between left side of front sub frame and vehicle body.

Torque: 220 ± 22 N · m

(9) Install coupling nuts between front left and front right control arm balls and steering knuckle.

Torque: 95 ± 10 N · m

(10) Install coupling bolt between steering column assembly and steering gear.

Torque: 55 ± 5 N · m

(11) Install fixing nuts between left and right steering tie rod outer ball assemblies and front steering knuckle assembly.

Torque: 60 ± 6 N · m

(12) Install the coupling bolt between rear right mounting cushion and rear mounting connecting rod.

Torque: 110 ± 11 N · m

(13) Install the coupling bolt between lower rear mounting cushion and upper rear mounting cushion.

Torque: 150 ± 15 N · m

(14) Install the precatalytic converter hanger block.
(15) Install the left side rail assembly.
(16) Install the right side rail assembly.
(17) Install the engine lower protector assembly.
(18) Install the front wheel.
(19) Connect the negative battery cable.

5.4 REAR SUSPENSION (PASSIVE SHOCK ABSORBER)

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Be sure to wear necessary safety equipment to prevent accidents.

(2) Check if safety lock of lifter is locked when repairing chassis parts.

(3) It is not allowed to weld or modify suspension loading parts and guide parts.

(4) When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Be sure to tighten coupling bolts and nuts to specified torques.

(2) Align the protrusion of rear coil spring lower cushion with the positioning hole of rear lower control arm during installation.

(3) Before assembling control arm assembly, apply grease on the outside of control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.

(4) Due to rubber bushing deformation, tightened bolt will exit false torque, so it is necessary to retighten the tightened bolt.

(5) After installation, lower vehicle and bounce vehicle up and down several times to stabilize rear suspension.

(6) Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.

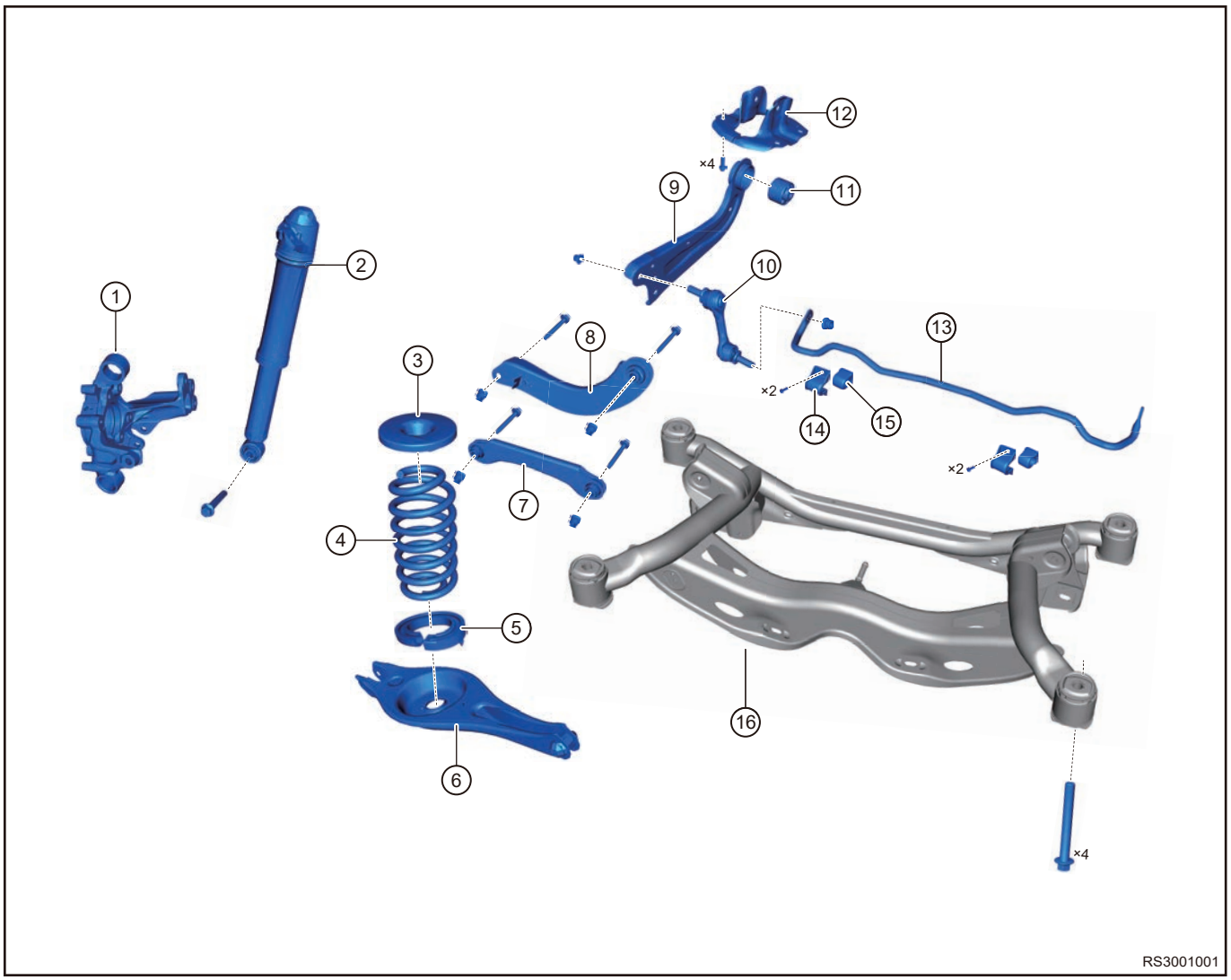
(7) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

Rear suspension of this model uses multi-link independent suspension (height is non-adjustable), which is equipped with lateral stabilizer, cylindrical coil spring and double action telescopic shock absorber.

2.2 System Components Diagram



1	Rear Left Steering Knuckle	9	Rear Right Trailing Arm Welding Assembly
2	Rear Shock Absorber Device	10	Rear Connecting Rod Assembly
3	Upper Coil Spring Cushion Assembly	11	Trailing Arm Bushing Assembly
4	Rear Coil Spring Assembly	12	Trailing Arm Mounting Bracket Assembly
5	Lower Coil Spring Cushion Assembly	13	Rear Stabilizer Bar
6	Rear Lower Control Arm Welding Assembly	14	Rear Stabilizer Bar Clamp
7	Pull Rod Welding Assembly	15	Stabilizer Bar Bushing
8	Rear Upper Control Arm Welding Assembly	16	Rear Sub Frame Assembly

2.3 Component Operation Description

■ Rear Control Arm Welding Assembly

As a guide and power transmission element for suspension system of vehicle, control arm transmits various power acting on wheels to vehicle body and keeps wheels moving in a certain trail. Control arm elastically connects wheels and vehicle body together with ball joint or bushing.


RS3001002

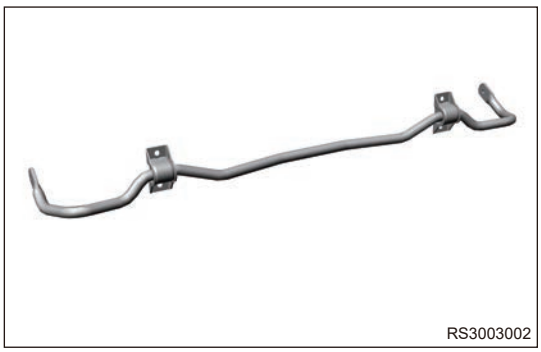
■ Rear Shock Absorber Assembly

It filters and eliminates vibration from roads to improve driving stability and bring people a sense of comfort and stability.


RS3002002

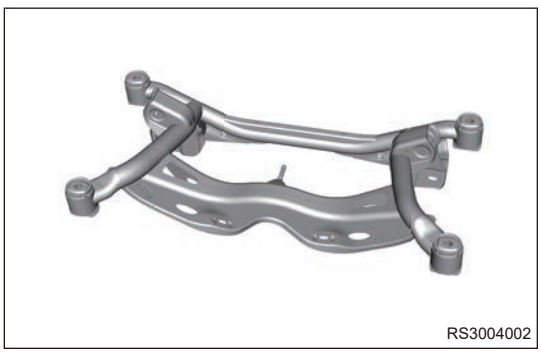
■ Rear Stabilizer Bar Assembly

Lateral stabilizer bar functions to prevent excessive lateral incline while vehicle is turning and keeps vehicle body in balance as much as possible. It aims to reduce lateral incline level of vehicle and improve smoothness. When vehicle is turning, vehicle body inclines and suspension on both sides have inconsistent bounce. The outer suspension will press against stabilizer bar to twist it, then elastic force from bar body will prevent wheel from lifting, so that vehicle body can be kept in balance as much as possible, thus realizing the lateral stability function.


RS3003002

■ Rear Sub Frame Assembly

Sub frame can reduce impact on vehicle body due to road shock and enhance connection rigid of suspension system and improve driving comfort and stability, making a strong and compact chassis during driving. It bears the deformation conditions such as loaded bend, longitudinal torsion, lateral bend and horizontal lozenging, etc. in place of vehicle body, which improves torsion resistance ability of vehicle body. Also, the force will be directly applied on it in a collision to improve vehicle safety performance.


RS3004002

3 Diagnosis & Testing

3.1 Problem Symptoms Table

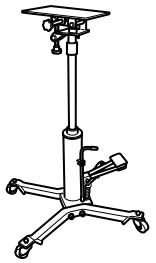
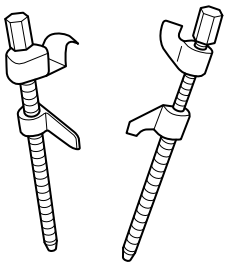
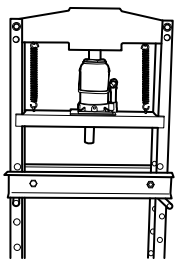
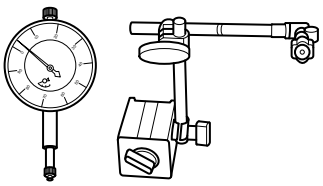
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Running deviation	Tire (worn or improperly inflated)
	Rear wheel alignment (incorrect)
	Rear hub bearing (excessively worn)
	Rear suspension components (worn or deformed)
	Steering gear (misaligned or damaged)
	Suspension component (worn)
Droop	Vehicle (overloaded)
	Rear coil spring (too soft)
	Rear shock absorber assembly (worn or damaged)
	Rear suspension components (excessively worn or deformed)
	Rear tire (improperly inflated)
	Rear wheel alignment (incorrect)
Sways/pitches	Rear tire (worn or improperly inflated)
	Rear stabilizer bar assembly (bent or broken)
	Rear shock absorber assembly (worn or damaged)
Rear wheel shimmy	Rear tire (worn or improperly inflated)
	Rear wheel (out of balance)
	Rear shock absorber assembly (worn or damaged)
	Rear wheel alignment (incorrect)
	Rear hub bearing (excessively worn)

4 On-vehicle Service

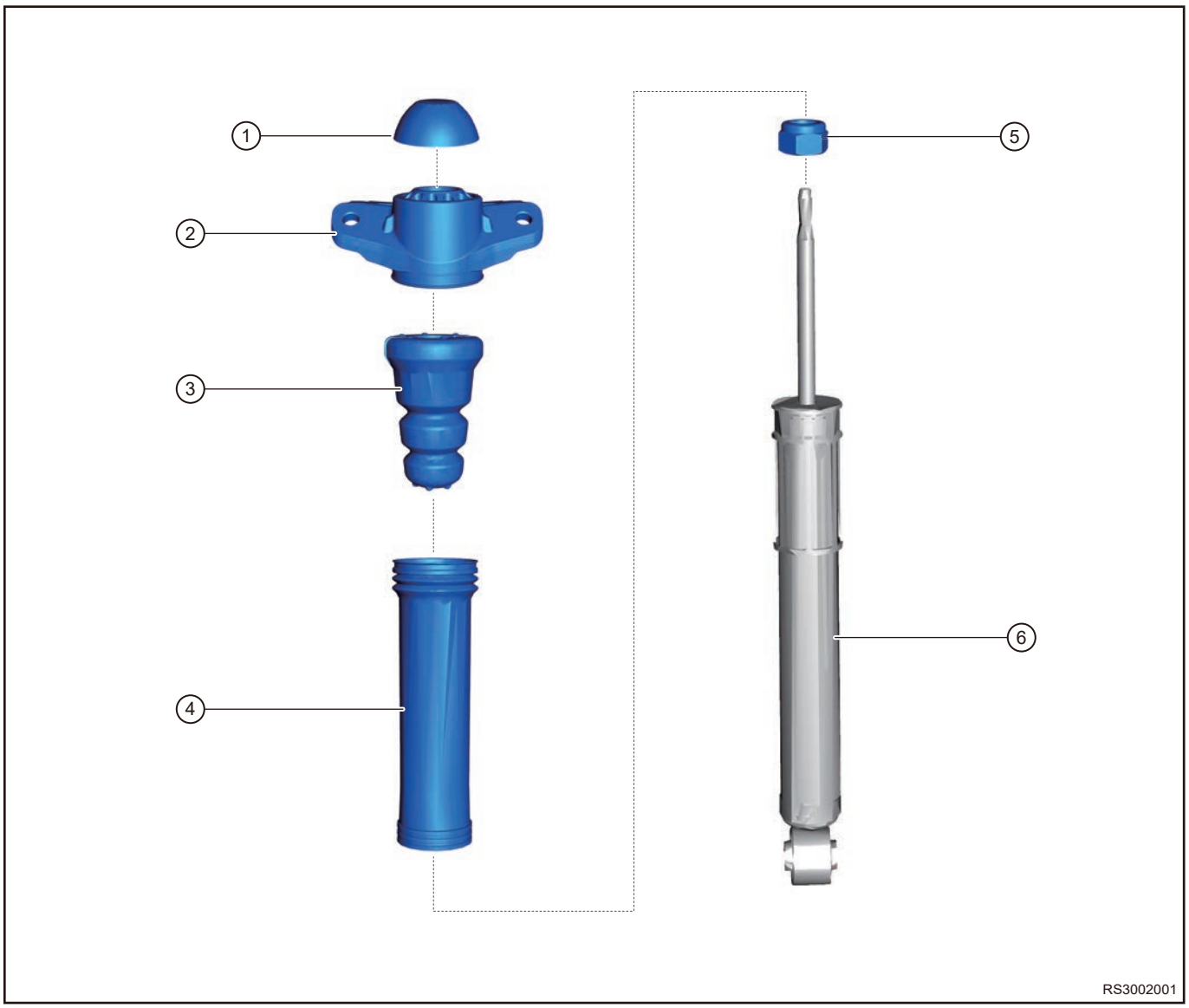
4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Transmission Carrier	 S00004
Spring Compressor	 S00016
Hydraulic Press	 S00010
Dial Indicator and Magnetic Holder	 S00018

4.2 Rear Shock Absorber Assembly

■ Description



1	Shock Absorber Cover Cap	4	Rear Shock Absorber Dust Boot
2	Rear Shock Absorber Upper Connecting Plate Assembly	5	Rear Shock Absorber Upper Nut
3	Rear Shock Absorber Buffer Block	6	Rear Shock Absorber Assembly

■ On-vehicle Inspection

Rear Shock Absorber Assembly Inspection

(1) Park vehicle on level ground, and bounce vehicle up and down, then check if vehicle shakes up and down when body bounds. If vehicle shakes up and down consecutively, shock absorber assembly may be damaged and should be replaced.

(1) As shock absorber assembly operates frequently during vehicle driving, oil gas is formed due to temperature rise of shock absorber, which then adheres to dust boot. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.

(2) When any of the following conditions occurs:

- Oil traces in circumferential direction are uneven;

- Oil traces reach lower connecting positions.

Above conditions indicate that there may be leakage in shock absorber assembly, and it is necessary to replace the shock absorber assembly.

(3) If it is difficult to accurately judge shock absorber assembly for leakage from appearance. Perform road test after wiping off oil on the surface of malfunctioning shock absorber. Under normal road conditions, drive vehicle for 5 to 10 minutes and perform inspection. If there are oil traces at the shock absorber assembly surface, it indicates that oil leakage exists, and it is necessary to replace the shock absorber assembly.

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.**

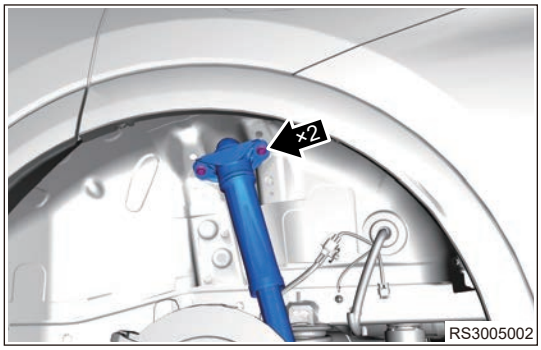
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

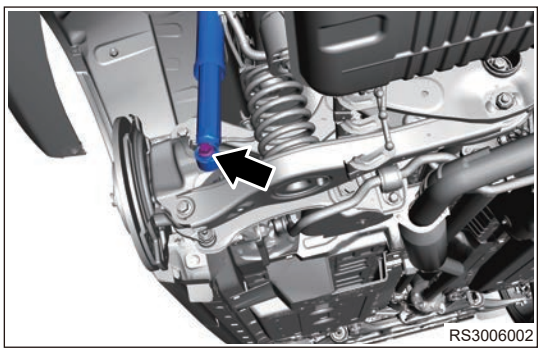
(4) Remove the rear left wheel house protector.

(5) Remove 2 coupling bolts (arrow) between upper part of rear left shock absorber assembly and body.



(6) Support the lower control arm with a transmission carrier.

(7) Remove coupling bolt and nut (arrow) between lower part of rear left shock absorber assembly and rear left steering knuckle assembly.



(8) Remove the rear left shock absorber assembly.

■ Disassembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Remove the rear left shock absorber cover cap.


RS3007002

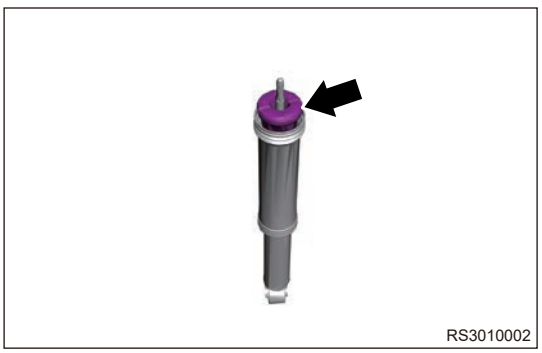
(2) Remove fixing nut from rear left shock absorber assembly.


RS3008002

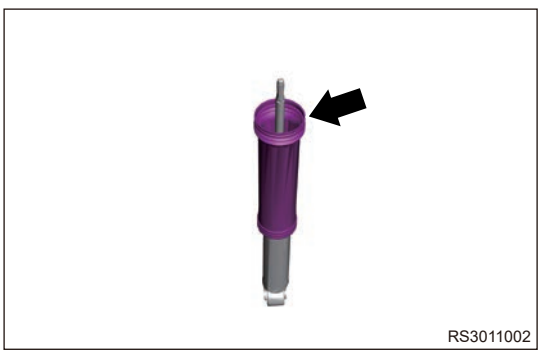
(3) Remove the rear left shock absorber upper connecting plate assembly.


RS3009002

(4) Remove the rear buffer block.


RS3010002

(5) Remove the rear dust boot.


RS3011002

■ Assembly

(1) Install the rear dust cover.

(2) Install the rear buffer block.

(3) Install the rear left shock absorber upper connecting plate assembly.

(4) Install fixing nut to rear left shock absorber assembly.

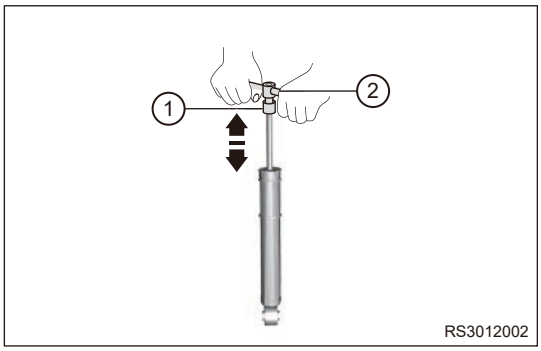
(5) Install the shock absorber cover cap.

■ Inspection

(1) Check the front shock absorber assembly

Manual inspection

1) Install the locking nut (1) to the upper end of front shock absorber assembly strut, and then install the T-wrench (2) or equivalent.



2) Compress and extend the front shock absorber assembly strut several times by hands in direction of arrow as shown in illustration. Check that there is no abnormal resistance or unusual sound during operation. If there is any abnormality, replace the front shock absorber assembly with a new one.

(2) Check the other components of front shock absorber assembly

1) Check front shock absorber cover cap, front spring upper cushion, front dust boot, front buffer block and front spring lower cushion for cracks, wear or deformation. Replace it as necessary.

2) Check front coil spring for wear, cracks or deformation. Replace it as necessary.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Bounce vehicle up and down several times to stabilize rear suspension after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install 2 coupling bolts between upper part of rear left shock absorber assembly and body.

Torque: 60 ± 0.5 N · m

(2) Install coupling bolt and nut between lower part of rear left shock absorber assembly and rear left steering knuckle assembly.

Torque: 160 ± 0.5 N · m

(3) Install the rear left wheel house protector.

(4) Install the rear left wheel.

(5) Connect the negative battery cable.

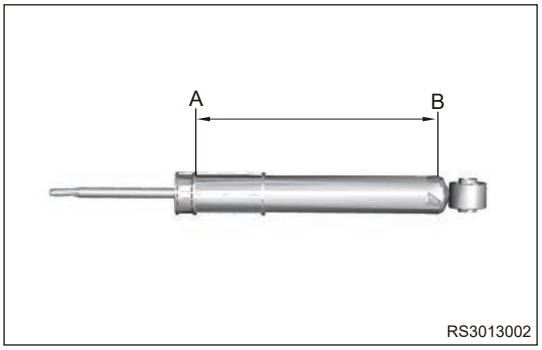
■ **Disposal**

⚠ Warning

- **Do not drill at high temperature and heat, and be sure to pay attention to safety!**
- **Shock absorber assembly contains nitrogen and oil, which are under high pressure. As hydraulic oil is explosive easily when exposed to heat, the surface is wet with water first before drilling or cutting.**
- **Be careful when drilling or cutting, because mental chips may fly about. Always perform operations with proper safety equipment to avoid personal injury.**
- **Before handling, be sure to wear goggles and release pressure inside shock absorber assembly to avoid personal injury.**

(1) Extend the rear shock absorber assembly strut fully.

(2) Using a drill, make a hole between A and B in the strut as shown in the illustration, to discharge gas from rear shock absorber assembly and hydraulic oil.



(3) After discharging gas and hydraulic oil from rear shock absorber assembly, handle the rear shock absorber assembly properly.

Hint:
Recycle disposed rear shock absorber assembly according to local environmental regulations.

4.3 Rear Coil Spring

■ **Removal**

Hint:
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

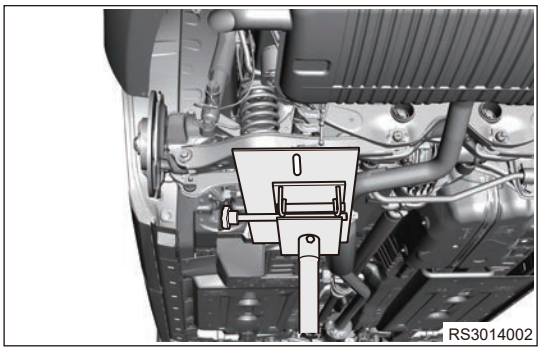
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

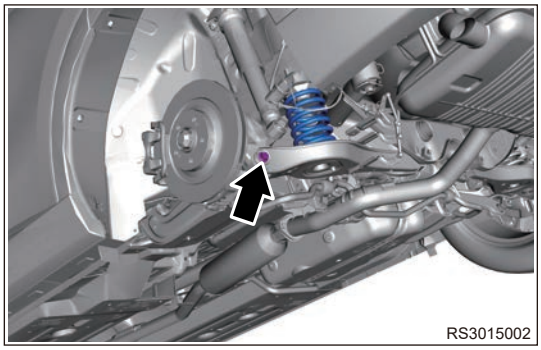
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

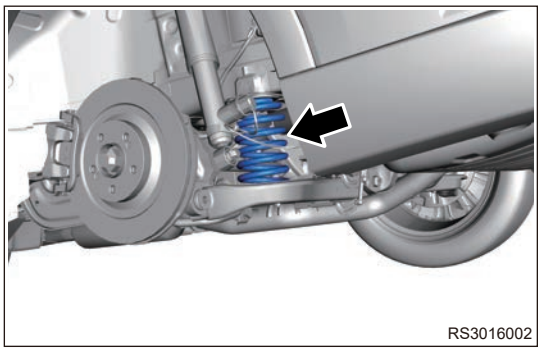
(4) Support the rear lower control arm with a transmission carrier securely.



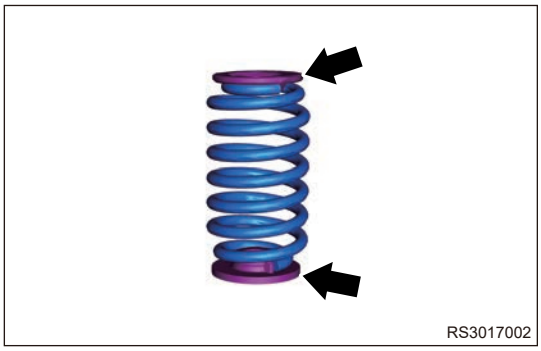
(5) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.


RS3015002

(6) Lower the transmission carrier slowly to an appropriate height and remove the rear coil spring carefully.


RS3016002

(7) Remove the rear coil spring upper and lower cushions.


RS3017002

■ **Inspection**

(1) Check rear coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.

(2) Check rear coil spring upper cushion and lower cushion for dirty, wear, cracks, deformation or damage. Replace it as necessary.

(3) Check the free length of rear coil spring.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Align the protrusion of rear coil spring lower cushion with the positioning hole of rear lower control arm during installation.**
- **After installation, lower vehicle and bounce vehicle up and down several times to stabilize rear suspension.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install the rear coil spring upper and lower cushions.

(2) Install coil spring and use transmission carrier to lift rear lower control arm to a proper height.

(3) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Slowly lower the transmission carrier and remove it.

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.4 Rear Upper Control Arm Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

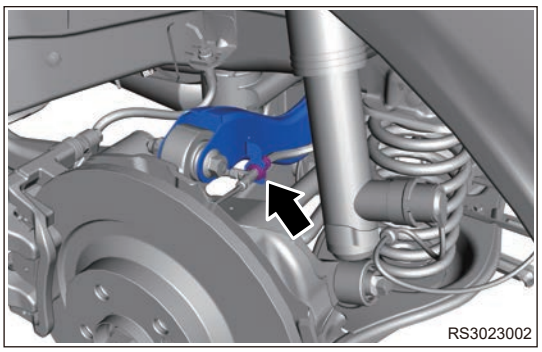
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

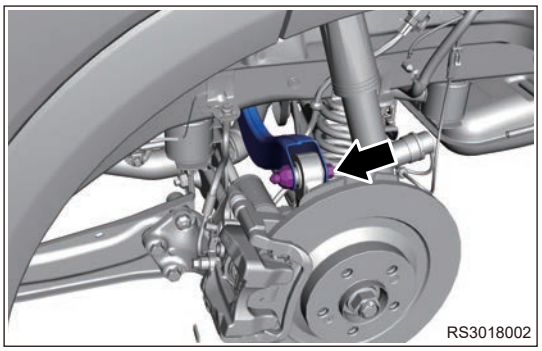
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

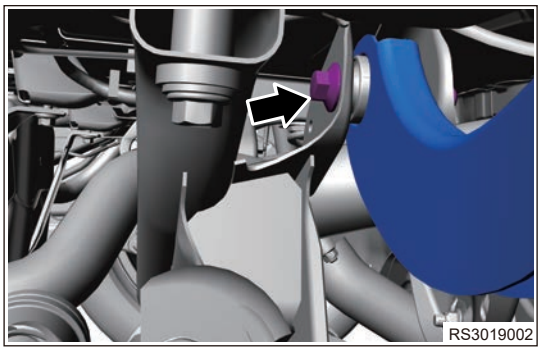
(4) Disconnect connector between rear left wheel speed sensor caliper wire harness and upper control arm.



(5) Remove coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

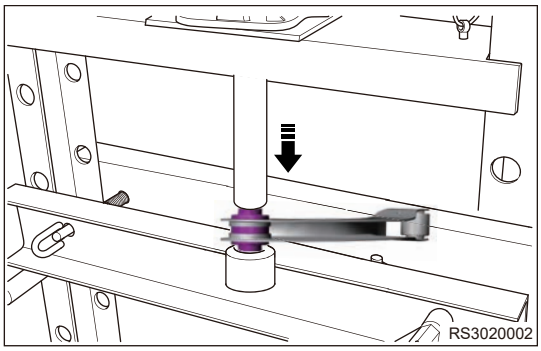


(6) Remove coupling bolt between rear upper control arm assembly and rear sub frame welding assembly.



(7) Remove the rear upper control arm assembly.

(8) Place the rear upper control arm assembly on a hydraulic press, cooperate with tools, and press out rear upper control arm assembly rubber bushing with hydraulic press.



■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Place the rear upper control arm assembly on a hydraulic press, cooperate with tools, and press control arm assembly rubber bushing into rear upper control arm with hydraulic press.

⚠ Caution

- **Before pressing in, apply grease on the outside of control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.**

(2) Install coupling bolt between rear upper control arm assembly and rear sub frame welding assembly.

Torque: 180 ± 0.5 N · m

(3) Install coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Install connector between rear left wheel speed sensor caliper wire harness and upper control arm.

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.5 Rear Lower Control Arm Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

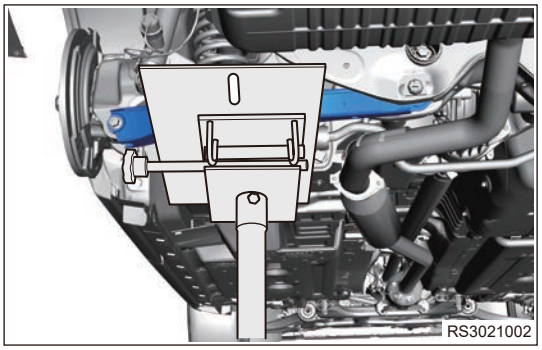
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

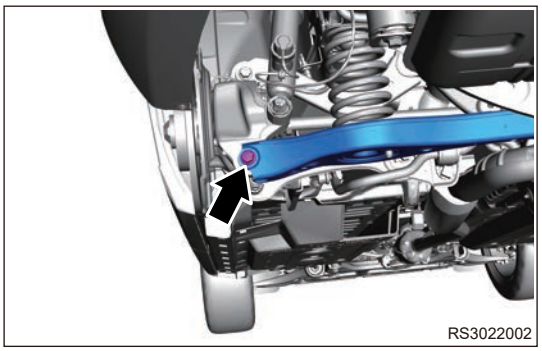
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Support the rear lower control arm assembly with a transmission carrier securely.

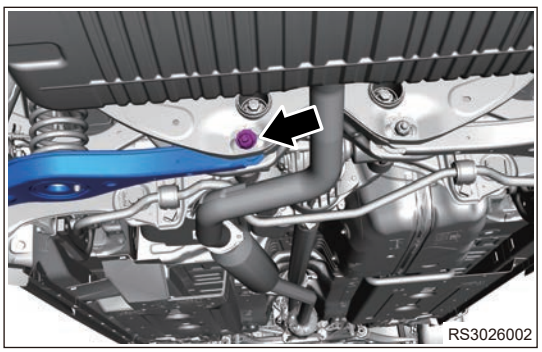


(5) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.



(6) Lower the transmission carrier slowly to a proper height and remove rear coil spring, rear coil spring upper cushion and rear coil spring lower cushion carefully.

(7) Remove eccentric adjusting bolt, nut and adjusting shim between rear lower control arm assembly and rear sub frame assembly.



(8) Remove the rear lower control arm assembly.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install eccentric adjusting bolt, nut and adjusting shim between rear lower control arm assembly and rear sub frame assembly.

Torque: 130 ± 0.5 N · m

(2) Install rear coil spring, rear coil spring upper and lower cushions and use transmission carrier to lift rear lower control arm to a proper height.

(3) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Slowly lower the transmission carrier.

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.6 Rear Trailing Arm Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

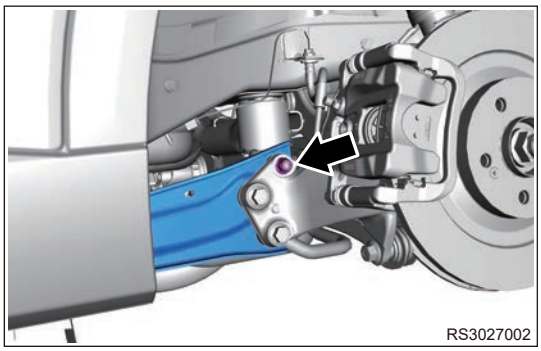
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

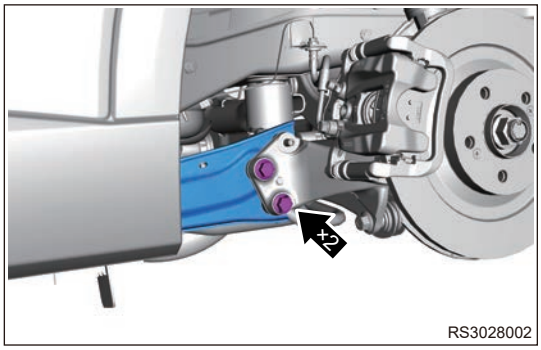
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Remove coupling nut on rear connecting rod through rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.

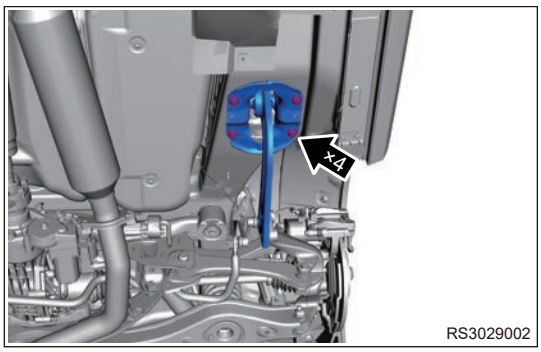

RS3027002

(5) Remove 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.



RS3028002

(6) Remove 4 coupling bolts between rear trailing arm assembly mounting bracket and body.



RS3029002

(7) Remove the rear trailing arm assembly (w/ mounting bracket).

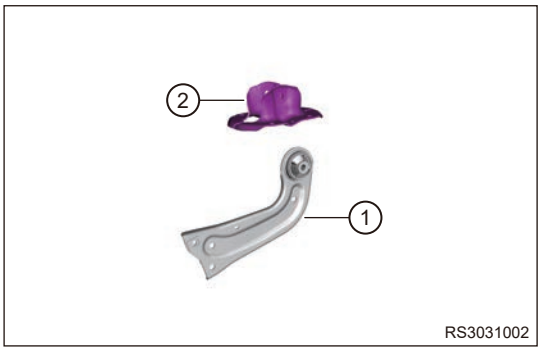
■ Disassembly

Hint:

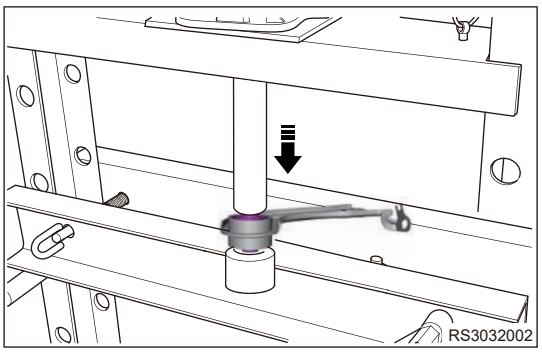
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Remove coupling bolt and nut between rear trailing arm assembly and mounting bracket.

(2) Separate rear trailing arm assembly (1) from mounting bracket (2).



(3) Place the rear trailing arm assembly on a hydraulic press, and press out rear trailing arm assembly rubber bushing with hydraulic press.



■ Assembly

(1) Place the rear trailing arm assembly on a hydraulic press, cooperate with tools, and press rear trailing arm assembly rubber sleeve into rear trailing arm assembly with hydraulic press.

⚠ Caution

- **Before pressing in, apply grease on the outside of trailing arm assembly rubber boot to prevent it from damage.**

(2) Install coupling bolt and nut between rear trailing arm assembly and mounting bracket.

Torque: 180 ± 0.5 N · m

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install 4 coupling bolts between rear trailing arm assembly mounting bracket and body.

Torque: 65 ± 0.5 N · m

(2) Install 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.

Torque: 160 ± 0.5 N · m

(3) Install coupling nut on rear connecting rod through trailing arm assembly and steering knuckle.

Torque: 60 ± 0.5 N · m

(4) Install the rear left wheel.

(5) Connect the negative battery cable.

4.7 Rear Pull Rod Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

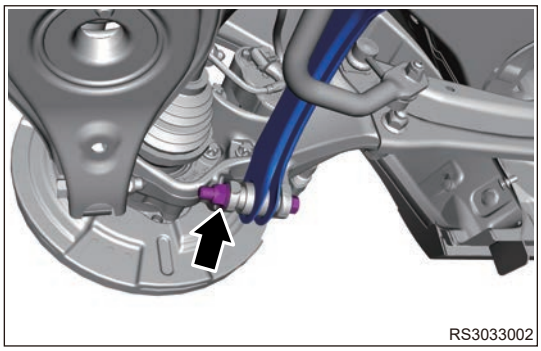
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

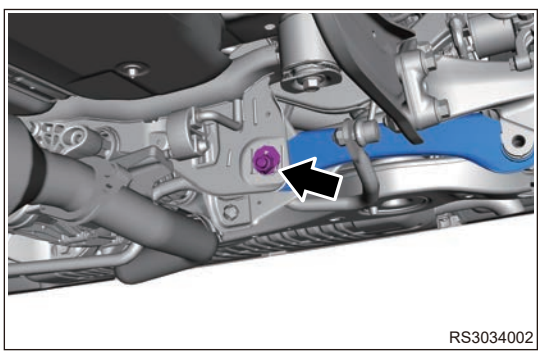
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Remove coupling bolt and nut between rear pull rod assembly and rear steering knuckle assembly.

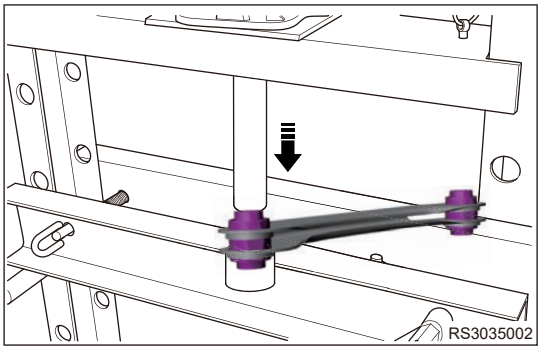

RS3033002

(5) Remove eccentric adjusting bolt, nut and adjusting shim between rear pull rod assembly and rear sub frame assembly.


RS3034002

(6) Remove the rear pull rod assembly.

(7) Place the rear pull rod assembly on a hydraulic press, and press out rear pull rod assembly rubber bushing with hydraulic press.



■ **Installation**

⚠ **Caution**
• **Be sure to tighten coupling bolts and nuts to specified torques.**

(1) Place the rear pull rod assembly on a hydraulic press, cooperate with tools, and press rear pull rod assembly rubber boot into rear pull rod assembly with hydraulic press.

⚠ **Caution**
• **Before pressing in, apply grease on the outside of rear pull rod assembly rubber boot to prevent it from damage.**

(2) Install eccentric adjusting bolt, nut and adjusting shim between rear pull rod assembly and rear sub frame assembly.

Torque: 130 ± 0.5 N · m

(3) Install coupling bolt and nut between rear pull rod assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Install the rear left wheel.

(5) Connect the negative battery cable.

4.8 Rear Stabilizer Bar Assembly

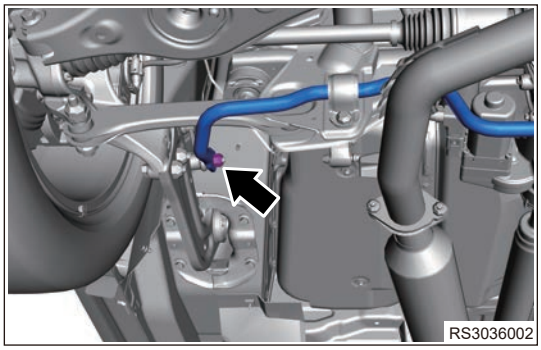
■ **Removal**

⚠ **Warning**
• **Be sure to wear necessary safety equipment to prevent accidents.** • **Check if safety lock of lifter is locked when repairing chassis parts.** • **It is not allowed to weld or modify suspension loading parts and guide parts.** • **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

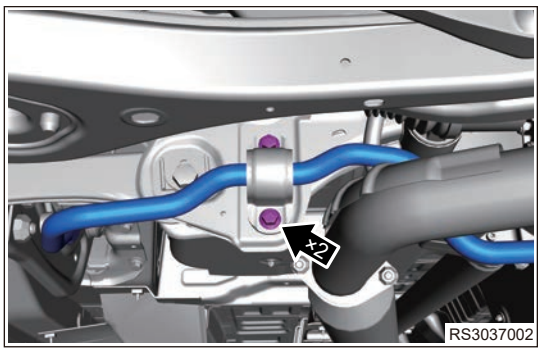
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove coupling nut between rear left connecting rod assembly and rear stabilizer bar assembly. Use same removal procedure for right side.

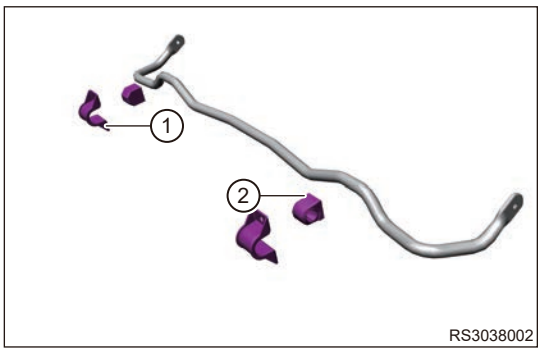


(4) Remove 2 coupling bolts between rear stabilizer bar assembly and rear sub frame welding assembly (Take left side as an example). Use same removal procedure for right side.



(5) Remove the rear stabilizer bar assembly.

(6) Remove rear stabilizer bar fixing clamp (1) and rear stabilizer bar rubber support (2) from rear stabilizer bar assembly.



■ Inspection

(1) Check rear stabilizer bar assembly fixing clamps for wear, cracks, deformation or damage. Replace it as necessary.

(2) Check rear stabilizer bar assembly rubber supports for dirt, wear, cracks, deformation or damage. Replace it as necessary.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install rear stabilizer bar fixing clamp and rear stabilizer bar rubber support.

(2) Install 2 coupling bolts between rear stabilizer bar assembly and rear sub frame welding assembly (Take left side as an example). Use same installation procedure for right side.

Torque: 60 ± 0.5 N · m

⚠ Caution

- **Due to rubber bushing deformation, tightened bolt will exit false torque, so it is necessary to retighten the tightened bolt.**

(3) Place rear connecting rod shield on rear connecting rod, install coupling nut between rear left connecting rod assembly and rear stabilizer bar assembly. Use same installation procedure for right side.

Torque: 60 ± 0.5 N · m

(4) Connect the negative battery cable.

4.9 Rear Connecting Rod Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

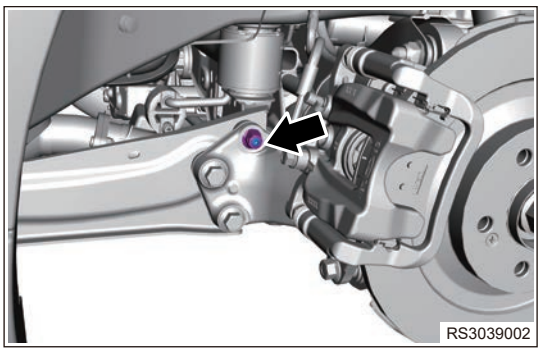
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

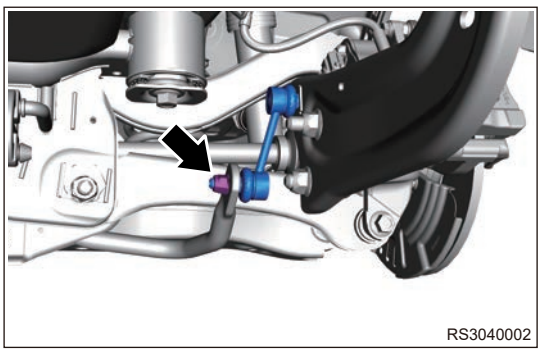
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Remove coupling nut on rear connecting rod through rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.


RS3039002

(5) Remove coupling nut between rear connecting rod assembly and rear stabilizer bar assembly, and remove rear connecting rod assembly.


RS3040002

■ Inspection

(1) Check rear connecting rod assembly bush for wear, cracks, deformation, damage or grease leakage. Replace it as necessary.

(2) Check if end of rear connecting rod assembly rotates smoothly. Replace it as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Make sure that end of rear connecting rod assembly rotates smoothly without any sticking after installation.**

(1) Install coupling nut between rear connecting rod assembly and rear stabilizer bar assembly.

Torque: 60 ± 0.5 N · m

(2) Install coupling nut on rear connecting rod through trailing arm assembly and steering knuckle.

Torque: 60 ± 0.5 N · m

(3) Install the rear left wheel.

(4) Connect the negative battery cable.

4.10 Rear Hub Bearing Assembly

■ **On-vehicle Inspection**

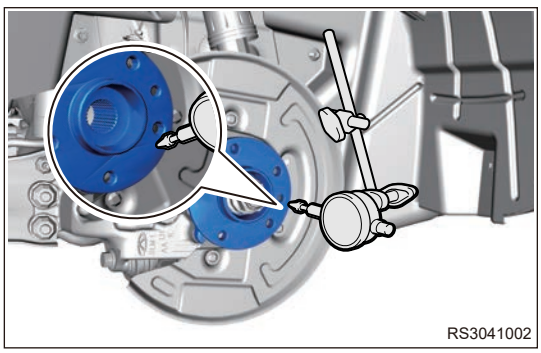
(1) Remove the rear wheel.

(2) Remove the rear brake caliper assembly.

(3) Remove the rear brake disc.

(4) Check looseness of rear hub bearing.

1) Check looseness near center of the rear hub bearing with a dial indicator. Maximum looseness: 0.05 mm

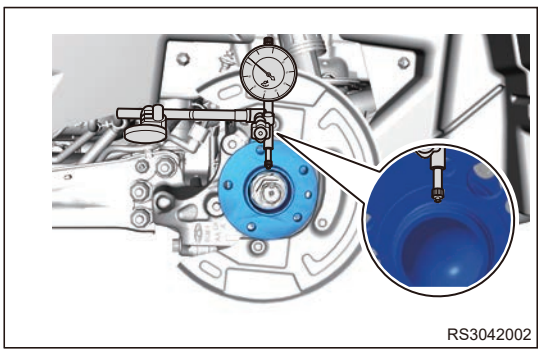

RS3041002

⚠ Caution

- **Ensure that dial indicator is perpendicular to measurement surface.**
- **If looseness exceeds maximum value, replace the rear hub bearing assembly.**

(5) Check the rear hub bearing runout.

1) Check runout of the rear hub bearing set with a dial indicator. Maximum runout: 0.05 mm.


RS3042002

⚠ Caution

- **Ensure that dial indicator is perpendicular to measurement surface.**
- **If looseness exceeds maximum value, replace the rear hub bearing assembly.**

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

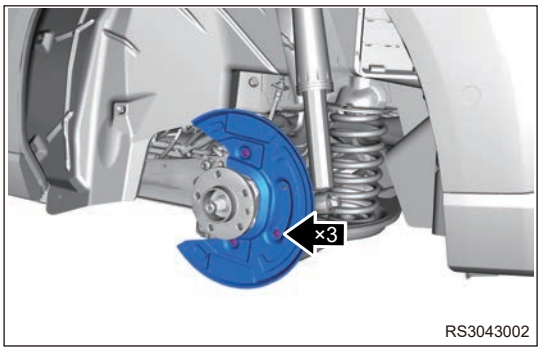
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

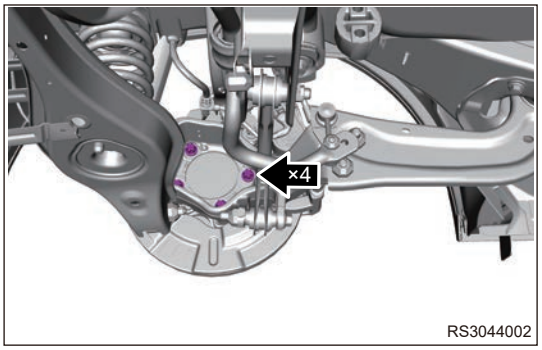
(4) Remove the rear left brake caliper assembly.

(5) Remove the rear left brake disc.

(6) Remove 3 fixing bolts between rear dust guard and rear left steering knuckle, and remove rear dust guard.



(7) Remove 4 fixing bolts of rear hub bearing.



(8) Remove the rear hub bearing.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install rear wheel bearing, and tighten 4 fixing bolts.

Torque: 110 ± 0.5 N · m

(2) Install dust guard and tighten 3 fixing bolts

Torque: 10 ± 1 N·m

(3) Install rear left brake disc, and tighten 2 fixing screws.

Torque: 8 ± 1 N·m

(4) Install the rear brake caliper assembly.

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.11 Rear Steering Knuckle

■ Removal

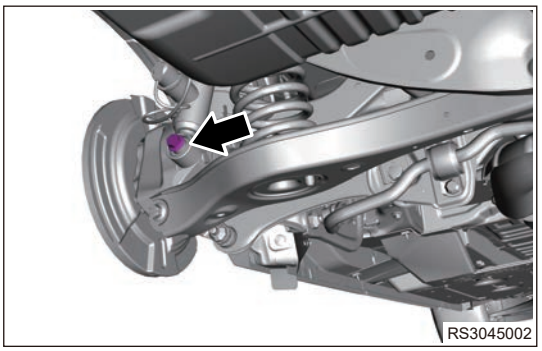
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

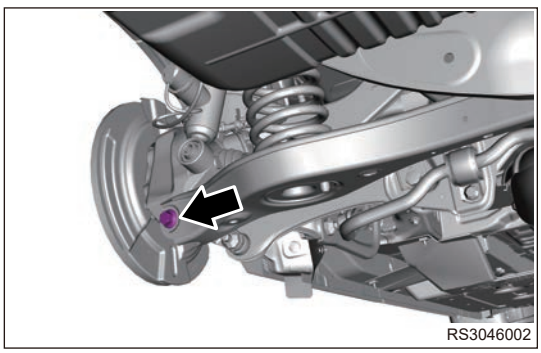
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

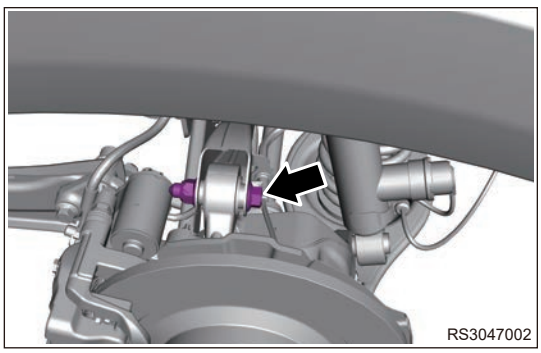
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear left wheel.
(4) Remove the rear brake caliper assembly.
(5) Remove the rear brake disc.
(6) Remove the rear dust guard.
(7) Remove the rear wheel speed sensor.
(8) Remove the rear hub bearing.
(9) Remove coupling bolt between rear shock absorber assembly and rear steering knuckle assembly.


RS3045002

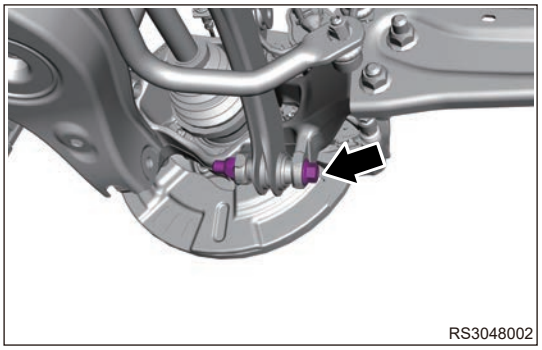
(10) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.


RS3046002

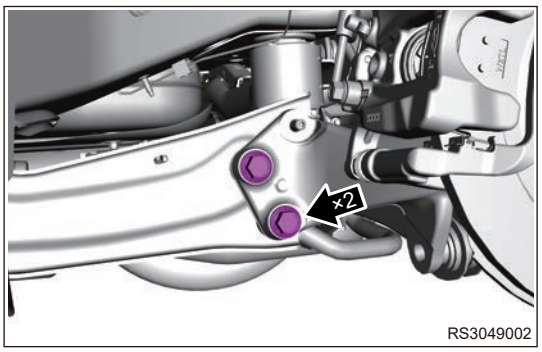
(11) Remove coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.


RS3047002

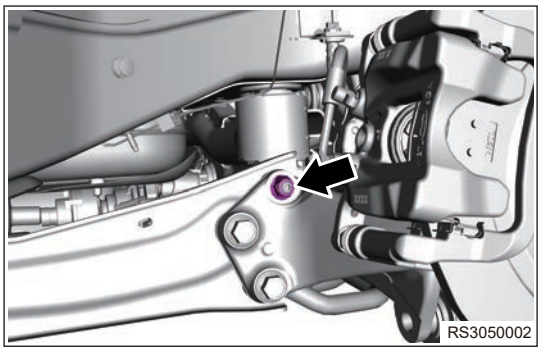
(12) Remove coupling bolt and nut between pull rod assembly and rear steering knuckle assembly.



(13) Remove 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.



(14) Remove 1 coupling nut of rear connecting rod through trailing arm assembly and steering knuckle.



(15) Remove the rear steering knuckle assembly.

■ Installation

⚠ Caution

- **Be sure to tighten bolts to specified torque.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.

Torque: 160 ± 0.5 N · m

(2) Install 1 coupling nut of rear connecting rod through trailing arm assembly and steering knuckle.

Torque: 60 ± 0.5 N · m

(3) Install coupling bolt and nut between pull rod assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Install coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(5) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(6) Install coupling bolt between rear shock absorber assembly and rear steering knuckle assembly.

Torque: 160 ± 0.5 N · m

(7) Install the rear hub bearing.

(8) Install the rear wheel speed sensor.

(9) Install the rear dust guard.

(10) Install the rear brake disc.

(11) Install the rear brake caliper assembly.

(12) Install the rear left wheel.

(13) Connect the negative battery cable.

4.12 Rear Sub Frame Assembly

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify bearing parts of wheel suspension and guide parts of wheel.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear left and rear right wheels.

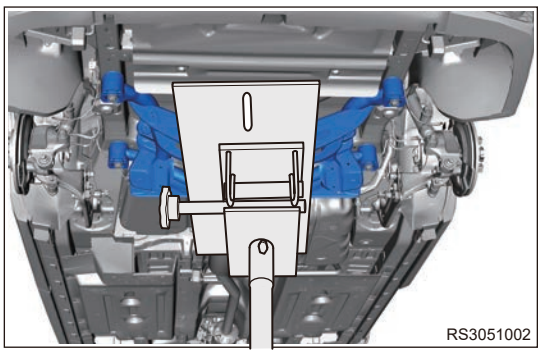
(4) Remove the rear muffler assembly.

(5) Remove the rear left and rear right lower control arm assembly.

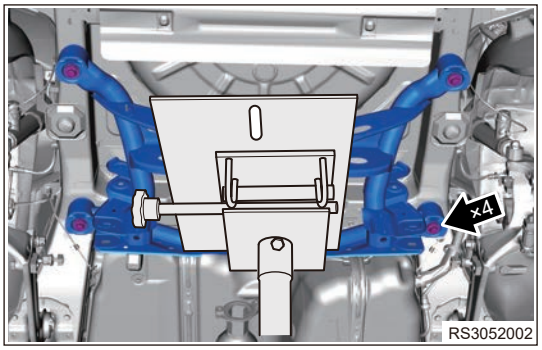
(6) Remove the rear left and right pull rod assembly.

(7) Remove the rear stabilizer bar assembly.

(8) Install transmission carrier to support rear sub frame assembly.



(9) Remove 4 coupling bolts between rear sub frame assembly and body.



(10) Remove the rear sub frame assembly.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Bounce vehicle up and down several times to stabilize rear suspension after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install transmission carrier to lift rear sub frame to a proper height.
(2) Install 4 coupling bolts between rear sub frame assembly and body.

Torque: 220 ± 0.5 N · m

(3) Install the rear stabilizer bar assembly.
(4) Install the left and right pull rod assembly.
(5) Install the rear left and rear right lower control arm assembly.
(6) Install the rear left and rear right wheels.
(7) Install the rear muffler assembly.
(8) Connect the negative battery cable.

5.5 REAR SUSPENSION (CONTINUOUSLY ADJUSTABLE DAMPER SHOCK ABSORBER)

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Be sure to wear necessary safety equipment to prevent accidents.

(2) Check if safety lock of lifter is locked when repairing chassis parts.

(3) It is not allowed to weld or modify suspension loading parts and guide parts.

(4) When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Be sure to tighten coupling bolts and nuts to specified torques.

(2) Align the protrusion of rear coil spring lower cushion with the positioning hole of rear lower control arm during installation.

(3) Before assembling control arm assembly, apply grease on the outside of control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.

(4) Due to rubber bushing deformation, tightened bolt will exit false torque, so it is necessary to retighten the tightened bolt.

(5) After installation, lower vehicle and bounce vehicle up and down several times to stabilize rear suspension.

(6) Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.

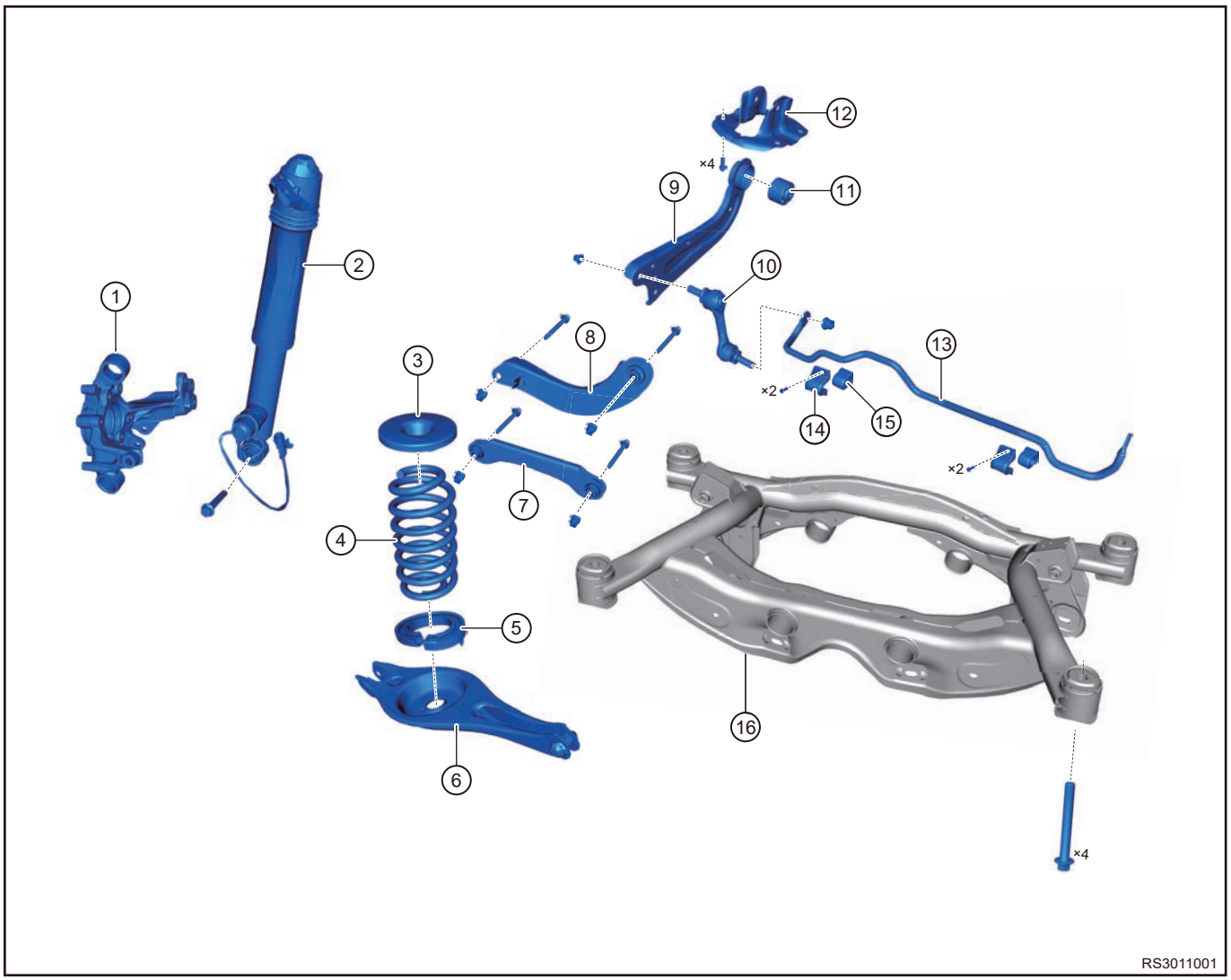
(7) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

Rear suspension of this model uses multi-link independent suspension (height is non-adjustable), which is equipped with lateral stabilizer, cylindrical coil spring and double action telescopic shock absorber. Configured electronic control shock absorber adjusts damper force automatically according to vehicle conditions, so as to satisfy requirements of controllability and smoothness for vehicle.

2.2 System Components Diagram



1	Rear Left Steering Knuckle	9	Rear Right Trailing Arm Welding Assembly
2	Rear Shock Absorber Device	10	Rear Connecting Rod Assembly
3	Upper Coil Spring Cushion Assembly	11	Trailing Arm Bushing Assembly
4	Rear Coil Spring Assembly	12	Trailing Arm Mounting Bracket Assembly
5	Lower Coil Spring Cushion Assembly	13	Rear Stabilizer Bar
6	Rear Lower Control Arm Welding Assembly	14	Rear Stabilizer Bar Clamp
7	Pull Rod Welding Assembly	15	Stabilizer Bar Bushing
8	Rear Upper Control Arm Welding Assembly	16	Rear Sub Frame Assembly

2.3 Component Operation Description

■ Rear Control Arm Welding Assembly

As a guide and power transmission element for suspension system of vehicle, control arm transmits various power acting on wheels to vehicle body and keeps wheels moving in a certain trail. Control arm elastically connects wheels and vehicle body together with ball joint or bushing.


RS3001002

■ Rear Shock Absorber Assembly

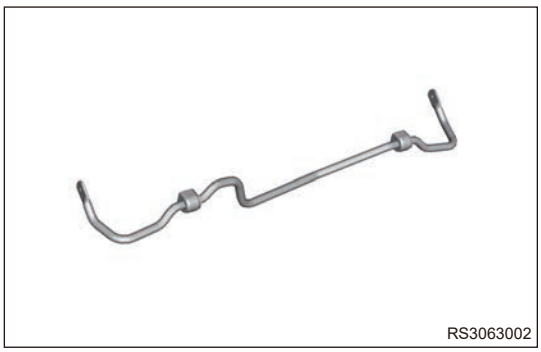
It filters and eliminates vibration from roads to improve driving stability and bring people a sense of comfort and stability.

Vehicle analyzation is performed according to CAN signal and wheel / body acceleration signal, and it controls vehicle posture, driving performance, non-spring loaded vibration, limit position and damper deviation, the four wheels electric control damper current is input by ECU. According to input current of ECU, solenoid valve adjusts cross-sectional area of shock absorber fluid passage to output required damper force.


RS3060002

■ Rear Stabilizer Bar Assembly

Lateral stabilizer bar functions to prevent excessive lateral incline while vehicle is turning and keeps vehicle body in balance as much as possible. It aims to reduce lateral incline level of vehicle and improve smoothness. When vehicle is turning, vehicle body inclines and suspension on both sides have inconsistent bounce. The outer suspension will press against stabilizer bar to twist it, then elastic force from bar body will prevent wheel from lifting, so that vehicle body can be kept in balance as much as possible, thus realizing the lateral stability function.


RS3063002

■ Rear Sub Frame Assembly

Sub frame can reduce impact on vehicle body due to road shock and enhance connection rigid of suspension system and improve driving comfort and stability, making a strong and compact chassis during driving. It bears the deformation conditions such as loaded bend, longitudinal torsion, lateral bend and horizontal lozenging, etc. in place of vehicle body, which improves torsion resistance ability of vehicle body. Also, the force will be directly applied on it in a collision to improve vehicle safety performance.


RS3061002

3 Diagnosis & Testing

3.1 Problem Symptoms Table

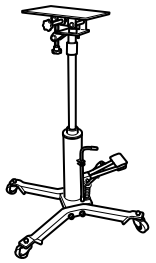
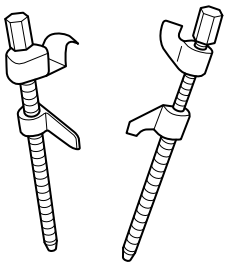
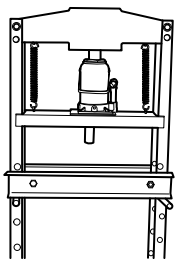
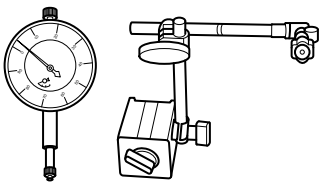
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Running deviation	Tire (worn or improperly inflated)
	Rear wheel alignment (incorrect)
	Rear hub bearing (excessively worn)
	Rear suspension components (worn or deformed)
	Steering gear (misaligned or damaged)
	Suspension component (worn)
Droop	Vehicle (overloaded)
	Rear coil spring (too soft)
	Rear shock absorber assembly (worn or damaged)
	Rear suspension components (excessively worn or deformed)
	Rear tire (improperly inflated)
	Rear wheel alignment (incorrect)
Sways/pitches	Rear tire (worn or improperly inflated)
	Rear stabilizer bar assembly (bent or broken)
	Rear shock absorber assembly (worn or damaged)
Rear wheel shimmy	Rear tire (worn or improperly inflated)
	Rear wheel (out of balance)
	Rear shock absorber assembly (worn or damaged)
	Rear wheel alignment (incorrect)
	Rear hub bearing (excessively worn)

4 On-vehicle Service

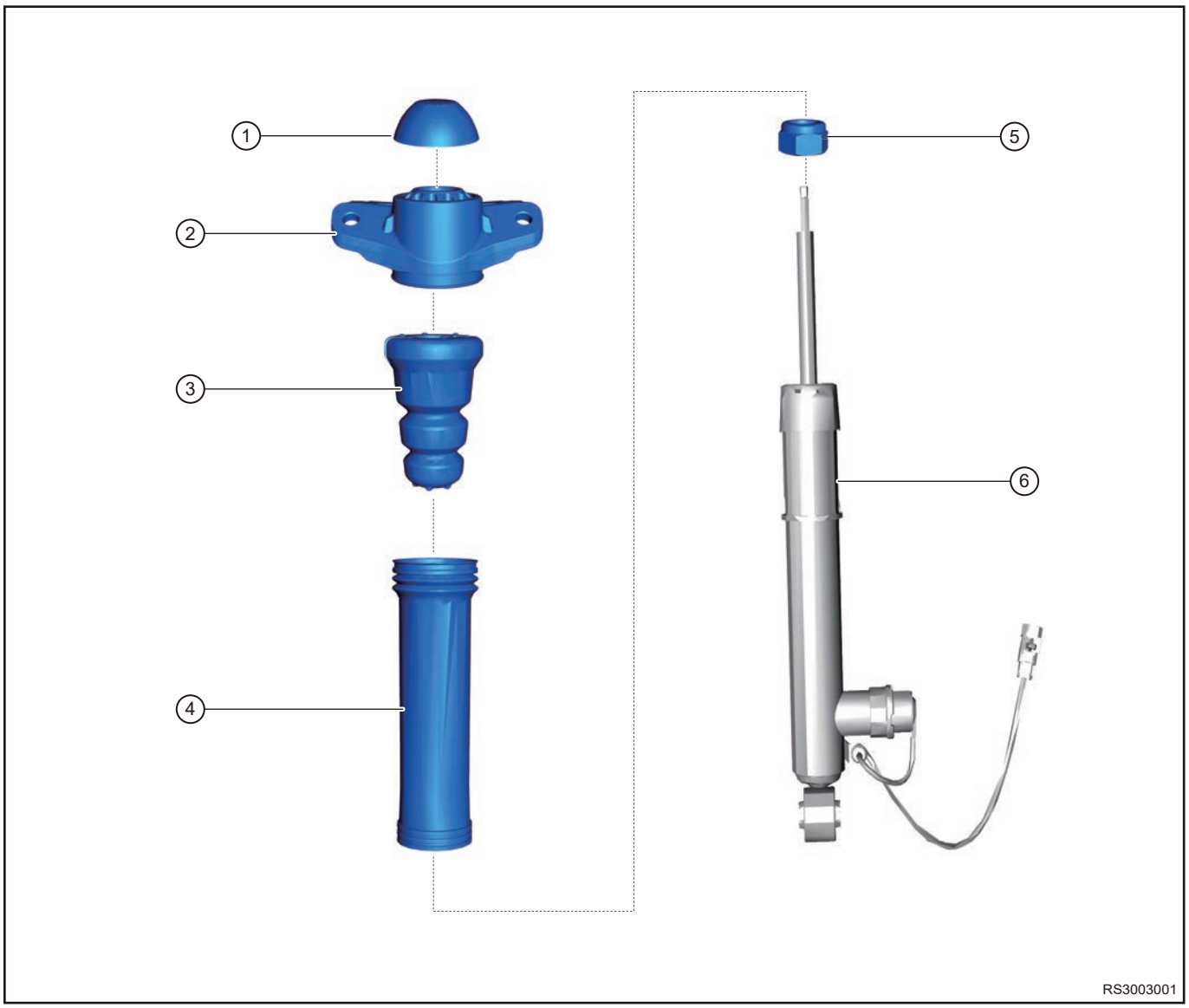
4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Transmission Carrier	 S00004
Spring Compressor	 S00016
Hydraulic Press	 S00010
Dial Indicator and Magnetic Holder	 S00018

4.2 Rear Shock Absorber Assembly

■ Description



1	Shock Absorber Cover Cap	4	Rear Shock Absorber Dust Boot
2	Rear Shock Absorber Upper Connecting Plate Assembly	5	Rear Shock Absorber Upper Nut
3	Rear Shock Absorber Buffer Block	6	Rear Shock Absorber Assembly

■ On-vehicle Inspection

Rear Shock Absorber Assembly Inspection

(1) Park vehicle on level ground, and bounce vehicle up and down, then check if vehicle shakes up and down when body bounds. If vehicle shakes up and down consecutively, shock absorber assembly may be damaged and should be replaced.

(1) As shock absorber assembly operates frequently during vehicle driving, oil gas is formed due to temperature rise of shock absorber, which then adheres to dust boot. This is a normal phenomenon, and it is not necessary to replace the shock absorber assembly.

(2) When any of the following conditions occurs:

- Oil traces in circumferential direction are uneven;

- Oil traces reach lower connecting positions.

Above conditions indicate that there may be leakage in shock absorber assembly, and it is necessary to replace the shock absorber assembly.

(3) If it is difficult to accurately judge shock absorber assembly for leakage from appearance. Perform road test after wiping off oil on the surface of malfunctioning shock absorber. Under normal road conditions, drive vehicle for 5 to 10 minutes and perform inspection. If there are oil traces at the shock absorber assembly surface, it indicates that oil leakage exists, and it is necessary to replace the shock absorber assembly.

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Make sure that safety lock of lifter has been locked, when removing and installing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing and installing chassis parts, replace self-locking nuts and rusted nuts for safety.**

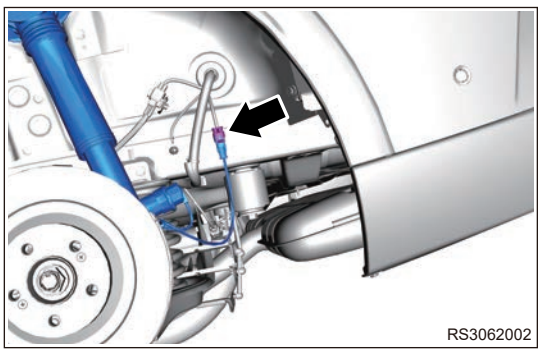
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

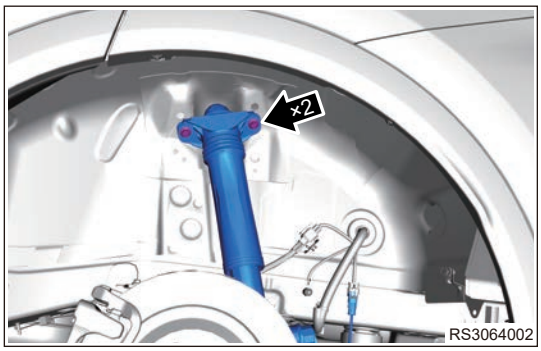
(3) Remove the rear left wheel.

(4) Remove the rear left wheel house protector.

(5) Disconnect the rear left speaker connector (arrow).


RS3062002

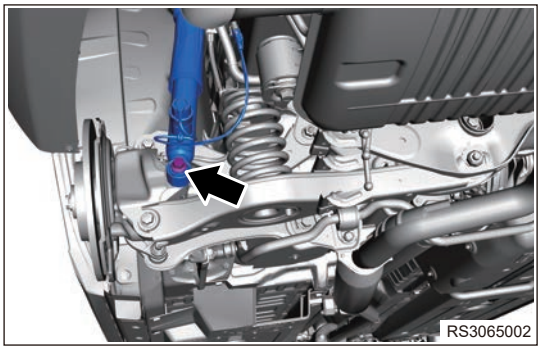
(6) Remove 2 coupling bolts (arrow) between upper part of rear left shock absorber assembly and body.



RS3064002

(7) Support the lower control arm with a transmission carrier.

(8) Remove coupling bolt and nut (arrow) between lower part of rear left shock absorber assembly and rear left steering knuckle assembly.



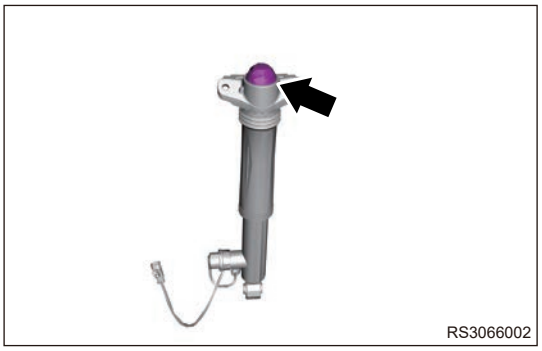
(9) Remove the rear left shock absorber assembly.

■ Disassembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Remove the rear left shock absorber cover cap.



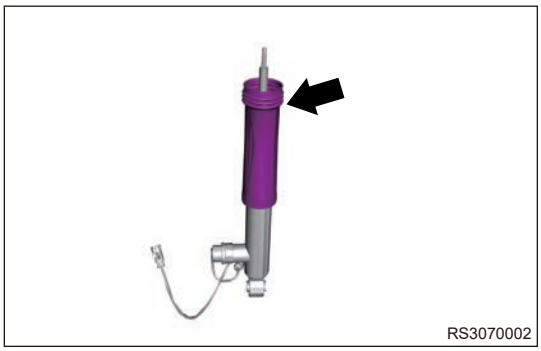
(2) Remove fixing nut from rear left shock absorber assembly.

(3) Remove the rear left shock absorber upper connecting plate assembly.

(4) Remove the rear buffer block.


RS3069002

(5) Remove the rear dust boot.


RS3070002

■ **Assembly**

(1) Install the rear dust cover.
(2) Install the rear buffer block.
(3) Install the rear left shock absorber upper connecting plate assembly.
(4) Install fixing nut to rear left shock absorber assembly.
(5) Install the shock absorber cover cap.

■ **Inspection**

(1) Check the components of front shock absorber assembly
  1) Check front shock absorber cover cap, front spring upper cushion, front dust boot, front buffer block and front spring lower cushion for cracks, wear or deformation. Replace it as necessary.
  2) Check front coil spring for wear, cracks or deformation. Replace it as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Bounce vehicle up and down several times to stabilize rear suspension after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install 2 coupling bolts between upper part of rear left shock absorber assembly and body.

Torque: 60 ± 0.5 N · m

(2) Install coupling bolt and nut between lower part of rear left shock absorber assembly and rear left steering knuckle assembly.

Torque: 160 ± 0.5 N · m

(3) Connect the shock absorber connector.
(4) Install the rear left wheel house protector.
(5) Install the rear left wheel.
(6) Connect the negative battery cable.

4.3 Rear Coil Spring

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

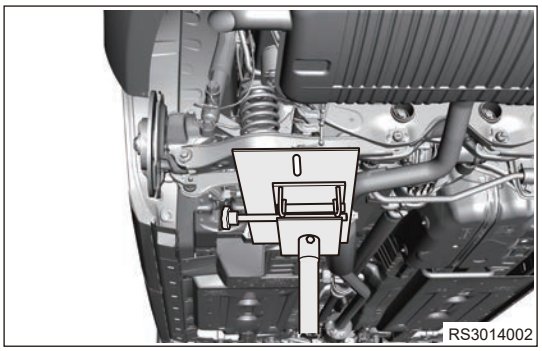
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

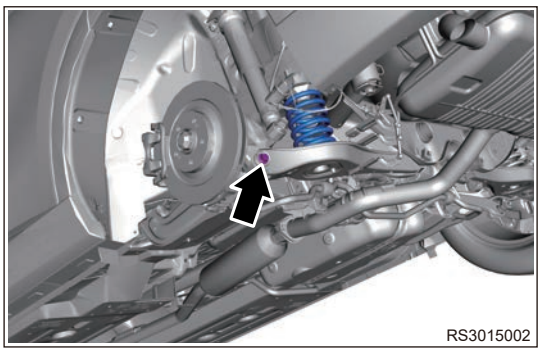
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

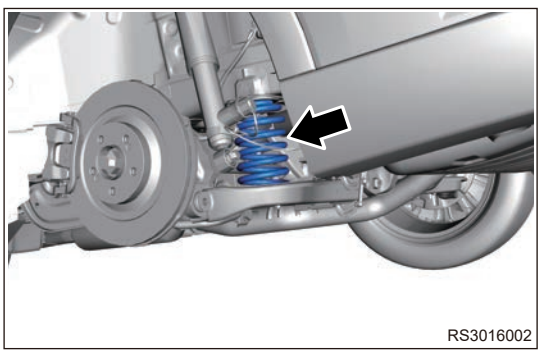
(4) Support the rear lower control arm with a transmission carrier securely.


RS3014002

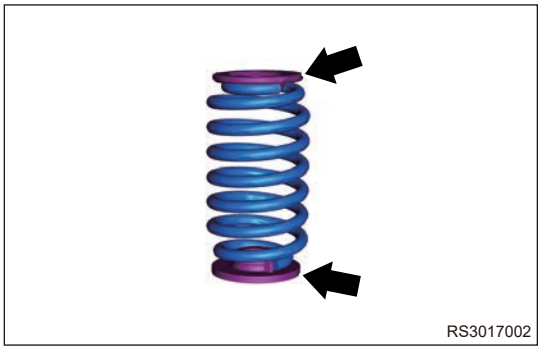
(5) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.


RS3015002

(6) Lower the transmission carrier slowly to an appropriate height and remove the rear coil spring carefully.


RS3016002

(7) Remove the rear coil spring upper and lower cushions.



■ **Inspection**

(1) Check rear coil spring for wear, cracks or permanent deformation due to excessive use. Replace it as necessary.

(2) Check rear coil spring upper cushion and lower cushion for dirty, wear, cracks, deformation or damage. Replace it as necessary.

(3) Check the free length of rear coil spring.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Align the protrusion of rear coil spring lower cushion with the positioning hole of rear lower control arm during installation.**
- **After installation, lower vehicle and bounce vehicle up and down several times to stabilize rear suspension.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install the rear coil spring upper and lower cushions.

(2) Install coil spring and use transmission carrier to lift rear lower control arm to a proper height.

(3) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Slowly lower the transmission carrier and remove it.

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.4 Rear Upper Control Arm Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

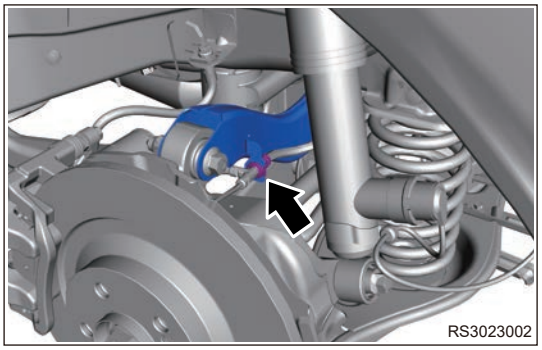
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

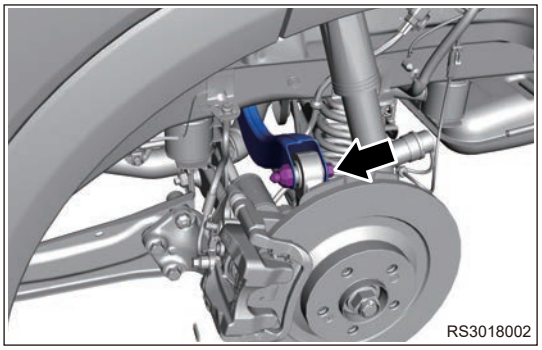
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

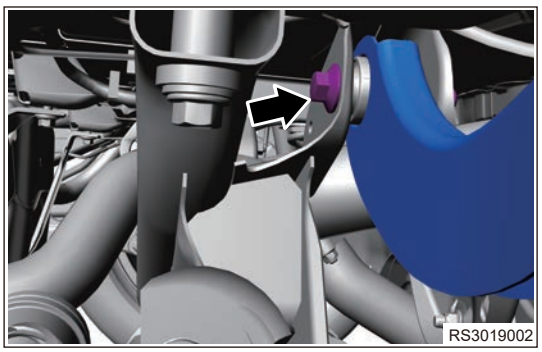
(4) Disconnect connector between rear left wheel speed sensor caliper wire harness and upper control arm.



(5) Remove coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

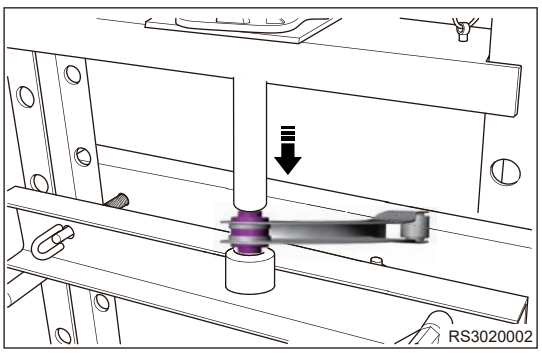


(6) Remove coupling bolt between rear upper control arm assembly and rear sub frame welding assembly.



(7) Remove the rear upper control arm assembly.

(8) Place the rear upper control arm assembly on a hydraulic press, cooperate with tools, and press out rear upper control arm assembly rubber bushing with hydraulic press.



■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Place the rear upper control arm assembly on a hydraulic press, cooperate with tools, and press control arm assembly rubber bushing into rear upper control arm with hydraulic press.

⚠ Caution

- **Before pressing in, apply grease on the outside of control arm assembly rubber bushing to prevent control arm assembly rubber bushing from being damaged.**

(2) Install coupling bolt between rear upper control arm assembly and rear sub frame welding assembly.

Torque: 180 ± 0.5 N · m

(3) Install coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Install connector between rear left wheel speed sensor caliper wire harness and upper control arm.

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.5 Rear Lower Control Arm Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

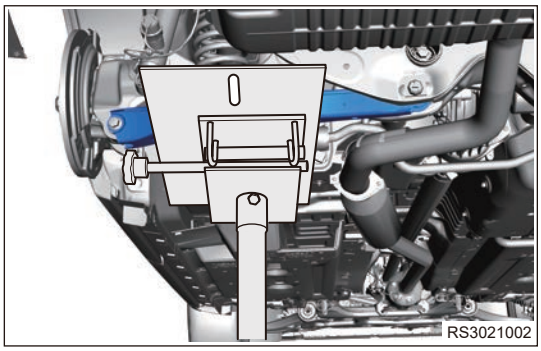
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

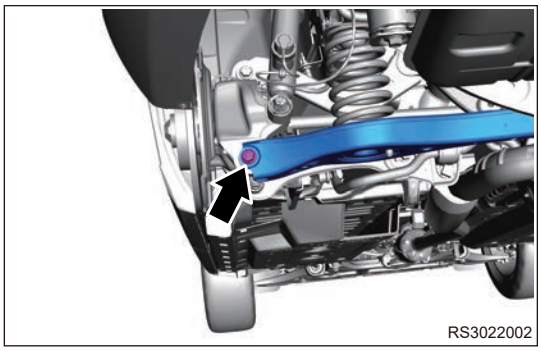
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Support the rear lower control arm assembly with a transmission carrier securely.

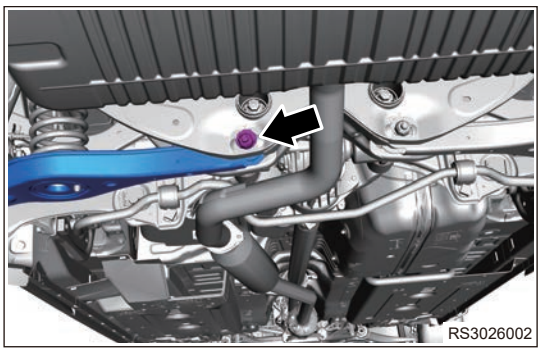

RS3021002

(5) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.


RS3022002

(6) Lower the transmission carrier slowly to a proper height and remove rear coil spring, rear coil spring upper cushion and rear coil spring lower cushion carefully.

(7) Remove eccentric adjusting bolt, nut and adjusting shim between rear lower control arm assembly and rear sub frame assembly.



(8) Remove the rear lower control arm assembly.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install eccentric adjusting bolt, nut and adjusting shim between rear lower control arm assembly and rear sub frame assembly.

Torque: 130 ± 0.5 N · m

(2) Install rear coil spring, rear coil spring upper and lower cushions and use transmission carrier to lift rear lower control arm to a proper height.

(3) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Slowly lower the transmission carrier.

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.6 Rear Trailing Arm Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

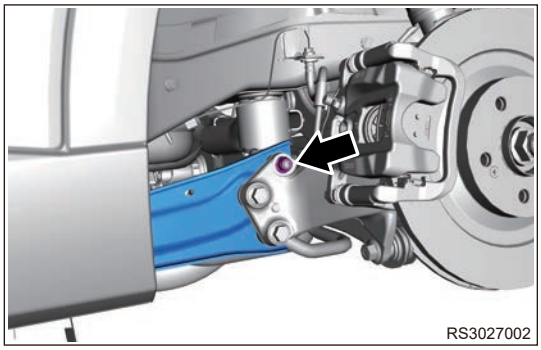
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

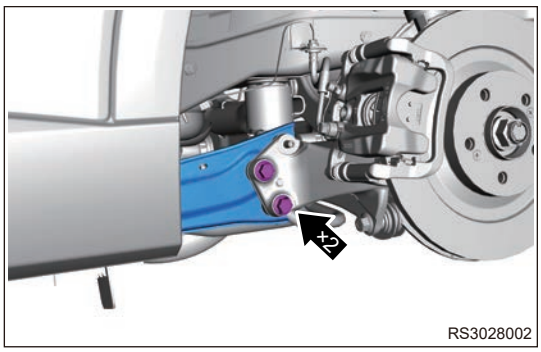
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Remove coupling nut on rear connecting rod through rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.

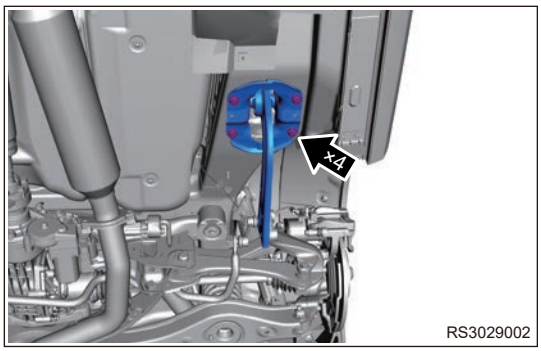

RS3027002

(5) Remove 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.



RS3028002

(6) Remove 4 coupling bolts between rear trailing arm assembly mounting bracket and body.



RS3029002

(7) Remove the rear trailing arm assembly (w/ mounting bracket).

■ Disassembly

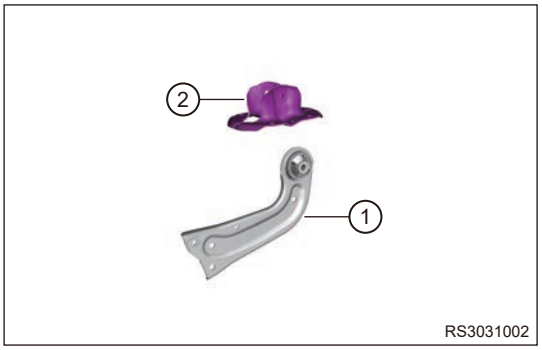
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

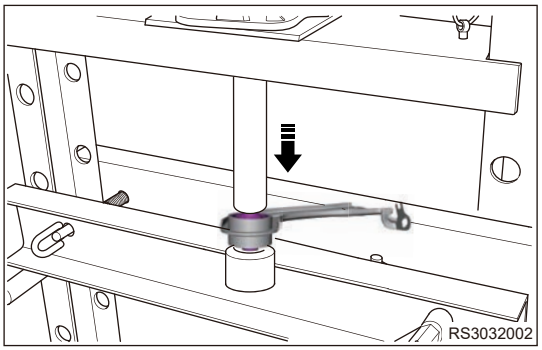
(1) Remove coupling bolt and nut between rear trailing arm assembly and mounting bracket.


RS3030002

(2) Separate rear trailing arm assembly (1) from mounting bracket (2).



(3) Place the rear trailing arm assembly on a hydraulic press, and press out rear trailing arm assembly rubber bushing with hydraulic press.



■ Assembly

(1) Place the rear trailing arm assembly on a hydraulic press, cooperate with tools, and press rear trailing arm assembly rubber sleeve into rear trailing arm assembly with hydraulic press.

⚠ Caution

- **Before pressing in, apply grease on the outside of trailing arm assembly rubber boot to prevent it from damage.**

(2) Install coupling bolt and nut between rear trailing arm assembly and mounting bracket.

Torque: 180 ± 0.5 N · m

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install 4 coupling bolts between rear trailing arm assembly mounting bracket and body.

Torque: 65 ± 0.5 N · m

(2) Install 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.

Torque: 160 ± 0.5 N · m

(3) Install coupling nut on rear connecting rod through trailing arm assembly and steering knuckle.

Torque: 60 ± 0.5 N · m

(4) Install the rear left wheel.

(5) Connect the negative battery cable.

4.7 Rear Pull Rod Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

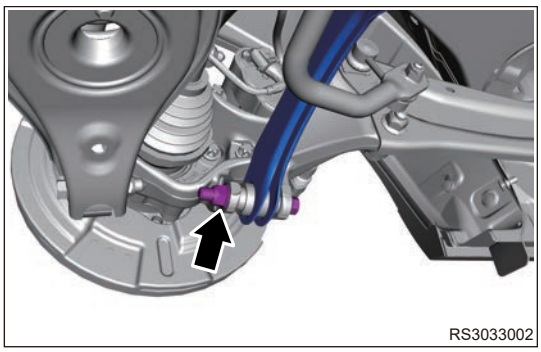
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

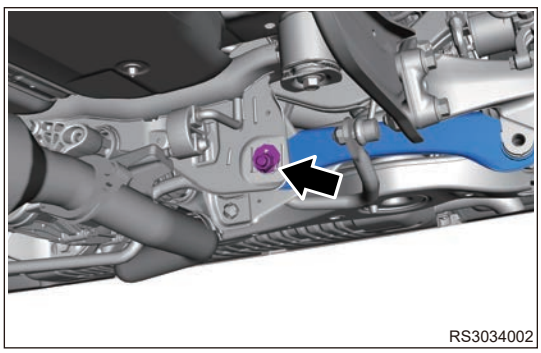
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Remove coupling bolt and nut between rear pull rod assembly and rear steering knuckle assembly.

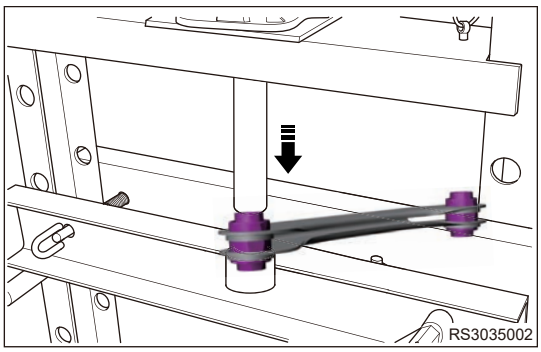

RS3033002

(5) Remove eccentric adjusting bolt, nut and adjusting shim between rear pull rod assembly and rear sub frame assembly.


RS3034002

(6) Remove the rear pull rod assembly.

(7) Place the rear pull rod assembly on a hydraulic press, and press out rear pull rod assembly rubber bushing with hydraulic press.


RS3035002

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**

(1) Place the rear pull rod assembly on a hydraulic press, cooperate with tools, and press rear pull rod assembly rubber boot into rear pull rod assembly with hydraulic press.

⚠ Caution

- **Before pressing in, apply grease on the outside of rear pull rod assembly rubber boot to prevent it from damage.**

(2) Install eccentric adjusting bolt, nut and adjusting shim between rear pull rod assembly and rear sub frame assembly.

Torque: 130 ± 0.5 N · m

(3) Install coupling bolt and nut between rear pull rod assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Install the rear left wheel.

(5) Connect the negative battery cable.

4.8 Rear Stabilizer Bar Assembly

■ Removal

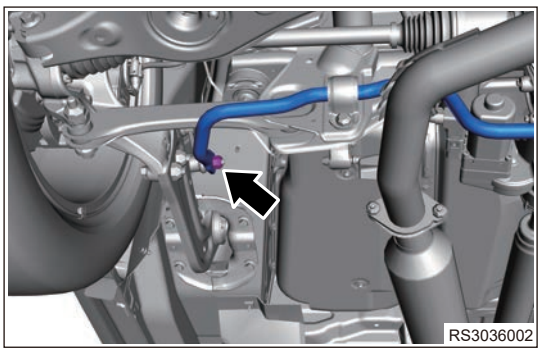
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

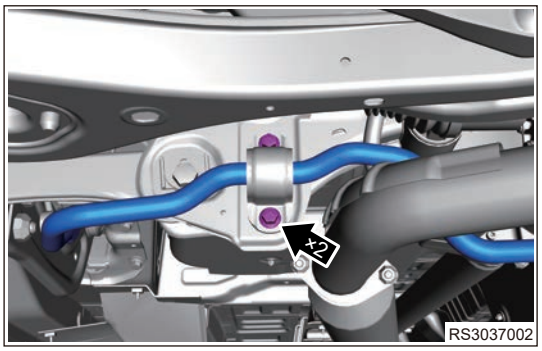
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove coupling nut between rear left connecting rod assembly and rear stabilizer bar assembly. Use same removal procedure for right side.

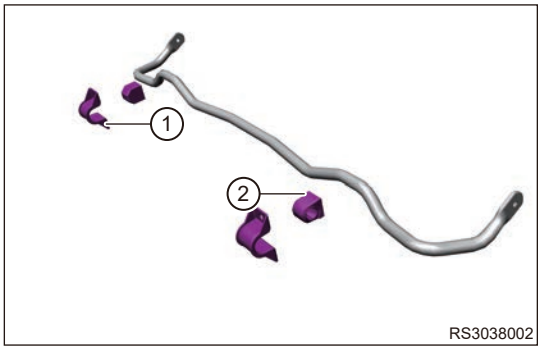


(4) Remove 2 coupling bolts between rear stabilizer bar assembly and rear sub frame welding assembly (Take left side as an example). Use same removal procedure for right side.



(5) Remove the rear stabilizer bar assembly.

(6) Remove rear stabilizer bar fixing clamp (1) and rear stabilizer bar rubber support (2) from rear stabilizer bar assembly.



■ **Inspection**

(1) Check rear stabilizer bar assembly fixing clamps for wear, cracks, deformation or damage. Replace it as necessary.

(2) Check rear stabilizer bar assembly rubber supports for dirt, wear, cracks, deformation or damage. Replace it as necessary.

■ **Installation**

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install rear stabilizer bar fixing clamp and rear stabilizer bar rubber support.

(2) Install 2 coupling bolts between rear stabilizer bar assembly and rear sub frame welding assembly (Take left side as an example). Use same installation procedure for right side.

Torque: 60 ± 0.5 N · m

⚠ Caution

- **Due to rubber bushing deformation, tightened bolt will exit false torque, so it is necessary to retighten the tightened bolt.**

(3) Place rear connecting rod shield on rear connecting rod, install coupling nut between rear left connecting rod assembly and rear stabilizer bar assembly. Use same installation procedure for right side.

Torque: 60 ± 0.5 N · m

(4) Connect the negative battery cable.

4.9 Rear Connecting Rod Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Warning

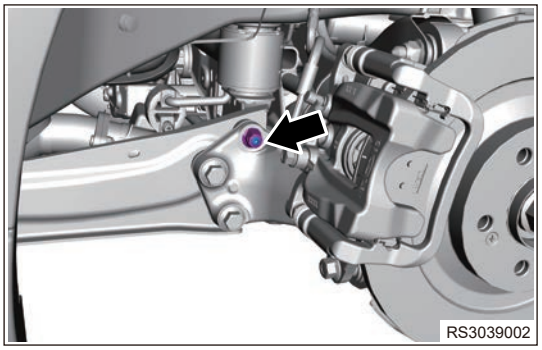
- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

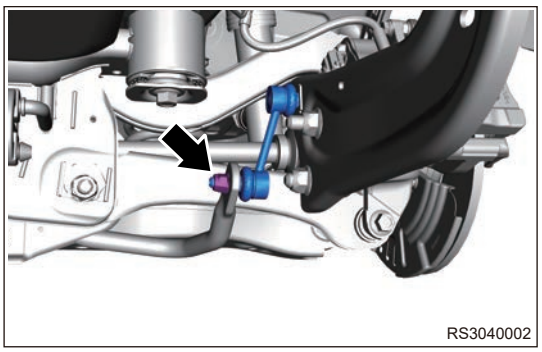
(2) Disconnect the negative battery cable.

(3) Remove the rear left wheel.

(4) Remove coupling nut on rear connecting rod through rear connecting rod assembly and rear trailing arm assembly, and disengage rear connecting rod assembly.



(5) Remove coupling nut between rear connecting rod assembly and rear stabilizer bar assembly, and remove rear connecting rod assembly.



■ Inspection

(1) Check rear connecting rod assembly bush for wear, cracks, deformation, damage or grease leakage. Replace it as necessary.

(2) Check if end of rear connecting rod assembly rotates smoothly. Replace it as necessary.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Make sure that end of rear connecting rod assembly rotates smoothly without any sticking after installation.**

(1) Install coupling nut between rear connecting rod assembly and rear stabilizer bar assembly.

Torque: 60 ± 0.5 N · m

(2) Install coupling nut on rear connecting rod through trailing arm assembly and steering knuckle.

Torque: 60 ± 0.5 N · m

(3) Install the rear left wheel.

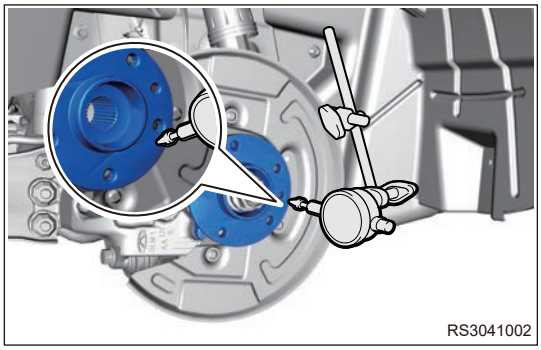
(4) Connect the negative battery cable.

4.10 Rear Hub Bearing Assembly

■ On-vehicle Inspection

(1) Remove the rear wheel.
(2) Remove the rear brake caliper assembly.
(3) Remove the rear brake disc.
(4) Check looseness of rear hub bearing.

1) Check looseness near center of the rear hub bearing with a dial indicator. Maximum looseness: 0.05 mm

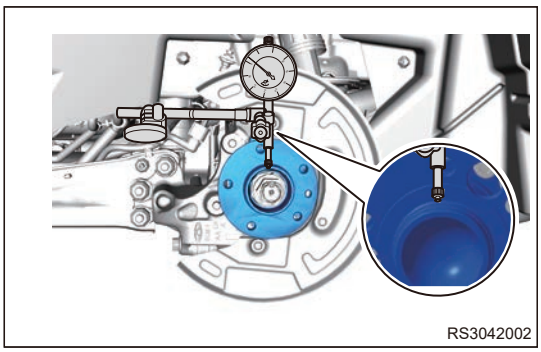

RS3041002

⚠ Caution

- **Ensure that dial indicator is perpendicular to measurement surface.**
- **If looseness exceeds maximum value, replace the rear hub bearing assembly.**

(5) Check the rear hub bearing runout.

1) Check runout of the rear hub bearing set with a dial indicator. Maximum runout: 0.05 mm.


RS3042002

⚠ Caution

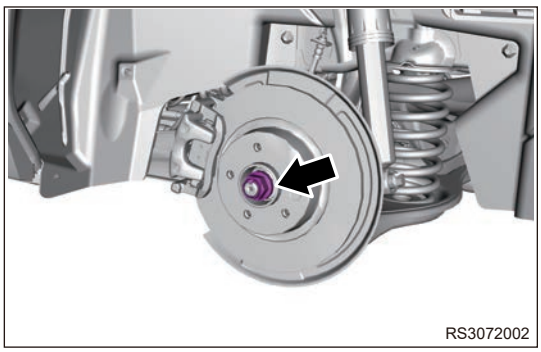
- **Ensure that dial indicator is perpendicular to measurement surface.**
- **If looseness exceeds maximum value, replace the rear hub bearing assembly.**

■ Removal

Hint:

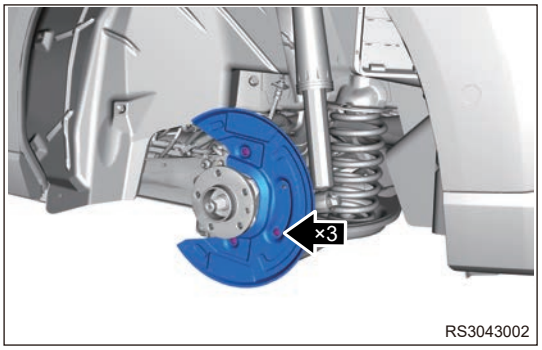
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear left wheel.
(4) Remove locking nut from rear left drive shaft.

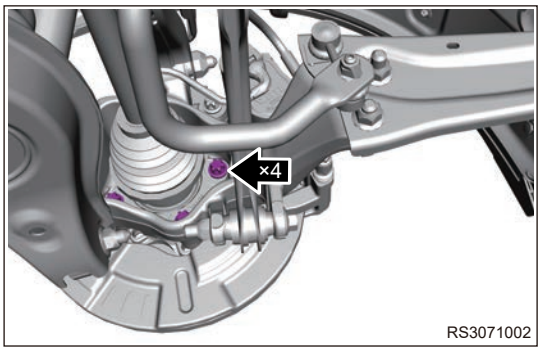

RS3072002

(5) Remove the rear left brake caliper assembly.
(6) Remove the rear left brake disc.

(7) Remove 3 fixing bolts between rear dust guard and rear left steering knuckle, and remove rear dust guard.



(8) Remove 4 fixing bolts of rear hub bearing.



(9) Remove the rear hub bearing.

■ **Installation**

⚠ **Caution**
• **Be sure to tighten coupling bolts and nuts to specified torques.** • **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install dust guard and tighten 3 fixing bolts

Torque: 10 ± 1 N·m

(2) Install rear wheel bearing, and tighten 4 fixing bolts.

Torque: 110 ± 0.5 N · m

(3) Install the rear left brake disc.

Torque: 8 ± 1 N·m

(4) Install the rear brake caliper assembly.

Torque: 115 ± 0.5 N · m

(5) Install the rear left wheel.

(6) Connect the negative battery cable.

4.11 Rear Steering Knuckle

■ **Removal**

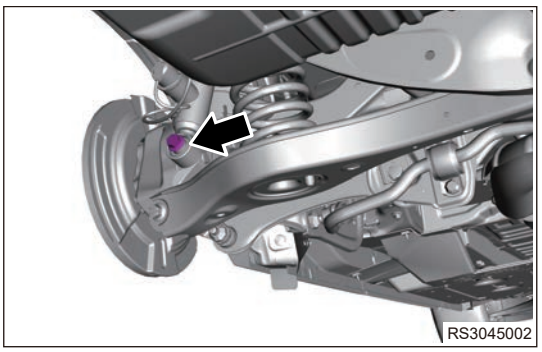
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

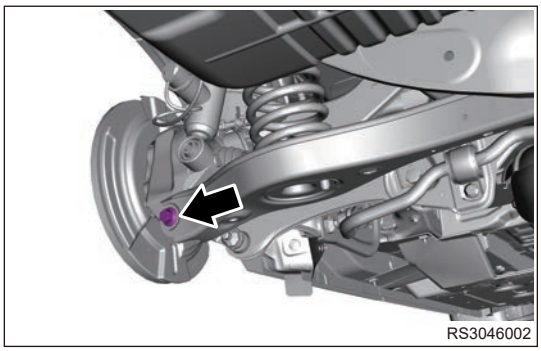
Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify suspension loading parts and guide parts.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

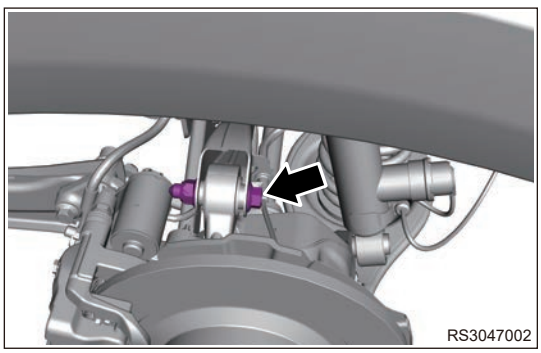
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear left wheel.
(4) Remove the rear brake caliper assembly.
(5) Remove the rear brake disc.
(6) Remove the rear dust guard.
(7) Remove the rear wheel speed sensor.
(8) Remove the rear hub bearing.
(9) Remove coupling bolt between rear shock absorber assembly and rear steering knuckle assembly.


RS3045002

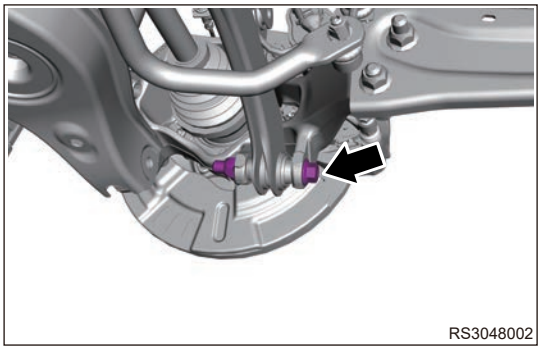
(10) Remove coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.


RS3046002

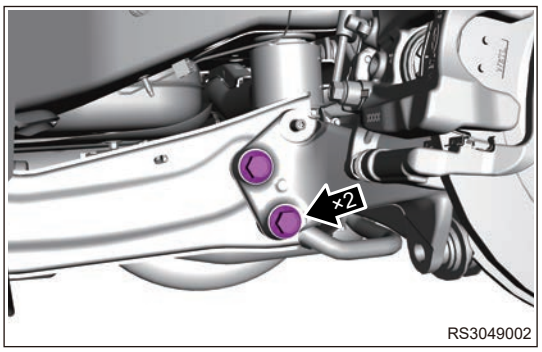
(11) Remove coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.


RS3047002

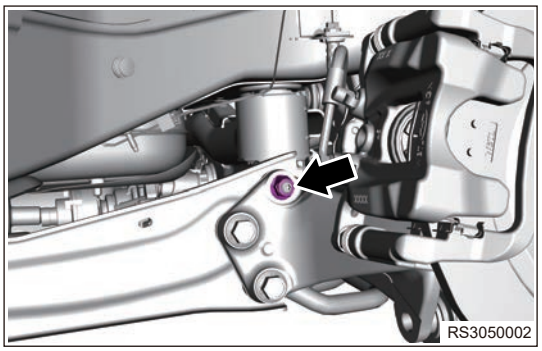
(12) Remove coupling bolt and nut between pull rod assembly and rear steering knuckle assembly.



(13) Remove 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.



(14) Remove 1 coupling nut of rear connecting rod through trailing arm assembly and steering knuckle.



(15) Remove the rear steering knuckle assembly.

■ Installation

⚠ Caution

- **Be sure to tighten bolts to specified torque.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to the standard range as necessary.**

(1) Install 2 coupling bolts and nuts between rear steering knuckle assembly and rear trailing arm assembly.

Torque: 160 ± 0.5 N · m

(2) Install 1 coupling nut of rear connecting rod through trailing arm assembly and steering knuckle.

Torque: 60 ± 0.5 N · m

(3) Install coupling bolt and nut between pull rod assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(4) Install coupling bolt and nut between rear upper control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(5) Install coupling bolt and nut between rear lower control arm assembly and rear steering knuckle assembly.

Torque: 180 ± 0.5 N · m

(6) Install coupling bolt between rear shock absorber assembly and rear steering knuckle assembly.

Torque: 160 ± 0.5 N · m

(7) Install the rear hub bearing.

(8) Install the rear wheel speed sensor.

(9) Install the rear dust guard.

(10) Install the rear brake disc.

(11) Install the rear brake caliper assembly.

(12) Install the rear left wheel.

(13) Connect the negative battery cable.

4.12 Rear Sub Frame Assembly

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents.**
- **Check if safety lock of lifter is locked when repairing chassis parts.**
- **It is not allowed to weld or modify bearing parts of wheel suspension and guide parts of wheel.**
- **When removing chassis parts, be sure to replace self-locking nuts and rusted nuts for safety.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear left and rear right wheels.

(4) Remove the rear muffler assembly.

(5) Remove the rear left and rear right lower control arm assembly.

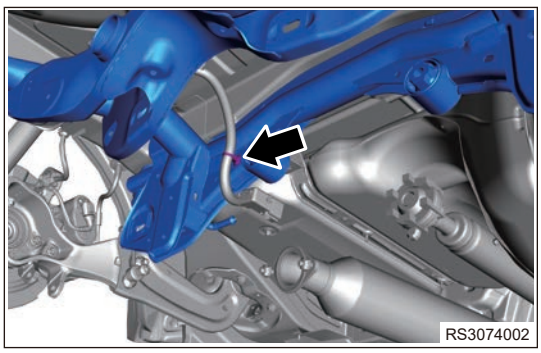
(6) Remove the rear left and right pull rod assembly.

(7) Remove the rear stabilizer bar assembly.

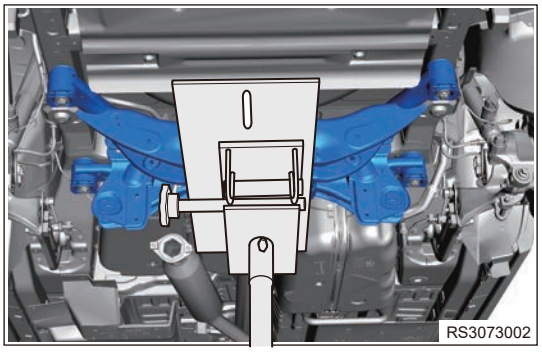
(8) Remove the rear left and rear right drive shaft assembly.

(9) Remove the rear final drive assembly.

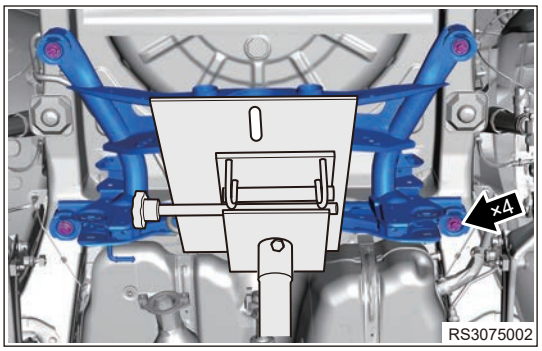
(10) Disconnect clip between 4WD motor wire harness and rear sub frame.



(11) Install transmission carrier to support rear sub frame assembly.



(12) Remove 4 coupling bolts between rear sub frame assembly and body.



(13) Remove the rear sub frame assembly.

■ Installation

⚠ Caution

- **Be sure to tighten coupling bolts and nuts to specified torques.**
- **Bounce vehicle up and down several times to stabilize rear suspension after installation.**
- **Check wheel alignment after installation is completed. Adjust wheel alignment to standard range as necessary.**

(1) Install transmission carrier to lift rear sub frame to a proper height.
(2) Install 4 coupling bolts between rear sub frame assembly and body.

Torque: 220 ± 0.5 N · m

(3) Install the rear final drive assembly.
(4) Install the rear left and right drive shaft assembly.
(5) Fill the final drive oil.
(6) Install clip between 4WD motor wire harness and rear sub frame.
(7) Install the rear stabilizer bar assembly.
(8) Install the left and right pull rod assembly.
(9) Install the rear left and rear right lower control arm assembly.
(10) Install the rear left and rear right wheels.
(11) Install the rear muffler assembly.
(12) Connect the negative battery cable.

5.6 TIRE AND WHEEL

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Use tire pressure gauge when inflating, and never inflate according to the tire pressure indication on meter. If inflating tires using pressure values displayed from tire pressure monitoring system, inflation pressure may be higher than the standard value, resulting in a risk of accident.

(2) If the tire pressure is too low, please resume it to normal pressure as soon as possible. Too low tire pressure will increase fuel consumption and tire wear. And seriously worn tire will cause an accident such as flat tire.

(3) Speed level of new replaced tire must meet the specified values for safe operation; otherwise the tire may blow out.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) Be sure to refer to the instruction when installing non-standard tires and rims.

(2) Use tires with standard specification and type.

(3) Avoid scratching tires and rims when removing and installing tires.

(4) Spare tire is not equipped with tire pressure sensor, so tire pressure monitoring system is still malfunctioning when spare tire is used on vehicle with tire pressure monitoring system.

(5) Before assembling the tire, apply glycerin or soapy water to the rim area of tire.

(6) The four driving tires mounted on the same vehicle must be from the same manufacturer and are not allowed to be mixed.

(7) Use tires only with the standard specification and type, because they have excellent reliability and skid resistance. Using a non-standard tire may lead to vehicle malfunction, which may cause an accident, resulting in serious injury or even death.

(8) Contact surface between rim and tire should be cleaned before installing a new tire.

(9) When installing wheel bolts, firstly, pre-tighten the bolts by hand, and then tighten them to the specified torque with a torque wrench.

(10) Do not apply grease to the wheel bolts.

(11) Some bad driving habits may shorten the tire life:

1) Rapid acceleration;
2) Depressing brake pedal suddenly and firmly;
3) High-speed driving;
4) Turning at excessive speed;
5) Striking curbs or other obstacles;
6) Tire pressure is too high or too low when driving vehicle.

(12) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

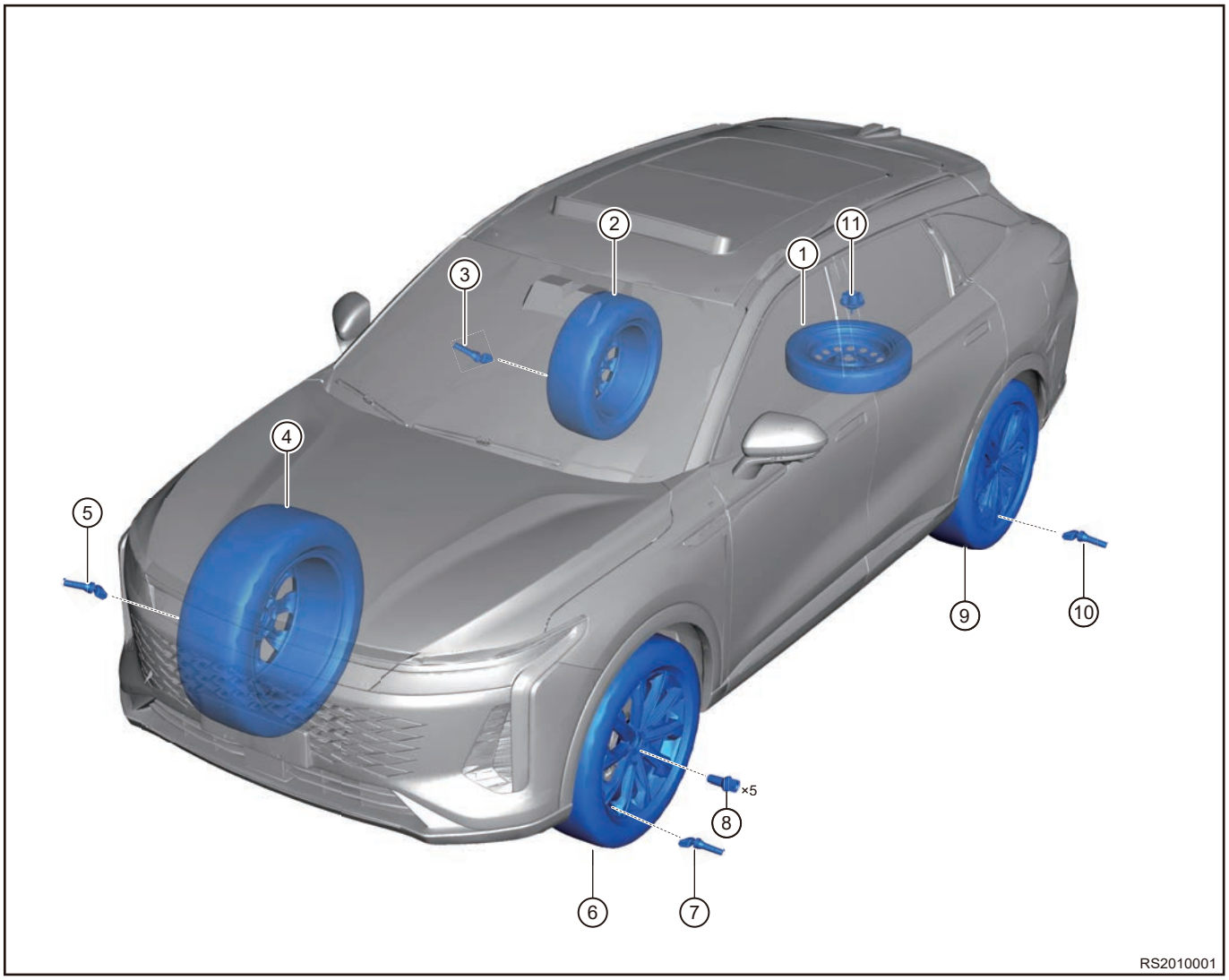
2 System Overview

2.1 System Description

Wheel is a rotating component that bears load between tire and axle. It is usually composed of two main components, rim and spoke. Rim is a component for mounting and supporting tire on wheel, and spoke is a supporting component between axle and rim on wheel. Wheels sometimes contain hubs in addition to above components.

Tire is a rolling toroidal elastic rubber equipment assembled to vehicle on the ground. It is usually installed on metal rim, and can support vehicle body to cushion outside impact, realize contact with road surface and ensure driving performance of vehicle. Tire is often used in complex and harsh conditions, it is under a variety of deformation, load, force and high and low temperature when driving, so it must have high load-bearing performance, traction performance, buffer performance.

2.2 System Components Diagram



1	Spare Tire Assembly	7	Front Left Wheel Tire Pressure Sensor
2	Rear Right Wheel	8	Wheel Bolt
3	Rear Right Wheel Tire Pressure Sensor	9	Rear Left Wheel
4	Front Right Wheel	10	Rear Left Wheel Tire Pressure Sensor
5	Front Right Wheel Tire Pressure Sensor	11	Spare Tire Fixing Bolt
6	Front Left Wheel		

2.3 Component Operation Description

■ Tire

Tire is one of important parts of vehicle. It directly contacts with road surface and works with vehicle suspension to cushion impact of vehicle while driving. Ensure that the vehicle has good seating and riding comforts and good adhesion between wheels and road surface to improve vehicle traction, braking and trafficability and bear weight of vehicle.


RS2020002

■ Tire Identification

Letter and number code of tire type, size, load index and speed level are stamped on the side wall of tire as shown in the illustration.
EXEED RX model is equipped with 2 sizes of tires (245/55R19, 245/50R20), and different sizes are equipped with different rim shapes, which should be subject to actual vehicle.

RS2030002

3 Diagnostic Information and Steps

3.1 Problem Symptoms Table

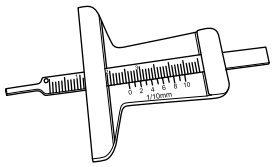
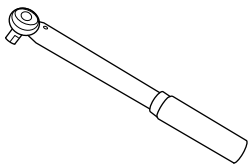
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Wear on one side of tire	Wheel alignment (incorrect)
Wear on both sides of tire	Tire pressure (insufficient)
Tire center wear	Tire pressure (excessive)
Serrated wear	Wheel alignment (incorrect)
Severe wear on partial area of tire	Braking (too hard)
Scratches on side wall of tire	Sharp objects on road (scratched)
Excessive tire noise	Tire pressure (incorrect)
	Tire (worn)

4 On-vehicle Service

4.1 Tool

■ General Tools

Tool Name	Tool Drawing
Tire Depth Gauge	 S00068
Torque Wrench	 S00079

4.2 Wheel

■ Precautions Before Tire Replacement

⚠ Caution

- **Spare tire is not equipped with tire pressure sensor, so tire pressure monitoring system is still malfunctioning when spare tire is used on vehicle with tire pressure monitoring system.**

⚠ Warning

- **Speed level of new replaced tire must meet the specified values for safe operation; otherwise the tire may blow out.**

(1) Remove the wheel.

(2) Use a tire remover to remove tires according to the instructions.

⚠ Caution

- **When removing and installing tire with tire pressure sensor, be sure to strictly refer to the Tire Pressure Monitoring section.**
- **When installing wheel assembly with TPMS, align dynamic balance testing mark (light point) on tire with valve core (TPMS) position on rim.**
- **Before installing air valve, check if air valve hole of wheel is smooth without any burrs, and apply glycerin to air valve rubber surface or soak air valve into glycerin fluid, and then pull or press the locating ring of air valve by force to pass it through the air valve hole and install it into place (it is possible to use soapy water instead of glycerin).**
- **The four driving tires mounted on the same vehicle must be from the same manufacturer and are not allowed to be mixed.**
- **Before assembling the tire, apply glycerin or soapy water to the rim area of tire.**
- **When there is "dark point" mark on rim, align the dynamic balance testing mark on tire with "dark point" mark on rim.**
- **When there is no "dark point" mark on rim, align the dynamic balance testing mark on tire with the air valve.**

(3) Adjust tire pressure to specified value.

⚠ Caution

- **Before performing four wheel alignment, check the four tires pressure and adjust the pressure: it is recommended to adjust tire pressure to recommended tire pressure on door frame label.**
- **The rated inflation pressure of T-type spare tire assembly is 420 kPa, and store spare tire in isolation from four loaded wheels.**
- **Please replace the tires only with standard specification and type.**

(4) Check contact surface among air valve, tire and rim for leakage.

(5) Using a dynamic balancer, adjust the wheel balance.

(6) Install the wheel.

Torque: 180 ± 18 N·m

⚠ Caution

- **Avoid scratching tires and rims when removing tires.**
- **Contact surface between tire and rim should be cleaned when installing tires.**

■ Tire Inspection

⚠ Caution

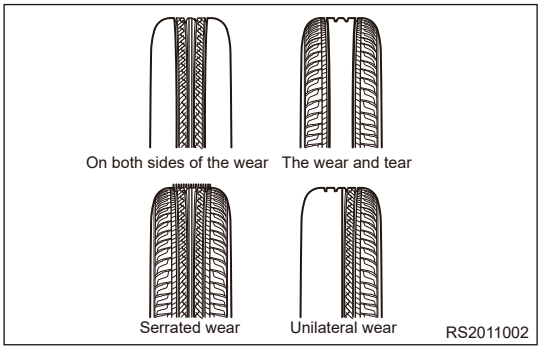
- **Be sure to refer to the instruction when installing non-standard tires and rims.**
- **Use tires with standard specification and type.**

(1) Check if tires are scratched or damaged as shown in the illustration.

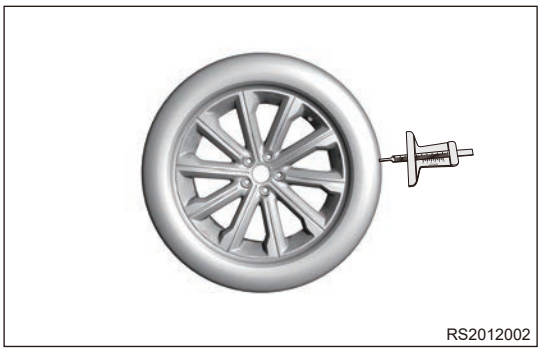

RS2090002

(2) Check if rims are scratched or damaged as shown in the illustration.

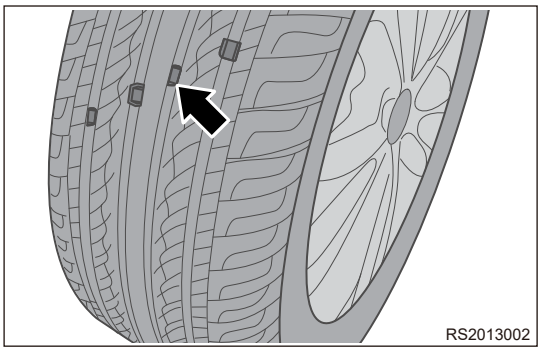
(3) Check if tires are worn abnormally as shown in the illustration.



(4) Measure the tread pattern depth with a tire depth gauge. When the depth is less than 1.6mm, the tire should be replaced.



(5) Check the tread wear indicators. When tires are worn to the indicating mark, replace them.



(6) Use tire pressure gauge to check if pressures of all tires (including spare tire) are normal. Inflate tires to specified tire pressure as necessary.

⚠ Warning

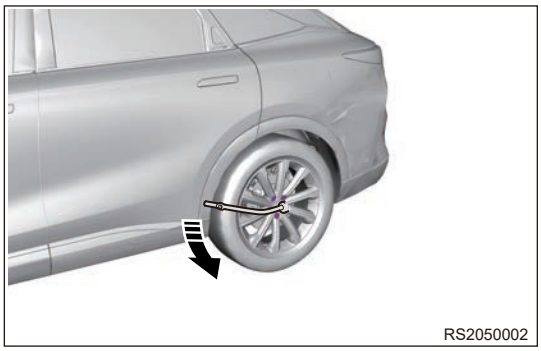
- **Use tire pressure gauge when inflating, and never inflate according to the tire pressure indication on meter. If inflating tires using pressure values displayed from tire pressure monitoring system, inflation pressure may be higher than the standard value, resulting in a risk of accident.**
- **If the tire pressure is too low, please resume it to normal pressure as soon as possible. Too low tire pressure will increase fuel consumption and tire wear. And seriously worn tire will cause an accident such as flat tire.**

(7) Check air valve for leakage.


RS2015002

■ Removal

(1) Stop vehicle at a level surface and apply parking brake.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Using a tire wrench, loosen the wheel mounting bolts.
(5) Firmly support and raise the vehicle to a proper height.
(6) Using a tire wrench, remove 5 wheel mounting bolts.


RS2050002

(7) Remove the wheel.

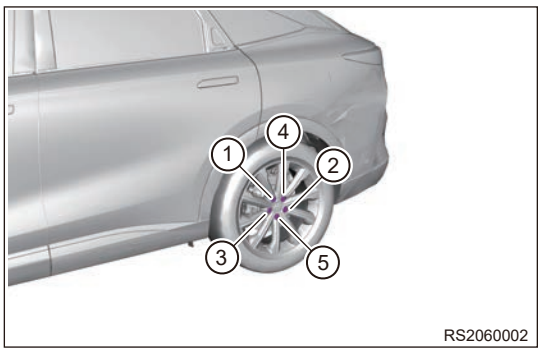
⚠ Caution

- **When removing and installing the wheel with tire pressure sensor, the tire pressure monitoring section must be strictly referred to.**

■ Installation

(1) Anti-corrosion and anti-rust treatment is conducted on the contact surface between wheel and brake disc.
(2) Install the wheel and pre-tighten the wheel mounting bolts by hand.
(3) Using a torque wrench, tighten the wheel mounting bolts evenly to the specified torque in the order shown in the illustration.

Torque: 180 ± 18 N · m



RS2060002

(4) Connect the negative battery cable.

■ Tire inflation

- Do not inflate tires with high tire temperature, which will cause serious damage to the tire, even blowouts, resulting in accidents.

- Do not inflate tires depending on values displayed from tire pressure monitoring system. Tire pressure monitoring system can monitor tire pressure and temperature in real time only when vehicle speed is more than 30 km/h. If inflating tires using pressure values displayed from tire pressure monitoring system, inflation value may be higher than tire standard value, which will cause accidents.
- When vehicle is driving normally, heat is generated in the tire due to friction, which will cause tire pressure to increase. Exposure of tires to the sunlight may also cause an increase in air pressure, resulting in a change in tire pressure. For every 10°C increase in tire temperature, tire pressure will increase by about 0.1 bar.

■ Wheel Balance

⚠ Caution

- **Dynamic balancer must be calibrated before adjusting wheel balance.**
- **Remove impurities inside tread pattern and original balance blocks to ensure wheel balance.**

(1) Remove the wheel.

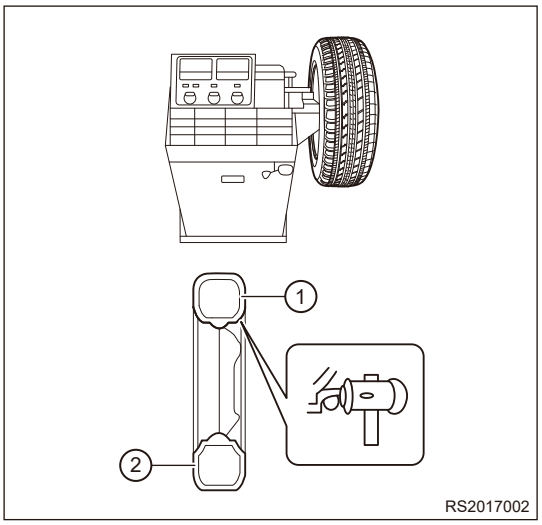
(2) Adjust tire pressure to specified value.

(3) Install wheel with balance block removed to balancer. Install the balance shaft with mounting surface of wheel facing inward, choose a suitable taper body, and firmly lock the wheels using a locking device (- align the taper body with center hole, otherwise data may be incorrect).

(4) Turn on the power source of balancer, and input parameters such as the measured distance from rim to balancer, rim width and rim diameter.

(5) Put down the wheel protector, and proceed to balance test procedure automatically (start button should be pushed for some balancers). When measurement is completed, the unbalanced weight for both sides of tire will be displayed on the balancer automatically, and the wheel brakes automatically until it stops. Do not open the protector before stopping. Failure to do this may lead to an accident.

(6) According to the measurement result, corresponding balance blocks should be installed on the outside (1) and inside (2) of rim edge as shown in the illustration.



(7) Perform test again after assembly is completed, until the balancer displays 0.

(8) After dynamic balance is completed, remove the wheel.

⚠ Caution

- **Balance block must be installed on aluminum rim.**
- **Ambient temperature should be higher than 25°C when installing balance block. If temperature cannot be guaranteed, heat the balance block so that the temperature is between 25°C and 38°C when installing it.**
- **Install balance block properly, weight difference between balance blocks should be 5g.**
- **DO NOT reuse the balance block.**
- **Both inside and outside of balance block are paste type.**
- **Requirement for residual imbalance: Outside ⩽ 10 g; inside ⩽ 8 g.**
- **Max. outside balance block weight: 112 g.**
- **Max. inside balance block weight: 67 g.**

4.3 Tire Rotation

■ Description

Front and rear tires operate at different loads and perform different steering, driving and braking functions. For these reasons, different wear rate is formed, causing irregular wear patterns. These effects can be reduced by rotating tires at regular time.
Advantages of tire rotation:

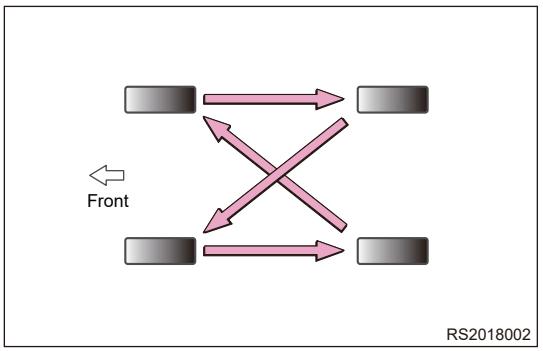
- Improving tread life;
- Maintaining traction levels;
- Maintaining a smooth and quiet driveability.

⚠ Caution

- **Chery recommends that you should rotate tires every 10000 km. However, the best suitable time for tire rotation differs depending on driver’ s driving habits and road conditions.**

■ Rotation method

(1) Perform tire rotation as shown in the illustration.



⚠ Caution

- **Perform tire pressure self-learning after tire rotation.**

4.4 Spare Tire

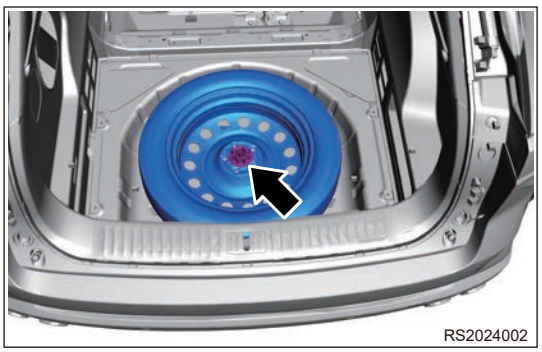
■ Removal

(1) Stop vehicle at a level surface and apply parking brake.

(2) Open the luggage compartment, remove the luggage compartment carpet assembly.

(3) Remove the luggage compartment storage box.

(4) Remove fixing bolt and spare tire.



■ Installation

(1) Place the spare tire in a suitable position in the luggage compartment and install the fixing bolts.

Torque: 5 ± 1 N·m

(2) Install the luggage compartment storage box.

(3) Install the luggage compartment carpet assembly, close luggage compartment.

BRAKE SYSTEM

6.1 ELECTRONIC STABILITY PROGRAM SYSTEM (ESP)

1 Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

(2) Brake control system must be repaired by professional technicians who have trained and mastered maintenance skills and only use original parts for replacement.

(3) DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose assembly, as brake fluid is corrosive.

(4) After removing brake line, perform sealing treatment to prevent foreign matter from entering.

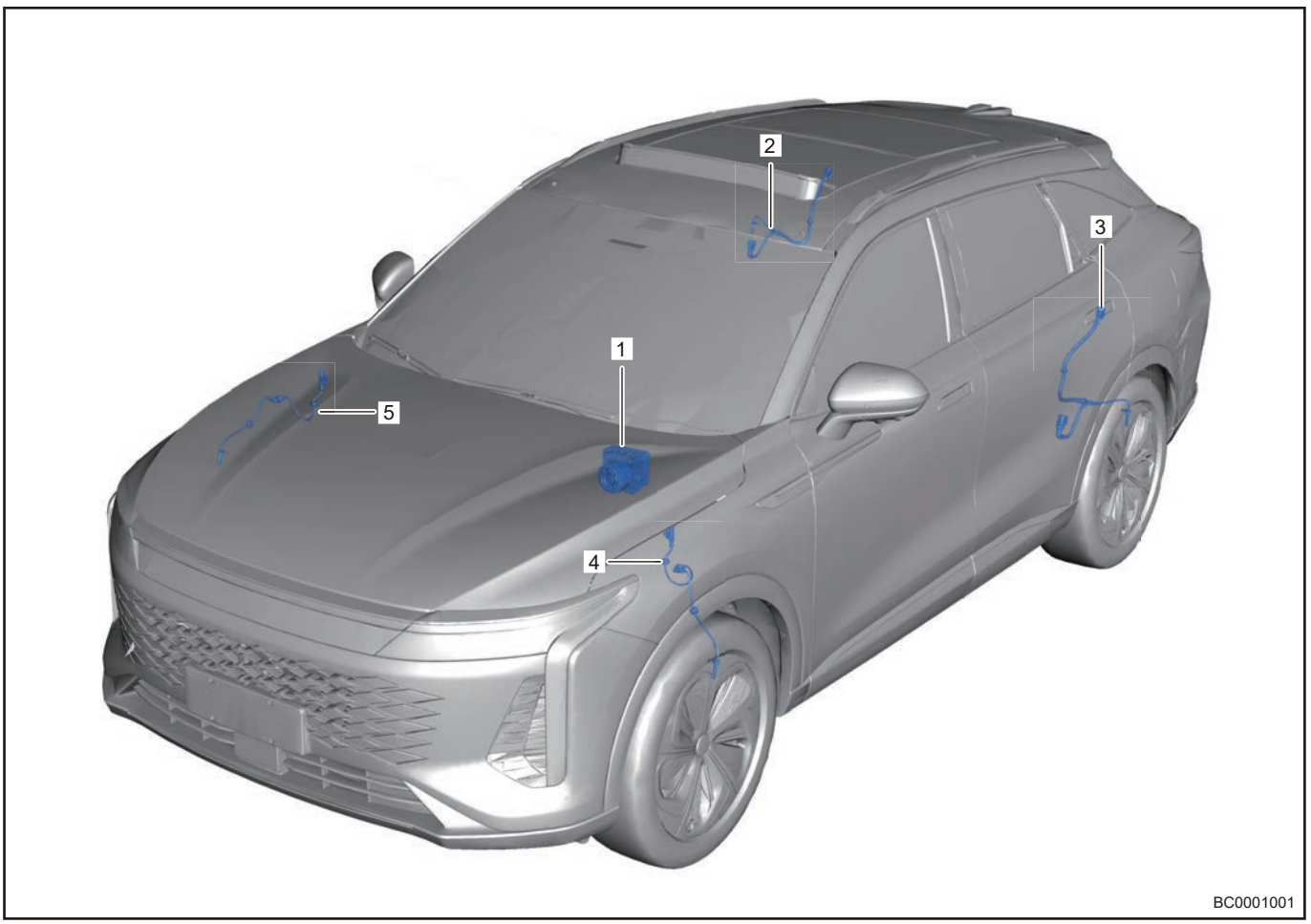
(5) DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.

(6) When connecting ESP module brake line, it must be connected properly. Incorrect connection may cause serious accidents.

(7) After removing brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.

2 System Overview

2.1 System Components Diagram



1	ESP Control Module	4	Front Left Wheel Speed Sensor
2	Rear Right Wheel Speed Sensor with Caliper Wire Harness Assembly	5	Front Right Wheel Speed Sensor
3	Rear Left Wheel Speed Sensor with Caliper Wire Harness Assembly		

Brake control system equipped on this model includes ABS (Anti-lock Brake System) and EBD (Electronic Brake Force Distribution), and ESP (Electronic Stability Program) includes HDC (Hill Descent Control). It mainly consists of the following components and functions:

- ESP control module assembly (hydraulic control module and electronic control module).
- Wheel speed sensors (each wheel has one sensor).
- Steering angle sensor (ESP).
- Yaw rate sensor (built in ESP control module assembly).
- HBA is English abbreviation of brake assist system, which functions as extension of ESP system. In emergency situation, drivers always apply braking timely, but not apply maximum braking force generally, thus extending brake distance. When this occurs, brake assist system will operate: when driver depresses brake pedal quickly in emergency with insufficient depressing force, HBA will increase brake pressure to maximum quickly, thus brake distance will be shortened by anti-lock brake system quickly and effectively.
- HHC is English abbreviation of Hill-start Assist Control System. When vehicle is static, HHC will determine if vehicle is on slope via longitudinal acceleration sensor. When vehicle starts to up from resting state (-uphill forward or reversing), HHC will enter operating state automatically. When starting off, system will keep previous brake pressure for 1 to 2 seconds after driver releases brake pedal, make sure vehicle is still stopped. Brake pressure will decrease when drive torque increases, thus avoiding an accident caused by vehicle sliding rearward during starting off on a slope.
- TCS is English abbreviation of Traction Control System. Drive wheel may slip when vehicle starts up or accelerates rapidly. Accident may occur due to direction out of control on smooth road surface such as ice and snow etc. TCS detects that drive wheel idling can be avoided when accelerating by applying brake to idling wheel or decreasing engine torque when driven wheel speed is lower than drive wheel (a feature of sliding).

Primary purpose of ABS is to prevent wheels from being locked during sudden braking. It has following effects:

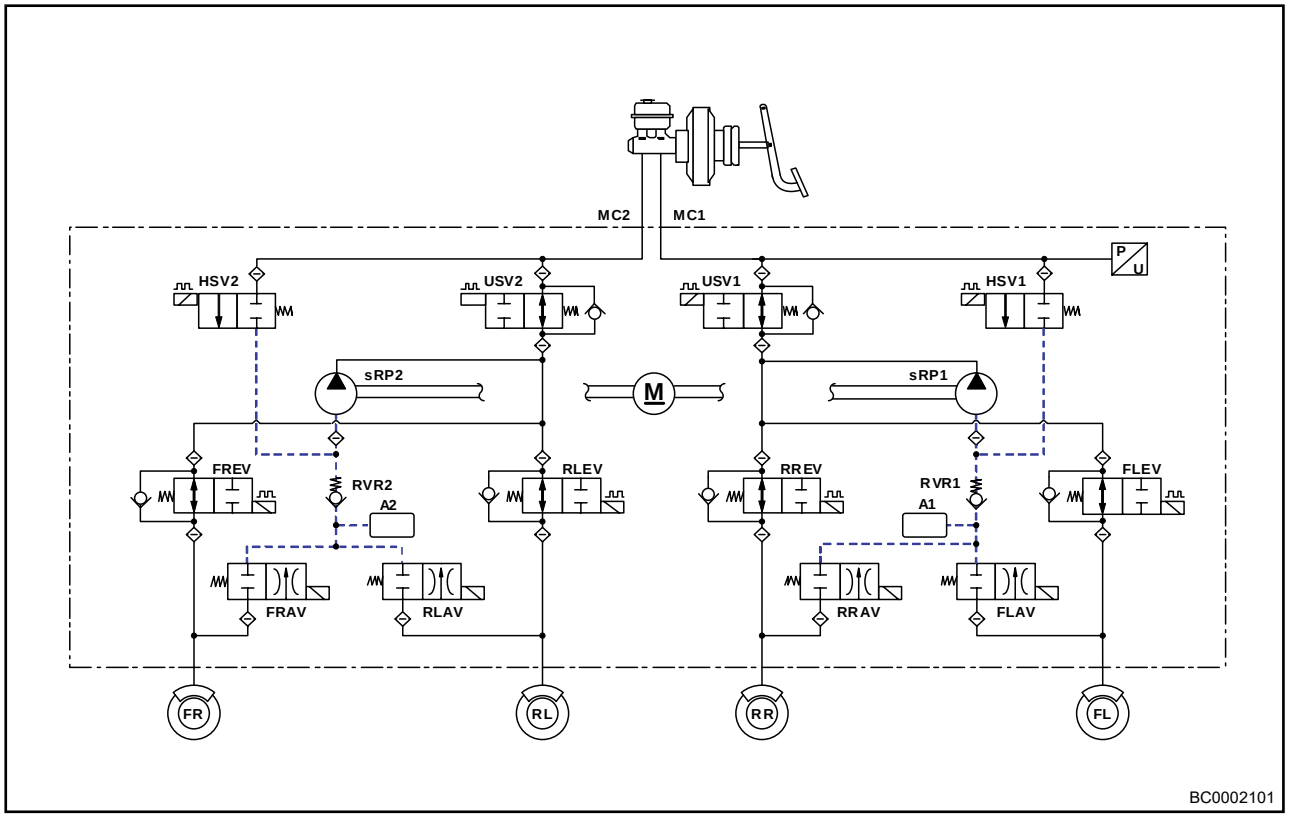
- Improving vehicle driving stability.
- Improving vehicle steering ability.
- Maintaining optimal brake pressure.
- Shortening brake distance efficiently.

2.2 ESP Operation

(1) ABS braking

1) If ABS system detects that wheels may be locked when applying brake, brake system will enter ABS braking mode. During braking, ESP control module outputs signals from each wheel speed sensor to each solenoid valve after analysis in order to adjust fluid pressure in each line, to prevent wheels from being locked.
2) There are some operating symptoms of ESP, but in fact they are normal.
   - If electronic control module is malfunctioning, fail-safe function will be activated, ESP system will not operate and ESP warning light will come on.
   - After vehicle is powered on or engine is started, short “buzz” sound can be heard. This is normal sound from ESP self-check.
   - Motor, solenoid valve, and return pump movement in hydraulic unit will cause noise when ESP is operating normally, but this is normal.
   - Brake pedal may vibrate slightly and mechanical noise can be heard during ESP operation, but this is normal.
   - Bumping sound between suspension and body can be caused by sudden brake.

(2) ESP Control Mode



Description	Definition	Description	Definition
MC1	Brake Master Cylinder Circuit 1	FLEV	Front Left Wheel Inlet Valve
MC2	Brake Master Cylinder Circuit 2	FLAV	Front Left Wheel Outlet Valve
M	Motor	FREV	Front Right Wheel Inlet Valve
RP1	Return Pump 1	FRAV	Front Right Wheel Outlet Valve
RP2	Return Pump 2	FLEV	Rear Left Wheel Inlet Valve
A1	Accumulator 1	RLAV	Rear Left Wheel Outlet Valve
A2	Accumulator 2	RREV	Rear Right Wheel Inlet Valve
FL	Front Left Wheel	RRAV	Rear Right Wheel Outlet Valve
FR	Front Right Wheel	HSV1	High Pressure Switch Valve 1
RL	Rear Left Wheel	HSV2	High Pressure Switch Valve 2
RR	Rear Right Wheel	USV1	Circuit Control Valve 1
UP	Pressure Sensor	USV2	Circuit Control Valve 2

Pressure regulation is achieved by EPB module assembly mainly through four input valves (EV) (normal open valve), four output valves (AV) (normal close valve), two high pressure valves (HSV), two circuit control valves (USV), return pump motor, return pump (sRP), pressure sensor and low pressure accumulator, etc.

(3) General brake operating condition

- For vehicles equipped with ABS, if brake pressure applied to wheels is not enough to lock wheels, oil pressure generated by master cylinder will be transmitted to wheel cylinder through normal open valve, producing regular braking effect. When further braking is not required, driver reduces pressure on brake pedal, and brake fluid of each wheel returns to master cylinder, so that the brake pressure decreases.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normally Open Valve	OFF	ON
Normally Closed Valve	OFF	OFF

(4) ESP operating (relief) condition

- For vehicles equipped with ESP, if brake pressure is applied excessively, friction coefficient between wheels and road will decrease, and wheels will be decelerated earlier than vehicle, which could cause wheels to lock. In this case, ESP control module transmits the command that reduces wheel pressure to hydraulic control module. In other words, normal open valve cuts off oil passage and the oil passage of normal close valve is open, in order to reduce wheel cylinder pressure. At this time, brake fluid drained from wheel cylinder is temporarily stored in low pressure accumulator. Then, the brake fluid stored in low pressure accumulator returns to master cylinder with rotation of motor.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normally Open Valve	ON	OFF
Normally Closed Valve	ON	ON

(5) ESP operating (maintaining) condition

- When appropriate pressure is applied to wheel cylinder by boosting or relieving pressure, ABS system enters maintaining pressure state. In other words, normal open valve cuts off oil passage and normal close valve also cuts off oil passage, the wheel cylinder pressure is maintained.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normally Open Valve	OFF	ON
Normally Closed Valve	OFF	OFF

(6) ESP operating (boost) condition

- When relieving pressure, if brake fluid is drained excessively or friction coefficient between wheels and road increases, it needs to increase each wheel pressure. In this case, ESP control module transmits the command that increases wheel pressure to hydraulic control module. Normal open valve opens oil passage and normal close valve cuts off oil passage. Brake fluid stored in low pressure accumulator is supplied to each wheel cylinder through master cylinder and normal open valve to boost pressure of each wheel cylinder.

Solenoid Valve	Powered Condition	Solenoid Valve Condition
Normally Open Valve	OFF	ON
Normally Closed Valve	OFF	OFF

ABS system operates circularly under relief, maintaining and boost pressure conditions until vehicle is completely stopped, so vehicle braking and steering performance will be guaranteed. ESP adjustment procedure is similar to ABS adjustment procedure. Brake fluid is supplied to wheel cylinders that need to increase pressure by pump, when stability control are realized and HSV valve opens and USV valve closes.

2.3 System Function Description

■ Hill-start Assist (HSA)

HSA helps driver to start and stop vehicle on a hill without using parking brake and brake pedal to ensure that the vehicle does not coast, preventing the vehicle from coasting and causing an accident. HSA function

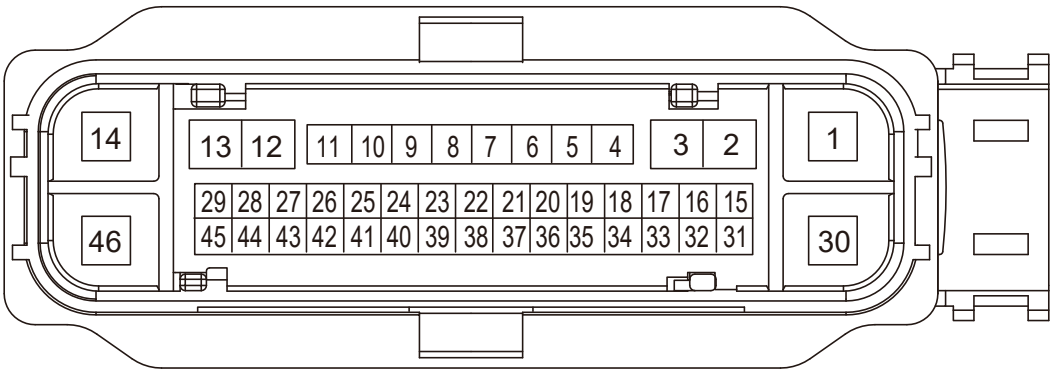
enhances vehicle maneuverability on a hill, such as easy to start or park. When driver releases brake pedal, the vehicle starts and moves forward without coasting.
Step 1: Driver depress servo brake to park the vehicle on a hill. Brake torque is sufficient to keep the vehicle completely stationary on a hill.
Step 2: The vehicle is stationary. Driver releases brake pedal and depresses accelerator pedal, HSA maintains brake pressure to avoid coasting.
Step 3: The vehicle is still stationary. As drive torque increases, HSA reduces brake pressure, but ensures that the vehicle does not move.
Step 4: Drive torque is sufficient to move the vehicle forward. HSA reduces brake torque to zero and the vehicle starts smoothly.

■ Hydraulic Brake Assist (HBA)

HBA can help driver actively apply the required maximum brake pressure to the vehicle during emergency braking, and shorten brake distance as much as possible. In an emergency, driver will depress brake pedal at a fast speed with insufficient force.
1. Brake detection during panic: Estimate TMC pressure gradient.
2. The maximum wheel pressure rising from active wheel braking pressure is limited by ABS.

3 System Circuit Diagram

3.1 ESP Control Module Assembly Terminal Definition



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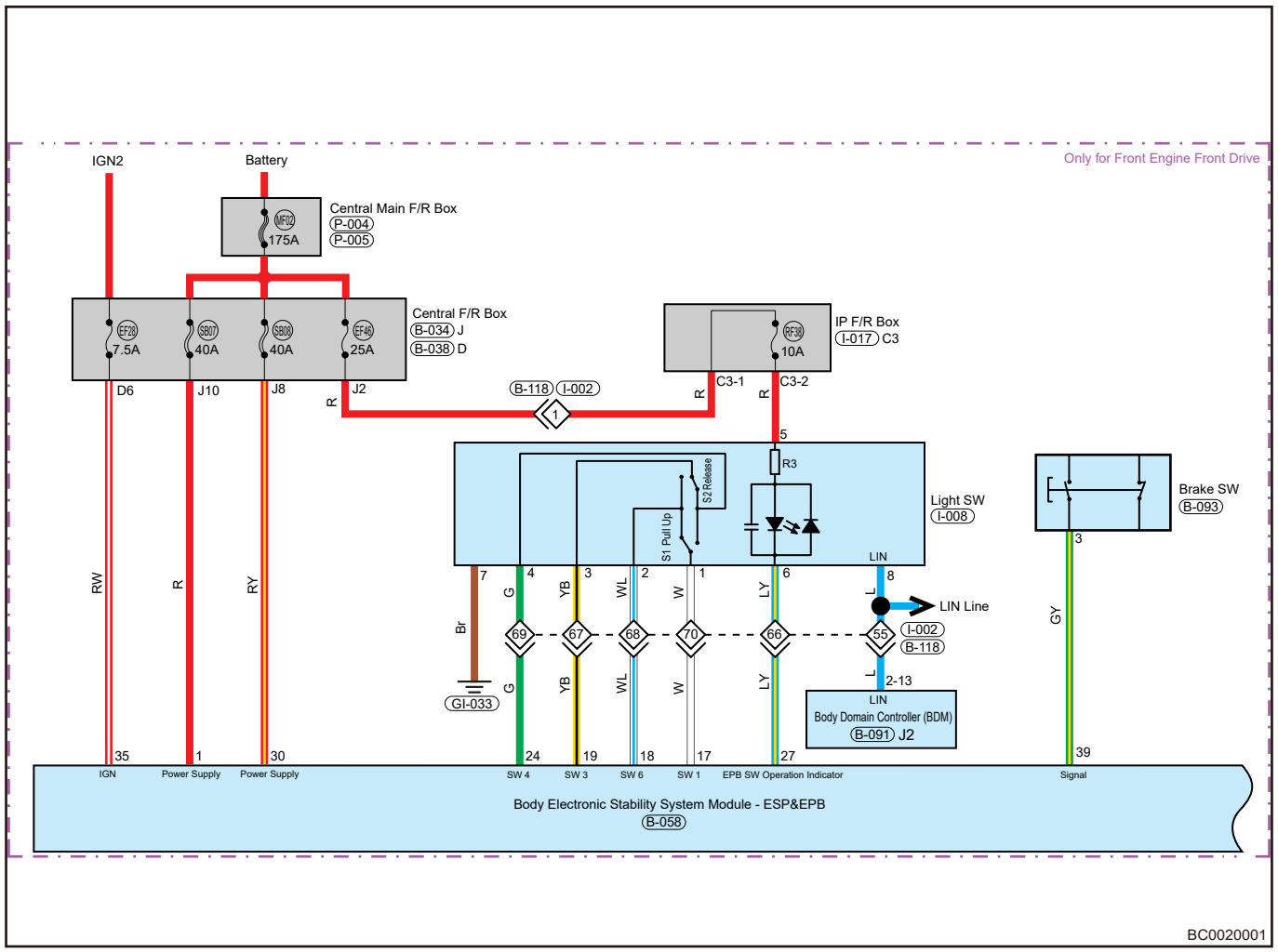
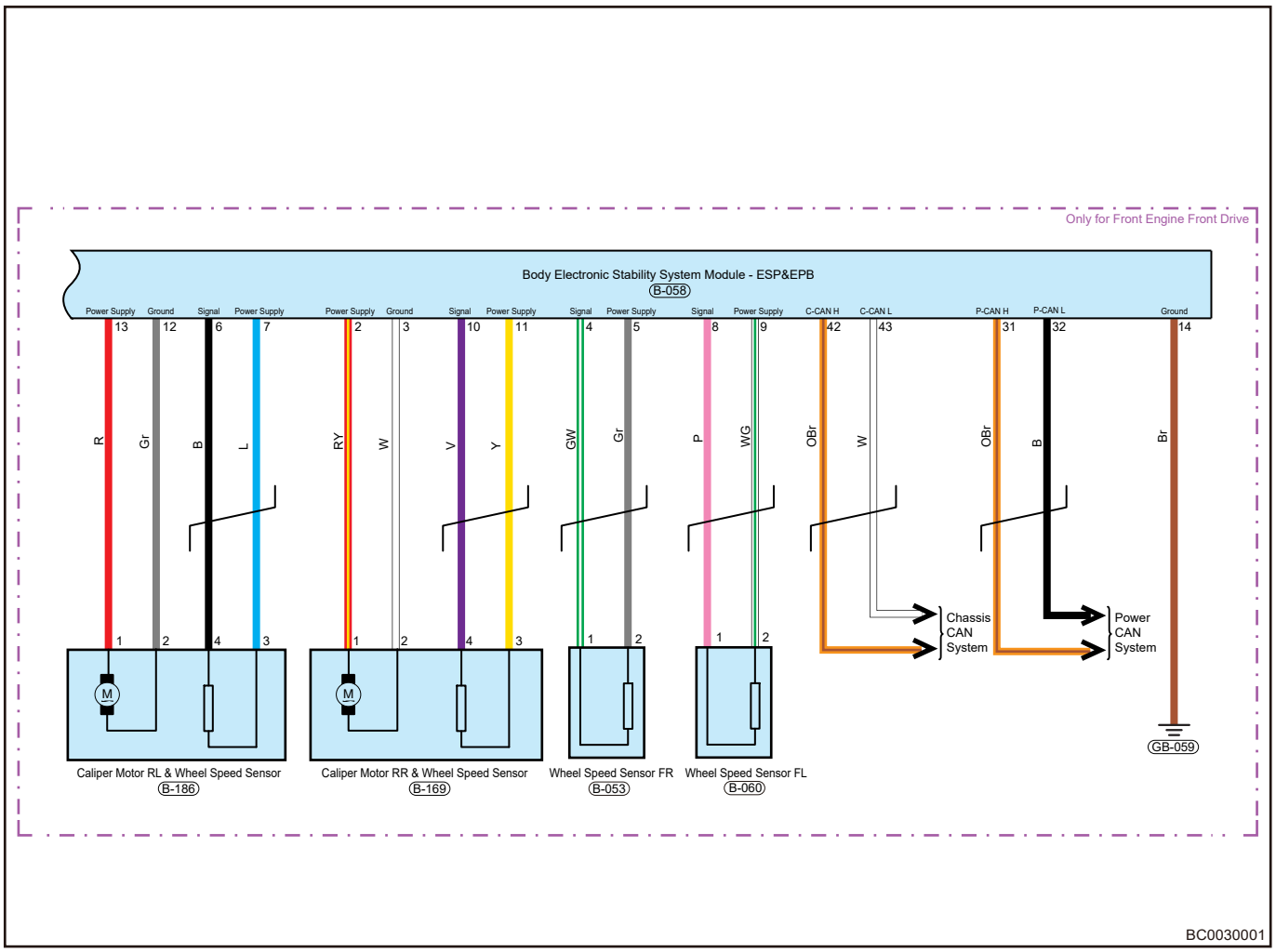
Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Motor Power Supply End (Positive)	24	EPB Switch Pin 4
2	Rear Right Caliper Motor Power Supply	25	-
3	Rear Right Caliper Motor Ground	26	-
4	Front Right Wheel Speed Sensor Signal Wire	27	EPB Switch Indicator
5	Front Right Wheel Speed Sensor Power Supply	28	-
6	Rear Left Wheel Speed Sensor Signal Wire	29	-
7	Rear Left Wheel Speed Sensor Power Supply	30	Power Supply

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
8	Front Left Wheel Speed Sensor Signal Wire	31	P-CAN H
9	Front Left Wheel Speed Sensor Power Supply	32	P-CAN L
10	Rear Right Wheel Speed Sensor Signal Wire	33	-
11	Rear Right Wheel Speed Sensor Power Supply	34	-
12	Left Caliper Motor Ground	35	Ignition Signal
13	Left Caliper Motor Power Supply	36	-
14	ECU Ground	37	-
15	-	38	-
16	-	39	Brake switch
17	EPB Switch Pin 1	40	-
18	EPB Switch Pin 6	41	-
19	EPB Switch Pin 3	42	C-CAN H
20	-	43	C-CAN L
21	-	44	-
22	-	45	-
23	-	46	-

3.2 Circuit Diagram





4 Diagnosis & Testing

4.1 Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
When ENGINE START STOP switch is turned to ON, ESP warning light does not come on	Fuse
	Wire harness or connector
	ESP Control Module Assembly
	Instrument Cluster
ESP warning light stays on	Fuse
	Wire harness or connector
	ESP Control Module Assembly
	Instrument Cluster
ESP operates abnormally	Wheel speed sensor (damaged, improperly installed, foreign matter attached)

Symptom	Suspected Area
	Hub ring gear (damaged, improperly installed, foreign matter attached)
	Brake line (blocked or leaked)
	Wire harness or connector
	ESP Control Module Assembly
Unable to communicate with ESP control module	Fuse
	Wire harness or connector
	ESP Control Module Assembly
	Diagnostic tester

4.2 Problem Repair (No DTC)

If there is a problem in brake system, but no DTC is stored in ESP control module assembly, this problem is called a problem without DTC. A problem without DTC is caused by basic brake system malfunction. For example:

(1) Brake fluid leakage (it may result in weak braking, brake pedal over-travel or even ineffective braking).
(2) Using inferior brake fluid (it can result in corrosion of brake line and ESP hydraulic regulating module internal elements, or even ineffective braking).
(3) Air in brake line (it may result in weak braking or even ineffective braking).
(4) Brake line blockage (it may result in hard braking or even ineffective braking).
(5) Excessive wear of brake disc (it may result in weak braking, brake pedal over-travel).
(6) Brake booster malfunction (it may result in weak or hard braking, brake pedal over-travel or even ineffective braking).
(7) Wrong brake line connection (it may result in ESP braking performance decreasing, drift, long braking distance etc.).

Hint:

- Caution: ESP no power supply or power supply abnormality will cause ESP warning light remaining on without storing any DTC.
- Troubleshooting method: check corresponding component according to the malfunction, repair or replace as necessary.

4.3 Diagnostic Help

(1) Connect diagnostic tester (the latest software) to diagnostic connector, and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of brake control system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all ESP wire harness system grounds related to the latest DTC.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.4 Intermittent Troubleshooting

If malfunction is intermittent, perform the followings:

(1) Check if connector is loose.
(2) Check if wire harness is worn, pierced, pinched or partially broken.
(3) Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.

(4) If possible, try to duplicate the conditions under which DTC was set.
(5) Look for data that has changed or DTC to reset during wiggling test.
(6) Look for broken, bent, protruded or corroded terminals.
(7) Inspect the mounting areas of brake control system, wire harness or wire harness connector and so on for damage, foreign matter, etc. that will cause incorrect signals.
(8) Check and clean all wire harness connectors and ground parts related to DTC.
(9) Refer to any Technical Bulletin that may apply to this malfunction.

4.5 Ground Inspection

Ground points are very important to normal work of circuit, and they are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.6 DTC Confirmation Procedure

Confirm that battery voltage is over 12V before performing following procedures

- Turn ENGINE START STOP switch to OFF.
- Connect diagnostic tester (the latest software) to diagnostic connector, and make it communicate with vehicle electronic module through data network.
- Turn ENGINE START STOP switch to ON.
- Use diagnostic tester to record and clear DTCs stored in ESP system.
- Turn ENGINE START STOP switch to OFF and wait for several seconds.
- Turn ENGINE START STOP switch to ON, select "Read DTC".
- If DTC is not detected, malfunction indicated by DTC is intermittent.

4.7 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C0001-04	TCS Control Channel Changeover Valve1 (ESP Only)
C0002-04	TCS Control Channel Changeover Valve2 (ESP Only)
C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)
C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)
C0010-04	Left Front Inlet Control-System Internal Failure
C0011-04	Left Front Outlet Control-System Internal Failure
C0014-04	Right Front Inlet Control-System Internal Failure
C0015-04	Right Front Outlet Control-System Internal Failure
C0018-04	Left Rear Inlet Control-System Internal Failure
C0019-04	Left Rear Outlet Control-System Internal Failure

DTC	DTC Definition
C001C-04	Right Rear Inlet Control-System Internal Failure
C001D-04	Right Rear Outlet Control-System Internal Failure
C0020-04	ABS Pump Motor Control-System Internal Failure
C0031-00	Front Left Wheel Speed Sensor Failure
C0031-09	Front Left Wheel Speed Sensor Component Fault
C0031-11	Front Left Wheel Speed Sensor Short to Ground
C0031-12	Front Left Wheel Speed Sensor Short to Power Supply
C0031-13	Front Left Wheel Speed Sensor Open
C0031-29	Front Left Wheel Speed Sensor Signal Invalid
C0031-37	Front Left Wheel Speed Sensor Signal Out of Range
C0034-00	Front Right Wheel Speed Sensor Fault
C0034-09	Front Right Wheel Speed Sensor Component Fault
C0034-11	Front Right Wheel Speed Sensor Short to Ground
C0034-12	Front Right Wheel Speed Sensor Short to Power Supply
C0034-13	Front Right Wheel Speed Sensor Open
C0034-29	Front Right Wheel Speed Sensor Signal Invalid
C0034-37	Front Right Wheel Speed Sensor Signal Out of Range
C0037-00	Rear Left Wheel Speed Sensor Fault
C0037-09	Rear Left Wheel Speed Sensor Component Fault
C0037-11	Rear Left Wheel Speed Sensor Short to Ground
C0037-12	Rear Left Wheel Speed Sensor Short to Power Supply
C0037-13	Rear Left Wheel Speed Sensor Open
C0037-29	Rear Left Wheel Speed Sensor Signal Invalid
C0037-37	Rear Left Wheel Speed Sensor Signal Out of Range
C003A-00	Rear right wheel speed sensor fault
C003A-09	Rear right wheel speed sensor component fault
C003A-11	Rear right wheel speed sensor short to ground
C003A-12	Rear Right Wheel Speed Sensor Short to Power Supply
C003A-13	Rear right wheel speed sensor open
C003A-29	Rear right wheel speed sensor signal invalid
C003A-37	Rear right wheel speed sensor signal out of range
C0040-64	Brake Pedal Switch Failure (ESP Only)-Signal Plausibility Failure

DTC	DTC Definition
C0044-01	Brake Pressure Sensor Failure (ESP Only)-General Electrical Failure
C0044-28	Brake Pressure Sensor Signal Bias Level Out Of Range Failure (ESP Only)
C0051-29	Steering Wheel Position Sensor (ESP Only)-Signal Invalid
C0051-54	Steering Wheel Position Sensor (ESP Only)-Missing Calibration
C0051-64	Steering Wheel Position Sensor (ESP Only)-Signal Plausibility Failure
C0061-64	Lateral Acceleration Sensor (ESP Only)-Signal Plausibility Failure
C0062-64	Longitudinal Acceleration Sensor (ESP Only)-Signal Plausibility Failure
C0063-01	Yaw rate sensor general electrical fault
C0063-54	Yaw rate sensor uncalibrated
C0063-64	Yaw Rate Sensor Failure (ESP Only)-Signal Plausibility Failure
C006B-00	Stability system active too long
C0089-04	TCS Disable Switch Failure (ESP Only)-System Internal Failure
C1000-16	ECU voltage too low
C1000-17	ECU voltage too high
C1001-04	Internal fault in ECU system
C1002-49	CAN Hardware Internal Electronic Failure
C1003-04	Valve Relay System Internal Failure
C1004-00	General Valve-No Sub Type Information
C1007-29	Reverse Gear Switch Signal Invalid (ESP Only)
C1008-00	General WSS-No Sub Type Information
C1009-00	ECU hardware related fault
C1800-19	Left Actuator - Circuit Current Above Threshold
C1800-72	Left Actuator - Release Failed
C1800-73	Left Actuator - Apply Failed
C1800-74	Left Actuator - Actuator Slipping (Apply TimeOut)
C1800-91	Left Actuator - Wrong Operating Characteristics Detect-Parametric
C1800-92	Left Actuator - High Mechanical Resistance-Performance or Incorrect Operation
C1800-93	Left Actuator - No Motor Start Detected-No Operation

DTC	DTC Definition
C1800-97	Left actuator - action limited
C1801-19	Right Actuator - Circuit Current Above Threshold
C1801-72	Right Actuator -Release Failed
C1801-73	Right Actuator - Apply Failed
C1801-74	Right Actuator - Actuator Slipping (Apply TimeOut)
C1801-91	Right Actuator - Wrong Operating Characteristics Detect-Parametric
C1801-92	Right Actuator - High Mechanical Resistance-Performance or Incorrect Operation
C1801-93	Right Actuator - No Motor Start Detected-No Operation
C1801-97	Right actuator - action limited
C1802-16	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold
C1802-17	Supply Voltage - Over Voltage-Circuit Voltage Above Threshold
C1802-44	PBC EEPROM Fault
C1803-95	Assembly test not performed
C1804-53	EPB Maintenance Mode
C1805-94	Hydric Support Failed
C1806-01	EPB Button Line Failure-General Electrical Failure
C1806-04	EPB Button Always Pushed or Pulled-System Internal Failure
C1824-01	EPB Left Actuator Electrical Failure-General Electrical Failure
C1825-01	EPB Right Actuator Electrical Failure-General Electrical Failure
C1822-00	EPB Left Actuator Failure
C1821-00	EPB Right Actuator Failure
C1824-1E	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
C1825-1E	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
C1830-00	ECU Left Actuator CAT-No Sub Type Information
C1833-00	EPB right actuator unintended run-no sub type information
C1831-00	ECU Right Actuator CAT-No Sub Type Information
C186D-44	SupervisionFail-Data Memory Failure
C1832-00	EPB left actuator unintended run-no sub type information

DTC	DTC Definition
C1806-16	EPB Button Under Voltage
C1823-00	APB Motor Enable Line Violation
C1807-98	Disc over heat
C1826-01	EPB actuator driver gen electrical failure - general electrical failure
C1808-12	Circuit Short To Battery of Left Rear Caliper
C1808-11	Circuit Short To Ground of Left Rear Caliper
C1808-13	Short Circuit in Left Rear Caliper
C1810-01	Short in Left Rear Caliper Positive and Negative
C1815-12	Circuit Short To Battery of Right Rear Caliper
C1815-11	Circuit Short To Ground of Right Rear Caliper
C1815-13	Short Circuit in Right Rear Caliper
C1817-01	Short in Right Rear Caliper Positive and Negative
C10AD-08	Vacuum Sensor General Fault
C156B-00	EPBASIC_GenericError-No Sub Type Information
C1546-04	EPB_SupplyFault-System Internal Failure
U0005-00	High Speed CAN Communication Bus (+) High
U0007-00	High Speed CAN Communication Bus (-) Low
U0073-88	Bus Off
U0100-87	Lost Communication With EMS (ESP Only)
U0101-87	Lost Communication With TCU (ESP Only)
U0126-87	Lost Communication With Steering Angle Sensor Module (ESP Only)
U0140-87	Lost Communication With BCM (ESP Only)
U0422-81	Invalid Data Received From Body Control Module (ESP Only)
U0428-81	Invalid Data Received From Steering Angle Sensor Module (ESP Only)
U1300-55	Software Configuration Error
U0104-04	Lost Communication With ACC (ESP Only)
U0104-08	Invalid Data Received From ACC (ESP Only)
U0170-81	Invalid Data Received From SCM
U1163-87	Lost Communication With ACC (ESP Only)-Miss Message
U0433 – 81	Invalid Data Received From ACC (ESP Only)
U1417-81	AccPedalNet_InvalidValue-Invalid Serial Data Received

DTC	DTC Definition
U1418-81	BTMNet_InvalidValue-Invalid Serial Data Received
U1421 - 81	SClutch_InvalidValue-Invalid Serial Data Received
U1422 - 81	EngineNet_InvalidValue-Invalid Serial Data Received
U1423 - 81	StartStopNet_InvalidValue-Invalid Serial Data Received
U1424 - 81	TCUNet_InvalidValue-Invalid Serial Data Received
U1425 - 81	VLCNet_InvalidValue-Invalid Serial Date Received
C2000-04	Rollerbench Misusage Detected
U0146-87	Lost Communication with CLM
U0447-81	Invalid Data Received From CLM
U0155-87	Lost Communication With ICM-Miss Message
U0423-81	Invalid Data Received from ICM-Invalid Serial Date Received
U1427-81	EngineNet_InvalidValue-Invalid Serial Data Received
U1300-56	Coding Value Outside Range Supported by Software
U1300-04	Incorrect Coding Parameter
U1300-08	Var-Coding Timeout
U1600-08	APB System State_Invalid Value APB
U1602-08	HAS_Invalid Value
U1603-08	SC Clutch_Invalid Value
U1605-08	ABA Net_InvalidValue
U1606-08	ABP Net_InvalidValue
U1607-08	AEB Net_InvalidValue
U1608-08	AWB Net_InvalidValue
U1609-08	VLC Net_InvalidValue
U1610-08	CDD Net_InvalidValue
U1612-08	ACC Net_InvalidValue
U1613-08	TCU Net_InvalidValue
U1614-08	BTM Net_InvalidValue
U1615-08	AccPedalNet_InvalidValue
U1619-08	EngineNet_InvalidValue-Invalid Serial Data Received
U1620-08	StartStopNet_InvalidValue-Invalid Serial Data Received
U1622-08	AWDNet_InvalidValue
U1623-08	SAS Net_Invalid Value
U1625-08	Vacuum Net_Invalid Value

DTC	DTC Definition
U1629-08	WorkingMode_InvalidValue
U1005-88	Bus Off (CAN1-BUS OFF)
U1161-87	RLCR_2 Frame Timeout
U1435-81	RLCR_2 Signal Invalid
C0061-02	Ays Signal in YAS Message Invalid
C0061-08	Ays Signal Error: Offset, Range, Unreliable
C0061-28	Lateral Acceleration Sensor Compensation Value Incorrect
C0062-02	Axs Signal in YAS Message Invalid
C0062-08	Axs Signal Error: Offset, Range, Unreliable, Constant Value
C0062-28	Longitudinal Acceleration Sensor Compensation Value Incorrect
C0063-02	Yrs Network Signal in YAS Message Invalid or No Calibration
C0063-08	Yrs Signal Unreliable
C006B-06	ABS Control Too Long
C00A8-00	Sensor Uncalibrated or Signal Fault
C0100-96	PBC Fault 0
C0101-96	PBC Fault 1
C0102-96	PBC Fault 2
C0103-96	PBC Fault 3
C0104-96	PBC Fault 4
C0105-96	PBC Fault 5
C0106-96	PBC Fault 6
C0107-96	PBC Fault 7
C0108-96	PBC Fault 8
C0109-96	PBC Fault 9
C0110-96	PBC Fault 10
C0111-96	PBC Fault 11
C0112-96	PBC Fault 12
C0113-96	PBC Fault 13
C0114-96	PBC Fault 14
C0115-96	PBC Fault 15
C0116-96	PBC Fault 16
C0117-96	PBC Fault 17
C0118-96	PBC Fault 18

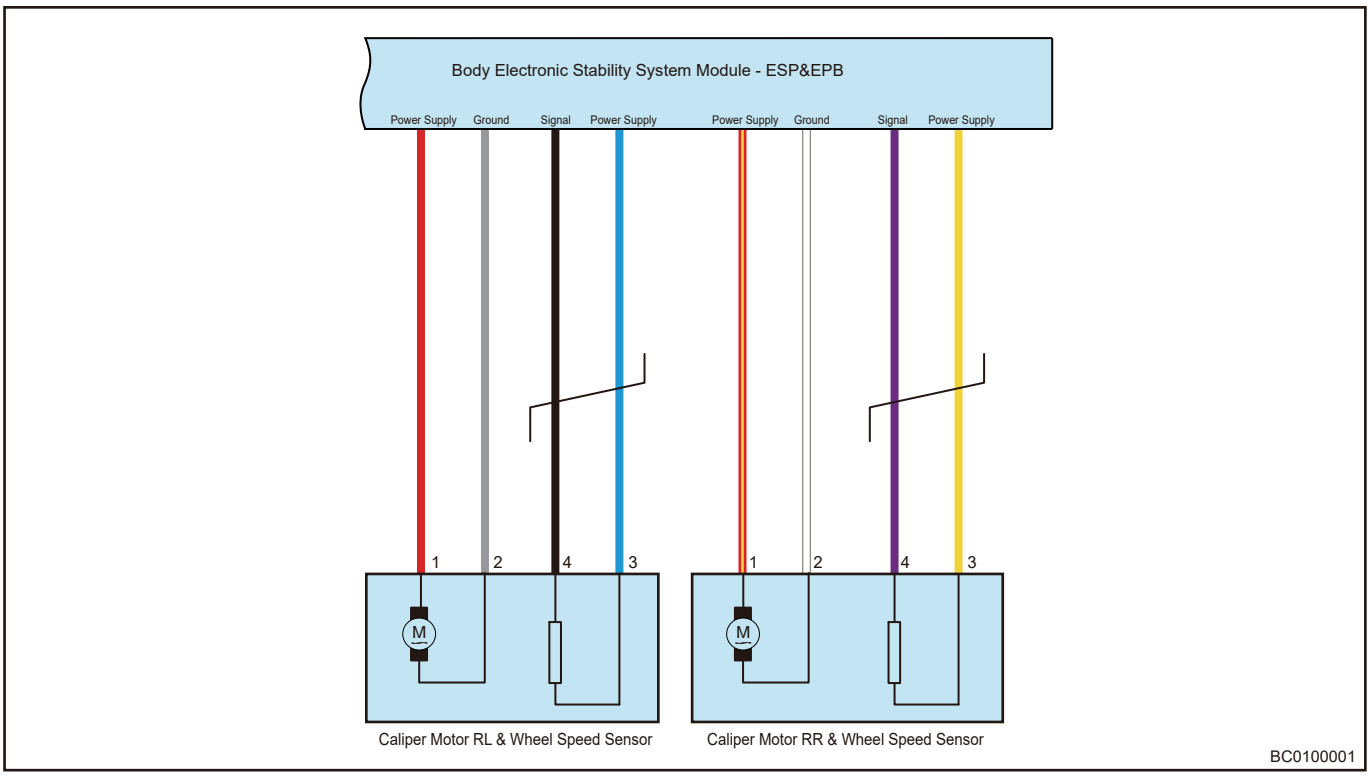
DTC	DTC Definition
C0119-96	PBC Fault 19
C0120-96	PBC Fault 20
C0121-96	PBC Fault 21
C0122-96	PBC Fault 22
C0123-96	PBC Fault 23
C0124-96	PBC Fault 24
C0125-96	PBC Fault 25
C0126-96	PBC Fault 26
C0127-96	PBC Fault 27
C0128-96	PBC Fault 28
C0129-96	PBC Fault 29
C0130-96	PBC Fault 30
C0131-96	PBC Fault 31
C0132-96	PBC Fault 32
C0133-96	PBC Fault 33
C0134-96	PBC Fault 34
C0135-96	PBC Fault 35
C0136-96	PBC Fault 36
C0137-96	PBC Fault 37
C0138-96	PBC Fault 38
C0139-96	PBC Fault 39
C0460-08	Sas Signal Error: Range/Unreliable/Offset/Constant Value
C058A-00	Angle Jump in RPS Signal Too High
C0616-9A	Current Vehicle in RBT Mode
C1000-04	ECU Circuit Protection Conflict or APB Circuit Error
C1010-08	System Mode Management Module Initialization Fault
C1034-77	Caliper Not Fully Released
C104C-04	PATA Button Switch Fault
C104D-12	Short to AVH Switch Light or Open
C104D-14	Short to Ground in AVH Switch Light
C1066-FC	SAS Calibration Signal Value Invalid
C108C-08	Reverse Gear Switch Signal Invalid
C10AE-00	Software Recognition Version Incorrect
C10AF-00	Detection Critical Overbraking During Actual Vehicle Deceleration

DTC	DTC Definition
C1561 – 1E	EPB Motor Electrical Coupling Failure
C1566-00	EPB Left Caliper Circuit Failure
C1566-01	EPB Left Motor Rotates Unexpectedly
C1566-FC	EPB Left Motor Line Failure
C1567-00	EPB Right Caliper Circuit Failure
C1567-01	EPB Right Motor Rotates Unexpectedly
C1567-FC	EPB Right Motor Line Failure
C1568-00	EPB Left Enable Line High and Low Level Abnormal
C1568-01	EPB Left Motor H-bridge Failure During CMST
C1568 – 1D	Short to EPB Left Motor
C1568-FC	EPB Left Motor Transistors Error
C1569-00	EPB Right Enable Line High and Low Level Abnormal
C1569-01	EPB Right Motor H-bridge Failure During CMST
C1569 – 1D	Short to EPB Right Motor
C1569-FC	EPB Right Motor Transistors Error
C156B-FC	EPB Motor GPIO Overcurrent Failure
C156C-00	APB Circuit GPIO Overheating Failure
C156C-92	APB Circuit General Fault
C156D-62	EPB Actuator Operation Unreliable
C1800-64	EPB Actuator Operation Unreliable
C186E-FC	ABS Pump Motor Control Other Cycle
C186F-28	Pressure Sensor Offset Error
C1870-00	EPB ASIC General Error
C1900-04	ECU Voltage Too High, Non-OBD Related Monitoring
C1901-04	ECU Voltage Too Low, Non-OBD Related Monitoring
C2A17-00	Brake System Air Error

4.8 DTC Diagnosis Procedure

DTC	**C1802-16**	**Supply Voltage - Low Voltage-Circuit Voltage Below Threshold**
DTC	**C1802-17**	**Supply Voltage - Over Voltage-Circuit Voltage Above Threshold**
DTC	**C1546-04**	**EPB_SupplyFault-System Internal Failure**

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1802-16	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold	• Battery failure • Charging system fault • Wire harness or connector failure • ESP module failure
C1802-17	Supply Voltage - Over Voltage-Circuit Voltage Above Threshold	
C1546-04	EPB_SupplyFault-System Internal Failure	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Check battery voltage. Standard voltage: 9 - 16 V.

NG → **Check or replace charging system or battery**

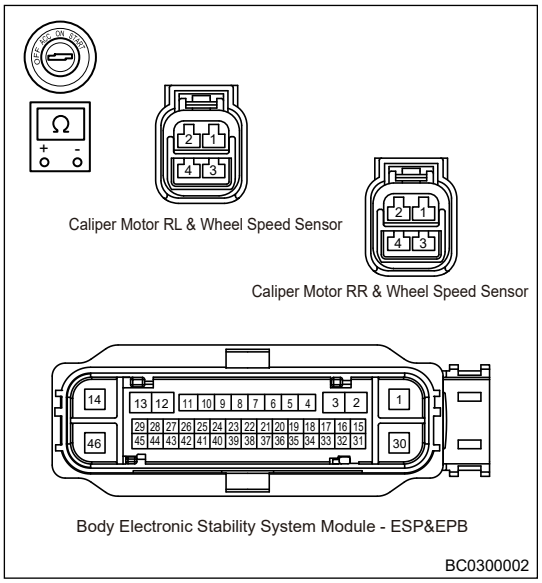
OK

2	**Check wire harness and connector (Brake caliper - ESP module)**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



NG → **Repair or replace related wire harness and connector**

OK

3	**Check brake caliper power supply circuit**

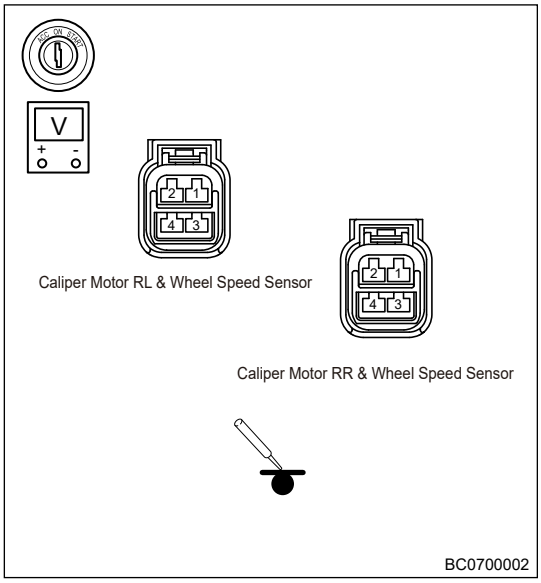
(a) Connect the ESP control module assembly connector.

(b) Connect the negative battery cable.

(c) Turn ENGINE START STOP switch to ON.

(d) Check voltage between caliper power supply terminal and body ground with multimeter.

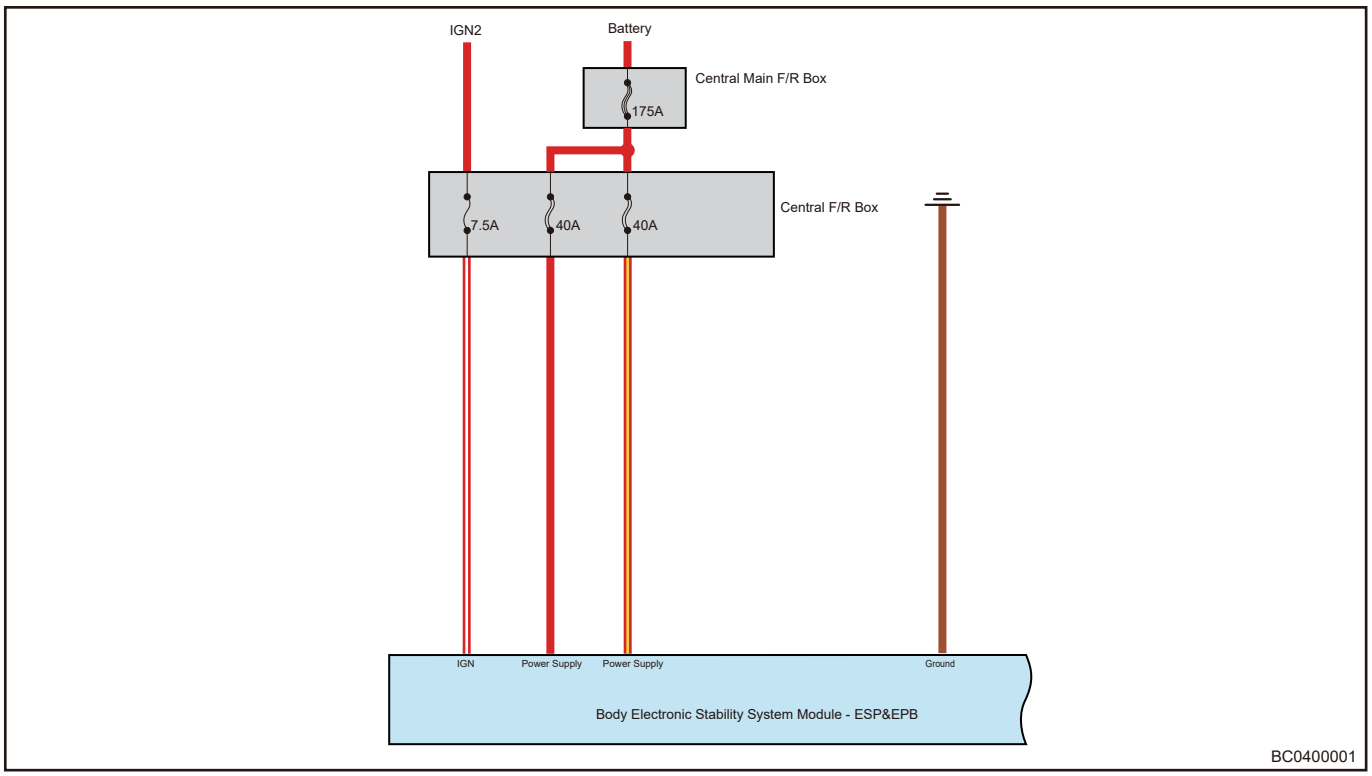
Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	4.75 V
Right caliper motor connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	4.75 V



OK	**Replace brake caliper**
NG	**Replace ESP module assembly**

DTC	**C0010-04**	**Left Front Inlet Control-System Internal Failure**
DTC	**C0011-04**	**Left Front Outlet Control-System Internal Failure**
DTC	**C0014-04**	**Right Front Inlet Control-System Internal Failure**
DTC	**C0015-04**	**Right Front Outlet Control-System Internal Failure**
DTC	**C0018-04**	**Left Rear Inlet Control-System Internal Failure**
DTC	**C0019-04**	**Left Rear Outlet Control-System Internal Failure**
DTC	**C001C-04**	**Right Rear Inlet Control-System Internal Failure**
DTC	**C001D-04**	**Right Rear Outlet Control-System Internal Failure**
DTC	**C0001-04**	**TCS Control Channel Changeover Valve1 (ESP Only)**
DTC	**C0002-04**	**TCS Control Channel Changeover Valve2 (ESP Only)**
DTC	**C0003-04**	**TCS Control Channel High Pressure Switch Valve 1 (ESP Only)**
DTC	**C0004-04**	**TCS Control Channel High Pressure Switch Valve 2 (ESP Only)**
DTC	**C1003-04**	**Valve Relay System Internal Failure**
DTC	**C1004-00**	**General Valve-No Sub Type Information**

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C0010-04	Left Front Inlet Control-System Internal Failure	• Fuse failure • Abnormal solenoid valve power supply • Wire harness or connector failure • ESP module failure
C0011-04	Left Front Outlet Control-System Internal Failure	
C0014-04	Right Front Inlet Control-System Internal Failure	
C0015-04	Right Front Outlet Control-System Internal Failure	
C0018-04	Left Rear Inlet Control-System Internal Failure	
C0019-04	Left Rear Outlet Control-System Internal Failure	
C001C-04	Right Rear Inlet Control-System Internal Failure	
C001D-04	Right Rear Outlet Control-System Internal Failure	
C0001-04	TCS Control Channel Changeover Valve1 (ESP Only)	
C0002-04	TCS Control Channel Changeover Valve2 (ESP Only)	
C0003-04	TCS Control Channel High Pressure Switch Valve 1 (ESP Only)	
C0004-04	TCS Control Channel High Pressure Switch Valve 2 (ESP Only)	

DTC	DTC Definition	Possible Cause
C1003-04	Valve Relay System Internal Failure	
C1004-00	General Valve-No Sub Type Information	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fuse

(a) Check if ESP fuse in center fuse and relay box is normal.

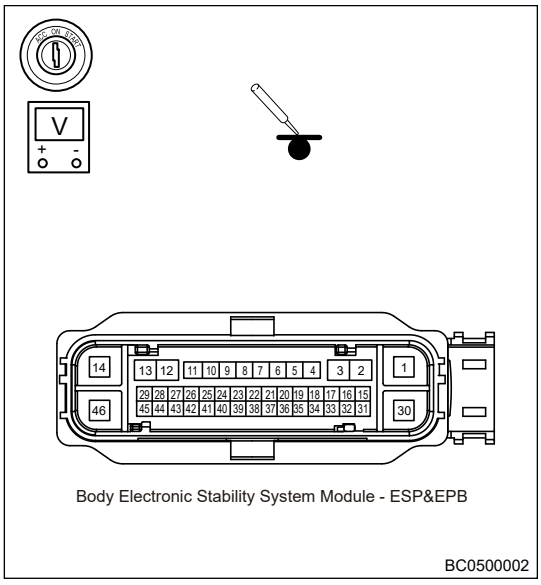
NG → **Replace related fuse**

OK

2	Check ESP module power supply circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ESP module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Connect the negative battery cable.
(g) Turn ENGINE START STOP switch to ON.
(h) Using a multimeter, measure voltage between ESP module connector (power supply terminal) and body ground.
(i) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
ESP module connector (power supply terminal) - Body ground	Always	9 - 16 V



Body Electronic Stability System Module - ESP&EPB
BC0500002

NG → **Repair or replace wire harness or connector**

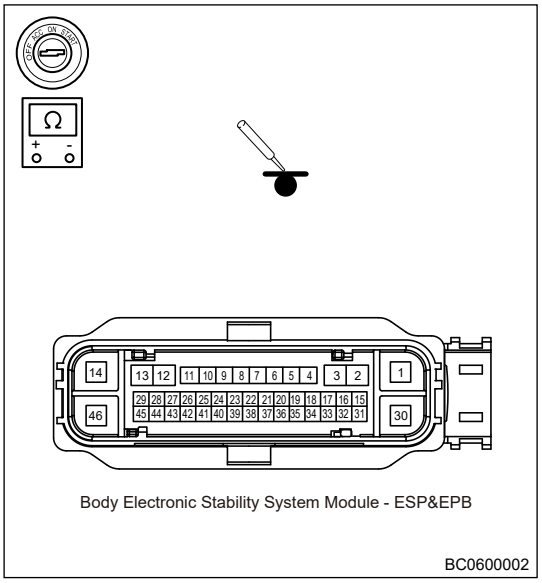
OK

3	Check ESP module ground circuit

(a) Using a multimeter, measure resistance between ESP module connector (ground terminal) and body ground.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
ESP module connector (ground terminal) - Body ground	Always	Less than 1 Ω



Body Electronic Stability System Module - ESP&EPB

BC0600002

NG → **Repair or replace wire harness or connector**

OK

4	Confirm DTCs again

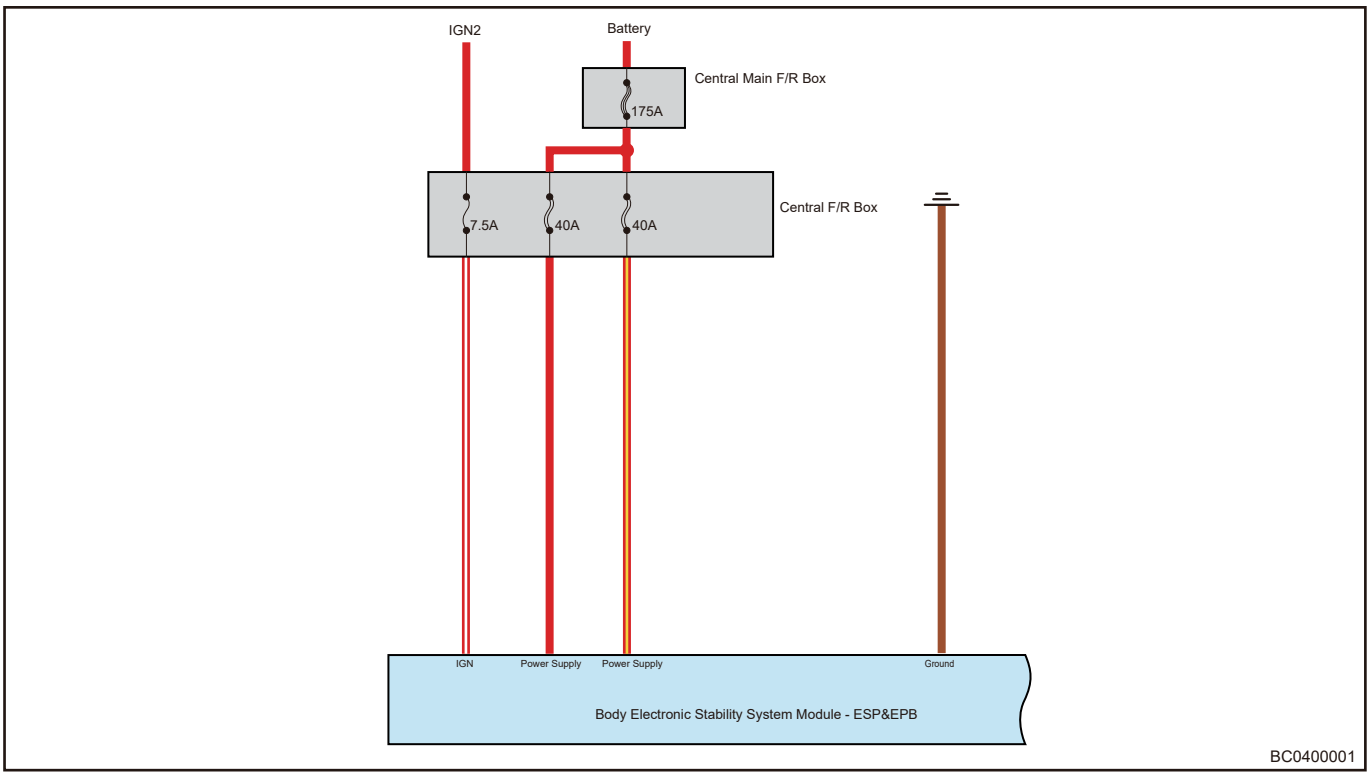
(a) Reconnect ESP module connector.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK → **System operates normally and there is no fault**

NG → **Replace ESP module assembly**

DTC	C0020-04	ABS Pump Motor Control-System Internal Failure

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C0020-04	ABS Pump Motor Control-System Internal Failure	• Fuse failure • Wire harness or connector failure • ESP module failure

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

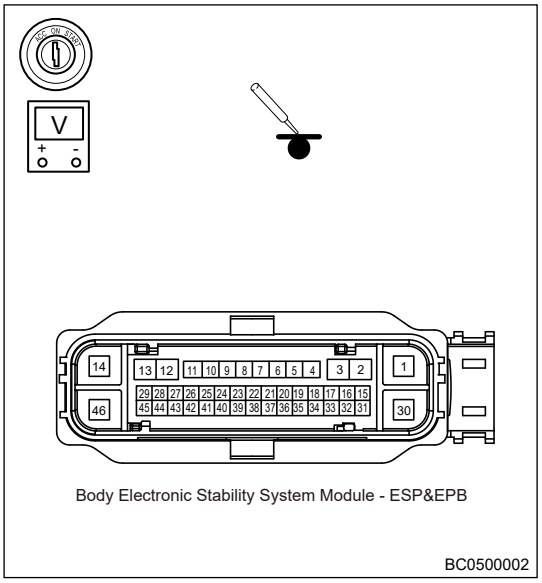
(a) Check if ESP fuse in center fuse and relay box is normal.

NG → **Replace related fuse**

OK

2	**Check ESP module power supply circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ESP module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Connect the negative battery cable.
(g) Turn ENGINE START STOP switch to ON.
(h) Using a multimeter, measure voltage between ESP module connector (power supply terminal) and body ground.
(i) Perform the voltage inspection.



Body Electronic Stability System Module - ESP&EPB
BC0500002

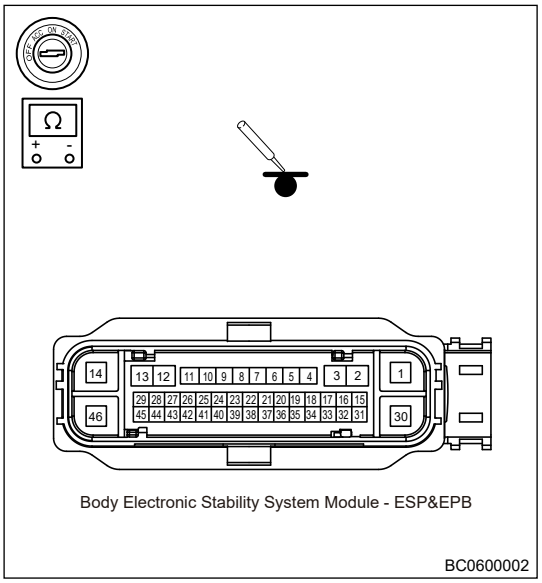
Multimeter Connection	Condition	Specified Condition
ESP module connector (power supply terminal) - Body ground	Always	9 - 16 V

NG → **Repair or replace wire harness or connector**

OK

3	Check ESP module ground circuit

(a) Using a multimeter, measure resistance between ESP module connector (ground terminal) and body ground.
(b) Perform the resistance inspection.



Body Electronic Stability System Module - ESP&EPB
BC0600002

Multimeter Connection	Condition	Specified Condition
ESP module connector (ground terminal) - Body ground	Always	Less than 1 Ω

NG → **Repair or replace wire harness or connector**

OK

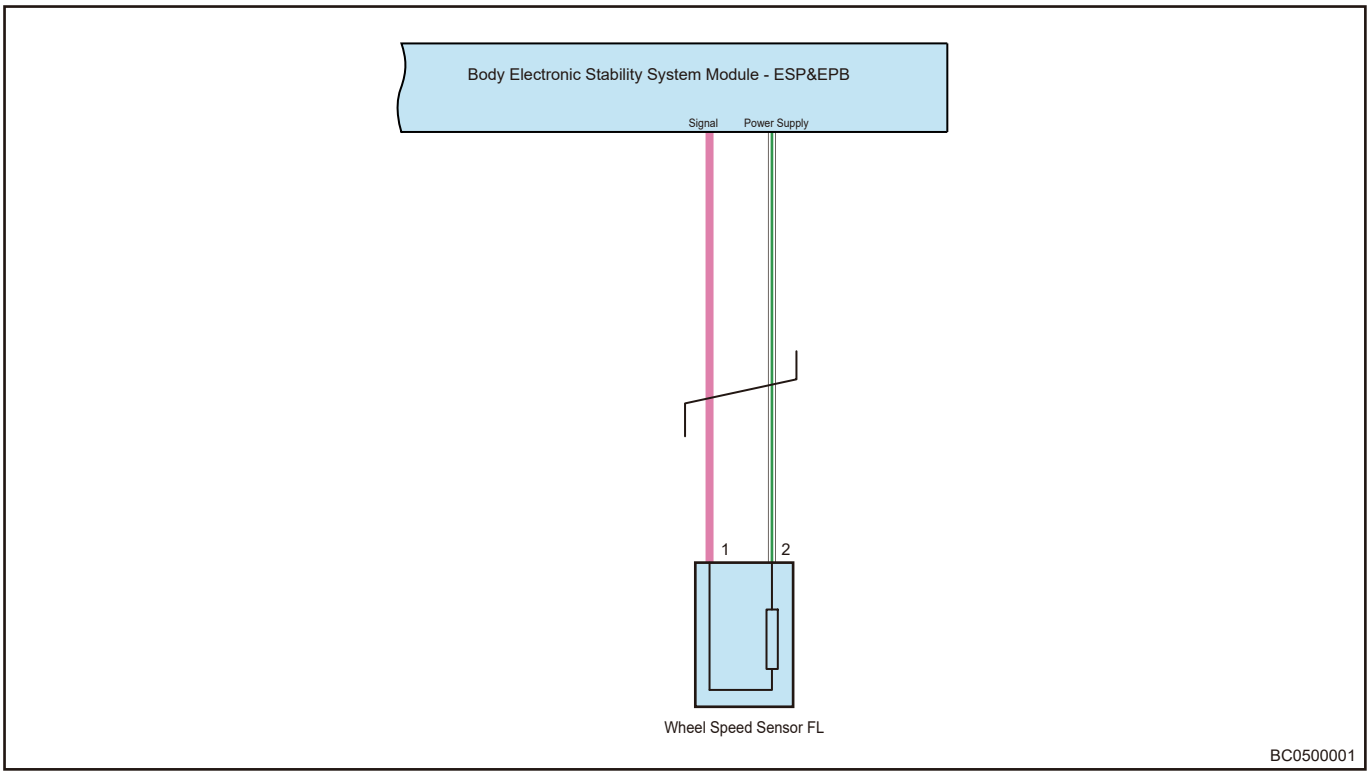
4	Confirm DTCs again

(a) Reconnect ESP module connector.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK	System operates normally and there is no fault
NG	Replace ESP module assembly

DTC	C0031-00	Front Left Wheel Speed Sensor Failure
DTC	C0031-09	Front Left Wheel Speed Sensor Component Fault
DTC	C0031-11	Front Left Wheel Speed Sensor Short to Ground
DTC	C0031-12	Front Left Wheel Speed Sensor Short to Power Supply
DTC	C0031-13	Front Left Wheel Speed Sensor Open
DTC	C0031-29	Front Left Wheel Speed Sensor Signal Invalid
DTC	C0031-37	Front Left Wheel Speed Sensor Signal Out of Range

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C0031-00	Front Left Wheel Speed Sensor Failure	• Wire harness or connector failure • Sensor failure • ESP module failure
C0031-09	Front Left Wheel Speed Sensor Component Fault	

DTC	DTC Definition	Possible Cause
C0031-11	Front Left Wheel Speed Sensor Short to Ground	
C0031-12	Front Left Wheel Speed Sensor Short to Power Supply	
C0031-13	Front Left Wheel Speed Sensor Open	
C0031-29	Front Left Wheel Speed Sensor Signal Invalid	
C0031-37	Front Left Wheel Speed Sensor Signal Out of Range	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check front left wheel speed sensor**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check front left wheel speed sensor.

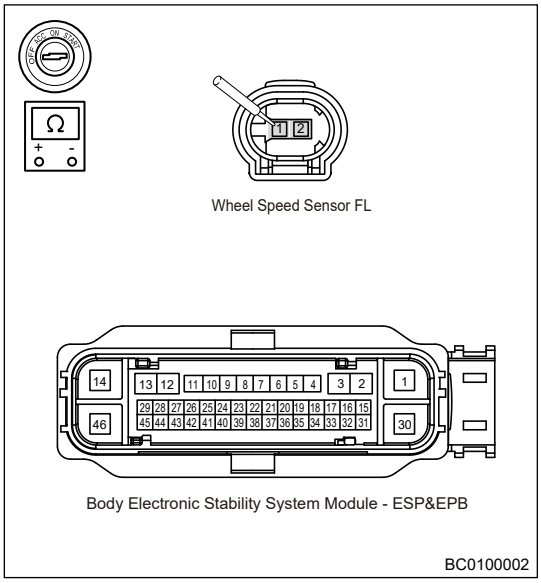
(d) Check if sensor installation is in good condition and sensor is dirty.

NG → **Clean or replace front left wheel speed sensor**

OK

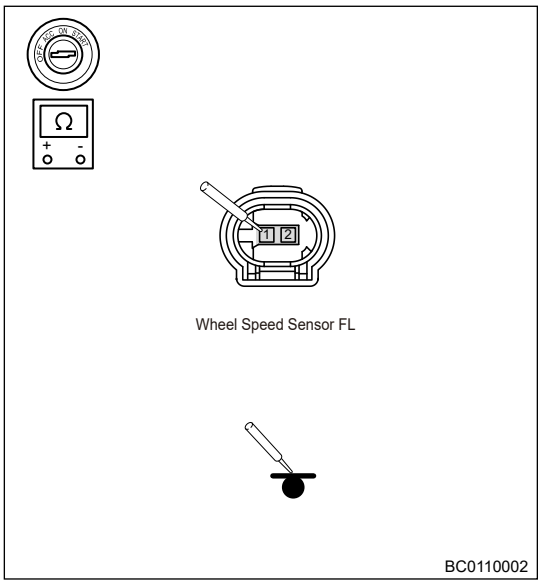
2	**Check wire harness and connector (Front left wheel speed sensor - ESP module)**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the front left wheel speed sensor connector.
(d) Disconnect the ESP module connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a multimeter, check for continuity between front left wheel speed connector terminal and ESP module connector (-corresponding terminal).



Multimeter Connection	Condition	Specified Condition
ESP module connector (-corresponding terminal) - Front left wheel speed connector (power supply terminal)	Always	Less than 1 Ω
ESP module connector (-corresponding terminal) - Front left wheel speed connector (signal terminal)	Always	Less than 1 Ω

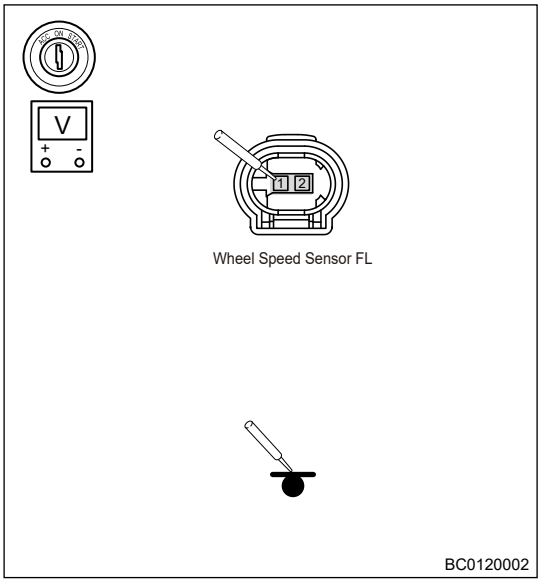
(h) Using a multimeter, measure if the resistance between front left wheel speed sensor connector terminal and body ground is normal.



Multimeter Connection	Condition	Specified Condition
Front left wheel speed sensor connector (signal terminal) - Body ground	Always	More than 10 kΩ
Front left wheel speed sensor connector (power supply terminal) - Body ground	Always	More than 10 kΩ

(i) Connect the negative battery cable.
(j) Turn ENGINE START STOP switch to ON.
(k) Using a multimeter, measure if the voltage between front left wheel speed sensor connector terminal and body ground is normal.

Multimeter Connection	Condition	Specified Condition
Front left wheel speed sensor connector (signal terminal) - Body ground	Always	0 V
Front left wheel speed sensor connector (power supply terminal) - Body ground	Always	4.75 V



NG → **Repair or replace wire harness or connector**

OK

3	Replace front left wheel speed sensor

(a) Replace front left wheel speed sensor to compare and verify. Check if a same DTC occurs.

OK → **Replace front left wheel speed sensor**

NG

4	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Read DTCs again.
(d) Check if the same DTCs occur.

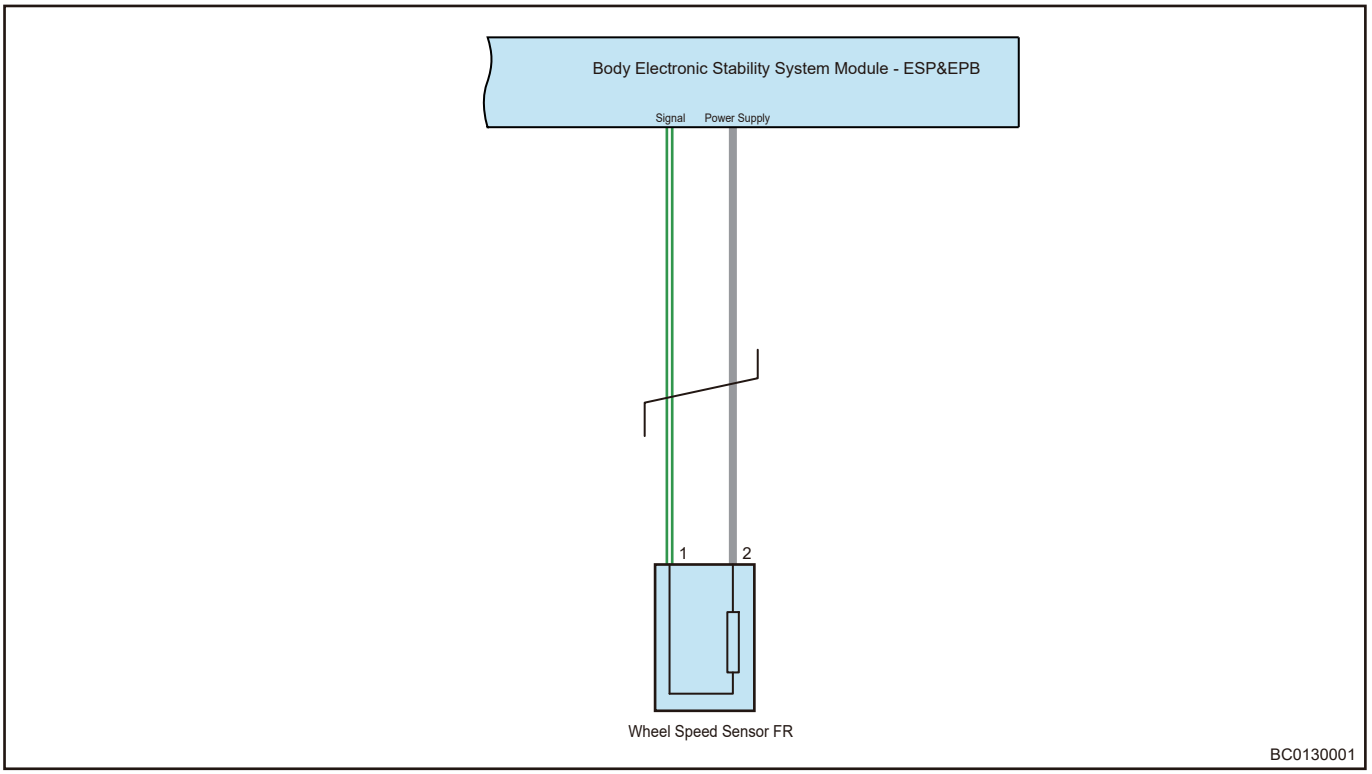
OK → **System operates normally and there is no DTC**

NG → **Replace ESP module assembly**

DTC	C0034-00	Front Right Wheel Speed Sensor Fault
DTC	C0034-09	Front Right Wheel Speed Sensor Component Fault
DTC	C0034-11	Front Right Wheel Speed Sensor Short to Ground
DTC	C0034-12	Front Right Wheel Speed Sensor Short to Power Supply
DTC	C0034-13	Front Right Wheel Speed Sensor Open

DTC	C0034-29	Front Right Wheel Speed Sensor Signal Invalid
DTC	C0034-37	Front Right Wheel Speed Sensor Signal Out of Range

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C0034-00	Front Right Wheel Speed Sensor Fault	• Wire harness or connector failure • Sensor failure • ESP module failure
C0034-09	Front Right Wheel Speed Sensor Component Fault	
C0034-11	Front Right Wheel Speed Sensor Short to Ground	
C0034-12	Front Right Wheel Speed Sensor Short to Power Supply	
C0034-13	Front Right Wheel Speed Sensor Open	
C0034-29	Front Right Wheel Speed Sensor Signal Invalid	
C0034-37	Front Right Wheel Speed Sensor Signal Out of Range	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check front right wheel speed sensor

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check front right wheel speed sensor.
(d) Check if sensor installation is in good condition and sensor is dirty.

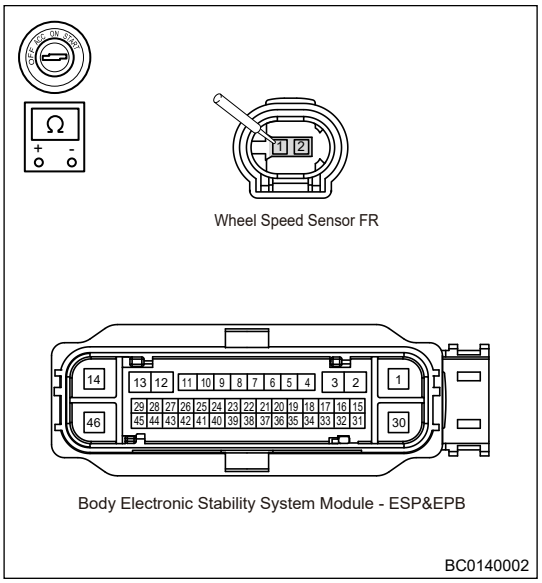
NG → **Clean or replace front right wheel speed sensor**

OK

2	Check wire harness and connector (Front right wheel speed sensor - ESP module)

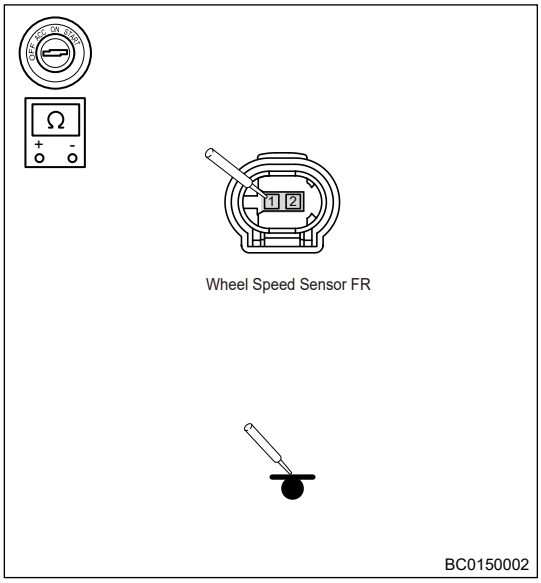
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the front right wheel speed sensor connector.
(d) Disconnect the ESP module connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a multimeter, check for continuity between front right wheel speed connector terminal and ESP module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Front right wheel speed connector (- power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Front right wheel speed connector (- signal terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



(h) Using a multimeter, measure if the resistance between front right wheel speed sensor connector terminal and body ground is normal.

Multimeter Connection	Condition	Specified Condition
Front right wheel speed sensor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Front right wheel speed sensor connector (signal terminal) - Body ground	Always	More than 10 kΩ

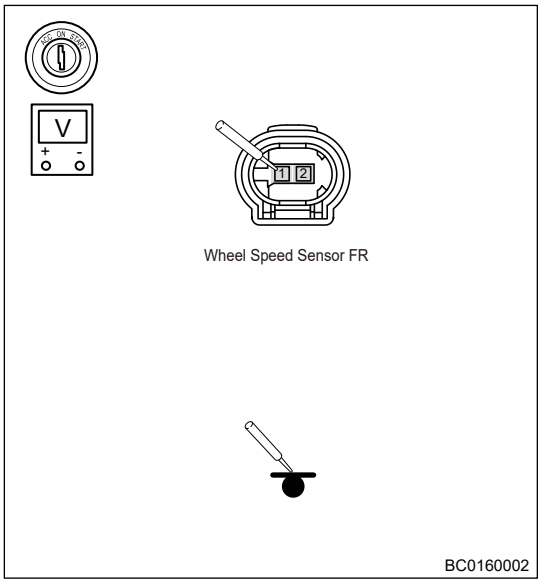


(i) Connect the negative battery cable.

(j) Turn ENGINE START STOP switch to ON.

(k) Using a multimeter, measure if the voltage between front right wheel speed sensor connector terminal and body ground is normal.

Multimeter Connection	Condition	Specified Condition
Front right wheel speed sensor connector (signal terminal) - Body ground	Always	0 V
Front right wheel speed sensor connector (power supply terminal) - Body ground	Always	4.75 V



NG → **Repair or replace wire harness or connector**

OK

3	Replace front right wheel speed sensor

(a) Replace front right wheel speed sensor to compare and verify. Check if a same DTC occurs.

OK → **Replace front right wheel speed sensor**

NG

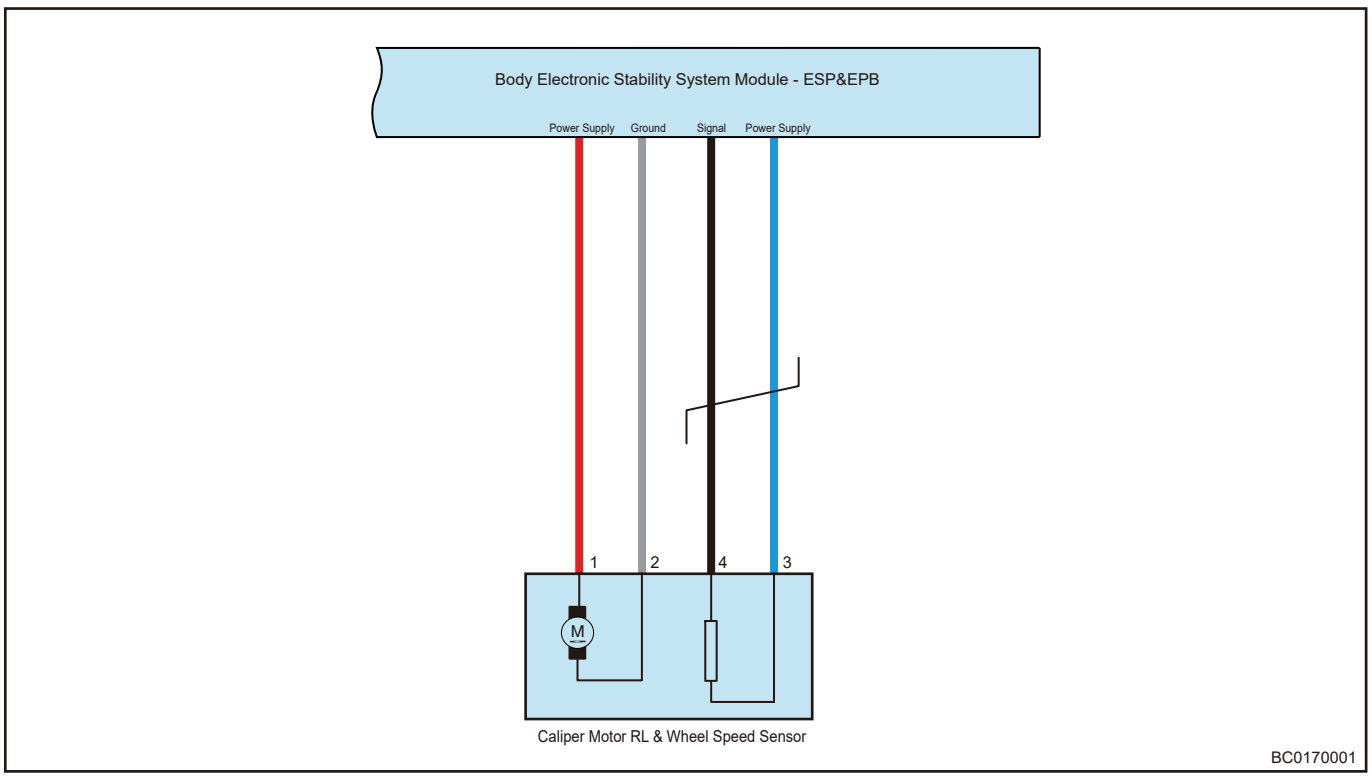
4	Confirm DTCs again

(a) Reconnect the ESP module connector B-029.
(b) Clear DTCs.
(c) Start the vehicle.
(d) Read DTCs again.
(e) Check if the same DTCs occur.

OK	System operates normally and there is no DTC
NG	Replace ESP module assembly

DTC	C0037-00	Rear Left Wheel Speed Sensor Fault
DTC	C0037-09	Rear Left Wheel Speed Sensor Component Fault
DTC	C0037-11	Rear Left Wheel Speed Sensor Short to Ground
DTC	C0037-12	Rear Left Wheel Speed Sensor Short to Power Supply
DTC	C0037-13	Rear Left Wheel Speed Sensor Open
DTC	C0037-29	Rear Left Wheel Speed Sensor Signal Invalid
DTC	C0037-37	Rear Left Wheel Speed Sensor Signal Out of Range

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C0037-00	Rear Left Wheel Speed Sensor Fault	• Wire harness or connector failure • Sensor failure • ESP module failure
C0037-09	Rear Left Wheel Speed Sensor Component Fault	

DTC	DTC Definition	Possible Cause
C0037-11	Rear Left Wheel Speed Sensor Short to Ground	
C0037-12	Rear Left Wheel Speed Sensor Short to Power Supply	
C0037-13	Rear Left Wheel Speed Sensor Open	
C0037-29	Rear Left Wheel Speed Sensor Signal Invalid	
C0037-37	Rear Left Wheel Speed Sensor Signal Out of Range	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check rear left wheel speed sensor**

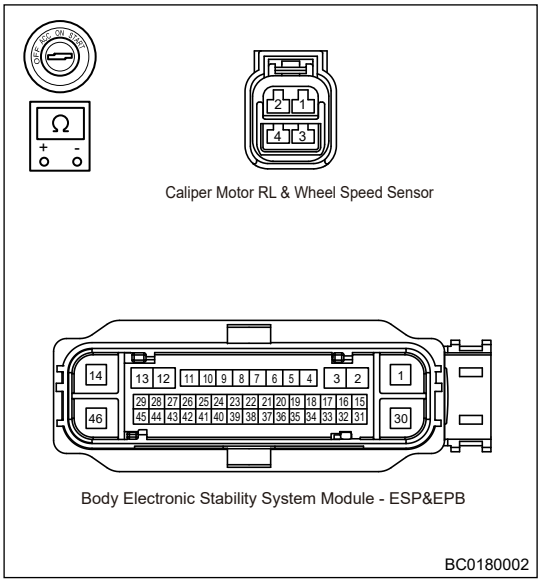
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check rear left wheel speed sensor.
(d) Check if sensor installation is in good condition and sensor is dirty.

NG → **Clean or replace rear left caliper motor with wheel speed sensor assembly**

OK

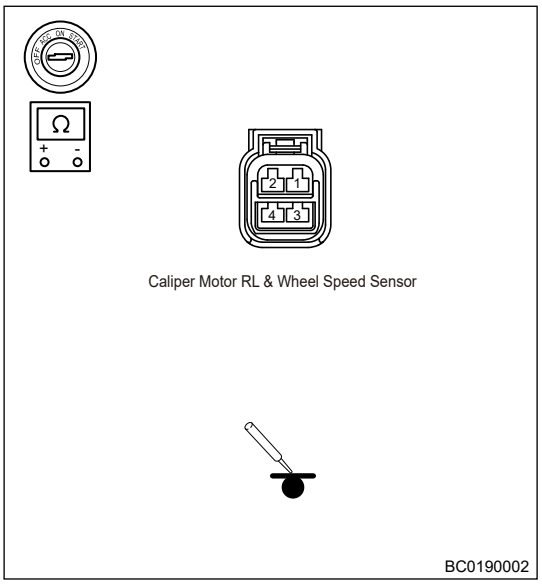
2	**Check wire harness and connector (Rear left wheel speed sensor - ESP module)**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left wheel speed sensor connector.
(d) Disconnect the ESP module connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a multimeter, check for continuity between rear left wheel speed connector terminal and ESP module connector (- corresponding terminal).



Multimeter Connection	Condition	Specified Condition
Rear left wheel speed connector (- power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Rear left wheel speed connector (- signal terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω

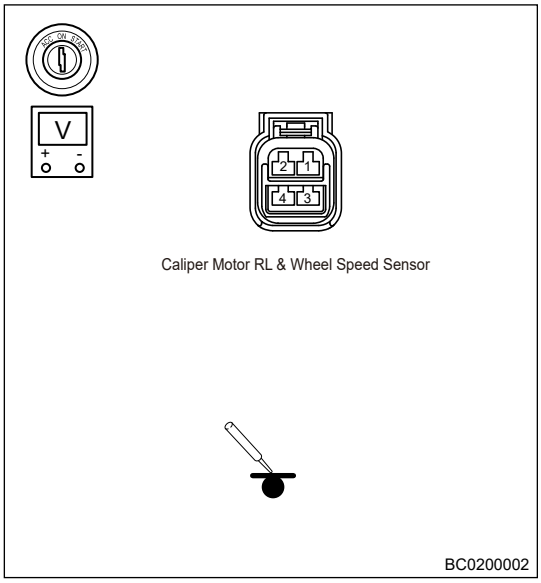
(h) Using a multimeter, measure if the resistance between rear left wheel speed sensor connector terminal and body ground is normal.



Multimeter Connection	Condition	Specified Condition
Rear left wheel speed sensor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Rear left wheel speed sensor connector (signal terminal) - Body ground	Always	More than 10 kΩ

(i) Connect the negative battery cable.
(j) Turn ENGINE START STOP switch to ON.
(k) Using a multimeter, measure if the voltage between rear left wheel speed sensor connector terminal and body ground is normal.

Multimeter Connection	Condition	Specified Condition
Rear left wheel speed sensor connector (power supply terminal) - Body ground	Always	4.75 V
Rear left wheel speed sensor connector (signal terminal) - Body ground	Always	0 V



NG → **Repair or replace wire harness or connector**

OK →

3	**Replace rear left caliper motor with wheel speed sensor**

(a) Replace rear left caliper motor with wheel speed sensor to compare and verify. Check if a same DTC occurs.

OK → **Replace rear left caliper motor with wheel speed sensor assembly**

NG →

4	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Read DTCs again.
(d) Check if the same DTCs occur.

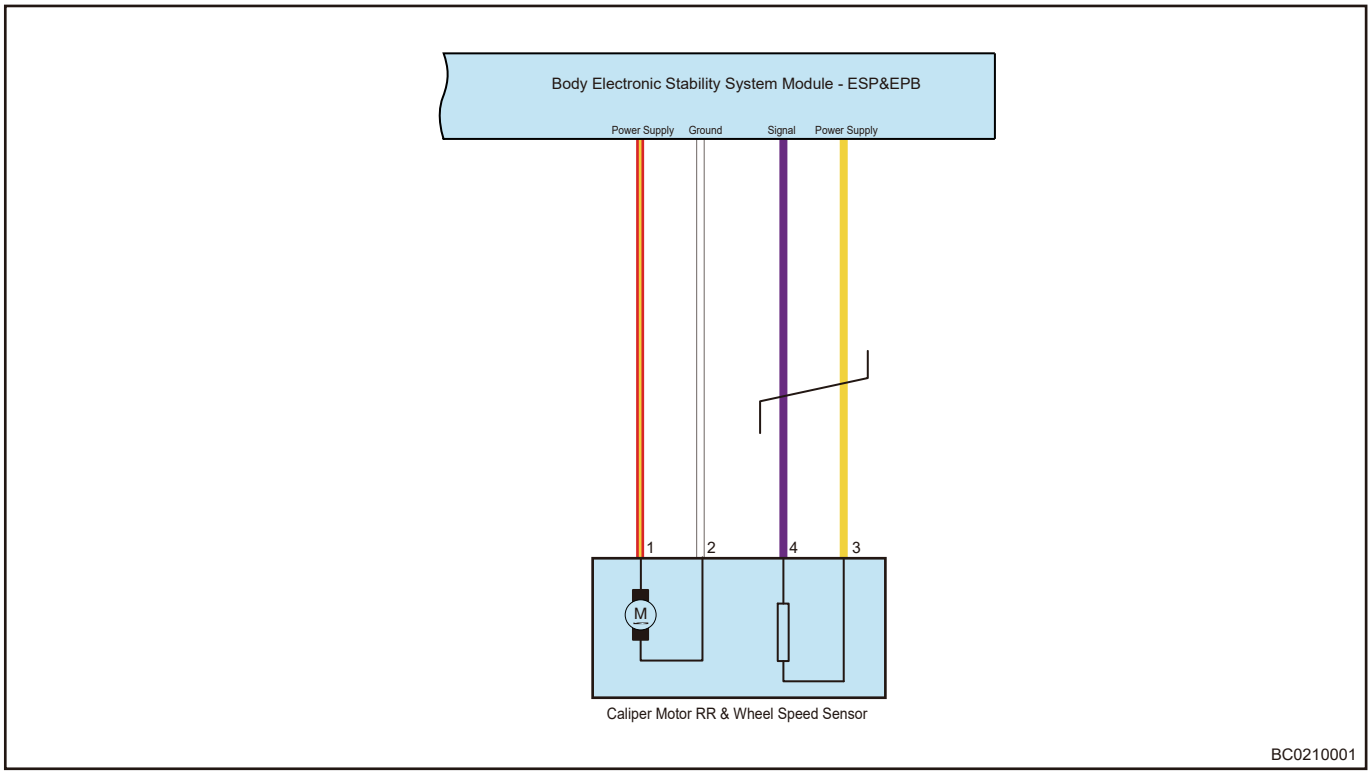
OK → **System operates normally and there is no DTC**

NG → **Replace ESP module assembly**

DTC	**C003A-00**	**Rear right wheel speed sensor fault**
DTC	**C003A-09**	**Rear right wheel speed sensor component fault**
DTC	**C003A-11**	**Rear right wheel speed sensor short to ground**
DTC	**C003A-12**	**Rear Right Wheel Speed Sensor Short to Power Supply**
DTC	**C003A-13**	**Rear right wheel speed sensor open**

DTC	C003A-29	Rear right wheel speed sensor signal invalid
DTC	C003A-37	Rear right wheel speed sensor signal out of range

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C003A-00	Rear right wheel speed sensor fault	• Wire harness or connector failure • Sensor failure • ESP module failure
C003A-09	Rear right wheel speed sensor component fault	
C003A-11	Rear right wheel speed sensor short to ground	
C003A-12	Rear Right Wheel Speed Sensor Short to Power Supply	
C003A-13	Rear right wheel speed sensor open	
C003A-29	Rear right wheel speed sensor signal invalid	
C003A-37	Rear right wheel speed sensor signal out of range	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check rear right wheel speed sensor

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check rear right wheel speed sensor.
(d) Check if sensor installation is in good condition and sensor is dirty.

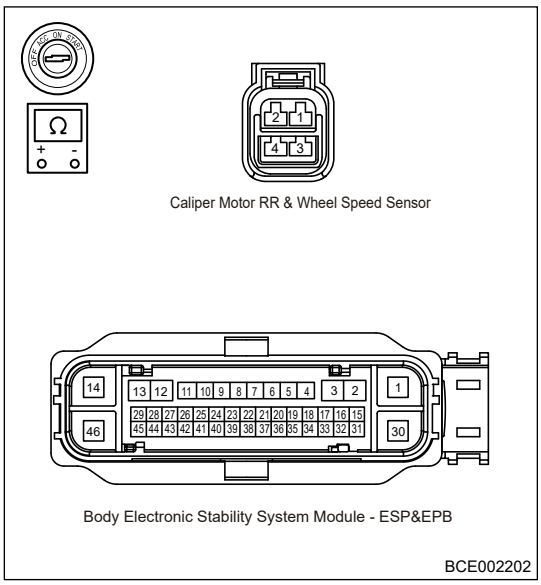
NG → **Clean or replace rear right caliper motor with wheel speed sensor assembly**

OK

2	Check wire harness and connector (Rear right wheel speed sensor - ESP module)

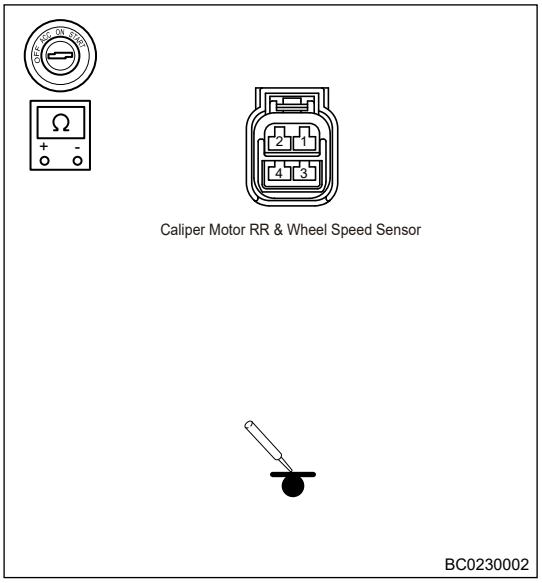
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear right wheel speed sensor connector.
(d) Disconnect the ESP module connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a multimeter, check for continuity between rear right wheel speed connector terminal and ESP module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Rear right wheel speed connector (- power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Rear right wheel speed connector (- signal terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



(h) Using a multimeter, measure if the resistance between rear right wheel speed sensor connector terminal and body ground is normal.

Multimeter Connection	Condition	Specified Condition
Rear right wheel speed sensor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Rear right wheel speed sensor connector (signal terminal) - Body ground	Always	More than 10 kΩ

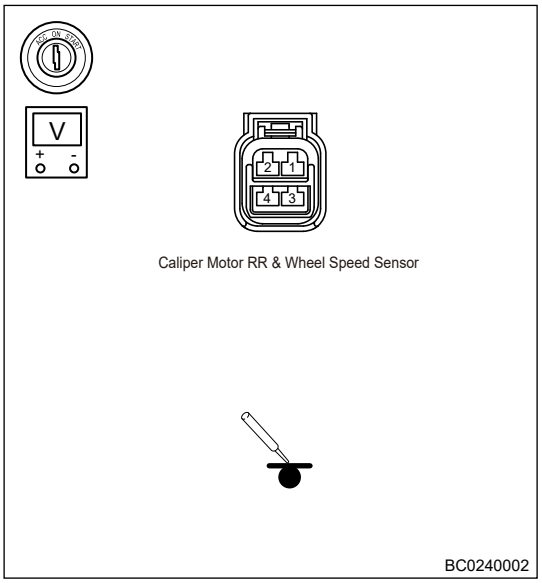


(i) Connect the negative battery cable.

(j) Turn ENGINE START STOP switch to ON.

(k) Using a multimeter, measure if the voltage between rear right wheel speed sensor connector terminal and body ground is normal.

Multimeter Connection	Condition	Specified Condition
Rear right wheel speed sensor connector (power supply terminal) - Body ground	Always	4.75 V
Rear right wheel speed sensor connector (signal terminal) - Body ground	Always	0 V



NG → **Repair or replace wire harness or connector**

OK

3	Replace rear right caliper motor with wheel speed sensor

(a) Replace rear right caliper motor with wheel speed sensor to compare and verify. Check if a same DTC occurs.

OK → **Replace rear right caliper motor with wheel speed sensor assembly**

NG

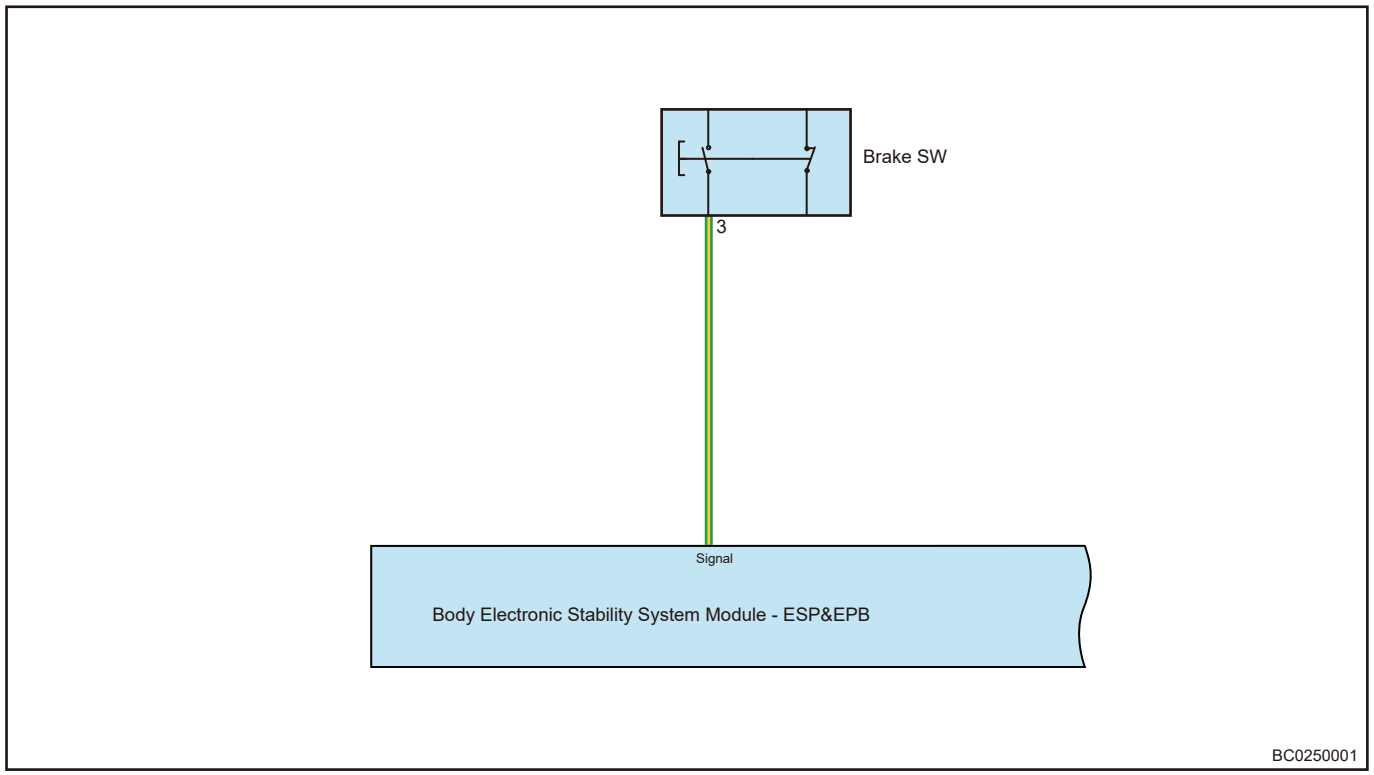
4	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Read DTCs again.
(d) Check if the same DTCs occur.

OK	System operates normally and there is no DTC
NG	Replace ESP module assembly

DTC	C0040-64	Brake Pedal Switch Failure (ESP Only)-Signal Plausibility Failure

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C0040-64	Brake Pedal Switch Failure (ESP Only)-Signal Plausibility Failure	• Wire harness or connector failure • Brake switch failure • ESP module failure

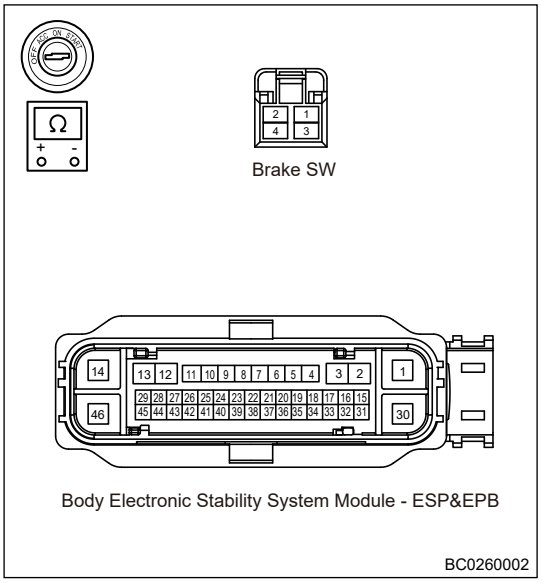
■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector (brake switch - ESP module)

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the brake switch connector.
(d) Disconnect the ESP module connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a multimeter, check for continuity between brake switch connector terminal and ESP module connector (corresponding terminal).



Multimeter Connection	Condition	Specified Condition
Brake switch connector (signal terminal) - ESP module connector (-corresponding terminal)	Always	Less than 1 Ω

NG → **Repair or replace related wire harness or connector**

OK

2	**Replace brake switch**

(a) Replace brake switch to compare and verify.
(b) Check if the same DTCs occur.

OK → **Replace brake switch**

NG

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Read DTCs again.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C0044-01**	**Brake Pressure Sensor Failure (ESP Only)-General Electrical Failure**
DTC	**C0044-28**	**Brake Pressure Sensor Signal Bias Level Out Of Range Failure (ESP Only)**

Description

DTC	DTC Definition	Possible Cause
C0044-01	Brake Pressure Sensor Failure (ESP Only)-General Electrical Failure	• Wire harness or connector failure • ESP module failure
C0044-28	Brake Pressure Sensor Signal Bias Level Out Of Range Failure (ESP Only)	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check ESP module wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ESP module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if ESP module connector terminals are loose, broken, bent or corrosive.

NG → **Repair or replace related wire harness or connector**

OK

2	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Read DTCs again.
(d) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	C0051-29	Steering wheel position sensor (ESP only)-signal invalid
DTC	C0051-54	Steering wheel position sensor (ESP only)-missing calibration
DTC	C0051-64	Steering wheel position sensor (ESP only)-signal plausibility failure

Description

DTC	DTC Definition	Possible Cause
C0051-29	Steering wheel position sensor (ESP only)-signal invalid	• Wire harness or connector failure • ESP module failure
C0051-54	Steering wheel position sensor (ESP only)-missing calibration	

DTC	DTC Definition	Possible Cause
C0051-64	Steering wheel position sensor (ESP only)-signal plausibility failure	

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check angle sensor calibration**

(a) Turn ENGINE START STOP switch to ON.
(b) Use diagnostic tester to recalibrate angle sensor.
(c) Use diagnostic tester to clear DTCs.
(d) Check if the same DTCs are still output.

NG → **Calibrate steering angle sensor**

OK

2	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C0061-64**	**Lateral acceleration sensor signal abnormal (ESP only)**
DTC	**C0062-64**	**Longitudinal acceleration sensor signal abnormal (ESP only)**
DTC	**C0063-64**	**Yaw rate sensor signal abnormal (ESP only)**
DTC	**C0063-01**	**Yaw rate sensor general electrical fault**
DTC	**C0063-54**	**Yaw rate sensor uncalibrated**

Description

DTC	DTC Definition	Possible Cause
C0061-64	Lateral acceleration sensor signal abnormal (ESP only)	• Lateral acceleration/yaw rate sensor is not calibrated • ESP module failure
C0062-64	Longitudinal acceleration sensor signal abnormal (ESP only)	
C0063-64	Yaw rate sensor signal abnormal (ESP only)	
C0063-01	Yaw rate sensor general electrical fault	

DTC	DTC Definition	Possible Cause
C0063-54	Yaw rate sensor uncalibrated	

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check if lateral acceleration/yaw rate sensor is calibrated**

(a) Turn ENGINE START STOP switch to ON.
(b) Use diagnostic tester to recalibrate lateral acceleration/yaw rate sensor.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

NG → **Calibrate lateral acceleration/yaw rate sensor**

OK

2	**Check ESP module**

(a) Check ESP control module assembly fixing bolt for looseness.
(b) Check ESP control module assembly fixing bracket bolt for looseness.

NG → **Tighten ESP module fixing bolt and fixing bracket bolt properly**

OK

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C006B-00**	**Stability system active too long**
DTC	**C006B-06**	**ABS Control Too Long**

Description

DTC	DTC Definition	Possible Cause
C006B-00	Stability system active too long	• Wire harness or connector failure • Sensor failure • ESP module failure
C006B-06	ABS Control Too Long	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect all wheel speed sensor connectors and ESP module connectors.

(d) Check if related wire harnesses are worn, pinched or broken.

(e) Check if related connector terminals are loose, broken, bent or corrosive.

NG → **Repair or replace related wire harness and connector**

OK

2	Check installation of wheel speed sensor

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check wheel speed sensor fixing bolt for looseness.

(d) Check for excessive clearance between installation position of wheel speed sensor and front steering knuckle.

(e) Check installation position of wheel speed sensor for dirt.

NG → **Tighten fixing bolt properly, clean or replace wheel speed sensor**

OK

3	Check hub gear ring and drive shaft upper gear ring

(a) Check hub gear ring and drive shaft upper gear ring for foreign matter, missing teeth or damage.

NG → **Replace hub bearing assembly or outer ball cage assembly**

OK

4	Check wheel speed sensor

(a) Drive vehicle straight ahead, and read datastream of wheel speed sensor with diagnostic tester.
(b) Check if data change of wheel speed sensor matches that of other wheel speed sensors.

NG → **Replace corresponding wheel speed sensor assembly**

OK

5	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C0061-02**	**Ays Signal in YAS Message Invalid**
DTC	**C0061-08**	**Ays Signal Error: Offset, Range, Unreliable**
DTC	**C0061-28**	**Lateral Acceleration Sensor Compensation Value Incorrect**
DTC	**C0062-02**	**Axs Signal in YAS Message Invalid**
DTC	**C0062-08**	**Axs Signal Error: Offset, Range, Unreliable, Constant Value**
DTC	**C0062-28**	**Longitudinal Acceleration Sensor Compensation Value Incorrect**
DTC	**C0063-02**	**Yrs Network Signal in AS Message Invalid or No Calibration**
DTC	**C0063-08**	**Yrs Signal Unreliable**
DTC	**C00A8-00**	**Sensor Uncalibrated or Signal Fault**

Description

DTC	DTC Definition	Possible Cause
C0061-02	Ays Signal in YAS Message Invalid	• Sensor is not calibrated • ESP module failure
C0061-08	Ays Signal Error: Offset, Range, Unreliable	
C0061-28	Lateral Acceleration Sensor Compensation Value Incorrect	
C0062-02	Axs Signal in YAS Message Invalid	
C0062-08	Axs Signal Error: Offset, Range, Unreliable, Constant Value	

DTC	DTC Definition	Possible Cause
C0062-28	Longitudinal Acceleration Sensor Compensation Value Incorrect	
C0063-02	Yrs Network Signal in AS Message Invalid or No Calibration	
C0063-08	Yrs Signal Unreliable	
C00A8-00	Sensor Uncalibrated or Signal Fault	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check if lateral acceleration/yaw rate sensor is calibrated**

(a) Turn ENGINE START STOP switch to ON.
(b) Use diagnostic tester to recalibrate lateral acceleration/yaw rate sensor.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

NG → **Calibrate lateral acceleration/yaw rate sensor**

OK

2	**Check ESP module**

(a) Check ESP control module assembly fixing bolt for looseness.
(b) Check ESP control module assembly fixing bracket bolt for looseness.

NG → **Tighten ESP module fixing bolt and fixing bracket bolt properly**

OK

3	**Confirm DTCs again**

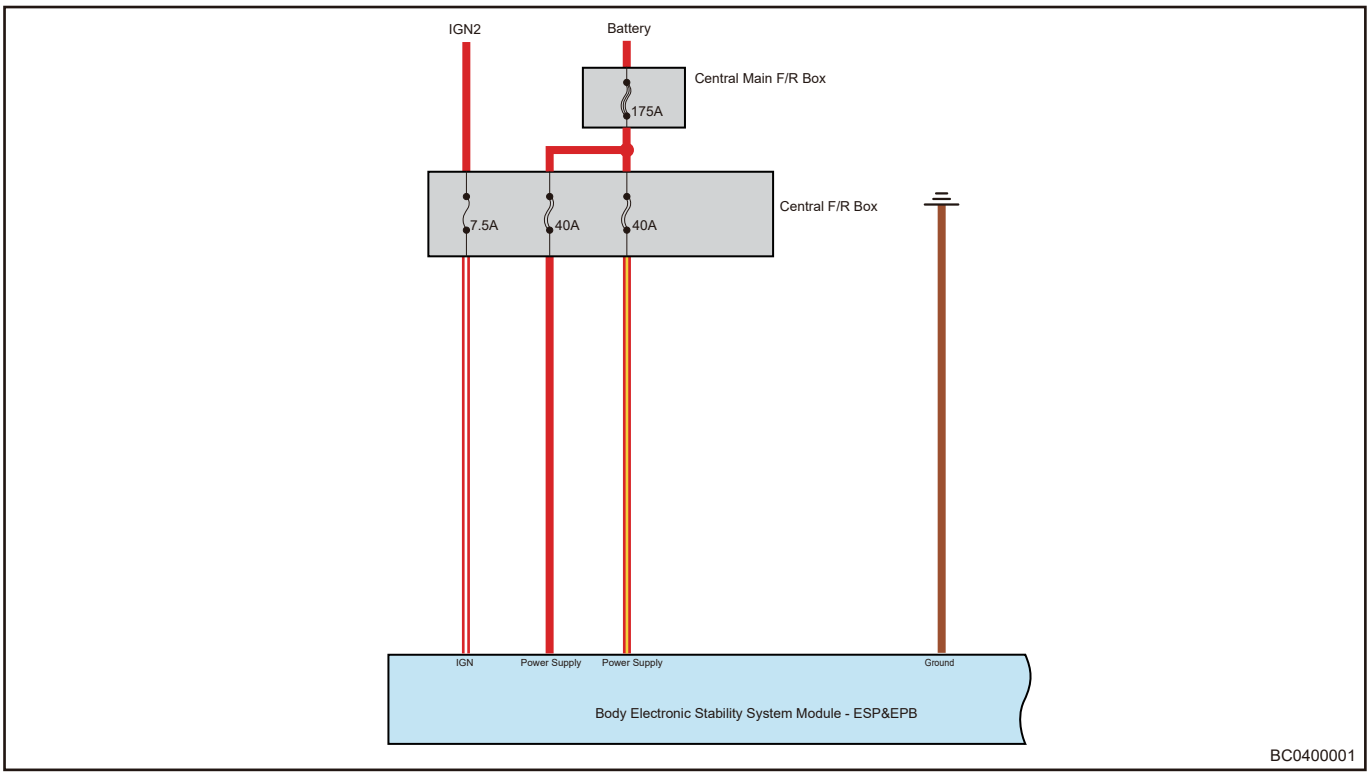
(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	C1000-16	ECU voltage too low
DTC	C1000-17	ECU voltage too high
DTC	C1001-04	Internal fault in ECU system
DTC	C1009-00	ECU hardware related fault
DTC	C1900-04	ECU Voltage Too High, Non-OBD Related Monitoring
DTC	C1901-04	ECU Voltage Too Low, Non-OBD Related Monitoring

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1000-16	ECU voltage too low	• Fuse failure • Battery or charging system failure • Wire harness or connector failure • ESP module failure
C1000-17	ECU voltage too high	
C1001-04	Internal fault in ECU system	
C1009-00	ECU hardware related fault	
C1900-04	ECU Voltage Too High, Non-OBD Related Monitoring	
C1901-04	ECU Voltage Too Low, Non-OBD Related Monitoring	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fuse

(a) Check if ESP fuse in center fuse and relay box is blown.

NG → **Replace related fuse**

OK

2	Check battery voltage

(a) Check if battery voltage is between 9 ~ 16 V.

NG → **Replace battery or check charging system**

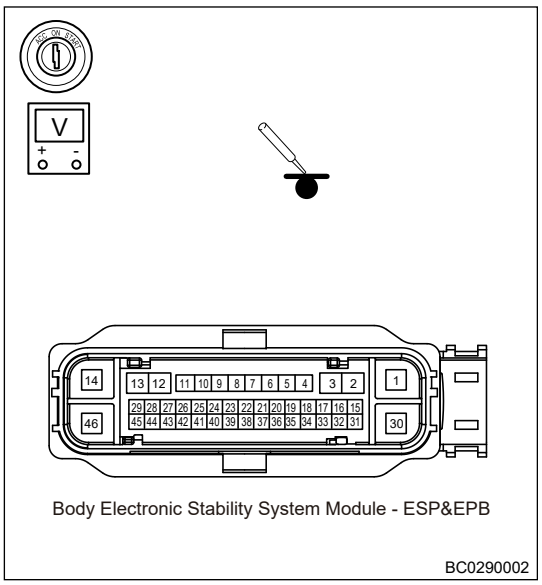
OK

3	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ESP module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Turn ENGINE START STOP switch to ON.
(g) Using a multimeter, measure the voltage between ESP module connector (power supply terminal) and body ground is normal.

Voltage Measurement

Multimeter Connection	Condition	Specified Condition
ESP module connector (power supply terminal) - Body ground	Ignition switch ON	9 ~ 4.9 V



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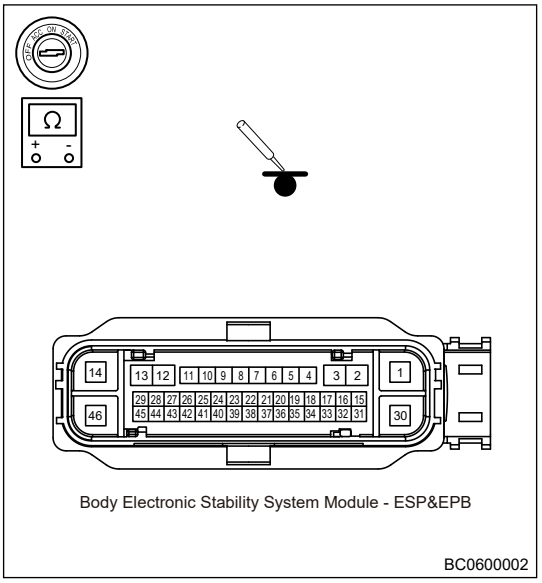
BC0290002

(h) Using a multimeter, measure the resistance between ESP module (ground terminal) and body ground is normal.

Resistance Measurement

Multimeter Connection	Condition	Specified Condition
ESP module (- ground terminal) - Body ground	Always	Less than 1 Ω



Body Electronic Stability System Module - ESP&EPB

BC0600002

NG → **Repair or replace related wire harness and connector**

OK

4	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	C2A17-00	Brake System Air Error

Description

DTC	DTC Definition	Possible Causes
C2A17-00	Brake System Air Error	• There is a small amount of air or slow leakage in the hydraulic circuit or caliper, but it can be pressurized normally • There is too much air or a large amount of leakage in the hydraulic circuit or caliper, unable to built-up pressure properly

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Re exhaust**

(a) Bleed the whole system.

OK → **Perform running test**

NG

2	**Reconfirm DTCs**

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check if this DTC in ESP module occurs again.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ESP module assembly**

DTC	**C1803-95**	**Assembly test not performed**
DTC	**C1802-44**	**PBC EEPROM Fault**
DTC	**C186D-44**	**SupervisionFail-Data Memory Failure**

Description

DTC	DTC Definition	Possible Cause
C1803-95	Assembly test not performed	• Off-line calibration is not performed • ESP module failure
C1802-44	PBC EEPROM Fault	
C186D-44	SupervisionFail-Data Memory Failure	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Assembly inspection**

(a) Perform diagnostic service "Assembly inspection".

NG → **Perform recalibration**

Next

2	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK	Confirm that system operates normally
NG	Replace ESP module

DTC	C1804-53	EPB maintenance mode

Description

DTC	DTC Definition	Possible Cause
C1804-53	EPB maintenance mode	• Enter service mode and not exit • ESP module failure

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Exit maintenance mode

(a) Perform maintenance mode using diagnostic tester.

Next

2	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK	Confirm that system operates normally
NG	Replace ESP module assembly

DTC	C1805-94	Hydric Support Failed

Description

DTC	DTC Definition	Possible Causes
C1805-94	Hydric Support Failed	• Power supply system failure • Wire harness or connector failure • ESP module failure

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check power supply fuse

(a) Check if ESP module power supply fuse is normal.

NG → **Replace fuse**

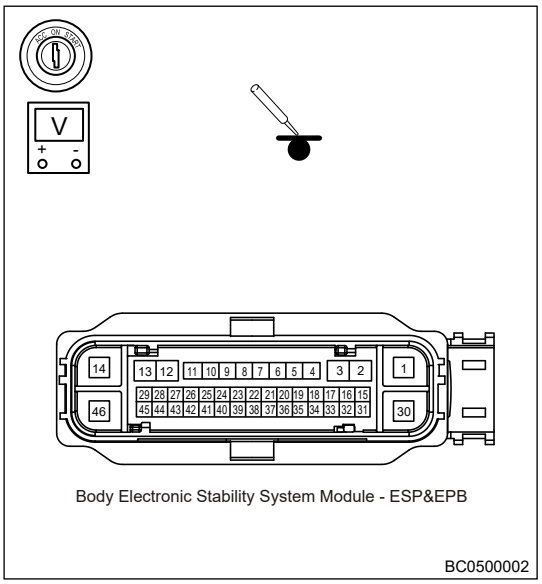
OK

2	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ESP module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Using a digital multimeter, measure the voltage between ESP module assembly connector (power supply terminal) and body ground.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
ESP module assembly connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



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NG → **Check and repair wire harness or connector**

OK

3	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check if this DTC in ESP module occurs again.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ESP module assembly**

DTC	C1826-01	EPB actuator driver gen electrical failure - general electrical failure

Description

DTC	DTC Definition	Possible Cause
C1826-01	EPB actuator driver gen electrical failure - general electrical failure	• Wire harness or connector failure • Electronic control execution unit failure • ESP module failure

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the electronic control execution unit connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.

NG → **Repair/replace related wire harness and connector**

OK ↓

2	Perform left/right brake caliper active test

(a) Perform rear left/right brake caliper active test.

NG → **Replace left/right brake caliper**

OK ↓

3	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK	Confirm that system operates normally
NG	Replace ESP module assembly

DTC	C1807-98	Disc over heat

Description

DTC	DTC Definition	Possible Cause
C1807-98	Disc over heat	• Electronic control execution unit failure • ESP module failure

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Perform left/right brake caliper active test

(a) Perform rear left/right brake caliper active test.

NG	Replace left/right brake caliper

OK

2	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK	Confirm that system operates normally
NG	Replace ESP module assembly

DTC	C0089-04	TCS Disable Switch Failure (ESP Only)-System Internal Failure
DTC	C104D-12	Short to AVH Switch Light or Open
DTC	C104D-14	Short to Ground in AVH Switch Light

Description

DTC	DTC Definition	Possible Causes
C0089-04	TCS Disable Switch Failure (ESP Only)-System Internal Failure	• Wire harness or connector failure • Instrument cluster failure • ESP module failure

DTC	DTC Definition	Possible Causes
C104D-12	Short to AVH Switch Light or Open	
C104D-14	Short to Ground in AVH Switch Light	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check ESP switch

(a) Check if there is a problem in ESP switch.

NG → **Replace instrument cluster**

OK ↓

2	Check related wire harness

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ESP module connector.
(d) Disconnect the instrument cluster connector.
(e) Disconnect the domain controller connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

NG → **Repair or replace wire harness or connector**

OK ↓

3	Reconfirm DTCs

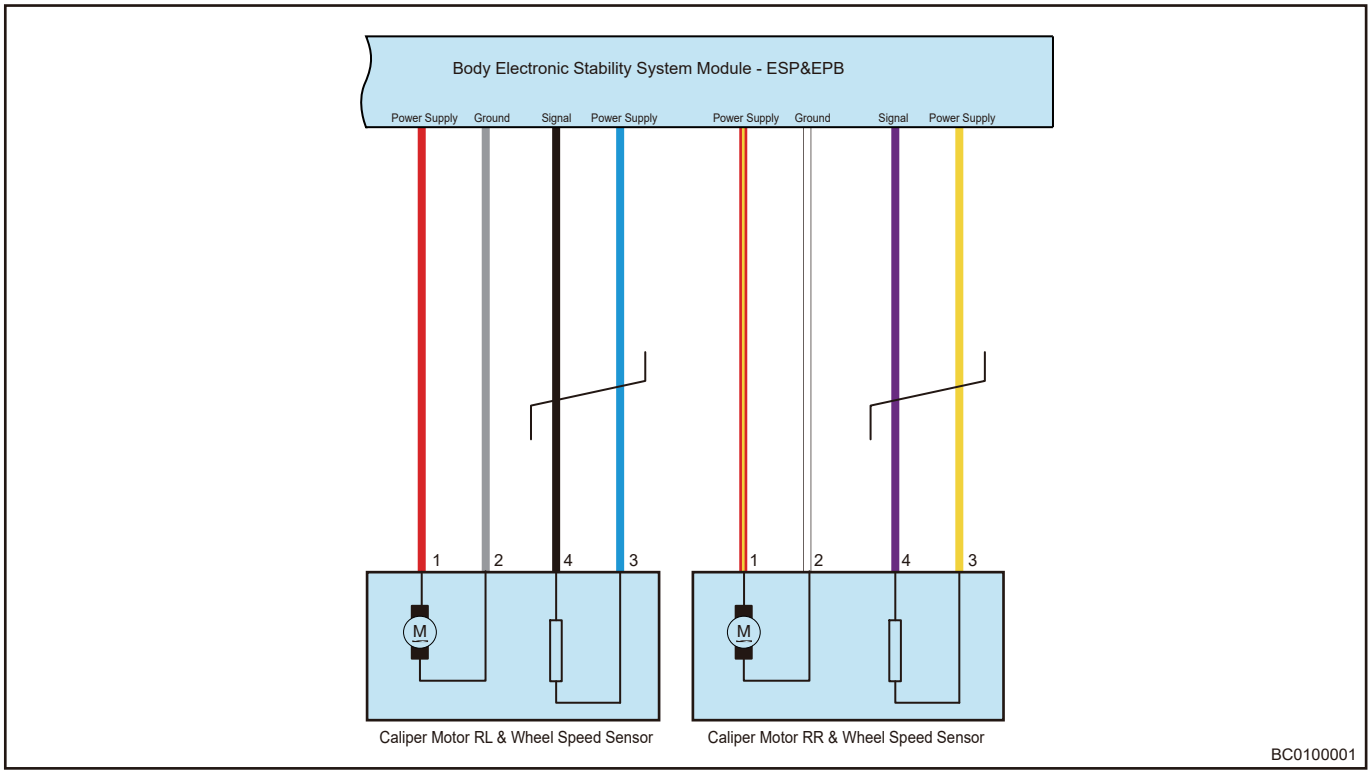
(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check if this DTC in ESP module occurs again.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ESP module assembly**

DTC	C1823-00	APB motor enable line violation

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1823-00	APB motor enable line violation	• Wire harness or connector failure • Electronic control execution unit failure • ESP module failure

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

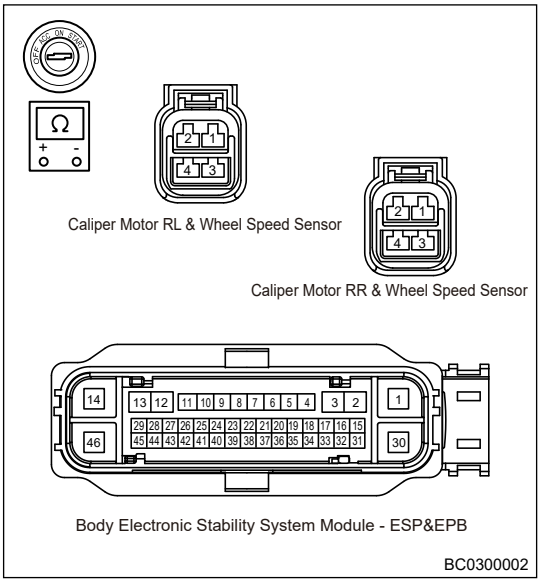
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

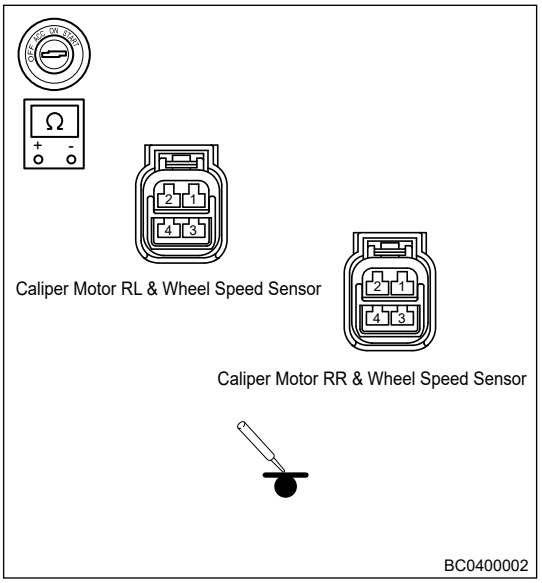
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



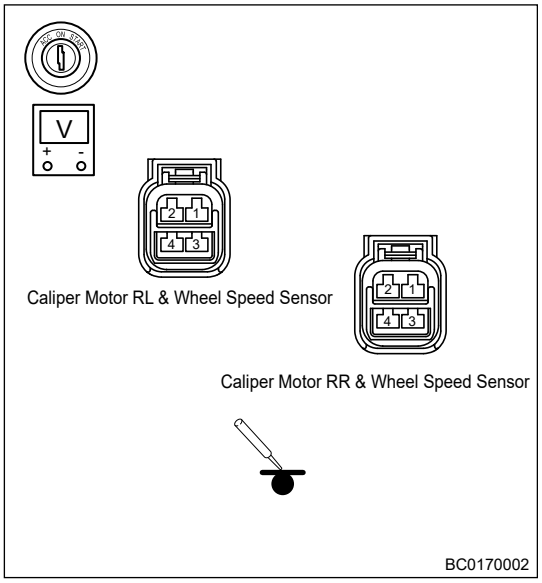
(i) Using a multimeter, measure the resistance between left/right caliper motor connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Left caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ



(j) Connect the negative battery cable.
(k) Turn ENGINE START STOP switch to ON.
(l) Using a multimeter, measure the voltage between left/right brake caliper wire harness and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	0 V
Left caliper motor connector (ground terminal) - Body ground	Always	0 V
Right caliper motor connector (power supply terminal) - Body ground	Always	0 V
Right caliper motor connector (ground terminal) - Body ground	Always	0 V



NG → **Repair or replace related wire harness and connector**

OK

2	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active test.

NG → **Replace left/right brake caliper**

OK

3	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C1007-29**	**Reverse Gear Switch Signal Invalid (ESP Only)**
DTC	**C108C-08**	**Reverse Gear Switch Signal Invalid**

Description

DTC	DTC Definition	Possible Causes
C1007-29	Reverse Gear Switch Signal Invalid (ESP Only)	• Related module system failure • ESP module failure
C108C-08	Reverse Gear Switch Signal Invalid	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check transmission module DTC

(a) Using diagnostic tester, check if related DTC in transmission module.

NG → **Repair or replace faulty area as needed**

OK

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check if this DTC in ESP module occurs again.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ESP module assembly**

DTC	C1008-00	General WSS-No Sub Type Information

Description

DTC	DTC Definition	Possible Causes
C1008-00	General WSS-No Sub Type Information	• Wheel speed sensor failure • Wire harness or connector failure • ESP module failure

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.

- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the corresponding faulty wheel speed sensor connector.
(d) Disconnect the ESP module connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Check circuit between faulty wheel speed sensor and ESP module.

NG → **Repair or replace related wire harness or connector as needed**

OK ↓

2	Replace sensor

(a) Replace faulty wheel speed sensor to compare and verify. Check if a same DTC occurs.

OK → **Replace wheel speed sensor**

NG ↓

3	Reconfirm DTCs

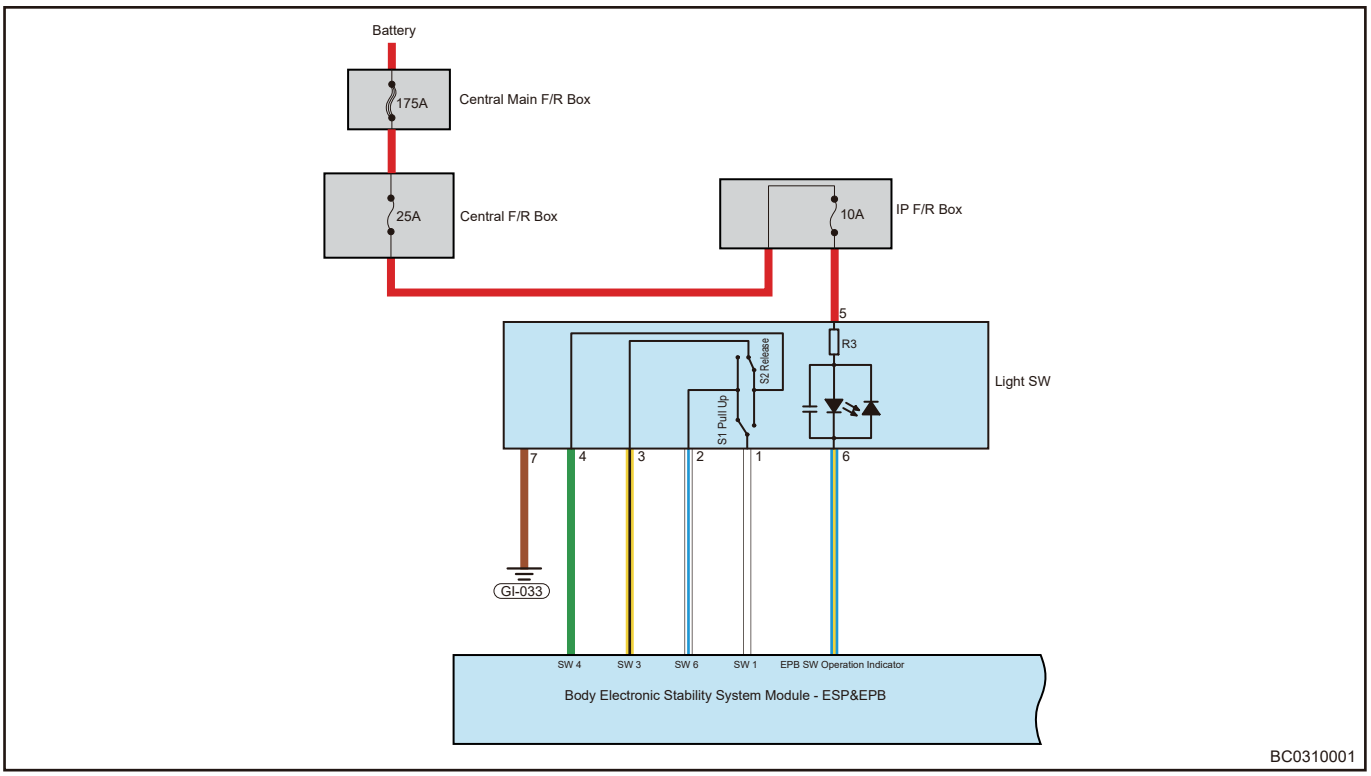
(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check if this DTC in ESP module occurs again.
(c) Diagnose again to confirm if fault reoccurs.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ESP module assembly**

DTC	C1806-01	EPB Button Line Failure-General Electrical Failure
DTC	C1806-16	EPB Button Under Voltage

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1806-01	EPB Button Line Failure-General Electrical Failure	• EPB switch failure • Wire harness or connector failure • ESP module failure
C1806-16	EPB Button Under Voltage	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Check battery voltage.
Standard voltage: Not less than 12 V.

NG → **Repair charging system/replace battery**

OK

2	**Check EPB switch**

(a) Turn ENGINE START STOP switch to OFF.

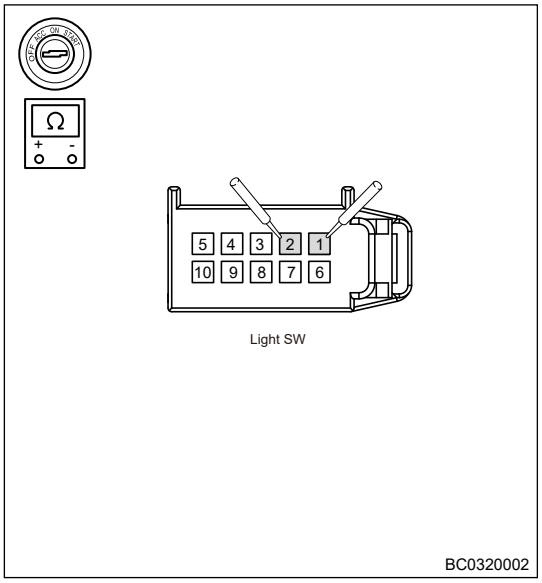
(b) Disconnect the negative battery cable.

(c) Disconnect EPB switch (integrated light switch) connector.

(d) Check if EPB switch is stuck or pushed in by other objects.

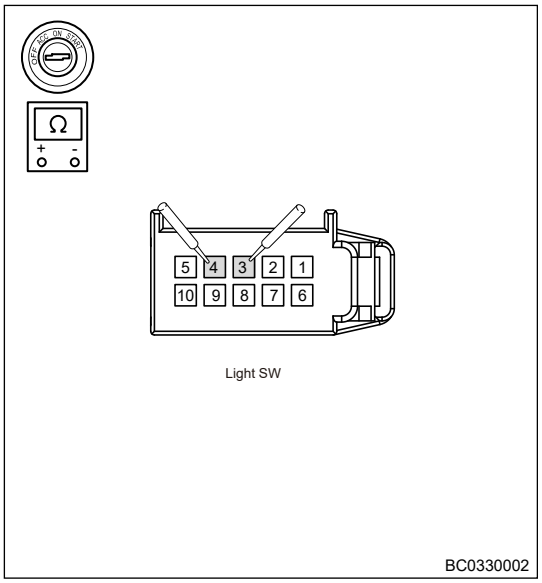
(e) Check for switch continuity when EPB switch is pulled.

Multimeter Connection	Condition	Specified Condition
Light switch (1) - light switch (2)	Always	Less than 1 Ω



(f) Check for switch continuity when EPB switch is released.

Multimeter Connection	Condition	Specified Condition
Light switch (4) - light switch (3)	Always	Less than 1 Ω



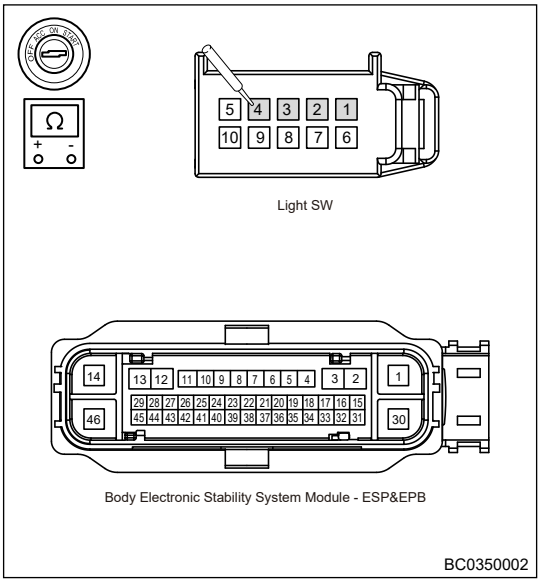
NG → **Replace light switch.**

OK

3	**Check related wire harness and connector**

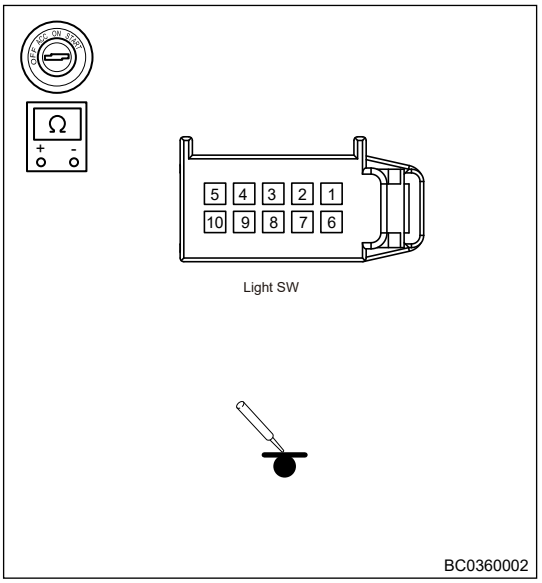
(a) Disconnect the ESP control module connector.
(b) Check if related wire harnesses are worn, pinched or broken.
(c) Check if related connector terminals are loose, broken, bent or corrosive.
(d) Check for continuity between light switch and ESP module.

Multimeter Connection	Condition	Specified Condition
Light switch (1) - ESP module connector (- connected terminal)	Always	Less than 1 Ω
Light switch (2) - ESP module connector (- connected terminal)	Always	Less than 1 Ω
Light switch (3) - ESP module connector (- connected terminal)	Always	Less than 1 Ω
Light switch (4) - ESP module connector (- connected terminal)	Always	Less than 1 Ω



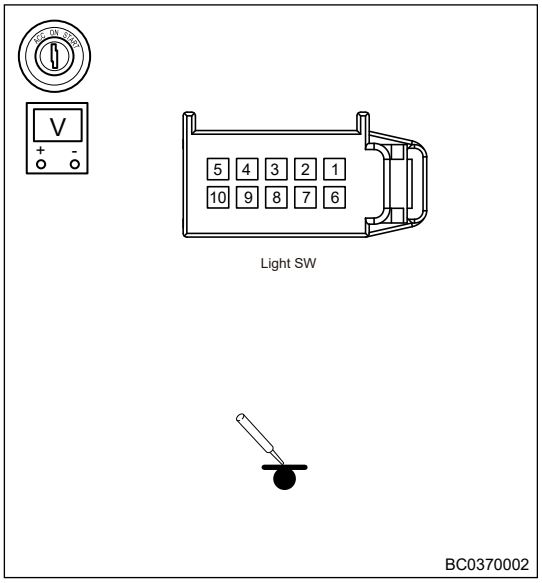
(e) Check the resistance between light switch (connected terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
Light switch (ground terminal) - Body ground	Always	Less than 1 Ω



(f) Check the voltage between light switch (power supply terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
Light switch (power supply terminal) - Body ground	Always	⩾ 9.8 V



NG → **Repair/replace related wire harness and connector**

OK

4	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	C1806-04	EPB Button Always Pushed or Pulled-System Internal Failure

Description

DTC	DTC Definition	Possible Causes
C1806-04	EPB Button Always Pushed or Pulled-System Internal Failure	• EPB internal switch detection circuit failure • EPB switch is stuck • ESP module failure

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check switch

(a) Pull up and press the switch several times, wait for more than 3 seconds after releasing the switch, and observe if switch light flashes. If it flashes, replace the switch.

(b) Pull up the EPB switch, use the diagnostic tester to read the current information inside the EPB, and check if the switch position obtained by the diagnostic tester is "parking position"; Press the EPB switch, use the diagnostic tester to read the current information inside the EPB, and check if the switch position obtained by the diagnostic tester is "release position"; In addition, when the EPB switch is not operated, obtain the position information of the switch through the diagnostic tester to check if it is "natural position"; If the three position information of EPB switch is inconsistent with the actual operation, it indicates that there may be an internal fault of EPB switch, and the EPB switch needs to be replaced at this time.

NG → **Replace EPB switch**

OK

2	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the ESP module connector.

(d) Disconnect the light switch (integrated parking switch) connector.

(e) Check if related wire harnesses are worn, pinched or broken.

(f) Check if related connector terminals are loose, broken, bent or corrosive.

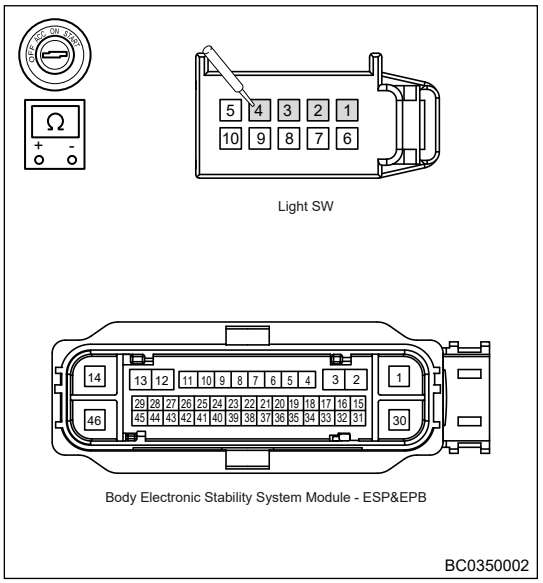
(g) Connect the negative battery cable.

(h) Turn ENGINE START STOP switch to ON.

(i) Using a digital multimeter, measure the resistance between connector ESP (corresponding terminal) and light switch connector (EPB terminal) to check for open.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ESP (connected terminal) - light switch (EPB terminal)	Always	⩽ 1 Ω



NG → **Repair or replace wire harness or connector**

OK

3	Reconfirm DTCs

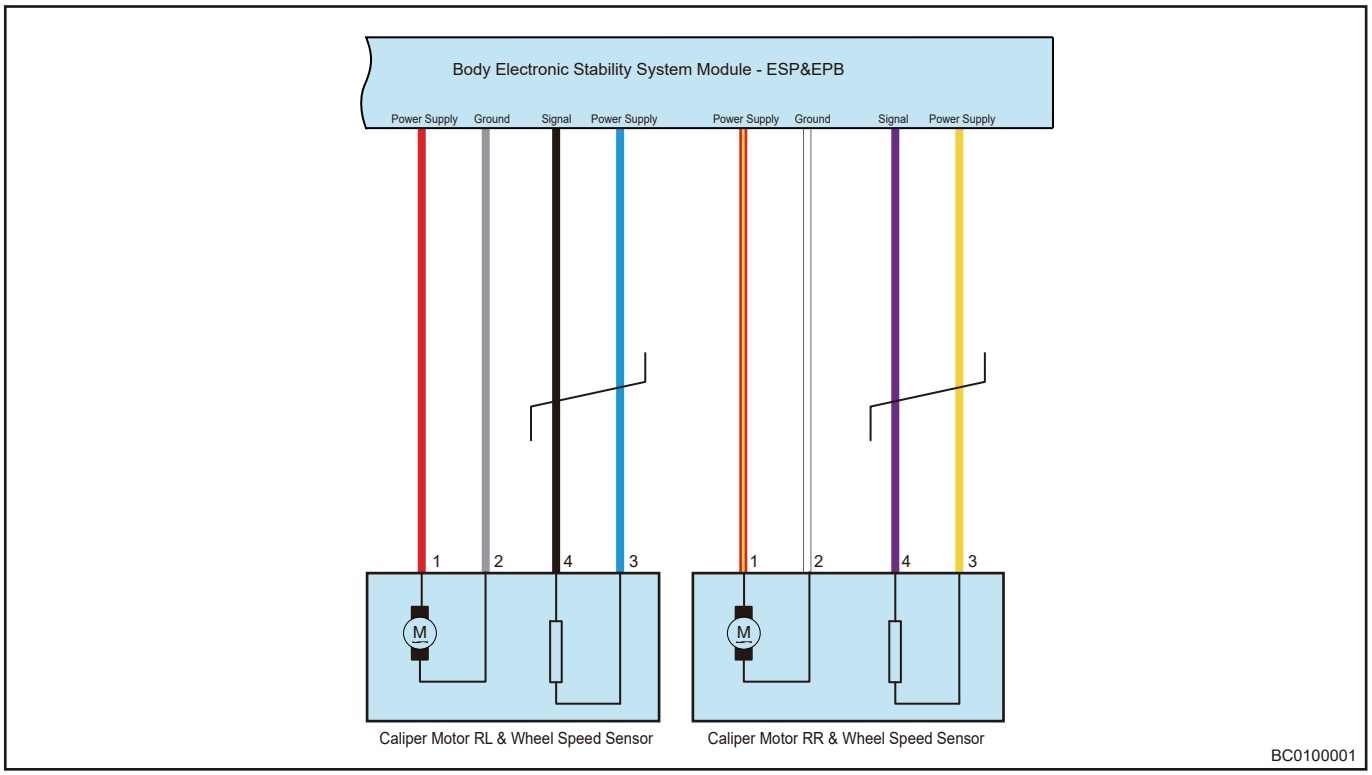
(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after operating EPB switch repeatedly. Check if this DTC occurs again inside EPB.

OK	Conduct test and confirm malfunction has been repaired
NG	Replace ESP module assembly

DTC	C1808-11	Circuit Short To Ground of Left Rear Caliper
DTC	C1808-12	Circuit Short To Battery of Left Rear Caliper
DTC	C1808-13	Short Circuit in Left Rear Caliper
DTC	C1810-01	Short in Left Rear Caliper Positive and Negative
DTC	C1815-11	Circuit Short To Ground of Right Rear Caliper
DTC	C1815-12	Circuit Short To Battery of Right Rear Caliper
DTC	C1815-13	Short Circuit in Right Rear Caliper
DTC	C1817-01	Short in Right Rear Caliper Positive and Negative

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1808-11	Circuit Short To Ground of Left Rear Caliper	• EPB motor failure • Wire harness or connector failure • ESP module failure
C1808-12	Circuit Short To Battery of Left Rear Caliper	
C1808-13	Short Circuit in Left Rear Caliper	
C1810-01	Short in Left Rear Caliper Positive and Negative	

DTC	DTC Definition	Possible Cause
C1815-11	Circuit Short To Ground of Right Rear Caliper	
C1815-12	Circuit Short To Battery of Right Rear Caliper	
C1815-13	Short Circuit in Right Rear Caliper	
C1817-01	Short in Right Rear Caliper Positive and Negative	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Perform electronic control execution unit active test**

(a) Perform rear left/right brake caliper active test.

NG → **Replace electronic control execution unit**

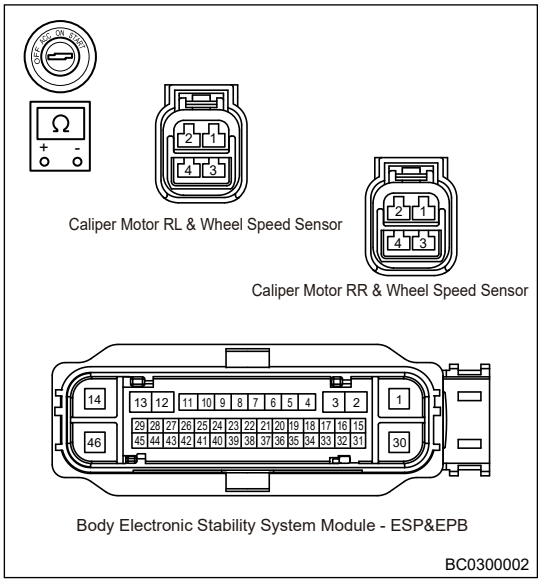
OK

2	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

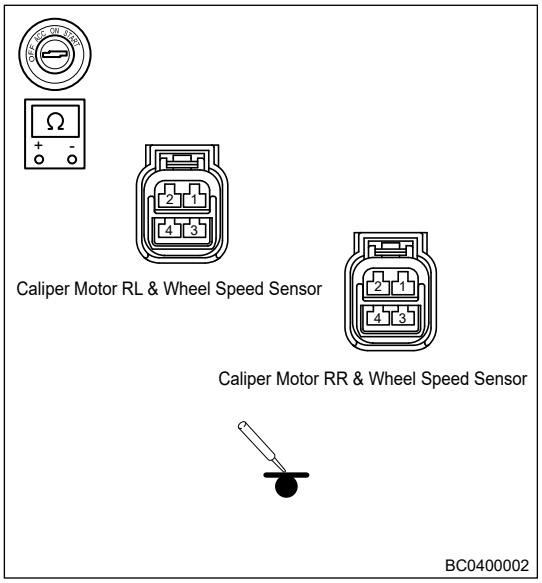
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



(i) Using a multimeter, measure the resistance between left/right caliper motor connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Left caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ



NG → **Repair or replace related wire harness and connector**

OK

3	Reconfirm DTCs

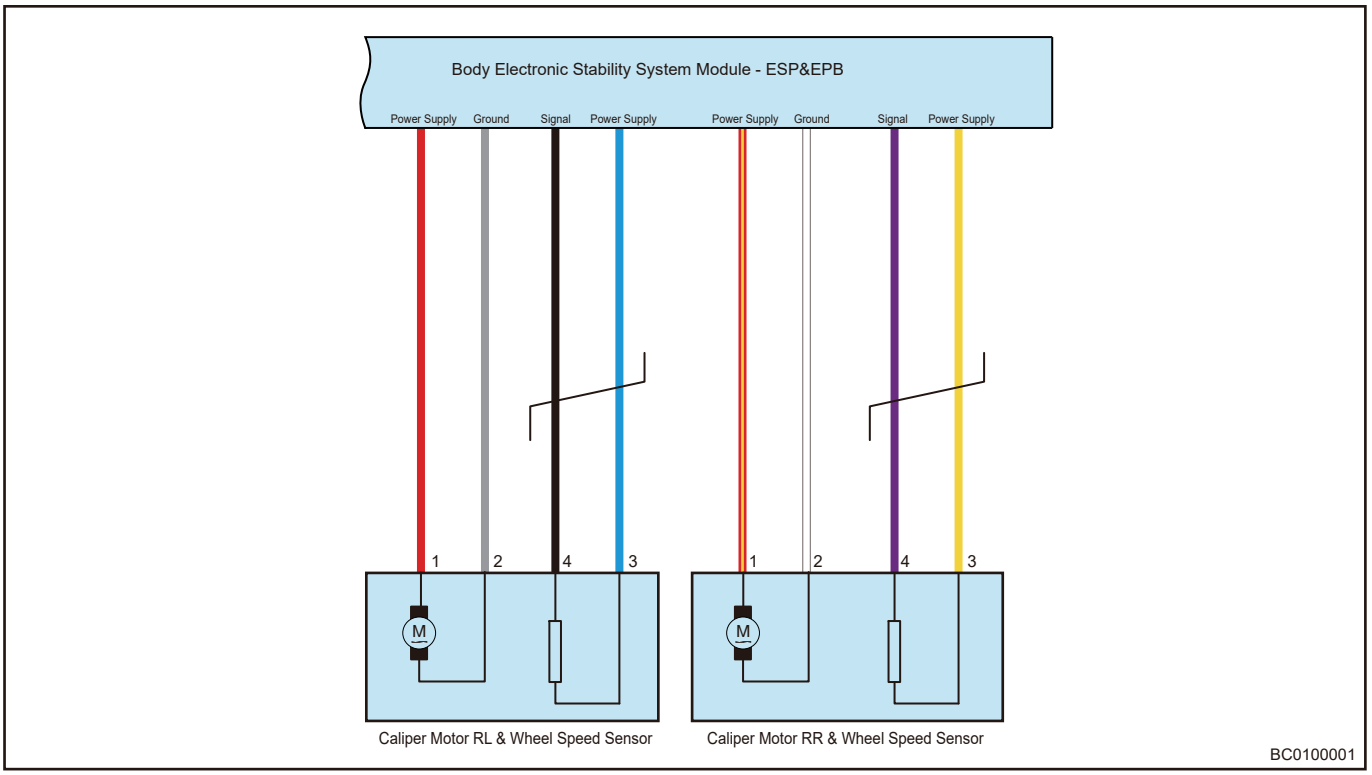
(a) Turn ENGINE START STOP switch to ON.
(b) Use diagnostic tester to clear DTCs.
(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm system operates normally**

NG → **Replace ESP module assembly**

DTC	C1830-00	ECU Left Actuator CAT-No Sub Type Information
DTC	C1831-00	ECU Right Actuator CAT-No Sub Type Information

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1830-00	ECU Left Actuator CAT-No Sub Type Information	• EPB motor failure • Wire harness or connector failure • ESP module failure
C1831-00	ECU Right Actuator CAT-No Sub Type Information	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

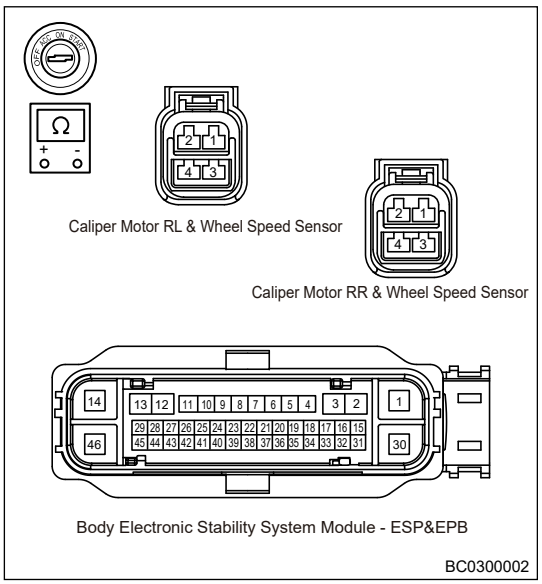
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

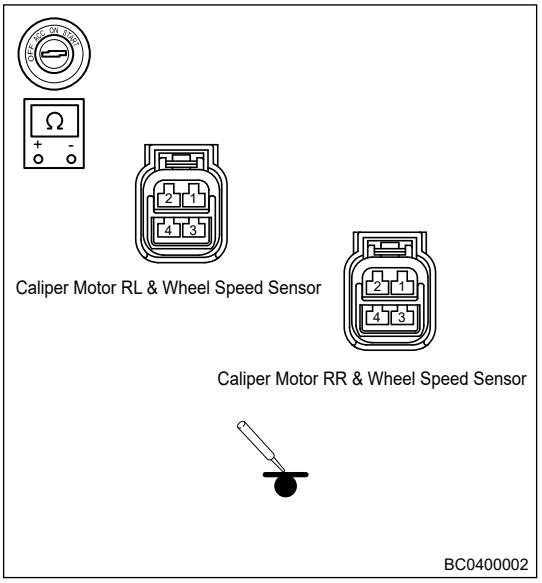
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



(i) Using a multimeter, measure the resistance between left/right caliper motor connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Left caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ

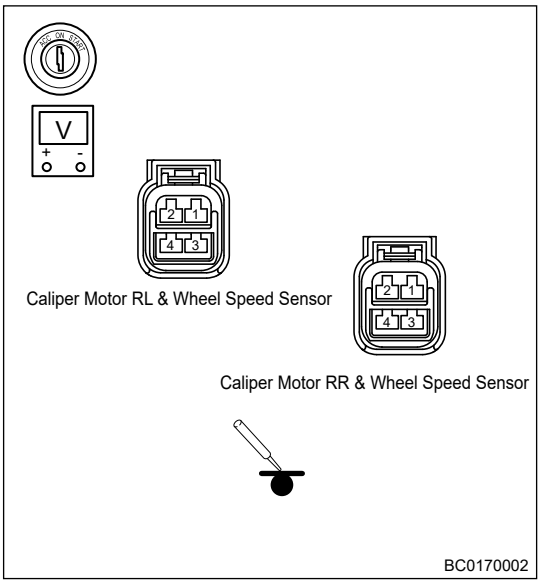


(j) Connect the negative battery cable.

(k) Turn ENGINE START STOP switch to ON.

(l) Using a multimeter, measure the voltage between left/right brake caliper wire harness and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	0 V
Left caliper motor connector (ground terminal) - Body ground	Always	0 V
Right caliper motor connector (power supply terminal) - Body ground	Always	0 V
Right caliper motor connector (ground terminal) - Body ground	Always	0 V



NG → **Repair or replace related wire harness and connector**

OK

2	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active test.

NG → **Replace left/right brake caliper**

OK

3	Confirm DTCs again

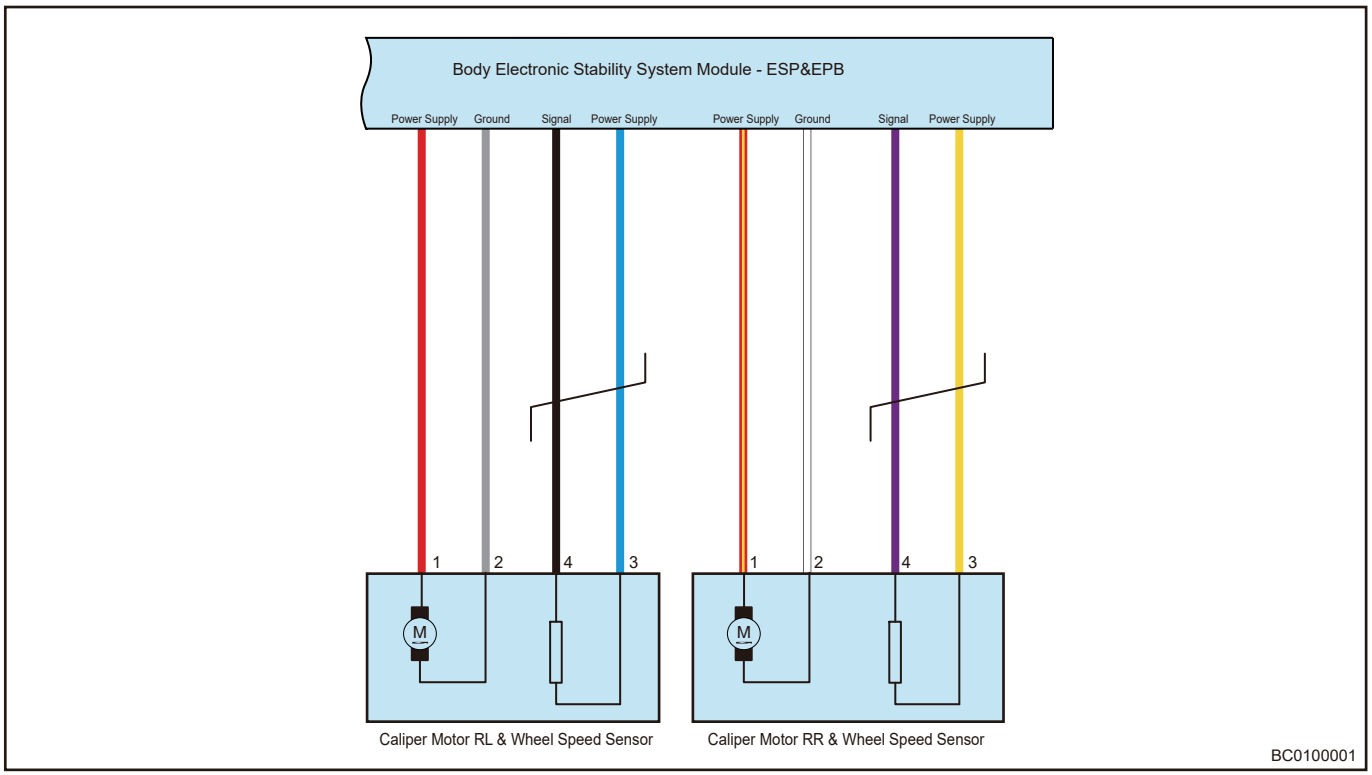
(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	C1800-97	Left actuator - action limited
DTC	C1801-97	Right actuator - action limited

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1800-97	Left actuator - action limited	• Wire harness or connector failure • Electronic control execution unit failure • ESP module failure
C1801-97	Right actuator - action limited	

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check left/right brake caliper**

(a) Check rear left/right brake caliper for interference.

NG → **Repair or replace as needed**

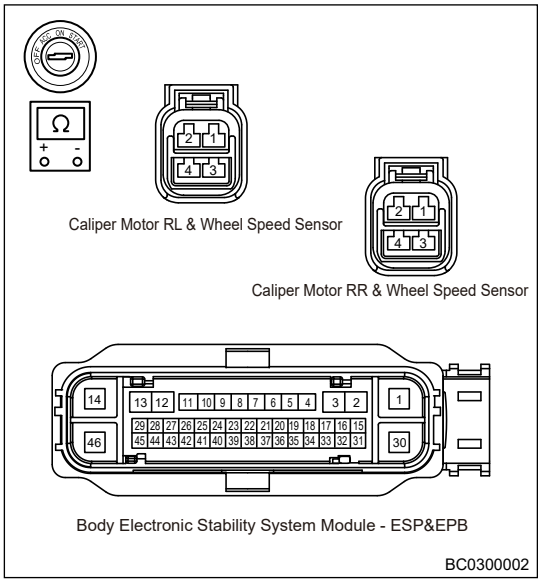
OK ↓

2	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

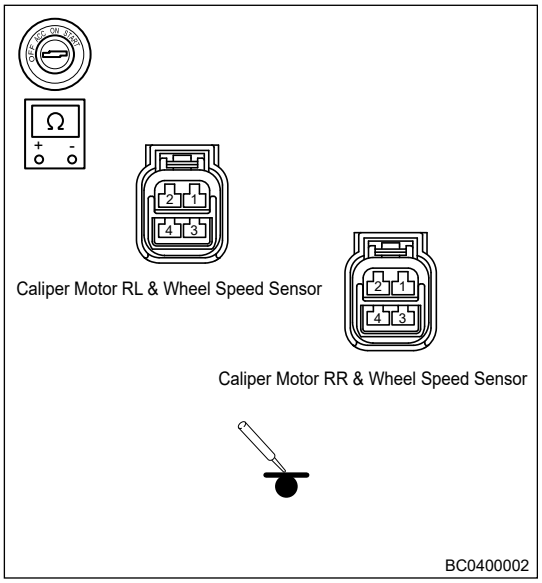
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



(i) Using a multimeter, measure the resistance between left/right caliper motor connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Left caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ



NG → Repair or replace related wire harness and connector

OK

3	Perform left/right brake caliper active test

(a) Perform rear left/right brake caliper active test.

NG → Replace left/right brake caliper

OK

4	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → Confirm that system operates normally

NG → Replace ESP module assembly

DTC	C1568-00	EPB Left Enable Line High and Low Level Abnormal
DTC	C1568-01	EPB Left Motor H-bridge Failure During CMST
DTC	C1568-FC	EPB Left Motor Transistors Error
DTC	C1569-00	EPB Right Enable Line High and Low Level Abnormal
DTC	C1569-01	EPB Right Motor H-bridge Failure During CMST
DTC	C1569-FC	EPB Right Motor Transistors Error
DTC	C156B-FC	EPB Motor GPIO Overcurrent Failure
DTC	C156C-00	APB Circuit GPIO Overheating Failure
DTC	C156C-92	APB Circuit General Fault

Description

DTC	DTC Definition	Possible Cause
C1568-00	EPB Left Enable Line High and Low Level Abnormal	• Wire harness or connector failure • Electronic control execution unit failure • ESP module failure
C1568-01	EPB Left Motor H-bridge Failure During CMST	
C1568-FC	EPB Left Motor Transistors Error	
C1569-00	EPB Right Enable Line High and Low Level Abnormal	
C1569-01	EPB Right Motor H-bridge Failure During CMST	
C1569-FC	EPB Right Motor Transistors Error	

DTC	DTC Definition	Possible Cause
C156B-FC	EPB Motor GPIO Overcurrent Failure	
C156C-00	APB Circuit GPIO Overheating Failure	
C156C-92	APB Circuit General Fault	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

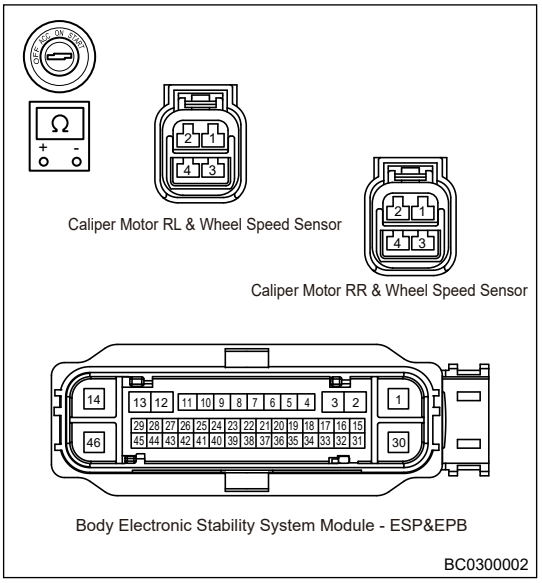
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

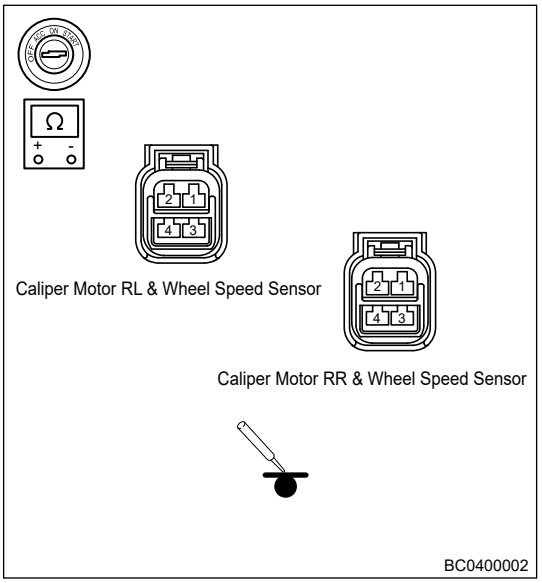
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



(i) Using a multimeter, measure the resistance between left/right caliper motor connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Left caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ



NG → Repair or replace related wire harness and connector

OK

2	Perform left/right brake caliper active test

(a) Perform rear left/right brake caliper active test.

NG → Replace left/right brake caliper

OK

3	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → Confirm that system operates normally

NG → Replace ESP module assembly

DTC	C1002-49	CAN Hardware Internal Electronic Failure
DTC	C10AD-08	Vacuum Sensor General Fault
DTC	C156B-00	EPBASIC_GenericError-No Sub Type Information
DTC	C2000-04	Rollerbench Misusage Detected
DTC	C1010-08	System Mode Management Module Initialization Fault
DTC	C10AE-00	Software Recognition Version Incorrect
DTC	C10AF-00	Detection Critical Overbraking During Actual Vehicle Deceleration
DTC	C186E-FC	ABS Pump Motor Control Other Cycle
DTC	C186F-28	Pressure Sensor Offset Error
DTC	C1870-00	EPB ASIC General Error

Description

DTC	DTC Definition	Possible Cause
C1002-49	CAN Hardware Internal Electronic Failure	• ESP module failure
C10AD-08	Vacuum Sensor General Fault	
C156B-00	EPBASIC_GenericError-No Sub Type Information	
C2000-04	Rollerbench Misusage Detected	
C1010-08	System Mode Management Module Initialization Fault	
C10AE-00	Software Recognition Version Incorrect	

DTC	DTC Definition	Possible Cause
C10AF-00	Detection Critical Overbraking During Actual Vehicle Deceleration	
C186E-FC	ABS Pump Motor Control Other Cycle	
C186F-28	Pressure Sensor Offset Error	
C1870-00	EPB ASIC General Error	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

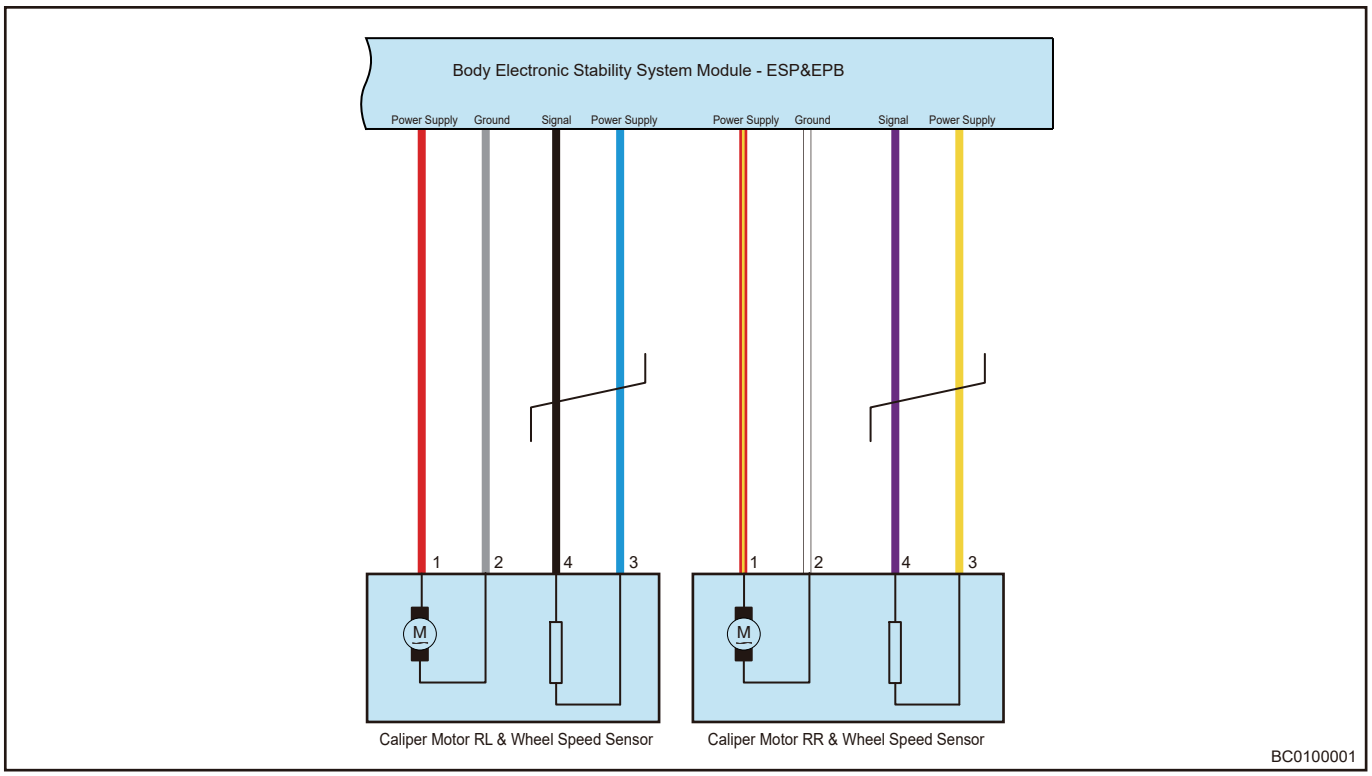
1	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK	**Confirm that system operates normally**
NG	**Replace ESP module**

DTC	**C1832-00**	**EPB left actuator unintended run-no sub type information**
DTC	**C1566-01**	**EPB Left Motor Rotates Unexpectedly**
DTC	**C156D-62**	**EPB Actuator Operation Unreliable**
DTC	**C1833-00**	**EPB right actuator unintended run-no sub type information**
DTC	**C1567-01**	**EPB Right Motor Rotates Unexpectedly**
DTC	**C1800-64**	**EPB Actuator Operation Unreliable**

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1832-00	EPB left actuator unintended run-no sub type information	• Wire harness or connector failure • ESP module failure
C1566-01	EPB Left Motor Rotates Unexpectedly	
C156D-62	EPB Actuator Operation Unreliable	
C1800-64	EPB Actuator Operation Unreliable	
C1567-01	EPB Right Motor Rotates Unexpectedly	
C1833-00	EPB right actuator unintended run-no sub type information	

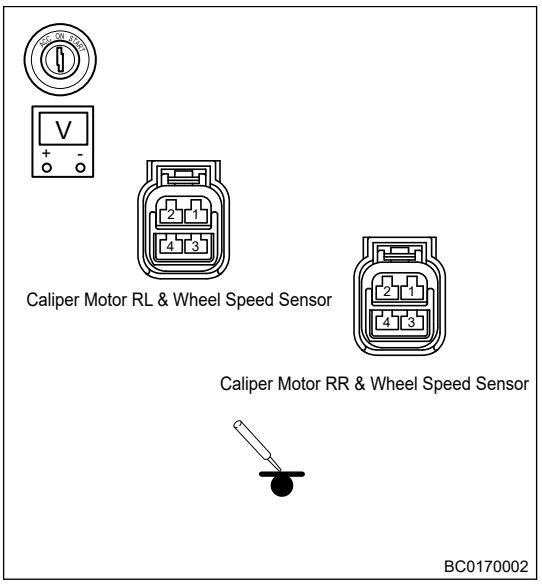
■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.
(h) Connect the negative battery cable.
(i) Turn ENGINE START STOP switch to ON.
(j) Using a multimeter, measure the voltage between left/right brake caliper wire harness and body ground.



Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	0 V
Left caliper motor connector (ground terminal) - Body ground	Always	0 V
Right caliper motor connector (power supply terminal) - Body ground	Always	0 V
Right caliper motor connector (ground terminal) - Body ground	Always	0 V

NG → **Repair or replace related wire harness and connector**

OK

2	**Confirm DTCs again**

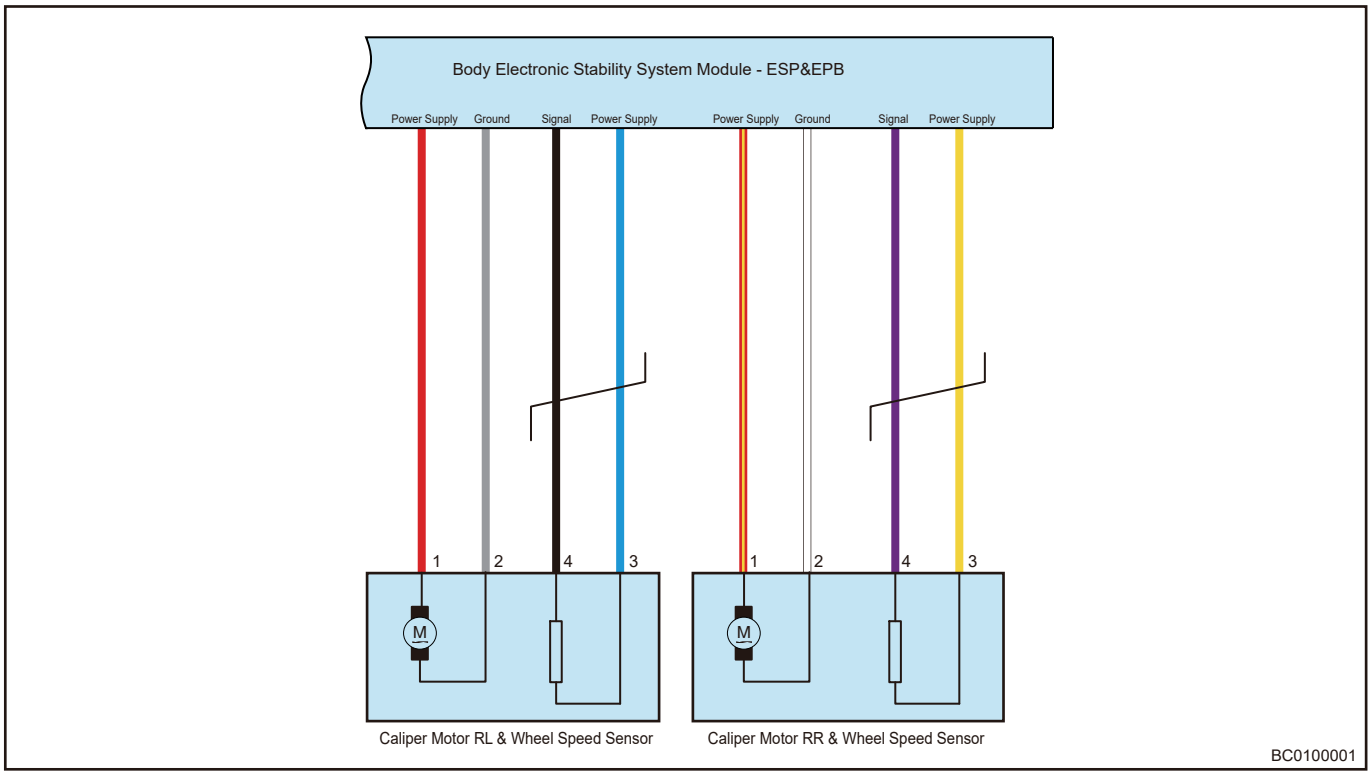
(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C1800-73**	**Left actuator - apply failed-actuator stuck closed**
DTC	**C1800-74**	**Left Actuator**
DTC	**C1801-73**	**Right actuator - apply failed-actuator stuck closed**
DTC	**C1801-74**	**Right Actuator - Actuator Slipping (Apply TimeOut)**

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1800-73	Left actuator - apply failed-actuator stuck closed	• Wire harness or connector failure • Actuator is not equipped with lining or lining is too thin, resulting in too long EPB braking time but still unable to brake normally • Electronic control execution unit failure • ESP module failure
C1800-74	Left Actuator	
C1801-73	Right actuator - apply failed-actuator stuck closed	
C1801-74	Right Actuator - Actuator Slipping (Apply TimeOut)	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check installation of actuator and parking caliper**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check if actuator and parking caliper are installed correctly.

NG → **Reinstall it**

OK

2	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the left/right caliper motor with wheel speed sensor connector.

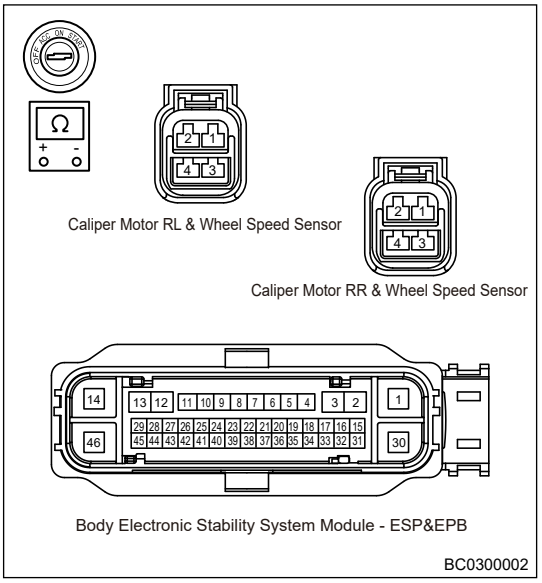
(d) Disconnect the ESP control module assembly connector.

(e) Check if related wire harnesses are worn, pinched or broken.

(f) Check if related connector terminals are loose, broken, bent or corrosive.

(g) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (-corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (-corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (-corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (-corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (-corresponding terminal)	Always	Less than 1 Ω



NG

Repair or replace related wire harness and connector

OK

3	Check caliper motor wire harness

(a) Check if there is short or other faults in caliper motor wire harness

OK → Replace rear caliper motor with wheel speed sensor

NG

4	Check left/right brake caliper

(a) Using a replacement method, measure left/right parking caliper.

NG → Replace left/right brake caliper

OK

5	Confirm DTCs again

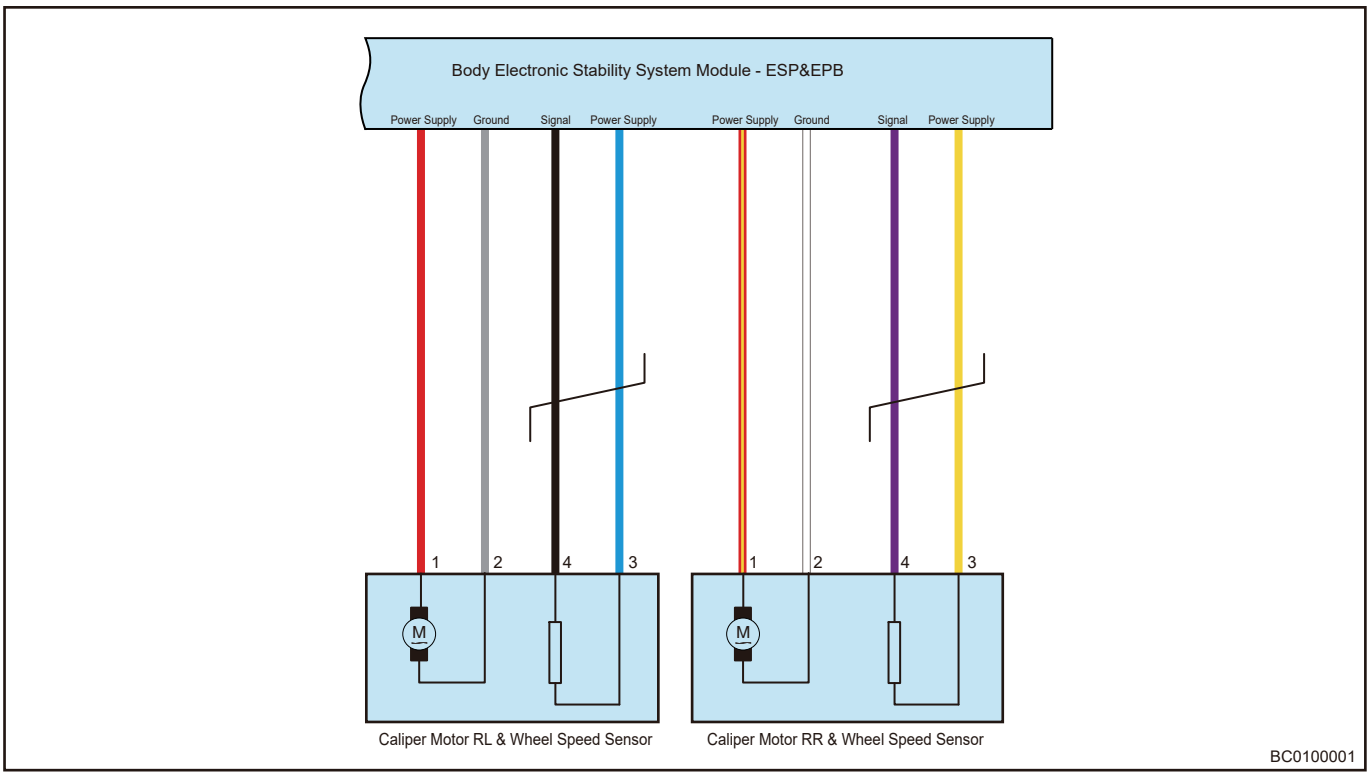
(a) Clear DTCs.
(b) Start the vehicle.
(c) Turn ENGINE START STOP switch to ON again and check if this DTC occurs inside EPB. Operate EPB switch to clamp and release repeatedly. Confirm that the fault has been solved.
(d) Check if the same DTCs occur.

OK → Confirm that system operates normally

NG → Replace ESP module assembly

DTC	C1800-72	Left actuator - release failed-actuator stuck open
DTC	C1801-72	Right actuator -release failed-actuator stuck open
DTC	C1034-77	Caliper Not Fully Released

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1800-72	Left actuator - release failed-actuator stuck open	• Electronic control execution unit internal mechanical malfunction • ESP module failure
C1801-72	Right actuator -release failed-actuator stuck open	
C1034-77	Caliper Not Fully Released	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check left/right caliper motor**

(a) Check the left/right caliper motor.

NG → **Replace left/right caliper motor**

OK

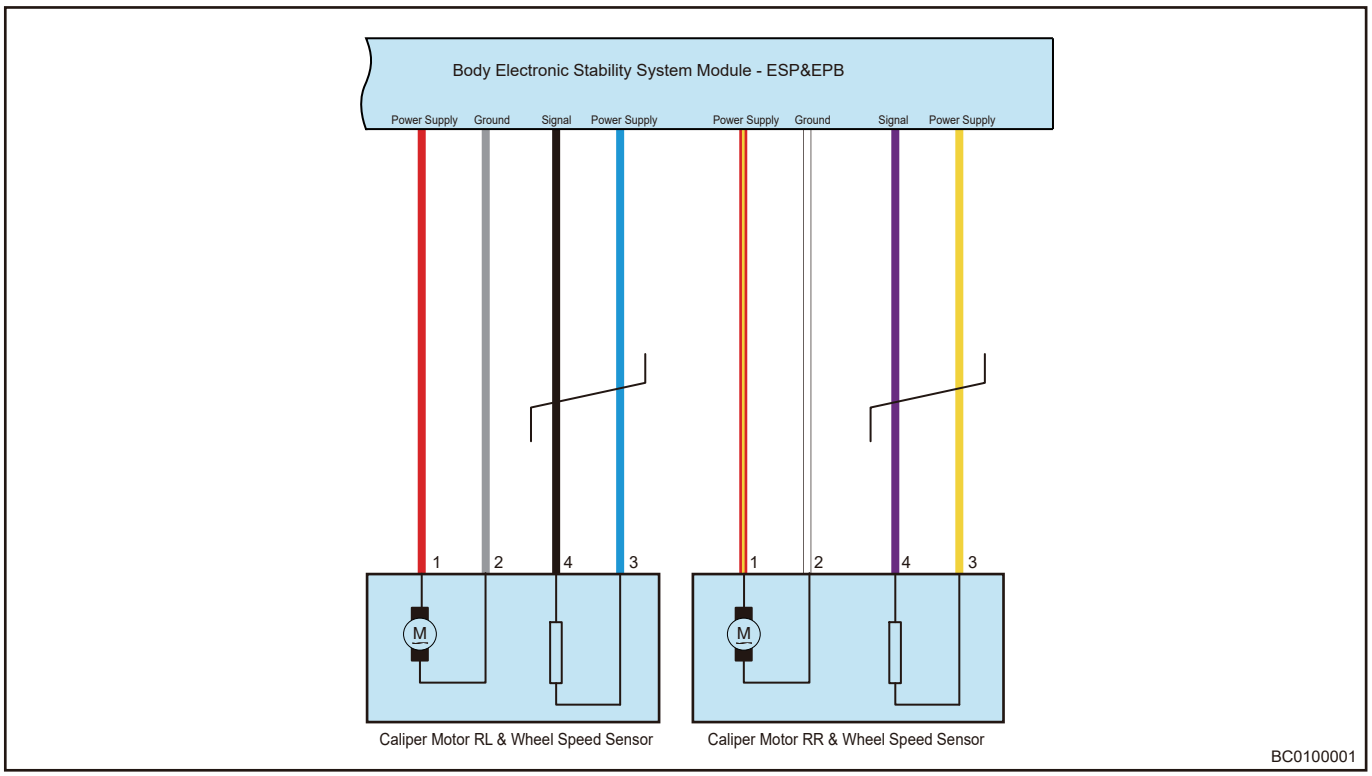
2	**Confirm DTCs again**

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK	Confirm that system operates normally
NG	Replace ESP module assembly

DTC	C1800-93	Left actuator - no motor start detected-no operation
DTC	C1801-93	Right actuator - no motor start detected-no operation

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1800-93	Left actuator - no motor start detected-no operation	• Wire harness or connector failure • Electronic control execution unit internal resistance is too large • ESP module failure
C1801-93	Right actuator - no motor start detected-no operation	

■ DTC Confirmation Procedure

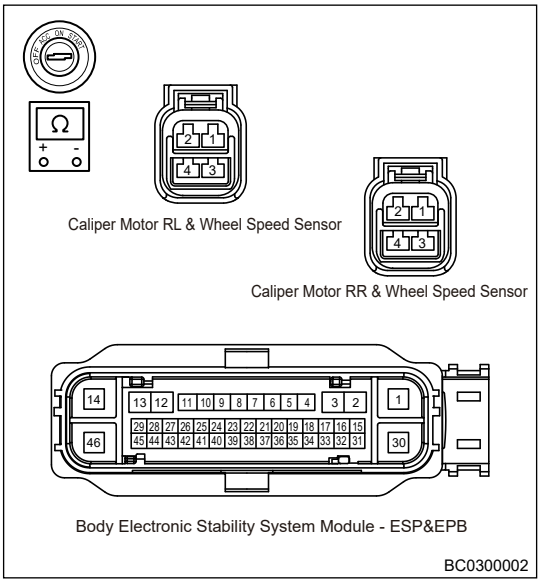
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



NG → **Repair or replace related wire harness and connector**

OK

2	Check left/right brake caliper wire harness

(a) Check the left/right brake caliper wire harness.

NG → **Replace left/right caliper motor with wheel speed sensor assembly**

OK

3	Check left/right brake caliper

(a) Check the left/right brake caliper motor.

NG → Replace left/right brake caliper

OK

4	Confirm DTCs again

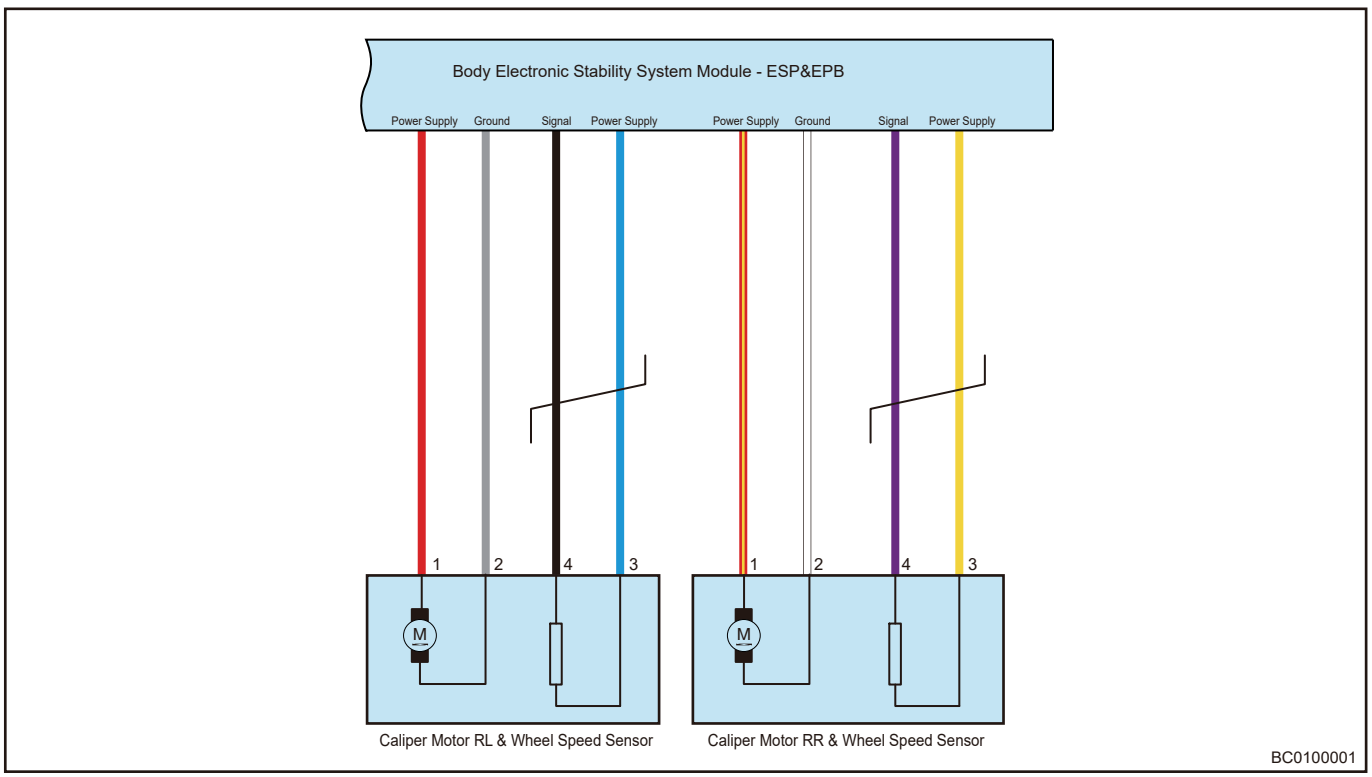
(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → Confirm that system operates normally

NG → Replace ESP module assembly

DTC	C1800-19	Left actuator - circuit current above threshold-circuit current above threshold
DTC	C1801-19	Right actuator - circuit current above threshold-circuit current above threshold

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1800-19	Left actuator - circuit current above threshold-circuit current above threshold	• Wire harness or connector failure • Short circuit in electronic control execution unit • ESP module failure
C1801-19	Right actuator - circuit current above threshold-circuit current above threshold	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

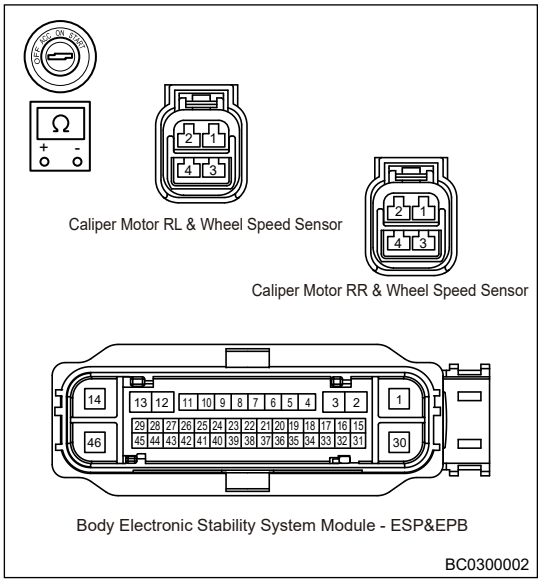
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

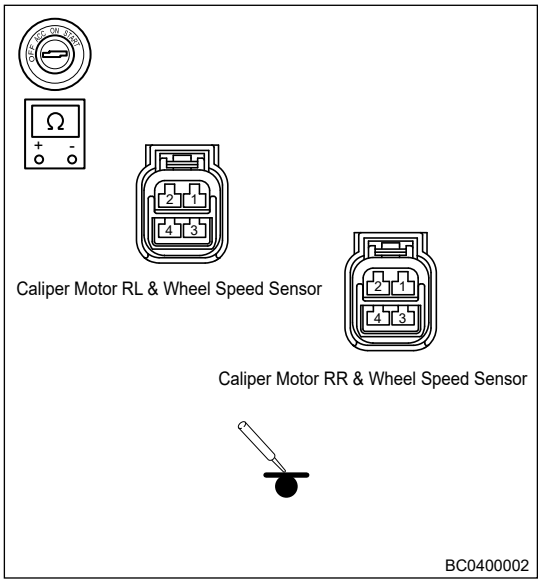
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



(i) Using a multimeter, measure the resistance between left/right caliper motor connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Left caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ



NG → **Repair or replace related wire harness and connector**

OK

2	Check left/right caliper motor wire harness

(a) Check the left/right caliper motor wire harness.

NG → **Replace left/right caliper motor with wheel speed sensor assembly**

OK

3	Check left/right brake caliper

(a) Check the left/right brake caliper motor.

NG → **Replace left/right brake caliper**

OK

4	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C1800-92**	**Left actuator - high mechanical resistance-performance or incorrect operation**
DTC	**C1801-92**	**Right actuator - high mechanical resistance-performance or incorrect operation**

Description

DTC	DTC Definition	Possible Cause
C1800-92	Left actuator - high mechanical resistance-performance or incorrect operation	• Electronic control execution unit mechanical malfunction • ESP module failure
C1801-92	Right actuator - high mechanical resistance-performance or incorrect operation	

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active test.

NG → **Replace left/right brake caliper**

OK

2	**Confirm DTCs again**

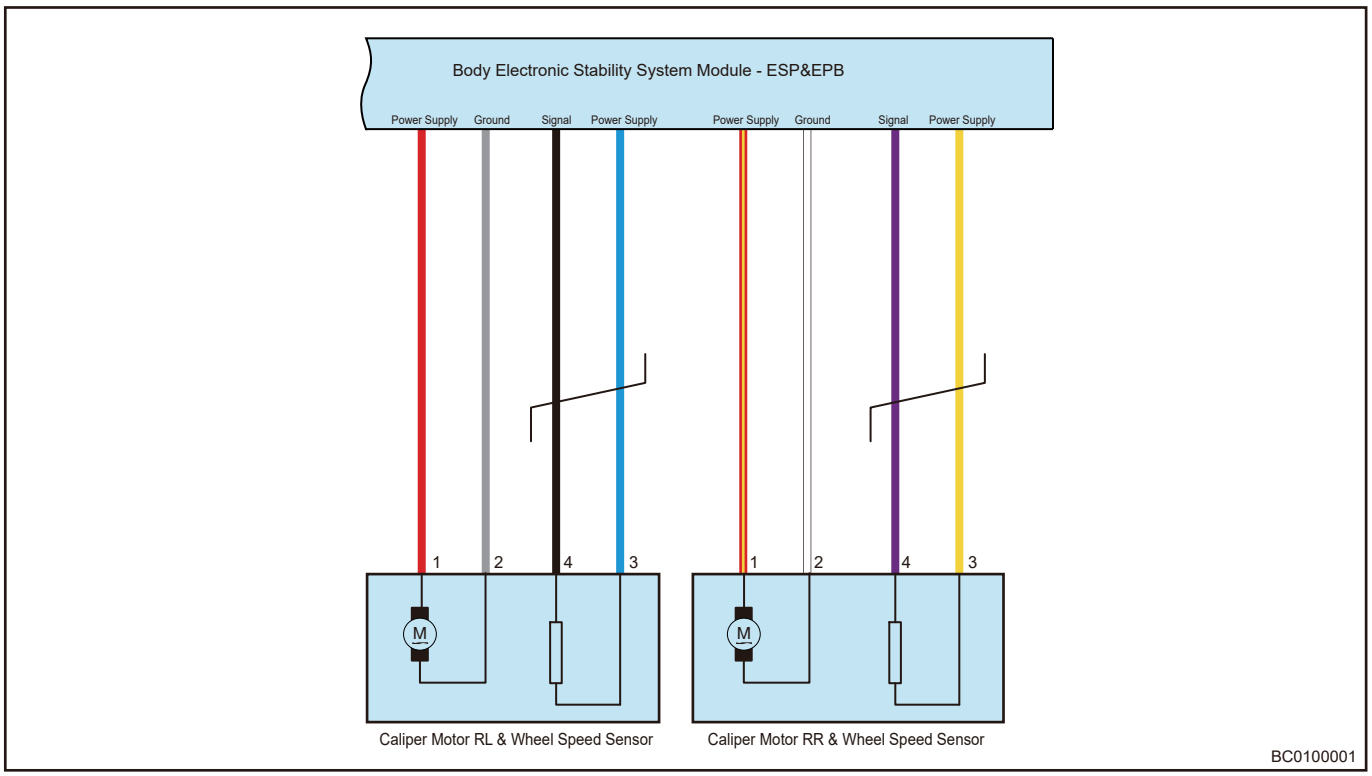
(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	**C1800-91**	**Left actuator - wrong operating characteristics detect-parametric**
DTC	**C1801-91**	**Right actuator - wrong operating characteristics detect-parametric**

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1800-91	Left actuator - wrong operating characteristics detect-parametric	• Electronic control execution unit internal resistance is too large • ESP module failure
C1801-91	Right actuator - wrong operating characteristics detect-parametric	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

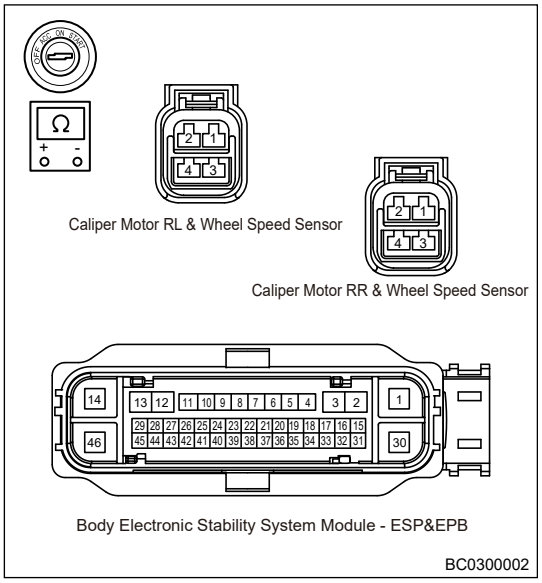
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



NG → **Repair or replace related wire harness and connector**

OK

2	Check left/right brake caliper

(a) Check the left/right brake caliper motor.

NG → **Replace left/right brake caliper**

OK

3	Confirm DTCs again

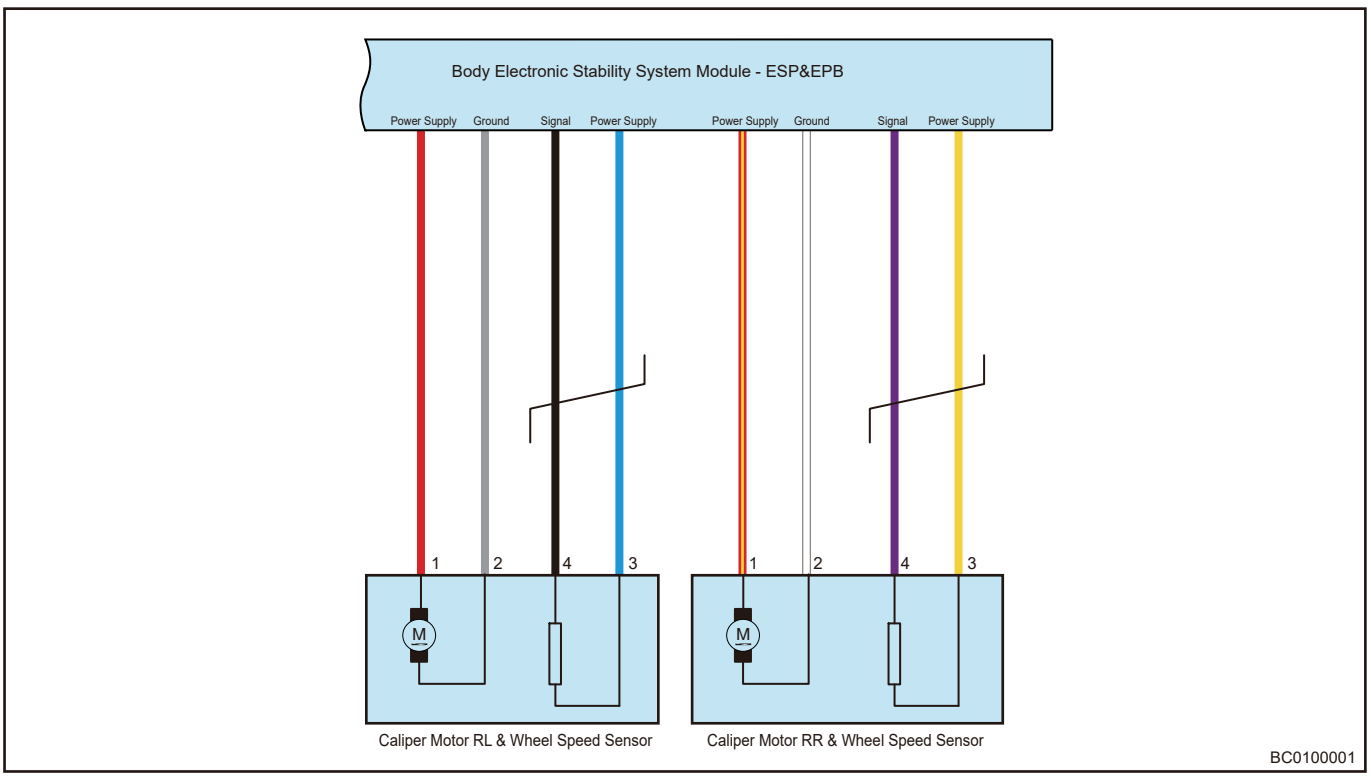
(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → Replace ESP module assembly

DTC	C1824-01	EPB left actuator electrical failure-general electrical failure
DTC	C1822-00	EPB left actuator failure
DTC	C1824-1E	EPB left actuator shunt on line or ECU-circuit resistance out of range
DTC	C1566-00	EPB Left Caliper Circuit Failure
DTC	C1566-FC	EPB Left Motor Line Failure
DTC	C1568 – 1D	Short to EPB Left Motor
DTC	C1561 – 1E	EPB Motor Electrical Coupling Failure
DTC	C1825-01	EPB right actuator electrical failure-general electrical failure
DTC	C1821-00	EPB right actuator failure
DTC	C1825-1E	EPB right actuator shunt on line or ECU-circuit resistance out of range
DTC	C1567-00	EPB Right Caliper Circuit Failure
DTC	C1567-FC	EPB Right Motor Line Failure
DTC	C1569 – 1D	Short to EPB Right Motor

Circuit Diagram



Description

DTC	DTC Definition	Possible Cause
C1824-01	EPB left actuator electrical failure-general electrical failure	• Wire harness or connector failure • Electronic control execution unit failure • ESP module failure
C1822-00	EPB left actuator failure	
C1824-1E	EPB left actuator shunt on line or ECU-circuit resistance out of range	
C1566-00	EPB Left Caliper Circuit Failure	
C1566-FC	EPB Left Motor Line Failure	
C1568 – 1D	Short to EPB Left Motor	
C1561 – 1E	EPB Motor Electrical Coupling Failure	
C1825-01	EPB right actuator electrical failure-general electrical failure	
C1821-00	EPB right actuator failure	
C1825-1E	EPB right actuator shunt on line or ECU-circuit resistance out of range	
C1567-00	EPB Right Caliper Circuit Failure	
C1567-FC	EPB Right Motor Line Failure	
C1569 – 1D	Short to EPB Right Motor	

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Perform left/right brake caliper active test**

(a) Perform rear left/right brake caliper active test.

NG → **Replace left/right brake caliper**

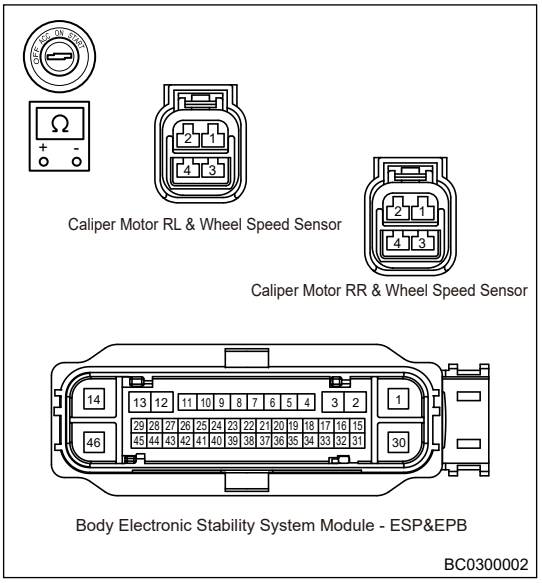
OK

2	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear left caliper motor with wheel speed sensor connector.
(d) Disconnect the rear right caliper motor with wheel speed sensor connector.
(e) Disconnect the ESP control module assembly connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

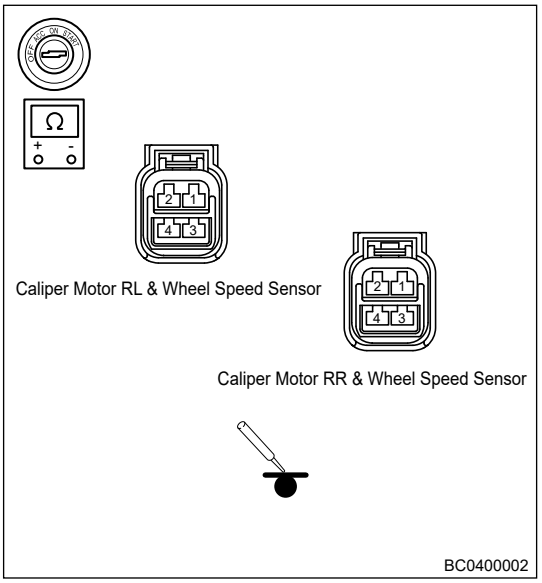
(h) Using a multimeter, check for continuity between left/right caliper motor connector terminal and EPB module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Left caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (power supply terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω
Right caliper motor connector (ground terminal) - ESP module connector (- corresponding terminal)	Always	Less than 1 Ω



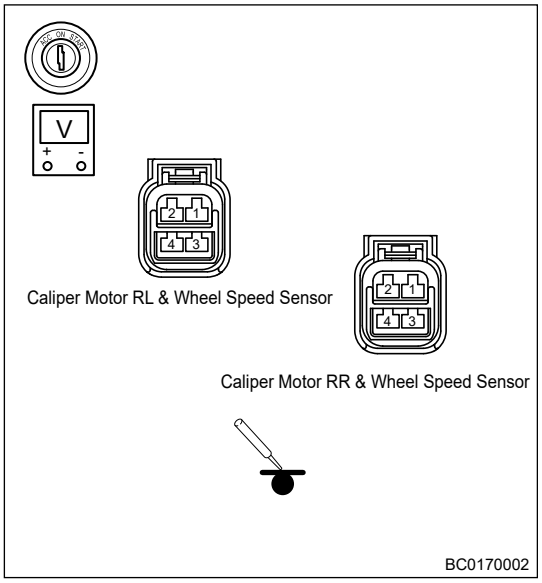
(i) Using a multimeter, measure the resistance between left/right caliper motor connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Left caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (power supply terminal) - Body ground	Always	More than 10 kΩ
Right caliper motor connector (ground terminal) - Body ground	Always	More than 10 kΩ



(j) Connect the negative battery cable.
(k) Turn ENGINE START STOP switch to ON.
(l) Using a multimeter, measure the voltage between left/right brake caliper wire harness and body ground.

Multimeter Connection	Condition	Specified Condition
Left caliper motor connector (power supply terminal) - Body ground	Always	0 V
Left caliper motor connector (ground terminal) - Body ground	Always	0 V
Right caliper motor connector (power supply terminal) - Body ground	Always	0 V
Right caliper motor connector (ground terminal) - Body ground	Always	0 V



NG → **Repair or replace related wire harness and connector**

OK

3	Confirm DTCs again

(a) Clear DTCs.
(b) Start the vehicle.
(c) Check if the same DTCs occur.

OK → **Confirm that system operates normally**

NG → **Replace ESP module assembly**

DTC	U0005-00	High Speed CAN Communication Bus (+) High
DTC	U0007-00	High Speed CAN Communication Bus (-) Low
DTC	U0073-88	Bus Off
DTC	U1005-88	Bus Off (CAN1-BUS OFF)
DTC	U0100-87	Lost Communication With EMS (ESP Only)
DTC	U1427-81	EngineNet_InvalidValue-Invalid Serial Data Received
DTC	U0101-87	Lost Communication With TCU (ESP Only)
DTC	U0126-87	Lost Communication With Steering Angle Sensor Module (ESP Only)
DTC	U0140-87	Lost Communication With BCM (ESP Only)

DTC	U0422-81	Invalid Data Received From Body Control Module (ESP Only)
DTC	U0428-81	Invalid Data Received From Steering Angle Sensor Module (ESP Only)
DTC	U1163-87	Lost Communication With ACC (ESP Only)-Miss Message
DTC	U0433 - 81	Invalid Data Received From ACC (ESP Only)-Invalid Serial Date Received
DTC	U0104-04	Lost Communication With ACC (ESP Only)
DTC	U0104-08	Invalid Data Received From ACC (ESP Only)
DTC	U1417-81	AccPedalNet_InvalidValue
DTC	U1418-81	BTMNet_InvalidValue-Invalid Serial Date Received
DTC	U1421 - 81	SClutch_InvalidValue-Invalid Serial Data Received
DTC	U1422 - 81	EngineNet_InvalidValue-Invalid Serial Data Received
DTC	U1423 - 81	StartStopNet_InvalidValue-Invalid Serial Data Received
DTC	U1424 - 81	TCUNet_InvalidValue-Invalid Serial Data Received
DTC	U1425 - 81	VLCNet_InvalidValue-Invalid Serial Date Received
DTC	U0146-87	Lost Communication with CLM
DTC	U0447-81	Invalid Data Received From CLM
DTC	U0170-81	Invalid Data Received From SCM
DTC	U0155-87	Lost Communication With ICM-Miss Message
DTC	U0423-81	Invalid Data Received from ICM-Invalid Serial Date Received

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check module failure**

(a) Using a diagnostic tester, read related module DTC.

NG → **Repair or replace as needed**

OK

2	**Check related wire harness and connector**

(a) Check if ESP and related module wire harness and connector are normal.

NG → **Repair or replace as needed**

OK

3	Refer to CAN Network Diagnosis

DTC	U1600-08	APB System State_Invalid Value APB
DTC	U1602-08	HAS_Invalid Value
DTC	U1603-08	SC Clutch_Invalid Value
DTC	U1605-08	ABA Net_InvalidValue
DTC	U1606-08	ABP Net_InvalidValue
DTC	U1607-08	AEB Net_InvalidValue
DTC	U1608-08	AWB Net_InvalidValue
DTC	U1609-08	VLC Net_InvalidValue
DTC	U1610-08	CDD Net_InvalidValue
DTC	U1612-08	ACC Net_InvalidValue
DTC	U1613-08	TCU Net_InvalidValue
DTC	U1614-08	BTM Net_InvalidValue
DTC	U1615-08	AccPedalNet_InvalidValue
DTC	U1619-08	EngineNet_InvalidValue-Invalid Serial Data Received
DTC	U1620-08	StartStopNet_InvalidValue-Invalid Serial Data Received
DTC	U1622-08	AWDNet_InvalidValue
DTC	U1623-08	SAS Net_Invalid Value
DTC	U1625-08	Vacuum Net_Invalid Value
DTC	U1629-08	WorkingMode_InvalidValue

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check related module failure

(a) Using a diagnostic tester, read related module DTC.

NG → Repair or replace as needed

OK → Replace ESP control module

DTC	U1300-55	Software Configuration Error
DTC	U1300-56	Coding Value Outside Range Supported by Software
DTC	U1300-04	Incorrect Coding Parameter
DTC	U1300-08	Var-Coding Timeout
DTC	U1161-87	RLCR_2 Frame Timeout
DTC	U1435-81	RLCR_2 Signal Invalid

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check software configuration**

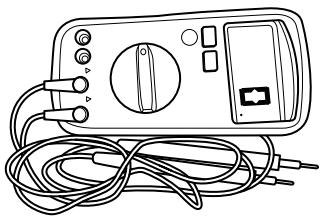
(a) Check if software configuration needs to be refreshed.

NG	**Refresh control module**
OK	**Replace ESP control module**

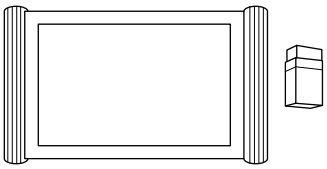
5 On-vehicle Service

5.1 Tools

■ **General Tools**

Tool Name	Tool Drawing
Digital Multimeter	 RCH000206

■ **Special Tools**

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH000106

5.2 Specifications

■ **Torque Specifications**

Description	Torque (N · m)
Wheel Mounting Bolt	180 ± 18
Fixing Bolt Between ESP Control Module Assembly Mounting Bracket and Body	23 ± 3.5
Front Wheel Speed Sensor Fixing Bolt	9 ± 1.5
Rear Wheel Speed Sensor Fixing Bolt	9 ± 1.5
Coupling Nut Between Brake Pipe and ESP Control Module Assembly	18 ± 2

■ **Brake Fluid Type**

Name	Type
Brake Fluid Type	DOT4

5.3 Brake System Bleeding

■ **Operation step**

⚠ Warning

- **When bleeding brake system, wear safety glasses. If brake fluid gets on your eyes or skin, wash off with water completely.**
- **Brake fluid has a corrosive on body paint surface. Do not drop brake fluid on body paint surface.**

⚠ Caution

- **Brake fluid should meet EXEED specified type (D0T4). DO NOT mix brake fluid with other types of brake fluid.**
- **Brake fluid has strong water absorbability, be sure to place it in the original sealed container.**
- **To prevent dust and other foreign matter from entering reservoir, wipe it off before removing reservoir cap.**

(1) Bleeding procedures for brake system with diagnostic tester are as follows:

1) Make sure all brake lines are installed and tightened properly.
2) Check that battery voltage is normal.
3) Turn ENGINE START STOP switch to OFF.
4) Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
5) Turn ENGINE START STOP switch to ON.
6) Using diagnostic tester, read and clear DTCs stored in ESP control module assembly.
7) Using diagnostic tester, enter Brake Control System, select manual bleeding, and then perform operation according to information and procedures displayed on diagnostic tester.

   Hint:
   - If bleeder plug is open, never depress brake pedal repeatedly. Doing so will increase the amount of air in system.
   - Do not drain brake fluid from brake fluid reservoir while bleeding the system. Otherwise, low fluid level in brake reservoir will cause additional air to enter the brake system.
   - Always check brake fluid level at all times to ensure that brake fluid level in brake reservoir is always close to MAX level.
8) For X type brake circuit, the bleeding order is: rear left wheel, front left wheel, front right wheel, rear right wheel.
9) After bleeding is completed, fill brake reservoir with brake fluid to MAX level.
10) Drive vehicle to perform a road test, and confirm that ESP system operates normally and brake pedal feel is good.

5.4 Matching Learning

■ Yaw rate sensor calibration

Prerequisites for sensor calibration:

- Calibration can be performed on rotary hub tester or a flat area.
- Maximum tilting angle of tester must be within allowable range, that both are met ± 0.57° (± 1%) in two positive directions.
- The tester must be stationary.
- Turn steering wheel to straight ahead position.
- Tire pressure is proper.
- Vehicle load is normal.
- Less remaining fuel in fuel tank is allowable.
- Vehicle stands on its own wheels.
- Only driver sits in vehicle.
- Additional interference is prohibited, such as vibration due to opening or closing hood etc.

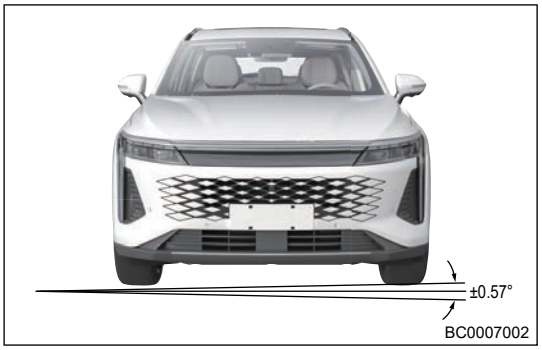
⚠ Caution

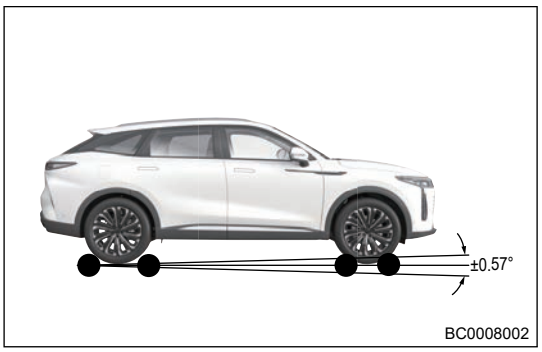
- **When replacing ESP module, integrated sensor must be calibrated. During calibration, ECU will write the measured new data into the EEPROM for use by ESP. Ensure the above calibration conditions are right, because ESP cannot determine whether the above mentioned preconditions are proper or not. If offset is too large, system will reject the calibration. In the case, it is necessary to repair the vehicle.**

(1) Connect the diagnostic tester.

(2) Turn ENGINE START STOP switch to ON.

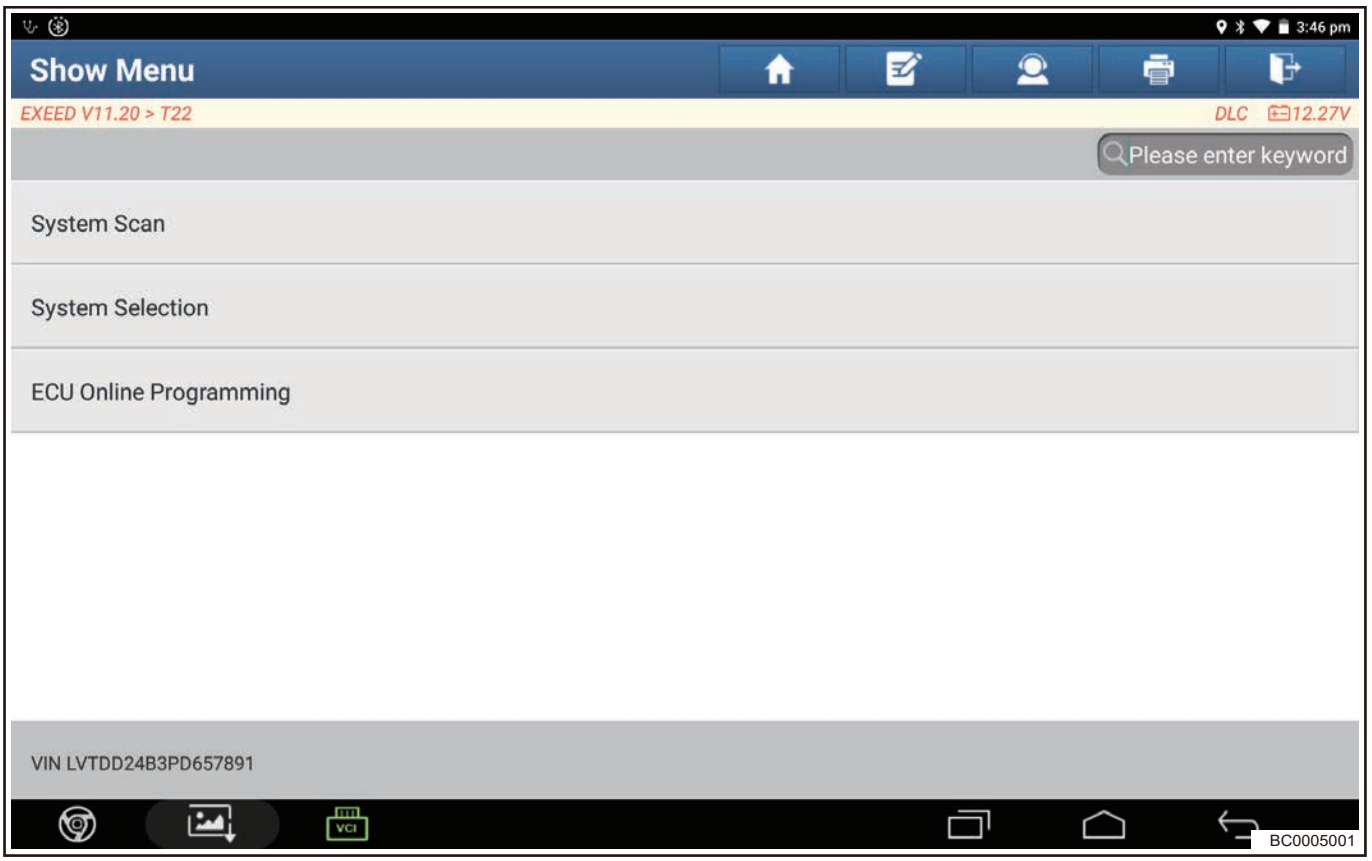
(3) Make sure vehicle tilt angle is in range of ± 0.57° (± 1%).



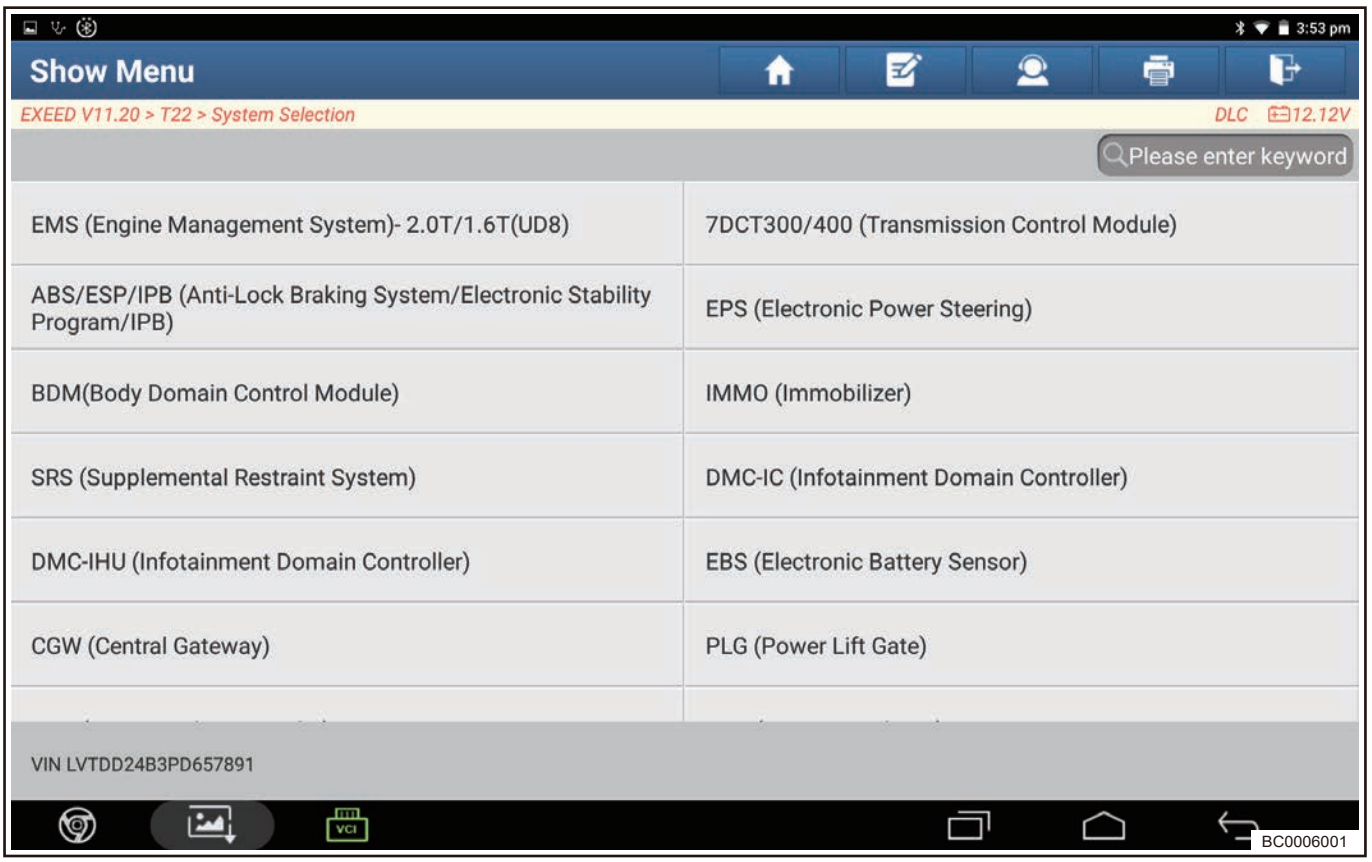


(4) Select “T22” model.

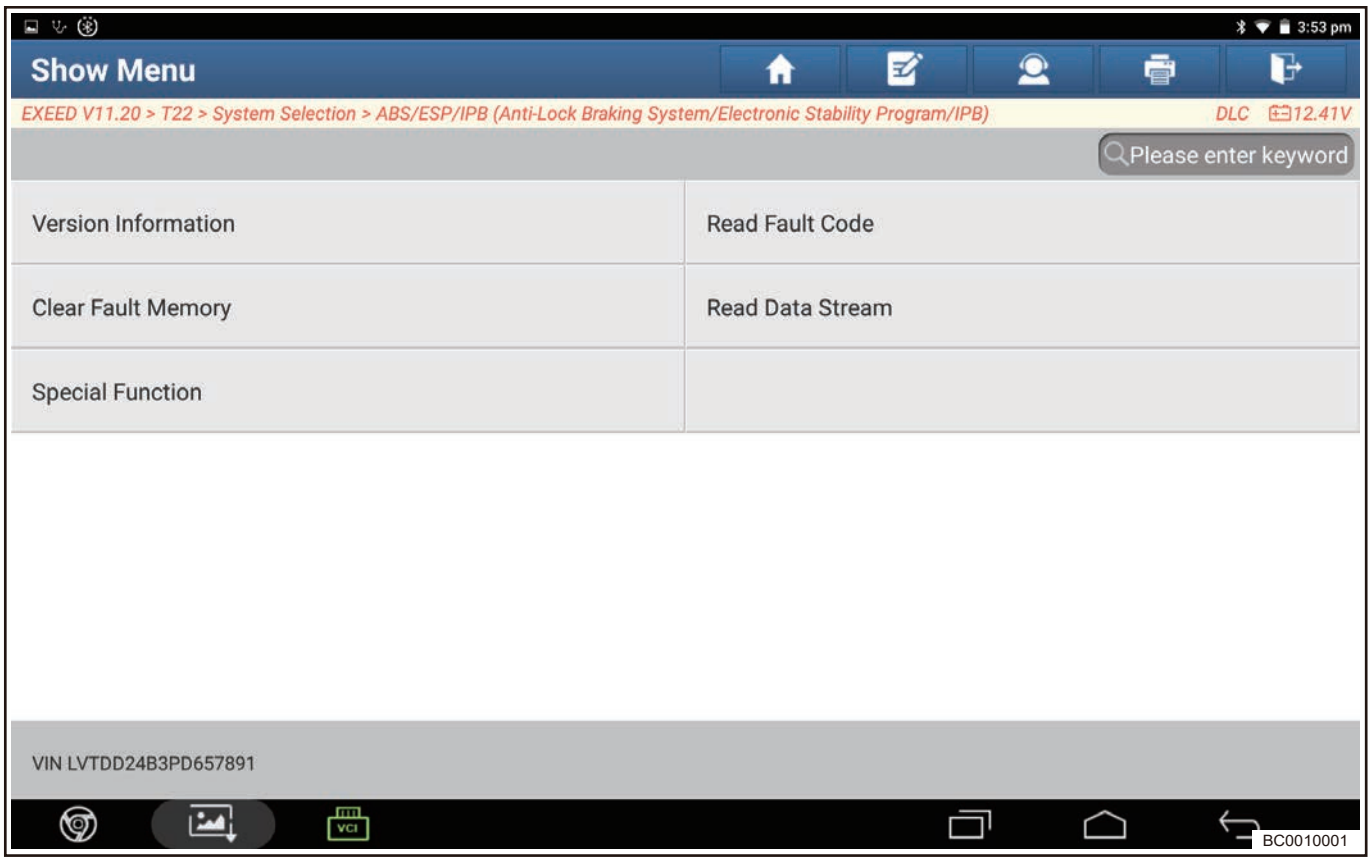
(5) Click “System Selection”.



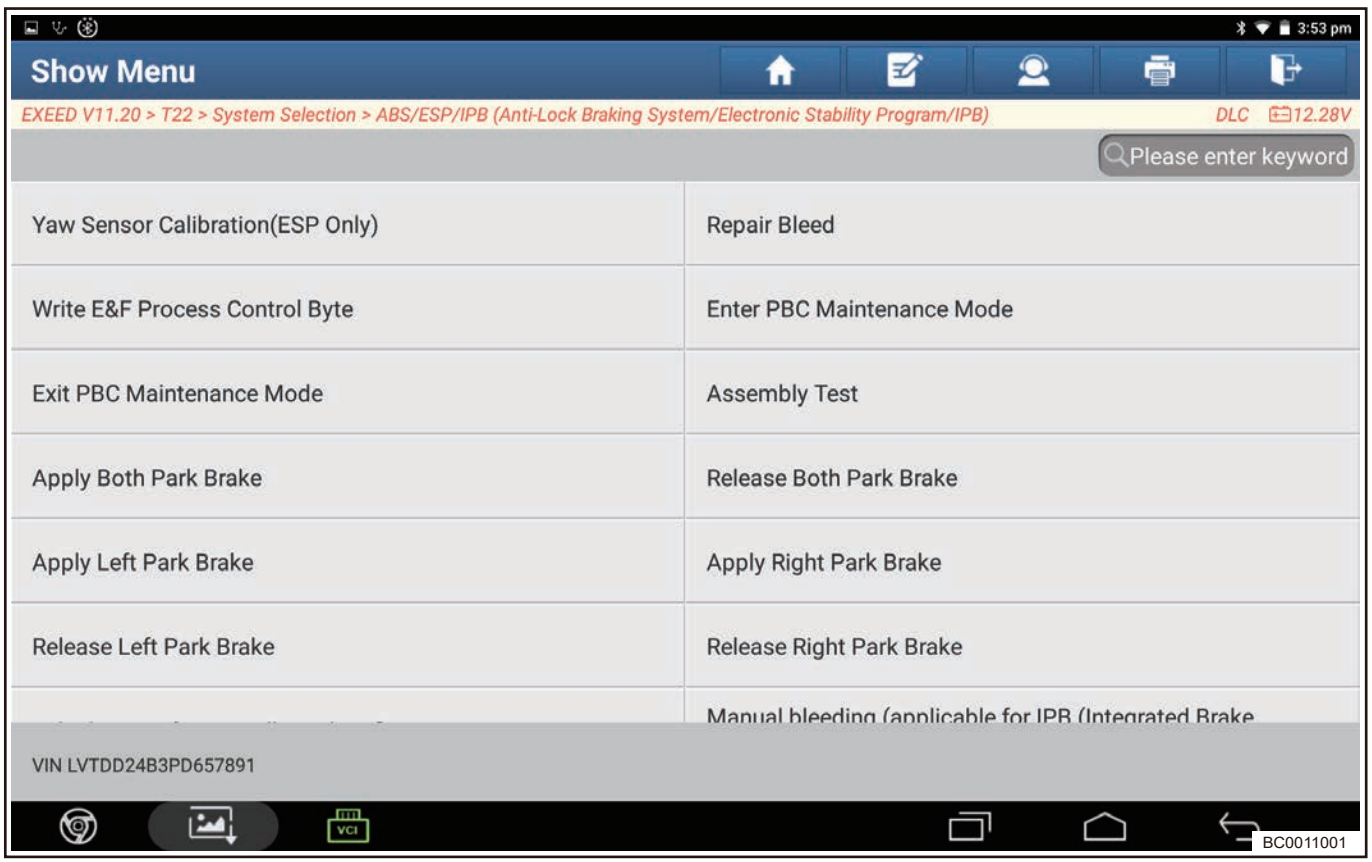
(6) Enter “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/Integrated Brake Controller)”.



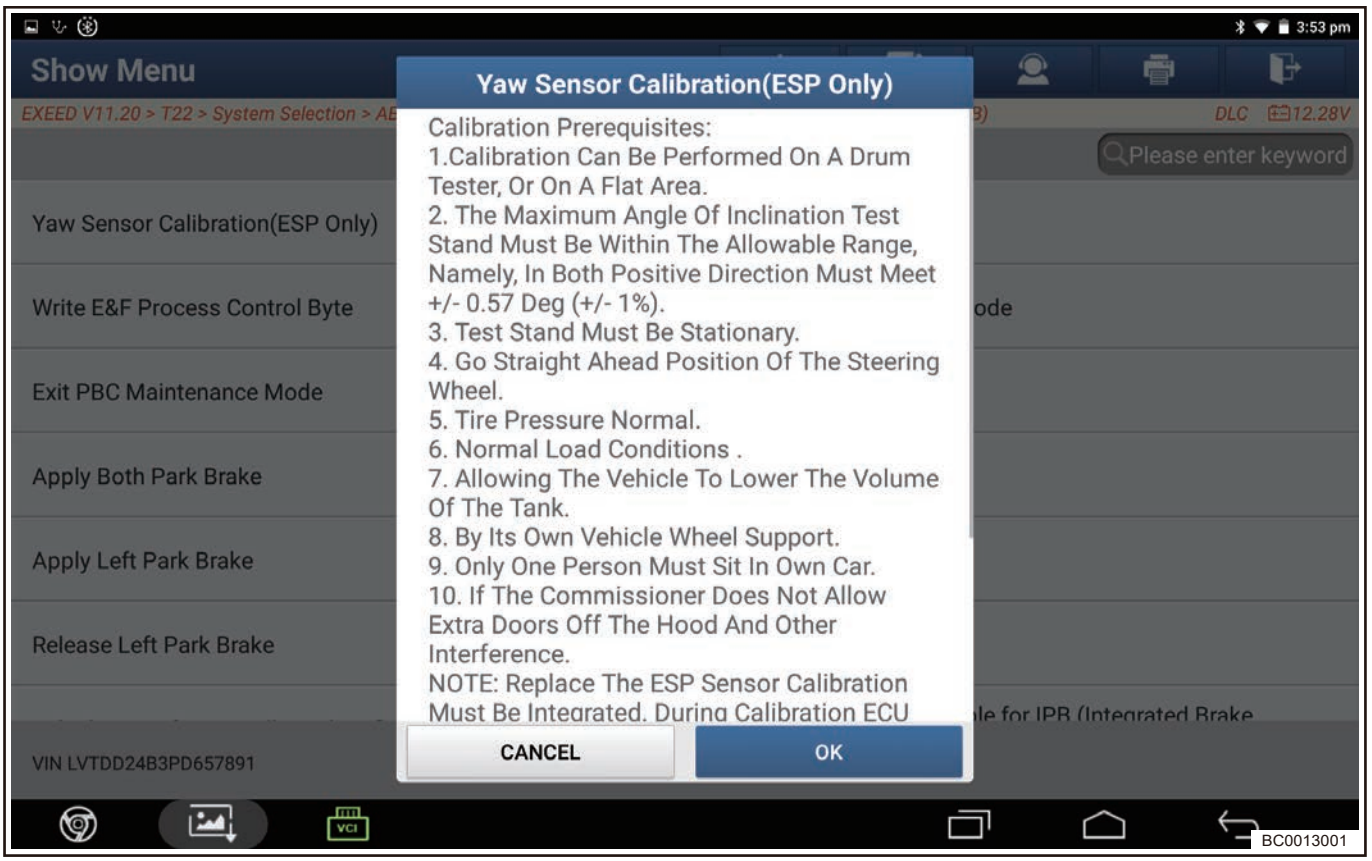
(7) Click "Special Function".



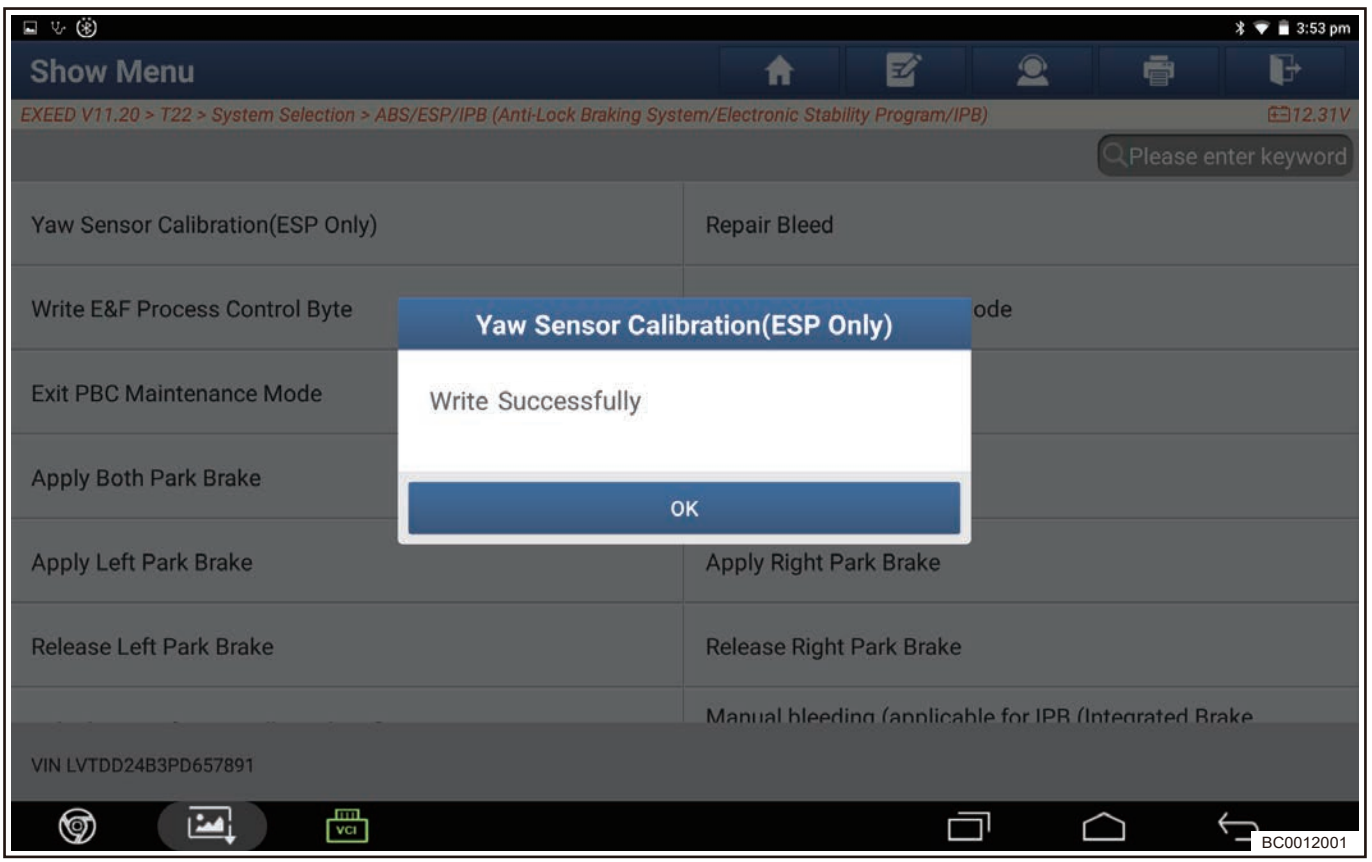
(8) Click "Yaw Sensor Calibration (ESP (Electronic Stability System) Only)".



(9) Confirm sensor calibration conditions, click “OK”.



(10) Calibration is successful, click “OK”.



⚠ Warning

- **Never cut off the power during calibration. (Power applied to equipment and steering angle sensor must not be cut off during calibration. Also, diagnostic tester and sensor must be connected properly. Otherwise, calibration cannot be performed properly. If any of them are connected poorly, electrical overload of the products can be caused worst of all.)**

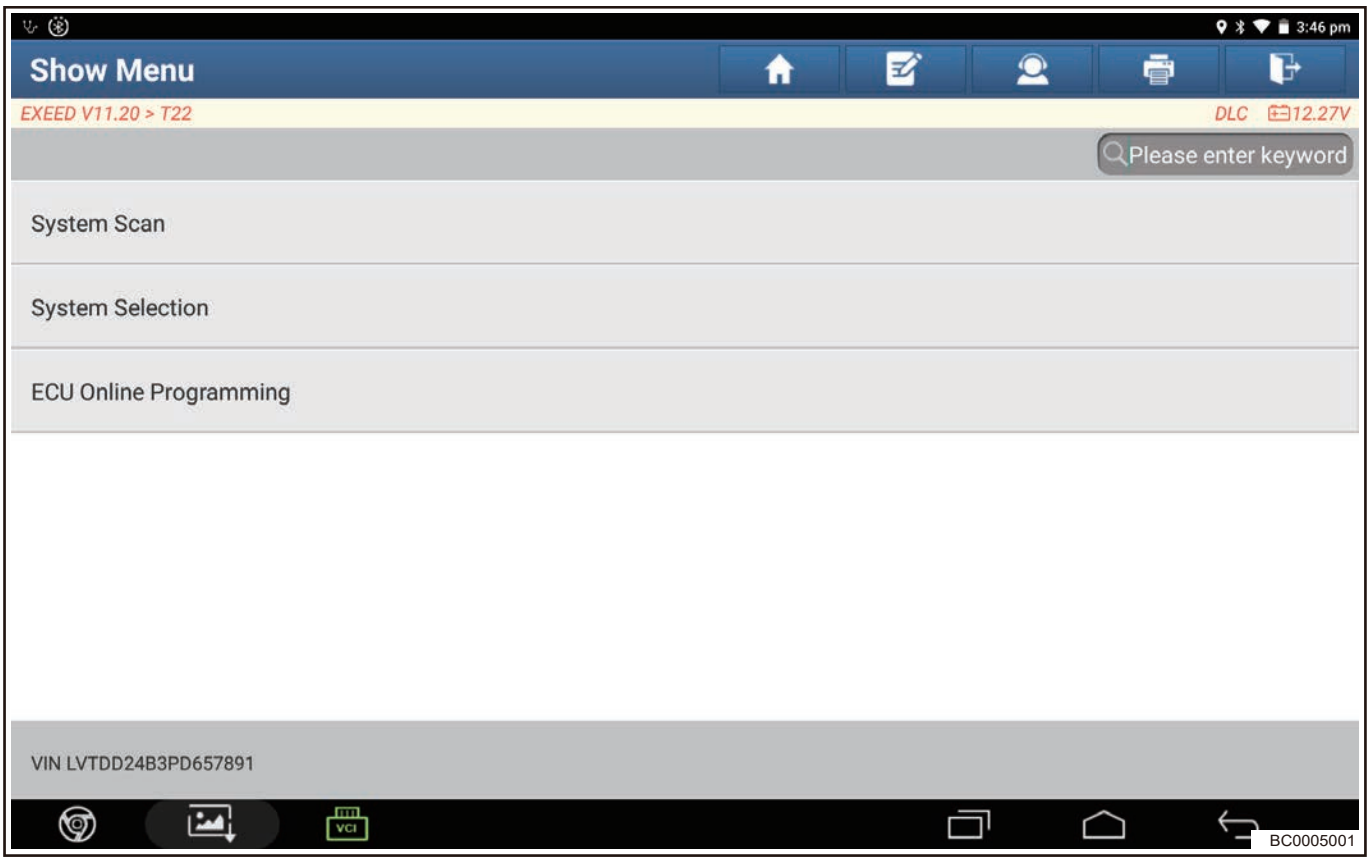
■ Vehicle Manufacture Filling-Identification Write-In

(1) Connect the diagnostic tester.

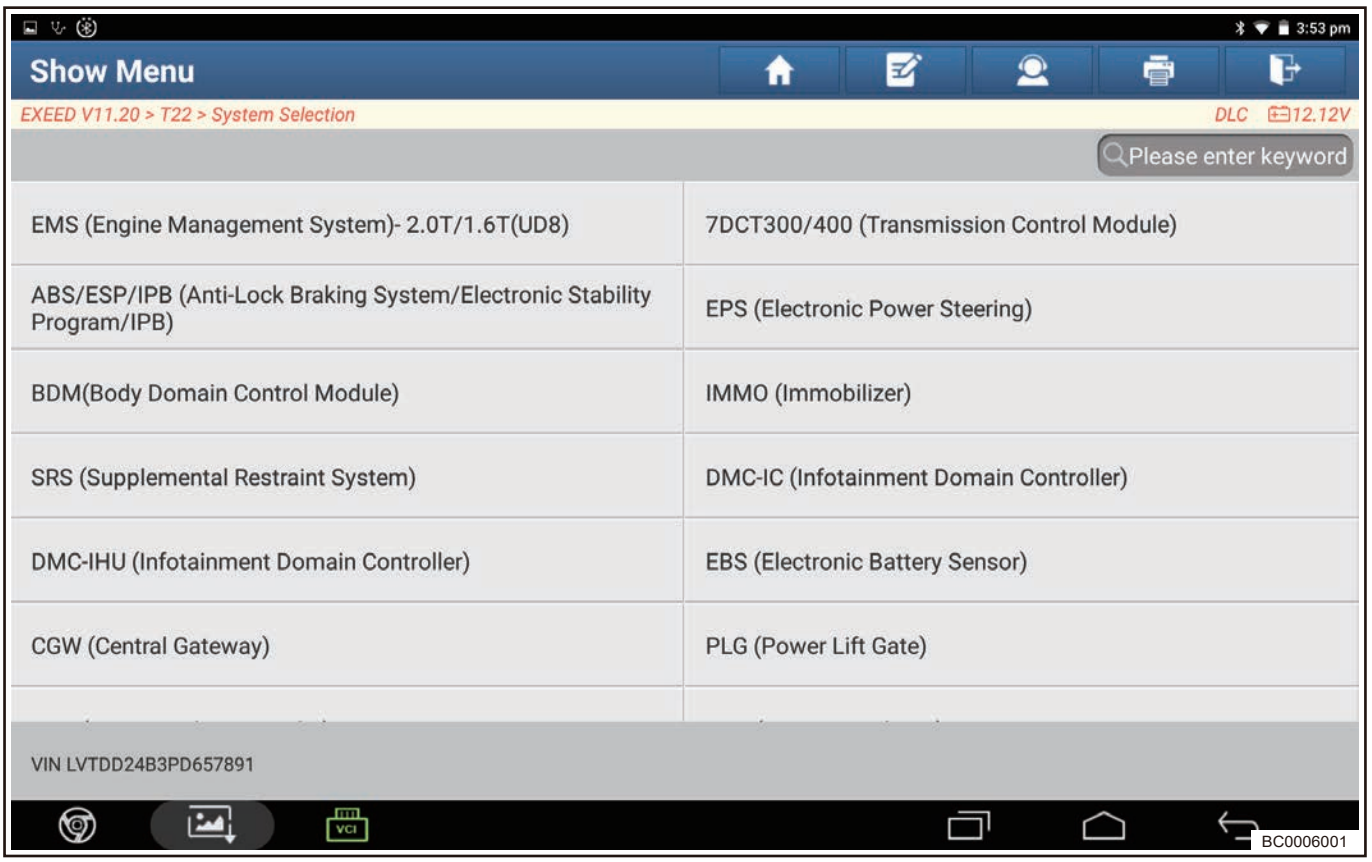
(2) Turn ENGINE START STOP switch to ON.

(3) Select “T22” model.

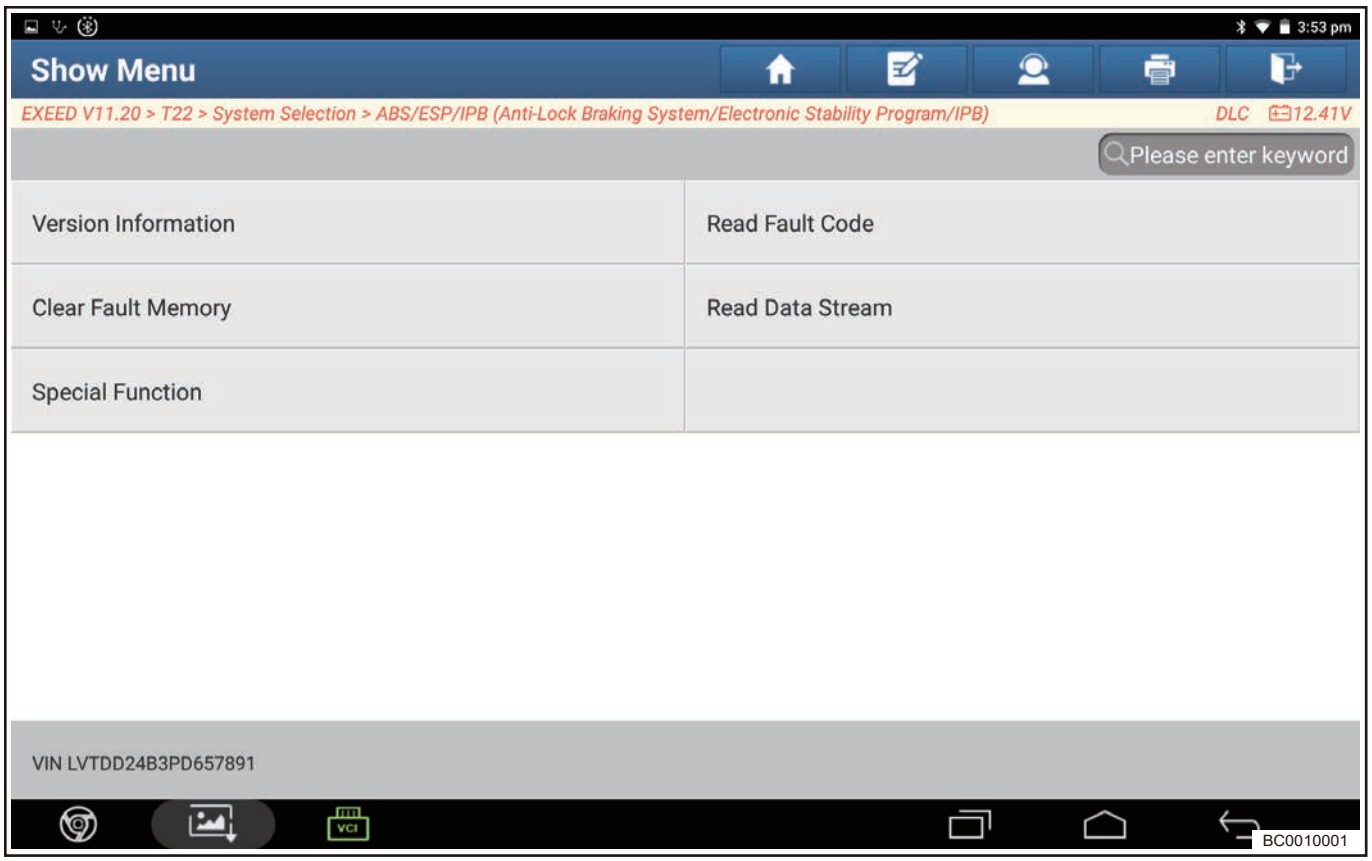
(4) Click “System Selection”.



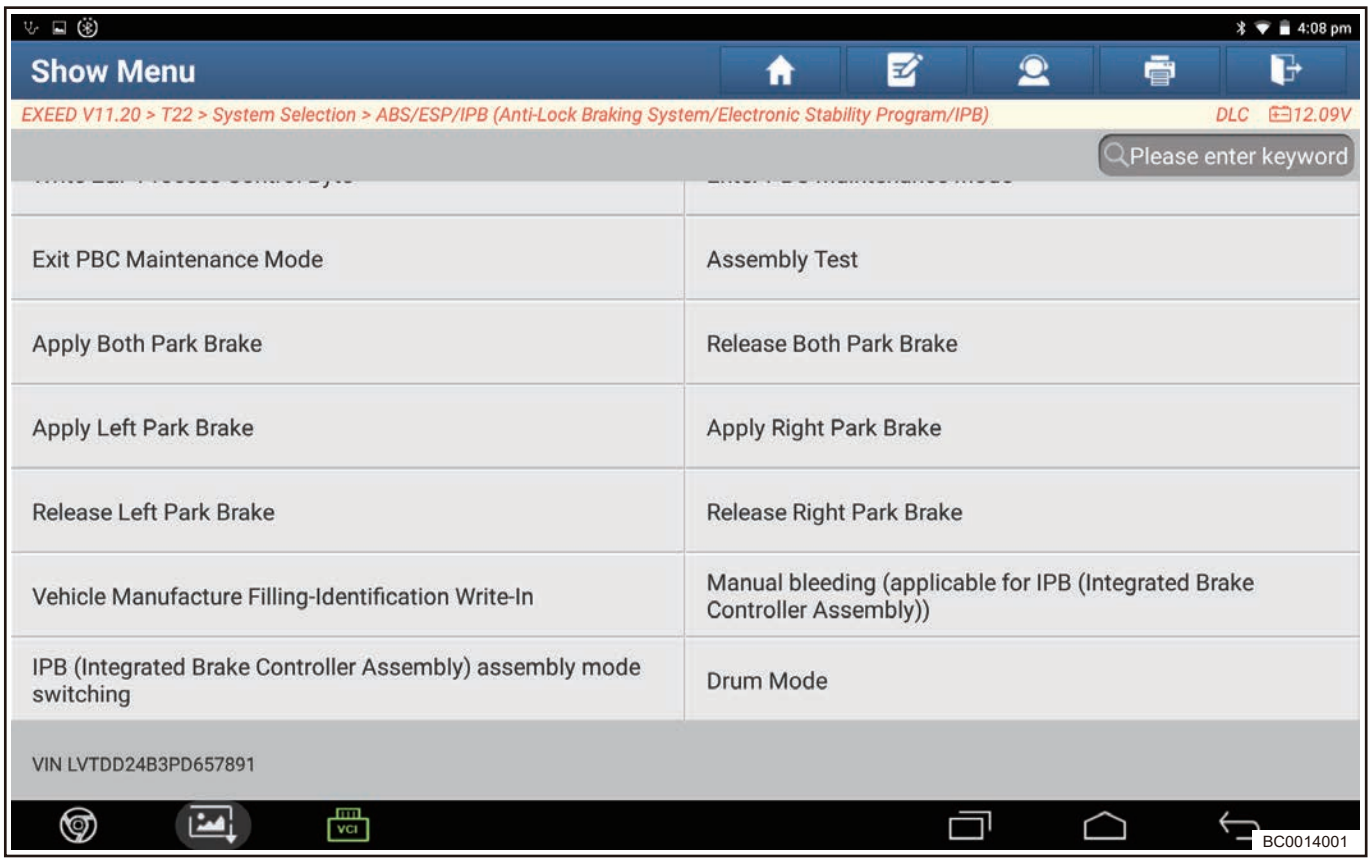
(5) Enter “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/Integrated Brake Controller)”.



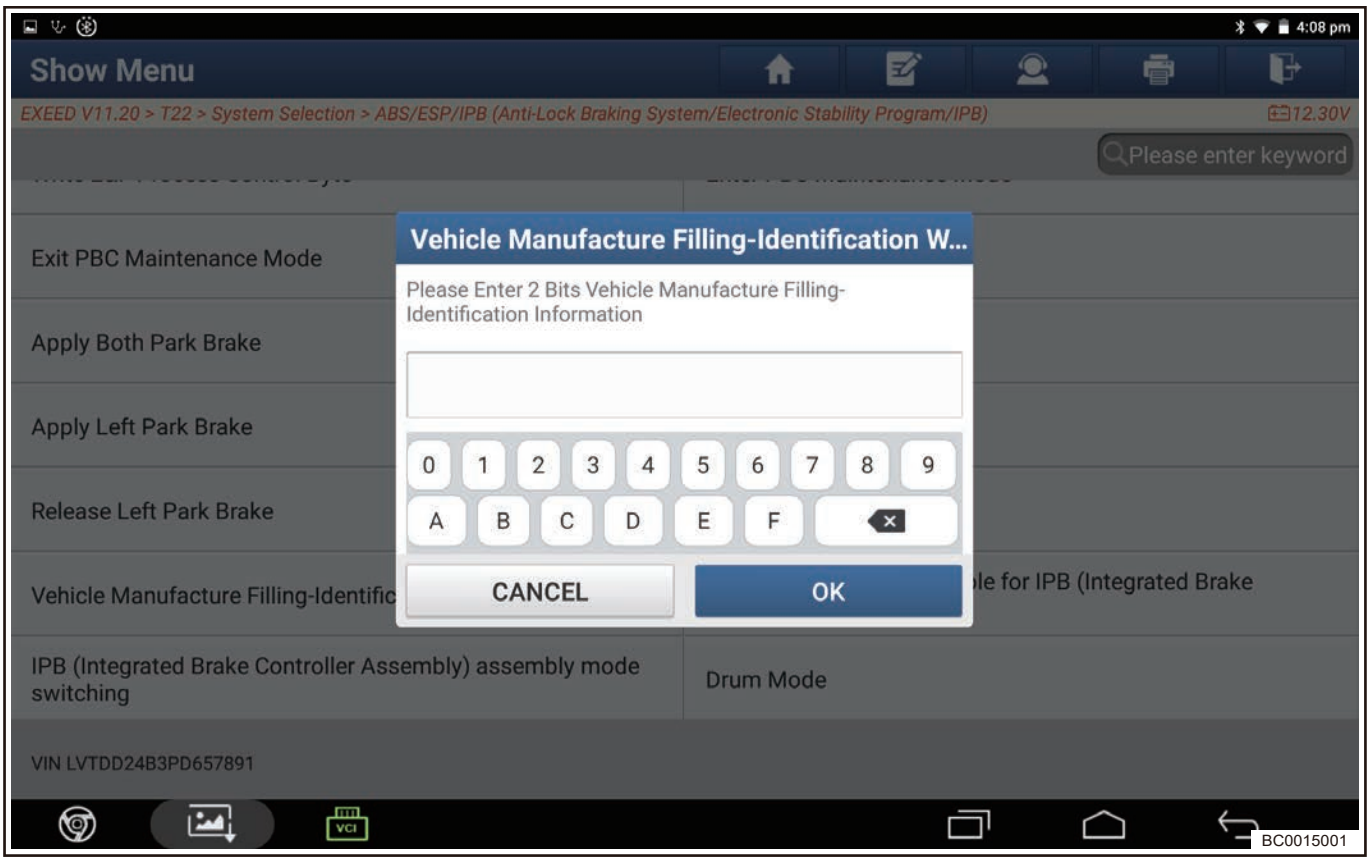
(6) Click "Special Function".



(7) Select "Vehicle Manufacture Filling-Identification Write-in" (configuration code can be read by reading data stream).



(8) Input 2-digit vehicle filling-identification information, and click "OK".



5.5 ESP Control Module Assembly

■ Removal

⚠ Caution

- **When repairing ESP system, first release the pressure of high pressure brake fluid in accumulator, to prevent high pressure brake fluid from spraying out and causing injury.**
- **Operation step: First turn ENGINE START STOP switch off, then depress and release brake pedal repeatedly, until brake pedal becomes hard.**
- **In addition, never turn on ENGINE START STOP switch before ESP system is installed completely to prevent hydraulic pump from energizing and running.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the battery assembly.

(4) Remove the battery tray assembly.

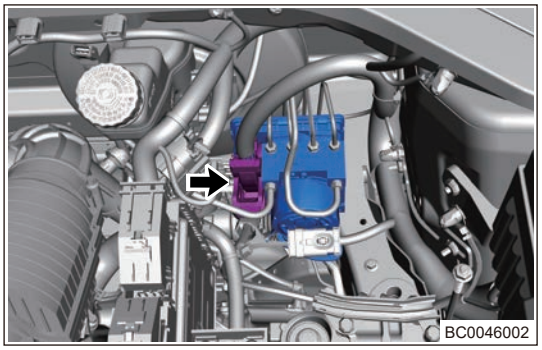
(5) Drain the brake fluid.

Hint:
Drained brake fluid should be well kept in a container. Never discard it at will.

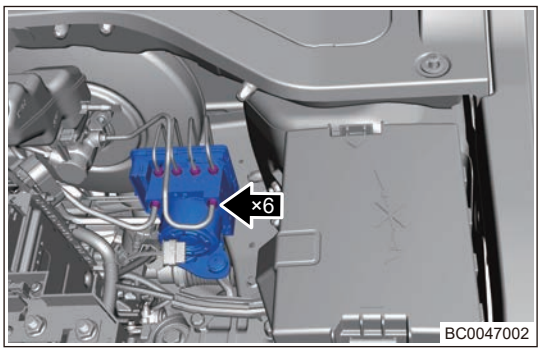
⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(6) Press the lock area of ESP control module assembly connector, toggle the connector lock bracket downward and disconnect ESP control module assembly connector (arrow).



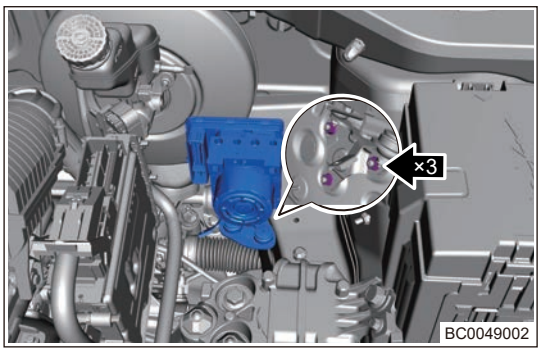
(7) Remove 6 brake pipe connecting nut (arrow) from ESP module.



⚠ Caution

- **When removing brake line, prevent foreign matter from entering ESP control module assembly threaded holes.**
- **After disconnecting brake line, sealing measure should be taken to prevent foreign matter form entering.**

(8) Remove 3 fixing nut (arrow) between ESP control module assembly mounting bracket and body.

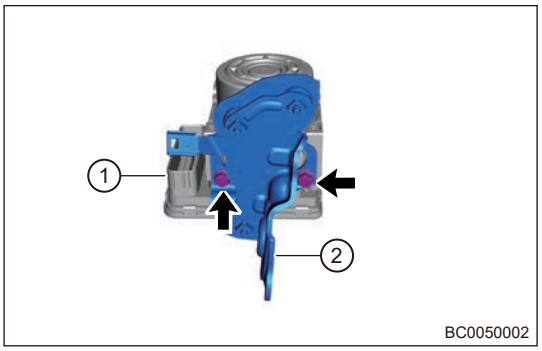


(9) Remove ESP control module assembly with mounting bracket.

■ Disassembly

(1) Remove the ESP control module assembly.

(2) Remove 2 fixing bolts (arrow) between EPB control module (1) and mounting bracket (2).



(3) Remove the ESP control module.

■ **Assembly**

(1) Install the ESP control module to proper position of module bracket.

(2) Tighten 2 fixing bolts between EPB control module and mounting bracket.

Tightening torque: 8 ± 3.5 N·m

■ **Installation**

⚠ Caution

- **ESP control module assembly contains hydraulic control module and electronic control module. As a unit, they cannot be repaired or replaced individually.**
- **Check insulator for aging or damage. Replace if necessary.**
- **When installing fixing bolts and screws, be sure to tighten them to specified torque.**
- **Perform ABS bleeding procedures for brake system after completing installation.**
- **Using diagnostic tester, enter brake control system, record and clear trouble code, then drive vehicle to perform a road test, confirming that ESP system operates normally and brake pedal feel is good.**
- **It is necessary to perform yaw rate sensor calibration after replacing ESP assembly.**
- **After replacing ESP assembly, perform "Assembly Inspection" with diagnostic tester, otherwise, malfunction may be lit.**

(1) Install ESP control module with mounting bracket and fix 3 fixing nuts.

Tightening torque: 23 ± 3.5 N·m

(2) Install 6 brake pipe connecting nuts (arrow) to ESP module, and tighten it.

Tightening torque: 18 ± 3.5 N·m

(3) Connect the ESP control module assembly connector and lock it.

(4) Install the battery tray.

(5) Install the battery assembly.

(6) Fill brake fluid.

(7) Drain the air in brake system.

⚠ Caution

- **The brake pipe must be connected to the corresponding liquid inlet, outlet of brake control module, the brake pipes cannot be exchanged.**
- **Perform bleeding procedures for brake system after completing installation.**

5.6 Front Wheel Speed Sensor (Front Left Wheel as Example)

■ **Removal**

⚠ Caution

- **Keep wheel speed sensor away from oil or other foreign matter. Otherwise speed signal generated by wheel speed sensor may be inaccurate, and system may even fail to operate normally.**

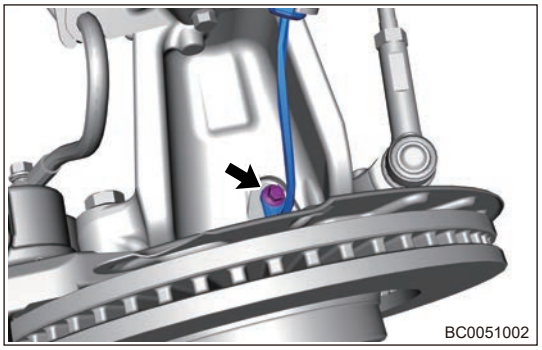
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Disconnect the negative battery cable.

(2) Remove the front left wheel.

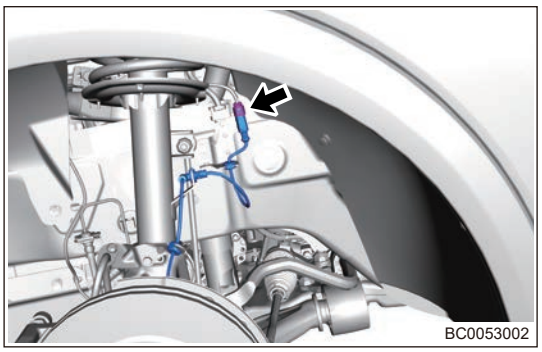
(3) Remove the fixing bolt (arrow) between front left wheel speed sensor and front left steering knuckle assembly, and disengage the front left wheel speed sensor carefully.



⚠ Caution

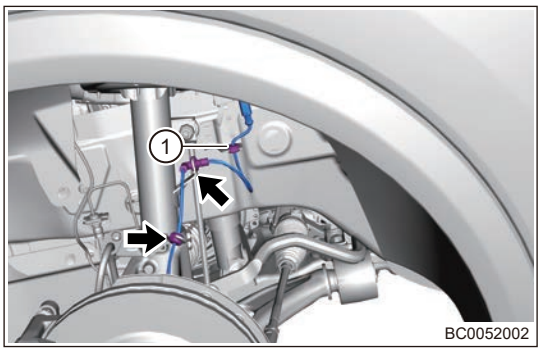
- **Keep head and installation hole of sensor free of foreign matter.**

(4) Disconnect the front left wheel speed sensor wire harness connector (arrow).



(5) Disengage the attachment part (arrow) of front left wheel speed sensor wire harness from front left shock absorber assembly and fixing bracket, disengage attachment parts (1) of front left wheel speed sensor wire harness from sensor bracket.

Hint:
Observe winding direction of sensor wire harness to prevent incorrect installation.

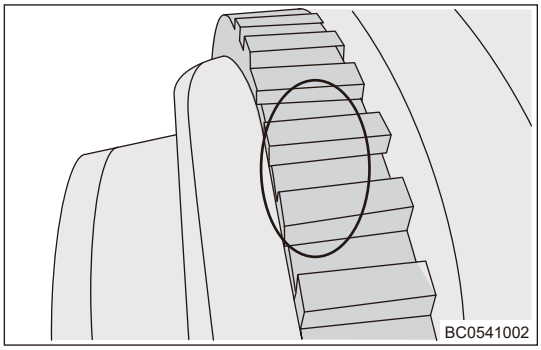


(6) Remove the front left wheel speed sensor.

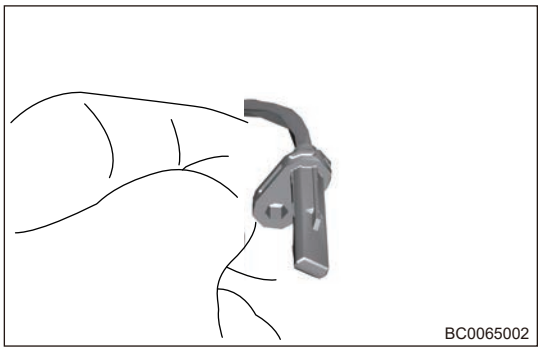
■ Inspection

(1) Check the front wheel speed sensor.
1) Check front wheel speed sensor surface for breakage, dents or notch.
2) Check front wheel speed sensor connector or wire harness for scratches, breakage or damage.
3) If any of above conditions occurs, replace the front wheel speed sensor with a new one.
4) Check wheel speed sensor for proper installation.

5) Using a diagnostic tester, read datastream of wheel speed sensor, record if each wheel speed is consistent with acceleration display, and if vehicle speed display is accurate.

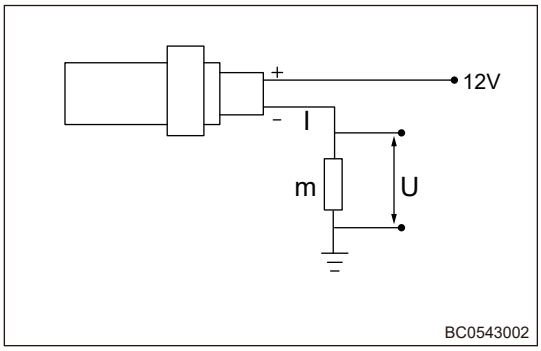


6) If wheel speed display is inconsistent, check the corresponding wheel speed sensor signal ring gear for missing teeth, dirt, demagnetization, off center.



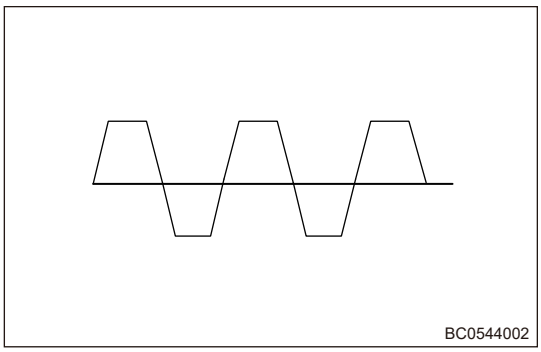
(2) Simple test for wheel speed sensor.

1) Connect power supply terminal of sensor to 12 V power supply, connect sensor signal terminal and 75 Ω resistor in series and make it grounded, then rotate wheels and test voltage signal of resistor with an oscilloscope.



2) U is switched between high and low levels without any obvious teeth missing as ring gear rotates.

- U low≈0.54 V
- U high≈1.07 V



⚠ Caution

- **Poles cannot be connected inversely during test, otherwise, damage may be caused.**
- **Above mentioned is a simple method and cannot replace the complete function test.**
- **Causes that affect test may include: Ring gear quality, installation error, etc.**

3) After any repair actions on wheel speed sensor, it is necessary to perform dynamic self-test of ESP system.
4) If malfunction still cannot be eliminated after completing dynamic self-test, replace wheel speed sensor.
5) After repair is finished, perform completion inspection.

■ **Installation**

⚠ Caution
• **When installing coupling bolts, be sure to tighten them to specified torque.**

(1) Install the front left wheel speed sensor to proper position of front left steering knuckle.
(2) Install fixing bolt between front left wheel speed sensor and front left steering knuckle assembly.

Tightening torque: 9 ± 3.5 N·m

(3) Connect the front left wheel speed sensor connector.
(4) Install attachment parts between front left wheel speed sensor wire harness and shock absorber bracket and sensor bracket.
(5) Install the front left wheel.
(6) Connect the negative battery cable.

5.7 Rear Wheel Speed Sensor (Rear Left Wheel as Example)

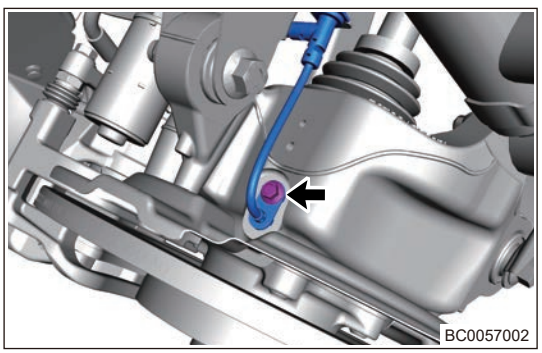
■ **Removal**

⚠ Caution
• **Keep wheel speed sensor away from oil or other foreign matter. Otherwise speed signal generated by wheel speed sensor may be inaccurate, and system may even fail to operate normally.**

Hint:

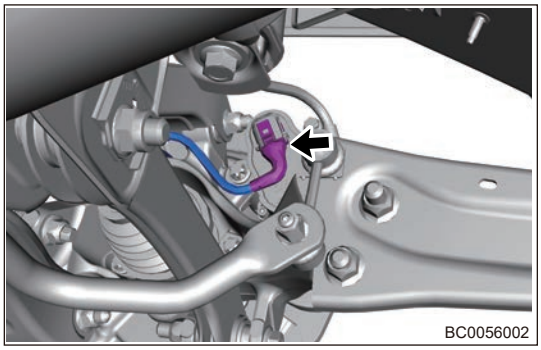
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear left wheel.
(4) Remove fixing bolt (arrow) and rear left wheel speed sensor.



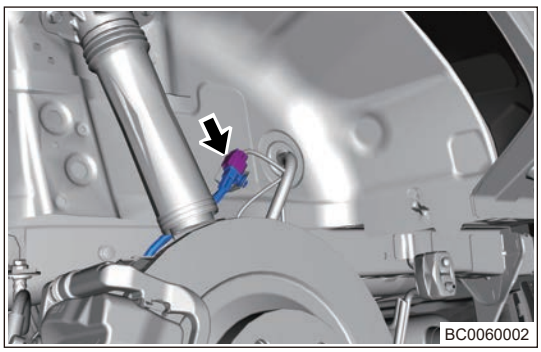
⚠ Caution
• **Keep head and installation hole of sensor free of foreign matter.**

(5) Disconnect the rear left brake caliper motor connector (arrow).

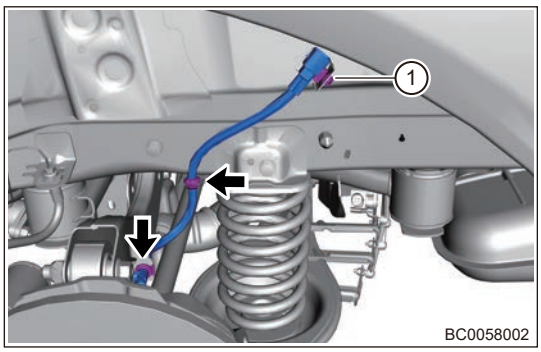


(6) Remove the rear left wheel house protector assembly.

(7) Disconnect the connector (arrow) between rear left wheel speed sensor connector and interior wire harness.



(8) Detach attachment parts (arrow) of rear wheel speed sensor wire harness from fixing bracket, and remove connector clip (1) from sensor mounting bracket.

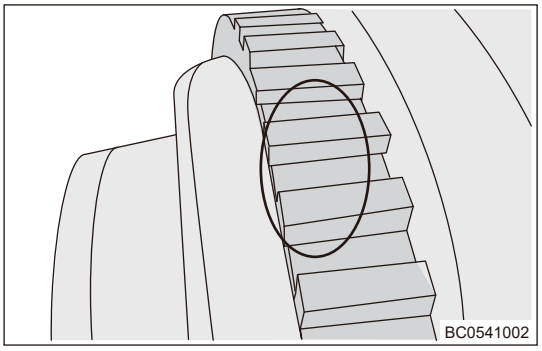


(9) Remove the rear left wheel speed sensor assembly.
   1) Remove the rear left brake caliper motor connector (arrow).
   2) Detach attachment parts (arrow) of rear wheel speed sensor wire harness from fixing bracket.
   3) Remove the rear seat cushion assembly.
   4) Disconnect rear wheel speed sensor with caliper wire harness assembly connector (arrow) and fixing clip (-arrow), and detach rear left wheel speed sensor wire harness cover (1) from vehicle body.
   5) Remove the rear left wheel speed sensor.

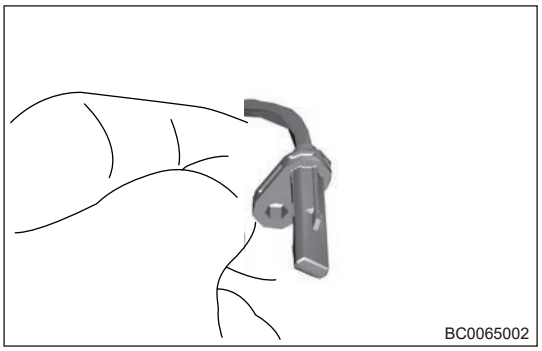
■ Inspection

(1) Check the rear left wheel speed sensor.
   1) Check rear wheel speed sensor surface for breakage, dents or notch.
   2) Check rear wheel speed sensor connector or wire harness for scratches, breakage or damage.
   3) If any of above conditions occurs, replace rear wheel speed sensor with a new one.
   4) Check wheel speed sensor for proper installation.

5) Using a diagnostic tester, read datastream of wheel speed sensor, record if each wheel speed is consistent with acceleration display, and if vehicle speed display is accurate.

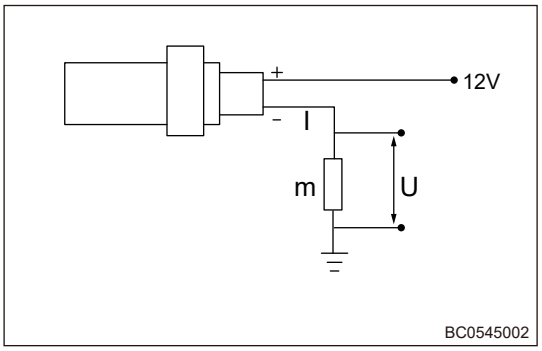


6) If wheel speed display is inconsistent, check the corresponding wheel speed sensor signal ring gear for missing teeth, dirt, demagnetization, off center.



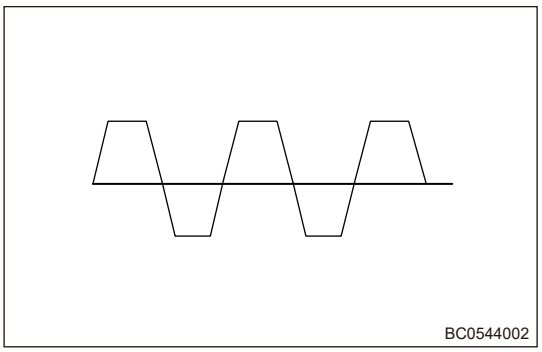
(2) Simple test for wheel speed sensor.

1) Connect power supply terminal of sensor to 12 V power supply, connect sensor signal terminal and 75 Ω resistor in series and make it grounded, then rotate wheels and test voltage signal of resistor with an oscilloscope.



2) U is switched between high and low levels without any obvious teeth missing as ring gear rotates.

- U low≈0.54 V
- U high≈1.07 V



⚠ Caution

- **Poles cannot be connected inversely during test, otherwise, damage may be caused.**
- **Above mentioned is a simple method and cannot replace the complete function test.**
- **Causes that affect test may include: Ring gear quality, installation error, etc.**

3) After any repair actions on wheel speed sensor, it is necessary to perform dynamic self-test of ESP system.
4) If malfunction still cannot be eliminated after completing dynamic self-test, replace wheel speed sensor.
5) After repair is finished, perform completion inspection.

■ **Installation**

⚠ **Caution**
• **When installing coupling bolts, be sure to tighten them to specified torque.**

(1) Install rear left wheel speed sensor to rear left steering knuckle, and tighten fixing bolt of sensor.

Tightening torque: 9 ± 3.5 N·m

(2) Connect the rear left caliper motor connector.
(3) Connect the connector between rear left wheel speed sensor connector and interior wire harness.
(4) Install attachment parts between fixing bracket and rear wheel speed sensor wire harness, and install clip between sensor mounting bracket and sensor connector.
(5) Install the rear left wheel house protector assembly.
(6) Install the rear left wheel.
(7) Connect the negative battery cable.

6.2 INTEGRATED BRAKE CONTROL SYSTEM (ONE BOX)

1 Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

(2) Integrated brake control system must be repaired by professional technicians who have trained and mastered maintenance skills and only use original parts for replacement.

(3) DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose assembly, as brake fluid is corrosive.

(4) After removing brake line, perform sealing treatment to prevent foreign matter from entering.

(5) DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.

(6) When connecting integrated brake control system brake line, it must be connected properly. Incorrect connection may cause serious accidents.

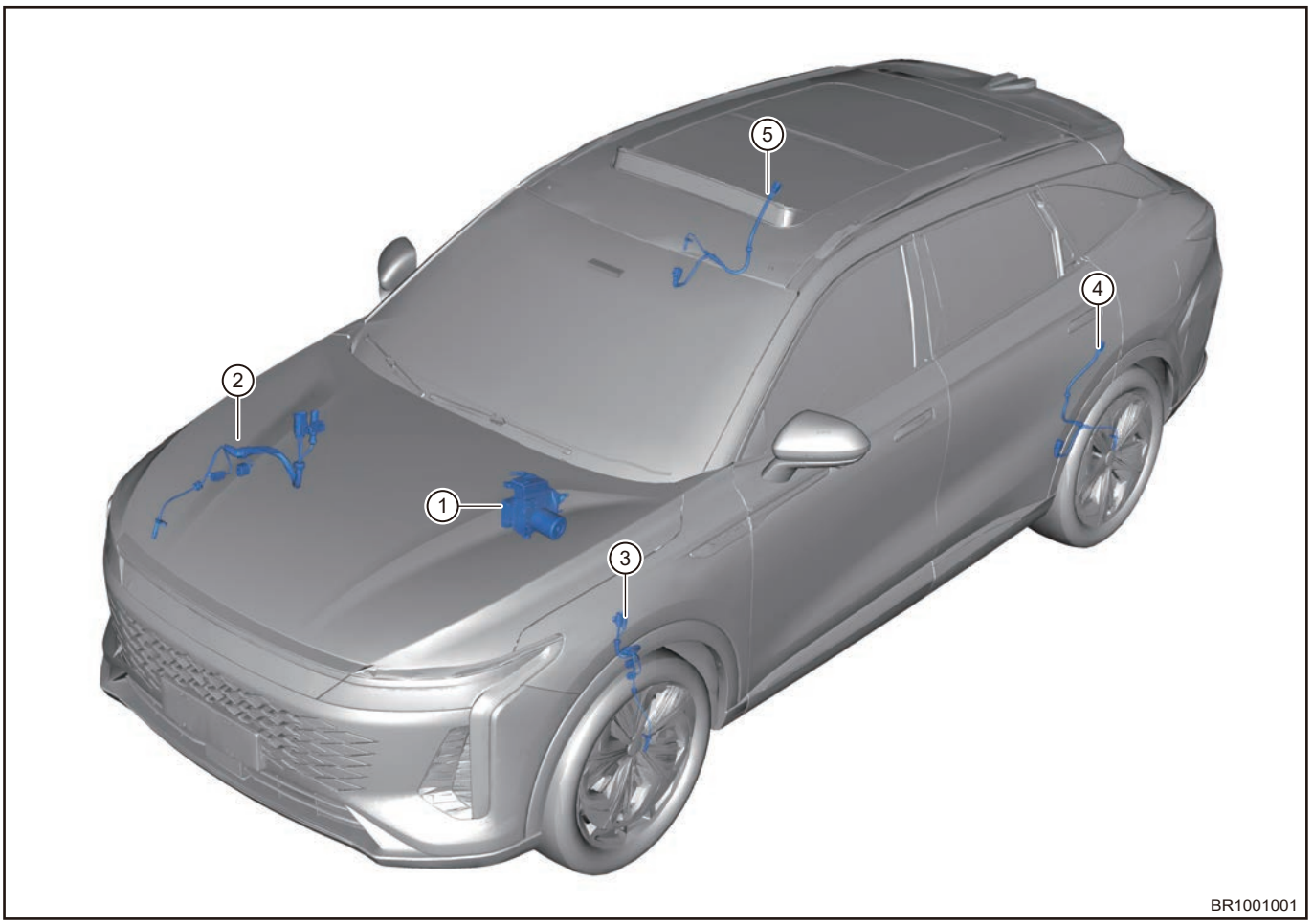
(7) After removing brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.

2 System Overview

2.1 System Description

Integrated brake control system is a drive-by-wire hydraulic brake system, which uses the displacement input by driver pedal as the brake request, realizing the wheel side brake force through motor boost. The brake pedal force from driver is achieved by the pedal sense simulator, which allows ideal pedal sense performance to be achieved. The integrated brake module is also integrated with all functions of ESP, realizing VAF functions such as ABS, VDC, TCS, HBA and RMI. The brake feedback torque generated when depressing brake pedal is calculated by integrated brake module.

2.2 System Components Diagram



1	Integrated Brake Controller Assembly	4	Rear Left Wheel Speed Sensor with Caliper Wire Harness Assembly
2	Front Right Wheel Sensor Wire Harness	5	Rear Right Wheel Speed Sensor with Caliper Wire Harness Assembly
3	Front Left Wheel Sensor Wire Harness		

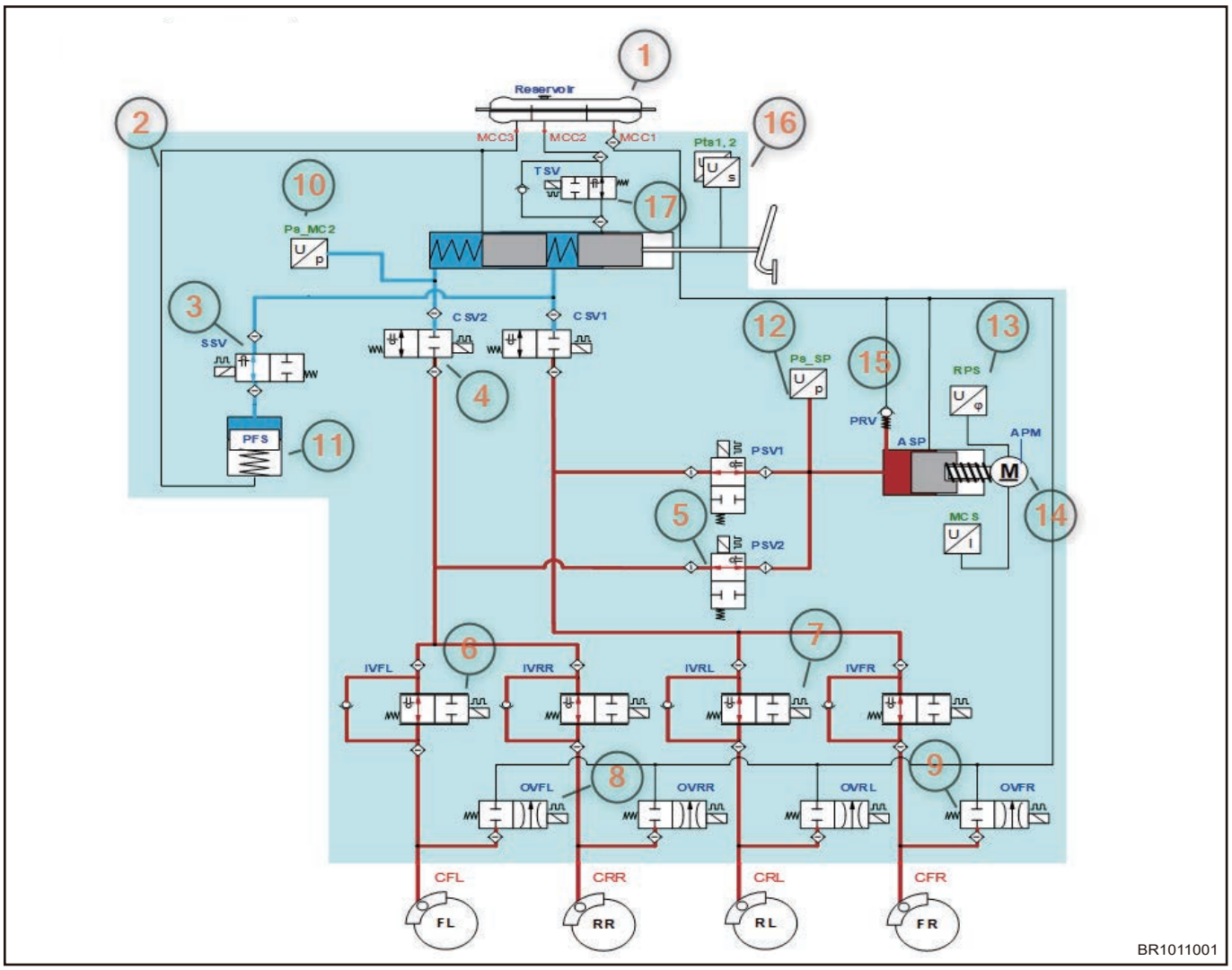
2.3 Operation

Integrated brake control system is an advanced decoupling electro-hydraulic brake system, which integrates the functions such as vacuum booster, electric vacuum pump, electronic stability program system and anti-lock braking system; Integrated brake control system can provide assistance for vehicle brake "on demand" according to driver's brake needs, and provide advanced control functions such as ABS/EBD/TCS/VDC/CST/HHC/HBA/CDP to improve vehicle stability and comfort.
Integrated brake control system is equipped with two kinds of brake feel (comfort/sport), it is used to adjust the brake pedal sense. In different modes, the relationship curve between brake pedal depth and vehicle deceleration is different. Driver can choose favorite brake pedal feel style.

2.4 Diagram of Integrated Brake Control System Hydraulic Circuit

■ Drive-by-wire decoupling hydraulic brake mode

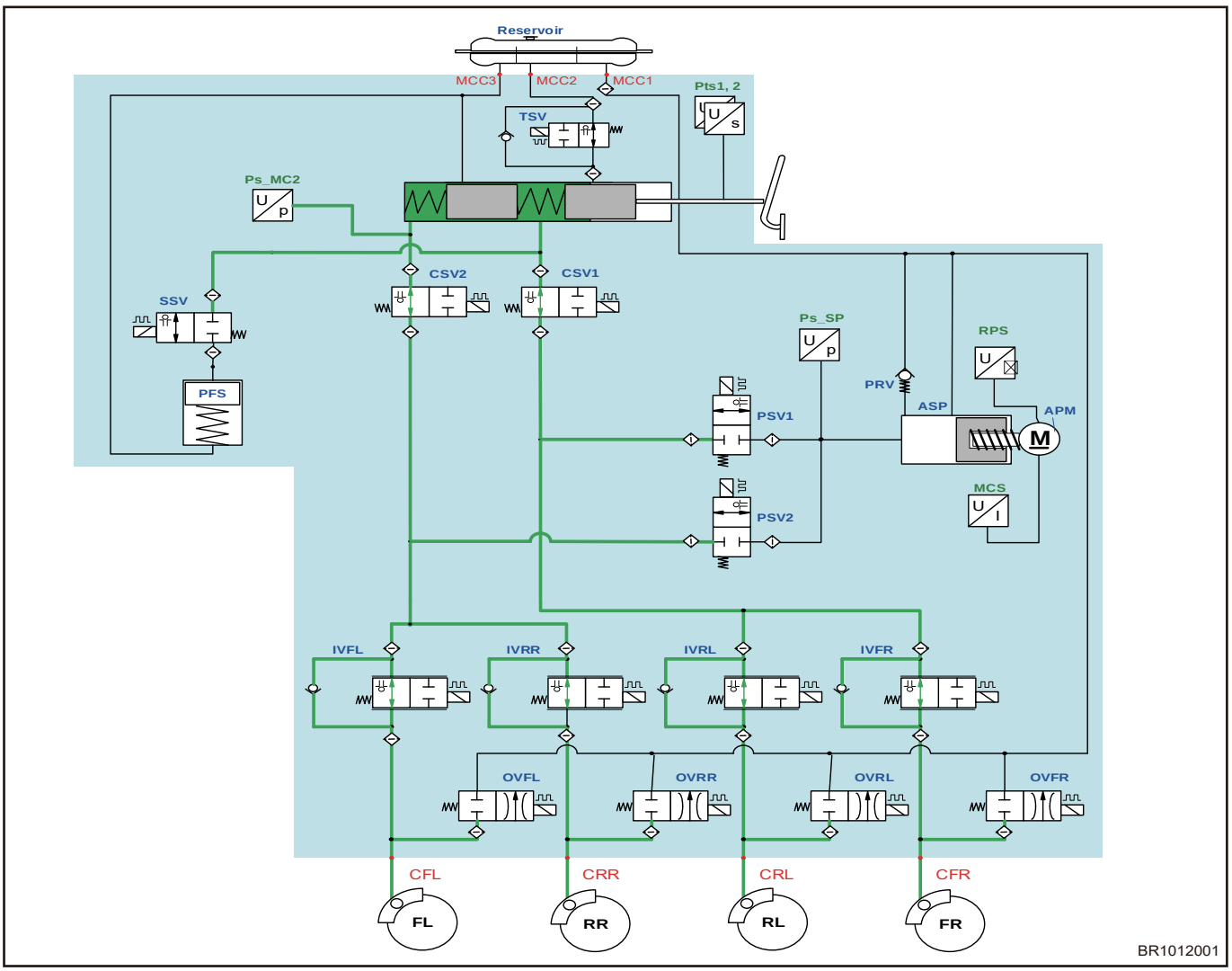
Integrated brake control system is in decoupling status under normal operation mode. The brake pedal sense is simulated by PFS. The brake pressure of brake wheel cylinder is established by Plunger (red circuit). When the brake pedal is depressed, the CSV valve closes to isolate the hydraulic connection between TMC circuit and Plunger circuit, the SSV valve opens to simulate brake pedal sense, and the PSV1/2 opens to release brake pressure to the wheel cylinder.



1	Brake Master Cylinder Assembly	10	Pressure Sensor
2	Intelligent Integrated Brake Module	11	Pedal Simulator (PFS)
3	Simulator Separation Valve (SSV)	12	Pressure Sensor (PS)
4	Circuit Separation Valve (CSV)	13	Rotor Position Sensor (RPS)
5	Piston Separation Valve (PSV)	14	Motor
6	Inlet Valve (EV)	15	Piston Refill Valve (PRV)
7	Inlet Valve (EV)	16	Linear Displacement Sensor (LIPs)
8	Outlet Valve (AV)	17	Test Separation Valve (TSV)
9	Outlet Valve (AV)		

■ Mechanical backup mode

If the integrated brake system pedal sense is degraded to the mechanical backup mode (non-decoupling), TMC brake circuit is connected with the brake wheel cylinder (green circuit) directly; At this time, the brake deceleration is controlled by the driver directly. When the brake pedal is depressed, CSV valve opens to guide brake fluid into the brake wheel cylinder, SSV closes to prevent brake fluid from entering PFS, and PSV1/2 closes to prevent brake fluid from entering Plunger circuit.



2.5 Brake System Bleeding

There are 2 methods for brake system bleeding, and specific operation procedures are as follows.

■ Manual Bleeding

⚠ Caution

- **When performing bleeding procedures for brake system, wear safety glasses.**
- **Be careful when bleeding air, as brake fluid at high pressure may spray out from bleeder screw.**

⚠ Warning

- **Before removing brake fluid reservoir, wipe off any dust and other foreign matters on brake fluid reservoir to prevent them from entering.**
- **Use fresh, clear and well-sealed brake fluid with specified type or equivalent.**
- **DO NOT allow the brake fluid to adhere to any paint surface, such as vehicle body. If brake fluid leaks onto any paint surface, immediately wash it off.**
- **During bleeding, do not depress brake pedal repeatedly at any time with bleeder screw opened. Otherwise, air amount in the system will increase to make an extra bleeding.**
- **DO NOT drain the brake fluid in brake fluid reservoir while bleeding brake system.**

(1) External bleeding phase: Using diagnostic tester or disconnect the negative battery cable, disable the integrated brake controller assembly assistance function. In a state of no assistance, repeatedly depress the brake pedal and open the bleeding bolt of the wheel cylinder for bleed, it is similar to the bleeding of vacuum booster models. After the end of this stage, activate the integrated brake controller assembly assistance function again;

(2) During the internal bleeding phase of the integrated brake controller assembly, diagnostic tester is used to perform system bleeding. During this phase, there is no need to open the bleeding bolt or depress the brake pedal;

(3) During the PFS bleeding phase of the integrated brake controller assembly, use diagnostic tester to activate the PFS bleeding, slowly depress the brake pedal to the bottom for 10 seconds, and then quickly release. Repeat this operation 10 times. Exit PFS bleeding after this stage;

(4) After bleeding, drive vehicle to perform a road test, and confirm that ONE BOX system operates normally and brake pedal feel is good.

■ Bleeding with Diagnostic Tester

⚠ Warning

- **When bleeding brake system, wear safety glasses. If brake fluid gets on your eyes or skin, wash off with water completely.**
- **Brake fluid has a corrosive on body paint surface. Do not drop brake fluid on body paint surface.**

⚠ Caution

- **Brake fluid should meet the specified type (D0T4). DO NOT mix brake fluid with other types of brake fluid.**
- **Brake fluid has strong water absorbability, be sure to place it in the original sealed container.**
- **To prevent dust and other foreign matter from entering reservoir, wipe it off before removing reservoir cap.**

(1) Bleeding procedures for brake system with diagnostic tester are as follows:

1) Make sure all brake lines are installed and tightened properly.
2) Check that battery voltage is normal.
3) Turn ENGINE START STOP switch to OFF.
4) Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
5) Turn ENGINE START STOP switch to ON.
6) Using diagnostic tester, read and clear DTCs stored in integrated brake control module assembly.
7) Using diagnostic tester, enter Brake Control System, select manual bleeding (suitable for IPB (-integrated brake control system)), and then perform operation according to information and procedures displayed on diagnostic tester.

   Hint:
   - For all systems that fail in process of online vacuum pumping/filling or replaced by dry parts, manual bleeding must be performed in accordance with this procedure.
   - To reach sufficient pressure in hydraulic regulator, brake pedal needs to be depressed repeatedly during whole draining process.
   - If bleeder plug is open, never depress brake pedal repeatedly. Doing so will increase the amount of air in system.
   - Do not drain brake fluid from brake fluid reservoir while bleeding the system. Otherwise, low fluid level in brake reservoir will cause additional air to enter the brake system.
   - Always check brake fluid level at all times to ensure that brake fluid level in brake reservoir is always close to MAX level.
8) Bleeding order: Rear left wheel, front left wheel, front right wheel, rear right wheel, air and leakage detection,series master cylinder test with pedal sense simulator.

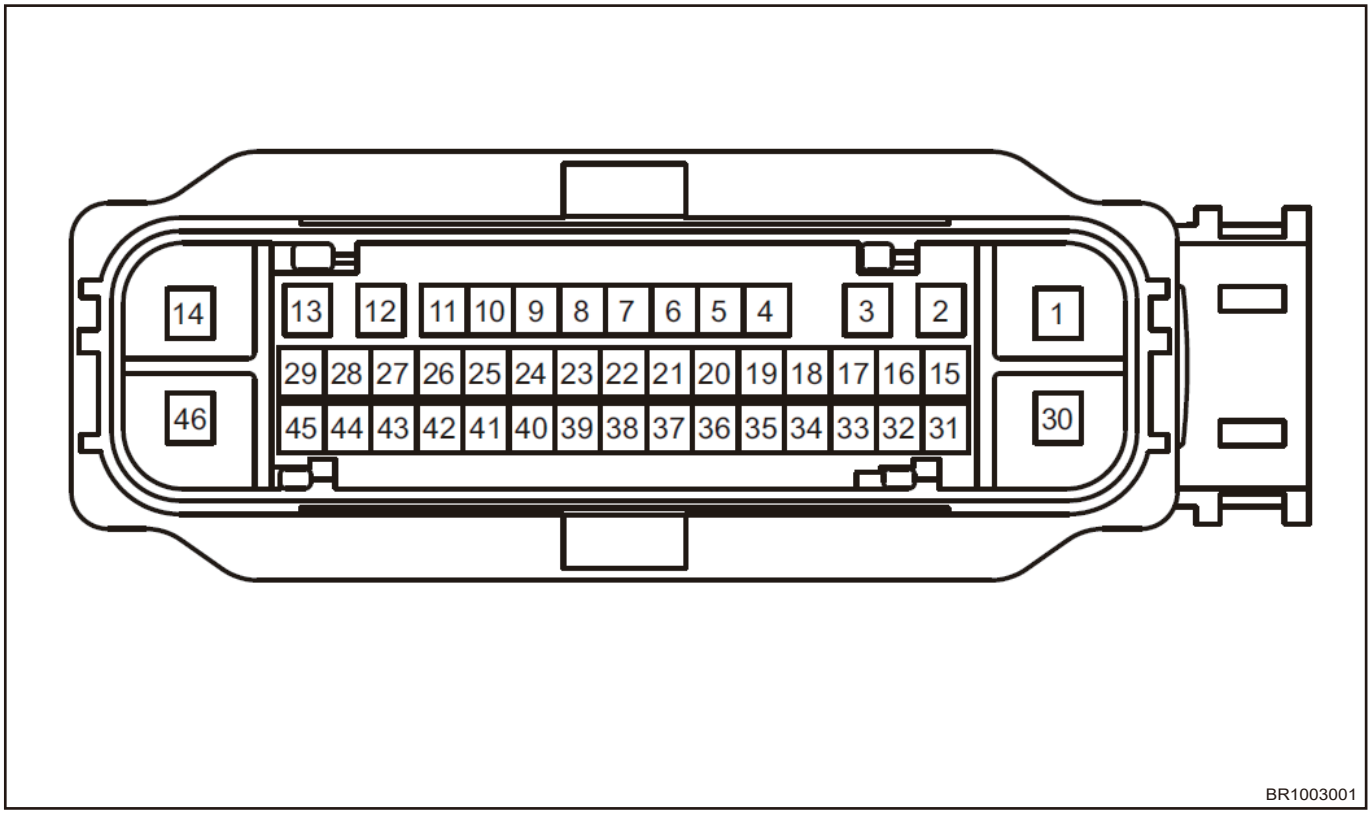
⚠ Caution

- **If it is necessary to repeat part or whole bleeding procedure, be sure to wait for 5 minutes to cool solenoid valve down, otherwise solenoid valve may be damaged due to overheat.**

9) After bleeding is completed, fill brake reservoir with brake fluid to MAX level.
10) Drive vehicle to perform a road test, and confirm that integrated brake controller assembly operates normally and brake pedal feel is good.

3 System Circuit Diagram

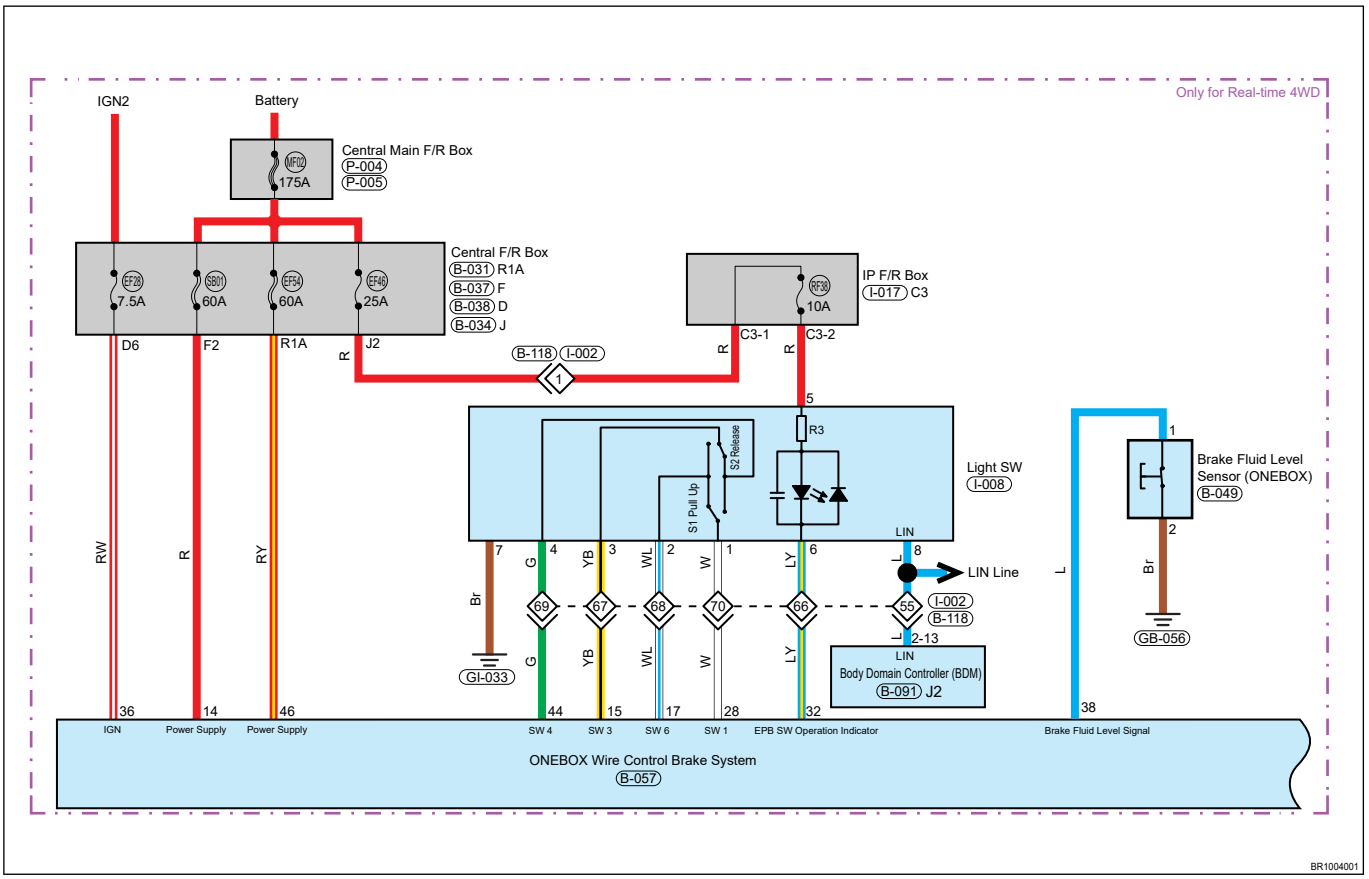
3.1 Module Terminal Definition

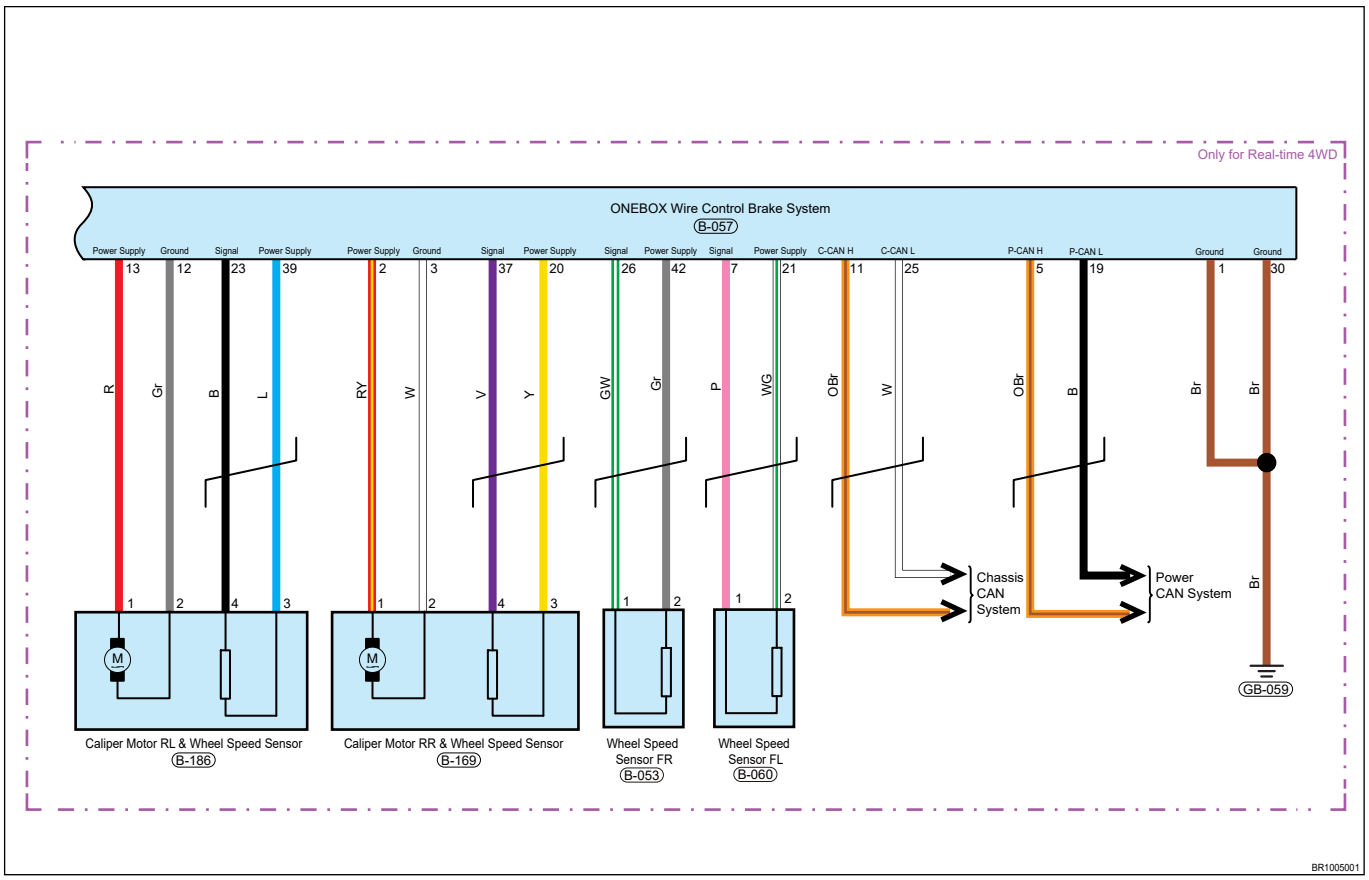


Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Ground	24	-
2	Rear Right Caliper Motor Power Supply	25	C-CAN L
3	Rear Right Caliper Motor Ground	26	Front Right Wheel Speed Sensor Signal Wire
4	-	27	-
5	P-CAN H	28	EPB Switch Pin 1
6	-	29	-
7	Front Left Wheel Speed Sensor Signal Wire	30	Ground
8	-	31	-
9	-	32	EPB Switch Signal Wire
10	-	33	-
11	C-CAN H	34	-
12	Rear Left Caliper Motor Ground	35	-
13	Rear Left Caliper Motor Power Supply	36	Ignition Signal
14	Motor Power Supply Terminal (Positive)	37	Rear Right Wheel Speed Sensor Signal Wire

1	Ground	24	-
15	EPB Switch Pin 3	38	Brake Fluid Level Signal
16	-	39	Rear Left Wheel Speed Sensor Power Supply
17	EPB Switch Pin 6	40	-
18	-	41	-
19	P-CAN L	42	Front Right Wheel Speed Sensor Power Supply
20	Rear Right Wheel Speed Sensor Power Supply	43	-
21	Front Left Wheel Speed Sensor Power Supply	44	EPB Switch Pin 4
22	-	45	-
23	Rear Left Wheel Speed Sensor Signal Wire	46	Power Supply

3.2 Circuit Diagram





4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

Hint:

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
When ENGINE START STOP switch is turned to ON, brake system malfunction indicator does not come on	Fuse
	Wire harness or connector
	Integrated brake control module assembly
	Instrument Cluster
Brake system malfunction indicator remains on	Fuse
	Wire harness or connector
	Integrated brake control module assembly
	Instrument Cluster
	Brake fluid level is low
Brake system operates abnormally	Wheel speed sensor (damaged, improperly installed, foreign matter attached)
	Hub ring gear (damaged, improperly installed, foreign matter attached)

Symptom	Suspected Area
	Brake line (blocked or leaked)
	Wire harness or connector
	Integrated brake control module assembly
Unable to communicate with integrated brake control module	Fuse
	Wire harness or connector
	Integrated brake control module assembly
	Communication Failure

4.2 Problem Repair (No DTC)

If there is a problem in brake system, but no DTC is stored in integrated brake control module assembly, this problem is called a problem without DTC. A problem without DTC is caused by basic brake system malfunction. For example:

(1) Brake fluid leakage (it may result in weak braking, brake pedal over-travel or even ineffective braking).
(2) Using inferior brake fluid (it can result in corrosion of brake line and integrated brake control system hydraulic regulating module internal elements, or even ineffective braking).
(3) Air in brake line (it may result in weak braking or even ineffective braking).
(4) Brake line blockage (it may result in hard braking or even ineffective braking).
(5) Excessive wear of brake disc (it may result in weak braking, brake pedal over-travel).
(6) Brake malfunction (it may result in weak or hard braking, brake pedal over-travel or even ineffective braking).
(7) Wrong brake line connection (it may result in integrated brake control system braking performance decreasing, drift, long braking distance etc).

Hint:

- Note: No power supply is provided to integrated brake control system or power supply is abnormal will cause brake system warning light remaining on without storing any DTC.
- Troubleshooting method: check corresponding component according to the malfunction, repair or replace as necessary.

4.3 Diagnostic Help

(1) Connect diagnostic tester (the latest software) to diagnostic connector, and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of brake control system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all integrated brake control system wire harness system grounds related to the latest DTC.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.4 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.

- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.5 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check brake control system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.6 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.7 Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the brake system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.
Standard Condition
Standard voltage: Not less than 12 V.

NG → **Replace battery**

OK

3	Customer problem analysis

Next

4	Read DTCs

NG → Perform repair according to problem symptoms table

OK

5	Read DTCs (current DTC and history DTC)

NG → Troubleshoot according to Intermittent DTC malfunction procedures

OK

6	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

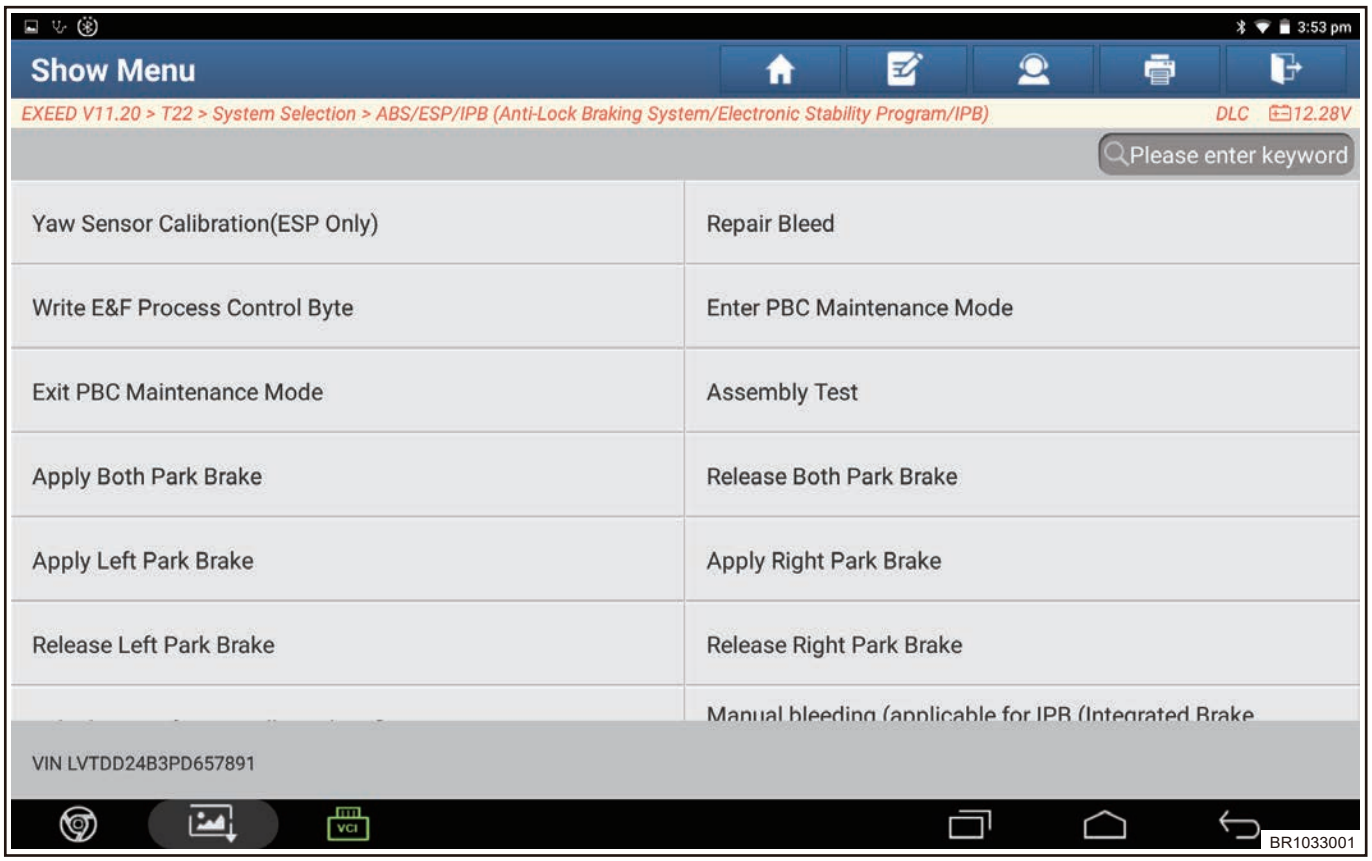
7	Adjust, repair or replace

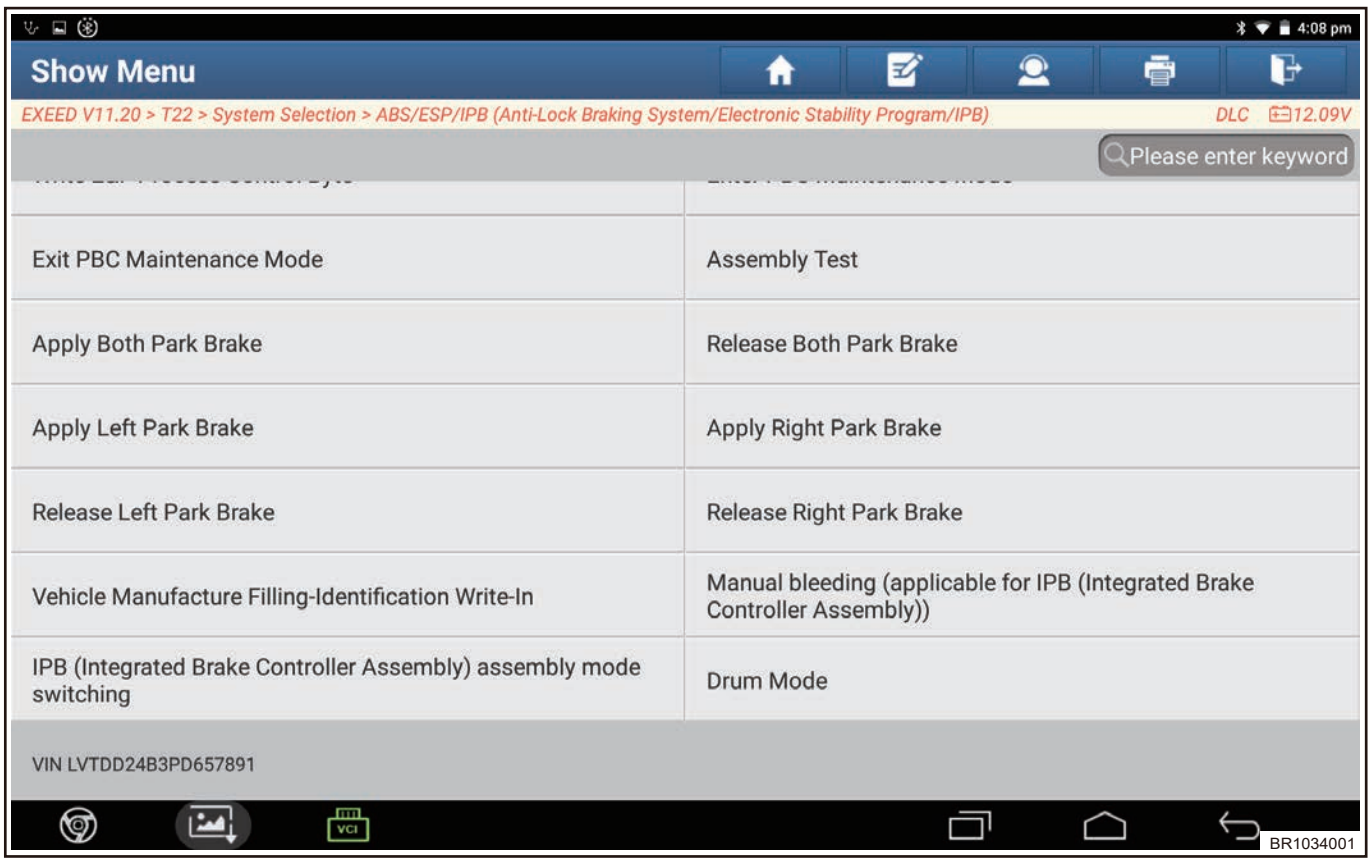
Next

8	Conduct test and confirm malfunction has been repaired

Next → End

4.8 Diagnostic Tester Interface Information





4.9 DTC Information List

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
P0562FC	OBD_ECU_ VoltageLow_ OtherCycle	System is powered on; Battery voltage is lower than 9 V for 3 seconds	1. Battery voltage too low or battery damaged; 2. Power supply voltage is not stable; 3. ONE BOX internal circuit fault;	· Detect if battery voltage is too low. If the battery voltage is really too low, it is necessary to charge the battery first, and then retest after the voltage reaches the battery rated voltage. If the battery has been charged for a long time and the battery voltage still cannot reach the rated voltage, it means that the battery has internal failure and the battery needs to be replaced at this time. · If the battery voltage is normal, but ONE BOX still detects the "battery voltage is too low" fault, check if ONE BOX power supply connection line is in poor contact with positive/negative of battery, or resistance is too big due to large area oxidation on contact surface. If the contact is poor, it needs to be reconnected. Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, if it still exists, it means that the internal voltage detection circuit of ONE BOX is damaged. Test again after replacing ONE BOX.
C183816	ECU voltage too low			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
P056300	OBD_ECU_ VoltageHigh	System is powered on; Battery voltage is 16 V for 3 seconds	1. External power supply voltage is too high or battery is damaged; 2. Power supply voltage is not stable;	· Measure vehicle battery voltage and check if the battery voltage is too high (-higher than 16 V). Check and repair if it is too high. If the battery voltage value is not within the rated voltage range due to battery internal structural failure, it is necessary to replace the battery to prevent damage to the EPB or other on-board electronic control units. · If the battery voltage is normal, but the ONE BOX still detects a "-Battery voltage is too high" fault, it indicates that the internal voltage detection circuit of the ONE BOX is faulty and the ONE BOX controller needs to be replaced. · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX. Note: **When there is "Battery voltage is too high" fault in ONE BOX, although the ONE BOX may still function normally, it needs to be troubleshot immediately to prevent damage to the ONE BOX actuator and controller due to high voltage.**
C183817	ECU voltage too high			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
P057B00	Linear Position Sensor, Channel 1, Sensor Interanl Error	1. Stroke sensor 1st path signal has fault such as hardware is damaged / connection is open 2. Hardware damage of stroke sensor / connection disconnected / abnormal external temperature and magnetic field strength 3. Stroke sensor supply voltage is out of range	1. Hardware damage of stroke sensor / connection disconnected / abnormal external temperature and magnetic field strength 2. Abnormal stroke sensor power supply 3. Stroke sensor damaged	· Perform primary check to confirm if the connection of stroke sensor is normal · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX · If the fault still exists, replace ONE BOX assembly and test again
P057C00	Linear Position Sensor, Channel 1 Line Low			
P057D00	Linear Position Sensor, Channel 1 Line High			
P057E00	Linear Position Sensor, Channel 1, Noise Error			
P05CB00	Wrong ECU Exchange			
P05DD00	Linear Position Sensor, Channel 2 Line Low			
P05DE00	Linear Position Sensor, Channel 2 Line High			
P05DF00	Linear Position Sensor, Channel 2 Transmission Failure			
P05E000	Difference between PTS1 and PTS2 Too High			
P05E009	PTS Signal Is Not Zero Fault: First Stage			
C007500	LiPS Timeout or Range Error			
C061900	PTS1 Offset Failure			
C061A00	PTS2 Offset Failure			
P05FF00	BSM Hard Pedal Characteristic Failure	The pressure corresponding to the master cylinder stroke is too high	Master cylinder or PFS stuck	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX If the fault still exists, replace ONE BOX

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
				assembly and test again
P05FF09	BSM Soft Pedal Characteristic Failure	The pressure corresponding to the master cylinder stroke is too low	Leakage or air in master cylinder	· Perform air bleeding again · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX If the fault still exists, replace ONE BOX assembly and test again
P060200	Control Module Programming Error	System Internal Fault	1. System self-check error 2. FLASH self-check error 3. ASIC over temperature 4. Internal power supply error 5. System stack error 6. Coprocessor error 7. RAM error and other internal faults	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
P060400	ECU RAM Failure	System Internal Fault	1. System self-check error 2. FLASH self-check error 3. ASIC over temperature 4. Internal power supply error 5. System stack error 6. Coprocessor error 7. RAM error and other internal faults	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX · If the fault still exists, replace ONE BOX assembly and test again
P060500	ECU ROM Failure			
P060600	ECU internal fault			
P060B00	ECU ADC Error			
P06B800	ECU HW NVRAM Error			
C007200	Brake System Overheated			
C004428	Pressure Sensor Temperature Error			
C100104	Internal fault in ECU system			
C100900	ECU hardware related fault			
C000100	Valve MV5 General Fault	1. Coil fault 2. Coil drive fault or over temperature fault, etc.	Coil or drive related hardware fault	· Cools down for 5 minutes, check if there is open circuit or short circuit in coil, if coil has been driven for too long, and check if there is

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C000200	Valve MV6 General Fault			open circuit or short circuit fault in coil current feedback circuit; · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the coil and test again
C000300	Valve MV7 General Fault			
C000400	Valve MV8 General Fault			
C002400	Valve MV9 General Fault			
C05D500	Valve MV5B General Fault			
C05D500	Valve MV5B General Fault			
C001000	Valve MV4A General Fault	1. Coil fault 2. Coil drive fault 3. Coil drive over temperature fault	1. Coil or drive related hardware fault 2. ECU damaged	· Cools down for 5 minutes, check if there is open circuit or short circuit in coil, if coil has been driven for too long; · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the coil and test again
C001100	Valve MV4B General Fault			
C001400	Valve MV2A General Fault			
C001500	Valve MV2B General Fault			
C001800	Valve MV1A General Fault			
C001900	Valve MV1B General Fault			
C001C00	Valve MV3A General Fault			
C001D00	Valve MV3B General Fault			
C004900	Brake Fluid Level Error	1. Low fluid level in reservoir 2. Open or short in brake fluid level sensor	1. Low fluid level in reservoir 2. Open or short in brake fluid level sensor	· Perform primary inspection, add brake fluid and calibrate the sensor · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists,

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
				replace the ONE BOX assembly and test again
C0072FC	DHP Valve Overheat Protection	Degraded function to enter backup braking	Diagnosis stop drive-by-wire brake function	· Restore high side through diagnostic instructions · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C180093	Left Actuator - No Motor Start Detected-No Operation	1. During EPB power on self-test, the voltage and current signals at both ends of left actuator connecting wire are abnormal; 2. When EPB operates, the voltage and current signals at both ends of left actuator connecting wire are abnormal.	1. Left actuator connecting wire open circuit; 2. Connecting wire of left actuator internal motor open circuit; 3. Left actuator connecting wire short circuit; 4. Left actuator internal motor connecting wire short circuit; 5. Left actuator internal motor stuck; 6. Left actuator is not equipped with lining or lining is too thin, resulting in too long EPB braking time but still unable to brake normally; 7. Left actuator internal mechanical fault; 8. EPB internal control motor circuit damaged.	· Check if left actuator and caliper are correctly installed. If not, reinstall them and then test again; · Check for proper connection of left actuator connector and wire harness. If not, reconnect connector. In addition, check connector clip for damage. If damaged, replace the connector to prevent the malfunction from occurring again. · Check pin of left actuator connecting wire for falling off from plastic housing of connector. If so, internal damage is suspected in plastic housing or the pin is pulled out of plastic housing by external force. In this case, the connector and the pin of connecting wire need to be replaced. · Check left actuator wire harness for disconnection or damage. If damaged, replace wire harness. If open in left motor is
C180019	Left Actuator - Circuit Current Above Threshold			
C180074	Left Actuator - Actuator Slipping (-Apply TimeOut)			
C180073	Left Actuator - Apply Failed			
C180072	Left Actuator - Release Failed			
C180091	Left Actuator - Wrong Operating Characteristics Detect-Parametric			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C180092	Left Actuator - High Mechanical Resistance-Performance or Incorrect Operation			caused by disconnection of connecting wire, it is also necessary to check if there is a relatively sharp material cutting the connecting wire near the disconnected position of connecting wire, if so, rectify to prevent the malfunction from occurring again. Check for open between 2 metal pins of left actuator connector (metal pins are connected to both ends of actuator motor through internal wire). If so, replace actuator. At this time, check for poor contact between the metal pin and the metal pin in female connector due to other factors, such as water seepage or corrosion. If so, replace it. · Check for short in left actuator connecting wire. If so, replace connecting wire. If short in left motor is caused by 2 connecting wires being cut by external sharp objects, it is also necessary to check cause of short circuit in time when replacing connecting wires, so as to avoid the same malfunction from occurring again. · In order to check if there is a short in connecting wire of left actuator internal motor or if motor is stuck due to mechanical problems,
C180097	Left actuator - action limited			
C182200	EPB Left Actuator Failure			
C180243	SupervisionFail-Data Memory Failure			
C182496	EPB Intern Left HW Failure			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C182596	EPB Intern Right HW Failure			disconnect left actuator connector and connect a fault-free actuator (used to check for actuator fault), turn ignition switch to ON again, and operate EPB switch to control the clamping/releasing of actuator, then check if actuator can operate normally. If it operates normally, the original actuator is faulty and needs to be replaced. · If there are no problems with all the above inspections, the internal circuit of EPB controller is damaged, it is necessary to replace EPB controller. Clear EPB DTC with diagnostic tester, turn ignition switch to ON again, and check for DTC in EPB again, then repeatedly operate EPB switch to perform clamping and releasing operations to confirm that the fault has been completely repaired.
C182401	EPB Left Actuator Electrical Failure-General Electrical Failure			
C180193	Right Actuator - No Motor Start Detected-No Operation	1. During EPB power on self-test, the voltage and current signals at both ends of connecting wire of right actuator are abnormal; 2. When EPB operates, the voltage and current at both ends of right actuator connecting wire is abnormal.	1. Right actuator connecting wire open circuit; 2. Connecting wire of right actuator internal motor open circuit; 3. Right actuator connecting wire short circuit; 4. Right actuator internal motor connecting wire short circuit; 5. Right actuator internal motor stuck; 6. Right actuator is not equipped with lining or lining is too thin, resulting in too long EPB braking	· Check if right actuator and caliper are correctly installed. If not, reinstall them and then test again. · Check for proper connection of right actuator connector and wire harness. If not, reconnect connector. In addition, check connector clip for damage. If damaged, replace the connector to prevent the
C180119	Right Actuator - Circuit Current Above Threshold			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C180174	Right Actuator - Actuator Slipping (- Apply TimeOut)		time but still unable to brake normally; 7. Right actuator internal mechanical fault; 8. EPB internal control motor circuit damaged.	malfunction from occurring again. · Check pin of right actuator connecting wire for falling off from plastic housing of connector. If so, internal damage is suspected in plastic housing or the pin is pulled out of plastic housing by external force. In this case, the connector and the pin of connecting wire need to be replaced. · Check right actuator wire harness for disconnection or damage. If damaged, replace wire harness. If open in right motor is caused by disconnection of connecting wire, it is also necessary to check if there is a relatively sharp material cutting the connecting wire near the disconnected position of connecting wire, if so, rectify to prevent the malfunction from occurring again. · Check for open between 2 metal pins of right actuator connector (metal pins are connected to both ends of actuator motor through internal wire). If so, replace actuator. At this time, check for poor contact between the metal pin and the metal pin in female connector due to other factors, such as water seepage or corrosion. If so, replace it.
C180173	Right Actuator - Apply Failed			
C180172	Right Actuator -- Release Failed			
C180191	Right Actuator - Wrong Operating Characteristics Detect-Parametric			
C180192	Right Actuator - High Mechanical Resistance-Performance or Incorrect Operation			
C180197	Right actuator - action limited			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C182100	EPB Right Actuator Failure			· Check for short in right actuator connecting wire. If so, replace connecting wire. If short in right motor is caused by 2 connecting wires being cut by external sharp objects, it is also necessary to check cause of short circuit in time when replacing connecting wires, so as to avoid the same malfunction from occurring again. · In order to check if there is a short in connecting wire of right actuator internal motor or if motor is stuck due to mechanical problems, disconnect right actuator connector and connect a fault-free actuator (used to check for actuator fault), turn ignition switch to ON again, and operate EPB switch to control the clamping/releasing of actuator, then check if actuator can operate normally. If it operates normally, the original actuator is faulty and needs to be replaced. · If there are no problems with all the above inspections, the internal circuit of EPB controller is damaged, it is necessary to replace EPB controller. Clear EPB DTC with diagnostic tester, turn ignition switch to ON again, and check for DTC in EPB again, then repeatedly operate EPB switch to
C1835FC	EPB Right Motor Transistors Error			
C182501	EPB Right Actuator Electrical Failure-General Electrical Failure			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
				perform clamping and releasing operations to confirm that the fault has been completely repaired.
C180395	Assembly Test Not Performed	1. PBC signal fault 2. Assembly test not performed	1. EEPROM data invalid or Checksum failed 2. Offline calibration is not performed during EPB offline	· Perform diagnostic service "Assembly inspection" according to "special function application", and recalibration · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX
C180244	PBC EEPROM Fault			
C180217	Supply Voltage - Over Voltage-Circuit Voltage Above Threshold	When EPB operates, the voltage at both ends of actuator connecting wire is abnormal	1. Power supply voltage of system too high, higher than 16 V 2. Power supply voltage of system too low, lower than 9 V	· Check if actuator and caliper are correctly installed. If not, reinstall them and then test again; · Check for proper connection of actuator connector and wire harness. If not, reconnect connector. In addition, check connector clip for damage. If damaged, replace the connector to prevent the malfunction from occurring again. · Check pin of actuator connecting wire for falling off from plastic housing of connector. If so, internal damage is suspected in plastic housing or the pin is pulled out of plastic housing by external force. In this case, the connector and the pin of connecting wire need to be replaced.

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C180216	Supply Voltage - Low Voltage-Circuit Voltage Below Threshold			· Check actuator wire harness for disconnection or damage. If damaged, replace wire harness. If open in motor is caused by disconnection of connecting wire, it is also necessary to check if there is a relatively sharp material cutting the connecting wire near the disconnected position of connecting wire, if so, rectify to prevent the malfunction from occurring again. · Check for open between 2 metal pins of actuator connector (metal pins are connected to both ends of actuator motor through internal wire). If so, replace actuator. At this time, check for poor contact between the metal pin and the metal pin in female connector due to other factors, such as water seepage or corrosion. If so, replace it. · Check for short in actuator connecting wire. If so, replace connecting wire. If short in motor is caused by 2 connecting wires being cut by external sharp objects, it is also necessary to check cause of short circuit in time when replacing connecting wires, so as to avoid the same malfunction from occurring again. · In order to check if there is a short in connecting wire of
C154604	EPB Power Supply Fault			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
				actuator internal motor or if motor is stuck due to mechanical problems, disconnect actuator connector and connect a fault-free actuator (used to check for actuator fault), turn ignition switch to ON again, and operate EPB switch to control the clamping/releasing of actuator, then check if actuator can operate normally. If it operates normally, the original actuator is faulty and needs to be replaced. · If there are no problems with all the above inspections, the internal circuit of EPB controller is damaged, it is necessary to replace EPB controller. Clear EPB DTC with diagnostic tester, turn ignition switch to ON again, and check for DTC in EPB again, then repeatedly operate EPB switch to perform clamping and releasing operations to confirm that the fault has been completely repaired.
C180453	EPB Maintenance Mode	EPB maintenance mode	EPB maintenance mode	· Perform diagnostic service to exit maintenance mode · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C180594	Hydric Support Failed	Hydric support failed	HPS cannot be used	· Check power supply voltage or ESP related faults Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX
C053B00	Valve Path Supply Line Open	1. After closing the high side of WCB solenoid valve, the feedback voltage of high side of solenoid valve is 70% higher than the supply voltage of solenoid valve, reaching the time of fault confirmation 2. WCB solenoid valve high side HD_D pin voltage is lower than VHD_D_DIS (1.6 ~ 3.2 V)	1. ECU power supply transient voltage too low; 2. Open in HD_D PIN resistor; 3. Short in WCB solenoid valve high side MOS transistor; 4. Short in WCB solenoid valve high side drive;	· Perform primary inspection to detect if there is abnormal low voltage in the power supply of the system · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C062D00	Valve Relay Gate Switch ON Error			
C055F00	Pressure in Plunger Circuit Is Too Low	1. Air or leakage in the single circuit of the system is detected, which does not affect the maximum deceleration 2. Air or leakage in the single circuit of the system is detected, which has affected the pressure built-up	1. There is a small amount of air or slow leakage in the hydraulic circuit or caliper, but it can be pressurized normally 2. There is too much air or a large amount of leakage in the hydraulic circuit or caliper, unable to built-up pressure properly	· Perform air bleeding again · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX · Accelerate the vehicle to 40 km/h and stop the vehicle. Diagnose again to confirm if fault reoccurs, and if it still exists, replace the ONE BOX assembly and test again
C05B000	Brake Fluid Leakage			
C005154	Steering Wheel Position Sensor (ESP Only)-Missing Calibration			
C100729	Reverse Gear Switch Signal Invalid			
C184000	Brake System Air Error			
C055FFB	IPB System: Master Cylinder Circuit Leakage or Pressure Build-up Capability	1. The pressure corresponding to the auxiliary master cylinder stroke is too high	1. Master cylinder isolation valve is not opened or caliper is too small 2. There are faults in system that affect	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while.

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
	Reduced or Valve Stuck	2. The hydraulic unit is abnormal internally, and drive-by-wire brake cannot be carried out	pressure build-up of auxiliary master cylinder, such as abnormal sealing of auxiliary master cylinder	Check to see if the DTC reappears inside ONE BOX · Accelerate the vehicle to 40 km/h and stop the vehicle. Diagnose again to confirm if fault reoccurs, and if it still exists, replace the ONE BOX assembly and test again
C055FFC	IPB System: Lost Brake Boosting Capability or Can't Build Up Pressure or DTC Torque Limitation Fault			
C058800	Rotation Position Sensor Signal Line Too Low	1. Position sensor fault 2. RPS power supply voltage fault	Position sensor is damaged or internal fault	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C058900	Rotation Position Sensor Signal Line Too High			
C058AFC	Rotor Position Sensor Raw Signals Implausible			
C059000	Brake Booster Motor Offset Current 1 Out of Range High	1. Brushless motor overcurrent 2. The brushless motor operates abnormally and fails to perform the required action	1. Brushless motor overcurrent 2. No power supply of brushless motor or ECU control error	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C0590FC	Brake Booster Motor Current 1 Short to High			
C059100	Brake Booster Motor Offset Current 1 Out of Range Low			
C0591FC	Brake Booster Motor Current 1 Short to Low			
C0595FC	Brushless Motor Muxer Timeout Error			
C059900	RPS Wrong Calib Data Version			
C059400	Brushless Motor Signal Not Plausible	1. PMSM motor drive PDD PIN open 2. PMSM motor drive over temperature PMSM motor drive chip failure	1. PMSM motor drive PDD PIN open 2. PMSM motor drive over temperature PMSM motor drive chip failure	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX,
C059500	Brushless Motor Bridge Driver Defect			
C05C24B	IPB Windings/ Rotor/ECU			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
	Temperature Issue: Level 1			and if it still exists, replace the ONE BOX assembly and test again
C05C300	UB6 Supply Path Failure	1. Open in power supply low side 2. Motor drive fault	Internal power supply mos transistor open circuit	· Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C008904	TCS Disable Switch Failure (ESP Only)	1. After ignition is started, AVH/ESC switch is continuously fed back as pressed for a long time 2. AVH/ESC switch indicator drive problem	1. AVH/ESC switch stuck 2. Open in AVH/ESC switch indicator drive	· Perform primary inspection to check if the AVH/ESC switch is stuck and if the connector of AVH/ESC switch wire is correctly connected with the switch · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C104D04	AVH Button Switch Failure			
C180616	EPB Button Under Voltage	Main and auxiliary microcontrollers have detected the abnormal state of switch for many times	1. Short or open in circuit connecting EPB to switch; 2. Switch internal circuit fault, etc; 3. EPB internal switch detection circuit failure; 4. EPB switch stuck.	· Check for short or open, etc. in circuit connecting to switch. If circuit is faulty, replace connecting wire; · Check if connecting wire connector is properly connected to switch. If not, connect it again; · Pull up and press the switch several times, wait for more than 3 seconds after releasing the switch, and observe if switch light flashes. If it

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C180601	EPB Button Line Failure-General Electrical Failure			flashes, replace the switch; · Pull up the EPB switch, use the diagnostic tester to read the current information inside the EPB, and check if the switch position obtained by the diagnostic tester is "-parking position"; Press the EPB switch, use the diagnostic tester to read the current information inside the EPB, and check if the switch position obtained by the diagnostic tester is "-release position"; In addition, when the EPB switch is not operated, obtain the position information of the switch through the diagnostic tester to check if it is "-natural position"; If the three position information of EPB switch is inconsistent with the actual operation, it indicates that there may be an internal fault of EPB switch, and the EPB switch needs to be replaced at this time. · Clear EPB DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after repeatedly operating EPB switch. Check for DTC in EPB again. If the DTC still exists, EPB internal switch detection circuit is damaged. Replace ECU and then test again.
C180604	EPB Button Always Pushed or Pulled-System Internal Failure			
C180000	EPB Left Actuator Electrical Failure-General Electrical Failure	1. The clamping time of caliper exceeds 3 seconds and fails to reach the current	1. Actuator internal fault 2. Caliper mechanical structure fault	· Replace the actuator that cannot operate normally.

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C183200	EPB left actuator unintended run-no sub type information	corresponding to set clamping force 2. The minimum current of motor during clamping is greater than the specific current threshold		· Connect diagnostic tester and clear DTC, repeatedly operate EPB switch to perform clamping and releasing operations, read EPB DTC, and check if fault still exists. If the DTC still exists, it indicates that internal resistance of connecting wire between actuator and EPB controller is too large due to poor contact at the connection point or oxidation of contact surface. As a result, actuator current is not enough to clamp. In this case, replace connecting wire and connector and then test again.
C180813	Circuit Open of Left Rear Caliper - Circuit Open			
C180811	Circuit Short To Ground of Left Rear Caliper			
C180812	Circuit Short To Battery of Left Rear Caliper			
C180100	EPB Right Actuator Electrical Failure-General Electrical Failure			
C183300	EPB right actuator unintended run-no sub type information			
C181513	Circuit Open of Right Rear caliper-Circuit Open			
C181511	Circuit Short To Ground of Right Rear Caliper			
C181512	Circuit Short To Battery of Right Rear Caliper			
C183400	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range			
C18341D	Short in Left Rear Caliper Positive and Negative			
C1834FC	EPB Left Motor Transistors Error			
C183500	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range			
C18351D	Short in Right Rear Caliper Positive and Negative			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
P05FF03	BSM Hard Pedal Characteristic failure with GoodCheck	1. Pressure sensor signal is open/short/ unstable 2. Master cylinder pressure sensor 2nd path signal wire is open or short 3. The voltage sum of two pressure signal wires is not in the range of (1 ± 10%) * 5 V 4. The pressure sensor has switched between fault and no-fault status for more than 16 times 5. Auxiliary master cylinder pressure sensor 2nd path signal wire is open or short 6. Hardware damage of pressure sensor/ connection disconnected/ abnormal external temperature and magnetic field strength 7. Pressure sensor and stroke sensor signals are invalid	1. Poor contact of pressure sensor signal wire P1 2. Open or short in pressure sensor signal wire P2 3. Open in 2nd path signal wire P2 of master cylinder pressure sensor 4. Hardware damage of pressure sensor/ connection disconnected/ abnormal external temperature and magnetic field strength 5. Fault in master cylinder pressure sensor and any stroke sensor 6. Pressure sensor damaged	· Perform primary inspection to confirm if the connection of pressure sensor is normal · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C053D00	Pressure Sensor 1 Range Error or Defective Plunger Pressure Sensor			
C053E00	Pressure Sensor 1 Line Low			
C053F00	Pressure Sensor 1 Line High or Plunger Pressure Sensor Implausible High			
C054100	Pressure Sensor 2 Range Error or Master Cylinder Pressure Sensor Offset Error			
C054200	Pressure Sensor 2 Line Low			
C054300	Pressure Sensor 2 Line High			
C056B00	Pressure Sensor 1 Noise or Internal Failure			
C056C00	Pressure Sensor 2 Noise or Internal Failure			
C055E00	Pressure Sensor Signal Not Plausible (Too Low) to Plunger Position			
P056023	RBRSS_ Redundant_UBB	/	System Internal Fault	/
P056024	RBRSS_ Redundant_UBVR	/	System Internal Fault	/
P0606FC	ECU UEXS Over Temperature	/	System Internal Fault	/
P062C00	WSSTest Hardware Failure	/	System Internal Fault	/
P06B8FC	Read RPS Calibration Data Failed	/	System Internal Fault	/
P25C600	Brake Booster Temperature	/	System Internal Fault	/

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
	Sensor 1 Circuit Low			
P25C700	Brake Booster Temperature Sensor 1 Circuit High	/	System Internal Fault	/
C003100	Left Front Wheel Speed Sensor Failure	/	System Internal Fault	/
C003200	WSS FL Undervoltage	/	System Internal Fault	/
C003208	Wrong Direction of Left Front Wheel Speed Sensor	/	System Internal Fault	/
C003400	Right Front Wheel Speed Sensor Failure	/	System Internal Fault	/
C003500	WSS FR Undervoltage	/	System Internal Fault	/
C003508	Wrong Direction of Left Rear Wheel Speed Sensor	/	System Internal Fault	/
C003700	Left Rear Wheel Speed Sensor Failure	/	System Internal Fault	/
C003800	WSS RL Undervoltage	/	System Internal Fault	/
C003808	Wrong Direction of Right Front Wheel Speed Sensor	/	System Internal Fault	/
C003A00	Right Rear Wheel Speed Sensor Failure	/	System Internal Fault	/
C003B00	WSS RR Undervoltage	/	System Internal Fault	/
C003B08	Wrong Direction of Right Rear Wheel Speed Sensor	/	System Internal Fault	/
C006164	Lateral Acceleration Sensor Signal Abnormal	1. YRS signal abnormal 2. YRS failure 3. The valid bits of AX, AY and YAW signals from YRS are invalid or the values exceed the normal range	1. ONE BOX sensor is not calibrated 2. Short or open in YRS circuit 3. Installation error of YRS is too large 4. Frame signal sending node fault causes invalid signal to be sent or exceeds normal range value	· Check YRS wire harness and calibrate YRS · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the
C006264	Longitudinal Acceleration Sensor Signal Abnormal			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C006364	Yaw Rate Sensor Signal Abnormal		5. YRS damaged	DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
C006B00	Stability system active too long			
C005164	Steering Wheel Position Sensor (ESP Only)-Signal Plausibility Failure			
C00724B	Disc over heat	/	System Internal Fault	/
C0072FB	DHP System Pressure Protection	/	System Internal Fault	/
C006354	Yaw Rate Sensor Signal Abnormal	/	System Internal Fault	/
P056200	ECU Reset Too Much During ECU Init	/	System Internal Fault	/
C050000	WSS Test FL Failure	/	System Internal Fault	/
C0500FC	Wss FL Line Undefine Error	/	System Internal Fault	/
C050200	WSS FL Line GND	1. Circuit is open for 110 ms 2. Circuit is short for 110 ms	1. Damage in wheel speed sensor or open in wire harness 2. Damage in wheel speed sensor or short in wire harness 3. Reverse connection 4. Water in connector	· Check if the connection of wheel speed sensor is in good condition, check if circuit of wheel speed sensor in wire harness is open or short, check if wheel speed sensor connection is reversed and if there is water in the connector. If there is a fault, troubleshoot. See circuit diagram for pin definition. Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX.
C050300	WSS FL Line High			
C050800	WSS FR Line GND			
C050900	WSS FR Line High			
C050400	Front left wheel speed sensor signal failure	1. Single wheel speed is lower than 20% of the maximum wheel speed for 5 seconds or multiple wheel speeds are	1. Excessive clearance between wheel speed sensor and ring gear 2. Wheel speed sensor fault or wire harness looseness	· Check if the connection of wheel speed sensor is in good condition, check if circuit of wheel speed sensor

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
C050A00	Front right wheel speed sensor signal failure	lower than 20% of the maximum wheel speed for 2 minutes 2. The deceleration or acceleration of wheel speed is greater than 50g for 28 consecutive cycles The wheel speed is greater than 3.58 m/s, and no wheel speed pulse signal is detected for 15 ms	Unstable installation in wheel speed sensor	in wire harness is open or short. If there is a fault, troubleshoot. See circuit diagram for pin definition Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX
C050600	WSS Test FR Failure	/	System Internal Fault	/
C0506FC	Wss FR Line Undefine Error	/	System Internal Fault	/
C050C00	WSS Test RL Failure	/	System Internal Fault	/
C050CFC	Wss RL Line Undefine Error	/	System Internal Fault	/
C050E00	WSS RL Line GND	1. Circuit is open for 110 ms 2. Circuit is short for 110 ms	1. Damage in wheel speed sensor or open in wire harness 2. Damage in wheel speed sensor or short in wire harness 3. Reverse connection 4. Check for water	· Check if the connection of wheel speed sensor is in good condition, check if circuit of wheel speed sensor in wire harness is open or short, check if wheel speed sensor connection is reversed and if there is water in the connector. If there is a fault, troubleshoot. See circuit diagram for pin definition. · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX.
C050F00	WSS RL Line High			
C051400	WSS RR Line GND			
C051500	WSS RR Line High			
C051000	Rear Left Wheel Speed Sensor Signal Failure	1. Single wheel speed is lower than 20% of the maximum wheel speed for 5 seconds or multiple wheel speeds are lower than 20% of the	1. Excessive clearance between wheel speed sensor and ring gear 2. Wheel speed sensor fault or wire harness looseness	· Check if the connection of wheel speed sensor is in good condition, check if circuit of wheel speed sensor in wire harness is
C051600	Rear right wheel speed sensor signal failure			

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
		maximum wheel speed for 2 minutes 2. The deceleration or acceleration of wheel speed is greater than 50g for 40 consecutive cycles 3. The wheel speed is greater than 3.58 m/s, and no wheel speed pulse signal is detected for 15 ms	Unstable installation in wheel speed sensor	open or short. If there is a fault, troubleshoot. See circuit diagram for pin definition · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX
C051200	WSS Test RR Failure	/	System Internal Fault	/
C0512FC	Wss RR Line Undefine Error	/	System Internal Fault	/
C053C00	Detected Multiple Not Plausible or Invalid WSS Signals	Wheel speed is less than 83% of vehicle speed or greater than 117% of vehicle speed for 10s	Low tire pressure or unmatched size	· Check tire pressure and tire size, Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX.
C053CFC	Wheel-speed Sensor Generic Error	/	System Internal Fault	/
C055500	WSS FL Wrong Sensor	/	System Internal Fault	/
C055600	WSS FR Wrong Sensor	/	System Internal Fault	/
C055700	WSS RL Wrong Sensor	/	System Internal Fault	/
C055800	WSS RR Wrong Sensor	/	System Internal Fault	/
C055F92	Pressure in Plunger Circuit Is Too Low (with GC)	/	System Internal Fault	/
C056300	ABS Implausible Long Control	/	System Internal Fault	/
C057900	Brake Booster Temperature Sensor 2 Circuit Low	/	System Internal Fault	/
C057A00	Brake Booster Temperature	/	System Internal Fault	/

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
	Sensor 2 Circuit High			
C057E00	Brake Booster Temperature Sensor Voltage Not Plausible	/	System Internal Fault	/
C059200	Brake Booster Motor Offset Current 2 Out of Range High	/	System Internal Fault	/
C0592FC	Brake Booster Motor Current 2 Short to High	/	System Internal Fault	/
C059300	Brake Booster Motor Offset Current 2 Out of Range Low	/	System Internal Fault	/
C0593FC	Brake Booster Motor Current 2 Short to Low	/	System Internal Fault	/
C059700	Hydraulic Module in Assembly Mode	/	System Internal Fault	/
C05C200	IPB Windings/ Rotor/ECU Temperature Issue: Level 2	/	System Internal Fault	/
C1000FC	System ASIC GPIO Error or APB Asic Voltage Error or PBC SW Failure	/	System Internal Fault	/
C102001	Redundant Supply Mode On	/	System Internal Fault	/
C109908	Wrong Direction of Wheel Speed Sensor	/	System Internal Fault	/
C182B1E	EPB Motor Electrical Coupling Failure	/	General electrical failure, wire harness connector failure	/
C183100	EPB Right Actuator CAT	/	General electrical failure, wire harness connector failure	/
C183401	EPB Right Actuator CAT	/	General electrical failure, wire harness connector failure	/
C183700	APB_GPIO_ OverTemperature	/	System Internal Fault	/
C183792	EPB actuator driver gen	/	System Internal Fault	/

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
	electrical failure - general electrical failure			
C183762	APB motor enable line violation	/	System Internal Fault	/
C183904	Rollerbench Misusage Detected	/	System Internal Fault	/
C1822FC	EPB Left Motor Line Failure	/	Wire harness connector fault	/
C1821FC	EPB Right Motor Line Failure	/	Wire harness connector fault	/
C183600	EPBASIC_ GenericError	/	System Internal Fault	/
C1836FC	EPB Motor GPIO Overcurrent Failure	/	System Internal Fault	/
U031800	Variant Mismatch with OBD Type	Model not configured	Model not configured	· Perform vehicle configuration · Clear ONE BOX DTC with diagnostic tester, turn ignition switch to ON again, and read DTC after waiting for a while. Check to see if the DTC reappears inside ONE BOX, and if it still exists, replace the ONE BOX assembly and test again
U000400	NET_ Undervoltage: OBD Monitoring	/	• Wire harness or connector failure • Voltage fault	For more details, refer to Chapter "CAN Network".
U000500	NET_Overvoltage: OBD Monitoring	/		
U007300	CAN0 Bus Off: OBD Monitoring	/	• Short or open in CAN wire • CAN_H and CAN_L connection is reversed, or CAN_H/L is short to power supply and ground • Whole CAN network fault • ECU internal circuit fault	
U007400	Control Module Communication Bus Off	/		
U010000	Lost Communication with EMS: OBD Monitoring	/	Signal lost	

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
U010087	Lost Communication with EMS: Not OBD Monitoring	/	Frame signal sending node fault causes frame signal can not be received	
U010187	Lost Communication With TCU	/	Signal lost	
U011487	Lost Communication with AWD	/	Signal lost	
U012687	Lost Communication with SAM	/	Signal lost	
U014087	Lost Communication with BCM	/	Frame signal sending node fault causes frame signal can not be received	
U014600	Lost Communication with CRBS (OBD related)	/	Signal lost	
U015187	Lost Communication with ABM/YAS	/	Frame signal sending node fault causes frame signal can not be received	
U015587	Lost Communication with ICM	/		
U016487	Lost Communication with CLM	/	Signal lost	
U029387	Lost Communication with HCU	/	Signal lost	
U030000	Hardware Detected Unsupported Software	/	Software failure	
U040100	Invalid Data Received from EMS: OBD Monitoring	/	Invalid data	
U040181	Invalid Data Received from EMS: Not OBD Monitoring	/	• EMS fault • TCU fault • SAS fault or bus abnormal • YAS fault or uncalibrated • SAS fault or uncalibrated	
U040281	Invalid TCU data	/		

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
U041481	Invalid Data Received From AWD	/	Invalid data	
U042281	Invalid Data Received From BCM	/	Invalid data	
U042381	Invalid Data Received From ICM	/	Invalid data	
U042481	Invalid Data Received From CLM	/	Invalid data	
U042881	Invalid Data Received From SAM	/	• EMS fault • TCU fault • SAS fault or bus abnormal • YAS fault or uncalibrated • SAS fault or uncalibrated	
U044700	Invalid Data Received From HCU_3: OBD Monitoring	/	Invalid signal received	
U045281	Invalid Data Received From ABM or YAS	/	• EMS fault • TCU fault • SAS fault or bus abnormal • YAS fault or uncalibrated • SAS fault or uncalibrated	
U059481	Invalid Data Received From HCU	/	Invalid signal received	
U130055	Software Configuration Error	/	Configuration has error	
U142481	TCUNet_ InvalidValue-Invalid Serial Data Received	/	Invalid signal received	
U141881	BTMNet_ InvalidValue-Invalid Serial Data Received	/	Invalid signal received	
U141781	AccPedalNet_ InvalidValue	/	Invalid signal received	

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
U142281	EngineNet_ InvalidValue-Invalid Serial Data Received	/	Invalid signal received	
U162208	AWDNet_ InvalidValue	/	Invalid signal received	
C005129	Steering Wheel Position Sensor - Signal Invalid	/	• EMS fault • TCU fault • SAS fault or bus abnormal • YAS fault or uncalibrated • SAS fault or uncalibrated	
U162908	WorkingMode_ InvalidValue	/	Invalid signal received	
U142381	StartStopNet_ InvalidValue-Invalid Serial Data Received	/	Invalid signal received	
U024587	Lost Communication with IHU	/	Signal lost	
U054681	Invalid Data Received From IHU	/	Invalid signal received	
U116387	Lost Communication with FRM	/	Signal lost	• Check wire harness and connector • Check related module
U043381	Invalid Data Received From FRM	/	Invalid signal received	
U116187	Lost Communication With RLCR	/	Signal lost	
U143587	Invalid Data Received From RLCR	/	Invalid signal received	
U119787	Lost Communication With IDCU	/	Signal lost	
U143781	Invalid Data Received From IDCU	/	Invalid signal received	
U014287	Lost Communication With APA	/	Signal lost	

DTC	DTC Definition	Detection Condition	Possible Causes	Maintenance Advice
U143281	Invalid Data Received From APA	/	Invalid signal received	
C1009FC	ECU fault	/	System Internal Fault	Replace ECU
C007406	EMS fault	/	System Internal Fault	Replace EMC
P062CFC	WSS Timestamp Error	/	System Internal Fault	Replace ECU
P06A710	Read OBD Configuration Error	/	System Internal Fault	Replace ECU
P06A720	Write OBD Configuration Error	/	System Internal Fault	Replace ECU
P07A070	Variant Mismatch with OBD Type	/	System Internal Fault	Replace ECU
P0FA030	Write OBD Type Failed	/	System Internal Fault	Replace ECU
P0FA040	Read OBD Type Failed	/	System Internal Fault	Replace ECU

4.10 DTC Diagnosis Procedure

DTC	U007300	CAN0 Bus Off: OBD Monitoring
DTC	U007400	Control Module Communication Bus Off

Description

DTC	DTC Definition	Possible Causes
U007300	CAN0 Bus Off: OBD Monitoring	• Short or open in CAN wire • CAN_H and CAN_L connection is reversed, or CAN_H/L is short to power supply and ground • Whole CAN network fault • ECU internal circuit fault
U007400	Control Module Communication Bus Off	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check if OBD is connected normally

(a) Connect diagnostic tester to OBD interface for diagnosis.
(b) Check if diagnostic tester is connected to integrated brake control system.

NG → **Refer to CAN network system to check CAN network**

OK

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace integrated brake control module assembly**

DTC	C050200	WSS FL Line GND
DTC	C050300	WSS FL Line High

Description

DTC	DTC Definition	Possible Causes
C050200	WSS FL Line GND	• Damage in wheel speed sensor or open in wire harness • Damage in wheel speed sensor or short in wire harness • Reverse connection • Water in connector
C050300	WSS FL Line High	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the wheel speed sensor connector.
(d) Check related connector terminals for looseness, breakage, bending, corrosion, reverse connection or water ingress.

NG → **Repair/replace related wire harness and connector**

OK

2	Check wheel speed sensor

(a) Drive vehicle straight ahead, and read datastream of wheel speed sensor with diagnostic tester.
(b) Check if data change of front left wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG → **Replace front left wheel speed sensor**

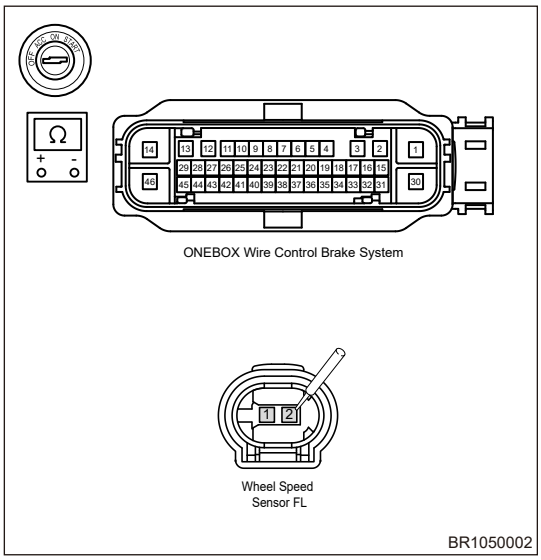
OK

3	Check sensor circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the front left wheel speed sensor connectors.
(e) Using a digital multimeter, check for continuity between ONE BOX module connector corresponding terminal and front left wheel speed sensor connector terminals (1, 2) to check for open circuit in wire harness and connector.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ONE BOX module connector corresponding terminal - Front left wheel speed sensor connector terminal (1)	Always	⩽ 1 Ω
ONE BOX module connector corresponding terminal - Front left wheel speed sensor connector terminal (2)	Always	⩽ 1 Ω

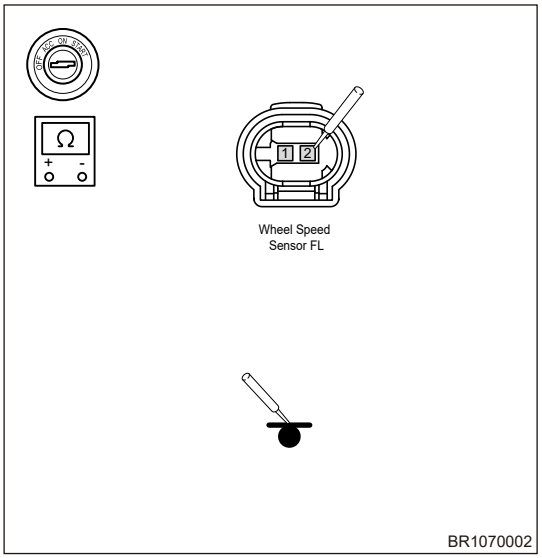


(f) Connect the ONE BOX module connector.

(g) Using a digital multimeter, check for continuity between front left wheel speed sensor connector terminals (1, 2) and body ground to check if front left wheel speed sensor is short to ground according to the table below.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
Front left wheel speed sensor connector terminal 1 - Body ground	Always	∞
Front left wheel speed sensor connector terminal 2 - Body ground	Always	∞



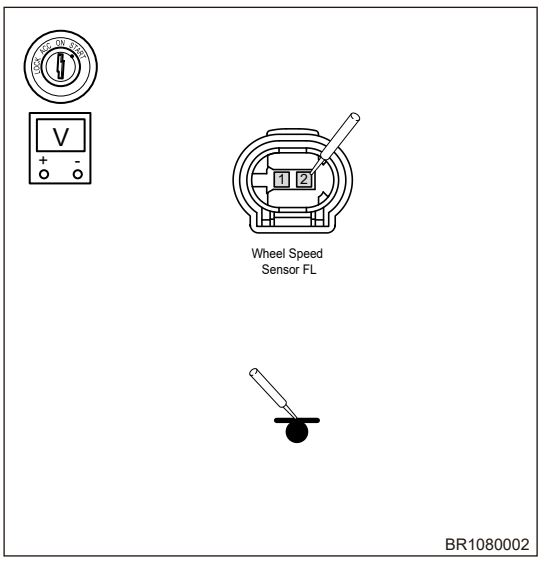
(h) Connect the negative battery cable.

(i) Turn ENGINE START STOP switch to ON.

(j) Using a digital multimeter, check the voltage between front left wheel speed sensor connector terminals (1, 2) and body ground to check if front left wheel speed sensor is short to power supply according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
Front left wheel speed sensor connector (signal terminal) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
Front left wheel speed sensor connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Approx. 5 V



NG → **Repair or replace wire harness between front left wheel speed sensor and ONE BOX module assembly**

OK

4	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Start the engine.

(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C050800	WSS FR Line GND
DTC	C050900	WSS FR Line High

Description

DTC	DTC Definition	Possible Causes
C050800	WSS FR Line GND	• Damage in wheel speed sensor or open in wire harness • Damage in wheel speed sensor or short in wire harness • Reverse connection • Water in connector
C050900	WSS FR Line High	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the wheel speed sensor connector.
(d) Check related connector terminals for looseness, breakage, bending, corrosion, reverse connection or water ingress.

NG → **Repair/replace related wire harness and connector**

OK

2	Check wheel speed sensor

(a) Drive vehicle straight ahead, and read datastream of wheel speed sensor with diagnostic tester.
(b) Check if data change of front right wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG → **Replace front right wheel speed sensor**

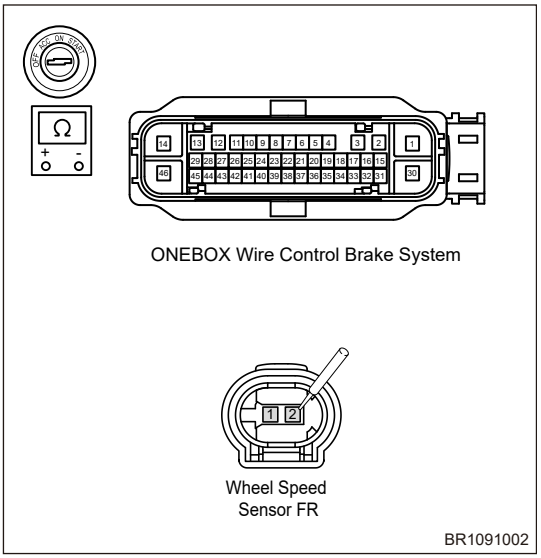
OK

3	Check sensor circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the front right wheel speed sensor connectors.
(e) Using a digital multimeter, check for continuity between ONE BOX module connector corresponding terminal and front right wheel speed sensor connector terminals (1, 2) to check for open circuit in wire harness and connector.

Standard Resistance

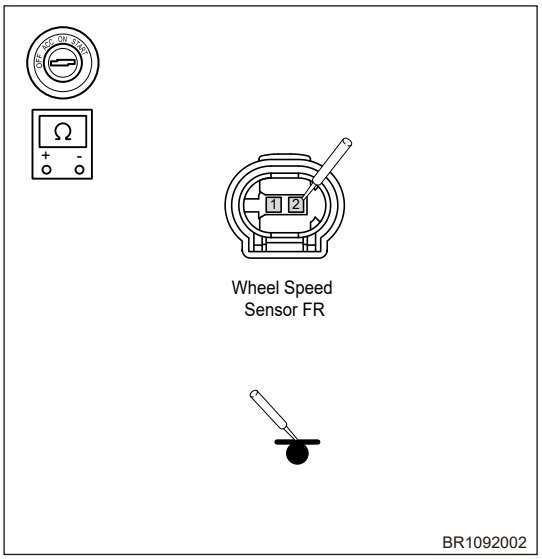
Multimeter Connection	Condition	Specified Condition
ONE BOX module connector corresponding terminal - Front right wheel speed sensor connector terminal (1)	Always	⩽ 1 Ω
ONE BOX module connector corresponding terminal - Front right wheel speed sensor connector terminal (2)	Always	⩽ 1 Ω



(f) Connect the ONE BOX module connector.
(g) Using a digital multimeter, check for continuity between front right wheel speed sensor connector terminals (1, 2) and body ground to check if front right wheel speed sensor is short to ground according to the table below.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
Front right wheel speed sensor connector terminal 1 - Body ground	Always	∞
Front right wheel speed sensor connector terminal 2 - Body ground	Always	∞



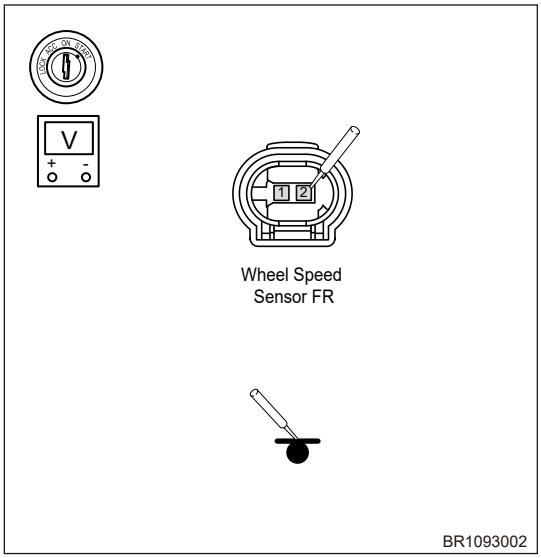
(h) Connect the negative battery cable.

(i) Turn ENGINE START STOP switch to ON.

(j) Using a digital multimeter, check the voltage between front right wheel speed sensor connector terminals(1, 2) and body ground to check if front right wheel speed sensor is short to power supply according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
Front right wheel speed sensor connector (signal terminal) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
Front right wheel speed sensor connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Approx. 5 V



NG → **Repair or replace wire harness between front right wheel speed sensor and ONE BOX control module assembly**

OK

4	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Start the engine.

(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C050E00	WSS RL Line GND
DTC	C050F00	WSS RL Line High

Description

DTC	DTC Definition	Possible Causes
C050E00	WSS RL Line GND	• Damage in wheel speed sensor or open in wire harness • Damage in wheel speed sensor or short in wire harness • Reverse connection • Water in connector
C050F00	WSS RL Line High	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the wheel speed sensor connector.
(d) Check related connector terminals for looseness, breakage, bending, corrosion, reverse connection or water ingress.

NG → **Repair/replace related wire harness and connector**

OK

2	**Check wheel speed sensor**

(a) Drive vehicle straight ahead, and read datastream of wheel speed sensor with diagnostic tester.
(b) Check if data change of rear left wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG → **Replace rear left wheel speed sensor**

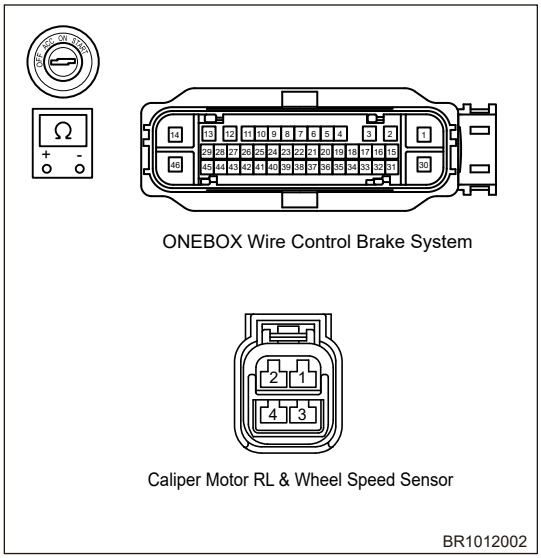
OK

3	**Check sensor circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the rear left wheel speed sensor connectors.
(e) Using a digital multimeter, check for continuity between ONE BOX module connector corresponding terminal and rear left speed sensor connector corresponding terminal to check for open circuit in wire harness and connector.

Standard Resistance

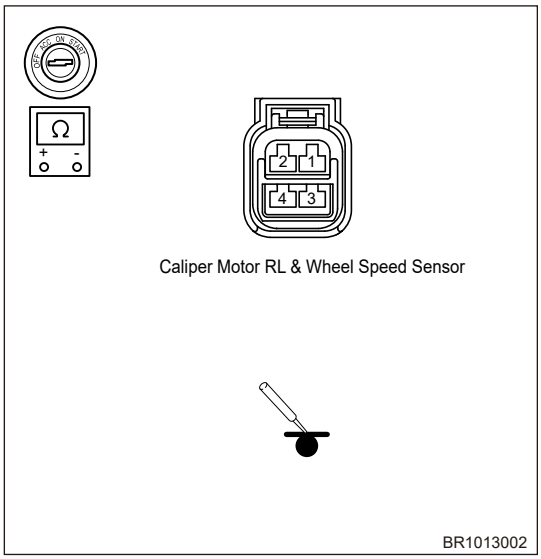
Multimeter Connection	Condition	Specified Condition
ONE BOX module connector (- corresponding terminal) - Rear left wheel speed sensor connector (power supply terminal)	Always	⩽ 1 Ω
ONE BOX module connector (- corresponding terminal) - Rear left wheel speed sensor connector (signal terminal)	Always	⩽ 1 Ω



(f) Using a digital multimeter, check for continuity between rear left wheel speed sensor connector terminal and body ground to check if rear left wheel speed sensor is short to ground according to the table below.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
Rear left wheel speed sensor (- signal terminal) - Body ground	Always	∞
Rear left wheel speed sensor connector (power supply terminal) - Body ground	Always	∞



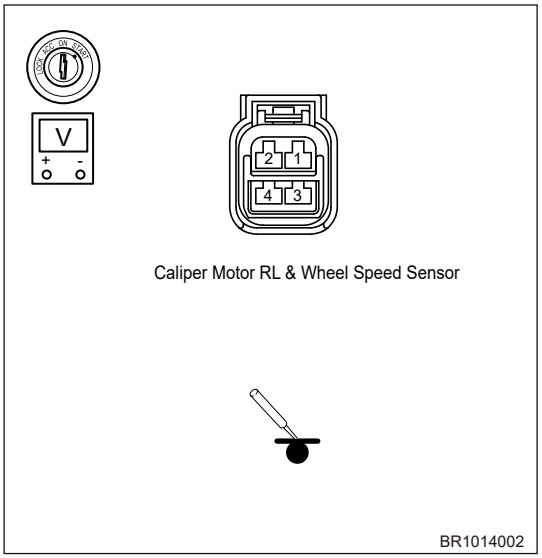
(g) Connect the negative battery cable.

(h) Turn ENGINE START STOP switch to ON.

(i) Using a digital multimeter, check the voltage between rear left wheel speed sensor connector terminal and body ground to check if rear left wheel speed sensor is short to power supply according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
Rear left wheel speed sensor (- signal terminal) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
Rear left wheel speed sensor connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Approx. 5 V



NG → **Repair or replace wire harness between rear left wheel speed sensor and ONE BOX control module assembly**

OK

4	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Start the engine.

(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C051400	WSS RR Line GND
DTC	C051500	WSS RR Line High

Description

DTC	DTC Definition	Possible Causes
C051400	WSS RR Line GND	• Damage in wheel speed sensor or open in wire harness • Damage in wheel speed sensor or short in wire harness • Reverse connection • Water in connector
C051500	WSS RR Line High	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).

- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the wheel speed sensor connector.
(d) Check related connector terminals for looseness, breakage, bending, corrosion, reverse connection or water ingress.

NG → **Repair/replace related wire harness and connector**

OK

2	Check wheel speed sensor

(a) Drive vehicle straight ahead, and read datastream of wheel speed sensor with diagnostic tester.
(b) Check if data change of rear right wheel speed sensor matches that of other wheel speed sensors, and if it is correct.

NG → **Replace rear right wheel speed sensor**

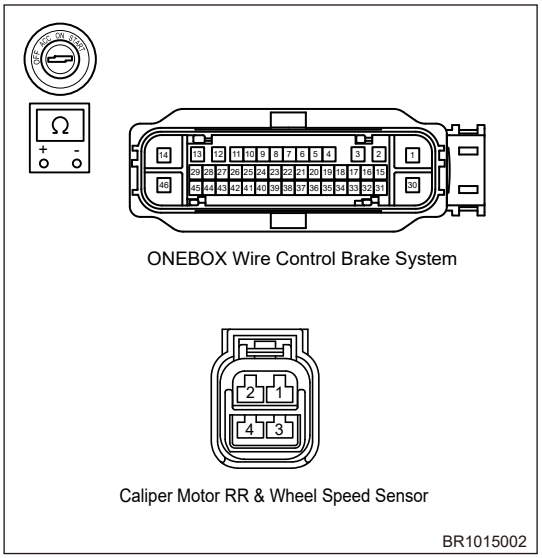
OK

3	Check sensor circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the rear right wheel speed sensor connectors.
(e) Using a digital multimeter, check for continuity between ONE BOX module connector corresponding terminal and rear right speed sensor connector corresponding terminal to check for open circuit in wire harness and connector.

Standard Resistance

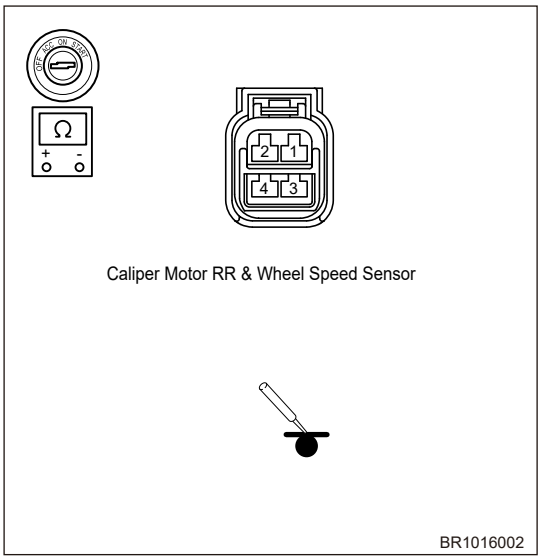
Multimeter Connection	Condition	Specified Condition
ONE BOX module connector (- corresponding terminal) - Rear right wheel speed sensor connector (- power supply terminal)	Always	⩽ 1 Ω
ONE BOX module connector (- corresponding terminal) - Rear right wheel speed sensor connector (- signal terminal)	Always	⩽ 1 Ω



(f) Using a digital multimeter, check for continuity between rear right wheel speed sensor connector corresponding terminal and body ground to check if rear right wheel speed sensor is short to ground according to the table below.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
Rear right wheel speed sensor connector (signal terminal) - Body ground	Always	∞
Rear right wheel speed sensor connector (power supply terminal) - Body ground	Always	∞



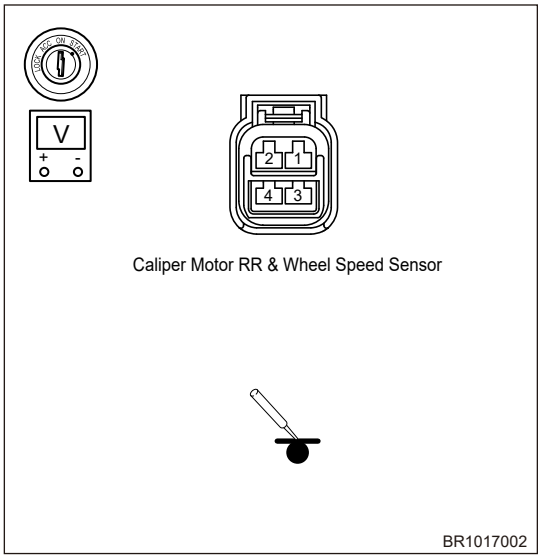
(g) Connect the negative battery cable.

(h) Turn ENGINE START STOP switch to ON.

(i) Using a digital multimeter, check the voltage between rear right wheel speed sensor connector corresponding terminal and body ground to check if rear right wheel speed sensor is short to power supply according to the table below.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
Rear right wheel speed sensor connector (signal terminal) - Body ground	ENGINE START STOP switch ON	Approx. 0 V
Rear right wheel speed sensor connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Approx. 5 V



NG → **Repair or replace wire harness between rear right wheel speed sensor and ONE BOX control module assembly**

OK

4	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Start the engine.

(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	**C050400**	**Front left wheel speed sensor signal failure**
DTC	**C050A00**	**Front right wheel speed sensor signal failure**
DTC	**C051000**	**Rear Left Wheel Speed Sensor Signal Failure**
DTC	**C051600**	**Rear right wheel speed sensor signal failure**

Description

DTC	DTC Definition	Possible Causes
C050400	Front left wheel speed sensor signal failure	• Excessive clearance between wheel speed sensor and ring gear • Wheel speed sensor fault or wire harness looseness • Unstable installation in wheel speed sensor
C050A00	Front right wheel speed sensor signal failure	
C051000	Rear Left Wheel Speed Sensor Signal Failure	

DTC	DTC Definition	Possible Causes
C051600	Rear right wheel speed sensor signal failure	

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect all wheel speed sensor and angle sensor connectors.
(d) Check if related connector terminals are loose, broken, bent or corrosive.

NG → **Repair/replace related wire harness and connector**

OK ↓

2	Check installation of wheel speed sensor

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery terminal cable.
(c) Check wheel speed sensor fixing bolt for looseness.
(d) Check for excessive clearance between installation position of wheel speed sensor and front steering knuckle.
(e) Check installation position of wheel speed sensor for dirt.

NG → **Tighten fixing bolt properly, clean or replace wheel speed sensor**

OK ↓

3	Check hub gear ring and drive shaft upper gear ring

(a) Check hub gear ring and drive shaft upper gear ring for foreign matter, missing teeth or damage.

NG → **Replace hub bearing assembly or outer ball cage assembly**

OK ↓

4	Check wheel speed sensor

(a) Drive vehicle straight ahead, and read datastream of wheel speed sensor with diagnostic tester.
(b) Check if data change of wheel speed sensor matches.

NG → **Replace corresponding wheel speed sensor assembly**

OK

5	Check signal circuit

(a) Check signal circuit between corresponding wheel speed sensor and ONE BOX module.

NG → **Repair or replace signal circuit between wheel speed sensor and ONE BOX module**

OK

6	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C053C00	Detected Multiple Not Plausible or Invalid WSS Signals

Description

DTC	DTC Definition	Possible Causes
C053C00	Detected Multiple Not Plausible or Invalid WSS Signals	• Low tire pressure or unmatched size

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check vehicle tire

(a) Check if the tire pressure meets the standard.
(b) Check if the tire size matches the vehicle.

NG → Supplement tire pressure or replace tire

OK

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Check if the same DTCs are still output.

OK → Conduct test and confirm malfunction has been repaired

NG → Replace ONE BOX module assembly

DTC	C006164	Lateral Acceleration Sensor Signal Abnormal
DTC	C006264	Longitudinal Acceleration Sensor Signal Abnormal
DTC	C006364	Yaw Rate Sensor Signal Abnormal
DTC	C006B00	Stability system active too long
DTC	C005164	Steering Wheel Position Sensor (ESP Only)-Signal Plausibility Failure

Description

DTC	DTC Definition	Possible Causes
C006164	Lateral Acceleration Sensor Signal Abnormal	• ONE BOX sensor is not calibrated • Short or open in YRS circuit • Installation error of YRS is too large • Frame signal sending node fault causes invalid signal to be sent or exceeds normal range value • YRS damaged
C006264	Longitudinal Acceleration Sensor Signal Abnormal	
C006364	Yaw Rate Sensor Signal Abnormal	
C006B00	Stability system active too long	
C005164	Steering Wheel Position Sensor (ESP Only)-Signal Plausibility Failure	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check intermittent fault

(a) Wait for 120 seconds, turn the ignition switch to ON and then to OFF.
(b) Clear DTC again.

OK → **Perform intermittent failure repair**

NG ↓

2	Check if yaw rate sensor (integrated sensor) is calibrated

(a) Check if yaw rate sensor (integrated sensor) is calibrated.

NG → **Perform the calibration of yaw rate sensor (-integrated sensor)**

OK ↓

3	Check yaw rate sensor wire harness and connector

(a) Check yaw rate sensor wire harness and connector (ignore this step for integrated sensor).

NG → **Repair or replace wire harness or connector**

OK ↓

4	Check yaw rate sensor

(a) Check yaw rate sensor wire harness and connector (ignore this step for integrated sensor).

NG → **Replace sensor**

OK ↓

5	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	P05FF03	BSM Hard Pedal Characteristic failure with GoodCheck
DTC	C053D00	Pressure Sensor 1 Range Error or Defective Plunger Pressure Sensor
DTC	C053E00	Pressure Sensor 1 Line Low
DTC	C053F00	Pressure Sensor 1 Line High or Plunger Pressure Sensor Implausible High
DTC	C054100	Pressure Sensor 2 Range Error or Master Cylinder Pressure Sensor Offset Error
DTC	C054200	Pressure Sensor 2 Line Low
DTC	C054300	Pressure Sensor 2 Line High
DTC	C055E00	Pressure Sensor Signal Not Plausible (Too Low) to Plunger Position
DTC	C056B00	Pressure Sensor 1 Noise or Internal Failure
DTC	C056C00	Pressure Sensor 2 Noise or Internal Failure

Description

DTC	DTC Definition	Possible Causes
P05FF03	BSM Hard Pedal Characteristic failure with GoodCheck	• Poor contact of pressure sensor signal wire P1 • Open or short in pressure sensor signal wire P2 • Open in 2nd path signal wire P2 of master cylinder pressure sensor • Hardware damage of pressure sensor/connection disconnected/abnormal external temperature and magnetic field strength • Fault in master cylinder pressure sensor and any stroke sensor • Pressure sensor damaged
C053D00	Pressure Sensor 1 Range Error or Defective Plunger Pressure Sensor	
C053E00	Pressure Sensor 1 Line Low	
C053F00	Pressure Sensor 1 Line High or Plunger Pressure Sensor Implausible High	
C054100	Pressure Sensor 2 Range Error or Master Cylinder Pressure Sensor Offset Error	
C054200	Pressure Sensor 2 Line Low	
C054300	Pressure Sensor 2 Line High	
C055E00	Pressure Sensor Signal Not Plausible (Too Low) to Plunger Position	
C056B00	Pressure Sensor 1 Noise or Internal Failure	
C056C00	Pressure Sensor 2 Noise or Internal Failure	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check intermittent fault

(a) Wait for 120 seconds, turn the ignition switch to ON and then to OFF.
(b) Clear DTC again.

OK → **Perform intermittent failure repair**

NG

2	Check connector

(a) Check if the connection of ONE BOX module connector is normal.

NG → **Repair or replace malfunctioning components**

OK

3	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	P057B00	Linear Position Sensor, Channel 1, Sensor Interanl Error
DTC	P057C00	Linear Position Sensor, Channel 1 Line Low
DTC	P057D00	Linear Position Sensor, Channel 1 Line High
DTC	P057E00	Linear Position Sensor, Channel 1, Noise Error
DTC	P05CB00	Wrong ECU Exchange
DTC	P05DD00	Linear Position Sensor, Channel 2 Line Low
DTC	P05DE00	Linear Position Sensor, Channel 2 Line High
DTC	P05DF00	Linear Position Sensor, Channel 2 Transmission Failure
DTC	P05E000	Difference between PTS1 and PTS2 Too High
DTC	C007500	LiPS Timeout or Range Error
DTC	C061900	PTS1 Offset Failure
DTC	C061A00	PTS2 Offset Failure

Description

DTC	DTC Definition	Possible Causes
P057B00	Linear Position Sensor, Channel 1, Sensor Interanl Error	• Hardware damage of stroke sensor/connection disconnected/abnormal external temperature and magnetic field strength • Abnormal stroke sensor power supply • Stroke sensor damaged
P057C00	Linear Position Sensor, Channel 1 Line Low	
P057D00	Linear Position Sensor, Channel 1 Line High	
P057E00	Linear Position Sensor, Channel 1, Noise Error	
P05CB00	Wrong ECU Exchange	
P05DD00	Linear Position Sensor, Channel 2 Line Low	
P05DE00	Linear Position Sensor, Channel 2 Line High	
P05DF00	Linear Position Sensor, Channel 2 Transmission Failure	
P05E000	Difference between PTS1 and PTS2 Too High	
C007500	LiPS Timeout or Range Error	
C061900	PTS1 Offset Failure	
C061A00	PTS2 Offset Failure	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check intermittent fault

(a) Wait for 120 seconds, turn the ignition switch to ON and then to OFF.
(b) Clear DTC again.

OK → **Perform intermittent failure repair**

NG

2	Check connector

(a) Check if the connection of ONE BOX module connector is normal.

NG → **Repair or replace malfunctioning components**

OK

3	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C004900	Brake Fluid Level Error

Description

DTC	DTC Definition	Possible Causes
C004900	Brake Fluid Level Error	• Low fluid level in reservoir • Open or short in brake fluid level sensor

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check reservoir level

(a) Check if reservoir level is within normal range.

NG → **Add fluid or adjust reservoir level to normal level, and check for leakage**

OK

2	Check brake fluid level sensor

(a) Using a replacement method, check brake fluid level sensor.

OK → **Replace brake fluid level sensor**

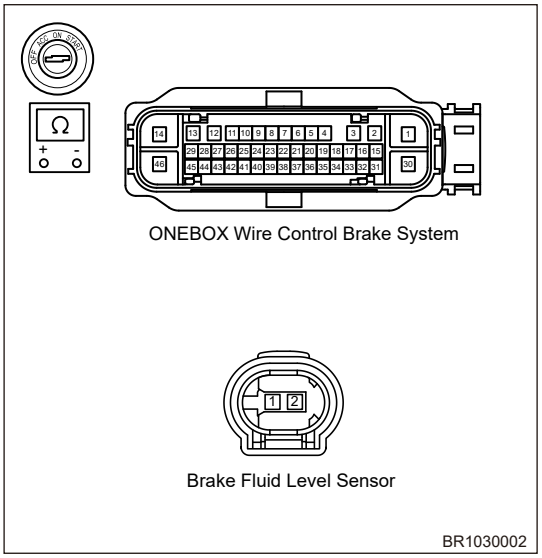
NG

3	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the brake fluid level sensor connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a digital multimeter, check for continuity between ONE BOX module assembly connector (corresponding terminal) and brake fluid level sensor connector (terminal 1).

Standard Resistance

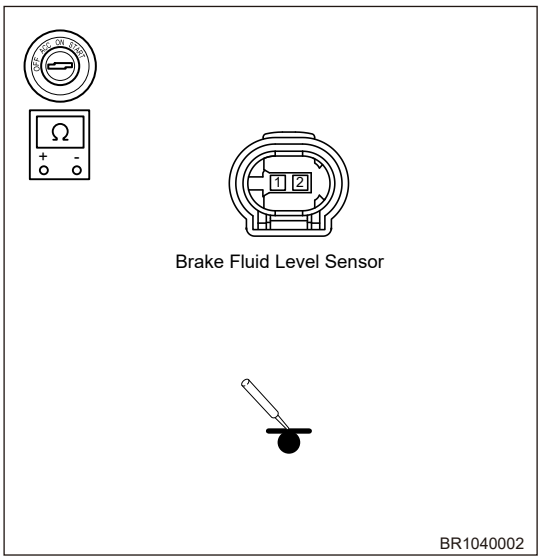
Multimeter Connection	Condition	Specified Condition
ONE BOX module (-corresponding terminal) - Brake fluid level sensor connector (signal terminal)	Always	⩽ 1 Ω



(h) Using a digital multimeter, check for continuity between brake fluid level sensor connector (ground terminal) and body ground.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
Brake fluid level sensor connector (-ground terminal) - Body ground	Always	⩽ 1 Ω



NG → **Check and repair wire harness or connector**

OK

4	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Check if the same DTCs are still output.

OK → **Conduct test and confirm malfunction has been repaired**

NG → Replace ONE BOX module assembly

DTC	P056300	OBD_ECU_VoltageHigh
DTC	C183817	ECU voltage too high

Description

DTC	DTC Definition	Possible Causes
P056300	OBD_ECU_VoltageHigh	• Battery voltage is too high or battery is damaged • Power supply voltage is not stable • ONE BOX internal circuit fault
C183817	ECU voltage too high	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery voltage

(a) Using a digital multimeter, measure voltage between positive battery terminal and negative battery terminal.
(b) Check if the battery voltage is too high (higher than 16 V).

NG → Replace battery

OK

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ignition switch to ON again, and read DTC after waiting for a while, check to see if the DTC reappears inside ONE BOX.

OK → Conduct test and confirm malfunction has been repaired

NG → Replace ONE BOX module assembly

DTC	P0562FC	OBD_ECU_VoltageLow_OtherCycle
DTC	C183816	ECU voltage too low
DTC	P056200	ECU Reset Too Much During ECU Init

Description

DTC	DTC Definition	Possible Causes
P0562FC	OBD_ECU_VoltageLow_ OtherCycle	• Battery voltage too low or battery damaged • Power supply voltage is not stable • ONE BOX internal circuit fault
C183816	ECU voltage too low	
P056200	ECU Reset Too Much During ECU Init	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check battery voltage

(a) Using a digital multimeter, measure voltage between positive battery terminal and negative battery terminal.

(b) Check if battery voltage is low.

NG → **Charge the battery, if the battery has been charged for a long time and the battery voltage still cannot reach the rated voltage, replace the battery**

OK

2	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the ONE BOX module connector.

(d) Check if related wire harnesses are worn, pinched or broken.

(e) Check if related connector terminals are loose, broken, bent or corrosive.

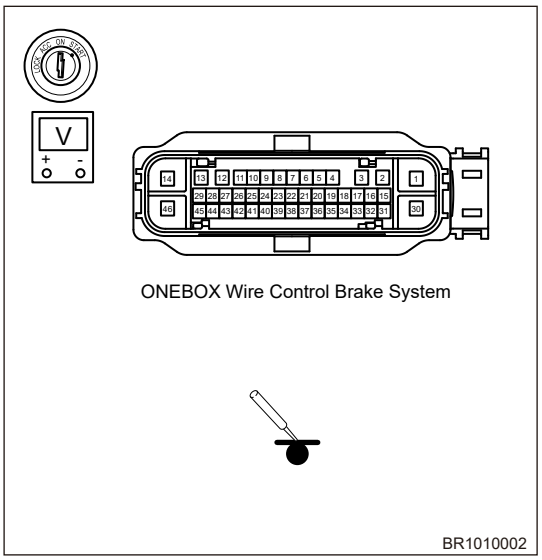
(f) Connect the negative battery cable.

(g) Turn ENGINE START STOP switch to ON.

(h) Using a digital multimeter, measure voltage between ONE BOX module connector (power supply terminal) and body ground.

Standard Voltage

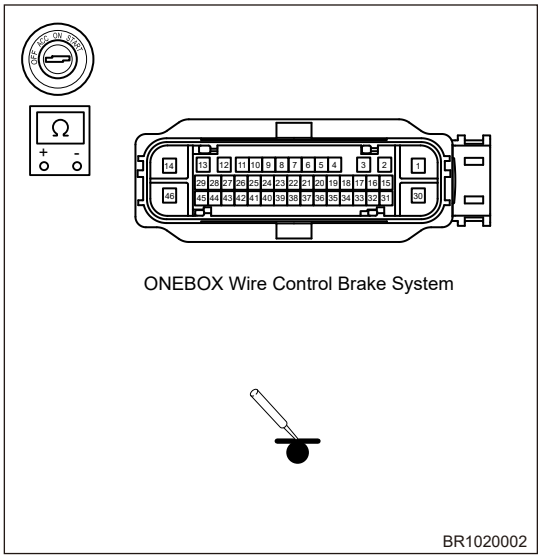
Multimeter Connection	Condition	Specified Condition
ONE BOX module connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



(i) Using a digital multimeter, check for continuity between connector ONE BOX (ground terminal) and body ground according to table below.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ONE BOX module connector (ground terminal) - Ground	Always	⩽ 1 Ω



NG → **Repair or replace wire harness or connector**

OK

3	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ignition switch to ON again, and read DTC after waiting for a while, check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	P056023	RBRSS_Redundant_UBB
DTC	P056024	RBRSS_Redundant_UBVR

Description

DTC	DTC Definition	Possible Causes
P056023	RBRSS_Redundant_UBB	• External power supply voltage is too high or battery is damaged • Power supply voltage is not stable • ONE BOX internal circuit fault
P056024	RBRSS_Redundant_UBVR	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check fuse

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check ONE BOX fuse in engine compartment fuse and relay box
(d) Check if fuse is blown.

NG → **Replace fuse**

OK

2	Check battery voltage

(a) Using a digital multimeter, measure voltage between positive battery terminal and negative battery terminal for normal.

NG → **Replace battery**

OK

3	Check alternator

(a) Check if generating capacity of alternator is normal.

NG → **Replace alternator**

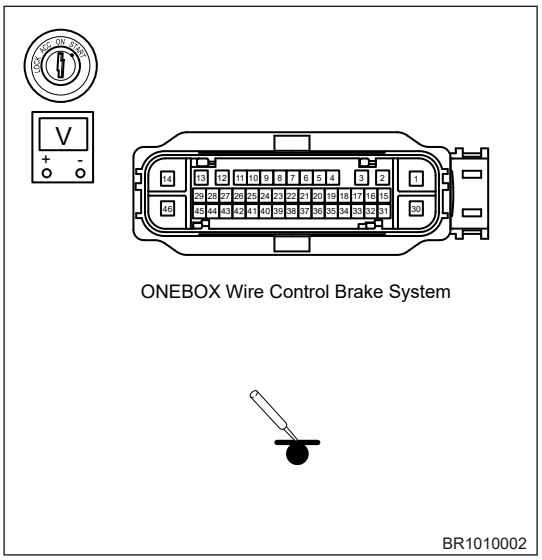
OK

4	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Connect the negative battery cable.
(g) Turn ENGINE START STOP switch to ON.
(h) Using a digital multimeter, measure voltage between ONE BOX module connector (power supply terminal) and body ground.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
ONE BOX module connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



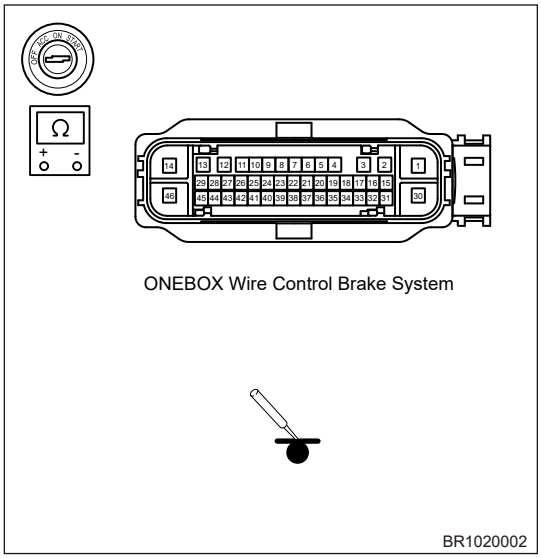
ONEBOX Wire Control Brake System

BR1010002

(i) Using a digital multimeter, check for continuity between connector ONE BOX (ground terminal) and body ground according to table below.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ONE BOX module connector (ground terminal) - Ground	Always	⩽ 1 Ω



NG → **Repair or replace wire harness or connector**

OK

5	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ignition switch to ON again, and read DTC after waiting for a while, check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C008904	TCS Disable Switch Failure (ESP Only)
DTC	C104D04	AVH Button Switch Failure

Description

DTC	DTC Definition	Possible Causes
C008904	TCS Disable Switch Failure (ESP Only)	• AVH/ESC switch stuck • AVH/ESC switch indicator drive open circuit
C104D04	AVH Button Switch Failure	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check AVH/ESC switch

(a) Check if AVH/ESC switch is stuck.

NG → **Replace instrument cluster**

OK →

2	Check related wire harness

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the instrument cluster connector.
(e) Disconnect the domain controller connector.
(f) Check if related wire harnesses are worn, pinched or broken.
(g) Check if related connector terminals are loose, broken, bent or corrosive.

NG → **Repair or replace wire harness or connector**

OK →

3	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) · Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C001000	Valve MV4A General Fault
DTC	C001100	Valve MV4B General Fault
DTC	C001400	Valve MV2A General Fault
DTC	C001500	Valve MV2B General Fault
DTC	C001800	Valve MV1A General Fault
DTC	C001900	Valve MV1B General Fault
DTC	C001C00	Valve MV3A General Fault
DTC	C001D00	Valve MV3B General Fault
DTC	C000100	Valve MV5 General Fault
DTC	C000200	Valve MV6 General Fault

DTC	C000300	Valve MV7 General Fault
DTC	C000400	Valve MV8 General Fault
DTC	C0024000	Valve MV9 General Fault
DTC	C05D500	Valve MV5B General Fault

Description

DTC	DTC Definition	Possible Causes
C001000	Valve MV4A General Fault	• Coil or drive related hardware fault • ECU damaged
C001100	Valve MV4B General Fault	
C001400	Valve MV2A General Fault	
C001500	Valve MV2B General Fault	
C001800	Valve MV1A General Fault	
C001900	Valve MV1B General Fault	
C001C00	Valve MV3A General Fault	
C001D00	Valve MV3B General Fault	
C000100	Valve MV5 General Fault	
C000200	Valve MV6 General Fault	
C000300	Valve MV7 General Fault	
C000400	Valve MV8 General Fault	
C0024000	Valve MV9 General Fault	
C05D500	Valve MV5B General Fault	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check fuse

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Remove the fuse corresponding to ONE BOX from engine compartment fuse and relay box.
(d) Check if fuse is blown.

NG → Replace fuse

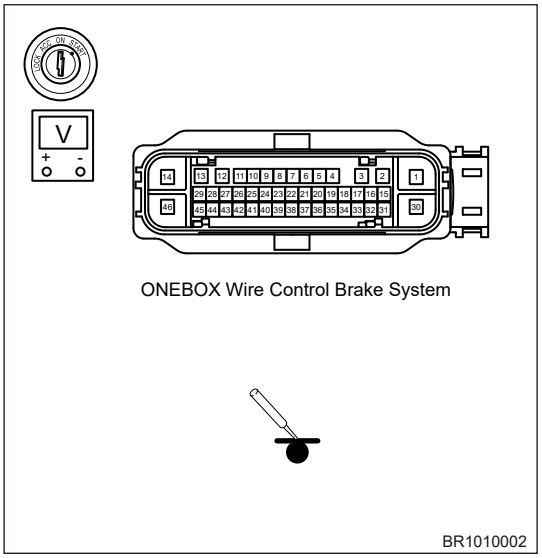
OK

2	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Using a digital multimeter, measure voltage between ONE BOX module assembly connector (power supply terminal) and body ground.

Standard Voltage

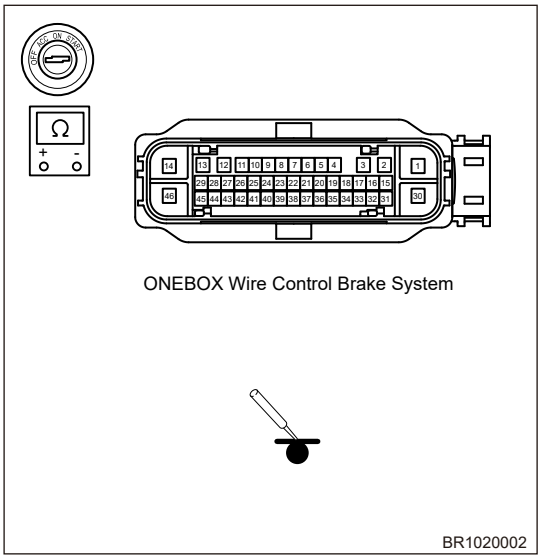
Multimeter Connection	Condition	Specified Condition
ONE BOX module assembly connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



(g) Using a digital multimeter, check for continuity between ONE BOX module assembly connector (ground terminal) and body ground.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ONE BOX module assembly connector (ground terminal) - Body ground	Always	⩽ 1 Ω



NG → **Check and repair wire harness or connector**

OK

3	Check coil

(a) Cools down for 5 minutes, check if there is open circuit or short circuit in coil, if coil has been driven for too long, and check if there is open circuit or short circuit fault in coil current feedback circuit.

NG → **Repair and replace the corresponding components**

OK

4	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace ONE BOX module assembly**

DTC	**C053B00**	**Valve Path Supply Line Open**
DTC	**C062D00**	**Valve Relay Gate Switch ON Error**

Description

DTC	DTC Definition	Possible Causes
C053B00	Valve Path Supply Line Open	• ECU power supply transient voltage too low • HD_D PIN resistance open circuit • WCB solenoid valve high side MOS transistor short • WCB solenoid valve high side drive short
C062D00	Valve Relay Gate Switch ON Error	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check battery**

(a) Using a multimeter, check if battery voltage is normal.

NG	**Replace battery**

OK

2	**Check alternator**

(a) Using a multimeter, check if generating capacity of alternator is normal.

NG	**Replace alternator**

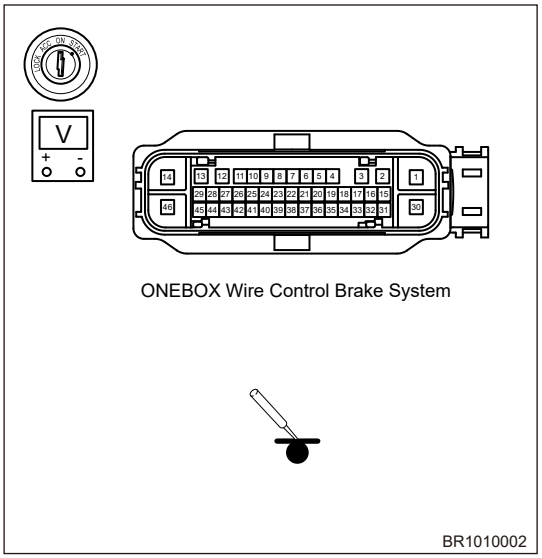
OK

3	**Check related wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Using a digital multimeter, measure voltage between ONE BOX module assembly connector (power supply terminal) and body ground.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
ONE BOX module assembly connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



ONEBOX Wire Control Brake System
BR1010002

NG → **Check and repair wire harness or connector**

OK →

4	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	**C059000**	**Brake Booster Motor Offset Current 1 Out of Range High**
DTC	**C0590FC**	**Brake Booster Motor Current 1 Short to High**
DTC	**C059100**	**Brake Booster Motor Offset Current 1 Out of Range Low**
DTC	**C0595FC**	**Brushless Motor Muxer Timeout Error**
DTC	**C059900**	**RPS Wrong Calib Data Version**

Description

DTC	DTC Definition	Possible Causes
C059000	Brake Booster Motor Offset Current 1 Out of Range High	• Brushless motor overcurrent • No power supply of brushless motor or ECU control error
C0590FC	Brake Booster Motor Current 1 Short to High	
C059100	Brake Booster Motor Offset Current 1 Out of Range Low	
C0595FC	Brushless Motor Muxer Timeout Error	

DTC	DTC Definition	Possible Causes
C059900	RPS Wrong Calib Data Version	

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Clear DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C058800	Rotation Position Sensor Signal Line Too Low
DTC	C058900	Rotation Position Sensor Signal Line Too High
DTC	C058AFC	Rotor Position Sensor Raw Signals Implausible

Description

DTC	DTC Definition	Possible Causes
C058800	Rotation Position Sensor Signal Line Too Low	• Position sensor is damaged or internal fault
C058900	Rotation Position Sensor Signal Line Too High	
C058AFC	Rotor Position Sensor Raw Signals Implausible	

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Clear DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	**P060200**	**Control Module Programming Error**
DTC	**P060400**	**ECU RAM Failure**
DTC	**P060500**	**ECU ROM Failure**
DTC	**P060600**	**ECU internal fault**
DTC	**P060B00**	**ECU ADC Error**
DTC	**P06B800**	**ECU HW NVRAM Error**
DTC	**C007200**	**Brake System Overheated**
DTC	**C004428**	**Pressure Sensor Temperature Error**
DTC	**C100104**	**Internal fault in ECU system**
DTC	**C100900**	**ECU hardware related fault**

Description

DTC	DTC Definition	Possible Causes
P060200	Control Module Programming Error	• System self-check error • FLASH self-check error • ASIC over temperature • Internal power supply error • System stack error • Coprocessor error • RAM error and other internal faults
P060400	ECU RAM Failure	
P060500	ECU ROM Failure	
P060600	ECU internal fault	
P060B00	ECU ADC Error	
P06B800	ECU HW NVRAM Error	
C007200	Brake System Overheated	
C004428	Pressure Sensor Temperature Error	
C100104	Internal fault in ECU system	
C100900	ECU hardware related fault	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Clear DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	Conduct test and confirm malfunction has been repaired
NG	Replace ONE BOX module assembly

DTC	P062CFC	WSS Timestamp Error
DTC	P06A710	Read OBD Configuration Error
DTC	P06A720	Write OBD Configuration Error
DTC	P07A070	Variant Mismatch with OBD Type
DTC	P0FA030	Write OBD Type Failed
DTC	P0FA040	Read OBD Type Failed

Description

DTC	DTC Definition	Possible Causes
P062CFC	WSS Timestamp Error	• ECU fault
P06A710	Read OBD Configuration Error	
P06A720	Write OBD Configuration Error	
P07A070	Variant Mismatch with OBD Type	
P0FA030	Write OBD Type Failed	
P0FA040	Read OBD Type Failed	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Clear DTCs**

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace ONE BOX module assembly**

DTC	**C05C300**	**UB6 Supply Path Failure**

Description

DTC	DTC Definition	Possible Causes
C05C300	UB6 Supply Path Failure	• Internal power supply mos transistor open circuit

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Clear DTCs**

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace ONE BOX module assembly**

DTC	**C180093**	**Left Actuator - No Motor Start Detected-No Operation**
DTC	**C180019**	**Left Actuator - Circuit Current Above Threshold**
DTC	**C180074**	**Left Actuator - Actuator Slipping (Apply TimeOut)**
DTC	**C180073**	**Left Actuator - Apply Failed**
DTC	**C180072**	**Left Actuator - Release Failed**

DTC	C180091	Left Actuator - Wrong Operating Characteristics Detect-Parametric
DTC	C180092	Left Actuator - High Mechanical Resistance-Performance or Incorrect Operation
DTC	C180097	Left actuator - action limited
DTC	C182200	EPB Left Actuator Failure
DTC	C180243	SupervisionFail-Data Memory Failure
DTC	C182496	EPB Intern Left HW Failure
DTC	C182401	EPB Left Actuator Electrical Failure-General Electrical Failure

Description

DTC	DTC Definition	Possible Causes
C180093	Left Actuator - No Motor Start Detected-No Operation	• Left actuator connecting wire open circuit • Connecting wire of left actuator internal motor open circuit • Left actuator connecting wire short circuit • Left actuator internal motor connecting wire short circuit • Left actuator internal motor stuck • Left actuator is not equipped with lining or lining is too thin, resulting in too long EPB braking time but still unable to brake normally • Left actuator internal mechanical fault • EPB internal control motor circuit is damaged
C180019	Left Actuator - Circuit Current Above Threshold	
C180074	Left Actuator - Actuator Slipping (Apply TimeOut)	
C180073	Left Actuator - Apply Failed	
C180072	Left Actuator - Release Failed	
C180091	Left Actuator - Wrong Operating Characteristics Detect-Parametric	
C180092	Left Actuator - High Mechanical Resistance-Performance or Incorrect Operation	
C180097	Left actuator - action limited	
C182200	EPB Left Actuator Failure	
C180243	SupervisionFail-Data Memory Failure	
C182496	EPB Intern Left HW Failure	
C182401	EPB Left Actuator Electrical Failure-General Electrical Failure	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check left parking caliper wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left parking caliper connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.

NG → **Repair or replace left parking caliper wire harness or connector**

OK

2	Check installation of left actuator and parking caliper

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check if left actuator and parking caliper are installed correctly.

NG → **Reinstall it**

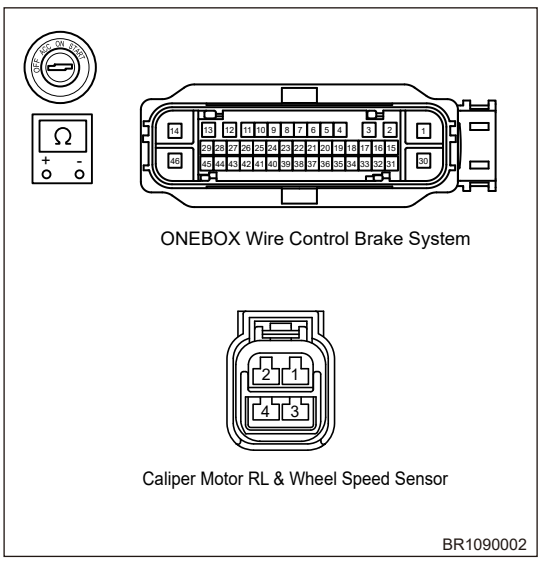
OK

3	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the rear left caliper connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a digital multimeter, check the resistance between ONE BOX module connector (corresponding terminal) and rear left caliper motor with wheel speed sensor connector (motor terminal) to check for open circuit in wire harness and connector.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ONE BOX (- corresponding terminal) - Rear left caliper motor with wheel speed sensor connector (motor terminal)	Always	⩽ 1 Ω



NG → Repair or replace wire harness or connector

OK

4	Check rear left caliper motor wire harness

(a) Check if there is short or other faults in rear left caliper motor wire harness

OK → Replace rear left caliper motor with wheel speed sensor

NG

5	Check left parking caliper

(a) Using a replacement method, measure left parking caliper.

OK → Replace left parking caliper

NG

6	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again and check if this DTC occurs inside EPB. Operate EPB switch to clamp and release repeatedly. Confirm that the fault has been solved.

OK → Conduct test and confirm malfunction has been repaired

NG → Replace ONE BOX module assembly

DTC	C180193	Right Actuator - No Motor Start Detected-No Operation
DTC	C180119	Right Actuator - Circuit Current Above Threshold
DTC	C180173	Right Actuator - Apply Failed
DTC	C180172	Right Actuator -Release Failed
DTC	C180191	Right Actuator - Wrong Operating Characteristics Detect-Parametric
DTC	C180192	Right Actuator - High Mechanical Resistance-Performance or Incorrect Operation
DTC	C180197	Right actuator - action limited
DTC	C182100	EPB Right Actuator Failure
DTC	C182501	EPB Right Actuator Electrical Failure-General Electrical Failure
DTC	C182596	EPB Intern Right HW Failure
DTC	C1835FC	EPB Right Motor Transistors Error

Description

DTC	DTC Definition	Possible Causes
C180193	Right Actuator - No Motor Start Detected-No Operation	• Right actuator connecting wire open circuit • Connecting wire of right actuator internal motor open circuit • Right actuator connecting wire short circuit • Right actuator internal motor connecting wire short circuit • Right actuator internal motor stuck • Right actuator is not equipped with lining or lining is too thin, resulting in too long EPB braking time but still unable to brake normally • Right actuator internal mechanical fault • EPB internal control motor circuit is damaged
C180119	Right Actuator - Circuit Current Above Threshold	
C180173	Right Actuator - Apply Failed	
C180172	Right Actuator -Release Failed	
C180191	Right Actuator - Wrong Operating Characteristics Detect-Parametric	
C180192	Right Actuator - High Mechanical Resistance-Performance or Incorrect Operation	
C180197	Right actuator - action limited	
C182100	EPB Right Actuator Failure	
C182501	EPB Right Actuator Electrical Failure-General Electrical Failure	
C182596	EPB Intern Right HW Failure	
C1835FC	EPB Right Motor Transistors Error	

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check right parking caliper wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the right parking caliper connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.
(f) Check if related connector pins are in good condition.

NG → **Repair or replace right parking caliper wire harness or connector**

OK

2	Check installation of right parking caliper

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check if right parking caliper is installed correctly.

NG → Reinstall it

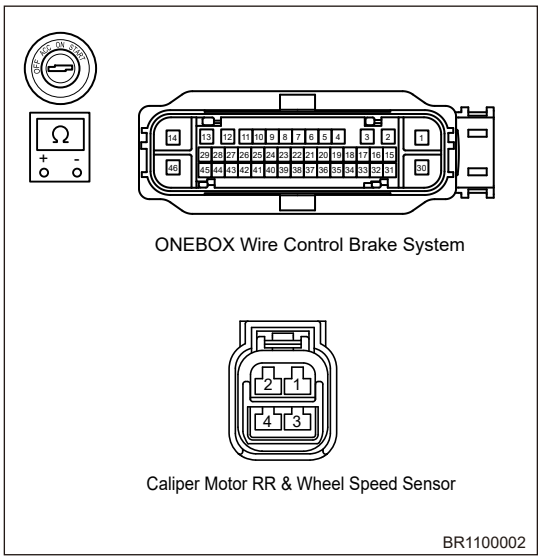
OK

3	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the rear right caliper connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Using a digital multimeter, check the resistance between ONE BOX module connector (corresponding terminal) and rear right parking caliper motor with wheel speed sensor connector (motor terminal) to check for open circuit in wire harness and connector.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ONE BOX Module (- corresponding terminal) - Rear right parking caliper motor with wheel speed sensor connector (motor terminal)	Always	⩽ 1 Ω



NG → Repair or replace wire harness or connector

OK

4	Check rear right caliper motor wire harness

(a) Check if there is short or other faults in rear right caliper motor wire harness.

OK → Replace rear right caliper motor with wheel speed sensor

NG

5	Check right parking caliper

(a) Using a replacement method, measure right parking caliper.

OK	Replace right parking caliper

NG

6	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again and check if this DTC occurs inside EPB. Operate EPB switch to clamp and release repeatedly. Confirm that the fault has been solved.

OK	Conduct test and confirm malfunction has been repaired
NG	Replace ONE BOX module assembly

DTC	C180616	EPB Button Under Voltage
DTC	C180601	EPB Button Line Failure-General Electrical Failure
DTC	C180604	EPB Button Always Pushed or Pulled-System Internal Failure

Description

DTC	DTC Definition	Possible Causes
C180616	EPB Button Under Voltage	• The circuit connecting EPB to the switch is short and open • Switch internal circuit fault, etc • EPB internal switch detection circuit failure • EPB switch is stuck
C180601	EPB Button Line Failure-General Electrical Failure	
C180604	EPB Button Always Pushed or Pulled-System Internal Failure	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check fuse

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Check the instrument panel fuse and relay box EPB switch fuse.
(d) Check if fuse is blown.

NG → Replace fuse

OK

2	Check battery voltage

(a) Using a digital multimeter, measure voltage between positive battery terminal and negative battery terminal.
(b) Battery voltage should be higher than 12 V.

NG → Replace battery

OK

3	Check switch

(a) Pull up and press the switch several times, wait for more than 3 seconds after releasing the switch, and observe if switch light flashes. If it flashes, replace the switch.
(b) Pull up the EPB switch, use the diagnostic tester to read the current information inside the EPB, and check if the switch position obtained by the diagnostic tester is "parking position"; Press the EPB switch, use the diagnostic tester to read the current information inside the EPB, and check if the switch position obtained by the diagnostic tester is "release position"; In addition, when the EPB switch is not operated, obtain the position information of the switch through the diagnostic tester to check if it is "natural position"; If the three position information of EPB switch is inconsistent with the actual operation, it indicates that there may be an internal fault of EPB switch, and the EPB switch needs to be replaced at this time.

NG → Replace EPB switch

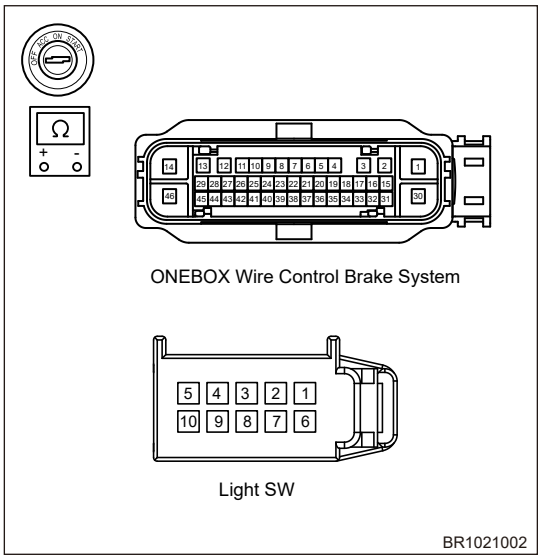
OK

4	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Disconnect the light switch (integrated parking switch) connector.
(e) Check if related wire harnesses are worn, pinched or broken.
(f) Check if related connector terminals are loose, broken, bent or corrosive.
(g) Connect the negative battery cable.
(h) Turn ENGINE START STOP switch to ON.
(i) Using a digital multimeter, measure the resistance between connector ONE BOX (corresponding terminal) and light switch connector (EPB terminal) to check for open.

Standard Resistance

Multimeter Connection	Condition	Specified Condition
ONE BOX (- corresponding terminal) - Light switch (EPB terminal)	Always	⩽ 1 Ω



NG → Repair or replace wire harness or connector

OK

5	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after operating EPB switch repeatedly. Check if this DTC occurs again inside EPB.

OK → Conduct test and confirm malfunction has been repaired

NG → Replace ONE BOX module assembly

DTC	C180000	EPB Left Actuator Electrical Failure-General Electrical Failure
DTC	C183200	EPB left actuator unintended run-no sub type information
DTC	C180813	Circuit Open of Left Rear Caliper - Circuit Open
DTC	C180811	Circuit Short To Ground of Left Rear Caliper
DTC	C180812	Circuit Short To Battery of Left Rear Caliper
DTC	C180100	EPB Right Actuator Electrical Failure-General Electrical Failure
DTC	C183300	EPB right actuator unintended run-no sub type information
DTC	C181513	Circuit Open of Right Rear caliper-Circuit Open
DTC	C181511	Circuit Short To Ground of Right Rear Caliper
DTC	C181512	Circuit Short To Battery of Right Rear Caliper
DTC	C183400	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
DTC	C18341D	Short in Left Rear Caliper Positive and Negative
DTC	C1834FC	EPB Left Motor Transistors Error
DTC	C183500	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range
DTC	C18351D	Short in Right Rear Caliper Positive and Negative

Description

DTC	DTC Definition	Possible Causes
C180000	EPB Left Actuator Electrical Failure-General Electrical Failure	• Actuator internal fault • Caliper mechanical structure fault
C183200	EPB left actuator unintended run-no sub type information	
C180813	Circuit Open of Left Rear Caliper - Circuit Open	
C180811	Circuit Short To Ground of Left Rear Caliper	

DTC	DTC Definition	Possible Causes
C180812	Circuit Short To Battery of Left Rear Caliper	
C180100	EPB Right Actuator Electrical Failure-General Electrical Failure	
C183300	EPB right actuator unintended run-no sub type information	
C181513	Circuit Open of Right Rear caliper-Circuit Open	
C181511	Circuit Short To Ground of Right Rear Caliper	
C181512	Circuit Short To Battery of Right Rear Caliper	
C183400	EPB Left Actuator Shunt On Line or ECU-Circuit Resistance Out of Range	
C18341D	Short in Left Rear Caliper Positive and Negative	
C1834FC	EPB Left Motor Transistors Error	
C183500	EPB Right Actuator Shunt On Line or ECU-Circuit Resistance Out of Range	
C18351D	Short in Right Rear Caliper Positive and Negative	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Check if related wire harnesses are worn, pinched or broken.
(b) Check if related connector terminals are loose, broken, bent or corrosive.

OK → **Repair or replace wire harness or connector**

NG

2	Check actuator

(a) Using a replacement method, replace the actuator that cannot operate normally.

OK → Repair or replace actuator

NG

3	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Repeatedly operate EPB switch to perform clamping and releasing operations, read EPB DTC, and check if fault still exists.

OK → Conduct test and confirm malfunction has been repaired

NG → Replace ONE BOX module assembly

DTC	C180244	PBC EEPROM Fault
DTC	C180395	Assembly Test Not Performed

Description

DTC	DTC Definition	Possible Causes
C180244	PBC EEPROM Fault	• EEPROM data invalid or Checksum failed • Off-line calibration not performed with EPB off-line
C180395	Assembly Test Not Performed	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Assembly inspection

(a) Perform diagnostic service "Assembly inspection".

NG → Perform recalibration

OK

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	Conduct test and confirm malfunction has been repaired
NG	Replace ONE BOX module assembly

DTC	C180453	EPB Maintenance Mode

Description

DTC	DTC Definition	Possible Causes
C180453	EPB Maintenance Mode	• EPB Maintenance Mode

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Exit maintenance mode using diagnostic tester

(a) Perform maintenance mode using diagnostic tester.

(b) Use diagnostic tester to clear DTCs.

(c) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	System is normal and there is no DTC
NG	Replace ONE BOX module assembly

DTC	C180594	Hydric Support Failed

Description

DTC	DTC Definition	Possible Causes
C180594	Hydric Support Failed	• HPS cannot be used

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.

- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check power supply fuse

(a) Check if ONE BOX module power supply fuse is normal.

NG → **Replace fuse**

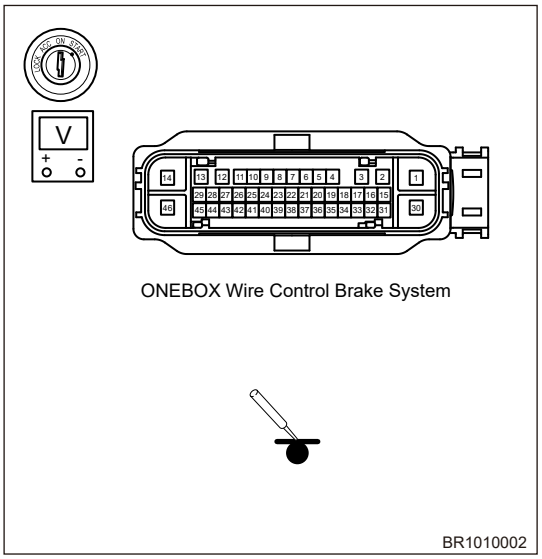
OK

2	Check related wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the ONE BOX module connector.
(d) Check if related wire harnesses are worn, pinched or broken.
(e) Check if related connector terminals are loose, broken, bent or corrosive.
(f) Using a digital multimeter, measure voltage between ONE BOX module assembly connector (power supply terminal) and body ground.

Standard Voltage

Multimeter Connection	Condition	Specified Condition
ONE BOX module assembly connector (power supply terminal) - Body ground	ENGINE START STOP switch ON	Not less than 12 V



NG → **Check and repair wire harness or connector**

OK

3	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	U031800	Variant Mismatch with OBD Type

Description

DTC	DTC Definition	Possible Causes
U031800	Variant Mismatch with OBD Type	• Model not configured

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Perform vehicle configuration

(a) Use diagnostic tester to perform vehicle configuration.

OK → **Perform running test**

NG

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	C0072FC	DHP Valve Overheat Protection

Description

DTC	DTC Definition	Possible Causes
C0072FC	DHP Valve Overheat Protection	• Diagnosis stop drive-by-wire brake function

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Reconfirm DTCs**

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace ONE BOX module assembly**

DTC	**C059400**	**Brushless Motor Signal Not Plausible**
DTC	**C059500**	**Brushless Motor Bridge Driver Defect**
DTC	**C05C24B**	**IPB Windings/Rotor/ECU Temperature Issue: Level 1**

Description

DTC	DTC Definition	Possible Causes
C059400	Brushless Motor Signal Not Plausible	• PMSM motor drive PDD PIN open • PMSM motor drive over temperature • PMSM motor drive chip failure
C059500	Brushless Motor Bridge Driver Defect	
C05C24B	IPB Windings/Rotor/ECU Temperature Issue: Level 1	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Reconfirm DTCs**

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace ONE BOX module assembly**

DTC	P05FF00	BSM Hard Pedal Characteristic Failure

Description

DTC	DTC Definition	Possible Causes
P05FF00	BSM Hard Pedal Characteristic Failure	Master cylinder or PFS stuck

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	Conduct test and confirm malfunction has been repaired
NG	Replace ONE BOX module assembly

DTC	P05FF09	BSM Soft Pedal Characteristic Failure

Description

DTC	DTC Definition	Possible Causes
P05FF09	BSM Soft Pedal Characteristic Failure	Leakage or air in master cylinder

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Re exhaust

(a) Bleed the whole system.

OK → **Perform running test**

NG

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK → **Conduct test and confirm malfunction has been repaired**

NG → **Replace ONE BOX module assembly**

DTC	**C055FFB**	**IPB System: Master Cylinder Circuit Leakage or Pressure Build-up Capability Reduced or Valve Stuck**
DTC	**C055FFC**	**IPB System: Lost Brake Boosting Capability or Can't Build Up Pressure or DTC Torque Limitation Fault**

Description

DTC	DTC Definition	Possible Causes
C055FFB	IPB System: Master Cylinder Circuit Leakage or Pressure Build-up Capability Reduced or Valve Stuck	• Master cylinder isolation valve is not opened or caliper is too small • There are faults in system that affect pressure build-up of auxiliary master cylinder, such as abnormal sealing of auxiliary master cylinder
C055FFC	IPB System: Lost Brake Boosting Capability or Can't Build Up Pressure or DTC Torque Limitation Fault	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

(c) Accelerate the vehicle to 40 km/h and stop the vehicle. Diagnose again to confirm if fault reoccurs.

OK	Conduct test and confirm malfunction has been repaired
NG	Replace ONE BOX module assembly

DTC	C055F00	Pressure in Plunger Circuit Is Too Low
DTC	C05B000	Brake Fluid Leakage
DTC	C005154	Steering Wheel Position Sensor (ESP Only)-Missing Calibration
DTC	C100729	Reverse Gear Switch Signal Invalid
DTC	C184000	Brake System Air Error

Description

DTC	DTC Definition	Possible Causes
C055F00	Pressure in Plunger Circuit Is Too Low	• There is a small amount of air or slow leakage in the hydraulic circuit or caliper, but it can be pressurized normally • There is too much air or a large amount of leakage in the hydraulic circuit or caliper, unable to built-up pressure properly
C05B000	Brake Fluid Leakage	
C005154	Steering Wheel Position Sensor (ESP Only)-Missing Calibration	
C100729	Reverse Gear Switch Signal Invalid	
C184000	Brake System Air Error	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Re exhaust

(a) Bleed the whole system.

OK	Perform running test

NG

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.
(c) Accelerate the vehicle to 40 km/h and stop the vehicle. Diagnose again to confirm if fault reoccurs.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace ONE BOX module assembly**

DTC	P05E009	PTS Signal Is Not Zero Fault: First Stage

Description

DTC	DTC Definition	Possible Causes
P05E009	PTS Signal Is Not Zero Fault: First Stage	System internal sensor not calibrated

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Calibrate sensor

OK	**Perform running test**

NG

2	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.
(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Replace ONE BOX module assembly**

DTC	U040181	Invalid Data Received from EMS: Not OBD Monitoring
DTC	U040281	Invalid TCU data
DTC	U042881	Invalid Data Received From SAM

DTC	U045281	Invalid Data Received From ABM or YAS
DTC	C005129	Steering Wheel Position Sensor - Signal Invalid

Description

DTC	DTC Definition	Possible Causes
U040181	Invalid Data Received from EMS: Not OBD Monitoring	• EMS fault • TCU fault • SAS fault or bus abnormal • YAS fault or uncalibrated • SAS fault or uncalibrated
U040281	Invalid TCU data	
U042881	Invalid Data Received From SAM	
U045281	Invalid Data Received From ABM or YAS	
C005129	Steering Wheel Position Sensor - Signal Invalid	

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Reconfirm DTCs

(a) Use diagnostic tester to clear DTCs.

(b) Turn ENGINE START STOP switch to ON again. Read DTCs after waiting for a period of time. Check to see if the DTC reappears inside ONE BOX.

OK	Conduct test and confirm malfunction has been repaired
NG	Refer to CAN system for troubleshooting

DTC	U010087	Lost Communication with EMS: Not OBD Monitoring
DTC	U014087	Lost Communication with BCM
DTC	U015187	Lost Communication with ABM/YAS
DTC	U015587	Lost Communication with ICM

Description

DTC	DTC Definition	Possible Causes
U010087	Lost Communication with EMS: Not OBD Monitoring	Frame signal sending node fault causes frame signal can not be received

DTC	DTC Definition	Possible Causes
U014087	Lost Communication with BCM	
U015187	Lost Communication with ABM/YAS	
U015587	Lost Communication with ICM	

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Reconfirm DTCs

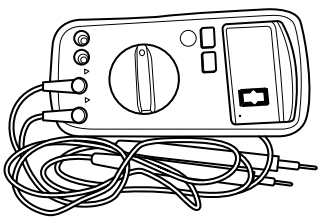
(a) Use diagnostic tester to clear DTCs.
(b) Start the engine.
(c) Accelerate the vehicle to 15 km/h and stop the vehicle. Diagnose again and check if the same DTCs are output.

OK	**Conduct test and confirm malfunction has been repaired**
NG	**Refer to CAN system for troubleshooting**

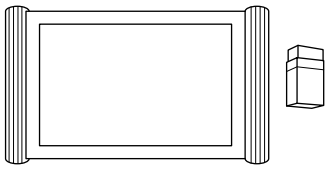
5 On-vehicle Service

5.1 Tools

■ **General Tools**

Tool Name	Tool Drawing
Digital Multimeter	 RCH000206

■ **Special Tools**

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH000106

5.2 Specifications

■ **Torque Specifications**

Description	Torque (N · m)
Wheel Mounting Bolt	180 ± 18
Fixing Nut between ONE BOX Control Module Assembly and Brake Pedal	23 ± 2
Front Wheel Speed Sensor Fixing Bolt	9 ± 1.5
Rear Wheel Speed Sensor Fixing Bolt	9 ± 1.5
Coupling Bolt between Brake Pipe and ONE BOX Control Module Assembly	18 ± 2

5.3 Integrated Brake Controller Assembly

■ **Removal**

⚠ Caution

- **When repairing integrated brake control system, first release the pressure of high pressure brake fluid in accumulator, to prevent high pressure brake fluid from spraying out and causing injury.**
- **Operation step: First turn ENGINE START STOP switch off, then depress and release brake pedal repeatedly, until brake pedal becomes hard.**
- **Never turn on ENGINE START STOP switch before integrated brake control system is installed completely to prevent hydraulic pump from energizing and running.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the battery assembly.

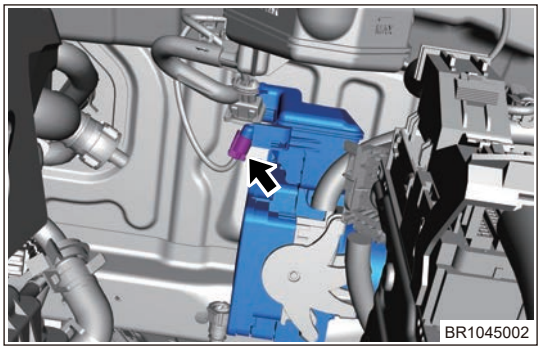
(4) Drain the brake fluid.

Hint:
Drained brake fluid should be well kept in a container. Never discard it at will.

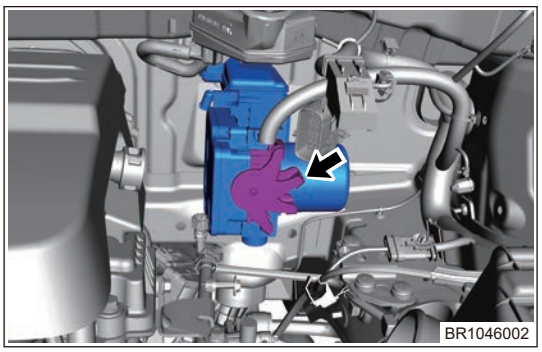
⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

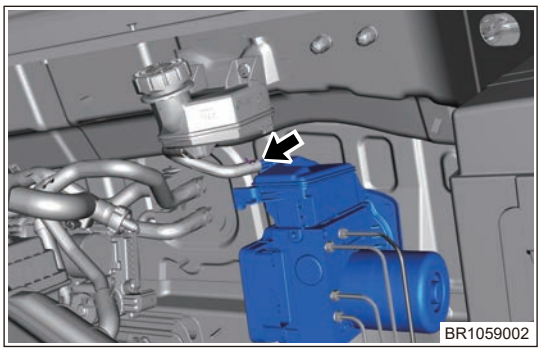
(5) Disconnect the brake fluid level sensor connector (arrow).



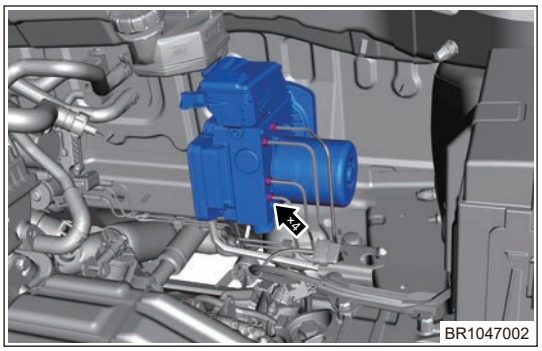
(6) Press the lock area of integrated brake controller assembly connector, toggle the connector lock bracket downward and disconnect integrated brake control module assembly connector (arrow).



(7) Remove the clamp (arrow) from reservoir connecting pipe and disconnect the reservoir connecting pipe.



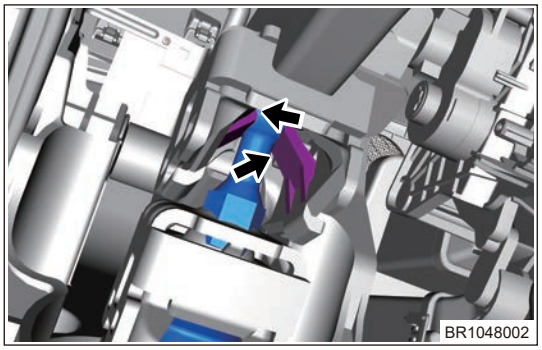
(8) Remove 4 coupling bolts (arrow), and disconnect connection between brake pipe and integrated brake controller assembly.



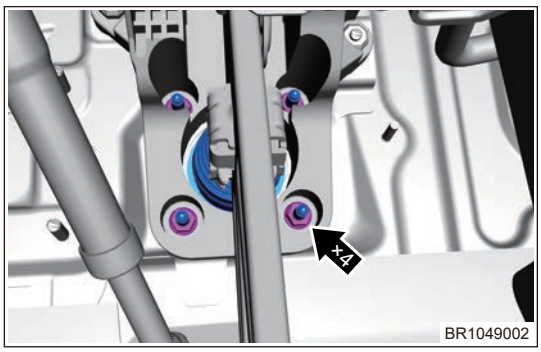
⚠ Caution

- **When removing brake line, prevent foreign matter from entering integrated brake control module assembly threaded holes.**
- **After removing brake line, sealing measure should be taken to prevent foreign matter form entering. If brake fluid spills, clean it in time.**

(9) Remove the mechanical connection (arrow) between integrated brake push rod and brake pedal.



(10) Remove 4 fixing nuts (arrow) from integrated brake controller.



(11) Remove the integrated brake controller assembly and integrated brake controller mounting gasket.

■ Installation

(1) Install the integrated brake controller assembly and integrated brake controller mounting gasket.

(2) Install 4 fixing nuts to integrated brake controller, and tighten them.

Tightening torque: 23 ± 2 N·m

(3) Install the mechanical connection between integrated brake controller push rod and brake pedal.

(4) Install the brake pipe to integrated brake controller assembly and tighten it.

Tightening torque: 18 ± 2 N·m

(5) Connect the reservoir connecting pipe, and install the fixing clamp.

(6) Connect the integrated brake control module assembly connector.

(7) Connect the brake fluid level sensor connector.

(8) Install the battery assembly.

(9) Connect the negative battery cable.

(10) Fill brake fluid.

(11) Drain air from integrated brake system.

Hint:
After the installation of integrated brake control module assembly is completed, proceed to the integrated brake control module diagnosis and manual bleed process.

⚠ Caution

- **Check insulator for aging or damage. Replace if necessary.**
- **Make sure that integrated brake control module is not struck during installation, and integrated brake control module mounting gasket and mounting surface of cowl panel are clean and free of foreign matters.**
- **When connecting the integrated brake control module assembly push rod and brake pedal, avoid pushing the integrated brake control module assembly push rod from side. Note: The angle of push rod around each direction after installation is less than < 3°.**
- **Do not pull up the pedal after integrated brake control module assembly push rod is connected with brake pedal to avoid damage to internal construction parts of integrated brake control module.**
- **The brake pipe must be connected to the corresponding liquid outlet of integrated brake control module, the brake pipes cannot be exchanged.**
- **When installing fixing bolts and screws, be sure to tighten them to specified torque.**
- **Perform bleeding procedures for brake system after completing installation.**
- **Using diagnostic tester, enter brake control system, record and clear trouble code, then drive vehicle to perform a road test, confirming that integrated brake control system operates normally and brake pedal feel is good.**

5.4 Matching Learning

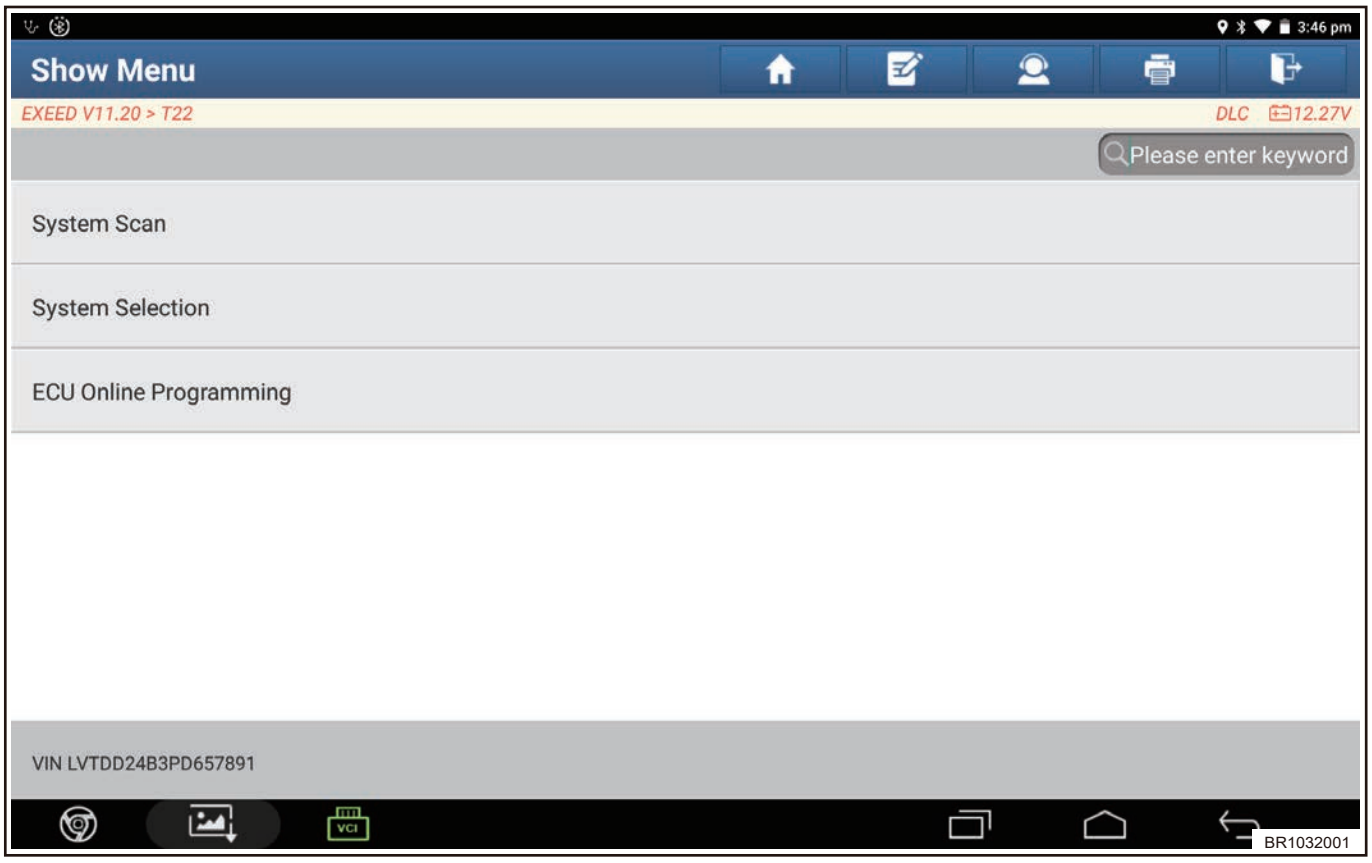
Hint:
After the between installation of integrated brake control module assembly is completed, proceed to the integrated brake control module diagnosis and manual bleed process.

■ Integrated Brake Controller Assembly Mode Switching

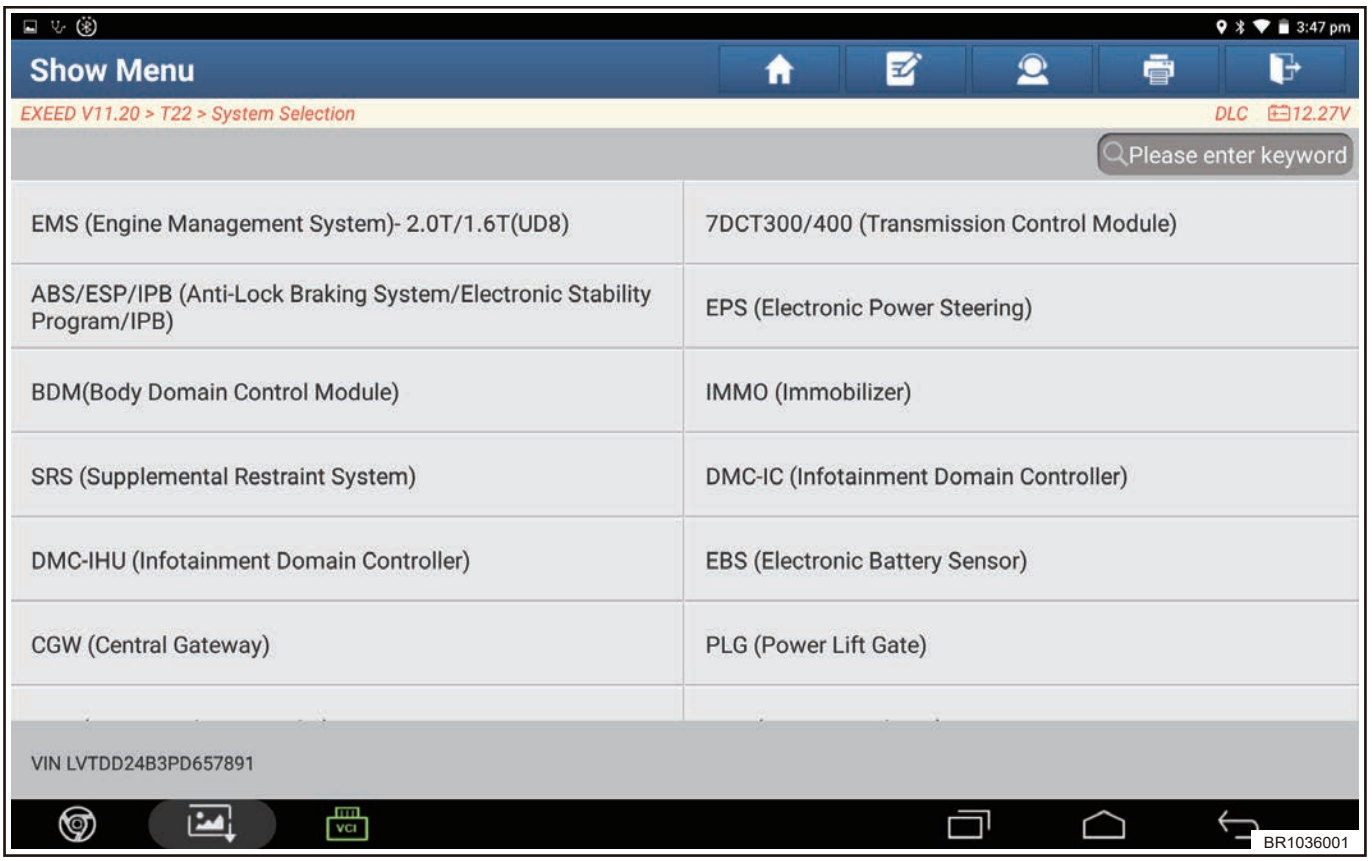
(1) Diagnostic tester connection.

(2) Select “T22” model.

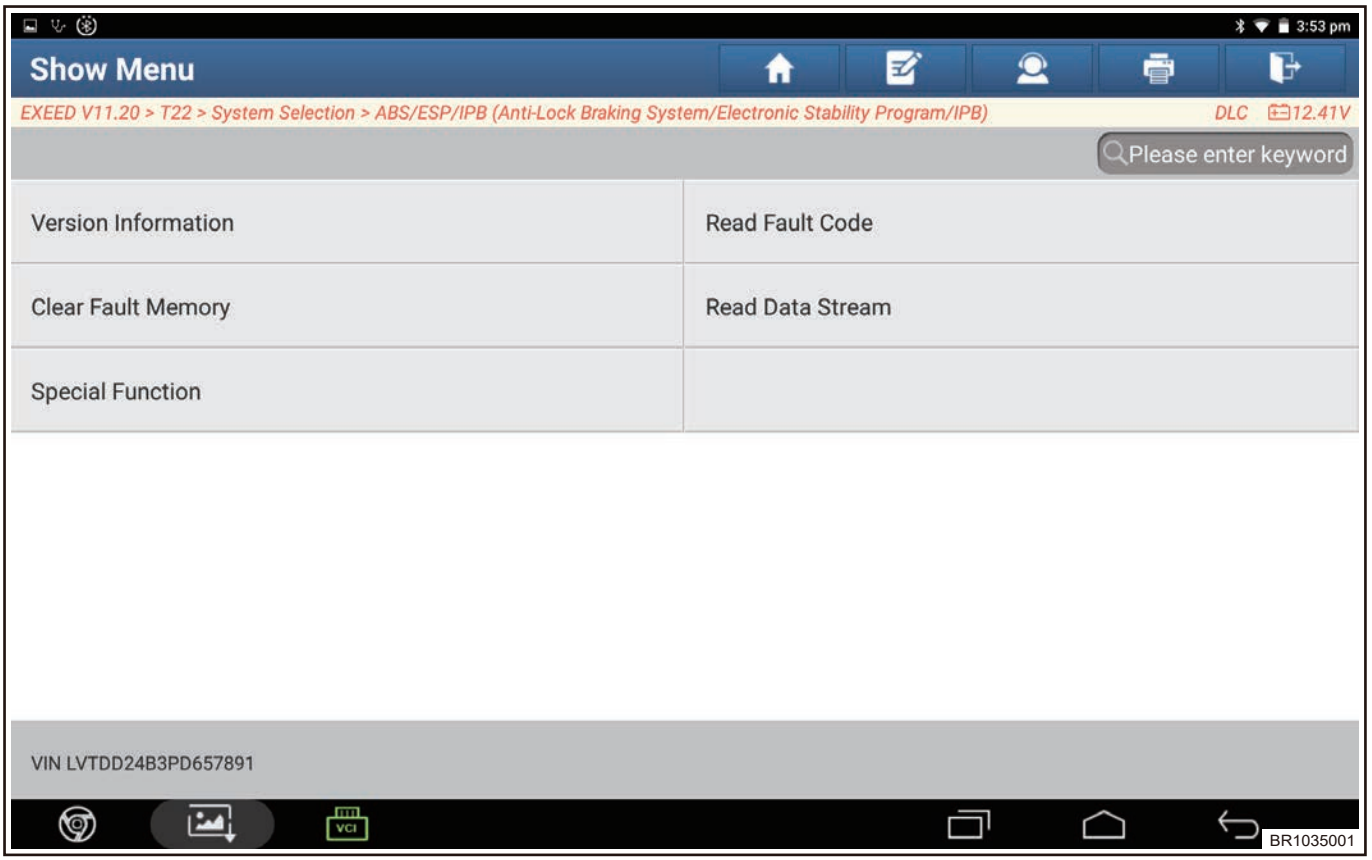
(3) Click “System Selection”.



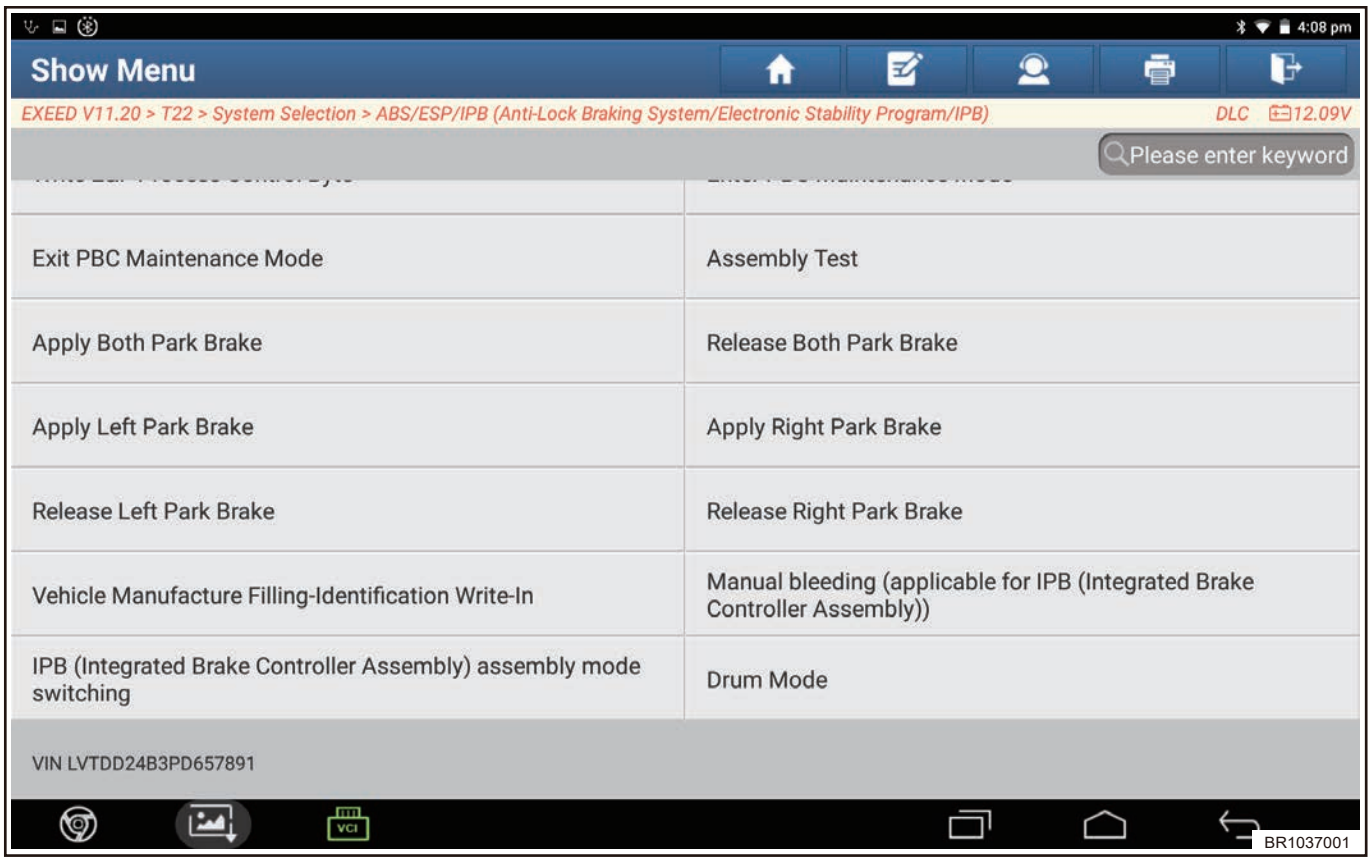
(4) Click “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPB)”.



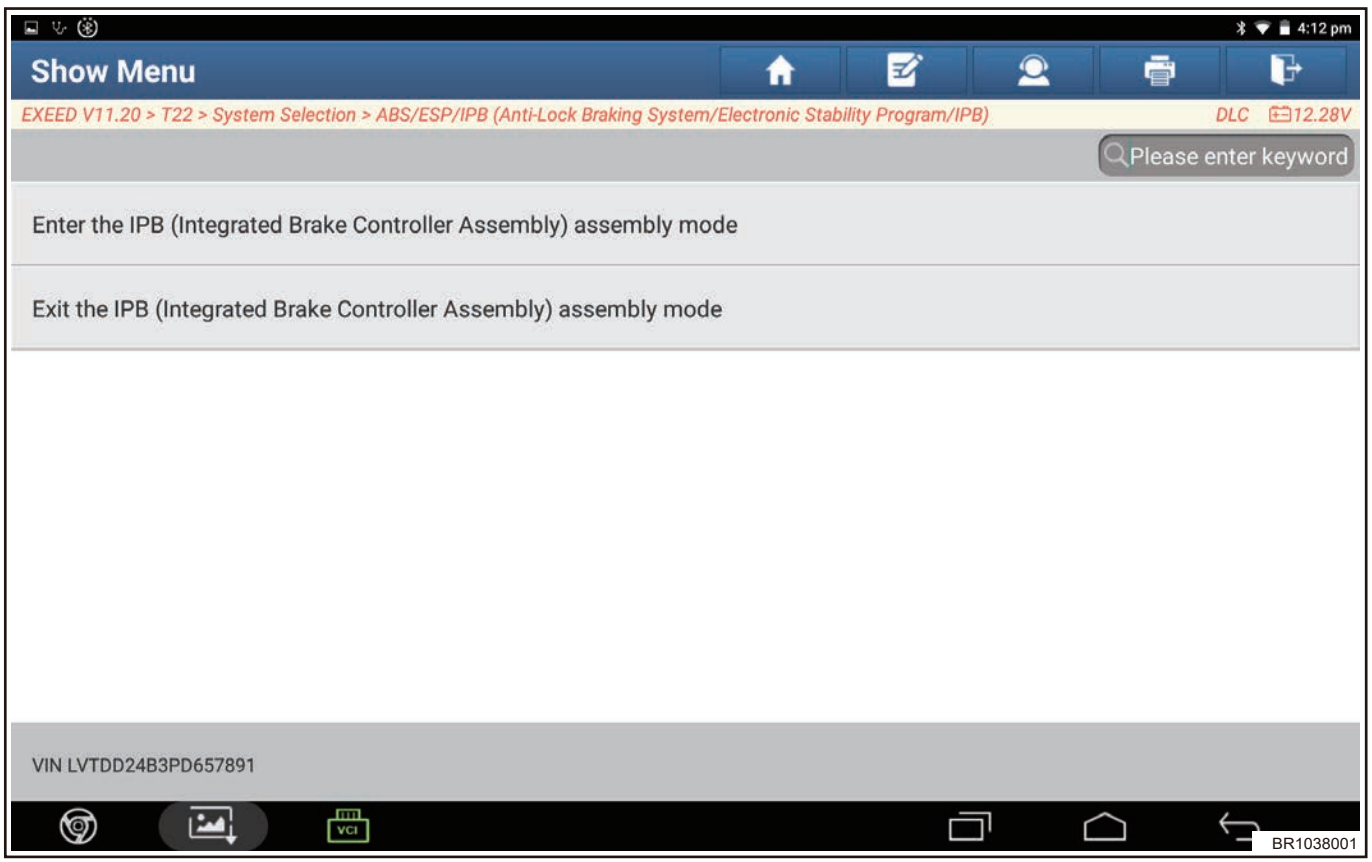
(5) Click "Special Function".



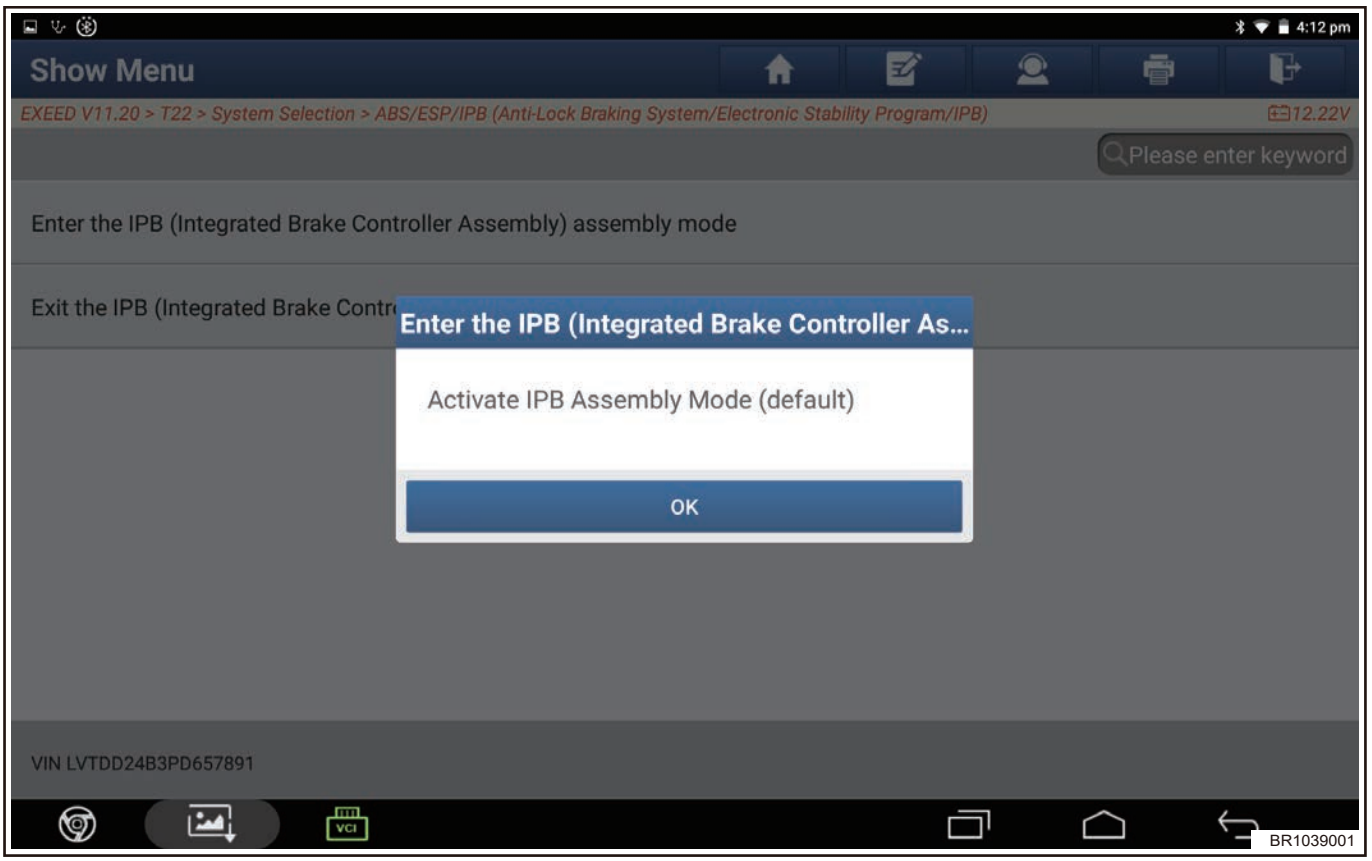
(6) Select "IPB (Integrated Brake Controller Assembly) assembly mode switching".



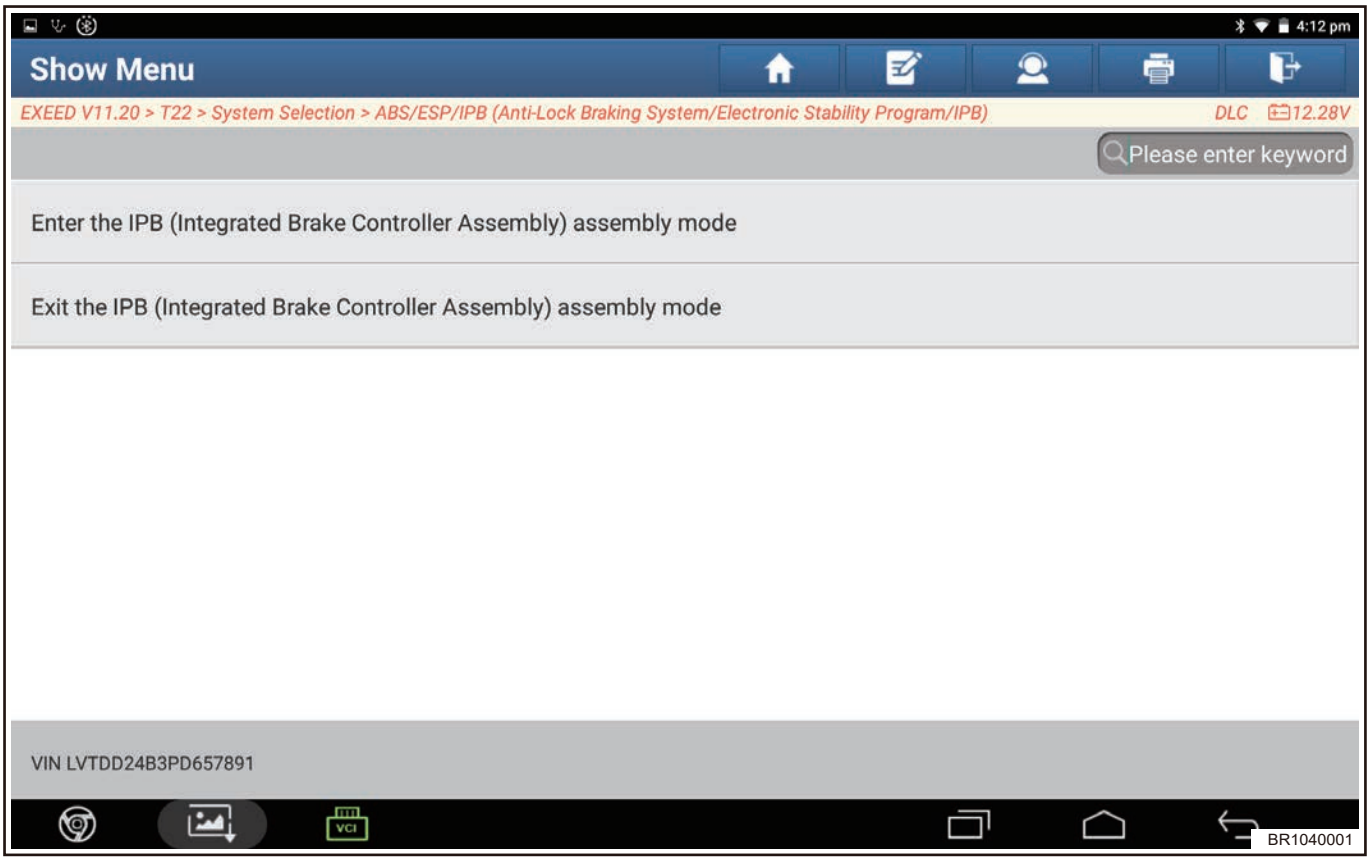
(7) Click "Enter the IPB (Integrated Brake Controller Assembly) assembly mode".



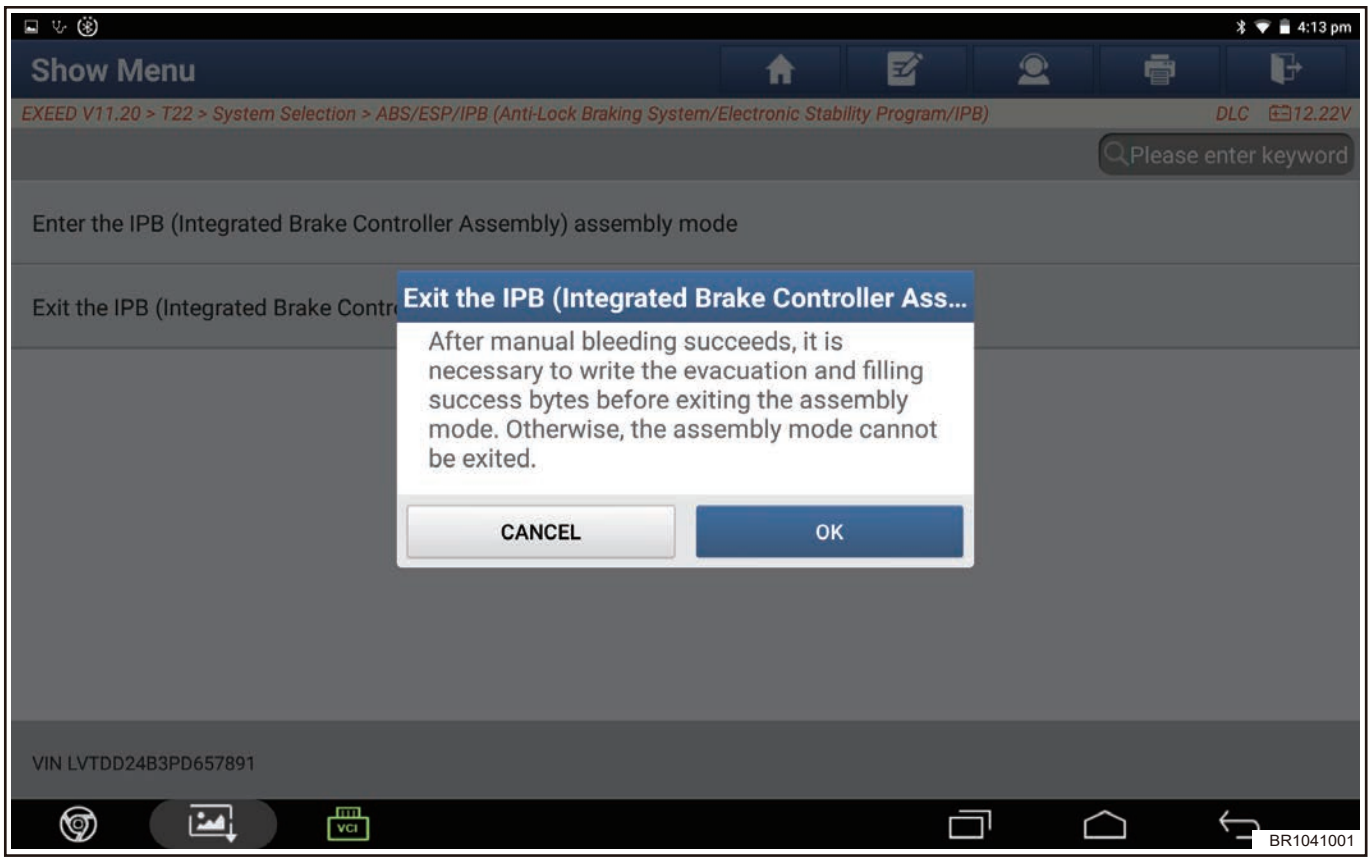
(8) Click "OK" to successfully enter.



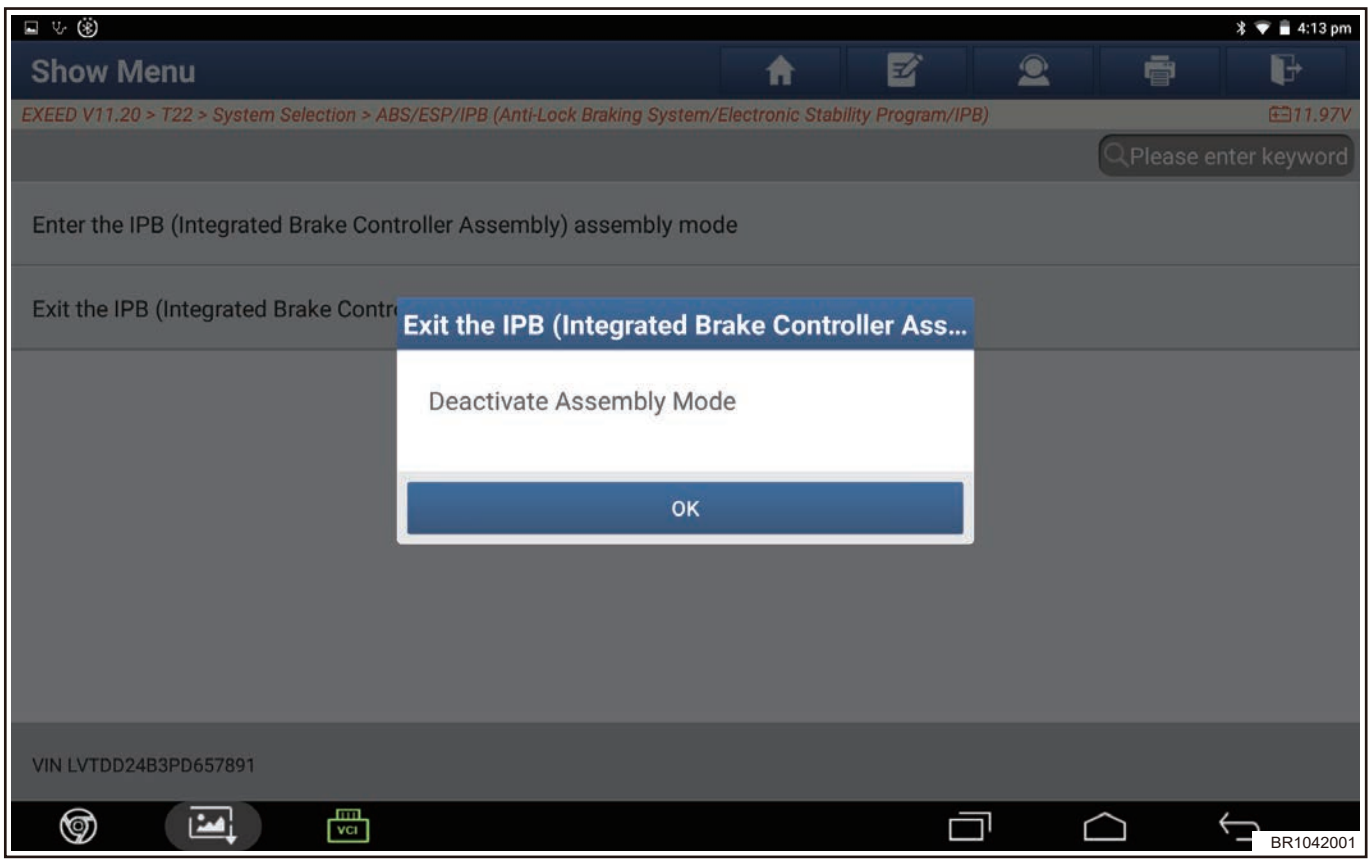
(9) After assembled, click "Exit the IPB (Integrated Brake Controller Assembly) assembly mode".



(10) Click "OK" after the prompt conditions are completed.



(11) Click "OK" to successfully exit.



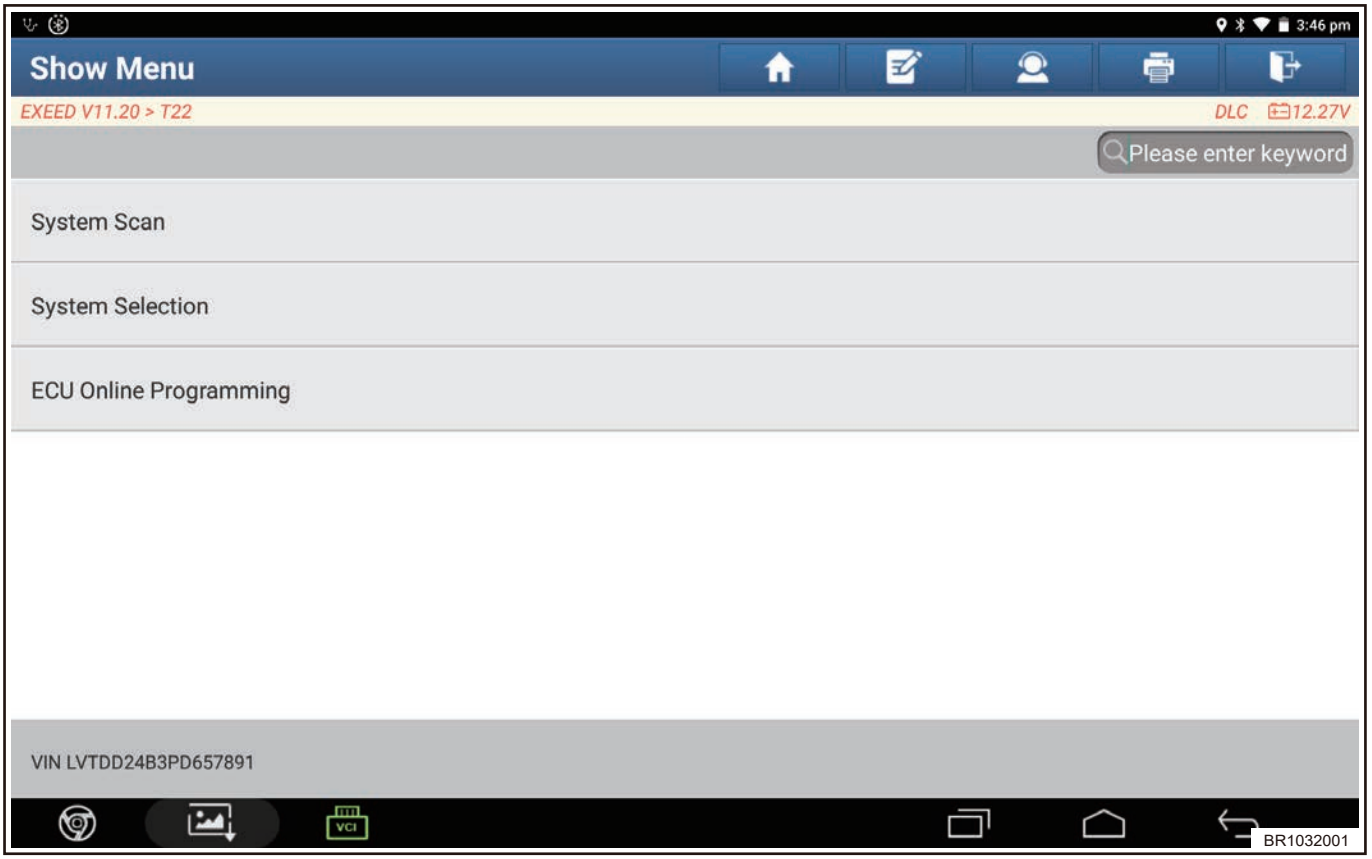
(12) End.

■ **Vehicle Manufacture Filling-Identification Write-In**

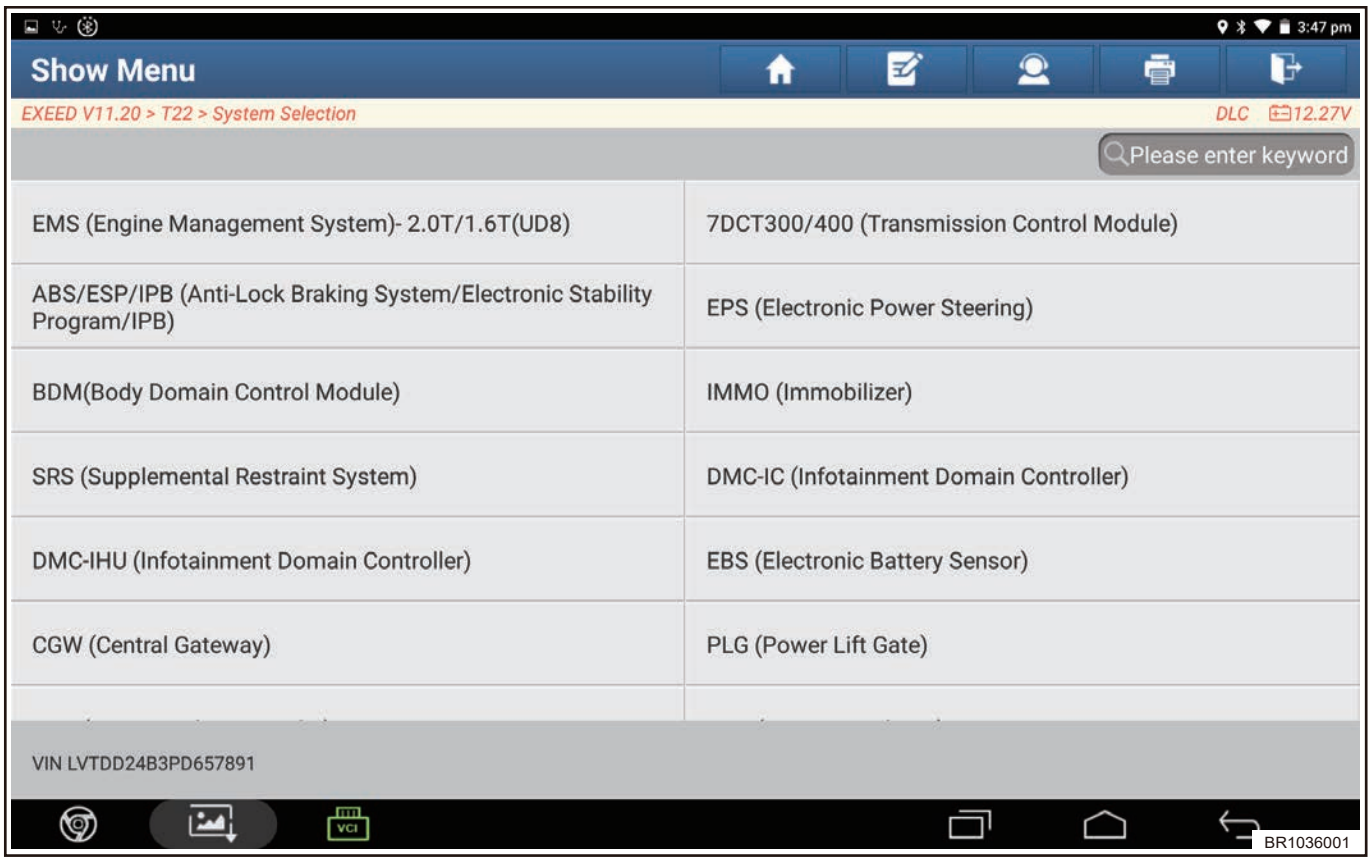
(1) Diagnostic tester connection.

(2) Select “T22” model.

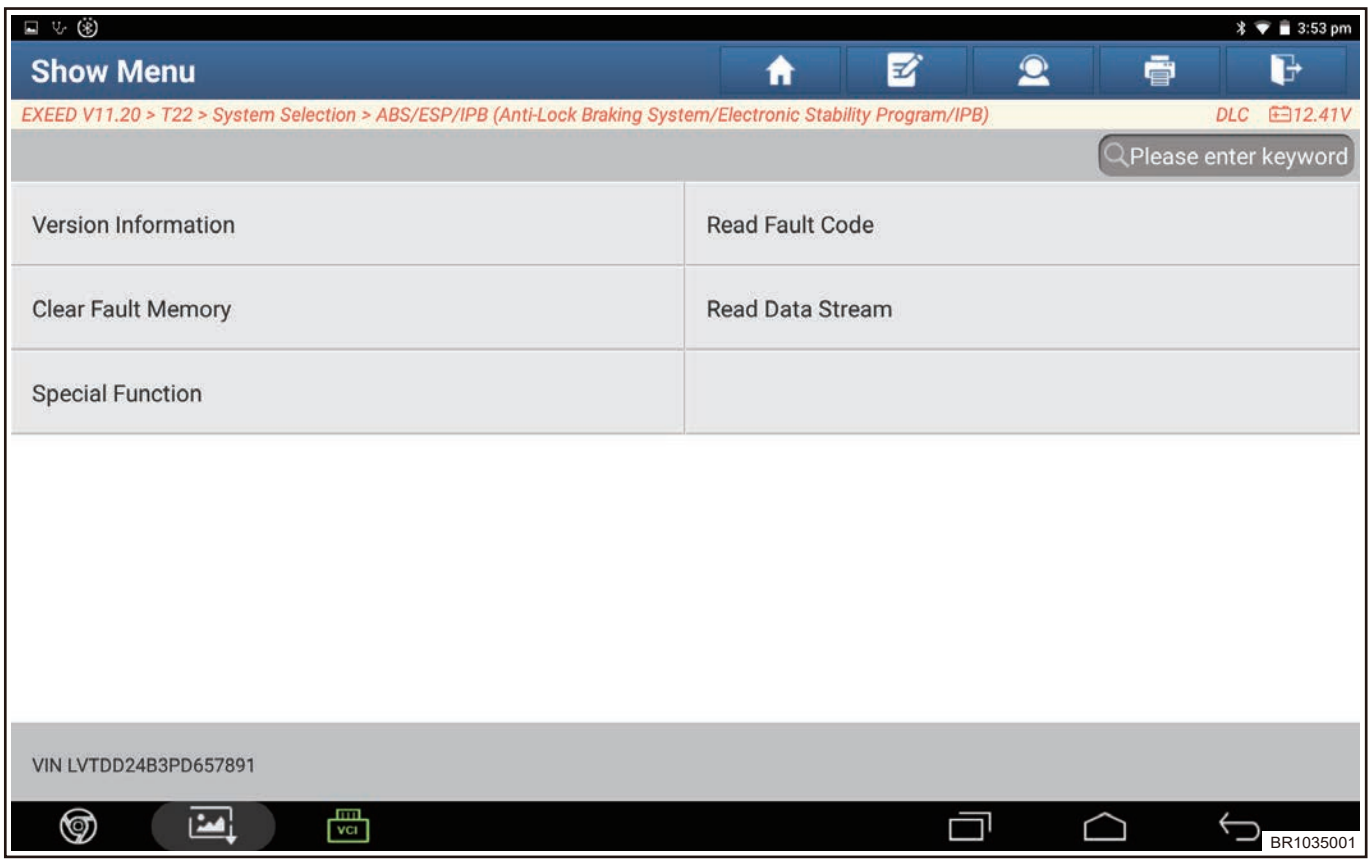
(3) Click “System Selection”.



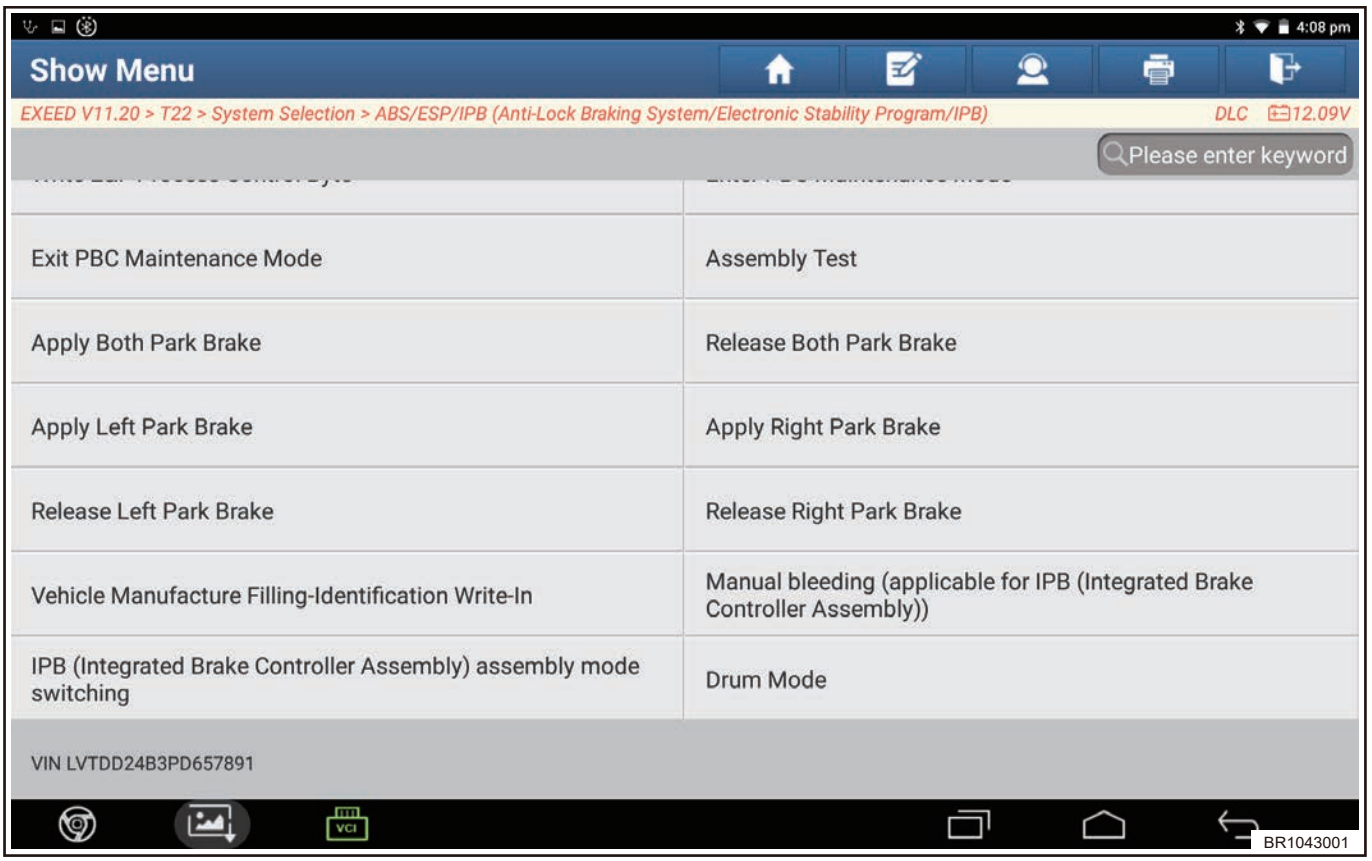
(4) Click “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPB)”.



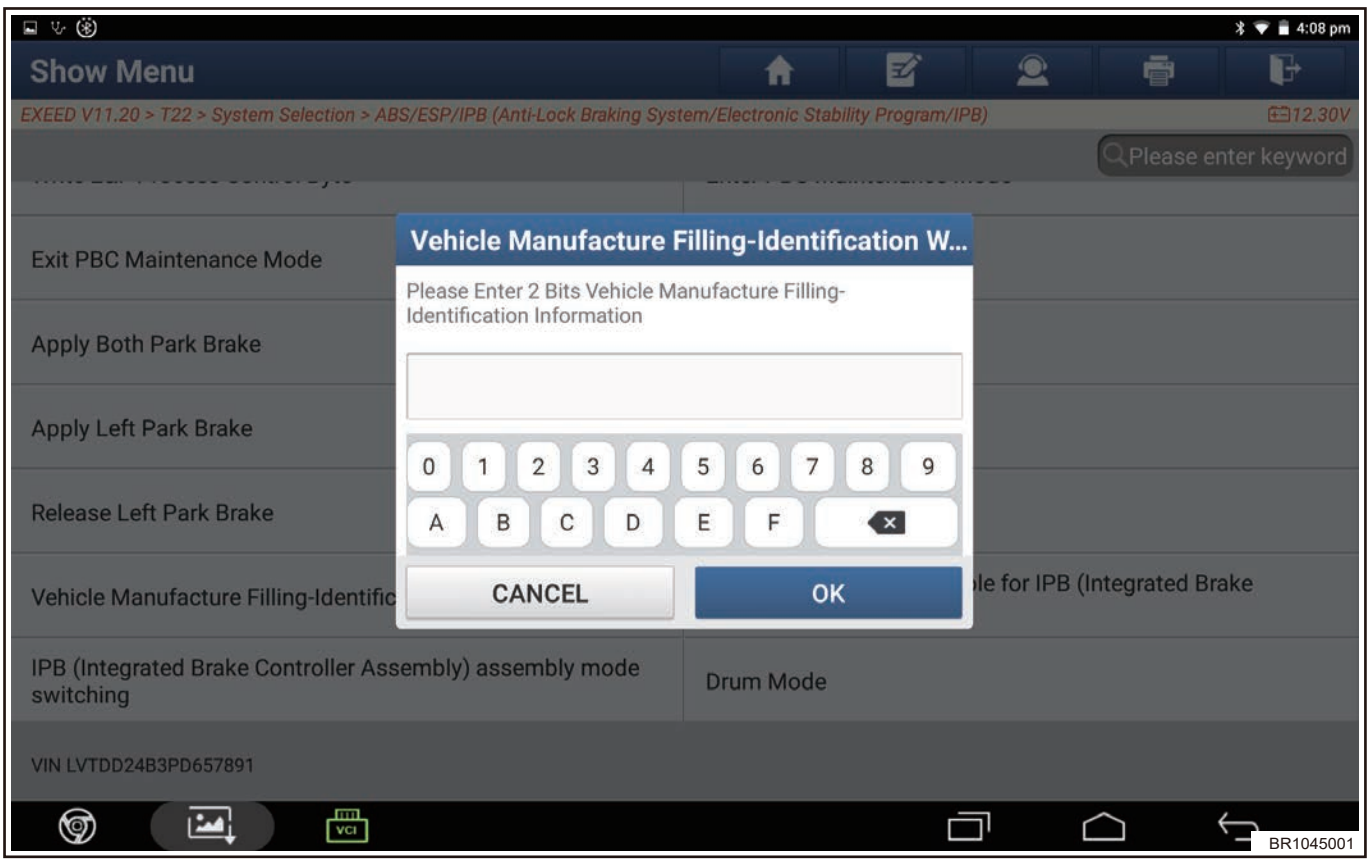
(5) Click "Special Function".



(6) Enter the special function, click "Vehicle Manufacture Filling-Identification Write-In".



(7) After writ-in the information of vehicle manufacture filling-identification, click "OK".

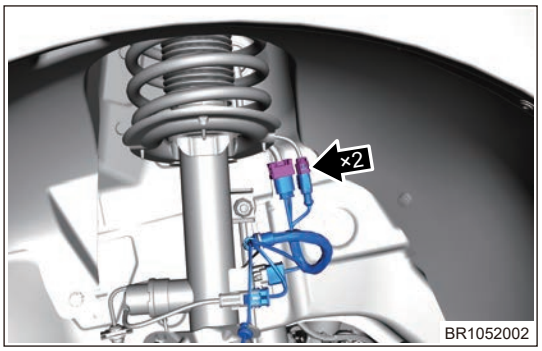


(8) After entering the configuration information twice, the diagnostic tester displays success, click "OK", and the information is successfully written.

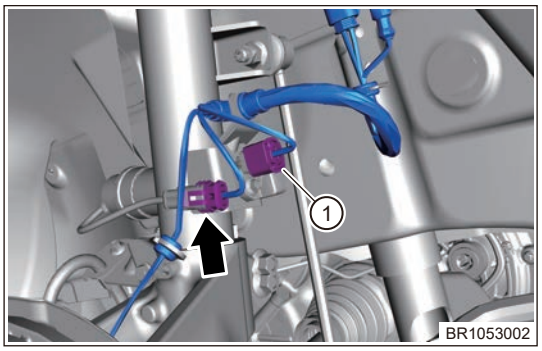
5.5 Wheel Speed Sensor Assembly (Take left side as an example)

■ Removal

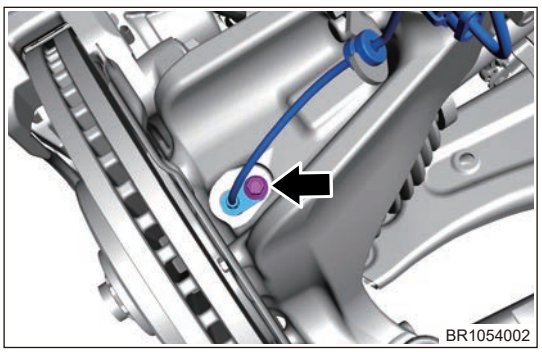
(1) Disconnect the negative battery cable.
(2) Remove the front left wheel.
(3) Disconnect the connection (arrow) between front left wheel sensor wire harness and interior wire harness.



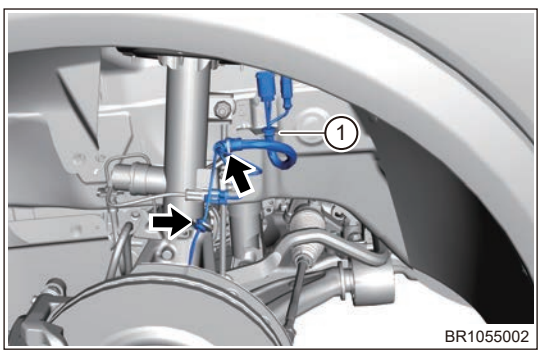
(4) Disconnect the connector (1) between front left wheel sensor wire harness and wheel sensor, and connector (-arrow) between front left wheel sensor wire harness and front left shock absorber.



(5) Remove 1 fixing bolt (arrow) between front left wheel speed sensor assembly and front left steering knuckle.

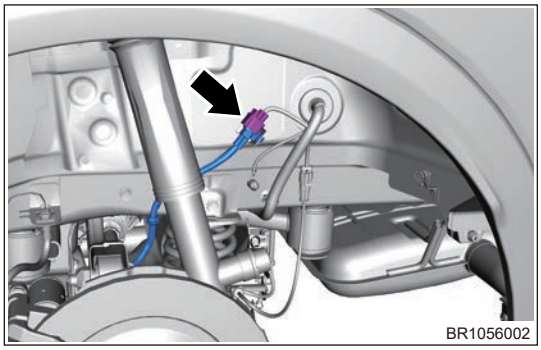


(6) Disengage the attachment part (arrow) of front left wheel speed sensor wire harness from front left shock absorber assembly and fixing bracket, disengage fixing clip (1) of front left wheel speed sensor wire harness from vehicle body.

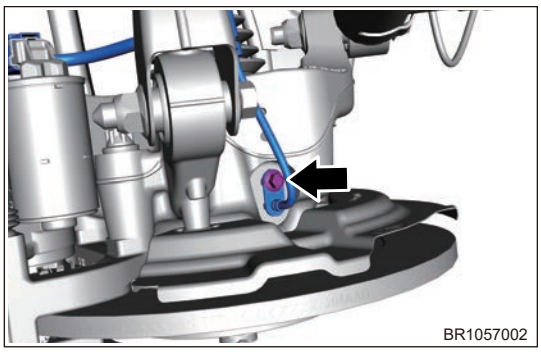


(7) Remove the front left wheel sensor wire harness.
(8) Remove the rear left wheel.
(9) Remove the rear left wheel house protector assembly.

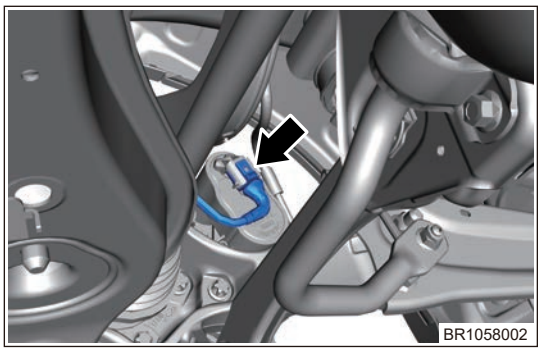
(10) Disconnect the connection (arrow) between rear left wheel speed sensor with caliper wire harness assembly connector and interior wire harness.



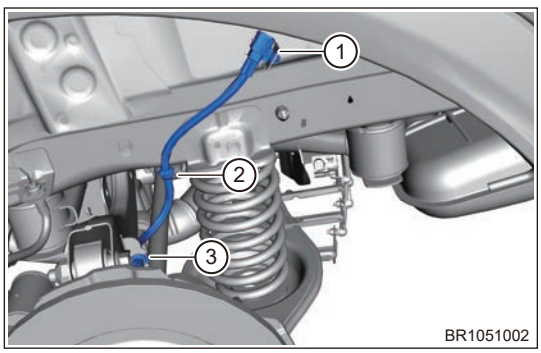
(11) Remove 1 fixing bolt (arrow) between rear left wheel speed sensor with caliper wire harness assembly and rear steering knuckle.



(12) Disconnect the rear left caliper connector (arrow).



(13) Disengage the fixing bracket (1) between rear left wheel speed sensor with caliper wire harness assembly and sensor wire harness, and the connection between rear left wheel speed sensor with caliper wire harness assembly and sensor mounting bracket (2), upper control arm bracket (3).



(14) Remove the rear left wheel speed sensor with caliper wire harness assembly.

■ **Installation**

(1) Install the connection between front left wheel sensor wire harness assembly and fixing bracket.
(2) Install 1 fixing bolt between front left wheel sensor wire harness assembly and front left steering knuckle.

Tightening torque: 9 + 1.5 N · m

(3) Connect the front left wheel sensor wire harness assembly connector to interior wire harness.
(4) Connect the front left wheel sensor wire harness to wheel sensor and front shock absorber connector.
(5) Install the front left wheel.
(6) Install rear left wheel speed sensor with caliper wire harness assembly to fixing bracket.
(7) Install 1 fixing bolt between rear left wheel speed sensor with caliper wire harness assembly and rear steering knuckle.

Tightening torque: 9 + 1.5 N · m

(8) Connect the rear left wheel speed sensor with caliper wire harness assembly connector to interior wire harness.
(9) Install the rear left wheel house protector assembly.
(10) Install the rear left wheel.
(11) Connect the negative battery cable.

6.3 FRONT BRAKE ASSEMBLY

1 Warnings and Precautions

1.1 Precautions

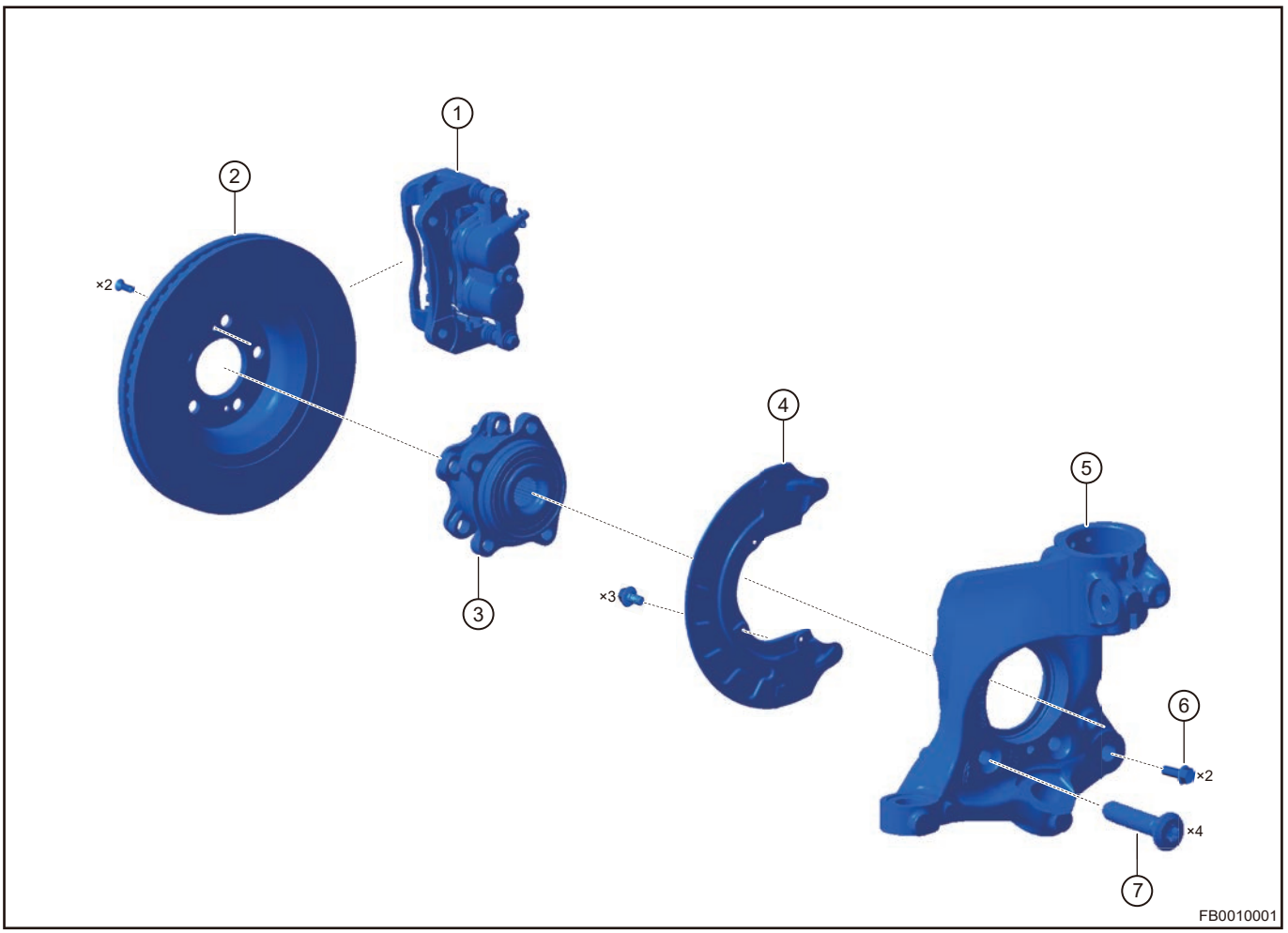
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

- DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.
- After removing front brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.
- When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

■ Front Left Steering Knuckle with Disc Brake Assembly

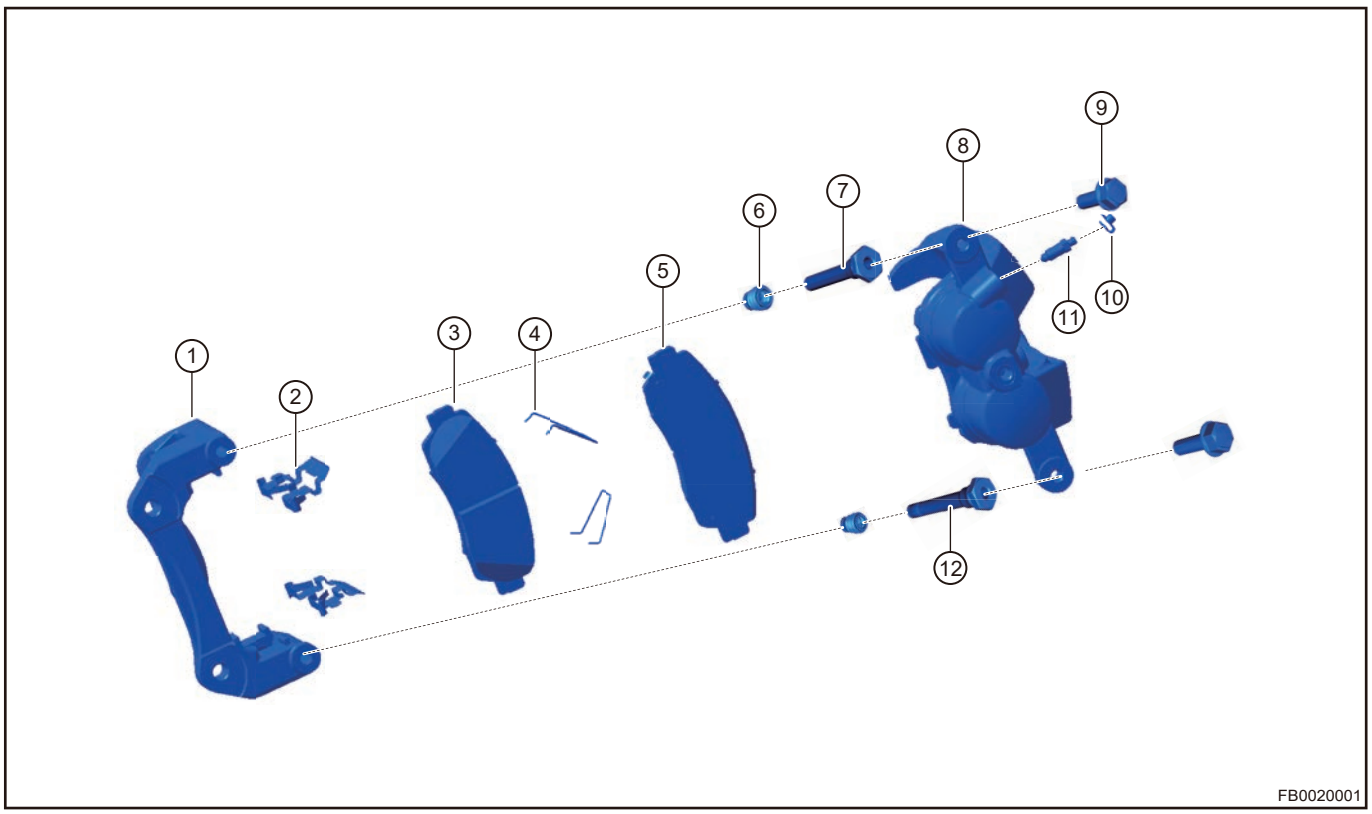


1	Front Left Brake Caliper Assembly	5	Front Left Steering Knuckle
2	Front Brake Disc	6	Front Brake Caliper Fixing Bolt

3	Front Hub Bearing Assembly	7	Front Hub Bearing Fixing Bolt
4	Front Left Dust Guard		

Front left steering knuckle with disc brake assembly is mainly composed of front left steering knuckle, front left dust guard, front left brake caliper assembly, front brake disc, front hub bearing etc.
Front brake disc is fixed on front hub bearing, clamped in the middle of rear outer lining assembly/rear inner lining assembly, and rotates with wheel. Front brake caliper body assembly is connected with front brake caliper bracket (bracket is fixed on steering knuckle) through guide pin tightening bolt.

■ Front Left Brake Caliper Assembly



1	Front Brake Caliper Bracket	7	Main Guide Pin (without Bushing)
2	Front Spring Plate	8	Front Left Brake Caliper Body Assembly
3	Front Outer Lining Assembly	9	Guide Pin Tightening Bolt
4	Lining Return Spring	10	Bleeder Plug Cover
5	Front Inner Lining Assembly	11	Bleeder Plug
6	Guide Pin Dust Boot	12	Sub Guide Pin (with Bushing)

⚠ Caution

- **Main guide pin is installed on the side close to bleeder plug, and sub guide pin is installed on the side far away from bleeder plug. Incorrect installation method will lead to abnormal sound on bumpy road.**

Front left brake caliper assembly is mainly composed of front brake caliper bracket, front left brake caliper body assembly, guide pin, guide pin dust boot, etc. When braking, brake fluid of brake master cylinder enters brake caliper assembly of each wheel through hydraulic line. A force acting on brake caliper assembly piston pushes brake caliper assembly piston and it’ s inner lining assembly to move to the left and press it onto brake disc, so brake disc applies a rightward reaction force to brake caliper assembly piston, making brake caliper assembly piston and brake caliper body assembly move to the right along guide pin until outer lining

assembly is also pressed onto brake disc. At this time, lining assemblies on both sides are pressed on brake disc, and brake disc is clamped to make it brake.

3 On-vehicle Service

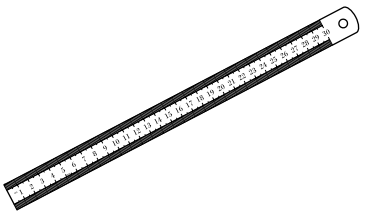
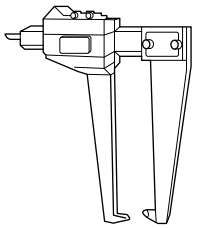
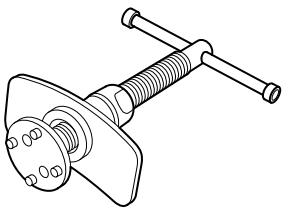
3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Brake System:

Symptom	Possible Cause
Braking deviation	Oily lining assembly
	Uneven brake disc wear
	Brake caliper body assembly failure (piston stuck)
Brake shakes	Hub bearing is damaged
	Uneven brake disc wear
	Steering/suspension part is loose
	Uneven lining assembly wear
	Brake caliper assembly fixing bolt is loose
Abnormal noise occurs during braking	Spring plate is damaged
	Hub bearing is damaged
	Abnormal brake disc wear
	Oily lining assembly
	Steering/suspension part is loose
	Abnormal lining assembly wear
	Brake caliper assembly fixing bolt is loose
Brake stuck	Minimum brake pedal free play
	Poor returning of guide pin (deformed or damaged)
	Brake caliper body assembly failure (piston stuck)

3.2 Tools

■ General Tools

Tool Name	Tool Drawing
Caliper	 S00044
Thickness Measurement Caliper	 S00082
Brake Cylinder Release Tool	 S00076

3.3 Specifications

■ Torque Specifications

Item	Tightening torque
2 Front Brake Disc Fixing Screws	8 ± 1 N·m
2 Coupling Bolts Between Front Left Brake Caliper Assembly and Front Left Steering Knuckle	190 ± 10 N·m
Coupling Bolt Between Front Left Brake Hose Assembly and Front Left Brake Caliper Assembly	27 ± 2 N·m
2 Guide Pin Tightening Bolt Between Front Left Brake Caliper Body Assembly and Front Brake Caliper Bracket	27 ± 5 N·m
3 Fixing Screws of Fender Apron	10 ± 1 N·m
Brake Caliper Bleeder Screw	10 ± 1 N·m

3.4 Disc Brake Assembly (Take left side as an example)

■ Removal

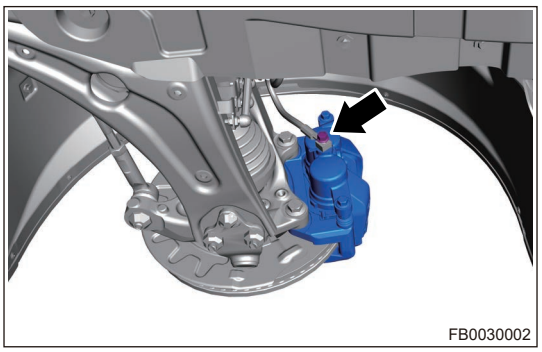
Hint:
Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

⚠ Caution

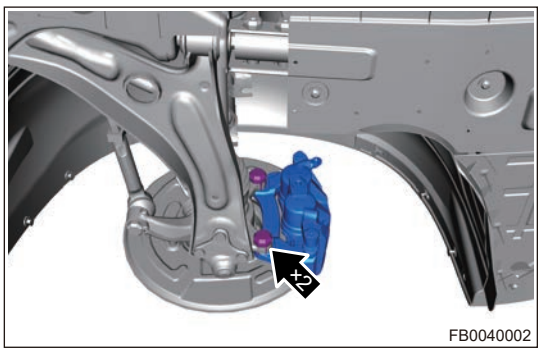
- **After removing disc brake assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.**

(1) Remove the front left wheel.

(2) Loosen coupling bolt between front left brake hose assembly and front left brake caliper assembly.


FB0030002

(3) Remove 2 coupling bolts between front left brake caliper assembly and front left steering knuckle.



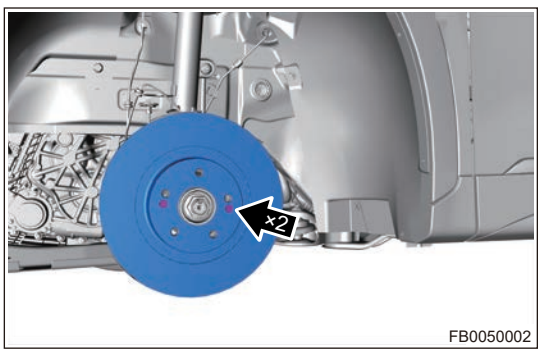
FB0040002

⚠ Caution

- **After removing brake hose, perform sealing treatment to prevent foreign matter from entering.**
- **DO NOT allow any foreign matter such as dirt and dust to enter brake hose from joint parts.**

(4) Remove the front left brake caliper assembly.

(5) Remove 2 fixing screws from front brake disc.



FB0050002

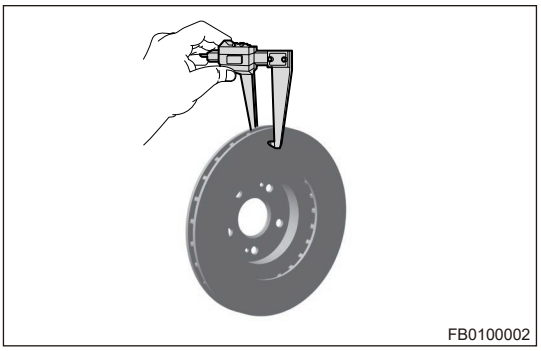
(6) Remove the front brake disc.

■ **Inspection**

(1) Visually check front brake disc for flatness, and also check for excessive wear. If the condition of front brake disc cannot be confirmed only by visual inspection, perform physical inspection as necessary.

(2) If it is less than the minimum thickness due to wear, replace front brake disc.

Minimum thickness: 23 mm



⚠ **Caution**

- **DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.**

(3) Slight scratch on the surface of front brake disc is a normal phenomenon. If crack, severe scratch, deformation and burned spots are found, the brake disc must be replaced.

(4) Abnormal wear of front brake disc may cause poor contact between new lining assembly and surface of front brake disc, which may cause abnormal wear of lining assembly.

■ **Installation**

Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

(1) Install the front brake disc.

(2) Install 2 fixing screws of front brake disc.

Torque: 8 ± 1 N·m

(3) Install the front left brake caliper assembly.

(4) Tighten coupling bolt between front left brake hose assembly and front left brake caliper assembly.

Torque: 27 ± 2 N·m

(5) Install 2 coupling bolts (thread locking glue shall be applied) between front left brake caliper assembly and front left steering knuckle.

Torque: 190 ± 10 N·m

(6) Install the front left wheel.

3.5 Lining Assembly (Take left side as an example)

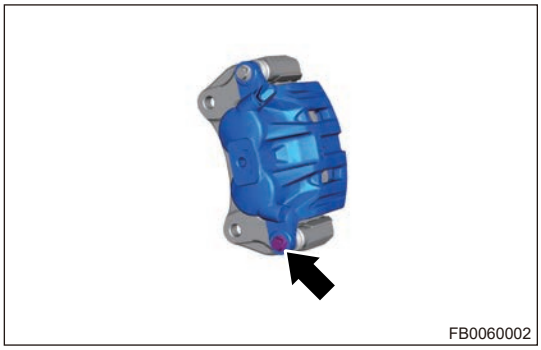
■ **Removal**

⚠ **Caution**

- **After removing front brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.**

(1) Remove the front left wheel.

(2) Remove 1 guide pin tightening bolt between front left brake caliper body assembly and front brake caliper bracket.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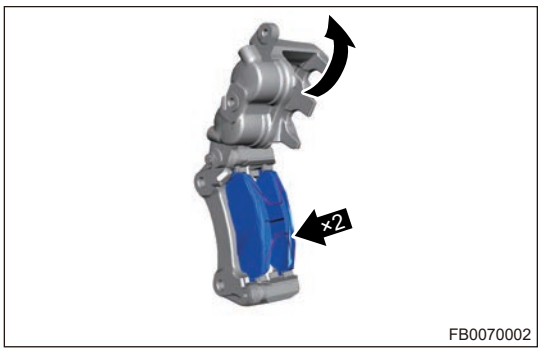
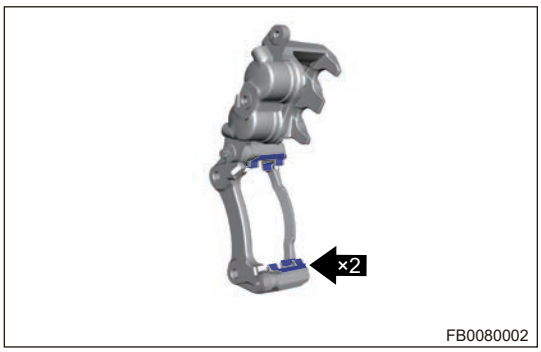
(3) Slowly lift up front left brake caliper body assembly and remove 2 lining return springs.



FB0070002

(4) Remove the front outer/inner lining assembly.

(5) Remove 2 front spring plates.



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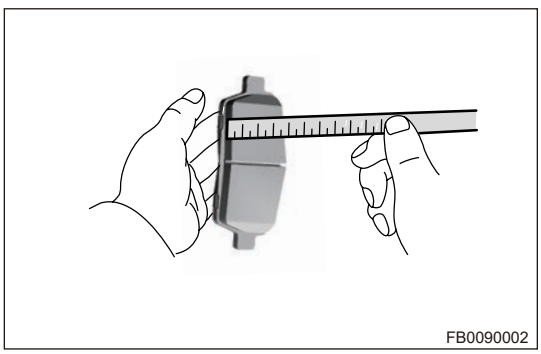
■ Inspection

Lining Assembly

(1) Visually check lining assembly for flatness, and also check for excessive wear. If the condition of lining assembly cannot be confirmed only by visual inspection, perform physical inspection as necessary.

(2) If it is less than the minimum thickness due to wear, replace lining assembly.

Minimum thickness: 2 mm


FB0090002

(3) When replacing lining assembly, it is necessary to replace front outer/inner lining assembly as well as lining on the other side of vehicle to maintain proper braking performance.

(4) If it is unnecessary to replace lining assembly, be sure to reinstall brake linings to original positions.

Front Brake Caliper Bracket and Guide Pin Set

(1) Check if front spring plate is deformed, cracked, rusted or elasticity is not enough (lining assembly cannot be clamped). Clean the contact surface between front brake caliper bracket and front spring plate with brake cleaner.

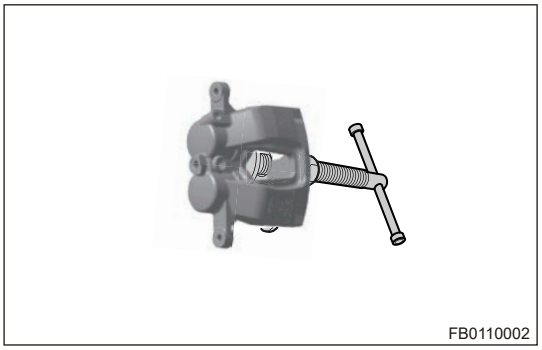
(2) Check if guide pin and guide pin dust boot are deformed, cracked and worn. Apply grease to guide pin and install guide pin dust boot to front brake caliper bracket, and push guide pin back and forth freely without sticking.

■ Installation

⚠ Caution

- **Be sure to tighten fixing bolts to specified torques during installation.**
- **Be sure to add brake fluid to a proper level after installation.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**

(1) Using brake cylinder release tool, slightly retract brake caliper piston.


FB0110002

(2) Install 2 front spring plates.

(3) Install front outer/inner lining assembly.

(4) Install 2 lining return springs and place front left brake caliper body assembly down slowly.

(5) Install 1 guide pin tightening bolt (thread locking glue shall be applied) between front left brake caliper body assembly and front brake caliper bracket.**Torque: 27 ± 5 N·m**

(6) Install the front left wheel.

6.4 REAR BRAKE ASSEMBLY

1 Warnings and Precautions

1.1 Precautions

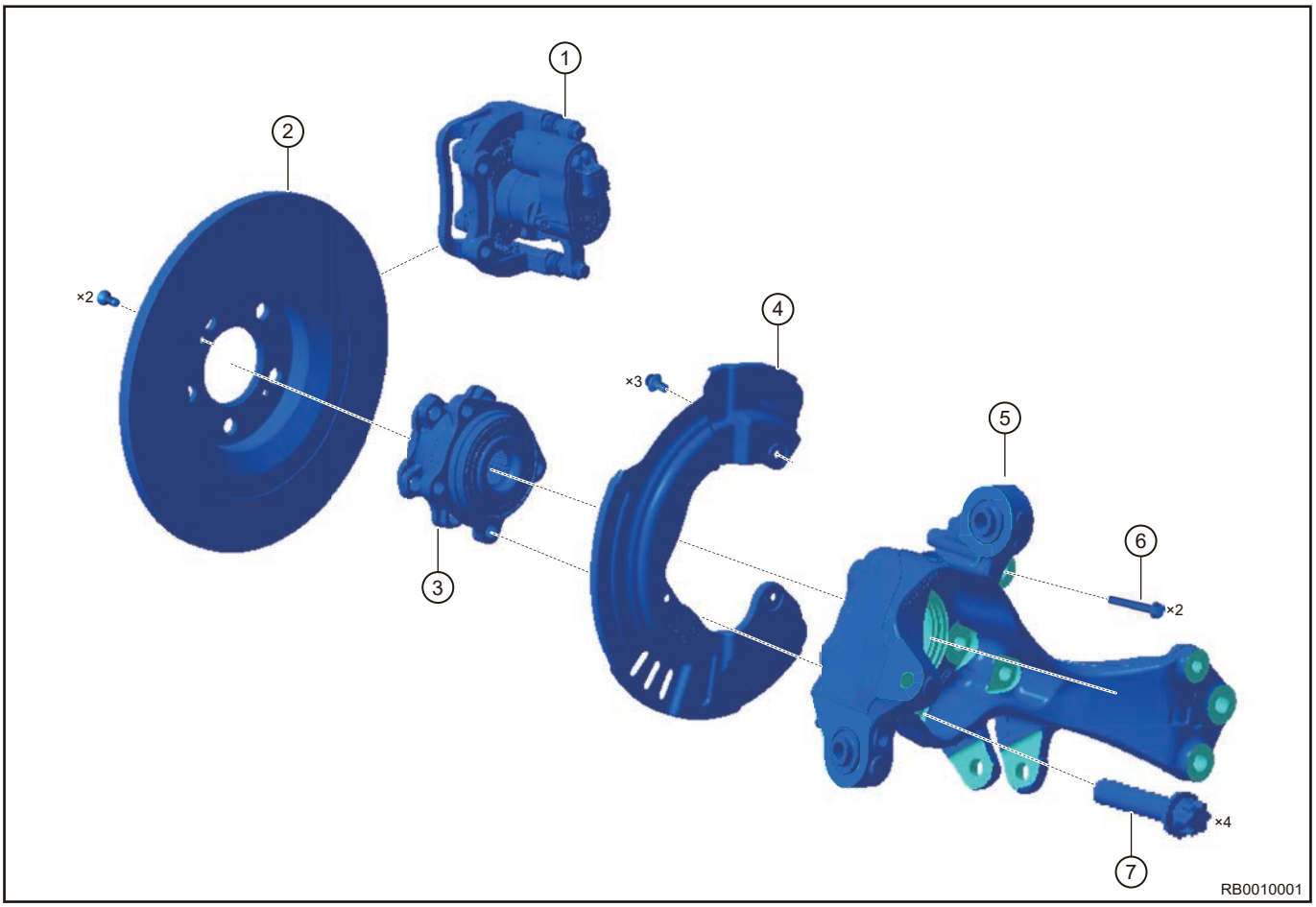
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

- DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.
- After removing rear brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.
- When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

■ Rear Left Brake Assembly

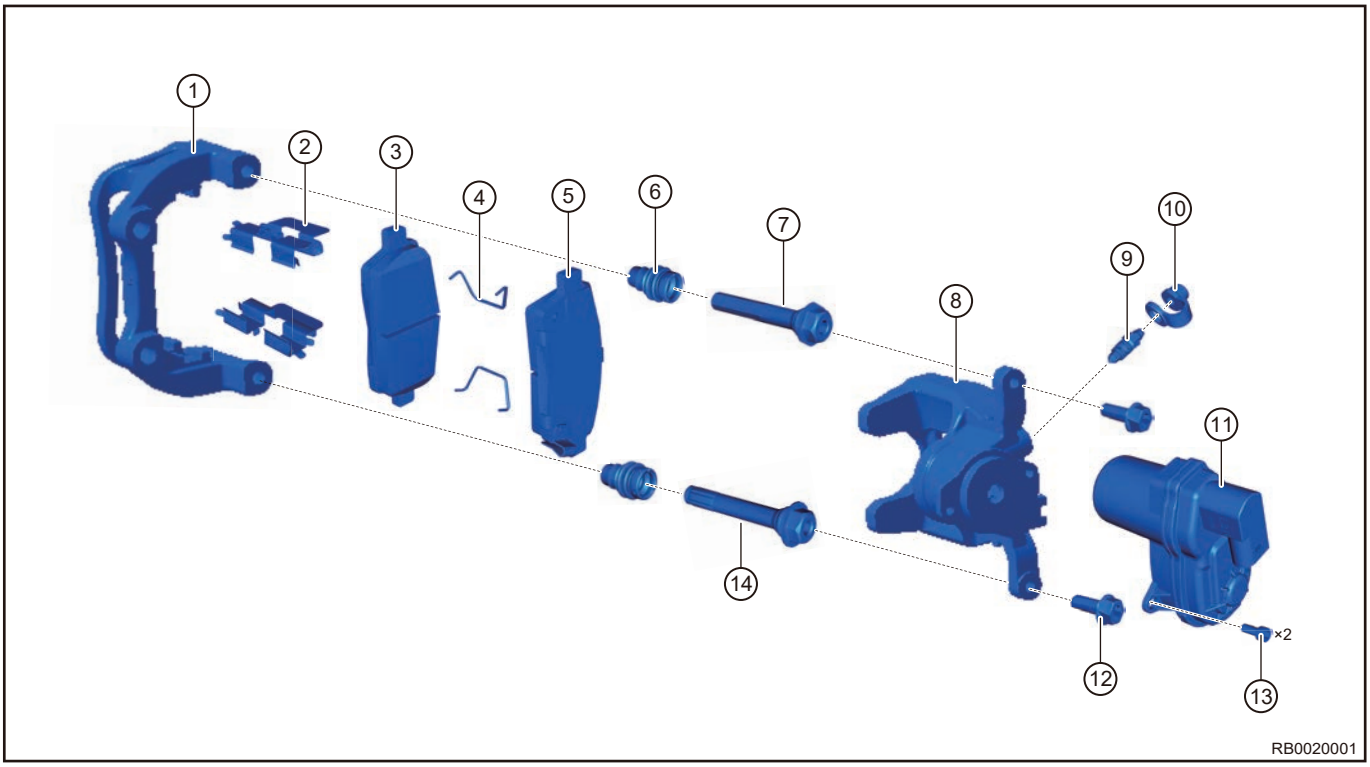


1	Rear Left Brake Caliper Assembly	5	Rear Left Steering Knuckle
2	Rear Brake Disc	6	Brake Caliper Mounting Bolt x 2

3	Rear Hub Bearing Unit	7	Hub Bearing Fixing Bolt x 4
4	Rear Left Dust Guard		

Rear left brake assembly is mainly composed of rear left brake caliper assembly, rear brake disc, rear hub bearing unit, etc.
Rear brake disc is fixed on rear hub bearing unit, clamped in the middle of rear outer lining assembly/rear inner lining assembly, and rotates with wheel. Rear brake caliper body assembly is connected with rear brake caliper bracket (bracket is fixed on steering knuckle) through guide pin tightening bolt.

■ **Rear Left Brake Caliper Assembly**



1	Rear Brake Caliper Bracket	8	Rear Left Brake Caliper Body Assembly
2	Rear Spring Plate x 2	9	Drain Bolt
3	Rear Outer Lining Assembly	10	Drain Plug Cover
4	Lining Return Spring x 2	11	Electronic control execution unit
5	Rear Inner Lining Assembly	12	Guide Pin Tightening Bolt
6	Guide Pin Dust Boot	13	Electronic Control Execution Unit Mounting Bolt x 2
7	Main Guide Pin	14	Sub Guide Pin

⚠ Caution

- **Main guide pin is installed on the side close to bleeder plug, and sub guide pin is installed on the side far away from bleeder plug. Incorrect installation method will lead to abnormal sound on bumpy road.**

Rear left brake caliper assembly is mainly composed of rear brake caliper bracket, rear left brake caliper body assembly, electronic control execution unit, guide pin, guide pin dust boot, etc. When braking, brake fluid of brake master cylinder enters brake caliper assembly of each wheel through hydraulic line. A force acting on brake caliper assembly piston pushes brake caliper assembly piston and it' s inner lining assembly to move to the left and press it onto brake disc, so brake disc applies a rightward reaction force to brake caliper assembly piston, making brake caliper assembly piston and brake caliper body assembly move to the right

along guide pin until outer lining assembly is also pressed onto brake disc. At this time, lining assemblies on both sides are pressed on brake disc, and brake disc is clamped to make it brake.

3 On-vehicle Service

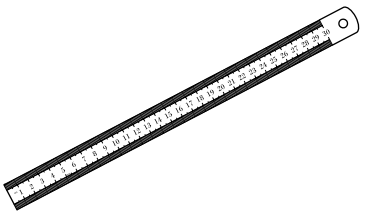
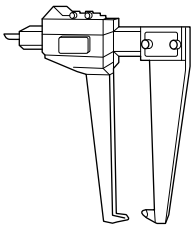
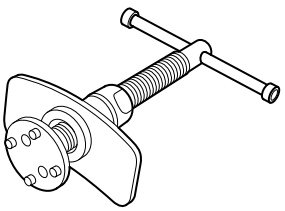
3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Brake System:

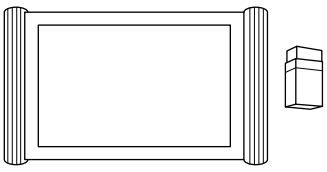
Symptom	Possible Cause
Braking deviation	Oily lining assembly
	Uneven brake disc wear
	Brake caliper body assembly failure (piston stuck)
Brake shakes	Hub bearing is damaged
	Uneven brake disc wear
	Steering/suspension part is loose
	Uneven lining assembly wear
	Brake caliper assembly fixing bolt is loose
Abnormal noise occurs during braking	Spring plate is damaged
	Hub bearing is damaged
	Abnormal brake disc wear
	Oily lining assembly
	Steering/suspension part is loose
	Abnormal lining assembly wear
	Brake caliper assembly fixing bolt is loose
Brake stuck	Minimum brake pedal free play
	Poor returning of guide pin (deformed or damaged)
	Brake caliper body assembly failure (piston stuck)

3.2 Tools

■ General Tools

Tool Name	Tool Drawing
Caliper	 S00044
Thickness Measurement Caliper	 S00082
Brake Cylinder Release Tool	 S00076

■ Special Tool

Tool Name	Tool Drawing
Diagnostic Tester	 S00001

3.3 Specifications

■ Torque Specifications

Item	Tightening torque
2 Mounting Bolts Between Electronic Control Execution Unit and Rear Left Brake Caliper Assembly	7.5 - 8.5 N·m
2 Rear Brake Disc Fixing Screws	8 ± 1 N·m
2 Brake Caliper Mounting Bolts Between Rear Left Brake Caliper Assembly and Rear Left Steering Knuckle	115 ± 5 N·m
Coupling Bolt Between Rear Left Brake Hose Assembly and Rear Left Brake Caliper Assembly	27 ± 2 N·m
2 Guide Pin Tightening Bolts Between Rear Left Brake Caliper Body Assembly and Rear Brake Caliper Bracket	27 ± 5 N·m

3.4 Special function

(1) Turn ENGINE START STOP switch to OFF.

(2) Connect the diagnostic tester (the latest software).

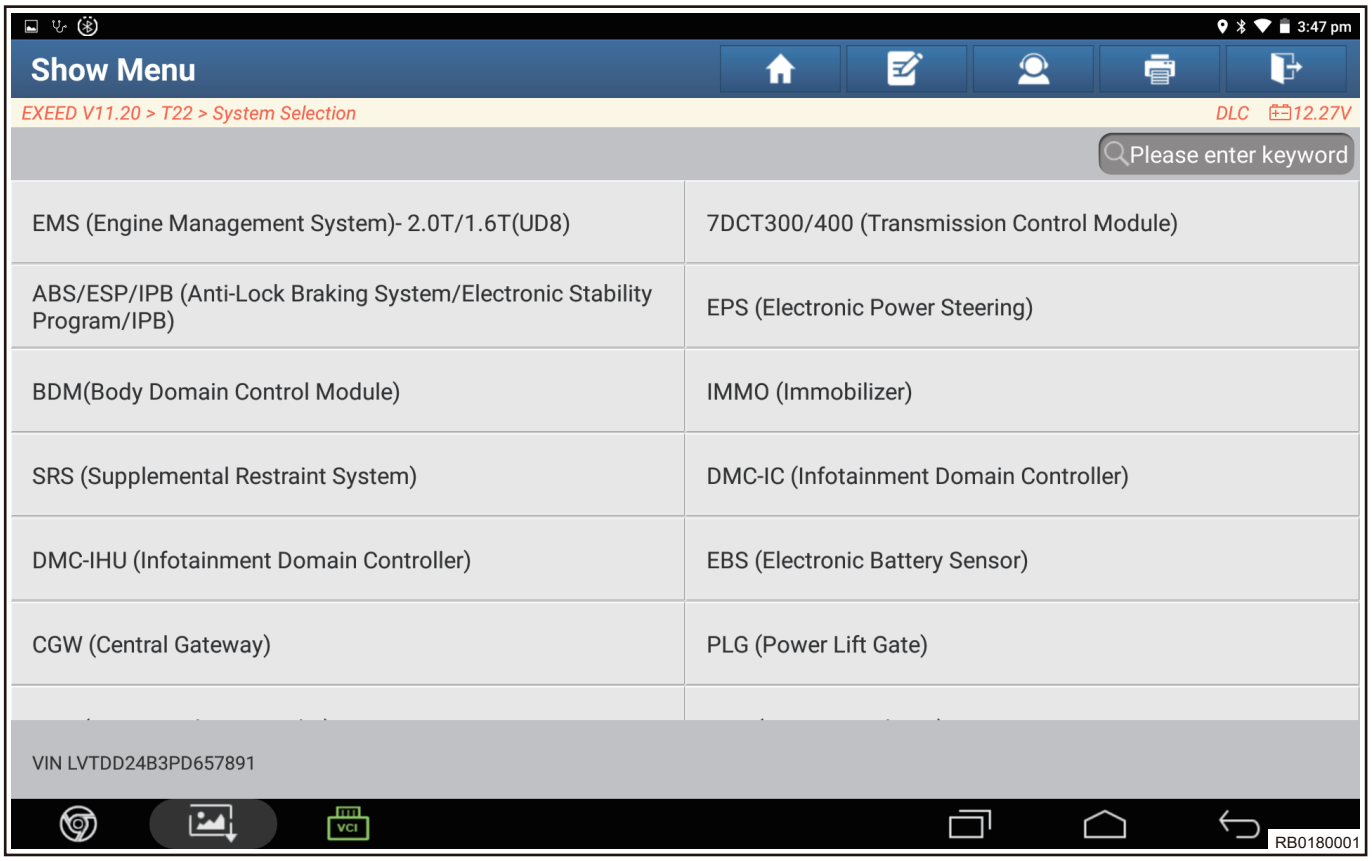
(3) Turn ENGINE START STOP switch to ON.

(4) Click "Traditional Diagnosis".

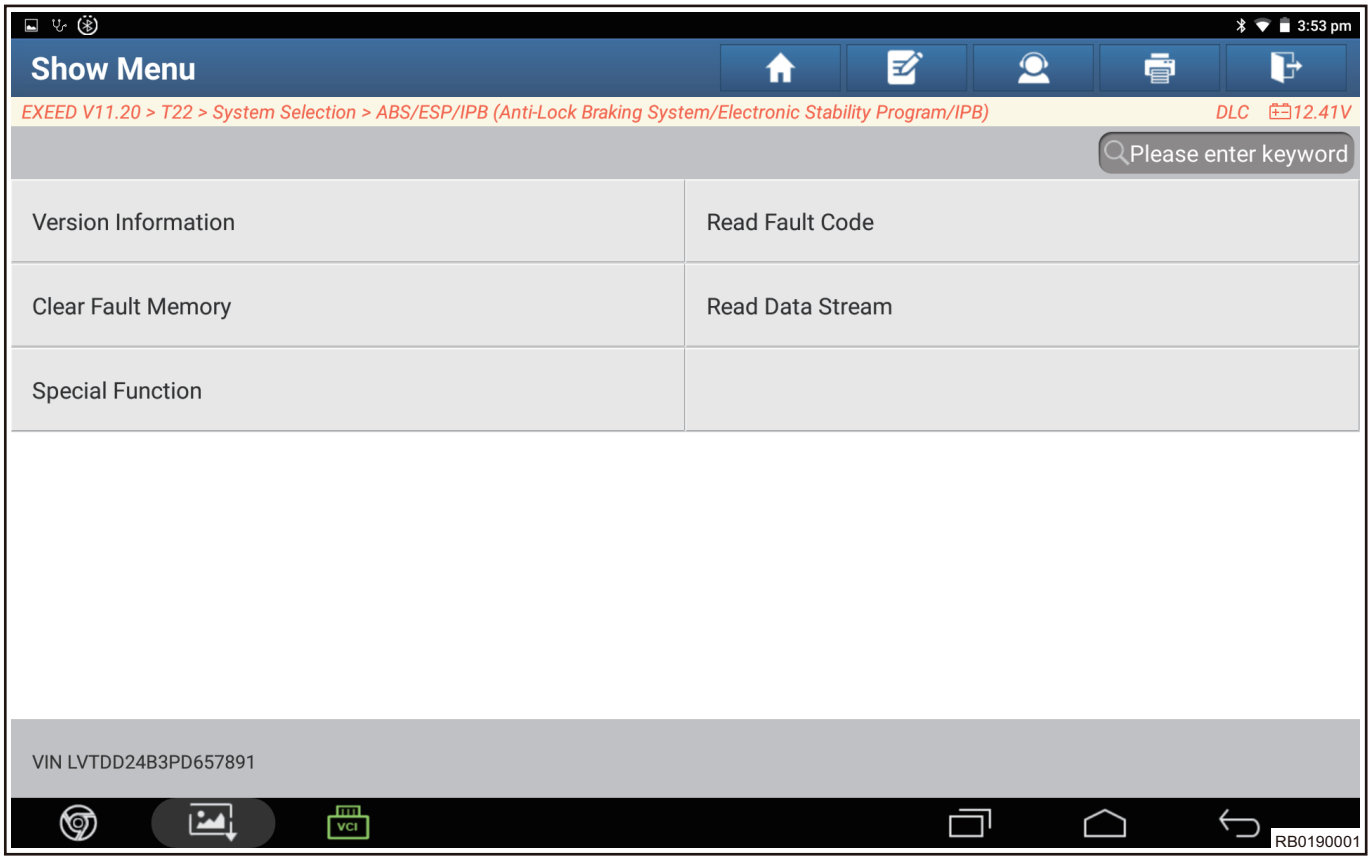
(5) Click “EXEED”.

(6) Click “T22”.

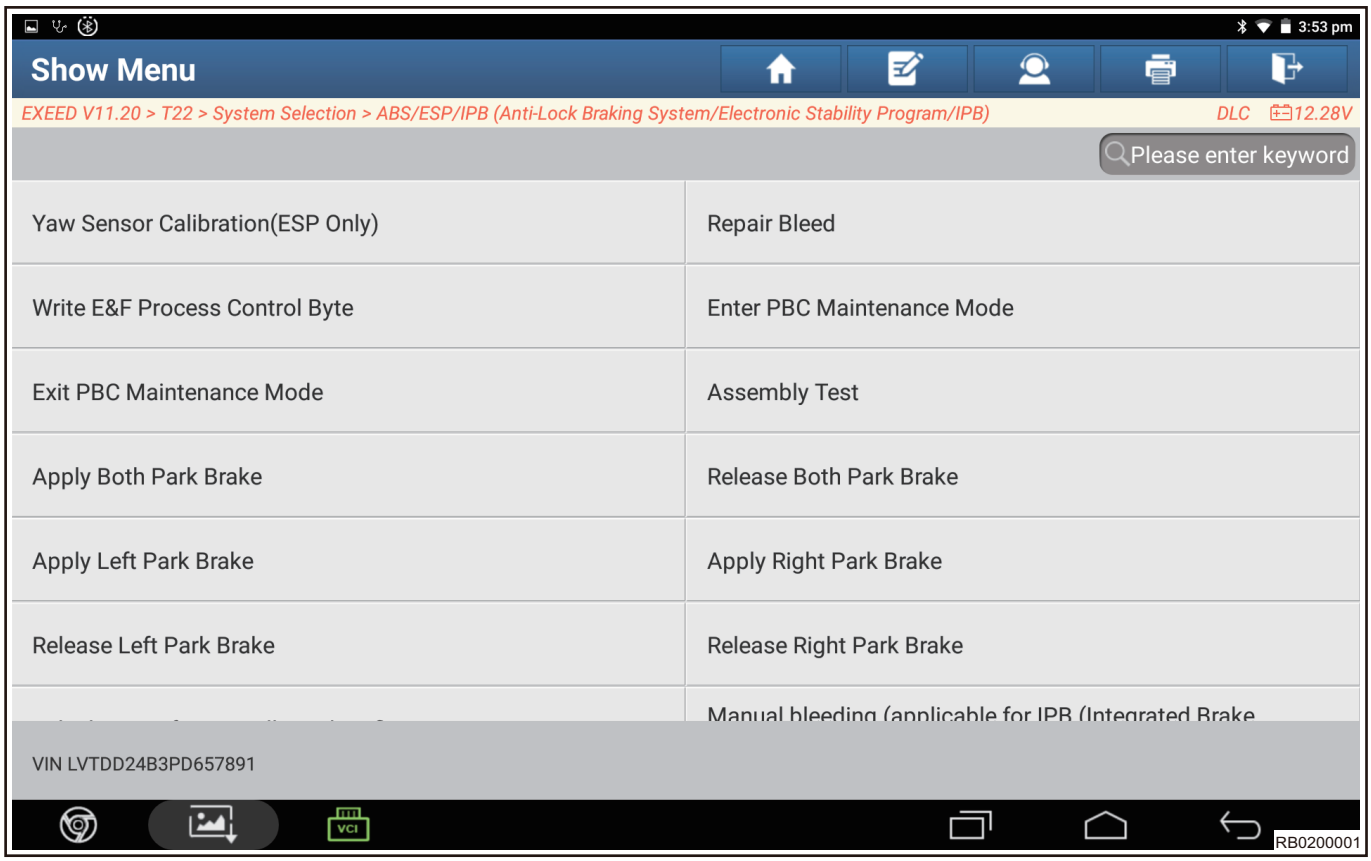
(7) Click “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPM)”.

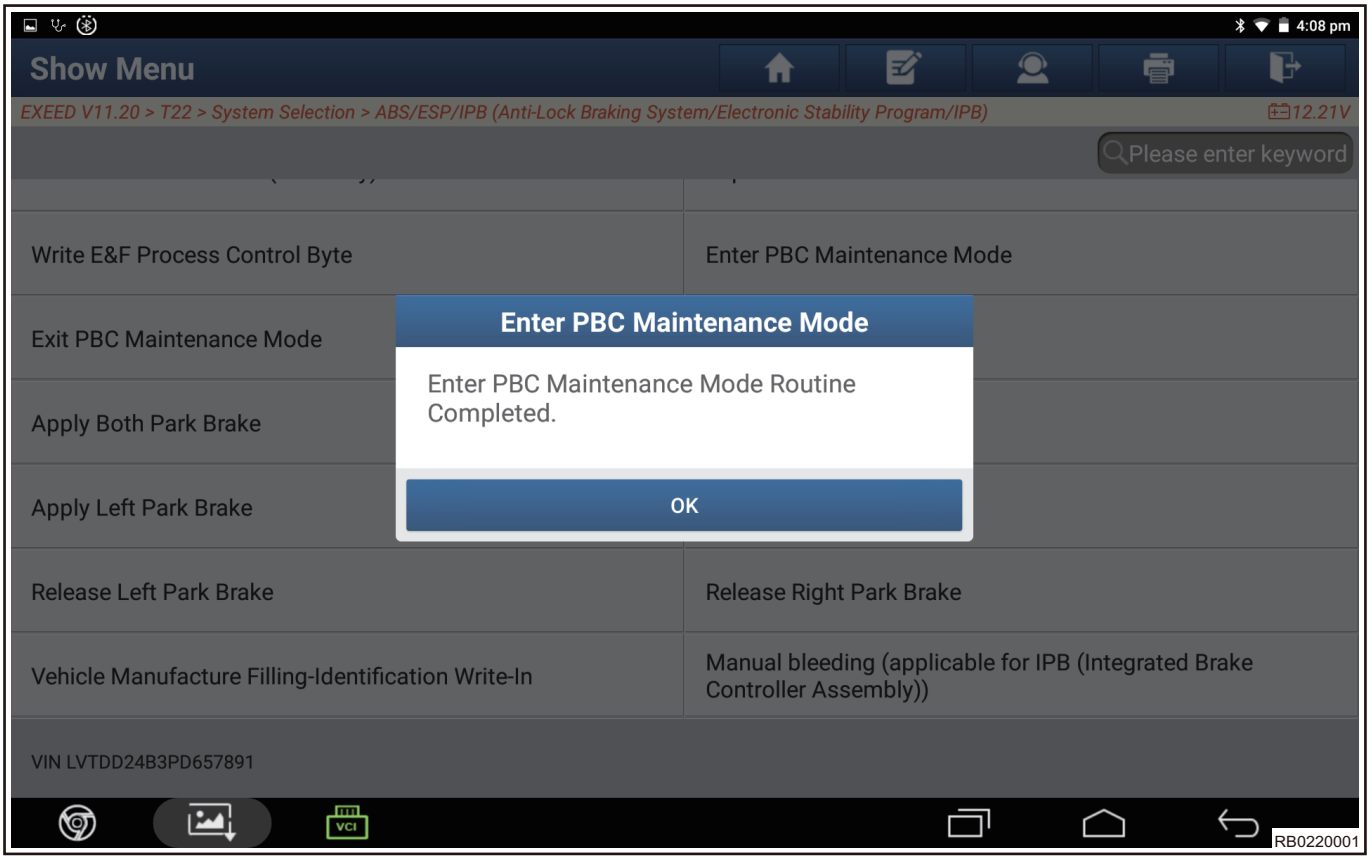


(8) Click "Special Function".

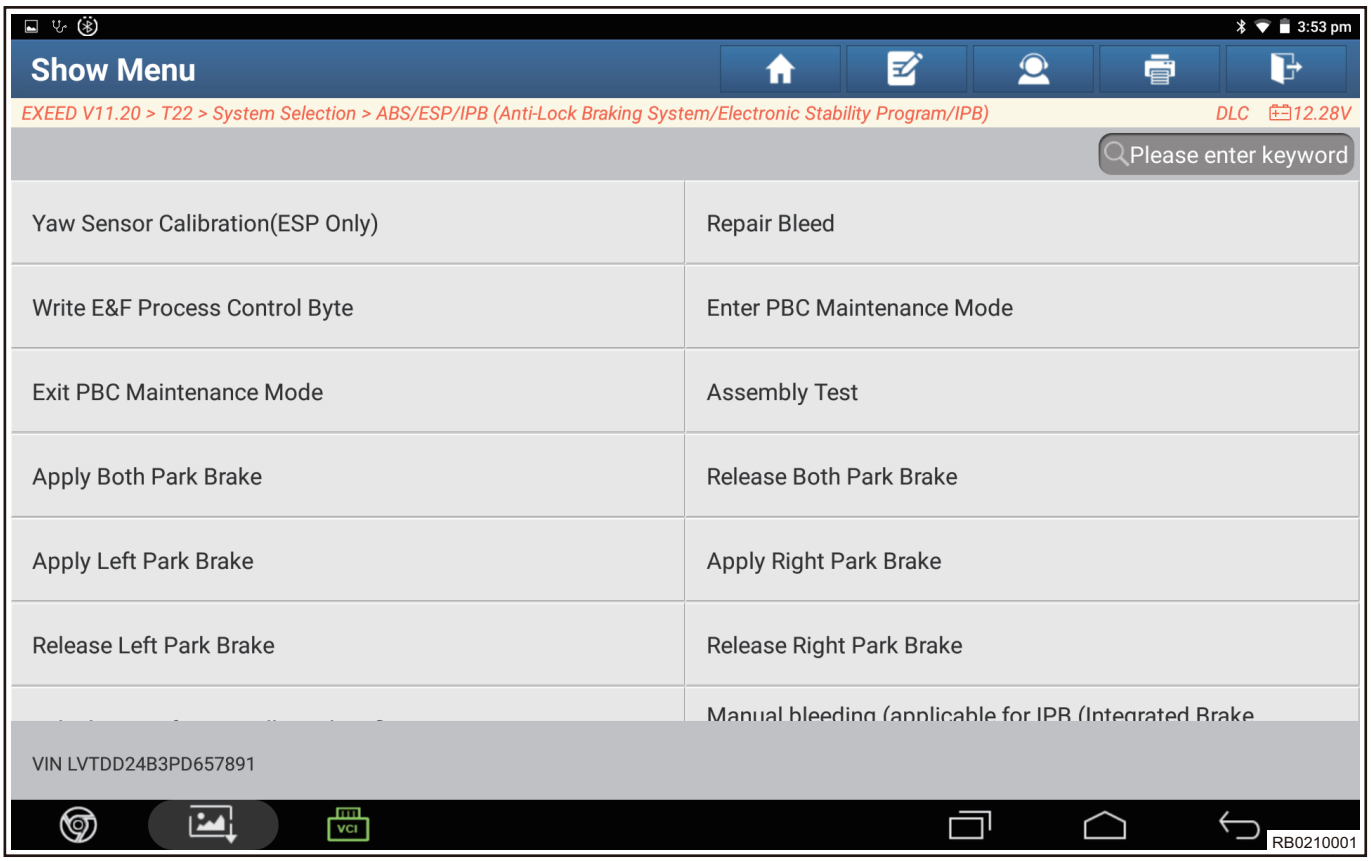


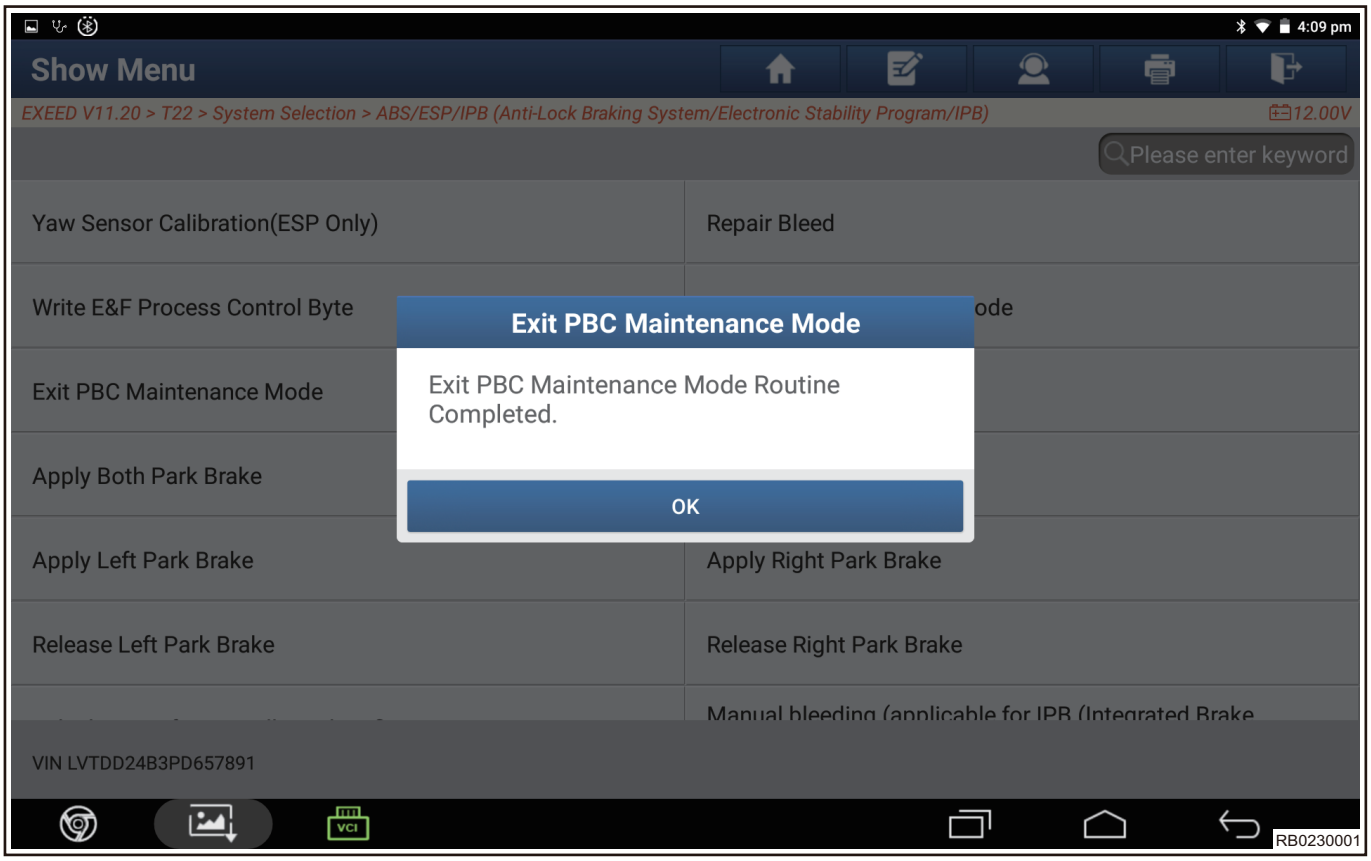
(9) Click “Enter PBC Maintenance Mode”, enter maintenance mode.





(10) Click “Exit PBC Maintenance Mode”, exit maintenance mode.





3.5 Rear Brake Assembly (Take left side as an example)

■ Removal

Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.
- Before removing rear disc brake assembly, it is necessary to use diagnostic tester to perform "Enter PBC Maintenance Mode".

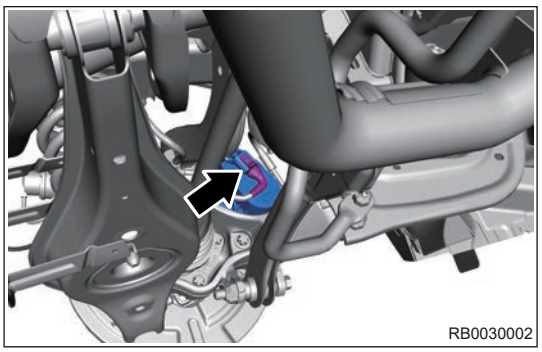
⚠ Caution

- **After removing rear brake assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.**

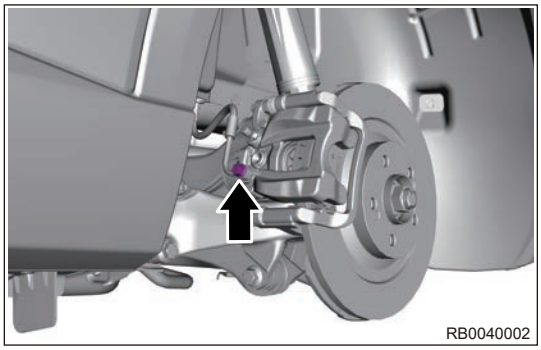
(1) Disconnect the negative battery cable.

(2) Remove the rear left wheel.

(3) Disconnect the electronic control execution unit wire harness connector.



(4) Remove coupling bolt between rear left brake hose assembly and rear left brake caliper assembly.



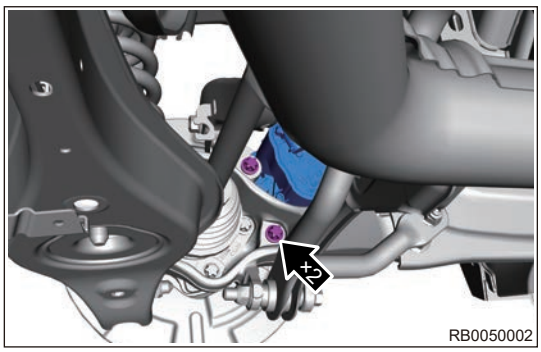
Hint:

- When removing coupling bolt, be careful not to drop 2 gaskets.

⚠ Caution

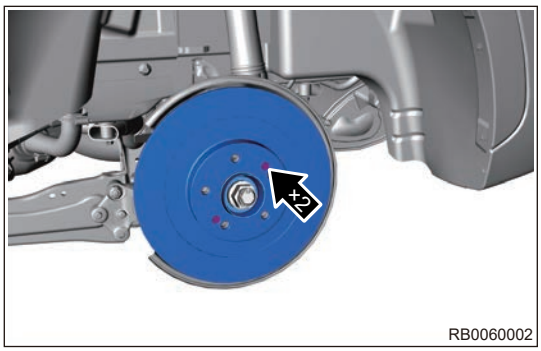
- **After removing brake line, perform sealing treatment to prevent foreign matter from entering.**
- **DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.**

(5) Remove 2 brake caliper mounting bolts between rear left brake caliper assembly and rear left steering knuckle.



(6) Remove the rear left brake caliper assembly.

(7) Remove 2 fixing screws from rear brake disc.



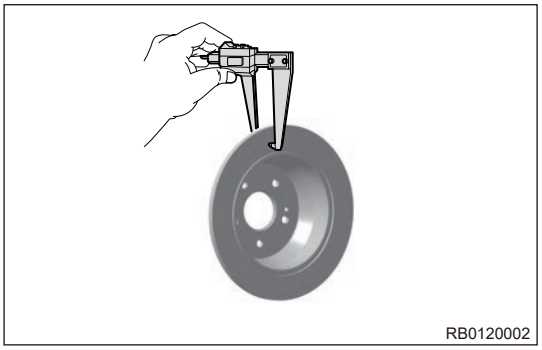
(8) Remove the rear brake disc.

■ Brake Disc Inspection

(1) Visually check rear brake disc for flatness, and also check for excessive wear. If the condition of rear brake disc cannot be confirmed only by visual inspection, perform physical inspection as necessary.

(2) If it is less than the minimum thickness due to wear, replace rear brake disc.

Minimum thickness: 8 mm



⚠ Caution

- **DO NOT machine the brake disc, because it may make brake disc thickness less than the minimum thickness.**

(3) Slight scratch on the surface of rear brake disc is a normal phenomenon. If crack, severe scratch, deformation and burned spots are found, the brake disc must be replaced.

(4) Abnormal wear of rear brake disc may cause poor contact between new lining assembly and surface of rear brake disc, which may cause abnormal wear of lining assembly.

■ Installation

Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.
- After installing rear disc brake assembly, it is necessary to use diagnostic tester to perform "Exit PBC Maintenance Mode".

(1) Install the rear brake disc.

(2) Install 2 fixing screws of rear brake disc.

Torque: 8 ± 1 N·m

(3) Install the rear left brake caliper assembly.

(4) Install 2 brake caliper mounting bolts between rear left brake caliper assembly and rear left steering knuckle (thread anti-loose gum should be applied).

Torque: 115 ± 5 N·m

(5) Install coupling bolt between rear left brake hose assembly and rear left brake caliper assembly.

Torque: 27 ± 2 N·m

Hint:

- When installing coupling bolts, be sure to install the 2 gaskets that were removed.

(6) Connect the electronic control execution unit wire harness connector.

(7) Install the rear left wheel.

(8) Connect the negative battery cable.

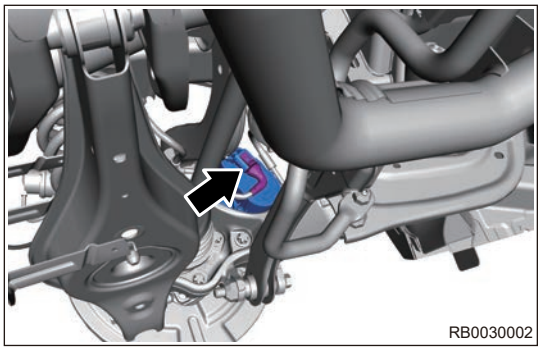
3.6 Electronic control execution unit

■ Removal

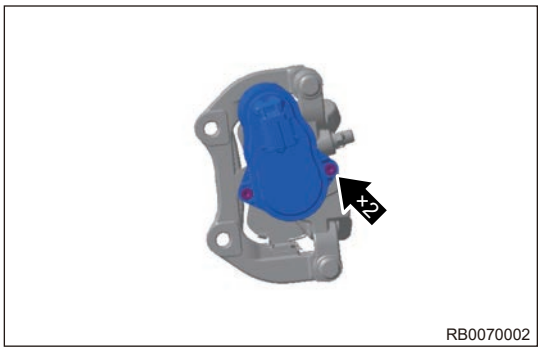
(1) Disconnect the negative battery cable.

(2) Remove the rear left wheel.

(3) Disconnect the electronic control execution unit wire harness connector.


RB0030002

(4) Remove 2 mounting bolts between electronic control execution unit and rear left brake caliper assembly.


RB0070002

(5) Remove the electronic control execution unit.

Hint:

- Remove electronic control execution unit and be careful not to damage motor seal ring.

■ Installation

(1) Install the electronic control execution unit.

(2) Install 2 mounting bolts between electronic control execution unit and rear left brake caliper assembly.

Torque: 7.5 - 8.5 N·m

(3) Connect the electronic control execution unit wire harness connector.

(4) Install the rear left wheel.

(5) Connect the negative battery cable.

3.7 Lining Assembly (Take left side as an example)

■ Removal

Hint:

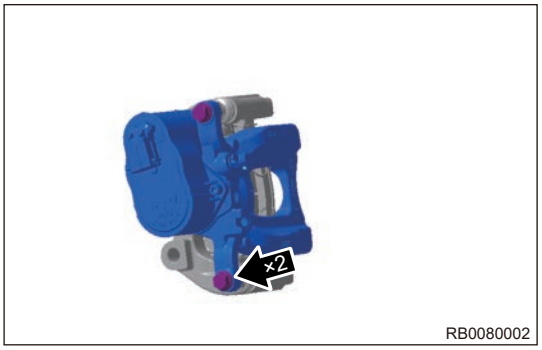
- Before removing rear left brake caliper body assembly, it is necessary to use diagnostic tester to perform "-Enter PBC Maintenance Mode".

⚠ Caution

- **After removing rear brake caliper assembly, it is strictly forbidden to depress brake pedal, otherwise the brake caliper piston will rush out of cylinder hole and the brake fluid will come out and pollute brake disc and other parts.**

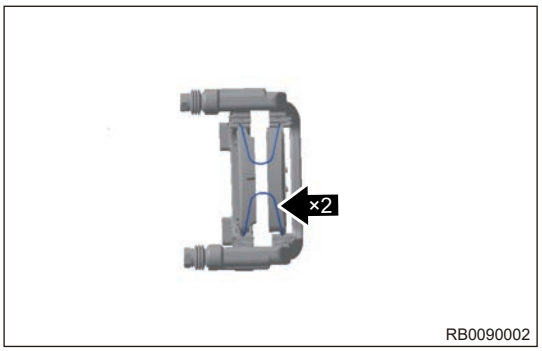
(1) Remove the rear left wheel.

(2) Remove 2 guide pin tightening bolts between rear left brake caliper body assembly and rear brake caliper bracket.

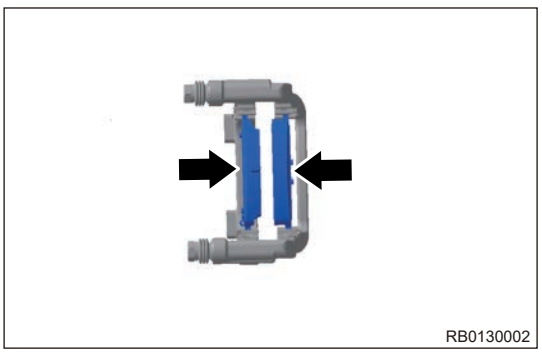


(3) Remove the rear left brake caliper body assembly.

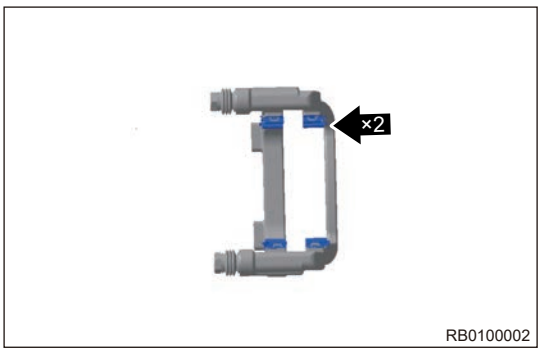
(4) Remove 2 lining return springs.



(5) Remove rear outer/inner lining assembly.



(6) Remove 2 rear spring plates.

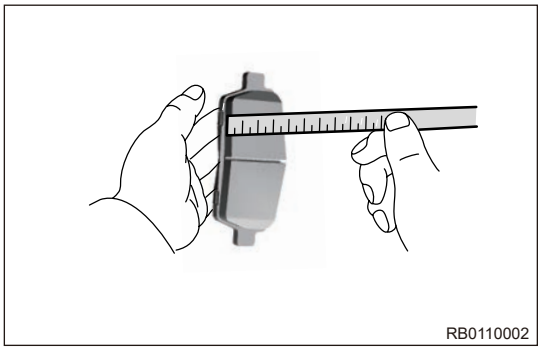


■ **Lining Inspection**

(1) Visually check lining assembly for flatness, and also check for excessive wear. If the condition of lining assembly cannot be confirmed only by visual inspection, perform physical inspection as necessary.

(2) If it is less than the minimum thickness due to wear, replace lining assembly.

Minimum thickness: 2 mm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(3) When replacing lining assembly, it is necessary to replace rear outer/inner lining assembly as well as lining on the other side of vehicle to maintain proper braking performance.

(4) If it is unnecessary to replace lining assembly, be sure to reinstall brake linings to original positions.

■ **Rear Brake Caliper Bracket and Guide Pin Set Inspection**

(1) Check if rear spring plate is deformed, cracked, rusted or elasticity is not enough (lining assembly cannot be clamped). Clean the contact surface between rear brake caliper bracket and rear spring plate with brake cleaner.

(2) Check if guide pin and guide pin dust boot are deformed, cracked and worn. Apply grease to guide pin and install guide pin dust boot to rear brake caliper bracket, and push guide pin back and forth freely without sticking.

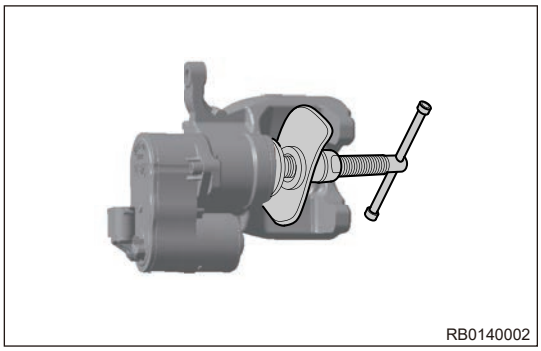
■ **Installation**

Hint:
After installing rear left brake caliper body assembly, it is necessary to use diagnostic tester to perform "Exit PBC Maintenance Mode".

⚠ **Caution**

- **Be sure to tighten fixing bolts to specified torques during installation.**
- **Be sure to add brake fluid to a proper level after installation.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Before installing brake linings, completely retract brake caliper piston back into bore of brake caliper.**
- **Depress brake pedal several times to secure brake linings to brake disc in order to ensure safety after installing brake linings and before moving vehicle.**
- **Replace the brake linings in pairs. DO NOT replace one alone.**
- **DO NOT install inner and outer linings in reverse.**
- **Be sure to perform "Exit Parking Brake Maintenance Mode" using diagnostic tester after installation.**

(1) Using brake cylinder release tool, slightly retract brake caliper piston.


RB0140002

(2) Install 2 rear spring plates.

(3) Install rear outer/inner lining assembly.

(4) Install 2 lining return springs.

(5) Install the rear left brake caliper body assembly.

(6) Install 2 guide pin tightening bolts between rear left brake caliper body assembly and rear brake caliper bracket (thread anti-loose gum should be applied).

Torque: 27 ± 5 N · m

(7) Install the rear left wheel.

6.5 HYDRAULIC BRAKE (ESP)

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) After removing brake line, perform sealing treatment to prevent foreign matter from entering.

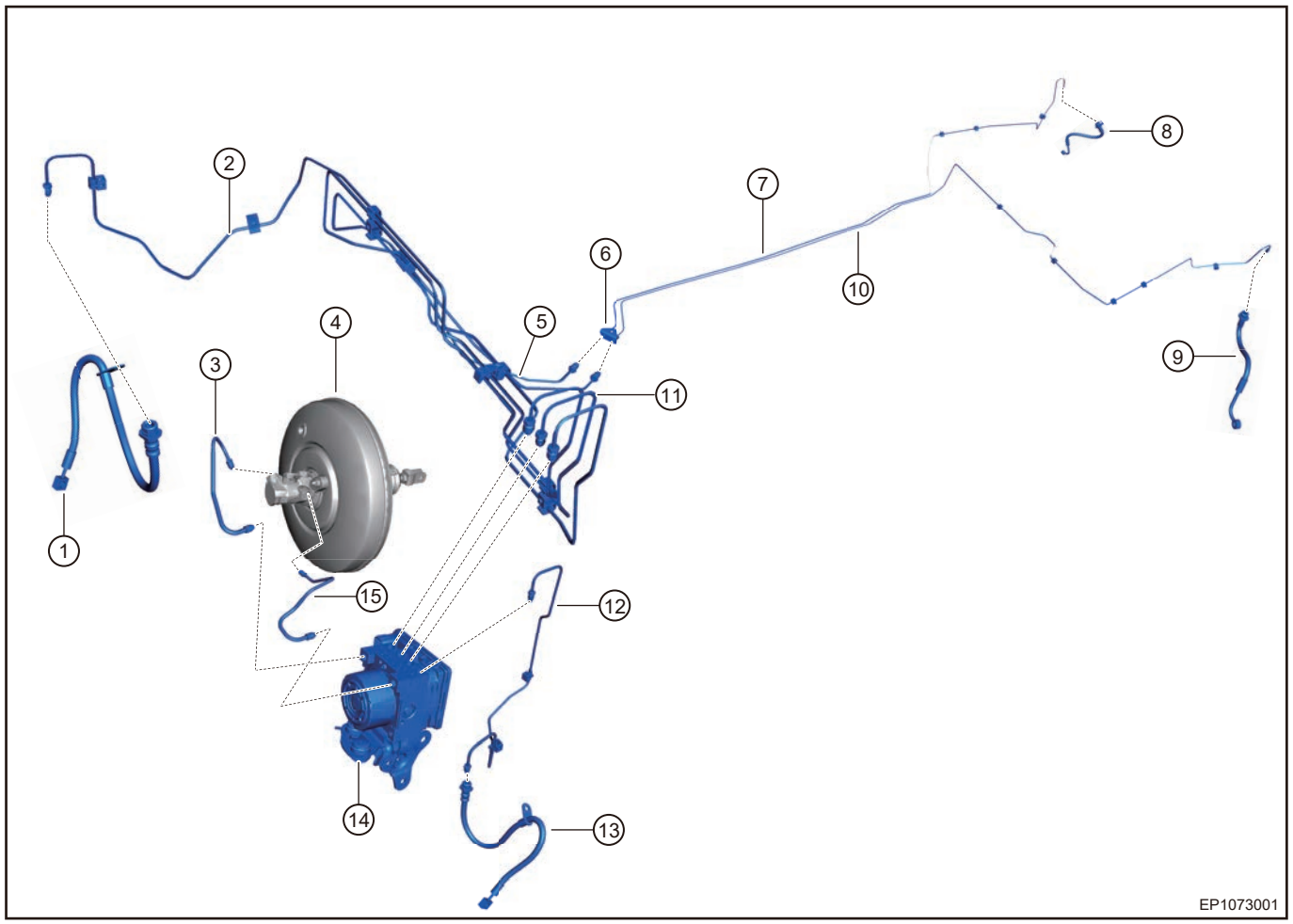
(2) DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.

(3) DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose assembly, as brake fluid is corrosive.

(4) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of ESP (vehicle power supply is turned off), so as to avoid reverse impact, resulting in ESP internal protection circuit breakdown.

2 System Overview

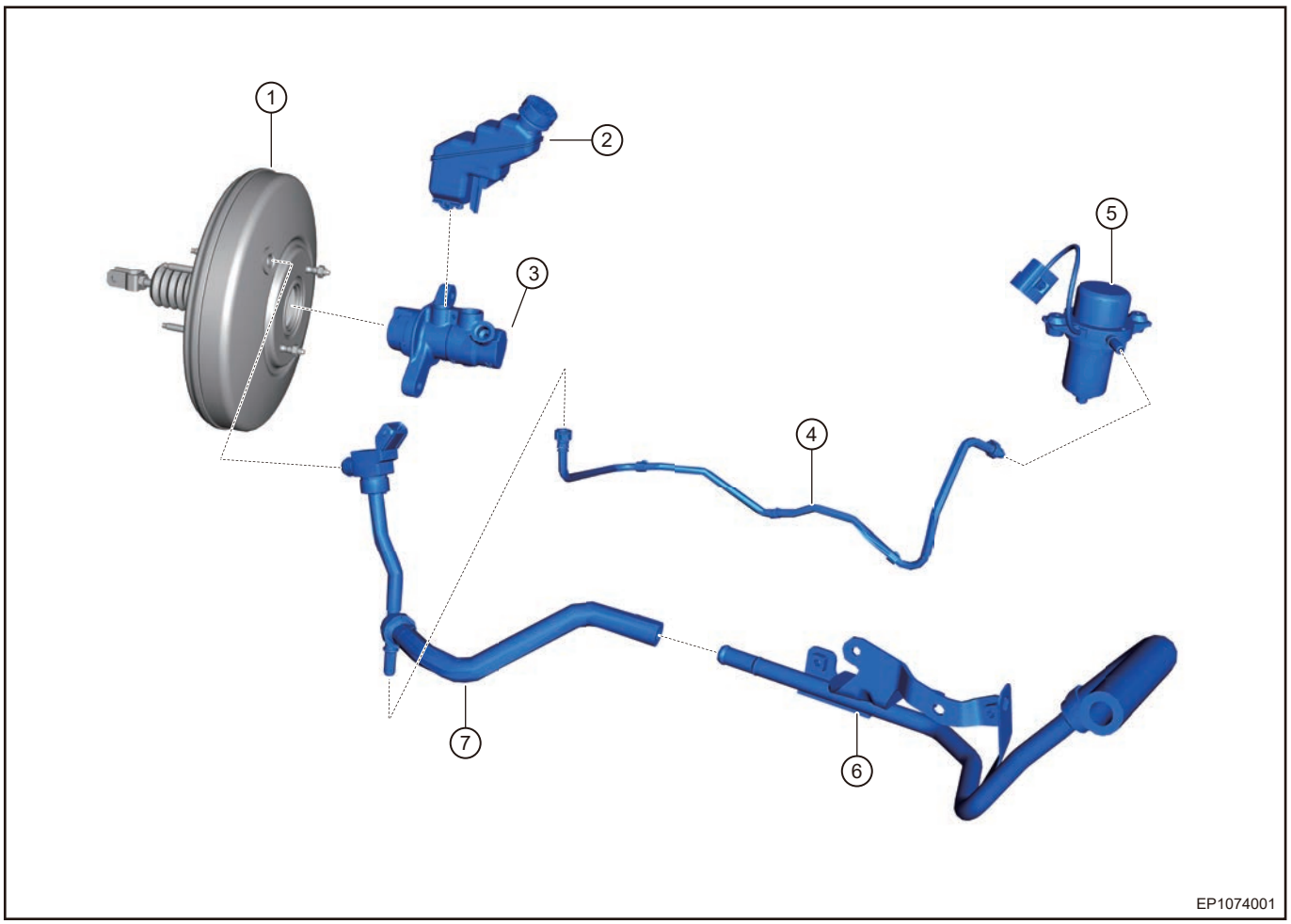
2.1 System Components Diagram



1	Front Right Brake Hose Assembly	9	Rear Left Brake Hose Assembly
2	Front Right Brake Pipe Assembly	10	Rear Left Brake Pipe II Assembly
3	Master Cylinder Rear Chamber Pipe Assembly	11	Rear Left Brake Pipe I Assembly

4	Vacuum Booster with Brake Master Cylinder Assembly	12	Front Left Brake Pipe Assembly
5	Rear Right Brake Pipe I Assembly	13	Front Left Brake Hose Assembly
6	Two-way	14	ESP Controller With Bracket Assembly
7	Rear Right Brake Pipe II Assembly	15	Master Cylinder Front Chamber Pipe Assembly
8	Rear Right Brake Hose Assembly		

Brake system adopts hydraulic transmission device, and mainly consists of ESP controller assembly, vacuum booster with master cylinder assembly, brake fluid reservoir assembly, hydraulic line (brake hose, brake pipe), brake caliper assembly, vacuum pump assembly, etc.
When brake pedal assembly is depressed, brake master cylinder assembly piston is pushed forward, and brake fluid pressure in brake master cylinder assembly is increased. Brake fluid enters brake caliper assembly of each wheel through hydraulic line, and brake caliper assembly piston is pushed outward to allow the force of depressing brake pedal to be transmitted to wheel brake caliper assembly, and push wheel brake caliper assembly to brake.
When brake pedal assembly is released, brake master cylinder assembly piston will return under the action of oil pressure and return spring, brake caliper assembly piston and wheel brake caliper assembly will return to release the brake on wheel.

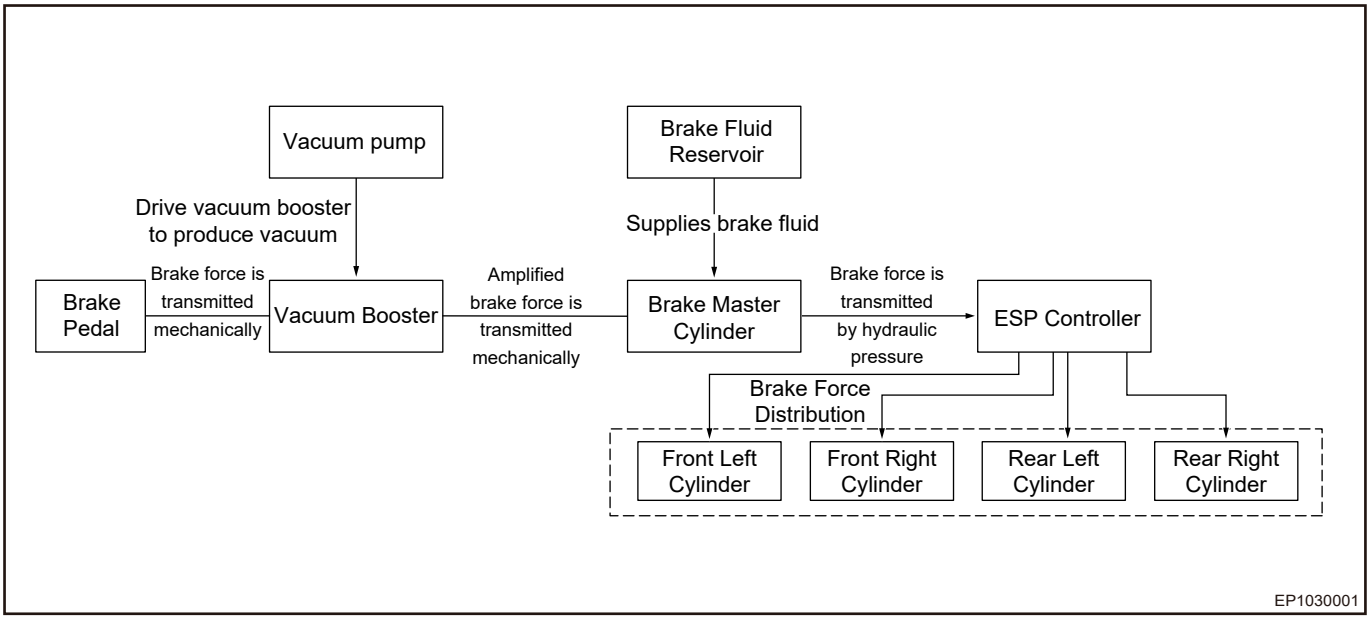


1	Vacuum Booster	5	Vacuum Pump Assembly
2	Brake Fluid Reservoir Assembly	6	Metal Vacuum Tube Assembly

3	Brake Master Cylinder Assembly	7	Vacuum Brake Hose with Pressure Sensor Assembly
4	Connecting Pipe Assembly		

Vacuum booster system is mainly composed of vacuum booster assembly, brake master cylinder assembly, brake fluid reservoir assembly, vacuum pump assembly, pressure sensor and pipeline etc.
Vacuum booster is a component that uses vacuum (negative pressure) to increase force applied by driver to brake pedal assembly.
Vacuum booster is generally located between brake pedal assembly and brake master cylinder assembly. For easy installation, it is usually combined with master cylinder as a set, and part of master cylinder is penetrated into vacuum booster housing.

2.2 System schematic diagram

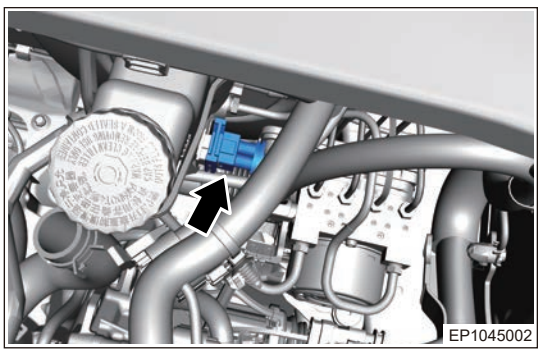


When vacuum booster can not obtain vacuum or obtained vacuum is insufficient (at high altitude, low temperature, etc.), it will lead to poor assistance of brake system. Vacuum booster system monitors vacuum changes in vacuum booster through atmospheric pressure sensor, judges operating time of vacuum pump through logic and provides appropriate auxiliary power for brake system. Thereby ensure that it can provide driver with sufficient braking assistance effect under various working conditions.

2.3 Component Operation Description

■ Brake Fluid Level Sensor

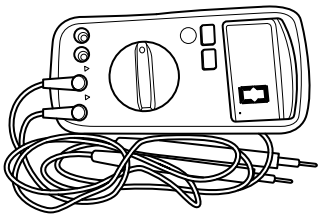
The float in brake fluid reservoir rises/falls according to brake fluid level.
When brake fluid level is on "MAX (maximum)" mark on brake fluid reservoir, the float in brake fluid reservoir rises.
When brake fluid level is on "MIN (minimum)" mark on brake fluid reservoir, the float in brake fluid reservoir falls.
When brake fluid level is below "MIN (minimum)" mark on brake fluid reservoir, brake system malfunction indicator on instrument cluster will come on.



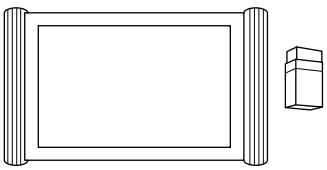
3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ Special Tools

Tool Name	Tool Drawing
Diagnostic tester	 S00001

3.2 Brake Bleeding

Hint:

- Be sure to perform brake bleeding after replacing hydraulic parts related to brake.
- An assistant will be required to assist when bleeding brake system.

■ Manual Bleeding

⚠ Caution

- **When performing bleeding procedures for brake system, wear safety glasses.**
- **Be careful when bleeding air, as brake fluid at high pressure may spray out from bleeder screw.**

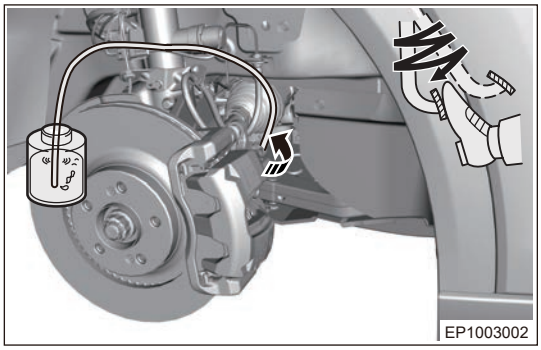
⚠ Warning

- **Before removing brake fluid reservoir, wipe off any dust and other foreign matters on brake fluid reservoir to prevent them from entering.**
- **Use fresh, clear and well-sealed brake fluid with specified type.**
- **DO NOT allow the brake fluid to adhere to any paint surface, such as vehicle body. If brake fluid leaks onto any paint surface, immediately wash it off.**
- **During bleeding, do not depress brake pedal repeatedly at any time with bleeder screw opened. Otherwise, air amount in the system will increase to make an extra bleeding.**
- **DO NOT drain the brake fluid in brake fluid reservoir while bleeding brake system.**

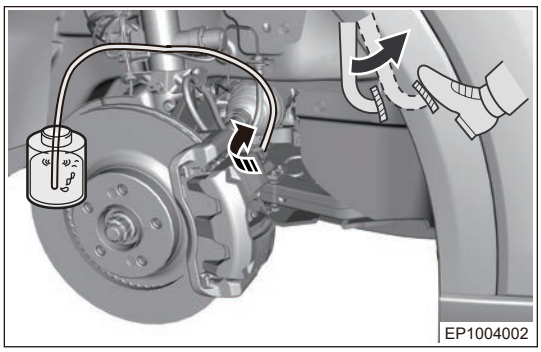
(1) Fill brake fluid reservoir with brake fluid to a proper level.

(2) Loosen brake cylinder bleeder screw cap and connect a clear plastic hose to bleeder screw. Submerge the end of hose into container.

(3) Have an assistant depress brake pedal 3 to 4 times repeatedly; and depress and hold it at a lower position, then loosen the bleeder screw.



(4) Tighten bleeder screw every time the brake pedal goes down quickly, then release the brake pedal.



(5) According to above steps, and use the same procedures to bleed brake line of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel, until no air exists in brake system.

Empty sign: A stream of fresh brake fluid flows into clear container without bubbles.

Hint:

- During bleeding of brake system, make sure brake fluid level in brake fluid reservoir is always near "MAX" mark. Check brake fluid level at all times during bleeding. Add brake fluid as necessary.

(6) Check and adjust the brake fluid level to “MAX” mark.

(7) Check the brake pedal braking effect. If braking effect is poor or pedal is spongy, air may still exist in system. Perform bleeding procedures for brake system again as necessary.

(8) Test vehicle to confirm that brakes operate properly with good depressing feel.

3.3 Replacement of brake fluid

■ Operation step

(1) Unscrew filler cap of brake fluid reservoir assembly.

(2) Start engine and keep it idling.

(3) Loosen bleeder screw cap of rear left wheel and connect a clear plastic hose to bleeder screw. Submerge the end of hose into container.

(4) Have an assistant depress brake pedal 3 to 4 times repeatedly; and depress and hold it at a lower position, then loosen the bleeder screw.

(5) Tighten bleeder screw every time the brake pedal goes down quickly, then release the brake pedal.

Hint:

- During replacement of brake fluid system, make sure brake fluid level in brake fluid reservoir is always near "MAX" mark. During replacement of brake fluid. Add brake fluid as necessary.

(6) According to above steps, and use the same procedures to replace brake fluid of each wheel in order of rear left wheel, front left wheel, front right wheel and rear right wheel.

Brake Fluid Empty Sign: A stream of fresh brake fluid flows into clear container.

(7) Check and adjust the brake fluid level to “MAX” mark.

(8) After replacing with new brake fluid, be sure to bleed the brake system for normal operation.

3.4 Vacuum Booster with Brake Master Cylinder Assembly

■ On-vehicle Inspection

(1) Air tightness inspection.
1) Start engine and stop it after 1 or 2 minutes, then disconnect negative battery cable. Slowly depress the brake pedal several times.
2) Make sure that booster is airtight. Check that every pedal depression amount becomes less than the previous one.
3) Start the engine. Depress and hold pedal, and then stop engine.
4) Make sure that booster is airtight. Depress and hold pedal for 30 seconds, and check that pedal reserve distance does not change.

(2) Operation inspection.
1) Stop engine and disconnect negative battery cable.
2) Depress the pedal several times and check that pedal reserve distance does not change.
3) Depress and hold the pedal, and then start engine. Check that the pedal can only be depressed slightly.

■ Removal

(1) Drain the brake fluid.

Hint:
- Drained brake fluid should be well kept in a container. Never discard it at will.

⚠ Caution

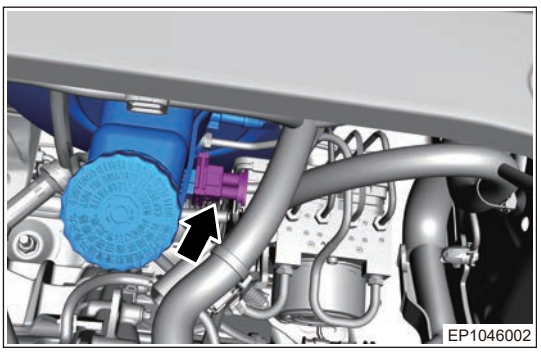
- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(2) Disconnect the negative battery cable.

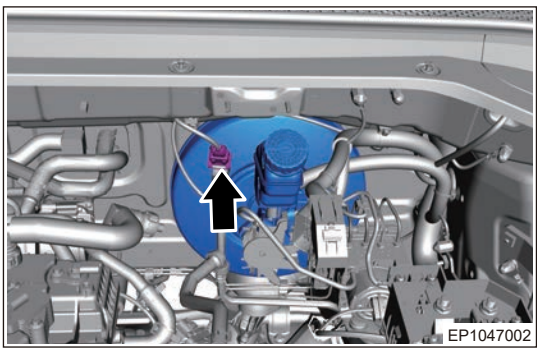
(3) Remove the battery.

(4) Remove the battery tray.

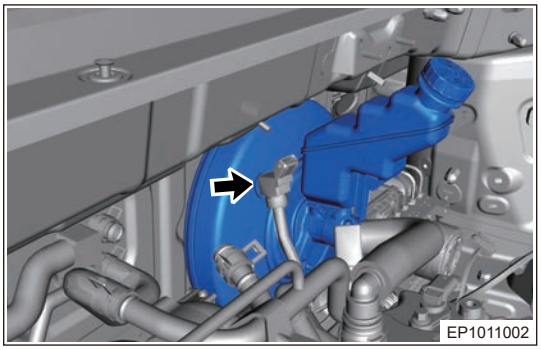
(5) Disconnect the brake fluid level sensor connector (arrow).


EP1046002

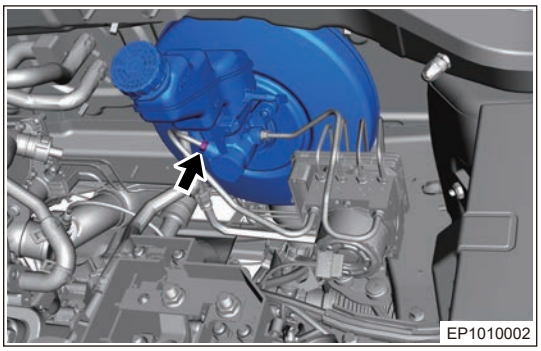
(6) Disconnect the vacuum pipe pressure sensor connector (arrow).


EP1047002

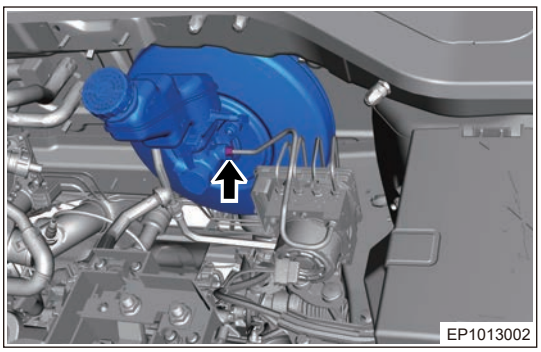
(7) Disconnect connector (arrow) between vacuum hose and vacuum booster.



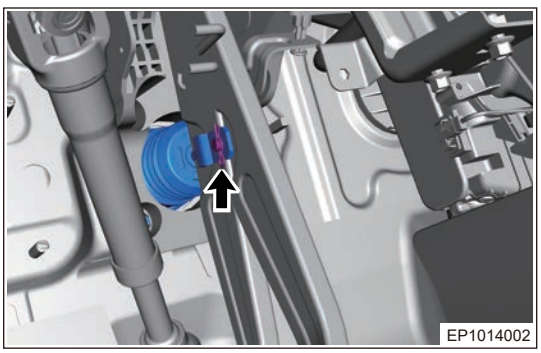
(8) Remove coupling nuts (arrow) between rear chamber pipe and brake master cylinder, and disconnect connector between rear chamber pipe assembly and brake master cylinder.



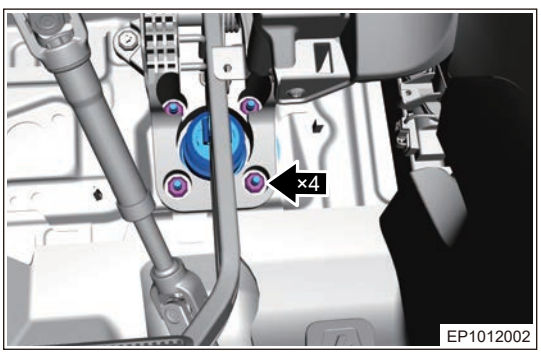
(9) Remove coupling nuts (arrow) between front chamber pipe and brake master cylinder, and disconnect connector between front chamber pipe assembly and brake master cylinder.



(10) Remove lock pin (arrow) between vacuum booster assembly and brake pedal, and remove pin shaft.



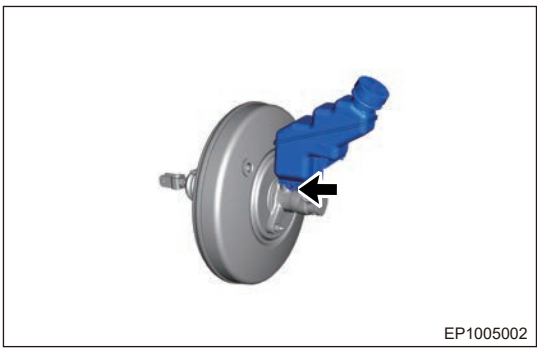
(11) Remove 4 fixing nuts (arrow) between vacuum booster assembly and brake pedal assembly.



(12) Remove the vacuum booster with brake master cylinder assembly.

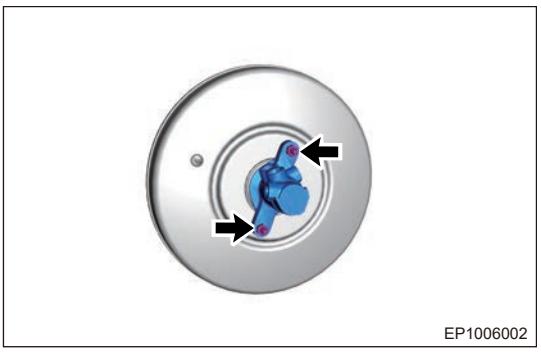
■ **Disassembly**

(1) Remove fixing pin (arrow) between brake fluid reservoir and brake master cylinder.


EP1005002

(2) Remove the brake fluid reservoir.

(3) Remove 2 fixing nuts (arrow) between brake master cylinder and vacuum booster.


EP1006002

(4) Remove the brake master cylinder assembly.

■ **Assembly**

(1) Install the brake master cylinder assembly to a proper position.

(2) Install 2 fixing nuts between brake master cylinder and vacuum booster.

Torque: 25 ± 4 N·m

(3) Install the brake fluid reservoir assembly to a proper position.

(4) Install fixing pin between brake fluid reservoir and brake master cylinder.

■ **Installation**

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Check that brake light operates normally after installation.**
- **Check if brake pedal free travel is within normal range after installing brake pedal. Normal range: ＜25 mm**

(1) Install the vacuum booster with brake master cylinder assembly to a proper position.

(2) Install 4 fixing nuts between vacuum booster assembly and brake pedal assembly.

Torque: 23 ± 2 N·m

(3) Install the pin shaft and lock pin between vacuum booster assembly and brake pedal.

(4) Install connector between vacuum brake hose and vacuum booster.

(5) Connect the vacuum pipe pressure sensor connector.

(6) Install fixing nut between master cylinder front chamber pipe assembly and brake cylinder.

(7) Install fixing nut between master cylinder rear chamber pipe assembly and brake cylinder.

(8) Connect the brake fluid level sensor connector.

(9) Install the battery tray.

(10) Install the battery.

(11) Connect the negative battery cable.

(12) Fill brake fluid and drain the air in brake system.

3.5 Brake Pedal Assembly

■ On-vehicle Inspection

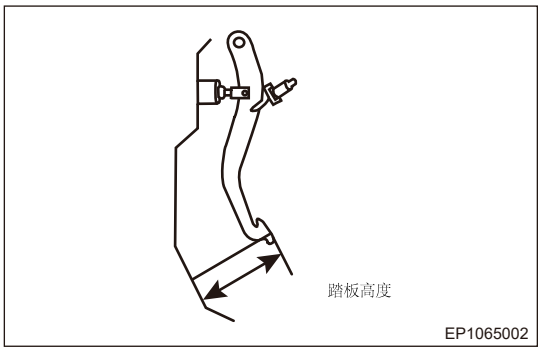
(1) Check the brake pedal free travel

1) Stop the engine. Depress brake pedal several times until there is no vacuum in the vacuum booster, and then release the brake pedal.

2) Depress the brake pedal until the resistance is felt.

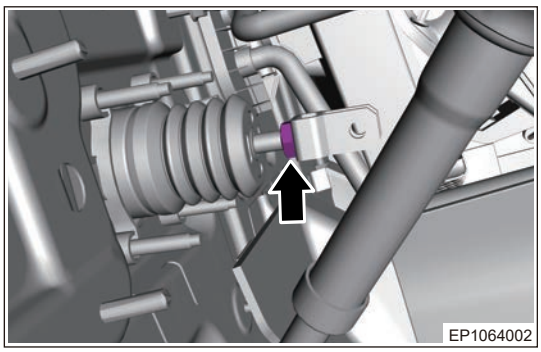
(2) Check the brake pedal height

1) As shown in illustration, remove carpet and measure brake pedal height between center of brake pedal and front cowl.



(3) Adjust the brake pedal height.

1) As shown in illustration, loosen lock nut (arrow) from vacuum booster push rod, and then turn vacuum booster push rod counterclockwise or clockwise to adjust brake pedal height until its height meets standard value. Brake pedal free travel reasonable range: ＜ 25 mm.



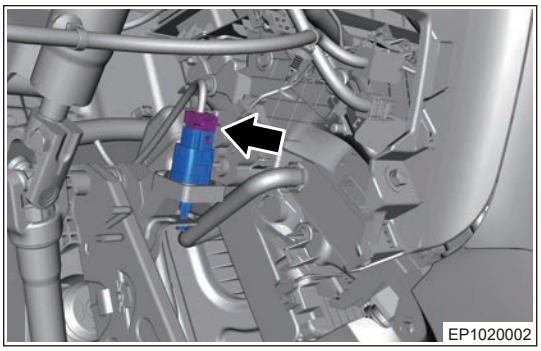
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

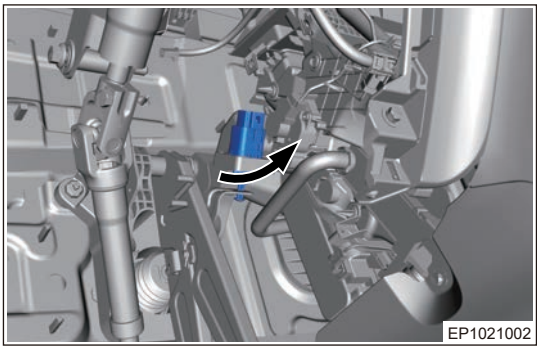
(2) Disconnect the negative battery cable.

(3) Remove the lower left protector assembly.

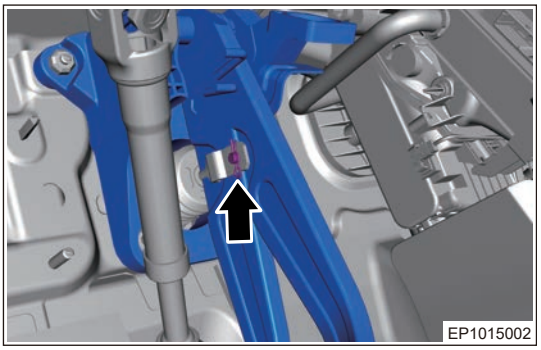
(4) Disconnect the brake switch assembly wire harness connector (arrow).



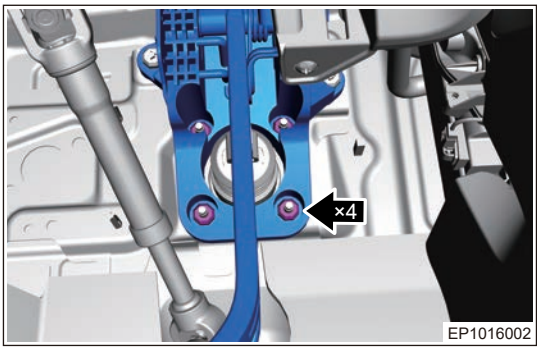
(5) Press switch with hand and turn it by 90° counterclockwise to remove brake switch assembly.



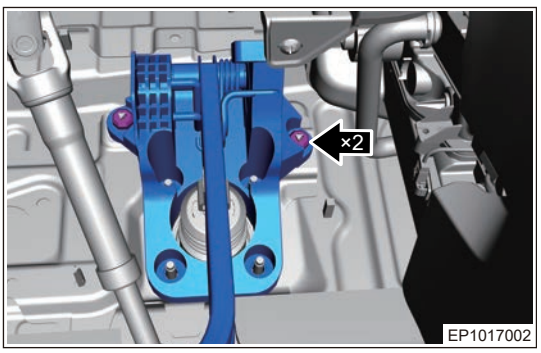
(6) Remove lock pin (arrow) between vacuum booster assembly and brake pedal, and remove pin shaft.



(7) Remove 4 fixing nuts between brake pedal assembly and vacuum booster assembly.



(8) Remove 2 fixing nuts (arrow) between brake pedal assembly and body.



(9) Remove the brake pedal assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Check that brake light operates normally after installation.**
- **Check if brake pedal free travel is within normal range after installing brake pedal. Normal range: ＜25 mm**

(1) Install the brake pedal assembly to a proper position.

(2) Install 6 fixing nuts on the brake pedal assembly.

Torque: 23 ± 2 N·m

(3) Install the pin shaft and lock pin between vacuum booster assembly and brake pedal.

(4) Install the brake switch.

⚠ Caution

- **Align with the mounting bracket clamping port. Do not depress the brake pedal and make sure the brake pedal is int the released state.**
- **Under the natural state of the brake pedal, check if "housing" and "movable bushing" of brake switch are flush. If flush, it indicates that the state is normal. Otherwise, operate it again according to the procedure and recheck.**

(5) Connect the brake switch assembly wire harness connector.

(6) Install the lower left protector assembly.

(7) Connect the negative battery cable.

3.6 Front Brake Hose Assembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ Removal

Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **Try to prevent body paint surface from being scratched during removal and installation.**

(1) Drain the brake fluid.

Hint:

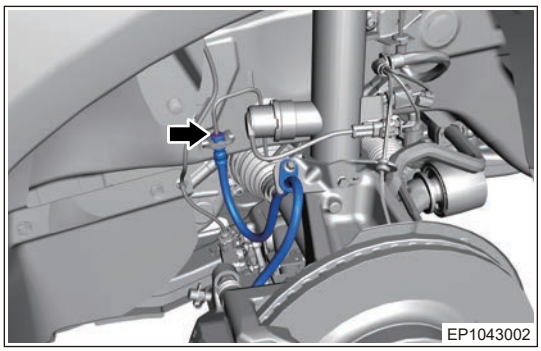
- Drained brake fluid should be well kept in a container. Never discard it at will.

⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(2) Remove the front left wheel.

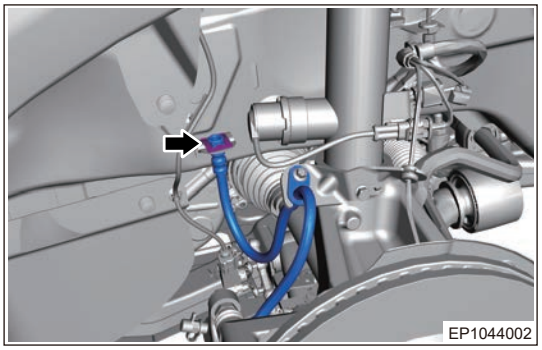
(3) Remove coupling nut (arrow) between front left brake hose assembly and front left brake pipe assembly.



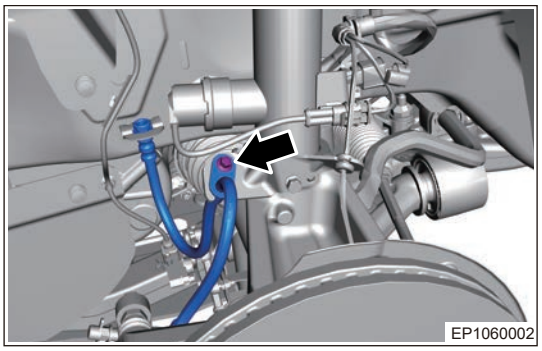
⚠ Caution

- **DO NOT allow any foreign matter such as dirt and dust to enter brake pipe from joint parts.**
- **After removing brake line, perform sealing treatment to prevent foreign matter from entering.**

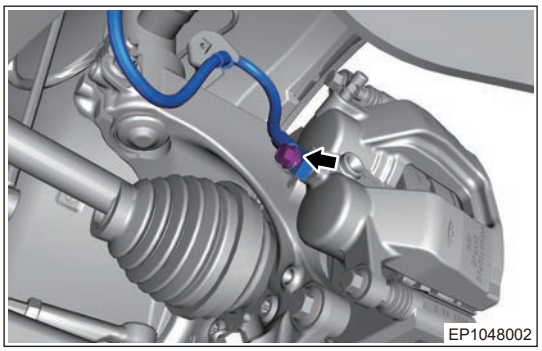
(4) Remove holding reed (arrow) between front left brake hose assembly and brake line mounting bracket.



(5) Remove fixing bolt (arrow) from front left brake hose assembly.



(6) Remove coupling bolt (arrow) between front left brake hose assembly and front left brake caliper assembly.



Hint:

- When removing coupling bolt, be careful not to drop 2 gaskets.

(7) Remove the front left brake hose assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the front left brake hose to a proper position.

(2) Install and tighten coupling bolt between front left brake hose assembly and front left brake caliper assembly.

Torque: 27 ± 2 N·m

Hint:

- When installing coupling bolt, be careful not to drop the 2 gaskets.

(3) Install and tighten coupling nut between front left brake hose assembly and front left brake pipe assembly.

Torque: 18 ± 2 N·m

(4) Install holding reed between front left brake hose assembly and brake line mounting bracket.

(5) Install and tighten the front left brake hose assembly fixing bolt.

Torque: 9 ± 1.5 N·m

(6) Fill brake fluid and drain the air in brake system.

(7) Install the front left wheel.

3.7 Rear Brake Hose Assembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ Removal

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **Try to prevent body paint surface from being scratched during removal and installation.**

Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

(1) Drain the brake fluid.

Hint:

- Drained brake fluid should be well kept in a container. Never discard it at will.

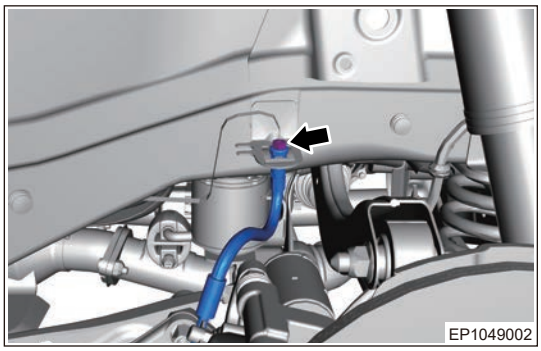
⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(2) Remove the rear left wheel.

(3) Remove the rear left wheel house protector assembly.

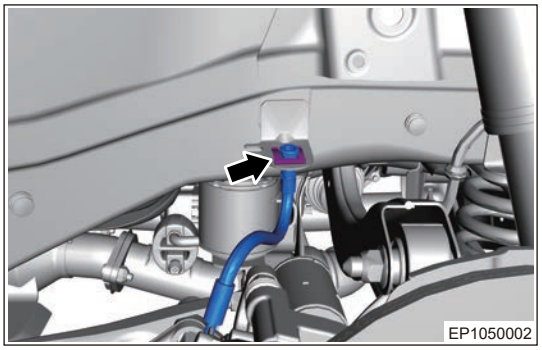
(4) Remove coupling nut (arrow) between rear left brake hose assembly and rear left brake pipe II assembly.



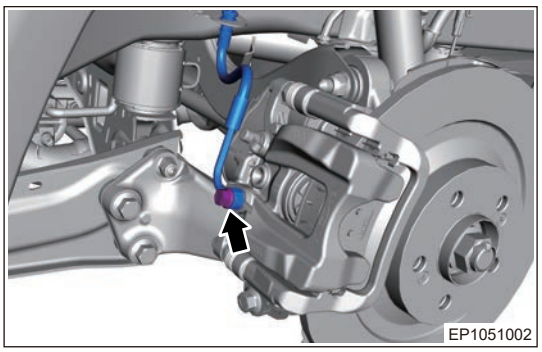
⚠ Caution

- **DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.**
- **After removing brake line, perform sealing treatment to prevent foreign matter from entering.**
- **DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.**

(5) Remove holding reed (arrow) between rear left brake hose assembly and rear left brake pipe bracket.



(6) Remove coupling bolt (arrow) between rear left brake hose assembly and rear left brake caliper assembly.



Hint:

- When removing coupling bolt, be careful not to drop 2 gaskets.

(7) Remove the rear left brake hose assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the rear left brake hose to a proper position.

(2) Install and tighten coupling bolt between rear left brake hose assembly and rear left brake caliper assembly.

Torque: 27 ± 2 N·m

Hint:

- When installing coupling bolt, be careful not to drop the 2 gaskets.

(3) Install and tighten coupling nut between rear left brake hose assembly and rear left brake pipe II assembly.

Torque: 18 ± 2 N·m

(4) Install holding reed between rear left brake hose assembly and rear left brake pipe bracket.

(5) Install the rear left wheel house protector assembly.

(6) Fill brake fluid and drain the air in brake system.

(7) Install the rear left wheel.

3.8 Vacuum Pump Assembly

■ Removal

⚠ Caution

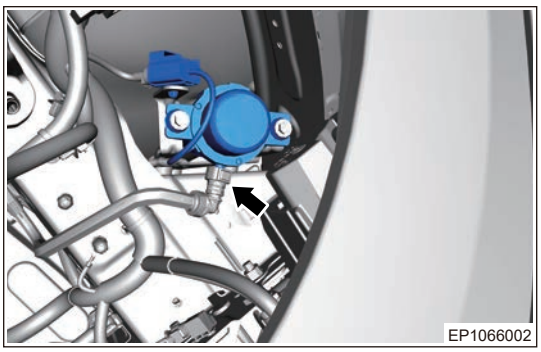
- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **Try to prevent body paint surface from being scratched during removal and installation.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

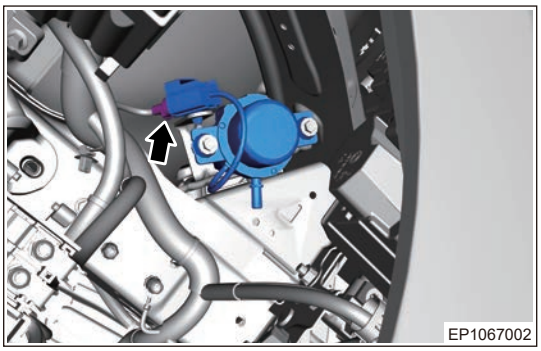
(2) Disconnect the negative battery cable.

(3) Remove the air filter assembly.

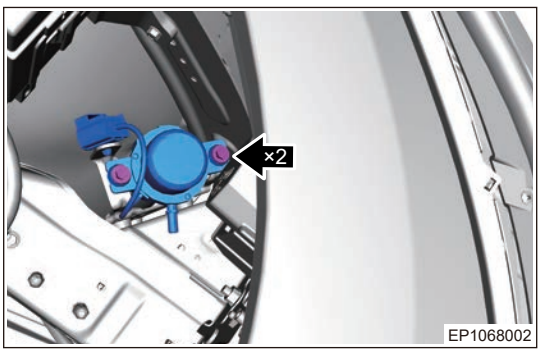
(4) Disconnect the connector (arrow) between vacuum pump and connecting pipe assembly connector.



(5) Disconnect the vacuum pump connector (arrow).



(6) Remove 2 fixing bolts (arrow) from vacuum pump assembly.



(7) Remove the vacuum pump assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check if vacuum pipe is clamped in place after installation. Repair or replace malfunctioning parts as necessary.**

(1) Install the vacuum pump assembly to a proper position.

(2) Install 2 fixing bolts to vacuum pump assembly.

Torque: 9 ± 1.5 N·m

(3) Connect the vacuum pump connector.

(4) Connect the vacuum pump and connecting pipe.

(5) Install the air filter assembly.

(6) Connect the negative battery cable.

3.9 Connecting Pipe Assembly

■ Removal

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **Try to prevent body paint surface from being scratched during removal and installation.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

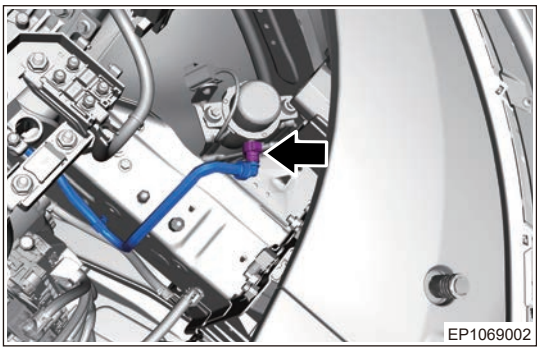
(2) Disconnect the negative battery cable.

(3) Remove the air filter assembly.

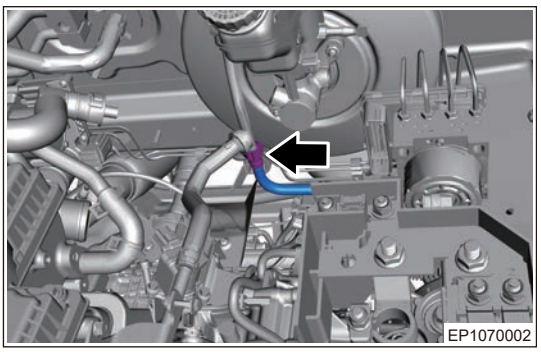
(4) Remove the battery.

(5) Remove the battery tray.

(6) Disconnect the connector (arrow) between vacuum pump and connecting pipe connector.



(7) Disconnect connector (arrow) between connecting pipe assembly and vacuum brake hose assembly.



(8) Remove connecting clip between connecting pipe assembly and body.

(9) Remove the connecting pipe assembly.

■ Installation

⚠ Caution

- **Be sure to check if vacuum pipe is clamped in place after installation. Repair or replace malfunctioning parts as necessary.**

(1) Install the connecting pipe assembly to a proper position.

(2) Install connecting clip between connecting pipe and body.

(3) Connect connector (arrow) between connecting pipe assembly and vacuum brake hose assembly.

(4) Connect the connector between vacuum pump and connecting pipe.

(5) Install the battery tray.

(6) Install the battery.

(7) Install the air filter assembly.

(8) Connect the negative battery cable.

3.10 Vacuum Brake Hose Assembly

■ Removal

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
- **Try to prevent body paint surface from being scratched during removal and installation.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

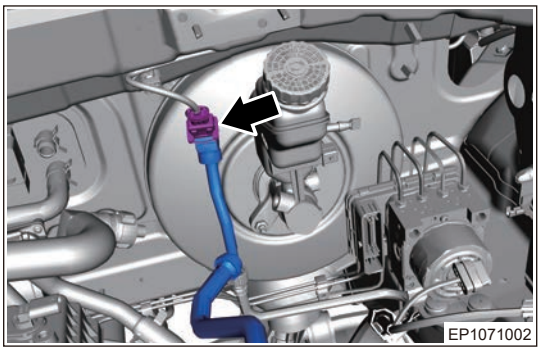
(2) Disconnect the negative battery cable.

(3) Remove the battery.

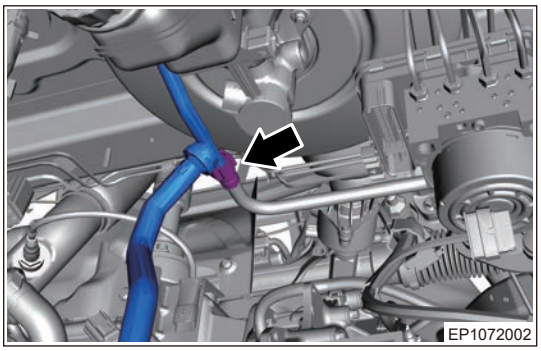
(4) Remove the battery tray.

(5) Remove the intake hose assembly.

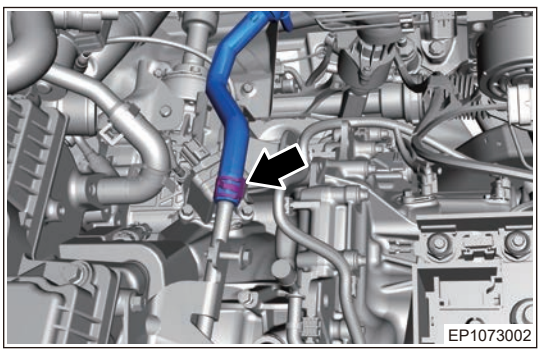
(6) Disconnect the vacuum pressure sensor connector (arrow).



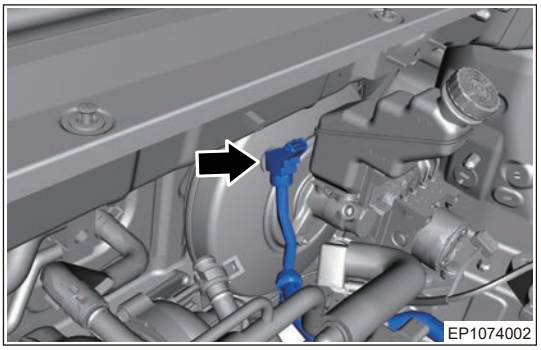
(7) Disconnect the connector (arrow) between vacuum brake hose assembly and connecting pipe assembly.



(8) Remove the connecting clamp (arrow) between vacuum brake hose assembly and metal vacuum tube and disconnect connector between vacuum brake hose assembly and metal vacuum tube.



(9) Disconnect connector (arrow) between vacuum hose and vacuum booster.



(10) Remove the vacuum brake hose assembly.

■ **Installation**

> ⚠ **Caution**
>
> - **Be sure to check if vacuum pipe is clamped in place after installation. Repair or replace malfunctioning parts as necessary.**

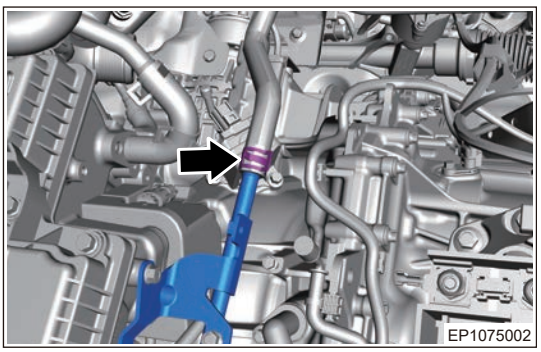
(1) Install the vacuum brake hose assembly to a proper position.
(2) Connect connector between vacuum brake hose assembly and vacuum booster.
(3) Connect the vacuum pressure sensor connector.
(4) Connect connector between vacuum brake hose assembly and connecting pipe.
(5) Install connector between vacuum brake hose assembly and metal vacuum tube, and install clamp.
(6) Install the intake hose assembly.
(7) Install the battery tray.
(8) Install the battery.
(9) Connect the negative battery cable.

3.11 Metal Vacuum Assembly

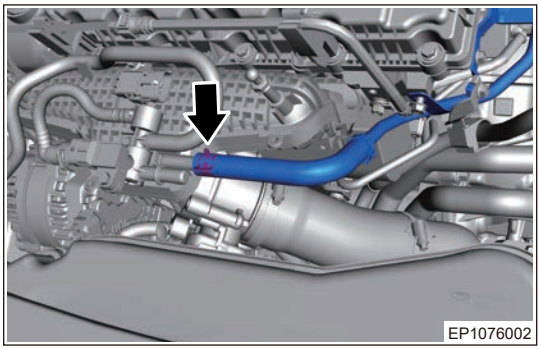
■ **Removal**

> ⚠ **Caution**
>
> - **Be sure to wear necessary safety equipment to prevent accidents when repairing.**
> - **Try to prevent body paint surface from being scratched during removal and installation.**

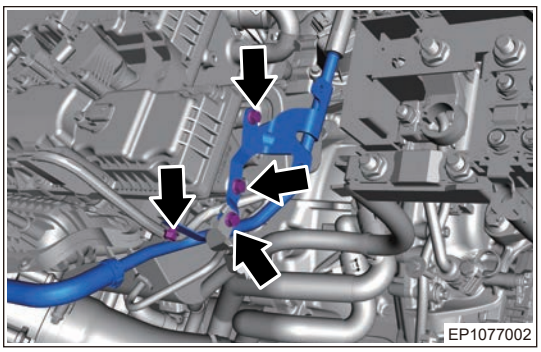
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the intake hose assembly.
(4) Remove the connecting clamp (arrow) between metal vacuum tube and vacuum brake hose assembly, and disconnect connector between metal vacuum tube and vacuum brake hose assembly.



(5) Remove the connecting clamp (arrow) between metal vacuum tube and intake manifold, and disconnect connector between metal vacuum tube and intake manifold.



(6) Remove fixing bolt from metal vacuum tube bracket.



(7) Remove the metal vacuum tube assembly.

■ **Installation**

⚠ Caution
• **Be sure to check if vacuum pipe is clamped in place after installation. Repair or replace malfunctioning parts as necessary.**

(1) Install the metal assembly to a proper position.

(2) Install the connector between metal vacuum pipe and intake manifold, and install the fixing clamp.

(3) Install connector between metal vacuum pipe and vacuum brake hose assembly, and install the fixing clamp.

(4) Install the metal vacuum tube bracket fixing bolt.

Torque: 9 ± 1.5 N·m

(5) Install the intake hose assembly.

(6) Connect the negative battery cable.

3.12 Front Left Brake Pipe Assembly

■ **Removal**

(1) Drain the brake fluid.

Hint:

- Drained brake fluid should be well kept in a container. Never discard it at will.

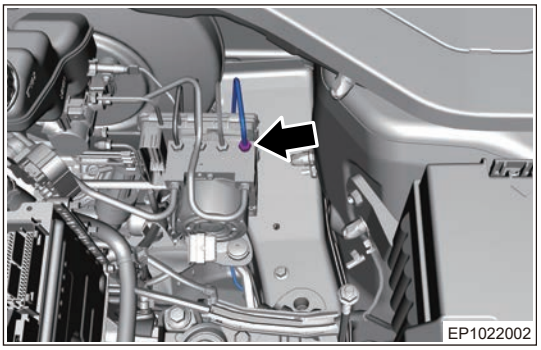
⚠ Caution
• **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(2) Remove the battery.

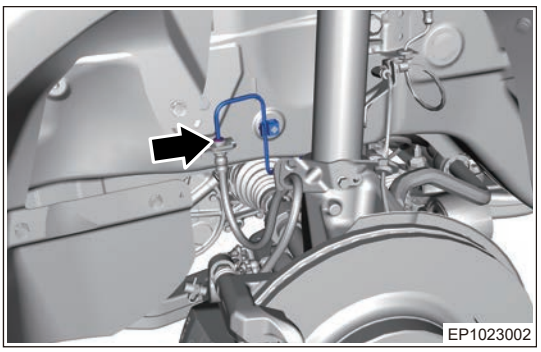
(3) Remove the battery tray.

(4) Remove the front left wheel.

(5) Remove coupling nut (arrow) between front left brake pipe assembly and ESP control module, and disconnect connector between front left brake pipe assembly and ESP control module.



(6) Remove coupling nut (arrow) between front left brake hose assembly and front left brake pipe.



⚠ Caution

- **When installing and tightening, hold pipeline by hand to prevent it from rotating. Visually check to make sure the second straight segment when connect ESP keeps at an angle of about 5 degrees.**
- **After removing brake line, perform sealing treatment to prevent foreign matter from entering.**

(7) Remove the front left brake pipe assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the front left brake pipe assembly to a proper position.

(2) Install coupling nut between front left brake hose assembly and front left brake pipe.

Torque: 18 ± 2 N·m

(3) Connect coupling nut between front left brake pipe assembly and ESP control module, and tighten coupling nut between front left brake pipe assembly and ESP control module.

Torque: 18 ± 2 N·m

(4) Install the battery tray.

(5) Install the battery.

(6) Fill brake fluid, and perform bleeding procedures for brake system to drain the air in brake system.

(7) Install the front left wheel.

3.13 Front Right Brake Pipe Assembly

■ Removal

(1) Drain the brake fluid.

Hint:

- Drained brake fluid should be well kept in a container. Never discard it at will.

⚠ Caution

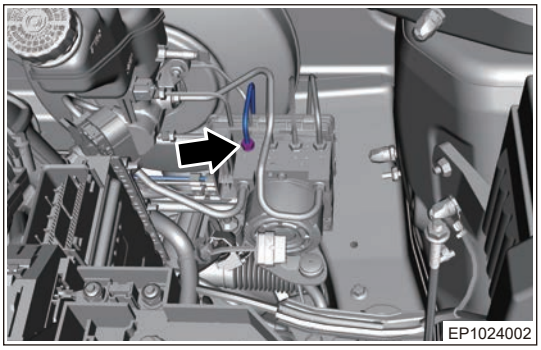
- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(2) Remove the battery.

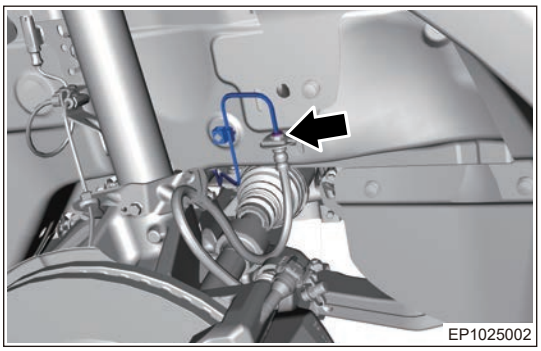
(3) Remove the battery tray.

(4) Remove the front right wheel.

(5) Remove coupling nut (arrow) between front right brake pipe assembly and ESP control module, and disconnect connector between front right brake pipe assembly and ESP control module.



(6) Remove coupling nut (arrow) between front right brake hose assembly and front right brake pipe.



⚠ Caution

- **DO NOT allow any foreign matter such as dirt and dust to enter brake pipe from joint parts.**
- **After removing brake line, perform sealing treatment to prevent foreign matter from entering.**

(7) Remove the front right brake pipe assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the front right brake pipe assembly to a proper position.

(2) Install the coupling nut between front right brake hose assembly and front right brake pipe.

Torque: 18 ± 2 N·m

(3) Connect coupling nut between front right brake pipe assembly and ESP control module, and tighten fixing nut between front right brake pipe assembly and ESP control module.

Torque: 18 ± 2 N·m

(4) Install the battery tray.

(5) Install the battery.

(6) Fill brake fluid, and perform bleeding procedures for brake system to drain the air in brake system.

(7) Install the front right wheel.

3.14 Master Cylinder Front Chamber Pipe Assembly

■ Removal

(1) Drain the brake fluid in brake fluid reservoir.

Hint:

- Drained brake fluid should be well kept in a container. Never discard it at will.

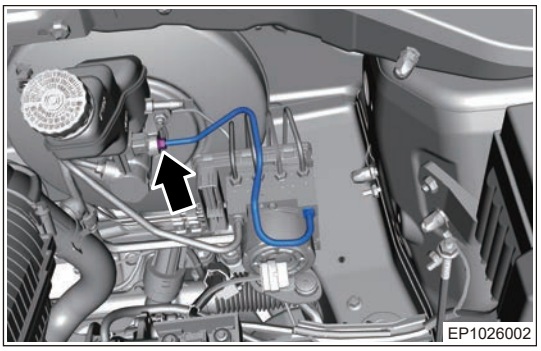
⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

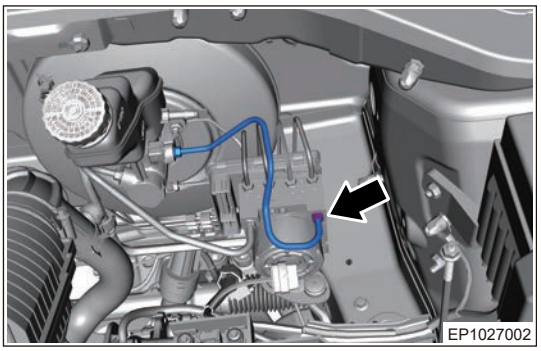
(2) Remove the battery.

(3) Remove the battery tray.

(4) Remove coupling nuts (arrow) between master cylinder front chamber pipe and brake master cylinder, and disconnect connector between master cylinder front chamber pipe assembly and brake master cylinder.


EP1026002

(5) Remove coupling nut (arrow) between master cylinder front chamber pipe assembly and ESP module.


EP1027002

(6) Remove the master cylinder front chamber pipe assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the master cylinder front chamber pipe assembly to a proper position.

(2) Connect connector between master cylinder front chamber pipe assembly and ESP module, and tighten coupling nut.

Torque: 18 ± 2 N·m

(3) Connect connector between master cylinder front chamber pipe and brake master cylinder, and tighten the coulpling nut.

Torque: 18 ± 2 N·m

(4) Install the battery tray.

(5) Install the battery.

(6) Fill brake fluid.

(7) Drain the air in brake system.

3.15 Master Cylinder Rear Chamber Pipe Assembly

■ Removal

(1) Drain the brake fluid in brake fluid reservoir.

Hint:

- Drained brake fluid should be well kept in a container. Never discard it at will.

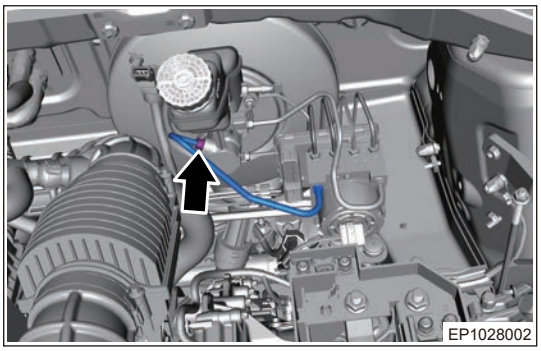
⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

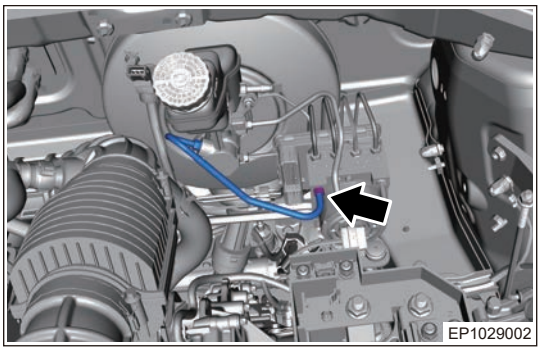
(2) Remove the battery.

(3) Remove the battery tray.

(4) Remove coupling nuts (arrow) between master cylinder rear chamber pipe assembly and brake master cylinder, and disconnect connector between rear chamber pipe assembly and brake master cylinder.



(5) Remove coupling nuts (arrow) between master cylinder rear chamber pipe assembly and ESP module, and disconnect connector between master cylinder rear chamber pipe assembly and ESP module.



(6) Remove the master cylinder rear chamber pipe assembly.

■ **Installation**

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the master cylinder rear chamber pipe assembly to a proper position.

(2) Install connector between master cylinder rear chamber pipe assembly and ESP control module, and tighten coupling nut between master cylinder rear chamber pipe assembly and ESP control module.

Torque: 18 ± 2 N·m

(3) Install connector between master cylinder rear chamber pipe assembly and brake cylinder, and tighten coupling nut between master cylinder rear chamber pipe assembly and brake cylinder.

Torque: 18 ± 2 N·m

(4) Install the battery tray.

(5) Install the battery.

(6) Fill brake fluid.

(7) Drain the air in brake system.

3.16 Rear Left Brake Pipe I Assembly

■ **Removal**

(1) Drain the brake fluid.

Hint:

- Drained brake fluid should be well kept in a container. Never discard it at will.

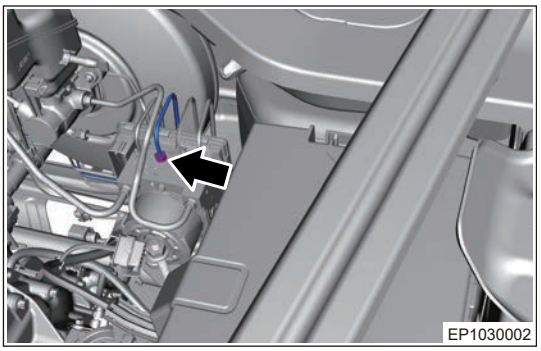
⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

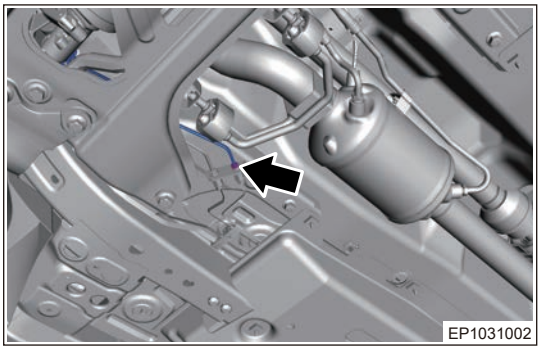
(2) Remove the battery.

(3) Remove the battery tray.

(4) Remove coupling nut (arrow) between rear left brake pipe I assembly and ESP controller, and disconnect connector between rear left brake pipe I assembly and ESP.



(5) Remove coupling nut (arrow) between rear left brake pipe I assembly and two-way pipe, and disconnect connector between rear left brake pipe I assembly and two-way pipe.



(6) Remove the rear left brake pipe I assembly.

■ **Installation**

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the rear left brake pipe I assembly to a proper position.

(2) Install connector between rear left brake pipe I assembly and two-way pipe, and tighten coupling nut between rear left brake pipe I assembly and two-way pipe.

Torque: 18 ± 2 N·m

(3) Install connector between rear left brake pipe I assembly and ESP controller, and tighten coupling nut between rear left brake pipe I assembly and ESP controller.

Torque: 18 ± 2 N·m

(4) Install the battery tray.

(5) Install the battery.

(6) Fill brake fluid.

(7) Drain the air in brake system.

3.17 Rear Right Brake Pipe I Assembly

■ **Removal**

(1) Drain the brake fluid.

Hint:

- Drained brake fluid should be well kept in a container. Never discard it at will.

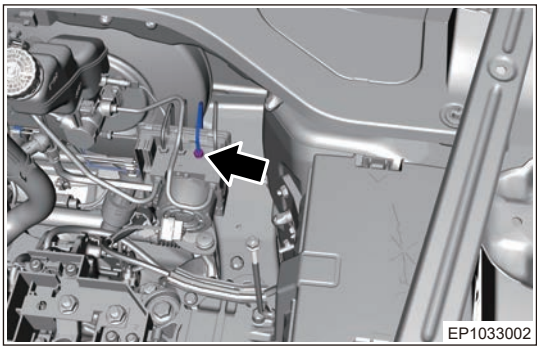
⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

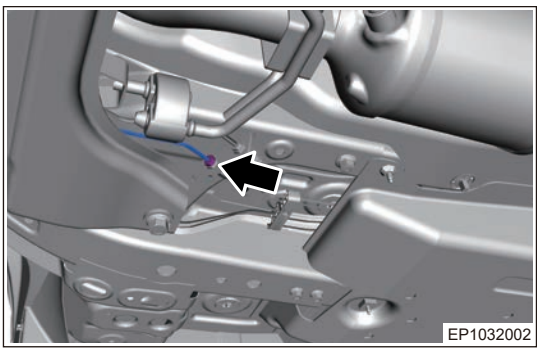
(2) Remove the battery.

(3) Remove the battery tray.

(4) Remove coupling nut (arrow) between rear right brake pipe I assembly and ESP controller, and disconnect connector between rear right brake pipe I assembly and ESP controller.



(5) Remove coupling nut (arrow) between rear right brake pipe I assembly and two-way pipe, and disconnect connector between rear right brake pipe I assembly and two-way pipe.



(6) Remove the rear right brake pipe I assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the rear right brake pipe I assembly to a proper position.

(2) Install connector between rear right brake pipe I assembly and ESP controller, and tighten coupling nut between rear right brake pipe I assembly and ESP controller.

Torque: 18 ± 2 N·m

(3) Install connector between rear right brake pipe I assembly and two-way pipe, and tighten coupling nut between rear right brake pipe I assembly and two-way pipe.

Torque: 18 ± 2 N·m

(4) Install the battery tray.

(5) Install the battery.

(6) Fill brake fluid.

(7) Drain the air in brake system.

3.18 Rear Left Brake Pipe II Assembly

■ Removal

(1) Drain the brake fluid.

Hint:

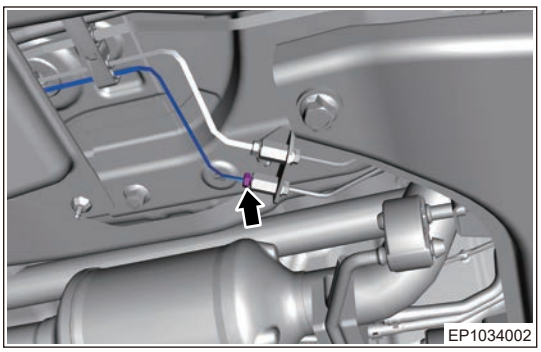
- Drained brake fluid should be well kept in a container. Never discard it at will.

⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(2) Disconnect the negative battery cable.

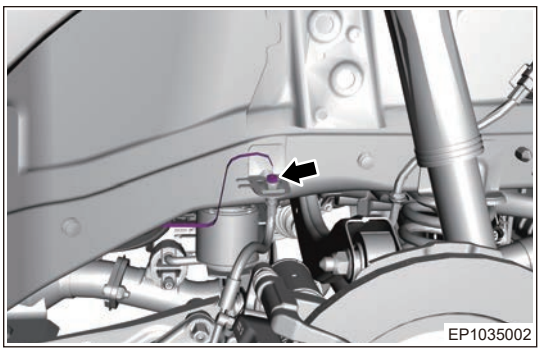
(3) Remove coupling nut (arrow) between rear left brake pipe II and two-way pipe, and disconnect connector between rear left brake pipe II and two-way pipe.



(4) Remove the rear left wheel.

(5) Remove the rear left wheel house protector assembly.

(6) Remove coupling nut between rear left brake pipe II assembly and rear left brake hose assembly.



(7) Remove the rear left brake pipe II assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the rear left brake pipe II assembly to a proper position.

(2) Install connector between rear left brake pipe II and two-way pipe, and tighten coupling nut between rear left brake pipe II and two-way pipe.

Torque: 18 ± 2 N·m

(3) Install and tighten coupling nut between rear left brake pipe II assembly and rear left brake hose assembly.

Torque: 18 ± 2 N·m

(4) Install the rear left wheel house protector assembly.

(5) Connect the negative battery cable.

(6) Fill brake fluid.

(7) Drain the air in brake system.

(8) Install the rear left wheel.

3.19 Rear Right Brake Pipe II Assembly

■ Removal

(1) Drain the brake fluid.

Hint:

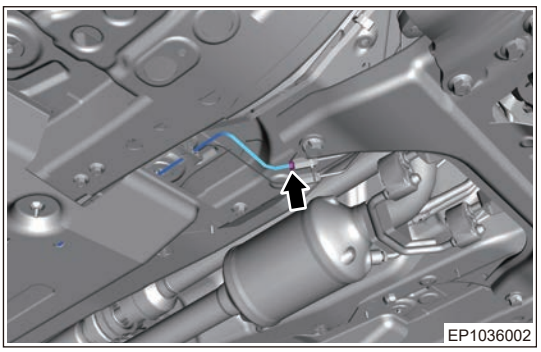
- Drained brake fluid should be well kept in a container. Never discard it at will.

⚠ Caution

- **Wash off brake fluid immediately if it comes in contact with any paint surface.**

(2) Disconnect the negative battery cable.

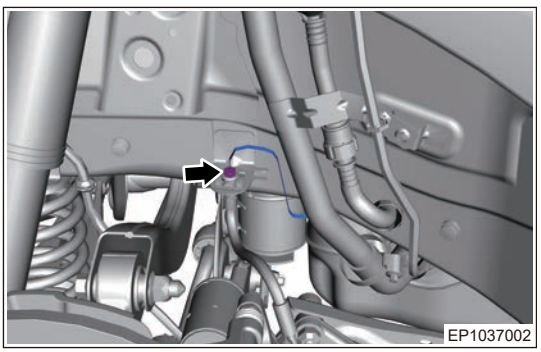
(3) Remove coupling nut (arrow) between rear right brake pipe II and two-way pipe, and disconnect connector between rear right brake pipe II and two-way pipe.



(4) Remove the rear right wheel.

(5) Remove the rear right wheel house protector assembly.

(6) Remove coupling nut (arrow) between rear right brake pipe II assembly and rear right brake hose assembly



(7) Remove the rear right brake pipe II assembly.

■ Installation

⚠ Caution

- **Be sure to tighten fixing plug and nut to specified torque during installation.**
- **Be sure to check brake system for leakage after installation. Repair or replace malfunctioning parts as necessary.**
- **Be sure to perform bleeding procedures for brake system after installation.**
- **Be sure to add brake fluid to a proper level after installation.**

(1) Install the rear right brake pipe II assembly to a proper position.

(2) Install connector between rear right brake pipe II and two-way pipe, and tighten coupling nut between rear right brake pipe II and two-way pipe.

Torque: 18 ± 2 N·m

(3) Install connector between rear right brake pipe II assembly and rear right brake pipe II assembly, and tighten coupling nut between rear right brake pipe II assembly and rear right brake hose assembly.

Torque: 18 ± 2 N·m

(4) Install rear right wheel house protector assembly.

(5) Connect the negative battery cable.

(6) Fill brake fluid.

(7) Drain the air in brake system.

(8) Install the rear right wheel.

6.6 HYDRAULIC BRAKE (ONE BOX)

1 Precautions

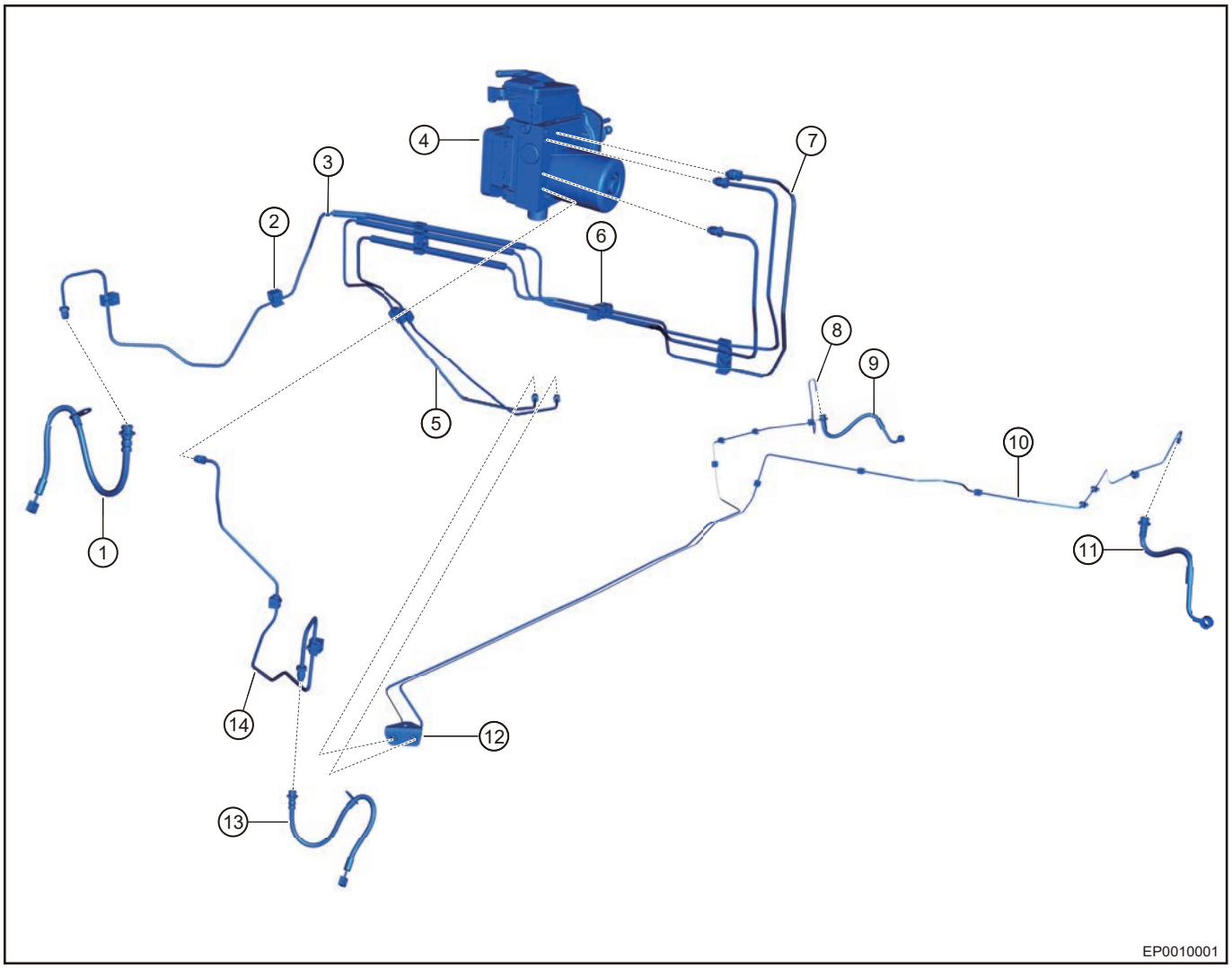
1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

- After removing brake line, perform sealing treatment to prevent foreign matter from entering.
- DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.
- DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose assembly, as brake fluid is corrosive.
- When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of integrated brake controller (vehicle power supply is turned off), so as to avoid reverse impact, resulting in integrated brake controller internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

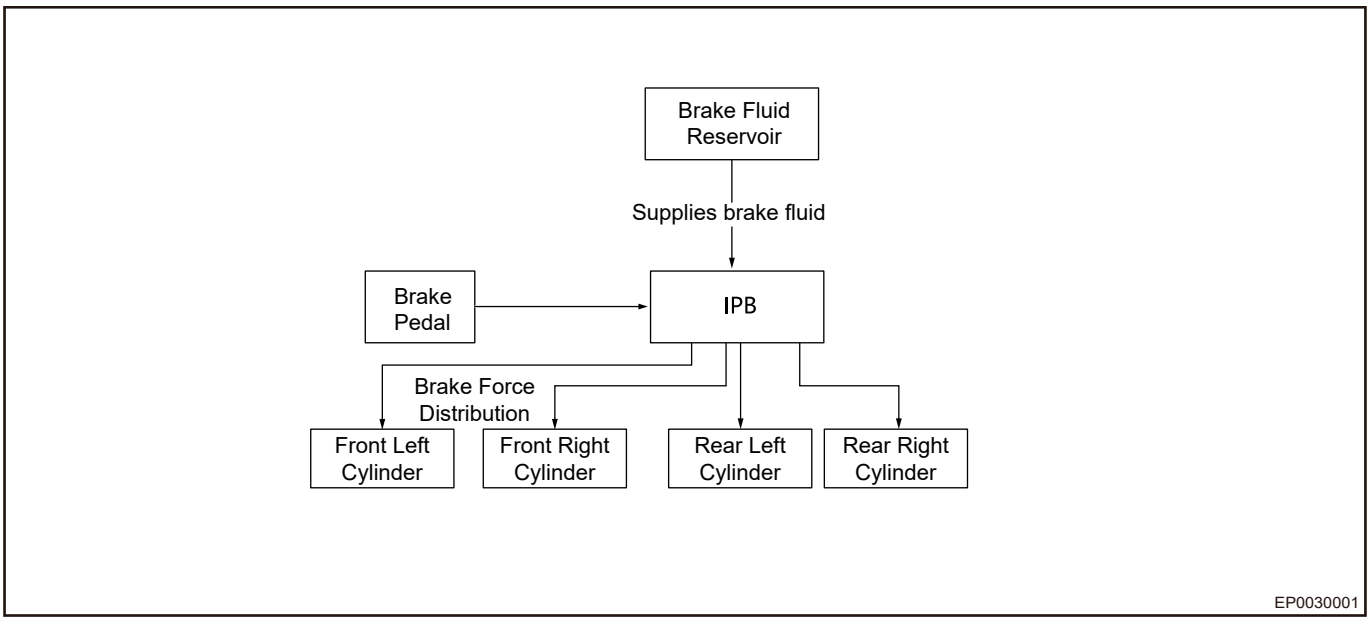


1	Front Right Brake Hose	8	Rear Right Brake Pipe II Assembly
2	Pipe Clamp with 1 Groove	9	Rear Right Brake Hose

3	Front Right Brake Pipe Assembly	10	Rear Left Brake Pipe II Assembly
4	Integrated Brake Control Module Assembly	11	Rear Left Brake Hose
5	Rear Right Brake Pipe I Assembly	12	Two-way
6	Pipe Clamp with 3 Grooves	13	Front Left Brake Hose
7	Rear Left Brake Pipe I Assembly	14	Front Left Brake Pipe Assembly

Brake system adopts hydraulic transmission device, and mainly consists of integrated brake control module assembly, brake fluid reservoir assembly, hydraulic line (brake hose, brake pipe), brake assembly etc.

2.2 System schematic diagram



The brake on this vehicle is controlled by integrated brake controller. The integrated brake controller is a drive-by-wire hydraulic brake system, which uses the displacement input by driver pedal as the brake request when brake pedal is depressed. After being calculated by system, the motor pushes piston of brake caliper assembly outwards through boost control, realizing the wheel side brake force.
When brake pedal assembly is released, brake pedal will return under the action of return spring, brake caliper assembly piston and wheel brake caliper assembly will return to release the brake on wheel.
The brake feedback torque generated when depressing brake pedal is calculated by integrated brake controller. The brake pedal force from driver is achieved by the pedal sense simulator, which allows ideal pedal sense performance to be achieved.

3 Diagnostic Information and Steps

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Brake System:

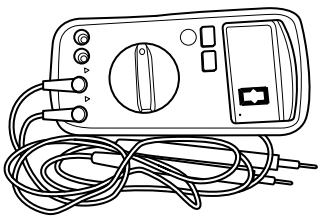
Symptom	Possible Cause
Poor braking effect	Brake fluid quality
	Air in brake system
	Uneven brake disc wear

Symptom	Possible Cause
	Uneven lining assembly wear
	Minimum brake pedal free play
	Brake system leakage (fluid or pressure)

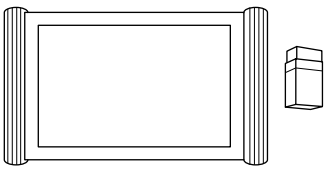
4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ Special Tools

Tool Name	Tool Drawing
Diagnostic tester	 S00001

4.2 Specifications

■ Torque Specifications

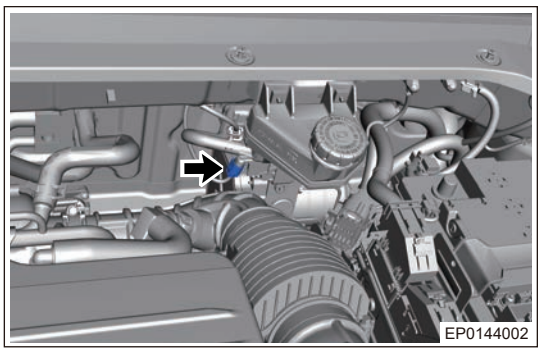
Item	Tightening Torque (N·m)
2 Fixing Nuts Between Brake Pedal Assembly and Vehicle Body	23 ± 2
4 Fixing Nuts Between Vacuum Integrated Brake Controller Assembly And Brake Pedal Assembly	23 ± 2
Coupling Bolt Between Front Left Brake Hose Assembly and Front Left Brake Caliper Assembly	27 ± 2 N·m
Coupling Nut Between Front Left Brake Hose Assembly and Front Left Brake Pipe Assembly	18 ± 2 N·m
Coupling Nut Between Front Left Brake Pipe Assembly and Integrated Brake Controller Assembly	18 ± 2 N·m

Item	Tightening Torque (N·m)
Coupling Bolt Between Rear Left Brake Hose Assembly and Rear Left Brake Caliper Assembly	27 ± 2 N·m
Coupling Nut Between Rear Left Brake Hose Assembly and Rear Left Brake Pipe II Assembly	18 ± 2 N·m
Coupling Nut Between Rear Left Brake Pipe II Assembly and Two-way	18 ± 2 N·m
Coupling Nut Between Rear Left Brake Pipe I Assembly and Two-way	18 ± 2 N·m
Coupling Nut Between Rear Left Brake Pipe I Assembly and Integrated Brake Controller Assembly	18 ± 2 N·m
Coupling Bolt between Front Right Brake Hose Assembly and Front Right Brake Caliper Assembly	27 ± 2 N·m
Coupling Nut Between Front Right Brake Pipe Assembly and Front Right Brake Hose Assembly	18 ± 2 N·m
Coupling Nut Between Front Right Brake Pipe Assembly and Integrated Brake Controller Assembly	18 ± 2 N·m
Coupling Bolt between Rear Right Brake Hose Assembly and Rear Right Brake Caliper Assembly	27 ± 2 N·m
Coupling Nut Between Rear Right Brake Pipe II Assembly and Rear Right Brake Hose Assembly	18 ± 2 N·m
Coupling Nut Between Rear Right Brake Pipe II Assembly and Two-way	18 ± 2 N·m
Coupling Nut Between Rear Right Brake Pipe I Assembly and Two-way	18 ± 2 N·m
Coupling Nut Between Rear Right Brake Pipe I Assembly and Integrated Brake Controller Assembly	18 ± 2 N·m

4.3 Inspection and Adjustment

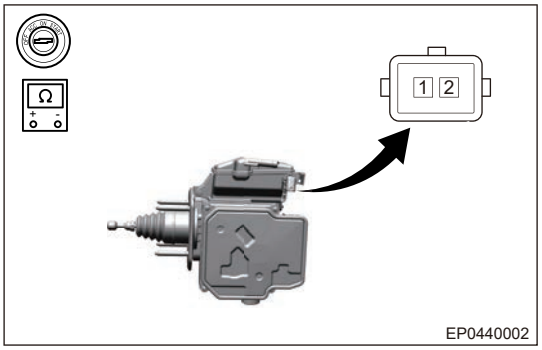
■ Brake Fluid Level Sensor

(1) Disconnect the brake fluid level sensor connector.



(2) Using ohm band of digital multimeter, measure brake fluid level sensor terminal.

Multimeter Connection	Brake Fluid Level	Specified Condition
Terminal 1 - Terminal 2	MAX	∞
Terminal 1 - Terminal 2	MIN	⩽ 1 Ω



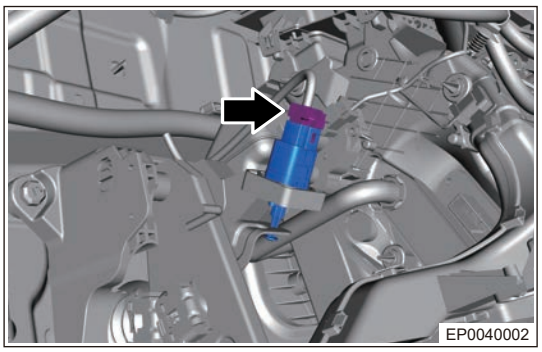
If measurement result is not as specified, replace brake fluid reservoir assembly.

(3) When brake system malfunction indicator on instrument cluster comes on, unplug brake fluid level sensor connector, if brake system malfunction indicator remains on, check wire harness and instrument cluster.

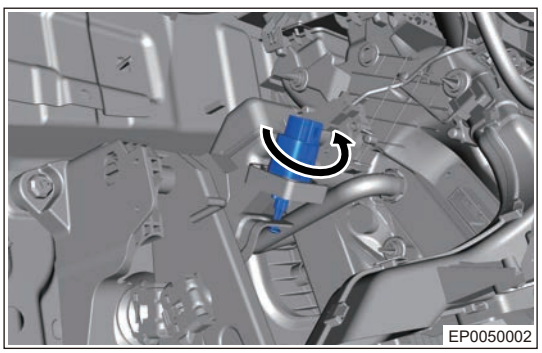
(4) When brake system malfunction indicator on instrument cluster comes on, unplug brake fluid level sensor connector, if brake system malfunction indicator goes off immediately, the level sensor is malfunctioning (precondition: brake fluid is within scale range).

■ Brake Switch Assembly

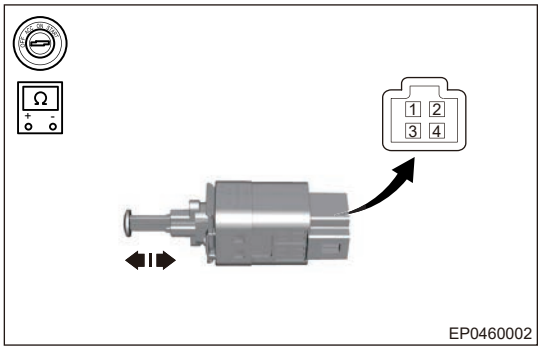
(1) Disconnect the brake light switch assembly connector.



(2) Press switch with hand and turn it by 90° counterclockwise to remove brake switch assembly.



(3) Using ohm band of digital multimeter, measure brake switch assembly terminal.



Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 3	Brake pedal depressed	∞
Terminal 2 - Terminal 4	Brake pedal depressed	⩽ 1 Ω
Terminal 1 - Terminal 3	Brake pedal released	⩽ 1 Ω
Terminal 2 - Terminal 4	Brake pedal released	∞

If measurement result is not as specified, replace brake switch assembly.

4.4 Brake System Bleeding

Refer to integrated brake controller system bleeding method.

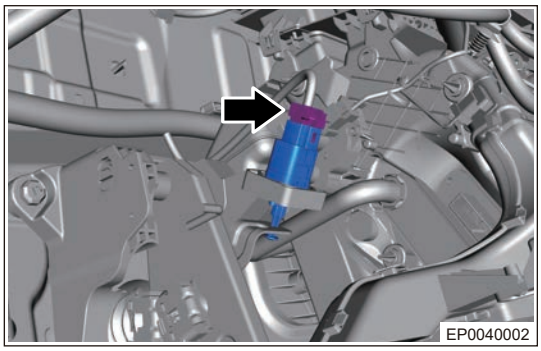
4.5 Brake Pedal Assembly

■ Removal

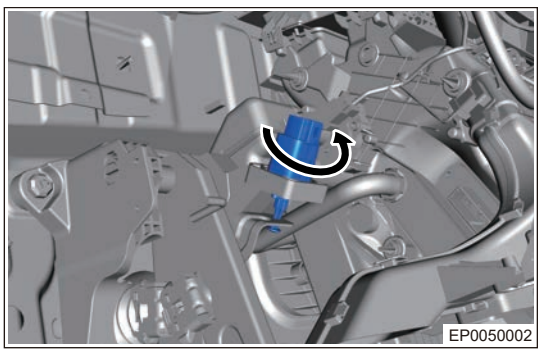
(1) Disconnect the negative battery cable.

(2) Remove the instrument panel lower left protector assembly.

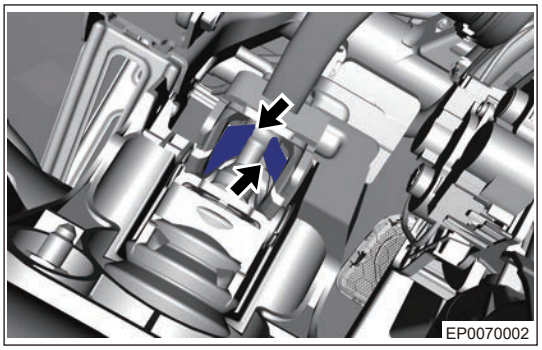
(3) Disconnect the brake light switch assembly connector.



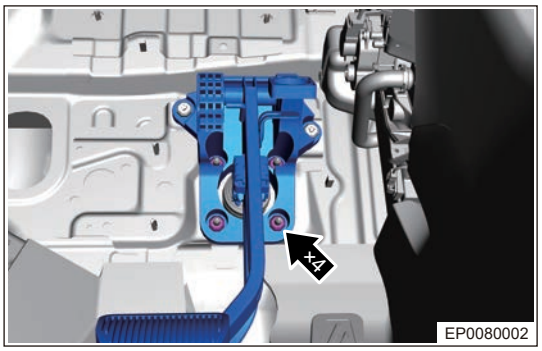
(4) Press switch with hand and turn it by 90° counterclockwise to remove brake switch assembly.



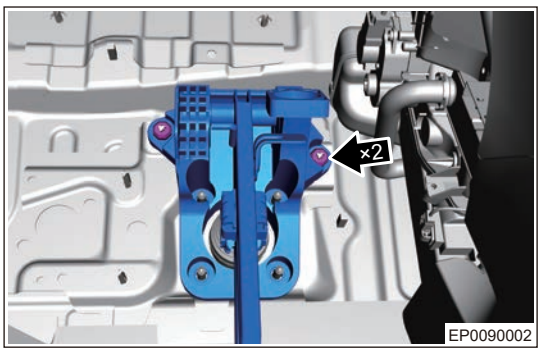
(5) Disconnect the connector (arrow) between integrated brake controller push rod and brake pedal.



(6) Remove 4 fixing nuts (arrow) between integrated brake controller assembly and brake pedal assembly



(7) Remove 2 fixing nut (arrow) between brake pedal assembly and body.



(8) Remove the brake pedal assembly.

■ Installation

(1) Install the brake pedal assembly.

(2) Install 2 fixing nut between brake pedal assembly and body.

Torque: 23 ± 2 N·m

(3) Install connector between integrated brake controller assembly and brake pedal assembly.

(4) Install 4 fixing nuts between integrated brake controller assembly and brake pedal assembly.

Torque: 23 ± 2 N·m

(5) Install brake switch assembly, press switch by hand and turn it 90° clockwise.

(6) Connect the brake light switch assembly connector.

(7) Install the instrument panel lower left protector assembly.

(8) Connect the negative battery cable.

⚠ Caution

- **When connecting integrated brake controller assembly push rod and brake pedal, avoid pushing the integrated brake controller assembly push rod from side to avoid damage the connection.**
- **Do not pull up the pedal after integrated brake controller assembly push rod is connected with brake pedal to avoid damage to internal construction parts of integrated brake controller assembly.**

4.6 Brake Fluid Reservoir Assembly

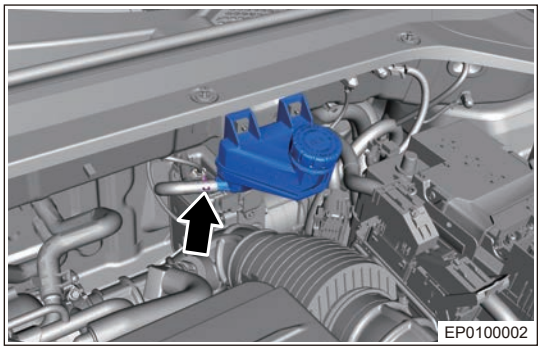
■ Removal

Hint:

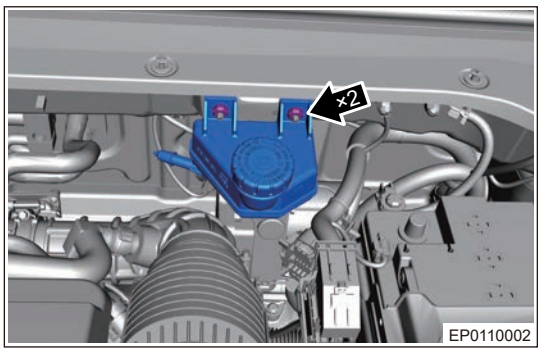
- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

(1) Drain the brake fluid in brake fluid reservoir assembly.

(2) Remove the elastic clamp (arrow) of brake fluid reservoir assembly and separate oil pipe and brake fluid reservoir.



(3) Remove 2 fixing nuts (arrow) from brake fluid reservoir assembly.



(4) Remove the brake fluid reservoir assembly.

■ Installation

(1) Install the brake fluid reservoir assembly.

(2) Install 2 fixing nuts to brake fluid reservoir assembly.

Torque: 9 ± 1.5 N·m

(3) Connect the brake fluid reservoir assembly oil pipe, and install elastic clamp.

(4) Fill brake fluid and drain the air in brake system.

4.7 Brake Hose Assembly (Take Left Side as an Example)

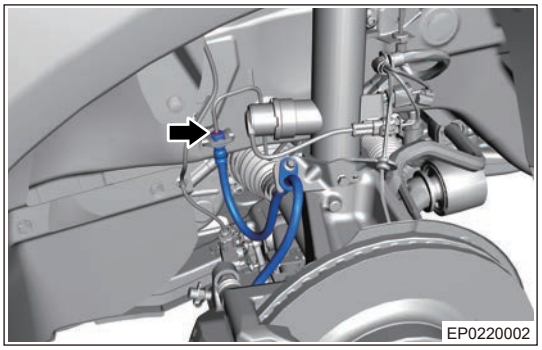
■ Removal

Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

(1) Remove the front left wheel.

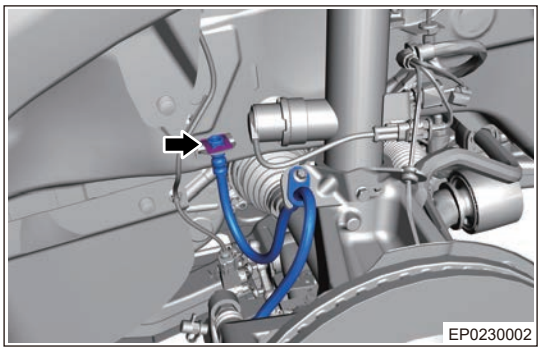
(2) Remove coupling nut (arrow) between front left brake hose assembly and front left brake pipe assembly.



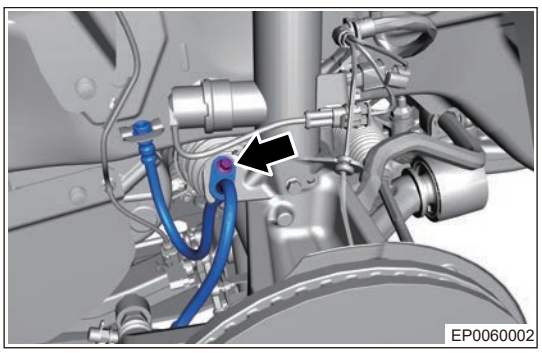
⚠ Caution

- **After removing brake line, perform sealing treatment to prevent foreign matter from entering.**
- **DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.**

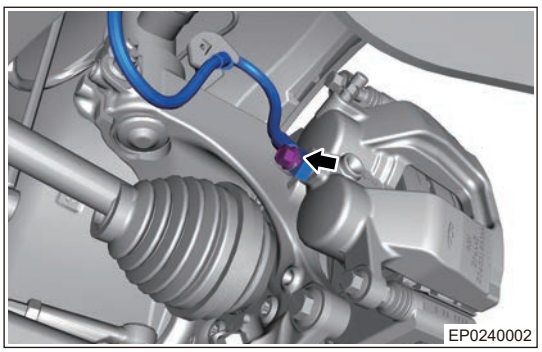
(3) Remove holding reed (arrow) between front left brake hose assembly and brake line mounting bracket.



(4) Remove fixing bolt (arrow) from front left brake hose assembly.



(5) Remove coupling bolt (arrow) between front left brake hose assembly and front left brake caliper assembly.



Hint:

- When removing coupling bolt, be careful not to drop 2 gaskets.

(6) Remove the front left brake hose assembly.

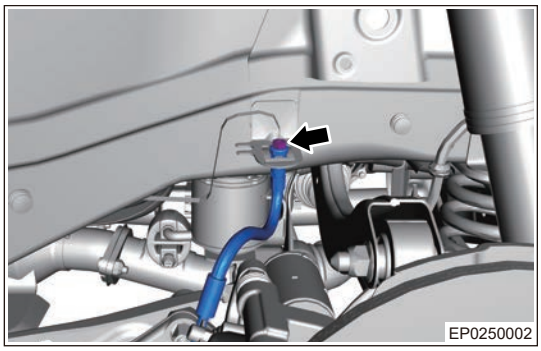
⚠ Caution

- **DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose assembly, as brake fluid is corrosive.**

(7) Remove the rear left wheel.

(8) Remove the rear left wheel house protector assembly.

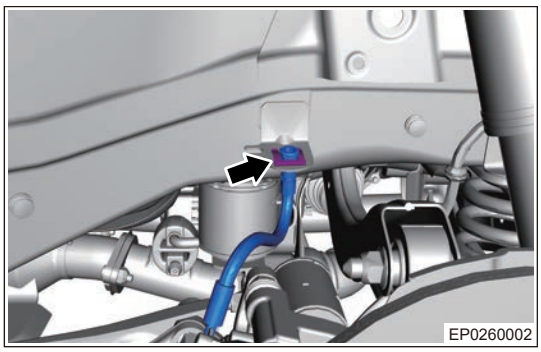
(9) Remove coupling nut (arrow) between rear left brake hose assembly and rear left brake pipe II assembly.



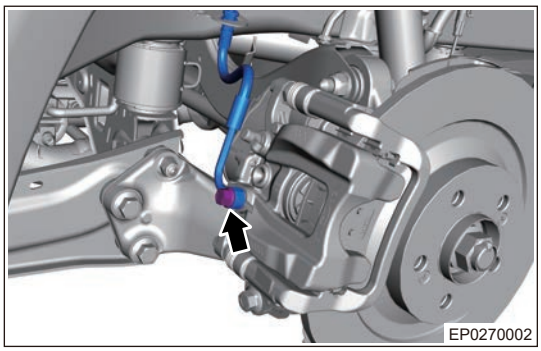
⚠ Caution

- **After removing brake line, perform sealing treatment to prevent foreign matter from entering.**
- **DO NOT allow any foreign matter such as dirt and dust to enter brake line from joint parts.**

(10) Remove holding reed (arrow) between rear left brake hose assembly and rear left brake pipe bracket.



(11) Remove coupling bolt (arrow) between rear left brake hose assembly and rear left brake caliper assembly.



Hint:

- When removing coupling bolt, be careful not to drop 2 gaskets.

(12) Remove the rear left brake hose assembly.

⚠ Caution

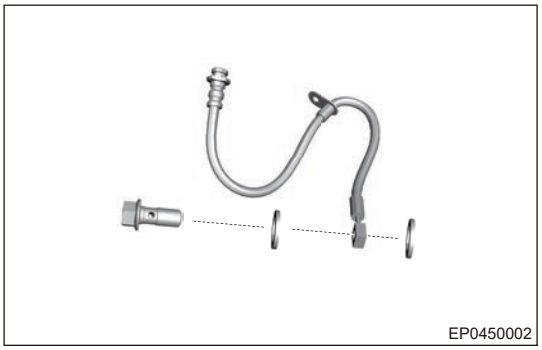
- **DO NOT allow brake fluid to be sprayed on your clothes or skin when removing brake hose, as brake fluid is corrosive.**

■ **Installation**

(1) Install the front left brake hose assembly.

(2) Install and tighten coupling bolt between front left brake hose assembly and front left brake caliper assembly.

Torque: 27 ± 2 N·m



Hint:

- When installing coupling bolt, be careful not to drop the 2 gaskets.

(3) Install and tighten coupling nut between front left brake hose assembly and front left brake pipe assembly.

Torque: 18 ± 2 N·m

(4) Install holding reed between front left brake hose assembly and brake line mounting bracket.

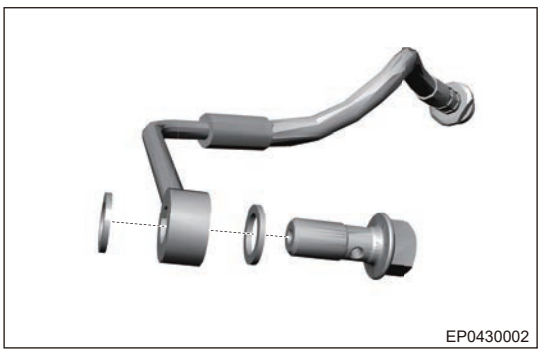
(5) Install and tighten the front left brake hose assembly fixing bolt.

Torque: 9 ± 1.5 N·m

(6) Install the rear left brake hose assembly.

(7) Install and tighten coupling bolt between rear left brake hose assembly and rear left brake caliper assembly.

Torque: 27 ± 2 N·m



Hint:

- When installing coupling bolt, be careful not to drop the 2 gaskets.

(8) Install and tighten coupling nut between rear left brake hose assembly and rear left brake pipe II assembly.

Torque: 18 ± 2 N·m

(9) Install holding reed between rear left brake hose assembly and rear left brake pipe bracket.

(10) Install the rear left wheel house protector assembly.

(11) Fill brake fluid and drain the air in brake system.

(12) Install front left wheel and rear left wheel.

4.8 Brake Pipe Assembly

■ **Removal**

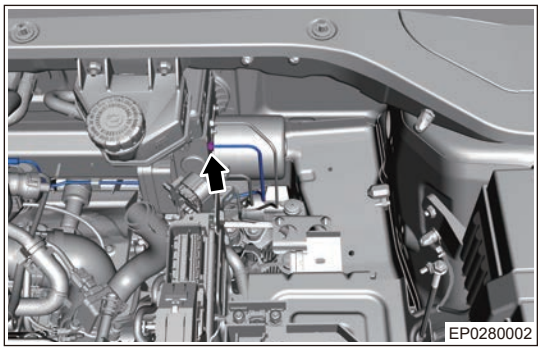
Hint:

- Be sure to perform brake system bleeding after removing/replacing hydraulic parts related to brake system.

(1) Drain the brake fluid in reservoir.

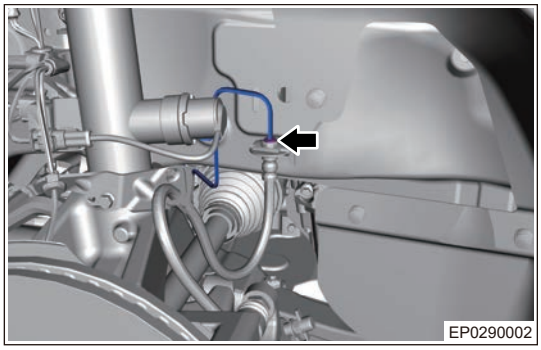
(2) Remove the battery.

(3) Remove coupling nut between front right brake pipe assembly and integrated brake controller assembly (arrow).



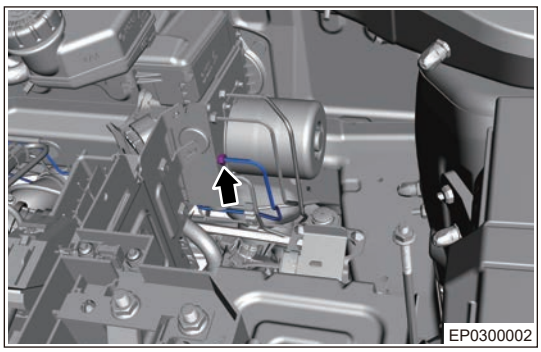
(4) Remove the front right wheel.

(5) Remove coupling nut (arrow) between front right brake pipe assembly and front right brake hose assembly

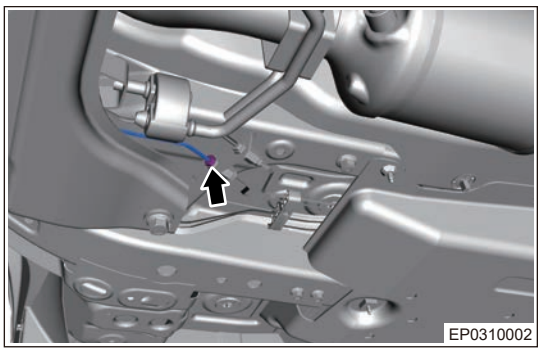


(6) Remove the front right brake pipe assembly.

(7) Remove coupling nut (arrow) between rear right brake pipe I assembly and integrated brake controller assembly.

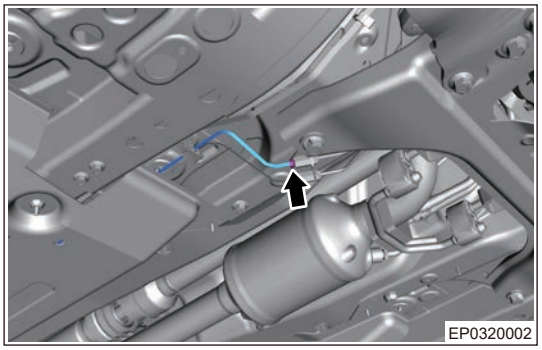


(8) Remove coupling nut (arrow) between rear right brake pipe I assembly and two-way.



(9) Remove the rear right brake pipe I assembly.

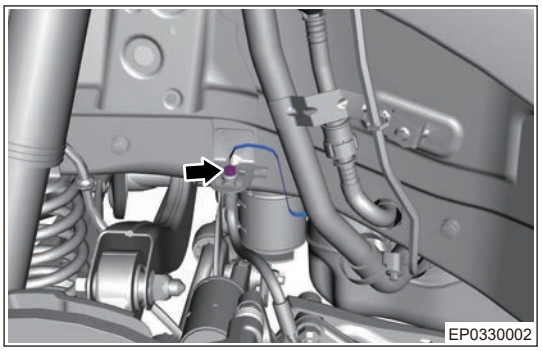
(10) Remove coupling nut (arrow) between rear right brake pipe II assembly and two-way.



(11) Remove the rear right wheel.

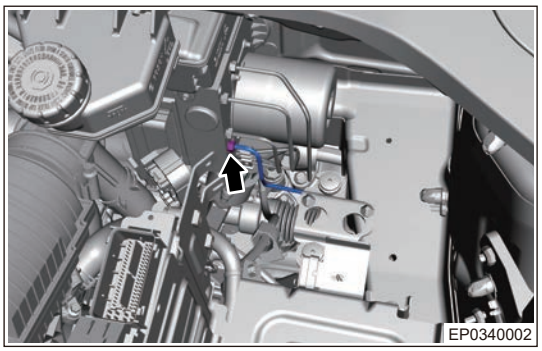
(12) Remove the rear right wheel house protector assembly.

(13) Remove coupling nut (arrow) between rear right brake pipe II assembly and rear right brake hose assembly



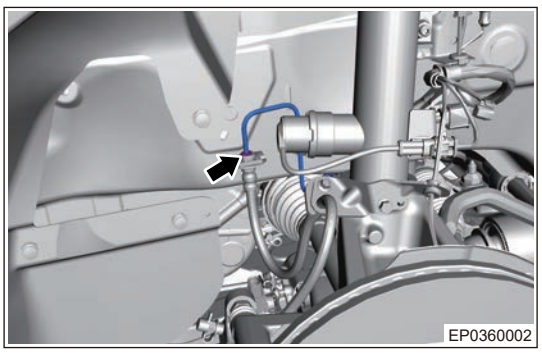
(14) Remove the rear right brake pipe II assembly.

(15) Remove coupling nut between front left brake pipe assembly and integrated brake controller assembly (arrow).



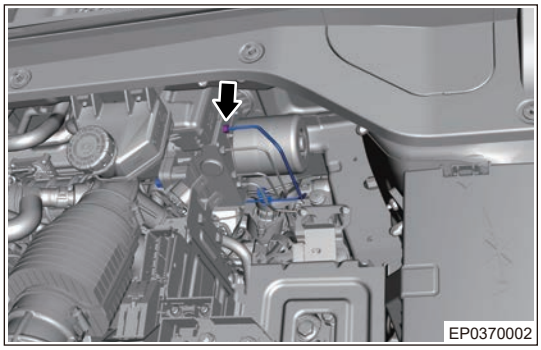
(16) Remove the front left wheel.

(17) Remove coupling nut (arrow) between front left brake pipe assembly and front left brake hose assembly.

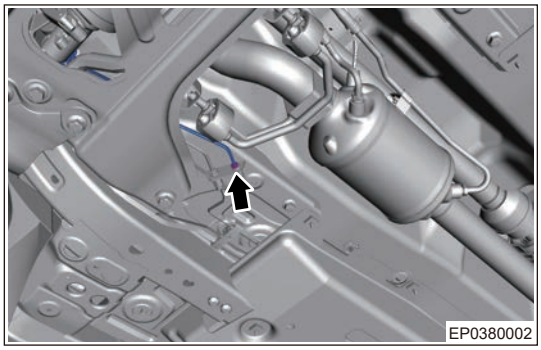


(18) Remove the front left brake pipe assembly.

(19) Remove coupling nut (arrow) between rear left brake pipe I assembly and integrated brake controller assembly.

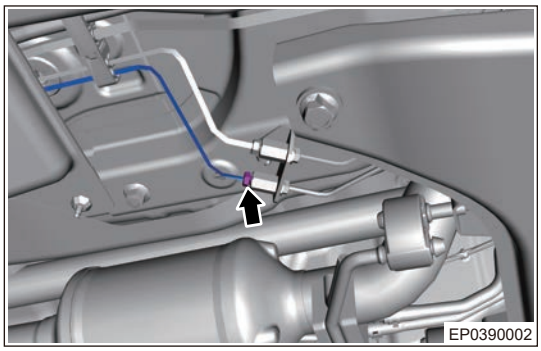


(20) Remove coupling nut (arrow) between rear left brake pipe I assembly and two-way.



(21) Remove the rear left brake pipe I assembly.

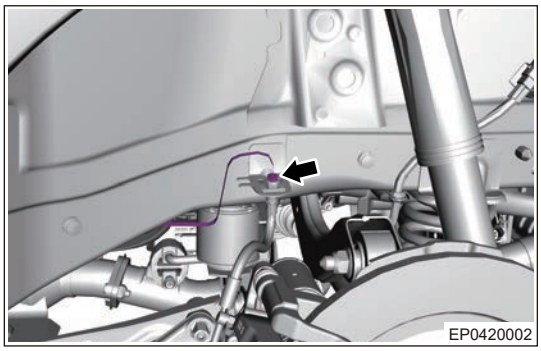
(22) Remove coupling nut (arrow) between rear left brake pipe II assembly and two-way.



(23) Remove the rear left wheel.

(24) Remove the rear left wheel house protector assembly.

(25) Remove coupling nut (arrow) between rear left brake pipe II assembly and rear left brake hose assembly.



(26) Remove the rear left brake pipe II assembly.

■ Installation

(1) Install the front right brake pipe assembly.

(2) Install and tighten coupling nut between front right brake pipe assembly and integrated brake controller assembly.

Torque: 18 ± 2 N·m

(3) Install and tighten coupling nut between front right brake pipe assembly and front right brake hose assembly.

Torque: 18 ± 2 N·m

(4) Install the rear right brake pipe I assembly.

(5) Install and tighten coupling nut between rear right brake pipe I assembly and integrated brake controller assembly.

Torque: 18 ± 2 N·m

(6) Install and tighten coupling nut between rear right brake pipe I assembly and two-way.

Torque: 18 ± 2 N·m

(7) Install the rear right brake pipe II assembly.

(8) Install and tighten coupling nut between rear right brake pipe II assembly and two-way.

Torque: 18 ± 2 N·m

(9) Install and tighten coupling nut between rear right brake pipe II assembly and rear right brake hose assembly.

Torque: 18 ± 2 N·m

(10) Install rear right wheel house protector assembly.

(11) Install the front left brake pipe assembly.

(12) Install and tighten coupling nut between front left brake pipe assembly and integrated brake controller assembly.

Torque: 18 ± 2 N·m

(13) Install and tighten coupling nut between front left brake pipe assembly and front left brake hose assembly.

Torque: 18 ± 2 N·m

(14) Install the rear left brake pipe I assembly.

(15) Install and tighten coupling nut between rear left brake pipe I assembly and integrated brake controller assembly.

Torque: 18 ± 2 N·m

(16) Install and tighten coupling nut between rear left brake pipe I assembly and two-way.

Torque: 18 ± 2 N·m

(17) Install the rear left brake pipe II assembly.

(18) Install and tighten coupling nut between rear left brake pipe II assembly and two-way.

Torque: 18 ± 2 N·m

(19) Install and tighten coupling nut between rear left brake pipe II assembly and rear left brake hose assembly.

Torque: 18 ± 2 N·m

(20) Install the rear left wheel house protector assembly.

(21) Add standard amount of brake fluid and drain the air in system.

(22) Install four wheels.

⚠ Caution

- **When connecting brake pipe to integrated brake control module assembly, the pipes of 4 wheels cannot be interchanged.**

6.7 ELECTRONIC PARKING BRAKE SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) To prevent vehicle from moving accidentally, after Electronic Parking Brake System (EPB) operates when vehicle is stopped or leaving vehicle, both red indicator and electronic parking switch indicator come on for a while and then go off. At the moment, observe if the indicators come on to make sure that electronic parking brake is applied successfully.

(2) To prevent vehicle from moving accidentally, when vehicle is in automatic parking status, it is necessary to confirm the gear position before starting vehicle by depressing accelerator pedal.

(3) Turn on sudden braking function only when the foot brake is faulty or brake pedal is stuck. Because integrated brake control system and its component can not exceed the physical limit of road adhesion. Turning on emergency braking function when driving on a curve, dangerous road area, heavy traffic road or in bad weather may lead to drift, sideslip or pull. Beware of accident.

(4) Use this function with caution during normal driving. Prevent other passengers from touching this switch by mistake while driving. Otherwise it may lead to an accident.

(5) When sudden braking function is triggered, a “drone” sound will be heard, it is normal.

(6) During sudden braking, electronic parking performs braking operation in a constant deceleration, which may be different from driver's expected deceleration and the braking distance may be different as well.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

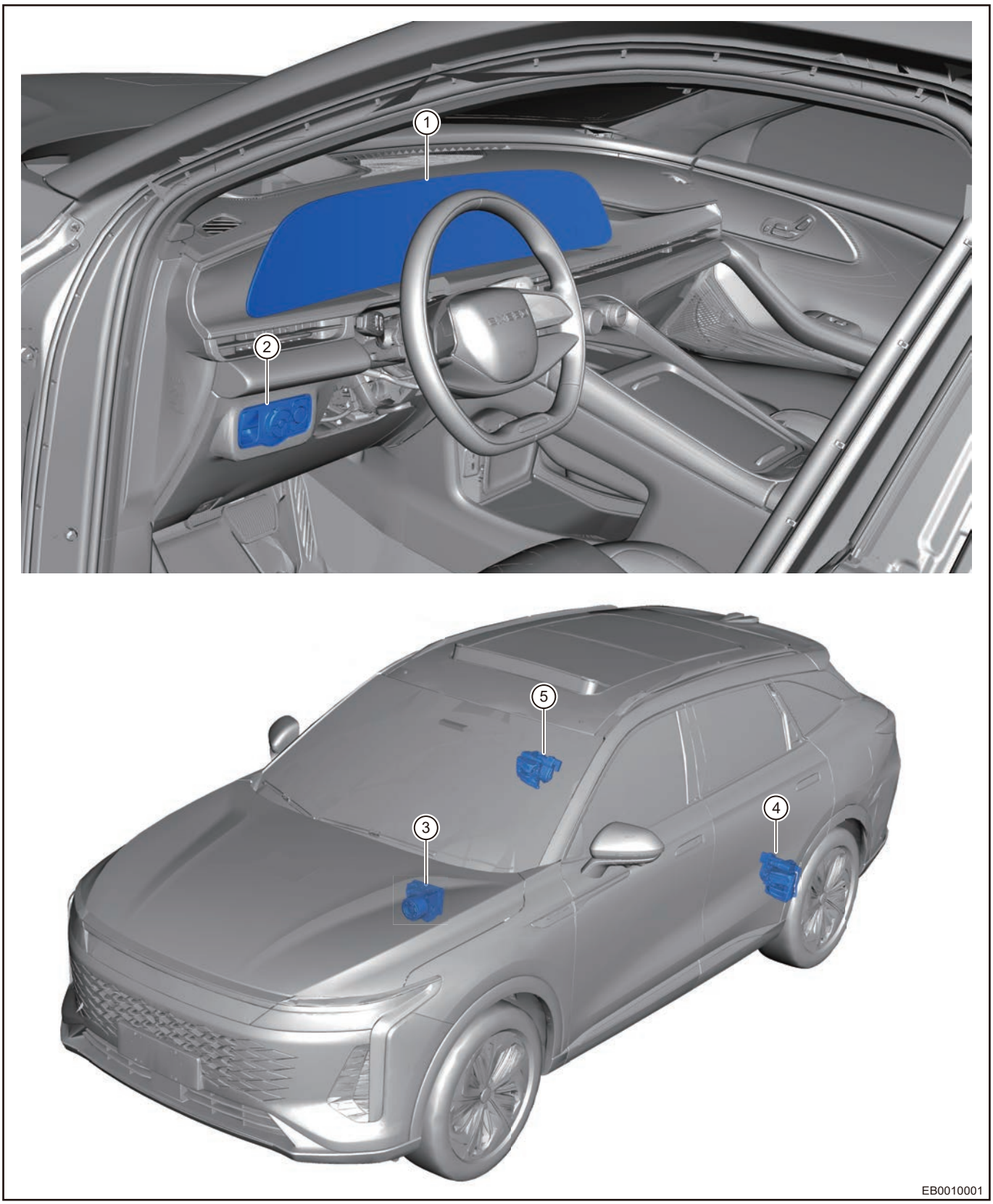
(2) If parking brake cannot be released by parking brake switch manually or automatically on a slope, please try to tow vehicle to a level road or place obstacles such as stoppers in front of or rear of front wheels respectively to prevent wheel rolling, avoiding coasting accident after releasing parking brake.

2 System Overview

2.1 System Description

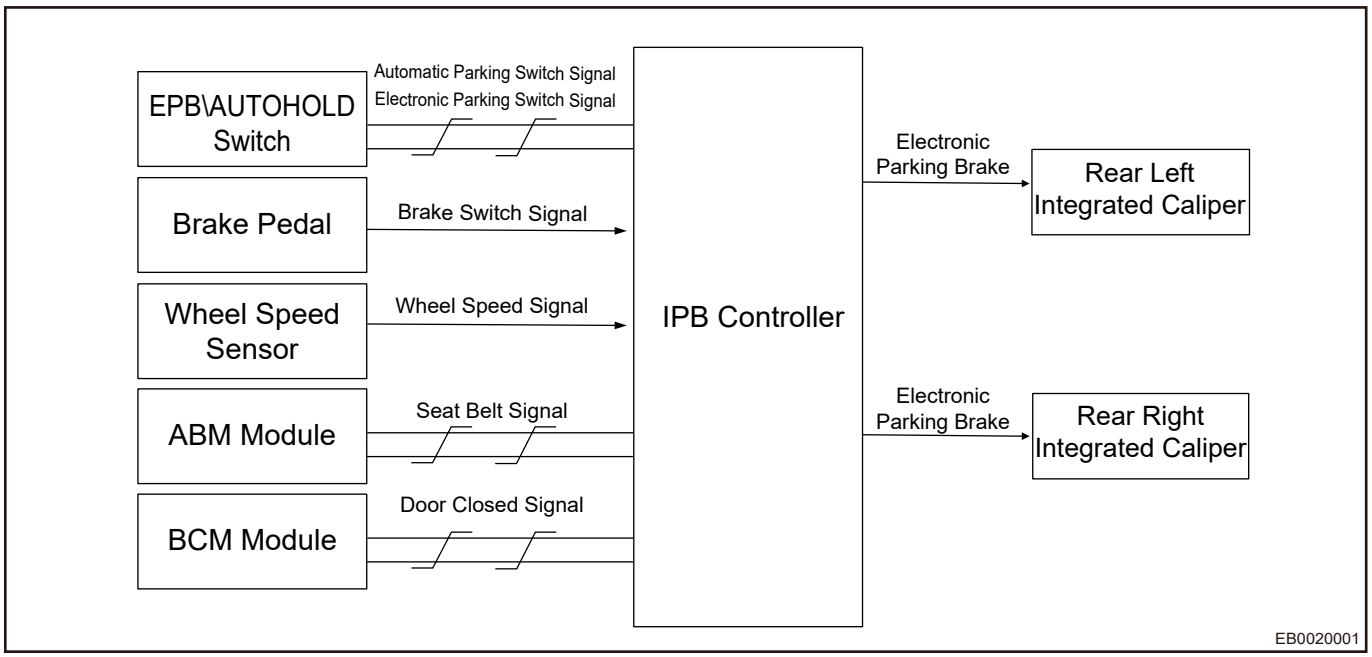
Electronic Parking Brake System (EPB) integrates temporary braking while driving with long-term braking after stopping. Therefore, vehicle can be stopped through electronic parking brake operation. Electronic parking brake stops vehicle through electronic parking brake operation. Its operation principle is the same as mechanical parking brake operation, which is to control vehicle stopping by friction generated from brake disc and brake lining, but control changes to electronic button from mechanical parking brake lever. Electronic parking brake has extended basic parking function to AUTO HOLD. With AUTO HOLD enabled, driver does not have to depress brake pedal for long time when stopping vehicle, and avoid unnecessary moving, that is vehicle will not slide rearward.

2.2 System Components Diagram



1	Instrument Cluster	2	EPB Switch Assembly (Integrated Light Control Switch)
3	Integrated Brake Control Module Assembly	4	Rear Left Integrated Caliper Assembly
5	Rear Right Integrated Caliper Assembly		

2.3 System schematic diagram



Integrated brake controller assembly collects seat belt signal and door closed signal via CAN line, and collects electronic parking switch signal, automatic parking switch signal, brake switch signal and wheel speed signal via hard-wire connection. Then, integrated caliper assembly operates according to data requirements analysis.

2.4 System Function Introduction

■ Manual parking function

When engine starts or ENGINE START STOP switch is in ON mode while vehicle is stationary, pull up the electronic parking switch, the red indicator and electronic parking switch indicator come on, which indicates parking brake function is operating.

■ Manual releasing function

When engine starts or ENGINE START STOP switch is in ON mode while depressing brake pedal, press the electronic parking switch manually, the red indicator and electronic parking switch indicator go off, which indicates parking brake function is released.

■ EPB automatic releasing

Fasten driver side seat belt, close driver side door. Start engine, and depress the accelerator pedal with gear position in D or R. The electronic parking brake will be released automatically and red indicator goes off. When vehicle is stopped, start engine and gear position is in D or R, it is necessary to depress accelerator pedal deeply and automatic parking brake is released only when drive force is greater than the force in coasting direction.

■ Stall and park

- With vehicle in stationary status, turn ENGINE START STOP button to OFF, and Electronic Parking Brake (EPB) achieves parking brake automatic application function.

⚠ Caution

- **Electronic parking brake can not be released when vehicle battery is depleted.**
- **With engine starting or ENGINE START STOP switch turned to ON, if parking brake can not be released manually by depressing brake pedal, depress accelerator pedal and press electronic parking brake switch to release electronic parking brake. Use this method only when parking brake can not be released manually by depressing brake pedal. Please take care when using this method.**
- **Fasten driver side seat belt and close driver side door when electronic parking brake is released automatically. Otherwise, automatic parking brake releasing conditions are not met.**
- **While electronic parking brake is applied or released, a "fizz" sound may be heard from rear of vehicle, which is generated during parking brake operation. This is normal, please rest assured use.**
- **If parking brake is applied or released while depressing the brake pedal, brake pedal may move up or down slightly, just depress brake pedal firmly.**
- **If vehicle coasts after stopping for a while, for safety, system will increase parking brake force automatically, to make vehicle stationary; during the process of increasing parking brake force, system will produce a certain operating sound, which is normal.**

⚠ Warning

- **To prevent vehicle from moving accidentally, after Electronic Parking Brake System (EPB) operates when vehicle is stopped or leaving vehicle, both red indicator and electronic parking switch indicator come on for a while and then go off. At the moment, observe if the indicators come on to make sure that electronic parking brake is applied successfully.**
- **To prevent vehicle from moving accidentally, when vehicle is in automatic parking status, it is necessary to confirm the gear position before starting vehicle by depressing accelerator pedal.**

■ Turn on automatic parking function

With engine started, driver side door is closed and driver side seat belt is fasten. Turn on automatic parking switch in audio heat unit to turn on automatic parking function, and system enters automatic parking mode.

■ Activate automatic parking function

With automatic parking function turned on and the conditions for automatic parking are met, vehicle stops from moving status after depressing brake pedal, automatic parking function is activated and green indicator comes on.
When vehicle is stationary and brake pedal is depressed, automatic parking function is activated and green indicator comes on when automatic parking function is turned on and automatic parking conditions are met.

■ Turn off automatic parking function

With automatic parking function turned on, turn off automatic parking switch in audio heat unit to turn off automatic parking function, and system exits automatic parking mode.

■ Release automatic parking

Automatic parking releasing method is the same as that of electronic parking, including manual and automatic releasing operations.

⚠ Caution

- **After vehicle starts, automatic parking switch is turned on, automatic parking system can not be entered if driver side door is not closed or driver side seat belt is unfastened.**
- **With automatic parking turned on, when vehicle is stopped moving by brake and kept in stationary state, automatic parking system will apply parking brake automatically while vehicle gear is in D or R position. Shift to N in short time parking, and shift to P in long time parking.**
- **With automatic parking function turned on, when opening driver side door or unfastening driver side seat belt, it will exit automatic parking function. When driver side door is closed or driver side seat belt is fastened again, automatic parking function is turned on again.**
- **When automatic parking function is activated, open driver side door or unfasten driver side seat belt, then automatic parking turns to electronic parking.**
- **With automatic parking function activated, if it is necessary to shift gear by depressing brake pedal at this time (for example, shift N to R position). Depress the brake pedal with greater force than when the automatic parking is not turned on (as the automatic parking is operative, the pedal stroke becomes shorter).**
- **Be sure to observe safety regulations to park the vehicle properly, avoid hurting yourself and pedestrian.**
- **Be sure to turn automatic parking function off when parking the vehicle in place or driving in narrow space (for example, before driving into car washing room).**
- **This function cannot be activated during due to insufficient Brake force when brake is extremely slight or vehicle slips to stop.**
- **Automatic parking function cannot replace parking brake system.**

■ Emergency braking function

If foot brake is faulty, pull up and hold the electronic parking switch to forcibly apply brake through electric parking brake. The red indicator flashes with alarming sound during emergency braking. To exit emergency braking, release the electronic parking switch.

⚠ Warning

- **Turn on sudden braking function only when the foot brake is faulty or brake pedal is stuck. Because integrated brake control module and its component can not exceed the physical limit of road adhesion. Turning on should braking function when driving on a curve, dangerous road area, heavy traffic road or in bad weather may lead to drift, sideslip or pull. Beware of accident.**
- **Use this function with caution during normal driving. Prevent other passengers from touching this switch by mistake while driving. Otherwise it may lead to an accident.**
- **When sudden braking function is triggered, a "drone" sound will be heard, it is normal.**
- **During sudden braking, electronic parking performs braking operation in a constant deceleration, which may be different from driver's expected deceleration and the braking distance may be different as well.**

■ Service Mode

(1) This mode is used when checking and repairing EPB system.

(2) When entering service mode, EPB caliper will be released in place automatically.

(3) Never perform "Exit Maintenance Mode" if inspection and repair of vehicle are not finished, to prevent serious accident.

(4) Diagnostic tester must be used to perform "Exit Maintenance Mode" after inspection and repair of vehicle are finished (such as replacing brake linings with new ones), failure to do so may cause vehicle to lose EPB function, however, conventional braking will not be affected.

(5) When service mode function is triggered, a "drone" sound will be heard, it is normal.

(6) Operation methods for entering and exiting service mode are as shown in table below:

Function	Vehicle Status	Engine Status	Key status	Operation Method	HMI Status	
					Instrument Cluster	Switch
Service Mode	Stationary	Ignited/Stall	ON	Entering or exiting is performed using diagnostic tester or by professional technicians at 4S shop	Red P and yellow P lights flash when entering service mode, and reflect EPB status of real-vehicle after exiting service mode	Reflect EPB status of real vehicle

3 Diagnostic Information and Steps

3.1 Problem Symptoms Table

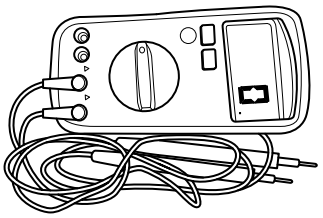
Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Unable to release/apply parking brake	Fuse fault
	Wire harness or connector fault
	Integrated brake controller assembly
	Electronic control execution unit
	Wheel speed signal fault
Switch failed	Switch fault
	Fuse fault
	Wire harness or connector fault
	Integrated brake controller assembly
CAN network fault	Fuse fault
	Wire harness or connector fault
	Integrated brake controller assembly

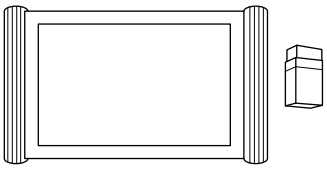
4 On-vehicle Service

4.1 Tools

■ General Tool

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

■ Special Tool

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

4.2 Diagnosis Tester Testing

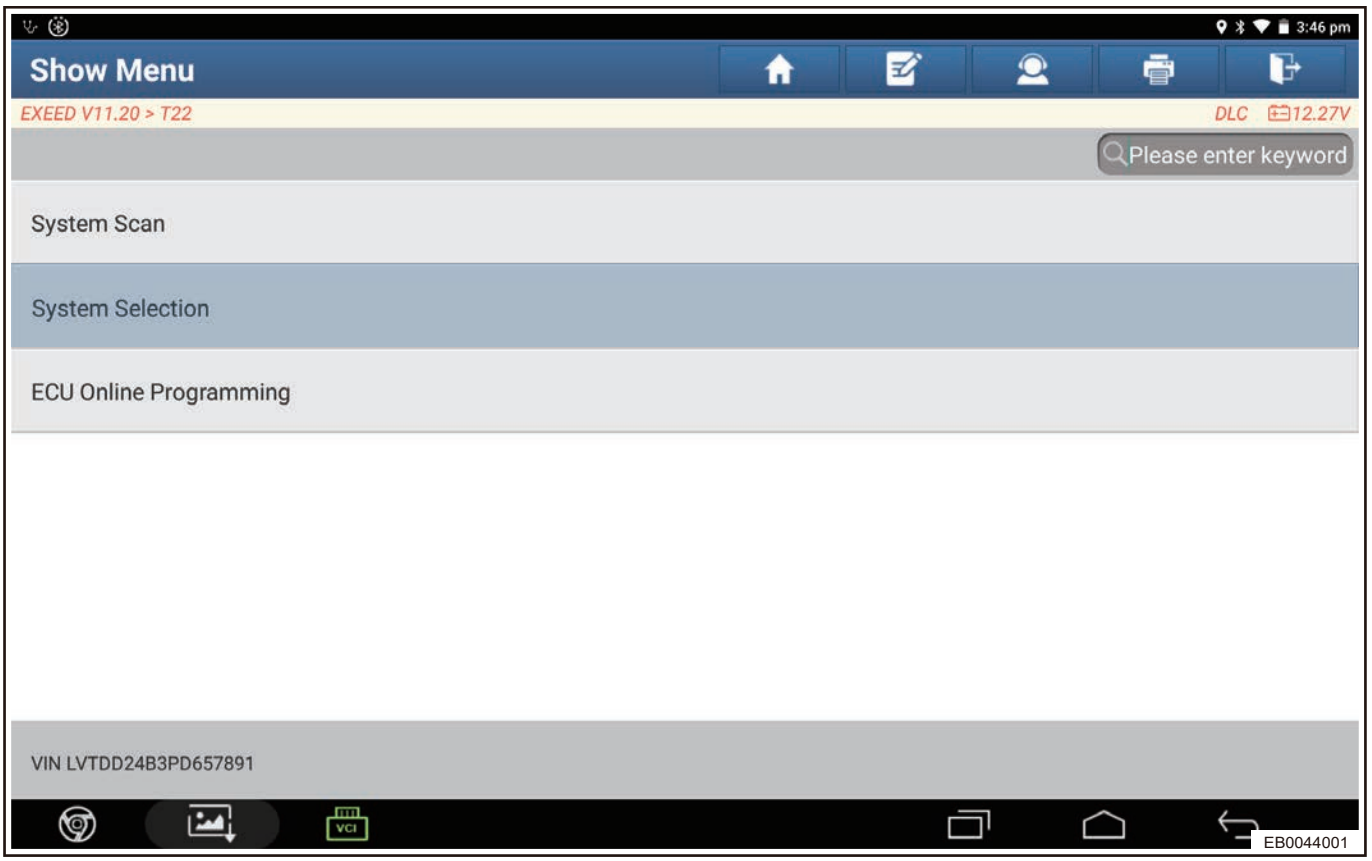
■ Rear brake calipers simultaneously release and clamp test

(1) Turn ENGINE START STOP switch to ON.

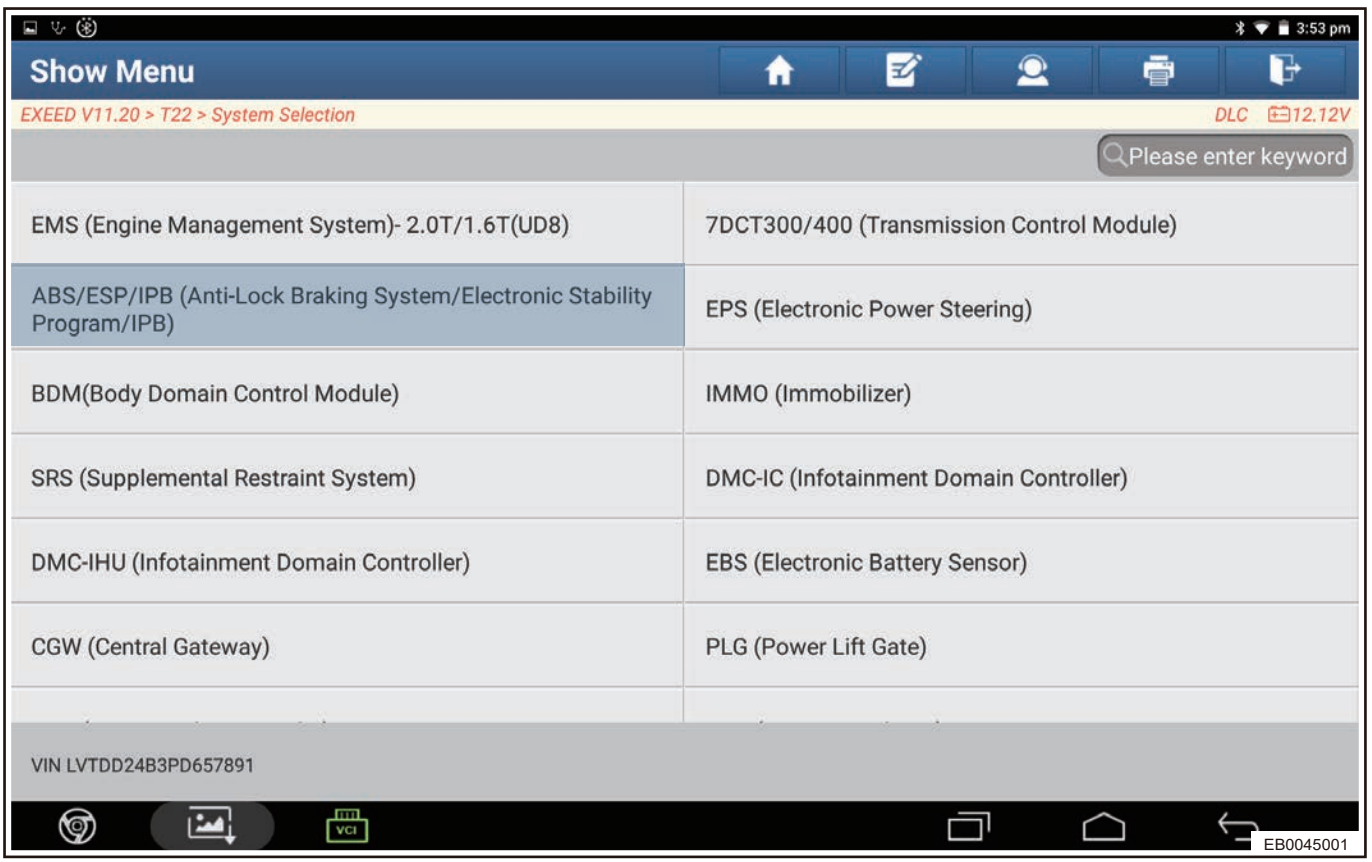
(2) Connect the diagnostic tester.

(3) Select “T22” model.

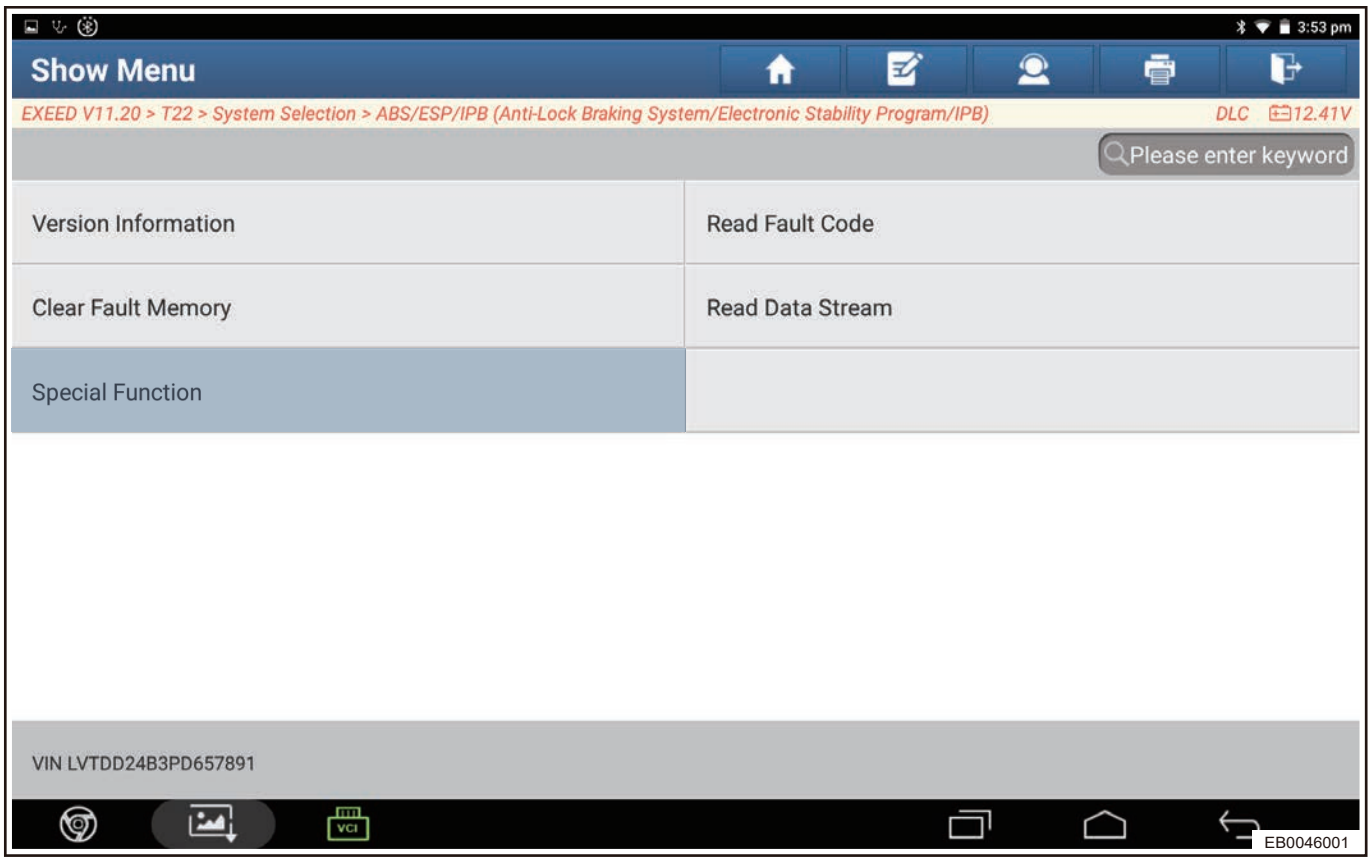
(4) Click “System Selection”.



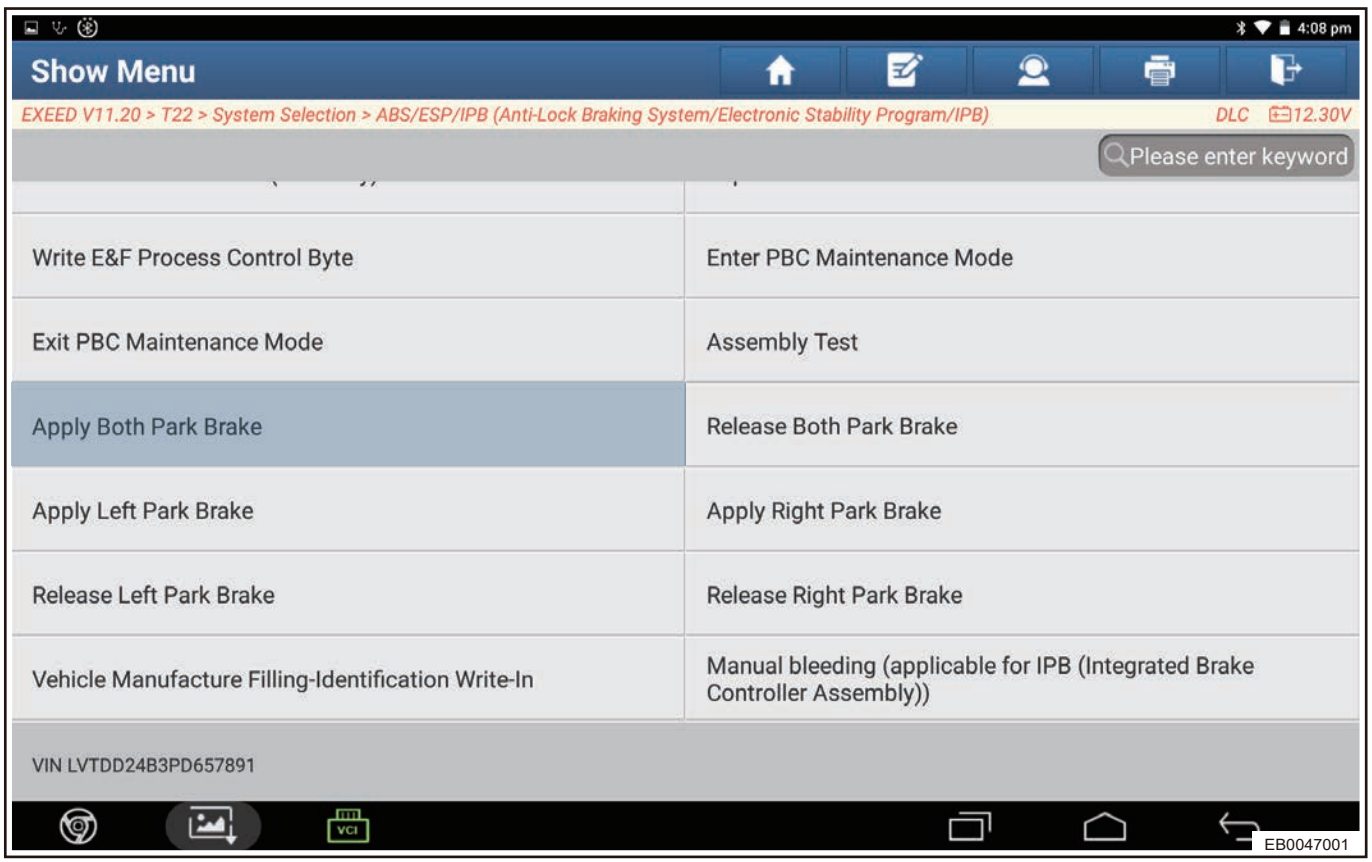
(5) Select and enter “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPB)”.

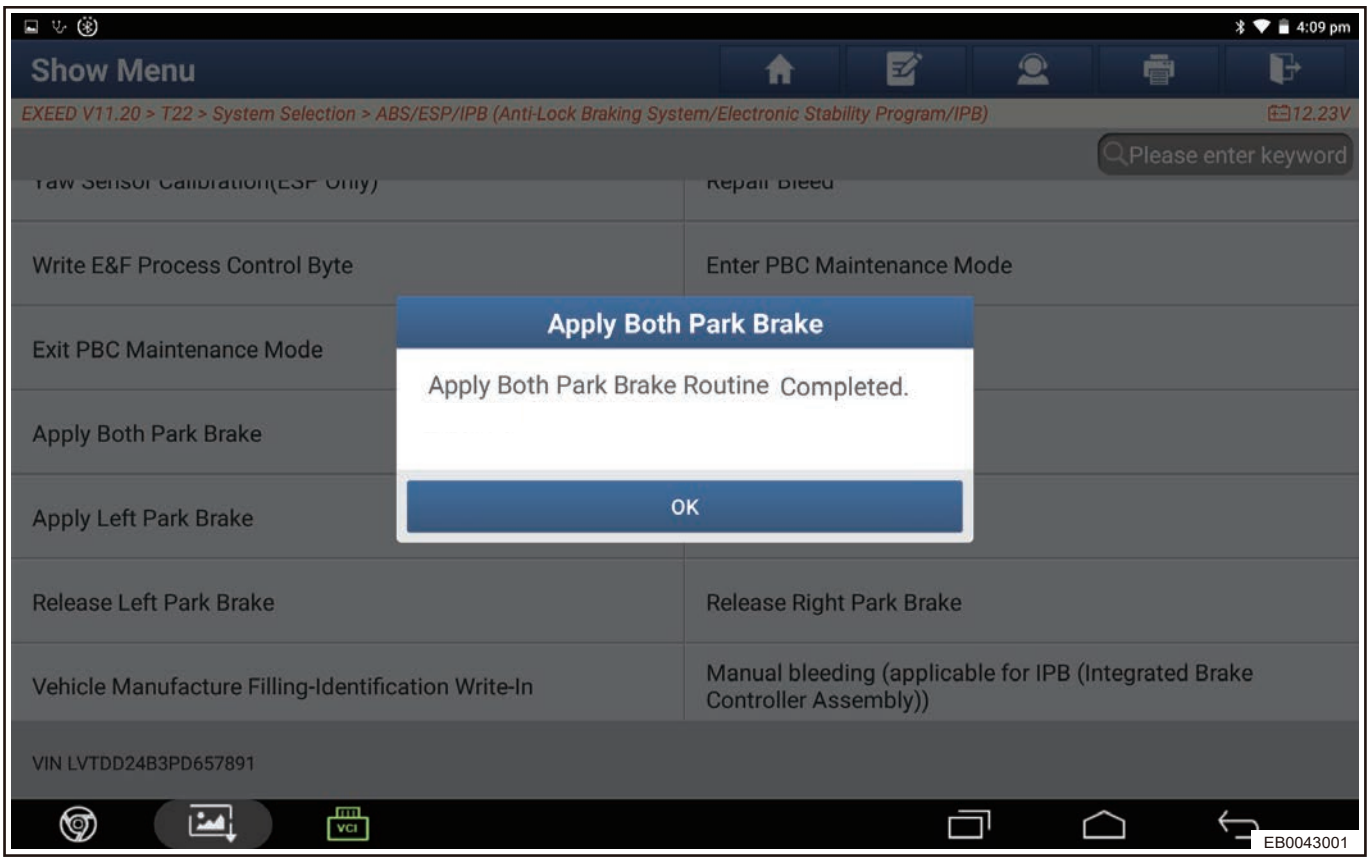


(6) Click "Special Function".

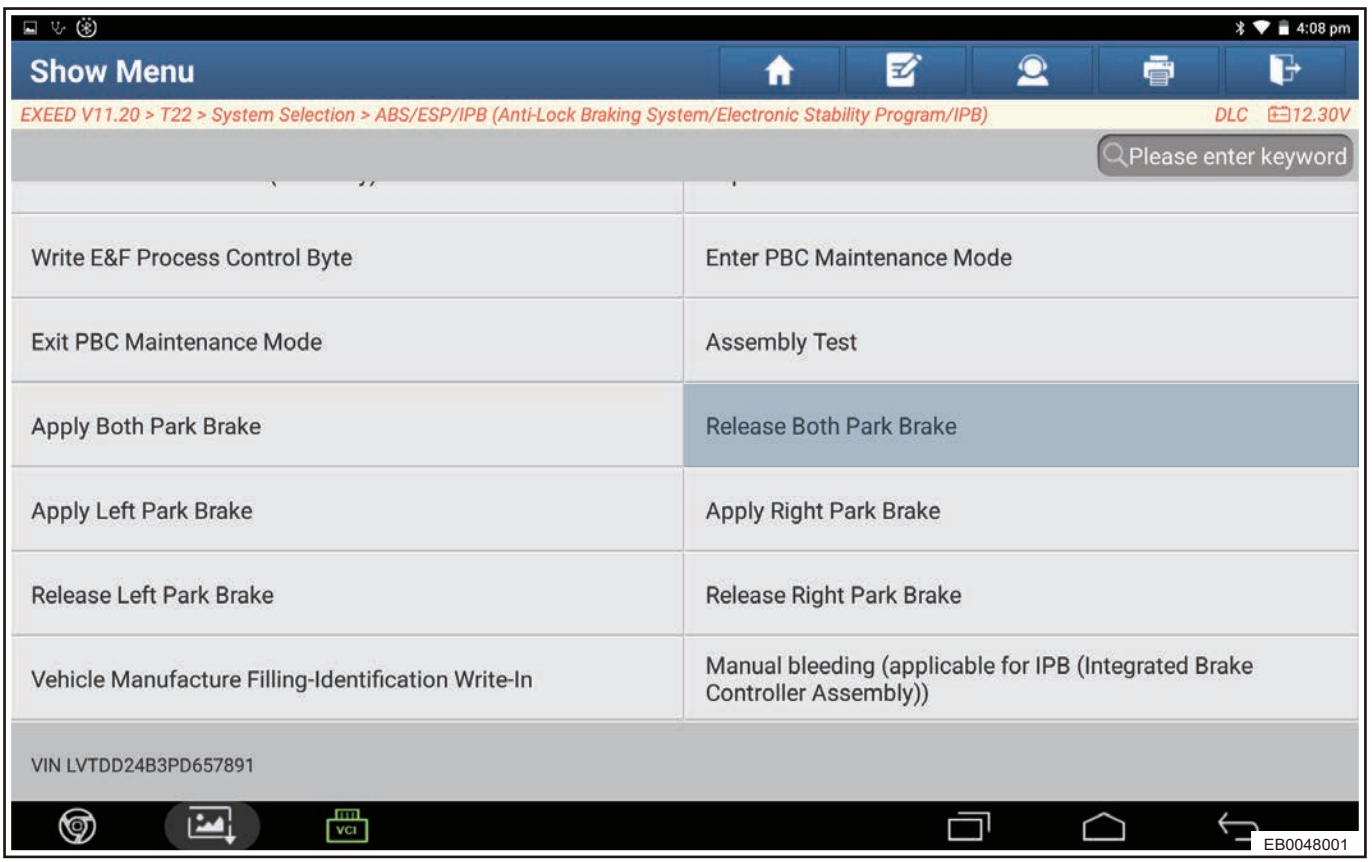


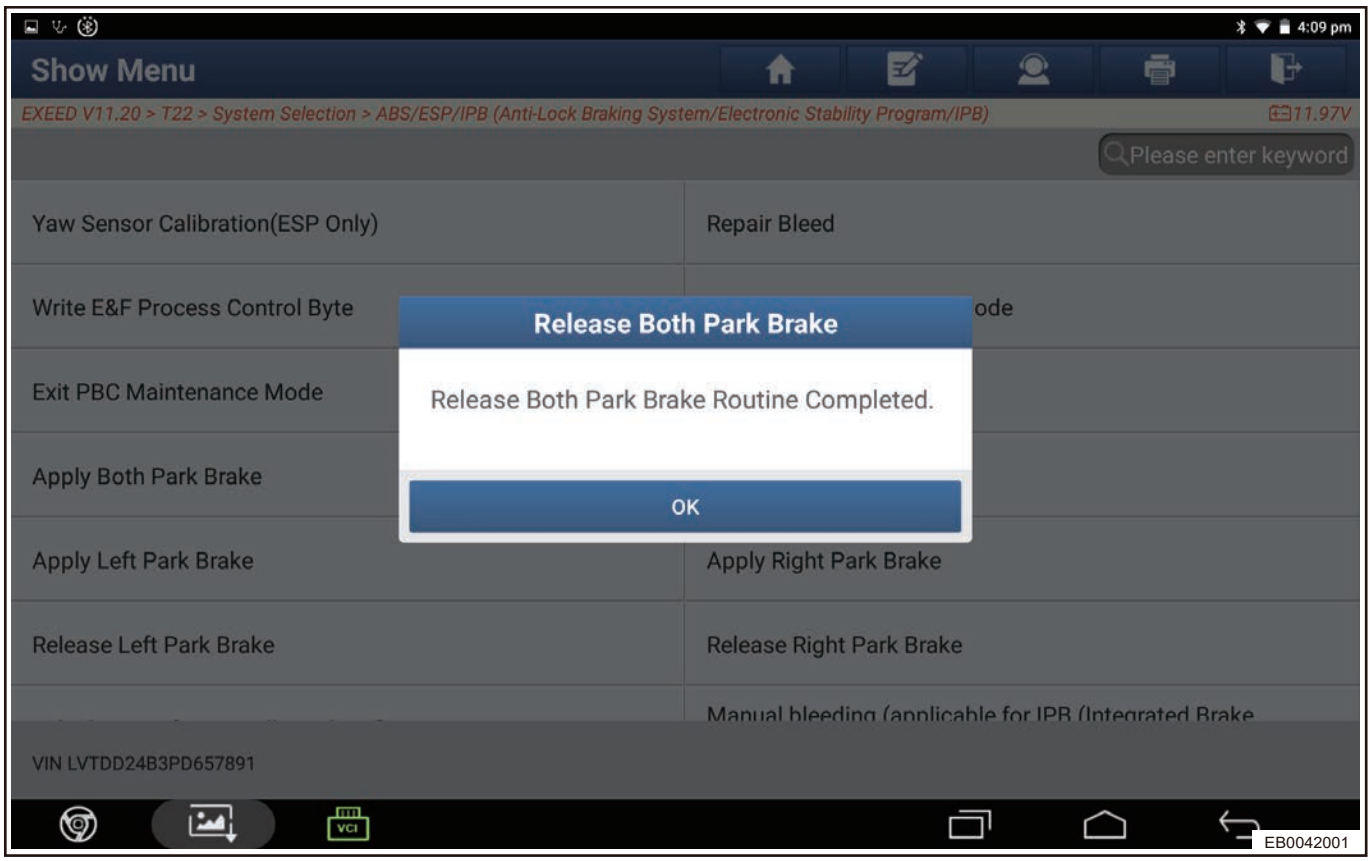
(7) Click “Apply Both Park Brake”.





(8) Click “Release Both Park Brake”.





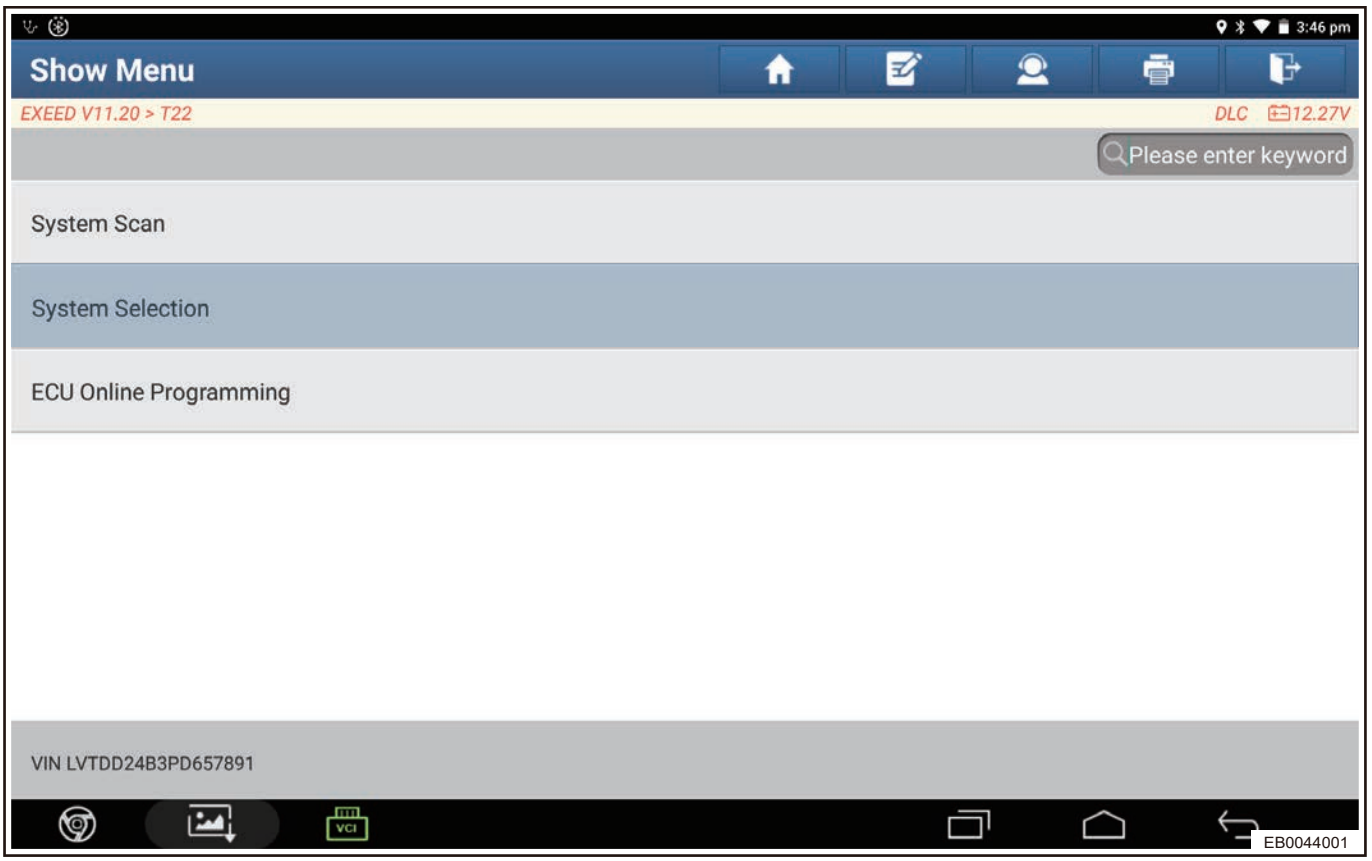
■ **Separately apply and release rear brake caliper test**

(1) Turn ENGINE START STOP switch to ON.

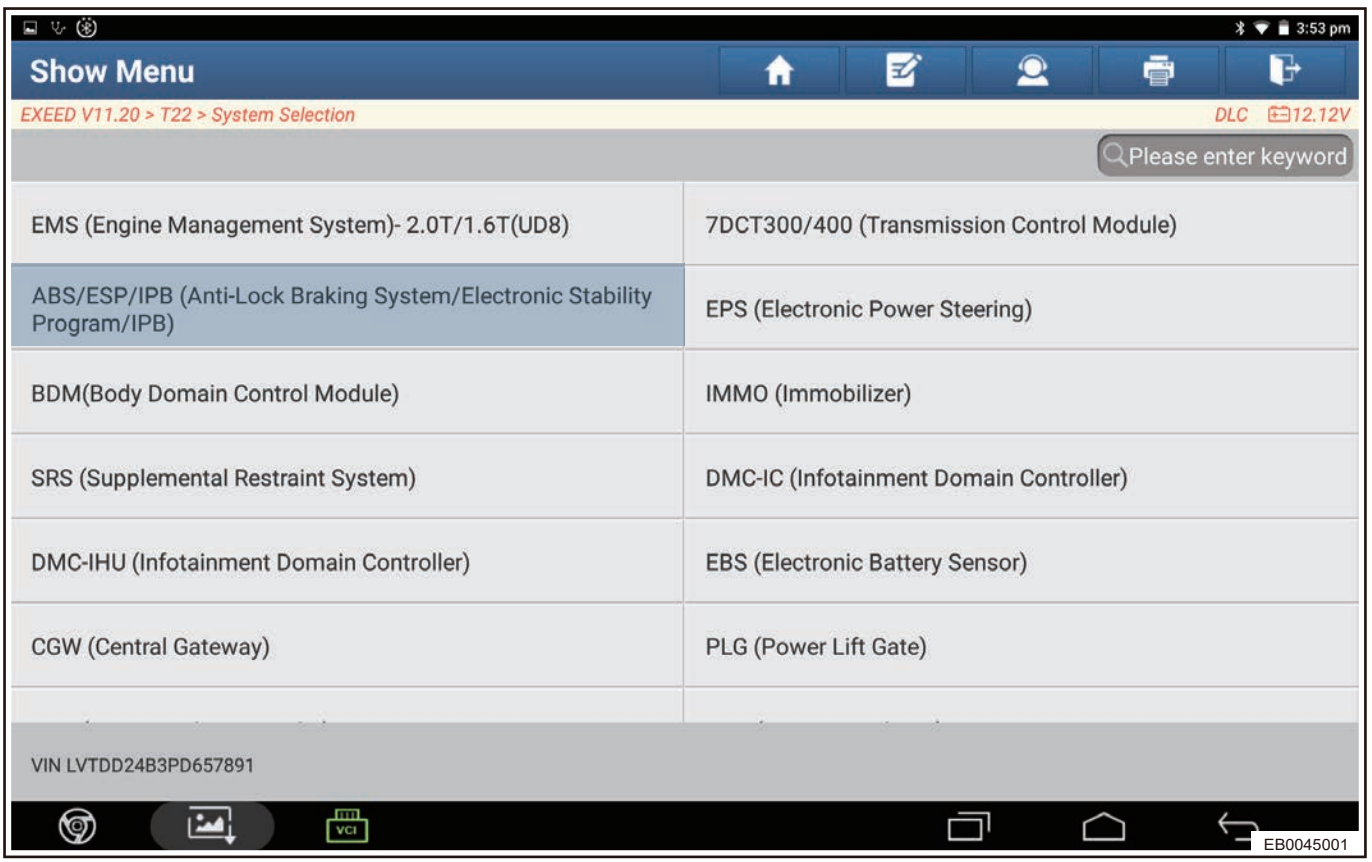
(2) Connect the diagnostic tester.

(3) Select “T22” model.

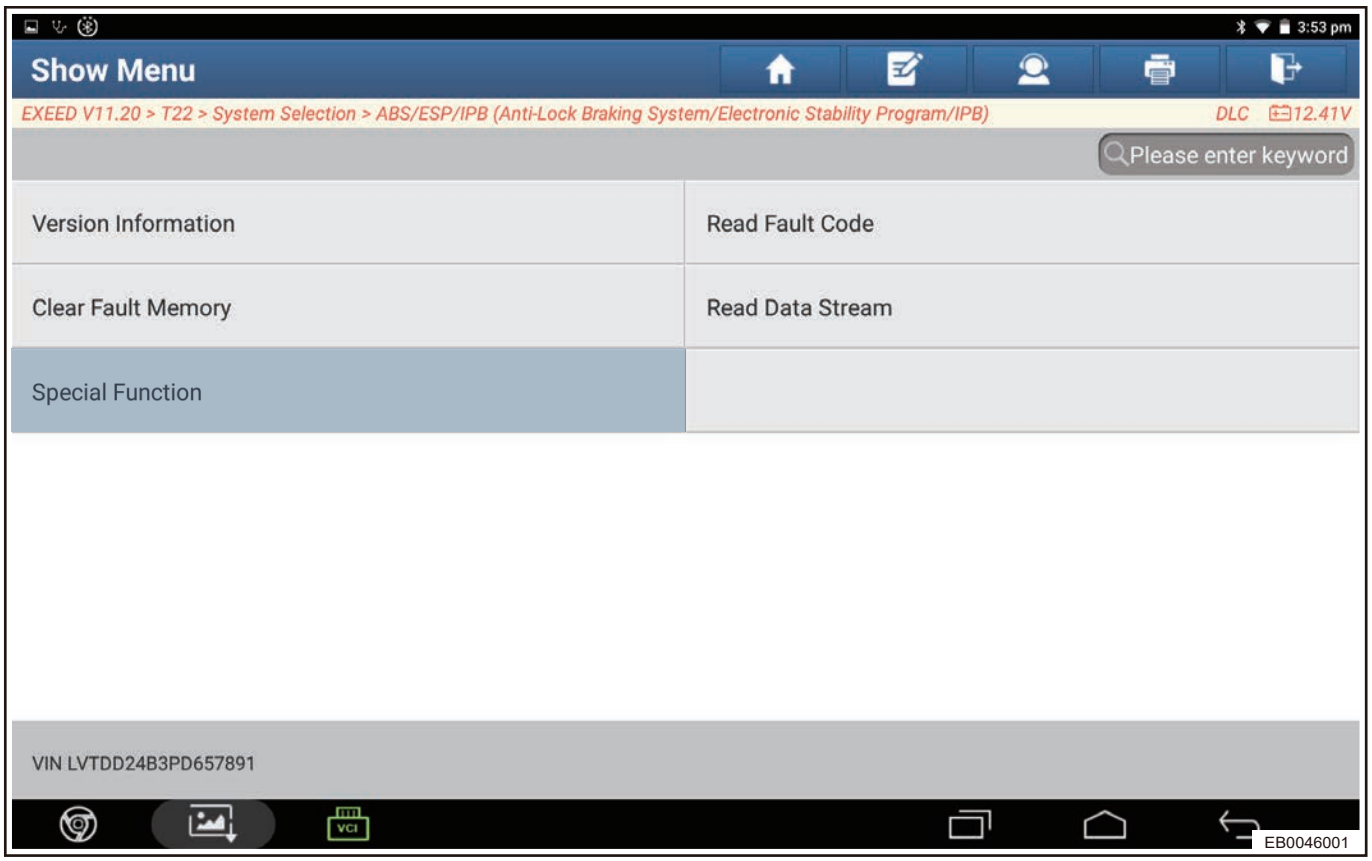
(4) Click “System Selection”.



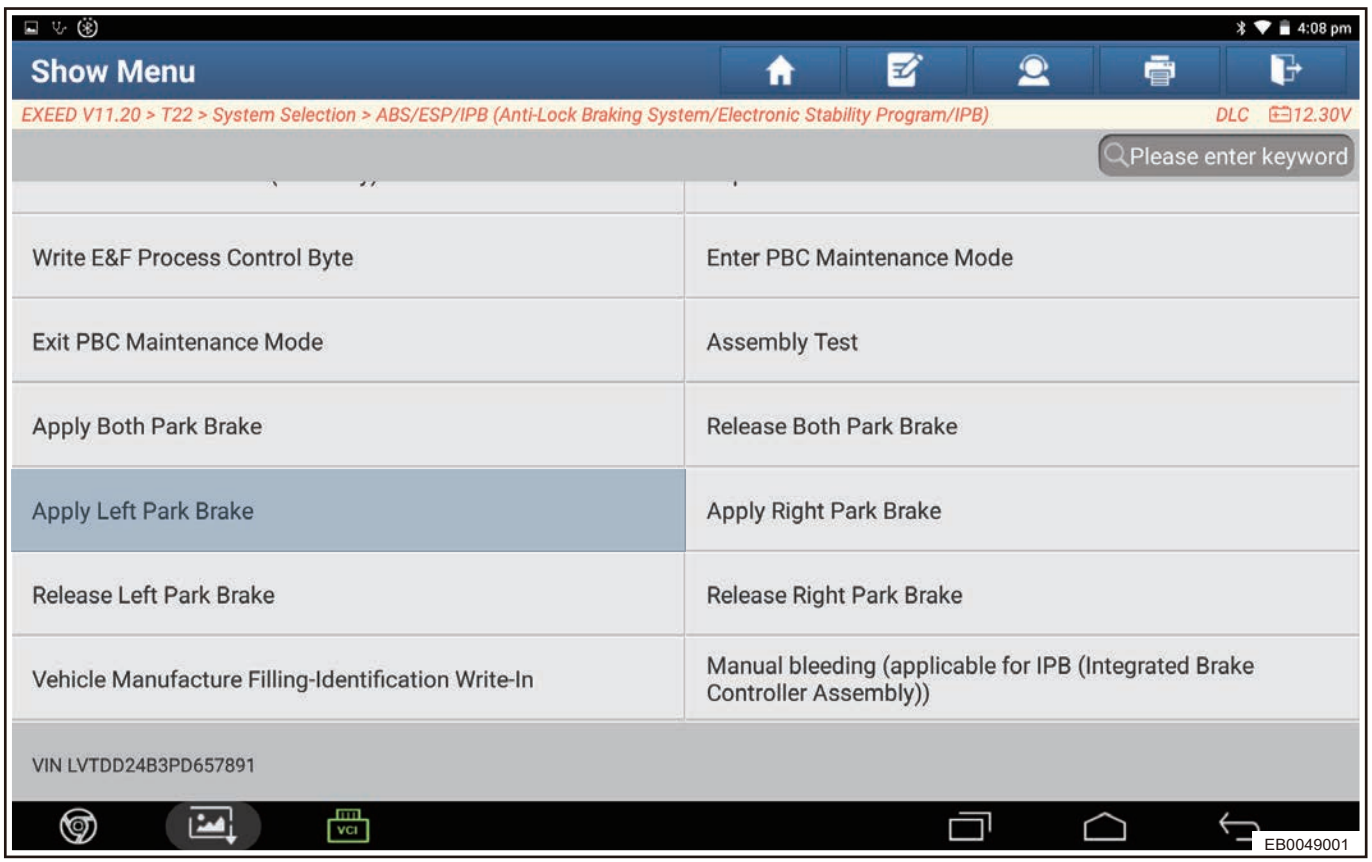
(5) Select and enter “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPB)”.

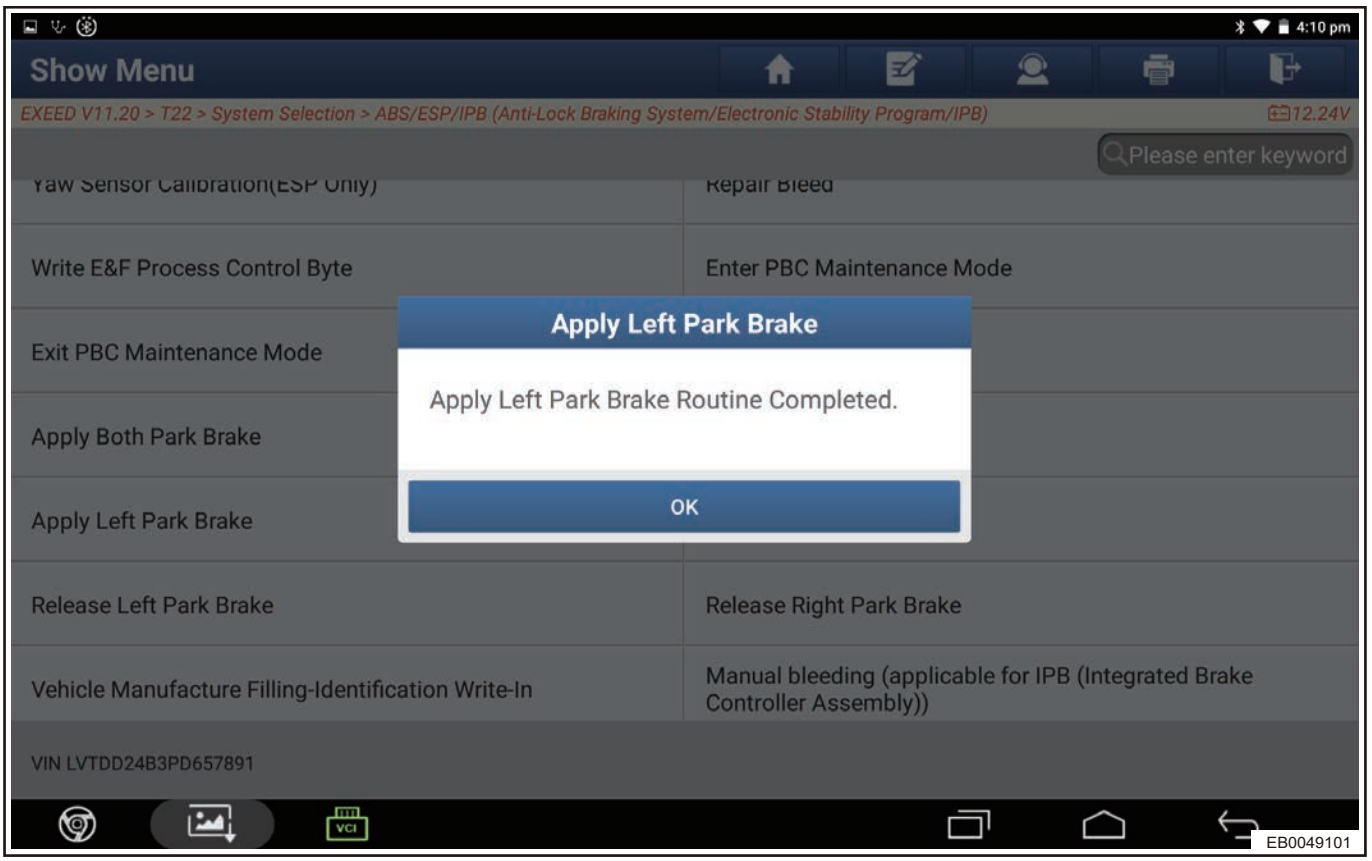


(6) Click "Special Function".

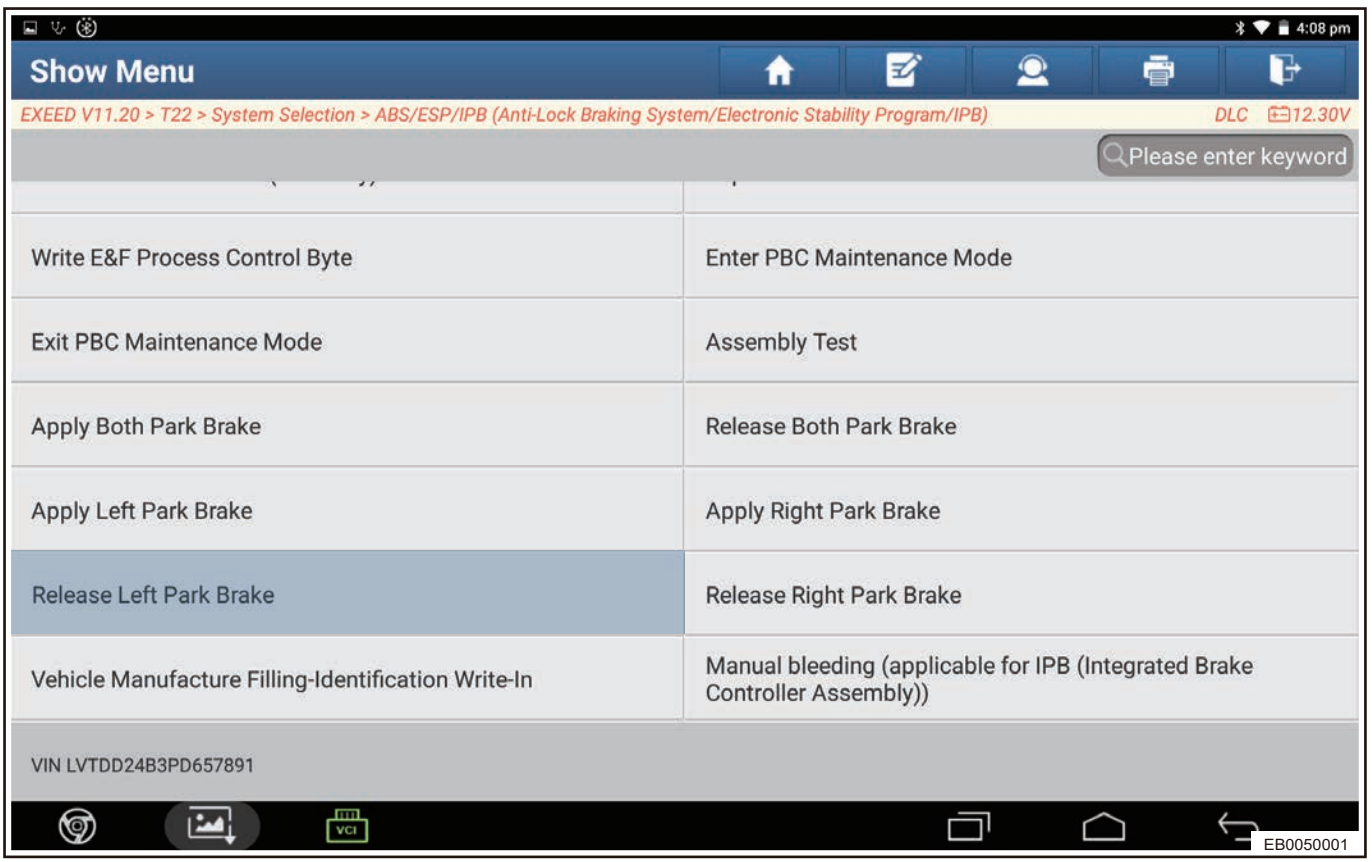


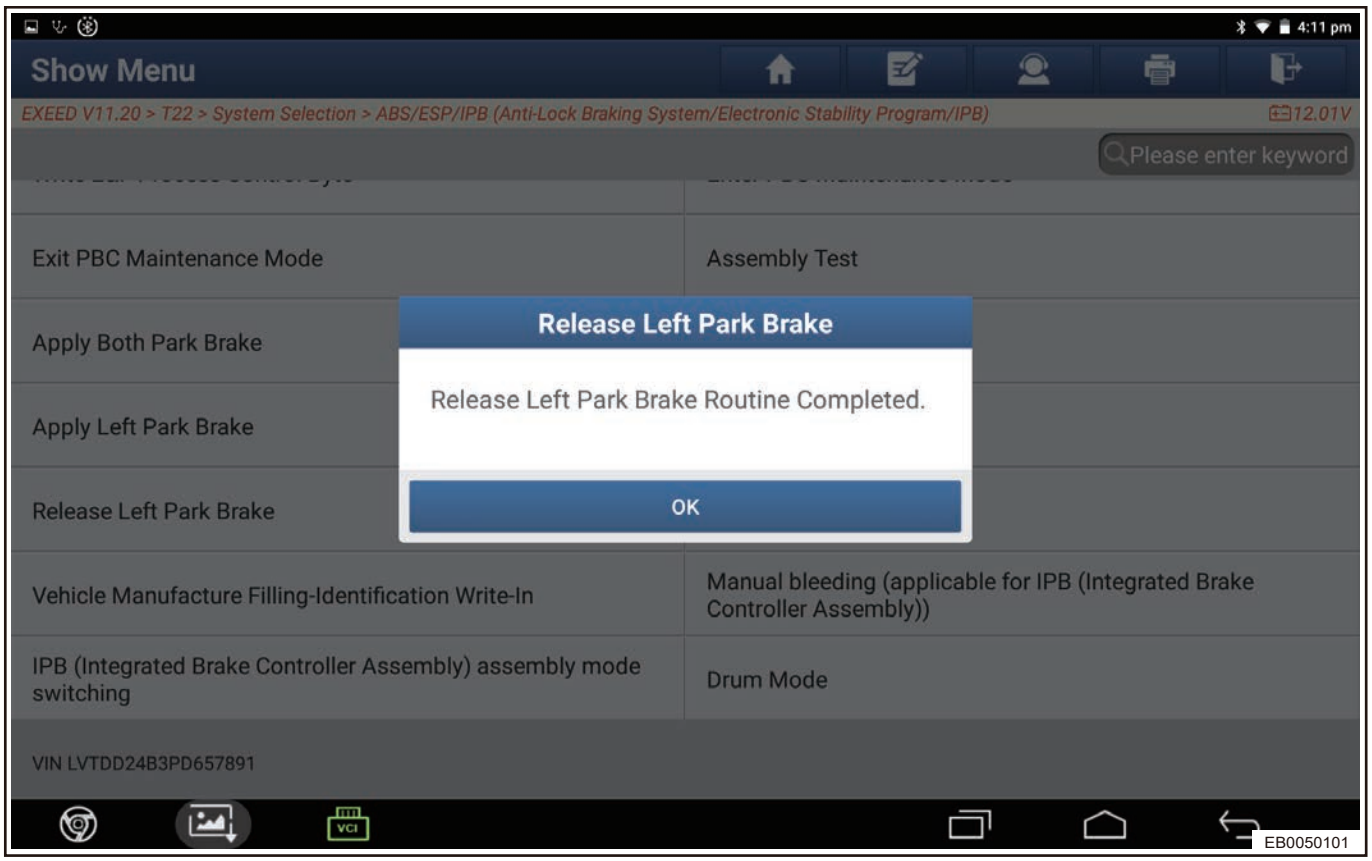
(7) Click “Apply Left Park Brake”.



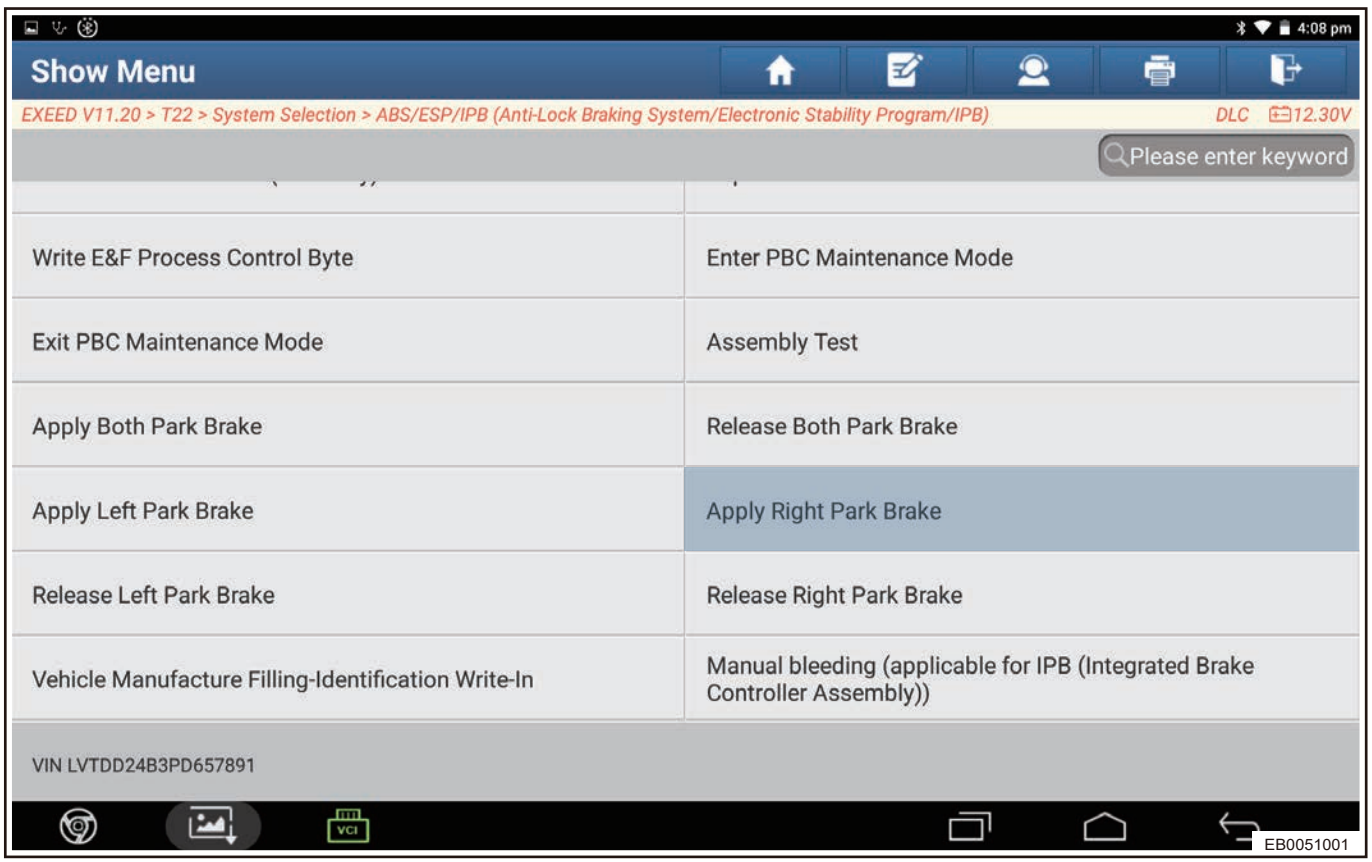


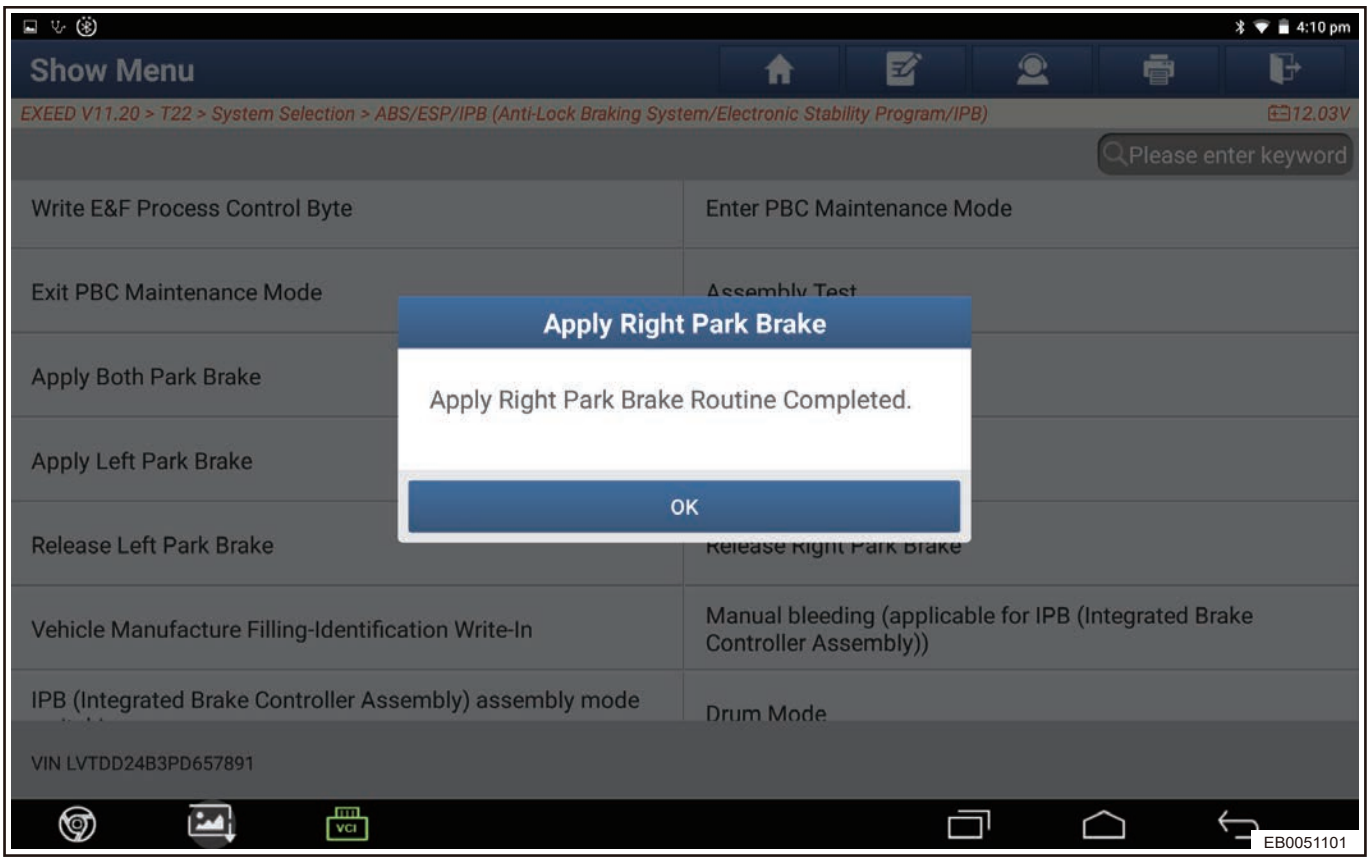
(8) Click “Release Left Park Brake”.



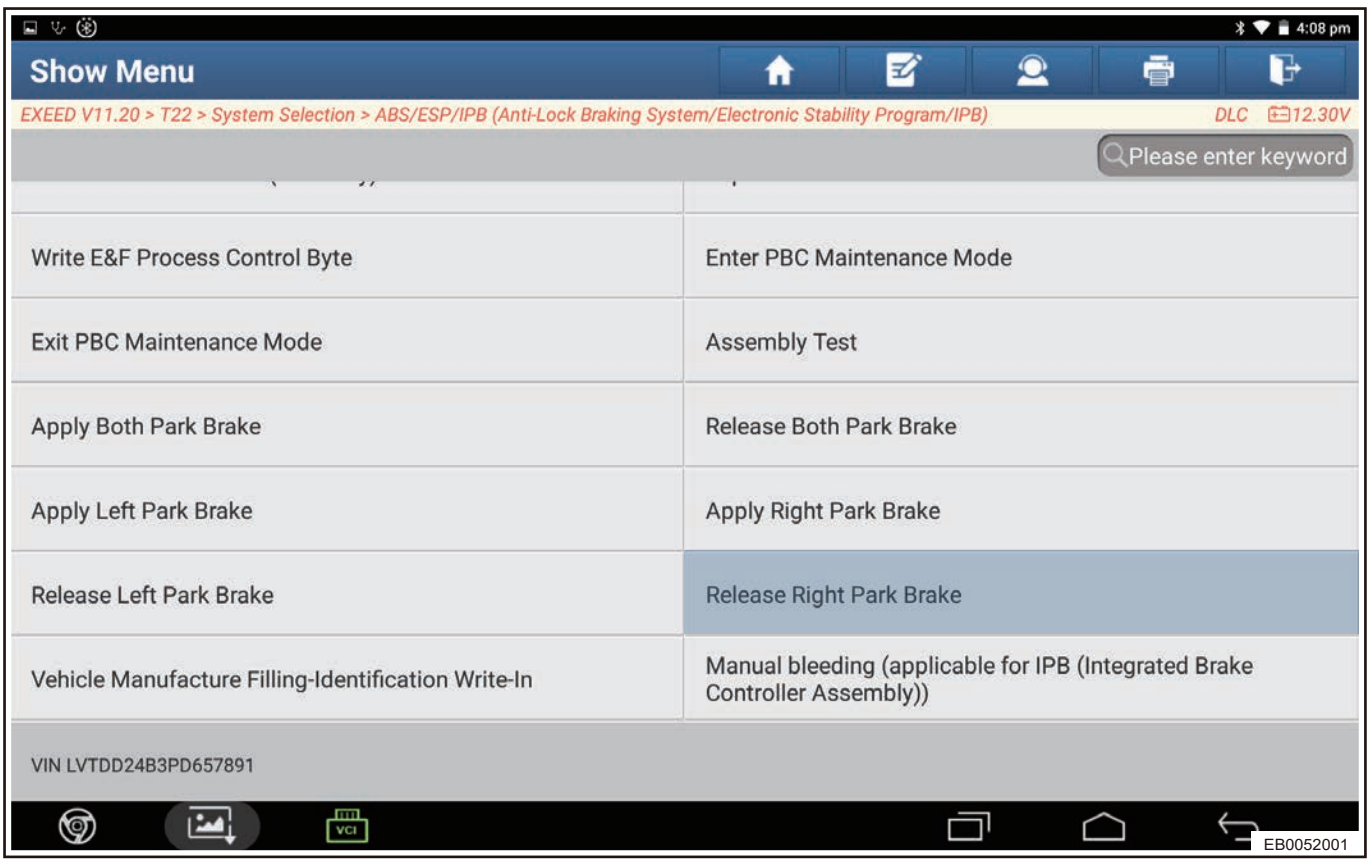


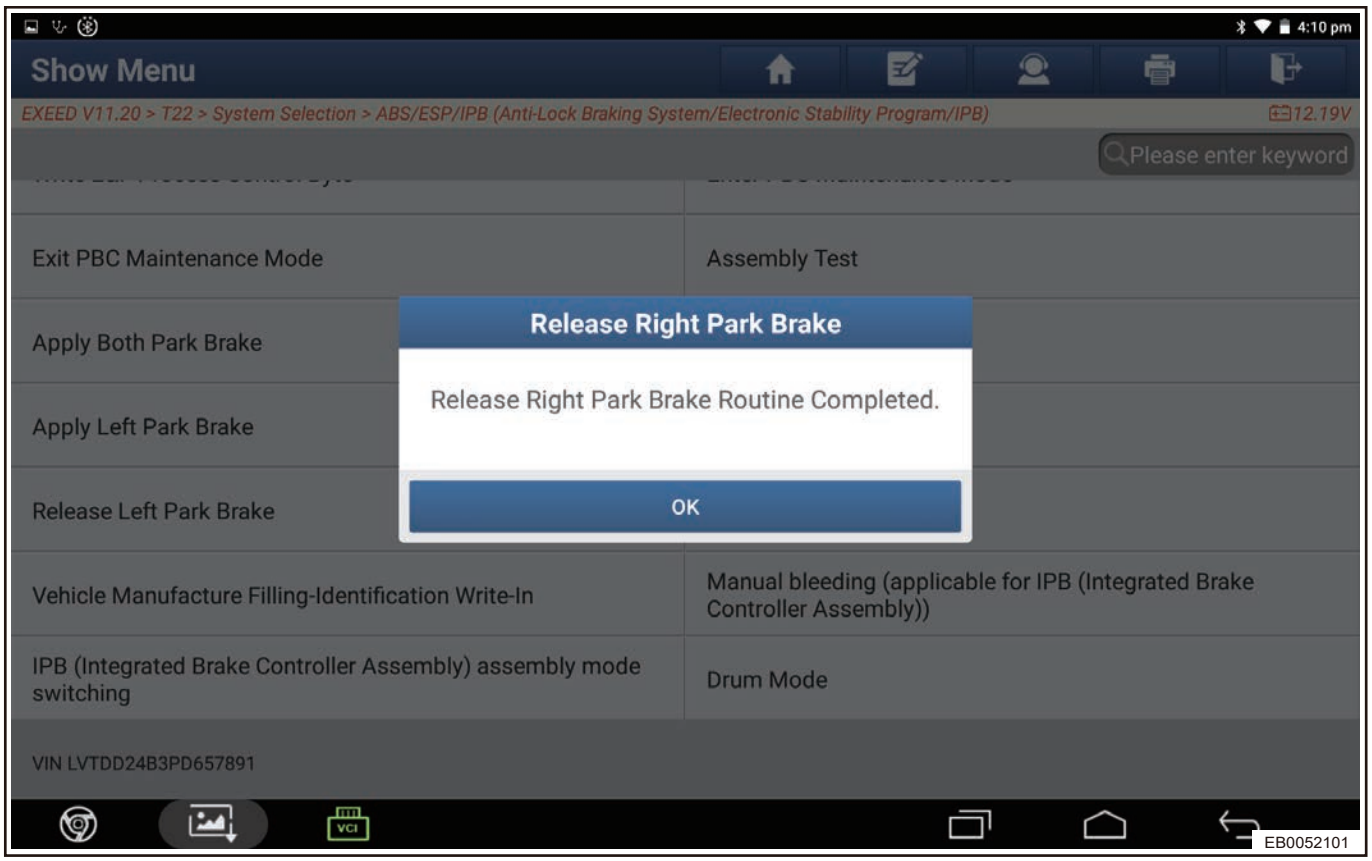
(9) Click “Apply Right Park Brake”.





(10) Click “Release Right Park Brake”.





⚠ Caution

- **All actions of the EPB action test should be in line with the actual operation, otherwise the EPB system should be overhauled.**

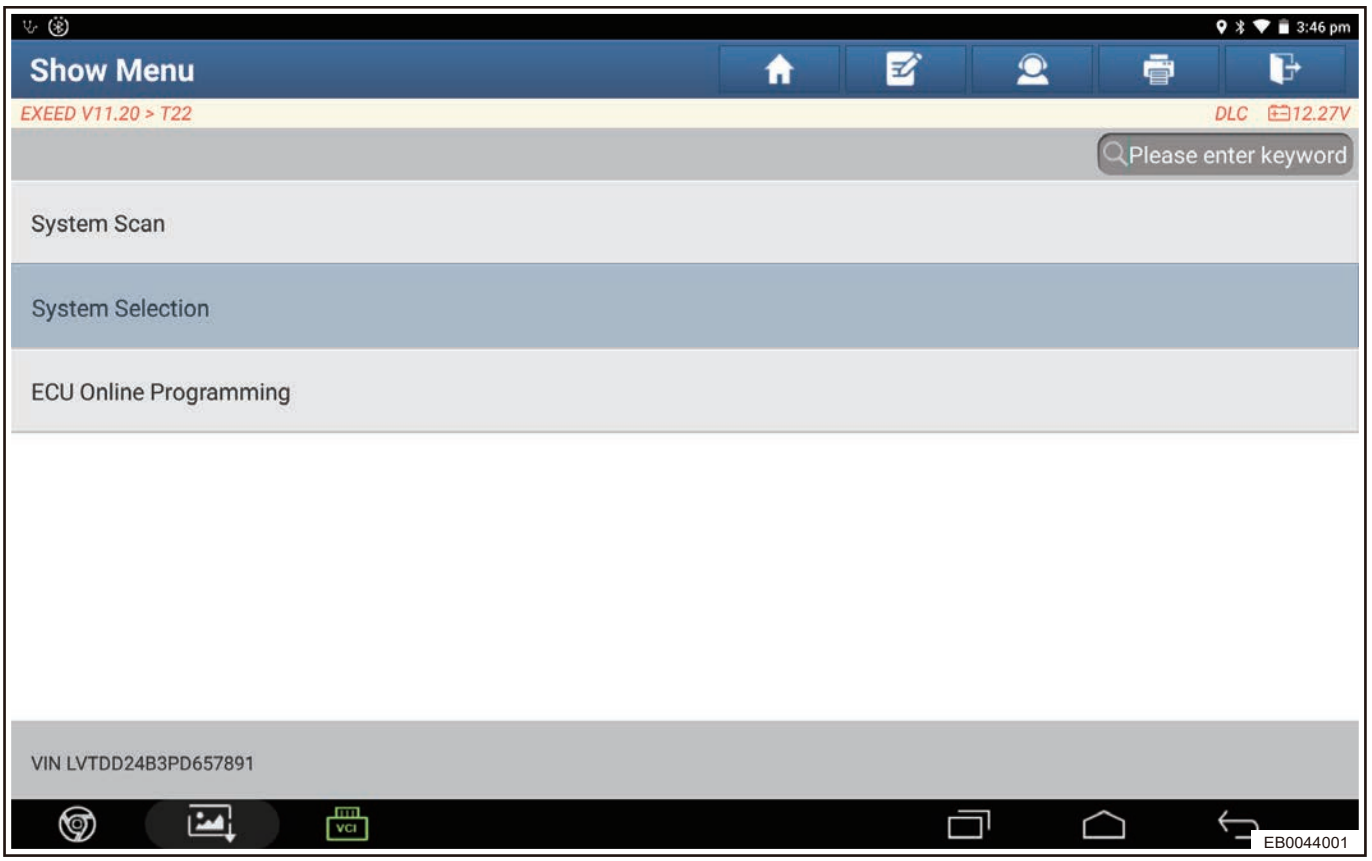
■ Brake System Maintenance Mode

(1) Turn ENGINE START STOP switch to ON.

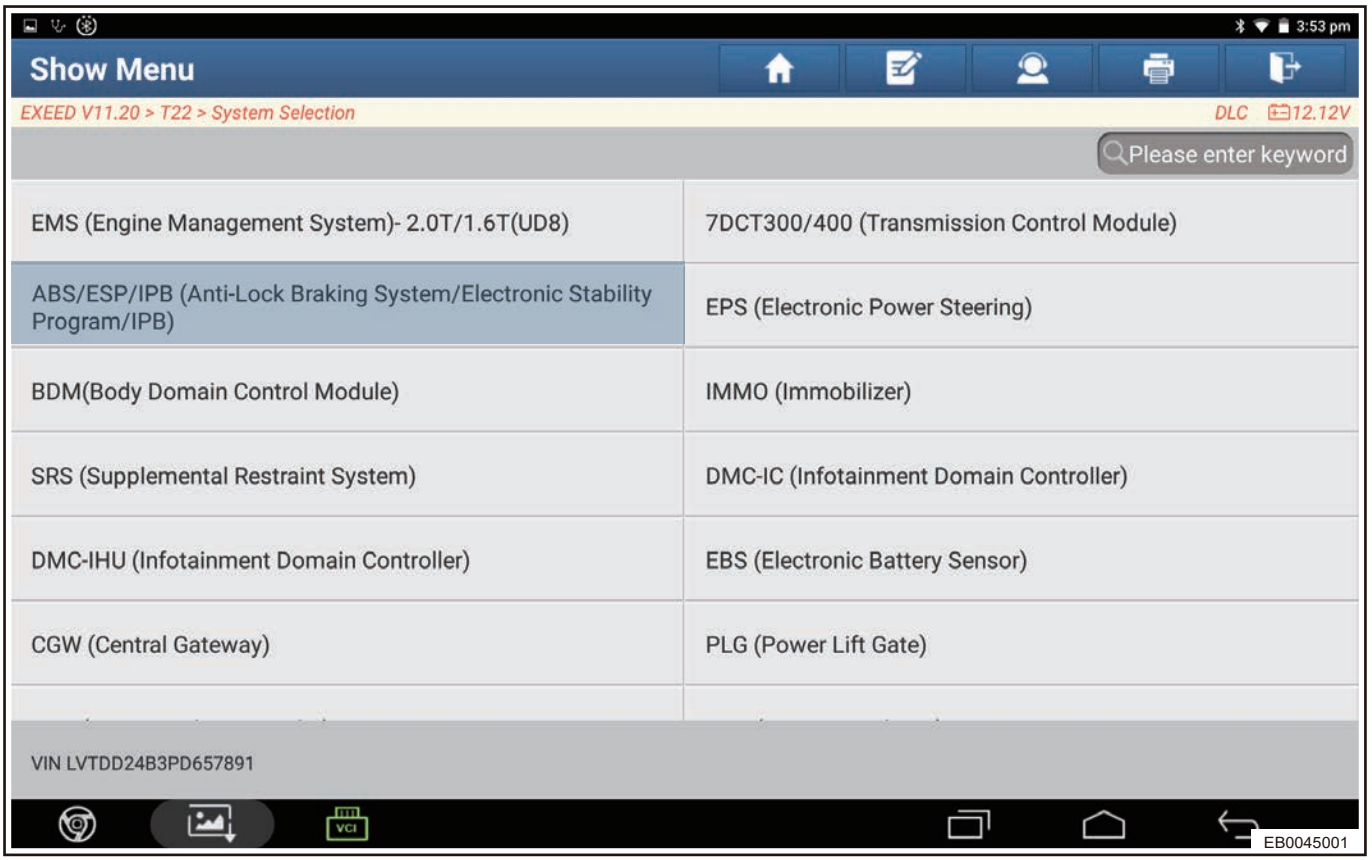
(2) Connect the diagnostic tester.

(3) Select “T22” model.

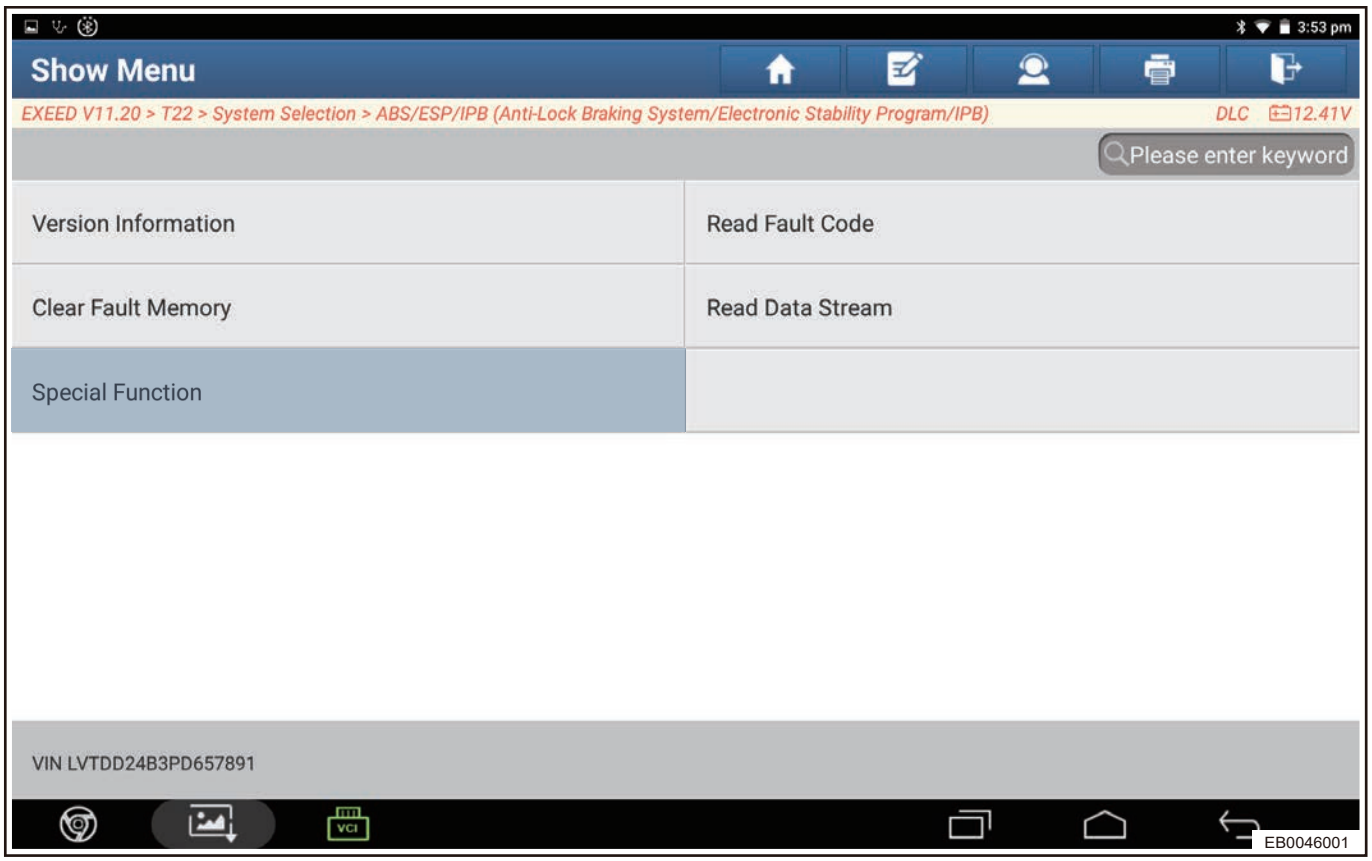
(4) Click “System Selection”.



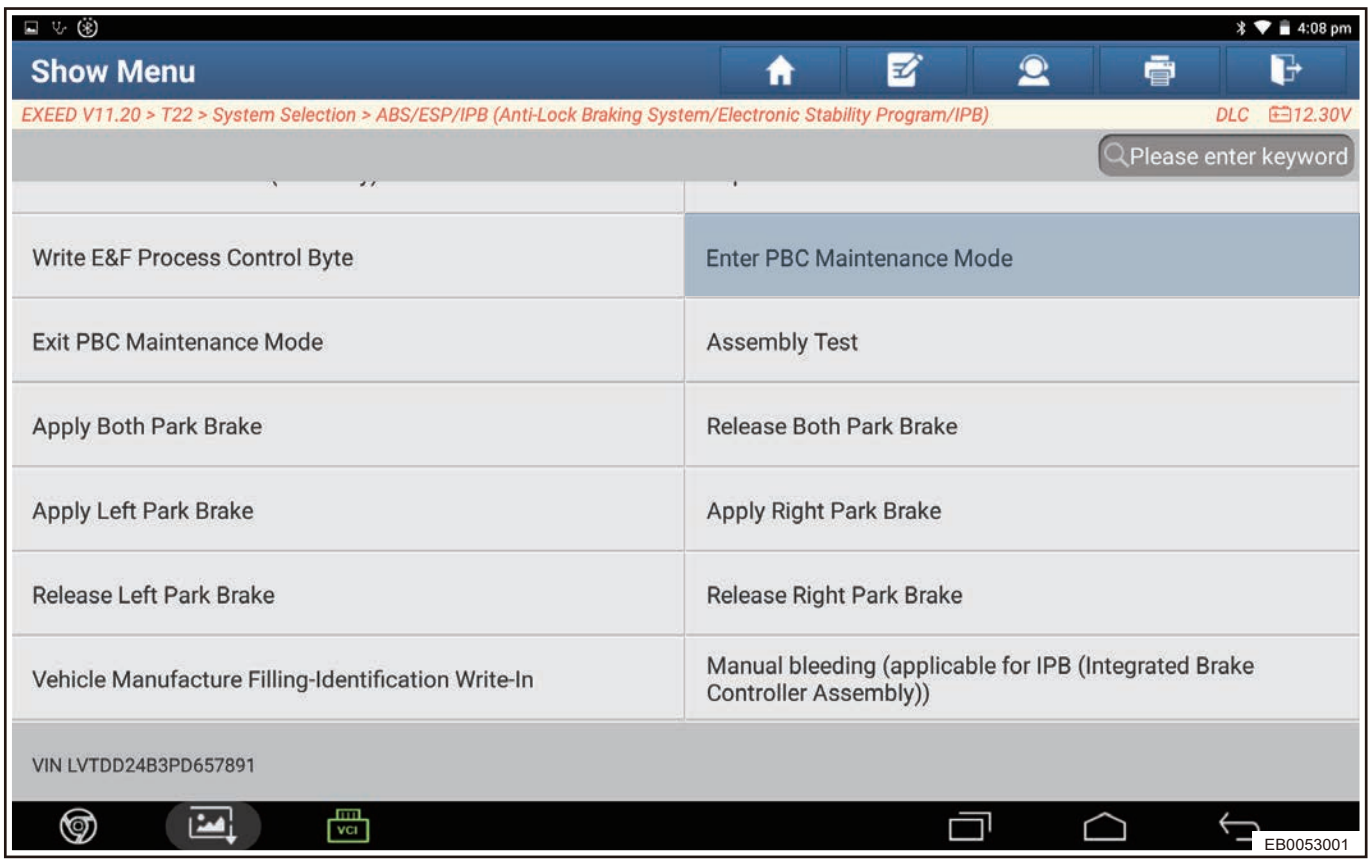
(5) Select and enter “ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPB)”.

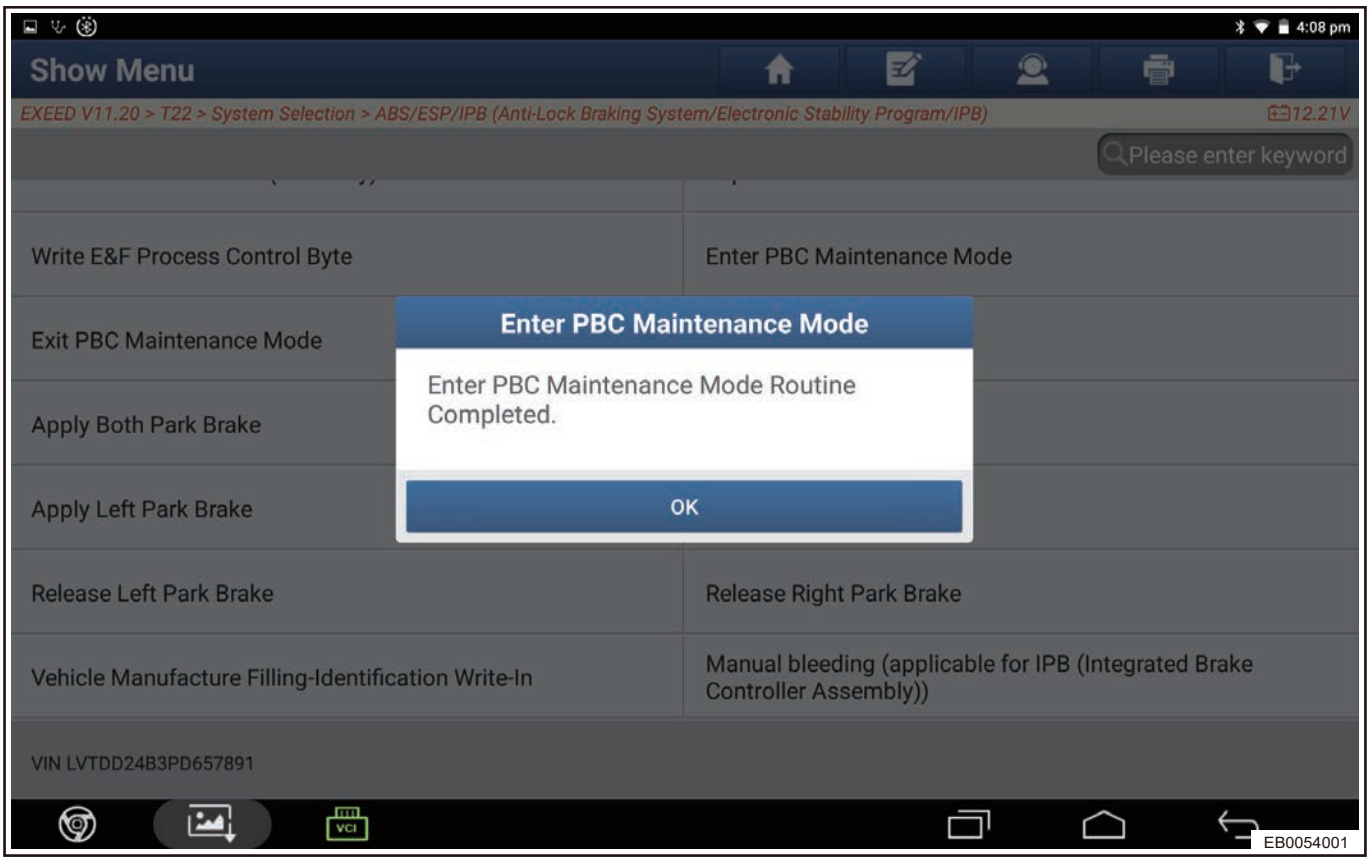


(6) Click "Special Function".

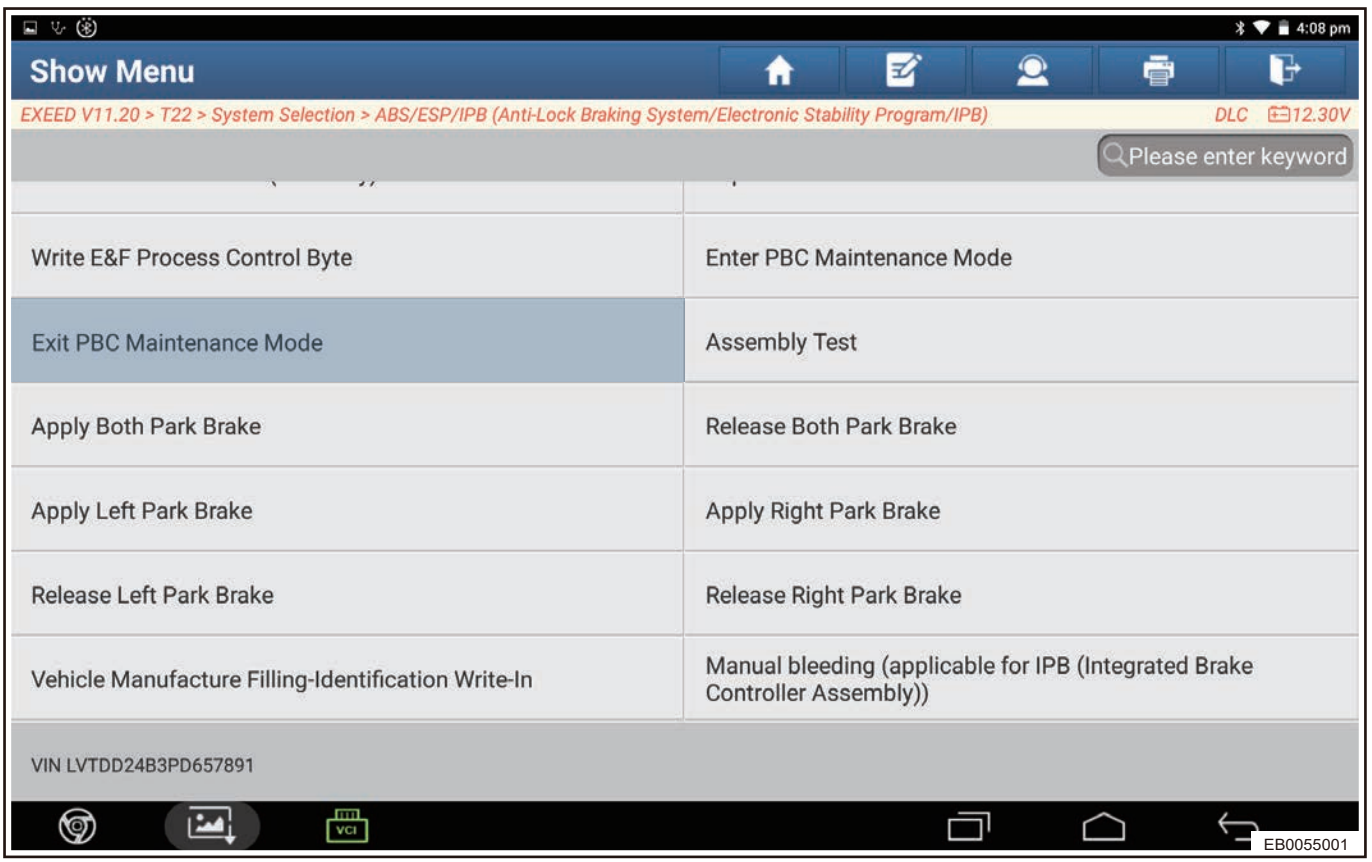


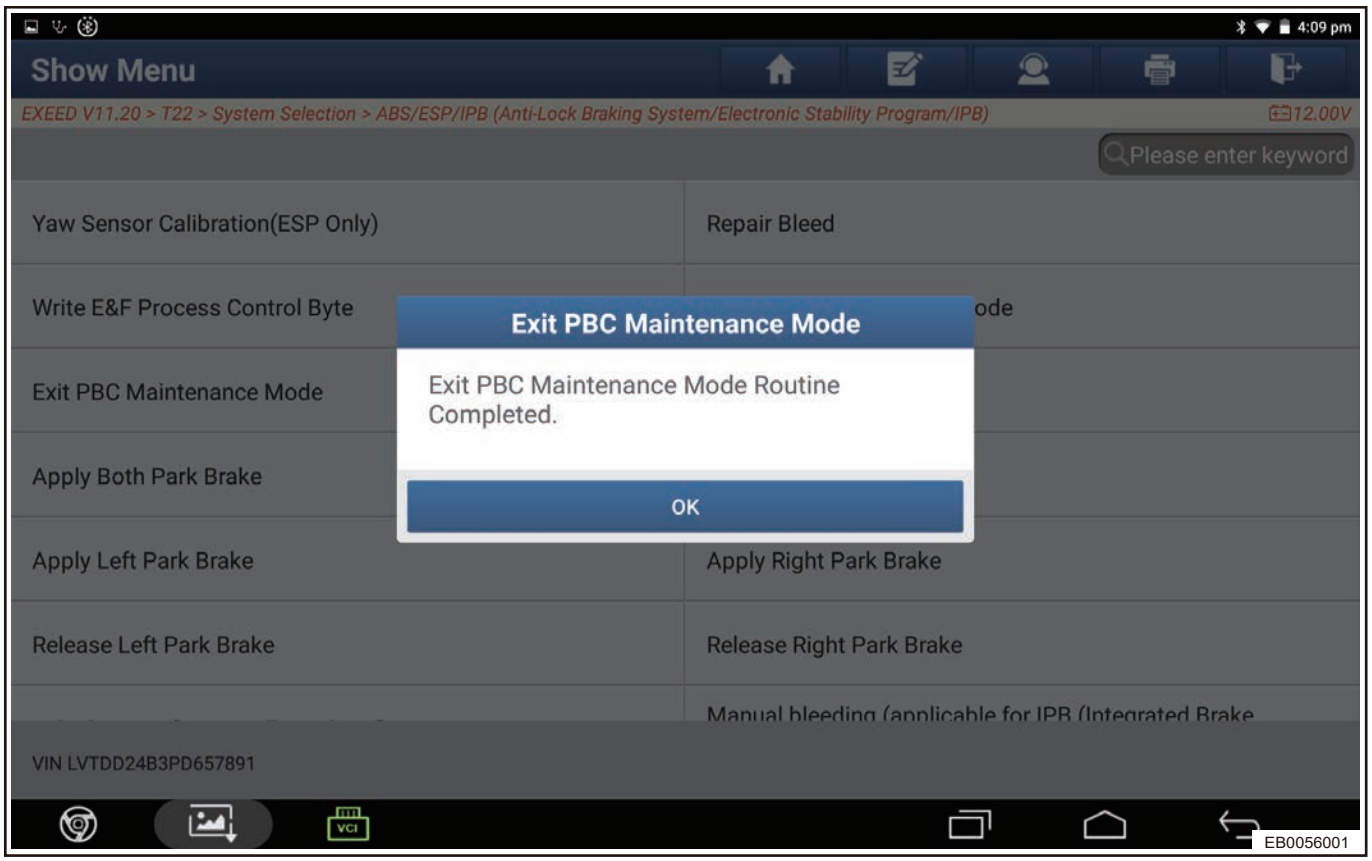
(7) Click “Enter PBC Maintenance Mode”.





(8) Click “Exit PBC Maintenance Mode”.





4.3 EPB System

■ On-vehicle Inspection

⚠ Caution

- **EPB system must be repaired by professional technicians who have trained and mastered maintenance skills and only use original parts for replacement.**
- **Before perform a fault diagnosis of EPB system, it is necessary to confirm that vehicle CAN interface can be connected properly.**
- **Note following when connecting EPB wire harness: Turn ENGINE START STOP switch off before disconnecting wire harness connector, make sure that connector is dry and clean and avoid any foreign material entering; Wire harness must be installed in place horizontally and vertically in order to avoid damaging connector.**
- **If EPB motor fuse need to be replaced, make sure that it is exactly the same with original model, including shape and parameters, and ensure that connection is fully in place.**

(1) Inspect friction material thickness of brake linings on both sides visually, replace it when minimum value is less than 2 mm.

(2) It is necessary to replace 4 brake linings of left and right brake calipers when replacing brake linings.

(3) If removed brake lining can be reused, it must be installed at original position when it is reinstalled.

(4) During warranty period of brake lining, it is not possible to replace brake lining with different wear thickness. If friction material thickness is less than 2mm in warranty period, brake lining should be replaced, and check brake caliper for dragging at the same time.

(5) Check EPB wire harness for aging or damage, replace as necessary.

4.4 Integrated Caliper Motor

Hint:

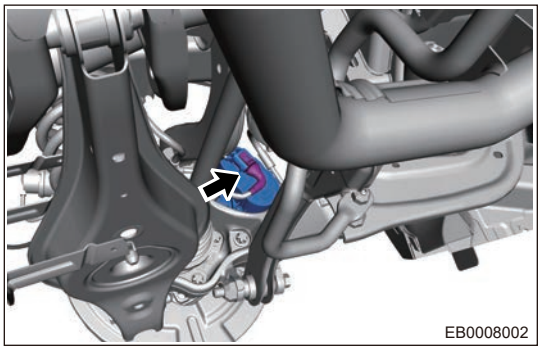
- Removal and installation procedure of left and right sides are the same. Take left side as an example below.

⚠ Caution

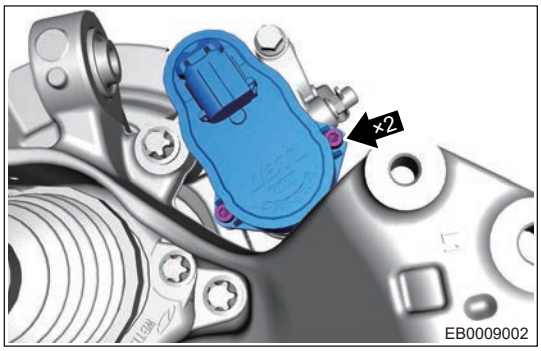
- **Be sure to wear safety equipment to prevent accidents, when removing integrated caliper motor.**
- **Remove integrated caliper motor without damaging motor seal ring and replace it when necessary.**
- **When removing integrated caliper motor, do not allow foreign matter enter into motor.**

■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear left wheel.
(4) Disconnect the integrated caliper motor wire harness connector (arrow).


EB0008002

(5) Remove 2 fixing bolts (arrows) from left integrated caliper motor.



EB0009002

⚠ Caution

- **Avoid dust or water polluting grease and seal rings when removing parking actuator.**

■ Installation

(1) Install left integrated caliper motor.
(2) Install 2 fixing bolts to left integrated caliper motor.
Tightening torque: 7.5 ± 8.5 N·m
(3) Connect the rear left integrated caliper motor wire harness connector.
(4) Install the rear left wheel.
(5) Connect the negative battery cable.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing integrated caliper motor.**
- **When installing integrated caliper motor, remove sediment, dust and other foreign objects that are on matching surface of parking actuator and on head of parking caliper.**
- **When installing integrated caliper motor, check whether the O-ring of parking caliper head is invalid or abnormal. Please replace it in time.**
- **When installing integrated caliper motor, parking caliper head and actuator motor must be tightly coupled, tighten fixing bolts to specified torque.**
- **When installing integrated caliper motor, check whether the O-ring is extruded between parking actuator and parking caliper, if it is extruded, should be reinstalled.**
- **When installing integrated caliper motor, manual parking clamp and release must be performed to confirm if parking function is normal.**

4.5 Electronic Parking Brake Switch

■ Removal

Hint:

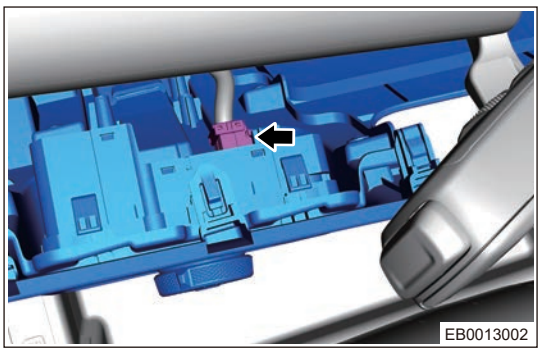
- Electronic parking switch is integrated into the light control switch

(1) Turn off all electrical equipment and ENGINE START STOP switch.

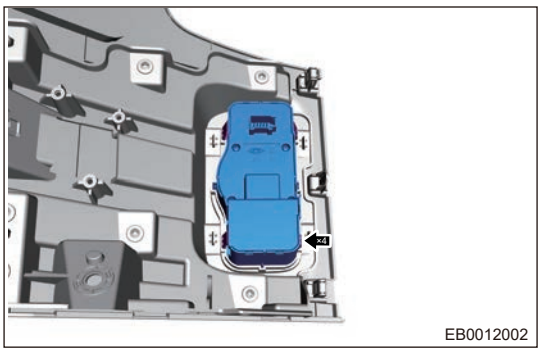
(2) Disconnect the negative battery cable.

(3) Remove the lower left protector body with light control switch assembly.

(4) Disconnect the light control switch connector.



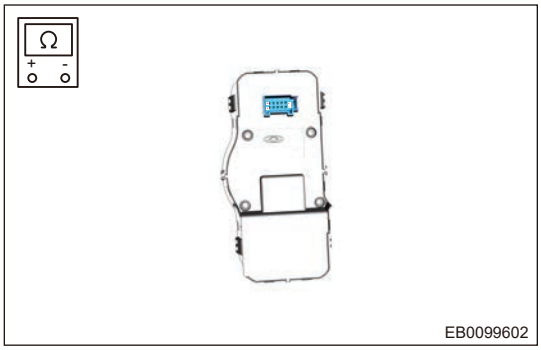
(5) Press the 4 buckles of the light control switch.



(6) Remove the light control switch assembly.

■ **Inspection**

(1) According to circuit diagram, internal resistance of EPB switch is measured using digital multimeter ohm gear. If it does not match with measured value of following table, replace the EPB switch.



Multimeter Connection	Manual Parking Switch	Specified Condition
Terminal 1 - Terminal 2	Parking brake pulled up	⩽ 1 Ω
Terminal 3 - Terminal 4	Parking brake released	⩽ 1 Ω

Multimeter Connection	Manual Parking Switch State	Specified Condition
Terminal 5 - Terminal 6	Manual parking switch indicator	2.2 kΩ

■ **Installation**

(1) Install light control switch assembly to lower left protector assembly.
(2) Connect the light control switch assembly connector.
(3) Install the lower left protector assembly.
(4) Connect the negative battery cable.

4.6 EPB Brake Caliper Emergency Release

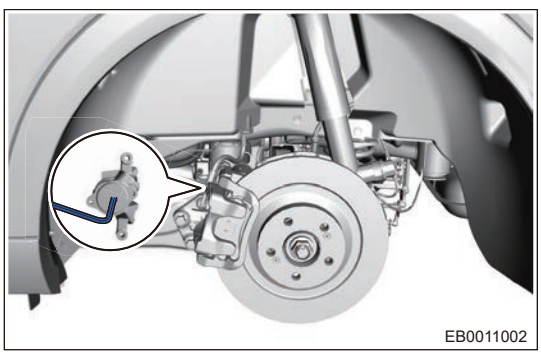
Hint:

- Use same procedures for right and left sides, procedures listed below are for left side.

⚠ Caution

- **If parking brake cannot be released by parking brake switch manually or automatically due to unexpected circumstances (such as battery does not output voltage, parking brake system failure, etc.) during using EPB system, you need to enable parking emergency releasing function to release parking brake, please follow the following steps for specific methods.**
- **If this malfunction occurs on a slope, please try to tow vehicle to a level road or place obstacles such as rocks in front of or rear of front wheels respectively to prevent wheel rolling, avoiding coasting accident after releasing rear wheel brake urgently.**
- **Be sure to wear safety equipment to prevent accidents, when EPB brake caliper emergency releasing.**

(1) Remove the rear left wheel.
(2) Remove the integrated caliper motor.
(3) Align inner hexagon M8 with spline in EPB caliper, rotate 2-3 cycles clockwise (when operator faces spline) or stop until brake disc can rotate freely (it is normal that a large rotation force is needed due to vehicle parking brake condition).



(4) The vehicle only loses parking function and does not affect normal braking function after releasing parking brake.

⚠ Caution

- **Emergency release is highly specialized, it is recommended to perform by EXEED 4S shop professionals.**

STEERING SYSTEM

7.1 ELECTRONIC POWER STEERING CONTROL SYSTEM (C-EPS)

1 Warnings and Precautions

1.1 Precautions

(1) Calibration requirements: Keep vehicle stationary and steering wheel centered to ensure that the left and right errors are within 10°.

(2) Battery voltage is higher than 9V and lower than 16 V.

(3) When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

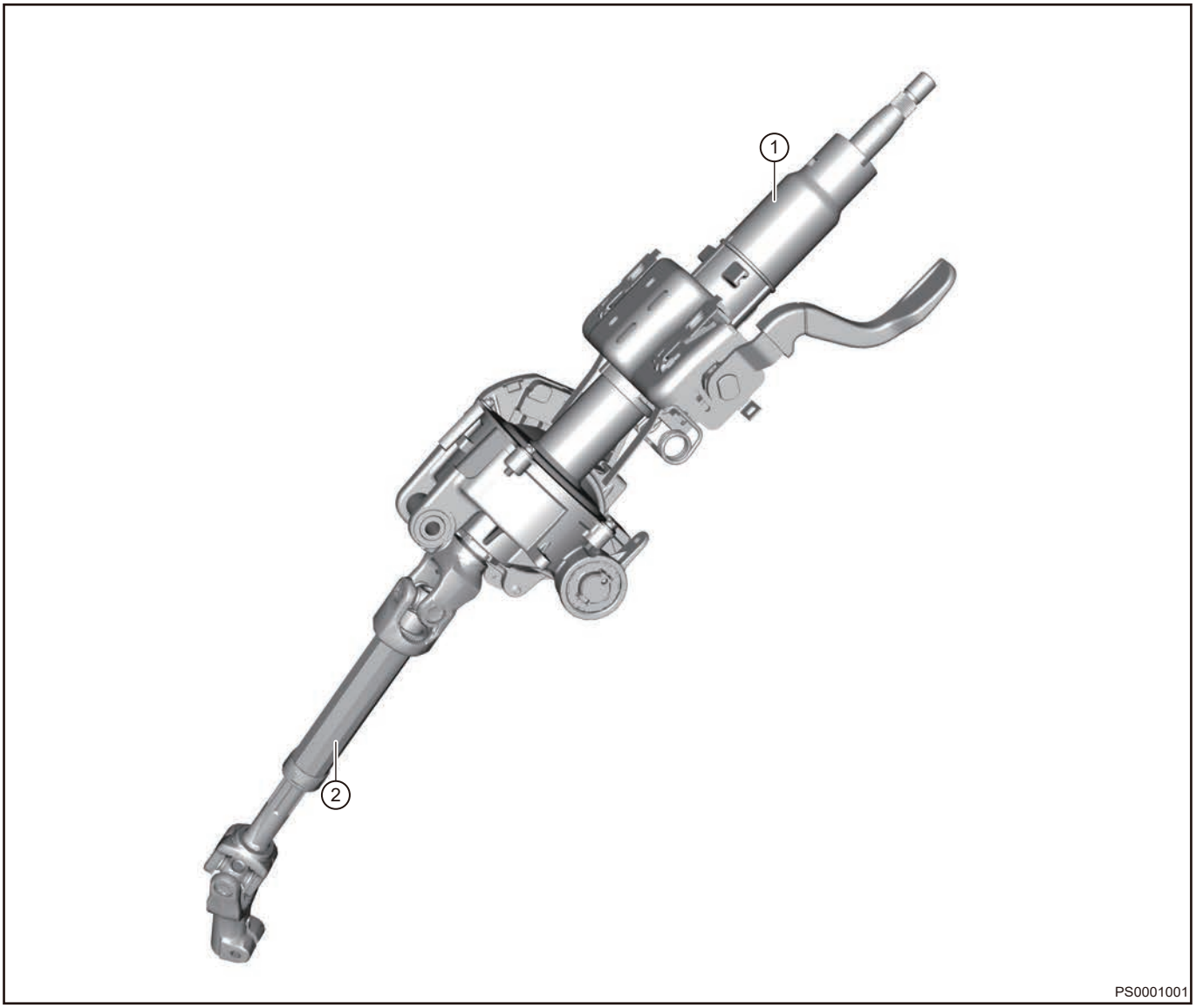
(4) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

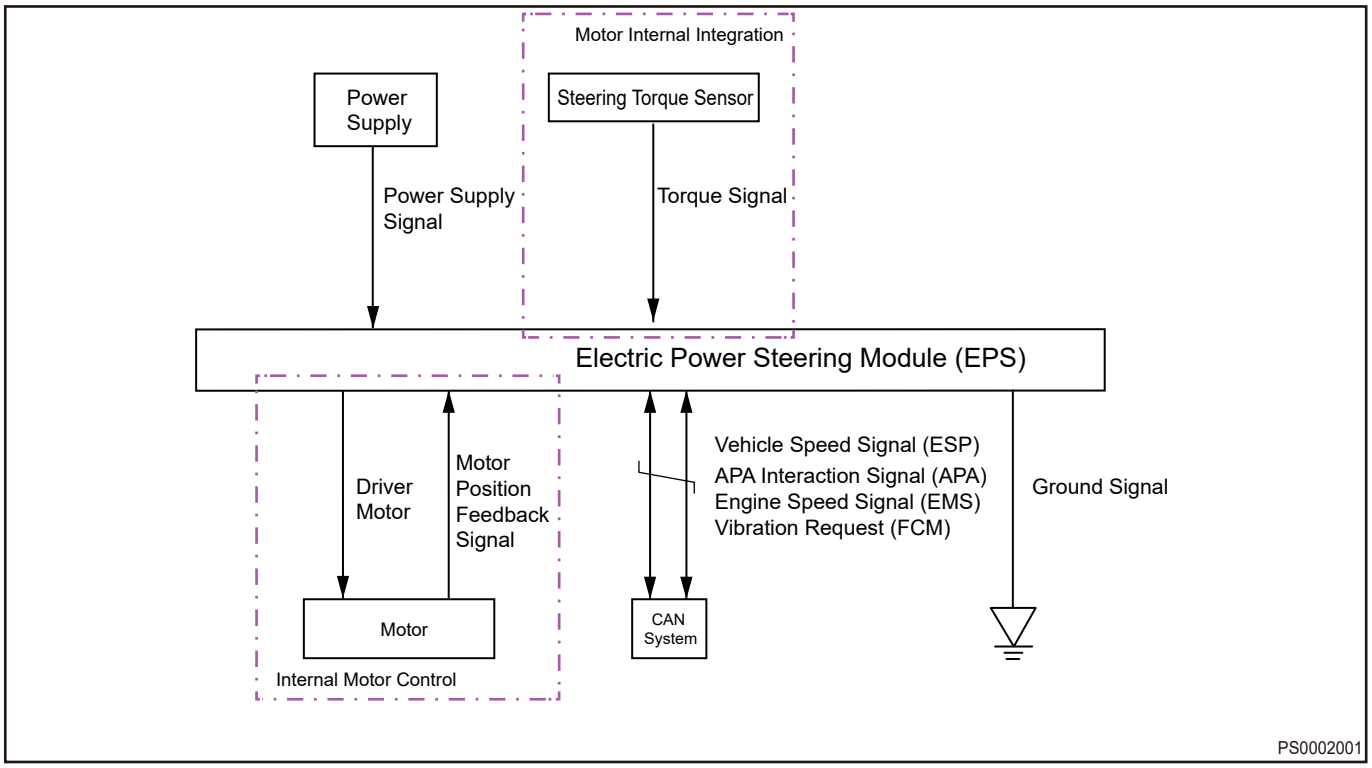
The steering column is the component of the steering system that connects the steering wheel and the steering gear. Through the steering column, the driver transfers torque to the steering gear, which drives the steering gear to achieve steering.

2.2 System Components Diagram



1	Electric Steering Column	2	Steering Intermediate Shaft Assembly

2.3 System schematic diagram



Electronic power steering module is integrated into steering column.

2.4 Operation

When driver rotates the steering wheel, torque sensor installed on steering column sends detected torque acting on steering wheel to steering assist control unit. Based on information such as steering torque, vehicle speed (provided by vehicle CAN line), steering wheel rotation speed and characteristic curve stored in control unit, control unit calculates required steering torque based on specified algorithm, and controls motor operation. The steering assist is provided by motor drive column, thus steering rack operates.

2.5 Component Operation Description

■ EPS Steering Angle Calibration and Soft Check Point Learning (For offline calibration of four-wheel alignment station electrical check equipment)

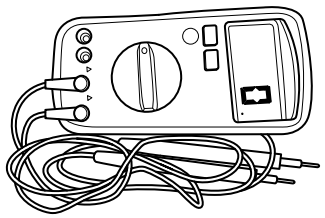
(1) Start vehicle;
(2) Turn steering wheel to left and right more than ± 45° at a speed of < 200°/s;
(3) Perform four-wheel alignment on vehicle;
(4) The ENGINE START STOP switch is turned off and turned on within 3 seconds (+15 on);
(5) Fix the steering wheel horizontally;
(6) Connect the electrical inspection equipment, enter corner calibration interface, and confirm directly until the calibration is completed according to the prompt of electrical inspection equipment;
(7) Calibration is completed;
(8) (After the four-wheel alignment is completed), drive out the four-wheel alignment station, turn the steering wheel left and right to the limit position, and keep the hand force not less than 10 N·m for more than 1 second, and ensure that the steering wheel hits the limit position and then returns to the center position;
(9) The software completes soft stop position learning.

⚠ Caution

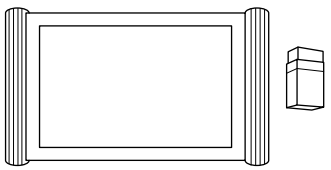
In step 2, if the steering speed is too fast or the steering angle is insufficient, it cannot be calibrated. In step 4, if the vehicle is not powered on in 3 seconds, it cannot be calibrated. In step 8, if the steering wheel limit position (turned to strike position) has not reached, it will cause soft stop position learning to be advanced for the first time, resulting in an power assist loss prior to the limit position.

3 Tools

■ General Tool

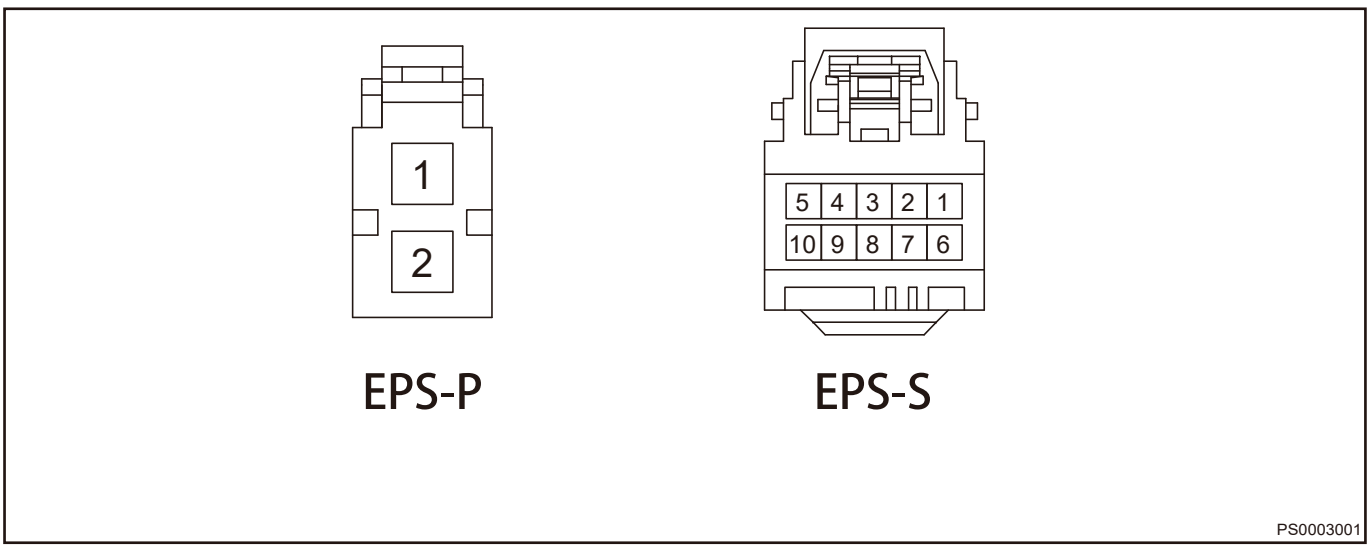
Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ Special Tool

Tool Name	Tool Drawing
Diagnostic tester	 S00001

4 System Circuit Diagram

4.1 Module Terminal Definition



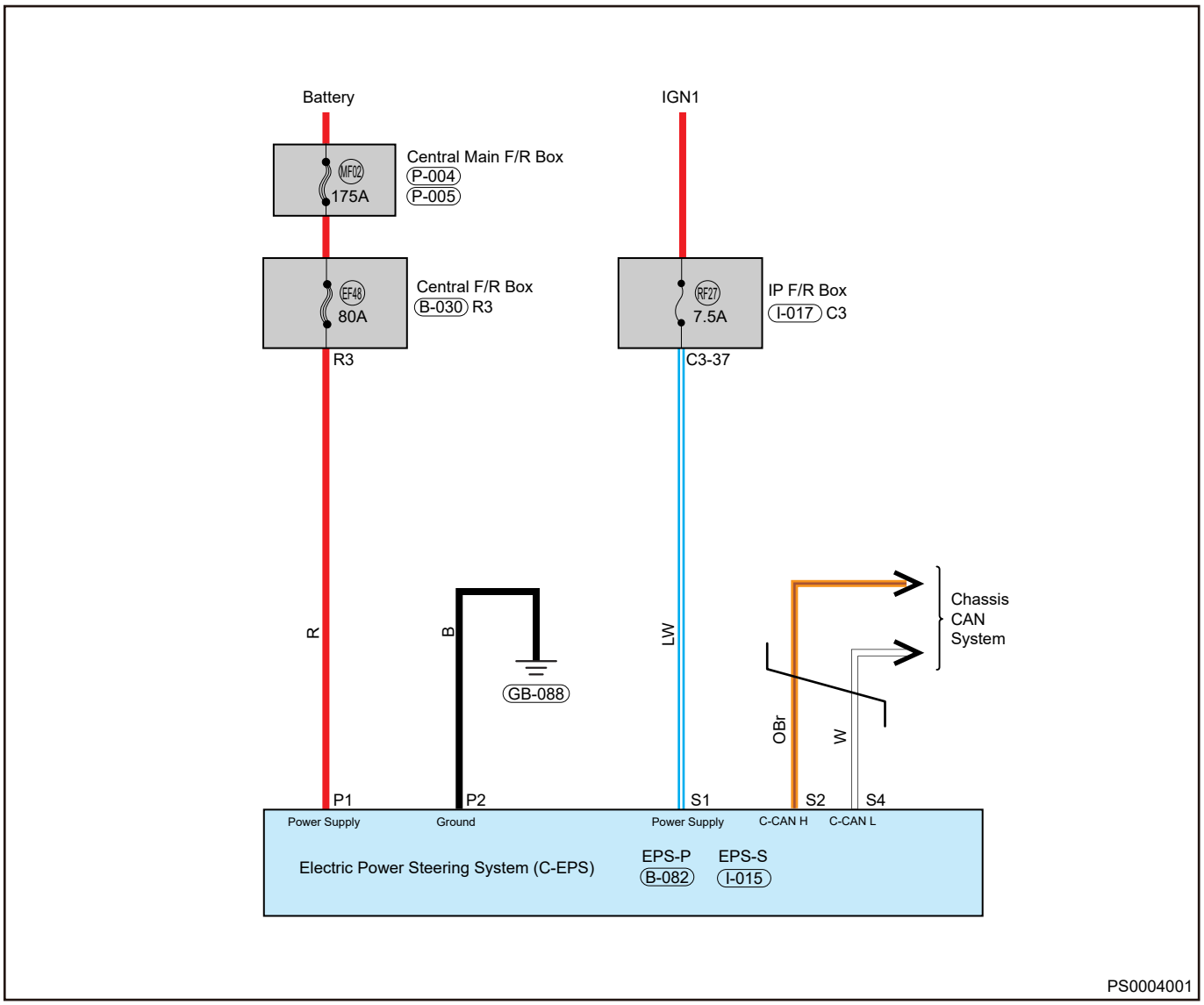
Vehicle power supply: Controller power supply connector

Pin	Definition	Pin	Definition
P-1	Power Supply	P-2	Ground

Vehicle signal: Controller signal connector

Pin	Definition	Pin	Definition
S-1	Ignition Signal	S-6	-
S-2	C-CAN H	S-7	-
S-3	-	S-8	-
S-4	C-CAN L	S-9	-
S-5	-	S-10	-

4.2 Circuit Diagram



5 Diagnostic Information and Steps

5.1 Diagnostic Help

- Connect diagnostic tester and make it communicate with vehicle electronic module through data network.
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be deleted, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that applied to the malfunction.

- Visually check the related wire harness.
- Check and clean Electronic Power Steering controller (EPS controller) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

5.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the following:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect sensors and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

5.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.

(2) Check all contact surfaces for tarnish, dirt and rust, etc.

(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

(5) Check if any additional accessories interfere with ground circuit.

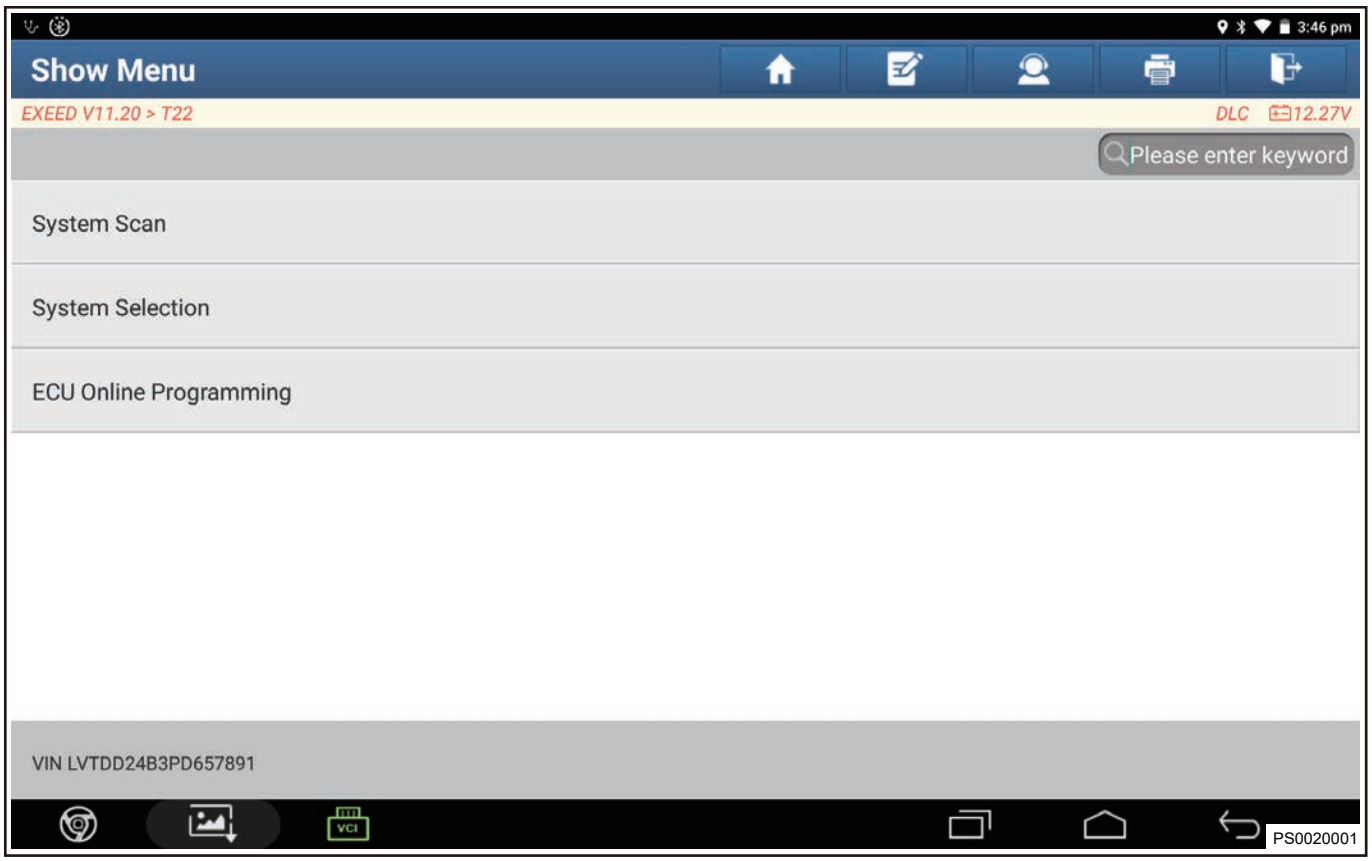
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

5.4 Motor position sensor calibration

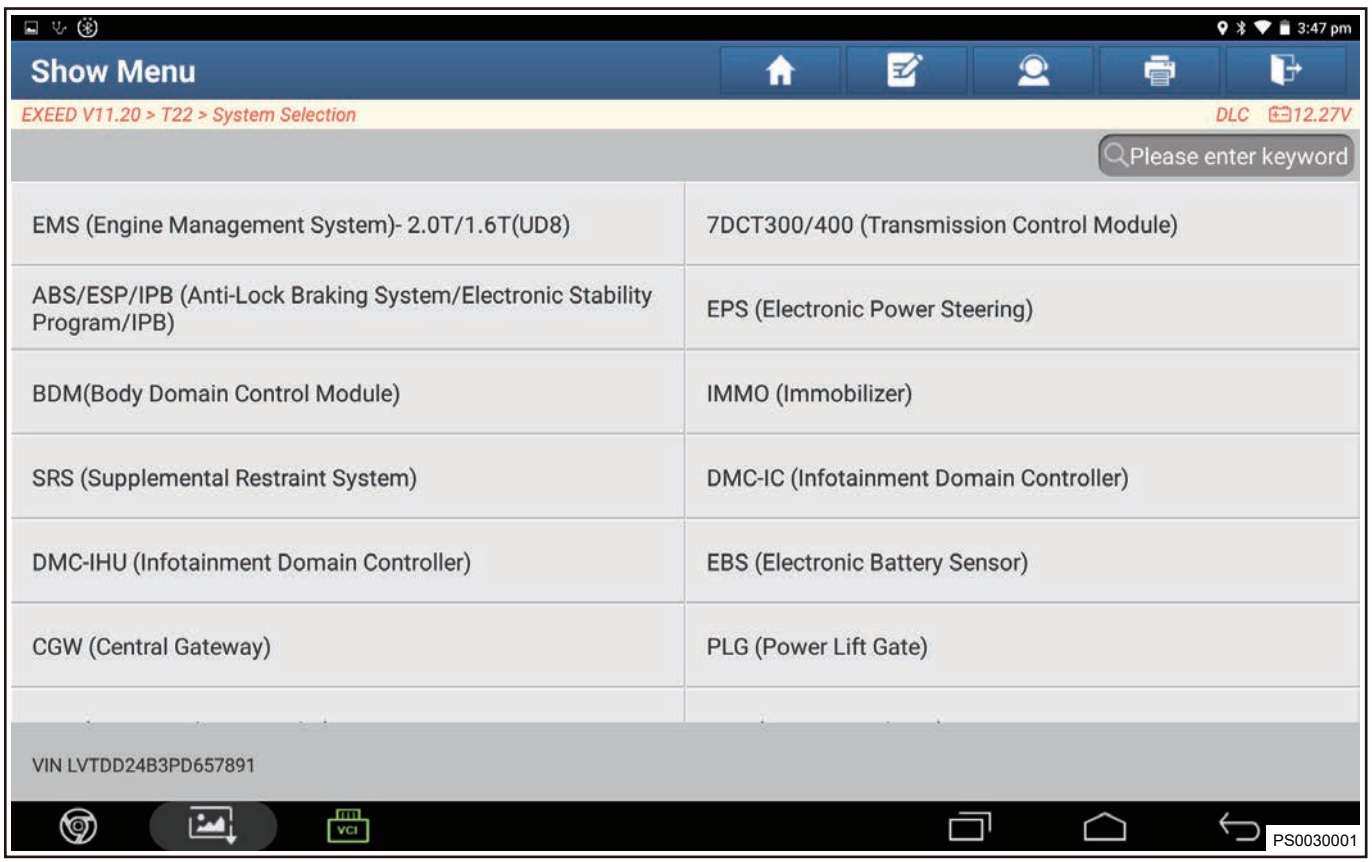
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

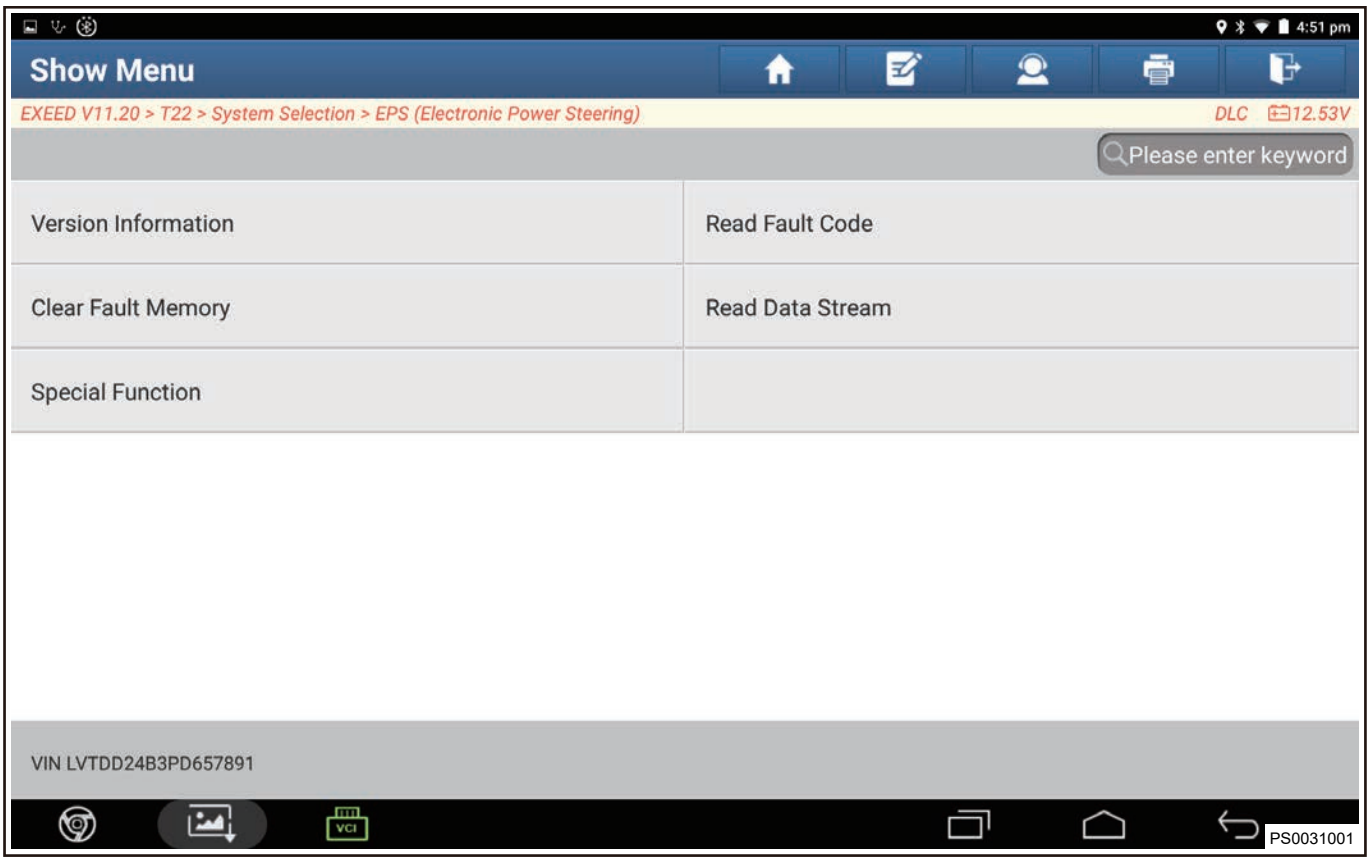
(3) Click “System Selection”.



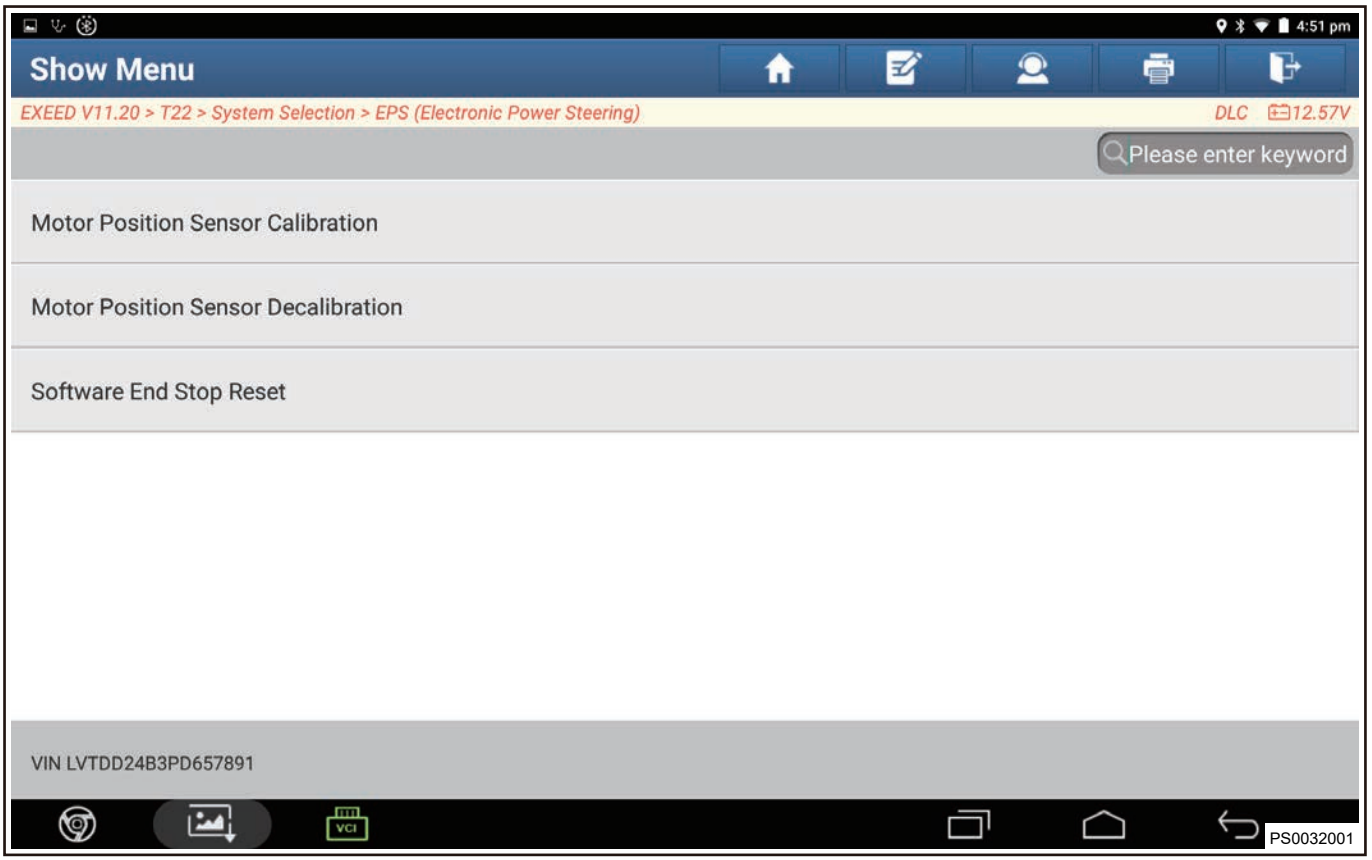
(4) Select “EPS (Electronic Power Steering)”.



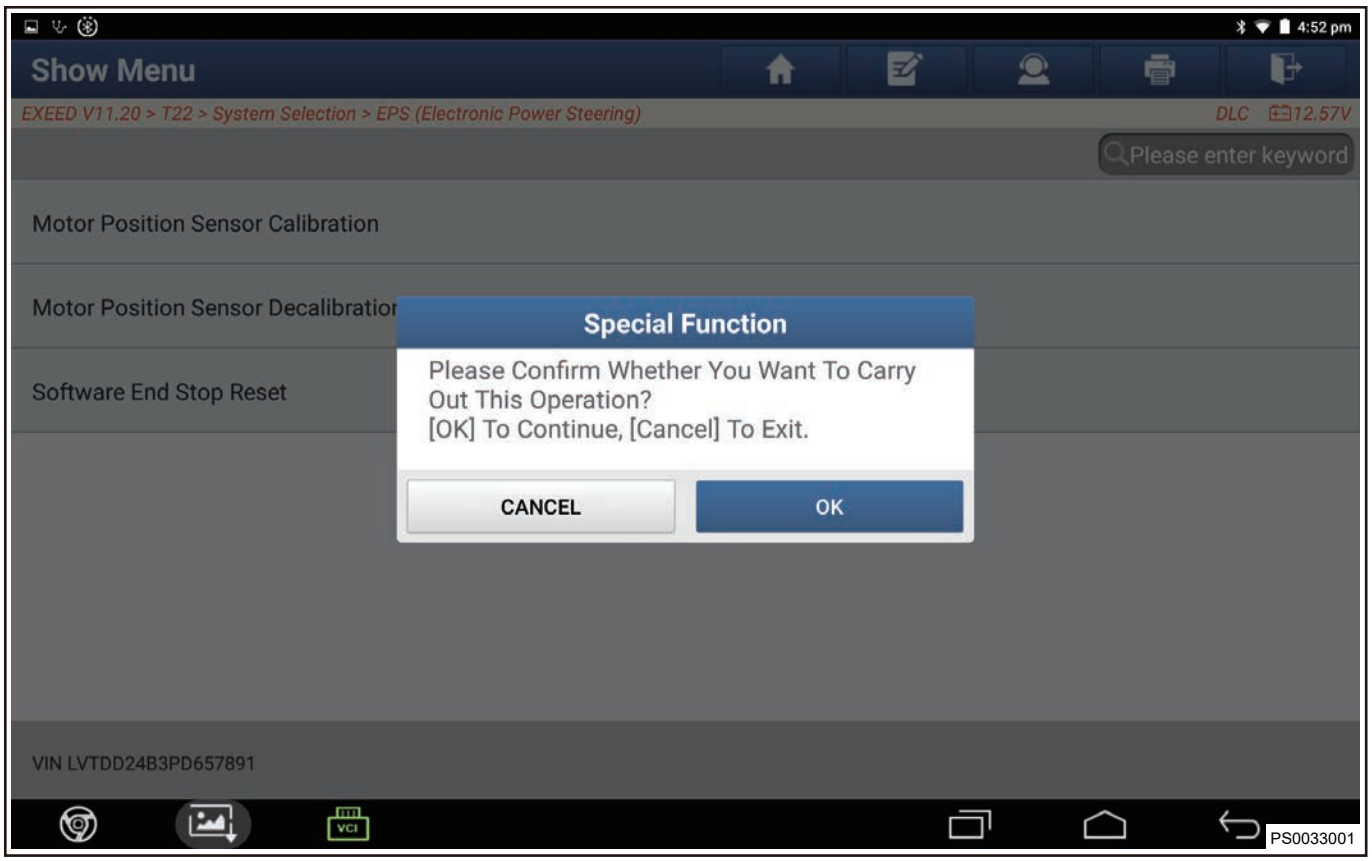
(5) Click "Special Function".



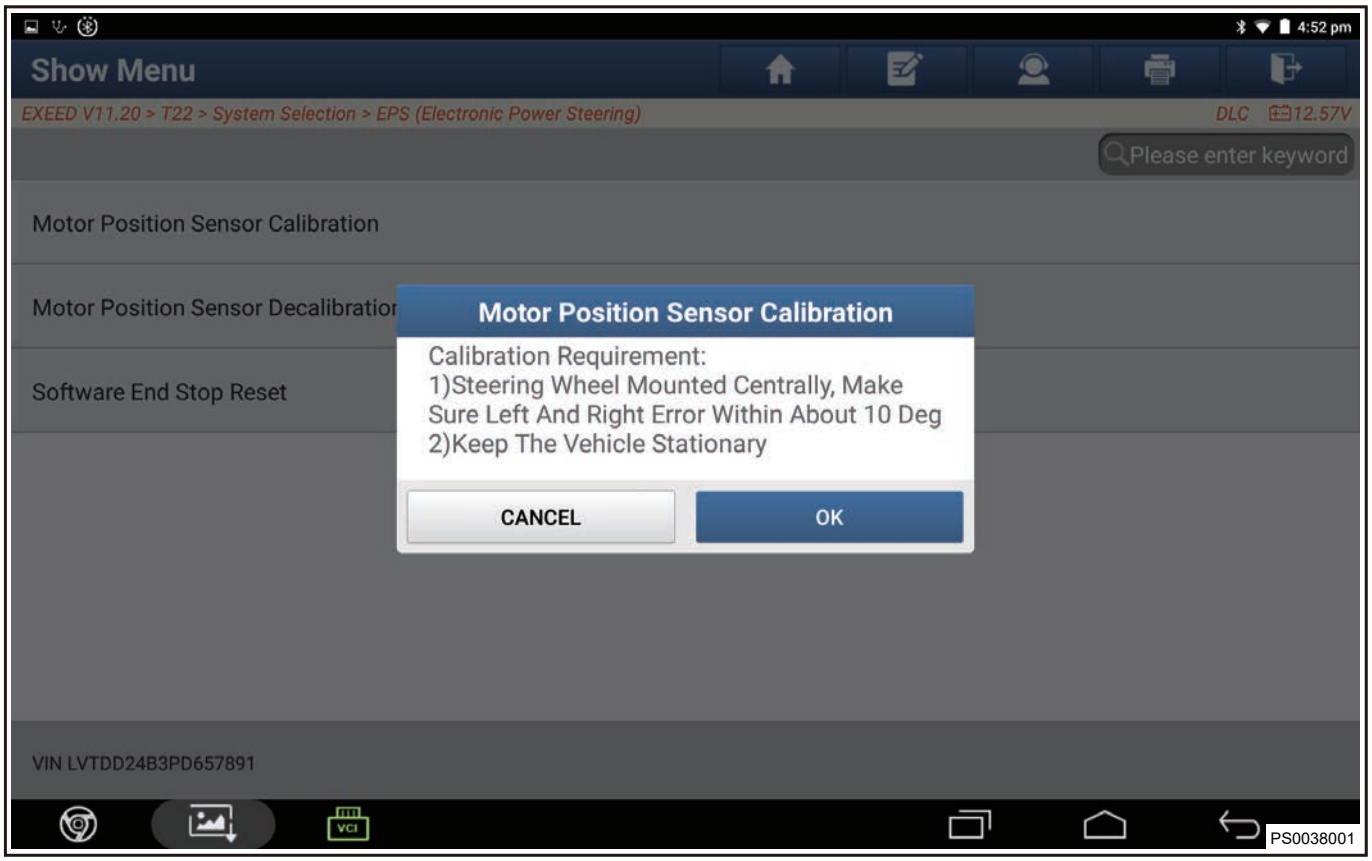
(6) Go to next interface, click “Motor Position Sensor Calibration”.



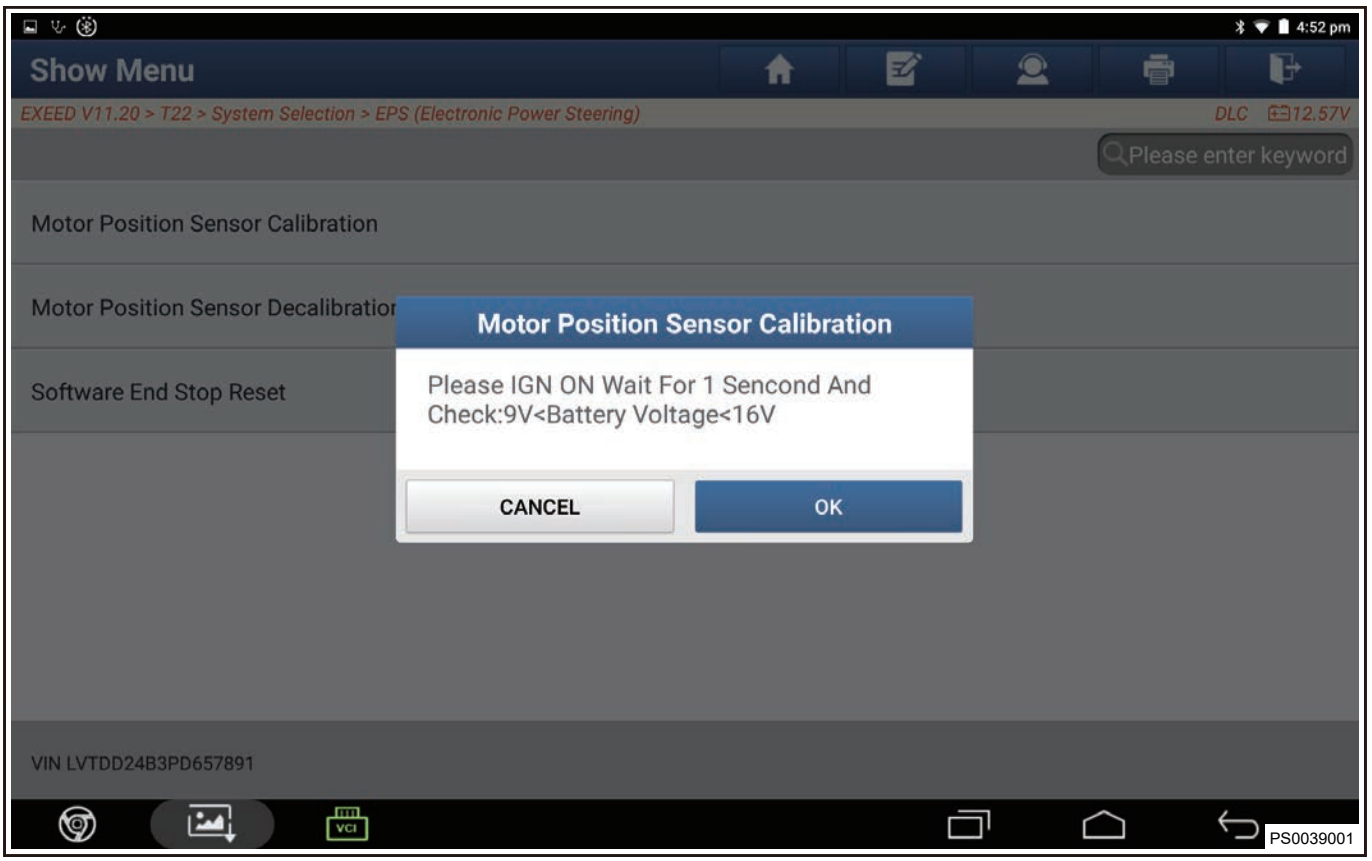
(7) Display “Please Confirm Whether You Want To Carry Out This Operation”, and click “OK”



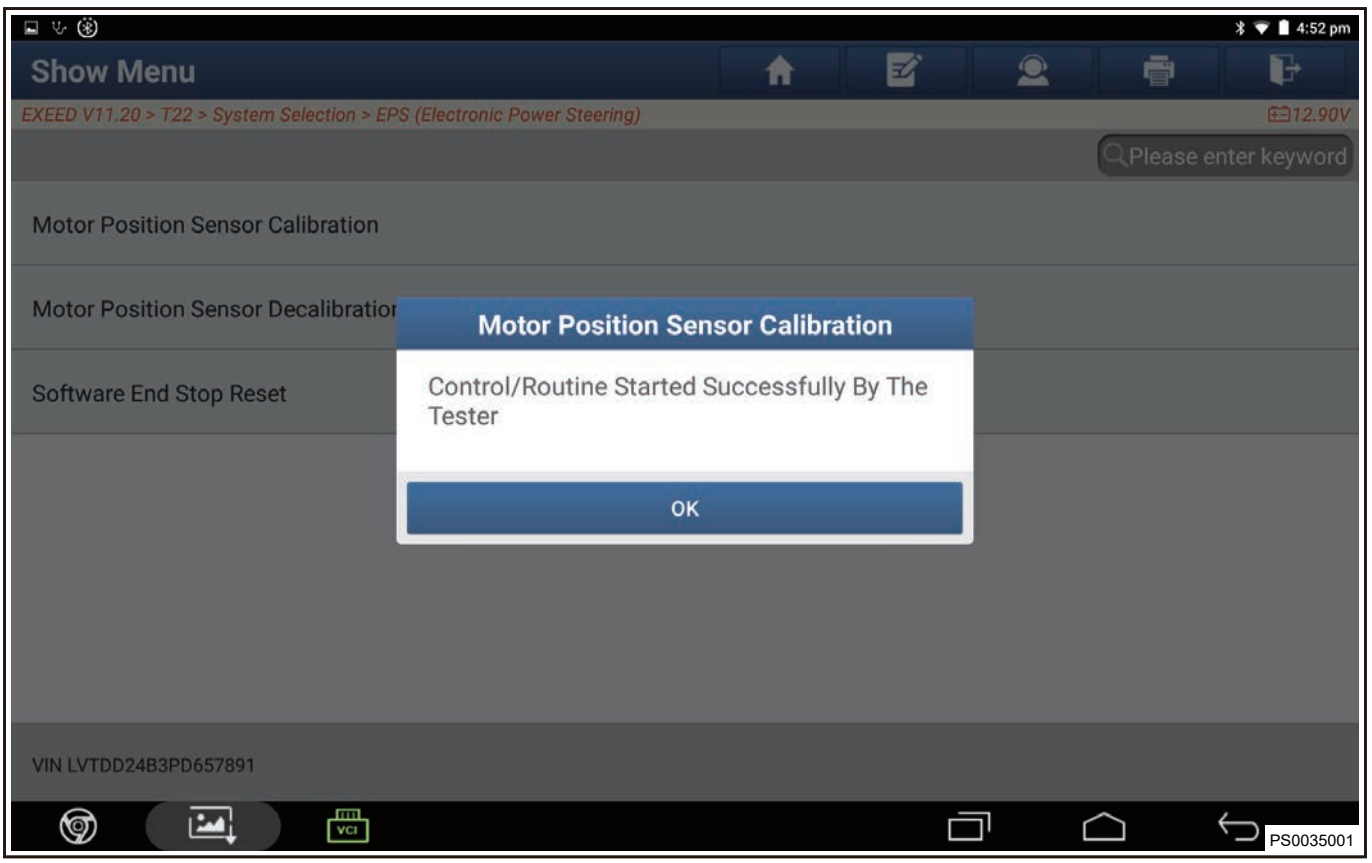
(8) Hint: “Calibration requirement: 1) Steering wheel mounted centrally. Make sure left and right error within about 10°. 2) Keep the vehicle stationary.” Then click “OK”.



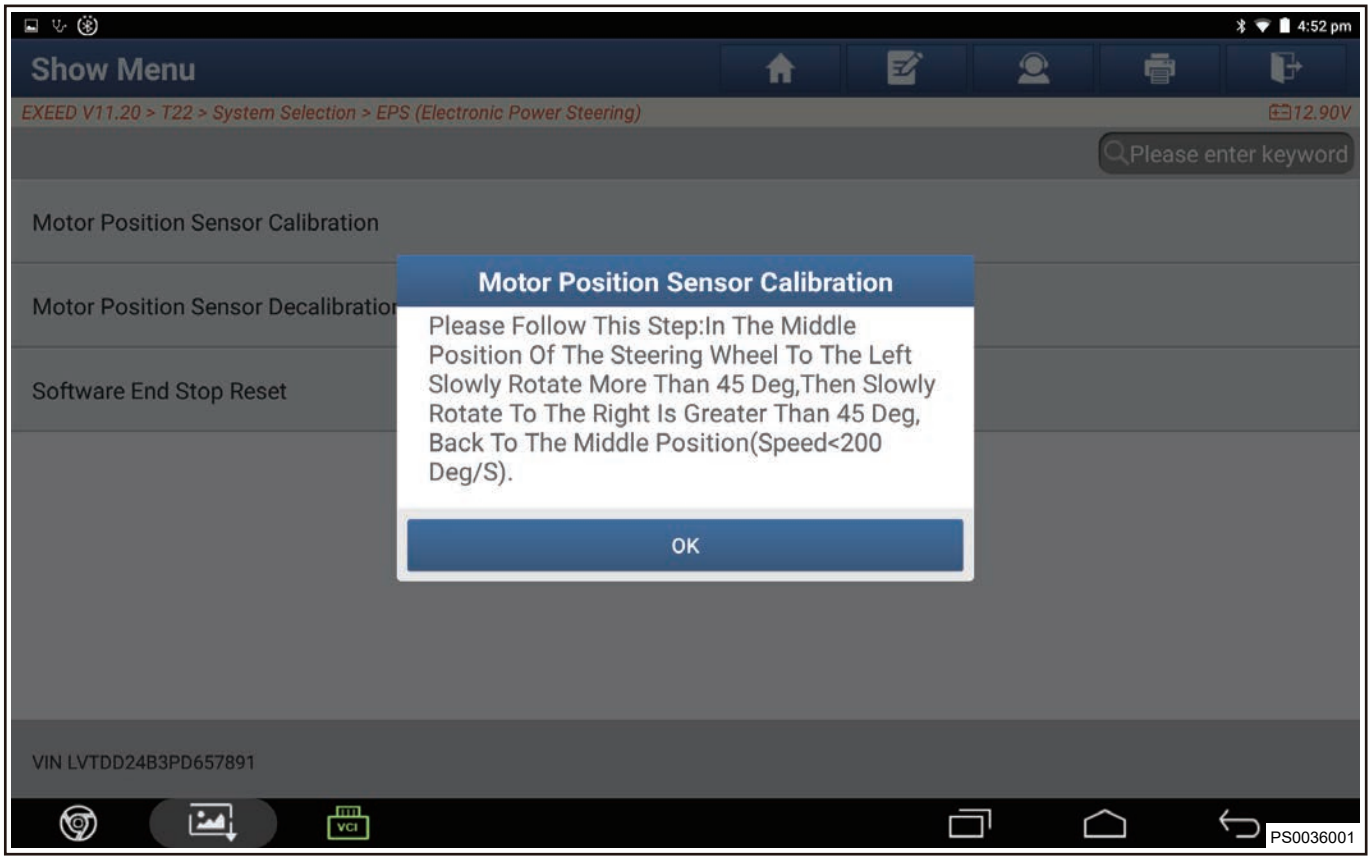
Hint: “Please IGN ON wait for 1 Second and check: 9 V < Battery Voltage < 16 V” and click “OK”



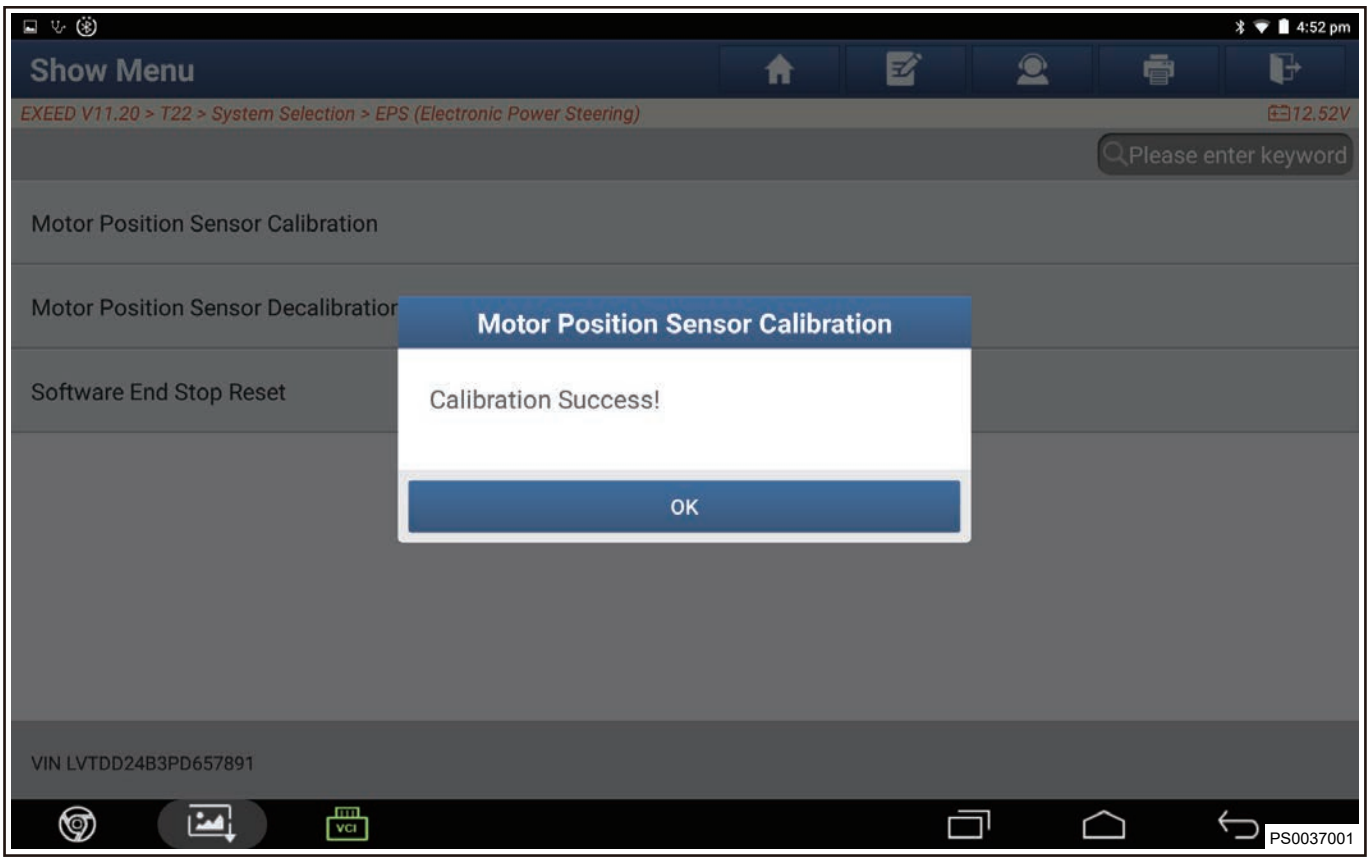
(9) Hint: “Control/Routine Started Successfully By the Tester”. Then click “OK”.

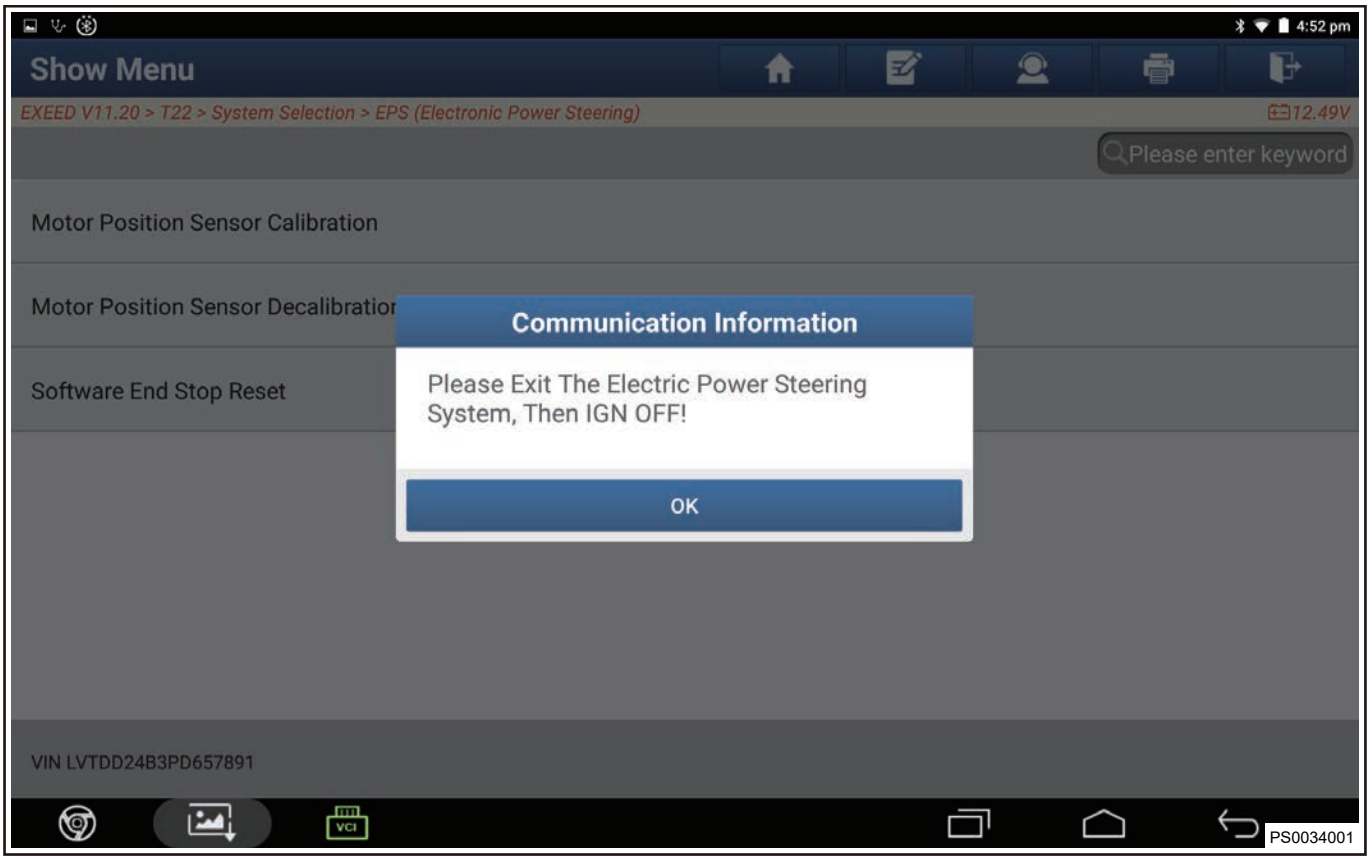


(10) Hint: “Please follow this step: In the middle position of the steering wheel to the left slowly rotate more than 45°, then slowly rotate to the right is greater than 45°, back to the middle position (Speed < 200°/s)” and click “OK”.



(11) Hint: “Calibration Success!” Then click “OK”, follow the prompts to complete the operation.


4:52 pm
Show Menu
EXEED V11.20 > T22 > System Selection > EPS (Electronic Power Steering)
12.52V
Please enter keyword
Motor Position Sensor Calibration
Motor Position Sensor Decalibration
Software End Stop Reset
Motor Position Sensor Calibration
Calibration Success!
OK
VIN LVTDD24B3PD657891
VCI
PS0037001


4:52 pm
Show Menu
EXEED V11.20 > T22 > System Selection > EPS (Electronic Power Steering)
12.49V
Please enter keyword
Motor Position Sensor Calibration
Motor Position Sensor Decalibration
Software End Stop Reset
Communication Information
Please Exit The Electric Power Steering System, Then IGN OFF!
OK
VIN LVTDD24B3PD657891
VCI
PS0034001

⚠ Caution
• **Calibration requirements: Keep vehicle stationary and steering wheel centered to ensure that the left and right errors are within 10°.** • **Battery voltage is higher than 9 V and lower than 16 V.**

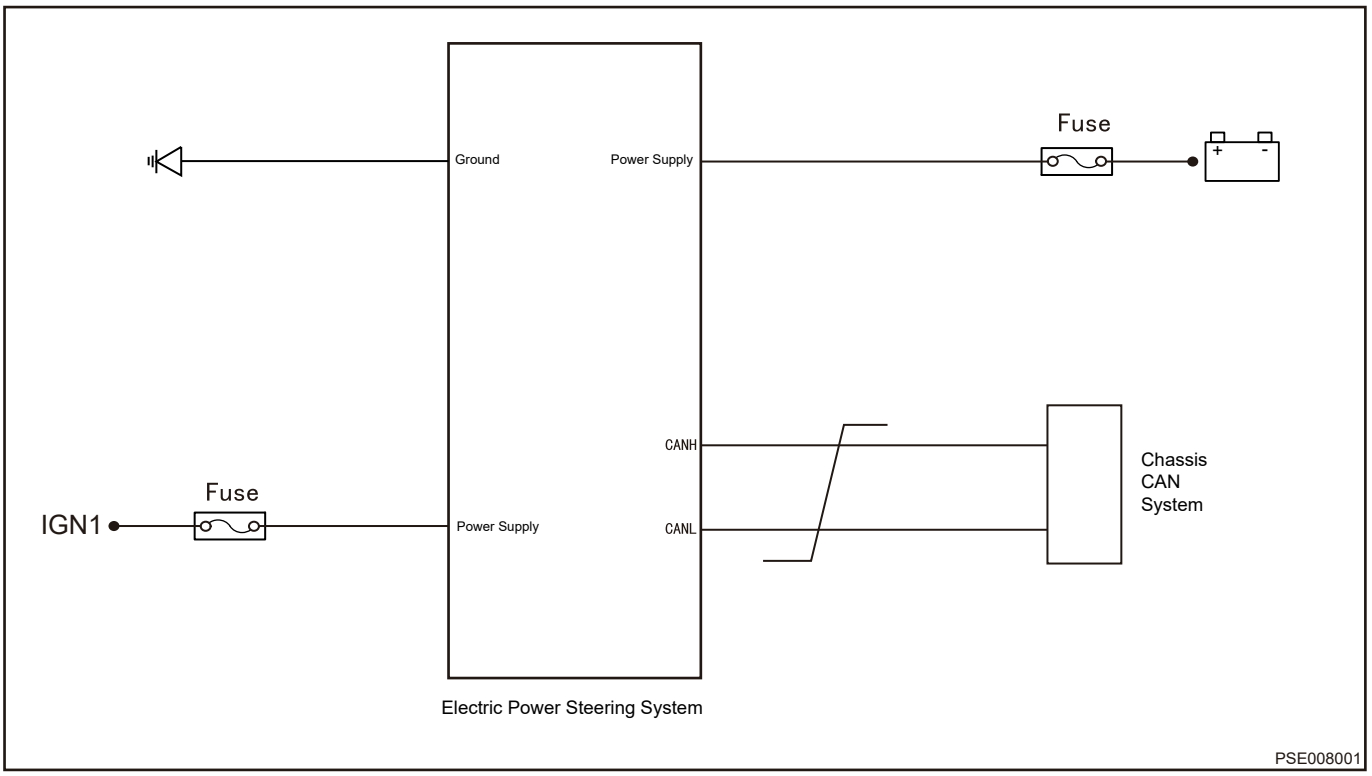
5.5 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C1201-44	Data Flash Verify Error-Data Memory Failure
C1202-49	ECU Hardware Error-Internal Electronic Failure
C120F-00	Steering Angle Sensor Not Calibrated-No Sub Type Information
C1210-49	Steering Angle Sensor Self Test Error
C1214-1C	High Power Supply Voltage
C1217-1C	Low Power Supply Voltage
C1218-4B	Over Temperature Reduction-Over Temperature
C1219-4B	Temperature Out Of Range-Over Temperature
C121A-49	Torque Sensor Error-Internal Electronic Failure
C121D-00	Motor Circuit Current Issue
C1220-49	Motor Circuit Measurement Issue
C1221-00	Soft End Stop Function no Calibration or Calibration Error
C1226-00	Trq Sensor Not Trimed
C1205-00	LKA Torque Request Overrun
U0073-88	BUS OFF
U0100-87	Lost Communication with EMS
U0129-87	Lost Communication with BSM
U1162-87	Lost Communication with Front Camera Module
U0142-87	Lost Communication with Around View Monitor Module - Missing Message
U0418-81	Invalid Data Received from BSM-Invalid Serial Data Received
U1405-81	Invalid Data Received from FCM
U0443-81	Invalid Data Received from AVM-Invalid Serial Date Received
U1300-55	Software Configuration Error
U3000-51	Control Module Not Programmed

5.6 DTC Diagnosis Procedure

DTC	**C1201-44**	**Data Flash Verify Error-Data Memory Failure**
DTC	**C1202-49**	**ECU Hardware Error-Internal Electronic Failure**
DTC	**C121D-00**	**Motor Circuit Current Issue**

DTC	C1220-49	Motor Circuit Measurement Issue
DTC	C121A-49	Torque Sensor Error-Internal Electronic Failure
DTC	C120F-00	Steering Angle Sensor Not Calibrated-No Sub Type Information
DTC	C1210-49	Steering Angle Sensor Self Test Error
DTC	C1221-00	Soft End Stop Function no Calibration or Calibration Error



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Connect negative battery terminal cable, and turn ENGINE START STOP switch to ON to make engine run normally.

(b) Check battery voltage with voltage band of multimeter.

Specified Condition

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch ON	Not less than 12 V

NG → **Check and repair battery**

OK

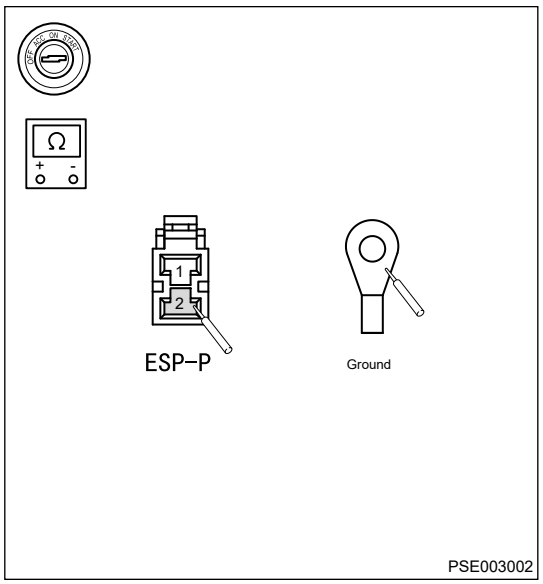
2	**Inspect ground and power supply circuit**

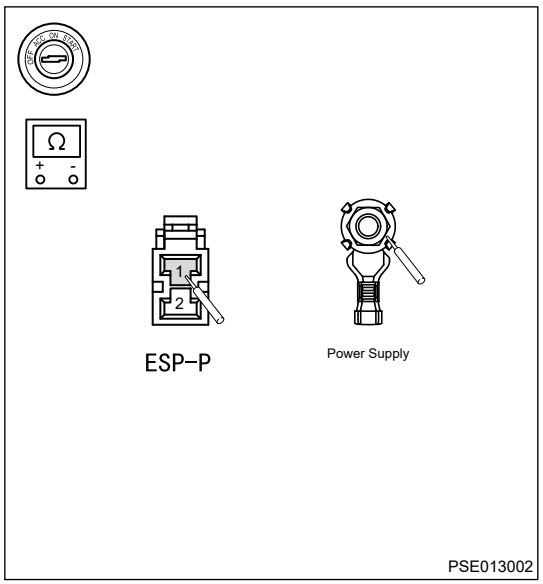
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect electric power steering EPS connector.

(c) Check for continuity between EPS (ground terminal) and ground.

(d) Check for continuity between EPS (power supply terminal) and power supply.



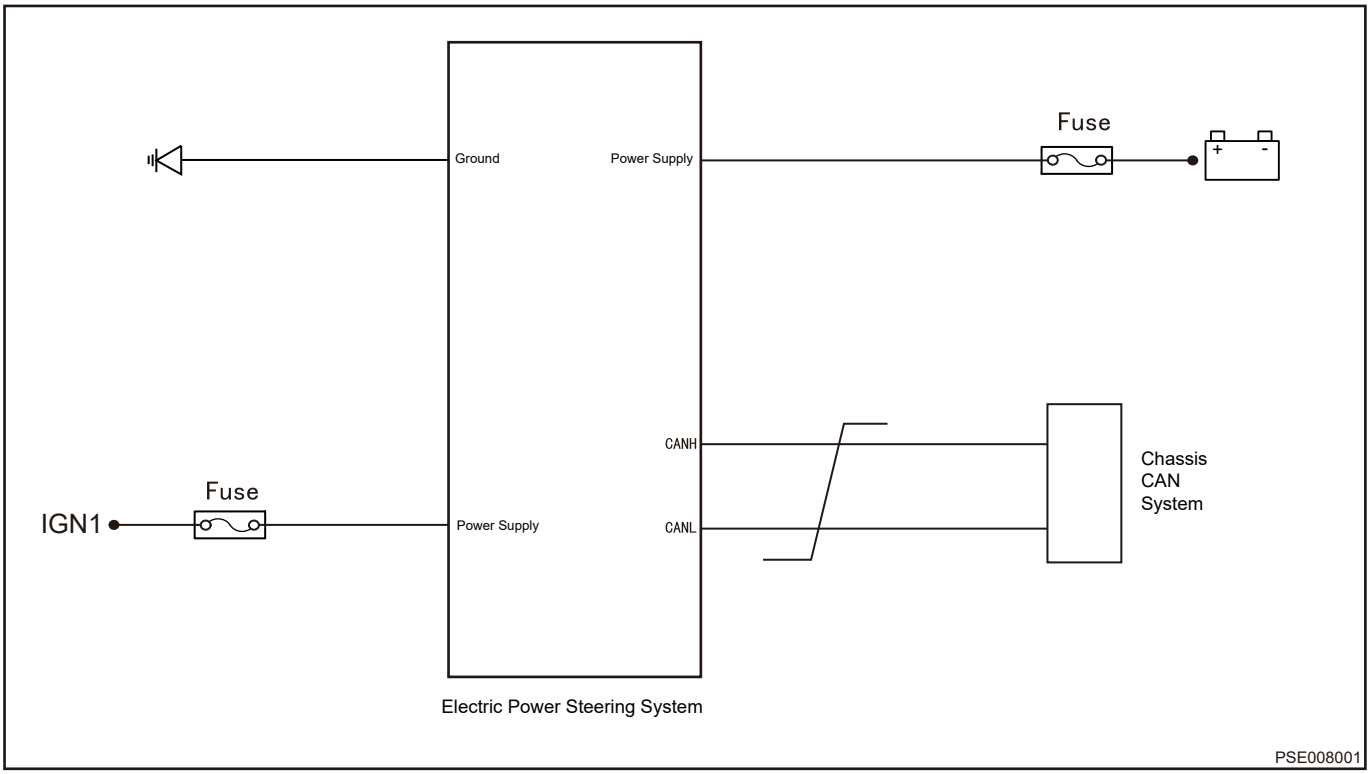


OK → **Replace EPS**

NG → **Replace or repair wire harness**

DTC	C1214-1C	High Power Supply Voltage
DTC	C1217-1C	Low Power Supply Voltage

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Check if battery voltage is normal.
(b) Check battery voltage with voltage band of multimeter.

NG → **Check and repair battery**

OK

2	**Check fuse**

(a) Turn ENGINE START STOP switch to OFF.
(b) Remove fuse from engine compartment fuse and relay.
(c) Check if fuse is blown.

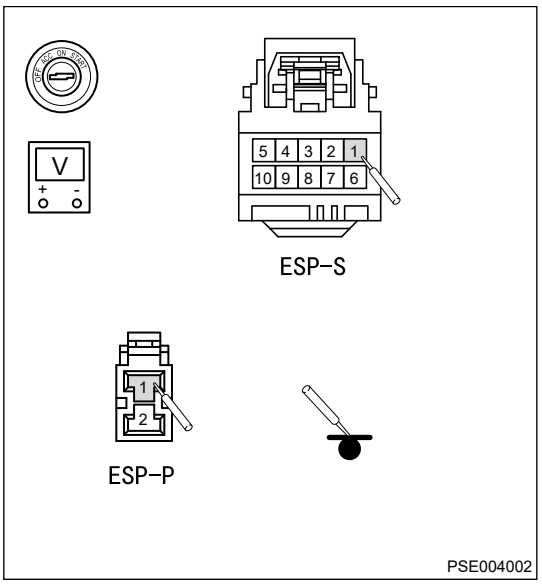
NG → **Replace fuse**

OK

3	**Check power supply voltage**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the EPS power supply connector.
(c) Turn ENGINE START STOP switch to ON.
(d) Check voltage

Multimeter Connection	Condition	Specified Condition
EPS power supply connector (P1) - Body ground	ENGINE START STOP switch ON	9 - 16 V
EPS power supply connector (S1) - Body ground	ENGINE START STOP switch ON	9 - 16 V



NG → **Repair or replace power supply wire harness**

OK

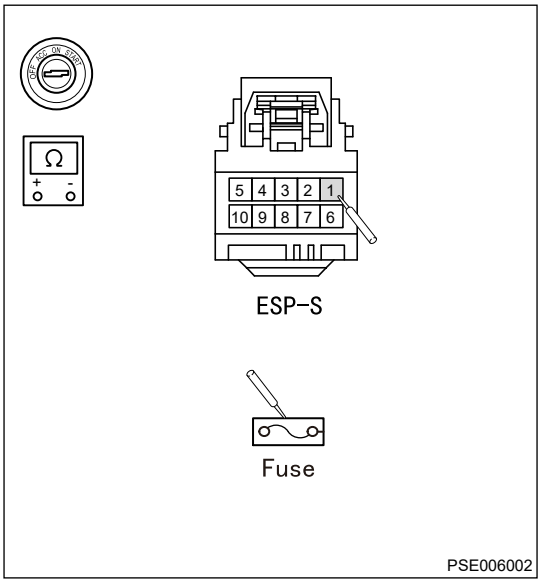
4	**Check wire harness and connector**

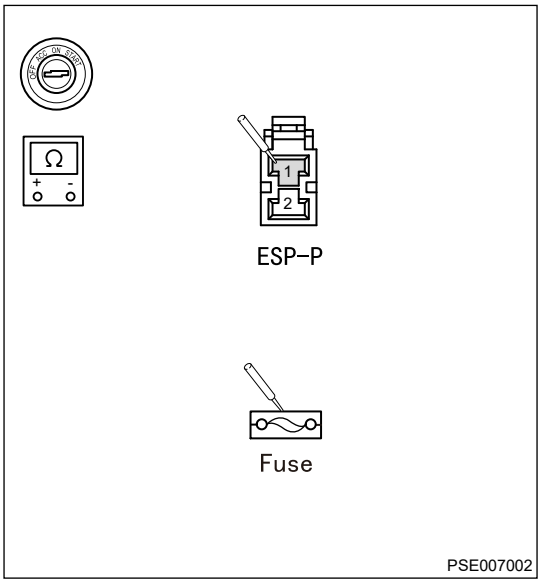
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the EPS power supply connector.

(c) Using ohm band of multimeter, check for continuity between EPS signal connector and engine compartment fuse and relay box fuse.

Multimeter Connection	Condition	Specified Condition
EPS power supply connector (P1) - Fuse	ENGINE START STOP switch "OFF"	⩽ 1 Ω
EPS power supply connector (S1) - Fuse	ENGINE START STOP switch "OFF"	⩽ 1 Ω

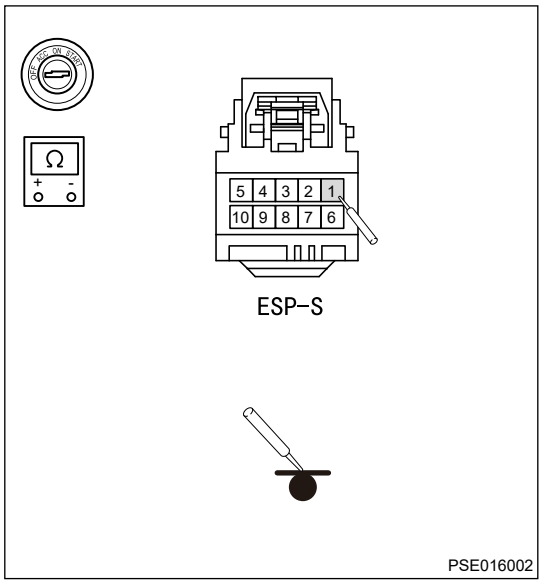


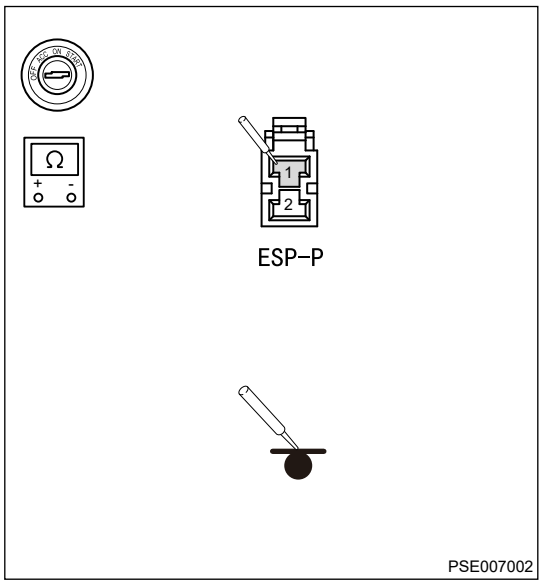


(d) Using ohm band of multimeter, check for continuity between EPS power supply connector and body ground.

Check for Short

Multimeter Connection	Condition	Specified Condition
EPS power supply connector (P1) - Ground	ENGINE START STOP switch "OFF"	∞
EPS power supply connector (S1) - Ground	ENGINE START STOP switch "OFF"	∞





NG	**Repair or replace control circuit wire harness and connector**
OK	**System operates normally**

DTC	**C1218-4B**	**Over Temperature Reduction-Over Temperature**
DTC	**C1219-4B**	**Temperature Out Of Range-Over Temperature**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.

- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Parked in the shade to dissipate heat**

(a) Parked in the shade to dissipate heat.

NG → **Replace EPS**

OK

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**U0073-88**	**CAN Bus Off**
DTC	**U0100-87**	**Lost Communication with EMS**
DTC	**U0129-87**	**Lost Communication with BSM**
DTC	**U1162-87**	**Lost Communication with Front Camera Module**
DTC	**U0142-87**	**Lost Communication with Around View Monitor Module - Missing Message**
DTC	**U0418-81**	**Invalid Data Received from BSM-Invalid Serial Data Received**
DTC	**U1300-55**	**Software Configuration Error**
DTC	**U3000-51**	**Control Module Not Programmed**
DTC	**U1405-81**	**Invalid Data Received from FCM**
DTC	**U0443-81**	**Invalid Data Received from AVM-Invalid Serial Date Received**

■ DTC Confirmation Procedure

Refer to CAN Network Malfunction Diagnosis.

7.2 ELECTRONIC POWER STEERING CONTROL SYSTEM (DP-EPS)

1 Warnings and Precautions

1.1 Precautions

(1) Calibration requirements: Keep vehicle stationary and steering wheel centered to ensure that the left and right errors are within 10°.

(2) Battery voltage is higher than 9V and lower than 16 V.

(3) When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

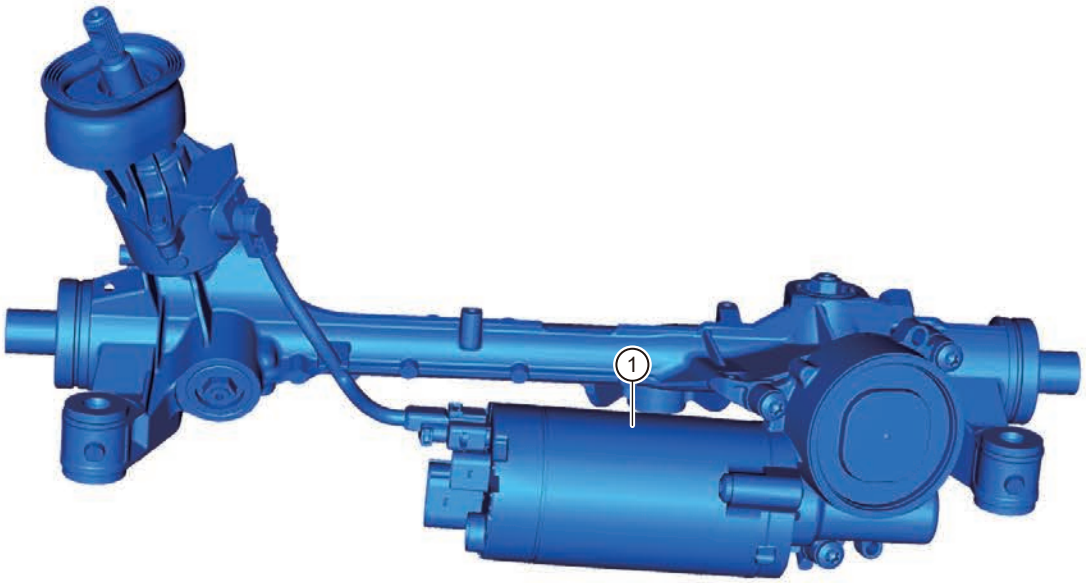
(4) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

The steering column is the component of the steering system that connects the steering wheel and the steering gear. Through the steering column, the driver transfers torque to the steering gear, which drives the steering gear to achieve steering.

2.2 System Components Diagram



PS0001001

1	Electronic Power Steering Gear		

2.3 Component Operation Description

■ EPS steering angle calibration and soft check point learning (For offline calibration of four-wheel alignment station electrical check equipment)

(1) Start vehicle;

(2) Turn steering wheel to left and right more than ± 45° at a speed of < 200°/s;

(3) Perform four-wheel alignment on vehicle;

(4) The ENGINE START STOP switch is turned off and turned on within 3 seconds (+15 on);

(5) Fix the steering wheel horizontally;

(6) Connect the electrical inspection equipment, enter corner calibration interface, and confirm directly until the calibration is completed according to the prompt of electrical inspection equipment;

(7) Calibration is completed;

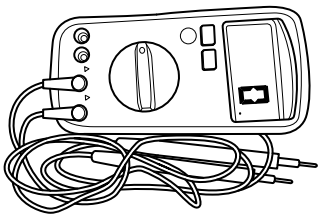
(8) (After the four-wheel alignment is completed), drive out the four-wheel alignment station, turn the steering wheel left and right to the limit position, and keep the hand force not less than 10 N·m for more than 1 second, and ensure that the steering wheel hits the limit position and then returns to the center position;

(9) The software completes soft stop position learning.

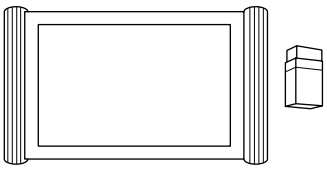
⚠ Caution
In step 2, if the steering speed is too fast or the steering angle is insufficient, it cannot be calibrated. In step 4, if the vehicle is not powered on in 3 seconds, it cannot be calibrated. In step 8, if the steering wheel limit position (turned to strike position) has not reached, it will cause soft stop position learning to be advanced for the first time, resulting in an power assist loss prior to the limit position.

3 Tool

■ General Tool

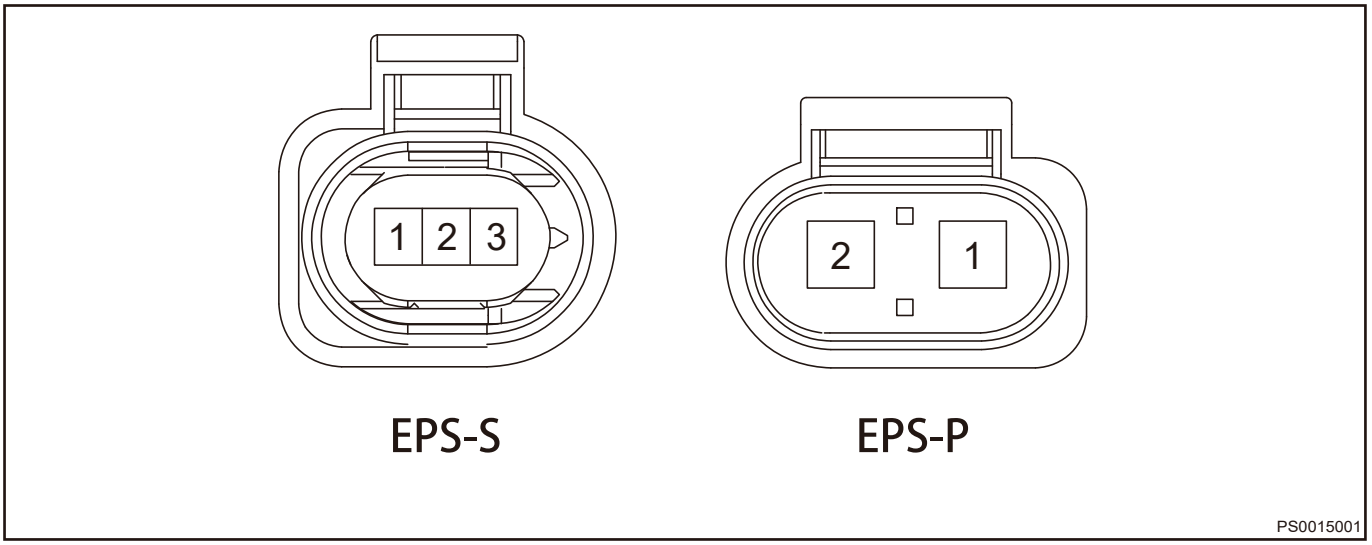
Tool Name	Tool Drawing
Digital Multimeter	 S00002

■ Special Tool

Tool Name	Tool Drawing
Diagnostic tester	 S00001

4 System Circuit Diagram

4.1 Module Terminal Definition



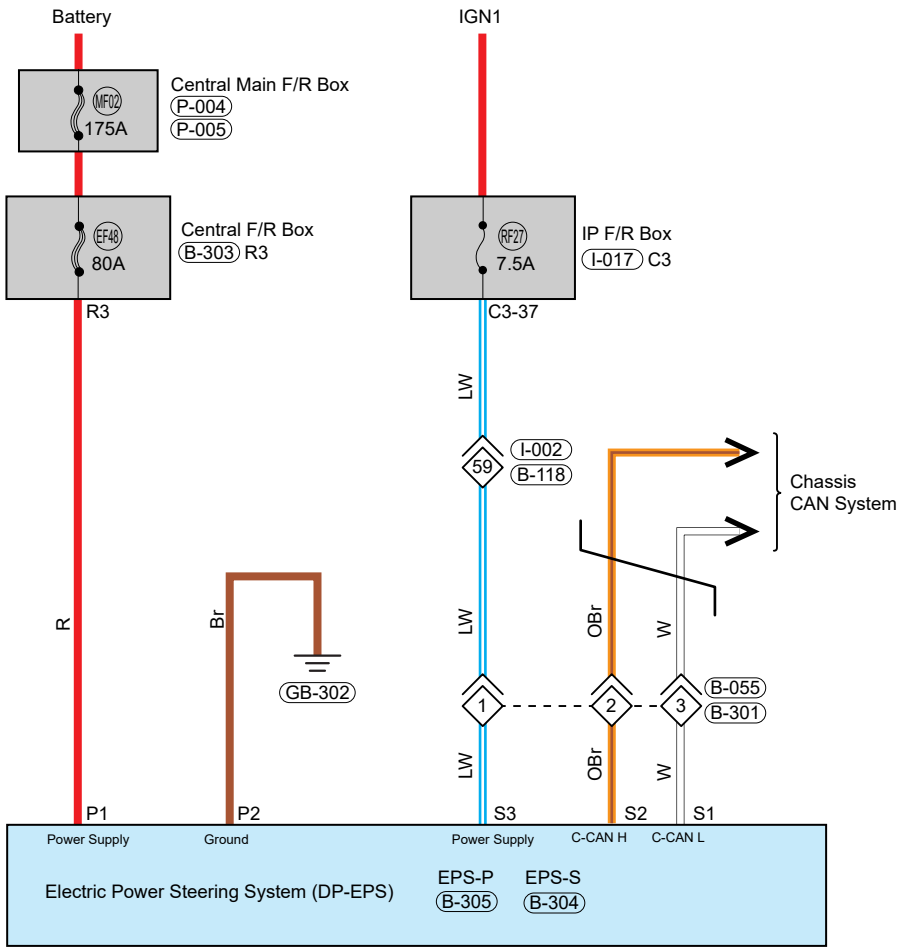
Vehicle power supply: Controller power supply connector

Pin	Definition	Pin	Definition
P-1	Power Supply	P-2	Ground

Vehicle signal: Controller signal connector

Pin	Definition	Pin	Definition
S-1	C-CAN L	S-3	Ignition Signal
S-2	C-CAN H		

4.2 Circuit Diagram



PS0016001

5 Diagnostic Information and Steps

5.1 Diagnostic Help

- Connect diagnostic tester and make it communicate with vehicle electronic module through data network.
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be deleted, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that applied to the malfunction.
- Visually check the related wire harness.
- Check and clean Electronic Power Steering controller (EPS controller) ground related to latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

5.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the following:

- Check if connector is loose.

- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect sensors and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

5.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.

(2) Check all contact surfaces for tarnish, dirt and rust, etc.

(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

(5) Check if any additional accessories interfere with ground circuit.

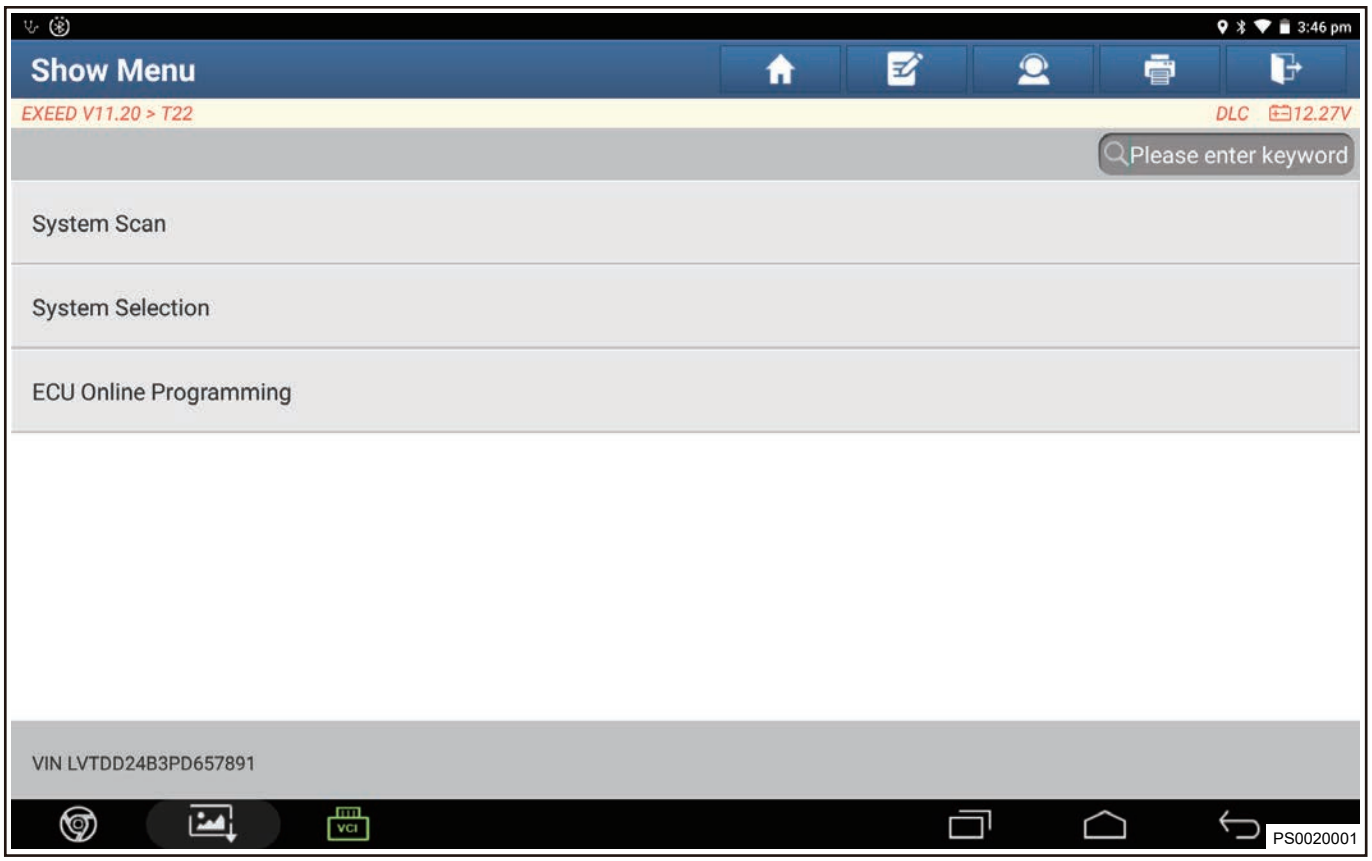
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

5.4 Motor position sensor calibration

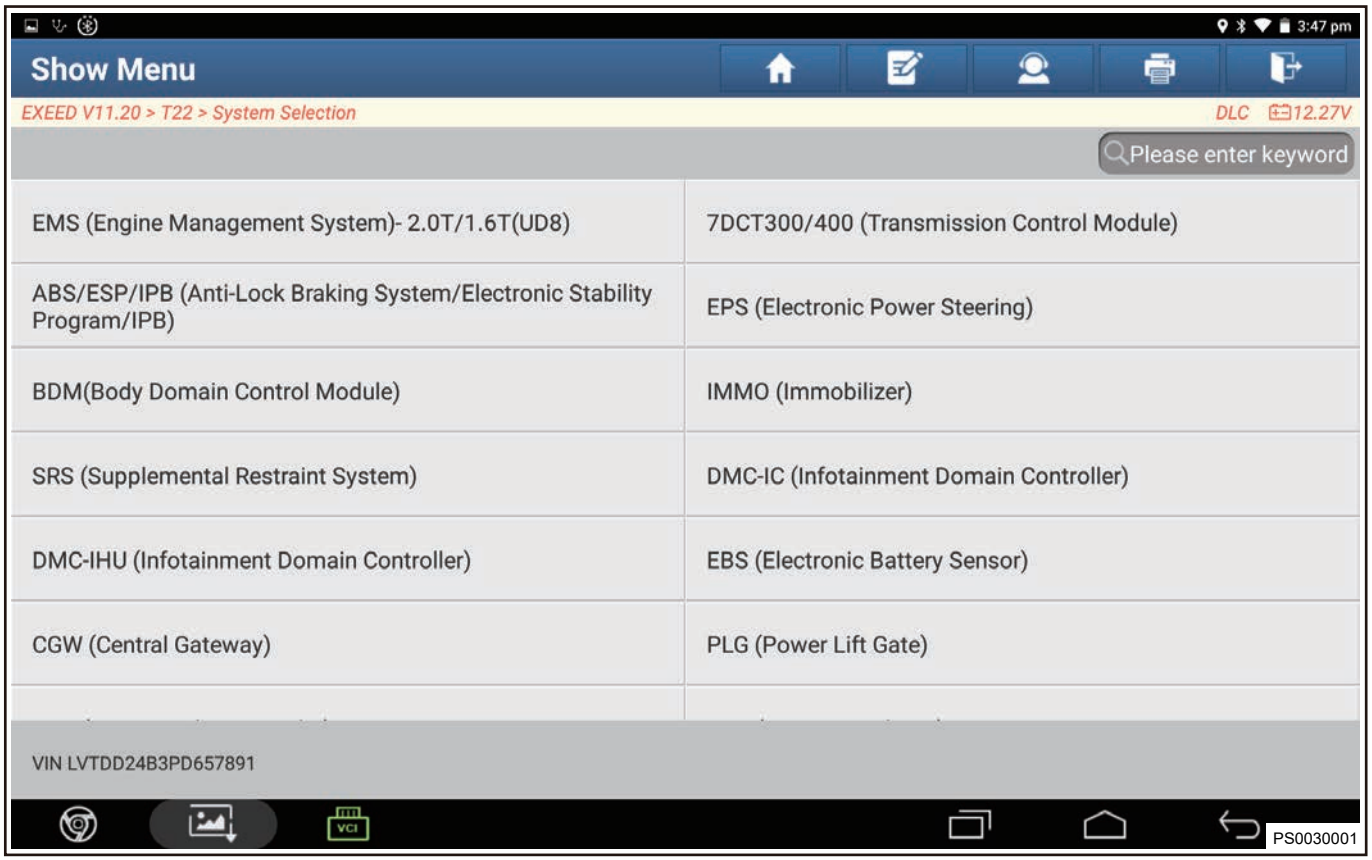
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

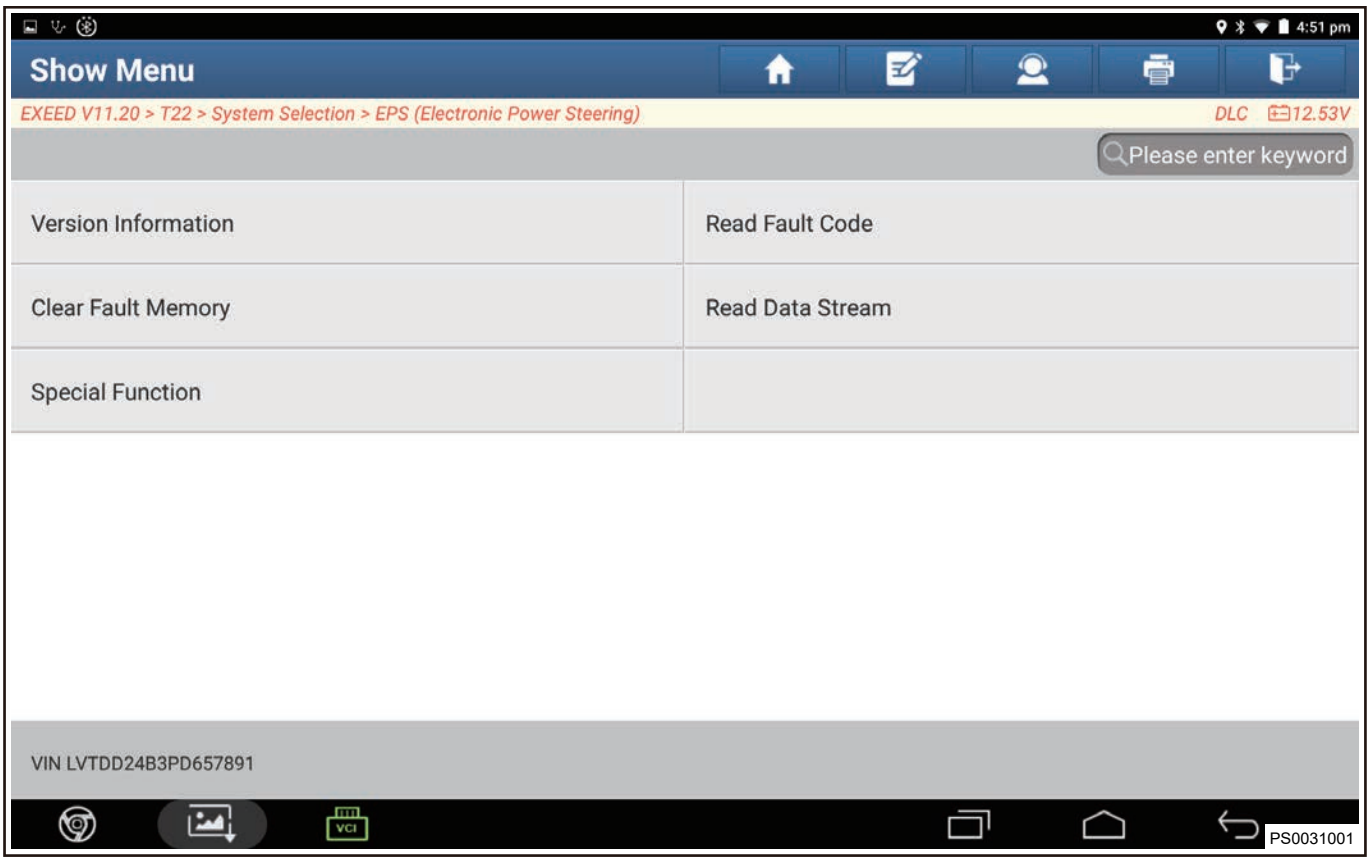
(3) Click “System Selection”.



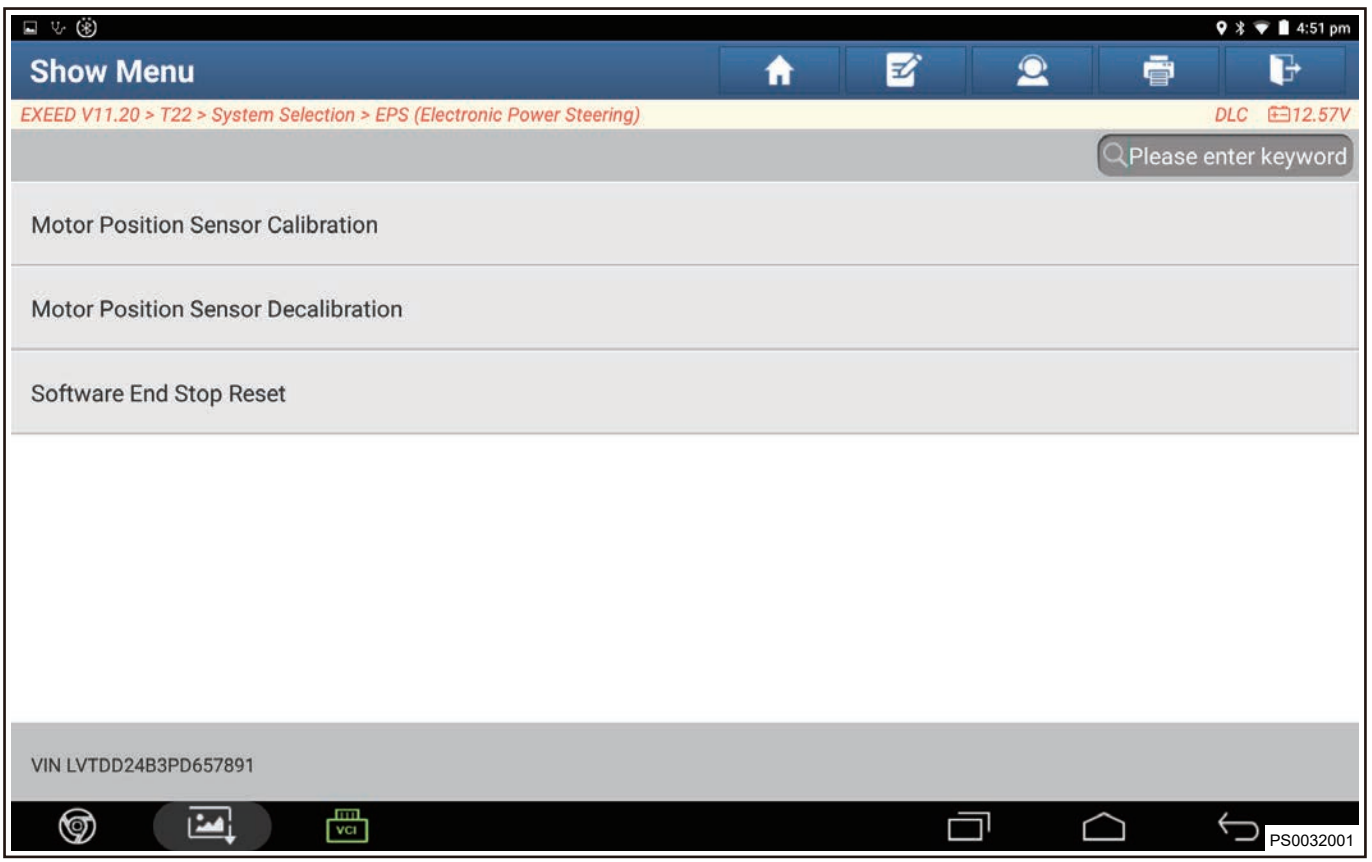
(4) Select “EPS (Electronic Power Steering)”.



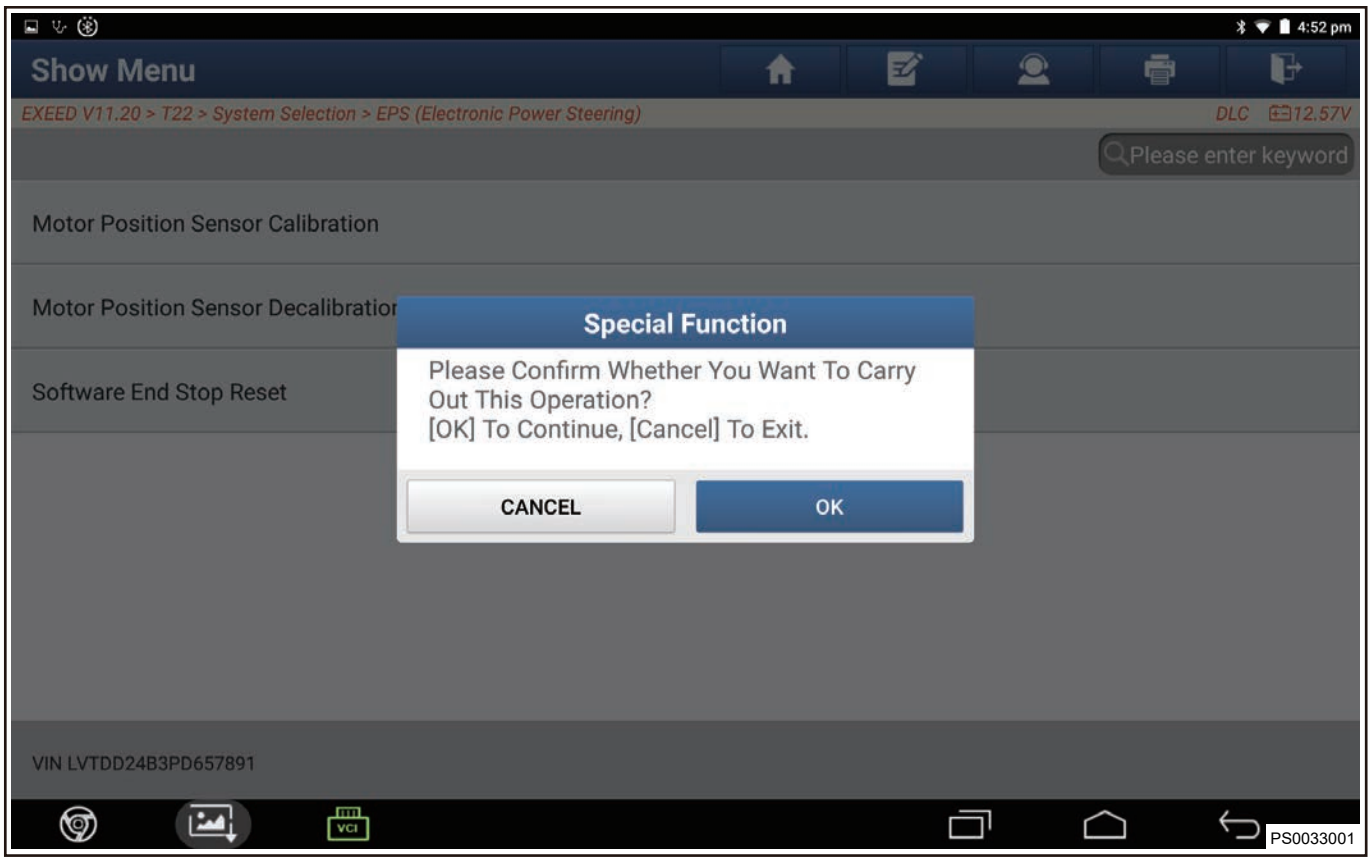
(5) Click "Special Function".



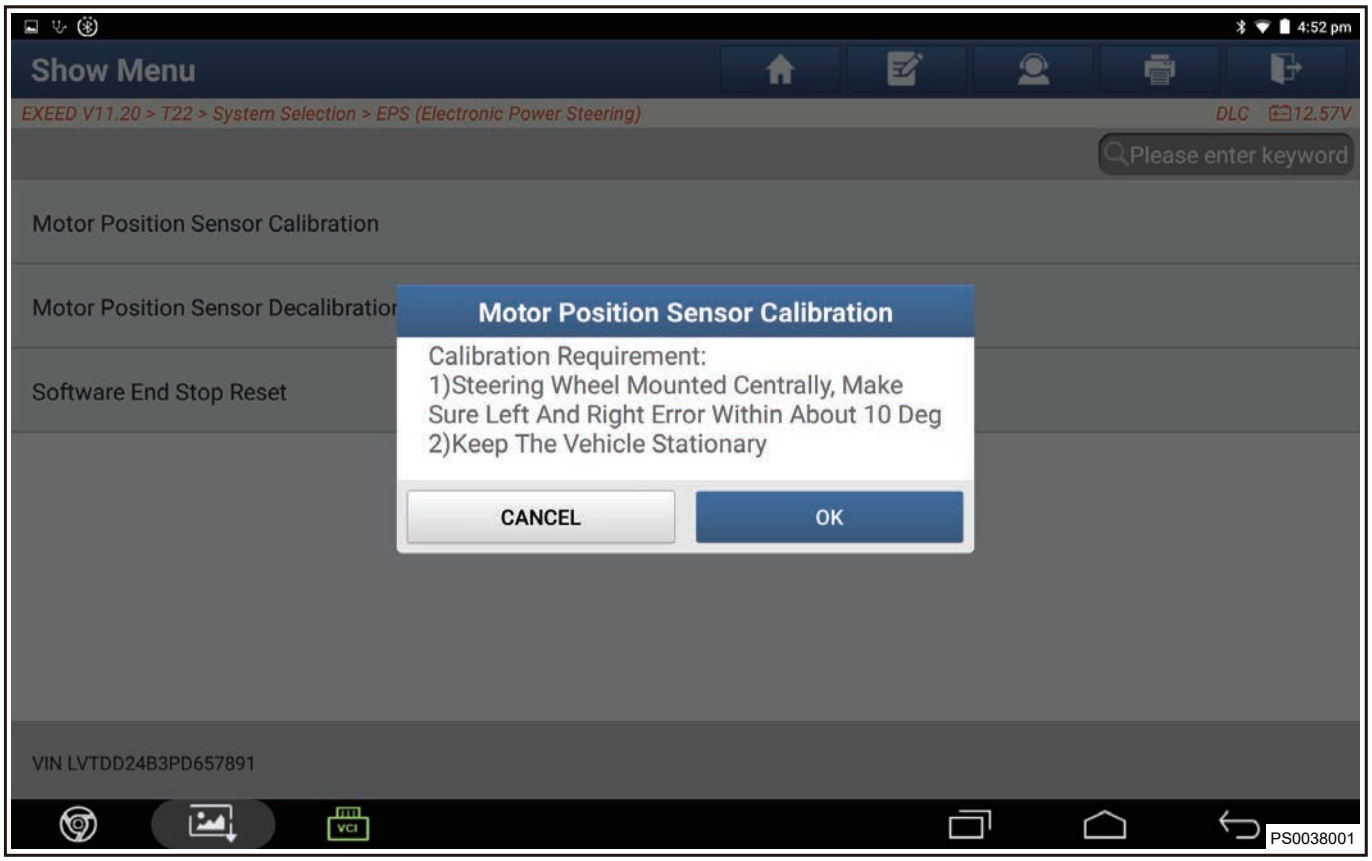
(6) Enter next interface, click “Motor Position Sensor Calibration”



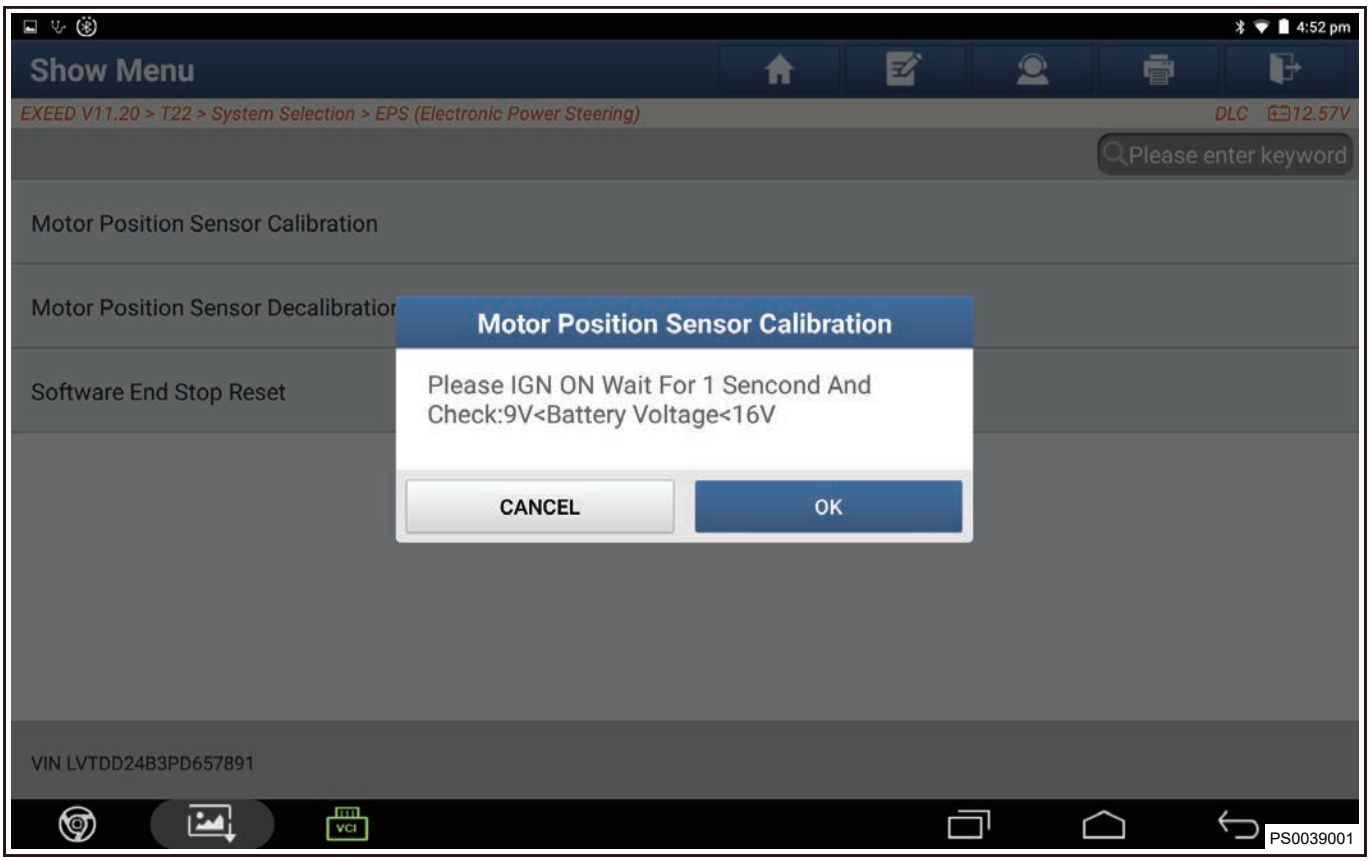
(7) Display “Please Confirm Whether You Want To Carry Out This Operation”, and click “OK”



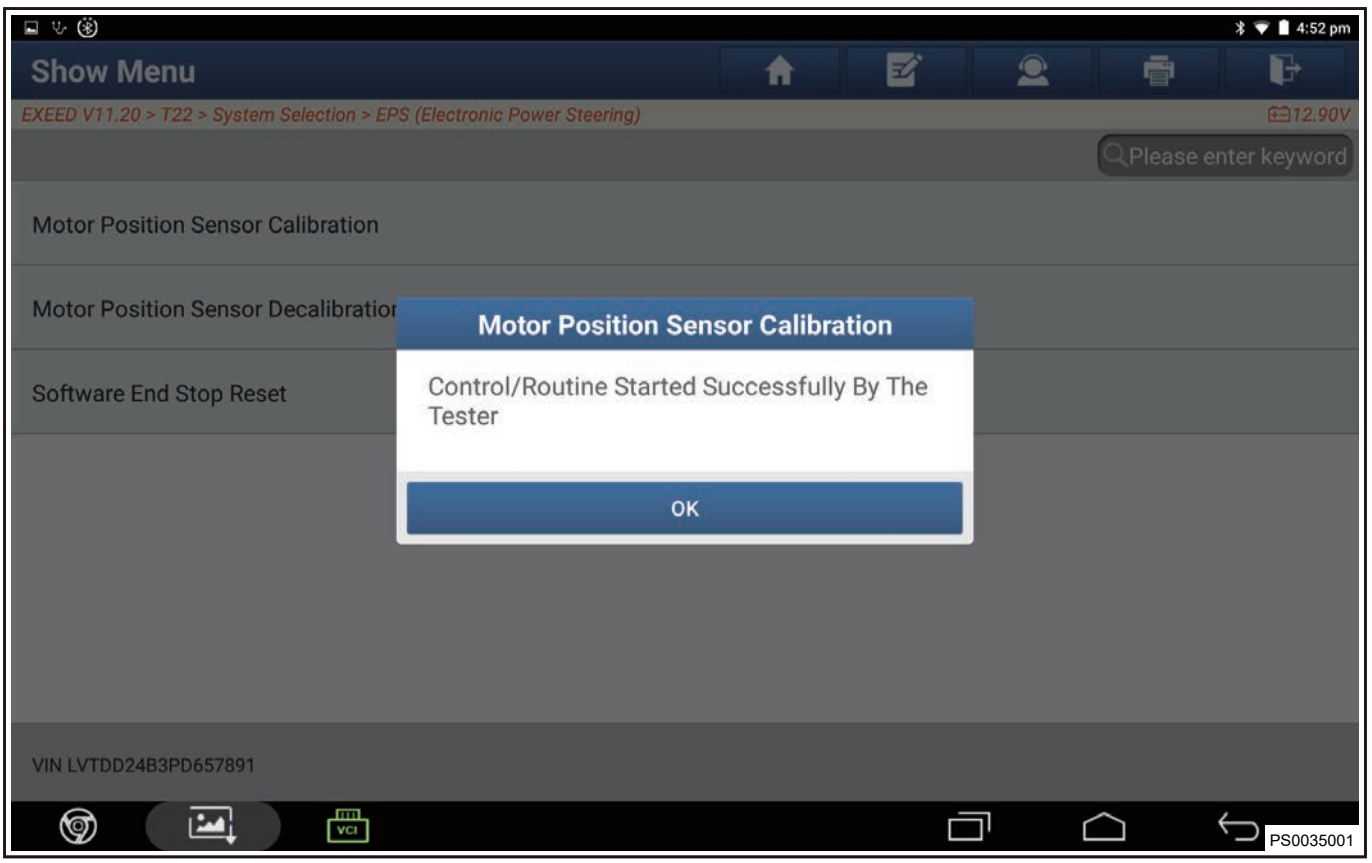
(8) Hint: “Calibration requirement: 1) Steering wheel mounted centrally. Make sure left and right error within about 10°. 2) Keep the vehicle stationary.” Then click “OK”.



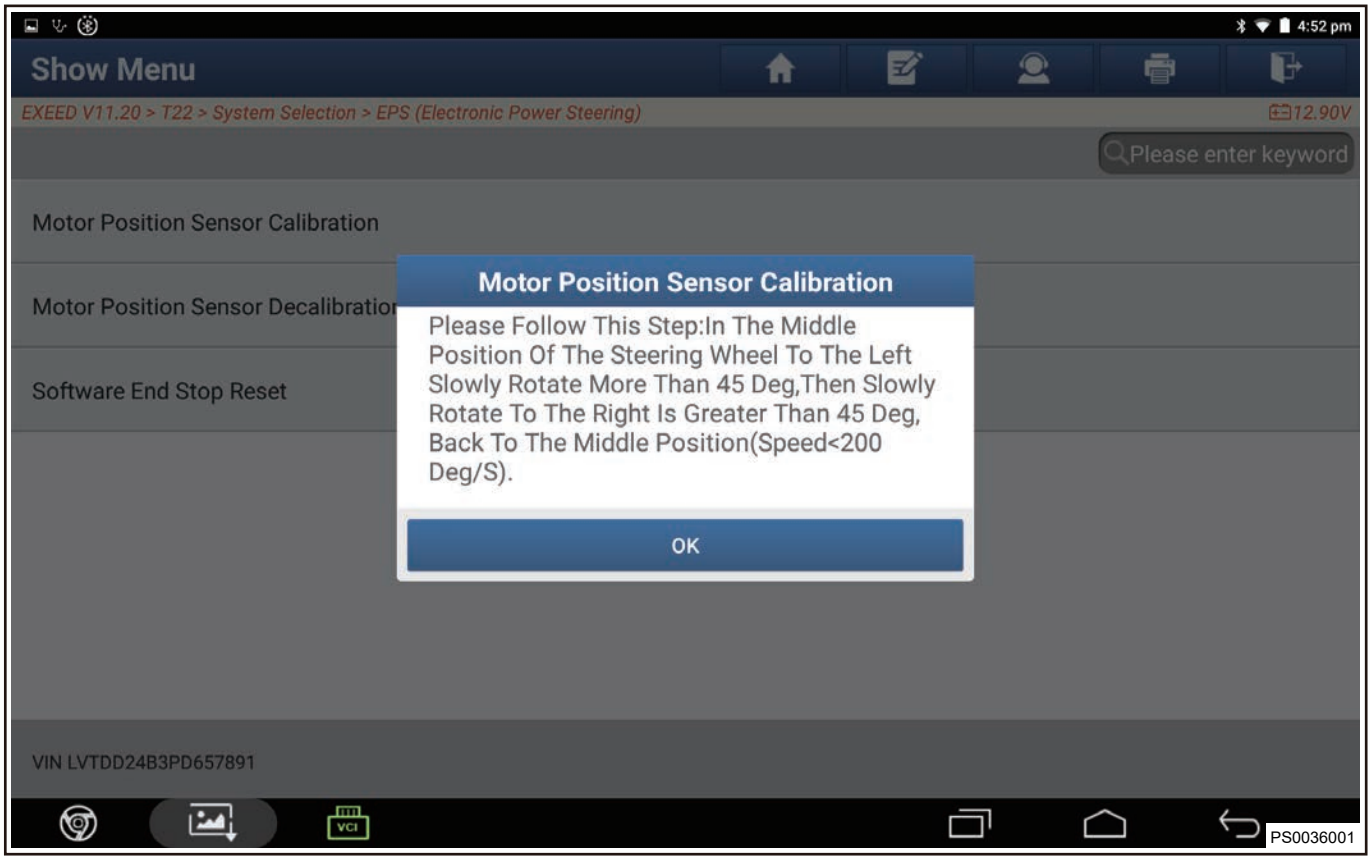
Hint: “Please IGN ON wait for 1 Second and check: 9 V < Battery Voltage < 16 V” and click “OK”.



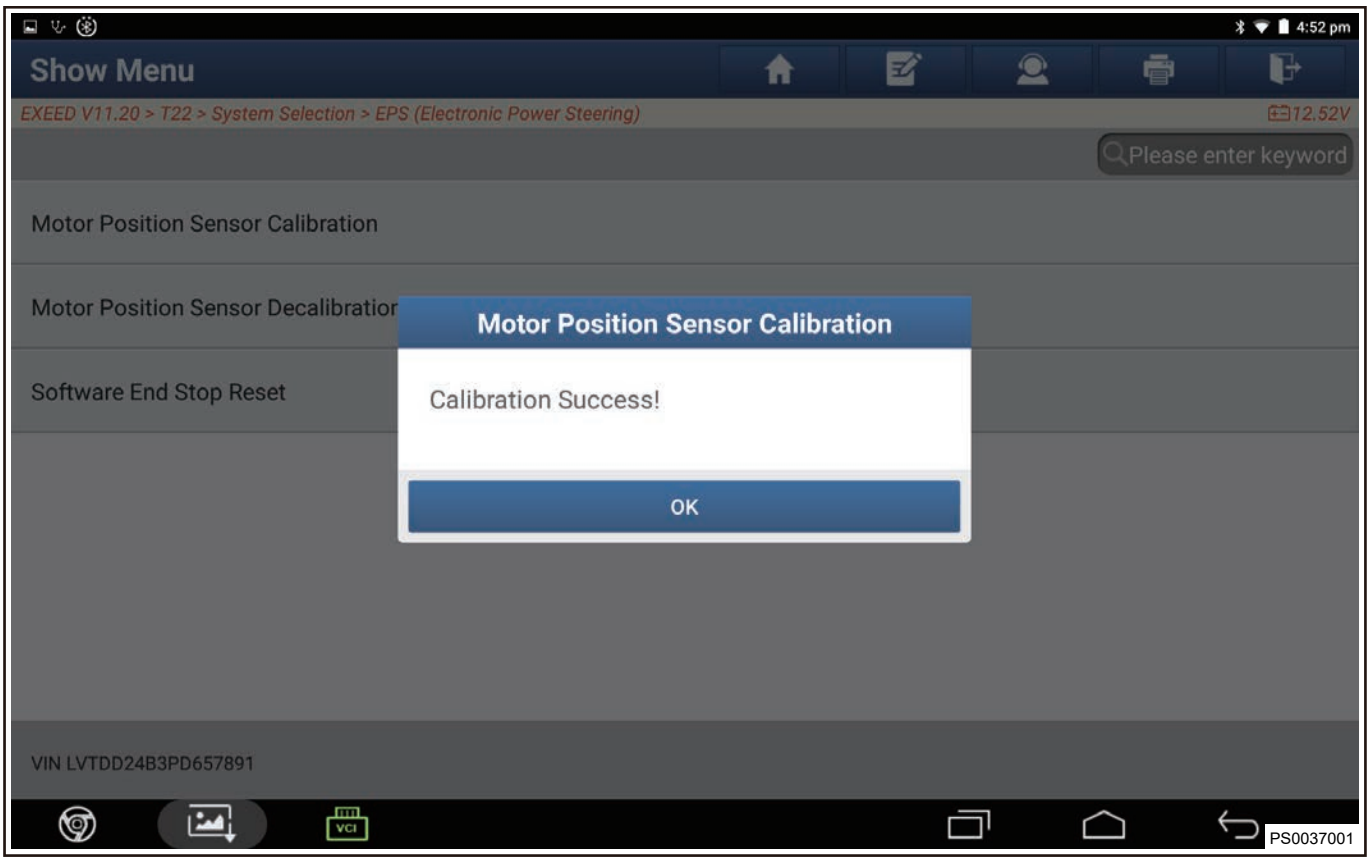
(9) Hint: “Control/Routine Started Successfully By the Tester”. Then click “OK”.

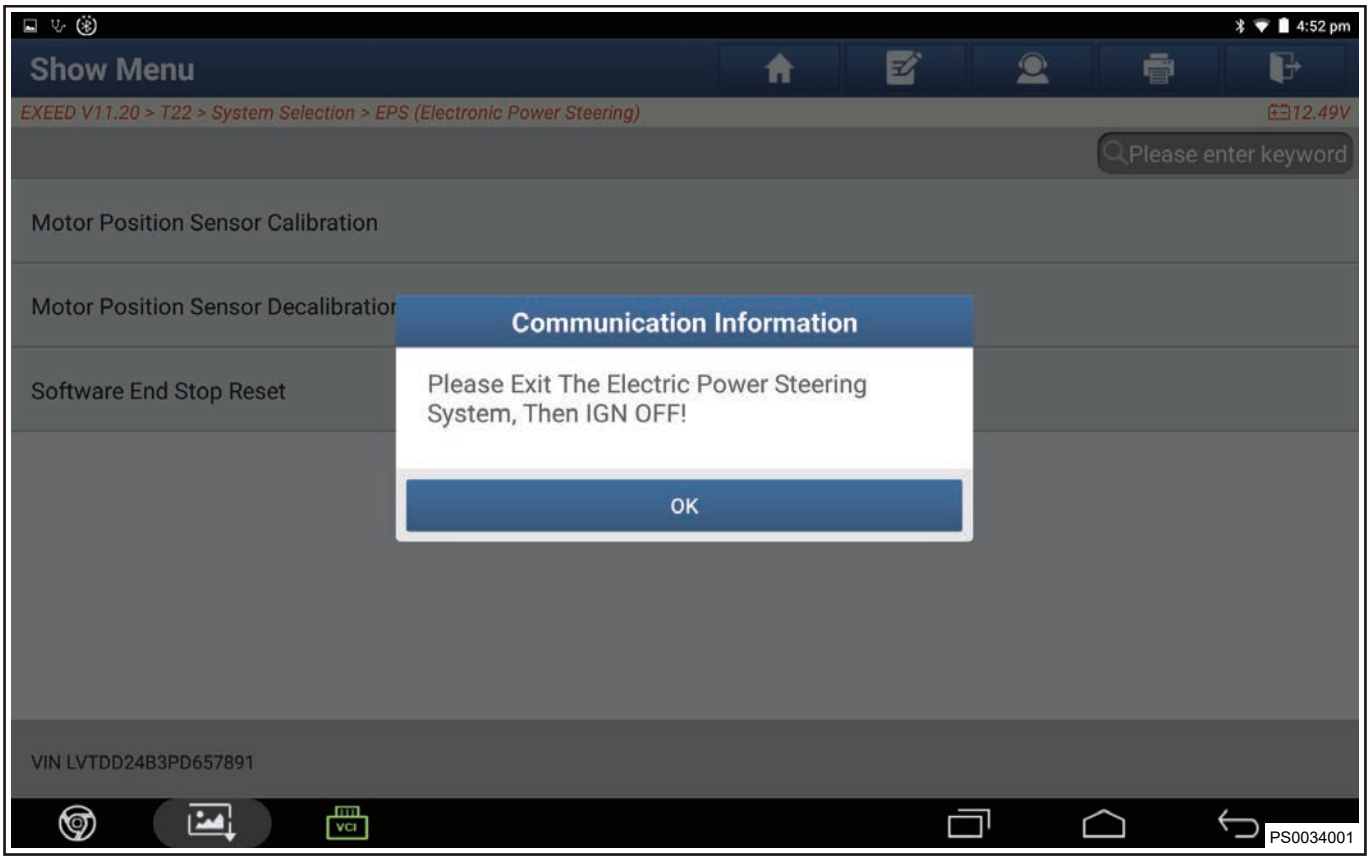


(10) Hint: “Please follow this step: In the middle position of the steering wheel to the left slowly rotate more than 45°, then slowly rotate to the right is greater than 45°, back to the middle position (Speed < 200°/s)” and click “OK”.



(11) Hint: “Calibration Success!” Then click “OK”, follow the prompts to complete the operation.


4:52 pm
Show Menu
EXEED V11.20 > T22 > System Selection > EPS (Electronic Power Steering)
12.52V
Please enter keyword
Motor Position Sensor Calibration
Motor Position Sensor Decalibration
Software End Stop Reset
Motor Position Sensor Calibration
Calibration Success!
OK
VIN LVTDD24B3PD657891
VCI
PS0037001


4:52 pm
Show Menu
EXEED V11.20 > T22 > System Selection > EPS (Electronic Power Steering)
12.49V
Please enter keyword
Motor Position Sensor Calibration
Motor Position Sensor Decalibration
Software End Stop Reset
Communication Information
Please Exit The Electric Power Steering System, Then IGN OFF!
OK
VIN LVTDD24B3PD657891
VCI
PS0034001

⚠ Caution

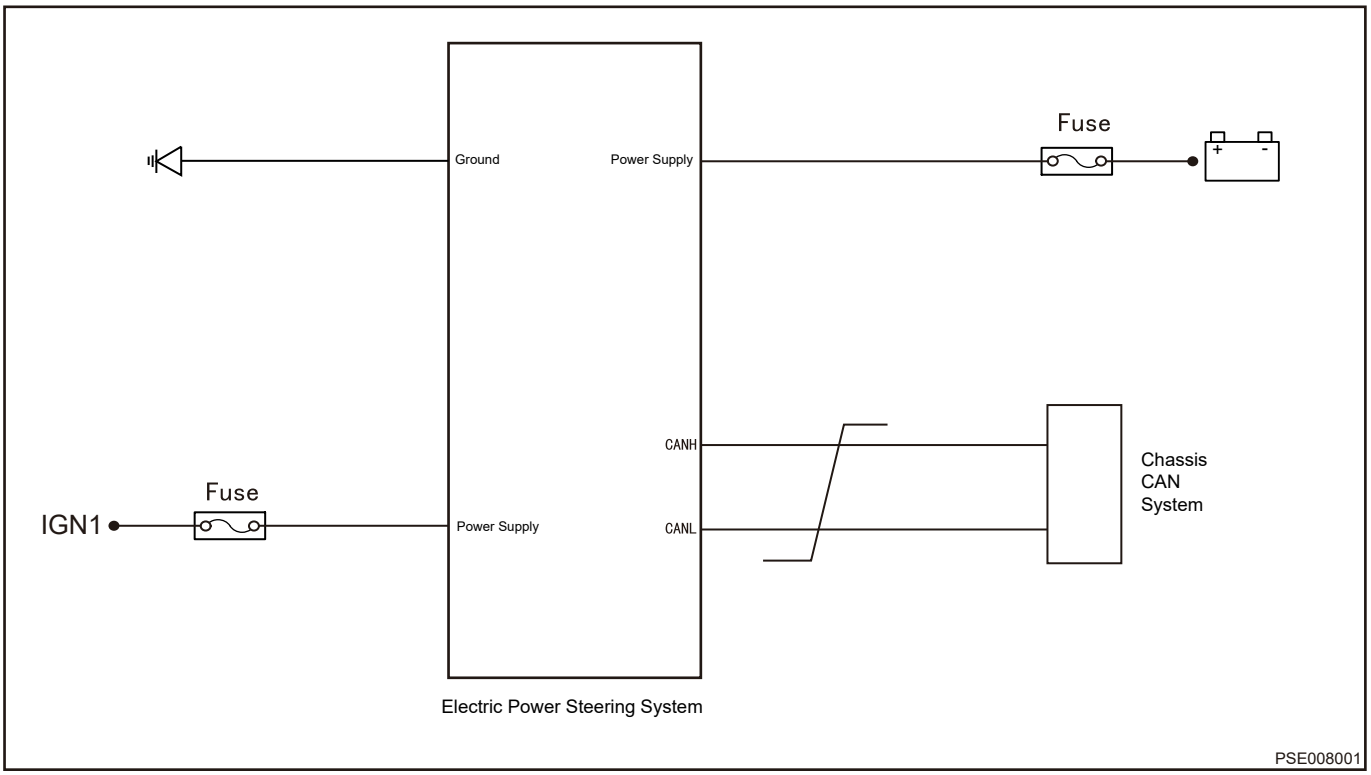
- **Calibration requirements: Keep vehicle stationary and steering wheel centered to ensure that the left and right errors are within 10°.**
- **Battery voltage is higher than 9 V and lower than 16 V.**

5.5 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
C1200-44	Data Flash Operation Error
C121E-44	RAM Check Error
C1202-49	ECU Hardware Error-Internal Electronic Failure
C1203-00	ECU Reset Error-No Sub Type Information
C1204-48	ECU Sw Monitoring Error
C1224-49	EEPROM SPI Communication Timeout
C1206-07	High Friction-Mechanical Failure
C1218-4B	Over Temperature Reduction-Over Temperature
C1209-49	Phase Current Error
C120A-49	Rotor Position Sensor Error
C120D-00	Steering Angle Implausible
C120E-00	Steering Angle No Initialization
C120F-00	Steering Angle No Initialization
C1207-49	Index Sensor Error-Internal Electronic Failure
C1214-17	Supply Voltage Too High
C1217-1C	Low Power Supply Voltage
C1219-4B	Temperature Out Of Range-Over Temperature
C121A-49	Torque Sensor Error-Internal Electronic Failure
C122D-48	ECU SW Information Error-Supervision Software Failure
C121D-00	Motor Drive Circuit Fault
C1221-00	Soft End Stop Function no Calibration or Calibration Error
U0073-88	Off CAN Busoff
U0100-87	Lost Communication with EMS
U0129-87	Lost Communication with BSM
U0418-81	Invalid Data Received from BSM
U1300-55	Software Configuration Error
U3000-51	Control Module Not Programmed

5.6 DTC Diagnosis Procedure

DTC	C1201-44	Data Flash Verify Error-Data Memory Failure
DTC	C1202-49	ECU Hardware Error-Internal Electronic Failure
DTC	C121E-44	RAM Check Error
DTC	C1203-00	ECU Reset Error-No Sub Type Information
DTC	C1204-48	ECU Sw Monitoring Error
DTC	C122D-48	ECU SW Information Error-Supervision Software Failure
DTC	C1210-49	Steering Angle Sensor Self Test Error
DTC	C1221-00	Soft End Stop Function no Calibration or Calibration Error
DTC	C120D-00	Steering Angle Implausible
DTC	C120E-00	Steering Angle No Initialization
DTC	C1221-00	Steering Angle No Initialization
DTC	C1207-49	Index Sensor Error-Internal Electronic Failure
DTC	C121D-00	Motor Drive Circuit Fault



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

(a) Connect negative battery terminal cable, and turn ENGINE START STOP switch to ON to make engine run normally.

(b) Check battery voltage with voltage band of multimeter.

Specified Condition

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch ON	Not less than 12 V

NG → **Check and repair battery**

OK ↓

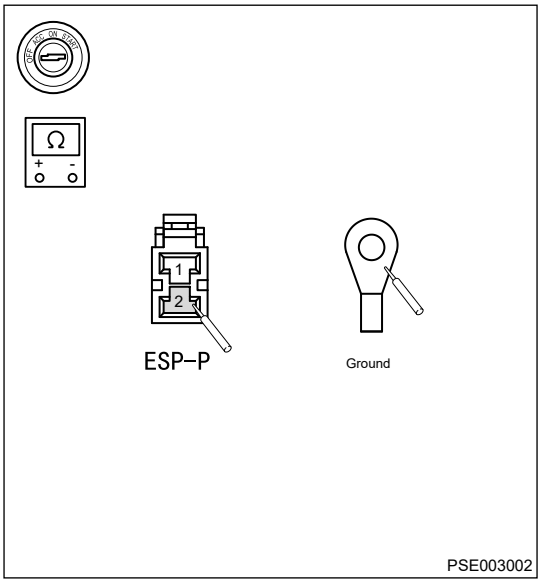
2	**Inspect ground and power supply circuit**

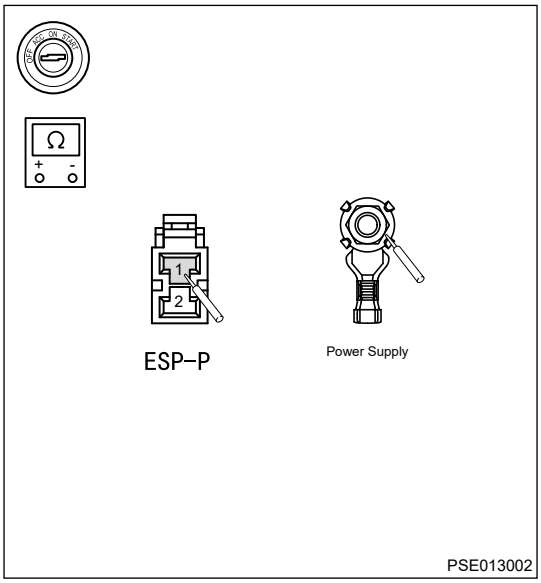
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect electric power steering EPS connector.

(c) Check for continuity between EPS (ground terminal) and ground.

(d) Check for continuity between EPS (power supply terminal) and power supply.





OK	**Replace DP steering gear assembly**
NG	**Replace or repair wire harness**

OK

3	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.

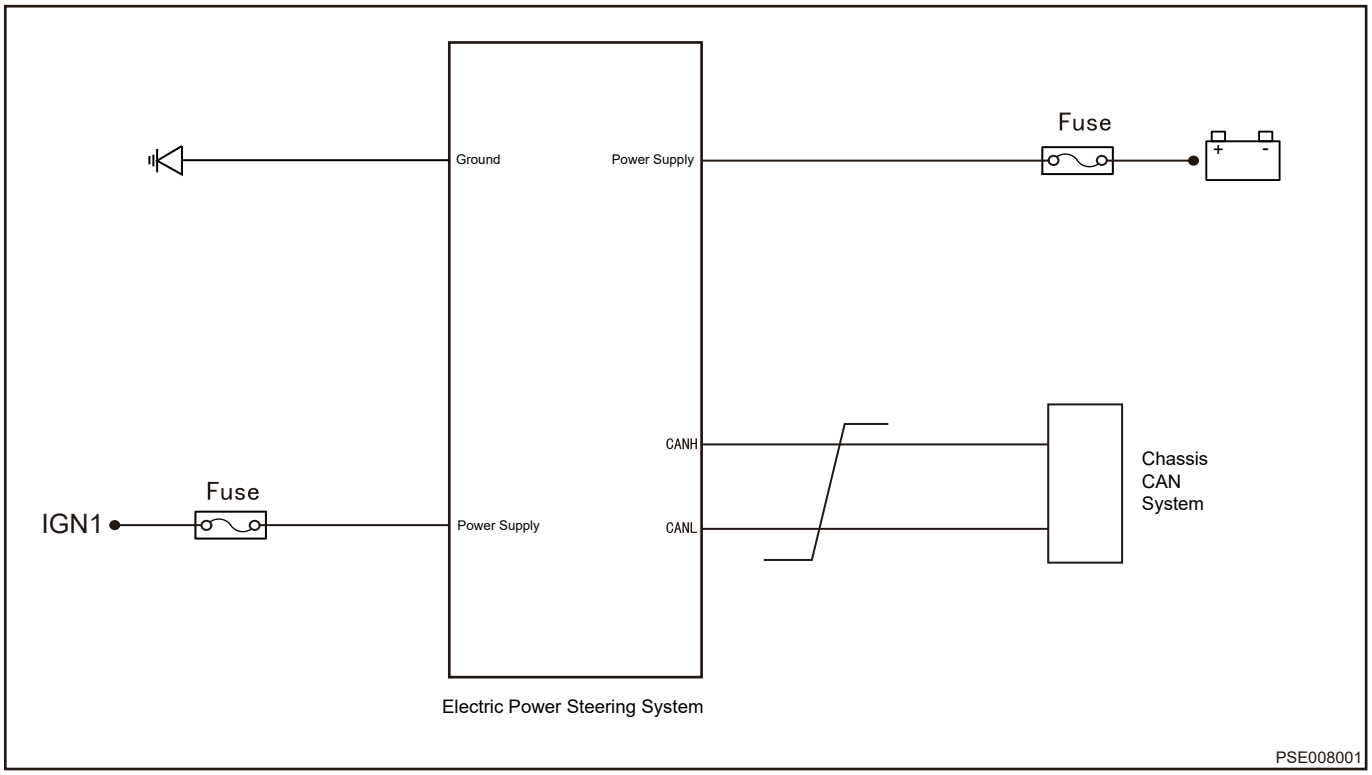
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG	Replace with a new ECU to check if fault reoccurs
OK	Conduct test and confirm malfunction has been repaired

DTC	C1214-1C	High Power Supply Voltage
DTC	C1217-1C	Low Power Supply Voltage

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery voltage

(a) Check if battery voltage is normal.
(b) Check battery voltage with voltage band of multimeter.

NG	Check and repair battery

OK

2	Check fuse

(a) Turn ENGINE START STOP switch to OFF.
(b) Remove fuse from engine compartment fuse and relay.
(c) Check if fuse is blown.

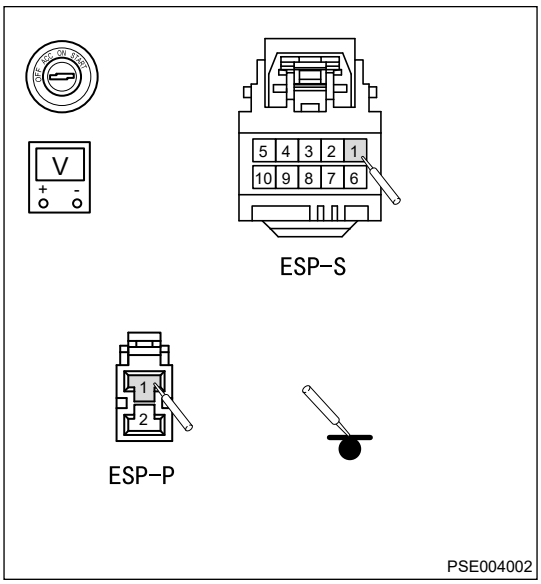
NG → Replace fuse

OK

3	Check power supply voltage

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the EPS power supply connector.
(c) Turn ENGINE START STOP switch to ON.
(d) Check voltage

Multimeter Connection	Condition	Specified Condition
EPS power supply connector (P1) - Body ground	ENGINE START STOP switch ON	9 - 16 V
EPS power supply connector (S1) - Body ground	ENGINE START STOP switch ON	9 - 16 V



NG → Repair or replace power supply wire harness

OK

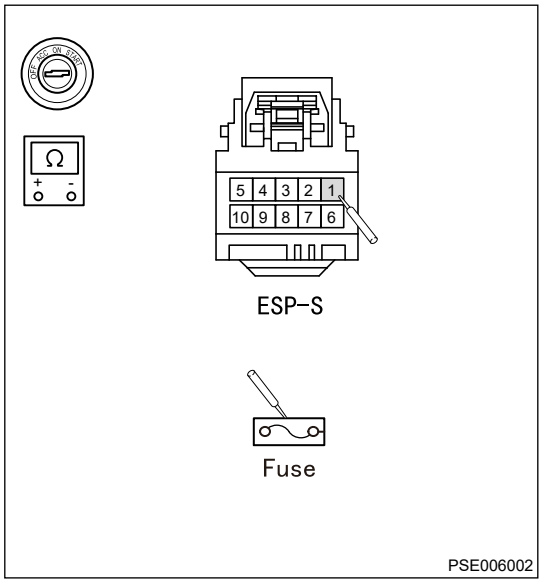
4	Check wire harness and connector

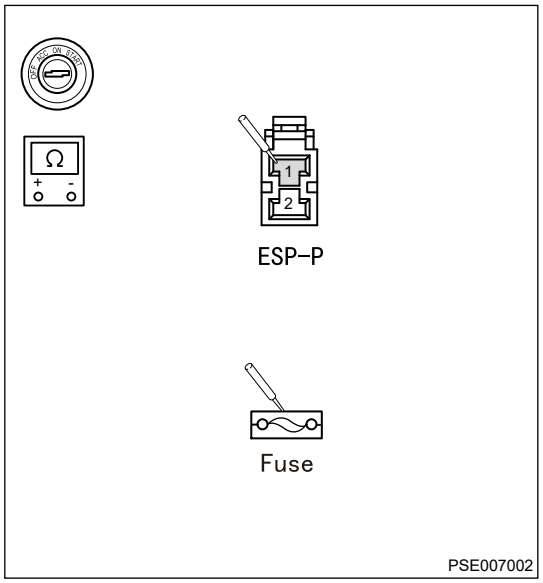
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the EPS power supply connector.

(c) Using ohm band of multimeter, check for continuity between EPS signal connector and engine compartment fuse and relay box fuse.

Multimeter Connection	Condition	Specified Condition
EPS power supply connector (P1) - Fuse	ENGINE START STOP switch "OFF"	⩽ 1 Ω
EPS power supply connector (S1) - Fuse	ENGINE START STOP switch "OFF"	⩽ 1 Ω

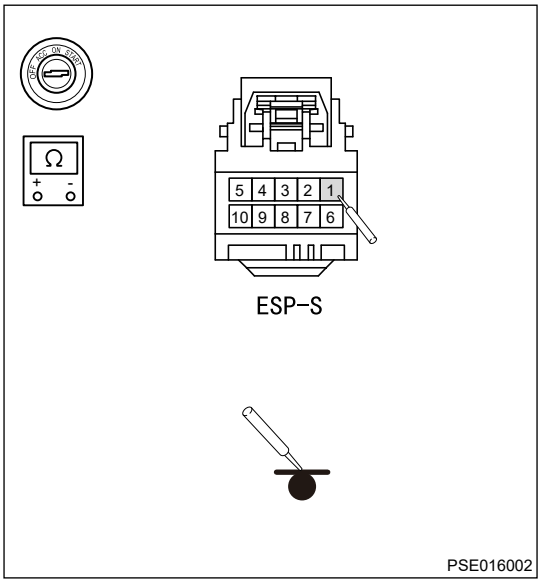


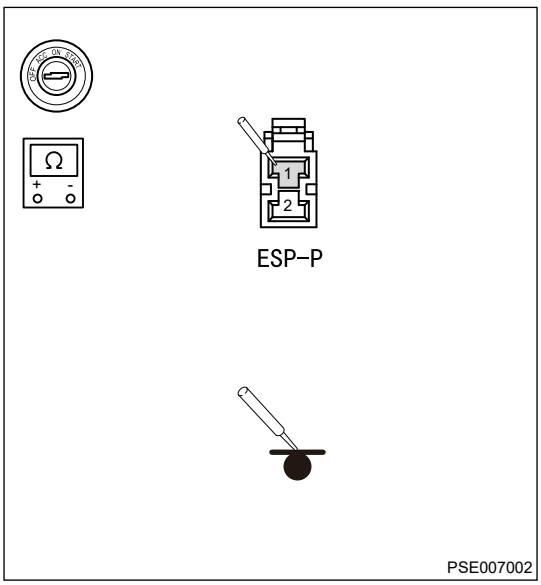


(d) Using ohm band of multimeter, check for continuity between EPS power supply connector and body ground.

Check for Short

Multimeter Connection	Condition	Specified Condition
EPS power supply connector (P1) - Ground	ENGINE START STOP switch "OFF"	∞
EPS power supply connector (S1) - Ground	ENGINE START STOP switch "OFF"	∞





NG → **Repair or replace control circuit wire harness and connector**

OK

5	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**C1218-4B**	**Over Temperature Reduction-Over Temperature**
DTC	**C1219-4B**	**Temperature Out Of Range-Over Temperature**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Parked in the shade to dissipate heat**

(a) Parked in the shade to dissipate heat.

NG → **Replace DP steering gear assembly**

OK

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**C1209-49**	**Phase Current Error**
DTC	**C120A-49**	**Rotor Position Sensor Error**
DTC	**C1206-07**	**High Friction-Mechanical Failure**
DTC	**C1224-49**	**EEPROM SPI Communication Timeout**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).

- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

NG → **Replace DP steering gear assembly**

OK

1	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**U0073-88**	**CAN Bus Off**
DTC	**U0100-87**	**Lost Communication with EMS**
DTC	**U0129-87**	**Lost Communication with BSM**
DTC	**U0418-81**	**Invalid Data Received from BSM**
DTC	**U1300-55**	**Software Configuration Error**
DTC	**U3000-51**	**Control Module Not Programmed**

■ **DTC Confirmation Procedure**

Refer to CAN Network Malfunction Diagnosis.

7.3 STEERING WHEEL

1 Warnings and Precautions

1.1 Warnings

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) Be sure to read precautions for SRS airbag before removing steering wheel.

(2) Be sure to read precautions for SRS airbag before removing multi-function switch.

(3) Be sure to read precautions for SRS airbag before removing shift fork.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) Wait at least 90 seconds after disconnecting the negative battery cable to prevent airbag and belt pretensioner from being activated.

(2) Motor position sensor in EPS module provides steering angle signal for EPS; Therefore, after replacing electric steering column assembly, steering gear and performing four-wheel alignment, it is necessary to calibrate motor position sensor in EPS module.

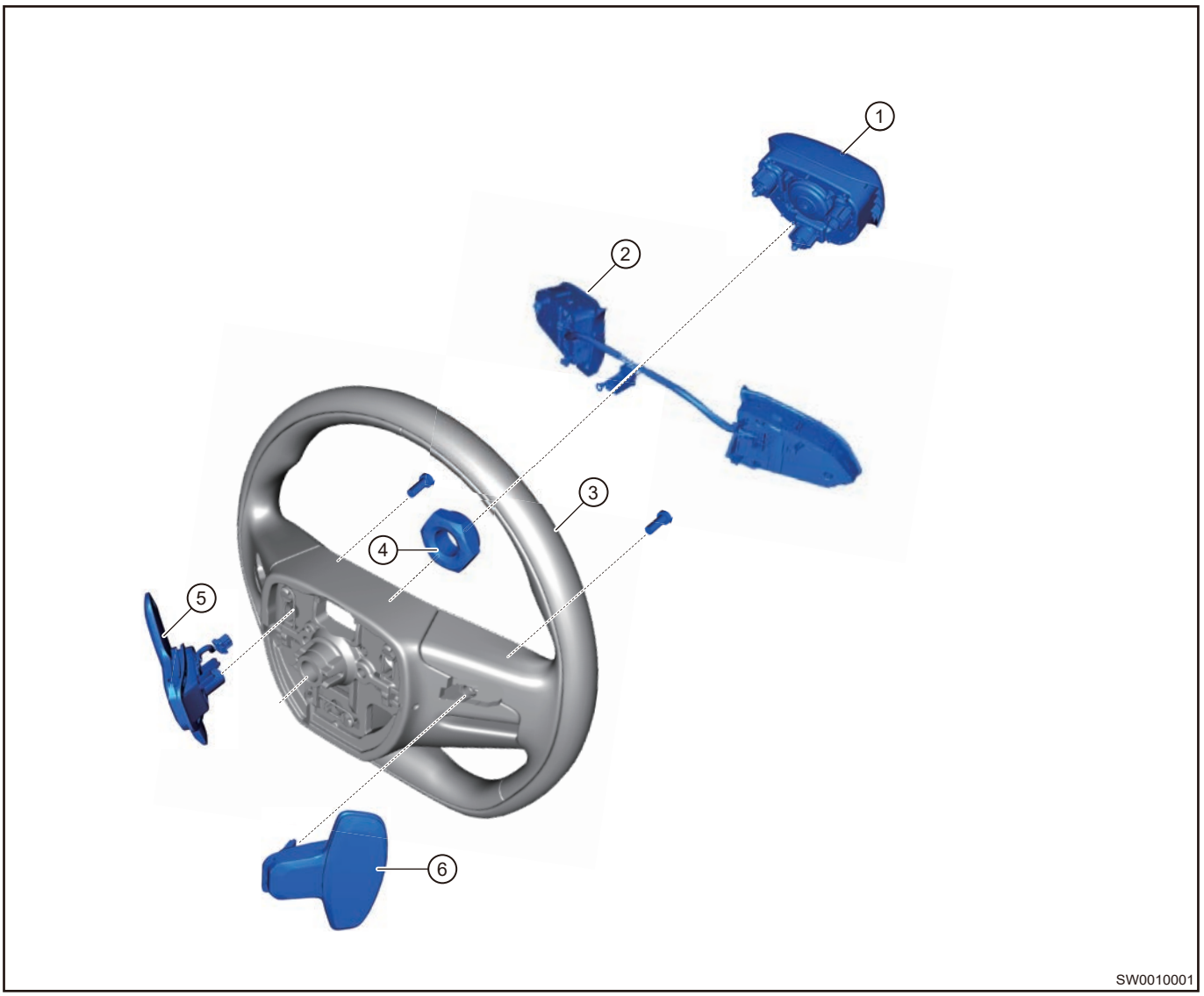
(3) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

Steering wheel is the device that driver controls the driving direction. Through the steering mechanism, steering wheel controls wheels to left and right to change driving direction or keep vehicle driving straight.

2.2 System Components Diagram

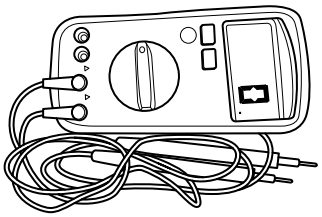
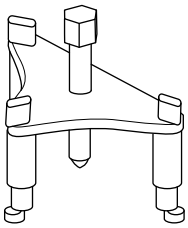


1	Driver Airbag	4	Steering Wheel Locking Nut
2	Steering Wheel Multi-function Switch	5	Right Shift Paddle
3	Steering Wheel Body	6	Left Shift Paddle

3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Steering Wheel Remover	 S00085

3.2 Replacement of Steering Wheel Body

■ Removal

⚠ Caution

- **After removing steering wheel, install spiral cable stopper pin fixing combination switch.**

(1) Adjust steering wheel to the centered position (visually check tire is straight-ahead).
(2) Turn ENGINE START STOP switch to OFF.
(3) Disconnect the negative battery cable.
(4) Remove the combination switch lower cover.
(5) Remove the driver airbag.
(6) Remove the steering wheel locking nut (arrow).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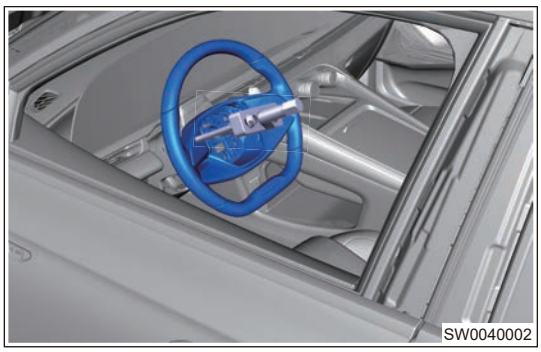
(7) Disconnect the steering wheel multi-function switch connector.

(8) Use steering wheel remover to remove steering wheel.



(9) Install spiral cable stopper pin fixing combination switch.

■ Inspection

Steering wheel centering or steering performance are affected by manufacturing error, requirements for four wheels alignment toe-in and steering wheel centering are as following:

(1) Confirm the left and right strokes of steering wheel after it is assembled.

(2) Before performing four-wheel alignment, first rotate steering wheel to left and right to determine rotation angle of one side is not less than 45°, then returns to horizontal position.

(3) Fix the steering wheel horizontally.

(4) When adjusting front wheel toe-in, it is necessary to adjust steering gear left and right tie rods. Loosen locking nut of steering gear tie rod when adjusting, use wrench to rotate inner lever at hexagonal position of outer lever, until toe-in value reaches specified value, then tighten locking nut. If threads exposed outside on left and right levers are greatly not equal (difference between threads exposed outside on left and right levers are more than 3 threads), please recheck if steering wheel is centered. It is necessary to hold the flat and square position of outer lever with wrench while tightening. Tightening torque for nut is 50 ± 5 N·m.

(5) After the four wheels alignment is completed and exiting the four wheels alignment station, turn the steering wheel to the limit position (make sure the steering wheel has hit the limit position) and return to the middle position, and the vehicle is turned off.

■ Installation

Hint:

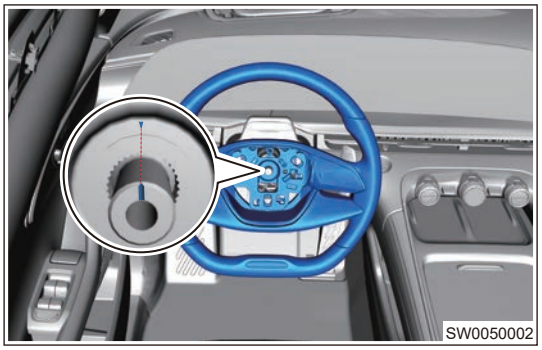
- The scale marks on steering wheel and steering column can only assist in assembly, and cannot be used on final position, it is necessary to perform toe-in and steering wheel rotation angle adjustment.

(1) Pull out the spiral cable stopper pin.

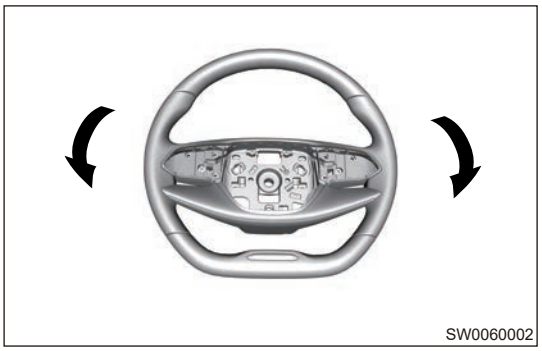
(2) Visually check tire is straight-ahead (adjust steering wheel to the centered position).

(3) Install the steering wheel.

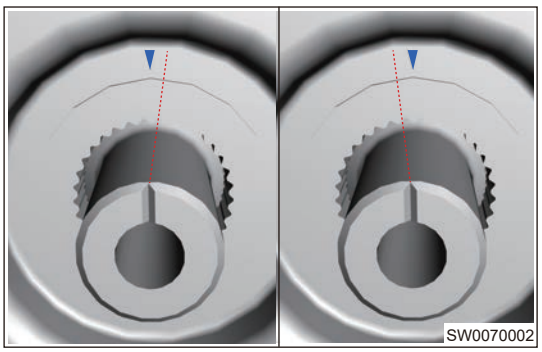
1) Align steering wheel scale mark with column scale mark.



2) Turn steering wheel left and right to the limit position, and check steering wheel rotation angle.



3) Visually check steering wheel rotation angle, and ensure the angle deviation on both sides is no more than 10°. If the deviation is more than 10°, check after adjusting one gear tooth.



(4) Install the steering wheel locking nut.

Torque: 30 ± 3 N·m

(5) Connect the steering wheel multi-function switch connector.

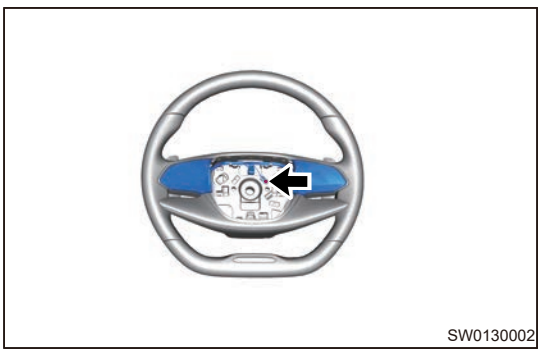
(6) Install the driver airbag.

3.3 Replacement of Steering Wheel Multi-function Switch

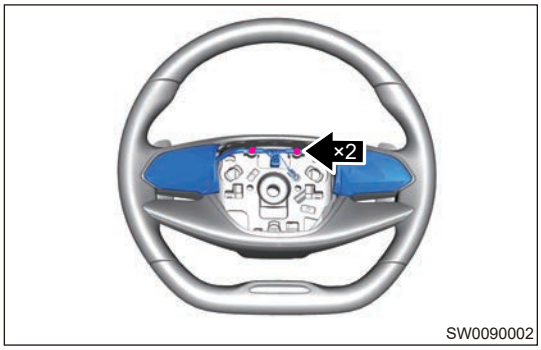
■ Removal

(1) Remove the driver airbag.

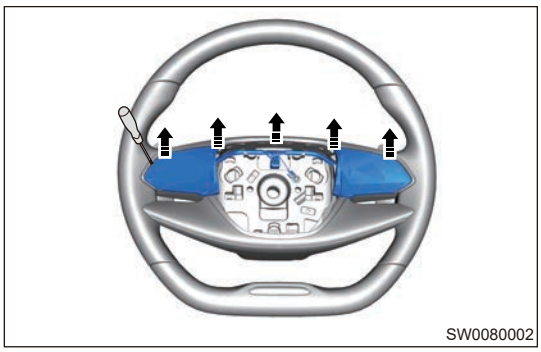
(2) Remove 1 fixing screw (arrow) of steering wheel multi-function switch wire harness.



(3) Remove 2 fixing bolts (arrow) of steering wheel multi-function switch trim cover.



(4) Using flat screwdriver, pry up trim cover and steering wheel multi-function switch.



(5) Remove the steering wheel multi-function switch.

■ Installation

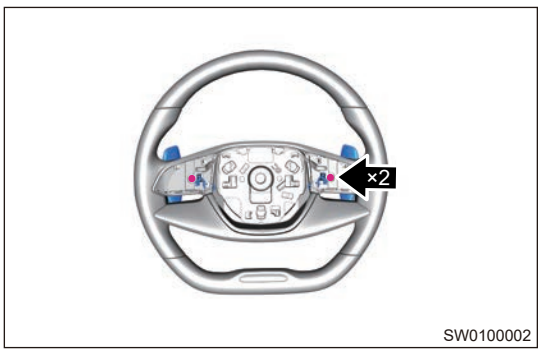
(1) Install the steering wheel multi-function switch.
(2) Install steering wheel multi-function switch and trim cover to steering wheel, press steering wheel multi-function switch firmly, and clip steering wheel with clips.
(3) Install 2 fixing screws of steering wheel multi-function switch trim cover.
(4) Install 1 fixing screw of steering wheel multi-function switch wire harness.
(5) Install the driver airbag.

3.4 Replacement of Shift Paddle

■ Removal

(1) Remove the steering wheel multi-function switch.

(2) Remove 2 fixing screws from left/right shift paddle and steering wheel.



(3) Remove left/right shift paddle.

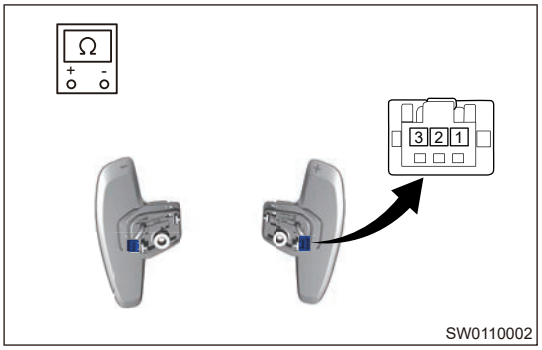
■ Inspection

(1) Remove the steering wheel multi-function switch.

(2) Using ohm band of digital multimeter, measure left/right shift paddle terminal.

Standard Resistance

Multimeter Connection	Switch Condition	Specified Condition
Terminal 1 - Terminal 2	Pressed	228 Ω ⩽ R ⩽ 252 Ω
Terminal 1 - Terminal 2	Released	R ⩾ 10 MΩ



If measurement result is not as specified, replace shift paddle.

■ **Installation**

(1) Install the left/right shift paddle.

(2) Install 2 fixing screws between left/right shift paddle and steering wheel.

Torque: 5 ± 0.5 N·m

(3) Install the steering wheel multi-function switch.

(4) Install the steering wheel.

7.4 ELECTRIC STEERING COLUMN

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Wear glove during assembling steering column with intermediate shaft assembly, prevent hands are contacted with steering column, which may cause rust.

(2) DO NOT hold steering column handle position, but steering column position; do not bump, strike steering column when taking, carrying or assembling it, prevent steering column from collapse.

(3) Adjustment handle is in locking state after steering column is assembled, do not transfer to next station, prevent handle is knocked during operation, which may cause person damage or handle breakage.

(4) DO NOT touch interior ornaments when removing steering column with intermediate shaft assembly to avoid scratching interior ornaments.

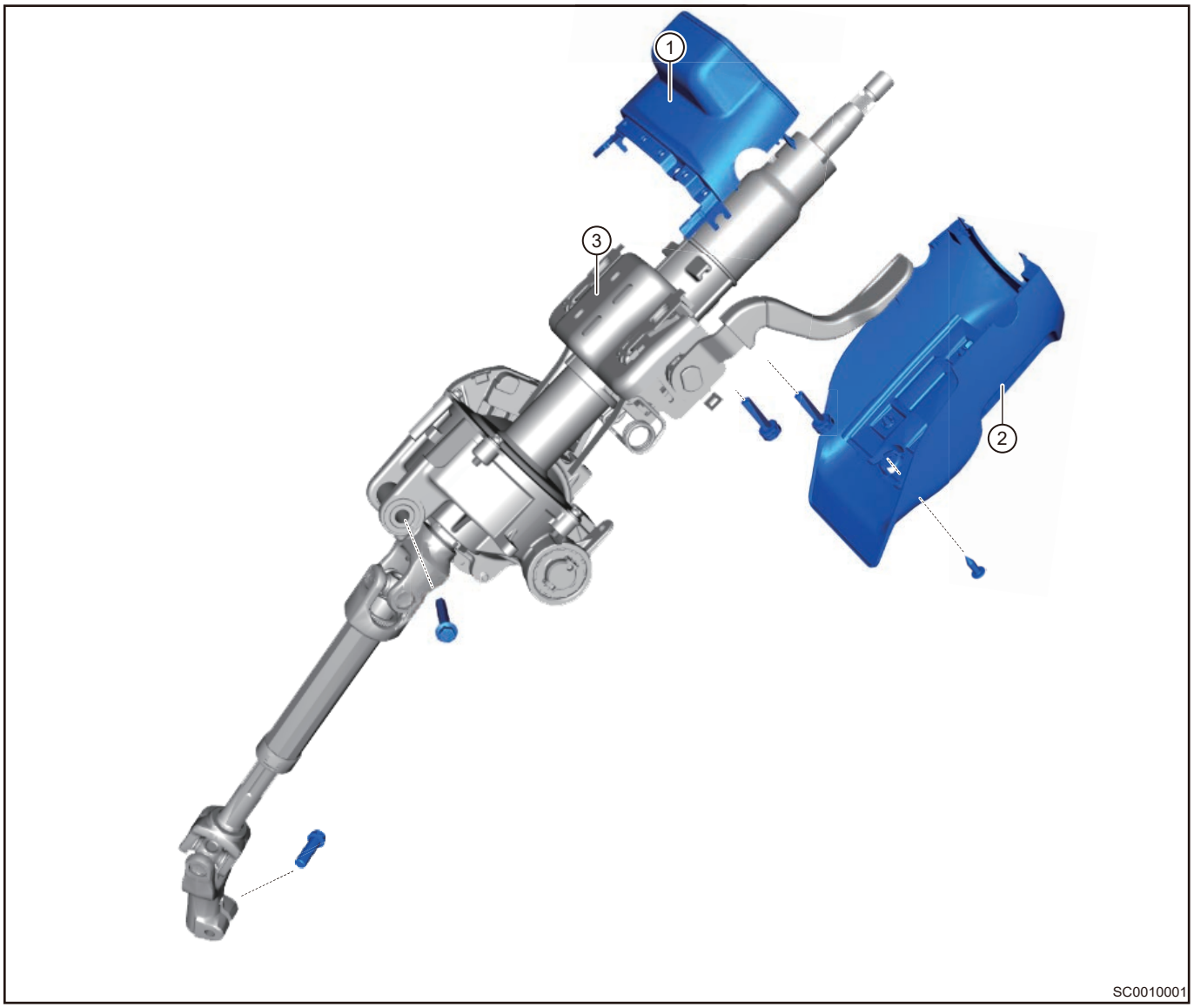
(5) After installing steering column, perform software configuration and center calibration.

(6) Motor position sensor in EPS module provides steering angle signal for EPS;
Therefore, after replacing electric steering column assembly, steering gear and performing four-wheel alignment, it is necessary to calibrate motor position sensor in EPS module.

(7) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

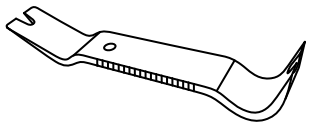


1	Combination Switch Upper Cover	3	Electric Steering Column with Intermediate Shaft Assembly
2	Combination Switch Lower Cover		

The steering column is the component of the steering system that connects the steering wheel and the steering gear. Through the steering column, the driver transfers torque to the steering gear, which drives the steering gear to achieve steering.

3 Tools

3.1 General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

4 Fasteners Torque List

4.1 Torque Specifications

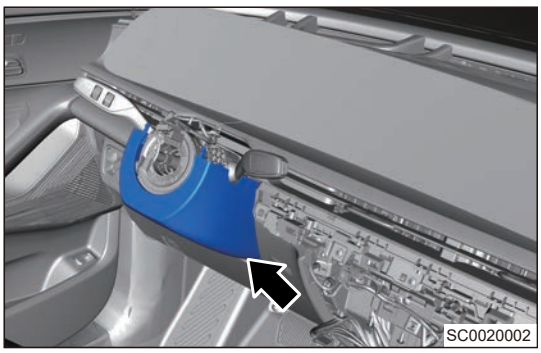
Item	Tightening torque
Steering Column Assembly Upper Bracket Fixing Bolt	25 ± 3 N·m
Steering Column Assembly Lower Bracket Fixing Bolt	50 ± 5 N·m
Coupling Bolt Between Steering Column with Intermediate Shaft Assembly and Steering Gear Input Shaft	55 ± 5 N·m
Universal Joint Protector Fixing Bolt	1.5 ± 0.5 N·m

5 On-vehicle Service

5.1 Combination Switch Cover Assembly

■ Removal

(1) Set the steering wheel to straight-ahead position.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the driver airbag assembly.
(5) Remove the steering wheel assembly.
(6) Remove the combination switch lower cover fixing screw, and remove the lower cover.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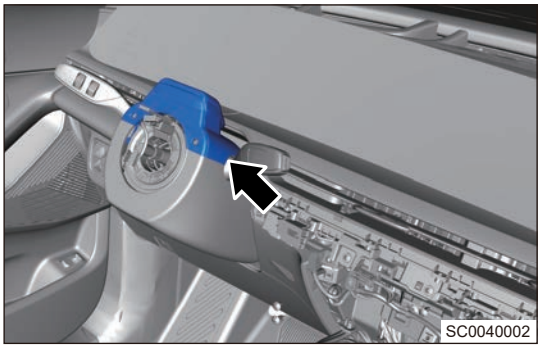
(7) Disengage connecting clips between upper cover and lower cover, then remove upper cover.



⚠ Caution

Operate carefully to prevent damage to components during removal.

Hint:

- Check combination switch upper and lower covers for damage or deformation. Replace upper and lower covers if necessary.
- Check if upper and lower cover clips are normal. Replace upper and lower covers if necessary.

■ Installation

(1) Loosen steering wheel adjusting handle, and adjust steering column assembly to uppermost position, then tighten adjusting handle to uppermost position.

(2) Insert steering column lower cover from right side of combination switch at an angle, and then install adjusting handle into cover hole.

(3) After adjusting lower cover, install upper cover and fix upper and lower cover clips in place.

(4) Install fixing screw to combination switch lower cover.

⚠ Caution

- **Tighten fixing screw in place.**
- **Operate carefully to prevent damage to components during installation.**

(5) Install the steering wheel assembly.

(6) Install the driver airbag assembly.

(7) Install the negative battery cable.

(8) Press ENGINE START STOP switch and perform running test.

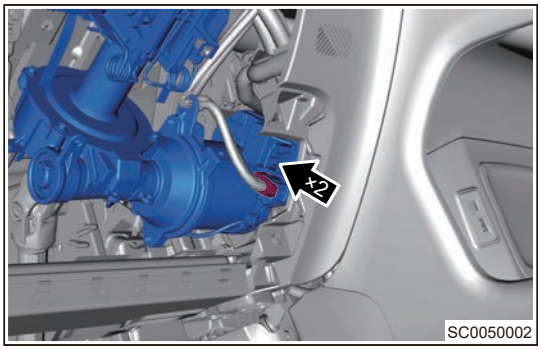
5.2 Steering Column with Intermediate Shaft Assembly

■ Removal

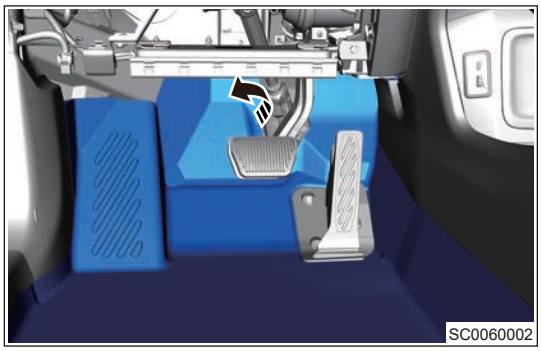
Procedures listed below are removal procedures for electronic steering column.

(1) Set the steering wheel to straight-ahead position.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the driver airbag assembly.
(5) Remove the steering wheel assembly.
(6) Remove the combination switch cover.
(7) Remove the spiral cable.
(8) Remove the light combination switch assembly.

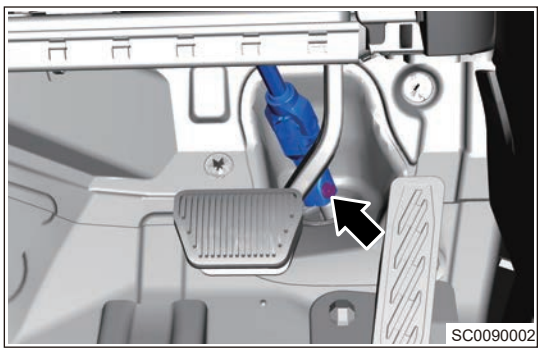
(9) Disconnect 2 connectors (arrow) from EPS controller.



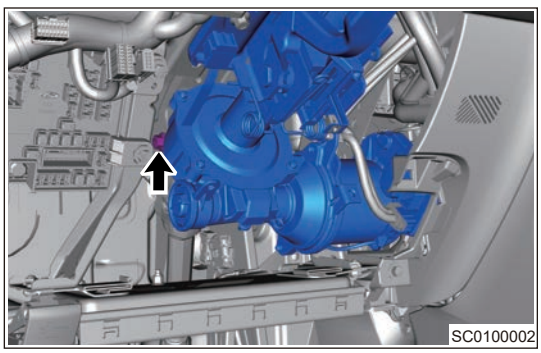
(10) Turn over carpet under driver seat in the direction of arrow.



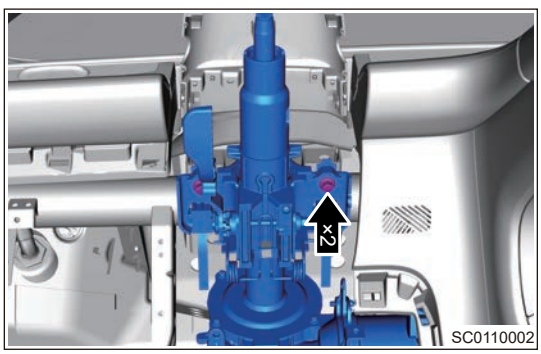
(11) Remove the coupling bolt (arrow) between steering column with intermediate shaft assembly and steering gear input shaft.



(12) Remove 1 fixing bolt (arrow) from steering column lower bracket.



(13) Remove 2 fixing bolts (arrow) from steering column upper bracket.



(14) Remove the steering column with intermediate shaft assembly.

Hint:

- Check steering column assembly for wear, crack or deformation. As welding or correction is not allowed, replace steering column assembly if necessary.
- Check steering column bearing for looseness, wear or sticking. Replace steering column assembly if necessary.

■ Installation

⚠ Caution

- **Wear glove during assembling, prevent hands are contacted with steering column, which may cause rust.**
- **DO NOT hold steering column handle position, but steering column position; do not bump, strike steering column when taking, carrying or assembling it, prevent steering column from collapse.**
- **Do not release steering column adjustment handle before tightening upper bracket bolt to prevent bracket from improper installation.**
- **Adjustment handle is in locking state after steering column is assembled, do not transfer to next station, prevent handle is knocked during operation, which may cause person damage or handle breakage.**
- **DO NOT touch interior ornaments when installing steering column with intermediate shaft assembly to avoid scratching interior ornaments.**
- **It is necessary to perform motor position sensor calibration after assembling.**

(1) Install the steering column with intermediate shaft assembly.

(2) Install 2 fixing bolts to steering column upper bracket.

Torque: 25 ± 3 N·m

(3) Install 1 fixing bolts to steering column lower bracket.

Torque: 50 ± 5 N·m

(4) Install coupling bolt between steering column with intermediate shaft assembly and steering gear input shaft.

Torque: 55 ± 5 N·m

(5) Place the carpet under driver seat in a suitable position.

(6) Connect 2 connectors to EPS controller.

(7) Install the light combination switch assembly.

(8) Install the spiral cable.

(9) Install the combination switch cover.

(10) Install the steering wheel assembly.

(11) Install the driver airbag assembly.

(12) Install the negative battery cable.

(13) Press ENGINE START STOP switch and perform running test.

(14) Connect EXEED special diagnostic tester, read and clear DTCs.

7.5 MECHANICAL STEERING COLUMN

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Wear glove during assembling steering column with intermediate shaft assembly, prevent hands are contacted with steering column, which may cause rust.

(2) DO NOT hold steering column handle position, but steering column position; do not bump, strike steering column when taking, carrying or assembling it, prevent steering column from collapse.

(3) Adjustment handle is in locking state after steering column is assembled, do not transfer to next station, prevent handle is knocked during operation, which may cause person damage or handle breakage.

(4) DO NOT touch interior ornaments when removing steering column with intermediate shaft assembly to avoid scratching interior ornaments.

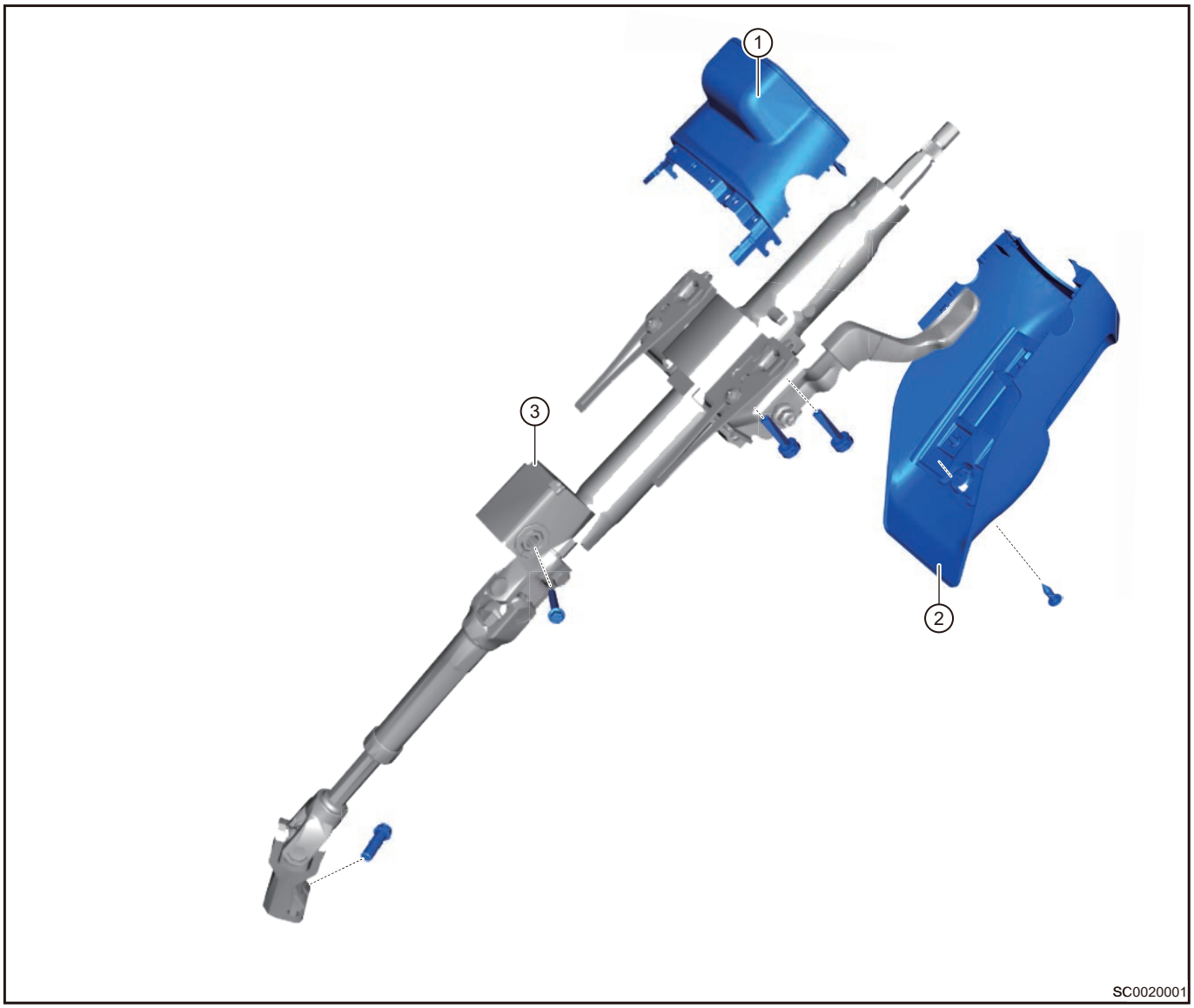
(5) After installing steering column, perform software configuration and center calibration.

(6) Motor position sensor in EPS module provides steering angle signal for EPS;
Therefore, after replacing electric steering column assembly, steering gear and performing four-wheel alignment, it is necessary to calibrate motor position sensor in EPS module.

(7) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Components Diagram

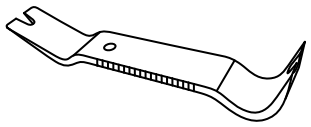


1	Combination Switch Upper Cover	3	Mechanical Steering Column with Intermediate Shaft Assembly
2	Combination Switch Lower Cover		

The steering column is the component of the steering system that connects the steering wheel and the steering gear. Through the steering column, the driver transfers torque to the steering gear, which drives the steering gear to achieve steering.

3 Tools

3.1 General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

4 Fasteners Torque List

4.1 Torque Specifications

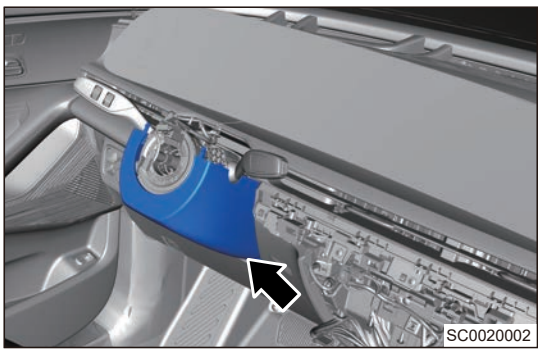
Item	Tightening torque
Steering Column Assembly Upper Bracket Fixing Bolt	25 ± 3 N·m
Steering Column Assembly Lower Bracket Fixing Bolt	50 ± 5 N·m
Coupling Bolt Between Steering Column with Intermediate Shaft Assembly and Steering Gear Input Shaft	55 ± 5 N·m
Universal Joint Protector Fixing Bolt	1.5 ± 0.5 N·m

5 On-vehicle Service

5.1 Combination Switch Cover Assembly

■ Removal

(1) Set the steering wheel to straight-ahead position.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the driver airbag assembly.
(5) Remove the steering wheel assembly.
(6) Remove the combination switch lower cover fixing screw, and remove the lower cover.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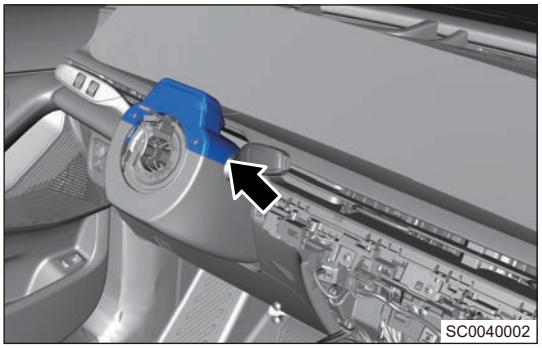
(7) Disengage connecting clips between upper cover and lower cover, then remove upper cover.



⚠ Caution

Operate carefully to prevent damage to components during removal.

Hint:

- Check combination switch upper and lower covers for damage or deformation. Replace upper and lower covers if necessary.
- Check if upper and lower cover clips are normal. Replace upper and lower covers if necessary.

■ Installation

(1) Loosen steering wheel adjusting handle, and adjust steering column assembly to uppermost position, then tighten adjusting handle to uppermost position.

(2) Insert steering column lower cover from right side of combination switch at an angle, and then install adjusting handle into cover hole.

(3) After adjusting lower cover, install upper cover and fix upper and lower cover clips in place.

(4) Install fixing screw to combination switch lower cover.

⚠ Caution

- **Tighten fixing screw in place.**
- **Operate carefully to prevent damage to components during installation.**

(5) Install the steering wheel assembly.

(6) Install the driver airbag assembly.

(7) Install the negative battery cable.

(8) Press ENGINE START STOP switch and perform running test.

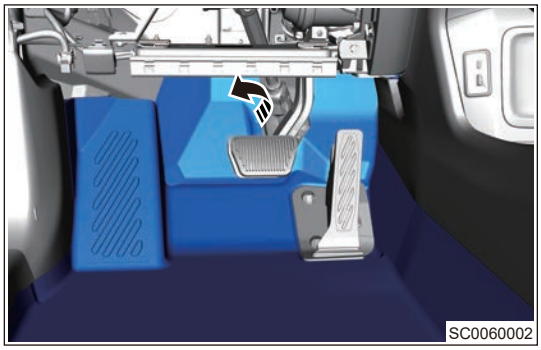
5.2 Steering Column with Intermediate Shaft Assembly

■ Removal

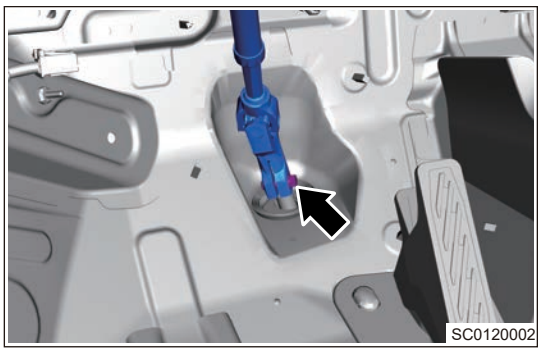
Procedures listed below are removal procedures for electronic steering column.

(1) Set the steering wheel to straight-ahead position.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the driver airbag assembly.
(5) Remove the steering wheel assembly.
(6) Remove the combination switch cover.
(7) Remove the spiral cable.
(8) Remove the light combination switch assembly.

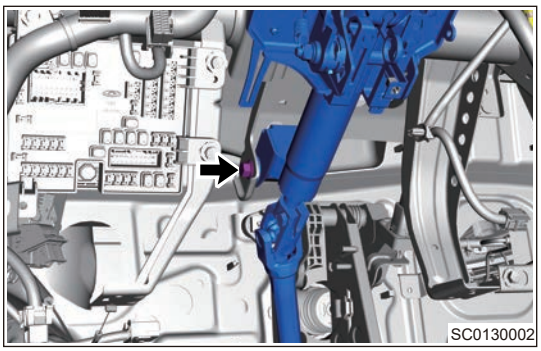
(9) Turn over carpet under driver seat in the direction of arrow.



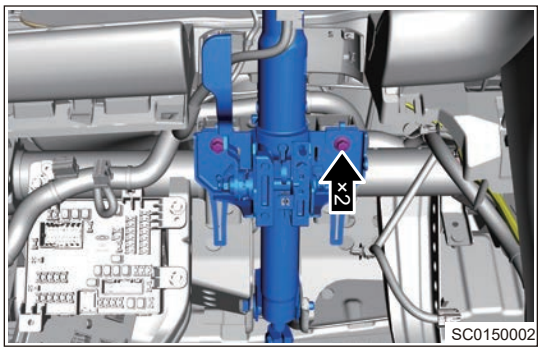
(10) Remove the coupling bolt (arrow) between steering column with intermediate shaft assembly and steering gear input shaft.



(11) Remove 1 fixing bolt (arrow) from steering column lower bracket.



(12) Remove 2 fixing bolts (arrow) from steering column upper bracket.



(13) Remove the steering column with intermediate shaft assembly.

Hint:

- Check steering column assembly for wear, crack or deformation. As welding or correction is not allowed, replace steering column assembly if necessary.
- Check steering column bearing for looseness, wear or sticking. Replace steering column assembly if necessary.

■ **Installation**

⚠ Caution

- **Wear glove during assembling, prevent hands are contacted with steering column, which may cause rust.**
- **DO NOT hold steering column handle position, but steering column position; do not bump, strike steering column when taking, carrying or assembling it, prevent steering column from collapse.**
- **Do not release steering column adjustment handle before tightening upper bracket bolt to prevent bracket from improper installation.**
- **Adjustment handle is in locking state after steering column is assembled, do not transfer to next station, prevent handle is knocked during operation, which may cause person damage or handle breakage.**
- **DO NOT touch interior ornaments when installing steering column with intermediate shaft assembly to avoid scratching interior ornaments.**
- **It is necessary to perform motor position sensor calibration after assembling.**

(1) Install the steering column with intermediate shaft assembly.
(2) Install 2 fixing bolts to steering column upper bracket.

Torque: 25 ± 3 N·m

(3) Install 1 fixing bolts to steering column lower bracket.

Torque: 50 ± 5 N·m

(4) Install coupling bolt between steering column with intermediate shaft assembly and steering gear input shaft.

Torque: 55 ± 5 N·m

(5) Place the carpet under driver seat in a suitable position.
(6) Connect 2 connectors to EPS controller.
(7) Install the light combination switch assembly.
(8) Install the spiral cable.
(9) Install the combination switch cover.
(10) Install the steering wheel assembly.
(11) Install the driver airbag assembly.
(12) Install the negative battery cable.
(13) Press ENGINE START STOP switch and perform running test.

7.6 STEERING GEAR

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) To replace steering gear, it is necessary to perform four-wheel alignment and center calibration.

(2) After four-wheel alignment, it is necessary to recalibrate center calibration.

(3) When removing and installing steering gear, it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

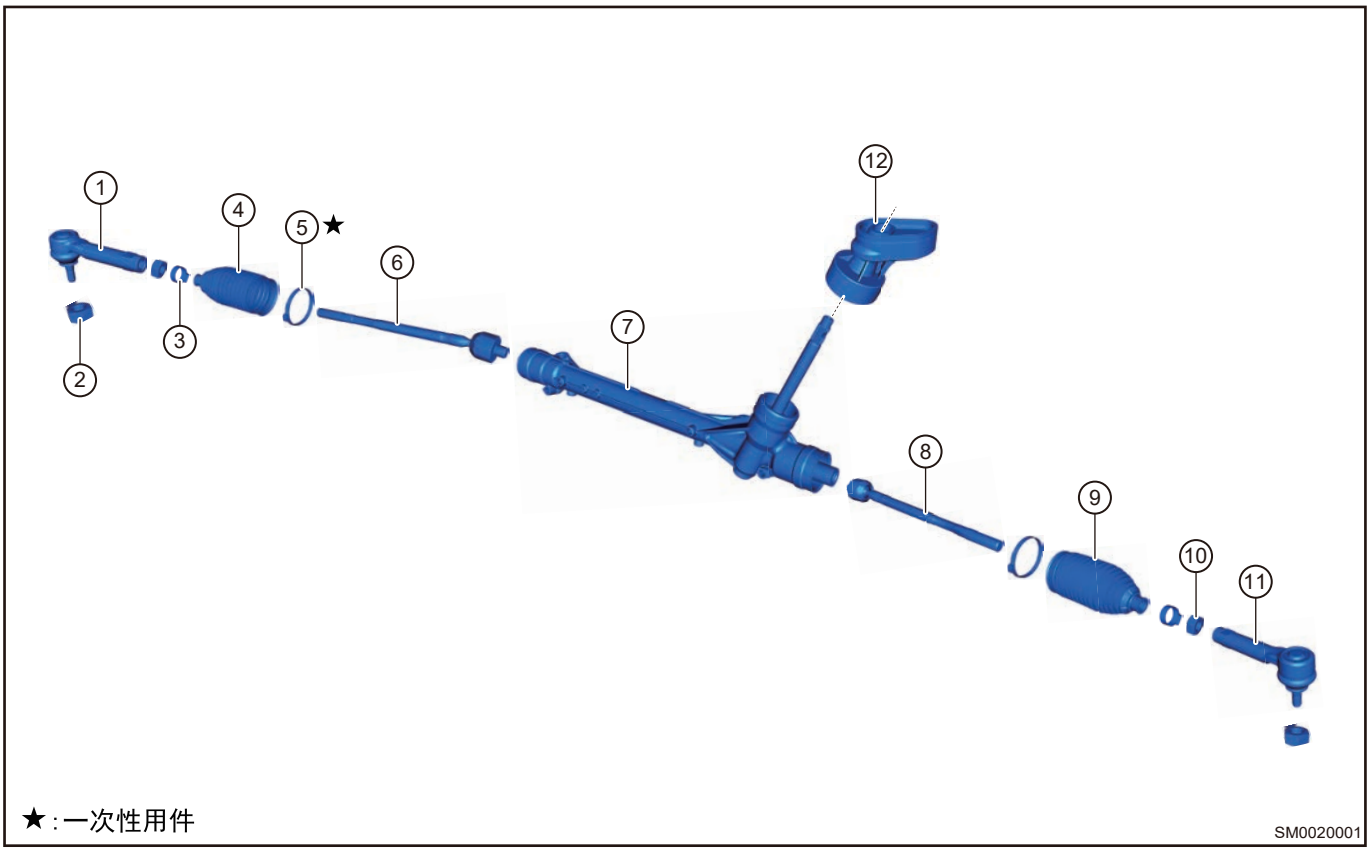
(4) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

This vehicle adopts the electronic power steering system, which can reduce the workload when driver operates the steering wheel, thus improving operation convenience and driving safety.

2.2 System Components Diagram



1	Right Steering Tie Rod Ball Pin	8	Left Steering Tie Rod Assembly
2	Steering Tie Rod Ball Pin Locking Nut	9	Left Steering Tie Rod Boot
3	Steel Belt Clamp	10	Steering Tie Rod Fixing Nut

4	Right Steering Tie Rod Boot	11	Left Steering Tie Rod Ball Pin
5	Steel Belt Elastic Clamp	12	Boot Assembly
6	Right Steering Tie Rod Assembly	13	Steering Gear Heat Insulator
7	Steering Gear Body		

3 On-vehicle Service

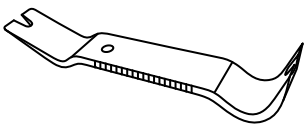
3.1 Fasteners Torque List

■ Torque Specifications

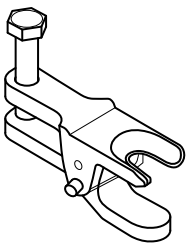
Item	Tightening torque
Fixing Bolt between Electric Steering Column with Intermediate Shaft Assembly and Steering Gear	55 ± 5 N·m
Tightening Bolt between Steering Gear and Steering Knuckle	60 ± 6 N·m
Tightening Bolt between Steering Gear and Sub Frame	180 ± 18 N·m
Tightening Bolt of Steering Gear Inner and Outer Tie Rod	55 ± 5 N·m
Tightening Bolt between Steering Gear and Heat Insulator	9 ± 1.5 N·m

3.2 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

■ Special Tools

Tool Name	Tool Drawing
Ball Separator	 S00019

3.3 Replace steering gear assembly

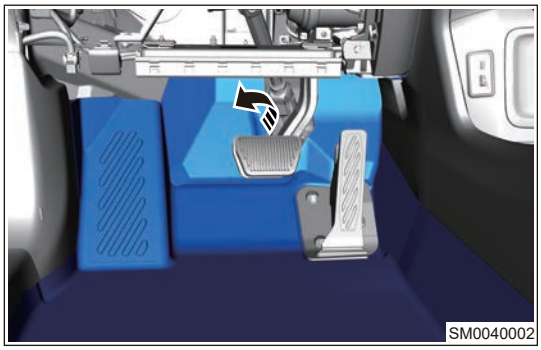
■ Removal

(1) Set the steering wheel to straight-ahead position.

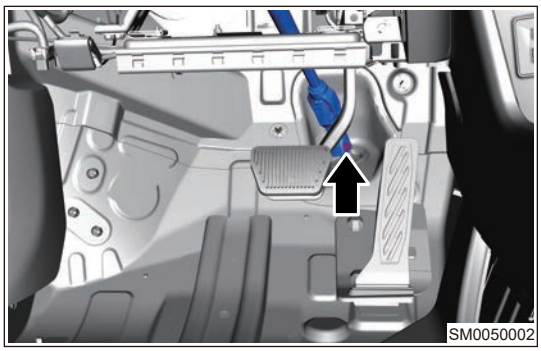
(2) Turn off all electrical equipment and ENGINE START STOP switch.

(3) Disconnect the negative battery cable.

(4) Turn over carpet under driver seat in the direction of arrow.



(5) Remove the coupling bolt (arrow) between steering column with intermediate shaft assembly and steering gear input shaft.



(6) Remove front left and front right wheels.

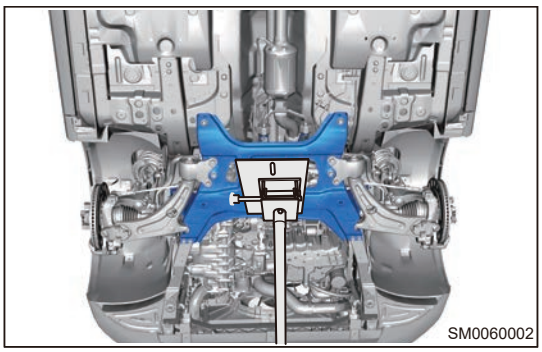
(7) Remove the engine lower protector assembly.

(8) Remove left and right side rail assembly.

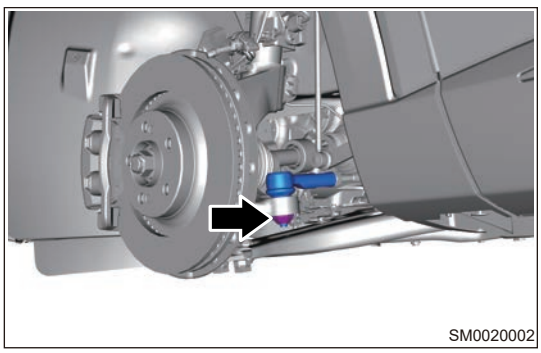
(9) Remove front left and front right control arm assemblies.

(10) Remove the rear mounting cushion assembly.

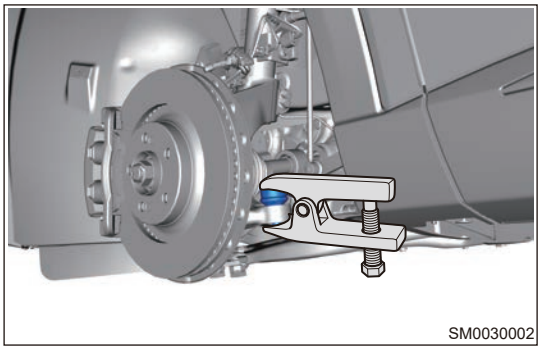
(11) Using a transmission carrier, support front sub frame welding assembly.



(12) Remove locking nut (arrow) between left steering tie rod ball pin assembly and front left steering knuckle assembly (the right side is same as left side).

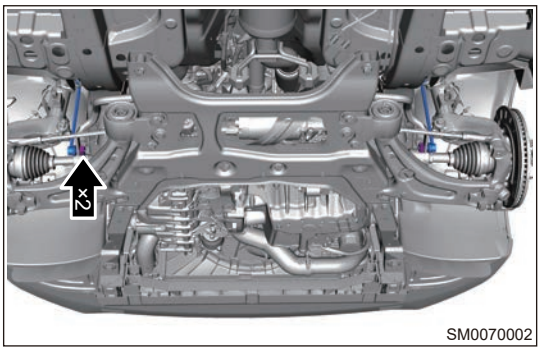


(13) Install ball pin separator, and separate steering tie rod ball pin from steering knuckle assembly.

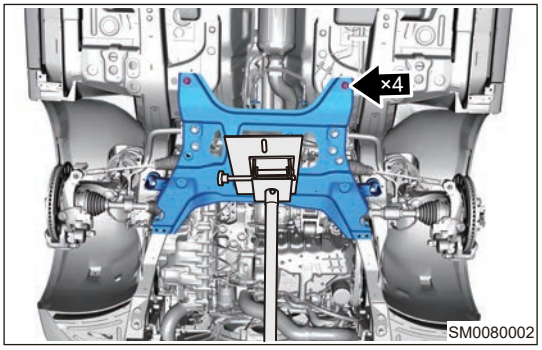


(14) Remove 2 locking nuts between front connecting rod and front stabilizer bar.

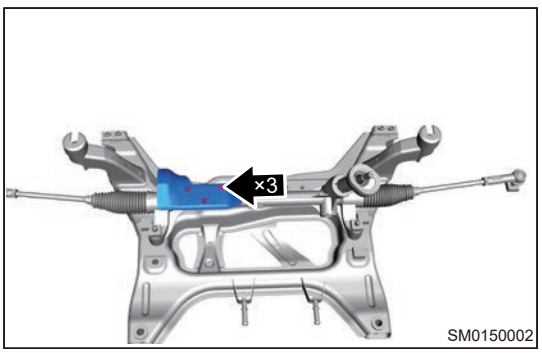
(15) Detach exhaust pipe fixing rubber lugs (arrow) from front sub frame welding assembly.



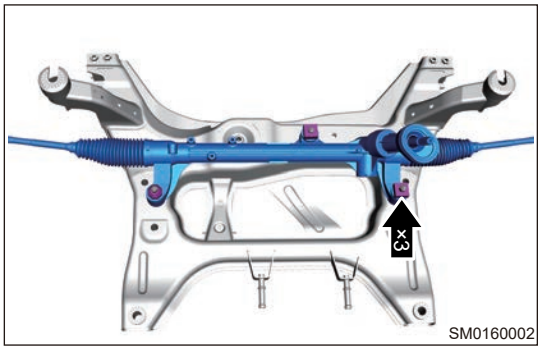
(16) Remove 4 fixing bolts (arrow) between front sub frame and vehicle body, and lower front sub frame slowly.



(17) Remove 3 fixing bolts and steering gear heat insulator.



(18) Remove 3 fixing bolts (arrow) that fix the steering gear with tie rod assembly from sub frame, and remove steering gear with tie rod assembly.



Hint:

- Check if steering gear dust boot is damaged, clamp is loose. Replace them if necessary to prevent water and micro dust from entering and causing parts failure prematurely.
- Check if steering gear is damaged. Replace the steering gear assembly if necessary.

■ Installation

(1) Install steering gear with tie rod assembly to sub frame.

(2) Install 3 fixing bolts fixing steering gear with tie rod assembly to sub frame.

Torque: 180 ± 18 N·m

(3) Install 3 fixing bolts to steering gear lower heat insulator.

Torque: 9 ± 1.5 N·m

(4) Slowly raise sub frame to a proper position and install 4 fixing bolts between sub frame and vehicle body.

Torque: 180 ± 18 N·m

(5) Separate transmission carrier from front sub frame welding assembly.

(6) Install 2 hanger blocks to front sub frame assembly.

(7) Install steering tie rod ball pin to steering knuckle assembly.

(8) Install locking nut between left steering tie rod ball pin assembly and front left steering knuckle assembly (the right side is same as left side).

Torque: 60 ± 6 N·m

(9) Install the rear mounting lower body.

(10) Install front left and front right control arm assemblies.

(11) Install left and right welding side rail assembly.

(12) Install the engine compartment lower protector assembly.

(13) Install front left and front right wheels.

(14) Install coupling bolt between steering column with intermediate shaft assembly and steering gear input shaft.

Torque: 55 ± 5 N·m

(15) Place the carpet under driver seat in a suitable position.

(16) Install the negative battery cable.

(17) Press ENGINE START STOP switch, perform four-wheel alignment and perform running test.

7.7 DP-STEERING GEAR

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) To replace steering gear, it is necessary to perform four-wheel alignment and center calibration.

(2) After four-wheel alignment, it is necessary to recalibrate center calibration.

(3) When removing and installing steering gear, it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

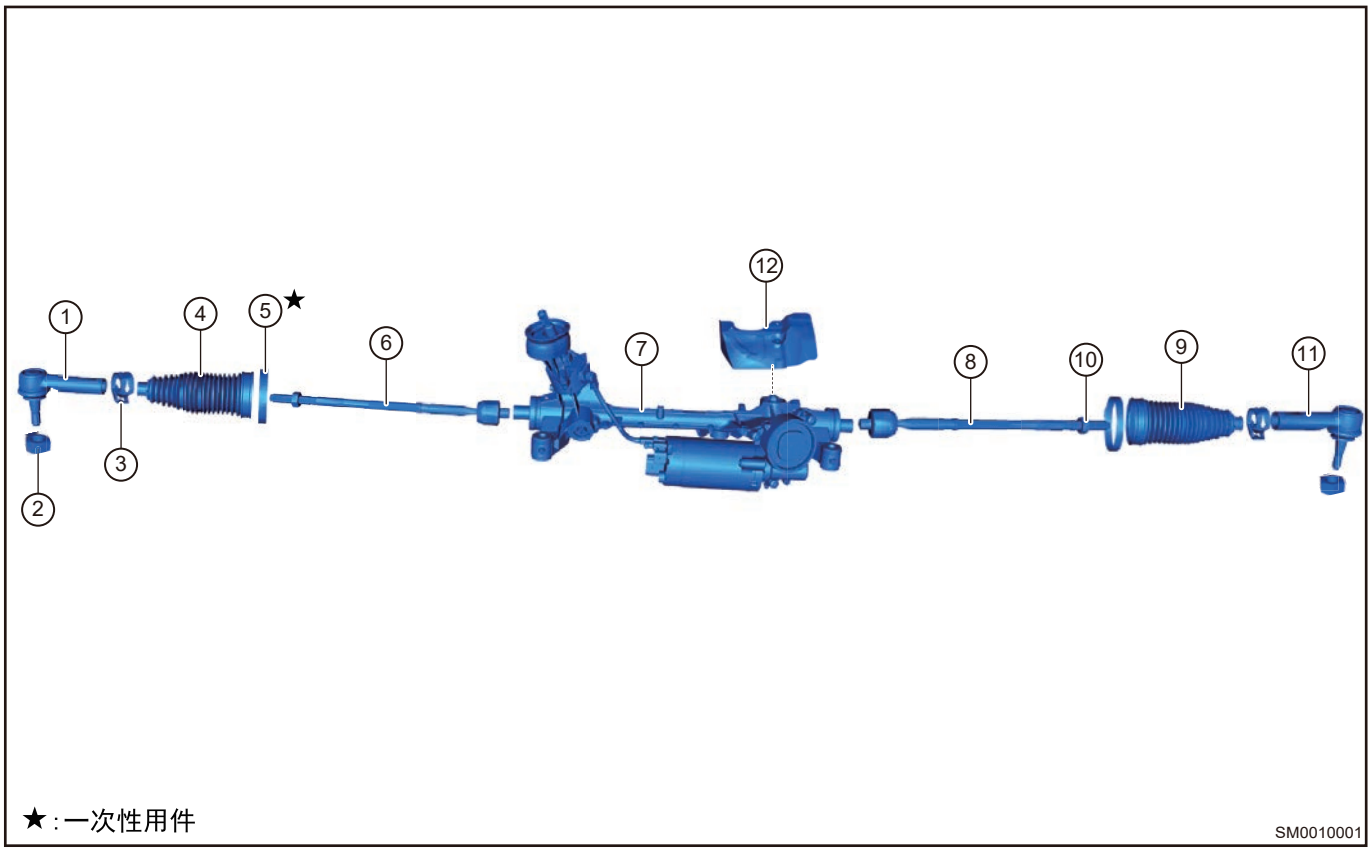
(4) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 System Description

This vehicle adopts the electronic power steering system, which can reduce the workload when driver operates the steering wheel, thus improving operation convenience and driving safety.

2.2 System Components Diagram



1	Left Steering Tie Rod Ball Pin	7	Steering Gear Body
2	Steering Tie Rod Ball Pin Locking Nut	8	Right Steering Tie Rod Assembly
3	Steel Belt Clamp	9	Right Steering Tie Rod Boot

4	Left Steering Tie Rod Boot	10	Steering Tie Rod Fixing Nut
5	Steel Belt Elastic Clamp	11	Right Steering Tie Rod Ball Pin
6	Left Steering Tie Rod Assembly	12	Steering Gear Heat Insulator

3 On-vehicle Service

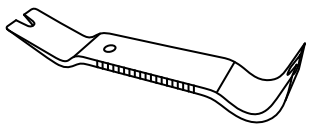
3.1 Fasteners Torque List

■ Torque Specifications

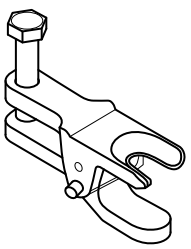
Item	Tightening torque
Fixing Bolt between Electric Steering Column with Intermediate Shaft Assembly and Steering Gear	55 ± 5 N·m
Tightening Bolt between Steering Gear and Steering Knuckle	60 ± 6 N·m
Tightening Bolt between Steering Gear and Sub Frame	180 ± 18 N·m
Tightening Bolt of Steering Gear Inner and Outer Tie Rod	55 ± 5 N·m
Tightening Bolt between Steering Gear and Heat Insulator	9 ± 1.5 N·m

3.2 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

■ Special Tools

Tool Name	Tool Drawing
Ball Separator	 S00019

3.3 Replace steering gear assembly

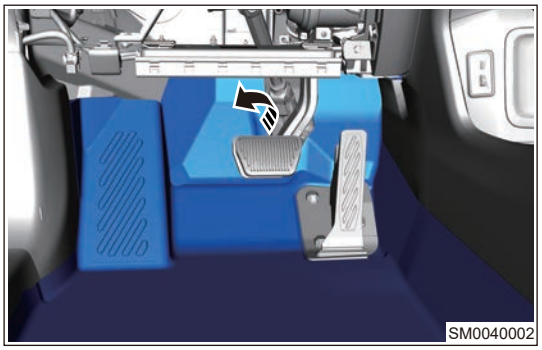
■ Removal

(1) Set the steering wheel to straight-ahead position.

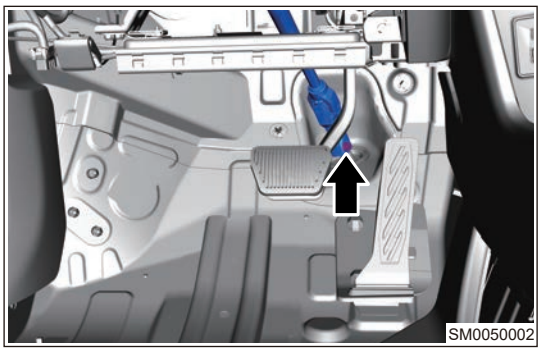
(2) Turn off all electrical equipment and ENGINE START STOP switch.

(3) Disconnect the negative battery cable.

(4) Turn over carpet under driver seat in the direction of arrow.


SM0040002

(5) Remove the coupling bolt (arrow) between steering column with intermediate shaft assembly and steering gear input shaft.


SM0050002

(6) Remove front left and front right wheels.

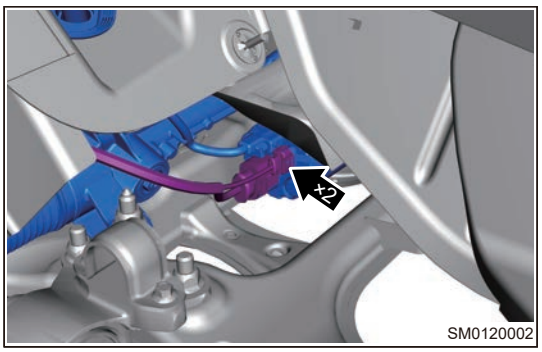
(7) Remove the engine lower protector assembly.

(8) Remove left and right side rail assembly.

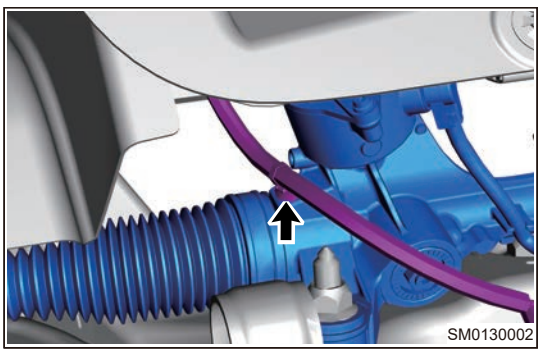
(9) Remove front left and front right control arm assemblies.

(10) Remove the rear mounting cushion assembly.

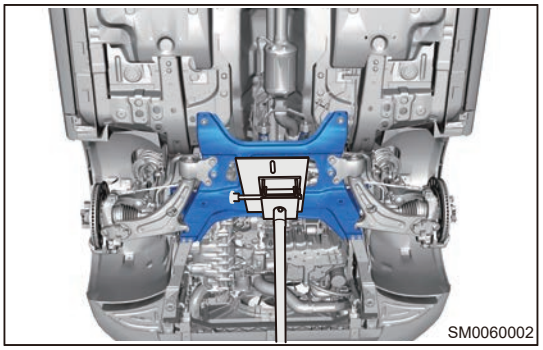
(11) Disconnect the wire harness connector (arrow) from DP steering gear.


SM0120002

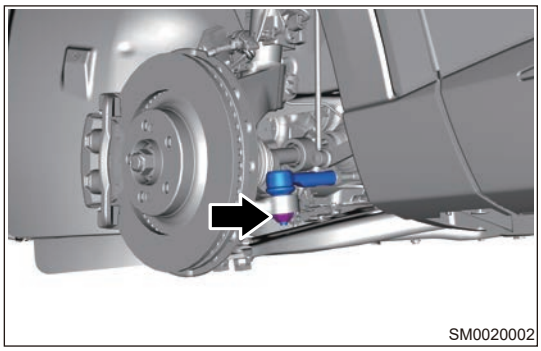
(12) Detach fixing clip (arrow) from DP steering gear upper wire harness.


SM0130002

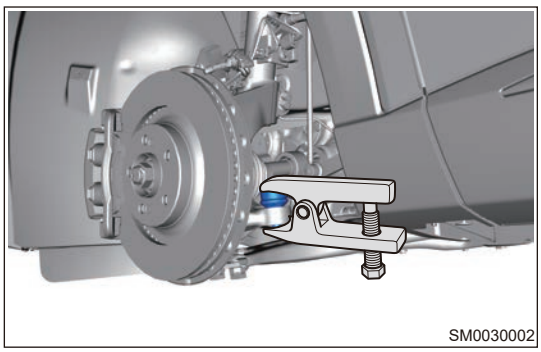
(13) Using a transmission carrier, support front sub frame welding assembly.



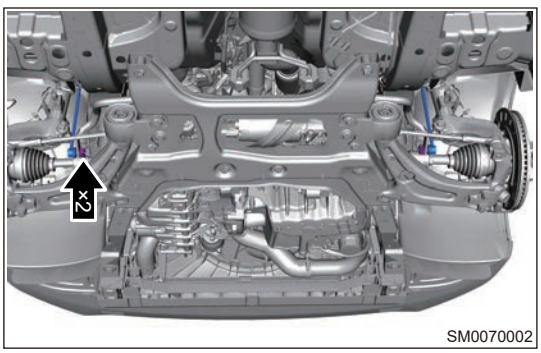
(14) Remove locking nut (arrow) between left steering tie rod ball pin assembly and front left steering knuckle assembly (the right side is same as left side).



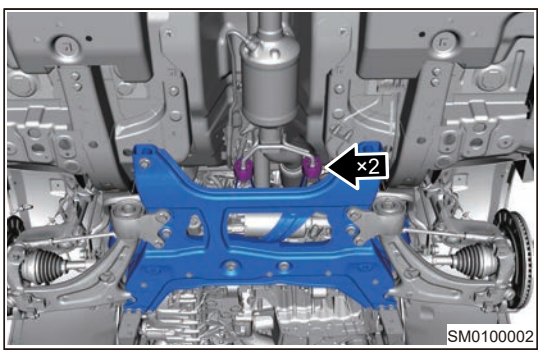
(15) Install ball pin separator, and separate steering tie rod ball pin from steering knuckle assembly.



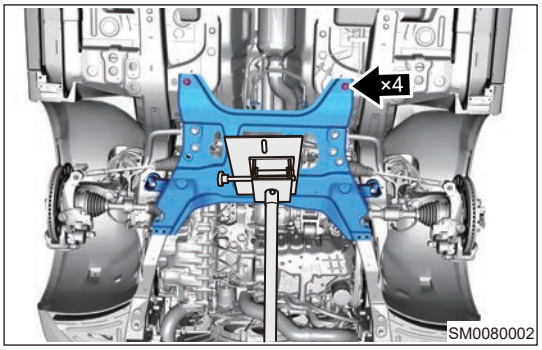
(16) Remove 2 locking nuts (arrow) between front connecting rod and front stabilizer bar.



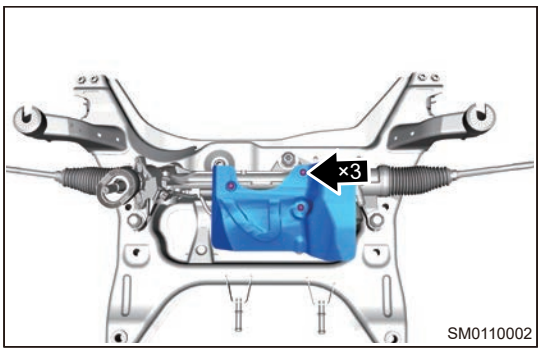
(17) Detach exhaust pipe fixing rubber lugs (arrow) from front sub frame welding assembly.



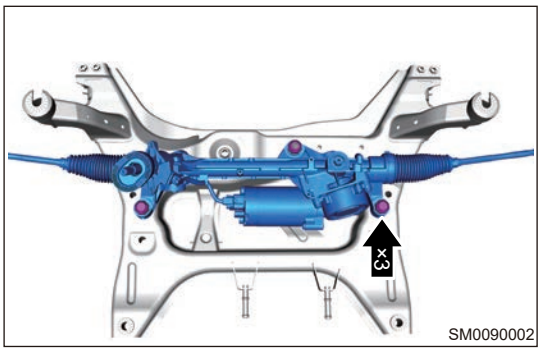
(18) Remove 4 fixing bolts (arrow) between front sub frame and vehicle body, and lower front sub frame slowly.



(19) Remove 3 fixing bolts and steering gear heat insulator.



(20) Remove 3 fixing bolts (arrow) that fix the steering gear with tie rod assembly from sub frame, and remove steering gear with tie rod assembly.



Hint:

- Check if steering gear dust boot is damaged, clamp is loose. Replace them if necessary to prevent water and micro dust from entering and causing parts failure prematurely.
- Check if steering gear is damaged. Replace the steering gear assembly if necessary.

■ Installation

(1) Install steering gear with tie rod assembly to sub frame.

(2) Install 3 fixing bolts fixing steering gear with tie rod assembly to sub frame.

Torque: 180 ± 18 N·m

(3) Install 3 fixing bolts to steering gear lower heat insulator.

Torque: 9 ± 1.5 N·m

(4) Slowly raise sub frame to a proper position and install 4 fixing bolts between sub frame and vehicle body.

Torque: 180 ± 18 N·m

(5) Separate transmission carrier from front sub frame welding assembly.

(6) Install DP-steering gear wire harness.

(7) Install 2 hanger blocks to front sub frame assembly.

(8) Install steering tie rod ball pin to steering knuckle assembly.

(9) Install locking nut between left steering tie rod ball pin assembly and front left steering knuckle assembly (the right side is same as left side).

Torque: 60 ± 6 N·m

(10) Install the rear mounting lower body.

(11) Install front left and front right control arm assemblies.

(12) Install left and right welding side rail assembly.

(13) Install the engine compartment lower protector assembly.

(14) Install front left and front right wheels.

(15) Install coupling bolt between steering column with intermediate shaft assembly and steering gear input shaft.

Torque: 55 ± 5 N·m

(16) Place the carpet under driver seat in a suitable position.

(17) Install the negative battery cable.

(18) Press ENGINE START STOP switch, perform four-wheel alignment and perform running test.

7.8 FOUR-WHEEL ALIGNMENT

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Be sure to perform wheel alignment procedures according to operating instructions of four-wheel alignment device.

(2) Periodic maintenance and service for four-wheel alignment device should be performed.

(3) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to turn off power supply of EPS (vehicle power supply is turned off), so as to avoid reverse impact, resulting in EPS internal protection circuit breakdown.

2 System Overview

2.1 Wheel Alignment

In general, wheel alignment has the following 6 parameters;

(1) Check the front wheel camber.

(2) Check the front wheel toe-in.

(3) Check the kingpin caster.

(4) Check the kingpin inclination.

(5) Check the rear wheel camber.

(6) Check the rear wheel toe-in.

3 Parameter Operation Description

3.1 Kingpin Caster

■ Main Functions

Looking at wheel from side, steering kingpin (the center of rotation when the wheel turns) tilts backward, which is called kingpin caster. After setting kingpin caster, there is a distance (called kingpin caster distance, which has the same principle with that of front wheel cross beam of bicycle tilting backward) between ground point of kingpin center line and ground projection point of wheel center. The ground point of wheel is located at rear end of extension line of steering kingpin, and wheel is pulled backward by rolling resistance during driving, so that the direction of wheel is naturally toward driving direction. Setting a large kingpin caster can improve straight line driving performance, and kingpin caster distance is also increased. If kingpin caster distance is too large, steering wheel will be heavy and wheel bumps will be increased due to road interference.

3.2 Kingpin Inclination

■ Main Functions

When looking at the tire from front and rear direction of vehicle, kingpin is inclined toward the inside of vehicle body. This angle is called kingpin inclination. When wheel turns around kingpin, the lowest point of wheel will fall below road surface, but in fact, the lower edge of wheel cannot fall below road surface. Instead, the steering vehicle wheel and entire front of vehicle are lifted up to a corresponding height. The gravity of vehicle has effect of returning steering vehicle wheels to original middle position, so steering wheel is easy to reset. In addition, kingpin inclination also reduces the distance between intersection of kingpin and road to intersection of wheel center plane and ground, thereby reducing driver's force on steering wheel during steering, making steering easier and reducing the impact force transmitted from steering vehicle wheel to steering wheel. However, kingpin inclination should not be too large, otherwise it will accelerate tire wear.

3.3 Front Wheel Camber

■ Main Functions

When looking at wheel from front and rear direction, tires are not installed vertically, but slightly tilted to show an "/\" shape, which is called negative camber, and when it is tilted in opposite direction, it is called positive

camber. In heyday of using bias tires, camber was set to be relatively large because it made it easier to operate the steering wheel by tilting the tires to the ground. Vehicle generally sets camber to be very small, close to vertical. The use of flat radial tires for automobiles continues to grow in popularity. Due to characteristics of radial tires (large rigid tire tread pattern and wide outer tread), setting a large camber will cause tire to wear out and reduce tire friction. Also, due to continuous use of power steering mechanism, camber has been continuously reduced. Nevertheless, setting a small camber can apply appropriate lateral thrust to wheel bearings on axle.

3.4 Front Wheel Toe-in

■ Main Functions

Four-wheel alignment toe value
Toe-in, the so-called "pigeon toe", refers to the front left and front right wheels being pointed inward respectively. The purpose of adopting this structure is to correct outward rotation of wheel caused by front wheel camber. As mentioned above, due to camber, the steering wheel operation becomes more easy. On the other hand, due to the tilt of wheels, front left and front right wheels rotate to outside respectively. To correct this problem, the left and right wheels have an inward angle, thus left and right wheels can keep moving in a straight line and reducing tire wear.

4 Fasteners Torque List

4.1 Torque Specifications

Item	Tightening torque
Steering Tie Rod Locking Nut	55 ± 5 N·m
Steering Wheel Locking Nut	30 ± 3 N·m
Coupling Bolt Between Rear Upper Control Arm Assembly and Rear Sub Frame Welding Assembly	130 ± 13 N·m
Coupling Bolt Between Rear Lower Control Arm Assembly and Rear Sub Frame Welding Assembly	130 ± 13 N·m

5 Diagnostic Information and Steps

5.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair or adjust faulty components, or replace it as necessary.

Symptom	Suspected Area
Vehicle pulls	Front wheel alignment (incorrect)
	Rear wheel alignment (incorrect)
Wheel shimmy	Front wheel alignment (incorrect)
	Rear wheel alignment (incorrect)
Abnormal tire wear	Tire (worn or improperly inflated)
	Front wheel alignment (incorrect)
	Rear wheel alignment (incorrect)

5.2 Inspection and Adjustment

■ Inspection before Wheel Alignment

If following components have been removed, installed or replaced, check and perform wheel alignment procedures:

- Front control arm assembly

- Front control arm ball pin assembly
- Front Steering Knuckle
- Front shock absorber assembly
- Steering gear and steering tie rod
- Drive shaft
- Front sub frame welding assembly
- Rear Sub Frame Welding Assembly

(1) Vehicle is in unloaded state.

(2) Use a lift to support and raise vehicle to a proper height.

(3) Check hub bearing for excessive clearance, and replace hub bearing as necessary.

(4) Check suspension components, steering tie rod and ball pin for wear, deformation or damage. Replace malfunctioning parts as necessary.

(5) Check shock absorber assembly for proper operation.

(6) Check if tire pressure is within specified range and adjust it to specified pressure as necessary.
Check if tire pressure is within the specified range and adjust it to specified pressure as necessary.

Items	Front Wheel	Rear Wheel	Spare Tire
Tire pressure (kPa) (unloaded)	230	230	420

(7) Check the rim and tire.

1)Visually check rim and tire for scratches, wear or damage.
2)Perform wheel dynamic balance procedures.

■ Front Wheel Camber

(1) Incorrect front wheel camber will cause abnormal tire wear. Check and adjust front wheel camber as necessary.
In normal conditions, it is not necessary to adjust camber after assembling the independent suspension and wheel steering knuckle.
If wheel camber is not within the tolerance due to other reasons, adjust through the coupling bolt between independent suspension and steering knuckle. Specified value for front wheel camber:

Items	Parameters
Front Wheel Camber	-0°30′ ±45′

■ Inspection

(1) Visually check driving system components for deformation and damage before adjustment. Replace deformed or damaged components as necessary.

(2) Install wheel alignment device onto front wheel, and perform inspection procedures according to operating instructions for wheel alignment device.

■ Front Wheel Toe-in

(1) Incorrect front wheel toe-in will cause wheel pull and abnormal tire wear. Check and adjust front wheel toe-in as necessary.
If front wheel toe-in is not within the tolerance due to other reasons, adjust the length of steering tie rod to return the toe-in to specified value. Specified Value for Front Wheel Toe-in:

Items	Parameters
Front Wheel Toe-in	5′ ±5′

■ Inspection

(1) Perform inspection with four-wheel alignment device (perform inspection procedures referring to operating instructions for four-wheel alignment device).

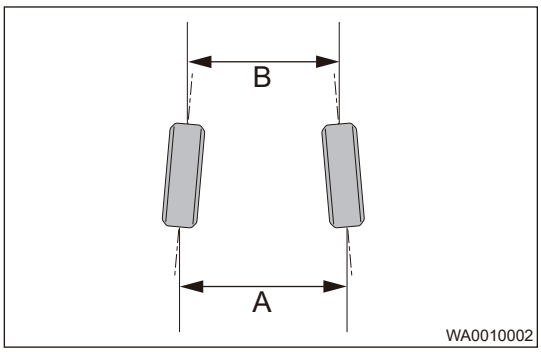
(2) Manual check:

4) Park vehicle on level ground, check if front tire pressure is within the specified range and adjust it to specified value as necessary.

5) Place marks on center position in front of front wheels, and measure distance A between marks with a tape measure.

6) Push vehicle to rotate wheels 180°, and measure distance B between marks with a tape measure when marks are turned to rear of wheels.

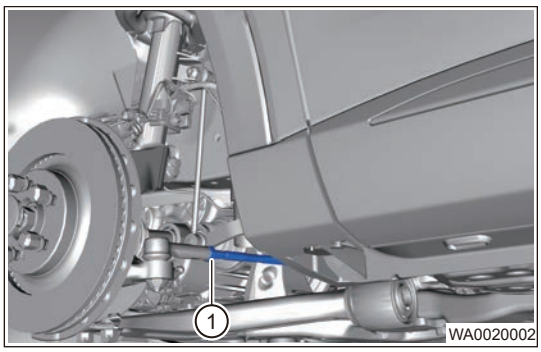
7) Calculation method: Front wheel toe-in = A - B ⩽ 1 mm



■ Adjustment

(1) Make adjusting preparation for wheel alignment according to requirement of tester.

(2) Loosen the locking nut (1) of steering tie rod, and turn the tie rod to adjust the length as required until front wheel toe-in reaches the specified value.



(3) Tighten the steering tie rod locking nut and reinstall the elastic jacket snap ring. Check if locking nut is tightened in place and if jacket position is correct.

Torque: 55 ± 5 N·m

⚠ Caution
If elasticity of elastic jacket snap ring is not enough, replace it.

(4) After adjusting front wheel toe-in, check steering wheel for eccentricity. If necessary, loosen the steering wheel locking nut and adjust the steering wheel to horizontal position, and then tighten the steering wheel locking nut to specified torque.

Torque: 30 ± 3 N·m

■ Kingpin Caster & Kingpin Inclination

(1) Kingpin caster and kingpin inclination can only be checked by using four-wheel alignment device.
Kingpin caster and kingpin inclination are assured by design structure and cannot be adjusted.
If measured value is not within the specified range, check if other components connected to steering knuckle are deformed or damaged.
In addition, check the connecting part of steering knuckle for deformation or damage.
If so, replace corresponding components. Specified Value for Kingpin Caster & Kingpin Inclination:

Items	Parameters
Kingpin Caster	6°21′ ±45′
Kingpin Inclination	12°52′ ±45′

■ Rear Wheel Camber

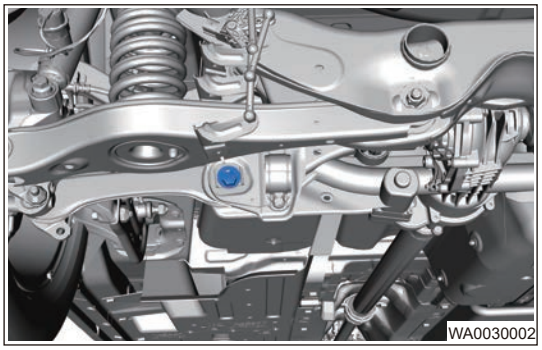
(1) Incorrect rear wheel camber will cause wheel pull and abnormal tire wear. Check and adjust rear wheel camber as necessary.
If rear wheel camber is not within the tolerance due to other reasons, adjust eccentric adjusting bolt and eccentric adjusting shim between tie rod assembly and rear sub frame welding assembly to return the toe-in to specified value. If rear wheel camber is not as specified, check rear suspension and wheels for damage or deformation. Replace damaged or deformed components as necessary.
Specified Value for Rear Wheel Camber:

Items	Parameters
Rear Wheel Camber	-0°40′ ±30′

■ Adjustment

(1) Make adjusting preparation for wheel alignment according to requirement of tester.

(2) Loosen the coupling bolts between tie rod assembly and rear sub frame assembly, be careful that eccentric adjusting shim does not detach from groove.



(3) Rotate the eccentric adjusting shim and eccentric adjusting bolt to adjust rear wheel camber to specified value.

(4) Tighten the coupling bolts between tie rod assembly and rear sub frame welding assembly to specified torque after adjustment (adjusting method of left and right wheels is the same).

Torque: 130 ± 13 N·m

■ Rear Wheel Toe-in

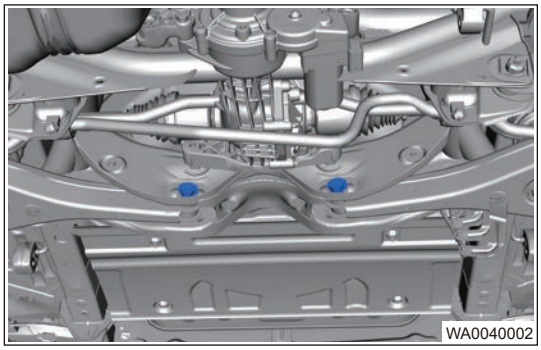
(1) Incorrect rear wheel toe-in will cause wheel pull and abnormal tire wear. Check and adjust rear wheel toe-in as necessary.
If rear wheel toe-in is not within the tolerance due to other reasons, adjust eccentric adjusting bolt and eccentric adjusting shim between rear lower control arm assembly and rear sub frame welding assembly to return the toe-in to specified value.
If rear wheel toe-in is not as specified, check rear suspension and wheels for damage or deformation. Replace damaged or deformed components as necessary.
Specified Value for Rear Wheel Toe-in:

Items	Parameters
Rear Wheel Toe-in	6′ ±5′

■ Adjustment

(1) Make adjusting preparation for wheel alignment according to requirement of tester.

(2) Loosen the coupling bolts between rear lower control arm assembly and rear sub frame welding assembly, be careful that eccentric adjusting shim does not detach from groove.



(3) Rotate the eccentric adjusting bolt and eccentric adjusting sleeve to adjust rear wheel toe-in to specified value.

(4) Tighten the coupling bolt between rear lower control arm assembly and rear sub frame welding assembly to specified torque after adjustment (adjusting method of left and right wheels is the same).

Torque: 130 ± 13 N·m

6 Four-wheel alignment parameters

6.1 Specifications (Parameters Standard for Four-wheel Alignment)

Items		Specified Value
Front Wheel	Front Wheel Camber	-0°30′ ± 45′
	Kingpin Caster	6°21′ ± 45′
	Kingpin Inclination	12°52′ ± 45′
	Front Wheel Toe-in	5′ ± 5′
Rear Wheel	Rear Wheel Camber	-0°40′ ± 30′
	Rear Wheel Toe-in	6′ ± 5′

AIR CONDITIONING SYSTEM

8.1 AIR CONDITIONING CONTROL SYSTEM

1 Warnings and Precautions

1.1 Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Take extra care when servicing A/C system under high pressure.

(2) Because there is refrigerant under high pressure in A/C system. It must be serviced by professional technician. Otherwise, a wrong service procedure may cause a serious danger or fatal injury.

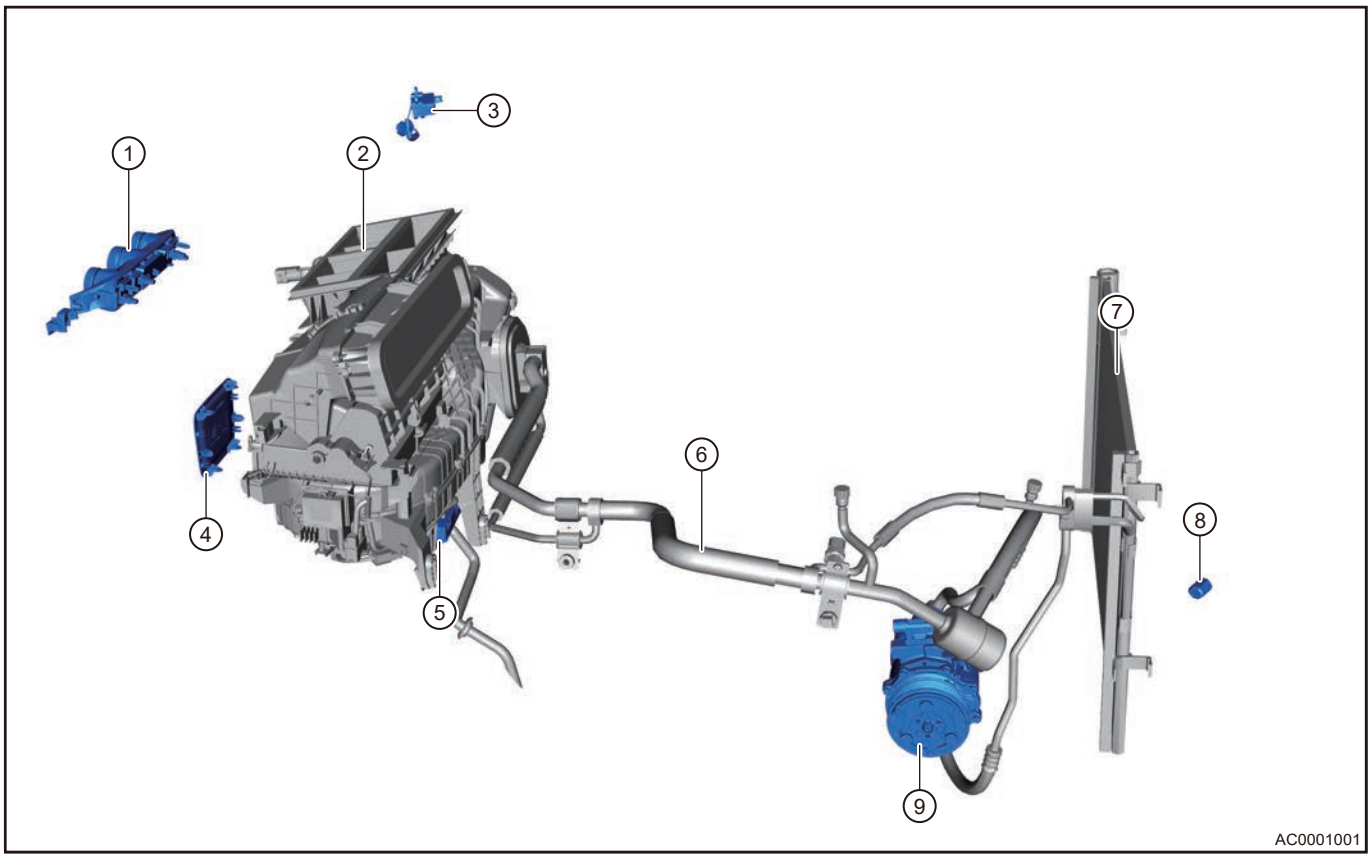
(3) If A/C system pressure is released unexpectedly, ventilate work area before servicing. In a closed work place, if a large amount of refrigerant is discharged, it may cause oxygen reduction and result in smothering, causing a serious or fatal injury.

2 System Overview

2.1 System Description

Air conditioning and distribution system: Air mixing and distributor part of HVAC, inner/outer circulation inlet, outlet and air filter. Control system: Automatic A/C control module, Automatic A/C control panel assembly, left/right mix damper motor, mode damper motor, inner/outer circulation motor, blower, blower speed regulation module, A/C pressure switch and evaporator temperature sensor as well as inside and outside PM2.5 sensors and air quality sensor for high-configuration automatic air conditioning.
Heating system: Heater core assembly, heating inlet hose, heating outlet hose and engine cooling circulation system.
Refrigerating system: Compressor assembly, condenser assembly, expansion valve, evaporator core assembly and A/C high and low pressure lines.

2.2 System Components Diagram



1	Automatic A/C Control Panel Assembly	6	A/C Line Assembly
2	Automatic HVAC Assembly	7	Condenser Assembly
3	Anion Generator	8	Outside Temperature Sensor Assembly
4	Fragrance Block Cover	9	A/C Compressor Assembly
5	Automatic A/C Control Module		

2.3 A/C System Function Description

■ Blower Advanced ON Function

Conditions for blower advanced ON for 30 seconds:

(1) Outside temperature is higher than 20°C

(2) Battery voltage is higher than 12.5 V

(3) Vehicle fortifying is released

Stopping conditions for blower advanced ON function:

(1) Blower advanced ON operates for more than 30 seconds

(2) Open any door

(3) Vehicle Fortifying

■ Blower Delay OFF Function

Enabling conditions for blower delay OFF function:

(1) A/C was turned on during the last driving

(2) Battery voltage is higher than 12.5 V

(3) Blower starts to operate for 1 minute and then stops after vehicle enters fortifying mode for more than 5 minutes

■ PM2.5 Function

Inside air is repeatedly purified by an efficient A/C element. If the interior environment quality is poor, system will give corresponding prompts. Operate according to the prompts, press PM2.5 button, and the air purification function will be turned on.
Disabled conditions for purification function:

(1) Outside temperature is lower than 2°C, room temperature is lower than 15°C, and engine coolant temperature is lower than 70°C

(2) Front defroster is turned on

(3) Wiper is turned on for more than 30 seconds

■ Anion Function

Anion function and one-button purification function are turned on at the same time.
Purification process of anion: The activated charged anion has a strong adsorption and decomposition effect, which makes PM2.5 and other particles fall and settle down. At the same time, it decomposes harmful viruses and bacteria to make them lose vitality and become nourishing water molecules, so as to achieve the purpose of air purification.

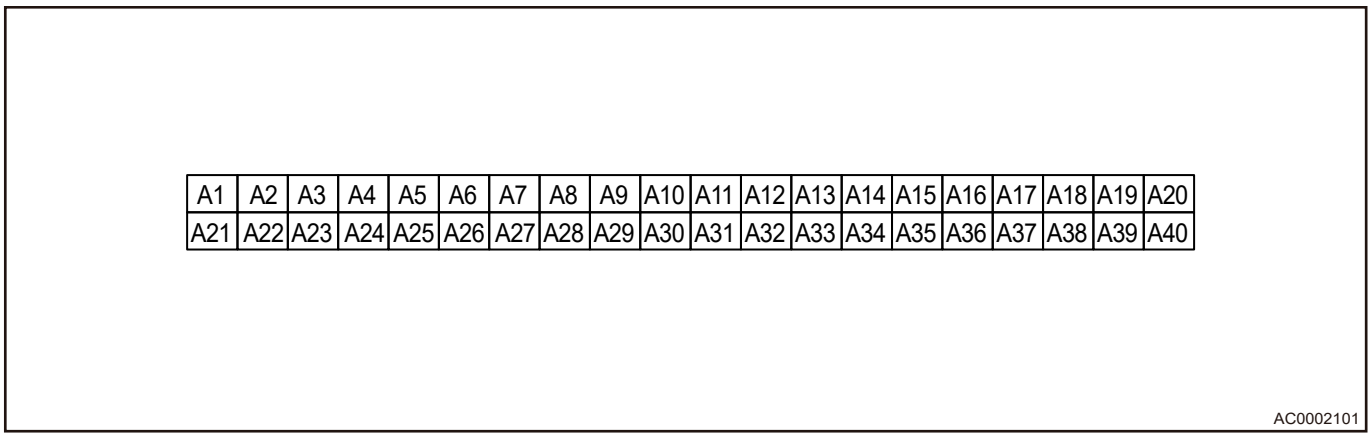
■ Automatic Defogging Function

After the automatic defogging function is turned on, the air conditioning will automatically remove the fog from front windshield when a fogging risk is collected on front windshield to ensure the driving safety.

3 Circuit Diagram

3.1 Module Terminal Definition

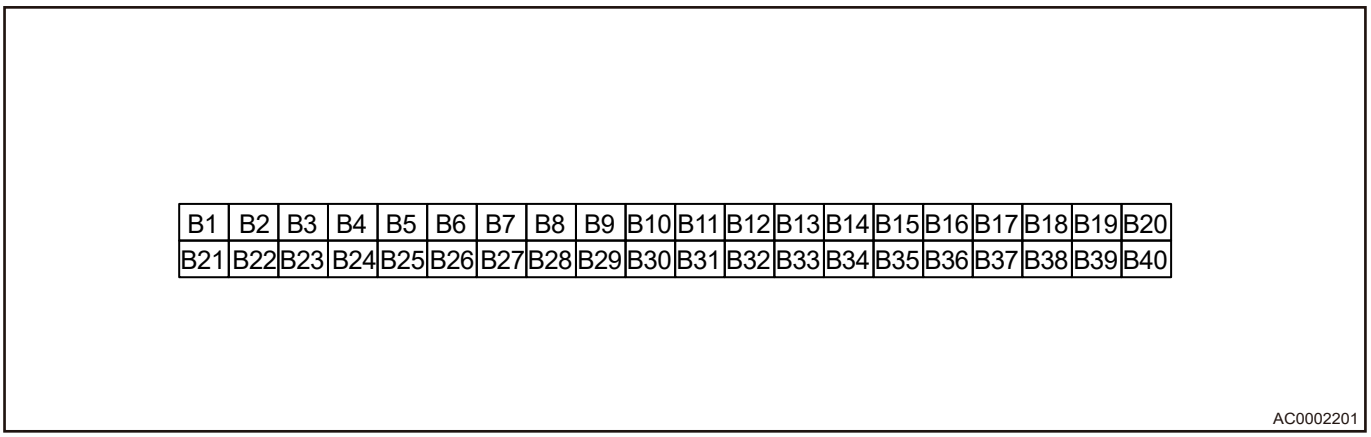
Automatic A/C module A



Pin	Definition	Pin	Definition
A1	Left Mix Damper Motor P1	A2	Left Mix Damper Motor P4
A3	Left Mix Damper Motor P3	A4	Right Mix Damper Motor P2
A5	Right Mix Damper Motor P1	A6	Right Mix Damper Motor P4
A7	Right Mix Damper Motor P3	A8	Blower Relay
A9	AQS Signal	A10	CAN-H
A11	CAN-L	A12	Ignition Signal
A13	Mode Damper Motor P2	A14	Mode Damper Motor P1
A15	Mode Damper Motor P4	A16	Mode Damper Motor P3
A17	Inner/Outer Circulation Motor P4	A18	Inner/Outer Circulation Motor P3
A19	Inner/Outer Circulation Motor P2	A20	Inner/Outer Circulation Motor P1
A21	Ground	A22	Sensor Ground
A23	-	A24	-
A25	-	A26	PM2.5 Sensor 2 Signal
A27	Air Outlet Temperature Sensor	A28	Evaporator Temperature Sensor+
A29	Outside Temperature Sensor+	A30	PM2.5 Sensor 1 Signal
A31	Left Foot Outlet	A32	Feedback Signal
A33	Blower Speed Control	A34	Right Foot Outlet
A35	-	A36	Sensor Power Supply
A37	KL30 power supply	A38	Compressor External Control Valve Drive +
A39	Compressor External Control Valve Drive -	A40	Left Mix Damper Motor P2

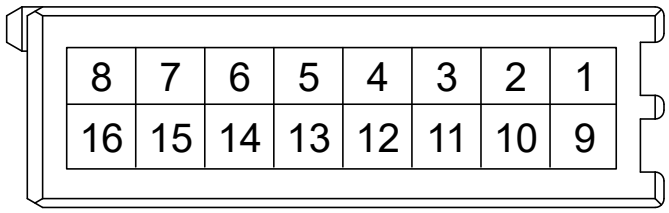
Automatic A/C Module B

B1	B2	B3	B4	B5	B6	B7	B8	B9	B10	B11	B12	B13	B14	B15	B16	B17	B18	B19	B20
B21	B22	B23	B24	B25	B26	B27	B28	B29	B30	B31	B32	B33	B34	B35	B36	B37	B38	B39	B40



Pin	Definition	Pin	Definition
B1	-	B2	-
B3	-	B4	-
B5	-	B6	-
B7	-	B8	-
B9	-	B10	-
B11	-	B12	-
B13	-	B14	Second Row Blower Control Signal
B15	Second Row Blower Relay	B16	Second Row Blower Speed Control
B17	Second Row Blower Feedback Signal	B18	-
B19	-	B20	Anion Enable Signal
B21	-	B22	-
B23	-	B24	-
B25	LIN Signal	B26	-
B27	-	B28	-
B29	PTC1	B30	-
B31	PTC2	B32	-
B33	Anion Signal	B34	-
B35	-	B36	-
B37	-	B38	-
B39	-	B40	-

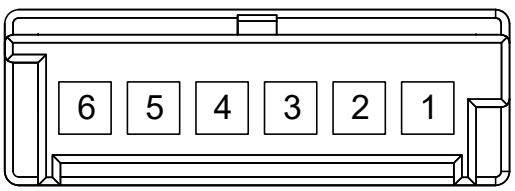
Front A/C Control Panel



AC0002301

Pin	Definition	Pin	Definition
1	-	2	-
3	Rear Defroster Feedback	4	B-CAN H
5	B-CAN L	6	-
7	Ground	8	KL15
9	-	10	-
11	-	12	-
13	-	14	-
15	-	16	KL30

Rear A/C Control Panel

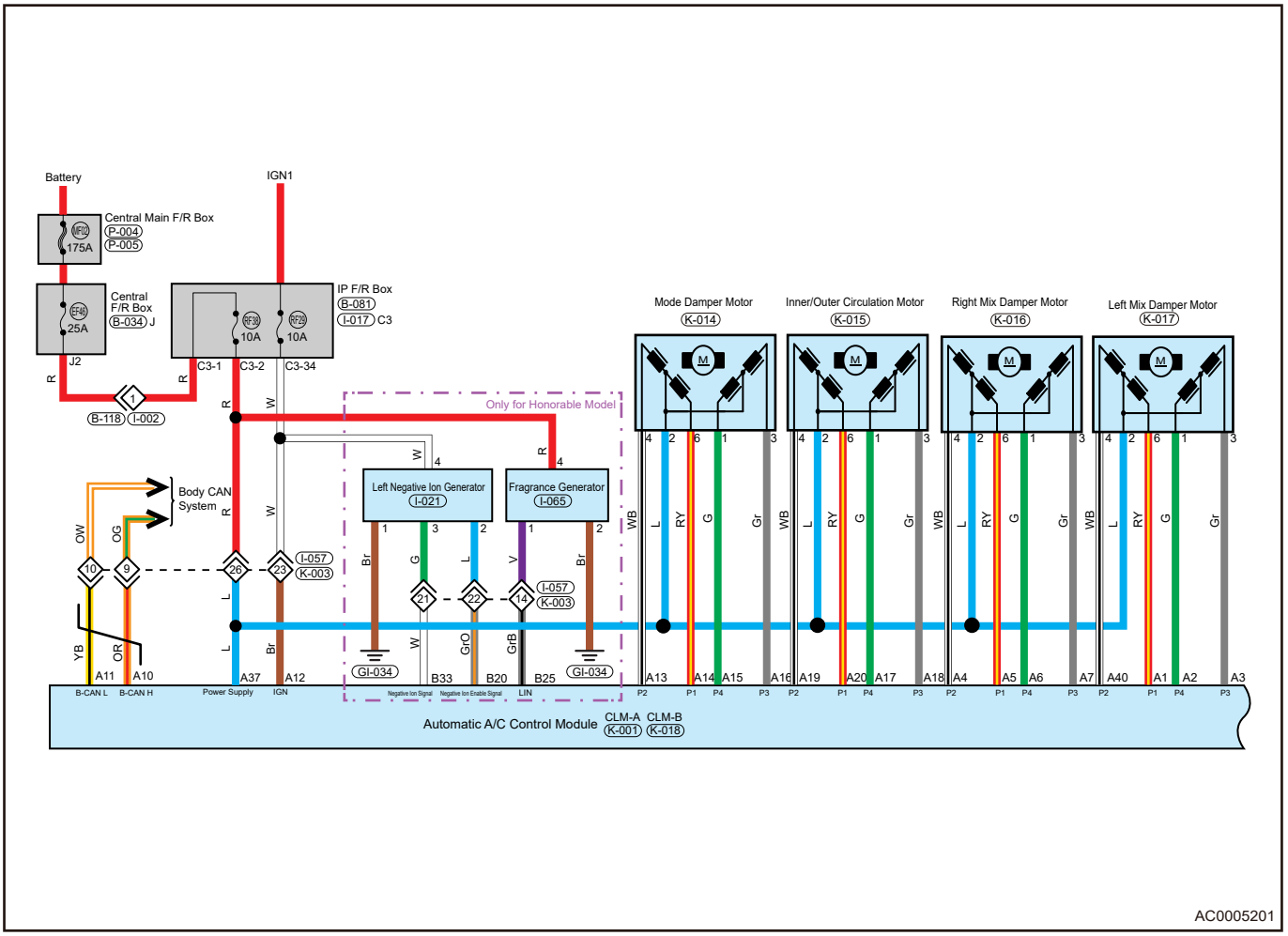


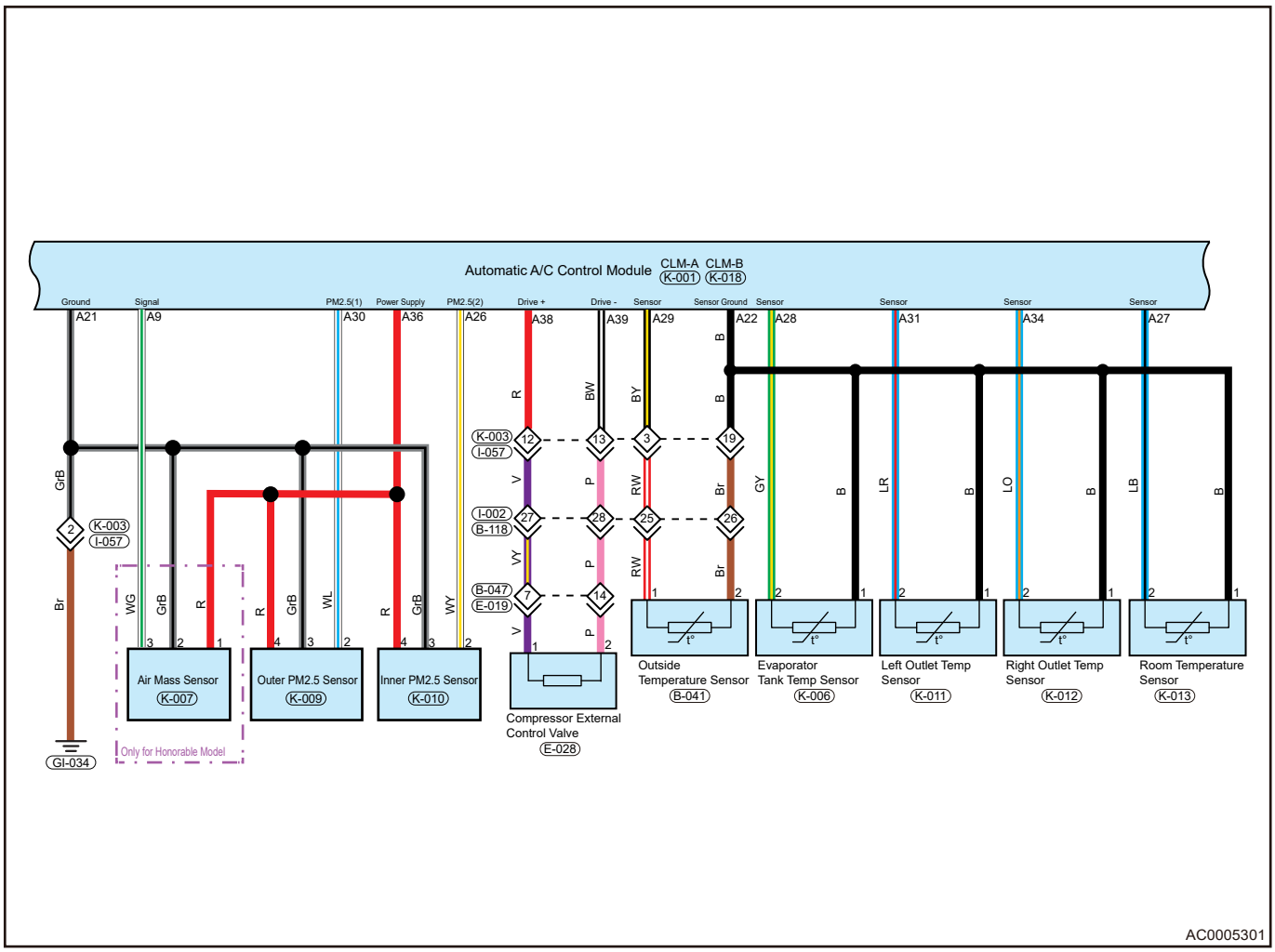
AC0002501

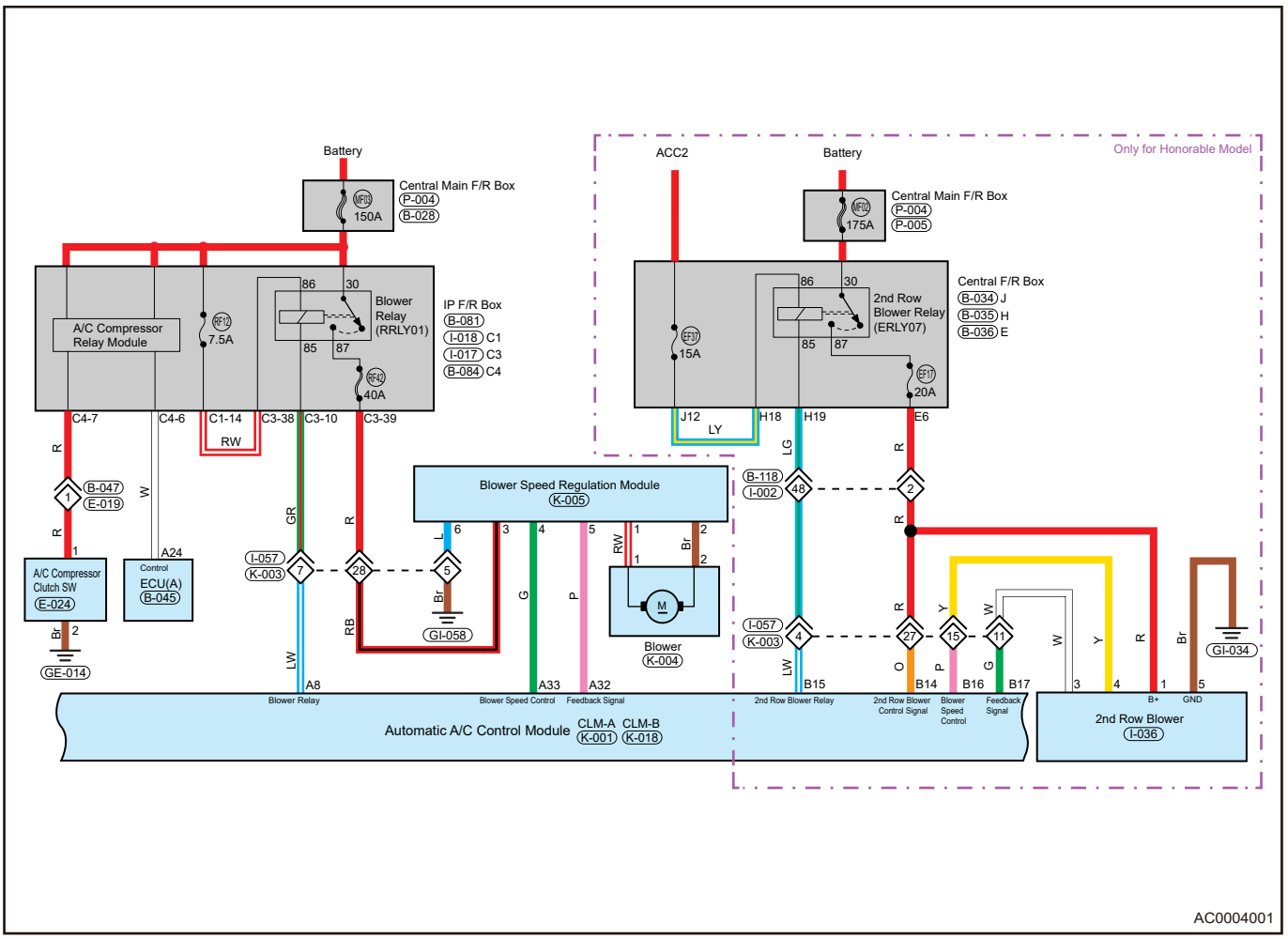
Pin	Definition	Pin	Definition
1	B-CAN H	2	B-CAN L
3	KL15	4	-
5	KL30	6	Ground

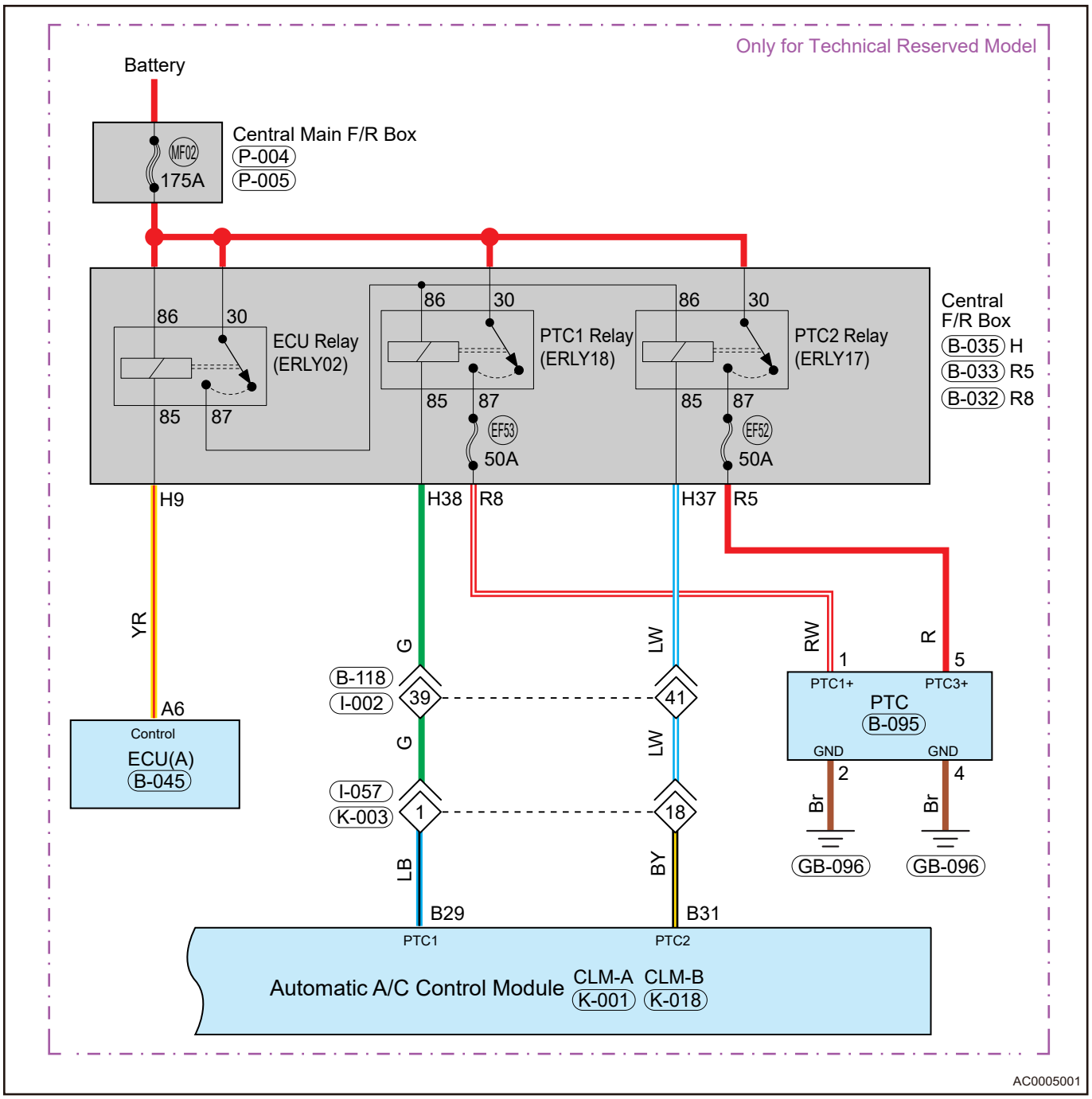
3.2 System Circuit Diagram

■ A/C Control Module

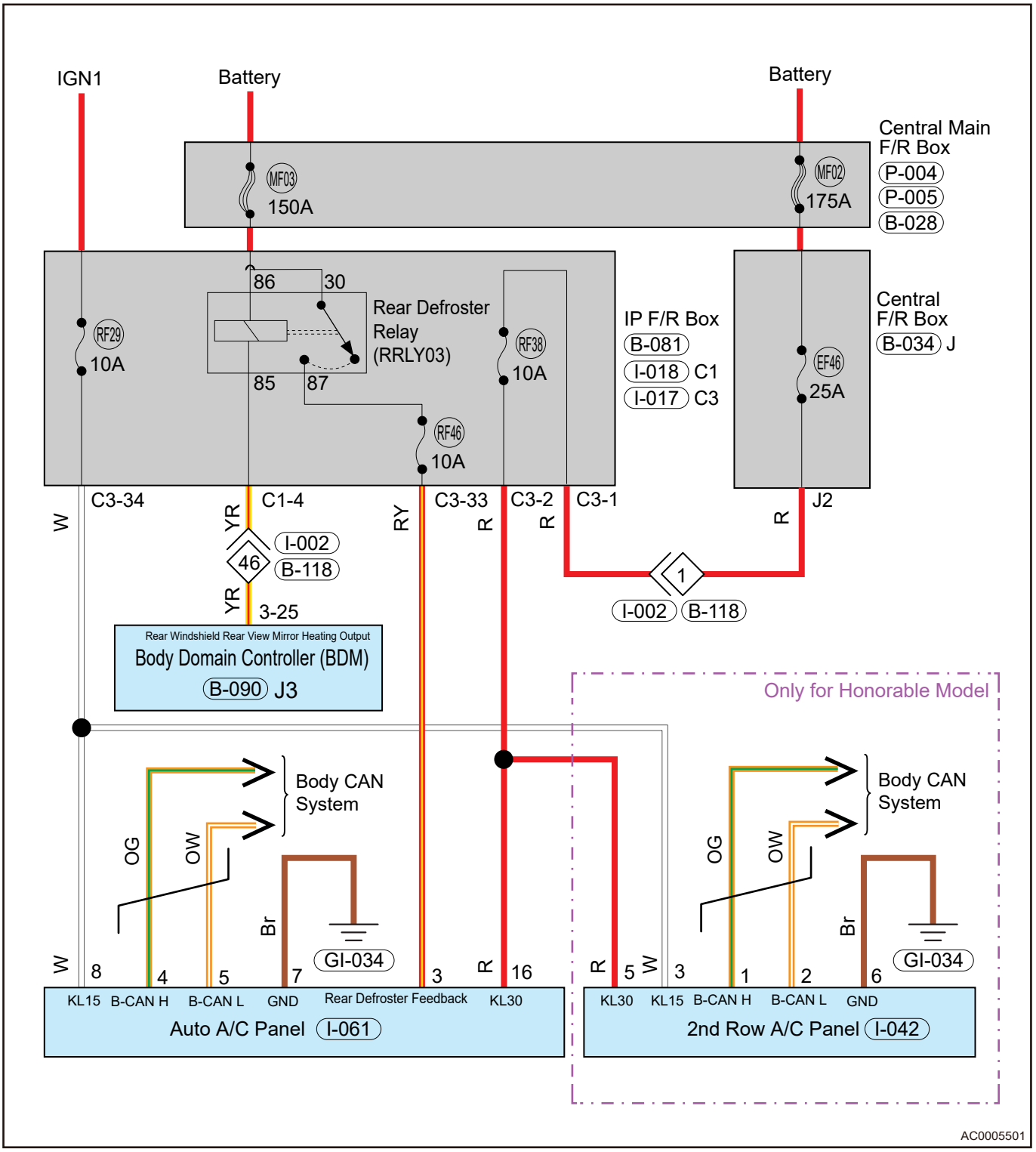



Automatic A/C Control Module
CLM-A K-001
CLM-B K-018
Ground
Signal
PM2.5(1)
Power Supply
PM2.5(2)
Drive +
Drive -
Sensor
Sensor Ground
Sensor
Sensor
Sensor
Sensor
A21
A9
A30
A36
A26
A38
A39
A29
A22
A28
A31
A34
A27
GrB
Br
WG
GrB
R
R
GrB
WL
R
GrB
WY
R
BW
BY
B
B
GY
B
LR
B
LO
B
LB
B
K-003
I-057
I-002
B-118
B-047
E-019
2
12
13
3
19
27
28
25
26
7
14
1
2
3
4
Air Mass Sensor
K-007
Outer PM2.5 Sensor
K-009
Inner PM2.5 Sensor
K-010
Compressor External Control Valve
E-028
Outside Temperature Sensor
B-041
Evaporator Tank Temp Sensor
K-006
Left Outlet Temp Sensor
K-011
Right Outlet Temp Sensor
K-012
Room Temperature Sensor
K-013
GI-034
Only for Honorable Model
AC0005301


Battery
Central Main F/R Box
P-004
B-028
MF10
150A
A/C Compressor Relay Module
RF12
7.5A
86
30
Blower Relay (RRLY01)
85
87
RF42
40A
IP F/R Box
B-081
I-018 C1
I-017 C3
B-084 C4
C4-7
C4-6
C1-14
RW
C3-38
C3-10
C3-39
R
W
GR
R
B-047
E-019
1
A24
A/C Compressor Clutch SW
E-024
Control
ECU(A)
B-045
Br
2
GE-014
I-057
K-003
7
28
RB
LW
A8
Blower Relay
Blower Speed Regulation Module
K-005
6
3
4
5
L
Br
GI-058
G
A33
Blower Speed Control
P
A32
Feedback Signal
RW
1
2
Br
M
Blower
K-004
Automatic A/C Control Module
CLM-A
K-001
CLM-B
K-018
Only for Honorable Model
ACC2
Battery
Central Main F/R Box
P-004
P-005
MF12
175A
EF37
15A
86
30
2nd Row Blower Relay (ERLY07)
85
87
EF17
20A
Central F/R Box
B-034 J
B-035 H
B-036 E
J12
LY
H18
H19
E6
LG
R
B-118
I-002
48
2
I-057
K-003
4
27
15
11
O
P
G
Y
W
B14
B16
B17
LW
B15
2nd Row Blower Relay
2nd Row Blower Control Signal
Blower Speed Control
Feedback Signal
3
4
1
5
B+
GND
2nd Row Blower
I-036
GI-034
AC0004001


Only for Technical Reserved Model
Battery
MF02
175A
Central Main F/R Box
P-004
P-005
86
30
85
87
ECU Relay
(ERLY02)
PTC1 Relay
(ERLY18)
PTC2 Relay
(ERLY17)
EF53
50A
EF52
50A
Central
F/R Box
B-035 H
B-033 R5
B-032 R8
H9
H38
R8
H37
R5
YR
G
LW
RW
R
B-118
I-002
39
41
1
5
PTC1+
PTC3+
PTC
B-095
GND
GND
A6
Control
ECU(A)
B-045
I-057
K-003
1
18
2
4
Br
Br
GB-096
GB-096
LB
BY
B29
B31
PTC1
PTC2
Automatic A/C Control Module
CLM-A
K-001
CLM-B
K-018
AC0005001

■ **A/C Control Panel**



4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
A/C no heating	Blower fuse (damaged)
	Blower relay (damaged)
	Blower speed regulation switch (damaged)
	Blower motor (damaged)
	Mix damper control mechanism (stuck or damaged)
	Heating pipe (blocked or damaged)
	Heater core assembly (blocked or damaged)
	Wire harness or connector (open or short)
A/C no cooling	Leak in system
	Refrigerant (overcharged)
	A/C pressure switch (damaged)
	Evaporator temperature sensor (damaged)
	A/C switch (damaged)
	Compressor assembly fuse (damaged)
	Compressor assembly relay (damaged)
	Compressor assembly belt (loose)
	Compressor assembly (damaged)
	Condenser assembly (blocked or damaged)
	Expansion valve (blocked or frosted)
	Evaporator core assembly (blocked or damaged)
	Wire harness or connector (open or short)
A/C intermittent cooling	Moisture in system
	Refrigerant (overcharged)
A/C insufficient cooling	Leak in system
	Refrigerant (insufficient)
	Refrigerant (overcharged)
	Air in refrigerant
	Moisture in refrigerant
	Condenser (dirty or blocked)
	Expansion valve (dirty or blocked)
	Condenser core (dirty or blocked)
	A/C high/low pressure line (dirty or blocked)
	Blower speed regulation switch (damaged)

Symptom	Possible Cause
	Blower motor (damaged)
	Compressor assembly belt (loose)
Too much noise in system	Compressor assembly belt (slip)
	Compressor assembly clutch bearing (worn or excessive clearance)
	Compressor assembly solenoid coil (faulty or loose connector)
	Compressor assembly belt (over tightened)
	Compressor assembly mounting bolt (loose)
	Cooling fan blade (distorted)
	Refrigerant oil (insufficient)
During operation, pressure on low pressure side switches between normal and vacuum	Moisture in refrigerant (excessive)
Pressure is too low for low pressure side and high pressure side, cooling performance is insufficient	A/C system (leaked)
	Refrigerant (insufficient)
Pressures at low pressure side and high pressure side are low, frost exists on line from condenser to A/C unit	Condenser (dirty or blocked)
Vacuum occurs at low pressure side, and pressure at high pressure side is too low, frost exists on lines on both sides of condenser or expansion valve	Moisture in refrigerant (excessive)
	Expansion valve (dirty or blocked)
	A/C line (leaked)
	Condenser (dirty or blocked)
Pressure at low pressure side and pressure at high pressure side is too high	Expansion valve (faulty)
	Refrigerant oil (excessive)
Pressure at low pressure side is normal or slightly low, and pressure at high pressure side is too high	Condenser surface (dirty)
	Cooling fan (not operating)
	Refrigerant (overcharged)
	Air in refrigerant
	Engine (overheating)
Pressure at low pressure side is too high, and pressure at high pressure side is too low	Compressor assembly belt (slip)
	Compressor assembly (faulty)
Pressure at low pressure side is too low, and pressure at high pressure side is too high	A/C high pressure line (blocked)
	Expansion valve (faulty)

4.2 Diagnosis Tools

■ Digital Multimeter

When using digital multimeter:

- Troubleshoot electrical malfunctions and wire harness system.
- Look for basic malfunction.
- Measure voltage, current and resistance.

4.3 Diagnostic Help

- Connect diagnostic tester (the latest software) to diagnostic interface, and make it communicate with vehicle electronic module through data network.
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean all system grounds related to the latest DTCs.
- If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.4 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.5 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate the conditions under which DTC was reset.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect the mounting areas of related wire harness or wire harness connector and so on for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- Remove control module from malfunctioning vehicle, then install it to a new vehicle and perform a test. If DTC cannot be cleared, control module is malfunctioning. If DTC can be cleared, install control module to original vehicle again.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.6 Ground Inspection

Groundings are very important to entire circuit system, which are normal or not can seriously affect the entire circuit system. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) and oxidation may increase load resistance. This case will seriously affect normal operation of circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.

- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.7 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the air conditioning system.

1	**Vehicle brought to workshop**

Next

2	**Examine vehicle and check basic items**

Check system power supply voltage, and check that fuse, wire harness and connector are connected normally.

OK

Standard voltage: Not less than 12 V.

Result

NG → **Check and replace malfunctioning parts**

OK

3	**Using a diagnostic tester, read related DTC and data stream information**

Result

Result	Proceed to
No DTC	A
DTC occurs	B

A → **Perform troubleshooting procedure without DTCs according to malfunction symptom**

B

4	**Troubleshoot according to DTCs troubleshooting procedure**

Result

Result	Proceed to
Problem is not resolved	A
Problem is resolved	B

A → **Return to procedure 1 and troubleshoot the process again**

B

5	**According to air conditioning system malfunction repair completion inspection and delivery, confirm if malfunction is repaired**

Result

Result	Proceed to
Delivery inspection is failed	A
Delivery inspection is qualified	B

A

Return to procedure 1 and troubleshoot the process again

B

6	**Finished**

4.8 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Causes	Malfunction Protection Measures
B1404_11	Filtered Evaporator Temperature Circuit Short to Ground	CLM detects that sensor output voltage is equal to 0 V continually	• Short in temperature sensor itself • Short in connecting wire between CLM and temperature sensor • CLM internal malfunction	The sensor uses 6.8 K pull-up resistor to 5 V power supply. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1404_15	Filtered Evaporator Temperature Circuit Short to Battery or Open	CLM detects that sensor output voltage is equal to 5V continually	• Open in temperature sensor itself • Open in connecting wire between CLM and temperature sensor • CLM internal malfunction	The sensor uses 6.8 K pull-up resistor to 5 V power supply. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1409_11	Mode Motor Step Circuit Short to Ground	SPI data of step motor driver IC sent by MCU is different from	• Short to power supply in connecting wire • Short to power supply in step motor internal circuit	Integrated chip overcurrent protection

DTC	DTC Definition	Detection Condition	Possible Causes	Malfunction Protection Measures
		the returned data of step motor driver IC, and the returned data are not all 0	• Short to power supply in CLM internal circuit	
B1409_12	Mode Motor Step Circuit Short to Battery	SPI data of step motor driver IC sent by MCU is different from the returned data of step motor driver IC, and the returned data are all 0	• Open or short to ground in connecting wire • Open or short to ground in step motor internal circuit • Open or short to ground in CLM internal circuit	Integrated chip overcurrent protection
B1410_11	Rec Motor Step Circuit Short to Ground	SPI data of step motor driver IC sent by MCU is different from the returned data of step motor driver IC, and the returned data are all 0	• Open or short to ground in connecting wire • Open or short to ground in step motor internal circuit • Open or short to ground in CLM internal circuit	Integrated chip overcurrent protection
B1410_12	Rec Motor Step Circuit Short to Battery	SPI data of step motor driver IC sent by MCU is different from the returned data of step motor driver IC, and the returned data are all 0	• Short to power supply in connecting wire • Short to power supply in step motor internal circuit • Short to power supply in CLM internal circuit	Integrated chip overcurrent protection
B1414_11	Mix Flap Motor Step (Right Side) Circuit Short to Ground	SPI data of step motor driver IC sent by MCU is different from the returned data of step motor driver IC, and the returned data are all 0	• Open or short to ground in connecting wire • Open or short to ground in step motor internal circuit • Open or short to ground in CLM internal circuit	Integrated chip overcurrent protection
B1414_12	Mix Flap Motor Step (Right Side) Circuit Short to Battery	SPI data of step motor driver IC sent by MCU is different from the returned	• Short to power supply in connecting wire • Short to power supply in step motor internal circuit	Integrated chip overcurrent protection

DTC	DTC Definition	Detection Condition	Possible Causes	Malfunction Protection Measures
		data of step motor driver IC, and the returned data are all 0	• Short to power supply in CLM internal circuit	
B1412_11	Mix Flap Motor Step (Left Side) Circuit Short to Ground	SPI data of step motor driver IC sent by MCU is different from the returned data of step motor driver IC, and the returned data are all 0	• Open or short to ground in connecting wire • Open or short to ground in step motor internal circuit • Open or short to ground in CLM internal circuit	Integrated chip overcurrent protection
B1412_12	Mix Flap Motor Step (Left Side) Circuit Short to Battery	SPI data of step motor driver IC sent by MCU is different from the returned data of step motor driver IC, and the returned data are all 0	• Short to power supply in connecting wire • Short to power supply in step motor internal circuit • Short to power supply in CLM internal circuit	Integrated chip overcurrent protection
B1408_29	Blower Voltage Gear Not Adjustable	The blower feedback voltage is 0 when CLM detects that the blower is = 1st gear, however, it will not generate corresponding feedback voltage as the change of blower gear	• CCP button invalid • CLM output PWM signal fault • VLCL blower driver circuit fault	Integrated chip overcurrent protection
B1408_31	Blower Voltage Not Output	Blower voltage outputs low level continuously when CLM detects that blower is = 1st gear	• CCP button invalid • CLM output PWM signal fault • VLCL blower driver circuit fault	Integrated chip overcurrent protection
B1403_11	Ambient Temperatu-re Sensor	CLM detects that sensor output voltage is equal to 0 V continually	• Short in temperature sensor itself • Short in connecting wire between CLM and temperature sensor	The sensor uses 10 K pull-up resistor to 5 V power supply. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is

DTC	DTC Definition	Detection Condition	Possible Causes	Malfunction Protection Measures
			• CLM internal malfunction	open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1403_15	External Ambient Temperatu-re Sensor Open	CLM detects that sensor output voltage is equal to 5V continually	• Open in temperature sensor itself • Open in connecting wire between CLM and temperature sensor • CLM internal malfunction	The sensor uses 10 K pull-up resistor to 5 V power supply. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1406_14	Solar Sensor (-Left) Circuit Short to Ground or Open	CLM detects that sensor output voltage is equal to 0 V continually	• Short in sensor itself • Short in connecting wire between CLM and sensor • CLM internal malfunction	Sensor connects a pull-down resistor of 7.68K to ground. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1406_12	Solar Sensor (-Left) Short to Power Supply	CLM detects that sensor output voltage is equal to 5V continually	• Open in sensor itself • Open in connecting wire between CLM and sensor • CLM internal malfunction	Sensor connects a pull-down resistor of 7.68K to ground. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1407_14	Solar Sensor (Right)	CLM detects that sensor output voltage is equal to 0 V continually	• Short in sensor itself • Short in connecting wire between CLM and sensor • CLM internal malfunction	Sensor connects a pull-down resistor of 7.68K to ground. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not

DTC	DTC Definition	Detection Condition	Possible Causes	Malfunction Protection Measures
				cause any adverse effects on the hardware circuit.
B1407_12	Solar Sensor (-Right) Short to Power Supply	CLM detects that sensor output voltage is equal to 5V continually	• Open in sensor itself • Open in connecting wire between CLM and sensor • CLM internal malfunction	Sensor connects a pull-down resistor of 7.68K to ground. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1418_11	Incar PM2.5 Sensor Circuit Short to Ground	When sensor output is continuously low level	Short to ground in sensor output	Sensor acquisition circuit collects high and low level signals by itself, it will not cause any adverse effects on the hardware circuit no matter port is short to ground or power supply.
B1418_15	Incar PM2.5 Sensor Circuit Short to Battery or Open	When sensor output is continuously high level	Short to power supply or open in sensor output circuit	Sensor acquisition circuit collects high and low level signals by itself, it will not cause any adverse effects on the hardware circuit no matter port is short to ground or power supply
B141B_11	Incar Temperatu-re Sensor Circuit Short to Ground	CLM detects that sensor output voltage is equal to 0 V continually	• Short to ground in sensor output • Open in connecting wire between CLM and temperature sensor • CLM internal malfunction	Sensor connects a pull-down resistor of 10K to ground. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B141B_12	Incar Temperatu-re Sensor Circuit Short to Battery	CLM detects that sensor output voltage is equal to 5V continually	• Short in temperature sensor itself • Short in connecting wire between CLM and temperature sensor • CLM internal malfunction	Sensor connects a pull-down resistor of 10K to ground. ADC sampling end is connected to the sampling point through a 4.7 K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7 K resistor or grounded, which will not cause any adverse effects on the hardware circuit.

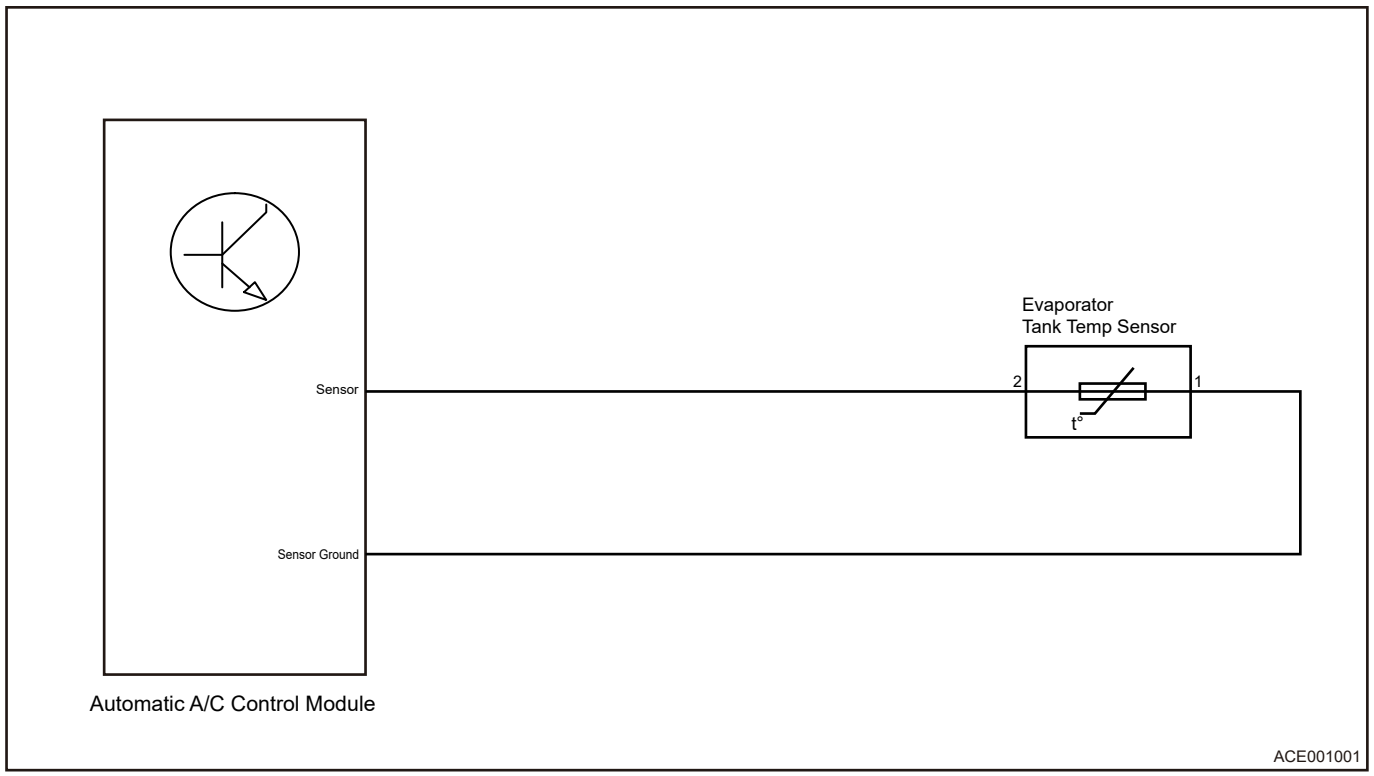
DTC	DTC Definition	Detection Condition	Possible Causes	Malfunction Protection Measures
B141A_11	Outcar PM2.5 Sensor Circuit Short to Ground	When sensor output is continuously low level	Short to ground in sensor output	Sensor acquisition circuit collects high and low level signals by itself, it will not cause any adverse effects on the hardware circuit no matter port is short to ground or power supply
B141A_15	Outcar PM2.5 Sensor Circuit Short to Battery or Open	When sensor output is continuously high level	Short to power supply or open in sensor output circuit	Sensor acquisition circuit collects high and low level signals by itself, it will not cause any adverse effects on the hardware circuit no matter port is short to ground or power supply
B1419_11	AQS Sensor Circuit Short to Ground	When sensor output is continuously low level	Short to ground in sensor output	Sensor acquisition circuit collects high and low level signals by itself, it will not cause any adverse effects on the hardware circuit no matter port is short to ground or power supply
B1419_15	AQS Sensor Circuit Short to Battery or Open	When sensor output is continuously high level	Short to power supply or open in sensor output circuit	Sensor acquisition circuit collects high and low level signals by itself, it will not cause any adverse effects on the hardware circuit no matter port is short to ground or power supply
B1419_09	AQS Sensor Component Failure	The feedback pwm of component is 97±1%	Air quality sensor self-diagnosis error	Sensor acquisition circuit collects high and low level signals by itself, it will not cause any adverse effects on the hardware circuit no matter port is short to ground or power supply
B1416_1C	Left Anion Generator Feedback Voltage Out Of Range	CLM detects that anion feedback voltage is out of normal range of 0.1 to 4.9 V	1: Anion generator itself fault 2: Short in connecting wire between CLM and anion 3: Internal fault in CLM	After anion feedback circuit divides the voltage signal via resistors of 51K and 36K, it will be connected to sampling point through 4.7K resistor. When there is open or short in temperature resistor, ADC sampling pin is pulled to 5 V through a 4.7K resistor or grounded, which will not cause any adverse effects on the hardware circuit.
B1417_1C	Right Anion Generator Feedback Voltage Out Of Range	CLM detects that anion feedback voltage is out of normal range of 0.1 to 4.9 V		
B141C_01	Fragrance Controller Step Motor Component Failure	LIN bus receives 0x2B message that indicates a	1: Short to power supply in connecting wire 2: Short to power supply in step motor internal circuit	Integrated chip overcurrent protection

DTC	DTC Definition	Detection Condition	Possible Causes	Malfunction Protection Measures
		step motor fault	3: Short to power supply in fragrance internal circuit	
B141D_01	Fragrance Controller Fan Component Failure	LIN bus receives 0x2B message that indicates a fan fault	Fan driver circuit fault	Integrated chip overcurrent protection
U1176_87	Lost Communic-ation with Fragrance	/	Network fault	/
U0073_88	CAN Bus Off	/	Network fault	/
U0140_87	Lost Communic-ation with BCM	/	Network fault	/
U0155_87	Lost Communic-ation with ICM	/	Network fault	/
U0151_87	Lost Communic-ation with ABM	/	Network fault	/
U0245_87	Lost Communic-ation with RRM	/	Network fault	/
U0100_87	Lost Communic-ation with EMS	/	Network fault	/
U0129_87	Lost Communic-ation with BSM	/	Network fault	/
U0160_87	Lost Communic-ation with AIPM	/	Network fault	/
U1300_55	Software Configurati-on Error	/	Software Configuration Error	/

4.9 DTC Diagnosis Procedure

DTC	B1404_11	Filtered Evaporator Temperature Circuit Short to Ground
DTC	B1404_15	Filtered Evaporator Temperature Circuit Open

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the A/C control module connector.
(c) Disconnect the evaporator temperature sensor connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

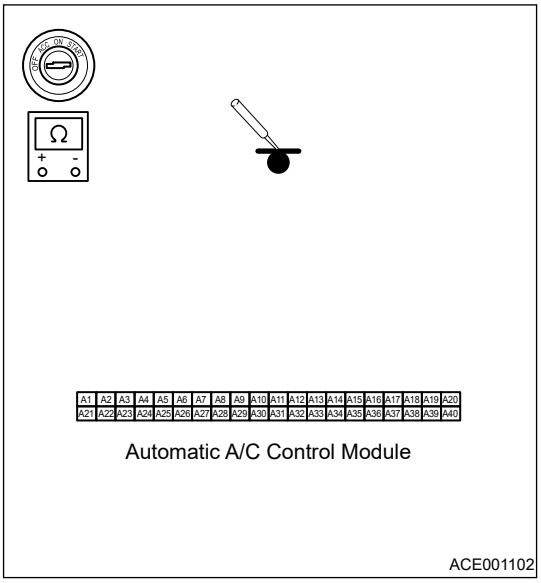
OK

2	**Check evaporator temperature sensor circuit**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, measure the resistance between A/C control module connector (corresponding evaporator temperature sensor terminal) and body ground to check if circuit is short to ground.

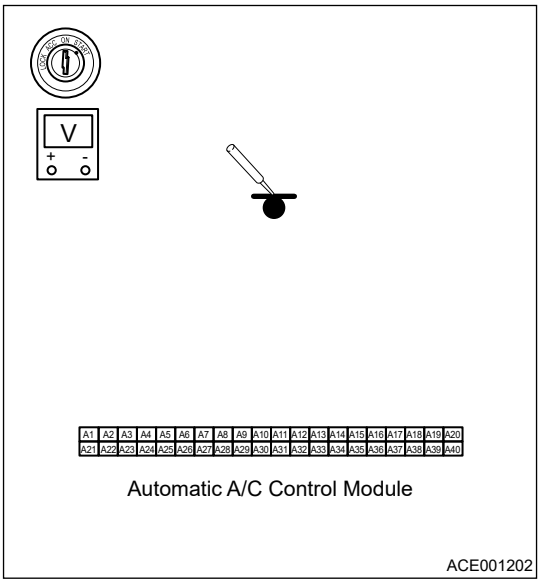
Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding evaporator temperature sensor + terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (- corresponding evaporator temperature sensor - terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞



(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between A/C control module connector (corresponding evaporator temperature sensor terminal) and body ground to check if circuit is short to power supply.

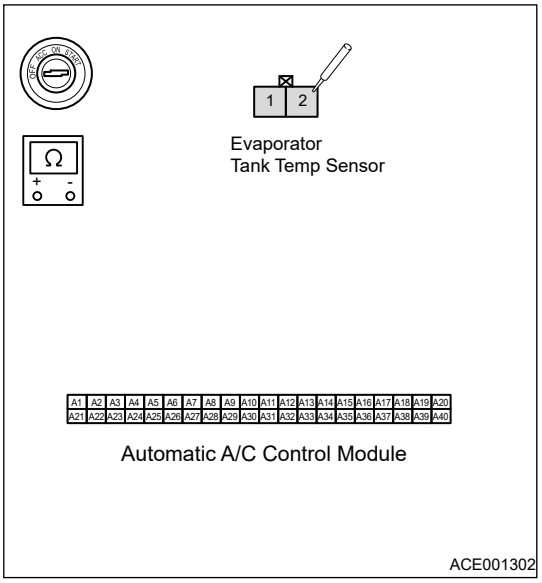
Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding evaporator temperature sensor + terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (- corresponding evaporator temperature sensor - terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(d) Turn ENGINE START STOP switch to OFF.

(e) Using a multimeter, measure the resistance between A/C control module connector (corresponding evaporator temperature sensor terminal) and evaporator temperature sensor terminal to check for open circuit.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding evaporator temperature sensor + terminal) - Evaporator temperature sensor (2)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (- corresponding evaporator temperature sensor - terminal) - Evaporator temperature sensor (1)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω



NG → **Repair or replace evaporator temperature sensor circuit as necessary.**

OK →

3	Check evaporator temperature sensor

(a) Replace evaporator temperature sensor to compare and verify.

(b) Check if the same DTC appears.

NG → **Replace evaporator temperature sensor**

OK →

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

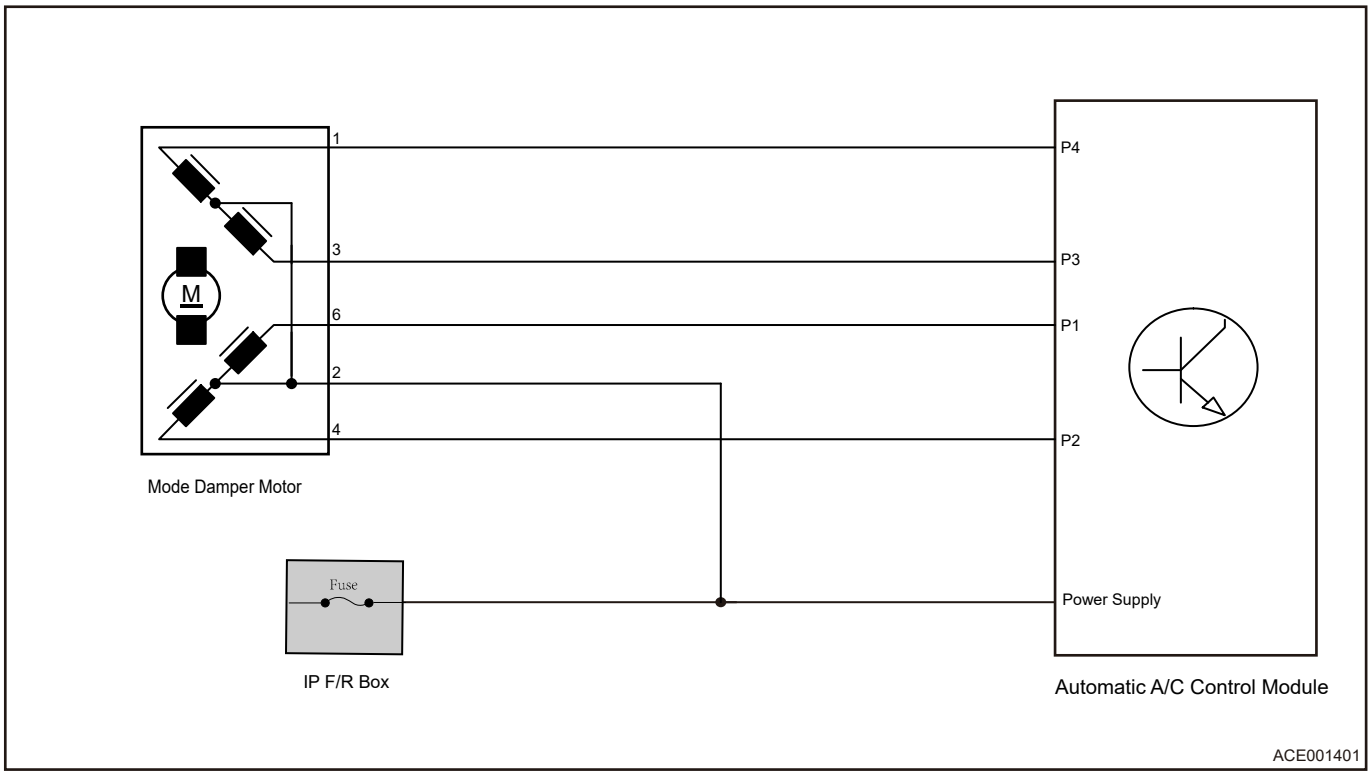
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1409_11	Mode Motor Step Circuit Short to Ground
DTC	B1409_12	Mode Motor Step Circuit Short to Battery

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the A/C control module connector.
(c) Disconnect the mode motor connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

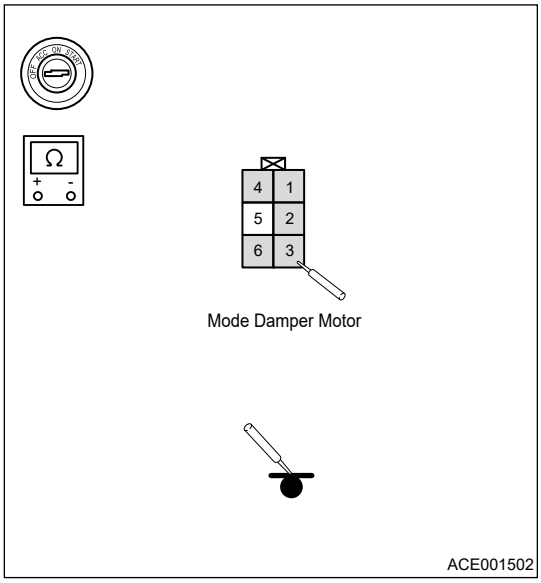
OK

2	Check mode motor circuit

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, measure the resistance between mode motor connector terminal and body ground to check if circuit is short to ground.

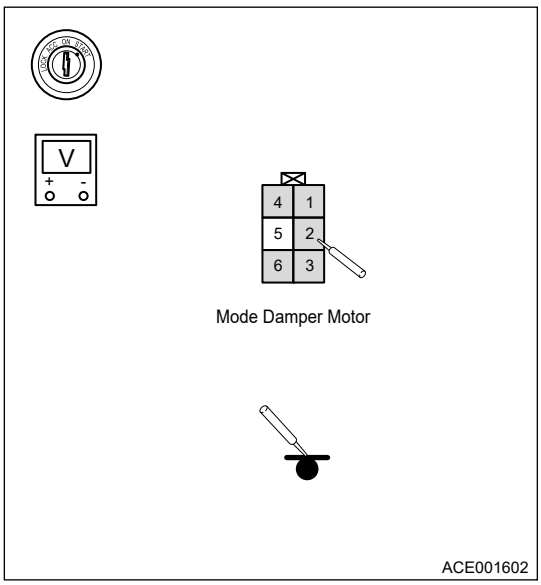
Multimeter Connection	Condition	Specified Condition
Mode damper motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Mode damper motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Mode damper motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Mode damper motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Mode damper motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to OFF	∞



(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between mode motor connector terminal and body ground to check if circuit is short to power supply.

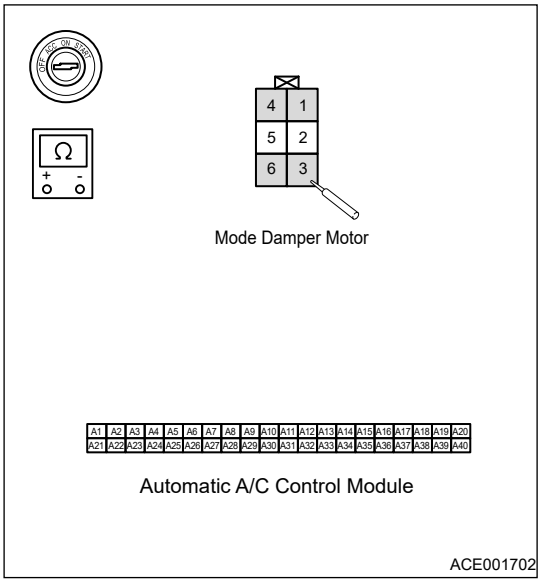
Multimeter Connection	Condition	Specified Condition
Mode damper motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Mode damper motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Mode damper motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Mode damper motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to ON	12 V
Mode damper motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(d) Turn ENGINE START STOP switch to OFF.

(e) Using a multimeter, measure the resistance between mode motor connector terminal and A/C control module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Mode damper motor connector terminal (1) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Mode damper motor connector terminal (3) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Mode damper motor connector terminal (6) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Mode damper motor connector terminal (4) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω



NG → **Repair or replace mode motor circuit as necessary**

OK ↓

3	Check mode motor

(a) Replace mode motor to compare and verify.

(b) Check if the same DTC appears.

NG → **Replace mode motor**

OK ↓

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

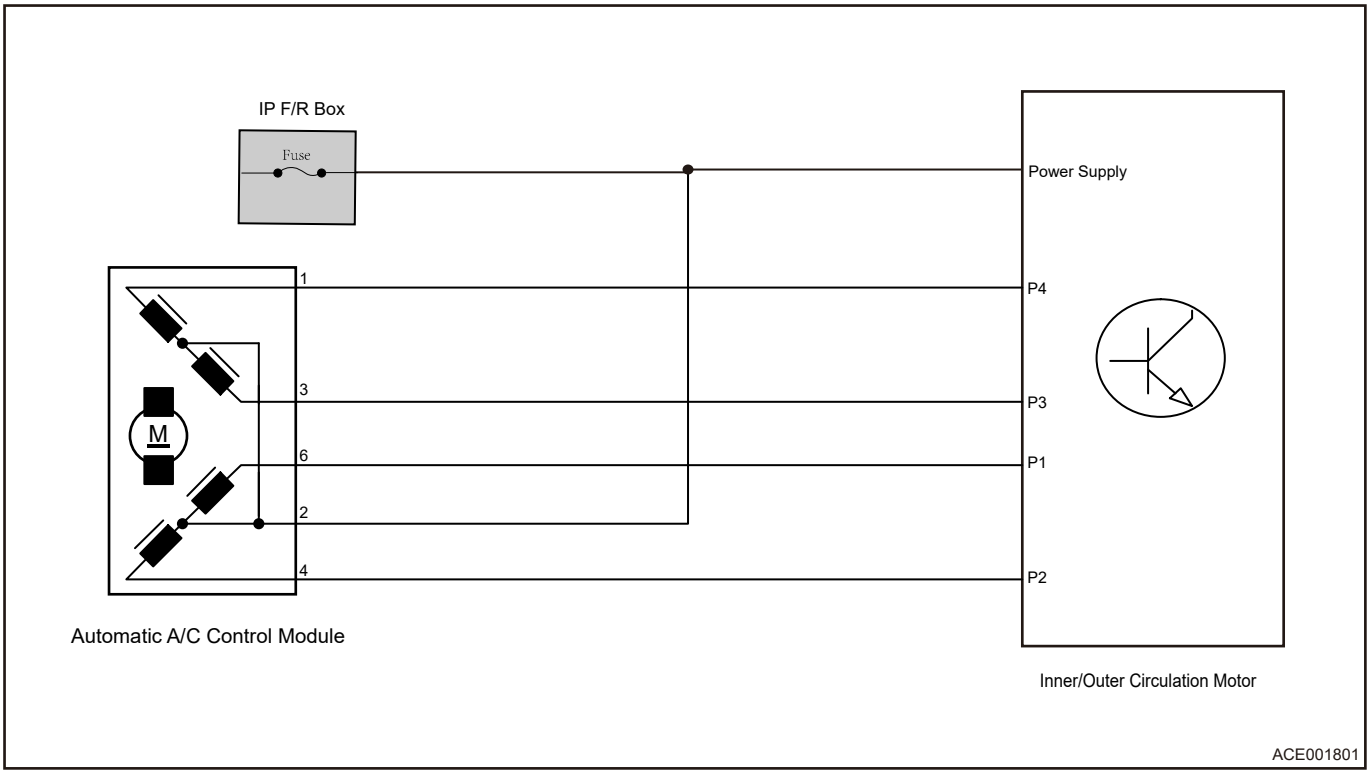
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG	Replace with a new ECU to check if fault reoccurs
OK	Conduct test and confirm malfunction has been repaired

DTC	B1410_11	Rec Motor Step Circuit Short to Ground
DTC	B1410_12	Rec Motor Step Circuit Short to Battery

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the A/C control module connector.
(c) Disconnect the inner/outer circulation motor connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG	Repair or replace wire harness or connector as needed

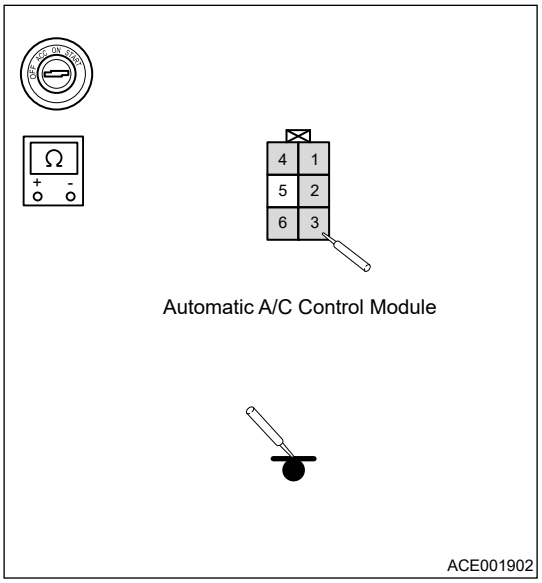
OK

2	Check inner/outer circulation motor circuit

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, measure the resistance between inner/outer circulation motor connector terminal and body ground to check if circuit is short to ground.

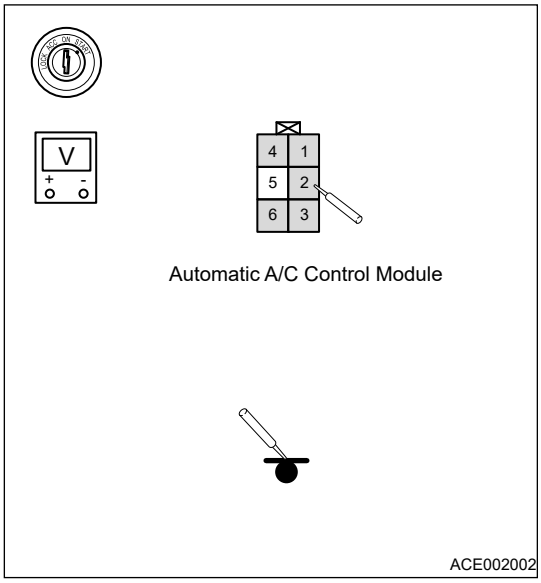
Multimeter Connection	Condition	Specified Condition
Inner/outer circulation motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Inner/outer circulation motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Inner/outer circulation motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Inner/outer circulation motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Inner/outer circulation motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to OFF	∞



(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between inner/outer circulation motor connector terminal and body ground to check if circuit is short to power supply.

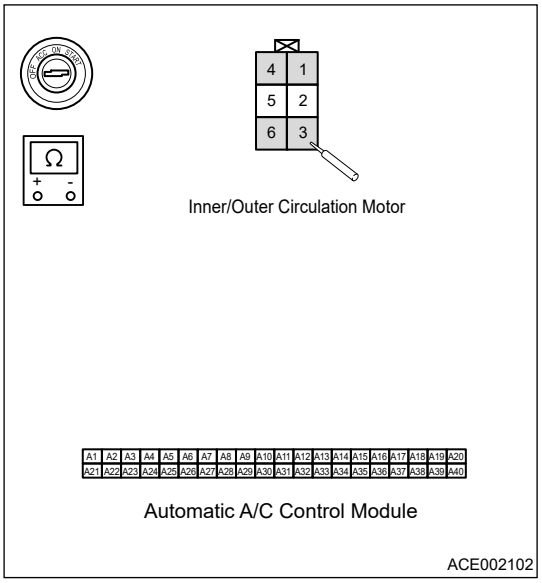
Multimeter Connection	Condition	Specified Condition
Inner/outer circulation motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Inner/outer circulation motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to ON	12 V
Inner/outer circulation motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Inner/outer circulation motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Inner/outer circulation motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(d) Turn ENGINE START STOP switch to OFF.

(e) Using a multimeter, measure the resistance between inner/outer circulation motor connector terminal and A/C control module connector (corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Inner/outer circulation motor connector terminal (1) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Inner/outer circulation motor connector terminal (3) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Inner/outer circulation motor connector terminal (6) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Inner/outer circulation motor connector terminal (4) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω



NG → **Repair or replace inner/outer circulation motor circuit**

OK

3	Check inner/outer circulation motor

(a) Replace inner/outer circulation motor to compare and verify

(b) Check if the same DTC appears.

NG → **Replace inner/outer circulation motor**

OK

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

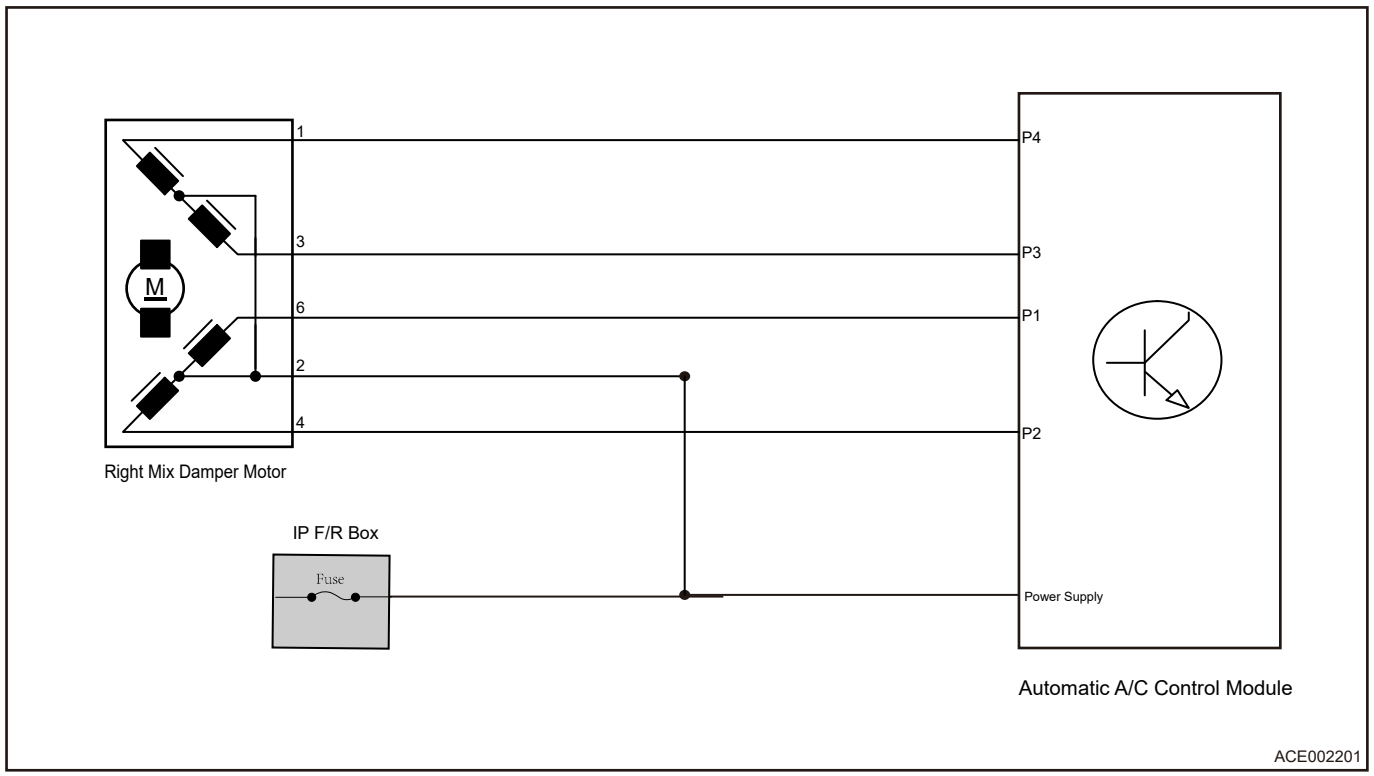
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace with a new ECU to check if fault reoccurs**
OK	**Conduct test and confirm malfunction has been repaired**

DTC	**B1414_11**	**Mix Flap Motor Step (Right Side) Circuit Short to Ground**
DTC	**B1414_12**	**Mix Flap Motor Step (Right Side) Circuit Short to Battery**

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the A/C control module connector.
(c) Disconnect the right mix motor connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

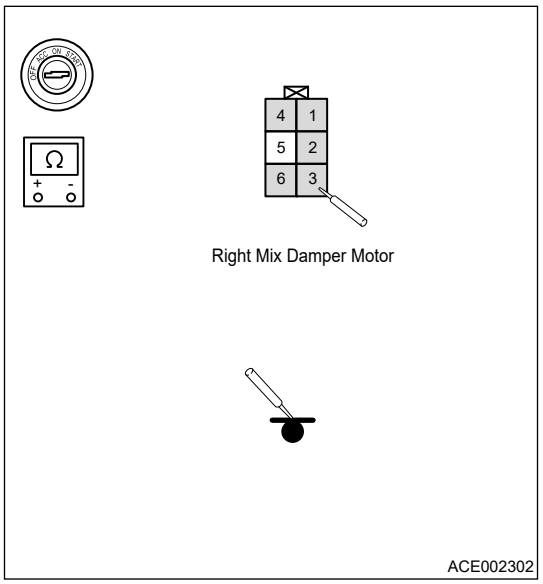
OK ↓

2	**Check right mix damper motor circuit**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, measure the resistance between right mix damper motor connector terminal and body ground to check if circuit is short to ground.

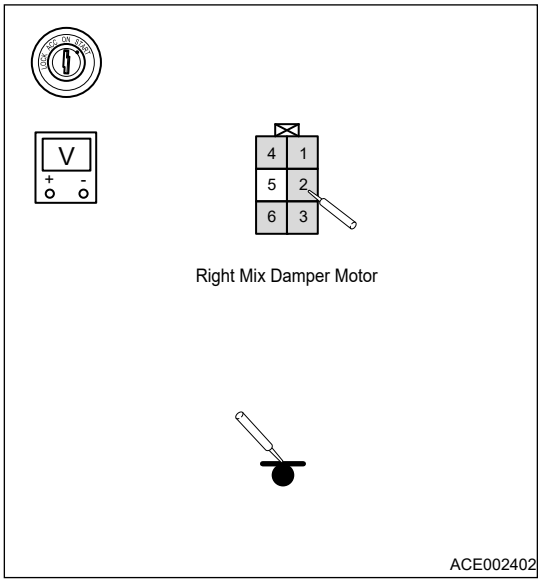
Multimeter Connection	Condition	Specified Condition
Right mix damper motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Right mix damper motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Right mix damper motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Right mix damper motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Right mix damper motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to OFF	∞



(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between right mix damper motor connector terminal and body ground to check if circuit is short to power supply.

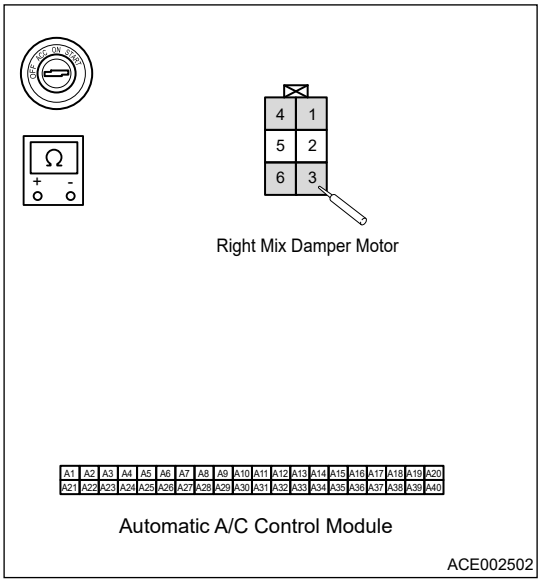
Multimeter Connection	Condition	Specified Condition
Right mix damper motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Right mix damper motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to ON	12 V
Right mix damper motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Right mix damper motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Right mix damper motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(d) Turn ENGINE START STOP switch to OFF.

(e) Using a multimeter, measure the resistance between right mix damper motor connector terminal and A/C control module connector (corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Mix damper motor connector terminal (1) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Mix damper motor connector terminal (3) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Mix damper motor connector terminal (6) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Mix damper motor connector terminal (4) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω



NG → **Repair or replace right mix damper motor circuit as necessary**

OK ↓

3	Check right mix damper motor

(a) Replace the right mix damper motor to compare and verify.

(b) Check if the same DTC appears.

NG → **Replace right mix damper motor**

OK ↓

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

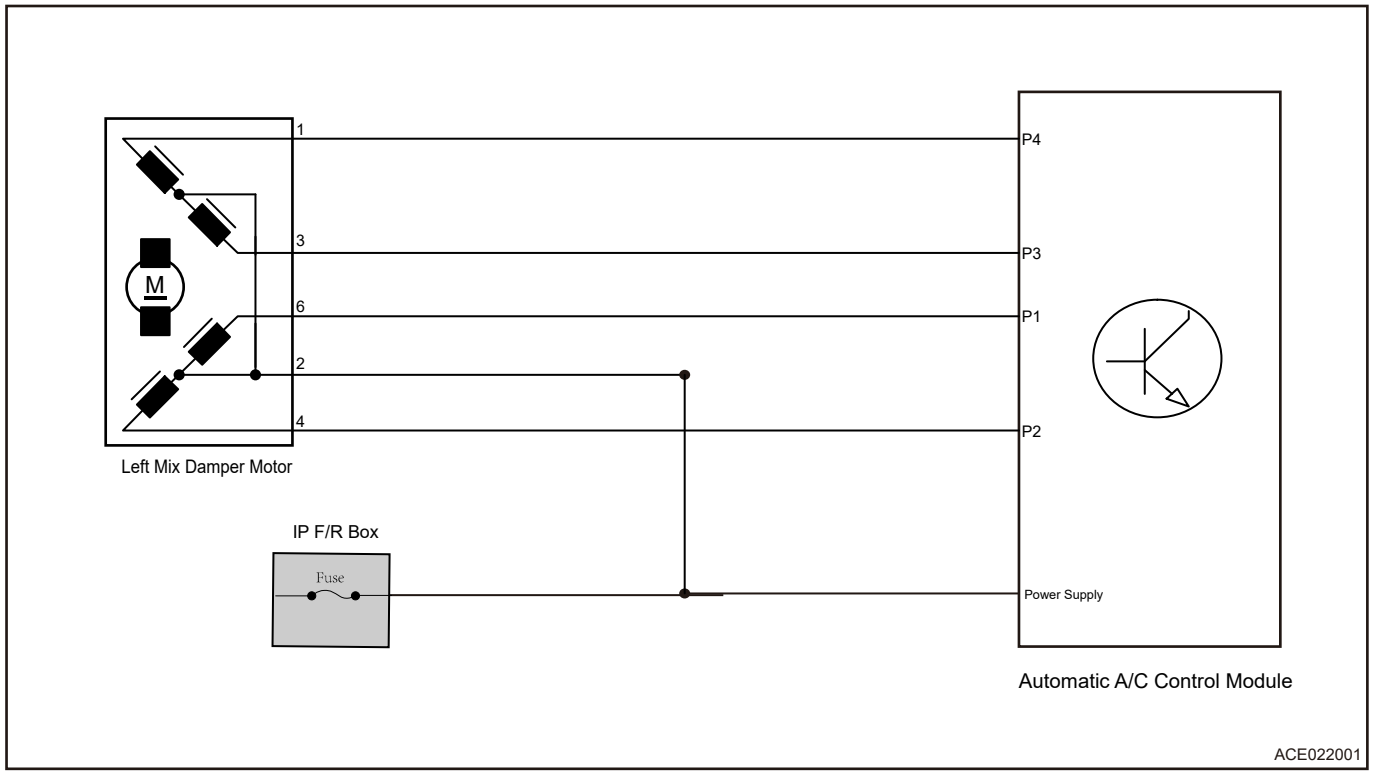
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG	Replace with a new ECU to check if fault reoccurs
OK	Conduct test and confirm malfunction has been repaired

DTC	B1412_11	Mix Flap Motor Step (Left Side) Circuit Short to Ground
DTC	B1412_12	Mix Flap Motor Step (Left Side) Circuit Short to Battery

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the A/C control module connector.
(c) Disconnect the left mix damper motor connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG	Repair or replace wire harness or connector as needed

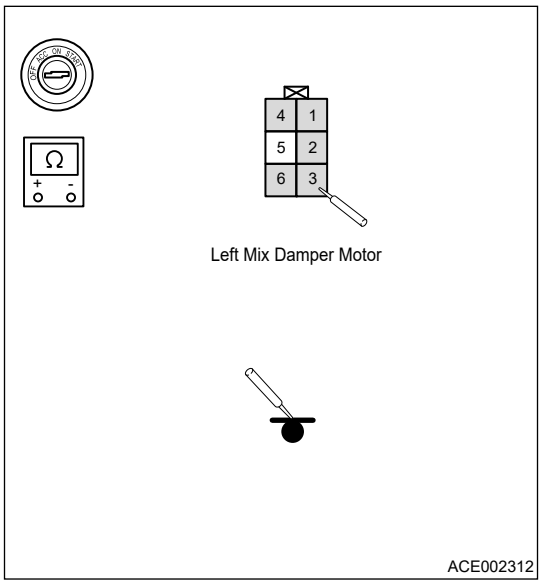
OK

2	Check left mix damper motor circuit

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, measure the resistance between left mix damper motor connector terminal and body ground to check if circuit is short to ground.

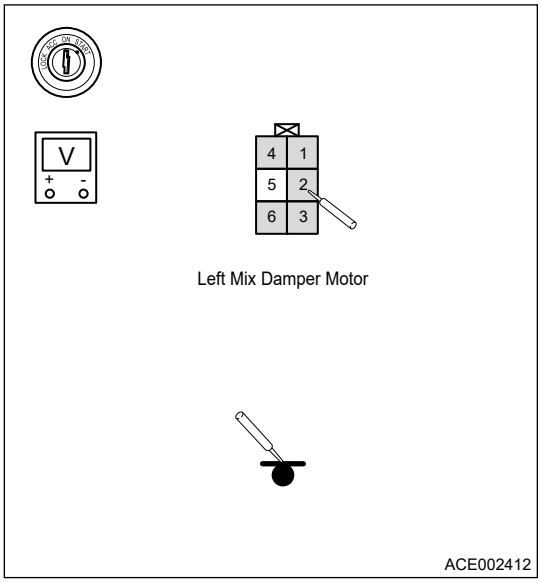
Multimeter Connection	Condition	Specified Condition
Left mix damper motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Left mix damper motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Left mix damper motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Left mix damper motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Left mix damper motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to OFF	∞



(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between left mix damper motor connector terminal and body ground to check if circuit is short to power supply.

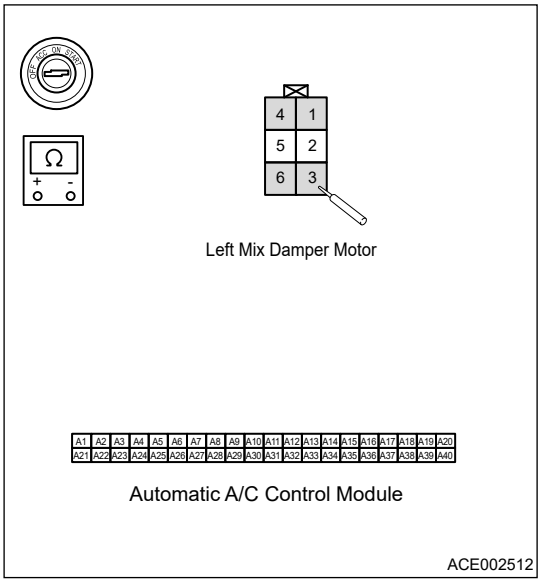
Multimeter Connection	Condition	Specified Condition
Left mix damper motor connector terminal (1) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Left mix damper motor connector terminal (2) - Body ground	Turn ENGINE START STOP switch to ON	12 V
Left mix damper motor connector terminal (3) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Left mix damper motor connector terminal (4) - Body ground	Turn ENGINE START STOP switch to ON	0 V
Left mix damper motor connector terminal (6) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(d) Turn ENGINE START STOP switch to OFF.

(e) Using a multimeter, measure the resistance between left mix damper motor connector terminal and A/C control module connector (corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Left mix damper motor connector terminal (1) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Left mix damper motor connector terminal (3) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Left mix damper motor connector terminal (6) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Left mix damper motor connector terminal (4) - A/C control module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω



NG → **Repair or replace left mix damper motor circuit as necessary**

OK

3	Check left mix damper motor

(a) Replace the left mix damper motor to compare and verify.

(b) Check if the same DTC appears.

NG → **Replace left mix damper motor**

OK

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

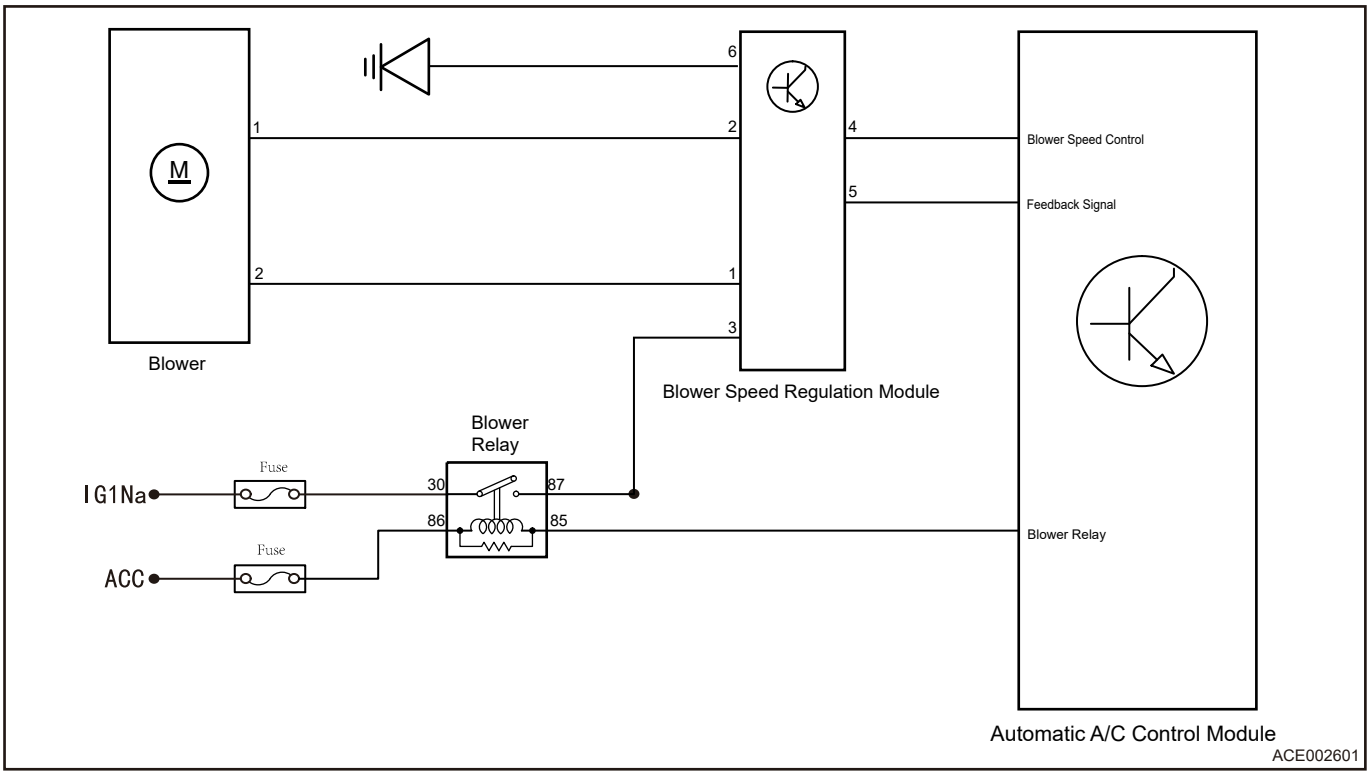
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace with a new ECU to check if fault reoccurs**
OK	**Conduct test and confirm malfunction has been repaired**

DTC	**B1408_29**	**Blower Voltage Gear Not Adjustable**
DTC	**B1408_31**	**Blower Voltage Not Output**

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

(a) Use circuit diagram as a guide to perform the following inspection procedures:

(b) Check if fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

OK

2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the blower connector.
(c) Disconnect the speed regulation module connector.
(d) Disconnect the A/C control module connector.
(e) Check connector for bad contact, bending, distortion, poor contact, etc.
(f) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector**

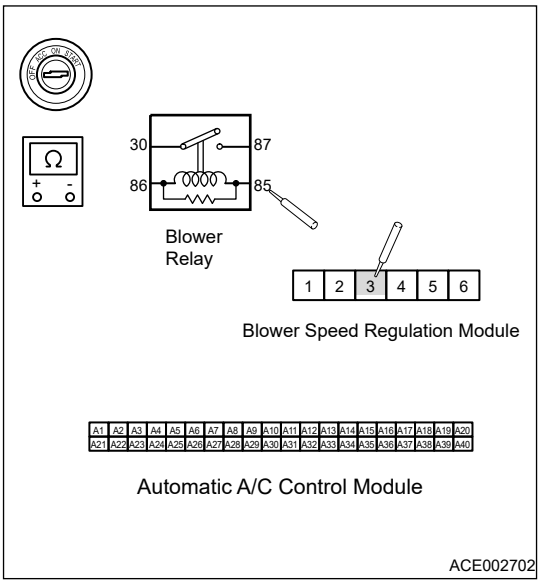
OK

3	Check circuit between blower relay and A/C control module

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between blower relay and speed regulation module connector (corresponding terminal), blower relay and A/C control module connector (-corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Blower relay (87) - Speed regulation module connector (-corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Blower relay (85) - A/C control module connector (-corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω



NG → **Repair or replace wire harness between blower relay and A/C control module as necessary**

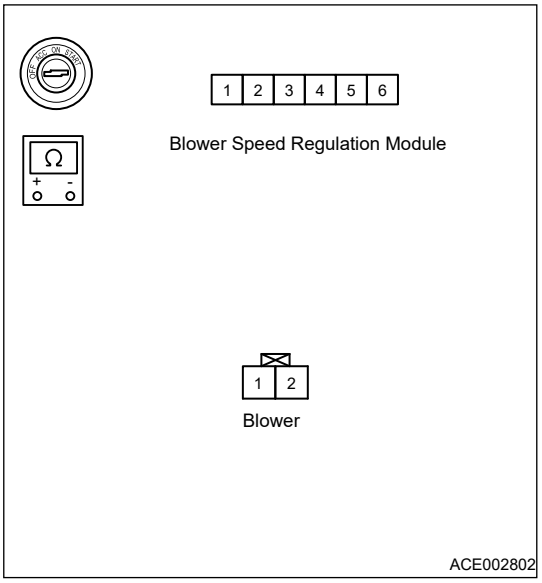
OK

4	Check circuit between speed regulation module and blower

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between blower connector terminal and speed regulation module connector (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Blower (1) - Speed regulation module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω
Blower (2) - Speed regulation module connector (- corresponding terminal)	Turn ENGINE START STOP switch to OFF	Less than 1 Ω



NG → **Repair or replace wire harness between speed regulation module and blower as necessary**

OK

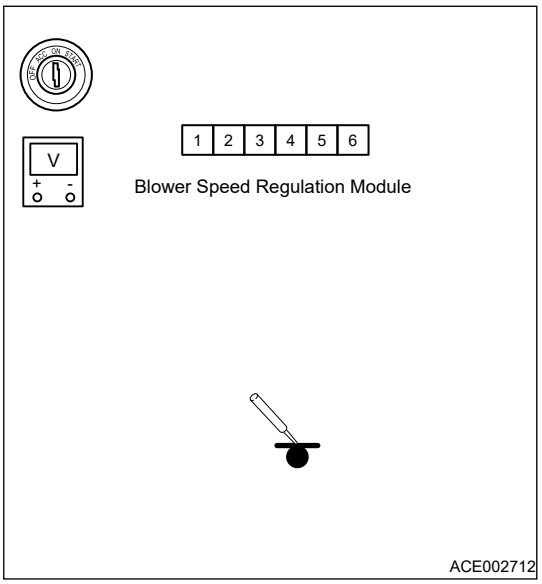
5	Check speed regulation module power supply circuit

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, measure the voltage between speed regulation module connector power supply terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Speed regulation module connector (- power supply terminal) - Body ground	Turn ENGINE START STOP switch to ON	12 V



NG → **Repair or replace speed regulation module power supply wire harness as necessary**

OK

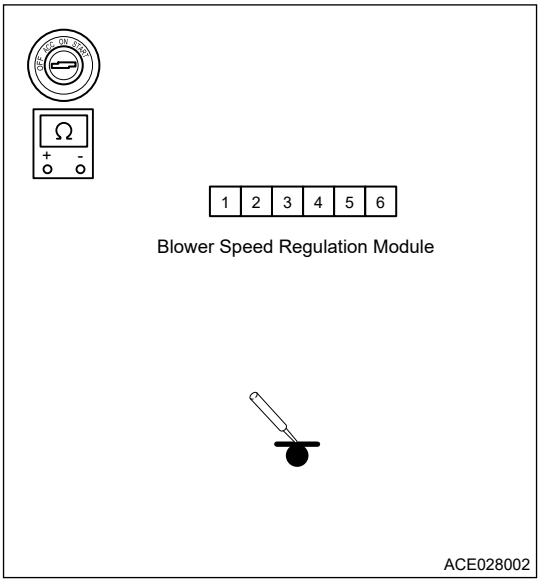
6	Check speed regulation module ground circuit

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, measure the resistance between speed regulation module connector ground terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Speed regulation module connector (-ground terminal) - Body ground	Turn ENGINE START STOP switch to OFF	Less than 1 Ω



NG → **Repair or replace speed regulation module ground wire harness as necessary**

OK →

7	Check blower

(a) Using 12 V battery, test the blower with power on.

(b) Check if blower is operating normally.

NG → **Repair or replace blower**

OK →

8	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

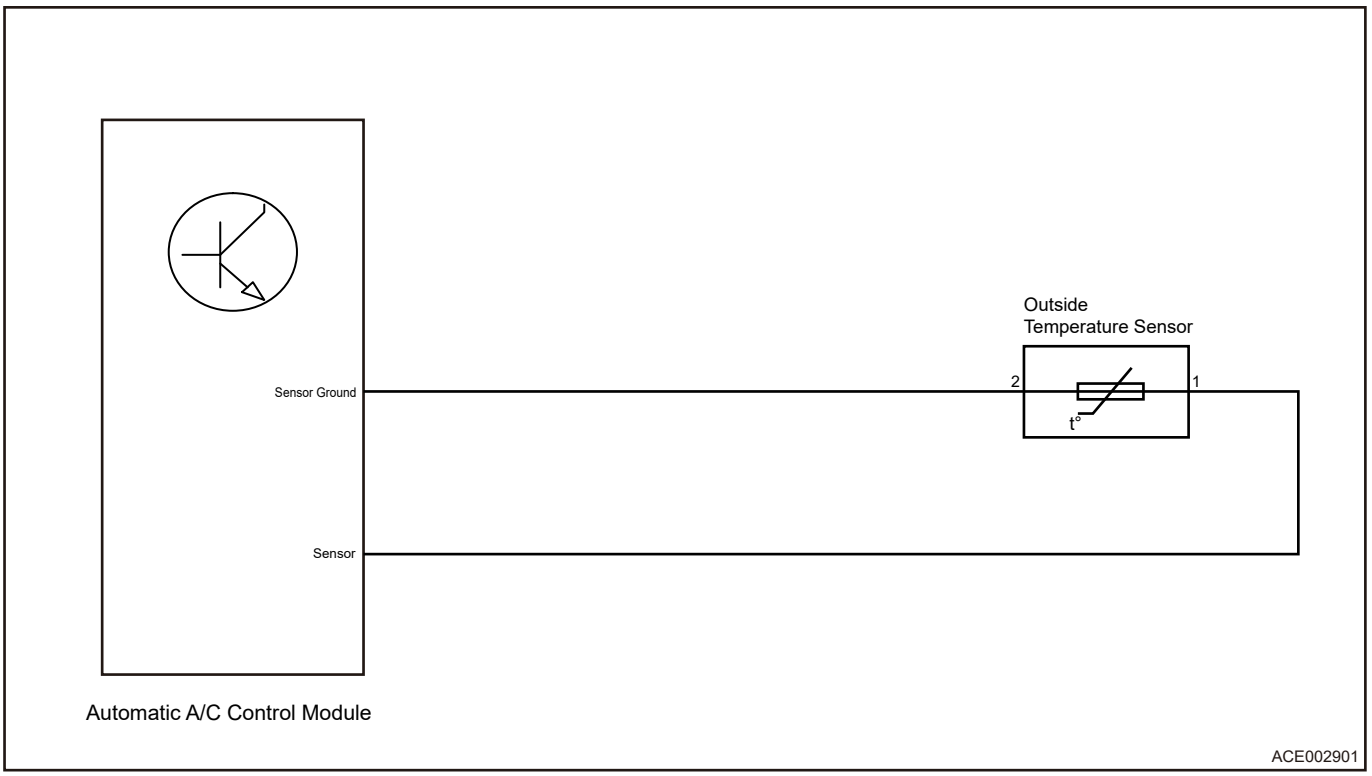
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1403_11	External Ambient Temperature Sensor Short to Ground
DTC	B1403_15	External Ambient Temperature Sensor Open

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the outside temperature sensor connector.
(c) Disconnect the A/C control module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace connector as necessary**

OK

2	**Check outside temperature sensor circuit**

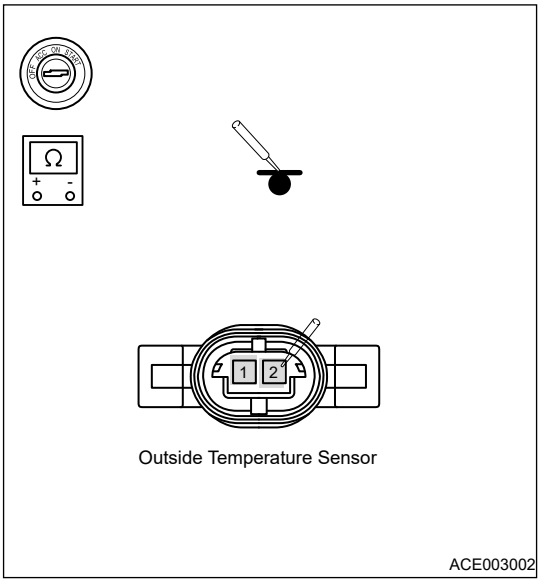
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the outside temperature sensor connector.

(c) Disconnect the A/C control module connector.

(d) Using a multimeter, measure the resistance between outside temperature sensor connector terminal and body ground to check if circuit is short to ground.

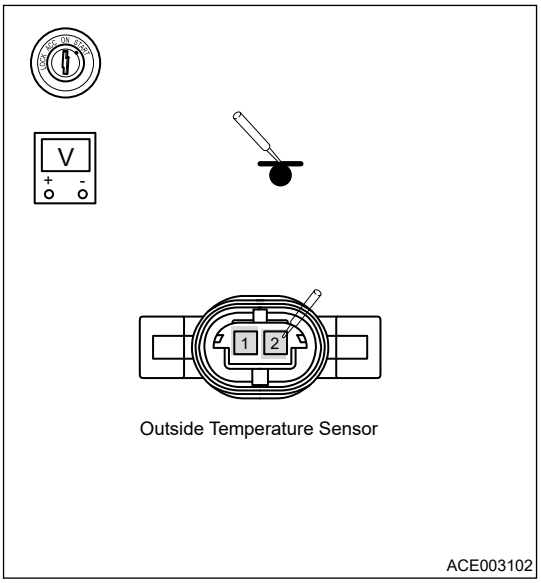
Multimeter Connection	Condition	Specified Condition
Outside temperature sensor connector (1) - Body Ground	Turn ENGINE START STOP switch to OFF	∞
Outside temperature sensor connector (2) - Body Ground	Turn ENGINE START STOP switch to OFF	∞



(e) Turn ENGINE START STOP switch to ON.

(f) Using a multimeter, measure the voltage between outside temperature sensor connector terminal and body ground to check if circuit is short to ground.

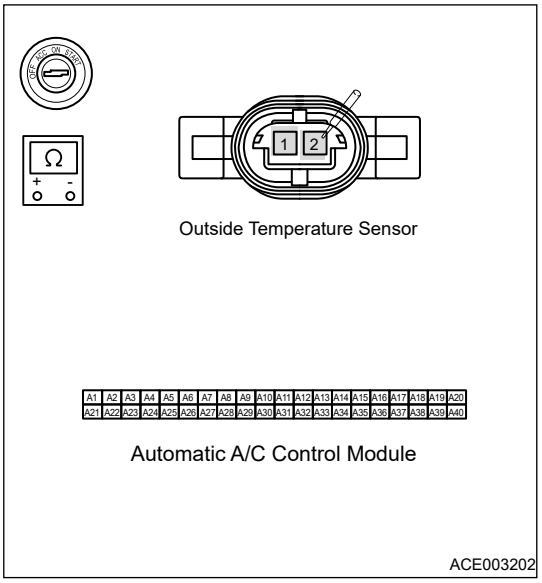
Multimeter Connection	Condition	Specified Condition
Outside temperature sensor connector (1) - Body Ground	Turn ENGINE START STOP switch to ON	0 V
Outside temperature sensor connector (2) - Body Ground	Turn ENGINE START STOP switch to ON	0 V



(g) Turn ENGINE START STOP switch to OFF.

(h) Using a multimeter, check for continuity between A/C control module connector (corresponding terminal) and outside temperature sensor connector terminal.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding terminal) - Outside temperature sensor (2)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (- corresponding terminal) - Outside temperature sensor (1)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω



NG → **Repair or replace outside temperature sensor wire harness as necessary**

OK →

3	Check outside temperature sensor

(a) Replace outside temperature sensor to compare and verify.

(b) Check if the same DTC appears.

NG → **Replace outside temperature sensor**

OK →

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1406_14	Solar Radiation (Left Side)-Circuit Short To Ground Or Open
DTC	B1406_12	Solar Radiation (Left side) Circuit Short to Battery
DTC	B1407_14	Solar Radiation (Right Side)-Circuit Short To Ground Or Open
DTC	B1407_12	Solar Radiation (Right Side) Circuit Short to Battery

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the solar sensor connector.
(c) Disconnect the A/C control module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace connector as necessary**

OK

2	Check solar sensor circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the solar sensor connector.
(c) Disconnect the A/C control module connector.
(d) Using a multimeter, measure the resistance between A/C control module connector (corresponding solar sensor connector terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding solar sensor connector terminal - left) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (- corresponding solar sensor connector terminal - right) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (- corresponding solar sensor connector power supply terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞

(e) Turn ENGINE START STOP switch to ON.

(f) Using a multimeter, measure the voltage between A/C control module connector (corresponding solar sensor connector terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (-corresponding solar sensor connector terminal - left) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (-corresponding solar sensor connector terminal - right) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (-corresponding solar sensor connector power supply terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V

(g) Turn ENGINE START STOP switch to OFF.

(h) Using a multimeter, measure the resistance between A/C control module connector (corresponding terminal) and solar sensor connector terminal.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (-corresponding terminal) - Solar sensor (4)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (-corresponding terminal) - Solar sensor (3)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (-corresponding terminal) - Solar sensor (1)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω

NG → **Repair or replace solar sensor wire harness as necessary**

OK

3	Check solar sensor

(a) Replace solar sensor to compare and verify.
(b) Check if the same DTC appears.

NG → **Replacement of Solar Sensor**

OK

4	Reconfirm DTCs

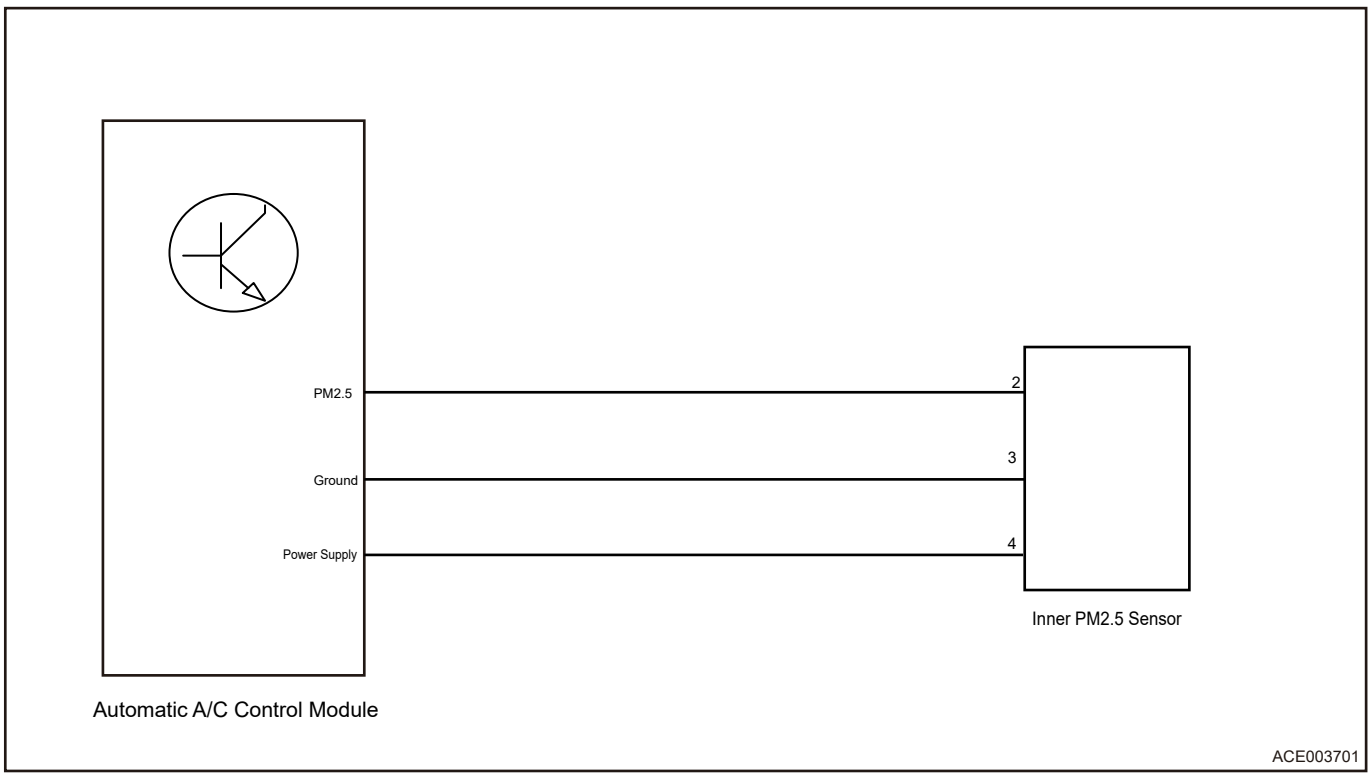
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1418_11	Incar PM2.5 Sensor Malfunction-Sensor Output to Ground
DTC	B1418_15	Incar PM2.5 Sensor Malfunction-Sensor Power Supply is Shut Off or Open

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the inside PM2.5 sensor connector.
(c) Disconnect the A/C control module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

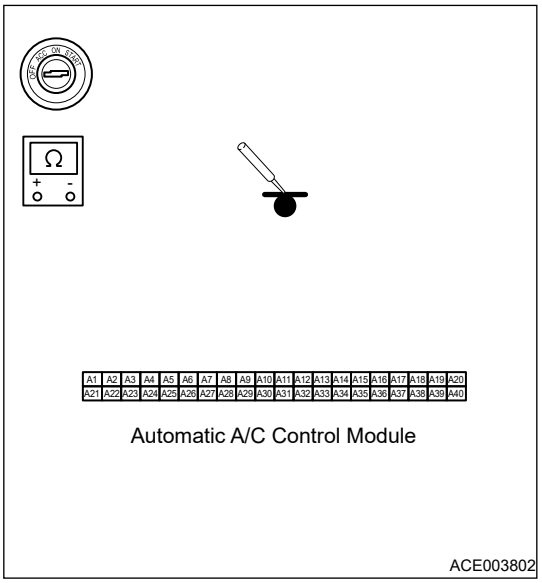
NG → Repair or replace connector as necessary

OK

2	Check inside PM2.5 sensor circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the inside PM2.5 sensor connector.
(c) Disconnect the A/C control module connector.
(d) Using a multimeter, measure the resistance between A/C control module connector (corresponding inside PM2.5 sensor terminal) and body ground.

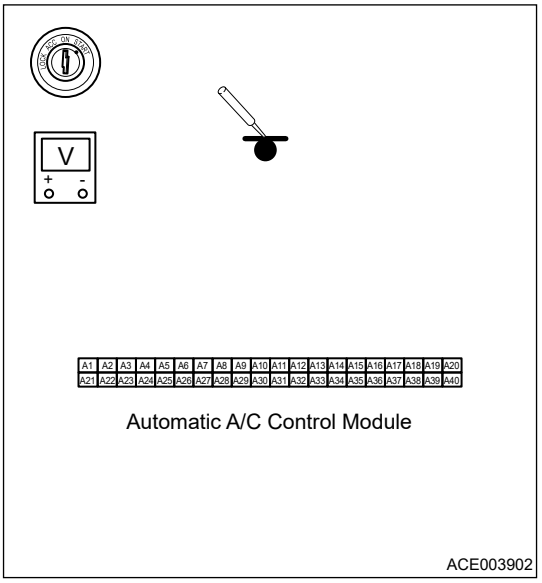
Multimeter Connection	Condition	Specified Condition
A/C control module connector (-corresponding inside PM2.5 sensor signal terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (-corresponding inside PM2.5 sensor power supply terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (-corresponding inside PM2.5 sensor ground terminal) - Body ground	Turn ENGINE START STOP switch to OFF	< 1 Ω



(e) Turn ENGINE START STOP switch to ON.

(f) Using a multimeter, measure the voltage between A/C control module connector (corresponding inside PM2.5 sensor terminal) and body ground.

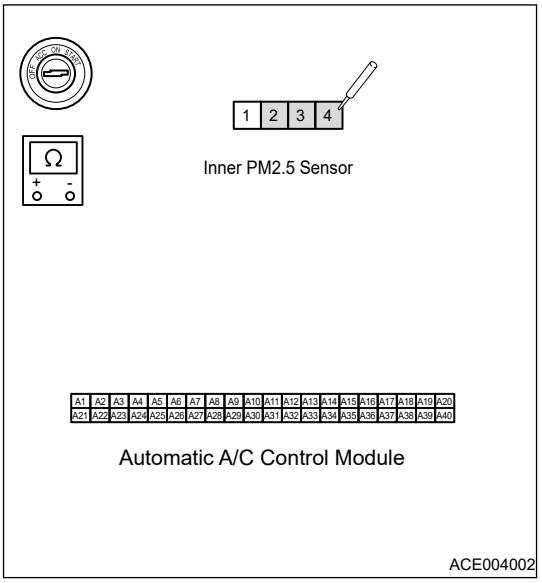
Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding inside PM2.5 sensor signal terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (- corresponding inside PM2.5 sensor power supply terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (- corresponding inside PM2.5 sensor ground terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(g) Turn ENGINE START STOP switch to OFF.

(h) Using a multimeter, measure the resistance between A/C control module connector (corresponding terminal) and inside PM2.5 sensor connector terminal.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding terminal) - Inside PM2.5 sensor connector (4)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (- corresponding terminal) - Inside PM2.5 sensor connector (1)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (- corresponding terminal) - Inside PM2.5 sensor connector (3)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω



NG → **Repair or replace inside PM2.5 sensor wire harness as necessary**

OK

3	Check inside PM2.5 sensor

(a) Replace inside PM2.5 sensor to compare and verify.
(b) Check if the same DTC appears.

NG → Replace inside PM2.5 sensor

OK

4	Reconfirm DTCs

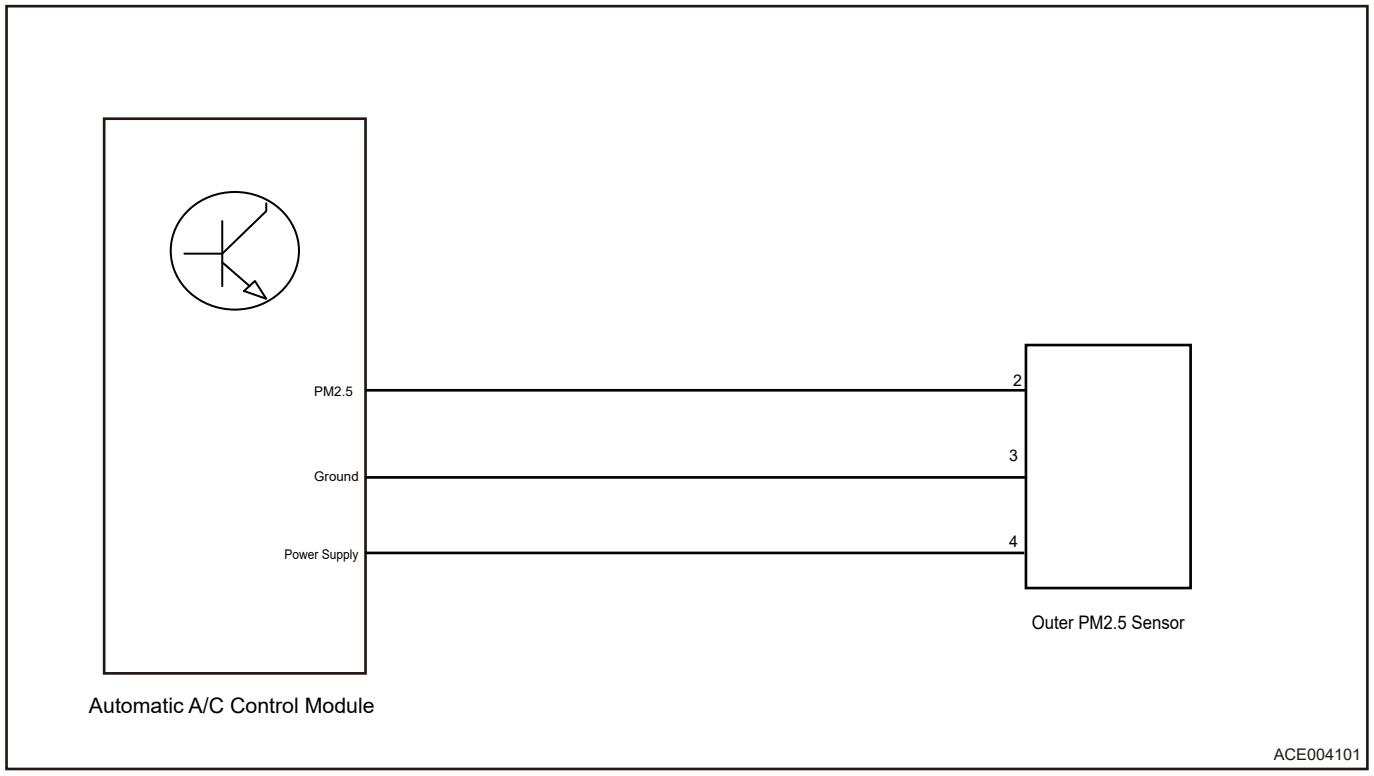
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → Replace with a new ECU to check if fault reoccurs

OK → Conduct test and confirm malfunction has been repaired

DTC	B141A_11	Outcar PM2.5 Sensor Malfunction Sensor Output to Ground
DTC	B141A_15	Outcar PM2.5 Sensor Circuit Power Supply is Shut Off or Open

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the outside PM2.5 sensor connector.
(c) Disconnect the A/C control module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

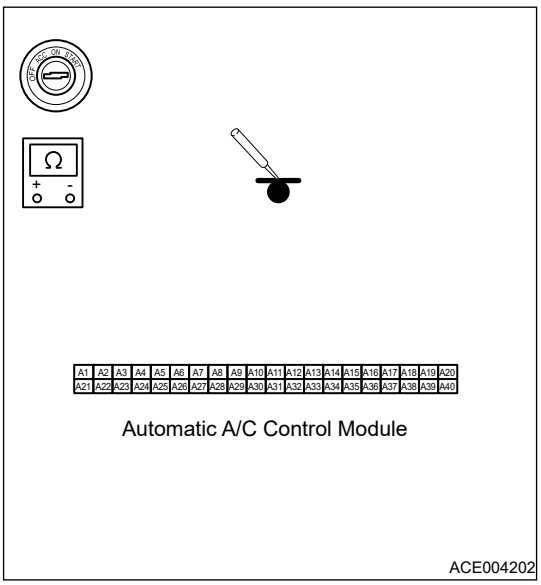
NG → **Repair or replace connector as necessary**

OK

2	Check outside PM2.5 sensor circuit

(a) Disconnect the outside PM2.5 sensor connector.
(b) Disconnect the A/C control module connector.
(c) Using a multimeter, measure the resistance between A/C control module connector (corresponding outside PM2.5 sensor terminal) and body ground.

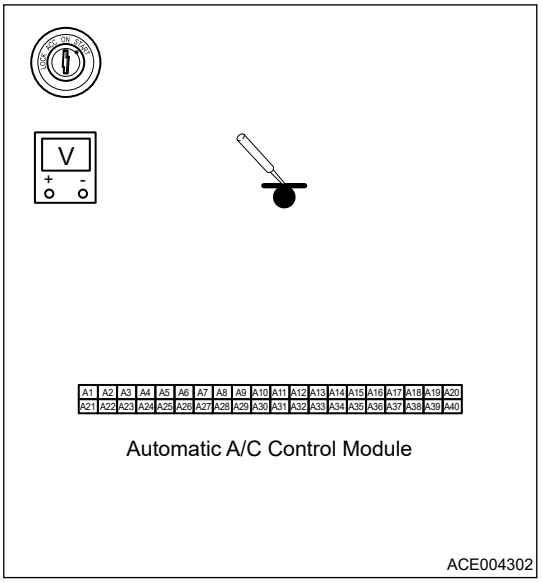
Multimeter Connection	Condition	Specified Condition
A/C control module connector (-corresponding outside PM2.5 sensor signal terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (-corresponding outside PM2.5 sensor power supply terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (-corresponding outside PM2.5 sensor ground terminal) - Body ground	Turn ENGINE START STOP switch to OFF	< 1 Ω



(d) Turn ENGINE START STOP switch to ON.

(e) Using a multimeter, measure the voltage between A/C control module connector (corresponding outside PM2.5 sensor terminal) and body ground.

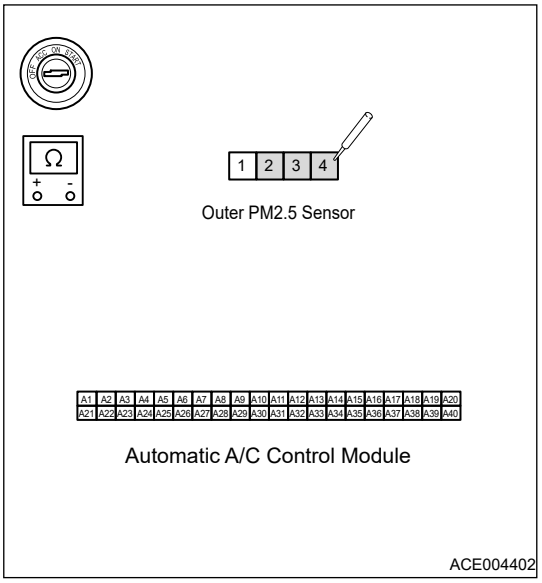
Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding outside PM2.5 sensor signal terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (- corresponding outside PM2.5 sensor power supply terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (- corresponding outside PM2.5 sensor ground terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(f) Turn ENGINE START STOP switch to OFF.

(g) Using a multimeter, measure the resistance between A/C control module connector (corresponding terminal) and outside PM2.5 sensor connector terminal.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding terminal) - Outside PM2.5 sensor connector (4)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (- corresponding terminal) - Outside PM2.5 sensor connector (1)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module connector (- corresponding terminal) - Outside PM2.5 sensor connector (3)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω



NG → **Repair or replace outside PM2.5 sensor wire harness as necessary**

OK

3	Check outside PM2.5 sensor

(a) Replace outside PM2.5 sensor to compare and verify.
(b) Check if the same DTC appears.

NG → Replace outside PM2.5 sensor

OK

4	Reconfirm DTCs

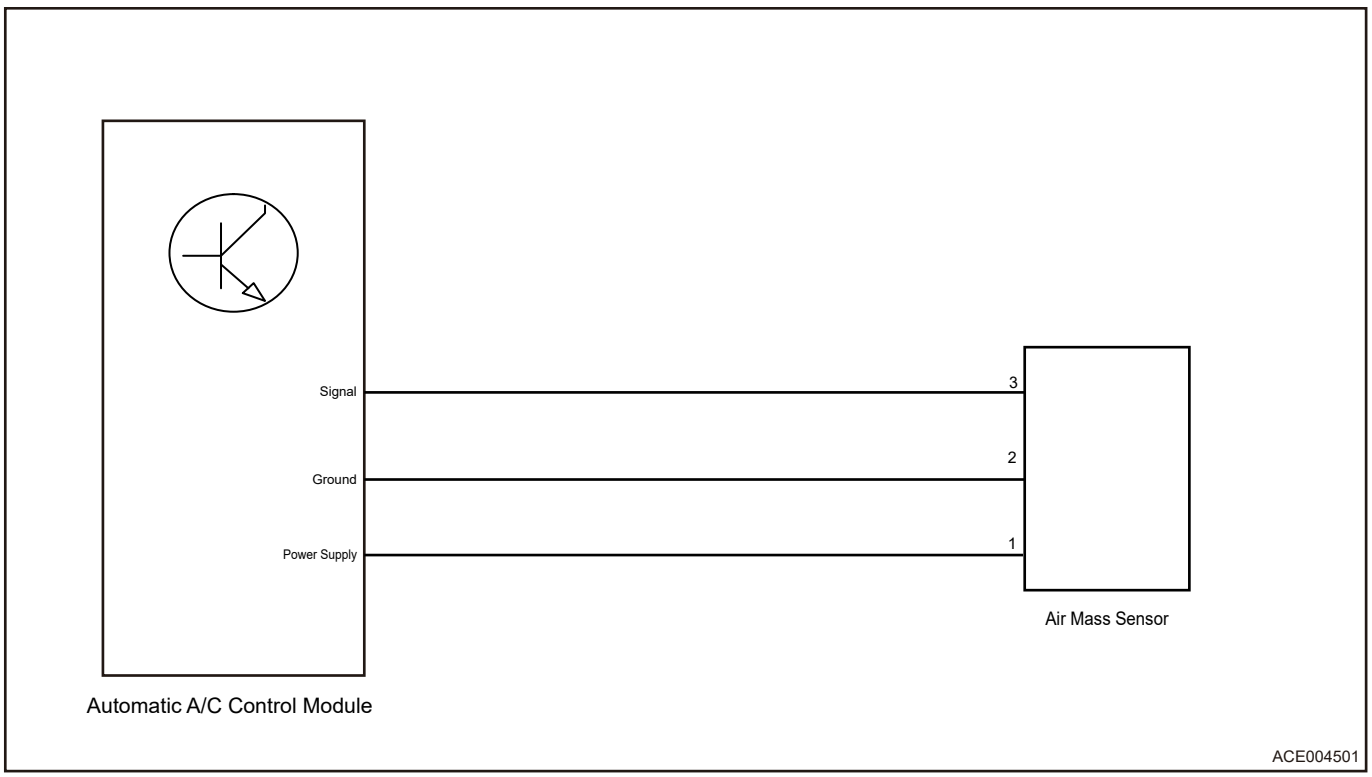
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → Replace with a new ECU to check if fault reoccurs

OK → Conduct test and confirm malfunction has been repaired

DTC	B1419_11	AQS Sensor Circuit Short to Ground
DTC	B1419_15	AQS Sensor Circuit Short to Battery or Open
DTC	B1419_09	AQS Sensor Component Failure

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the air quality sensor connector.
(c) Disconnect the A/C control module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

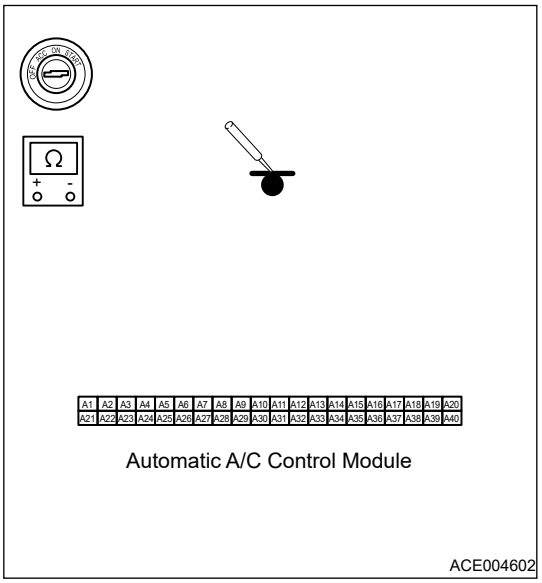
NG → **Repair or replace connector as necessary**

OK

2	Check air quality sensor circuit

(a) Using a multimeter, measure the resistance between A/C control module connector (corresponding air quality sensor terminal) and body ground.

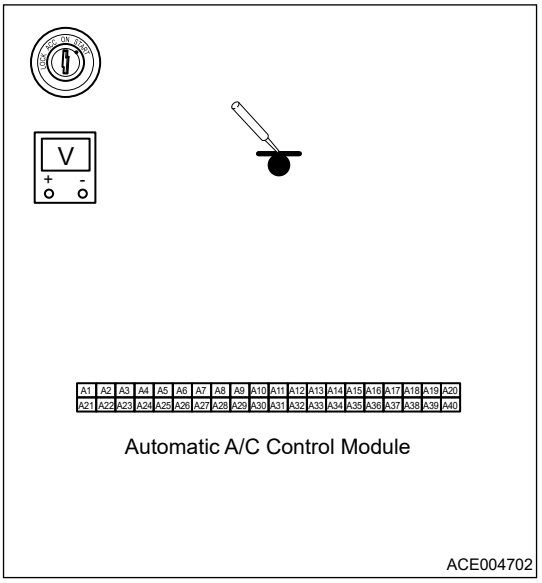
Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding air quality sensor signal terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (- corresponding air quality sensor power supply terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (- corresponding air quality sensor ground terminal) - Body ground	Turn ENGINE START STOP switch to OFF	< 1 Ω



(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between A/C control module connector (corresponding air quality sensor terminal) and body ground.

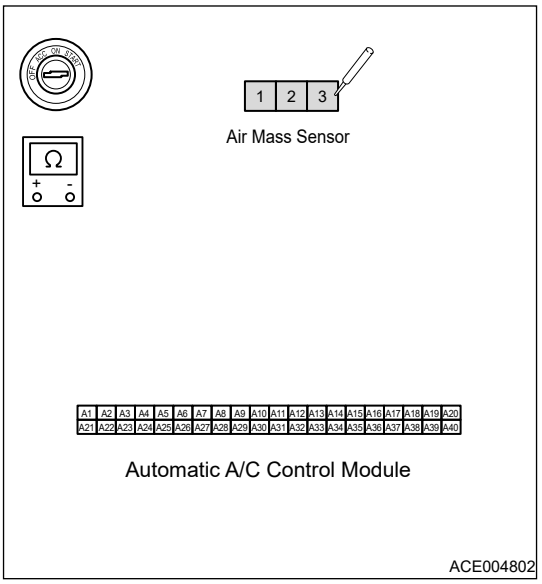
Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding air quality sensor signal terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (- corresponding air quality sensor power supply terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V
A/C control module connector (- corresponding air quality sensor ground terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V



(d) Turn ENGINE START STOP switch to OFF.

(e) Using a multimeter, measure the resistance between A/C control module connector (corresponding terminal) and air quality sensor connector terminal.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding terminal) - Air quality sensor (3)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module (corresponding terminal) - Air quality sensor (1)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module (corresponding terminal) - Air quality sensor (2)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω



NG → **Repair or replace air quality sensor wire harness as necessary**

OK

3	**Check air quality sensor**

(a) Replace air quality sensor to compare and verify.
(b) Check if the same DTC appears.

NG → **Replace air quality sensor**

OK

4	Reconfirm DTCs

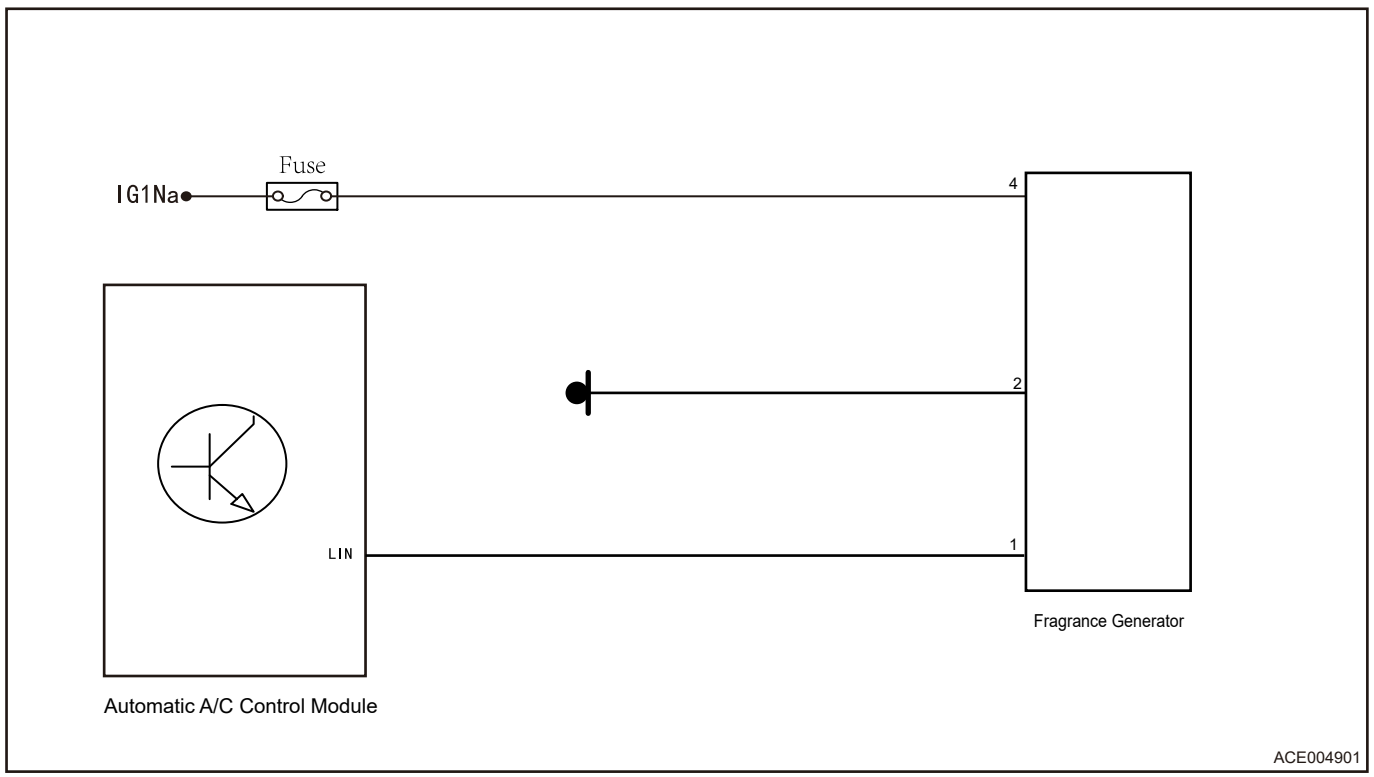
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B141C_01	Fragrance Controller Step Motor
DTC	B1419_15	Fragrance Controller Fan

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fragrance sensor fuse

(a) Turn ENGINE START STOP switch to OFF.
(b) Check fragrance sensor fuse for bad contact, bending, distortion, poor contact, etc.

NG → **Repair or replace corresponding fuse**

OK

2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the fragrance generator connector.
(c) Disconnect the A/C control module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

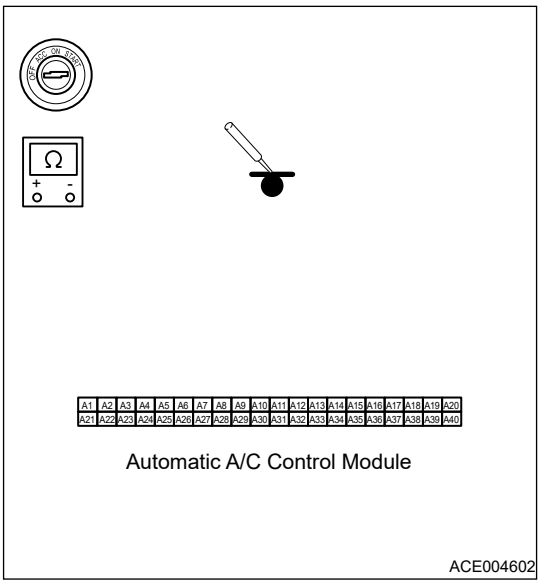
NG → **Repair or replace wire harness or connector as necessary**

OK

3	Check resistance between fragrance generator circuit and ground

(a) Using a multimeter, measure the resistance between A/C control module connector (corresponding fragrance generator terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
A/C control module connector (-corresponding fragrance sensor signal terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (-corresponding fragrance sensor power supply terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
A/C control module connector (-corresponding fragrance sensor ground terminal) - Body ground	Turn ENGINE START STOP switch to OFF	< 1 Ω



NG → **Repair or replace fragrance sensor wire harness as necessary**

OK

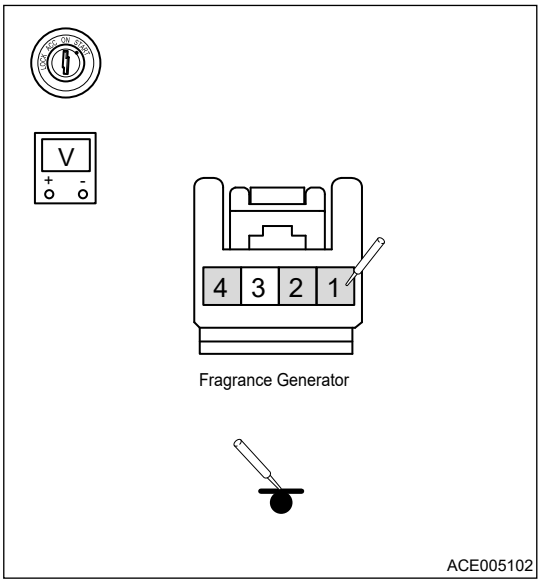
4	Check voltage between fragrance generator circuit and ground

(a) Connect the A/C control module connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between fragrance generator terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Fragrance sensor (- signal terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 - 11 V
Fragrance sensor (- power supply terminal) - Body ground	Turn ENGINE START STOP switch to ON	12 V
Fragrance sensor (- ground terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V



NG → **Repair or replace fragrance generator wire harness as necessary**

OK

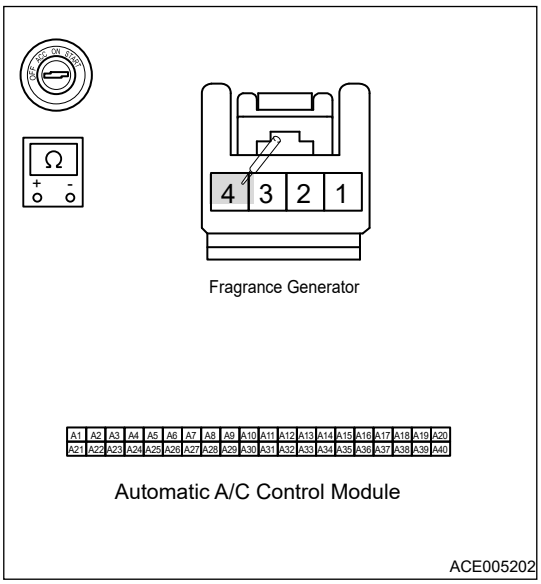
5	Check circuit between fragrance generator and A/C control module

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the A/C control module connector.

(c) Using a multimeter, measure the resistance between fragrance generator connector terminal and A/C control module (- corresponding terminal).

Multimeter Connection	Condition	Specified Condition
A/C control module connector (- corresponding terminal) - Fragrance generator (1)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω



NG → **Repair or replace wire harness between fragrance generator and A/C control module as necessary**

OK

6	Check fragrance generator

(a) Replace fragrance generator to compare and verify.
(b) Check if the same DTC appears.

NG → **Replace fragrance generator**

OK

7	Reconfirm DTCs

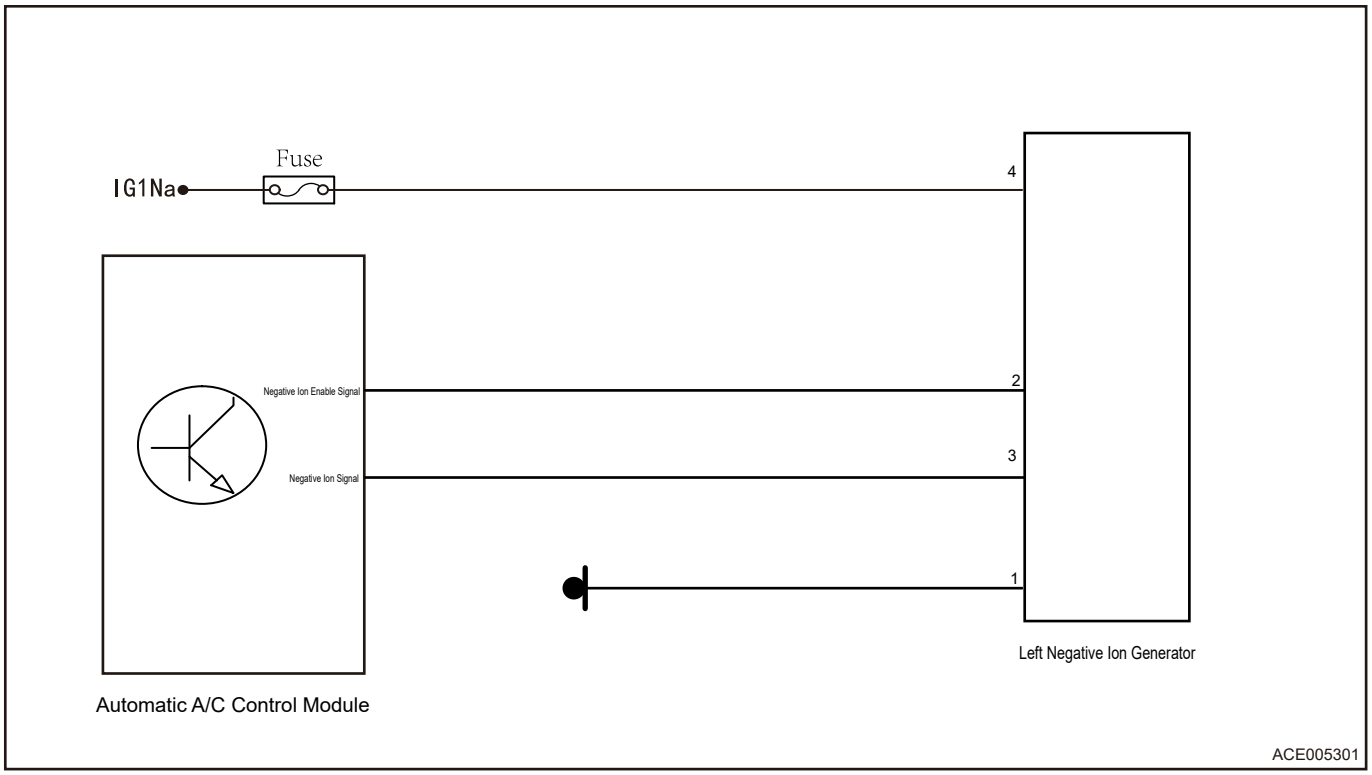
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1416_1C	Left Anion Generator Feedback Voltage Out Of Range

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check left anion generator fuse

(a) Check if left anion generator fuse is normal.

NG → **Replace fuse**

OK ↓

2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the left anion generator connector.
(c) Disconnect the A/C control module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

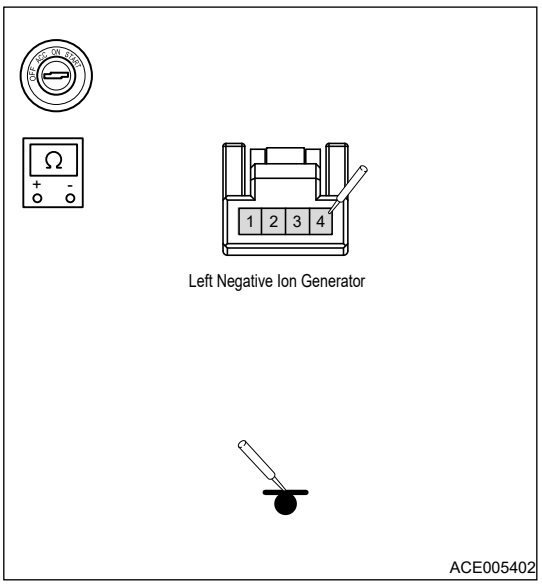
NG → **Repair or replace wire harness or connector as needed**

OK ↓

3	Check resistance between left anion generator circuit and ground

(a) Using a multimeter, measure the resistance between left anion generator connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left anion generator (signal terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Left anion generator (power supply terminal) - Body ground	Turn ENGINE START STOP switch to OFF	∞
Left anion generator (ground terminal) - Body ground	Turn ENGINE START STOP switch to OFF	< 1 Ω



NG → **Repair or replace left anion generator wire harness as necessary**

OK

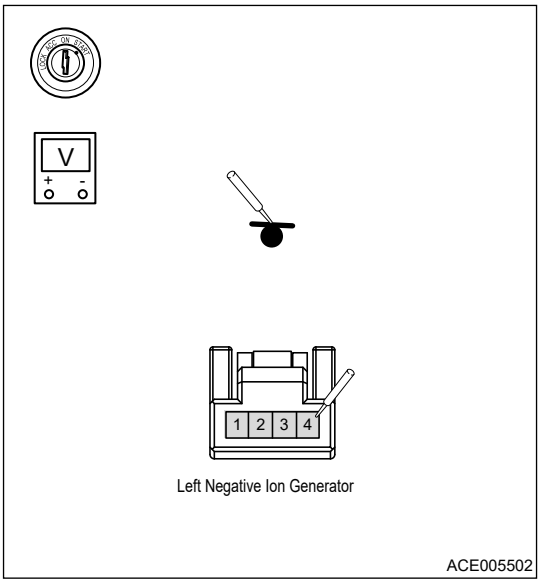
4	Check voltage between left anion generator circuit and ground

(a) Connect the A/C control module connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Using a multimeter, measure the voltage between left anion generator connector terminal and body ground.

Multimeter Connection	Condition	Specified Condition
Left anion generator (signal terminal) - Body ground	Turn ENGINE START STOP switch to ON	0.1 - 4.9 V
Left anion generator (power supply terminal) - Body ground	Turn ENGINE START STOP switch to ON	12 V
Left anion generator (ground terminal) - Body ground	Turn ENGINE START STOP switch to ON	0 V



NG → **Repair or replace left anion generator wire harness as necessary**

OK

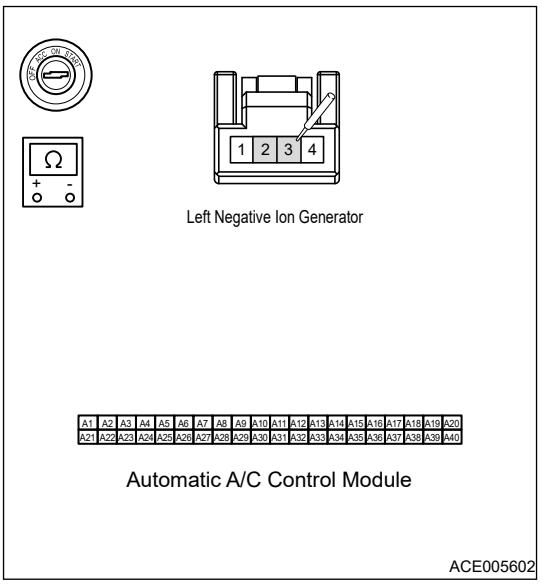
5	Check circuit between left anion generator and A/C control module

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the A/C control module connector.

(c) Using a multimeter, measure the resistance between left anion generator connector terminal and A/C control module connector (corresponding terminal).

Multimeter Connection	Condition	Specified Condition
A/C control module (corresponding terminal) - Left anion generator (2)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω
A/C control module (corresponding terminal) - Left anion generator (3)	Turn ENGINE START STOP switch to OFF	⩽ 1 Ω



NG → **Repair or replace wire harness between left anion generator and A/C control module as necessary**

OK

6	Check left anion generator

(a) Replace left anion generator to compare and verify.
(b) Check if the same DTC appears.

NG → **Replace left anion generator**

OK

7	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired.**

DTC	U1300_55	Software Configuration Error

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

OK → **System is normal and there is no DTC**

NG → **Replace A/C control module**

DTC	U0073_88	CAN Busoff
DTC	U0140_87	Lost Communication with BCM

DTC	U0155_87	Lost Communication with ICM
DTC	U0151_87	Lost Communication with ABM
DTC	U0245_87	Lost Communication with RRM
DTC	U0100_87	Lost Communication with EMS
DTC	U0129_87	Lost Communication with BSM
DTC	U0160_87	Lost Communication with AIPM
DTC	U1176_87	Lost Communication with Fragrance

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the A/C control module connector.
(c) Disconnect the related module connector.
(d) Check connector for bad contact, bending, distortion, poor contact, etc.
(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

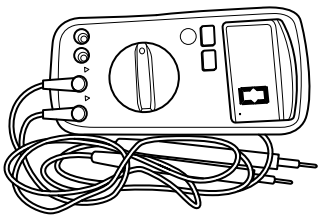
OK

2	**Refer to "CAN Network System" for troubleshooting**

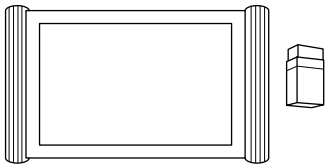
5 On-vehicle Service

5.1 Tools

■ **General Tools**

Tool Name	Tool Drawing
Digital Multimeter	 RCH000206

■ **Special Tools**

Tool Name	Tool Drawing
Diagnostic tester	 RCH000106

5.2 A/C Control Panel

■ **Removal**

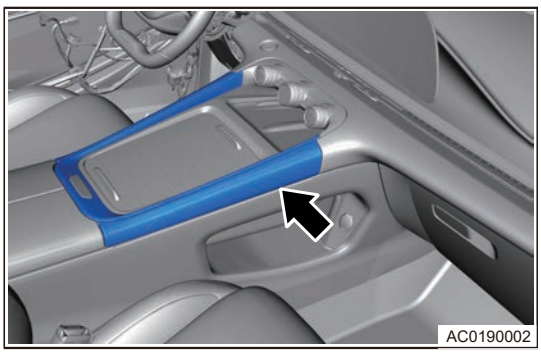
⚠ Caution

- **Be careful not to scratch instrument panel surface when removing central control panel cover and A/C panel.**

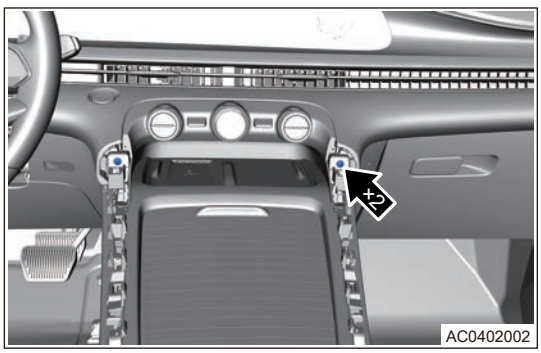
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Using an interior crow plate, pry off auxiliary fascia console trim strip assembly carefully.


AC0190002

(4) Remove 2 fixing screws (arrow) from automatic A/C control panel assembly.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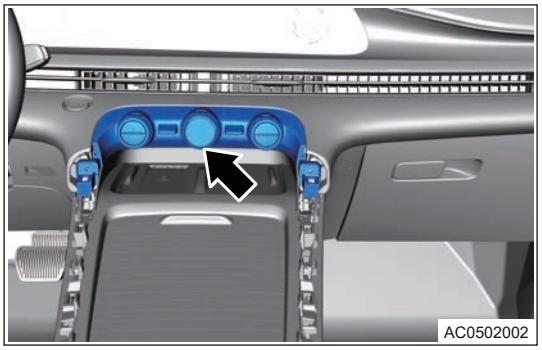
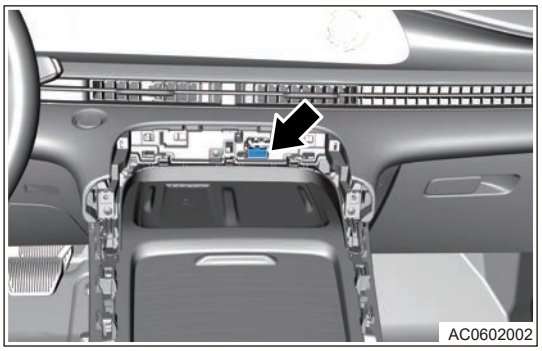
(5) Using an interior crow plate, carefully pry off A/C control panel assembly.



(6) Disconnect the A/C control panel connector (arrow).



(7) Remove the A/C control panel assembly.

■ **Installation**

⚠ **Caution**
• **Be careful not to scratch the panel and instrument panel parts during installation.**

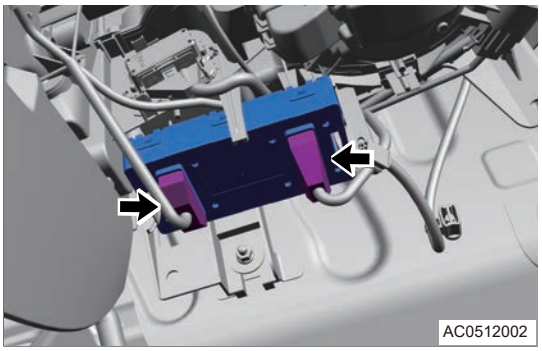
(1) Connect the A/C control panel connector.
(2) Install A/C control panel assembly, tighten 2 fixing screws.
Tightening torque: 1.5 ± 0.5 N·m

(3) Install the auxiliary fascia console trim strip assembly.
(4) Connect the negative battery cable.

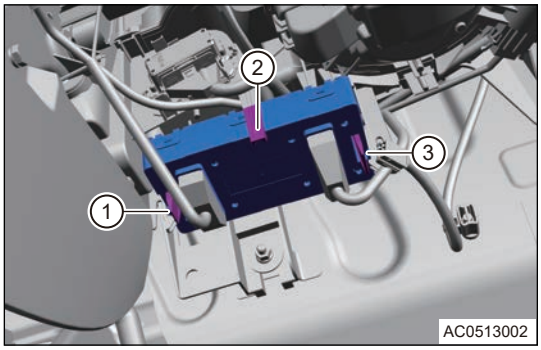
5.3 Automatic A/C Control Module

■ **Removal**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the instrument panel right soundproof board assembly.
(4) Disconnect the automatic A/C control module connectors (arrow).



(5) Move clips (1), (2), and (3) on HVAC to both sides to separate module from clip installation structure.



(6) Remove the automatic A/C control module.

■ Installation

(1) Two mounting holes of automatic A/C control module with different sizes are aligned with two mounting guide plates on HVAC housing.

(2) Apply a positive thrust to Z so that 3 clips on HVAC are fully clamped into automatic A/C control module.

(3) Connect the automatic A/C control module connector.

(4) Install the instrument panel right muffler board assembly.

(5) Connect the negative battery cable.

8.2 A/C COOLING

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Take extra care when servicing A/C system under high pressure.

(2) Because there is refrigerant under high pressure in A/C system. It must be serviced by professional technician. Otherwise, a wrong service procedure may cause a serious danger or fatal injury.

(3) If A/C system pressure is released unexpectedly, ventilate work area before servicing. In a closed work place, if a large amount of refrigerant is discharged, it may cause oxygen reduction and result in smothering, causing a serious or fatal injury.

(4) Never drain refrigerant in A/C system into the atmosphere directly, and avoid environmental contamination.

1.2 Precautions

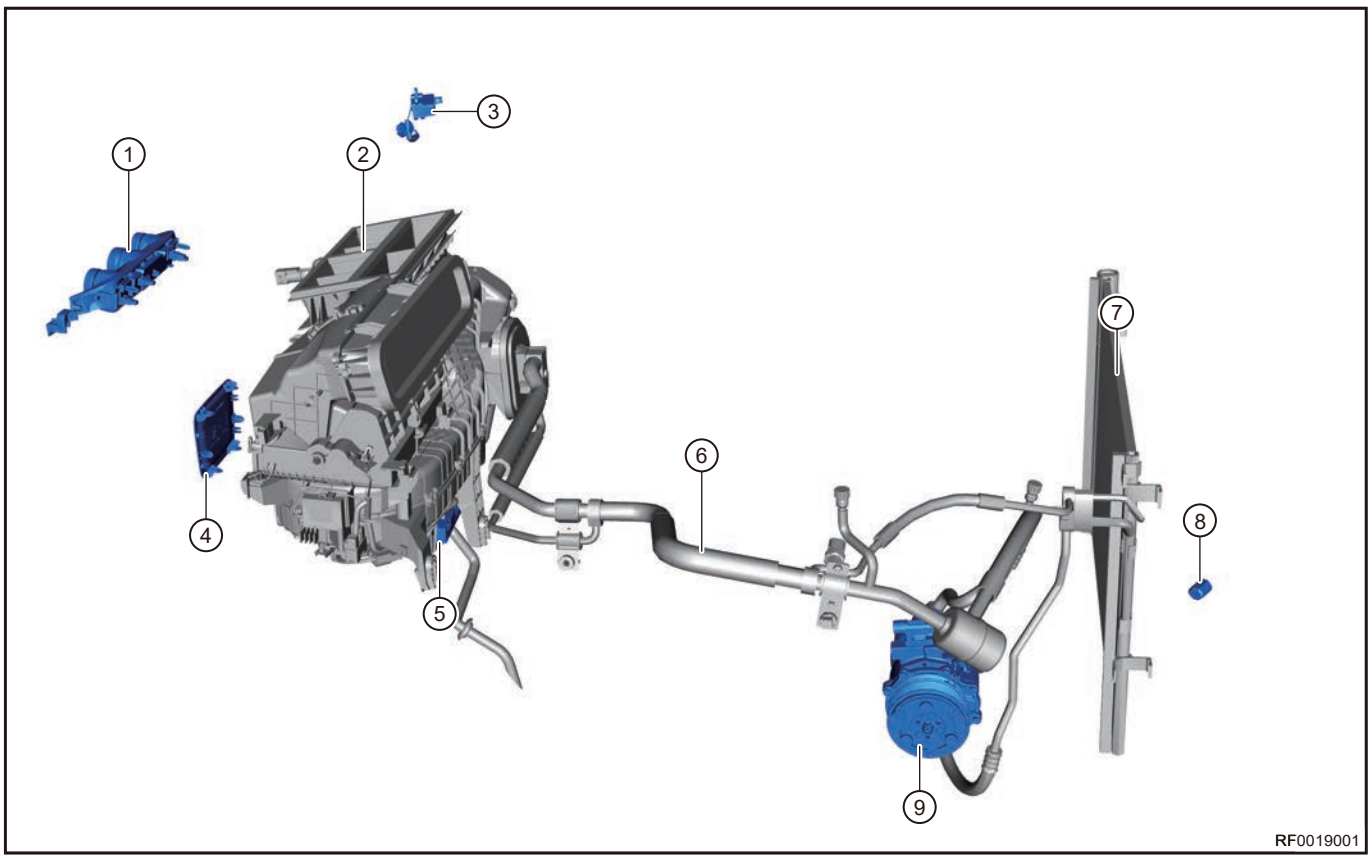
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Special service equipment for R134a refrigerant must be used to recover/charge refrigerant.

(2) Disconnected A/C line and connecting part should be sealed to prevent foreign matter from entering.

2 System Overview

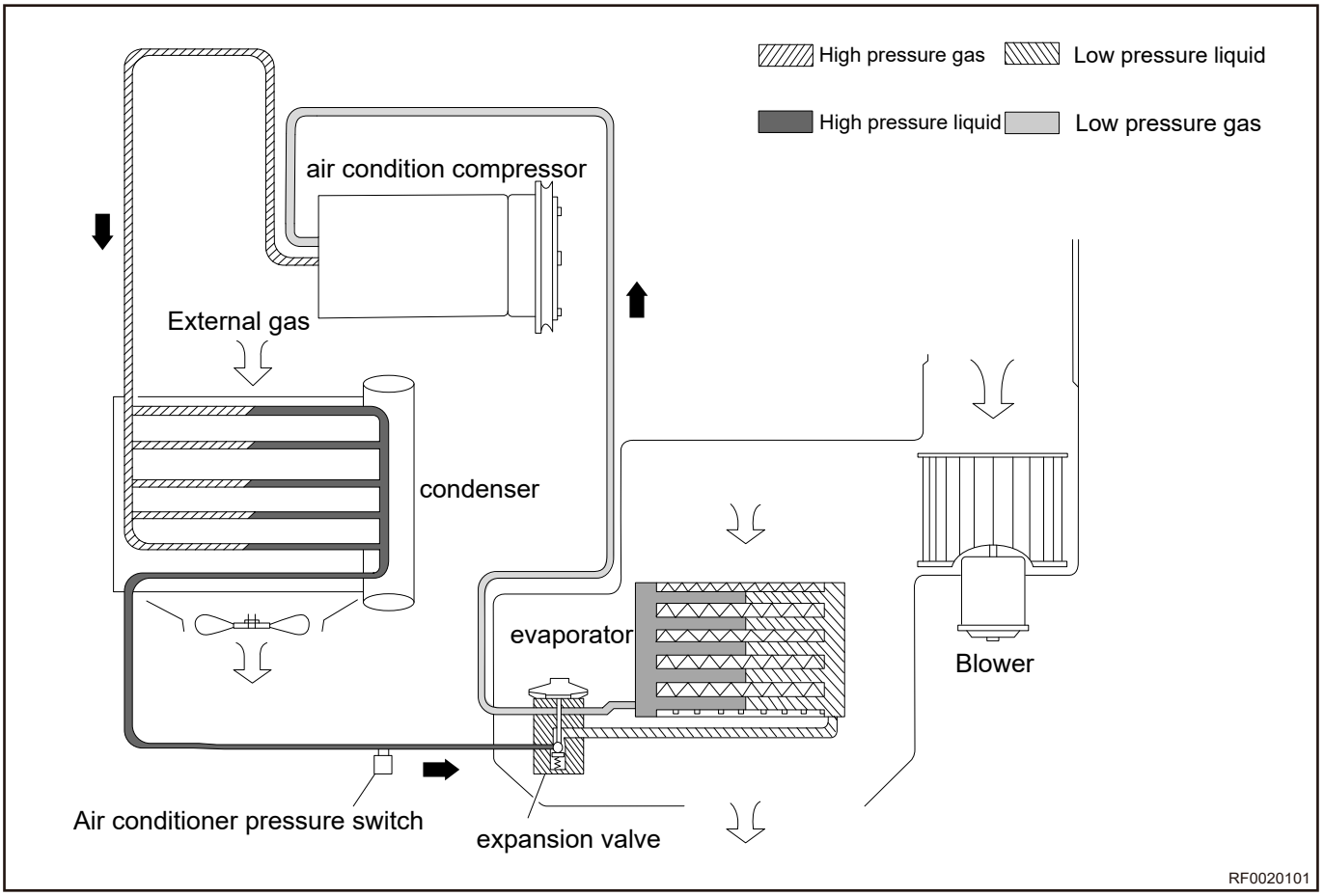
2.1 System Components Diagram



1	Automatic A/C Control Panel Assembly	6	A/C Line Assembly
2	Automatic HVAC Assembly	7	Condenser Assembly
3	Anion Generator	8	Outside Temperature Sensor Assembly
4	Air Freshner Block Cover	9	A/C Compressor Assembly
5	Automatic A/C Control Module		

It adopts an integrated heating and cooling air conditioning, which way with external control variable displacement compressor + expansion valve control method, and uses environment-friendly refrigerant R134a. This system consists of basic components: compressor, condenser, HVAC, pipeline and other accessories such as pressure switch, O-ring, etc.

2.2 System schematic diagram

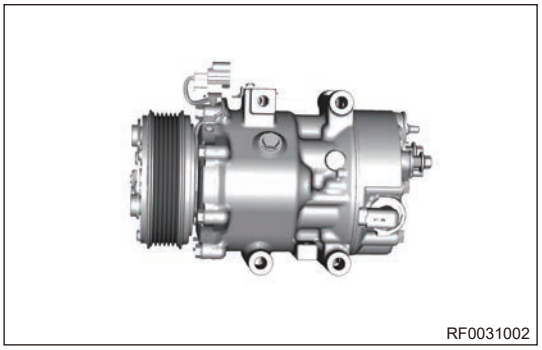


Outside fresh air enters air inlet filter assembly through cowl top opening at the right side of windshield base. Fresh air flows through evaporator core and heater core, and then enters vehicle through outlets on instrument panel and floor. Temperature can be adjusted by air volume knob on A/C control panel. Turn on the compressor assembly by pressing A/C switch on DVD A/C interface. Refrigerant is compressed by compressor assembly and converted into high temperature/pressure gas, which is then condensed into high pressure liquid in the condenser. Then the liquid is filtered and dried by receiver drier (integrated with condenser) and delivered to expansion valve and becomes low-pressure liquid through throttling and depressurization. Finally the liquid enters evaporator in vehicle and absorbs heat and evaporates, thus refrigeration is achieved. A/C heating is realized by engine coolant circulation system. Heater core is a main component of heating system. With engine running, engine coolant flows from engine water pump to heater core, and the heater core transmits the heat from engine coolant to the air that flows through heater core. At this time, A/C switch is off. The air flowing through heater core becomes hot wind through heat exchanging, thus providing heating. Temperature adjustment control mechanism can be controlled by rotating temperature adjustment knob. Mix damper closes when temperature adjustment knob is rotated counterclockwise to MAX COOL position. If airflow does not flow through heater core, the heat transmission will not occur.

2.3 Component Operation Description

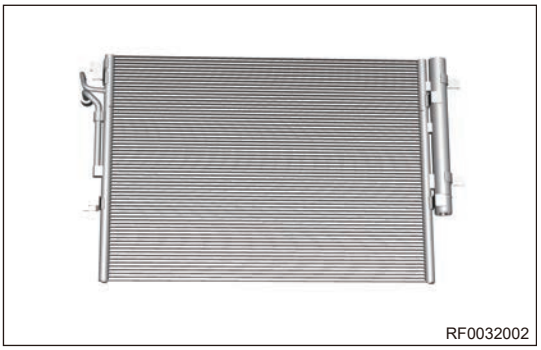
■ A/C Compressor

Compressor is an important element of refrigeration system. It compresses the low temperature/pressure refrigerant vapor from evaporator and makes it become high temperature/pressure refrigerant vapor. It adopts a variable displacement compressor. When refrigeration system is operating, the electromagnetic clutch of variable capacity compressor is always in the engaged status. It can change the piston displacement continuously and steadily within a certain range by external control valve according to the change of refrigeration load and engine speed, so as to realize the regulation of system flow.


RF0031002

■ Condenser

Condenser contains desiccant that is used to remove water from the refrigerant in line. Compressor compresses the refrigerant into high temperature/pressure refrigerant gas, which is then discharged into the condenser, in which heat is released to the cooling medium air and condensed into high pressure liquid.


RF0032002

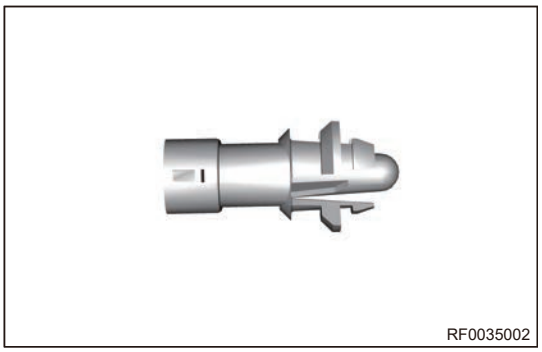
■ A/C Pressure Sensor

A/C pressure sensor is installed on high pressure pipe and used to monitor the refrigerant pressure and output the refrigerant pressure signal to ECM. ECM controls compressor based on the signal transmitted from A/C pressure sensor.


RF0033002

■ Ambient Temperature Sensor

Ambient temperature sensor is installed at lower left of front impact beam and used to detect the ambient temperature and control the automatic mode of air conditioning. The sensor sends signal to automatic A/C module. The resistance of ambient temperature sensor changes with the change of ambient temperature. Resistance increases as temperature decreases. Resistance decreases as temperature increases.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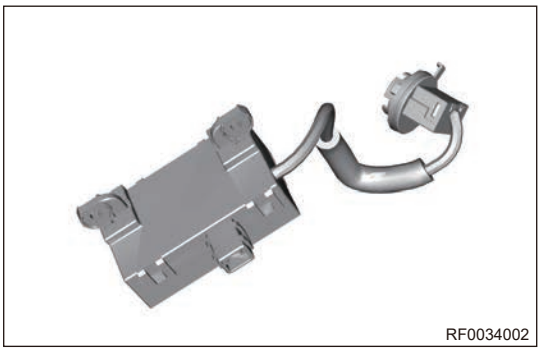
■ **Anion Generator**

Anion generator is installed on blower air duct. The anion generator boosts the low voltage into positive high voltage and negative high voltage by booster circuit, and ionizes the air under the action of positive high voltage electric field and negative high voltage electric field to generate a large number of positive and negative ions.



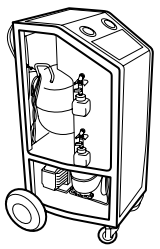
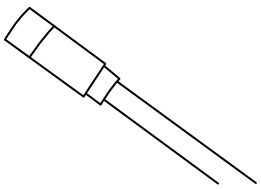
Hint:

The connector of negative ion generator must be disconnected when cleaning the air conditioning line after sale to avoid fire.

3 On-vehicle Service

3.1 Special tool and equipment

■ **General Tools**

Tool Name	Tool Drawing
Refrigerant Recycling Machine	 S00034
Gas Leak Detector	 RCH009206

3.2 Fasteners Torque List

■ **Torque Specifications**

Item	Tightening torque
Compressor Fixing Bolt	25 ± 0.5 N·m
A/C Coaxial Line Assembly Fixing Bolt	9 ± 0.5 N·m
A/C Coaxial Line Assembly Fixing Nut	9 ± 0.5 N·m
Expansion Valve Inlet and Outlet Inner Hexagon Bolt	9 ± 0.5 N·m
Fixing Bolt Between A/C Coaxial Line Assembly and Compressor Assembly	25 ± 0.5 N·m
Fixing Bolt Between Compressor and Condenser Line Assembly	25 ± 0.5 N·m

■ **Refrigerant Charging Specification**

Description	Charging Capacity (g)
R134a	600 ± 15

■ **Refrigerant Oil Charging Specifications**

Description	Charging Capacity (ml)
Evaporator Replacement	30
Compressor Assembly Replacement	Pour out all the oil inside new compressor, supplement according to original vehicle actual pouring amount
Condenser Replacement	30
Replace A/C line	10

3.3 On-vehicle Inspection

- A/C refrigerant lines and hoses are used to transfer refrigerant among A/C system components. Any twist or bend in refrigerant lines and hoses will reduce performance of A/C system and refrigerant flow in system.
- There remains high pressure in refrigerant when A/C compressor assembly is operating. It is necessary to ensure that each connecting part in A/C system is sealed well. Check all system lines at least once a year to ensure that they are in good condition and properly routed. Refrigerant lines and hoses cannot be repaired and must be replaced if leakage or damage exists.

■ **General inspection**

- Check if there exists any oil or dust in each joint of A/C line. If this occurs, there may exist leak.
- Check if condenser surface is dirty and if fins are deformed.
- Check if there are harsh noises while compressor assembly is operating normally.
- Temperature difference should be noticeable by touching intake line and exhaust line of compressor assembly with hand. Normally, temperature of low pressure line is relatively low and that of high pressure line is relatively hot. Feel the temperature difference between condenser inlet pipe and outlet pipe, under normal conditions, temperature of inlet pipe is higher than that of outlet pipe. If you feel the temperature difference between expansion valve inlet and outlet line with hand, under normal conditions, temperature of expansion valve inlet line is relatively hot and that of outlet line is relatively cool, and the temperature difference between them is noticeable.

■ **Using pressure gauge set, check the refrigerant pressure.**

(1) Connect the manifold pressure gauge set. After following conditions are met, read pressure values on pressure gauge. Measurement Condition:

- Inner/outer circulation switch is in outer circulation position.
- Engine runs at approximately 2000 rpm.
- Adjust temperature knob to Max. Cool.
- Set blower speed control switch to highest band.
- Turn on A/C switch.

Hint:
Observe the pressure value on pressure gauge, under normal condition, low pressure is 0.15-0.20 Mpa, high pressure is 1.3-1.7 Mpa.

■ Compressor assembly noise inspection

Hint:

- When checking noise related to A/C system, you must first know the conditions under which the noise occurs. These conditions include: weather, vehicle speed, engine speed, engine temperature and any other special conditions. Loud noises during A/C operation can often mislead someone. For example, some sounds, like a failed bearing, may be caused by loose bolts, mounting brackets or a loose compressor assembly.
- A/C compressor assembly must be replaced if any abnormal noise is heard from compressor assembly.
- Noise may occur from drive belt at different engine speeds, and you may mistake it for a noise from A/C compressor assembly.

(1) Select a quiet place for testing.

(2) Duplicate customer's feedback information as much as possible.

(3) Turn on and off A/C several times to identify compressor assembly noise clearly.

(4) Check the condition of compressor assembly belt.

(5) Check the hub, pulley, bearing assembly of compressor assembly. Make sure that hub and pulley are aligned correctly, and pulley bearing is securely installed to A/C compressor assembly.

(6) Check if refrigerant line routes incorrectly, and if it is damaged or has an interference that could result in an abnormal noise. Also, check the refrigerant line for twist or bend, otherwise the refrigerant will be limited to flow, which will cause a noise.

(7) Loosen all compressor assembly tightening bolts and retighten them.

(8) If noise occurs when liquid refrigerant in A/C suction line is under a slugging condition, replace the condenser and check refrigerant oil level and charging condition for refrigerant.

(9) If the slugging condition still exists after replacing condenser, replace the A/C compressor assembly.

⚠ Caution

DO NOT race engine when vacuum pump operates or vacuum exists in A/C system. Otherwise, A/C compressor assembly will be damaged seriously.

■ Refrigerant leakage inspection

⚠ Warning

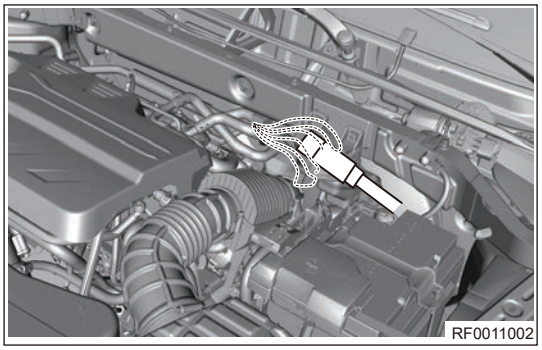
- **DO NOT perform a pressure test or a leakage test to R134a service device or vehicle A/C system with compressed air. Mixture of air and R134a is inflammable at high pressure. This mixture has potential danger, and it may cause a fire or explosion, resulting in vehicle damage, personal injury or death.**
- **Avoid inhaling vapor or moisture from the A/C refrigerant and refrigerant oil.**
- **Only use technical service device to discharge R134a system. If system discharges unexpectedly, ventilate work place before servicing.**
- **If A/C refrigerant filling amount is empty or low, A/C system may have leak. Check all A/C lines, joints and parts for remaining oil. The remaining oil is indication mark of A/C system leaking position.**

(1) After recharging refrigerant, use gas leak detector to check refrigerant gas for leakage.

(2) Perform operations under following conditions:

- Turn ENGINE START STOP switch to OFF.
- Ensure the ventilation is well (gas leak detector may react to volatile gases which are not from refrigerant, such as gasoline vapor or exhaust gas).
- Repeat the test for 2 or 3 times.
- Make sure that there is some refrigerant remaining in the refrigeration system.

(3) Place gas leak detector near the joint of A/C line, and check the A/C line for leakage. If gas leak detector makes a sound, it indicates that a leakage exists. Repair or replace the leakage A/C line as necessary.



(4) Disconnect A/C pressure sensor connector, and use same procedures to check A/C pressure sensor for leakage. Replace A/C pressure sensor as necessary.

(5) Insert gas leak detector into evaporator tank assembly, and use same procedures to check evaporator for leakage. Clean or replace the evaporator core assembly as necessary.

(6) Use same procedures to check condenser for leakage. Clean or replace the condenser assembly as necessary.

3.4 Refrigerant recovering/draining

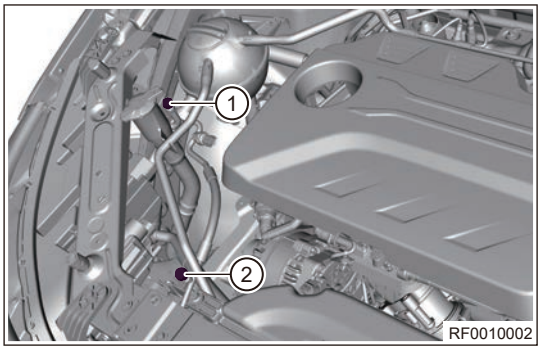
⚠ Warning

- **Take extra care when servicing A/C system under high pressure.**
- **Because there is refrigerant under high pressure in A/C system. It must be serviced by professional technician. Otherwise, a wrong service procedure may cause a serious danger or fatal injury.**
- **If A/C system pressure is released unexpectedly, ventilate work area before servicing. In a closed work place, if a large amount of refrigerant is discharged, it may cause oxygen reduction and result in smothering, causing a serious or fatal injury.**
- **Never drain refrigerant in A/C system into the atmosphere directly, and avoid environmental contamination.**
- **It is necessary to recover refrigerant with R134a refrigerant special recycling machine.**
- **DO NOT work near open flames.**
- **Always dispose of recovered refrigerant as specified.**
- **Never charge R-12 to refrigerant system which is designed to use R134a. This refrigerant is incompatible, which could damage the A/C system.**
- **DO NOT race engine when vacuum pump operates or vacuum exists in A/C system. Otherwise, A/C compressor assembly will be damaged seriously.**

(1) Open the engine hood and remove the engine compartment trim cover assembly.

(2) Loosen the joint cover of A/C high/low pressure line.

(3) Connect the red connector to A/C high pressure line joint (2), and connect the blue connector to A/C low pressure line joint (1).



(4) Open the high pressure valve and low pressure valve of refrigerant recycling machine.

(5) Choose "recovering" item on machine and make it start to operate.

(6) Check the low pressure value on pressure gauge to ensure that recycling is completed, and then turn off machine.

(7) Disconnect the connection between refrigerant recycling machine and A/C line joint.

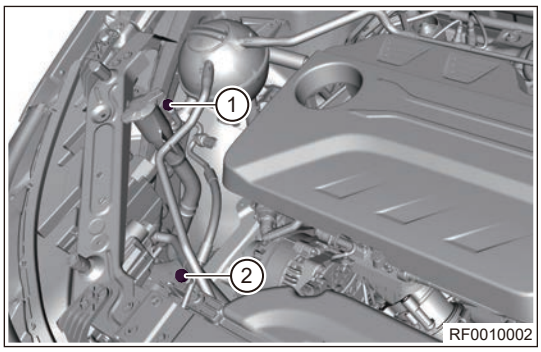
(8) Reinstall the cover onto refrigerant line joint.

3.5 Vacuum pumping

(1) Open the engine hood and remove the engine compartment trim cover assembly.

(2) Loosen the joint cover of A/C high/low pressure line.

(3) Connect the red connector to A/C high pressure line joint (2), and connect the blue connector to A/C low pressure line joint (1).



(4) Open the high pressure valve and low pressure valve of refrigerant recycling machine.

(5) Choose "vacuum pumping" item on machine and the time setting is 15 minutes, then choose OK and make it start to operate.

(6) Wait for 10 minutes after completing operation, check if there is any change in A/C system vacuum. If there is any change, the A/C system leakage may exist, you should check and repair the A/C system. If there is no change, proceed to perform refrigerant charging procedures.

3.6 Refrigerant recharging

⚠ Warning

- **A small amount of refrigerant oil in A/C system will be discharged when recovering and draining refrigerant. When filling A/C system, be sure to supplement refrigerant oil, as some amount of refrigerant oil are lost during recovering.**
- **DO NOT fill excessive refrigerant. Otherwise, it will cause excessive pressure to compressor assembly, resulting in compressor assembly noise and A/C system failure.**
- **Always perform vacuum pumping before recharging refrigerant.**

(1) Perform vacuum pumping with a vacuum pump.

(2) Add refrigerant oil after checking that there is no leakage in A/C system.

(3) Perform vacuum pumping for 3 minutes again after adding refrigerant oil, then charge refrigerant.

(4) Choose "charging" item on machine and set the amount of charging to specified value, then choose "OK" and make it start to operate.

(5) Open the suction valve and close the discharging valve, and then open the charging valve to allow refrigerant to flow into the system.

(6) When the delivery of refrigerant has stopped, close the charging valve.

(7) If charged refrigerant is not delivered to specified position, start the engine to operate the A/C compressor assembly.

(8) Open the charging valve to deliver the remaining refrigerant to A/C system.

⚠ Warning

At this time, do not open exhaust (high pressure) valve. Failure to do so may result in personal injury or even death.

(9) Perform A/C system pressure test after charging.

(10) Remove the connecting pipe for refrigerant charging after the test is completed.

(11) Reinstall the cover onto A/C line joint.

3.7 Refrigerant oil recovering

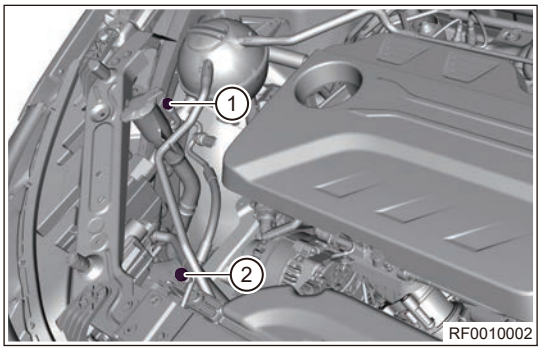
⚠ Warning

- **Special service equipment for R134a refrigerant must be used.**
- **Always keep work area in good ventilation, because A/C system is easy to leak.**
- **Always dispose of recovered refrigerant as specified.**
- **Refrigerant oil must be charged after replacing A/C system components or recovering refrigerant.**

(1) Open the engine hood and remove the engine compartment trim cover assembly.

(2) Loosen the joint cover of A/C high/low pressure line.

(3) Connect the red connector to A/C high pressure line joint (2), and connect the blue connector to A/C low pressure line joint (1).



(4) Open the high pressure valve and low pressure valve of refrigerant recycling machine.

(5) Recover refrigerant oil according to instructions on the machine.

(6) Record amount of recovered refrigerant oil.

(7) Disconnect the connection between refrigerant recycling machine and A/C line joint.

(8) Reinstall the joint cover onto refrigerant line joint.

3.8 Refrigerant oil charging

(1) Perform vacuum pumping with a vacuum pump. Wait for 10 minutes after completing operation, check if there is any change in A/C system pressure. If there is any change, the A/C system leakage may exist, you should check and repair the A/C system. If there is no change, proceed to perform refrigerant oil charging procedures.

(2) Open the suction valve and close the exhaust valve, and then open the charging valve to allow refrigerant oil to flow into the system.

(3) Close the charging valve after refrigerant oil charging is completed.

(4) Perform vacuum pumping again for 3 minutes.

(5) Continue to perform refrigerant charging procedures after operation is completed.

■ Refrigerant Oil Charging Amount Specifications

Items	A/C Compressor Assembly Replacement	Condenser Replacement	Evaporator Tank Replacement	Pipe replacement
Refrigerant Oil Charging Amount	Supplement according to actual pouring amount	30 ML	30 ML	10 ML

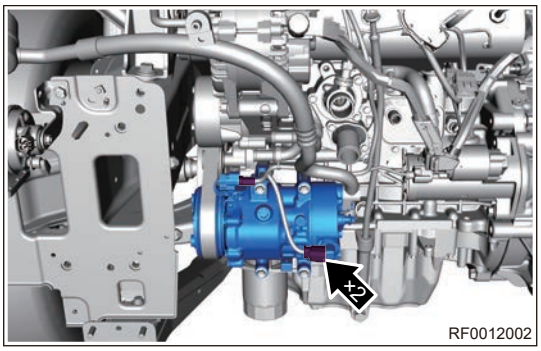
3.9 Compressor Assembly

■ Removal

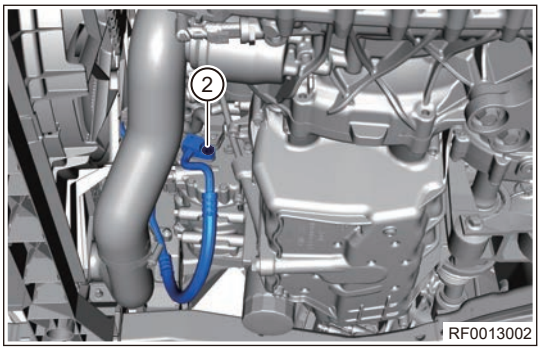
⚠ Warning

- **Be sure to follow safety precautions before performing this procedure. Failure to do so may result in serious personal injury or even death.**
- **Special service equipment for R134a refrigerant must be used to recover/charge refrigerant.**
- **Always keep work area in good ventilation.**
- **Disconnected A/C line and connecting part should be sealed to prevent foreign matter from entering.**
- **When replacing compressor assembly, it is necessary to measure the refrigerant oil amount removed from new A/C compressor assembly.**

(1) Recover the refrigerant from A/C system assembly.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Disconnect the negative battery cable.
(4) Remove the engine lower protector assembly.
(5) Remove the accessory drive belt.
(6) Disconnect the compressor assembly wire harness connector.


RF0012002

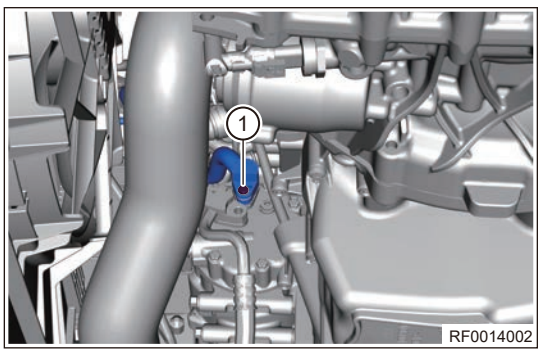
(7) Remove 1 fixing bolt (1) between compressor to condenser line assembly and compressor assembly, and disengage the compressor to condenser line assembly from compressor assembly.



RF0013002

Hint:
Use plug to seal line joint and compressor joint.

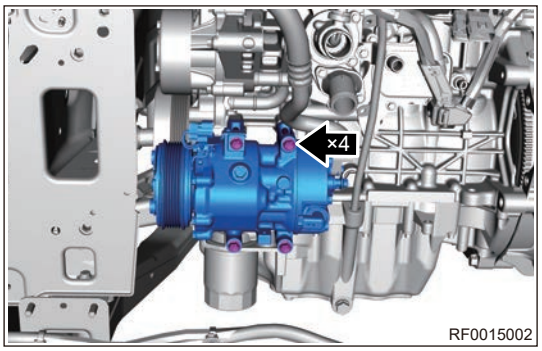
(8) Remove 1 fixing bolt (2) between A/C coaxial line assembly and compressor assembly and detach A/C coaxial line assembly from compressor assembly.



RF0014002

Hint:
Use plug to seal line joint and compressor joint.

(9) Remove 4 fixing bolts between compressor assembly and mounting bracket.



(10) Remove the compressor carefully.

■ **Installation**

⚠ Caution

- **Tighten fixing bolts and nuts to specified torques.**
- **It is necessary to replace refrigerant line O-ring seal when installing refrigerant line. Failure to do so may result in refrigerant leakage.**
- **Lubricate new rubber O-ring with clean refrigerant oil and install it to refrigerant line joint.**
- **Only use specified O-ring, as it is made of special materials for R134a system.**
- **Only use recommended refrigerant oil which is applicable to A/C compressor assembly on vehicle.**
- **When installing a new compressor assembly, always remove a certain amount of refrigerant oil from new A/C compressor assembly as specified.**
- **Perform recharging for A/C system and check for refrigerant leakage.**

(1) Install the compressor on the correct position of the compressor bracket.

(2) Install 4 fixing bolts between compressor assembly and mounting bracket.

Torque: 22.5 ± 2.5 N·m

(3) Install A/C coaxial line assembly, and install 1 fixing bolt between A/C coaxial line assembly and compressor assembly.

Torque: 25 ± 3 N·m

(4) Install compressor to condenser line assembly, and install 1 fixing bolt between compressor to condenser line assembly and compressor assembly.

Torque: 25 ± 3 N·m

(5) Connect the compressor assembly wire harness connector.

(6) Install the accessory drive belt.

(7) Install the engine lower protector assembly.

(8) Check system for leakage.

(9) Vacuum pumping and refrigerant recharging.

(10) Connect the negative battery cable.

(11) Turn the ENGINE START STOP switch to ON, test compressor operation.

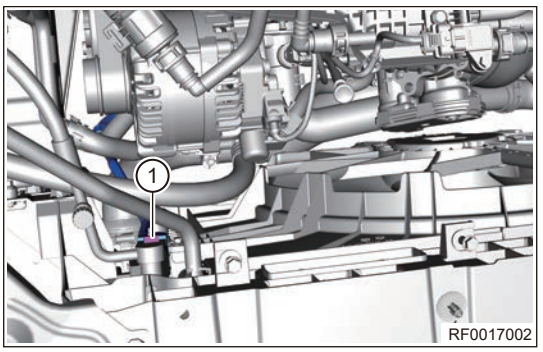
3.10 Condenser Assembly

■ Removal

⚠ Warning

- **Be sure to follow safety precautions before performing this procedure. Failure to do so may result in serious personal injury or even death.**
- **Always keep work area in good ventilation.**
- **Disconnected A/C line and connecting part should be sealed to prevent foreign matter from entering.**

(1) Remove the engine compartment trim cover assembly.
(2) Recover the refrigerant from A/C system.
(3) Turn off all electrical equipment and ENGINE START STOP switch.
(4) Disconnect the negative battery cable.
(5) Remove the front bumper assembly.
(6) Remove the front impact beam assembly.
(7) Remove the air deflector assembly.
(8) Remove 1 fixing nut (1) between compressor to condenser line assembly and A/C coaxial line assembly and condenser.



(9) Carefully remove the condenser assembly.

■ Installation

⚠ Caution

- **Tighten fixing bolts and nuts to specified torques.**
- **It is necessary to replace refrigerant line O-ring seal when installing refrigerant line. Failure to do so may result in refrigerant leakage.**
- **Lubricate new rubber O-ring with clean refrigerant oil and install it to refrigerant line joint.**
- **Only use specified O-ring, as it is made of special materials for R134a system.**
- **Only use recommended refrigerant oil which is applicable to A/C compressor assembly on vehicle.**
- **Perform recharging for A/C system and check for refrigerant leakage.**

(1) Clamp condenser assembly lower mounting bracket to radiator assembly bracket and adjust the position.
(2) Clamp condenser assembly lower mounting bracket to radiator assembly mounting bracket.
(3) Install the radiator and condenser assembly module to the vehicle.
(4) Install 1 fixing nut between compressor to condenser line assembly and A/C coaxial line assembly and condenser.

Torque: 9 ± 1 N·m

(5) Install the air deflector assembly.
(6) Install the front impact beam assembly.
(7) Install the front bumper assembly.
(8) Check system for leakage.
(9) Vacuum pumping and refrigerant recharging.
(10) Install the engine compartment trim cover assembly.

(11) Connect the negative battery cable.

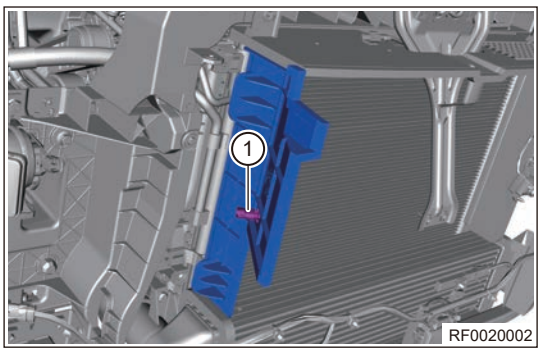
3.11 Outside Temperature Sensor

■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing front grille.**
- **Appropriate force should be applied, when removing front grille. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing front grille.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front bumper assembly.
(4) Disconnect the outside temperature sensor connector and remove the outside temperature sensor (1).



■ Installation

⚠ Caution

The clip of outside temperature sensor will lose water and become hard when exposed to air for a long time, and the clip is easy to break during installation.

(1) Install the clip of outside temperature sensor to right air deflector (front passenger side) fixing hole.
(2) Connect the outside temperature sensor to corresponding electrical wire harness connector.
(3) Install the vehicle front grille.
(4) Connect the negative battery cable.

3.12 Pressure Sensor

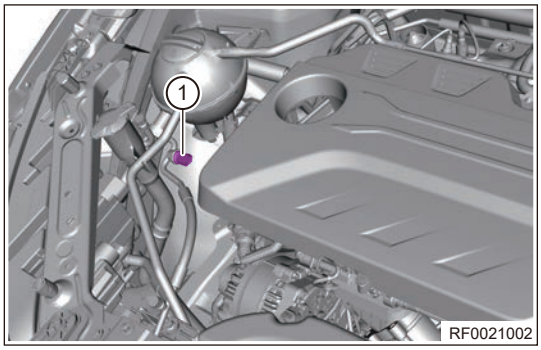
■ Removal

⚠ Warning

Appropriate force should be applied, when removing pressure sensor. Be careful not to operate roughly.

(1) Remove the engine compartment trim cover assembly.
(2) Recover the refrigerant from A/C system assembly.
(3) Turn off all electrical equipment and ENGINE START STOP switch.
(4) Disconnect the negative battery cable.

(5) Disconnect the pressure sensor connector, and remove the pressure sensor (1) with wrench.



■ **Installation**

(1) Install the pressure sensor.

(2) Connect the pressure sensor connector.

(3) Check system for leakage.

(4) Vacuum pumping and refrigerant recharging.

(5) Install the engine compartment trim cover assembly.

(6) Connect the negative battery cable.

3.13 Compressor - Condenser Line Assembly

■ **Removal**

⚠ **Warning**
Appropriate force should be applied, when removing compressor - condenser line assembly. Be careful not to operate roughly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

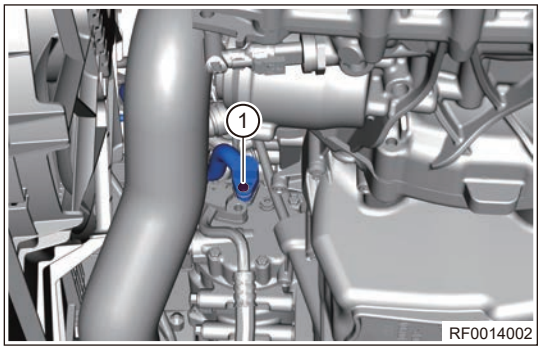
(3) Remove the engine lower protector assembly.

(4) Remove the engine compartment trim cover assembly.

(5) Remove the front bumper assembly.

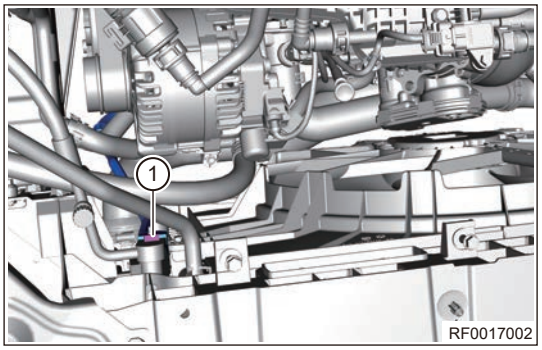
(6) Recover the refrigerant from A/C system assembly.

(7) Remove 1 fixing bolt (1) between compressor to condenser line assembly and compressor assembly, and disengage the A/C low pressure line from compressor assembly.



Hint:
Use plug to seal line joint and compressor joint.

(8) Remove fixing nut (1) from compressor - condenser line assembly, and detach line from condenser assembly.



Hint:
Use plug to seal line joint and compressor joint.

(9) Remove the compressor to condenser line assembly.

■ **Installation**

(1) Install compressor - condenser line assembly to compressor.

Torque: 25 ± 3 N·m

(2) Install compressor - condenser line assembly and install 1 fixing nut.

Torque: 9 ± 1 N·m

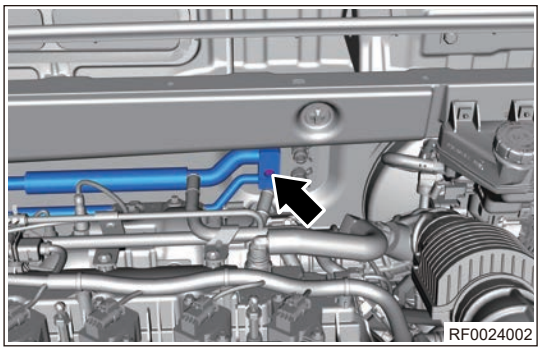
(3) Check system for leakage.
(4) Vacuum pumping and refrigerant recharging.
(5) Install the front bumper assembly.
(6) Install the engine compartment trim cover assembly.
(7) Install the engine lower protector assembly.
(8) Connect the negative battery cable.

3.14 A/C Coaxial Line Assembly

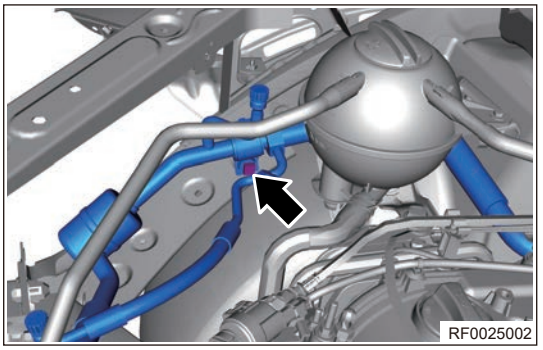
■ **Removal**

⚠ **Warning**
Appropriate force should be applied, when removing A/C coaxial line assembly. Be careful not to operate roughly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the engine lower protector assembly.
(4) Remove the engine compartment trim cover assembly.
(5) Remove the front bumper assembly.
(6) Recover the refrigerant from A/C system assembly.
(7) Remove 1 fixing bolt from A/C coaxial line assembly, and disengage line.

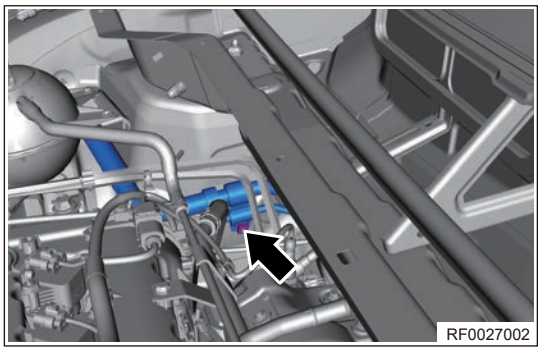


(8) Remove 1 fixing bolt from A/C coaxial line assembly clamp.

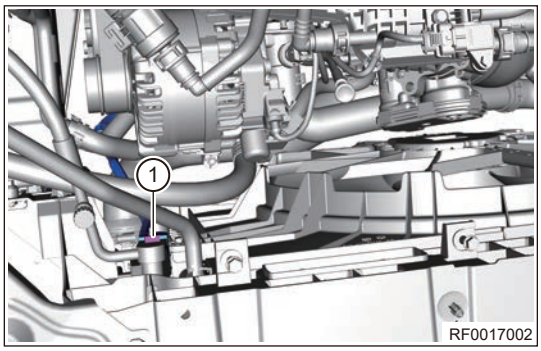


(9) Disconnect the A/C pressure sensor connector.

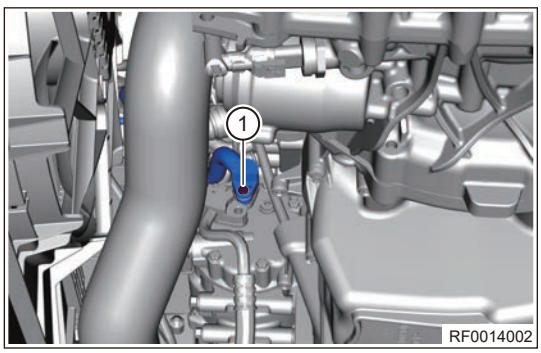
(10) Remove 1 fixing bolt from A/C coaxial line assembly.



(11) Remove 1 fixing nut from A/C coaxial line assembly.



(12) Remove 1 fixing bolt from A/C coaxial line assembly.



■ Installation

(1) Install compressor - condenser line assembly to compressor.

Torque: 25 ± 3 N·m

(2) Install compressor - condenser line assembly and install 1 fixing nut.

Torque: 9 ± 1 N·m

(3) Install the fixing bolt to A/C coaxial line assembly.

Torque: 9 ± 1 N·m

(4) Connect the A/C pressure sensor connector.
(5) Install fixing bolt to A/C coaxial line assembly clamp.
Torque: 9 ± 1 N·m

(6) Install 1 fixing bolt between A/C as coaxial line assembly and expansion valve.
Torque: 9 ± 1 N·m

(7) Check system for leakage.
(8) Add the refrigerant into A/C system assembly.
(9) Install the front bumper assembly.
(10) Install the engine lower protector assembly.
(11) Connect the negative battery cable.

8.3 A/C FAN BODY AND AIR DUCT

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Take extra care when servicing A/C system under high pressure.

(2) Because there is refrigerant under high pressure in A/C system. It must be serviced by professional technician. Otherwise, a wrong service procedure may cause a serious danger or fatal injury.

(3) If A/C system pressure is released unexpectedly, ventilate work area before servicing. In a closed work place, if a large amount of refrigerant is discharged, it may cause oxygen reduction and result in smothering, causing a serious or fatal injury.

(4) Never drain refrigerant in A/C system into the atmosphere directly, and avoid environmental contamination.

1.2 Precautions

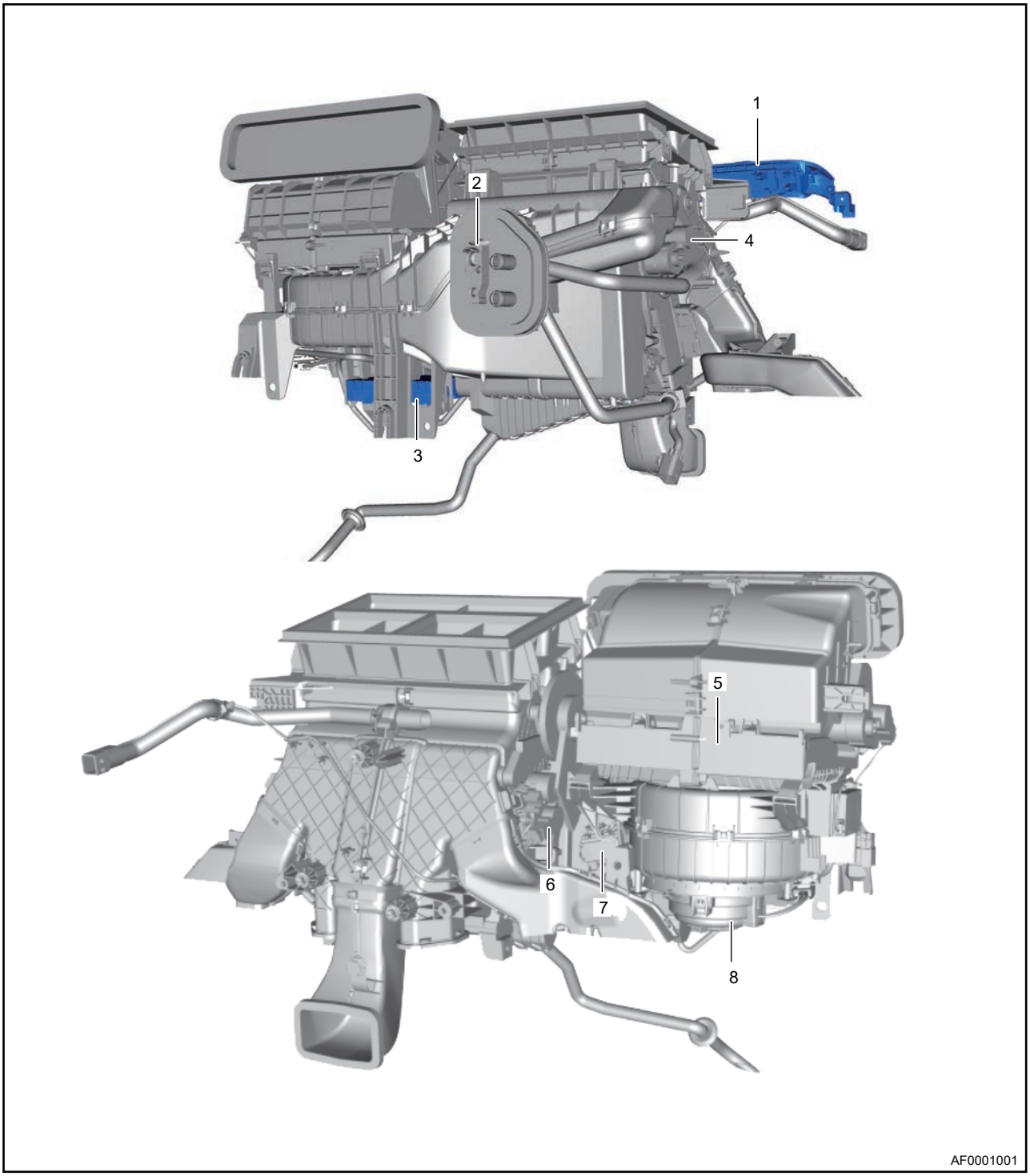
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Special service equipment for R134a refrigerant must be used to recover/charge refrigerant.

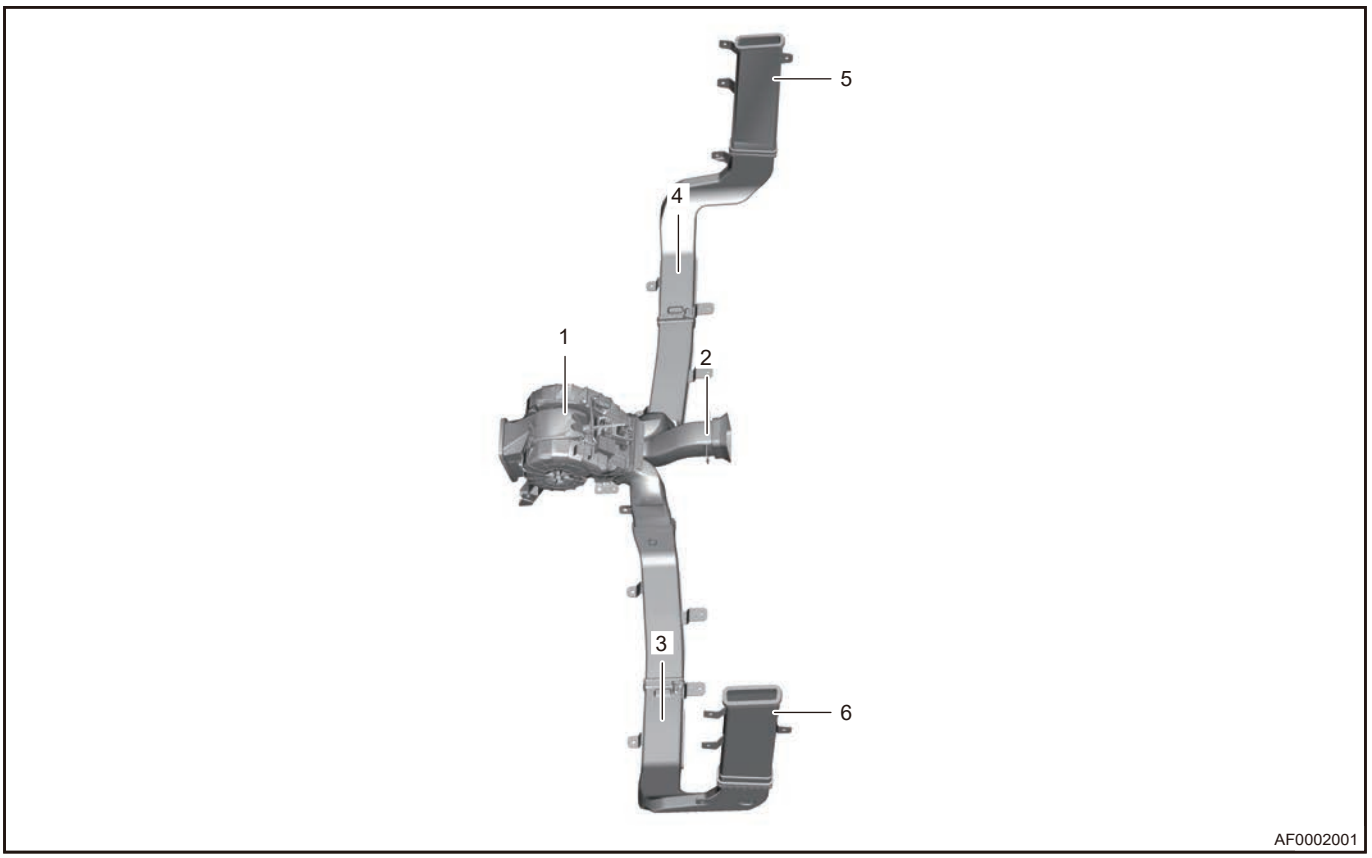
(2) Disconnected A/C line and connecting part should be sealed to prevent foreign matter from entering.

2 System Overview

2.1 System Components Diagram



1	Automatic A/C Control Panel Assembly	5	A/C Element
2	Evaporator	6	Mode Damper Motor
3	A/C Control Module	7	Blower Speed Regulation Module
4	Mix Damper Motor	8	Blower Assembly

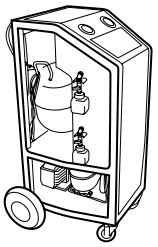
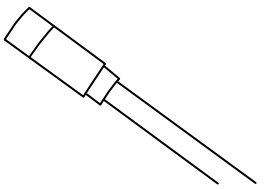


1	Rear Blower	4	Right B-pillar Floor Section Duct
2	Rear Blower Transition Duct	5	Right B-pillar Quarter Section Duct
3	Left B-pillar Floor Section Duct	6	Left B-pillar Quarter Section Duct

3 On-vehicle Service

3.1 Special tool and equipment

■ General Tools

Tool Name	Tool Drawing
Refrigerant Recycling Machine	 S00034
Gas Leak Detector	 RCH009206

3.2 Fasteners Torque List

■ Torque Specifications

Item	Tightening torque
Blower Fixing Screw	5 ± 1 N·m
A/C High/Low Pressure Line Clamp Fixing Bolt	9 ± 1 N·m
Expansion Valve Fixing Bolt	9 ± 1 N·m

■ Refrigerant Charging Specification

Description	Charging Capacity (g)
R134a	600 ± 15

■ Refrigerant Oil Charging Specifications

Description	Charging Capacity (ml)
Evaporator Replacement	30
Compressor Assembly Replacement	Pour out all the oil inside new compressor, supplement according to original vehicle actual pouring amount
Condenser Replacement	30
Replace A/C line	10

3.3 A/C Control Panel Assembly

■ Removal

⚠ Caution

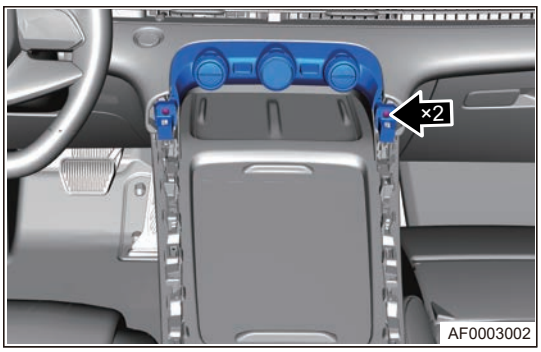
- **Be careful not to scratch instrument cluster surface, when removing central control panel cover and A/C panel.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

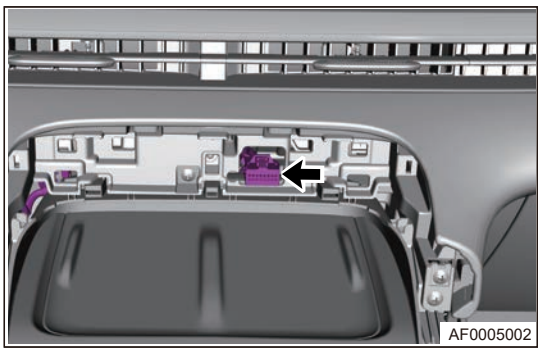
(2) Remove the A/C control panel assembly.

1) Pry up auxiliary fascia console trim panel (arrow) with interior crow plate.

2) Remove 2 fixing bolts (arrow) from A/C control panel assembly.



3) Disconnect the A/C control panel connector (arrow).



4) Remove the A/C control panel.

■ Installation

⚠ Caution

- **Be careful not to scratch the panel and instrument panel parts during installation.**

(1) Connect the A/C control panel connector.

(1) Install 2 A/C control panel fixing bolts.

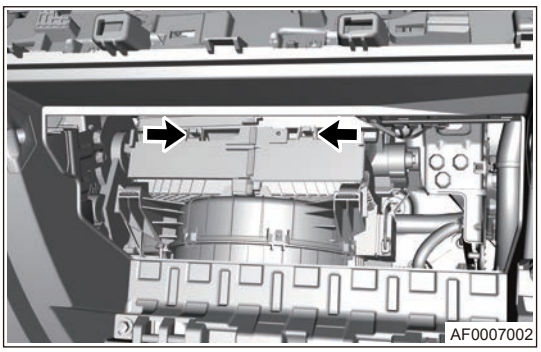
(1) Install the auxiliary fascia console trim panel.

3.4 A/C Element

■ Removal

(1) Remove the glove box assembly.

(2) Detach 2 clips (1) from A/C element protector cover, and remove A/C element protector cover.



(3) Remove the A/C element assembly from air inlet position on upper side of blower.

■ Installation

(1) Install the A/C element assembly along air inlet position on upper side of blower.

(2) Install the A/C element protector cover.

(3) Install the glove box assembly.

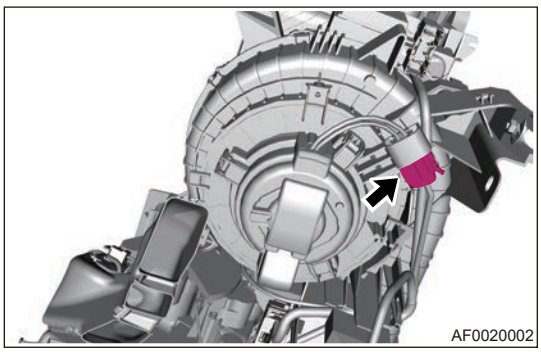
3.5 Front Blower Assembly

■ Removal

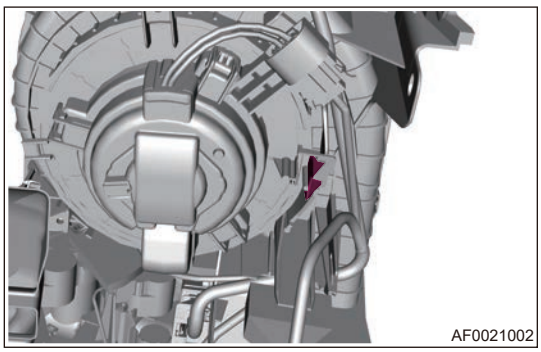
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Disconnect the blower assembly connector (arrow).



(4) Disengage the clip (arrow).

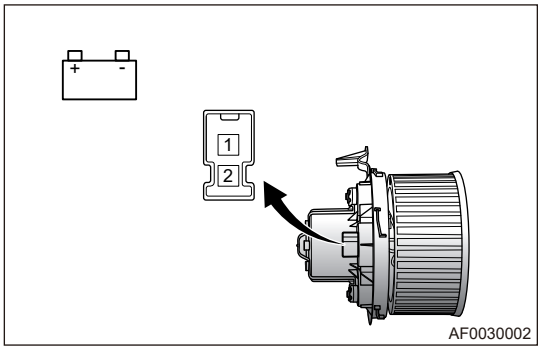


(5) Rotate and remove the blower assembly.

■ Inspection

(1) Remove the blower assembly.

(2) Connect the positive (+) battery lead to terminal 1 and negative (-) battery lead to terminal 2. Check that the blower motor operates smoothly.



■ **Installation**

(1) Install 1 fixing clip on blower assembly and tighten clip.

Torque: 5 ± 1 N·m

(2) Connect the negative battery cable.

3.6 Front Blower Speed Regulation Module

■ **Removal**

⚠ Warning

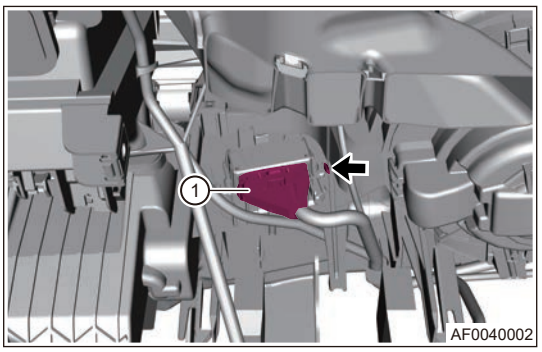
- **During normal operation, blower speed regulation module may be very hot. Turn off blower and wait for a few minutes to cool it before diagnosing or servicing, in order to avoid burns.**
- **DO NOT operate blower assembly when removing the blower speed regulation module from vehicle. Failure to do so may result in damage to the blower assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the glove box assembly.

(4) Disconnect the blower speed regulation module connector (1), disengage the attachment structure of blower speed regulation module.



(5) Remove the blower speed regulation module assembly.

■ **Installation**

(1) Install the blower speed regulation module assembly, secure the attachment structure of blower speed regulation module.

(2) Connect the blower speed regulation module connector.

(3) Install the glove box assembly.

(4) Connect the negative battery cable.

(5) Connect diagnostic tester, read and clear DTCs.

3.7 Inner/Outer Circulation Damper Motor

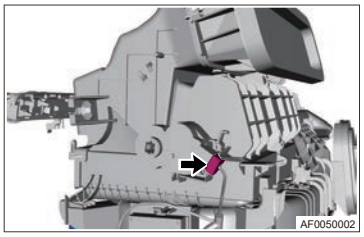
■ **Removal**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the glove box assembly.

(4) Disconnect the inner/outer circulation damper motor connector, and disengage the fixing clip.



(5) Rotate counterclockwise to remove the inner/outer circulation damper motor.

■ Installation

(1) Rotate clockwise to install the inner/outer circulation damper motor.

(2) Secure the fixing clip of inner/outer circulation damper motor.

(3) Connect the inner/outer circulation damper motor connector.

(4) Install the glove box assembly.

(5) Connect the negative battery cable.

3.8 Mode Damper Motor

■ Removal

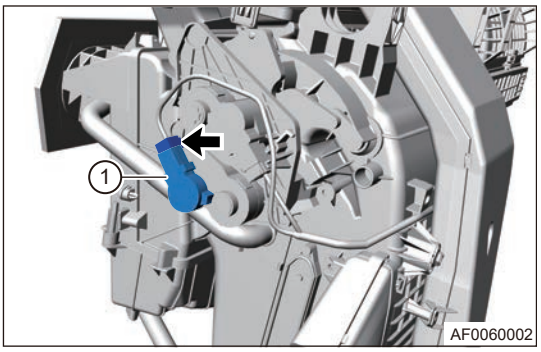
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the instrument panel lower left protector assembly.

(4) Disconnect the mode damper motor connector (arrow).

(5) Detach the fixing clip (1) from mode damper motor.



(6) Rotate counterclockwise to remove the mode damper motor.

■ Installation

(1) Rotate clockwise to install the mode damper motor.

(2) Secure the fixing clip from mode damper motor.

(3) Connect the mode damper motor connector.

(4) Install the instrument panel lower left protector assembly.

(5) Connect the negative battery cable.

3.9 Left Mix Damper Motor

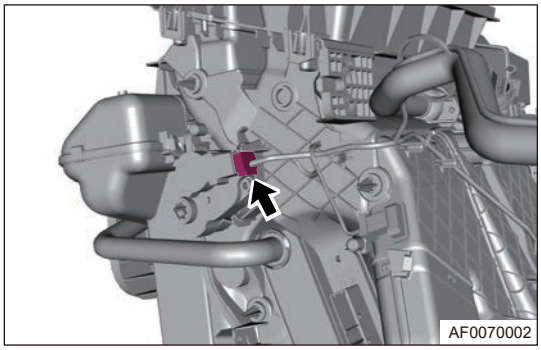
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the instrument panel lower left protector.

(4) Disconnect the left mix damper motor connector, detach the clip and rotate left mix damper motor (1) counterclockwise to remove it.



■ **Installation**

(1) Rotate clockwise and Install the left mix damper motor.

(2) Secure the fixing clip on left mix damper motor.

(3) Connect the left mix damper motor connector.

(4) Install the instrument panel lower left protector.

(5) Connect the negative battery cable.

3.10 Right Mix Damper Motor

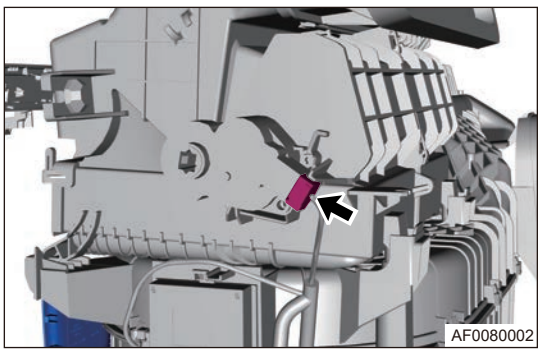
■ **Removal**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the glove box assembly.

(4) Disconnect the right mix damper motor connector.



(5) Loosen clip, rotate counterclockwise and remove right mix damper motor.

■ **Installation**

(1) Rotate clockwise to install the right mix damper motor.

(2) Secure the fixing clip on right mix damper motor.

(3) Connect the right mix damper motor connector.

(4) Install the glove box assembly.

(5) Connect the negative battery cable.

3.11 Automatic A/C Control Module

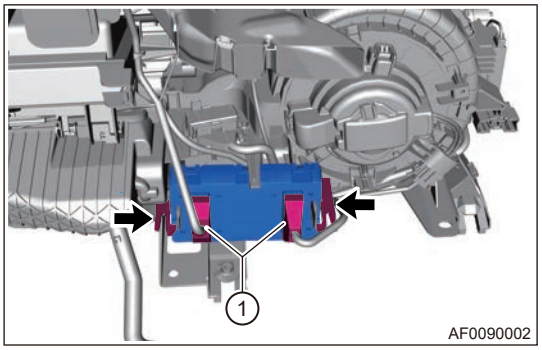
■ **Removal**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the instrument panel right soundproof board assembly.

(4) Disconnect the automatic A/C control module connector (1), and move 2 fixing clips of control module to both sides (arrow).



(5) Remove the automatic A/C control module.

■ Installation

(1) Two mounting holes of automatic A/C control module with different sizes are aligned with two mounting guide plates on HVAC housing. Apply a positive thrust to Z so that 2 clips on HVAC are fully clamped into automatic A/C control module.

(2) Connect the automatic A/C control module connector.

(3) Connect the negative battery cable.

(4) Connect EXEED special diagnostic tester, read and clear DTCs.

3.12 Inner/Outer PM2.5 Sensor

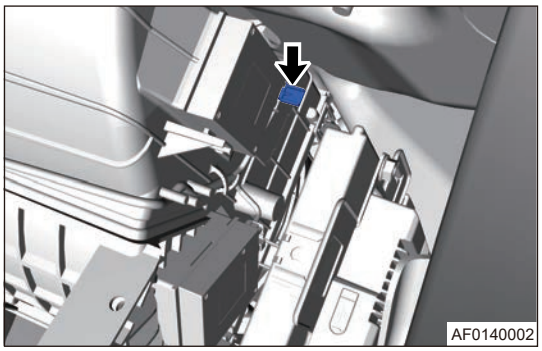
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

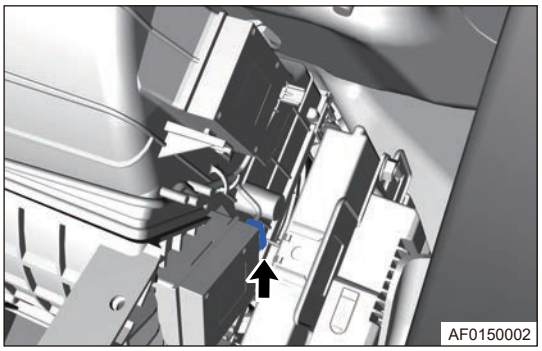
(2) Disconnect the negative battery cable.

(3) Remove the instrument panel assembly.

(4) Disconnect outside PM2.5 sensor, detach outside PM2.5 sensor fixing clip and remove outside PM2.5 sensor.



(5) Disconnect inside PM2.5 sensor, detach inside PM2.5 sensor fixing clip and remove inside PM2.5 sensor.



■ Installation

(1) Install inner/outer PM2.5 sensor and secure clip.

(2) Connect inner/outer PM2.5 sensor connector.

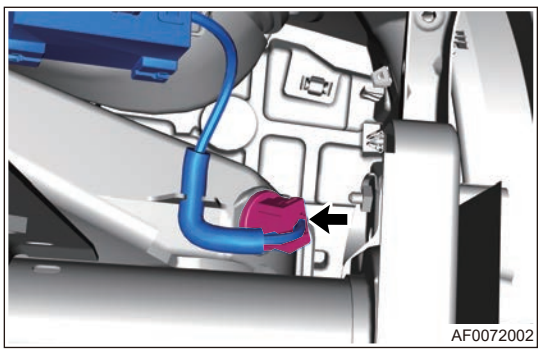
(3) Install the instrument panel assembly.

(4) Connect the negative battery cable.

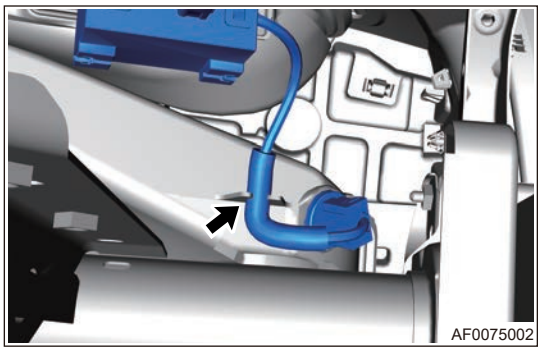
3.13 Anion Generator

■ Removal

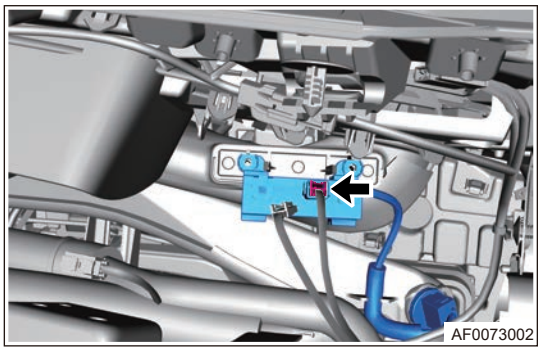
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the instrument panel assembly.
(4) Remove the anion generator.
(5) Rotate the anion generator counterclockwise (opposite direction of arrow).



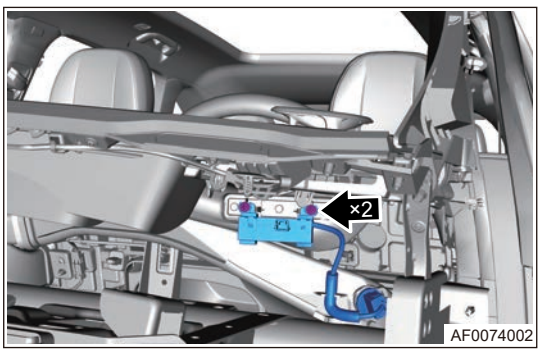
(6) Disengage clip (arrow) from anion generator wire harness.



(7) Disconnect anion generator connector (arrow).



(8) Remove 2 fixing screws (arrow) and anion generator.



■ **Installation**

(1) Install 2 fixing screws to anion generator.

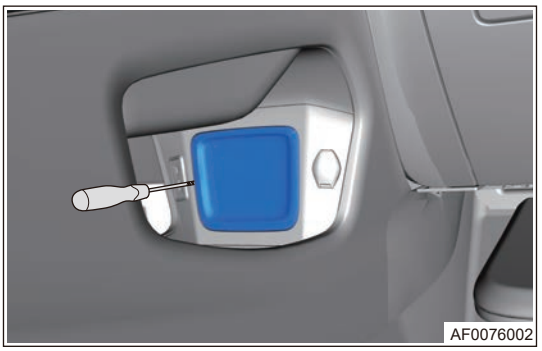
Torque: 1.5 ± 0.5

(2) Install the wire harness clip, and secure the wire harness to air duct through the clip.
(3) Align the generator with the air duct opening and rotate it clockwise in the direction of arrow to the limit position.
(4) Connect the anion generator connector.
(5) Install the instrument panel assembly.

3.14 Fragrance Generator

■ **Removal**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the fragrance generator.
(4) Use a flat tip screwdriver to carefully insert about 3 mm from the gap between fragrance generator and front lower of auxiliary fascia console (put a soft object under it to avoid damage to the front lower of auxiliary fascia console). Use a little force to pry fragrance generator out from front lower of auxiliary fascia console.



(5) Disconnect the wire harness connector, remove the fragrance generator or remove the fragrance block cover directly.

■ **Installation**

(1) Connect the fragrance generator to the corresponding wire harness connect, and a "click" sound is heard, indicating that the connector is properly connected.
(2) Install the fragrance generator/fragrance block cover into the corresponding fixing hole in the lower front of auxiliary fascia console, and a "click" sound is heard, indicating that the the installation is properly connected.

3.15 HVAC Assembly

■ **Removal**

⚠ Warning

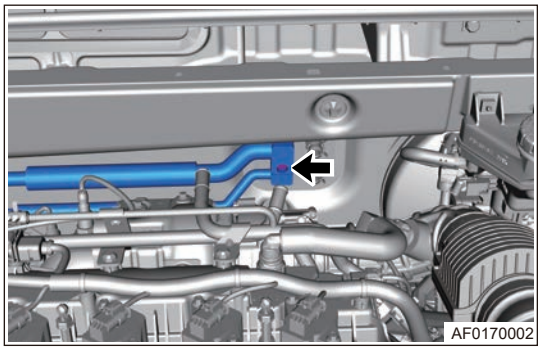
- **Special service equipment for R134a refrigerant must be used to recover/charge refrigerant.**
- **Be careful not to damage hoses during removal and installation.**
- **Always keep work area in good ventilation.**
- **Disconnected A/C line and connecting part should be sealed to prevent foreign matter from entering.**

(1) Recover the refrigerant from A/C system.
(2) Turn off all electrical equipment and ENGINE START STOP switch.
(3) Drain the coolant.
(4) Disconnect the negative battery cable.
(5) Remove the driver airbag.
(6) Remove the steering wheel assembly.
(7) Remove the auxiliary fascia console assembly.

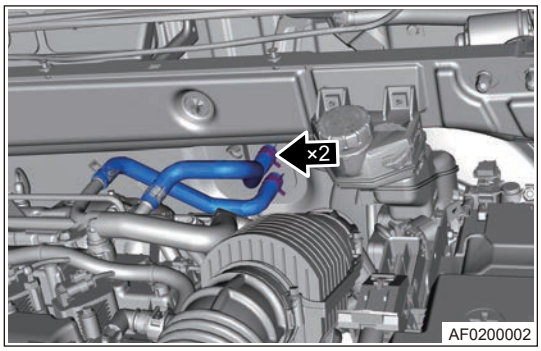
(8) Remove the instrument panel body assembly.

(9) Remove the instrument panel crossmember assembly.

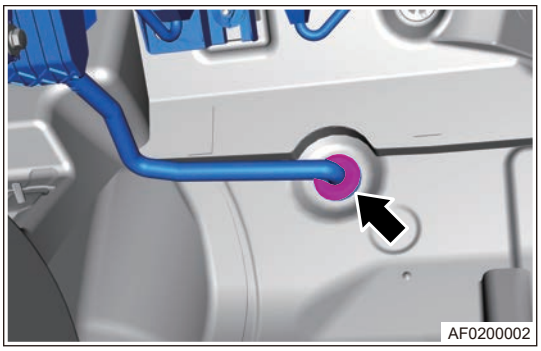
(10) Remove fixing bolt (arrow) between A/C high/low pressure line and expansion valve.



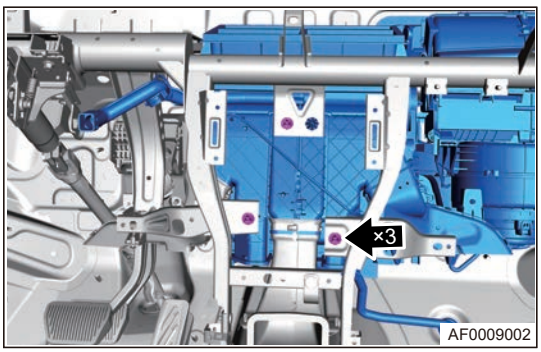
(11) Using snap spring pliers, disengage fixing clamp from heating inlet and outlet hoses to detach the inlet and outlet hoses (arrow).



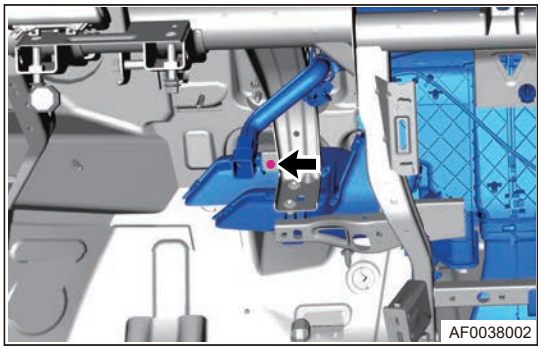
(12) Disengage the outlet hose of HVAC and fixing bush rubber (arrow) of body.



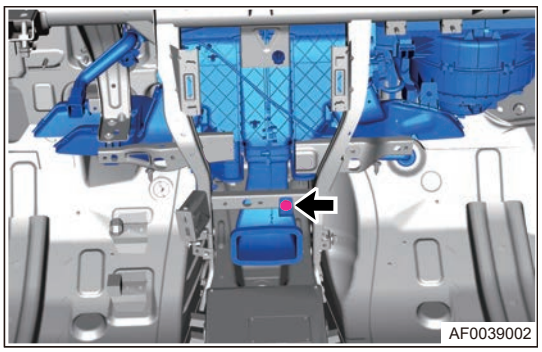
(13) Remove 3 fixing bolts (arrow) between HVAC and instrument panel crossmember.



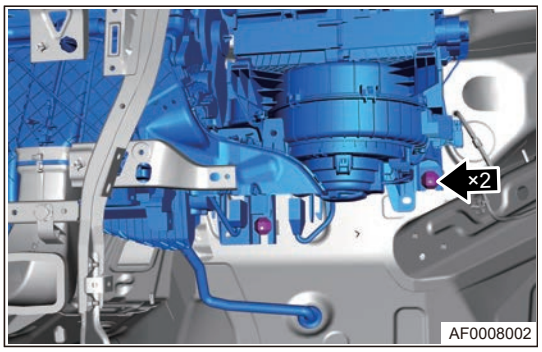
(14) Remove 1 cross-recessed button head self-tapping screw (arrow) between left foot duct assembly and instrument panel crossmember bracket.



(15) Remove the fixing plastic clip (arrow) between transition duct and instrument panel crossmember bracket.



(16) Remove HVAC fixing nuts (arrow).

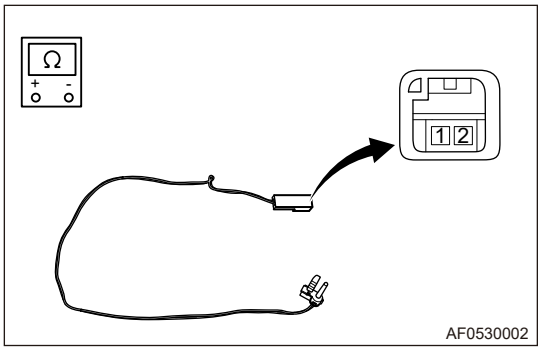


(17) Disconnect wire harness of HVAC assembly and interior.

(18) Carefully remove HVAC assembly from cabin.

■ **Check the evaporator temperature sensor.**

(1) Using ohm band of digital multimeter, measure the resistance of evaporator temperature sensor according to the table below.



Multimeter Connection	Temperature (℃)	Standard Resistance (Ω)
Terminal 1 - Terminal 2	-5	7716
Terminal 1 - Terminal 2	0	6194
Terminal 1 - Terminal 2	5	4963
Terminal 1 - Terminal 2	10	4007
Terminal 1 - Terminal 2	15	3259
Terminal 1 - Terminal 2	20	2669

Hint:

- Resistance decreases as temperature increases.
- If result is not as specified, replace evaporator temperature sensor.

⚠ Caution

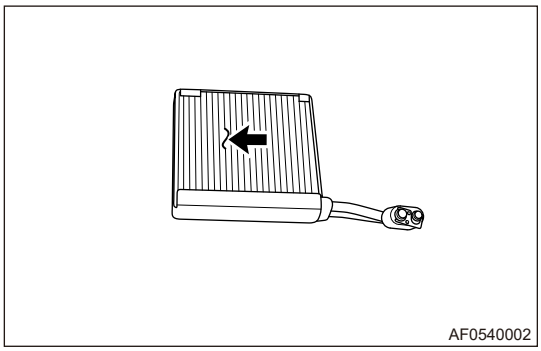
- **Resistance value may change even if sensor is touched slightly. Make sure that connector of sensor is held firmly.**
- **During measurement, sensor temperature must be almost the same as the ambient temperature.**

■ **Check the evaporator core assembly.**

(1) Check if evaporator core assembly is cracked, damaged and leaked. If any problem is found, replace the evaporator core assembly.

(2) Check fin for bends.

1) If any fin is bent, carefully straighten it with a screwdriver or pliers.



■ **Check the heater core assembly.**

(1) Check if heater core assembly is cracked, damaged or leaked. Check if heater core assembly is cracked, damaged or leaked.

(2) Check fin for bends.

1) If any fin is bent, carefully straighten it with a screwdriver or pliers.

■ **Check the damper control mechanism assembly.**

(1) Check if inner/outer circulation damper adjustment mechanism is stuck, deformed, damaged or if it has fallen out. Replace as necessary.

(2) Check if mode damper adjustment mechanism is stuck, deformed, damaged or if it has fallen out. Replace as necessary.

(3) Check if face/defrost damper set is stuck, deformed, damaged or if it has fallen out. Replace as necessary.

⚠ Caution

- **If evaporator core is reused, do not insert evaporator temperature sensor into its original position. Insert it to a location that is 1 fin to the right or left of its previous location.**
- **During installation, apply a small amount of grease to contact surface of the inner/outer circulation damper adjustment mechanism to ensure that it can operate smoothly.**
- **During installation, apply a small amount of grease to contact surface of the mix damper adjustment mechanism set to ensure that it can operate smoothly.**
- **During installation, apply a small amount of grease to contact surface of the face damper adjustment mechanism to ensure that it can operate smoothly.**
- **During installation, apply a small amount of grease to contact surface of the defrost damper adjustment mechanism to ensure that it can operate smoothly.**
- **Always check that inner/outer circulation damper mechanism assembly operates normally after installation.**
- **Always check that mix damper mechanism assembly operates normally after installation.**
- **Always check that face damper mechanism assembly operates normally after installation.**
- **Always check that defrost damper mechanism assembly operates normally after installation.**
- **Tighten fixing bolts and nuts to specified torques.**
- **It is necessary to replace refrigerant line O-ring seal when installing refrigerant line. Failure to do so may result in refrigerant leakage.**
- **It is necessary to replace refrigerant line O-ring seal when installing refrigerant line. Failure to do so may result in refrigerant leakage.**
- **Only use specified O-ring, as it is made of special materials for R134a system.**
- **Only use recommended refrigerant oil which is applicable to A/C compressor assembly on vehicle.**
- **Be sure to recharge refrigerant and check for refrigerant leakage after installation.**
- **Be sure to recharge engine cooling system and check for coolant leakage after installation.**

■ Installation

(1) Install HVAC assembly into cabin and secure bolts.

Torque: 7 ± 0.5 N · m

(2) Install the instrument panel crossmember assembly.

(3) Install the self-tapping screw to left foot duct assembly.

Torque: 1.5 ± 0.5 N · m

(4) Install the transition duct plastic clip.

Torque: 1.5 ± 0.5 N · m

(5) Connect inlet and outlet hoses, using snap spring pliers, secure the fixing clamp on the inlet and outlet hoses.

(6) Connect the outlet hose of HVAC and fixing bush rubber of body.

(7) Install A/C high/low pressure line and secure fixing bolt.

Torque: 9 ± 1 N·m

(8) Connect HVAC wire harness and interior wire harness.

(9) Install the instrument panel body assembly.

(10) Install the auxiliary fascia console assembly.

(11) Install the steering wheel assembly.

(12) Install the driver airbag.

(13) Connect the negative battery cable.

(14) Add antifreeze.

(15) Vacuum pumping and refrigerant recharging.

3.16 Left B-pillar Floor Section Duct

■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the auxiliary fascia console assembly.

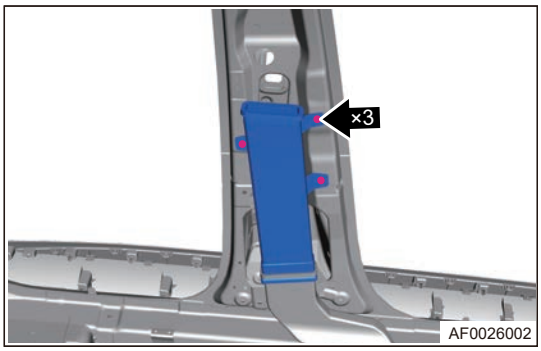
(4) Remove the left B-pillar trim board assembly.

(5) Remove the auxiliary fascia console assembly.

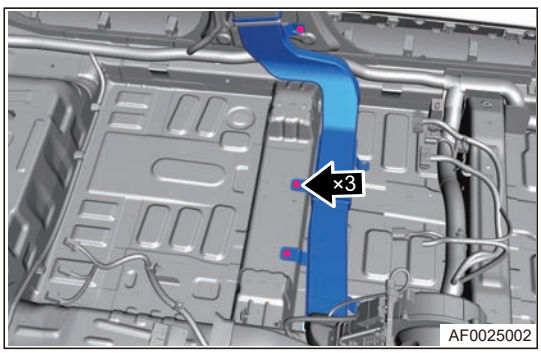
(6) Remove the seat assembly.

(7) Lift the carpet assembly.

(8) Remove 3 plastic clips and left B-pillar quarter section duct (arrow).



(9) Remove 3 plastic clips (arrow) from left B-pillar floor section duct (arrow).



(10) Remove the left B-pillar floor section duct.

■ Installation

(1) Connect left B-pillar floor section duct to rear blower assembly outlet.

(2) Install 3 plastic clips to left B-pillar floor section duct.

(3) Install 3 plastic clips to left B-pillar quarter section duct.

(4) Put down the carpet assembly.

(5) Install the seat assembly.

(6) Install the auxiliary fascia console assembly.

(7) Connect the negative battery cable.

3.17 Rear Blower Assembly

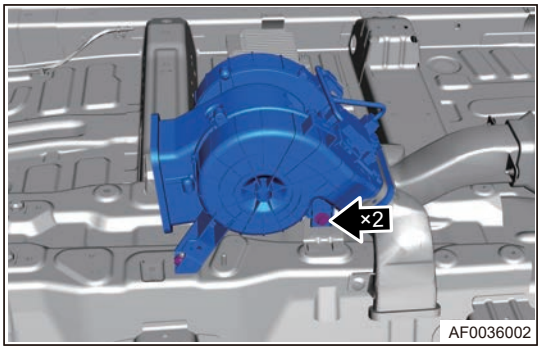
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

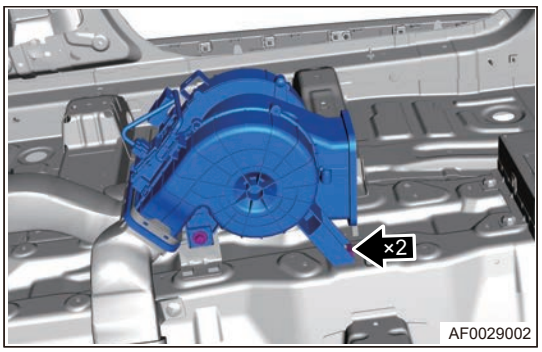
(2) Disconnect the negative battery cable.

(3) Remove the auxiliary fascia console assembly.

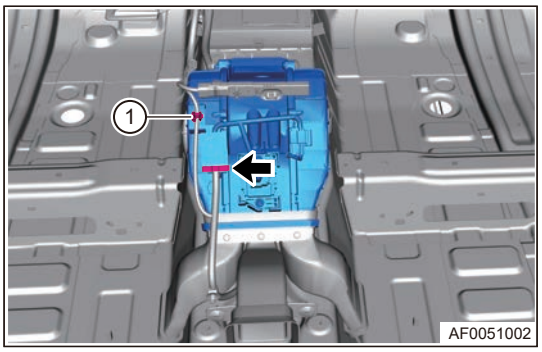
(4) Remove 1 fixing nut and 1 fixing bolt (arrow) from left side of rear blower assembly.



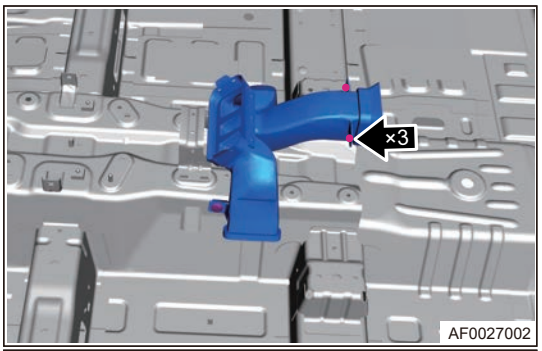
(5) Remove 1 fixing nut and 1 fixing bolt (arrow) from right side of rear blower assembly.

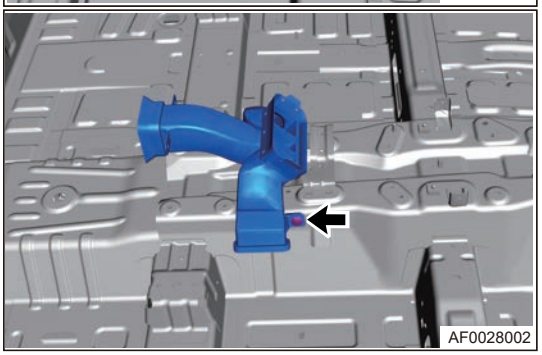


(6) Remove the rear blower wire harness connector (-arrow), wire harness clip (1), and rear blower assembly.

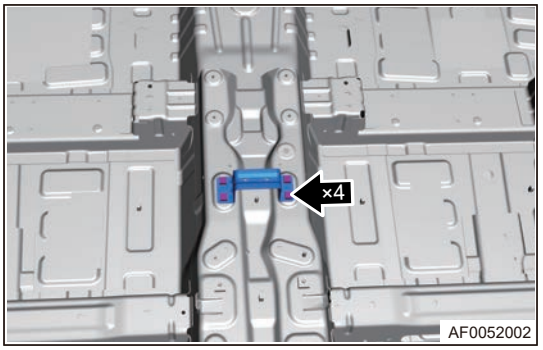


(7) Remove 4 plastic clips on the left and right sides of rear blower transition duct, and remove the rear blower transition duct (arrow).





(8) Remove 4 fixing nuts (arrow) from rear blower assembly bracket.



(9) Remove the rear blower assembly bracket.

■ Installation

(1) Install the fixing nut between rear blower assembly and center passage.

Torque: 5 ± 1 N·m

(2) Install 2 fixing nuts and 2 fixing bolts to rear blower assembly.

Torque: 5 ± 1 N·m

(3) Connect rear blower transition duct to rear blower assembly outlet.
(4) Install the auxiliary fascia console assembly.
(5) Connect the negative battery cable.

SAFETY AND RESTRAIN SYSTEM

SAFETY AND RESTRAIN SYSTEM

9.1 AIRBAG CONTROL SYSTEM

1 Warnings and Precautions

1.1 Warnings

(1) Before removing airbag system components, disconnect the negative battery cable and wait for at least 90 seconds. Before servicing steering system, remove the driver airbag and spiral cable for safekeeping.

(2) If vehicle has been involved in a minor collision but the airbags do not deploy, always inspect airbag components.

(3) If airbags may be touched during servicing, remove the airbags as necessary and keep it properly before servicing.

(4) Never use airbag components from another vehicle. When replacing the airbag components, parts of the same model should be selected for replacement.

(5) If an airbag component is dropped or if there are any cracks, dents or other defects in the case, bracket or connector, it must be replaced with an airbag component with same model.

(6) Information labels are attached to the periphery of airbag components. Always follow the cautions and instructions on labels.

(7) Do not use a common multimeter to measure the resistance of airbag. Only use a multimeter with high impedance for measurement. Otherwise, the airbag may be deployed.

1.2 Precautions

(1) Never expose airbag components directly to hot air or open flame.

(2) Never attempt to disassemble or repair airbag components.

(3) Removed airbags should be kept properly. Never put other objects on them. If triggered accidentally, it may cause personal injury.

(4) As a disposable component, the airbag must be replaced after deployment and never reuse.

(5) Always dispose of vehicle together with airbags, or the airbags may be triggered accidentally to cause personal injury.

■ Precautions during usage

Airbag is passive safety system component. In order to actually protect the passengers in collision with airbag, users should follow the precautions related to airbag usage:Precautions regarding usage:

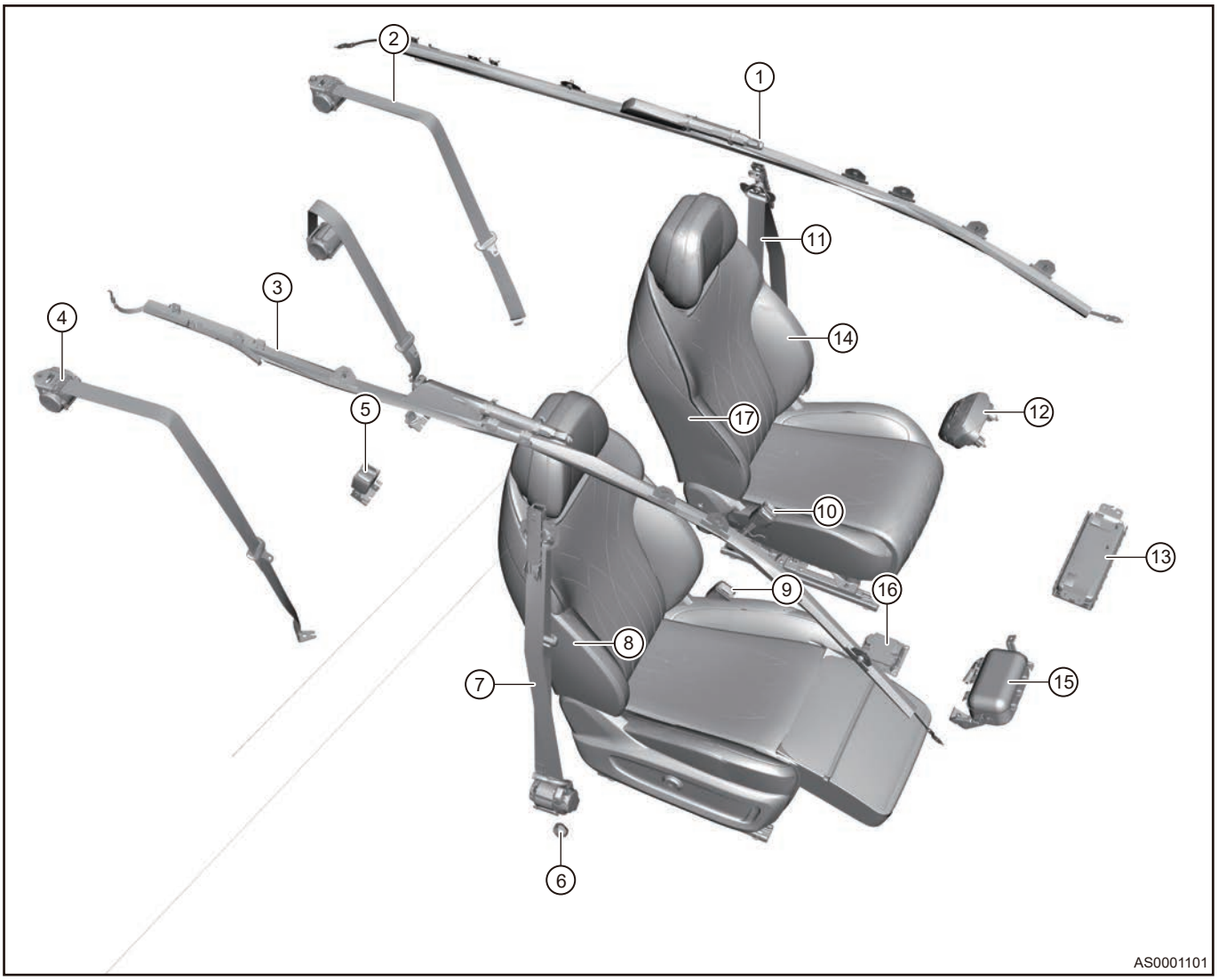
- Driver and passengers should use belt correctly. Correct belt usage can protect human body and reduce the personal injury in accidents.
- DO NOT add any additional units without permission that may interfere or damage belt pretensioner or airbag.
- DO NOT place any objects on steering wheel and front passenger side instrument panel, or these objects may cut into the inflated airbag or become trajectile to injure human body.
- DO NOT add or reversely place seat cover for seats with side airbag.
- Children that are under twelve are not allowed to sit in front seat. For vehicles equipped with passenger airbag, backward facing child seat is not allowed to use on front passenger seat.
- It’s only allowed to install genuine spare parts.
- Only authorized personnel can remove the controller, wire harness and connector from airbag.
- If airbag and belt pretensioner are deployed in accident, airbag controller and all wire harness with airbag connectors must be replaced together with airbag and belt.
- Airbag controller in all vehicles have been matched and verified and it’s forbidden to change vehicle structure and airbag controller. Random addition and modification of airbag controller and wire harness will make airbag controller operate abnormally, leading to airbag fault deployment and undeployment, which results in personal injury.
- Airbag manufacturer suggests that the airbag should be replaced after 10 years.

2 System Overview

2.1 System Description

Supplemental restraint system (SRS) consists of Airbag Control Module (ACM), driver airbag/front passenger airbag, front side airbag, curtain airbag, seat belt and other components. Circuit is continuously monitored and controlled by the airbag controller assembly. Airbag indicator on instrument cluster illuminates for approximately 6 seconds for a test each time ENGINE START STOP switch is turned to “ON”. Airbag indicator goes off after the test is completed. If indicator comes on at any time other than test time, it indicates that there is a problem in supplemental restraint system circuit.

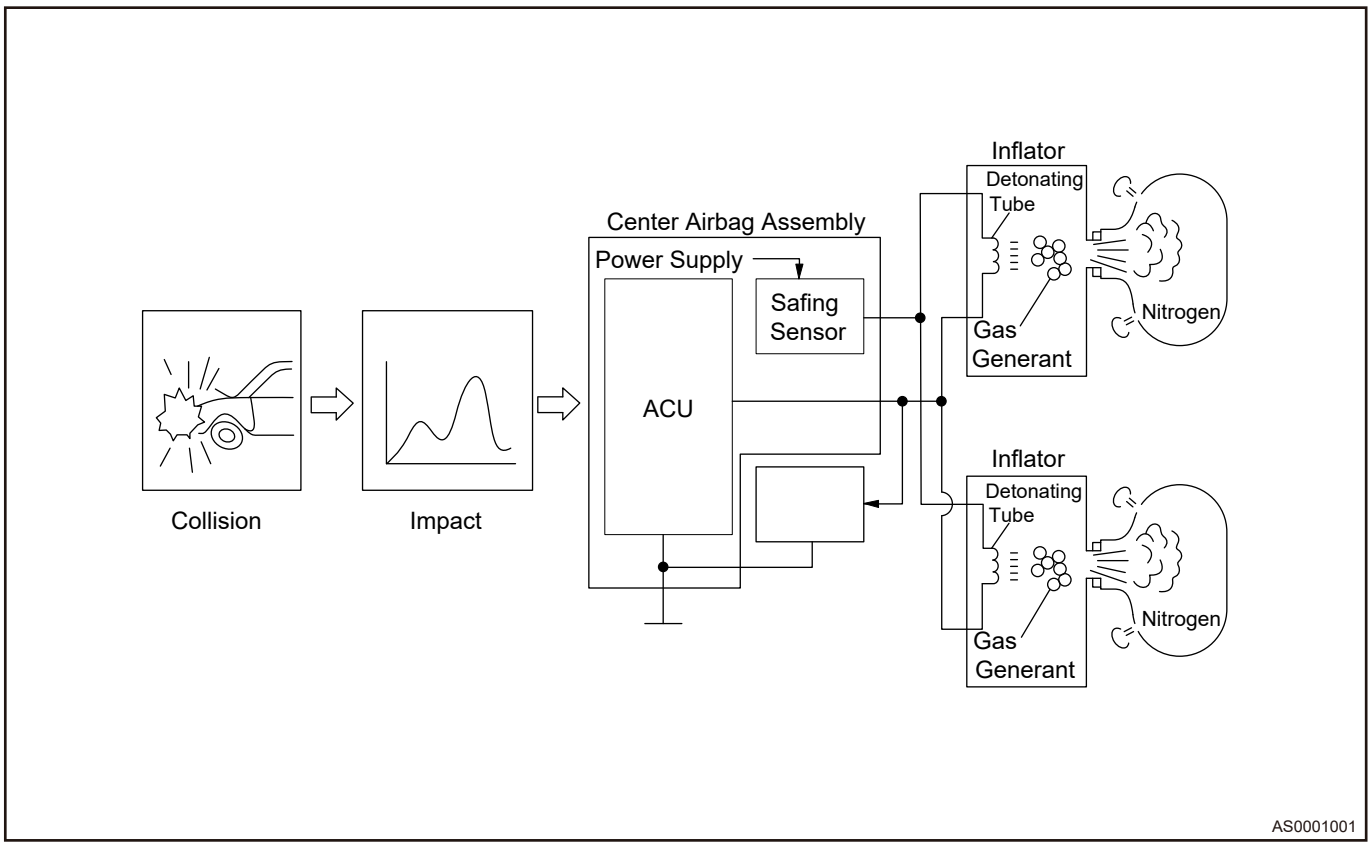
2.2 System Components Diagram



1	Left Curtain Shield Airbag Assembly	10	Front Left Seat Belt Buckle Assembly
2	Rear Left Seat Belt Assembly	11	Front Left Seat Belt Assembly
3	Right Curtain Shield Airbag Assembly	12	Driver Airbag Assembly
4	Rear Right Seat Belt Assembly	13	Knee Airbag Assembly
5	Double Buckle Assembly	14	Driver Side Seat Airbag Assembly

6	Right Side Collision Sensor	15	Front Passenger Airbag Assembly
7	Front Right Seat Belt Assembly	16	Airbag Controller Assembly
8	Front Passenger Side Seat Airbag Assembly	17	Middle Airbag Assembly
9	Front Right Seat Belt Buckle Assembly		

2.3 System Schematic Diagram



- Whether the airbag is deployed depends on the deceleration signal of the vehicle during the collision. When the deceleration signal reaches the set activation conditions; The microprocessor in the airbag controller of the supplemental restraint system sends signal to inflator unit of the corresponding airbag to rapidly deploy the airbag, thus protecting the occupant.

(1) The airbag controller controls the airbag and seat belt.

- Seat belt signals of front passenger and rear seat belt are directly transmitted to the airbag controller through hard wire connection.
- The airbag controller directly controls whether the airbags and curtain shield airbag actuators are activated. When a collision occurs, the airbag controller will determine whether to issue the ignition command according to the detailed ignition condition strategy.

(2) This vehicle adopts occupant restraint system, which includes active and supplemental types. Active restraint system requires occupants to take some actions, such as fastening seat belt; while supplemental restraint system requires no actions from occupants.

Airbag controller is a real-time embedded electronic control unit designed for passenger protection in cabin.

The main function of airbag controller is to trigger passive safety related devices such as airbags and pretensioner in the event of a crash.

1) Active restraint system

i. Driver seat belt and front passenger seat belt.

ii. Rear seat belt.

2) SUPPLEMENTAL RESTRAINT SYSTEM

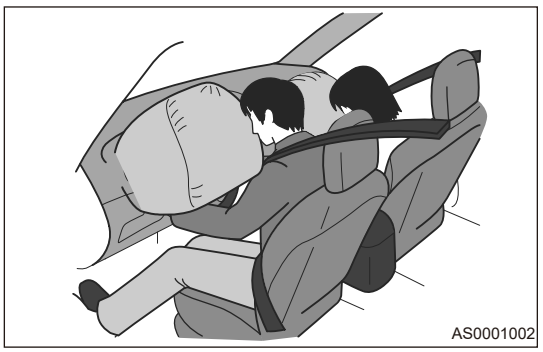
i. Airbag system.

■ Collision operating condition

Hint:
When the collision reaches the set ignition threshold.

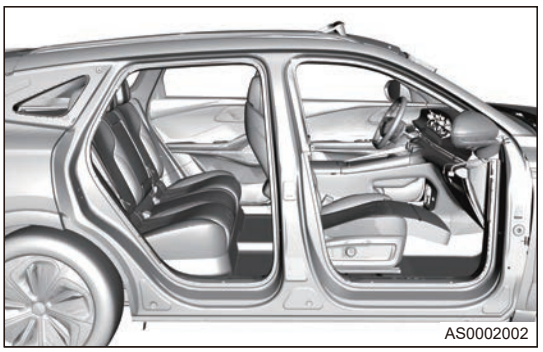
(1) Front collision

- Frontal collision is detected by the sensor in controller;
- Frontal collision ignition deployment circuit: driver and passenger front airbags, all seat belt with pretensioners.



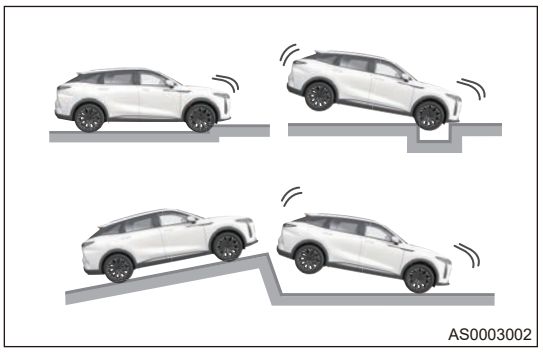
(2) Side collision

- Side collision is detected by the side collision sensor in B-pillar and the sensor in controller.

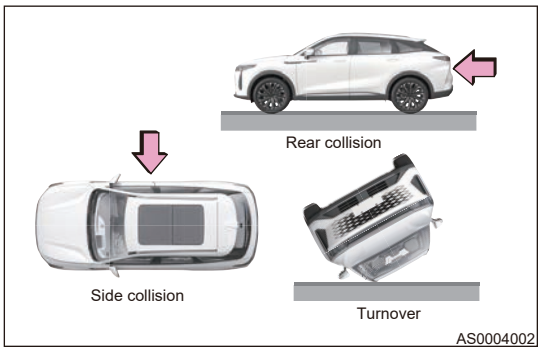


(3) Other collisions

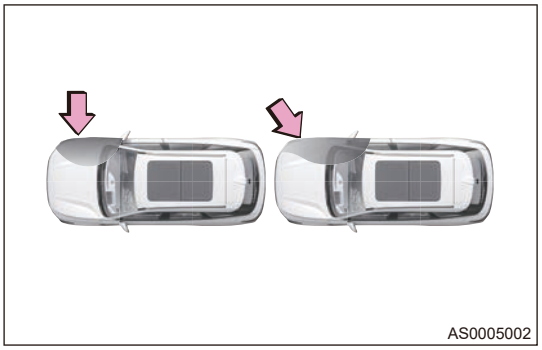
- If the bottom of vehicle is subjected to a severe impact, the driver airbag and front passenger airbag may also deploy as shown in illustration.



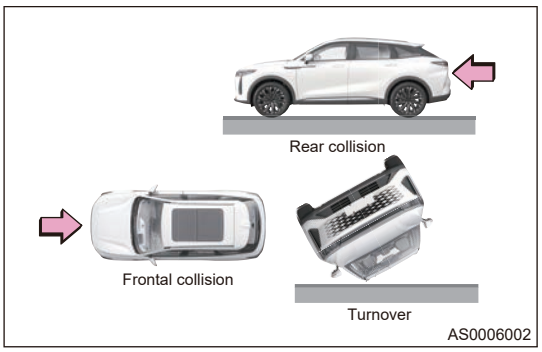
- When vehicle is involved in side collision, rear collision, roll over or frontal collision at low speed as shown in illustration, the driver airbag and front passenger airbag will not generally deploy.



- As shown in illustration, if a collision to the side of the vehicle body other than the passenger compartment, or the vehicle is subjected to a collision from the side at certain angles, the front side airbag and curtain shield airbag may not deploy.


AS0005002

- The side airbag and curtain shield airbag will not generally deploy if the vehicle is involved in a front collision, rear collision or roll over.



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2.4 System Components Description

■ Airbag control module

The controller controls ignition circuit and activates airbag (and belt pretensioner) according to set activation threshold to keep occupants at proper position in the cabin when accident occurs, thus protecting occupants.

■ Driver frontal airbag and passenger frontal airbag

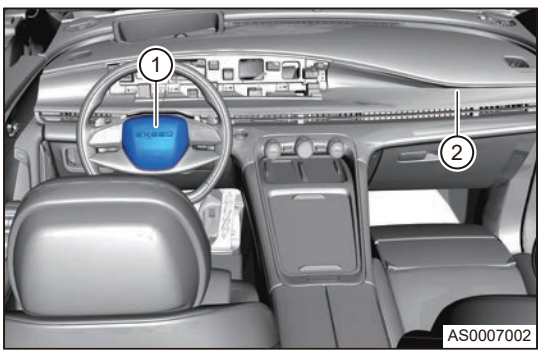
Driver frontal airbag is located on the steering wheel and integrated with the horn switch. Passenger frontal airbag is located above the glove box and inside the instrument panel upper body. As shown in illustration:

(1) Position of driver frontal airbag.

Resistance: 2.0 ± 0.3 Ω

(2) Position of front passenger front airbag.

Resistance: 2.0 ± 0.3 Ω



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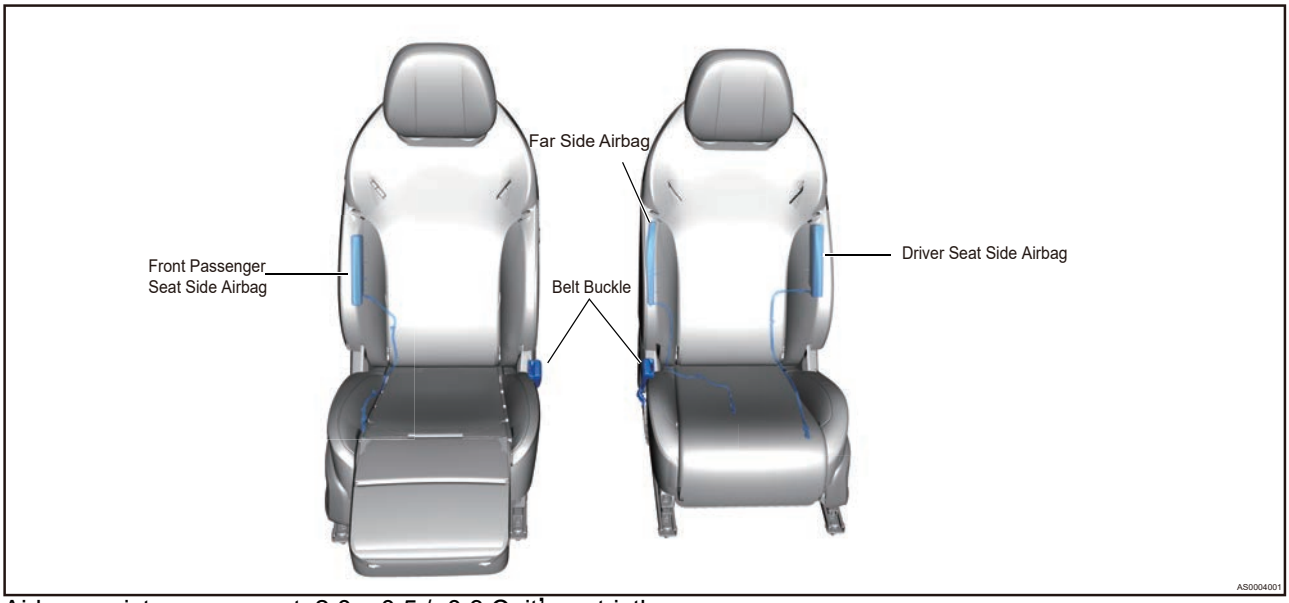
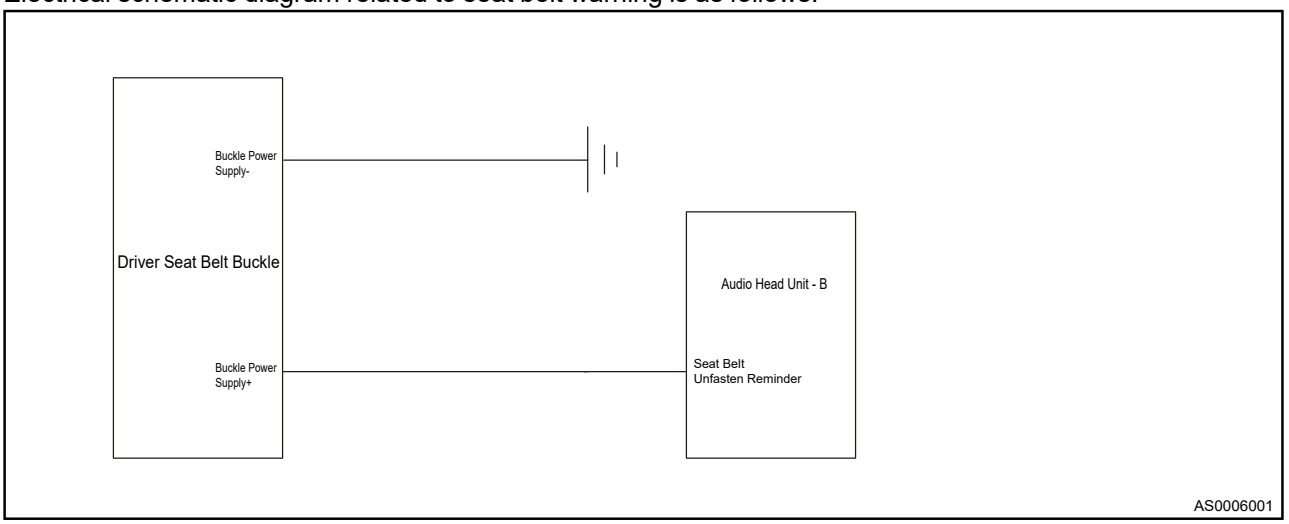
■ Front passenger side airbag, middle airbag and front passenger seat belt buckle



Airbag resistance on seat: 2.0 + 0.5 / -0.3 Ω, it’ s strictly forbidden to measure resistance with multimeter!

- Front passenger detection device schematic diagram as shown in illustration: Passenger loading status: When detected external resistance is lower than 100 Ω, it’ s judged that there is passenger. When resistance is higher than 400 Ω, it’ s judged that there is no passenger.
- Front passenger seat belt buckle schematic diagram is as shown in illustration. Front passenger seat belt buckle status: When detected external resistance is lower than 400 Ω, it’ s judged that the seat belt is not fastened. When resistance is higher than 900 Ω, it’ s judged that the seat belt is fastened.
- Driver seat belt buckle schematic diagram is as shown in illustration. The buckle is connected to the audio heat unit seat belt unfasten reminder terminal. When ENGINE START STOP switch is ON, if the audio heat unit seat belt unfasten reminder terminal is high level / suspending, the driver seat belt warning in instrument cluster does not alarm; if the audio heat unit seat belt unfasten reminder terminal is low level, it will alarm.

Electrical schematic diagram related to seat belt warning is as follows:



Warning strategy is as follows

Front seat belt not buckled or not properly fastened reminder:

When the vehicle speed is less than 22 km/h, the red indicator light of the instrument cluster remains on. When the vehicle speed is more than or equal to 22 km/h, the red indicator light of the instrument cluster flashes, accompanied by sound alarm, which is used to remind personnel to fasten their seat belt.

Rear seat belt not buckled or not properly fastened reminder (if equipped):

When the vehicle speed is more than or equal to 22 km/h, the red indicator light of the instrument cluster remains on after flashing fro 40s, accompanied by sound alarm (rear row seat belt unfastened red indicator remains on, seat belt fastened green indicator remains on, all seat belts fastened indicator turns off).

Hint:
If the seat belt is released during driving, an alarm will sound according to the above description, and the alarm will stop if any of the following conditions are met:

- Fasten the seat belt correctly.
- Turn ENGINE START STOP switch to OFF mode.

■ Curtain shield airbag

Curtain shield airbag is mainly used to protect the head of passengers during side collision. The curtain shield airbag is installed in the inner side of roof and body quarter sheet metal, usually run through the front and rear, and it is controlled by the lateral acceleration sensor in the body. It will deploy when the lateral acceleration is greater than the calibrated threshold.

Resistance: 2.0 ± 0.3 Ω

■ Seat belt

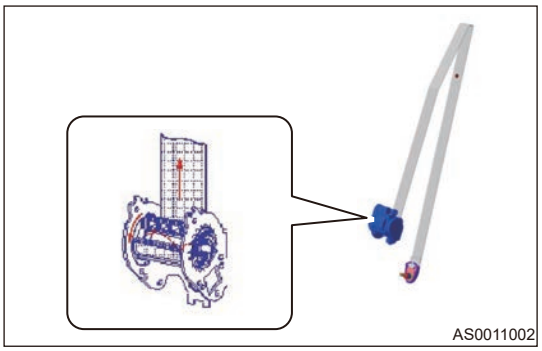
Following types of belts are equipped together with common emergency lock type seat belt:

(1) Emergency lock type belt

Reduce the pressure of belt on passengers, protect the occupants and prevent second collision.

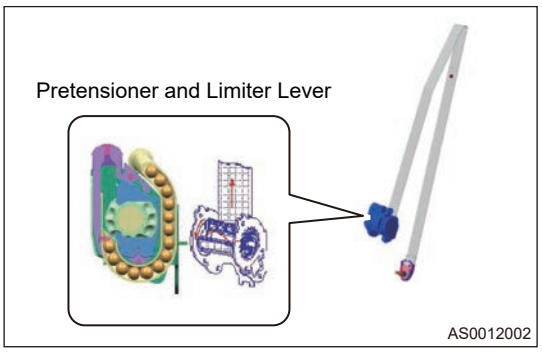
(2) Limiting type belt

Besides common emergency lock type belt, limiter lever is added. Reduce the pressure of belt on passengers, protect the occupants and prevent second collision.



(3) Limiting type belt with pretensioner

Besides common emergency lock type belt, pretensioner and limiter lever are added, which tightens the belt, reduces the pressure of belt on passengers, protects the occupants and prevents second collision during deployment.



2.5 Post-accident Repair and Inspection

(1) Post-accident components replacement of deployed airbag.

1) Airbag controller components should be replaced immediately in accordance with the provisions in this manual after the airbag is deployed in an accident.

(2) Post-accident components replacement of seat belt.

Hint:
After the collision, the seat belt replacement can be divided into the following two situations:

- The seat belt with pretensioner is determined to be activated or not depending on the form of the collision.
- Restraint and emergency locking are based on the presence or absence of an occupant.

1) Some seat belts need to be replaced or recommended to be replaced if airbag is deployed in an accident.

Seat Belt	Replace or Not
Used limiting type seat belt in the event of an accident	It is necessary to replace it
Seat belt with pretensioner that must be exploded or has been exploded	It is necessary to replace it
Used common emergency lock type seat belt in the event of an accident	It is necessary to replace it
Height adjuster (the seat belt had been used in the event of an accident)	It is necessary to replace it

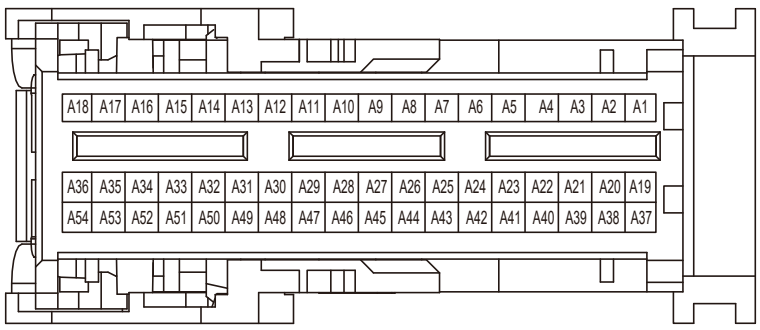
(3) Post-accident inspection of other components

1) No matter whether the airbag is deployed or not, specific inspection must be carried out after any collision. The steering column must be measured for dimension. Check the instrument panel and steering column cover for cracks or other damage, check the instrument panel support for deformation, bending, cracks or other damage and check the seat belt and installation fixing point.

3 System Circuit Diagram

3.1 Module Terminal Definition

■ Airbag Module A



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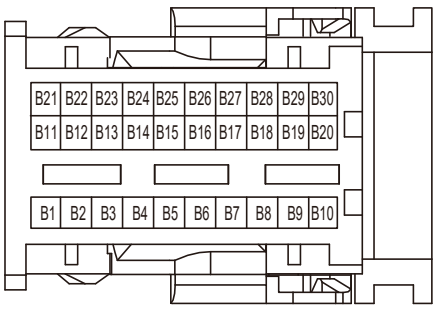
Pin	Definition	Pin	Definition
A1	-	A28	-
A2	-	A29	Front Left Collision Sensor +
A3	-	A30	Front Left Collision Sensor -
A4	-	A31	Front Passenger Seat Belt Retractor Pretensioner -
A5	-	A32	Front Passenger Seat Belt Retractor Pretensioner +

Pin	Definition	Pin	Definition
A6	-	A33	Front Passenger Airbag +
A7	-	A34	Front Passenger Airbag -
A8	-	A35	-
A9	Sensor	A36	-
A10	-	A37	-
A11	Front Right Collision Sensor +	A38	-
A12	Front Right Collision Sensor -	A39	-
A13	Driver Seat Belt Retractor Pretensioner -	A40	-
A14	Driver Seat Belt Retractor Pretensioner +	A41	-
A15	-	A42	-
A16	-	A43	-
A17	Driver Airbag -	A44	-
A18	Driver Airbag +	A45	-
A19	-	A46	-
A20	-	A47	-
A21	-	A48	-
A22	-	A49	Driver Knee Airbag -
A23	S-CAN H	A50	Driver Knee Airbag +
A24	S-CAN L	A51	Far Side Airbag +
A25	Sensor Ground	A52	Far Side Airbag -
A26	-	A53	-
A27	Collision Output	A54	-

■ **Airbag Module B**

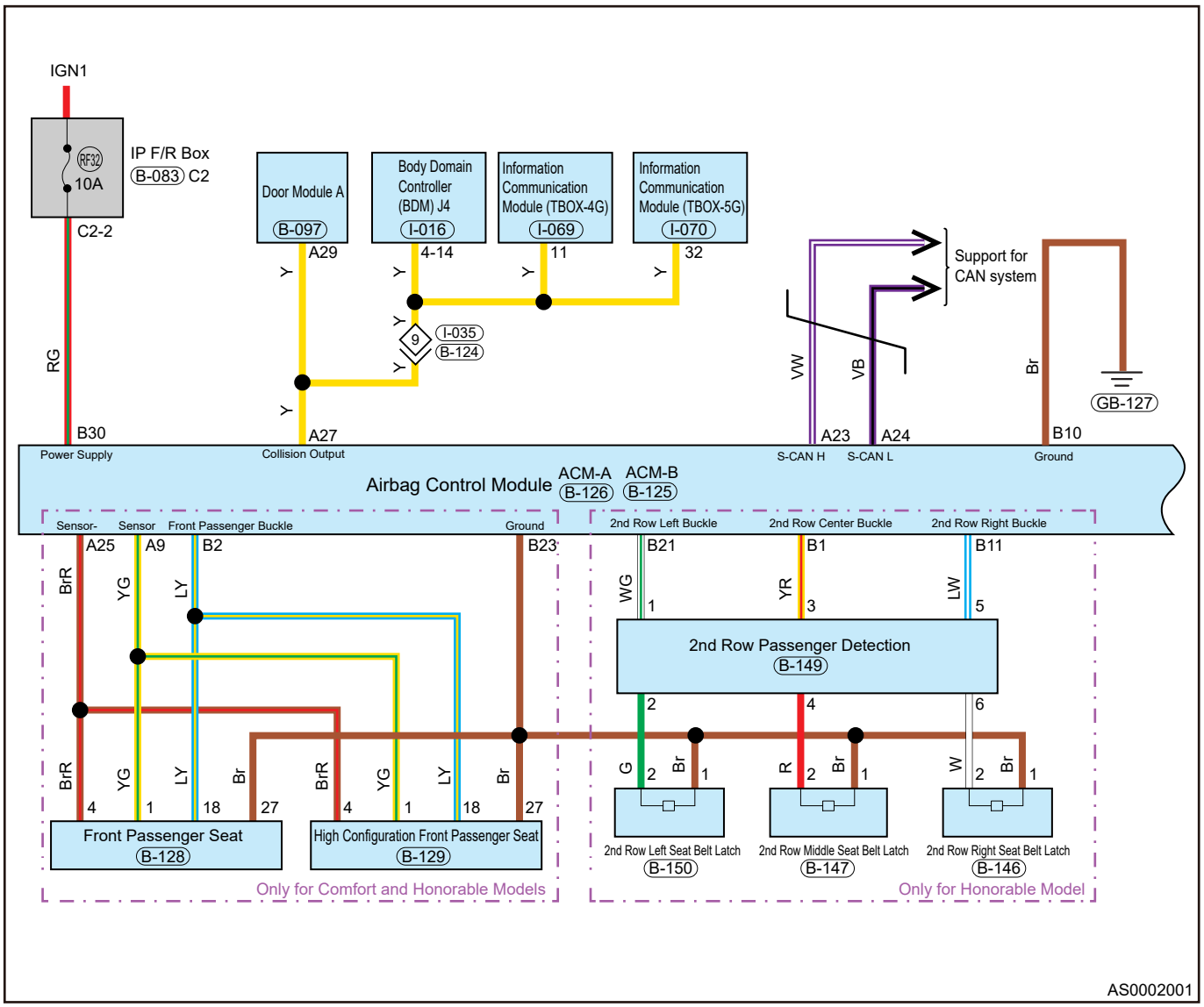


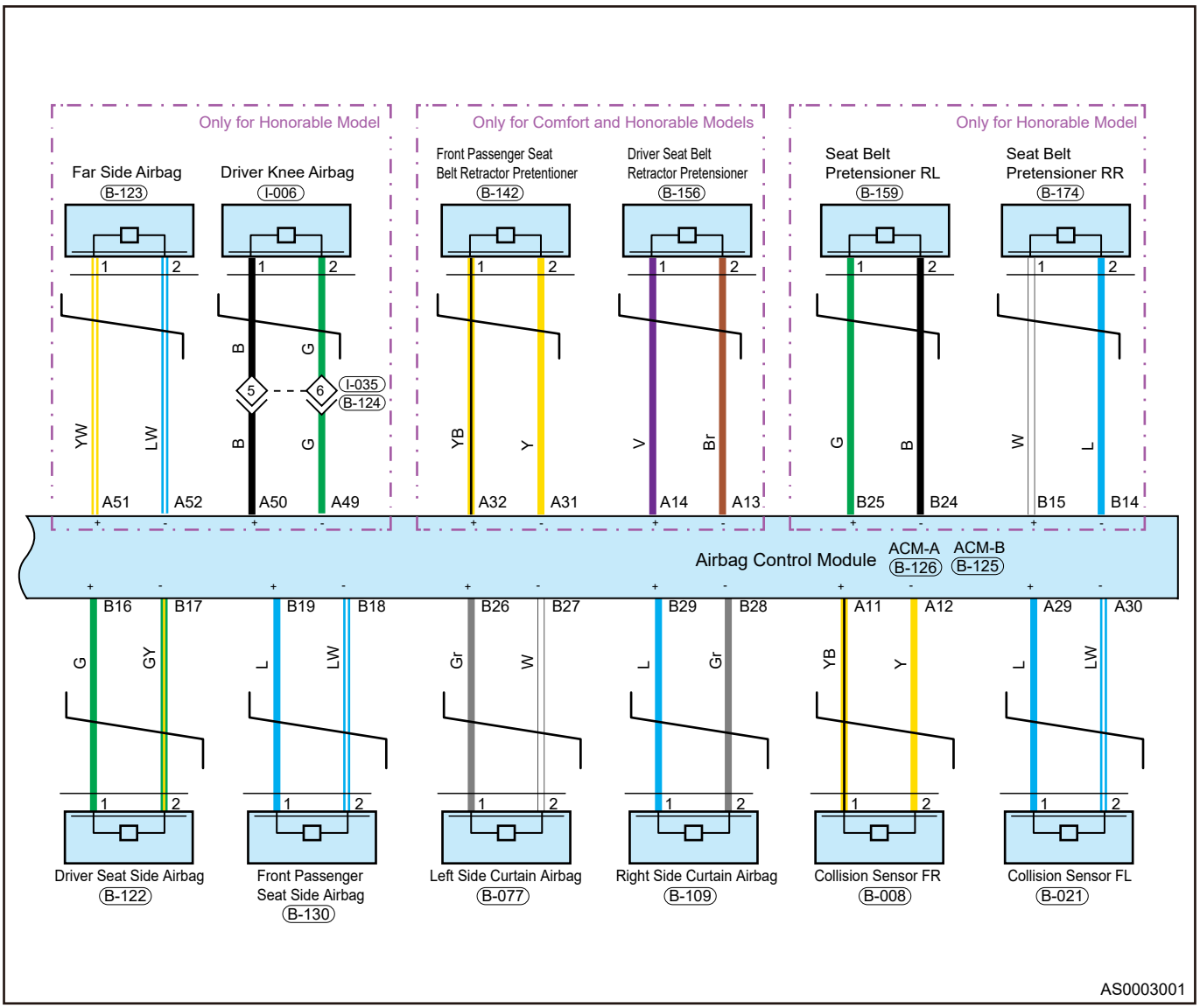
AS0007101

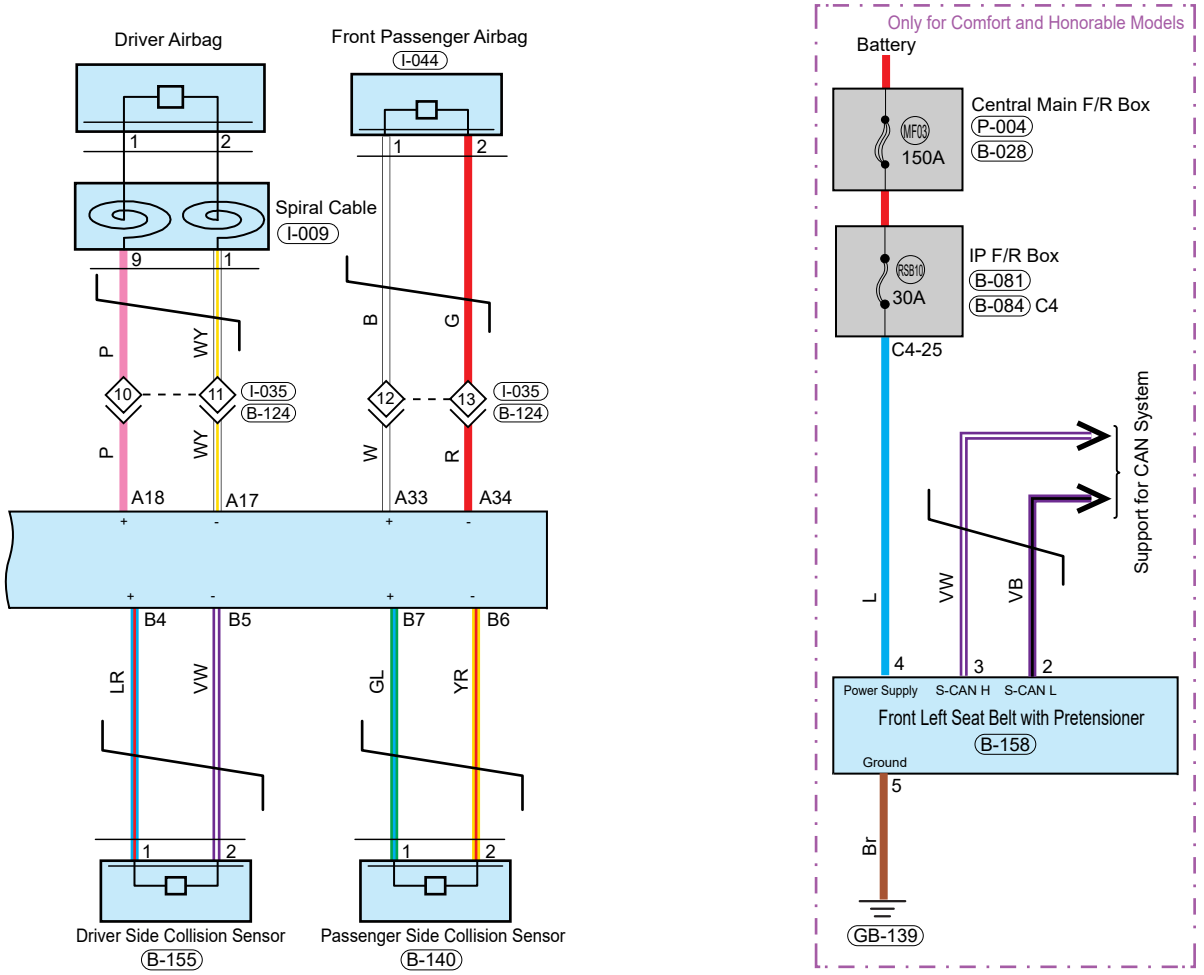
Pin	Definition	Pin	Definition
B1	Second Row Middle Seat Belt Buckle	B16	Driver Seat Side Airbag +
B2	Front Passenger Buckle	B17	Driver Seat Side Airbag -

Pin	Definition	Pin	Definition
B3	-	B18	Front Passenger Seat Side Airbag -
B4	Driver Side Collision Sensor +	B19	Front Passenger Seat Side Airbag +
B5	Driver Side Collision Sensor -	B20	-
B6	Occupant Side Collision Sensor -	B21	Second Row Left Seat Belt Buckle
B7	Occupant Side Collision Sensor +	B22	-
B8	-	B23	Sensor Ground
B9	-	B24	Rear Left Seat Belt Pretensioner -
B10	Ground	B25	Rear Left Seat Belt Pretensioner +
B11	Second Row Right Seat Belt Buckle	B26	Left Curtain Shield Airbag +
B12	-	B27	Left Curtain Shield Airbag -
B13	-	B28	Right Curtain Shield Airbag -
B14	Rear Right Seat Belt Pretensioner -	B29	Right Curtain Shield Airbag +
B15	Rear Right Seat Belt Pretensioner +	B30	Power Supply

3.2 Circuit Diagram




Only for Honorable Model
Only for Comfort and Honorable Models
Only for Honorable Model
Far Side Airbag
B-123
Driver Knee Airbag
I-006
Front Passenger Seat Belt Retractor Pretentioner
B-142
Driver Seat Belt Retractor Pretensioner
B-156
Seat Belt Pretensioner RL
B-159
Seat Belt Pretensioner RR
B-174
I-035
B-124
YW
LW
B
G
YB
Y
V
Br
W
L
A51
A52
A50
A49
A32
A31
A14
A13
B25
B24
B15
B14
Airbag Control Module
ACM-A
B-126
ACM-B
B-125
B16
B17
B19
B18
B26
B27
B29
B28
A11
A12
A29
A30
GY
Gr
Driver Seat Side Airbag
B-122
Front Passenger Seat Side Airbag
B-130
Left Side Curtain Airbag
B-077
Right Side Curtain Airbag
B-109
Collision Sensor FR
B-008
Collision Sensor FL
B-021
AS0003001



4 Matching Learning

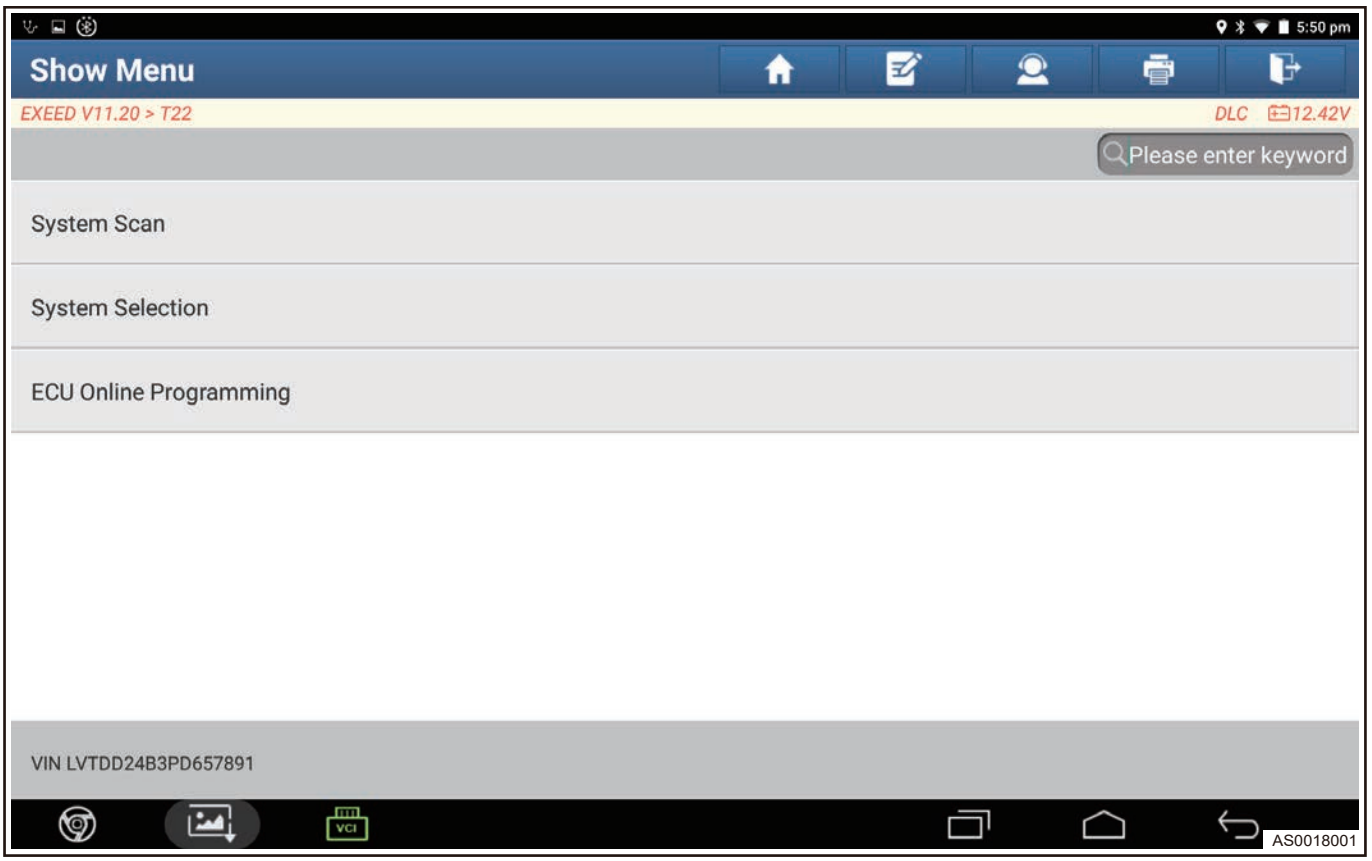
4.1 Module Matching Learning

Items	Applicable Situations	Actions Required by Diagnostic Tester	Note
Module Replacement	· Module damaged, needs replacement	Write VIN Code	/
		IMU (Inertial Sensor) Calibration	/

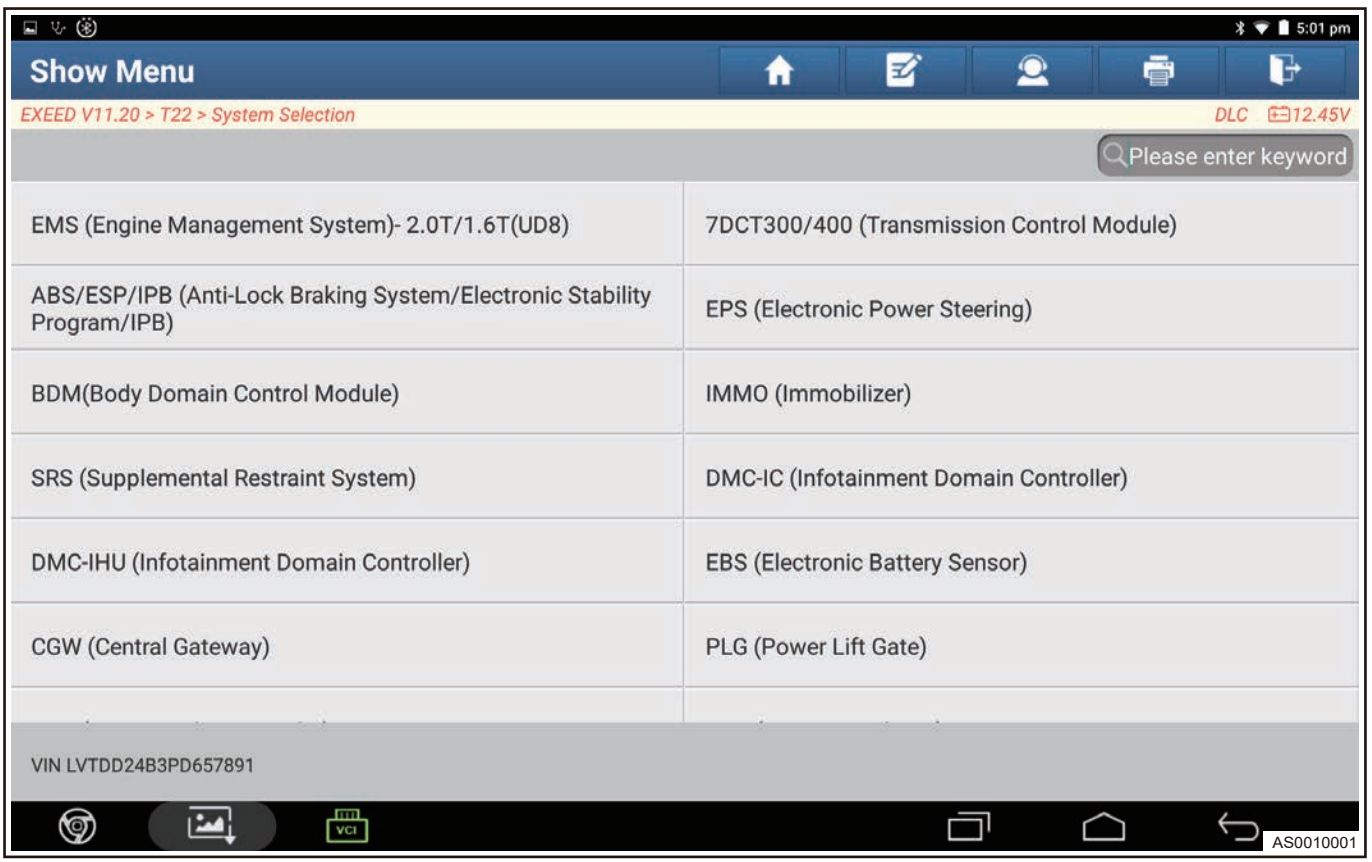
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

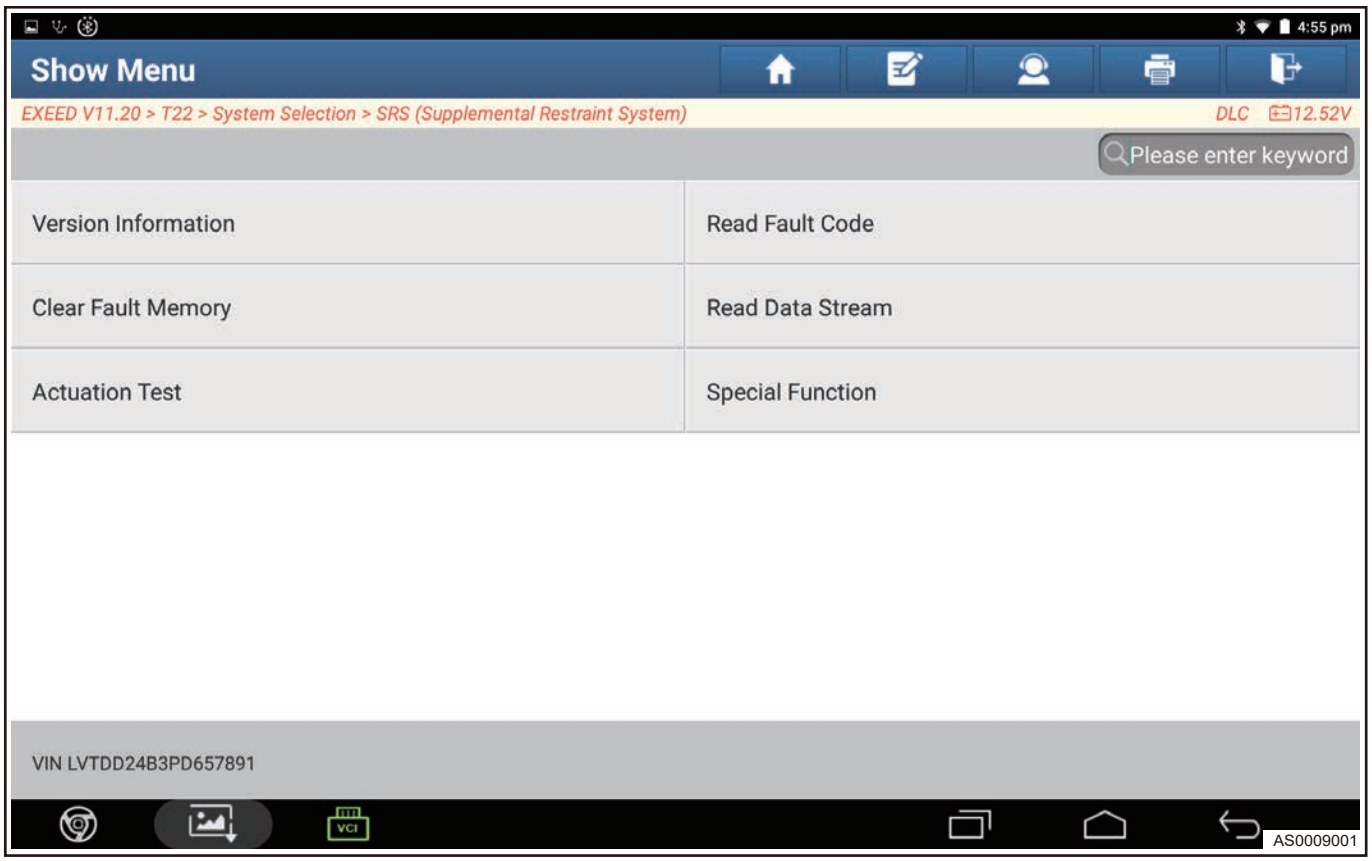
(3) Click “System Selection”.



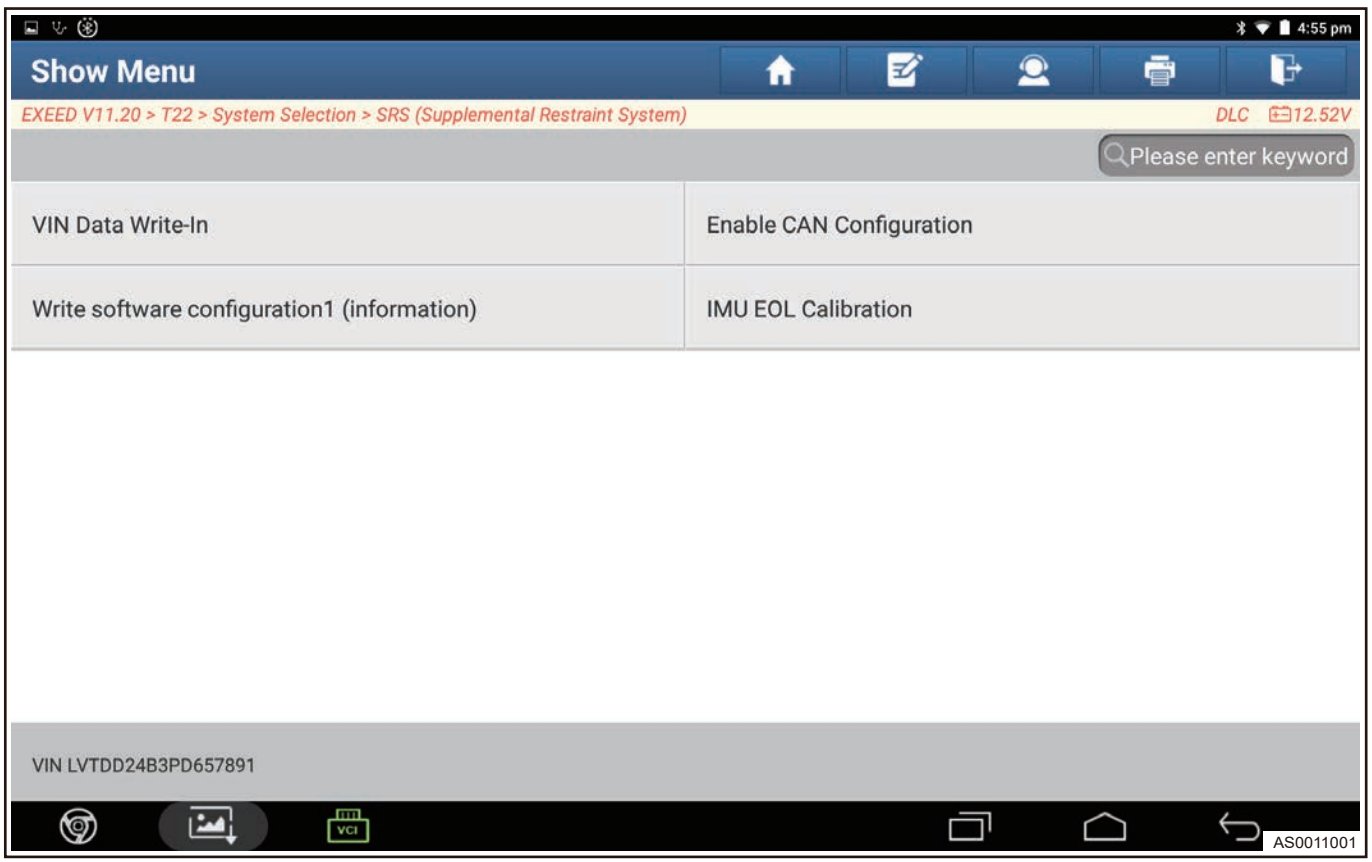
(4) Proceed to next interface and click “SRS (Supplemental Restraint System)”.



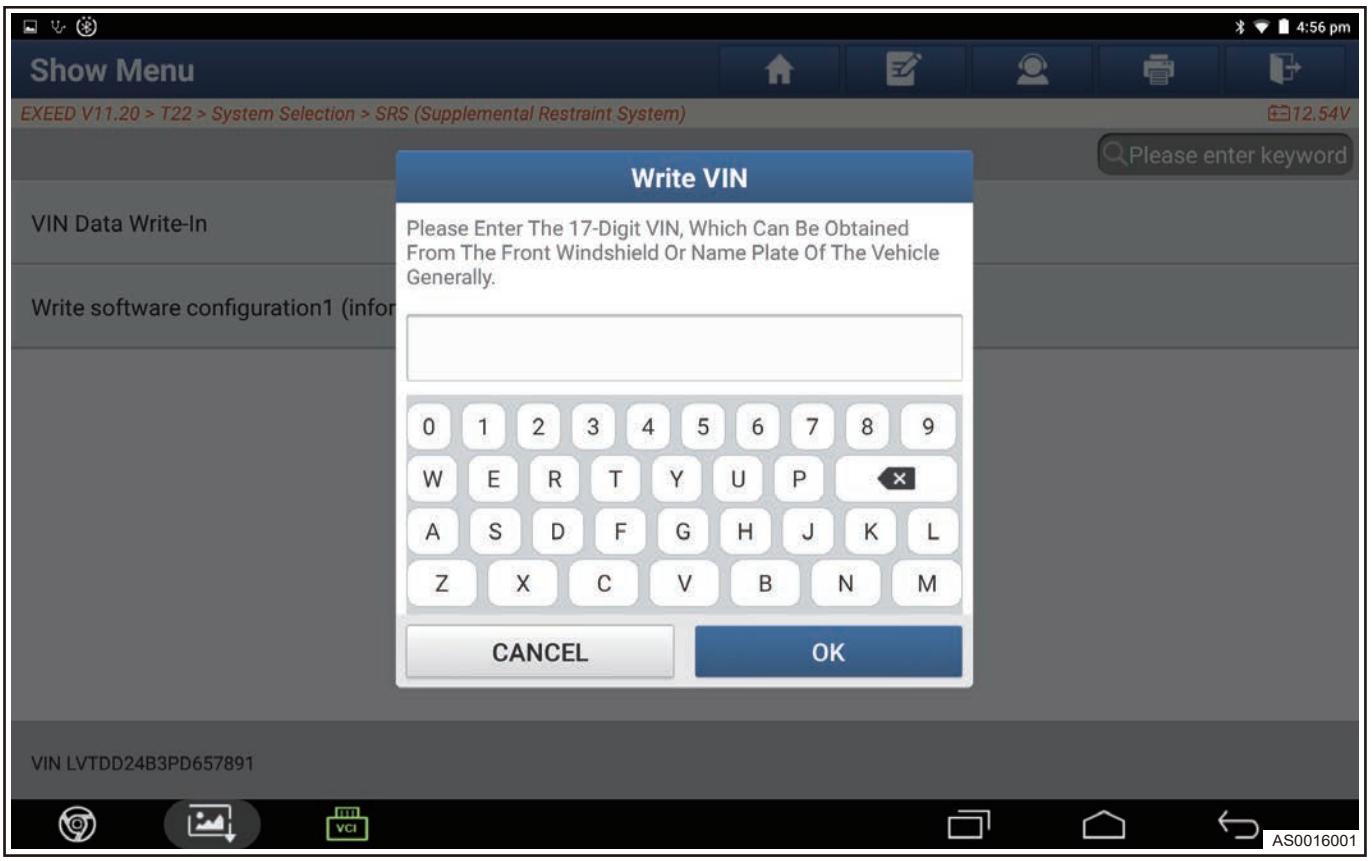
(5) Enter next screen and click “Special Function”.



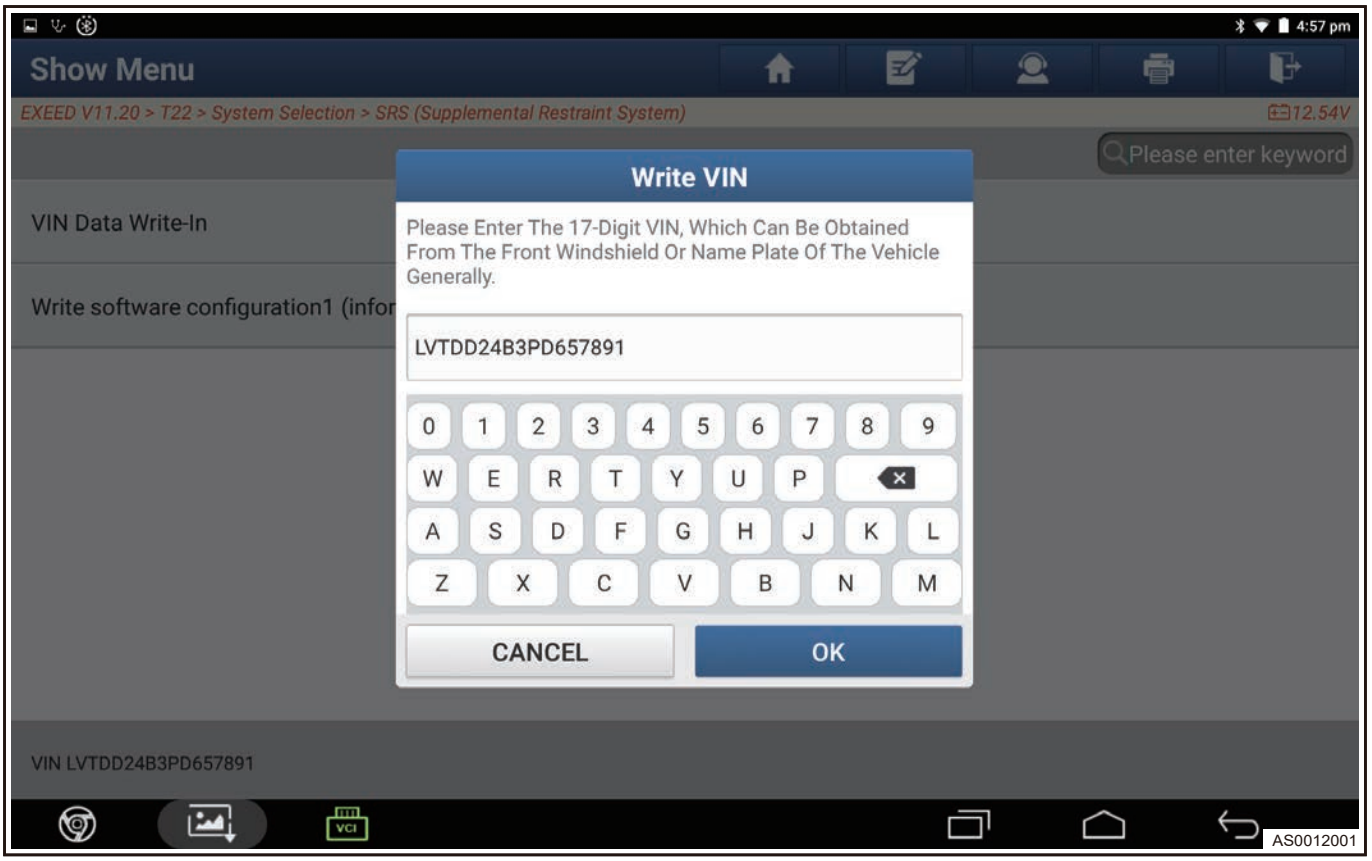
(6) Select “VIN Data Write-In”.



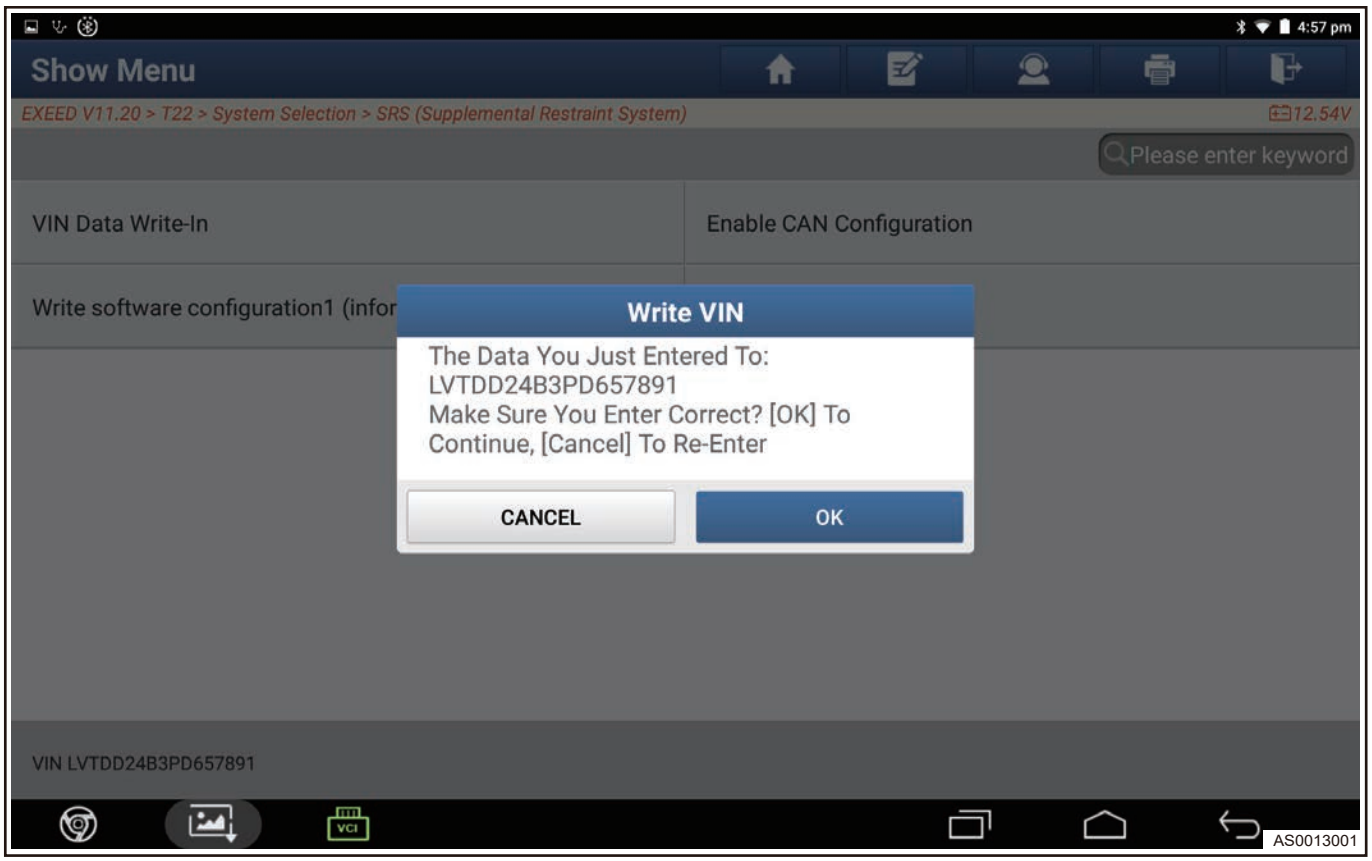
(7) Click and enter 17 bit VIN code.

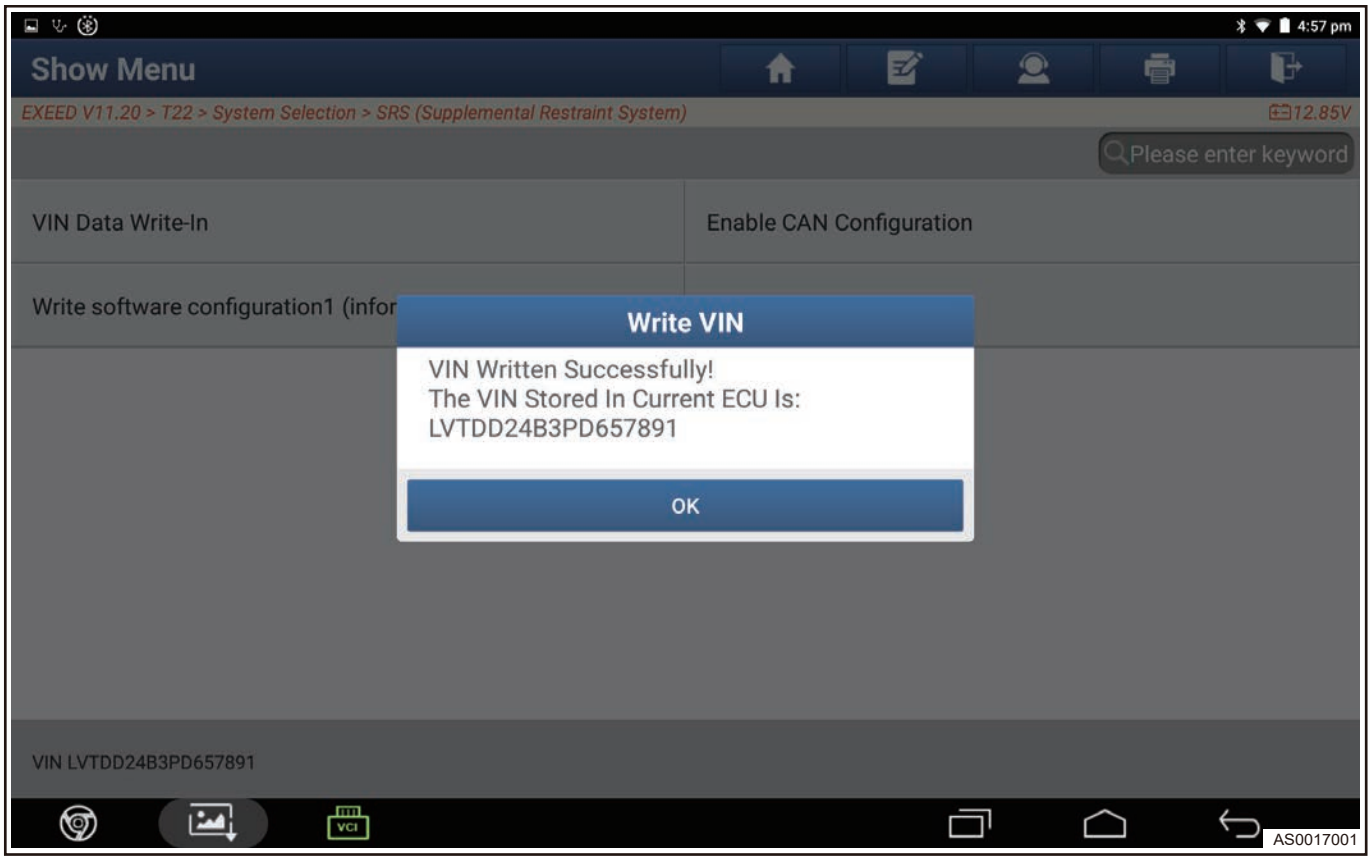


(8) After entering 17-digit VIN code, and click "Confirm".



(9) Interface shows "VIN Written Successfully", click "OK".


4:57 pm
Show Menu
EXEED V11.20 > T22 > System Selection > SRS (Supplemental Restraint System)
12.54V
Please enter keyword
VIN Data Write-In
Enable CAN Configuration
Write software configuration1 (infor
Write VIN
The Data You Just Entered To:
LVTDD24B3PD657891
Make Sure You Enter Correct? [OK] To Continue, [Cancel] To Re-Enter
CANCEL
OK
VIN LVTDD24B3PD657891
VCI
AS0013001


4:57 pm
Show Menu
EXEED V11.20 > T22 > System Selection > SRS (Supplemental Restraint System)
12.85V
Please enter keyword
VIN Data Write-In
Enable CAN Configuration
Write software configuration1 (infor
Write VIN
VIN Written Successfully!
The VIN Stored In Current ECU Is:
LVTDD24B3PD657891
OK
VIN LVTDD24B3PD657891
VCI
AS0017001

⚠ Caution

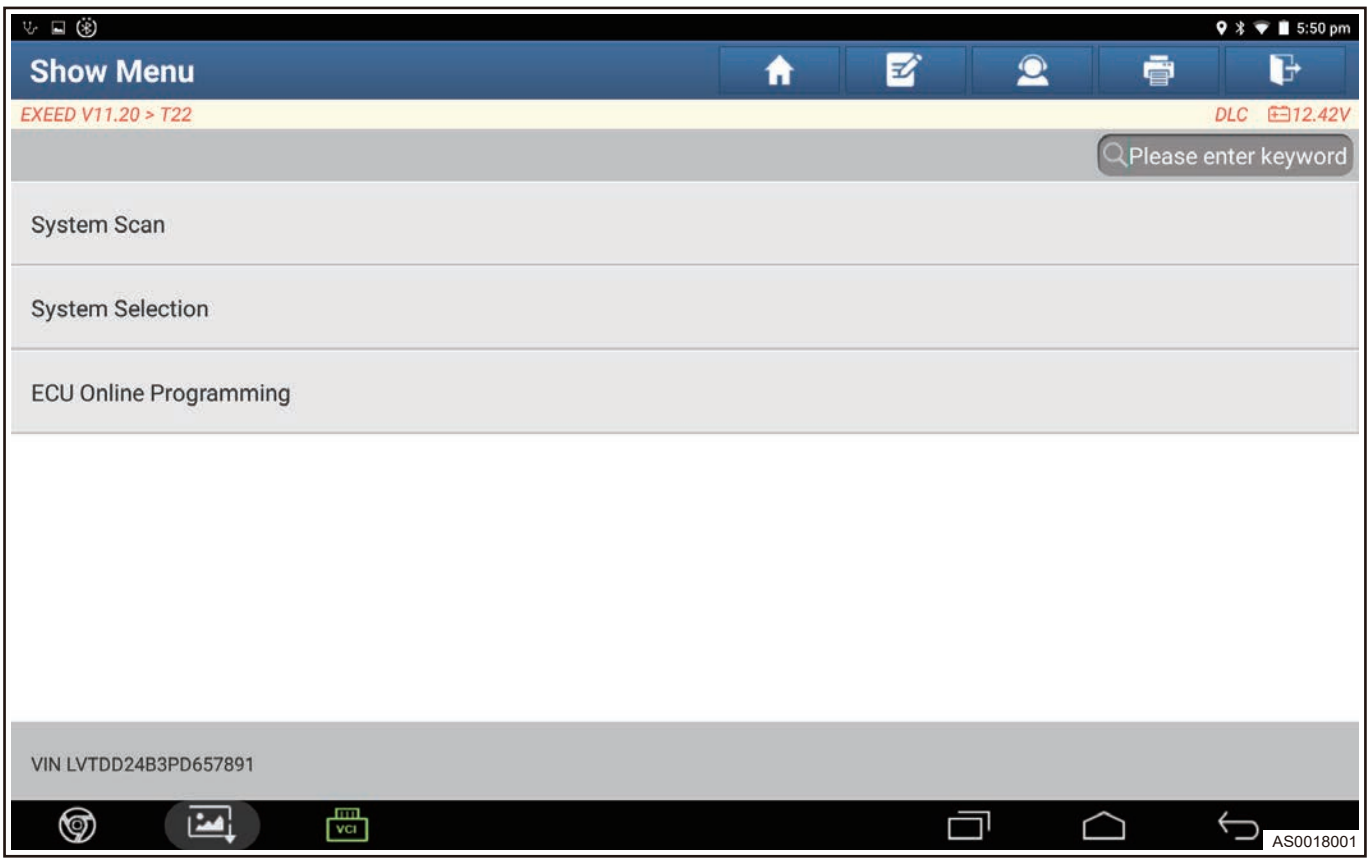
- **ACU is divided into high configuration and low configuration. Confirm the vehicle configuration information during installation firstly.**
- **Handle ACU carefully and it’ s strictly forbidden to tap and crash it fiercely.**
- **There should be no other objects between ACU installation plane and ACU module, and ACU must be installed directly on body panel.**
- **Make sure that the ignition key cylinder is in OFF state during installation and removal of ACU, and never install or remove it with power on.**
- **Reconfirm the installation direction of ACU after installation and make sure that label arrow direction is facing vehicle head. If fitted reversely, airbag controller assembly will not operate normally.**
- **ACU is not configured or during in configuration (when airbag light is flashing), ACU does not have the function of deployment, vehicle can not operate normally.**

4.2 Software Configuration Information Writing

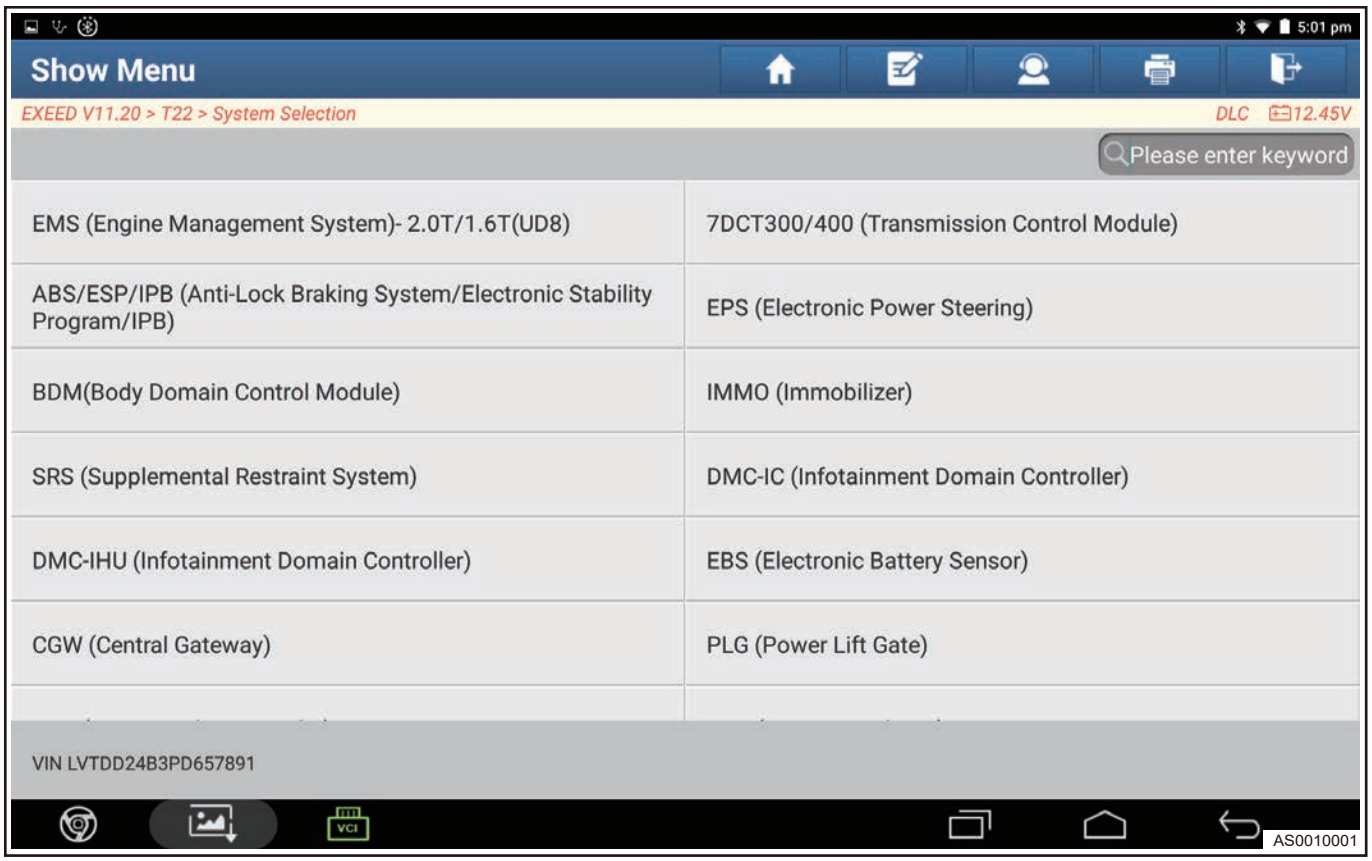
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

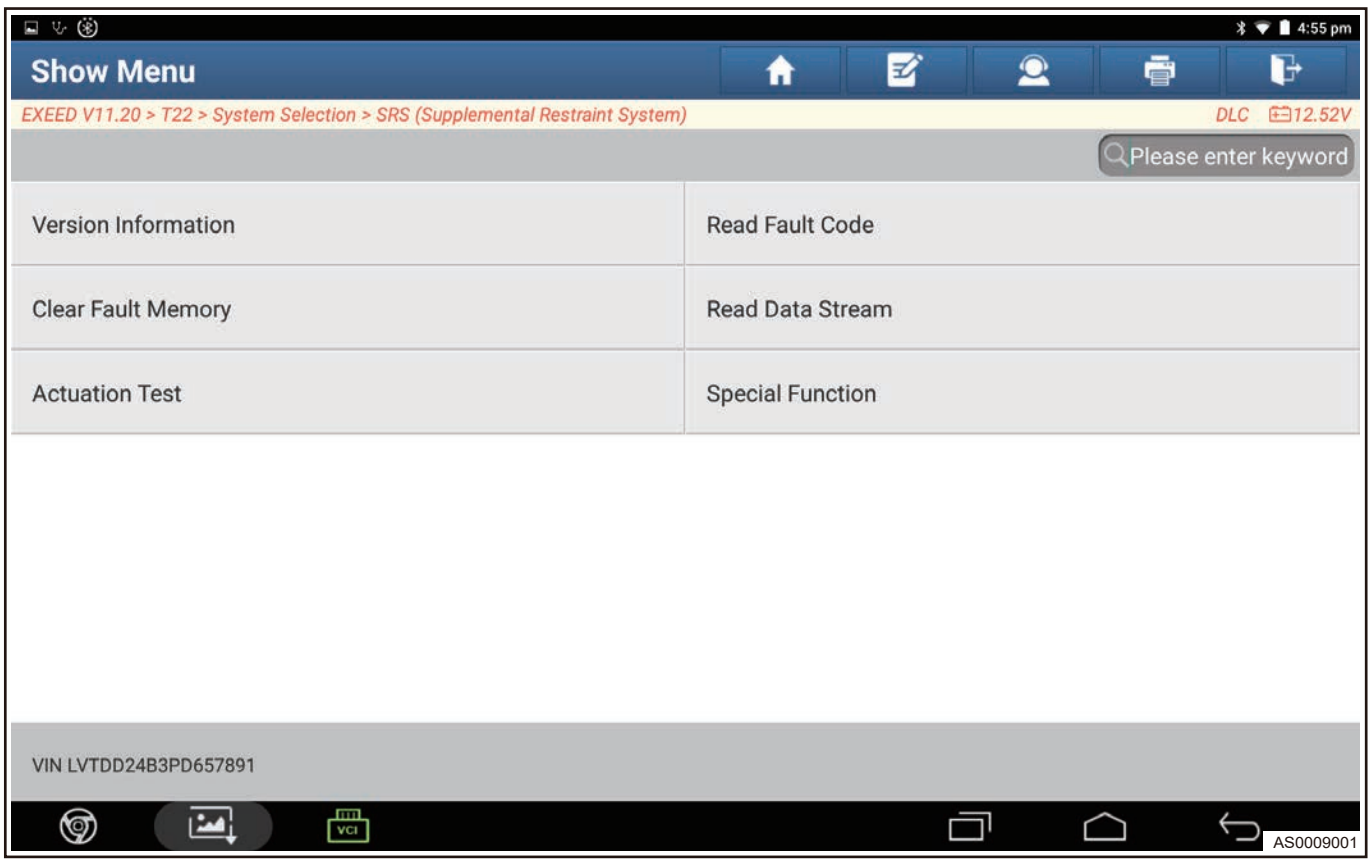
(3) Click “System Selection”.



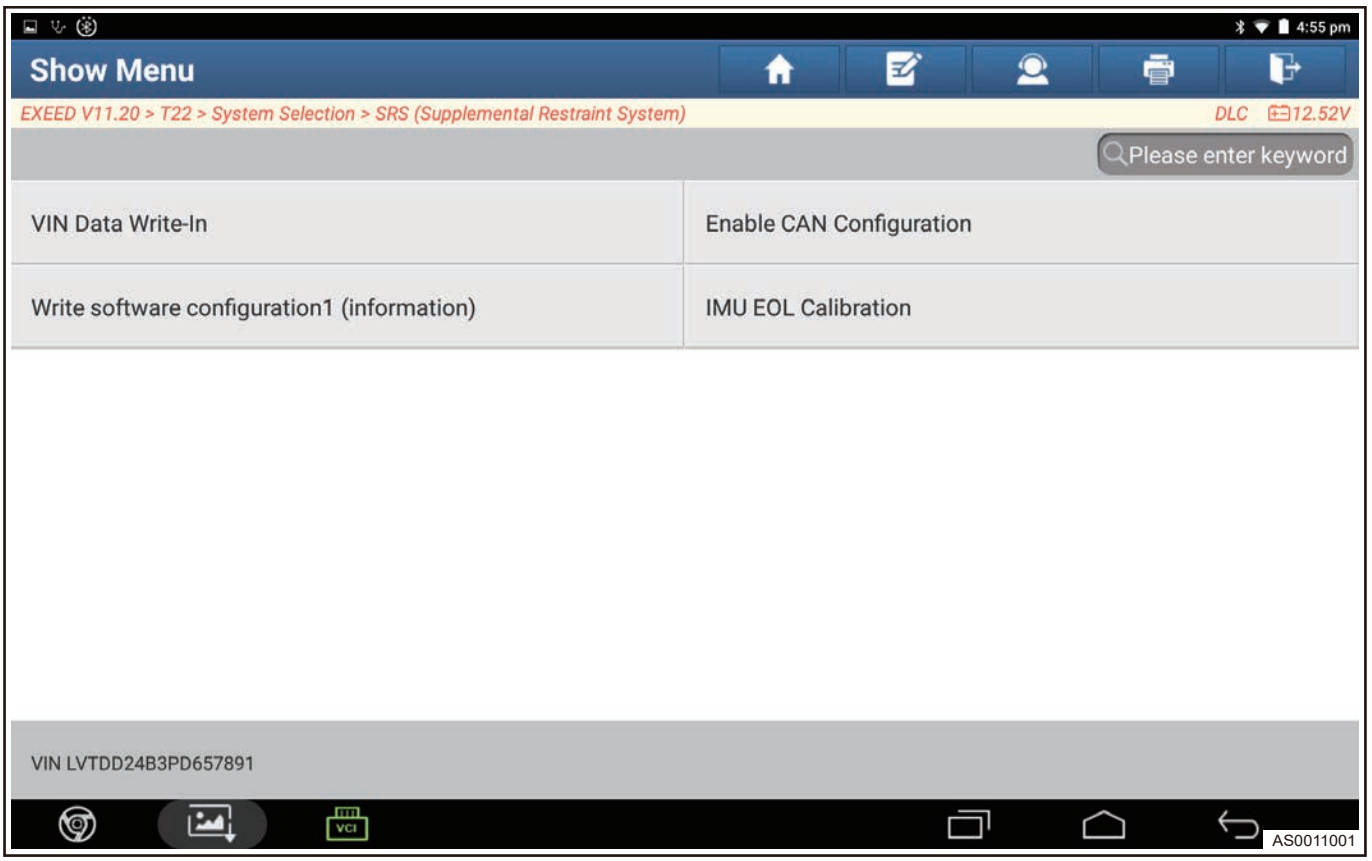
(4) Proceed to next interface and click “SRS (Supplemental Restraint System)”.



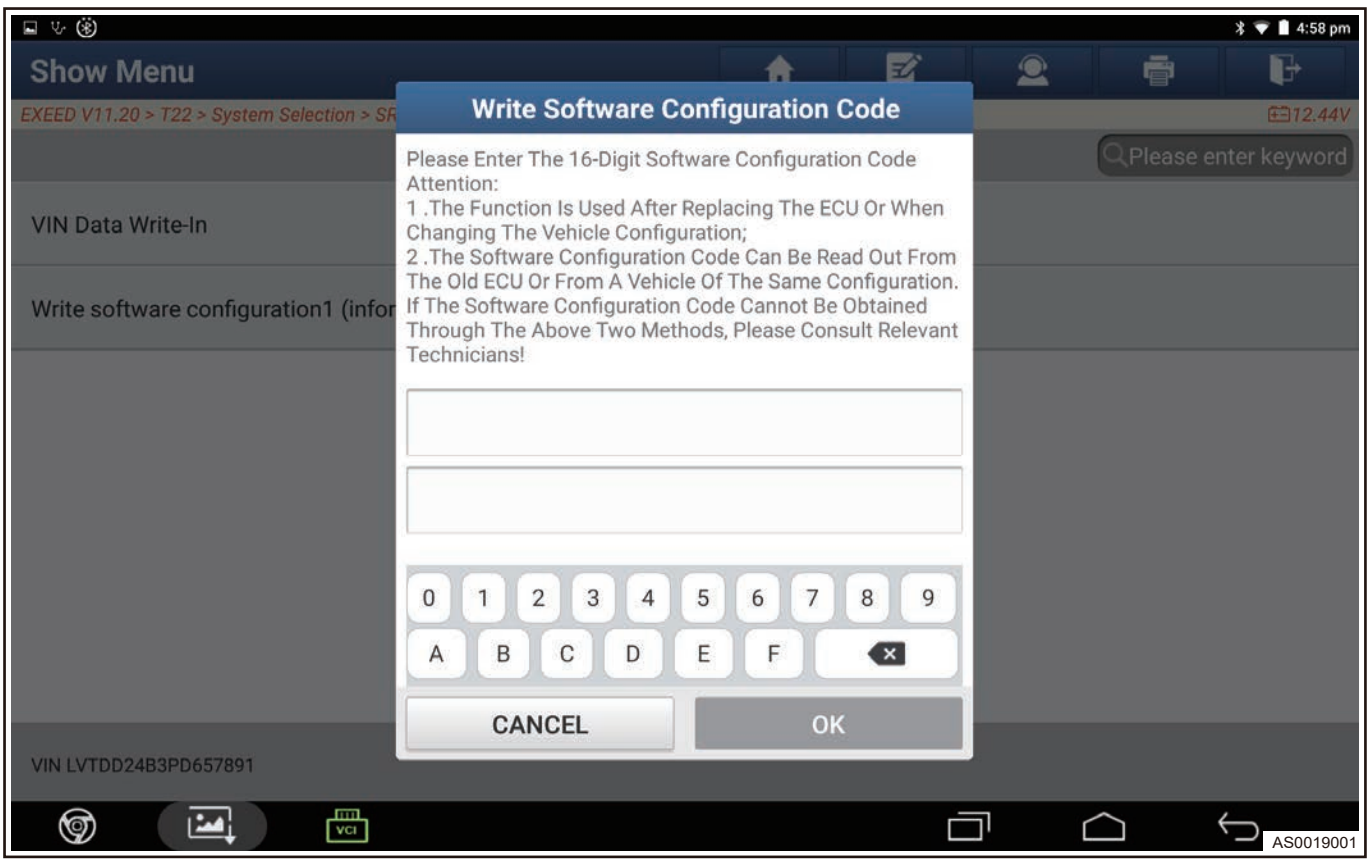
(5) Enter next screen and click “Special Function”.



(6) Select "Write Software Configuration1 (Information)".



(7) Input configuration information and click "OK".

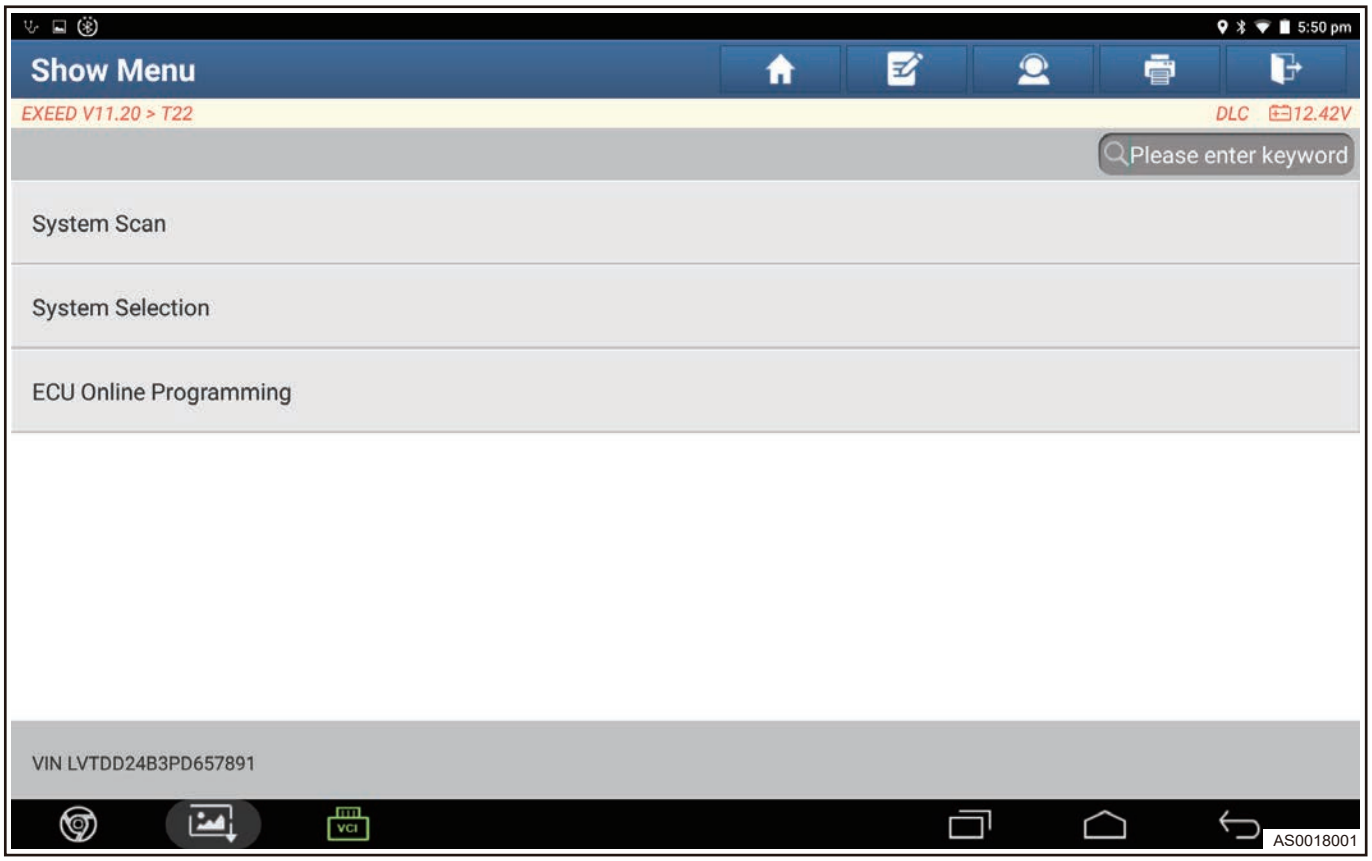


4.3 IMU (Inertial Sensor) Calibration

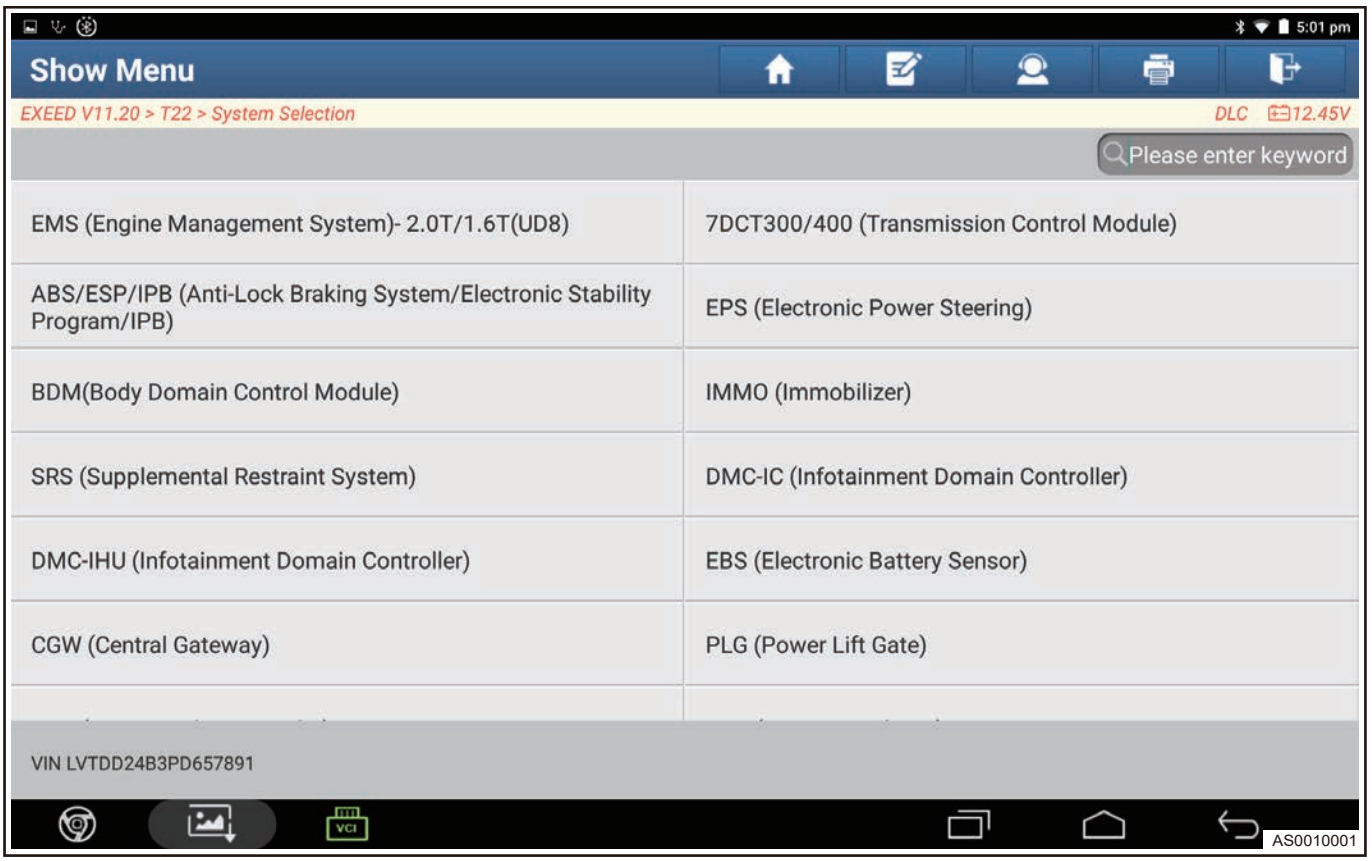
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

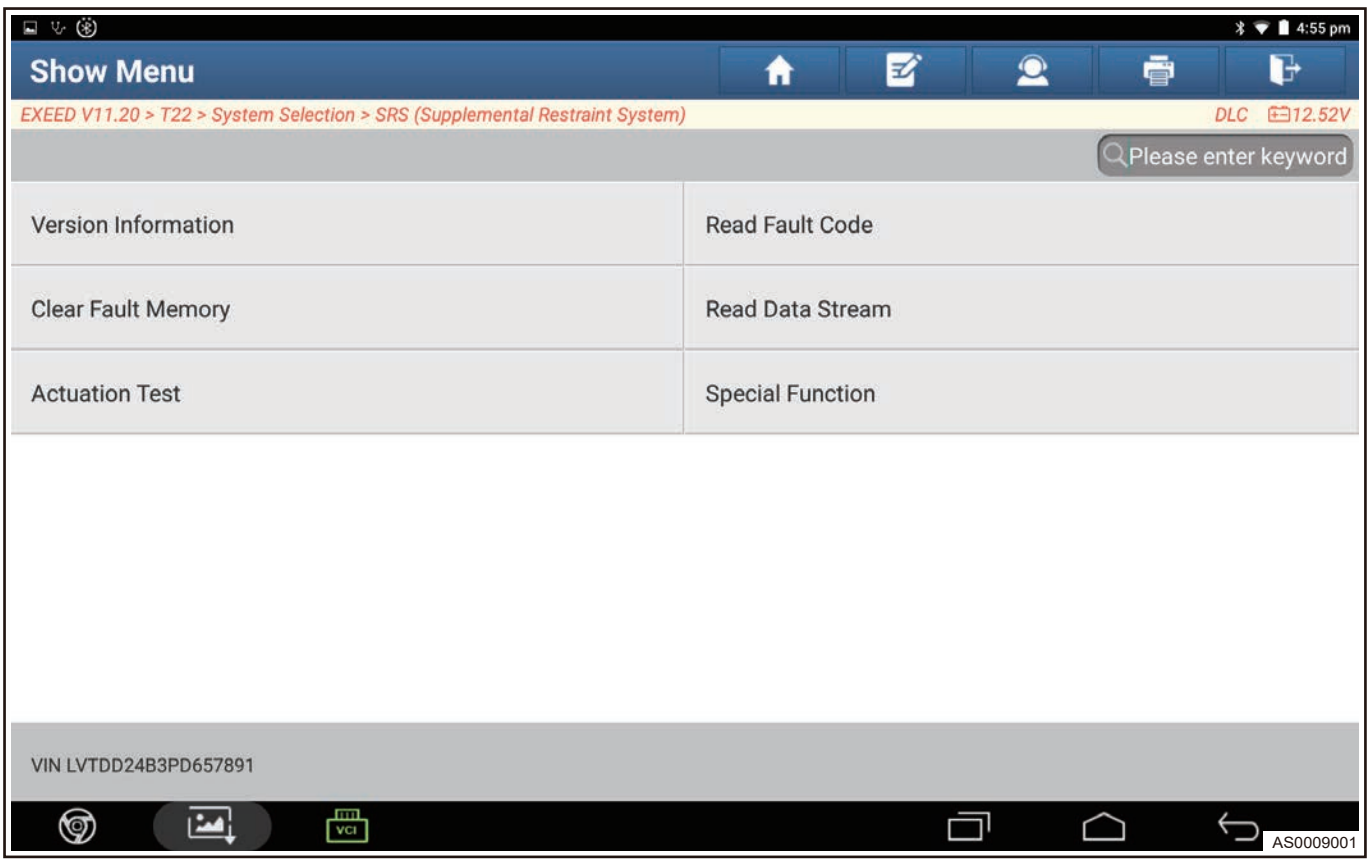
(3) Click “System Selection”.



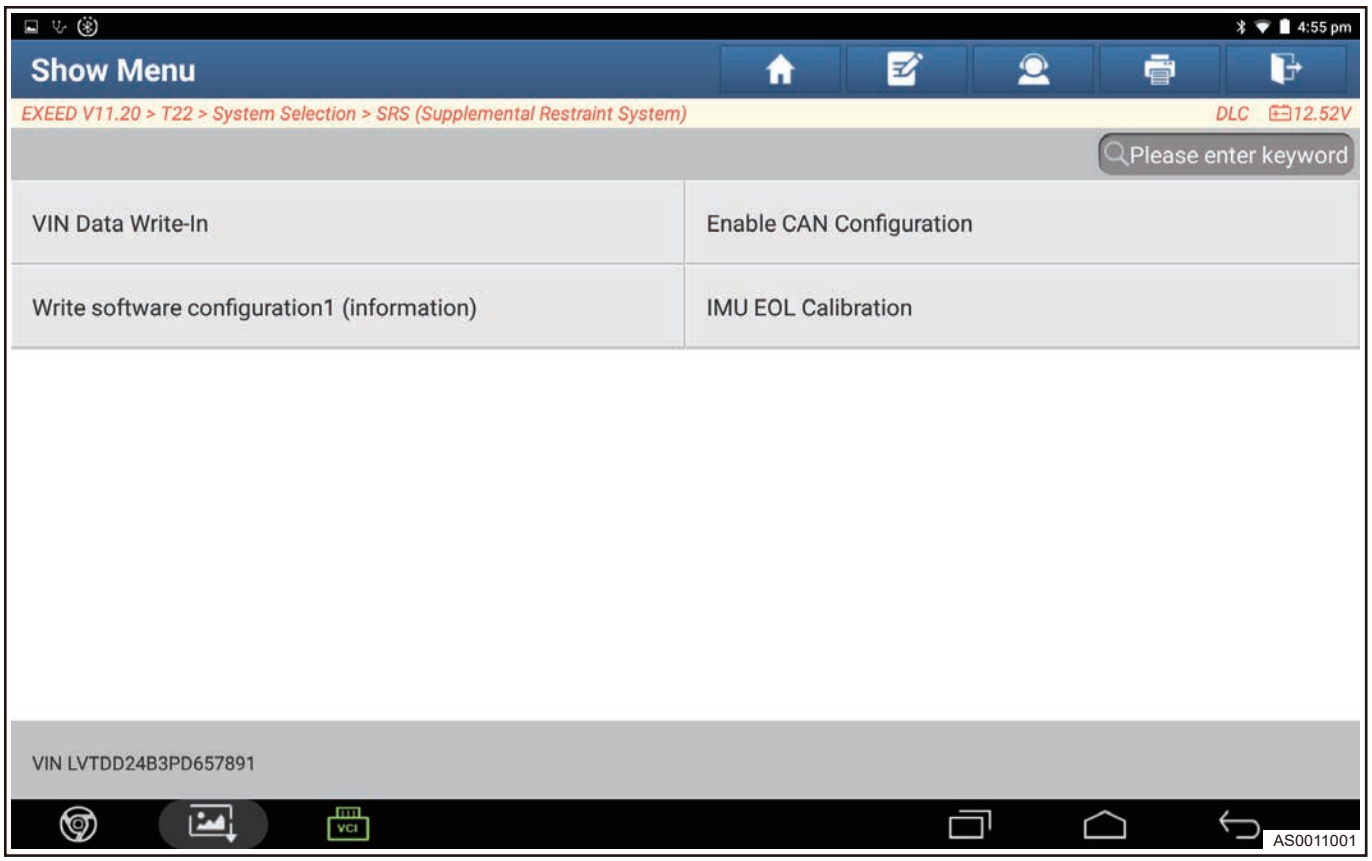
(4) Proceed to next interface and click “SRS (Supplemental Restraint System)”.



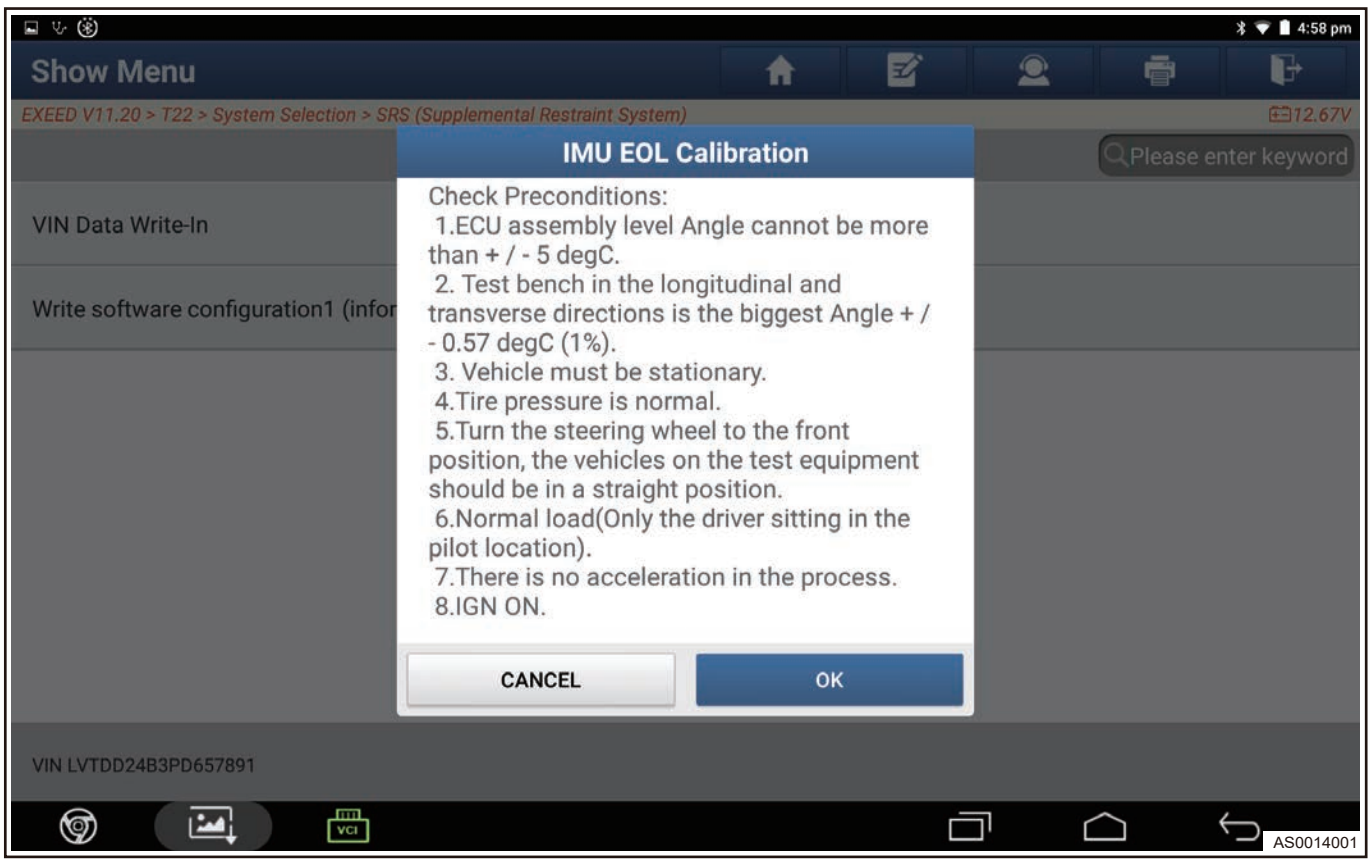
(5) Enter next screen and click “Special Function”.



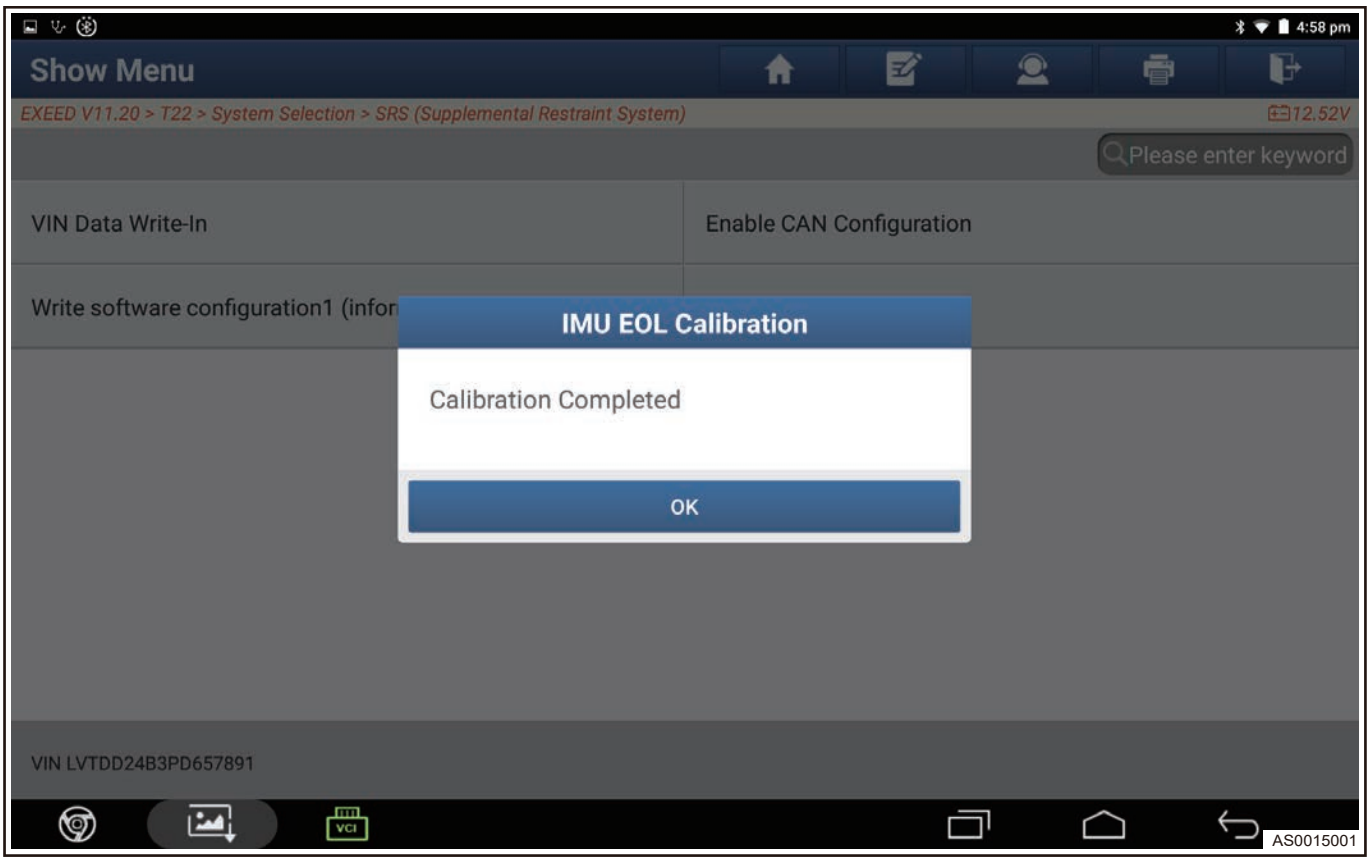
(6) Select “IMU EOL Calibration”.



(7) Sensor calibration conditions.



(8) Diagnostic tester will prompt whether calibration is succeed or not.



⚠ Caution

- **After replacing the airbag module, it is necessary to recalibrate the inertial sensor.**

5 Diagnosis & Test

5.1 Diagnosis Contents

■ Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Airbag system indicator remains on	Battery voltage is too low or too high
	Airbag module internal fault
	Instrument cluster airbag indicator fault
	Poor contact in instrument cluster connector
	Airbag module power supply fuse open or poor contact
	Poor contact in airbag module connector
	Airbag circuit fault
Airbag assembly (resistance is too high or too low)	Airbag itself fault
	Connection fault between airbag and airbag module
	Airbag module fault

■ DTC Confirmation Procedure

Confirm that battery voltage is normal before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ENGINE START STOP switch to ON.
- Use diagnostic tester to record and clear DTCs stored in supplemental restraint system.
- Turn the ENGINE START STOP switch to OFF and wait for several seconds.
- Turn ENGINE START STOP switch to “ON”, and then select read DTC.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

■ Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect airbag components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

■ Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

■ Preparations Before Dealing with Airbag System Wire Harness Malfunction

(1) Read and record the system DTC.
(2) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable for at least 1 minute so that the airbag controller has enough time to discharge.
(3) Prevent electric static discharge, such as static-proof wrist strap.
(4) To prevent the ignition element from igniting accidentally during wire harness measurement, it is necessary to disengage all elements connected to wire harness, such as airbag, module, sensor etc. before measuring.

■ Airbag System Malfunction Repair Completion Inspection

(1) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable (if is the connected);
(2) Connect each wire harness connector of airbag system;
(3) Connect negative battery cable;

(4) Start the vehicle, operate the electrical system, turn on the electrical equipment as much as possible (-blower, rear defroster, headlight, audio, etc.). If all the following requirements are met, the airbag system is normal, otherwise it should be checked and repaired again:

1) ENGINE START STOP switch is ON, system performs self-check, airbag warning light comes on. Warning light goes off when self-check is completed.

2) Connect the diagnostic tester, read the DTC and observe the datastream. Use the simulation method if necessary. Test the vehicle in the malfunction conditions described by customer, check if the malfunction is no longer duplicate and no other DTCs are produced.

3) If equipped with front passenger detection device, the front passenger seat belt warning light should operate normally; (Check method: A person sits on the front passenger seat and does not wear the seat belt, the light comes on and goes off after the seat belt is fastened.)

4) Clear history DTC (if exists)

■ Disposal of Airbag

Airbag deploys (in vehicle).

(1) It is necessary to deploy the airbag before disposing. If the vehicle is scrapped and disassembled, the airbag may deploy in vehicle.

1) Preventive procedure of airbag deployment

⚠ Caution

To prevent injury when deploying the airbag in vehicle, please refer to following prevention methods:

- **Remove all movable objects or loose parts within airbag deployment range before the airbag is deployed.**
- **The airbag is deployed only in the reserved airbag deployment area with door closed and side window opened.**
- **The airbag is deployed only in the reserved airbag deployment area (site), the technicians must stand at least 10 meters in front of the vehicle.**
- **Do not load voltage before all preparations have been completed.**
- **Cool down the airbag at least 30 minutes before handling the deployed airbag.**
- **Please wear gloves and safety glasses during disposal process.**
- **If airbag deployment is failed, wait at least 5 minutes after disconnecting the voltage, and then you can approach the vehicle.**

2) Prevention methods of deployment procedure

i. Inside deployment prevention methods

- Disconnect the negative and positive battery cables and move the battery 10 meters away from the vehicle.
- Prepare two additional wire harnesses at least 10 meters long for each one and special connector for connecting the spiral cable (clock spring). Peel off the 13 mm insulation coat at the end of wire harness. Connect the connector at one end and another end to twist as shown in illustration.
- Place the twisted end next to the battery for airbag deployment, but do not connect it to battery at this time.
- Remove driver side lower instrument panel from steering column. When connecting the lower part of steering column to SRS wire harness connector of spiral cable, connect the connector in figure 10.
- Clean the site.
- Disengage the twisted end of the wire harness next to the battery for airbag deployment.
- One wire harness contacts with negative battery and another one contacts with positive battery, the airbag will deploy at this time.
- Deploy the passenger side airbag module using the same procedure.
- Handle the deployed airbag with correct prevention methods. Refer to “Handling Procedure for Deployed Airbag” in this manual.

ii. Outside deployment prevention methods

- Install the airbag set to the tire with rim with airbag front surface faced up, and the space for wire and connector is reserved to prevent the deployment from being destroyed.
- Prepare two additional wire harnesses at least 10 meters long for each one and special connector for connecting airbag set. Peel off the 13 mm insulation coat at the end of wire harness. Connect the connector at one end as shown in illustration.
- Place the twisted end next to the battery for airbag deployment, but do not connect it to battery at this time.
- Stack 4 old tires without rims on the wheel installed with airbag set, and secure all the tires in 4 different positions with rope.
- Clean the site.
- Disengage the twisted end of the wire harness next to the battery for airbag deployment.
- One wire harness contacts with negative battery and another one contacts with positive battery, the airbag will deploy at this time.
- Deploy the passenger side airbag module using the same procedure.
- Handle the deployed airbag with correct prevention methods. Refer to “Handling Procedure for Deployed Airbag Set” in this manual.

Handling procedure for deployed airbag set

(2) Place the deployed airbag in a solid plastic bag.

(3) Be sure to seal the plastic bag tightly.

(4) Wash both hands carefully after handling the deployed airbag.

(5) Although above protection measures are taken, if the irritant substance attaches to the eyes or skin, flush it with a large amount of water immediately.

⚠ Caution

- **There may be powder particles on airbag surface, which is primarily composed of chemical reaction product (used to lubricate bag when inflating).**
- **There may be substance which can irritate eyes or skin attached to the deployed airbag, so please wear gloves and safety glasses during disposal process.**
- **After the airbag deploys, the temperature on airbag module metal surface is very high. To avoid any injury or fire, please keep the deployed airbag module far away from any combustible materials,**
- **Do not pour water or oil on the airbag after the airbag deploys and handle it after cooling for 30 minutes.**

■ Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the airbag control system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

OK

Standard voltage: Not less than 12 V.

Result

Result	Proceed to
OK	A
NG	B

B → Replace battery

A

3	Check ACU warning light

Next

4	Check for DTCs (current DTC and history DTC)

Result

Result	Proceed to
DTC occurs	A
No DTC	B

B → Perform repair according to problem symptoms table

A

5	Read DTCs (current DTC and history DTC)

Result

Result	Proceed to
Current DTC	A
History DTC	B

B → Troubleshoot according to Intermittent DTC malfunction procedures

A

6	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

7	Adjust, repair or replace

Next

8	Conduct test and confirm malfunction has been repaired

Next → End

5.2 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition
B1250-16	Power Supply Circuit Voltage Below Threshold
B1250-17	Power Supply Circuit Voltage Above Threshold
B0001-11	Driver Frontal Airbag Deployment Control Circuit Short to Ground
B0001-12	Driver Frontal Airbag Deployment Control Circuit Short to Battery
B0001-1A	Driver Frontal Airbag Deployment Control Circuit Resistance Below Threshold
B0001-1B	Driver Frontal Airbag Deployment Control Circuit Resistance Above Threshold
B0010-11	Passenger Frontal Airbag Deployment Control-Circuit Short to Ground
B0010-12	Passenger Frontal Airbag Deployment Control-Circuit Short to Battery
B0010-1A	Passenger Frontal Airbag Deployment Control-Circuit Resistance Below Threshold
B0010-1B	Passenger Frontal Airbag Deployment Control-Circuit Resistance Above Threshold
B0004-11	Driver Knee Airbag Deployment Control-Circuit Short To Ground
B0004-12	Driver Knee Airbag Deployment Control-Circuit Short To Power Supply
B0004-1A	Driver Knee Airbag Deployment Control-Circuit Resistance Below Threshold
B0004-1B	Driver Knee Airbag Deployment Control-Circuit Resistance Above Upper Threshold
B0013-11	Front Passenger Knee Airbag Deployment Control-Circuit Short To Ground
B0013-12	Front Passenger Knee Airbag Deployment Control-Circuit Short To Power Supply
B0013-1A	Front Passenger Knee Airbag Deployment Control-Circuit Resistance Below Threshold
B0013-1B	Front Passenger Knee Airbag Deployment Control-Circuit Resistance Above Threshold
B0020-11	Left Side Airbag Deployment Control Circuit Short to Ground
B0020-12	Left Side Airbag Deployment Control Circuit Short to Battery
B0020-1A	Left Side Airbag Deployment Control Circuit Resistance Below Threshold
B0020-1B	Left Side Airbag Deployment Control Circuit Resistance Above Threshold

DTC	DTC Definition
B0028-11	Right Side Airbag Deployment Control Circuit Short to Ground
B0028-12	Right Side Airbag Deployment Control Circuit Short to Battery
B0028-1A	Right Side Airbag Deployment Control Circuit Resistance Below Threshold
B0028-1B	Right Side Airbag Deployment Control Circuit Resistance Above Threshold
B0021-11	Left Curtain Shield Airbag Deployment Control Circuit Short to Ground
B0021-12	Left Curtain Shield Airbag Deployment Control Circuit Short to Battery
B0021-1A	Left Curtain Shield Airbag Deployment Control Circuit Resistance Below Threshold
B0021-1B	Left Curtain Shield Airbag Deployment Control Circuit Resistance Above Threshold
B0029-11	Right Curtain Shield Airbag Deployment Control Circuit Short to Ground
B0029-12	Right Curtain Shield Airbag Deployment Control Circuit Short to Battery
B0029-1A	Right Curtain Shield Airbag Deployment Control Circuit Resistance Below Threshold
B0029-1B	Right Curtain Shield Airbag Deployment Control Circuit Resistance Above Threshold
B1285-11	Front Row Left Seatbelt Retractor Pretensioner Deployment Control-Circuit Short To Ground
B1285-12	Front Row Left Seatbelt Retractor Pretensioner Deployment Control Circuit Short to Battery
B1285-1A	Front Row Left Seatbelt Retractor Pretensioner Deployment Control-Circuit Resistance Below Threshold
B1285-1B	Front Row Left Seatbelt Retractor Pretensioner Deployment Control Circuit Resistance Above Threshold
B1286-11	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Short to Ground
B1286-12	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Short to Battery
B1286-1A	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Resistance Below Threshold
B1286-1B	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Resistance Above Threshold
B1204-11	Belt Pretensioner Driver Deployment Control Circuit Short to Ground
B1204-12	Belt Pretensioner Driver Deployment Control Circuit Short to Battery

DTC	DTC Definition
B1204-1A	Belt Pretensioner Driver Deployment Control Circuit Resistance Below Threshold
B1204-1B	Belt Pretensioner Driver Deployment Control Circuit Resistance Above Threshold
B1205-11	Belt Pretensioner Passenger Deployment Control Circuit Short to Ground
B1205-12	Belt Pretensioner Passenger Deployment Control Circuit Short to Battery
B1205-1A	Belt Pretensioner Passenger Deployment Control Circuit Resistance Below Threshold
B1205-1B	Belt Pretensioner Passenger Deployment Control Circuit Resistance Above Threshold
B0073-11	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Short to Ground
B0073-12	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Short to Battery
B0073-1A	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Resistance Below Threshold
B0073-1B	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Resistance Above Threshold
B0075-11	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Short to Ground
B0075-12	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Short to Battery
B0075-1A	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Resistance Below Threshold
B0075-1B	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Resistance Above Threshold
B0030-11	Second Row Left Side Airbag Deployment Control Circuit Short to Ground
B0030-12	Second Row Left Side Airbag Deployment Control Circuit Short to Battery
B0030-1A	Second Row Left Side Airbag Deployment Control Circuit Resistance Below Threshold
B0030-1B	Second Row Left Side Airbag Deployment Control Circuit Resistance Above Threshold
B0038-11	Second Row Right Seat Side Airbag Deployment Control Circuit Short to Ground
B0038-12	Second Row Right Seat Side Airbag Deployment Control Circuit Short to Battery
B0038-1A	Second Row Right Seat Side Airbag Deployment Control Circuit Resistance Below Threshold
B0038-1B	Second Row Right Seat Side Airbag Deployment Control Circuit Resistance Above Threshold
B0006-11	Far Side Airbag Deployment Control Circuit Short to Ground

DTC	DTC Definition
B0006-12	Far Side Airbag Deployment Control Circuit Short To Battery
B0006-1A	Far Side Airbag Deployment Control Circuit Resistance Below Threshold
B0006-1B	Far Side Airbag Deployment Control Circuit Resistance Above Threshold
B0007-11	Pedestrian Protection Airbag Deployment Control Circuit Short to Ground
B0007-12	Pedestrian Protection Airbag Deployment Control Circuit Short To Battery
B0007-1A	Pedestrian Protection Airbag Deployment Control Circuit Resistance Below Threshold
B0007-1B	Pedestrian Protection Airbag Deployment Control Circuit Resistance Above Threshold
B0008-11	Second Row Left Side Frontal Airbag Deployment Control Circuit Short to Ground
B0008-12	Second Row Left Side Frontal Airbag Deployment Control Circuit Short To Battery
B0008-1A	Second Row Left Side Frontal Airbag Deployment Control Circuit Resistance Below Threshold
B0008-1B	Second Row Left Side Frontal Airbag Deployment Control Circuit Resistance Above Threshold
B0009-11	Second Row Right Side Frontal Airbag Deployment Control Circuit Short to Ground
B0009-12	Second Row Right Side Frontal Airbag Deployment Control Circuit Short To Battery
B0009-1A	Second Row Right Side Frontal Airbag Deployment Control Circuit Resistance Below Threshold
B0009-1B	Second Row Right Side Frontal Airbag Deployment Control Circuit Resistance Above Threshold
B00C7-12	Passenger Presence Detection Switch Short to Battery
B00C7-95	Passenger Load Detection Function Parameter Configuration Error
B1233-12	Passenger Buckle Switch Short to Battery
B1233-95	Passenger Buckle Switch Function Parameter Configuration Error
B1234-12	Second Row Left Buckle Switch Short to Battery
B1253-95	Second Row Left Buckle Switch Parameter Configuration Error
B1235-12	Second Row Middle Buckle Switch Short to Battery
B1254-95	Second Row Middle Buckle Switch Parameter Configuration Error
B1236-12	Second Row Right Buckle Switch Short to Battery

DTC	DTC Definition
B1255-95	Second Row Right Buckle Switch Parameter Configuration Error
B1237-12	Third Row Left Buckle Switch Short to Battery
B1256-95	Third Row Left Buckle Switch Parameter Configuration Incorrect
B1238-12	Third Row Right Buckle Switch Short to Battery
B1257-95	Third Row Right Buckle Switch Parameter Configuration Incorrect
B00DF-95	PAB Buckle Switch Config Error
B00DF-12	PAB Buckle Switch Short to Battery
B00DF-11	PAB Buckle Switch Short to GND
B00DF-13	PAB Buckle Switch Circuit Open
B00DF-1B	PAB Buckle Switch Circuit Resistance Too High
B00DF-1A	PAB Buckle Switch Circuit Resistance Too Low
B00DF-96	PAB Buckle Switch Circuit Residence is Bad
B0090-11	Left Front Restraints Sensor Circuit Short to Ground
B0090-12	Left Front Restraints Sensor Circuit Short to Battery
B0090-13	Left Front Restraints Sensor Circuit Open
B0090-96	Left Front Restraints Sensor Component Internal Failures
B0090-95	Left Front Restraints Sensor Config Error
B0090-00	Left Front Restraints Sensor Commutation Failures
B0095-11	Right Front Restraints Sensor Circuit Short to Ground
B0095-12	Right Front Restraints Sensor Circuit Short to Battery
B0095-13	Right Front Restraints Sensor Circuit Open
B0095-96	Right Front Restraints Sensor Component Internal Failures
B0095-95	Right Front Restraints Sensor Config Error
B0095-00	Right Front Restraints Sensor Commutation Failures
B0091-11	Left Side Restraints Sensor Circuit Short to Ground
B0091-12	Left Side Restraints Sensor Circuit Short to Battery
B0091-13	Left Side Restraints Sensor Circuit Open
B0091-96	Left Side Restraints Sensor Component Internal Failures
B0091-95	Left Side Restraints Sensor Config Error
B0091-00	Left Side Restraints Sensor Commutation Failures
B0096-11	Right Side Restraints Sensor Circuit Short to Ground
B0096-12	Right Side Restraints Sensor Circuit Short to Battery

DTC	DTC Definition
B0096-13	Right Side Restraints Sensor Circuit Open
B0096-96	Right Side Restraints Sensor Component Internal Failure
B0096-95	Right Side Restraints Sensor Configuration Error
B0096-00	Right Side Restraints Sensor Commutation Failures
B0097-11	Left Side Pressure Sensor Circuit Short to Ground
B0097-12	Left Side Pressure Sensor Circuit Short to Battery
B0097-13	Left Side Pressure Sensor Circuit Open
B0097-96	Left Side Pressure Sensor Component Internal Failures
B0097-00	Left Side Pressure Sensor Commutation Failures
B0097-95	Left Side Pressure Sensor Config Error
B0098-11	Right Side Pressure Sensor Circuit Short to Ground
B0098-12	Right Side Pressure Sensor Circuit Short to Battery
B0098-13	Right Side Pressure Sensor Circuit Open
B0098-96	Right Side Pressure Sensor Component Internal Failures
B0098-00	Right Side Pressure Sensor Commutation Failures
B0098-95	Right Side Pressure Sensor Config Error
B122C-00	ACU Has Been Scrapped-No Sub Type Information
B1216-47	Front crash
B1217-47	Side Collision
B1218-47	Rear Crash
B1219-47	Side Roll Over
B127F-47	Crash Recording Locked
B1215-00	Squib Cross Coupling Error
B1240-00	ICM Airbag Lamp Failed
U0073-88	ACU Bus OFF
U0100-87	Lost Communication with EMS
U0129-87	Lost Communication With Brake System Control Module-Missing Message
U0155-87	Lost Communication with ICM
U0140-87	Lost Communication with BCM
U0293-87	Lost Communication with HCU
U3000-51	Control Module Not Flash Calibration File
U1300-55	EOL Not Configured by ACU
B1251-00	ACU Internal Error-No Sub Type Information

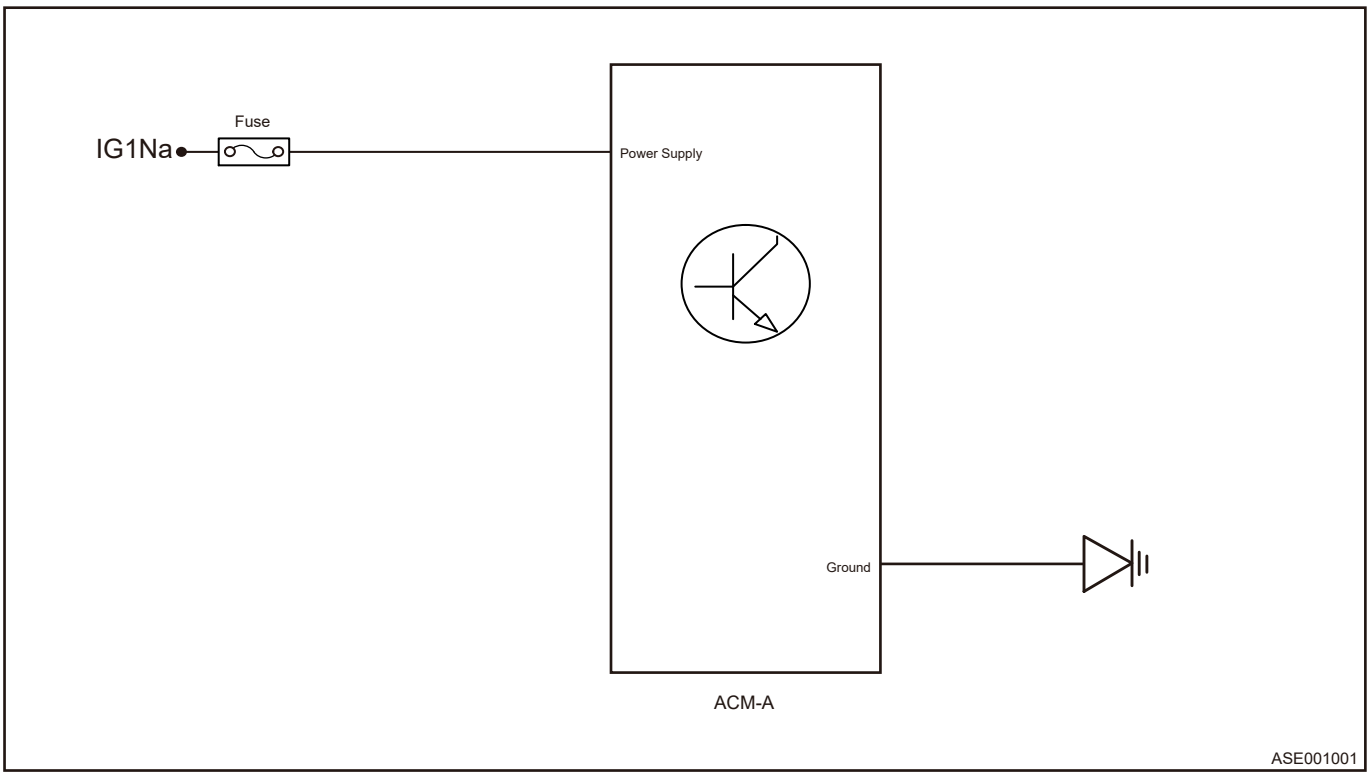
DTC	DTC Definition
B1251-57	Calibration Data and Configuration Information - Incompatible Software Component
B122F-55	VIN Code Not Been Written in ABM
B122D-95	Driver Airbag Unexpected Config
B122E-95	Passenger Airbag Unexpected Config
B121F-95	Left Side Airbag Unexpected Config
B1220-95	Right Side Airbag Unexpected Config
B1221-95	Left Curtain Unexpected Config-Incorrect Assembly
B1222-95	Right Curtain Unexpected Config
B1223-95	Front Row Left Seatbelt Retractor Pretensioner Unexpected Config
B1224-95	Front Row Right Seatbelt Retractor Pretensioner Unexpected Config
B1225-95	Belt Pretensioner Driver Unexpected Config
B1226-95	Belt Pretensioner Pass Unexpected Config
B1227-95	Second Row Left Seatbelt Pretensioner Unexpected Config
B1229-95	Second Row Right Seatbelt Pretensioner Unexpected Config
B0004-95	Driver Knee Airbag Unexpected Config-Incorrect Assembly
B0013-95	Front Passenger Knee Airbag Unexpected Config-Incorrect Assembly
B0030-95	Second Row Left Seat Side Airbag Unexpected Config
B0038-95	Second Row Right Seat Side Airbag Unexpected Config
B0006-95	Far Side Airbag Unexpected Config
B0007-95	Pedestrian Protection Airbag Unexpected Config
B0008-95	Second Row Left Frontal Airbag Unexpected Config
B0009-95	Second Row Right Frontal Airbag Unexpected Config
B1284-12	Crash Output Fault-Short to Battery
B1284-11	Crash Output Fault-Short to Ground
B1284-13	Crash Output Fault-Circuit Open
B00DE-12	On Lamp Short to Battery
B00DE-11	On Lamp Short to GND
B00DE-13	On Lamp Fault Circuit Open
B00DD-12	Off Lamp Short to Battery
B00DD-11	Off Lamp Short to GND

DTC	DTC Definition
B00DD-13	Off Lamp Fault Circuit Open
B00DE-09	Use qualified meter and BCM
B1287-54	Yaw Rate Sensor Not Calibrated
B1287-99	IMU (Inertial Measurement Unit) Calibration Failed

5.3 DTC Diagnosis Procedure

DTC	B1250-16	Power Supply Circuit Voltage Below Threshold
DTC	B1250-17	Power Supply Circuit Voltage Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check system voltage

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

Check voltage

Multimeter Connection	Detection Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch ON	Not less than 12 V

NG → **Repair or replace battery**

OK ↓

2	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuse is blown or no power.

NG → **Replace fuse or check the cause for no power**

OK ↓

3	Check airbag controller connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the airbag controller connector.

(c) Check connector for bad contact, bending, distortion, poor contact, etc.

NG → **Repair or replace airbag controller connector**

OK ↓

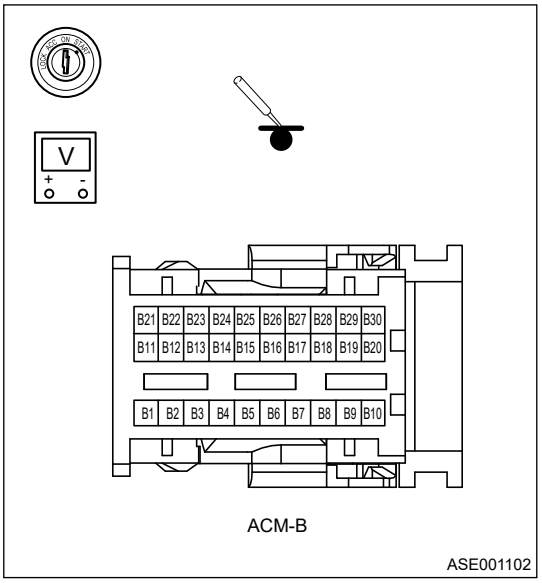
4	Check airbag controller power supply circuit

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag module connector (power supply terminal) and body ground.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- power supply terminal) - Body ground	Turn ignition switch to ON	12 V



NG → **Repair airbag controller power supply wire harness**

OK

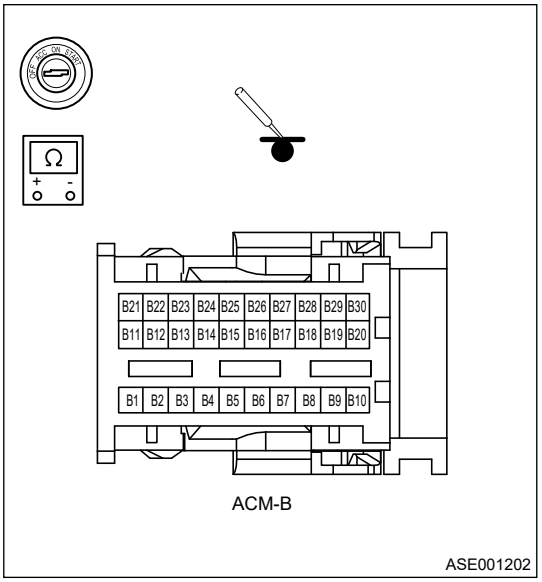
5	Check airbag controller ground circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag module connector (ground terminal) and body ground.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- ground terminal) - Body ground	ENGINE START STOP switch OFF	⩽ 1 Ω



NG → **Repair airbag controller ground wire harness**

OK

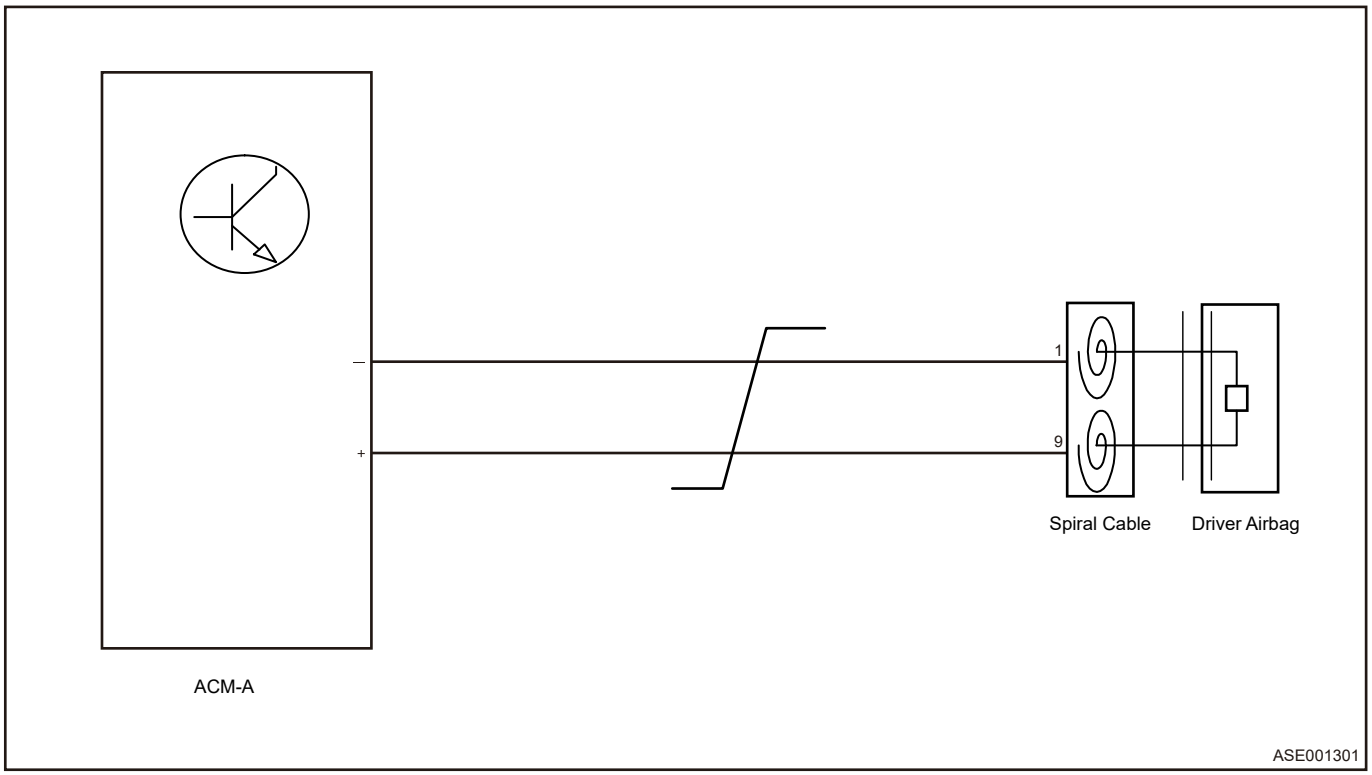
6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace with a new ECU to check if fault reoccurs**
OK	**Conduct test and confirm malfunction has been repaired**

DTC	**B0001-11**	**Driver Frontal Airbag Deployment Control Circuit Short to Ground**
DTC	**B0001-12**	**Driver Frontal Airbag Deployment Control Circuit Short to Battery**
DTC	**B0001-1A**	**Driver Frontal Airbag Deployment Control Circuit Resistance Below Threshold**
DTC	**B0001-1B**	**Driver Frontal Airbag Deployment Control Circuit Resistance Above Threshold**

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the driver frontal airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

OK

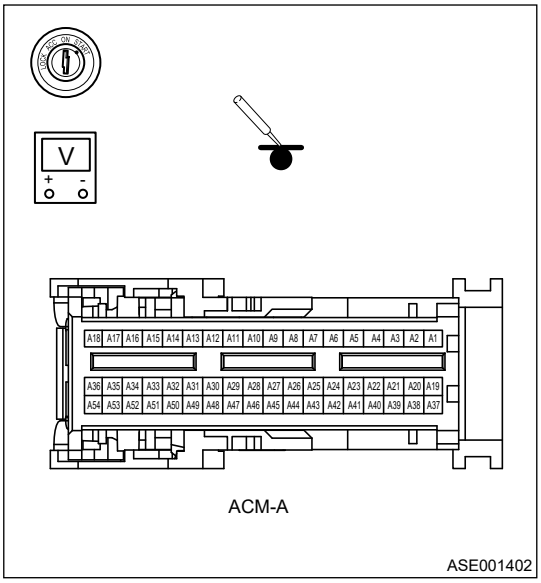
2	**Check voltage between driver frontal airbag circuit and ground**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag control module connector (connected driver airbag terminal) and body ground.

(c) Perform the voltage inspection.



Multimeter Connection	Condition	Specified Condition
Airbag module connector (-connected driver airbag terminal+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module connector (-connected driver airbag terminal-) - Body ground	ENGINE START STOP switch ON	0 V

NG → **Repair or replace driver frontal airbag wire harness as needed**

OK

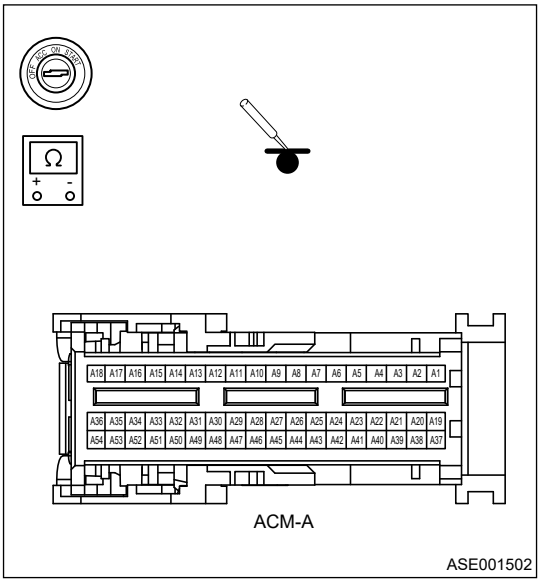
3	**Check the resistance between driver frontal airbag circuit and ground**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag control module connector (connected driver airbag terminal) and body ground.

(c) Perform the resistance inspection.



Multimeter Connection	Condition	Specified Condition
Airbag module connector (-connected driver airbag terminal+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module connector (-connected driver airbag terminal-) - Body ground	ENGINE START STOP switch OFF	∞

NG → **Repair or replace driver frontal airbag wire harness as needed**

OK

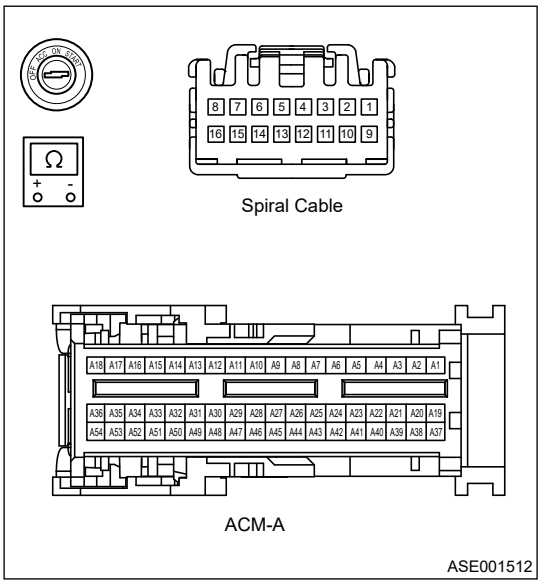
4	Check circuit between airbag controller and spiral cable

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check for continuity between spiral cable connector (driver frontal airbag) and airbag control module connector (connected terminal).

(c) Perform the resistance inspection.



Multimeter Connection	Condition	Specified Condition
Airbag module connector (-connected terminal) - Spiral cable (1)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module connector (-connected terminal) - Spiral cable (9)	ENGINE START STOP switch OFF	Less than 1 Ω

NG → **Repair or replace wire harness between airbag controller and spiral cable.**

OK

5	Check the driver frontal airbag

(a) Substitute one 2.5 Ω resistor for airbag.
(b) Check if DTC exists.

NG → **Repair or replace driver frontal airbag**

OK

6	Check spiral cable

(a) Check if spiral cable has any damage, stuck or other symptoms.
(b) Check if spiral cable is normal.

NG → **Repair or replace spiral cable**

OK

7	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
Use circuit diagram as a guide to perform the following inspection procedures:

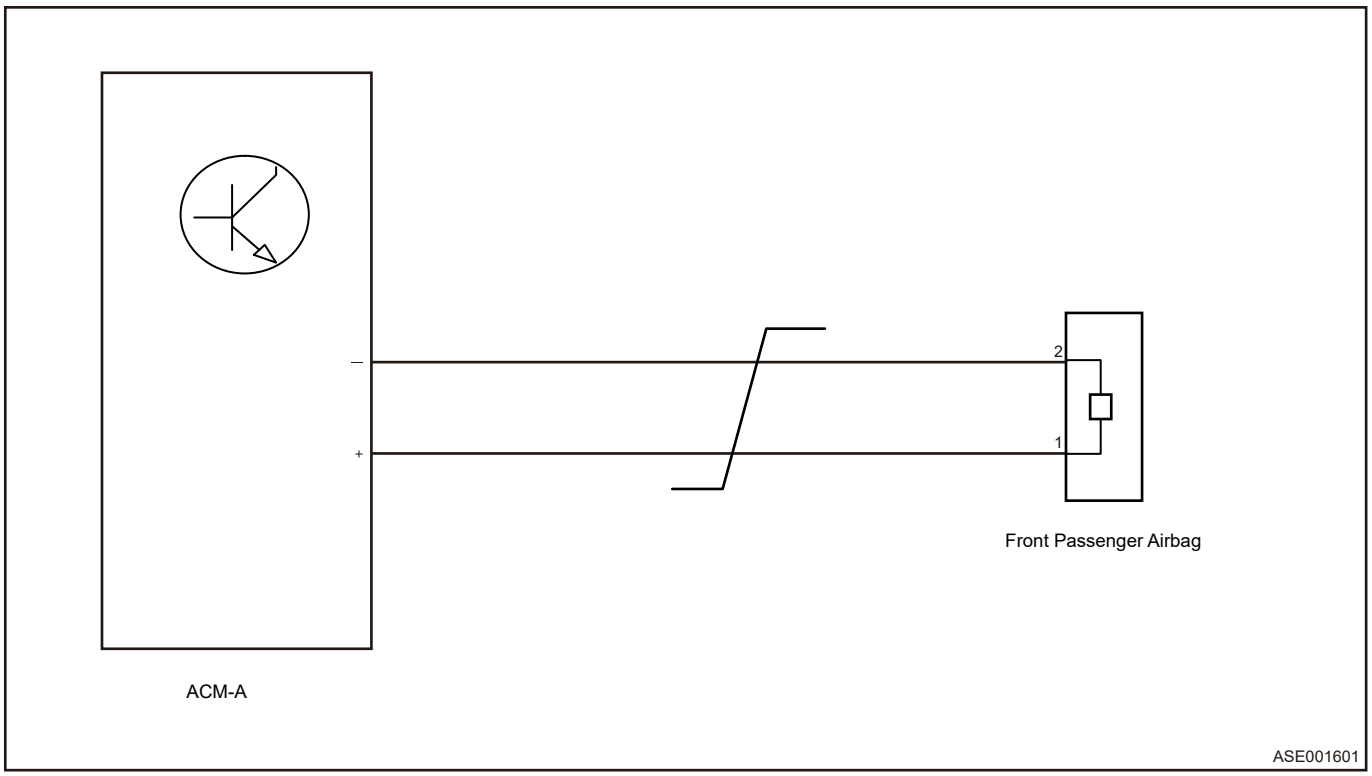
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0010-11	Passenger Frontal Airbag Deployment Control-Circuit Short To Ground
DTC	B0010-12	Passenger Frontal Airbag Deployment Control-Circuit Short To Battery
DTC	B0010-1A	Passenger Frontal Airbag Deployment Control-Circuit Resistance Below Threshold
DTC	B0010-1B	Passenger Frontal Airbag Deployment Control-Circuit Resistance Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the front passenger frontal airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

OK

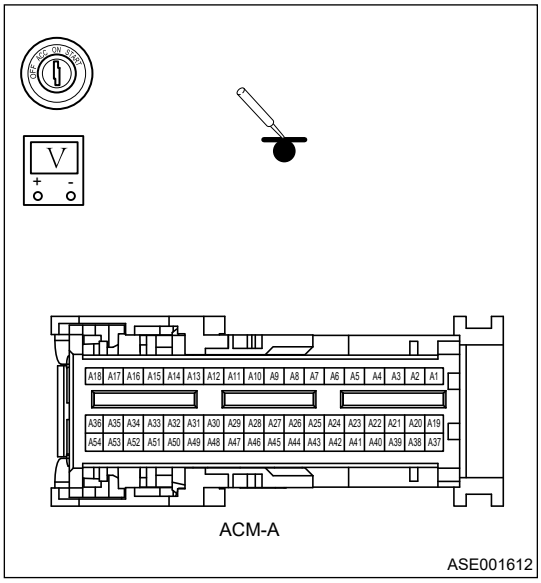
2	Check voltage between front passenger frontal airbag circuit and ground

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag control module connector (connected front passenger frontal airbag terminal) and body ground.

(c) Perform the voltage inspection.



Multimeter Connection	Condition	Specified Condition
Airbag module (-connected front passenger frontal airbag +) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (-connected front passenger frontal airbag -) - Body ground	ENGINE START STOP switch ON	0 V

NG → **Repair or replace front passenger frontal airbag wire harness as needed**

OK

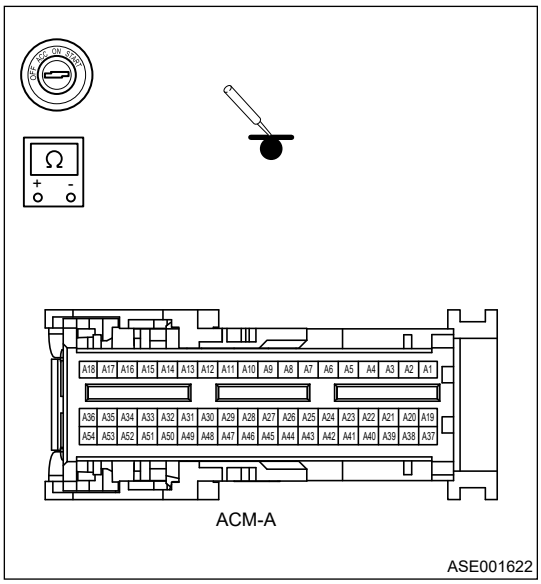
3	Check resistance between front passenger frontal airbag circuit and ground

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag control module connector (connected front passenger frontal airbag terminal) and body ground.

(c) Perform the resistance inspection.



Multimeter Connection	Condition	Specified Condition
Airbag module (-connected front passenger frontal airbag +) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (-connected front passenger frontal airbag -) - Body ground	ENGINE START STOP switch OFF	∞

NG → **Repair or replace front passenger frontal airbag wire harness as needed**

OK

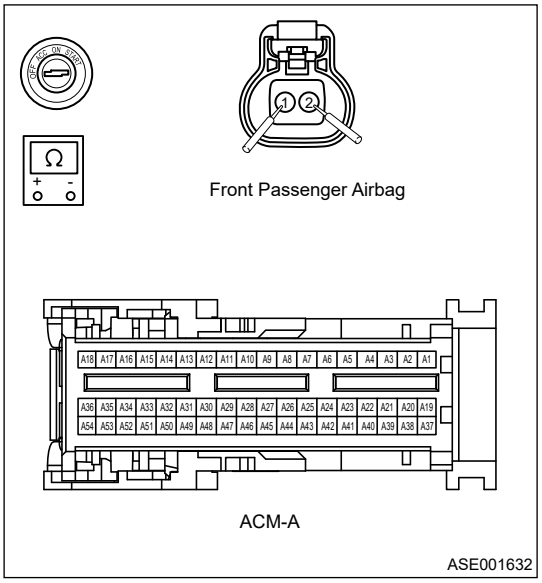
4	Check circuit between airbag controller and front passenger frontal airbag

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between airbag control module connector (connected terminal) and front passenger frontal airbag connector terminal.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Front passenger frontal airbag (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Front passenger frontal airbag (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and front passenger frontal airbag as needed**

OK

5	Check the front passenger frontal airbag

(a) Substitute one 2.5 Ω resistor for airbag.

(b) Check if DTC exists.

NG → **Replace the front passenger frontal airbag**

OK

6	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

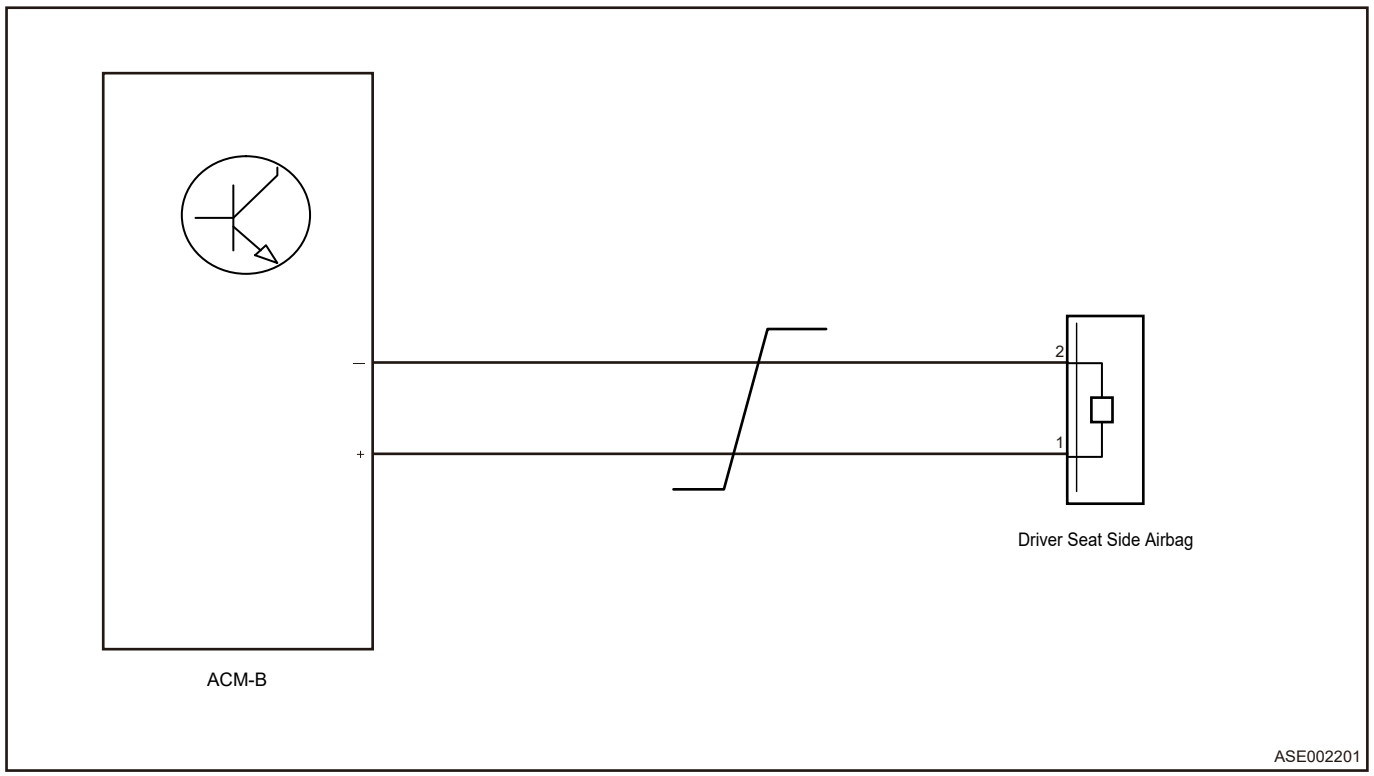
NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0020-11	Left Side Airbag Deployment Control Circuit Short to Ground
DTC	B0020-12	Left Side Airbag Deployment Control Circuit Short to Battery

DTC	B0020-1A	Left Side Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0020-1B	Left Side Airbag Deployment Control Circuit Resistance Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ignition switch to OFF.

(b) Disconnect the driver side airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG	**Repair or replace wire harness or connector as needed**

OK

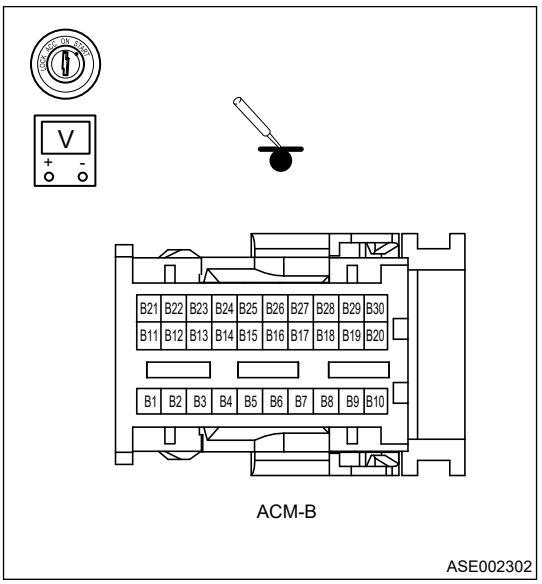
2	Check voltage between driver side airbag circuit and ground

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag control module connector (connected driver side airbag terminal) and body ground.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (-connected driver side airbag+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (-connected driver side airbag-) - Body ground	ENGINE START STOP switch ON	0 V



NG

Repair or replace driver side airbag wire harness

OK

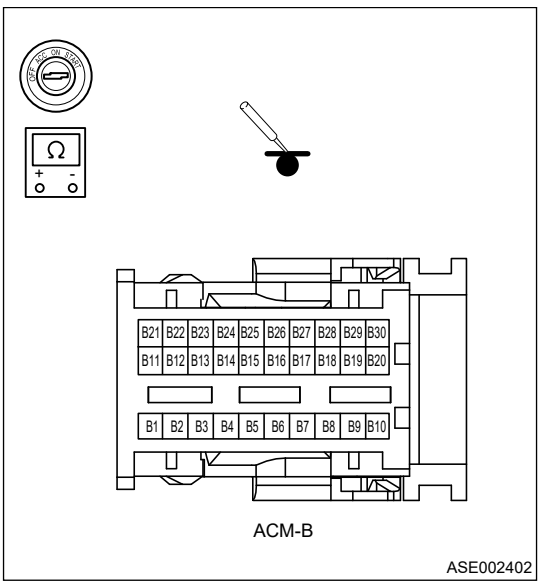
3	Check resistance between driver side airbag circuit and ground

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag control module connector (connected driver side airbag terminal) and body ground.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (-connected driver side airbag+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (-connected driver side airbag-) - Body ground	ENGINE START STOP switch OFF	∞



NG

Repair or replace driver seat side airbag wire harness

OK

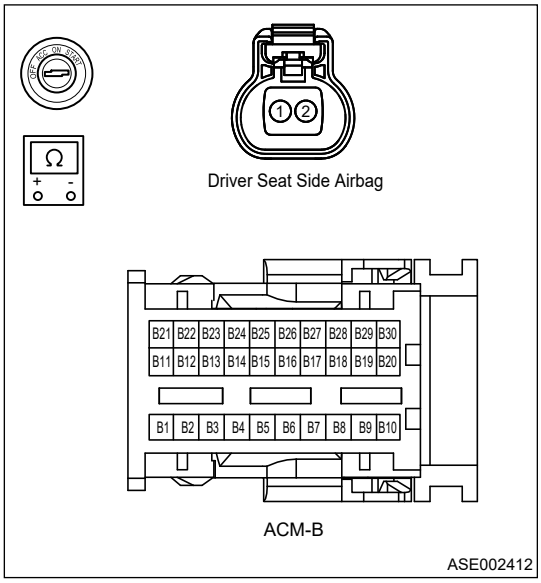
4	Check circuit between airbag controller and driver side airbag

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between airbag controller connector (connected terminal) and driver side airbag connector terminal.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Driver side airbag (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Driver side airbag (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and driver side airbag**

OK ↓

5	Check driver seat side airbag

(a) Substitute one 2.5 Ω resistor for airbag.

(b) Check if DTC exists.

NG → **Replace the driver seat**

OK ↓

6	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

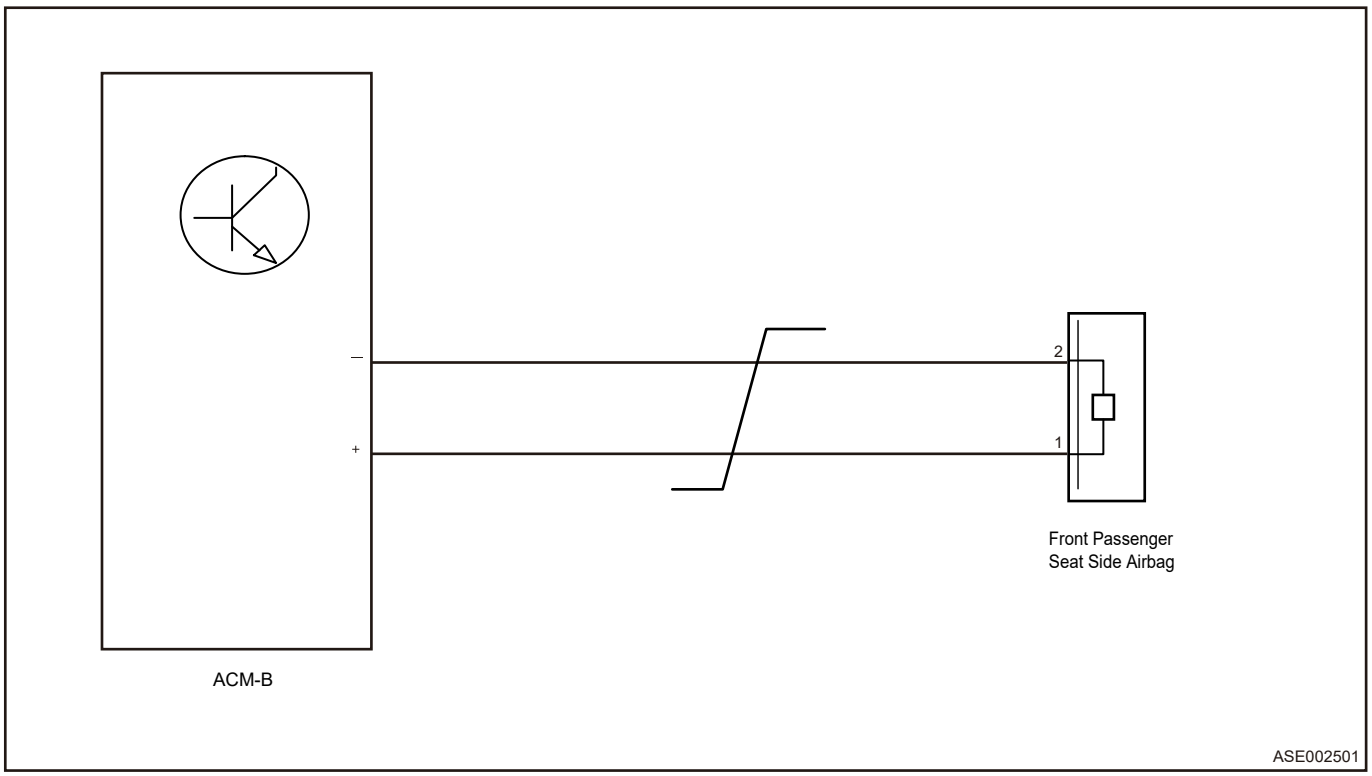
NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0028-11	Right Side Airbag Deployment Control Circuit Short to Ground
DTC	B0028-12	Right Side Airbag Deployment Control Circuit Short to Battery

DTC	B0028-1A	Right Side Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0028-1B	Right Side Airbag Deployment Control Circuit Resistance Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ignition switch to OFF.

(b) Disconnect the front passenger side airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

OK

2	Check voltage between front passenger side airbag circuit and ground

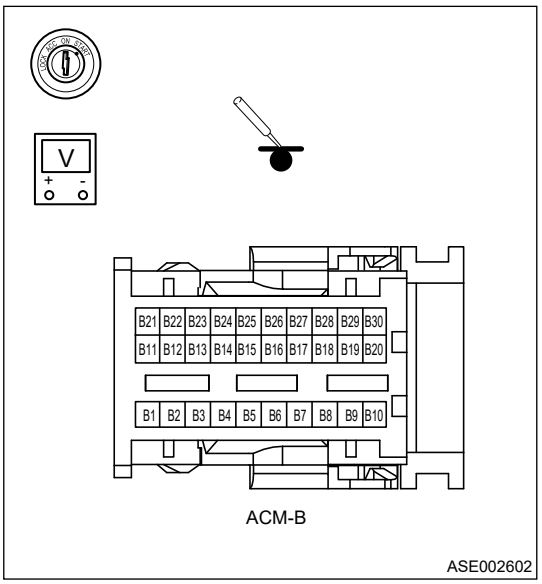
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag control module connector (connected front passenger side airbag terminal) and body ground.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected front passenger side airbag+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (- connected front passenger side airbag-) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace front passenger side airbag wire harness**

OK

3	Check resistance between front passenger side airbag circuit and ground

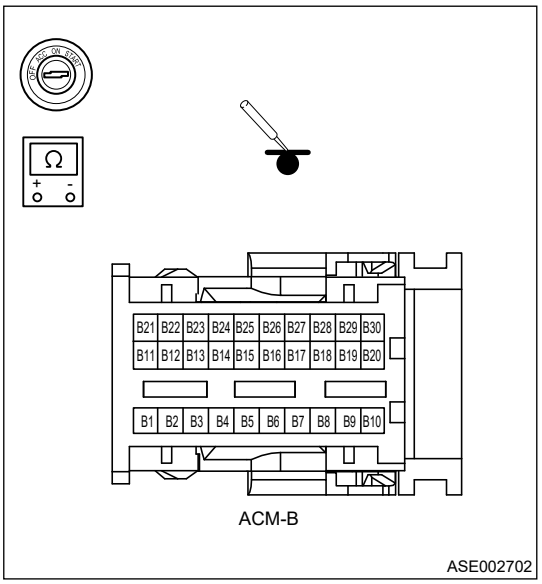
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag control module connector (connected front passenger side airbag terminal) and body ground.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected front passenger side airbag+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (- connected front passenger side airbag-) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace front passenger side airbag wire harness**

OK

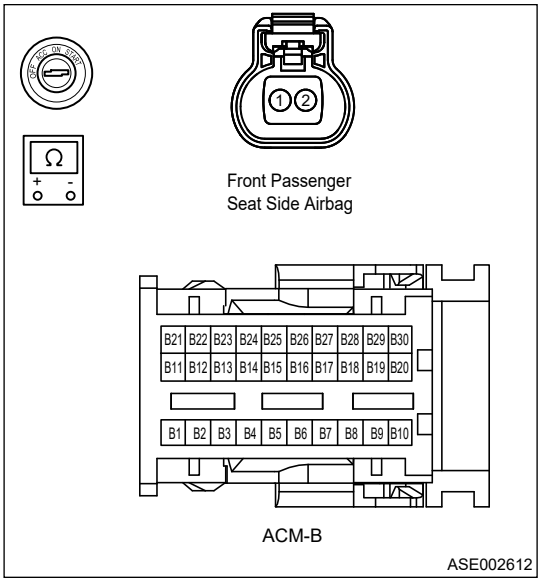
4	Check circuit between airbag controller and front passenger side airbag

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between airbag control module connector (connected terminal) and front passenger side airbag connector terminal.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Front passenger side airbag (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Front passenger side airbag (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and front passenger side airbag**

OK

5	Check front passenger seat side airbag

(a) Substitute one 2.5 Ω resistor for airbag.

(b) Check if DTC exists.

NG → **Replace the front passenger seat**

OK

6	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

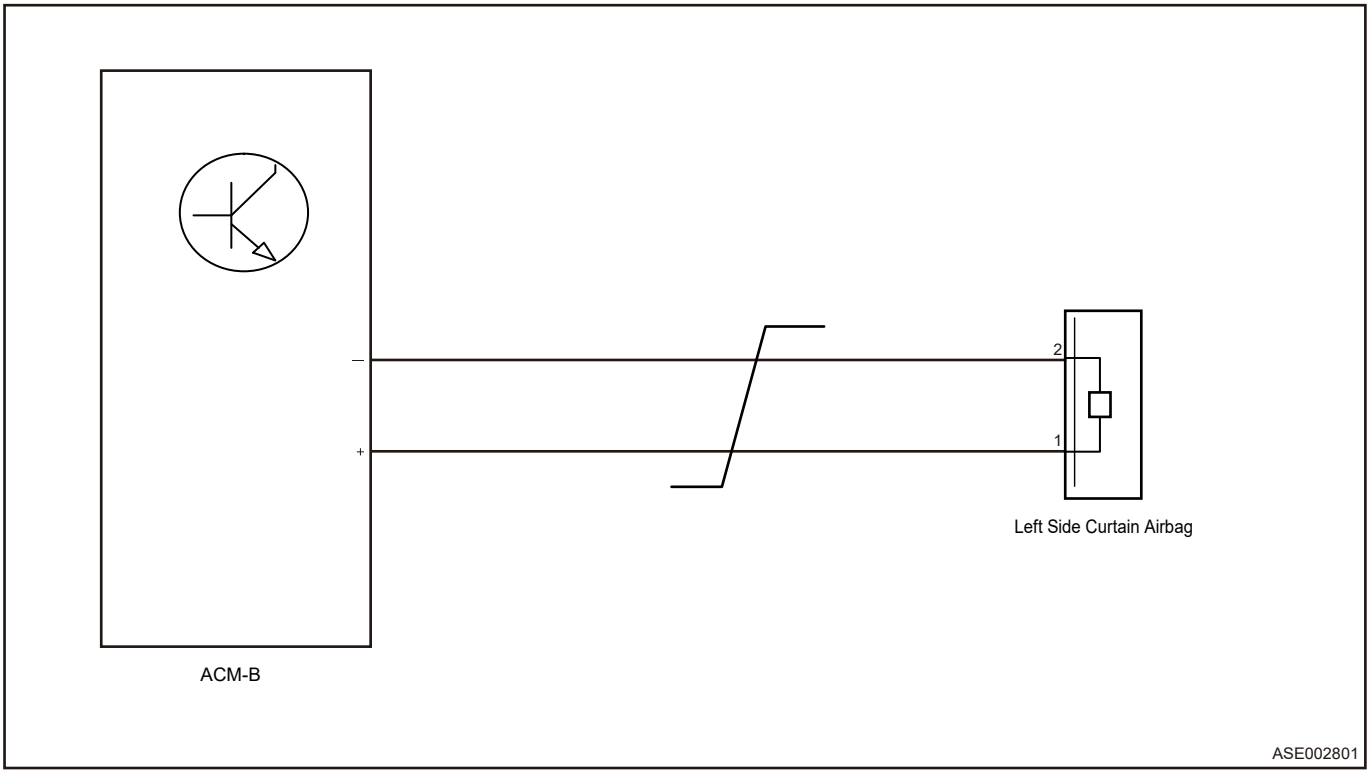
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0021-11	Left Curtain Shield Airbag Deployment Control Circuit Short to Ground
DTC	B0021-12	Left Curtain Shield Airbag Deployment Control Circuit Short to Battery
DTC	B0021-1A	Left Curtain Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0021-1B	Left Curtain Airbag Deployment Control Circuit Resistance Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ignition switch to OFF.

(b) Disconnect the driver curtain shield airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

OK

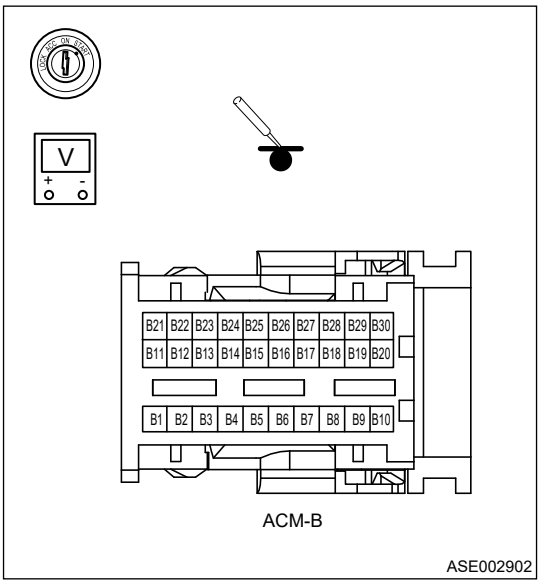
2	Check voltage between driver curtain shield airbag circuit and ground

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag control module connector (connected driver curtain shield airbag terminal) and body ground.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected driver curtain shield airbag +) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (- connected driver curtain shield airbag-) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace driver curtain shield airbag wire harness**

OK

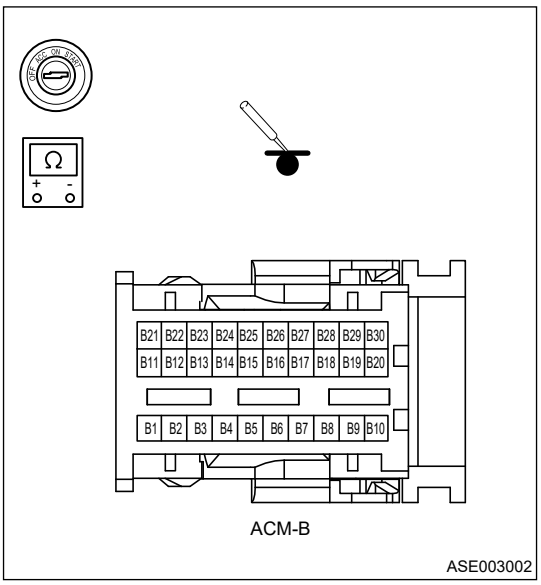
3	Check resistance between driver curtain shield airbag circuit and ground

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag control module connector (connected driver curtain shield airbag terminal) and body ground.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected driver curtain shield airbag +) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (- connected driver curtain shield airbag-) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace driver curtain shield airbag wire harness**

OK

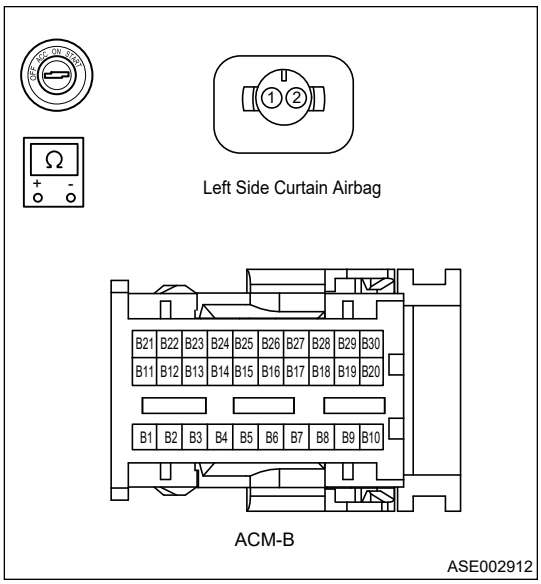
4	Check circuit between airbag controller and driver curtain shield airbag

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between airbag control module connector (connected terminal) and driver curtain shield airbag connector terminal.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Driver curtain shield airbag (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Driver curtain shield airbag (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and driver curtain shield airbag**

OK

5	Check driver curtain shield airbag

(a) Substitute one 2.5 Ω resistor for airbag.

(b) Check if DTC exists.

NG → **Replace the driver curtain shield airbag**

OK

6	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

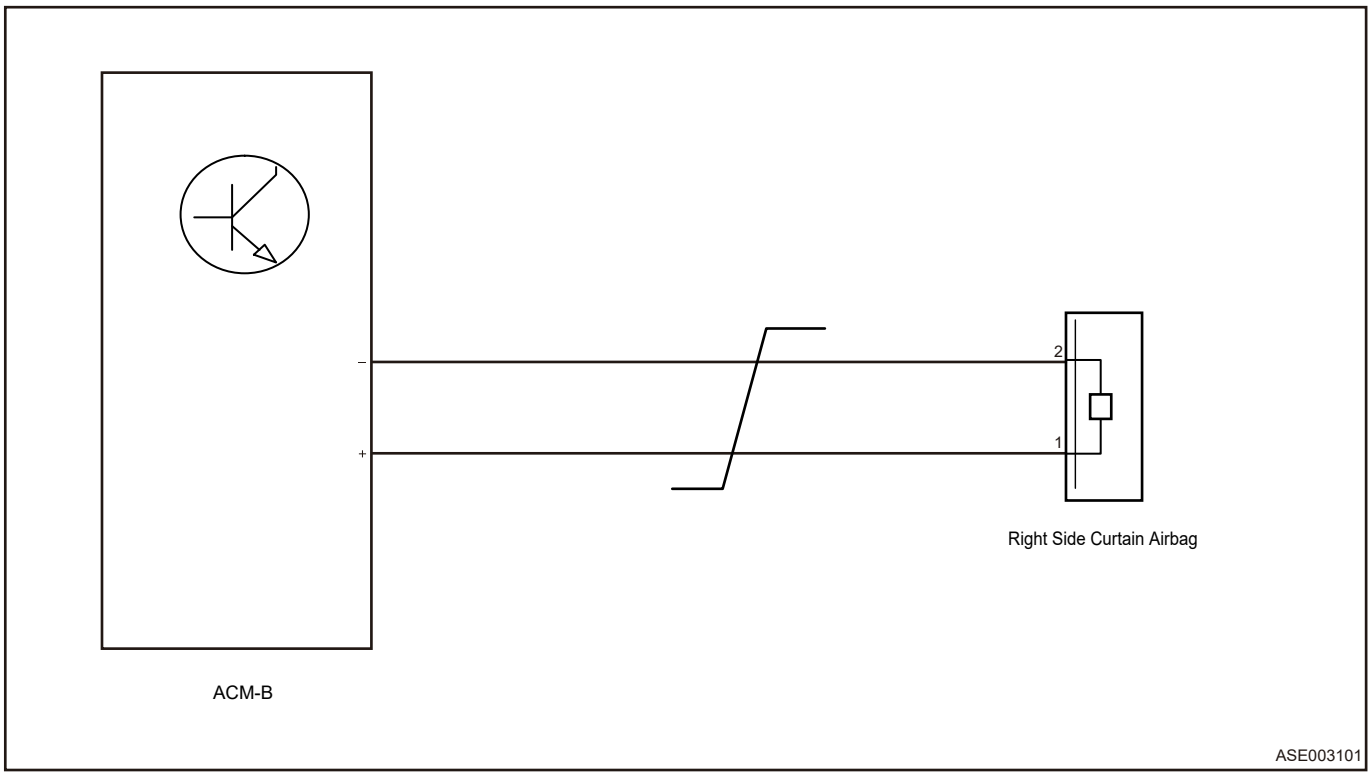
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0029-11	Right Curtain Shield Airbag Deployment Control Circuit Short to Ground
DTC	B0029-12	Right Curtain Shield Airbag Deployment Control Circuit Short to Battery
DTC	B0029-1A	Right Curtain Shield Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0029-1B	Right Curtain Shield Airbag Deployment Control Circuit Resistance Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ignition switch to OFF.

(b) Disconnect right side curtain shield airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

OK

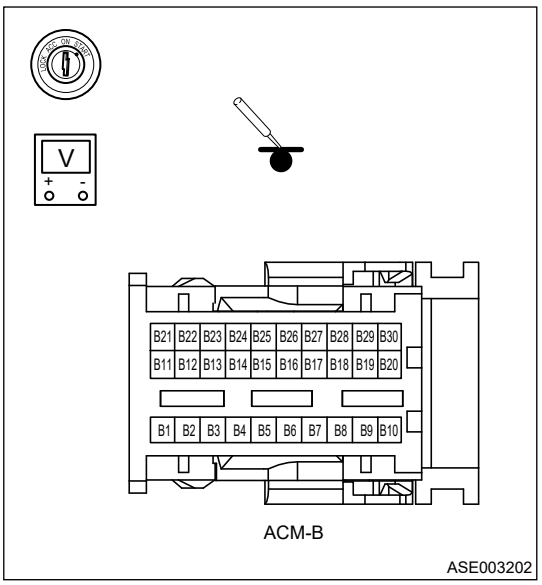
2	**Check voltage between right side curtain shield airbag circuit and ground**

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag control module connector (connected right side curtain shield airbag terminal) and body ground.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (right side curtain shield airbag+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (right side curtain shield airbag-) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace right side curtain shield airbag wire harness**

OK

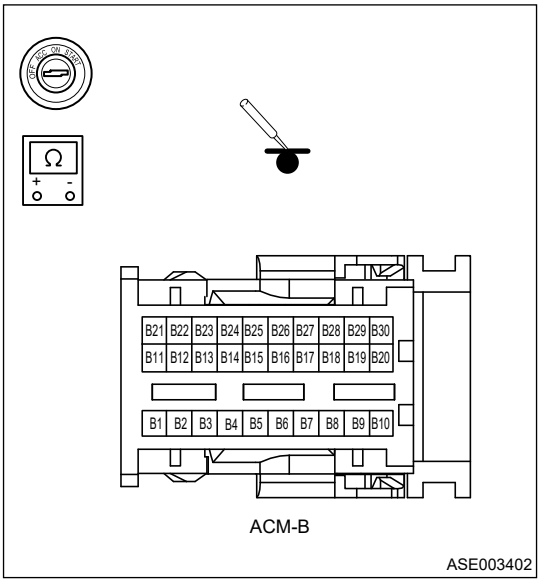
3	**Check resistance between right side curtain shield airbag circuit and ground**

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag control module connector (connected right side curtain shield airbag terminal) and body ground.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (right side curtain shield airbag+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (right side curtain shield airbag-) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace right side curtain shield airbag wire harness**

OK

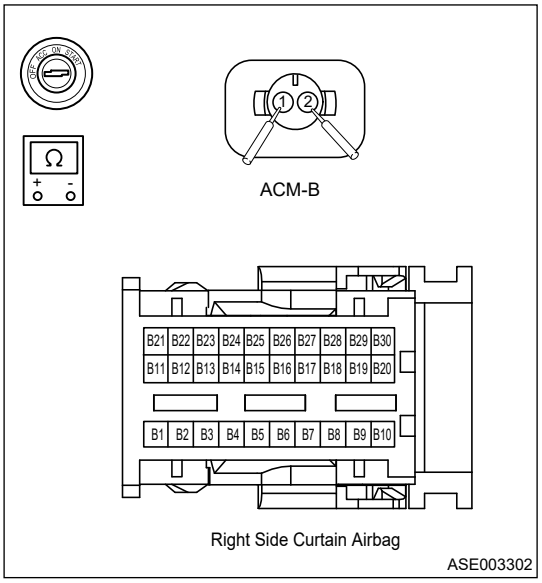
4	Check circuit between airbag controller and right side curtain shield airbag

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between airbag control module connector (connected terminal) and right side curtain shield airbag connector terminal.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Right side curtain shield airbag (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Right side curtain shield airbag (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and right side curtain shield airbag**

OK

5	Check right side curtain shield airbag

(a) Substitute one 2.5 Ω resistor for airbag.
(b) Check if DTC exists.

NG → **Replace right side curtain shield airbag**

OK

6	Reconfirm DTCs

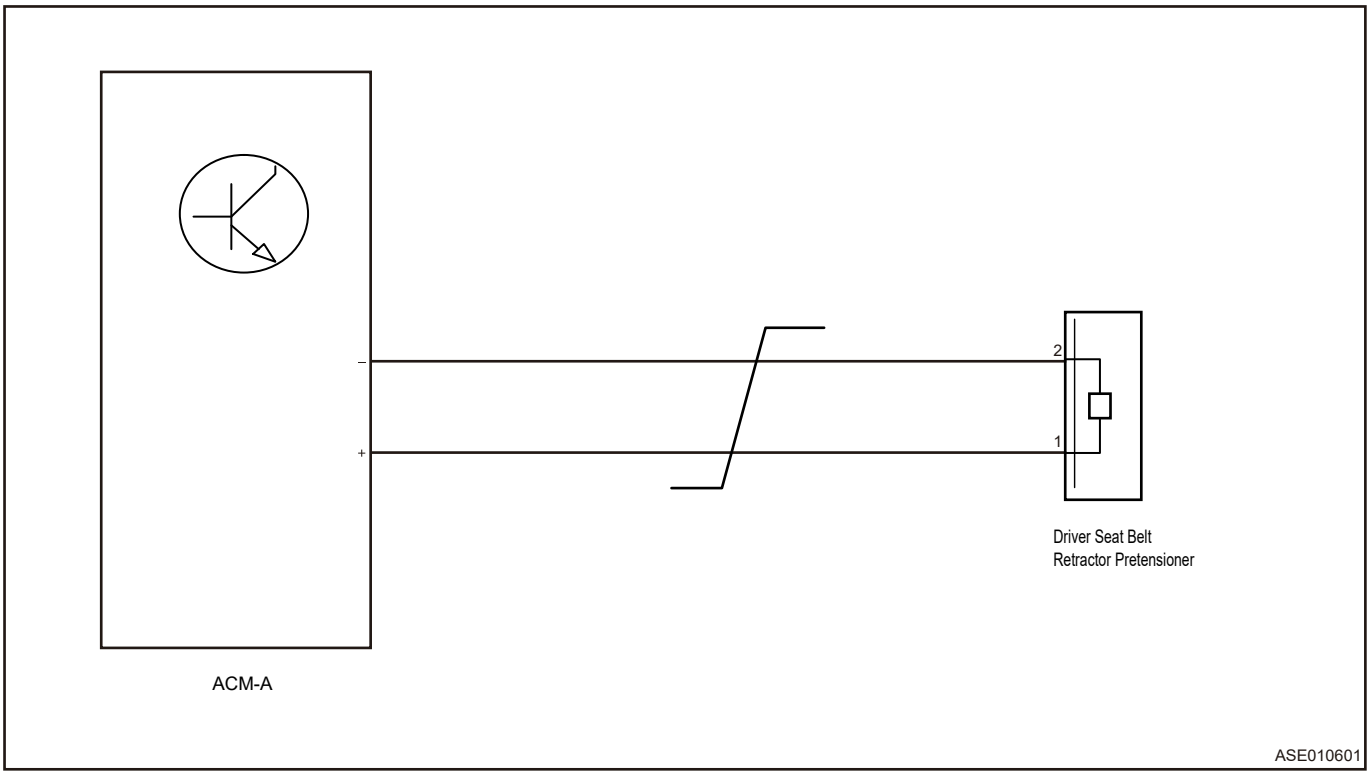
For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1285-11	Front Row Left Seatbelt Retractor Pretensioner Deployment Control-Circuit Short To Ground
DTC	B1285-12	Front Row Left Seatbelt Retractor Pretensioner Deployment Control Circuit Short to Battery
DTC	B1285-1A	Front Row Left Seatbelt Retractor Pretensioner Deployment Control-Circuit Resistance Below Threshold
DTC	B1285-1B	Front Row Left Seatbelt Retractor Pretensioner Deployment Control Circuit Resistance Above Threshold

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ignition switch to OFF.

(b) Disconnect front left seat belt with pretensioner (retractor) connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

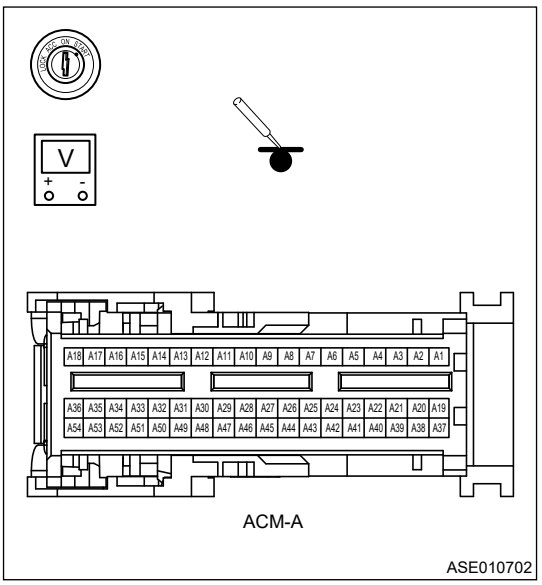
OK

2	**Check voltage between front left seat belt with pretensioner circuit and ground**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- front left seat belt with pretensioner +) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (- front left seat belt with pretensioner -) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace front left seat belt with pretensioner wire harness**

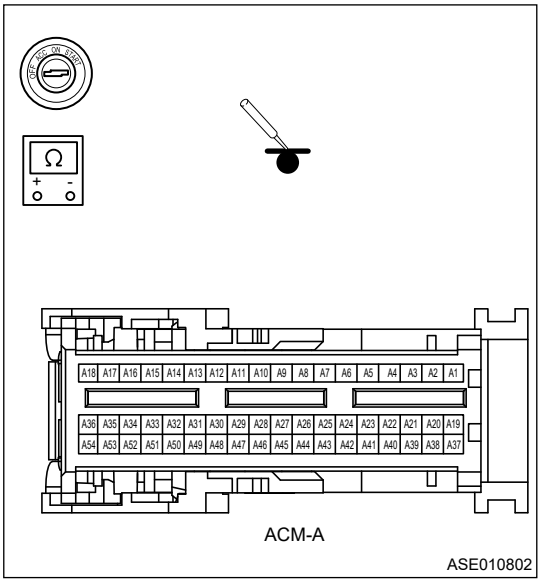
OK

3	**Check resistance between front left seat belt with pretensioner circuit and ground**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- front left seat belt with pretensioner +) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (- front left seat belt with pretensioner -) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace front left seat belt with pretensioner ground wire harness**

OK

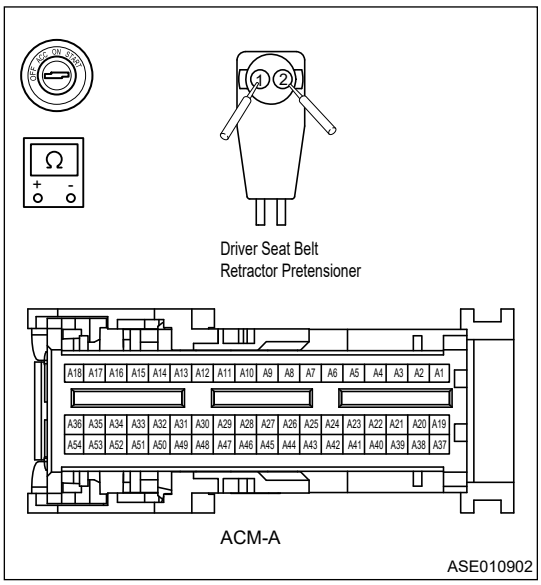
4	Check circuit between airbag controller and front left seat belt with pretensioner

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Front left seat belt with pretensioner (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Front left seat belt with pretensioner (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and front left seat belt with pretensioner**

OK

5	Check front left seat belt with pretensioner

(a) Substitute one 2.5 Ω resistor for airbag.
(b) Check if DTC exists.

NG → **Replace front left seat belt with pretensioner**

OK

6	Reconfirm DTCs

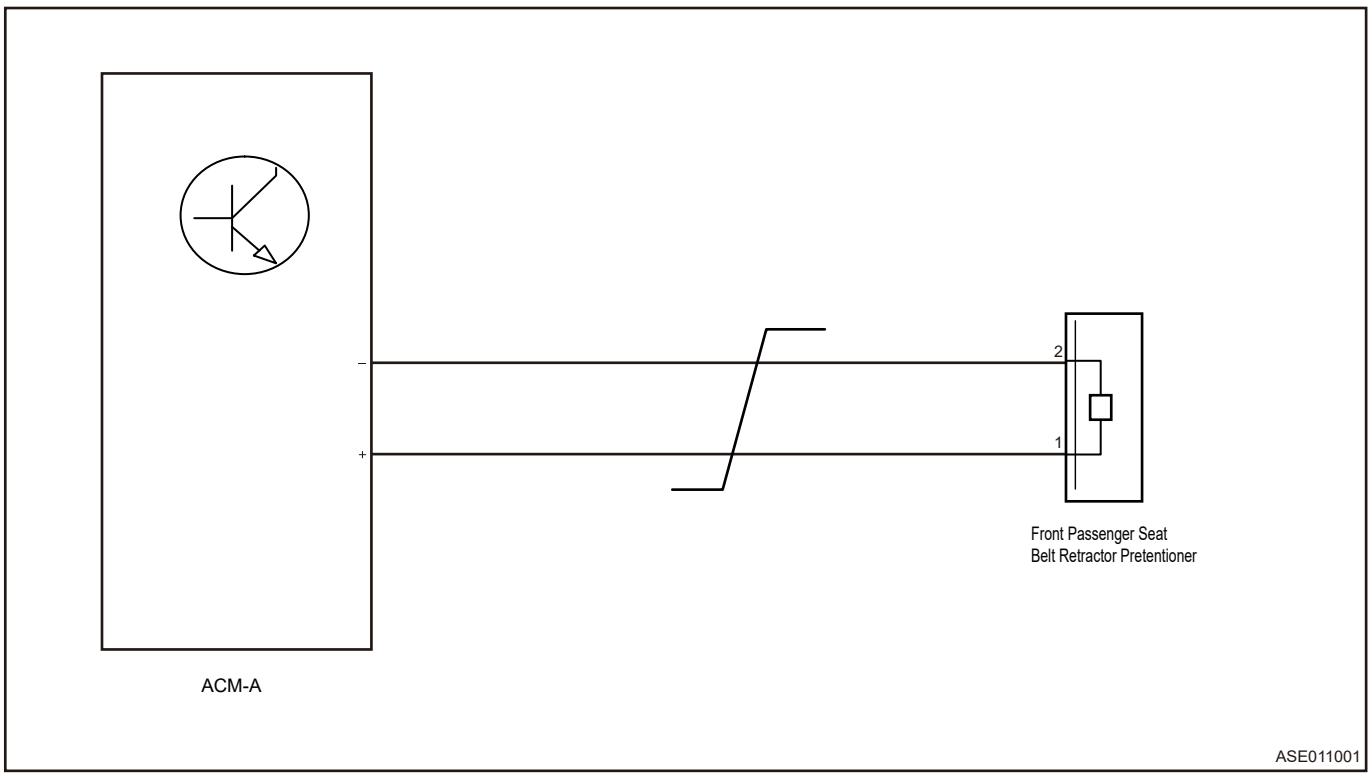
For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1286-11	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Short to Ground
DTC	B1286-12	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Short to Battery
DTC	B1286-1A	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Resistance Below Threshold
DTC	B1286-1B	Front Row Right Seatbelt Retractor Pretensioner Deployment Control Circuit Resistance Above Threshold

Control Schematic Diagram



■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check wire harness and connector**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ignition switch to OFF.

(b) Disconnect front right seat belt with pretensioner (retractor) connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

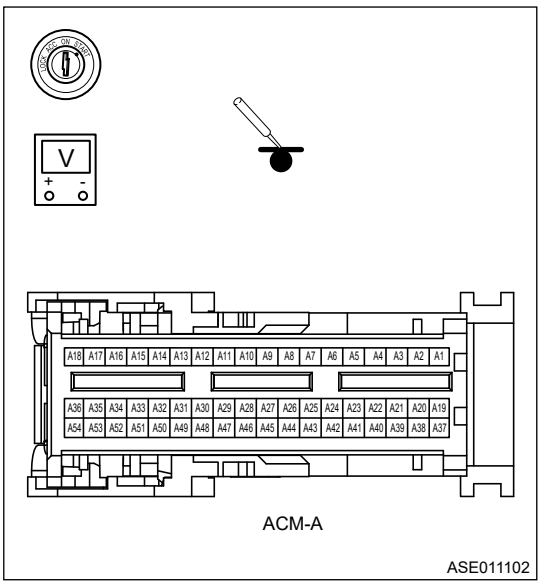
OK

2	**Check voltage between front right seat belt with pretensioner circuit and ground**

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- front right seat belt with pretensioner +) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (- front right seat belt with pretensioner -) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace front right seat belt with pretensioner wire harness**

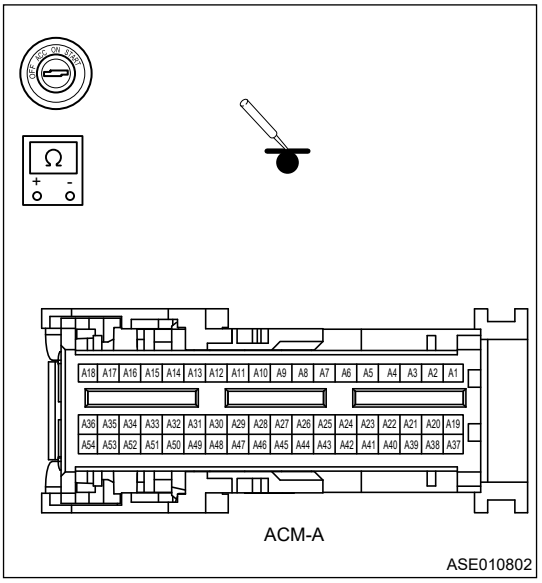
OK

3	**Check resistance between front right seat belt with pretensioner circuit and ground**

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- front right seat belt with pretensioner +) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (- front right seat belt with pretensioner -) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace front right seat belt with pretensioner wire harness**

OK

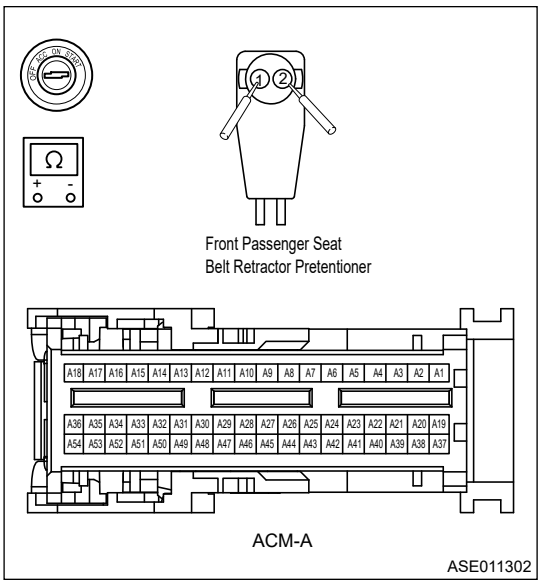
4	Check circuit between airbag controller and front right seat belt with pretensioner

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Front right seat belt with pretensioner (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Front right seat belt with pretensioner (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and front right seat belt with pretensioner**

OK

5	Check front right seat belt with pretensioner

(a) Substitute one 2.5 Ω resistor for airbag.
(b) Check if DTC exists.

NG → **Replace front right seat belt with pretensioner**

OK

6	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1204-11	Belt Pretensioner Driver Deployment Control Circuit Short to Ground
DTC	B1204-12	Belt Pretensioner Driver Deployment Control Circuit Short to Battery
DTC	B1204-1A	Belt Pretensioner Driver Deployment Control Circuit Resistance Below Threshold
DTC	B1204-1B	Belt Pretensioner Driver Deployment Control Circuit Resistance Above Threshold

For repair methods, refer to "Driver Frontal Airbag Malfunction Troubleshooting Procedure" to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B1205-11	Belt Pretensioner Passenger Deployment Control Circuit Short to Ground
DTC	B1205-12	Belt Pretensioner Passenger Deployment Control Circuit Short to Battery
DTC	B1205-1A	Belt Pretensioner Passenger Deployment Control Circuit Resistance Below Threshold
DTC	B1205-1B	Belt Pretensioner Passenger Deployment Control Circuit Resistance Above Threshold

For repair methods, refer to "Driver Frontal Airbag Malfunction Troubleshooting Procedure" to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B0073-11	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Short to Ground
DTC	B0073-12	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Short to Battery
DTC	B0073-1A	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Resistance Below Threshold
DTC	B0073-1B	Second Row Left Seatbelt Pretensioner Deployment Control Circuit Resistance Above Threshold

For repair methods, refer to "Driver Frontal Airbag Malfunction Troubleshooting Procedure" to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B0075-11	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Short to Ground
DTC	B0075-12	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Short to Battery
DTC	B0075-1A	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Resistance Below Threshold
DTC	B0075-1B	Second Row Right Seatbelt Pretensioner Deployment Control Circuit Resistance Above Threshold

For repair methods, refer to “Driver Frontal Airbag Malfunction Troubleshooting Procedure” to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B0030-11	Second Row Left Side Airbag Deployment Control Circuit Short to Ground
DTC	B0030-12	Second Row Left Side Airbag Deployment Control Circuit Short to Battery
DTC	B0030-1A	Second Row Left Side Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0030-1B	Second Row Left Side Airbag Deployment Control Circuit Resistance Above Threshold

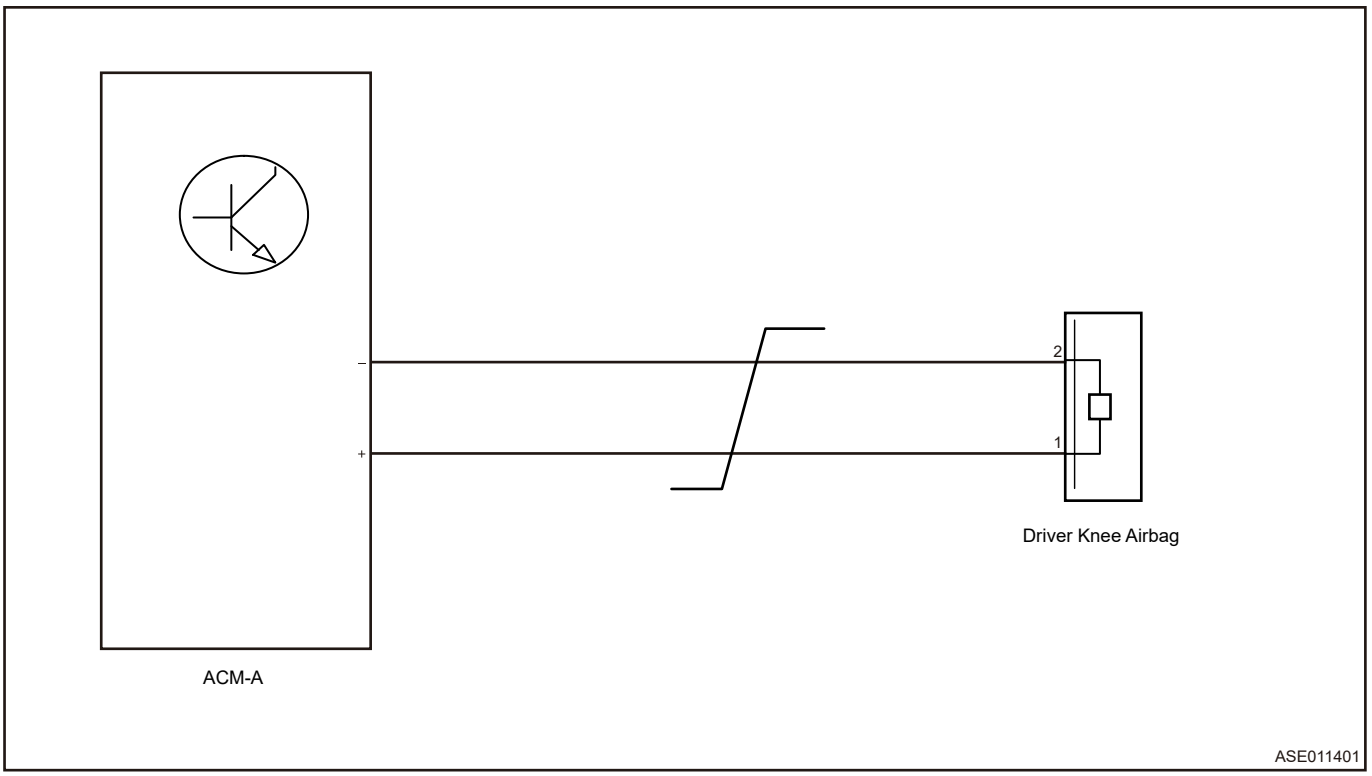
For repair methods, refer to “Driver Frontal Airbag Malfunction Troubleshooting Procedure” to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B0038-11	Second Row Right Seat Side Airbag Deployment Control Circuit Short to Ground
DTC	B0038-12	Second Row Right Seat Side Airbag Deployment Control Circuit Short to Battery
DTC	B0038-1A	Second Row Right Seat Side Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0038-1B	Second Row Right Seat Side Airbag Deployment Control Circuit Resistance Above Threshold

For repair methods, refer to “Driver Frontal Airbag Malfunction Troubleshooting Procedure” to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B0004-11	Driver Knee Airbag Deployment Control-Circuit Short To Ground
DTC	B0004-12	Driver Knee Airbag Deployment Control-Circuit Short To Power Supply
DTC	B0004-1A	Driver Knee Airbag Deployment Control-Circuit Resistance Below Threshold
DTC	B0004-1B	Driver Knee Airbag Deployment Control-Circuit Resistance Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect driver knee airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

OK

2	Check voltage between driver knee airbag circuit and ground

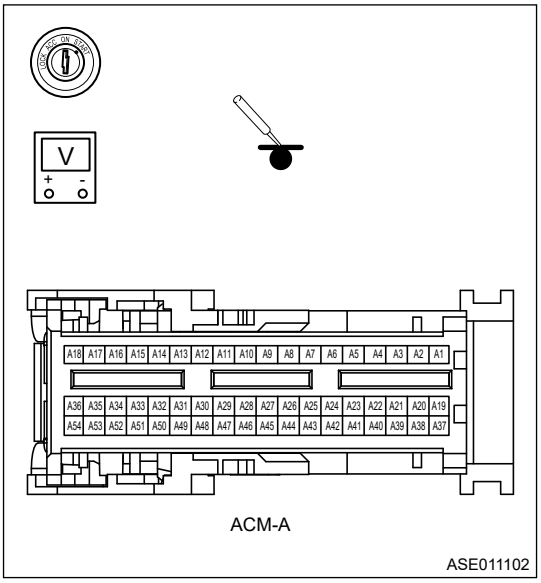
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Using a multimeter, check voltage between airbag control module connector (connected driver knee airbag terminal) and body ground.

(c) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (-driver knee airbag+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (-driver knee airbag-) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace driver knee airbag wire harness**

OK

3	Check resistance between driver knee airbag circuit and ground

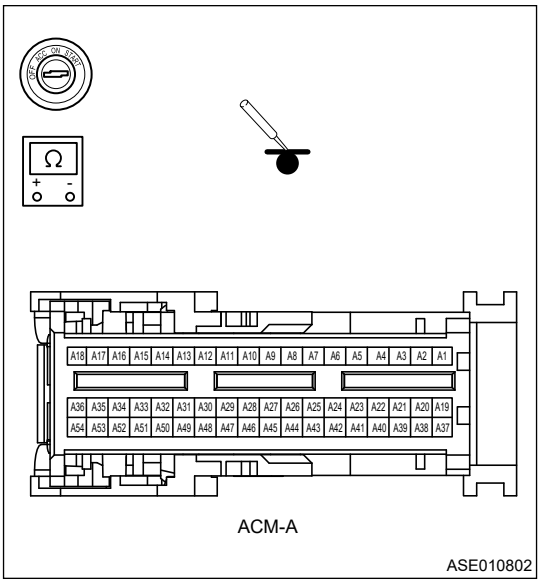
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, check resistance between airbag control module connector (connected driver knee airbag terminal) and body ground.

(c) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (-driver knee airbag+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (-driver knee airbag-) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace driver knee airbag wire harness**

OK

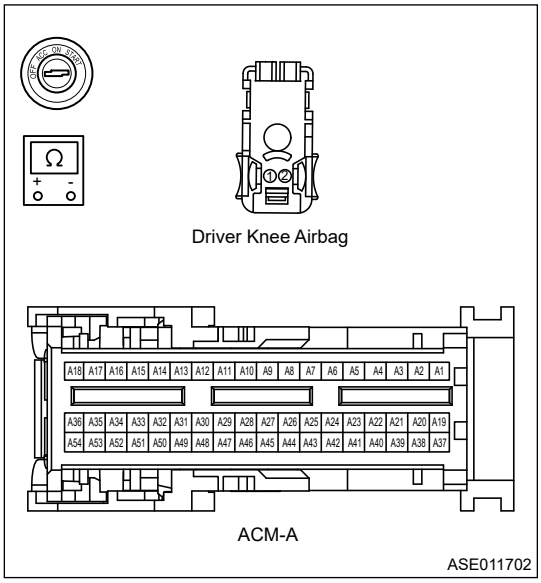
4	Check circuit between airbag controller and driver knee airbag

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a multimeter, check for continuity between airbag control module connector terminal (connected terminal) and driver knee airbag connector terminal.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Driver knee airbag (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Driver knee airbag (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and driver knee airbag**

OK →

5	Check the driver knee airbag

(a) Substitute one 2.5 Ω resistor for airbag.

(b) Check if DTC exists.

NG → **Replace the driver knee airbag**

OK →

6	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

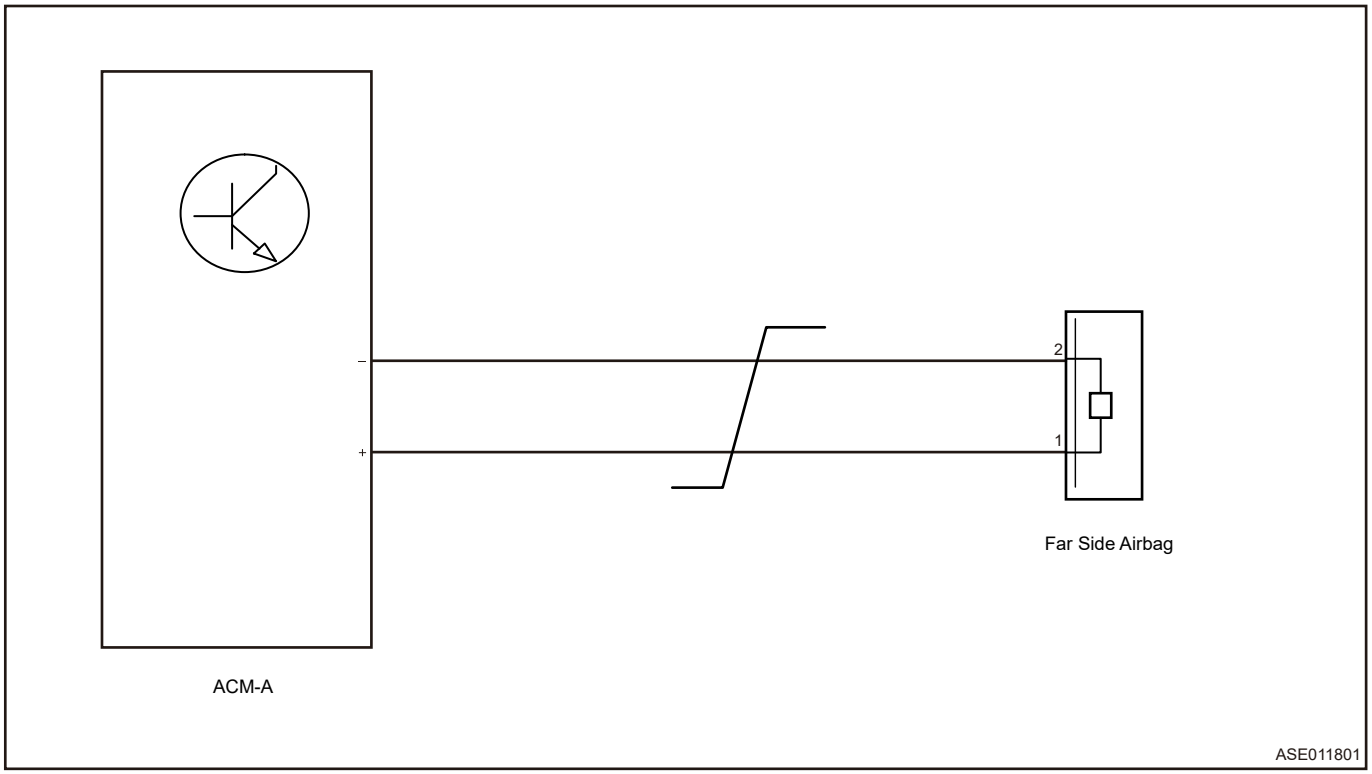
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0006-11	Far Side Airbag Deployment Control Circuit Short to Ground
DTC	B0006-12	Far Side Airbag Deployment Control Circuit Short To Battery
DTC	B0006-1A	Far Side Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0006-1B	Far Side Airbag Deployment Control Circuit Resistance Above Threshold

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the far side airbag connector.

(c) Disconnect the airbag control module connector.

(d) Check connector for bad contact, bending, distortion, poor contact, etc.

(e) Check if wire harness is worn, pierced, pinched or partially broken.

NG → **Repair or replace wire harness or connector as needed**

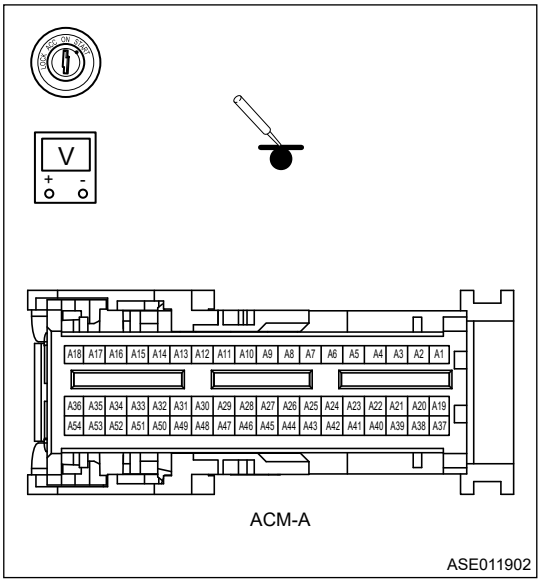
OK

2	Check voltage between far side airbag circuit and ground

(a) Turn ENGINE START STOP switch to ON.

(b) Perform the voltage inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (far side airbag+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (far side airbag-) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace far side airbag wire harness**

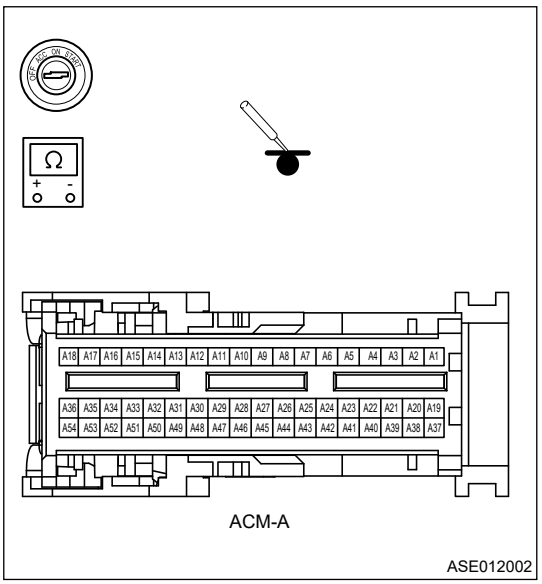
OK →

3	Check resistance between far side airbag circuit and ground

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (far side airbag+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (far side airbag-) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace far side airbag wire harness**

OK →

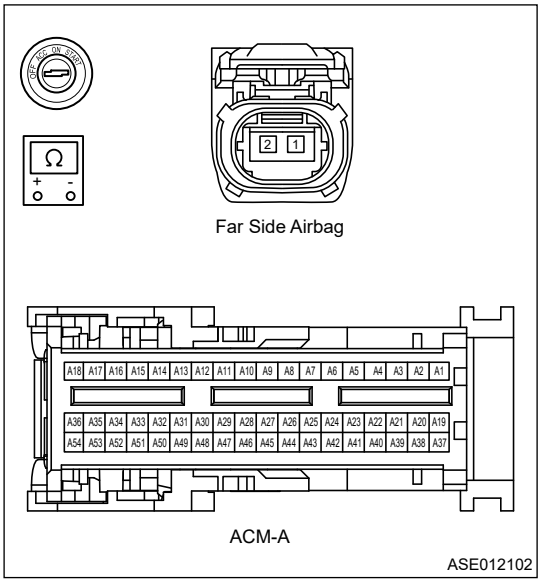
4	Check circuit between airbag controller and far side airbag

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (-connected terminal) - Far side airbag (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (-connected terminal) - Far side airbag (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and front side airbag**

OK

5	Check far side airbag

(a) Substitute one 2.5 Ω resistor for airbag.

(b) Check if DTC exists.

NG → **Replace far side airbag**

OK

6	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0008-11	Second Row Left Side Frontal Airbag Deployment Control Circuit Short to Ground
DTC	B0008-12	Second Row Left Side Frontal Airbag Deployment Control Circuit Short To Battery

DTC	B0008-1A	Second Row Left Side Frontal Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0008-1B	Second Row Left Side Frontal Airbag Deployment Control Circuit Resistance Above Threshold

For repair methods, refer to "Driver Frontal Airbag Malfunction Troubleshooting Procedure" to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B0009-11	Second Row Right Side Frontal Airbag Deployment Control Circuit Short to Ground
DTC	B0009-12	Second Row Right Side Frontal Airbag Deployment Control Circuit Short To Battery
DTC	B0009-1A	Second Row Right Side Frontal Airbag Deployment Control Circuit Resistance Below Threshold
DTC	B0009-1B	Second Row Right Side Frontal Airbag Deployment Control Circuit Resistance Above Threshold

For repair methods, refer to "Driver Frontal Airbag Malfunction Troubleshooting Procedure" to perform troubleshooting and repair according to Circuit Diagram Manual.

DTC	B00C7-12	Passenger Presence Detection Switch Short to Battery

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check voltage between front passenger load detection switch and power supply**

(a) Turn ignition switch to OFF.

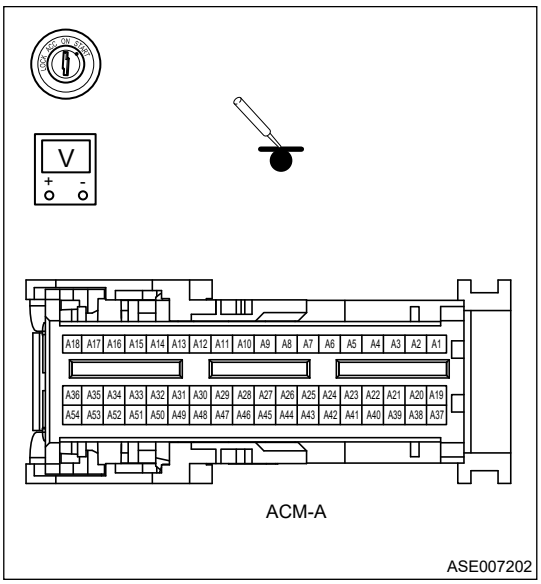
(b) Disconnect the airbag control module connector.

(c) Turn ignition switch to ON.

(d) Using a multimeter, check voltage between airbag control module connector (connected front passenger load detection terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
Airbag module (-front passenger load detection+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (-front passenger load detection-) - Body ground	ENGINE START STOP switch ON	0 V

NG	**Repair or replace front passenger load detection switch wire harness**



OK

2	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

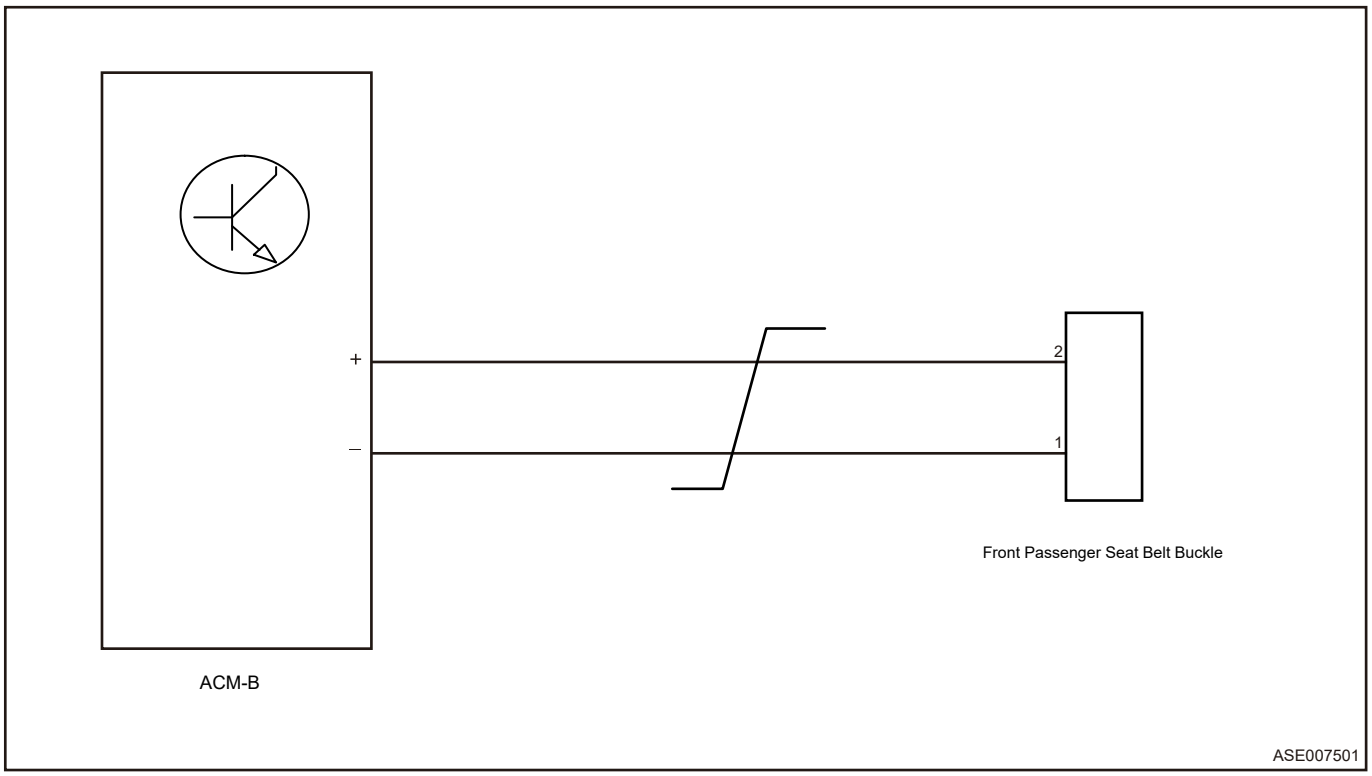
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1233-12	Passenger Buckle Switch Short to Battery

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

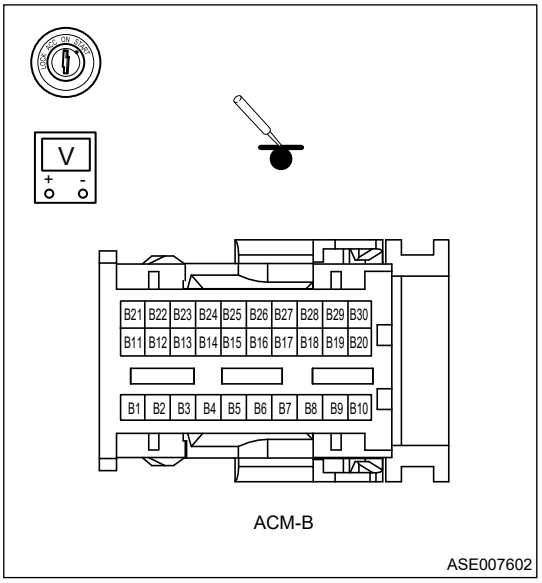
1	Check voltage between front passenger seat belt buckle switch and power supply

(a) Disconnect the airbag connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Check voltage between connector terminal circuit and ground.

Multimeter Connection	Condition	Specified Condition
Airbag module (- front passenger seat belt buckle switch+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (- front passenger seat belt buckle switch-) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace front passenger seat belt buckle switch wire harness**

OK

2	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B00C7-95	Passenger Load Detection Function Parameter Configuration Error

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check front passenger load detection function parameter configuration

(a) Check if front passenger load detection function parameter configuration is incorrect.

NG → **Refresh configuration or replace ECU module**

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1233-95	Passenger Buckle Switch Function Parameter Configuration Error

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check front passenger seat belt buckle switch parameter configuration

(a) Check if front passenger seat belt buckle switch function parameter configuration is incorrect.

NG → **Replace front passenger seat belt buckle switch**

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1234-12	Second Row Left Buckle Switch Short to Battery

For diagnostic methods, refer to "Passenger buckle switch-circuit short to battery" to perform inspection according to Circuit Diagram Manual.

DTC	B1253-95	Second Row Left Buckle Switch Parameter Configuration Error

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check second row left seat belt buckle switch parameter configuration

(a) Check if second row left seat belt buckle switch parameter configuration is incorrect.

NG → **Replace second row left seat belt buckle switch**

OK →

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1235-12	Second Row Middle Buckle Switch Short to Battery

For diagnostic methods, refer to "Passenger buckle switch-circuit short to battery" to perform inspection according to Circuit Diagram Manual.

DTC	B1236-12	Second Row Right Buckle Switch Short to Battery

For diagnostic methods, refer to "Passenger buckle switch-circuit short to battery" to perform inspection according to Circuit Diagram Manual.

DTC	B1237-12	Third Row Right Buckle Switch Short to Battery

For diagnostic methods, refer to "Passenger buckle switch-circuit short to battery" to perform inspection according to Circuit Diagram Manual.

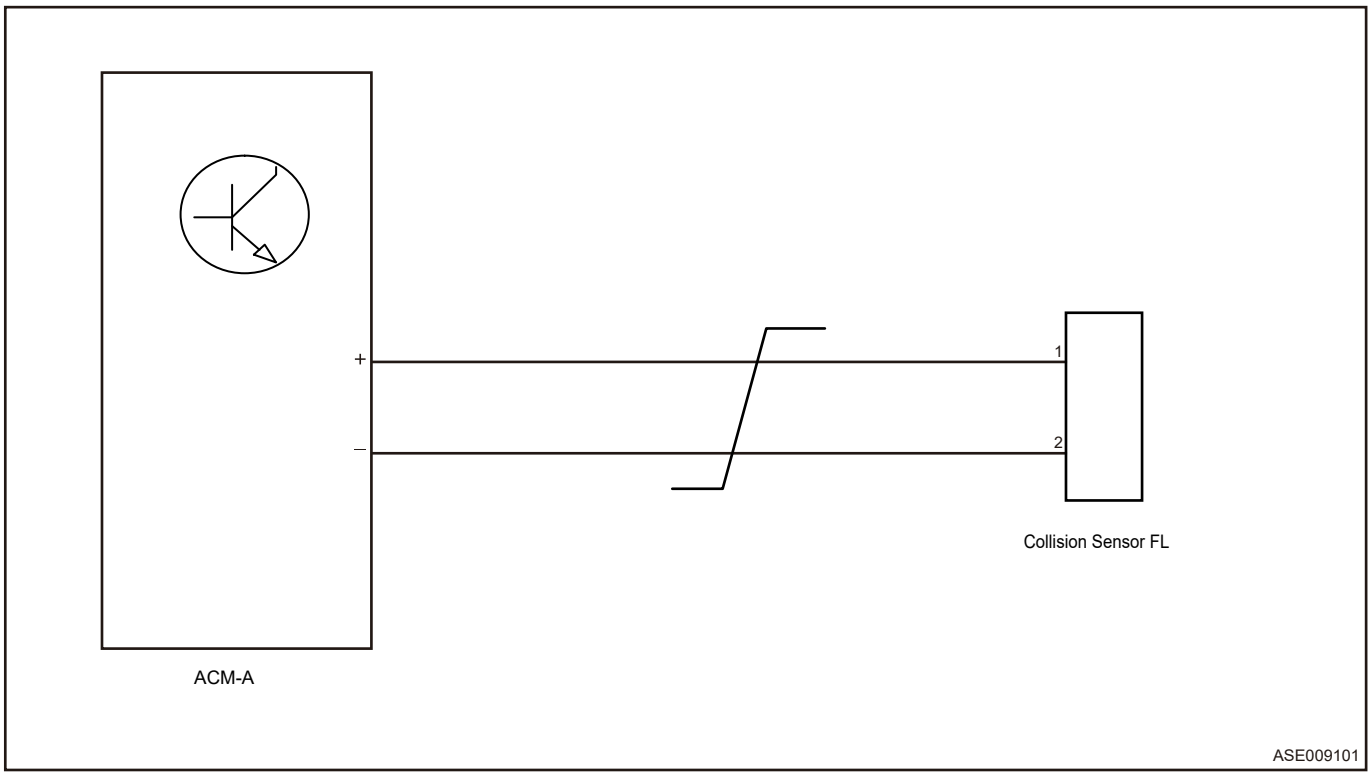
DTC	B1238-12	Third Row Right Buckle Switch Short to Battery

For diagnostic methods, refer to "Passenger buckle switch-circuit short to battery" to perform inspection according to Circuit Diagram Manual.

DTC	B0090-11	Left Front Restraints Sensor Circuit Short to Ground
DTC	B0090-12	Left Front Restraints Sensor Circuit Short to Battery

DTC	B0090-13	Left Front Restraints Sensor Circuit Open
DTC	B0090-96	Left Front Restraints Sensor Component Internal Failures
DTC	B0090-91	Left Front Restraints Sensor Config Error
DTC	B0090-00	Left Front Restraints Sensor Commutation Failures

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

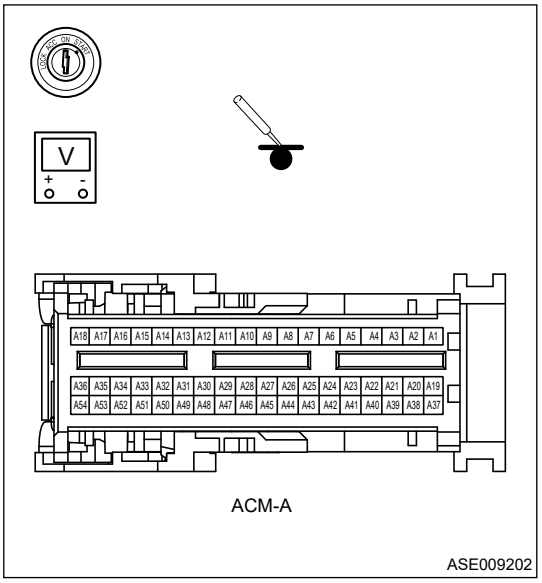
1	**Check voltage between front left collision sensor circuit and ground**

(a) Disconnect the airbag connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Check voltage between connector terminal circuit and ground.

Multimeter Connection	Condition	Specified Condition
Airbag module (-front left collision sensor+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (-front left collision sensor-) - Body ground	ENGINE START STOP switch ON	0 V



ACM-A

ASE009202

NG → **Repair or replace front left collision sensor wire harness**

OK

2	Check resistance between front left collision sensor circuit and ground

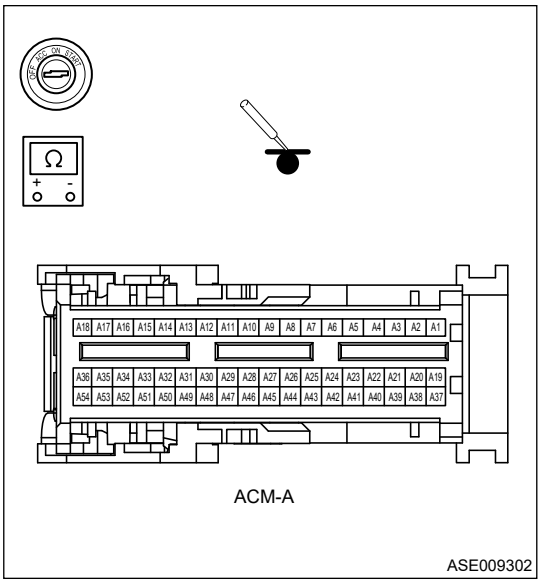
(a) Disconnect front left collision sensor connector.

(b) Disconnect the airbag connector.

(c) Turn ENGINE START STOP switch to OFF.

(d) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (-front left collision sensor+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (-front left collision sensor-) - Body ground	ENGINE START STOP switch OFF	∞



ACM-A

ASE009302

NG → **Repair or replace front left collision sensor wire harness**

OK

3	Check circuit between airbag controller and front left collision sensor

Use circuit diagram as a guide to perform the following inspection procedures:

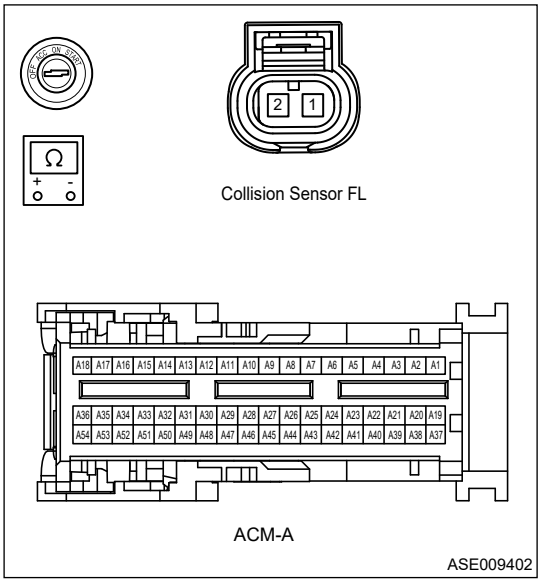
(a) Disconnect front left collision sensor.

(b) Disconnect the airbag connector.

(c) Turn ENGINE START STOP switch to OFF.

(d) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (- connected terminal) - Front left collision sensor (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (- connected terminal) - Front left collision sensor (1)	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness between airbag controller and front left collision sensor**

OK →

4	Check collision sensor

(a) Replace the collision sensor.

(b) Check if DTC exists.

OK → **Replace collision sensor**

NG →

5	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

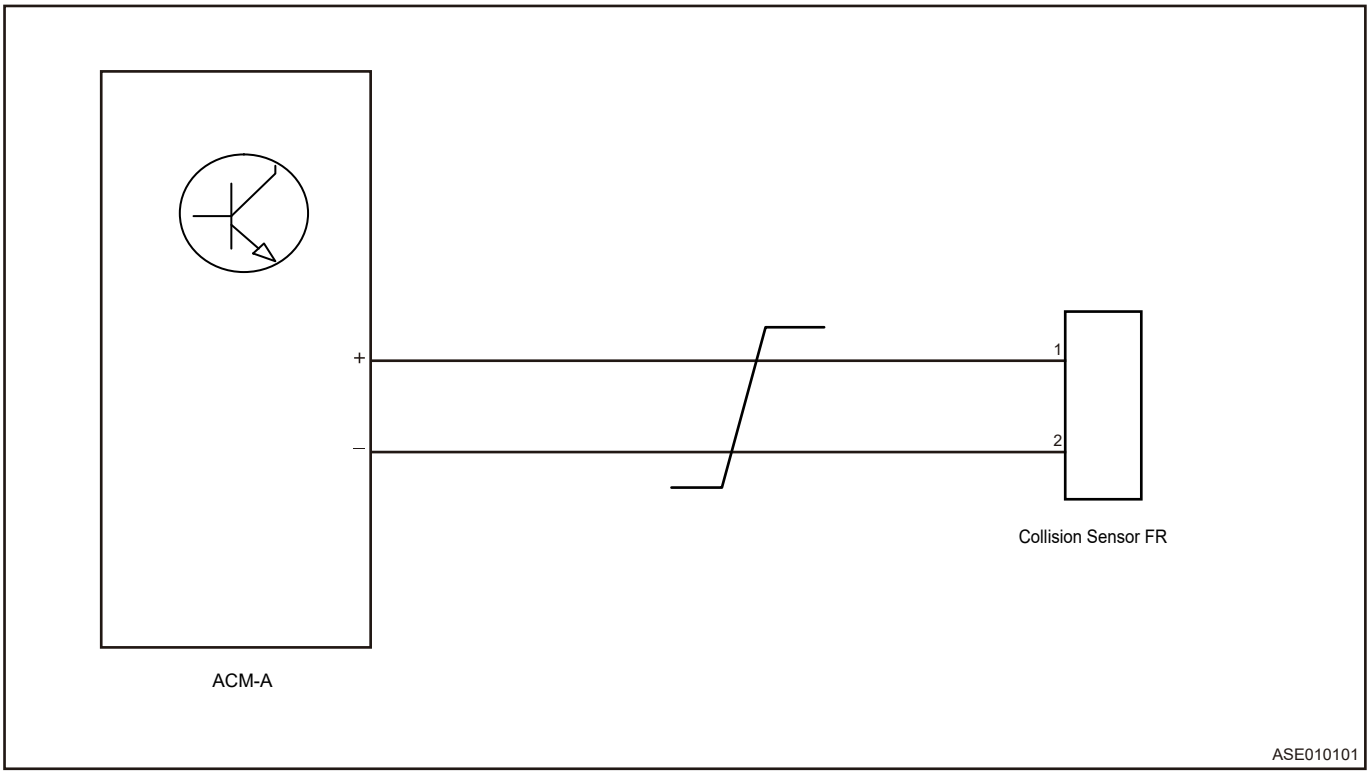
NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0095-11	Right Front Restraints Sensor Circuit Short to Ground
DTC	B0095-12	Right Front Restraints Sensor Circuit Short to Battery
DTC	B0095-13	Right Front Restraints Sensor Circuit Open
DTC	B0095-96	Right Front Restraints Sensor Component Internal Failures

DTC	B0095-91	Right Front Restraints Sensor Config Error
DTC	B0095-00	Right Front Restraints Sensor Commutation Failures

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

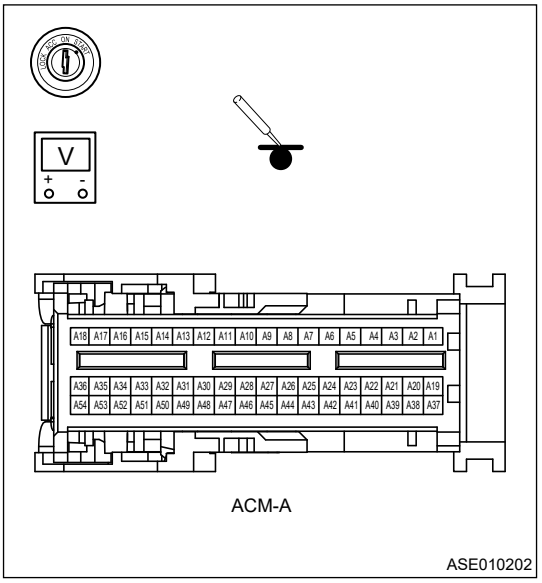
1	**Check voltage between front right collision sensor circuit and ground**

(a) Disconnect the airbag connector.

(b) Turn ENGINE START STOP switch to ON.

(c) Check voltage between connector terminal circuit and ground.

Multimeter Connection	Condition	Specified Condition
Airbag module (-front right collision sensor+) - Body ground	ENGINE START STOP switch ON	0 V
Airbag module (-front right collision sensor-) - Body ground	ENGINE START STOP switch ON	0 V



NG → **Repair or replace front right collision sensor wire harness**

OK

2	Check resistance between front right collision sensor circuit and ground

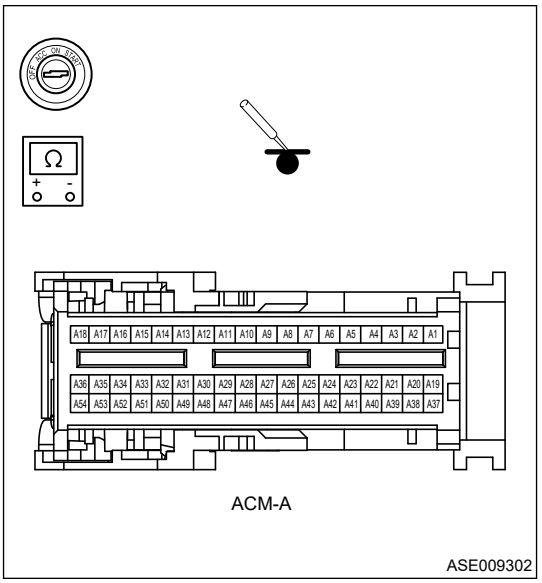
(a) Disconnect front right collision sensor connector.

(b) Disconnect the airbag connector.

(c) Turn ENGINE START STOP switch to OFF.

(d) Perform the resistance inspection.

Multimeter Connection	Condition	Specified Condition
Airbag module (-front right collision sensor+) - Body ground	ENGINE START STOP switch OFF	∞
Airbag module (-front right collision sensor-) - Body ground	ENGINE START STOP switch OFF	∞



NG → **Repair or replace front right collision sensor wire harness**

OK

3	Check circuit between airbag controller and front right collision sensor

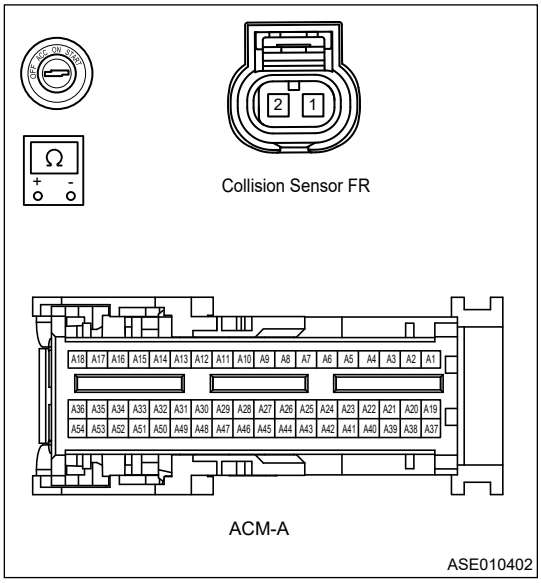
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Disconnect front right collision sensor.

(b) Disconnect the airbag connector.

(c) Turn ENGINE START STOP switch to OFF.

(d) Perform the resistance inspection.



Multimeter Connection	Condition	Specified Condition
Airbag module (-connected terminal) - Front right collision sensor (2)	ENGINE START STOP switch OFF	Less than 1 Ω
Airbag module (-connected terminal) - Front right collision sensor (1)	ENGINE START STOP switch OFF	Less than 1 Ω

NG → **Repair or replace wire harness between airbag controller and front right collision sensor**

OK

4	Check collision sensor

(a) Replace the collision sensor.

(b) Check if DTC exists.

OK → **Replace collision sensor**

NG

5	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B0091-11	Left Side Restraints Sensor Circuit Short to Ground
DTC	B0091-12	Left Side Restraints Sensor Circuit Short to Battery
DTC	B0091-13	Left Side Restraints Sensor Circuit Open
DTC	B0091-96	Left Side Restraints Sensor Component Internal Failures

DTC	B0091-95	Left Side Restraints Sensor Config Error
DTC	B0091-00	Left Side Restraints Sensor Commutation Failures

For detection methods, refer to “Front Left Collision Sensor Failure Diagnosis Procedure” to perform inspection and repair according to Circuit Diagram Manual.

DTC	B0096-11	Right Side Restraints Sensor Circuit Short to Ground
DTC	B0096-12	Right Side Restraints Sensor Circuit Short to Battery
DTC	B0096-13	Right Side Restraints Sensor Circuit Open
DTC	B0096-96	Right Side Restraints Sensor Component Internal Failure
DTC	B0096-95	Right Side Restraints Sensor Configuration Error
DTC	B0096-00	Right Side Restraints Sensor Commutation Failures

For detection methods, refer to “Front Left Collision Sensor Failure Diagnosis Procedure” to perform inspection and repair according to Circuit Diagram Manual.

DTC	B122F-55	VIN Code Not Been Written in ABM

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Read VIN code information

(a) Use a diagnostic tester to check if VIN information exists in ABM.

Exist	Replace with a new ECU to check if fault reoccurs
Not exist	Perform “Write VIN Code” for ABM

DTC	B1251-00	ACU Internal Error-No Sub Type Information
DTC	B122C-00	ACU Has Been Scrapped-No Sub Type Information
DTC	B1216-47	Front crash
DTC	B1217-47	Side Collision
DTC	B1218-47	Rear Crash
DTC	B1219-47	Side Roll Over
DTC	B127F-47	Crash Recording Locked

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).

- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Reconfirm DTCs**

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace with a new ECU to check if fault reoccurs**
OK	**Conduct test and confirm malfunction has been repaired**

DTC	**B1287-54**	**Yaw Rate Sensor Not Calibrated**
DTC	**B1287-99**	**IMU (Inertial Measurement Unit) Calibration Failed**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Calibrate yaw rate sensor**

(a) Use diagnostic tester to check if yaw rate sensor is calibrated.

NG	**Calibrate yaw rate sensor, if it fails, replace airbag control module**
OK	**Replace with a new ECU to check if fault reoccurs**

DTC	**B1215-00**	**Squib Cross Coupling Error**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTC occurs again.

NG → **Check and repair if related fault circuits are cross failure**

OK

2	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1240-00	ICM Airbag Lamp Failed

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTC occurs again.

NG → **Replace BDM or instrument cluster module**

OK

2	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → Conduct test and confirm malfunction has been repaired

DTC	B1284-12	Crash Output Fault-Short to Battery
DTC	B1284-11	Crash Output Fault-Short to Ground
DTC	B1284-13	Crash Output Fault-Circuit Open

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTC occurs again.

NG → Check and repair circuit between airbag module and BDM according to Circuit Diagram Manual

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → Replace with a new ECU to check if fault reoccurs

OK → Conduct test and confirm malfunction has been repaired

DTC	U0073-88	ACU Bus OFF
DTC	U0100-87	Lost Communication with EMS
DTC	U0129-87	Lost Communication with BSM
DTC	U0155-87	Lost Communication with ICM
DTC	U0140-87	Lost Communication with BCM
DTC	U0293-87	Lost Communication with HCU
DTC	U3000-51	Control Module Not Flash Calibration File

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**(Refer to CAN network)**

DTC	**U1300-55**	**EOL Not Configured by ACU**
DTC	**U3000-51**	**Control Module Not Flash Calibration File**
DTC	**B1251-57**	**Calibration Data and Configuration Information - Incompatible Software Component**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Perform reconfiguration**

(a) Use diagnostic tester to perform EOL configuration for ACU.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**B121F-95**	**Left Side Airbag Unexpected Config**
DTC	**B1220-95**	**Right Side Airbag Unexpected Config**
DTC	**B1221-95**	**Left Curtain Unexpected Config-Incorrect Assembly**
DTC	**B1222-95**	**Right Curtain Unexpected Config**
DTC	**B1223-95**	**Front Row Left Seatbelt Retractor Pretensioner Unexpected Config**
DTC	**B1224-95**	**Front Row Right Seatbelt Retractor Pretensioner Unexpected Config**
DTC	**B1225-95**	**Belt Pretensioner Driver Unexpected Config**
DTC	**B1226-95**	**Belt Pretensioner Pass Unexpected Config**
DTC	**B1227-95**	**Second Row Left Seatbelt Pretensioner Unexpected Config**
DTC	**B1229-95**	**Second Row Right Seatbelt Pretensioner Unexpected Config**
DTC	**B0004-95**	**Driver Knee Airbag Unexpected Config-Incorrect Assembly**
DTC	**B0013-95**	**Front Passenger Knee Airbag Unexpected Config-Incorrect Assembly**

DTC	B0030-95	Second Row Left Seat Side Airbag Unexpected Config
DTC	B0038-95	Second Row Right Seat Side Airbag Unexpected Config
DTC	B0006-95	Far Side Airbag Unexpected Config

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTC occurs again.

NG → **Compare with configuration table to confirm if actual vehicle has corresponding malfunction configuration**

OK

2	**Rewrite the correct configuration code with diagnostic tester**

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Rewrite the correct configuration code with diagnostic tester.

NG → **Confirm if configuration code matches with real vehicle configuration. If error still exists, obtain correct configuration code**

OK

3	**Reconfirm DTCs**

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B122D-95	Driver Airbag Unexpected Config

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Confirm if airbag controller are applicable to this model.**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Confirm that the airbag controller configuration.

(b) Correct the controller spare part number.

NG → **Replace or repair the airbag controller**

OK

2	**Reconfirm DTCs**

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B122E-95	Passenger Airbag Unexpected Config

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Confirm if airbag controller are applicable to this model.**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Confirm that the airbag controller configuration.

(b) Correct the controller spare part number.

NG → **Replace or repair the airbag controller**

OK

2	Reconfirm DTCs

For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new ECU to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

6 On-vehicle Service

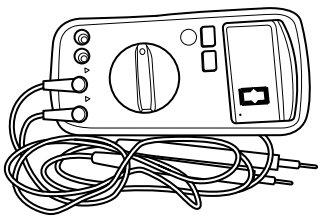
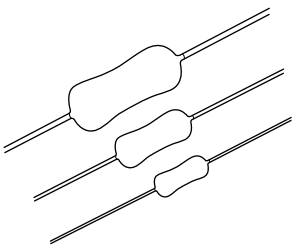
6.1 Specifications

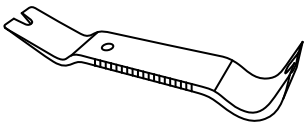
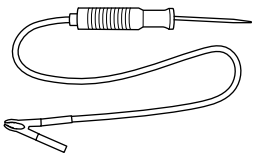
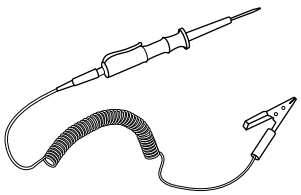
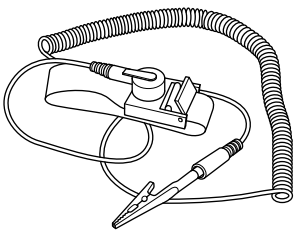
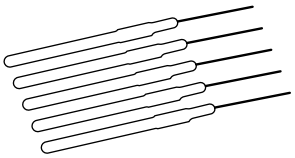
■ Torque Specifications

Item	Tightening torque
Airbag Control Fixing Bolt	9 ± 1 N·m

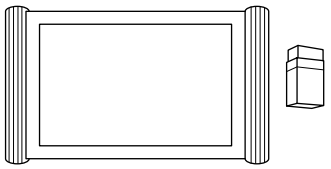
6.2 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Resistor (2 Ω)	 S00070

Tool Name	Tool Drawing
Interior Crow Plate	 S00020
Bulb Test Light	 S00071
Diode Test Light	 S00072
Static-proof Wrist Strap	 S00073
Wire Harness Terminal Service Tool	 S00074

■ **Special Tools**

Tool Name	Tool Drawing
Diagnostic tester	 S00001

6.3 Replacement of Airbag System Controller.(ACU)

■ **Removal**

⚠ Warning

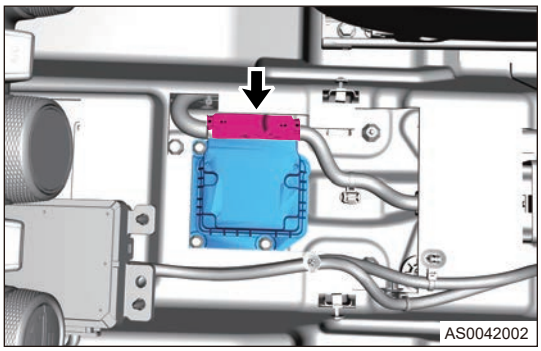
- **Be sure to follow correct procedures to remove and install airbag system controller.**
- **Inspect and confirm that part number in airbag control module label matches with configuration card part number in vehicle; Parts surface should be free of chips and labels and bar codes should be intact and clear before assembly; Peel off one bar code after inspection and attach it to record card in vehicle.**
- **Handle airbag control module carefully and it' s strictly forbidden to tap and crash it fiercely.**
- **There should be no other objects between airbag control module installation plane and ACU module, and ACU must be installed directly on body panel.**
- **Make sure that the ENGINE START STOP Switch is in OFF state during installation and removal of ACU, and never install or remove it with power on.**
- **Reconfirm the installation direction of ACU after installation and make sure that label arrow direction is facing vehicle head. If fitted reversely, airbag controller assembly will not operate normally.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

(3) Remove the auxiliary fascia console assembly.

(4) Press lower limit clamp to separate wire harness connector (arrow) and remove airbag controller assembly.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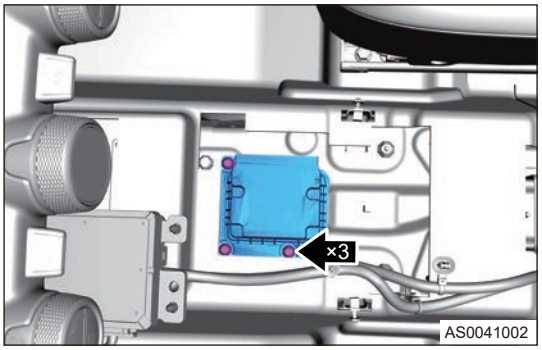
(5) Remove 3 fixing bolts (10# socket wrench) from airbag controller.



■ **Inspection**

(1) Check whether pins of airbag system controller are exposed and bent before assembly.

(2) Check whether there are cracks, burrs and other phenomena on airbag system controller.

■ **Installation**

⚠ Caution

- **Before installing tightening bolts, always make sure that airbag wire harness is not held down or stuck. Adjust if necessary and install it in place.**
- **Make sure to tighten fixing bolts to specified torque during installation.**
- **Always keep vehicle power off during installation. It is forbidden to install the airbag controller assembly with vehicle power on.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**

(1) Install 3 fixing bolts to airbag system controller.

Torque: 9 ± 1 N·m

(2) Connect the airbag system controller assembly controller.

(3) Install the auxiliary fascia console assembly.

(4) Install the negative battery cable.

9.2 AIRBAG

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Wire harness assembly: Arrange the wire harness without any torsion and wrinkles, etc. Never make it contact with metal or non-metal sharp edge. It should be connected with ACU (Airbag Module), SIS and each airbag module firmly without any looseness.

(2) System power-on detection:

1) After powering-on, ACU sends airbag indicator light on signal via CAN, the lighting time should last for 3 seconds (When the controller has an Squib fault or undervoltage/overvoltage error, initialization time of malfunction indicator is extended to a maximum of 10 seconds). After self-check is completed, ACU sends airbag indicator off signal via CAN, the warning light goes off for (1±0.1) seconds, and then it will enter normal operation state;

2) After completion of (remains on for 3 seconds) and (goes off for 1±0.1 seconds) states, if there is no DTC in system that requires the indicator light to be turned on, the indicator light will go off. If the indicator light remains on, it indicates that there is a malfunction in ACU, it is necessary to clear the fault with a diagnostic tester. Check corresponding components and wire harness connection according to the fault display of diagnostic tester. If the malfunction is still not eliminated, you must complete the corresponding adjustment operation under the guidance of the quality department, design department and suppliers until the indicator light goes off.

3) Diagnosis of airbag system should be completed at the follow-up station of four-wheel alignment. It is required to perform diagnosis when the vehicle is powered-on and airbag modules, etc. are fully fastened.

(3) The installation and repairing of all airbag parts must be performed with power off, and it’ s strictly forbidden to install, remove and rework on production line with power on. If the replacement or repairing of airbag parts is involved, you must cut off power supply. Because within 30 seconds of vehicle stalling or fuse removed (refer to Technology Instruction for Wire Harness System Assembly and Adjustment), sufficient power to deploy airbag is still remained inside airbag controller, so perform the repairing operation after 30 seconds of airbag controller and battery cut off.

(4) Be sure to clear all DTCs from ACU after vehicle assembly is complete.

(5) Store the airbag in a place with enough spare space to prevent accidental airbag deployment. If there is no airbag deployment space, accidental airbag deployment may injure human body or damage the vehicle.

(6) In order to avoid DTC, never energize airbag system before connecting all airbag system components and performing diagnostic inspection.

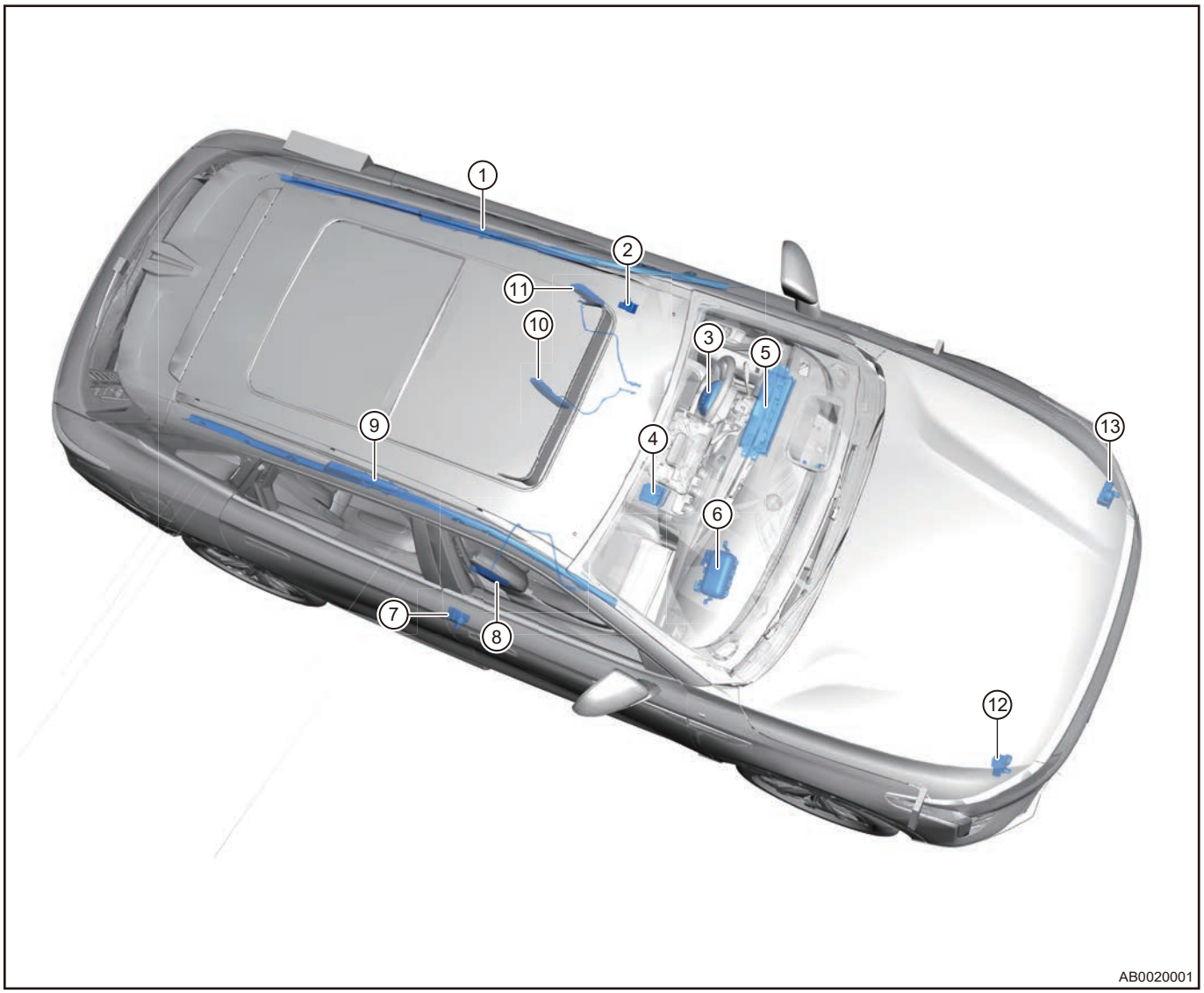
(7) If airbag and ACU had fallen down from a position higher than 1 m, please do not reuse it and insulate it.

(8) Handle airbag and ACU carefully, and never tap or strike it fiercely.

(9) Assembly, detection and removal of airbag system must meet relevant requirements and specifications, and never perform operation casually.

2 System Overview

2.1 System Components Diagram



1	Left Curtain Shield Airbag Assembly	8	Front Right Seat Side Airbag Assembly
2	Left Side Collision Sensor	9	Right Curtain Shield Airbag Assembly
3	Driver Airbag Assembly	10	Middle Airbag Assembly
4	Airbag Module Assembly	11	Front Left Seat Side Airbag Assembly
5	Knee Airbag Assembly	12	Right Frontal Collision Sensor
6	Front Passenger Airbag Assembly	13	Left Frontal Collision Sensor
7	Right Side Collision Sensor		

Airbag: The controller controls ignition circuit and activates airbag (and belt pretensioner) reasonably to keep occupants at proper position in the cabin when accident occurs, thus protecting occupants.

3 Diagnostic Information and Steps

3.1 Diagnosis Procedure

■ Preparations before dealing with airbag system wire harness malfunction

- Read and record the system DTC.
- Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable for at least 90 seconds so that the airbag controller has enough time to discharge.
- Prevent electric static discharge, such as static-proof wrist strap.
- To prevent the ignition element from igniting accidentally during wire harness measurement, it is necessary to disengage all elements connected to wire harness, such as airbag, module, sensor etc. before measuring.

■ Airbag system malfunction repair completion inspection

(1) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable (if it is connected).

(2) Connect each wire harness connector of airbag system.

(3) Connect negative battery cable.

(4) Start the vehicle, operate the electrical system, turn on the electrical equipment as much as possible (-blower, rear defroster, headlight, audio, etc.). If all the following requirements are met, the airbag system is normal, otherwise it should be checked and repaired again:

1) ENGINE START STOP switch is ON, system performs self-check, airbag warning light comes on. Warning light goes off when self-check is completed.

2) Connect the diagnostic tester, read the DTC and observe the datastream. Use the simulation method if necessary. Test the vehicle in the malfunction conditions described by customer, check if the malfunction is no longer duplicate and no other DTCs are produced.

3) If equipped with front passenger detection device, the front passenger seat belt warning light should operate normally; (Check method: A person sits on the front passenger seat and does not wear the seat belt, seat belt warning light comes on and goes off after the seat belt is fastened.)

4) Clear history DTC (If exists).

■ Handling procedure for deployed airbag set

(1) Place the deployed airbag in a solid plastic bag.

(2) Be sure to seal the plastic bag tightly.

(3) Wash both hands carefully after handling the deployed airbag.

(4) Although above protection measures are taken, if the irritant substance attaches to the eyes or skin, flush it with a large amount of water immediately.

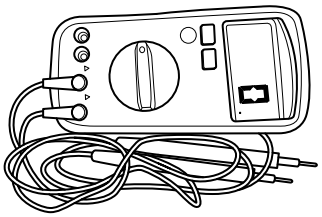
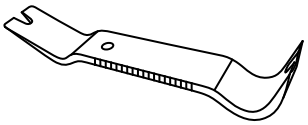
⚠ Warning

- **There may be powder particles on airbag surface, which is primarily composed of chemical reaction product (used to lubricate bag when inflating).**
- **There may be substance which can irritate eyes or skin attached to the deployed airbag, so please wear gloves and safety glasses during disposal process.**
- **After the airbag deploys, the temperature on airbag module metal surface is very high. To avoid any injury or fire, please keep the deployed airbag module far away from any combustible materials,**
- **Do not pour water or oil on the airbag after the airbag deploys and handle it after cooling for 30 minutes.**

4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Interior Crow Plate	 S00020

4.2 Specifications

■ Torque Specifications

Item	Tightening torque
Collision Sensor Fixing Bolt	9 ± 1.5 N·m
Coil Spring Snap Spring Fixing Screw	6 ± 0.5 N·m
Knee Airbag Fixing Bolt	9 ± 1.5 N·m
CAB Generator Bracket Fixing Bolt	10 ± 1.5 N·m
Front Passenger Airbag Fixing bolt	23 ± 4 N·m
Front Passenger Airbag Assembly Fixing Screw	2.5 ± 0.5 N·m

4.3 Replacement of Driver Airbag Assembly (DAB)

■ Removal

⚠ Warning

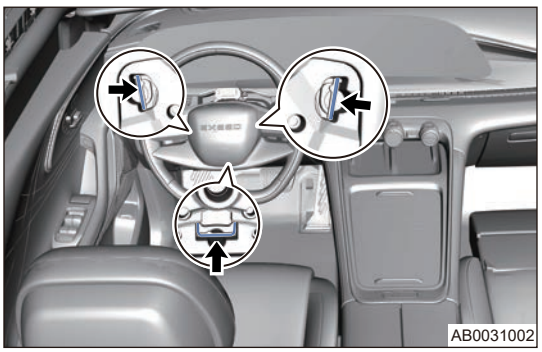
- **Be sure to follow correct procedures to remove and install airbag system controller.**
- **DAB installation and repairing must be performed with power off, and it's strictly forbidden to install, remove and rework DAB on any production line with power on. DAB replacement and repairing must be performed with power off. Within 30s of vehicle stalling or fused removed (refer to Technology Instruction for Wire Harness System Assembly), sufficient power to deploy airbag is still remained inside airbag controller, so it's necessary to perform repairing after 30s since the power of airbag controller is cut off.**
- **In order to avoid occurrence of DTC, never energize airbag system before connecting all airbag system components (including DAB) and performing diagnostic inspection.**
- **Keep space in area for storing DAB to prevent accidental deployment of DAB. If there is no deployment space, accidental deployment of DAB may injure human body or damage the vehicle.**
- **If DAB falls down from a position higher than 1 m, please do not reuse it and insulate it;**
- **Handle DAB carefully, and never tap or strike it fiercely.**
- **Assembly, detection and removal of DAB must meet relevant requirements and specifications, and never perform operation casually.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

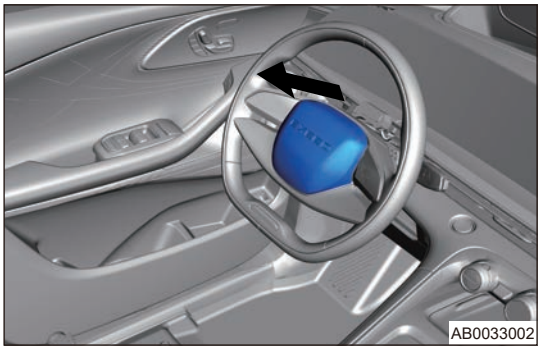
(3) Position the front wheels straight ahead.

(4) Using a slotted screwdriver, remove driver airbag assembly in sequence through 3 removal holes in locations of 3 o'clock, 9 o'clock and 6 o'clock on steering wheel. Insert the screwdriver into removal hole of 3 o'clock position on steering wheel in removal direction and push it further lightly when reaching to snap spring until a "click" sound is heard, which means that the clip is detached, and the corresponding side of airbag will be bounced up. Then perform removal in 9 o'clock direction with the same method as above. Finally perform removal in 6 o'clock direction, and then take up the whole driver airbag assembly from steering wheel lightly with both hands.



(5) Removal of spiral cable and driver airbag assembly connector: While taking up driver airbag assembly with one hand, use 2 fingers of the other hand to press and hold lock clips of both sides in "pressing direction" as indicated in illustration and then remove driver airbag assembly connector in removal direction, and remove 1 connector of horn ground wire.

(6) Remove the driver airbag assembly.



■ **Inspection**

(1) Before assembly, confirm that label part number in driver airbag assembly and configuration card part number in vehicle matches;

(2) Then check driver airbag assembly cover plate surface for trimming, residual, air vent, scratches, galling etc.; it’ s also forbidden for defects such as inclusion and dents etc. Peel off a bar code after inspection and attach it to record card in vehicle.

■ **Installation**

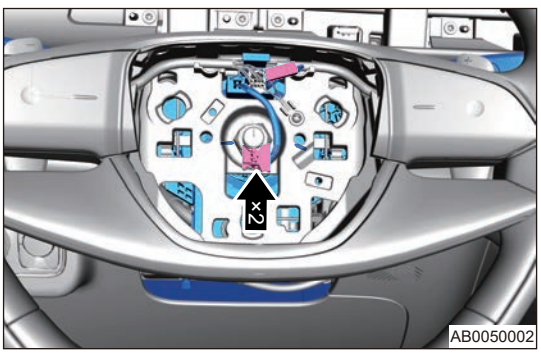
⚠ Warning

- **Install the driver airbag assembly after completing the steering wheel;**
- **Make sure that all connectors are securely connected and the wire harness is fixed in the set slot before pressing driver airbag assembly into steering wheel;**
- **After installing the driver airbag assembly, airbag light is normal after the power is turned on, ensure that the horn pressing function is normal;**
- **Press periphery and center part of driver airbag assembly cover with palms to make sure that the pressing operation is smooth without sluggish.**

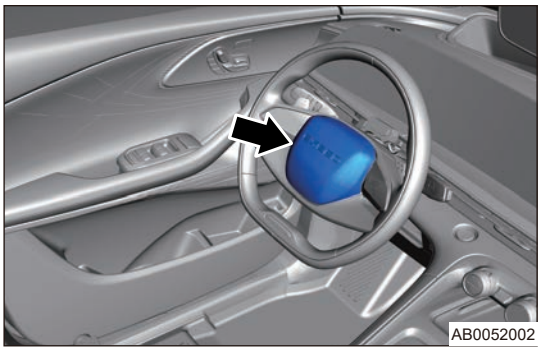
⚠ Caution

- **Press periphery and center part of DAB cover with palms to make sure that the pressing operation is smooth without sluggish after installation.**

(1) Insert horn connector on spiral cable side into horn metal plate on DAB side, insert airbag connector of spiral cable into generator of driver airbag assembly until a “click” sound is heard. The connector plane and generator port fitted flatly indicates that the connector is installed in place.



(2) DAB of Yaoguang model adopts press-in mounting structure without any mounting tools. Put DAB into the steering wheel and ensure stability, press center part of airbag trim cover with palms of both hands until a “click” sound is heard, which means that the airbag and steering wheel have been fixed and installation is completed.



4.4 Replacement of Front Passenger Airbag Assembly (PAB)

■ Removal

⚠ Warning

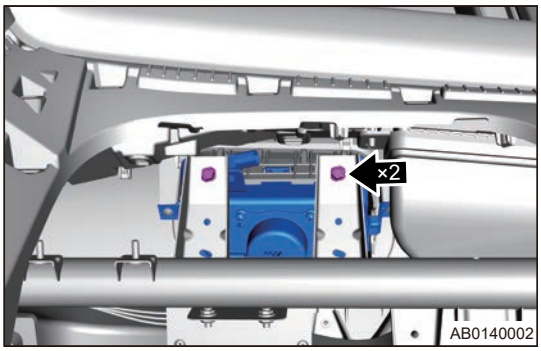
- **Handle airbag assembly carefully, and never tap or strike it fiercely.**
- **Removal, inspection and installation of airbag system must meet relevant requirements and specifications, and never perform operation casually.**
- **Removed airbag should be kept properly with face up. Store the airbag in a place with enough spare space to prevent accidental airbag deployment.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

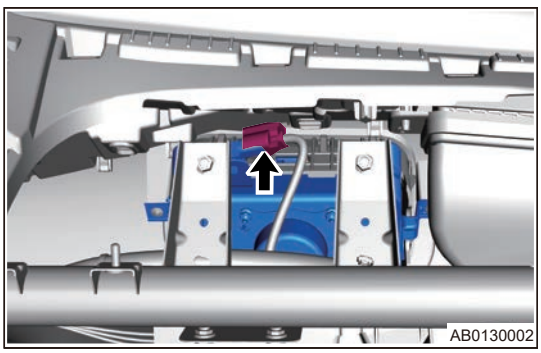
(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

(3) Remove the glove box assembly.

(4) Remove 2 coupling bolts (arrow) between front passenger airbag assembly and instrument panel crossmember assembly.

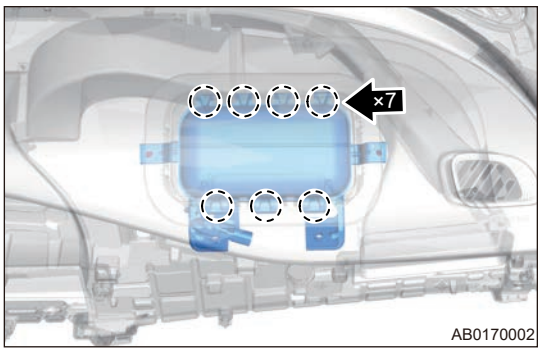


(5) Remove front passenger airbag assembly wire harness connector assembly (arrow).

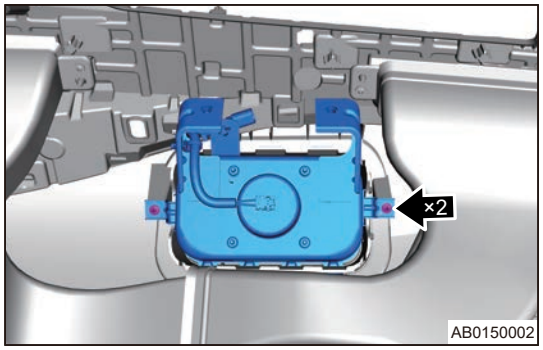


(6) Remove the instrument panel upper body assembly.

(7) Using an interior crow plate, pry off 7 fixing claws around front passenger airbag assembly mounting bracket to separate it from instrument panel body assembly.



(8) Remove 2 self-tapping screws (arrow) between front passenger airbag assembly and instrument panel airbag frame.



■ Inspection

(1) Confirm that label part number on front passenger airbag assembly and configuration card part number in vehicle matches before assembly;

(2) Then check front passenger airbag assembly cover plate surface for trimming, residual, air vent, scratches, galling etc.; it’ s also forbidden for defects such as inclusion and dents etc. Peel off a bar code after inspection and attach it to record card in vehicle.

■ Installation

⚠ Warning

- **Inspect and confirm that parts surface should be free of chips and damages and labels and bar codes should be intact and clear before assembly; Peel off one bar code after inspection and attach it to record card in vehicle.**
- **Before installing tightening bolts, always make sure that airbag wire harness is not held down or stuck. Adjust if necessary and install it in place.**
- **Make sure to tighten fixing bolts to specified torque during installation.**
- **When installing front passenger airbag assembly, first slide the hook on one side into locating hole in airbag box, and then press in hook on the other side firmly, making sure that hooks on both sides enter the corresponding locating holes correctly.**
- **Always keep vehicle power off during installation. It is forbidden to install the front passenger airbag assembly with vehicle power on.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**

(1) PAB should be installed firstly to instrument panel upper body. Place PAB entirely into airbag bracket on back side of instrument panel upper body. First hang 3 hooks into fixing holes in airbag frame, then press 4 hooks on the other side firmly into bracket holes and make sure that hooks on both sides have been put into the corresponding fixing holes.

(2) Using 2 cross-recessed button head self-tapping screws, tighten front passenger airbag assembly to instrument panel airbag frame.

Tightening torque: 2.5 ± 0.5 N·m

(3) Insert the instrument panel wire harness connector into the PAB adapter connector, push the connector in the insertion direction as shown, and hear a "click" sound to indicate that it is assembled in place. PAB port has error-proofing function and it’ s forbidden to connect forcibly.

(4) After installing instrument panel body, pre-tighten 2 bolts of PAB to CCB bracket in glove box port. Tighten point on left side, then tighten point on right side and finally tighten bolts with installer according to set torque value.

Tightening torque: 23 ± 4 N·m

4.5 Replacement of Side Curtain Shield Airbag Assembly (CAB)

■ Removal

⚠ Warning

- **Handle airbag assembly carefully, and never tap or strike it fiercely.**
- **Removal, inspection and installation of airbag system must meet relevant requirements and specifications, and never perform operation casually.**
- **Removed airbag should be kept properly with face up. Store the airbag in a place with enough spare space to prevent accidental airbag deployment.**

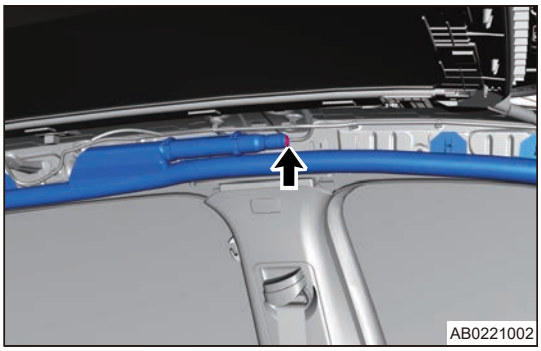
Hint:
Removal method of right curtain shield airbag and left side is same.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

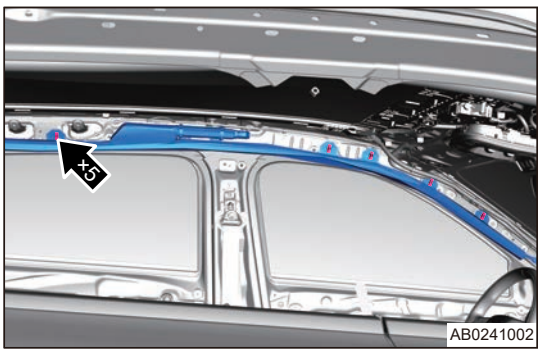
(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

(3) Remove the roof assembly.

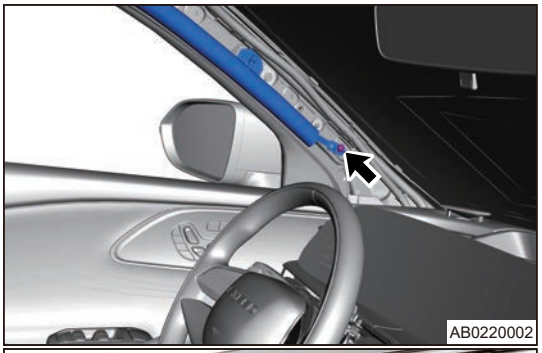
(4) Disconnect the wire harness connector (arrow) from side curtain shield airbag generator.

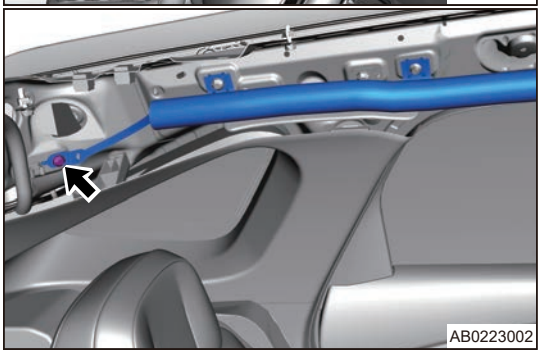


(5) Remove 5 air bag clips (arrow) from left curtain shield airbag.

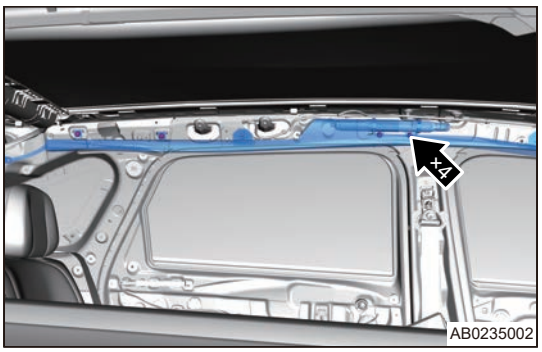


(6) Remove 2 fixing bolts (arrow) from left curtain shield airbag strip fixing end plate.



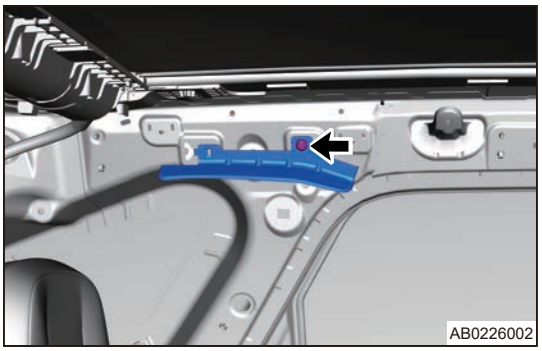


(7) Remove 4 fixing bolts (arrow) from left curtain shield airbag.



(8) Remove the left curtain shield airbag.

(9) Remove 1 fixing bolt (arrow) from C-pillar guide bracket.



(10) Remove C-pillar guide bracket.

■ Inspection

(1) Check that airbag components surface should be free of damages before assembly and labels and bar codes should be intact and clear; it's also necessary to check that CAB installation area on vehicle body should be free of rags, sharp corners, welding spatters etc.; peel off one bar code after the checking and attach it to record card in vehicle.

■ **Installation**

⚠ Caution

- **The installation of airbags can not be rotated and twisted. It is essential to check if protecting bag stitching of air bag is in lower part of air bag during assembly:**
- **Air bag on each armrest installation bracket should be in lower part of armrest bracket. If air bag covers armrest installation bracket, it's necessary to adjust air bag to lower part of the armrest bracket with hands.**
- **Air bag on C pillar guide bracket should be in upper part of guide bracket. After assembling air bag clip, it's necessary to adjust air bag to upper part of C pillar guide bracket with hands.**
- **If any of the above situation occurs, normal deployment of airbag will be affected when side collision occurs, it can not form effective protection for drivers and passengers; It is necessary to focus on control during assembly, and above problems are not allowed to occur.**

(1) Temporary install C pillar guide bracket to vehicle body with hooks (hang swallow tail hook into vehicle body swallow tail groove and then hang the hook beside bolt hole into vehicle body hole) and then tighten it to vehicle body with bolt through bolt hole.

Tightening torque: 10 ± 1.5 N·m

(2) Hang the hook on CAB generator bracket into vehicle body swallow tail groove and then press 3# clip into the corresponding installation hole in vehicle body; lightly hold the air bag with one hand and use tools to pre-tighten round hole and then waist-shaped hole on CAB generator bracket with the other hand and finally tighten the bolt to vehicle body according to torque requirements.

Tightening torque: 10 ± 1.5 N·m

(3) Press 5 air bag clips (equipped with the generator) on front and rear part of generator into the corresponding installation holes in vehicle body in sequence; protecting bag stitching of air bag must be in lower part of air bag during assembly. Then, hang the end hook of the last airbag fixing point into the body hook hole.

(4) First hang the hook on strip fixing end plate into hook hole in vehicle body and now strip should operate normally and then tighten the bolt to vehicle body; the front and rear row strip hooks are fixed in the same way; for front strip, it is needed to clip strip into A pillar fixing clip.

Tightening torque: 10 ± 1.5 N·m

(5) Insert the connector on wire harness end into generator end and make sure that the connector is assembled into place. Insert wire harness end connector directly into generator end and a "click" sound indicates that it is installed in place; the port has failure-proof function and do not insert it forcibly.

4.6 Driver Knee Airbag Assembly (KAB)

■ **Removal**

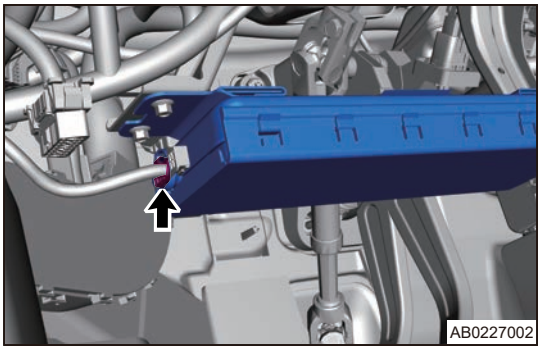
⚠ Warning

- **Handle airbag assembly carefully, and never tap or strike it fiercely.**
- **Removal, inspection and installation of airbag system must meet relevant requirements and specifications, and never perform operation casually.**
- **Removed airbag should be kept properly with face up. Store the airbag in a place with enough spare space to prevent accidental airbag deployment.**

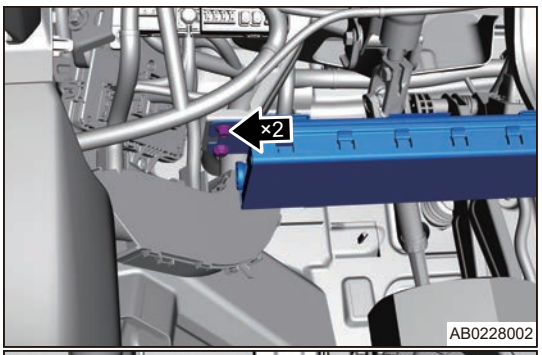
(1) Turn off all electrical equipment and ENGINE START STOP switch.

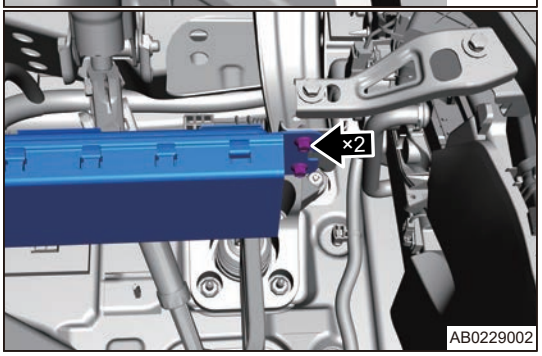
(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

(3) Disconnect the knee airbag assembly wire harness connector (arrow).



(4) Remove 4 fixing bolts (arrow) from knee airbag assembly.





(5) Remove the knee airbag assembly.

■ Installation

⚠ Caution

- **Inspect and confirm that airbag parts surface should be free of damages and labels and bar codes should be intact and clear before assembly; Peel off one bar code after inspection and attach it to record card in vehicle.**

(1) KAB should be installed to instrument panel crossmember. Firstly, turn the instrument panel packing machine clockwise from the right side by 60° to 90°, and then hang the small hooks on the left and right brackets of KAB into instrument panel crossmember bracket holes (with the generator port facing left); First hang the left hook into the hook hole, and then hang the right hook into the hook hole, ensuring that both hooks have entered the corresponding instrument panel crossmember fixing holes.

(2) Fasten the KAB to the instrument panel cross member bracket with four bolts.

Tightening torque: 9 ± 1.5 N·m

(3) Insert the instrument panel wire harness connector into KAB generator connector, press in the direction as shown until a "click" sound is heard. The connector plane and generator port fitted flatly indicates that the connector is installed in place. KAB port has failure-proof function and it’ s forbidden to connect forcibly.

4.7 Replacement of Front Seat Side Airbag

■ Removal

⚠ Warning

- **Front passenger side airbag is non-removable and must be removed together with seat assembly.**

Hint:
Removal method of right seat side airbag and left side is same.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

(3) Remove the front left seat assembly.

(4) Front left seat side airbag installation position.

■ Inspection

(1) Check the front seat for scratches and dirt before assembly.

(2) Check whether the front seat can adjust automatically before assembly.

■ Installation

⚠ Caution

- **Always install correctly according to specified operating instructions.**

(1) Install the front left seat assembly.

4.8 Replacement of Spiral Cable

■ Removal

⚠ Warning

- **An activation prevention mechanism is built in airbag system connector. When connector is disconnected, this mechanism cuts off circuit by bringing short spring plate into contact with terminals, thus insulating the circuit from external power sources to prevent accidental airbag activation.**
- **To release activation prevention mechanism, insert a piece of paper with the same thickness as male terminal between terminals and short spring plate to disconnect the connection.**

Hint:
When removing spiral cable, use the positioning pin to hold it in its original position.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

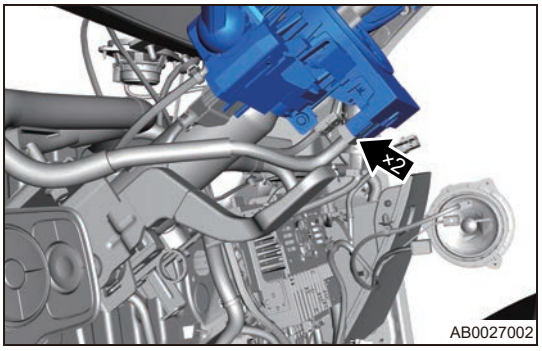
(3) Position the front wheels straight ahead.

(4) Remove the driver airbag.

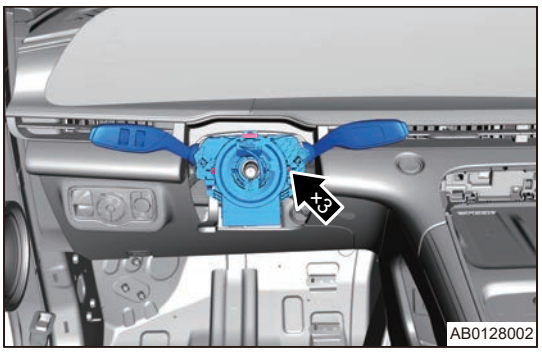
(5) Remove the steering wheel assembly.

(6) Remove the combination switch cover assembly.

(7) Disconnect the spiral cable wire harness connector (arrow).



(8) Detach the fixing claws (arrow) between spiral cable and combination switch assembly to release spiral cable.



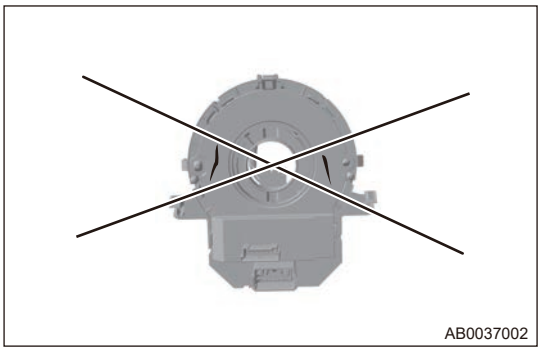
■ Inspection

Hint:

- An activation prevention mechanism is built in airbag system connector. When connector is disconnected, this mechanism cuts off circuit by bringing short spring plate into contact with terminals, thus insulating the circuit from external power sources to prevent accidental airbag activation.
- To release activation prevention mechanism, insert a piece of paper with the same thickness as male terminal between terminals and short spring plate to disconnect the connection.

(1) Check spiral cable

1) Check that there are no scratches or cracks on connectors, or no cracks, dents or chipping on the cable.



2) If there are scratches, cracks, dents or cuts on connectors or spiral cable, replace the spiral cable with a new one.

(2) Remove spiral cable and measure pin 1 and pin 2

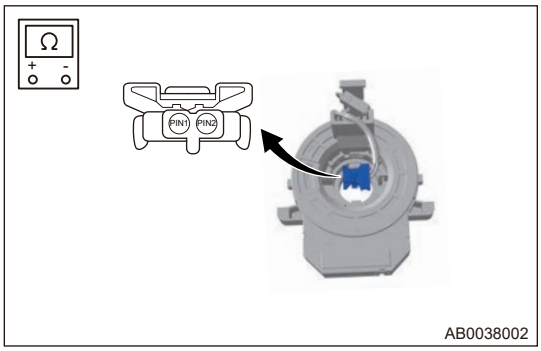
Use circuit diagram as a guide to perform the following inspection procedures:

1) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable and wait for at least 90 seconds.
2) Remove the spiral cable single part.
3) Using ohm band of multimeter, measure resistance between 2 pins of spiral cable.

Specified Condition

Multimeter Connection	Condition	Specified Condition
PIN1 - PIN2	ENGINE START STOP switch "OFF"	⩽ 1 Ω

If result is not as specified, replace spiral cable assembly.



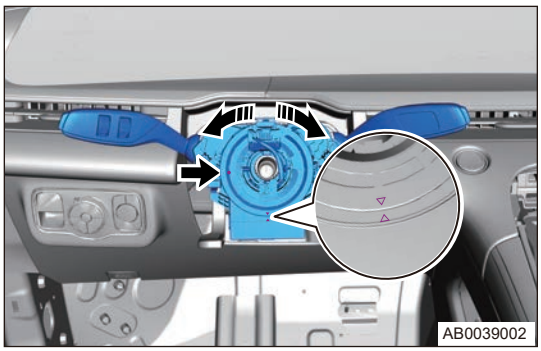
■ **Installation**

⚠ Caution

- **Always install correctly according to specified operating instructions.**
- **DO NOT rotate the spiral cable over specified turns to prevent it from breaking.**
- **Be sure to install fixing claws in place when installing spiral cable.**
- **Check that horn operates normally after installation.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**

Hint:

Always install spiral cable correctly according to matchmarks on spiral cable and steering column (fully turn spiral cable in a direction slowly, then turn it in the opposite direction until yellow ball appears in transparent neutral window and arrow marks align with each other), otherwise the spiral cable may be damaged.



(1) Combine the spiral cable with the combination switch assembly.

(2) Connect the spiral cable wire harness connector.

(3) Install the combination switch cover assembly.

(4) Install the steering wheel assembly.

(5) Install the driver airbag.

4.9 Replacement of Side Collision Sensor Assembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ Removal

⚠ Warning

- **Before installing tightening bolts, always make sure that airbag wire harness is not held down or stuck. Adjust if necessary and install it in place.**
- **Make sure to tighten fixing bolts to specified torque during installation.**
- **Always keep vehicle power off during installation. It is forbidden to install the airbag controller assembly with vehicle power on.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**
- **During assembly, insert locating pin of the sensor into waist-shaped locating hole.**
- **Be sure to follow correct procedures to remove and install side collision sensor.**
- **Insert wire harness connector into side collision sensor port and generally a "click" sound will be heard after pushing into connector end to lock, which indicates that it is clamped into place; Connector port has error-proofing function. If it cannot be inserted, adjust and insert it again and do not insert it forcibly.**

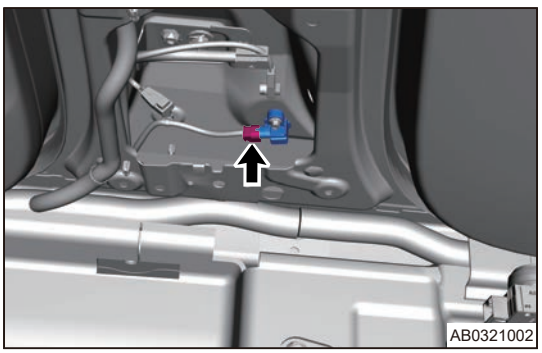
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

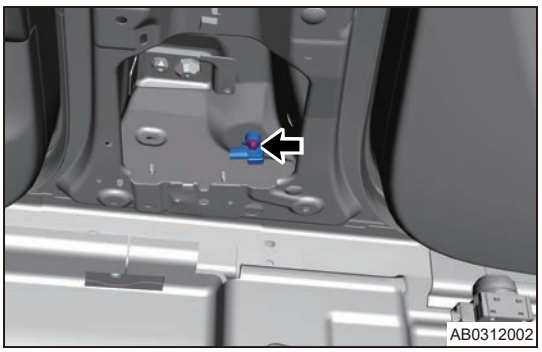
(3) Remove the left B-pillar lower protector.

(4) Remove the seat belt retractor.

(5) Remove the wire harness connector (arrow).



(6) Remove 1 fixing bolt from side collision sensor assembly. (arrow).



■ Inspection

(1) Check whether pins of collision sensor are exposed and bent before assembly.

(2) Check collision sensor for cracks, burrs and creases before assembly.

■ **Installation**

⚠ Caution

- **Before installing tightening bolts, always make sure that airbag wire harness is not held down or stuck. Adjust if necessary and install it in place.**
- **Make sure to tighten fixing bolts to specified torque during installation.**
- **Always keep vehicle power off during installation. It is forbidden to install the airbag controller assembly with vehicle power on.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**

(1) Install waist-shaped pin of side collision sensor into waist-shaped hole of B-pillar reinforcing plate, install and tighten fixing bolts.

Tightening torque: 9 ± 1.5 N·m

(2) Insert wire harness connector into side collision sensor port, lock after pushing into the end of connector.

4.10 Replacement of Front Collision Sensor Assembly

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ **Removal**

⚠ Warning

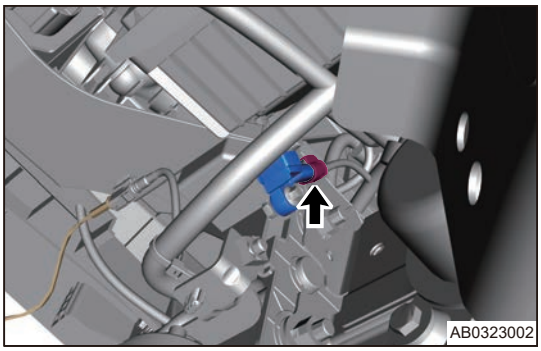
- **Before installing tightening bolts, always make sure that airbag wire harness is not held down or stuck. Adjust if necessary and install it in place.**
- **Make sure to tighten fixing bolts to specified torque during installation.**
- **Always keep vehicle power off during installation. It is forbidden to install the airbag controller assembly with vehicle power on.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**
- **During assembly, insert locating pin of the sensor into waist-shaped locating hole.**
- **Be sure to follow correct procedures to remove and install side collision sensor.**
- **Insert wire harness connector into side collision sensor port and generally a "click" sound will be heard after pushing into connector end to lock, which indicates that it is clamped into place; Connector port has error-proofing function. If it cannot be inserted, adjust and insert it again and do not insert it forcibly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

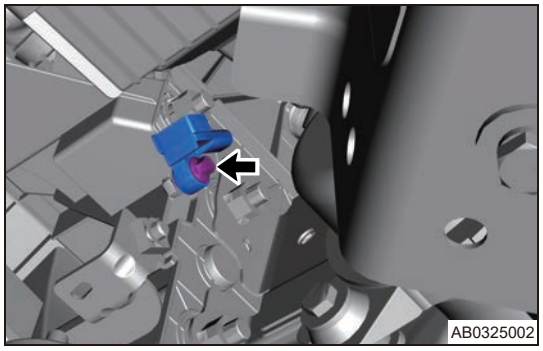
(2) Wait at least 90 seconds after disconnecting the negative battery cable to disable supplementary restraint system.

(3) Remove the front bumper assembly.

(4) Disconnect the front collision sensor connector (arrow).



(5) Remove 1 fixing bolt (arrow) from front collision sensor assembly.



■ **Inspection**

(1) Check whether pins of collision sensor are exposed and bent before assembly.

(2) Check collision sensor for cracks, burrs and creases before assembly.

■ **Installation**

⚠ Caution

- **Before installing tightening bolts, always make sure that airbag wire harness is not held down or stuck. Adjust if necessary and install it in place.**
- **Make sure to tighten fixing bolts to specified torque during installation.**
- **Always keep vehicle power off during installation. It is forbidden to install the airbag controller assembly with vehicle power on.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**

(1) Install front collision sensor into waist-shaped hole of front bumper crossmember mounting board, install and tighten fixing bolts.

Tightening torque: 9 ± 1.5 N·m

(2) Insert wire harness connector into side collision sensor port, lock after pushing into the end of connector.

(3) Install the front bumper assembly.

4.11 Disposal of Airbag

■ **Airbag deploys (in vehicle)**

It is necessary to deploy the airbag before disposing. If the vehicle is scrapped and disassembled, the airbag may deploy in vehicle.

(1) Preventive procedure of airbag deployment.

⚠ Warning

To prevent injury when deploying the airbag in vehicle, please refer to following prevention methods:

- **Remove all movable objects or loose parts within airbag deployment range before the airbag is deployed;**
- **The airbag is deployed only in the reserved airbag deployment area with door closed and side window opened;**
- **The airbag is deployed only in the reserved airbag deployment area (site), the technicians must stand at least 10 meters in front of the vehicle;**
- **Do not load voltage before all preparations have been completed;**
- **Cool down the airbag at least 30 minutes before handling the deployed airbag;**
- **Please wear gloves and safety glasses during disposal process;**
- **If airbag deployment is failed, wait at least 5 minutes after disconnecting the voltage, and then you can approach the vehicle.**

(2) Prevention methods of deployment procedure.

1) Inside deployment prevention methods:
   i. Disconnect the negative and positive battery cables and move the battery 10 meters away from the vehicle.
   ii. Prepare two additional wire harnesses at least 10 meters long for each one and special connector for connecting the spiral cable. Peel off the 13 mm insulation coat at the end of wire harness. Connect the connector at one end and another end to twist.
   iii. Place the twisted end next to the battery for airbag deployment, but do not connect it to battery at this time.
   iv. Remove driver side lower instrument panel from steering column. Connect lower part of steering column to SRS wire harness connector of spiral cable.
   v. Clean the site.
   vi. Disengage the twisted end of the wire harness next to the battery for airbag deployment.
   vii. One wire harness contacts with negative battery and another one contacts with positive battery, the airbag will deploy at this time.
   viii. Deploy the passenger side airbag module using the same procedure.
   ix. Handle the deployed airbag with correct prevention methods.
2) Outside deployment prevention methods:
   i. Install the airbag set to the tire with rim with airbag front surface faced up, and the space for wire and connector is reserved to prevent the deployment from being destroyed.
   ii. Prepare two additional wire harnesses at least 10 meters long for each one and special connector for connecting airbag set. Peel off the 13 mm insulation coat at the end of wire harness. Connect the connector at one end.
   iii. Place the twisted end next to the battery for airbag deployment, but do not connect it to battery at this time.
   iv. Stack 4 old tires without rims on the wheel installed with airbag set, and secure all the tires in 4 different positions with rope.
   v. Clean the site.
   vi. Disengage the twisted end of the wire harness next to the battery for airbag deployment.
   vii. One wire harness contacts with negative battery and another one contacts with positive battery, the airbag will deploy at this time.
   viii. Deploy the passenger side airbag module using the same procedure.
   ix. Handle the deployed airbag with correct prevention methods.

9.3 SEAT BELT

1 Warnings and Precautions

1.1 Precautions

Precautions for Seat Belt Assembly

(1) Be sure to perform assembly of vehicle in accordance with BOM strictly. It is not allowed to replace the parts assembly without permission;

(2) During assembly of vehicle, tighten parts with specified torque in list strictly;

(3) It is not allowed to replace the components of parts assembly without permission, such as bolt, washer etc;

(4) If the parts assembly is accidentally dropped during handling and installation, please check the plastic parts of parts assembly (such as retractor) for cracks. If there is crack, insulate and dispose it after packaging and marking to prevent accidental injury;

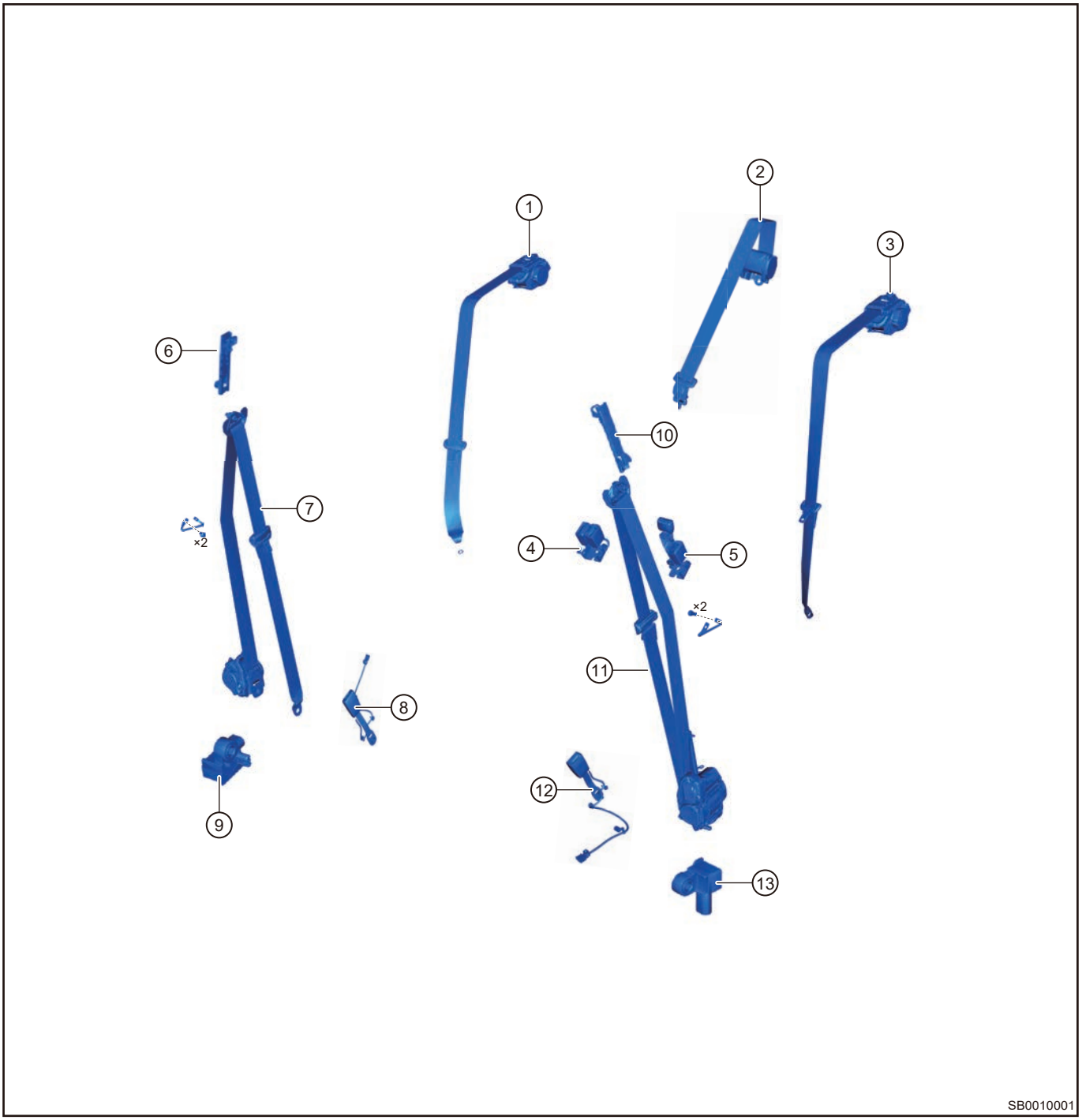
(5) It is necessary to check whether the seat belt is in good condition before installing it; Pull the webbing and lock the buckle after assembling to ensure that the webbing can be extended and retracted smoothly, the buckle can be locked and unlocked normally. Make sure that there are no objects (such as tools, etc) can scratch the webbing during assembly of seat belt;

(6) During overturn inspection of rear seat, never insert locking tab of rear center seat belt into big buckle;

(7) It is not allowed to check the retracted function of the rear center seat belt with small buckle (rear seat small buckle lock assembly) unlocked.

2 System Overview

2.1 System Components Diagram



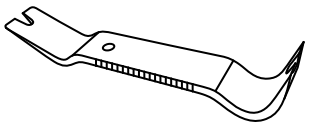
1	Rear Right Seat Belt Assembly	8	Front Right Seat Belt Buckle
2	Rear Center Seat Belt Assembly	9	Right Side Collision Sensor
3	Rear Left Seat Belt Assembly	10	Left Height Adjuster Assembly
4	Double-lock Buckle Lock Assembly	11	Front Left Seat Belt Assembly
5	Rear Left Seat Belt Buckle	12	Front Left Seat Belt Buckle

6	Right Height Adjuster Assembly	13	Left Side Collision Sensor
7	Front Right Seat Belt Assembly		

3 On-vehicle Service

3.1 Tool

■ General Tool

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

3.2 Specifications

■ Torque Specifications

Item	Tightening torque
Double-lock Buckle Assembly Fixing Bolt	50 ± 5 N·m
Small Buckle Lock Assembly Fixing Bolt	50 ± 5 N·m
Front Left Buckle Assembly Fixing Bolt	50 ± 5 N·m
Retractor Fixing Bolt	50 ± 5 N·m
Rear Left Seat Belt Lower End Plate Fixing Bolt	50 ± 5 N·m
Fork Bracket Fixing Bolt	2.5 ± 0.5 N·m
Guide Ring Mounting Bolt	50 ± 5 N·m
Height Adjuster Assembly Fixing Bolt	23 ± 4 N·m

3.3 Front Seat Belt Assembly

Hint:

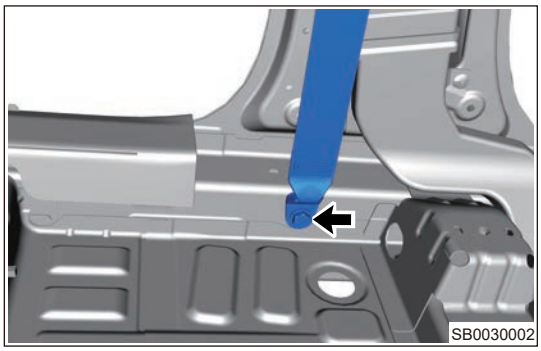
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ Removal

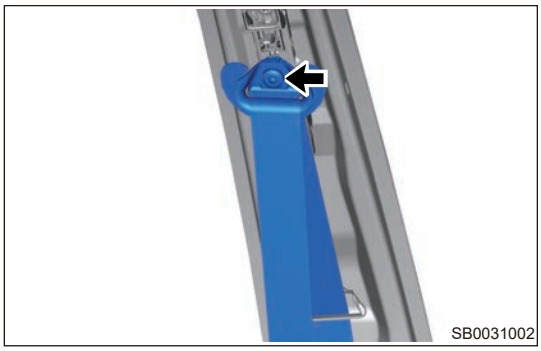
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front seat belt assembly.**
- **Appropriate force should be applied, when removing front seat belt assembly. Be careful not to operate roughly.**
- **Try to prevent interior from being scratched, when removing front seat belt assembly.**

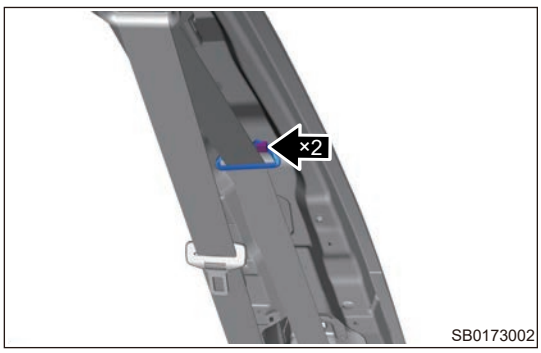
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left doorsill pressure plate assembly.
(4) Remove the front left door opening weatherstrip.
(5) Remove the rear left doorsill pressure plate assembly.
(6) Remove the rear left door opening weatherstrip.
(7) Remove the left B-pillar lower protector assembly.
(8) Remove the left B-pillar upper protector assembly.
(9) Remove the left B-pillar quarter duct.
(10) Remove the left B-pillar floor duct.
(11) Remove the front left seat belt assembly.
(12) Fold back the left carpet, remove 1 fixing screw (arrow) from front seat belt assembly lower end plate.


SB0030002

(13) Remove 1 fixing bolt (arrow) from front seat belt assembly guide ring.


SB0031002

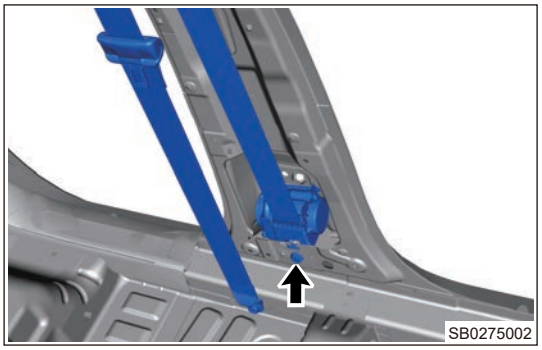
(14) Remove 2 fixing screws from seat belt assembly fork bracket.



SB0173002

(15) Disconnect connector from retractor.

(16) Remove 1 fixing bolt from front left seat belt retractor, and remove front left seat belt retractor assembly.



■ Inspection

(1) Check front left seat belt webbing for dirt, cuts, cracks or wear and replace it if necessary.

(2) Check whether the pins on the gas generator are broken or bent.

(3) Check whether retractor can freely rewind and release the webbing without sticking.

■ Installation

⚠ Warning

- **When connecting gas generator connector, if the pin inside of gas generator is deflective, please pack it properly and dispose it.**

⚠ Caution

- **If the connector wire harness is too long or interferes with the webbing, it is necessary to insert the wire harness into B-pillar to increase the gap between wire harness and webbing.**

(1) Take a front left seat belt assembly that is in good condition. First insert the seat belt pretensioner connector of interior wire harness into the gas generator connector of retractor and press the lock button, ensure that the connector is connected properly and clamped in place (connecting angle is 90).

(2) Using retractor tightening bolt, install the T-type hook of retractor to the retractor mounting board slot of B-pillar sheet metal, then install and tighten the retractor fixing bolt.

Torque: 50 ± 5 N·m

(3) Tighten the guide ring mounting bolt to the fixing nut of height adjuster assembly, install and tighten the bolt.

Torque: 50 ± 5 N·m

(4) Take a fork bracket that is in good condition, pass the webbing through the fork bracket. The fork bracket mounting hole should be aligned with B-pillar sheet metal hole (pay attention to the mounting direction of fork bracket that the arrow marked on fork bracket should face toward the roof), tighten outer hexagon screw of guide ring.

Torque: 2.5 ± 0.5 N·m

(5) Install 1 fixing bolt to front left seat belt assembly lower end plate.

Torque: 50 ± 5 N·m

(6) Install the left B-pillar floor duct.
(7) Install the left B-pillar quarter duct.
(8) Install B-pillar lower protector assembly.
(9) Install the B-pillar upper protector assembly.
(10) Install the rear left door opening weatherstrip.
(11) Install the rear left doorsill pressure plate assembly.
(12) Install the front left door opening weatherstrip.
(13) Install the front left doorsill pressure plate assembly.
(14) Install the negative battery cable.

3.4 Rear Seat Belt Assembly

Hint:

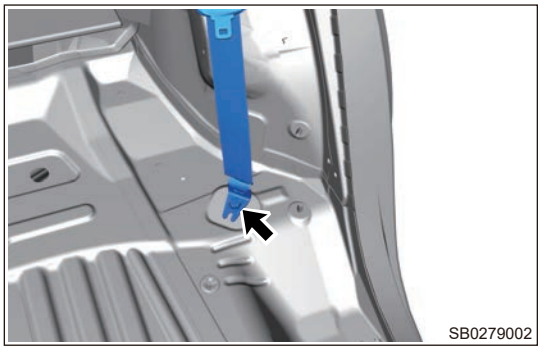
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

■ Removal

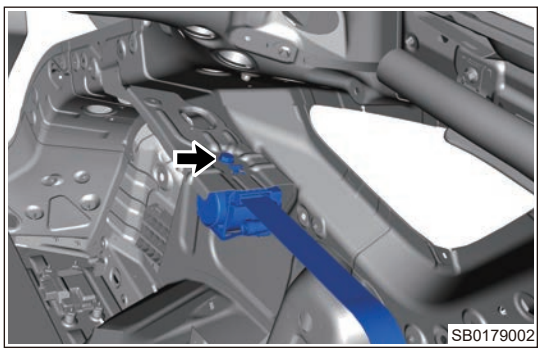
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing rear seat belt assembly.**
- **Appropriate force should be applied, when removing the rear seat belt assembly. Be careful not to operate roughly.**
- **Try to prevent interior from being scratched, when removing rear seat belt assembly.**

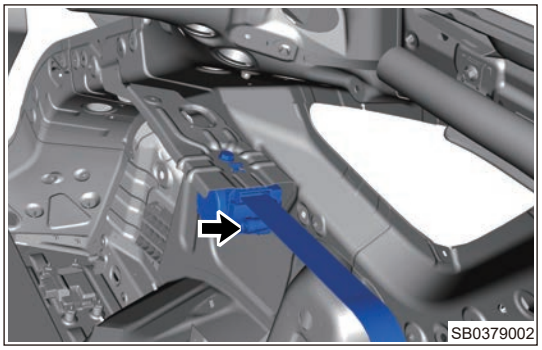
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear seat cushion and seatback.
(4) Remove the rear seat belt lower fixing bolt (arrow).


SB0279002

(5) Remove the left luggage compartment wheel house assembly.
(6) Remove 1 fixing bolt (arrow) from retractor assembly and remove T-type hook of retractor assembly from mounting board.


SB0179002

(7) Remove seat belt pretensioner connector of interior wire harness from gas generator connector of retractor.



(8) Remove the rear left seat belt assembly.

■ Installation

⚠ Caution

- **Keep seat belt assembly clean without oil attached and check seat belt assembly for damage, when installing rear seat belt assembly.**
- **Be sure to tighten all fixing bolts and fixing screws according to specified torque, when installing rear seat belt assembly.**
- **Be sure to perform assembly of vehicle in accordance with BOM strictly. It is not allowed to replace the parts assembly without permission.**
- **During assembly of vehicle, tighten parts with specified torque in list strictly.**
- **It is not allowed to replace the components of parts assembly without permission, such as bolt, washer etc.**
- **If the parts assembly is accidentally dropped during handling and installation, please check the plastic parts of parts assembly (such as retractor) for cracks. If there is crack, insulate and dispose it after packaging and marking to prevent accidental injury.**
- **It is necessary to check whether the seat belt is in good condition before installing it; Pull the webbing and lock the buckle after assembling to ensure that the webbing can be extended and retracted smoothly, the buckle can be locked and unlocked normally. Make sure that there are no objects (such as tools, etc.) can scratch the webbing during assembly of seat belt.**
- **During overturn inspection of rear seat, never insert locking tab of center seat belt into buckle;**
- **It is not allowed to check the pull-out and retracted function of the center seat belt assembly with small buckle (small buckle lock assembly) unlocked.**

(1) Install rear left seat belt assembly to a proper position.

(2) Insert the seat belt pretensioner connector of interior wire harness into the gas generator connector of retractor and press the lock button, ensure that the connector is connected properly and clamped in place (connecting angle is 45).

(3) Install the T-type hook of retractor to the retractor mounting board slot of C-pillar sheet metal, then install and tighten the retractor fixing bolt.

Torque: 50 ± 5 N·m

(4) Install C-pillar lower protector assembly, and pass the locking tab and webbing through the hole of C-pillar lower protector.

(5) Install and tighten 1 fixing bolt of rear left seat belt assembly lower end plate.

Torque: 50 ± 5 N·m

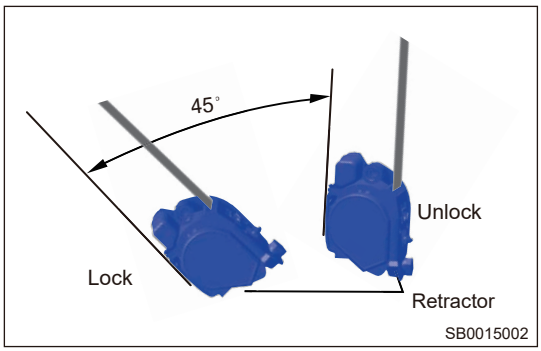
Hint:

- The webbing between lower end plate and retractor should be smooth without any breakage and twist.
- If the rear left seat belt assembly is limiting type belt with pretensioner, the resistance value is 2.15 ± 0.35 Ω, it’ s strictly forbidden to measure resistance with multimeter.
- If the webbings on both sides of rear seat cannot be pulled out, it is necessary to make a preliminary judgment on the seat belt that if the seat belt is locked due to the sensitivity function of seat belt.
- Judgment method: Slowly contract the webbing for 10-15 mm, and then pull out it slowly. If the seat belt can be pulled out normally and there are no other problems, the seat belt is normal. If the webbing can not be pulled out, further testing of seat belt is required.

■ Inspection

Hint:

- DO NOT disassemble the rear seat belt retractor.
- The retractor should be extended and retracted freely within 15° to each side. When the angle is more than 15° or less than 27°, either locking or unlocking is OK, but when the angle is more than 27°, it must be locked.
- If result is not as specified, replace rear seat belt assembly.



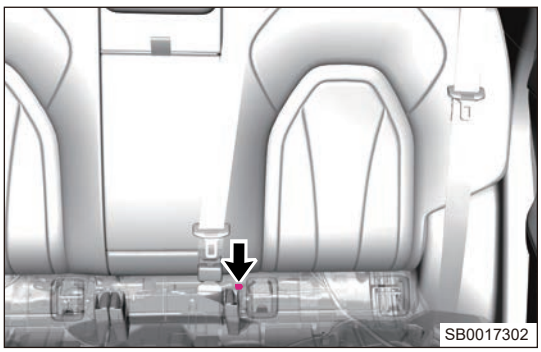
3.5 Rear Center Seat Belt Assembly

■ Removal

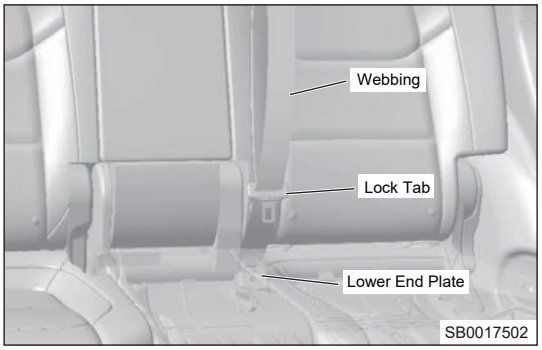
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing rear seat belt assembly.**
- **Appropriate force should be applied, when removing the rear seat belt assembly. Be careful not to operate roughly.**
- **Try to prevent interior from being scratched, when removing rear seat belt assembly.**

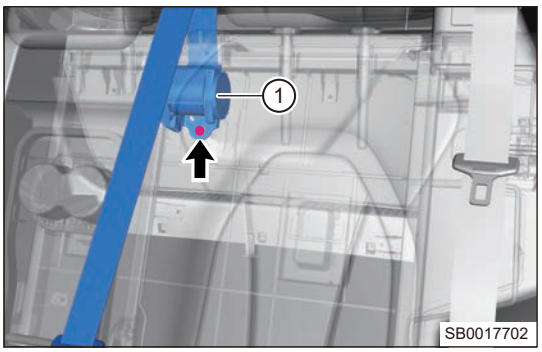
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear seat.
(4) Remove the center seat belt assembly.
(5) Remove the center seat belt mounting bolt (arrow).



(6) Insert webbing, locking tab and lower end plate of the center seat belt assembly.



(7) Remove fixing bolt (arrow) between retractor and seat frame, and take retractor (1) out of limit hook of seat frame and move it away.



■ Installation

⚠ Caution

- **Pass the webbing, locking tab and lower end plate through the seat frame hole and prevent scratches.**
- **The above assembling operation should be carried out in seat factory. The bar code on the second row center seat belt assembly should be peeled off after installing the second row left seat and attach it to the corresponding position on vehicle.**
- **The seat factory should test the above installation torque by a ratio of 100%.**

(1) Take out the rear center seat belt assembly that is in good condition, hook the retractor mounting hole onto the seat frame mounting bolt, and align the retractor limit hole with seat frame limit hook, install and tighten the tightening bolt.

Torque: 50 ± 5 N·m

(2) After completing the above steps, pass the webbing and locking tab of the second row center seat belt assembly through the seat frame and web guide (when the webbing is pulled out, make sure that seatback position is same as the normal usage position of real vehicle, otherwise the webbing cannot be pulled out; webbing from seat guide to retractor is required to be smooth, and there is no folding or twisting). Then clamp the webbing clip on the webbing, approximately more than 20mm (inside) away from the small snap fastener.

(3) Assemble the seat assembly.

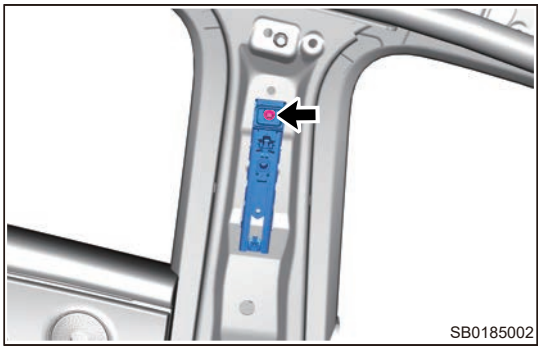
(4) Install the seat assembly.

3.6 Replacement of Height Adjuster Assembly

■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left B-pillar protector assembly.
(4) Remove the front left seat belt assembly.

(5) Remove 1 fixing bolt (arrow) from height adjuster assembly.



(6) Remove the height adjuster assembly.

■ Inspection

(1) Check if height adjuster slides up and down properly.

(2) Check height adjustment bolt hole for wear.

■ Installation

(1) Install height adjuster to a proper position.

(2) Install the height adjuster assembly limit hook into the body limit hole, then align the height adjuster mounting bolt with the height adjuster upper fixing point mounting nut on body B-pillar and pre-tighten it, finally tighten the mounting bolt.

Torque: 23 ± 4 N·m

(3) Install the front left seat belt assembly.

(4) Install the B-pillar protector assembly.

(5) Connect the negative battery cable.

3.7 Replacement of Front Left Buckle Assembly

⚠ Caution

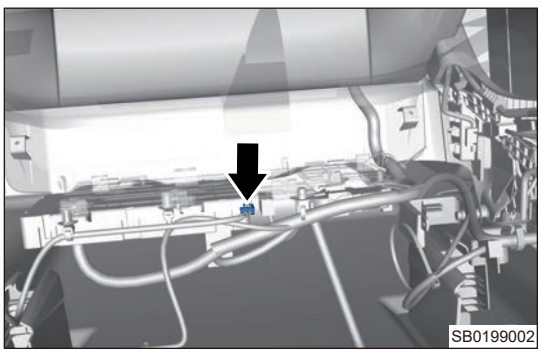
- **Be sure to wear safety equipment to prevent accidents, when removing front seat belt buckle assembly.**
- **Try to prevent interior from being scratched, when removing front seat belt buckle assembly.**
- **Try to prevent wire harness and connector from being damaged, when removing front seat belt buckle assembly.**

■ Removal

Hint:

- Removal and adjustment method of front right buckle assembly is similar to the front left buckle assembly.

(1) Disconnect wire harness connector of front left buckle assembly and corresponding connector of instrument panel wire harness.



(2) Remove wire harness clips of front left seat assembly on the specified location of seat.

(3) Loosen front left buckle mounting bolt, and remove front left buckle assembly.

■ Inspection

(1) Check buckle connector pins for bending and breakage.

(2) Check if buckle can lock seat belt locking tab.

■ Installation

(1) Install a good front left buckle assembly, align buckle limit hole with limit hook of seat frame, install and tighten buckle mounting bolt.

Torque: 50 ± 5 N·m

(2) Secure the wire harness clips of front left buckle assembly to the specified location of seat.

(3) Connect wire harness connector of front left buckle assembly and corresponding connector of interior wire harness.

3.8 Rear Small Buckle Lock Assembly

■ Removal

⚠ Caution

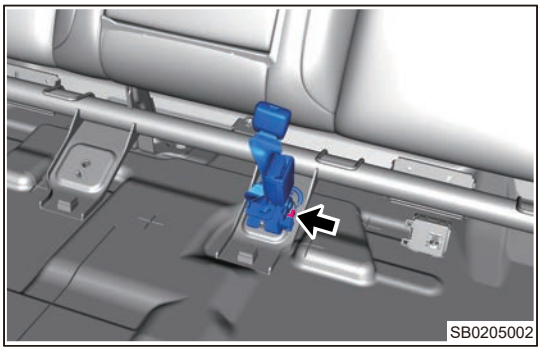
- **Be sure to wear safety equipment to prevent accidents, when removing rear seat belt buckle assembly.**
- **Try to prevent interior from being scratched, when removing rear seat belt buckle assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

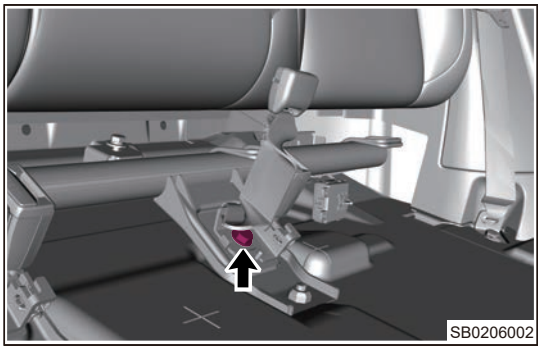
(2) Disconnect the negative battery cable.

(3) Remove the rear seat cushion assembly.

(4) Disconnect the connection (arrow) between small buckle lock wire harness and interior wire harness.



(5) Remove 1 fixing bolt (arrow) from small buckle lock assembly.



(6) Remove small buckle lock assembly.

■ **Installation**

⚠ Caution

- **Be sure to tighten all fixing nuts according to specified torque, when installing seat belt buckle assembly.**
- **For buckle with reminder function, connect the wire harness connector on buckle assembly with corresponding connector of interior wire harness and ensure that the connector is connected properly and clamped in place (the order can be adjusted during the actual installation).**
- **The assembly and adjustment method of small buckle lock assembly is similar to that of double-lock buckle.**

(1) Install rear small buckle lock assembly in good condition, place the lower end piece upper limit slot over the body tube beam limit screw, install and tighten buckle mounting bolt.

Torque: 50 ± 5 N·m

(2) Then move the lock to a diagonal upward direction to facilitate final cushion insertion.

(3) Connect wire harness connector of rear small buckle lock assembly and corresponding connector of floor wire harness.

3.9 Replacement of Double-lock Buckle Assembly

■ **Removal**

⚠ Caution

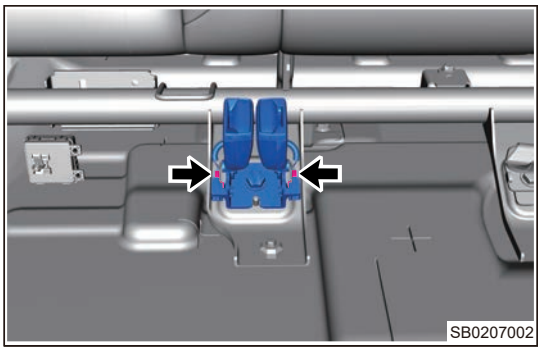
- **Be sure to wear safety equipment to prevent accidents, when removing rear seat belt buckle assembly.**
- **Try to prevent interior from being scratched, when removing rear seat belt buckle assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

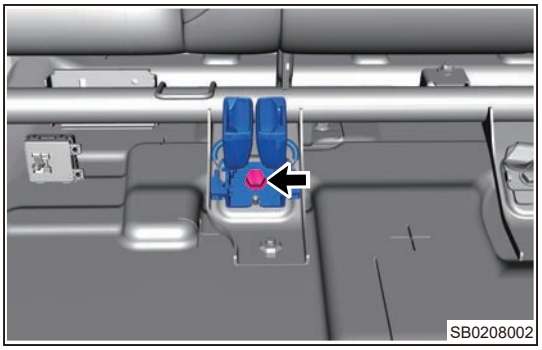
(2) Disconnect the negative battery cable.

(3) Remove the rear seat cushion assembly.

(4) Disconnect the connection (arrow) between double-lock buckle wire harness and interior wire harness.



(5) Remove 1 fixing bolt (arrow) from double-lock buckle assembly.



(6) Remove the double-lock buckle assembly.

■ **Installation**

⚠ Caution

- **Be sure to tighten all fixing nuts according to specified torque, when installing seat belt buckle assembly.**
- **For buckle with reminder function, connect the wire harness connector on buckle assembly with corresponding connector of interior wire harness and ensure that the connector is connected properly and clamped in place (the order can be adjusted during the actual installation).**
- **The assembly and adjustment method of small buckle lock assembly is similar to that of double-lock buckle.**

(1) Install double-lock buckle assembly in good condition, place the lower end piece upper limit slot over the body tube beam limit screw, install and tighten buckle mounting bolt.

Torque: 50 ± 5 N·m

(2) Then move the lock to a diagonal upward direction to facilitate final cushion insertion.

(3) Connect wire harness connector of double-lock buckle assembly and corresponding connector of interior wire harness.

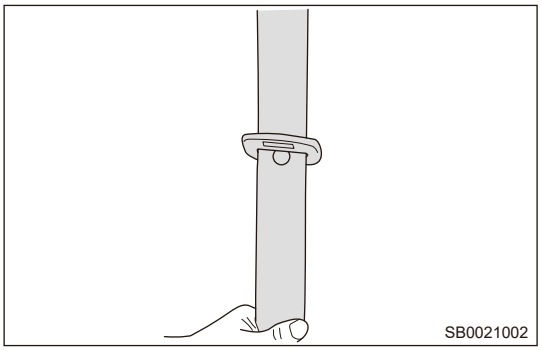
3.10 Locking Tab Reversing

■ **Operation method**

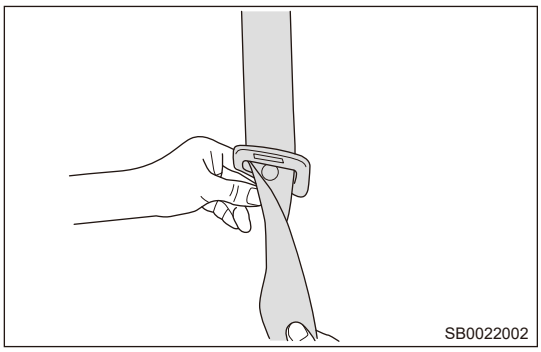
⚠ Caution

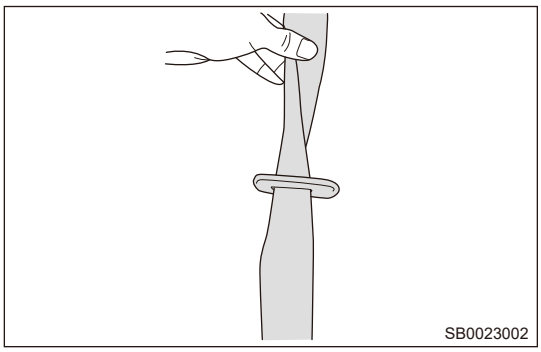
- **When the seat belt is recycled, safety webbing contacts with the seat side shoulder, which may cause the safety webbing to be reversed by 180 degrees with the locking tab. When pulling the locking tab (- inside opening clearance is larger than the thickness of webbing) at the next time of usage, the locking tab may be reversed occasionally. In this case, recover it according to the instructions (without removing seat belt), and the webbing is not damaged and without replacing.**

(1) Figure after the locking tab is reversed.

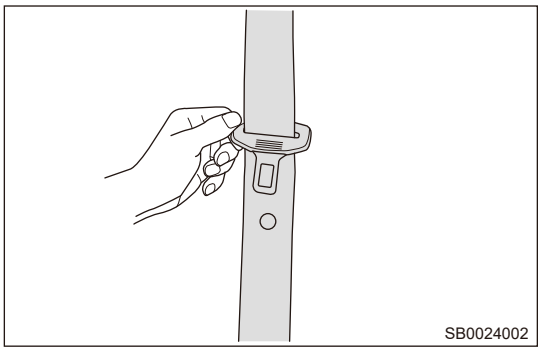


(2) Fold the webbing in any direction and pull it downward forcefully to make the reversed webbing be pulled into the locking tab.





(3) Complete the lock tab reversing.



BODY ELECTRICAL

BODY ELECTRICAL

10.1 INSTRUMENT CLUSTER SYSTEM

1 Warnings and Precautions

1.1 Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Try to prevent interior and body paint from being scratched, when removing instrument cluster.

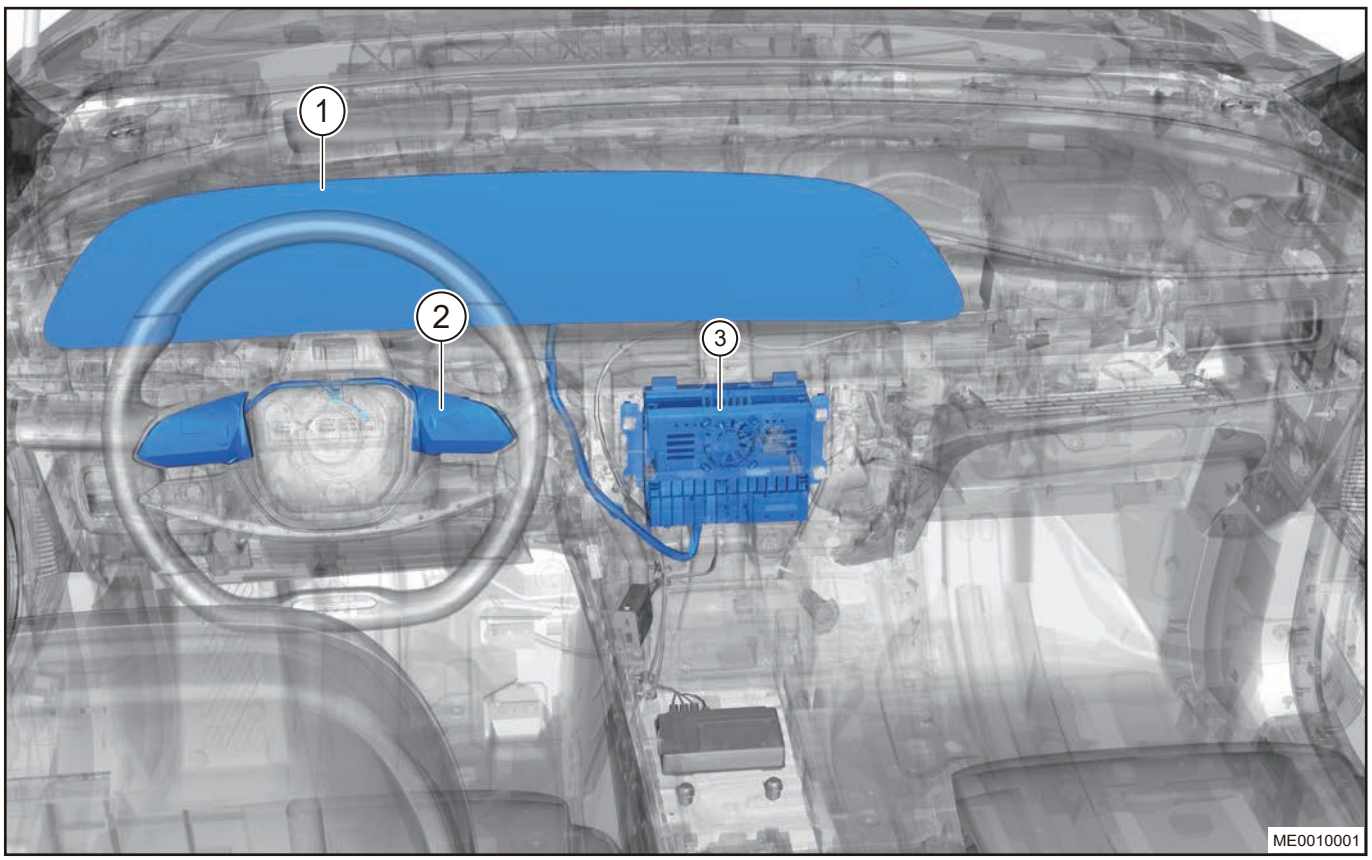
(2) Be sure to wear necessary safety equipment to prevent accidents, when removing instrument cluster.

(3) Appropriate force should be applied, when removing instrument cluster. Be careful not to operate roughly.

(4) When removing instrument cluster, handle it with care, so as to avoid instrument cluster damage caused by collisions.

2 System Overview

2.1 System Components Diagram



1	Dual LCD	2	Steering Wheel Multi-function Switch
3	Domain Controller Module		

2.2 System Principle

The configuration for the instrument cluster of this mode is integrated domain controller structure, which includes an audio module and an instrument cluster module internally;

(1) A domain controller indicates that at least one server is responsible for the verification of each computer and user connected to the network in "domain" mode, which is equivalent to the guard of a unit, called

"Domain Controller (abbreviated for DCM)". The domain controller integrates Instrument Cluster Module (ICM), Audio Head Unit Module (RRM) and panoramic view monitor control module into one module, but all the modules still operate independently by their independent ECU.

(2) Domain controller (instrument cluster) part still maintains the traditional instrument cluster function.

(3) ESP function has a setting item on instrument cluster. Customer can set it to ON or OFF by themselves. The instrument cluster sends out the state set by customer, and ESP module receives the signal and sends out the actual state signal. The setting item of instrument cluster is displayed according to the feedback signal of ESP module.

(4) Data between domain controller (instrument cluster) and instrument cluster display is transmitted via low voltage differential signal (LDVS).

(5) Multi-function steering wheel controls the domain controller (instrument cluster) by transmitting signal to the central gateway module (CGW) via LIN line, and then transmitting information via CAN line network.

(6) Multi-function steering wheel (standard) controls domain controller (instrument cluster) by transmitting information directly via ordinary dedicated line.

(7) Oil pressure switch/driver seat belt switch/fuel pump and sensor/brake fluid level are transmitted to the domain controller (instrument cluster) via ordinary dedicated line.

2.3 Operation/Malfunction Indicator

Operation indicator is used to prompt the driver that some system on vehicle is operating and corresponding operation indicator will come on.Malfunction indicator is used to warn the driver that some system on vehicle is malfunctioning and corresponding malfunction indicator will come on or flash.

Name	Indicator	Description
Daytime Running Indicator		Start the engine and daytime running indicator remains on.
Position Indicator		Turn on the position light and it remains on.
Turn Signal Light Indicator		While turning on left turn signal light or right turn signal light, the corresponding turn signal light also flashes. When hazard warning light switch is turned on, left and right turn signal indicators flash at the same time.
High Beam Indicator		Turn on high beam light, it remains on.
Rear Fog Indicator		Turn on rear fog light, it remains on.
Intelligent Headlight Assist System (IHC) Indicator		This indicator is used to show that Intelligent Headlight Assist System (IHC) is in operation.
Intelligent Headlight Assist System (IHC) Malfunction Indicator		This indicator is used to remind the driver that Intelligent Headlight Assist System (IHC) is faulty. Please go to EXEED service station for inspection and repair as soon as possible.

Name	Indicator	Description
Front Seat Belt Indicator		The indicator is used to remind that the front seat belt is unfastened or improperly fastened, fasten the seat belt before driving. Note: Passenger seat belt alarm function is not a standard configuration, which should be subject to actual vehicle configuration.
ELECTRONIC PARKING BRAKE SYSTEM		This indicator is used to show that Electronic Parking Brake System (EPB) is in operation.
Electronic Parking Brake System (EPB) Malfunction Indicator		This indicator is used to remind the driver that Electronic Parking Brake System (EPB) is faulty. Please go to EXEED service station for inspection and repair as soon as possible.
Automatic Parking System (AUTO HOLD) Indicator		This indicator is used to show that automatic parking system (AUTO HOLD) is in operation.
Brake System Malfunction Indicator		The indicator is used to remind the driver that brake fluid level is low or brake system is faulty, please contact EXEED dealer for inspection and repair immediately.
Anti-lock Brake System (ABS) Malfunction Indicator		The indicator is used to remind the driver that Anti-Lock Brake System (ABS) is faulty, please go to EXEED dealer for inspection and repair as soon as possible.
Hill Descent Control System (HDC) Indicator		The indicator is used to show that Hill Descent Control System (HDC) is in operation.
Hill Descent Control System (HDC) Malfunction Indicator		This indicator is used to remind the driver that Hill Descent Control System (HDC) is faulty. Please go to EXEED service station for inspection and repair as soon as possible.
Electronic Stability Control System (ESP) Indicator		If the indicator flashes, it means the Electronic Stability Program System (ESP) is in operation status. If the indicator is remains on, it is used to remind the driver that Electronic Stability Program System (ESP) is faulty, please go to EXEED dealer for inspection and repair as soon as possible.
ESP OFF Indicator		After turning off ESP function, ESP OFF indicator remains on, which means that Electronic Stability

Name	Indicator	Description
		Program System (ESP) is in shielded status.
Lane Departure Warning System (LDW) Indicator		The indicator flashes to show that Lane Departure Warning System (LDW) is in operation. The indicator remains on to remind the driver that Lane Departure Warning System (LDW) is faulty. Please go to EXEED service station for inspection and repair as soon as possible.
Auto Emergency Brake System (AEB) Indicator		The indicator remains on to show that Auto Emergency Brake System (AEB) is in operation.
Auto Emergency Brake System (AEB) Malfunction Indicator		The indicator remains on to remind the driver that Auto Emergency Brake System (AEB) is faulty. Please go to EXEED service station for inspection and repair as soon as possible.
Idle Start and Stop System Indicator		The indicator remains on to show that idle start and stop system meets operating conditions.
Idle Start and Stop System Malfunction Indicator		The indicator blinks to remind the driver that idle start and stop system is faulty. Please go to EXEED service station for inspection and repair as soon as possible. The indicator remains on to show that idle start and stop system does not meet safety start conditions or has been turned off.
Gasoline Particulate Filter (GPF) Indicator		If the indicator remains on, it is used to remind the driver that Gasoline Particulate Filter (GPF) is full, please increase vehicle speed to clean.
Gasoline Particulate Filter (GPF) Malfunction Indicator		If the indicator remains on, it is used to remind the driver that Gasoline Particulate Filter (GPF) is faulty, please go to EXEED dealer for inspection and repair as soon as possible.
4WD System Malfunction Indicator		The indicator remains on to remind the driver that 4WD system is faulty. Please go to EXEED service station for inspection and repair as soon as possible.
Airbag Malfunction Indicator		The indicator remains on to remind the driver that airbag is faulty. Please go to EXEED service station

Name	Indicator	Description
		for inspection and repair as soon as possible.
Tire Pressure Monitoring System (-TPMS) Malfunction Indicator		The indicator remains on to remind the driver that tire pressure is faulty. Check whether the tire pressure is too low or the temperature is too high. If the tire pressure is normal, please contact EXEED service station for inspection and repair as soon as possible.
Electronic Power Steering System (EPS) Malfunction Indicator		The indicator remains on to remind the driver that Electronic Power Steering System (EPS) is faulty. Please contact EXEED service station for inspection and repair immediately.
EPC Malfunction Indicator		The indicator remains on to remind the driver that engine system is faulty. Please contact EXEED service station for inspection and repair immediately.
Engine Malfunction Indicator		The indicator remains on to remind the driver that engine is faulty. Please contact EXEED service station for inspection and repair immediately.
Transmission Malfunction Indicator		The indicator remains on to remind the driver that the transmission system is faulty. Please contact EXEED dealer for inspection and repair immediately.
High Coolant Temperature Warning Light		The indicator remains on to remind the driver that engine coolant temperature is too high. Drive the vehicle to a safe area and stop, idle for several minutes then turn vehicle power supply to OFF mode. Please contact EXEED service station for inspection and repair immediately.
Maintenance Indicator		The indicator remains on to remind the driver that the vehicle needs to be maintained. Please go to EXEED service station for inspection and repair as soon as possible.
Warning Indicator		The indicator remains on to remind the driver that there is fault or abnormal information in vehicle. Relevant alarm information can be inquired in the fault inquiry screen. If it cannot be solved, please contact EXEED dealer immediately.

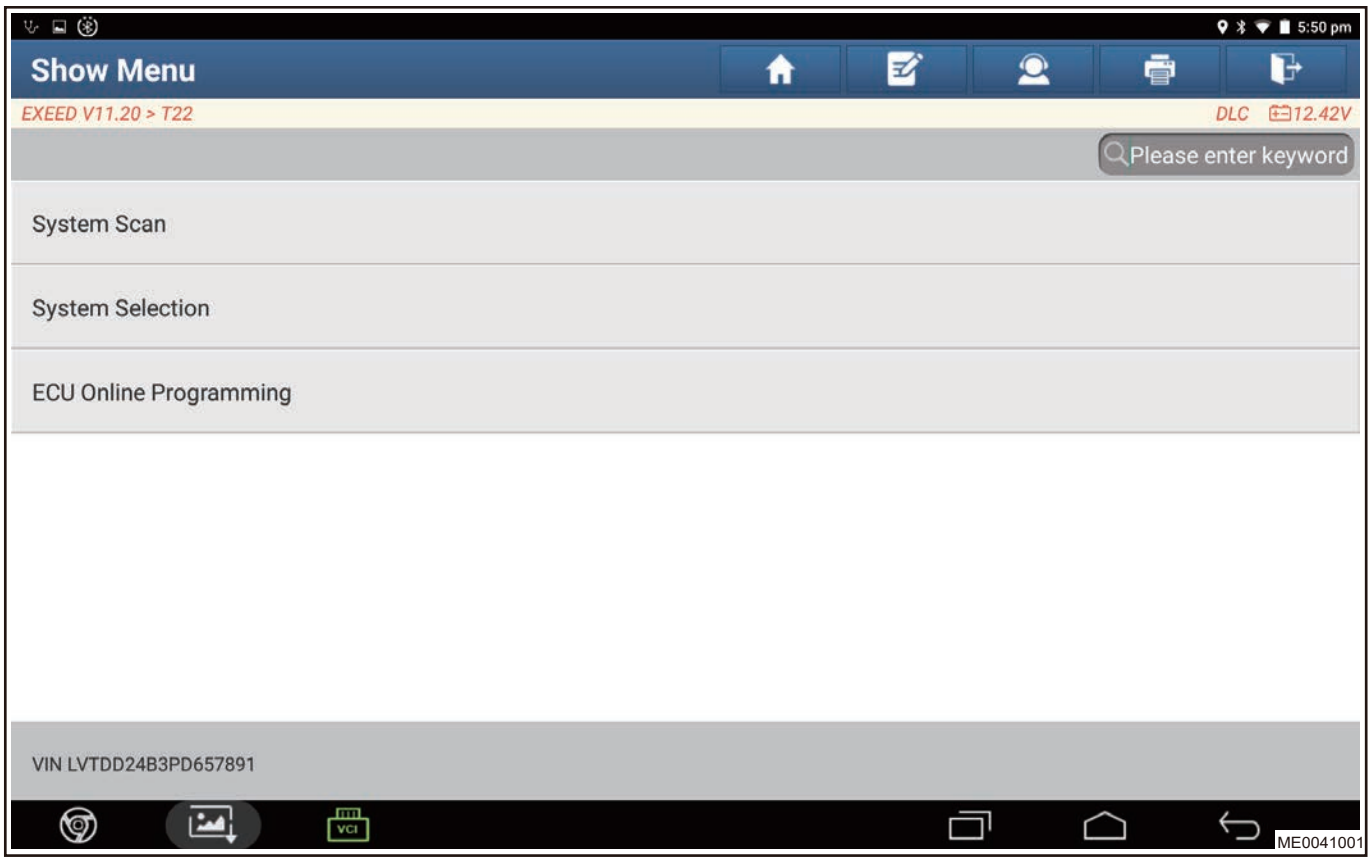
Name	Indicator	Description
Fatigue Driving Indicator		The indicator remains on to remind the driver that the driving time has exceeded the set time and have a rest.
Overspeed Warning Indicator		The indicator remains on to remind the driver that the vehicle speed has exceeded the set speed limit value, please pay attention to the vehicle speed.
Low Oil Pressure Warning Indicator		The indicator remains on to remind the driver that engine oil pressure is low, drive the vehicle to a safety area and stop it, please contact EXEED service station for inspection and repair immediately.
Charging System Indicator		The indicator remains on to show the charging system status. If the indicator does not remain on when the vehicle power is turned to ON mode or remains on after starting engine, please go to EXEED service station for inspection and repair as soon as possible.
Low Fuel Level Warning Indicator		This indicator remains on to remind the driver that the vehicle fuel is insufficient, please add fuel as soon as possible.

2.4 Maintenance Indicator Clearing

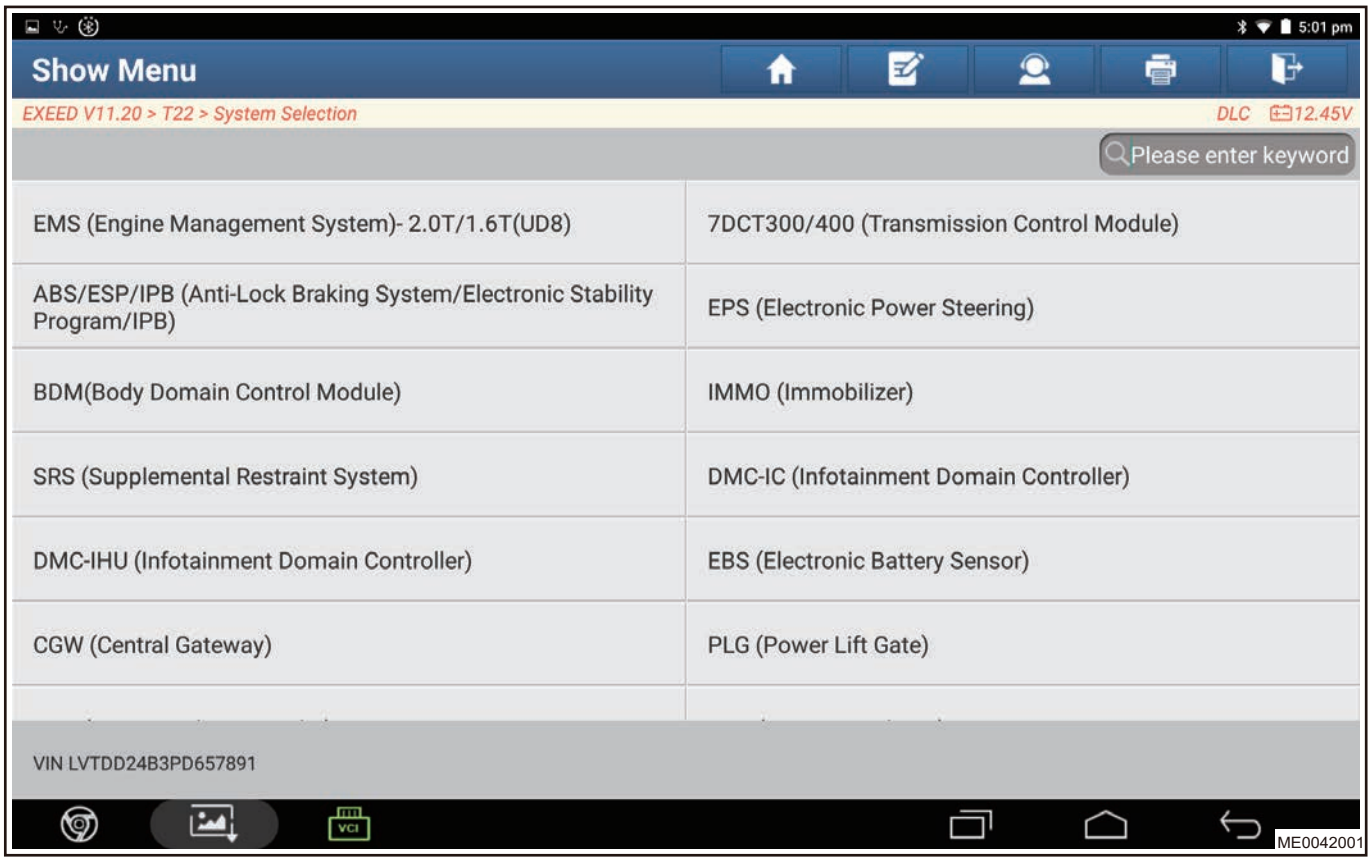
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

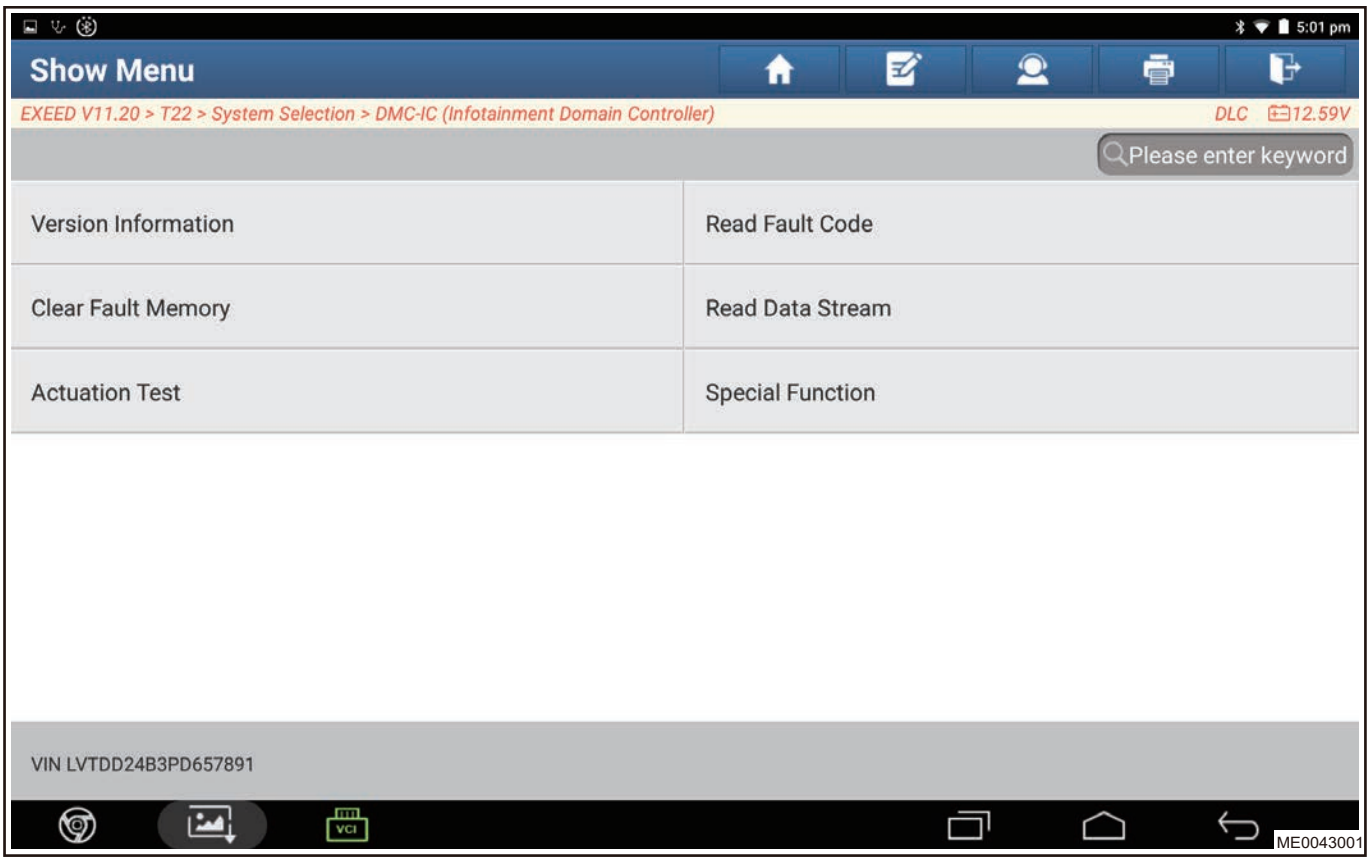
(3) Click “System Selection”.



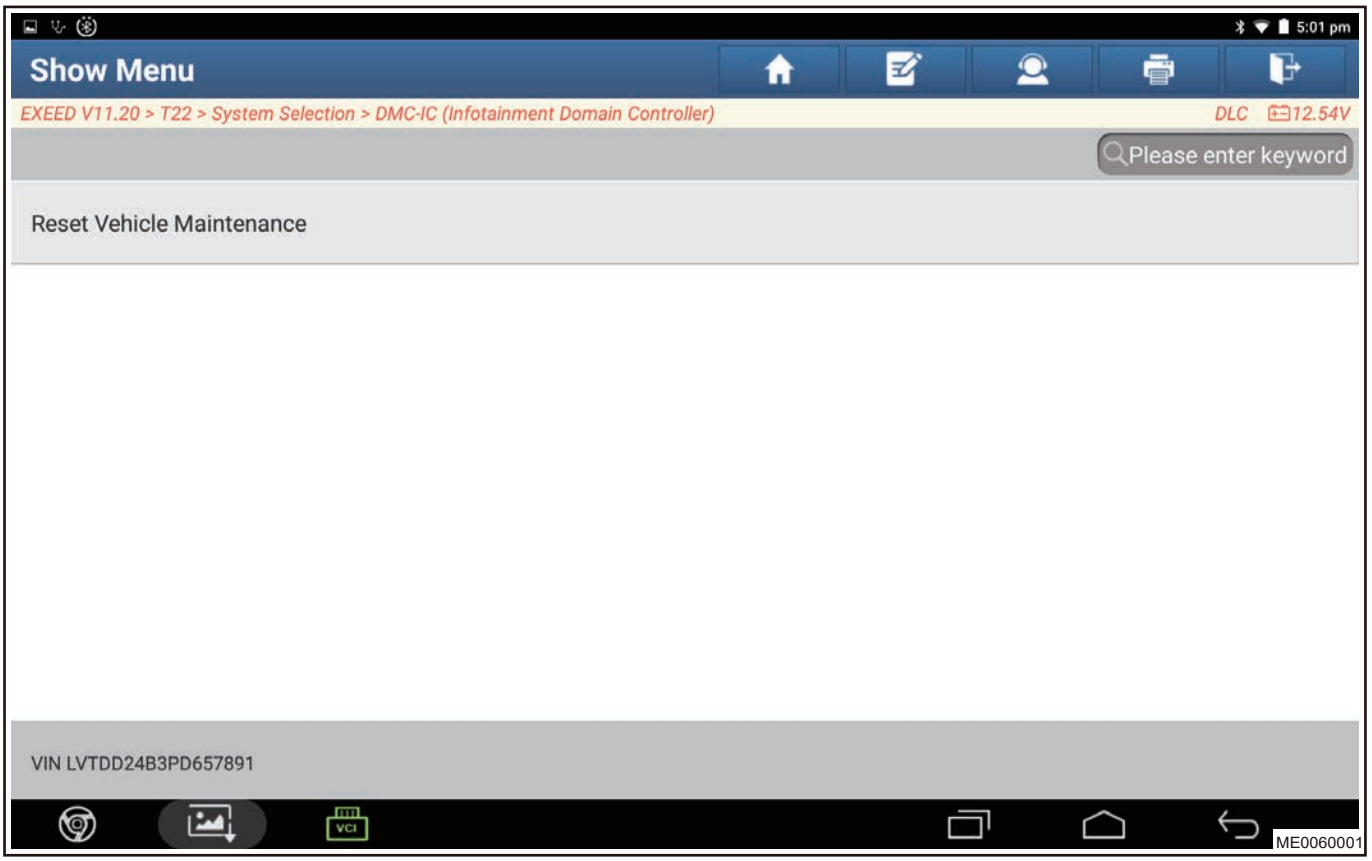
(4) Click "Domain controller - instrument cluster".



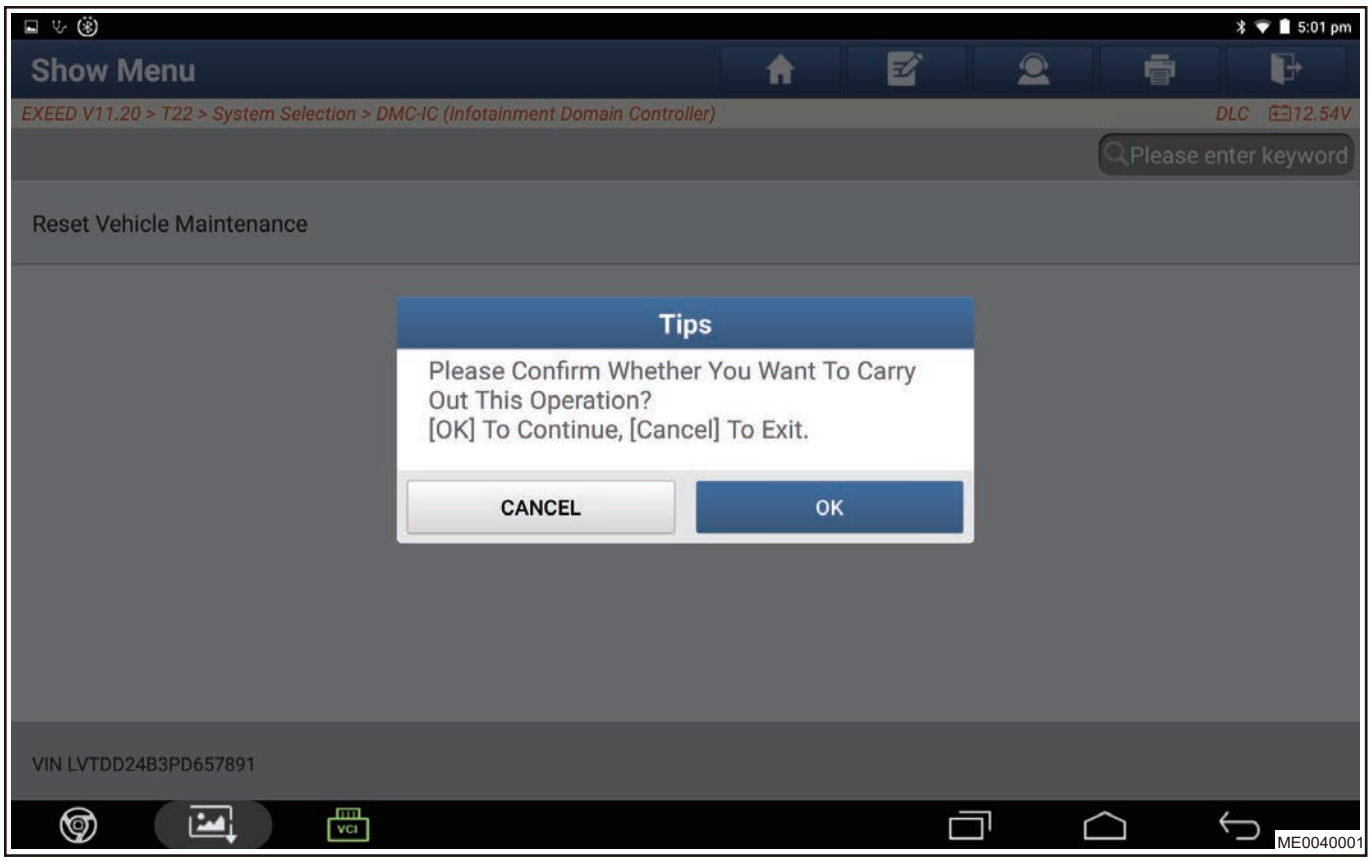
(5) Click "Special Function".



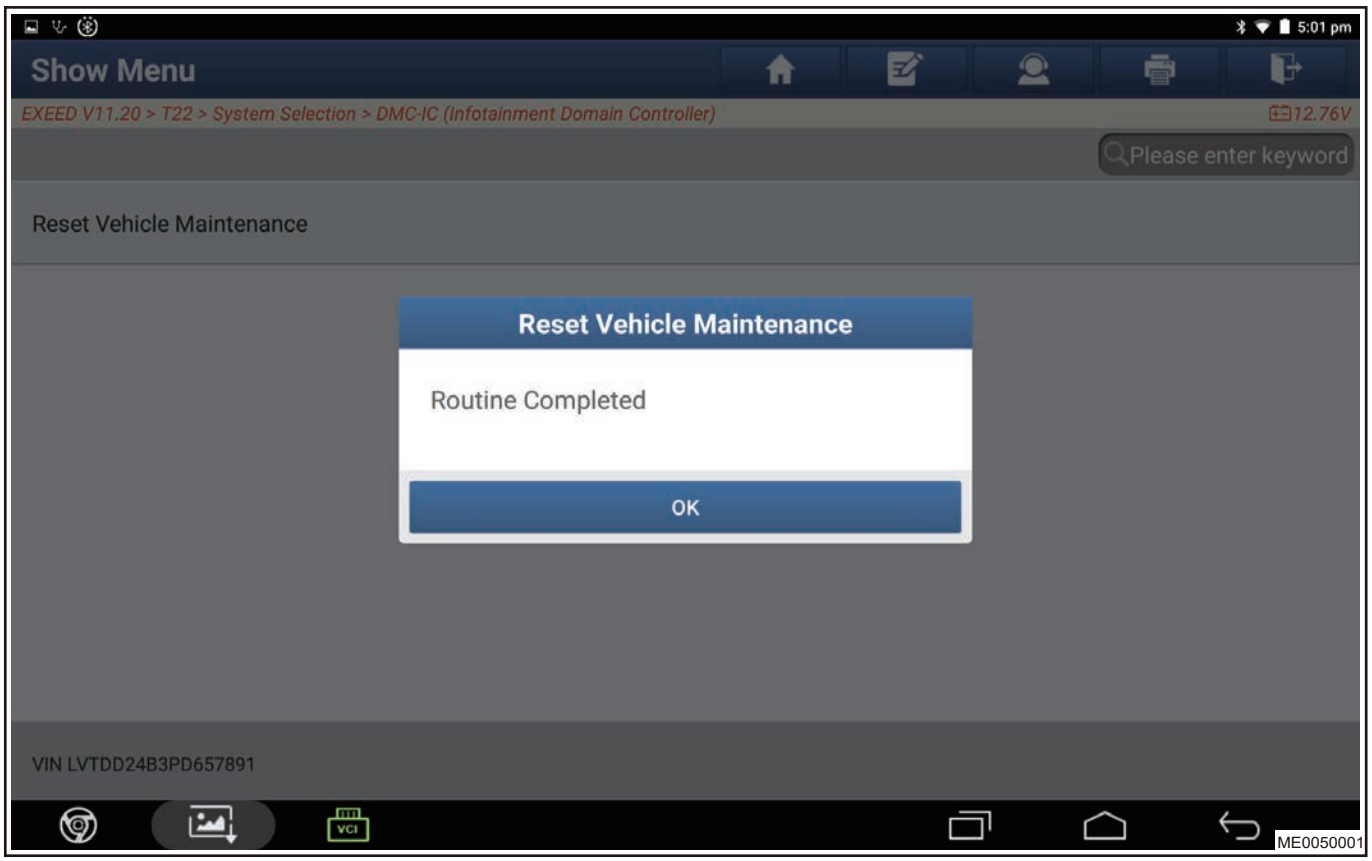
(6) Enter next interface and click “Reset Vehicle Maintenance”.



(7) Click "OK".

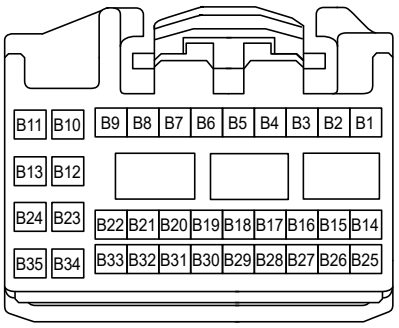


(8) Reset is finished, click “OK”.



3 System Circuit Diagram

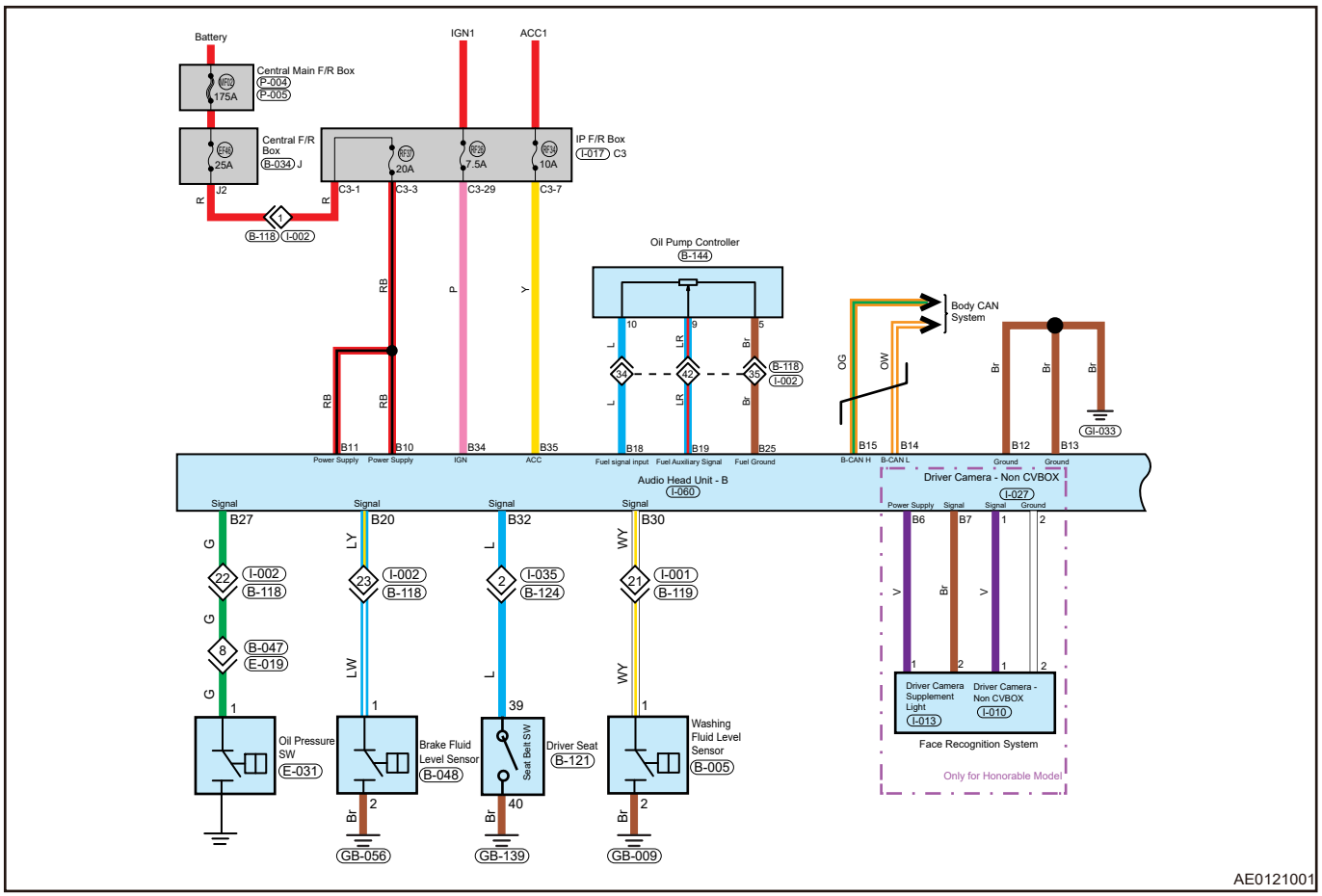
3.1 Audio Head Unit - B Terminal Definition



ME0020001

Pin	Definition	Pin	Definition
B1	-	B19	Fuel Auxiliary Signal
B2	-	B20	Brake Fluid Level Sensor Signal
B3	-	B21	-
B4	-	B22	-
B5	-	B23	-
B6	Driver Camera Fill Light Power Supply	B24	-
B7	Driver Camera Fill Light Signal	B25	Fuel Ground
B8	-	B26	-
B9	-	B27	Oil Pressure Switch Signal
B10	Power Supply	B28	-
B11	Power Supply	B29	-
B12	Ground	B30	Washer Fluid Level Sensor Signal
B13	Ground	B31	-
B14	B-CAN L	B32	Seat Belt Switch Signal
B15	B-CAN H	B33	-
B16	-	B34	IGN
B17	-	B35	ACC
B18	Fuel Signal Input		

3.2 Circuit Diagram



4 Diagnosis & Testing

4.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Entire instrument cluster does not operate	Fuse
	Domain controller
	Wire harness or connector
Vehicle speed displays abnormally	Wheel speed sensor
	Wire harness or connector
	Domain controller
Tachometer is abnormal	Engine speed sensor
	Domain controller
	Wire harness or connector
	Engine Control Module (ECM)

Symptom	Suspected Area
Fuel gauge is abnormal	Fuel level sensor
	Domain controller
	Wire harness or connector
Position indicator is abnormal	Position light switch (combination light switch assembly)
	Wire harness or connector
	Domain controller
	Body Control Module (BDM)
Turn signal indicator is abnormal	Turn signal light switch (combination light switch assembly)
	Body Control Module (BDM)
	Domain controller
	Wire harness or connector
High beam indicator is abnormal	High beam switch (combination light switch assembly)
	Body Control Module (BDM)
	Domain controller
	Wire harness or connector
Rear fog indicator is abnormal	Rear fog light switch (combination light switch assembly)
	Body Control Module (BDM)
	Domain controller
	Wire harness or connector
Charging system warning light is abnormal	Generator
	Domain controller
	Wire harness or connector
Low engine oil pressure warning light is abnormal	Engine oil level
	Engine oil pressure switch
	Wire harness or connector
	Domain controller
ABS warning light is abnormal	ABS control unit assembly
	CAN line or connector
	Domain controller
Coolant temperature warning light is abnormal	Coolant level
	Extremely high engine coolant temperature
	Coolant Temperature Sensor
	Wire harness or connector

Symptom	Suspected Area
	Domain controller
	Body Control Module (BDM)
Engine malfunction warning light is abnormal	CAN line or connector
	Engine Control Module (ECM)
	Domain controller
SRS warning light is abnormal	CAN line or connector
	Airbag control module (SRS)
	Domain controller
Driver seat belt reminder light is abnormal	Driver seat belt buckle switch
	Wire harness or connector
	Domain controller
Front passenger seat belt reminder light is abnormal (If equipped)	Front passenger seat belt buckle switch
	Wire harness or connector
	Domain controller
Brake system warning light is abnormal	Low brake fluid level
	Parking brake switch
	Domain controller
Cruise indicator is abnormal	Cruise switch (multi-function switch)
	Wire harness or connector
	Domain controller
Transmission malfunction warning light is abnormal	Transmission Control Unit (TCU)
	CAN line or connector
	Domain controller
Low tire pressure warning light is abnormal	Low or high tire pressure (tire pressure is not within specified range)
	Domain controller

4.2 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.

(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(4) Only use a digital multimeter to measure voltage of electronic system.

(5) Refer to any Technical Bulletin that may apply to this malfunction.

(6) Visually check related wire harness and connector.

(7) Check and clean system grounds related to the latest DTCs.

(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.3 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Check modules and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.4 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.5 Diagnostic Trouble Code (DTC) Chart

<table>
<tr><th>DTC</th><th>DTC Definition</th><th>Possible Cause</th><th>Maintenance Advice</th></tr>
<tr><td>B1100-13</td><td>Power Supply Fault - Circuit Open</td><td>• Fuse
• Wire harness connector
• DMC</td><td>Check wire harness</td></tr>
<tr><td>B1100-16</td><td>Power Supply Fault - Circuit Voltage Below Threshold</td><td rowspan="2">• Fuse
• Charging system
• Wire harness connector
• DMC</td><td>Check for short or open in battery, fuse and each wire harness terminal</td></tr>
<tr><td>B1100-17</td><td>Power Supply Fault - Circuit Voltage Over Threshold</td><td>Check battery and alternator</td></tr>
<tr><td>B1101-11</td><td>Fuel System Short Circuit</td><td rowspan="4">• Instrument cluster fault
• Fuel pump fault
• Fuel pump wire harness fault</td><td rowspan="4">Check corresponding wire harness, if the fault still occurs, replace the instrument cluster</td></tr>
<tr><td>B1101-15</td><td>Fuel System Open Circuit</td></tr>
<tr><td>B110C-11</td><td>Fuel Main Pump Master Detect Circuit and Ground Short Circuit Fault</td></tr>
<tr><td>B110C-13</td><td>Fuel Main Pump Master Detect Circuit Open Fault</td></tr>
</table>

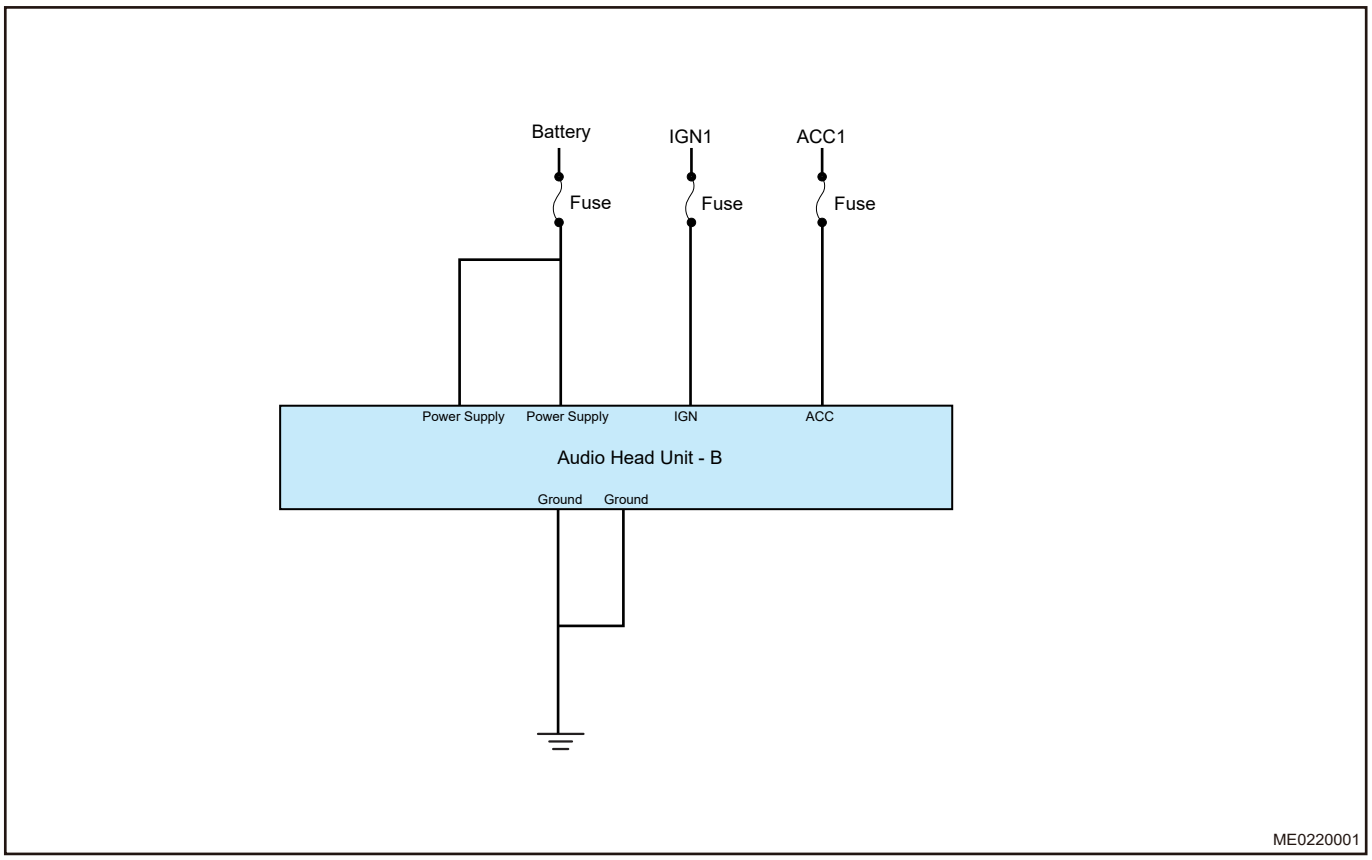
DTC	DTC Definition	Possible Cause	Maintenance Advice
B110D-11	Fuel Main Pump Assistant Detect Circuit and Ground Short Circuit Fault		
B110D-13	Fuel Main Pump Assistant Detect Circuit Open Circuit Fault		
B110A-00	Steering Button Failure	• Steering Wheel Button • Wire harness connector fault • Instrument cluster fault	Check corresponding wire harness connector and steering wheel button, if the fault still occurs, replace the instrument cluster
B1116-13	Sub Pump Assistant Detect Circuit Open Circuit Fault	• Instrument cluster fault • Fuel pump fault • Fuel pump internal wire harness fault	Check corresponding wire harness, if the fault still occurs, replace the instrument cluster
B1104-41	Instrument Cluster EEPROM Data Checksum Error	• Instrument panel internal fault	Perform power off test, if the fault still occurs, replace the instrument cluster
B110E-04	Display Overall Function Failure (Including but Not Limited to Display and Touch)		
B110F-04	Display Module Function Failure		
B1110-04	Display Backlight Module Function Failure		
B1111-04	Display Video Signal Failure		
B1112-04	Display Backlight Level Missing		
B1113-04	Communication Failure Between Display and IHU		
U0073-88	BD CAN Busoff	• Instrument panel internal fault • Wire harness connector fault • Each module fault	Refer to “CAN Network System” for inspection and repair
U1010-88	IFT CAN Busoff		
U0140-87	Lost Communication with BCM		
U0214-87	Lost Communication with PEPS		
U0164-87	Lost Communication with CLM		
U0141-87	Lost Communication with Reversing Radar		
U0142-87	Lost Communication with Around View Monitor Module - Missing Message		

DTC	DTC Definition	Possible Cause	Maintenance Advice
U0230-87	Lost Communication with PLG		
U0100-87	Lost Communication with EMS		
U0129-87	Lost Communication with BSM		
U0101-87	Lost Communication with TCU		
U0151-87	Lost Communication with ABM		
U1157-87	Lost Communication with Blind Spot Detection		
U0131-87	Lost Communication with Electronic Power Steering Module		
U1162-87	Lost Communication with Front Camera Module		
U1163-87	Lost Communication with FRM		
U1193-87	Lost Communication with Electric Shifting Controller		
U1189-87	Lost Communication with MFS		
U0126-87	Lost Communication with SAM		
U1300-55	Software Configuration Error	• Software information not configured	Reconfiguration

4.6 DTC Diagnosis Procedure

DTC	**B1100-13**	**Power Supply Fault - Circuit Open**
DTC	**B1100-16**	**Power Supply Fault - Circuit Voltage Below Threshold**
DTC	**B1100-17**	**Power Supply Fault - Circuit Voltage Over Threshold**

System schematic diagram



■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery voltage

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

NG → **Check or replace charging system or battery**

OK

2	Check fuse

(a) Check if pow supply fuse is normal.

NG → **Replace fuse**

OK

3	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.

(b) Disconnect the negative battery terminal cable.

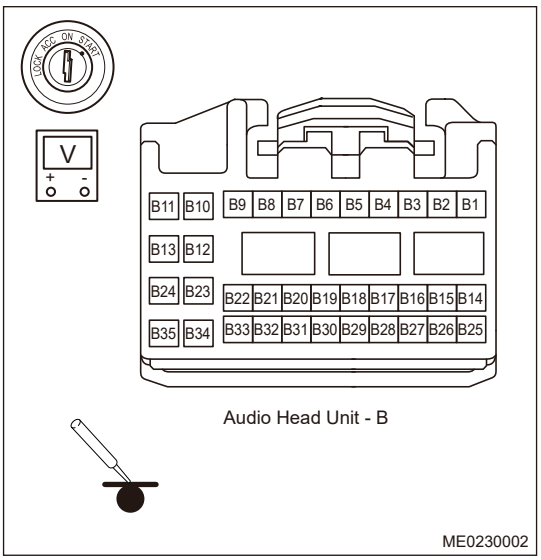
(c) Disconnect the audio head unit B connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

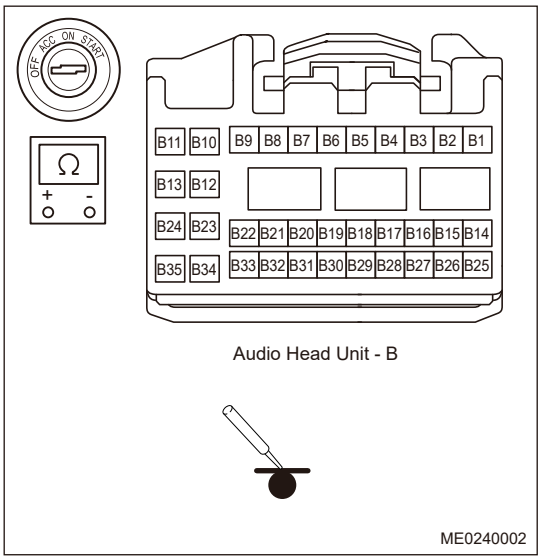
(f) Using a digital multimeter, measure voltage between audio head unit B (power supply terminal) and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Head unit B (power supply terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



(g) Using a digital multimeter, measure resistance between audio head unit B (ground terminal) and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Head unit B (ground terminal) - Body ground	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness or connector**

OK

4	Confirm DTCs again

(a) Connect all the connectors.

(b) Connect the negative battery cable.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

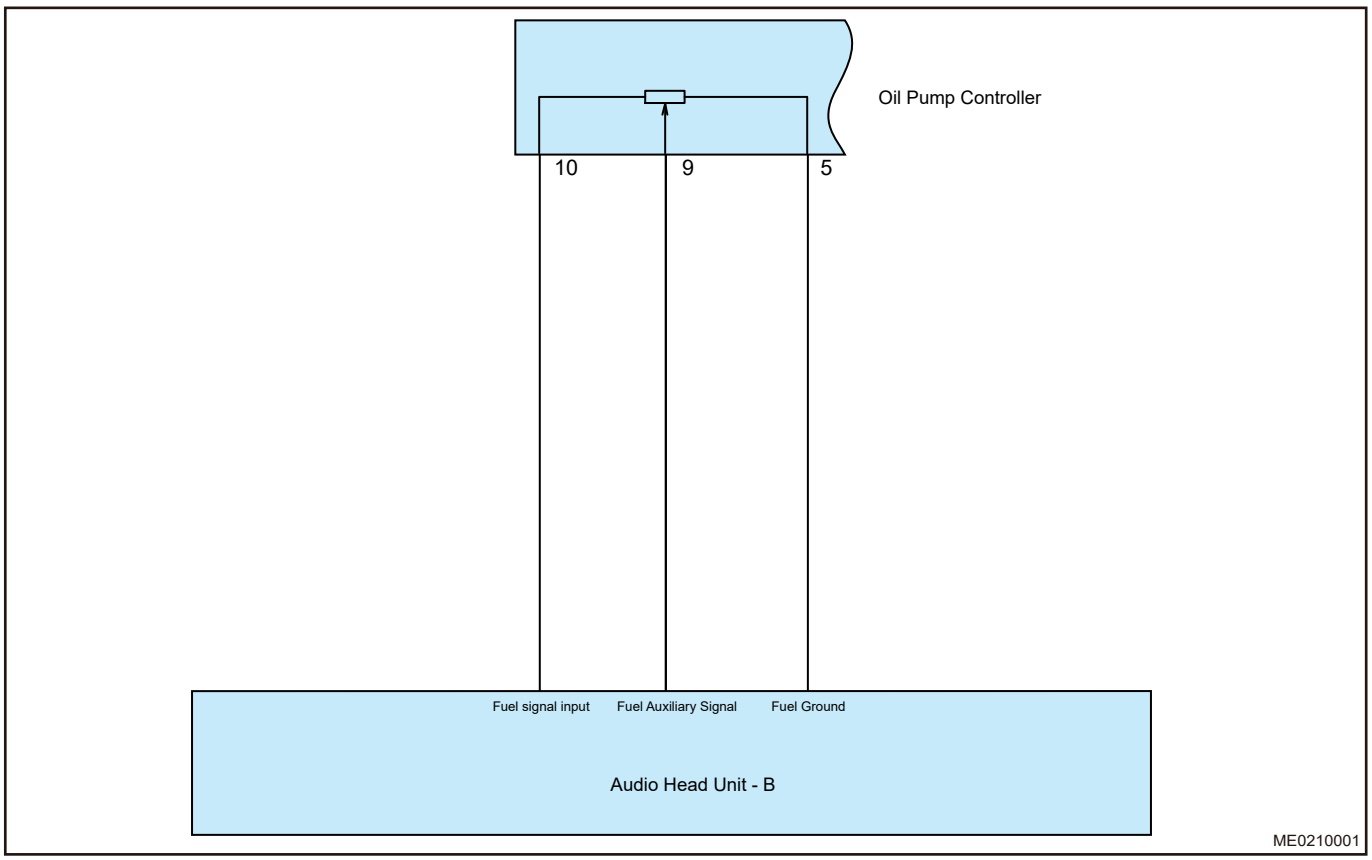
(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace domain controller**

DTC	B1101-11	Fuel System Short Circuit
DTC	B1101-15	Fuel System Open Circuit
DTC	B110C-11	Fuel Main Pump Master Detect Circuit and Ground Short Circuit Fault
DTC	B110C-13	Fuel Main Pump Master Detect Circuit Open Fault
DTC	B110D-11	Fuel Main Pump Assistant Detect Circuit and Ground Short Circuit Fault
DTC	B110D-13	Fuel Main Pump Assistant Detect Circuit Open Circuit Fault
DTC	B1116-13	Sub Pump Assistant Detect Circuit Open Circuit Fault

Control Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Confirm DTCs**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the fuel pump wire harness connector and domain controller instrument cluster wire harness connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

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

OK ↓

2	**Check fuel pump level sensor resistance**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the fuel pump wire harness connector.

(c) Turn fuel float multimeter from low to high to check if resistances between terminal 10 and terminal 5 of fuel pump change continuously.

NG → **Replace fuel pump assembly**

OK ↓

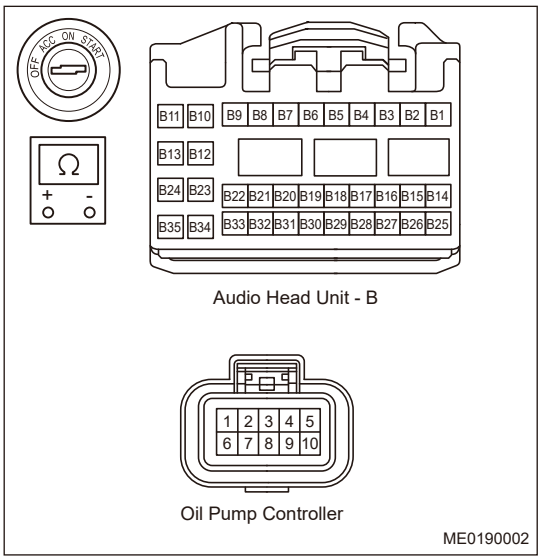
3	**Check fuel pump wire harness**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the fuel pump wire harness connector.

(c) Using a multimeter, check resistance between terminals of fuel pump wire harness connector and domain controller (instrument cluster) wire harness connector to check if there is an open circuit in fuel pump wire harness according to table below.

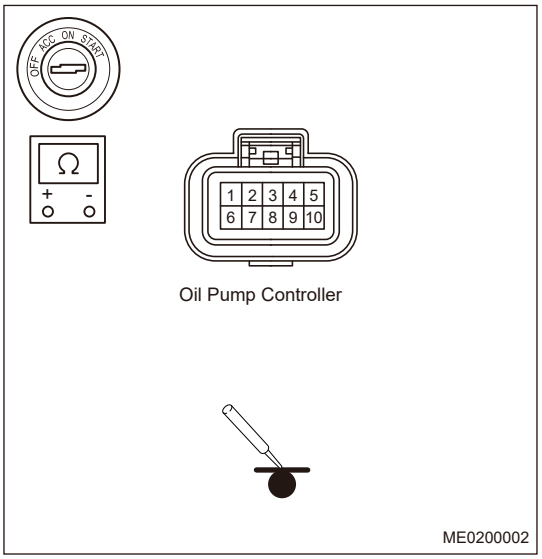
Multimeter Connection	Condition	Specified Condition
Fuel pump (10) - Domain controller (-instrument cluster) (connected terminal)	ENGINE START STOP switch "OFF"	< 1 Ω
Fuel pump (9) - Domain controller (-instrument cluster) (connected terminal)		< 1 Ω



Multimeter Connection	Condition	Specified Condition
Fuel pump (5) - Domain controller (- instrument cluster) (connected terminal)		< 1 Ω

(d) Using a digital multimeter, measure ground resistance between fuel pump wire harness connector and body according to table below.

Multimeter Connection	Condition	Specified Condition
Fuel pump (10) - Body ground	ENGINE START STOP switch "OFF"	∞
Fuel pump (9) - Body ground		∞
Fuel pump (5) - Body ground		∞



NG → **Repair or replace instrument panel wire harness**

OK

4	Confirm DTCs again

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B110A-00	Steering Button Failure

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Power off test

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable and wait for 3 minutes to check if it recovers.

NG → Clear DTCs

OK

2	Check the steering wheel multi-function button

(a) Check the multi-function steering wheel button.

(b) Check the multi-function steering wheel wire harness connector.

NG → Replace multi-function steering wheel and related wire harness

OK → Conduct test and confirm malfunction has been repaired

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → Replace domain controller

OK → Conduct test and confirm malfunction has been repaired

DTC	B1104-41	Instrument Cluster EEPROM Data Checksum Error
DTC	B110E	Display Overall Function Failure (Including but Not Limited to Display and Touch)
DTC	B110F	Display Module Function Failure
DTC	B1110	Display Backlight Module Function Failure
DTC	B1111	Display Video Signal Failure
DTC	B1112	Display Backlight Level Missing

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Power off test

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable and wait for 3 minutes to check if it recovers.

NG → **Clear DTCs**

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	U0073-88	BD CAN Busoff
DTC	U1010-88	IFT CAN Busoff
DTC	U0140-87	Lost Communication with BCM
DTC	U0214-87	Lost Communication with PEPS
DTC	U0164-87	Lost Communication with CLM
DTC	U0141-87	Lost Communication with Reversing Radar
DTC	U0142-87	Lost Communication with Around View Monitor Module - Missing Message
DTC	U0230-87	Lost Communication with PLG
DTC	U0100-87	Lost Communication with EMS
DTC	U0129-87	Lost Communication with BSM
DTC	U0101-87	Lost Communication with TCU
DTC	U0151-87	Lost Communication with ABM
DTC	U1157-87	Lost Communication with Blind Spot Detection
DTC	U0131-87	Lost Communication with Electronic Power Steering Module
DTC	U1162-87	Lost Communication with Front Camera Module
DTC	U1163-87	Lost Communication with FRM
DTC	U1193-87	Lost Communication with Electric Shifting Controller
DTC	U1189-87	Lost Communication with MFS
DTC	U0126-87	Lost Communication with SAM
DTC	U1300-55	Software Configuration Error

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.

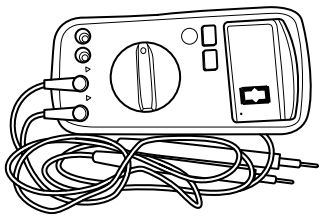
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system

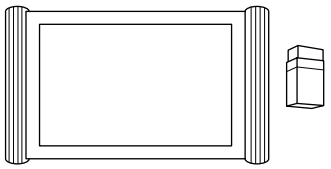
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

■ Special Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

5.2 Specifications

■ Torque Specifications

Description	Torque (N · m)
Hyperscreen Fixing Bolt	5 ± 1 N·m

5.3 Dual LCD

■ Removal

⚠ Warning

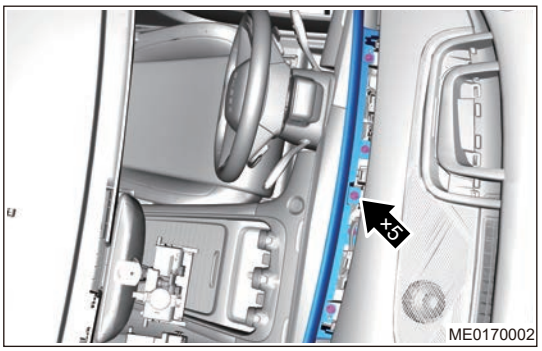
- **Be sure to wear necessary safety equipment to prevent accidents, when removing dual LCD.**
- **Appropriate force should be applied, when removing dual LCD. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

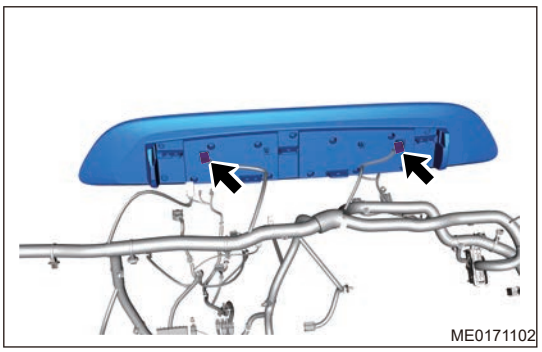
(2) Disconnect the negative battery cable.

(3) Using an interior crow plate, pry off screw block cover.

(4) Remove 5 fixing bolts from dual LCD.



(5) Disconnect the dual LCD instrument cluster connector.



(6) Remove the dual LCD.

■ **Installation**

⚠ Caution

- **Tighten fixing nut to specified torque, when installing dual LCD.**
- **Install connector into place when installing dual LCD.**
- **Check audio system for proper operation, after installing dual LCD.**

(1) Connect wire harness connector of dual LCD.
(2) Place the dual LCD in the installation position.
(3) Install 5 fixing bolts to dual LCD.
Tightening torque: 5 ± 1 N·m

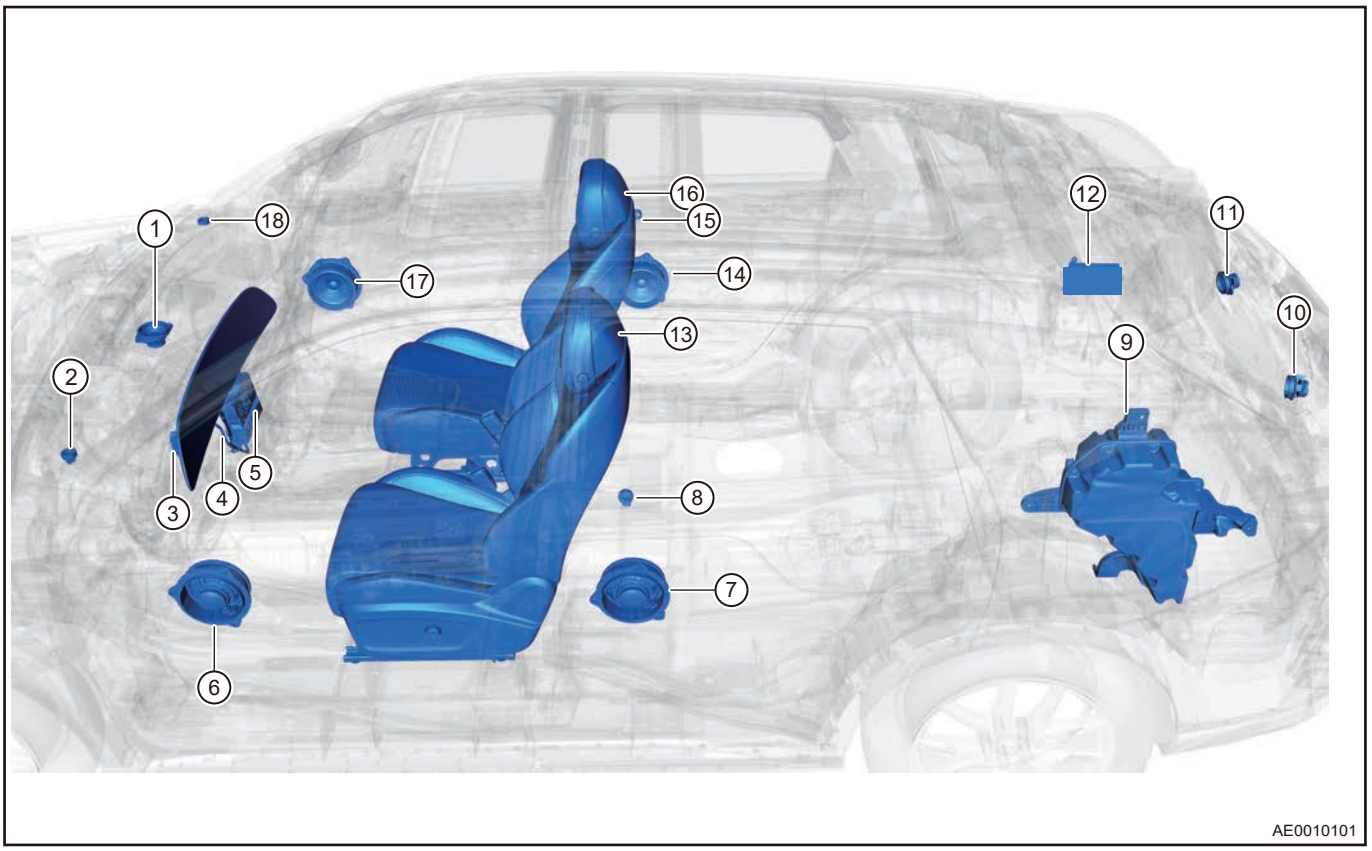
(4) Install the dual LCD bolt block cover.
(5) Connect the negative battery cable.

10.2 AUDIO/VISUAL SYSTEM

1 System Overview

1.1 System Components Diagram

Audio head unit is integrated with instrument cluster.



1	Center Speaker	2	Tweeter (Front Left)
3	Dual LCD	4	Display Connecting Wire
5	Domain Controller Module	6	Woofer (Front Left)
7	Woofer (Rear Left)	8	Tweeter (Rear Left)
9	Subwoofer	10	Surround Speaker (Rear Left)
11	Surround Speaker (Rear Right)	12	Speaker/Power Amplifier
13	Headrest Speaker (Integrated supply of Front Left Headrest Speaker and Seat Assembly)	14	Woofer (Rear Right)
15	Tweeter (Rear Right)	16	Headrest Speaker (Integrated supply of Front Right Headrest Speaker and Seat Assembly)
17	Woofer (Front Right)	18	Tweeter (Front Right)

Hint:

- 4 tweeters and 4 woofers: 1 tweeter and 1 woofer for the front left door protector, instrument panel (front left), front right door protector, instrument panel (front right), front left door protector, and 1 tweeter and 1 woofer for the front right door protector.

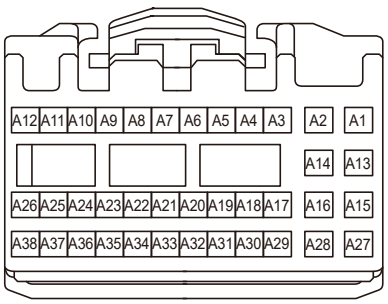
1.2 System Principle

- A domain controller indicates that at least one server is responsible for the verification of each computer and user connected to the network in "domain" mode, which is equivalent to the guard of a unit, called "-Domain Controller (abbreviated for DCM)". In this mode, domain controller integrates Instrument Cluster Module (ICM), Audio Head Unit Module (RRM) and panoramic view system into one module, but all the modules still operate independently by their independent ECU.
- Domain controller (audio head unit) part still maintains the traditional audio head unit function.

- Audio control panel controls domain controller (audio head unit) by transmitting information via CAN line network.
- Multi-function steering wheel controls the domain controller (audio head unit) by transmitting signal to the central gateway module (CGW) via LIN line, and then transmitting information via CAN line network.
- Multi-function steering wheel (standard) controls domain controller (audio head unit) by transmitting information directly via ordinary dedicated line.
- Radio/AVM video/face recognition camera/AR navigation is transmitted to domain controller (audio head unit) via digital signal.
- Data from domain controller (audio head unit) and USB1/USB2/TBOX is transmitted via universal serial bus (USB).
- Data from domain controller (audio head unit) and instrument cluster display is transmitted to instrument cluster display via low voltage differential signal (LDVS).
- Microphone 1 voice signal is transmitted to domain controller (audio head unit) through TBOX, microphone 2 voice signal is directly transmitted to domain controller (audio head unit).
- The standard reversing view monitor transmits signal to domain controller (audio head unit) via a dedicated line by using a common camera.

2 System Circuit Diagram

2.1 Audio Head Unit - A Terminal Definition

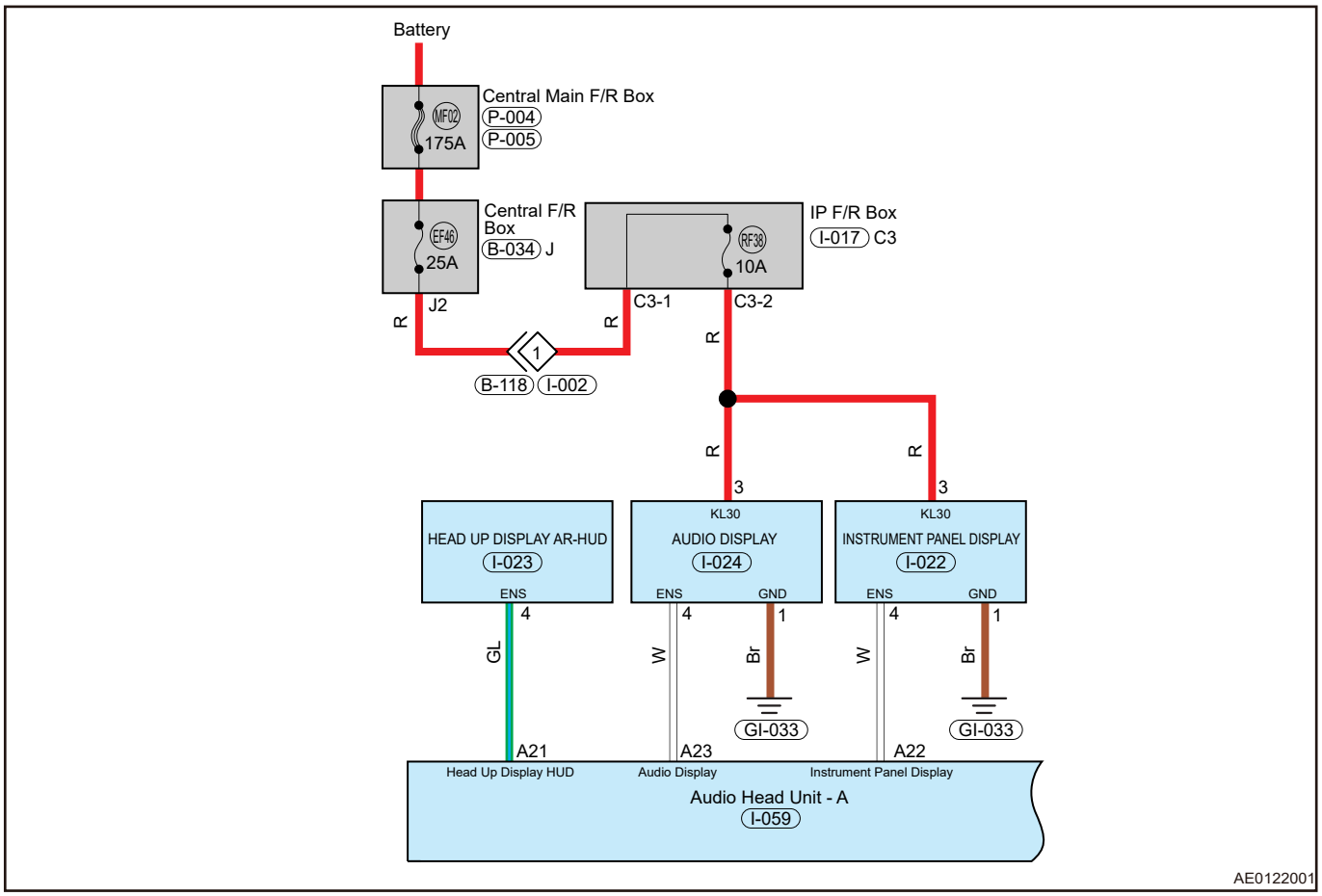


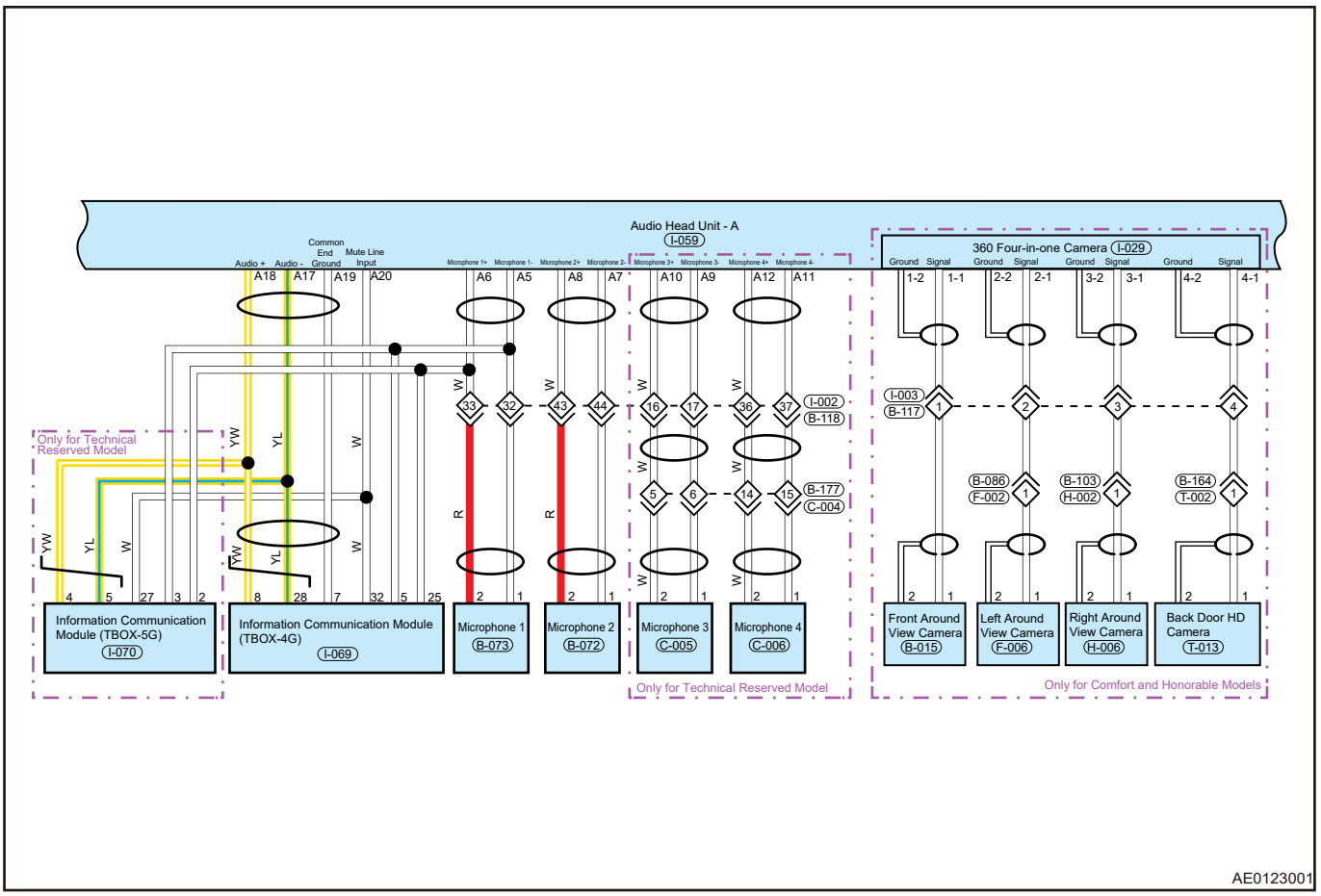
AE0012101

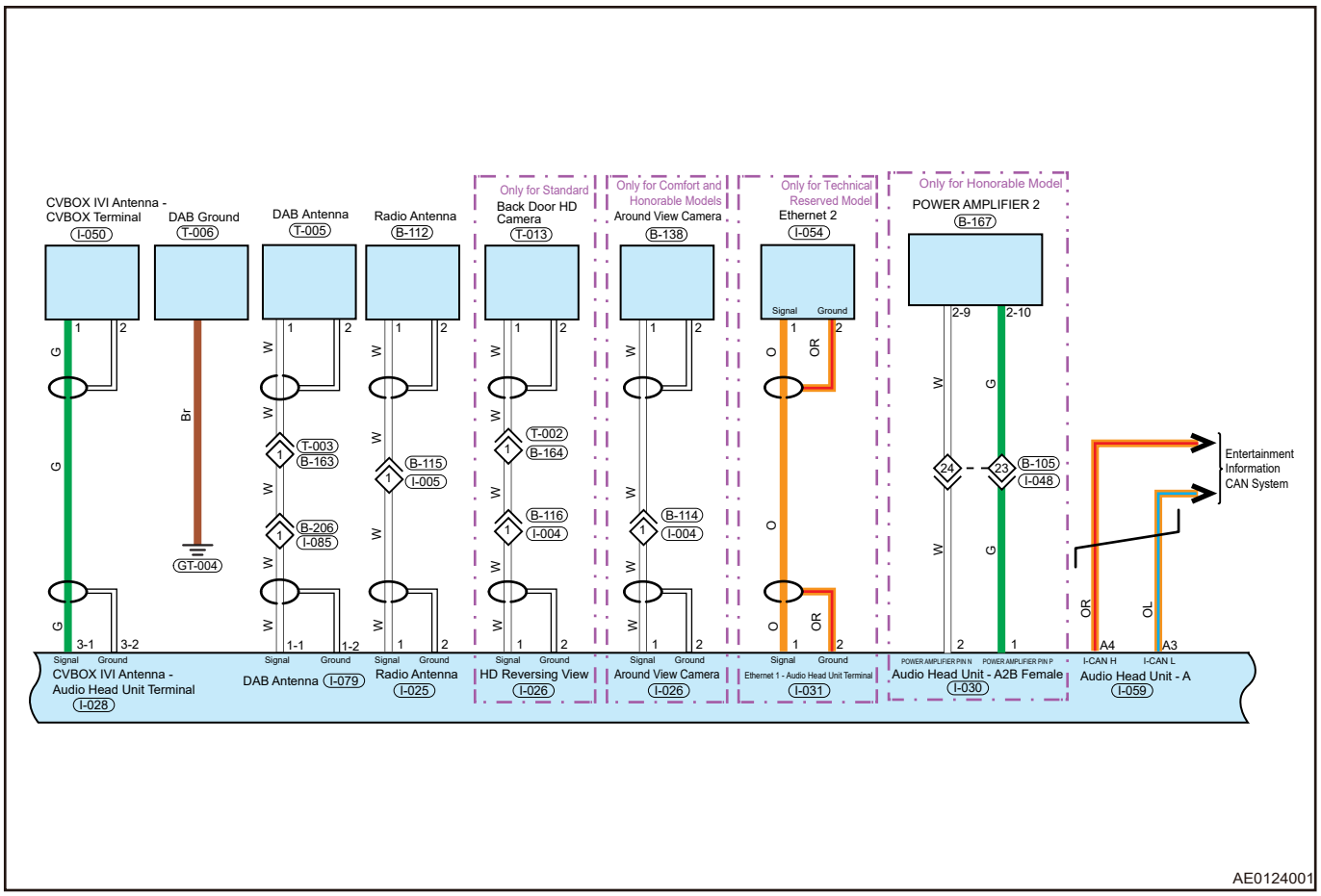
Pin	Definition	Pin	Definition
A1	Rear Left Tweeter and Woofer +	A20	Mute Line Input
A2	Rear Left Tweeter and Woofer -	A21	Head Up Display (HUD)
A3	I-CAN L	A22	Instrument Cluster Display
A4	I-CAN H	A23	Audio Display
A5	Left Microphone -	A24	-
A6	Left Microphone +	A25	-
A7	Right Microphone -	A26	-
A8	Right Microphone +	A27	Rear Right Tweeter and Woofer +
A9	Microphone 3 -	A28	Rear Right Tweeter and Woofer -

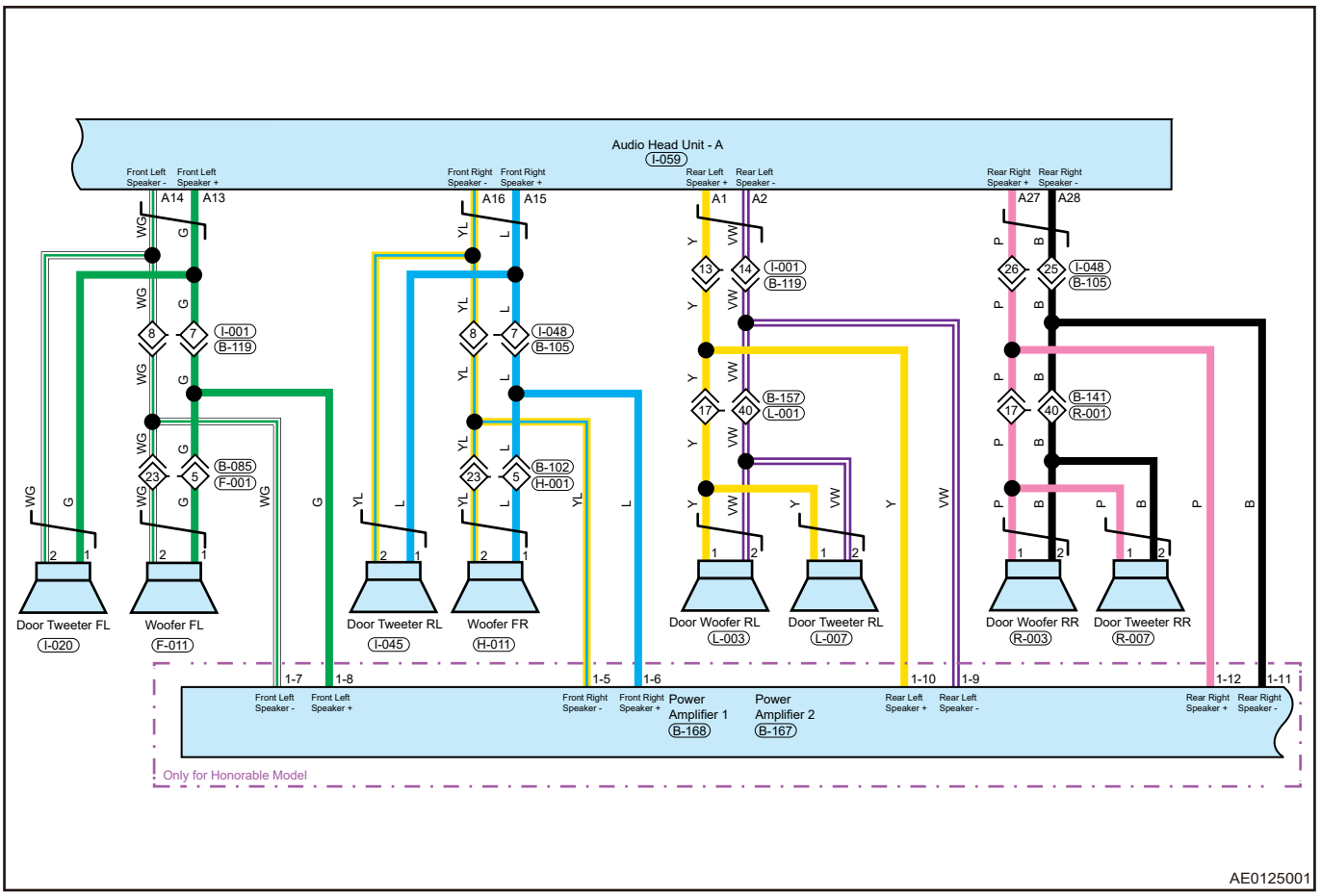
Pin	Definition	Pin	Definition
A10	Microphone 3 +	A29	-
A11	Microphone 4 -	A30	-
A12	Microphone 4 +	A31	-
A13	Front Left Tweeter and Woofer +	A32	Background Light
A14	Front Left Tweeter and Woofer -	A33	-
A15	Front Right Tweeter and Woofer +	A34	-
A16	Front Right Tweeter and Woofer -	A35	-
A17	Audio -	A36	-
A18	Audio +	A37	-
A19	Common Terminal Ground	A38	-

2.2 Circuit Diagram




Audio Head Unit - A
I-059
Common End Ground
Mute Line Input
Audio +
Audio -
Microphone 1+
Microphone 1-
Microphone 2+
Microphone 2-
Microphone 3+
Microphone 3-
Microphone 4+
Microphone 4-
A18
A17
A19
A20
A6
A5
A8
A7
A10
A9
A12
A11
360 Four-in-one Camera I-029
Ground
Signal
1-2
1-1
2-2
2-1
3-2
3-1
4-2
4-1
I-003
B-117
I-002
B-118
B-177
C-004
B-086
F-002
B-103
H-002
B-164
T-002
Only for Technical Reserved Model
Information Communication Module (TBOX-5G)
I-070
Information Communication Module (TBOX-4G)
I-069
Microphone 1
B-073
Microphone 2
B-072
Microphone 3
C-005
Microphone 4
C-006
Front Around View Camera
B-015
Left Around View Camera
F-006
Right Around View Camera
H-006
Back Door HD Camera
T-013
Only for Technical Reserved Model
Only for Comfort and Honorable Models
AE0123001


CVBOX IVI Antenna - CVBOX Terminal
I-050
DAB Ground
T-006
DAB Antenna
T-005
Radio Antenna
B-112
Only for Standard
Back Door HD Camera
T-013
Only for Comfort and Honorable Models
Around View Camera
B-138
Only for Technical Reserved Model
Ethernet 2
I-054
Only for Honorable Model
POWER AMPLIFIER 2
B-167
Entertainment Information CAN System
GT-004
T-003
B-163
B-206
I-085
B-115
I-005
T-002
B-164
B-116
I-004
B-114
I-004
B-105
I-048
CVBOX IVI Antenna - Audio Head Unit Terminal
I-028
DAB Antenna
I-079
Radio Antenna
I-025
HD Reversing View
I-026
Around View Camera
I-026
Ethernet 1 - Audio Head Unit Terminal
I-031
Audio Head Unit - A2B Female
I-030
Audio Head Unit - A
I-059
AE0124001



3 Diagnosis & Testing

3.1 Matching Learning

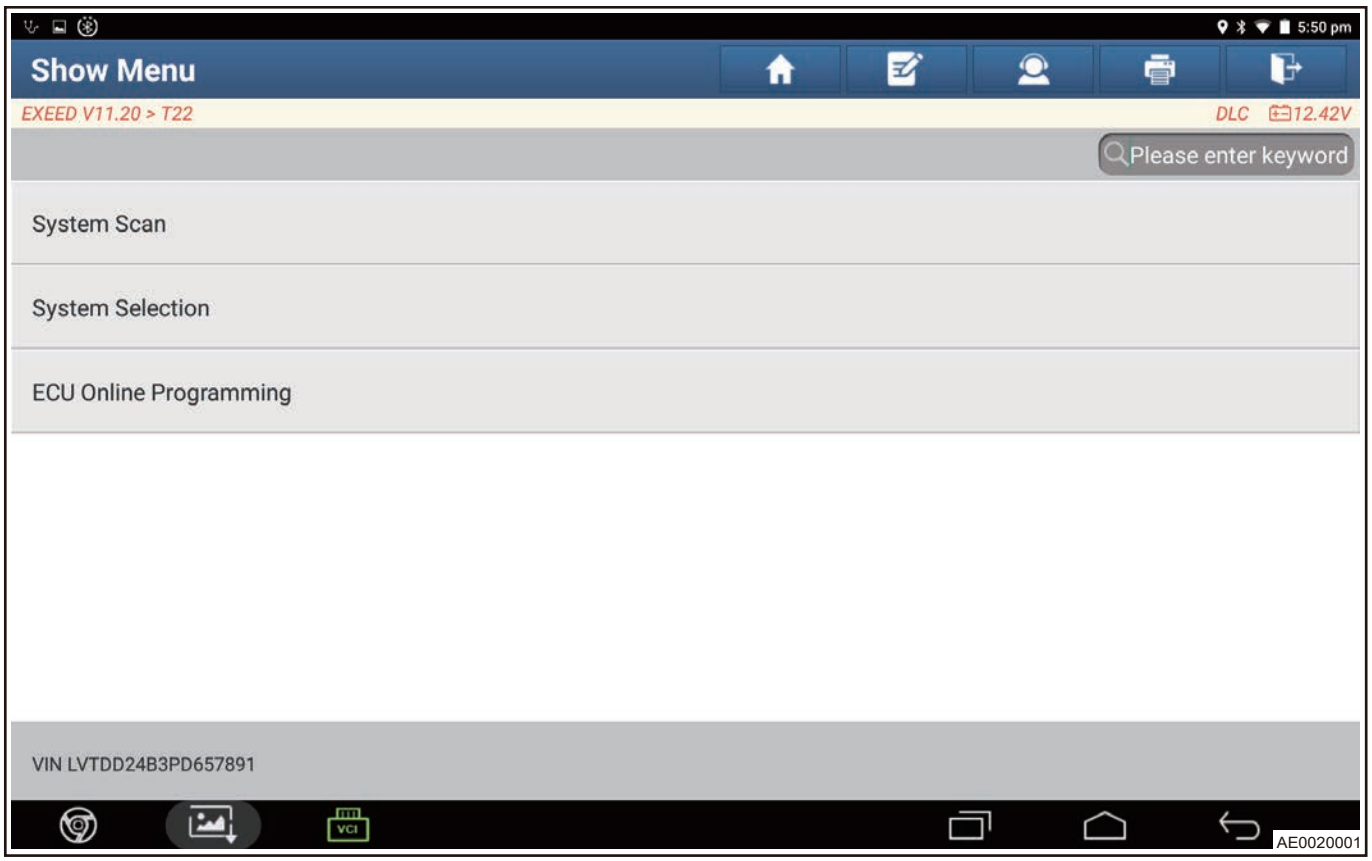
Items	Items that need to be learned with diagnostic tester
Replace domain controller (DMC)	VIN code learning
	Programing DMC or TIHU anti-theft learning (matching procedure and method are the same as EMS)
Amplifier calibration	Used for writing calibration data of amplifier function

■ Write VIN Code

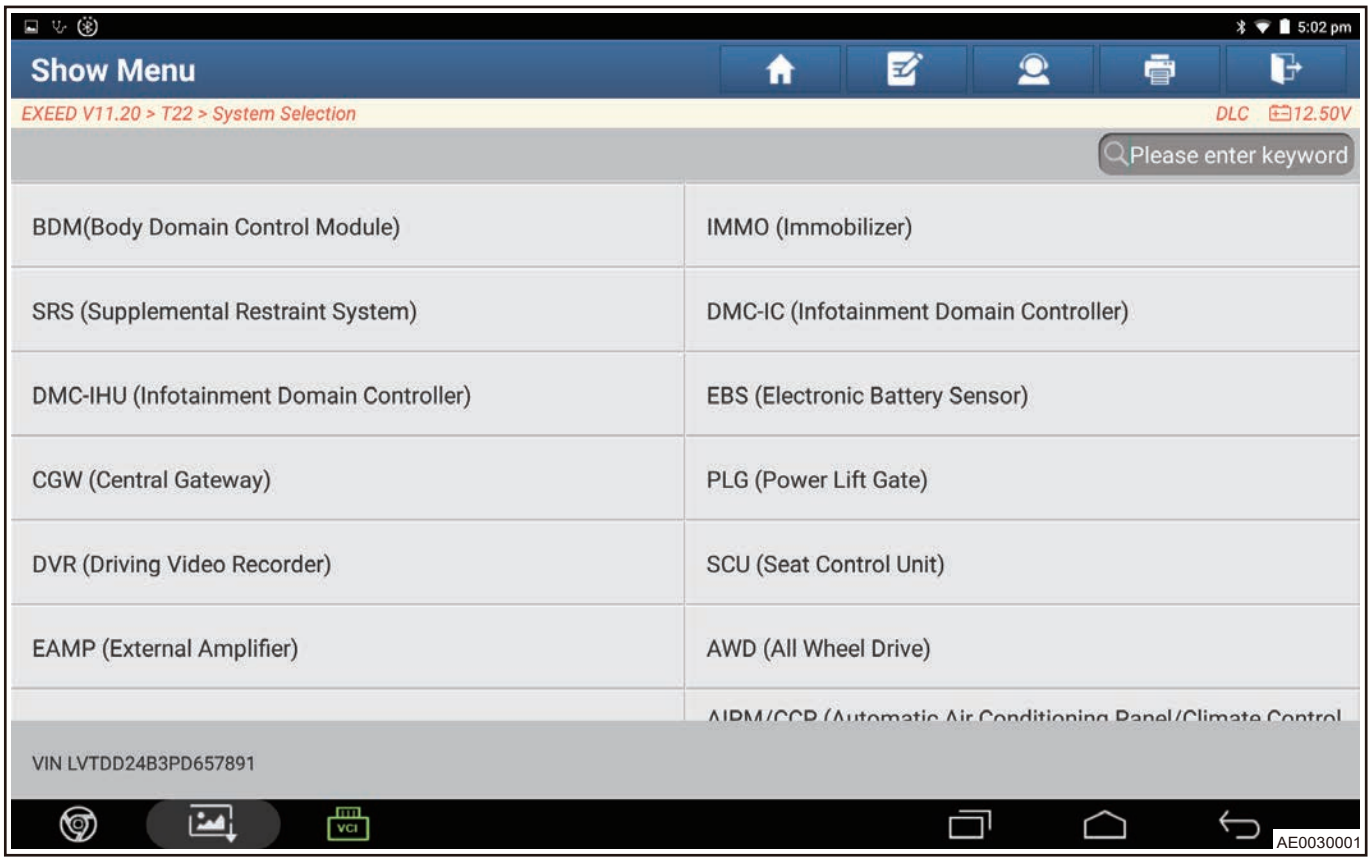
(1) Connect the diagnostic tester.

(2) Select “T22” model.

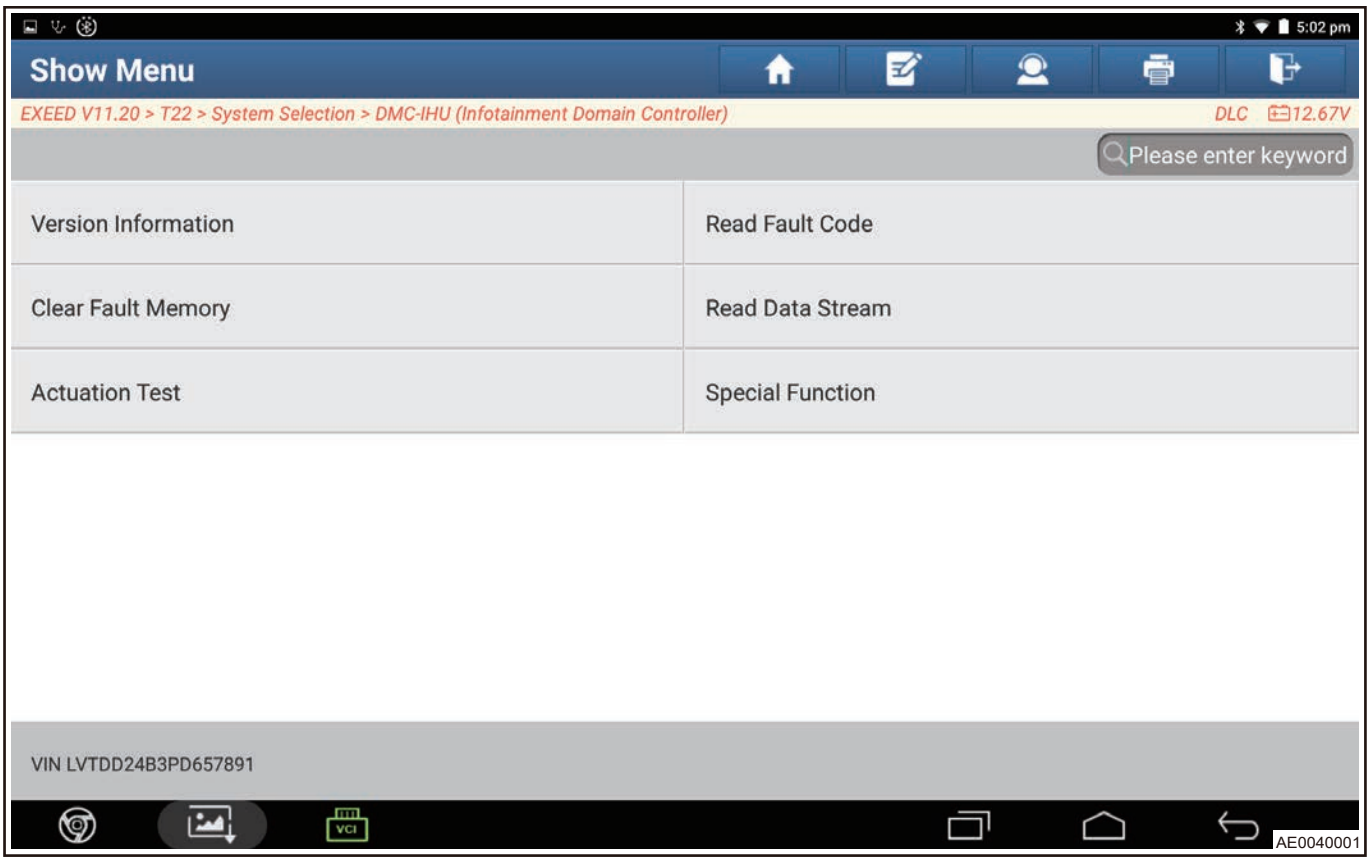
(3) Click “System Selection”.



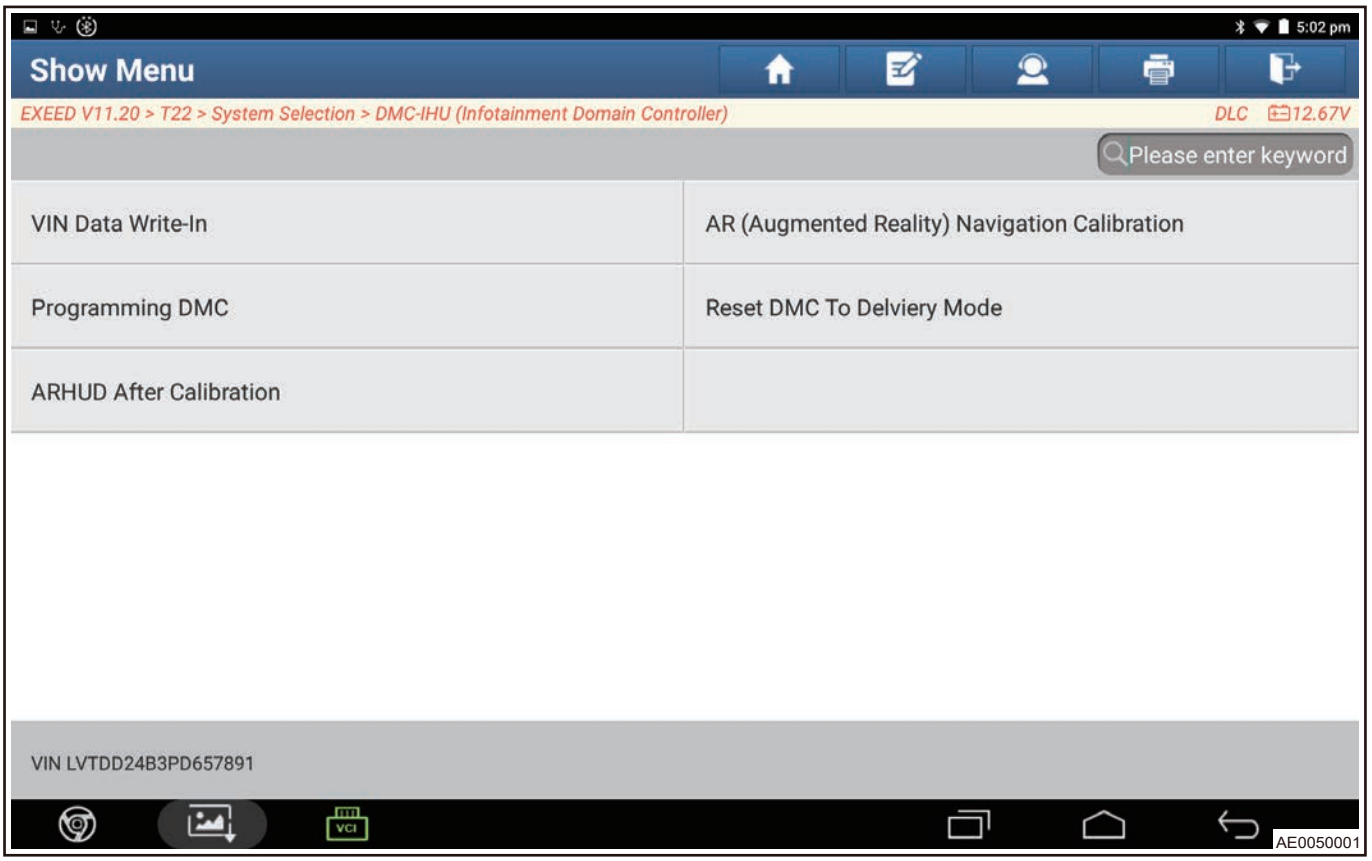
(4) Click “DMC-IC (Infotainment Domain Controller)”.



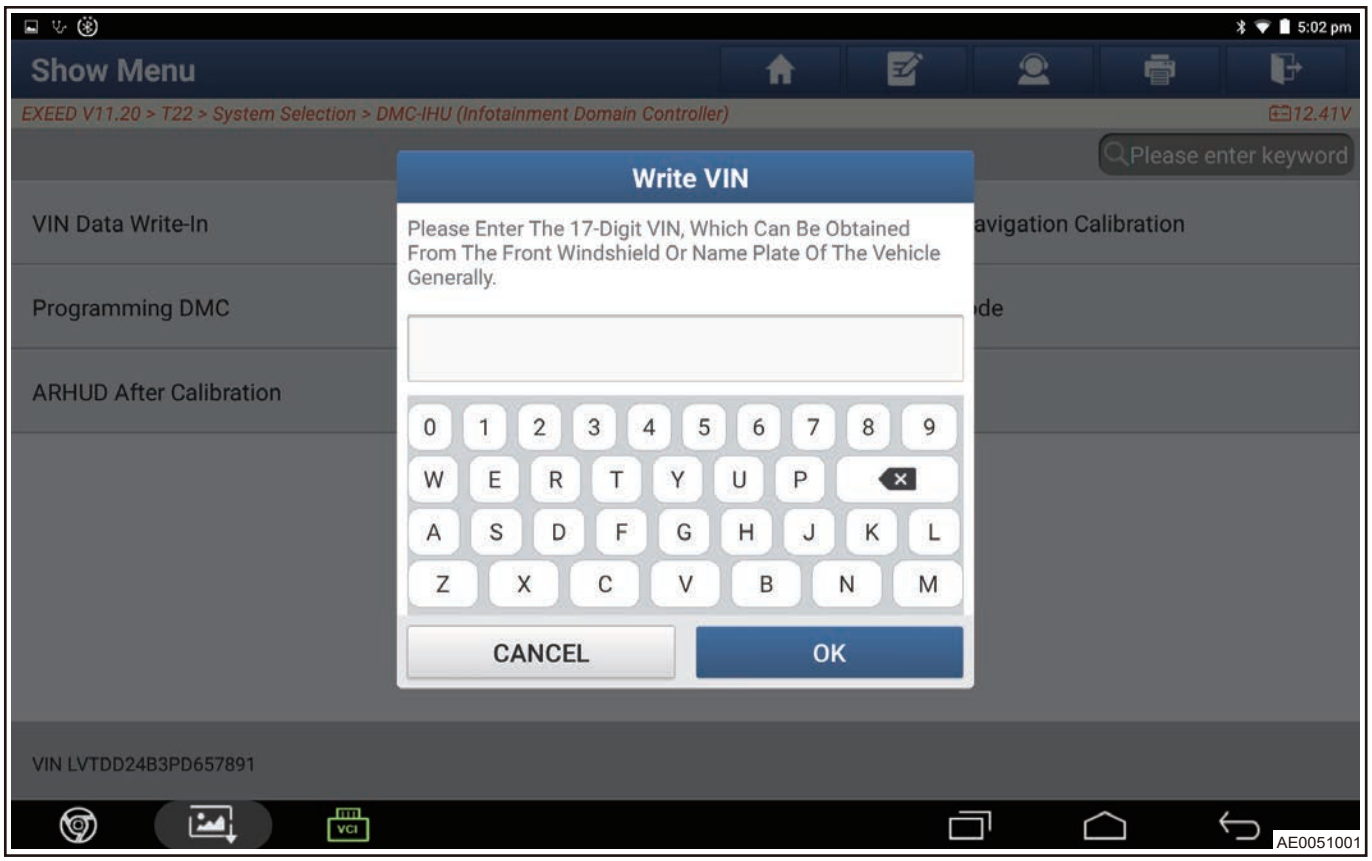
(5) Click "Special Function".



(6) Enter next screen and click “VIN Code Write-in”.



(7) Input VIN code, and click “OK”.

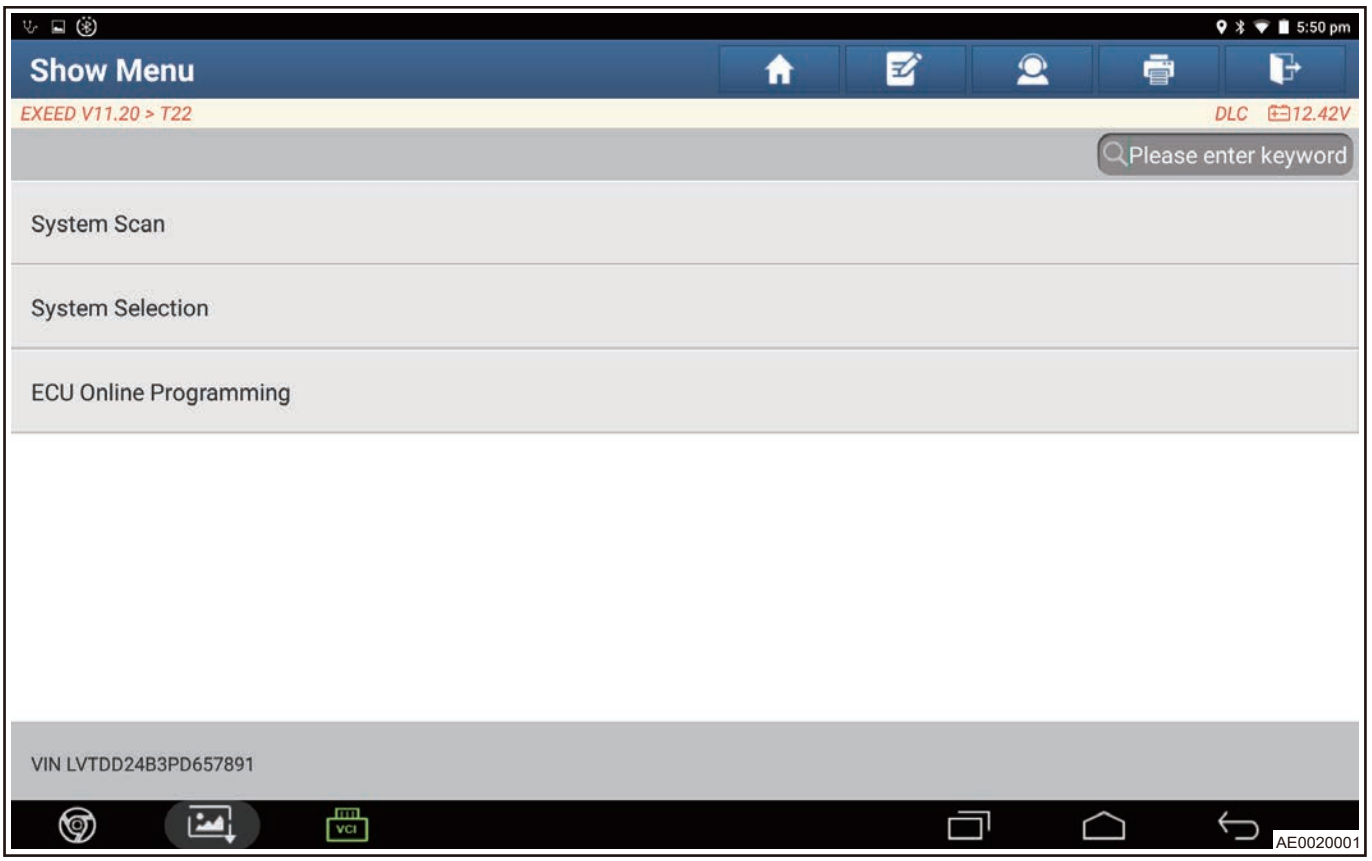


■ **Program DMC (Infotainment Domain Controller)**

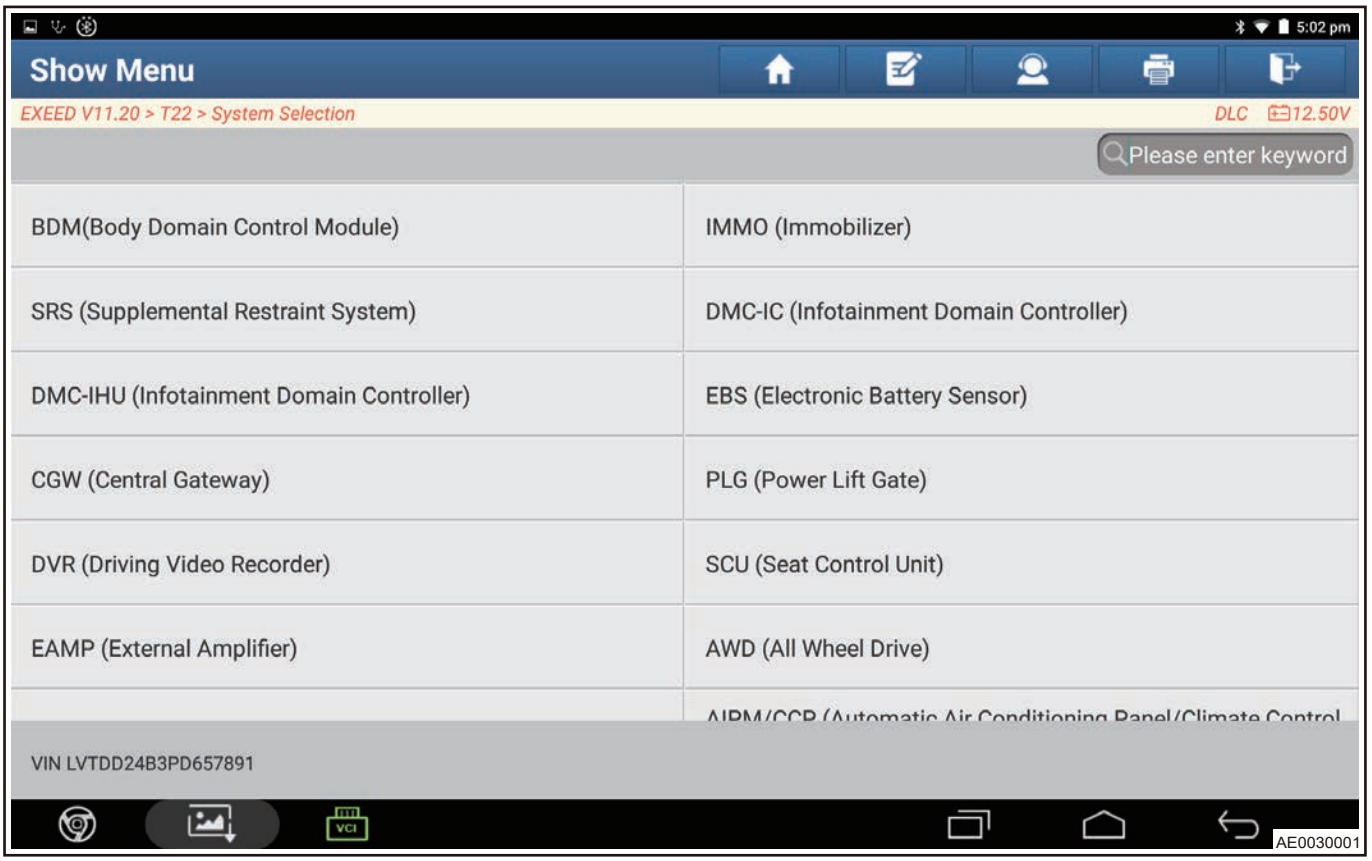
(1) Connect the diagnostic tester.

(2) Select “T22” model.

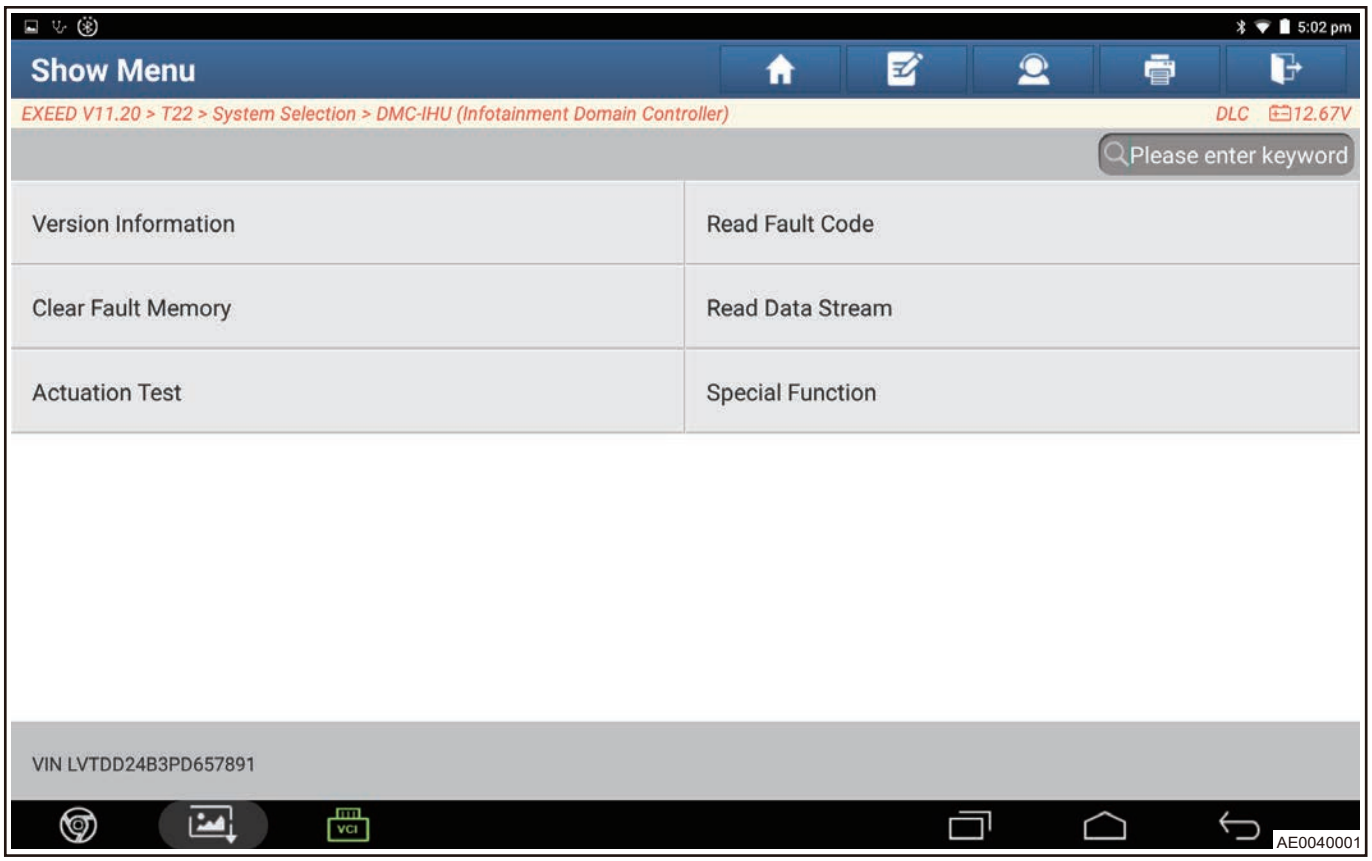
(3) Click “System Selection”.



(4) Click “DMC-IC (Infotainment Domain Controller)”.

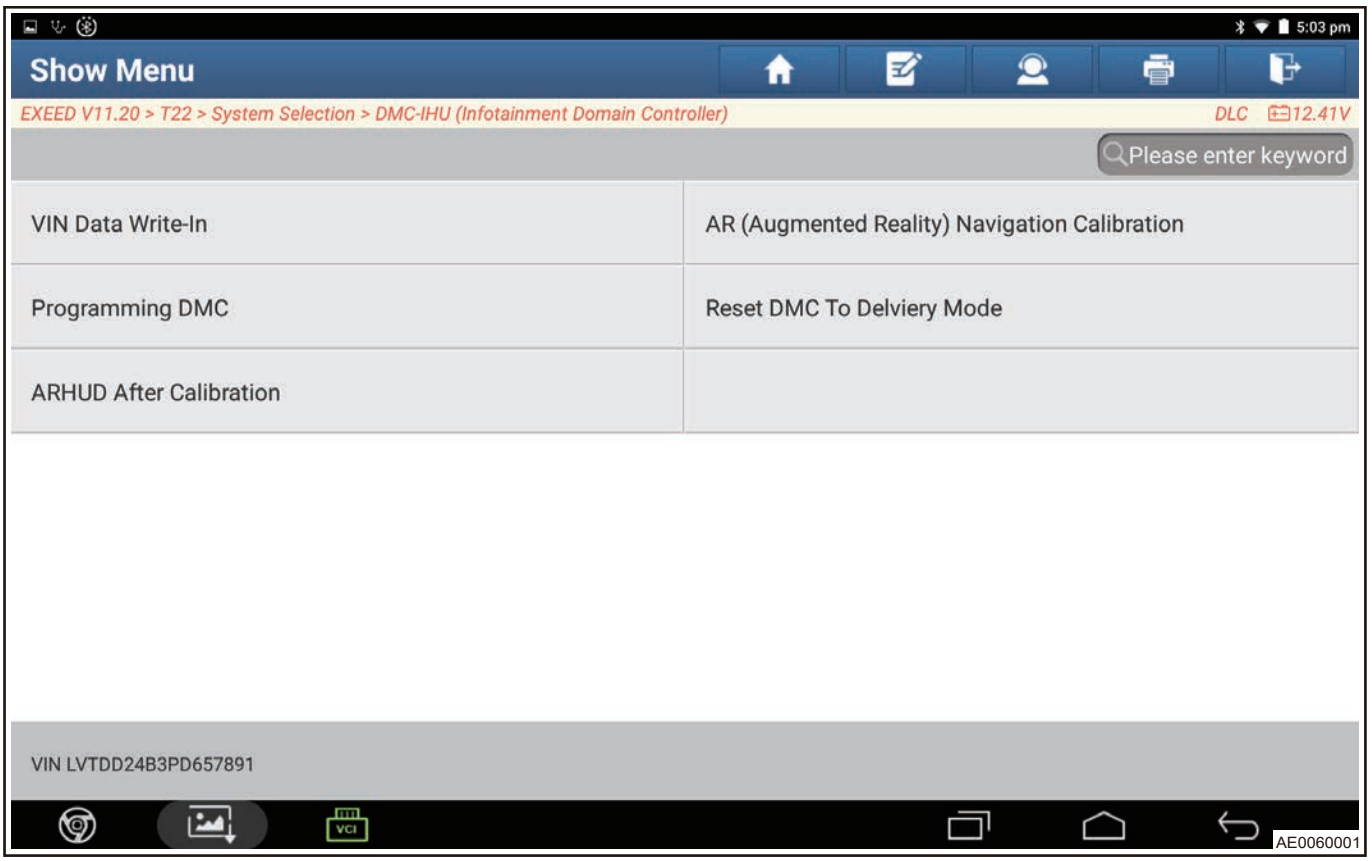


(5) Click "Special Function".



(6) Enter next screen and click “Program DMC (Infotainment Domain Controller)”.

Hint:
Matching procedure and method are the same as EMS programing immobilizer.



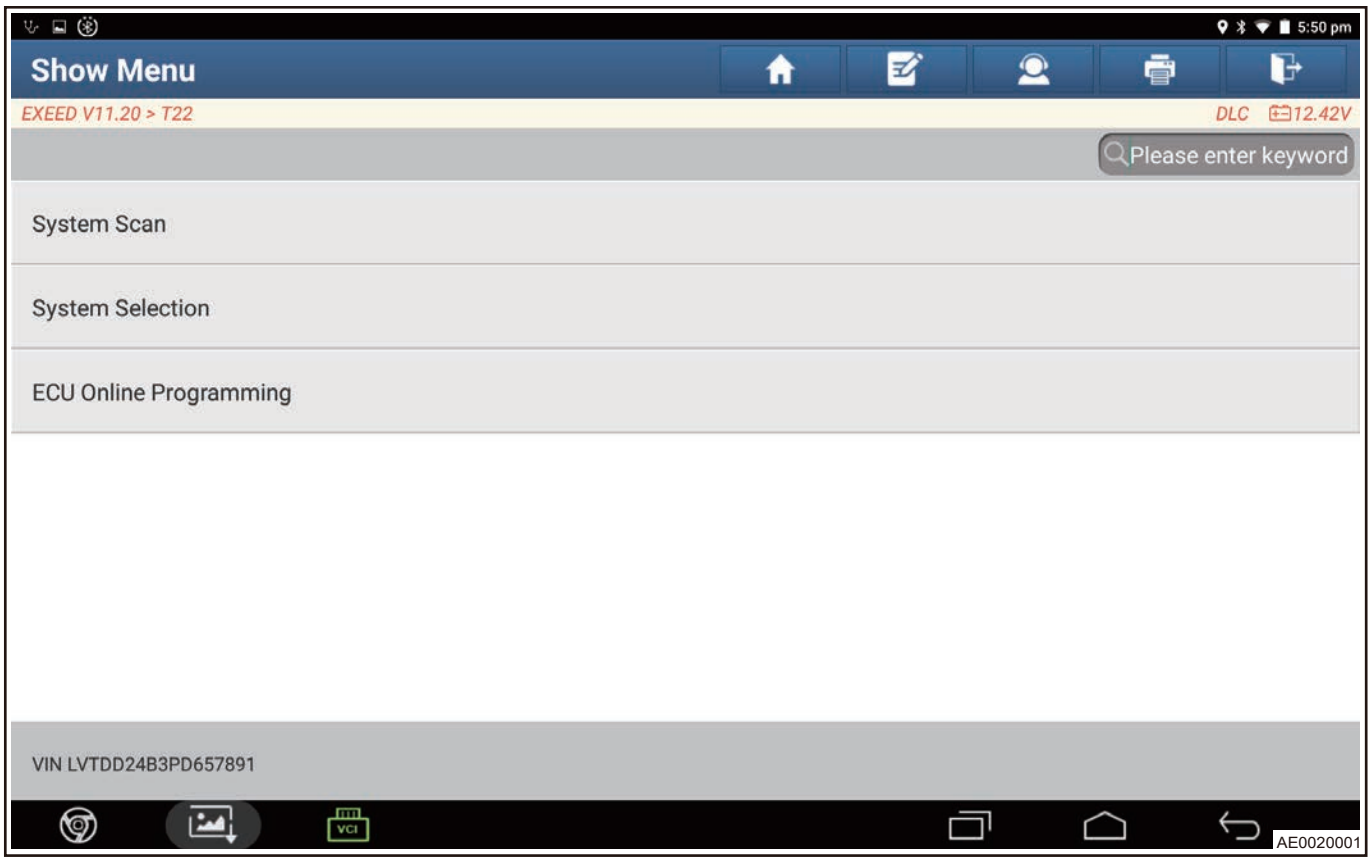
(7) Operation is finished.

■ Amplifier Calibration Data Writing

(1) Connect the diagnostic tester.

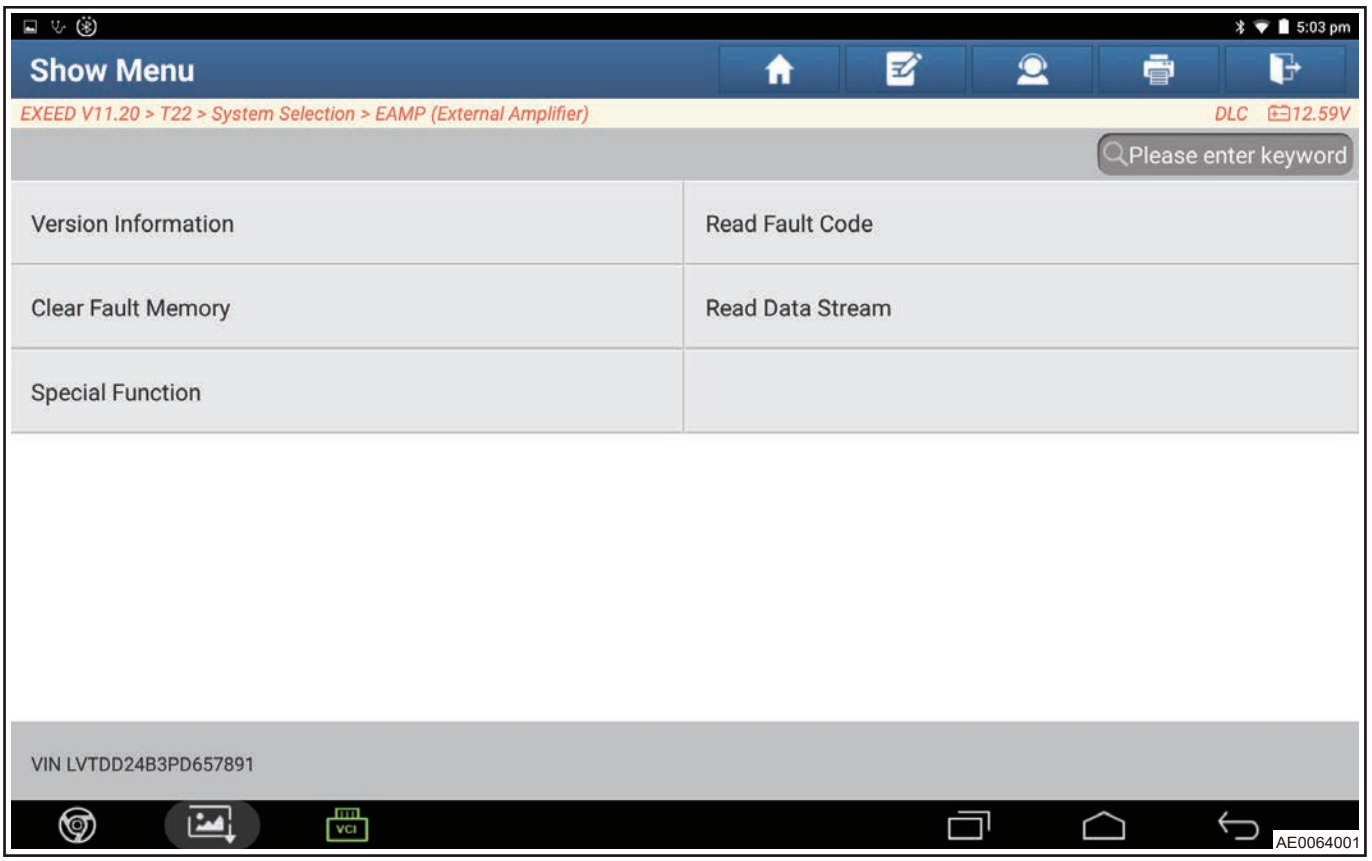
(2) Select “T22” model.

(3) Click “System Selection”.

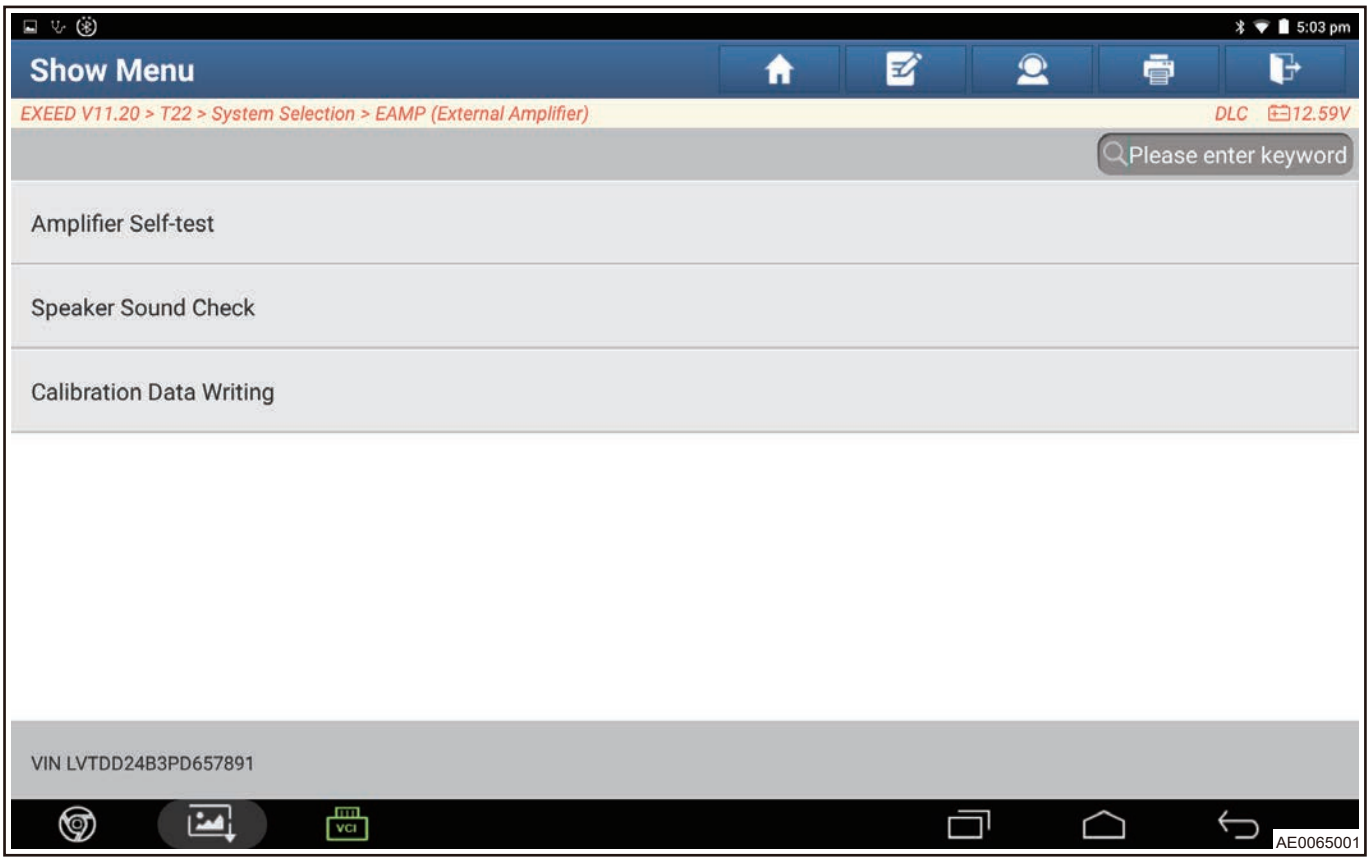


(4) Click “EAMP (External Amplifier)”.

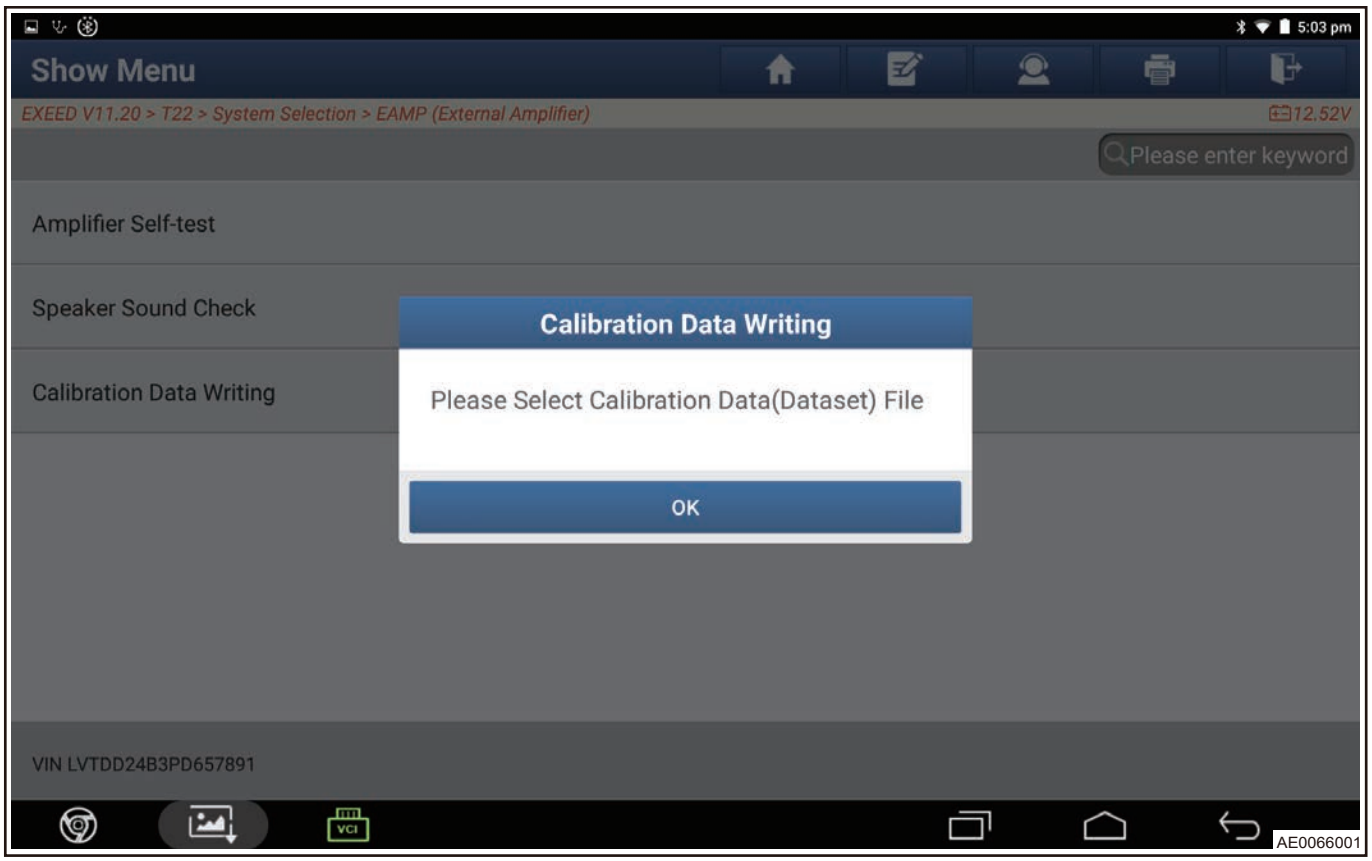
(5) Click "Special Function".



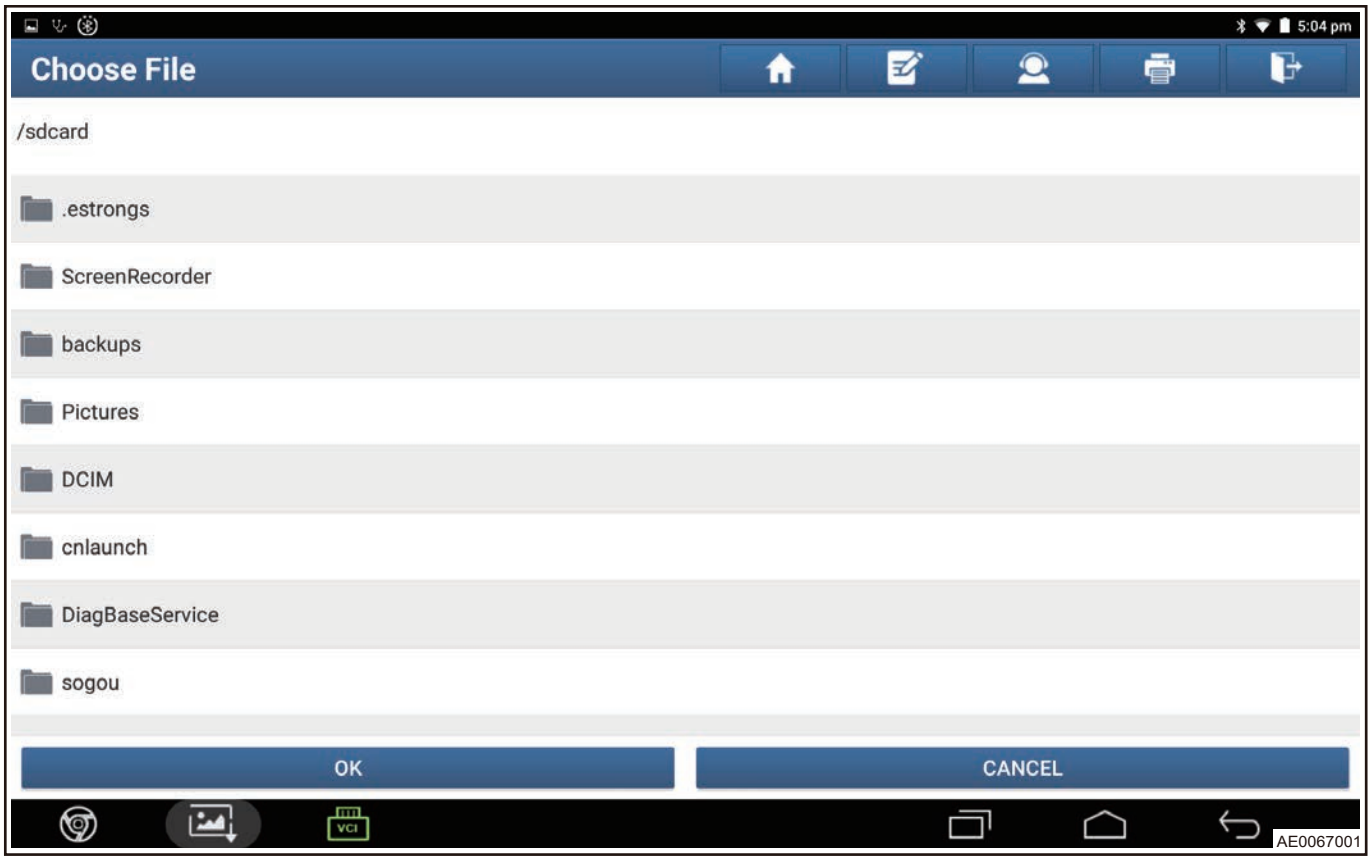
(6) Enter next screen and click “Calibration Data Writing”.



(7) Enter next screen and click “OK”.



(8) According to the storage path of the calibration file, select the calibration file, click "OK", and wait for the prompt to complete the calibration.



3.2 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Current Status	Symptom	Possible Cause and Solution
General condition	Head unit operates, but has no sound or sound is very low	Turn up the volume. Check setting of front and rear, left and right balance for horn
	Navigation volume cannot be adjusted	Stop vehicle, and adjust navigation volume on navigation screen or volume setting screen
	Head unit screen cannot be operated	In some states, operations on screen are not available. End current state, long press the Power button for 10S to restart the system and try to operate the screen again. Or click [SET] button to restore factory setting in the system setting
	Some functions in air conditioning setting are not available	Some functions related to the vehicle are available only when ENGINE START STOP switch is in ON
Radio playback	Poor reception	Check if antenna is fully deployed, connection is correct (whether negative is grounded). The required radio signal is too weak, please use manual search
	Available station cannot be searched by automatic station searching	When there are several available stations in current range and favorite station is 0, only 40 stations with the strongest signal can be searched. If you have other favorite ones, please manually search and store them
USB file playback	There are unplayable files	The system cannot support all formats of files. There are many audio and video formats nowadays. Even file formats supported by audio and video descriptions may not be supported due to the different encoding formats. Please refer to audio and video descriptions, download supported formats and try
	Volume fluctuates up and down during playback	Volume fluctuates up and down during playback, as there is no uniform standard, the volume cannot be handled uniformly, please adjust the volume knob by yourself.
	Knocking/noise	It may be caused when the original file is being recorded or caused by noise. Please confirm if it is a native problem with other players

Current Status	Symptom	Possible Cause and Solution
	USB audio, video, pictures can not be played normally and no prompt is given	Due to large number of USB manufacturers, the file system, supported protocols, etc. are very different, the system can not support all of them. Please try another USB.
Music playback	Bluetooth music name is showed as unknown	The model shows name in accordance with Bluetooth standard, if phone does not comply with the standard, it will be shown as unknown. Please change your phone and try again
Speech recognition	Inaccurate speech recognition	Say out voice command words provided by voice recognition system as much as possible and use Mandarin; Try to keep the vehicle quiet, and use voice recognition function in low noise surroundings; Microphone is in dome light position, so if noise is unavoidable, say command out as close to the microphone as possible

Hint:
If malfunction still cannot be eliminated, please drive vehicle to EXEED Automobile authorized after-sales service center or 4S shop for inspection and repair. Do not remove head unit without authorization and repair it by yourself.

3.3 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all grounds related to the latest DTC.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

3.4 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Check modules and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.5 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.

(2) Check all contact surfaces for tarnish, dirt and rust, etc.

(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

(5) Check if any additional accessories interfere with ground circuit.

(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

3.6 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the control system.

1	**Vehicle brought to workshop**

Next

2	**Examine vehicle and check basic items**

Check system power supply voltage, and check that fuse, wire harness and connector are connected normally.

OK

Standard voltage: Not less than 12 V.

Result

NG → **Check and replace malfunctioning parts**

OK

3	**Using a diagnostic tester, read related DTC and data stream information**

Result

Result	Proceed to
No DTC	A
DTC occurs	B

A → **Perform troubleshooting procedure without DTCs according to malfunction symptom**

B

4	**Troubleshoot according to DTCs troubleshooting procedure**

Result

Result	Proceed to
Problem is not resolved	A
Problem is resolved	B

A → **Return to procedure 1 and troubleshoot the process again**

B

5	**According to malfunction repair completion inspection and delivery, confirm if malfunction is resolved**

Result

Result	Proceed to
Delivery inspection is failed	A
Delivery inspection is qualified	B

A → **Return to procedure 1 and troubleshoot the process again**

B

6	**Finished**

3.7 Diagnostic Trouble Code (DTC) Chart - (DMC-IHU)

DTC	DTC Definition	Possible Cause	Maintenance Advice
B1800-16	Power Supply Voltage Failure - Circuit Voltage Below Threshold	1. Fuse 2. Charging system 3. Wire harness connector 4. Audio head unit	Check for short or open in battery, fuse and each wire harness terminal
B1800-17	Power Supply Voltage Failure - Circuit Voltage Above Threshold	1. Fuse 2. Charging system 3. Wire harness connector 4. Audio head unit	Check battery and alternator
B1810-00	Front Panel Button Failure	1. Panel button failure 2. Wire harness connector failure 3. Audio head unit failure	1. Check for panel button failure 2. Check for wire harness connector failure 3. Check for audio head unit failure
B1811-00	Steering Wheel Button Failure - No Sub Type Information	1. Steering wheel quick button 2. Wire harness connector 3. Audio head unit	1. Check steering wheel quick button 2. Wire harness connector 3. Audio head unit
B1816-11	Front Left Speaker - Circuit Short to Ground	Wire harness fault	Check wire harness
B1816-12	Front Left Speaker - Circuit Short to Battery	Wire harness fault	Check wire harness

DTC	DTC Definition	Possible Cause	Maintenance Advice
B1816-13	Front Left Speaker - Circuit Open	Wire harness fault	Check wire harness
B1816-14	Front Left Speaker - Short Circuit	Wire harness fault	Check wire harness
B1817-11	Front Right Speaker Circuit Short to Ground	Wire harness fault	Check wire harness
B1817-12	Front Right Speaker Circuit Short to Battery	Wire harness fault	Check wire harness
B1817-13	Front Right Speaker - Circuit Open	Wire harness fault	Check wire harness
B1817-14	Front Right Speaker - Short Circuit	Wire harness fault	Check wire harness
B1818-11	Rear Left Speaker Circuit Short to Ground	Wire harness fault	Check wire harness
B1818-12	Rear Left Speaker Circuit Short to Battery	Wire harness fault	Check wire harness
B1818-13	Rear Left Speaker - Circuit Open	Wire harness fault	Check wire harness
B1818-14	Rear Left Speaker - Short Circuit	Wire harness fault	Check wire harness
B1819-11	Rear Right Speaker - Circuit Short to Ground	Wire harness fault	Check wire harness
B1819-12	Rear Right Speaker Circuit Short to Battery	Wire harness fault	Check wire harness
B1819-13	Rear Right Speaker - Circuit Open	Wire harness fault	Check wire harness
B1819-14	Rear Right Speaker - Short Circuit	Wire harness fault	Check wire harness
B181B-04	Display Module Function Fault System Internal Failure	1. Audio head unit internal fault 2. Data connecting wire 3. Display failure	1. Check audio head unit power supply ground 2. Check audio head unit 3. Check data connecting wire 4. Check display
B181C-04	Display Touch Function Fault System Internal Failure	1. Audio head unit internal fault 2. Data connecting wire 3. Display failure	1. Check audio head unit power supply ground 2. Check audio head unit 3. Check data connecting wire 4. Check display
B181D-04	Display Backlight Module Function Fault System Internal Failure	1. Audio head unit internal fault 2. Data connecting wire 3. Display failure	1. Check audio head unit power supply ground 2. Check audio head unit 3. Check data connecting wire 4. Check display
B1820-04	Communication Failure Between Display and Head Unit IIC System Internal Failure	1. Audio head unit internal fault 2. Data connecting wire 3. Display failure	1. Check audio head unit power supply ground 2. Check audio head unit 3.

DTC	DTC Definition	Possible Cause	Maintenance Advice
			Check data connecting wire 4. Check display
B1830-04	Amplifier Control Fault System Internal Failure	1. Speaker 2. Wire harness connector 3. Domain controller	Check for short or open in speaker and each wire harness terminal
B1832-04	Radio/DSP Circuit Control Fault System Internal Failure	1. Speaker 2. Wire harness connector 3. Domain controller	Check for short or open in speaker and each wire harness terminal
B1835-04	Communication Failure Between MCU and Main Processor System Internal Failure	Audio head unit	Perform power off test, if the fault still occurs, replace the audio head unit
B1836-04	TBOX Connection On/ Off Fault System Internal Failure	1. Connect the data wire 2. Audio head unit 3. TBOX module	1. Check the data connecting wire 2. Check audio head unit 3. Check TBOX module
B1840-4B	MMI Over Temperature	Audio Head Unit	Perform power off test, if the fault still occurs, replace the audio head unit
B1843-16	Display Undervoltage Circuit Voltage Below Threshold	1. Power supply wire connected to display 2. Audio head unit 3. Display	1. Check the power supply wire connected with display 2. Check audio head unit 3. Check display
B1843-17	Display Overvoltage Circuit Voltage Above Threshold	1. Power supply wire connected to display 2. Audio head unit 3. Display	1. Check the power supply wire connected with display 2. Check audio head unit 3. Check display
B1844-04	Communication Failure with DESerializer System Internal Failure	1. Data wire connected to display 2. Audio head unit 3. Display	1. Check data wire connected to display 2. Check audio head unit 3. Check display
B1841-19	USB1 Current-Over Occur - Circuit Current Above Threshold	1. USB data cable 2. Audio head unit	1. Check USB data cable 2. Check audio head unit
B184C-04	MIC1 Internal Fault in Power Circuit System	1. Microphone 1 wire harness connector 2. Audio head unit	Check for short or open in microphone 1 and each wire harness terminal
	MIC1 Short to Ground		
	Open Circuit in MIC1		
B184D-04	MIC2 Short to Power Supply	1. Microphone 2. Wire harness connector 3. Audio head unit	Check for short or open in microphone 2 and each wire harness terminal
	MIC2 Short to Ground		
	Open Circuit in MIC2		
B1815-00	Abnormal GPS Antenna	1. GPS antenna 2. Audio head unit	1. Check GPS antenna 2. Check audio head unit
B1A20-13	Front Camera LVDS Signal Lost System Internal Failure	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure

DTC	DTC Definition	Possible Cause	Maintenance Advice
B1A21-13	Rear Camera LVDS Signal Lost System Internal Failure	/	/
B1A22-13	Left Camera LVDS Signal Lost System Internal Failure	/	/
B1A23-13	Right Camera LVDS Signal Lost System Internal Failure	/	/
B1A26-54	AVM No Calibration Record Failure	AVM No Calibration	Calibrate AVM
B1849-04	Connecting Fault with SD-SDI Reversing View Monitor System Internal Failure	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1814-11	Radio Antenna Circuit Short to Ground	/	1. Check for wire harness connector failure 2. Check for audio head unit failure
B1814-17	Radio Antenna Circuit Voltage Above Threshold	/	1. Check for wire harness connector failure 2. Check for audio head unit failure
B1814-13	Radio Antenna Circuit Open	/	1. Check for wire harness connector failure 2. Check for audio head unit failure
B181A-04	Central Control Display Overall Function Failure (Including but Not Limited to Display and Touch) - System Internal Failure	System internal failure	1. Check for power supply failure 2. Check for audio head unit failure
B181E-04	Central Control Display Video Signal Failure - System Internal Failure	System internal failure	1. Check for power supply failure 2. Check for audio head unit failure
B181F-04	Central Control Display Backlight Level Missing - System Internal Failure	System internal failure	1. Check for power supply failure 2. Check for audio head unit failure
B1842-19	USB2 Current Above Threshold	1. USB data cable 2. Audio head unit	1. Check USB data cable 2. Check audio head unit
B1847-04	Connecting Fault with Head Unit Screen - System Internal Failure	/	1. Check for power supply failure 2. Check for audio head unit failure
B1848-04	Connecting Fault with Instrument Cluster Screen - System Internal Failure	/	1. Check for power supply failure 2. Check for audio head unit failure
B185E-00	VIN Not Programmed	VIN is not programmed	Program VIN code again
B185F-00	PIN Not Programmed	PIN is not programmed	Program PIN code again
B1860-00	SK Not Programmed	SK is not programmed	Program SK code again

DTC	DTC Definition	Possible Cause	Maintenance Advice
B1850-11	Built-in AVM Front Camera Power Supply Short to Ground	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1851-12	Built-in AVM Front Camera Power Supply Short to Battery Positive	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1852-13	Built-in AVM Front Camera Wire Harness Open	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1853-11	Built-in AVM Rear Camera Power Supply Short to Ground	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1854-12	Built-in AVM Rear Camera Power Supply Short to Battery Positive	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1855-13	Built-in AVM Rear Camera Wire Harness Open	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1856-11	Built-in AVM Left Camera Power Supply Short to Ground	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1857-12	Built-in AVM Left Camera Power Supply Short to Battery Positive	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1858-13	Built-in AVM Left Camera Wire Harness Open	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B1859-11	Built-in AVM Right Camera Power Supply Short to Ground	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B185A-12	Built-in AVM Right Camera Power Supply Short to Battery Positive	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B185B-13	Built-in AVM Right Camera Wire Harness Open	1. Wire harness connector failure 2. Camera failure 3. Audio head unit failure	1. Check for wire harness connector failure 2. Check for camera failure 3. Check for audio head unit failure
B185C-54	Built-in AVM No Calibration	AVM is not calibrated	Calibrate AVM

3.8 Diagnostic Trouble Code (DTC) Chart - (DMC-ARHUD)

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1E80-16	Power Supply Voltage too Low	IGN = ON (other than 3s after starting), voltage < 8.5 V (- tolerance of ± 0.2 V) for 1000 ms	• Fuse • Wire harness • Head up display module	Check HUD power supply
B1E80-17	Power Supply Voltage too High	IGN = ON, battery (KL30 PIN) voltage ＞ 16.5 V (- tolerance of ± 0.2 V) for 1000 ms		
B1E81-1D	Motor Drive Circuit Current Out of Range	/	1. Internal module fault.	Reset and restart to check if the fault still exists. If it still exists, replace the motor.
B1E81-4B	Motor Drive Over Temperature	/	1. Internal module fault.	Check if the HUD fin is installed correctly, check if the LED driver board is faulty, if has, replace the LED driver board, and check if the ECU is overheating.
B1E82-19	HUD LED Drive Circuit Current Above Threshold	/	1. Internal module fault.	1. Check HUD power supply circuit 2. Reset and restart to check if the fault still exists. If it still exists, replace the HUD.
B1E82-13	HUD LED Drive Circuit Open	/	1. Internal module fault.	
B1E82-4B	HUD LED Drive Over Temperature	/	1. Internal module fault.	Check if the HUD fin is installed correctly, check if the LED driver board is faulty, if has, replace the LED driver board, and check if the ECU is overheating.
B1E84-71	HUD Reflector Position Switch Stuck	/	1. Internal module fault.	Reset and restart to check if the fault still exists. If it still exists, replace the motor
B1E85-4B	HUD TFT Over Temperature	/	1. The location of the vehicle and whether it is in a sunny environment; 2. Internal module failure.	1. Move the vehicle to a cool place and retest it; 2. Check if the HUD fin is installed correctly, check if the LED driver board is

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				faulty, if has, replace the LED driver board, and check if the ECU is overheating.
B1E87-00	HUD Abnormal Reset	/	1. Abnormal reset; 2. Internal module failure.	If the fault persists, replace the HUD
B1E88-04	HUD Display Screen Video Signal - Abnormal Video Signal	/	1. HUD display screen video signal - Abnormal video signal; 2. Internal module failure.	Check wire harness connector.
B1E89-04	HUD Display Screen Self Judgment - Solar Backflow Causing Screen Shutdown	/	1. The location of the vehicle and whether it is in a sunny environment; 2. Internal module failure.	1. Move the vehicle to a cool place and retest it; 2. Check if the HUD fin is installed correctly, check if the LED driver board is faulty, if has, replace the LED driver board, and check if the ECU is overheating.

3.9 Diagnostic Trouble Code (DTC) Chart - (DMC- Network- CAN)

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0100-87	Lost Communication with EMS	\	(1) "Module with loss of communication" does not send messages normally according to the cycle; • Power supply, ground • Module initialization is incorrect • Module configuration is incorrect • There are strong magnetic fields or other disturbances in the surrounding environment • The distance between the two node modules is too far • Internal module fault, crash (2) CAN wire harness connection failure; • CAN_H open, CAN_L open, CAN_H short to CAN_L/open, CAN_L short to VBAT, CAN_H short to GND, CAN_L short to GND, etc. • Termination resistor open (3) Controller itself is faulty. • Power supply, ground • Module initialization is incorrect • Module configuration is incorrect • There are strong magnetic fields or	(1) Check if the "module with loss of communication" sends messages normally according to the cycle; • Check power supply, grounding and quality of power supply, such as voltage fluctuations. • Check the reason for the initialization failure. • Check if module configuration is incorrect. • Check if there are strong magnetic fields or other disturbances in the surrounding environment. • Check if the wire harness of the two node modules is modified or repaired, causing the distance to be too far. • Check the module for internal fault and crash, and replace it to troubleshoot if necessary. (2) Check if the wire harness connection between the two nodes is normal; • CAN_H open, CAN_L open, CAN_H short to CAN_L/open, CAN_L short to VBAT, CAN_H short to GND,
U0101-87	Lost Communication with TCU	/		
U0129-87	Lost Communication with BSM	/		
U0131-87	Lost Communication with Electronic Power Steering Module	/		
U0140-87	Lost Communication with Body Control Module or Body Domain Controller	/		
U0151-87	Lost Communication with ABM	/		
U0164-87	Lost Communication with CLM	/		
U0230-87	Lost Communication with PLG	/		
U1162-87	Lost Communication with Front Camera Module	/		
U1161-87	Lost Communication With Rear Left Corner Radar RLCR Module	/		
U1169-87	Lost Communication With Rear Right Corner Radar RRCR Module	/		
U0208-87	Lost Communication with Seat Module Controller	/		
U1189-87	Lost Communication with MFS	/		
U1194-87	Lost Communication with Wireless Charging Module	/		
U0186-87	Lost Communication with Brand Audio Module Controller-Missing Message	/		
U0209-87	Lost Communication with First Row Driver Seat Heating Module	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0210-87	Lost Communication with First Row Passenger Seat Heating Module	/	other disturbances in the surrounding environment	CAN_L short to GND, etc. • Check if the termination resistor is open or short, etc. (3) Check if the controller itself is faulty. • Power supply, ground • Module initialization is incorrect • Module configuration is incorrect • There are strong magnetic fields or other disturbances in the surrounding environment
U0211-87	Lost Communication with Second Row Left Seat Heating Module	/		
U0247-87	Lost Communication with Second Row Right Seat Heating Module	/		
U0198-87	Lost Communication With Remote Control Module	/		
U1197-87	Lost Communication with Smart Driving Domain Controller	/		
U0146-87	Lost Communication with Central Gateway	/		
U1007-88	Body CAN Bus Off	/	• Intermittent problem • Vehicle configuration problem • CAN line • Module failure • Central gateway	• Power on again • Check peripheral signal interference, etc. • Check vehicle configuration • Check central gateway • Check CAN line • Check module failure
U0073-88	Information and Entertainment CAN Bus Off	/		
U1300-55	Software Configuration Error	/	Vehicle CAN configuration error	Check vehicle CAN configuration

3.10 Diagnostic Trouble Code (DTC) Chart - (DMC- Network- Ethernet)

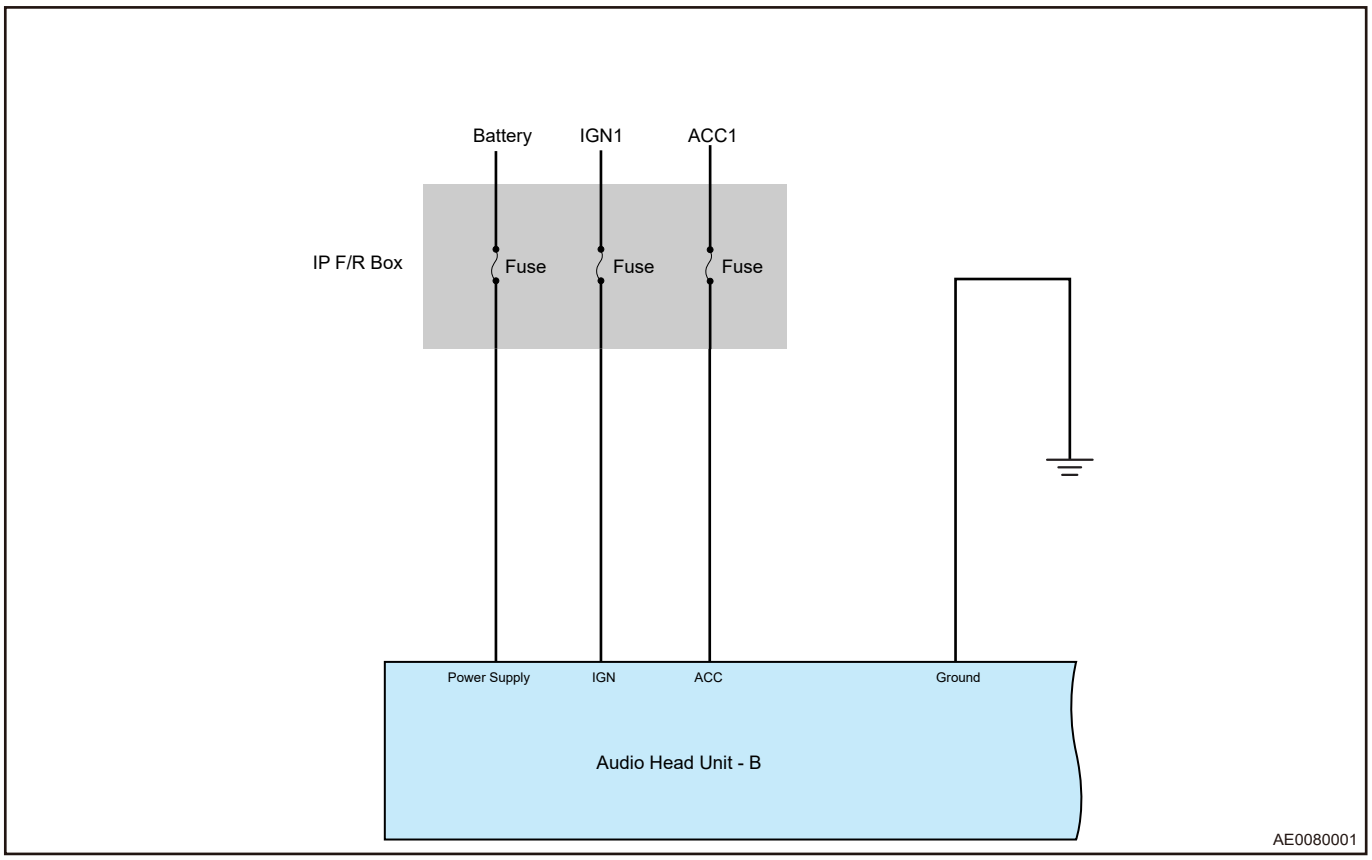
DTC	DTC Definition	Possible Cause	Maintenance Advice
U2151-08	Unexpected Connection Loss Between Gateway and Infotainment Domain Controller	1. Circuit is open; 2. Gateway failure; 3. Infotainment domain controller failure.	1. Check circuit; 2. Check peripheral signal interference, etc; 3. Check central gateway; 4. Check infotainment domain controller.
U2120-84	Insufficient SQI	1. Circuit is open; 2. TBOX failure; 3. Infotainment domain controller failure.	1. Check circuit; 2. Check peripheral signal interference, etc; 3. TBOX failure; 4. Check infotainment domain controller.
U2060-12	Short in Ethernet Signal Wire		
U2080-13	Open in Ethernet Signal Wire		

DTC	DTC Definition	Possible Cause	Maintenance Advice
U2300-87	TBOX Information Communication Module Stops Providing Service		
U2302-87	IDCU Smart Driving Domain Controller Stops Providing Service		
U2350-87	TBOX Information Communication Module system Service Response Time Out		
U2351-87	TBOX Information Communication Module BEICALL Call Service Response Time Out		
U2352-87	TBOX Information Communication Module OTA Master Control Upgrade Service Response Time Out		
U2353-87	TBOX Information Communication Module U Disk Upgrade Service Response Time Out		
U2354-87	TBOX Information Communication Module U Disk Transmission Log Service Response Time Out		
U2356-87	TBOX Information Communication Module Position Information Service Response Time Out		

3.11 DTC Diagnosis Procedure

DTC	B1800-16	Power Supply Voltage too Low
DTC	B1800-17	Power Supply Voltage too High

System Schematic Diagram



■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

NG → **Check or replace charging system or battery**

OK

2	**Check fuse**

(a) Turn off all electrical equipment and ENGINE START STOP switch.

(b) Disconnect the negative battery cable.

(c) Check if pow supply fuse is normal.

NG → **Replace fuse**

OK

3	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.

(b) Disconnect the negative battery terminal cable.

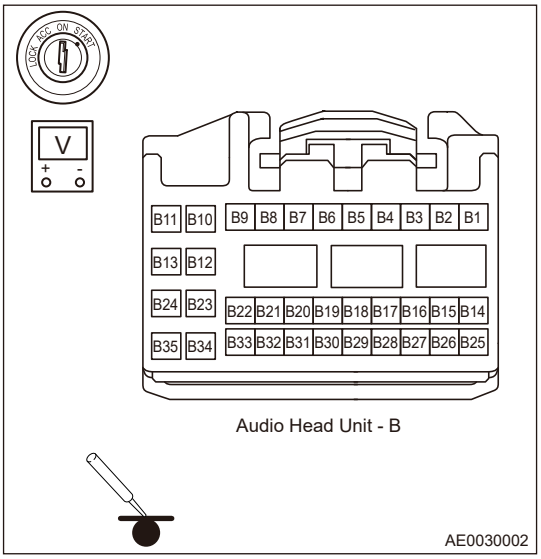
(c) Disconnect the audio head unit B connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

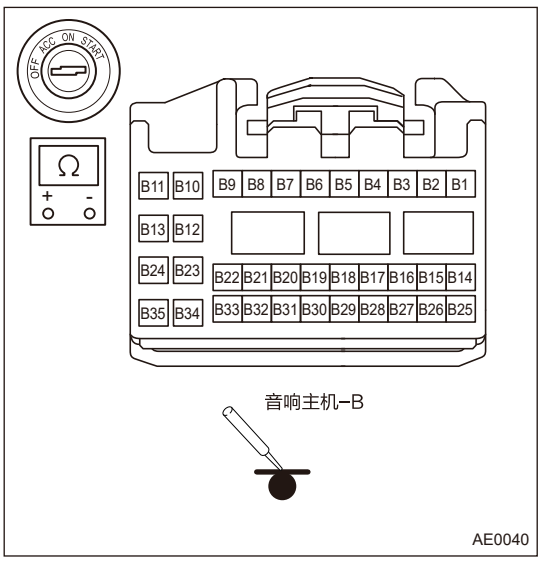
(f) Using a digital multimeter, measure voltage between audio head unit B connector (power supply terminal) and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Audio head unit B connector (power supply terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



(g) Using a digital multimeter, measure resistance between audio head unit B connector (ground terminal) and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Audio head unit B (-ground terminal) - Body ground	ENGINE START STOP switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness or connector**

OK

4	Confirm DTCs again

(a) Connect all the connectors.

(b) Connect the negative battery cable.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → Replace domain controller

DTC	B1832-04	Tuner IC R/W Failure

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Disconnect the radio antenna and audio head unit connector.
(c) Look for broken, bent, protruded or corroded connector terminals.
(d) Check if wire harness is worn, pierced, pinched or partially broken.

NG → Repair or replace wire harness or connector

OK ↓

2	Check circuit

(a) Using a digital multimeter, check for continuity between audio head unit audio antenna and audio antenna connector terminal.

NG → Repair or replace wire harness

OK ↓

3	Check radio antenna

(a) Replace radio antenna to compare and verify.
(b) Check if the same DTC appears.

OK → Replace radio antenna

NG ↓

4	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal
NG	Replace audio head unit

DTC	B1815-00	Abnormal GPS Antenna

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check GPS antenna connector

(a) Check if GPS antenna interface is clean and if there is a short circuit.

NG	Clean, repair and replace as needed

OK

2	Check GPS antenna

(a) Replace GPS antenna to compare and verify.
(b) Check if the same DTC appears.

OK	Replace GPS antenna

NG

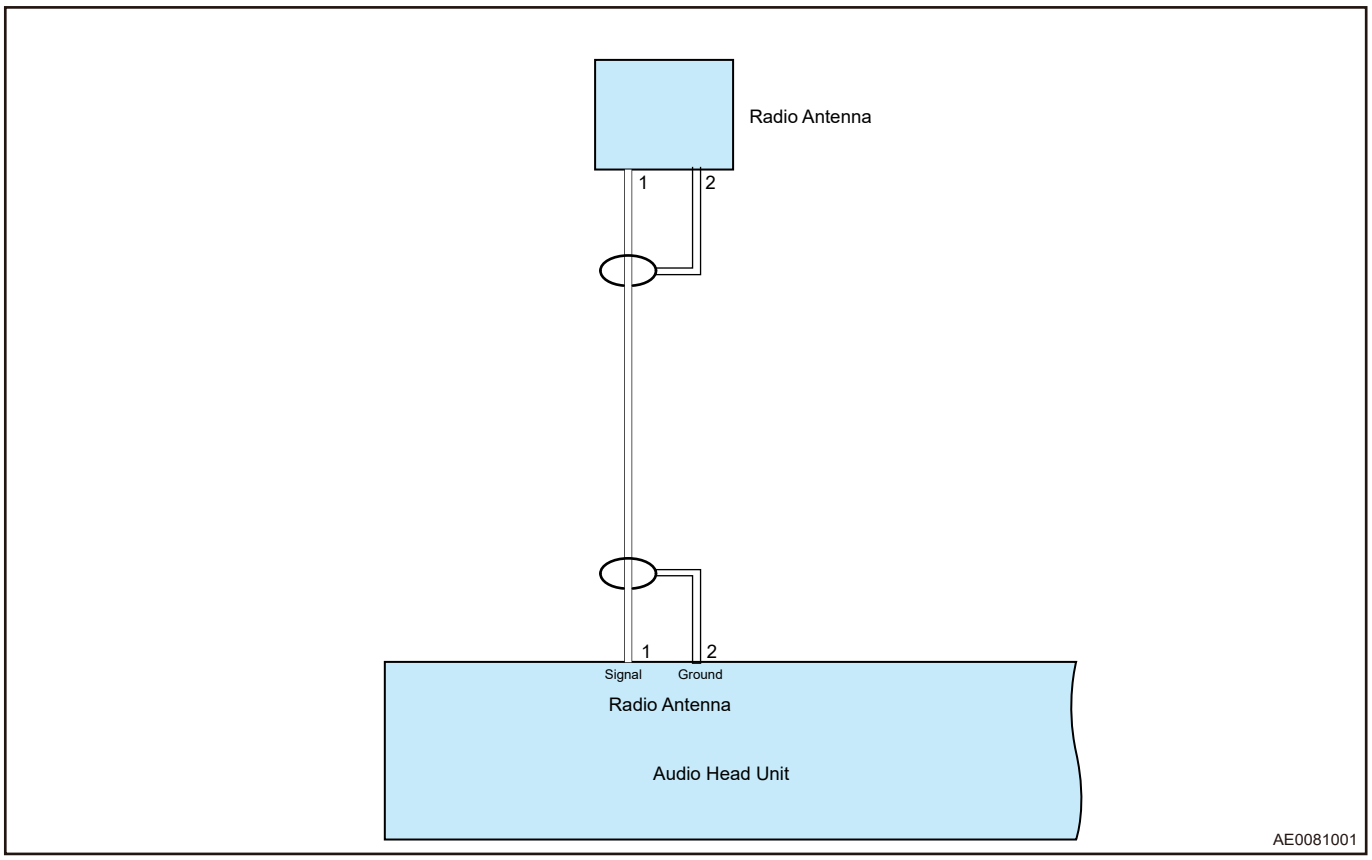
3	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal
NG	Replace audio head unit

DTC	B1814-11	Radio Antenna Circuit Short to Ground
DTC	B1814-17	Radio Antenna Circuit Voltage Above Threshold
DTC	B1814-13	Radio Antenna Circuit Open

System Schematic Diagram



■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

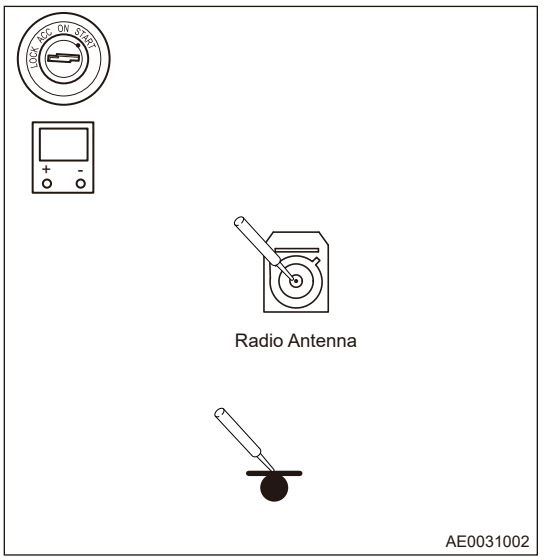
(a) Turn off all electrical equipment and ENGINE START STOP switch.

(b) Disconnect the negative battery terminal cable.

(c) Turn ENGINE START STOP switch to OFF.

(d) Disconnect the domain controller radio antenna connector.

(e) Using a digital multimeter, measure whether there is a short circuit between domain controller radio antenna terminal and ground according to the table below.

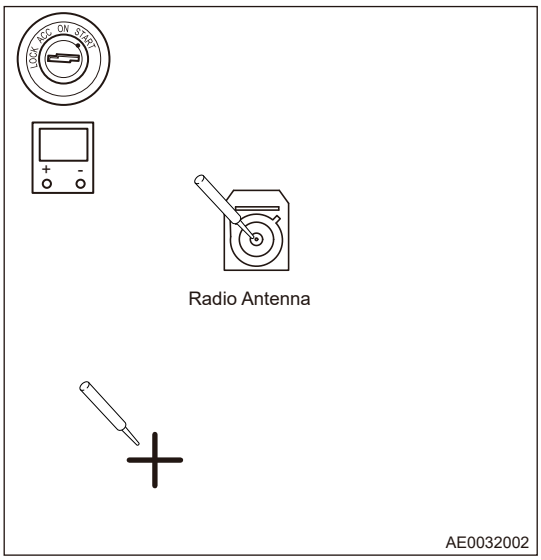


Multimeter Connection	Condition	Specified Condition
Domain controller radio antenna terminal (1) - Body ground	ENGINE START STOP switch "OFF"	∞

Multimeter Connection	Condition	Specified Condition
Domain controller radio antenna terminal (2) - Body ground		∞

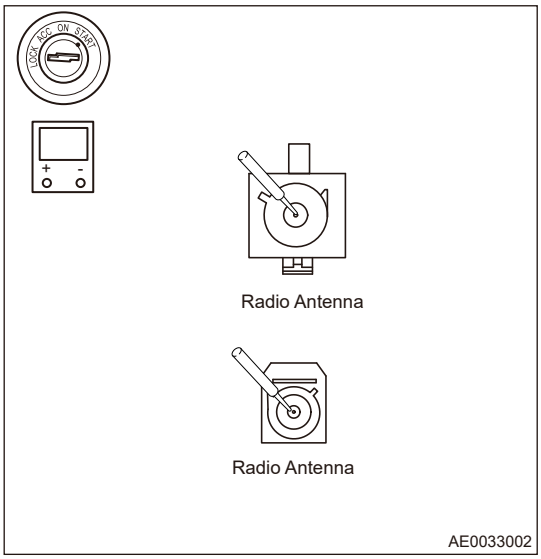
(f) Using a digital multimeter, measure whether there is a short circuit between domain controller radio antenna terminal and power supply according to the table below.

Multimeter Connection	Condition	Specified Condition
Domain controller radio antenna terminal (1) - Positive wire harness	ENGINE START STOP switch "OFF"	∞
Domain controller radio antenna terminal (2) - Positive wire harness		∞



(g) Using a digital multimeter, measure whether there is an open circuit between domain controller radio antenna terminal and antenna connector terminal according to the table below.

Multimeter Connection	Condition	Specified Condition
Domain controller radio antenna terminal (1) - Radio antenna terminal (1)	ENGINE START STOP switch "OFF"	Less than 1 Ω
Domain controller radio antenna terminal (2) - Radio antenna terminal (2)		Less than 1 Ω



NG → **Repair or replace wire harness or connector**

OK →

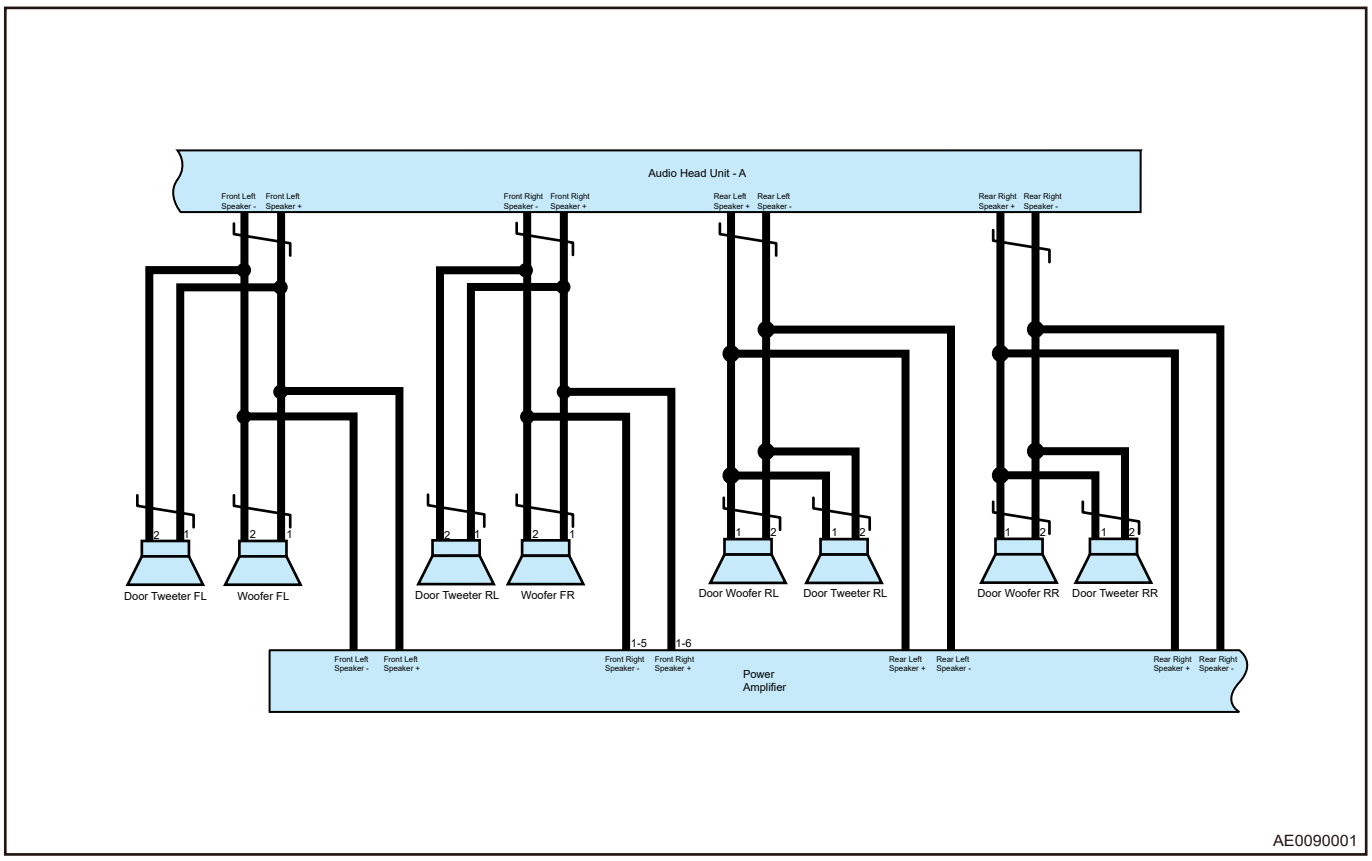
2	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal
NG	Replace domain controller

DTC	B1816-11	Front Left Speaker Circuit Short to Ground
DTC	B1816-12	Front Left Speaker Circuit Short to Battery
DTC	B1816-13	Front Left Speaker Circuit Open
DTC	B1817-11	Front Right Speaker Circuit Short to Ground
DTC	B1817-12	Front Right Speaker Circuit Short to Battery
DTC	B1817-13	Front Right Speaker Circuit Open
DTC	B1818-11	Rear Left Speaker Circuit Short to Ground
DTC	B1818-12	Rear Left Speaker Circuit Short to Battery
DTC	B1818-13	Rear Left Speaker Circuit Open
DTC	B1819-11	Rear Right Speaker Circuit Short to Ground
DTC	B1819-12	Rear Right Speaker Circuit Short to Battery
DTC	B1819-13	Rear Right Speaker Circuit Open
DTC	B1813-00	Speakers Connected to Amplifier Failure
DTC	B1830-04	Amplifier R/W Failure

System Schematic Diagram



■ DTC Confirmation Procedure

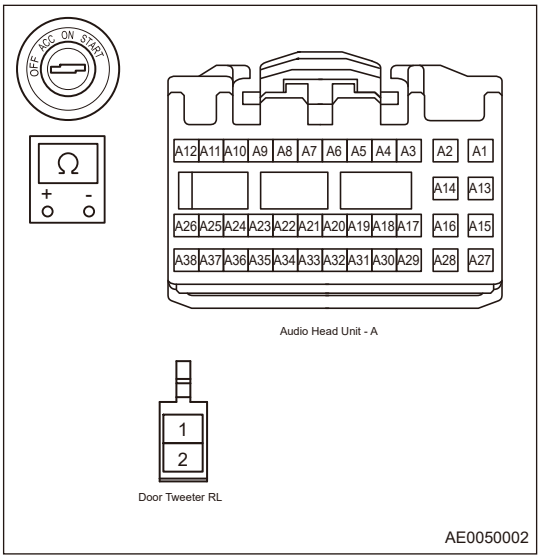
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check horn of vehicle

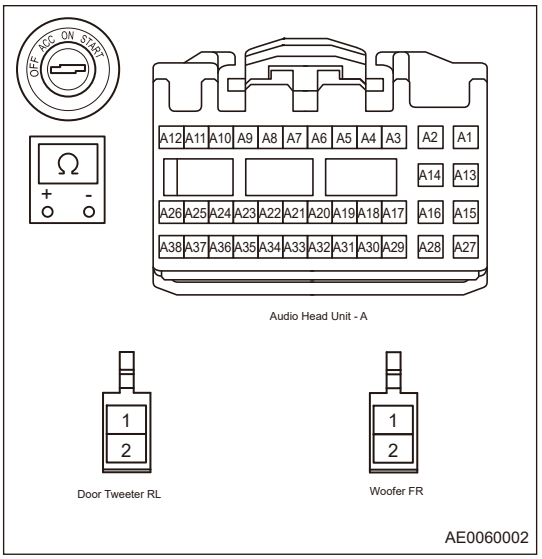
(a) Play music to check for speakers failing to operate on vehicle.
(b) Take the front right tweeter failing to operate as an example.
(c) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(d) Disconnect the front right tweeter and domain controller audio connector.
(e) Check for continuity between front right tweeter connector and domain controller audio connector.

Multimeter Connection	Condition	Specified Condition
Front right tweeter (1) - Domain controller audio (- connected terminal)	ENGINE START STOP switch OFF	Less than 1 Ω
Front right tweeter (2) - Domain controller audio (- connected terminal)		



(f) Take front right tweeter and front right woofer failing to operate as an example.
(g) Disconnect front right tweeter, front right woofer and domain controller audio connector.
(h) Check for continuity between front right tweeter connector, front right woofer connector and domain controller audio connector.

Multimeter Connection	Condition	Specified Condition
Front right tweeter (1) - Domain controller audio (- connected terminal)	ENGINE START STOP switch OFF	Less than 1 Ω
Front right tweeter (2) - Domain controller audio (- connected terminal)		
Front right woofer (1) - Domain controller audio (- connected terminal)		



Multimeter Connection	Condition	Specified Condition
Front right woofer (2) - Domain controller audio (- connected terminal)		

NG → **Repair or replace wire harness**

OK →

2	Check front right tweeter and woofer

(a) Using a replacement method, remove front left tweeter and woofer and install them to the front right position.

(b) Check if front right tweeter and woofer operate properly.

OK → **Replace tweeter and woofer**

NG → **Replace domain controller**

DTC	B1810-00	Front Panel Button Failure

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check center control panel wire harness and connector

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the center control panel connector.

(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

(e) Check for broken, bent, protruded or corroded terminals.

NG → **Repair or replace as needed**

OK →

2	Check center control panel

(a) Replace center control panel to compare and verify.

(b) Check if the same DTC appears.

OK → **Replace center control panel**

NG

3	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal
NG	Replace audio head unit

DTC	B1847-04	Connecting Fault with Head Unit Screen - System Internal Failure
DTC	B1848-04	Connecting Fault with Instrument Cluster Screen - System Internal Failure
DTC	B1849-04	Panoramic Controller Connection Failure - System Internal Failure

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Power off test

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Wait for 2 minutes, and then connect the negative battery cable, turn ENGINE START STOP switch to ON to check if the fault occurs again.

OK	System is normal

NG

2	Check hyperscreen and connecting wire harness between hyperscreen and domain controller

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Remove hyperscreen and connecting wire harness between hyperscreen and domain controller from malfunctioning vehicle, Then install it to a new vehicle and perform a test.

NG	Repair or replace hyperscreen and connecting wire harness

OK

3	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal
NG	Replace domain controller

DTC	B1811-00	Steering Button Failure

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

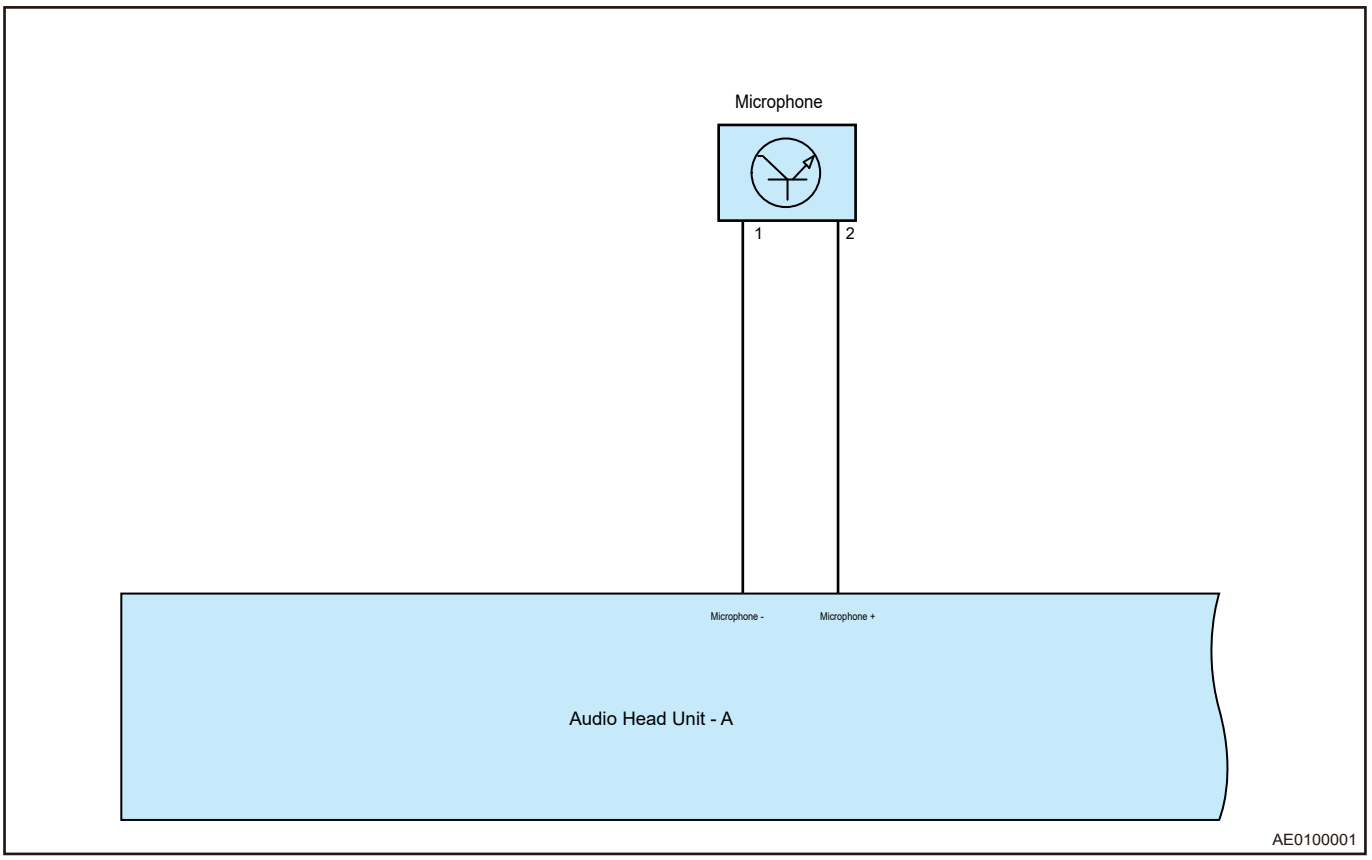
1	Check the steering wheel button

(a) Check if steering wheel button is stuck or damaged.

OK	Replace domain controller
NG	Replace steering wheel button

DTC	B184C-04	Microphone 1 Fault
DTC	B184D-04	Microphone 2 Fault

System Schematic Diagram



■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check microphone**

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Remove microphone 2 from malfunctioning vehicle, then install it to a new vehicle and perform a test.

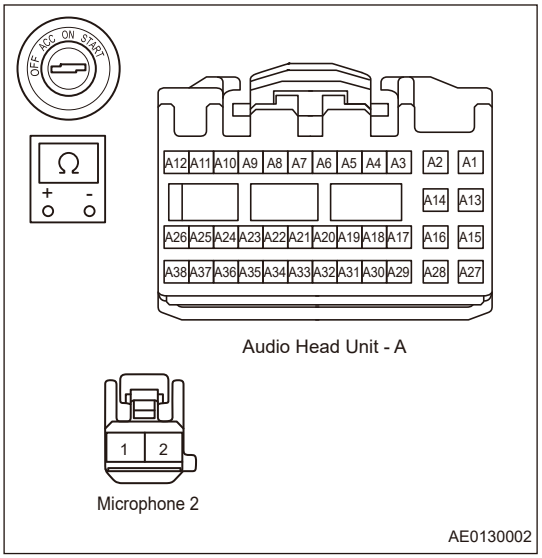
NG → **Replace microphone 2**

OK

2	**Check wire harness connector between domain controller and microphone 2**

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Disconnect microphone 2 connector and instrument panel wire harness controller audio connector.
(c) Check for continuity between microphone 2 connector and domain controller audio connector.

Multimeter Connection	Condition	Resistance
Microphone 2 connector (1) - Domain controller audio (connected terminal)	ENGINE START STOP switch "OFF"	< 1 Ω
Microphone 2 connector (2) - Domain controller audio (connected terminal)		



NG → **Repair or replace wire harness or connector**

OK

3	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace domain controller**

DTC	B1835-04	Communication Failure Between MCU and Main Processor
DTC	B1840-4B	MMI Over Temperature
DTC	B1841-19	USB1 Current Above Threshold
DTC	B1842-19	USB2 Current Above Threshold

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check domain controller

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.

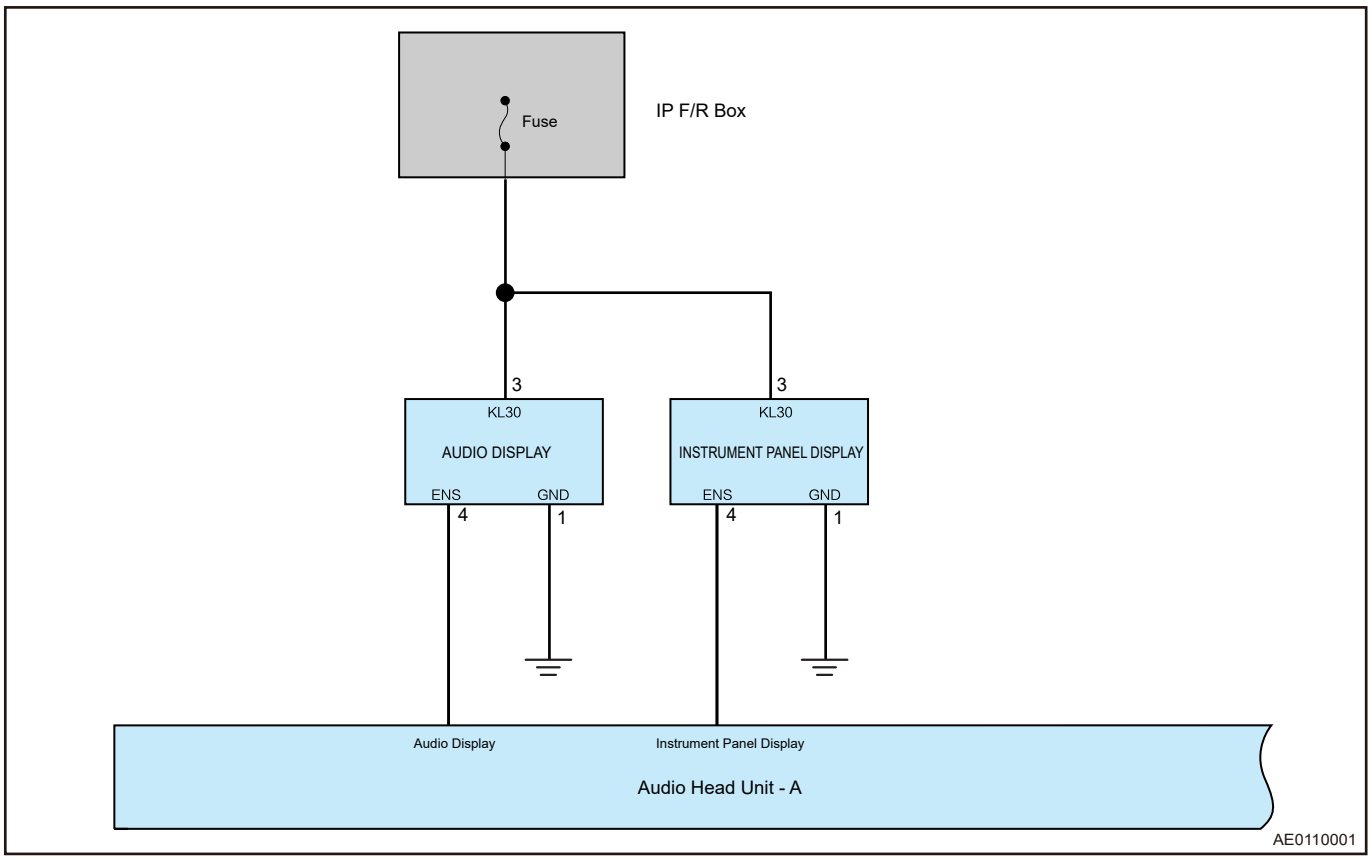
(b) Remove domain controller from malfunctioning vehicle, then install it to a new vehicle and perform a test.

(c) Check for system DTC.

OK	System is normal
NG	Replace domain controller

DTC	B181A-04	Central Control Display Overall Function Failure (Including but Not Limited to Display and Touch) - System Internal Failure
DTC	B181B-04	Central Control Display Module Function Fault - System Internal Failure
DTC	B181C-04	Central Control Display Touch Function Fault - System Internal Failure
DTC	B181D-04	Central Control Display Backlight Module Function Fault - System Internal Failure
DTC	B181E-04	Central Control Display Video Signal Failure - System Internal Failure
DTC	B181F-04	Central Control Display Backlight Level Missing - System Internal Failure
DTC	B1820-04	Communication Failure Between Central Control Display and Head Unit IIC - System Internal Failure
DTC	B1820-04	Communication Failure Between Display and IHU
DTC	B1843-16	Screen Undervoltage
DTC	B1843-17	Screen Overvoltage

System Schematic Diagram



■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Restart audio head unit**

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable for 5 minutes.
(b) Restart the audio head unit.
(c) Check for system DTC.

OK	**System is normal**

NG

2	**Check display power supply and communication line**

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Check display power supply and communication line.

NG	**Replace or check and repair related wire harness**

OK

3	Check domain controller

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.

(b) Remove domain controller from malfunctioning vehicle, then install it to a new vehicle and perform a test.

(c) Check for system DTC.

NG	Replace domain controller

OK

4	Display

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.

(b) Remove display from malfunctioning vehicle, then install it to a new vehicle and perform a test.

(c) Check for system DTC.

OK	System is normal
NG	Replace display

DTC	B1836-04	TBOX Connection ON/OFF Fault

■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Restart audio head unit

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable for 5 minutes.

(b) Restart the audio head unit.

(c) Check for system DTC.

OK	System is normal

NG

2	Check communication line

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.

(b) Check communication line between TBOX and display.

NG	Replace or check and repair related wire harness

OK

3	Check domain controller

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.

(b) Remove domain controller from malfunctioning vehicle, then install it to a new vehicle and perform a test.

(c) Check for system DTC.

NG → Replace domain controller

OK

4	TBOX

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.

(b) Remove Tbox from malfunctioning vehicle, then install it to a new vehicle and perform a test.

(c) Check for system DTC.

OK → System is normal

NG → Replace TBOX

DTC	B185E-00	VIN Not Programmed
DTC	B185F-00	PIN Not Programmed
DTC	SK Not Programmed	SK is not programmed

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Restart audio head unit

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable for 5 minutes.

(b) Restart the audio head unit.

(c) Check for system DTC.

OK → System is normal

NG

2	Rematch learning according to DTC information

(a) Turn ENGINE START STOP switch to ON.
(b) Use a diagnostic tester for system matching learning.

NG → **Replace or check and repair related wire harness**

OK

3	Check domain controller

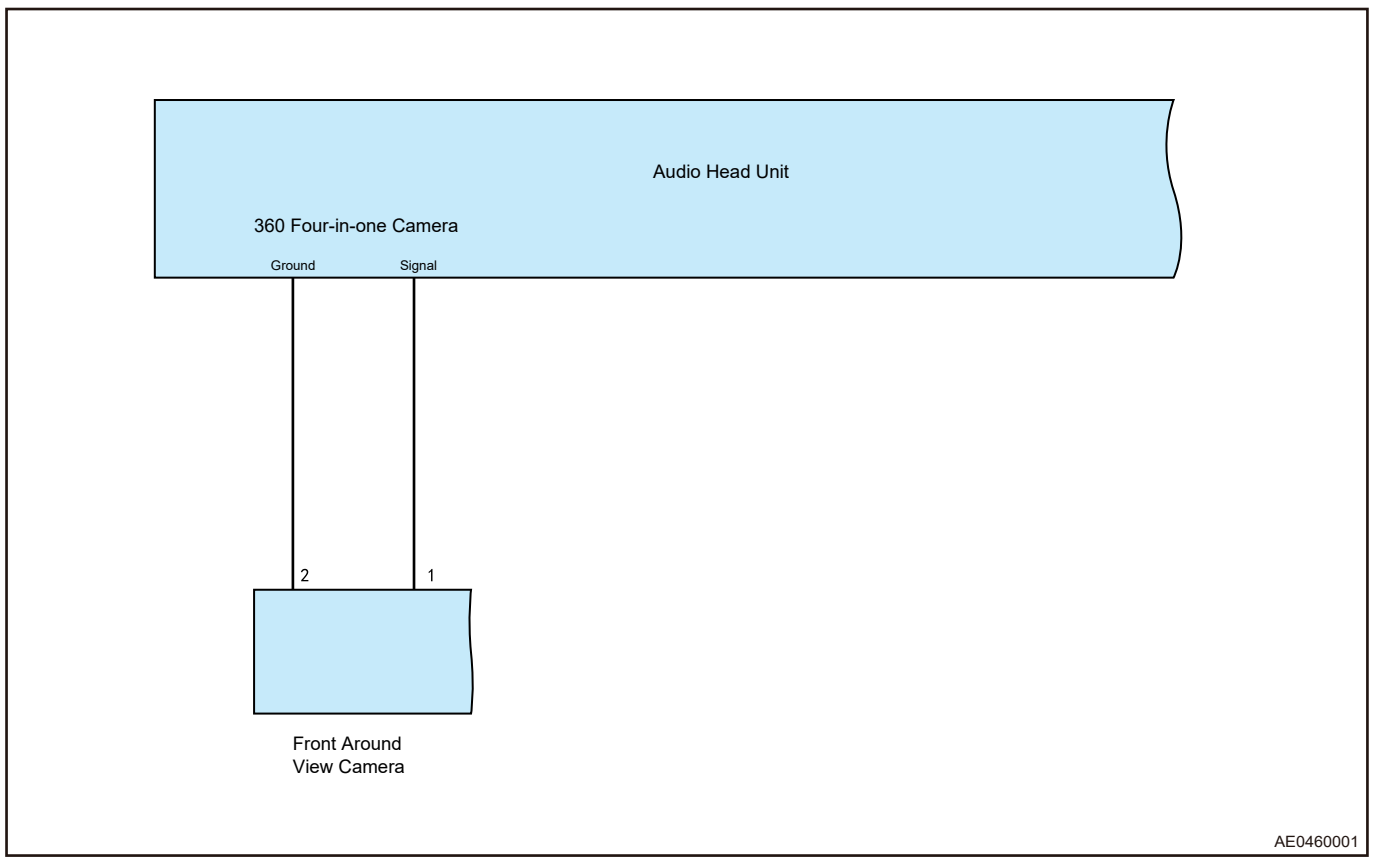
(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Remove domain controller from malfunctioning vehicle, then install it to a new vehicle and perform a test.
(c) Check for system DTC.

OK → **System is normal**

NG → **Replace domain controller**

DTC	B1850-11	Built-in AVM Front Camera Power Supply Short to Ground
DTC	B1851-12	Built-in AVM Front Camera Power Supply Short to Battery Positive
DTC	B1852-13	Built-in AVM Front Camera Wire Harness Open

System Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Replace camera

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace front camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK → **Replace front camera**

NG

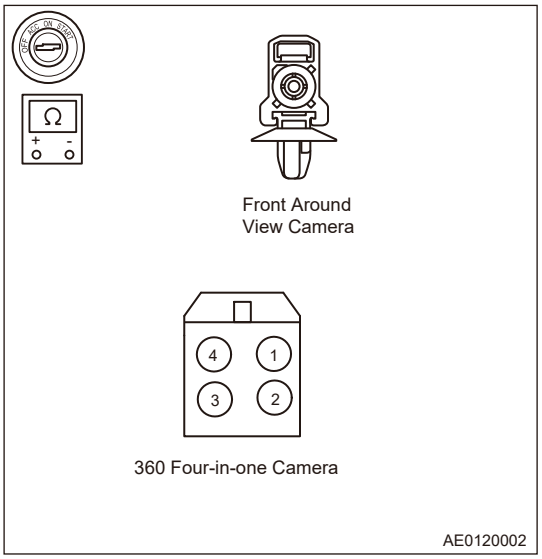
2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and front camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and front camera connector.

Multimeter Connection	Condition	Specified Condition
Four-in-one antenna connector (connected terminal) - Front camera connector (1)	Always	⩽ 1 Ω
Four-in-one antenna connector (connected terminal) - Front camera connector (2)	Always	⩽ 1 Ω



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

OK

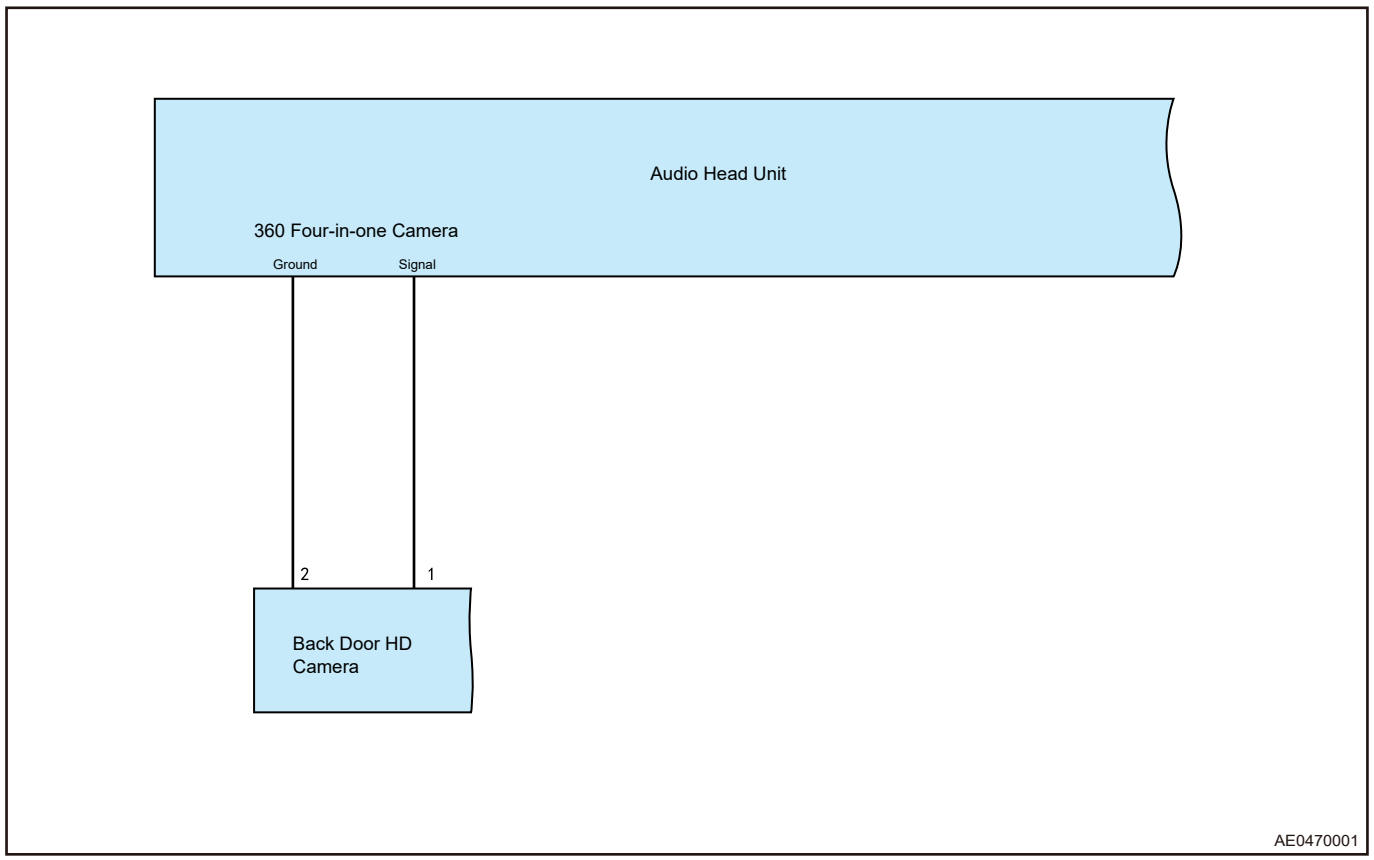
3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace domain controller**
OK	**Conduct test and confirm malfunction has been repaired**

DTC	**B1853-11**	**Built-in AVM Rear Camera Power Supply Short to Ground**
DTC	**B1854-12**	**Built-in AVM Rear Camera Power Supply Short to Battery Positive**
DTC	**B1855-13**	**Built-in AVM Rear Camera Wire Harness Open**

System Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Replace camera with a new one**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace rear camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK → **Replace rear camera**

NG

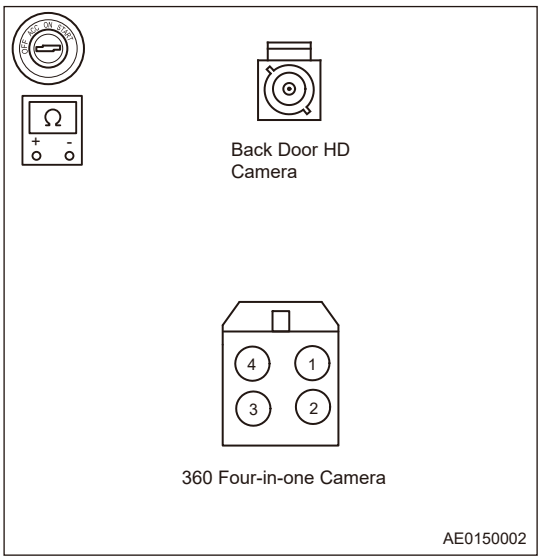
2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and rear camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and rear camera connector.

Multimeter Connection	Condition	Specified Condition
Four-in-one antenna (connected terminal) - Rear camera (1)	Always	⩽ 1 Ω
Four-in-one antenna (connected terminal) - Rear camera (2)	Always	⩽ 1 Ω



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

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

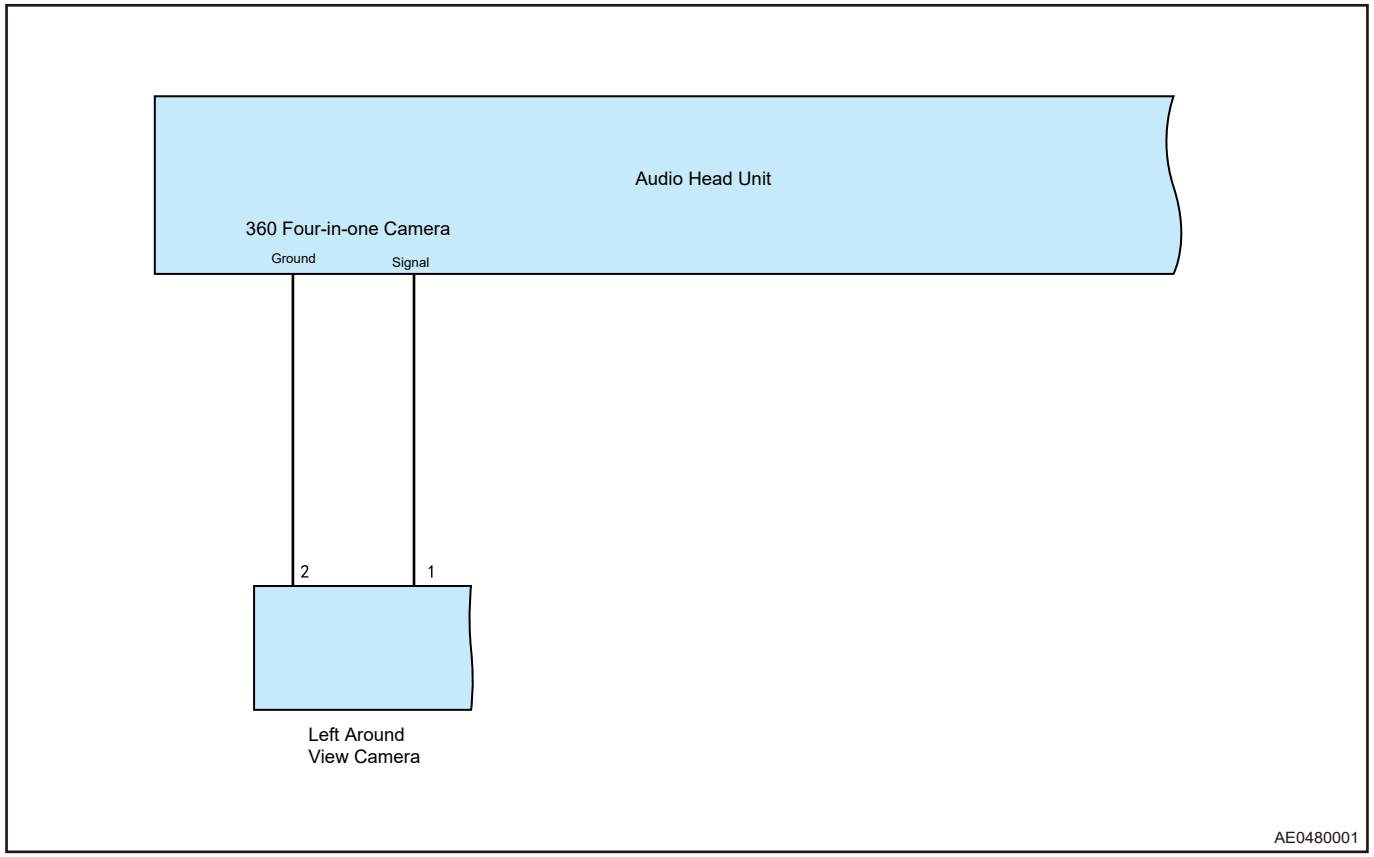
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1856-11	Built-in AVM Left Camera Power Supply Short to Ground
DTC	B1857-12	Built-in AVM Left Camera Power Supply Short to Battery Positive
DTC	B1858-13	Built-in AVM Left Camera Wire Harness Open

System Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Replace camera**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace left camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK → **Replace left camera**

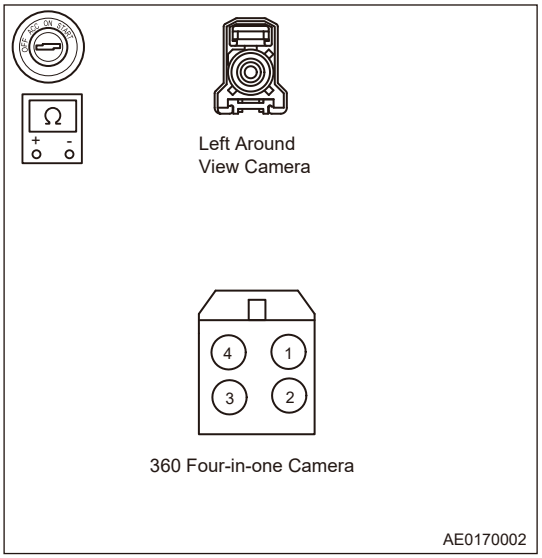
NG

2	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and left camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and left camera connector.



Multimeter Connection	Condition	Specified Condition
Four-in-one antenna connector (connected terminal) - Left camera connector (1)	Always	⩽ 1 Ω
Four-in-one antenna connector (connected terminal) - Left camera connector (2)	Always	⩽ 1 Ω

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

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

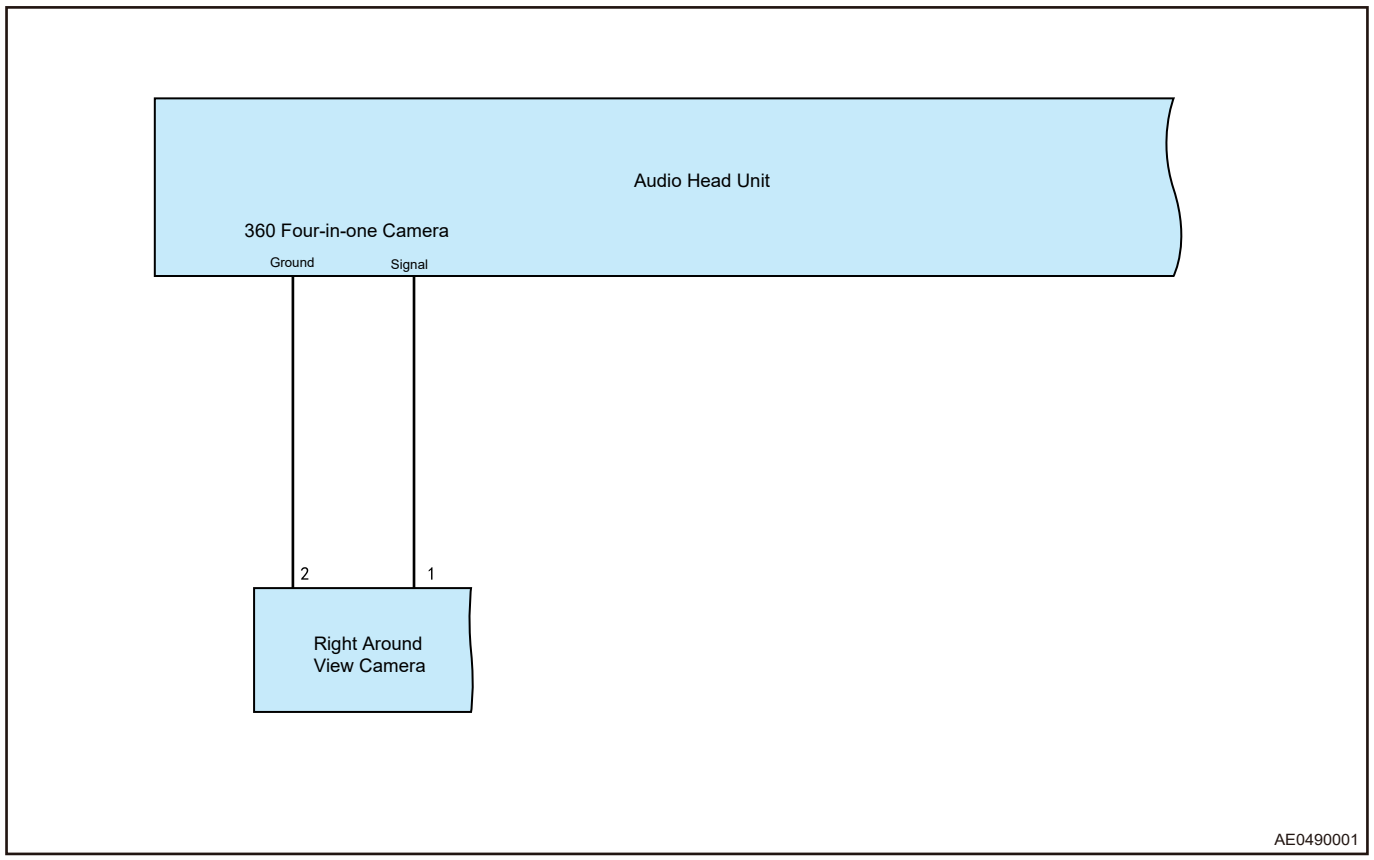
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**B1859-11**	**Built-in AVM Right Camera Power Supply Short to Ground**
DTC	**B185A-12**	**Built-in AVM Right Camera Power Supply Short to Battery Positive**
DTC	**B185B-13**	**Built-in AVM Right Camera Wire Harness Open**

System Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Replace camera**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace right camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK → **Replace right camera**

NG

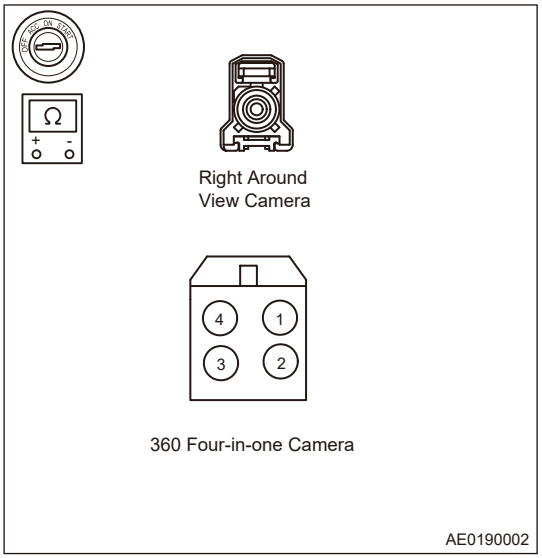
2	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and right camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and right camera connector.

Multimeter Connection	Condition	Specified Condition
Four-in-one antenna (connected terminal) - Right camera (1)	Always	⩽ 1 Ω
Four-in-one antenna (connected terminal) - Right camera (2)	Always	⩽ 1 Ω



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

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B185C-54	Built-in AVM No Calibration

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.

(b) Check if DTCs occur again.

NG → **Recalibrate the module**

OK

2	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

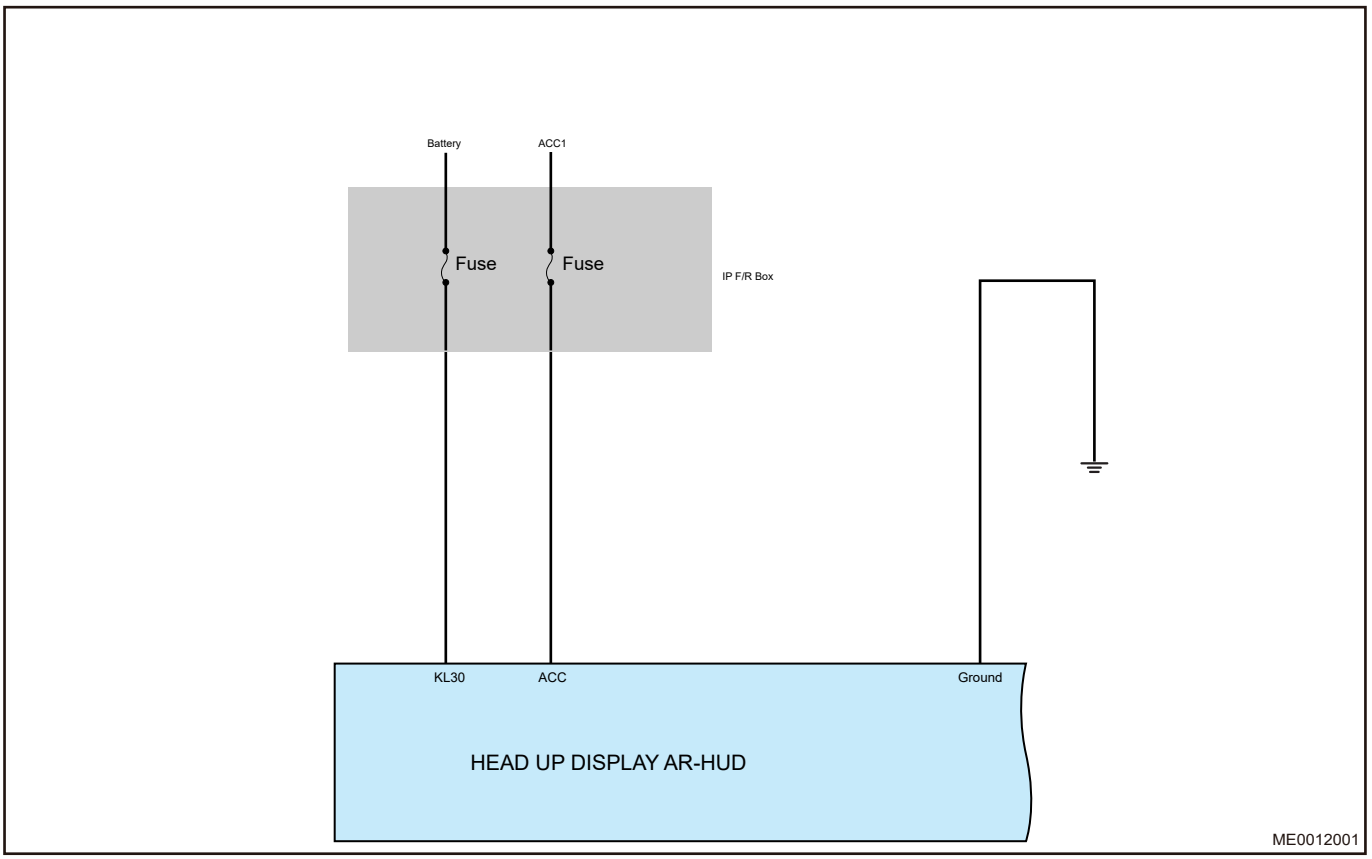
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new control module to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1E80-16	Circuit Voltage Below Threshold
DTC	B1E80-17	Circuit Voltage Above Threshold

System Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery voltage

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch "ON"	Not less than 12 V

NG → **Repair or replace battery/alternator**

OK

2	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuse is normal.

NG → **Replace fuse**

OK

3	Check interior power supply wire harness

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

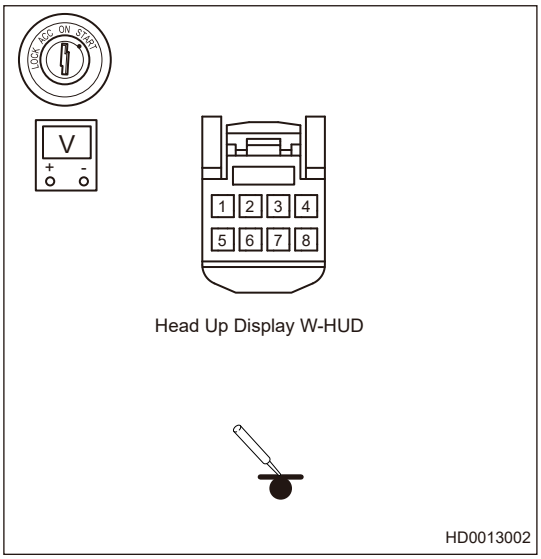
(c) Disconnect the head up display connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

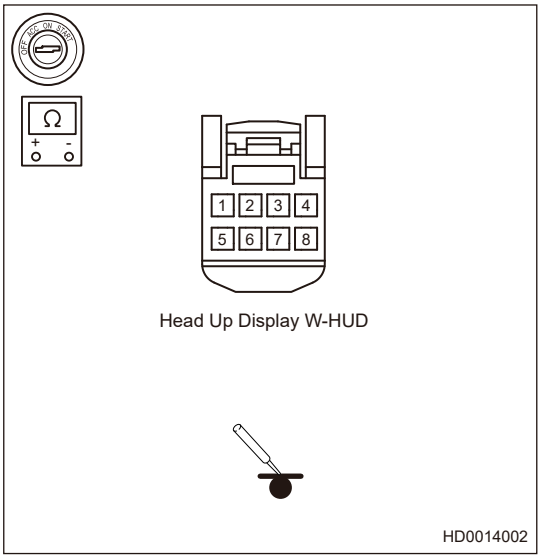
(f) Using a digital multimeter, measure voltage between head up display connector (power supply terminal) and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Head up display (- power supply terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



(g) Using a digital multimeter, measure resistance between head up display (ground terminal) and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Head up display (-ground terminal) - Body ground	ENGINE START STOP switch "OFF"	< 1 Ω



NG → **Repair or replace related wire harness**

OK

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG → **Replace head up display module**

OK → **System is normal**

DTC	**B1E81-1D**	**Motor Drive Circuit Current Out of Range**
DTC	**B1E81-4B**	**Motor Drive Over Temperature**
DTC	**B1E82-19**	**HUD LED Drive Circuit Current Above Threshold**
DTC	**B1E82-13**	**HUD LED Drive Circuit Open**
DTC	**B1E82-4B**	**HUD LED Drive Over Temperature**
DTC	**B1E84-71**	**HUD Reflector Position Switch Stuck**
DTC	**B1E85-4B**	**HUDTFT Overtemperature**
DTC	**B1E87-00**	**HUD Abnormal Reset**
DTC	**B1E88-04**	**HUD Display Screen Video Signal - Abnormal Video Signal**
DTC	**B1E89-04**	**HUD Display Screen Self Judgment - Solar Backflow Causing Screen Shutdown**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Reconfirm DTCs**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

OK	**System is normal**

2	**Check if vehicle HUD is in direct sunlight**

Use circuit diagram as a guide to perform the following inspection procedures:

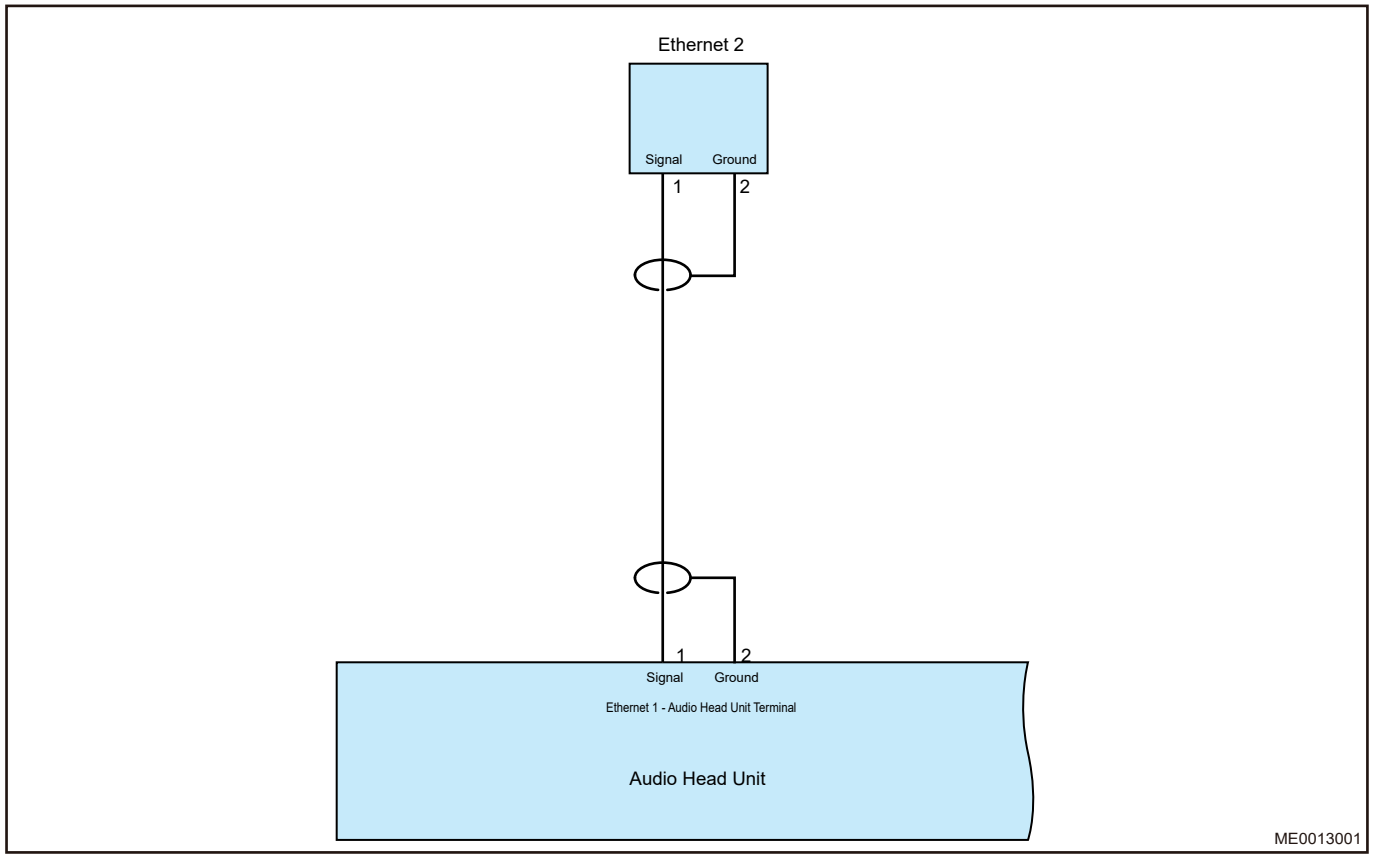
(a) Check if vehicle is in direct sunlight.

NG	**Adjust the vehicle to a cool and shaded environment, wait, and then retest**
OK	**Replace head up display module**

■ **5G network signal failure**

DTC	**U2151-08**	**Unexpected Connection Loss Between Gateway and Infotainment Domain Controller**
DTC	**U2120-84**	**Insufficient SQI**
DTC	**U2060-12**	**Short in Ethernet Signal Wire**
DTC	**U2080-13**	**Open in Ethernet Signal Wire**
DTC	**U2300-87**	**TBOX Information Communication Module Stops Providing Service**
DTC	**U2302-87**	**IDCU Smart Driving Domain Controller Stops Providing Service**
DTC	**U2350-87**	**TBOX Information Communication Module system Service Response Time Out**
DTC	**U2351-87**	**TBOX Information Communication Module BEICALL Call Service Response Time Out**
DTC	**U2352-87**	**TBOX Information Communication Module OTA Master Control Upgrade Service Response Time Out**
DTC	**U2353-87**	**TBOX Information Communication Module U Disk Upgrade Service Response Time Out**
DTC	**U2354-87**	**TBOX Information Communication Module U Disk Transmission Log Service Response Time Out**
DTC	**U2356-87**	**TBOX Information Communication Module Position Information Service Response Time Out**

System Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check if power supply and ground for sender module are normal**

NG → **Check and repair power supply or ground, verify the fault phenomenon again**

OK

2	**Check if vehicle module configuration is correct**

NG → **Rewrite correct configuration code, verify the fault phenomenon again**

OK

3	Check if the Ethernet connection is normal (open circuit, short circuit, etc.)

NG → Check and repair Ethernet bus and node, verify the fault phenomenon again

OK

4	Check the signal for strong interference

NG → Check if there is interference in the signal or the twisted pair is dropped with oscilloscope, verify the fault phenomenon again

OK

5	Check modules in network

NG → Replace module, verify the fault phenomenon again

OK

6	Replace module, check and repair, then verify the fault phenomenon again

DTC	U0140-87	Lost Communication with BCM
DTC	U0214-87	Lost Communication with PEPS
DTC	U0164-87	Lost Communication with CLM
DTC	U0141-87	Lost Communication with Reversing Radar
DTC	U0142-87	Lost Communication with Around View Monitor Module - Missing Message
DTC	U0230-87	Lost Communication with PLG
DTC	U0100-87	Lost Communication with EMS
DTC	U0129-87	Lost Communication with BSM
DTC	U0101-87	Lost Communication with TCU
DTC	U0151-87	Lost Communication with ABM
DTC	U1157-87	Lost Communication with Blind Spot Detection
DTC	U0131-87	Lost Communication with Electronic Power Steering Module

DTC	U1162-87	Lost Communication with Front Camera Module
DTC	U1163-87	Lost Communicate with Front Radar
DTC	U1193-87	Lost Communication with Electric Shifting Controller
DTC	U1189-87	Lost Communication with MFS
DTC	U0126-87	Lost Communication with SAM
DTC	U1194 -87	Lost Communication with Wireless Charging Module
DTC	U1160 – 87	Lost Communication with Auto A/C Panel
DTC	U0208-87	Lost Communication with Seat Module Controller
DTC	U0193-87	Lost Communication with Audio Control Panel Controller

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system

4 On-vehicle Service

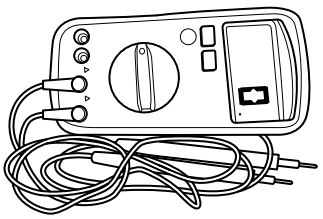
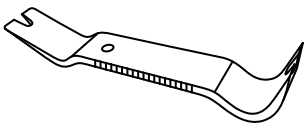
4.1 Specifications

■ Torque Specifications

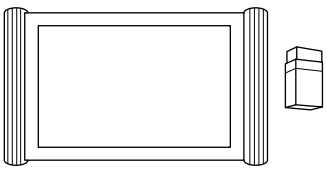
Description	Torque (N · m)
Woofer Fixing Screw	1.5 ± 0.5
Domain Controller Fixing Bolt	5 ± 1

4.2 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006
Interior Crow Plate	 RCH002506

■ Special Tool

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

4.3 Domain Controller

■ Removal

Hint:

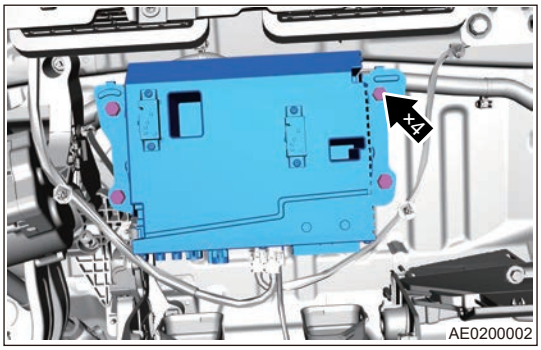
- Be sure to wear safety equipment to prevent accidents, when removing domain controller.
- Appropriate force should be applied, when removing domain controller. Be careful not to operate roughly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the auxiliary fascia console assembly.

(4) Remove 4 fixing bolts from domain controller.



(5) Disconnect domain controller connector, and remove domain controller.

■ **Installation**

⚠ Caution

- **Tighten fixing bolts to specified torque, when installing domain controller.**
- **Connect connectors in place, when installing domain controller.**
- **Check audio system for proper operation, after installing domain controller.**

(1) Place the domain controller to installation position.

(2) Install 4 fixing bolts to domain controller.
Tightening torque: 5 ± 1 N·m

(3) Connect the domain controller wire harness connector.

(4) Install the auxiliary fascia console assembly.

(5) Connect the negative battery cable.

4.4 Tweeter (Front Left)

■ **Removal**

Hint:
Use same procedures for right and left sides (take left side as an example).

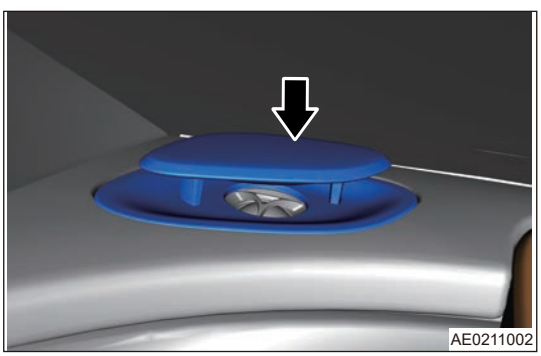
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing tweeter.**
- **Appropriate force should be applied when removing tweeter. Be careful not to operate roughly.**

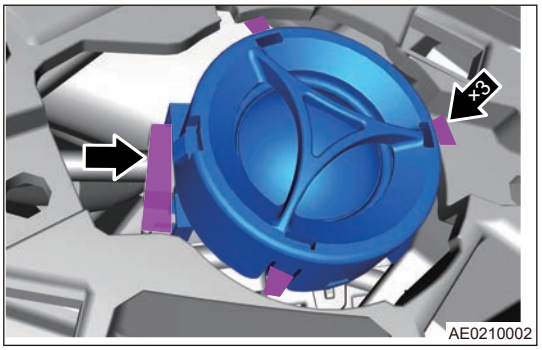
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Pry off left speaker cover assembly (arrow) from instrument panel, remove speaker cover assembly.



(4) Disconnect tweeter connector, pry up 3 fixing clips from front left tweeter and remove tweeter.



■ **Installation**

⚠ Caution
• **Check tweeter for proper operation, after installing tweeter.**

(1) Place the tweeter to installation position.

(2) Connect tweeter wire harness connector.

(3) Install the left speaker cover assembly.

(4) Connect the negative battery cable.

4.5 Woofer (Front Left)

■ **Removal**

Hint:
Use same procedures for right and left sides (take left side as an example).

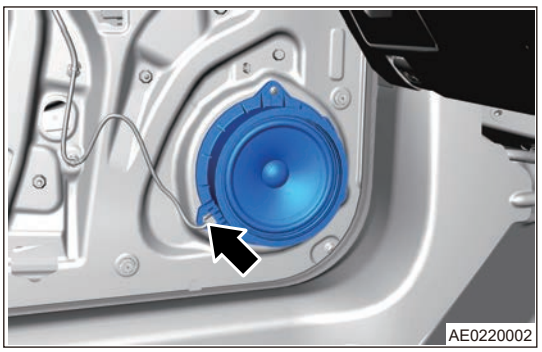
⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing woofer.** • **Appropriate force should be applied when removing woofer. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

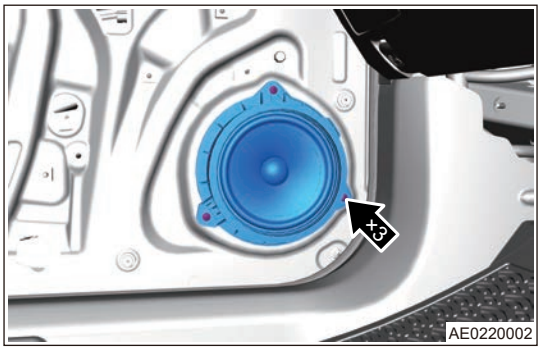
(3) Remove the front left door protector.

(4) Disconnect the woofer connector.



(5) Remove 3 fixing screws and woofer.

Tightening torque: 1.5 ± 0.5 N·m



■ **Installation**

⚠ Caution

- **Be sure to tighten fixing bolts to specified torque, when installing woofer.**
- **Check front left woofer for proper operation, after installing woofer.**

(1) Place the woofer to installation position.

(2) Install 3 fixing screws of woofer.

Tightening torque: 1.5 ± 0.5 N·m

(3) Install the front left door protector.

(4) Connect the negative battery cable.

4.6 Tweeter (Rear Left)

■ **Removal**

Hint:
Use same procedures for right and left sides (take left side as an example).

⚠ Caution

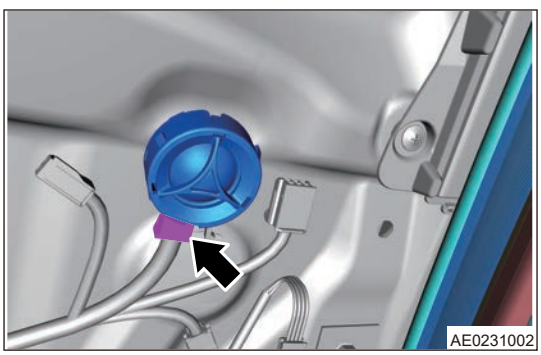
- **Be sure to wear safety equipment to prevent accidents, when removing rear left tweeter.**
- **Appropriate force should be applied when removing rear left tweeter. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

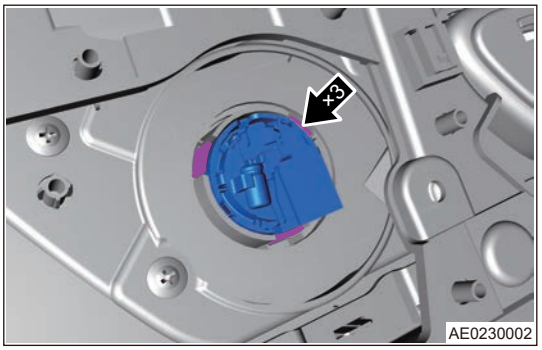
(2) Disconnect the negative battery cable.

(3) Remove the rear left door inner trim panel assembly.

(4) Disconnect the tweeter connector.



(5) Pry up 3 fixing clips of tweeter, and remove tweeter. Remove the tweeter.



■ **Installation**

⚠ Caution
• **Check tweeter for proper operation, after installing tweeter.**

(1) Place the tweeter to installation position.

(2) Connect tweeter wire harness connector.

(3) Install the rear left door interior trim panel.

(4) Install the negative battery cable.

4.7 Woofer (Rear Left)

■ **Removal**

Hint:
Use same procedures for right and left sides (take left side as an example).

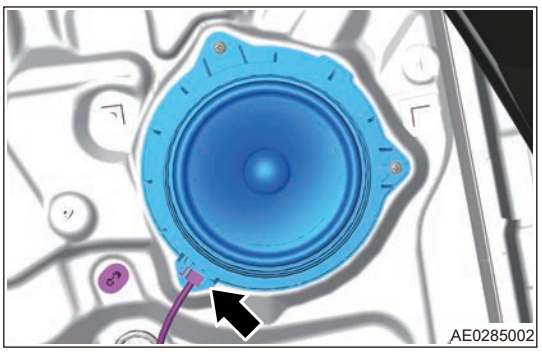
⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing woofer.** • **Appropriate force should be applied when removing woofer. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

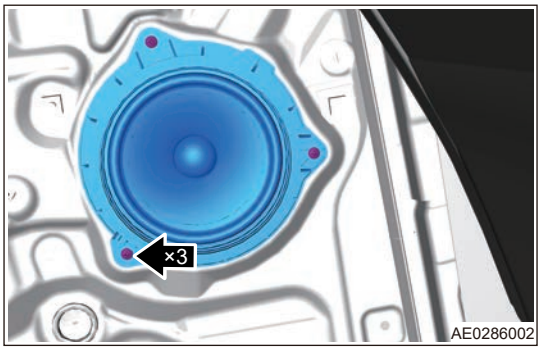
(2) Disconnect the negative battery cable.

(3) Remove the rear left door protector assembly.

(4) Disconnect the woofer connector.



(5) Remove 3 fixing screws and woofer.



■ **Installation**

⚠ Caution

- **Be sure to tighten fixing bolts to specified torque, when installing tweeter.**
- **Check tweeter for proper operation, after installing tweeter.**

(1) Place the woofer to installation position.

(2) Install 3 fixing screws of woofer.
Tightening torque: 1.5 ± 0.5 N·m

(3) Connect the woofer connector.

(4) Install the rear left door protector assembly.

(5) Connect the negative battery cable.

4.8 Subwoofer

■ **Removal**

Hint:

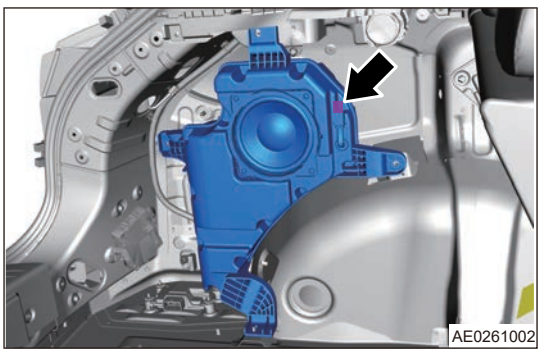
- Be sure to wear safety equipment to prevent accidents, when removing subwoofer.
- Appropriate force should be applied when removing subwoofer. Be careful not to operate roughly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

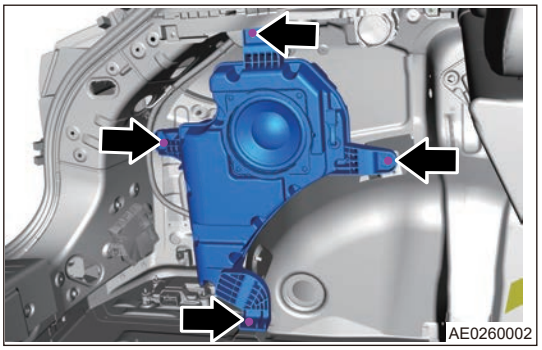
(2) Disconnect the negative battery cable.

(3) Remove the right luggage compartment wheel house assembly.

(4) Disconnect and remove subwoofer connector (arrow).



(5) Remove 3 fixing bolts of subwoofer and fixing nut of rear floor.



■ Installation

(1) Place the subwoofer to installation position.
(2) Install 3 fixing bolts of subwoofer and fixing nut of rear floor.
Tightening torque: 5 ± 1 N·m
(3) Connect subwoofer wire harness connector.
(4) Install the right luggage compartment wheel house assembly.
(5) Connect the negative battery cable.

4.9 Surround Speaker (Rear Left)

■ Removal

Hint:
Use same procedures for right and left sides (take left side as an example).

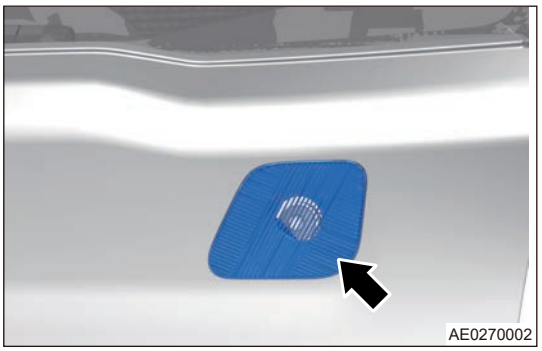
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing surround speaker.**
- **Appropriate force should be applied when removing surround speaker. Be careful not to operate roughly.**

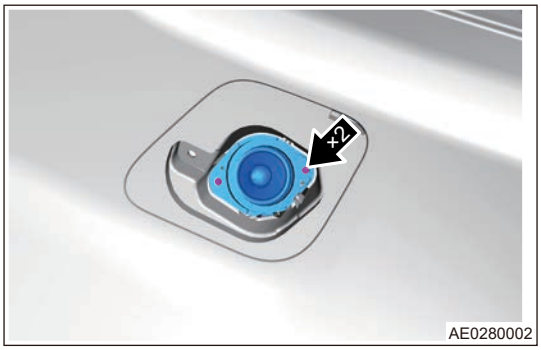
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

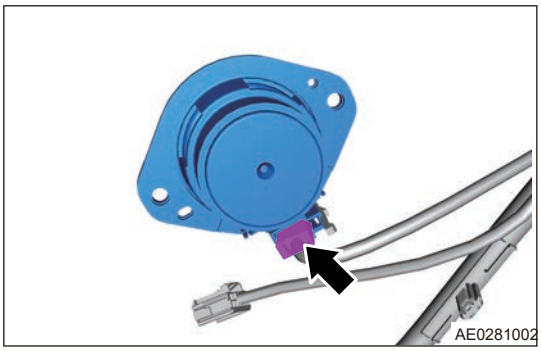
(3) Pry off speaker cover from back door lower inner protector assembly.



(4) Remove 2 fixing screws from surround speaker.



(5) Remove connector (arrow) and surround speaker.



■ **Installation**

⚠ Caution

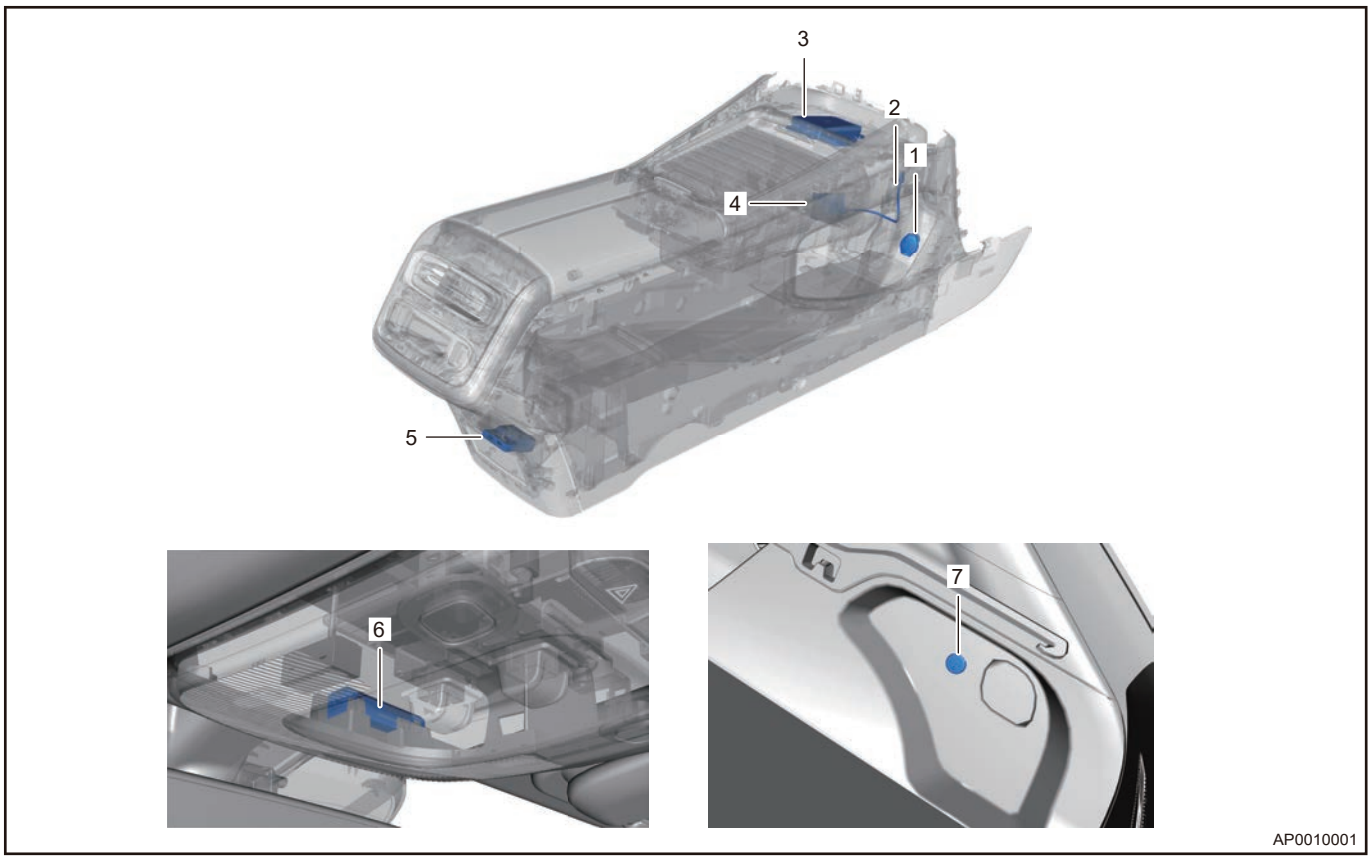
- **Be sure to tighten fixing bolts to specified torque, when installing rear left surround speaker.**
- **Check rear left surround speaker for proper operation, after installing rear left surround speaker.**

(1) Place the surround speaker to installation position.
(2) Install 2 fixing screws of surround speaker.
Tightening torque: 1.5 ± 0.5 N·m
(3) Connect surround speaker wire harness connector.
(4) Install speaker cover of back door lower inner protector assembly.
(5) Connect the negative battery cable.

10.3 ACCESSORY POWER SUPPLY

1 System Overview

1.1 System Components Diagram



1	Backup Power Supply and Cigarette Lighter	2	USB Connecting Wire
3	Mobile Phone Wireless Charging Module	4	USB Charging Module
5	Rear USB Charging Module	6	USB Charging Module
7	Backup Power Supply and Cigarette Lighter		

The backup power supply and cigarette lighter refer to a 12 V power socket inside our vehicle. Two backup power supplies and cigarette lighters are located below the auxiliary fascia console and above the right luggage compartment wheel house assembly. It consists of a cover, hog ring, and base assembly.
Wireless charging adopts an electromagnetic induction technology with convenience, versatility, novelty and safety, so that you can have a better experience while driving.

1.2 Wireless Charging Usage Description

(1) Turn ENGINE START STOP switch to ON mode and place mobile phone in the wireless charging sensing area, then the wireless charging starts to operate, and the audio head unit displays a normal charging symbol; After charging is completed, audio head unit will display a charging completed symbol.

(2) Wireless charging may not work properly in the following conditions:

- The back of mobile phone is more than 5.1 mm away from wireless charging sensing area, and mobile phone cannot be charged.
- There is thick metal on back of mobile phone (such as 1 yuan coin, metal housing of mobile phone), mobile phone cannot be charged, and audio head unit displays a mark with exclamation mark.
- Wireless charging operation frequency is close to keyless entry working frequency, which is easy to interfere with each other; When door is open/closed, the vehicle will recognize whether the key is left in vehicle, the keyless entry starts to work. At this time, it's necessary to shield charging function for 30 seconds; Wait for 30 seconds, the wireless charging function resumes.

⚠ Caution

If your mobile phone does not support the wireless charging function, it is recommended that you do not use the wireless charging paster. The quality of wireless charging paster in the market is uneven and easy to be damaged if used frequently (function failure, poor interface contact, identification failure in metal foreign objects, etc.).

(3) Phone forgetting reminder function: When ENGINE START STOP switch is switched to OFF mode and driver side door is opened, if mobile phone is placed in the wireless charging sensing area, the system will sound an alarm for 20 seconds and alarm stops if the phone is removed within 20 seconds.

⚠ Caution

- **Phone forgetting reminder function only supports the mobile phone with wireless charging function.**
- **Phone forgetting reminder function needs to be set in the audio system.**

(4) For Wireless Charging System (CWC) function settings and status display item suggestions and signals, refer to signal list

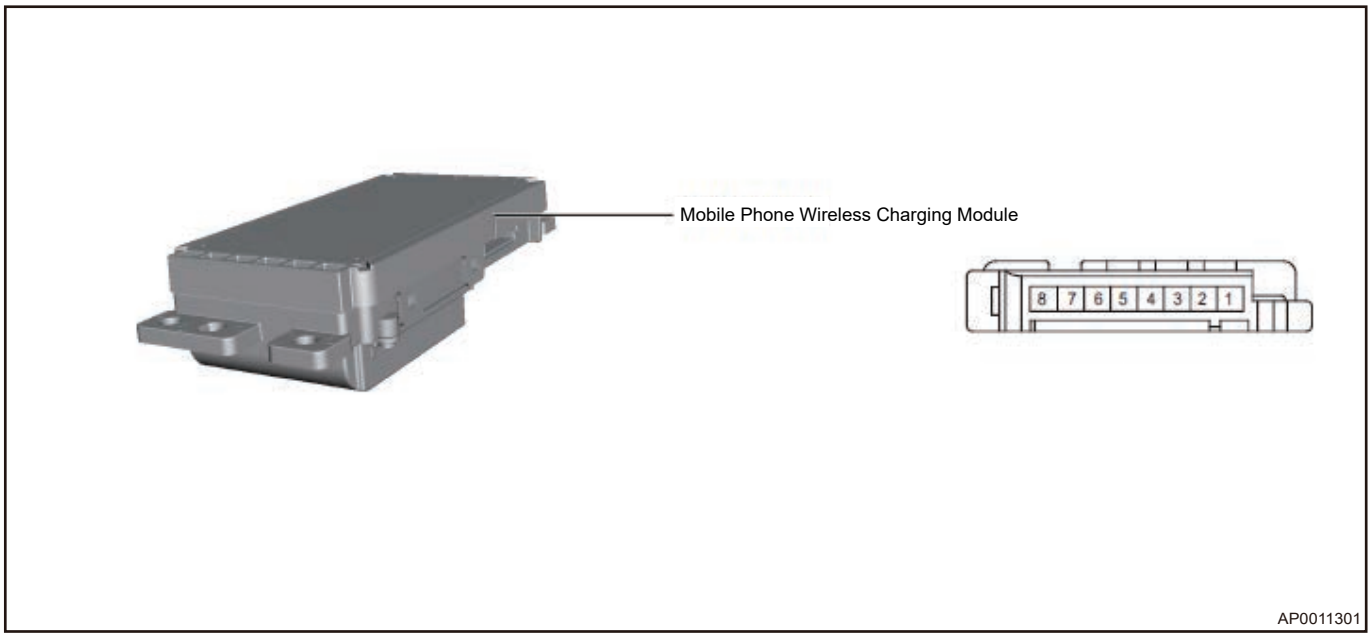
Level 1 Menu	Level 2 Menu	Selection Item	Note
Vehicle settings	Mobile phone wireless charging function	ON	IHU is set to ON by default, CWC will keep the wireless charging function ON until "OFF" signal is sent from IHU. With wireless charging function ON, CWC starts the wireless charging operation after mobile phone is detected in charging position and ACC signal is received.
		OFF	
	Phone forgetting reminder function	ON	Phone forgetting reminder function will keep ON until "OFF" signal is sent from IHU. With forgetting reminder function ON, an alarm signal will be sent to DVD when forgetting reminder condition is detected, and no alarm is sent when forgetting reminder is off.
		OFF	
Display status	/	In charging	Three display statuses (no icon will be displayed on head unit when vehicle is not charged).
		Charging completed	
		Charging fault	

Level 1 Menu	Level 2 Menu	Selection Item	Note
Forgetting reminder		Sending alarm signal	With mobile phone on CWC, CWC starts to count the time and sends alarm signal to IHU after ACC off signal and driver side door open signal are received by CWC, then head unit alarms. CWC stops sending alarm signal after 20s or if mobile phone is removed within 20s, then head unit stops alarming.
		Stopping alarm signal	

2 Circuit Diagram

2.1 Module Terminal Definition

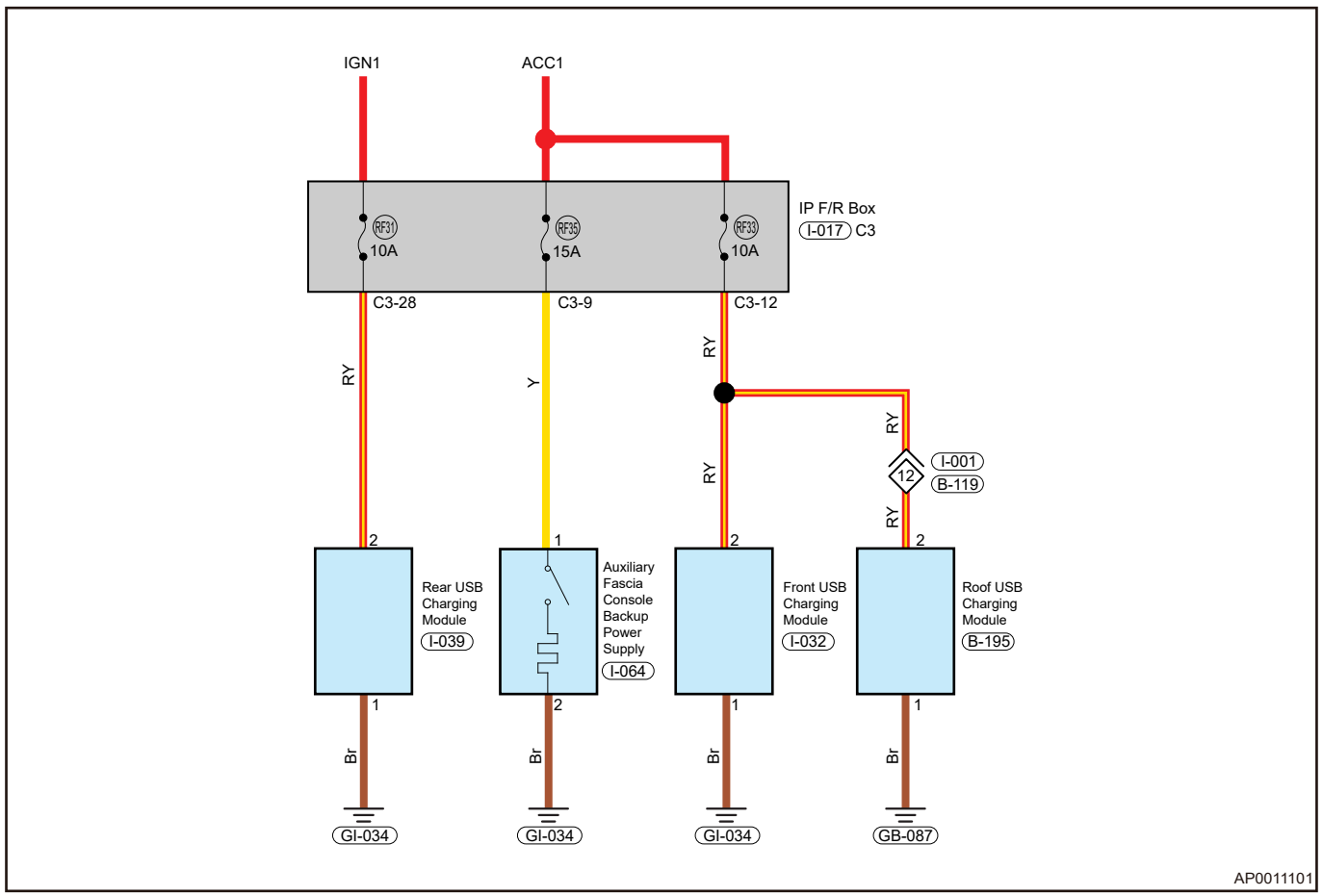
■ Mobile Wireless Charging Module Terminal Definition



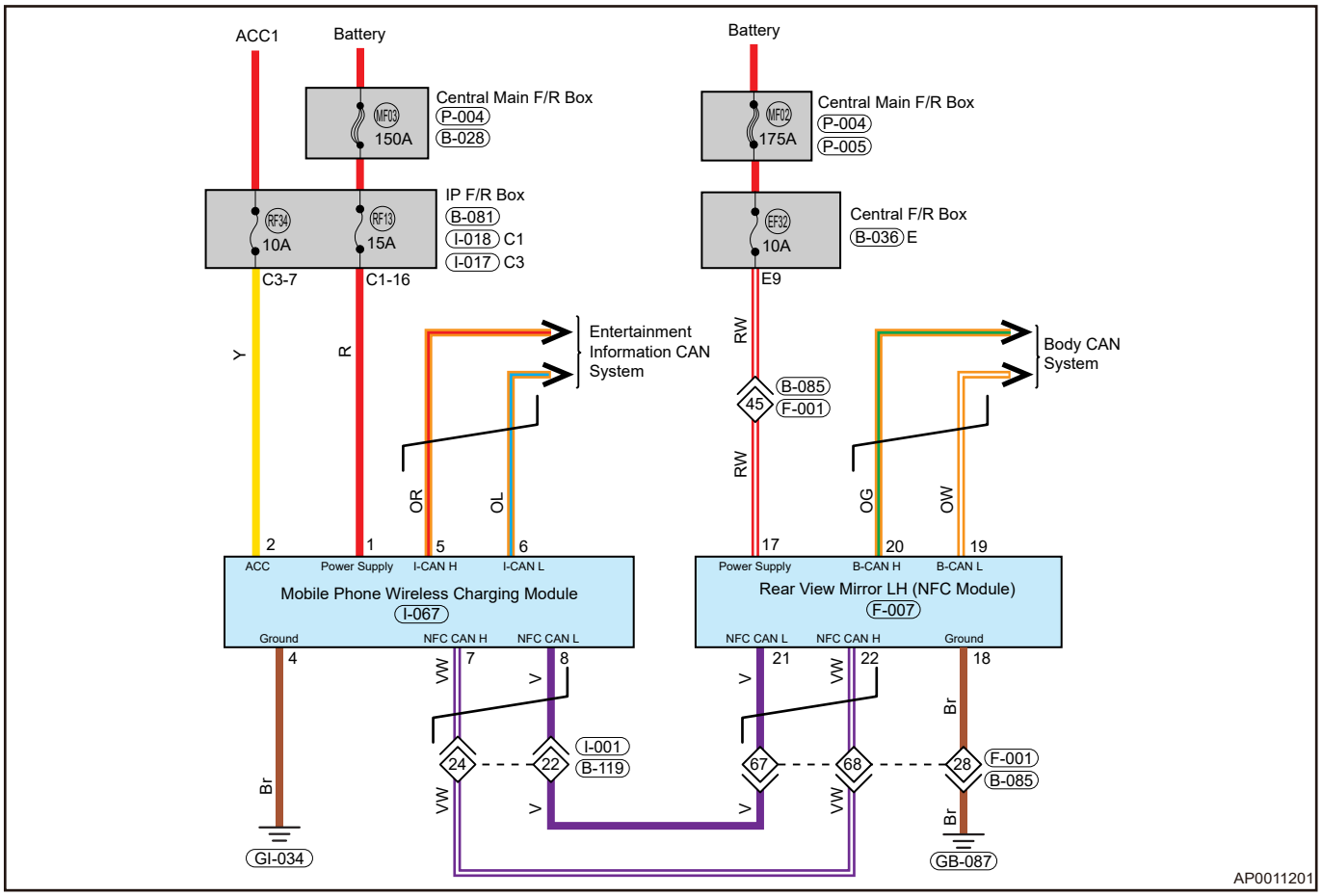
1	Power Supply	5	I-CAN H
2	ACC	6	I-CAN L
3	-	7	NFC CAN H
4	Ground	8	NFC CAN L

2.2 System Circuit Diagram

■ Backup Power Supply, USB Charging Module



■ **Wireless Charging, NFC**



3 Diagnosis & Testing

3.1 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean system grounds related to the latest DTCs.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

3.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.

- Inspect components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

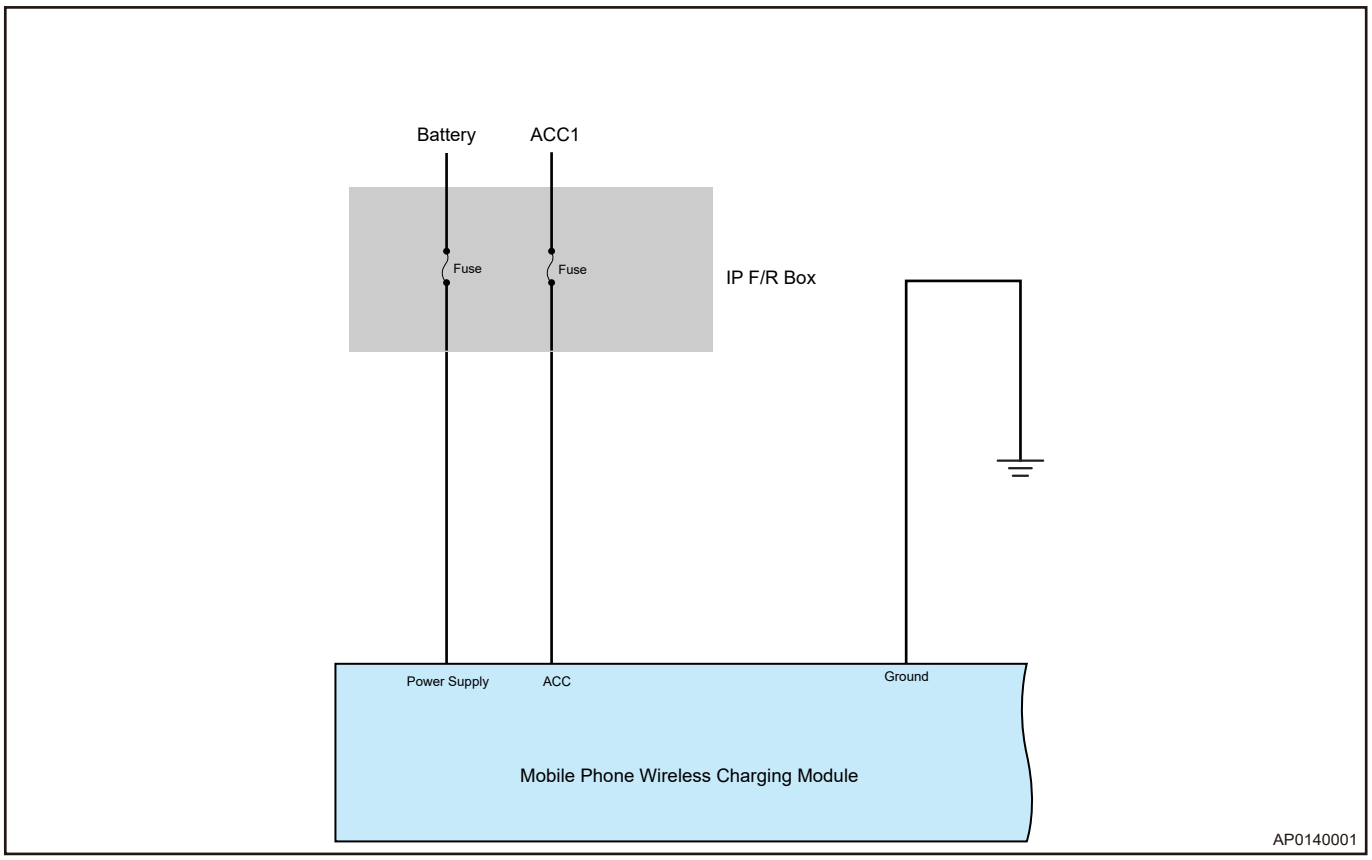
3.4 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Possible Causes
B1B32-16	System Voltage Low	• Disconnection or poor connection between battery and instrument panel after engine starting • Power supply is not stable, and some loads may decrease suddenly • Power supply is not stable, and load fails suddenly • Instrument panel wire harness and connector fault
B1B33-17	System Voltage High	
B1B30-92	Foreign Object Existing-Performance Or Incorrect Operation	• Foreign matters exist between mobile phone and wireless charging • Excessive charing time • Wireless charging paster damaged • Charging operation out of standard
B1B31-98	Temperature Too High - Component or System Temperature Too High	
B1B34-98	Abnormal Fan - Component Or System Over Temperature	
U0073-88	Node Offline	Refer to CAN communication system
U0100-87	Lost Communication with EMS	
U0129-87	Lost communication with BSM	
U0140-87	Lost Communication with BCM	
U1300-55	Software Configuration Error	

3.5 DTC Diagnosis Procedure

DTC	B1B32-16	Circuit Voltage Below Threshold
DTC	B1B33-17	Circuit Voltage Above Threshold

System Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the wireless charging module connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

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

OK

2	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuse is normal.

NG → **Replace fuse**

OK

3	**Check wireless charging module power supply voltage**

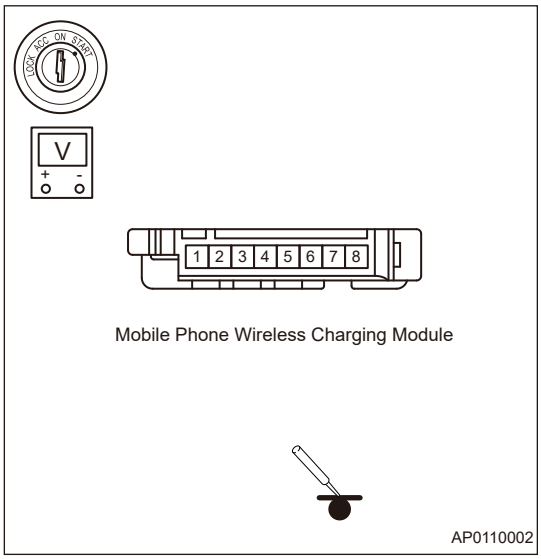
(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the wireless charging module connector.

(c) Connect the negative battery cable, and turn ENGINE START STOP switch to ON.

(d) Using a digital multimeter, check for voltage between wireless charging module connector power supply terminal and ground according to the table below.

Multimeter Connection	Specified Voltage
Wireless charging module connector (power supply terminal) - Ground	Not less than 12 V
Wireless charging module connector (ACC terminal) - Ground	Not less than 12 V



NG → **Check and repair wire harness or connector**

OK

4	**Using a 21 W test lamp, test power supply voltage**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the wireless charging module connector.

(c) Connect the negative battery cable, and turn ENGINE START STOP switch to ON.

(d) Using a 21 W test lamp, check voltage between the terminals of instrument panel fuse and relay box to check if power supply of power supply voltage is normal according to the table below.

Multimeter Connection	Specified Condition
Instrument panel fuse and relay box (corresponding terminal) - Ground	Test light comes on normally
Instrument panel fuse and relay box (corresponding terminal) - Ground	Test light comes on normally

NG → **Check and repair wire harness or connector**

OK

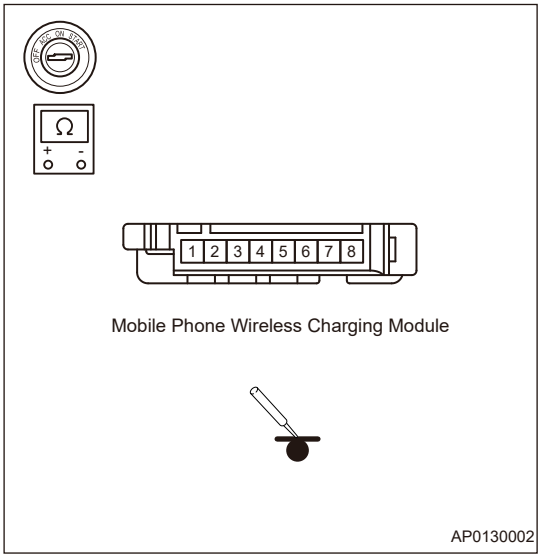
5	Check ground

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the wireless charging connector.

(c) Measure resistance between wireless charging module connector ground terminal and ground and check if it is open according to the table below.

Multimeter Connection	Condition	Specified Condition
Wireless charging module connector (-ground terminal) - Body ground	Always	⩽ 1 Ω



NG → **Check and repair wireless charging module ground wire harness and ground point**

OK

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace wireless charging module**

OK → **System operates normally**

DTC	B1B30-92	Foreign Object Existing-Performance Or Incorrect Operation
DTC	B1B31-98	Temperature Too High - Component or System Temperature Too High
DTC	B1B34-98	Abnormal Fan - Component Or System Over Temperature

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for foreign matters

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the wireless charging wire harness connector.

(c) Check for foreign matters between wireless charging module and mobile phone.

NG → **Remove foreign matters.**

OK

2	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the wireless charging module connector.

(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

(d) Check for broken, bent, protruded or corroded terminals.

(e) Check if related connector pins are in good condition.

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

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace wireless charging module**

OK → **System operates normally**

DTC	U0073-88	Node Offline
DTC	U0100-87	Lost Communication with EMS
DTC	U0129-87	Lost communication with BSM
DTC	U0140-87	Lost Communication with BCM
DTC	U1300-55	Software Configuration Error

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

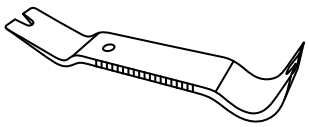
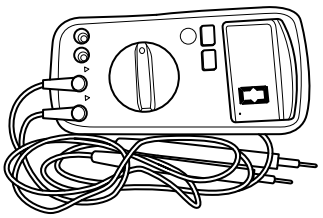
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system.

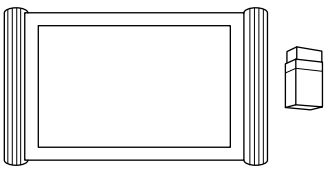
4 On-vehicle Service

4.1 Tools

■ **General Tools**

Tool Name	Tool Drawing
Interior Crow Plate	 RCH002506
Digital Multimeter	 RCH0002006

■ **Special Tool**

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

4.2 Front Backup Power Supply

■ **Removal**

⚠ **Caution**

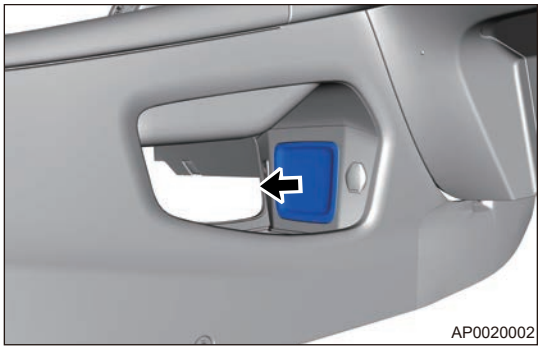
- **Be sure to wear safety equipment to prevent accidents, when removing front backup power supply.**
- **Appropriate force should be applied, when removing front backup power supply. Be careful not to operate roughly.**
- **Try to prevent USB panel assembly from being scratched, when removing front backup power supply.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

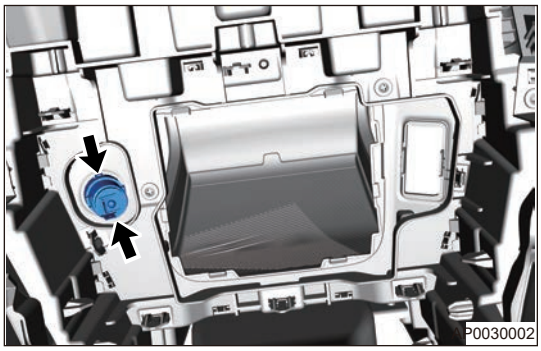
(3) Remove the front backup power supply.

1) Pry off clip of air freshner block cover, and remove air freshner block cover.



2) Disconnect connector from backup power supply.

3) Press fixing clips (arrow) of backup power supply and remove backup power supply.



■ **Installation**

⚠ Caution
• **Check backup power supply for proper operation after installing backup power supply assembly.**

(1) Place the backup power supply assembly to installation position.

(2) Connect the backup power supply connector.

(3) Install the air freshner block cover.

(4) Connect the negative battery cable.

4.3 USB Charging Module

■ **Removal**

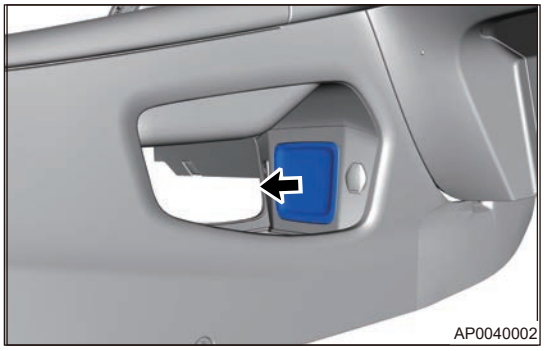
⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing USB charging module.** • **Appropriate force should be applied, when removing USB charging module assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

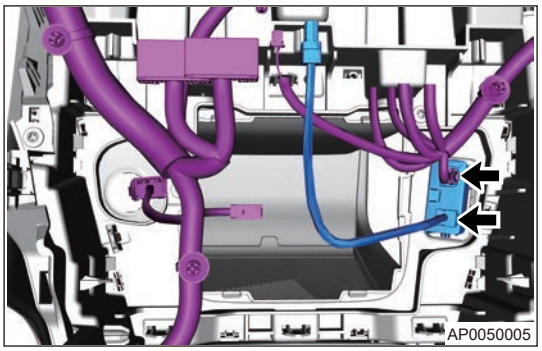
(2) Disconnect the negative battery cable.

(3) Remove the USB charging module.

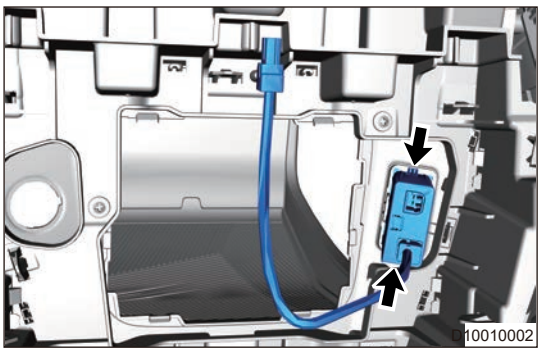
1) Pry off clip of air freshner block cover, and remove air freshner block cover.



2) Disconnect the USB charging module connector (arrow).



3) Press 2 clips (arrow), and remove USB charging module.



■ **Installation**

⚠ Caution

- **Check USB charging module for proper operation after installing USB charging module.**

(1) Place the USB charging module assembly to installation position.
(2) Connect the USB charging module connector.
(3) Install the air freshner block cover.
(4) Connect the negative battery cable.

4.4 USB Charging Module

■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing USB charging module.**
- **Appropriate force should be applied, when removing USB charging module. Be careful not to operate roughly.**
- **Try to prevent auxiliary fascia console rear cover assembly from being scratched, when removing USB charging module.**

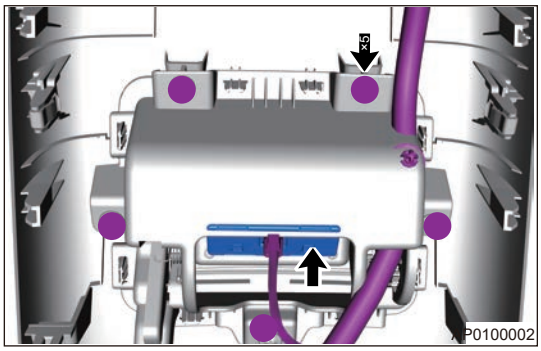
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

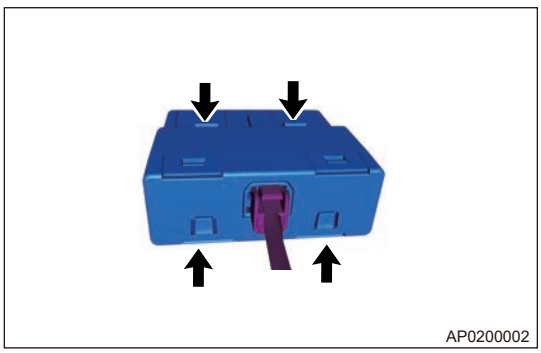
(3) Remove the USB charging module.

1) Remove the auxiliary fascia console rear panel assembly.

2) Remove 5 fixing screws (arrow) and USB rear panel.



3) Press the clip, remove the USB charging module.



■ **Installation**

⚠ **Caution**
· **Check USB charging module for proper operation after installing USB charging module assembly.**

(1) Install the USB charging module assembly to USB rear panel.

(2) Place the USB rear panel to installation position.

(3) Install 5 fixing screws of USB rear panel.

(4) Install the auxiliary fascia console rear panel assembly.

(5) Connect the negative battery cable.

4.5 Wireless Charging Module

■ Removal

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing wireless charging module assembly.**
- **Appropriate force should be applied, when removing wireless charging module assembly. Be careful not to operate roughly.**
- **Try to prevent auxiliary fascia console assembly from being scratched, when removing wireless charging module assembly.**

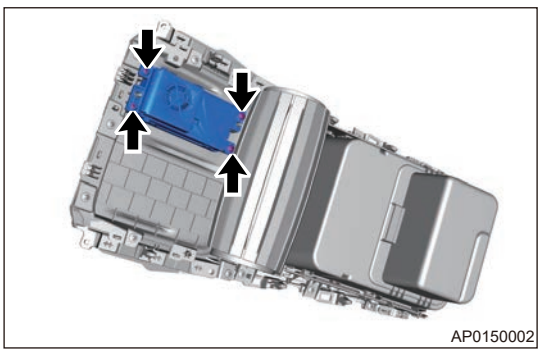
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Using an interior crow plate, pry off auxiliary fascia console trim panel assembly carefully.

(4) Remove the wireless charging module.

1) Disconnect the mobile phone wireless charging module connector.
2) Remove 4 fixing screws from wireless charging module.



3) Remove the wireless charging module.

■ Installation

⚠ Caution

- **Check wireless charging module for proper operation after installing wireless charging module assembly.**

(1) Place the wireless charging module to installation position.
(2) Install 4 fixing screws of wireless charging module.
(3) Connect the wireless charging module connector.
(4) Install the auxiliary fascia console trim panel assembly.
(5) Connect the negative battery cable.

4.6 Backup Power Supply and Cigarette Lighter

■ Removal

⚠ Caution

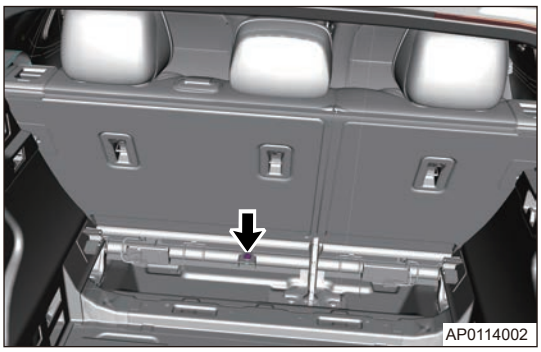
- **Be sure to wear safety equipment to prevent accidents, when removing wireless charging module assembly.**
- **Appropriate force should be applied, when removing wireless charging module assembly. Be careful not to operate roughly.**
- **Try to prevent auxiliary fascia console assembly from being scratched, when removing wireless charging module assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

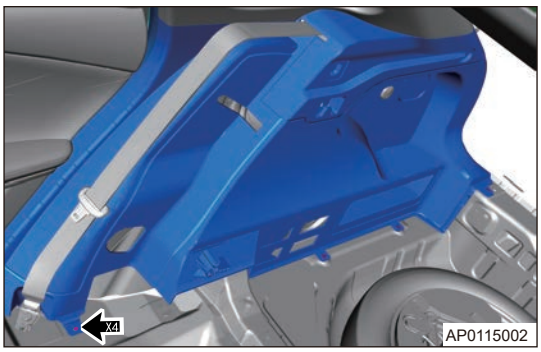
(2) Disconnect the negative battery cable.

(3) Loosen 2 screws (arrow) from back doorsill pressure plate assembly with a cross screwdriver.

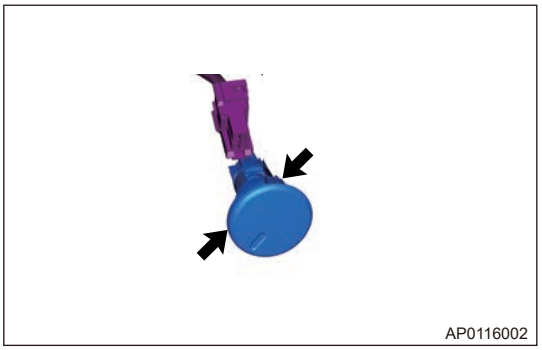
(4) Remove the tool box, lower the seat cushion seatback, and remove the seat cushion bolt (arrow).



(5) Remove 4 screws (arrow) and right luggage compartment wheel house assembly.



(6) Disconnect backup power supply and cigarette lighter connector, and press 2 clips, remove backup power supply and cigarette lighter.



■ Installation

⚠ Caution

- **Check wireless charging module for proper operation after installing backup power supply and cigarette lighter.**

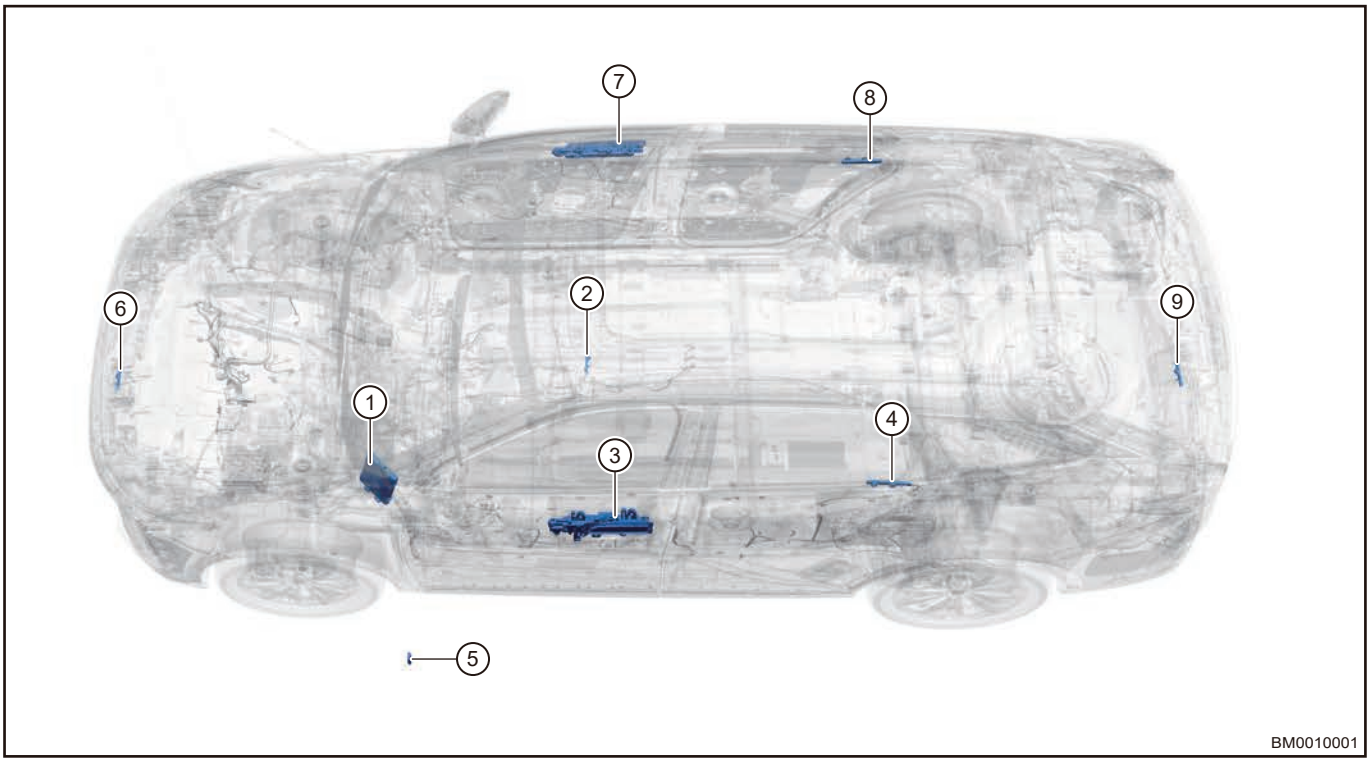
(1) Place the backup power supply and cigarette lighter to installation position.
(2) Connect backup power supply and cigarette lighter wire harness connector.
(3) Install the right luggage compartment wheel house assembly.
(4) Install 4 fixing screws of right luggage compartment wheel house assembly.
(5) Install seat cushion bolt, lift the cushion seatback, and install the tool box.
(6) Install the back doorsill pressure plate assembly.
(7) Install 2 fixing screws of back doorsill pressure plate assembly.
(8) Connect the negative battery cable.

10.4 BODY DOMAIN CONTROL SYSTEM

1 System Overview

1.1 System Components Diagram

Body domain control system (BDM) is mainly composed of body domain control module, body domain control module bracket, multi-function low frequency antenna, remote controller, door handle sensor, and a high performance low frequency antenna. Body domain control module and bracket are installed below instrument panel driver side position. There are three multi-function low frequency antennas, which are installed on the bracket under the center passage cup holder, the rear bumper crossmember, and the front impact crossmember. The high performance low frequency antenna is installed on the rear left door and rear right door sheet metal. And there is no separate door handle sensor, which is only supplied through door handle assembly provided by the supplier.



1	Body Domain Control Module	6	Low Frequency Antenna (-Front Bumper)
2	Low Frequency Antenna (-Center Passage)	7	Door Handle Sensor (-Front Right Handle)
3	Door Handle Sensor (-Front Left Handle)	8	High Performance Low Frequency Antenna (Rear Right Door Panel)
4	High Performance Low Frequency Antenna (Rear Left Door Panel)	9	Low Frequency Antenna (-Rear Bumper)
5	Smart Key		

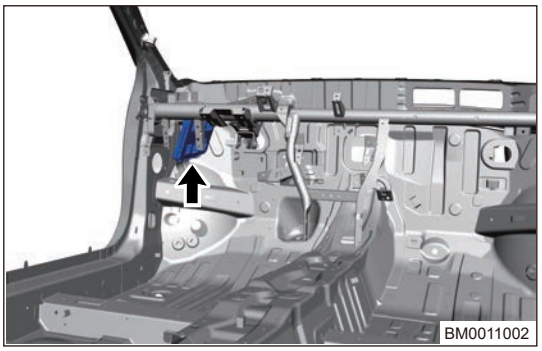
1.2 Function description

(1) Integrated with PEPS function;
(2) Integrated with TPMS function;
(3) Integrated with window jam protection function (if the vehicle is equipped with jam protection function);

(4) The main functions are as below: Defrost, turn signal light, lane change, hazard warning light, position light, park light, low beam light, follow me home, car location, automatic lighting, high beam, passing light, rear fog light control, daytime running light, battery save, dome light, anti-theft management, luggage compartment opening management, door status, central lock, front wiper control, front washer control, back-up light control, key status position signal, sudden braking hazard warning light double flashing alarm function, brake light control, rear view mirror folding, remote control function.

1.3 BDM Installation Position

Installed on body domain control module bracket.



1.4 Headlight Leveling

- Enabled conditions:
  - Power supply is in ON mode.
- Execution output:

  According to the internally determined level configuration of headlight leveling, BDM outputs the headlight leveling hardwire PWM signal corresponding to the percentage configuration word of Level 0 ~ Level 3 for headlight leveling.

  (1) For details of level configuration for headlight leveling, refer to "DVD setting function→ headlight leveling" function.

  (2) The configuration word of Level 0 ~ Level 3 for headlight leveling is obtained by the customer through calibration and written through diagnosis.

  (3) The high level of headlight leveling hardwire PWM output is the power supply voltage collected by BDM (there is a voltage drop of about 0.5 V compared to the power supply voltage), and the duty ratio is the corresponding configuration word percentage frequency requirement of 20 kHz.

1.5 Winter Heating System

■ Rear Windshield Heating Function

- Enabled conditions:

  (1) Power supply is in ON mode.

  (2) 0x421 EngineSts = 0x1:Run is received.

  (3) When EBS configuration word is 0x0:Not Present, the power supply voltage collected by BDM is 11.5 V.

  (4) When EBS configuration word is 0x1:Present, LIN signal U_BATT >= 11.5V(0x2200) is received from EBS.

  (5) Rear windshield heating configuration word is 0x1:Present.
- Trigger conditions:

  (1) Rear windshield heating network signal is valid, and 0x4FA Rear_ DefrostReq=0x1:Active.

  (2) Network signal 0x499 IHU_26_ReWinDefrstSwt jumping from 0x0: Not active to 0x1:Active is detected.

  (3) Network signal 0x4F2 TBOX_ReDefrstReq=0x1:ON is detected.
- Execution output:

  (1) Drive the rear defroster to output.

  (2) Network signal 0x391 RARDfstCmd = 0x1 :Active is sent.

(3) Start the rear defroster heating work for 20 minutes.

- Interruption condition:

(1) When the rear defroster heating output is valid, if the power supply voltage collected by BDM is less than 11.5 V for more than 5 seconds, the rear defroster heating interruption is triggered.

(2) During the interruption of rear defroster heating output, if the power supply voltage collected by BDM is 12.5 V for more than 15 seconds, the rear defroster heating function is restored.

- Interruption output:

(1) During the interruption of rear defroster heating output, turn off the rear defroster output.

(2) Network signal 0x391 RARDfstCmd = 0x1 :Active does not change.

(3) Rear defroster heating work continues to be timed.

(4) Restore the rear defroster heating function and drive the rear defroster to output immediately.

- Off condition:

(1) Power supply is in OFF or ACC mode.

(2) 0x421 EngineSts = 0x0:Not Run is received.

(3) Rear defroster heating work is timed for more than 20 minutes.

(4) Rear windshield heating network signal is triggered again, and the received network signal 0x4FA Rear_DefrostReq changes to 0x1:Active.

(5) Rear windshield heating network signal is triggered again, and the received network signal 0x4FA Rear_DefrostReq changes to 0x1:Active.

(6) Network signal 0x4F2 TBOX_ReDefrstReq=0x02:OFF is detected.

- Off output:

(1) Turn off rear defroster output of hardwire.

(2) Network signal 0x391 RARDfstCmd = 0x0:Off.

(3) Rear defroster heating work time is cleared.

1.6 Rear View Mirror Folding

■ Power opening of rear view mirror

- Enabled conditions:

(1) Engine is not in ENG_CRANKING status.

(2) The rear view mirror status is "folded" or "folding".

(3) Opening rear view mirror is not triggered after the first power-on.

Hint:
The status of rear view mirror is a variable stored in BDM and EEP is not recorded. After power off, the initial state of powering on is "unfolded". After the first power-on, the rear view mirror is triggered to open, regardless of whether the mirror status is "folded" or "folding".

- Trigger conditions:

(1) When the rear view mirror adjustment switch type is configured as 0x0: hardwire, the rear view mirror hardwire folding switch is detected to be suspended to jump edge of ground.

(2) When the rear view mirror adjustment switch type is configured as 0x1: LIN, the received LIN signal 0x02F ReVMirrFoldSwt jumps from 0x0:Not Active to 0x1:press. When 0x2:stuck is received, the switch is judged to be invalid.

(3) When the parking status flag bit is valid (for details of parking mode, refer to PMM functional specification), 0x3F7 IDCU_9_AVPReqOutdReviMirr = 0x1:Request is received:

- Execution output:

(1) Perform the rear view mirror unfolding output for 10 seconds, and set the rear view mirror status to "-opening" during the execution process.

(2) After the timing of a execution time is completed, set the rear view mirror status to "opened".

■ Power folding rear view mirror

- Enabled conditions:

(1) Engine is not in ENG_CRANKING status.

(2) The rear view mirror status is "opened" or "opening".

(3) Vehicle speed judged by BDM < = 10 km/h.

- Trigger conditions:

(1) When the rear view mirror adjustment switch type is configured as 0x0: hardwire, the rear view mirror hardwire folding switch is detected to be suspended to jump edge of ground.

(2) When the rear view mirror adjustment switch type is configured as 0x1:LIN, the received LIN signal 0x2F ReVMirrFoldSwt jumps from 0x0:Not Active to 0x1:press. When 0x2:stuck is received, the switch is judged to be invalid.

- Execution output:

(1) Perform the rear view mirror unfolding output for 10 seconds, and set the rear view mirror status to "-folding" during the execution process.

(2) After the timing of a execution time is completed, set the rear view mirror status to "folded".

■ Automatic opening of rear view mirror

- Enabled conditions:

(1) Engine is not in ENG_CRANKING status.

(2) The rear view mirror status is "folded" or "folding".

(3) Opening rear view mirror is not triggered after the first power-on.

Hint:
The status of rear view mirror is a variable stored in BDM and EEP is not recorded. After power off, the initial state of powering on is "unfolded". After the first power-on, the rear view mirror is triggered to open, regardless of whether the mirror status is "folded" or "folding".

- Trigger conditions:

(1) Anti-theft state changes to Pre_rearming Mode or Disarm Mode.

(2) Trigger the WEL welcome light to turn on.

(3) It was detected that the vehicle speed changed from <=10km/h to 10km/h.

- Execution output:

(1) Perform the rear view mirror unfolding output for 10 seconds, and set the rear view mirror status to "-opening" during the execution process.

(2) After the timing of a execution time is completed, set the rear view mirror status to "opened".

■ Automatic folding rear view mirror

- Enabled conditions:

(1) Engine is not in ENG_CRANKING status.

(2) The rear view mirror status is "opened" or "opening".

(3) Vehicle speed judged by BDM < = 10 km/h.

(4) Rear view mirror automatic folding enabling is valid (as determined in the DVD setting function).

- Trigger conditions:

(1) Anti-theft state changes to Arming Mode.

(2) Trigger the WEL welcome light to turn off.

- Execution output:

(1) Perform the rear view mirror unfolding output for 10 seconds, and set the rear view mirror status to "-folding" during the execution process.

(2) After the timing of a execution time is completed, set the rear view mirror status to "folded".

■ Automatic stopping of opening/folding in ENG_CRANKING status

If engine changes to ENG_CRANKING status during folding or opening of the rear view mirror, the action is immediately stopped and the action timing T is stopped. Wait until engine changes out of ENG_CRANKING status, continue the previous timing and actions until the timing ends.

■ Valid opposite signal during opening/folding action

If the same signal is valid while the folding/opening action is being performed, ignore the command. If there is a valid opposite signal, stop the current action immediately and wait for 500 ms before performing a new action, and no other commands are responded to during 500 ms.

1.7 Rear View Mirror Adjustment

The rear view mirror adjustment function binds the seat memory function configuration word. When the seat memory function configuration word is 0x0: Not Present, the rear view mirror adjustment function is enabled; when the seat memory function configuration word is 0x1: Present, the rear view mirror adjustment function is disabled.

■ Rear view mirror adjustment switch acquisition

- Bind the rear view mirror adjustment switch type configuration word. When it is configured as 0x00: hardwire, hardwire signal is collected; when it is configured as 0x01:LIN, LIN signal is collected. LIN signals are LeReVMirrSelSwt, RiReVMirrSelSwt and ReVMirrAdjmtSwt sent by 0x02F DDSP.
- When adjusting the rear view mirror through the steering wheel switch, CAN signals MFS_3_ LeMirrSwtUp, MFS_3_LeMirrSwtDwn, MFS_3_LeMirrSwtLe, MFS_3_LeMirrSwtRi, MFS_3_RiMirrSwtUp, MFS_3_RiMirrSwtDwn, MFS_3_RiMirrSwtLe, MFS_3_RiMirrSwtRi are collected.

Hint:
For CAN signal-adjusted rear view mirror, it coexists with hardwire or LIN switch regardless of the configuration word.

■ Manual rear view mirror adjustment judgment

- Enabled conditions 1:
  (1) Power supply is in ON or START mode.
  (2) Seat memory function configuration word = 0x0: Not Present, and rear view mirror adjustment function is enabled.
  (3) When the rear view mirror adjustment switch type is configured as 0x0: hardwire, the left rear view mirror selector switch is detected to change from invalid to valid, and timing is triggered within 10 seconds.
  (4) When the rear view mirror adjustment switch type is configured as 0x0: hardwire, the right rear view mirror selector switch is detected to change from invalid to valid, and timing is triggered within 10 seconds.
  (5) When the rear view mirror adjustment switch type is configured to 0x1:LIN, the received LIN signal 0x2F LeReVMirrSelSwt jumps from 0x0:Not Active to 0x1:press, and timing is triggered within 10 seconds.
  (6) When the rear view mirror adjustment switch type is configured to 0x1:LIN, the received LIN signal 0x05 RiReVMirrSelSwt jumps from 0x0:Not Active to 0x1:press, and timing is triggered within 10 seconds.

  Hint:

  (1) When the enabled conditions a&b&(c|e) are valid, the left rear view mirror adjustment enabling is valid, and the right rear view mirror adjustment enabling is invalid; When the enabled conditions a&b&(d|f|) are valid, the left rear view mirror adjustment enabling is invalid, and the right rear view mirror adjustment enabling is valid.
  (2) When the enabled conditions a&b&(c|e) are valid or the enabled conditions a&b&(d|f) are valid, and 10s timing starts, if 10s timeout occurs, the corresponding side rear view mirror adjustment enabling is invalid; During the 10s timing period, if the enabled conditions a&b&(c|e) are triggered again or the enabled conditions a&b&(d|f) are valid, the timing starts again.
  (3) When the enabled conditions a&b&(c|e) are valid, and the trigger conditions a&b&(d|f) are valid, the 10s timing starts; Vice versa.
- Trigger condition 1:
  (1) When the rear view mirror adjustment switch type is configured as 0x0: hardwire, the rear view mirror adjustment hardwire switch is turned to any of the "up", "down", "left" and "right" gears.
  (2) When the rear view mirror adjustment switch type is configured as 0x1:LIN, any value of the LIN signal ReVMirrAdjmtSwt = 0x1:Up, 0x2:Down, 0x3:Left, 0x4:Right is received.
- Enabled conditions 2:
  (1) Power supply is in ON or START mode.
  (2) Seat memory function configuration word = 0x0: Not Present, and rear view mirror adjustment function is enabled.
  (3) The left rear view mirror adjustment enabling is invalid, and the right rear view mirror enabling is invalid.

- Trigger condition 2:

  (1) Only one of the received CAN signals 0x41D MFS_3_LeMirrSwtUp, 0x41D MFS_3_LeMirrSwtDwn, 0x41D MFS_3_LeMirrSwtLe, 0x41D MFS_3_LeMirrSwtRi has a code value equal to 0x01: press.

  (2) Only one of the signals 0x41D 0x41D MFS_3_RiMirrSwtUp, 0x41D MFS_3_RiMirrSwtDwn, x41D MFS_3_RiMirrSwtLe, 0x41D MFS_3_RiMirrSwtRi has a code value equal to 0x01: press.

  Hint:

  (1) When two or more CAN signals "press" appear in the same-side rear view mirror, the first trigger shall prevail, and the press triggered later shall be ignored.

  (2) The maximum output time for the same-side rear view mirror adjustment output is 10s. After 10s, the output will stop until it is triggered again, regardless of whether the output is valid or not.

- Execution output:

  (1) For enabled condition 1, when other enabled conditions are met, the corresponding left rear view mirror selector indicator or right rear view mirror selector indicator will be illuminated during the 10s timing period according to the rear view mirror left/right selector switch, regardless of whether the seat memory function configuration word is valid or not. During the 10s timing period, the corresponding LIN signals 0x28 BDM_LeReVMirrSelSwtIndcr and BDM_RiReVMirrSelSwtIndc are sent depending on the left/right switch selection for the rear view mirror.

  (2) When the seat memory function configuration word is 0x0: Not Present, the LIN signals 0x28 SCU_LeReVMirrSelSwtIndc and SCU_RiReVMirrSelSwtIndcr are sent based on the hardwire outputs of the left rear view mirror selection indicator and right rear view mirror selection indicator.

  (3) The seat memory function configuration word 0x1: Present is transmitted to LIN signals 0x28 SCU_LeReVMirrSelSwtIndcr and SCU_RiReVMirrSelSwtIndcr based on the network signals 0x442 SCU_LeReVMirrSelSwtIndcr and SCU_RiReVMirrSelSwtIndcr.

  (4) When seat memory function configuration word is 0x0: Not Present, trigger the corresponding rear view mirror adjustment request as defined in the table below, otherwise no mirror adjustment output is performed.

Left and Right Selection Switch	Adjustment Switch				Rear View Mirror Adjustment Request
	Up	Right	Left	Down	
Left	√	—	—	—	Left rear view mirror up
	—	√	—	—	Left rear view mirror right
	—	—	√	—	Left rear view mirror left
	—	—	—	√	Left rear view mirror down
Right	√	—	—	—	Right rear view mirror up
	—	√	—	—	Right rear view mirror right
	—	—	√	—	Right rear view mirror left
	—	—	—	√	Right rear view mirror down
Enabled conditions are invalid or adjustment switch is not at any gear					No adjustment on left side, and no adjustment on right side

■ **Rear view mirror reverse down strategy**

- Enabled conditions:

  (1) Back-up light output is valid.

  (2) Rear view mirror is not in the down recovery process.

- Execution output:

  (1) Trigger the down adjustment of left and right rear view mirrors and stop triggering after a continuous output of T ms, T is obtained by the calibration of configuration word for rear view mirror down adjustment time.

- Recovery conditions:

  (1) Back-up light output is invalid.

  (2) Rear view mirror is not in the down process.

- Execution output:

  (1) Trigger the up adjustment of left and right rear view mirrors and stop triggering after a continuous output of T_{up}ms, T_{up} is obtained by the calibration of configuration word for rear view mirror down recovery time.

Hint:
During the down and recovery operations of rear view mirror, manual rear view mirror adjustment function needs to be disabled. After down operation of rear view mirror is finished, adjust rear view mirror manually.

■ **Rear view mirror adjustment output**

- Rear view mirror adjustment output priority

  Rear view mirror reverse down output has a higher priority. When the rear view mirror reverse down output is valid (including down and up), the manual rear view mirror adjustment output is disabled. The manual rear view mirror adjustment output recovers after the rear view mirror reverse down output is finished.

- Rear view mirror adjustment output strategy

  Based on the judged rear view mirror adjustment request, rear view mirror adjustment H-bridge ports output according to the following strategy ("-" indicates high resistance)

Rear View Mirror Adjustment Request	Port 01	Port 02	Port 03	Port 04	Port 05	Port 06
No adjustment on left side	—	—	—	—	—	—
Left rear view mirror up	High	Low	—	—	—	—
Left rear view mirror down	Low	High	—	—	—	—
Left rear view mirror left	—	Low	High	—	—	—
Left rear view mirror right	—	High	Low	—	—	—
No adjustment on right side	—	—	—	—	—	—
Right rear view mirror up	—	—	—	High	Low	—
Right rear view mirror down	—	—	—	Low	High	—

Right rear view mirror left	—	—	—	—	Low	High
Right rear view mirror right	—	—	—	—	High	Low

1.8 Mileage Backup

■ Mileage backup recording strategy

- Enabled conditions:

  (1) 0x42A TotODOMtrBkpEna = 0x1:Enable is received.

- Trigger conditions:

  (1) Power supply mode changes from ON to OFF or ACC.

- Execution output:

  (1) When the total mileage 0x430 TotalOdometer_km – 100km received from instrument cluster is greater than or equal to the total mileage 0x2EA TotODOMtrBkp recorded by BDM, the value of TotalOdometer_km is assigned to TotODOMtrBkp and the value of TotODOMtrBkp is recorded in EEP.

  (2) Otherwise, TotODOMtrBkp is not updated or recorded in EEP.

■ Mileage backup reading strategy

- Trigger conditions:

  (1) Power supply mode changes from OFF or ACC to ON.

- Execution output:

  (1) BDM reads the value of TotODOMtrBkp from EEP and sends the network signal.

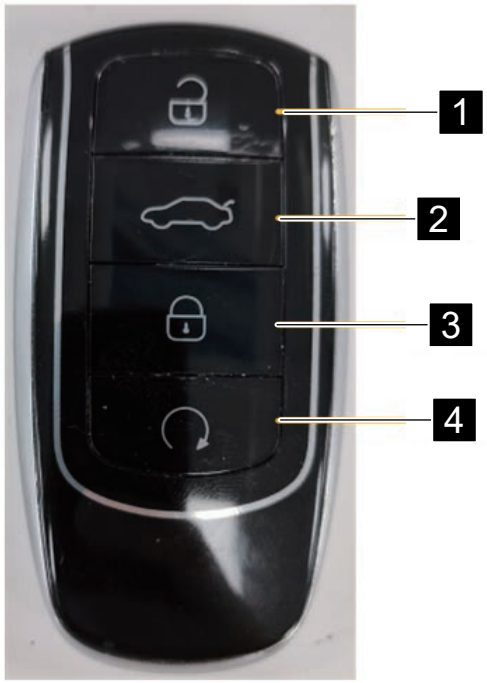
  Hint:
  The initial value of TotODOMtrBkp is 0.

1.9 Collision Signal Acquisition

There are two sources of collision signals, the network signal and the hardwire signal. Either source triggers a valid collision, which is judged to be a triggered collision state.

1.10 Wireless Key Signal Acquisition

The wireless key is divided into a four-button key and a three-button key. The four-button key has four buttons for "lock", "unlock back door", "unlock" and "remote start", and the three-button key has three buttons for "-lock", "unlock back door" and "unlock". The function of four-button key should be able to override the three-button key.The correspondence between buttons and signals emitted when four-button key is pressed is as follows; the key itself does not make the corresponding logic for long press and 2 consecutive presses:



ME0021001

1	Unlock Button	3	Lock Button
2	Back Door Open Button	4	Remote Start Button

BDM needs to recognize the following three triggering operations for the key:

(1) Short press, which recognizes that the key button is pressed.

(2) Press, which recognizes that the key button is pressed continuously. 3 seconds is recognized as long press for the lock button and remote start button and 1.5 seconds for the unlock button and back door unlock button.

(3) Pressing twice in a row, which recognizes that the key is triggered twice within 2 seconds.

The key commands recognized by each key button under the different triggering operations follow the logic of table below:

	Short Press	Long Press	Pressing Twice in a Row
Lock	Lock	Remote vehicle start (3rd generation) = 0x01 or 0x02: Long press for 3 seconds to start remotely Remote window up configuration (DID:602C) valid: Long press for 0.5 seconds to raise window remotely	Vehicle location
Unlock	Unlock	Long press for 1.5 seconds to lower window	X (after unlock is recognized, the 2nd pressing is shielded)

Back door unlock	X (no response)	Long press for 1.5 seconds to unlock back door	X (no response)
Remote start	X (no response)	Remote vehicle start (3rd generation) = 0x01 or 0x02: Long press for 3 seconds to start remotely	X (no response)

1.11 ENGINE START STOP Switch Signal Acquisition

■ ENGINE START STOP switch signal sending strategy

- Trigger conditions:
  (1) Power supply is in ON or START mode, and ENGINE START STOP switch changing from invalid to valid is detected.
  (2) LIN signal is detected.
- Execution output:
  (1) BDM sends periodic message.
- Off condition:
  (1) Power supply is in OFF or ACC mode, or invalid ENGINE START STOP switch is detected.
  (2) LIN signal is detected.
- Off output:
  (1) BDM sends periodic message.

■ ENGINE START STOP switch indicator output strategy

- Trigger conditions:
  (1) Power supply is in ON mode.
  (2) 0x280 SSMStatus = 0x0:Reset/Not Implemented is received.
- Execution output:
  (1) Turn on the ENGINE START STOP switch indicator output.
- Off condition:
  (1) Power supply is in OFF or ACC mode.
  (2) 0x280 SSMStatus != 0x0:Reset/Not Implemented is received.
- Off output:
  (1) Turn Off the ENGINE START STOP switch indicator output.

1.12 Advanced Power Management

■ SOC limit level determination

- BDM determines the limit level based on the 0xF5 SOC signal on battery LIN2 and sends the limit level to the network signal 0x2EA LbaLimits.
  (1) When battery SOC is more than 55%, BDM sends the limit level signal 0x2EA LbaLimits = 0x0: Level0;
  (2) When battery SOC is more than 50% and less than 55%, and EBS current is less than 0, BDM sends the limit level 0x2EA LbaLimits = 0x1:Level1; If battery SOC returns to 57%, the limit level is restored to 0x2EA LbaLimits = 0x0:Level0;
  (3) When battery SOC is more than 45% and less than 50%, and EBS current is less than 0, BDM sends the limit level 0x2EA LbaLimits = 0x2:Level2; If battery SOC returns to 52%, the limit level is restored to 0x2EA LbaLimits = 0x1:Level1;
  (4) When battery SOC is 45% or less and EBS current is less than 0, BDM sends the limit level 0x2EA LbaLimits = 0x3:Level3; If battery SOC returns to 47%, the limit level is restored to 0x2EA LbaLimits = 0x2:Level2.

■ Low battery prompts

- BDM sends battery level prompts to the network (network signal TBD) based on the vehicle's power supply status information and limit level information.

(1) When the limit level is Level0, the low battery prompt 0x427 Lbatip = 0x0:no warning is sent.
(2) When the vehicle power supply is in OFF, ACC, IGN ON mode (transmitter not started) and the limit level is Level1 or Level2 or Level3, the low battery prompt signal 0x427 Lbatip =0x1:warning 1 is sent.
(3) When the vehicle power supply is in IGN ON mode (engine started) and the limit level is Level1 or Level2 or Level3, the low battery prompt signal 0x427 Lbatip =0x3:warning 3 is sent.

1.13 Vehicle Mode Switching

■ Overview

- Vehicle mode switching means that BDM needs to switch several modes of the vehicles according to the power supply status of whole vehicle and related operations of customers. Vehicle modes include the following modes:
  (1) Factory mode.
  (2) Transport mode.
  (3) User mode.
  (4) Roller mode.
  (5) Collision mode.
  (6) Factory pause mode.
  (7) Transport pause mode.

■ Factory/factory pause mode → User mode

- Enabled conditions:
  (1) The vehicle is in factory mode or factory pause mode.
  (2) Vehicle speed is less than 4 km/h.
- Trigger conditions:
  (1) Cumulative count of power supply status switching from OFF to ON is more than 100 times in factory mode and factory suspend mode.
- Execution output:
  (1) Vehicle mode switches from factory mode or factory pause mode to user mode.

■ Factory pause mode → User mode (diagnostic command)

- Enabled conditions:
  (1) The vehicle is in factory pause mode.
  (2) Vehicle speed is less than 4 km/h.
  (3) Power supply state is IGN_ON.
- Trigger conditions:
  (1) It is configured as user mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 03.
- Execution output:
  (1) Vehicle mode switches from factory pause mode to user mode.

■ Transport mode → User mode

- Enabled conditions:
  (1) The vehicle is in transport mode.
  (2) Vehicle speed is less than 4 km/h.
- Trigger conditions:
  (1) Cumulative count of power supply status switching from OFF to ON is more than 50 times in transport mode.
- Execution output:
  (1) Vehicle mode switches from transport mode to user mode.

■ Transport mode → User mode (diagnostic command)

- Enabled conditions:
  (1) The vehicle is in transport mode.
  (2) Vehicle speed is less than 4 km/h.

(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) It is configured as user mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 03.

- Execution output:

(1) Vehicle mode switches from transport mode to user mode.

■ Roller mode → User mode

- Enabled conditions:

(1) The vehicle is in roller mode.

(2) Vehicle speed is less than 4 km/h.

- Trigger conditions:

(1) Power supply is not in IGN_ON state (Engine Running).

- Execution output:

(1) Vehicle mode switches from roller mode to user mode.

■ Roller mode → User mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in roller mode.

(2) Vehicle speed is less than 4 km/h.

(3) Power supply is not in IGN_ON state (Engine Running).

- Trigger conditions:

(1) It is configured as user mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 03.

- Execution output:

(1) Vehicle mode switches from roller mode to user mode.

■ Collision mode → User mode

- Enabled conditions:

(1) The vehicle is in collision mode.

(2) Vehicle speed is less than 4 km/h.

- Trigger conditions:

(1) Switching of power supply state OFF-ON-OFF-ON is completed within 10s.

- Execution output:

(1) Vehicle mode switches from collision mode to user mode.

■ Collision mode → User mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in collision mode.

(2) Vehicle speed is less than 4 km/h.

(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) It is configured as user mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 03.

- Execution output:

(1) Vehicle mode switches from roller mode to user mode.

■ User mode → Factory pause mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in user mode.

(2) Vehicle speed is less than 4 km/h.

(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) It is configured as factory pause mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 01.

- Execution output:

(1) Trigger PEPS to find key in vehicle, if the key is valid, vehicle mode switches from user mode to factory suspend mode.

(2) If key is not located within 1s or the key authentication is invalid, the user mode is maintained.

■ Factory mode→ factory pause mode

- Enabled conditions:

(1) The vehicle is in factory mode.

(2) Vehicle speed is less than 4 km/h.

- Trigger conditions:

(1) Power supply state changes from OFF to non-OFF.

- Execution output:

(1) Vehicle mode switches from factory mode to factory pause mode.

■ Factory pause mode→ factory mode

- Enabled conditions:

(1) The vehicle is in factory pause mode.

(2) Power supply state is OFF.

- Trigger conditions:

(1) Timed OFF state lasts for more than 3 minutes.

- Execution output:

(1) Vehicle mode switches from factory pause mode to factory mode.

Hint:
Trigger the hazard warning light switch by pressing and holding it for more than 3s during the 3-minute timing.

■ Transport mode → Factory pause mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in transport mode.

(2) Vehicle speed is less than 4 km/h.

(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) It is configured as factory pause mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 01.

- Execution output:

(1) Vehicle mode switches from transport mode to factory pause mode.

■ Collision mode → Factory pause mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in collision mode.

(2) Vehicle speed is less than 4 km/h.

(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) It is configured as factory pause mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 01.

- Execution output:

(1) Trigger PEPS to find key in vehicle, if the key is valid, vehicle mode switches from collision mode to factory suspend mode.

(2) If key is not located within 1s or the key authentication is invalid, the collision mode is maintained.

■ User mode → Transport mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in user mode.
(2) Vehicle speed is less than 4 km/h.
(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) It is configured as transport mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 02.

- Execution output:

(1) Trigger PEPS to find key in vehicle, if the key is valid, vehicle mode switches from user mode to transport mode.
(2) If key is not located within 1s or the key authentication is invalid, the user mode is maintained.

■ Factory pause mode → Transport mode

- Enabled conditions:

(1) The vehicle is in user mode.
(2) Vehicle speed is less than 4 km/h.
(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) Depress brake pedal and complete hazard warning light switch ON → OFF twice within 5s, followed by overtake light switch ON → OFF twice.

- Execution output:

(1) Vehicle mode switches from factory pause mode to transport mode.

■ Factory pause mode → transport mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in factory pause mode.
(2) Vehicle speed is less than 4 km/h.
(3) Power supply state is IGN_ON.

- Trigger conditions:

(1) It is configured as transport mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 02.

- Execution output:

(1) Vehicle mode switches from factory pause mode to transport mode.

■ Transport mode → Transport pause mode

- Enabled conditions:

(1) The vehicle is in transport mode.
(2) Vehicle speed is less than 4 km/h.

- Trigger conditions:

(1) Power supply state changes from non-IGN_ON (Engine Running) to IGN_ON (Engine Running).

- Execution output:

(1) Vehicle mode switches from transport mode to transport pause mode.

■ Transport pause mode → Transport mode

- Enabled conditions:

(1) The vehicle is in transport pause mode.
(2) Vehicle speed is less than 4 km/h.

- Trigger conditions:

(1) Power supply state changes from IGN_ON (Engine Running) to non-IGN_ON (Engine Running).

- Execution output:

(1) Vehicle mode switches from transport pause mode to transport mode.

■ Collision mode → Transport mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in collision mode.
(2) Vehicle speed is less than 4 km/h.
(3) The vehicle is in collision mode.

- Trigger conditions:

(1) It is configured as transport mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 02.

- Execution output:

(1) Trigger PEPS to find key in vehicle, if the key is valid, vehicle mode switches from collision mode to transport mode.
(2) If key is not located within 1s or the key authentication is invalid, the collision mode is maintained.

■ User mode → Roller mode (diagnostic command)

- Enabled conditions:

(1) The vehicle is in user mode.
(2) Vehicle speed is less than 4 km/h.
(3) Power supply is in IGN_ON state (Engine Running).

- Trigger conditions:

(1) It is configured as transport mode via the diagnostic command, and the corresponding diagnostic command is 31 01 60 39 02.

- Execution output:

(1) Vehicle mode switches from user mode to roller mode.

■ User mode → Roller mode

- Enabled conditions:

(1) The vehicle is in user mode.
(2) Vehicle speed is less than 4 km/h.
(3) Power supply is in IGN_ON state (Engine Running).

- Trigger conditions:

(1) Depress brake pedal and complete hazard warning light switch ON → OFF once within 5s, followed by position light switch ON → OFF twice and hazard warning light switch ON → OFF once.

- Execution output:

(1) Vehicle mode switches from user mode to roller mode.

■ User/Factory/Factory pause/Transport/Transport pause/Roller mode → Collision mode

- Enabled conditions:

(1) The vehicle is in non-collision mode.

- Trigger conditions:

(1) Hardwire or network collision signal is valid (determined by ANC).

- Execution output:

(1) Vehicle mode switches from others modes to collision mode.

■ Function disabled in vehicle mode

Some functions need to be disabled when vehicle is in factory mode, factory pause mode, transport mode, transport pause mode, collision mode, roller mode. The disabled functions are summarized below.

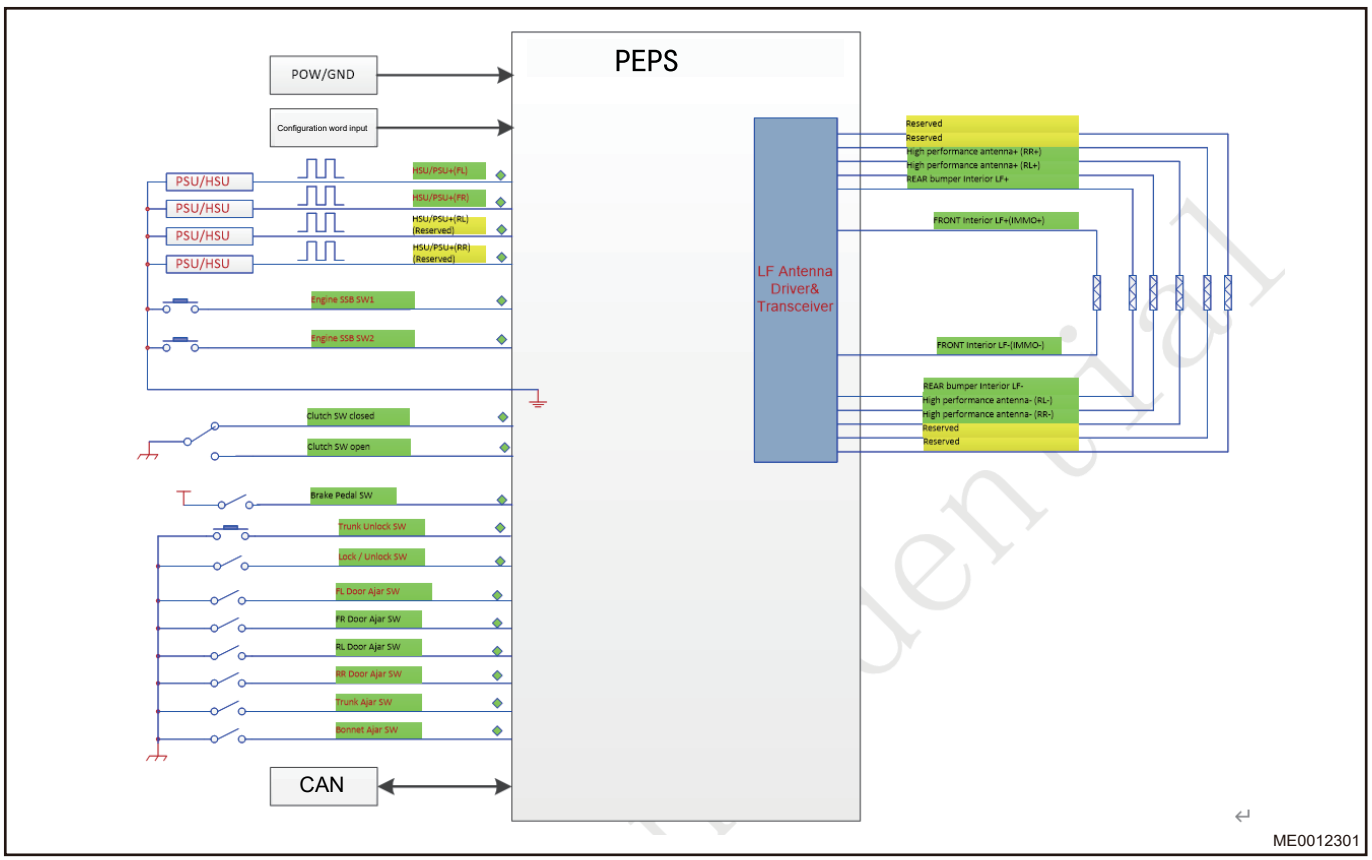
Vehicle Mode	BDM Functional Requirement
User mode	No functional inhibition
Factory mode (off)	1. Turn off the polling function (PE shielded)
	2. Turn off the follow me home function
	3.Turn off the lead me to the car function
	4. Turn off the position lights

Factory pause mode	No functional inhibition
Transport Mode	1. Turn off the polling function (PE shielded)
	2. Turn off the follow me home function
	3.Turn off the lead me to the car function
	4. Only the driver door unlocks (including central control switch)
Transport pause mode (running)	4. Only the driver door unlocks (including central control switch)
Collision mode	No functional inhibition
Roller mode (running)	No functional inhibition

1.14 PEPS Function

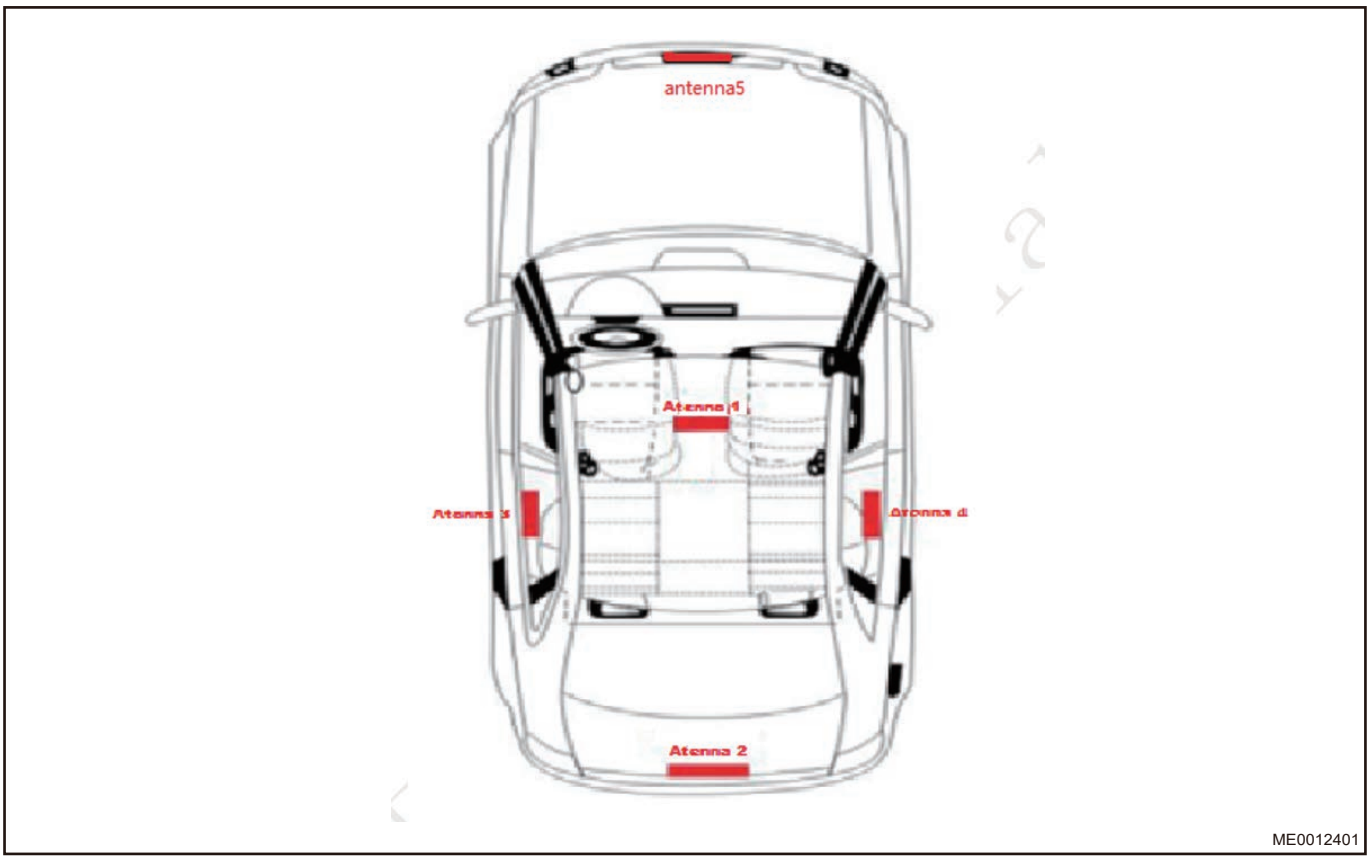
■ System diagram

PEPS system means that the BDM completes information interaction with the key via internal and external antennas and achieves unlocking and starting functions, etc. without using the key directly.



■ Types and arrangement positions of PEPS antenna

Arrangement positions of the five antennas are as follows:



(1) Interior low frequency antenna (IMMO multiplexing antenna) is used to locate whether key is in vehicle. It is a normal LF antenna during normal operation. Multiplexing IMMO backup antenna is available when key is not located.

(2) Rear bumper antenna is used to locate whether key is at the rear of vehicle.

(3) Left side high performance antenna is used to locate whether key is outside the vehicle on left side. It is also used to assist the interior low frequency antenna in locating whether key is in vehicle when finding key in vehicle.

(4) Right side high performance antenna is used to locate whether key is outside the vehicle on right side. It is also used to assist the interior low frequency antenna in locating whether key is in vehicle when finding key in vehicle.

(5) Front bumper antenna is used to locate whether key is at the front of vehicle.

■ Key location strategy with passive entry & passive start

- Front left door PE unlock

(1) Enabled conditions:

1) Power supply is in OFF mode or remote start flag bit is valid, or OTA model flag is valid.
2) Front left door is in closed state.
3) Vehicle mode is not a factory mode or transport mode.
4) The feedback state of driver door lock is locked.

(2) Trigger conditions:

1) Front left door PE unlock request is valid.

(3) Execution output:

1) BDM drives LF antenna to locate key. If Bluetooth key PE function is not disabled, the network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) If Bluetooth key PE function is not disabled, system determines whether Bluetooth key is in the front left door PE position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x3: Passive entr or 0x8:Driver PE when the Bluetooth antenna type configuration word is 0x0 Multi-

Bluetooth. System determines whether Bluetooth key is in the front left door PE position based on the network signal pending when the Bluetooth antenna type configuration word is 0x1 single Bluetooth.

4) If the locating key (including Bluetooth key) is outside the vehicle near the left door handle, the PE unlock command is sent.
5) If the locating key (including Bluetooth key) is not outside the vehicle near the left door handle, no command is sent.

- Front right door PE unlock

(1) Enabled conditions:

1) Power supply is in OFF mode or remote start flag bit is valid, or OTA model flag is valid.
2) Front right door is in closed state.
3) Vehicle mode is not a factory mode or transport mode.
4) The feedback state of driver door lock is locked.

(2) Trigger conditions:

1) Front right door PE unlock request is valid.

(3) Execution output:

1) BDM drives LF antenna to locate key. If Bluetooth key PE function is not disabled, the network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) If Bluetooth key PE function is not disabled, system determines whether Bluetooth key is in the front right door PE position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x3: Passive entr or 0x8:Driver PE when the Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the front right door PE position based on the network signal pending when the Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is outside the vehicle near the right door handle, the PE unlock command is sent.
5) If the locating key (including Bluetooth key) is not outside the vehicle near the right door handle, no command is sent.

- Front left door PE lock

(1) Enabled conditions:

1) Power supply is in OFF mode or remote start flag bit is valid, or OTA model flag is valid.
2) Four doors are in closed state.
3) Vehicle mode is not a factory mode or transport mode.

(2) Trigger conditions:

1) Front left door PE lock request is valid.

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) If Bluetooth key PE function is not disabled, system determines whether Bluetooth key is in the front left door PE position based on the TBOX network signal 0x520 Multi_BLTKeySts =0x8:Driver PE when the Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the front left door PE position based on the network signal pending when the Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is outside the vehicle near the left door handle, and no key is located inside the vehicle, the PE unlock command is sent.
5) If the locating key (including Bluetooth key) is not outside the vehicle near the left door handle, no command is sent.
6) If the locating key (including Bluetooth key) is inside the vehicle, no command is sent regardless of whether there is a key outside the vehicle. If the current driver door lock status feedback is unlocked, 0x480 SmartSystemWarning1_3 = Lock (RKE or smart) performed while Identifier in the vehicle is triggered at the same time.

(4) Alarm off conditions:

1) Power supply is not in OFF mode.
2) Any door is open for more than 10s.
3) Vehicle speed is 4 km/h or higher.
4) Continuous alarm time exceeds 60 seconds.
5) PE lock or RKE lock request is triggered.
6) Any unlock request is triggered.

(5) Alarm off output:

1) Network signal SmartSystemWarning1_3 = 0x0:Normal is sent.

- Front right door PE lock

(1) Enabled conditions:

1) Power supply is in OFF mode or remote start flag bit is valid, or OTA model flag is valid.
2) Four doors are in closed state.
3) Vehicle mode is not a factory mode or transport mode.

(2) Trigger conditions:

1) Front right door PE lock request is valid.

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) If Bluetooth key PE function is not disabled, system determines whether Bluetooth key is in the front right door PE position based on the TBOX network signal 0x520 Multi_BLTKeySts =0x8: Driver PE when the Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the front left door PE position based on the network signal pending when the Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is outside the vehicle near the right door handle, and no key is located inside the vehicle, the PE unlock command is sent.
5) If the locating key (including Bluetooth key) is not outside the vehicle near the right door handle, no command is sent.
6) If the locating key (including Bluetooth key) is inside the vehicle, no command is sent regardless of whether there is a key outside the vehicle. If the current driver door lock status feedback is unlocked, 0x480 SmartSystemWarning1_3 = Lock (RKE or smart) performed while Identifier in the vehicle is triggered at the same time.

(4) Alarm off conditions:

1) Power supply is not in OFF mode.
2) Any door is open for more than 10s.
3) Vehicle speed is 4 km/h or higher.
4) Continuous alarm time exceeds 60 seconds.
5) PE lock or RKE lock request is triggered.
6) Any unlock request is triggered.

(5) Alarm off output:

1) Network signal SmartSystemWarning1_3 = 0x0:Normal is sent.

- Back door PE unlock

(1) Enabled conditions:

1) Power supply is in OFF mode or remote start flag bit is valid, or OTA model flag is valid.
2) The hardwire switch for back door state is invalid (back door closed) when PLG configuration word is 0x0:Not Present.
3) System judges that the back door state is Close based on the PLG network signal when the PLG configuration word is 0x1:Present, as described in table below (the hardwire switch state is not judged at this time).
4) Vehicle mode is not a factory mode or transport mode.

(2) Trigger conditions:

1) Back door unlock switch is valid.
2) Back door unlock signal 0x436 PLG_UnLockInformation = 0x2:PEUnlock is received.
3) Back door unlock signal 0x436 PLG_UnLockInformation = 0x1:KnickUnlock is received when PLG configuration word is 0x1:Present.

(3) Execution output:

1) BDM drives LF antenna to locate key. If Bluetooth key PE function is not disabled, the network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) If Bluetooth key PE function is not disabled, system determines whether Bluetooth key is in the back door PE position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0xA:Tailgate PE when the Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the back door PE position based on the network signal pending when the Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is outside the vehicle near the back door, the back door PE unlock command is sent with the network signal 0x412 PEPS_PLGUnlockReq = 0x1: UnLock, and cleared after sending 3 times.
5) If the locating key (including Bluetooth key) is not outside the vehicle near the back door, no command is sent.

(4) Alarm off conditions:

1) Power supply is not in OFF mode.
2) Any door is open for more than 10s.
3) Vehicle speed is 4 km/h or higher.
4) Continuous alarm time exceeds 60 seconds.
5) PE lock or RKE lock request is triggered.
6) Any unlock request is triggered.

(5) Alarm off output:

1) Network signal SmartSystemWarning1_3 = 0x0:Normal is sent.

■ Key location strategy with PS

- Locating key by depressing brake pedal or clutch pedal

  For MT models (configuration word TCU1 = 0x0 & TCU2 = 0x0 & TCU3 = 0x0 & TCU4 = 0x0), BDM collects the clutch switch.

  For MT models (configuration word TCU1 = 0x0 & TCU2 = 0x0 & TCU3 = 0x0 & TCU4 = 0x0), BDM collects the clutch switch.

(1) Enabled conditions:

1) The current key is valid.
2) Power supply is in OFF mode.
3) Remote start flag bit is valid and power supply is in ON mode (engine running).
4) Parking state flag bit is valid and power supply is in ON mode (engine running).

(2) Trigger conditions:

1) Depress brake pedal (AT models) or clutch pedal (MT models) when enabled condition 2 is met.
2) Network signals 0x2E9 ESP1_PressureMasCylindValidData = 0x0:Valid and 0x2E9 ABS_ESP_1_ PressureMasterCylinder >= 0x005 are received when enabled condition 3/4 is met.

   Hint:
   0x2E9 ABS_ESP_1_PressureMasterCylinde signal is not detected within 3s after power supply is switched to ON mode, and is valid by default, brake state is considered not depressed, and detection starts after 3s.

(3) Execution output:

1) When the enabled condition "a" is valid, wait for the key to fail before continuing with the following output.
2) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.

3) Locate the key position based on the RSSI value feedback of key.
4) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.
5) If the locating key (including Bluetooth key) is inside the vehicle, the key is judged to be valid and the valid state remains for 5 seconds.
6) If the locating key (including Bluetooth key) is not inside the vehicle, locate the key once every second (network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously) until key is located or brake pedal is depressed for more than 10 minutes.

(4) Off condition:

1) Release brake pedal (AT models) or clutch pedal (MT models).
2) When power supply is in OFF mode and brake pedal (AT models) or clutch pedal (MT models) is depressed for more than 10 minutes.
3) Power supply mode changes to START or ON (engine running).
4) Trigger any of the four doors to lock.

(5) Off output:

1) Key location process stops immediately.

- Locating key by pressing SSB

(1) Enabled conditions:

1) Power supply is in any mode, and current key is invalid.

(2) Trigger conditions:

1) Press SSB switch.

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is inside the vehicle, the key is judged to be valid and the valid state remains for 5 seconds.
5) If the locating key (including Bluetooth key) is not inside the vehicle, IMMO backup is triggered to locate the key.
6) Following the execution output 5, if key is located by the IMMO backup, the key is judged to be valid and the valid state remains for 5 seconds.
7) Following the execution output 5, if key is not located by the IMMO backup, the key is judged to be invalid. Trigger the LF antenna again to locate the key, and trigger IMMO key location cycle if no key is located. The maximum key location time is 30s and location stops after key is found.

- Locating key with door closed

(1) Enabled conditions:

1) Power supply is in OFF mode or remote start flag bit is valid, and current key is invalid.

(2) Trigger conditions:

1) The state of any of the four doors and back door changes from open to closed.
2) Four doors and back door change from closed to any door open (for locating key with Polling walk-away lock function).

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is inside the vehicle, the key is judged to be valid and the valid state remains for 5 seconds.
5) If the locating key (including Bluetooth key) is not inside the vehicle, IMMO backup is triggered to locate the key.
6) Following the execution output 5, if key is located by the IMMO backup, the key is judged to be valid and the valid state remains for 5 seconds.
7) Following the execution output 5, if key is not located by the IMMO backup, the key is judged to be invalid. Trigger the LF antenna again to locate the key, and trigger IMMO key location cycle if no key is located. The maximum key location time is 30s and location stops after key is found.

■ Other key location strategies

- Locating key with mis-lock prevention

(1) Enabled conditions:

1) Door lock state is Lock.

(2) Trigger conditions:

1) Four doors and back door change from not all closed to all closed.

Hint:
The state of back door for PLG configuration is judged based on the PLG network signal.

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is inside the vehicle, the PE unlock command is sent. For details of unlock strategy, refer to LOC module functional specification.

- Locating key with automatic re-lock

(1) Trigger conditions:

1) Trigger the automatic re-lock (the automatic re-lock is triggered after a successful fortifying deactivation in fortifying state and no door is open within 30 seconds).

(2) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.

4) If the locating key (including Bluetooth key) is inside the vehicle, the PE unlock command is sent, and it will not trigger the automatic re-lock again. 0x480 SmartSystemWarning1_3 = Lock (RKE or smart) performed while Identifier in the vehicle is triggered at the same time.

(3) Alarm off conditions:

1) Power supply is not in OFF mode.
2) Any door is open for more than 10s.
3) Vehicle speed is 4 km/h or higher.
4) Continuous alarm time exceeds 60 seconds.
5) PE lock or RKE lock request is triggered.
6) Any unlock request is triggered.

(4) Alarm off output:

1) Network signal SmartSystemWarning1_3 = 0x0:Normal is sent.

- Locating key by closing door in position other than OFF

(1) Enabled conditions:

1) Power supply is not in OFF mode.
2) Vehicle speed is less than 4 km/h.
3) Parking state flag bit is invalid.
4) Shield other invalid alarm states of key location.

(2) Trigger conditions:

1) Any of the four doors and back door changes from open to closed.

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is inside the vehicle, no command is sent.
5) If the locating key (including Bluetooth key) is not inside the vehicle, network signal SmartSystemWarning1_1 = 0x1:Identifier is out of vehicle is sent.

(4) Alarm off conditions:

1) Power supply is in OFF mode.
2) Vehicle speed is 4 km/h or higher.
3) Legal key is located in vehicle.

(5) Alarm off output:

1) Network signal SmartSystemWarning1_1 = 0x0:Normal is sent.

- Locating key by vehicle speed in ON position

(1) Enabled conditions:

1) BDM triggers a valid alarm of locating key by closing door in position other than OFF.
2) Shield other invalid alarm states of key location (shield the other alarm states of key location).

(2) Trigger conditions:

1) The vehicle speed changes from less than 4 km/h to 4km/h or more for the first time after power supply state changes from non-ON to ON.

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.

3) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) If the locating key (including Bluetooth key) is inside the vehicle, no command is sent.
5) If the locating key (including Bluetooth key) is not inside the vehicle, network signal SmartSystemWarning2_2 = 0x1:Identifier is out of vehicle range when vehicle starts running is sent.

(4) Alarm off conditions:

1) Legal key is located in vehicle.
2) Continuous alarm time exceeds 7 seconds.

(5) Alarm off output:

1) Network signal SmartSystemWarning2_2 = 0x0:Normal is sent.

- Locating key by remote start

(1) Enabled conditions:

1) Power supply is in OFF mode.

(2) Trigger conditions:

1) TBOX message TBOX_RVSReq = 0x1:EngineStart is received.
2) When remote vehicle start (3rd generation) is 0x1 CVT/DCT or 0x02 MT, long press the remote key RVS button for more than 3 seconds.

(3) Execution output:

1) BDM drives LF antenna to locate key. Network signal 0x480 BLTKeyLocalizationReq = 0x1:Active is sent synchronously.
2) Locate the key position based on the RSSI value feedback of key.
3) System determines whether Bluetooth key is in the interior PS position based on the TBOX network signal 0x520 Multi_BLTKeySts = 0x4:Passive start when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x0 Multi-Bluetooth. System determines whether Bluetooth key is in the interior PS position based on the network signal pending when the phone Bluetooth key is 0x1 Present and Bluetooth antenna type configuration word is 0x1 single Bluetooth.
4) The locating key (including Bluetooth key) is inside or not inside the vehicle.

■ Wireless charging module disabled strategy

- Wireless charging module disabled strategy with power off

(1) When locating key by pressing SSB is triggered with power supply in OFF mode, PEPS_SSBInhibitCWCSts = 0x1:Disable is sent. Perform key location operation again after 50 ms.

(2) When power supply switches to non-OFF mode or PEPS_SSBInhibitCWCSts is 0x1:Disable for more than 2 seconds, PEPS_SSBInhibitCWCSts = 0x0:Default is sent.

- Wireless charging module disabled strategy without power off

(1) Trigger any key location with power supply in on-OFF mode, and PEPS_WirelessCharging_CtrSts = 0x1:Disable is sent to disable the wireless charging module. Perform key location operation again after 50 ms.

(2) Keep PEPS_WirelessCharging_CtrSts at 0x1:Disable for 5 seconds after disabling the wireless charging module.

(3) When wireless charging module is disabled for 5 seconds and no key is located, PEPS_WirelessCharging_CtrSts = 0x0:Default is sent.

- Wireless charging module disabled strategy under other conditions

(1) In diagnostic session mode, PEPS_WirelessCharging_CtrSts = 0x1:Disable is always sent.

(2) When remote start flag bit is valid, PEPS_WirelessCharging_CtrSts = 0x1:Disable is always sent.

■ Other alarm strategies

- Low key battery alarm

(1) Enabled conditions:

1) Among the key RF messages received by BDM, "low battery" flag bit is set.

(2) Trigger conditions:

1) The engine speed becomes higher than 500 rpm for the first time after power supply state changes from non-ON to ON (0xFA EMS1_EngineSpeed > 500 (0x07D0)).

2) Power supply state is kept in ON for more than 20 minutes.

3) Power supply switches from ON to OFF.

(3) Execution output:

1) Network signal SmartSystemWarning3_1 = 0x1:Identifier low battery detected is sent.

(4) Off condition:

1) Among the key RF messages received by BDM, "low battery" flag bit is cleared.

2) Continuous alarm time exceeds 15 seconds.

(5) Off output:

1) Network signal SmartSystemWarning3_1 = 0x0:Normal is sent.

■ Active polling function

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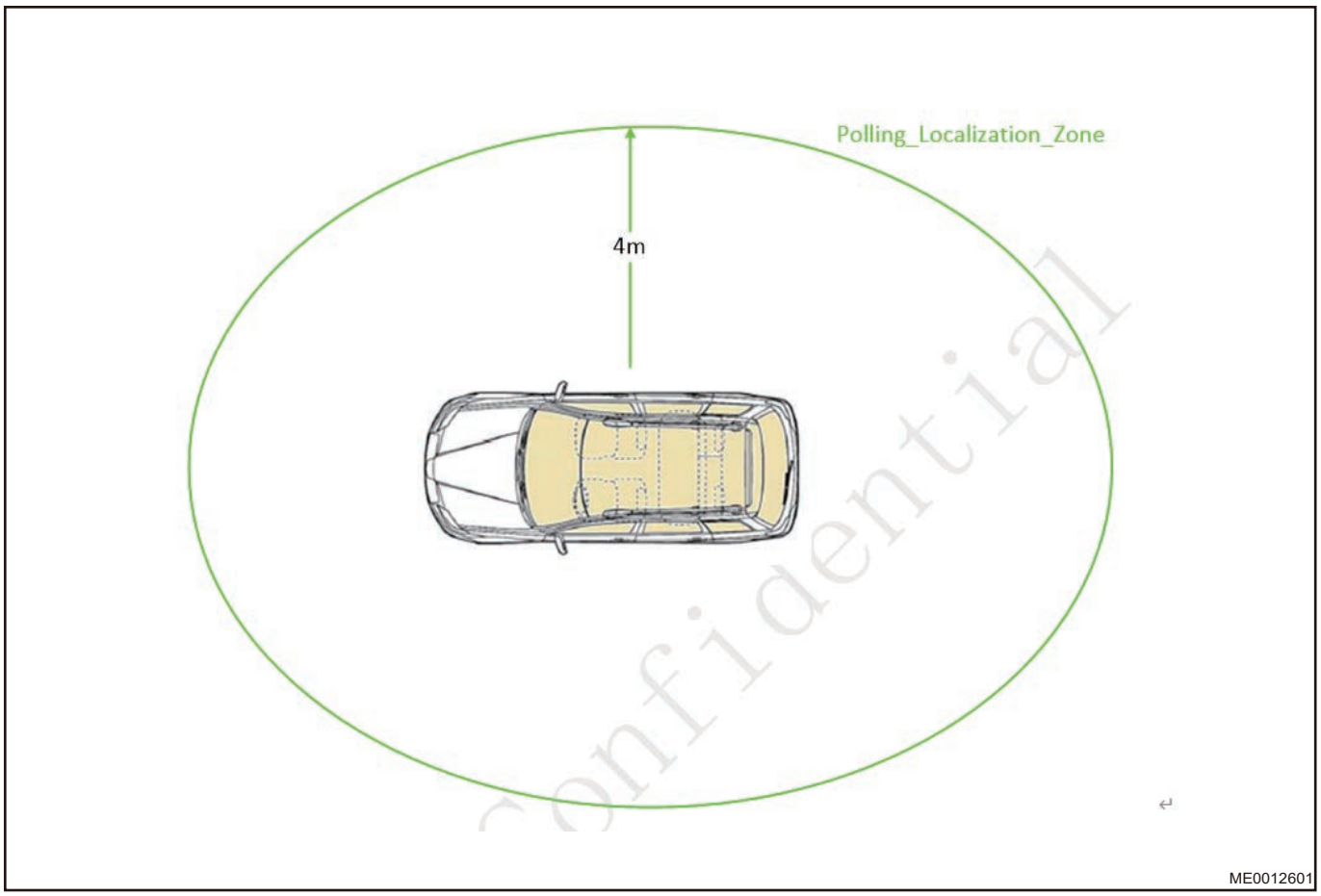
(1) Welcome light wake-up area

1) The external antenna sends data to locate a valid key, and when the key approaches and accesses to the wake-up area, wake-up LF message will be received and high frequency signal will be replied to wake up the BDM.

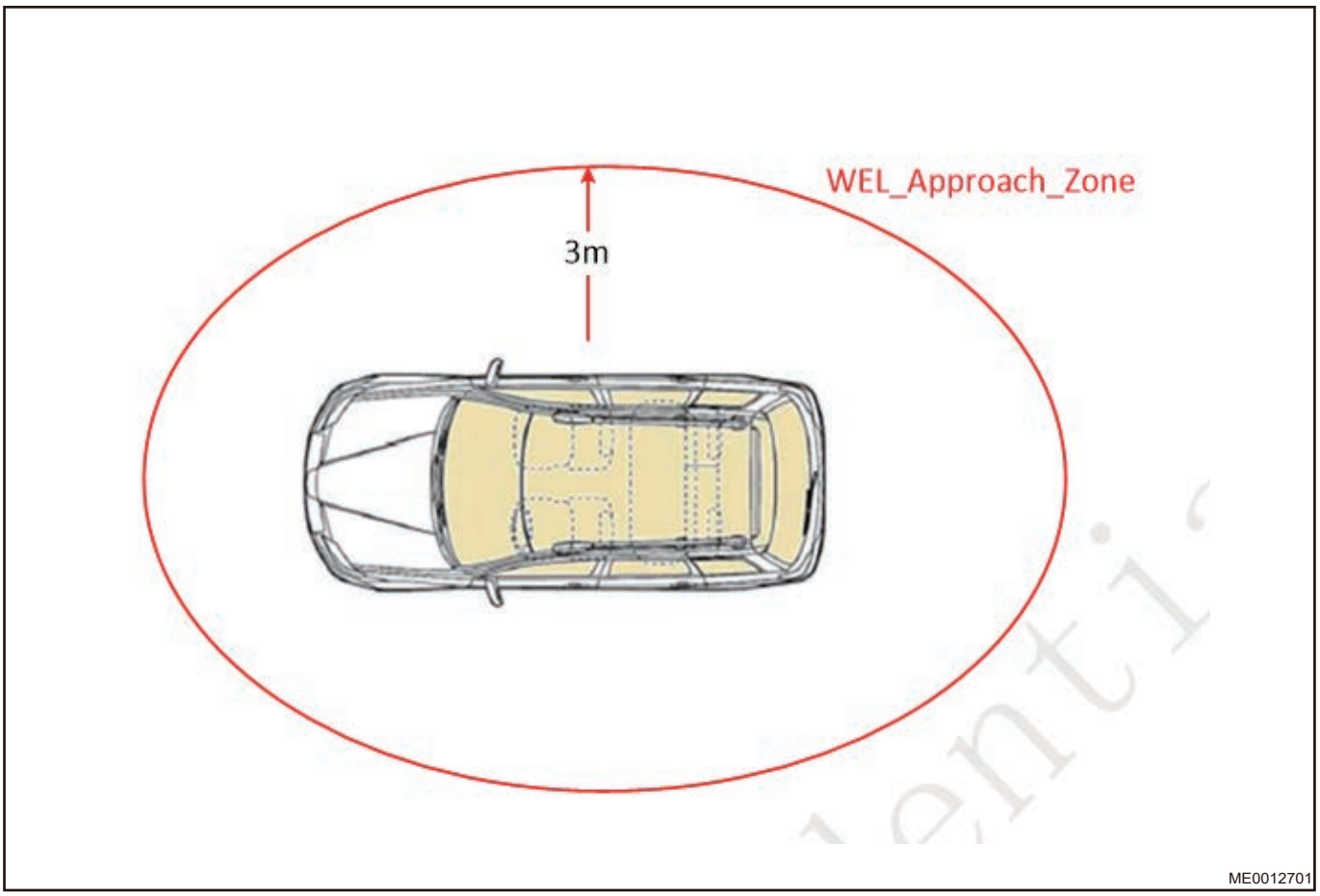
2) If key is not in the wake-up area, the antenna only sends data and not the carrier, thus reducing static power consumption. At this time, it is only possible to identify whether key is in the wake-up area, but not to locate it accurately.

3) If key is detected to be in the wake-up area, the antenna sends both data and carrier, which allows the key to be located accurately.



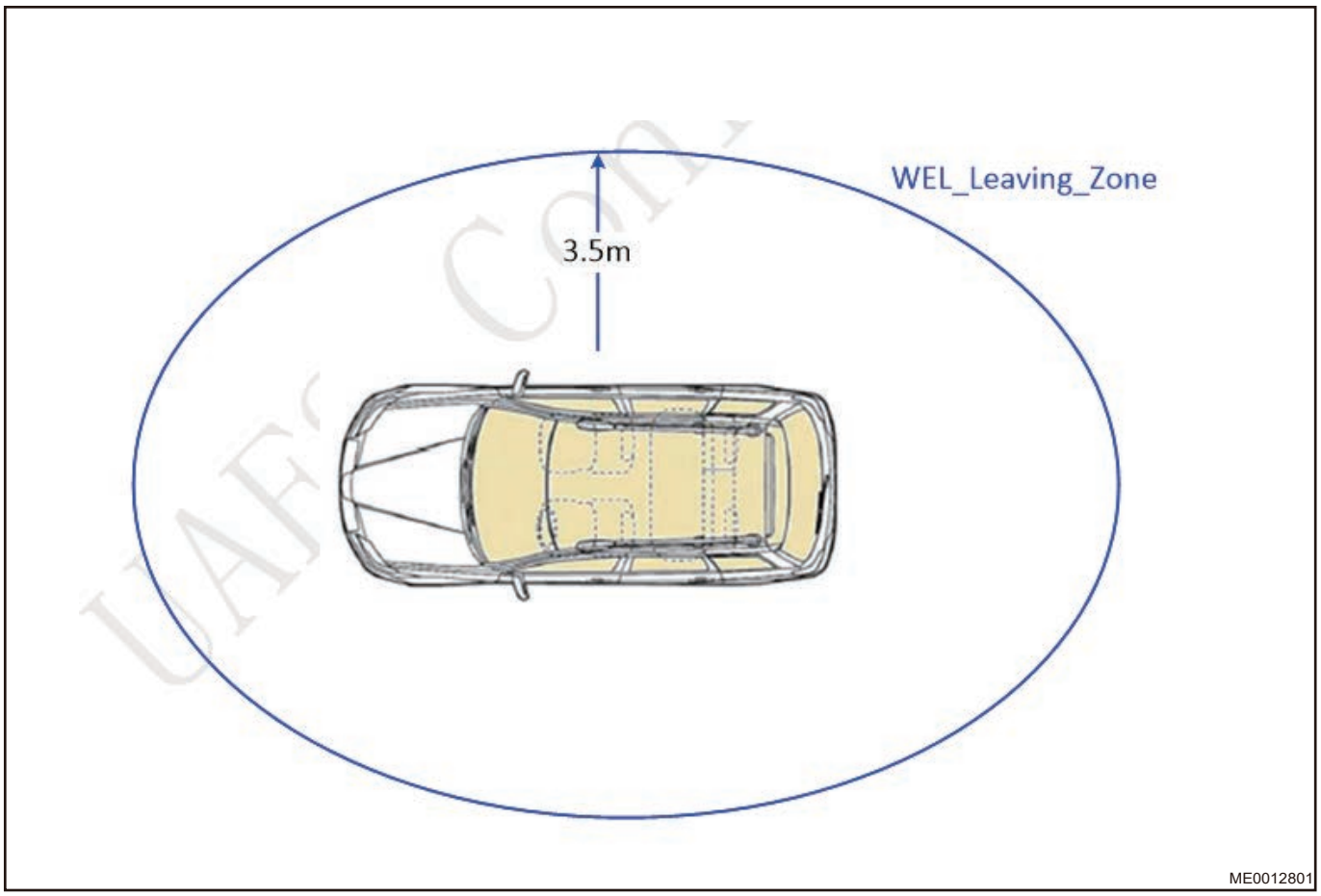
(2) Welcome light approach area

1) This area is used to send a request for lighting the welcome light. System sends carrier and data through the external antenna, and compares the RSSI value replied by key with the calibration boundary value for lighting the welcome light area, and the request for lighting the welcome light is sent when the RSSI value is greater than the calibration boundary value.



(3) Area of leaving the courtesy light

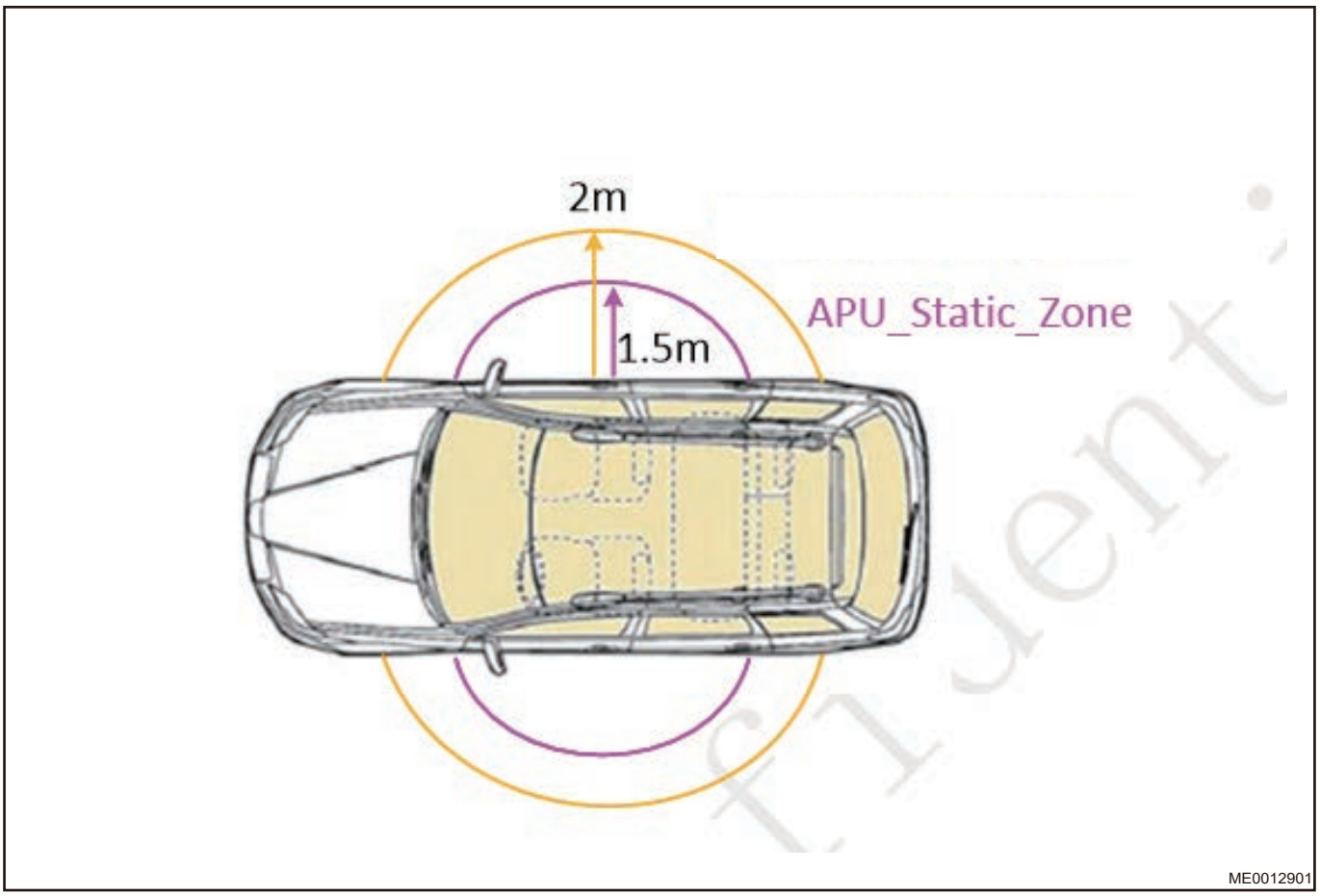
1) This area is used for sending the request of extinguishing the courtesy light, sending the carrier wave and data through the external antenna, comparing the calibrated boundary value of the area leaving the courtesy light with RSSI value returned by the key, and sending the request of extinguishing the courtesy light when the RSSI value is less than the calibrated boundary value.



(4) Area of unlocking when approaching & area of unlocking hysteresis when approaching

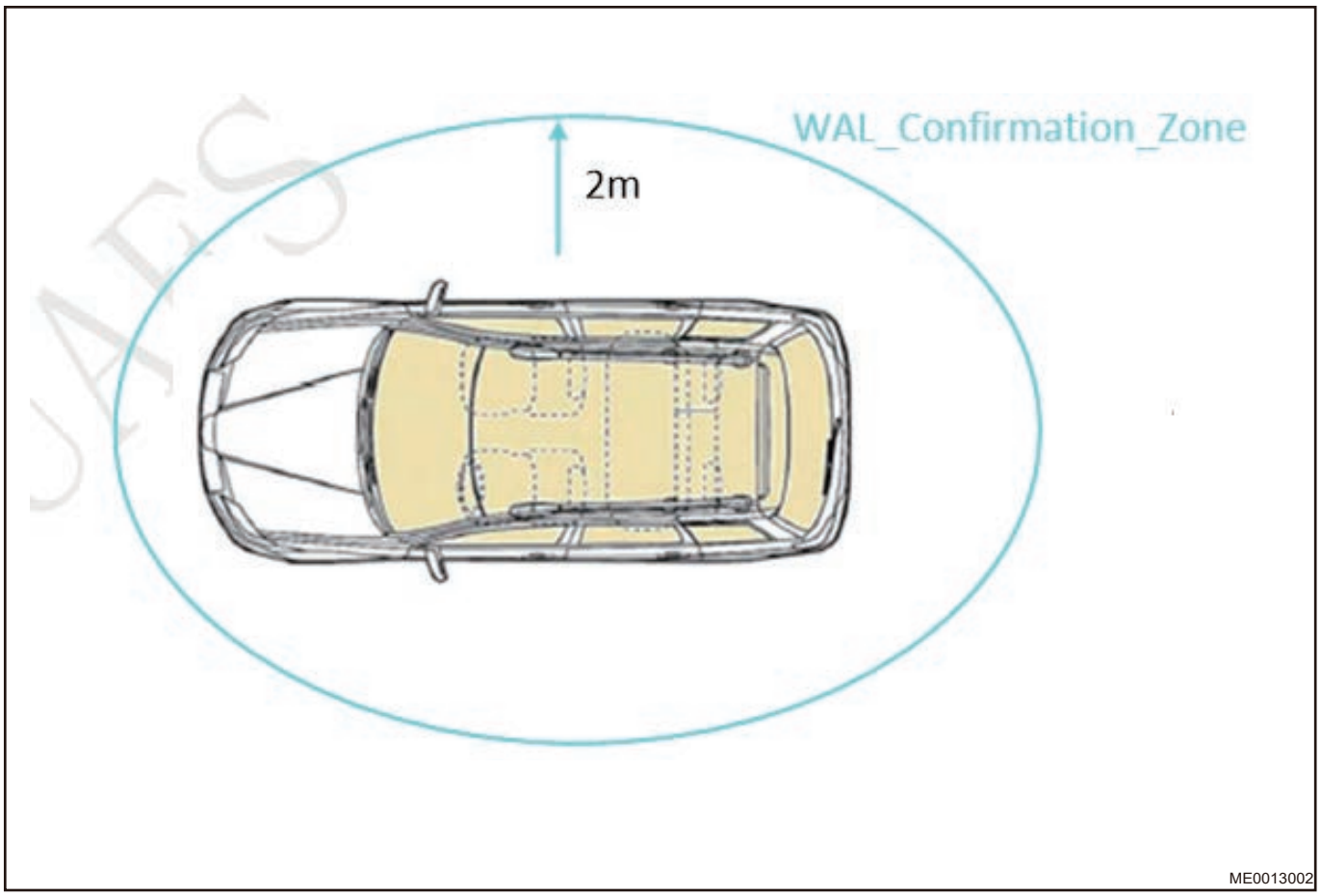
1) This area is used for sending the request of unlock when approaching, sending the carrier wave and data through the external antenna, comparing the calibrated boundary value of the area for unlocking when approaching with RSSI value returned by the key, and sending the unlock request when the RSSI value is greater the calibrated boundary value.

2) The area of unlock when approaching is divided into left and right areas. When approaching from the driver side, the driver independent unlocking request or the whole vehicle unlocking request is sent according to the driver independent unlocking configuration word; When approaching from front passenger side, send a request for unlocking the whole vehicle.



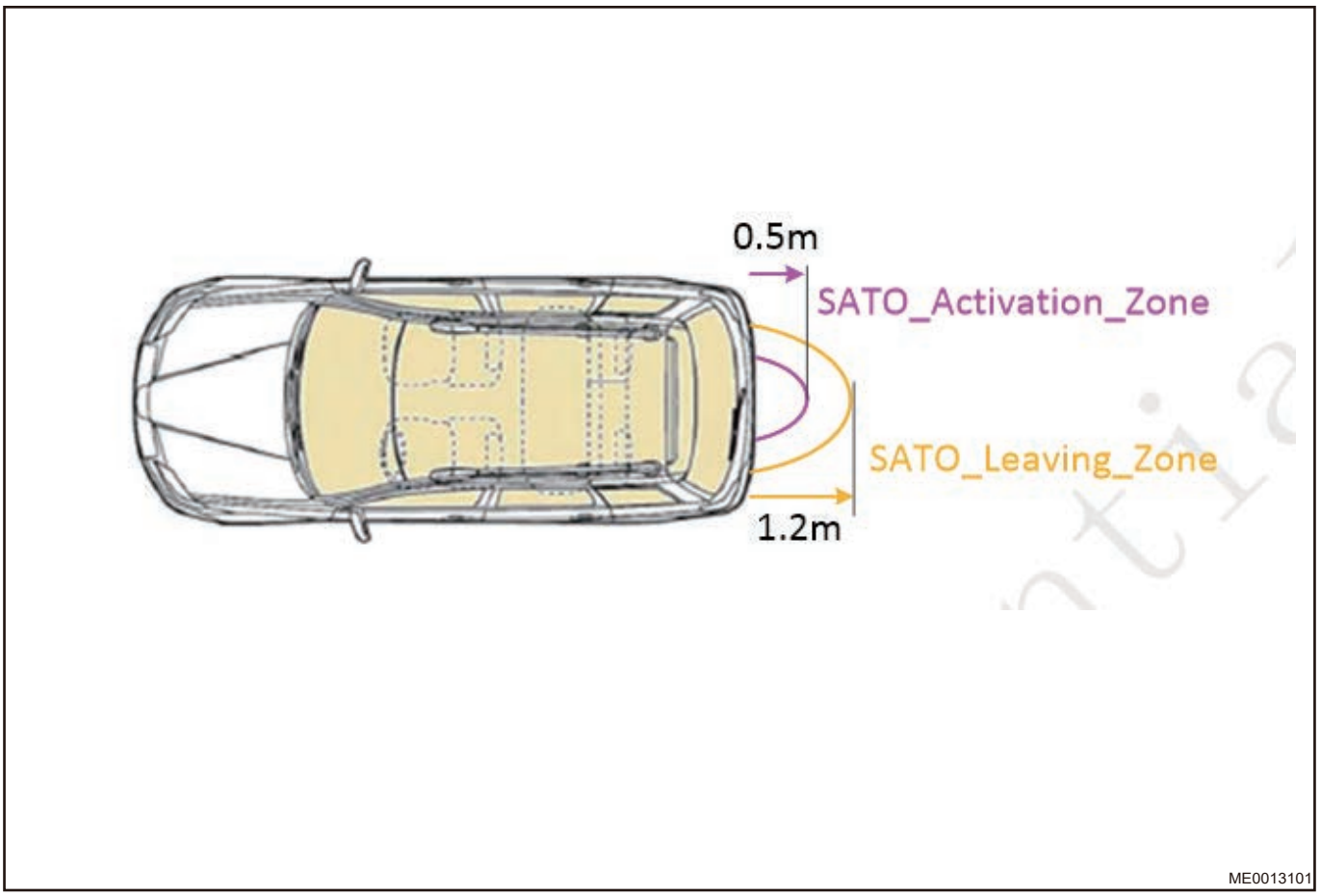
(5) Area of locking confirmation when leaving

1) When the last key leaves this area, vehicle locking will be triggered automatically, sending the carrier wave and data through the external antenna, comparing the calibrated boundary value of area for locking confirmation when leaving with RSSI value returned by the key, and sending the lock request when the RSSI value is less than the calibrated boundary value.



(6) Luggage compartment unlocking area & luggage compartment retraction area

1) This area is used to detect whether the end user has approached the luggage compartment of the vehicle and to send a luggage compartment unlock request.



- WEL courtesy light Illumination

  (1) WEL courtesy light Illumination refers to that when the user approaches the vehicle with the smart key, a predefined exterior light comes on to illuminate the road near the door.

- WAL locking when leaving

  (1) WAL locking when leaving refers to that when the user leaves the locking area, the vehicle will be locked automatically, and the end user does not need to press the locking button of the smart key or touch the door handle sensor.

- APU unlocking when approaching

  (1) APU unlocking when approaching refers to that when the user approaches the vehicle with a valid intelligent key, the vehicle will automatically unlock, and the end user does not need to press the unlock button of the smart key or touch the door handle sensor.

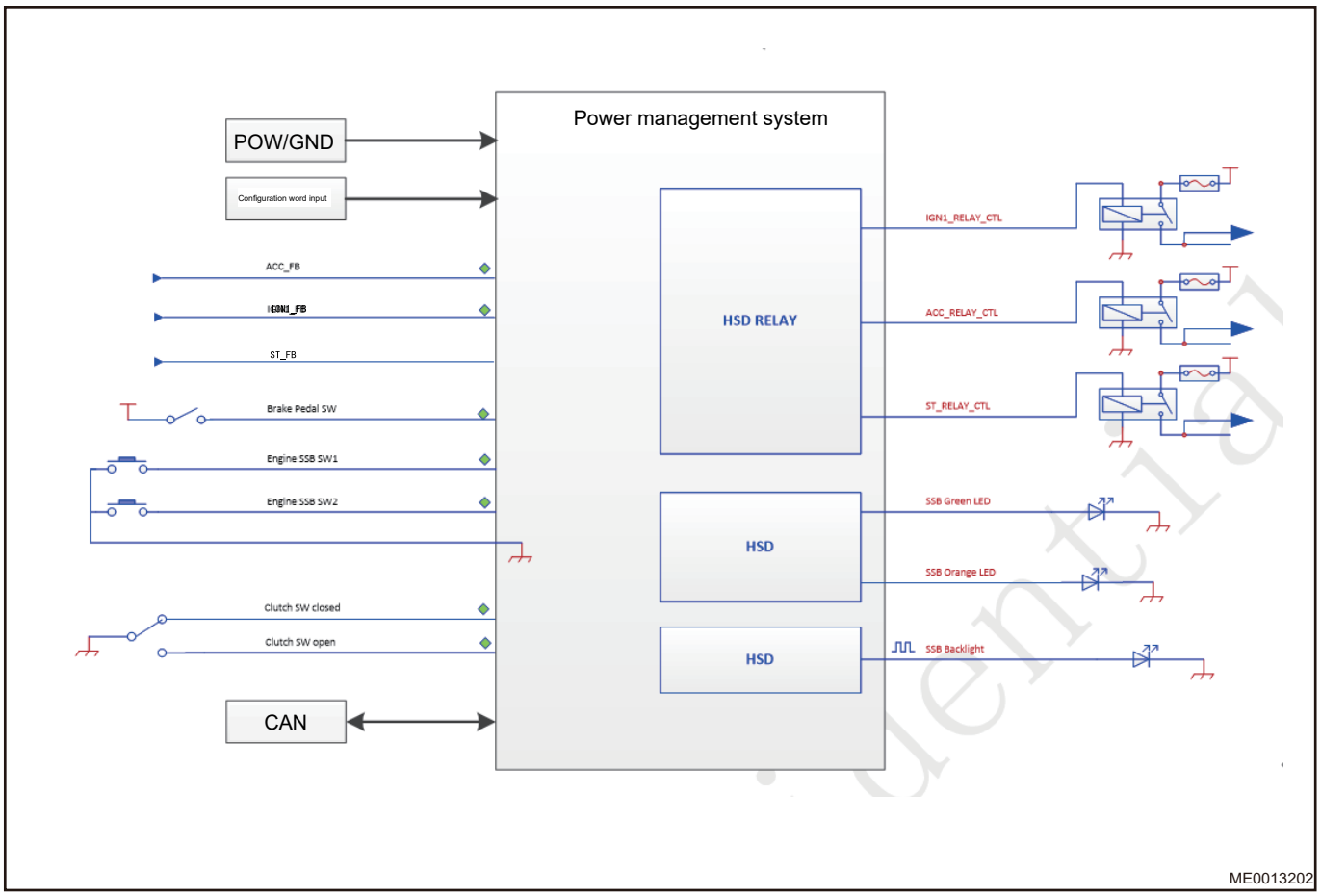
- SATO luggage compartment opens automatically

  (1) Luggage compartment opens automatically refers to that when the end user approaches the rear area of the luggage compartment with a valid key, the vehicle will inform the user to enter the valid area. If the user is always in the sub-area or continues to approach the luggage compartment, the luggage compartment will be unlocked.

1.15 Power Supply Control System

■ System diagram

Power control system is one of the necessary systems for the vehicle. It is mainly used to judge the current power mode of the vehicle and control the work of ACC, IG and START relays.



■ Safety-related characteristics

When BDM is in power mode ON, IG1 output has hold function.

(1) When the power mode is switched to ON, the BDM will record the current power state to the EEP.

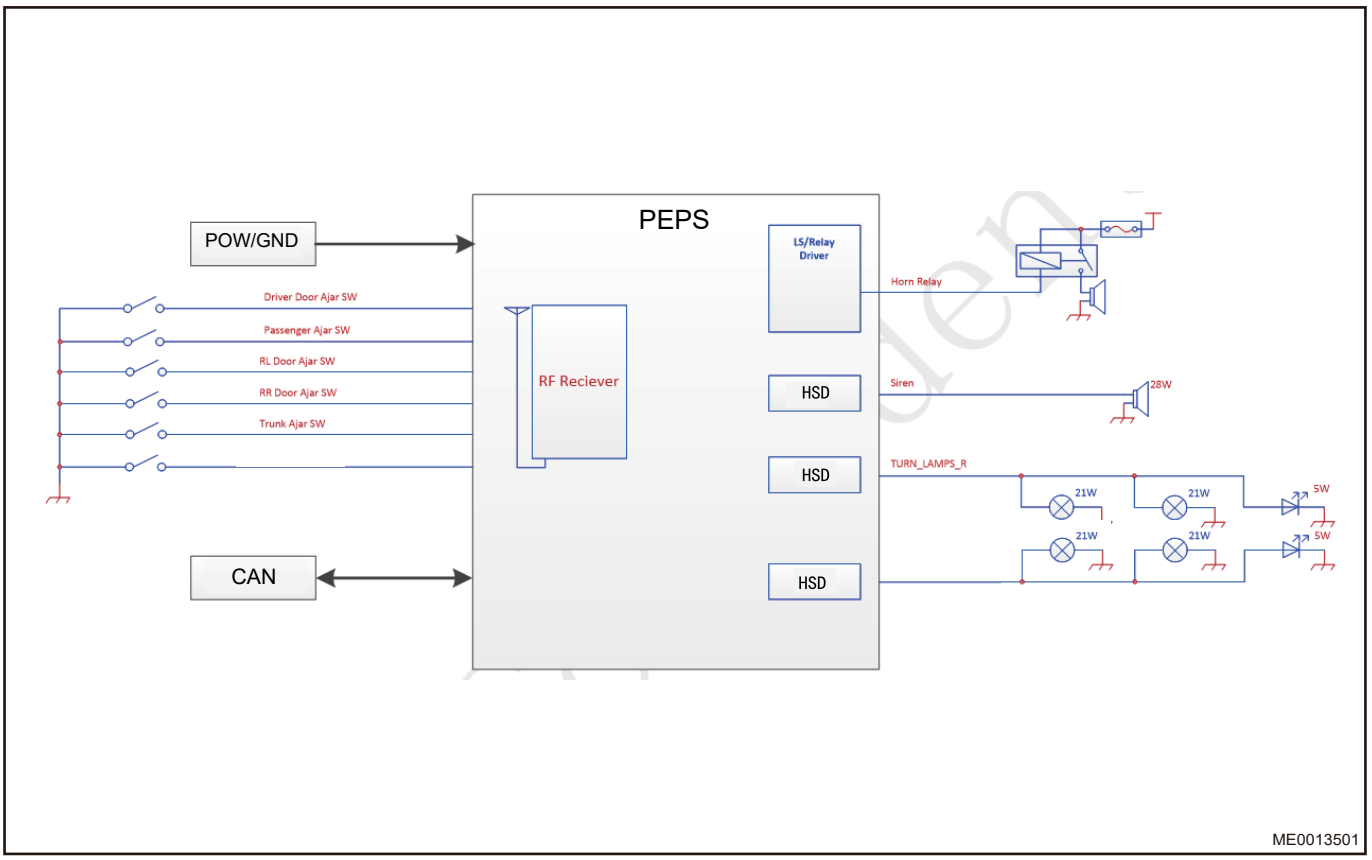
(2) When BDM monitors the communication failure of MCU and judges the failure of MCU, it will keep the current IG1 output through latch circuit and trigger MCU to reinitialize through reset signal.

(3) When MCU initialization is completed, it will switch to the corresponding power state through default transfer according to the power state recorded in EEP.

1.16 Body Anti-theft System

■ System diagram

Body anti-theft system is one of the necessary systems for the vehicle. It is mainly used to switch the anti-theft state of the vehicle under different conditions and monitor the door state of the vehicle under fortifying state, so as to ensure that the vehicle can trigger the corresponding alarm when it is invaded.



■ Safety-related characteristics

The anti-theft status of the vehicle should be stored in the EEP of BDM, and it shall be ensured that the status can be remembered after the power failure of the vehicle, and after the power status is restored, BDM shall restore the previous anti-theft status according to the results stored in EEP.

■ Overview

- The function of external anti-theft alarm system is to provide sound and light alarm if illegal intrusion is detected when the system is in fortifying state. The light alarm is realized by the turn signal light of the vehicle, while the sound alarm is realized by the external horn device.
- The external anti-theft alarm system must remember its own status in case of power failure to prevent illegal intrusion after power failure.
- The factory status of the external anti-theft alarm system is fortifying deactivation.

■ After-sales replacement of smart key

- **Description**

⚠ Caution

- **If user lost a smart key with one key left, when replacing with a new smart key, perform as follows to replace with a new one: Learn the new key by "Add new key" service, delete all smart keys by "Delete all keys" service, then learn the remain two smart keys in order by "Add old key" service. If user finds the lost key, it can be reactivated by "Add old key" service on diagnostic tester. If not, even if the lost one is found, it cannot be used normally.**

There are two match methods between smart key and system: "Replace with new key" and "Add old key".

(1) "Add new key" refers to match blank key (never match with any system) with system. It usually happens when user would have additional new key on the basis of the old ones.

(2) "Add old key" refers to rematch learned key with system (it must be previous system).

- **Match Operation**

⚠ Caution

- **Perform “Add new key” and “Add old key” when the ignition switch is in OFF position.**

(1) Anti-theft match description for “Add new key” is as follows:

1) Technician reads VIN in EMS of user’s vehicle with diagnostic tester, then obtain PIN through VIN.
2) Place the smart key to be matched on the key mark in cup holder, enter anti-theft control system program on diagnostic tester, select “Add new key” menu, input PIN, diagnostic tester will perform “Add new key” program automatically.
3) After that, press unlock button and check if left and right turn signal light indicators on instrument cluster blink. If the indicators blink, new key is matched successfully, otherwise, new key is not matched successfully.

(2) Anti-theft match description for “Add old key” is as follows:

1) Technician reads VIN in EMS of user’s vehicle with diagnostic tester, then obtain PIN through VIN.
2) Enter anti-theft control system program on diagnostic tester, select “Delete all keys” menu.
3) Place the smart key to be matched on the key mark in cup holder, enter anti-theft control system program on diagnostic tester, select “Add old key” menu, input PIN, diagnostic tester will perform “Add old key” program automatically.
4) After that, press unlock button and check if left and right turn signal light indicators on instrument cluster blink. If the indicators blink, new key is matched successfully, otherwise, new key is not matched successfully.

•

⚠ Caution

- **When performing “Add old key”, it is necessary to carry previous matched smart key and perform match operation one by one according to match procedures, or previous matched key will be disabled.**
- **Regardless of “Add new key” or “Add old key”, only one smart key can be kept in vehicle and keep key on key mark in cup holder. Make sure that there is no other key in vehicle. If there is other key, bring it to a position 2 m away from vehicle.**

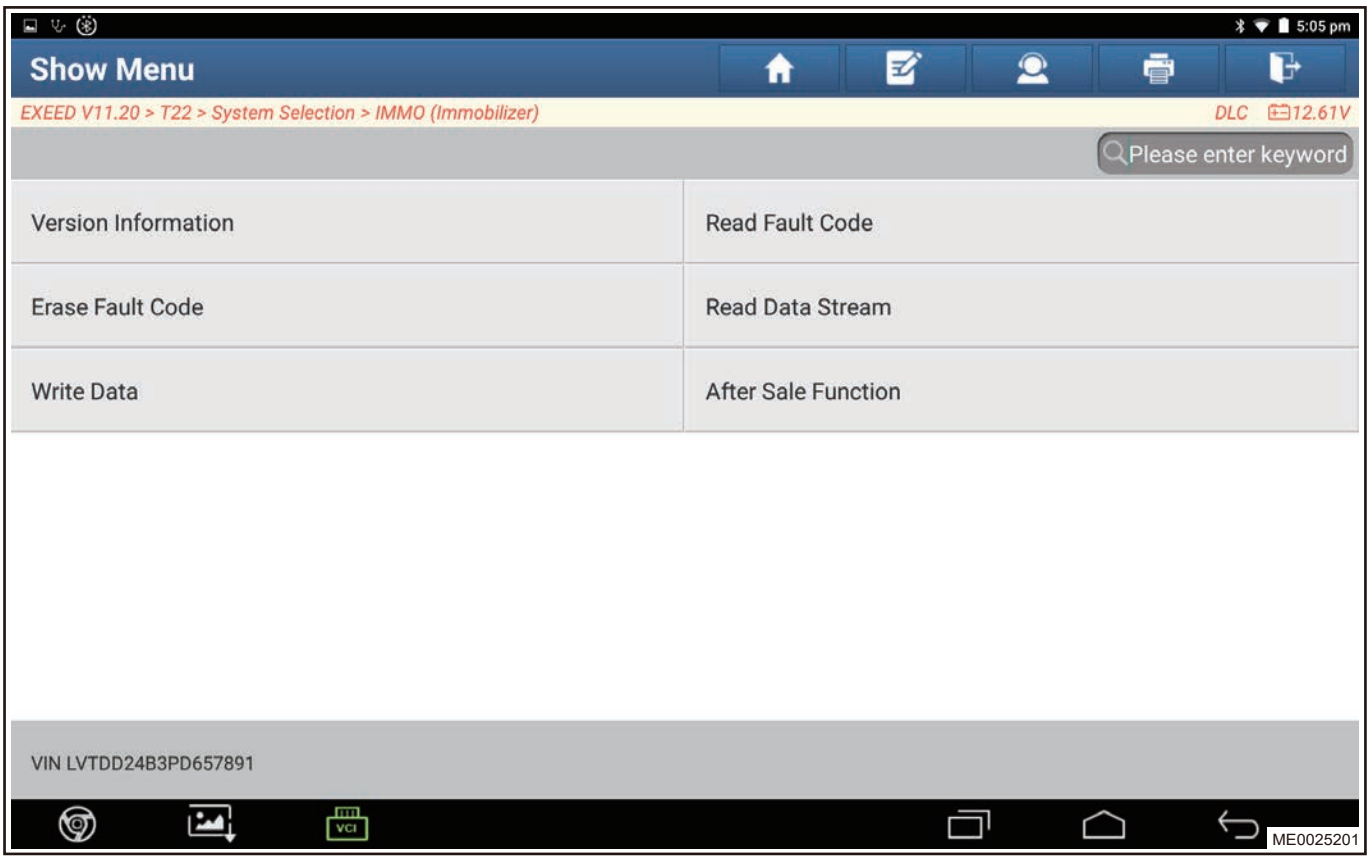
- **Matching Learning**

(1) **Writing VIN code**

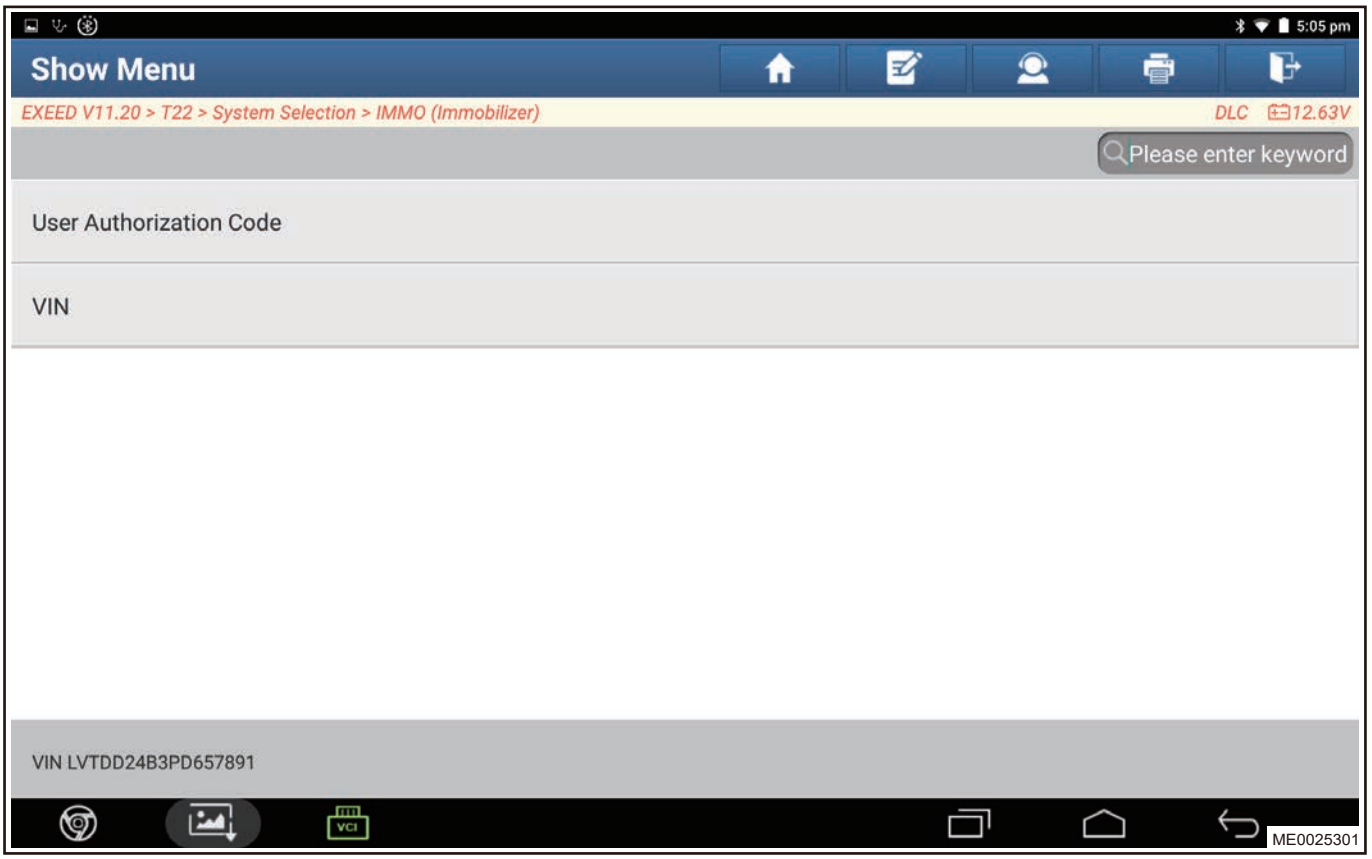
⚠ Caution

- **The correct vehicle VIN code must be entered. Inputting the wrong VIN code may cause vehicle abnormality.**

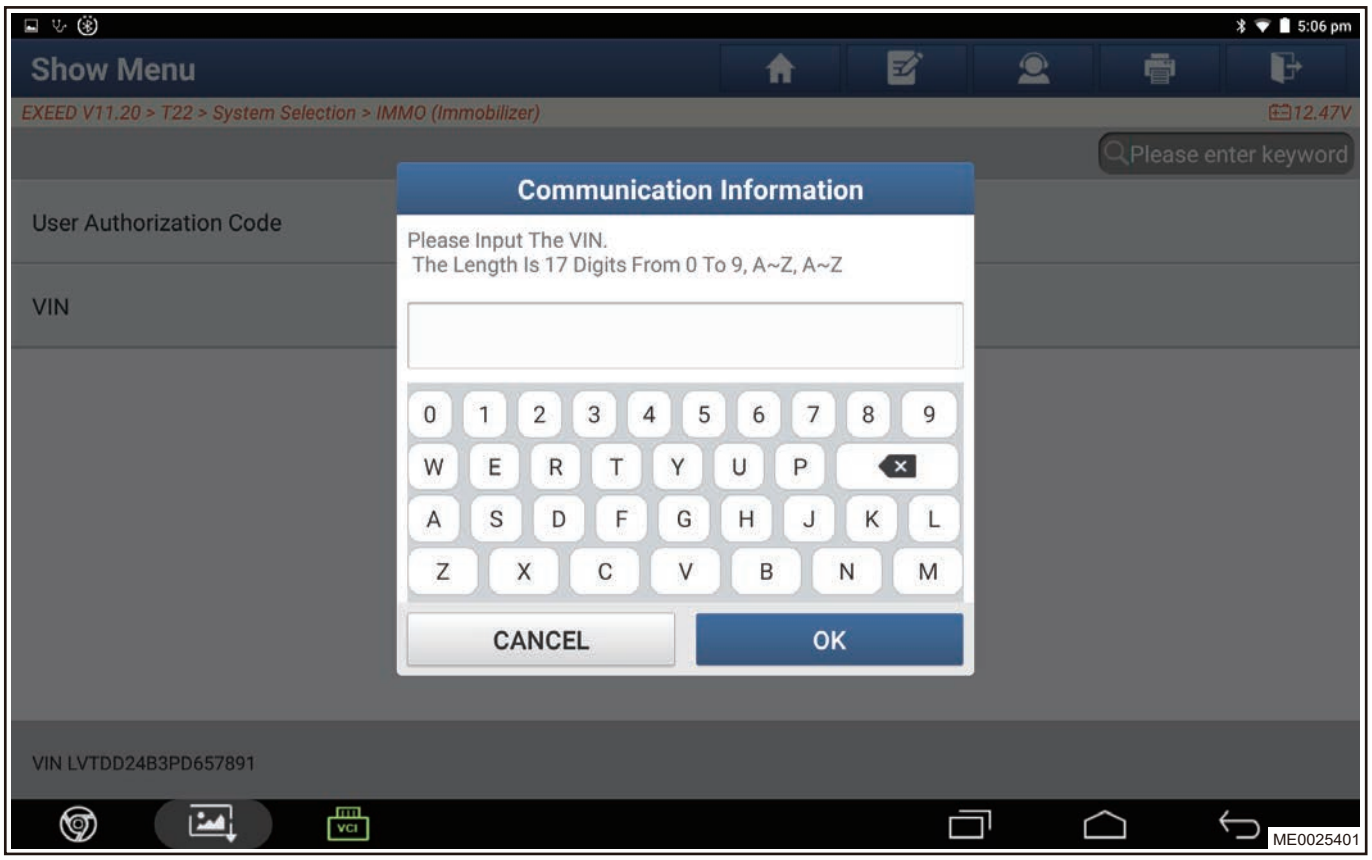
1) Enter diagnostic interface, select “IMMO (Immobilizer System)” on diagnostic tester interface to enter next interface.
2) Click “Write Data”.



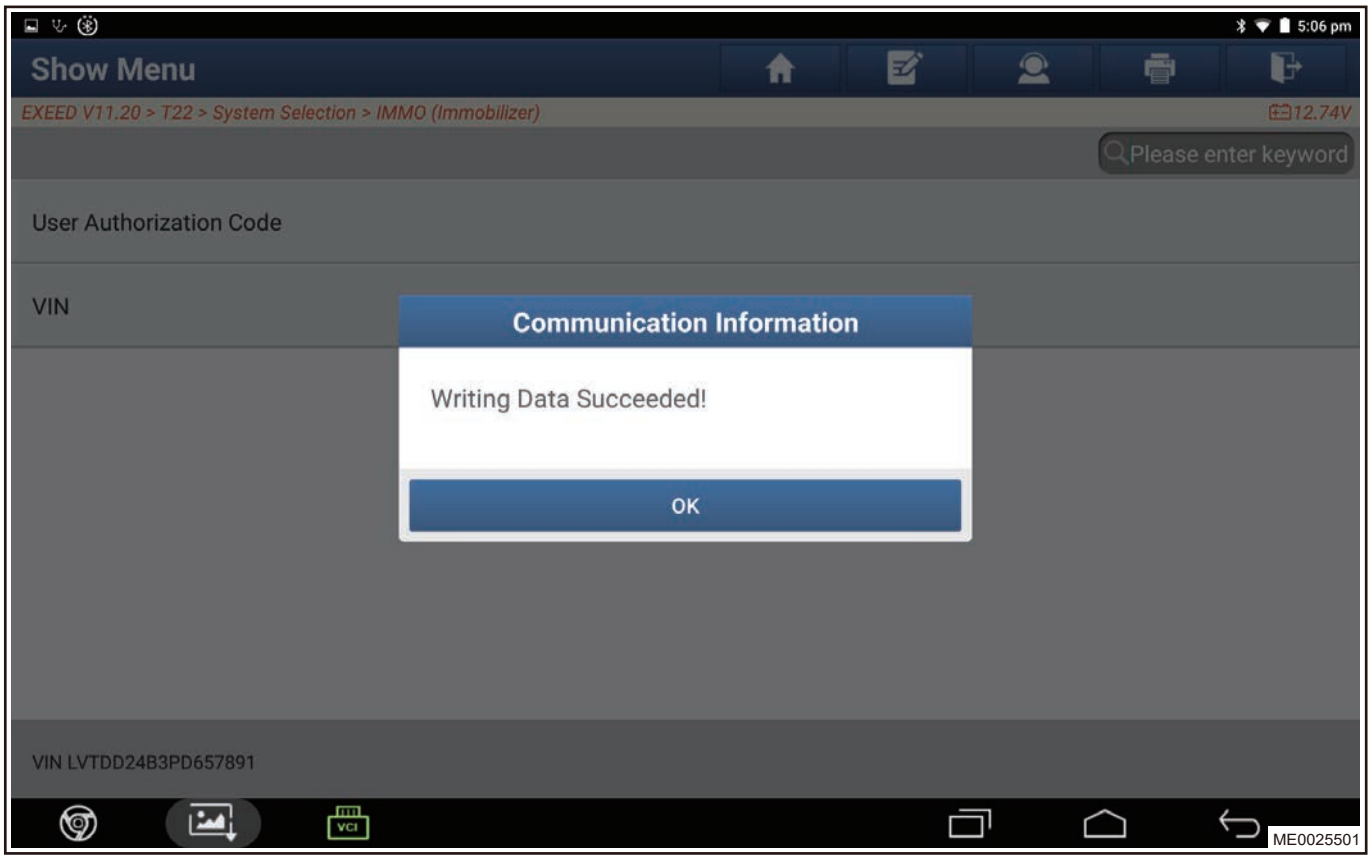
3) Click “VIN”.



4) After entering the correct VIN number, click “OK”.



5) Write data successfully, click “OK”.

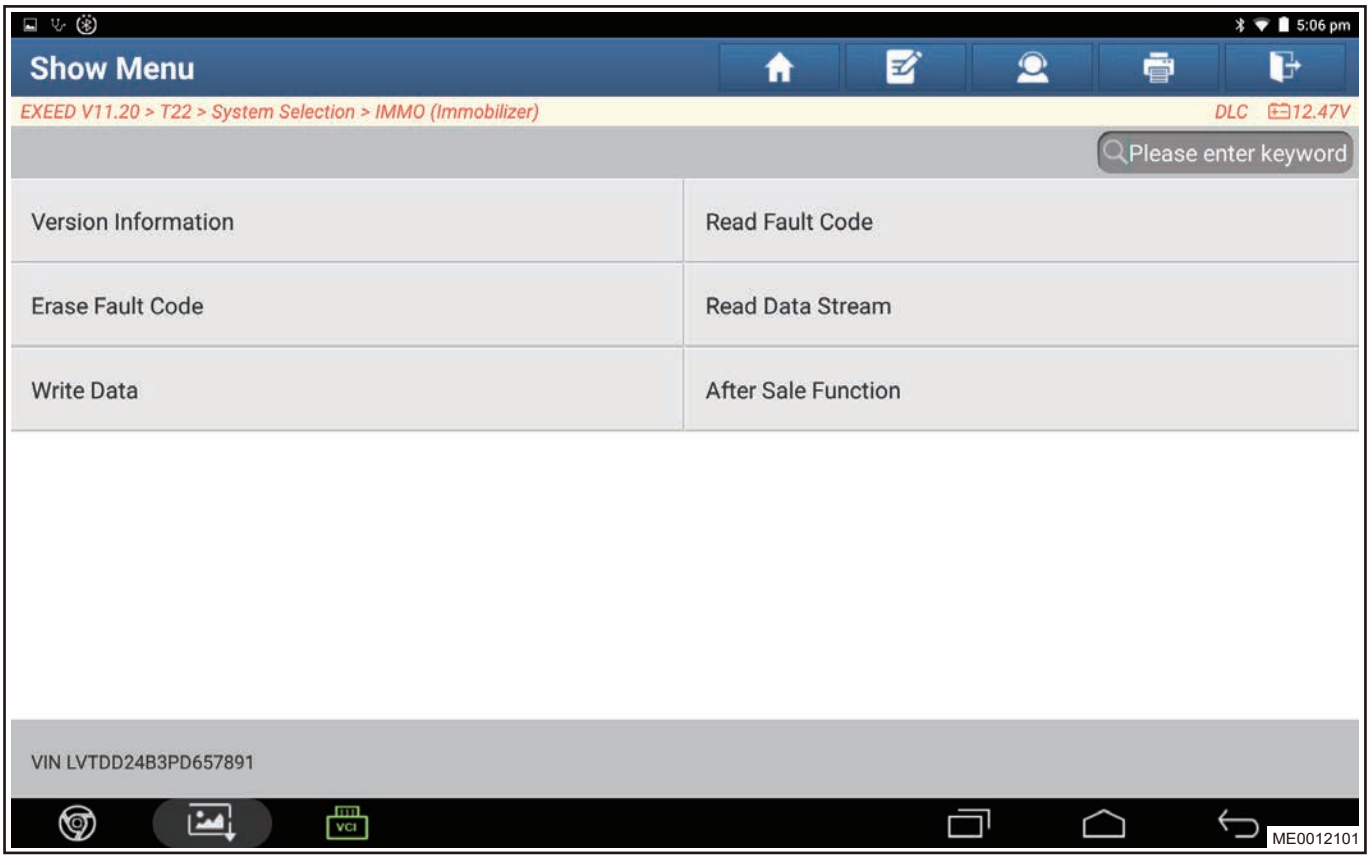


(2) **Programming IMMO (Learn SK from T-BOX)**

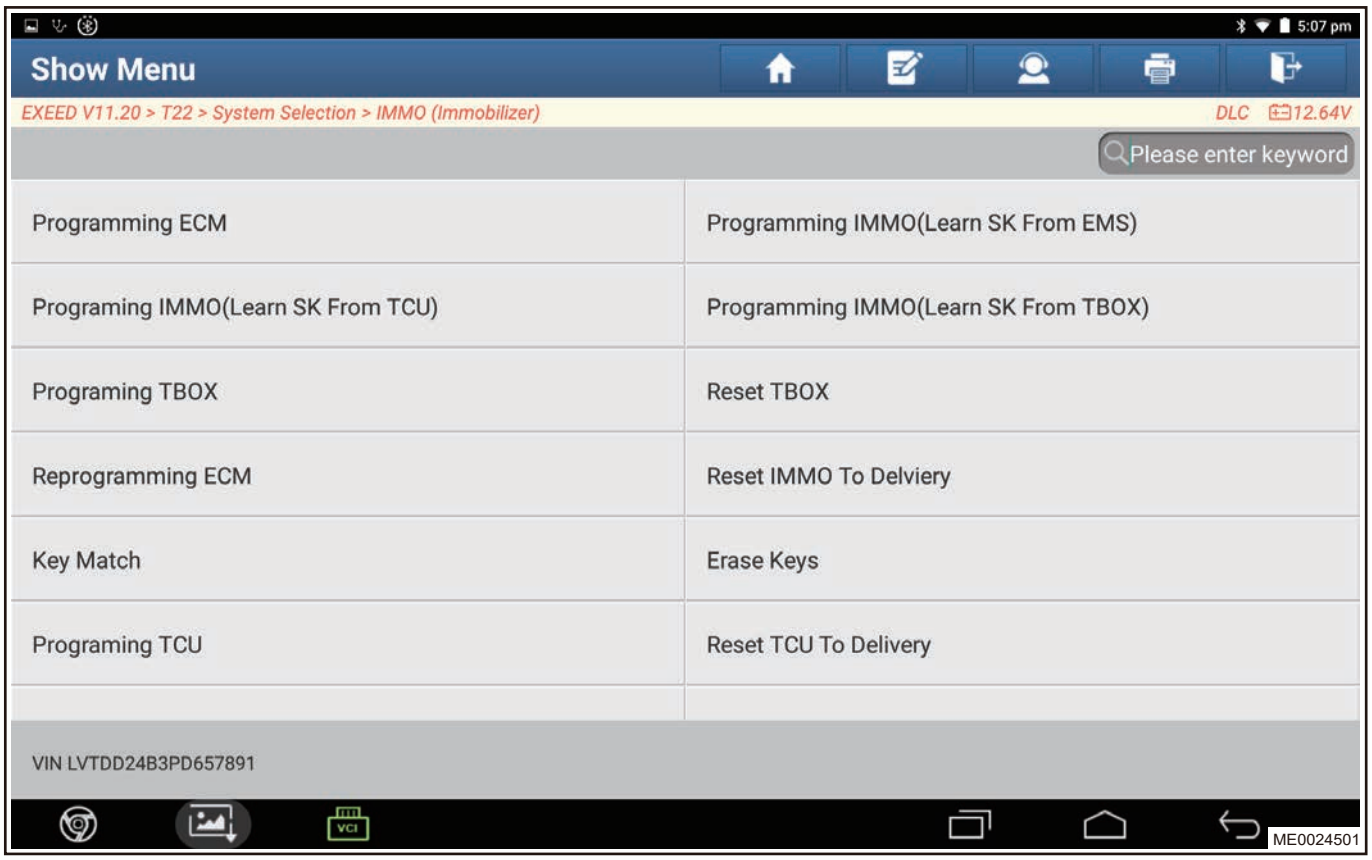
⚠ Caution

- **This function is only for replacing the new immobilizer (or immobilizer that is reset successfully), the vehicle is equipped with (TBOX) remote wireless communication terminal (TBOX remote wireless communication terminal and key are the original accessories).**
- **This function requires 8-digit anti-theft security code (PIN) to be obtained through EXEED after-sales service.**

1) Enter diagnostic interface, select “IMMO (Immobilizer System)” on diagnostic tester interface to enter next interface.
2) Click “Immobilizer Matching”.

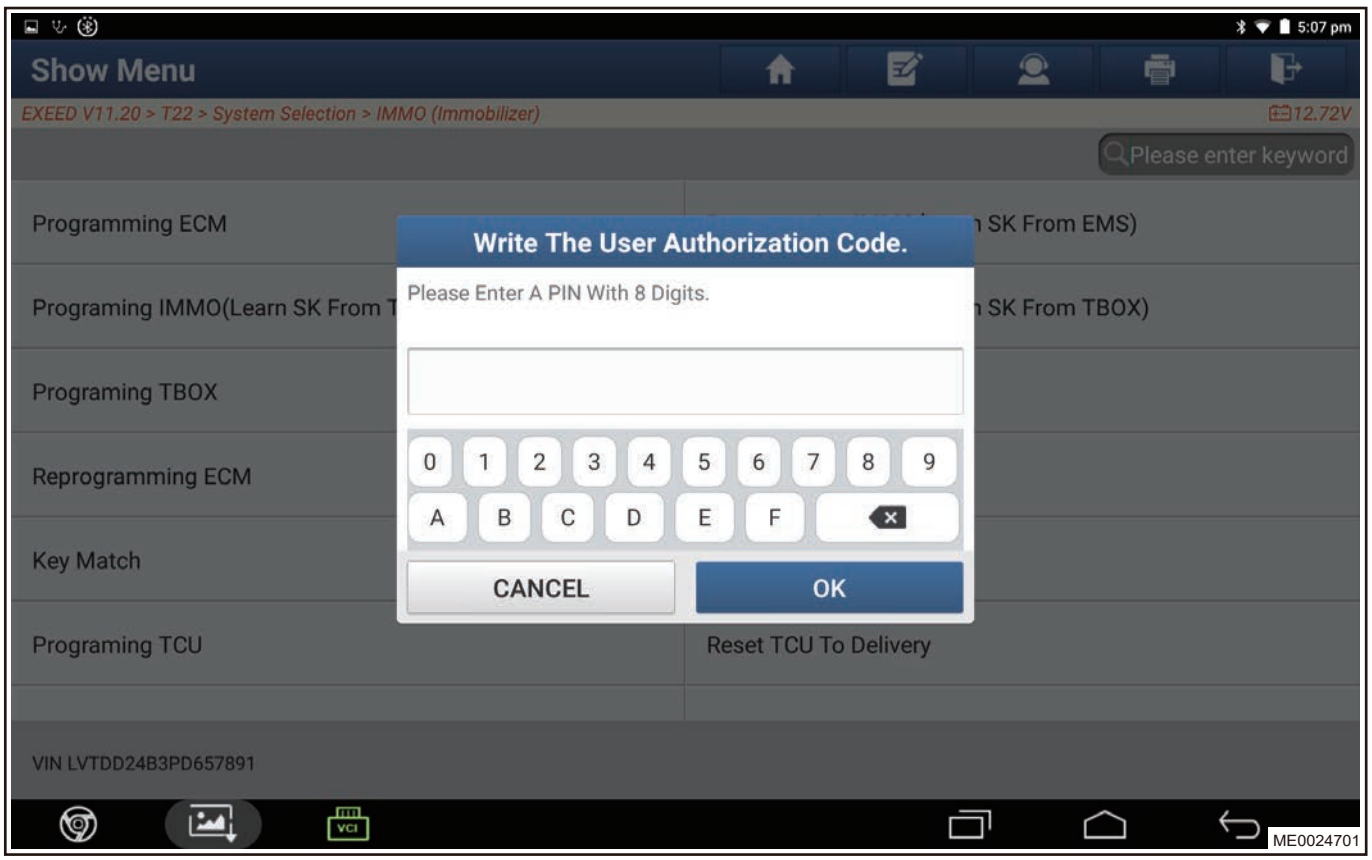


3) Click “Programming IMMO (Learn SK from T-BOX)”.

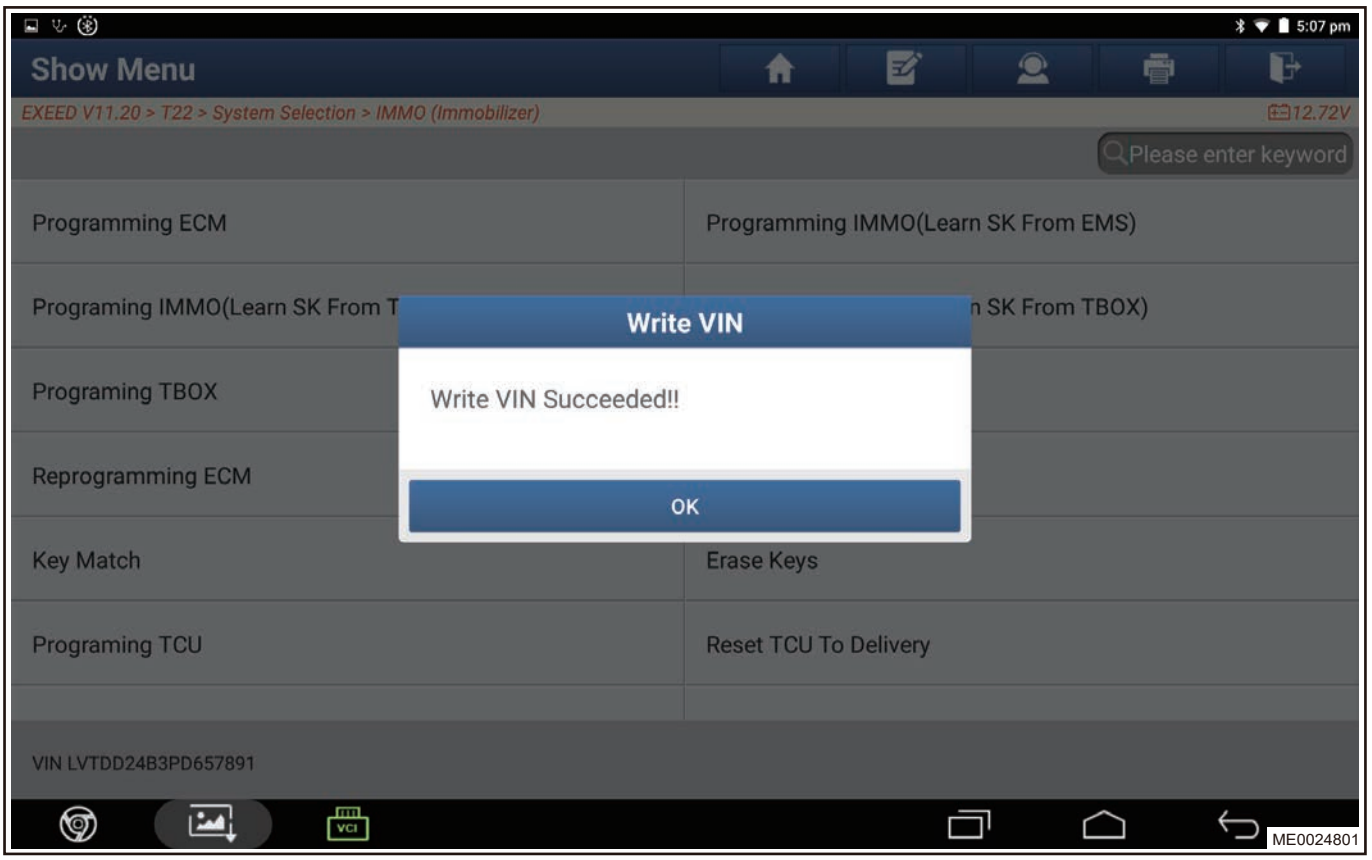


4) After confirming the execution, click “YES”.

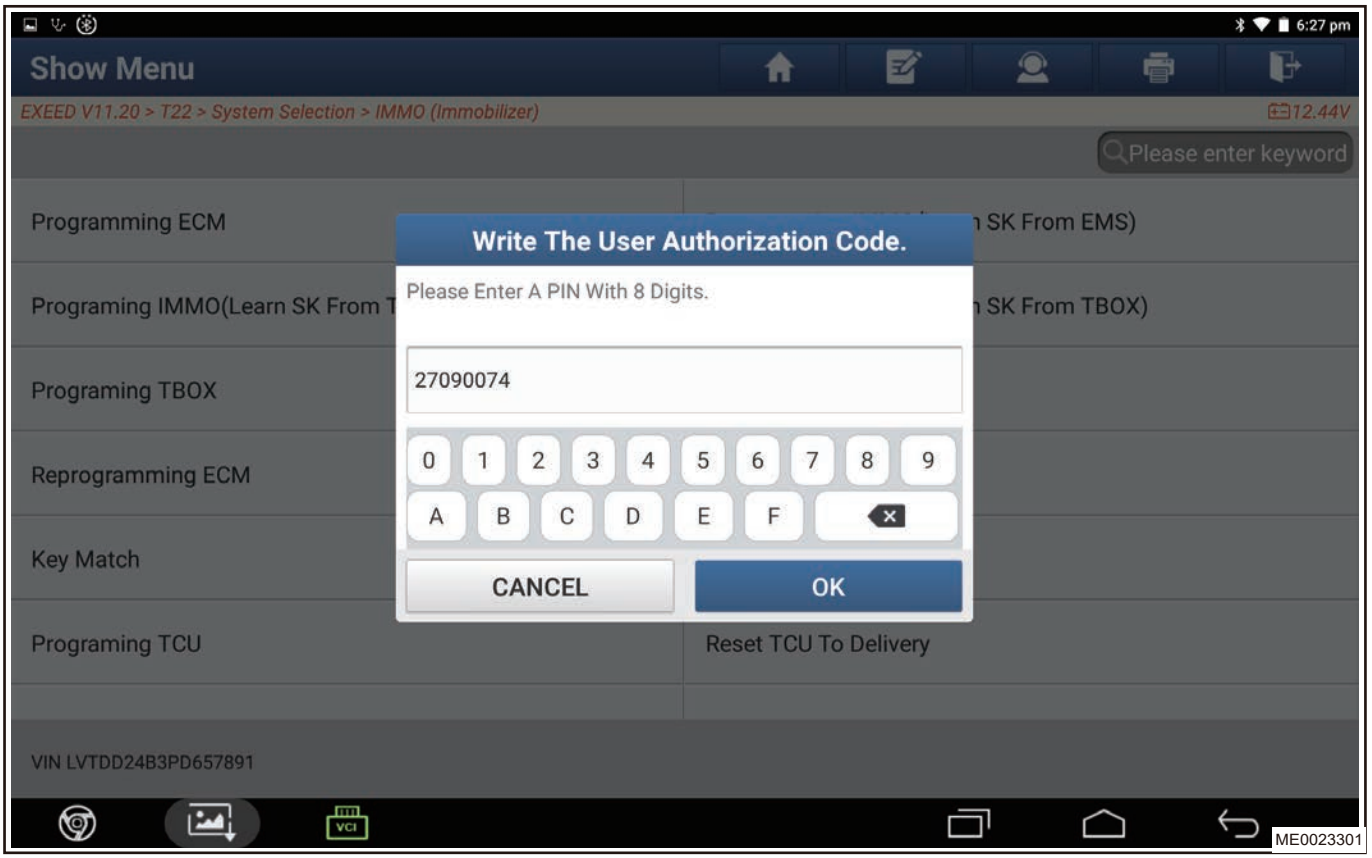
5) After entering the correct vehicle VIN number, click “OK”.



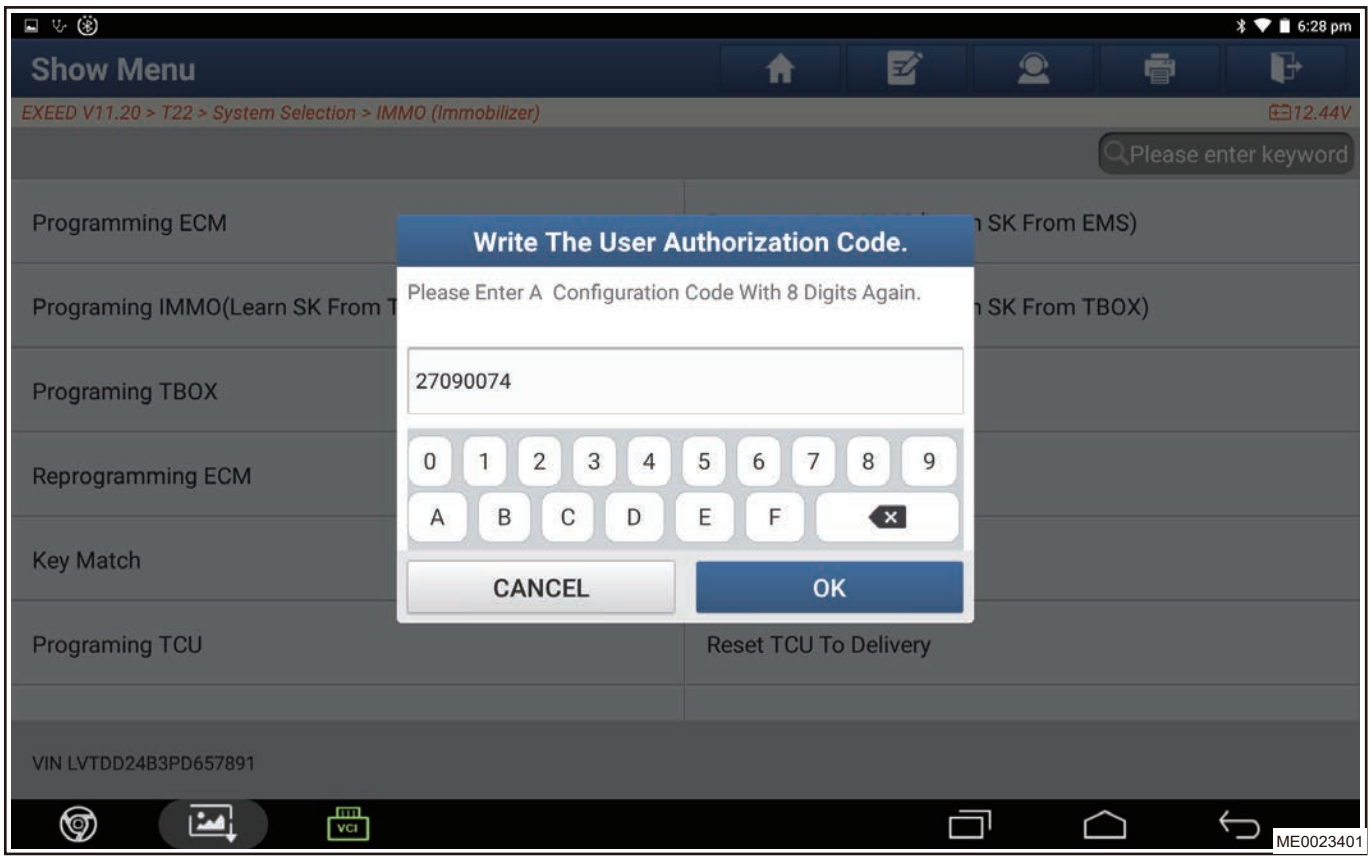
6) Click “OK”.



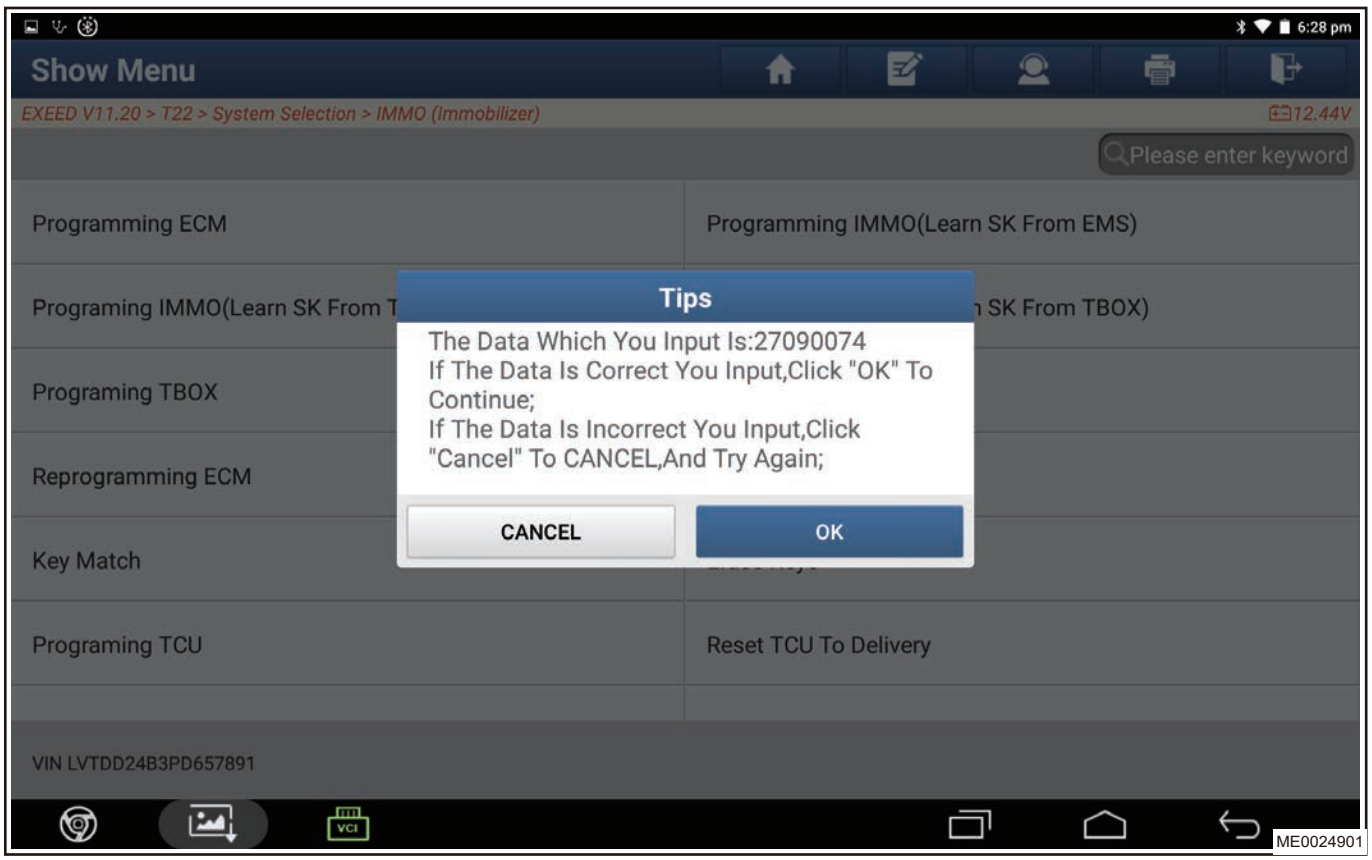
7) Get the 8-digit anti-theft security code (PIN) through EXEED after-sales service and enter it, click “OK”.



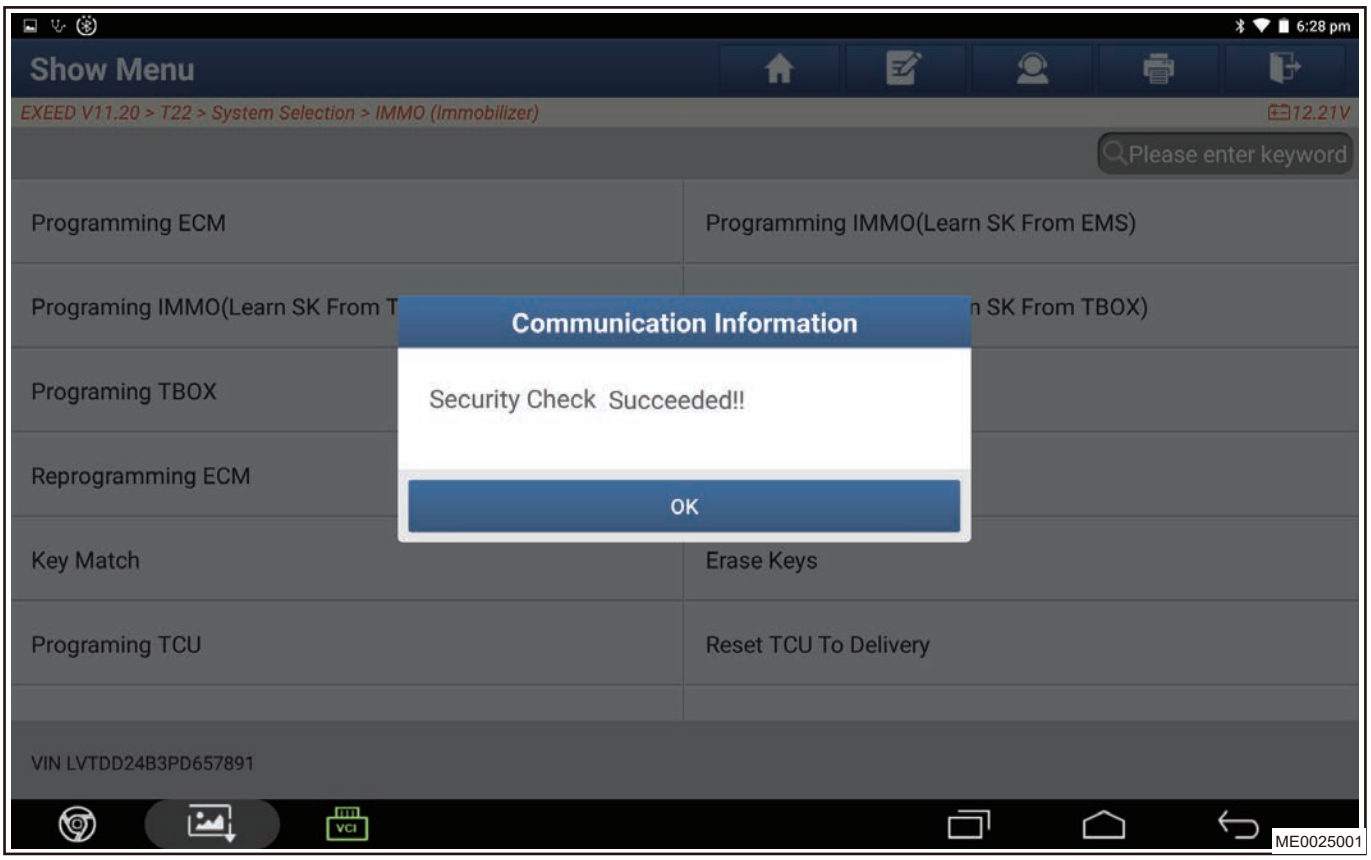
8) Enter again, and click “OK”.



9) Verify that the anti-theft security code entered is correct, click “OK”.



10)Anti-theft security code is written successfully, click “OK”.



11) Programming IMMO successfully, click “OK”.

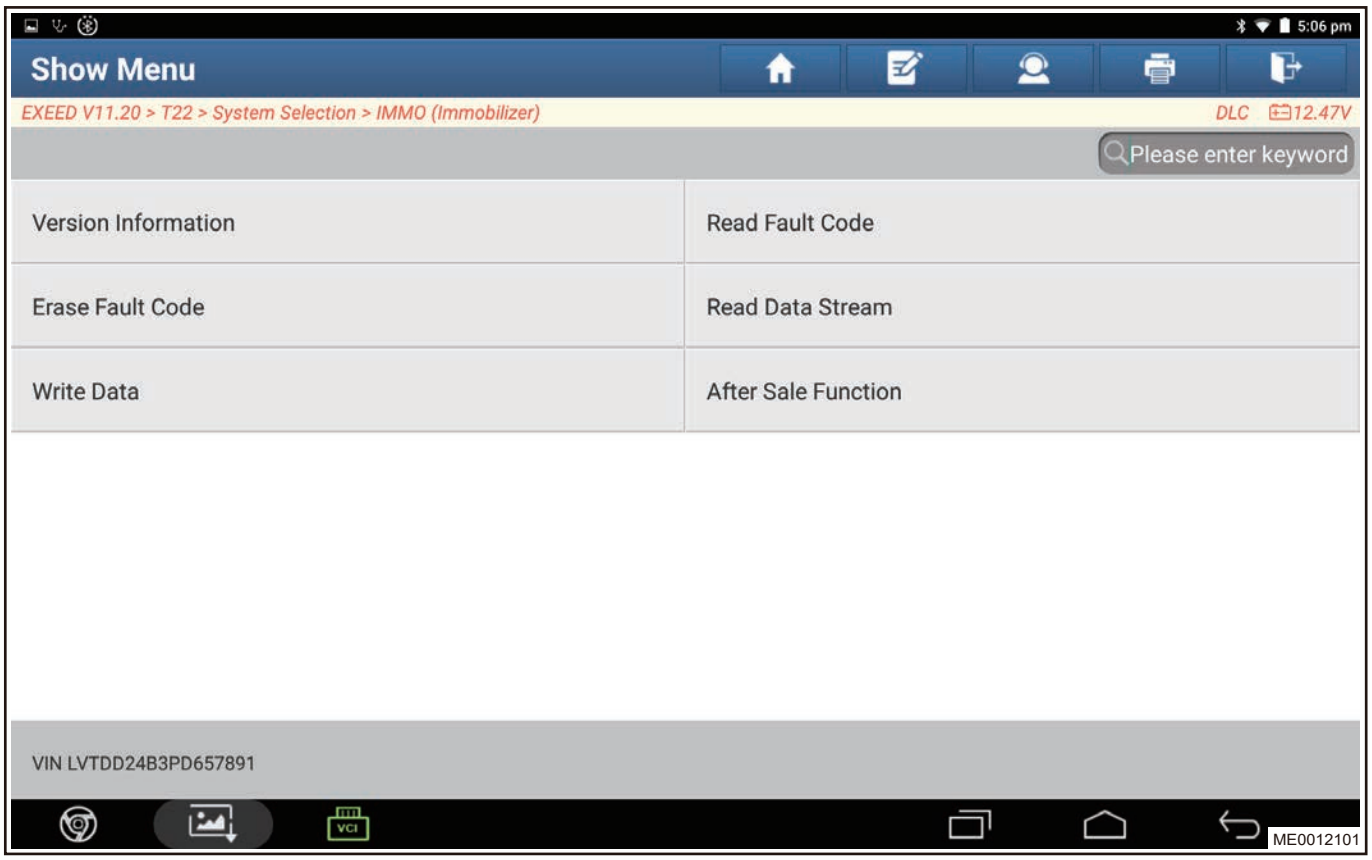
(3) **Add new key**

⚠ Caution

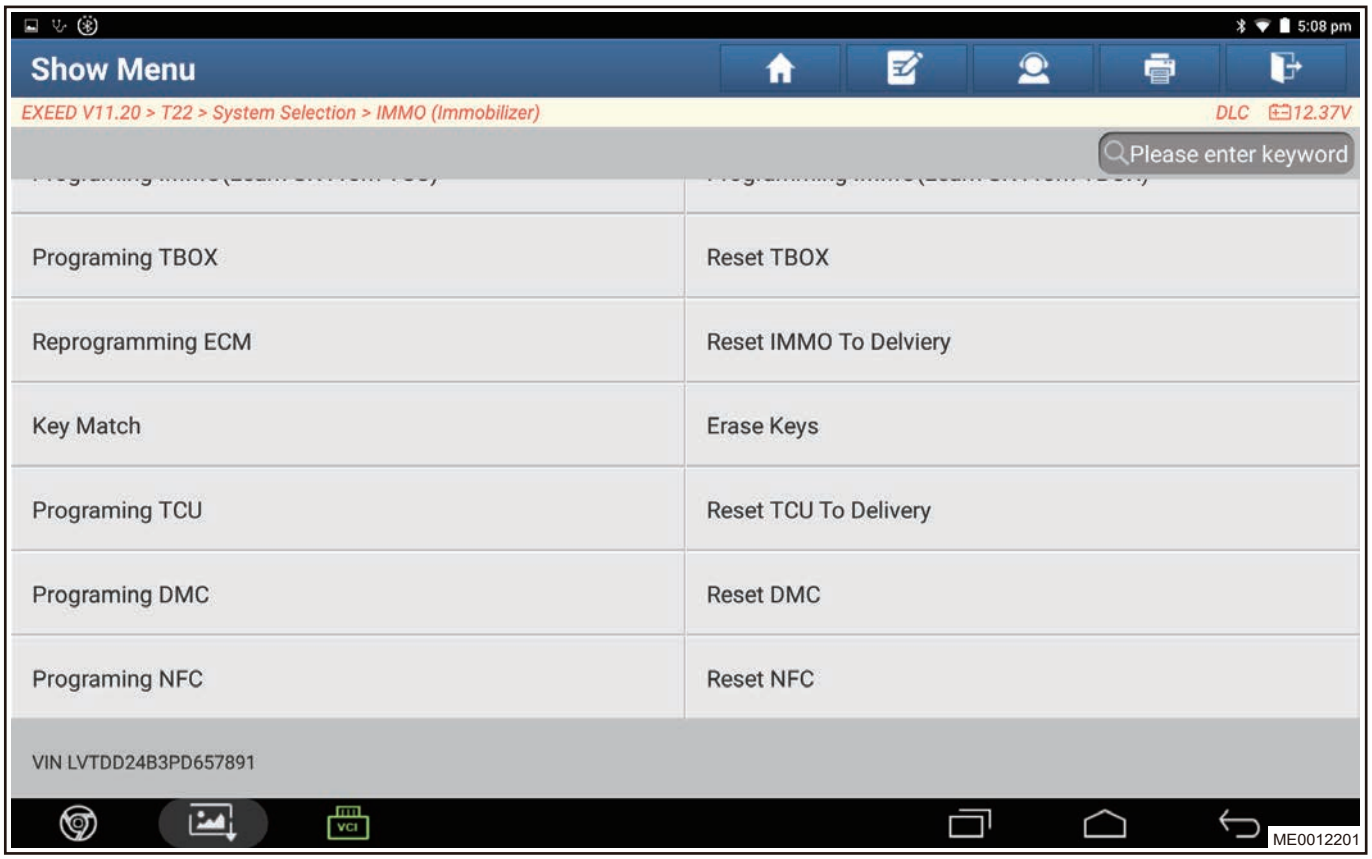
- **Before the diagnostic tester matching operation, you need to put the key to be matched into the anti-theft coil induction place located in the center armrest box.**
- **The purpose of this function is to add a new key to the immobilizer. The added key can only be matched with the immobilizer of this vehicle, and can no be matched with other immobilizer.**
- **This function requires 8-digit anti-theft security code (PIN) to be obtained through EXEED after-sales service.**

1) Enter diagnostic interface, select “IMMO (Immobilizer System)” on diagnostic tester interface to enter next interface.

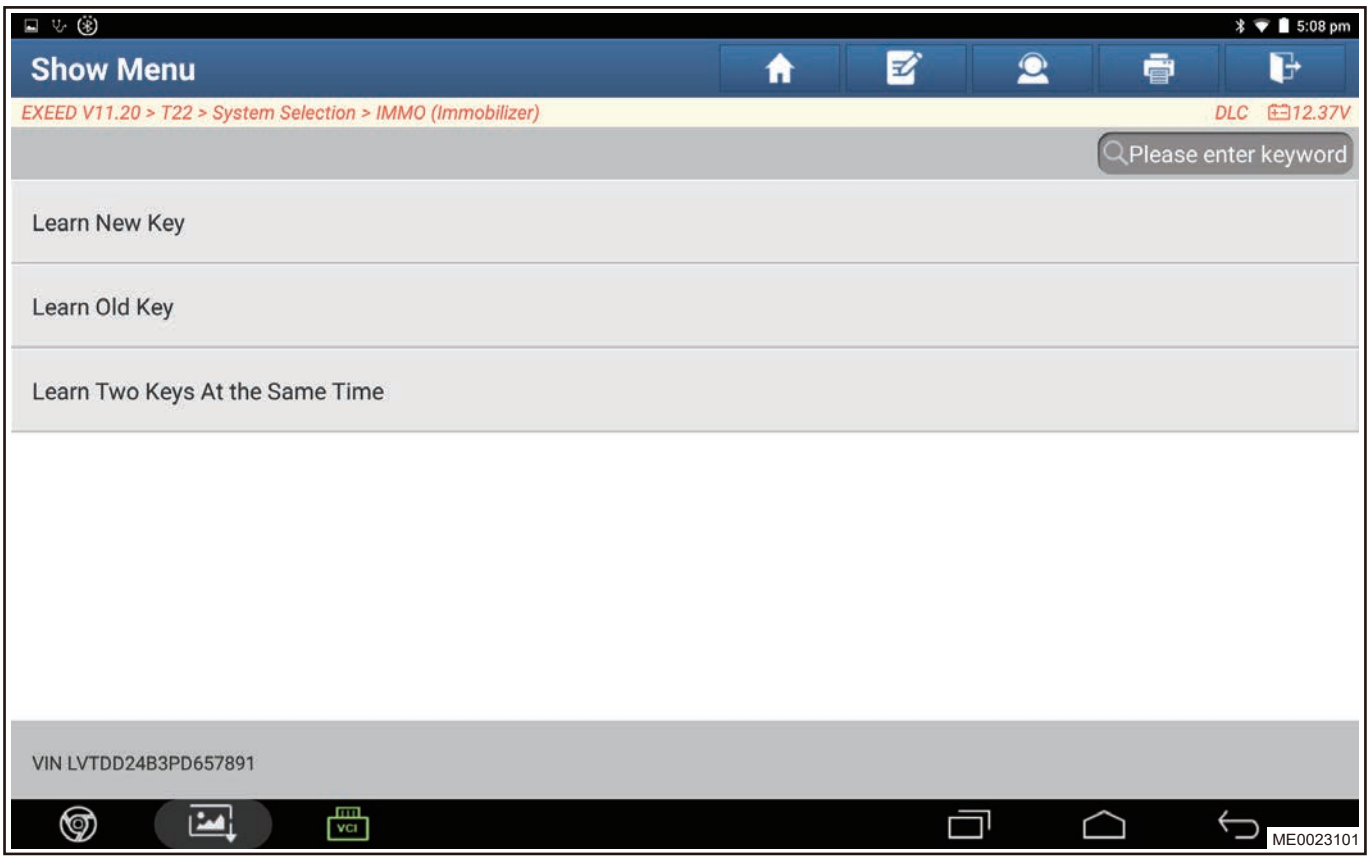
2) Click “Immobilizer Matching”.



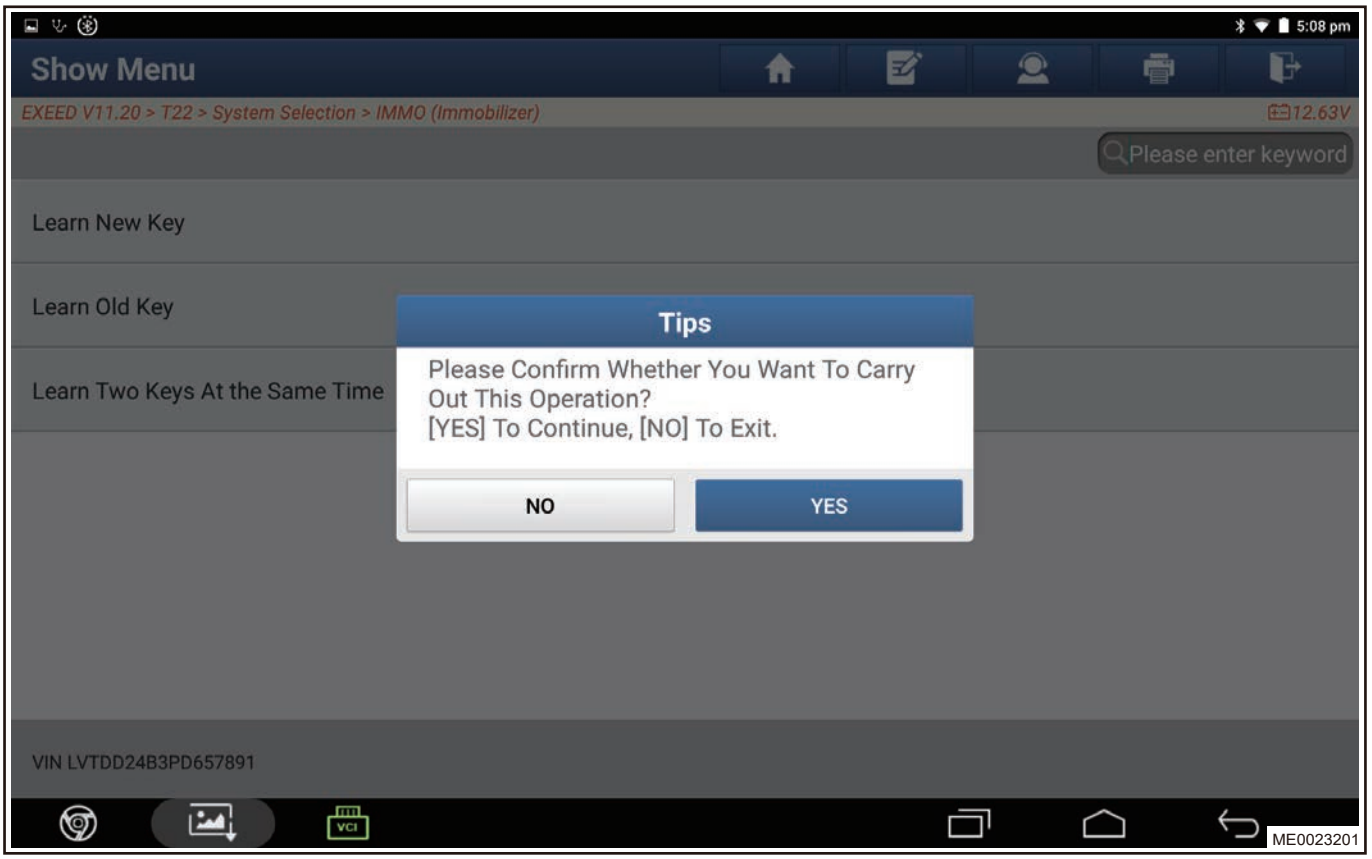
3) Click “Key Match”.



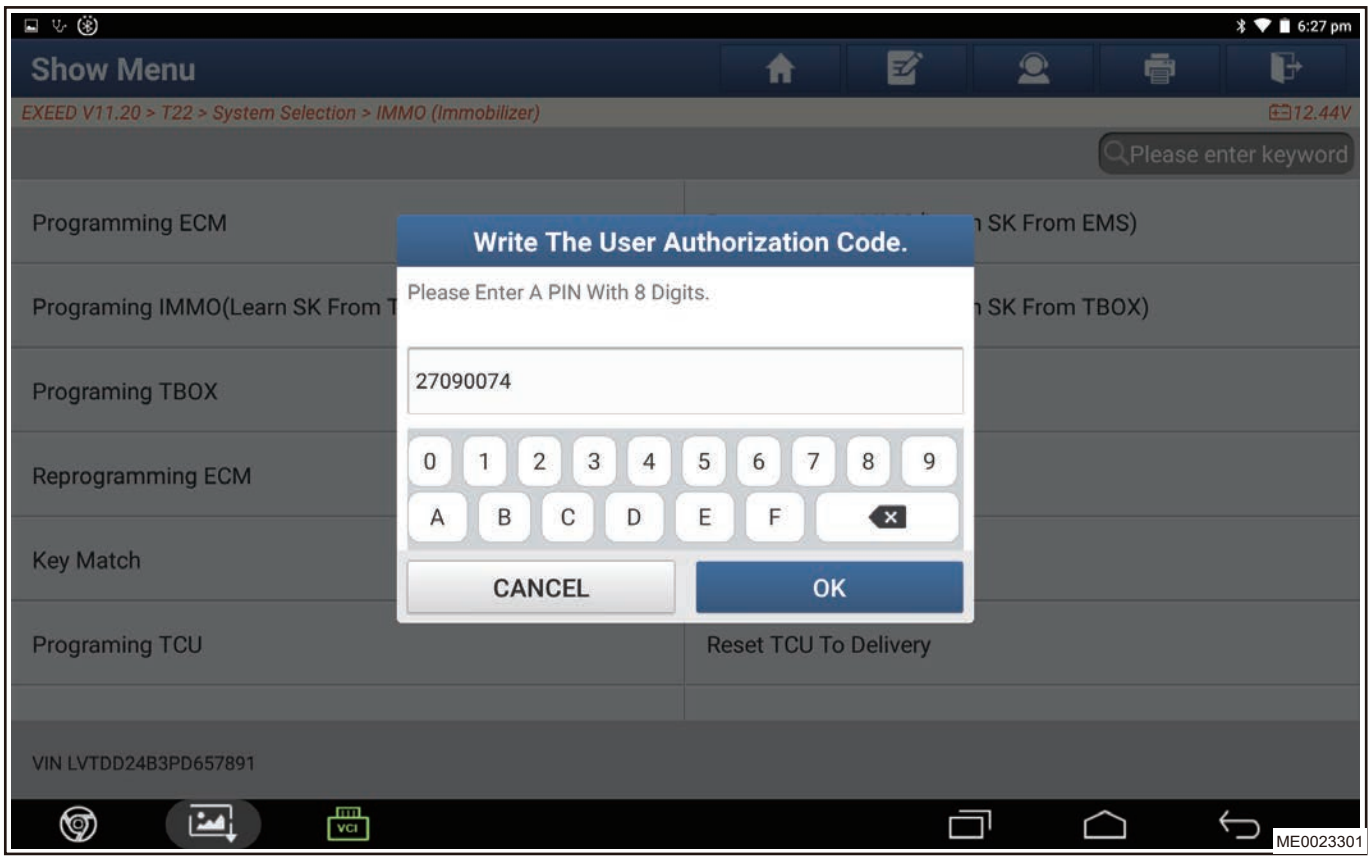
4) Click “Learn New Key”.



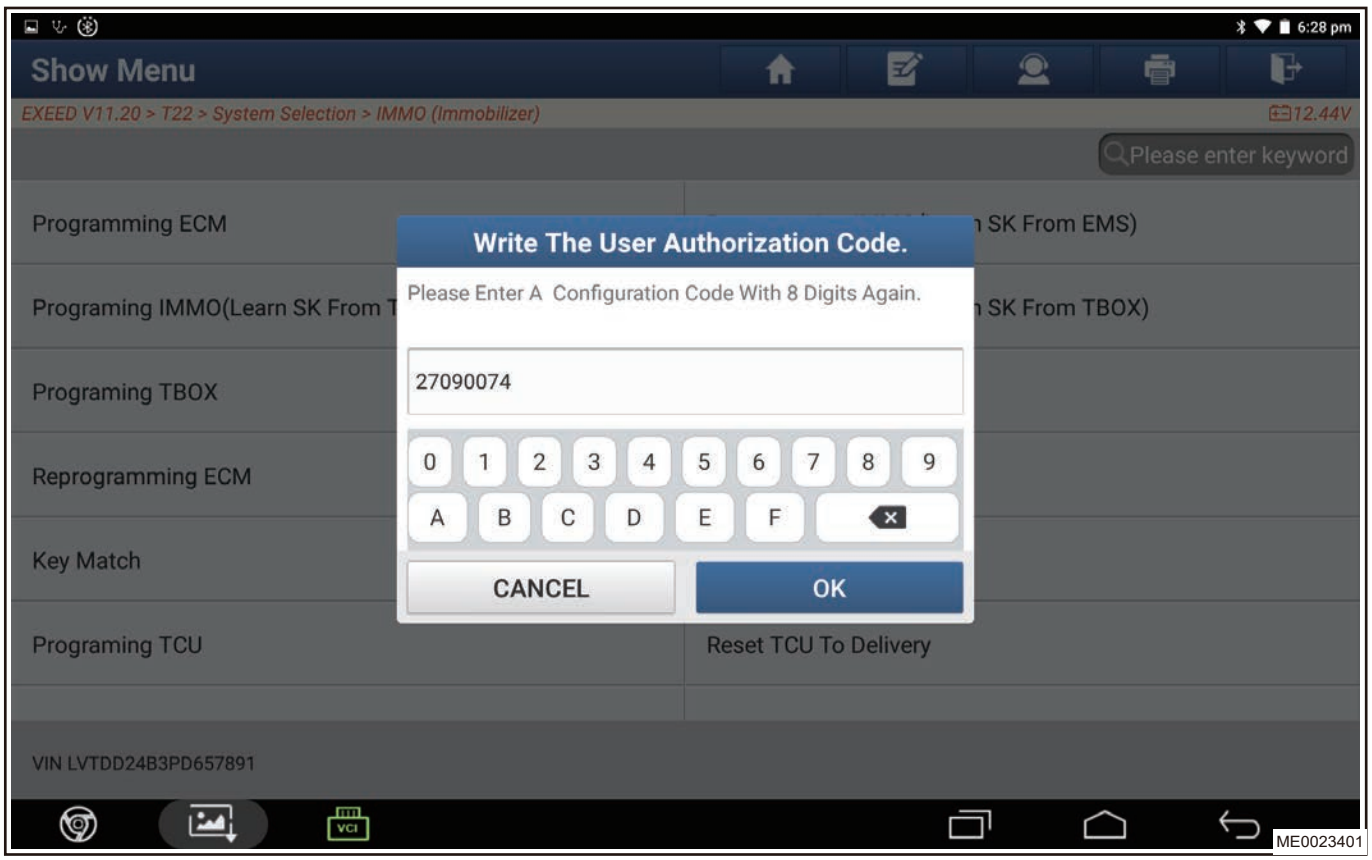
5) After prompts are confirmed, click “YES”.



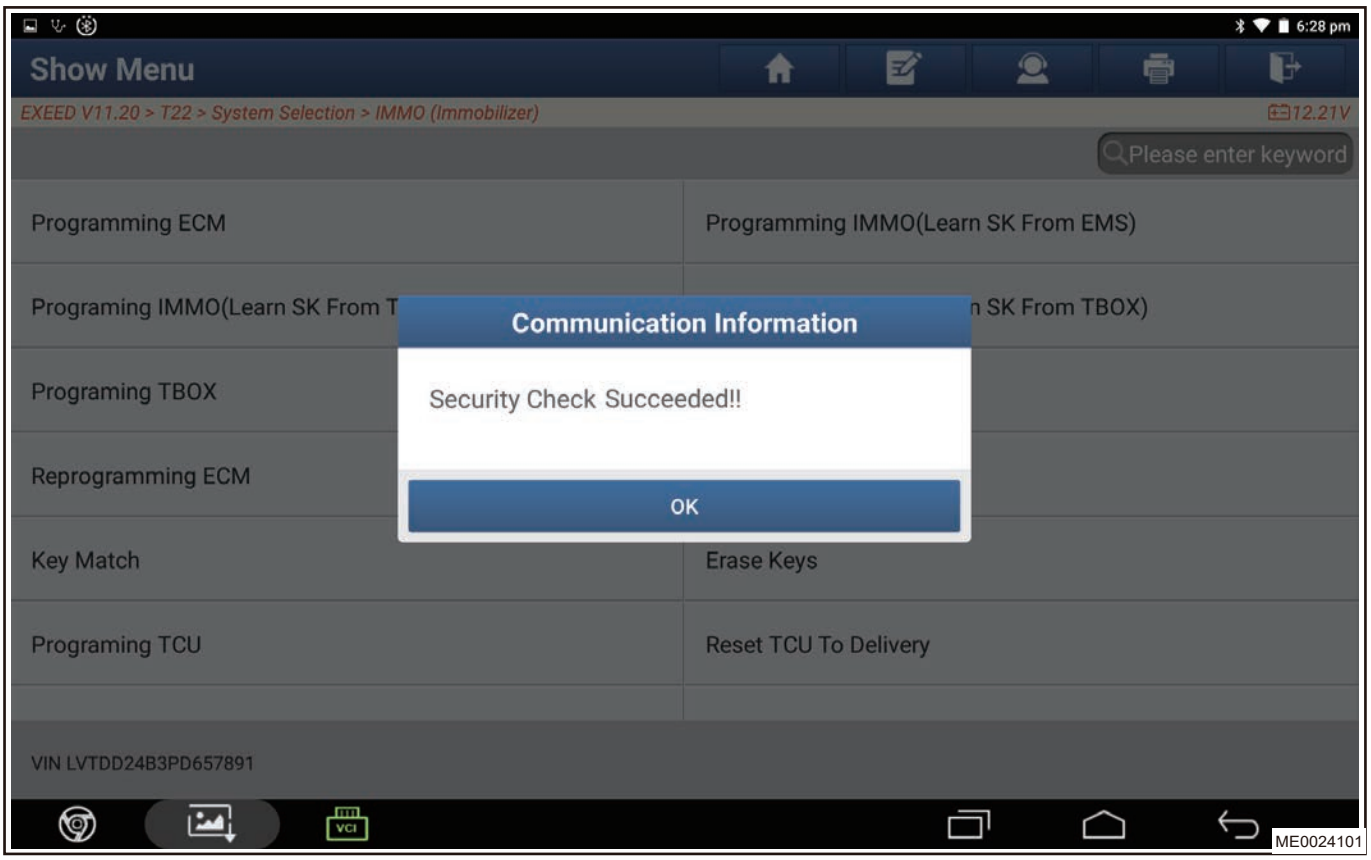
6) Get the 8-digit anti-theft security code (PIN) through EXEED after-sales service and enter it, click “OK”.



7) Enter the anti-theft security code (PIN) again, click “OK”



8) Anti-theft security code is written successfully, click “OK”.



9) Add the new key successfully, click “OK”.

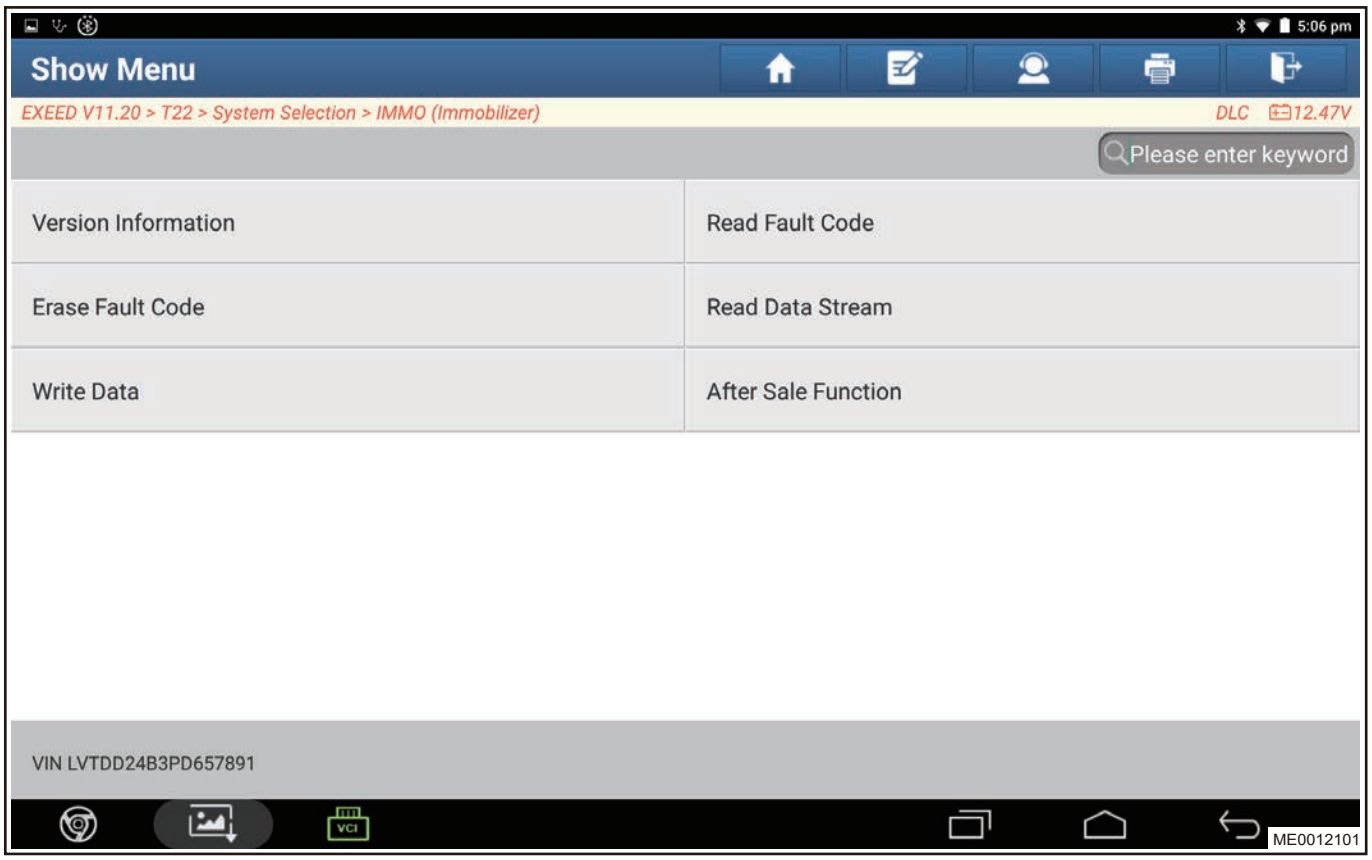
(4) **Add old key**

⚠ Caution

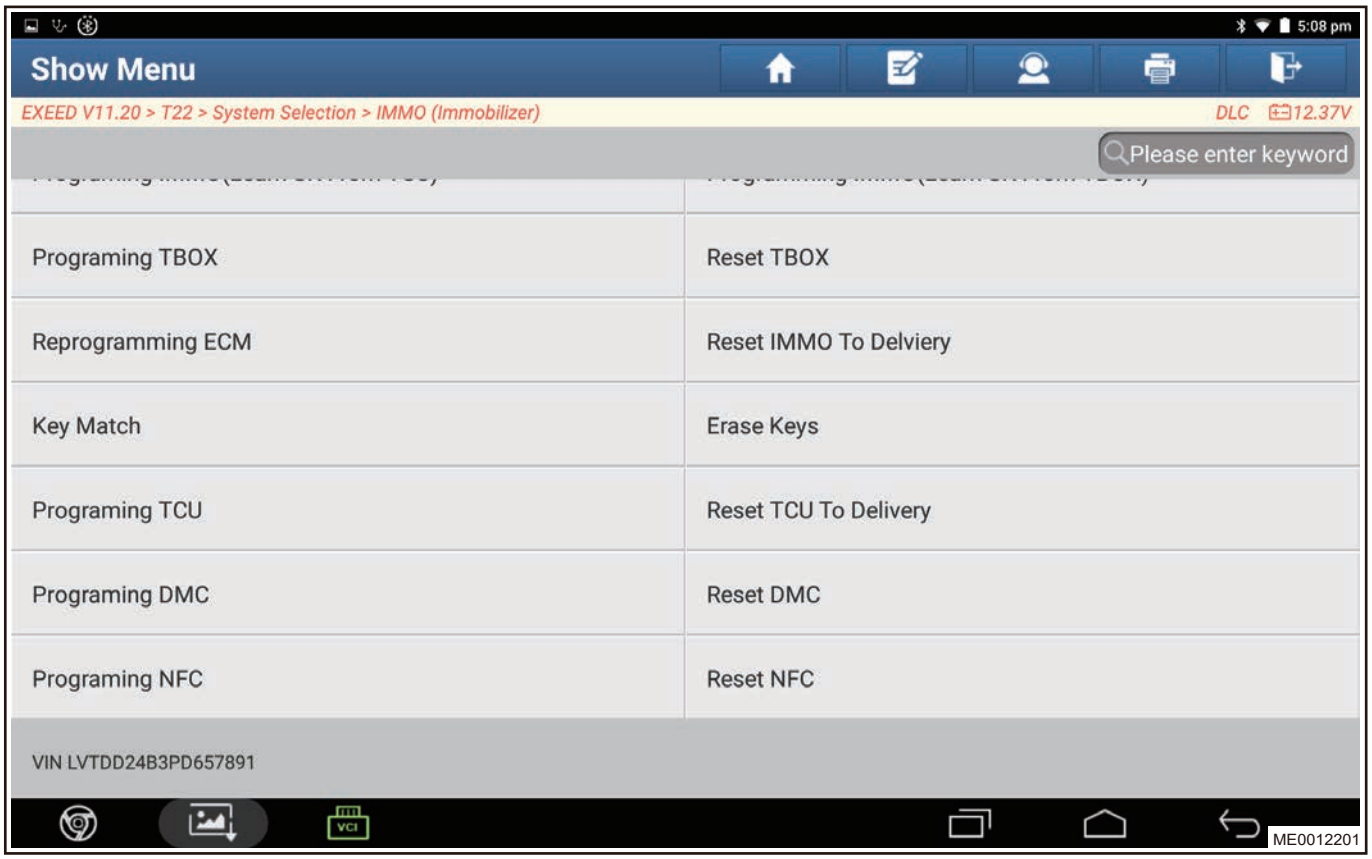
- **Before the diagnostic tester matching operation, you need to put the key to be matched into the anti-theft coil induction place located in the center armrest box.**
- **The purpose of this function is to add a old key to the immobilizer. The old key can only be the used key of this vehicle and the key (SK) has not been changed. The old key of other vehicles cannot be used.**
- **This function requires 8-digit anti-theft security code (PIN) to be obtained through EXEED after-sales service.**

1) Enter diagnostic interface, select “IMMO (Immobilizer System)” on diagnostic tester interface to enter next interface.

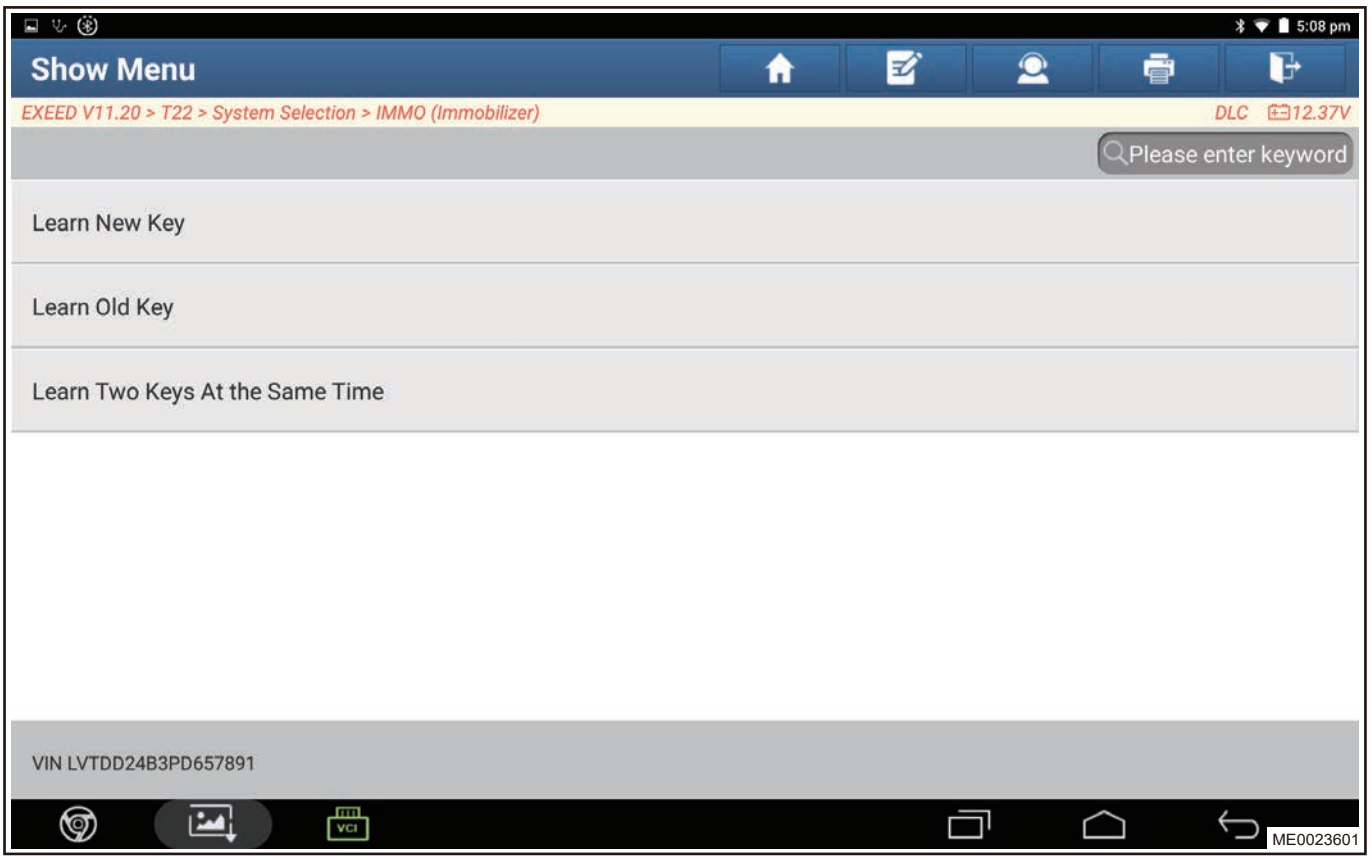
2) Click “Immobilizer Matching”.



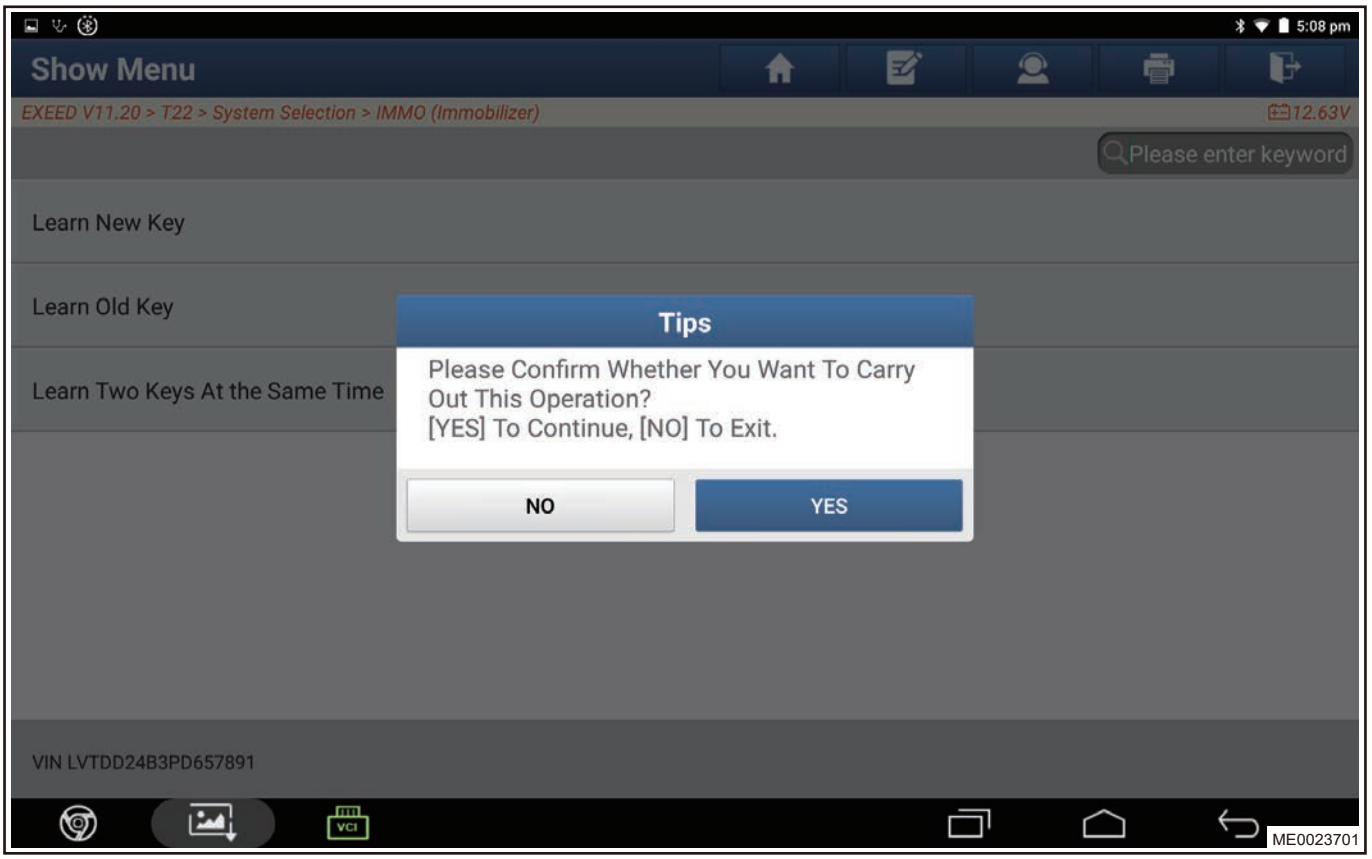
3) Click “Key Match”.



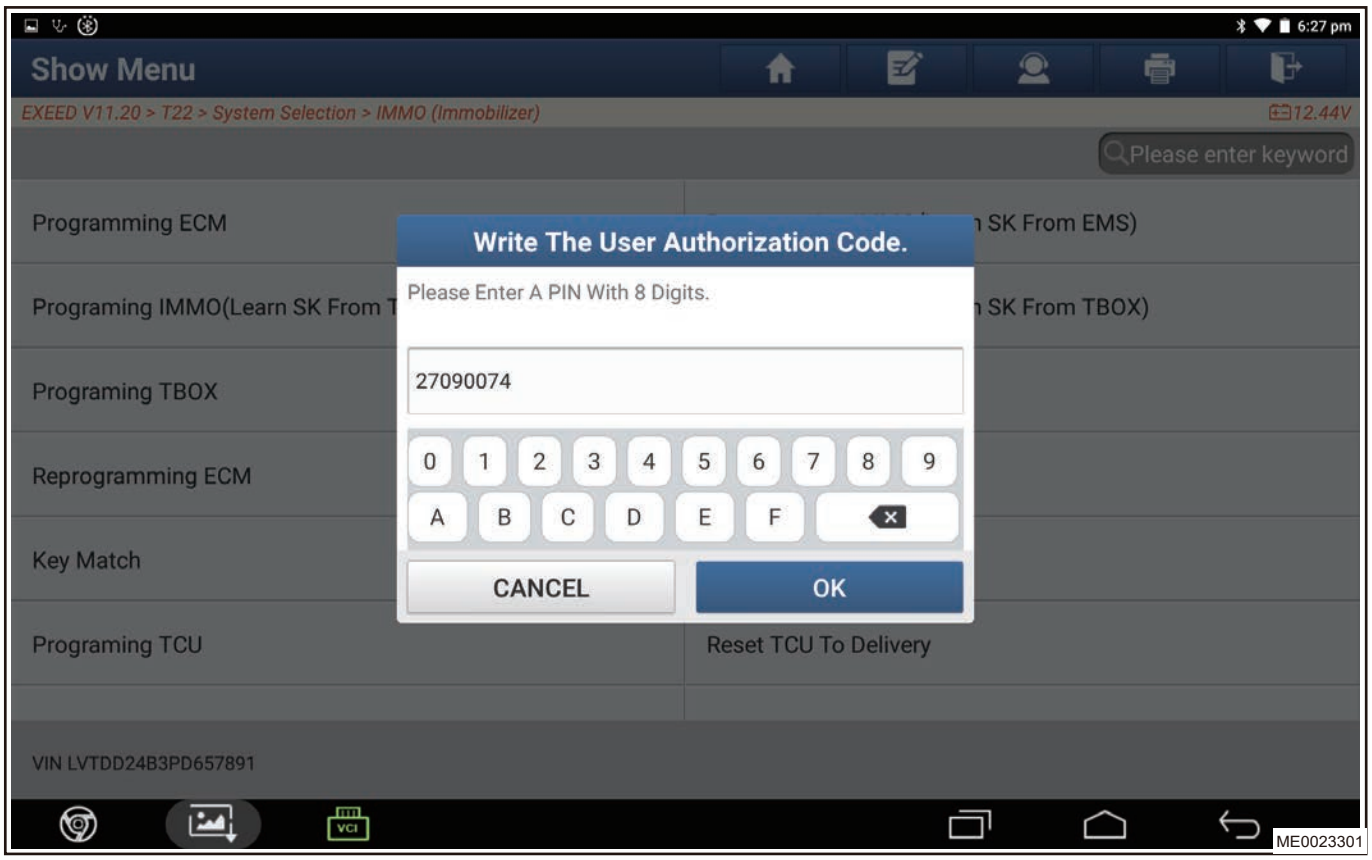
4) Click “Learn Old Key”.



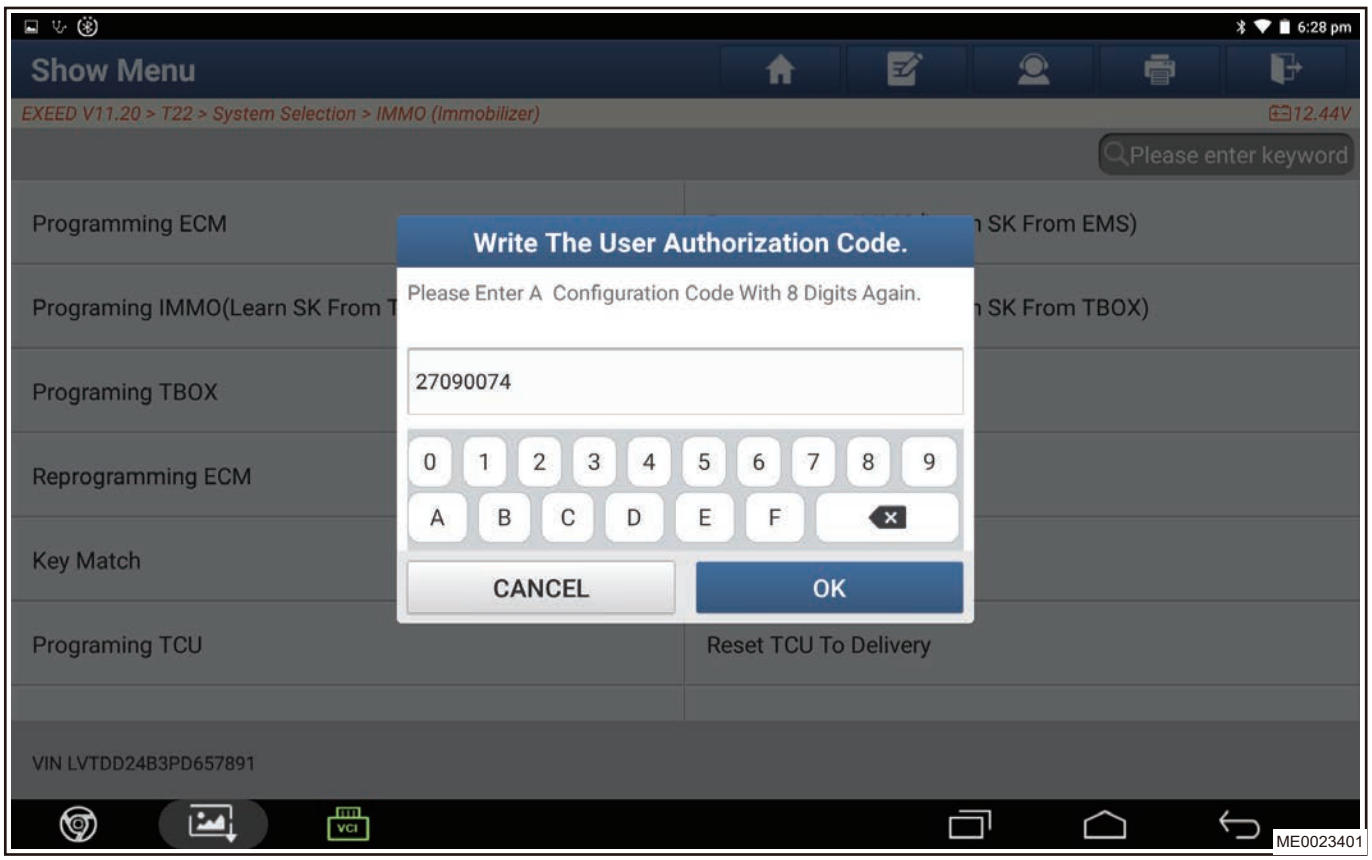
5) After prompts are confirmed, click “YES”.



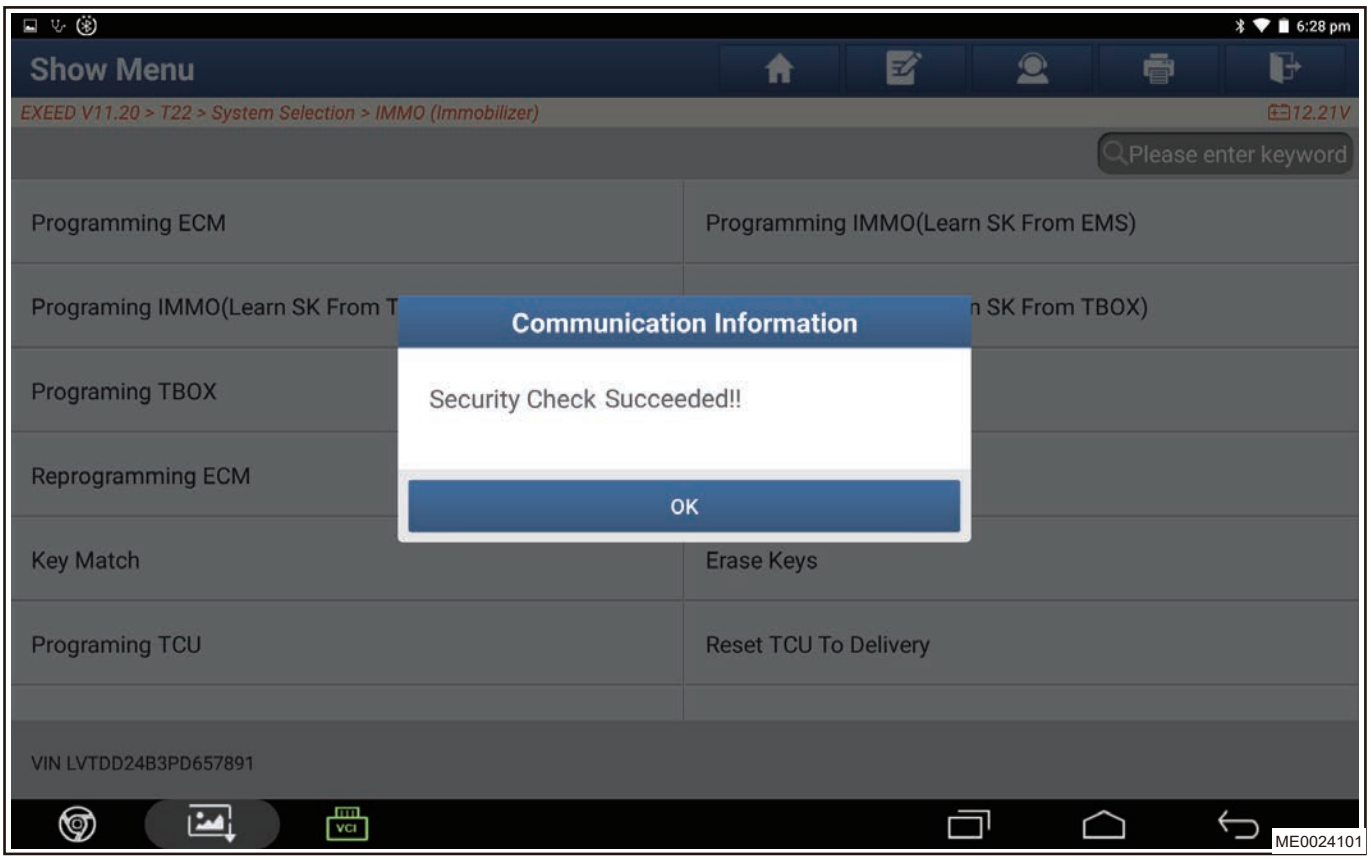
6) Get the 8-digit anti-theft security code (PIN) through EXEED after-sales service and enter it, click “OK”.



7) Enter the anti-theft security code (PIN) again, click “OK”



8) Anti-theft security code is written successfully, click “OK”.



9) Add the old key successfully, click “OK”.

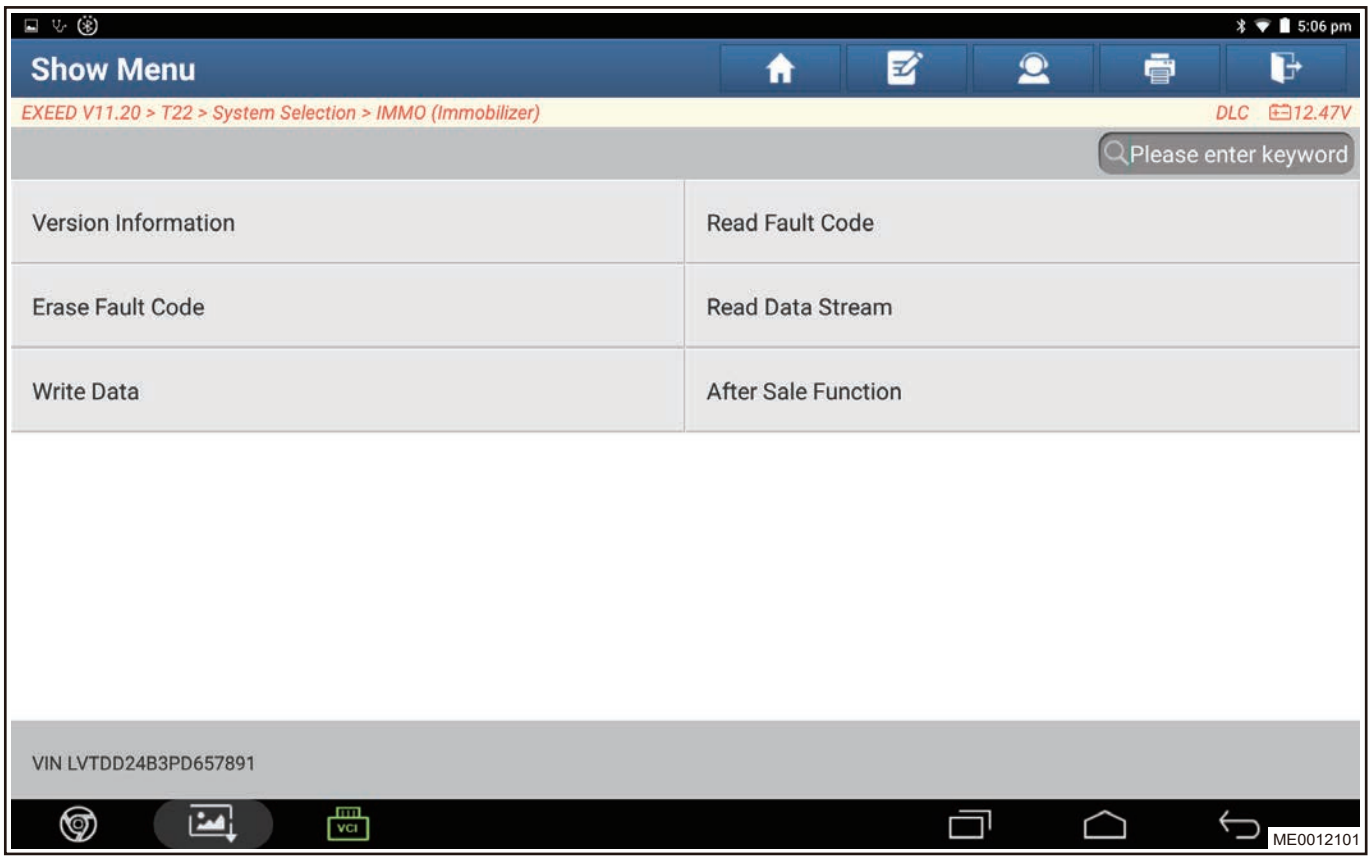
(5) **Programming NFC**

⚠ Caution

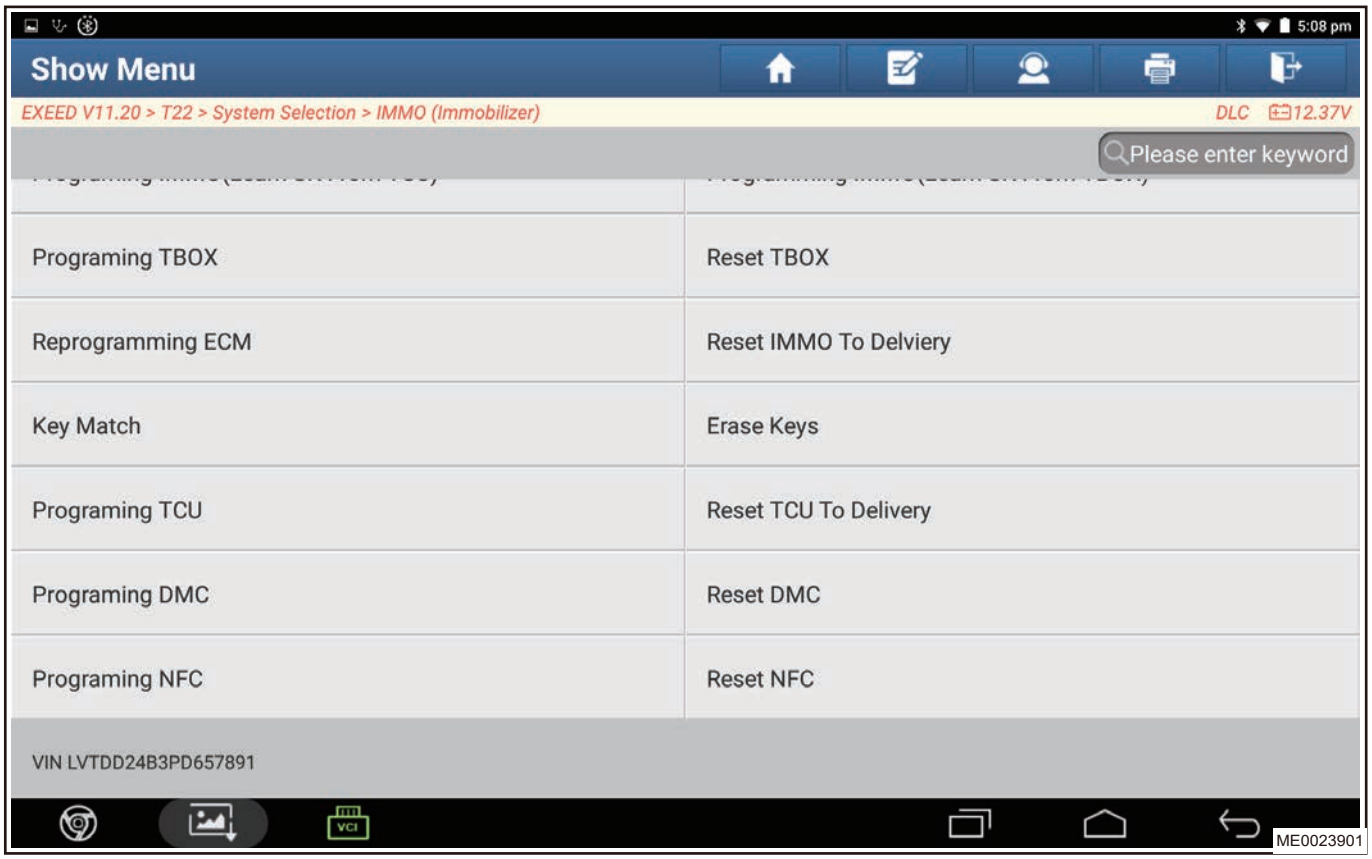
- **Only replace with new NFC module (or successfully reset NFC module), immobilizer and key are the original accessories.**
- **This function requires 8-digit anti-theft security code (PIN) to be obtained through EXEED after-sales service.**

1) Enter diagnostic interface, select “IMMO (Immobilizer System)” on diagnostic tester interface to enter next interface.

2) Click “Immobilizer Matching”.

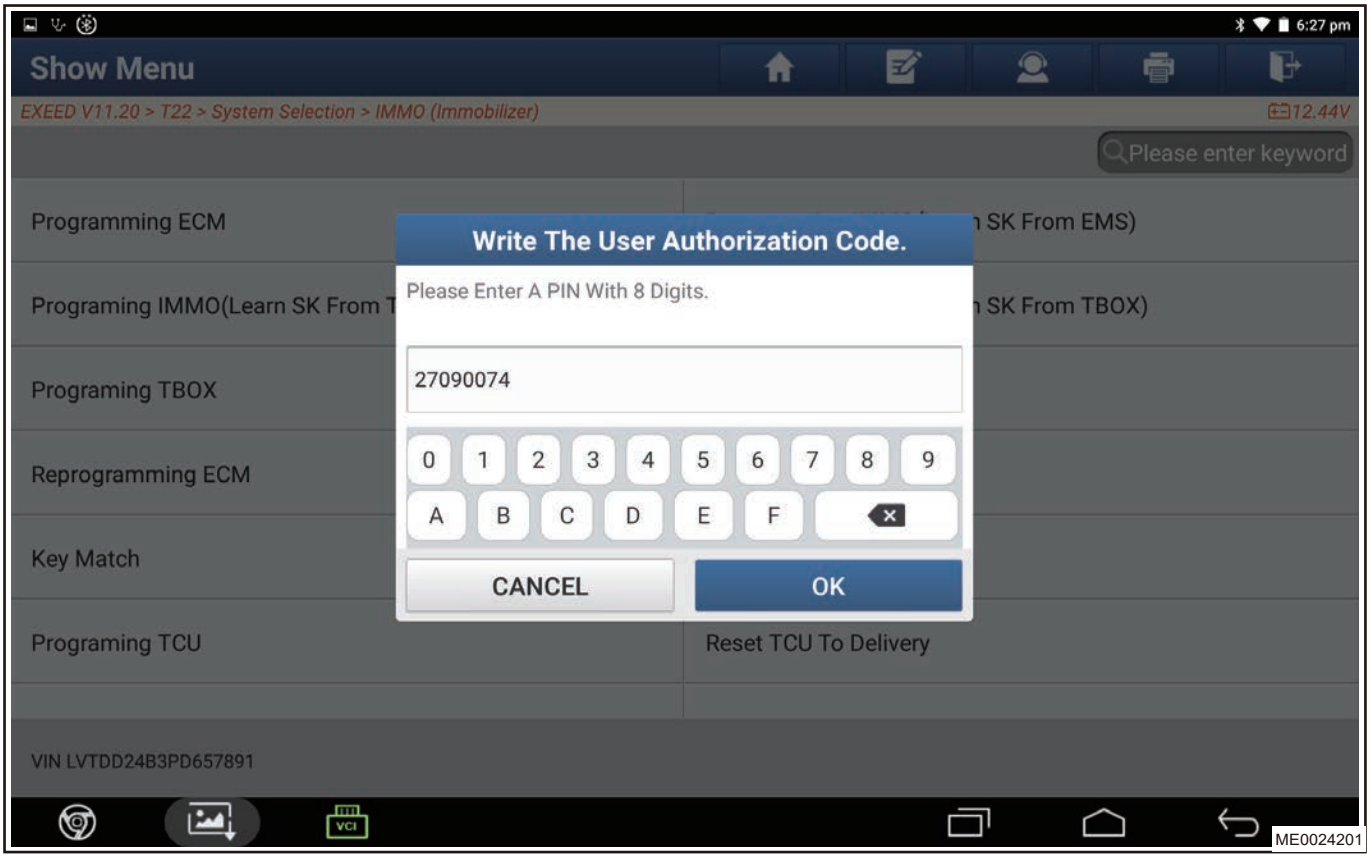


3) Click “Programming NFC”.

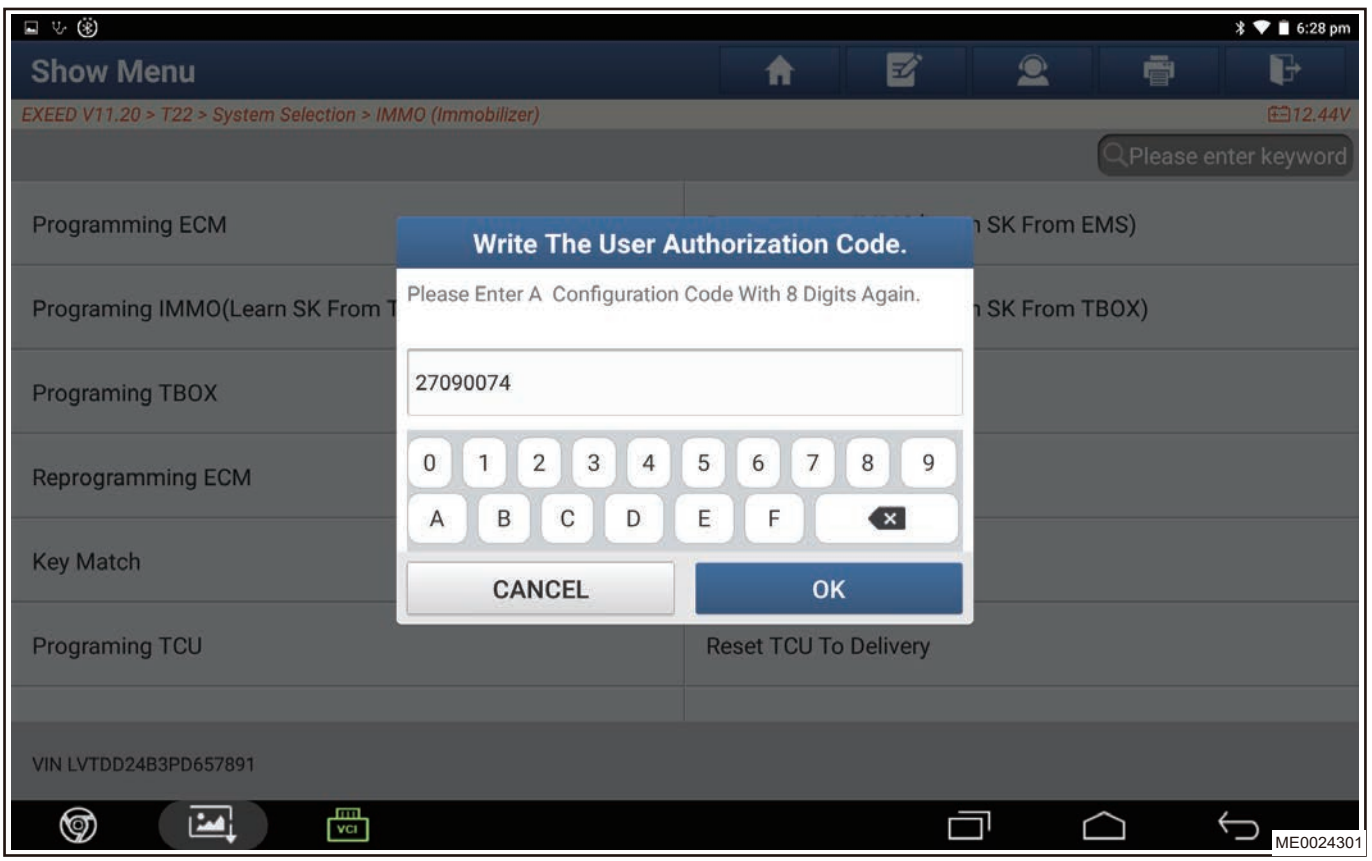


4) After prompts are confirmed, click “OK”.

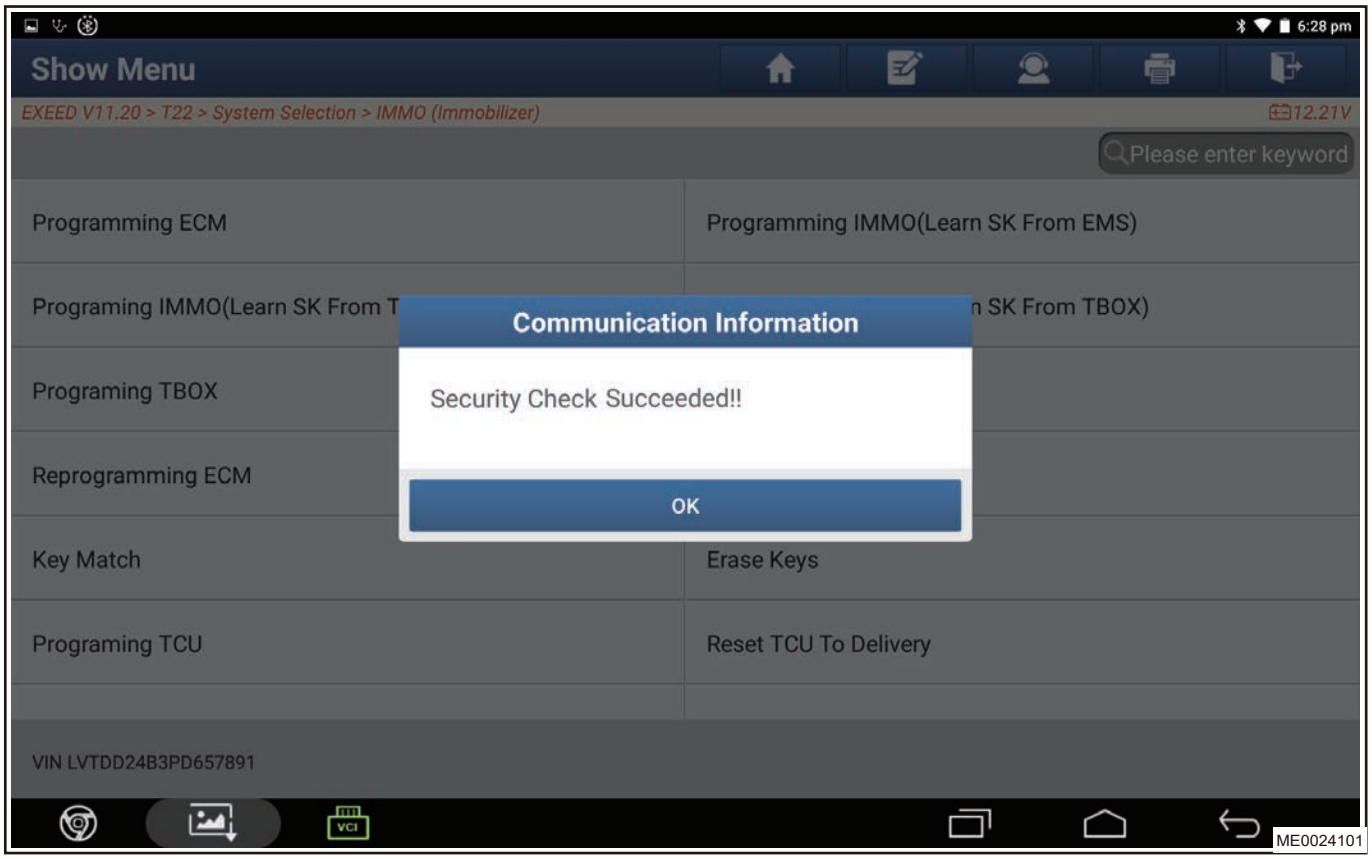
5) Get the 8-digit anti-theft security code (PIN) through EXEED after-sales service and enter it, click “OK” .



6) Enter the anti-theft security code (PIN) again, click “OK”



7) Anti-theft security code is written successfully, click “OK”.



8) Programming is finished.

■ **After-sales replacement of smart key PEPS (integrated in BDM) module**

⚠ Caution

- **Please contact EXEED after-sales service station to obtain PIN.**
- **Unmatched smart keyless entry and PEPS (integrated BDM) can switch power supply from IGN OFF to IGN ON for 50 times. Once it exceeds 50 times, PEPS (integrated BDM) cannot be used. So, do not turn on and off power supply at will with PEPS (integrated BDM) unmatched.**

(1) Technician reads VIN in EMS with diagnostic tester, then obtains PIN through VIN.

(2) Enter anti-theft control system program on diagnostic tester, select “Program IMMO” menu; input PIN according to prompt on diagnostic tester, after “Program IMMO” is performed successfully, it will display “Program IMMO is successful”.

(3) Then match previous keys one by one according to instructions of “Add old key”.

■ **After-sales replacement of Engine Management System (EMS)**

(1) Technician reads VIN in old EMS or smart keyless entry and PEPS (integrated BDM) unit with diagnostic tester, then obtains PIN through VIN.

(2) After new EMS is assembled successfully, press ignition switch (IG) to turn on power supply.

(3) Enter anti-theft control system program on diagnostic tester, select “Program EMS” menu; input VIN and PIN according to prompts on diagnostic tester. After “Program EMS” is performed successfully, it will display “Match EMS is successful”.

(4) Depress brake pedal (for DCT models), press ignition switch once to check if vehicle can be started successfully. If vehicle can be started successfully, EMS replacement is completed, if vehicle cannot be started successfully, EMS replacement is not completed.

1.17 BDM and TBOX Certification

When remote startup is triggered, BDM supports authentication with TBOX.

■ **Remote locking request**

- Execution output:

  (1) Remote locking request is valid.

  (2) When other enabling conditions are met, four-door locking is triggered.

  (3) When the fortifying conditions are met, enter the fortifying, trigger the fortifying prompt, the left and right turn signal lights come on for 500ms and then go out, and the turn signal light flowing water effect enabling output is 100% during turn signal light output; According to the configuration word of the anti-theft alarm device, the siren output is turned off after 50ms or the high and low pitched horn outputs are turned off after 20ms.

  (4) When the fortifying conditions are not met, the fortifying failure prompt will be triggered, the left and right turn signal lights come on for 500ms and then go out. After waiting for 1.5 seconds, the left and right turn signal lights come on for 500ms and then go out again, and the turn signal light flowing water effect enabling output is 100% during turn signal light output.

  (5) Meet the relevant conditions and trigger the fortifying window up function.

Hint:

(1) After receiving the TBOX remote command, if other enabling conditions are not met, such as the power mode is not met, the authentication is not passed, etc., the remote locking request remains invalid, and there is no need to send the failure reason.

(2) Do not respond to the same TBOX command for 1 second after receiving the TBOX remote command.

■ **Remote unlocking request**

- Execution output:

  (1) Remote unlocking request is valid.

  (2) When other enabling conditions are met, four-door unlocking is triggered.

■ **Remote luggage compartment door unlocking request**

- Execution output:

  (1) Remote luggage compartment door unlocking request is valid.

  (2) When other enabling conditions are met, luggage compartment door unlocking is triggered.

  (3) When the independent fortifying deactivation conditions of luggage compartment door are met, enter the luggage compartment door independent fortifying deactivation state, trigger the luggage compartment door independent fortifying deactivation prompt, the left and right turn signal lights come on for 1 second and then go out, and the turn signal light flowing water effect enabling output is 100% during turn signal light output.

■ **Remote car location request**

- Execution output:

  (1) Send the associated remote window request.

  (2) When the conditions are met, drive the four-door window up, down or to the ventilated position.

■ **Remote start mode**

- Execution output:

  (1) Switching the power mode to ON or START in the fortifying state will not trigger the anti-theft alarm.

  (2) Switching the power mode to ON or START in the fortifying state will not trigger the forced lighting of the position light and sends ParkLightSts = 0x1 anti-theft alarm.

  (3) Disable wiper function

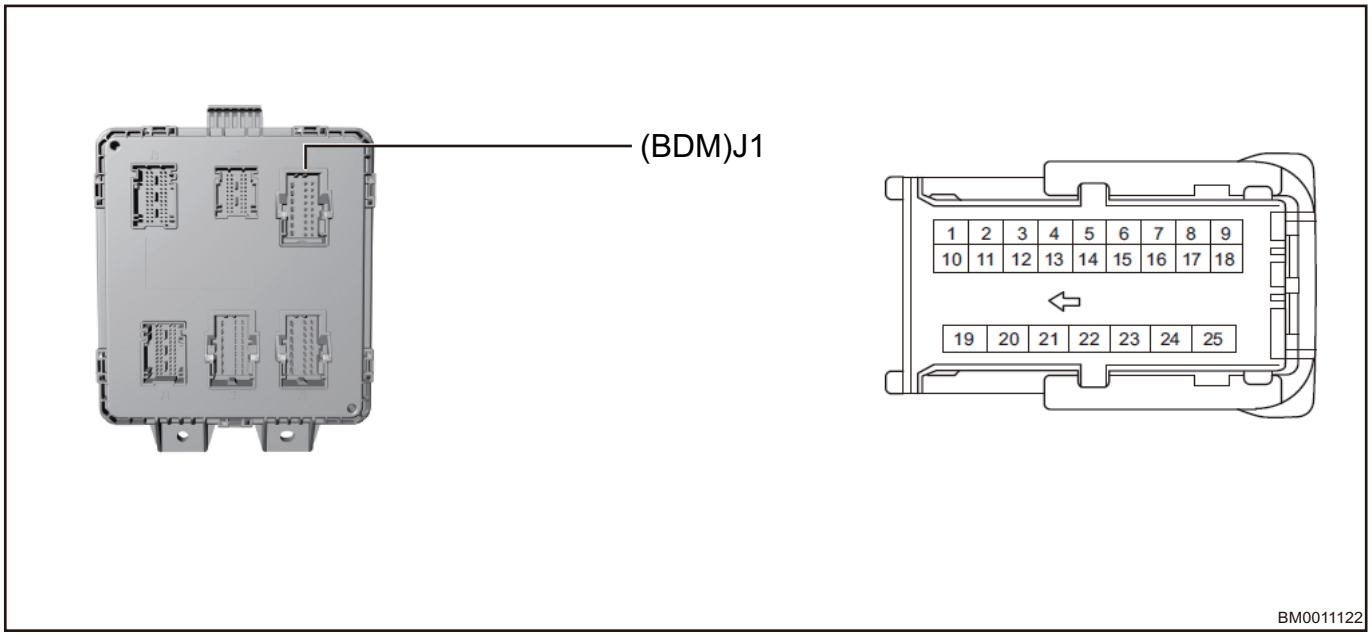
  (4) The combination switch is in AUTO or low beam position to disable the low beam function.

  (5) Even if the power state is not met, it can still perform unlocking and locking functions, including mechanical unlocking, RKE unlocking and locking, PEPS unlocking and locking, remote unlocking and locking, unlocking when approaching, locking when leaving, etc.

2 Circuit Diagram

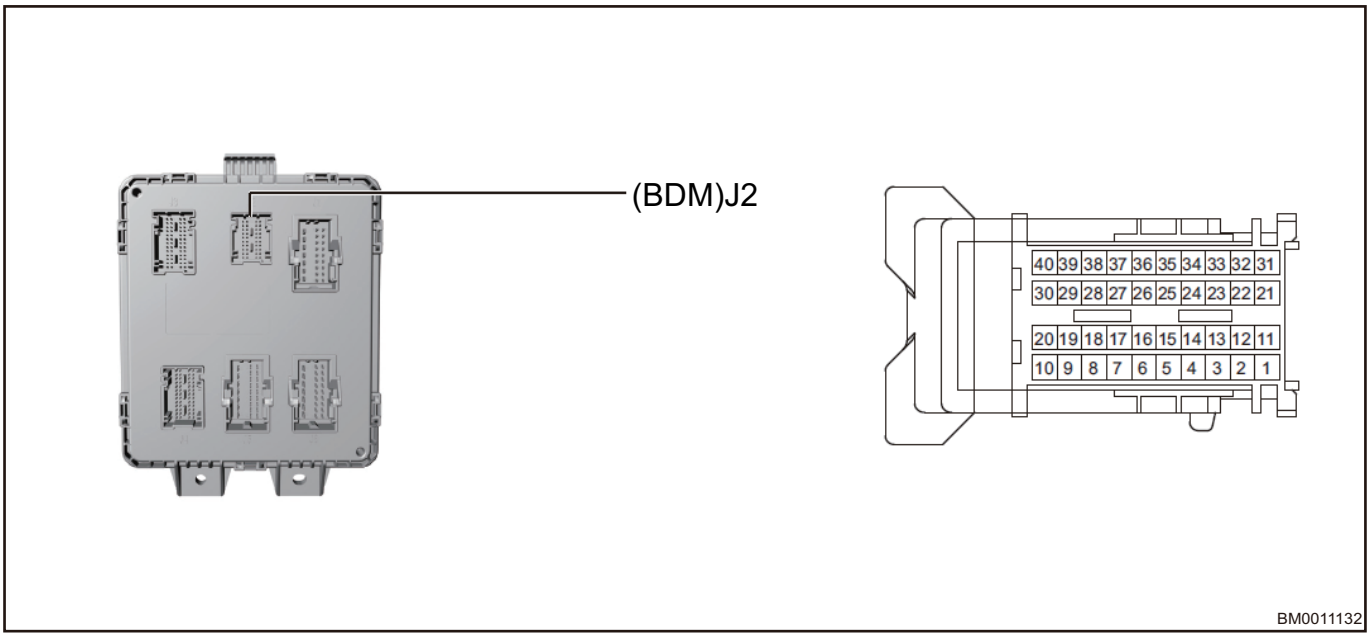
2.1 Body Domain Control Module Terminal Definition

■ **Body domain control module connector J1**



Pin	Function	Pin	Function
1	Left High Beam Light Output	14	Battery Save Output
2	Left Daytime Running Light Output	15	-
3	-	16	Door Lock (Front Left/Fuel Tank Cap) Unlock Output
4	-	17	Rear View Mirror Unfolding Output
5	Rear Fog Light Output	18	-
6	-	19	Power Supply_4
7	-	20	Ground 7
8	-	21	Door Lock (Front Right/ Rear Left/Rear Right) Unlock Output
9	Rear View Mirror Folding Output	22	Door Lock Lock Output
10	Front Position Light	23	Power Supply_5
11	Left Low Beam Light Output	24	Power Supply_6
12	-	25	Power Supply_9
13	-		

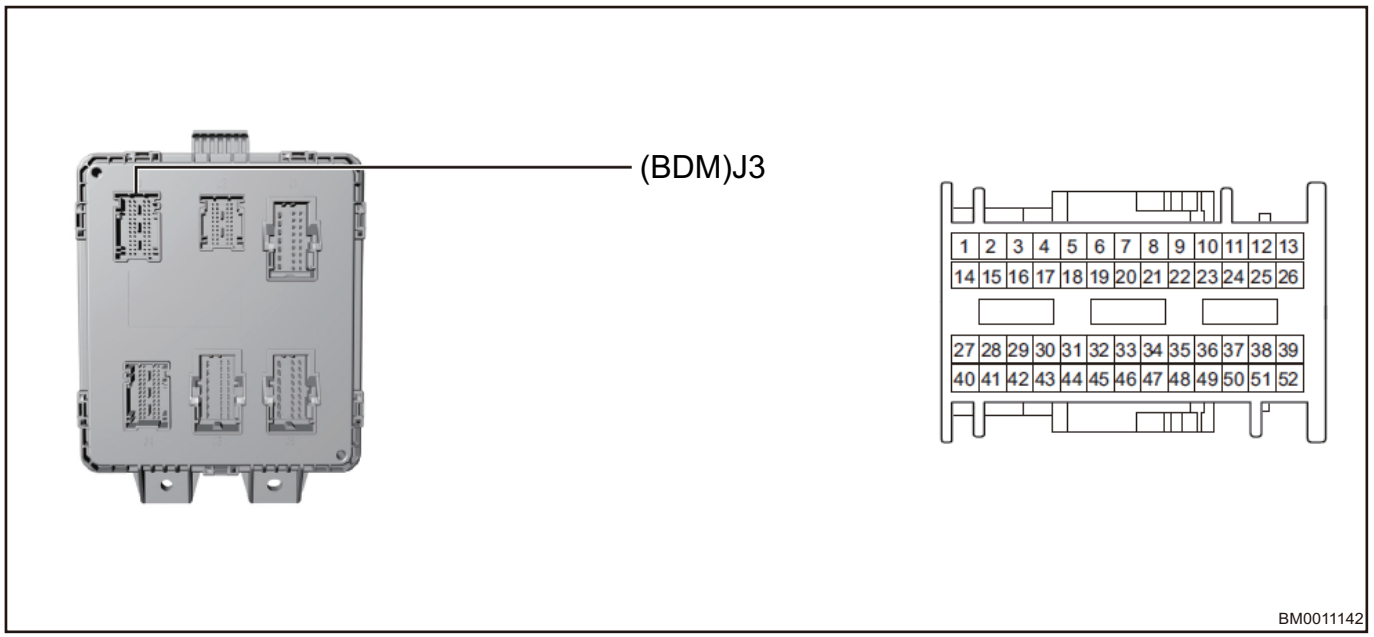
■ **Body domain control module connector J2**



Pin	Function	Pin	Function
1	-	21	B-CAN L
2	-	22	-
3	LIN1	23	LIN4
4	Right Adjustment Common Terminal	24	LIN3
5	Right Horizontal Adjustment	25	-
6	Left Horizontal Adjustment	26	-
7	Rear Right Door Open Signal Input	27	-
8	Rear Left Door Open Signal Input	28	-
9	Front Right Door Open Signal Input	29	-
10	Front Left Door Open Signal Input	30	-
11	Ground 4	31	B-CAN H
12	Brake Pedal Switch Input	32	-
13	LIN2	33	-
14	Right Vertical Adjustment	34	-
15	Left Vertical Adjustment	35	Turn Signal Light Flow Effect Enabling
16	Left Adjustment Common Terminal	36	Position Light Flow Effect Enabling Output
17	Door Lock Status Input	37	-

Pin	Function	Pin	Function
18	-	38	-
19	Engine Hood Open Signal Input	39	-
20	-	40	-

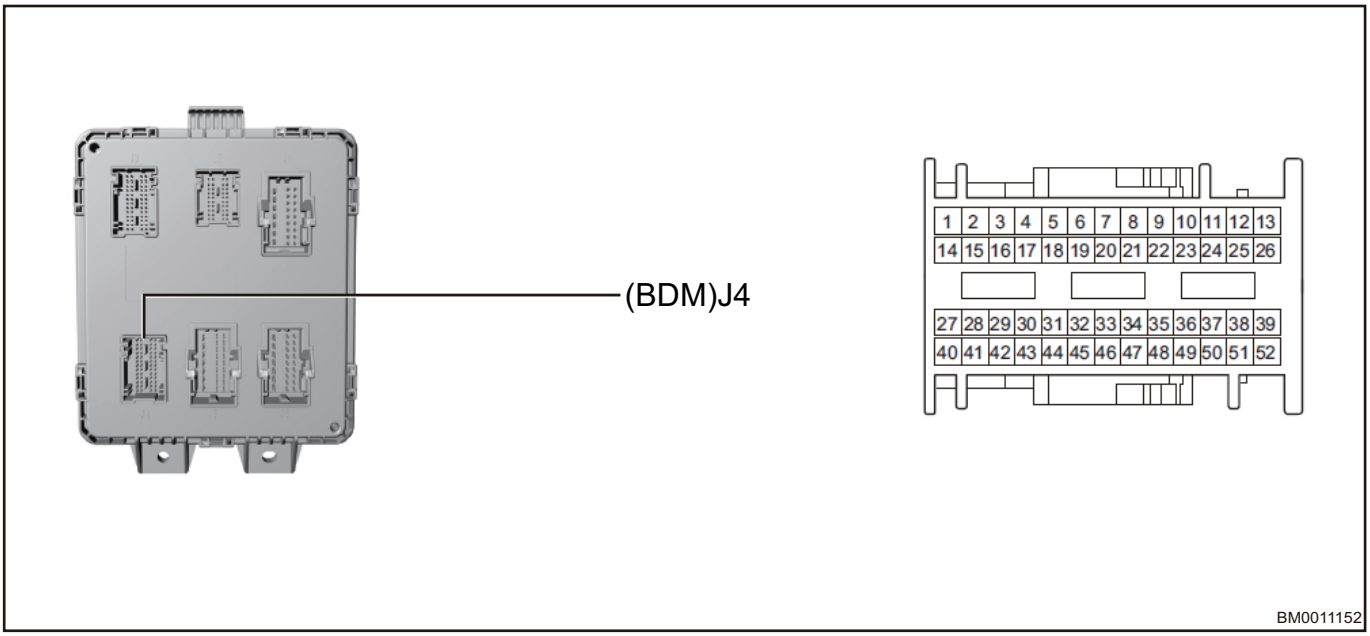
■ **Body domain control module connector J3**



Pin	Function	Pin	Function
1	-	27	Antenna 1- (Front)
2	-	28	Rear Right High Performance Antenna +
3	Front Right Door Handle Signal Input +	29	Rear Left High Performance Antenna +
4	Front Left Door Handle Signal Input +	30	Interior Front Antenna -
5	-	31	Interior Rear Bumper Antenna +
6	-	32	Front Wiper Stop Position Input
7	-	33	Rear Turn Signal Light Diagnosis Feedback (- Movable Side)
8	-	34	Rear Right Child Lock Status Feedback
9	IGN Relay Drive	35	Rear Left Child Lock Status Feedback
10	Rear Wiper Output	36	Rear Turn Signal Light Diagnosis Feedback Input (Fixed Side)

Pin	Function	Pin	Function
11	Rear Washer Output	37	Front Turn Signal Light Diagnosis Feedback Input
12	High and Low Pitched Horn Output	38	-
13	Front Washer Output	39	Rear Wiper Stop Position Input
14	-	40	Antenna 1+ (Front)
15	-	41	Rear Right High Performance Antenna -
16	-	42	Rear Left High Performance Antenna -
17	-	43	Interior Front Antenna +
18	-	44	Interior Rear Bumper Antenna -
19	-	45	-
20	-	46	Passenger Side Switch – Control Rear Right Window Input
21	-	47	Passenger Side Switch – Control Rear Left Window Input
22	ACC Relay Drive	48	Passenger Side Switch – Control Front Passenger Window Input
23	-	49	-
24	Front Wiper Low Speed Output	50	-
25	Rear Windshield Rear View Mirror Heating Output	51	-
26	Front Wiper High Speed Output	52	-

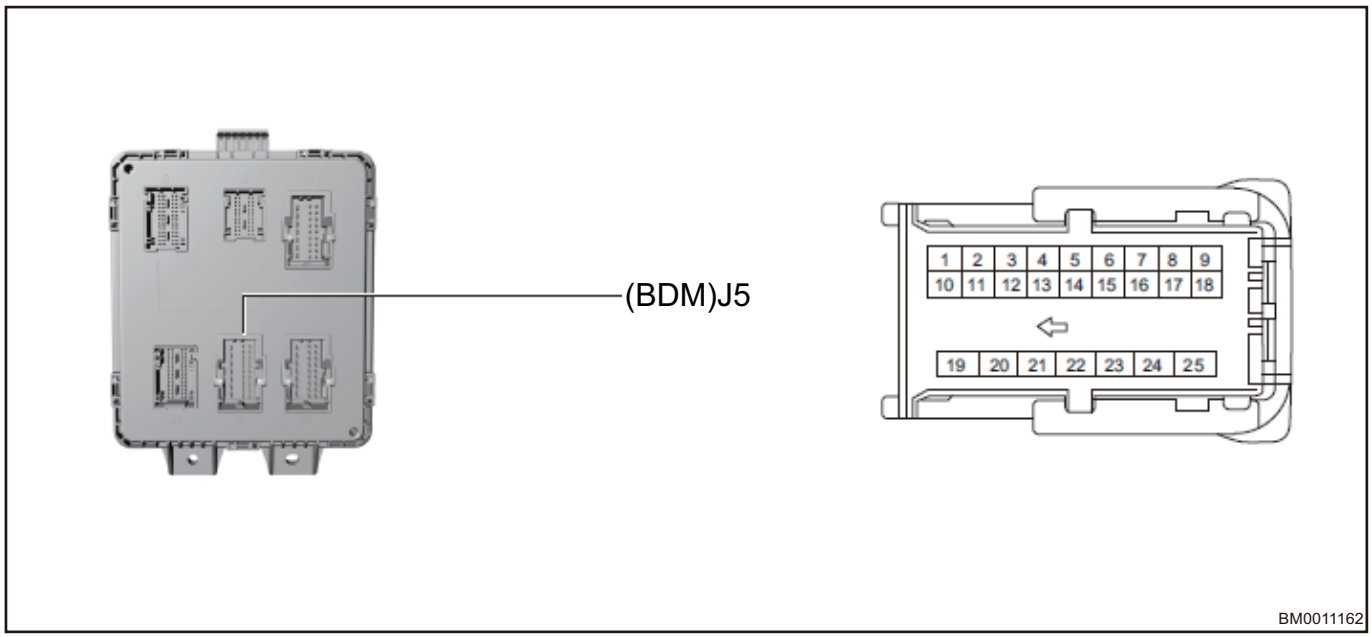
■ Body domain control module connector J4



Pin	Function	Pin	Function
1	Ground 3	27	-
2	-	28	-
3	-	29	-
4	-	30	-
5	-	31	-
6	-	32	ENGINE START STOP Switch Input 2
7	ENGINE START STOP Switch Indicator (Backlight)	33	ENGINE START STOP Switch Input 1
8	-	34	IGN Power Supply Feedback
9	Hazard Warning Light Switch Indicator	35	ACC Power Supply Feedback
10	-	36	-
11	DA-CAN H	37	High and Low Pitched Horn Switch Input
12	-	38	Hazard Warning Light Switch Input
13	-	39	Driver Power Back Door Switch Input
14	Collision Hard Wire Input	40	-
15	-	41	-
16	-	42	-
17	-	43	-

Pin	Function	Pin	Function
18	-	44	-
19	-	45	-
20	-	46	-
21	-	47	-
22	-	48	-
23	-	49	-
24	DA-CAN L	50	-
25	-	51	-
26	LIN5	52	-

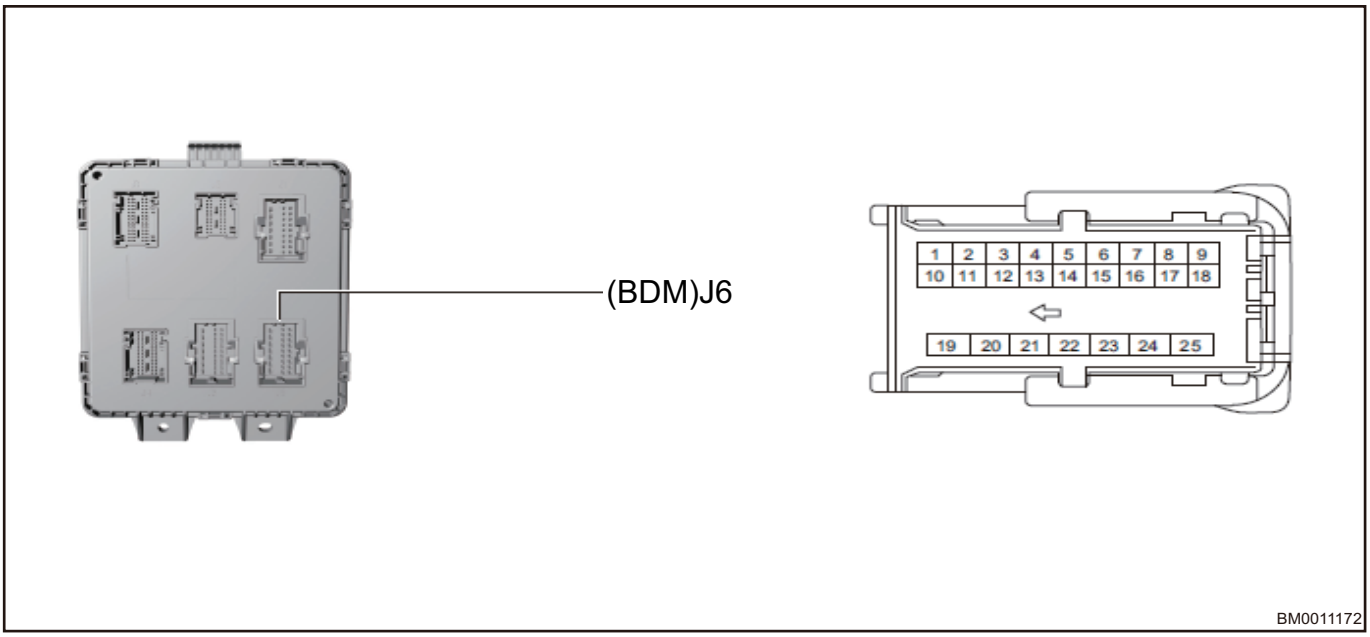
■ **Body domain control module connector J5**



Pin	Function	Pin	Function
1	-	14	-
2	Right Turn Signal Light Output	15	-
3	-	16	-
4	-	17	-
5	-	18	Power Supply_1
6	-	19	Front Left Window UP Output
7	-	20	Power Supply_3
8	-	21	Rear Right Window UP Output
9	Ground 1	22	Power Supply_8

Pin	Function	Pin	Function
10	Left Turn Signal Light Output	23	Rear Right Window DOWN Output
11	Anti-theft Horn Output	24	Front Left Window DOWN Output
12	Left Corner Light Output	25	Ground 5
13	Right Corner Light Output		

■ **Body domain control module connector J6**



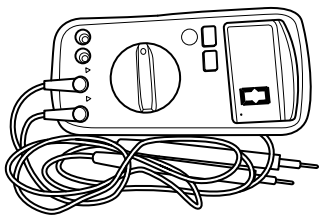
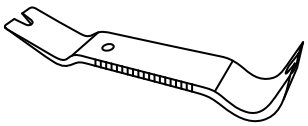
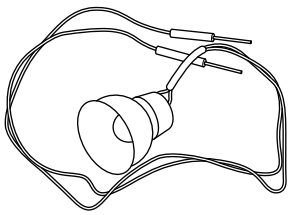
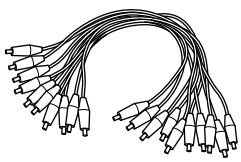
Pin	Function	Pin	Function
1	Rear Position Light&License Plate Light	14	Front Right Courtesy Doorsill Light
2	Right High Beam Light Output	15	Interior Light Output
3	Brake Light	16	Rear View Mirror Foot Light Output
4	Back-up Light Output	17	High Mounted Stop Light
5	-	18	-
6	Ground 2	19	Front Right Window UP Output
7	-	20	Power Supply_2
8	Luggage Compartment Light Output	21	Rear Left Window UP Output
9	Headlight Leveling Output	22	Power Supply_7
10	Right Low Beam Light Output	23	Rear Left Window DOWN Output

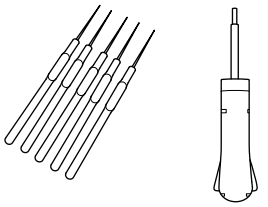
Pin	Function	Pin	Function
11	Right Daytime Running Light Output	24	Front Right Window DOWN Output
12	Front Left Courtesy Doorsill Light	25	Ground 6
13	-		

3 On-vehicle Service

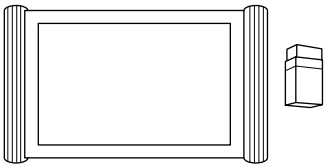
3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006
Interior Crow Plate	 RCH002506
Bulb Test Light (21 W)	 RCH008706
Jumper Wire	 RCH008806

Tool Name	Tool Drawing
Wire Harness Terminal Tools	 RCH008906
Oscilloscope	 RCH006106

■ **Special Tool**

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

3.2 Specifications

■ **Torque Specifications**

Description	Torque (N · m)
BDM Controller Fixing Bolt	7 ± 1

3.3 Body Domain Control Module

■ **Removal**

Hint:

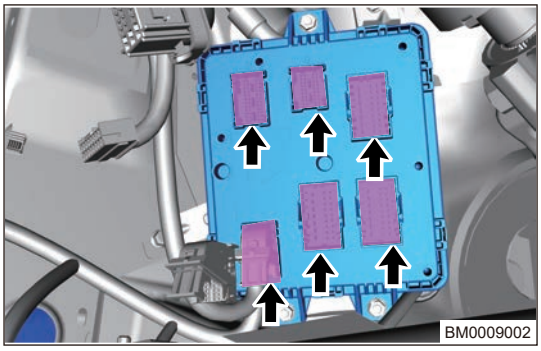
- Before replacing the BDM, read configurations of the original software. After replacing it, write the original configuration codes.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

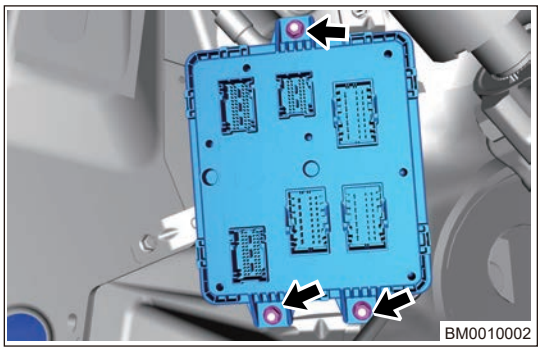
(2) Disconnect the negative battery cable.

(3) Remove the body domain control module.

1) Disconnect the body domain control module connector (arrow).



2) Remove 3 fixing bolts from body domain control module.



■ **Installation**

(1) Place body domain control module into the mounting position.
(2) Install 3 fixing nuts to body domain control module.
Tightening torque: 7 ± 1 N·m
(3) Connect 6 connectors on body domain control module.
(4) Connect the negative battery cable.

⚠ Caution

- **For the jam protection function, it is easy to fail due to frequent testing and cause inconvenience to subsequent stations, which has a significant impact. Requirement:**
  - **Only manually learn at the matching station; It is prohibited to use obstacles such as hands or notepads for testing to prevent pinch injuries.**

10.5 TIRE PRESSURE MONITORING SYSTEM (TPMS)

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

(2) Be sure to wear necessary safety equipment to prevent accidents, when removing tire pressure sensor.

(3) If the tire pressure is too low, please resume it to normal pressure as soon as possible. Too low tire pressure will increase fuel consumption and tire wear. And seriously worn tire will cause an accident such as flat tire.

(4) When a high temperature alarm occurs, stop vehicle to cool the tire naturally, otherwise there is a danger of accident. When tire temperature is too high, never cool the tire by pouring cold water, otherwise, tire may be damaged, resulting in an accident.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair:

(1) Be sure to secure the tire pressure sensor to the hub before installing the tire.

(2) Operate carefully to avoid damaging tire pressure sensor, when removing tire pressure sensor.

(3) Avoid dropping the sensor. If tire pressure sensor is dropped from a place 1m high to the ground, it is interpreted as fault in tire pressure sensor.

(4) Tire pressure sensor must be installed on clean and dry hub.

(5) Valve cap must be on the valve, except inflation, deflation, air pressure inspection, etc.

(6) During installation, do not contact the tire pressure sensor with used tools, to avoid damage to the tire pressure sensor.

(7) Sensor air pressure inlet cannot be covered partially or completely by lubricant or other materials.

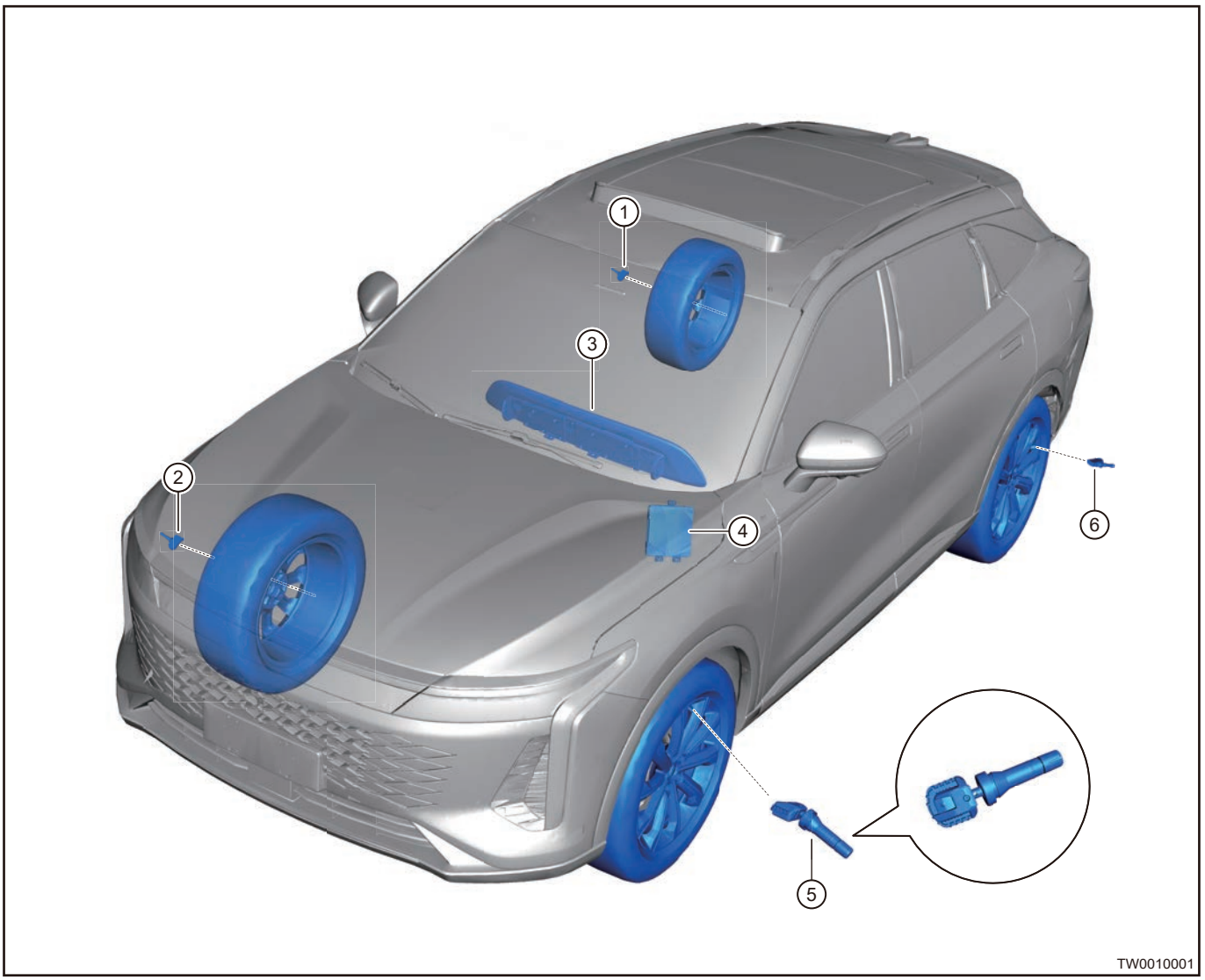
(8) When removing and installing steering system, suspension system, brake, tire, etc., it is necessary to cut off vehicle power supply.

2 System Overview

2.1 System Description

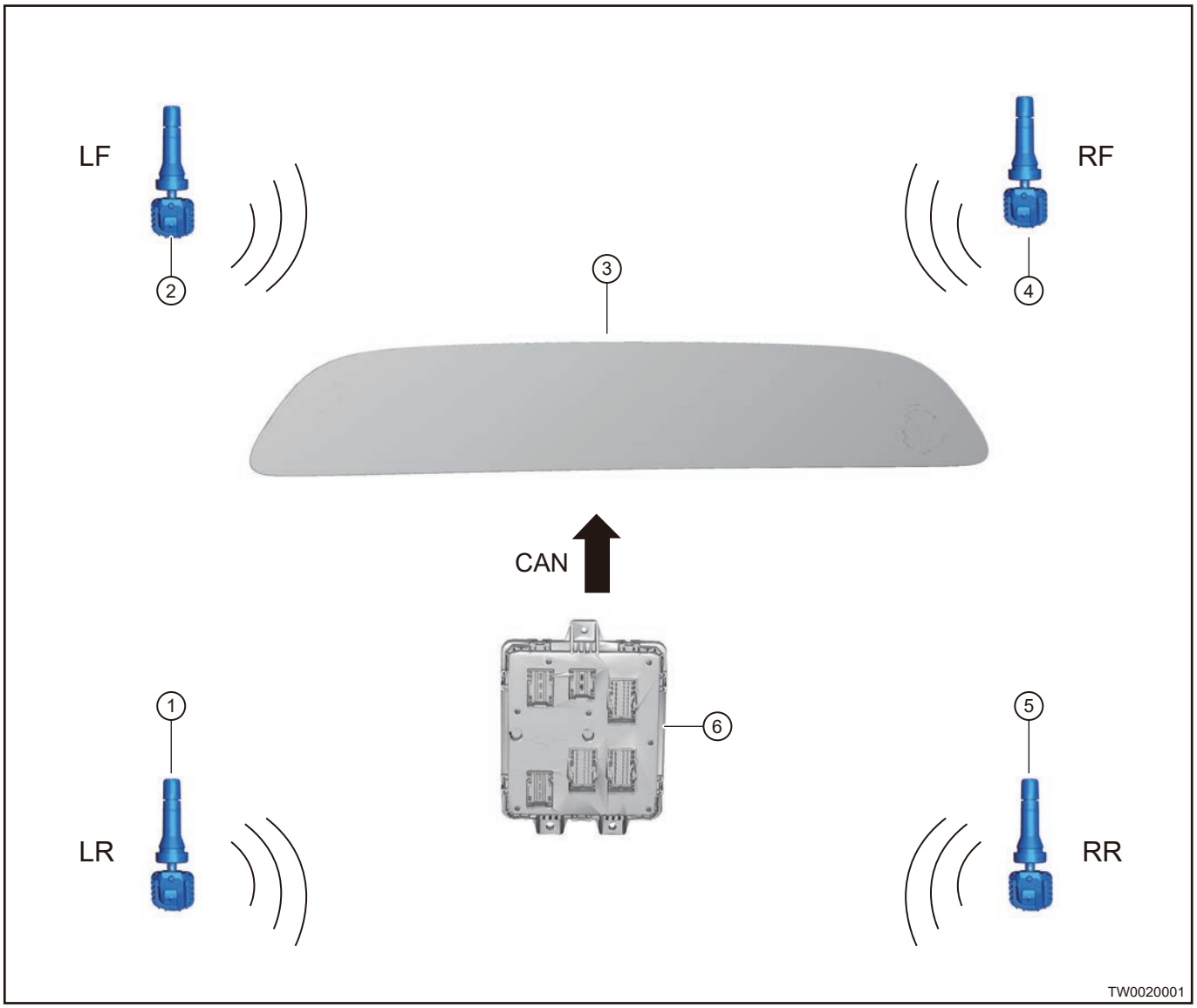
Tire pressure monitoring system is an active safety device, which can monitor tire pressure and temperature in real time. When tire pressure is too low or temperature is too high, tire pressure monitoring system will warn.

2.2 System Components Diagram



1	Rear Right Tire Pressure Sensor	4	Body Domain Control Module
2	Front Right Tire Pressure Sensor	5	Front Left Tire Pressure Sensor
3	Dual LCD	6	Rear Left Tire Pressure Sensor

2.3 System Schematic Diagram



1	Rear Left Tire Pressure Sensor	4	Front Right Tire Pressure Sensor
2	Front Left Tire Pressure Sensor	5	Rear Right Tire Pressure Sensor
3	Dual LCD	6	Body Domain Control Module

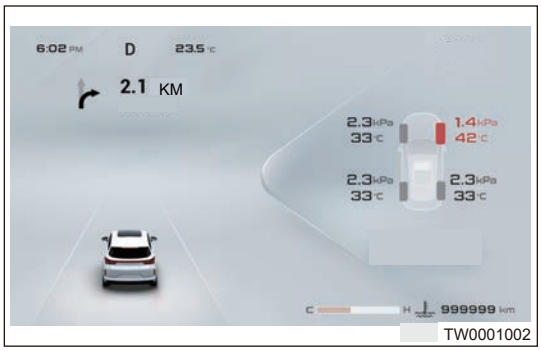
Tire pressure sensor is the transmitting terminal of tire information, body domain control module is the receiving terminal of tire information, meter is the display terminal of tire information, and tire pressure sensor is the core of tire pressure monitoring system. Tire pressure sensor is installed on rim, which collects data as pressure, temperature inside tire, and sends these data to body domain control module through radio-frequency signal. The body domain control module receives radio-frequency signal sent from tire pressure sensor and processes these data. Body domain control module processes data of tire pressure sensor, then sends them to meter via CAN bus. Tire pressure value and temperature value are displayed on instrument cluster via CAN bus signal. When tire pressure is too low or temperature is too high, it informs driver of abnormal tire.

2.4 Tire Pressure Monitoring System (TPMS) Information

When the driving speed of the vehicle is more than 30 km/h and the driving time is more than 45s, the meter can display the pressure and temperature of the tire in real time.

■ Low pressure alarm

When vehicle tire pressure is less than 175 kpa, and the vehicle is continuously driving with a speed higher than 30 Km/h, the system will send a low pressure alarm within 5 minutes. With ENGINE START STOP switch turned from OFF to ON position, the system will also send a low pressure alarm if tire pressure displayed on meter is less than 175 kpa. When a low pressure alarm occurs, the corresponding wheel symbol turns red, the current pressure value is displayed, and the tire pressure alarm light is always on.



TW0001002

⚠ Caution

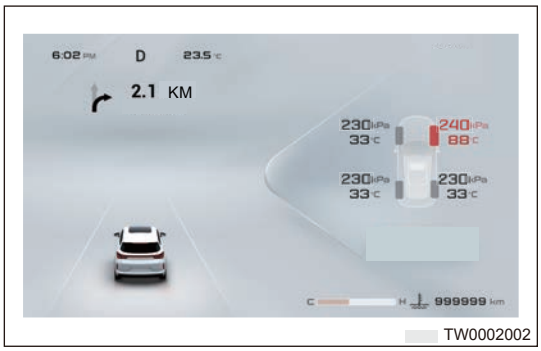
- **The tire pressure is too low, please restore the normal tire pressure as soon as possible; If the tire pressure is too low, it will increase the fuel consumption and tire wear, and seriously worn tire will cause an accident such as flat tire.**

When a low pressure alarm occurs, restore the tire pressure to 230 kpa as soon as possible, and drive the vehicle with a speed higher than 30 km/h for a period of time, the low pressure alarm will be deactivated automatically.

■ High temperature alarm

When the tire temperature is higher than 85˚C and the vehicle is continuously driving with a speed higher than 30 Km/h, the system will send a high temperature alarm automatically within 5 minutes. With ENGINE START STOP switch turned from OFF to ON position, the system will also send a high temperature alarm if tire temperature displayed on meter is higher than 85˚C.

When a high temperature alarm occurs, the corresponding wheel symbol turns red, the current temperature value is displayed, and the tire pressure alarm light is always on.



TW0002002

⚠ Caution

- **When a high temperature alarm occurs, stop vehicle to cool the tire naturally, otherwise there is a danger of accident. When tire temperature is too high, never cool the tire by pouring cold water, otherwise, tire may be damaged, resulting in an accident.**

When a high temperature alarm occurs, after the tire temperature is less than 80˚C, and the vehicle is continuously driving with a speed higher than 30 km/h for a period of time, the high temperature alarm will be deactivated automatically.

■ System malfunction

When the vehicle speed is higher than 30 km/h, if the tire pressure monitoring system fails to receive radio frequency signal from one or more sensors within 10 minutes, it will send a system malfunction alarm, the meter will display “Tire Pressure Monitoring System Fault”, and the yellow indication on instrument cluster will remain on after flashing for 75 seconds.

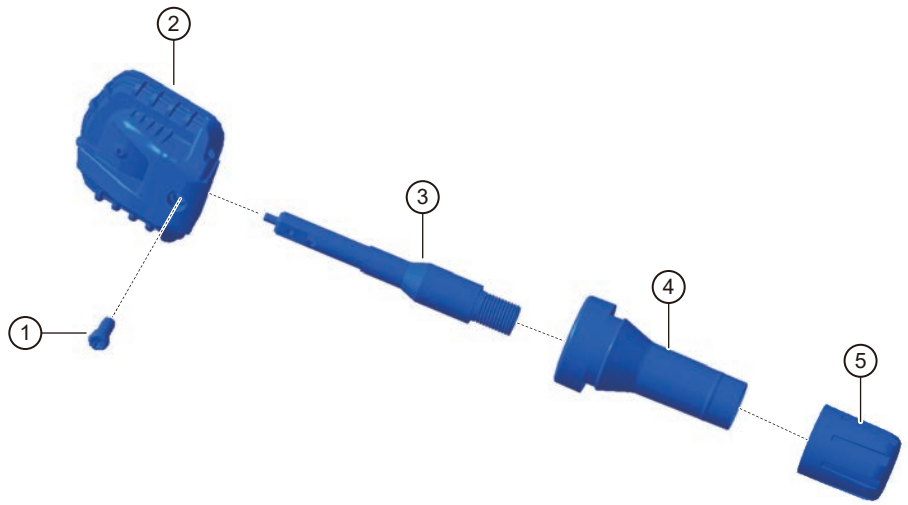
■ Automatic positioning

- It can be used for unlearned tire pressure system or after replacing new tire pressure sensor in tire, the sensor ID can be automatically learned through automatic positioning function.
- If tires are exchanged or tire pressure sensors are replaced with new ones, and the vehicle stops for more than 20 minutes, when vehicle is continuously driving with a speed 30 km/h for more than 10 minutes, system can automatically learn tire pressure and match it to corresponding position.

3 Component Operation Description

3.1 Tire Pressure Sensor

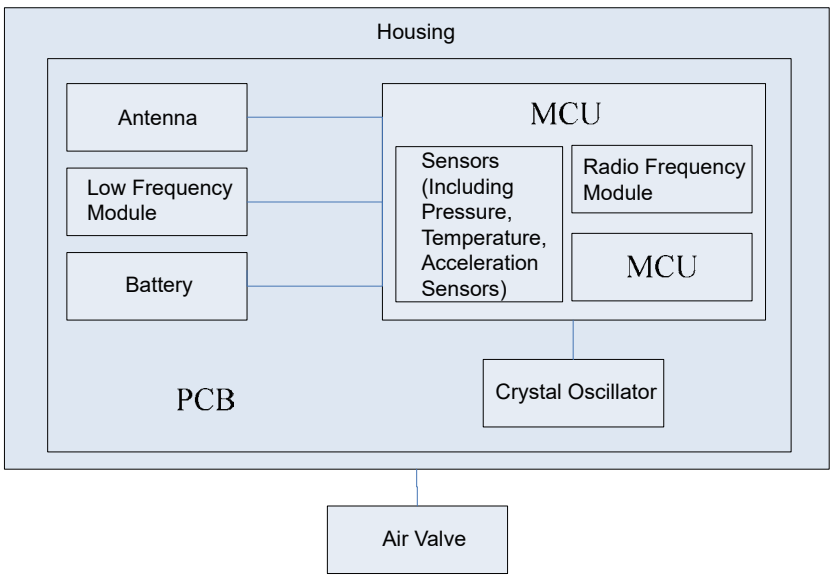
■ Tire pressure sensor composition



TW0003001

1	Fixing Screw	4	Valve
2	Tire Pressure Sensor Module	5	Valve Cap
3	Valve Stem		

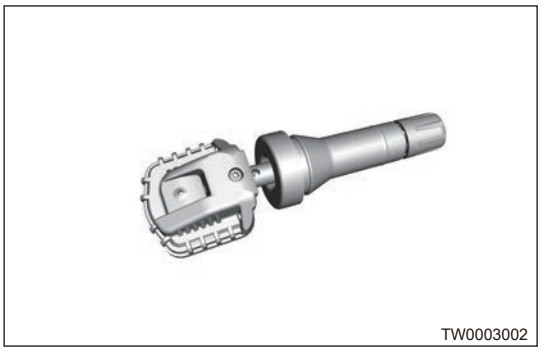
■ System diagram



TW0004001

■ Main function

Tire pressure sensor can monitor tire pressure and temperature, and send tire pressure and temperature information to body domain control module. When tire pressure is too low or temperature is too high, it informs driver of abnormal tire through instrument cluster.

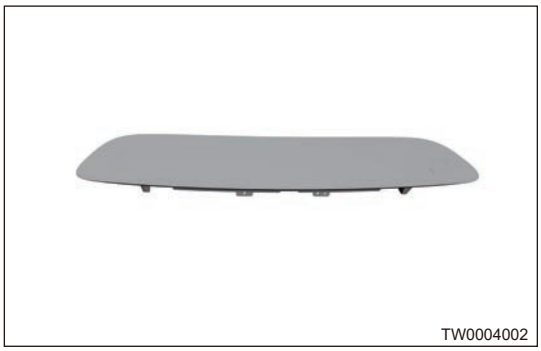

TW0003002

- When system is faulty or disabled, firstly eliminate wireless interference from electrical devices added by customer, such as electronic dog and drive recorder. Then check tire pressure sensor to determine if EXEED genuine tire pressure sensor is installed. If tire pressure sensor of other manufacturers (Non EXEED genuine tire pressure sensor) is used by customer, configuration and learning for tire pressure sensor cannot be performed and system is abnormal or disabled.
- Do not remove the tire pressure sensor when the tire pressure sensor is not faulty. Tire pressure sensor is integrated with functions of common air valve, and inflating/deflating operation is the same as common air valve. Use genuine sensor fittings, without replacing components inside of sensor. After maintenance, install genuine waterproof cap of tire pressure sensor correctly. Do not reuse disposed tire pressure sensor components, otherwise air leakage may be caused, resulting in a possibility of danger. When performing inflation/deflation and tire removal operations, do not damage the sensor.
-

3.2 Dual LCD

■ Main function

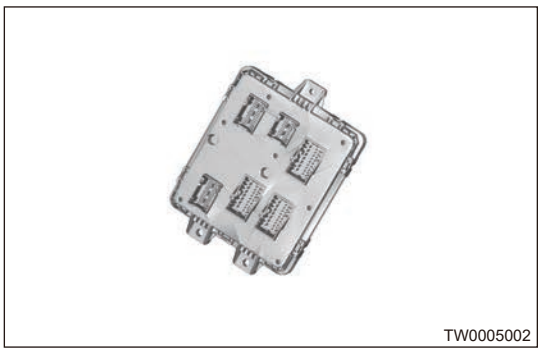
Body domain control module processes data of tire pressure sensor, then sends them to dual LCD via CAN bus. Tire pressure value and temperature value are displayed on dual LCD via CAN bus signal. When tire pressure is too low or temperature is too high, it informs driver of abnormal tire.


TW0004002

3.3 Body Domain Control Module

■ Main function

Body domain control module receives radio-frequency signal sent from tire pressure sensor, processes these data and sends them to dual LCD via CAN bus.


TW0005002

4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area	Troubleshooting
Low pressure alarm (warning light remains on, malfunctioning wheel symbol turns red)	Tire pressure is less than 1.75 bar	Check and charge tire pressure to 2.3 bar (with an error limit of 0.1 bar)
	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Body Domain Control Module (BDM) damaged	Replace body domain control module and perform sensor learning
	Tire pressure system set	Check and repair
High temperature alarm (warning light remains on, wheel symbol turns red)	Tire temperature is higher than 85°C	Cool down naturally
	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Body Domain Control Module (BDM) damaged	Replace body domain control module and perform sensor learning
	Tire pressure system set	Check and repair
System malfunction alarm (warning light remains on after flashing for 75 seconds)	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Incorrect sensor configuration and learning when replacing with new wheel (spare tire included)	Perform configuration and learning
	Electromagnetic interference/shield	Eliminate shielded objects outside of tire/strong electromagnetic radio interference
	Body Domain Control Module (BDM) damaged	Replace body domain control module and perform sensor learning
	Tire pressure system set	Check and repair
All tire pressure information cannot be displayed (all tire pressure information for four wheels display as "–")	Display status cannot be reached	Vehicle speed is more than 30 Km/h for more than 45 seconds
	Replaced tire pressure sensor is not configured correctly, sensor is not learned	Perform configuration and learning
	Body Domain Control Module (BDM) damaged	Replace body domain control module and perform sensor learning
	Electromagnetic interference/shield	Eliminate shielded objects outside of tire/strong electromagnetic radio interference
	Four sensors are not installed or all of them are damaged (very rare)	Reinstall or replace
Certain tire pressure information cannot be displayed (certain tire	Tire pressure sensor function is disabled	Replace, perform configuration and learning

Symptom	Suspected Area	Troubleshooting
pressure information displays as "–")	Incorrect sensor configuration and learning when replacing with new wheel (spare tire included)	Perform configuration and learning
	Electromagnetic interference/shield	Eliminate shielded objects outside of tire/strong electromagnetic radio interference
	Body Domain Control Module (BDM) damaged	Replace body domain control module and perform sensor learning
	Tire pressure system set	Check and repair

4.2 Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the tire pressure monitoring system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal

OK

Standard voltage: Not less than 12 V

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	**Read DTCs**

No DTC → **Perform repair according to problem symptoms table**

DTC occurs

5	**Read DTCs (current DTC and history DTC)**

History DTC → **Troubleshoot according to Intermittent DTC malfunction procedures**

Current DTC

6	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

7	Adjust, repair or replace

Next

8	Conduct test and confirm malfunction has been repaired

Next → End

4.3 Diagnostic Help

- Connect diagnostic tester (the latest software) to diagnostic interface, and make it communicate with vehicle electronic module through data network.
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Visually check the related wire harness.
- Check and clean all system grounds related to the latest DTCs.
- If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.4 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use diagnostic tester to record and clear DTCs stored in tire pressure monitoring system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Start engine, drive vehicle at a speed higher than 30 km/h and perform road test with diagnostic tester connected to diagnostic interface.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by DTC is intermittent. Please refer to Intermittent DTC Troubleshooting.

4.5 Intermittent DTC Troubleshooting

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check tire pressure sensors and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.

- Refer to any Technical Bulletin that may apply to this malfunction.

4.6 Diagnostic Trouble Code (DTC Chart)

DTC	DTC Definition
C1403-29	Front Left Hand Sensor Signal Invalid
C1403-55	Front Left Hand Sensor Not Configured
C1403-96	Front Left Hand Sensor Component Internal Fail
C1404-29	Front Right Hand Sensor Signal Invalid
C1404-55	Front Right Hand Sensor Not Configured
C1404-96	Front Right Hand Sensor Component Internal Fail
C1405-29	Rear Left Hand Sensor Signal Invalid
C1405-55	Rear Left Hand Sensor Not Configured
C1405-96	Rear Left Hand Sensor Component Internal Fail
C1406-29	Rear Right Hand Sensor Signal Invalid
C1406-55	Rear Right Hand Sensor Not Configured
C1406-96	Rear Right Hand Sensor Component Internal Fail
C1413-98	Front Left Hand Tire Temperature Component System Over Temperature
C1414-98	Front Right Hand Tire Temperature Component System Over Temperature
C1415-98	Rear Left Hand Tire Temperature Component System Over Temperature
C1416-98	Rear Right Hand Tire Temperature Component System Over Temperature
C1417-16	Front Left Hand Sensor Component or System Low Voltage
C1418-16	Front Right Hand Sensor Component or System Low Voltage
C1419-16	Rear Left Hand Sensor Component or System Low Voltage
C141A-16	Rear Right Hand Sensor Component or System Low Voltage
C142A-49	Receiver Internal Electronic Failure

4.7 Diagnostic Trouble Code (DTC) Diagnosis Procedure

■ Tire pressure sensor signal invalid fault

DTC	**C1403-29**	**Front Left Hand Sensor Signal Invalid**
DTC	**C1404-29**	**Front Right Hand Sensor Signal Invalid**
DTC	**C1405-29**	**Rear Left Hand Sensor Signal Invalid**
DTC	**C1406-29**	**Rear Right Hand Sensor Signal Invalid**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C1403-29	Front Left Hand Sensor Signal Invalid	The vehicle speed exceeds 30 km/h, and the tire pressure signal of the corresponding wheel has not been received for 10 minutes, and the system fault alarm occurs	• Signal missing or interference • Sensor fault • BDM fault
C1404-29	Front Right Hand Sensor Signal Invalid		
C1405-29	Rear Left Hand Sensor Signal Invalid		
C1406-29	Rear Right Hand Sensor Signal Invalid		

■ DTC confirmation procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check power supply voltage of body domain control module**

(a) Using a digital multimeter, measure voltage between power supply terminal of body domain control module and ground.
(b) Power supply voltage should be not less than 12 V.

NG → **Check and repair battery and power supply system**

OK

2	**Check body control module ground circuit**

(a) Check if the body control module ground is loose or corroded.

NG → **Tighten or replace body domain control module ground circuit**

OK

3	**Check configuration of tire pressure monitoring system**

(a) After configuration is finished, drive vehicle with a speed higher than 30 km/h for a period of time (vehicle speed is higher than 30 km/h, if the tire pressure signal at a certain position is not received for a continuous period of 10 minutes, the position is judged as signal missing).

NG → **Reconfigure tire pressure sensor of malfunctioning wheel**

OK

4	Check tire pressure sensor of malfunctioning wheel

(a) After replacement, perform configuration and test.

NG → **Replace tire pressure sensor of malfunctioning wheel**

OK

5	Check Body Domain Control Module (BDM)

(a) After replacement, it is necessary to perform configuration.

OK → **System is normal**

NG → **Repair or replace Body Domain Control Module (BDM).**

■ **Tire sensor configuration fault**

DTC	**C1403-55**	**Front Left Hand Sensor Not Configured**
DTC	**C1404-55**	**Front Right Hand Sensor Not Configured**
DTC	**C1405-55**	**Rear Left Hand Sensor Not Configured**
DTC	**C1406-55**	**Rear Right Hand Sensor Not Configured**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C1403-55	Front Left Hand Sensor Not Configured	• Tire pressure sensor ID is the default value • Other wheel sensor IDs configured by the system are duplicated with the faulty wheel sensor ID	• TPMS function is not configured • Sensor learning incorrect • Tire pressure sensor fault • BDM fault
C1404-55	Front Right Hand Sensor Not Configured		
C1405-55	Rear Left Hand Sensor Not Configured		
C1406-55	Rear Right Hand Sensor Not Configured		

■ **DTC confirmation procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check power supply voltage of domain controller

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a digital multimeter, measure voltage between power supply terminal of domain controller and ground.

(b) Power supply voltage should be not less than 12 V.

NG → **Check and repair battery and power supply system**

OK ↓

2	Check domain controller ground circuit

(a) Check if domain controller ground is loose or corroded.

NG → **Tighten or replace domain controller ground circuit**

OK ↓

3	Check configuration of tire pressure monitoring system

(a) After configuration is finished, drive vehicle with a speed higher than 30 km/h for a period of time.

NG → **Reconfigure tire pressure sensor of malfunctioning wheel**

OK ↓

4	Check tire pressure sensor of malfunctioning wheel

(a) After replacement, it is necessary to perform configuration.

NG → **Replace tire pressure sensor of malfunctioning wheel**

OK ↓

5	Check Body Domain Control Module (BDM)

(a) After replacement, it is necessary to perform configuration.

OK → **System is normal**

NG → **Repair or replace Body Domain Control Module (BDM).**

■ **Receiver internal electronic failure**

DTC	C142A-49	Receiver Internal Electronic Failure

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C142A-49	Receiver Internal Electronic Failure	A system failure alarm occurs and no signal is received from any of the four wheel sensors	Receiver internal circuit failure, sensor signal cannot be received

■ **DTC confirmation procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check power supply voltage of body domain control module

(a) Using a digital multimeter, measure voltage between power supply terminal of body domain control module and ground.

(b) Power supply voltage should be not less than 12 V.

NG → **Check and repair battery and power supply system**

OK

2	Check body domain control module ground circuit

(a) Check if the body domain control module ground is loose or corroded.

NG → **Tighten or replace body domain control module ground circuit**

OK

3	Check tire pressure sensor of malfunctioning wheel

(a) After replacement, it is necessary to perform configuration.

NG → **Replace tire pressure sensor of malfunctioning wheel**

OK

4	Check Body Domain Control Module (BDM)

(a) After replacement, it is necessary to perform configuration.

OK	System is normal
NG	Repair or replace Body Domain Control Module (BDM)

■ **Tire temperature too high fault**

DTC	C1413-98	Front Left Hand Tire Temperature Component System Over Temperature
DTC	C1414-98	Front Right Hand Tire Temperature Component System Over Temperature
DTC	C1415-98	Rear Left Hand Tire Temperature Component System Over Temperature
DTC	C1416-98	Rear Right Hand Tire Temperature Component System Over Temperature

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C1413-98	Front Left Hand Tire Temperature Component System Over Temperature	The system gives a high temperature alarm, and the temperature of the faulty wheel is > 85°C	• Tire pressure and temperature are too high • BDM fault
C1414-98	Front Right Hand Tire Temperature Component System Over Temperature		
C1415-98	Rear Left Hand Tire Temperature Component System Over Temperature		
C1416-98	Rear Right Hand Tire Temperature Component System Over Temperature		

■ **DTC confirmation procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check tire temperature of faulty wheel

(a) Check the tire pressure of faulty wheel with air pressure gauge.

(b) Tire temperature should be lower than 80°C.

NG	1. Check whether the tire pressure is too low or too high, and set it to about 2.3 bar. 2. Check for abnormal wear or interference around the tire

OK

2	Check power supply voltage of body domain control module

(a) Using a digital multimeter, measure voltage between power supply terminal of body domain control module and ground.

(b) Power supply voltage should be not less than 12 V.

NG → **Check and repair battery and power supply system**

OK

3	Check body domain control module ground circuit

(a) Check if the body domain control module ground is loose or corroded.

NG → **Tighten or replace body domain control module ground circuit**

OK

4	Check Body Domain Control Module (BDM)

(a) After replacement, it is necessary to perform configuration.

OK → **System is normal**

NG → **Repair or replace Body Domain Control Module (BDM)**

■ **Tire pressure sensor voltage too low fault**

DTC	**C1417-16**	**Front Left Hand Sensor Component or System Low Voltage**
DTC	**C1418-16**	**Front Right Hand Sensor Component or System Low Voltage**
DTC	**C1419-16**	**Rear Left Hand Sensor Component or System Low Voltage**
DTC	**C141A-16**	**Rear Right Hand Sensor Component or System Low Voltage**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C1417-16	Front Left Hand Sensor Component or System Low Voltage	When the receiver receives the sensor signal containing BATTERY LOW information 3 times in one ignition cycle. (When key is turned to IGN-OFF, the fault count is cleared)	• Low battery voltage inside the sensor (- sensor battery voltage < 2.2V) • BDM fault
C1418-16	Front Right Hand Sensor Component or System Low Voltage		
C1419-16	Rear Left Hand Sensor Component or System Low Voltage		

DTC	DTC Definition	Detection Condition	Possible Cause
C141A-16	Rear Right Hand Sensor Component or System Low Voltage		

■ **DTC confirmation procedure**

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check whether the power of the faulty wheel sensor is too low**

(a) Check whether the power of the faulty wheel sensor is too low.

NG → **Replace tire pressure sensor**

OK

2	**Check power supply voltage of body domain control module**

(a) Using a digital multimeter, measure voltage between power supply terminal of body domain control module and ground.

(b) Power supply voltage should be not less than 12 V.

NG → **Check and repair battery and power supply system**

OK

3	**Check body domain control module ground circuit**

(a) Check if the body domain control module ground is loose or corroded.

NG → **Tighten or replace body domain control module ground circuit**

OK

4	**Check Body Domain Control Module (BDM)**

(a) After replacement, it is necessary to perform configuration.

OK → **System is normal**

NG → **Repair or replace Body Domain Control Module (BDM)**

■ **Sensor element internal failure**

DTC	**C1403-96**	**Front Left Hand Sensor Component Internal Failures**
DTC	**C1404-96**	**Front Right Hand Sensor Component Internal Failures**
DTC	**C1405-96**	**Rear Left Hand Sensor Component Internal Failures**
DTC	**C1406-96**	**Rear Right Hand Sensor Component Internal Failures**

Description

DTC	DTC Definition	Detection Condition	Possible Cause
C1403-96	Front Left Hand Sensor Component Internal Failures	When the receiver receives the sensor fault information in the data sent by the sensor 3 times in an ignition cycle, P=0=0=0 (when the key is turned to IGN-OFF, the fault count is cleared)	• Sensor fault • BDM fault
C1404-96	Front Right Hand Sensor Component Internal Failures		
C1405-96	Rear Left Hand Sensor Component Internal Failures		
C1406-96	Rear Right Hand Sensor Component Internal Failures		

■ **DTC confirmation procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check power supply voltage of domain controller**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Using a digital multimeter, measure voltage between power supply terminal of domain controller and ground.

(b) Power supply voltage should be not less than 12 V.

NG → **Check and repair battery and power supply system**

OK →

2	**Check domain controller ground circuit**

(a) Check if domain controller ground is loose or corroded.

NG → Tighten or replace domain controller ground circuit

OK

3	Check configuration of tire pressure monitoring system

(a) After configuration is finished, drive vehicle with a speed higher than 30 km/h for a period of time.

NG → Reconfigure tire pressure sensor of malfunctioning wheel

OK

4	Check tire pressure sensor of malfunctioning wheel

(a) After replacement, it is necessary to perform configuration.

NG → Replace tire pressure sensor of malfunctioning wheel

OK

5	Check BDM module

(a) After replacement, perform configuration and test.

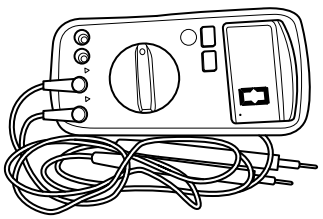
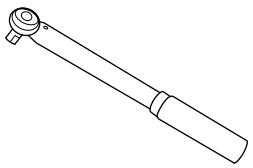
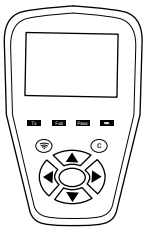
NG → Replace BDM module

OK → System operates normally

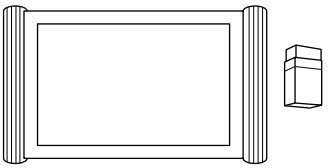
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Torque Wrench	 S00079
Low Frequency Trigger	 S00069

■ Special Tool

Tool Name	Tool Drawing
Diagnostic tester	 S00001

5.2 Replace Tire Pressure Sensor

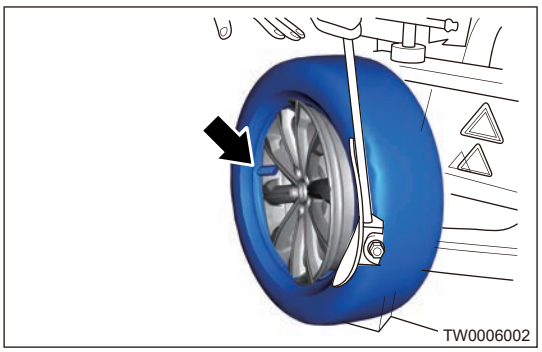
■ Removal

⚠ Caution

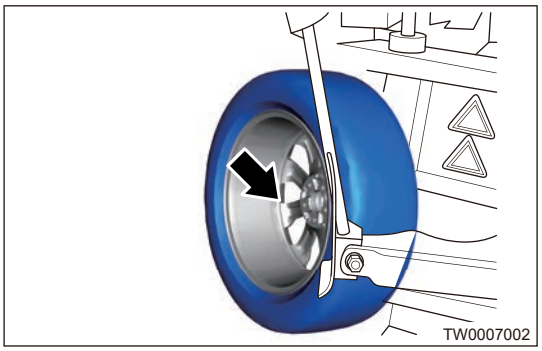
- **Avoid dropping the sensor. If tire pressure sensor is dropped from a place 1m high to the ground, it is interpreted as fault in tire pressure sensor.**
- **Valve cap must be on the valve, except inflation, deflation, air pressure inspection, etc.**
- **During removal, do not contact the tire pressure sensor tools used, to avoid damage to the tire pressure sensor.**
- **Sensor air pressure inlet cannot be covered partially or completely by lubricant or other materials.**
- **During tire removal, follow the operation specification, never damage the tire pressure sensor.**
- **Both crowbar and tire cannot contact with sensor.**

(1) Remove the wheels from the vehicle and deflate tire completely.

(2) Keep one side with tire pressure sensor 30 cm away from separation shovel, and put shovel block between rim and tire, then depress the pedal to separate rim and tire.



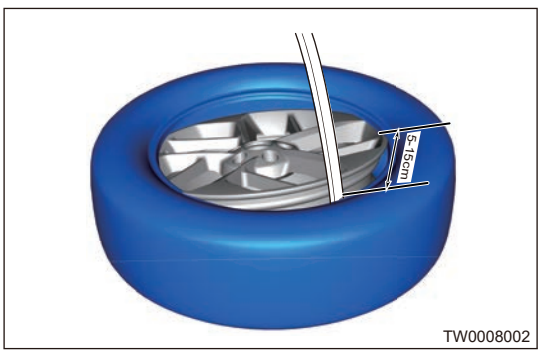
(3) Turn over tire to keep one side with tire pressure sensor 30 cm away from separation shovel, and put shovel block between rim and tire, then depress the pedal to separate rim and tire.



⚠ Caution

- **The angle between the tire pressure shovel and air valve (sensor) must be greater than 90 degrees.**

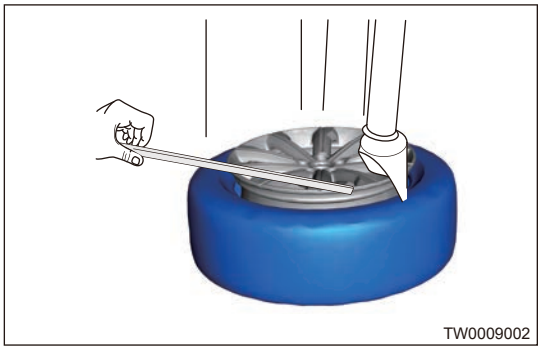
(4) Lock tire on wheel, lower replacer head and keep it 5 - 15 cm away from sensor.



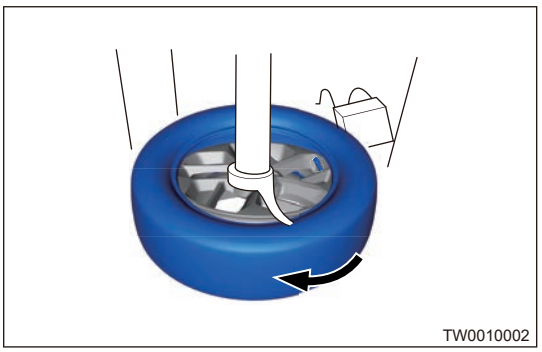
⚠ Warning

- **Upper tire edge removal: Lock rim onto the tire removal machine, and use the installation head position of tire removal machine as the 12 o'clock position, the position of air valve should be within the range of 11 to 12 o'clock, which can ensure that the upper tire edge will not scratch the sensor.**

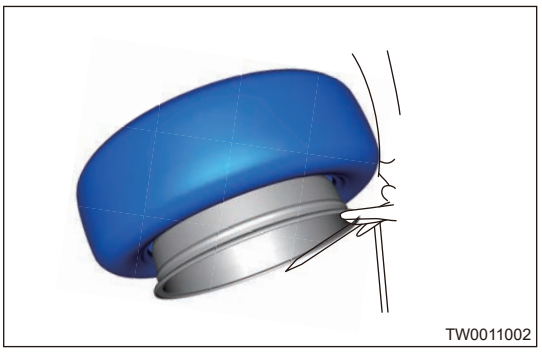
(5) Use crowbar to pry out outside tire, and sleeve it to replacer head, then take away crowbar.



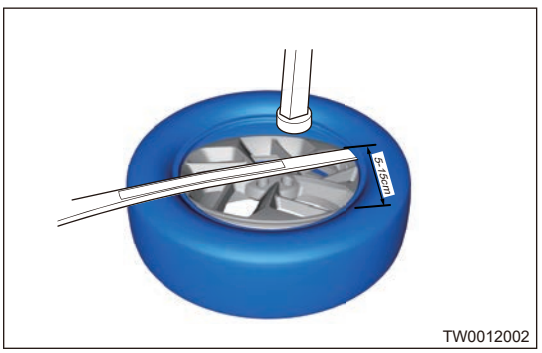
(6) Rotate wheel, and the movable direction of wheel should be the direction that replacer head is gradually kept away from tire pressure sensor, then remove upper part of tire.



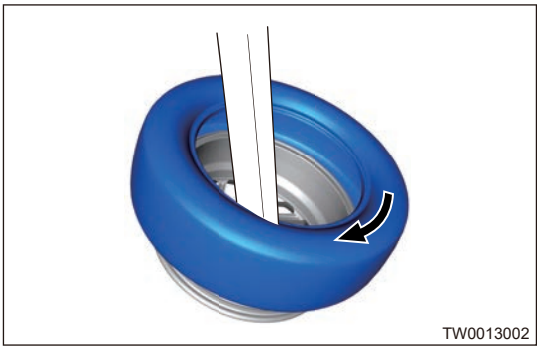
(7) Lift tire and pry out lower part of tire using crowbar.



(8) Lower replacer head and pry out lower side tire tread using crowbar, then sleeve it on replacer head and keep it 5 - 15 cm away from sensor.



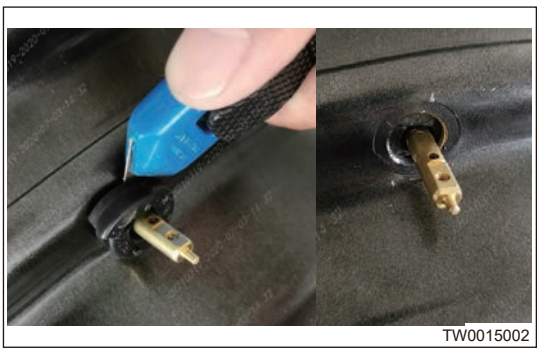
(9) Rotate wheel, and the movable direction of wheel should be the direction that replacer head is gradually kept away from tire pressure sensor, then pry out tire completely.


TW0013002

(10) Unscrew the screw from the tire pressure sensor body and remove the tire pressure sensor body.


TW0014002

(11) Use a knife to cut a circle around the tire pressure sensor to expose the valve stem and remove the rubber nozzle.

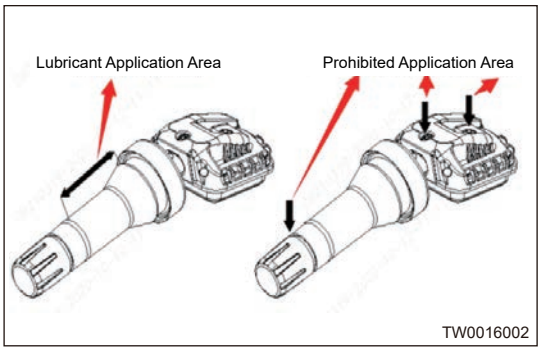

TW0015002

■ Installation

⚠ Caution

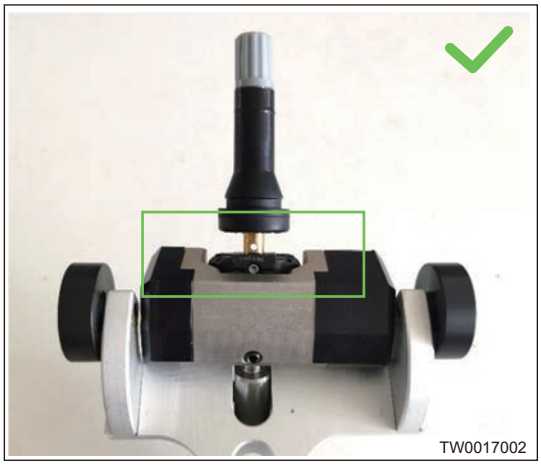
- **Avoid dropping the sensor. If tire pressure sensor is dropped from a place 1m high to the ground, it is interpreted as fault in tire pressure sensor.**
- **Tire pressure sensor must be installed on clean and dry hub.**
- **Valve cap must be on the valve, except inflation, deflation, air pressure inspection, etc.**
- **Sensor air pressure inlet cannot be covered partially or completely by lubricant or other materials.**
-

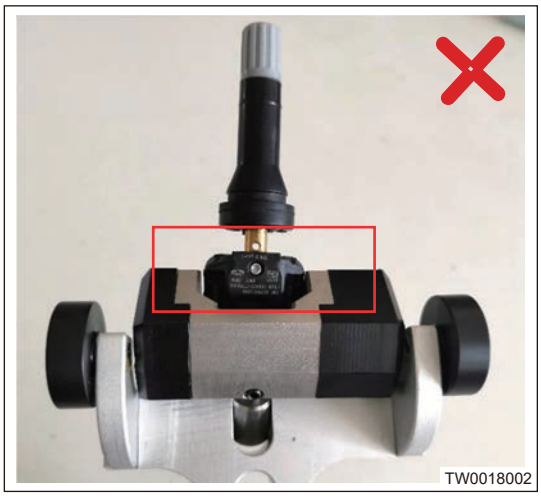
(1) Apply grease or lubricant to the sensor at the position required in the following figure. TAL-030 tire assembly lubricant or TECH720C lubricant is recommended.



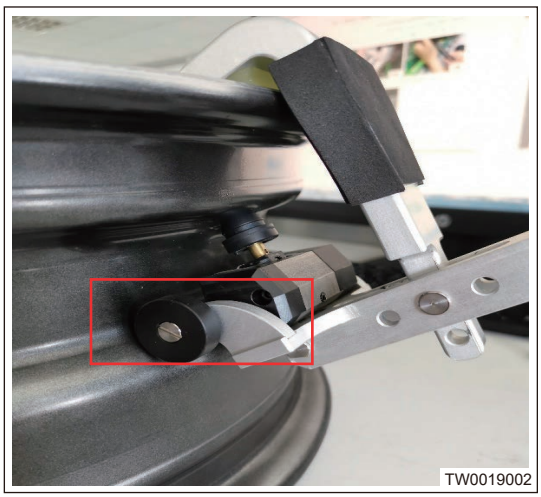
TW0016002

(2) Install the sensor (with a tilt angle of approximately 65 °) smoothly into the predetermined position of the installation tool chamber.


TW0017002


TW0018002

(3) Align the axis of the fixture installed with sensor with rim hole, and press roller tightly against the curved surface of rim. After the sensor is inserted into the rim hole, press the roller onto the curved surface of rim and rotate the hook to hang onto the outer edge of rim.

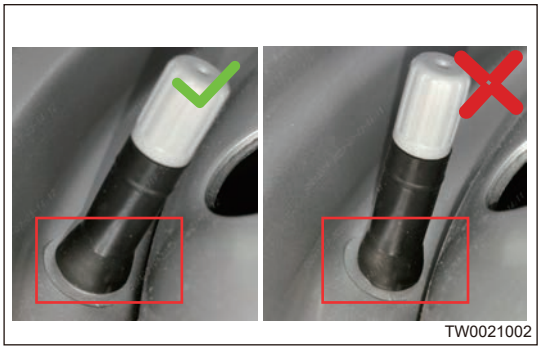

TW0019002

(4) Hold the handle by hand and press down in the direction of gravity (F≈140N-220N). The sensor rubber nozzle is pressed into rim hole by force.

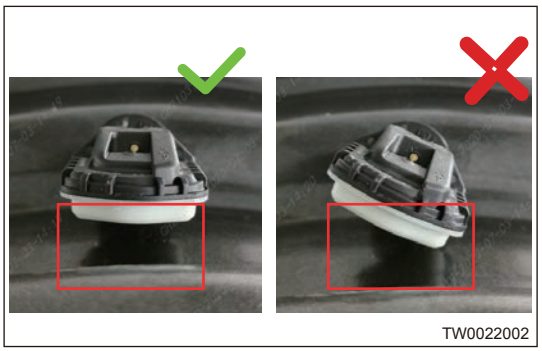

TW0020002

(5) Remove the hook, remove installation tool, installation is completed.

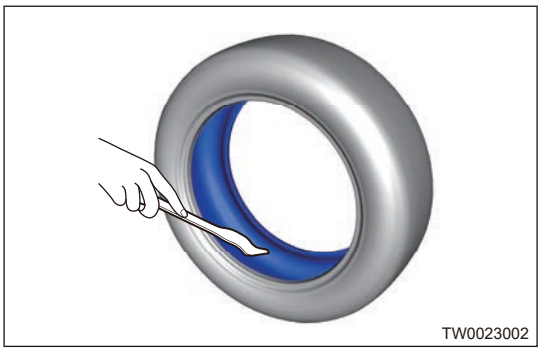
(6) Qualified inspection standard, rubber nozzle identification ring is exposed outside of rim.


TW0021002

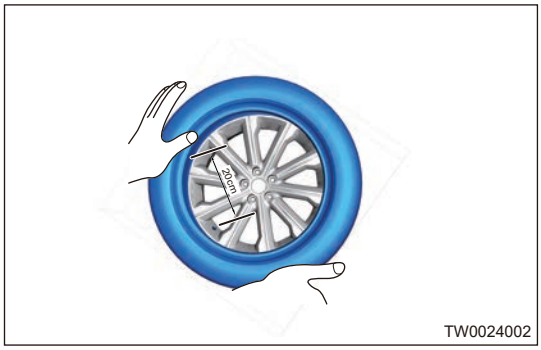
(7) Qualified inspection standard, the sensor body is parallel to the cut surface of rim curved surface.


TW0022002

(8) Installation is the same as common tire. Before loading tire, apply soapy water or glycerin to tire bead along inner circle.

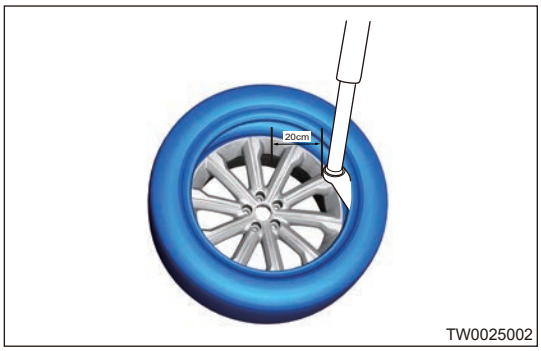

TW0023002

(9) Put tire on hub and keep intersection between hub and tire edge 15 - 20 cm away from valve stem.



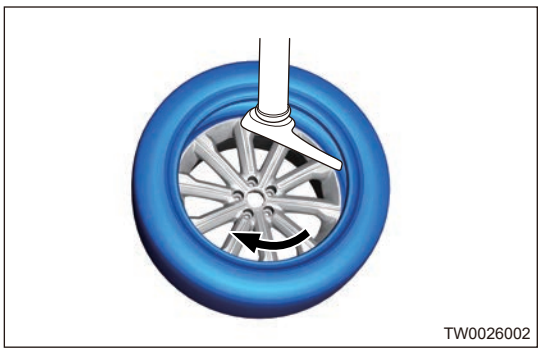
TW0024002

(10) Install bottom tire to make sure the distance between intersection and valve stem is about 20cm.

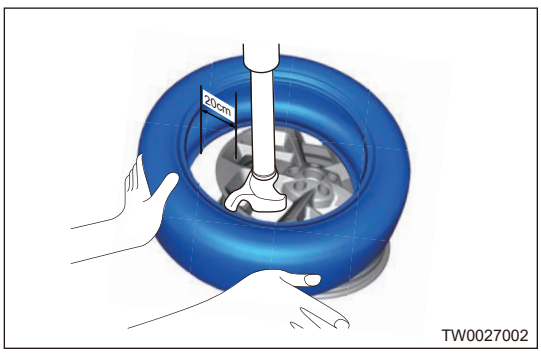


TW0025002

(11) Rotate wheel to install one side of tire into hub. Rotation direction of wheel should be the direction that makes replacer head get farther and farther away from sensor.

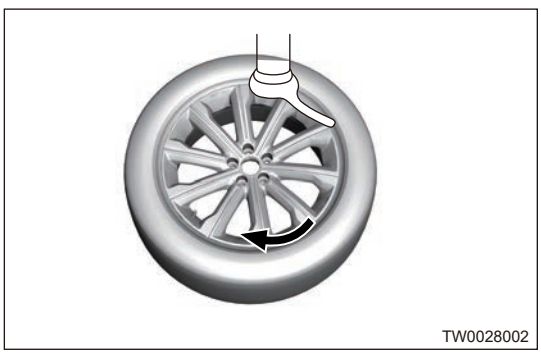

TW0026002

(12) Put another side of tire in place, so that intersection between tire edge and hub is 20 cm away from valve stem.



TW0027002

(13) Rotate wheel to install another side of tire into hub.


TW0028002

⚠ Caution
• **Be sure to observe the operation regulation to prevent tire pressure sensor from being damaged.** • **Both crowbar and tire cannot contact with sensor.** • **Confirm that distance between intersection and valve stem is proper.**

5.3 Matching Learning

Hint:

- Perform tire pressure learning when rotating tire and replacing tire pressure sensor. And perform each tire sensor learning with diagnostic tester.
- Tire pressure monitoring function is turned on after BDM is replaced, then it is necessary to perform learning of tire pressure sensor again.

⚠ Caution
• **Among the air bleeding method and the low frequency trigger triggering method, only trigger tire pressure sensor activation method is different, other steps are the same.**

■ Diagnostic tester learning tire pressure sensor (air bleeding)

Hint:

- Perform tire pressure learning when rotating tire and replacing tire pressure sensor. And perform each tire sensor learning with diagnostic tester.
- Tire pressure monitoring function is turned on after BDM is replaced, then it is necessary to perform learning of tire pressure sensor again.

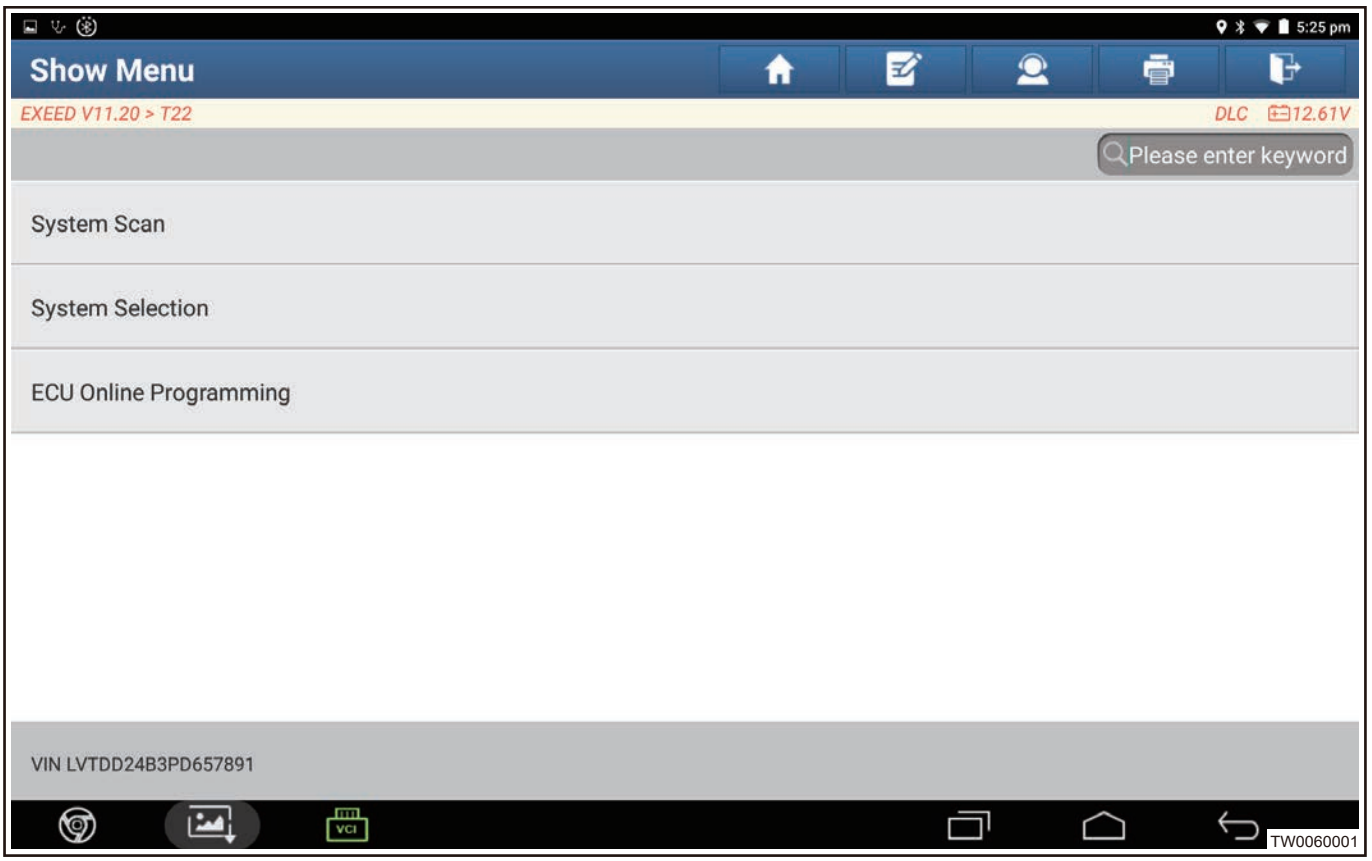
Precautions	Description
Avoid error learning of tire	Learned tire must be matched with bleeding tire
	Only operate one tire every time, and do not bleed (or inflate) other tires at this time
	Keep away from other vehicles with tire pressure sensor, avoiding error learning or interference

- If tire learned in system does not matched with bleeding tire, system will recognize an error, resulting in tire information displayed in instrument cluster not corresponding to actual tire information.
- When learning a tire, please do not inflate or bleed other tires. Bleeding or inflating the tire will cause error tire learning.
- When learning tire pressure monitoring system, please do not approach other vehicles equipped with tire pressure sensor and with tire pressure sensor in activated state, otherwise it may lead to error learning or failure to learn.
- After completing learning, please confirm whether four tire pressure sensor ID of actual vehicle is consistent with tire pressure sensor ID recorded by BDM.

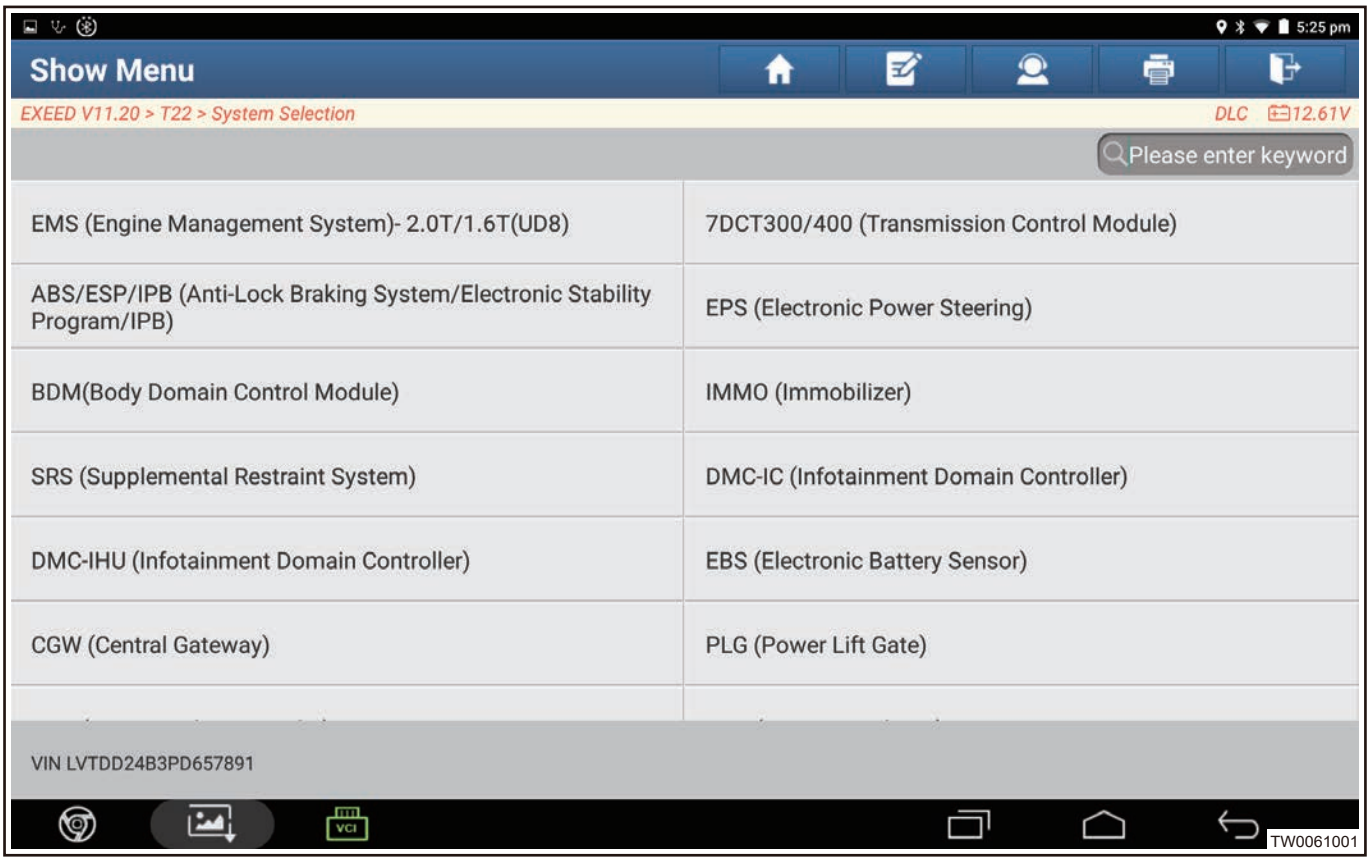
(1) Connect diagnostic tester and turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

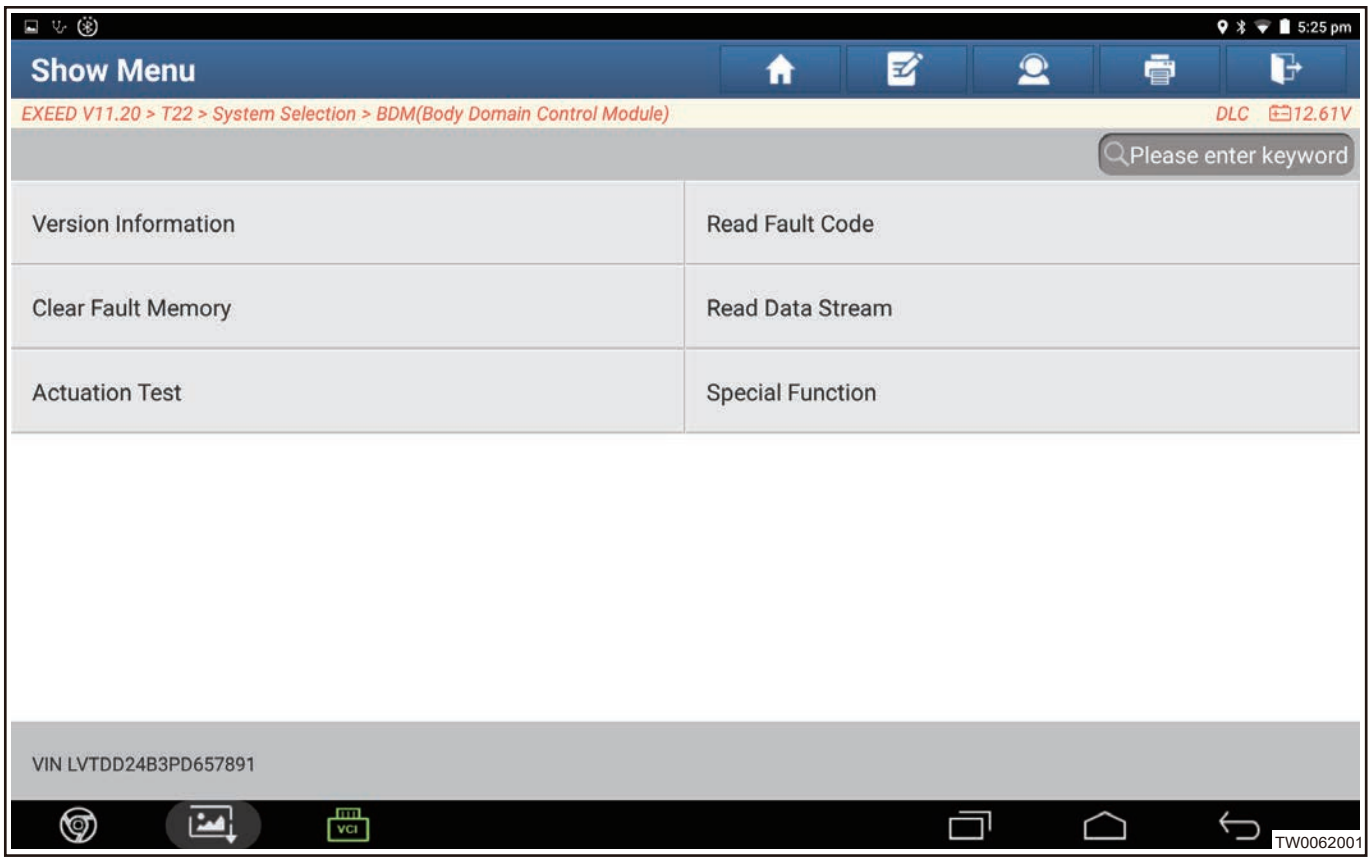
(3) Click “System Selection”.



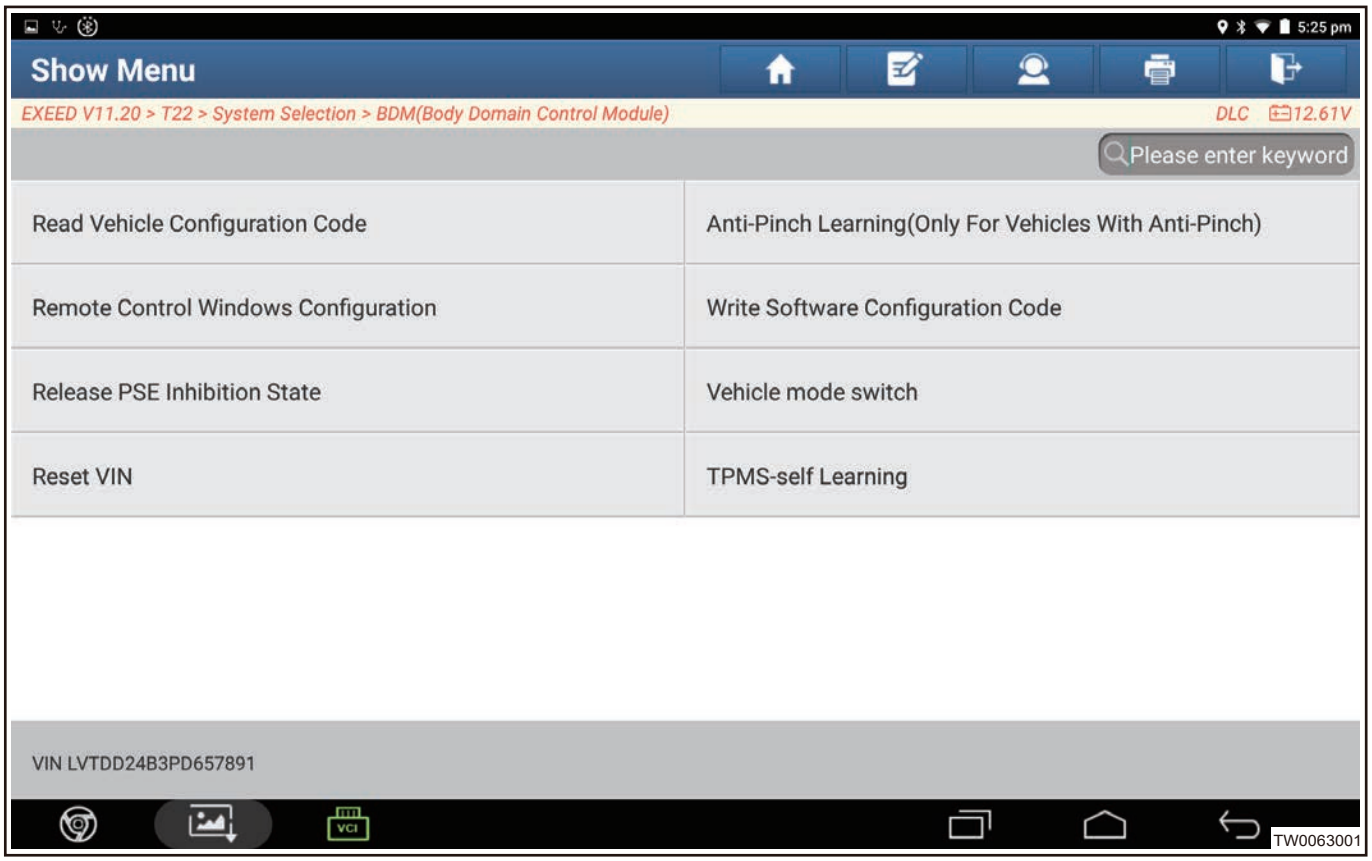
(4) Click “BDM (Body Domain Control Module)”.



(5) Click “Special Function”.

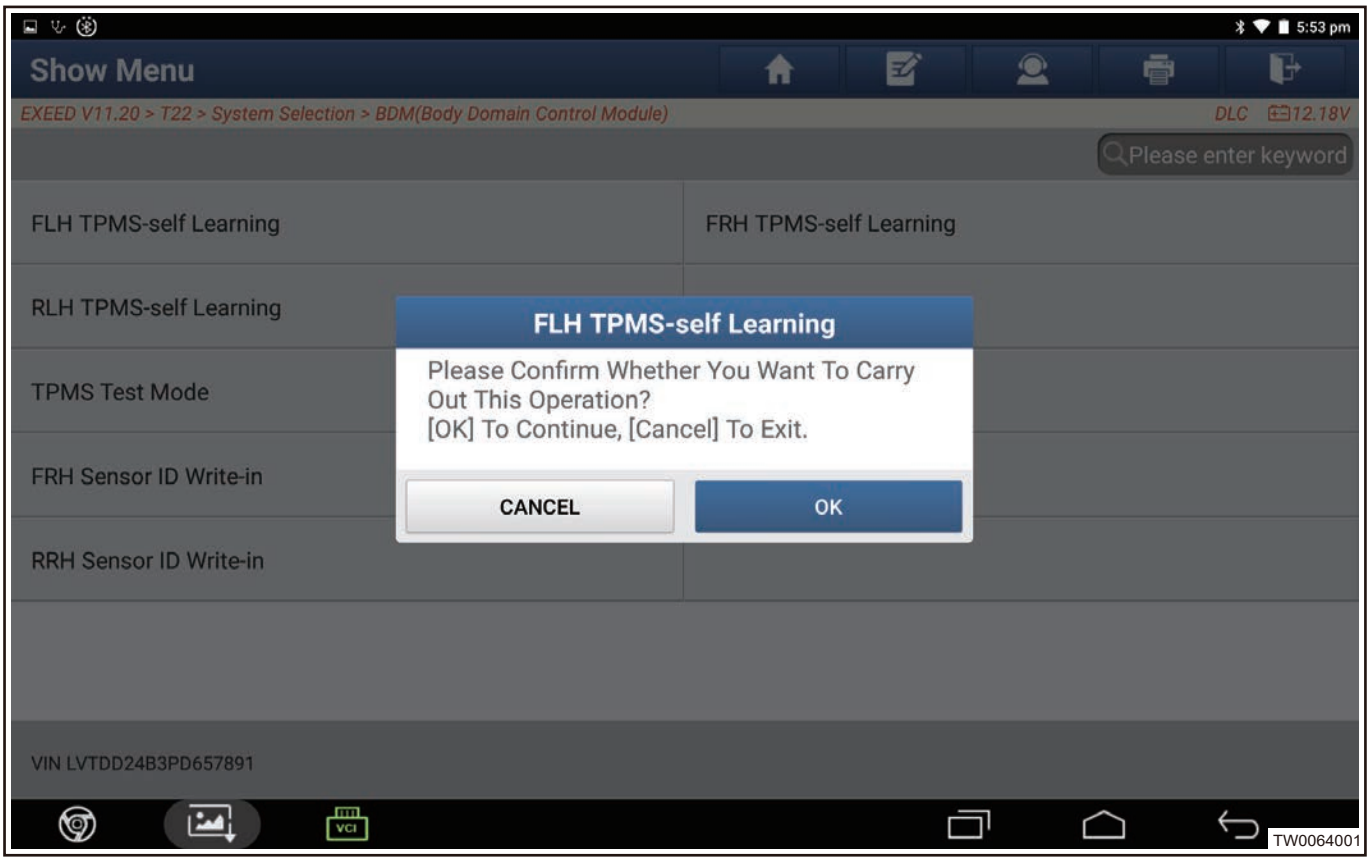


(6) Click “TPMS-self Learning”.

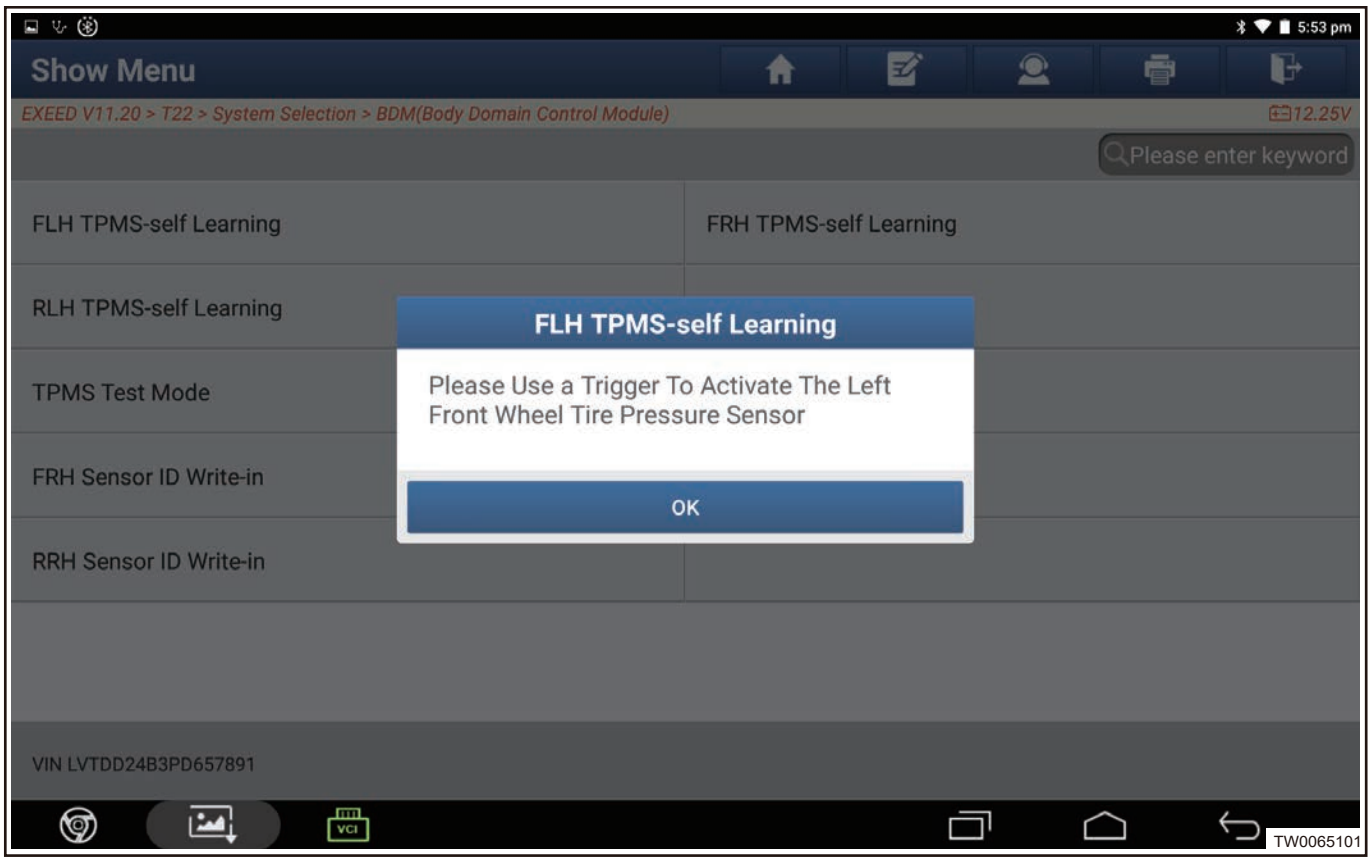


(7) Click on the tire menu that needs to be learned (take the left front tire as an example).

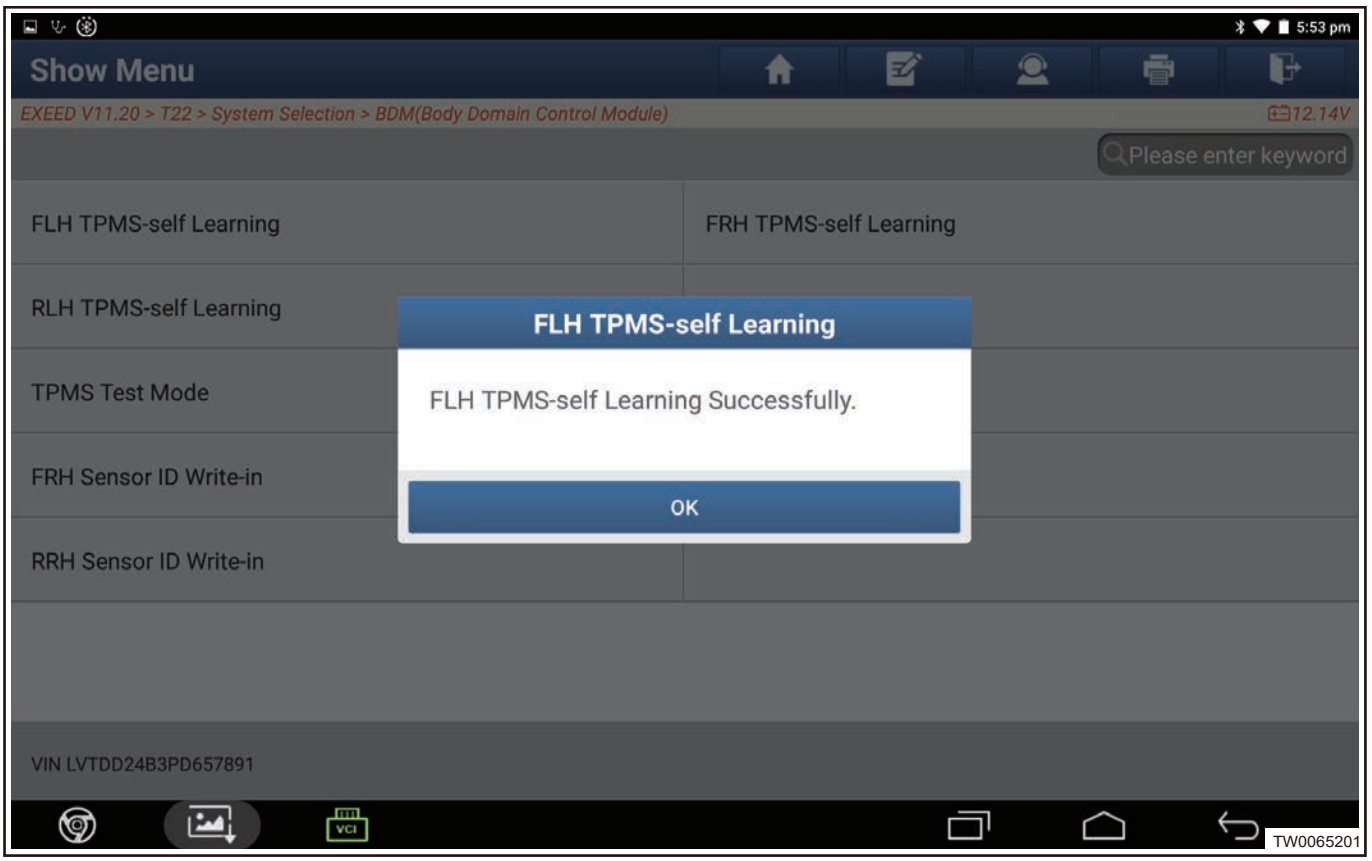
(8) Confirming information, click “OK”.



(9) Operates according to prompt.



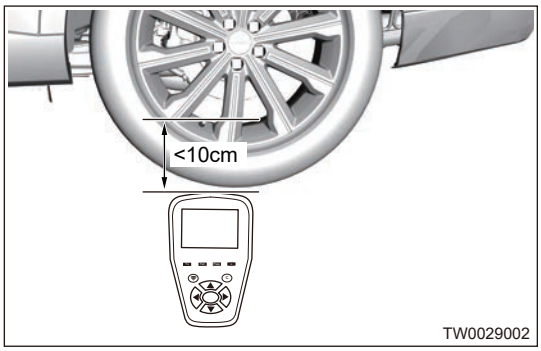
(10) Deflate the left front wheel, when the left front tire pressure sensor learning is successfully learned, the instrument cluster tire pressure fault light turns off, display the left front tire pressure value, the diagnostic tester prompts "Program has been completed", indicating that the left front tire pressure sensor has been learned.



■ Use diagnostic tester to learn tire pressure sensor (low frequency trigger triggering method)

Preparation:
There is enough pressure in tire (full loaded pressure is recommended), BDM turns on tire pressure monitoring function.

- If the malfunction is suspected in tire pressure sensor, use the low-frequency trigger to perform test.
- After turning ENGINE START STOP switch to IGN-ON and learning status is entered, the sensor can send wireless tire pressure signal with low-frequency trigger (-without inflating/deflating the tire). After the triggering operation is finished, tire pressure for the wheel learned will be displayed on the meter, which indicates that the learning is finished successfully.
- Distance between low-frequency trigger and tire pressure sensor is less than 10 cm. Place the antenna of low-frequency trigger close to the rubber tire near tire pressure sensor on the wheel, and then press triggering button on low-frequency trigger. After the low-frequency trigger is successfully triggered, relative information about learned tire such as tire ID, pressure and temperature will be displayed, which indicates that the sensor is operating normally. Otherwise, replace the tire pressure sensor.



Low frequency trigger learning process:

1	**Start**

Next

2	ENGINE START STOP switch is in ON, but do not start vehicle

Next

3	Switch conventional screen to tire pressure screen on meter; Operate diagnostic tester and select "TPMS Self-learning" menu in "Special Operation"

Next

4	Select tire to be learned with diagnostic tester

Next

5	Enter tire pressure learning status, left and right turn signal lights start blinking

Next

6	Trigger wheel sensor to be learned using low-frequency trigger

Next

7	Tire pressure sensor ID, temperature and pressure values are displayed on low-frequency trigger

Next

8	Left and right turn signal lights stop blinking, the tire pressure data can be displayed on meter, it indicates that tire pressure learning of this tire is completed, click “OK” button on diagnostic tester to exit learning status

Next

9	Check if other tire sensors are also learned

Yes → Step 4

No

10	Rode test: Vehicle speed is more than 30 Km/h for 45 seconds

Next

11	Check if tire pressure information is displayed correctly

No → Step 2

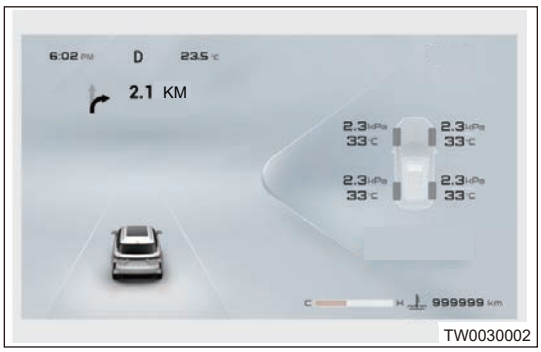
Yes

12	End

■ **Meter screen display for successful tire pressure sensor learning**

(1) Left and right turn signal lights stop blinking, and tire pressure data is displayed on meter, indicating that tire pressure learning is completed, such as left front wheel.

The displayed tire pressure is 230 kpa and the temperature is 33˚C for front left wheel, which indicate that the front left wheel is learned successfully.



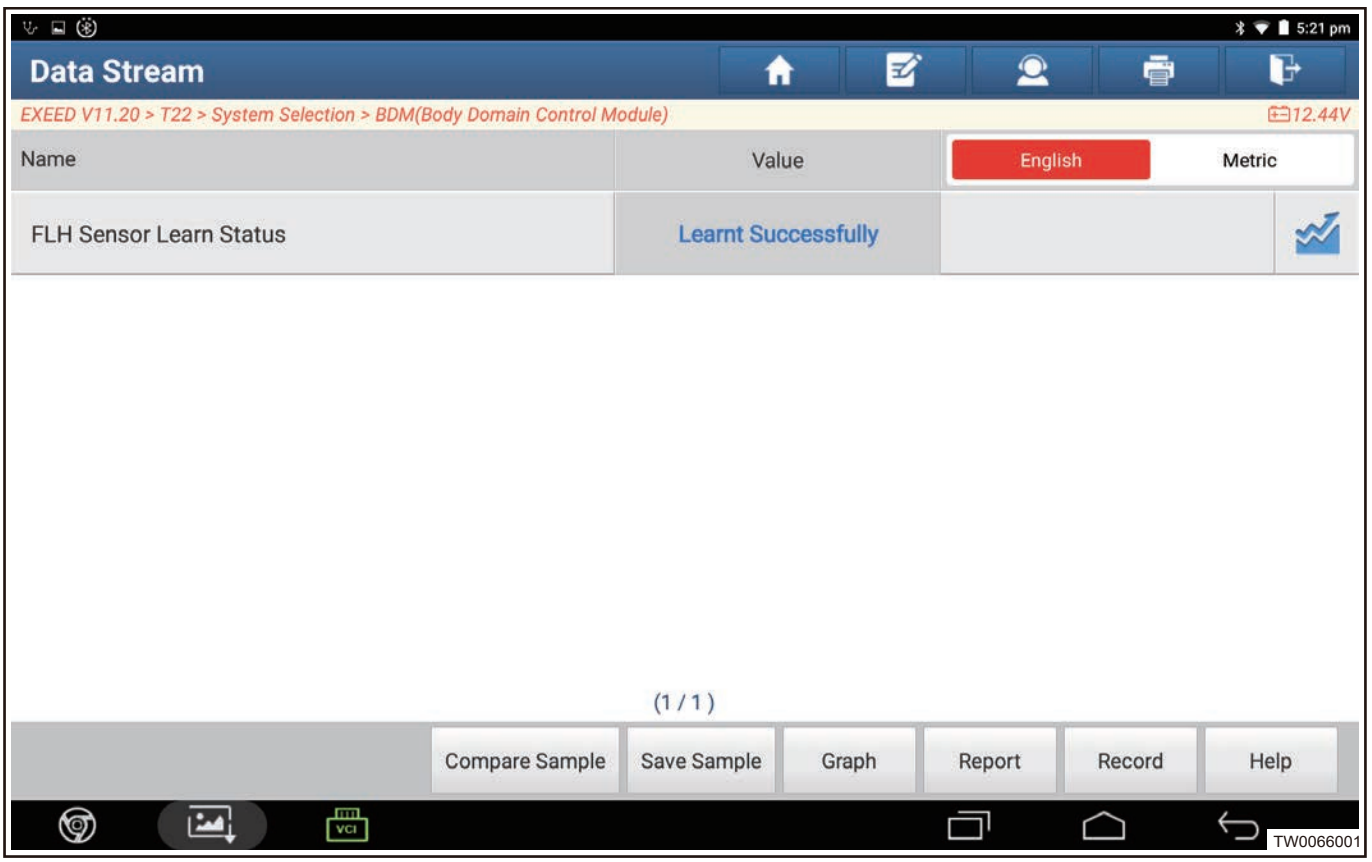
⚠ Caution

- **Only after learn is successful, click "OK", otherwise learning will not be successful.**

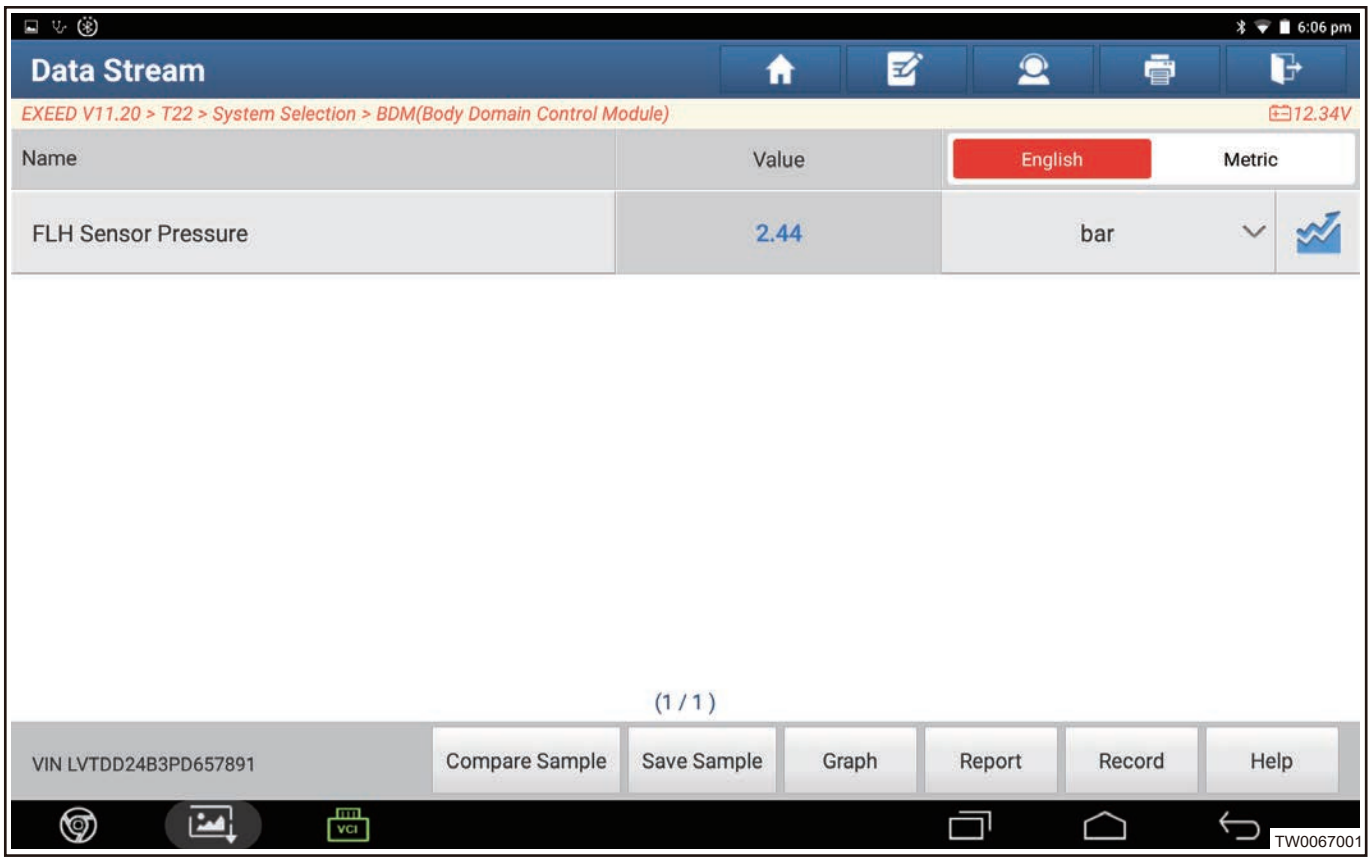
■ **Inspection of tire pressure monitoring system learning status**

After repairing or reconfiguring tire pressure monitoring system, perform inspection of tire pressure monitoring system learning status. Select Read Data Stream to check learning status of tire pressure system.

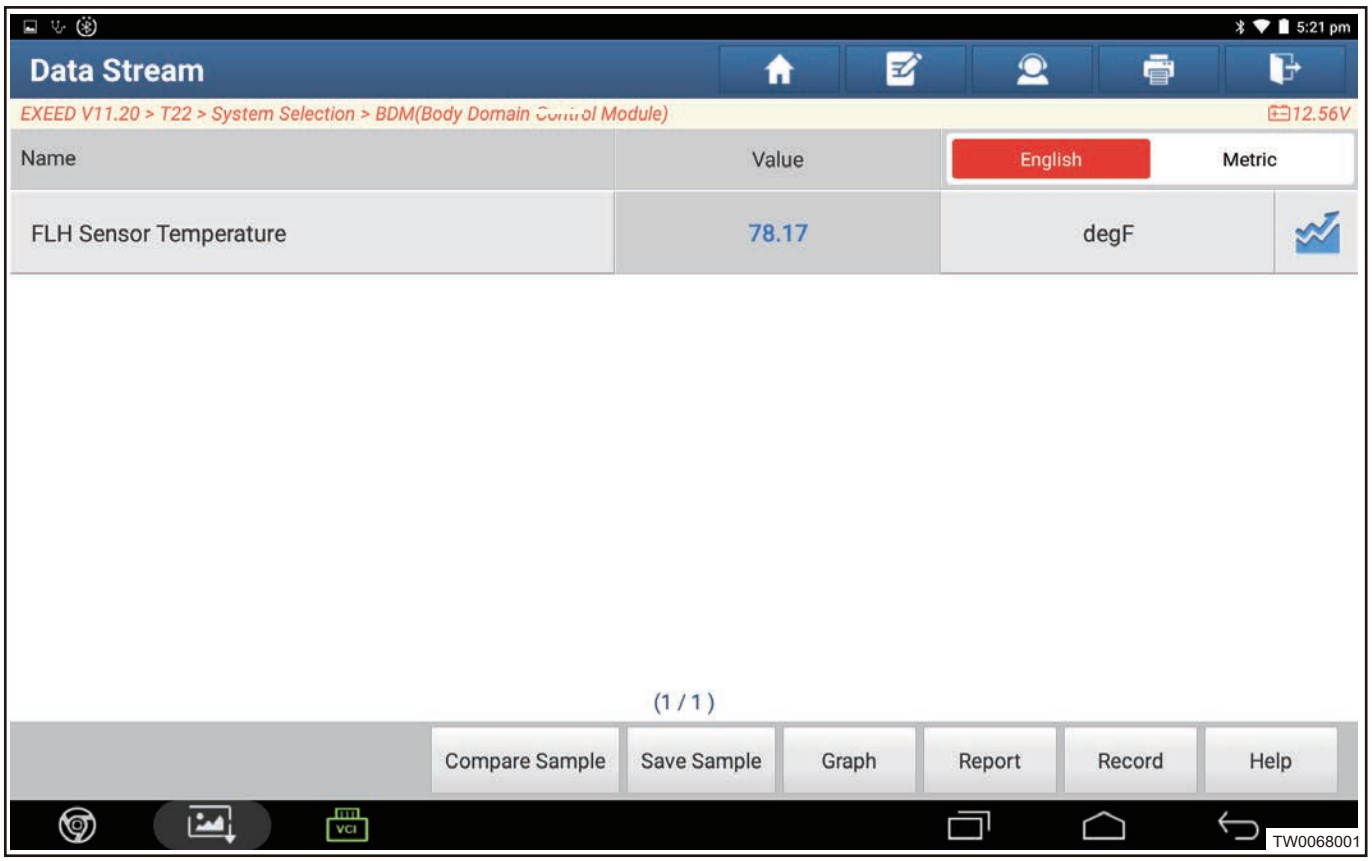
(1) Click sensor learning status to check sensor learning status and whether learning is successful. If learning is not successful, unsuccessful learning will be displayed.



(2) Click sensor pressure to read corresponding tire pressure value.



(3) Click sensor temperature to read corresponding tire temperature value.



■ Automatic positioning learning method

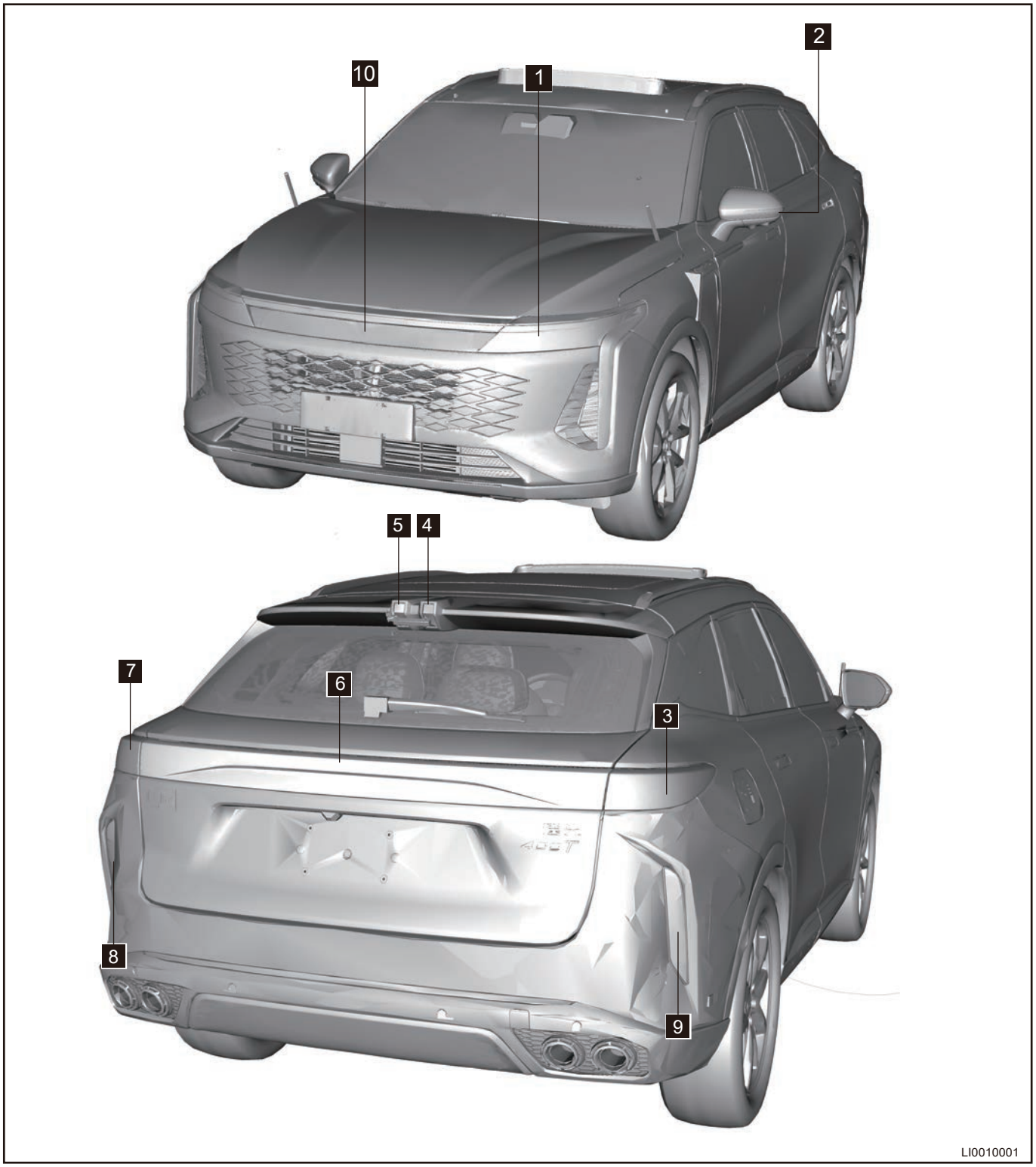
Automatic tire pressure positioning function:

- It can be used for unlearned tire pressure system or after replacing new tire pressure sensor in tire, the sensor ID can be automatically learned through automatic positioning function.
- If tires are exchanged or tire pressure sensors are replaced with new ones, and the vehicle stops for more than 20 minutes, when vehicle is continuously driving with a speed 30 km/h for more than 10 minutes, system can automatically learn tire pressure and match it to corresponding position.

10.6 LIGHTING SYSTEM

1 System Overview

1.1 System Components Diagram



1	Headlight Assembly	6	Back Door Combination Light Assembly (Movable)
2	Side Turn Signal Light	7	Rear Left Combination Light (Fixed) Assembly
3	Rear Right Combination Light (Fixed) Assembly	8	Rear Left Fog Light Assembly
4	Third Stop Light Assembly (Movable, Right Side of T22)	9	Rear Right Fog Light Assembly
5	Third Stop Light Assembly (Movable, Left Side of T22)	10	Front Signal Light Assembly

Lighting system on this model consists of vehicle lighting device and light signal device, which are used for normal operation of vehicle and ensuring safety when driving at night or in fog.Lighting system consists of headlight assembly (including headlight, side turn signal light, front signal light assembly), rear right combination light (fixed) assembly, third stop light assemblies (one on the left and one on the right), back door combination light assembly, rear left combination light (fixed) assembly, rear left fog light assembly, rear right fog light assembly and front signal light assembly.

1.2 Exterior Light Control

Turn signal light

■ **Enabling condition**

Power supply mode is ON or CRANK.

■ **OFF condition**

(1) Power supply mode is OFF or ACC.

(2) Trigger condition a: Turn signal light switch status is OFF when turn signal light flash is triggered.

(3) Trigger condition b: When turn signal light flash is triggered.

(4) Trigger condition c: When turn signal light flash is triggered.

■ **OFF condition**

(1) Power supply mode is OFF or ACC.

(2) Trigger condition a: Turn signal light switch status is OFF when turn signal light flash is triggered.

(3) Trigger condition b: CAN signal received when turn signal light flash is triggered.

(4) Trigger condition c: When turn signal light flash is triggered.

■ **OFF condition**

(1) Power supply mode is OFF or ACC.

(2) After turn signal light flashes three times.

Hazard warning light

■ **Enabling condition**

When hazard warning light output is invalid.

■ **Trigger condition**

(1) Hazard warning light switch is changed from invalid to valid.

(2) When turn signal light switch is invalid and local hazard warning light is not triggered.

■ **OFF condition**

(1) When hazard warning light output is valid, press hazard warning light switch again.

(2) Trigger condition b: When the triggered hazard warning light flashes.

■ **Note**

The locally triggered turn signal light function and hazard warning light function have higher priority than the AVP parking triggered hazard warning light function. That is, the AVP parking triggered hazard warning light function must operate when the local turn signal light switch is invalid and the local hazard warning light function is not triggered. When the AVP parking triggered hazard warning light function is valid, the local turn signal light switch is valid, and the output is performed according to the local function. If the local hazard warning light switch is valid, the hazard warning light can be turned off. When the local hazard warning light

trigger is valid, it cannot be turned off through AVP parking triggered hazard warning light signal.**Collision double flashing**

■ **Enabling condition**

Power supply mode is ON, or within 1 second after ON-ACC-OFF.

■ **Trigger condition**

BDM judges that it is collision status currently.

■ **OFF condition**

(1) Power supply mode is switch from ON to OFF, and then to ON again.

(2) Hazard warning light switch is pressed.

■ **Note**

(1) Within one second after the power supply mode is switched from ON to OFF, if BDM receives a valid collision signal, it still needs to execute the collision double flashing. If the collision double flashing is activated under this condition, the collision double flashing can be turned off when power supply is switched to ON.

(2) In addition to note a, after activating the collision double flashing function, BDM ignores other collision signals and resumes receiving and responds to other collision signals after switching the power supply mode to OFF and ON.

■ **Hazard warning state stored by EEPROM:**

(1) Hazard warning manual state and collision triggered hazard warning light flashing should be stored in EEPROM, so that the hazard warning can be restarted after the system is reset.

(2) The hazard warning state in EEPROM can be turned off in the same way as the collision flashing, without time limit.

Automatic parking mode

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Engine status is ENG_RUNNING.

■ **OFF condition**

(1) Power supply mode is OFF or ACC.

(2) Network signal 0x22A AVM_APA_1_HzrdLiReq=0x0: Not active is received.

■ **Execution priority of turn signal light and hazard warning light**

If BDM receives illumination requests from turn signal light and hazard warning light at the same time, drive the turn signal light according to the following priority:

(1) Collision double flashing function has the highest priority.

(2) Emergency braking double flashing takes second place.

(3) Turn signal light triggered by sound and light alert comes on.

(4) Hazard warning light switch input, turn signal light switch input, rear collision warning mode and automatic parking mode have the same priority, the later operated one has priority.

(5) After the low priority is triggered, when the high priority or the same priority is triggered, the alarm will continue to be triggered according to the high priority and later trigger after the high priority or the same priority function exits.

Position light control

■ **Enabling condition**

Power supply mode is ON, ACC or CRANK.

■ **Trigger condition**

Type configuration of light switch is 0x00: Position light switch or low beam light switch is valid with hard wire.

■ **Note**

The power supply mode is OFF, turn on the position light again, and the position light will come on in the form of parking light. When the remote control lock/PE lock/mechanical lock/remote lock/exit lock command is received and locked successfully, the parking light will not go off after entering the fortifying state.

Parking light control

■ **Enabling condition**

Power supply mode is OFF.

Static ceremony light function (with position light ceremony function)

■ **Classification of position light enable signal**

PWM duty ratio of position light enable signal is divided into 0%, 50%, 100%, and PWM frequency is 100 HZ ± 5. Note: In addition to unlocking/locking ceremony light function, when the position light comes on, PWM duty cycle 0% is sent synchronously by position light enable signal.

Unlocking ceremony light function

■ **Enabling condition**

(1) Power supply mode is OFF.

(2) Four doors, engine hood and back door are closed.

(3) Position light output is invalid.

■ **Trigger condition**

(1) Fortifying deactivation prompt is triggered.

(2) Function of ON when approaching courtesy light is triggered.

■ **OFF condition**

(1) Static ceremony light function is activated for more than 25 s.

(2) When any door is open during this period, this function is turned off.

(3) Power supply mode is ACC or ON.

(4) BDM receives PE lock command, remote control lock signal, remote lock signal or exit lock command.

(5) Remote control/TBOX vehicle location prompt and turn signal light prompt when approaching back door to unlock are triggered.

(6) Brake input is valid.

(7) Hazard warning light switch is changed from invalid to valid.

Locking ceremony light function

■ **Enabling condition**

(1) Power supply mode is OFF.

(2) Four doors, engine hood and back door are closed.

(3) Position light output is invalid.

■ **Trigger condition**

Fortifying prompt is triggered.

■ **OFF condition**

(1) Locking ceremony light function is activated for more than 6 s.

(2) Power supply mode is ACC or ON.

(3) BDM receives PE unlock command, remote control unlock signal, remote unlock signal or command of unlock when approaching.

(4) Any door, engine hood or back door is opened.

(5) Remote control/TBOX vehicle location prompt and turn signal light prompt when approaching back door to unlock are triggered.

(6) Brake input is valid.

(7) Hazard warning light switch is changed from invalid to valid.

Hazard warning light switch is changed from invalid to valid

■ **Enabling condition**

Remote state flag bit 1.

■ **OFF condition**

Remote state flag bit 0.

■ **Output OFF**

(1) Position light output is OFF.

(2) Network signal 0x391/0x392 ParkLightSts=0 is sent.

Low beam light

■ **Enabling condition**

(1) Power supply mode is ON or CRANK.

(2) Remote state flag bit is 0.

The locally triggered low beam light function has higher priority than the AVP parking triggered low beam light function. That is, the AVP parking triggered low beam light function must operate when the local combination switch is invalid. When the AVP parking triggered low beam light function is valid, the local light combination switch is valid, and the output is performed according to the local function.

Automatic follow me home mode

■ **Enabling condition**

(1) Configuration words come on automatically.

(2) Headlight delayed OFF enable in DVD configuration items is valid.

(3) Power supply mode is OFF.

(4) When automatic wiper configuration word is 0x1: Present, LIN signal S_AUTO_LAMP = 1 (Headlamp Activate = 1) from light sensor is received; Or when automatic wiper configuration word is invalid, valid hard wire signal from light sensor is received.

(5) Automatic light switch is valid or automatic light mode is AUTO.

(6) Vehicle mode is not factory mode and transport mode.

■ **Trigger condition**

Fortifying prompt is triggered.

■ **OFF condition**

(1) Follow me home function output is valid for more than 27 s.

(2) Headlight delayed OFF enable in DVD configuration items is invalid.

(3) Power supply mode is switched to ACC or ON.

(4) When automatic wiper configuration word is valid, LIN signal S_AUTO_LAMP = 0 from light sensor is received; Or when automatic wiper configuration word is invalid, invalid hard wire signal from light sensor is received.

(5) Automatic light switch is invalid and automatic light mode is not AUTO.

(6) Remote control RKE or PEPS unlock signal, PE unlock command, remote unlock signal or command of unlock when approaching is received.

(7) Vehicle mode is factory mode or transport mode.

Manual follow me home mode

■ **Enabling condition**

(1) Configuration words come on automatically.

(2) Within 120 s after power supply mode is switched to OFF.

(3) Vehicle mode is not factory mode and transport mode.

■ **Trigger condition**

Note for passing light switch valid: Passing light switch is a self-reset switch. When passing light switch is set to invalid, perform FMH function.

■ **Increasing ON time**

(1) If this function is activated (light is already on) and enabled condition is met, the output will increase by 30 s every time when high beam light/passing light switch is switched from OFF to passing light, but it should not be more than 8 times (max. time is 8*30 = 240 s).

(2) If this function is canceled (regardless of automatic or manual follow me home mode), this function is activated again within 2 minutes after power supply mode is switched to OFF (max. time is 8*30 = 240 s).

(3) When this function is activated, the passing light switch is activated within 2 min after power supply mode is switched to OFF.

■ **OFF condition**

(1) Out of time.

(2) Power supply mode is switched to ACC or ON.

(3) When the passing light switch is activated for 2 s.

(4) Vehicle mode is factory mode or transport mode.

■ **Output OFF**

(1) Low beam light, position light and license plate light go off, ON time is re-timed and activation time is also reset.

(2) After follow me home function is turned off, if can be activated again within 2 minutes after power supply mode is switched to OFF.

Car location light LMC

■ **Enabling condition**

(1) Headlight delayed OFF enable in DVD configuration items is valid.

(2) Power supply mode is OFF.

(3) When automatic wiper configuration word is valid, LIN signal from light sensor is received; Or when automatic wiper configuration word is invalid, valid hard wire signal from light sensor is received.

(4) Automatic light switch is valid or light mode is AUTO.

(5) Vehicle mode is not factory mode and transport mode.

■ **Trigger condition**

Fortifying deactivation prompt is triggered

■ **OFF condition**

(1) 27 s time is up.

(2) Headlight delayed OFF enable in DVD configuration items is invalid.

(3) Power supply mode is switched to ACC or ON

(4) Automatic light switch is invalid and automatic light mode is not AUTO.

(5) When automatic wiper configuration word is valid, LIN signal S_AUTO_LAMP = 0 from light sensor is received; Or when automatic wiper configuration word is invalid, invalid hard wire signal from light sensor is received.

(6) Fortifying prompt is triggered.

(7) Position light output triggered by unlocking ceremony light is changed from valid to invalid.

(8) Vehicle mode is factory mode or transport mode.

High beam light
Configuration: Automatic switch of high/low beam light: Not exist

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Low beam light output is valid.

(3) Automatic switch of high/low beam light.

(4) Remote state flag bit is 0.

■ **Perform output**

(1) High beam light comes on.

(2) BDM sends network signal.

■ **OFF condition**

(1) Power supply mode is switched from ON to ACC or OFF.

(2) Low beam light output is invalid.

(3) Type configuration word of wiper switch is 0x00: Passing light switch is changed to valid with hard wire.

(4) Type configuration word of wiper switch is 0x02: The received CAN signal 0x47A CSA_1_ HiBeamSwtCmd is changed from 0x00 OFF to 0x2: flash with CAN.

Configuration: Automatic switch of high/low beam light exists
High beam light 1

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Automatic switch of high/low beam light.

(3) Type configuration of light switch is 0x00: Automatic light switch is invalid with hard wire.

(4) Type configuration of light switch is 0x01: Automatic light switch mode is not AUTO with LIN Signal.

(5) Low beam light output is valid.

(6) Remote state flag bit is 0.

■ **Perform output**

(1) High beam light comes on.

(2) BDM sends CAN network signal 0x391/0x392 HighbeamSts=1, 0x391 HMA SW=0.

■ **OFF condition**

(1) Power supply mode is switched from ON to ACC or OFF.

(2) Low beam light output is invalid.

(3) Type configuration word of wiper switch is 0x00: Passing light switch is changed to valid with hard wire.

(4) Type configuration word of wiper switch is 0x02: The received CAN signal 0x47A CSA_1_ HiBeamSwtCmd is changed from 0x00 OFF to 0x2: flash with CAN.

(5) Type configuration of light switch is 0x00: Automatic light switch is valid with hard wire.

(6) Type configuration of light switch is 0x01: Automatic light mode is AUTO with LIN.

■ **Output OFF**

(1) Output is turned off.

(2) BDM sends CAN network signal 0x391/0x392 HighbeamSts=0, 0x391 HMASW=0.

High beam light 2

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Configuration of light switch is 0x00: Master light SW mode is AUTO with hard wire.

(3) Configuration of light switch is 0x00: Master light SW mode is AUTO with hard wire.

(4) Low beam light output is valid.

(5) Not turning on signal 0x307 from IHC is received by BDM.

(6) Type configuration word of wiper switch is 0x00: High beam light switch is changed from invalid to valid with hard wire.

(7) Type configuration word of wiper switch is 0x02: CAN signal 0x47A is received with CAN. CSA_1_ HiBeamSwtCmd is changed from 0x00 OFF to 0x1:high beam.

(8) Remote state flag bit is 0

■ **OFF condition**

(1) BDM receives FCM signal 0x307 HMA_HighbeamReq=0.

(2) Power supply mode is switched from ON to ACC or OFF.

(3) Low beam light output is invalid.

(4) Configuration of light switch is 0x00: Automatic light switch is invalid with hard wire.

(5) Configuration of light switch is 0x01: Automatic light mode is not AUTO with LIN.

■ **Note:**

When performing this function, high beam light switch is changed to valid again, or passing light switch is changed to valid, enter “High beam light 3, high beam light ON forcibly” below.

High beam light 3, high beam light ON forcibly

■ **Perform output**

(1) Trigger condition a or c is met, high beam light comes on (high beam light function), and HMA function exits temporarily.

(2) Trigger condition b or d is met, high beam light comes on (passing light function), and HMA function exits temporarily.

■ **OFF condition**

(1) Power supply mode is switched from ON to OFF or ACC.

(2) Low beam light output is invalid.

Passing light

■ **Enabling condition**

(1) Power supply mode is ON.

(2) High beam light output is invalid.

(3) Remote state flag bit is 0.

■ **Perform output**

(1) High beam light comes on.

(2) BDM sends network signal HighBeamSts=1.

■ **OFF condition**

(1) Power supply mode is switched from ON to ACC or OFF.

(2) Type configuration word of wiper switch is 0x00: Passing light switch is changed to invalid with hard wire.

(3) Type configuration word of wiper switch is 0x02: The received CAN signal 0x47A CSA_1_ HiBeamSwtCmd is not 0x2: flash with CAN.

■ **Output OFF**

(1) High beam light goes off.

(2) BDM sends network signal HighBeamSts=0.

■ **Note:**

(1) BDM sends passing light switch state signal in real time, passing light switch is changed to valid, BDM sends 0x391 FlashSW=1, and sends 0x391 FlashSW=0 after switch is reset.

(2) When passing light switch is valid, power supply mode is Crank, and high beam light output is stopped temporarily. However, CAN signal 0x391/0x392 HighBeamSts=1 is still sent normally, and output restores after Crank.

High beam light ON with AVP parking

■ **Enabling condition**

(1) Power supply mode is ON.

(2) High beam light output is invalid.

■ **Perform output**

(1) Perform output.

(2) BDM sends network signal.

■ **OFF condition**

(1) Power supply mode is switched from ON to ACC or OFF.

(2) Combination light switch assembly is OFF, or high beam light and passing light switches are valid.

(3) Combination light switch assembly is OFF, or CAN signal is received.

■ **Output OFF**

(1) High beam light goes off.

(2) BDM sends network signal.

Note: The locally triggered high beam light function has higher priority than the AVP parking triggered high beam light function. That is, the AVP parking triggered high beam light function must operate when the local combination switch, high beam light and passing light switches are invalid. When the AVP parking triggered high beam light function is valid, the local light combination switch is valid, or high beam light and passing light are valid, and the output is performed according to the local function.

■ **Type configuration word of high/low beam light**

(1) With high beam light output, determine if the low beam light needs to come on synchronously according to type configuration word of high/low beam light.

(2) Type configuration word of high/low beam light: When high beam light is separated from low beam light, high beam light comes on.

(3) Type configuration of high/low beam light.

Automatic light mode

■ **Light judgment of AUTO by default with power on**

DM needs to achieve the switch of automatic light mode AUTO and OFF, low beam light switch and position light switch according to network signal; BDM is AUTO by default with power on.

■ **Enabling condition**

(1) Automatic light mode is not AUTO.

■ **Execution action**

(1) Automatic light mode is switched to AUTO.

(2) Send network signal.

■ **Enabling condition**

Automatic light mode is AUTO

■ **Perform output**

(1) Automatic light mode is switched to a mode other than AUTO.

(2) Send network signal.

Automatic light

■ **Enabling condition**

(1) Configuration words come on automatically.

(2) Power supply mode is ON or CRANK.

(3) Configuration of light switch: Automatic light switch is valid with hard wire.

(4) Configuration of light switch: BDM determines that light switch is AUTO.

(5) When automatic wiper configuration word is valid, LIN signal from light sensor is received, that is, light sensor signal is valid; Or when configuration word is invalid, hard wire signal from light sensor is received.

(6) Remote state flag bit is 0.

■ **Perform output**

(1) Low beam light comes on.

(2) Position light comes on.

(3) When automatic light switch is valid, it is only related to switch position or automatic light mode.

(4) When automatic light valid mode is AUTO, it is only related to switch position or automatic light mode.

OFF condition

■ **Position light OFF condition**

(1) Power supply mode is OFF or ACC.

(2) Power supply mode is ON, and after automatic light switch is invalid for 2 s with hard wire.

(3) Power supply mode is ON, and after automatic light mode is switched to a mode other than AUTO for 2 s.

(4) Power supply mode is ON, and when automatic wiper configuration word is invalid, light sensor hard wire is invalid, or when automatic wiper configuration word is valid.

■ **Low beam light OFF condition**

(1) Power supply mode is OFF or ACC.

(2) Power supply mode is ON, and automatic light switch is invalid.

(3) Power supply mode is ON, and automatic light mode is switched to a mode other than AUTO.

(4) Power supply mode is ON, and when automatic wiper configuration word is invalid, light sensor hard wire is invalid, or when automatic wiper configuration word is valid.

Output OFF

■ **Position light output is turned off**

(1) Position light goes off.

(2) Send network signal.

(3) When automatic light switch is invalid, it is only related to switch position.

■ **Low beam light output is turned off**

(1) Low beam light goes off.

(2) Send network signal.

(3) When automatic light switch is invalid, it is only related to switch position.

(4) When automatic light switch is invalid, it is only related to switch position or automatic headlight AUTO.

■ **Note**

When LIN signal or light sensor hard wire input is valid, when LIN signal or light sensor hard wire input is invalid, or when light sensor is lost or faulty, the signal remains in the previous state.

■ **Signal remains in the previous state**

When BDM detects that RLS communication lost and RLS fault, the signal remains in the previous state.

Front fog light

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Position light output is valid.

(3) Configuration word of front fog light is 1.

■ **OFF condition**

(1) When trigger condition a is met, front fog light switch is invalid.

(2) When trigger condition b is met, LIN signal is received.

(3) Power supply mode is OFF or ACC.

(4) Position light output is invalid.

(5)

■ **Output OFF**

(1) Front fog light goes off.

Rear Fog Light

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Position light output is valid.

(3) Front fog light output or low beam light output is valid.

Daytime running light

(1) Position light output, high beam light output, front fog light output and low beam light output are invalid.

(2) Power supply mode is ON.

■ **OFF condition**

(1) Position light output, high beam light output, front fog light output or low beam light output is valid.

(2) Power supply mode is ACC or OFF.

■ **Output OFF**

Daytime running light goes offNote:

(1) When daytime running light comes on, passing light switch is changed to valid, and daytime running light still keeps output.

(2) Daytime running light has two types of operating mode, which is achieved by software configuration word.

(3) Distance configuration word of daytime running light and turn signal light: In close range mode, that is, the distance between front turn signal light and daytime running light is not more than 40 mm, the daytime running light is activated.

Left turn signal light is activated, without left daytime running light output and with right daytime running light output.

Right turn signal light is activated, without right daytime running light output and with left daytime running light output.

When hazard warning light, collision, emergency braking function are valid, and other left and right turn signal light output is valid, the daytime running light output is invalid.

1.3 Decoration Light Function

■ **Enabling condition**

(1) Position light output, high beam light output, front fog light output and low beam light output are invalid.

(2) Power supply mode is ON.

■ **Perform output**

Decoration lights (on both left and right sides) come on.

■ **OFF condition**

(1) Position light output, high beam light output, front fog light output, low beam light output, left/right turn signal light output or emergency flasher output is valid.

(2) Power supply mode is OFF or ACC.

■ **Output OFF**

Decoration lights (on both left and right sides) go off.

1.4 Emergency Stop Light

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Vehicle speed is higher than 50 km/h.

■ **OFF condition**

(1) Power supply mode is OFF.

(2) Network signal is received.

■ **Output OFF**

(1) Left and right turn signal lights go off.

(2) Hazard warning indicator goes off.

1.5 BDM Detects Emergency Braking Signal

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Vehicle speed is higher than 50 km/h before deceleration.

(3) Vehicle acceleration is lower than -6 m/s².

■ **OFF condition**

(1) Vehicle acceleration is higher than -2.5 m/s².

(2) Power supply mode is OFF.

(3) Hazard warning light switch is changed from invalid to valid.

1.6 Brake Light

■ **Enabling condition**

(1) Brake light switch is valid.

■ **Perform output**

(1) Brake lights (on both left and right sides) come on.

(2) High mounted stop light comes on.

■ **OFF condition**

(1) Brake light switch is invalid.

■ **Output OFF**

(1) Brake light goes off.

(2) High mounted stop light goes off.

(3) Send network signal.

■ **LIMPHOME**

Limphome function is required for brake light. When MCU is reset, it is required to turn on brake light with brake light hard wire.

1.7 Back-up Light

■ **Enabling condition**

Power supply mode is ON.

■ **Perform output**

(1) Back-up light comes on.

■ **OFF condition**

Power supply mode is ACC or OFF.

1.8 Auxiliary Lighting

■ **Enabling condition**

(1) Power supply mode is ON.

(2) Low beam light output is valid.

(3) Vehicle speed < 40 km/h.

■ **OFF condition**

(1) Power supply mode is ACC or OFF.

(2) Low beam light output is invalid.

(3) Vehicle speed ⩾ 40 km/h

■ **Output OFF**

Turn off the front fog lights or corner lights on the corresponding side.

1.9 Rear View Mirror Foot Light

■ Enabling condition

Power supply mode is OFF or ACC.

■ Trigger condition

Fortifying deactivation prompt is triggered.

■ Fortifying deactivation prompt is triggered

Foot light comes on for 15 s.

■ OFF condition

(1) 15 s ON timer ends.

(2) Power supply mode is switched to ON.

Note: If fortifying deactivation prompt is triggered again during 15 s timing, 15 s timer is reset.

■ Output OFF

Foot light goes offWhen foot light comes on, BDM enters foot light logic controlled by door status signal if any door is opened.

1.10 Foot Light Controlled by Door Status Signal

■ Enabling condition

(1) Power supply mode is OFF, ACC or ON.

(2) Any of four doors is open.

■ Perform output

Foot light comes on for 3 min.

■ OFF condition

(1) 3 min ON timer ends.

(2) Power supply mode is ON, and four doors are closed.

(3) Power supply mode is OFF or ACC, and four doors are closed.

■ Output OFF

(1) When OFF condition a or b is met, foot light goes off immediately.

(2) When OFF condition c is met, BDM controls foot light to turn on for 8 s, and then go off.

Note:

(1) When foot light comes on, BDM enters foot light logic controlled by remote control signal after fortifying deactivation prompt is triggered by BDM.

(2) When fortifying fails, foot light continues to come on according to previous logic.

(3) Foot light will not illuminate if back door is opened.

(4) When the first door is opened, foot light comes on for 3 min, and then if you open other doors, foot light will be re-timed and go off after coming on for 3 min.

■ Sound and light alert

The priority of sound and light alert is defined according to the following principle: anti-theft alarm alert > remote window UP not closed alarm > other alerts. The priority of sound and light alert of the same level is judged according to the way that the post-trigger interrupts the pre-trigger.

1.11 Courtesy Light Function

■ Enabling condition

Courtesy light ON command is received.

■ Perform output

BDM performs courtesy light function, that is, turn on rear view mirror foot light, position light and license plate light for 25 s, and PWM duty cycle 50% is sent synchronously by position light enable signal.

■ OFF condition

(1) Courtesy light OFF command is received.

(2) Perform courtesy light function.

(3) Remote unlock signal, remote control unlock signal or PE unlock command is received.

(4) Remote lock signal, exit lock command, remote control lock signal or PE lock command is received.

(5) Power supply mode is ACC or ON in non-remote start condition.

(6) Any of four doors, engine hood or luggage compartment door is opened.

■ **Output OFF**

BDM turns off courtesy light function, that is, turn off rear view mirror foot light, position light and license plate light

■ **Note:**

During courtesy light ON period, if all the following conditions are met, low beam light comes on:

(1) When configuration word of automatic wiper is valid or invalid, light sensor hard wire signal is received. Note: After courtesy light ON request is received, light sensor signal is detected after 1 s delay.

(2) If unlock command when approaching is received during courtesy light ON period, BDM continues to turn on courtesy light. During this ON period, if LMC function activation condition is met, BDM ignores LMC and continues to turn on courtesy light, until courtesy light OFF condition is met, and BDM turns off courtesy light.

(3) During courtesy light ON period, if fortifying deactivation prompt trigger condition is met, the turn signal light will flash twice with frequency of 500 ms ON, 500 ms OFF. Turn signal light flow effect enabling output PWM duty cycle is D while turn signal light outputs.

(4) If courtesy light OFF condition is met during courtesy light ON period, BDM turns off courtesy light; If LMC activation condition is met, perform LMC function.

(5) If fortifying prompt trigger condition is met during courtesy light ON period, the turn signal light flashes once and comes on for 500 ms.

(6) If fortifying fails, enter fortifying failure mode, turn signal light flashes twice. Flashing time is 500 ms, interval time is 1.5 s.

1.12 Turn Signal Light Prompt When Approaching Back Door to Unlock

■ **Trigger condition**

Turn signal light prompt request when approaching back door to unlock is received.

■ **OFF condition**

Turn signal light prompt when approaching back door to unlock is set to 0.

■ **Note:**

(1) In the condition that hazard warning light or turn signal light is activated, BCM ignores this request and keeps operating condition of hazard warning light or turn signal light.

(2) During corresponding turn signal light prompt when approaching back door to unlock, if there are other valid inputs (such as turn signal light activation, hazard warning light activation or PLG turn signal light request activation), BCM controls turn signal light to turn on according to corresponding requirements; If the above function is deactivated, BCM controls turn signal light to turn off (that is, it is not restored after turn signal light prompt when approaching back door to unlock is interrupted by other turn signal light function requirements).

1.13 Remote Car Location Prompt

■ **Enabling condition**

Vehicle is in fortifying status.

■ **Trigger condition**

Remote control key car location signal is received.

■ **Perform output**

(1) Horn sounds 6 times.

(2) Turn signal light flashes 10 times. Turn signal light flow effect enabling output PWM duty cycle is D while turn signal light outputs.

1.14 TBOX Car Location Prompt

■ **Enabling condition**

(1) Power supply mode is OFF or ACC, or remote mode flag bit is valid

■ **Trigger condition**

Valid remote car location request is received.

■ **Perform output**

Note: It does not respond to new remote car location request within 1 s after remote car location request is valid. If new remote car location request is received within 3 s after remote car location request is valid for 1 s, perform the operation of horn sounding 3 times and turn signal light flashing 3 times again after the previous operation of horn sounding 3 times and turn signal light flashing 3 times is performed. That is, horn sounds 6 times, turn signal light flashes 6 times. Low beam light 15 s is re-timed at the same time. If new remote car location request is received after remote car location request is valid for 3 s, perform output again, and low beam light 15 s is re-timed.

■ **OFF condition**

(1) Remote control unlock/lock, PE unlock/lock, unlock when approaching, exit lock, remote unlock/lock, remote control back door unlock, PE back door unlock, back door unlock when approaching, or TBOX back door unlock is triggered.

(2) Power supply mode is switched to ON and remote state flag bit is valid.

(3) Car location cycle ends.

■ **Output OFF**

Exit remote car location, and turn signal light, horn, low beam light perform corresponding actions according to the newly triggered request in OFF condition.

1.15 Remote Window UP Not Closed Alarm

■ **Enabling condition**

Vehicle is in fortifying status after fortifying is successful.

■ **Trigger condition**

BDM receives window not closed alarm request from jam protection module.

1.16 Fortifying Prompt

■ **Trigger condition**

Fortifying prompt is triggered, corresponding fortifying prompt flag bit output by VSS module is received.

1.17 Fortifying Deactivation Prompt

■ **Trigger condition**

Fortifying deactivation prompt is triggered, corresponding fortifying deactivation prompt flag bit output by VSS module is received.

1.18 Anti-theft Alarm Alert

■ **Trigger condition**

Anti-theft alarm alert is triggered, corresponding anti-theft alarm alert flag bit output by VSS module is received.

■ **Perform output**

(1) One alarm cycle is 28 s. During one alarm cycle, the buzzer continuously outputs for 28 s, as for high and low pitched horn, the horn sounds intermittently for 28 s (28 times) in the way of 500 ms output and 500 ms stop, the turn signal lights on both sides output for 28 s (35 times) in the way of 400 ms ON and 400 ms OFF, and turn signal light flow effect enabling output is 100% while turn signal light outputs.

(2) The maximum output of the alarm caused by the secondary trigger condition is 1 alarm cycle. If alarm source is released (power supply mode OFF, four doors, engine hood or luggage compartment door closed), stop alarm after this alarm cycle ends, and anti-theft condition is changed to: If alarm source is still not released after one alarm cycle ends, keep alarm condition and stop alarm alert.

(3) Other new alarm trigger sources are not affected during one alarm cycle. If another alarm source is triggered after alarm source is released and this alarm cycle ends, the new one alarm cycle is triggered again.

(4) Up to 5 alarm cycles are triggered every time when entering alarm condition. If alarm source still exists after 5 alarm cycles end, alarm alert is not triggered again, but current alarm condition remains (including network signal).

1.19 Separate Back Door Fortifying Deactivation Prompt

■ **Trigger condition**

Separate back door fortifying deactivation prompt is triggered.

1.20 Back Door Unlock Prompt

Normal back door

■ Trigger condition

Back door unlock output is triggered.

■ Perform output

BDM controls turn signal light to flash twice with frequency of 300 ms ON - 300 ms OFF.

1.21 Power Back Door

■ Perform output

BDM controls turn signal light to flash twice with frequency of 300 ms ON - 300 ms OFF.

1.22 Horn Output

■ Enabling condition 1

(1) Horn switch is valid.

(2) Any horn output request of prompt type is valid.

(3) When parking state flag bit is valid.

■ OFF condition

(1) Enabling condition 1 is not met.

(2) When enabling condition b is met, parking state flag bit is invalid.

■ Output OFF

Horn output is invalid.

1.23 Horn Alarm Function

■ Perform output

One alarm cycle is 0.9 s. During one alarm cycle, the horn sounds intermittently for 900 ms (3 times) in the way of 10 ms output and 290 ms stop.Note:

(1) Only one alarm cycle is performed for one valid trigger alarm.

(2) When trigger condition is met during alarm cycle, stop current alarm cycle and restart the new alarm cycle.

■ Output OFF

Stop horn output immediately.

1.24 Interior Lighting

■ Power save function

The power save function is a time management function that keeps the interior light power supply active after the interior light is activated.

Condition 1: Power supply mode is not OFF

■ Enabling condition

(1) Power supply mode is not OFF.

(2) Power supply mode is OFF, any of four doors and back door is opened.

(3) Power supply mode is OFF, and RKE unlock command, PE unlock command, mechanical key unlock command, TBOX unlock command or PEPS unlock command when approaching is received.

(4) Power supply mode is OFF, and anti-theft state enters from fortifying deactivation, pre-fortifying or fortifying state to fortifying state.

(5) Power supply mode is OFF, and courtesy light ON request when approaching triggered by PEPS is received.

(6) Power supply mode is OFF, and exit lock request triggered by PEPS is received.

■ Perform output

Note: If a new trigger condition is valid during the timing period, the timing will be re-timed, e.g., if you enter fortification during the 15 min timing period, the timing will be re-timed according to 3 min.

■ OFF condition

Timer ends.

■ **Output OFF**

Power save output is OFF.
Interior dome light control
Controlled by power supply mode

■ **Enabling condition**

Power supply mode is switched from ON or ACC to OFF.

■ **OFF condition**

(1) 3 min ON timer ends.

(2) Power supply mode is switched to ON within 3 minutes.

■ **Output OFF**

BDM will linearly turn off the interior dome light with a 1% reduction every 30 ms (100%-0 change within 3 s).
Note: Interior light management is not affected when power supply mode is switched to ACC within or after 3 minutes (± 10%).
Controlled by opening door

■ **Enabling condition**

Power supply mode is ON, ACC or OFF.

■ **Trigger condition**

Any of four doors is opened.

■ **Perform output**

BDM will linearly turn on the interior dome light with a 1% increase every 30 ms (0-100% change within 3 s), and interior dome light output is activated for 3 minutes.

■ **OFF condition**

3 min timer endsWhen four doors are closed within 3 minutes.

■ **Output OFF**

1.25 Unlock Control Lighting

■ **Enabling condition**

Power supply mode is OFF or ACC.

■ **Trigger condition**

RKE unlock command, PE unlock command, mechanical key unlock command, TBOX unlock command or PEPS unlock command when approaching is received.

■ **Perform output**

BDM will linearly turn on the interior dome light with a 1% increase every 30 ms (0-100% change within 3 s), and interior dome light output is activated for 15 s.

■ **OFF condition**

(1) 15 s ON timer ends.

(2) RKE lock command, PE lock command, mechanical key lock command, TBOX lock command or PEPS exit lock command is received within 15 s.

■ **Controlled by collision**

(1) a. Power supply mode is ON.

(2) b. Trigger collision is detected (For detailed collision collecting strategy, refer to “Collision Signal Collecting” in ANC function specification).

■ **Perform output**

(1) BDM turns on interior dome light immediately for 30 min.

■ **OFF condition**

(1) Power supply mode is ON, and interior light 30 min ON timer ends.

(2) Power supply mode is switched to OFF within 30 min.

■ **OFF condition**

(1) Power supply mode is ON, and interior light 30 min ON timer ends.

(2) Power supply mode is switched to OFF within 30 min.

■ **Output OFF**

BDM will linearly turn off the interior dome light with a 1% reduction every 30 ms (100%-0 change within 3 s). Note: The door status does not affect this functionNote: If there is no priority requirement, interior dome light comes on when any ON condition is met, and goes off when any OFF condition is met.

■ **Luggage compartment light control**

Power supply mode is not considered for this function.

■ **Perform output**

Luggage compartment light comes on for 15 minutes.

■ **OFF condition**

(1) 15 min ON timer ends.

(2) Back door is closed.

■ **Output OFF**

Luggage compartment light goes off.

■ **Doorsill light control**

■ **Enabling condition**

Any of four doors is opened.

■ **Perform output**

Corresponding side doorsill light comes on for 3 minutes.

■ **OFF condition**

(1) 3 min timer ends.

(2) The side door corresponding to doorsill light is closed.

■ **Output OFF**

Corresponding side doorsill light goes off.When any other door is opened during 3 min timing, 3 min re-timing is performed.

Backlight adjustment output

■ **Enabling condition**

Position light output is valid.

■ **OFF condition**

Position adjustment output is invalid.

■ **Output OFF**

Backlight adjustment output is turned offNote: When the backlight adjustment output percentage changes, including backlight ON and OFF, the backlight percentage output needs to change linearly, and the change rate is 1% every 30 ms, which is the same as the fade in and fade out speed of interior dome light.

Ambient light

■ **Function description**

After the ambient light function is turned on, the vehicle position light comes on, or when the door is opened, the ambient light arranged in the interior of the vehicle comes on to highlight the interior environment. Users can also set the color and brightness of the ambient light according to their needs.Distinguished by the type of ambient light, when type configuration of ambient light is 0x00: Use the old ambient light without smart ambient light.

Position light ON/ambient light OFF

■ **Enabling condition**

(1) Ambient light enable in DVD settings is valid.

(2) Position light output is valid.

■ **OFF condition**

(1) Ambient light enable in DVD settings is invalid.

(2) Position light output is invalid.

Door control ON/ambient light OFF

■ **Enabling condition**

(1) Position light output is invalid.

(2) Vehicle is in fortifying deactivation mode.

(3) Any of four doors is opened.

(4) Ambient light enable in DVD settings is valid.

Related driving mode OFF

■ Enabling condition

Ambient light related driving mode in DVD settings is turned off.

Related driving mode ON

■ Enabling condition

Ambient light related driving mode in DVD settings is turned on.Note: In the same ignition cycle, if the "related driving mode" is turned off again, the color of ambient light is the color memorized by BDM before the "related driving mode" is turned on. When the vehicle is power off, the battery is disconnected and powered on again, the "related driving mode" is OFF by default.

■ Ambient light brightness and related musical rhythm mode

When the musical rhythm mode is turned off, the ambient light brightness is adjusted according to the brightness set by DVD. When the musical rhythm mode is turned on, the ambient light color and brightness are output according to the IHU music signal.

Musical rhythm mode OFF

■ Enabling condition

Ambient light musical rhythm mode in DVD settings is turned off.

Musical rhythm mode ON

■ Enabling condition

Ambient light musical rhythm mode in DVD settings is turned on.

■ Perform output

Note: In the same ignition cycle, after the “musical rhythm” is turned on, if the "musical rhythm" is turned off again, the brightness of ambient light is the brightness memorized by BDM before the "musical rhythm" is turned on.

Ambient light signal transmitting function

Dynamic ambient function when energized and ignited

■ Enabling condition

(1) Power supply mode is OFF.

(2) Fortifying stall function is not activated.

■ Trigger condition

Power supply mode is switched from OFF to non-OFF.

Welcome function when opening door

■ Enabling condition

(1) Power supply mode is OFF.

(2) Fortifying stall function is not activated.

(3) Dynamic ambient function when energized and ignited is not activated.

■ Trigger condition

(1) Any door change of four doors from close to open is detected.

Fortifying stall function

■ Enabling condition

Power supply mode is OFF.

■ Trigger condition

Anti-theft state change from non-fortifying state to fortifying state is detected.

2 Diagnosis & Testing

2.1 Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Low beam light does not come on (one side)	Fuse

Symptom	Suspected Area
	Headlight bulb
	Wire harness or connector
Low beam light does not come on (both sides)	Fuse
	Headlight bulb
	Combination light switch assembly
	Low beam relay
	Wire harness or connector
	Domain controller (BDM)
High beam light does not come on (one side)	Fuse
	Headlight bulb
	Wire harness or connector
High beam light does not come on (both sides)	Fuse
	Headlight bulb
	Combination light switch assembly
	High beam relay
	Wire harness and connector
	Domain controller (BDM)
Position light does not come on (one side)	Position light bulb
	Wire harness or connector
Position lights do not come on (both sides)	Position light bulbs (all)
	Wire harness or connector
	Combination light switch assembly
	Domain controller (BDM)

■ **Daytime Running Light**

Symptom	Suspected Area
Daytime running light does not come on	Daytime running light bulb
	Wire harness or connector
	Domain controller (BDM)

■ **Rear Fog Light**

Symptom	Suspected Area
Rear fog light does not come on	Rear fog light bulb
	Combination light switch
	Wire harness or connector
	Domain controller (BDM)

■ **Turn Signal Light and Hazard Warning Light**

Symptom	Suspected Area
Hazard warning light and turn signal light do not come on	Bulb
	Combination light switch
	Wire harness or connector
	Domain controller (BDM)
	Hazard warning light switch
Hazard warning light does not come on (hazard warning light is normal)	Hazard warning light switch
	Wire harness or connector
	Domain controller (BDM)
Turn signal light does not come on (hazard warning light is normal)	Combination light switch
	Wire harness or connector
	Domain controller (BDM)

■ **License Plate Light**

Symptom	Suspected Area
License plate light does not come on	License plate light bulb
	Combination light switch assembly
	Wire harness or connector
	Body Control Module (BCM)

■ **Luggage Compartment Light**

Symptom	Suspected Area
Luggage compartment light does not come on	Luggage compartment light bulb
	Luggage compartment lock assembly
	Wire harness or connector
	Domain controller (BDM)

■ **Brake Light**

Symptom	Suspected Area
Brake lights do not come on (all)	Fuse
	Brake Light
	Brake light switch
	Wire harness connector
	Domain controller (BDM)
Only one brake light does not come on	Brake light bulb
	Wire harness or connector

■ **Front Dome Light**

Symptom	Suspected Area
Front dome light does not come on	Front dome light bulb
	Wire harness or connector
	Front Dome Light Assembly
	Domain controller (BDM)

■ **Back-up Light**

Symptom	Suspected Area
Back-up lights do not come on (all)	Back-up Light
	Back-up light switch (MT)
	Domain controller (BDM)
	Wire harness or connector
	Gear switch

2.2 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all CD system grounds related to the latest DTCs.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

2.3 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

2.4 Ground Inspection

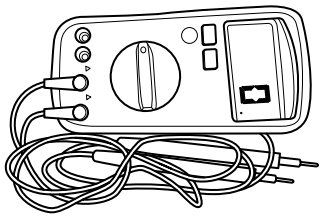
Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

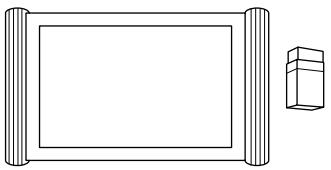
3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

■ Special Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

3.2 Specifications

■ Torque Specifications

Description	Torque (N · m)
Headlight Assembly Fixing Bolt	3.5 ± 0.5
High Mounted Stop Light Fixing Nut	2.5 ± 0.5
Rear Fog Light Fixing Screw	1.5 ± 0.5
Rear Combination Light Movable Part Nut	3.5 ± 0.5
Rear Tail Light Fixed Part Nut	1.5 ± 0.5

3.3 Combination light switch assembly

■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the driver airbag.

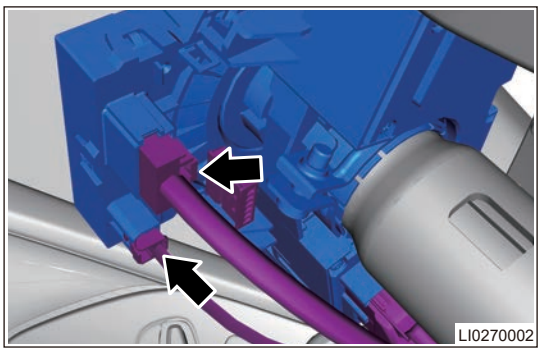
(4) Remove the steering wheel.

(5) Remove the combination switch cover.

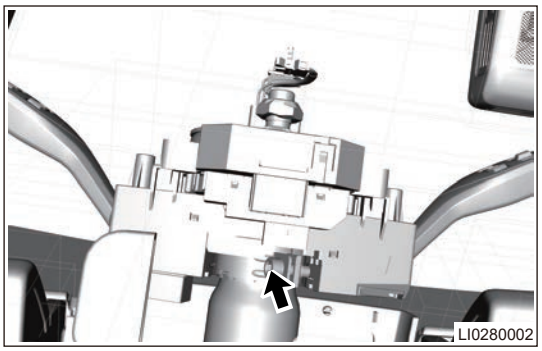
(6) Remove the spiral cable assembly.

(7) Remove the combination switch assembly.

1) Disconnect the combination switch wire harness connector.



2) Loosen the fixing bolt, and remove the combination switch assembly.



■ **Installation**

⚠ Caution

- **Always install spiral cable correctly according to specified operating instructions.**
- **Check that horn operates normally after installation.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**

(1) Set combination switch assembly to installation position.
(2) Tighten fixing bolt to combination switch.
(3) Install the spiral cable assembly.
(4) Install the combination switch cover.
(5) Install the steering wheel.
(6) Install the driver airbag.
(7) Connect the negative battery cable.

3.4 Headlight Assembly

■ **Removal**

Hint:
Use same procedures for right headlight assembly and left headlight assembly. Operation procedures listed below are for left headlight assembly.

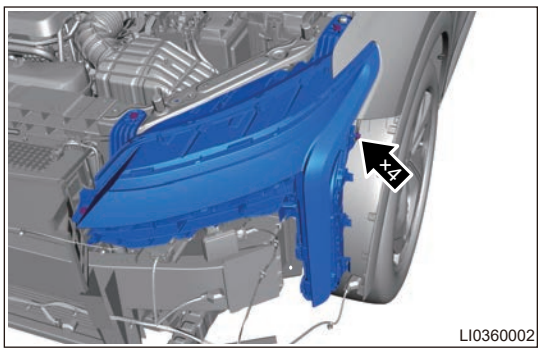
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

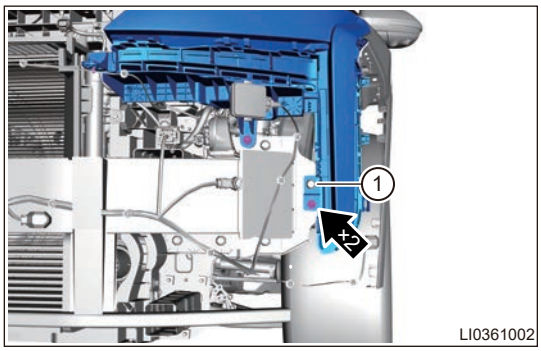
(3) Remove the front bumper assembly.

(4) Remove the headlight assembly.

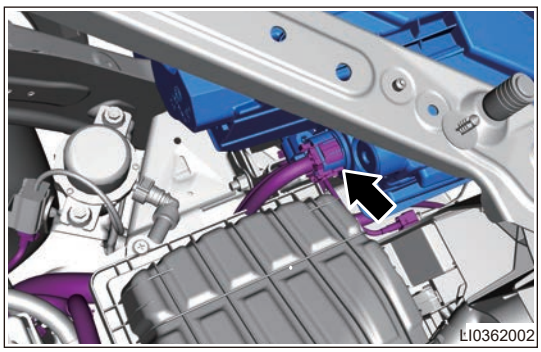
1) Remove 4 fixing bolts (arrow) from upper part of headlight assembly.



2) Remove 2 fixing bolts (arrow) and plastic clip (1) from lower part of headlight assembly.



3) Disconnect wire harness connector (arrow) from headlight assembly and remove headlight assembly.



■ Installation

⚠ Caution

- **When installing headlight assembly, make sure headlight assembly is well fitted with hood, front wing and front bumper. Adjust it as necessary.**

(1) Connect wire harness connector to headlight assembly and set headlight assembly to installation position.

(2) Install 2 fixing bolts and plastic clip to lower part of headlight assembly.
Tightening torque: 3.5 ± 0.5 N · m

(3) Install 4 fixing bolts to upper part of headlight assembly.
Tightening torque: 3.5 ± 0.5 N · m

(4) Install the front bumper assembly.

(5) Connect the negative battery cable.

3.5 Front Signal Light Assembly

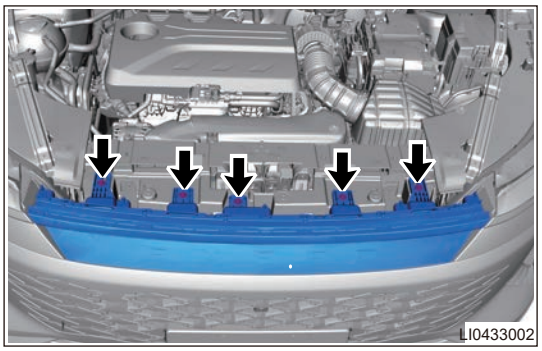
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

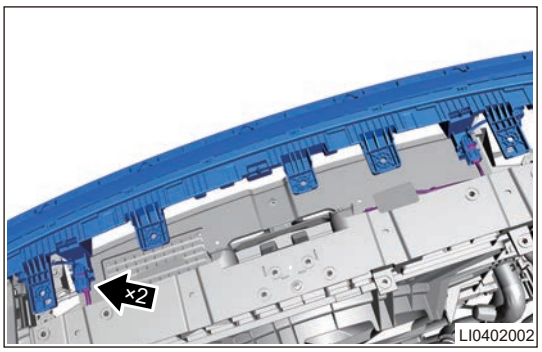
(2) Disconnect the negative battery cable.

(3) Remove the front signal light.

1) Remove 5 fixing bolts (arrow) from upper part of front signal light.



2) Remove connectors (arrow) on both sides at rear part of light, install the light along Z direction to remove front bumper bracket, and remove front signal light assembly.



■ Installation

(1) Connect connectors on both sides to rear part of light, and set front signal light assembly to installation position.

(2) Install 5 fixing bolts to upper part of front signal light.

Tightening torque: 3.5 ± 0.5 N · m

(3) Connect the negative battery cable.

3.6 Rear Combination Light (Fixed) Assembly

Hint:

- Use same procedures for rear left combination light (fixed) assembly and rear left combination light assembly (fixed part).
- Procedures listed below are for rear left combination light (fixed) assembly.

■ Removal

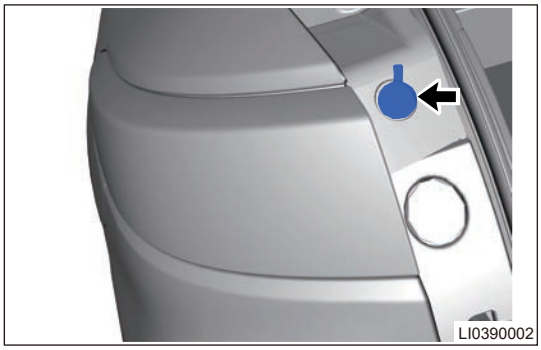
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

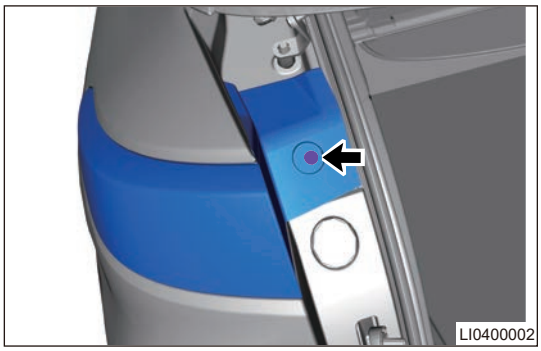
(3) Remove the rear wheel house trim panel.

(4) Remove the rear left combination light (fixed) assembly.

1) Using a screwdriver wrapped with protective tape, pry off rear left combination light plugs (arrow).



2) Remove 1 fixing screw (arrow) from rear left combination light (fixed) assembly, and disconnect rear left combination light connector.



3) Remove the rear left combination light (fixed) assembly.

■ Installation

⚠ Caution

- **When installing rear left combination light (fixed) assembly, make sure rear fog light assembly is well fitted with luggage compartment and rear bumper. Adjust it as necessary.**

(1) Set rear left combination light (fixed) assembly to installation position.

(2) Install 1 fixing screw to rear left combination light (fixed) assembly.

Tightening torque: 3.5 ± 0.5 N · m

(3) Connect the rear left combination light (fixed) assembly wire harness connector.

(4) Install the rear left combination light block cover.

(5) Install the rear wheel house trim panel.

(6) Install the negative battery cable.

3.7 Back Door Combination Light

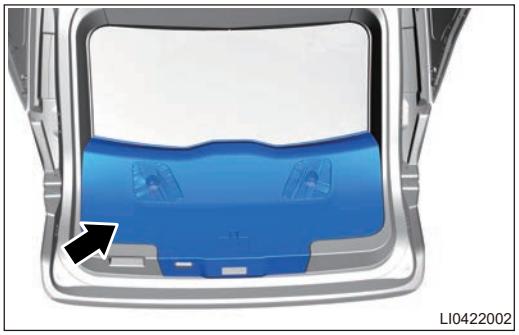
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

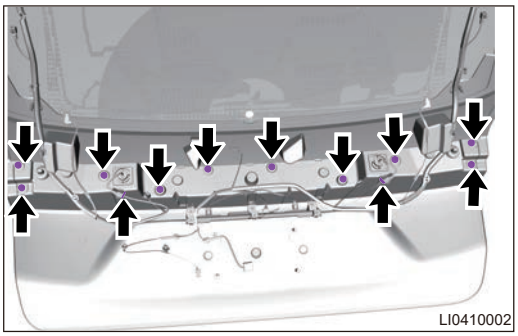
(2) Disconnect the negative battery cable.

(3) Remove the back door combination light.

1) Open back door, and remove back door inner protector as a unit.



2) Remove 10 fixing nuts from combination light mounting plate, and remove wire harness connector.
3) Remove the combination light from outside of vehicle, and removal is completed.



■ Installation

⚠ Caution

- **When installing back door combination light, make sure back door combination light is well fitted with luggage compartment and rear bumper. Adjust it as necessary.**

(1) Set back door combination light to installation position.
(2) Install 10 fixing nuts to combination light.
Tightening torque: 3.5 ± 0.5 N · m
(3) Connect the combination light assembly wire harness connector.
(4) Install the back door inner protector.
(5) Connect the negative battery cable.

3.8 Rear Left Fog Light Assembly

■ Removal

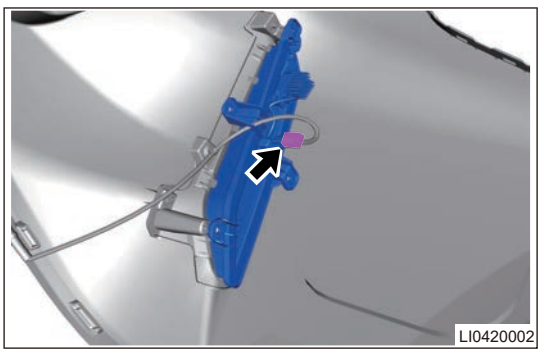
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

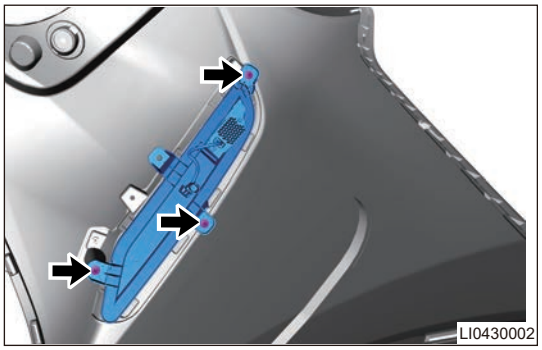
(3) Remove the rear bumper assembly.

(4) Remove the rear left fog light assembly.

1) Remove the wire harness end connector (arrow).



2) Then remove 3 fixing screws (arrow) from rear left fog light assembly.



3) Finally remove rear left fog light assembly from rear part of rear bumper, and removal is completed.

■ **Installation**

⚠ **Caution**
• **Use same procedures for rear right fog light assembly and rear left fog light assembly.** • **When installing rear left fog light assembly, make sure rear fog light assembly is well fitted with luggage compartment and rear bumper. Adjust it as necessary.**

(1) Set rear left fog light assembly to installation position.

(2) Install 3 fixing screw to rear left fog light assembly.

Tightening torque: 1.5 ± 0.5 N · m

(3) Connect the rear left fog light assembly wire harness connector.

(4) Install the rear bumper assembly.

(5) Connect the negative battery cable.

3.9 Front Dome Light Assembly

■ **Removal**

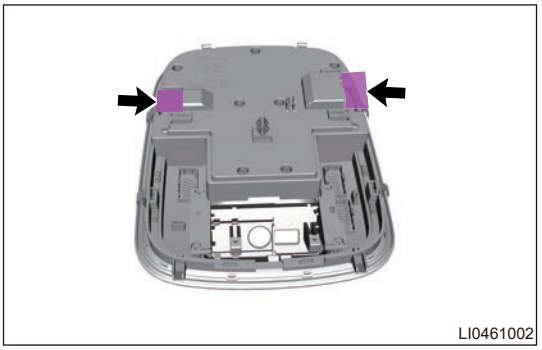
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front dome light assembly.

1) Pull out dome light downwards forcibly from one side (arrow) of rear part of front dome light.

1) Remove the wire harness end connector (female terminal).
2) Remove the dome light from roof.



■ **Installation**

(1) Connect 2 front dome light wire harness connectors.
(2) Set front dome light to installation position.
(3) Connect the negative battery cable.

3.10 Rear Dome Light

■ **Removal**

Hint:

- Use same procedures for rear right dome light and rear left dome light. Procedures listed below are for rear left dome light.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear dome light.

1) Push light towards switch direction with force, remove rear dome light after detaching one side clips.

2) Remove wire harness connector and rear dome light.

■ **Installation**

(1) Connect the rear dome light wire harness connector.
(2) Set rear dome light to installation position.
(3) Connect the negative battery cable.

3.11 Luggage Compartment Light Assembly

■ **Removal**

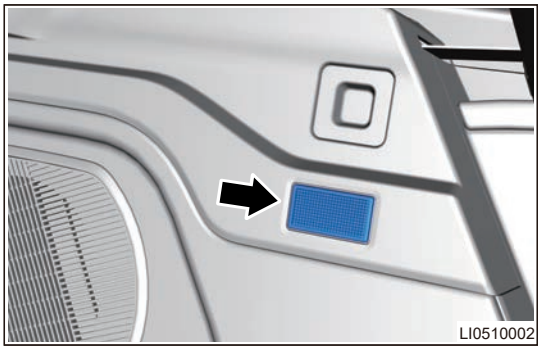
(1) Open the back door.

(2) Turn off all electrical equipment and ENGINE START STOP switch.

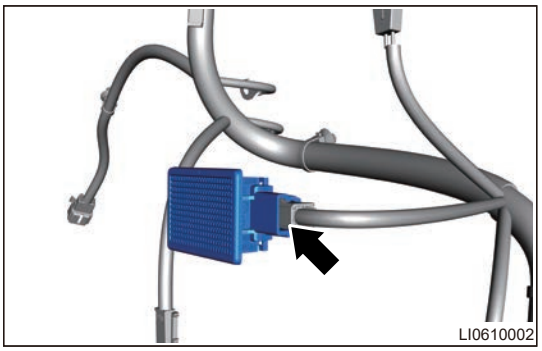
(3) Disconnect the negative battery cable.

(4) Remove the luggage compartment light assembly.

1) Using a slotted screwdriver, push the license plate light in direction of arrow as shown in illustration, and remove the luggage compartment light.



2) Disconnect wire harness connector, and remove luggage compartment light assembly.



■ Installation

(1) Connect the luggage compartment light wire harness connector.

(2) Set luggage compartment light assembly to installation position.

(3) Connect the negative battery cable.

3.12 High Mounted Stop Light Assembly

■ Removal

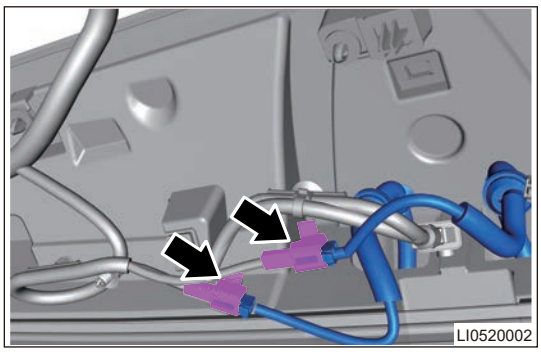
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

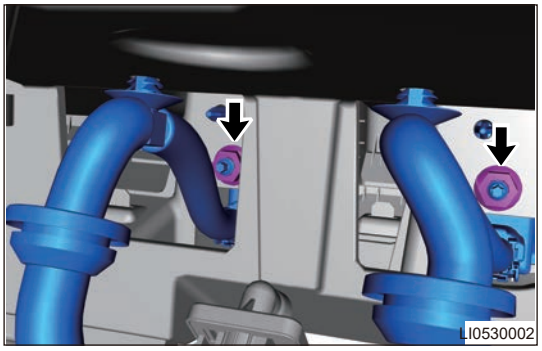
(3) Remove the spoiler assembly.

(4) Remove the high mounted stop light assembly.

1) Remove the wire harness connector, loosen the antenna, so that the wire harness connector can be taken out smoothly.



2) Unscrew 2 fixing nuts.



3) Remove the high mounted stop light assembly.

■ **Installation**

(1) Set high mounted stop light to installation position.

(2) Install 2 fixing nuts to high mounted stop light.

Tightening torque: 3.5 ± 0.5 N · m

(3) Connect the high mounted stop light wire harness connector.

(4) Install the spoiler assembly.

(5) Install the negative battery cable.

3.13 License Plate Light

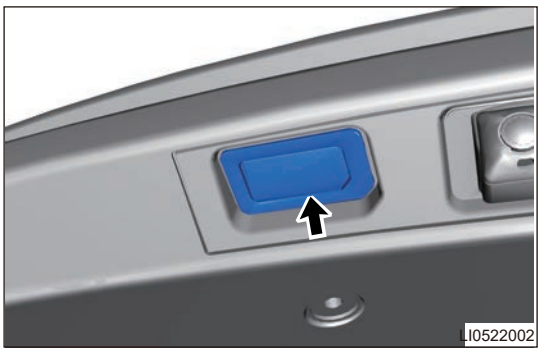
■ **Removal**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

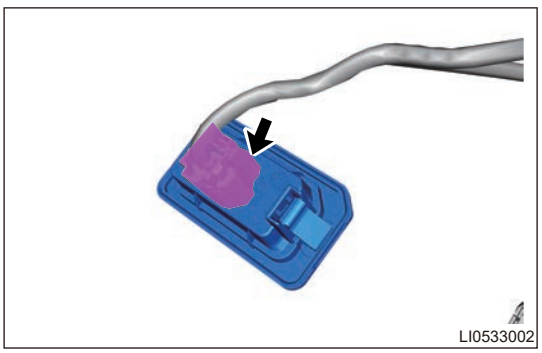
(2) Disconnect the negative battery cable.

(3) Remove the license plate light.

1) Using a slotted screwdriver, pry off license plate light.



2) Disconnect license plate light connector (arrow), and remove license plate light.



■ **Installation**

(1) Connect the license plate light wire harness connector.

(2) Set license plate light to installation position.

(3) Connect the negative battery cable.

10.7 WIPER SYSTEM

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

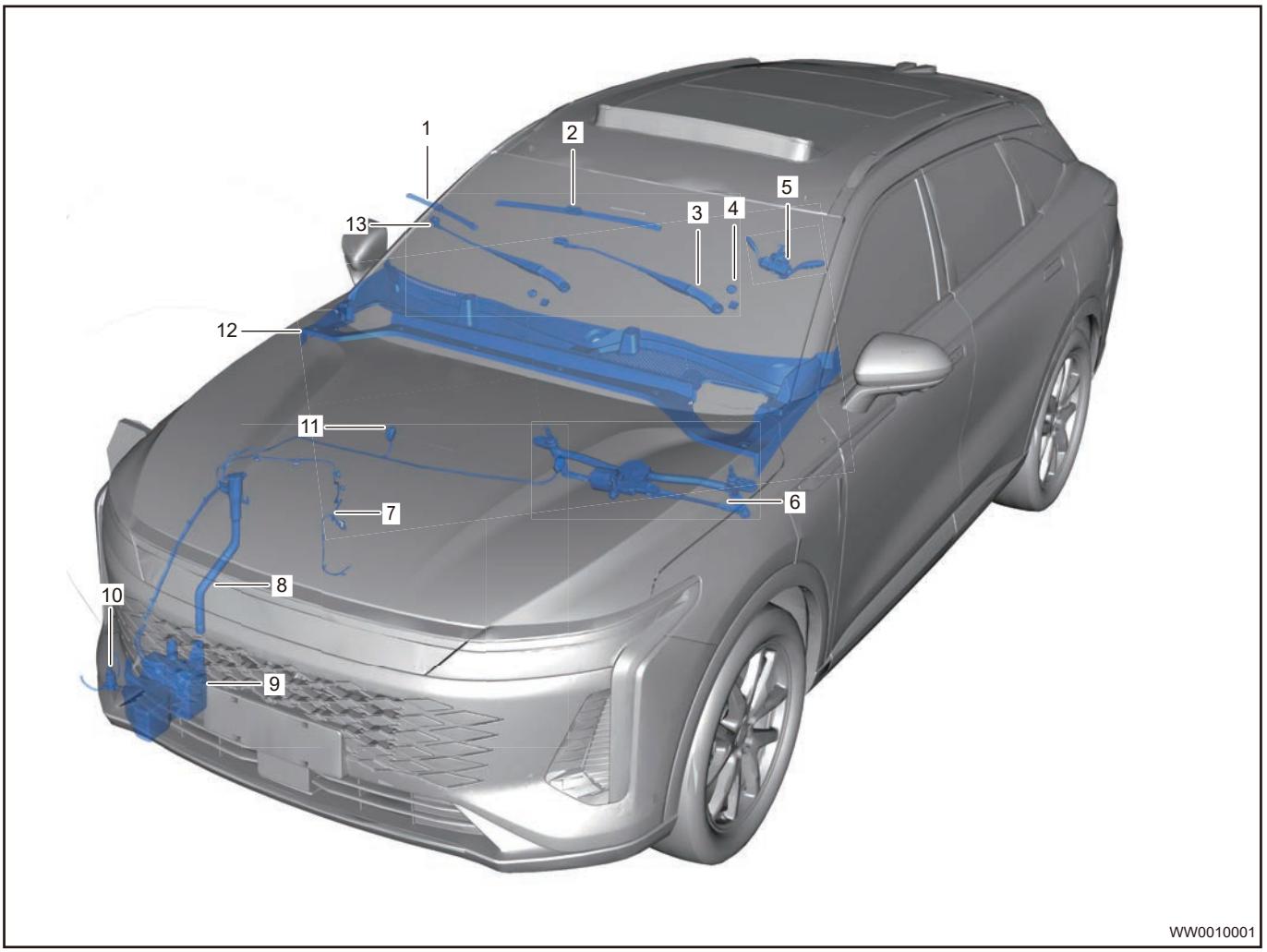
(2) Be sure to wear safety equipment to prevent accidents, when removing.

(3) Operate carefully to avoid damaging front/rear windshield to prevent accidents, when removing.

2 System Overview

2.1 System Components Diagram

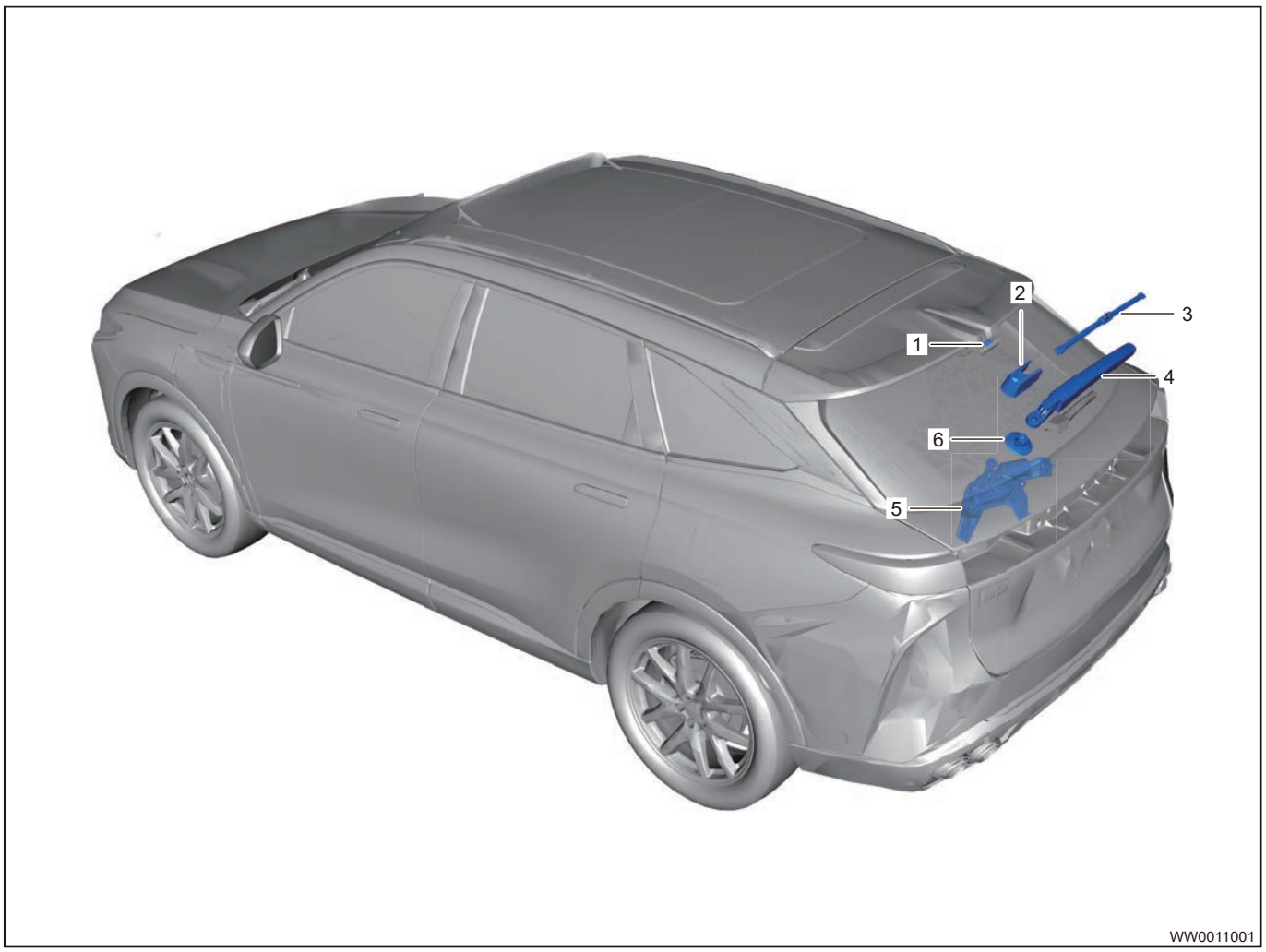
■ **Wiper and Washer**



1	Sub Wiper Blade	8	Guide Pipe Assembly
2	Main Wiper Blade	9	Washer Fluid Reservoir
3	Main Wiper Arm	10	Dual Outlet Washer Motor
4	Trim Cap	11	Front Nozzle

5	Combination Switch Assembly	12	Front Windshield Lower Finish Panel Body
6	Motor and Link Rod Assembly	13	Sub Wiper Arm
7	Washer Line Assembly		

■ **Wiper and Washer**



1	Rear Nozzle	4	Rear Wiper Arm
2	Rear Wiper Trim Cap	5	Rear Wiper Motor Assembly
3	Rear Wiper Blade	6	Rubber Ring

■ **Front Wiper Service Mode**

Turn ENGINE START STOP switch to ON mode, and turn it off. Quickly and briefly press the left button of wiper combination switch, and the wiper will automatically raise to the stop position.

2.2 Function Description

Front wiper / washer system

■ **Overview**

Front wiper / washer system cleans the front windshield when the vehicle needs. In order to avoid frequent relay turning on / off, the minimum output time is 200 ms. When the engine starts, the front wiper / washer function will be disabled. After the engine is started, if the enabled conditions are still met, the front wiper / washer function will continue to be performed.

■ **Front wiper switch detection**

Wiper switches are divided into hard wire switch and CAN network switch according to the light wiper combination switch configuration word.

■ **Front wiper output execution**

Front wiper output is controlled by two external relays which are front wiper low speed output and front wiper high speed output. Front wiper low speed output provides the enable signal to control the wiper operation and stop. Front wiper high speed output provides the speed signal to control the wiper high and low speed operation. The relationship between front wiper output action and port control is as follows:

Front Wiper Output Command	**Port Control**	
	Front Wiper Low Speed Output	**Front Wiper High Speed Output**
Front wiper stops to operate	0	0
Front wiper operates at low speed	1	0
Front wiper operates at high speed	1	1

Front wiper mist / low speed function

■ **Enabled condition**

(1) Power supply mode is ON and not remote.

(2) Front wiper switch status is "front wiper low speed".

■ **Output execution**

(1) Perform front wiper low speed operation.

(2) Network signal is sent.

■ **OFF condition**

(1) Power supply mode is ACC or OFF or remote.

(2) Front wiper switch status is "front wiper OFF".

(3) Front wiper switch status is "front wiper intermittent".

(4) Front wiper switch status is "front wiper high speed".

(5) Power supply mode is START.

Front wiper high speed function

■ **Enabled condition**

(1) Power supply mode is ON and not remote.

(2) Front wiper switch status is "front wiper high speed".

■ **OFF condition**

(1) Power supply mode is ACC or OFF or remote.

(2) Front wiper switch status is "front wiper OFF".

(3) Front wiper switch status is "front wiper intermittent".

(4) Front wiper switch status is "front wiper low speed".

(5) Power supply mode is START.

Front wiper intermittent function

■ **Overview**

Wiper intermittent function refers to the function that the wiper switch stops the fixed interval time during each wiper cycle in the intermittent gear without automatic wiper configuration. During the intermittent stop of wiper, the timing is performed inside BDM, perform the wiper low speed command when the timing conditions are met, and re-time when the wiper returns to the homing position. The timing starts from the end of the previous cycle, the wiper returns to the homing position. At the beginning of the next cycle, the BDM drives the wiper to operate at low speed. The error limit of timing is within 0.2 seconds.

■ **Enabled condition**

(1) Automatic wiper configuration word PrmAutoWiper = 0x0:Not Present.

(2) Power supply mode is ON and not remote.

(3) Front wiper switch status is "front wiper intermittent".

■ **Output execution**

(1) Perform front wiper low speed operation.

(2) After completing the current wiping cycle and returning to the homing position, BDM determines the interval time according to the current interval gear level.

(3) During the timing, if the intermittent adjustment gear level does not change, the interval time does not change.

(4) During the timing, if the intermittent adjustment gear level changes, BDM determines the interval time again according to the current intermittent gear level.

(5) If the updated interval time >= the original interval time, BDM continues to time according to the new interval time.

(6) If the updated interval time < the original interval time, immediately perform the front wiper low speed operation.

(7) Immediately perform front wiper low speed operation when the timing time is up.

Note: When the wiper is in the homing position, the interval time adjustment becomes longer, and interval time is extended; Interval time adjustment becomes shorter, and wipe once immediately. If the wiper is not in the homing position, it remains according to the new interval time after reaching the homing position.

■ **OFF condition**

(1) Power supply mode is ACC or OFF or remote.

(2) Front wiper switch status is "front wiper OFF".

(3) Front wiper switch status is "front wiper low speed".

(4) Front wiper switch status is "front wiper high speed".

(5) Power supply mode is START.

Front wiper automatic function

■ **Overview**

When the it is automatic wiper configuration, and the front wiper switch is in the INT / AUTO gear, the automatic wiper function will be turned on. The model equipped with automatic wiper function connects optical rain sensor to BDM via LIN line. BDM needs to send vehicle state signal required by optical rain sensor to optical rain sensor. Optical rain sensor sends wiper low speed, high speed and stop commands to BDM according to the rain status, and the BDM drives the wiper motor according to these commands.

■ **Enabled condition**

(1) Automatic wiper configuration word

(2) Power supply mode is ON and not remote.

(3) Front wiper switch status is "front wiper intermittent" corresponding to front wiper automatic.

■ **Output execution**

(1) Immediately perform front wiper low speed operation when trigger condition a is valid.

(2) Immediately perform front wiper high speed operation when trigger condition b, c are valid.

■ **OFF condition**

(1) Power supply mode is ACC or OFF.

(2) Front wiper switch status is "front wiper OFF".

(3) Front wiper switch status is "front wiper low speed".

(4) Front wiper switch status is "front wiper high speed".

Front wiper and washer linked function

■ **Enabled condition**

(1) Power supply mode is ON and not remote.

(2) Front washer switch is valid, and timing time T (linked) >= 500 ms.

(3) Front washer output is valid.

(4) Front wiper switch status is "front wiper OFF".

(5) Front wiper switch status is "front wiper intermittent".

(6) Front wiper switch status is "front wiper intermittent".

■ **OFF condition**

(1) The power mode is ON and the washer switch is valid with timing time T < 500 ms, the front washer switch is invalid.

(2) Power supply mode is ACC or OFF or remote.

(3) Front washer output is invalid.

(4) Front wiper switch status is "front wiper low speed" or "front wiper high speed".

(5) Power supply mode is START.

Front wiper homing judgment

■ **Function logic**

(1) The sampling filter of front wiper homing switch is 30 ms, so the time difference between the actual validity of wiper homing switch and the validity of wiper homing switch determined by BDM is 35 ± 5 ms.

(2) When the wiper homing switch is valid and there is currently no request for wiper output, front wiper low speed output and front wiper high speed output remain invalid.

(3) When the power mode changes to OFF or ACC, the front wiper operates at low speed and the front wiper homing switch is invalid, the front wiper remains in low speed until the front wiper homing switch is valid.

(4) When the power mode changes to ON from OFF or ACC, the front wiper stops operating and the front wiper homing switch is invalid, it does not need to drive the front wiper to operate at low speed.

(5) When the power mode is OFF or ACC or START, the front wiper stops operating and the front wiper homing switch changes to invalid from valid, the front wiper will continue to stop operating.

(6) The power mode is ON and the front wiper stops operating, the front wiper homing switch changes to invalid from valid.

Front wiper stalling protection

■ **Function logic**

(1) The current wiper is operating at low speed or high speed, the front wiper homing switch status is always unchanged and the time is 10 seconds (whether the front wiper homing switch is valid or not), BDM will trigger the front wiper stalling protection function, and the front wiper stops operating.

(2) After the front wiper stalling protection is triggered, when the power mode changes to ON from OFF or ACC, or the front wiper switch 1 changes to valid from invalid, or the front wiper switch 2 changes to valid from invalid, it will be recovered from stalling protection status.

(3) After the front wiper stalling protection is triggered, it will not be recovered from stalling protection status even if the front wiper homing switch status changes.

(4) Front wiper stalling protection function is triggered in all front wiper functions.

Front wiper service mode function

■ **Enabled condition**

(1) Power mode changes from ON to OFF or ACC within 10 seconds.

(2) Front wiper homing switch is valid, and the wiper is in the homing position.

■ **Trigger condition**

Front wiper switch status changes from "front wiper OFF" to "front wiper low speed" corresponding to front wiper MIST.

■ **OFF condition**

(1) Front wiper switch is in wiper service position.

(2) Power mode is switched to ON.

(3) Front wiper switch status is not "front wiper OFF".

■ **Output OFF**

(1) Front wiper provides the wiper service mode, which triggers the front wiper to operate at low speed.

(2) After the wiper completes the current wiping cycle and returns to the homing position, the front wiper stops operating.

Front wiper / front washer function disabled during hood open

■ **Function logic**

(1) When the vehicle is stationary (refer to ANC module for the determination of vehicle stationary) and the hood switch is valid, BDM does not respond to any form of wiper and washer requests.

(2) When the vehicle is stationary (refer to ANC module for the determination of vehicle stationary) and the hood switch is valid, the BDM will wait for low front wiper low speed output or front wiper high speed

output to operate the current cycle, and stop the output after returning to the homing position. When the hood switch is valid, the front washer output is immediately stopped, and all related timings (including front wiper intermittent park timing, the washer switch stalling timing and washer linked delay timing) are suspended at the same time.

(3) After the hood switch is invalid for 1 ± 0.5 seconds, BDM continues to respond to the previous wiper and washer requests. If front wiper switch 1 and front wiper switch 2 are invalid at this time, the front wiper operates the current cycle at low speed, and stops the output after returning to the homing position. If front washer switch is invalid at this time, front washer output is not executed. If front washer switch or front wiper switch is still valid, continue the previous strategy and timing.

(4) During hood open and front wiper function disabled, when the power mode is switched to OFF, the hood is closed after 1 ± 0.5 seconds, the front wiper operates the current cycle at low speed, and stops output after returning to the homing position.

(5) When the vehicle is not stationary, the front wiper / front washer function is disabled without triggering hood opening.

(6) When the vehicle mode is in the factory pause mode, the front wiper / front washer function is disabled without triggering hood opening.

Rear wiper / washer system

■ Overview

(1) Rear wiper / washer system cleans the rear windshield when the vehicle needs. When the engine starts, the rear wiper / washer function will be disabled. After the engine is started, if the enabled conditions are still met, the rear wiper / washer function will continue to be performed.

Rear wiper intermittent function

■ Output execution

(1) Rear wiper output is valid.

(2) After completing the current wiping cycle and returning to the homing position, the BDM starts timing, and the interval time of rear wiper intermittent is a fixed value of 4 ± 0.2 s.

(3) When the timing time is up, drive immediately, and rear wiper output is valid.

Rear wiper reverse linked function

■ Enabled condition

(1) Power supply mode is ON and not remote.

(2) Front wiper switch status is not "front wiper OFF".

■ Output execution

Same as output execution of rear wiper intermittent function.

■ OFF condition

(1) Power supply mode is ACC or OFF or remote.

(2) Front wiper switch status is "front wiper OFF".

(3) Reverse signal is invalid.

(4) Power supply mode is START.

■ Rear washer function

(1) Rear washer output is valid, and front washer output remains invalid.

(2) BDM outputs time T seconds from the start of rear washer.

■ OFF condition

(1) When enabled condition 1 is triggered, rear washer switch is invalid.

(2) When enabled condition 2 is triggered

(3) Power supply mode is not ON or remote

(4) Time T >= 12 s

Rear wiper and washer linked function

■ Output execution

(1) Rear wiper output is valid (continuous output without interval).

(2) If the rear wiper switch is valid, BDM does not perform the rear wiper intermittent function at this time.

Rear wiper / rear washer function disabled during back door open

■ **Function logic**

(1) When the vehicle is stationary (vehicle speed is less than 4 km/h) (refer to ANC module for the determination of vehicle stationary) and the back door switch is valid, BDM does not respond to any form of rear wiper and rear washer requests.

(2) When the vehicle is stationary (vehicle speed is less than 4 km/h) (refer to ANC module for the determination of vehicle stationary) and the back door switch is valid, BDM waits for rear wiper to operate the current cycle, stops the output after returning to the homing position, when the back door switch is valid, the washer output is immediately stopped.

(3) After the back door switch is invalid for 1 ± 0.5 seconds, BDM continues to respond to the previous rear wiper and rear washer requests. If rear wiper switch is invalid at this time, the rear wiper operates the current cycle, and stops the output after returning to the homing position. If rear washer switch is invalid at this time, rear washer output is not executed.

(4) During back door open and rear wiper function disabled, when the power mode is switched to OFF, back door is closed after 1 ± 0.5 seconds, the rear wiper operates the current cycle, and stops output after returning to the homing position.

(5) When the vehicle is not stationary, the rear wiper / rear washer function is disabled without triggering back door opening.

Rear wiper homing judgment

■ **Function logic**

(1) The sampling filter of rear wiper homing switch is 30 ms, so the time difference between the actual validity of wiper homing switch and the validity of wiper homing switch determined by BDM is 35 ± 5 ms.

(2) When the rear wiper homing switch is valid and there is currently no request for rear wiper output, rear wiper output remains invalid.

(3) When the power mode changes to OFF, the rear wiper homing switch is invalid, the rear wiper output needs to remain valid until the rear wiper homing switch is valid.

(4) When the power mode changes to ON from OFF or ACC, the rear wiper output is invalid and the rear wiper homing switch is invalid, it does not need to drive the rear wiper valid output.

(5) When the power mode is OFF or START, there is no rear wiper output request, even if the rear wiper homing switch changes to invalid from valid, the rear wiper invalid output will also remain.

(6) When the power mode is ON, there is no rear wiper output request, if the rear wiper homing switch changes to invalid from valid, it does not need to drive the rear wiper valid output.

Rear wiper stalling protection

■ **Function logic**

(1) When the rear wiper low speed output is valid, the rear wiper homing switch status is always unchanged and the time is 6 seconds, BDM will trigger the rear wiper stalling function, rear wiper invalid output is performed.

(2) After the rear wiper stalling protection is triggered, when the power mode changes to ON from OFF or ACC, or the rear wiper switch changes to valid from invalid, it will be recovered from stalling protection status.

(3) After the rear wiper stalling protection is triggered, it will not be recovered from stalling protection status even if the rear wiper homing switch status changes.

(4) Rear wiper stalling protection function is triggered in all rear wiper functions.

3 Diagnosis & Testing

3.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Both front wiper and washer systems do not operate	Fuse
	Wiper Switch Assembly
	Washer pump

Symptom	Suspected Area
	Wire harness or connector
	BCM
Front wiper system does not operate in LO or HI	Wiper Switch Assembly
	Front wiper motor assembly
	Wire harness or connector
	BCM
Front wiper system does not operate	Fuse
	Wiper Switch Assembly
	Front wiper motor assembly
	Wire harness or connector
	BCM
Front wiper arm and blade do not return to homing position when front wiper switch is turned off	Front wiper motor assembly
	Wire harness or connector
	BCM
Washer system does not operate	Nozzle assembly
	Wiper Switch Assembly
	Washer pump
	Wire harness or connector
	BCM

3.2 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean system grounds related to the latest DTCs.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

3.3 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.

- Inspect components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.4 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.

(2) Check all contact surfaces for tarnish, dirt and rust, etc.

(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

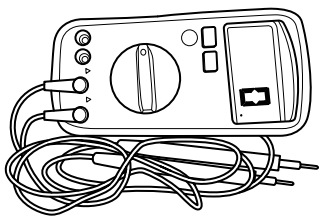
(5) Check if any additional accessories interfere with ground circuit.

(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

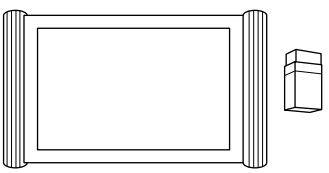
4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

■ Special Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

4.2 Specifications

■ Torque Specifications

Description	Torque (N · m)
Front Wiper Arm Assembly Fixing Nut	24 ± 4
Wiper Motor and Link Rod Assembly Fixing Bolt	9 ± 1.5
Washer Fluid Reservoir Assembly Fixing Bolt	7 ± 1.5

4.3 Combination light switch assembly

■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the driver airbag.

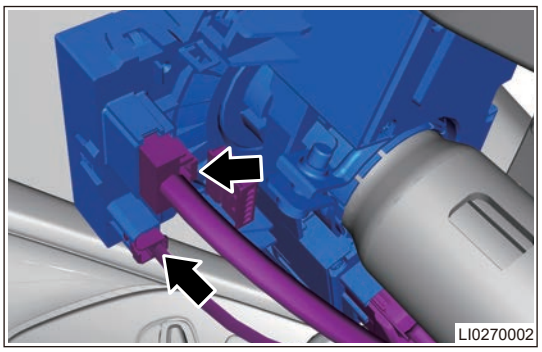
(4) Remove the steering wheel.

(5) Remove the combination switch cover.

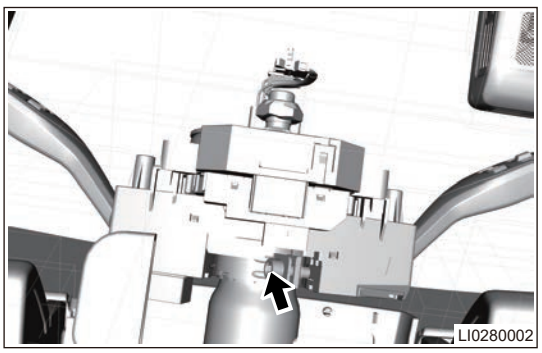
(6) Remove the spiral cable assembly.

(7) Remove the combination switch assembly.

1) Disconnect the combination switch connector.



2) Remove the fixing bolt, and remove the combination switch assembly.



■ Installation

⚠ Caution

- **Always install spiral cable correctly according to specified operating instructions.**
- **Check that horn operates normally after installation.**
- **Check SRS warning light after installation, and make sure that supplemental restraint system operates normally.**

(1) Place combination switch assembly to installation position.

(2) Tighten the combination switch fixing bolt.

(3) Connect the combination switch wire harness connector.

(4) Install the spiral cable assembly.

(5) Install the combination switch cover.

(6) Install the steering wheel.

(7) Install the driver airbag.

(8) Connect the negative battery cable.

4.4 Front Wiper Blade Assembly

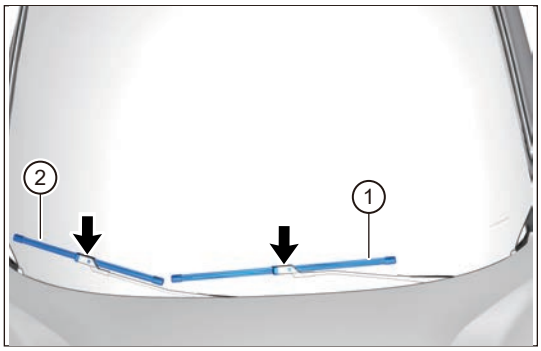
■ Removal

⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing front wiper blade assembly.**

(1) Operate front wiper to enter service mode.

(2) Remove the front wiper blade assembly.

1) Press the clip (arrow), remove wiper blade (1) as shown in illustration.



1

■ Installation

(1) Install the front wiper blade assembly.

(2) Exit the front wiper service mode.

4.5 Front Wiper Arm Assembly

■ Removal

Hint:

- Be sure to wear safety equipment to prevent accidents, when removing front wiper arm assembly.
- Appropriate force should be applied, when removing front wiper arm assembly. Be careful not to operate roughly.
- Try to prevent front windshield assembly from being scratched, when removing front wiper arm assembly.

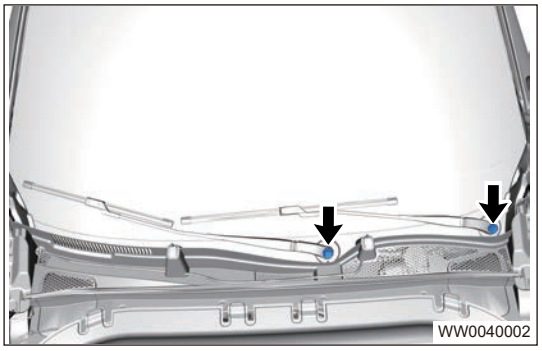
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Open the engine hood.

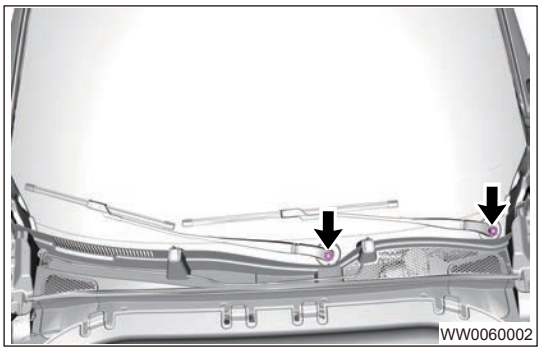
(3) Disconnect the negative battery cable.

(4) Remove the front wiper arm assembly.

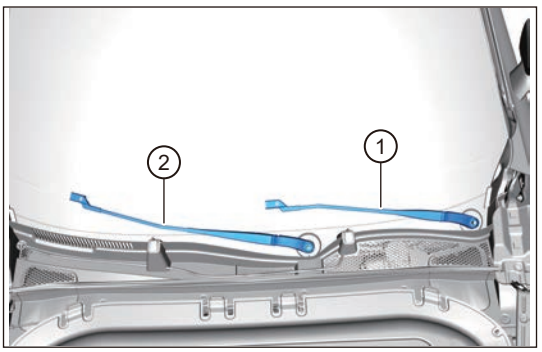
1) Using a screwdriver wrapped with protective tape, remove front wiper arm trim caps (arrow).



2) Remove 2 fixing nuts (arrow) from front wiper arm assembly.



3) Remove front main wiper arm (1) and front sub wiper arm (2).



■ Installation

⚠ Caution

- **Always operate carefully to prevent other components from being damaged, when installing front wiper arm assembly.**
- **Be sure to tighten fixing nuts to specified torque, when installing front wiper arm assembly.**
- **Check front wiper arm assembly for proper operation after installation.**

Hint:

- Adjust front wiper arm assembly to proper position when installing.
- Pay attention to locating points on front windshield assembly during installation. Wiper arm blade should be pressed against locating points.

(1) Place front wiper blade assembly to installation position.
(2) Install 2 fixing nuts to wiper blade assembly.
Tightening torque: 24 ± 4 N·m
(3) Install 2 front wiper arm trim cap.
(4) Connect the negative battery cable.

4.6 Front Wiper Motor and Link Rod Assembly

■ Removal

Hint:

- Be sure to wear safety equipment to prevent accidents, when removing front wiper motor assembly.
- Appropriate force should be applied, when removing front wiper motor assembly. Be careful not to operate roughly.
- Try to prevent body paint surface from being scratched, when removing front wiper motor assembly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

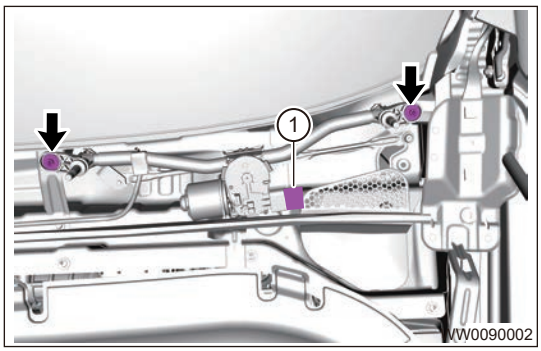
(2) Disconnect the negative battery cable.

(3) Remove the front windshield lower trim panel assembly.

(4) Remove the wiper motor and link rod assembly.

1) Disconnect the connector (1) from wiper motor and link rod assembly.

2) Remove 2 fixing bolts (arrow) from wiper motor and link rod assembly.



3) Remove the wiper motor and link rod assembly.

■ Inspection

(1) Check the front wiper motor assembly.

1) Check the LO operation.

Measurement Condition	Specified Condition
Battery negative (-) → Terminal 4	Motor running at low speed (LO)
Battery positive (+) → Terminal 2	

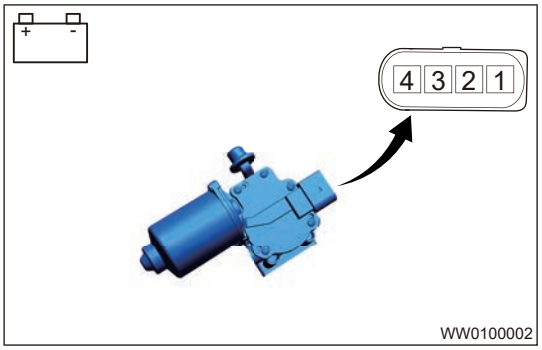
If result is not as specified, replace front wiper motor assembly.

2) Check the HI operation.

Measurement Condition	Specified Condition
Battery negative (-) → Terminal 4	Motor running at low speed (HI)
Battery positive (+) → Terminal 1	

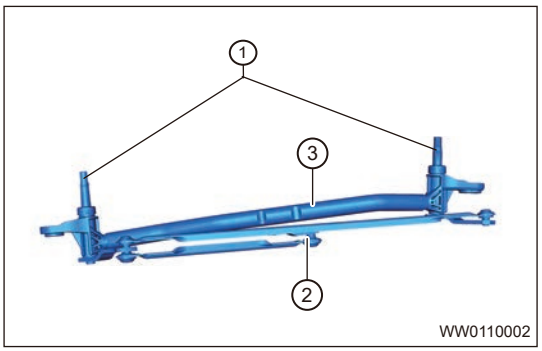
3) Check the auto reset function.

- Connect positive (+) battery lead to terminal 2 or 1, and connect negative (-) battery lead to terminal 4. When motor runs at low speed (LO) or high speed (HI), disconnect battery positive (+) to stop front wiper motor at any position other than the original position.
- Connect terminal 4 and terminal 3 with a lead and then connect another lead from middle to positive (+) battery, and connect negative (-) battery lead to terminal 2 to make motor operate to original position at low speed (LO) again.
- Check whether the front wiper motor assembly can stop automatically after it operates to original position. OK: Motor operates to original position and stops automatically, that is, motor can reset automatically. If result is not as specified, replace front wiper motor assembly.



(2) Check the wiper link rod.

1) Check the pivot (1) for looseness or falling off, link rod (2) for deformation or break, and shaft sleeve (3) for catching. Replace the wiper link rod if necessary.



■ Installation

Hint:

- Always operate carefully to prevent other components from being damaged, when installing front wiper motor assembly.
- Adjust and make sure that wiper motor and link rod are at original position, before installing front wiper motor assembly, otherwise, wiper system cannot operate normally.
- Install connector in place and tighten fixing bolts and nuts to the specified torque when installing front wiper motor assembly.
- Check wiper system for proper operation after installing front wiper motor assembly.

(1) Place wiper motor and link rod assembly to installation position.

(2) Install 2 fixing bolts to wiper motor and link rod assembly.

Tightening torque: 9 ± 1.5 N·m

(3) Connect the wiper motor and link rod assembly wire harness connector.

(4) Install the front windshield lower trim board assembly.

(5) Install the negative battery cable.

4.7 Front Nozzle Assembly

■ Removal

Hint:

- Be sure to wear safety equipment to prevent accidents, when removing front nozzle assembly.
- Appropriate force should be applied, when removing multi-function interface. Be careful not to operate roughly.

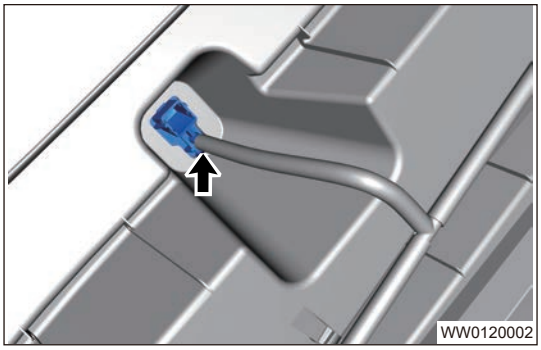
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front windshield lower support assembly.

(4) Remove the front nozzle assembly.

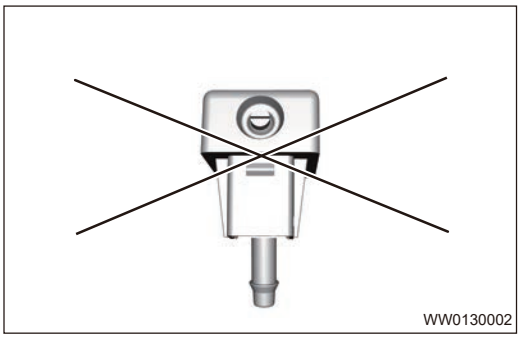
1) Loosen front nozzle assembly and disconnect water spray hose as shown in illustration.



■ Inspection

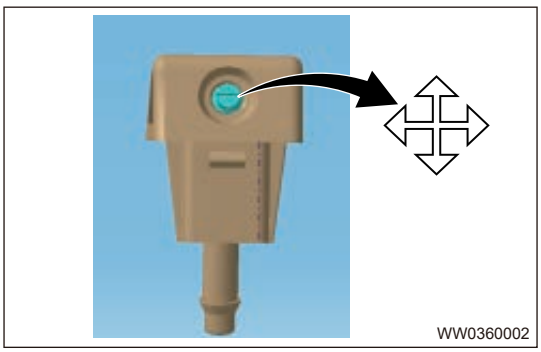
(1) Check the front washer nozzle assembly.

1) Check front nozzle for blockage, deformation or damage. Replace the front nozzle if necessary.

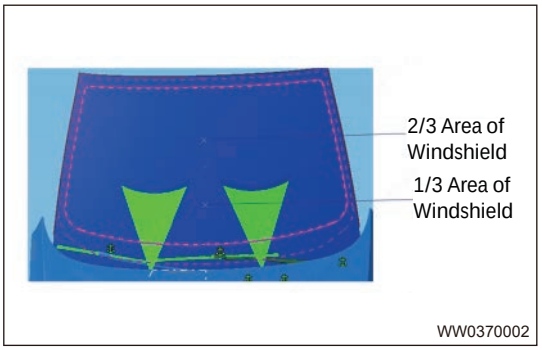


(2) Adjust nozzle angle.

1) Adjust the nozzle bead up and down to adjust the nozzle angle, so as to reach the ideal injection position.



2) Adjust the nozzle to spray the washer fluid at a position about 1/3 - 2/3 of the front windshield



3) Due to the high injection pressure, when the washer fluid is sprayed onto the front windshield, some of the washer fluid will be reflected on the roof cover through the windshield, which is a normal phenomenon, but the water column is not allowed to spray directly out of the front windshield.

■ **Installation**

⚠ Caution

- **Always operate carefully to prevent components from being damaged, when installing front nozzle assembly.**
- **Install washer pipeline joints in place when installing front nozzle assembly.**
- **Check front nozzle for proper operation, after installing front nozzle assembly.**

(1) Connect front nozzle assembly to spray hose.
(2) Install the front nozzle assembly.
(3) Install the front windshield lower trim board assembly.
(4) Connect the negative battery cable.

4.8 Washer Pump Assembly

■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing washer pump assembly.**
- **Appropriate force should be applied, when removing washer pump assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing washer pump assembly.**

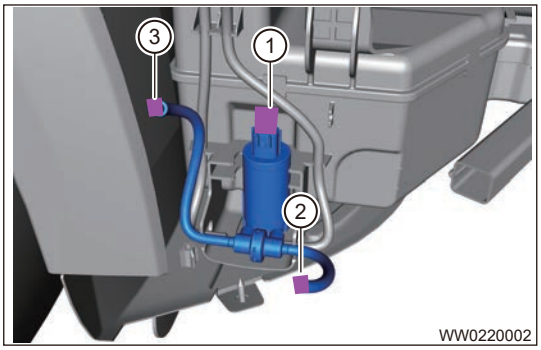
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

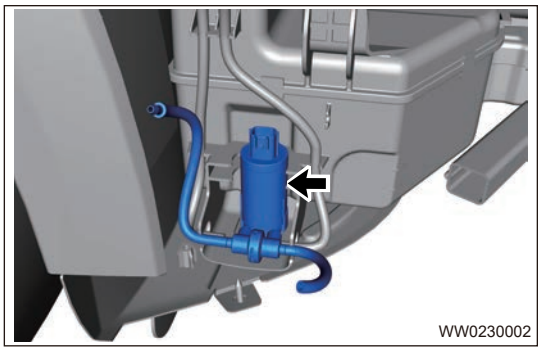
(4) Remove the washer pump assembly.

1) Disconnect the front and rear washer pump connectors (1).
2) Disconnect joints (2) and (3) between front washer line and washer pump.



1

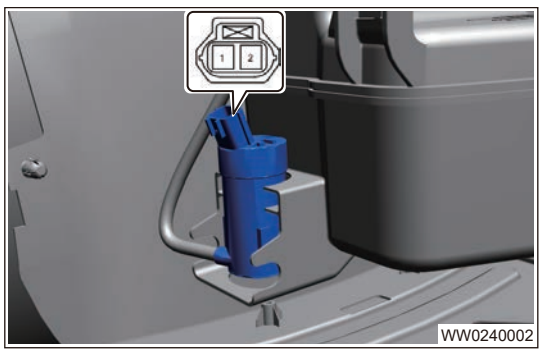
3) Remove the washer pump assembly.



■ Inspection

(1) Check the washer pump assembly.

1) Fill washer fluid reservoir assembly with washer fluid.
2) Connect positive (+) battery lead to terminal 1 of washer pump, and connect negative (-) battery lead to terminal 2.
3) Check that washer fluid flows out of front washer pump. OK: Washer fluid flows out of front washer pump. If result is not as specified, replace the washer pump assembly.
4) Connect positive (+) battery lead to terminal 1 of washer pump, and connect negative (-) battery lead to terminal 2.
5) Check that washer fluid flows out of rear washer pump. OK: Washer fluid flows out of rear washer pump. If result is not as specified, replace the washer pump assembly.



■ Installation

⚠ Caution

- **Always operate carefully to prevent components from being damaged, when installing washer pump assembly.**
- **Install washer pipeline joint in place, when installing washer pump assembly.**
- **Check washer system for proper operation, after installing washer pump assembly.**

(1) Place washer pump assembly to installation position.
(2) Connect joint between front washer line and washer pump.
(3) Connect the washer pump assembly wire harness connector.
(4) Install the front bumper assembly.
(5) Connect the negative battery cable.

4.9 Washer Fluid Reservoir Assembly

■ Removal

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing washer fluid reservoir assembly.**
- **Appropriate force should be applied, when removing washer fluid reservoir assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing washer fluid reservoir assembly.**

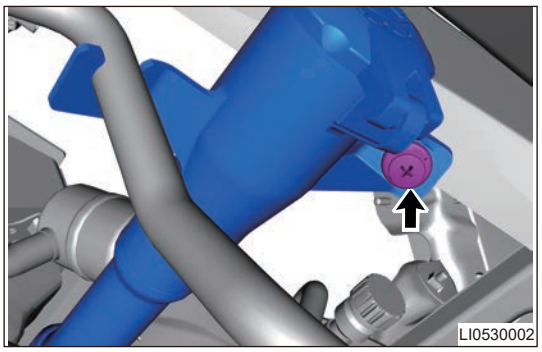
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

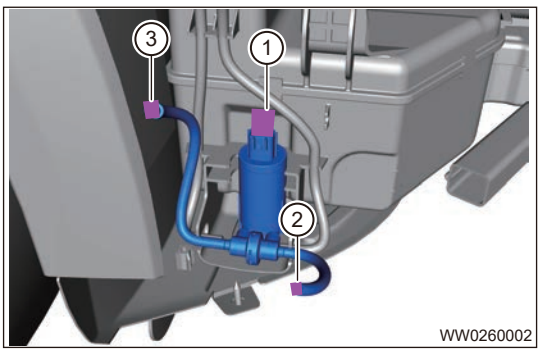
(4) Remove the guide pipe assembly.

1) Remove fixing clip (arrow) from guide pipe assembly.
2) Remove guide pipe assembly (1) from washer fluid reservoir assembly.

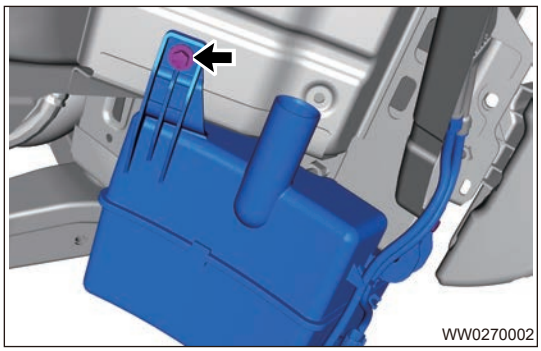


(5) Remove the washer fluid reservoir assembly.

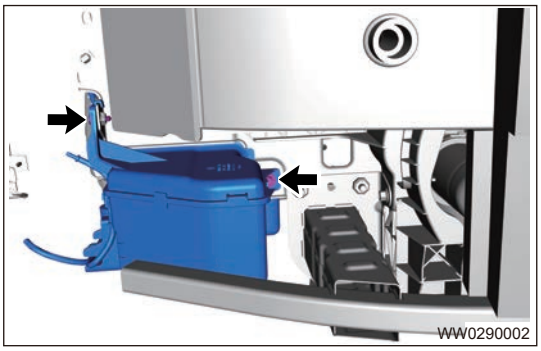
1) Disconnect the front and rear washer pump connectors (1).
2) Disconnect joints (2) and (3) between front washer line and washer pump.



3) Remove 1 fixing bolt (arrow) from washer fluid reservoir assembly.



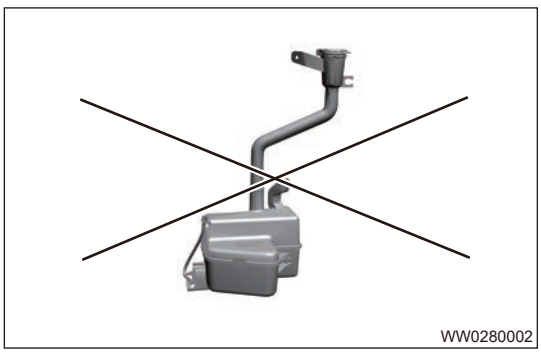
4) Remove 2 fixing bolts (arrow) and washer fluid reservoir assembly.



■ Inspection

(1) Check the washer fluid reservoir assembly.

1) Check washer fluid reservoir assembly for leakage, deformation or damage. Replace washer fluid reservoir assembly if necessary.
2) Check internal and external sides of washer fluid reservoir for dirt. Remove dirt or replace washer fluid reservoir assembly if necessary.
3) Check grommet for damage. Replace grommet if necessary.



■ Installation

⚠ Caution

- **Always operate carefully to prevent components from being damaged, when installing washer fluid reservoir assembly.**
- **Tighten fixing bolts to specified torque, when installing washer fluid reservoir assembly.**
- **Install washer pipeline joint in place when installing washer fluid reservoir assembly.**

(1) Place washer fluid reservoir assembly to installation position.
(2) Install 3 fixing bolts to washer fluid reservoir assembly.
Tightening torque: 7 ± 1.5 N·m
(3) Connect joint between front washer line and washer pump.
(4) Connect the front and rear washer pump wire harness connectors.
(5) Install the guide pipe assembly.
(6) Install the front bumper assembly.
(7) Install the negative battery cable.

4.10 Front Washer Line Assembly

■ Removal

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing washer pipeline assembly.**
- **Appropriate force should be applied, when removing washer pipeline assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing washer pipeline assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

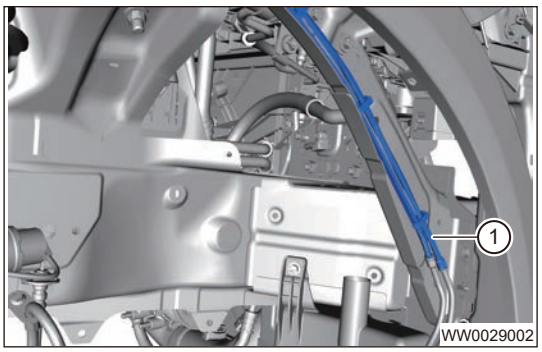
(4) Remove the front right wheel house protector assembly.

(5) Remove the front windshield trim board assembly.

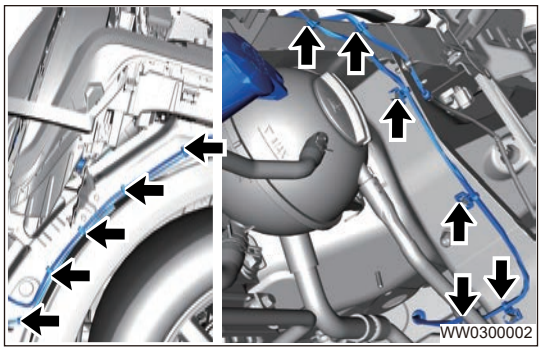
(6) Remove the front nozzle assembly.

(7) Remove the front washer line assembly.

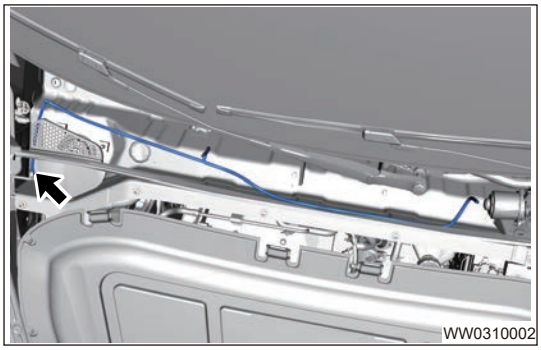
1) Disconnect the joint (1) between front washer line and front washer pump.

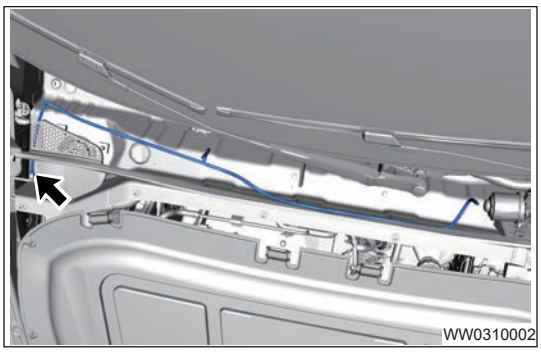


2) Remove 11 clips (arrow) from washer line 1 on inner side of wing.



3) Unplug quick connectors (arrow) from lines 1 and 2.





■ **Installation**

⚠ Caution

- **Always operate carefully to prevent components from being damaged, when installing washer line assembly.**
- **Install washer pipeline joint in place, when installing washer pipeline assembly.**
- **Check washer system for proper operation, after installing washer pipeline assembly.**

(1) Place front washer line to installation position.
(2) Connect quick connectors to lines 1 and 2.
(3) Connect all fixing clips to front washer line.
(4) Connect joint between front washer line and front washer pump.
(5) Install the front nozzle assembly.
(6) Install the front windshield trim protector assembly.
(7) Install the front right wheel house protector assembly.
(8) Install the front bumper assembly.
(9) Install the negative battery cable.

10.8 WINDOW/SLIDING ROOF

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) To protect window regulating system, window jam protection function will be canceled in some cases, and automatic window UP function will also be canceled, to avoid possible potential risk, at this time window only has general regulating function, window regulating function of corresponding door will resume after jam protection learning.

(2) When removing/installing sliding roof fixing bracket, an assistant is needed to hold it. This can prevent sliding roof fixing bracket from dropping during operation, which may cause an accident.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Be sure to wear safety equipment to prevent accidents, when removing window regulator switch.

(2) Prevent window glass from dropping which will cause damage, when removing front and rear door glass assembly.

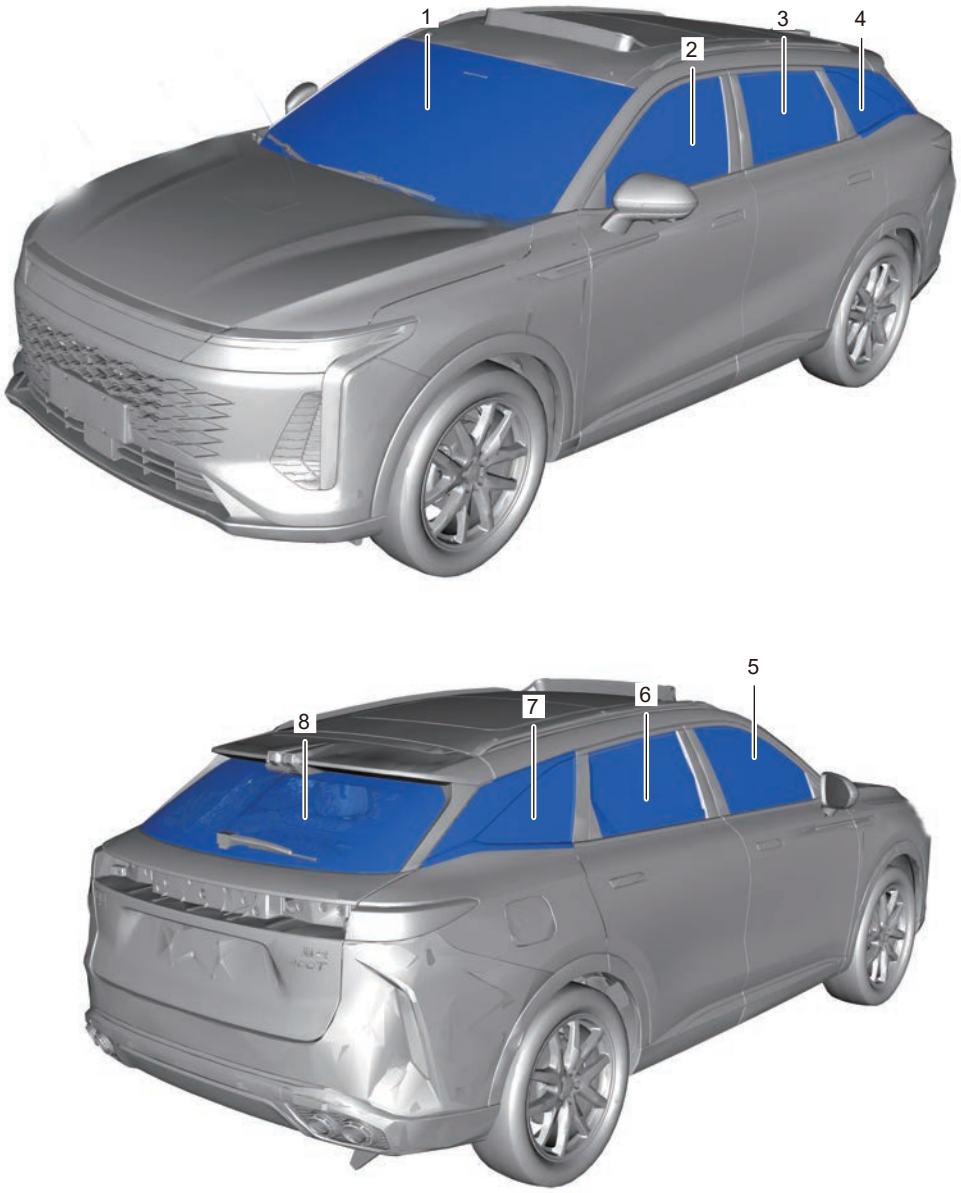
(3) When removing front windshield assembly, two persons are required and prevent it from dropping.

(4) When removing rear windshield assembly, two persons are required and prevent it from dropping.

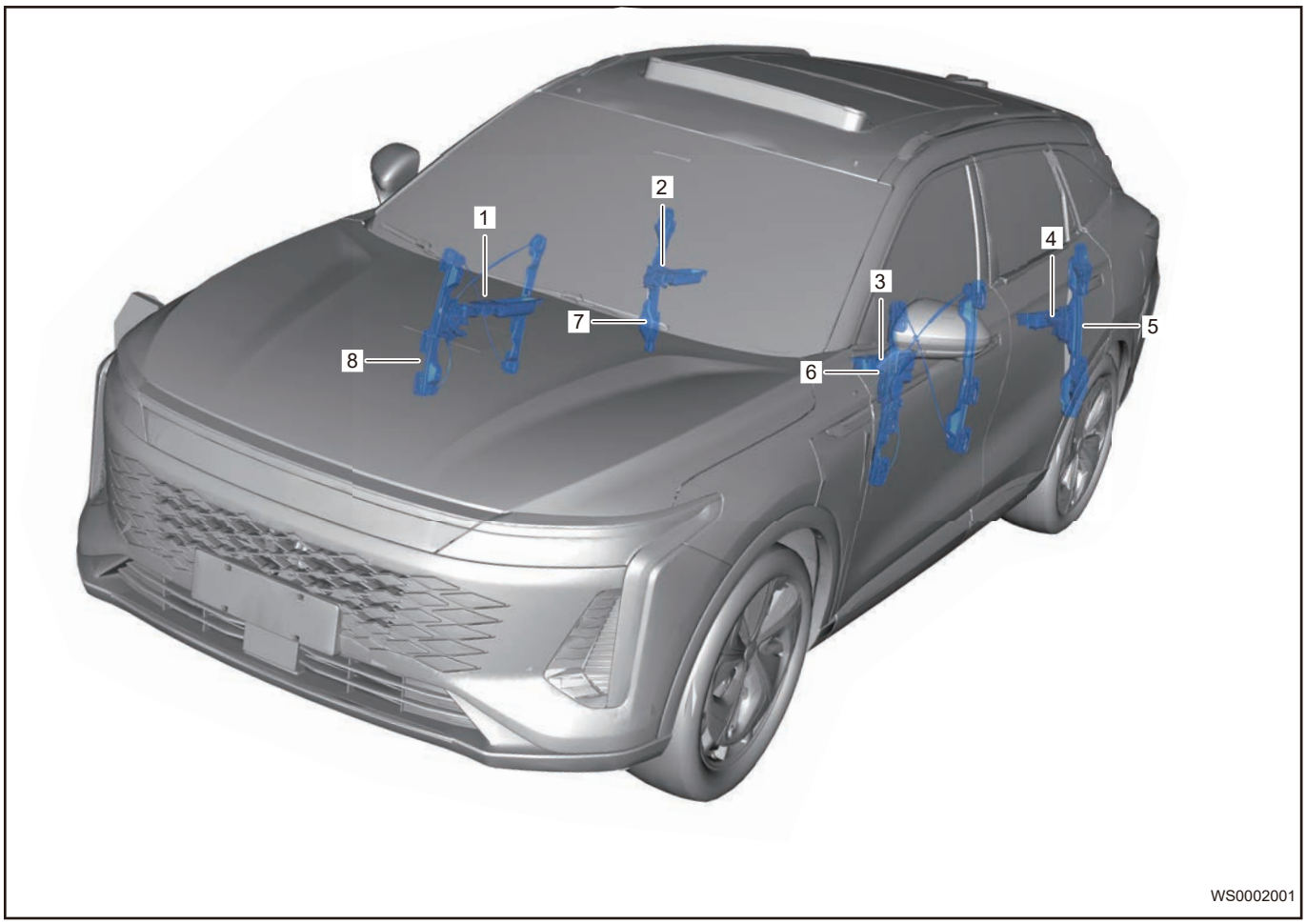
(5) Appropriate force should be applied, when removing sliding roof front and rear glass. Be careful not to operate roughly, to avoid damage to sliding roof glass.

2 System Overview

2.1 System Components Diagram

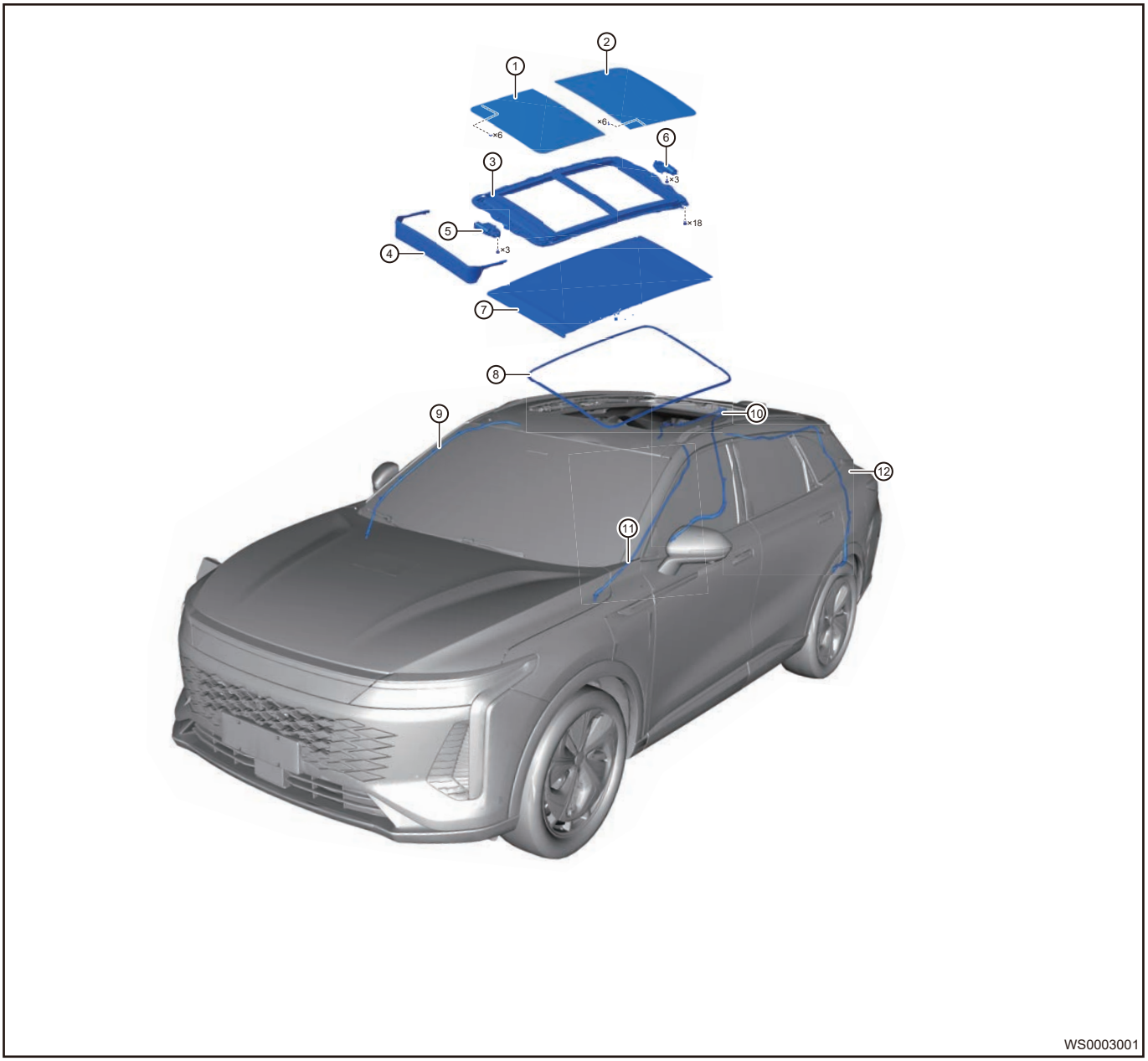


1	Front Windshield Assembly	5	Front Right Side Door Quarter Window Glass Assembly
2	Front Left Side Door Quarter Window Glass Assembly	6	Rear Right Side Door Glass Assembly
3	Rear Left Side Door Glass Assembly	7	Rear Right Quarter Window Assembly
4	Rear Left Quarter Window Assembly	8	Rear Windshield Assembly



1	Single Door Window Regulator Switch (-Front Right)	5	Rear Left Rope-wheeled Window Regulator Assembly
2	Single Door Window Regulator Switch (-Rear Right)	6	Front Left Rope-wheeled Window Regulator Assembly
3	Driver Window Regulator Switch	7	Rear Right Rope-wheeled Window Regulator Assembly
4	Single Door Window Regulator Switch (-Rear Left)	8	Front Right Rope-wheeled Window Regulator Assembly

Power window control system controls each window glass UP/DOWN function by operating the window regulator control switches on door inner protector assembly. Main control devices of this system include: Driver window regulator switch (built into driver side door) and single door window regulator switches (built into front and rear passenger side doors). Press driver window regulator switch or any switch on window regulator switch, to transmit the UP/DOWN signal to corresponding power window regulator motor, thus controlling UP/DOWN operation of corresponding power window glass.



1	Sliding Roof Front Glass Assembly	7	Sliding Roof Sun Visor Assembly
2	Sliding Roof Rear Glass Assembly	8	Sliding roof weatherstrip
3	Sliding Roof Frame	9	Front Right Sliding Roof Drain Hose Assembly
4	Sliding Roof Wind Screen	10	Rear Right Sliding Roof Drain Hose Assembly
5	Sliding Roof Glass Motor	11	Front Left Sliding Roof Drain Hose Assembly
6	Sliding Roof Sun Visor Motor	12	Rear Left Sliding Roof Drain Hose Assembly

2.2 System Principle

Window control system - BDM integrated SLC

■ **Overview**

(1) When window jam protection type = 0x0 ripple jam protection (integrated), all window functions are controlled by BDM, including the acquisition of all window switches, control of all window motors, and window jam protection strategy.

(2) The window control system is used to control the raising and lowering of the four door windows.

(3) The window disable switch disables the passenger side switch to control the window lift control.

(4) When the engine is started, the window motor will stop immediately. After the engine is started, the previous movement will not be continued, and the window control needs to be triggered again.

(5) When the APM configuration word is configured as 0x0: Not Present, BDM does not support SLC jam protection strategy.

■ **Perform output**

(1) Mask this switch signal until it leaves the sticky state.

(2) When the passenger window switch is sticking, the driver window switch can still operate the window normally.

(3) When the driver window switch is sticking, the corresponding window switch on passenger side can still operate the window normally.

■ **Close condition:**

After the switch is stuck in a certain position, it is detected that the switch changes to another position and remains in this position for more than 0.5 seconds.

■ **Window motor output execution**

Each window is raised and lowered by two internal relays, and the relationship between window output action and port control is as follows:

XX Window Command	**Port Control**	
	XX Window Up Output	**XX Window Down Output**
Window stops	0	0
Window up	1	0
Window down	0	1

The window jam protection system should sample the voltage and current of the terminal motors of four doors.

(1) The jam protection system should collect the motor terminal voltage when the motor is running.

(2) The jam protection system collects the operating current signal of the motor, and the collection period is 200 us.

(3) It is necessary to ensure the correct sampling of motor current under the operating conditions of motor start, normal operation and blocked.

(4) It is necessary to ensure the correct sampling of motor current under the operating conditions of motor start, normal operation and blocked.

Manual window down function

■ **Enabling condition**

(1) Power mode is ON, or within 120 seconds after ON ACC/OFF and the front door is not opened.

(2) Not in voltage protection state.

(3) Not in thermal protection state.

Note: Regarding the enabling condition a, there are the following requirements.

(1) The 120-second is counted from switching out of ON.

(2) Within 120 seconds, if the window is moving, open any front door at this time, the window stops immediately (except for jam protection rollback, the window stops immediately after rollback is completed).

(3) After 120 seconds and either front door is not opened, if there is automatic window up/down, it will stop after completing the current automatic window action.

(4) After 120 seconds and either front door is not opened, if there is manual window up/down, it will stop immediately.

(5) When either front door is opened and then closed within 120 seconds, the enabling condition is no longer met and the glass up/down function triggered by the button will not be activated.

■ **Trigger condition**

(1) It is detected that the driver manual window down request is valid and the switch is not stuck.

(2) It is detected that the passenger manual window down request is valid, the switch is not stuck, and the window disabling function is not triggered.

■ **Perform output**

(1) Perform the corresponding window down.

■ **Close condition:**

(1) Trigger condition 2 is valid and the window disabling function is triggered.

(2) The window moves to the lower limit position.

(3) Enabling condition 1 and power state is not satisfied.

(4) The power mode changes to START.

(5) If the enabling condition 2 is not met, the voltage protection state is entered.

(6) If the enabling condition 3 is not met, the thermal protection state is entered.

(7) The window movement lasts for more than 10 seconds.

(8) The triggered switch is stuck.

(9) The same window received a new move request.

■ **Close output**

Perform the corresponding window stop.

Manual window up function

■ **Enabling condition**

(1) Power mode is ON, or within 120 seconds after ON-ACC/OFF and the front door is not opened.

(2) Not in voltage protection state.

(3) Not in thermal protection state.

■ **Trigger Condition**

(1) It is detected that the driver manual window up request is valid and the switch is not stuck.

(2) It is detected that the passenger manual window up request is valid, the switch is not stuck, and the window disabling function is not triggered.

■ **Perform output**

(1) Perform the corresponding window up.

■ **Close condition:**

(1) Trigger condition 2 is valid and the window disabling function is triggered.

(2) The window moves to the higher limit position.

(3) Enabling condition 1 and power state is not satisfied.

(4) The power mode changes to START.

(5) If the enabling condition 2 is not met, the voltage protection state is entered.

(6) If the enabling condition 3 is not met, the thermal protection state is entered.

(7) The window movement lasts for more than 10 seconds.

(8) The triggered switch is stuck.

(9) The same window received a new move request.

■ **Close output**

Perform the corresponding window stop.

One-button window down function

■ **Enabling condition**

(1) Power mode is ON, or within 120 seconds after ON-ACC/OFF and the front door is not opened.

(2) Not in voltage protection state.

(3) Not in thermal protection state.

■ **Trigger Condition**

(1) It is detected that the driver one-button window down request is valid and the switch is not stuck.

(2) It is detected that the passenger one-button window down request is valid, the switch is not stuck, and the window disabling function is not triggered.

■ **Perform output**

Perform the corresponding window down.

■ **Close condition:**

(1) Trigger condition 2 is valid and the window disabling function is triggered.
(2) The window moves to the lower limit position.
(3) Enabling condition 1 and power state is not satisfied.
(4) The power mode changes to START.
(5) If the enabling condition 2 is not met, the voltage protection state is entered.
(6) If the enabling condition 3 is not met, the thermal protection state is entered.
(7) The window movement lasts for more than 10 seconds.
(8) The triggered switch is stuck.
(9) The same window received a new move request.

■ **Close output**

Perform the corresponding window stop.

One-button window up function

■ **Enabling condition**

(1) Power mode is ON, or within 120 seconds after ON-ACC/OFF and the front door is not opened.
(2) Not in voltage protection state.
(3) Not in thermal protection state.
(4) Window jam protection has completed self-learning.
(5) APM configuration word is configured.

■ **Trigger Condition**

(1) It is detected that the driver one-button window up request is valid and the switch is not stuck.
(2) It is detected that the passenger one-button window up request is valid, the switch is not stuck, and the window disabling function is not triggered.

■ **Perform output**

Perform the corresponding window up.

■ **Close condition:**

(1) Trigger condition 2 is valid and the window disabling function is triggered.
(2) The window moves to the higher limit position.
(3) Enabling condition 1 and power state is not satisfied.
(4) The power mode changes to START.
(5) If the enabling condition 2 is not met, the voltage protection state is entered.
(6) If the enabling condition 3 is not met, the thermal protection state is entered.
(7) The window movement lasts for more than 10 seconds.
(8) The triggered switch is stuck
(9) The same window received a new move request.
(10) The jam protection rollback happens.
(11) Window position is lost.

■ **Close output**

(1) Perform the corresponding window stop.

Passenger window disabled function

■ **Enabling condition**

(1) Power mode is OFF.
(2) All doors are closed.
(3) Not in voltage protection state.
(4) Not in thermal protection state.
(5) No window switch input for the corresponding side window, except when the switch is sticking.

■ **Trigger Condition**

(1) Remote key unlock long press signal is received (press unlock button for more than 1.5 seconds).

(2) PE unlock request is received for more than 0.52 seconds.

■ **Close condition:**

(1) The window moves to the lower limit position.

(2) Enabling condition 1 is not met and power state is not OFF.

(3) If the enabling condition 3 is not met, the voltage protection state is entered.

(4) If the enabling condition 3 is not met, the voltage protection state is entered.

(5) The window movement lasts for more than 10 seconds.

(6) A valid window switch input is detected for the corresponding side window.

(7) The trigger conditions are not met, the remote key unlocking is invalid or the PE unlocking request is invalid.

(8) Position is lost.

(9) Any of the four doors is opened.

Long-press remote window up function

■ **Enabling condition**

(1) Power mode is OFF.

(2) All doors are closed.

(3) Not in voltage protection state.

(4) No window switch input for the corresponding side window, except when the switch is sticking.

■ **Trigger Condition**

Remote key locking long press 0.5 seconds signal is received.

Fortifying window up function

■ **Enabling condition**

(1) Power mode is OFF.

(2) All doors are closed.

(3) Not in voltage protection state.

(4) Not in thermal protection state.

(5) Window jam protection has completed self-learning.

(6) No window switch input for the corresponding side window, except when the switch is sticking.

■ **Trigger Condition**

(1) Fortifying prompt is triggered.

(2) Automatic re-lock function is triggered.

■ **Close condition:**

(1) The window moves to the higher limit position.

(2) Enabling condition 1 is not met and power state is not OFF.

(3) If the enabling condition 3 is not met, the voltage protection state is entered.

(4) If the enabling condition 4 is not met, the thermal protection state is entered.

(5) The window movement lasts for more than 10 seconds.

(6) A valid window switch input is detected for the corresponding side window.

(7) The jam protection rollback happens.

(8) Window position is lost.

(9) Any of the four doors is opened.

■ **Window up/down function controlled by remote**

This section is consistent with the customer's "Ripple Window Jam Protection System Development Counting Specification D V2.1", the following are additional instructions, if inconsistent, the customer's original requirements shall prevail.

■ **Enabling condition**

(1) Power mode is OFF or power is in remote mode.

(2) Four doors & two covers are closed.

(3) Not in voltage protection state.

(4) Not in thermal protection state.

(5) Window jam protection has completed self-learning.

(6) Individual windows are in a stationary state.

Window up/down function controlled by voice

■ Enabling condition

(1) Power mode is ON.

(2) Four doors & two covers are closed.

(3) Not in voltage protection state.

(4) Not in thermal protection state.

(5) Window jam protection has completed self-learning.

(6) Individual windows are in a stationary state.

■ Speed-regulating window control system-SLC with independent LIN

When window jam protection type = 0x01: Hall jam protection (freestanding), the window function is controlled by the speed-regulating window controller on LIN bus. BDM sends the required network signal for the speed-regulating window controller through LIN line, and receives the related signal through LIN and sends it to CAN bus. The collection of driver window switch, the control of window motor and the jam protection strategy are all realized by the speed-regulating window controller, and BDM plays an auxiliary role.

■ ArmingSts transmission strategy of LIN signal

Trigger Condition

(1) Fortifying prompt is triggered.

(2) Fortifying deactivation prompt is triggered.

■ Sliding Roof Control System

(1) The sliding roof control system is used to control the opening and closing of sliding roof.

(2) The sliding roof module has a separate controller SRF, which is connected with BCM through LIN1, and BCM is the master node.

(3) BCM sends the required vehicle status signal to SRF via LIN. SRF controls the opening and closing of sliding roof according to these commands.

2.3 Window Jam Protection System

■ Composition

It consists of 1 front left door window regulator switch, 3 single window regulator switches, 4 window regulators and Body Domain Controller (BDM).

■ Function Introduction

"Jam protection" is window regulating system with jam protection function, which mainly reflects on: When operating window auto UP or remote one-button UP, and passenger is caught carelessly by window which raises automatically, jam protection control module will control window regulator motor to reverse before motor reaches the set jam protection force, thus making window glass go down a certain distance, avoiding injury to passenger.

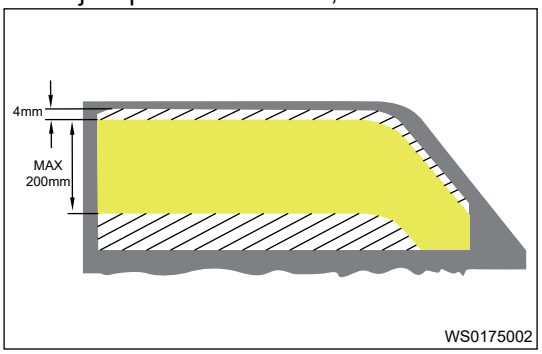
■ Jam Protection Requirement

Window regulating system with jam protection function must meet followings in performance requirements of jam protection system:

(1) Jam protection area, which is within 4 mm - 200 mm range of yellow part in following illustration.

(2) Jam protection force is less than 100 N.

(3) When jam protection occurs, down distance of window reverse is about 150 mm.



■ Operation

Jam protection system achieves jam protection function by controlling rotation of motor.
When window raises automatically, if one passenger is caught, according to motor characteristics, it can be known that current increases quickly and speed decreases, jam protection system collects relevant parameters and performs calculation, which will drive motor to reverse before jam protection force reaches 100 N, thus achieving "jam protection".

■ Basic Function

(1) General function: UP/DOWN function of normal power glass;

(2) Auto window UP: Turn window regulator switch to top. If there is no obstacle, window will go up automatically until reaching top and then stop;

(3) Remote one-button window UP: Press wireless key lock button once, door will lock automatically and window will go up automatically until reaching top and then stop;

(4) Jam protection function;

(5) Ignition pause function: As engine starts, window regulating operation will pause to provide large current for assist;

(6) Window DOWN by long pressing remotely;

(7) Canceling jam protection: When jam protection occurs twice continuously, auto window UP will be canceled (jam protection), ensuring raising window fully when it is necessary to raise window forcibly;

(8) Overload heat protection: To avoid damage caused by motor overheating, abnormal operation of window regulating frequently is not allowed;

(9) Soft pausing function: To avoid impact and noise due to going down to bottom of glass driven by motor, stop going down as glass nearly reaches bottom;

(10) Manual learning function: Press window switch, raise glass manually to top and make it be locked for 2 s, then operate glass to bottom manually and make it be locked for 2 s.

■ General Function

Do not operate window regulator switch for power window regulating until ENGINE START STOP switch is turned to ON.
Window regulator switch has delay function, that is window regulator switch can operate if front door is not opened within 120 s after turning key to a position other than ON position; within this period, once any front door is opened, glass regulating function will be disabled immediately.

■ Remote One-button Window UP and Auto Window UP Function

- To protect window regulating system, window jam protection function will be canceled in some cases, and automatic window UP function will also be canceled, to avoid possible potential risk, at this time window only has general regulating function, window regulating function of corresponding door will resume after jam protection learning.
- When window raises automatically or remotely, make sure that there is no obstacle within window raising range, or jam protection will be activated and the window operates in reverse direction, causing the condition that window cannot close normally.
- Jam protection function is a kind of window safety protection function. Do not use any object and informal method to verify jam protection frequently, or it will damage system mechanism (such as motor, glass, regulator and glass guide etc).

■ Remote Window UP

Turn off ENGINE START STOP switch, remove key, and close four doors, and vehicle enters armed state when remote lock button or door handle switch is pressed, and four window glasses will raise automatically. If

lock button, unlock button or door handle switch is pressed again as window glass raises automatically, window glass will stop raising.

■ **Jam Protection Function**

If jam protection system operates normally, jam protection function will be activated when the window meets obstacle resistance within jam protection area as window raises automatically or by one-button remotely. Max. allowable jam protection force by system is 100 N while glass will stop automatically and go back a certain distance (150 mm). If you want to close window, move away the obstacle, and operate switch again. When window is nearly closed (within 4 mm), jam protection function will stop sensing, so extremely thin obstacle will not be seen easily during window raising.

■ **Remote Long-press Window DOWN Function**

Turn ENGINE START STOP switch to OFF and remove key with four doors closed, press and hold unlock button on remote key for at least 1.5 seconds, window glass of four doors will go down automatically. Release unlock button on remote key during going down, window glass will stop operating.

Press and hold unlock button on remote key as window goes down remotely. If remote signal suspends due to shaking (including hands tremble, electromagnetic interference etc), remote window DOWN operation will end.

■ **Jam Protection Canceling Conditions**

System will cancel jam protection function in following conditions:

(1) When jam protection occurs twice continuously (window does not raise to top);

(2) Control module cuts off power supply connection during operation or non-operation;

(3) Window position calculation judged by system exceeds limit value.

1)If there is obstacle as window closes within 10 seconds for first jam protection rollback, jam protection function will be activated again, and window will reverse automatically. At this time, only manual window UP function operates. Window provides maximum closing force within 10 seconds, to make window be closed smoothly in some extreme cases. Please make sure there is no obstacle during closing, avoiding personal injury.

2)When jam protection is canceled, use the remote one-button window UP function, window will go down to bottom and then raise to the top, thus jam protection learning is completed, so that system has multiple functions.

■ **Overload Heat Protection Function**

If the window is operated repeatedly within a short time, window regulator motor will be burnt due to overheating.

To protect the motor, if window regulating operation is performed about 10 times continuously, control function of corresponding window switch will be disabled actively. After motor temperature resumes to normal, the switch will be able to operate, and this function will not affect the normal use of window regulating function.

■ **Performing Jam Protection Module Self-learning in Following Conditions**

(1) After locking occurs twice continuously.

(2) After replacing body control module.

(3) After replacing power window regulator.

(4) After vehicle powers off.

■ **Learning Function (Jam Protection Module Initialization)**

(1) When vehicle passes through bumps, hollow road surface during driving, one-button window UP operation is interrupted and window may reverse and go down because door system suffers action of gravity suddenly. Probability of rollback occurrence by mistake is low, and it is normal.

(2) Learning function includes manual learning and diagnostic tester learning.
During normal use of window regulating system, such as entering "jam protection canceling" condition without auto window UP (jam protection function), jam protection window regulating system resumes to multiple functions by using manual learning.
It is necessary to perform diagnostic tester learning when replacing door regulating system related mechanisms (such as window regulator, glass run etc.), to make sure system parameters can be updated. After completing learning, clear the fault codes using diagnostic tester.
Make sure there is no obstacle in window range during learning, manual learning steps are as follows:

1)Turn ENGINE START STOP switch to ON.

2)Operate window glass to raise until reaching top manually and lock it for 2 seconds.

3)Release the switch.
4)Operate window glass to go down until reaching bottom manually and keep it lock for 2 seconds.
5)Release the switch.
6)Try the auto window UP function.

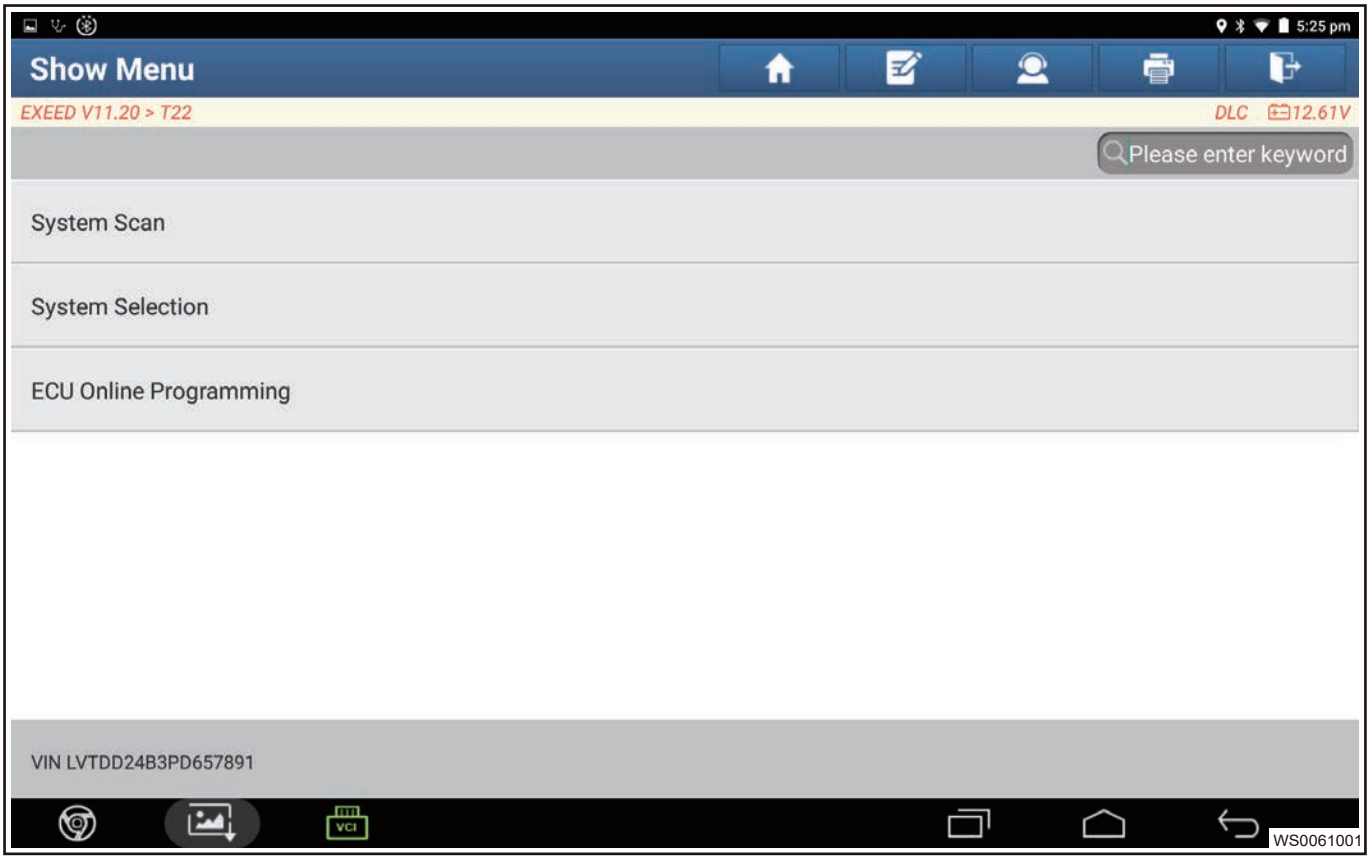
3 Matching Learning

3.1 Window Jam Protection Learning with Diagnostic Tester

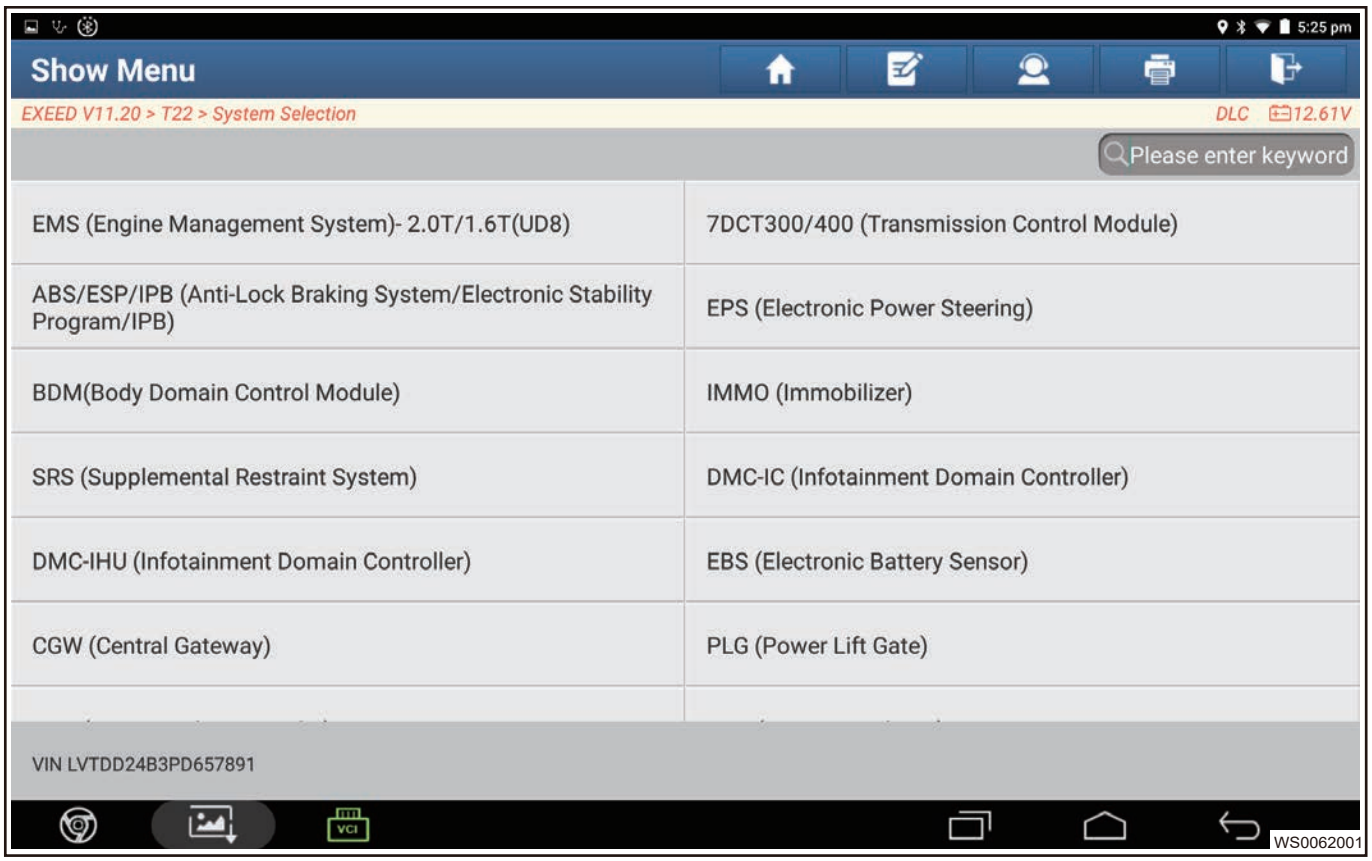
(1) Connect diagnostic tester, turn ignition switch to ON.

(2) Select the model “T22”.

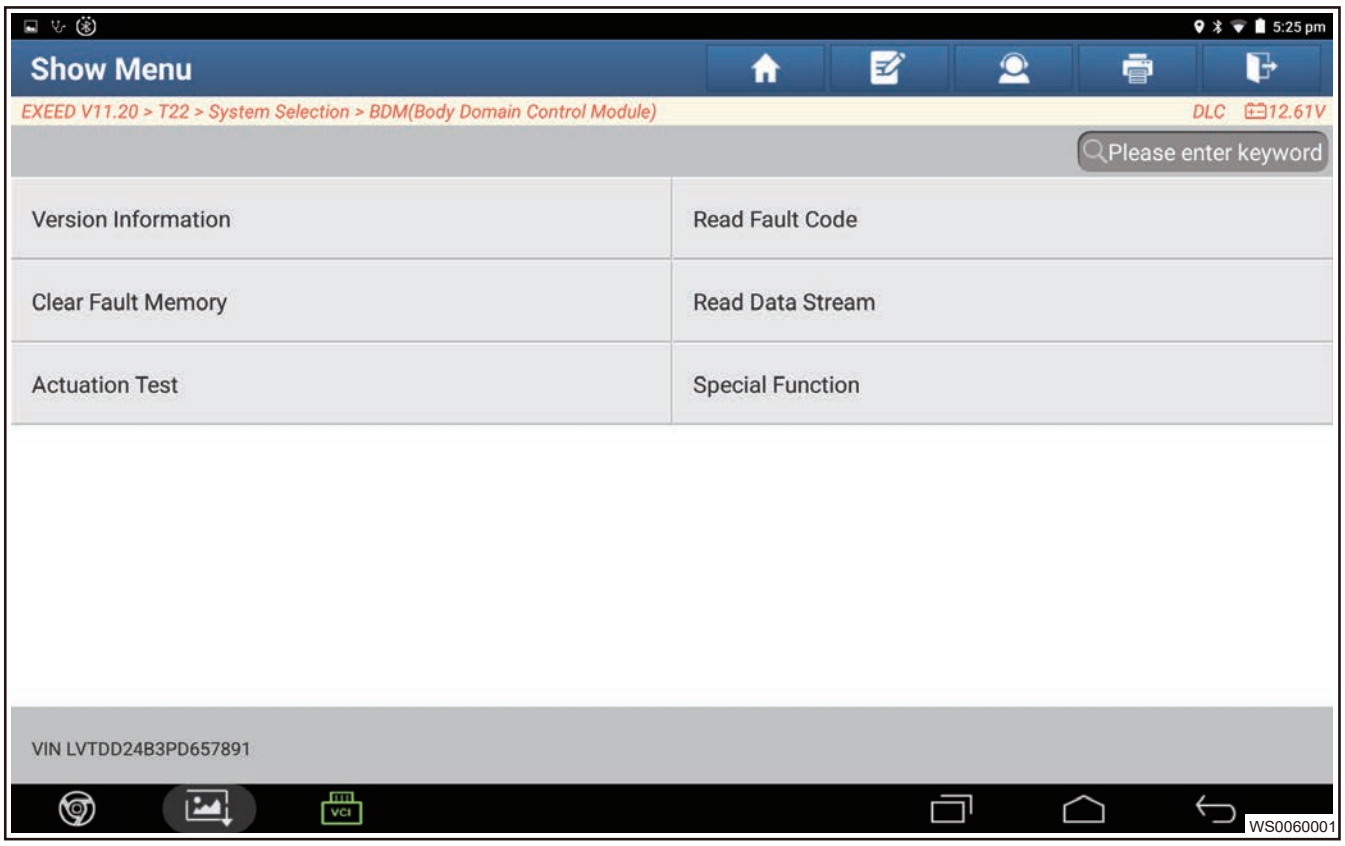
(3) Click “System Selection”.



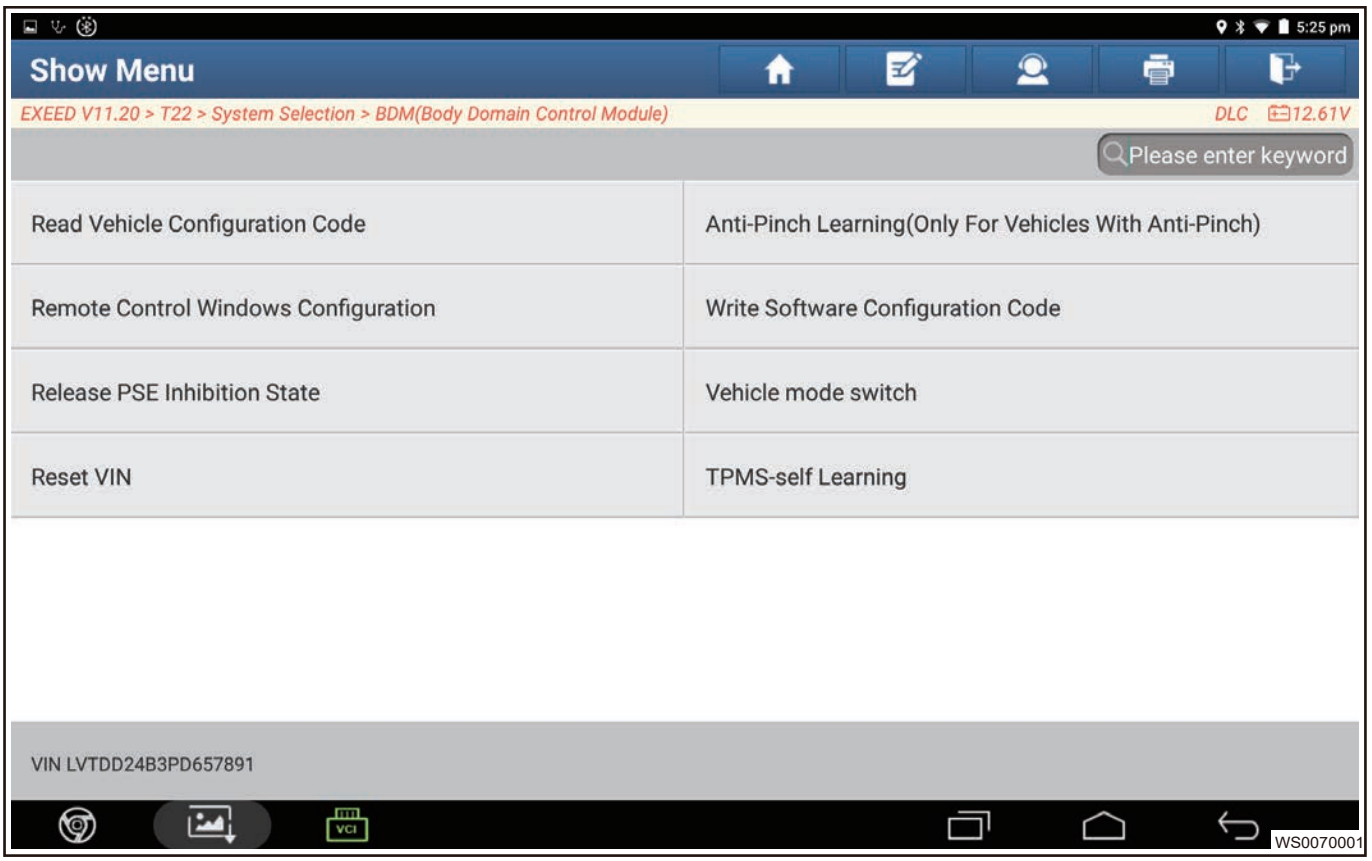
(4) Select “BDM (Body Domain Controller)” to enter next interface.



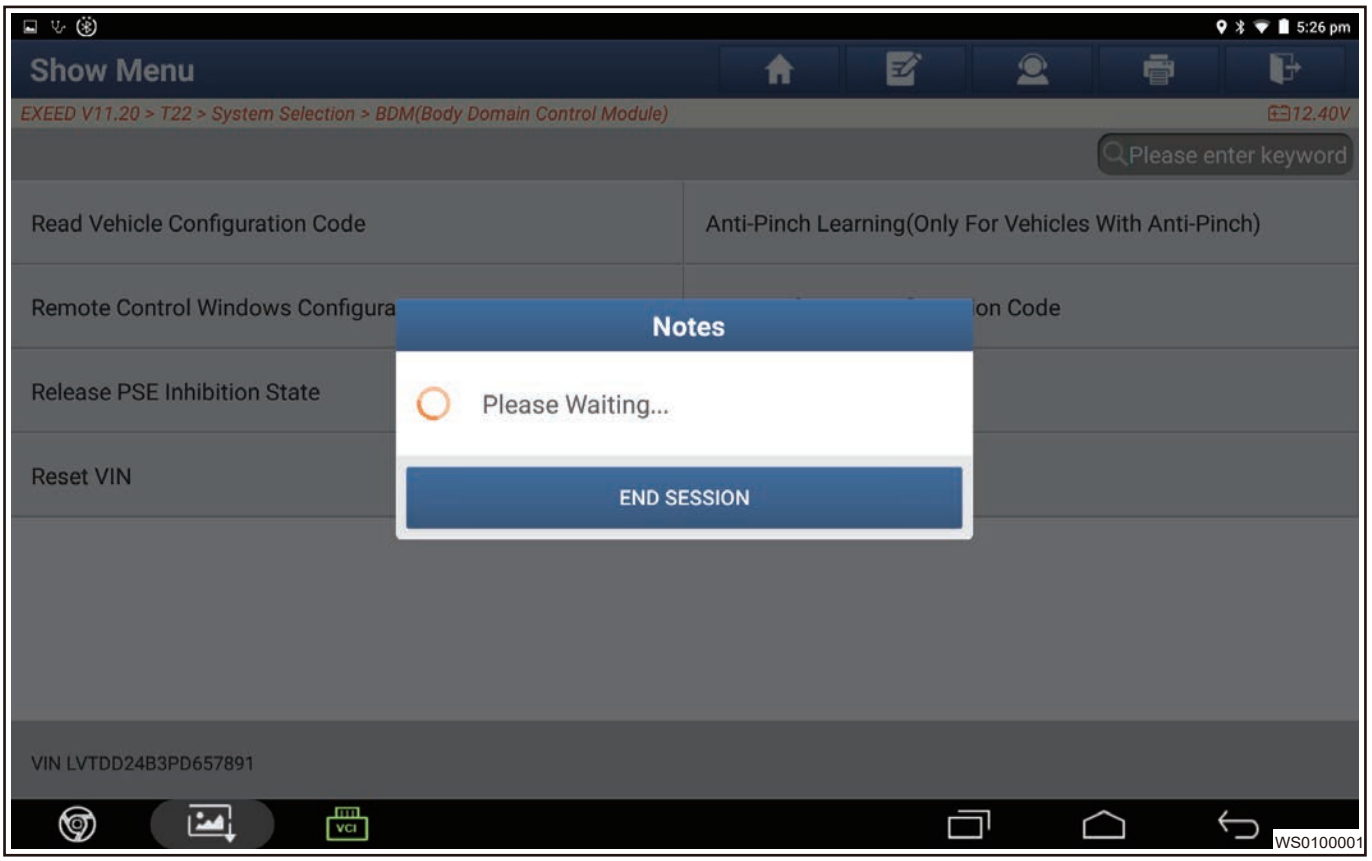
(5) Select "Special Function" on diagnostic tester interface and click it to enter.



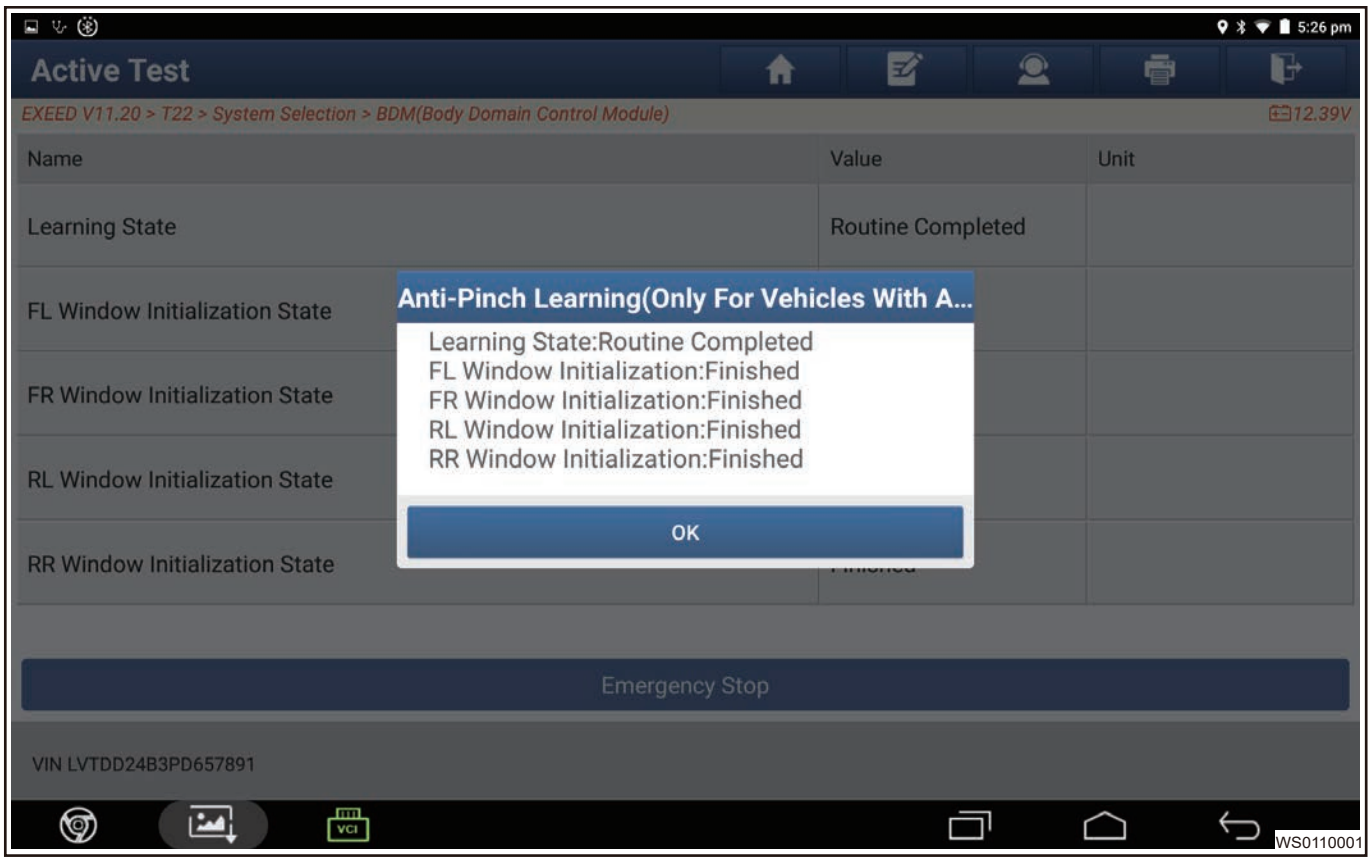
(6) Select "Anti-Pinch Learning (Only For Vehicles With Anti-Pinch)" on diagnostic tester interface and click it to enter.



(7) At this time, window jam protection learning will be performed.



(8) Window glass self-learning is succeeded.



3.2 Manual Self-learning Method for Sliding Roof

After operating the sliding roof to the fully closed position, long press the close button for 10 seconds, and then the motor reset sound "click" is heard (the sliding roof glass will move slightly back and forth), and the whole self-learning ends (if it is unsuccessful, it needs to be operated again).

3.3 Manual Self-learning Method for Sun Visor

After operating the sun visor to the fully closed position, long press the close button for 10 seconds, and then the motor reset sound "click" is heard (the sun visor will move slightly back and forth), and the whole self-learning ends (if it is unsuccessful, it needs to be operated again).

4 Diagnosis & Test

4.1 Problem Symptoms Table

■ Sliding Roof Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Sliding roof water leakage	Sliding roof weatherstrip damaged
	Drain hose clogged or folded
	Distance between sliding roof glass and roof hole is extremely large or height of glass is poor
	Sliding roof drain is clogged by foreign matters
Wind noise from sliding roof	Poor fixation of sliding roof glass and roof

Symptom	Suspected Area
	Sliding roof wind screen damaged
Abnormal starting and operation	Poor connection in wire harness, fuse or ground wire
	Poor sliding roof control unit, sliding roof motor
	Sun visor control unit, sun visor fault
	Improper installation position between sun visor mounting
	Sun visor comes off from guide rail
	Foreign matters in guide rail
Incorrect starting	Sun visor switch fault
	Poor sliding roof motor
	Sun visor comes off from guide rail, guide rail is scratched with trim strip after it is damaged
	Sun visor module fault
	Sun visor motor fault
Operating noise of sun visor	Operation is resisted when sun visor comes off from guide rail or trim strip is damaged
	Lack of grease in guide rail of sun visor
	Impact between drain hose and vehicle body
	Distance between sliding roof glass and roof hole is extremely large or height of glass is poor
	Sun visor mounting bracket deformation or improper position

■ Power Glass Problem Symptoms Table

Hint:

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Driver side/passenger side power window glass cannot be operated with driver side window regulator switch	Power supply, fuse
	Driver side window regulator switch
	Driver side/passenger side power window regulator
	Wire harness or connector
	Body Domain Controller (BDM)
Passenger side power window glass cannot be operated with passenger side window regulator control switch	Power supply, fuse
	Passenger side power window regulator switch
	Passenger side power window regulator
	Wire harness or connector
	Body Domain Controller (BDM)

Symptom	Suspected Area
Power window glass has intermittent problem	Ground
	Wire harness or connector

4.2 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect the diagnostic tester (the latest software).
(3) Turn ENGINE START STOP switch to ON.
(4) Use the diagnostic tester to record and clear DTCs stored in the system.
(5) Turn ENGINE START STOP switch to OFF and wait several seconds.
(6) Turn ENGINE START STOP switch to ON and check DTCs in the system again.
(7) If DTC is detected, it indicates current malfunction.
(8) If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.3 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.4 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.5 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the control system.

1	**Vehicle brought to workshop**

Next

2	Examine vehicle and check basic items

Check system power supply voltage, and check that fuse, wire harness and connector are connected normally.

OK

Standard voltage: Not less than 12 V.

Result

NG → **Check and replace malfunctioning parts**

OK ↓

3	Using a diagnostic tester, read related DTC and data stream information

Result

Result	Proceed to
No DTC	A
DTC occurs	B

A → **Perform troubleshooting procedure without DTCs according to malfunction symptom**

B ↓

4	Troubleshoot according to DTCs troubleshooting procedure

Result

Result	Proceed to
Problem is not resolved	A
Problem is resolved	B

A → **Return to procedure 1 and troubleshoot the process again**

B ↓

5	According to system malfunction repair completion inspection and delivery, confirm if malfunction is resolved.

Result

Result	Proceed to
Delivery inspection is failed	A
Delivery inspection is qualified	B

A	Return to procedure 1 and troubleshoot the process again

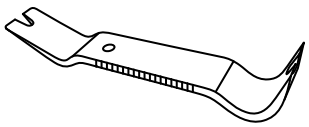
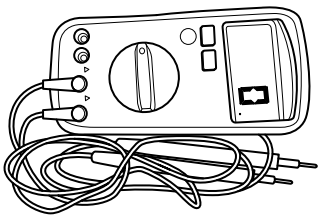
B

6	Finished

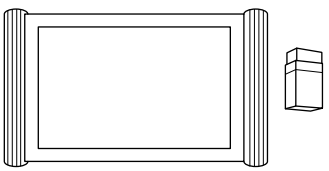
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 RCH002506
Digital Multimeter	 RCH0002006

■ Special Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

5.2 Specifications

■ Torque Specifications

Description	Torque (N · m)
Sliding Roof Mounting Bracket Fixing Bolt	10 ± 1.5
Glass Assembly Bracket Fixing Screw	5 ± 0.5
Front Door Glass Rear Guide Rail Fixing Bolt	7 ± 1.0
Power Window Regulator Fixing Nut	7 ± 1.0
Rear Door Glass Rear Guide Rail Fixing Bolt	7 ± 1.0

5.3 Front Left Door Power Window Regulator Switch

■ Removal

⚠ Caution

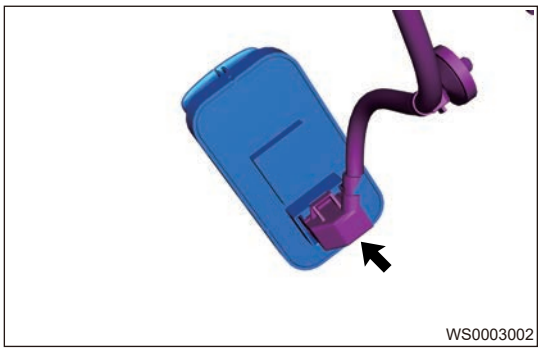
- **Be sure to wear safety equipment to prevent accidents, when removing front left door power window regulator switch.**
- **Appropriate force should be applied when removing front left door window regulator switch. Be careful not to operate roughly.**
- **Try to prevent front door inner protector assembly from being scratched, when removing front left door window regulator switch.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front left door protector assembly.

(4) Disconnect front left door window regulator switch wire harness connector, remove front left door window regulator switch.



■ Inspection

(1) Check the front left door window regulator switch.

1) Using a digital multimeter, check for continuity between terminals of front left door window regulator switch.

Component	Multimeter Connection	Switch Condition	Specified Condition
Front Left Door Window Regulator Switch	1 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Front Right Door Window Regulator Switch	2 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear Left Door Window Regulator Switch	3 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear Right Door window regulator Switch	4 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω

2) If result is not as specified, replace front left door window regulator switch.

■ **Installation**

⚠ Caution

- **Check if connector is correctly installed, when installing front left door window regulator switch.**
- **Check if front left door window regulator switch can be operated normally after installation.**

(1) Connect the window regulator switch wire harness connector.

(2) Install window regulator switch in installation position.

(3) Install the front left door protector assembly.

(4) Connect the negative battery cable.

5.4 Front Door Weather Bar

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front door weather bars.**
- **Appropriate force should be applied when removing front door weather bars. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing front door weather bars.**

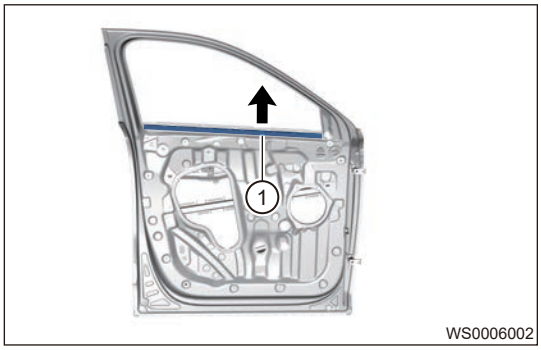
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front left door inner weather bar.

1) Remove the front left door inner protector assembly.

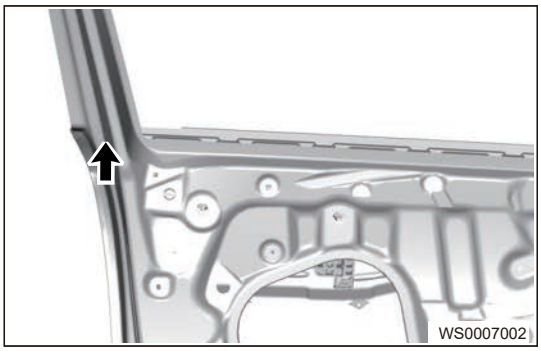
2) Using an interior crow plate, remove front door inner weather bar (1) from slot in direction of arrow.



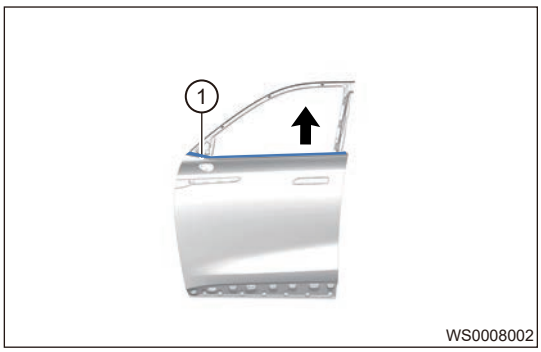
(4) Remove the front left door outer weather bar.

1) Remove the outside rear view mirror assembly.

2) Remove 1 fixing screws (arrow).



3) Using an interior crow plate, remove front door outer weather bar (1) from slot in direction of arrow.



■ Installation

(1) Install front door weather bar in installation position.

(2) Tighten 1 fixing screw to front door outer weather bar.

(3) Install the outside rear view mirror assembly

(4) Install the front door inner weather bar.

(5) Install the front door protector assembly.

(6) Connect the negative battery cable.

5.5 Front Door Upper Glass Run

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front door glass upper run.**
- **Appropriate force should be applied, when removing front door glass upper run. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

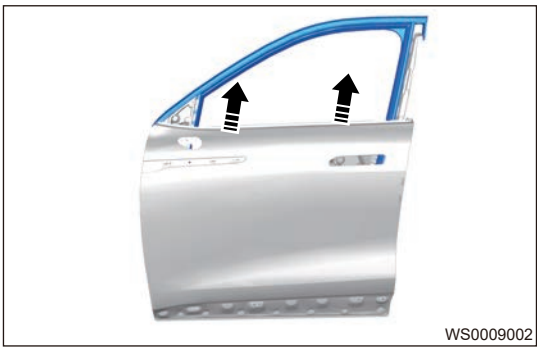
(3) Remove the front left door inner protector assembly.

(4) Remove the left outside rear view mirror assembly.

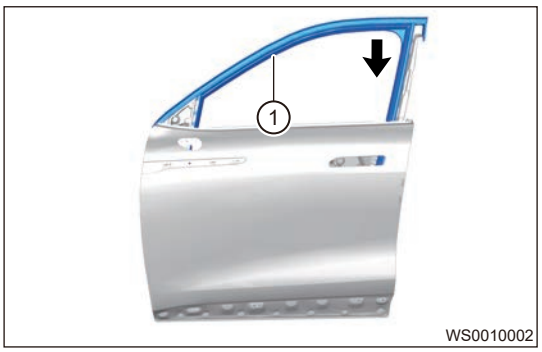
(5) Remove the front left door weather bar.

(6) Remove the front left door glass upper run.

1) Lower the front door glass assembly and pull the lower part of front door upper glass run out from slot in direction of arrow.



2) Remove front left door glass upper run (1) from slot in direction of arrow as shown in illustration.



■ Installation

(1) Clip the front door upper glass run into the mounting slot.

(2) Insert the lower part of the front door upper glass run into the installation position.

(3) Install the front door weather bar.

(4) Install the left outside rear view mirror assembly.

(5) Install the front left door inner protector assembly.

(6) Connect the negative battery cable.

5.6 Front Door Glass Assembly

■ Removal

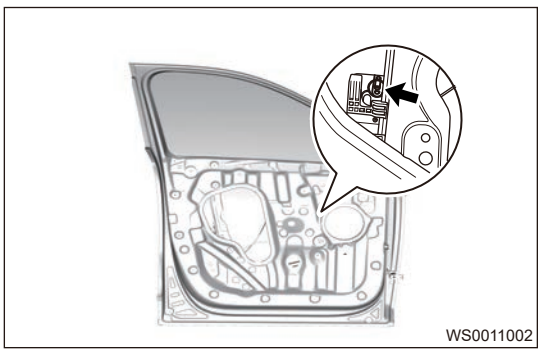
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front door glass assembly.**
- **Appropriate force should be applied when removing front door glass assembly. Be careful not to operate roughly.**
- **Try to prevent window glass from dropping which will cause damage, when removing front door glass assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left door inner protector assembly.
(4) Remove the front left door protective film assembly.
(5) Remove the front left door weather bar.
(6) Remove the front left door glass assembly.
1) Raise front door glass assembly to a proper position.
2) Using a screwdriver wrapped with protective tape, detach the fixing clip (arrow) from front door glass assembly and remove the front left door glass assembly.


WS0011002

■ Installation

(1) Carefully install front door glass assembly in installation position, align fixing clips and make sure it is installed in place.
(2) Install the front left door weather bar.
(3) Install the front left door protective film assembly.
(4) Install the front left door inner protector assembly.
(5) Connect the negative battery cable.

5.7 Front Door Rear Glass Guide Rail Assembly

■ Removal

Hint:

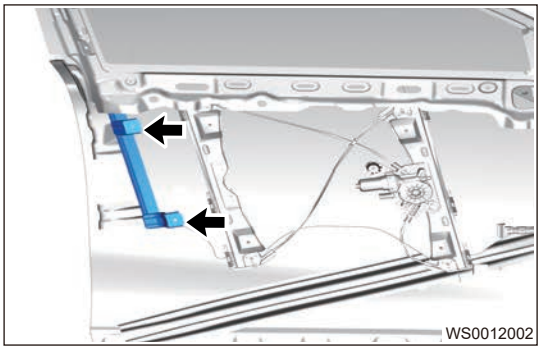
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front door rear glass guide rail assembly.**
- **Appropriate force should be applied, when removing front door rear glass guide rail assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left door inner protector assembly.
(4) Remove the front left door protective film assembly.
(5) Remove the front left door weather bar.
(6) Remove the front left door rear glass assembly.
(7) Remove the front door rear glass guide rail assembly.

1) Remove 2 fixing bolts (arrow) from front door glass rear guide rail assembly, and remove front left door glass rear guide rail assembly.



■ **Installation**

(1) Install front door glass rear guide rail assembly in installation position.

(2) Tighten 2 fixing bolts to front door glass rear guide rail assembly.

Tightening torque: 7 ± 1.0 N · m

(3) Install the front left door rear glass assembly.

(4) Install the front left door weather bar.

(5) Install the front left door protective film assembly.

(6) Install the front left door inner protector assembly.

(7) Connect the negative battery cable.

• **After installing front door rear glass guide rail assembly, make sure that window glass can go up and down smoothly and freely without any vibration, chattering or shock loading, etc.**

5.8 Front Door Power Window Regulator

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ **Caution**
• **Be sure to wear safety equipment to prevent accidents, when removing front door power window regulator.** • **Appropriate force should be applied when removing front door power window regulator. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front left door inner protector assembly.

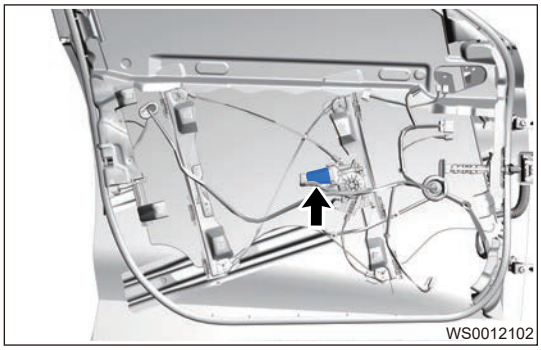
(4) Remove the front left door protective film assembly.

(5) Remove the front left door weather bar.

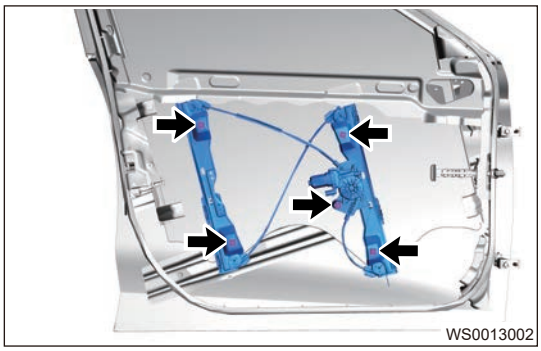
(6) Remove the front left door glass assembly.

(7) Remove the front left door power window regulator.

1) Disconnect the front door power window regulator connector (arrow).


WS0012102

2) Remove 5 fixing nuts from front door power window regulator, and remove front left door power window regulator assembly.

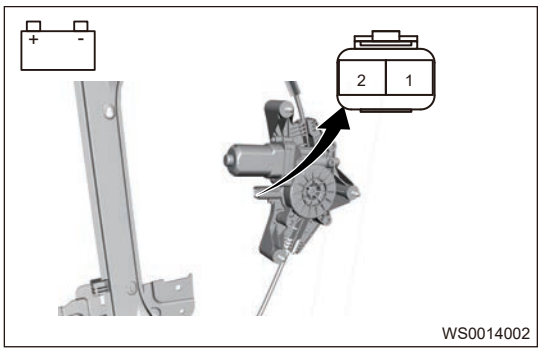

WS0013002

■ Inspection

(1) Check the front door power window regulator.

1) Apply battery voltage to the terminals of power window regulator motor connector, and check the operation of front door power window regulator motor according to table below.

Battery positive (+)	Battery Negative (-)	Specified Condition
1	2	UP smoothly
2	1	DOWN smoothly



WS0014002

2) If result is not as specified, replace front door power window regulator.

■ Installation

(1) Install front door power window regulator in installation position.

(2) Tighten 5 fixing nuts to front door power window regulator.

Tightening torque: 7 ± 1 N·m

(3) Connect the front door power window regulator wire harness connector

(4) Install the front left door glass assembly.

(5) Install the front left door weather bar.

(6) Install the front left door protective film assembly.

(7) Install the front left door inner protector assembly.

(8) Connect the negative battery cable.

⚠ Caution

- **After installing front door power window regulator is installed, make sure that window glass can go up and down smoothly and freely without any vibration, chattering or shocking, etc.**

5.9 Rear Left Door Power Window Regulator Switch

■ Removal

Hint:

- Use same procedures for front right, rear right and rear left sides.
- Procedures listed below are for rear left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing power window regulator switch.**
- **Appropriate force should be applied when removing power window regulator switch. Be careful not to operate roughly.**
- **Try to prevent door inner protector assembly from being scratched, when removing power window regulator switch.**

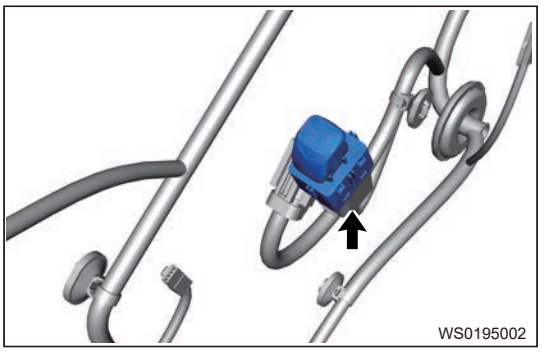
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear left door inner protector assembly.

(4) Remove the rear left power window regulator switch.

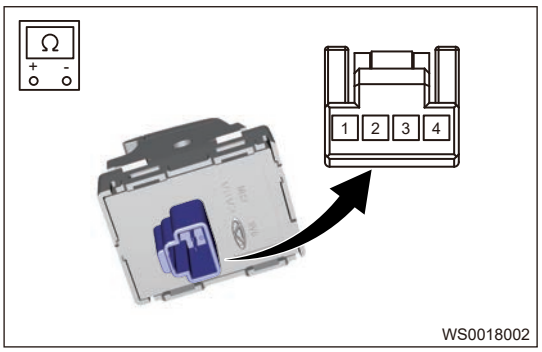
1) Disconnect wire harness connector to remove rear left power window regulator switch.



■ Inspection

(1) Check the power window regulator switch.

1) Using a digital multimeter, check for continuity between terminals of other three power window regulator switches according to table below.



Component	Multimeter Connection	Switch Condition	Specified Condition
Front Right Door Window Regulator Switch	2 - 1	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear Left Door Window Regulator Switch	2 - 1	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear Right Door Window Regulator Switch	2 - 1	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω

Component	Multimeter Connection	Switch Condition	Specified Condition
		Manual UP	3000 Ω
		Auto UP	1500 Ω

2) If result is not as specified, replace power window regulator switch.

■ **Installation**

⚠ Caution

- **Check if connector is installed in place, when installing power window regulator switch.**
- **Check if power window regulator switch can be operated normally after installation.**

(1) Install rear left power window regulator switch in installation position.
(2) Connect the rear left power window regulator switch wire harness connector.
(3) Install the rear left door inner protector assembly.
(4) Connect the negative battery cable.

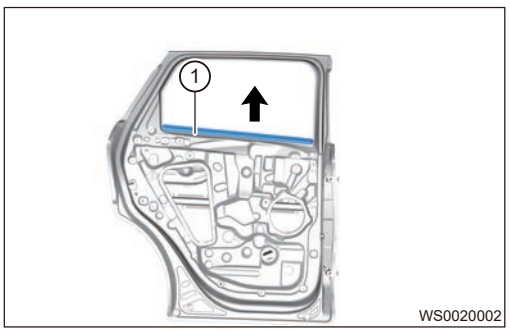
5.10 Rear Door Weather Bar

■ **Removal**

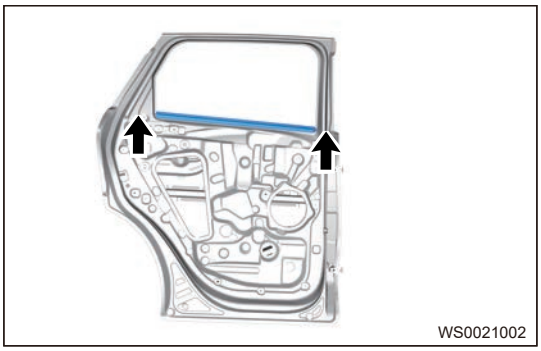
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing rear door weather bars.**
- **Appropriate force should be applied when removing rear door weather bars. Be careful not to operate roughly.**

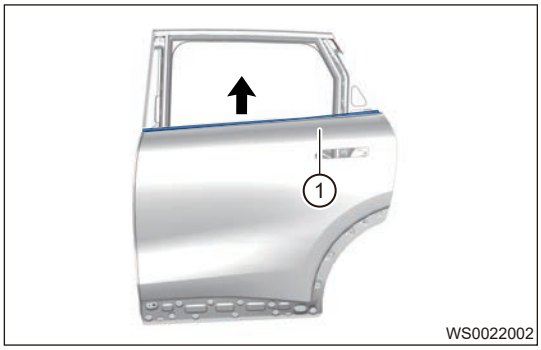
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear left door inner weather bar.
1) Remove the rear left door inner protector assembly.
2) Using an interior crow plate, remove rear door inner weather bar (1) from slot in direction of arrow.



(4) Remove the rear left door outer weather bar.
1) Remove 2 fixing screws (arrow).



2) Using an interior crow plate, remove rear door outer weather bar (1) from slot in direction of arrow.



■ Installation

(1) Install rear left door outer weather bar in installation position.
(2) Tighten 2 fixing screws to rear left door outer weather bar.
(3) Install rear left door inner weather bar in installation position.
(4) Install the rear left door inner protector assembly.
(5) Connect the negative battery cable.

5.11 Rear Door Upper Glass Run

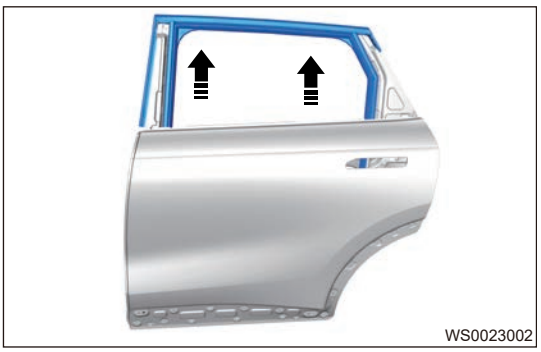
■ Removal

Hint:

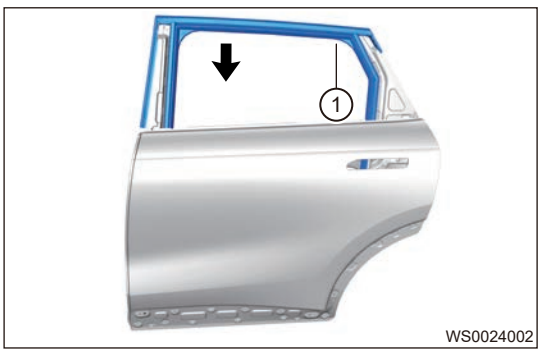
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear left door weather bar.
(4) Remove the rear left door glass upper run.

1) Lower rear door glass assembly and pull lower part of rear door upper glass run out from slot in direction of arrow.



2) Remove rear left door glass upper run (1) in direction of arrow as shown in illustration.



■ Installation

(1) Install upper part of rear left door glass upper run to fixing slot.
(2) Insert lower part of rear left door glass upper run into installation position.
(3) Install the rear left door weather bar.

(4) Connect the negative battery cable.

5.12 Rear Door Glass Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear left door inner protector assembly.

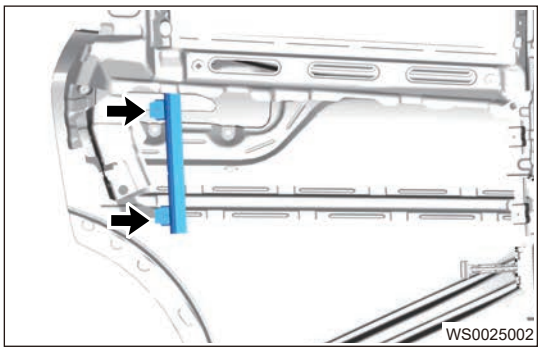
(4) Remove the rear left door protective film assembly.

(5) Remove the rear left door weather bar.

(6) Remove the rear left door glass upper run.

(7) Remove the rear left door glass rear guide rail assembly.

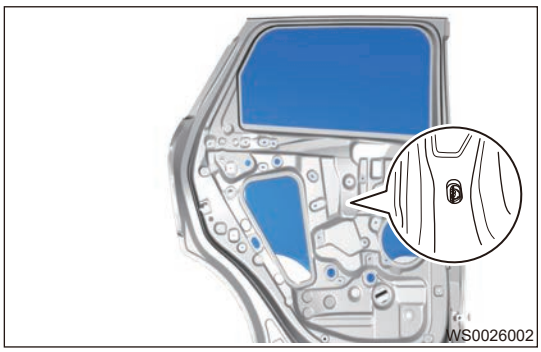
1) Remove 2 fixing screws and 1 fixing bolt (arrow) from rear left door guide rail, and remove rear left door glass guide rail.



(8) Remove the rear left door glass assembly.

1) Raise front door glass assembly to a proper position.

2) Detach snap pin from rear door glass assembly, and remove rear left door glass assembly.



■ Installation

(1) Carefully insert the rear left door glass assembly into the installation position, make sure it is inserted into the fixing clips and installed in place.

(2) Install rear left door glass rear guide rail assembly in installation position.

(3) Tighten 2 fixing bolts to rear left door glass rear guide rail assembly.

(4) Install the rear left door glass upper run.

(5) Install the rear left door weather bar.

(6) Install the rear left door protective film assembly.

(7) Install the rear left door inner protector assembly.

(8) Connect the negative battery cable.

⚠ Caution

- **Try to prevent window glass from dropping which will cause damage, when installing rear door glass assembly.**

5.13 Rear Door Power Window Regulator

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing rear door power window regulator.**
- **Appropriate force should be applied when removing rear door power window regulator. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear left door inner protector assembly.

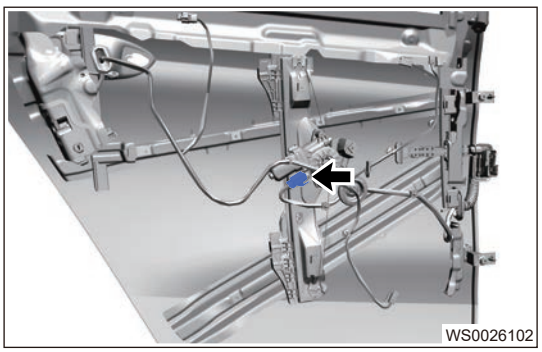
(4) Remove the rear left door protective film assembly.

(5) Remove the rear left door weather bar.

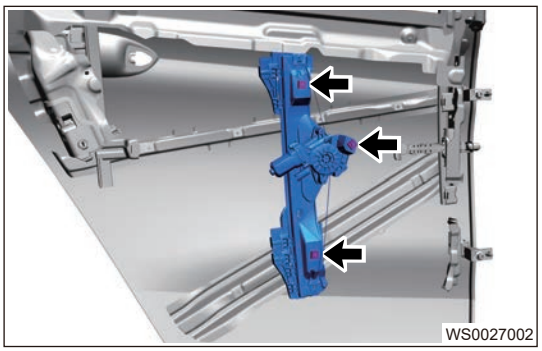
(6) Remove the rear left door glass assembly.

(7) Remove the rear left door power window regulator.

1) Disconnect the rear door power window regulator connector (arrow).



2) Remove 3 fixing nuts (arrow) from rear door power window regulator.



■ Installation

(1) Install rear door power window regulator in installation position.

(2) Tighten 3 fixing bolts to rear door power window regulator.

Tightening torque: 7 ± 1 N · m

(3) Connect the rear door power window regulator wire harness connector.

(4) Install the rear left door glass assembly.

(5) Install the rear left door weather bar.

(6) Install the rear left door protective film assembly.

(7) Install the rear left door inner protector assembly.

(8) Connect the negative battery cable.

⚠ Caution

- **After installing rear door power window regulator, make sure that window glass can go up and down smoothly and freely without any vibration, chattering or shocking, etc.**

5.14 Front Windshield Assembly

■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the roof assembly.

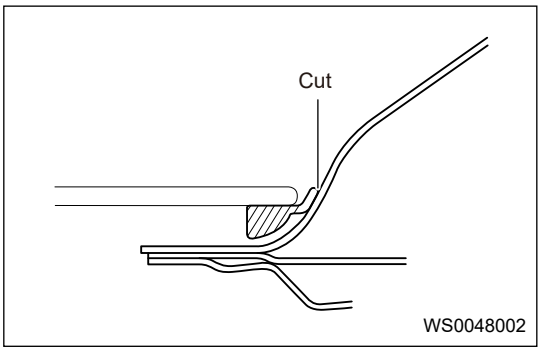
⚠ Caution

- **It is not necessary to completely remove the roof assembly. Lower the front part of roof assembly, so that front windshield assembly can be removed.**

(4) Remove the inside rear view mirror assembly.
(5) Remove the wiper arm assembly.
(6) Remove the front windshield lower trim panel assembly.
(7) Remove the front windshield weatherstrip.
(8) Remove the front windshield assembly.
1) Using a knife, cut off the adhesive.

⚠ Caution

- **Try to prevent body paint surface from being scratched, when cutting off the adhesive.**



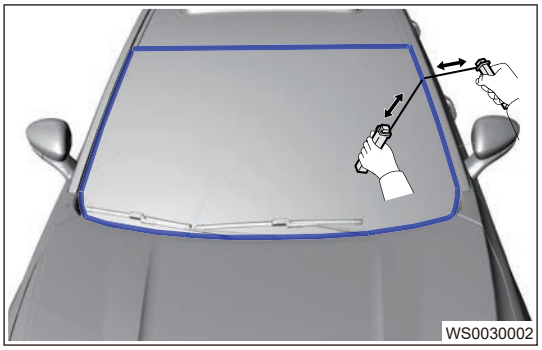
2) Apply protective tape to the outer surface of body to prevent scratches.

⚠ Caution

- **To prevent instrument panel upper body assembly from being scratched, place a plastic sheet between piano wire and instrument panel upper body assembly.**

3) Pass a piano wire through the seam between body and front windshield assembly.

4) Tie wooden blocks or similar objects to both piano wire ends, cut off the adhesive by pulling the piano wire around front windshield assembly, and remove the front windshield assembly.

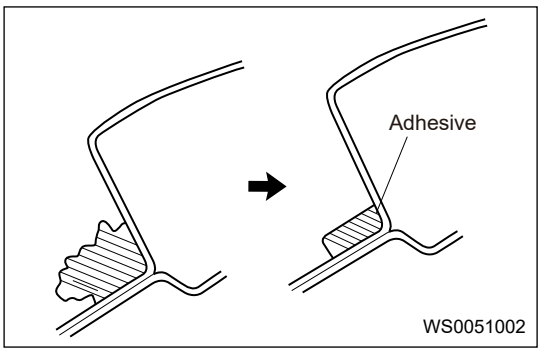


⚠ Caution

- **When removing front windshield assembly, an assistant is needed.**
- **When removing front windshield assembly, prevent it from dropping.**
- **Leave as much adhesive on the body as possible when cutting off the adhesive.**
- **When separating front windshield assembly from vehicle, be careful not to damage body paint, interior and exterior ornaments.**

(9) Clean the vehicle body.

1) Using a knife, cut off any excess adhesive on the contact surface of vehicle body as shown in illustration.



⚠ Caution

- **Try to prevent body paint surface from being scratched, when cutting off the adhesive.**
- **Leave as much adhesive on the body as possible, when cutting off the adhesive.**

2) Clean the contact surface of vehicle body with cleaner.

⚠ Caution

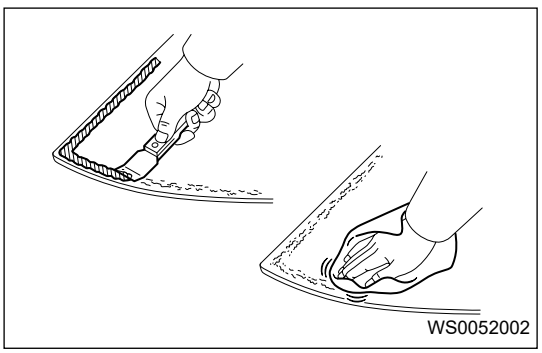
- **Even if all adhesive has been removed, cleaning of vehicle body would be necessary.**

(10) Clean the removed glass.

⚠ Caution

- **DO NOT touch the glass after cleaning it.**
- **Even if a new glass is used, it is necessary to clean it with glass cleaner.**

1) Using a scraper, remove the adhesive sticking to glass.



2) Clean the outer edges of glass with cleaner.

■ Installation

Installation Condition

- Scan the code to confirm the part number and name before assembly, check the number of accessories and whether stopper is lost and whether small cracks or bubbles exist around windshield. Never install unqualified windshield to vehicle.
- Check if gum application surface on the sheet metal is flat before assembly.
- After glass is applied with gum, check if the glass gum is applied uniformly, especially at the corner of glass. Never load the glass of which gum is not applied uniformly.

(1) Wipe the sheet metal primer area matched with the windshield with alcohol cloth and make sure width is 20 - 24 mm.

(2) Apply sheet metal primer A11-4105013 and make sure application width is 19 - 21 mm; Do not expose it in the air before applying the sheet metal primer.

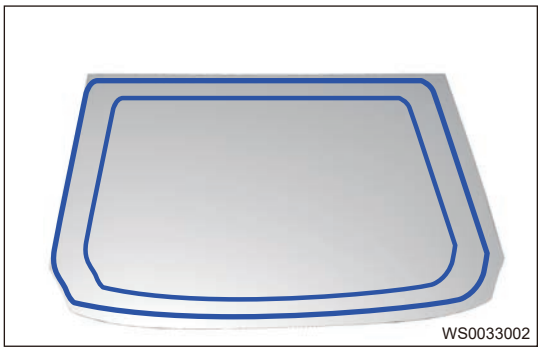
(3) Using cleaner A11-4105017 (accelerant), clean the area around gum application and make sure cleaning width is 15 - 17 mm.

(4) Apply A11-4105015 windshield primer (tolerance ± 1mm) along the glue line on the glass. Make sure application width is 13 - 15 mm. Apply gum A11-4105011 along the glue line in the center of the glue line at the lower part of the windshield. Make sure the gum width is 7 - 9 mm, height is 11 - 13 mm and the height after being compressed is 5 - 7 mm. There should be no uneven gum and gum deviation from application line before assembly. There also no gum leakage or fluid overflowing after assembly; if gum overflowing from glass occurs, it is necessary to remove it.

(5) Align dowel pins of front windshield with corresponding set holes for windshield installation on sheet metal of tonneau cover. Install the windshield, make sure to fix the upper end first and then make it contact the lower end (be careful to avoid impact to the glass and wrinkles to weatherstrips during assembly, and weatherstrips is matching with sheet metal well).

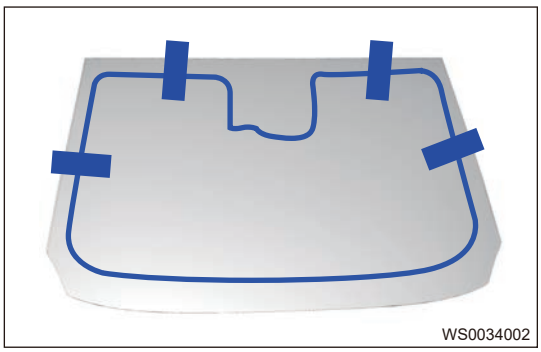
(6) Fine tuning glass left and right to make sure clearance between glass edges and tonneau cover and quarter is uniform and meets the requirements of DTS (NOTE: Stand at the center of front left wheel to observe windshield VIN code).

1) Slightly tap four sides of glass (within 100 - 200 mm from coil to outside edge of glass as shown in illustration) to install glass into place (height after being compressed is 5 - 7 mm).


WS0033002

2) Apply tape (4 positions, length of tape is 150 - 200 mm) to prevent glass from sliding.

Hint:
In order to avoid blocking the wiper blade after tape is applied, it is required that the length of adhesive tape remaining on the glass shall not exceed 100 mm on the top of glass, and the length of quarter part shall be between 40 and 60.


WS0034002

(7) Install the front windshield lower trim board assembly.

(8) Install the wiper arm assembly.

(9) Install the inside rear view mirror assembly.

(10) Install the roof assembly.

(11) Connect the negative battery cable.

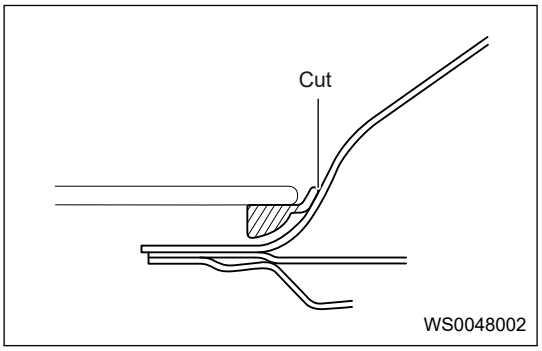
5.15 Rear Windshield Assembly

■ Removal

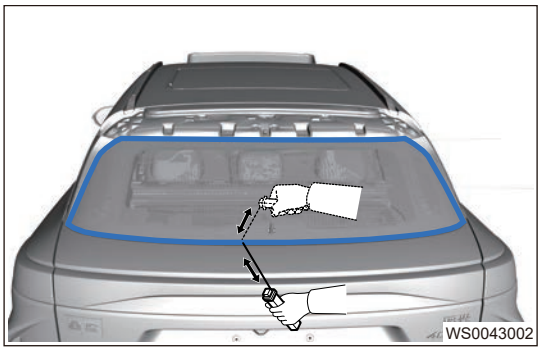
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear door protector assembly.
(4) Remove the rear windshield weatherstrip.
(5) Remove the rear windshield assembly.
1) Using a knife, cut off the adhesive.

⚠ Caution

- **Try to prevent body paint surface from being scratched, when cutting off the adhesive.**



2) Apply protective tape to the outer surface of body to prevent scratches.
3) Pass a piano wire through the seam between body and rear windshield assembly.
4) Tie wooden blocks or similar objects to both piano wire ends, cut off the adhesive by pulling the piano wire around rear windshield assembly, and remove the rear windshield assembly.



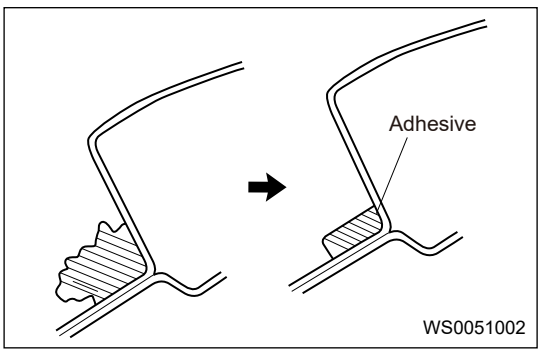
⚠ Caution

- **When removing rear windshield assembly, two persons are required.**
- **When removing rear windshield assembly, prevent it from dropping.**
- **Leave as much adhesive on the body as possible when cutting off the adhesive.**
- **When separating rear windshield assembly from vehicle, be careful not to damage body paint, interior and exterior ornaments.**

(6) Clean the vehicle body.
1) Using a knife, cut off any excess adhesive on the contact surface of vehicle body as shown in illustration.

⚠ Caution

- **Try to prevent body paint surface from being scratched, when cutting off the adhesive.**
- **Leave as much adhesive on the body as possible, when cutting off the adhesive.**



2) Clean the contact surface of vehicle body with cleaner.

⚠ Caution

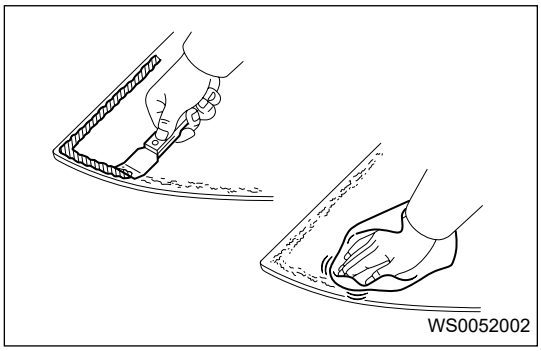
- **Even if all adhesive has been removed, cleaning of vehicle body would be necessary.**

(7) Clean the removed glass.

⚠ Caution

- **DO NOT touch the glass after cleaning it.**

1) Using a scraper, remove the adhesive sticking to glass.



2) Clean the outer edges of glass with glass cleaner.

■ Installation

(1) Detailed description and technology requirements during assembly.

1) Before assembling, check the number of accessories and whether stopper is lost and whether small cracks or bubbles exist around windshield. Never install unqualified windshield to vehicle.
2) Check if gum application surface on the sheet metal is flat before assembly.
3) After glass is applied with gum, check if the glass gum is applied uniformly, especially at the corner of glass. Never load the glass of which gum is not applied uniformly.

(2) Assembly order:

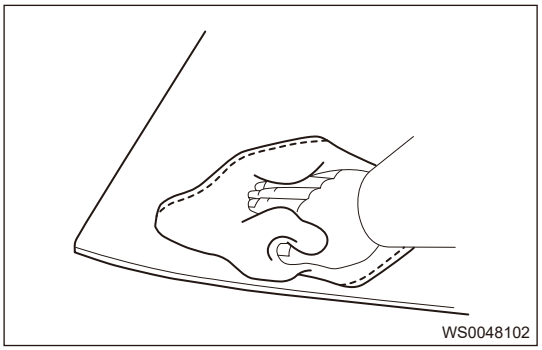
1) Wipe the primer area with alcohol cloth and width is 20 - 24 mm;
2) Apply sheet metal primer A11-4105013 to the center position of sheet metal installation area and make sure application width is 19 - 21 mm; Do not expose it in the air before applying the sheet metal primer.
3) Using cleaner A11-4105017 (accelerant), clean the area around gum application and make sure cleaning width is 15 - 17 mm;
4) Apply A11-4105015 windshield primer (tolerance ± 1 mm) on the application position around rear windshield. Make sure application width is 13 - 15 mm. Apply gum A11-4105011 from center lower position along application line. Make sure the gum width is 7 - 9 mm, height is 11 - 13 mm and the height after being compressed is 5 - 7 mm. There should be no uneven gum and gum deviation from application line before assembly and no gum leakage or fluid overflowing after assembly; if gum overflowing from glass occurs, it is necessary to remove it;
5) Align dowel pins of rear back door with corresponding set holes for windshield mounting on metal sheet of back door outer panel to install the windshield (be careful to avoid impact to the glass during assembly);
6) Fine tuning glass to make sure clearance between glass edges is uniformly. Slightly tap four sides of glass to install glass into place (height after being compressed is 5 - 7 mm) and apply tape (see 4 positions in the figure, length of tape is 150 - 200 mm) to prevent glass from shaking.
7) After installation, connect wire harness connector and tongue on the glass, and confirm the installing condition.

(3) Clean the contact surface of rear windshield.

⚠ Caution

- **DO NOT touch the surface of rear windshield after cleaning it.**

1) Remove any residue on the contact surface of rear windshield with a clean, lint-free cloth soaked with cleaner.

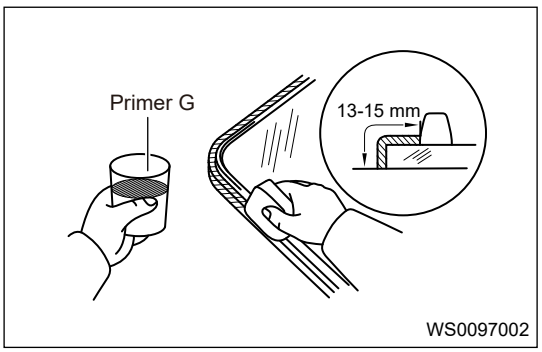


(4) Apply a coat of primer to the contact surface of rear windshield assembly.

⚠ Caution

- **Allow primer to dry for at least 3 minutes.**
- **DO NOT apply primer to the adhesive.**
- **DO NOT apply too much primer.**
- **DO NOT keep any opened primer for later use.**

1) Using a brush, apply a coat of primer to glass edge and contact surface.
2) Wipe off any excess primer with a clean cloth before drying.
3) Width of primer is 13 to 15 mm.



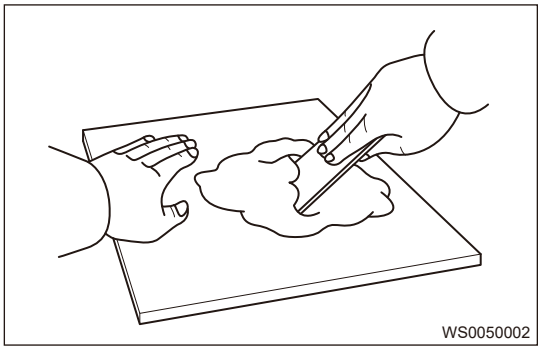
(5) Mix the adhesive.

⚠ Caution

- **Adhesive should be mixed thoroughly within 5 minutes.**

1) Using a solvent, thoroughly clean the mixing board and scraper.

2) Using a scraper, thoroughly mix 500 g main adhesive and 75 g hardener on the mixing board.

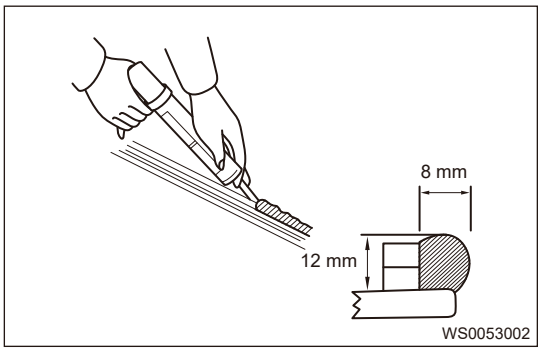


(6) Apply the adhesive.

1) Cut off the tip of cartridge nozzle and add adhesive.
2) Install the cartridge to sealer gun.
3) Apply adhesive evenly to rear windshield assembly as shown in illustration.

   Adhesive width: 8 mm

   Adhesive height: 12 mm

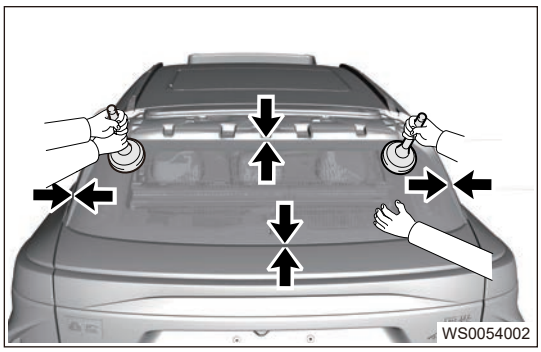


(7) Install the rear windshield assembly.

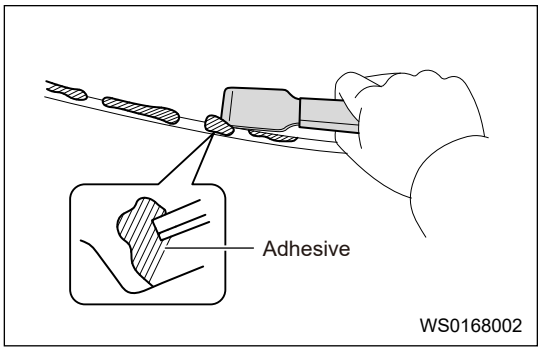
⚠ Caution

- **Check that upper-and-lower clearance and right-and-left clearance of rear windshield assembly are uniform, to ensure good fitting with weatherstrips all around.**

1) Align the matchmarks on glass and vehicle body, and gently press in glass along the edge.



2) Using a scraper, uniformly apply adhesive to the glass edge.



3) Remove any excess or spilled adhesive with the scraper.
4) Apply tape all the way around, and do not remove them until the adhesive hardens.

(8) Check and repair the sealing of glass.
1) Check the glass for leakage after adhesive has completely hardened.
2) If it leaks, seal the leaks by adding adhesive.

(9) Connect the negative battery cable.

5.16 Sliding Roof Switch Assembly

■ Removal

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing sliding roof switch assembly.**
- **Try to prevent interior from being scratched during operation, when removing sliding roof switch assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the sliding roof switch assembly.
1) Using an interior crow plate, remove sliding roof switch assembly and disconnect wire harness connector.

■ Installation

(1) Connect sliding roof switch assembly wire harness connector.
(2) Install sliding roof switch assembly in installation position.
(3) Connect the negative battery cable.

⚠ Caution

- **Make sure that sliding roof switch functions properly, after installing sliding roof switch assembly.**

5.17 Sliding Roof Glass Motor

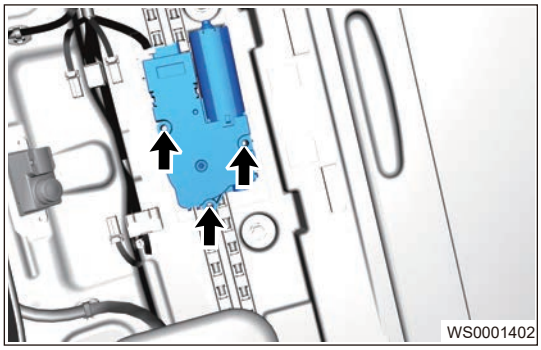
■ Removal

⚠ Caution

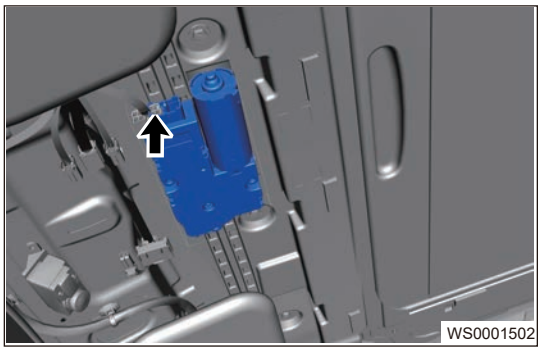
- **Be sure to wear safety equipment to prevent accidents, when removing sliding roof glass motor.**
- **Appropriate force should be applied, when removing sliding roof glass motor. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the roof assembly.
(4) Remove the sliding roof glass motor.

1) Remove 3 fixing screws (arrow) from sliding roof glass motor assembly.



2) Disconnect wire harness connector (arrow) from sliding roof glass motor assembly.



3) Remove the sliding roof glass motor assembly.

■ **Installation**

⚠ Caution

- **Connect connector in place and tighten fixing screw to specified torque, when installing sliding roof glass motor assembly.**
- **After sliding roof glass motor is installed, there should be no abnormal noise and resistance when opening and closing the sliding roof glass.**

(1) Connect sliding roof glass motor assembly wire harness connector.
(2) Install sliding roof glass motor assembly in installation position.
(3) Tighten 3 fixing screws to sliding roof glass motor assembly.
(4) Install the roof assembly.
(5) Connect the negative battery cable.

5.18 Sliding Roof Glass

■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing sliding roof glass.**
- **Appropriate force should be applied when removing sunroof glass. Be careful not to operate roughly to prevent sunroof glass from being damage.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the sliding roof glass.
  1) Open the sun visor in direction of arrow
  2) Remove 4 fixing bolts from left side of sliding sunroof glass. (Use same method for right side)
  3) Remove the sliding sunroof glass carefully from the roof.

■ **Installation**

⚠ Caution

- **The matching levelness tolerance between sliding roof front glass and tonneau cover is -2.5 - 0 mm, matching levelness tolerance between sliding roof front glass and rear glass is 0 - 2.5 mm, matching levelness tolerance between sliding roof rear glass and tonneau cover is -1 - 2 mm.**
- **When the matching between the glass of sliding roof and tonneau cover does not meet the requirements, the sliding roof is adjusted by two operators (one operator inside the vehicle to adjust and one operator outside the vehicle to assist). The operator inside the vehicle should adjust height of sliding roof according to the instructions of operator outside the vehicle, so that it reaches the matching requirements with tonneau cover. When the person outside the vehicle indicates that the matching requirement has been achieved, the person inside the vehicle then tightens the screw (-torque 5 ± 0.5 N·m).**

(1) Carefully install sliding roof assembly in installation position.

(2) Install 4 fixing bolts on left side of sliding sunroof glass. (Use same method for right side)

(3) Connect the negative battery cable.

5.19 Sliding Roof Drain Hose

■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing sliding roof drain hose.**
- **Prevent interior from being scratched during operating, when removing sliding roof drain hose.**
- **Use same procedures for right and left sides.**
- **Procedures listed below are for left side.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front windshield lower trim panel assembly.

(4) Remove the left A-pillar upper protector assembly.

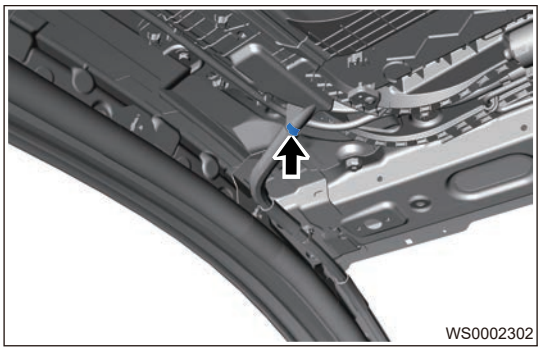
(5) Remove the left B-pillar upper protector assembly.

(6) Remove the left C-pillar upper protector assembly.

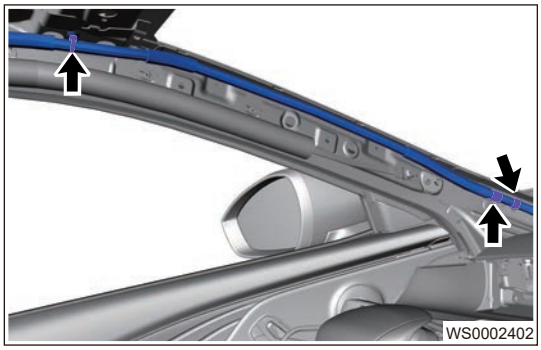
(7) Remove the roof assembly.

(8) Remove the front left drain hose.

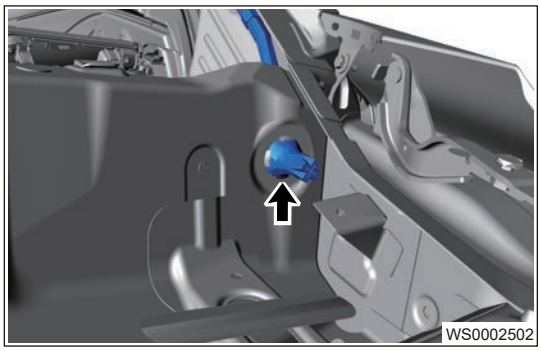
1) Using clamp pliers, remove clamp (arrow) from front left drain hose.



2) Using an interior pry bar, carefully pry off fixing band (arrow) from front left drain hose.



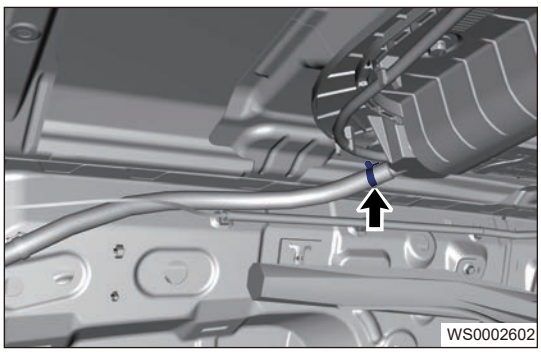
3) Disengage plug (arrow) from lower end of sliding roof front drain hose to large round hole.



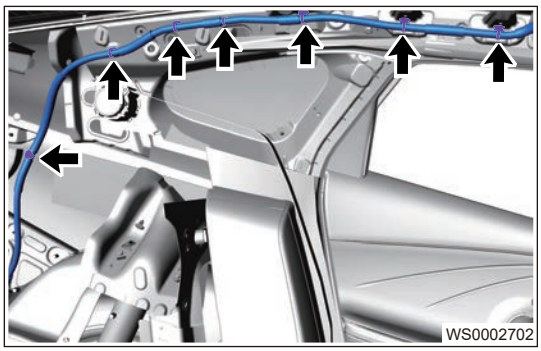
4) Remove the sliding roof front left drain hose.

(9) Remove the sliding roof rear drain hose assembly.

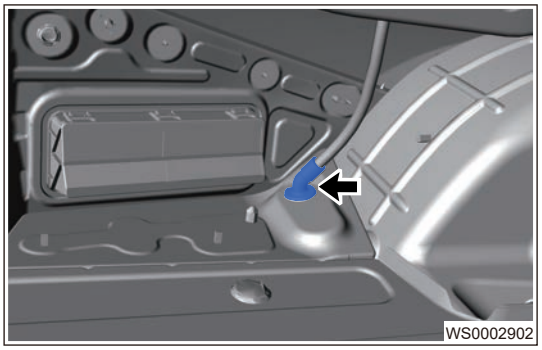
1) Using clamp pliers, remove clamp (arrow) from rear left drain hose.



2) Using an interior pry bar, carefully pry off fixing band (arrow) from rear left drain hose.



3) Disengage the connection (arrow) between sliding roof rear drain hose and sliding roof drain hose, remove sliding roof rear drain hose.



■ **Installation**

(1) Install sliding roof rear drain hose and sliding roof drain hose in the installation position.
(2) Connect fixing band on rear left drain hose.
(3) Install clamp on rear left drain hose.
(4) Install sliding roof front left drain hose in installation position.
(5) Connect plug (arrow) from lower end of sliding roof front drain hose to large round hole.
(6) Install fixing band on front left drain hose.
(7) Install clamp on front Left drain hose.
(8) Install the roof assembly.
(9) Install the left C-pillar upper protector assembly.
(10) Install the left B-pillar upper protector assembly.
(11) Install the left A-pillar upper protector assembly.
(12) Install the front windshield lower trim board assembly.
(13) Connect the negative battery cable.

⚠ Caution

- **After installation, check drain hose for distortion to avoid rough draining or blockage.**
- **Note that the sponges on drain hose is installed in place and make sure that drain hose should not be scratched by metal panel.**
- **The drain hose blocking part should be installed in place and connected with drain hose and metal panel without any looseness.**

5.20 Sliding Roof Assembly

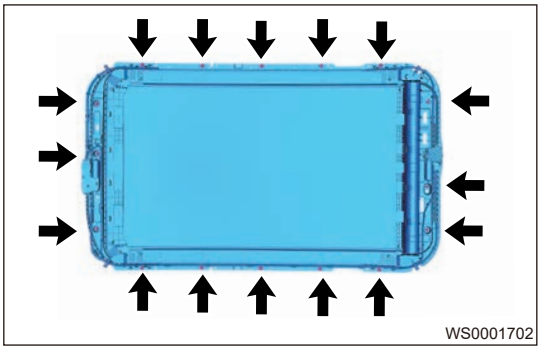
■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing sliding roof assembly.**
- **Appropriate force should be applied when removing sliding roof assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the roof assembly.
(4) Remove the sliding roof glass motor.
(5) Disconnect the sliding roof drain hose.
(6) Remove the sliding roof assembly.

1) Remove 16 fixing bolts (arrow) and sliding roof assembly carefully.



■ Installation

⚠ Caution

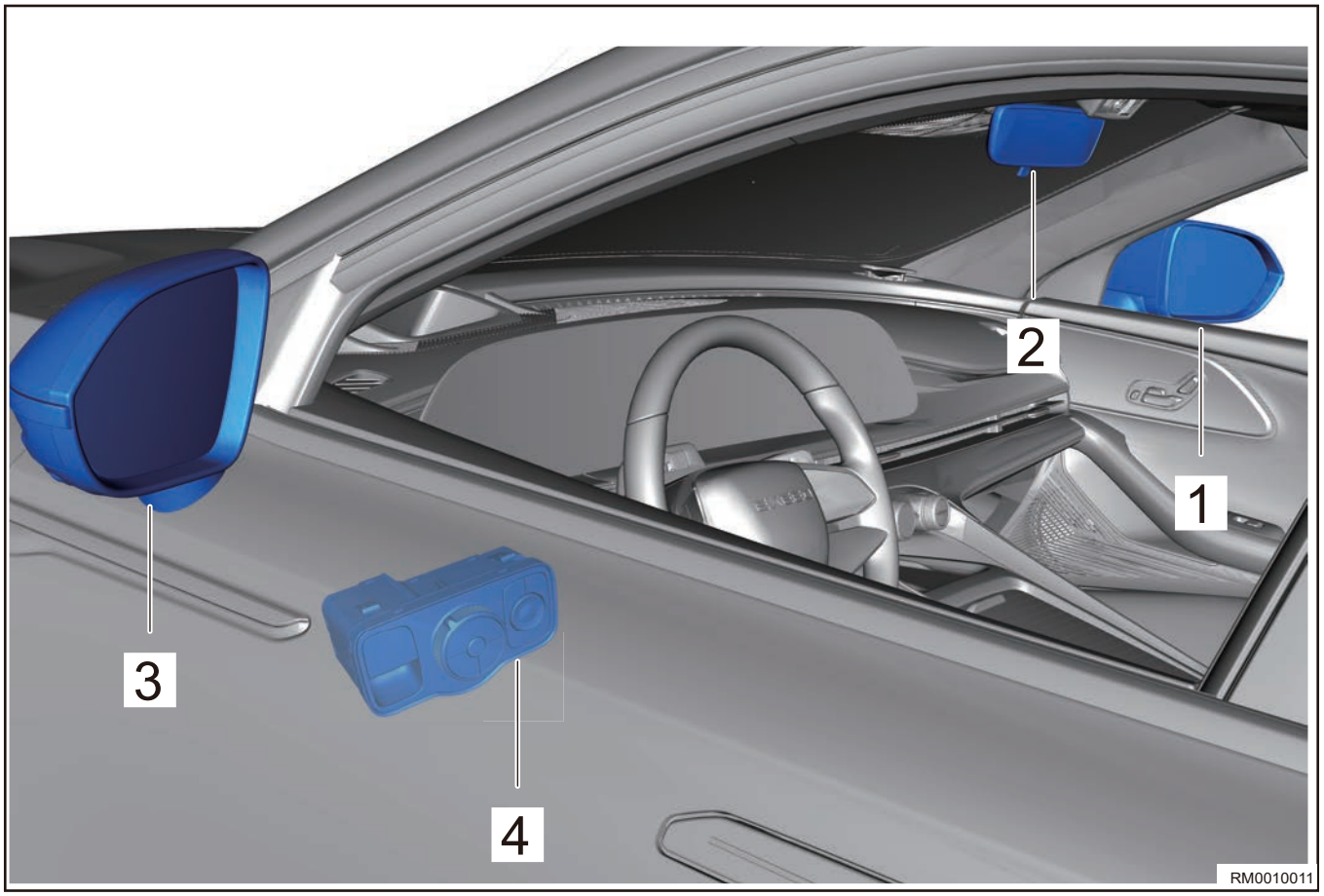
- **Connect connector in place and tighten fixing screws to specified torque, when installing sliding roof assembly.**
- **After sliding roof is installed, there should be no abnormal noise and resistance when opening and closing the sliding roof.**

(1) Install sliding roof assembly in installation position.
(2) Tighten 16 fixing bolts to sliding roof assembly.
Tightening torque: 9 ± 1.5 N·m
(3) Connect the sliding roof drain hose.
(4) Install the sliding roof glass motor.
(5) Connect the roof assembly.
(6) Connect the negative battery cable.

10.9 INSIDE/OUTSIDE REAR VIEW MIRROR

1 System Overview

1.1 System Components



1	Right Outside Rear View Mirror Assembly	3	Left Outside Rear View Mirror Assembly
2	Inside Rear View Mirror Assembly	4	Light Control Switch Assembly

This vehicle is equipped with power outside rear view mirror assembly and inside rear view mirror assembly.
Power outside rear view mirror assembly: Driver can control the rotation of motor by operating the outside rear view mirror adjustment switch in vehicle, thus adjusting the mirror surface to a required visual angle and folding mirror.
Outside rear view mirror adjustment switch: Located at bottom left of steering wheel. With ENGINE START STOP switch ON, press the outside rear view mirror adjustment switch to "L" or "R" position to select left or right outside rear view mirror assembly, and then press the up or down and left or right button of outside rear view mirror adjustment switch to a required visual angle.
Manual glare-resistant inside rear view mirror assembly: It is necessary to adjust inside rear view mirror to desired direction with hands. When driving at night, to reduce glare, adjust the inside rear view mirror assembly to required angle by pulling glare-resistant rod backward.
Automatic glare-resistant inside rear view mirror assembly (if equipped): It is composed of a special mirror, two photosensitive diodes and an electronic controller. The electronic controller receives the front and back light signals from the photosensitive diodes. If light shines on the inside rear view mirror, for example if the light behind is brighter than that in front, the electronic controller will output a voltage to the conductive layer. The voltage on conductive layer will change the color of electrochemical layer on mirror surface. The higher the voltage is, the darker the color of electrochemical layer is. At this time, ever if a strong light shines on the rear view mirror, a dark light will be reflected on the driver’ s eyes through the glare-resistant inside rear view mirror assembly, which will not be glaring. The electrochemical layer on mirror surface will change

continuously and automatically according to the incident intensity of light behind, thus preventing glare. When reversing the vehicle, the glare-resistant function of glare-resistant inside rear view mirror will be released.

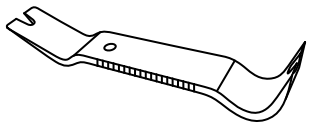
2 Specifications

■ Torque Specifications

Description	Torque (N · m)
Outside Rear View Mirror Fixing Bolt	7.0 ± 1.5 N · m
Inside Rear View Mirror Fixing Bolt	1.5 ± 0.5 N · m

3 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 RCH002506

4 Diagnosis & Testing

4.1 Problem Symptoms Table

Hint:

- Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area	Recommended Repair Method
Outside rear view mirror cannot adjust angle	Fuse	Check if fuse is blown
	Outside rear view mirror switch	Check if outside rear view mirror switch is damaged
	Outside rear view mirror motor	Check if outside rear view mirror motor is damaged
	Wire harness or connector	Check if wire harnesses or connector is normal
Outside rear view mirror cannot be defrosted and defogged	Fuse and relay	Check if fuse and relay are normal
	Outside rear view mirror defogging switch	Check if outside rear view mirror defogging switch is damaged
	Outside rear view mirror heating wire	Check if outside rear view mirror heating wire is normal
	Wire harness or connector	Check if wire harnesses or connector is normal
	Body Control Module (BCM)	Check if Body Control Module (BCM) is normal

4.2 Diagnostic Help

- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.

4.3 Intermittent Troubleshooting

■ If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- Check for broken, bent, protruded or corroded terminals.
- Inspect the mounting conditions of rear view mirror assembly, wire harness or wire harness connector and so on for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to malfunction.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.4 Ground Inspection

Ground points are very important to normal operation of circuit, which are normal or not can seriously affect the entire circuit system. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. In such cases, the circuit operation will be seriously affected. Circuit is sensitive to ground. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.5 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the rear view mirror control system.

1	**Vehicle brought to workshop**

Next

2	**Examine vehicle and check basic items**

Check system power supply voltage, and check that fuse, wire harness and connector are connected normally.

OK

Standard voltage: Not less than 12 V.

Result

NG → **Check and replace malfunctioning parts**

OK

3	**Using a diagnostic tester, read related DTC and data stream information**

Result

Result	Proceed to
No DTC	A
DTC occurs	B

A → **Perform troubleshooting procedure without DTCs according to malfunction symptom**

B

4	**Troubleshoot according to DTCs troubleshooting procedure**

Result

Result	Proceed to
Problem is not resolved	A
Problem is resolved	B

A → **Return to procedure 1 and troubleshoot the process again**

B

5	**According to rear view mirror system malfunction repair completion inspection and delivery, confirm if malfunction is resolved.**

Result

Result	Proceed to
Delivery inspection is failed	A
Delivery inspection is qualified	B

A → **Return to procedure 1 and troubleshoot the process again**

B

6	**Finished**

5 On-vehicle Service

5.1 Outside Rear View Mirror Assembly

■ Removal

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing outside rear view mirror assembly.**
- **Operate carefully to prevent components from being damaged, when removing outside rear view mirror assembly.**
- **Try to prevent interior and body paint surface from being scratched, when removing outside rear view mirror assembly.**

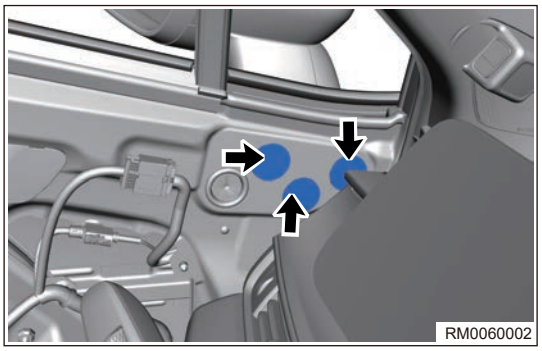
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

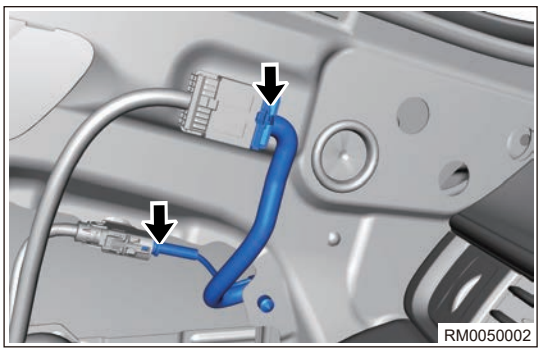
(3) Remove the front left door inner protector assembly.

(4) Remove the left outside rear view mirror assembly.

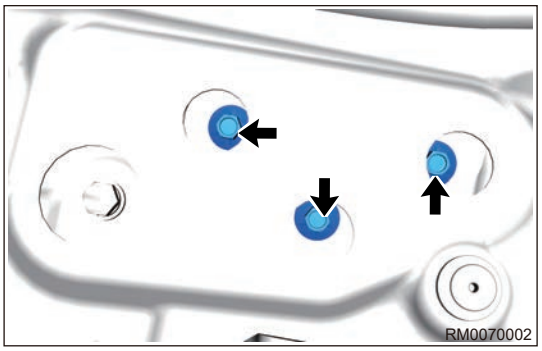
1) Remove the front left door protector block cover.



2) Disconnect the left outside rear view mirror connector.



3) Remove 3 fixing bolts from left outside rear view mirror.



■ **Installation**

⚠ Caution

- **Install connector in place and tighten fixing bolts to specified torque when installing outside rear view mirror assembly.**
- **Make sure the outside rear view mirror assembly can move smoothly, flexibly and reliably after installing.**
- **After installing outside rear view mirror assembly, it is necessary to perform panoramic image calibration (if equipped).**

(1) Install left inner rear view mirror in installation position.

(2) Install 3 fixing bolts to left outside rear view mirror.

Tightening torque: 7.0 ± 1.5 N·m

(3) Connect the left outside rear view mirror connector.

(4) Install the front left door protector block cover.

(5) Install the front left door inner protector assembly.

(6) Connect the negative battery cable.

5.2 Outside Rear View Mirror Lens Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Avoid breaking claw when removing outside rear view mirror lens assembly.**
- **Avoid damaging lens due to dropping when removing outside rear view mirror lens assembly.**
- **Try to prevent body paint surface from being scratched when removing outside rear view mirror lens assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

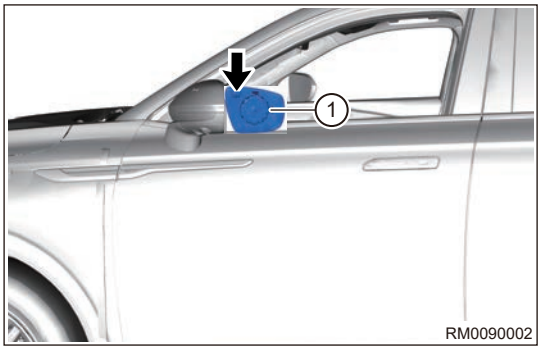
(3) Remove the left outside rear view mirror lens assembly.

1) Press the outside rear view mirror surface to tilt it.

2) Apply protective tape around exterior frame of outside rear view mirror.

3) Using an interior crow plate, pry off the claws of outside rear view mirror lens assembly.

4) Disconnect the connector (arrow) from rear view mirror lens assembly, and remove left outside rear view mirror lens assembly (1) (if equipped with rear view mirror heater).



■ **Inspection**

(1) Check the outside rear view mirror lens assembly. (If equipped with rear mirror heater)

1) Apply battery voltage to terminals of outside rear view mirror lens assembly connector, and check operation of outside rear view mirror lens assembly according to table below.

Measurement Condition		Specified Condition
Battery positive (+)	Battery negative (-)	Outside rear view mirror lens becomes warm

(2) If result is not as specified, replace outside rear view mirror lens assembly.

■ **Installation**

(1) Connect the rear view mirror lens assembly wire harness connector.

(2) Install the rear view mirror lens assembly.

(3) Connect the negative battery cable.

⚠ Caution

- **Make sure the lens can move smoothly, flexibly and reliably after installing outside rear view mirror lens assembly.**

5.3 Light Control Switch Assembly

■ **Removal**

⚠ Caution

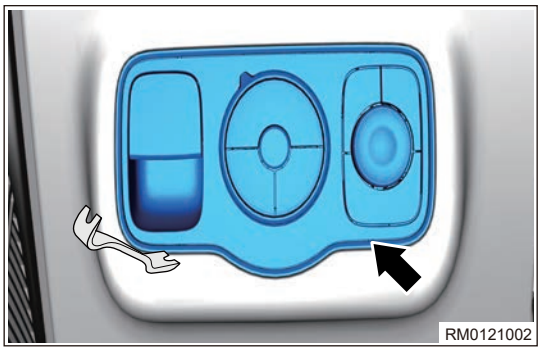
- **Be sure to wear safety equipment to prevent accidents, when removing light control switch assembly.**
- **Try to prevent instrument panel assembly from being scratched, when removing light control switch assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

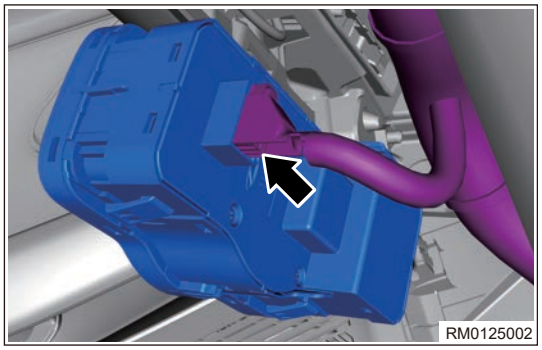
(2) Disconnect the negative battery cable.

(3) Remove the light control switch assembly.

1) Using an interior crow plate, pry off light control switch assembly. (arrow)



2) Disconnect light control switch assembly connector, and remove light control switch assembly.



■ **Installation**

⚠ Caution

- **Operate carefully to prevent damage to other components when installing outside rear view mirror adjustment switch.**
- **Install connectors in place, when installing outside rear view mirror adjustment switch.**
- **Check that switch can operate normally after installing outside rear view mirror adjustment switch.**

(1) Connect the light control switch assembly wire harness connector.

(2) Install the light control switch assembly.

(3) Connect the negative battery cable.

5.4 Inside Rear View Mirror Assembly

■ **Removal**

⚠ Caution

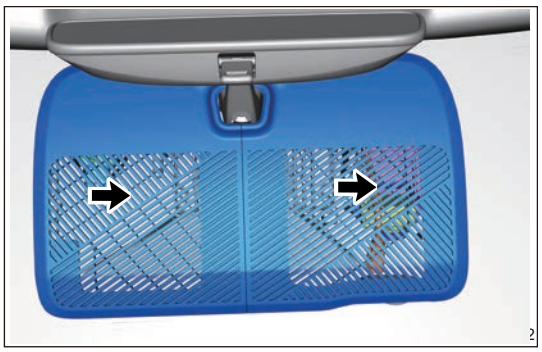
- **Appropriate force should be applied when removing inside rear view mirror assembly. Be careful not to operate roughly.**
- **Try to prevent front windshield assembly from being scratched when removing inside rear view mirror assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

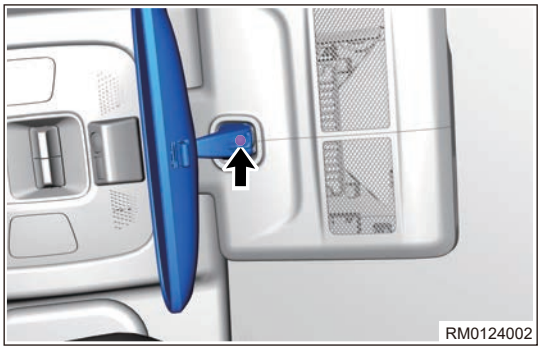
(2) Disconnect the negative battery cable.

(3) Remove the inside rear view mirror assembly.

1) Remove left and right protective covers (arrow) from rear view mirror.



1) Remove inner hexagon head screw (arrow) from inner rear view mirror base, and remove inner rear view mirror assembly.



■ Installation

⚠ Caution

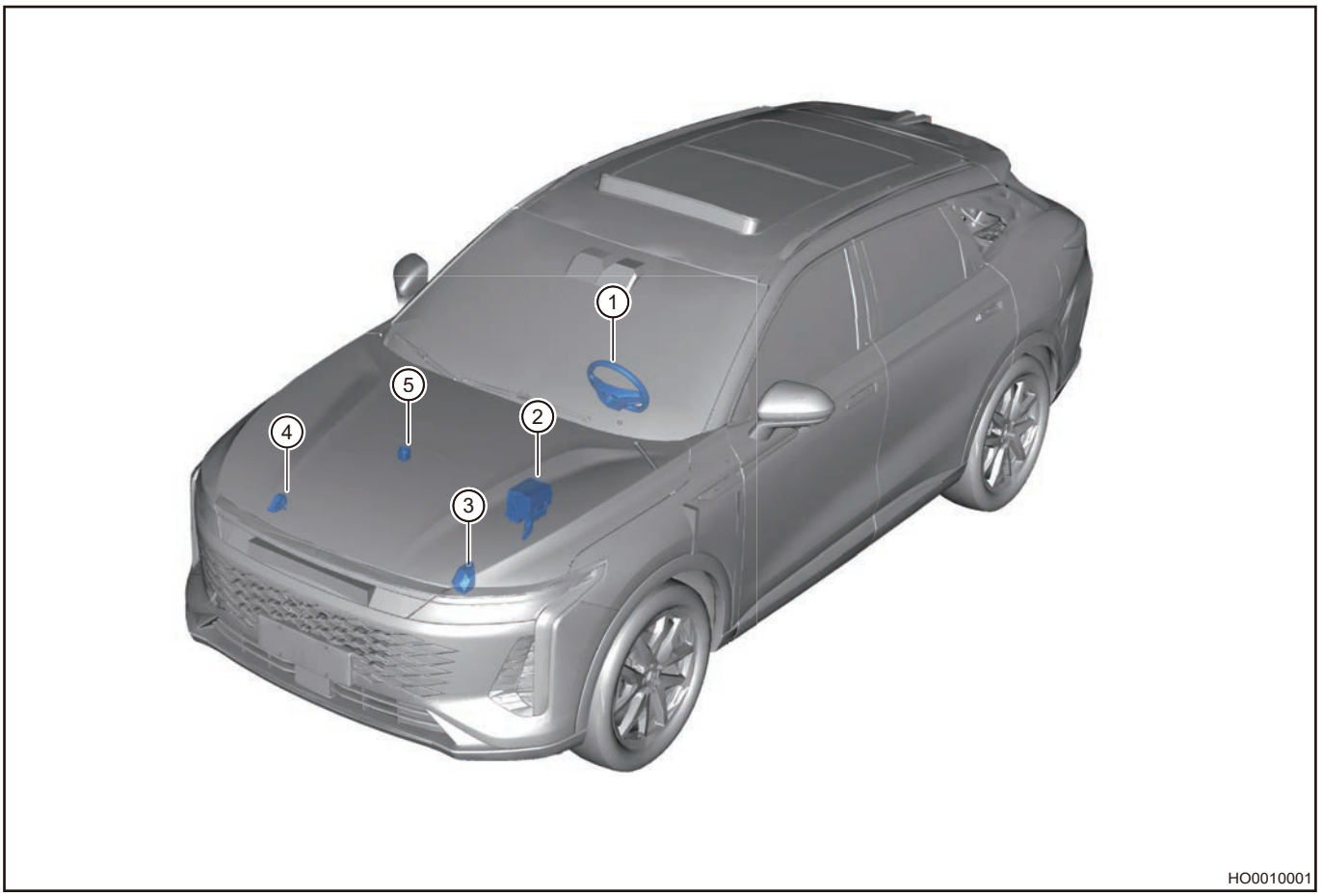
- **Before installation, check if there is any obvious appearance defects (such as scratches, material missing, damage, etc.) and select the qualified parts.**
- **Check that the inside rear view mirror should be within the normal range required by view and the lens assembly should be matched with lens base assembly firmly without any looseness.**

(1) Install inner rear view mirror in installation position.
(2) Tighten inner hexagon head screw on inner rear view mirror base.
Tightening torque: 1.5 ± 0.5 N·m
(3) Install left and right protective covers to rear view mirror.
(4) Connect the negative battery cable.

10.10 HORN SYSTEM

1 System Overview

1.1 System Components Diagram



1	Horn Switch	2	Engine Compartment Fuse and Relay Box
3	High Pitched Horn	4	Low Pitched Horn
5	Anti-theft Horn		

This vehicle is equipped with dual electronic horn (high pitched, low pitched) system and anti-theft horn. Horn system consists of following components:

- Horn: High pitched horn is installed in groove of front bumper crossmember left mounting plate, and low pitched horn is installed in groove of front bumper crossmember right mounting plate.
- Horn switch: Horn switch is installed on steering wheel.
- Horn fuse: Horn fuse is located in engine compartment fuse and relay box.
- Horn relay: Horn relay is located in engine compartment fuse and relay box.

2 Diagnosis & Testing

2.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Low pitched horn does not sound	Low pitched horn (damaged)
	Wire harness (open)
	Connector (loose)
High pitched horn does not sound	High pitched horn (damaged)
	Wire harness (open)
	Connector (loose)
Horn does not sound	Horn fuse (blown)
	Horn relay
	Horn switch (damaged)
	Spiral cable (damaged)
	Wire harness (short or open)

2.2 Horn System Inspection

Press and release the horn button

Treatment	Normal Result	Abnormal Result
Press and release the horn button	Horn sounds when horn button is pressed. Horn stops sounding when horn button is released.	Horn does not sound, horn sounds abnormally

Horn does not sound or sounds abnormally

Problem Symptom	Troubleshooting
Horn sounds hoarsely	Check the battery or power supply circuit
Only high pitched horn or low pitched horn sounds	Check and repair wire harness of horn that does not sound or replace horn
Both high pitched and low pitched horns do not sound	Check horn fuse or relay box
Horn sounds when pressing button, and does not sound when locking vehicle with remote controller	Check if the audio is set as “only fortify light”. Set “fortify horn + light” if it is possible. If the setting is correct and the fault exists, check and repair BDM and path.
Horn does not sound when pressing button, and sounds when locking vehicle with remote controller	Check and repair horn button and its circuit

2.3 Troubleshooting for Abnormal Horn Sound

(1) If horn sound is obviously abnormal, perform the following routine inspection:

1) Check terminals for poor contact; repair any poor contact problem;
2) Check ground circuit; if there is poor contact, repair it;
3) Make sure horn assembly fixing bolt is properly fastened;
4) Make sure there is no contact between horn assembly and any other objects; if contact occurs, determine the correct position of other objects again, bend the horn assembly bracket if necessary, and operate horn to determine if the situation still exists.

(2) If the situation is still obvious, perform the following specific inspection:

1) Determine the type of sound produced by horn: Grave, sharp.

2) If it is obviously grave, it indicates that the current is too high and the horn assembly must be replaced.
3) If it is obviously sharp, foreign matters may attach to horn, remove horn assembly and check for foreign matters.
4) Remove any attached foreign matters and reinstall the horn assembly.

⚠ Caution
· **If no foreign matter is found, or if the foreign matter cannot be removed, replace horn assembly.**

2.4 Horn Fuse Inspection

(1) Identify the horn fuse in engine compartment fuse and relay box.

(2) Check the horn fuse.

1) Using a fuse puller, remove the horn fuse.
2) Check if fuse is blown. Replace fuse if it is blown.

⚠ Caution
· **Use a fuse with the same specification as original fuse to avoid affecting the normal use of electrical equipment.**

2.5 Horn Relay Inspection

(1) Identify the horn relay in engine compartment fuse and relay box.

(2) Check the horn relay.

1) Remove horn relay, and press meter inspection.

Multimeter Connection	Condition	Specified Condition
Terminal 3 - Terminal 5	When battery voltage is not applied between terminal 2 and terminal 1	∞
Terminal 3 - Terminal 5	When battery voltage is applied between terminal 2 and terminal 1	⩽ 1 Ω

If result is not as specified, replace relay.

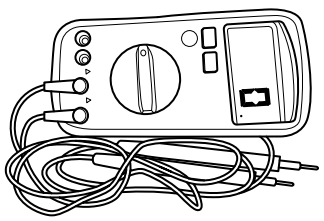
2.6 Horn Ground Point Inspection

Ground position of horn is located in steering wheel, it is grounded over steering column and body, and the resistance cannot be greater than 1 Ω.

3 On-vehicle Service

3.1 Tools

■ **General Tools**

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

3.2 High Pitched Horn Assembly

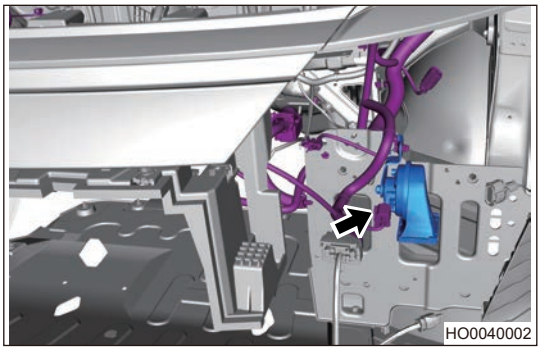
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

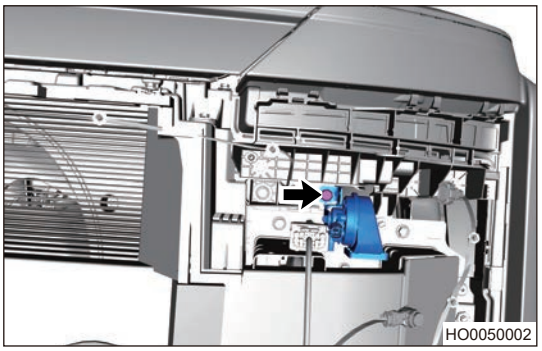
(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

(4) Disconnect the horn wire harness connector.



(5) Remove the horn fixing nut, remove the horn.



■ Installation

⚠ Caution

- **Tighten the fixing nuts to the specified torque.**
- **Install connectors securely.**

(1) Place the high pitched horn in the installation position.

(2) Install high pitched horn fixing nut.
Tightening torque: 20 ± 2 N·m

(3) Connect the high pitched horn wire harness connector.

(4) Install the front bumper assembly.

(5) Connect the negative battery cable.

3.3 Low Pitched Horn Assembly

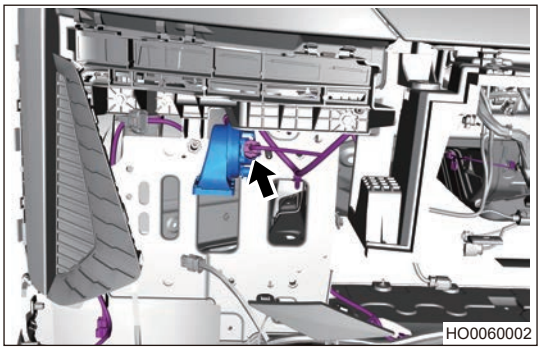
■ Removal

(1) Turn off all electrical equipment and ENGINE START STOP switch.

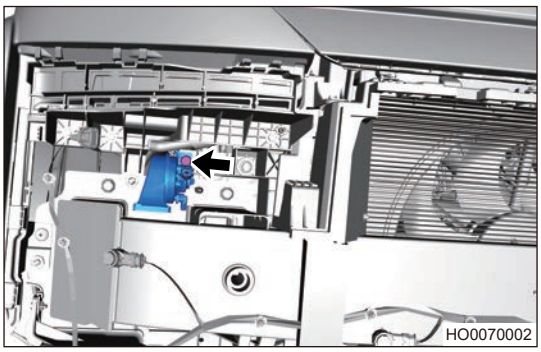
(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

(4) Disconnect the horn wire harness connector.



(5) Remove the horn fixing nut, remove the horn.



■ **Installation**

⚠ **Caution**
• **Tighten the fixing nuts to the specified torque.** • **Install connectors securely.**

(1) Place the low pitched horn in the installation position.

(2) Install low pitched horn fixing nut.

Tightening torque: 20 ± 2 N·m

(3) Connect the low pitched horn wire harness connector.

(4) Install the front bumper assembly.

(5) Connect the negative battery cable.

3.4 Anti-theft Horn Assembly

■ **Removal**

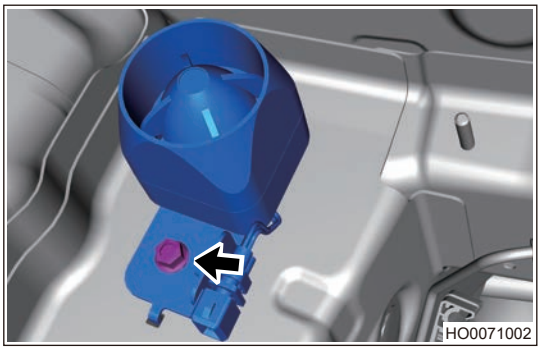
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Open the engine hood.

(4) Disconnect the anti-theft horn wire harness connector.

(5) Remove the anti-theft horn fixing bolt, remove the anti-theft horn.



■ **Installation**

⚠ Caution

- **Tighten the fixing nuts to the specified torque.**
- **Install connectors securely.**

(1) Place the anti-theft horn in the installation position.
(2) Install 1 fixing bolt to anti-theft horn.
(3) Connect the anti-theft horn wire harness connector.
(4) Connect the negative battery cable.

10.11 COMBINATION SWITCH ASSEMBLY

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Be sure to wear safety equipment to prevent accidents, when removing combination switch assembly.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

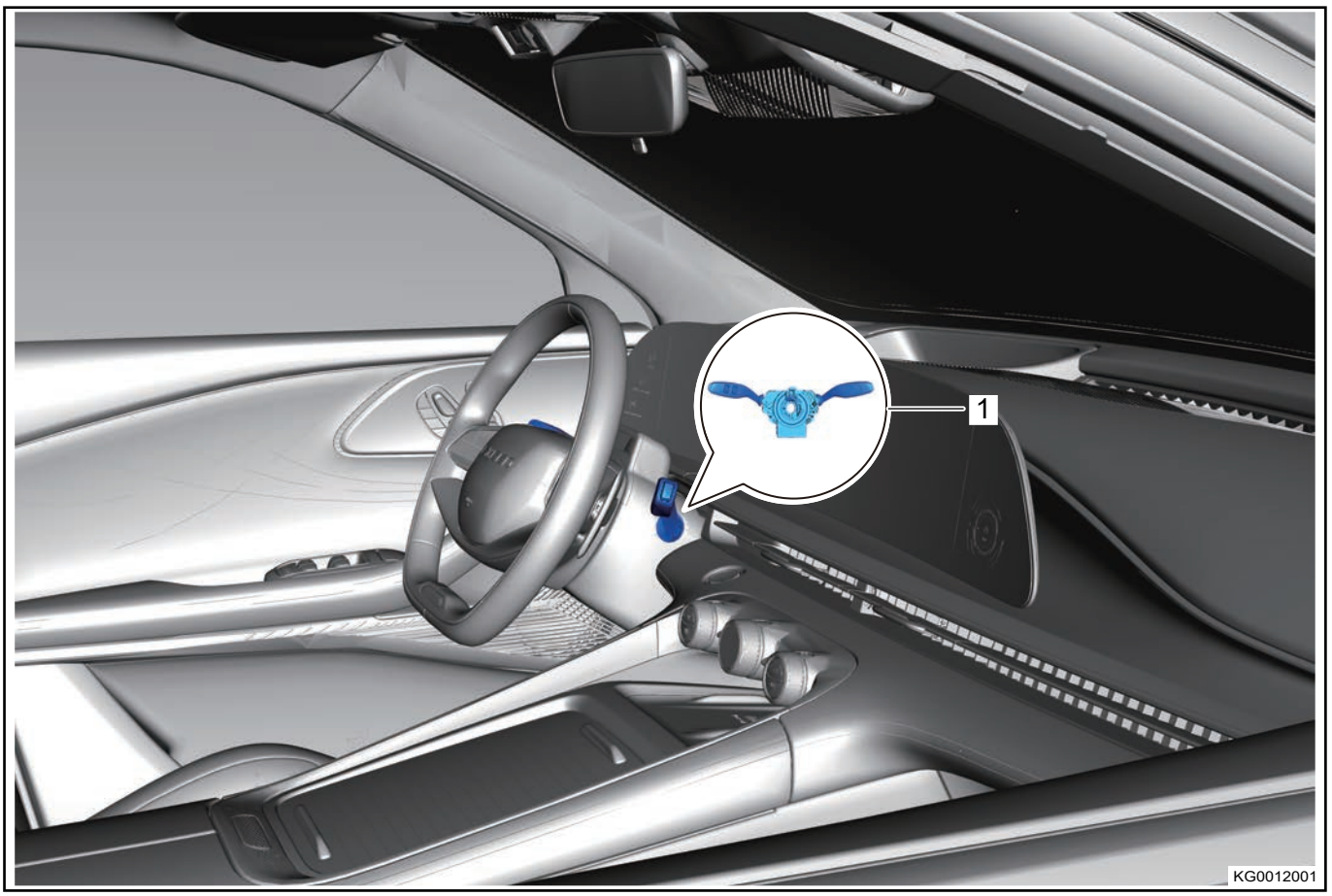
(1) Appropriate force should be applied, when removing driver airbag and steering wheel. Be careful not to operate roughly.

2 System Overview

2.1 System Description

The combination switch assembly (CSA) of the EXEED RX model integrates the headlight high beam switch, turn signal light switch, front and rear wiper switches, front and rear washer switches, and transmission gear switch, and transmits signals through network transmission.

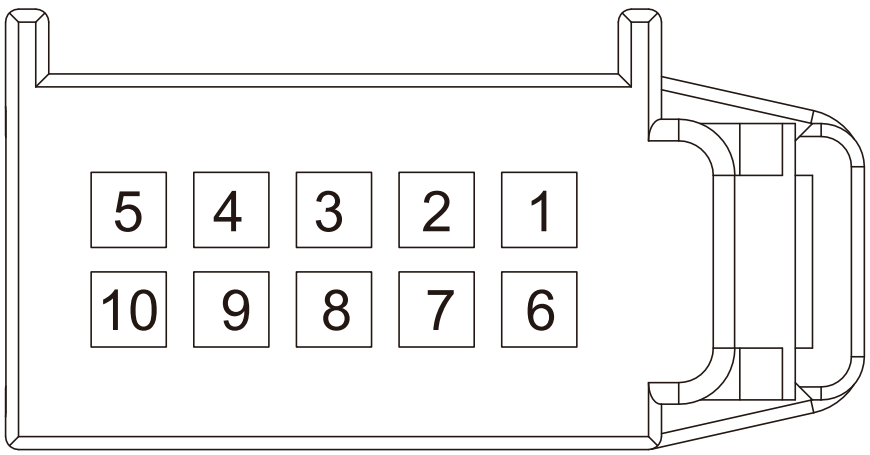
2.2 System Diagram



1	Combination Switch Assembly		

3 System Circuit Diagram

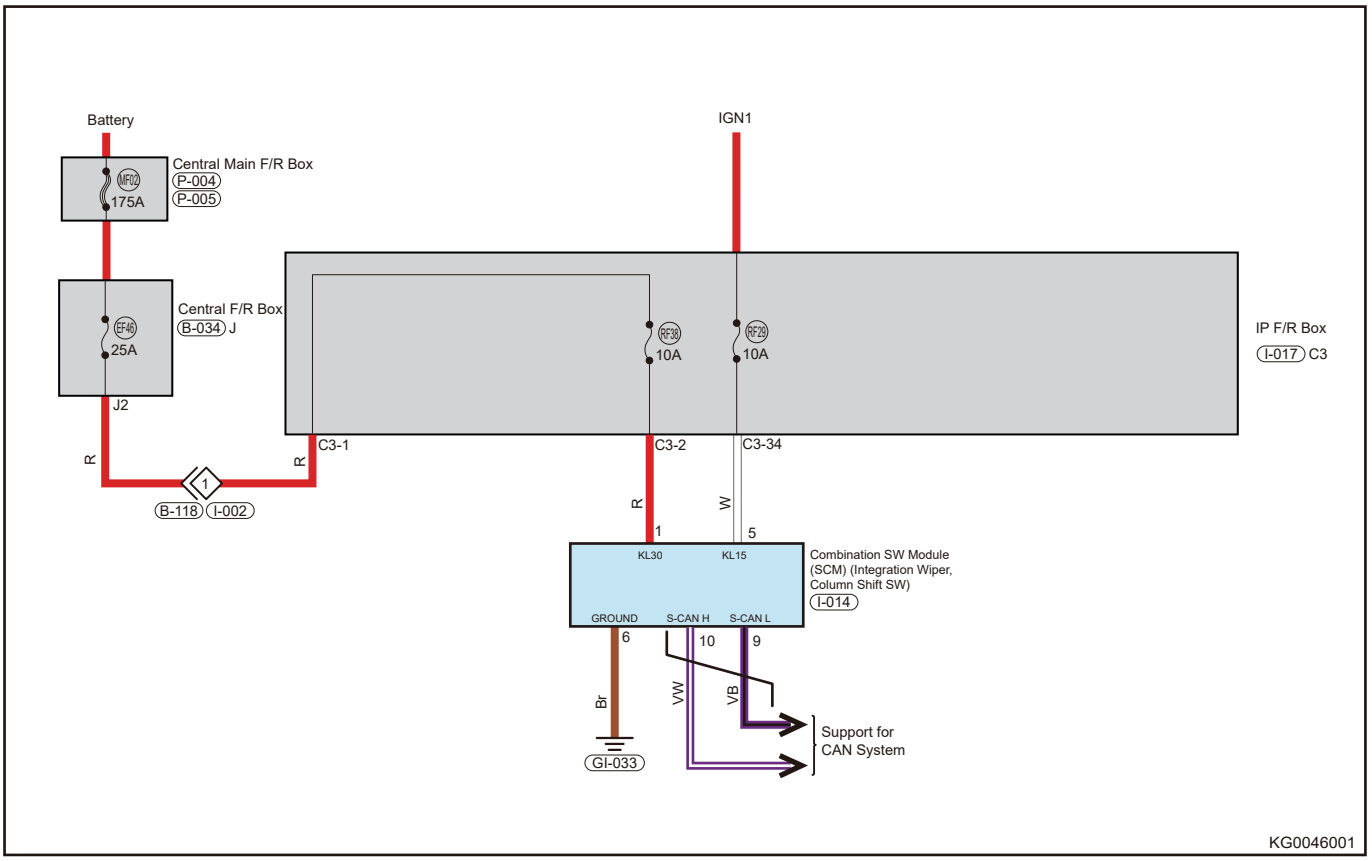
3.1 Combination Switch Terminal Definition



KG0045001

Terminal No.	Description	Terminal No.	Description
1	KL30	6	Ground
2	-	7	-
3	-	8	-
4	-	9	S-CAN L
5	KL15	10	S-CAN H

3.2 Circuit Diagram



4 Diagnosis & Testing

4.1 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Inspect components and mounting areas of combination switch for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.

- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.4 Diagnosis Procedure

Hint:

- Use following procedures to troubleshoot the combination switch assembly.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.
Standard Condition
Standard voltage: Not less than 12 V.

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	**Read DTCs**

NG → **Perform repair according to problem symptoms table**

OK

5	**Read DTCs (current DTC and history DTC)**

NG → Troubleshoot according to Intermittent DTC malfunction procedures

OK

6	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

7	Adjust, repair or replace

Next

8	Conduct test and confirm malfunction has been repaired

Next → End

4.5 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
C1950-16	Battery Voltage Circuit Voltage Below Threshold	When IG ON for 3 s and the switch is powered on or reset for 3 s, it is detected that the power supply voltage is below 8.5 V for more than 1 s	• Power supply system failure • Wire harness or connector damaged • Combination switch failure	• Check and repair power supply system • Check wire harness or connector • Replace combination switch
C1951-17	Battery Voltage Circuit Voltage Above Threshold	When IG ON for 3 s and the switch is powered on or reset for 3 s, it is detected that the power supply voltage is higher than 16.5 V for more than 1 s		
C190D-14	Steering Function Short to Ground	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the steering circuit is short to ground for 3 s	Short in steering circuit	• Check steering circuit for short • Replace combination switch
C190D-15	Steering Function Short to Power Supply or Open	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the steering circuit is short	Short or open in steering circuit	• Check steering circuit for short or open • Replace combination switch

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
		to power supply or open for 3 s		
C190D-1C	Steering Function Voltage Value Out of Range	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the steering circuit voltage is abnormal for more than 3 s	• Steering circuit resistance is damaged • Steering contact bridge not installed	Replace combination switch
C190E-14	Passing High Beam Function Short to Ground	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the passing high beam circuit is short to ground for 3 s	Passing high beam circuit is short	• Check passing high beam circuit for short • Replace combination switch
C190E-15	Passing High Beam Function Short to Power Supply or Open	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the passing high beam circuit is short to power supply or open for 3 s	Passing high beam circuit is short or open	• Check passing high beam circuit for short or open • Replace combination switch
C190E-1C	Passing High Beam Function Voltage Value Out of Range	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the passing high beam circuit voltage is abnormal for more than 3 s	• Passing high beam circuit resistance is damaged • Passing high beam contact bridge not installed	Replace combination switch
C190E-71	Passing Function Stuck	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, passing is stuck for 60 s	Mechanical structure stuck	Check mechanical structure for stuck
C190F-71	High Beam Function Stuck	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, high beam is stuck for 60 s	Mechanical structure stuck	Check mechanical structure for stuck

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
C1910-71	RND Hall Sensor Group A Position Stuck	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, RND column shift is stuck for 60 s	Mechanical structure stuck	Check mechanical structure for stuck
C1910-09	RND Hall Sensor Group A Fault	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, RND column shift is stuck in invalid position or with invalid code for 3 s	• Mechanical structure stuck • Hall sensor fault	• Check mechanical structure for stuck • Replace combination switch
C1911-71	RND Hall Sensor Group B Position Stuck	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, RND column shift is stuck for 60 s	Mechanical structure stuck	Check mechanical structure for stuck
C1911-09	RND Hall Sensor Group B Fault	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, RND column shift is stuck in invalid position or with invalid code for 3 s	• Mechanical structure stuck • Hall sensor fault	• Check mechanical structure for stuck • Replace combination switch
C1912-14	P Gear Circuit Short to Ground	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the P gear circuit is short to ground for 3 s	Short in P gear circuit	• Check P gear circuit for short • Replace combination switch
C1912-15	P Gear Circuit Short to Power Supply or Open	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16V) for 3 s, the P gear circuit is short to power supply or open for 3 s	P gear circuit is short or open	• Check P gear circuit for short or open • Check if P gear connector falls off • Replace combination switch
C1912-71	P Gear Circuit Stuck	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power	Mechanical structure stuck	Check mechanical structure for stuck

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
		supply is normal (9-16 V) for 3 s, P gear is stuck for 60 s		
C1913-14	Front Wiper Mode Switch Short to Ground	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, front wiper mode circuit is short to ground for 3 s	Front wiper mode circuit is short	• Check front wiper mode circuit for short • Replace combination switch
C1913-15	Front Wiper Mode Switch Short to Power Supply or Open	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, front wiper mode circuit is short to power supply or open for 3 s	Front wiper mode circuit is short or open	• Check front wiper mode circuit for short or open • Check if front wiper mode connector falls off • Replace combination switch
C1913-1C	Front Wiper Mode Switch Voltage Out of Range	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, front wiper mode circuit is abnormal for more than 3 s	• Front wiper mode circuit resistance is damaged • Front wiper mode contact bridge not installed	Replace combination switch
C1914-14	Front Wiper Washer Switch Short to Ground	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, front wiper washer circuit is short to ground for 3 s	Front wiper washer circuit is short	• Check front wiper washer circuit for short • Replace combination switch
C1914-15	Front Wiper Washer Switch Short to Power Supply or Open	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, front wiper washer circuit is short to power supply or open for 3 s	Front wiper washer circuit is short or open	• Check front wiper washer circuit for short or open • Check if front wiper washer connector falls off • Replace combination switch
C1914-71	Front Wiper Jog Washer Stuck	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, front wiper jog washer is stuck for 60 s	Mechanical structure stuck	Check mechanical structure for stuck

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
C1915-14	Rear Wiper Washer Switch Short to Ground	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, rear wiper washer circuit is short to ground for 3 s	Rear wiper washer circuit is short	• Check rear wiper washer circuit for short • Replace combination switch
C1915-15	Rear Wiper Washer Switch Short to Power Supply or Open	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, rear wiper washer circuit is short to power supply or open for 3 s	Front wiper washer circuit is short or open	• Check rear wiper washer circuit for short or open • Check if rear wiper washer connector falls off • Replace combination switch
C1915-1C	Rear Wiper Washer Switch Voltage Out of Range	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, rear wiper mode circuit is abnormal for more than 3 s	• Rear wiper mode circuit resistance is damaged • Rear wiper mode contact bridge not installed	Replace combination switch
C1915-71	Rear Wiper Washer Switch Stuck	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, rear wiper washer is stuck for 60 s	Mechanical structure stuck	Check mechanical structure for stuck
U0073-88	CAN Bus Off	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, CAN Busoff fault occurs	Short in CAN bus	Check CAN bus for short
U0129-87	Lost Communication with BSM	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, CAN Busoff fault recovers for 3 s, it is detected that ABS_ESP_1 signal is received for more than 500 ms	• ESP or CSA CAN wire harness damaged • ESP does not send ABS_ESP_1 signal	Check CAN bus for damage
U0155-87	Lost Communication with ICM	When IG ON for 3 s and the switch is powered on or reset	• ICM or CSA CAN wire harness damaged	Check CAN bus for damage

DTC	DTC Definition	Fault Detection Condition	Possible Cause	Maintenance Advice
		for 3 s and the power supply is normal (9-16 V) for 3 s, CAN Busoff fault recovers for 3 s, it is detected that ICM_1 signal is received for more than 500 ms	• ICM does not send ICM_1 signal	
U0418-81	Invalid Data Received from BSM	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, CAN Busoff fault recovers for 3 s, it is detected that the received ESP node data is invalid	• ESP or CSA CAN wire harness damaged • ESP node fault	Check CAN bus for damage
U0423-81	Invalid Data Received From ICM	When IG ON for 3 s and the switch is powered on or reset for 3 s and the power supply is normal (9-16 V) for 3 s, CAN Busoff fault recovers for 3 s, it is detected that the received ICM node data is invalid	• ICM or CSA CAN wire harness damaged • ICM node fault	Check CAN bus for damage
U1300-55	Not Configured	Or relationship: • Not Configured • Configuration error • Configure as reserved range	• Not Configured • Configuration error • Configure as reserved range	Reconfigure with the diagnostic tester

4.6 DTC Diagnosis Procedure

DTC	C1950-16	Battery Voltage Circuit Voltage Below Threshold
DTC	C1951-17	Battery Voltage Circuit Voltage Above Threshold

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

1	Check battery voltage

(a) Using multimeter, check if battery voltage is normal.

NG → **Recharge or replace battery**

OK ↓

2	Check alternator

(a) Check if generating capacity of alternator is normal.

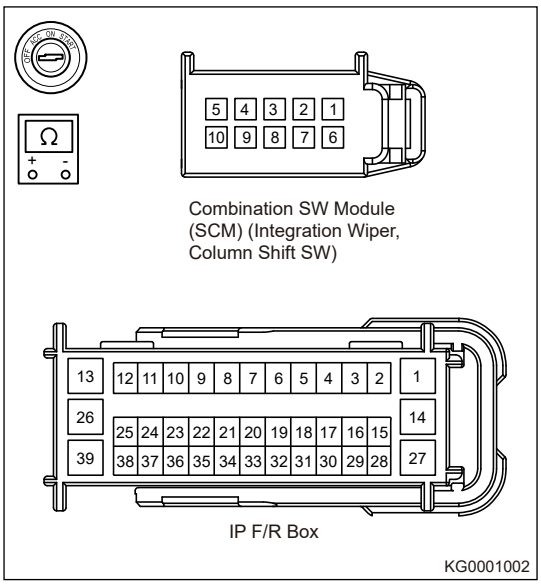
NG → **Check and repair charging system**

OK ↓

3	Check supply circuit

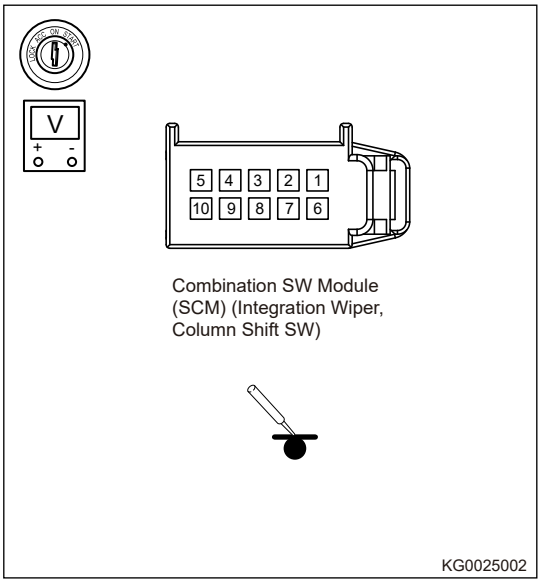
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery terminal cable.
(c) Remove the combination switch upper and lower covers.
(d) Disconnect the combination switch connector.

(e) Use a digital multimeter to measure resistance between combination switch connector (power supply terminal) and instrument panel fuse and relay box (connected terminal) to determine if the circuit is open.



(f) Turn ENGINE START STOP switch to ON.

(g) Use a digital multimeter to measure voltage between combination switch connector (power supply terminal) and body ground, it should be 9~16 V.



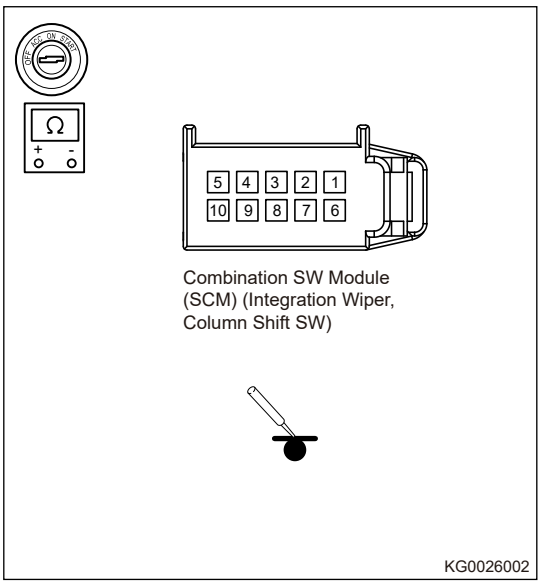
NG → **Repair or replace wire harness or connector as needed**

OK

4	**Check combination switch ground circuit**

(a) Turn ENGINE START STOP switch to OFF.

(b) Using a multimeter, measure resistance between combination switch (resistance terminal) and body ground point to check ground wire for open.



NG → **Check and repair wire harness or adjust ground point**

OK

5	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	Confirm that system is normal

NG	Replace combination switch assembly

DTC	C190D-14	Steering Function Short to Ground
DTC	C190D-15	Steering Function Short to Power Supply or Open

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG	Repair or replace wire harness or connector

OK

2	Check steering circuit

(a) Check steering circuit for short or open.

NG	Repair or replace circuit as needed

OK

3	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	Confirm that system is normal
NG	Replace combination switch assembly

DTC	C190D-1C	Steering Function Voltage Value Out of Range

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG	Repair or replace wire harness or connector

OK

2	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	**Confirm that system is normal**

NG	**Replace combination switch assembly**

DTC	**C190E-14**	**Passing High Beam Function Short to Ground**
DTC	**C190E-15**	**Passing High Beam Function Short to Power Supply or Open**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check wire harness and connector**

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG	**Repair or replace wire harness or connector**

OK

2	**Check high beam light circuit**

(a) Check passing high beam circuit for short or open.

NG	**Repair or replace circuit as needed**

OK

3	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	Confirm that system is normal

NG	Replace combination switch assembly

DTC	C190E-1C	Passing High Beam Function Voltage Value Out of Range

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG	Repair or replace wire harness or connector

OK

2	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	Confirm that system is normal
NG	Replace combination switch assembly

DTC	C190E-71	Passing Function Stuck
DTC	C190F-71	High Beam Function Stuck

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check combination switch**

(a) Check high beam and passing function of combination switch for stuck.

OK	Confirm that system is normal
NG	Replace combination switch assembly

DTC	C1910-71	RND Hall Sensor Group A Position Stuck
DTC	C1910-09	RND Hall Sensor Group A Fault
DTC	C1911-71	RND Hall Sensor Group B Position Stuck
DTC	C1911-09	RND Hall Sensor Group B Fault
DTC	C1912-71	P Gear Circuit Stuck

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).

- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check combination switch**

(a) Check PRND gear position function of combination switch for stuck.

OK	**Confirm that system is normal**
NG	**Replace combination switch assembly**

DTC	**C1912-14**	**P Gear Circuit Short to Ground**
DTC	**C1912-15**	**P Gear Circuit Short to Power Supply or Open**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check wire harness and connector**

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG	**Repair or replace wire harness or connector**

OK

2	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK → Confirm that system is normal

NG → Replace combination switch assembly

DTC	C1913-14	Front Wiper Mode Switch Short to Ground
DTC	C1913-15	Front Wiper Mode Switch Short to Power Supply or Open

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG → Repair or replace wire harness or connector

OK

2	Check wiper mode circuit

(a) Check wiper mode circuit for short or open.

NG	Repair or replace circuit as needed

OK

3	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	Confirm that system is normal
NG	Replace combination switch assembly

DTC	C1913-1C	Front Wiper Mode Switch Voltage Out of Range

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG	Repair or replace wire harness or connector

OK

2	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	Confirm that system is normal

NG	Replace combination switch assembly

DTC	C1914-14	Front Wiper Washer Switch Short to Ground
DTC	C1914-15	Front Wiper Washer Switch Short to Power Supply or Open

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG	Repair or replace wire harness or connector

OK

2	Check front wiper washer circuit

(a) Check front wiper washer circuit for short or open.

NG	Repair or replace circuit as needed

OK

3	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK	Confirm that system is normal
NG	Replace combination switch assembly

DTC	C1914-71	Front Wiper Jog Washer Stuck

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check combination switch

(a) Check front wiper jog washer function of combination switch for stuck.

OK	Confirm that system is normal
NG	Replace combination switch assembly

DTC	C1915-14	Rear Wiper Washer Switch Short to Ground
DTC	C1915-15	Rear Wiper Washer Switch Short to Power Supply or Open

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).

- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check wire harness and connector

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG → **Repair or replace wire harness or connector**

OK ↓

2	Check rear wiper washer circuit

(a) Check rear wiper washer circuit for short or open.

NG → **Repair or replace circuit as needed**

OK ↓

3	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK → **Confirm that system is normal**

NG → **Replace combination switch assembly**

DTC	C1915-1C	Rear Wiper Washer Switch Voltage Out of Range

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check wire harness and connector**

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect the combination switch connector.
(d) Check if wire harnesses are worn, pierced, pinched or partially broken.
(e) Check for broken, bent, protruded or corroded terminals.

NG → **Repair or replace wire harness or connector**

OK

2	**Reconfirm DTCs**

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to ON.
(d) Check if DTC exists.

OK → **Confirm that system is normal**

NG → **Replace combination switch assembly**

DTC	C1915-71	Rear Wiper Washer Switch Stuck

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.

- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check combination switch**

(a) Check rear wiper washer function of combination switch for stuck.

OK	**Confirm that system is normal**
NG	**Replace combination switch assembly**

DTC	**U1300-55**	**Not Configured**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution
• **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Reconfiguration**

(a) Reconfigure with the diagnostic tester.

OK	**Confirm that system is normal**
NG	**Replace combination switch assembly**

DTC	**U0073-88**	**CAN Bus Off**
DTC	**U0129-87**	**Lost Communication with BSM**
DTC	**U0155-87**	**Lost Communication with ICM**
DTC	**U0418-81**	**Invalid Data Received from BSM**
DTC	**U0423-81**	**Invalid Data Received From ICM**

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

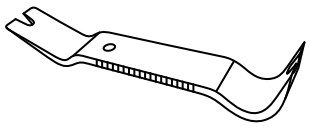
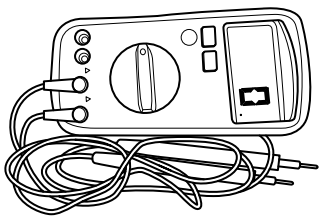
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**(Refer to CAN system)**

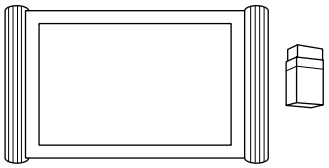
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020
Digital Multimeter	 S00002

■ Special Tool

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 S00001

5.2 Specifications

■ Torque Specifications

Position	Torque Specifications (N·m)
Combination Switch Tightening Screw	5 ± 1

5.3 Combination Switch Assembly

■ Removal

⚠ Caution

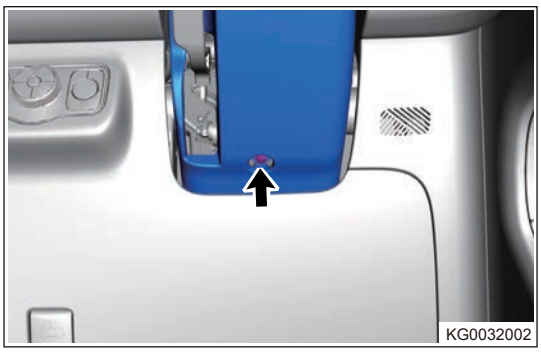
- **Be sure to wear safety equipment to prevent accidents, when removing combination switch assembly.**
- **Appropriate force should be applied when removing combination switch assembly. Be careful not to operate roughly.**

(1) Disconnect the negative battery cable.

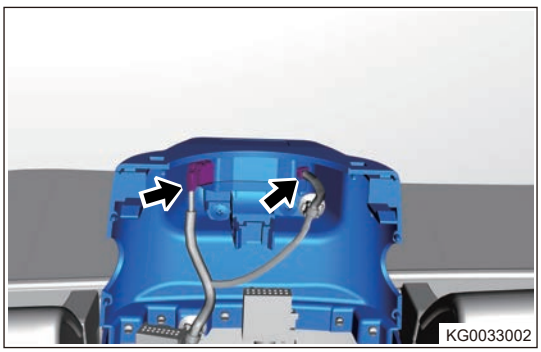
(2) Remove the driver airbag.

(3) Remove the steering wheel assembly.

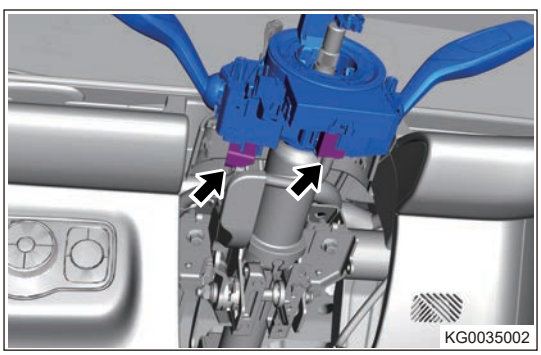
(4) Remove fixing screw (arrow) from combination switch lower cover, disengage upper and lower covers of combination switch, remove combination switch lower cover.



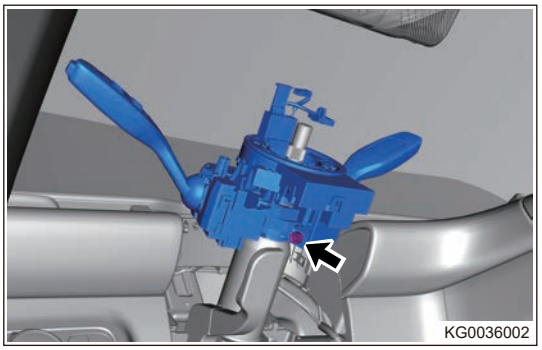
(5) Disconnect face recognition camera connectors (-arrow) of combination switch upper cover, remove combination switch upper cover with face recognition camera assembly.



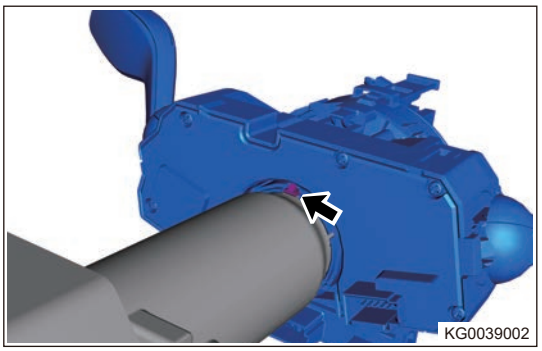
(6) Disconnect combination switch assembly and spiral cable connectors (arrow).



(7) Loosen fixing clamp (arrow) of combination switch assembly.



(8) Pry off clip (arrow) on upper part of combination switch.



(9) Remove the combination switch assembly along column upwards.

■ Installation

⚠ Caution

- **When the combination switch is delivered for use, there is a yellow dowel pin on the spiral cable, which is used to ensure that the spiral cable is in the zero position. Before fixing the combination switch on the steering column, the vehicle wheels must be positioned in a straight forward position (visually). (To ensure that the zero position of spiral cable is consistent with zero position of wheel) After installing the combination switch into the steering column, please do not rotate the spiral cable and confirm that the above is completed before installation. If the yellow dowel pin is removed and spiral cable has been rotated by an unknown angle before installation, the spiral cable can be readjusted to the center position as follows: Rotate the rotating part of the spiral cable in one direction until the spiral cable is tightened, and then rotate it in the opposite direction for approximately 2.5 turns to return to the zero position.**

(1) Align 2 dowel pins and one clip of the combination switch with the positioning groove and opening on column.
(2) Place the combination switch on the steering column until you hear a click sound.
(3) Tighten fixing screw of combination switch assembly.

Tightening torque: 5 ± 1 N·m

(4) Connect combination switch assembly and spiral cable connectors.
(5) Connect the face recognition camera connector.
(6) Install the upper and lower covers of combination switch.
(7) Install fixing screw of combination switch lower cover.
(8) Install the steering wheel.
(9) Install the driver airbag.
(10) Connect the negative battery cable.

5.4 Matching Learning

■ Write VIN Code

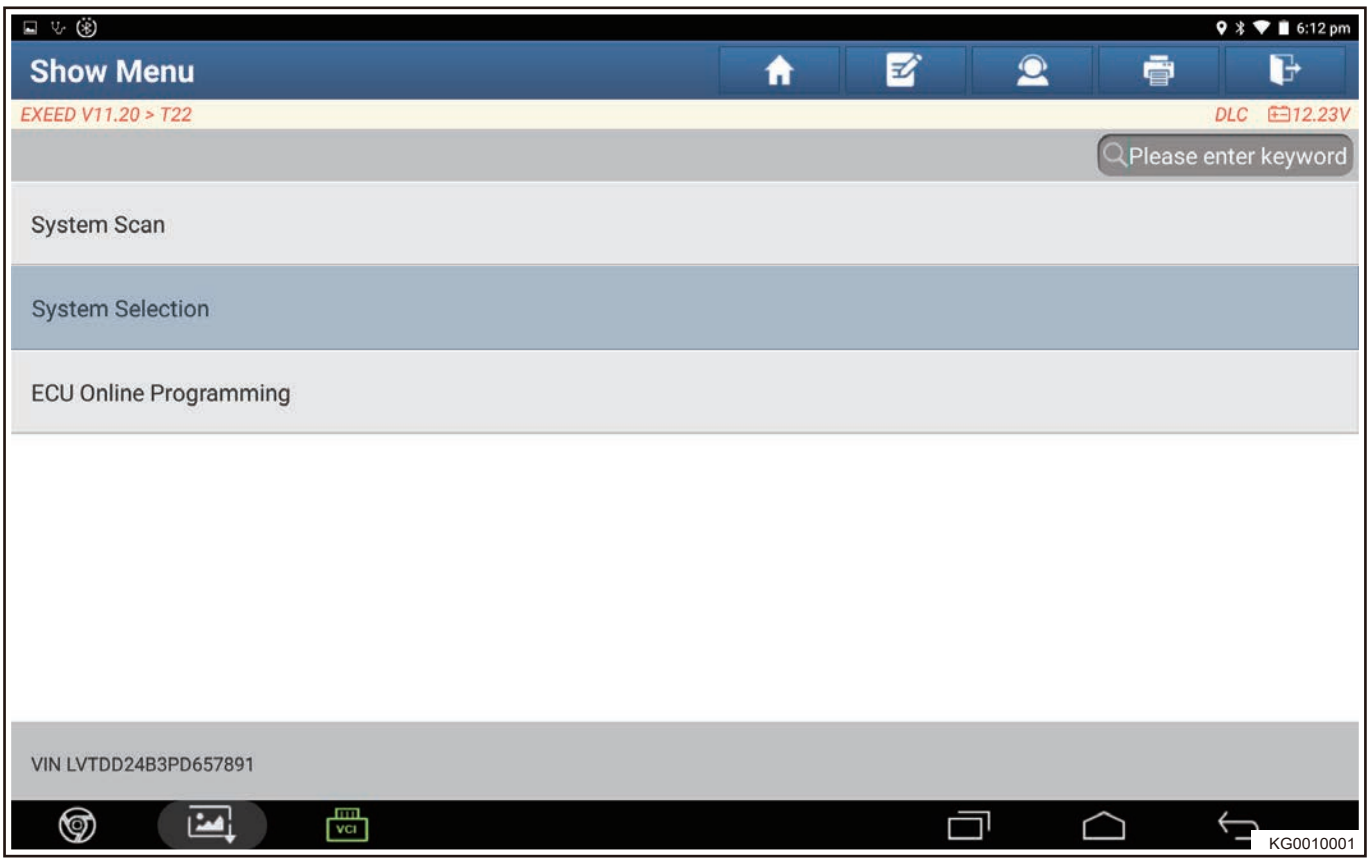
Hint:

- After replacing combination switch assembly, use the diagnostic tester to write VIN code.

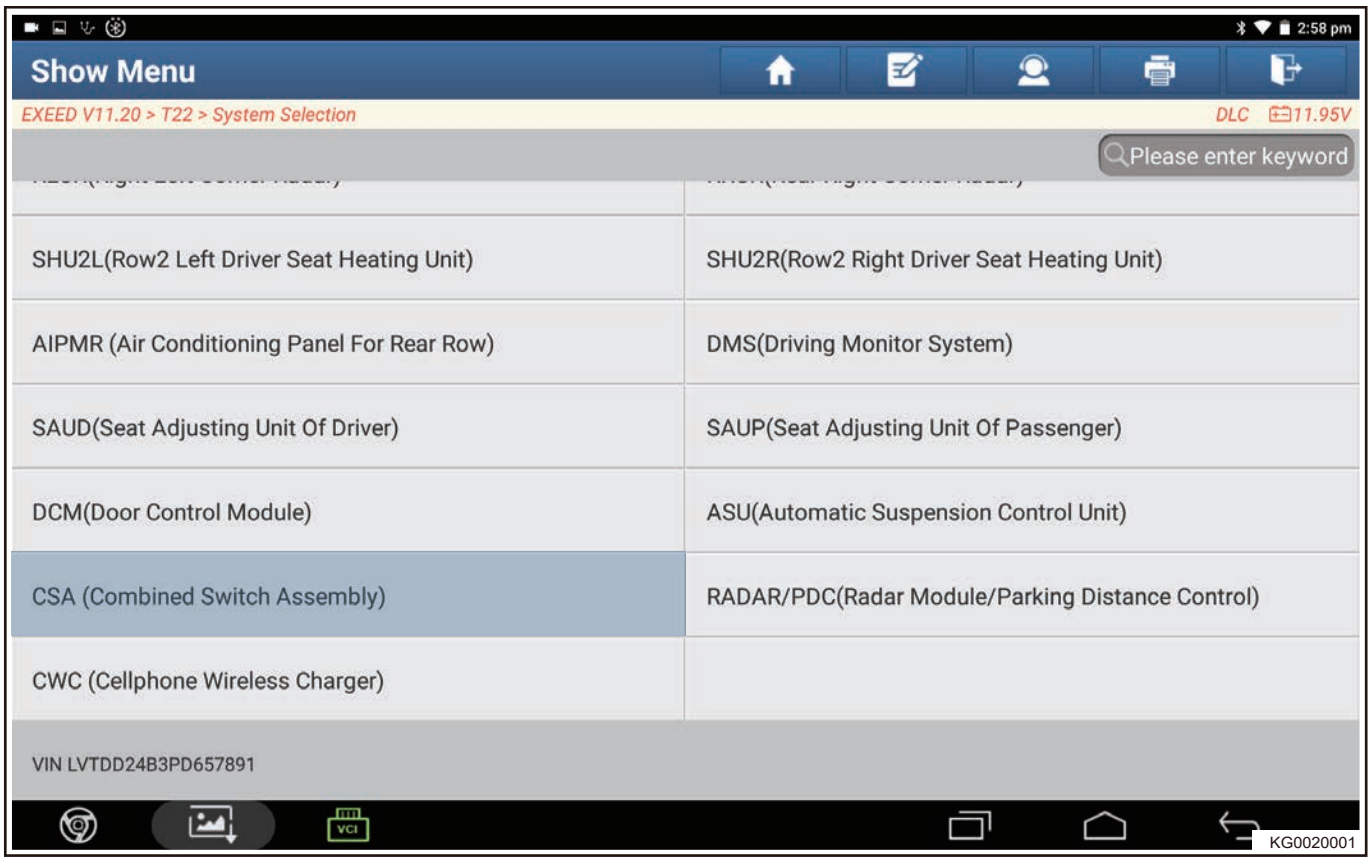
(1) Connect the diagnostic tester.

(2) Select “T22” model.

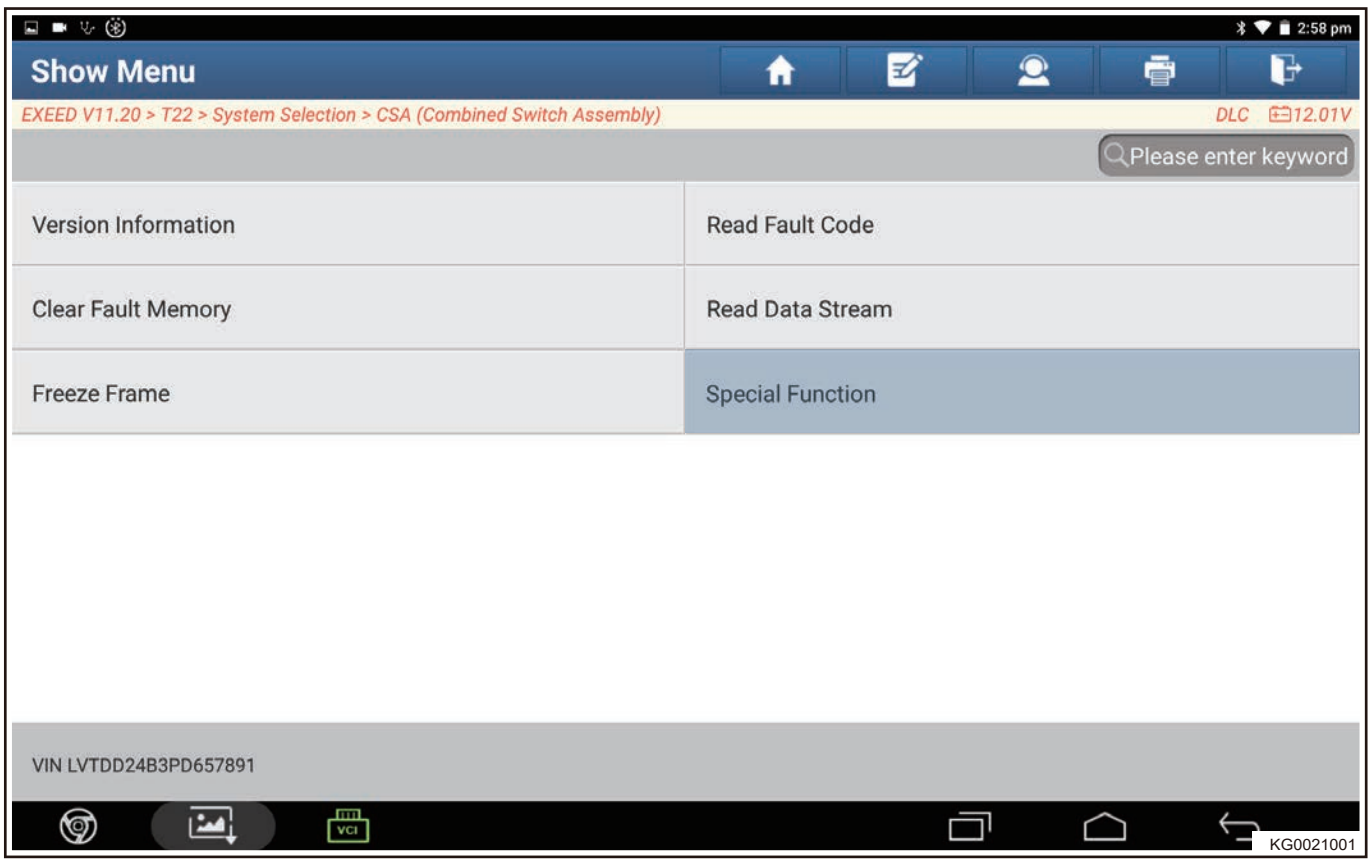
(3) Click “System Selection”.



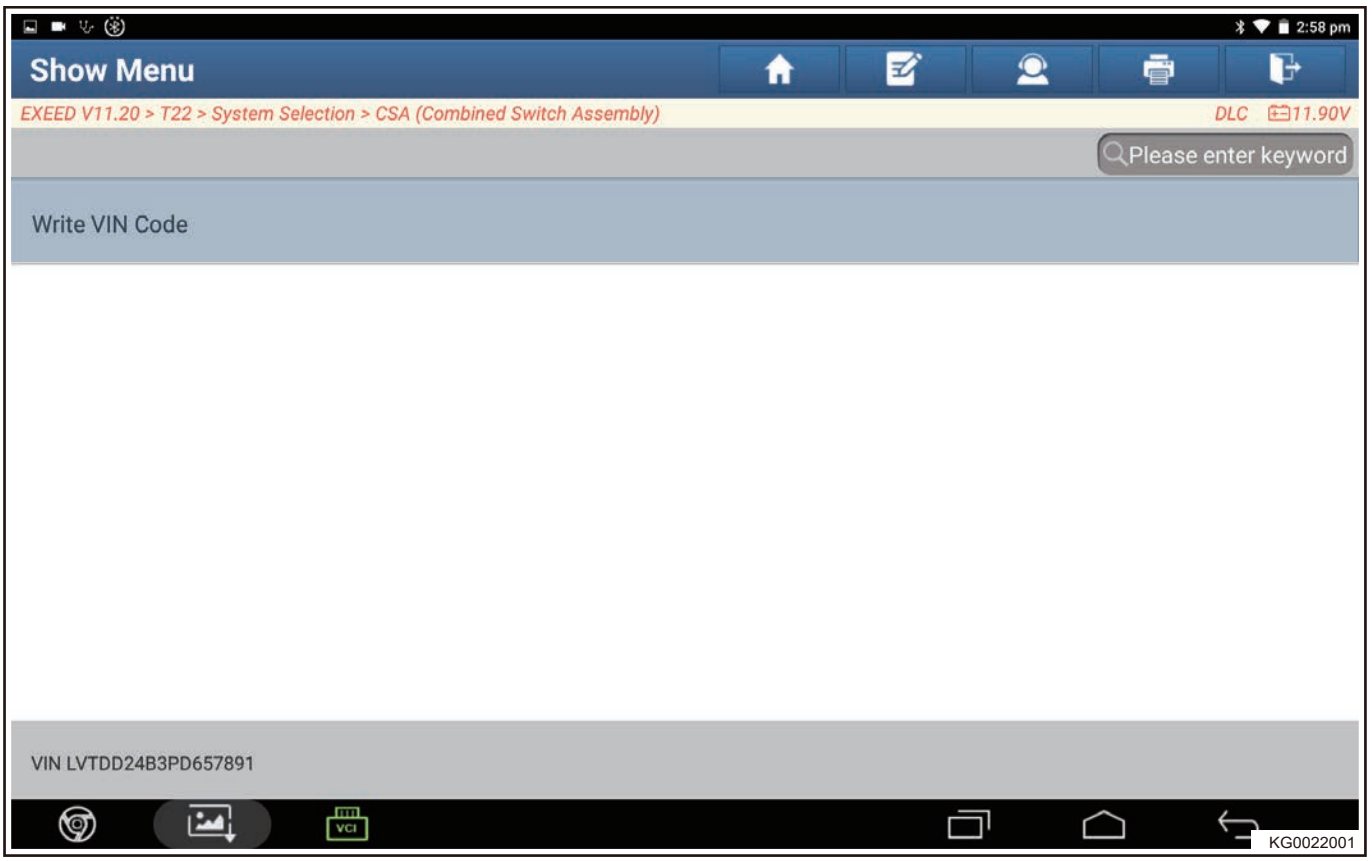
(4) Select "CSA (Combined Switch Assembly)".



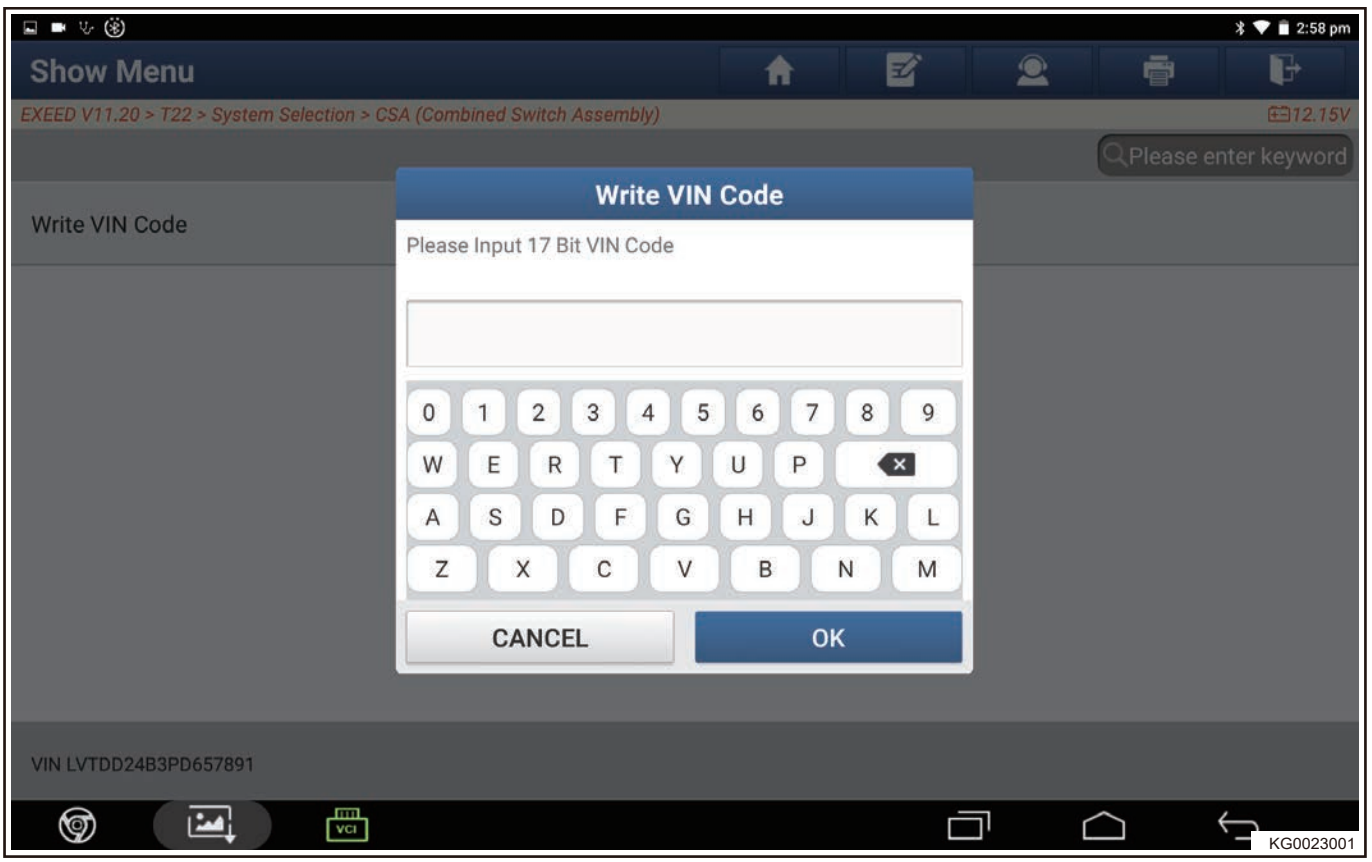
(5) Select “Special Function”.



(6) Select “Write VIN Code”.



(7) Write VIN code. After confirming information, click “Confirm”.



(8) The screen displays “Write VIN Success!”, click “OK”.

10.12 Head Up Display

1 Warnings and Precautions

1.1 Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Be sure to wear safety equipment to prevent accidents, when removing head up display.

(2) Appropriate force should be applied when removing head up display. Be careful not to operate roughly.

(3) Try to prevent interior and body paint surface from being scratched when removing head up display.

2 System Overview

2.1 System Description

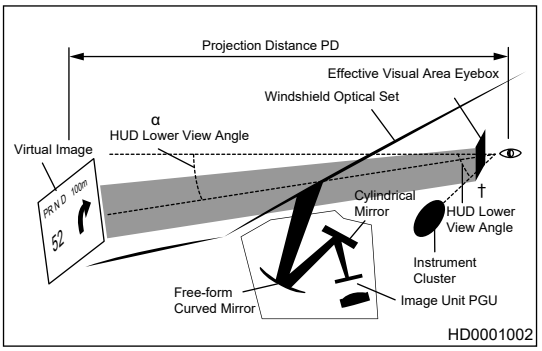
Head up display, call HUD for short, is a driving assist instrument used in vehicle. It is a kind of integrated optical electronic equipment composed of electronic components, display components, controllers, etc. Through optical system and electronic control, HUD projects driving information (such as speed, turning, driving range, etc.), navigation information, driving assistance (ADAS) and other information to front windshield in the form of images and characters, forming a virtual image in front of driver field of vision, so that driver can obtain corresponding information in real time without adjusting line of sight; HUD can adaptively adjust brightness of virtual image to match visual requirements by capturing brightness signal of external environment; At the same time, adjust image position to fully meet needs of drivers of different heights. Through the application of HUD, driving safety and comfort can be greatly improved.

■ Running noise

Under the whole vehicle environment, when adjusting HUD, the noise of test motor is no more than 40 dB at 50 cm away from HUD.

■ Optical principle

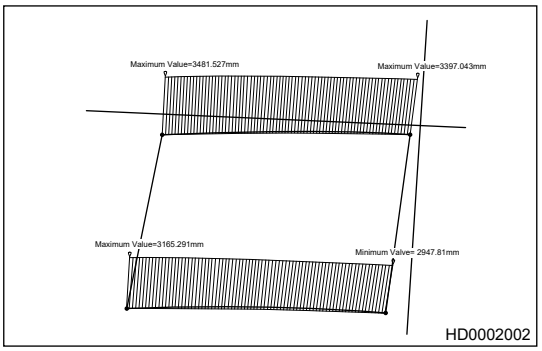
The optical imaging principle of HUD is: HUD drives the image unit to emit a light beam, which is reflected by a cylindrical mirror and a free-form curved mirror, then the light beam is projected to the front windshield, and then front windshield reflects the light beam to driver’ s eyes, so that the driver can see an enlarged virtual image at a greater distance ahead.

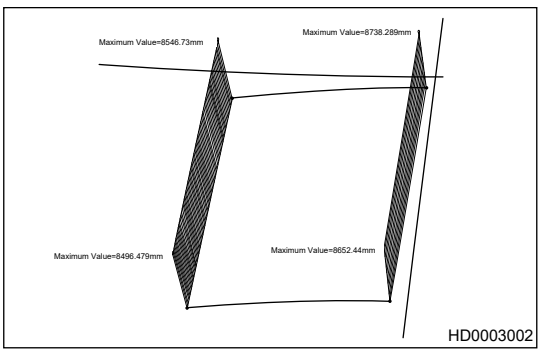


■ Windshield demand

As a part of the imaging system, the front windshield has certain requirements on radius of curvature, variation range and wedge angle. The curvature radius parameter information of front windshield of HUD projection area is shown in illustration:
Curvature radius analysis of front windshield (transverse direction)
Curvature radius analysis of front windshield (vertical direction)

- Variation range of glass curvature radius in horizontal direction: 8500-8700.
- Variation range of glass curvature radius in vertical direction: 2950 - 3500.





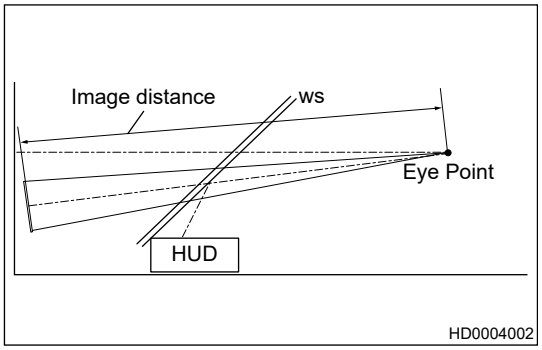
■ Image parameters

(1) The main parameters of HUD image are as follows:

Type	Parameters	Tolerance Requirements	Note
Image size	241 mm x 80 mm	± 6 %	Calculated based on FOV and projection distance
Image distance	2300 mm	± 6%	/
Field of view angle	6° x 2°	± 6%	/
Lower view angle	3.5°	± 0.3°	/
Left view angle	0°	± 0.5°	
Eye box size	130 mm × 50 mm	/	Whole image seen within eye box
Eye movement range	± 50 mm	/	Whole image seen within moving range of eye box
HUD virtual image brightness	⩾ 10,000 cd/m2	/	White light brightness, highest brightness
Ghosting	/	Central eye box ⩽ 2 mm, total eye box ⩽ 3 mm	/
Distortion	/	5%	HUD factory status

(2)

The image distance is the distance from the eye point to the actual virtual image center, and the HUD projection distance is 2300 mm.



(3) The field of view angle is the opening angle of the left and right edges and the top and bottom edges of the virtual image seen at the eye point. The field of view angle of HUD is 6° x 2°.

(4) The lower view angle is the angle between the line connecting eye point and center point of virtual image and horizontal plane. The lower view angle of HUD is 3.5°.

(5) The left view angle is the angle between line connecting eye point and center point of image and vertical plane. The left view angle of HUD is 0°.

(6) The size of the eye box indicates the range of eye movement in which whole image can be seen on driver side for the virtual image. The eye box size of HUD is 130 mm x 50 mm.

(7) The eye movement range indicates the adjustable amount of eye box. The eye movement range of HUD is ± 50 mm.

(8) HUD virtual image brightness is the brightness of HUD virtual image projected on front windshield. The maximum brightness of virtual image of HUD is required to be ⩾ 10,000 cd/m2.

(9) The ghosting defines the overlapping degree of different virtual images formed by reflection of inner and outer surfaces of glass when HUD is projected on the front windshield. The ghosting of HUD requires that the measured value of central eye box ⩽ 2 mm, and the range of whole eye box ⩽ 3 mm.

(10) The distortion is that the actual HUD image will deviate from ideal value, which leads to a certain degree of distortion of image. This distortion degree is usually described by a ratio. The distortion requirement of HUD at factory is ⩽ 5%.

■ **Operating voltage range**

HUD		CAN		Description
Data Stream/ Others	**Voltage Value**	**Data Stream/ Others**	**Voltage Value**	
Low voltage function prohibition	8.5 V	Low voltage network prohibition	5.8 V	Drop from normal voltage to the lowest voltage that cannot work
Low voltage function recovery	9 V	Low voltage network recovery	6 V	Recover from low voltage to the lowest voltage that can work normally
High voltage function prohibition	16.5 V	High voltage network prohibition	18.5 V	Recover from normal voltage to the highest voltage that cannot work normally
High voltage function recovery	16 V	High voltage network recovery	18 V	Drop from high voltage to the highest voltage that can work normally
Low voltage recovery time	200 ms ± 10 %	Low voltage recovery time	< 500 ms ± 10 %	Delay time from low voltage to normal voltage

HUD		CAN		Description
Data Stream/ Others	Voltage Value	Data Stream/ Others	Voltage Value	
High voltage recovery time	200 ms ± 10 %	High voltage recovery time	< 500 ms ± 10 %	Delay time from high voltage to normal voltage
Note description: • Setting voltage of DTC is 9 ~ 16 V and delay time is 200 ms ± 10 %. • CAN voltage is defined by network platform department. If there is conflict with the above table, the network platform department shall prevail. • Deviation of above voltage is controlled within ± 0.1 V.				

(1) Normal operating voltage range: 9 V to 16.0 V, including 9 V and 16.0 V (all voltages refer to the voltage at HUD power supply connection):

- When battery voltage is below 8.5 V, HUD output will be controlled according to the definition of low voltage protection.
- When battery voltage is higher than 16.5 V, HUD output will be controlled according to the function definition of high voltage protection.
- When battery voltage returns from abnormal to normal, all outputs will return to the output defined by respective function definitions.

(2) High voltage protection function:

- If voltage is higher than 16.5 V, function output will be suspended in order to protect HUD.
- If voltage drops from high voltage to 16 V or below, HUD will resume function output.

(3) Low voltage protection function:

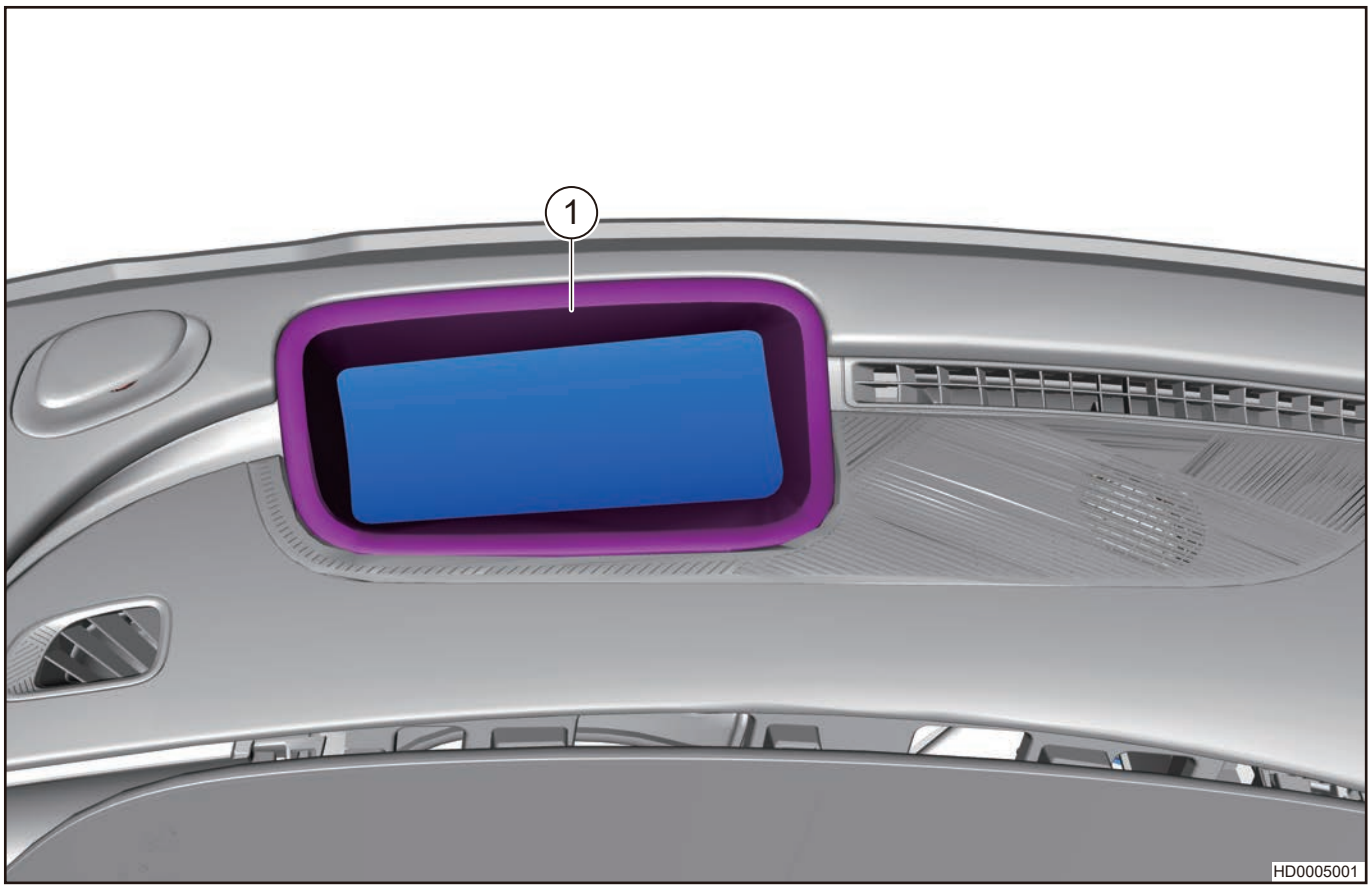
- If voltage is lower than 8.5 V, in order to save power, HUD will turn off output except CAN communication port.
- If voltage rises from low voltage to 9 V or above, HUD output will resume.

(4) Voltage range of 6 V ~ 16 V ensures CAN communication is normal.

■ Operating current range

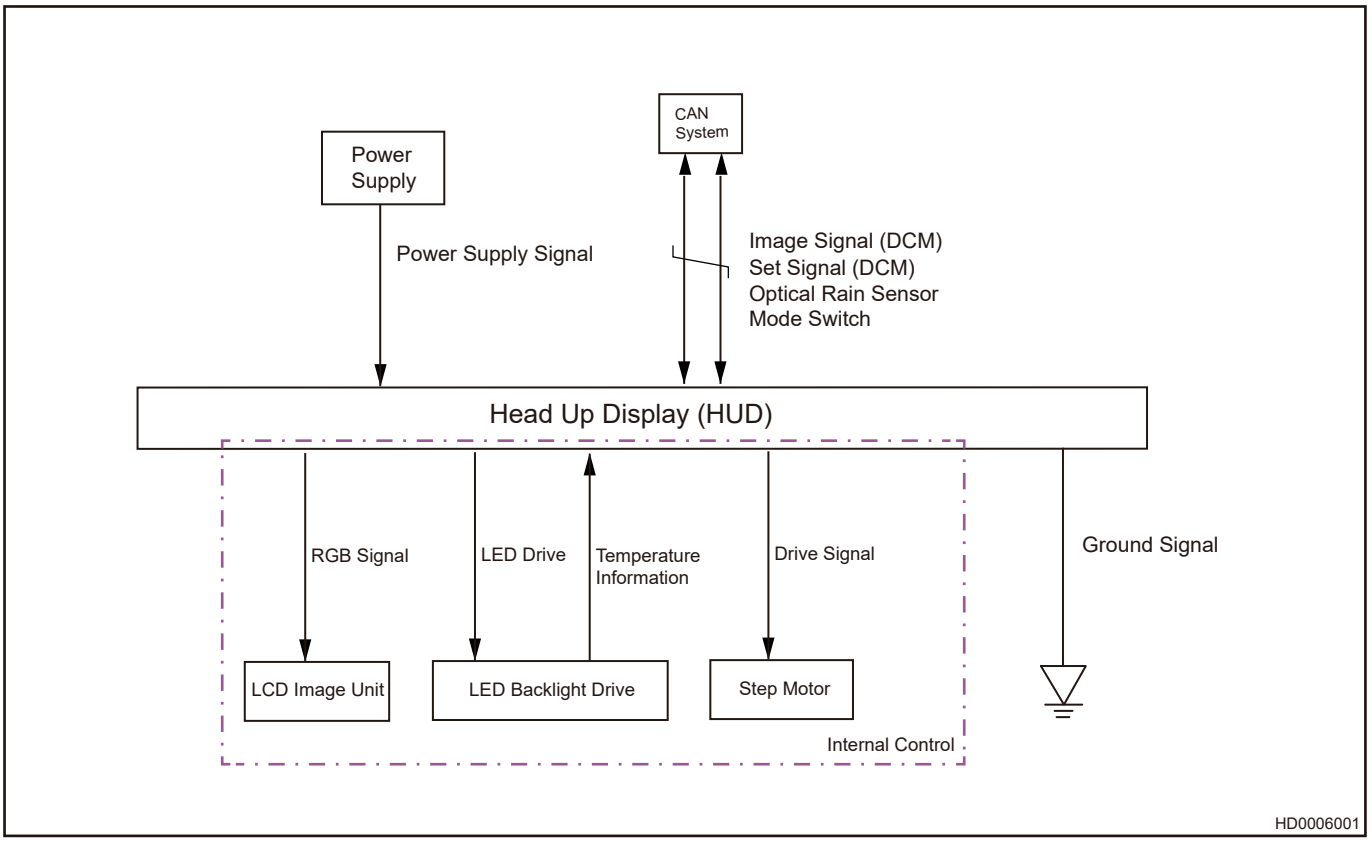
Operating Current	Sleep current
< 1 A (HUD current under long-term stable operation condition)	⩽ 0.2 mA

2.2 System Components Diagram



1	Head Up Display		

2.3 System schematic diagram

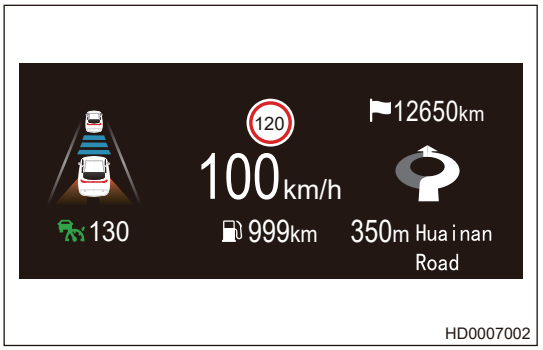


The head up display receives image signal, setting signal, switch signal and rain sensor signal in head unit through CAN and projects driving information, navigation information and driving assistance information to windshield in front of driver through the internal control unit.

2.4 Human-computer Interaction

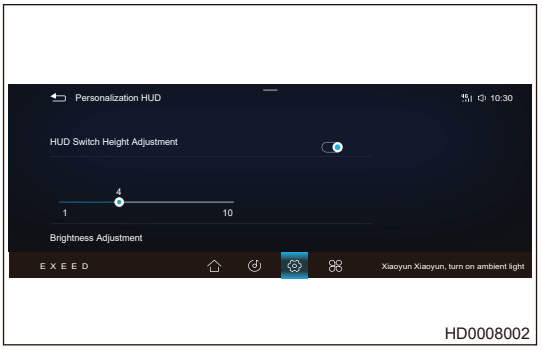
■ HUD display image

HUD display image signal is sent by DMC through CAN. HUD projects image on front windshield after receiving CAN signal. HUD can display driving status, ADAS signal, entertainment, navigation and other information as needed. HUD display information is as shown in illustration:



■ Head up display adjustment/setting

Through the touch screen menu setting, HUD display ON/OFF function can be controlled, image brightness and position can be adjusted, and normal mode/snow mode and other display styles can be switched. As shown in illustration below, brightness, height, function customization and mode switching are only effective when HUD is on.



Setting Item	Function	Description
ON/OFF	Turn HUD display information on or off	Control whether HUD is displayed.
Image height adjustment	Manually adjust the height of HUD display image	Adjust HUD height to adapt to use habits of different drivers.
Image brightness adjustment	Automatic adjustment	Vehicle collects ambient light brightness through rain light sensor, and HUD automatically adjusts HUD display image brightness according to the collected ambient brightness signal value, so as to adapt to different ambient brightness.
	Manual Adjustment	After HUD brightness is adjusted automatically, driver can fine-tune brightness to adapt to usage habits of different drivers
Snow mode switch	Normal mode/snow mode	HUD display style (including normal mode and snow mode) is selected according to the external environment. Snow mode: Due to white and bright background of external environment, HUD is required to adjust display style to meet requirements of user to recognize display content normally.
HUD display mode	Display interface settings	Navigation/ADAS interface interchanges left and right.

2.5 HUD functional requirements

According to CAN signal, HUD displays vehicle information, navigation information, active safety information and entertainment information through optical projection on front windshield. At the same time, the user can turn on/off HUD display, adjust HUD display brightness and height, and switch display mode through touch screen of central console.
It takes about 6 seconds for HUD from wake-up to normal display.

■ HUD function display

(1) Driving information display

- HUD displays current speed and driving mileage.

(2) Active safety display

- When adaptive cruise system operates, HUD displays adaptive cruise state, set target speed information, following distance information and icon of vehicle in front;

- When lane departure system operates, HUD displays different lane information, and prompts warning/alarm status through left and right deviation of vehicle;
- When front collision warning system/automatic emergency braking system operates, HUD displays the warning information of front collision warning system/automatic emergency braking system;
- When traffic signal recognition system operates, HUD displays speed limit information; When driving speed exceeds set speed, HUD displays speed limit information;
- When blind spot monitoring system operates, HUD displays blind spot monitoring information.

(3) Navigation information display

- HUD displays steering angle (straight, right turn, U-turn, left front turn, roundabout and other relevant navigation steering information).

(4) Bluetooth phone information display

- When Bluetooth phone function operates, HUD displays name of corresponding person.

■ HUD action sequence

(1) When there is no memorized height information, HUD height is 6th gear (a total of 10 gears, 1 gear is the lowest virtual image, 10 gear is the highest virtual image);

(2) When there is no memorized brightness level information and no RLS valid signal is received, HUD brightness is 25% of the maximum virtual image brightness when backlight is turned on;

(3) When there is no memorized HUD switch status information, HUD status information is OFF (HUD factory setting is ON);

(4) When there is no memorized snow mode switch status information, snow mode switch status information is OFF;

(5) When there is no memorized ADAS position status information, HUD shows that ADAS is on left side;

(6) The setting interface status of IHU should be displayed according to HUD feedback signal.

■ Over temperature protection

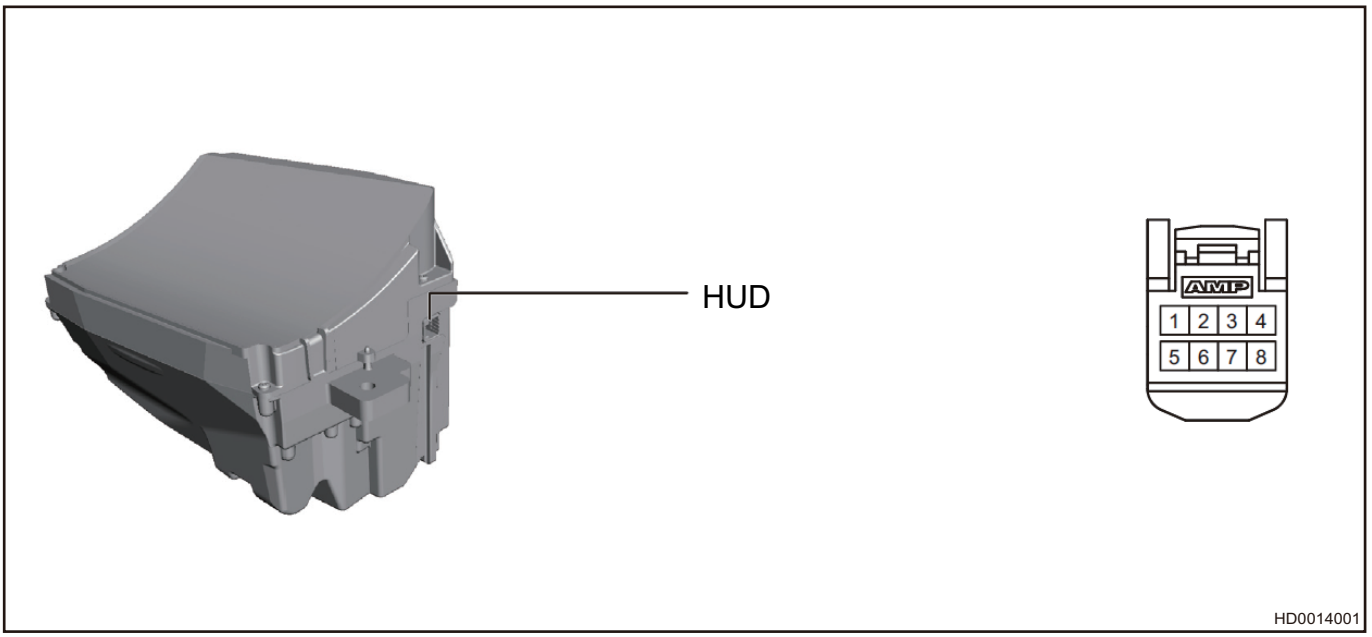
HUD is ON:

Function overview	Through obtaining HUD internal temperature information, judge whether TFT screen is in over temperature state. If TFT temperature is too high, HUD will gradually reduce display brightness.
Basic process	When internal temperature of HUD exceeds a certain value (threshold 1, to be calibrated), HUD will reduce image brightness; If HUD internal detection temperature > 85 ℃ (to be calibrated), HUD screen will pop up the text "HUD temperature is too high, turn off HUD" for 3 s, at the same time, set STAT_HUDDisplayOnOff value to 0, and then turn off HUD display; When HUD detects that temperature drops to 45 ℃, HUD will turn on again, and brightness will be displayed according to gear value and RLS signal value saved during manual adjustment.
Signal process	Precondition satisfied → internal temperature information (sensor) → HUD drives LED → image brightness adjustment.
Others	Vehicle collects ambient light brightness through rain light sensor, and HUD automatically adjusts HUD display image brightness according to the collected ambient brightness signal value, so as to adapt to different ambient brightness.
	When HUD goes to sleep, rotate lens back to Park position to prevent sunlight from shining on screen.

3 Circuit Diagram

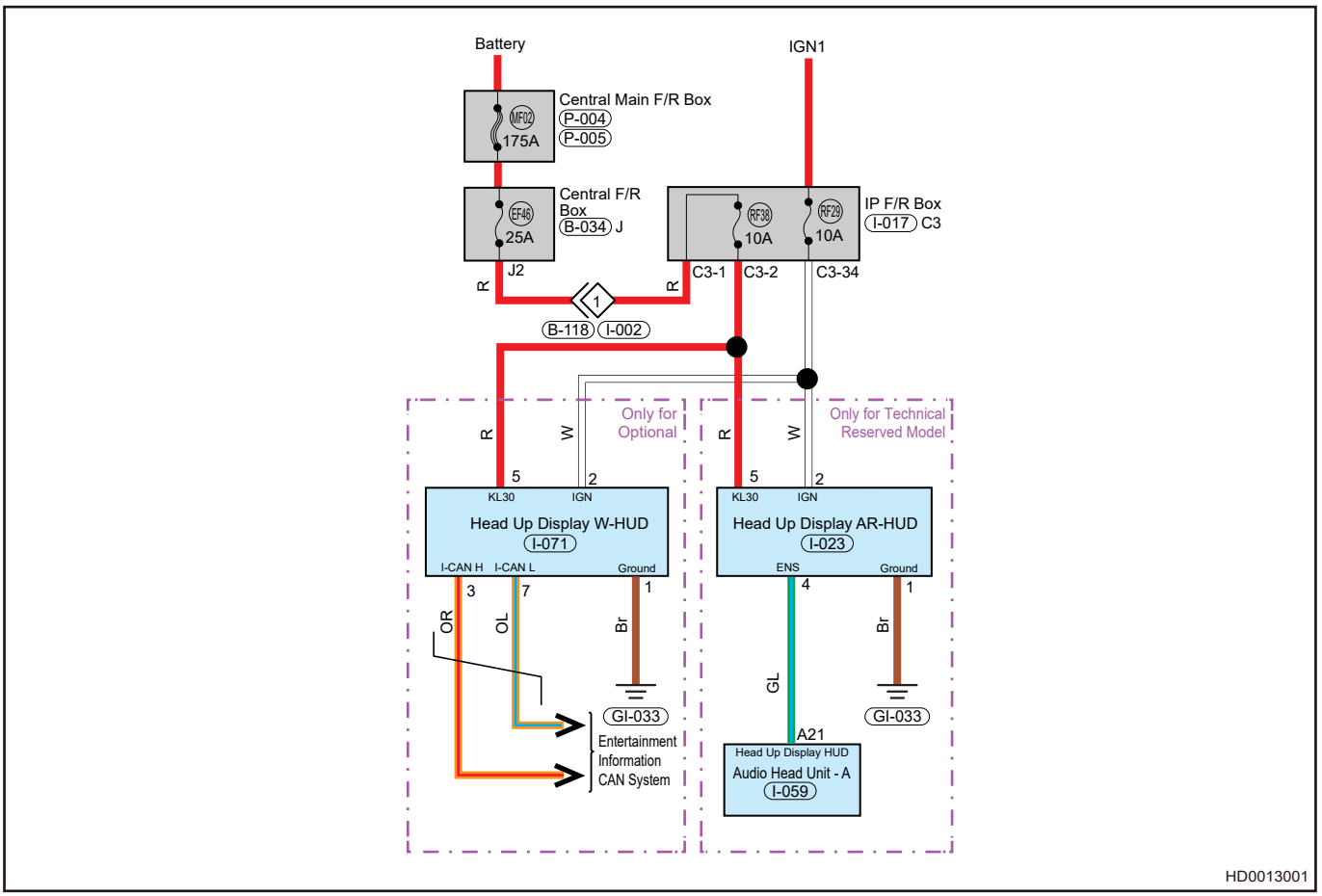
3.1 Terminal Definition

■ Head Up Display (HUD) Terminal Definition



1	Ground	5	KL30
2	IGN	6	-
3	-	7	-
4	ENS	8	-

3.2 System Circuit Diagram



4 Diagnosis & Testing

4.1 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.

(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.

(4) Only use a digital multimeter to measure voltage of electronic system.

(5) Refer to any Technical Bulletin that may apply to this malfunction.

(6) Visually check related wire harness and connector.

(7) Check and clean system grounds related to the latest DTCs.

(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.

- Look for broken, bent, protruded or corroded terminals.
- Check modules and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.

(2) Check all contact surfaces for tarnish, dirt and rust, etc.

(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

(5) Check if any additional accessories interfere with ground circuit.

(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.4 Diagnosis Procedure

Use following procedures to troubleshoot the system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	**Read DTCs**

History DTC → **Troubleshoot according to Intermittent DTC malfunction procedures**

Current DTC

5	**Repair according to Diagnostic Trouble Code (DTC) Chart**

Next

6	Adjust, repair or replace

Next

7	Conduct test and confirm malfunction has been repaired

Next

End

4.5 Diagnostic Trouble Code (DTC) Chart

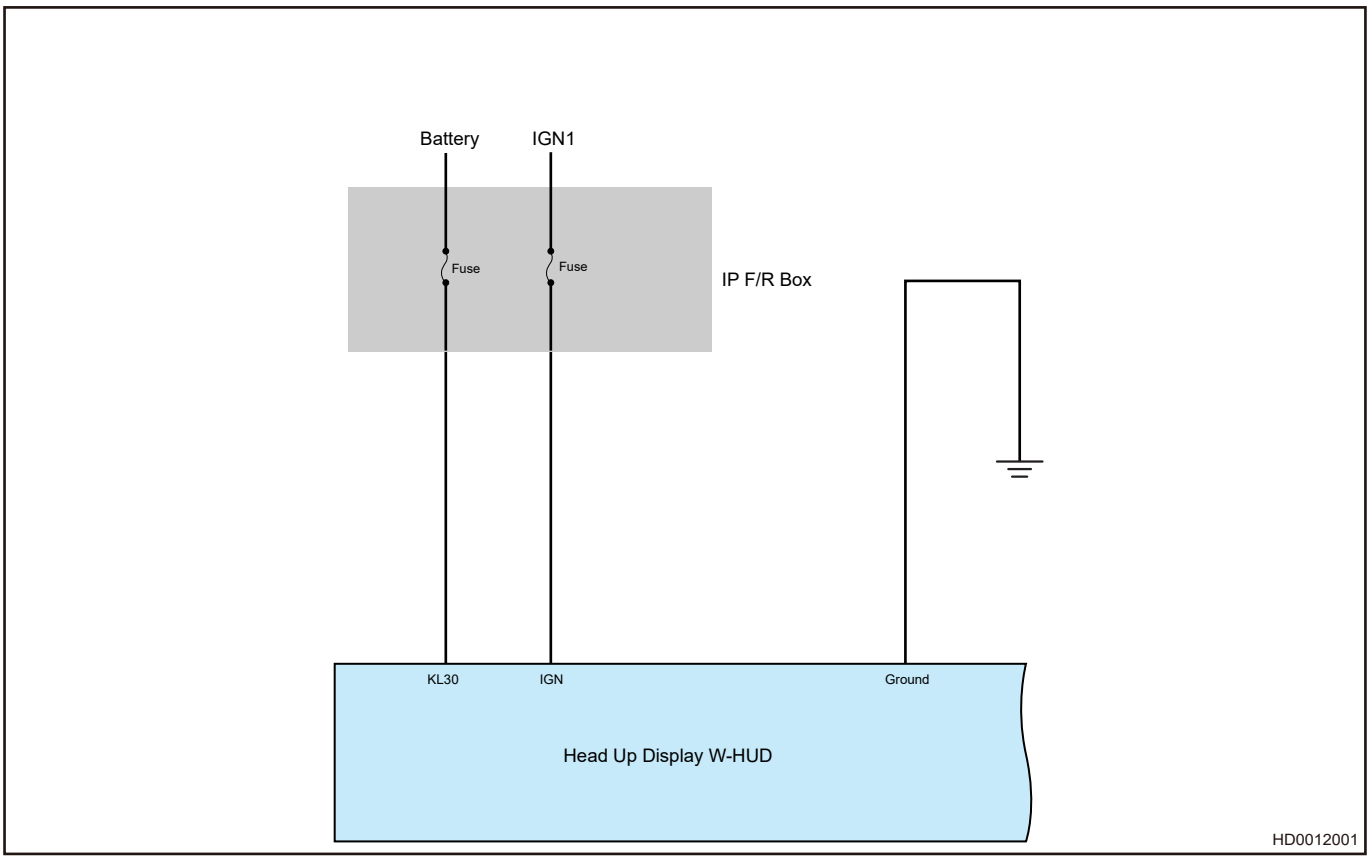
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1E8016	Circuit voltage below threshold	IGN = ON (other than 3s after starting) voltage <8.5V (± 0.2 V tolerance) for 1000 ms	• Fuse • Wire harness • Head up display module	Detect HUD power supply
B1E8017	Circuit voltage above threshold	IGN = ON, battery (KL30 PIN) voltage ＞ 16.5 V (± 0.2 V tolerance) for 1000 ms		
B1E8102	Motor drive fault	The step motor feedback voltage is less than 1 V for 5000 ms	• Main board adjustment function fails	Reset and restart, check if the fault still exists, if fault still exists, replace the motor.
B1E8203	LED Background Light Drive Fault	LED drive feedback error state times is more than 5	• Internal short circuit current is too high • High voltage is connected to ground	Update the LED drive circuit board
B1E8301	High Temperature Fault	HUD internal detected temperature value is more than 65℃, error state times is more than 5	• The maximum brightness of HUD corresponding to change value in temperature calibration table is too high	Check if HUD fin is installed correctly, check if LED drive board is faulty, if so, replace LED drive plate, check if ECU is overheat.
B1E8471	Limit Switch Fault	Limit Switch incorrect conditions: 1. When limit switch is turned off, check the feedback level, it indicates fault if low level is detected, 2.	• HUD height adjustment is abnormal	Reset and restart, and perform self-check.

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
		When limit switch is turned on (the big len is not pressed to limit switch), it indicates fault if feedback voltage is detected to be high level;		
B1E8517	TFT Flat Cable Error	Temperature detection resistance feedback value of TFT flat cable is out of range for more than 5 times.	• Connector is not reliable and flat cable is loose.	Check if TFT flat cable is in good condition
B1E8766	Abnormal Reset Fault	Abnormal reset is occurred (power on and reset, watch dog reset, or software reset is not abnormal reset)	• Reset potential is abnormal	If fault alway exists, replace HUD
B1E8892	EPROM Error	Checksum error in EEPROM stored data.	• Data memory is insufficient.	If fault alway exists, replace HUD
B1E8992	FLASH Error	Flash module is overflow or digit error	• Data memory is insufficient.	If fault alway exists, replace HUD
B1E8A92	RAM Fault	RAM module is overflow or digit error	• Data memory is insufficient.	If fault alway exists, replace HUD

4.6 DTC Diagnosis Procedure

DTC	B1E8016	Circuit Voltage Below Threshold
DTC	B1E8017	Circuit Voltage Above Threshold

System schematic diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch "ON"	Not less than 12 V

NG → **Repair or replace battery/alternator**

OK

2	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

(c) Check for continuity of instrument panel fuse with a digital multimeter.

NG → **Replace fuse**

OK

3	**Check interior power supply wire harness**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

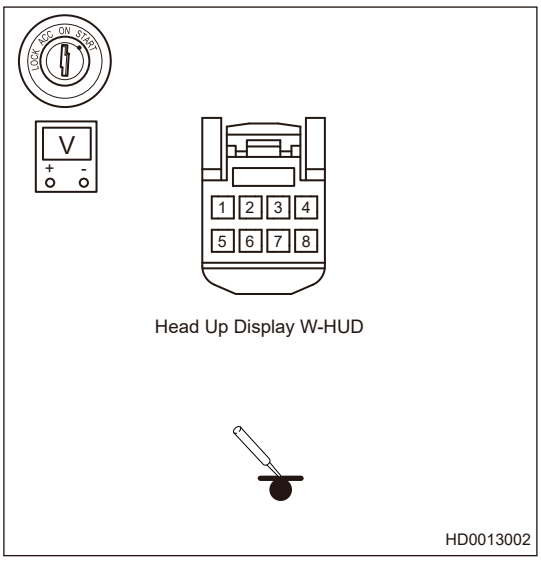
(c) Disconnect the head up display connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

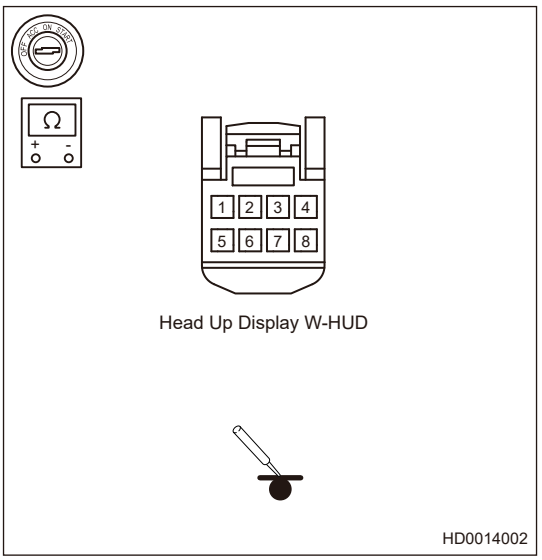
(f) Using a digital multimeter, measure voltage between head up display connectors power supply terminal and ground according to table below.

Multimeter Connection	Condition	Specified Condition
Head up display power supply terminal - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



(g) Using a digital multimeter, measure resistance between head up display ground terminal and ground according to the table below.

Multimeter Connection	Condition	Specified Condition
Head up display ground terminal - Body ground	ENGINE START STOP switch "OFF"	< 1 Ω



NG → **Repair or replace related wire harness**

OK

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG	Replace head up display module
OK	System is normal

DTC	B1E8102	Motor drive fault
DTC	B1E8203	LED Background Light Drive Fault
DTC	B1E8301	High Temperature Fault
DTC	B1E8471	Limit Switch Fault
DTC	B1E8517	TFT Flat Cable Error
DTC	B1E8766	Abnormal Reset Fault
DTC	B1E8892	EPROM Error
DTC	B1E8992	FLASH Error
DTC	B1E8A92	RAM Fault

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

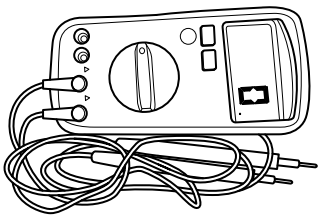
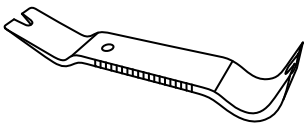
(d) Check if the same DTCs are still output.

NG	Replace head up display module
OK	System is normal

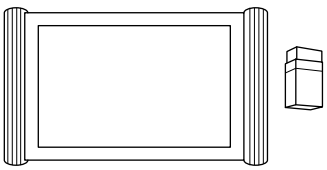
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006
Interior Crow Plate	 RCH002506

■ Special Tools

Tool Name	Tool Drawing
Diagnostic tester	 RCH0001006

5.2 Replacement of Head Up Display (HUD)

■ Removal

⚠ Warning

- **Try to prevent interior and body paint surface from being scratched when removing head up display.**
- **Be sure to wear safety equipment to prevent accidents, when removing head up display.**
- **Appropriate force should be applied when removing head up display. Be careful not to operate roughly.**

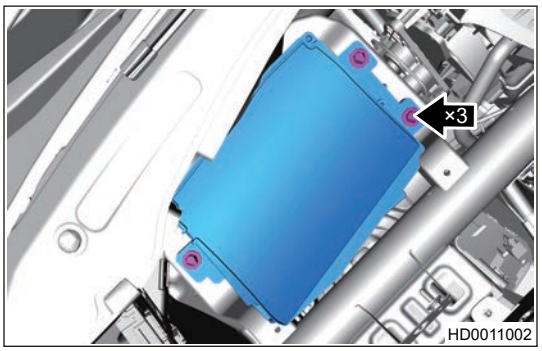
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove head up display cover with interior crow plate.

(4) Disconnect the head up display wire harness connector.

(5) Remove 3 fixing bolts from head up display.



(6) Remove the head up display.

■ Installation

(1) Place the head up display in the installation position.

(2) Install 3 fixing bolts of head up display.

(3) Connect the head up display wire harness connector.

(4) Install the head up display cover.

(5) Connect the negative battery cable.

5.3 Replacement of AR Head Up Display (HUD)

■ Removal

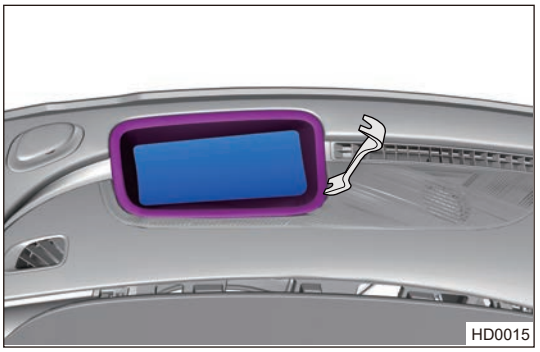
⚠ Warning

- **Try to prevent interior and body paint surface from being scratched when removing head up display.**
- **Be sure to wear safety equipment to prevent accidents, when removing head up display.**
- **Appropriate force should be applied when removing head up display. Be careful not to operate roughly.**

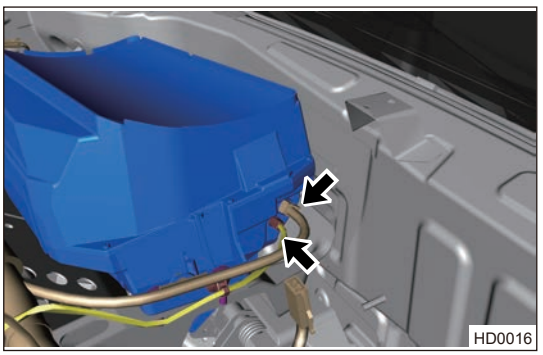
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

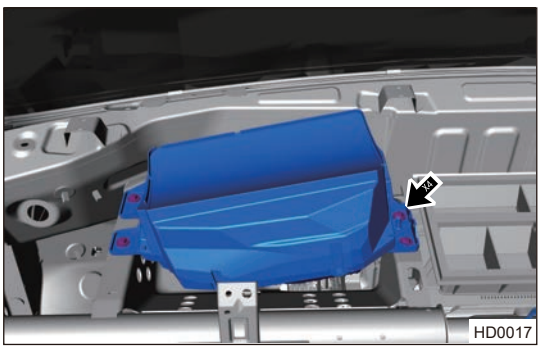
(3) Remove head up display cover with interior crow plate.



(4) Disconnect 2 head up display wire harness connectors.



(5) Remove 4 fixing bolts from head up display.



(6) Remove the head up display.

■ Installation

(1) Place the head up display in the installation position.
(2) Install 4 fixing bolts of head up display.
(3) Connect 2 head up display wire harness connectors.
(4) Install the head up display cover.
(5) Connect the negative battery cable.

10.13 DRIVING ASSIST (ADAS)

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Be sure to wear necessary safety equipment to prevent accidents, when removing multi-function front camera.

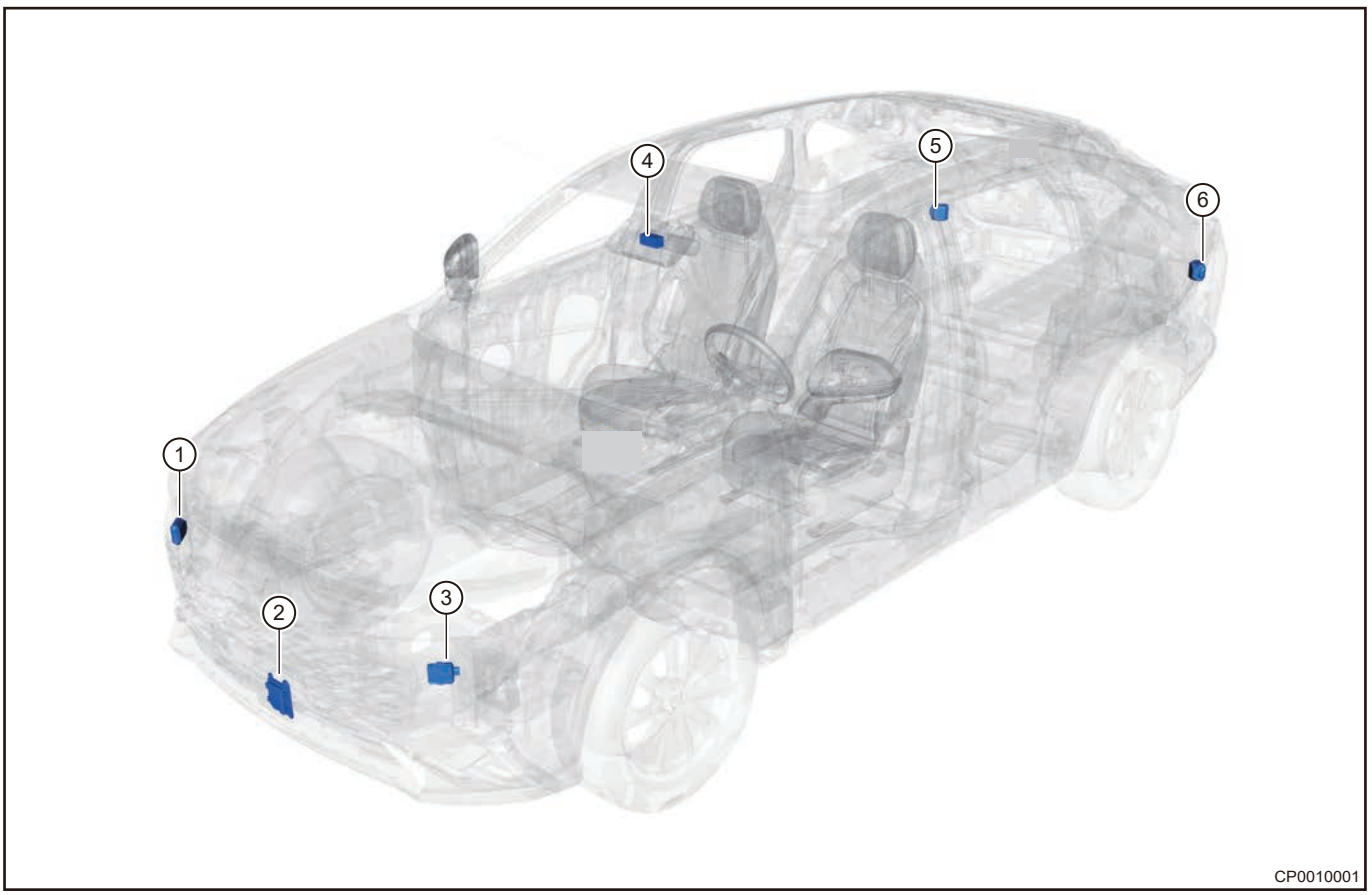
(2) Appropriate force should be applied when removing multi-function front camera. Be careful not to operate roughly.

(3) When removing multi-function front camera left/right cover plates, pay attention to the removal direction to avoid damaging cover plates.

(4) Remove multi-function front camera to perform matching calibration.

2 System Overview

2.1 System Components Diagram



1	Microwave Angle Radar (Front Right)	2	Long-distance Microwave Radar
3	Microwave Angle Radar (Front Left)	4	Multi-function Front Camera
5	Microwave Angle Radar (Rear Right)	6	Microwave Angle Radar (Rear Left)

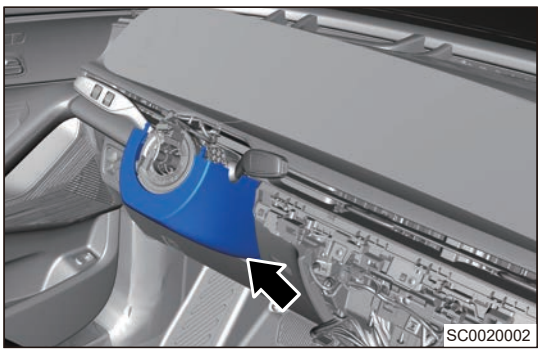
2.2 Adaptive Cruise

■ Description

Adaptive cruise control system can keep vehicle driving at the speed set by the driver, and can also follow the vehicle to keep a set safe distance.
Adaptive Cruise (ACC) system, Automatic Emergency Braking (AEB) system and Front Collision Warning (FCW) system share a front camera sensor.

■ Adaptive cruise system adjustment button

(1) Following distance increase button: Following distance increase adjustment (1).
(2) Following distance decrease button: Following distance decrease adjustment (2).
(3) Adaptive cruise system button: Short press to turn on/off adaptive cruise system; Long press to switch ACC and TJA/ICA mode (3).
(4) Active speed limit LIM button: Turn on/off active speed limit (4).
(5) Set to enter adaptive cruise system, adjustment speed value button (5).
(6) Set to enter adaptive cruise system, active speed limit, adjustment speed value (6).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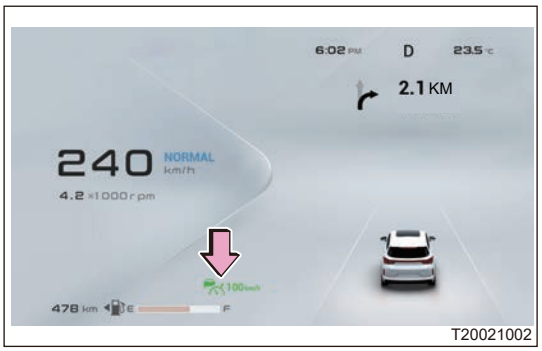
⚠ Caution

- **SET- and RES+ are buttons shared by adaptive cruise system and active speed limit.**
- **There are vehicles ahead in the same lane and driving speed is not higher than set speed of the vehicle, adaptive cruise system will control the vehicle to follow the vehicles ahead.**
- **There are no vehicles ahead in the same lane, or there are vehicles ahead in the same lane and driving speed is higher than set speed, the vehicle will drive at set speed.**

■ Entering adaptive cruise system

(1) When the vehicle starts and the speed is higher than 15 km/h or there is a ahead vehicle can follow, the vehicle automatically enters the cruise state, indicator on instrument cluster comes on.
(2) During pre-cruising, when the speed is higher than 15 km/h or there is a ahead vehicle can follow, press "" button to activate adaptive cruise system, "" indicator on instrument cluster comes on.
(3) When the speed is higher than 15 km/h or there is a ahead vehicle can follow, press "SET-" button to set the current speed to cruise speed.



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⚠ Caution

- **When parking brake is applied and the vehicle is in pre-cruise state, press "SET-" button, there is a prompt "Please depress accelerator pedal to activate adaptive cruise system" on instrument cluster, driver will depress accelerator pedal lightly to activate adaptive cruise system according to he prompt.**

■ Exiting adaptive cruise system

During cruising, if one or more of the following conditions occur, adaptive cruise system will exit:

- The vehicle moves backward.
- Depress brake pedal during driving.
- Apply electrical parking brake during driving.
- shift lever is not in D position.
- Engine hood or door is opened.

- Driver seat belt is not fastened.
- Turn hill descent function on.
- Electronic stability program system operates.
- Anti-lock braking system operates.
- Automatic emergency braking system operates.
- Electronic stability program system is not turned on.
- Adaptive cruise system is fault.
- Acceleration pedal is depressed for more than 15 minutes by driver.

After the above conditions that cause function to exit are restored, press "RES+" button to enter cruise state and restore the set state before exiting.

■ Activation conditions of adaptive cruise system

Adaptive cruise system can be activated when the following conditions are met simultaneously:

- Vehicle speed is higher than 15 km/h or objects in the front are recognized.
- Brake pedal is not depressed (when driving).
- Driver door is closed.
- Driver seat belt is fastened.
- Electronic shift switch is in D position.
- Parking brake is not applied.
- Hill descent function is not turned on.
- Electronic stability program system is turned on.
- Electronic stability program system is not activated.
- Anti-lock braking system is not activated.

■ Adaptive cruise system vehicle speed setting

During cruising, short press "RES+" button, set speed increases by 1 km/h; long press "RES+" button, set speed increases by 5 km/h. When speed is higher than 80 km/h, set speed increases by 10 km/h.
During cruising, short press "SET-" button, set speed decreases by 1 km/h; long press "SET-" button, set speed decreases by 5 km/h. When speed is higher than 80 km/h, set speed decreases by 10 km/h.

Hint:

- The adaptive cruise system speed is set to 15 km/h minimum and 150 km/h maximum.
- When driving uphill, speed will be slightly lower than set speed, and when driving downhill, speed will be slightly higher than set speed.

⚠ Caution

- **When adaptive cruise system function fails, adaptive cruise yellow indicator comes on. At this time, adaptive cruise system will not operate normally. Contact the EXEED service station for inspection and repair as soon as possible.**

■ Be sure to read the following precautions when using adaptive cruise system

- Adaptive cruise system can not violate the laws of physics and there are some limitations, driver must always control the vehicle and take full responsibility for the vehicle.
- If the vehicle is too close to a vehicle in adjacent lane, adaptive cruise system may select the vehicle as a front tracking target to respond.
- Adaptive cruise system can not respond to stationary objects and vehicles, crossing vehicles, oncoming vehicles, pedestrians, bicycles, and animals.
- When adaptive cruise system controls the vehicle to stop for a short time, driver must ensure that there are no obstacles or other traffic participants, such as pedestrians, bicycles, animals, etc. in front of the vehicle.
- When adaptive cruise system function fails, "  " yellow indicator comes on. At this time, adaptive cruise system will not operate normally. Contact the EXEED service station for inspection and repair immediately.
- When the adaptive cruise system controls the vehicle, do not inadvertently step on accelerator pedal, otherwise, adaptive cruise system will not apply brake to vehicle, driver should be ready to brake actively at any time to ensure safety.

- Adaptive cruise system can only realize limited braking, if the vehicle ahead applies emergency braking suddenly, another vehicle cuts in front of the vehicle quickly or the vehicle quickly cut into the rear of the vehicle slower than the vehicle, adaptive cruise system may not be able to respond or respond too slowly, in this case, driver should take over control of the vehicle in time.
- The driver must adjust the appropriate distance between the vehicle and the vehicle ahead according to traffic and weather conditions, and is responsible for the safe vehicle stopping. In severe weather such as rain, snow, fog, etc., adaptive cruise system may not be able to recognize vehicle ahead. In this case, adaptive cruise system should be turned off.
- Adaptive cruise system is suitable for highways and roads in good condition, and is not recommended for urban roads, narrow roads, mountain roads, hills, tunnels, etc. If adaptive cruise system is used on curve, it may cause the loss of vehicle ahead target or delay of target selection due to the limitation of sensor detection range. In these cases, adaptive cruise system will control the vehicle to accelerate to set speed.
- When following the vehicle ahead to stop, adaptive cruise system may not recognize the end of vehicle but the lower or upper part of vehicle (for example, rear axle of truck with a higher chassis, upper part of a lower flat trailer). In these cases, system will not be able to guarantee a proper stopping distance or even lead to collision. Therefore, the driver must be alert and take over control of vehicle at any time during this process.
- Two sensors, radar and camera, are mounted on the front area of vehicle and behind the windshield. It should be noted that the field of vision of sensor should not be blocked by pollutants, and there should be no modification or license plate decoration frame in the front or surrounding areas, especially when the snow completely covers the sensor, the adaptive cruise system function will exit. The sensor may also be affected by vibration or collision, resulting in system performance degradation or no function. In this case, contact the EXEED service station to recalibrate the sensor as soon as possible.
- All the above precautions do not cover all the situations that may affect normal operation of system function. The system function may not bring expected effect due to other reasons. Driver must always take responsibility for the vehicle control.

■ Following distance

During cruising, press "二"/"三" button to adjust following distance, the distance is divided into five grades (-near, nearer, medium, farther and far).

⚠ Caution

- **Following distance increases with increase of speed.**
- **If the distance is minimum, the distance from vehicle ahead is very small when following the vehicle ahead at low speed. In view of safety considerations, the maximum distance should be selected when following on slippery road.**
- **Electronic stability system continues to brake during decreasing speed following the vehicle ahead, motor rotation can generate operating sound, this is normal and please keep driving.**

⚠ Warning

- **Please note that any driving behavior complies with all the provisions of traffic laws.**
- **During the whole operation, you are responsible for controlling vehicle, and intervening as necessary.**

■ Exceeding set speed

During adaptive cruising, the driver depresses accelerator pedal to exceed set speed. Release accelerator pedal, return to previous control state. During exceeding set speed, if the distance from vehicle ahead is too small, the instrument cluster will display a prompt information and sound audio reminder to remind driver to take a avoidance measures.

■ Curve speed control

When driving into a curve during cruising, driving speed will be decreased appropriately to assist the driver to safely pass through the curve.

⚠ Warning

- **During the whole operation, you are responsible for controlling the vehicle and decreasing the speed of entering curve as much as possible.**
- **When driving into a curve, due to the limitation of radar sensor to detect the target, it may not be possible to detect the vehicle ahead of the same driving track in time, in this case, the driver should be ready to take over control of the vehicle at any time.**

■ Stop-and-go function

During driving following the vehicle ahead with adaptive cruise system, if the vehicle ahead decreases speed to stop, the vehicle also decreases speed to stop. There is a stable recognition function for stationary obstacles, when system detects a stationary obstacle in front of the vehicle, it actively applies brake for the vehicle.

- Stop following vehicle ahead: During cruising, the vehicle drives with adaptive cruise system accordance with the set following distance. During performing brake following the vehicle ahead, the speed gradually decreases, following distance gradually narrows, following distance is maintained within the set distance.
- Stop when detecting stationary obstacle: Adaptive cruise system has a stable recognition ability for stationary obstacles. When the system detects a stationary obstacle ahead, it performs brake and stop according to its own speed and distance from the obstacle.
- Start following vehicle ahead: The vehicle ahead starts and drives within 3 seconds, and the vehicle automatically accelerates to follow the vehicle ahead; When the vehicle ahead starts and drives within 3 seconds to 10 minutes, adaptive cruise system enters the state to be activated. Driver needs to gently depress accelerator pedal, press "RES+" button (resume set cruise speed before stopping) or "SET-" button (set the current speed to cruise speed) to reactivate adaptive cruise system; Stop for more than 10 minutes, adaptive cruise system is exited, electronic parking system automatically activates for parking.
- Departure reminder system: When the system detects that the vehicle ahead has left, if the vehicle has not started, the instrument cluster will display a prompt information and sound audio reminder. User can turn on/off departure reminder system in head unit system.

⚠ Warning

- **Adaptive cruise control system can only achieve limited braking and can not perform emergency braking.**
- **When driving following the vehicle ahead, always pay attention to if instrument cluster displays vehicle ahead target. If not, it means that the target ahead of adaptive cruise system has been lost, and the vehicle will accelerate according to set speed.**

■ Active speed limit entering

(1) Short press "" button to enter pre-limit state; Enter speed limit state when speed is higher than 30 km/h.

■ Active speed limit cancellation

- Speed is lower than 30 km/h, exit speed limit state, enter pre-limit state; When speed is no lower than 30 km/h, the vehicle enters speed limit state.
- Short press "" button to exit speed limit state.

⚠ Caution

Switch the ENGINE START STOP switch to OFF mode, if positive/negative of battery needs to be disconnected, wait for 15 minutes, if not, error reporting fault may occur.

⚠ Warning

Do not use cruise control in any of the following situations. Failure to do so may result in loss of vehicle control and could cause an accident, resulting in death or serious injury.

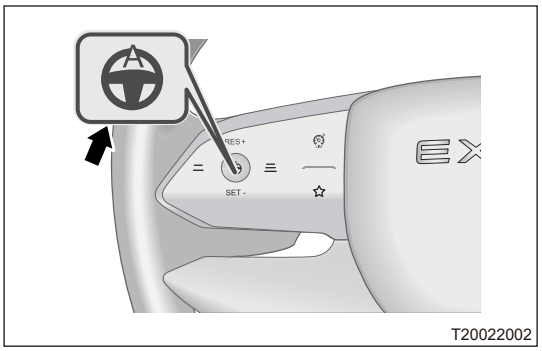
- **In heavy traffic;**
- **On roads with sharp bends;**
- **On winding roads;**
- **On slippery roads, such as roads covered with sown, ice or snow;**
- **Vehicle speed may exceed set speed when driving down a steep hill;**
- **During emergency traction.**

2.3 Traffic Jam Assist System (TJA) and Integrated Cruise Assist System (ICA)

For traffic jam assist system and integrated cruise assist system, TJA and ICA can reduce workload of drivers and provide driving assist function in monotonous driving environment or traffic jam. The function mainly relies on multi-function camera on the front windshield to detect lane lines for both vertical and horizontal control of vehicle.

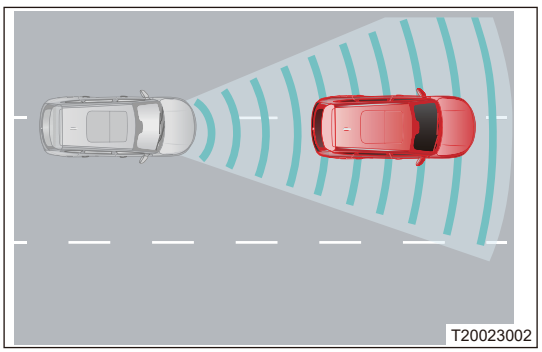
(1) When TJA/ICA is to be activated or activated, short press main button to activate/exit TJA/ICA; Long press main button to switch between ACC and TJA/ ICA modes.

If TJA/ICA activation conditions are not met at this time, "" gray indicator light on instrument cluster remains on; If TJA/ICA activation conditions are met at this time, "" blue indicator on instrument cluster remains on.



(2) When the speed is lower than 40 km/h, traffic jam assist system operates, and vehicle will be kept running near lane center. If no lane line is detected, the vehicle will follow the vehicle ahead as a target. If lane line and vehicle target are not detected, the function will be canceled.

(3) When the speed is 40 km/h to 130 km/h, integrated cruise assist system operates, and vehicle will be kept running near lane center. If no lane line is detected, no matter whether there is a target vehicle ahead, the function will be canceled.



■ Function exiting

During normal operation of TJA/ICA system, if one or more of the following situations occur, system functions will exit.

- Any one of conditions for exiting ACC function.
- Lanes are too wide or too narrow.
- Curving radius of lane is too small.
- Lane lines are not detected.
- Driver actively turns steering wheel.
- Steering wheel is out of hands.
- Turn on turn signal light.

- Vehicle speed is lower than 1 km/h.

⚠ Caution

- **TJA/ICA is a driving assist system and can not violate the laws of physics, there are some limitations, driver must always control of the vehicle and take full responsibility for the vehicle.**
- **The vertical control of TJA/ICA system is carried out by ACC system, and horizontal control is carried out by lane keeping system. All precautions of ACC and LKA systems are also applicable to this system.**
- **TJA/ICA system does not provide automatic driving function and does not allow off-hand driving. Under such conditions as turning, crossing, merging and cutting in of vehicles ahead, driver should control the vehicle at all times to ensure the safety of vehicle.**
- **TJA/ICA system performance is affected by weather, illumination and lane line clarity. For example, under the conditions of backlight, sunset, night, snow and ice on the road surface and unclear lane lines due to road wear, the performance will be significantly reduced or even lost.**
- **When system fails, "" yellow indicator on instrument cluster comes on. At this time, TJA/ICA will not operate normally. Contact the EXEED service station for inspection and repair.**
- **All the above precautions do not cover all the situations that may affect normal operation of system function. The system function may not bring expected effect due to other reasons. Driver must always take responsibility for vehicle control.**

2.4 Automatic Emergency Braking (AEB) System and Front Collision Warning (FCW) System

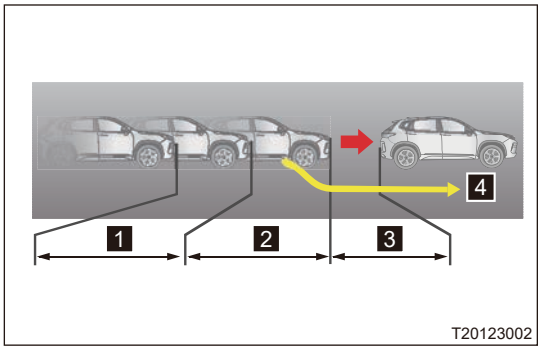
Automatic emergency braking system cooperates with collision warning system to send out an alarm to alert the driver when the vehicle is about to collide with a vehicle or pedestrian ahead. If the driver cannot react fast enough, the vehicle will automatically brake to reduce the damage caused by the collision.

(1) (1) Warning before collision occurs.

(2) (2) Partial braking before collision warning occurs.

(3) (3) Full braking before collision occurs.

(4) (4) If the driver reacts correctly (such as: avoid collision by steering), subsequent emergency braking is canceled.



⚠ Caution

- **Front collision warning system will not sound an alarm when speed is lower than 30 km/h. For static target ahead, front collision warning system will not sound an alarm when speed is higher than 85 km/h.**
- **Automatic emergency braking system does not work if seat belt is not fastened and doors are not closed.**
- **For stationary target vehicle, operating speed range of AEB is 4 km/h to 48 km/h. For moving target vehicle, operating speed range of AEB is 4 km/h to 80 km/h. For pedestrians and cyclists, operating speed range of AEB is 4 km/h to 65 km/h.**
- **"" yellow indicator comes on. At this time, contact the EXEED service station for inspection and repair as soon as possible.**
- **After vehicle is automatically braked to stop, vehicle will not remain stationary and driver needs to take over the vehicle.**
- **During the activation of AEB system, if driver turns steering wheel quickly or depresses accelerator pedal firmly, AEB system will exit.**
- **Front collision warning system and automatic emergency braking system do not work if electronic stability program system, front collision warning system, automatic emergency braking system are not in ON.**

⚠ Warning

- **Targets can be detected by the automatic emergency braking system include passenger vehicles, buses and trucks. There are certain limitations in the detection of some restructured vehicles, such as cement tankers, special vehicles with higher or lower chassis, etc.**
- **Only when automatic emergency braking system detects that people's head, arm and leg swings conform to the characteristics of normal walking, it can play its best role. Pedestrians crossing the lane of the vehicle will be regarded as targets. Pedestrians walking vertically in this lane, walking in curves and blocked by other objects may not be regarded as targets by the automatic emergency braking system.**
- **Automatic emergency braking system can works best when it detects the contours of body and bicycle, as well as movements of normal ride. Automatic emergency braking system does not regard an oncoming cyclist as a target.**
- **During the whole operation, you are responsible for controlling vehicle, and intervening as necessary.**
- **Automatic emergency braking system is not always able to detect vehicles, cyclists or pedestrians, there are many reasons why automatic braking may occur unnecessarily or not operation. Within the operating speed range of automatic emergency braking system, it is not always possible to completely avoid a collision, and system is only used as an assist driving system to reduce the severity of collision. Therefore, during driving, you are responsible for controlling vehicle, and intervening as necessary.**

■ Be sure to carefully read the following precautions using automatic emergency braking system:

- Automatic emergency braking system can not violate the laws of physics and there are some limitations, driver must always control the vehicle and take full responsibility for the vehicle.
- Driver should control speed and the distance between the vehicle ahead and the vehicle according to weather, road surface and traffic conditions.
- Automatic emergency braking system does not respond to animals or crossing vehicles, as well as oncoming vehicles, bicycles or pedestrians.
- System performance will be greatly limited to the target that quickly cuts into the lane, the target that is detected after the vehicle changes the lane, and the target in the curve.
- All passengers on the vehicle must fasten their seat belts and secure the loaded objects to avoid danger when automatic emergency braking system is triggered.
- When automatic emergency braking system fails, "  " yellow indicator comes on. At this time, contact the EXEED service station for inspection and repair as soon as possible.
- Front collision warning system and automatic emergency braking system should be turned off when the vehicle is tested on drum test bench.
- When installing non-full size spare tire, it is recommended to turn off front collision warning system and automatic emergency braking system and replace original full size tire in time.
- Under some special circumstances, automatic emergency braking system may perform unnecessary warning and braking, such as crossing the railroad track, entering the turning of the underground parking lot, etc. Some conditions will affect and weaken sensor detection, such as tunnel, the light of oncoming vehicle, the reflection of wet road surface, etc, affecting related functions of system.
- Two sensors, radar and camera, are mounted on the front area of vehicle and behind the windshield. It should be noted that the field of vision of sensor should not be blocked by pollutants, and there should be no modification or license plate decoration frame in the front or surrounding areas, especially when the snow completely covers the sensor, the system function will exit. The sensor may also be affected by vibration or collision, resulting in automatic emergency braking system performance degradation or no function. In this case, contact the EXEED service station to recalibrate the sensor as soon as possible.
- All the above precautions do not cover all the situations that may affect normal operation of automatic emergency braking system function. Automatic Emergency Braking (AEB) system function may not bring expected effect due to other reasons. Driver must always take responsibility for the vehicle control.

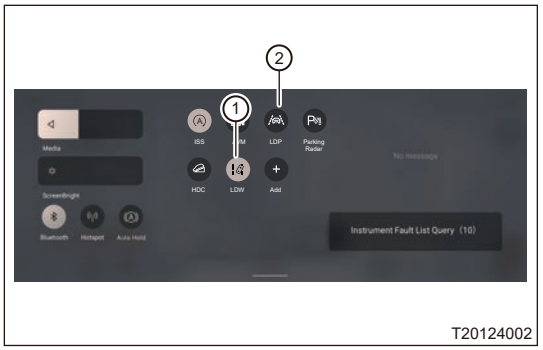
2.5 Lane Assist System

Lane assist system includes lane departure warning system and lane keeping assist system, which can help drivers reduce traffic accidents caused by lane departure and improve driving safety.

■ Lane departure warning system/lane keeping assist system switch

(1) Press "1" button to turn on/off lane departure warning system.

(2) Press "2" button to turn on/off lane departure intervention system.

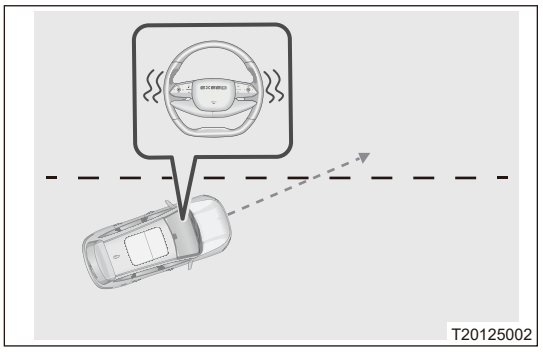


■ Lane departure warning system/lane departure interference system indicator

Indicator	Function ON/ limitation	Standby	Activation	Problem
LDW indicator	"  " grey indicator remains on.	"  " green indicator remains on.	"  " green indicator blinks.	"  " yellow indicator remains on.
LDP indicator	"  " grey indicator remains on.	"  " green indicator remains on.	"  " green indicator blinks.	"  " yellow indicator remains on.

■ Lane departure warning system

Lane departure warning system can help drivers reduce traffic accidents caused by lane departure and improve driving safety.
When speed is higher than 65 km/h, lane departure warning system is activated with sound warning and steering wheel vibration alarm when the vehicle deviates lane; When speed is lower than 60 km/h, exit lane departure warning system after 3s.



- Alarm function can be activated when the corresponding side lane line is detected, and suppressed when lane lines on two sides are lost.
- If there is only one lane line on the road, lane departure warning system only alarms for the side where lane line exists.

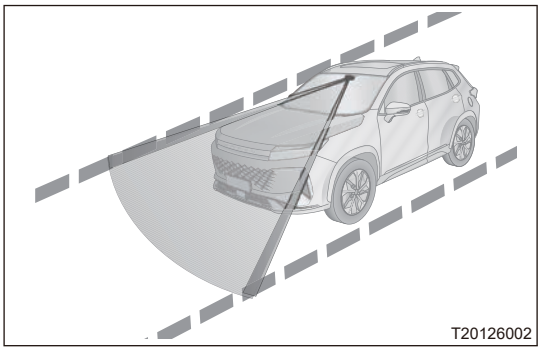
⚠ Caution

- **This system operates only when vehicle speed is above 65 km/h.**
- **When anti-lock braking system or electronic stability program system is activated, alarm function is suppressed.**
- **When turn signal light and deviating side are different, alarm function is still turned on; Alarm function is suppressed when turn signal light of deviating side is turned on.**
- **When brake force is too small, alarm function can be activated; When brake force is too large, alarm function is suppressed.**
- **When steering speed is too low, alarm function is activated; When steering speed is too high, alarm function is suppressed.**
- **When depressing accelerator pedal lightly, alarm function can be activated; When depressing accelerator pedal firmly, alarm function is suppressed.**
- **When hazard warning light is turned on, alarm function is suppressed.**

■ Lane Keeping Assist System

The lane keeping assist system assists the driver to control the vehicle to drive in the center of the lane during high speed driving, reducing the driving intensity of driver and improving driving safety. When lane keeping assist system operates, the user can operate steering wheel to control the vehicle in active.

The lane keeping assist system detects lane line through front camera. When the lane lines on the left and right sides are identified by the system, the system applies corrective steering intervention to make the vehicle always drive in the middle of the lane. Driver can correct steering wheel at any time. When function is ON, it intervenes when the speed is higher than 65 km/h.



Though the lane keeping assist function is turned on, but the function will exit or cannot be activated under the following conditions:

- Vehicle speed is lower than 60 km/h or higher than 130 km/h;
- Driver turns on hazard warning light/turn signal light;
- Driver rapidly depresses accelerator pedal or deeply depresses brake pedal;
- The vehicle swings too fast in lateral direction;
- Vehicle is changing lanes;
- When driving on a curve with a small turning radius;
- The vehicle has just entered the road with lane lines;
- When the lane line is too thin, broken, blurred;
- Road is too narrow or too wide;
- System recognizes that the driver has not operated the steering wheel for a period of time;
- The driver controls the steering wheel when system applies corrective steering control;
- When camera can not detect lane marking line target due to coverage or weather;

⚠ Caution

- **The marking line that can be identified by the camera: White solid line, white dashed line, yellow solid line, yellow dashed line, double solid line, etc.**
- **In cold or bad weather, system may not operate. Rain, snow, fog or intensive illumination can affect the sensor.**
- **Lane keeping assist system can only work on two clear lane lines, and lane departure warning system can work on one clear lane line. Lane assist system may not operate on the cement road.**
- **Lane assist system may not operate in the road construction area.**
- **Lane assist system may not operate on the water-logged or muddy road.**
- **Lane assist system may not operate at sharp curve or narrow road.**
- **When only one lane line is detected, the alarm stability of the system decreases.**
- **If the sensor is interfered, the system will not function.**
- **Sensor may be misled by temporary construction markings line on the road, etc., resulting in false and incorrect alarms.**
- **If suspension components of the vehicle are not approval by us, the lane assist system may not operate normally.**
- **Make sure the front camera is free of foreign objects, such as bird dung, insect and ice etc.**

⚠ Caution

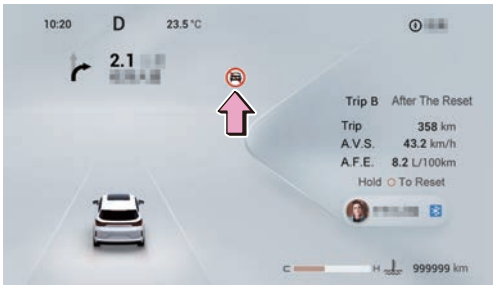
- **When lane is added or merged, driver needs to take active control.**
- **When driving in complex traffic environment (such as road crossing, traffic congestion), driver needs to take active control.**
- **When driving on a sharp curve, driver needs to take active control.**

⚠ Warning

- **Lane assist system only provides assistance to the driver, and cannot operate normally under all driving conditions, weather conditions, traffic or road conditions.**
- **During the whole operation, driver is responsible for controlling vehicle, monitoring and managing lane assist system, and intervening as necessary.**
- **Do not take both hands off the steering wheel when driving.**

2.6 Traffic Sign Recognition System

Traffic sign recognition system detects traffic sign information on road ahead and displays it on instrument cluster, reminding you to pay attention to local traffic rules.
After traffic sign recognition system is turned on, system continuously monitors traffic signs on both sides of road, and displays the corresponding reminder icon on instrument cluster after identifying sign matching the vehicle type. If no parking sign is identified and driver is judged to have a parking timeout for a certain time, instrument cluster triggers alarm reminder.



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■ Traffic sign recognition system may not be able to recognize the following conditions

- A faded sign.
- A sign located on curve.
- Rotating or damaged sign.

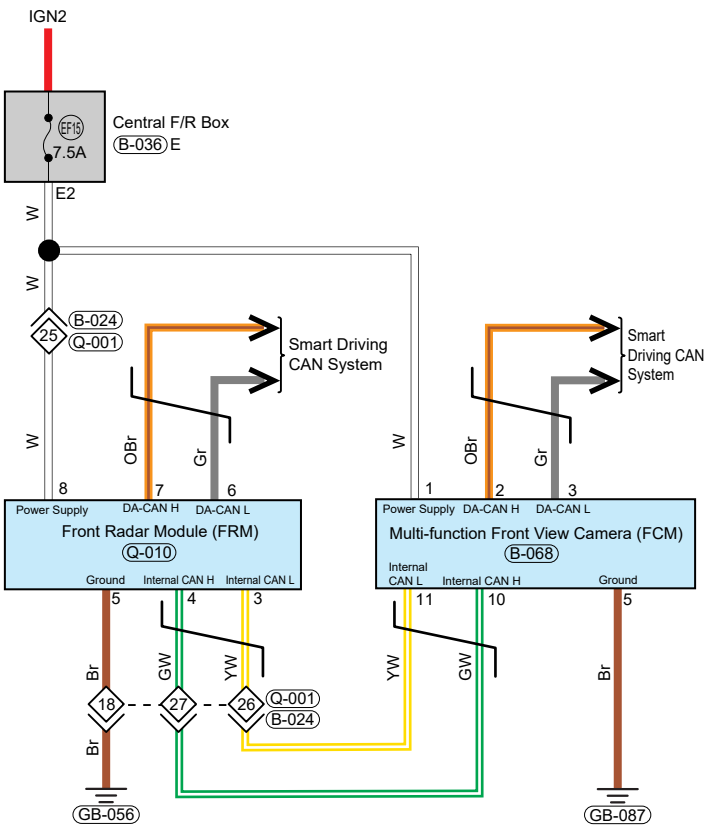
- A sign that towers over road.
- A sign that is completely/partially covered or concealed.
- A sign that is completely or partially covered by frost, snow, or dust.

⚠ Warning

Traffic sign recognition system is based on camera function, is considerably affected by weather and light, is not suitable for all situations.

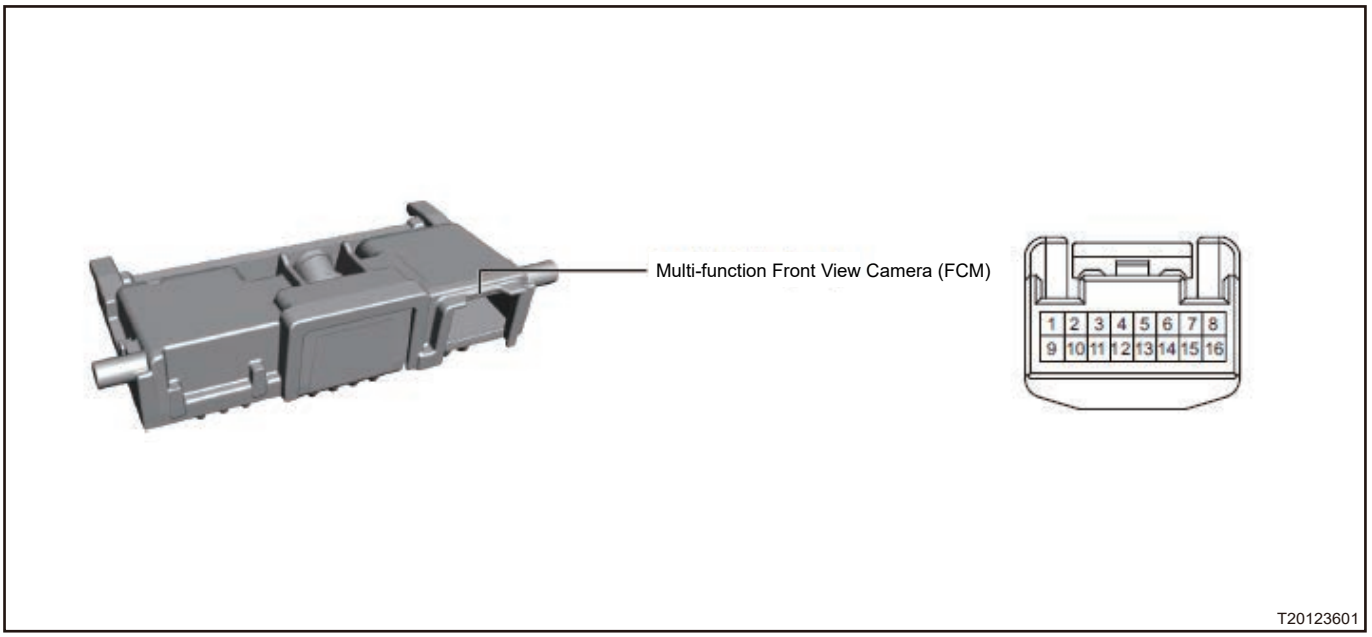
3 Circuit Diagram

3.1 System Circuit Diagram



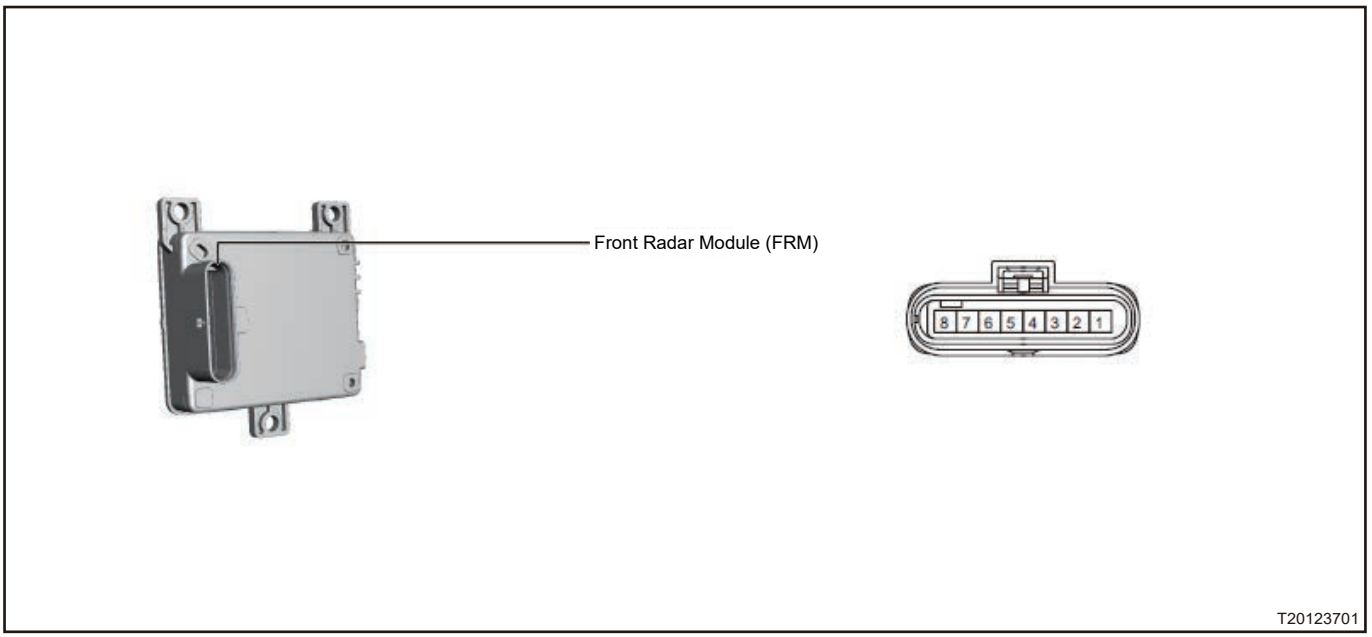
3.2 Module Terminal Definition

■ Multi-function Front Camera (FCM)



1	Power Supply	2	DA-CAN H
3	DA-CAN L	4	-
5	Ground	6	-
7	-	8	-
9	-	10	Internal CAN H
11	Internal CAN L	12	-
13	-	14	-
15	-	16	-

■ Front Radar Module (FRM)



1	-	2	-
3	Internal CAN L	4	Internal CAN H
5	Ground	6	DA-CAN L
7	DA-CAN H	8	Power Supply

4 Diagnosis & Testing

4.1 Problem Symptoms Table

■ Adaptive Cruise

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Vehicle speed can not be set (Meter indicator does not illuminate)	Wire harness or connector
	Instrument Cluster
	Engine Control Module (ECM)
Vehicle speed can not be set (Meter indicator comes on normally)	Cruise control switch
	Brake switch
	ESP and EPB
	Wire harness or connector
	Body Control Module (BCM)
	Engine Control Module (ECM)

4.2 Diagnostic Help

(1) Connect diagnostic tester X-431 (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean grounds related to the latest DTCs.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.3 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Check and clean all wire harness connectors and ground parts related to DTC.

- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.4 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.

(2) Check all contact surfaces for tarnish, dirt and rust, etc.

(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

(5) Check if any additional accessories interfere with ground circuit.

(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.5 Front Radar Module (FRM) DTC Chart

DTC	DTC Definition	Possible cause	Maintenance Advice
U007388	CAN Communication Error - Communication Bus Off Error (Public CAN)	• Network fault	• Check CAN network
U003888	CAN Communication Error - Communication Bus Off Error (Private CAN)		
U012687	CAN Communication Error - Lost Communication with SAM		
U012987	CAN Communication Error - Lost Communication with BSM		
U015587	CAN Communication Error - Lost Communication with ICM		
U014087	CAN Communication Error - Lost Communication with BCM		
U010087	CAN Communication Error - Lost Communication with EMS		
U010187	CAN Communication Error - Lost Communication with TCU		
U014287	CAN Communication Error - Lost Communication with TCU		
U12E087	CAN Communication Error - Lost Communication with FCM		

DTC	DTC Definition	Possible cause	Maintenance Advice
U042881	CAN Communication Error - Invalid Data Received from SAM		
U041881	CAN Communication Error - Invalid Data from Brake System Control Module		
U042381	CAN Communication Error - Invalid Data Received from ICM		
U042281	CAN Communication Error - Invalid Data from BCM		
U040181	CAN Communication Error - Invalid Data Received from EMS		
U044781	CAN Communication Error - Invalid Data Received from CGW		
U014687	CAN Communication Error - Lost Communication with CGW		
U040281	CAN Communication Error - Invalid DLC received from TCU		
U044381	CAN Communication Error - Invalid DLC received from TCU		
U12E086	CAN Communication Error - Invalid Data Received from FCM		
C106017	Supply Voltage Too High	• Battery • Wire harness • Front radar module	• Check wire harness and connection • Check module power supply voltage • Check and repair module
C106016	Supply Voltage Too Low		
C193009	Communication Failure	• Module or interior wire harness is damaged	• Check wire harness and connection • Check and repair module
C193102	Radar Signal Interference	• The vehicle may be equipped with other interference components	• Check for interference components
C19324B	Temperature too high	• Overheating protection	• Clear DTCs
C193317	Radar Internal Voltage Too Low	• Battery • Wire harness • Front Radar Module	• Check wire harness and connection • Check module power supply voltage

DTC	DTC Definition	Possible cause	Maintenance Advice
			• Check and repair module
C193405	Radar Hardware and Software Mismatch	• Module or interior wire harness is damaged	• Check wire harness and connection • Check and repair module
C193604	Steering Angle and Wheel Tire Angle Offset	• Steering angle position is not calibrated	• Perform recalibration
C193707	Tire Size Incorrect	• Different tire type	• Replacement of tires
C193804	Radar Modulation Abnormal	• Radar (not calibrated)	• Recalibration
C193978	Radar Horizontal Angle Misaligned		
C193A78	Radar Vertical Angle Misaligned		
C193B76	Radar Surface Contaminated or Covered with Foreign Object	• Front radar module assembly • There is dirt on radar surface	• Check module surface
C193C09	Radar Digital Signal Processor Power Abnormal	• Module or interior wire harness is damaged	• Check wire harness and connection • Check and repair module
C193D04	Radar Hardware Failure		
C193E78	Radar Calibration Incomplete	• Radar (not calibrated)	• Recalibration
C193F53	DTC Production Mode Active	• Production mode turns on	• Turn production mode off
C193C76	Radar Surface Contaminated or Covered with Foreign Object	• Front radar module assembly • There is dirt on radar surface	• Check module surface
C193E76	Radar Surface Contaminated or Covered with Foreign Object		
C193F76	Radar Surface Contaminated or Covered with Foreign Object		
C193D76	Radar Waveform Disturbed	• The vehicle may be equipped with other interference components	• Check for interference components
C193076	Radar Unavailable	• Module failure	• Replacement of module
U300051	Data Not Programmed	• Configuration data is not written into module	• Write configuration data

DTC	DTC Definition	Possible cause	Maintenance Advice
530104	Radar Hardware Failure	• Module failure	• Replacement of module
530204	Radar Reference Speed Unavailable	• Module or interior wire harness is damaged	• Check wire harness and connection • Check and repair module
530801	Vehicle Voltage Failure	• Battery • Wire harness • Front Radar Module	• Check wire harness and connection • Check module power supply voltage • Check and repair module
531210	Radar Heater Unavailable	• Module or interior wire harness is damaged	• Check wire harness and connection • Check and repair module
53134B	Temporary Failure		
982700	Code Incomplete	• Configuration data is not written into module	• Write configuration data

4.6 DTC Diagnosis Procedure

DTC	**C106017**	**Supply Voltage Too High**
DTC	**C106016**	**Supply Voltage Too Low**
DTC	**C193317**	**Radar Internal Voltage Too Low**
DTC	**530801**	**Vehicle Voltage Failure**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check voltage**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Check battery voltage (not less than 12 V) with a digital multimeter.

NG → **Replace battery**

OK

2	Check charging system

(a) Turn ENGINE START STOP switch to OFF.
(b) Check positive and negative battery cables for broken or damage.
(c) Turn ENGINE START STOP switch to ON.
(d) Start the engine.
(e) Check if voltage of positive and negative battery is normal with a digital multimeter (13.5 V - 14.8 V).

NG → **Repair or replace positive and negative battery cables and alternator**

OK ↓

3	Check fuse

(a) Check if fuse is blown.

NG → **Replace fuse**

OK ↓

4	Check engine compartment fuse and relay box output voltage

(a) Turn ignition switch to ON.
(b) Check the voltage between fuse box (corresponding terminal) and ground. (When using digital multimeter).

NG → **Replace the instrument panel fuse box assembly**

OK ↓

5	Check for open in wire harness

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect front radar module connector and fuse box connector.
(d) Using ohm band of digital multimeter, measure if resistance of front radar module (power supply terminal) and fuse box (-corresponding terminal) is normal to check wire harness for open.

NG → **Handle and repair related wire harness**

OK ↓

6	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace front radar module assembly**
OK	**Conduct test and confirm malfunction has been repaired.**

DTC	C193604	Steering Angle and Wheel Tire Angle Offset

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK	**System is normal**

NG

2	Check steering angle position

NG	**Refer to calibrated steering angle position of steering system**
OK	**Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again**

DTC	C193707	Tire Size Incorrect

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK	System is normal

NG

2	Check if the tire size is the same as original tire size

NG	Replace tire of same type
OK	Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again

DTC	C193102	Radar Signal Interference
DTC	C193D76	Radar Waveform Disturbed

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK	System is normal

NG

2	Check if the vehicle is equipped with other interference components

NG	Remove add-on components and test function
OK	Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again

DTC	C193B76	Radar Surface Contaminated or Covered with Foreign Object
DTC	C193C76	Radar Surface Contaminated or Covered with Foreign Object
DTC	C193E76	Radar Surface Contaminated or Covered with Foreign Object
DTC	C193F76	Radar Surface Contaminated or Covered with Foreign Object

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.

(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Check if front radar is covered by foreign matters and clean dirt on the surface of front radar**

NG → **Replace front radar module assembly**

OK → **Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again**

DTC	**C19324B**	**Temperature too high**

1	**Clear DTC to relieve overheat protection**

DTC	**C193804**	**Radar Modulation Abnormal**
DTC	**C193978**	**Radar Horizontal Angle Misaligned**
DTC	**C193A78**	**Radar Vertical Angle Misaligned**
DTC	**C193E78**	**Radar Calibration Incomplete**

Hint:
Possible cause of malfunction: Front radar calibration is not performed or corresponding calibration conditions are not met.

1	**Refer to front radar calibration method and perform calibration again**

DTC	**982700**	**Code Incomplete**
DTC	**U300051**	**Data Not Programmed**

Hint:
Possible cause of malfunction: Configuration data is not written into module.

1	**Rewrite configuration data**

(a) Using diagnostic tester, enter system "Special operation" to perform configuration data writing.

OK	Perform running test after clearing DTCs

DTC	C193F53	DTC Production Mode Active

1	Turn production mode off

(a) Use diagnostic tester, enter system "Special Operation" to turn off production mode.

OK	Perform running test after clearing DTCs

DTC	C193009	Communication Failure
DTC	C193405	Radar Hardware and Software Mismatch
DTC	C193804	Radar Modulation Abnormal
DTC	C193C09	Radar Digital Signal Processor Power Abnormal
DTC	530204	Radar Reference Speed Unavailable
DTC	53134B	Temporary Failure
DTC	531210	Radar Heater Unavailable

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK	System is normal

NG

2	Check if front radar operates normally

NG	Replace front radar module assembly
OK	Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again

DTC	530104	Radar Hardware Failure
DTC	C193076	Radar Unavailable
DTC	C193D04	Radar Hardware Failure

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTCs and read front radar control system DTCs again.
(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Replace front radar module**

(a) Replace front radar module.
(b) Perform running test after clearing DTCs.

OK → **Replace front radar module assembly**

DTC	**U007388**	**CAN Communication Error - Communication Bus Off Error (Public CAN)**
DTC	**U003888**	**CAN Communication Error - Communication Bus Off Error (Private CAN)**
DTC	**U012687**	**CAN Communication Error - Lost Communication with SAM**
DTC	**U012987**	**CAN Communication Error - Lost Communication with BSM**
DTC	**U015587**	**CAN Communication Error - Lost Communication with ICM**
DTC	**U014087**	**CAN Communication Error - Lost Communication with BCM**
DTC	**U010087**	**CAN Communication Error - Lost Communication with EMS**
DTC	**U010187**	**CAN Communication Error - Lost Communication with TCU**
DTC	**U014287**	**CAN Communication Error - Lost Communication with TCU**
DTC	**U12E087**	**CAN Communication Error - Lost Communication with FCM**
DTC	**U0428-81**	**CAN Communication Error - Invalid Data Received from SAM**
DTC	**U041881**	**CAN Communication Error - Invalid Data from Brake System Control Module**
DTC	**U042381**	**CAN Communication Error - Invalid Data Received from ICM**
DTC	**U042281**	**CAN Communication Error - Invalid Data from BCM**
DTC	**U040181**	**CAN Communication Error - Invalid Data Received from EMS**
DTC	**U044781**	**CAN Communication Error - Invalid Data Received from CGW**

DTC	U040281	CAN Communication ERROR - Invalid Data Received from TCU
DTC	U044381	CAN Communication ERROR - Invalid Data Received from TCU
DTC	U12E086	CAN Communication Error - Invalid Data Received from FCM
DTC	U014687	CAN Communication Error - Lost Communication with CGW

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system

4.7 Front Camera Module (FCM) DTC Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1400-16	Voltage too Low	/	Voltage is too low	Check battery, alternator or wire harness
C1400-17	Voltage too High	/	Voltage is too high	
C1401-16	ECU Internal Low Voltage Fault	/	Internal circuit output voltage is low	(1) Turn off the ignition switch (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C1401-17	ECU Internal High Voltage Fault	/	Internal circuit output voltage is high	(1) Turn off the ignition switch (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C1402-97	MPC Camera Fault	/	MPC camera fault	(1) Turn off the ignition switch (2) Check front of camera for obstruction (3) Power on again and wait for 5 seconds (4) Clear DTC (5) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (6) Replace MPC

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1403-98	ECU Temperature Exceeds Maximum Value	/	ECU temperature exceeds maximum value	(1) Turn off the ignition switch (2) Take appropriate heat dissipation measures (such as turning on air conditioning in vehicle) (3) Power on again and wait for 5 seconds (4) Clear DTC (5) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (6) Replace MPC
C1404-98	ECU Temperature Exceeds Operating Value	/	ECU temperature exceeds operating value	(1) Turn off the ignition switch (2) Take appropriate heat dissipation measures (such as turning on air conditioning in vehicle) (3) Power on again and wait for 5 seconds (4) Clear DTC (5) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (6) Replace MPC
C1405-49	ECU Internal Hardware Fault	/	ECU internal electrical malfunction	Replace MPC hardware
C1406-49	Internal Circuit Fault	/	ECU internal electrical malfunction	
C1406-55	Calibration Data Error	/	Calibration data error	(1) Refresh the correct software and DATASET again (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still active: (5) Replace MPC
C1407-55	Calibration File Mismatch with Main Software			
C1408-55	Calibration File Lost			
C1406-57	Mismatch between Calibration Data and Main Software	/		
C1407-48	ECU Software Fault	/	ECU software fault	(1) Turn off the ignition switch (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C1407-57	Data Fusion Failure	/	Software component invalid/incompatible	(1) Refresh the correct software and DATASET again (2)

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still active: (5) Replace MPC
C1408-48	ECU Software Is Faulty Temporarily	/	ECU software is faulty temporarily	(1) Turn off the ignition switch (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C1409-48	ECU Self-check Fault	/	ECU self-check fault	(1) Turn off the ignition switch (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140A-54	MPC No Calibration Fault	/	MPC has no calibration fault	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140B-48	MPC Calculating Vision Module Detecting Fault	/	MPC calculates vision module detecting fault	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140B-4A	FCM Installation Deviation Out of Limit	/	Component installation error	Check installation of MPC and surrounding parts
C140B-57	MPC Online Calibration Out of Range	/	MPC online calibration exceeds range	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				present/active: (5) Replace MPC
C140C-57	MPC Initial Calibration Out of Range	/	MPC initial calibration exceeds range	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140A-48	MPC Function Module Service Error	/	MPC function module service is incorrect	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140D-57	MPC Calibration Input Parameter Fault	/	MPC calibration input parameter fault	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140E-57	MPC Calibration Execution Timeout Fault	/	MPC calibration execution timeout fault	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140A-57	MPC Calibration Execution Not Completion	/	MPC function module service is incorrect	(1) Recalibration (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still present/active: (5) Replace MPC
C140F-00	RLCR System Fault	/	MPC calibration execution timeout fault	Check RLCR
C1410-00	RRCR System Fault	/		Check RRCR
C1411-00	ESP System Fault	/		Check ESP
C1412-00	EPB System Fault	/		Check EPB

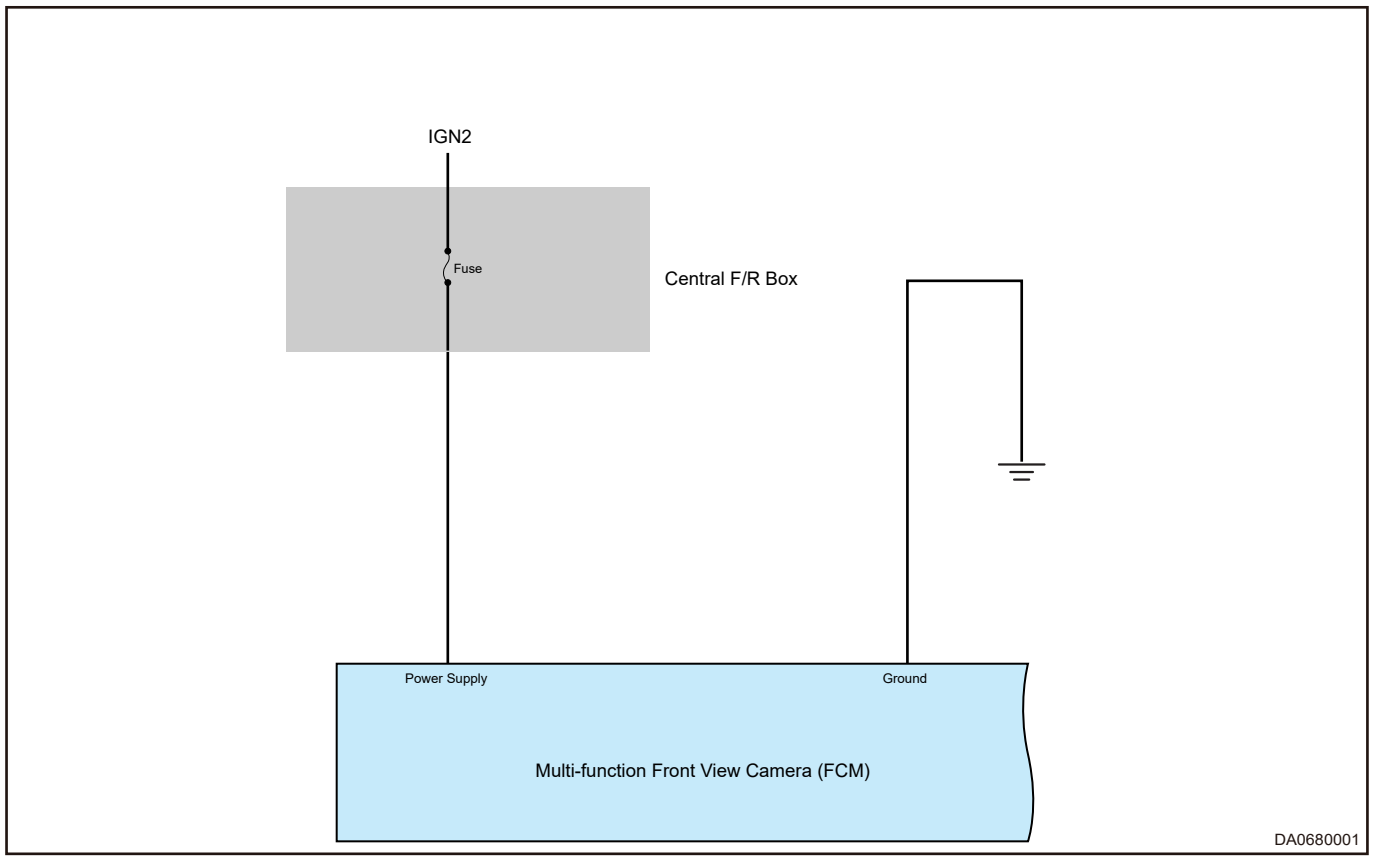
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1413-00	EPS System Fault	/		Check EPS
C1414-00	ICM System Fault	/		Check ICM
C1415-00	TCU System Fault	/		Check TCU
C1416-00	YAS System Fault	/		Check YAS
C1417-87	Lost Communication with Front Radar	/		Check FRM
C1418-81	Front Radar Signal Invalid or Front Radar System Fault	/		Check FRM
U0073-88	Public CAN Network Bus Off	/	Refer to "CAN" network system	Check CAN bus or replace ECU.
U0100-87	Lost Communication with EMS	/		
U0101-87	Lost Communication with TCU	/		
U0128-87	Lost Communication with EPB	/		
U0129-87	Lost Communication with ESP	/		
U0131-87	Lost Communication with EPS	/		
U0133-87	Lost Communication with HCU Node	/		
U0140-87	Lost Communication with BCM	/		
U0146-87	Lost Communication with CGW Node	/		
U0151-87	Lost Communication with YAS	/		
U0155-87	Lost Communication with ICM	/		
U0164-87	Lost Communication with CLM	/		
U0165-87	Lost Communication with IPB Node	/		
U0245-87	Lost Communication with TIHU	/		
U0401-81	EMS Signal Invalid	/		
U0402-81	TCU Signal Invalid	/		
U0418-81	ESP Signal Invalid	/		
U0420-81	EPS Signal Invalid	/		
U0422-81	BCM Signal Invalid	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0423-81	ICM Signal Invalid	/		
U0424-81	CLM Signal Invalid	/		
U0425-81	Invalid Data Received From HCU Node	/		
U0426-81	Invalid Data Received From IPB Node	/		
U0447-81	DTC_INVALID_ DATA_CGW	/		
U0452-81	YAS Signal Invalid	/		
U0546-81	TIHU Signal Invalid	/		
U059B-81	MFS Signal Invalid	/		
U1161-87	Lost Communication with RLCR	/		
U1169-87	Lost Communication with RRCR	/		
U1189-87	Lost Communication with MFS Node	/		
U1417-87	Lost Communication with FRM Node	/		
U12A1-88	Private CAN Network Bus Off	/		
U12E1-81	Invalid Signal Value Received From FCM_ FRM Node	/		
U12E1-87	Lost Communication with FCM_FRM Node	/		
U1300-55	ECU Configuration Information Not Written	/		Check CAN configuration
U1409-81	Invalid Signal Value Received From FRM Node	/		
U1435-81	RLCR Signal Invalid	/		Check CAN bus or replace ECU.
U1436-81	RRCR Signal Invalid	/		
U3000-51	Calibration Data Missed	/		(1) Refresh the correct software and DATASET again (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still active: (5) Replace MPC

4.8 DTC Diagnosis Procedure

DTC	C1400-16	Voltage too Low
DTC	C1400-17	Voltage too High

System schematic diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check fuse**

(a) Check if fuse in instrument panel fuse and relay box is blown.

NG → **Replace fuse**

OK

2	**Check output voltage of instrument panel fuse and relay box**

(a) Turn ignition switch to ON.

(b) Check the voltage between instrument panel fuse and relay box and ground. (When using digital multimeter)

Multimeter Connection	Condition	Normal Condition
Instrument panel fuse and relay box - Body ground	ON	9 - 14.5 V

NG → **Replace fuse and relay box assembly**

OK →

3	Check for open in wire harness

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

(c) Disconnect front camera module connector and instrument panel fuse and relay box connector.

(d) Using ohm band of digital multimeter, measure if resistance of front camera module connector, instrument panel fuse and relay box connector to check wire harness for open.

Multimeter Connection	Condition	Normal Condition
Front camera module (1) - Instrument panel fuse and relay box (corresponding terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

NG → **Repair or replace related wire harness**

OK → **Replace front camera module**

DTC	C1401-16	ECU Internal Low Voltage Fault
DTC	C1401-17	ECU Internal High Voltage Fault

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.

(b) Check if DTC occurs again.

NG → Turn off vehicle power supply (disconnect negative battery cable), then clear DTCs again.

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → Replace front camera module

OK → Conduct test and confirm malfunction has been repaired

DTC	C1402-97	MPC Camera Fault

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
The following detection takes rear bumper antenna as an example.

1	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front camera control system DTCs again.
(b) Check if DTCs occur again.

OK → System is normal

NG

2	Check front camera module

(a) Check if front camera module is covered by foreign matters and clean dirt on the surface of front camera module.

NG → Replace front camera module assembly

OK → Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again

DTC	C1403-98	ECU Temperature Exceeds Maximum Value
DTC	C1404-98	ECU Temperature Exceeds Operating Value

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
The following detection takes rear bumper antenna as an example.

1	Take appropriate heat dissipation measures

(a) Take appropriate heat dissipation measures (such as turning on air conditioning in vehicle).

OK → System is normal

NG

2	Check for DTCs

(a) Using diagnostic tester, clear DTCs and read front camera control system DTCs again.

(b) Check if DTCs occur again.

NG → Replace front camera module assembly

OK → Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again

DTC	C1405-49	ECU Internal Hardware Fault
DTC	C1406-49	Internal Circuit Fault

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.

(b) Check if DTC occurs again.

NG → Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace front camera module**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	C1406-55	Calibration Data Error
DTC	C1407-55	Calibration File Mismatch with Main Software
DTC	C1408-55	Calibration File Lost
DTC	C1406-57	Mismatch between Calibration Data and Main Software
DTC	C1407-57	Data Fusion Failure
DTC	C140B-48	MPC calculates vision module detecting fault
DTC	C140A-54	MPC No Calibration Fault
DTC	C140B-57	MPC Online Calibration Out of Range
DTC	C140A-48	MPC Function Module Service Error
DTC	C140C-57	MPC Initial Calibration Out of Range
DTC	C140D-57	MPC Calibration Input Parameter Fault
DTC	C140E-57	MPC Calibration Execution Timeout Fault
DTC	C140A-57	MPC Calibration Execution Not Completion

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Rewrite calibration data

(a) Using diagnostic tester, rewrite the calibration data.

OK → **Perform running test after clearing DTCs**

NG → **Replace front camera module, rewrite configuration data**

DTC	C140B-4A	FCM Installation Deviation Out of Limit

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Perform installation again

OK → System is normal

NG

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → Replace front camera module

OK → Conduct test and confirm malfunction has been repaired

DTC	C140F-00	RLCR System Fault
DTC	C1410-00	RRCR System Fault
DTC	C1411-00	ESP System Fault
DTC	C1412-00	EPB System Fault
DTC	C1413-00	EPS System Fault
DTC	C1414-00	ICM System Fault
DTC	C1415-00	TCU System Fault
DTC	C1416-00	YAS System Fault
DTC	C1417-87	Lost Communication with Front Radar
DTC	C1418-81	Front Radar Signal Invalid or Front Radar System Fault

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check each system**

NG → **Refer to each system for test**

OK

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace front camera module**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	U0073-88	Public CAN Network Bus Off
DTC	U0100-87	Lost Communication with EMS
DTC	U0101-87	Lost Communication with TCU
DTC	U0128-87	Lost Communication with EPB
DTC	U0129-87	Lost Communication with ESP
DTC	U0131-87	Lost Communication with EPS
DTC	U0133-87	Lost Communication with HCU Node
DTC	U0140-87	Lost Communication with BCM
DTC	U0146-87	Lost Communication with CGW Node
DTC	U0151-87	Lost Communication with YAS
DTC	U0155-87	Lost Communication with ICM
DTC	U0164-87	Lost Communication with CLM
DTC	U0165-87	Lost Communication with IPB Node
DTC	U0245-87	Lost Communication with TIHU
DTC	U0401-81	EMS Signal Invalid
DTC	U0402-81	TCU Signal Invalid
DTC	U0418-81	ESP Signal Invalid
DTC	U0420-81	EPS Signal Invalid
DTC	U0422-81	BCM Signal Invalid
DTC	U0423-81	ICM Signal Invalid
DTC	U0424-81	CLM Signal Invalid

DTC	U0425-81	Invalid Data Received From HCU Node
DTC	U0426-81	Invalid Data Received From IPB Node
DTC	U0447-81	DTC_INVALID_DATA_CGW
DTC	U0452-81	YAS Signal Invalid
DTC	U0546-81	TIHU Signal Invalid
DTC	U059B-81	MFS Signal Invalid
DTC	U1161-87	Lost Communication with RLCR
DTC	U1169-87	Lost Communication with RRCR
DTC	U1189-87	Lost Communication with MFS Node
DTC	U1417-87	Lost Communication with FRM Node
DTC	U12A1-88	Private CAN Network Bus Off
DTC	U12E1-81	Invalid Signal Value Received From FCM_FRM Node
DTC	U12E1-87	Lost Communication with FCM_FRM Node
DTC	U1300-55	ECU Configuration Information Not Written
DTC	U1409-81	Invalid Signal Value Received From FRM Node
DTC	U1435-81	RLCR Signal Invalid
DTC	U1436-81	RRCR Signal Invalid
DTC	U3000-51	Calibration Data Missed

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

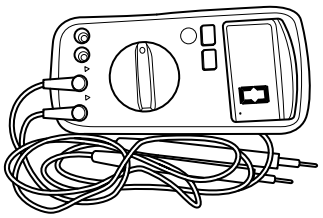
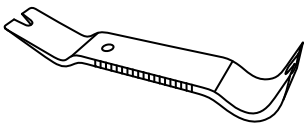
Hint:

When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system.

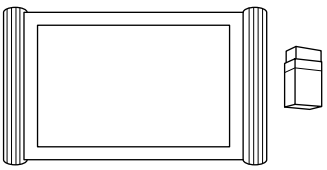
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Interior Crow Plate	 S00020

■ Special Tool

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 S00001

5.2 Microwave Radar Replacement

■ Removal

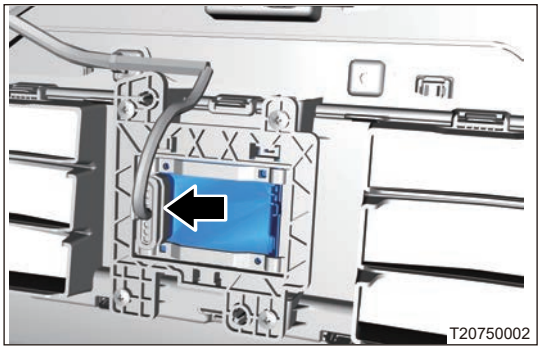
⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents, when removing front bumper assembly.**
- **Appropriate force should be applied, when removing front bumper assembly. Be careful not to operate roughly.**
- **Avoid breaking claws, when disassembling front bumper assembly.**
- **Avoid damage when detaching fixing clip of microwave radar.**

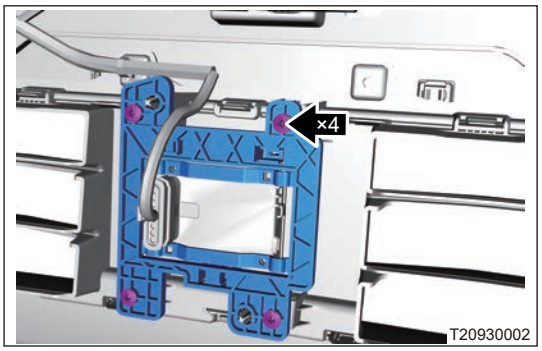
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

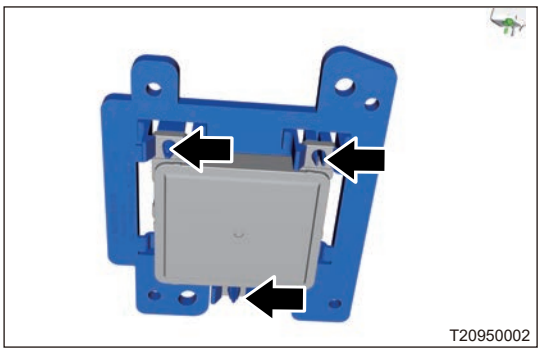
(4) Disconnect the microwave radar connector.



(5) Remove 4 fixing bolts.



(6) Loosen 3 fixing clips.



(7) Carefully remove the microwave radar.

■ **Installation**

Caution
• **Try to prevent body paint surface from being scratched, when installing front bumper assembly.** • **Make sure that front bumper is installed correctly and fitting clearance between front bumper and body is appropriate, when installing front bumper assembly.**

(1) Install 3 fixing clips to microwave radar.

(2) Tighten 4 fixing bolts to microwave radar.

(3) Connect the microwave radar connector.

(4) Install the front bumper assembly.

(5) Connect the negative battery cable.

5.3 Matching Learning

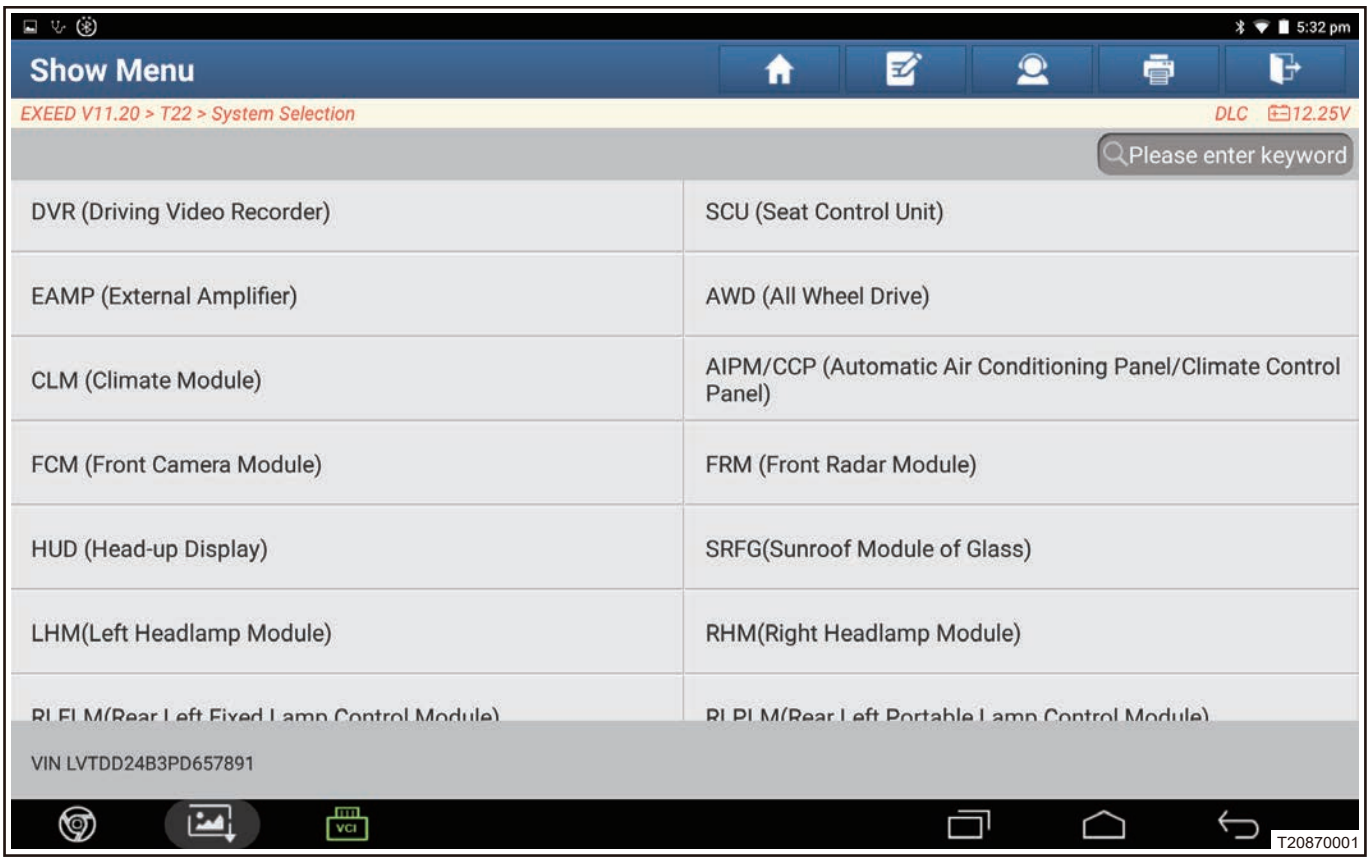
■ **Write VIN Code**

(1) Connect the diagnostic tester, enter system.

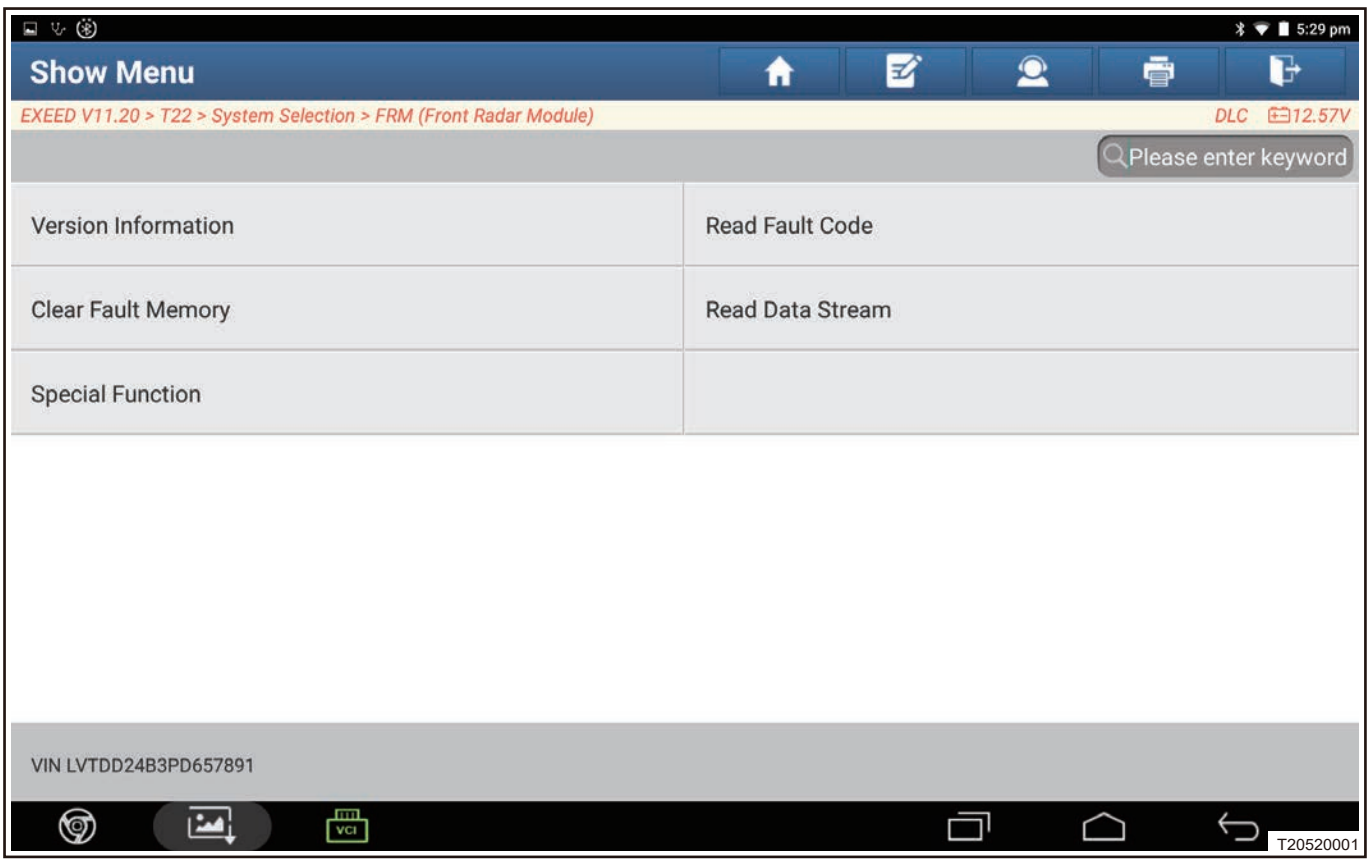
(2) Select "T22" model.

(3) Click "System Selection".

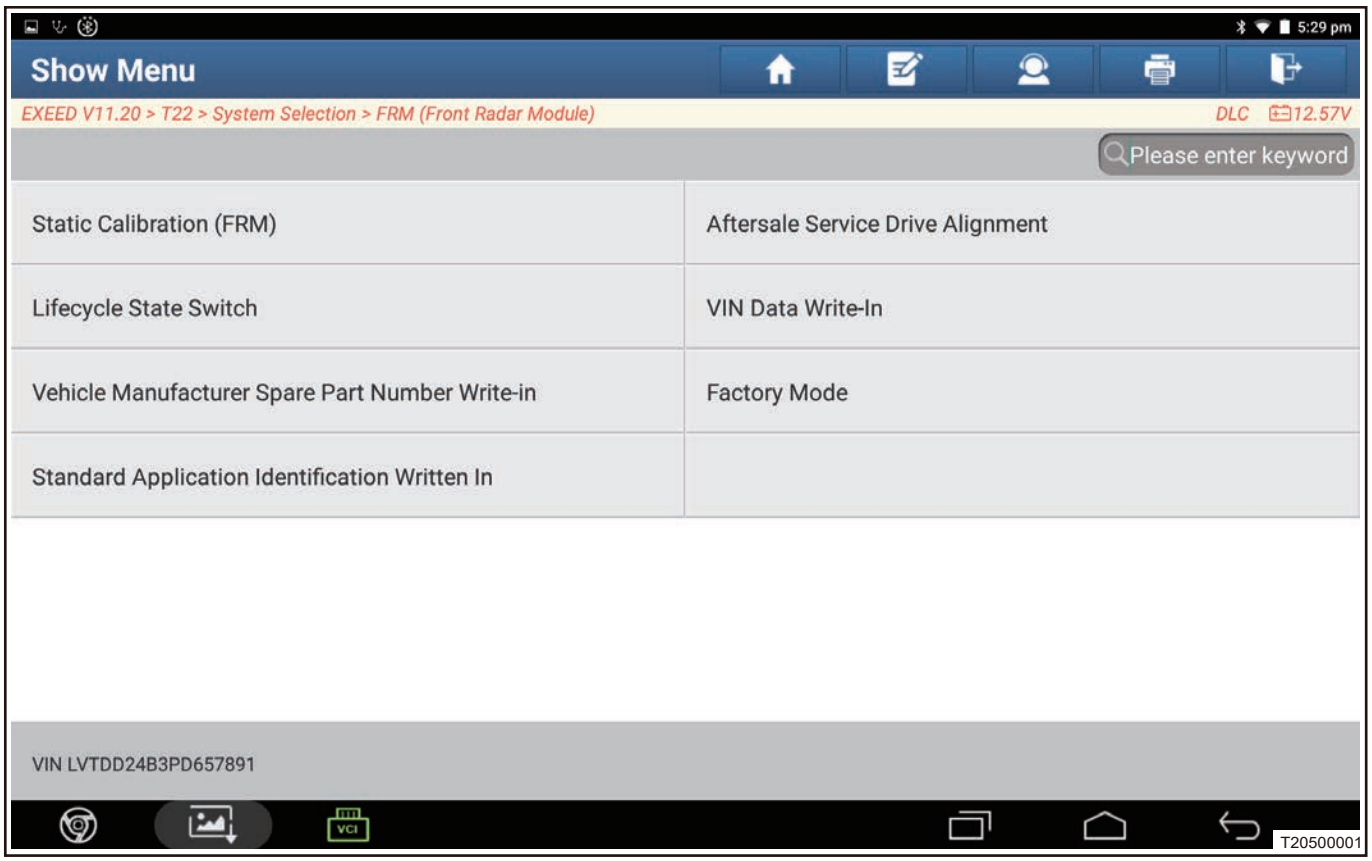
(4) Click "FRM (Front Radar Module)".



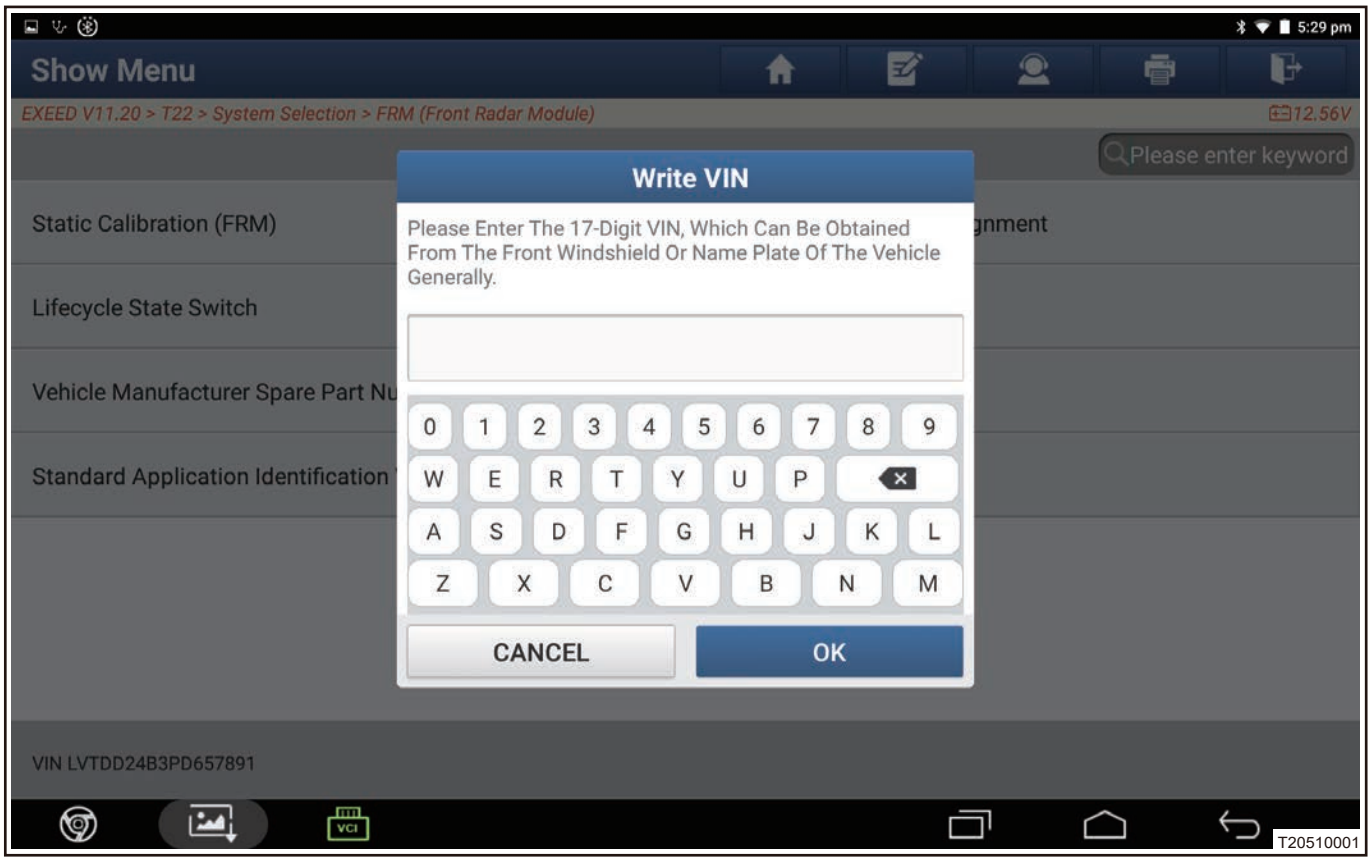
(5) Click "Special Operation".



(6) Click "VIN Data Write-In".



(7) Input correct VIN, and then click "OK".



(8) Operation is finished.

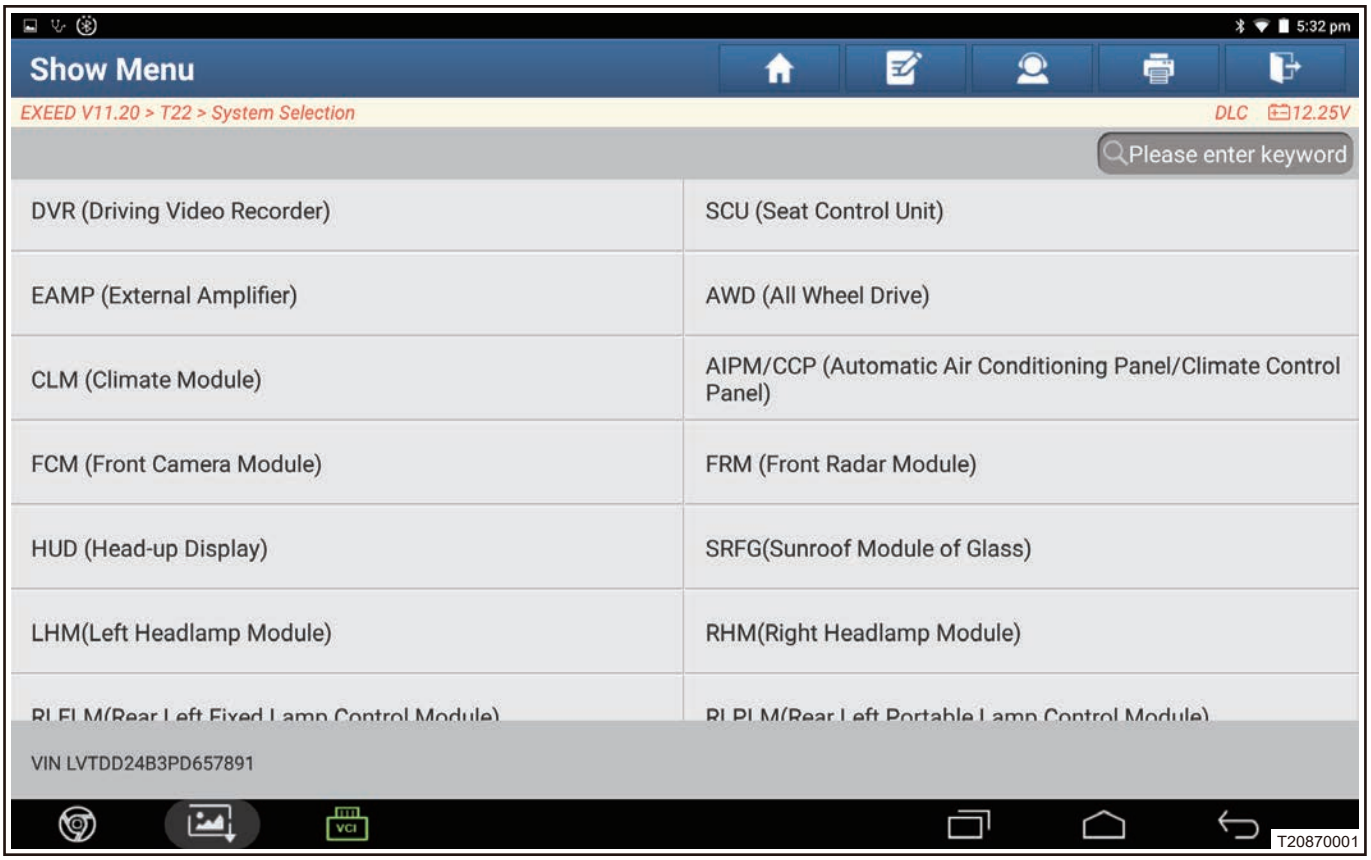
■ **Data writing**

(1) Connect the diagnostic tester, enter system.

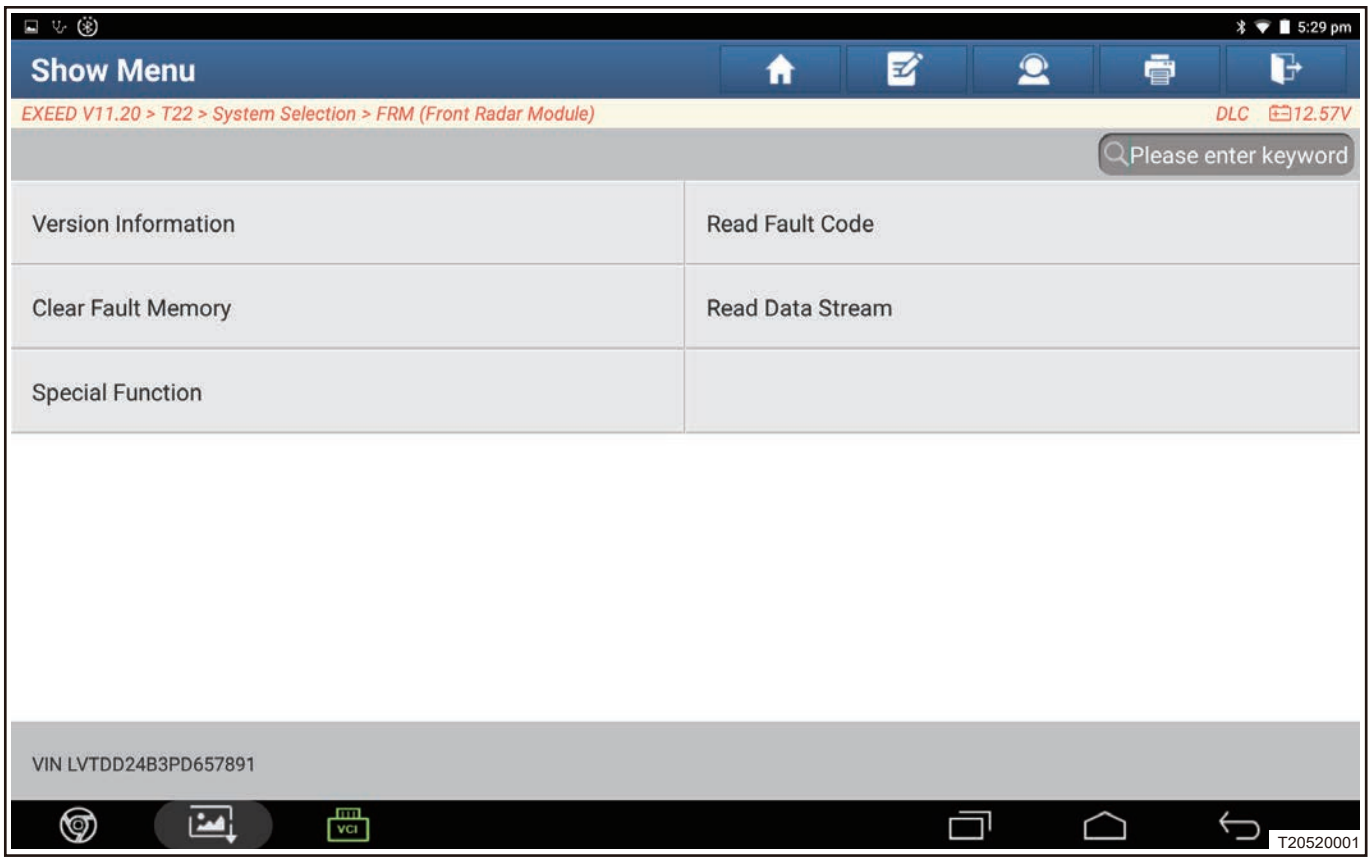
(2) Select "T22" model.

(3) Click "System Selection".

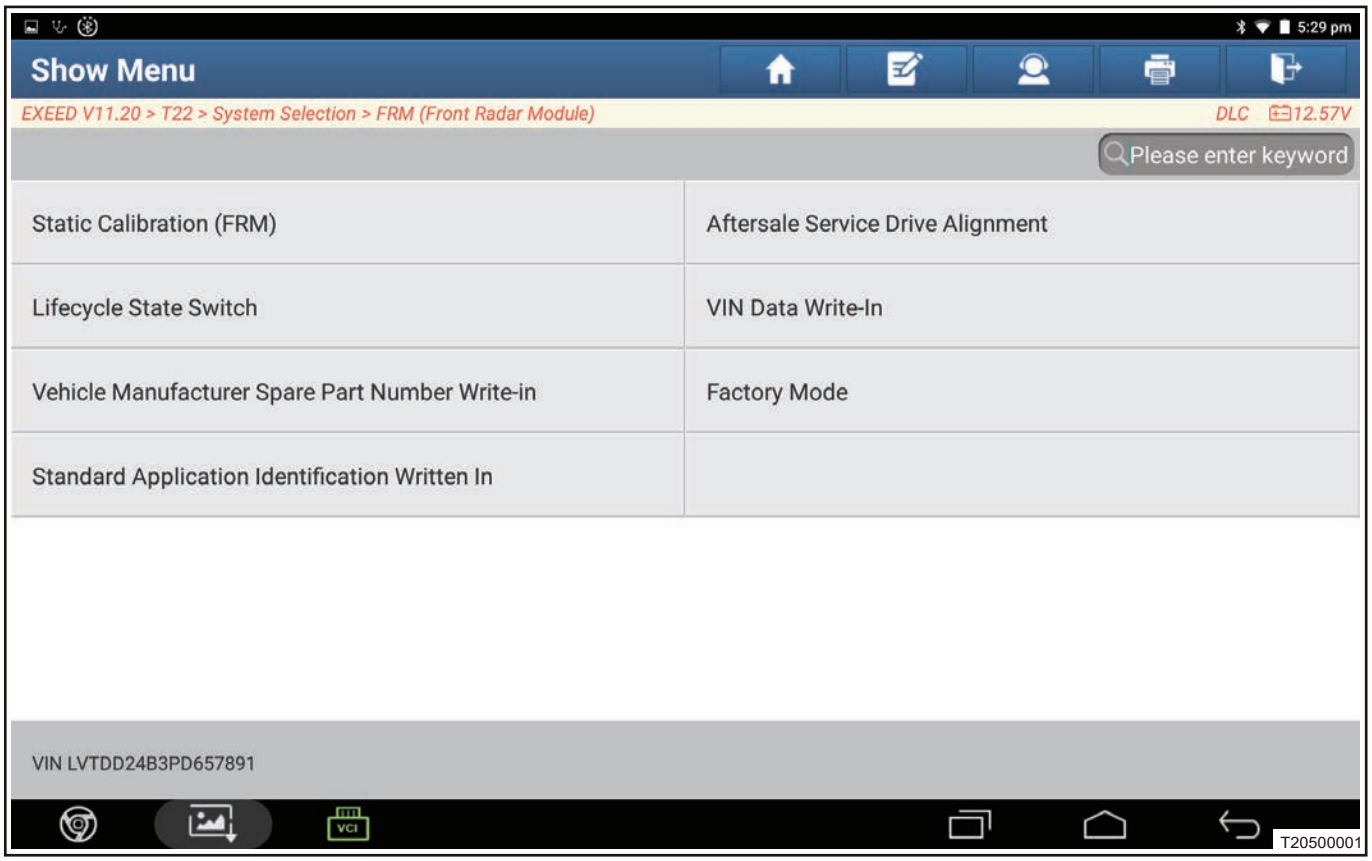
(4) Click "FRM (Front Radar Module)".



(5) Click "Special Operation".



(6) Click "Application Data Writing".



(7) Perform writing.

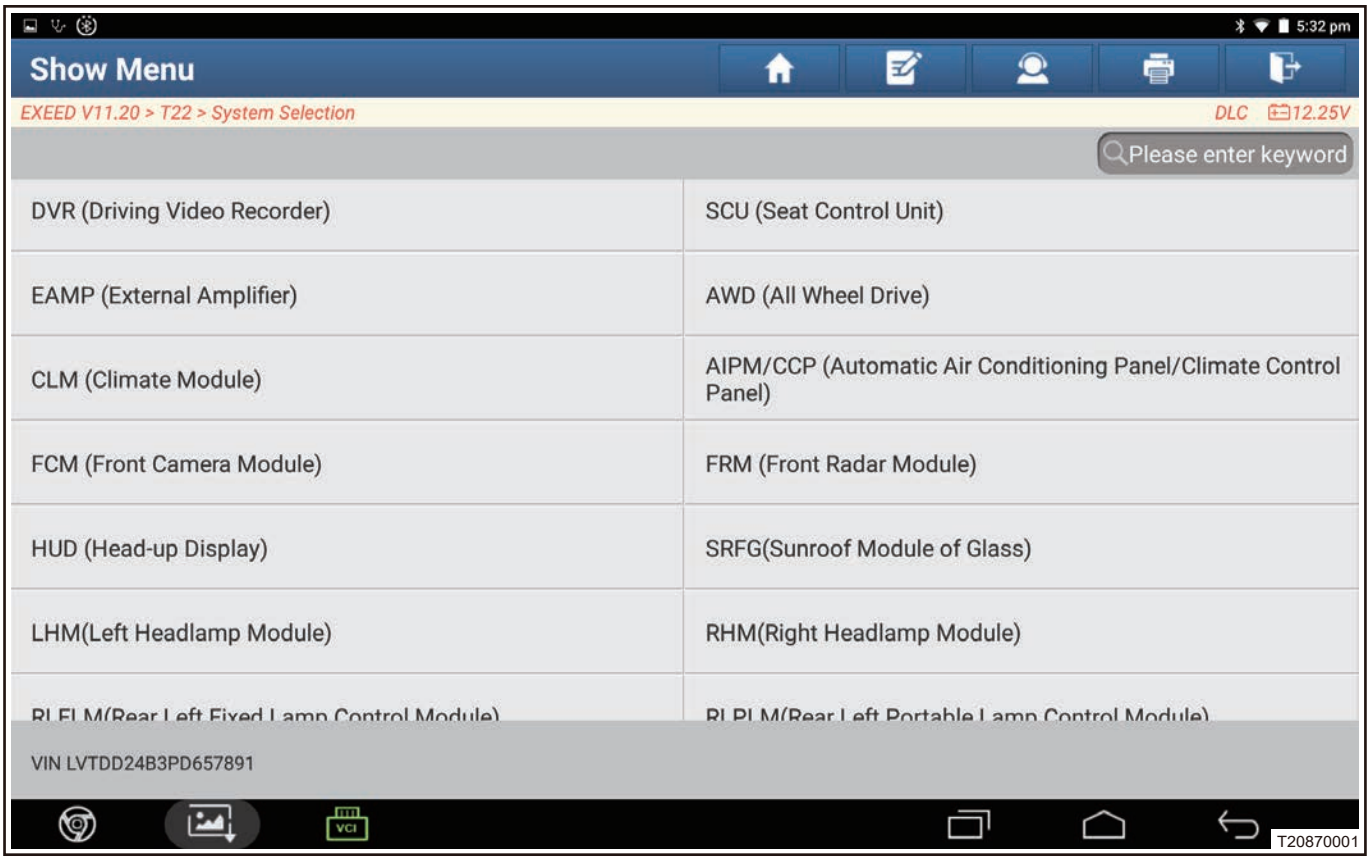
■ **Front Radar Driving Calibration**

(1) Connect the diagnostic tester, enter system.

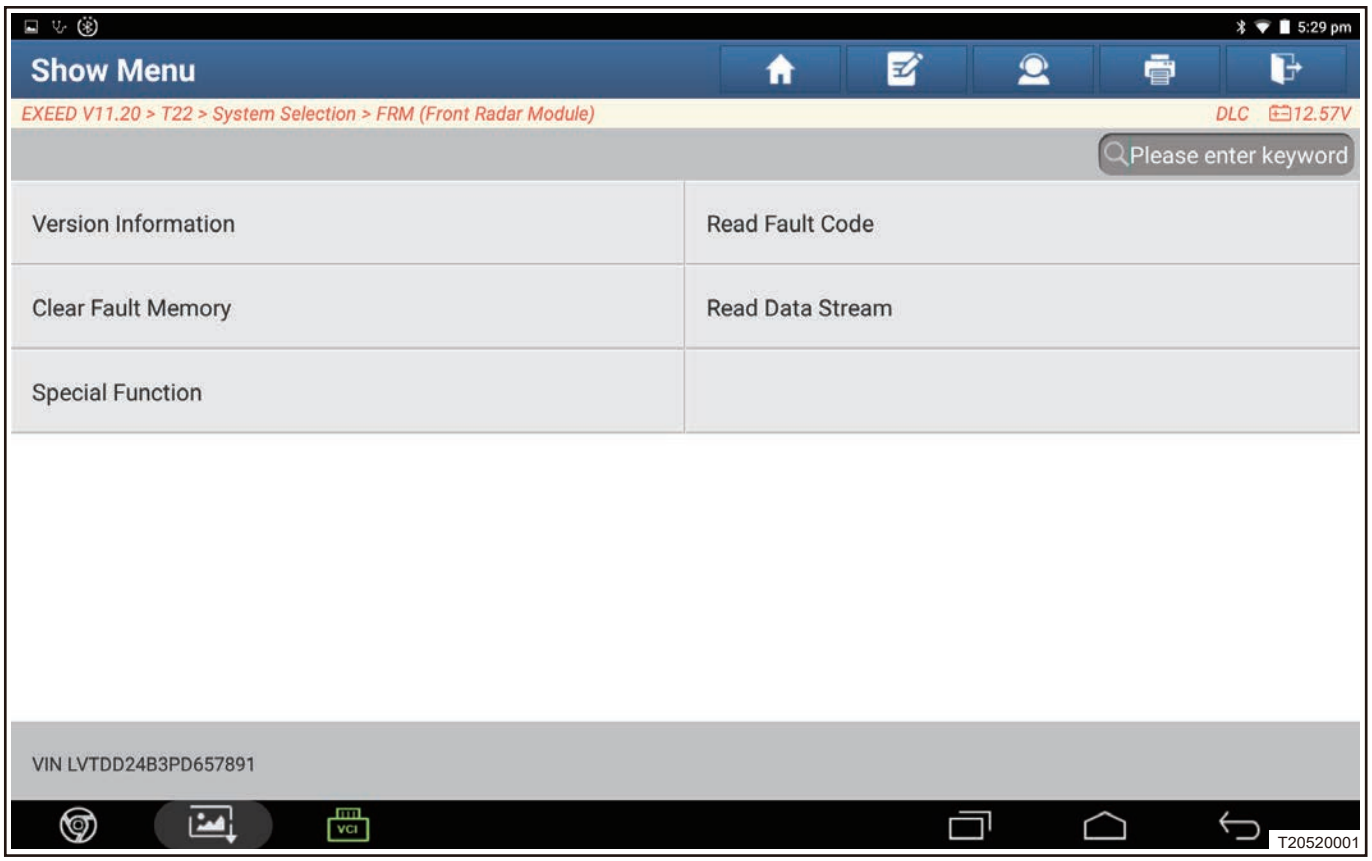
(2) Select "T22" model.

(3) Click "System Selection".

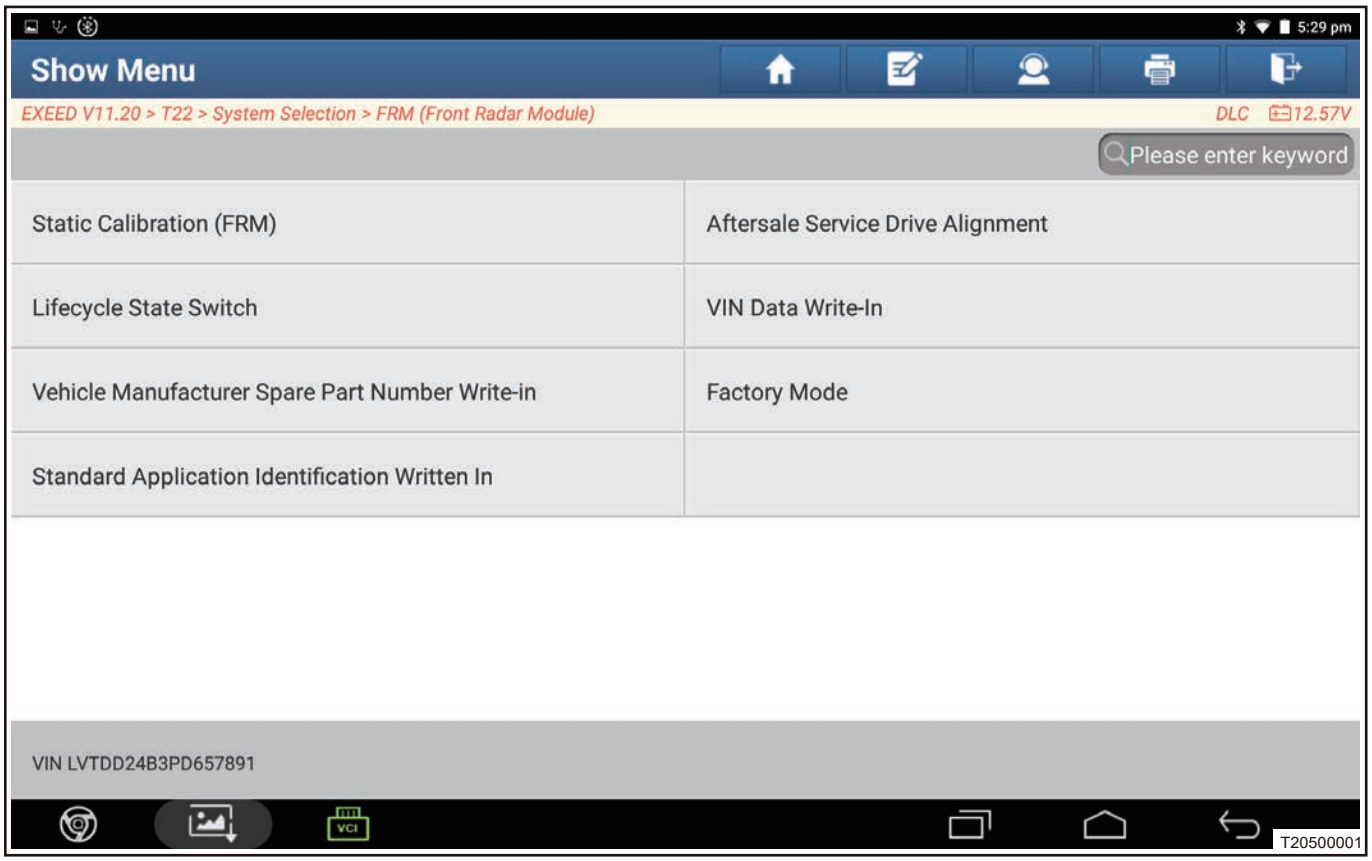
(4) Click "FRM (Front Radar Module)".



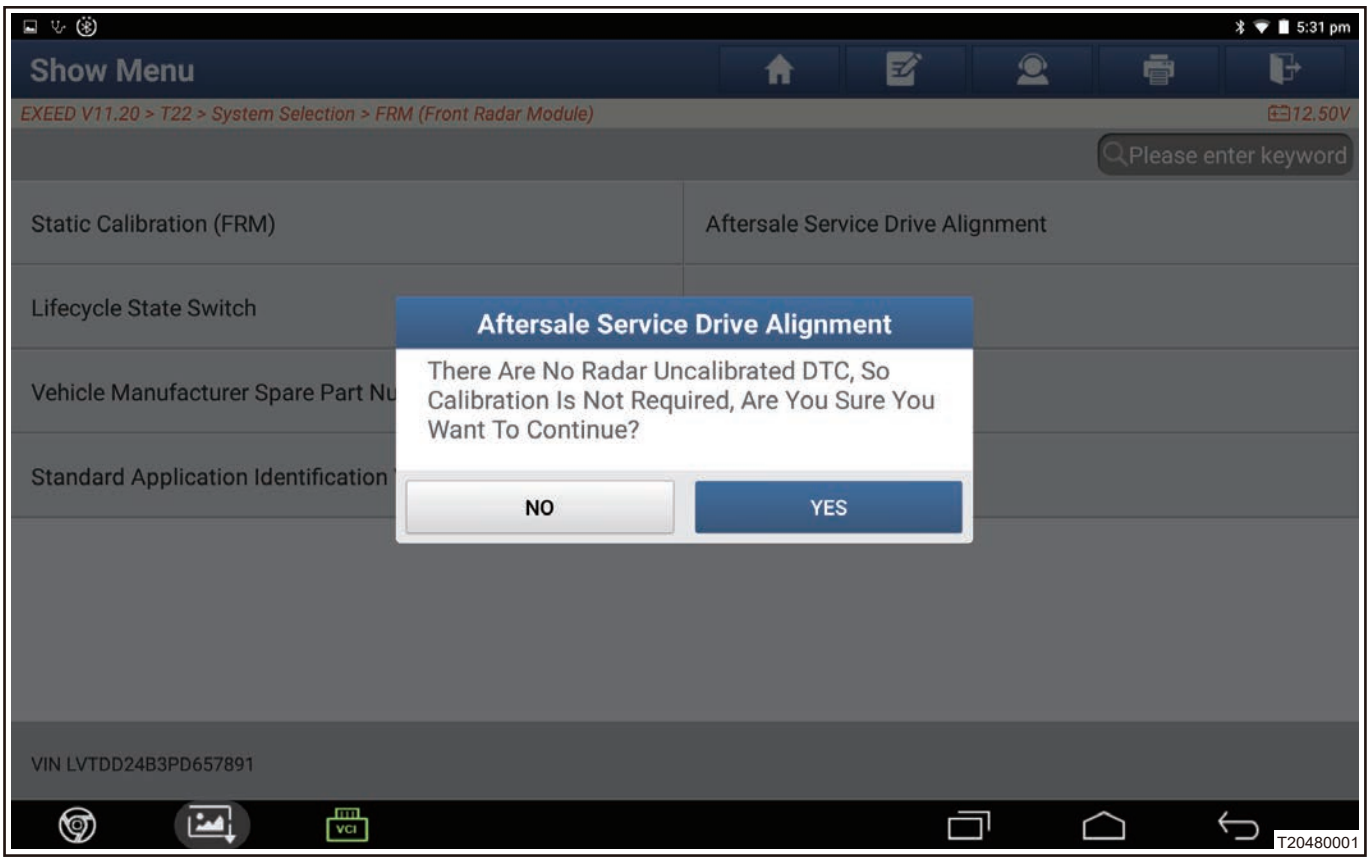
(5) Click "Special Operation".



(6) Click "Aftersale Service Drive Alignment".



(7) Click "YES" after conditions are met.



(8) Enter calibration screen after confirmation.

(9) The progress bar jumps to 100%. Radar calibration is completed.

⚠ Caution

- **Driving conditions always do not meet requirements: Surrounding references, road conditions.**
- **Communication between diagnostic tester and body is interrupted during calibration.**
- **Installation deviation of radar is too large.**

5.4 Multi-function Front Camera Module Assembly

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents, when removing multi-function front camera.**
- **Appropriate force should be applied when removing multi-function front camera. Be careful not to operate roughly.**
- **Remove multi-function front camera to perform matching calibration.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

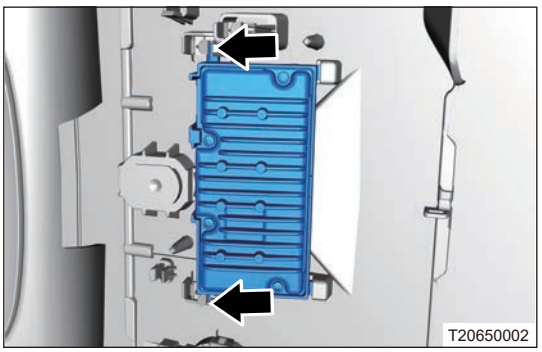
(3) Remove left and right protective covers from inside rear view mirror.

⚠ Caution

- **When removing cover plate, remove left cover plate first and then right cover plate.**
- **When removing left cover plate, separate left cover plate from right cover plate horizontally.**

(4) Disconnect the front camera connector.

(5) Remove 2 fixing clips and front camera.



■ Installation

⚠ Caution

- **Install multi-function front camera module, clamp fixing clip to the specified position.**

(1) Install front camera module in an appropriate position and clamp fixing clip to the specified position.

(2) Connect connector to multi-function front camera module.

(3) Install the cover plate.

(4) Connect the negative battery cable.

5.5 Matching Learning

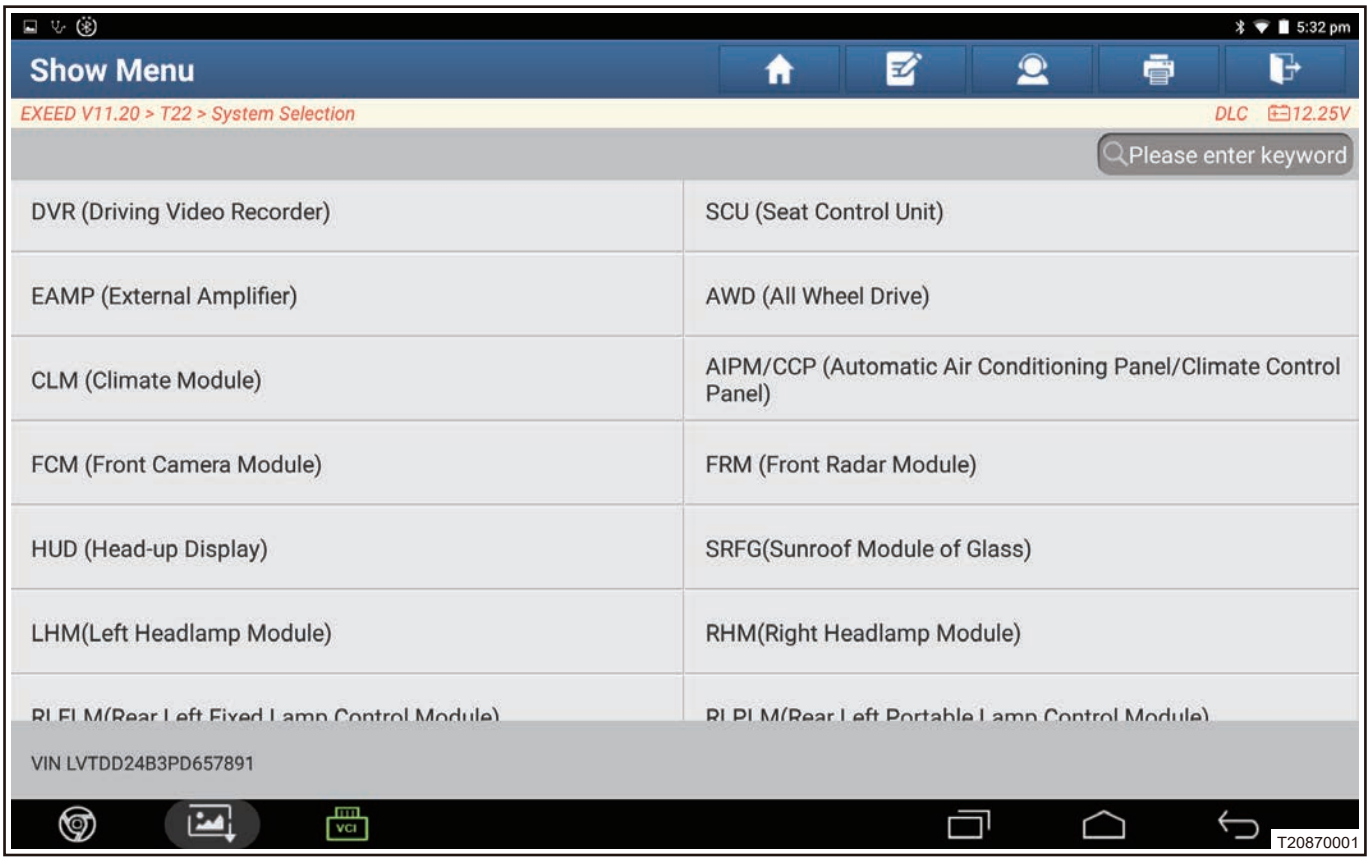
■ Writing VIN code

(1) Connect the diagnostic tester, enter system.

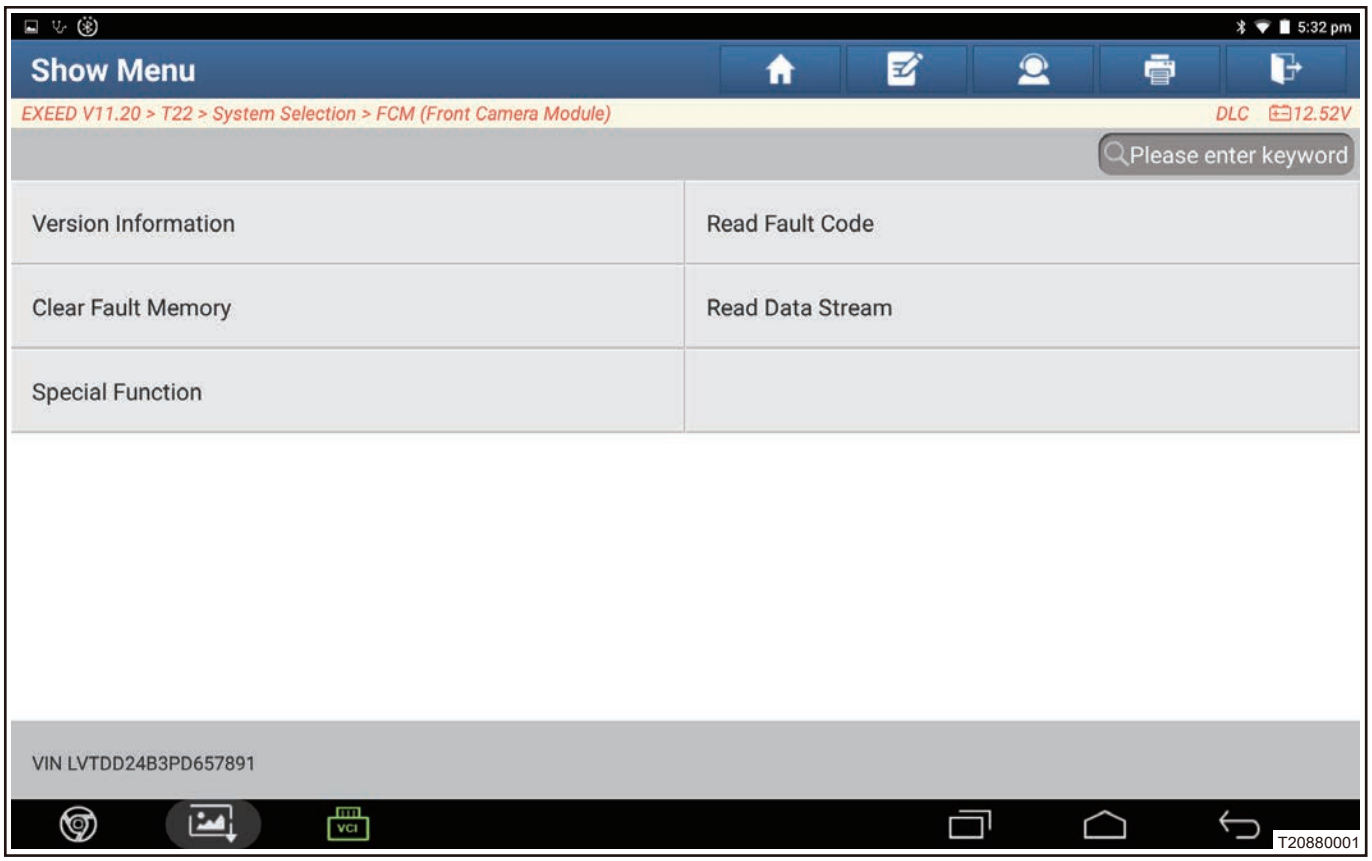
(2) Select "T22" model.

(3) Click "System Selection".

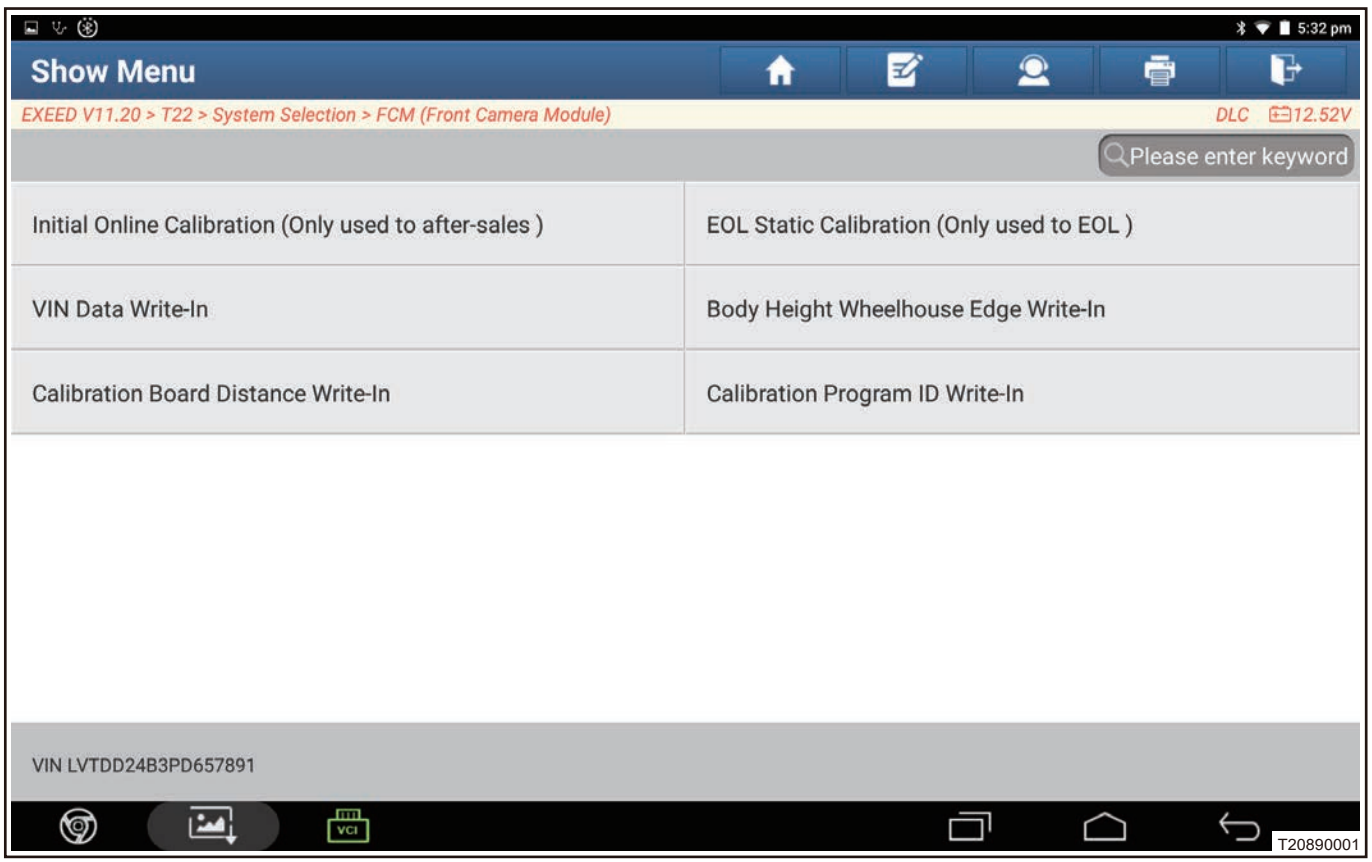
(4) Click "FCM (Front Camera Module)".



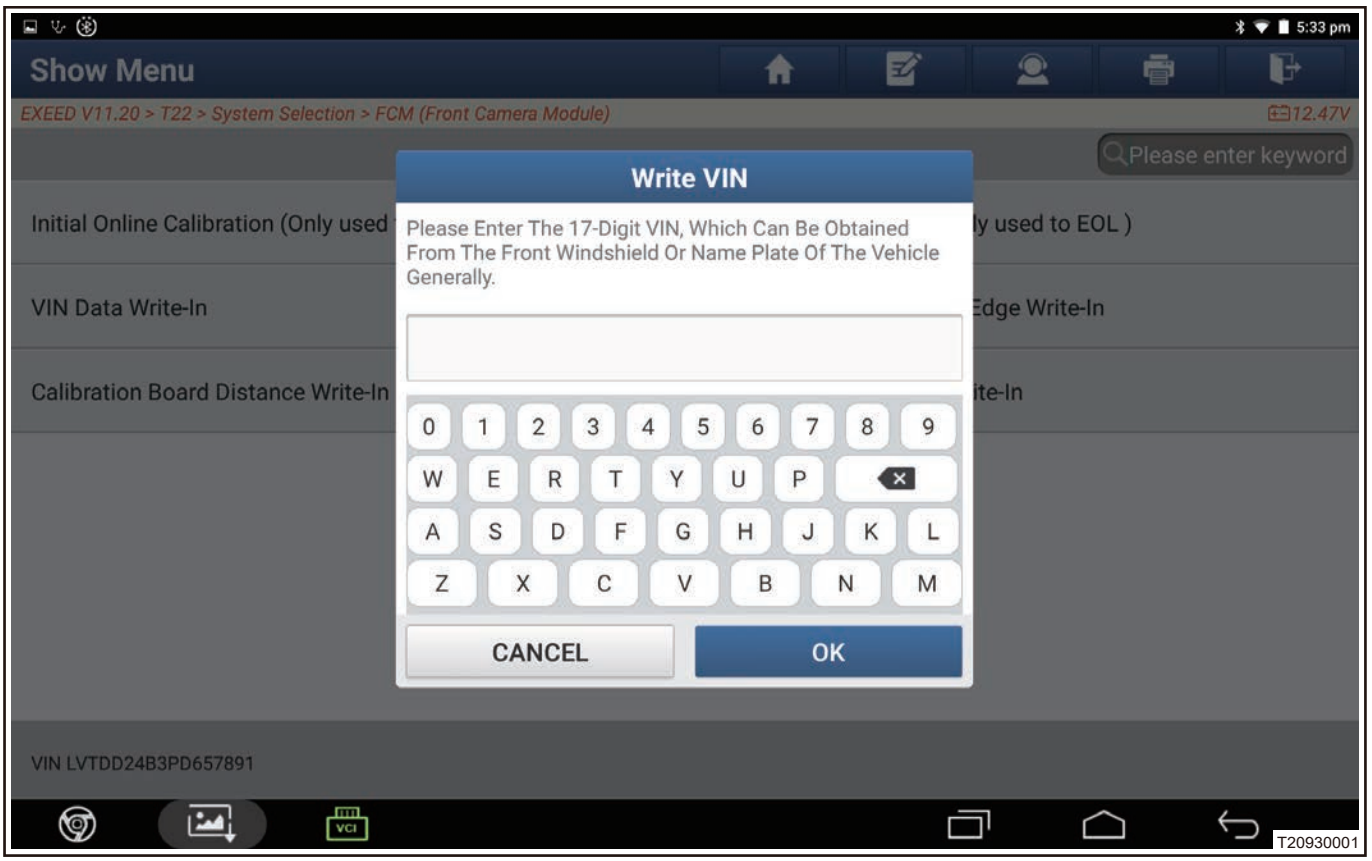
(5) Click "Special Operation".



(6) Click "VIN Data Write-In".



(7) Input corresponding VIN code and click "OK".



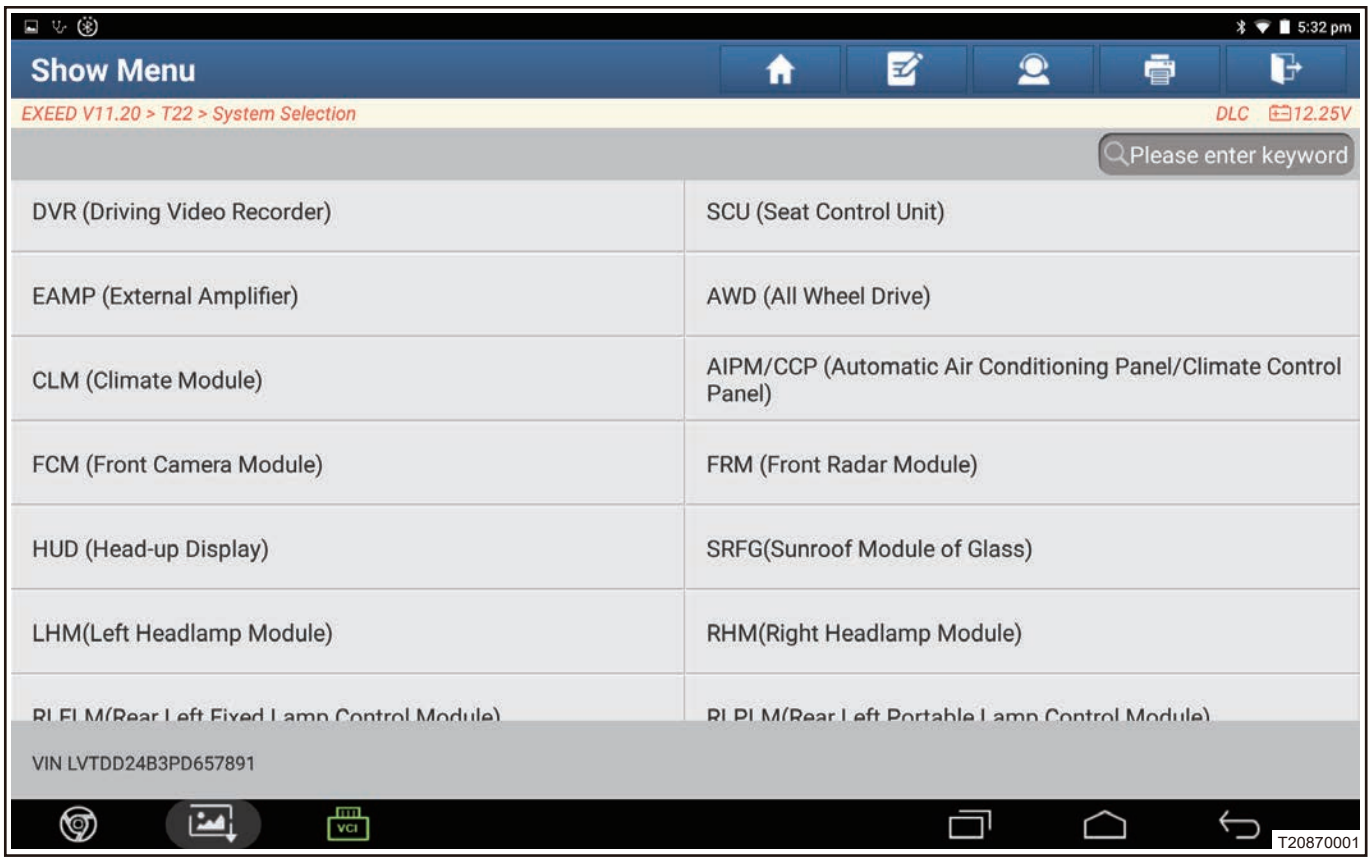
■ **Online Initialization Calibration**

(1) Connect the diagnostic tester, enter system.

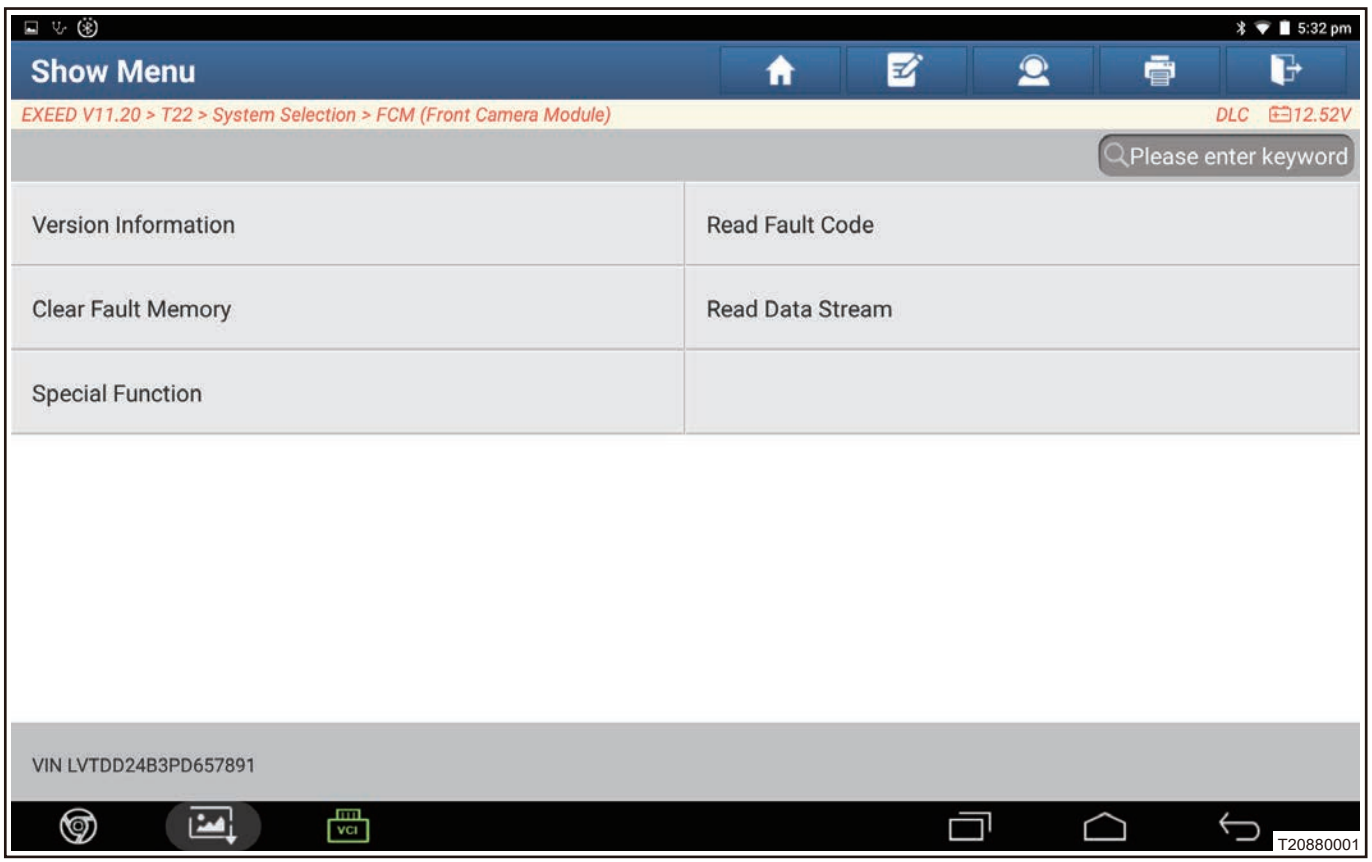
(2) Select "T22" model.

(3) Click "System Selection".

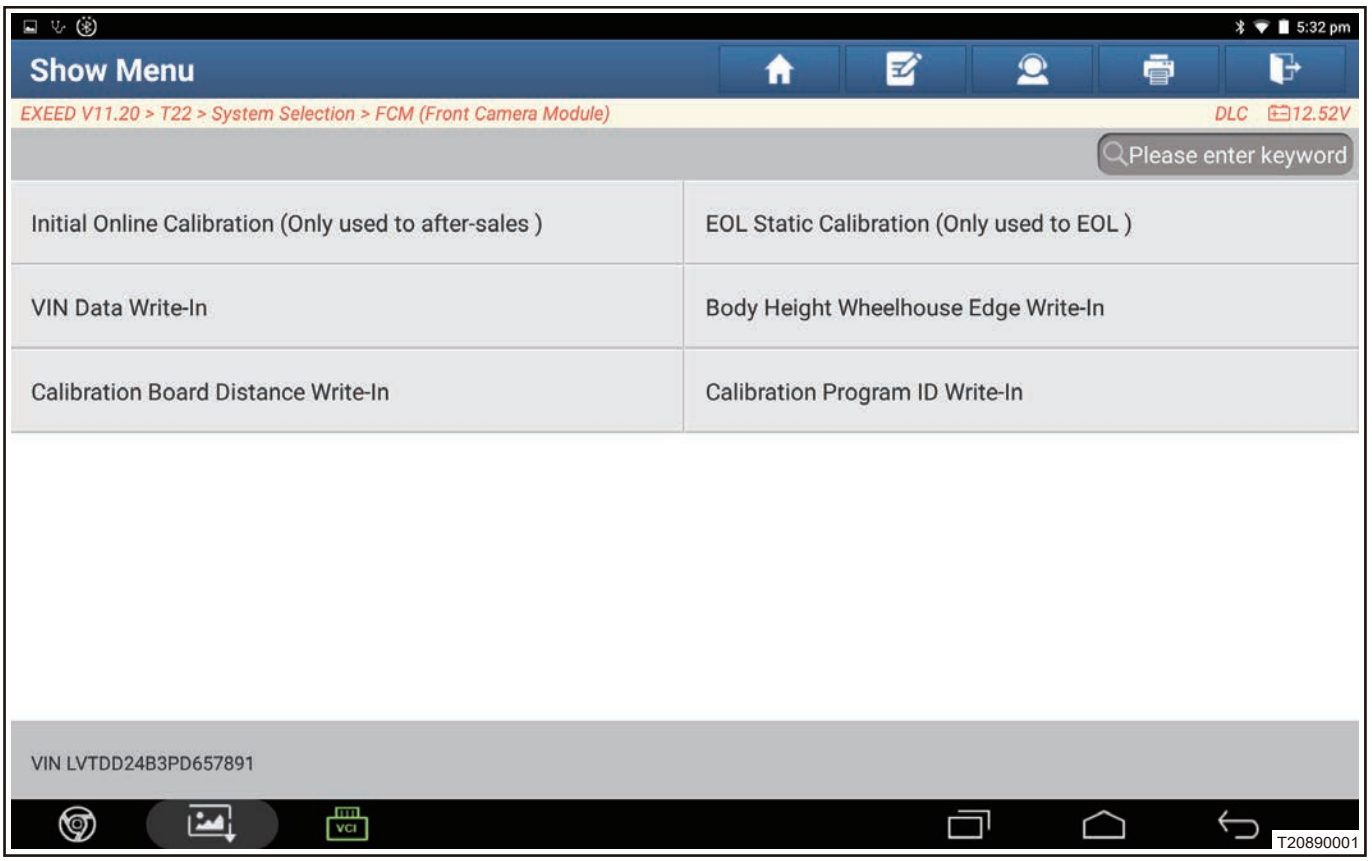
(4) Click "FCM (Front Camera Module)".



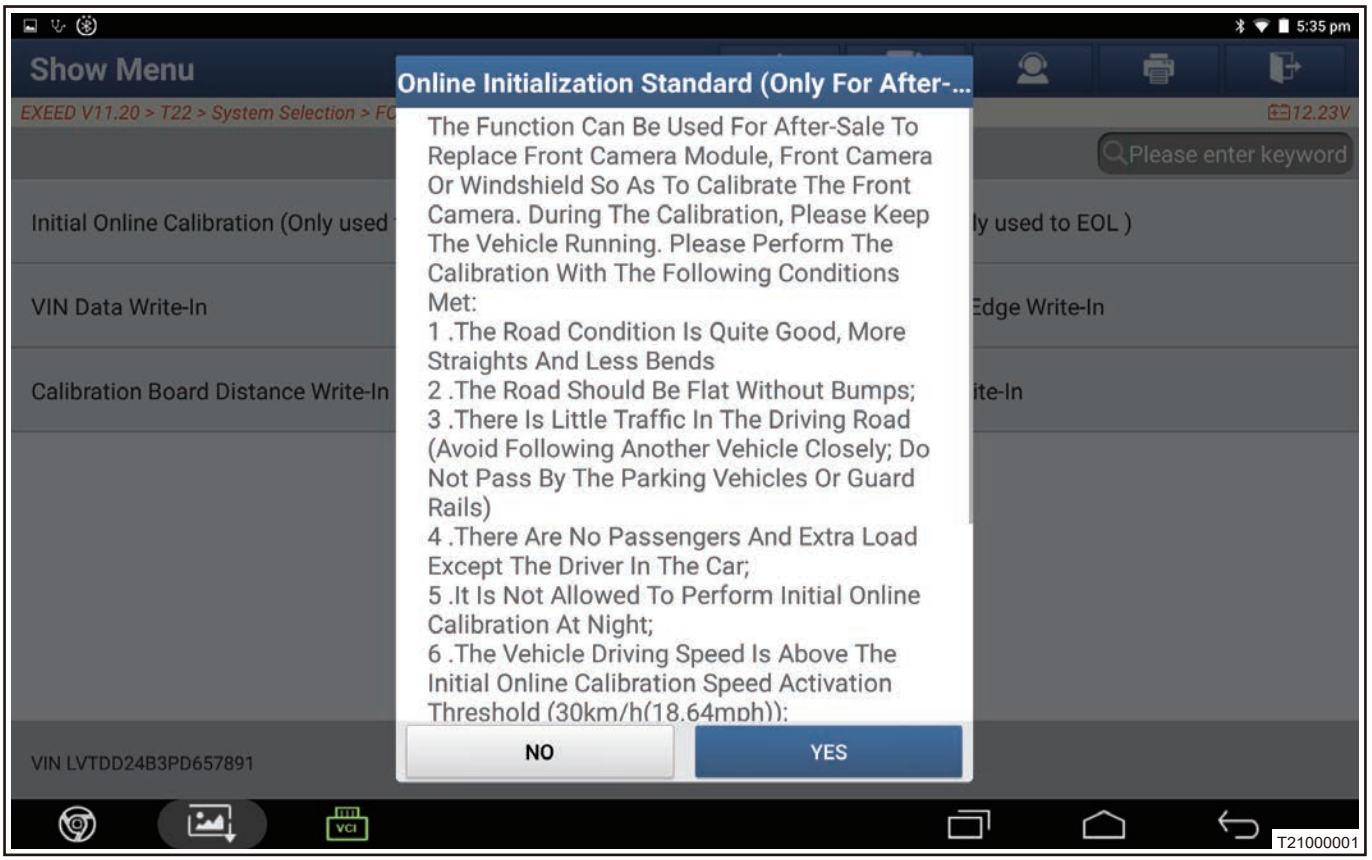
(5) Click "Special Operation".



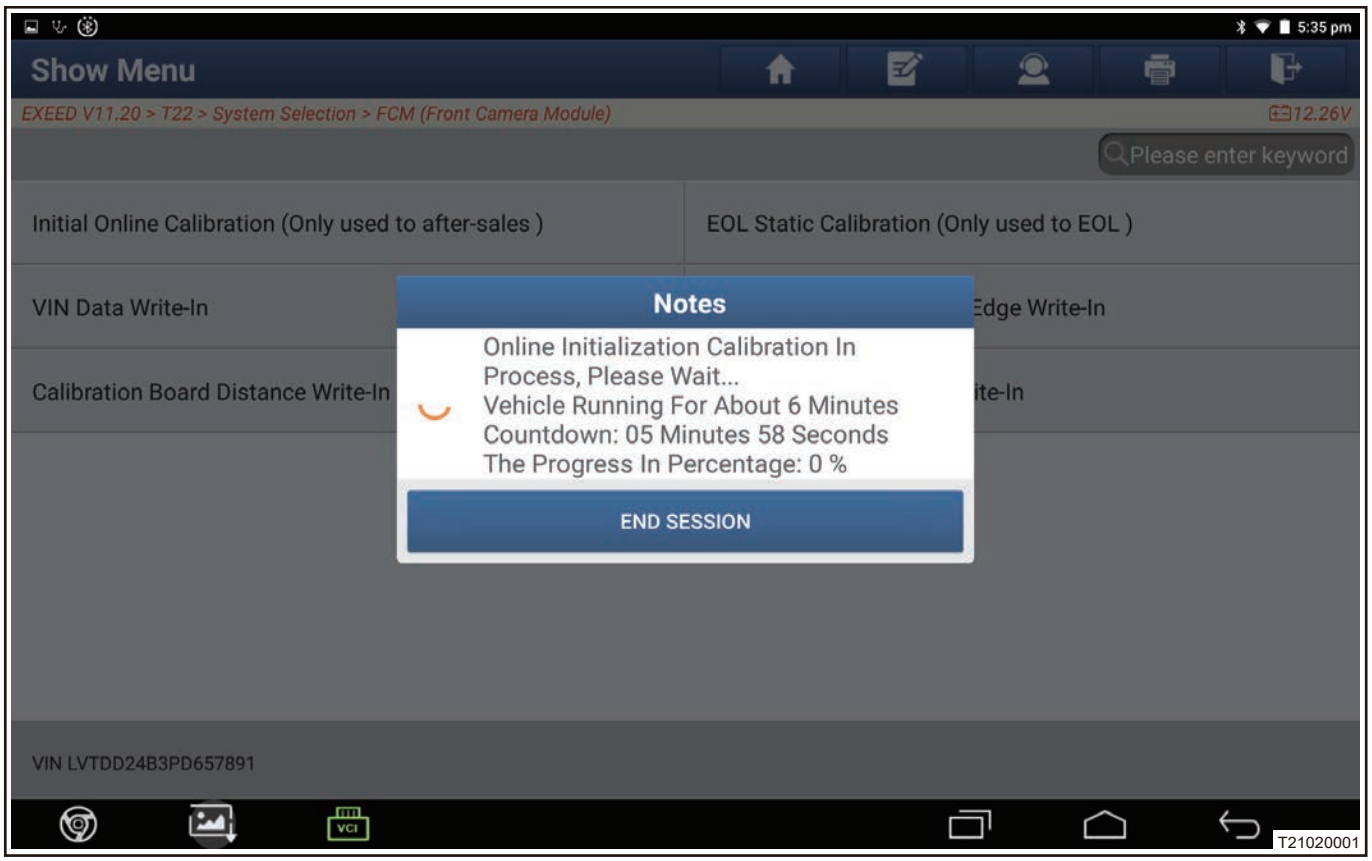
(6) Click "Online Initialization Calibration (Only for After-Sales)".



(7) Confirm and click "YES" after conditions are met.



(8) According to the information, drive the vehicle for 6 minutes.

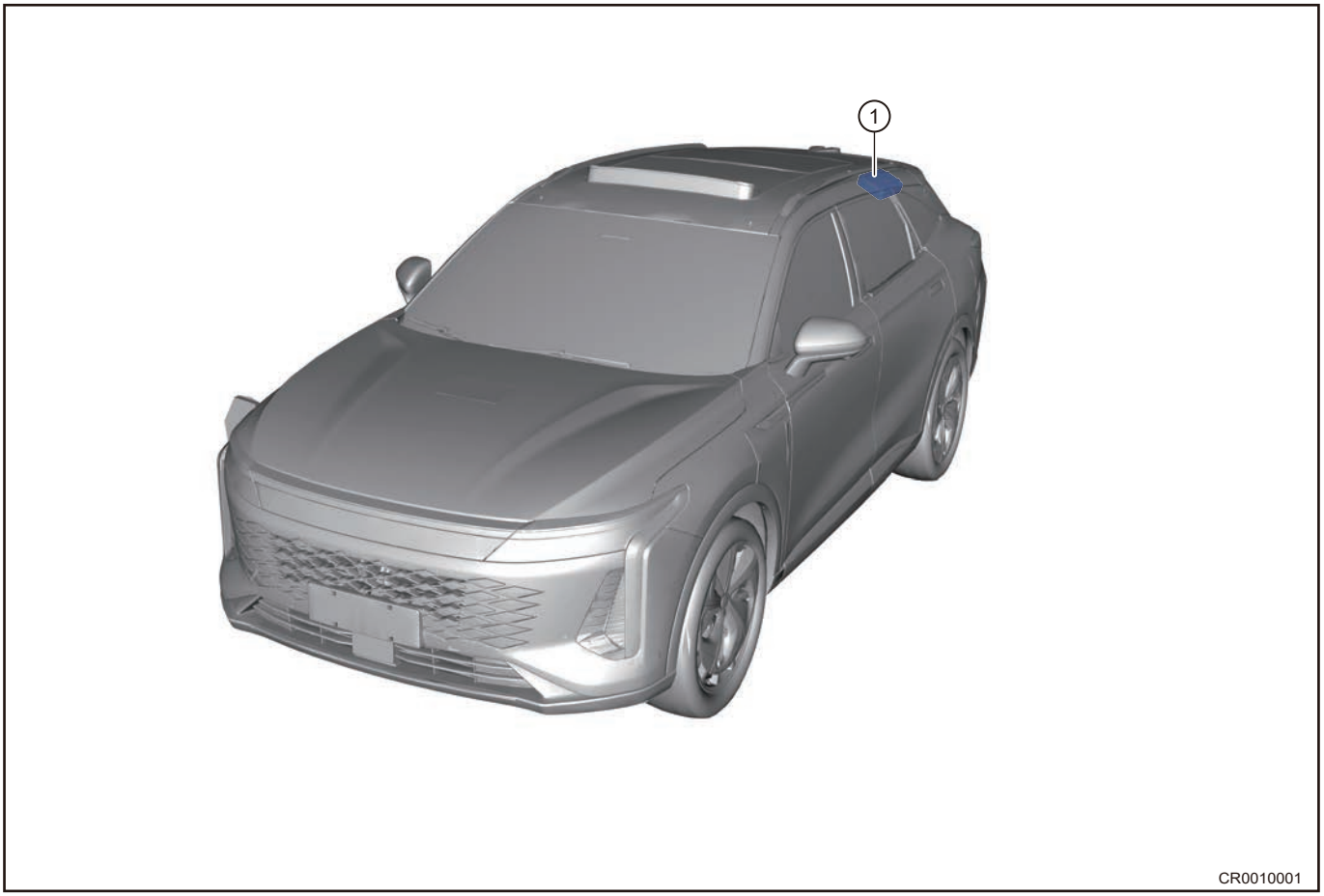


(9) After diagnostic tester screen is displayed successfully, calibration is completed, if not, perfrom calibration again.

10.14 CHILD MONITORING SYSTEM

1 System Overview

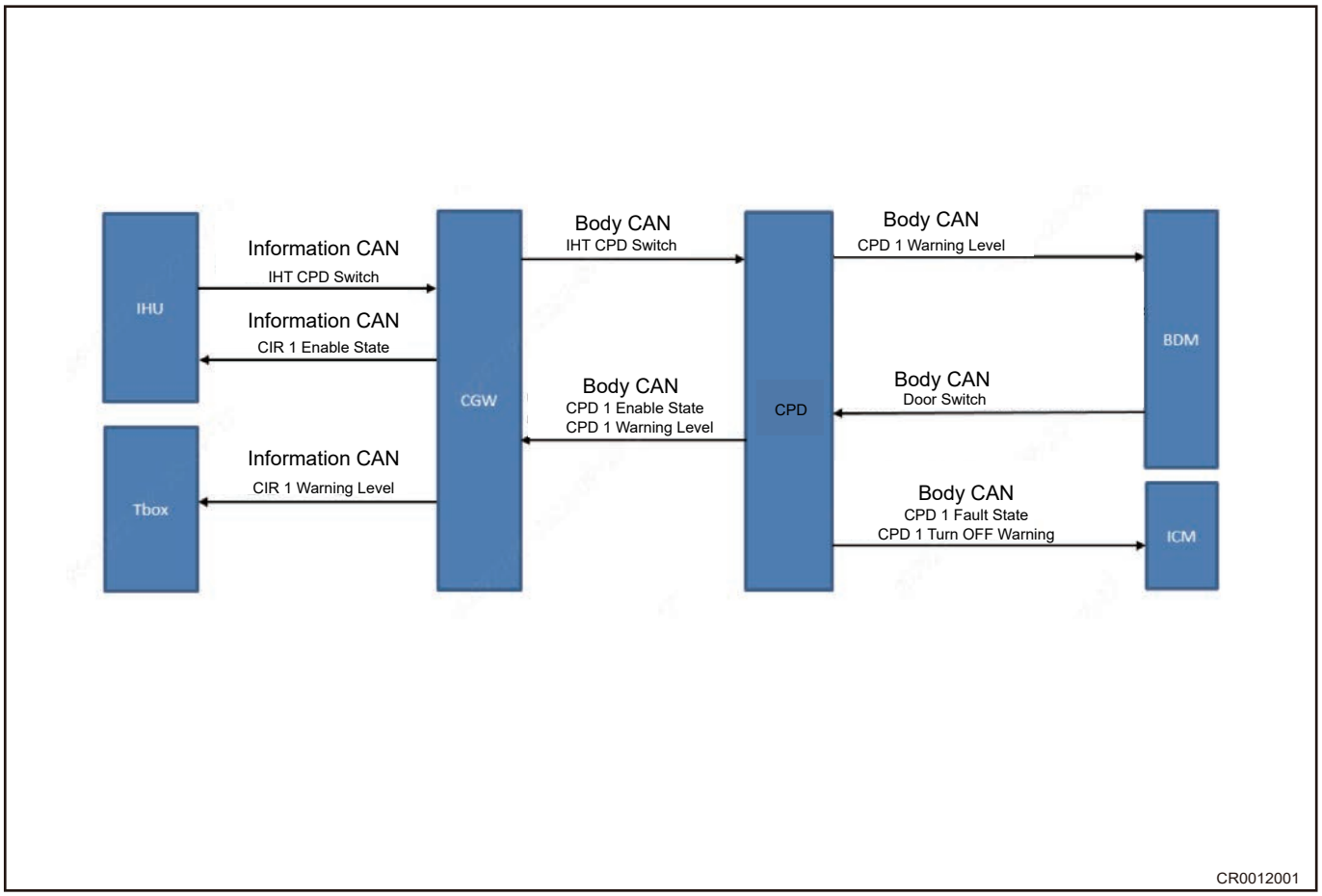
1.1 System Components Diagram



1	Interior Radar Module		

The child protection monitoring system can alert the driver and surrounding people by sounding the buzzer and flashing the hazard warning light when the vehicle is turned off, all windows are closed and locked if stranded child who may be in danger is detected in the vehicle. It is necessary to go to the vehicle parking area immediately to protect the child stranded in the vehicle.

1.2 System schematic diagram



1.3 Alarm Reminder for Child Protection Monitoring System

■ Level 1 alarm

- Alarm triggering: Turn ENGINE START STOP switch to OFF mode, the vehicle is in lock state, all doors are closed, and the child protection monitoring system is in open state. When the vehicle is locked for 10 seconds, the child protection monitoring system detects that there is child stranded in the vehicle, the hazard warning light flashes and buzzer sounds, and the reminder time lasts for 5 seconds or alarm is released.
- Alarm releasing: Unlock or open any door of the vehicle.

■ Level 2 alarm

- Alarm triggering: Within 85 seconds after the end or release of the level 1 alarm, when the child protection monitoring system detects that there is stranded child in vehicle, the hazard warning light flashes and buzzer sounds (the alarm lasts for 30 seconds, pauses for 30 seconds, and cycles through this cycle), and continues until the alarm is released or the level 3 alarm is triggered.
- Alarm releasing: Unlock or open any door of the vehicle.

■ Level 2 alarm triggered again

- Alarm triggering: With the level 2 alarm is released and the vehicle is in lock state, within 90 seconds after the release of the level 2 alarm, when the child protection monitoring system detects that there is stranded child in vehicle, the hazard warning light flashes and buzzer sounds, and continues until the alarm is released or the level 3 alarm is triggered.
- Alarm releasing: Open any door of the vehicle.

■ Level 3 alarm

- Alarm triggering: All doors are in closed state, and the vehicle is locked for 10 minutes or there are 5 minutes to level 1 alarm. When the child protection monitoring system detects that there are stranded child in the vehicle, the hazard warning light flashes and buzzer sounds. The reminder lasts for 20 minutes or the alarm is released, and a mobile SMS reminder is triggered.

⚠ Caution
Turn ENGINE START STOP switch to ON mode, when the child protection monitoring system is malfunction, the instrument cluster displays a text prompt message.

1.4 Turn Child Protection Monitoring System ON/OFF

■ ON

(1) ENGINE START STOP switch ON.

(2) Click the CPD function on head unit screen to turn it on.

■ ON

(1) ENGINE START STOP switch ON.

(2) Click the CPD function on head unit screen to turn it off.

1.5 Malfunction Reminder for Child Protection Monitoring System

(1) ENGINE START STOP switch ACC or ON.

(2) Instrument cluster displays "Abnormal child monitoring reminder function, please contact 4S shop"

1.6 Power Supply State Switching Display

- When switch ENGINE START STOP switch from ACC or ON to OFF,a new timing is required:

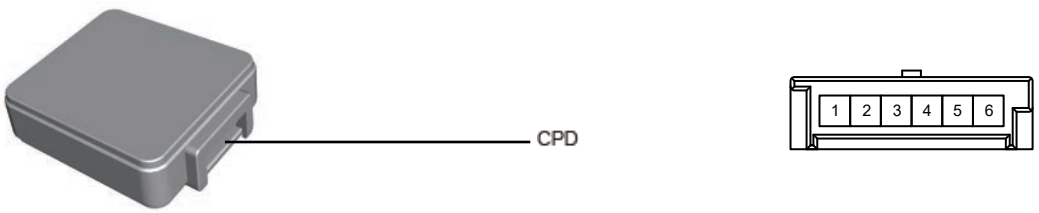
  (1) The power mode is switched to OFF when the text prompt for ACC or ON is displayed for less than 11 seconds, it will display 6 seconds when retime.

- When the ENGINE START STOP switch is switched between ACC and ON, there is no need to retime:

  (1) When switching between ACC and ON, there is no need to retime, and just display for 11 seconds.

2 Circuit Diagram

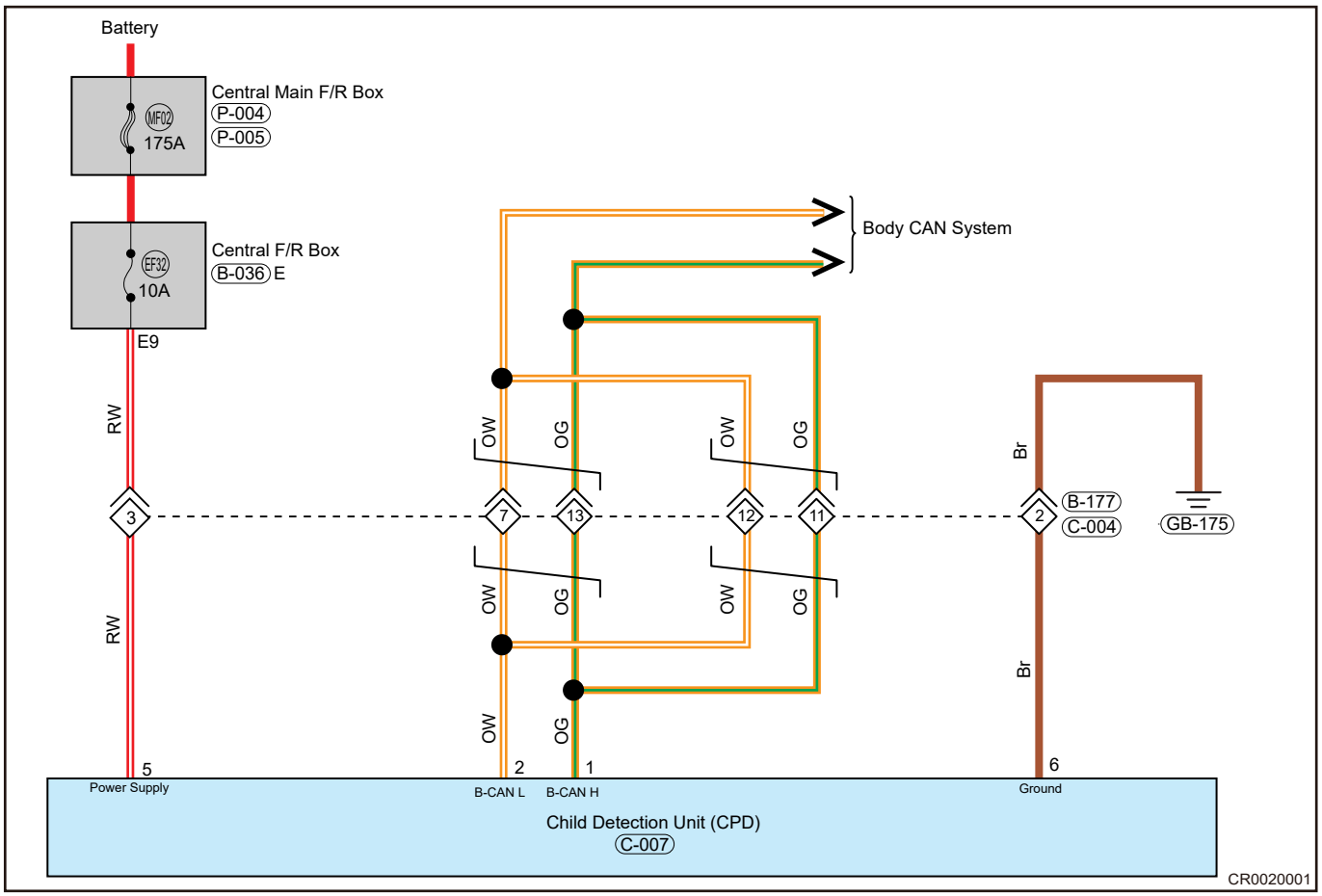
2.1 Child Monitoring Unit (CPD) Terminal Definition



CR0011001

1	CAN-H	4	-
2	CAN-L	5	KL30
3	-	6	GND

2.2 System Circuit Diagram



3 Diagnosis & Testing

3.1 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all system grounds related to the latest DTCs.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

3.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.

- Look for broken, bent, protruded or corroded terminals.
- Inspect components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.

(2) Check all contact surfaces for tarnish, dirt and rust, etc.

(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

(5) Check if any additional accessories interfere with ground circuit.

(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

3.4 Diagnosis Procedure

Use following procedures to troubleshoot the system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

NG → **Replace battery**

OK

3	**Customer problem analysis**

Next

4	**Read DTCs**

History DTC → **Troubleshoot according to Intermittent DTC malfunction procedures**

Current DTC

5	**Repair according to Diagnostic Trouble Code (DTC) Chart**

Next

6	Adjust, repair or replace

Next

7	Conduct test and confirm malfunction has been repaired

Next

End

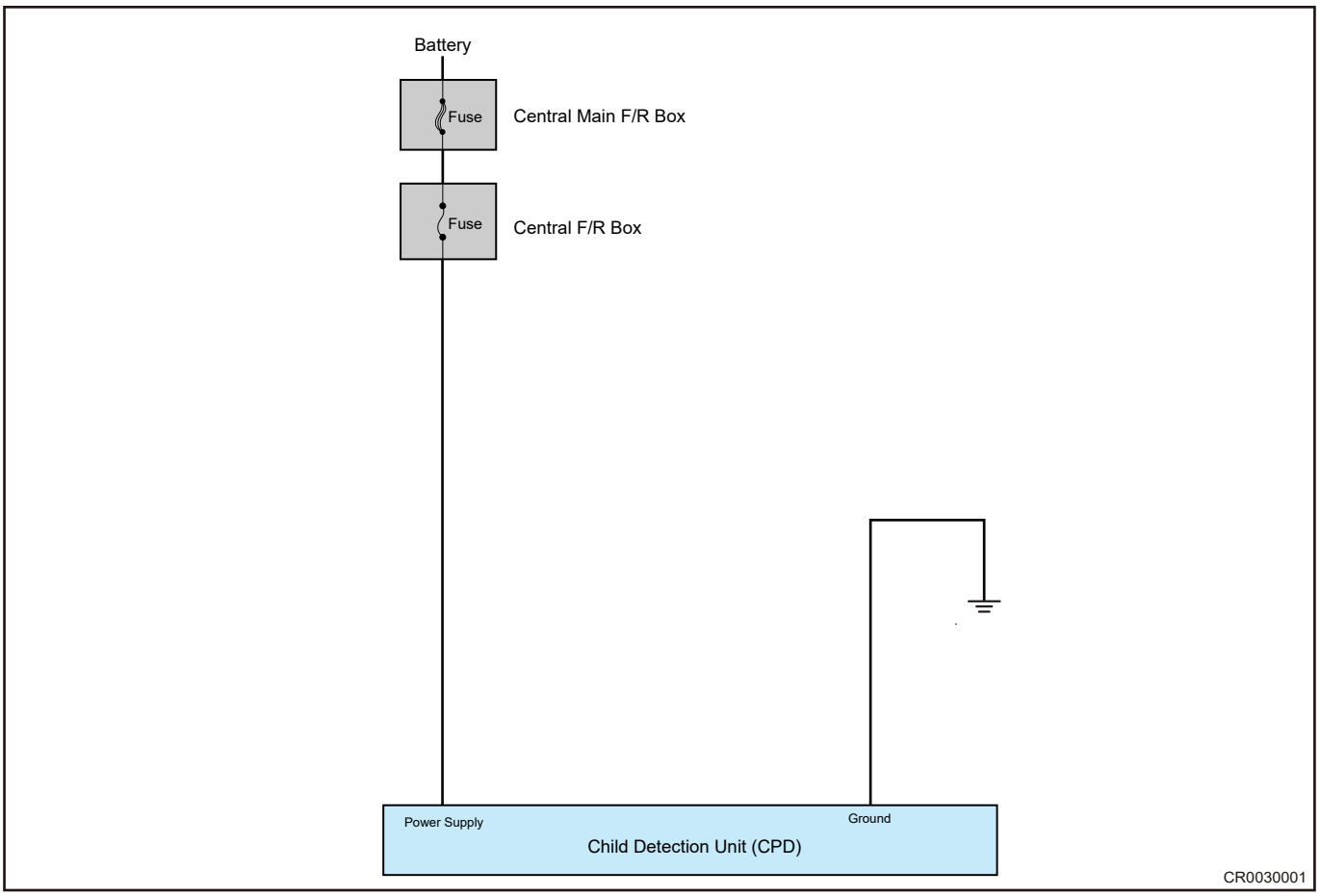
3.5 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Possible Cause
B278116	Voltage Too Low	• Fuse failure • Wire harness or connector failure • CPD module fault
B278217	Voltage Too High	
B278698	Temperature Too High	• The maximum value corresponding to the temperature change value in the temperature calibration gauge is too large
B250144	Radio Frequency Fault	• Module failure
U014087	Lost Communication With BCM or Body Control Front Module	• Check CAN bus or replace ECU
U007388	CAN Bus Off	
U300051	Control Module Not Programmed	• Check vehicle CAN configuration

3.6 DTC Diagnosis Procedure

DTC	B278116	Voltage too Low
DTC	B278217	Voltage too High

System schematic diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch "ON"	Not less than 12 V

NG → **Repair or replace battery/alternator**

OK

2	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuse is normal.

NG → **Replace fuse**

OK

3	Check interior power supply wire harness

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

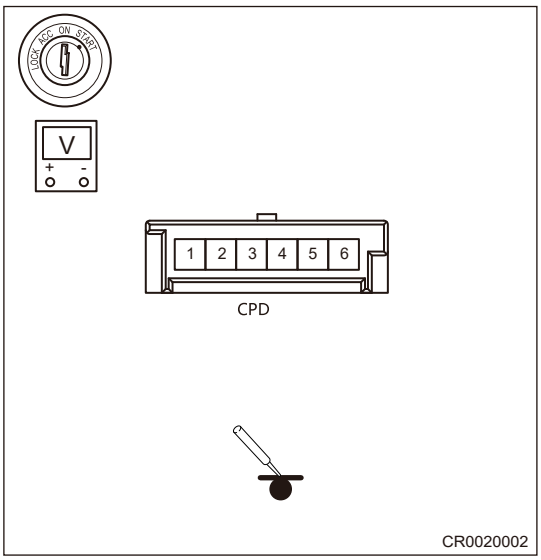
(c) Disconnect the CPD connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

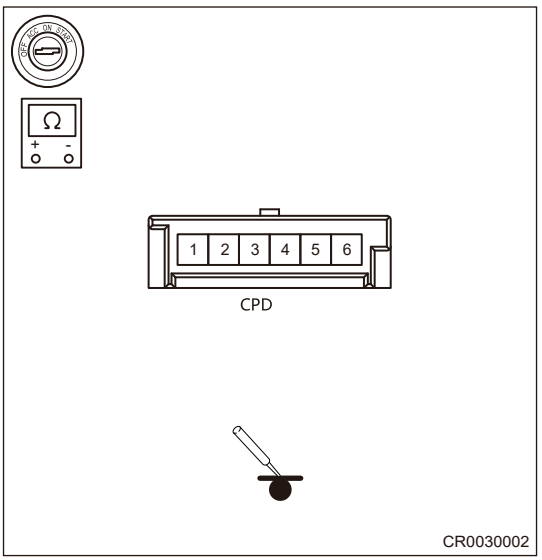
(f) Using a digital multimeter, measure voltage between CPD connector power supply terminal and ground according to table below.

Multimeter Connection	Condition	Specified Condition
CPD (power supply terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



(g) Using a digital multimeter, measure resistance between CPD ground terminal and ground according to the table below.

Multimeter Connection	Condition	Specified Condition
CPD (ground terminal) - Body ground	ENGINE START STOP switch "OFF"	< 1 Ω



NG → **Repair or replace related wire harness**

OK

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG	Replace the CPD module
OK	System is normal

DTC	B278698	Temperature too high
DTC	B250144	Radio Frequency Fault

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG	Replace the CPD module
OK	System is normal

DTC	U014087	Lost Communication With BCM or Body Control Front Module
DTC	U007388	CAN Bus Off
DTC	U300051	Control Module Not Programmed

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

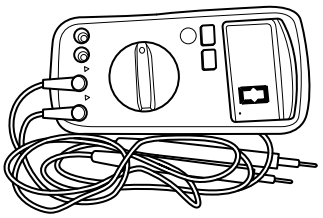
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system.

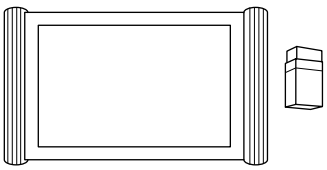
4 On-vehicle Service

4.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

■ Special Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

4.2 Interior Radar Module Assembly

■ Removal

⚠ Caution

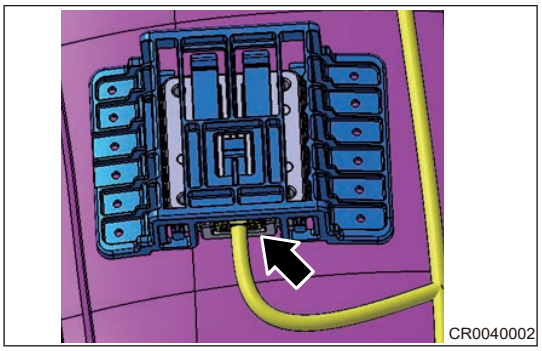
- **Avoid breaking the bracket, especially the clip when removal and installation. The bracket is fixed to roof interior with adhesive, it is difficult to replace.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

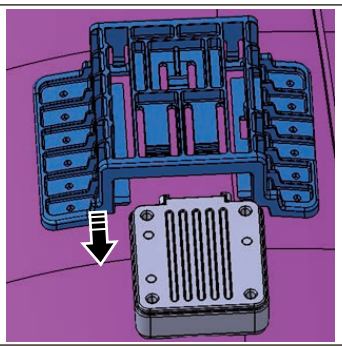
(2) Disconnect the negative battery cable.

(3) Remove the roof in vehicle.

(4) Disconnect wire harness connector (arrow) from the interior radar module.


CR0040002

(5) Remove the interior radar module from bracket (in direction of arrow), and remove the interior radar module assembly.

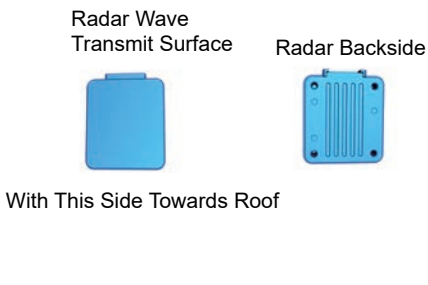

CR0050002

■ Installation

⚠ Caution

- **Install the interior radar module with the smooth side facing the roof and cannot be installed upside down, otherwise it will cause the radar do not function.**

(1) Install the interior radar module to the bracket.



CR0060002

(2) Connect wire harness connector to the interior radar module.

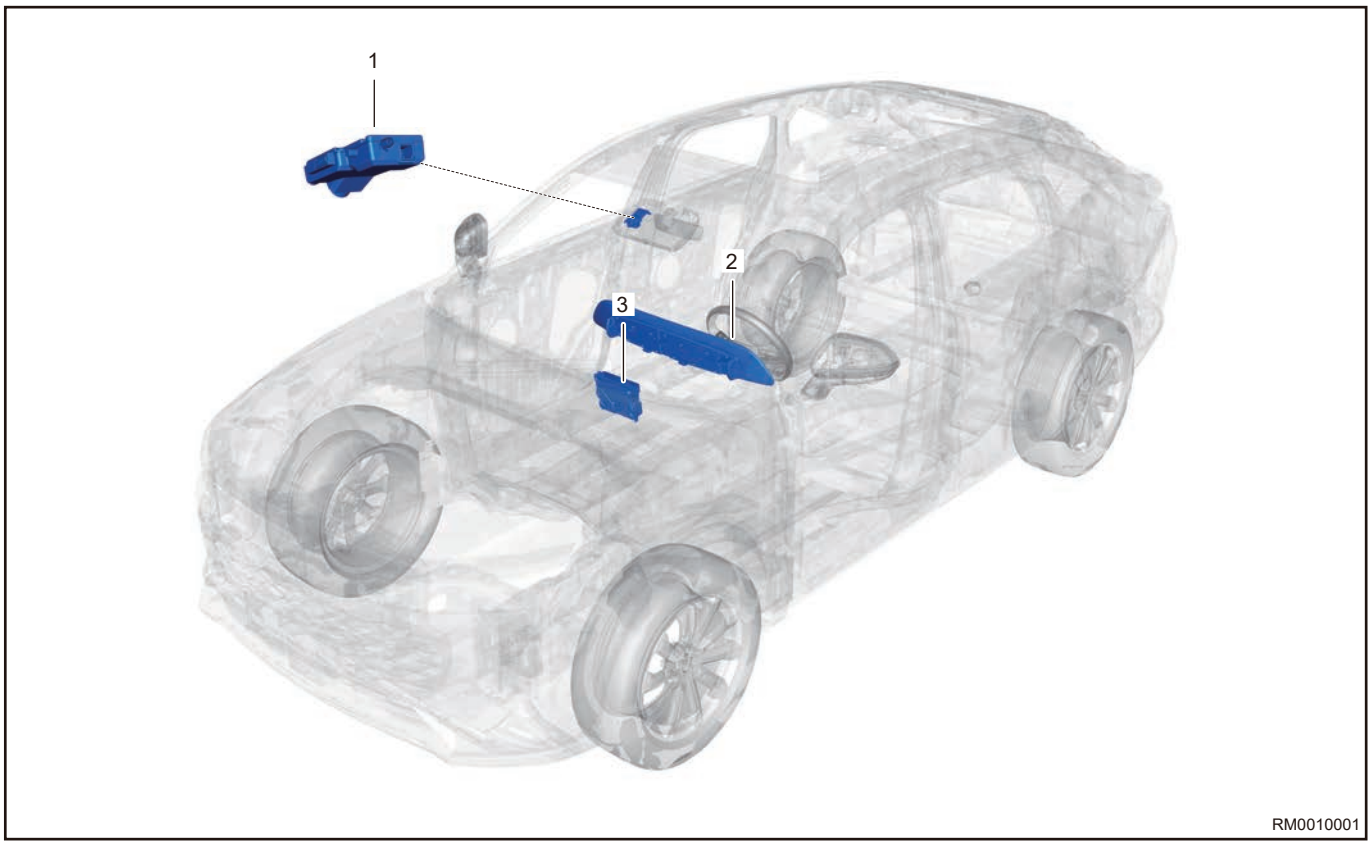
(3) Install the roof to vehicle.

(4) Connect the negative battery cable.

10.15 DRIVING RECORDER

1 System Overview

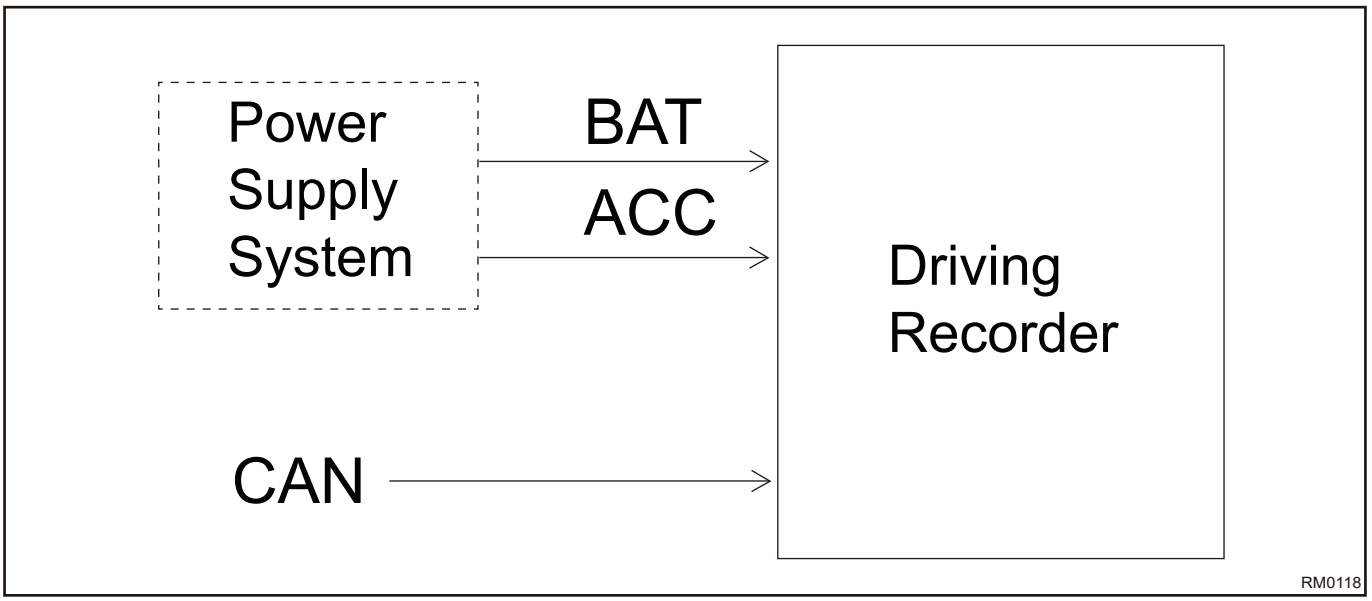
1.1 System Components



1	Driving Recorder	3	Domain Controller
2	Dual LCD		

Driving recorder is an instrument that records images, sounds and other relevant information during driving. It can record video images and sounds of the whole process of vehicle driving, providing evidence for traffic accidents. People who like autonomous driving can also use it to record the driving process.

1.2 System ON



■ **System ON Logic Is Shown in Table Below**

BAT	ON (KL15)	CAN Communication	Parking Monitoring	System Condition
OK	OFF	Yes	ON or OFF	System starts and starts to record automatically
		No	ON	When vibration intensity of vehicle exceeds the set threshold, the driving recorder will be waken up by the signal from built-in G-sensor to record 20s video. After recording the video, if there is no continuous G-sensor signal, the system will shut down automatically. (There is time watermark, but there is no driving behavior information)
			OFF	Vehicle vibrates and driving recorder cannot be waken up to record video
	ON	Available or not available	ON or OFF	System starts and starts to record automatically
NG	/	/	/	System cannot start (less than 6 V or more than 18 V)

1.3 System OFF

■ **System OFF Logic Is Shown in Table Below**

BAT	ON (KL15)	CAN Communication	System Condition
OK	ON	Yes	Normal operation
		Interrupted	Driving recorder can record video properly, but CAN related function cannot operate properly
	OFF	Yes	System is in normal operating status, recording is normal and system does not turn off
		Interrupted	System off
NG	/	/	System off

1.4 Ambient Temperature

(1) Operating temperature range: -40℃ to 85℃;

(2) Storage temperature without load: -40℃ to 95℃.

(3) Relative humidity: 0 to 85%.

1.5 Operating Current

(1) Single head unit: ⩽ 300 mA

1.6 Static Current

(1) Driving recorder system: ⩽ 0.1mA.

(2) Start driving recorder with BATT terminal of head unit connector connected to multimeter (dialed to current band), cuts off the power supply at ON position under normal operating status, and the stable current value measured by multimeter after head unit enter sleep mode (CAN network is turned off and system does not operate) is the static current.

1.7 Product Feature

■ **Function Overview**

Function	Description	Note
DVR Video Output	120° ± 5° in horizontal, 140° ± 5° in diagonal	It is 5G Wi-Fi connection by default, 2.4G Wi-Fi is optional, IHU display realizes display function, time delay ⩽ 500 ms
Frame Rate	30 fps	/
Lens Pixels	⩾ 1920*1080	/
Low-light Level	0.1 lux	/
Dynamic Range	＞ 95 dB	/
Signal Noise Ratio	＞ 40 dB	/
Storage Medium	TF card (8 GB ~ 128 GB supported)	/
Record Function	Support	Synchronous sound recording when recording
Parking Monitoring	Support	/

Function	Description	Note
Power-off Storage Protection	Support	/
ON Position Signal Detection	Support	/
Snapshotting	Steering wheel drive-by-wire Mode button snapshotting (Mode button is defined as snapshotting), or snapshot by voice control	Sound prompt is necessary when taking photos
File Playback	Support	/
General/Emergency Recording	Support	/
CAN Communication	Support	/
Indicator	Dual color (red and blue) indicator Device operates normally (normal recording): Blue indicator remains on; Wi-Fi connection/data interaction: Blue indicator flashes slowly; Device failure/function abnormality: Red indicator remains on; Recording abnormality/no TF card: Red indicator flashes slowly; Software upgrade: Red and blue indicators flash alternately.	Blue indicator blinks slowly, red indicator blinks slowly: Blinks at a frequency of 1 Hz; Red and blue indicator blinks alternately: Blinks at a frequency of 1 Hz. Priority of red indicator is higher than that of blue indicator.

■ **System Parameter**

Function	Description	Note
Driving Recorder	Starts to record automatically after starting	/
Recording Resolution	1080P (by default), 720P	/
Recording Time	1 minute, 3 minutes (by default), 5 minutes	/
Driving Information Overlay	ON (by default), OFF	/
Recording	ON, OFF (by default)	/
Gravity Sensing Sensitivity	High, Medium (by default), Low	/
Wide Dynamic	ON (by default), OFF	/
Snapshotting	Taking photo, short video, taking photo + short video (by default)	/

■ **System Characteristics**

Primary Function	Secondary Function	Description	Note
General Recording	Video recording	Video recording is circularly covered, video is saved in TF card;	Folder is full without prompt
	Video recording switch	Video recording switch	ON by default
	Recording Resolution	1920*1080@30 frame/ 1280*720@30 frame	1920*1080@30 frame by default

Primary Function	Secondary Function	Description	Note
	Sound recording switch	ON/OFF	Sound recording OFF by default
	Recording file time	1 minute/3 minutes/5 minutes	3 minutes by default
	Driving Information Overlay	Driving information overlay switch	ON by default
		Driving information is from CAN network;	/
		Driving information includes: Vehicle speed, gear position, accelerator pedal, high beam light, low beam light, rear fog light, left turn signal light, right turn signal light, parking brake, foot brake, seat belt	Real-time preview screen does not display
	Time Watermark	Current time watermark is on the screen of video file, which can be seen during video playback; The source of time: DVR RTC clock (at each cold start of DVR, CAN is obtained to perform time calibration);	Real-time preview screen does not display
	HDR switch	HDR switch	ON is for DVR function screen by default
Emergency recording	Emergency recording	When vibration is greater than vibration acceleration threshold of emergency recording, 10 s video before and after vibration moment is saved in emergency video area separately; After IG ON, get the vehicle acceleration value from CAN; before IG ON, get the vibration value from Gsensor on DVR Emergency video file is circularly covered;	When recording is off, emergency recording will not be turned off; When emergency video folder is full, prompt box that shows "Emergency video folder of driving recorder is full, please remove the file in card timely" will pop up on IHU screen
	Vibration acceleration induction sensitivity	Three vibration acceleration thresholds: High, medium, low	Medium by default
	Emergency recording overwriting	If the storage area of emergency recording has been full, new emergency video will replace the oldest emergency video.	/

Primary Function	Secondary Function	Description	Note
Parking Monitoring	Parking Monitoring	If vibration is greater than the parking monitoring vibration acceleration threshold with driving recorder turned off, it will turn off after turning on to record for 20 seconds.	Duration is the same as that of emergency recording video
	Parking monitoring switch	Parking monitoring switch	ON by default
Taking pictures	Taking pictures	• Photo resolution is the same as the current video resolution; • During taking pictures, recording is not paused; • The photo is stored in photo storage area of TF card; • The photo is overwritten circularly;	When photo folder is full, prompt box that shows "-Photo folder of driving recorder is full" will pop up on IHU screen.
	Steering wheel button control capturing	If IHU defines steering wheel line control Mode button as "Driving recorder capturing", it will response to steering wheel button and take picture; Customized capturing setting can be set on setting screen of driving recorder: Capturing option function can be customized. Customized option (taking pictures, short video, taking pictures + short video). Duration of captured video is 10 seconds, which consists of first 5 seconds and last 5 seconds of video that responds to the moment of capturing.	• During emergency recording, it cannot respond to capturing. If it is in the process of capturing for recording currently, it cannot respond to emergency video recording. • If capturing setting is "-short video", "taking pictures + short video", it will not respond to the capturing command again during short video recording, until the recording is completed. It will respond to next capturing command when "Mode" button is pressed again
Playback	Video playback	Play the video file recorded by driving recorder in TF card on central control navigation head unit.	/
	Photo playback	Play the photo file recorded by driving recorder in TF card on central control navigation head unit.	/
File management	File management	Manage (delete) the video (common and emergency video) and photo file stored in TF card of DVR	/

Primary Function	Secondary Function	Description	Note
		on central control navigation head unit.	
	Formatting TF card	Format the TF card by central control navigation screen operation.	/
AR Navigation Video Output	AR Navigation Video Output	Intercept 1488*616 (-tentative) resolution video output;	Specific angle is subject to real vehicle calibration
DVR video output and interaction	DVR video output and interaction	DVR outputs video and interacts via Wi-Fi	/
		After DVR application is turned on by central control navigation head unit, it connects with Wi-Fi and start to transmit data; After exiting DVR application, it stops data transmission and interaction, central control keeps connected with Wi-Fi of DVR.	When user clicks central control APK with central control AP (hot spot) turned off, AP (hot spot) is turned on by central control automatically
		Wi-Fi ID and password are transmitted through CAN network.	Wi-Fi ID is unique.
		Use RTSP transport protocol to transmit real-time screen	/
		Function includes: Real-time preview, normal video playback, taking pictures, file management, setting, etc.	/
		Switching between Wi-Fi 2.4G and 5G via CAN	DVR Wi-Fi uses 5G frequency band by default, when 2.4G frequency band switching request is received by DVR sent from central control, DVR switches to 2.4G frequency band.
Power Management, CAN Network	ON position signal response	When power is turned on in ON position, system turns on and starts recording; When power is turned off in ON position and there is no CAN communication, system turns off and stops recording, and saves the video file;	/
	Video Storage Protection with Power Off	When it detects that B+ power supply is cut off, start to save the video	/

Primary Function	Secondary Function	Description	Note
		when stopping recording. Use super capacitor to save power and save the recording file before the moment of power off.	
	CAN network wake-up	System starts after receiving wake-up command from CAN network.	/
	Transmit information	1. Vehicle driving information	/
		2. Wake-up command	/
Status Indication	Indicator	Dual color (red and blue) indicator Device operates normally: Blue indicator remains on Wi-Fi connection/data interaction: Blue indicator blinks slowly Device fault/abnormal function: Red indicator remains on Abnormal recording/no TF card: Red indicator blinks slowly Software upgrading: Red and blue indicator blinks alternately	Blue indicator blinks slowly: Blinks at a frequency of 1Hz Red indicator blinks slowly: Blinks at a frequency of 1Hz Red and blue indicator blinks alternately: Blinks at a frequency of 1 Hz

1.8 Functional Requirement

- Note: As there are two proportions of central control display: 8:3 and 16:9, so there are two proportions of UI in central control. This specification takes UI of 8:3 as an example, the difference of UI for 16:9 is only the layout and style, function is the same as UI of 8:3. The UI screen diagram in this section is only for assisting function description, specific UI is subject to actual design.
- This product is a two-in-one product with a driving recorder and an AR navigation camera. The video display operation and AR navigation video of driving recorder need to be displayed on central control navigation screen. The operation method of DVR depends on whether central control navigation head unit supports it. The function introduction in this section takes touch method as an example. Button operation method depends on whether there are buttons on button panel that support DVR operation. Driving recorder can be turned on and off and perform capturing through voice command.

1.9 Driving Recorder Connection

- Driving recorder communicates with IHU via Wi-Fi, real-time screen uses RTSP protocol (Real Time Streaming Protocol). IHU acts as Wi-Fi AP (hot spot), and DVR connects with Wi-Fi AP (hot spot) of IHU. IHU Wi-Fi hot spot uses 5G frequency band by default. For some models, IHU Wi-Fi can be switched to 2.4G. After IHU Wi-Fi is set to 2.4G by user, prompt box that shows "Current WiFi hot spot is 2.4G, which will affect the experience. It is recommended to switch to 5G" will pop up when entering DVR screen by clicking driving recorder icon on IHU!
- When user clicks APK, prompt box that shows precautions as followings will pop up.

⚠ Caution

(1) Please use brand memory card of Class 10 or later purchased from regular channels. For details, refer to user manual;

(2) Memory card is consumable. Please export important files regularly and save them to other storage media to avoid file loss;

(3) WiFi of audio system is unavailable during driving recorder connection. (For audio head unit with dual MAC address function, cancel this prompt).

- If user does not select "Do not prompt any more" and click OK, prompt box will pop up again when clicking APK next time. After selecting "Do not prompt any more" and clicking OK, prompt box will not pop up any more when entering APK next time.
- If Wi-Fi is in AP mode when IHU is turned on, IHU will send SSID and password to DVR via CAN when it is turned on. When clicking IHU DVR APK to enabled it, IHU will send connecting request to DVR via CAN to establish connection between DVR and IHU;
- If Wi-Fi AP is turned off or in STA mode (Internet mode) when IHU is turned on, IHU turns on AP automatically and sends SSID, password, connecting request, etc. to DVR to establish connection between DVR and IHU when IHU DVR APK is enabled.
- When exiting APK, if IHU is in AP mode, central control navigation Wi-Fi always keep connected with driving recorder. If user disconnects the Wi-Fi connection of driving recorder and central control manually, for example, IHU Wi-Fi is switched to STA internet mode by user, IHU will switch back to AP mode automatically and send SSID, password, connecting request, etc. to DVR to establish connection between DVR and IHU when IHU DVR APK is enabled again.
- On real-time preview screen, decode and display H.264 video streaming from head unit camera of DVR in real time (there is a certain delay due to video capture, encoding, transmission, decoding and player cache, the delay is less than 500 MS);
- If Wi-Fi is disconnected abnormally on any screen of DVR APK, APK will return to real-time preview screen, UI previews black screen of video area and prompts "Driving recorder connection is not connected".
- Click "Back" ICON on upper left corner to exit to central control main screen. Wi-Fi will remain connected after exiting.
- In normal conditions (no Wi-Fi interference for external environment), it is required that the first connection time does not exceed 5 seconds.

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1.10 TF Card Album Folder

(1) General video folder

- Folder name: "NOR"
- Internal file name: NOR_date_time A.MP4 (NOR_20180723_123233A.MP4)

- Storage space = (total capacity of TF card - 500 M (reserved buffer space) - 200 M (photo folder space)) *3/4

(2) Emergency video folder

- Folder name: "EVT"
- Internal file name: EVT_date_time A.MP4 (EVT_20180723_123233A.MP4)
- Storage space = (total capacity of TF card - 500 M (reserved buffer space) - 200 M (photo folder space)) *1/4

(3) Photo folder

- Folder name: "PHO"
- Internal file name: PHO_date_time A.JPG (PHO_20180723_123233A.JPG)
- Storage space = 200 M

1.11 Ordinary Video Recording

(1) Start the vehicle, the driving recorder starts recording, the red dot in the middle of the head unit real time screen flashes, and the word REC is displayed. The timing in the middle of the screen increases by second.

(2) The recorded video by ordinary video recording is stored by time segment. The system default is 3 minutes, which can be manually changed to 1 minute or 5 minutes.

(3) Ordinary recordings are recorded in segments and stored in the regular video folder. When the regular video folder is full, it will automatically overwrite the earliest recorded video.

1.12 Video Recording

(1) The video recording of the driving recorder has been continuing. Due to the limited capacity of the TF card, the memory card will be full after the TF card is recorded for a period of time. The driving recorder adopts the logic of cyclic storage of video. When the memory card is full, the latest video will overwrite the earliest recorded video in the folder.

(2) The recorder supports up to 1080P resolution video, and the default is 1920*1080@30 frame; the user can change the resolution to 1280*720@30 frame through the central control navigation screen. After changing to 1280* 720@30 frame, it can also be manually changed back to 1920*1080@30 frame.

(3) The length of the recorded video segment is 3 minutes.

(4) The recorded video is stored by time segment. The system default is 3 minutes, which can be manually changed to 1 minute or 5 minutes.

1.13 Emergency recording

(1) When the driving recorder is in normal operation, if the vehicle collides, the driving recorder is not damaged and this function is activated, automatically recording videos of 10 seconds before and after the collision.

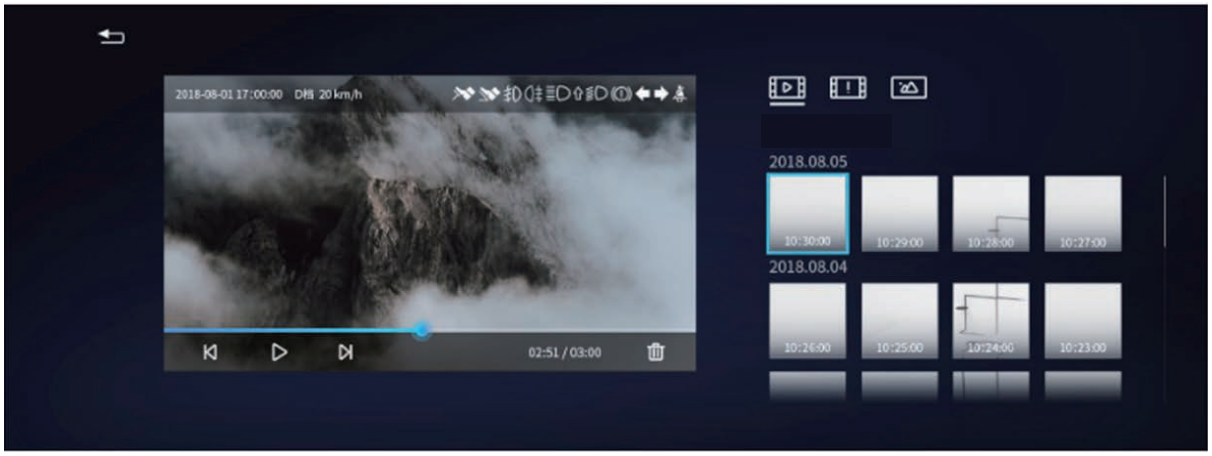
(2) The emergency recording is stored in the emergency video folder. When the emergency video folder is full, it will automatically overwrite the earliest recorded video. At the same time, the head unit will have a text prompt: The emergency video folder of driving recorder is full and has been recycled for you. Please check it promptly.

⚠ Caution

When an unexpected collision occurs, there may be insufficient collision strength or other factors, and it is not guaranteed that emergency video files will be generated every time the collision occurs. If no emergency video is generated, you can search for the video segment of the accident in the regular video folder.

1.14 Time Watermark

(1) The time watermark is corrected by CAN, and it will be corrected once when starting up. The time watermark contains date and time information in the format of "year-month-day hour: minute: second". The time watermark is not displayed in the real-time preview interface, and is visible in the upper left corner of the video during playback.



RM0267001

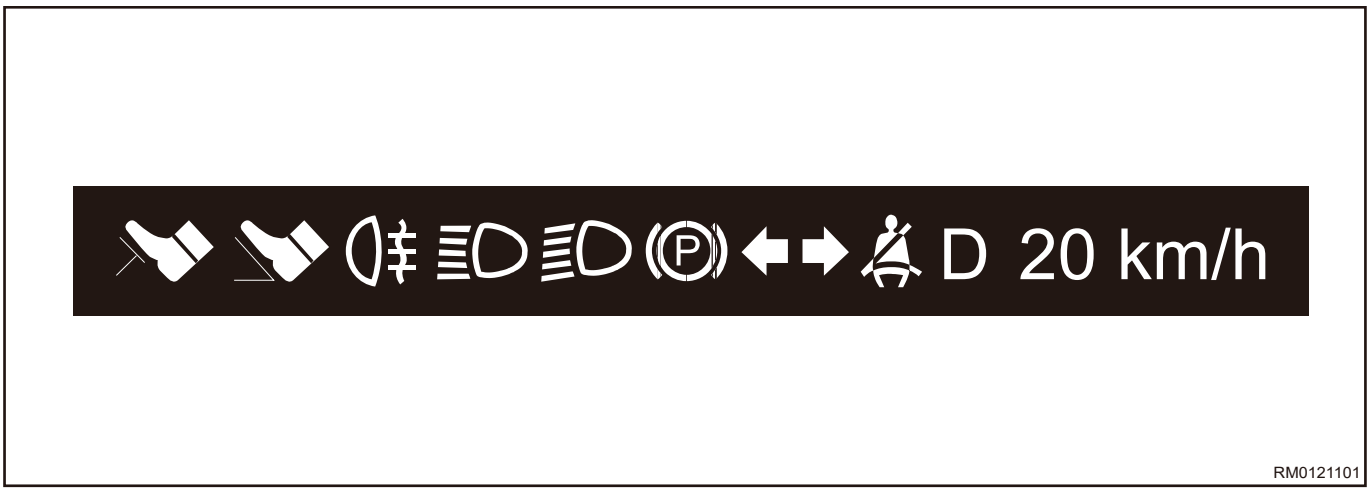
1.15 Driving Information Overlay

(1) DVR will receive the vehicle driving information from CAN network and save it in the video recording file in the form of watermark icon. The information watermark of DVR is acquired according to the CAN signal. When there is no CAN signal, the information watermark will not be displayed and CAN network will not actively wake up other ECU.

See the table below for driving information.

Display Composite Information	Icon
Vehicle speed	20km/h
Gear Position	D
Accelerator pedal	
High Beam Light	
Low Beam Light	
Rear Fog Light	
Right turn signal light	
Left turn signal light	
Hand brake	
Foot brake	
Safety belt warning status (consistent with instrument warning light status)	

(2) The watermarks of light, brake and seat belt display as follows:



Driving information comes from CAN network. When the vehicle performs corresponding actions and the driving recorder receives corresponding CAN information, the corresponding icon will be highlighted; if the corresponding actions are not performed, the corresponding icon will be grayed out; if the high beam light is turned on, the high beam light icon will be highlighted; if the high beam light is turned off, the high beam light icon will be grayed out. Vehicle speed information display: Numbers km/h.

(3) These vehicle status information is not visible on real-time preview interface, but it will be superimposed and recorded on the video stored in TF card. When the user plays back the recorded video, the vehicle driving information can be seen.

(4) If a configuration is abnormal and the corresponding CAN message is not received during use, the corresponding watermark will be displayed as "-".

1.16 Video Storage Protection with Power Off

(1) Under the condition of B+ power normal working, when the system detects the shutdown command (ON power off), the system will immediately stop recording and start video saving, and use the battery to complete the saving of the video file before shutdown.

(2) The driving recorder has built-in super capacitor. When driving recorder works normally, it will start to charge, and it will be full for about 1 minute. When the driving recorder B+ is abnormal or disconnected and the super capacitor is fully charged, the super capacitor will supply power to driving recorder to complete the saving of the video file before shutdown, and the video saving time is about 2s.

1.17 Parking Monitoring

(1) When the engine is in the off state, if the vehicle collides, the driving recorder is not damaged and this function is activated, it will turned on automatically to record for 20 seconds and then turned off.

(2) The parking monitoring recording is stored in the emergency video folder. When the emergency video folder is full, it will automatically overwrite the earliest recorded video. At the same time, the head unit will have a text prompt: The emergency video folder of driving recorder is full.

(3) The parking monitor function is ON by default. The user can turn off or turn on the parking monitor function through the central control navigation.

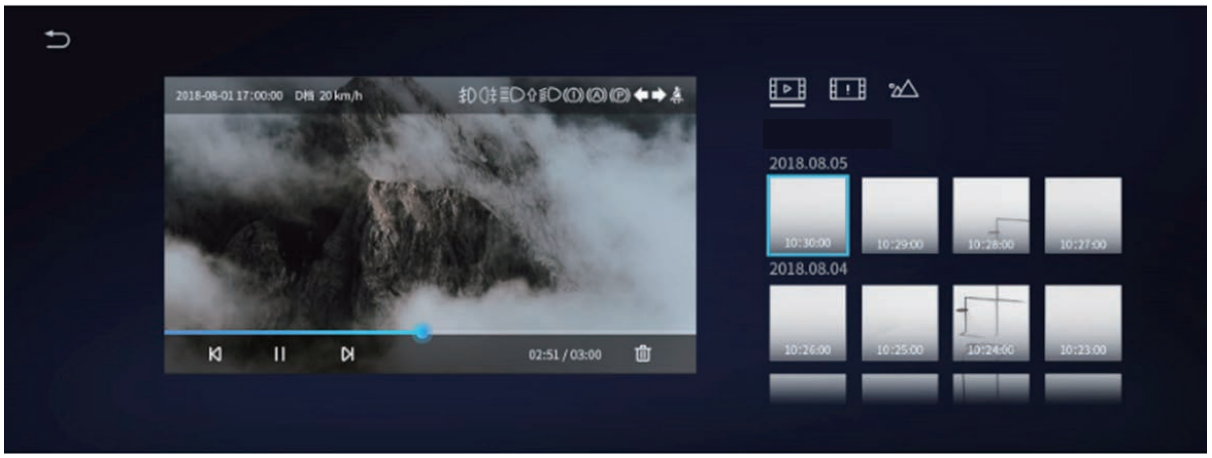
1.18 Photograph Operation and Control

(1) With driving recorder ON, such as the "Snapshot Setting" is set to "Photograph" via driving recorder, you can take photos quickly through photograph button (Mode button) on drive-by-wire of steering wheel. Button signal is transfered via CAN for high configuration models, and hard line is adopted for low configuration models. Take a photo each time you press the button. Sound prompt is necessary when taking photos. You can take photos by clicking ICON in UI interface of central control navigation. The minimum response interval between two consecutive photographing commands is 500 ms.

1.19 Photograph Storage

(1) The photos taken are consistent with the currently set video resolution, such as if the set video is 1080P or 720P, and the photos taken are also 1080P or 720P. Photographs are taken during the video recording process, and the video recording is not affected. Photograph storage uses the logic of circular overlay. When the "Photograph" folder is full, the latest photograph will overwrite the earliest photograph.

1.20 Playback and Deleting Of Video in TF Card

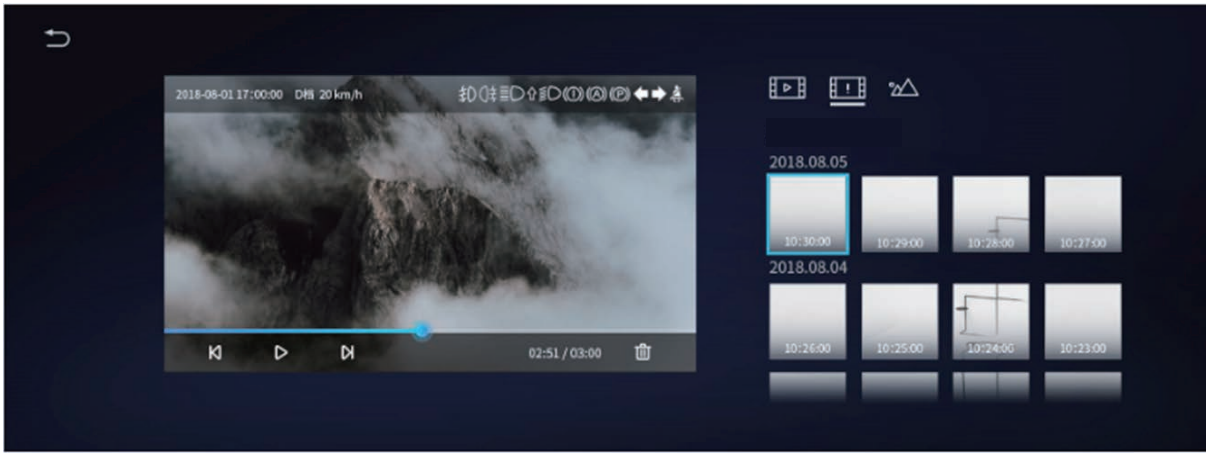


RM0269001

(1) On video list interface in TF card, press and hold one video in list, there will be a small circle at top right corner of the video thumbnail, it indicates that this video is selected when there is a " √ ". Click the small circle in front of "XXX files in total", you can check all or cancel all selections. Click "Delete" to delete from the earliest recorded video, and the deleted video cannot be recovered.

RM0270001

(2) On video list interface in TF card, select one video and click " ▷ " to start playing the current video.



RM0271001

(3) Time watermark and driving status information (such as "driving information" setting is on during video capture) can be displayed on the video playback interface. Click ICON to pause playback, ICON will change to , click ICON to continue to play; ICON will change to . Drag the time progress bar to quickly locate the video playback time.

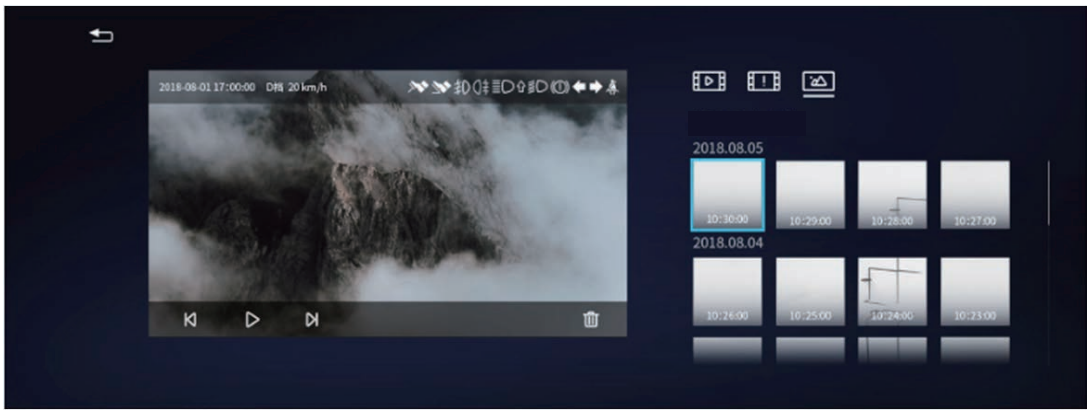
(4) Click " " or " " ICON to switch to previous video (recorded earlier) or next video (recorded later).

(5) Click the non-touch area of video to enter full screen interface, the ratio of video is 16:9. It cannot be fully displayed on the 8:3 display screen in full screen, and the area above the screen will be intercepted to cover the display screen. Click " " to exit full screen playback interface, and click " " again to exit playback interface and return to DVR main interface.

1.21 Playback and Deleting of Photos in TF Card

(1) On photo list interface in TF card, press and hold one photo in list, there will be a small circle at top right corner of the video thumbnail, it indicates that this photo is selected when there is a " √ ". Click the small circle in front of "XXX files in total", you can check all or cancel all selections. Click "Delete" to delete from the earliest photo taken, and the deleted photo cannot be recovered.

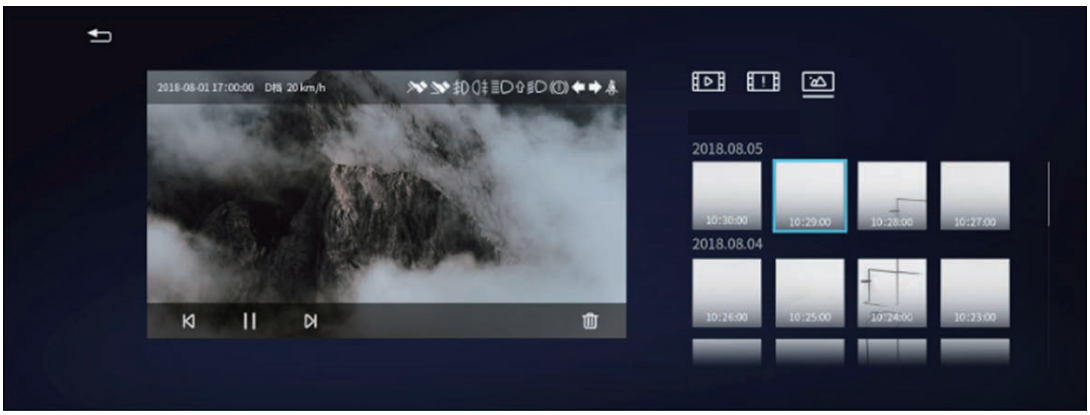
(2) On photo list interface in TF card, click one photo, this photo will be displayed at left area of screen.



RM0272001

(3) Time watermark and driving information (such as "driving information" setting is on during photo taking) can be displayed on the photo playback interface. Click ICON, the photos will be played automatically at speed of 3 seconds per photo from the current photo, ICON will change to , click

will pause automatic play, ICON returns to ▷.



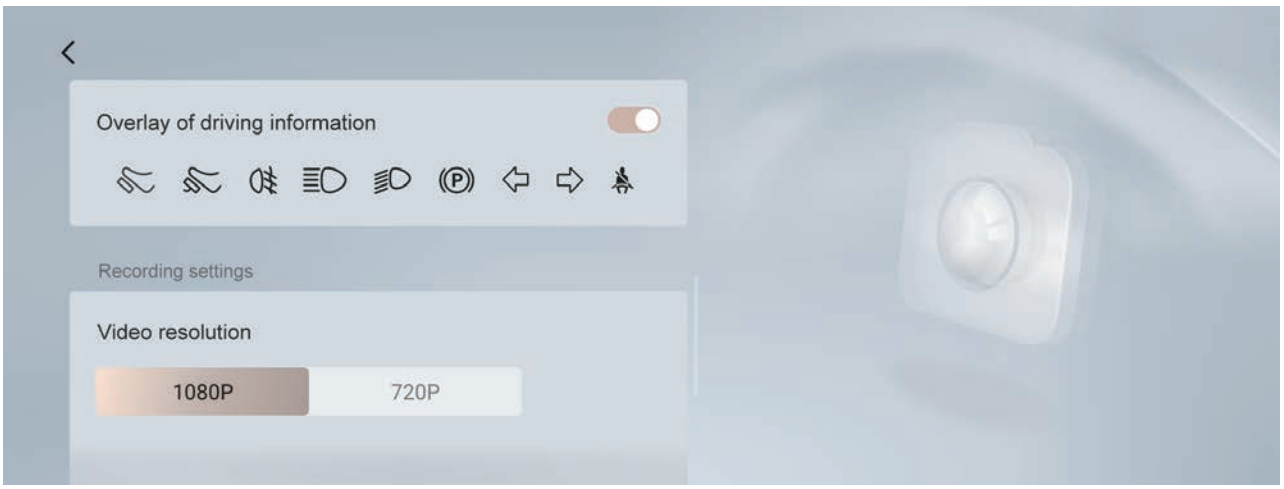
RM0273001

(4) Click "⏮" or "⏭" ICON to switch to previous photo (taken earlier) or next photo (taken later).

(5) Click the non-touch area of picture to enter full screen interface, the picture ratio took by DVR is 16:9. It cannot be fully displayed on the 8:3 display screen in full screen, and the area above the screen will be intercepted to cover the display screen. Click "⮌" to exit full screen playback interface, and click "⮌" again to exit playback interface and return to DVR main interface.

1.22 Setting

(1) By clicking setting soft button can enter the setting menu interface of driving recorder, setting items of driving recorder contains the following:



RM0262001

Driving information overlay: ON (default) and OFF
Resolution: 1080P (default) and 720P
Video duration: 1 minute, 3 minutes (default) and 5 minutes
Vibration sensitivity: High, Medium (default) and Low
Wide dynamic: ON (default) and OFF
Parking monitoring: ON (default) and OFF
Snapshot: Photo taking, short video and photo taking + short video (default)
Recorder memory card: TF capacity and operable formatted TF card are displayed
As for recorder: Displays the hardware version number and software version number of the recorder, and can operate and upgrade the driving recorder software
Factory reset: Restore the factory default settings of the recorder

⚠ Caution

1) **The target market is domestic models and supports Chinese and English system voice. When the central control IHU changes the system language, APK of DVR changes synchronously with the system language of the central control IHU. The target market is international models, Chery provides translation in minority languages, and Skyworth adapts that to APK.**
2) **On "As for recorder" interface, click the text position of version number continuously for 10 times to enter factory mode to view version number of APK. The version number rule is APP: YY.ZZ.WW build (A), for example, APP: 00.01.02 build (8). Rule of YY.ZZ.WW is the same as software version rule of Chery, build (8) indicates the 8th official release version. When any digit in YY.ZZ.WW is changed, the number in build (A) is not zeroed, this number in build (A) is accumulated with the number of APK releases during the whole APK development process. If the APK is not officially released but is only an internal temporary version, this number is not accumulated, only YY.ZZ.WW changes.**

1.23 AR Navigation Video Output

When DVR is turned on, video streaming of AR navigation is always transmitted; If DVR detects that ON signal is turned off, and after CAN network is turned off, DVR turns off AR navigation video output.

1.24 AR Navigation Video Requirement

(1) DVR head unit intercepts the video at the center of the camera with a resolution of 1488*616 (tentative), transmits it to central control navigation head unit via LVDS, for AR navigation map analysis and processing; Output video frame rate requires 30 frames;

(2) If user changes the recording resolution from 1080P to 720P in recorder setting interface, a prompt box will pop up: "720P does not support AR navigation. When AR navigation is turned on, the resolution will automatically switch back to 1080P".

(3) When user starts AR navigation, a prompt box will pop up: "Automatically switch to HD mode for you, please wait."

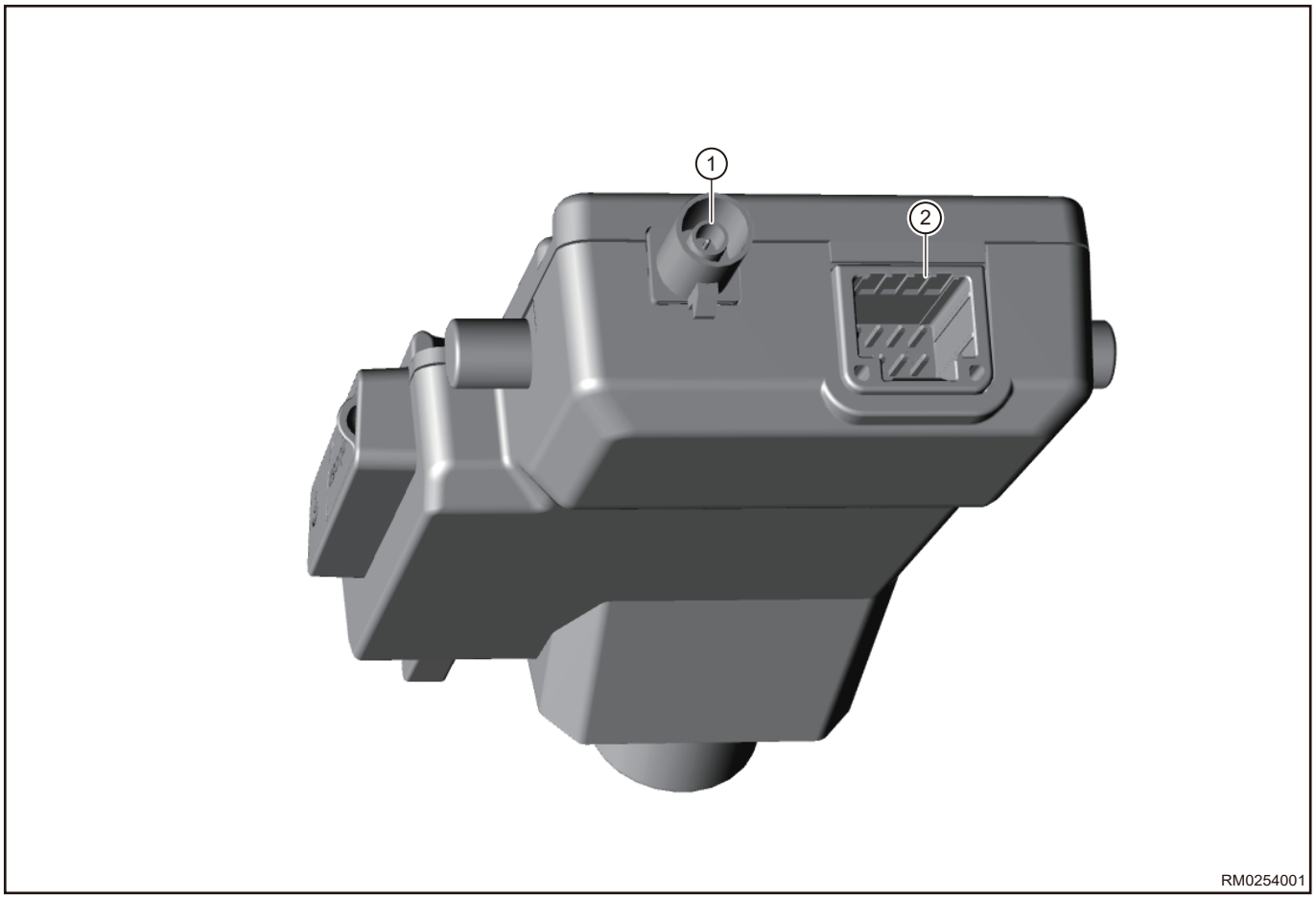
(4) Note: Resolution remains 1080P after exiting AR navigation.

1.25 Status Indication

Status indicator is located next to the TF card slot, and it is red-blue indicator.
Blue indicator constant on indicates that device operates normally;
Blue indicator flashes slowly, that is, blue indicator flashes at a frequency of 1 HZ, indicating that the Wi-Fi connection is successful;
Red indicator constant on indicates that device failure/abnormal function, including abnormal TF card or low card speed, video stopping and machine fault;
Red indicator flashes slowly, that is, red indicator flashes at a frequency of 1 HZ, indicating that video is abnormal/there is no TF card;
Alternating red and blue flashes indicate that the software is being upgraded;

1.26 System Connector Definition

■ Connector Model



There are two external connectors for the product, the main connector and LVDS connector (refer to the circuit diagram of the driving recorder system for details).

Name	Type	Supplier
Main connector	GT25H2-8DP-2.2H (8PIN)	HRS
LVDS connector	59S2AQ-40MT5- K-1	Rosenberger

■ Main Connector Pin Function Definition

Main Connector						
			DVR Terminal	GT25H2-8DP-2.2H (8PIN)		
			Wire Terminal	HS'G: 1717103-1 TM'L: 1674311-1		
Pin	Function	Rated Current	Minimum Value Imin	Maximum Value Imax	Signal Type	Note
1	B+ (Battery Positive)	300 MA	0.1 MA	500 MA	Power Supply	/
2	IGN (ON Signal)	10 MA	0 MA	10 MA	Signal Wire	/
3	CAN_H (CAN Bus Positive)	100 MA	10 uA	100 MA	Signal Wire	/

4	SWC+ (-Photograph Button Positive)	10 MA	0 MA	10 MA	Signal Wire	Reserved
5	GND (Battery Negative)	300 MA	0.1 MA	500 MA	GND	/
6	NC (Vacant)	/	/	/	/	/
7	CAN_L (CAN Bus Negative)	100 MA	10 uA	100 MA	Signal Wire	/
8	SWC- (-Photograph Button Negative)	10 MA	0 MA	10 MA	Signal Wire	Reserved

■ **LVDS Connector Pin Function Definition**

Main Connector						
			DVR Terminal	59S2AQ-40MT5- K-1		
			Wire Terminal	HS'G: 59Z113-000-K TM'L: 59K16B-102T4		
Pin	Function	Rated Current	Minimum Value Imin	Maximum Value Imax	Signal Type	Note
1	LVDS+	100 MA	0.1 MA	100 MA	High Speed Signal Wire	/
2	GND	100 MA	0.1 MA	100 MA	GND	/

1.27 Indicator Color Definition

LED Indicator	Red	Blue

1.28 Drive-by-wire Button Definition

"Mode" button on steering wheel is the user-customizable button, which can be defined by the user as: sound source switching or driving recorder snapshot. If it is defined as driving recorder snapshot, you can perform driving recorder snapshot function by pressing Mode button. User can customize the snapshot in the setting interface of the driving recorder: Photo taking, short video and photo taking + short video (default)

1.29 Interaction Between DVR and Central Control

Driving recorder function involves the interaction among central control IHU, central control APK and driving recorder.
Main functions of central control are:

(1) As a hot spot, central control needs to support DVR Wi-Fi access

(2) It is necessary to provide CAN writing interface to send CAN data for central control APK

(3) It is necessary to provide CAN data callback interface, notify APK when central control receives relevant CAN data

(4) DVR interface display and interactive operation

Main functions implemented by APK:

(1) Interact with the DVR through Wi-Fi

(2) Notify the DVR of some central control information (such as Wi-Fi SSID, etc.) through the CAN writing interface provided by the central control

(3) Feedback the CAN information (such as TF card status, etc.) received by the central control from DVR

Main functions implemented by DVR:

(1) Basic functions of driving recorder

(2) Report DVR status and other information through CAN

(3) Respond APK by requirements sent from CAN (such as TF card status, etc.)

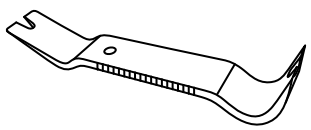
The CAN command interacting with DVR is an event message, and the time interval between two messages is not less than 20 ms. Like a CAN message which is composed of multiple frames, the sending interval of two frames is 20 ms.
The main protocols for CAN interaction between central console and DVR are as follows.

Command Type	Parameter Length	Sending Timing	Note
MAC Address	6 Byte	1. Sending as IHU opening 2. Sending as changing 3. Sending as DVR sends requirements and IHU responds (as DVR opening)	Such as: 00:23:DE:2C:34:DF, sending from start to end; parameter length (6 Byte) + 1 (1 Byte check digit) is the total data length.
Wi-Fi Name	64 Bytemax	1. Sending as IHU opening 2. Sending as changing 3. Sending as DVR sends requirements and IHU responds 4. Sending as IHU turns on AP	Wi-Fi name is variable length. When the overall length of data is more than 6, it is necessary to send it by frame.
Wi-Fi Password	64 Bytemax	1. Sending as IHU opening 2. Sending as changing 3. Sending as DVR sends requirements and IHU responds 4. Sending as IHU turns on AP	Wi-Fi password is variable length. When the overall length of data is more than 6 Byte, it is necessary to send it by frame.
Wi-Fi Connection	1 Byte	When DVR APK starts/ exits	/
UDP broadcast terminal number	2 Byte	1. When head unit APK starts 2. DVR requests actively	Used for notifying APK to connect with DVR by DVR broadcasting
TF Card Status	1 Byte	1. DVR sends actively when TF status changes 2. DVR is sent passively when APK requires actively (when APK starts)	The status of card includes: 1. TF card status is normal 2. Card is not inserted (-displayed in IHU: storage card in driving recorder is not inserted) 3. TF card is not formatted (displayed in IHU: storage card in driving recorder is not formatted)

Command Type	Parameter Length	Sending Timing	Note
			4. Card is abnormal (-displayed in IHU: storage card in driving recorder is abnormal)
DVR Status	1 Byte	1. DVR sends actively when DVR status changes 2. DVR is sent passively when APK requires actively (when central console starts)	Included status: 1. DVR status is normal 2. DVR status is abnormal
Photo Folder Status	1 Byte	1. DVR sends actively when photo space is full 2. DVR is sent passively when APK requires actively	Included status: 1. Photo space is not full 2. Photo space is full (-displayed in IHU: photo folder in driving recorder has been full)
Emergency Video Folder Status	1 Byte	1. DVR sends actively when emergency video space is full 2. DVR is sent passively when APK requires actively	Included status: 1. Emergency video space is not full 2. Emergency video space is full (displayed in IHU: Emergency video folder in driving recorder has been full)
DVR Requirement	1 Byte	When DVR needs to actively acquire the central console information	SSID information and others needs to be known when DVR starts
APK Requirement	1 Byte	When APK needs to actively acquire the DVR status	APK requires actively. After DVR receives this requirement, TF card status, DVR status, photo space status and emergency video space is sent by CAN

2 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 RCH002506

3 Diagnosis & Testing

3.1 Diagnostic Help

- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.

3.2 Intermittent Troubleshooting

■ If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- Check for broken, bent, protruded or corroded terminals.
- Inspect the mounting conditions of rear view mirror assembly, wire harness or wire harness connector and so on for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to malfunction.
- Refer to any Technical Bulletin that may apply to this malfunction.

3.3 Ground Inspection

Ground points are very important to normal operation of circuit, which are normal or not can seriously affect the entire circuit system. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. In such cases, the circuit operation will be seriously affected. Circuit is sensitive to ground. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

3.4 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the control system.

1	**Vehicle brought to workshop**

Next

2	**Examine vehicle and check basic items**

Check system power supply voltage, and check that fuse, wire harness and connector are connected normally.

OK

Standard voltage: Not less than 12 V.

Result

NG → **Check and replace malfunctioning parts**

OK

3	Using a diagnostic tester, read related DTC and data stream information

Result

Result	Proceed to
No DTC	A
DTC occurs	B

A → **Perform troubleshooting procedure without DTCs according to malfunction symptom**

B

4	Troubleshoot according to DTCs troubleshooting procedure

Result

Result	Proceed to
Problem is not resolved	A
Problem is resolved	B

A → **Return to procedure 1 and troubleshoot the process again**

B

5	According to rear view mirror system malfunction repair completion inspection and delivery, confirm if malfunction is resolved.

Result

Result	Proceed to
Delivery inspection is failed	A
Delivery inspection is qualified	B

A → **Return to procedure 1 and troubleshoot the process again**

B

6	Finished

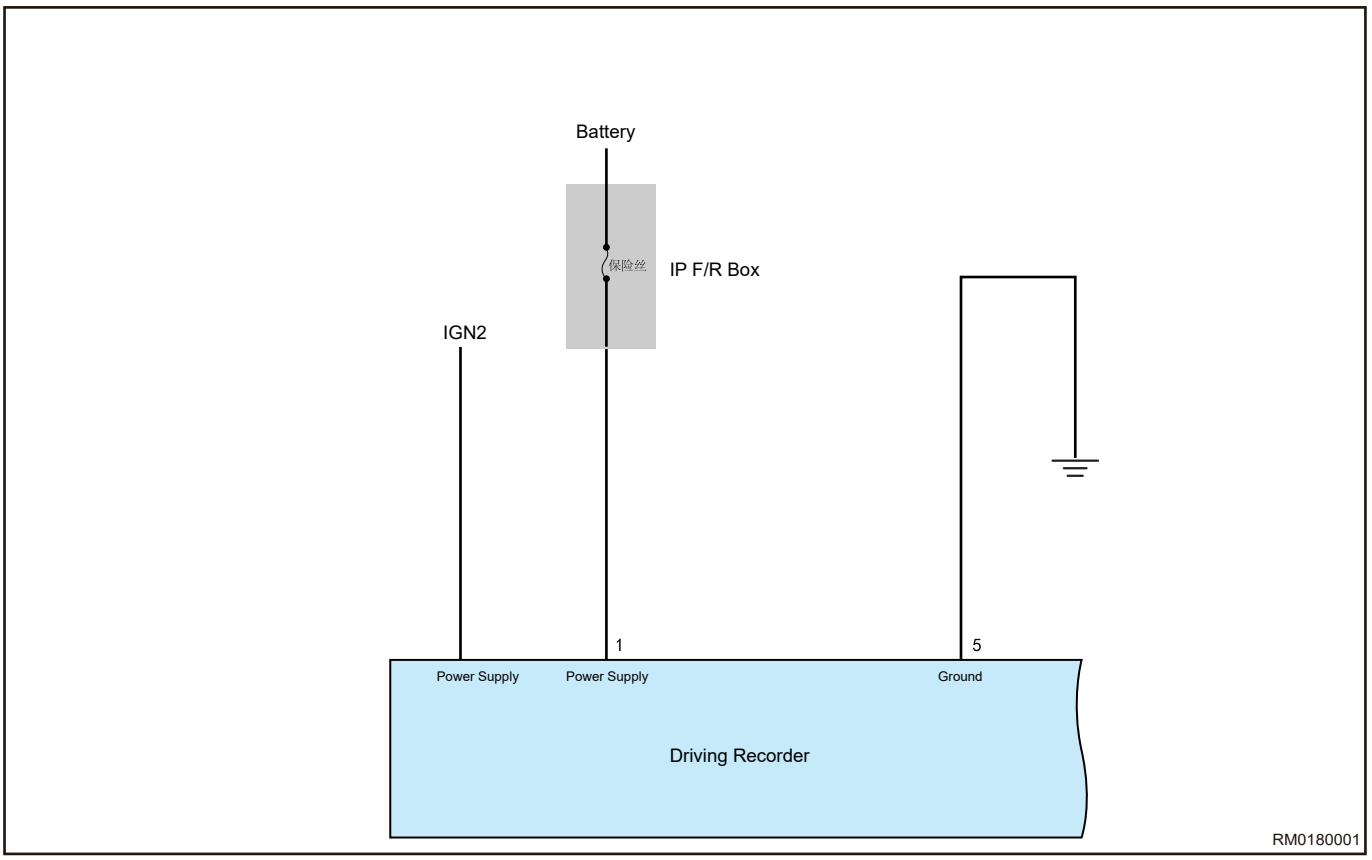
3.5 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1000-16	Circuit Voltage Below Threshold	/	Fuse/battery/wire harness/module damaged	/
B1000-17	Circuit Voltage Above Threshold	/		/
B1B50-00	Image Sensor Fault-Image Acquisition Fault	/	Module damaged	/
B1B51-00	DSP Fault	/	Module damaged	/
B1B52-00	WIFI Fault-Wifi Module Fault	/	Module damaged	/
B1B53-00	G-SENSOR Fault	/	Module damaged	/
B1B54-4A	SD Card Fault-SD Card Low Speed\-Disk Fragmentation Too Much\SD Card Invalid	/	Memory card damaged	/
U0073-88	Control Module Communication Bus Off	/	Refer to “CAN” system for inspection	/
U0100-87	Lost Communication with EMS	/		/
U0101-87	Lost Communication with TCU	/		/
U0129-87	Lost Communication with BSM	/		/
U0140-87	Lost Communication with BCM	/		/
U0155-87	Lost Communication with ICM	/		/
U1300-55	Software Configuration Error	/		/
U0100-87	Lost Communication with EMS	/		/

3.6 DTC Diagnosis Procedure

DTC	B1000-16	Circuit Voltage Below Threshold
DTC	B1000-17	Circuit Voltage Above Threshold

System schematic diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch "ON"	Not less than 12 V

NG → **Repair or replace battery/alternator**

OK

2	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

(c) Check for continuity of instrument panel fuse with a digital multimeter.

NG → **Replace fuse**

OK

3	**Check interior power supply wire harness**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

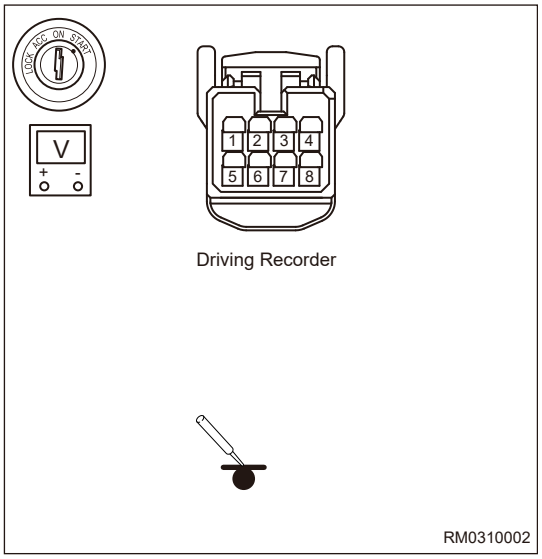
(c) Disconnect the driving recorder connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

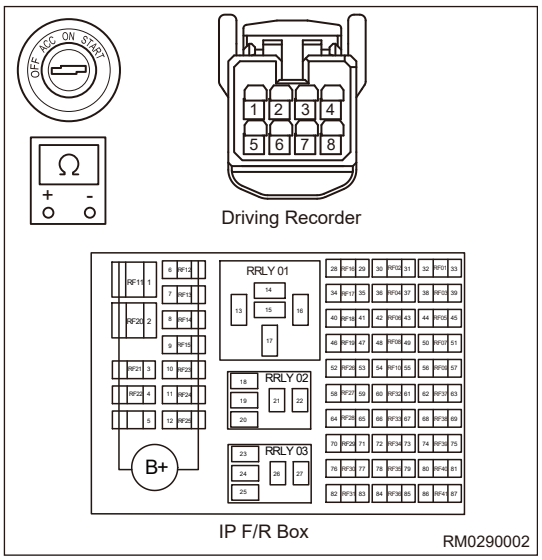
(f) Using a digital multimeter, measure voltage between driving recorder connector power supply terminal and ground according to table below.

Multimeter Connection	Condition	Specified Condition
Driving recorder connector power supply terminal - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



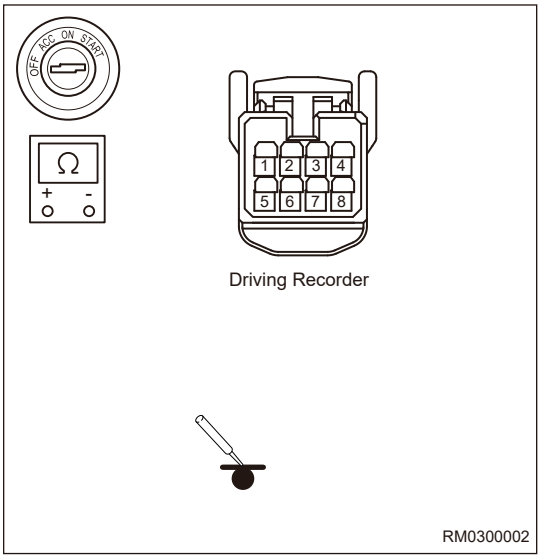
(g) Using a digital multimeter, measure resistance between driving recorder connector and instrument panel fuse and relay box according to table below.

Multimeter Connection	Condition	Specified Condition
Visual controller connector power supply terminal - Instrument panel fuse and relay box (- corresponding terminal)	ENGINE START STOP switch "OFF"	Less than 1 Ω



(h) Using a digital multimeter, measure resistance between visual controller connector ground terminal and ground according to table below.

Multimeter Connection	Condition	Specified Condition
Driving recorder connector ground - Body ground	ENGINE START STOP switch "OFF"	Less than 1 Ω



NG → **Repair or replace related wire harness**

OK

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG → **Replace driving recorder module**

OK → **System is normal**

DTC	**B1B50-00**	**Image Sensor Fault-Image Acquisition Fault**
DTC	**B1B51-00**	**DSP Fault**
DTC	**B1B52-00**	**WIFI Fault-Wifi Module Fault**
DTC	**B1B53-00**	**G-SENSOR Fault**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG	Replace the driving recorder
OK	System is normal

DTC	B1B54-4A	SD Card Fault-SD Card Low Speed\Disk Fragmentation Too Much\SD Card Invalid

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check memory card

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Replace memory card with a new one for running test.

OK	Replace memory card

NG

2	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG	Replace the driving recorder
OK	System is normal

DTC	U0073-88	Control Module Communication Bus Off
DTC	U0100-87	Lost Communication with EMS
DTC	U0101-87	Lost Communication with TCU
DTC	U0129-87	Lost Communication with BSM
DTC	U0140-87	Lost Communication with BCM

DTC	U0155-87	Lost Communication with ICM
DTC	U1300-55	Software Configuration Error

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Refer to CAN network system**

4 On-vehicle Service

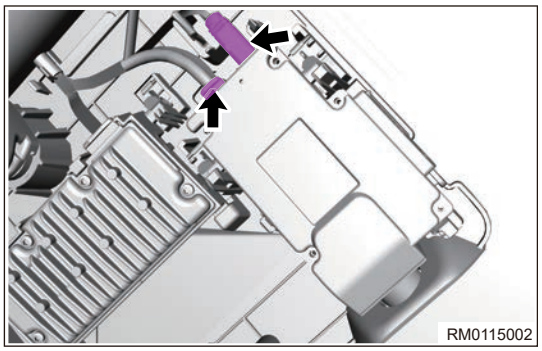
4.1 Driving Recorder

■ **Removal**

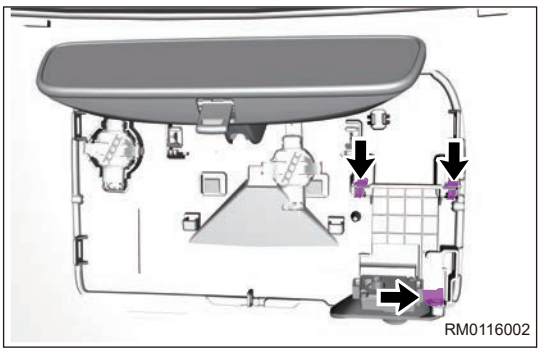
⚠ Caution

- **Appropriate force should be applied when removing driving recorder. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the inside rear view mirror left protective cover.
(4) Remove the inside rear view mirror right protective cover.
(5) Remove the driving recorder.
1) Remove the driving recorder connectors (arrow).



2) Remove the fixing columns (arrow) on both sides of driving recorder along the upward direction of bracket base, and take out the lens of driving recorder and front end pin, and finally remove driving recorder.



■ **Installation**

(1) Insert the lens and front end pin of the driving recorder into the installation position.

(2) Clip the fixing columns on both sides of driving recorder along the upward direction of bracket base.
(3) Connect the driving recorder connector.
(4) Install the inside rear view mirror right protective cover.
(5) Install the inside rear view mirror left protective cover.
(6) Connect the negative battery cable.

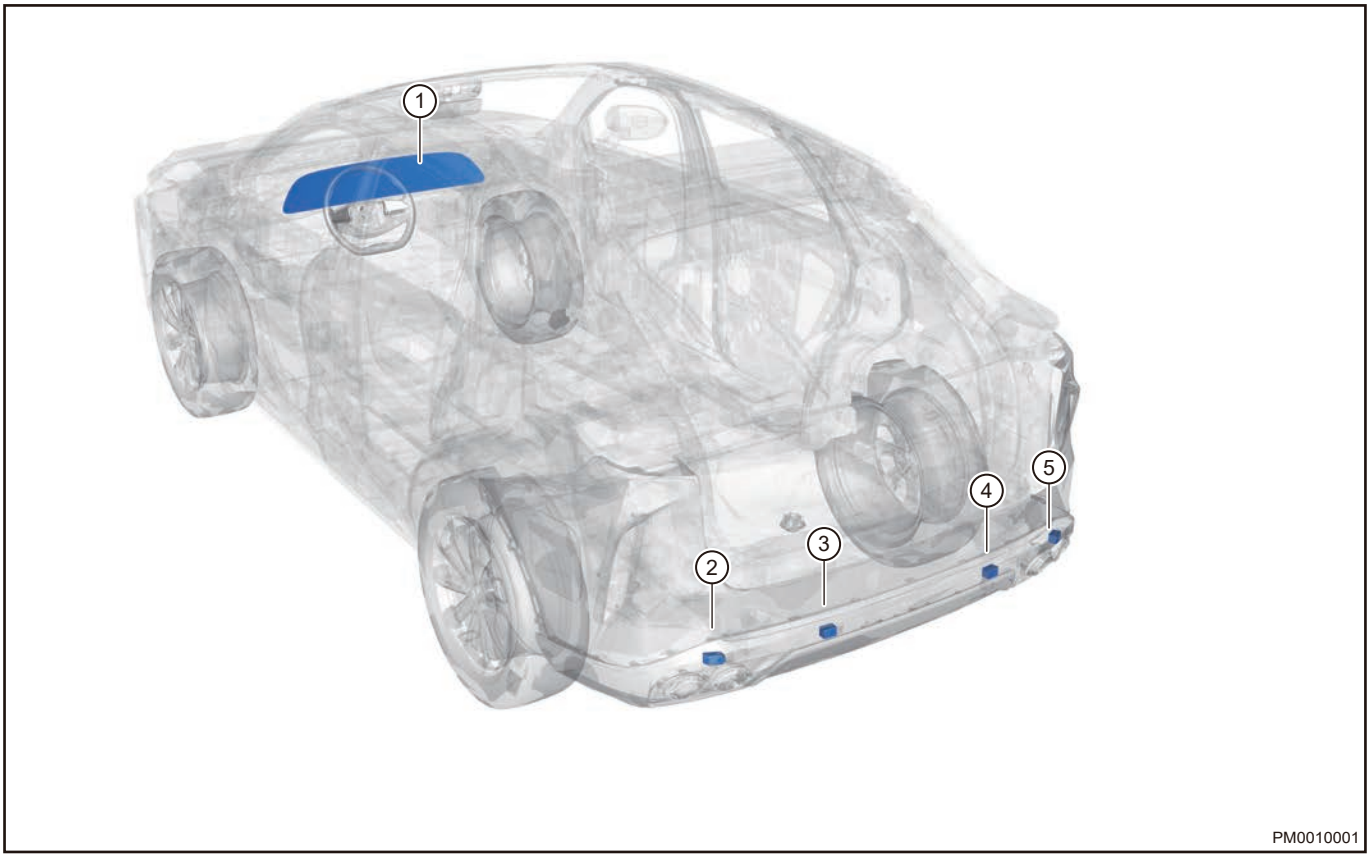
10.16 PARKING RADAR SYSTEM

1 System Overview

1.1 System Description

■ Parking radar system (low configuration)

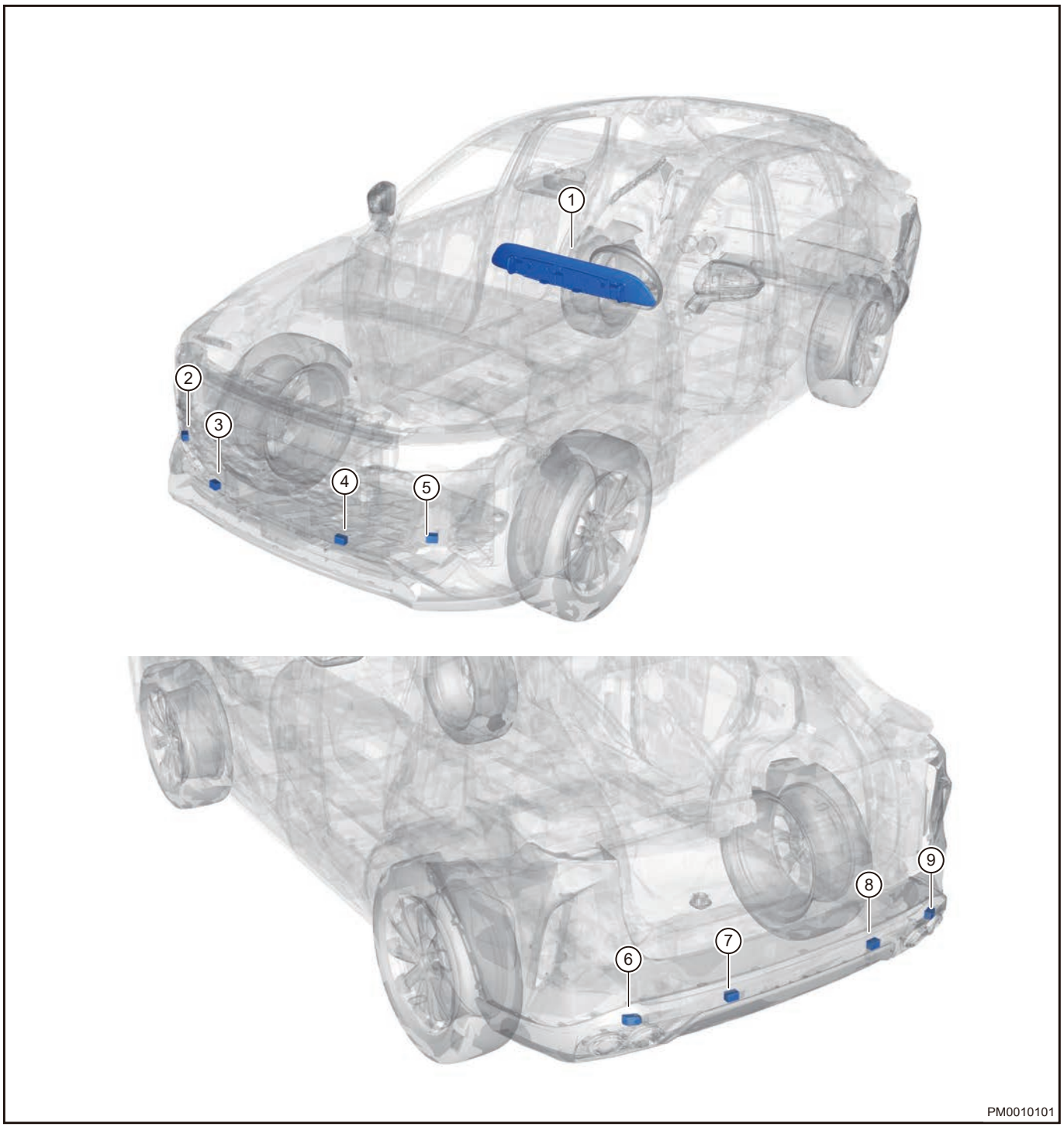
Parking radar system consists of instrument cluster, 1 radar control module (integrated with rear left parking radar sensor) and 4 sensors (digital ultrasonic sensors) . Sensors adopt separated structure. Sensor installation angles are different. Parts related to system consist of ENGINE START STOP switch, reverse switch, and hyperscreen. ENGINE START STOP switch provides operating power for system; Reverse switch provides operation activation signal for system; Hyperscreen is end terminal of the system and provides sound alarm prompt and distance display function for driver.



1	Hyperscreen	2	Radar Module (Integrated with Rear Left Radar Sensor)
3	Rear Left Center Radar Sensor	4	Rear Right Center Radar Sensor
5	Rear Right Radar Sensor		

■ Parking radar system (high configuration)

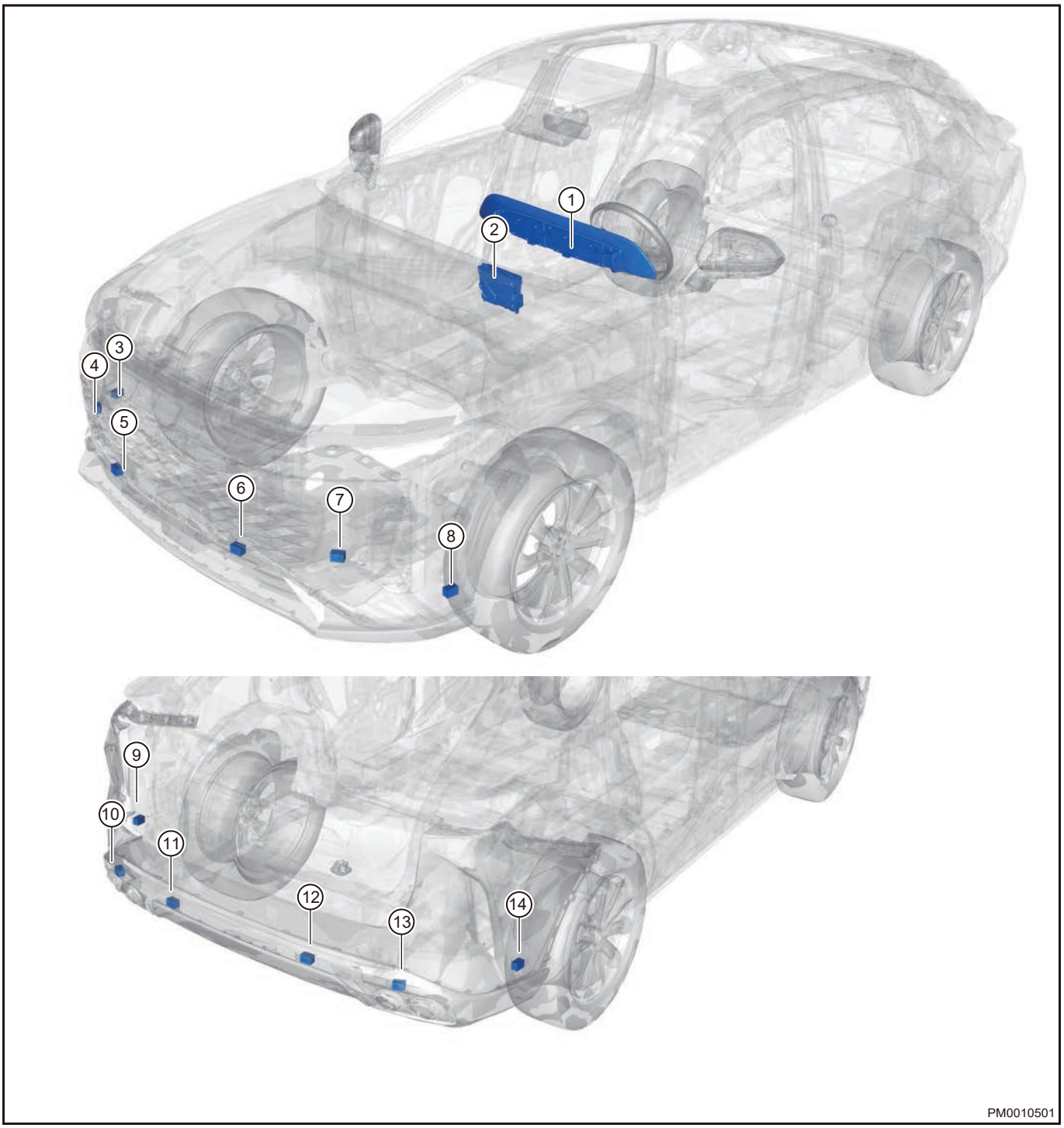
High configuration parking radar system consists of instrument cluster, 1 radar control module (integrated with rear left parking radar sensor) and 8 sensors. Sensors adopt separated structure. Sensor bodies are same, but sensor installation angles are different. Parts related to system consist of ENGINE START STOP switch, reverse switch, hyperscreen, PAS switch and vehicle speed (8 sensors system). ENGINE START STOP switch provides operating power for system; Reverse switch provides operation activation signal for system; Hyperscreen is end terminal of the system and provides sound alarm prompt and distance display function for driver. The PAS switch and speed signal are only related with the 8 sensors system.



1	Hyperscreen	2	Front Right Radar Sensor
3	Front Right Center Radar Sensor	4	Front Left Center Radar Sensor
5	Front Left Radar Sensor	6	Rear Left Radar Sensor
7	Rear Left Center Radar Sensor	8	Rear Right Center Radar Sensor
9	Rear Right Radar Sensor	10	

■ Automatic parking system

Automatic parking system consists of instrument cluster, 1 parking control module and 12 sensors. Sensors adopt separated structure. Sensor bodies are same, but sensor installation angles are different. Parts related to system consist of ENGINE START STOP switch, reverse switch, hyperscreen, PAS switch and vehicle speed. ENGINE START STOP switch provides operating power for system; Reverse switch provides operation activation signal for system; Hyperscreen is end terminal of the system and provides sound alarm prompt and distance display function for driver.



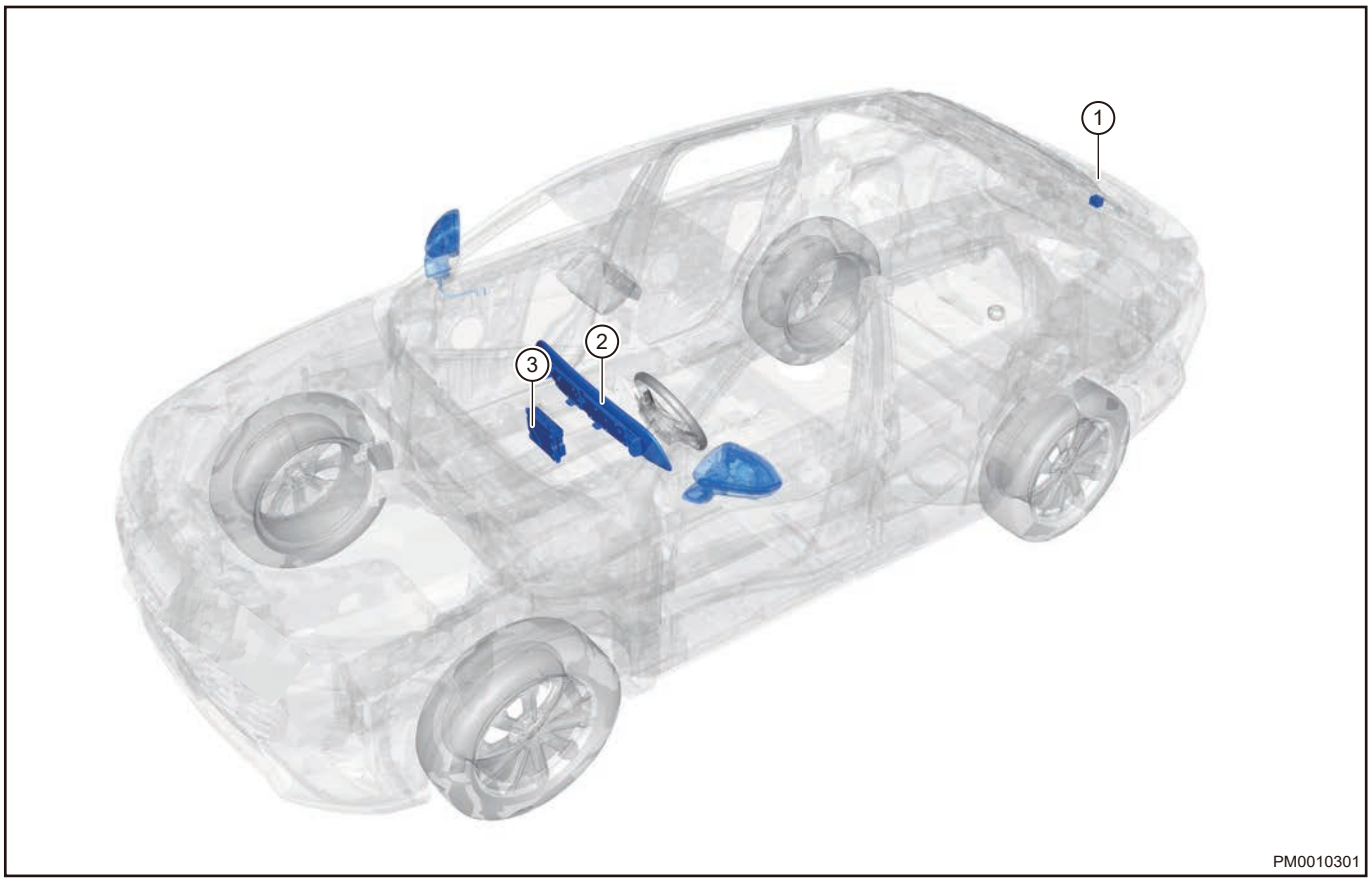
1	Hyperscreen	2	Domain Controller
3	Ultrasonic Sensor (Front Right Outside)	4	Ultrasonic Sensor (Front Right Center)

5	Ultrasonic Sensor (Front Right Inside)	6	Ultrasonic Sensor (Front Left Inside)
7	Ultrasonic Sensor (Front Left Center)	8	Ultrasonic Sensor (Front Left Outside)
9	Ultrasonic Sensor (Rear Left Outside)	10	Ultrasonic Sensor (Rear Left Center)
11	Ultrasonic Sensor (Rear Left Inside)	12	Ultrasonic Sensor (Rear Right Inside)
13	Ultrasonic Sensor (Rear Right Center)	14	Ultrasonic Sensor (Rear Right Outside)

■ Parking view monitor system (low configuration)

Parking view monitor of low configuration is linked with rear camera through video signal wire, and it displays the vehicle rear view converted by audio head unit.

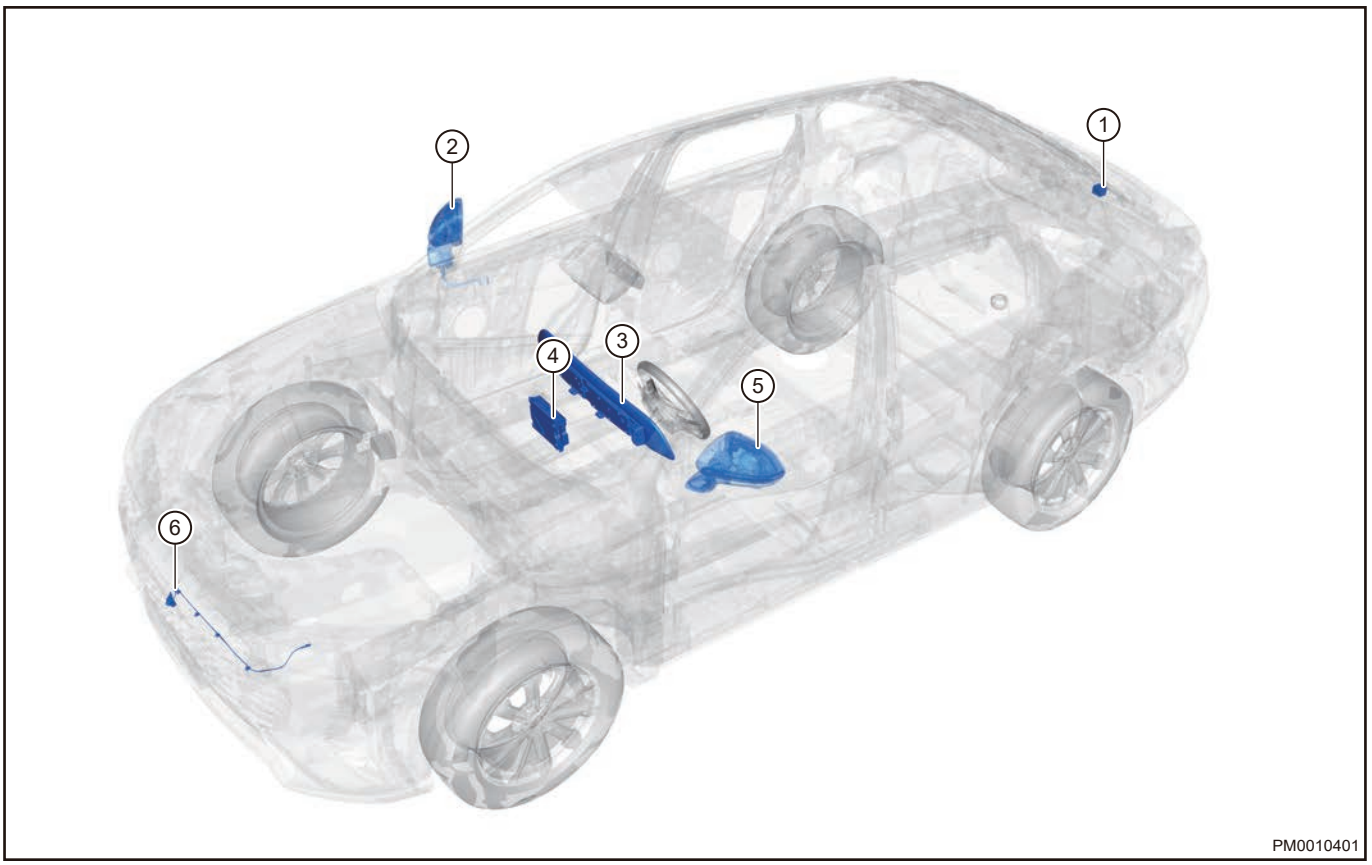
- Only one camera is installed on the rear part.
- The audio head unit receives signal and operates to form image.



1	Rear Camera Assembly	2	Hyperscreen
3	Audio Head Unit/Domain Controller	4	Rear Center Radar Sensor

■ Panoramic view monitor system (high configuration)

Panoramic view monitor system consists of four HD (100 W) cameras (front camera, rear camera, left camera and right camera), domain controller, AVM system switch, LVDS video transmission line and connecting wire harness.



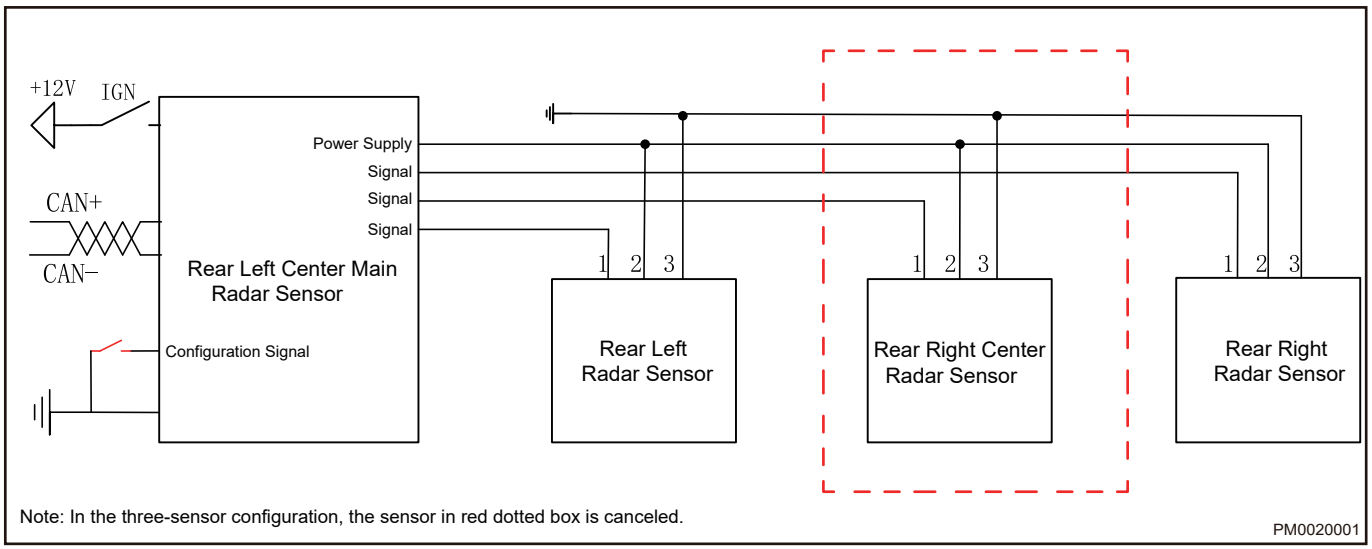
1	Hyperscreen	2	Right Camera Assembly
3	Rear Right Radar Sensor	4	Rear Center Radar Sensor
5	Rear Left Radar Sensor	6	Rear Camera Assembly
7	Left Camera Assembly	8	Audio Head Unit/Domain Controller
9	Front Camera Assembly		

1.2 Parking Radar System

■ System schematic diagram (PDC (low configuration without head unit radar))

Parking radar assist system of low configuration uses digital sensors and ultrasonic technology to measure distance, which can remind the driver of the distance between the rear of vehicle and other objects, and give sound prompts and image display to reduce personnel injury or vehicle damage caused by reversing.

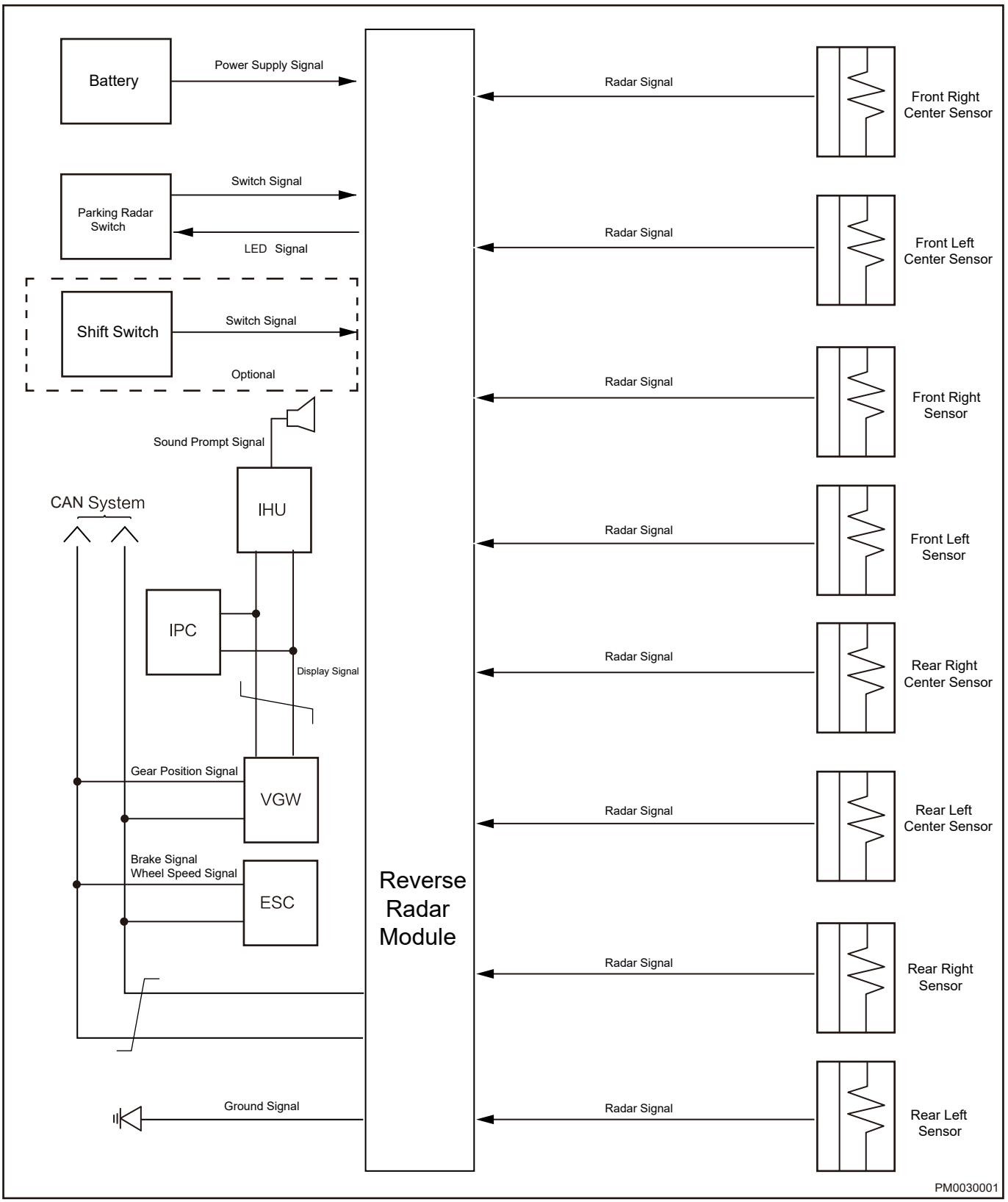
- This system cancels single radar head unit, and integrates head unit radar on the rear left middle radar sensor.
- Front and rear obstacle radar 3 and radar 4 are identified through pin No. 8. Configuration signal: Probe 4 is vacant, probe 3 is grounded.
- Main probe is connected to vehicle IGN power supply, therefore, it has no static current.



■ System schematic diagram (PDC (high configuration with head unit radar))

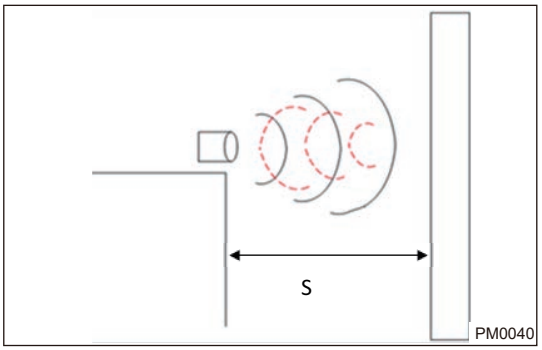
Parking radar assist system of high configuration uses digital sensors and ultrasonic technology to measure distance, which can remind the driver of the distance between the rear of vehicle and other objects, and give sound prompts and image display to reduce personnel injury or vehicle damage caused by reversing.

- This system equips with single radar head unit.
- PAS switch is low circuit detection circuit. When PAS switch port is high level or vacant, system has no operation.
- LED signal indicator is controlled by module to output 12 V high level signal. When radar system is off or standby, LED port outputs 0 V. Maximum output drive current is 10 mA.
- Ultrasonic drive circuit is controlled by module to output 12 V high level signal. When the sensor detects an obstacle, a low level square wave signal is returned on the signal line.
- Optional R gear hard wire switch is low level detection circuit. When R gear switch port is high level or vacant, system has no operation.


Battery
Power Supply Signal
Parking Radar Switch
Switch Signal
LED Signal
Shift Switch
Switch Signal
Optional
Sound Prompt Signal
IHU
CAN System
IPC
Display Signal
Gear Position Signal
VGW
Brake Signal
Wheel Speed Signal
ESC
Ground Signal
Reverse Radar Module
Radar Signal
Front Right Center Sensor
Radar Signal
Front Left Center Sensor
Radar Signal
Front Right Sensor
Radar Signal
Front Left Sensor
Radar Signal
Rear Right Center Sensor
Radar Signal
Rear Left Center Sensor
Radar Signal
Rear Right Sensor
Radar Signal
Rear Left Sensor
PM0030001

■ Operating principle

Parking radar system uses ultrasonic reflection principle to detect distance. After parking radar sensors send out ultrasonic and receive back wave from obstacle, control module calculates obstacle distance (S = t × 340 ÷ 2) according to ultrasonic distance measuring principle, and sends data to display terminal to display and alarm.



■ Control logic

PDC function activates and deactivates the system according to gear and radar switch. When vehicle is powered on for the first time, radar switch is turned off by default;

(1) When gear position is shifted from P position to R position, both front and rear radars are activated; Low configuration rear 4-radar system is only activated in R position, and the radar system is in standby in non-R position.

(2) When gear position is shifted from P position to D/N/M position, radar system keeps standby state. At this time, press radar switch with vehicle speed lower than 15 km/h and the front and rear radar systems are activated. (Not applicable to the low configuration rear 4-radar system)

(3) When gear position is shifted from P to D/N/M, regardless of whether the radar system is in standby or activated by the switch, when the vehicle speed is not lower than 15 km/h, the radar system is in standby. At this time, pressing the radar switch cannot activate the radar system.

(4) After the system is activated in R position, keep the front and rear radars activated when shifting to D/N/M; It is not applicable to rear 4-radar system because it has no front radar.

(5) When vehicle EPB is pulled up, only the display shows without sound when the radar system is activated (same for high configuration and low configuration).

(6) After the radar system is activated in D/N/M position, when the vehicle speed is not lower than 15 km/h, the system is in standby and stops detection. When the vehicle speed decreases to 15 km/h, the system exits, but it can be activated by the radar switch.

■ System function

- Power-on self-check:
  (1) When the system is powered on, it starts to perform self-check diagnosis, and operates according to control logic after self-check.
- Standby self-check:
  (1) When the system is in standby after power on, the radar system constantly diagnoses and records the fault information at the corresponding position when the sensor malfunctions.
- Operation self-check:
  (1) After the system is activated, the radar system constantly diagnoses and records the fault information at the corresponding position when the sensor malfunctions, the normal sensor continues to detect.
- Deactivation after power off:
  (1) System is powered off and deactivated after power off.
- Function activation:
  (1) When self-check is OK after the system is powered on, P position is in standby state by default and jumps to activation mode or keeps standby according to the current statuses of the switch, gear, and vehicle speed.
  (2) When shifting to R position, the radar system is activated.
  (3) When shifting to D/M/N with radar switch ON, the front and rear radars are activated, which is not applicable to the low configuration system.
  (4) After the driver use a switch to turn off the system in non-P and non-R positions, the system is turned on when shifting to R position
- Function fault:

(1) When PCD voltage is too high/low or front and rear radars malfunction, the whole PDC system is faulty and function cannot be activated.

(2) When individual radars in the front and rear part of PDC fail, the system can still be activated, but it operates in degraded condition.

■ System detection section warning:

The response way of parking radar system is buzzer sounding. The table below shows the correspondence between buzzer response frequency and actual obstacle distance:

Front Section	FLC	FLM	FRM	FRC	Buzzer warns
0x1E: No distance	60 < Distance	90 < Distance	90 < Distance	60 < Distance	0x0: No.
Distance = (D)*5 + 25 actual output	-	60 < Distance ⩽ 90	60 < Distance ⩽ 90	-	0x3: 2Hz
	35 < Distance ⩽ 60	35 < Distance ⩽ 60	35 < Distance ⩽ 60	35 < Distance ⩽ 60	0x2: 4Hz
	Distance ⩽ 35	Distance ⩽ 35	Distance ⩽ 35	Distance ⩽ 35	0x1: Continuous sound
Rear section	**RLC**	**RLM**	**RRM**	**RRC**	**Buzzer warns**
0x3E: No distance (rear 4 issues 0x1E)	60 < Distance	150 ⩽ Distance	150 ⩽ Distance	60 < Distance	0x0: No.
Distance = (D)*5 + 25 actual output	-	90 < Distance ⩽ 150	90 < Distance ⩽ 150	-	0x4: 1Hz
	-	60 < Distance ⩽ 90	60 < Distance ⩽ 90	-	0x3: 2Hz
	35 < Distance ⩽ 60	35 < Distance ⩽ 60	35 < Distance ⩽ 60	35 < Distance ⩽ 60	0x2: 4Hz
	Distance ⩽ 35	Distance ⩽ 35	Distance ⩽ 35	Distance ⩽ 35	0x1: Continuous sound

Requirements for alarm sound:

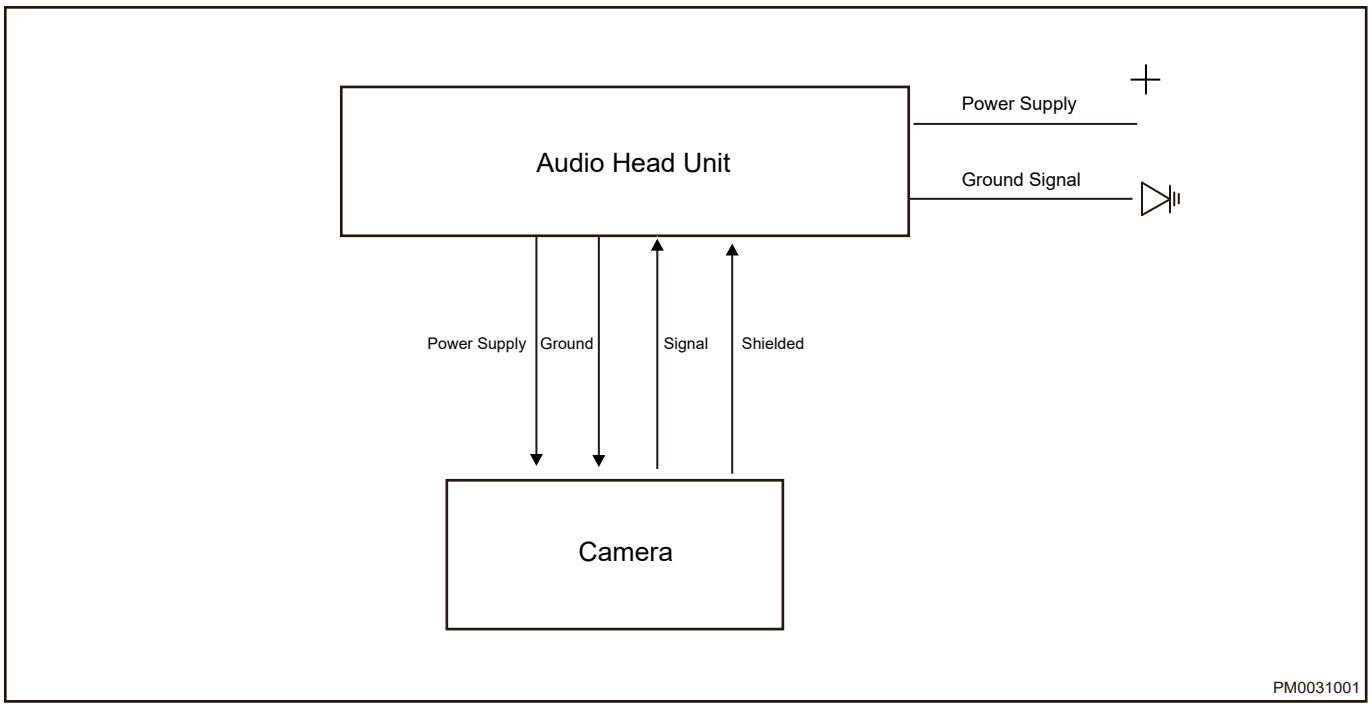
- Front radar alarm sound and rear radar alarm sound should be different so that the driver can distinguish easily.
- The frequency of radar sound alarm should be based on the alarm that is closest to the obstacle detected by the front and rear radar sensors.
- If front and rear radar detect that the distance from the obstacle is same, it warns according to the rear radar alarm sound.

1.3 Parking View Monitor System

■ System schematic diagram (RVC (rear single camera))

Parking view monitor of low configuration is linked with rear camera through video signal wire, and it displays the vehicle rear view converted by audio head unit.

- Only one camera is installed on the rear part.
- The audio head unit receives signal and operates to form image.



1.4 Dynamic Track HD Visual Parking View Monitor

■ Operation

Consists of: Instrument cluster, navigation, camera, 4 rear radar sensors and radar module.Parking view monitor system consists of radar sensor (sensor), camera, control module and display alarm device etc. After starting vehicle, parking radar system functions when shifting to reverse gear. When the radar sensor detects an obstacle, multi-information display in instrument cluster will display distance information and buzzer sounds. Navigator displays color image behind vehicle in real time and provides static or dynamic guidelines for driver reference. By this way, the system can help driver to eliminate blind areas and blurred vision, improving driving safety.

■ Parking view monitor display

⚠ Caution

In the panoramic view monitor system, rear camera of high configuration model is connected to panoramic view monitor system controller, and rear camera of medium configuration model is connected to navigation system.

(1) Description

- High and medium configuration models are fitted with reversing camera. The camera captures the views behind the vehicle which will be presented to driver by navigation system. Also, navigation system provides static guidelines or dynamic guidelines that move as turning of steering wheel so as to estimate the vehicle’ s reversing track lines.

(2) Dynamic back guidelines and local view of rear area

- After entering surrounding + rear view screen by shifting to reverse gear, static/dynamic back guidelines and local view of rear area will be displayed on rear view image.

(3) Definition of static back guidelines

- Red guidelines indicate about 0.5 m away from bumper;
- Yellow guidelines indicate about 1 m away from bumper;
- The closer green guidelines indicate about 2 m away from bumper;
- The far green guidelines indicate about 3 m away from bumper.

(4) Dynamic track lines

- Dynamic track lines are used for prejudging the vehicle’ s traveling trace, which varies as the wheel rotation.

1.5 Panoramic View Monitor System

■ Function

Composition: Panoramic view monitor system consists of four HD (100 W) cameras (front camera, rear camera, left camera and right camera), domain controller, AVM system switch, LVDS video transmission line and connecting wire harness. Domain controller and head unit are connected by shielded wire.Function description: Panoramic view monitor system consists of a controller, four ultra wide angle cameras and LVDS video transmission lines, etc. It captures images from four directions (front, rear, left and right) and splices them into an aerial view around the vehicle using image processing algorithms, then displays it on the navigation display. Panoramic view monitor system provides surrounding view + single side view, three-dimensional surrounding view roaming, three-dimensional left/right side view, and dynamic/static reversing track. Side camera is integrated into the outside rear view mirror assembly. Panoramic control system module is located inside the glove box on front passenger side and shares a bracket with central gateway; front camera is located on the middle grille of front bumper and installed on the front bumper; rear camera is located under the back door and installed on the back door open switch assembly.

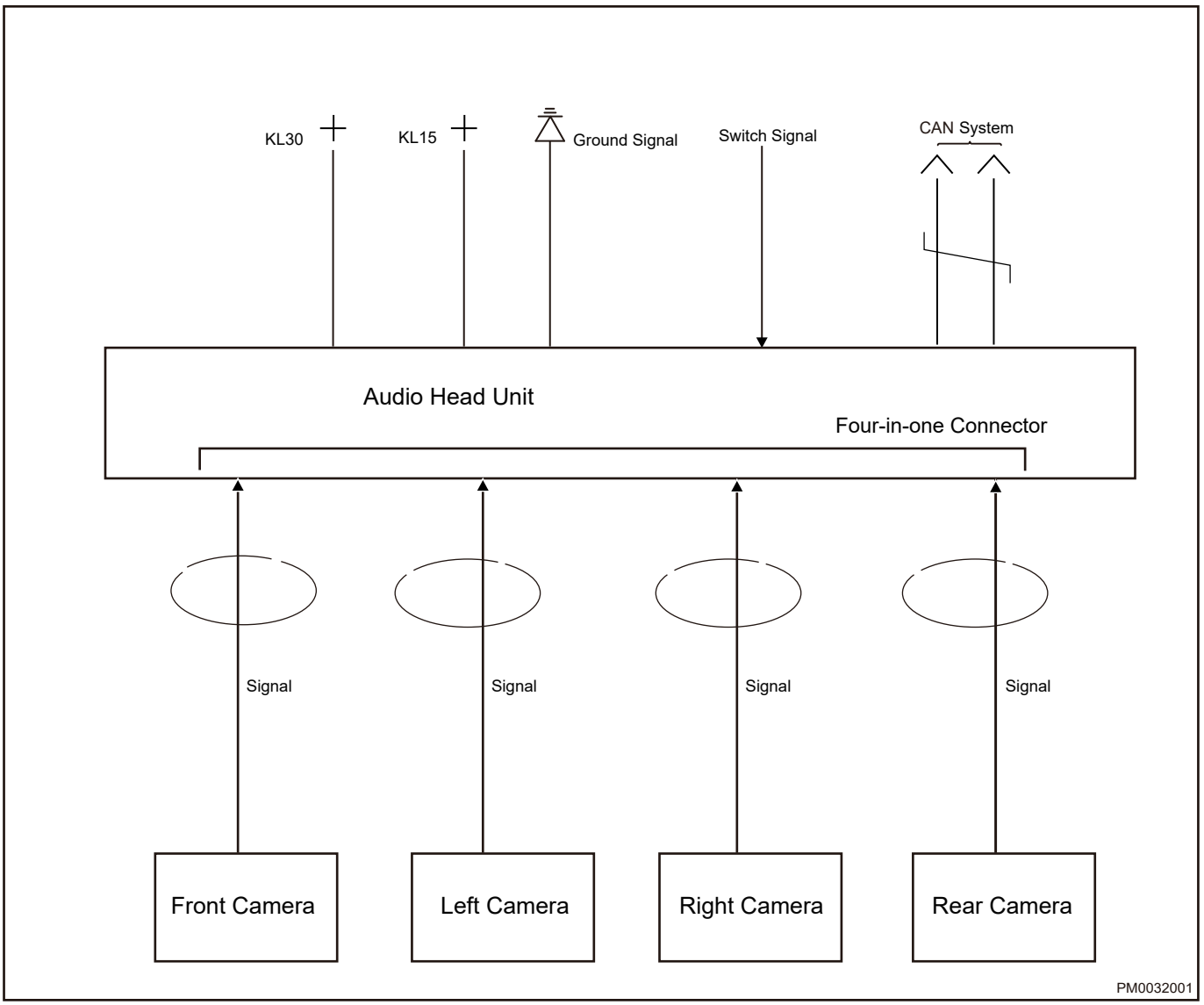
Function	Description
Single side and birds-eye view	Single side view of front, rear, left and right, and splicing view. Single side view can be switched
3D view and birds-eye view	Click on the birds-eye view to switch the corresponding 3D view, and the 3D view can be switched to any viewpoint by sliding
Wide-angle view	Combine the front view/rear view into a triplet wide-angle view through distortion correction
Panoramic startup animation	When AVM is starting, surround the vehicle all around
Turn signal light activating panoramic	When the turn signal light switch is turned on, the 3D view of rear left or rear right side of vehicle is displayed
Steering wheel steering angle activating panoramic	When steering wheel angle is higher than 180°, the 3D view of rear left or rear right side of vehicle is displayed
Enlarging view	Click on the enlarging view button to display the front/rear enlarged view. When the auto enlarge setting option is turned on, it will receive the ultrasonic radar information, and automatically switch to the front/rear enlarged view when it is less than 30 cm
Virtual door opening view	Receive door signal, engine hood signal and sliding roof signal, and display the corresponding view on the birds-eye view and 3D view when the four doors, engine hood, back door and sliding roof are opened
Vehicle guideline	Click on to select the opening and closing of the vehicle guideline
Visual radar	Ultrasonic radar transmits the distance information to the panoramic controller, and displays the distance or alarm prompt information on the panoramic screen
License plate number setting	Receive the license plate number sent by audio head unit and display it in 3D vehicle icon
3D view switch button	Click the button around the vehicle to switch the corresponding view of 3D view
Front wheel steering	Receive the steering wheel angle signal and accurately display the steering angle of front wheels in 3D view
Real-time wheel speed	Receive the wheel speed signal and accurately display the wheel speed in 3D view

Function	Description
Real-time turn signal light display	Real-time display of turn signal light information when switch the turn signal light switch
RCTA warning information	Integrate BSD radar information, and display warning information in the view when RCTA alarms
Obstacles activating panoramic	Activate the panoramic view monitor after receiving the parking radar information
Return button	Exit panoramic view monitor system by return button in non-R position.
Setting item button	Click to pop up setting item menu
Reset default setting	Click to reset default setting, then return to the original default setting switch of system
	Receive the factory reset signal of the head unit, then return to the original default setting switch of system
Remote AVM	Reserved function
FOTA upgrade	AVM can be updated by FOTA
U disk upgrade	Software is upgraded by transmitting AVM refresh package through the audio head unit and USB disk
UART and CAN transmitting coordinate and file	Coordinate and file can be transmitted through LVDS wire UART that connects audio
	Coordinate and file transmitted by audio can be received via CAN network too
Road calibration	Calibration can be automatically completed after driving on clear lane lines for a period of time after it is sold
Transparent body	Body is transparent in 3D view after it is turned on
Front wheel side view	Click to open front wheel side view in 3D view
Rear wheel side view	Click to open rear wheel side view in 3D view

■ System schematic diagram (panoramic view monitor)

Panoramic view monitor system sends signals of 4 HD cameras in front, rear, left and right to audio head unit via video signal wire, and vehicle images are collected and processed through audio head unit.

- 4 HD cameras are in front, rear, left and right.
- The audio head unit integrates with panoramic view monitor module function.
- The audio head unit receives signal and operates to form image.



■ System activation and exiting mode

⚠ Caution

- **Panoramic view monitor system has professionally calibrated before leaving factory. Any removal and installation behaviors without permission that cause changes in installation position and angle of camera may affect the function and effect of panoramic view monitor system.**
- **Panoramic view monitor system functions to provide driving assist, however, object in image does not indicate the actual size and distance from it. There is a slight delay and blind spot in image relative to the actual condition, so this function is not a substitute for driver' s operation and judgment. During on, off and use of the function, driver should pay attention to the surroundings to ensure safe driving.**
- **Never use panoramic view monitor when outside rear view mirrors are folded. Make sure to close back door securely when operating vehicle using panoramic view monitor.**
- **Distance from object seen from panoramic view monitor is different from the actual distance.**
- **Cameras are installed on front grille, outside rear view mirrors and above the rear license plate. Do not put anything on the camera.**
- **Do not spray water around the camera when washing vehicle with high pressure water. Otherwise, water drop may enter camera and condense on the lens, causing malfunction, fire or electric shock.**
- **Do not tap the cameras. They are precision instruments. Failure to do so may cause malfunction or damage, leading to fire or electric shock.**

Hint:

- Be careful not to scratch the lens when cleaning dirt or snow on the surface of camera.
- Use the displayed route and aerial view as reference. Displayed route and aerial view are greatly affected by numbers of passenger in vehicle, fuel amount, vehicle location, road surface condition and road surface grade.

Activation Condition		System Activation	Exit Condition	
Preconditions	Trigger Condition		Corresponding Exit Condition	Priority Exit Condition
ENGINE START STOP switch ON, vehicle speed ⩽ 30 km/h	Shift to R	R is activated	Exit R position, the duration is longer than 15 seconds, and there is no effective operation within the duration	Vehicle speed > 30 km/h
	AVM switch is pressed	AVM switch is activated	Press AVM switch again	
			Operate other high priority switches	
	Turn on the turn signal light	Turn signal light is activated	Turn off the turn signal light and there is no effective operation within 500 ms	
			Operate other high priority switches	
	Steering wheel angle is more than 190°	Steering wheel angle is activated	Steering wheel angle is less than 180° and the duration is longer than 1 second, and there is no effective operation within the duration time	
			Operate other high priority switches	
In R position, vehicle speed < 15 km/h	Parking radar obstacle distance signal is received	Obstacles is activated	Exit after 15 seconds after obstacle-free distance information	Press the AVM switch, operate other high-priority switches, N or P, press the exit button
			N or P	

2 Matching Learning

2.1 Panoramic Control System

■ Camera calibration

(1) Situations needs to perform camera calibration:

1) When removing or installing camera or rear view mirror with camera.
2) When camera position changes due to vehicle accident.
3) After replacing panoramic view monitor system controller.
4) When removing and installing front and rear bumpers.

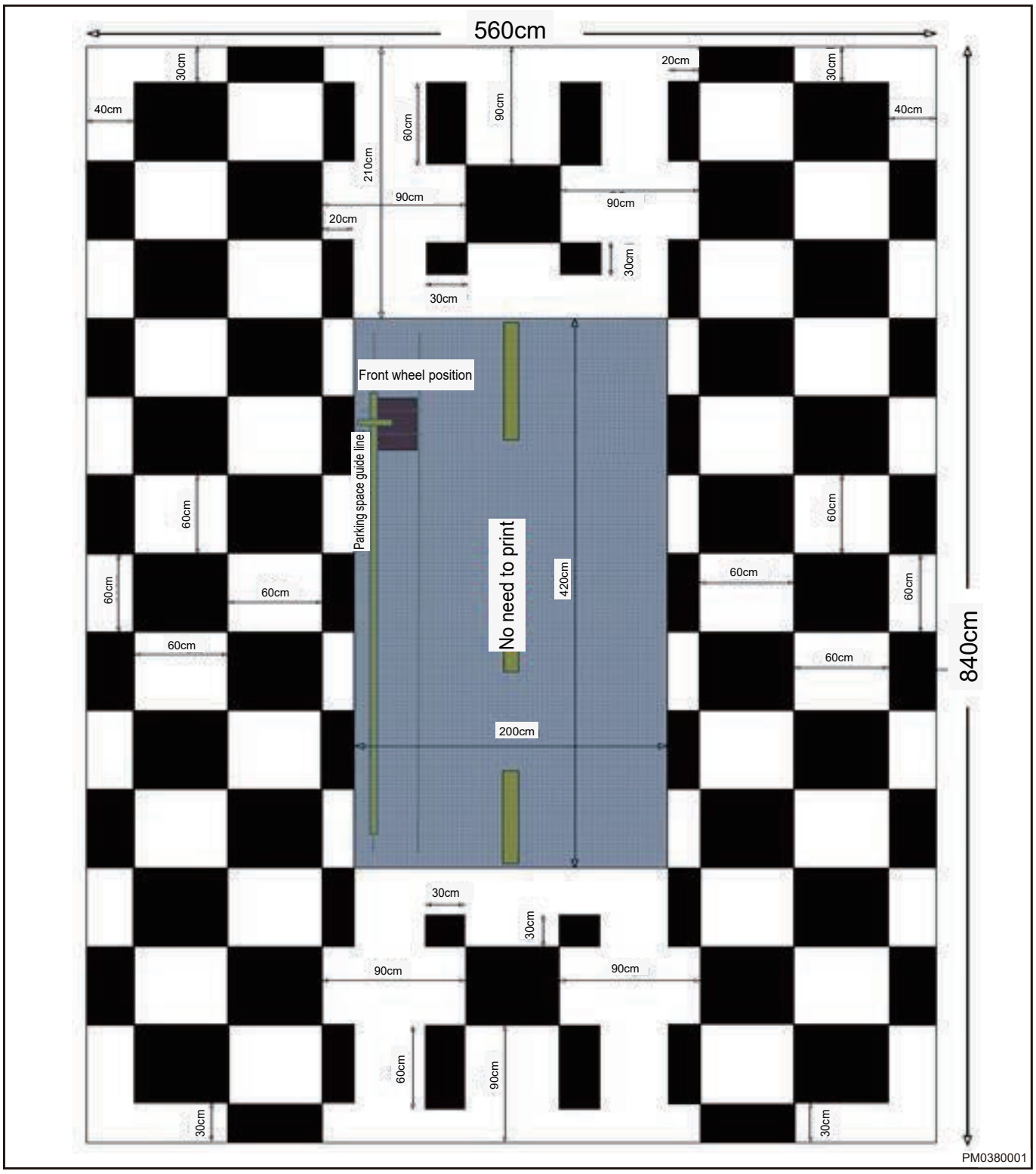
(2) Calibration environment requirement

1) Site requirement: Calibration site size: About 5.6 m in width and 8.4 m in length, which can accommodate the vehicle driving and calibration cloth laying.
2) Ground flatness and calibration cloth laying requirement:
   - To ensure the calibration effect, calibration site requires the ground as flat as possible, and calibration cloth has no any obvious bumps after laying;
   - When laying a calibration cloth, pay attention that it is fully unfolded and laid smoothly, and each piece should be corresponded according to requirement.
3) Lighting conditions: There is no special requirement for light environment of calibration site. Make sure each positioning triangle and its focus can be clearly seen during calibration.
4) Storage of calibration cloth: Calibration cloth should be rolled up smoothly (with left and right sides separated) after use for safekeeping.

⚠ Caution
If calibration cloth is wet, please dry it and then roll it up. Avoid wrinkles during rolling, so as not to affect the subsequent use.

(3) Calibration cloth drawing (HD)

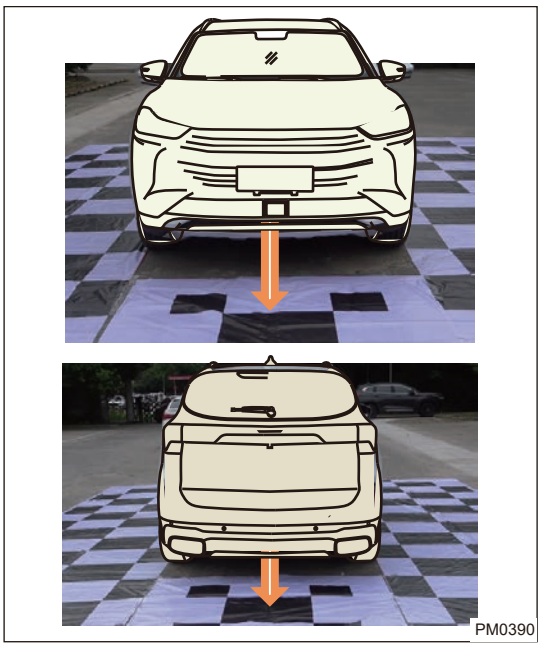
Hint:
Schematic diagram description of placing calibration cloth: It is recommended to leave a certain clearance (about 5cm) between the calibration cloth and the left and right sides of vehicle.



(4) Calibration method:

1) Park vehicle at the fixed location.

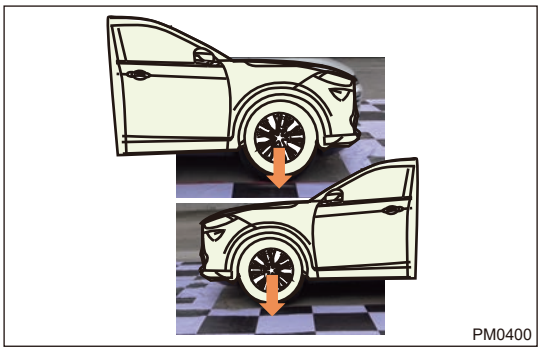
2) Lay calibration cloth (front and rear sides) at front and rear of vehicle.



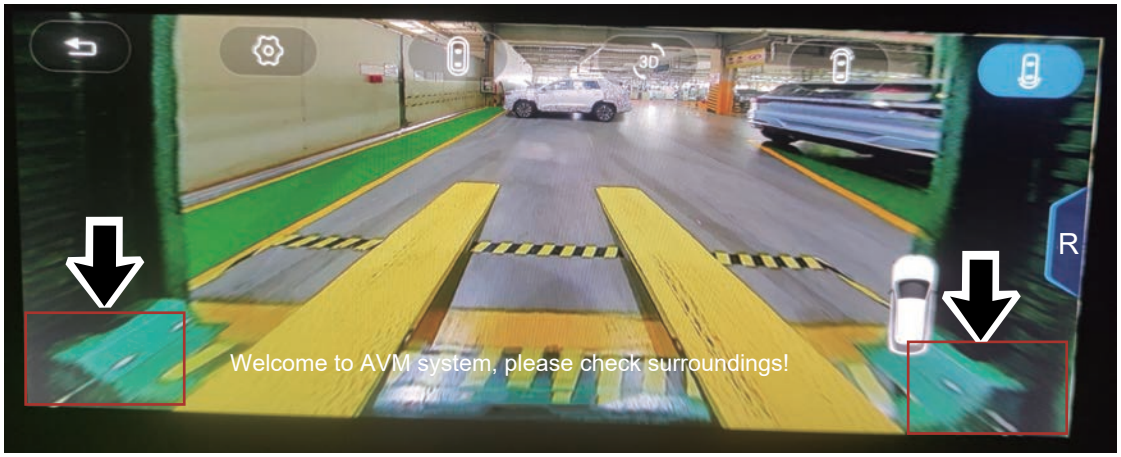
⚠ Caution

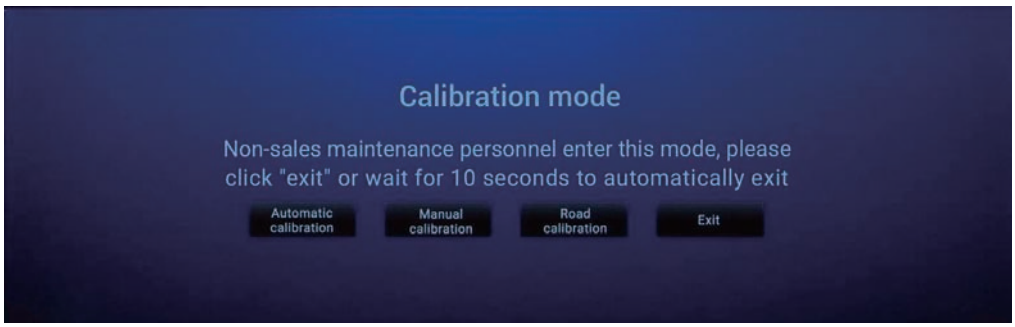
- **"Front center" of calibration cloth corresponds to the front side of vehicle.**
- **Center line position of calibration cloth should align with the middle position of front and rear of vehicle.**

3) Unfold calibration cloth (left and right sides) and lay it onto both sides of vehicle.
   - Center line corresponds to front left and right wheel positions.
   - Left and right sides and front and rear sides of calibration cloth should be placed in accordance with single and double arrow marks respectively.



4) Enter calibration mode (calibration function is activated): When ignition switch is on, touch AVM switch, and panoramic image interface is displayed. Click 3 times on left and 3 times on right to enter panoramic image calibration interface.





PA0170001

⚠ Caution

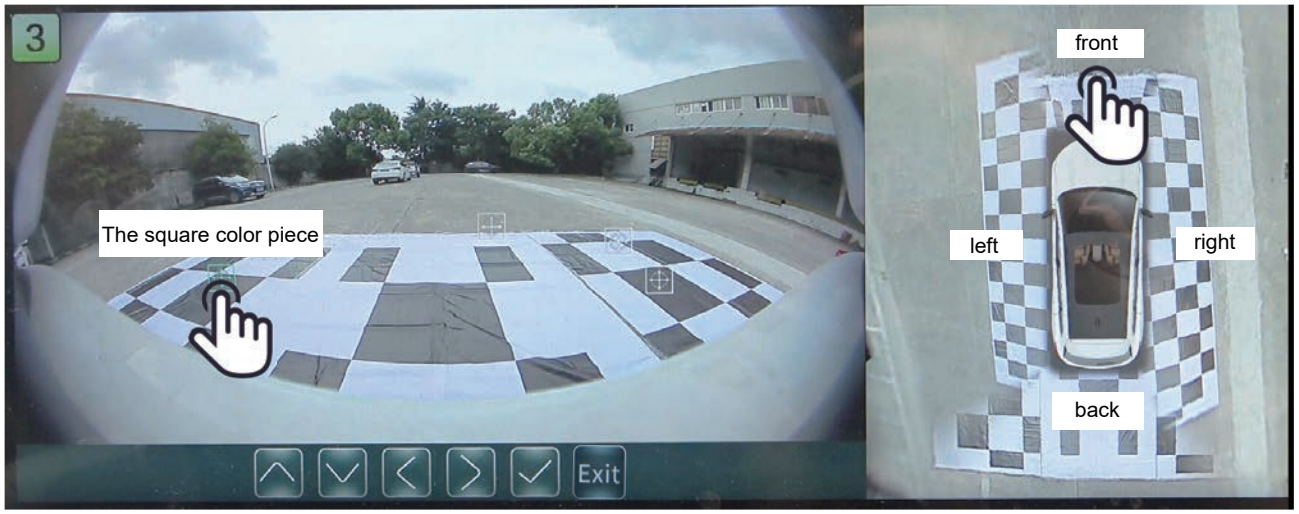
- **It is not easy for user to enter hidden functions.**

(5) Automatic calibration process: Click "Automatic calibration", and wait for the calibration status prompt. If successful, the system will automatically restart. If unsuccessful, it chooses to recalibrate.

(6) Manual calibration process: Click "Manual calibration", it is necessary to manually calibrate the front, right, rear and left views. Front view calibration operation is taken as an example:

1) Manually click "front" view of panorama view on right side, and 5 square color lumps in the single side view can be seen. The selected color lump is green and unselected color lump is white.

2) Manually click to select the color lump, and perform adjustment by up, down, left and right buttons. Adjust the center of color lump to the focus of two black lumps of the corresponding calibration point, and click " √ " after completing to save.



PA0080001

3) According to the previous step, make 5 color lumps correspond to the 5 different square focus in illustration respectively, thus the calibration operation of "front" view is completed. Then, perform calibrations for "left", "right" and "rear" views in accordance with the procedures above.

4) After calibration of 4 directions are completed, it is necessary to observe if panoramic view screen on right side is displayed smoothly without misalignment, which can be determined by lines on calibration cloth. If the line is straight without any misalignment or twist, it is determined that the calibration is OK.

5) After calibration is confirmed, click "Exit" button to exit, then select " √ " in the pop-up dialog box to complete the whole calibration operation.

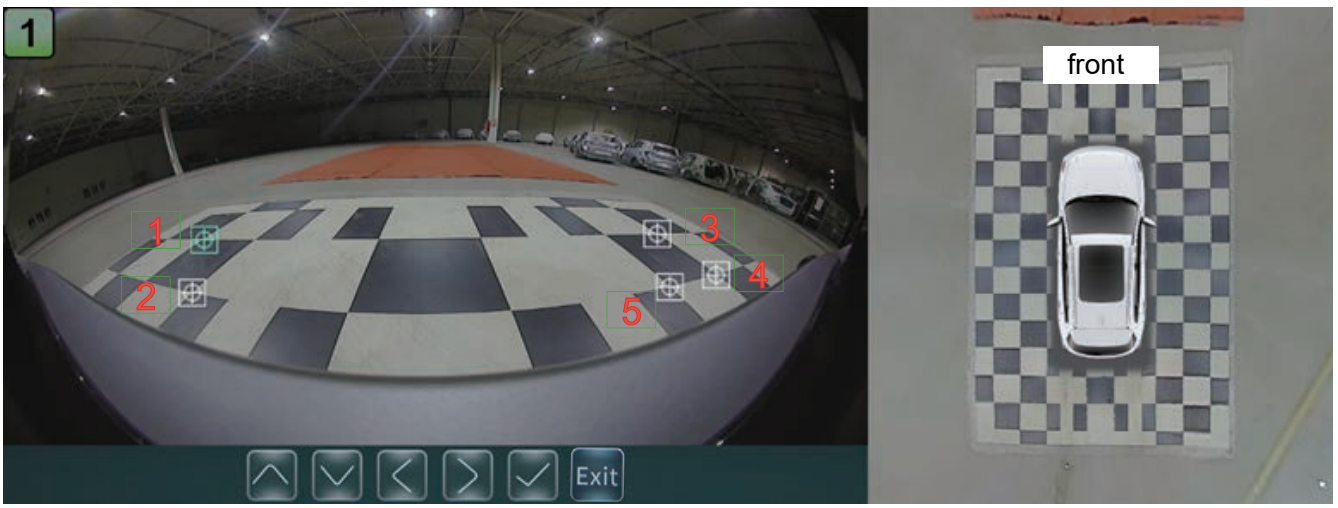
⚠ Caution

- **For the premise of clicking to save, it is necessary to ensure that the image on the right window is normal.**

PA0090001

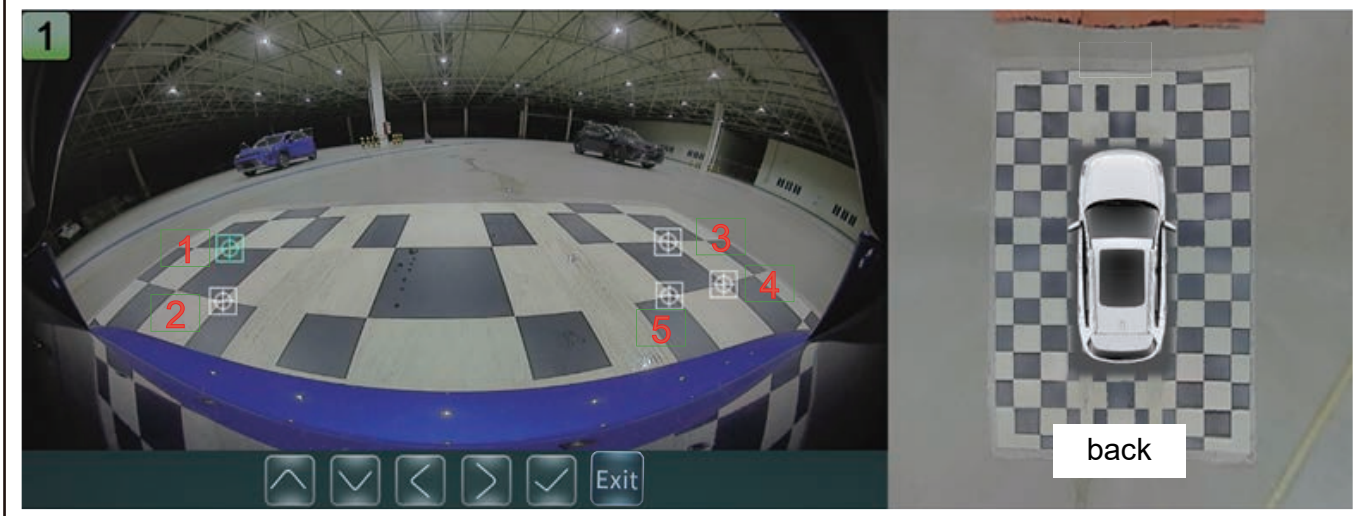
Corresponding calibration point

- Front corresponding calibration point



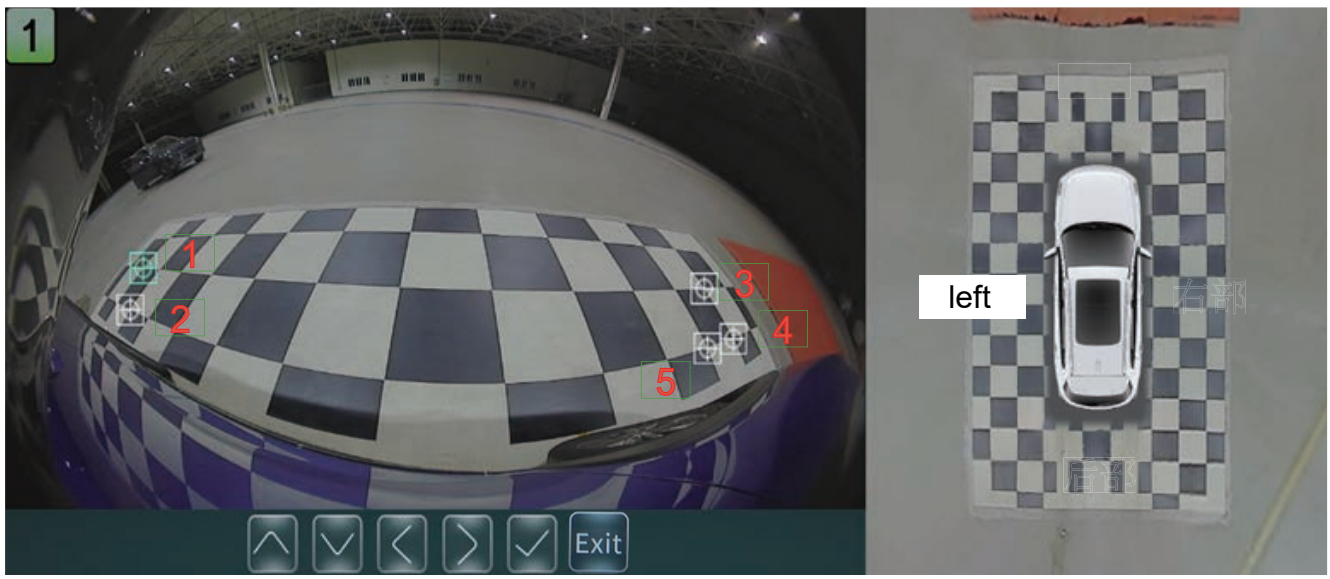
PA0100001

- Rear corresponding calibration point



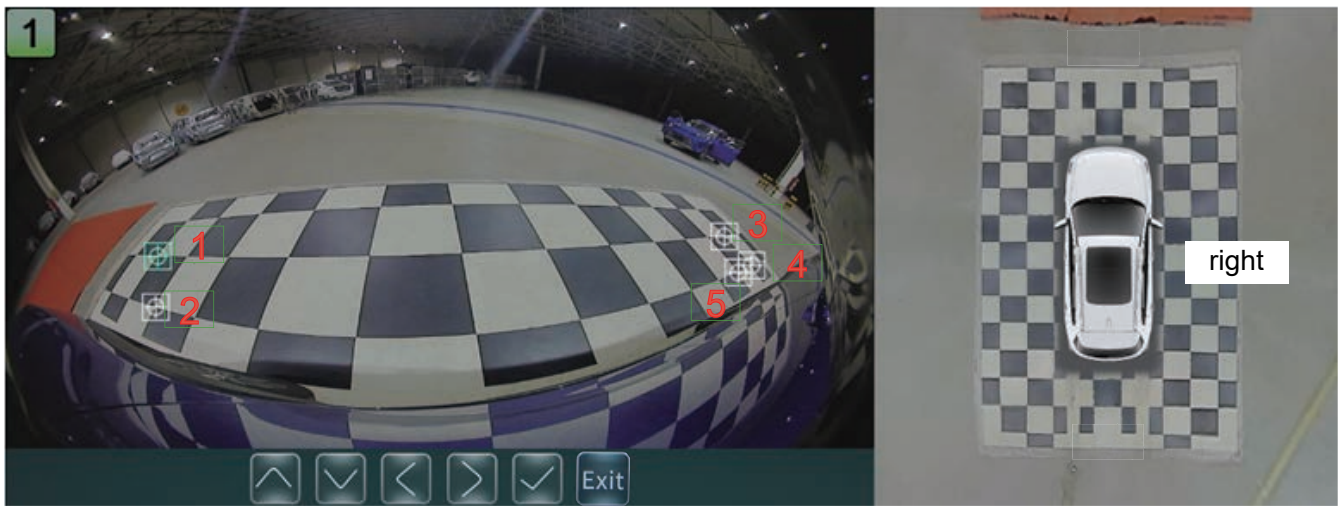
PA0110001

- Left corresponding calibration point



PA0130001

- Right corresponding calibration point



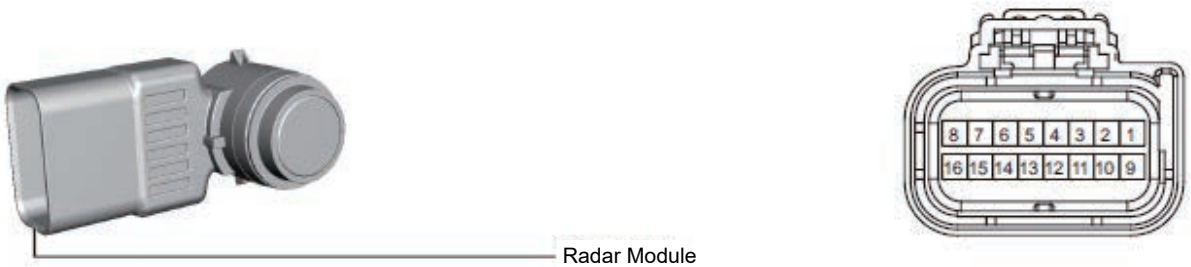
PA0120001

(7) Switch view

1) Enter panoramic monitoring, press back button to exit panoramic monitoring setting
2) Enter panoramic display, touch 2D/3D button to switch 2D/3D angle.
3) Enter panoramic display, touch front/rear wide-angle button to switch front/rear wide-angle.
4) Enter panoramic display and click button to switch to corresponding view.
5) Enter panoramic monitoring, click shortcut button on right side of panoramic monitoring to enter panoramic monitoring settings.

3 Circuit Diagram

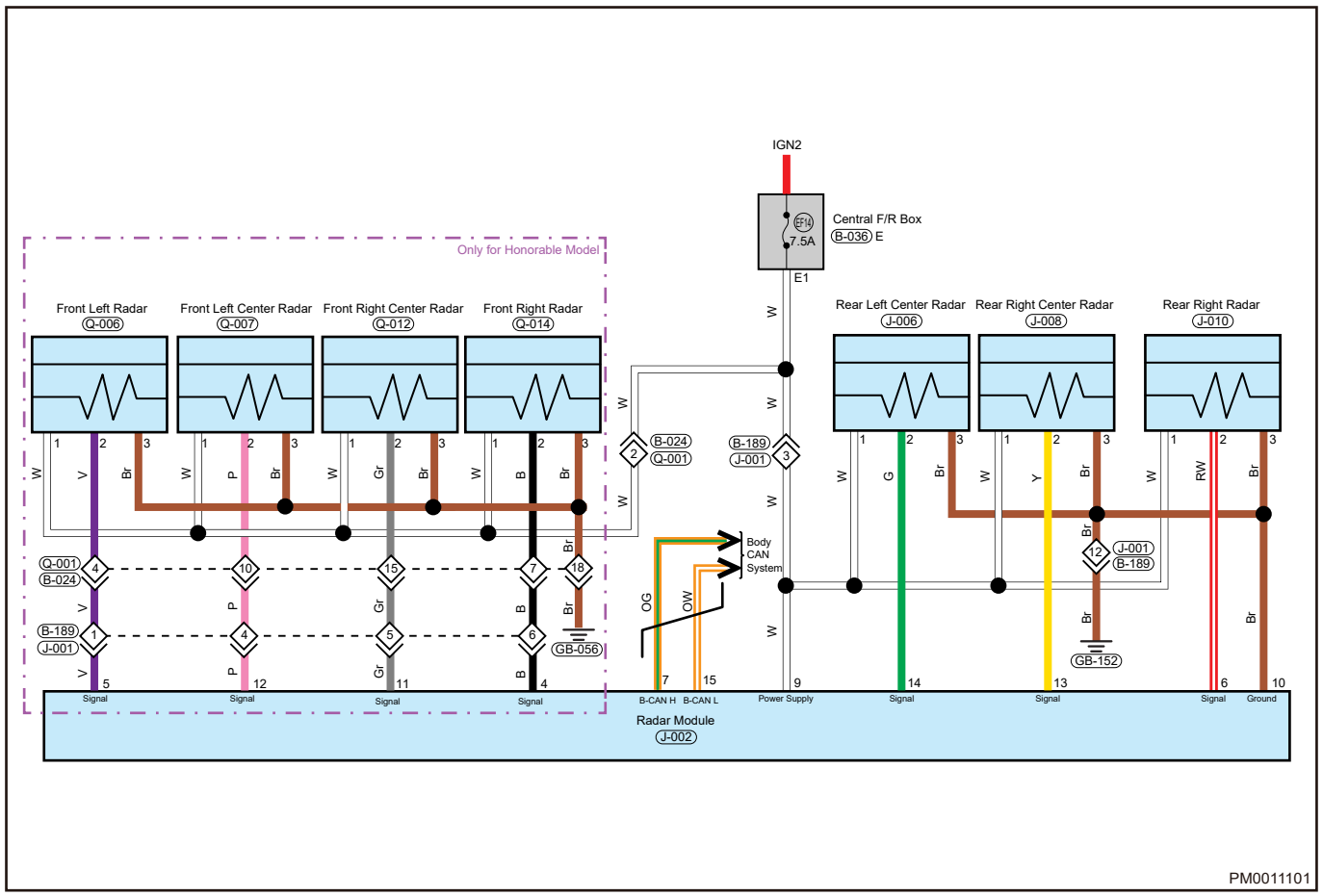
3.1 Module Terminal Definition



PM0012101

Pin	Definition	Pin	Definition
1	-	2	-
3	-	4	Front Right Radar Signal
5	Front Left Radar Signal	6	Rear Right Radar Signal
7	B-CAN H	8	-
9	Power Supply	10	Ground
11	Front Right Center Radar Signal	12	Front Left Center Radar Signal
13	Rear Right Center Radar Signal	14	Rear Left Center Radar Signal
15	B-CAN L	16	-

3.2 System Circuit Diagram



4 Diagnosis & Testing

4.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
After reverse gear is engaged, there is no reversing view monitor and the meter does not display the reverse distance	Observe whether the back-up light is come on: If it is come on, check the reverse signal input of DVD/ navigation system and BCM. If it is not come on, check the back-up light switch and line
After reverse gear is engaged, there is no reversing view monitor and the meter display the reverse distance	Check the reverse signal input of DVD/navigation system, camera and line.
After reverse gear is engaged, there is reversing view monitor (if equipped with reversing view monitor) but the meter does not display the reverse distance	Check the reverse signal input of BCM, the LIN of BCM and reversing radar controller, and check the reversing radar controller
Sensor failure, and instrument cluster send an alarm	Check whether there is dirt on parking radar sensor. If so, remove the dirt on the sensor and check whether the sensor is damaged. If necessary, replace the inspection sensor wire harness

4.2 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all system grounds related to the latest DTCs.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.3 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.4 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.

(4) Reinstall ground bolt or nut securely.

(5) Check if any additional accessories interfere with ground circuit.

(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

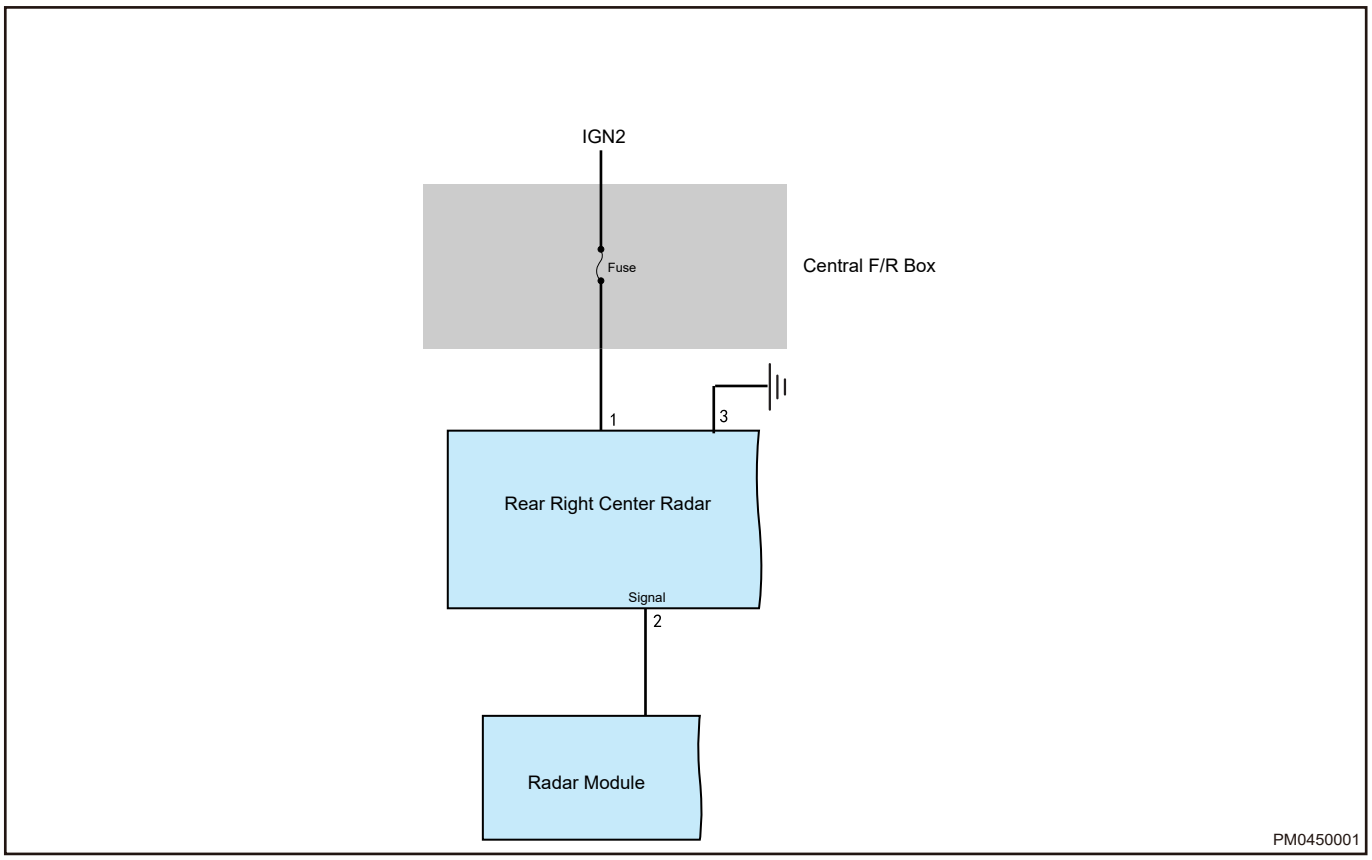
4.5 Reversing Radar System (Low Configuration) Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1A05-25	Rear Left Sensor Failure	/	• Signal or wire harness connector damaged • Main reversing radar damaged	It is recommended to check and repair parking radar assist system
B1A06-25	Rear Left Center Sensor Failure	/		
B1A07-25	Rear Right Center Sensor Failure	/		
B1A08-25	Rear Right Sensor Failure	/		
UO140-87	Lost Communication with BCM	/	Refer to CAN communication system	
U0129-87	Lost Communication with BSM	/		
U0155-87	Lost Communication with ICM	/		

4.6 DTC Diagnosis Procedure

DTC	**B1A05-25**	**Rear Left Sensor Failure**
DTC	**B1A06-25**	**Rear Left Center Sensor Failure**
DTC	**B1A07-25**	**Rear Right Center Sensor Failure**
DTC	**B1A08-25**	**Rear Right Sensor Failure**

Hint:
Detection of each radar is the same. Take the rear right center radar as an example.
Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check radar sensor**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace radar sensor with a new one, connect negative battery cable, turn ENGINE START STOP switch to ON and turn on parking radar system. Using diagnostic tester, read DTC and observe if DTC still exists.

OK → **Replace radar sensor**

NG

2	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if fuse is blown.

NG → **Replace fuse**

OK

3	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

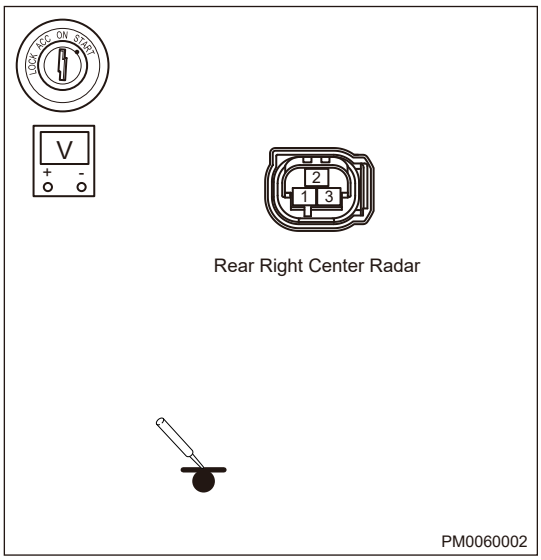
(b) Disconnect main radar connector and rear right center radar sensor connector.

Use circuit diagram as a guide to perform the following inspection procedures:

(c) Turn ENGINE START STOP switch to ON.

(d) Using ohm band of multimeter, measure voltage between rear right center radar power supply terminal and body ground.

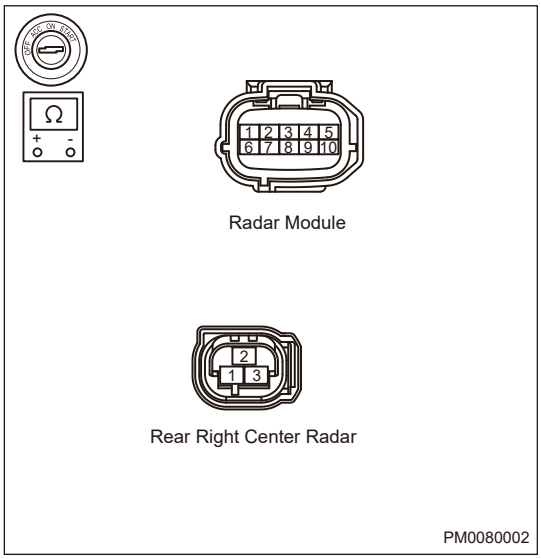
Multimeter Connection	Condition	Specified Condition
Rear right center radar sensor (power supply terminal) - Body ground	ENGINE START STOP switch ON	12 V



Use circuit diagram as a guide to perform the following inspection procedures:

(e) Using ohm band of multimeter, check for continuity between main radar and rear right center sensor separately.

Multimeter Connection	Condition	Specified Condition
Rear right center sensor (2) - Main radar (connected terminal)	Always	⩽ 1 Ω



NG → **Replace wire harness and connector**

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace main radar**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	UO140-87	Lost Communication with BCM
DTC	U0129-87	Lost Communication with BSM
DTC	U0155-87	Lost Communication with ICM

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system

4.7 Reversing Radar System (High Configuration) Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1A01-25	Front Left Sensor Failure	/	• Signal or wire harness connector damaged • Radar sensor damaged • Radar module damaged	It is recommended to check and repair parking radar assist system
B1A02-25	Front Left Center Sensor Malfunction	/		
B1A03-25	Front Right Center Sensor Malfunction	/		
B1A04-25	Front Right Sensor Malfunction	/		
B1A05-25	Rear Left Sensor Failure	/		
B1A06-25	Rear Left Center Sensor Failure	/		
B1A07-25	Rear Right Center Sensor Failure	/		
B1A08-25	Rear Right Sensor Failure	/		
B1A09-25	Overvoltage Fault	/	• Battery	

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1A0A-25	Undervoltage Fault	/	• Signal or wire harness connector damaged • Radar sensor damaged • Radar module damaged	
UO140-87	Lost Communication with BCM	/	Refer to CAN communication system	
U0129-87	Lost Communication with BSM	/		
U0155-87	Lost Communication with ICM	/		

4.8 DTC Diagnosis Procedure

DTC	B1A01-25	Front Left Sensor Failure
DTC	B1A02-25	Front Left Center Sensor Malfunction
DTC	B1A03-25	Front Right Center Sensor Malfunction
DTC	B1A04-25	Front Right Sensor Malfunction
DTC	B1A05-25	Rear Left Sensor Failure
DTC	B1A06-25	Rear Left Center Sensor Failure
DTC	B1A07-25	Rear Right Center Sensor Failure
DTC	B1A08-25	Rear Right Sensor Failure

Hint:
Detection of each radar is the same.

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check radar sensor

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace radar sensor with a new one, connect negative battery cable, turn ENGINE START STOP switch to ON and turn on parking radar system. Using diagnostic tester, read DTC and observe if DTC still exists.

OK → **Replace radar sensor**

NG

2	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect reversing radar module connector and malfunctioning radar sensor connector.

(c) Using ohm band of multimeter, check for continuity between reversing radar module ground output and sensor separately

Multimeter Connection	Condition	Specified Condition
Radar control module (connected terminal) - Radar sensor (1)	Always	⩽ 1 Ω
Radar control module (connected terminal) - Radar sensor (2)		⩽ 1 Ω
Radar control module (connected terminal) - Radar sensor (3)		⩽ 1 Ω

NG → **Replace wire harness and connector**

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace reverse radar module**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1A09-25	Overvoltage Fault
DTC	B1A0A-25	Undervoltage Fault

Hint:
Detection of each radar is the same.

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check battery voltage

Using multimeter, check if battery voltage is normal.

OK → Repair or replace battery as needed

NG

2	Check radar sensor

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace radar sensor with a new one, connect negative battery cable, turn ENGINE START STOP switch to ON and turn on parking radar system. Using diagnostic tester, read DTC and observe if DTC still exists.

OK → Replace radar sensor

NG

3	Check wire harness and connector

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect reversing radar module connector and malfunctioning radar sensor connector.

(c) Using ohm band of multimeter, check for continuity between reversing radar module ground output and sensor separately

Multimeter Connection	Condition	Specified Condition
Radar control module (connected terminal) - Radar sensor (1)	Always	⩽ 1 Ω
Radar control module (connected terminal) - Radar sensor (2)		⩽ 1 Ω
Radar control module (connected terminal) - Radar sensor (3)		⩽ 1 Ω

NG → Replace wire harness and connector

OK

4	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → Replace reverse radar module

OK → Conduct test and confirm malfunction has been repaired

DTC	U0140-87	Lost Communication with BCM
DTC	U0129-87	Lost Communication with BSM
DTC	U0155-87	Lost Communication with ICM

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system

4.9 Panoramic Control System (AVM) Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1A20-13	AVM Front Camera LVDS Cable Open	/	• Camera • Wire harness • Domain controller	/
B1A21-13	AVM Rear Camera LVDS Cable Open	/		/
B1A22-13	AVM Left Camera LVDS Cable Open	/		/
B1A23-13	AVM Right Camera LVDS Cable Open	/		/
B1A20-11	AVM Front Camera Power Short to Ground	/		/
B1A20-12	AVM Front Camera Power Short to Battery	/		/

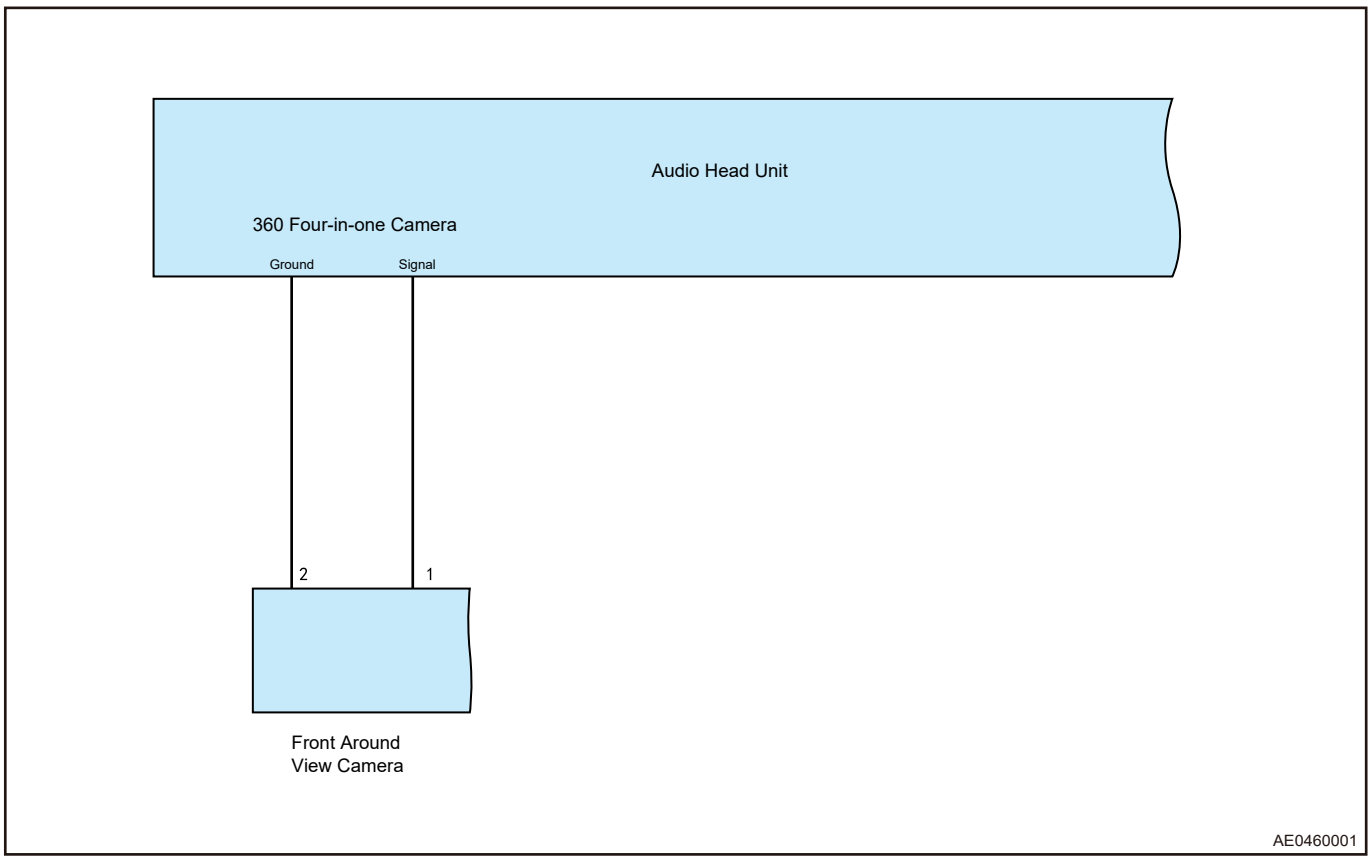
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1A21-11	AVM Rear Camera Power Short to Ground	/		/
B1A21-12	AVM Rear Camera Power Short to Battery	/		/
B1A22-11	AVM Left Camera Power Short to Ground	/		/
B1A22-12	AVM Left Camera Power Short to Battery	/		/
B1A23-11	AVM Right Camera Power Short to Ground	/		/
B1A23-12	AVM Right Camera Power Short to Battery	/		/
B1A24-04	AVM ECU Trouble	/	• Domain controller	/
B1A25-17	Control Module Input Power High	/	• Circuit fault • Power Supply Chip Fault Battery fault	/
B1A25-16	Control Module Input Power Low	/	• Circuit fault • Power Supply Chip Fault Battery fault	/
B1A26-54	AVM No Calibration	/	Perform recalibration	/
B1A27-71	AVM On/Off Switch Mechanical Adhesion	/	Switch fault	/
U0140-87	Lost Communication with BCM	/	Refer to CAN communication system	/
U0155-87	Lost Communication with ICM	/		/
U0141-87	Lost Communication with Reversing Radar	/		/
U0126-87	Lost Communication with SAM	/		/
U0245-87	Lost Communication with MMI (RRM)	/		/
U0101-87	Lost Communication with Transmission	/		/

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0100-87	Lost Communication with EMS	/		/
U0129-87	Lost Communication with ESC	/		/
U1300-55	Software Configuration Error	/		/
U007388	CAN Bus Off	/		/

4.10 DTC Diagnosis Procedure

DTC	B1A20-13	AVM Front Camera LVDS Cable Open
DTC	B1A20-11	AVM Front Camera Power Short to Ground
DTC	B1A20-12	AVM Front Camera Power Short to Battery

Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Replace camera with a new one

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace front camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK → **Replace front camera**

NG

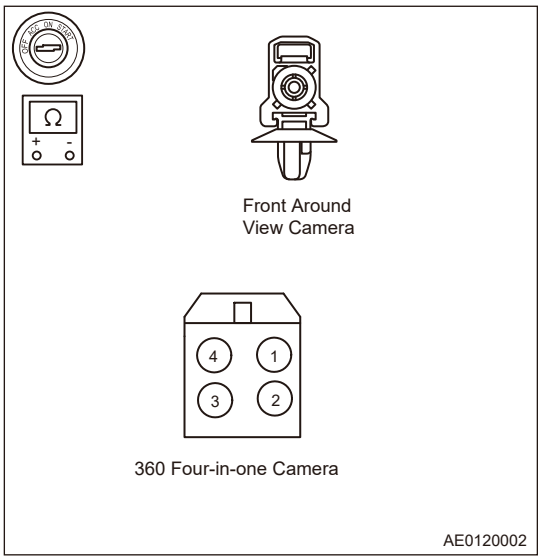
2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and front camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and front camera connector.

Multimeter Connection	Condition	Specified Condition
Four-in-one antenna connector (connected terminal) - Front camera connector (1)	Always	⩽ 1 Ω
Four-in-one antenna connector (connected terminal) - Front camera connector (2)	Always	⩽ 1 Ω



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

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

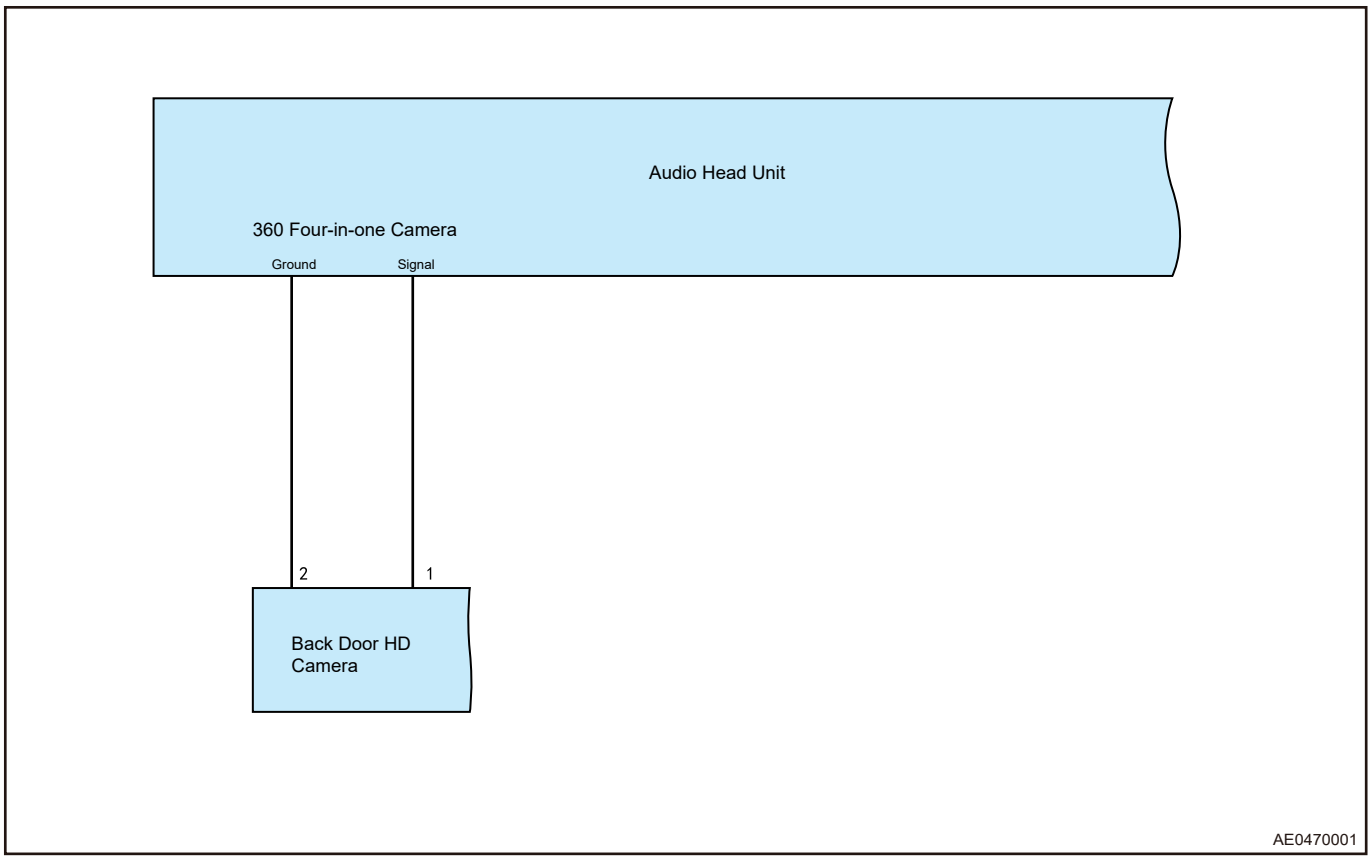
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1A21-13	AVM Rear Camera LVDS Cable Open
DTC	B1A21-11	AVM Rear Camera Power Short to Ground
DTC	B1A21-12	AVM Rear Camera Power Short to Battery

Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Replace camera with a new one**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace rear camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK	**Replace rear camera**

NG

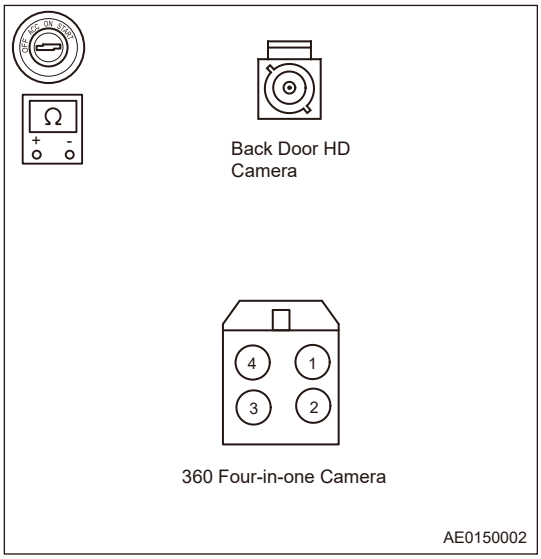
2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and rear camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and rear camera connector.

Multimeter Connection	Condition	Specified Condition
Four-in-one antenna (connected terminal) - Rear camera (1)	Always	⩽ 1 Ω
Four-in-one antenna (connected terminal) - Rear camera (2)	Always	⩽ 1 Ω



NG → Repair or replace wire harness and connector

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

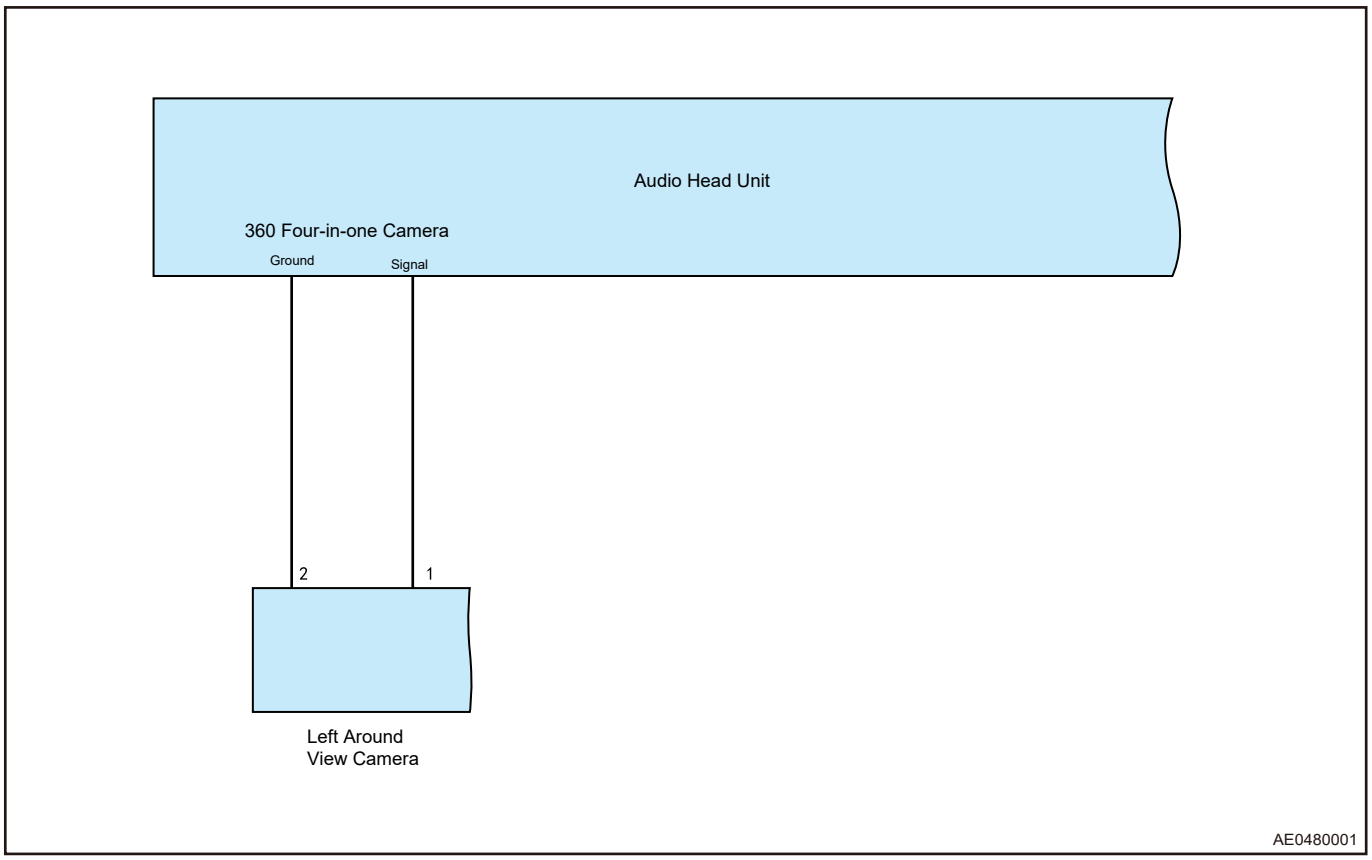
(c) Read the fault information and confirm that the fault has been solved.

NG → Replace domain controller

OK → Conduct test and confirm malfunction has been repaired

DTC	B1A22-13	AVM Left Camera LVDS Cable Open
DTC	B1A22-11	AVM Left Camera Power Short to Ground
DTC	B1A22-12	AVM Left Camera Power Short to Battery

Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Replace camera with a new one**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace left camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK → **Replace left camera**

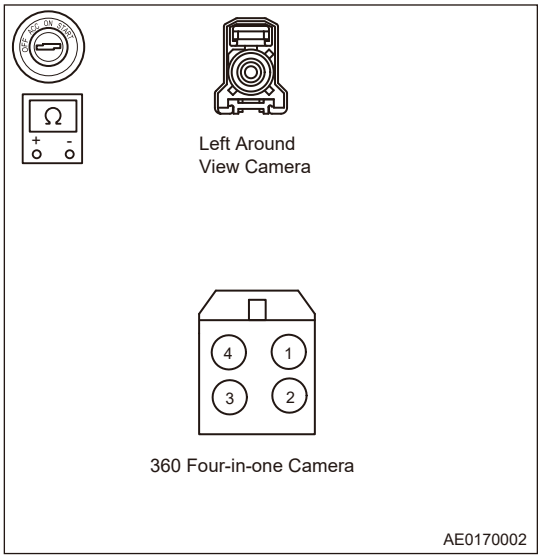
NG

2	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and left camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and left camera connector.



Multimeter Connection	Condition	Specified Condition
Four-in-one antenna connector (connected terminal) - Left camera connector (1)	Always	⩽ 1 Ω
Four-in-one antenna connector (connected terminal) - Left camera connector (2)	Always	⩽ 1 Ω

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

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

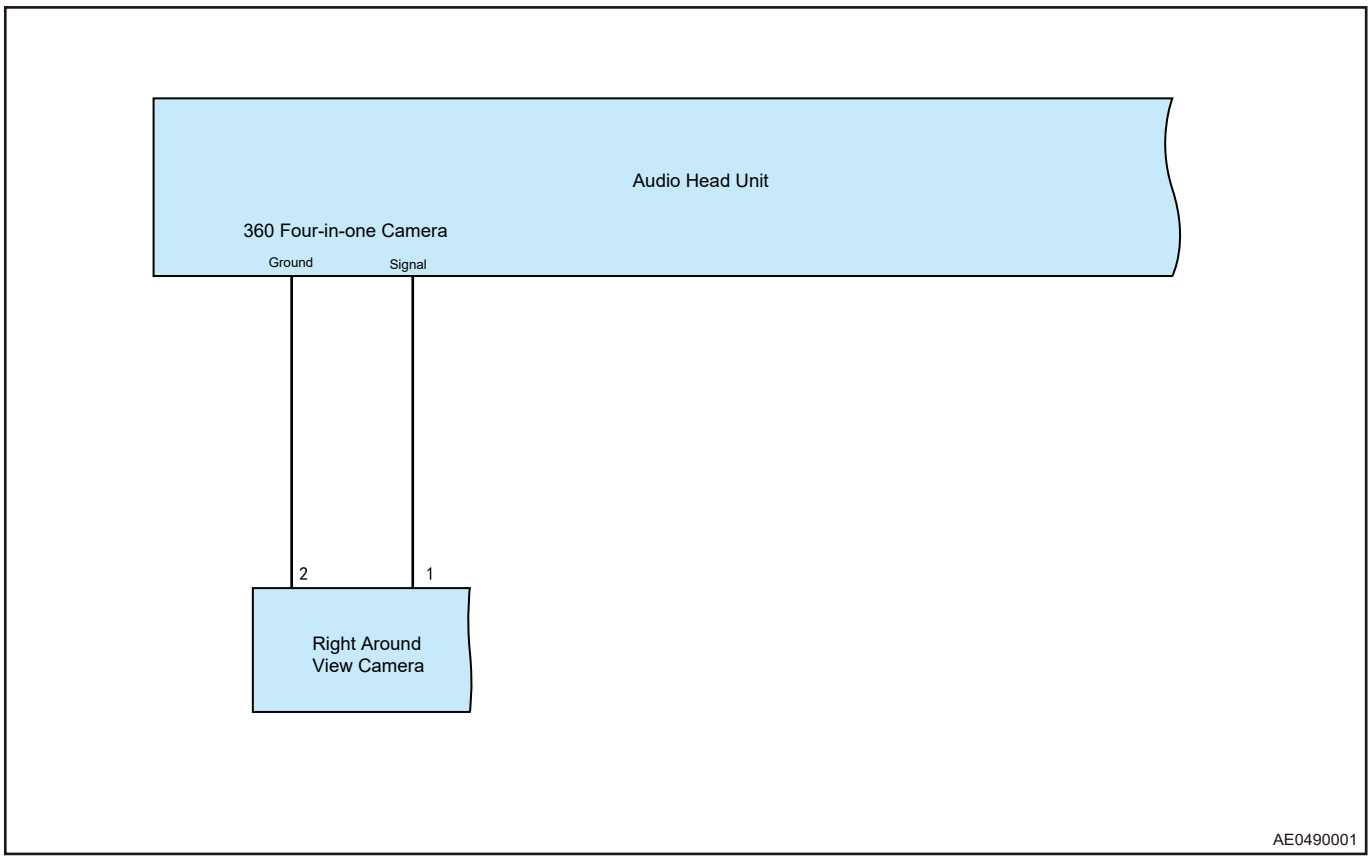
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**B1A23-13**	**AVM Right Camera LVDS Cable Open**
DTC	**B1A23-11**	**AVM Right Camera Power Short to Ground**
DTC	**B1A23-12**	**AVM Right Camera Power Short to Battery**

Schematic Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Replace camera with a new one**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Replace right camera with a new one, connect negative battery cable, and turn ENGINE START STOP switch to ON. Start panoramic view monitor system and observe if the camera is working properly.

OK → **Replace right camera**

NG

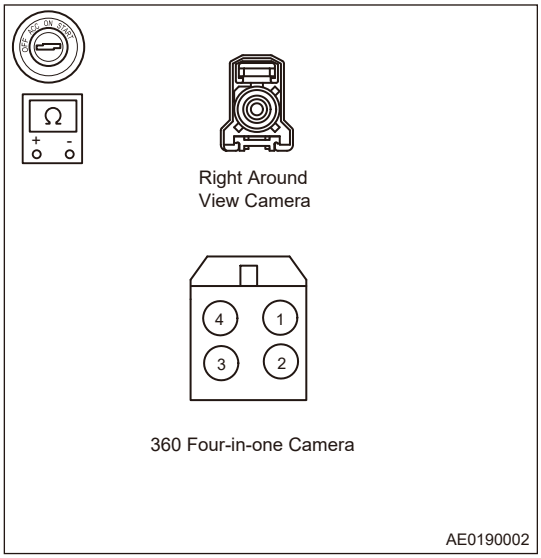
2	**Check wire harness and connector**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect four-in-one antenna connector and right camera connector.

(c) Using ohm band of multimeter, check for continuity between four-in-one antenna connector and right camera connector.

Multimeter Connection	Condition	Specified Condition
Four-in-one antenna (connected terminal) - Right camera (1)	Always	⩽ 1 Ω
Four-in-one antenna (connected terminal) - Right camera (2)	Always	⩽ 1 Ω



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

OK

3	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace domain controller**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1A26-54	AVM No Calibration

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.

(b) Check if DTCs occur again.

NG → **Recalibrate the module**

OK

2	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new control module to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1A24-04	AVM ECU Trouble

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.

(b) Check if DTC occurs again.

NG → **Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again**

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new module to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	B1A27-71	AVM On/Off Switch Mechanical Adhesion

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTC occurs again.

NG → **Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again**

OK

2	**Reconfirm DTCs**

(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new switch to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	**B1A25-17**	**Control Module Input Power High**
DTC	**B1A25-16**	**Control Module Input Power Low**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTC occurs again.

NG → **Turn off vehicle power supply (disconnect the negative battery cable), then clear DTCs again**

OK

2	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

(c) Read the fault information and confirm that the fault has been solved.

NG → **Because the panoramic view monitor module is integrated in audio domain controller, refer to domain controller power supply troubleshooting method for specific inspection method.**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	U0140-87	Lost Communication with BCM
DTC	U0155-87	Lost Communication with ICM
DTC	U0141-87	Lost Communication with Reversing Radar
DTC	U0126-87	Lost Communication with SAM
DTC	U0245-87	Lost Communication with MMI (RRM)
DTC	U0101-87	Lost Communication with Transmission
DTC	U0100-87	Lost Communication with EMS
DTC	U0129-87	Lost Communication with ESC
DTC	U1300-55	Software Configuration Error
DTC	U0073-88	CAN Bus Off

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

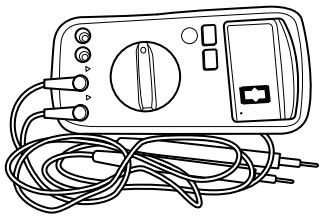
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system

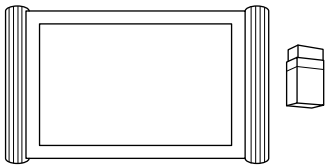
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

■ Special Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

5.2 Reversing Radar Sensor (Rear Sensor)

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing parking radar sensors.**
- **Operate carefully to avoid damaging parking radar sensors, when removing parking radar sensors.**

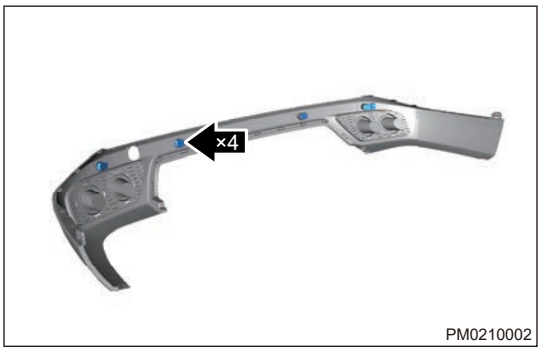
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the rear bumper.

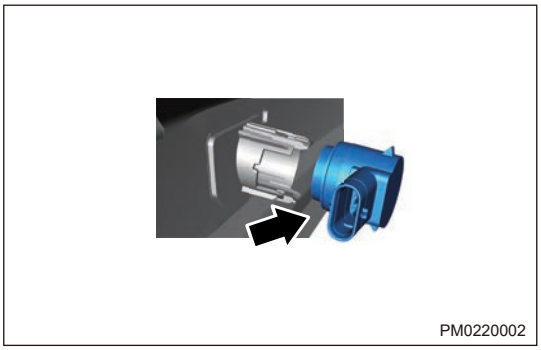
(4) Disconnect the parking radar sensor connector.

Hint:
The radar without head unit should be installed on the inner rightmost of rear bumper.



PM0210002

(5) Remove parking radar sensor from slot of rear bumper assembly.



■ **Installation**

⚠ Warning

When installing parking radar sensor, align the boss at end of parking radar sensor with the slot on rear bumper assembly, and then firmly install parking radar sensor.

Caution

- **Install connectors in place when installing parking radar sensors.**
- **Check parking radar system for proper operation, after installing parking radar sensors.**

(1) Install parking radar sensor to slots of rear bumper assembly.

(2) Connect the parking radar sensor wire harness connector.

(3) Install the rear bumper assembly.

(4) Connect the negative battery cable.

5.3 Reversing Radar Sensor (Front Sensor)

■ **Removal**

⚠ Warning

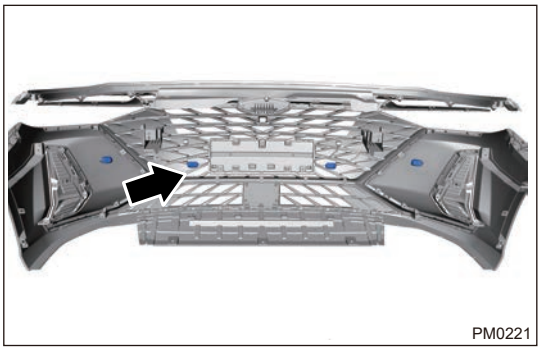
- **Be sure to wear necessary safety equipment to prevent accidents, when removing parking radar sensors.**
- **Operate carefully to avoid damaging parking radar sensors, when removing parking radar sensors.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

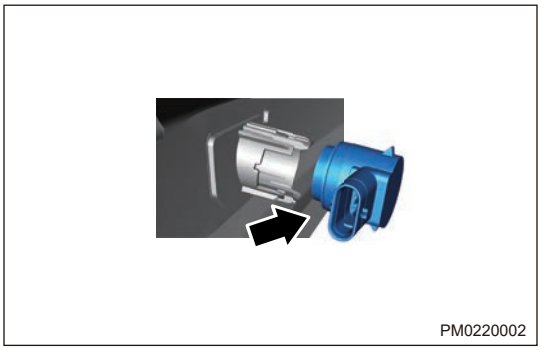
(2) Disconnect the negative battery cable.

(3) Remove the front bumper.

(4) Disconnect the parking radar sensor connector.



(5) Remove parking radar sensor from slot of front bumper assembly.



■ **Installation**

⚠ Warning

When installing parking radar sensor, align the boss at end of parking radar sensor with the slot on front bumper assembly, and then firmly install parking radar sensor.

Caution

- **Install connectors in place when installing parking radar sensors.**
- **Check parking radar system for proper operation, after installing parking radar sensors.**

(1) Install parking radar sensor to slots of front bumper assembly.
(2) Connect the parking radar sensor wire harness connector.
(3) Install the front bumper assembly.
(4) Connect the negative battery cable.

5.4 Rear Camera Assembly (If Equipped)

■ **Removal**

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing rear camera assembly.**
- **Appropriate force should be applied when removing rear camera assembly. Be careful not to operate roughly.**

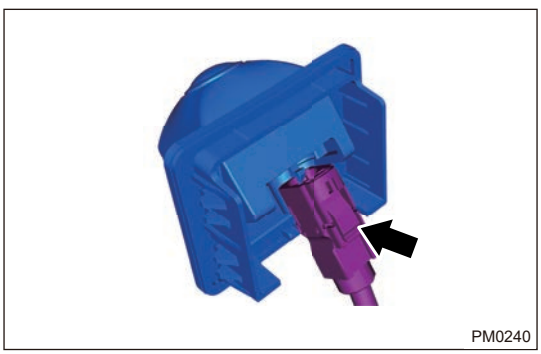
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the combination light assembly (Refer to Installation and Removal of Combination Light).

(4) Press camera connector clip by force.

(5) Disconnect the HD rear camera connector and remove the rear camera.



■ **Installation**

(1) Place the left side of HD rear camera in the installation position.
(2) Connect the HD rear camera wire harness connector.
(3) Install the combination light assembly.
(4) Connect the negative battery cable.

5.5 Front Camera Assembly (If Equipped)

■ **Removal**

⚠ Warning

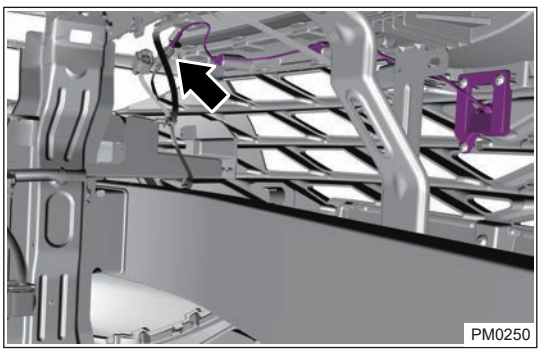
- **Be sure to wear necessary safety equipment to prevent accidents, when removing front camera assembly.**
- **Appropriate force should be applied when removing front camera assembly. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

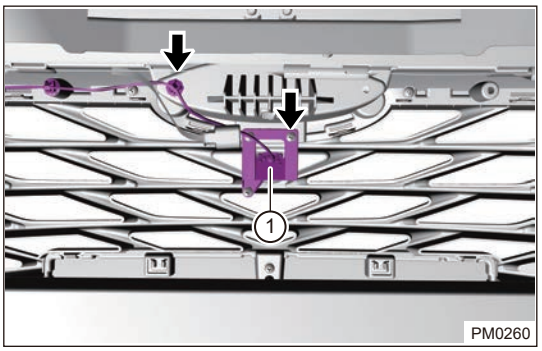
(2) Disconnect the negative battery cable.

(3) Remove the bumper assembly.

(4) Remove connector (arrow) from front camera.



(5) Remove bumper and remove 3 fixing bolts (arrow) from camera with a cross screwdriver, then pry off clips and remove camera (1).



■ **Installation**

(1) Install the HD camera assembly to the front bumper assembly.
(2) Install 3 fixing bolts to the HD camera assembly.
(3) Connect the HD camera assembly wire harness connector.
(4) Install the front bumper assembly.
(5) Connect the negative battery cable.

5.6 Side Camera Assembly (Both Sides) (If Equipped)

■ Removal (Take left side as an example)

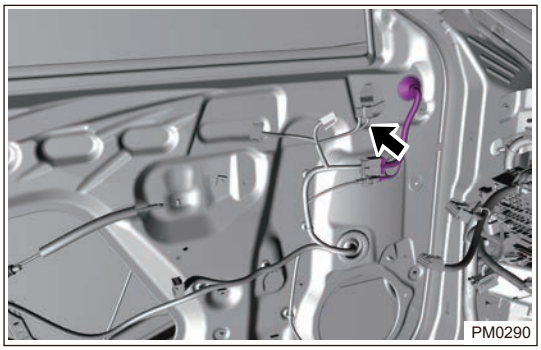
⚠ Warning
As side camera is installed inside the outside rear view mirror assembly, it must be replaced together with outside rear view mirror assembly when damaged.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

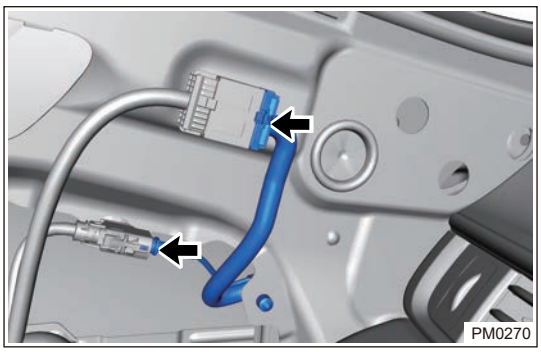
(2) Disconnect the negative battery cable.

(3) Remove the front left door protector assembly.

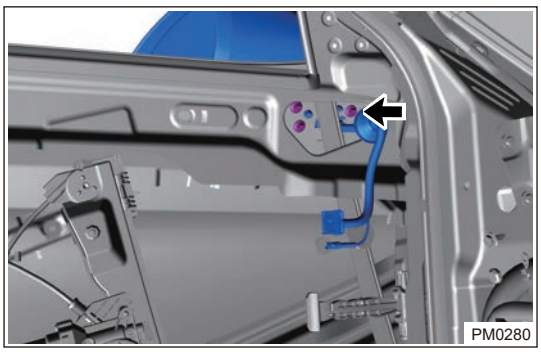
(4) Remove the front left door inner panel.



(5) Disconnect the left outside rear view mirror connector.



(6) Remove 3 fixing bolts from left outside rear view mirror.



(7) Remove the left outside rear view mirror assembly.

■ **Installation**

⚠ Caution

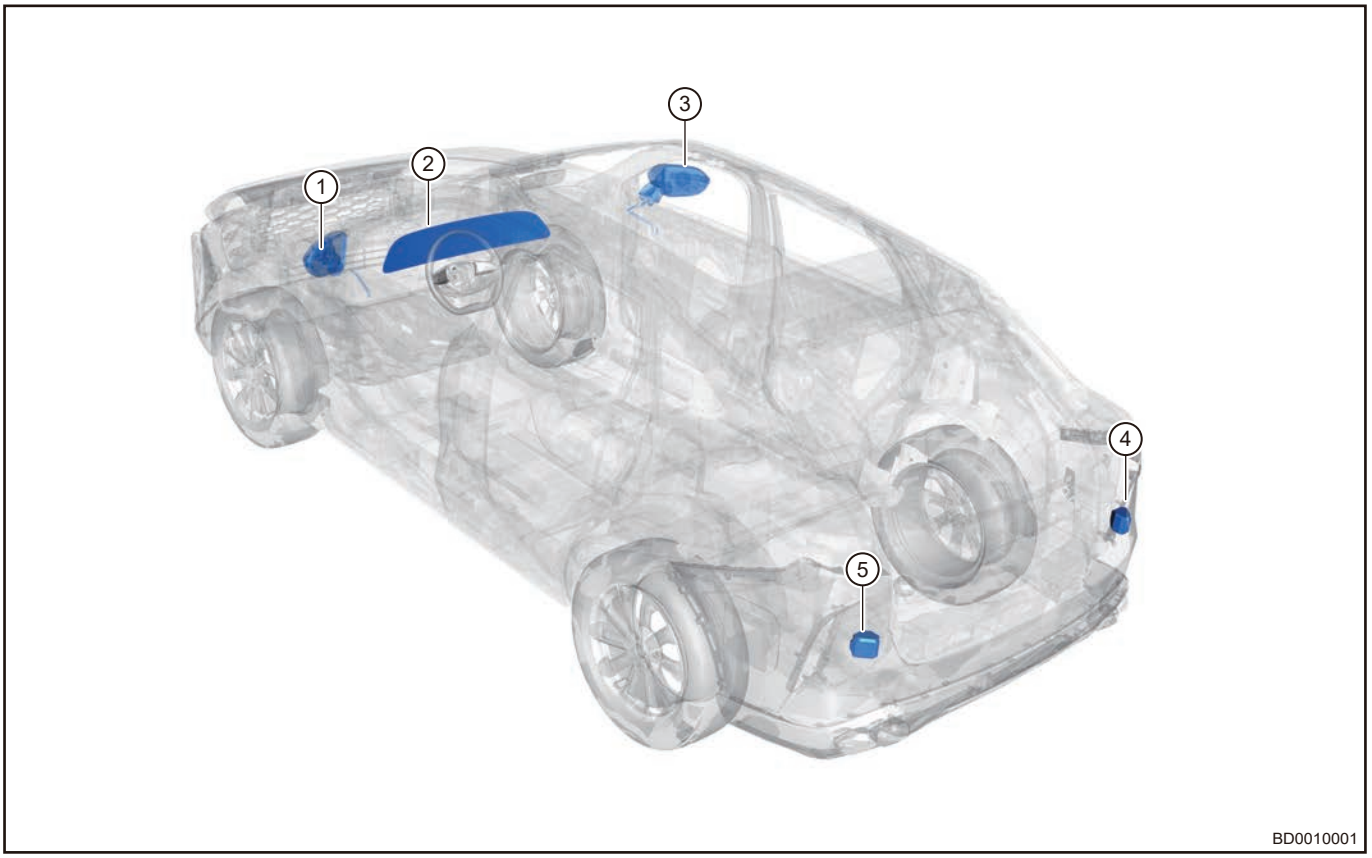
- **Install connector in place and tighten fixing nuts to the specified torque, when installing the outside rear view mirror assembly.**
- **Make sure the outside rear view mirror assembly can move smoothly, flexibly and reliably after installing.**
- **After installing outside rear view mirror assembly, it is necessary to perform panoramic image calibration.**

(1) Place the left outside rear view mirror in the installation position.
(2) Install 3 fixing bolts to the outside rear view mirror.
Tightening torque: 7 ± 1 N·m
(3) Connect the outside rear view mirror connector.
(4) Install the front left door inner panel.
(5) Install the front left door protector assembly.
(6) Connect the negative battery cable.

10.17 BLIND SPOT DETECTION SYSTEM

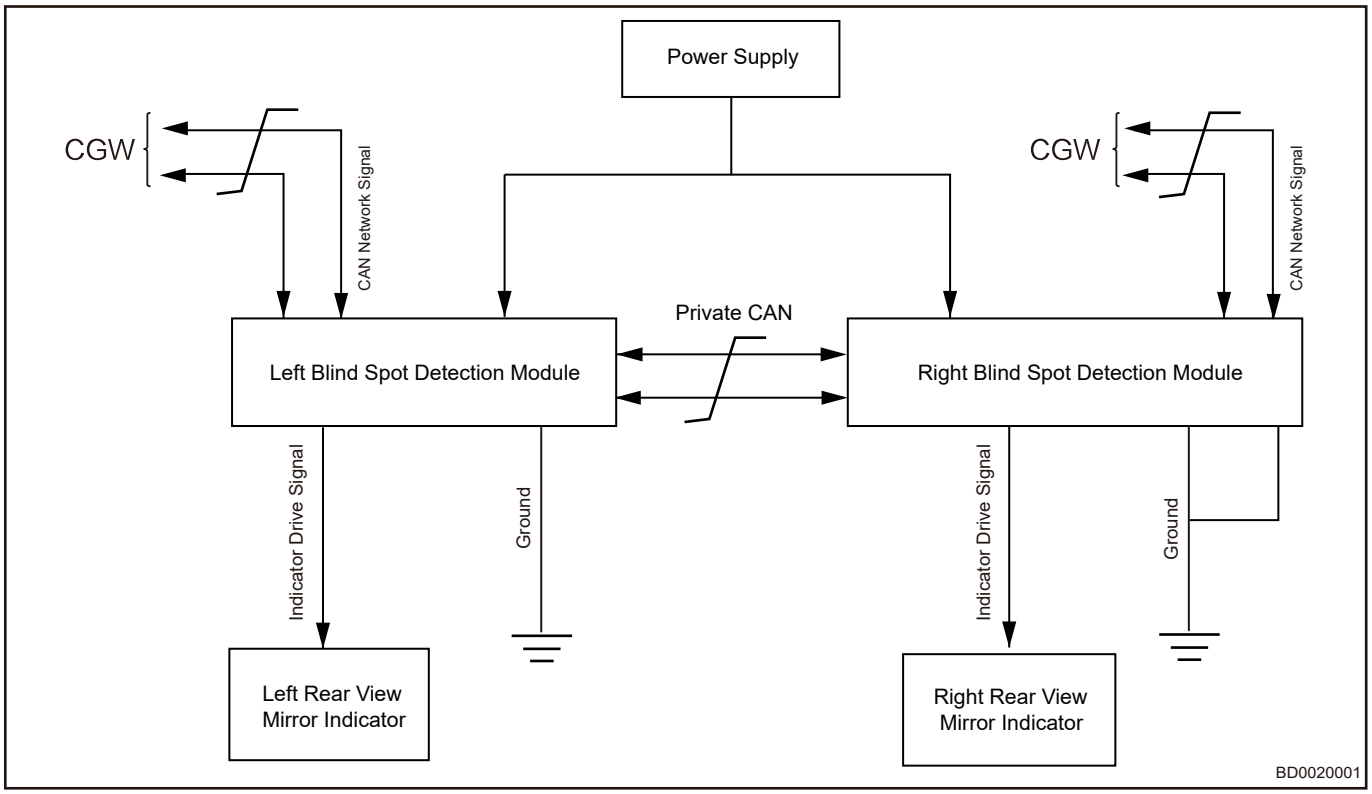
1 System Overview

1.1 System Description



1	Left LED Light	2	Hyperscreen
3	Right LED Light	4	Sub Blind Spot Detection Module
5	Master Blind Spot Detection Module		

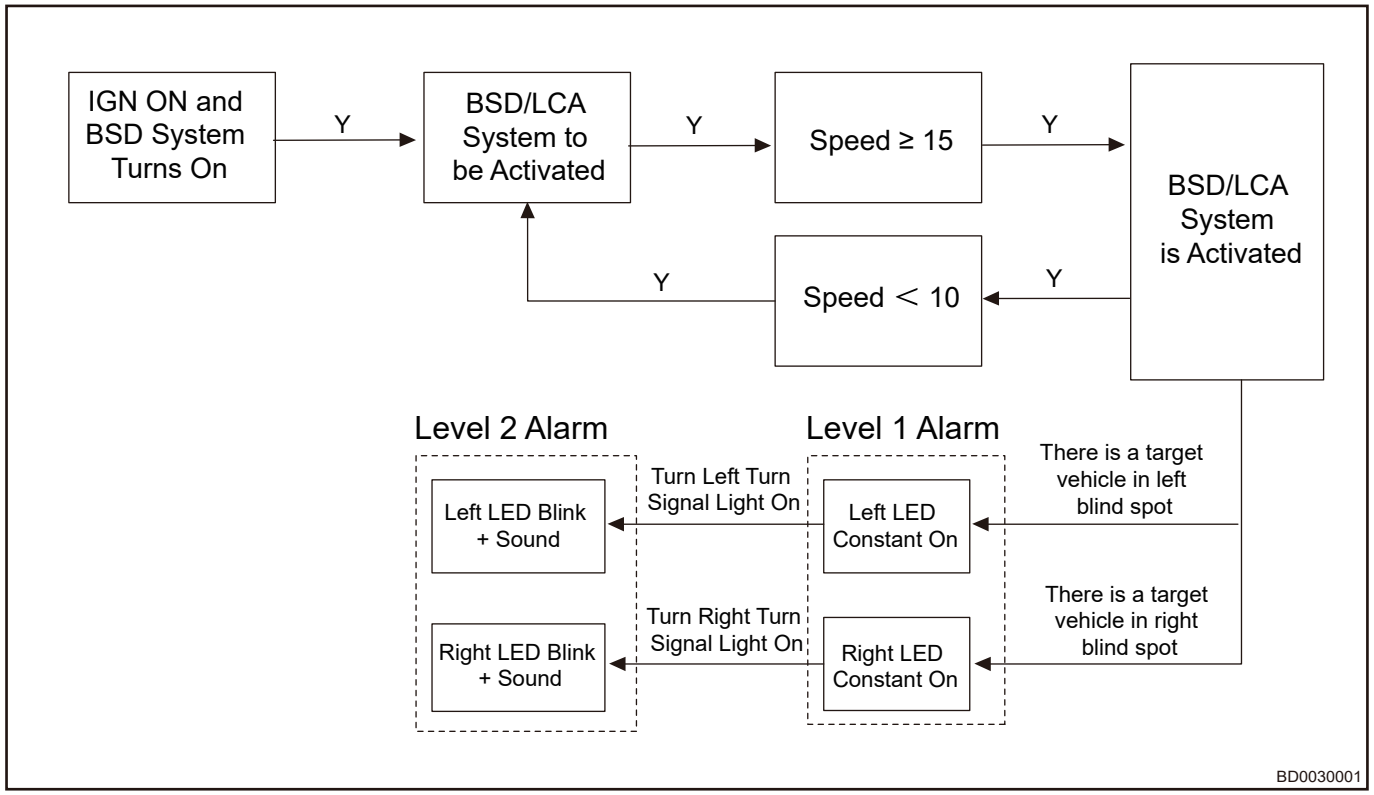
1.2 System Principle



Blind spot detection (BSD), door open collision warning system (DOW) and rear approach warning system (RCW) are turned on/off by audio head unit. Main blind spot detection radar/sub blind spot detection radar collects wheel speed signal, door open signal, gear signal, turn signal light signal and ENGINE START STOP switch status signal through CAN line. Outside rear view mirror LED indicator and rear door LED indicator operate and instrument cluster displays relevant warning information through data requirements analysis.

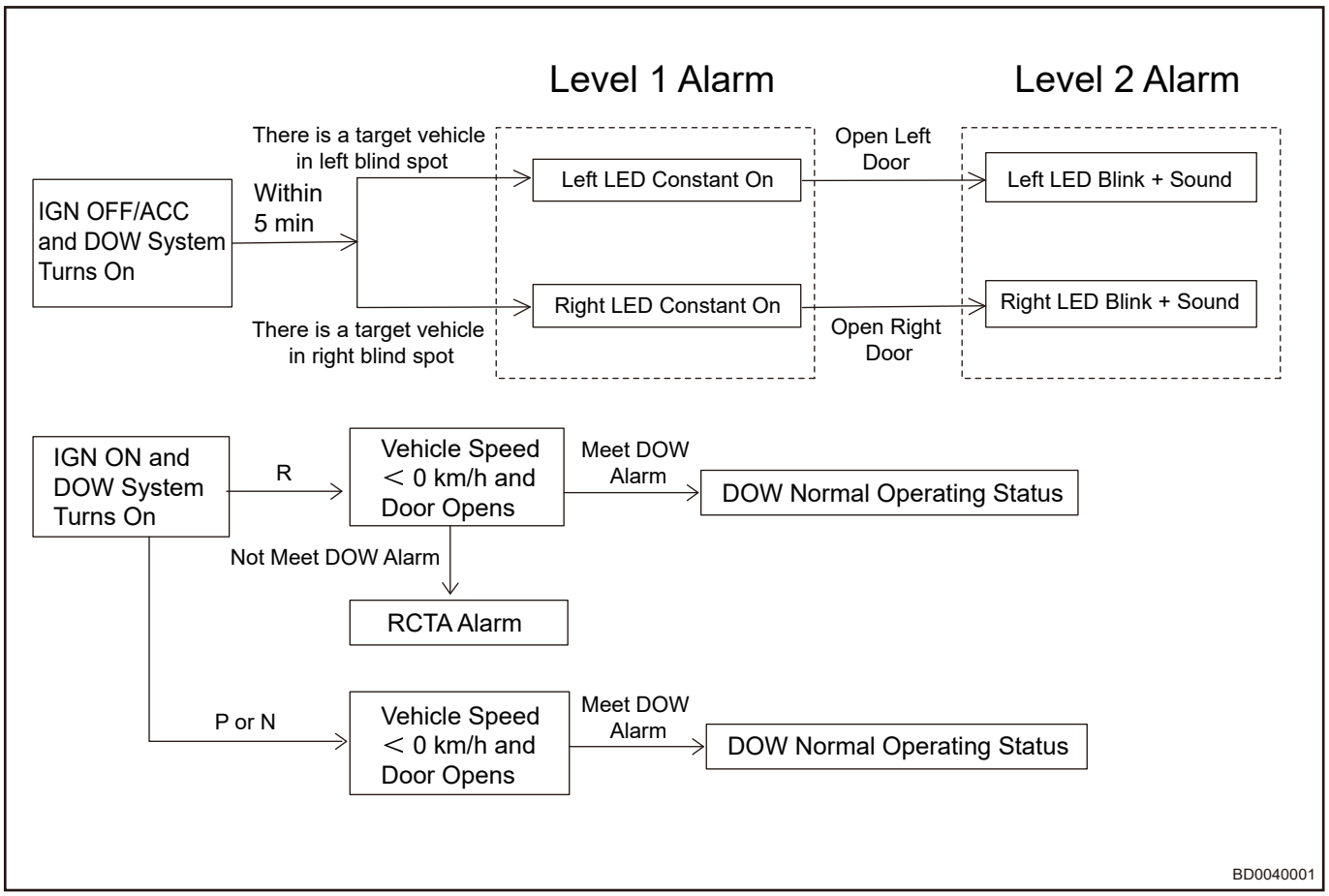
1.3 System Function

■ Blind Spot Detection (BSD)/Lane Change Assist (LCA)



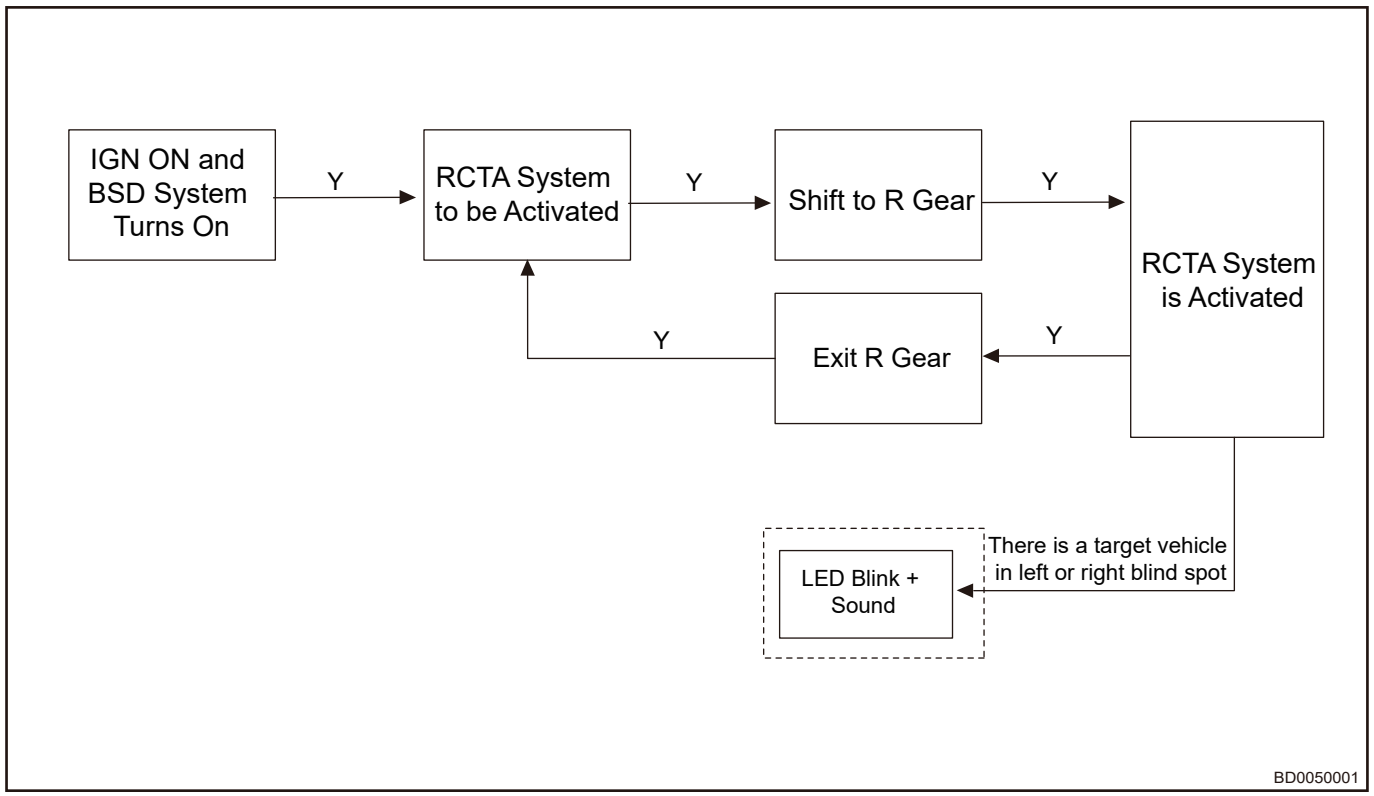
Blind spot detection/lane change assist monitors whether there are moving vehicles in the rear area of left and right sides of vehicle, and sends the information to driver to remind the driver to pay attention to driving safety and lane change safety. This system also extends door open collision warning system, rear cross traffic alert and rear approach warning system.

■ Door Open Collision Warning System (DOW)



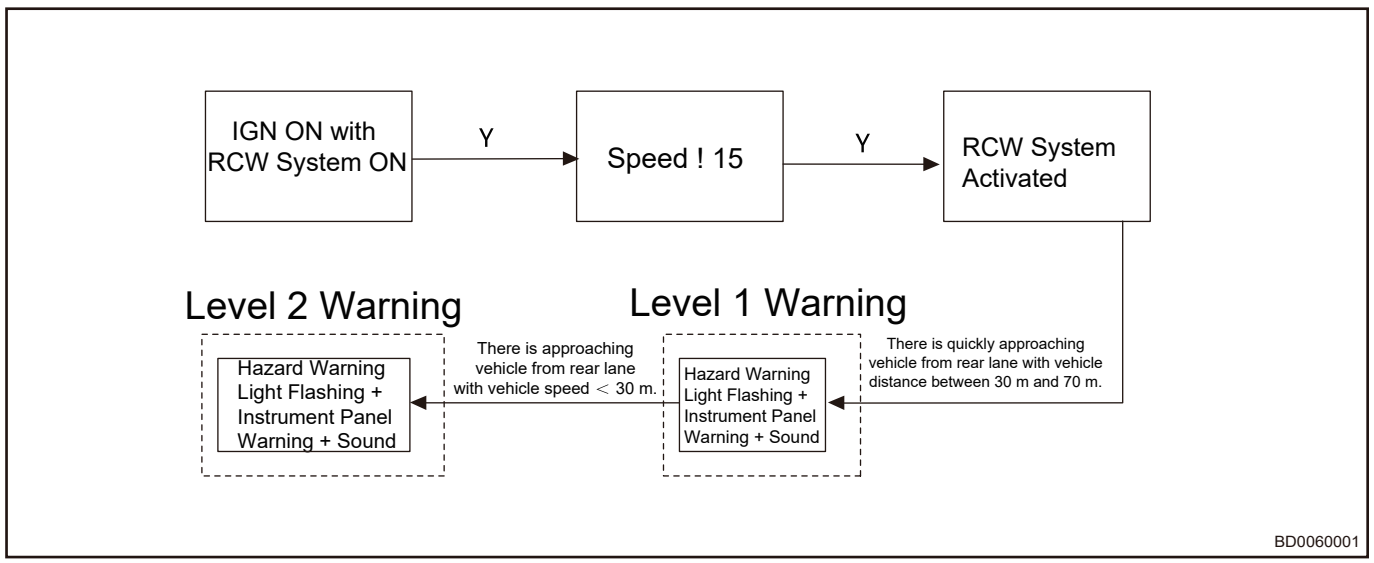
When the vehicle is stationary, blind spot detection detects that there are approaching vehicles on left and right sides and the door is opened, door open collision warning system will give an alarm to remind the driver/ occupant to pay attention to the vehicle from rear side when exiting the vehicle to avoid collision.

■ **Rear Cross Traffic Alert (RCTA)**



When reversing (shift lever is in R), blind spot detection detects that there are approaching vehicles on left and right sides, it sends the information to driver to remind the driver to pay attention to the vehicle from rear side to avoid collision.

■ **Rear Approach Warning System (RCW)**



When driving, blind spot detection detects that there is a rapid approach in the rear of vehicle and there is a danger of rear collision with this vehicle, it sends the information to driver to remind the driver of this vehicle and following vehicle to avoid collision.

1.4 Component Operation Description

■ **Main/Sub Blind Spot Detection Radar**

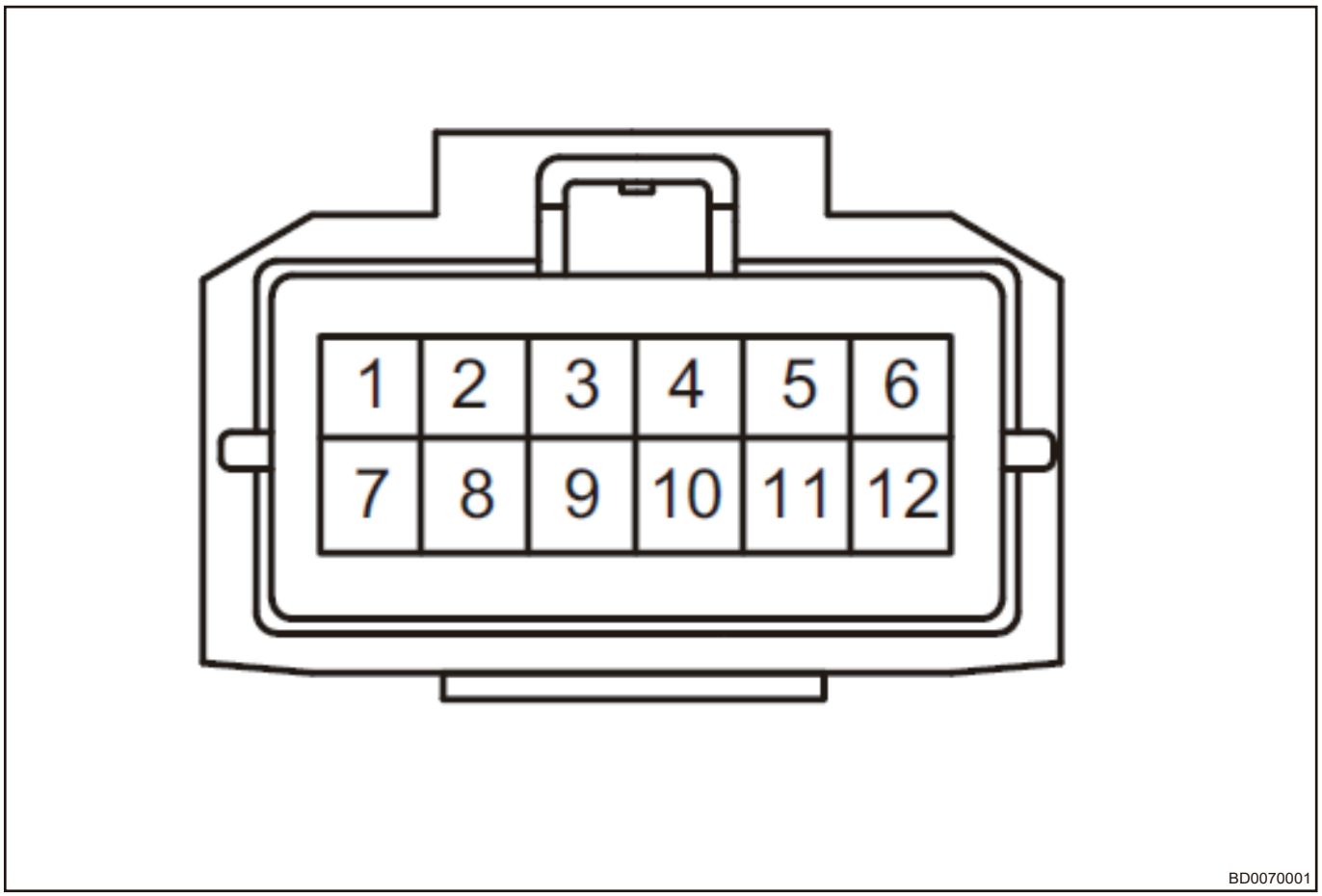
Blind spot detection system uses 77 GHz microwave radar technology to detect through the principle of ultrasonic reflection. Main/sub blind spot detection radar sends out ultrasonic and receives back wave from

obstacle, control module calculates obstacle position and distance according to ultrasonic distance measuring principle, and sends data to display terminal to remind.

2 System Circuit Diagram

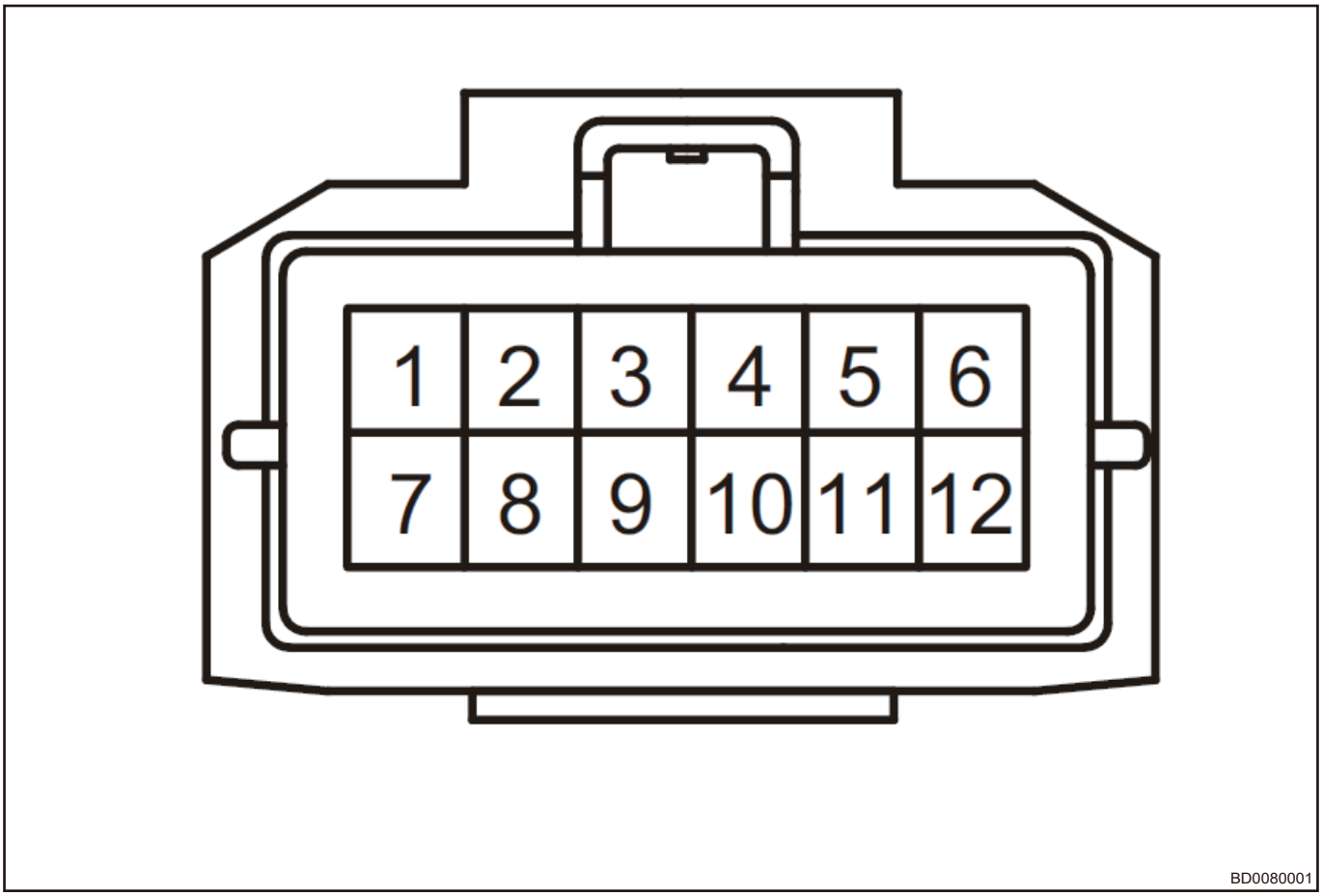
2.1 Blind Spot Detection Module Terminal Definition

■ **Main Blind Spot Detection**



PIN	Description	PIN	Description
1	DA-CAN H	2	DA-CAN L
3	Internal CAN-H	4	Internal CAN-L
5	-	6	-
7	Ground	8	KL30
9	Left Side BSD Indicator Signal	10	Front Left DOW Light (Optional)
11	Ground	12	-

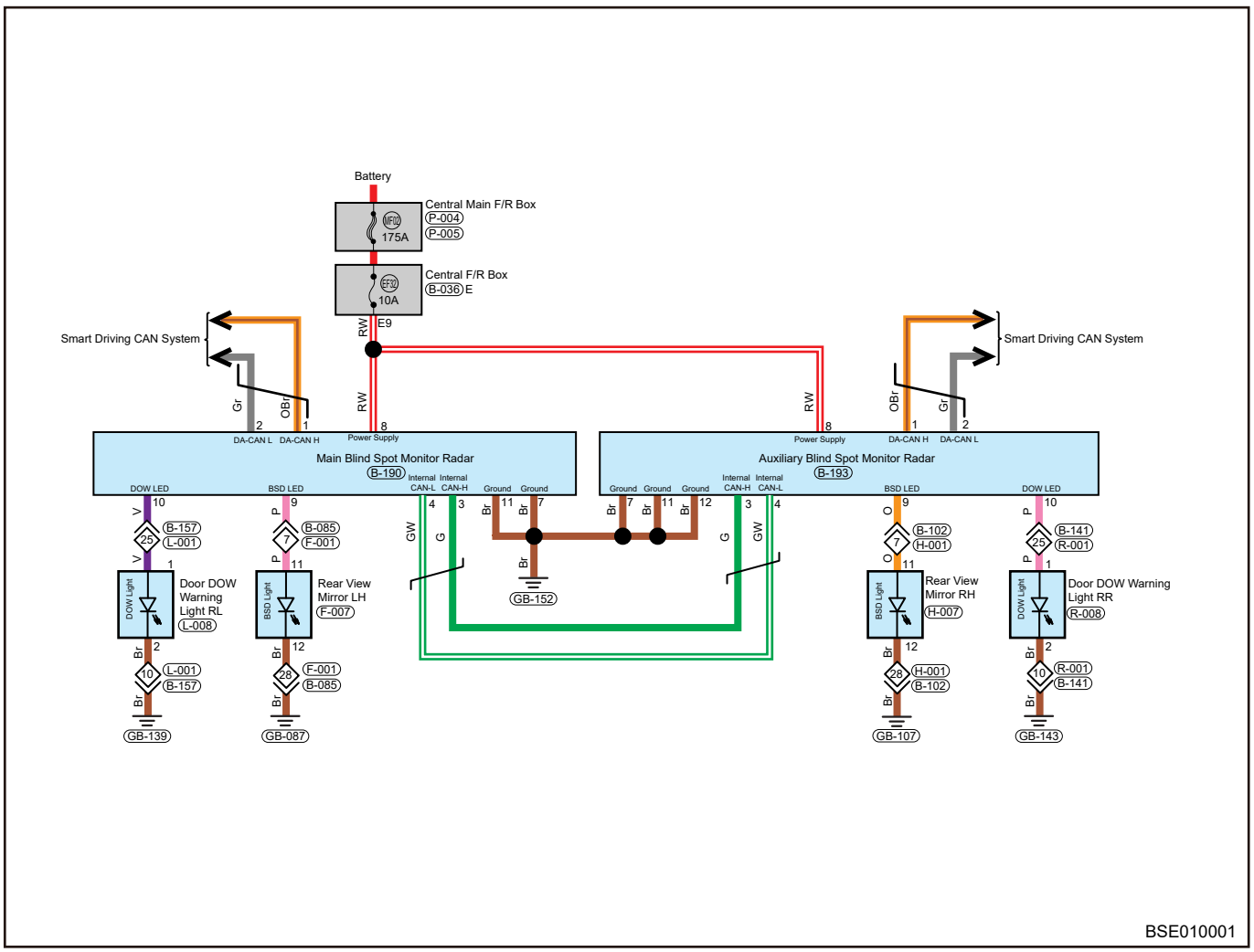
■ Sub Blind Spot Detection



PIN	Description	PIN	Description
1	DA-CAN H	2	DA-CAN L
3	Internal CAN-H	4	Internal CAN-L
5	-	6	-
7	Ground	8	KL30
9	Right Side BSD Indicator Signal	10	Front Right DOW Light (Optional)
11	Ground	12	Ground

2.2 Blind Spot Detection Module Circuit Diagram

■ Blind Spot Detection System



3 Matching Learning

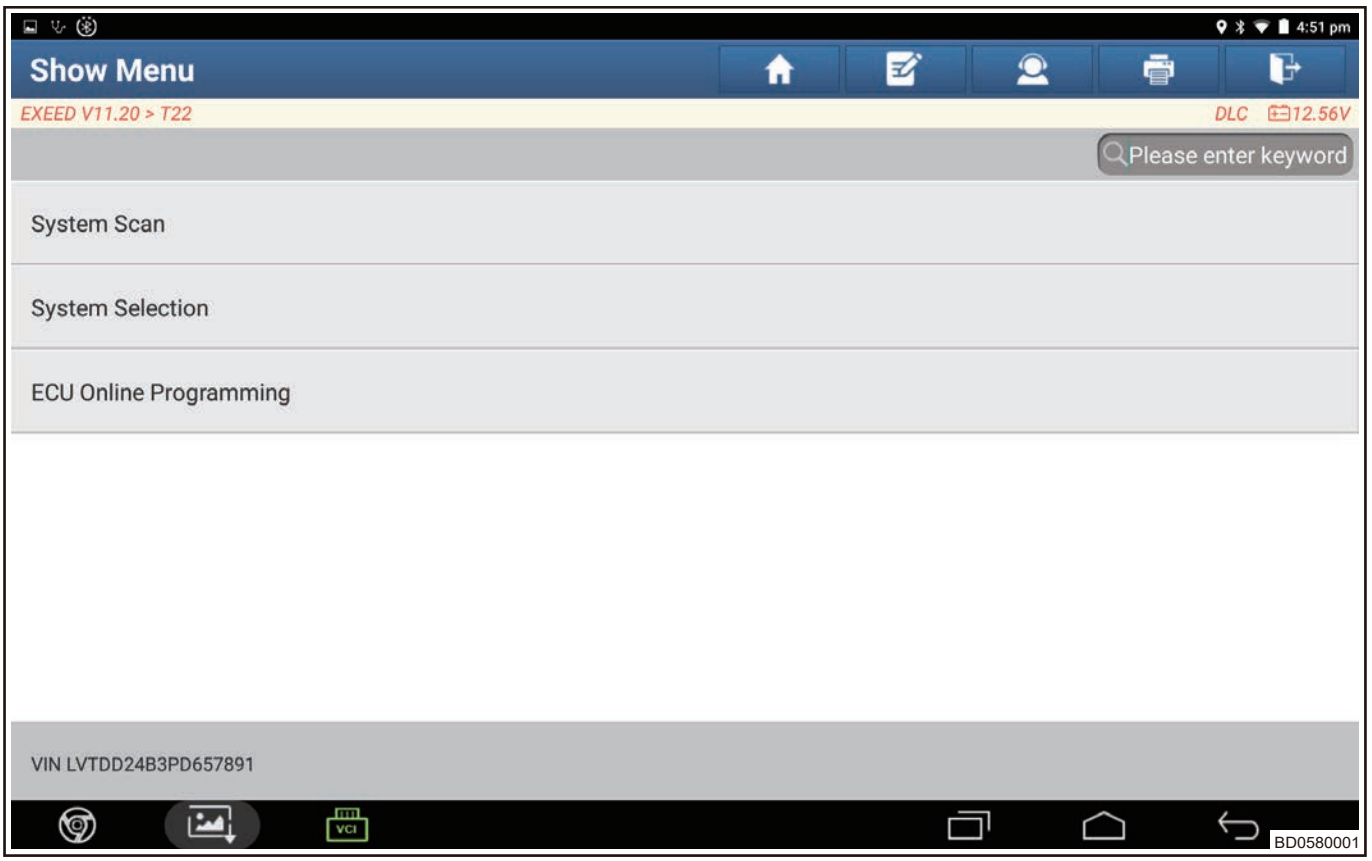
3.1 After-Sales Calibration

■ Left rear angle radar (calibration steps for left and right angle radars are the same)

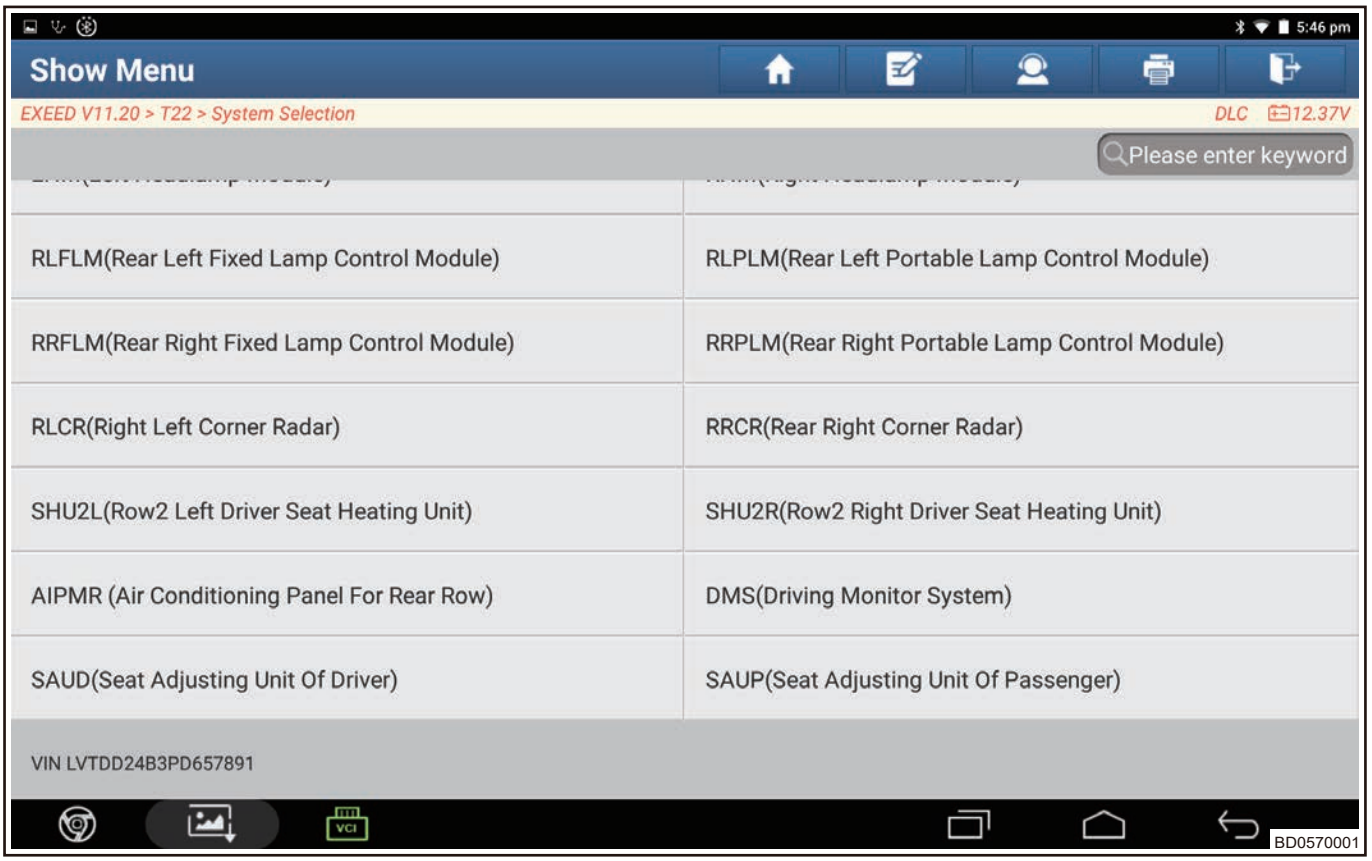
(1) Connect the diagnostic tester.

(2) Select “T22” model.

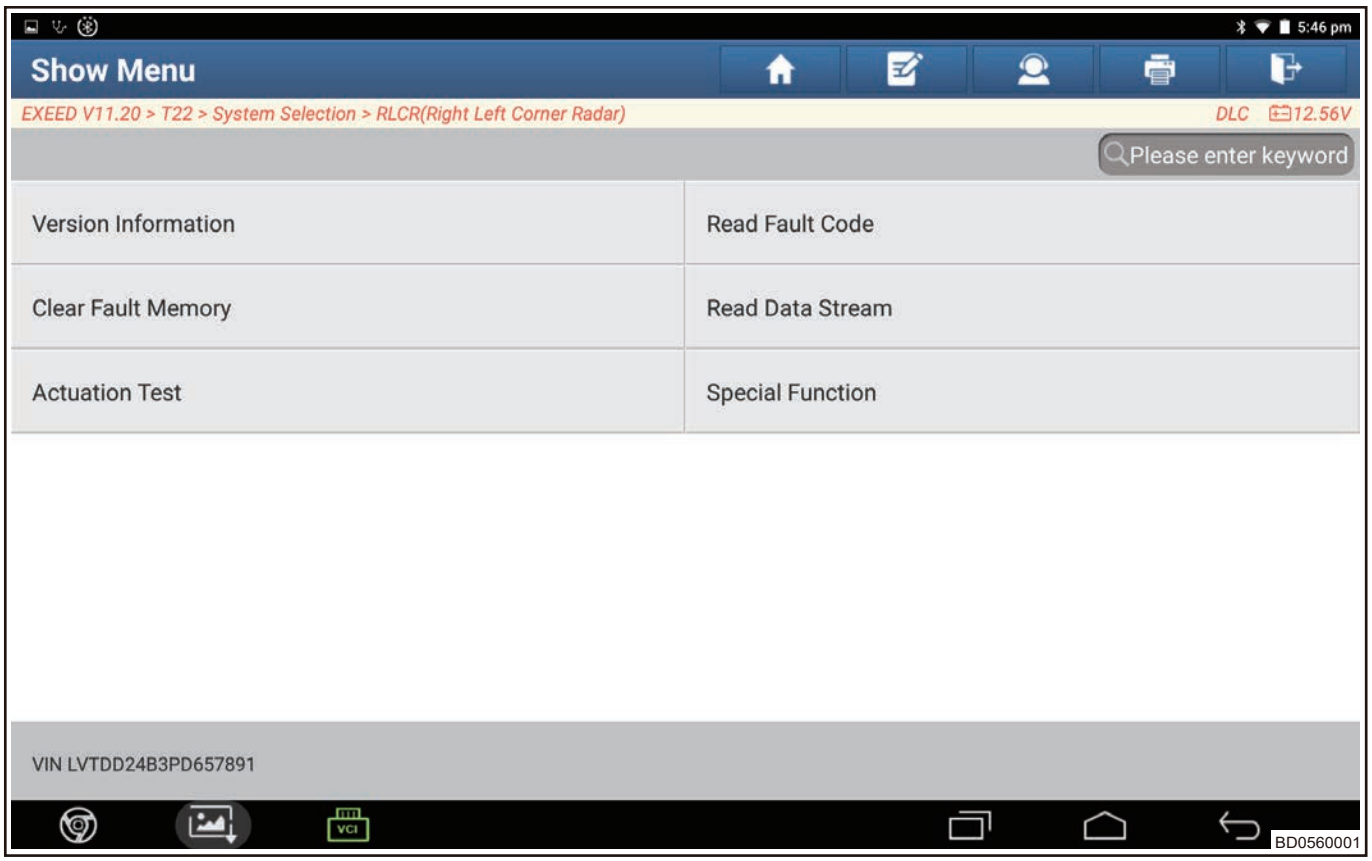
(3) Click “System Selection”.



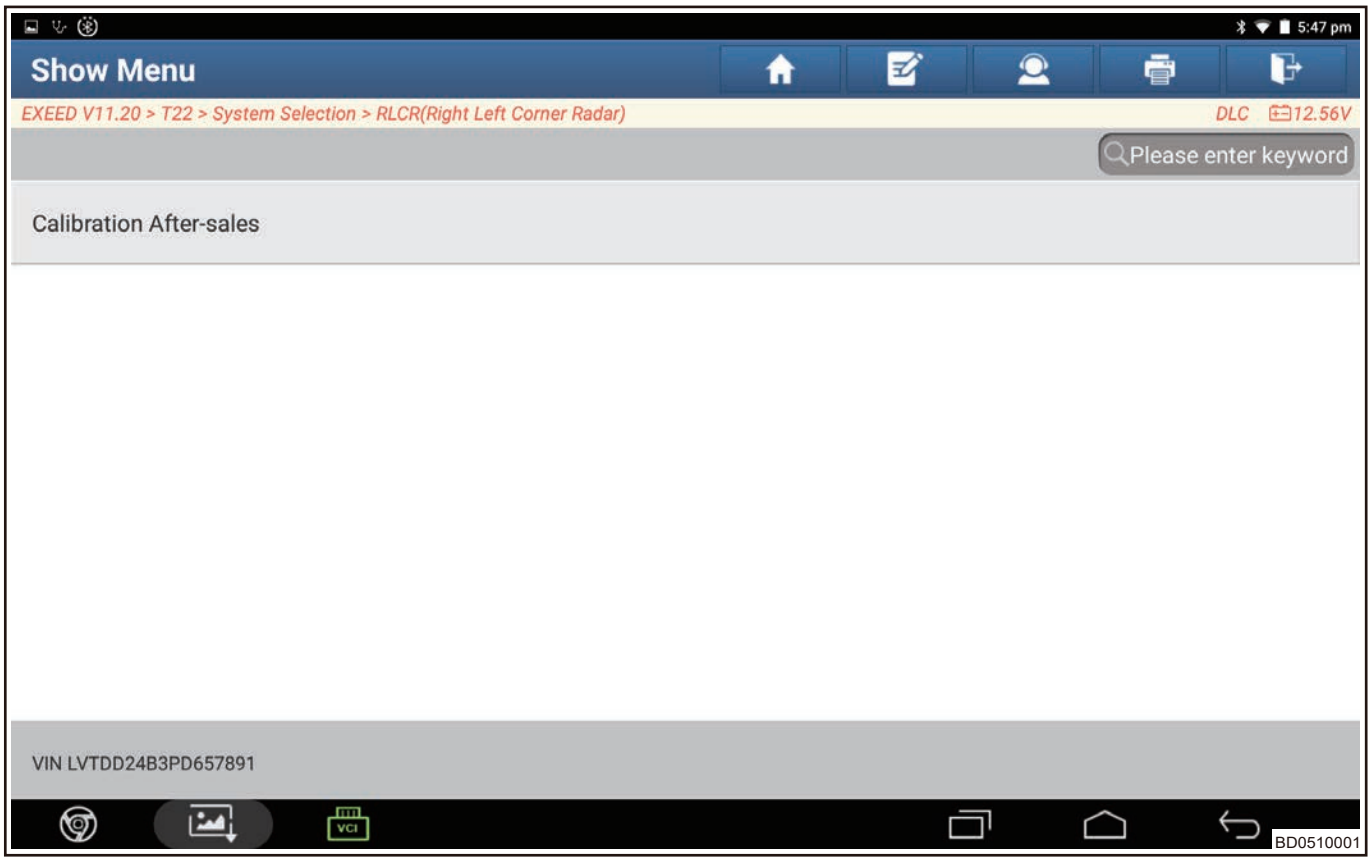
(4) Select “RLCR (Rear Left Corner Radar)”.



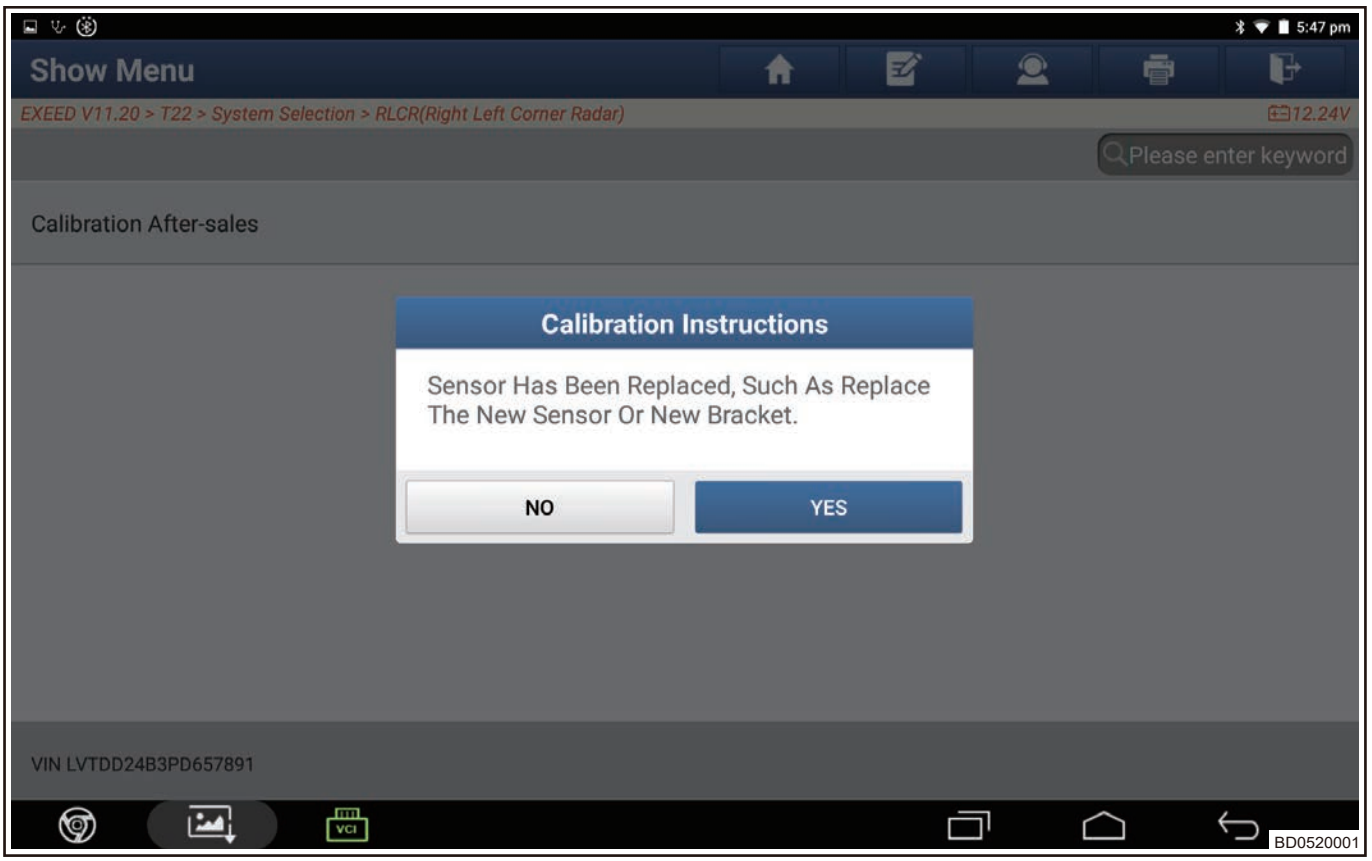
(5) Select “Special Function”.



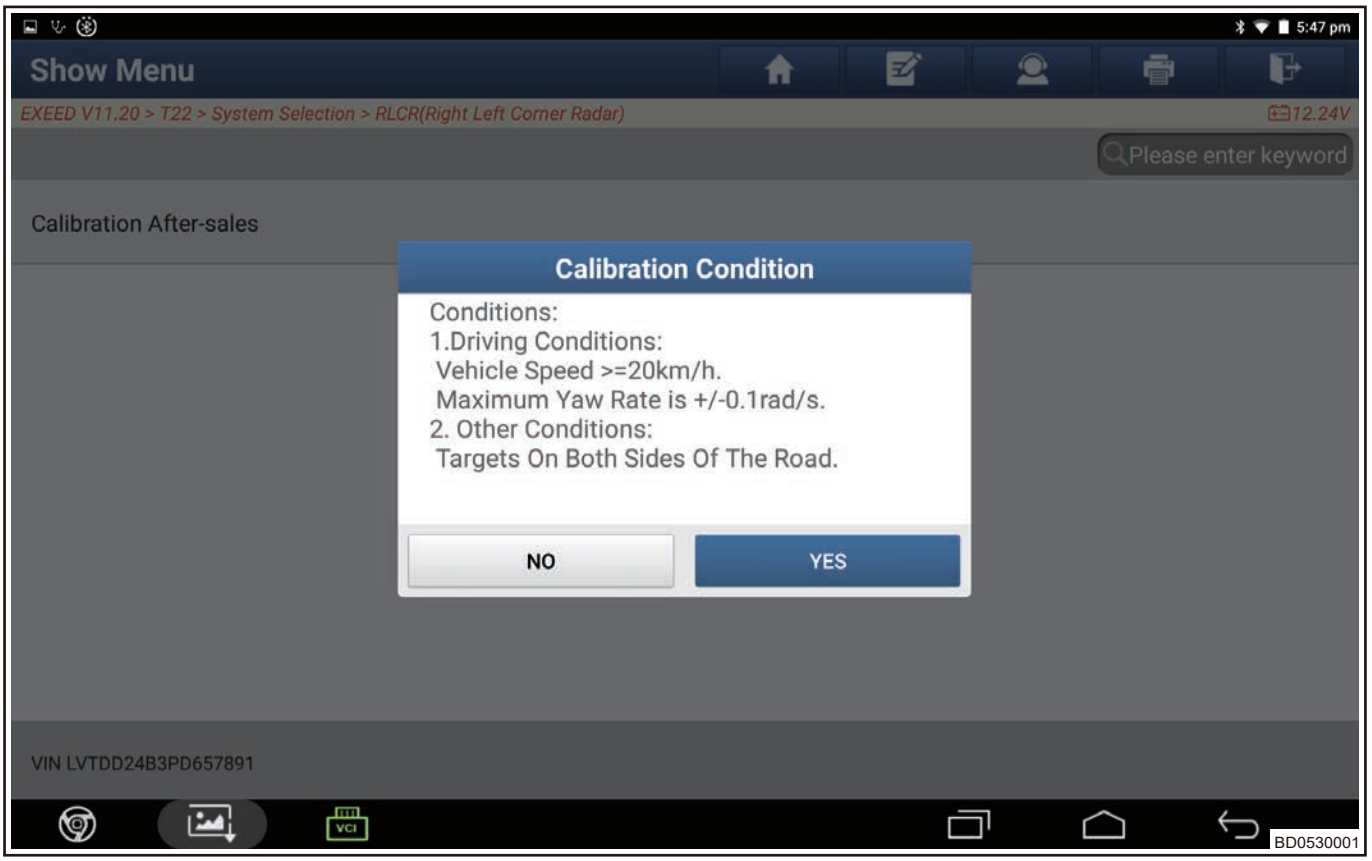
(6) Click "Calibration After-sales".



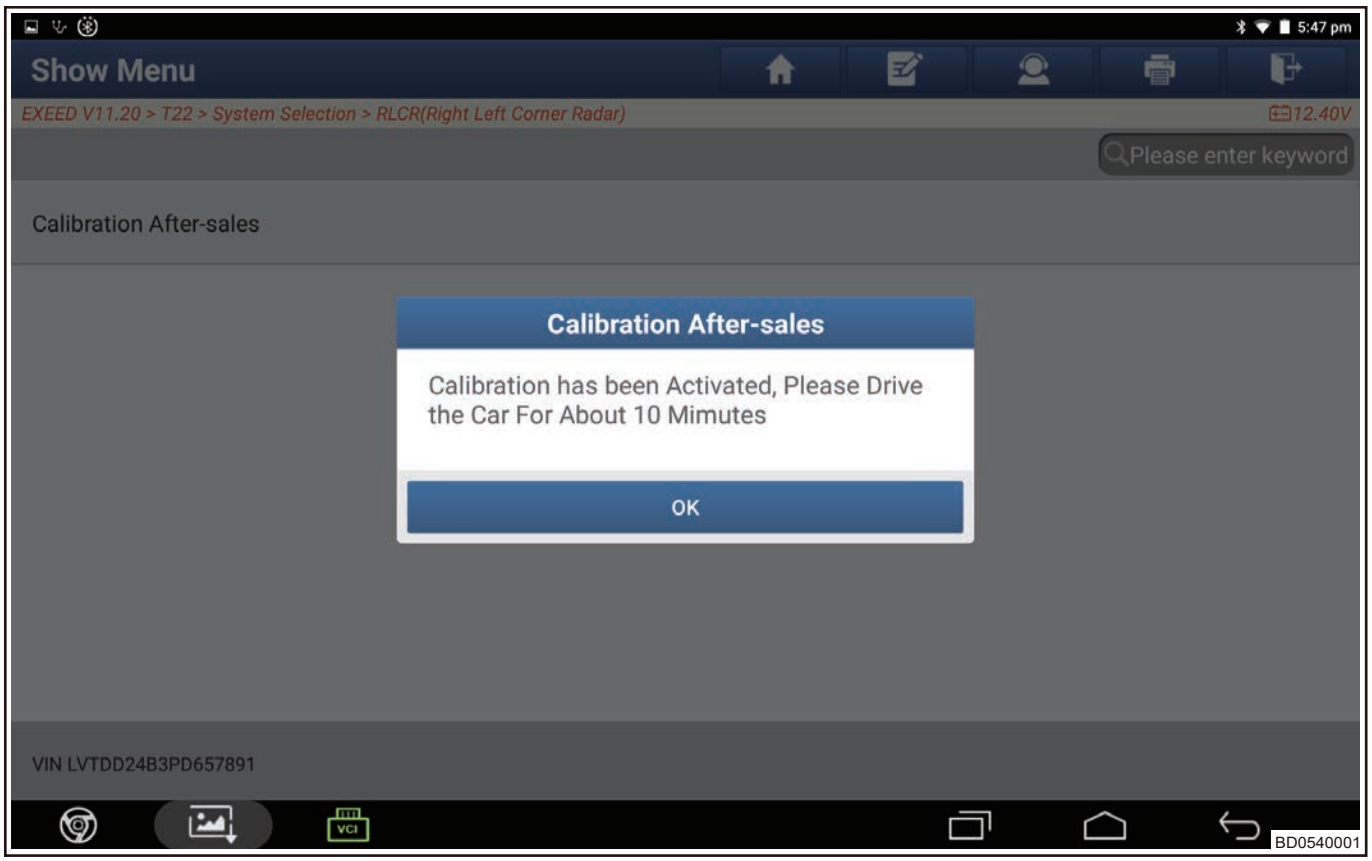
(7) Read calibration description and click “YES”.

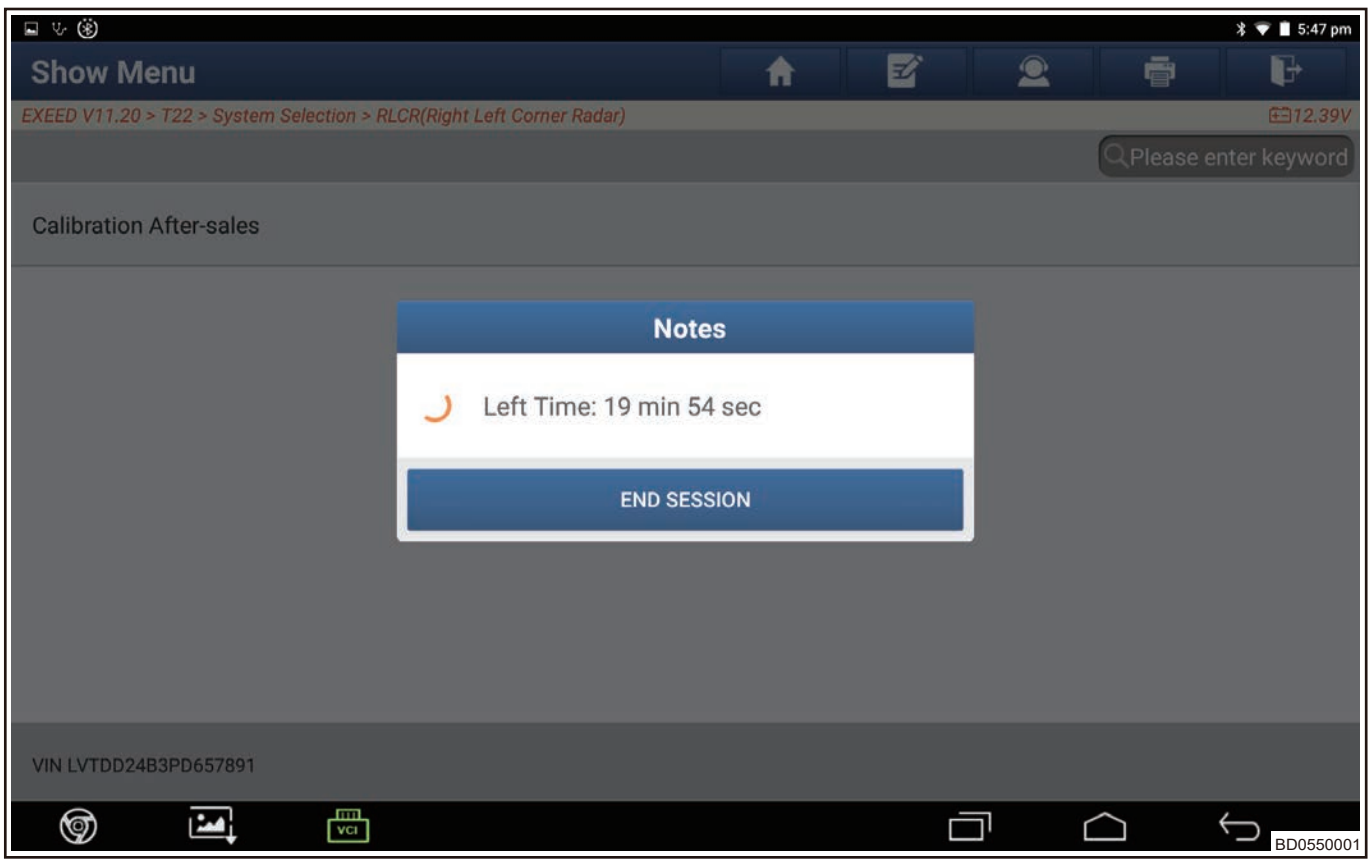


(8) Read calibration condition and click “YES”.



(9) Follow the prompts to start calibration.


5:47 pm
Show Menu
EXEED V11.20 > T22 > System Selection > RLCR(Right Left Corner Radar)
12.40V
Please enter keyword
Calibration After-sales
Calibration After-sales
Calibration has been Activated, Please Drive the Car For About 10 Mimutes
OK
VIN LVTDD24B3PD657891
VCI
BD0540001


5:47 pm
Show Menu
EXEED V11.20 > T22 > System Selection > RLCR(Right Left Corner Radar)
12.39V
Please enter keyword
Calibration After-sales
Notes
Left Time: 19 min 54 sec
END SESSION
VIN LVTDD24B3PD657891
VCI
BD0550001

4 Diagnosis & Testing

4.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
Blind spot detection (BSD) malfunction indicator comes on	Fuse
	Wire harness fault
	Main/sub blind spot detection radar
Blind spot detection (BSD) operates abnormally	Main/sub blind spot detection radar
	Main/sub blind spot detection radar is obstructed or shielded
CAN network failure	Fuse
	Wire harness fault
	Central Gateway (CGW)
	Main/sub blind spot detection radar

4.2 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

(1) Turn ENGINE START STOP switch to OFF.
(2) Connect diagnostic tester (the latest software) to diagnostic interface.
(3) Connect diagnostic tester (the latest software) to diagnostic interface.
(4) Use the diagnostic tester to record and clear DTCs stored in the blind spot detection system.
(5) Turn ENGINE START STOP switch to OFF and wait several seconds.
(6) Turn ENGINE START STOP switch to ON, and then select read DTC.
(7) If DTC is detected, it indicates current malfunction. Go to inspection procedure - Step 1.
(8) If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.3 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all system grounds related to the latest DTCs.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.4 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.

- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Inspect components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.5 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.6 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1700-16	Power Supply Under Volt	/	Battery, alternator or wire harness	Check battery, alternator or wire harness
C1701-17	Battery Voltage Is High	/	Battery, alternator or wire harness	Check battery, alternator or wire harness
C1702-76	Radar Installation Angle Failure	/	Installation is incorrect	Check installation of BSD
C1703-11	LED Short Circuit Malfunction	/	Outside rear view mirror indicator or wire harness	Please check outside rear view mirror BSD indicator
C1704-92	Radar Blockage	/	Radar is blocked	Please remove objects covered on the radar surface
C1705-56	Configuration Invalid	/	Software configuration is incorrect	Please check software configuration
C1706－4B	System Over Temperature	/	Frequency chip temperature exceeds 130℃	Module failure
C1707－42	Internal Electronic Element Failure	/	RF fault or abnormal communication	Module failure
U0073-88	VCAN Bus Off	/	Refer to “CAN” system	Check CAN bus or replace ECU

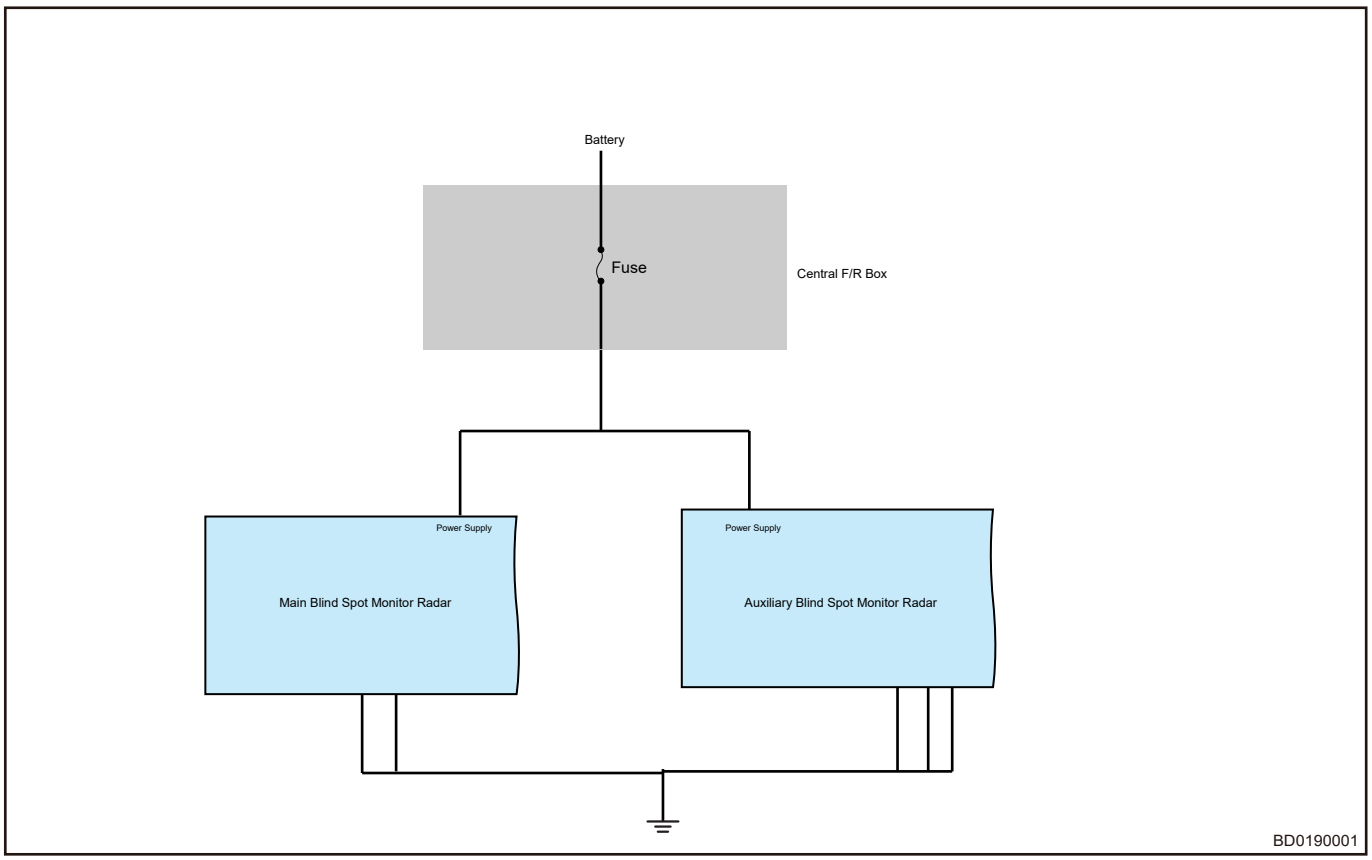
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U1162-87	Lost communication with FCM	/		Check CAN bus or replace ECU.
U0129-87	Lost Communication with BSM	/		Check CAN bus or replace ECU
U0140-87	Lost Communication with BCM	/		Check CAN bus or replace ECU
U0100-87	Lost Communication with EMS	/		Check CAN bus or replace ECU
U0155-87	Lost Communication with ICM	/		Check CAN bus or replace ECU
U0101-87	Lost Communication with TCU	/		Check CAN bus or replace ECU
U1405-81	Invalid Data Received from FCM	/		Check CAN bus or replace ECU
U0418-81	Invalid Data Received from BSM	/		Check CAN bus or replace ECU
U0422-81	Invalid Data Received from BCM	/		Check CAN bus or replace ECU
U0401-81	Invalid Data Received from EMS	/		Check CAN bus or replace ECU
U0423-81	Invalid Data Received from ICM	/		Check CAN bus or replace ECU
U0402-81	Invalid Data Received from TCU	/		Check CAN bus or replace ECU
U1010-88	Private CAN Bus off	/		Check CAN bus or replace ECU
U1198-87	Communication Interrupted with RLCR (Private CAN)	/		Check CAN bus or replace ECU
U1199-87	Communication Interrupted with RRCR (Private CAN)	/		Check CAN bus or replace ECU
U1438-81	Invalid Data Received from RLCR (Private CAN)	/		Check CAN bus or replace ECU
U1439-81	Invalid Data Received from RRCR (Private CAN)	/		Check CAN bus or replace ECU

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U3000-51	Calibration File Not Flash	/	Calibration file is not flashed	(1) Flash the correct software and calibration file. (2) Power on again and wait for 5 seconds. (3) Clear DTC (4) Read DTC. If no DTC outputs: ECU is reusable. If DTC is still in active state: (5) Replace ECU
U1300-55	Software Configuration Error	/	Not configured	Check vehicle CAN configuration

4.7 DTC Diagnosis Procedure

DTC	C1700-16	Power Supply Under Volt
DTC	C1701-17	Battery Voltage Is High

Schematic Diagram



■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check fuse

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check the fuse.

NG → **Replace fuse**

OK

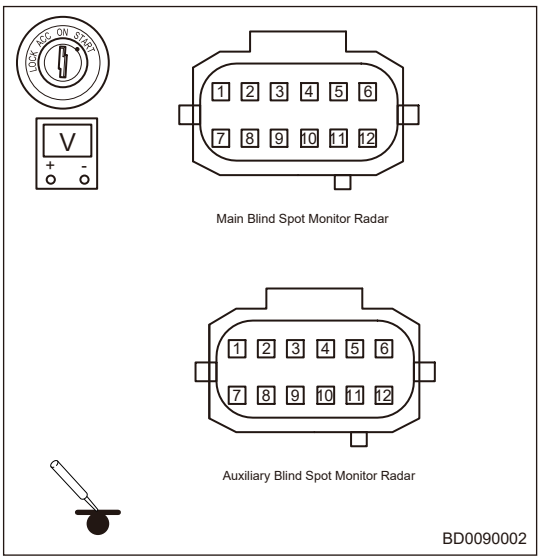
2	Check wire harness and connector

(a) Turn ENGINE START STOP switch to "OFF", and disconnect the negative battery cable.

(b) Disconnect main blind spot detection module connector and sub blind spot detection module connector.

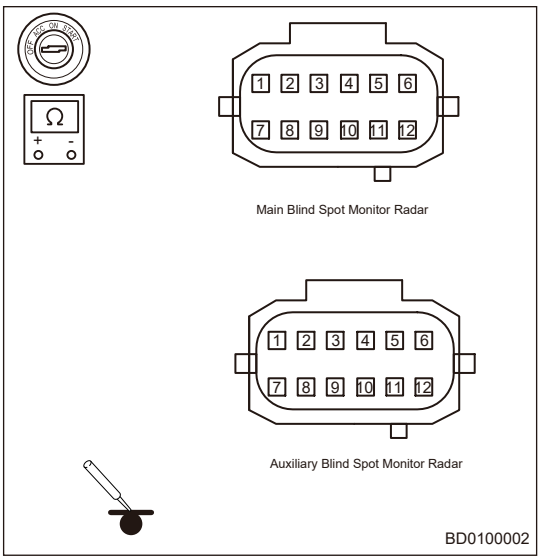
(c) Turn ENGINE START STOP switch to ON.

(d) Using voltage band of multimeter, check the voltage between main blind spot detection module power supply terminal and body ground, sub blind spot detection module power supply terminal and body ground separately.



Multimeter Connection	Condition	Specified Condition
Main blind spot detection module (- power supply terminal) - Body ground	ENGINE START STOP switch OFF	Not less than 12 V
Blind spot detection module (power supply terminal) - Body ground		Not less than 12 V

(e) Using ohm band of multimeter, check the resistance between main blind spot detection module ground terminal and body ground, sub blind spot detection module ground terminal and body ground separately.



Multimeter Connection	Condition	Specified Condition
Main blind spot detection module (- ground terminal) - Body ground	ENGINE START STOP switch OFF	⩽ 1 Ω
Sub blind spot detection module (- ground terminal) - Body ground		⩽ 1 Ω

NG	Repair or replace faulty wire harness

OK

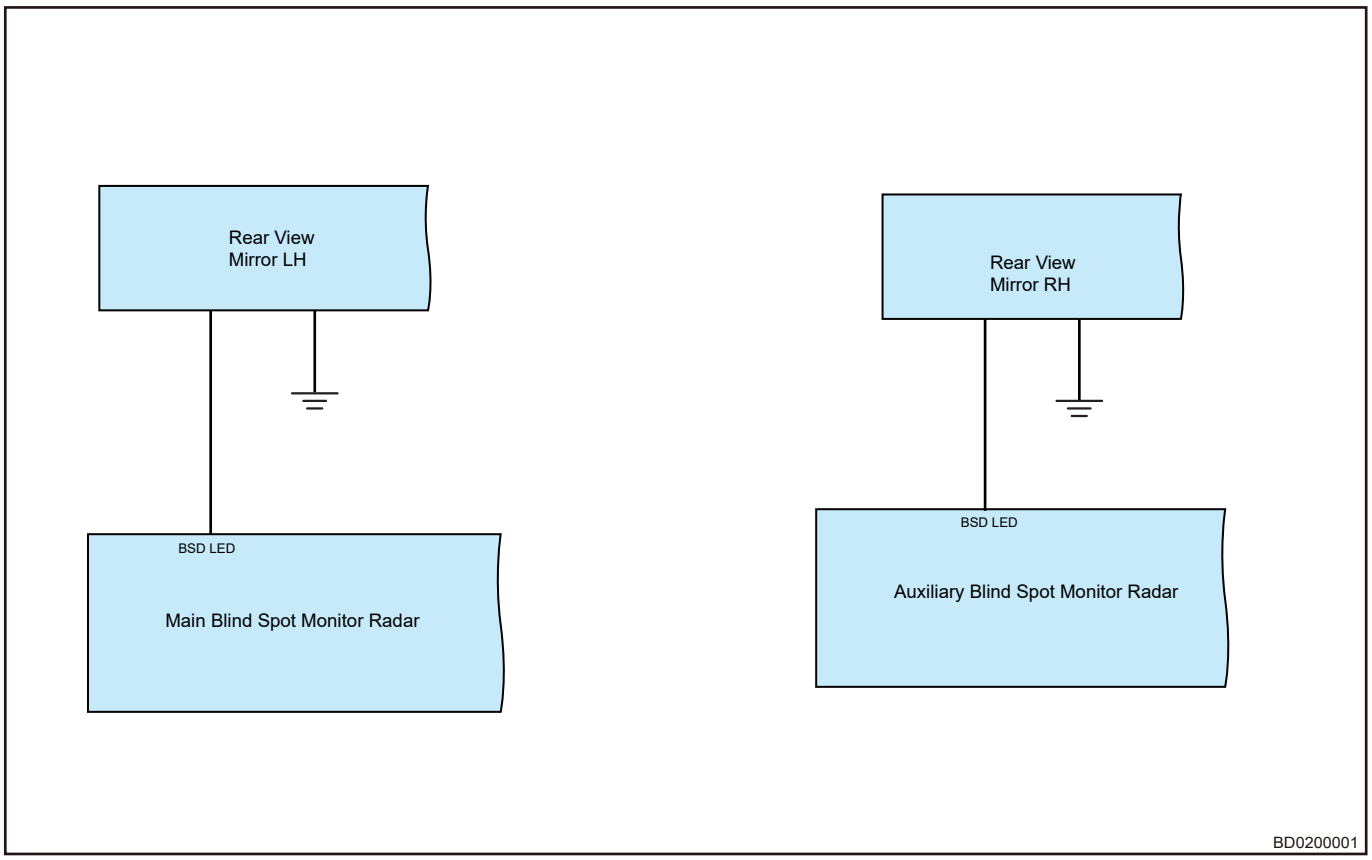
3	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal
NG	Replace main/sub blind spot detection module

DTC	C1703-11	LED Short Circuit Malfunction

System Schematic Diagram



■ DTC Confirmation Procedure

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

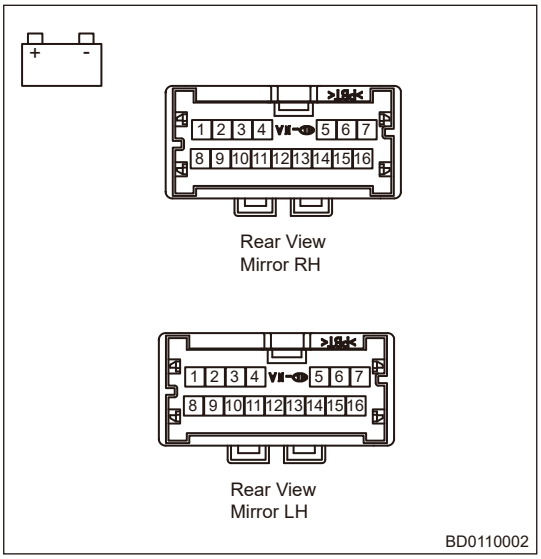
1	Check LED light

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn off all electrical equipment and ENGINE START STOP switch.

(b) Disconnect the negative battery terminal cable.

(c) Check if LED light comes on by connecting the positive battery cable to power supply terminal of front right power rear view mirror (power supply terminal of front left power mirror), and negative battery cable to ground terminal of left/right rear view mirror.



Multimeter Connection	Condition	Specified Condition
Left rear view mirror (power supply terminal) - Positive battery cable, left view mirror (ground terminal) - Negative battery cable	Always	LED light comes on
Right rear view mirror (power supply terminal) - Positive battery cable, right view mirror (ground terminal) - Negative battery cable		LED light comes on

NG → **Replace power rear view mirror/lens**

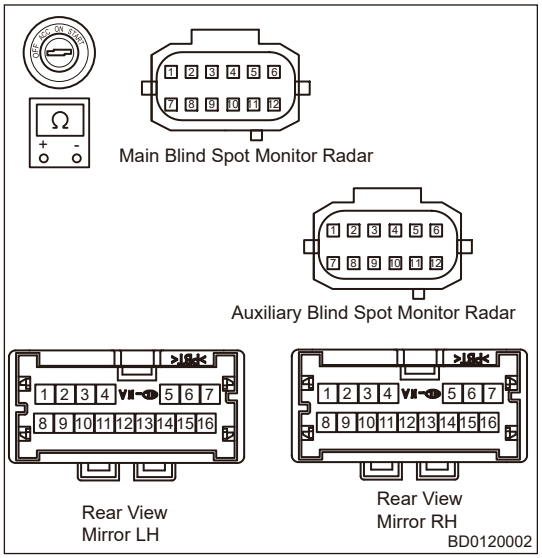
OK

2	Check wire harness and connector

(a) Disconnect main and sub blind spot detection module connectors and left and right rear view mirror connectors respectively.

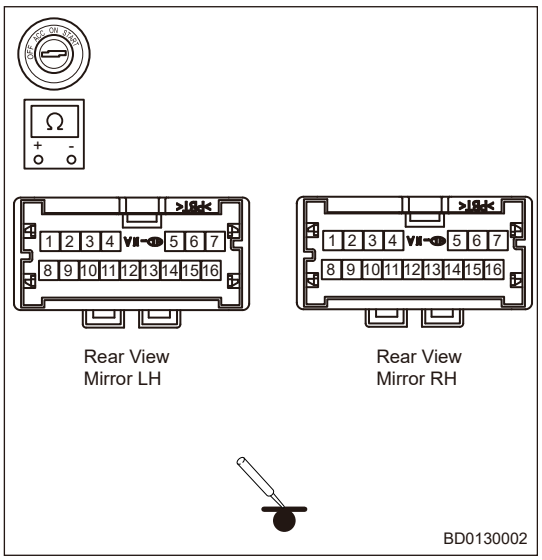
(b) Using ohm band of multimeter, check for continuity between main and sub blind spot detection modules, left and right rear view mirrors separately.

Multimeter Connection	Condition	Specified Condition
Main blind spot detection module (-connected terminal) - Left rear view mirror (11)	ENGINE START STOP switch OFF	⩽ 1 Ω
Sub blind spot detection module (-connected terminal) - Right rear view mirror (11)		⩽ 1 Ω



(c) Using ohm band of multimeter, check for continuity between left and right rear view mirror ground terminals and body ground separately.

Multimeter Connection	Condition	Specified Condition
Left rear view mirror (ground terminal) - Body ground	ENGINE START STOP switch OFF	⩽ 1 Ω
Right rear view mirror (ground terminal) - Body ground		⩽ 1 Ω



NG → **Repair or replace faulty wire harness**

OK

3	Confirm DTCs again

(a) Connect all the connectors.

(b) Connect the negative battery cable.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace blind spot detection module**

DTC	C1702-76	Radar Installation Angle Failure

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check installation of module

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn off all electrical equipment and ENGINE START STOP switch.

(b) Disconnect the negative battery terminal cable.

(c) Check module for improper installation.

NG → **Perform installation again**

OK

2	Confirm DTCs again

(a) Connect all the connectors.

(b) Connect the negative battery cable.

(c) Use diagnostic tester to clear DTCs.

(d) Start the engine.

(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace blind spot detection module**

DTC	C1704-92	Radar Blockage

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check module

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn off all electrical equipment and ENGINE START STOP switch.

(b) Disconnect the negative battery terminal cable.

(c) Check if module is covered.

NG	Remove obstruction

OK

2	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal
NG	Replace blind spot detection module

DTC	C1706 - 4B	System Over Temperature
DTC	C1707 - 42	Internal Electronic Element Failure

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check module

Use circuit diagram as a guide to perform the following inspection procedures:
(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery terminal cable.
(c) Check if module is damaged.

NG	Replace blind spot detection module

OK

2	Confirm DTCs again

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK	Confirm that system is normal

DTC	C1705-56	Configuration Invalid

■ **DTC Confirmation Procedure**

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTCs occur again.

NG → **Rematch module**

OK

2	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace with a new control module to check if fault reoccurs**

OK → **Conduct test and confirm malfunction has been repaired**

DTC	U0073-88	VCAN Bus Off
DTC	U1162-87	Lost communication with FCM
DTC	U0129-87	Lost Communication with BSM
DTC	U0140-87	Lost Communication with BCM
DTC	U0100-87	Lost Communication with EMS
DTC	U0155-87	Lost Communication with ICM
DTC	U0101-87	Lost Communication with TCU
DTC	U1405-81	Invalid Data Received from FCM
DTC	U0418-81	Invalid Data Received from BSM
DTC	U0422-81	Invalid Data Received from BCM
DTC	U0401-81	Invalid Data Received from EMS
DTC	U0423-81	Invalid Data Received from ICM
DTC	U0402-81	Invalid Data Received from TCU
DTC	U1010-88	Private CAN Bus off
DTC	U1198-87	Communication Interrupted with RLCR (Private CAN)
DTC	U1199-87	Communication Interrupted with RRCR (Private CAN)

DTC	U1438-81	Invalid Data Received from RLCR (Private CAN)
DTC	U1439-81	Invalid Data Received from RRCR (Private CAN)
DTC	U3000-51	Calibration File Not Flash
DTC	U1300-55	Software Configuration Error

■ **DTC Confirmation Procedure**

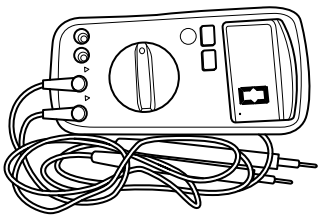
- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.
Refer to CAN communication system.

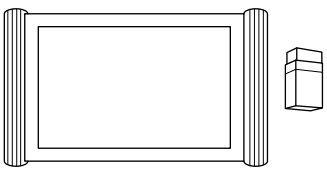
5 On-vehicle Service

5.1 Tools

■ **General Tool**

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006

■ **Special Tool**

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

5.2 Master Blind Spot Detection Module

■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing main blind spot detection module.**
- **Operate carefully to prevent damage to blind spot detection module, when removing main blind spot detection module.**
- **Removal and installation steps of main and sub blind spot detection modules are the same. Take main blind spot detection module as an example.**

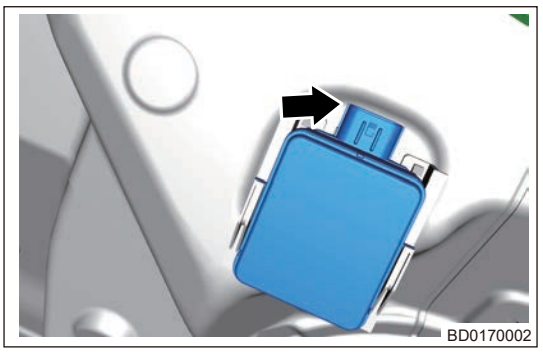
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

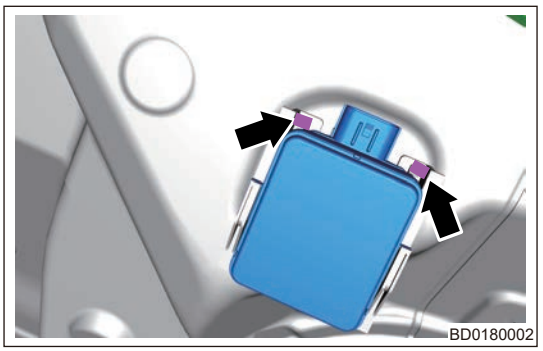
(3) Remove the rear bumper assembly.

(4) Remove the main blind spot detection radar module.

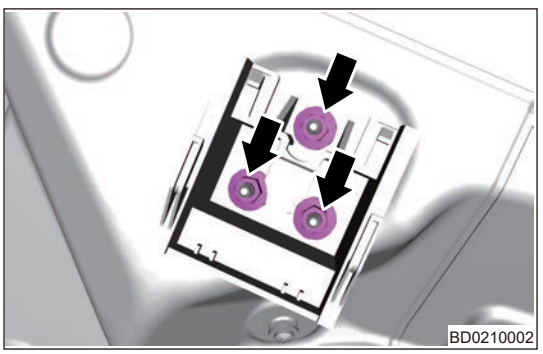
1) Disconnect the main blind spot detection radar module connector.



2) Press fixing clips from main blind spot detection module, and remove main blind spot detection module.



3) Remove 3 fixing nuts from blind spot detection module bracket, and remove the bracket.



■ **Installation**

⚠ Caution

- **Install connector in place, when installing blind spot detection module.**
- **Check blind spot detection module system for proper operation, after installing blind spot detection module.**
- **When sheet metal paint operation is performed on the rear bumper, there should not be a sudden change in the thickness of rear bumper. Dielectric constant of paint ＜ 100: (Thickness of paint is less than 15 um, weight of metal component is about 7%) dielectric constant of paint ＜ 50 (Thickness of paint is less than 45 um)**

(1) Install the blind spot detection module bracket.
(2) Tighten 3 fixing bolts of blind spot detection module bracket.
(3) Install main blind spot detection module to bracket.
(4) Connect the main blind spot detection module wire harness connector.
(5) Install the rear bumper assembly.
(6) Connect the negative battery cable.

10.18 FATIGUE MONITORING SYSTEM

1 Warnings and Precautions

1.1 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Be sure to wear necessary safety equipment to prevent accidents, when removing fatigue monitoring system component.

(2) Appropriate force should be applied when removing fatigue monitoring system component. Be careful not to operate roughly.

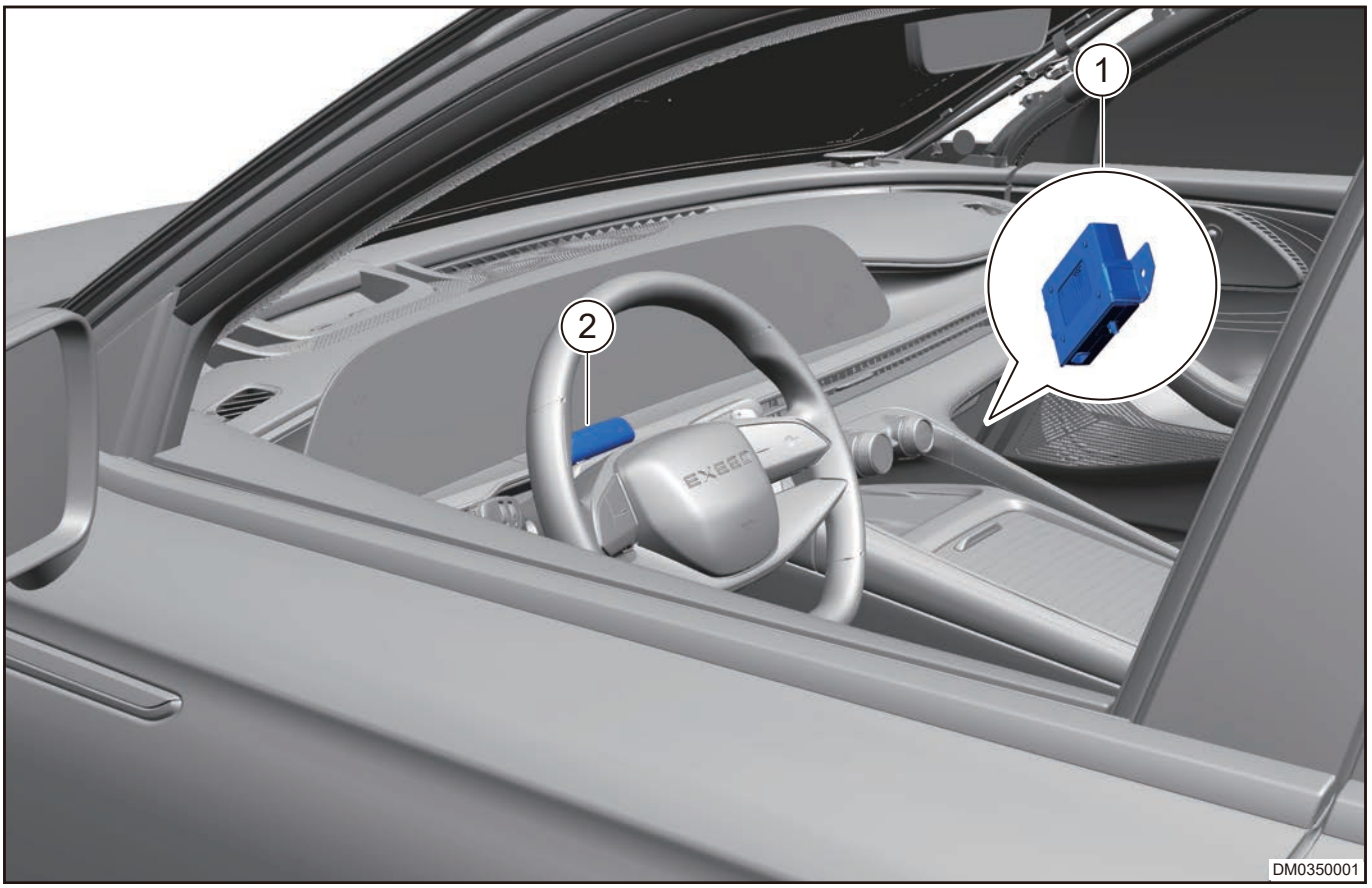
(3) Try to prevent interior and body paint surface from being scratched when removing fatigue monitoring system component.

2 System Overview

2.1 System Description

Driver Monitoring System (DMS) uses infrared cameras arranged in the cabin to monitor the driver's driving state in real time, and uses interior camera to collect driver's face images (such as yawning, closing eyes, nodding, etc.) and line of sight area information in real time, so as to detect and judge the driver's state in real time.

2.2 System Components Diagram



1	DMS Controller	2	DMS Camera

2.3 Function Introduction

■ Fatigue monitoring

(1) By monitoring the driver's facial expression, eye closure and blinking frequency, it can judge whether the driver is tired.

(2) Improve the driver's fatigue state through a certain interactive way; Automatically search nearby service areas and navigate.

■ Distraction monitoring (line of sight tracking)

(1) By tracking the driver's line of sight, it determines the driver's gaze area and whether he/she is distracted from driving.

(2) According to the driver's line of sight, it enables driver gaze partitioning and supports multi-mode interaction.

(3) As an autopilot takeover status input.

2.4 Warning Strategy

(1) Mild fatigue prompt scenario: When the DMS module detects that the vehicle speed is higher than 10 km/h and the driver is in a mild fatigue state, the DMS output signal (DMS_1_DrvrAbnormStAlrm== Drowsycted) & (DMS_1_DrvrFatiLvl==Drowsycted).

(2) Moderate fatigue prompt scenario: When the DMS module detects that the vehicle speed is higher than 10 km/h and the driver is in a moderate fatigue state, the DMS output signal (DMS_1_ DrvrAbnormStAlrm== Microsleep) & (DMS_1_DrvrFatiLvl== Microsleep).

(3) Severe fatigue prompt scenario: When the DMS module detects that the vehicle speed is higher than 10 km/h and the driver is in a severe fatigue state, the DMS outputs signal (DMS_1_DrvrAbnormStAlrm== Asleep) & (DMS_1_DrvrDistrLvl== Asleep).

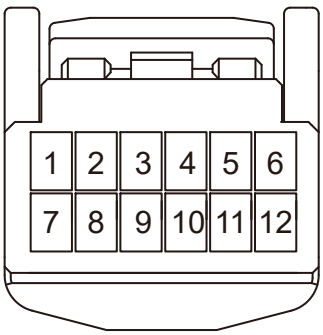
(4) Driver short-time distraction reminding scenario: When DMS module detects that the vehicle speed is higher than 20 km/h and the driver is in a short-time distraction state, the DMS output signal (DMS_1_ DrvrAbnormStAlrm== distributed) & (DMS_1_DrvrDistrLvl== distributed).

(5) Driver long-term distraction reminder: When DMS module detects that the vehicle speed is higher than 20 km/h and the driver is in a long-term distraction state, the DMS output signal (DMS_1_ DrvrAbnormStAlrm== Long Distracted) & (DMS_1_DrvrDistrLvl== Long Distracted).

(6) Driver unresponsive reminder: When the DMS module detects that the vehicle speed is higher than 20 km/h and the driver is in an unresponsive state, the DMS output signal (DMS_1_ DrvrAbnormStAlrm = = Unresponsive) & (DMS_1_ DrvUnrspvSt== Unresponsive).

3 System Circuit Diagram

3.1 Module Terminal Definition

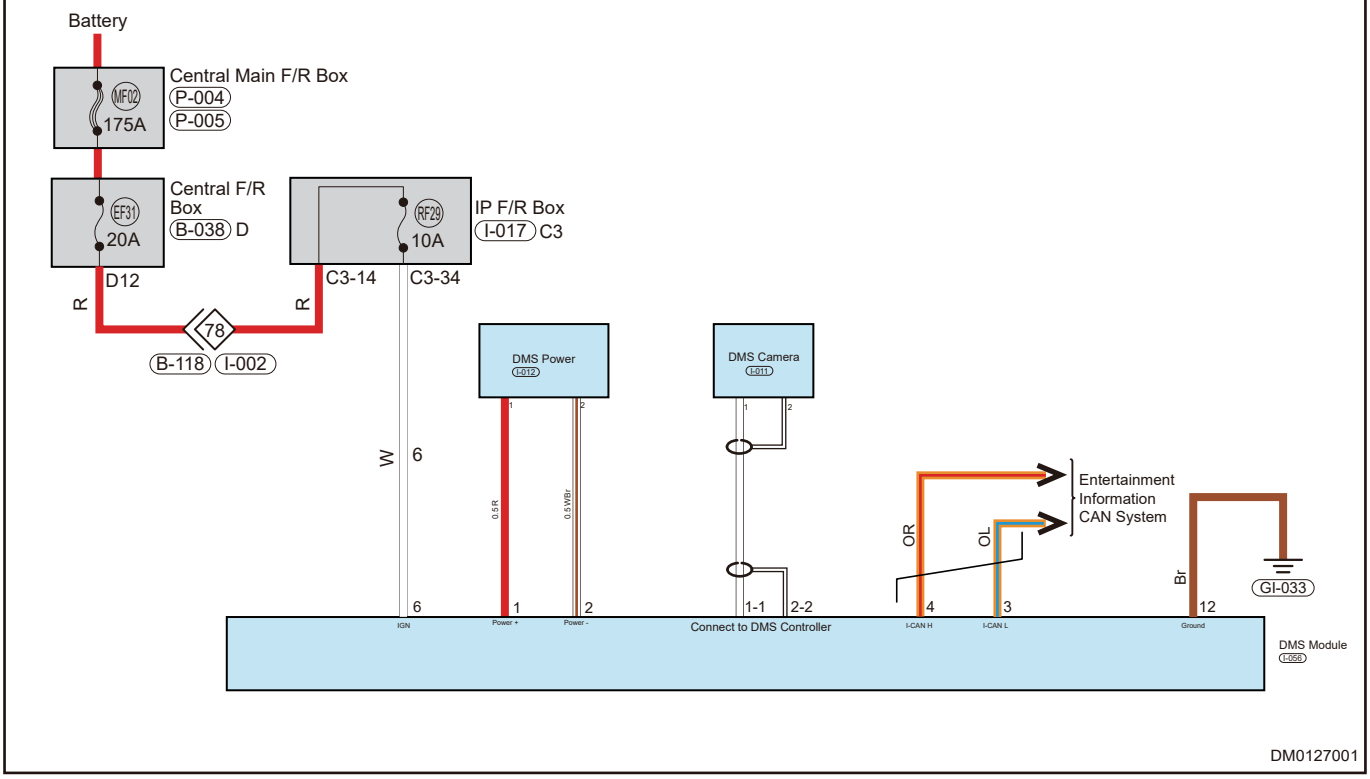


DMS Module

DM0126001

Pin	Definition	Pin	Definition
1	Power +	7	-
2	Power -	8	-
3	I-CAN L	9	-
4	I-CAN H	10	-
5	-	11	-
6	IGN	12	Ground

3.2 Circuit Diagram



DM0127001

4 Diagnosis & Testing

4.1 Diagnostic Help

(1) Connect diagnostic tester X-431 3G (the latest software) to Data Link Connector (DLC), and make it communicate with vehicle electronic module through data network.
(2) Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
(3) If Diagnostic Trouble Code (DTC) cannot be cleared, it indicates that there is a current malfunction.
(4) Only use a digital multimeter to measure voltage of electronic system.
(5) Refer to any Technical Bulletin that may apply to this malfunction.
(6) Visually check related wire harness and connector.
(7) Check and clean all grounds related to the latest DTC.
(8) If numerous trouble codes are set, refer to circuit diagram and look for any common ground circuit or power supply circuit applied to DTC.

4.2 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.
- Check modules and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.3 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.4 Diagnosis Procedure

Use following procedures to troubleshoot the system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

NG → Replace battery

OK

3	Customer problem analysis

Next

4	Read DTCs

History DTC → Troubleshoot according to Intermittent DTC malfunction procedures

Current DTC

5	Repair according to Diagnostic Trouble Code (DTC) Chart

Next

6	Adjust, repair or replace

Next

7	Conduct test and confirm malfunction has been repaired

Next → End

4.5 Diagnostic Trouble Code (DTC) Chart

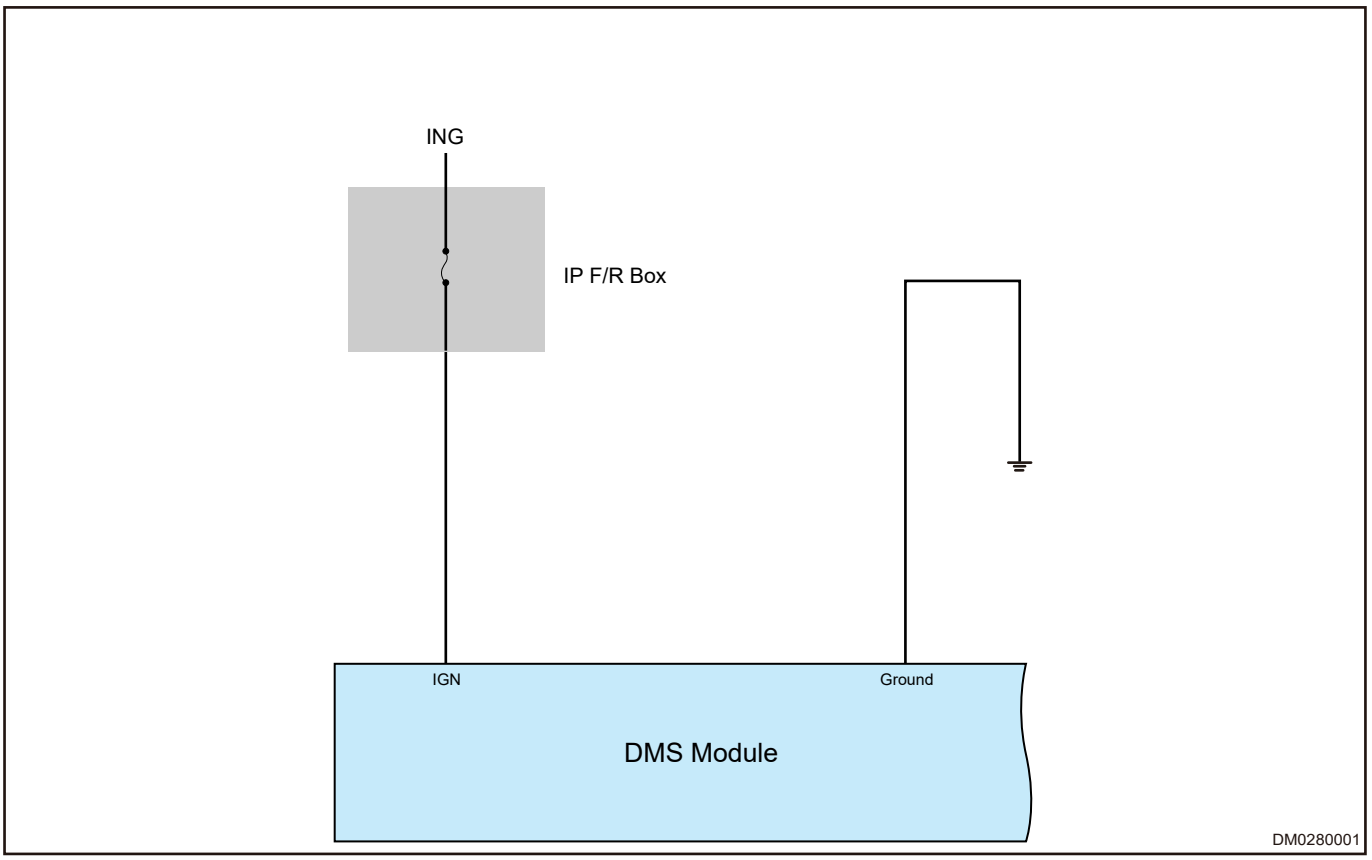
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B2A0013	DMS Camera Open Circuit	/	• Wire harness or connector fault • DMS camera fault • DMS module fault	• Check wire harness and connector • Replace DMS camera • Replace DMS module
B2A0111	DMS Camera Power Short to Ground	/		
B2A0253	DMS Camera Circuit Fault	/		
B2A0368	Camera Blocked	/	• DMS camera is blocked • DMS camera fault	• Check DMS camera for foreign objects • Replace DMS camera

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B2A04A2	DMS System Voltage Too Low	/	• Abnormal battery or alternator • Wire harness or connector failure • DMS module fault	• Check battery and alternator • Check wire harness or connector • Replace DMS module
B2A05A3	DMS System Voltage Too High	/		
B2A0549	DMS System Circuit Fault	/	• Wire harness or connector failure • DMS module fault	• Check wire harness and connector • Replace DMS module
U012987	Lost Communication with BSM	/	CAN network fault	• Check CAN network
U007388	Control Module Communication (CAN) Bus OFF	/	CAN network fault	• Check CAN network
U130055	Software Configuration Error	/	Software configuration Error	Reconfiguration

4.6 DTC Diagnosis Procedure

DTC	B2A04A2	DMS System Voltage Too Low
DTC	B2A05A3	DMS System Voltage Too High
DTC	B2A0649	DMS System Circuit Fault

Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check battery voltage**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Start engine, and use voltage band of multimeter to check if battery voltage is normal. (Rated voltage: Not less than 12 V)

Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch "ON"	⩾ 9.8 V

NG → **Repair or replace battery/alternator**

OK

2	**Check fuse**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Check if the fatigue monitoring module fuse is normal.

NG → **Replace fuse**

OK

3	Check power supply circuit

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

(c) Disconnect the DMS module connector.

(d) Check if wire harnesses are worn, pierced, pinched or partially broken.

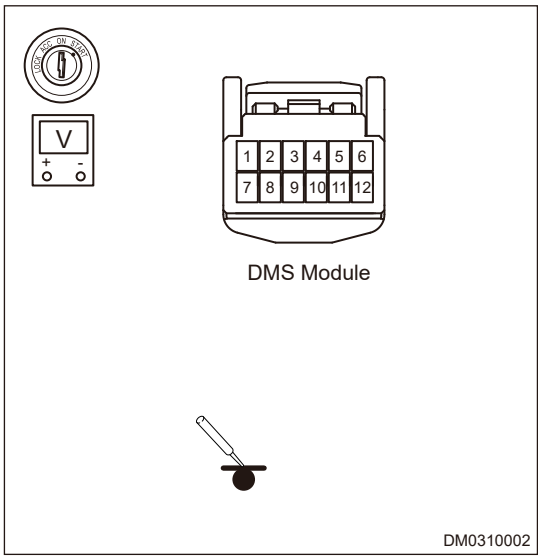
(e) Check for broken, bent, protruded or corroded terminals.

(f) Check if related connector pins are in good condition.

(g) Connect the negative battery cable.

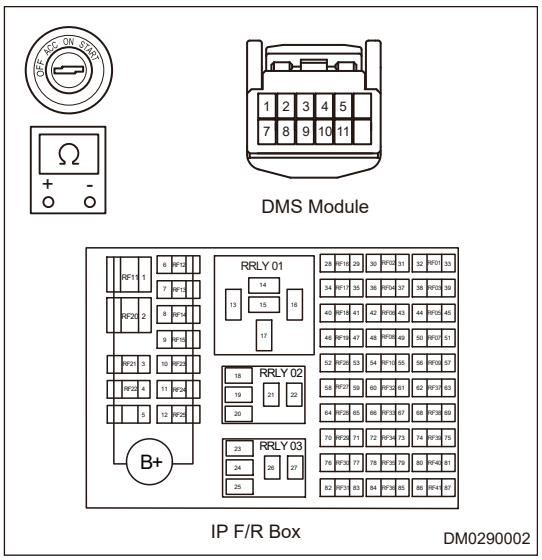
(h) Turn ENGINE START STOP switch to ON.

(i) Using a digital multimeter, check voltage between DMS module connector (power supply terminal) and body ground according to the table below.



Multimeter Connection	Condition	Specified Condition
DMS module (- power supply terminal) - Body ground	ENGINE START STOP switch "ON"	⩾ 9.8 V

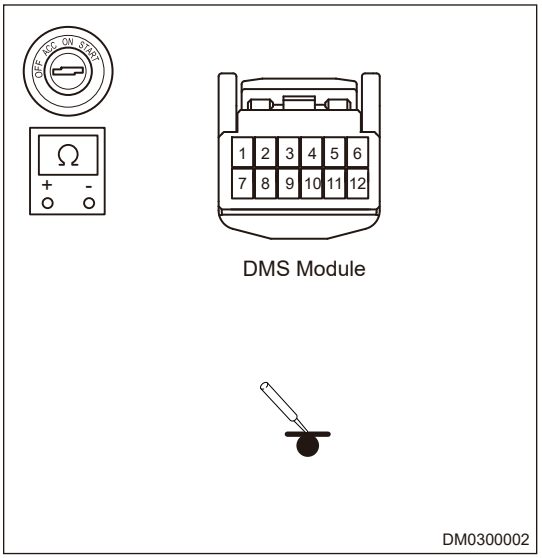
(j) Using a digital multimeter, check resistance between DMS module connector (power supply terminal) and instrument panel fuse and relay box (connected terminal) according to the table below.



Multimeter Connection	Condition	Specified Condition
DMS module connector (power supply terminal) - Instrument panel fuse and relay box (- connected terminal)	ENGINE START STOP switch "OFF"	< 1 Ω

(k) Using a digital multimeter, check resistance between DMS module connector (ground terminal) and body ground according to the table below.

Multimeter Connection	Condition	Specified Condition
MS module connector (ground terminal) - Body ground	ENGINE START STOP switch "OFF"	< 1 Ω



NG → **Repair or replace related wire harness**

OK

4	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

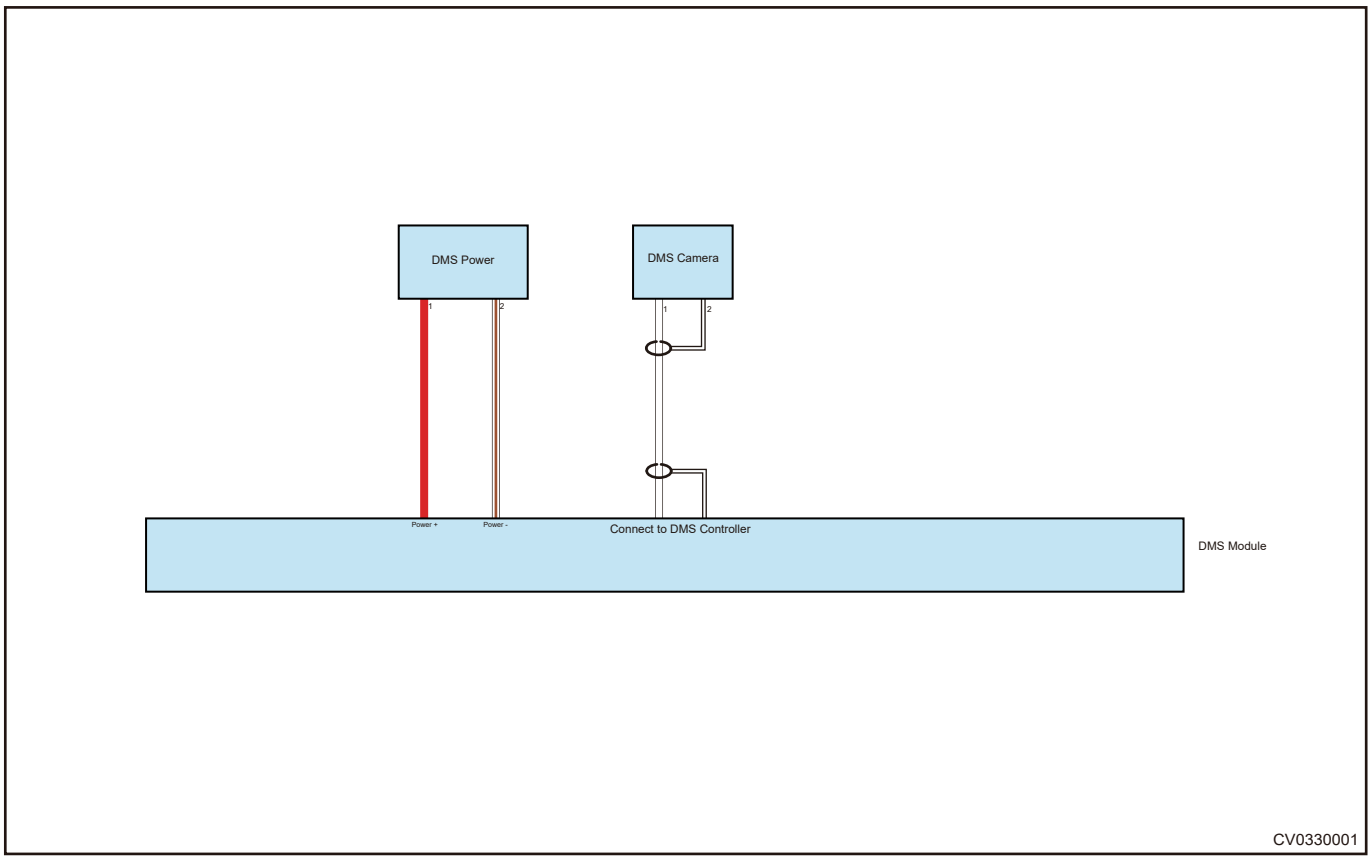
(d) Check if the same DTCs are still output.

NG → **Replace DMS module**

OK → **System is normal**

DTC	B2A0013	DMS Camera Open Circuit
DTC	B2A0111	DMS Camera Power Short to Ground
DTC	B2A0253	DMS Camera Circuit Fault

Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Check circuit**

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

(c) Disconnect the DMS module connector.

(d) Disconnect the DMS camera connector.

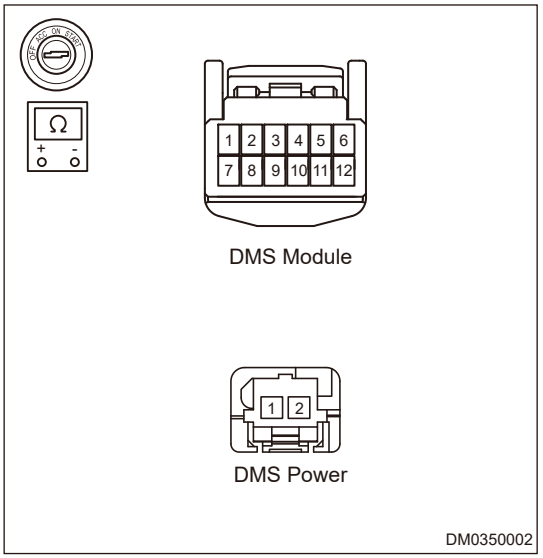
(e) Check if wire harnesses are worn, pierced, pinched or partially broken.

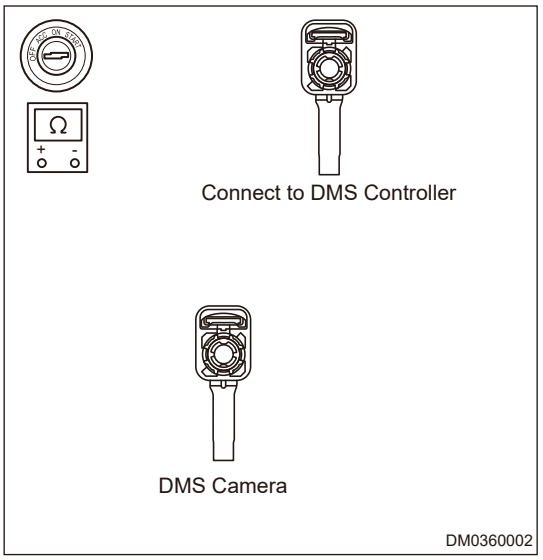
(f) Check for broken, bent, protruded or corroded terminals.

(g) Check if related connector pins are in good condition.

(h) Using a digital multimeter, check for continuity between DMS module connector (connected terminal) and DMS camera connector terminal according to table below.

Multimeter Connection	Condition	Specified Condition
DMS module connector (- connected terminal) - DMS power (1)	ENGINE START STOP switch "OFF"	< 1 Ω
DMS module connector (- connected terminal) - DMS power (2)	ENGINE START STOP switch "OFF"	< 1 Ω
Connect to DMS controller(1) - DMS camera (1)	ENGINE START STOP switch "OFF"	< 1 Ω
Connect to DMS controller(2) - DMS camera (2)	ENGINE START STOP switch "OFF"	< 1 Ω



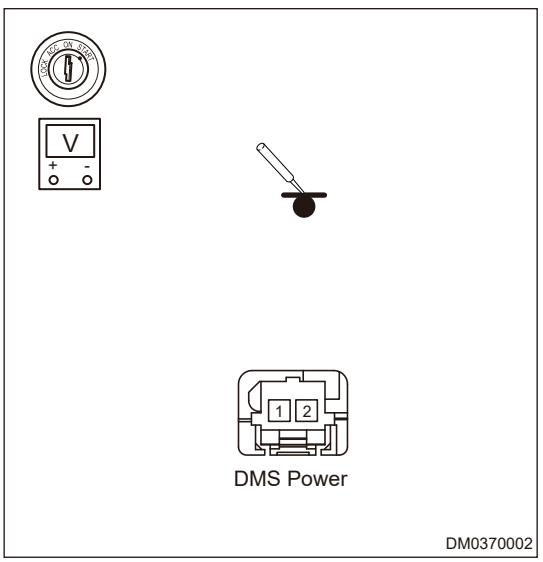


Use circuit diagram as a guide to perform the following inspection procedures:

(i) Turn ENGINE START STOP switch to ON.

(j) Using a digital multimeter, check voltage between DMS camera connector (power supply terminal) and body ground according to the table below.

Multimeter Connection	Condition	Specified Condition
DMS power (1) - Body ground	ENGINE START STOP switch "ON"	0 V
DMS power (2) - Body ground	ENGINE START STOP switch "ON"	0 V



NG → **Repair or replace related wire harness or connector**

OK

2	Check DMS camera

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Replace original vehicle camera with a new one.

(b) Clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

OK	Replace camera

NG

3	Reconfirm DTCs

Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Use diagnostic tester to clear DTCs.

(c) Start the engine.

(d) Check if the same DTCs are still output.

NG	Replace DMS module
OK	System is normal

DTC	B2A0368	Camera Blocked

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	Check DMS camera

(a) Check if camera is covered.

NG	Remove obstruction
OK	Replace camera

DTC	U130055	Software Configuration Error

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.

- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Reconfirm DTCs**

(a) Reconfigure the data with diagnostic tester.
(b) Use diagnostic tester to clear DTCs.
(c) Start the engine.
(d) Check if the same DTCs are still output.

NG	**Replace DMS module**
OK	**System is normal**

DTC	**U012987**	**Lost Communication with BSM**
DTC	**U007388**	**Control Module Communication (CAN) Bus OFF**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is not detected, malfunction is intermittent.

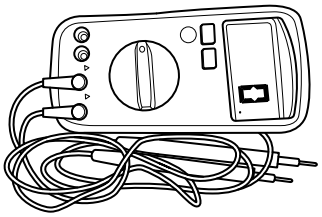
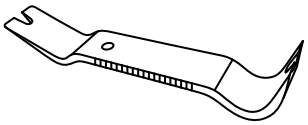
Hint:
When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

1	**Refer to CAN network system**

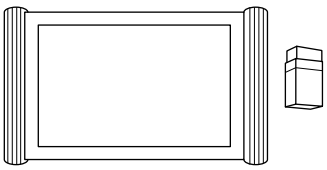
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Interior Crow Plate	 RCH002506

■ Special Tool

Tool Name	Tool Drawing
Diagnostic tester	 S00001

5.2 DMS Controller

■ Removal

⚠ Warning

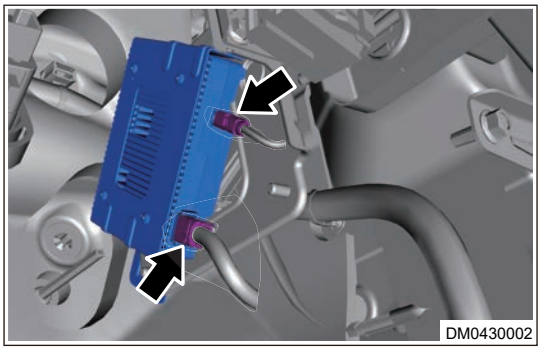
- **Be sure to wear necessary safety equipment to prevent accidents, when removing DMS module.**
- **Appropriate force should be applied when removing DMS module. Be careful not to operate roughly.**
- **DO NOT scratch interior when removing DMS module.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

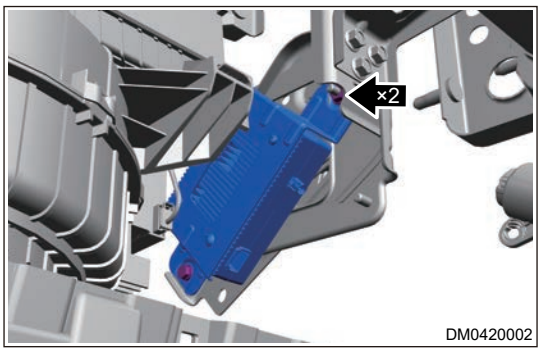
(2) Disconnect the negative battery cable.

(3) Remove the instrument panel lower right protector assembly.

(4) Disconnect the DMS module connector.



(5) Remove 1 fixing bolt and 1 fixing nut from DMS module, and remove DMS module assembly.



■ Installation

(1) Install 1 fixing bolt and 1 fixing nut to DMS module assembly.

Tightening torque: 7 ± 1 N·m

(2) Connect DMS module connector.

(3) Install the instrument panel lower right protector assembly.

(4) Connect the negative battery cable.

5.3 DMS Camera

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing DMS camera.**
- **Appropriate force should be applied when removing DMS camera. Be careful not to operate roughly.**
- **DO NOT scratch interior when removing DMS module.**

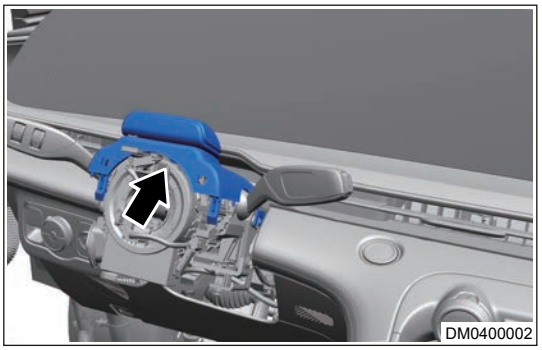
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

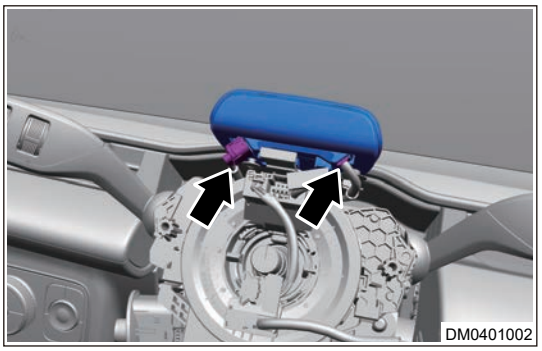
(3) Remove the steering wheel assembly.

(4) Remove the combination switch lower cover.

(5) Remove the combination switch upper cover assembly.



(6) Disconnect the DMS camera connector.



(7) Remove 2 fixing screws (arrow) from DMS camera.

(8) Remove DMS camera.

■ Installation

(1) Install 2 fixing screws to camera.
(2) Connect the camera connector.
(3) Install the combination switch upper cover.
(4) Install the combination switch lower cover.
(5) Install the steering wheel assembly.
(6) Connect the negative battery cable.

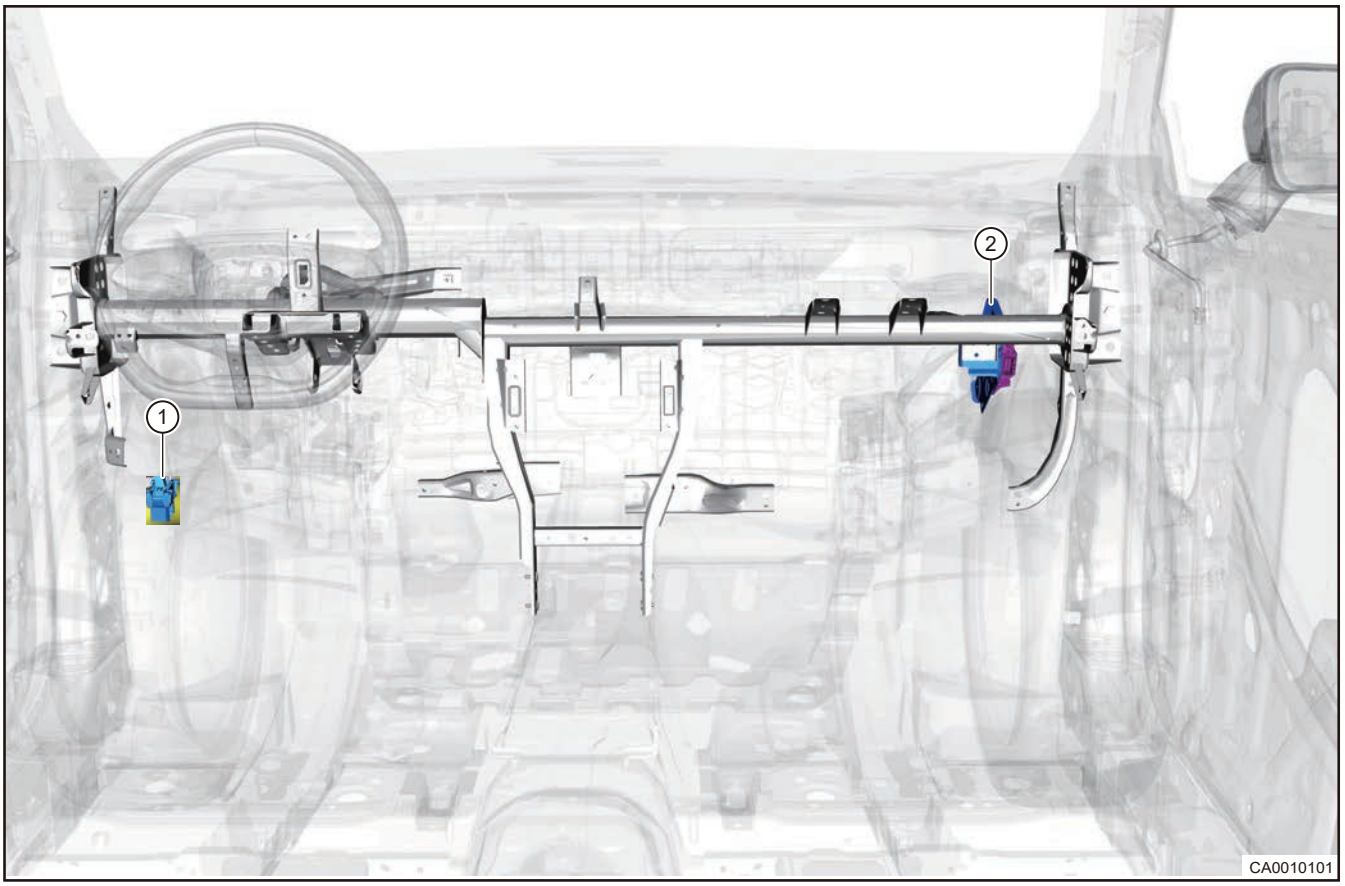
10.19 CAN SYSTEM

1 System Overview

1.1 System Description

Most controllers of data communication system and diagnostic interfaces are connected via CAN gateway module (CGW), CAN controller and CAN transceiver are integrated into gateway module. Termination resistors are respectively integrated into gateway module, ICM, BCM, ECM, audio module (IHU) to form body CAN bus with CGW and ICM as the termination resistors, ECM and CGW are termination resistor power CAN bus, IHU and CGW are termination resistor information entertainment CAN bus, EPB and CGW are termination resistor chassis CAN bus. Termination resistance is 120 Ω, termination resistance of gateway module connected with diagnostic interface is 60 Ω.

1.2 Description



1	Diagnostic Interface	2	Central Gateway

1.3 Operation

CAN bus is also called vehicle bus, and full name is “Controller Area Network” which means local area network, it connects all control units together in some way to form a complete system. Each control unit collects different signals by each sensor, and transmits data among modules under the same rules. Network information can meet different real-time requirements by its priority. Data transmitted via CAN bus control unit is level model of binary format, and data transmission line transmits the voltage signal.

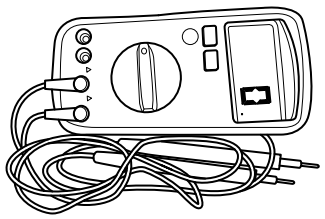
1.4 Composition

- Bus speed is: 500 Kbit/s;
- Cannot run in single line - If a CAN line of module is disconnected, CAN signal of this module cannot be transmitted;
- Vehicle driving CAN diagnosis is performed through No.6 pin and No.14 pin of diagnostic interface.

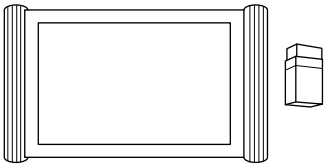
OBD: Diagnostic Interface	CGW: Central Network Module
IHU: Audio Head Unit	TBOX
TCU: DCT Transmission Controller	ECM: Electronic Engine Injection Controller
ESP (EPB) Module	ABM: Airbag Control Module
CLM: Automatic A/C Module	APM: Central Control Integration Panel
BCM: Body Control Module	PEPS
ICM: Instrument Cluster	AVM: Panoramic View Monitor Control Module
RADAR: Reverse Radar Module	PLGM: Power Back Door Module
SAM: Steering Wheel Angle Sensor	EPS: Electronic Power Steering
EPB: Electronic Parking Brake	

2 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH0002006
Oscilloscope	 RCH0061006

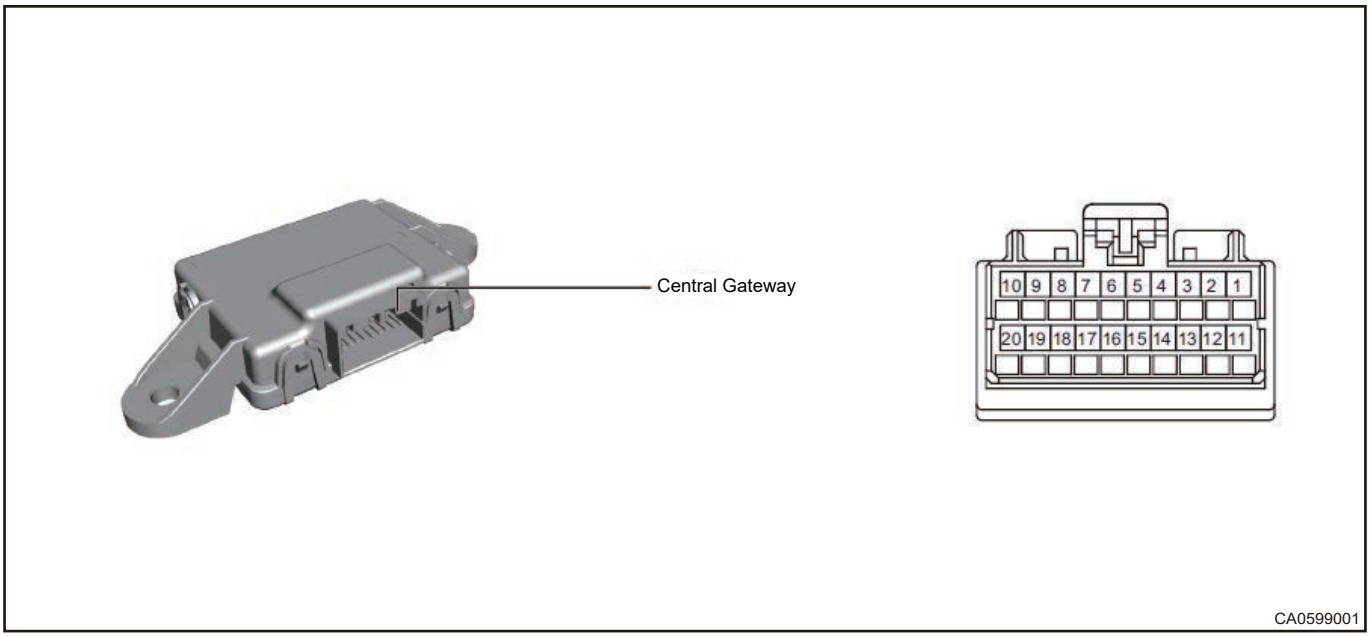
■ Special Tool

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006

3 Circuit Diagram

3.1 Module Terminal Definition

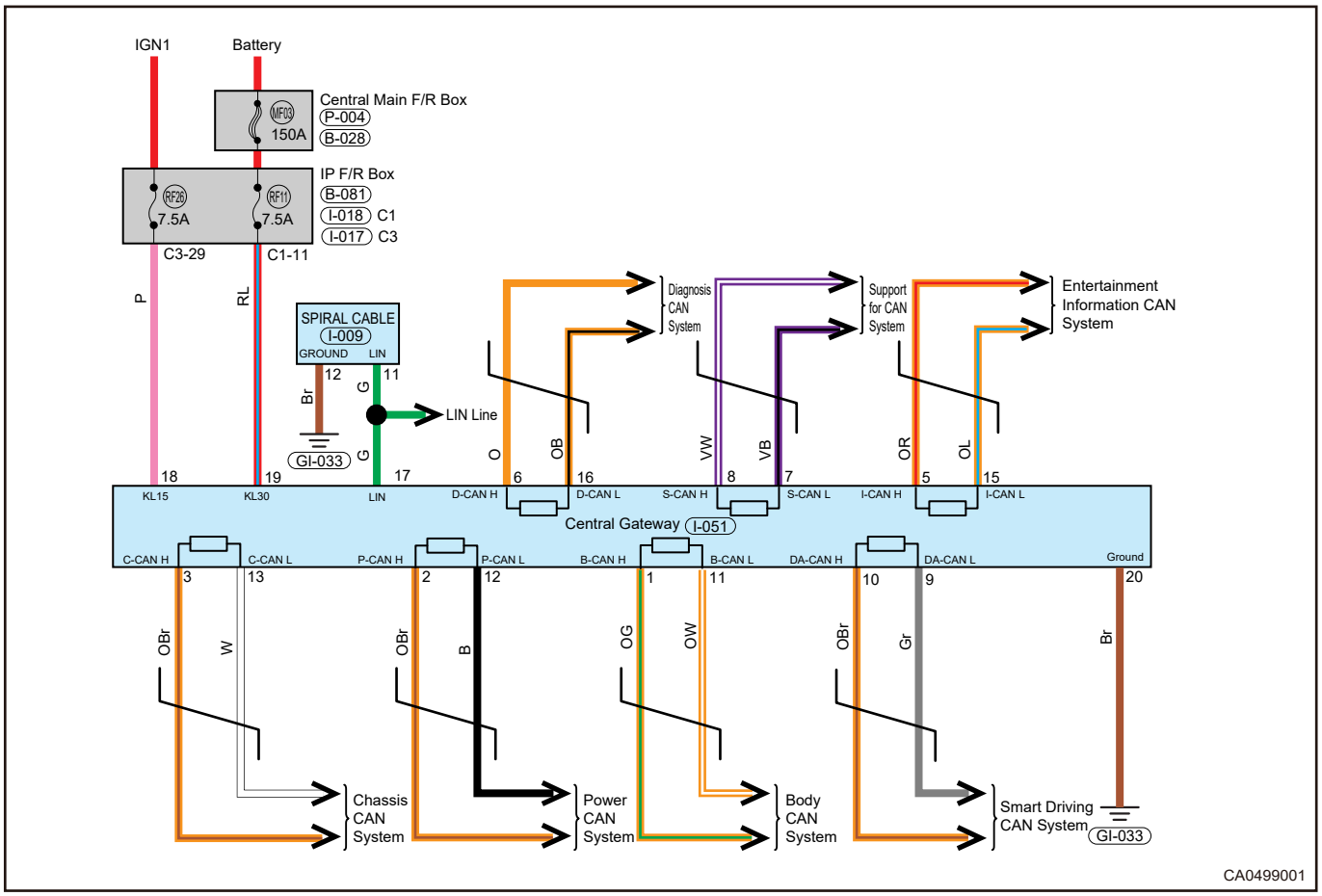
■ Central Gateway



Pin	Definition	Pin	Definition
1	B-CAN H	2	P-CAN H
3	C-CAN H	4	-
5	I-CAN H	6	D-CAN H
7	S-CAN L	8	S-CAN H
9	DA-CAN L	10	DA-CAN H
11	B-CAN L	12	P-CAN L
13	C-CAN L	14	-
15	I-CAN L	16	D-CAN L
17	LIN	18	KL15
19	KL30	20	Ground

3.2 System Circuit Diagram

■ Central Gateway (CGW)



4 Diagnosis & Test

4.1 Problem Symptoms Table

⚠ Caution

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Possible Cause
Diagnostic interface cannot access to the system	Fuse
	CAN bus
	Gateway module
Engine control system failure	CAN bus
	Battery voltage
	Module damaged
	Ground wire
Brake control system failure	Wire harness or connector
	Module

Symptom	Possible Cause
Airbag system failure	ECM
	Wire harness and connector
	Airbag module failure
Body electrical failure	BDM
	Wire harness or connector
	Instrument cluster
Transmission failure	Transmission Control Module (TCU) failure
	Wire harness or connector
	ECM

4.2 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the control system.

1	**Vehicle brought to workshop**

Next

2	**Examine vehicle and check basic items**

Check system power supply voltage, and check that fuse, wire harness and connector are connected normally.

OK

Standard voltage: Not less than 12 V.

Result

NG → **Check and replace malfunctioning parts**

OK

3	**Using a diagnostic tester, read related DTC and data stream information**

Result

Result	Proceed to
No DTC	A
DTC occurs	B

A → **Perform troubleshooting procedure without DTCs according to malfunction symptom**

B

4	**Troubleshoot according to DTCs troubleshooting procedure**

Result

Result	Proceed to
Problem is not resolved	A
Problem is resolved	B

A → **Return to procedure 1 and troubleshoot the process again**

B

5	**According to airbag system malfunction repair completion inspection and delivery, confirm that malfunction is resolved**

Result

Result	Proceed to
Delivery inspection is failed	A
Delivery inspection is qualified	B

A → **Return to procedure 1 and troubleshoot the process again**

B

6	**Finished**

4.3 DTC Confirmation Procedure

Confirm that battery voltage is normal before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software) to Data Link Connector (DLC).
- Turn ENGINE START STOP switch to ON.
- Use diagnostic tester to record and clear DTCs stored in supplemental restraint system.
- Turn ENGINE START STOP switch to OFF and wait for several seconds.
- Turn ENGINE START STOP switch to "ON", and then select read DTC.
- If DTC is detected, it indicates current malfunction. Go to inspection procedure - Step 1.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.4 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, try to duplicate the conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Look for broken, bent, protruded or corroded terminals.

- Inspect central gateway components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.5 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

(1) Remove ground bolt or nut.
(2) Check all contact surfaces for tarnish, dirt and rust, etc.
(3) Clean as necessary to ensure that contact is in good condition.
(4) Reinstall ground bolt or nut securely.
(5) Check if any additional accessories interfere with ground circuit.
(6) If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.6 Failure Analysis Method

(1) Use diagnostic tester to diagnose and analyze the trouble code.

When a module or several modules need to receive the data sent by a module to complete the corresponding function, once the data is not received, the module received the data will generate trouble codes, which could be read by diagnostic tester as: "Lost communication with XX module", "-Communication with XX module is not normal"; When the bus is out of work, the trouble code will be read as CAN bus close; When there is malfunction on module CAN configuration, code will be reported as "-configuration code error".

CAN network failures consist of the following types:

1) Receive continuous invalid signals: This type of fault indicates communication effective bit received by control module is "invalid" or invalid signal after processing.
2) Signal is below normal range: This type of fault indicates serial data bus signal is below normal range.
3) Signal is above normal range: This type of fault indicates serial data bus signal is above normal range.
4) Invalid signal: This type of fault indicates serial data bus signal does not match specified execution condition.
5) Lost signal: This type of fault indicates specified no specified information is received.
6) Bus closed: This type of fault indicates bus is out of work.
7) Unstable signal: This type of fault indicates a transient distortion or interruption of a bus signal.

(2) Waveform analysis.

It is main method to determine the hardware fault of CAN bus system. Check operation of high speed CAN and low speed CAN and judge most CAN network hardware faults through oscilloscope.

For example, if bus waveform is abnormal, after sales staff can judge by "plug and unplug each joint and observe the waveform of oscilloscope at the same time". If bus waveform is normal after unplugging a joint, the fault is in the module or the bus connected this module. This method is especially suitable for modules that do not have trouble code self-diagnosis.

(3) Circuit diagram analysis.

Use multimeter, oscilloscope, diagnostic tester and combine with circuit diagram to determine where is the fault.

4.7 Common Troubleshooting

(1) Diagnostic tester reads trouble code of CAN configuration error.

Fault expression: CAN or configuration code error is not performed by meter or BCM, read "Software configuration error", "Configuration code error" with diagnostic tester.

Exclusion methods and steps:

This type of situation usually belongs to CAN system software failure. Write correct configuration code to these modules or sensors or calibrate these sensors, clear the trouble code and verify the malfunction phenomenon again.

(2) Diagnostic tester cannot communicate with all modules.

Malfunction symptom: If diagnostic tester can be used normally on other vehicle, but cannot communicate with each module on faulty vehicle, malfunction indicators or warning lights on the meter turn on.

Malfunction reason: Diagnostic interface power supply and ground malfunction, diagnostic interface CAN line is open to normal CAN line, bus CAN-H is short to CAN-L, CAN-H is short to ground, CAN-L is short to ground, CAN-H is short to power supply, CAN-L is short to power supply, CAN line is mixed, node (-module) is malfunctioning or power supply grounding is abnormal.

(3) Exclusion methods and steps:

1	**Diagnose if power supply voltage and grounding resistance are correct.**

NG → **Inspect and repair diagnosis interface power supply or ground, verify the fault phenomenon again.**

OK ↓

2	**Use multimeter to detect parallel termination resistor, and check if resistance is correct**

NG → **Check and repair connecting wire between diagnostic interface and two modules with termination resistor or replace module with incorrect resistance to verify the malfunction symptom again.**

OK ↓

3	**Connect oscilloscope and observe waveform at the same time. Observe if waveform is normal.**

NG → **Inspect and repair the power supply and ground of these modules, and verify the malfunction symptom again.**

OK ↓

4	**Determine type of fault waveform, inspect and repair, then reconfirm the fault phenomenon again.**

(4) The diagnostic tester cannot communicate with several modules.

Malfunction symptom: The diagnostic tester cannot communicate with several modules, but can communicate with at least one module.

Malfunction cause: Module power supply malfunction, CAN main line open, CAN line mixed fitting, node (module) malfunction, gateway module malfunction.

(5) Power supply malfunction (power supply and ground).

The core part of vehicle multiplex system is an electronic control unit containing a communication IC chip. The normal operating voltage of the electronic control unit is generally in the range of operating

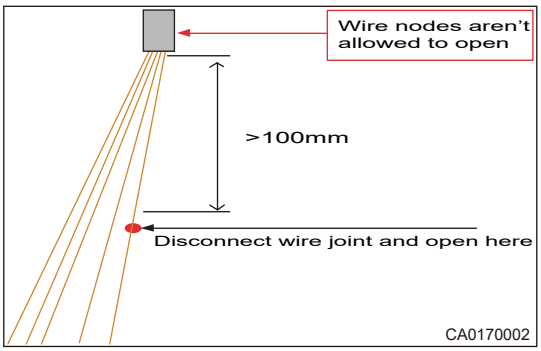
voltage: 9 V ⩽ U ⩽ 16 V. CAN network communication voltage range: 6 V ⩽ U ⩽ 16 V. If the operating voltage provided by vehicle power system is lower than this value, some electronic control units with higher requirements on operating voltage will temporarily stop working, thus making multiplex system unable to communicate. The CAN hardware controller inside ECM may not work under 6 V. Use battery tester to detect, if it does not meet the requirements, charge the battery or replace the battery (and also detect the power generated by alternator).

(6) Link malfunction.

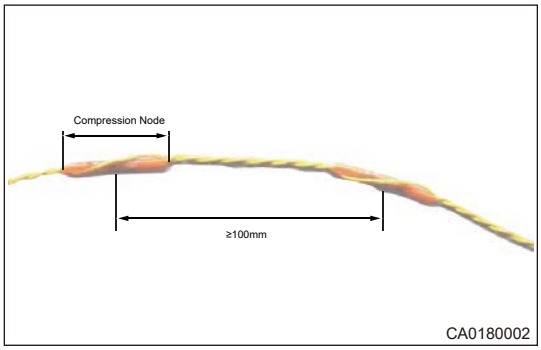
Link refers to a communication connection line between nodes. Link malfunction refers to malfunction of data communication lines, such as short circuit, open circuit and communication signal attenuation or distortion caused by changes in physical properties of the lines. These factors often cause multiple electronic control units to fail to work properly or the control system to operate improperly. To determine whether the link is malfunctioning, use an oscilloscope or a specific vehicle CAN tester to observe whether the current data communication signal matches the standard data communication signal. Maintenance methods are generally to repair shorted or open twisted-pair lines, or to eliminate the root cause of changing the physical properties of twisted-pair lines.

1) Maintenance instructions for CAN line.

Sometimes, in order to determine the malfunction, it is necessary to disconnect a control unit from line connection point and disconnect the CAN bus connected to the control unit, or to repair wire harness after the malfunction has been determined. The data transmitted by CAN bus may even affect vehicle safety and life safety of personnel. Improper maintenance of CAN bus may cause interference or loss of signals, resulting in these data not being transmitted. Therefore, the following regulations must be observed during maintenance:

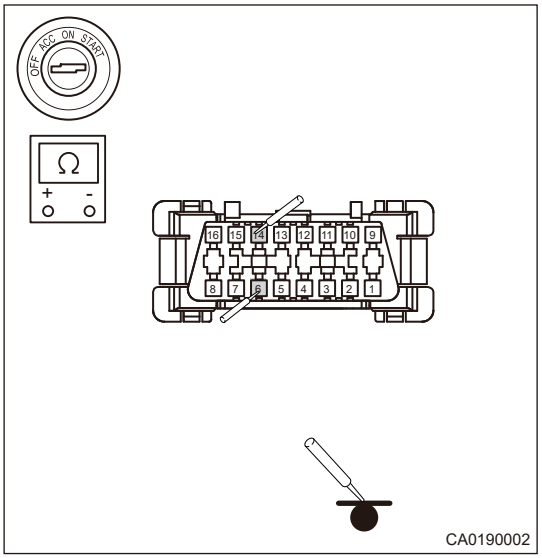


- During CAN bus maintenance, the disconnection point is required to be at least 100 mm away from the line node, and the line node must never be opened, maintained and updated;
- If the CAN line is to be disconnected, it is only allowed to be carried out at a distance of ⩾ 100 mm from the next pressure node; The twisting of CAN lines is of decisive significance to the interference effect of CAN. Only if the twisting is not damaged, the CAN can be protected from interference, so keep as little interference with the twisting as possible during maintenance.

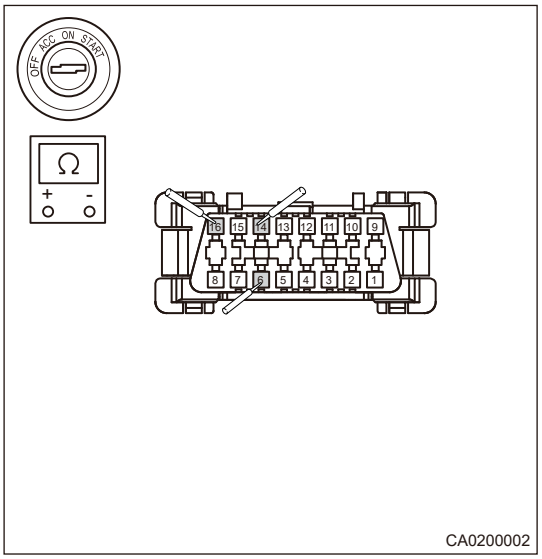


2) Use a multimeter to measure the resistance to ground and power supply of CAN-H and CAN-L.

   - After disconnecting battery for 5 minutes, the measured resistance values between diagnostic interfaces 6# (CAN-H) and 14# (CAN-L) and ground are both 32 MΩ.



- After disconnecting battery for 5 minutes, the measured resistance values between diagnostic interfaces 6# (CAN-H) and 14# (CAN-L) and 16# are both 33.5 MΩ.



3) Termination resistor.

The termination resistor is installed in gateway module of system and is used to prevent CAN bus signal from reflecting the changing voltage on CAN bus. When the termination resistor fails and the square wave is transmitting, because of the reflection of line, if it is serious, the signal will be deformed and the signal of control unit will be invalid. When measuring the CAN bus signal with an oscilloscope, if the signal does not match standard signal, it is also necessary to check whether the termination resistor is damaged.

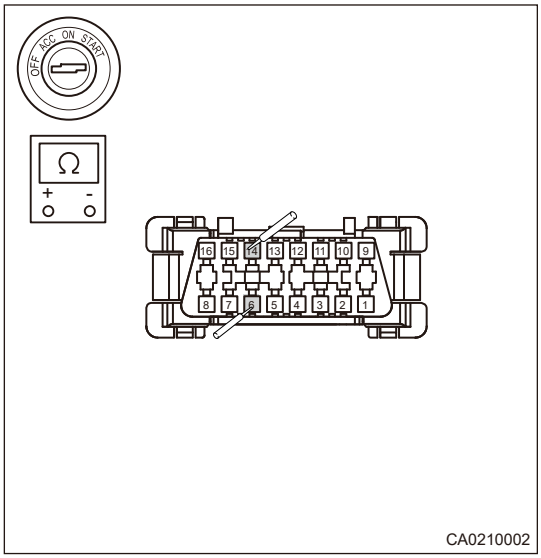
Measurement step of termination resistor:

(1) Turn ENGINE START STOP switch to OFF, disconnect the negative battery cable;

(2) Wait about 5 minutes until all capacitors are fully discharged;

(3) Connect the measuring instrument and measure total resistance. Using ohmmeter, measure resistance between diagnostic interfaces (6) and (14) (standard resistance is 60 Ω).

Measured value (for reference only): the measured resistance between diagnostic interfaces 6 # and 14 # is 58.7Ω (the two termination resistors are connected in parallel), after gateway module is disconnected separately, and the measured resistance between diagnostic interfaces 6 # and 14 # is ∞.

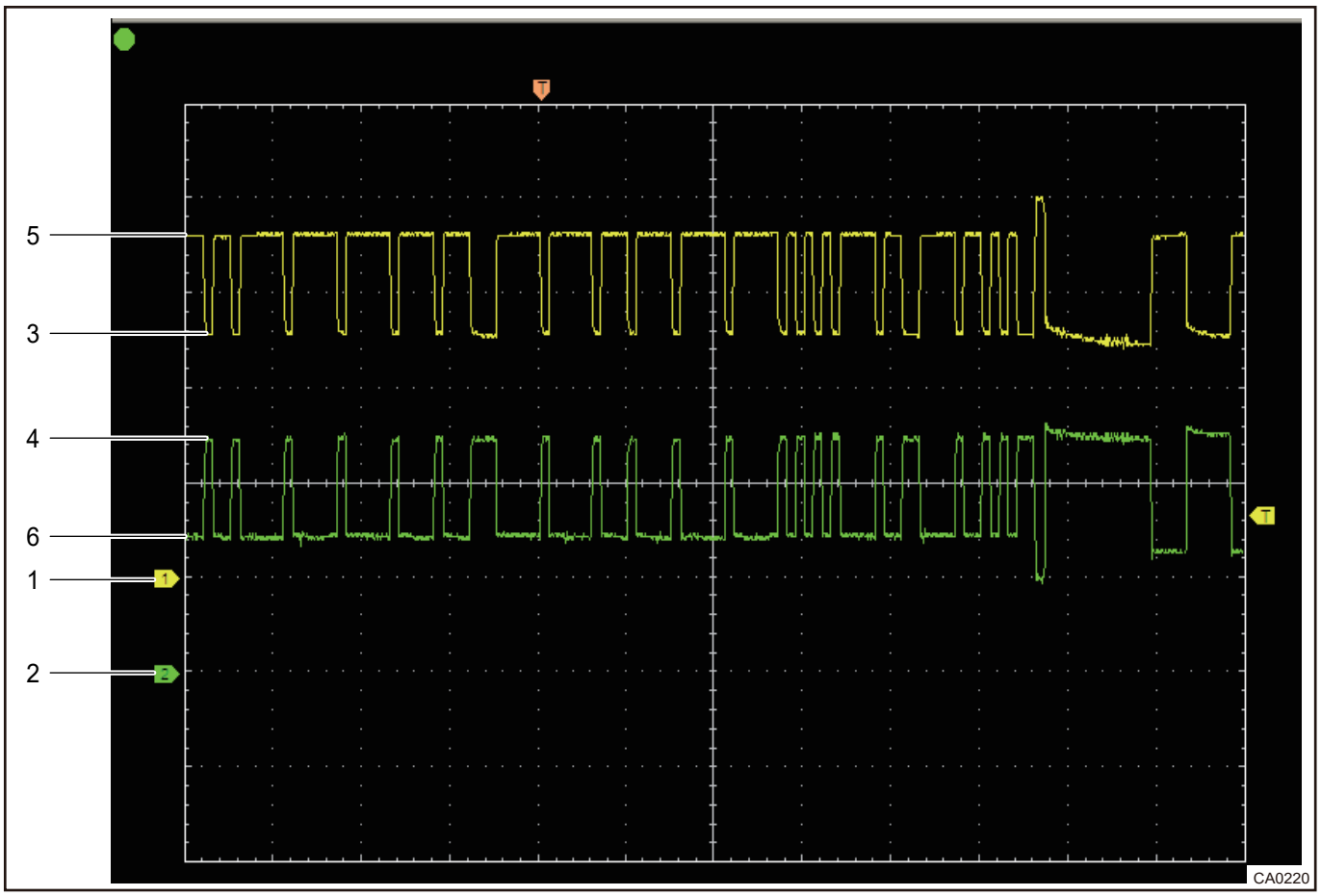


4.8 Oscilloscope Analysis

(1) Oscilloscope connection

CH1 (channel 1) is connected to diagnostic interface 6# (CAN-H), CH2 (channel 2) is connected to diagnostic interface 14# (CAN-L), and alligator clip of the oscilloscope probe is connected to the common body ground.

Normal waveform



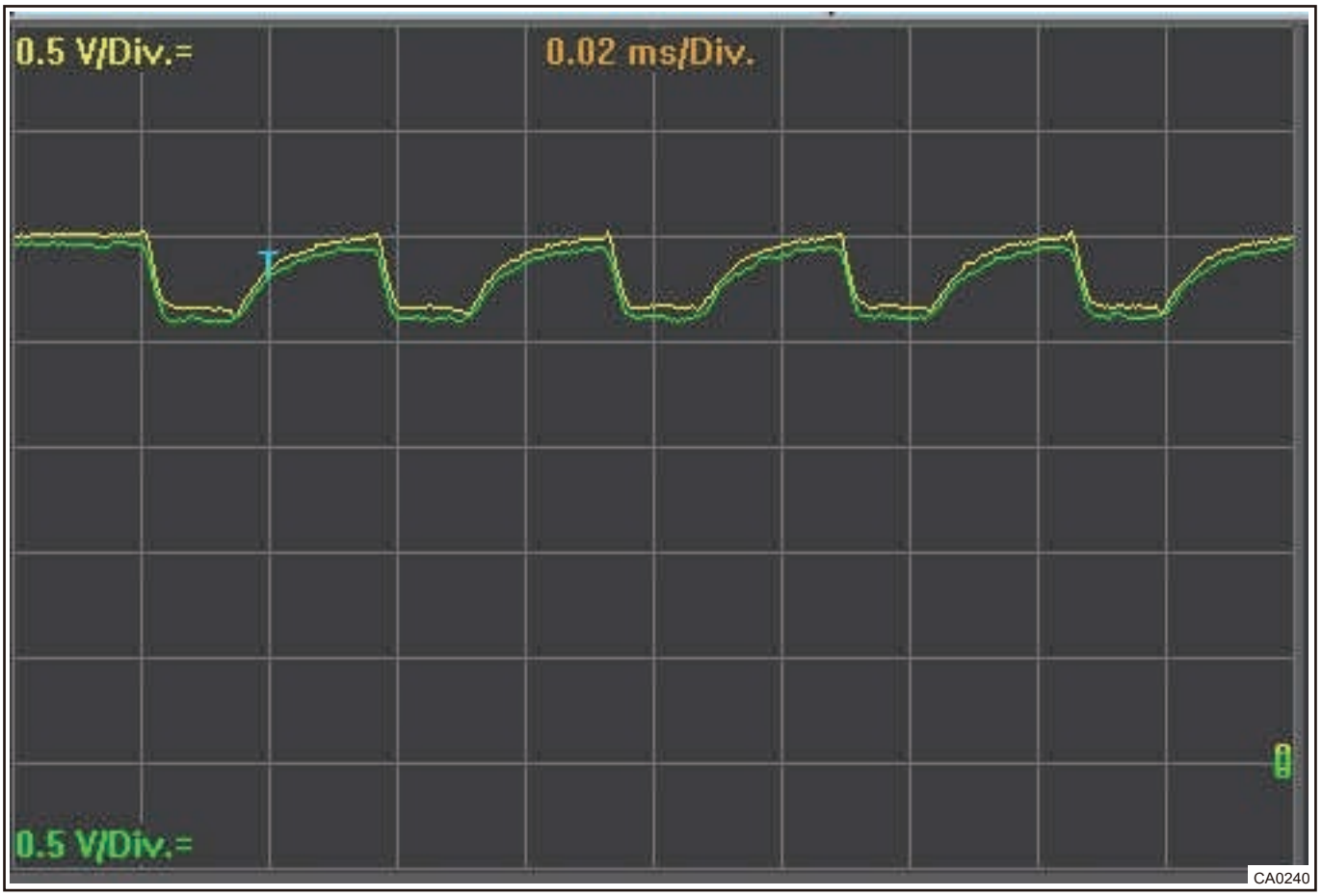
1	Zero potential of CAN-H	4	The recessive voltage potential of CAN-L is approximately 2.5 V (logic value 1)
2	Zero potential of CAN-L	5	The dominant voltage potential of CAN-H is approximately 3.6 V (logic value 0)
3	The recessive voltage potential of CAN-H is approximately 2.6 V (logic value 1)	6	The dominant voltage potential of CAN-L is approximately 1.4 V (logic value 0)

Potential	CAN-H - Ground	CAN-L - Ground	Voltage Difference
Dominant	3.6 V (3.5 V)	1.4 V (1.5 V)	2.2 V (2.0 V)
Recessive	2.6 V (2.5 V)	2.5 V (2.5 V)	0.1 V (0 V)

Hint:

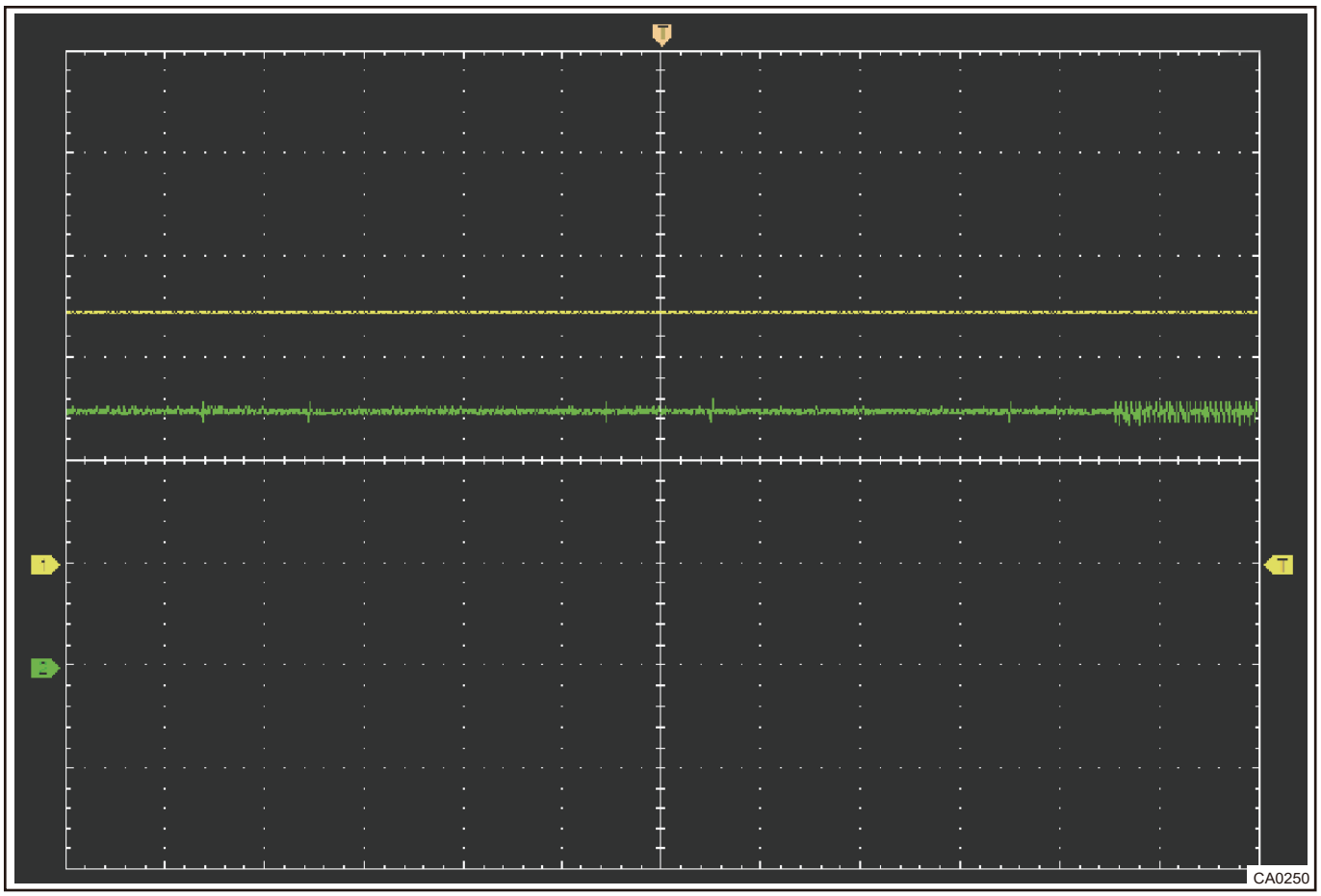
1) Always use voltage difference between two lines to confirm data. When voltage of CAN-H rises, the voltage of CAN-L decreases accordingly. The waveform is rectangular and symmetrical.
2) As the oscilloscope shows, CAN-Bus has only two operating states. At the recessive voltage potential, the two voltage values are very close. At the dominant voltage potential, the two voltage standard difference is 2.0 V.
3) The difference between measured voltage value and standard value is approximately 100 mV.
4) During communication, high-speed CAN operating voltage range: CAN-H: 2.75 V~4.5 V (dominant), 2 V~3 V (recessive); CAN_L: 0.5 V~2.25 V (dominant), 2 V~3 V (recessive); No signal transmission means that CAN bus will transmit recessive signals when it is idle, and new information will start with dominant signals.

(2) Short point (arrow) between CAN-H and CAN-L



Short circuit malfunction waveform of CAN-H and CAN-L

- Observe with an oscilloscope, the voltage potential is at recessive voltage value (approximately 2.5 V). By moving the position of zero potential on two oscilloscope channels to make the zero potential of two channels be coincident. It can be seen that waveforms of the CAN-H and CAN-L change consistently and their potentials are consistent;
- The short circuit waveforms of CAN-H and CAN-L during actual vehicle test are shown in following illustration. Both waveforms are straight line with a voltage of approximately 2.5 V. Use a multimeter to test that the termination resistor is close to or equal to 0 ohms. Power CAN and body CAN, CAN-H and CAN-L short circuit vehicles can not start.



Troubleshooting procedures:

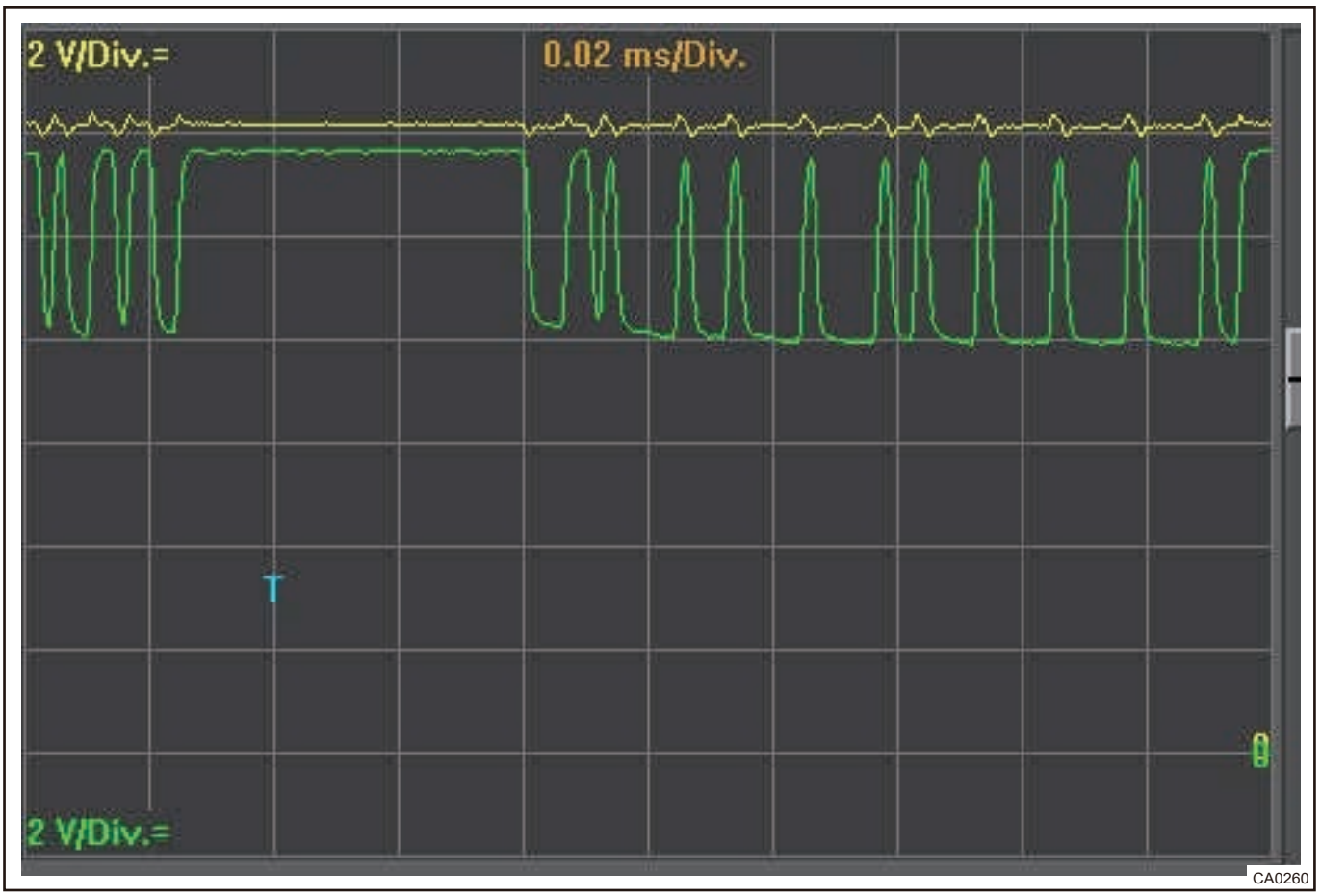
1) By plugging and unplugging control unit on CAN bus one by one and observing oscilloscope waveform at the same time, it can be judged whether it is a short circuit caused by the control unit or by the CAN-H and CAN-L line connection;

2) If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;

3) For short circuit caused by short circuit of line, it is necessary to disconnect CAN wire groups (CAN-H and CAN-L) from wire harness connector or wire harness node in turn, and pay attention to waveform of oscilloscope; After disconnecting faulty wire group, waveform of oscilloscope returns to normal;

4) When there is no other measurement method, only CAN line can be disconnected from line connection point. Pay attention to maintenance instructions of CAN line.

(3) CAN-H is short to power supply



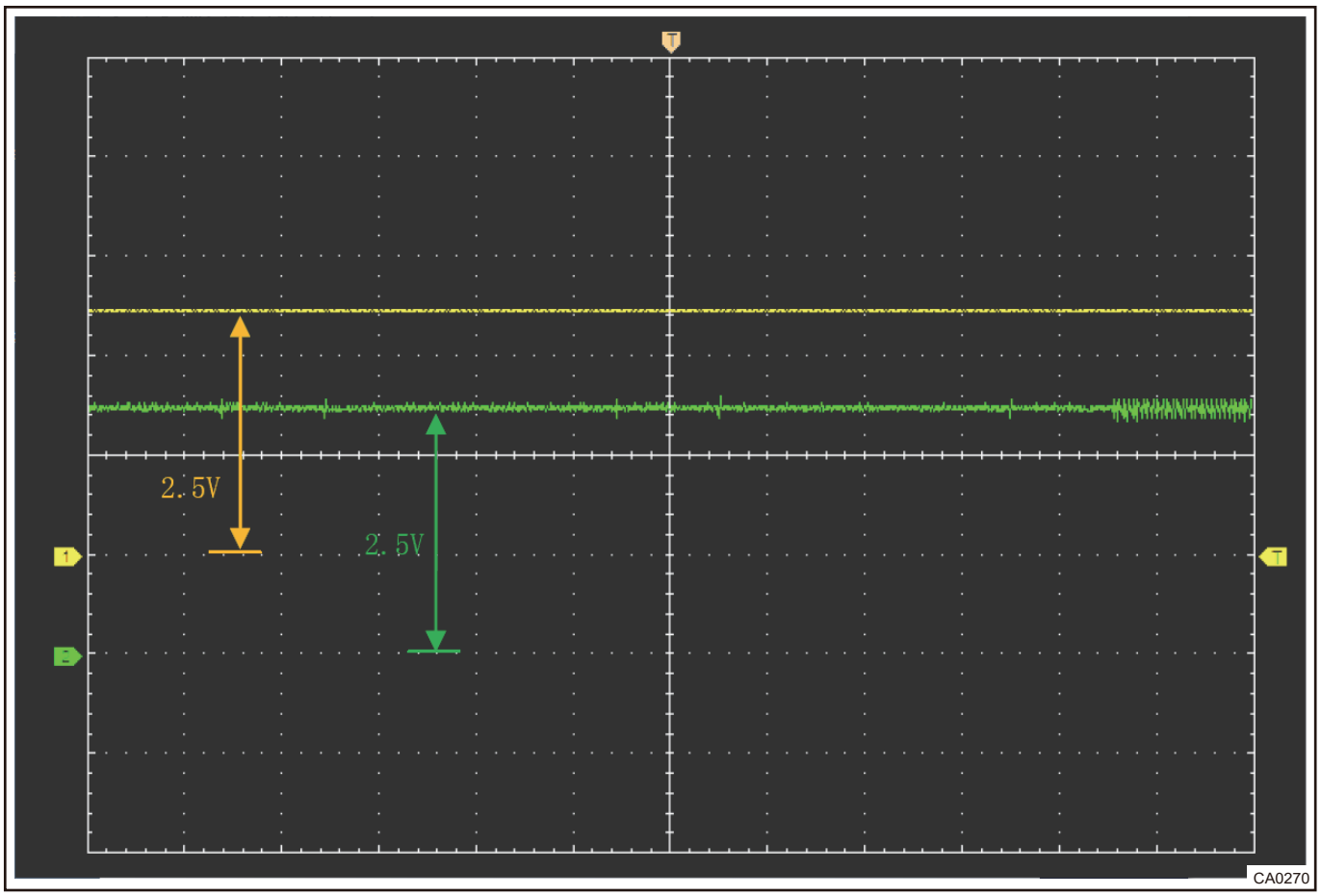
Malfunction symptoms:

- Observe with an oscilloscope: the voltage potential of CAN-H line is placed at 12 V, the recessive voltage of CAN-L line is placed at approximately 12 V, and amplitude becomes larger due to internal connection of CAN-H and CAN-L in transceiver of control unit.

  Troubleshooting procedures:

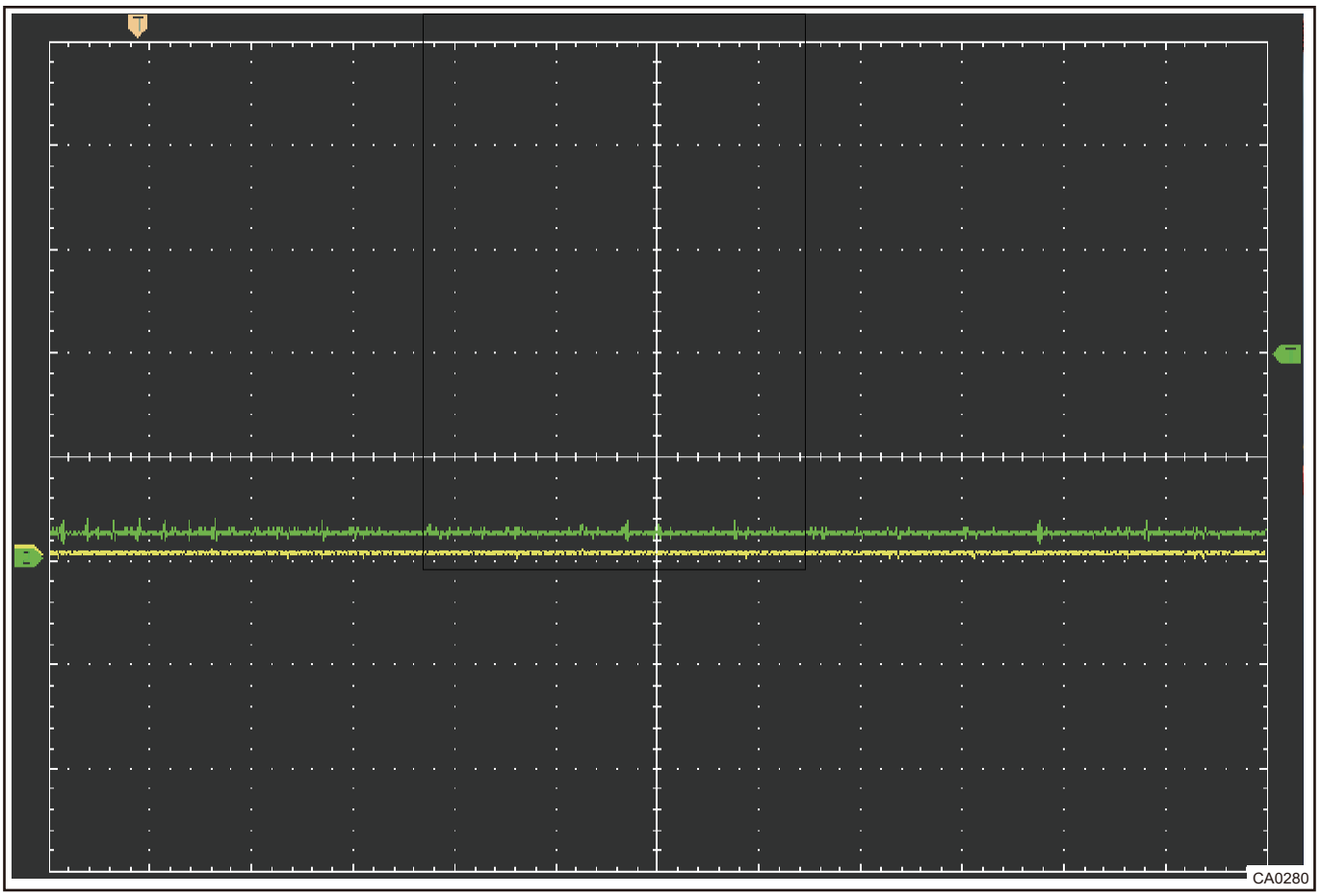
  1) By plugging and unplugging control unit on CAN bus one by one and observing oscilloscope waveform at the same time, it can be judged whether it is a short circuit caused by the control unit or by the CAN-H line connection;
  2) If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;
  3) When there is no other measurement method, only CAN line can be disconnected from line connection point. Pay attention to maintenance instructions of CAN line.

- The short circuit waveform to positive in CAN-H during actual vehicle test is shown in following illustration. The voltage potential of CAN-H line is placed at 12 V (battery voltage), and the recessive voltage of CAN-L line is placed at approximately 12 V (battery voltage). The amplitude becomes larger. The diagnostic tester cannot access each module. Power CAN and body CAN, CAN-H short to power supply, vehicles can not start.



(4) CAN-H is short to ground

Malfunction waveform



Malfunction symptoms:

- Observe with an oscilloscope: The voltage potential of CAN-H line is placed at 0 V, and the voltage of CAN-L line is placed at about 0.2 V (near 0 V).

Malfunction causes

- Bus CAN-H is short to ground, node (module) malfunction.

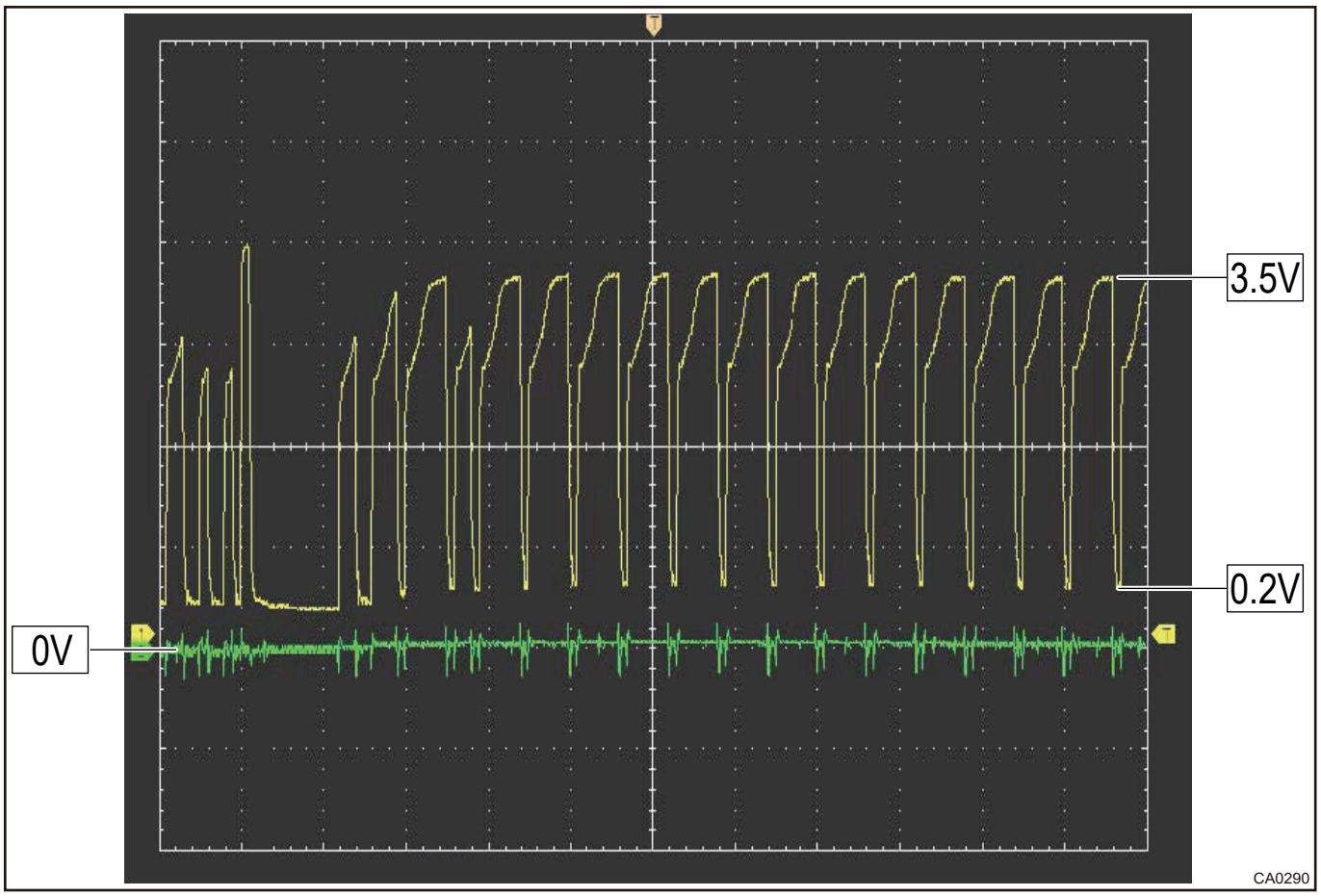
Troubleshooting procedures:

1) Plug and unplug control unit on CAN bus one by one, and observe if the oscilloscope waveform becomes normal.
2) If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;
3) When there is no other measurement method, only CAN line can be disconnected from line connection point. Pay attention to maintenance instructions of CAN line.

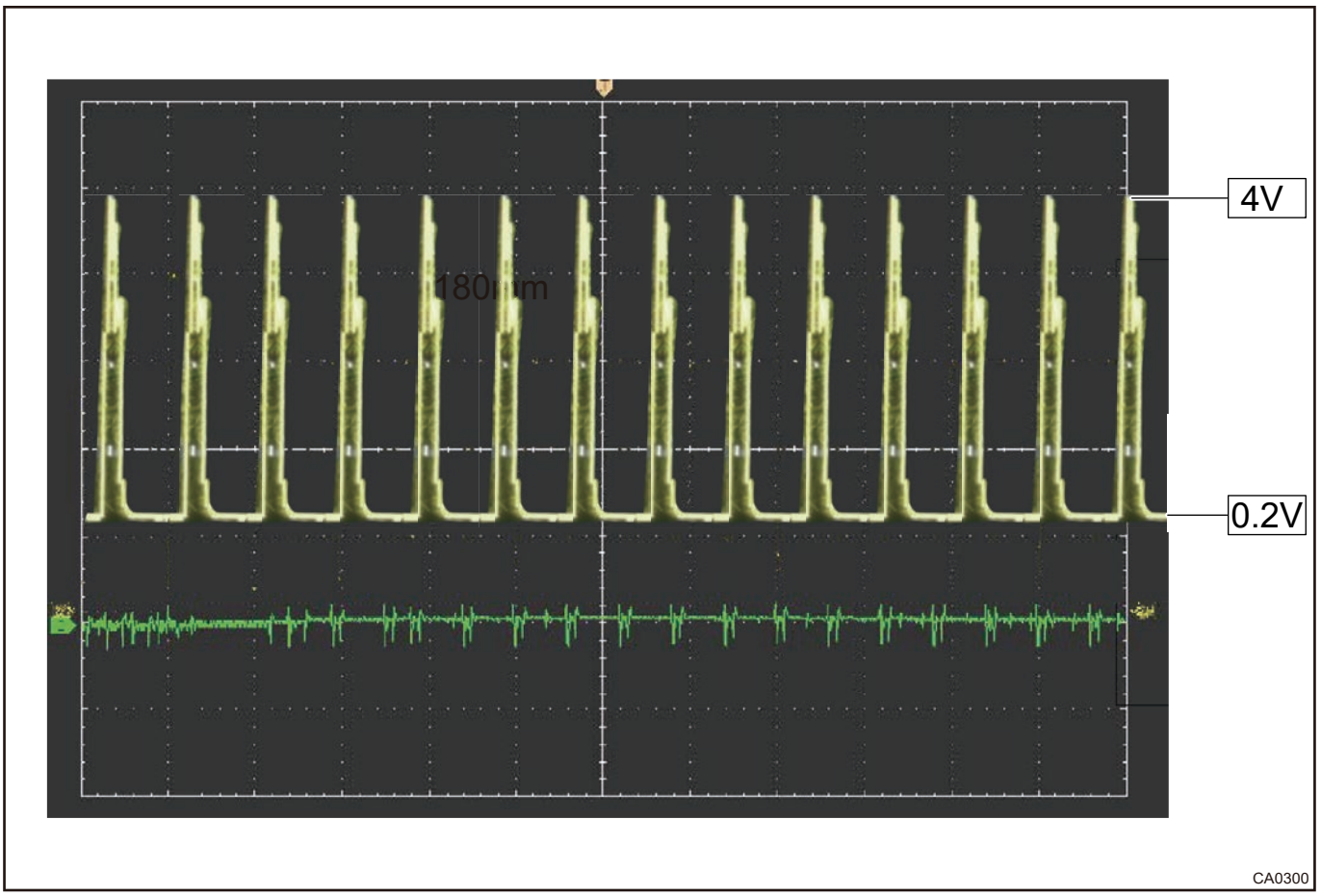
In the short circuit waveform to ground in CAN-H during actual vehicle test, the voltage potential of CAN-H line is placed at 0 V, and the recessive voltage of CAN-L line is placed at approximately 0.2 V. Power CAN and body CAN, CAN-H short to ground, vehicles can not start.

(5) CAN-L is short to ground

Malfunction waveform



CAN malfunction waveform



Malfunction symptoms:

- Observe with an oscilloscope: The voltage of CAN-L is approximately 0 V, and the recessive voltage of CAN-H line is also reduced to 0.2 V (near 0 V). Malfunction cause: Bus CAN-L is short to ground, node (module) malfunction.

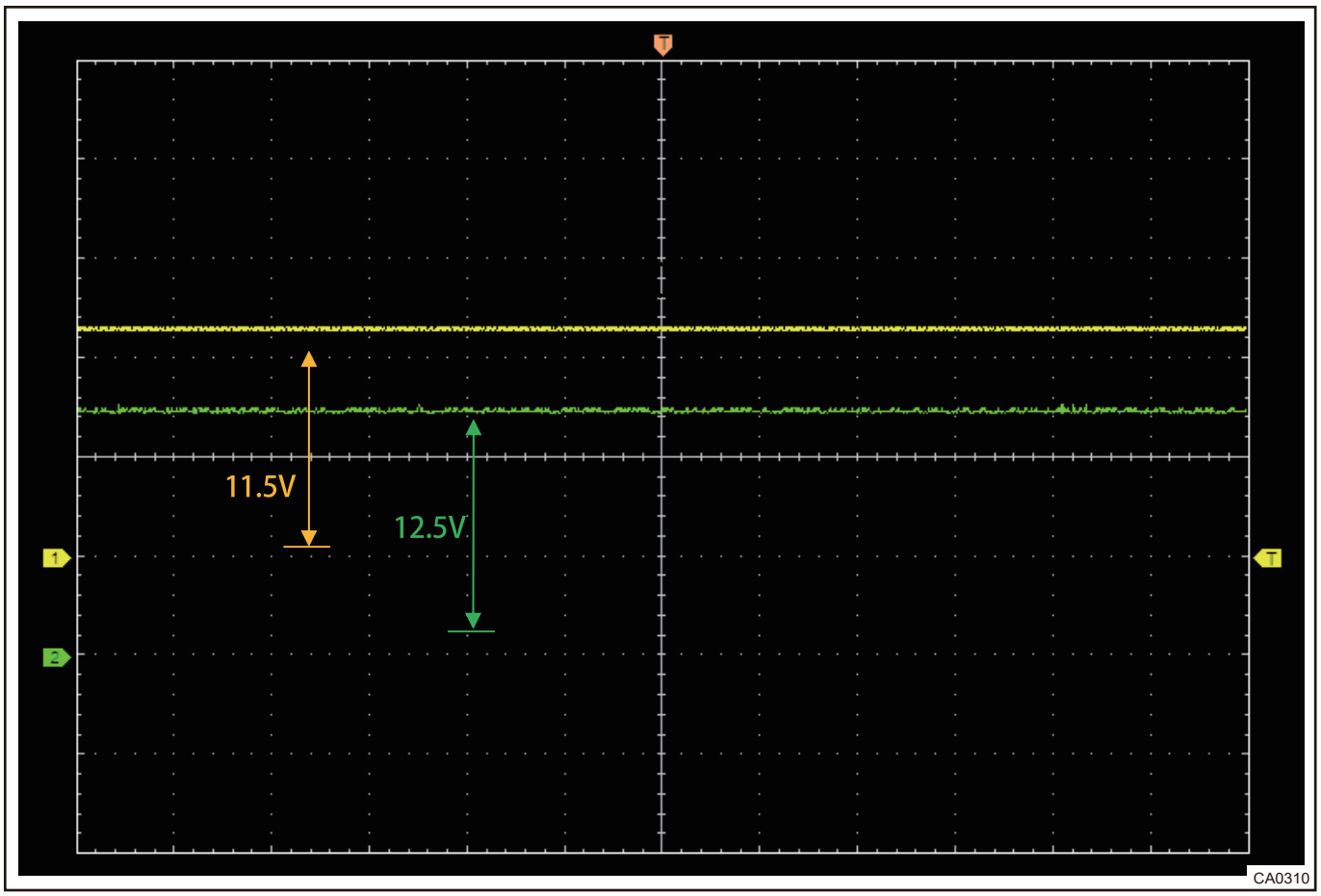
Troubleshooting procedures:

1) By plugging and unplugging control unit on CAN bus one by one and observing oscilloscope waveform at the same time, it can be judged whether it is a short circuit caused by the control unit or by the CAN-L line ground;
2) If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;
3) When there is no other measurement method, only CAN line can be disconnected from line connection point. Pay attention to maintenance instructions of CAN line.

In the short circuit waveform to ground of CAN-L during actual vehicle test, the voltage potential of CAN-L line is placed at 0 V. Power CAN and body CAN, CAN-L short to ground, vehicles can not start.

(6) CAN-L is short to power supply

Malfunction waveform



Malfunction symptoms:

- Observe with an oscilloscope: Both bus voltages are approximately 12 V, and waveforms are straight lines.

  Malfunction cause: Bus CAN-L is short to power supply, node (module) malfunction.

  Troubleshooting procedures:

  1) By plugging and unplugging control unit on CAN bus one by one and observing oscilloscope waveform at the same time, it can be judged that the short circuit is caused by the control unit or short circuit to power supply in CAN-L line;
  2) If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;
  3) When there is no other measurement method, only CAN line can be disconnected from line connection point. Pay attention to maintenance instructions of CAN line.

  After short circuit between CAN-L and power supply is judged during real vehicle test, power CAN and body CAN and CAN- L are short to power supply, and vehicle cannot start.

4.9 Diagnostic Trouble Code (DTC) Chart

■ Fault Summary for Node Missing and Communication Loss

DTC	DTC Definition	Detection Condition
U0100-87	Lost Communication with EMS	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0xFA message is received within 500 ms
U0101-87	Lost Communication with TCU	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x300 message is received within 500 ms
U0129-87	Lost Communication with BSM	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x2E9 message is received within 500 ms
U0144-87	Lost Communication with Battery	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No EBS LIN message is received within 4000 ms
U0151-87	Lost Communication with Restraints Control Module	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x320 message is received within 4000 ms
U0155-87	Lost Communication with ICM	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x430 message is received within 500 ms

DTC	DTC Definition	Detection Condition
U0164-87	Lost Communication with CLM	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x535 message is received within 2000 ms
U0208-87	Lost Communication with Seat Memory Module	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x442 message is received within 2000 ms
U0230-87	Lost Communication with Power Luggage Compartment Door	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x436 message is received within 2000 ms
U0231-87	Lost Communication with Rain Sensor	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No RSM LIN message is received within 4000 ms
U1162-87	Lost Communication with Front Camera Module	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) Start detection after 3 seconds of BUS OFF recovery (5) No 0x307 message is received within 1000 ms

■ **Faults for Other Categories**

DTC	DTC Definition	Detection Condition
U0073-88	CAN1 Bus Off	(1) Start detection after being in ON for 3 seconds (2) Start detection after 3 seconds of system reset (3) Start detection after 3 seconds since the voltage returns to 9 - 16 V (4) BDM detected BUS OFF and did not return to normal within the fast recovery cycle

4.10 DTC Diagnosis Procedure

■ **Fault Summary for Node Missing and Communication Loss**

DTC	U0100-87	Lost Communication with EMS
DTC	U0101-87	Lost Communication with TCU
DTC	U0129-87	Lost Communication with BSM
DTC	U0144-87	Lost Communication with Battery
DTC	U0151-87	Lost Communication with Restraints Control Module
DTC	U0155-87	Lost Communication with ICM
DTC	U0164-87	Lost Communication with CLM
DTC	U0208-87	Lost Communication with Seat Memory Module
DTC	U0230-87	Lost Communication with Power Luggage Compartment Door
DTC	U0231-87	Lost Communication with Rain Sensor
DTC	U1162-87	Lost Communication with Front Camera Module

1	Read if CAN bus has fault using the diagnostic tester

NG → Check and repair CAN bus fault, verify the fault phenomenon again.

OK ↓

2	Check if module that has lost communication, power supply and ground are normal.

NG → Check and repair faulty module power supply or ground, verify the fault phenomenon again

OK ↓

3	Using a multimeter, check if it is normal from module that has lost communication to CAN network wire harness connection and node.

NG → Check wire harness connection and node between modules, verify the fault phenomenon again.

OK ↓

4	Connect oscilloscope and observe waveform at the same time. Observe if waveform is normal.

NG

Check and repair the cause of abnormal waveforms (such as interference from other equipment added to power supply and ground, etc.), verify the fault phenomenon again.

OK

5	Replace the module that has lost communication.

Verify the fault phenomenon again.

■ Bus Off Fault

DTC	U0073-88	CAN1 Bus Off

1	Check if central gateway module power supply and ground are normal.

NG

Check and repair power supply or ground, verify the fault phenomenon again.

OK

2	Check if CAN bus and node are connected normally (CAN_H open, CAN_L open, CAN_H short to CAN_L/open, CAN_L short to VBAT, CAN_H short to GND, CAN_L short to GND, termination resistor open, etc.).

NG

Check and repair CAN bus and node, verify the fault phenomenon again.

OK

3	Check the signal for strong interference.

NG

Check if there is interference in the signal or the twisted pair is dropped with oscilloscope, verify the fault phenomenon again.

OK

4	Check modules in network.

NG

Unplug or replace module, verify the fault phenomenon again.

OK

5	Replace module, check and repair, then verify the fault phenomenon again.

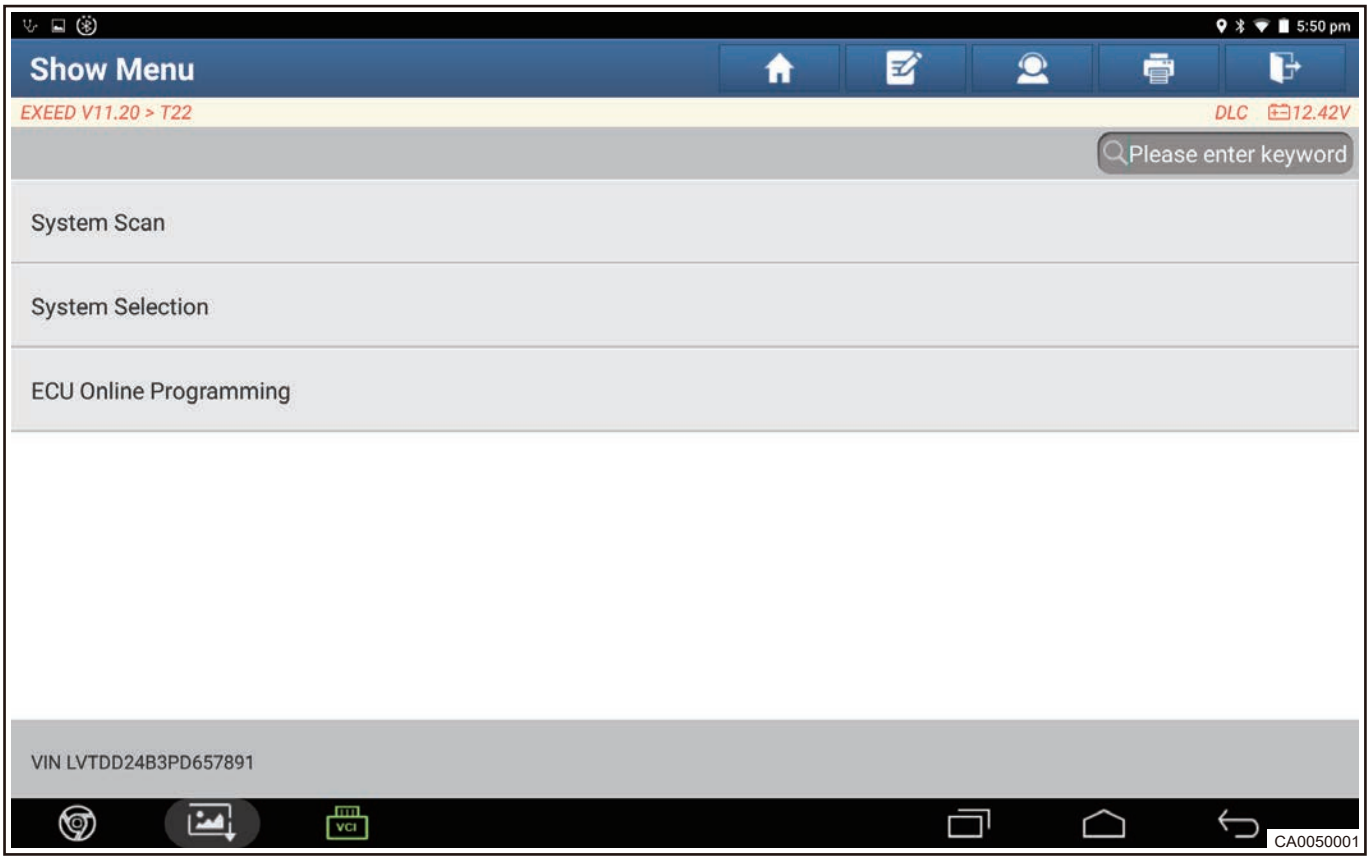
4.11 Matching Learning

■ Software Configuration Information Writing

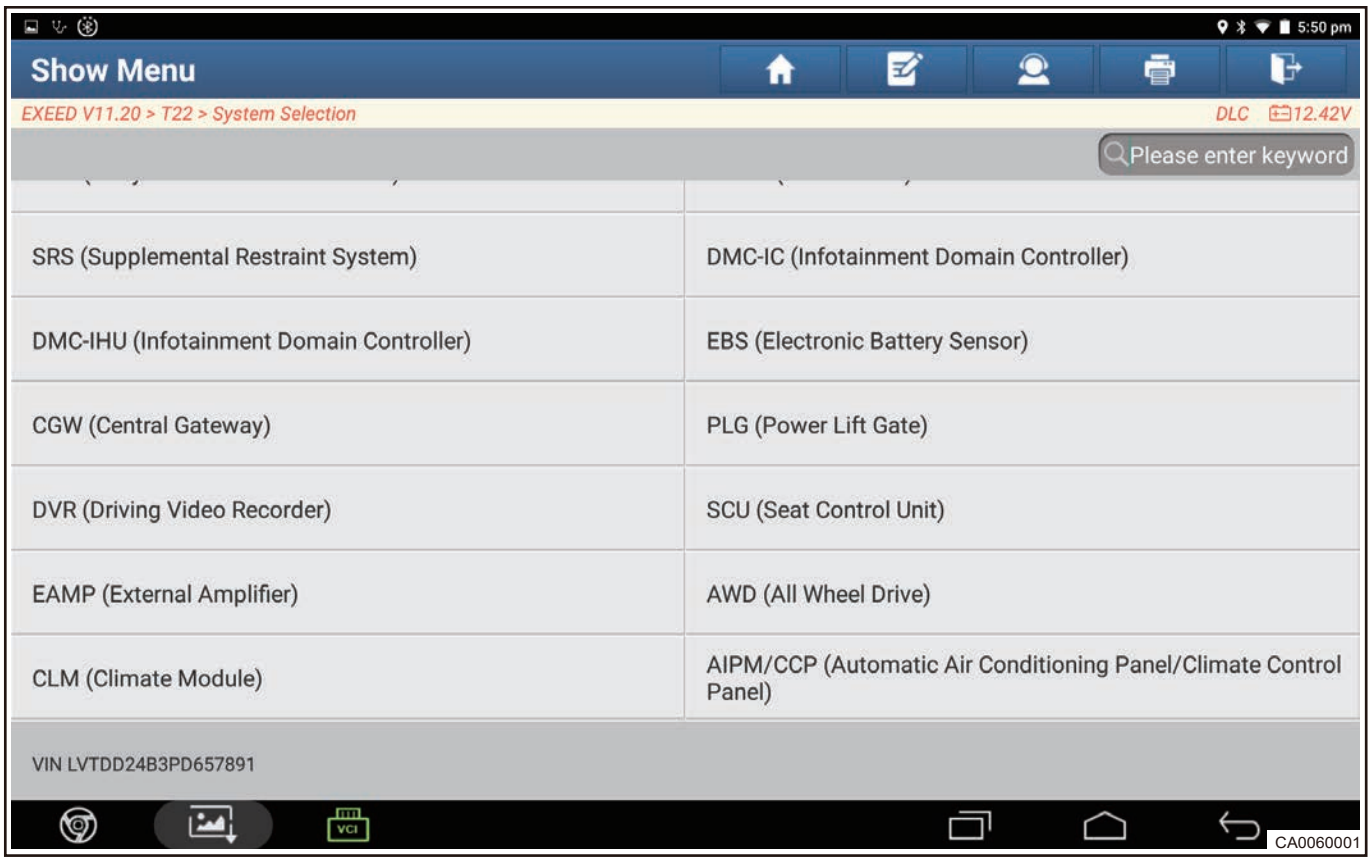
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

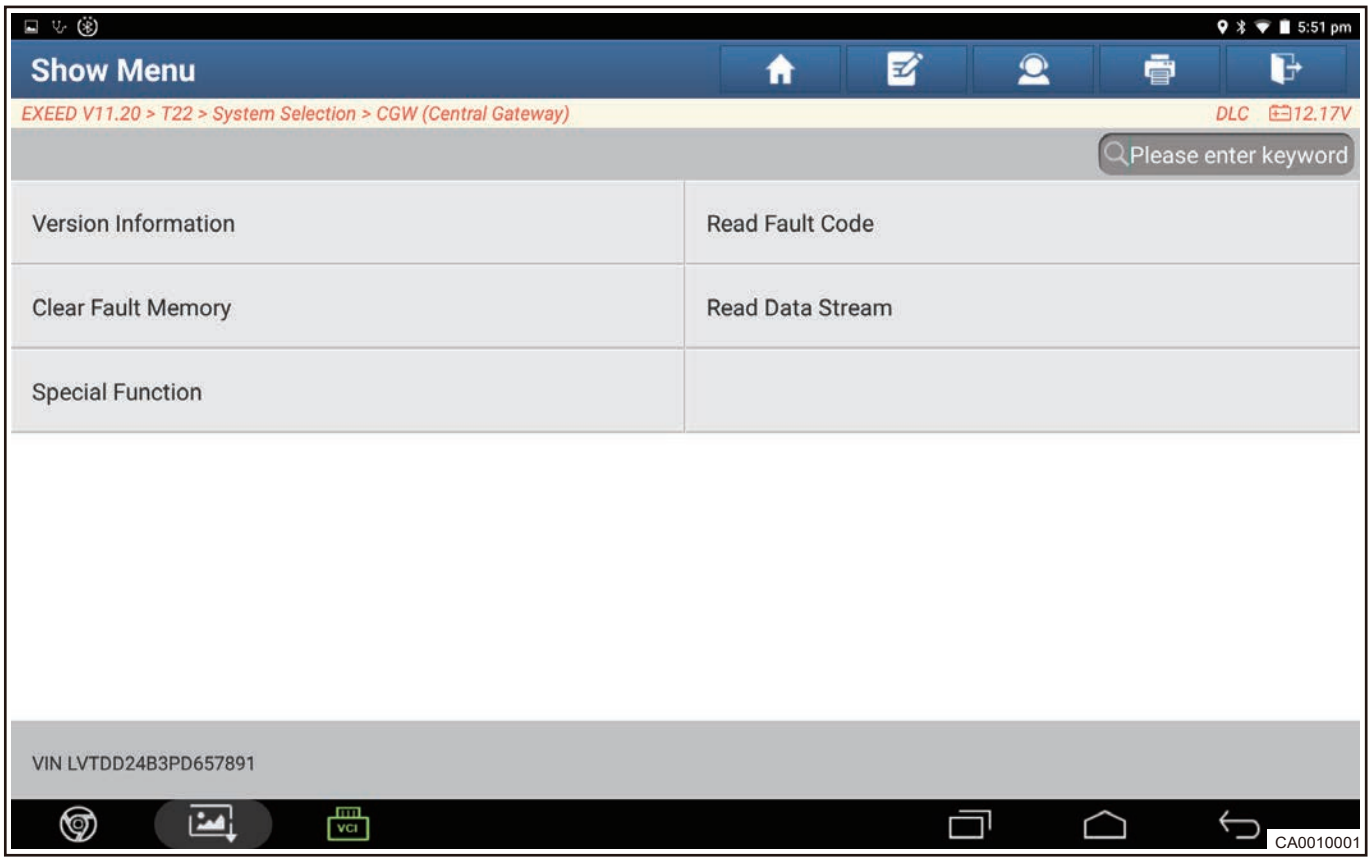
(3) Click “System Selection”.



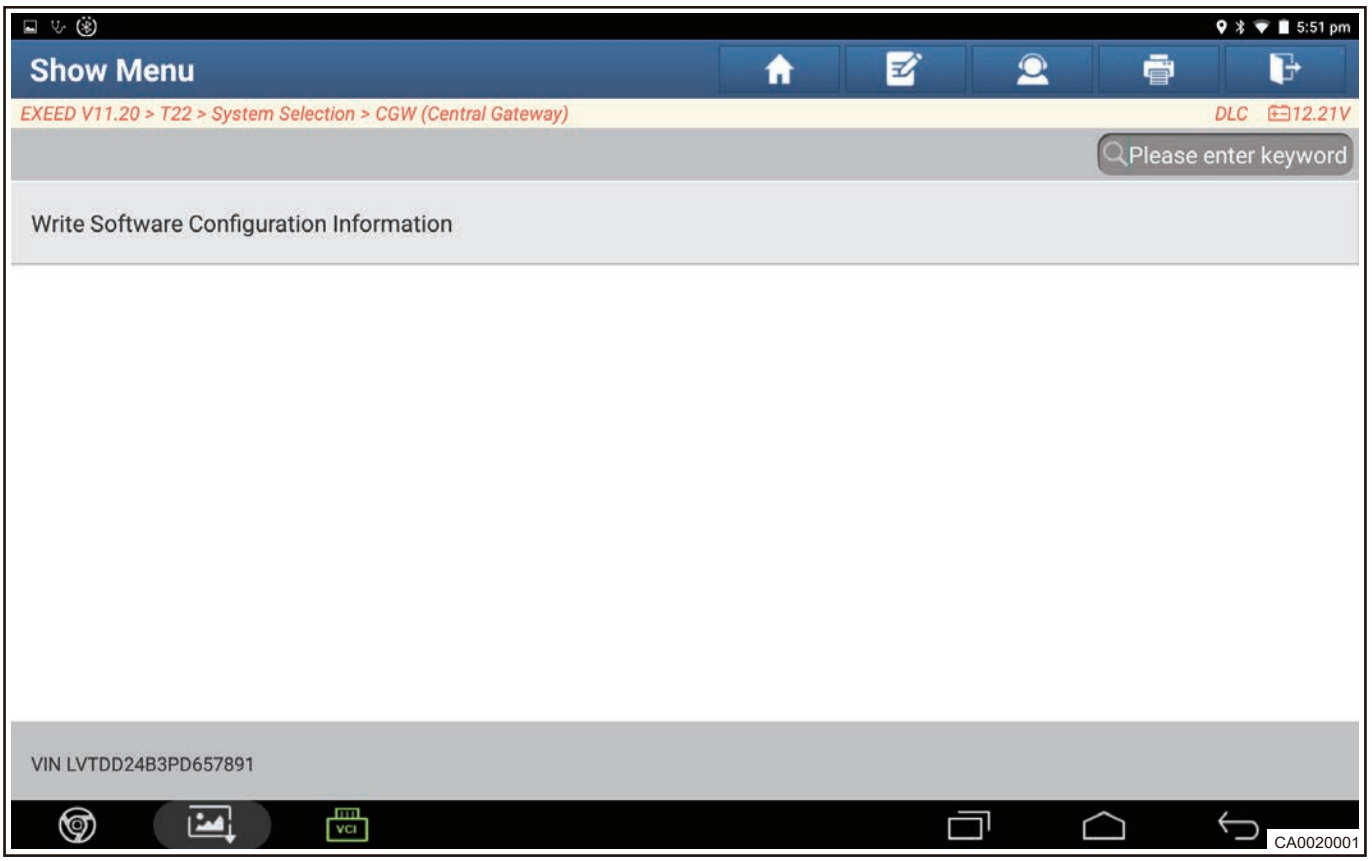
(4) Select “CGW (Central Gateway)”.



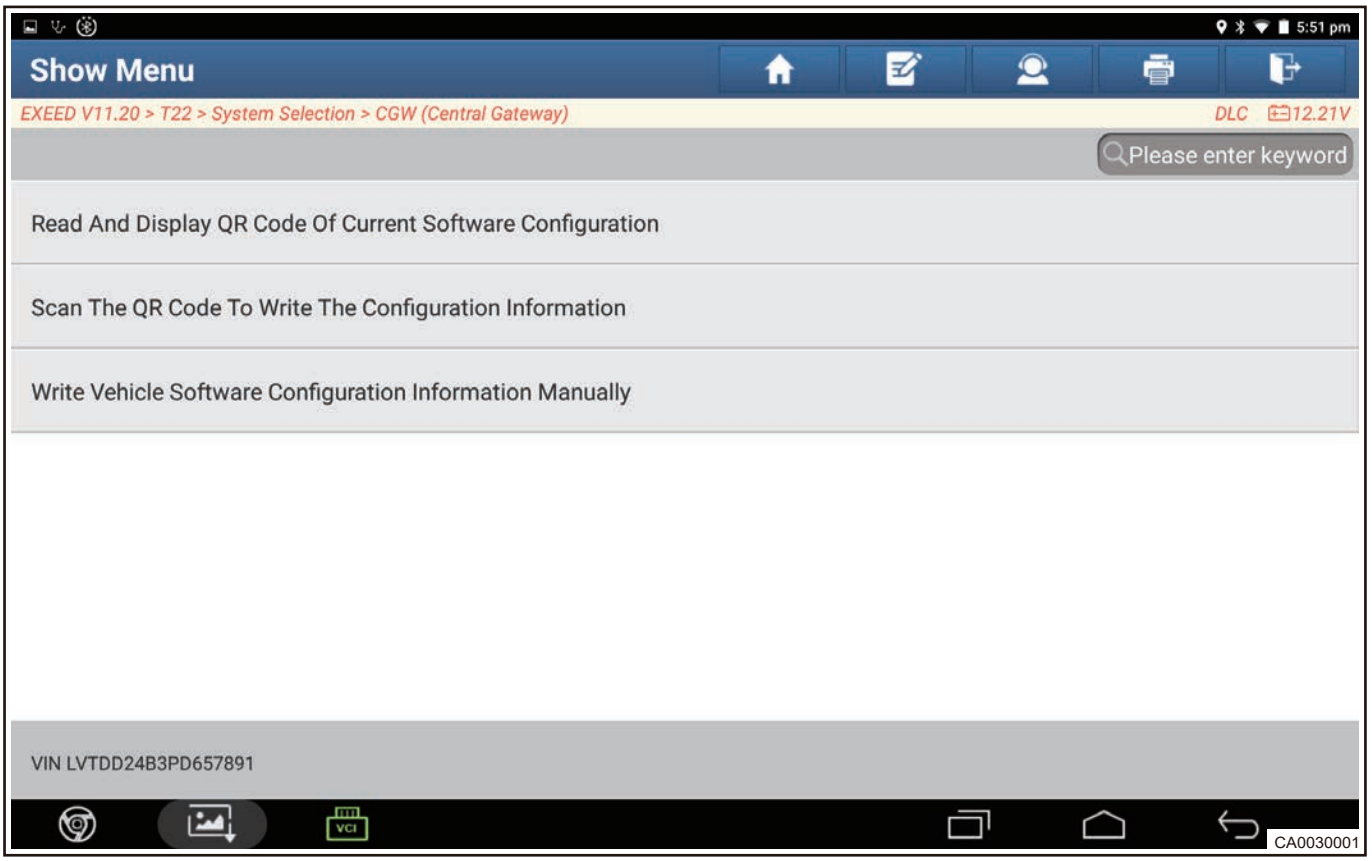
(5) Click "Special Function".



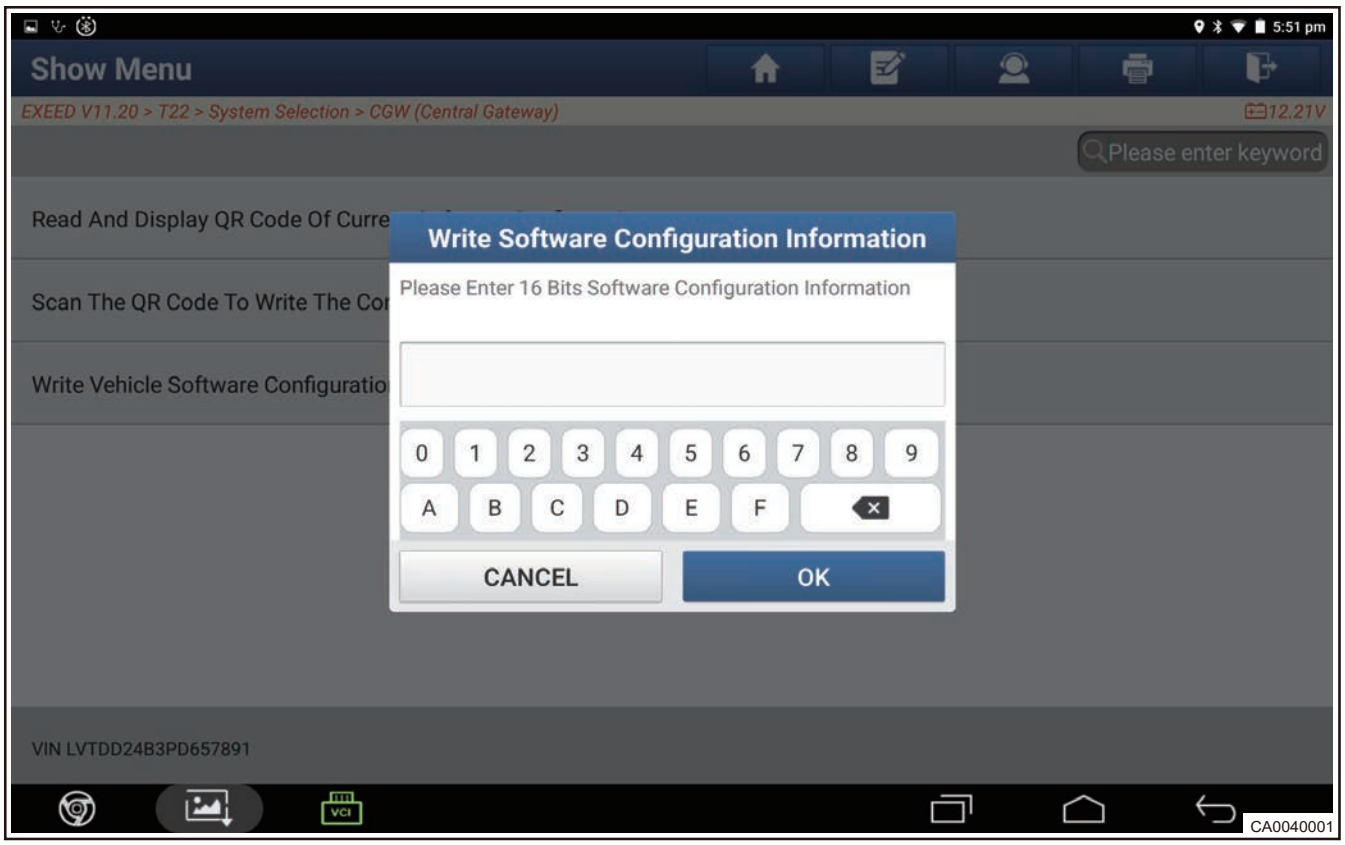
(6) Enter next interface and click “Write Software Configuration Information”.



(7) Enter next interface and click “Write Vehicle Software Configuration Information Manually”.



(8) Input corresponding configuration information and click “OK”.



5 On-vehicle Service

5.1 Gateway Module (CGW) (Low Configuration)

■ **Removal**

⚠ Caution

- **Read configuration code of CGW module and record it with a diagnostic tester, before removing gateway module.**
- **Try to prevent interior and body paint surface from being scratched, when removing gateway module.**

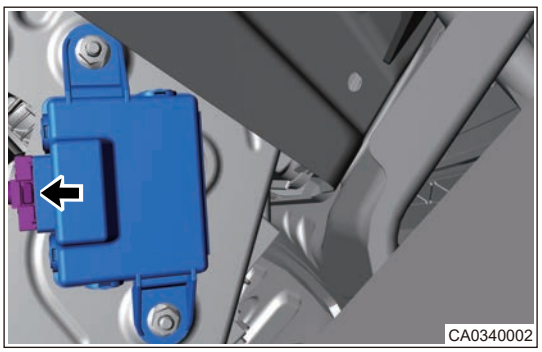
(1) Turn ENGINE START STOP switch to OFF.

(2) Disconnect the negative battery cable.

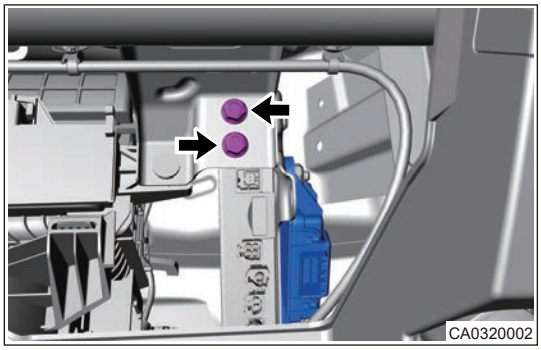
(3) Remove the glove box assembly.

(4) Remove the gateway module.

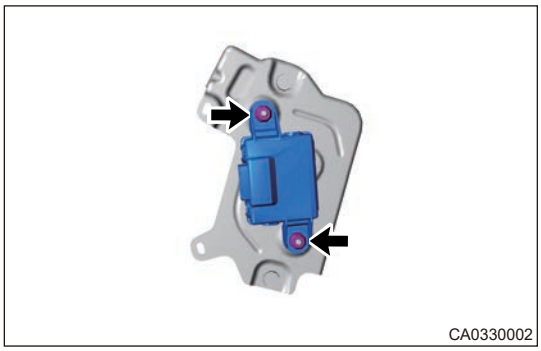
1) Disconnect the gateway module connector (arrow).



2) Remove 3 fixing bolts (arrow) from gateway bracket.



3) Remove 2 fixing nuts (arrow) between gateway module and gateway bracket.



4) Remove the gateway module.

■ **Installation**

(1) Install 2 fixing nuts between gateway module and gateway bracket.
(2) Install 3 fixing bolts of gateway bracket.
(3) Connect the gateway module wire harness connector.
(4) Install the glove box assembly.
(5) Connect the negative battery cable.
(6) Write configuration code with diagnostic tester to check module for proper operation after installation.

5.2 Gateway Module (CGW) (High Configuration)

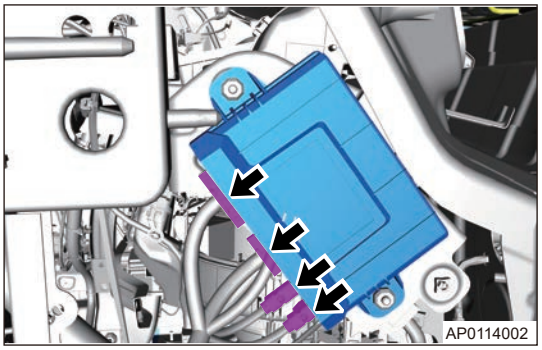
■ **Removal**

⚠ Caution

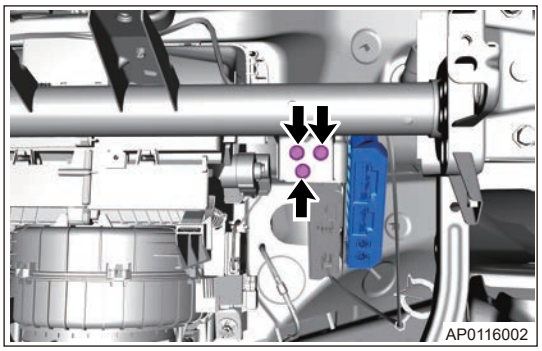
- **Read configuration code of CGW module and record it with a diagnostic tester, before removing gateway module.**
- **Try to prevent interior and body paint surface from being scratched, when removing gateway module.**

(1) Turn ENGINE START STOP switch to OFF.
(2) Disconnect the negative battery cable.
(3) Remove the glove box assembly.
(4) Remove the gateway module.

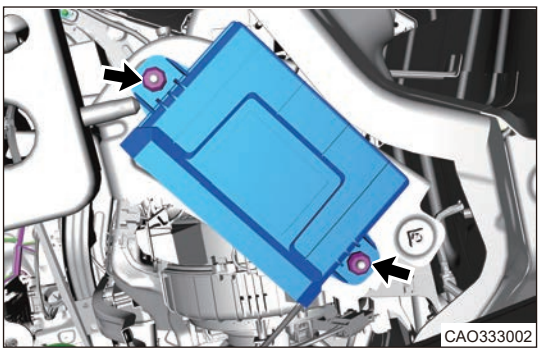
1) Disconnect the gateway module connector (arrow).



2) Remove 3 fixing bolts (arrow) from gateway bracket.



3) Remove 2 fixing nuts (arrow) between gateway module and gateway bracket.



4) Remove the gateway module.

■ Installation

(1) Install 2 fixing nuts between gateway module and gateway bracket.
(2) Install 3 fixing bolts of gateway bracket.
(3) Connect the gateway module wire harness connector.
(4) Install the glove box assembly.
(5) Connect the negative battery cable.
(6) Write configuration code with diagnostic tester to check module for proper operation after installation.

CONTENTS

BODY

1.1 INSTRUMENT PANEL

1 Warnings and Precautions

1.1 Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

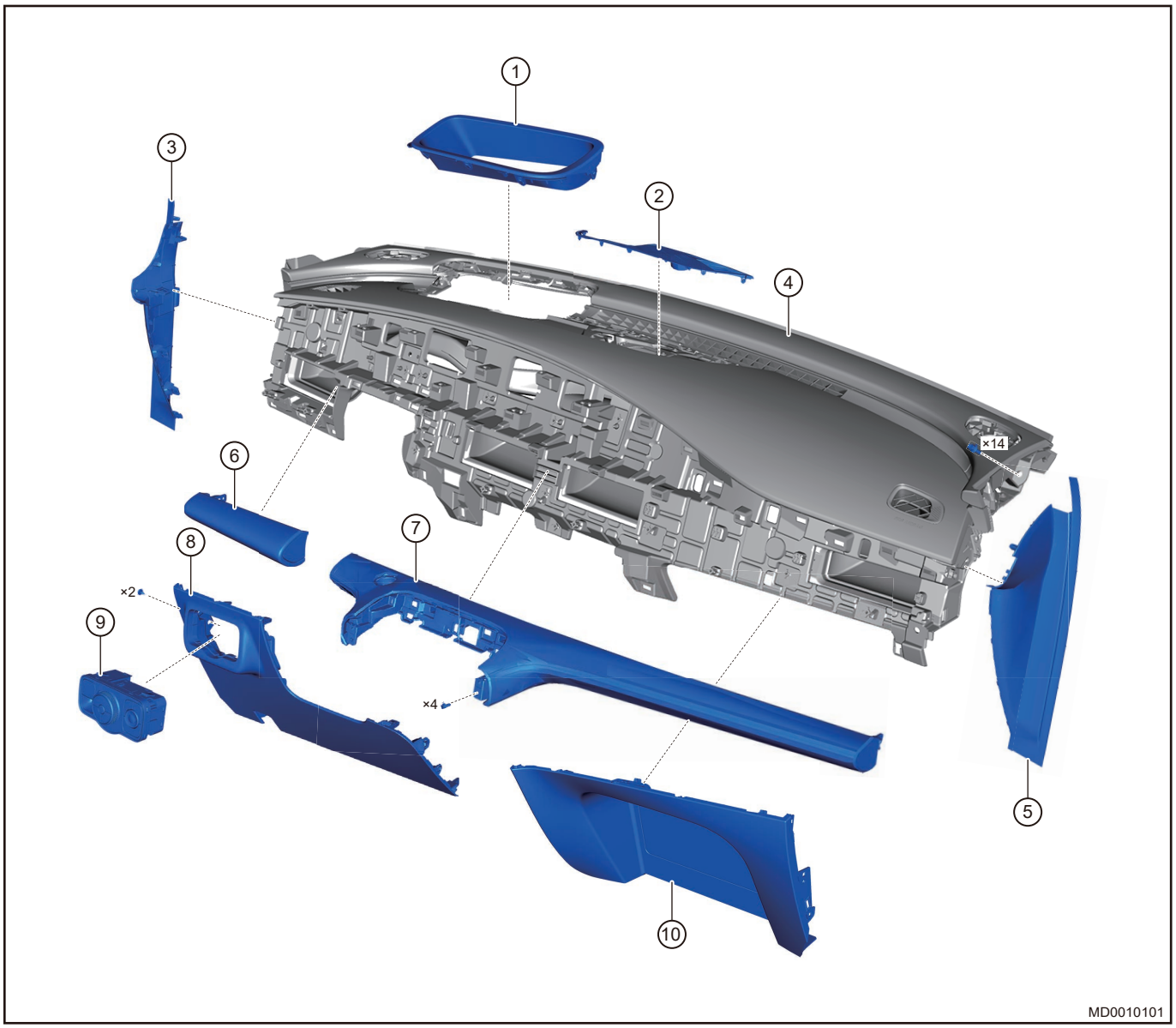
(1) Be sure to wear safety equipment to prevent accidents, when removing instrument panel assembly.

(2) Appropriate force should be applied, when removing instrument panel assembly. Be careful not to operate roughly.

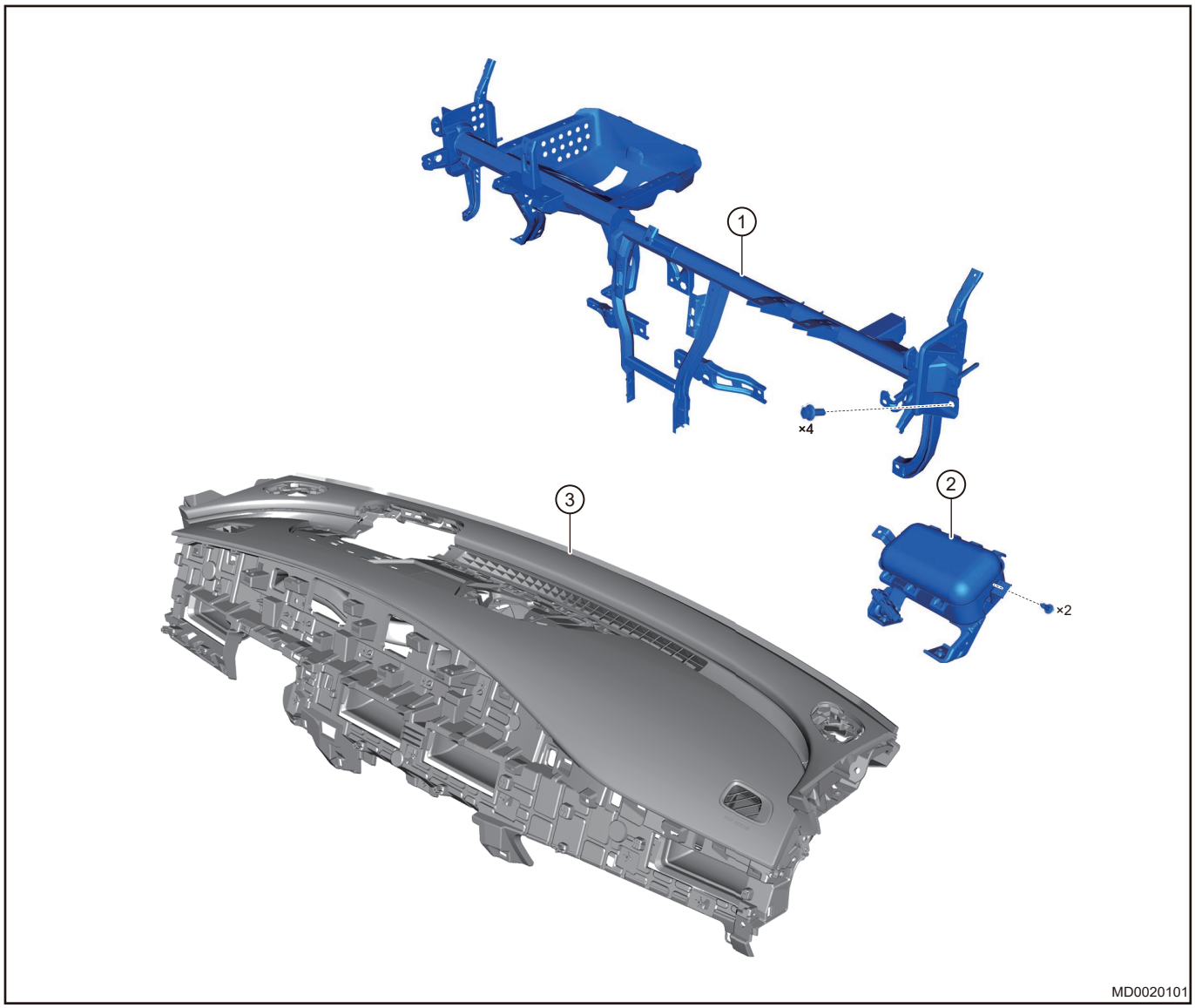
(3) DO NOT scratch interior and body paint, when removing instrument panel assembly.

2 System Overview

2.1 System Components Diagram



1	HUD Cover Plate	6	Left Instrument Panel Trim Panel Assembly
2	Speaker Cover	7	Right Instrument Panel Trim Panel Assembly
3	Instrument Panel Left End Plate Assembly	8	Lower Left Protector Assembly
4	Instrument Panel Body Assembly	9	Lighting Control Switch Assembly
5	Instrument Panel Right End Plate Assembly	10	Lower Right Protector Assembly

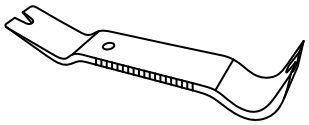


1	Instrument Panel Crossmember Assembly	3	Instrument Panel Body Assembly
2	Front Passenger Airbag Assembly		

3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

3.2 Fasteners Torque List

■ Torque Specifications

Item	Tightening torque
Instrument Panel Fixing Bolt	7 ± 1.5 N·m
Passenger Side Airbag and Crossmember Fixing Bolt	23 ± 4 N·m
Instrument Panel Left Lower Protector Assembly Fixing Screw	1.5 ± 0.5 N·m
Middle Channel Left Connecting Bracket Fixing Nut	7.0 ± 1.5 N·m
Instrument Panel Crossmember Fixing Bolt	23 ± 4 N·m

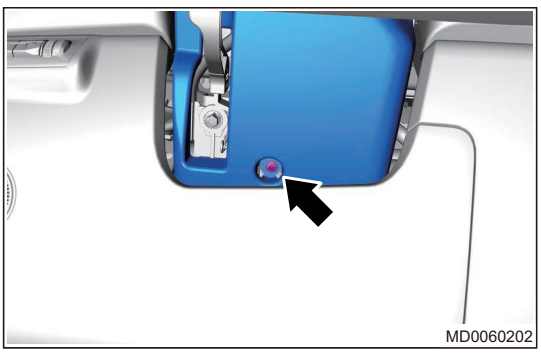
3.3 INSTRUMENT PANEL

■ Removal

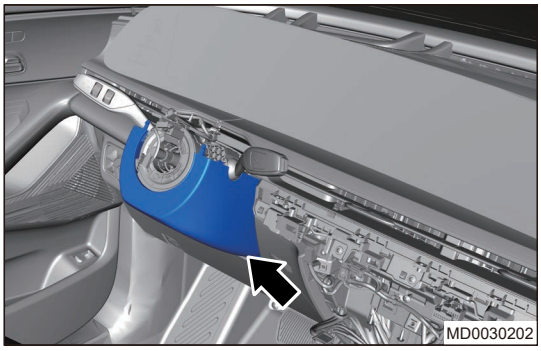
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing instrument panel.**
- **Appropriate force should be applied, when removing instrument panel. Be careful not to operate roughly.**

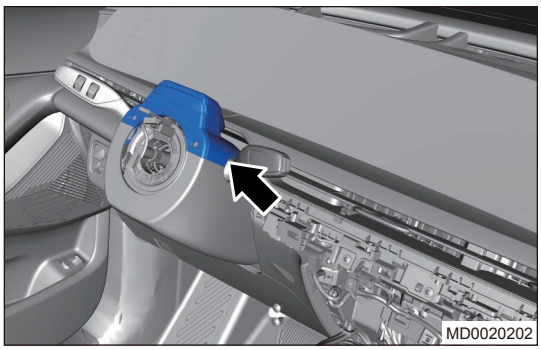
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the auxiliary fascia console assembly.
(4) Remove the driver airbag assembly.
(5) Remove the steering wheel assembly.
(6) Remove fixing screw from combination switch lower cover assembly.


MD0060202

(7) Remove the combination switch lower cover.



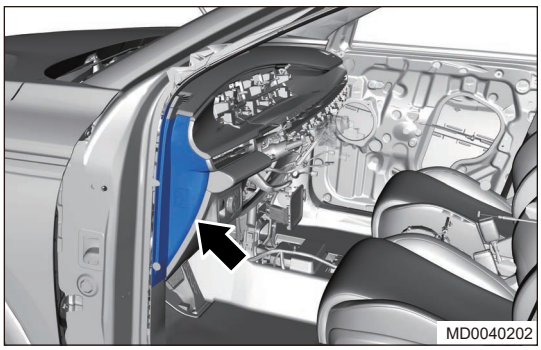
(8) Using an interior crow plate, carefully pry off the combination switch upper cover.



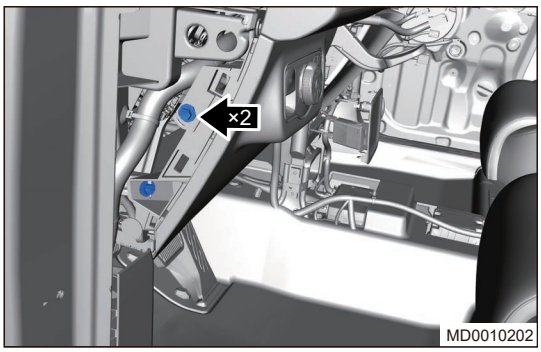
(9) Removal the combination switch assembly.

(10) Remove the dual LCD.

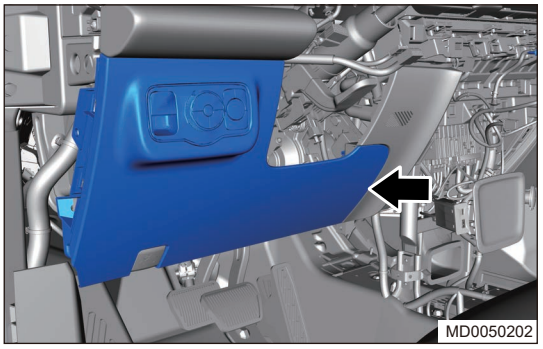
(11) Using an interior crow plate, remove the instrument panel left end panel assembly.



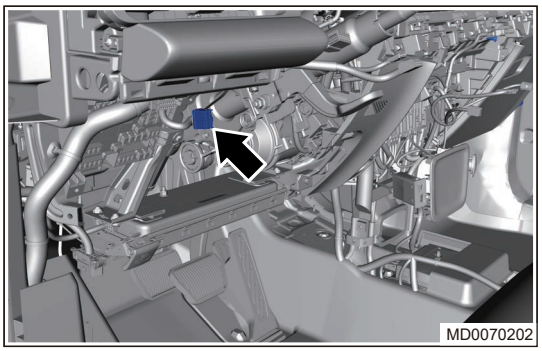
(12) Remove 2 fixing bolts from instrument panel lower left protector assembly.



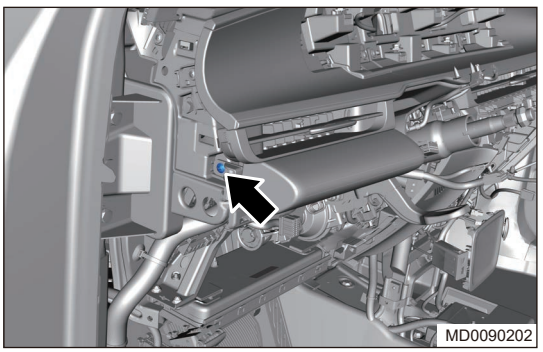
(13) Using an interior crow plate, carefully pry off lower instrument panel lower left protector assembly.



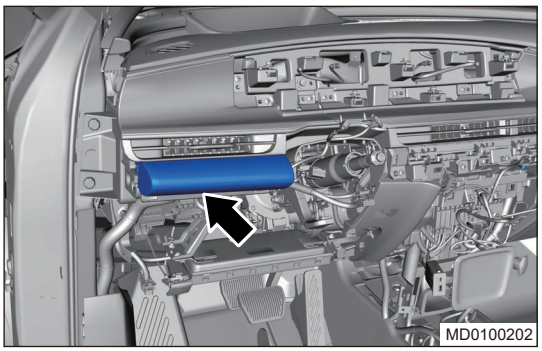
(14) Disconnect the connector.



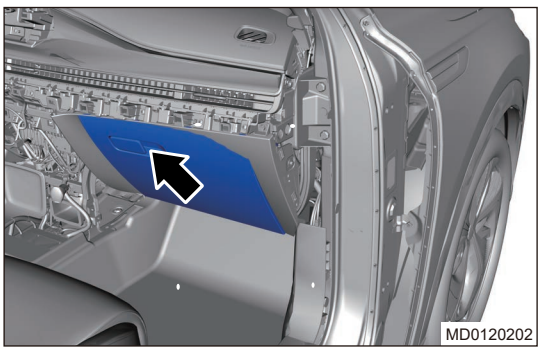
(15) Remove 1 fixing screw from left instrument panel trim panel assembly.



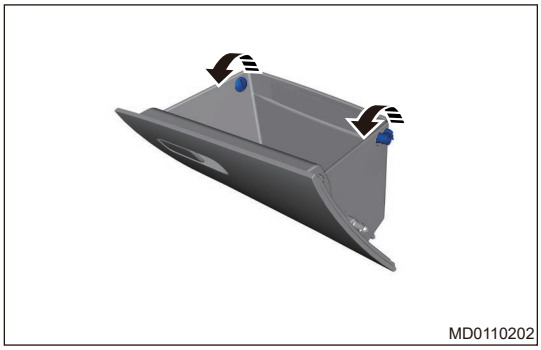
(16) Using an interior crow plate, pry off instrument panel left trim board assembly carefully.



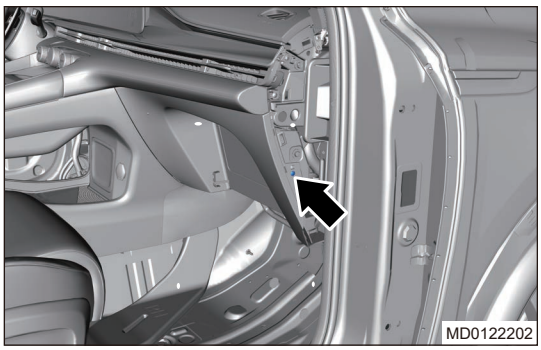
(17) Press glove box lock button to open glove box.



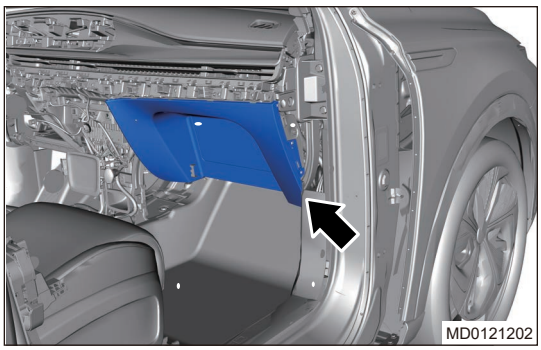
(18) Rotate lock knob in direction of arrow to remove it.



(19) Remove 1 fixing screw from right lower protector assembly.



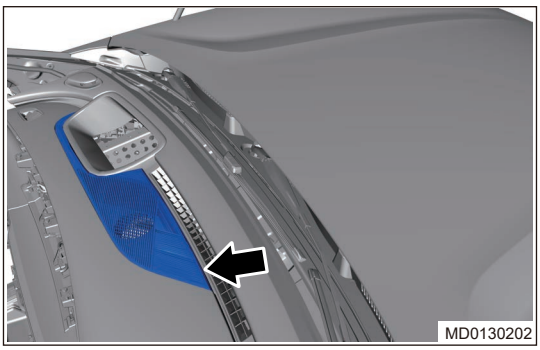
(20) Using an interior crow plate, carefully pry off lower right protector assembly.



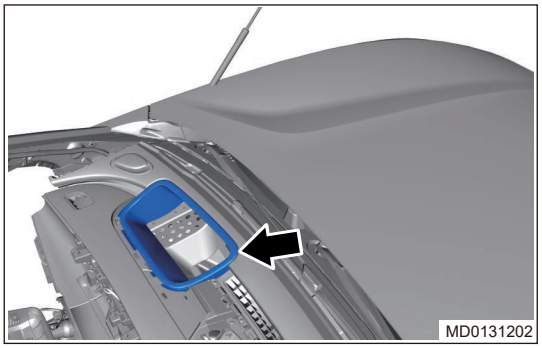
(21) Remove the left A-pillar upper protector assembly.

(22) Remove the right A-pillar upper protector assembly.

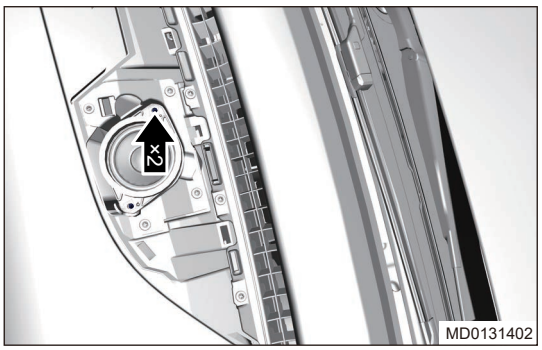
(23) Using an interior crow plate, carefully pry off the speaker cover assembly.



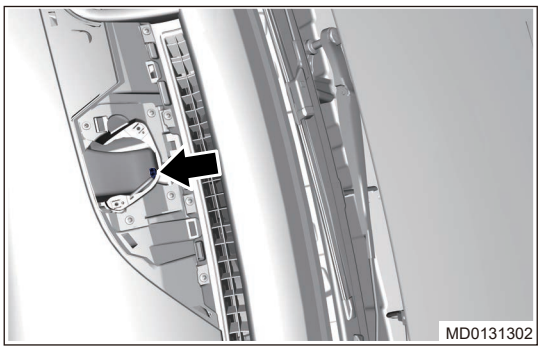
(24) Using an interior crow plate, carefully pry off the HUD cover plate assembly.



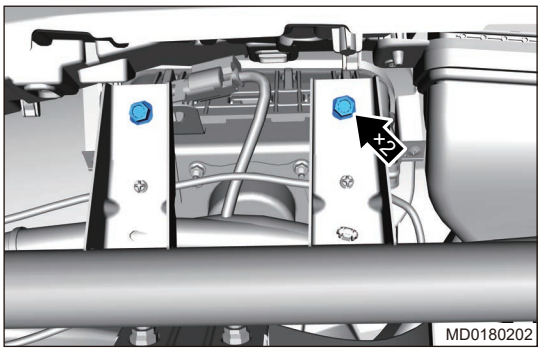
(25) Remove 2 fixing screws from speaker.



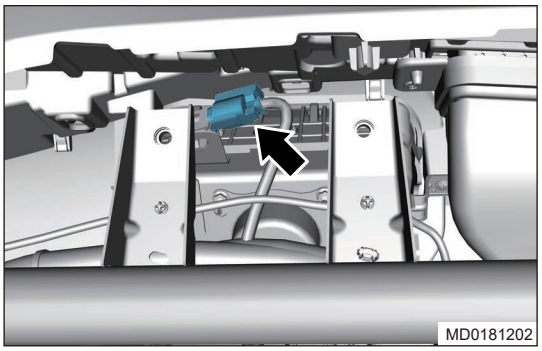
(26) Disconnect the connector.



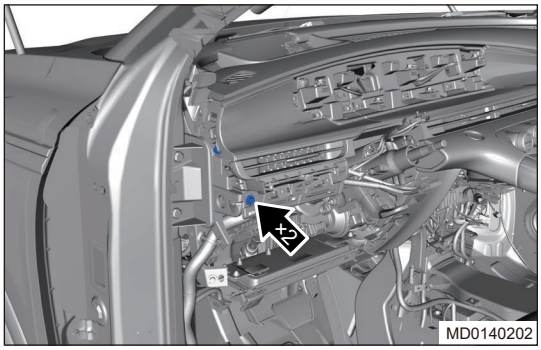
(27) Remove 2 fixing bolts between passenger side airbag and crossmember.



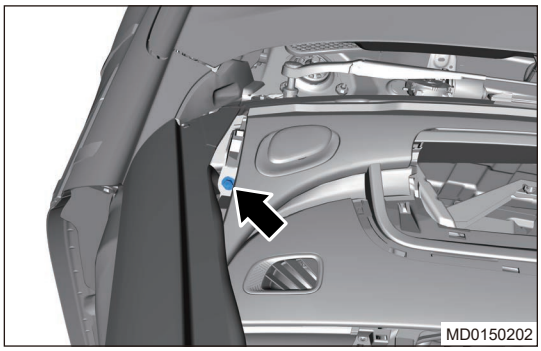
(28) Disconnect the passenger side airbag connector.



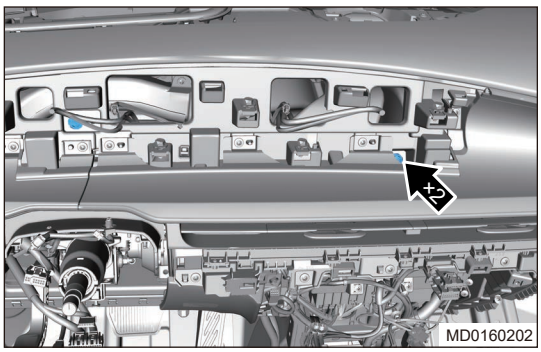
(29) Remove 2 fixing bolts from instrument panel.



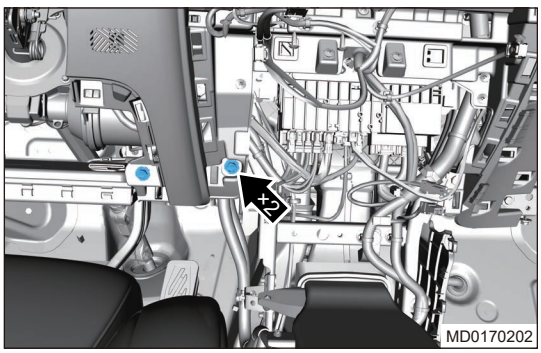
(30) Remove 1 fixing bolt from instrument panel.



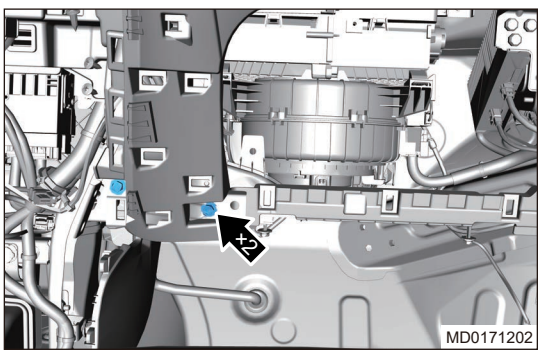
(31) Remove 2 fixing bolts from instrument panel.



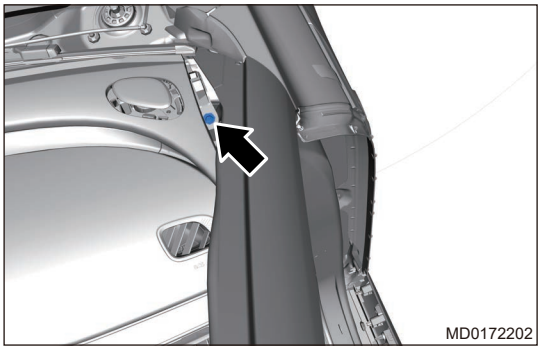
(32) Remove 2 fixing bolts from instrument panel.



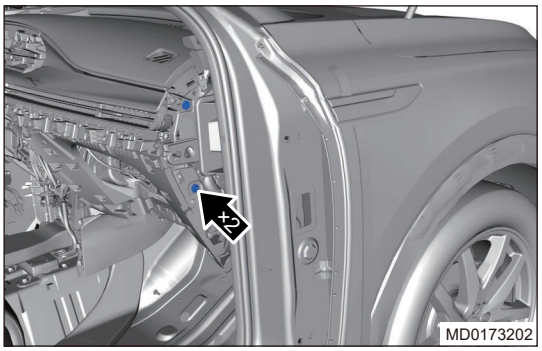
(33) Remove 2 fixing bolts from instrument panel.



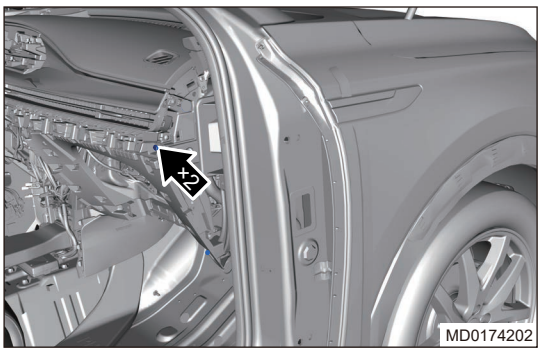
(34) Remove 1 fixing bolt from instrument panel.



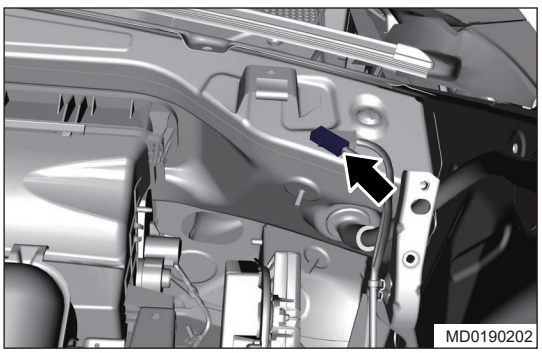
(35) Remove 2 fixing bolts from instrument panel.



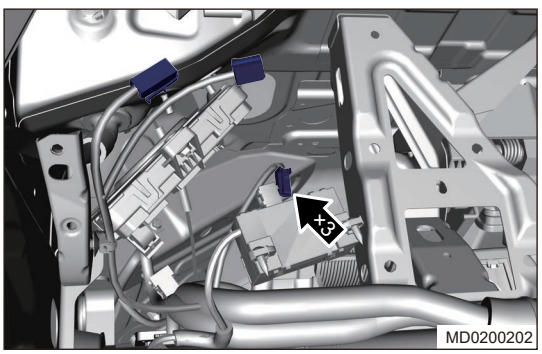
(36) Remove 2 fixing bolts from instrument panel.



(37) Disconnect the horn connector.



(38) Disconnect the horn anion and other connectors.



(39) Remove fixing clips from instrument panel assembly, and remove instrument panel.

■ **Installation**

⚠ **Caution**
• **Be sure to wear safety equipment to prevent accidents, when installing instrument panel assembly.** • **Appropriate force should be applied, when installing instrument panel assembly. Be careful not to operate roughly.** • **DO NOT scratch interior and body paint, when installing instrument panel assembly.**

(1) Install instrument panel to a proper position on body, and install clips.
(2) Connect the horn anion and other connectors.
(3) Connect the horn connector.
(4) Install 2 fixing bolts to instrument plate.
Torque: 7 ± 1.5 N · m

(5) Install 2 fixing bolts to instrument plate.
Torque: 7 ± 1.5 N · m

(6) Install 1 fixing bolt to instrument plate.
Torque: 7 ± 1.5 N · m

(7) Install 2 fixing bolts to instrument plate.
Torque: 7 ± 1.5 N · m

(8) Install 2 fixing bolts to instrument plate.
Torque: 7 ± 1.5 N · m

(9) Install 2 fixing bolts to instrument plate.
Torque: 7 ± 1.5 N · m

(10) Install 1 fixing bolt to instrument plate.
Torque: 7 ± 1.5 N · m

(11) Install 2 fixing bolts to instrument plate.
Torque: 7 ± 1.5 N · m

(12) Connect the passenger side airbag connector.
(13) Install 2 fixing bolts between passenger side airbag and crossmember.
Torque: 23 ± 4 N · m

(14) Connect speaker connector and install 2 fixing screws.
(15) Install the HUD cover plate assembly.
(16) Install speaker cover assembly.
(17) Install the right A-pillar upper protector assembly.
(18) Install the left A-pillar upper protector assembly.
(19) Install the lower right protector assembly.
(20) Install 1 fixing screw to the lower right protector assembly.
Torque: 1.5 ± 0.5 N · m

(21) Install the glove box assembly.

(22) Install the left instrument panel trim panel assembly.

(23) Install 1 fixing screw to left instrument panel trim panel assembly.

Torque: 1.5 ± 0.5 N · m

(24) Install instrument panel left lower protector assembly, and connect connector.

(25) Install 2 fixing bolts to instrument panel left lower protector assembly.

(26) Install the instrument panel left end panel assembly.

(27) Install the dual LCD.

(28) Install the combination switch assembly.

(29) Install the combination switch upper cover.

(30) Install the combination switch lower cover.

(31) Install fixing screw to combination switch lower cover.

(32) Install the steering wheel assembly.

(33) Install the driver airbag assembly.

(34) Install the auxiliary fascia console assembly.

(35) Connect the negative battery cable.

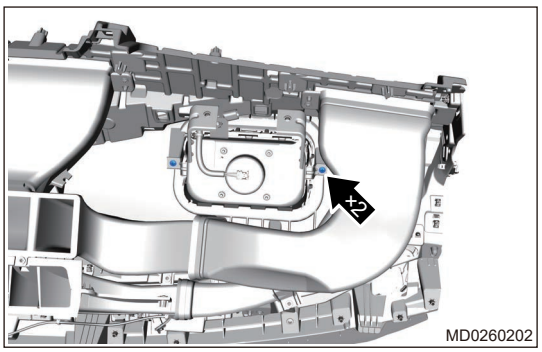
■ Disassembly

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when disassembling instrument panel.**
- **Appropriate force should be applied, when disassembling instrument panel. Be careful not to operate roughly.**

(1) Remove the instrument panel assembly.

(2) Remove 2 fixing screws from front passenger airbag, and pry off front passenger airbag assembly.



■ Assembly

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when assembling instrument panel assembly.**
- **Appropriate force should be applied, when assembling instrument panel assembly. Be careful not to operate roughly.**

(1) Install 2 fixing screws to front passenger airbag.

Torque: 2.5 ± 0.5 N · m

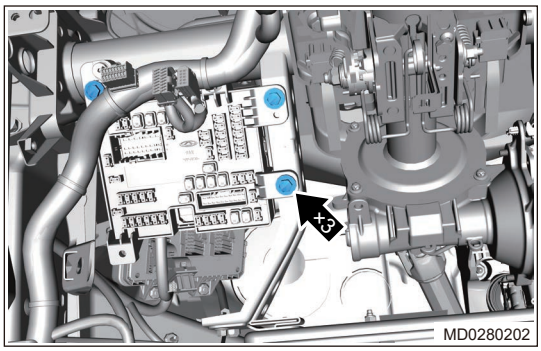
3.4 Instrument Panel Crossmember Assembly

■ Removal

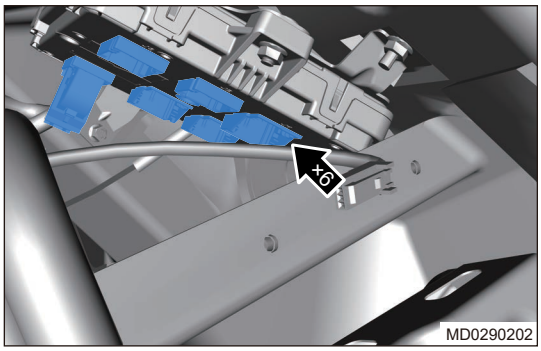
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing instrument panel crossmember assembly.**
- **Appropriate force should be applied, when removing instrument panel crossmember assembly. Be careful not to operate roughly.**

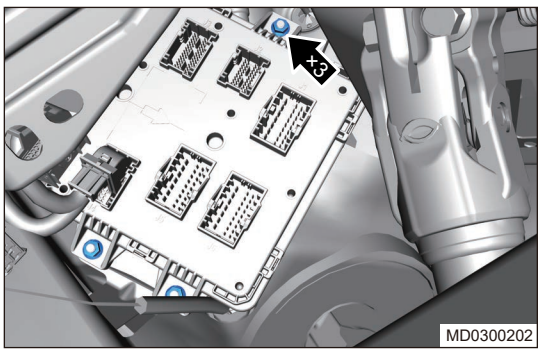
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the auxiliary fascia console assembly.
(4) Remove the instrument panel assembly.
(5) Remove the front windshield lower trim board body.
(6) Remove 3 fixing bolts from instrument panel fuse and relay box.



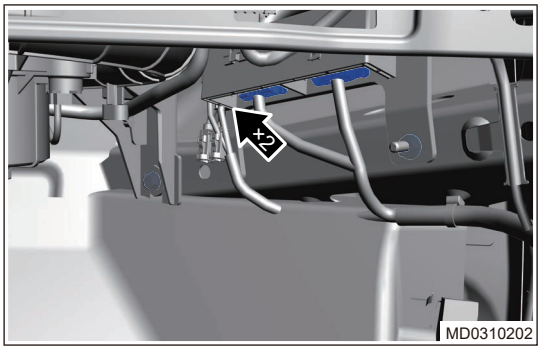
(7) Disconnect 6 connectors from Body Domain Controller (BDM).



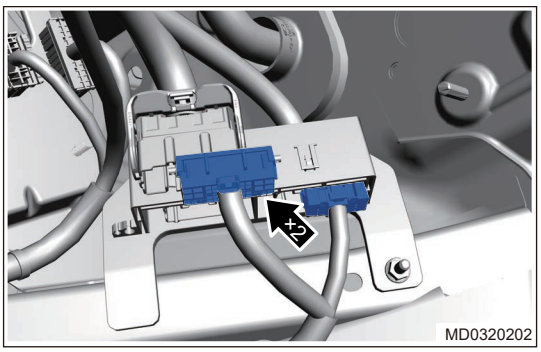
(8) Remove 3 fixing nuts from Body Domain Controller (BDM).



(9) Disconnect 2 connectors between instrument panel wire harness and interior wire harness.



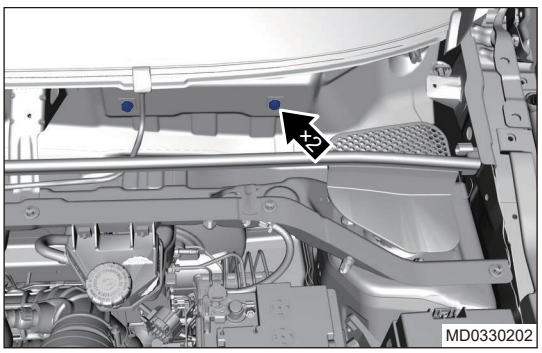
(10) Disconnect 2 connectors between instrument panel wire harness and interior wire harness.



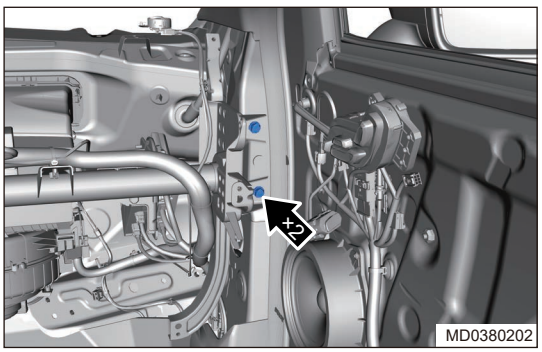
(11) Remove the domain controller.

(12) Detach all wire harness fixing clips from instrument panel crossmember.

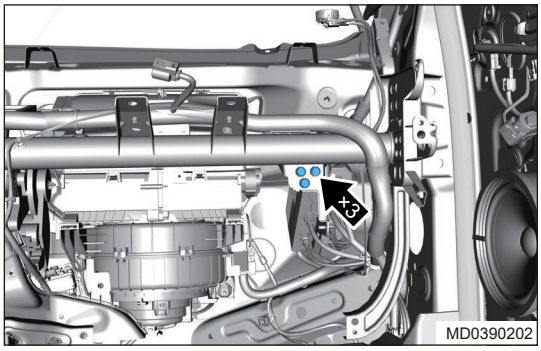
(13) Remove 2 fixing bolts from instrument panel crossmember.



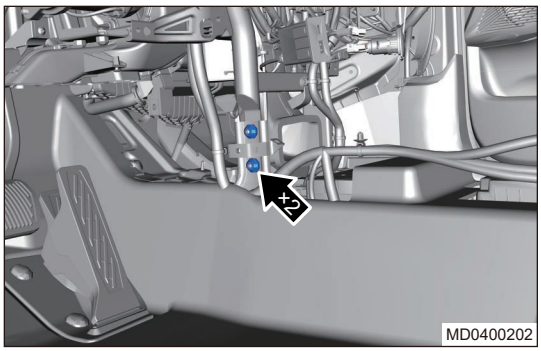
(14) Remove 2 fixing bolts from instrument panel crossmember (take right side as an example).



(15) Remove 3 fixing bolts from Ethernet gateway controller module bracket on instrument panel crossmember.



(16) Remove 2 fixing nuts from middle channel left connecting bracket (use same procedures for right and left sides).



(17) Remove the instrument panel crossmember assembly.

■ Installation

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing instrument panel crossmember.**
- **Appropriate force should be applied, when installing instrument panel crossmember. Be careful not to operate roughly.**

(1) Install instrument panel crossmember assembly to a proper position on body.
(2) Install 2 fixing nuts to middle channel left connecting bracket (use same procedures for right and left sides).

Torque: 7.0 ± 1.5 N · m

(3) Install 3 fixing bolts to Ethernet gateway controller module bracket on instrument panel crossmember.
(4) Install 2 fixing bolts to instrument panel crossmember (take right side as an example).

Torque: 23 ± 4 N · m

(5) Install 2 fixing bolts to instrument panel crossmember.

Torque: 23 ± 4 N · m

(6) Install fixing clips on all instrument panel wire harness.
(7) Install the domain controller.
(8) Connect 2 connectors between instrument panel wire harness and interior wire harness.
(9) Connect 2 connectors between instrument panel wire harness and interior wire harness.
(10) Install 3 fixing nuts to Body Domain Controller (BDM).
(11) Connect 6 connectors to Body Domain Controller (BDM).
(12) Install 3 fixing bolts from instrument panel fuse and relay box.
(13) Install the front windshield lower trim board body.
(14) Install the instrument panel assembly.

(15) Install the auxiliary fascia console assembly.
(16) Connect the negative battery cable.

1.2 Auxiliary Fascia Console

1 Warnings and Precautions

1.1 Precautions

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

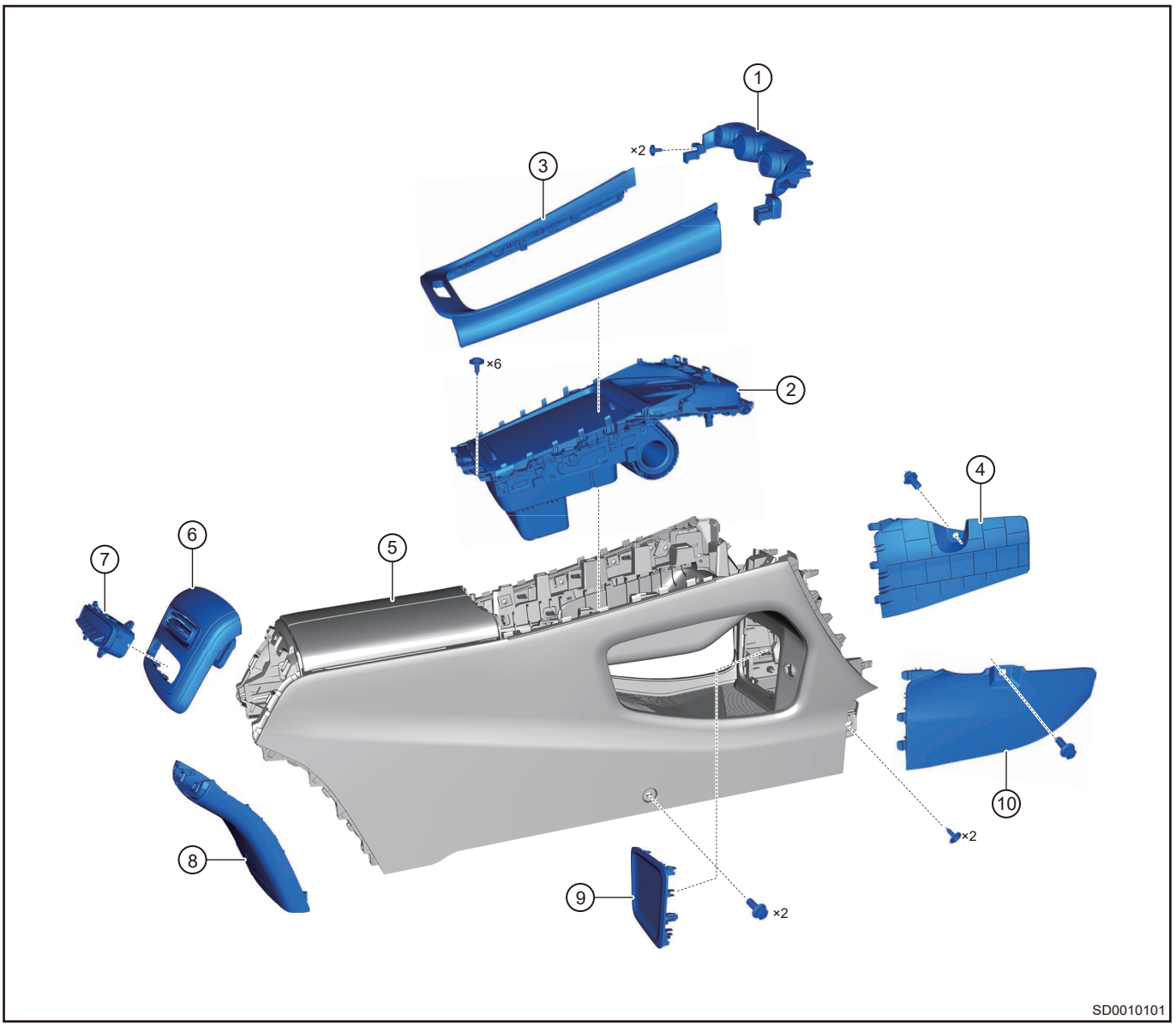
(1) Be sure to wear safety equipment to prevent accidents, when removing auxiliary fascia console assembly.

(2) Appropriate force should be applied, when removing auxiliary fascia console assembly. Be careful not to operate roughly.

(3) DO NOT scratch interior and body paint, when removing auxiliary fascia console assembly.

2 System Overview

2.1 System Components Diagram

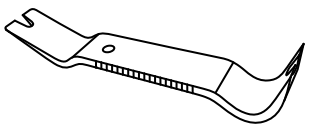


1	Automatic A/C Control Panel Assembly	6	Rear Face Outlet Assembly
2	Auxiliary Fascia Console Trim Panel Assembly	7	Second Row A/C Control Panel
3	Auxiliary Fascia Console Trim Strip Assembly	8	Auxiliary Fascia Console Rear Panel Assembly
4	Auxiliary Fascia Console Front Left Protector Assembly	9	Air Freshner Block Cover
5	Auxiliary Fascia Console Body Assembly	10	Auxiliary Fascia Console Front Right Protector Assembly

3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

3.2 Fasteners Torque List

■ Torque Specifications

Item	Tightening torque
Armrest Box Bracket Fixing Bolt	7 ± 1.5 N·m
Auxiliary Fascia Console Upper Fixing Bolt	5 ± 1 N·m
Auxiliary Fascia Console Upper Fixing Screw	1.5 ± 0.5 N·m
Right Instrument Panel Trim Board Assembly Fixing Screw	1.5 ± 0.5 N·m
Automatic A/C Control Panel Fixing Screw	1.5 ± 0.5 N·m

3.3 Auxiliary Fascia Console

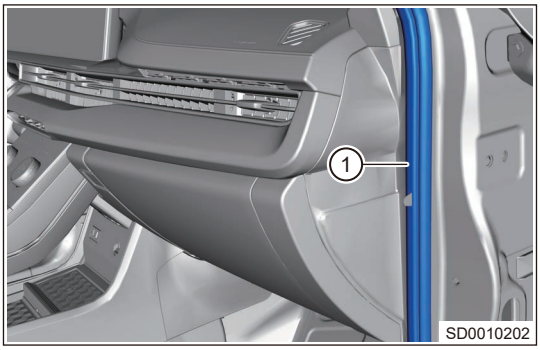
■ Removal

⚠ Warning

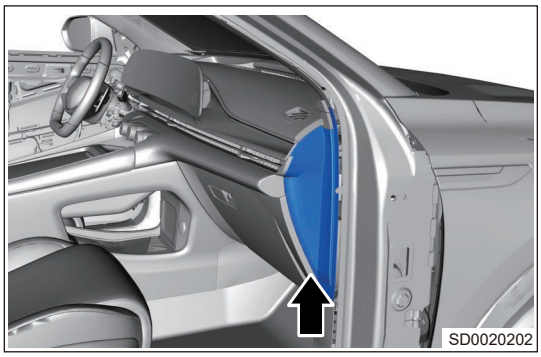
- **Be sure to wear safety equipment to prevent accidents, when removing auxiliary fascia console.**
- **Appropriate force should be applied, when removing auxiliary fascia console. Be careful not to operate roughly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.

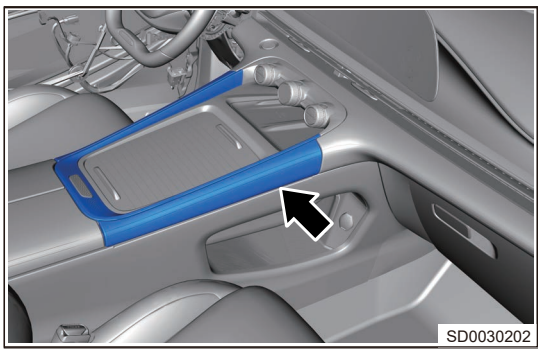
(3) Remove door opening weatherstrip (1) near the instrument panel right end cover.



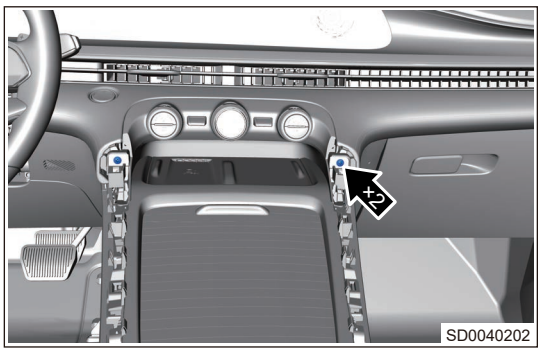
(4) Using an interior crow plate, remove the instrument panel right end plate assembly.



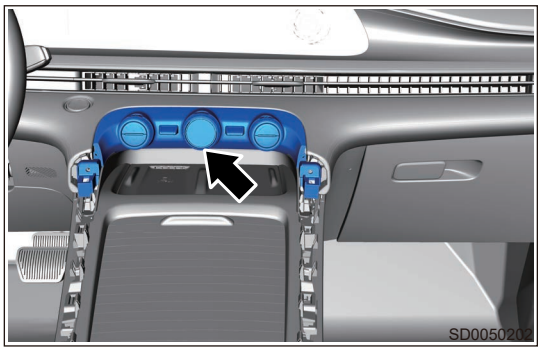
(5) Using an interior crow plate, pry off auxiliary fascia console trim strip assembly carefully.



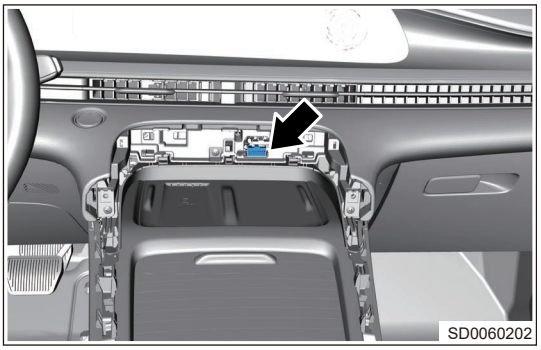
(6) Remove 2 fixing screws from automatic A/C control panel assembly.



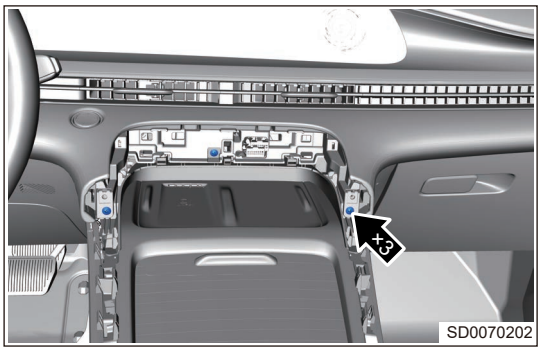
(7) Using an interior crow plate, carefully crow off automatic A/C control panel.



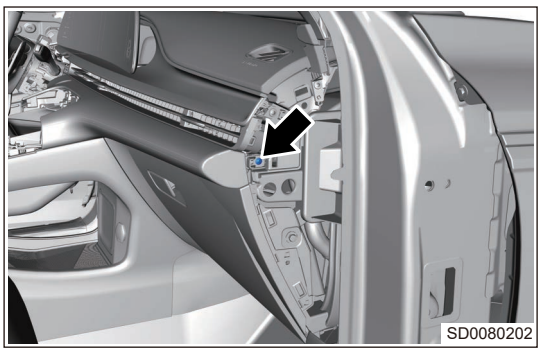
(8) Disconnect the automatic A/C control panel connector.



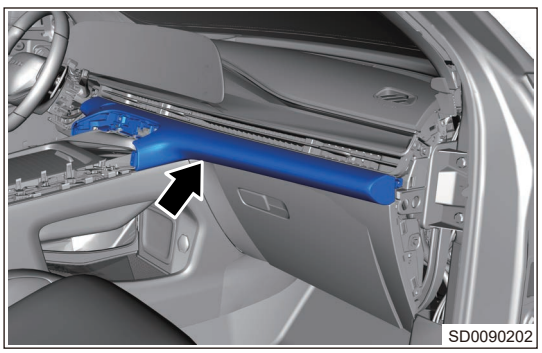
(9) Remove 3 fixing screws from right instrument panel trim panel assembly.



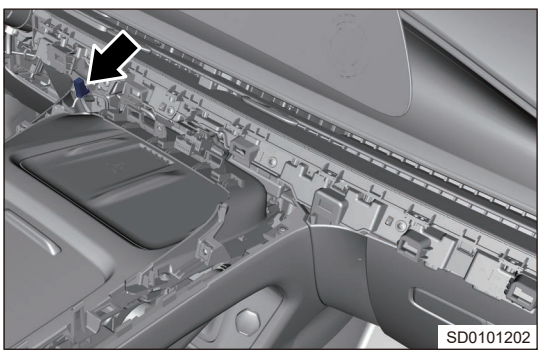
(10) Remove 1 fixing screws from right instrument panel trim panel assembly.



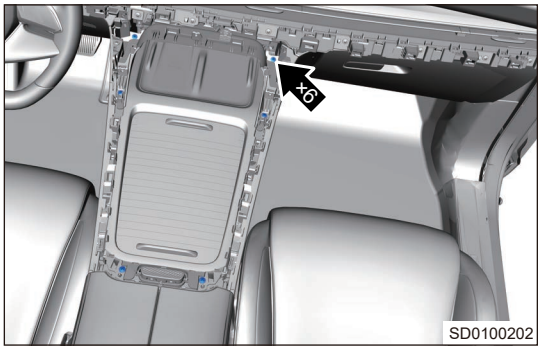
(11) Using an interior crow plate, pry off right instrument panel trim board assembly carefully.



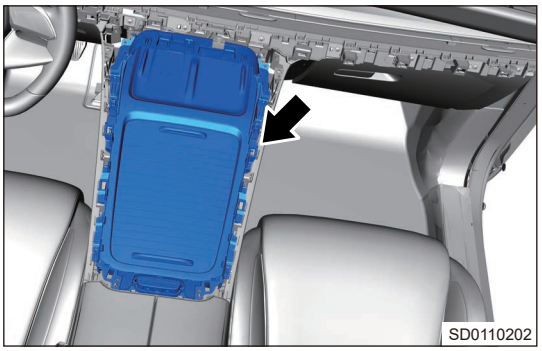
(12) Disconnect ENGINE START STOP switch connector.



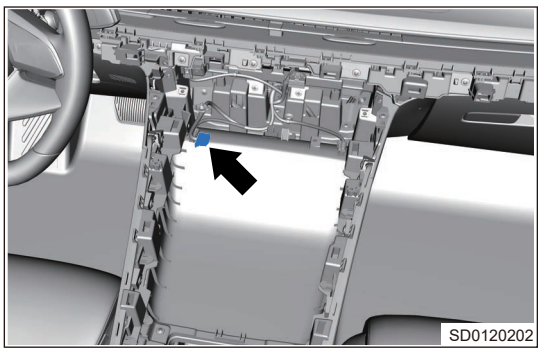
(13) Remove 6 fixing screws from auxiliary fascia console trim panel assembly.



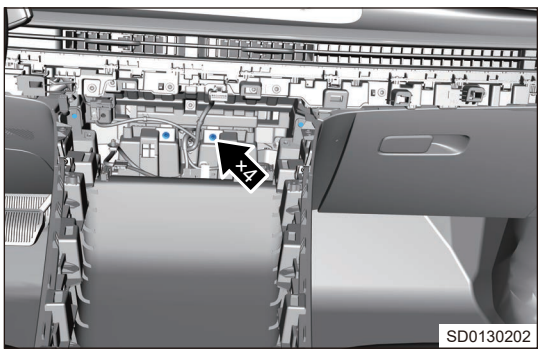
(14) Using an interior crow plate, pry off auxiliary fascia console trim panel assembly carefully.



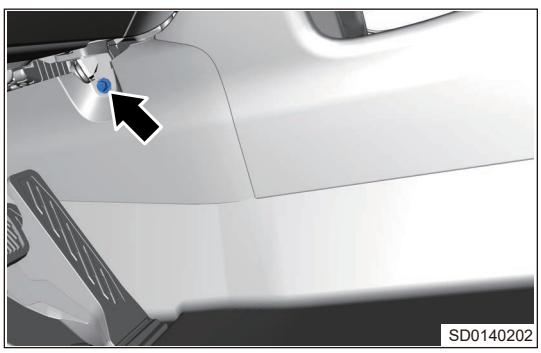
(15) Disconnect the wireless charging module connector.



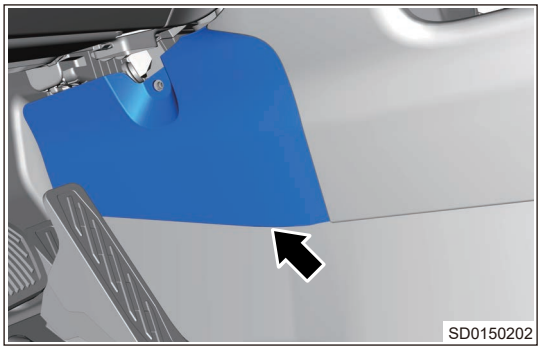
(16) Remove 4 fixing screws from auxiliary fascia console assembly.



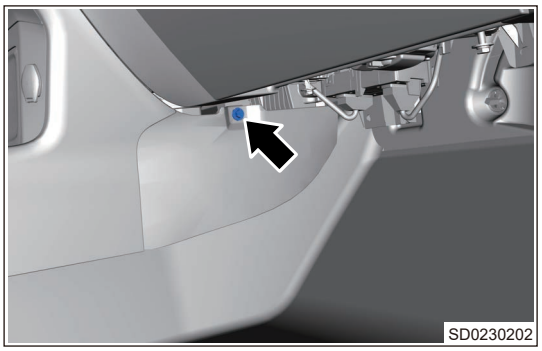
(17) Remove 1 fixing bolt from auxiliary fascia console front left protector assembly.



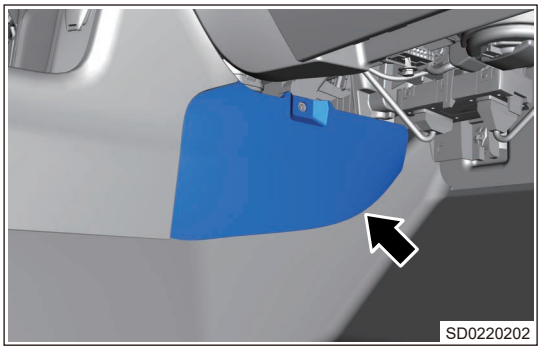
(18) Using an interior crow plate, pry off auxiliary fascia console front left protector assembly carefully.



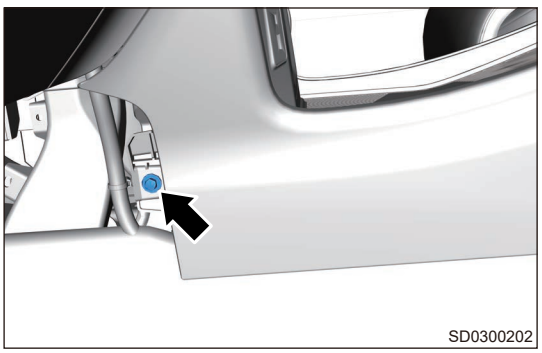
(19) Remove 1 fixing bolt from auxiliary fascia console front right protector assembly.



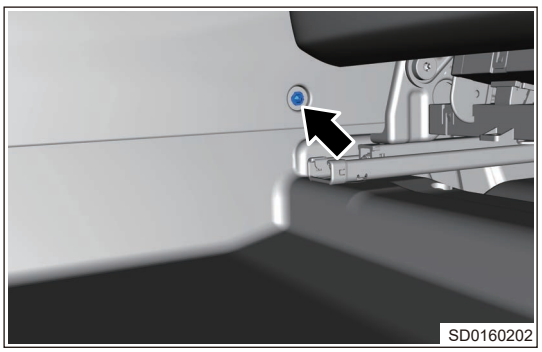
(20) Using an interior crow plate, pry off auxiliary fascia console front right protector assembly carefully.



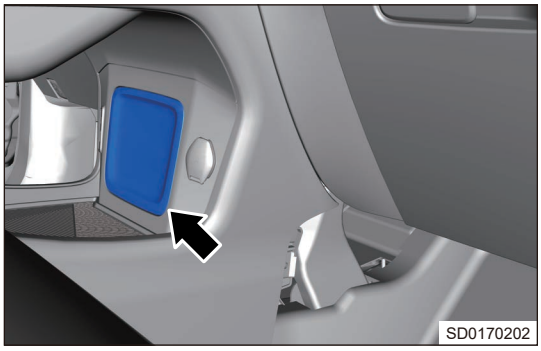
(21) Remove 1 fixing bolt from auxiliary fascia console. (- Using same procedure for left and right sides)



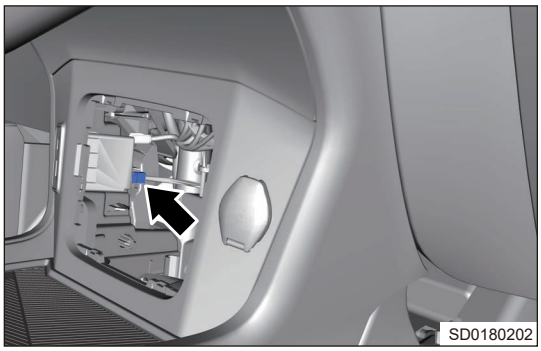
(22) Remove 1 fixing screw from auxiliary fascia console. (- Using same procedure for left and right sides)



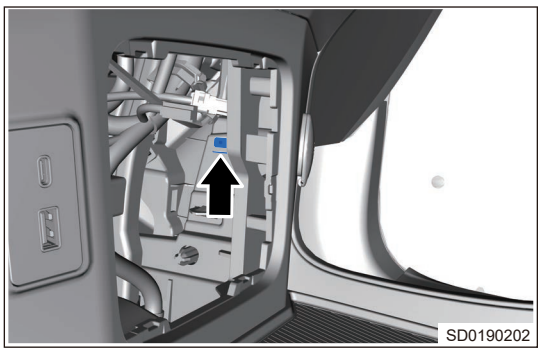
(23) Using an interior crow plate, carefully pry off the air freshner block cover.



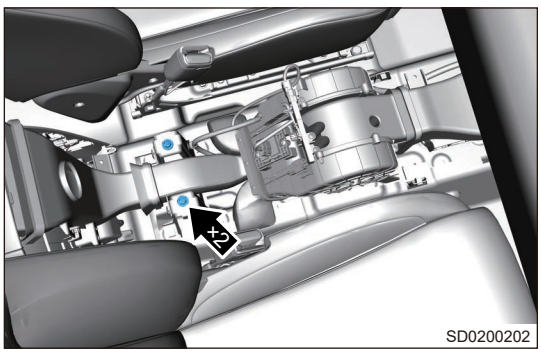
(24) Disconnect the USB connector.



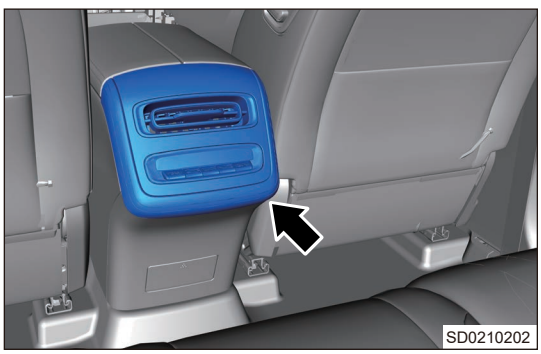
(25) Disconnect connector from power supply.



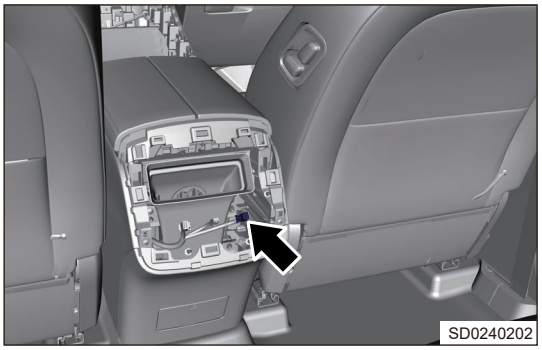
(26) Open the armrest box, remove gasket of armrest box and 2 fixing bolts.



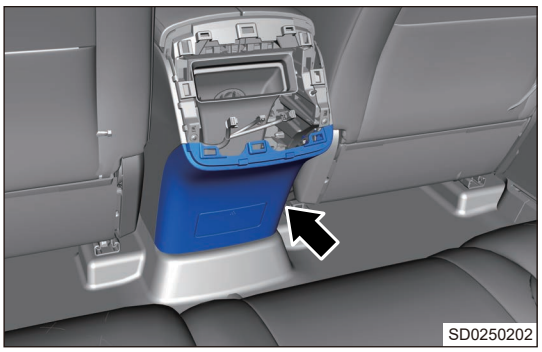
(27) Using an interior crow plate, carefully pry off the rear face outlet assembly.



(28) Disconnect the second row A/C control panel connector.

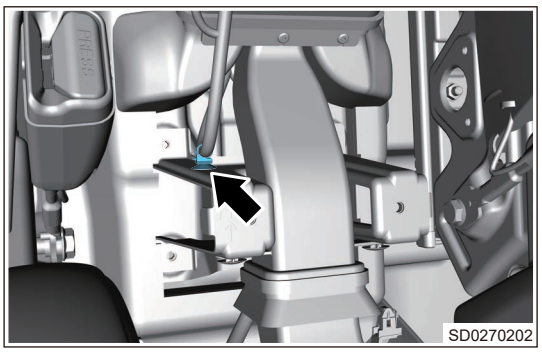


(29) Using an interior crow plate, pry off auxiliary fascia console rear panel assembly carefully.

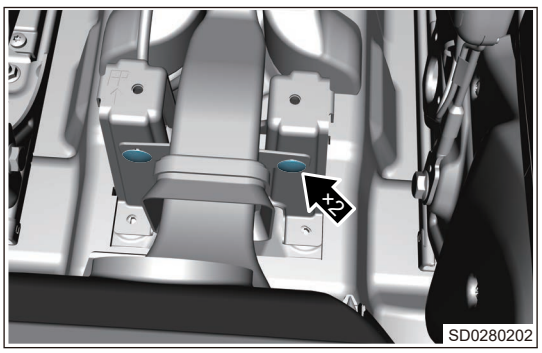


(30) Disconnect USB connector and remove auxiliary fascia console assembly.

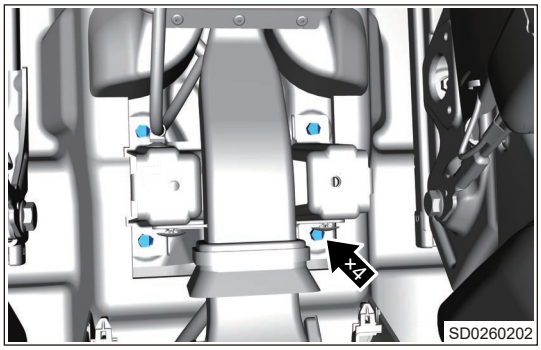
(31) Remove 1 fixing clip from armrest box bracket.



(32) Remove 2 fixing clips from armrest box bracket.



(33) Remove 4 fixing bolts from armrest box bracket.



■ Installation

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing auxiliary fascia console assembly.**
- **Appropriate force should be applied, when installing auxiliary fascia console assembly. Be careful not to operate roughly.**
- **DO NOT scratch interior and body paint, when installing auxiliary fascia console assembly.**

(1) Install 4 fixing bolts to armrest box bracket.

Torque: 7 ± 1.5 N · m

(2) Install 2 fixing clips to armrest box bracket.
(3) Install 1 fixing clip to armrest box bracket.
(4) Install auxiliary fascia console assembly to a proper position on body.
(5) Install auxiliary fascia console rear panel assembly, and connect USB connector.
(6) Install rear face outlet assembly, and connect the second row A/C control panel connector.
(7) Install 2 fixing bolts to armrest box and install armrest box pad.

Torque: 5 ± 1 N · m

(8) Connect the power supply connector.
(9) Connect the USB connector.
(10) Install air freshner block cover.
(11) Install 1 fixing screw to auxiliary fascia console. (Using same procedure for left and right sides)

Torque: 1.5 ± 0.5 N · m

(12) Install 1 fixing bolt to auxiliary fascia console. (Using same procedure for left and right sides)

Torque: 5 ± 1 N · m

(13) Install auxiliary fascia console front right protector assembly.
(14) Install 1 fixing bolt to auxiliary fascia console front right protector assembly.

Torque: 5 ± 1 N · m

(15) Install auxiliary fascia console front left protector assembly.
(16) Install 1 fixing bolt to auxiliary fascia console front left protector assembly.

Torque: 5 ± 1 N · m

(17) Install 4 fixing screws to auxiliary fascia console assembly.

Torque: 1.5 ± 0.5 N · m

(18) Install auxiliary fascia console trim panel assembly, and connect wireless charging module connector.
(19) Install 6 fixing screws to auxiliary fascia console trim panel assembly.

Torque: 1.5 ± 0.5 N · m

(20) Install right instrument panel trim panel assembly, and connect ENGINE START STOP switch connector.
(21) Install 1 fixing screw to right instrument panel trim panel assembly.

Torque: 1.5 ± 0.5 N · m

(22) Install 3 fixing screws to right instrument panel trim panel assembly.

Torque: 1.5 ± 0.5 N · m

(23) Install automatic A/C control panel and connect automatic A/C control panel connector.
(24) Install 2 fixing screws to automatic A/C control panel assembly.

Torque: 1.5 ± 0.5 N · m

(25) Install the auxiliary fascia console trim strip assembly.
(26) Install the instrument panel right end plate assembly.
(27) Install door opening weatherstrip near the instrument panel right end cover.
(28) Connect the negative battery cable.

1.3 EXTERIOR

1 Warnings and Precautions

1.1 Warnings

Be sure to wear safety equipment to prevent accidents before repairing, to avoid property damage, personal injury or even death.

1.2 Precautions

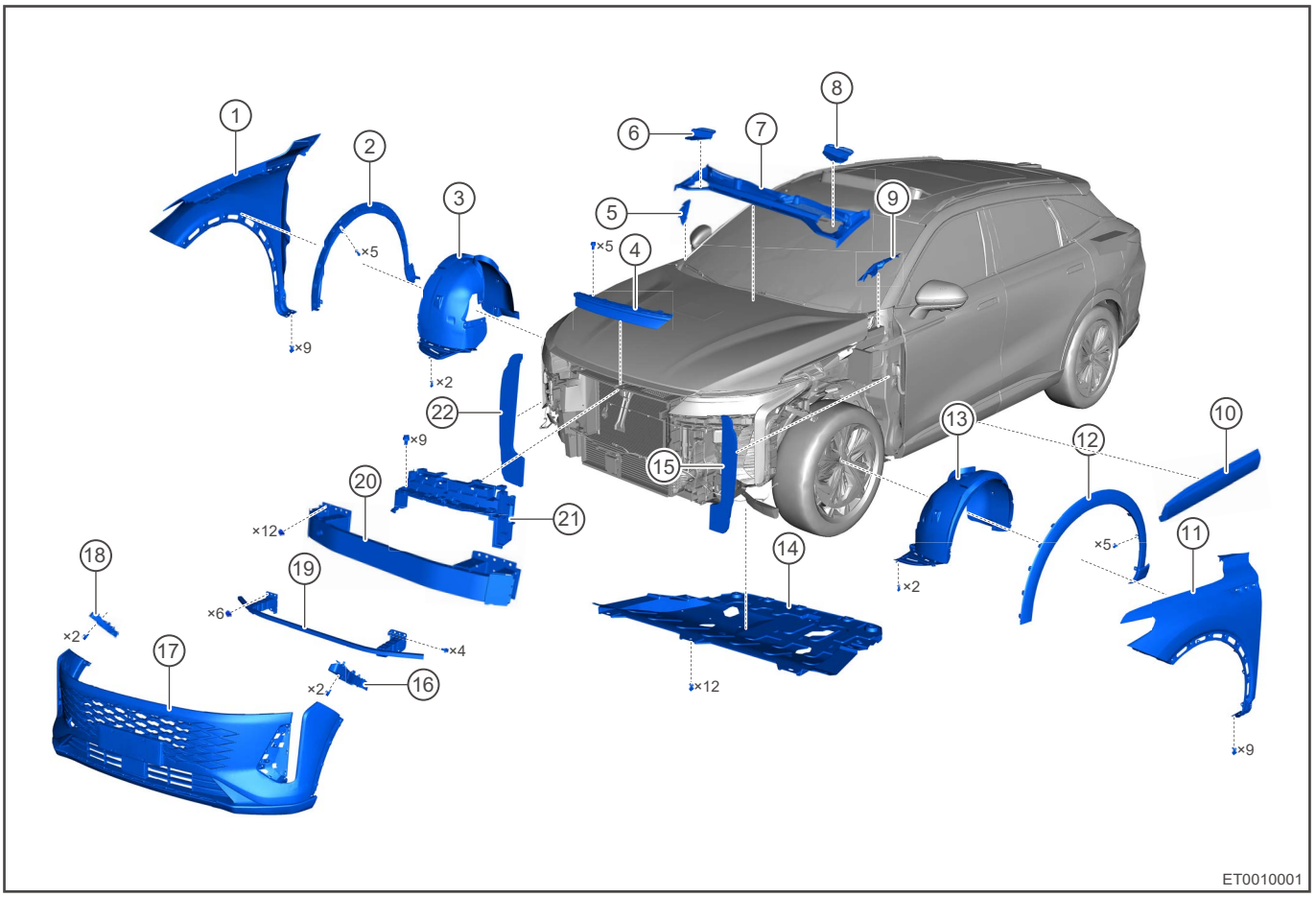
It should be avoid dangerous operation and damage to the vehicle when performing the repair in this section.

2 System Overview

2.1 System Components Diagram

Bumper assembly and bumper crossmember assembly are safety device to protect the front and rear body, which mainly absorb and reduce outside shock.
Exterior mainly consists of front bumper assembly, front bumper mounting bracket, front bumper crossmember assembly, front wheel house protector, front wheel arch, wing assembly, side skirt protector assembly, door trim panel assembly, engine hood lower protector, rear bumper assembly, rear bumper mounting bracket, rear bumper crossmember assembly, rear wheel house protector, front windshield lower trim board assembly, D-pillar protector assembly, roof rack assembly, spoiler, etc.

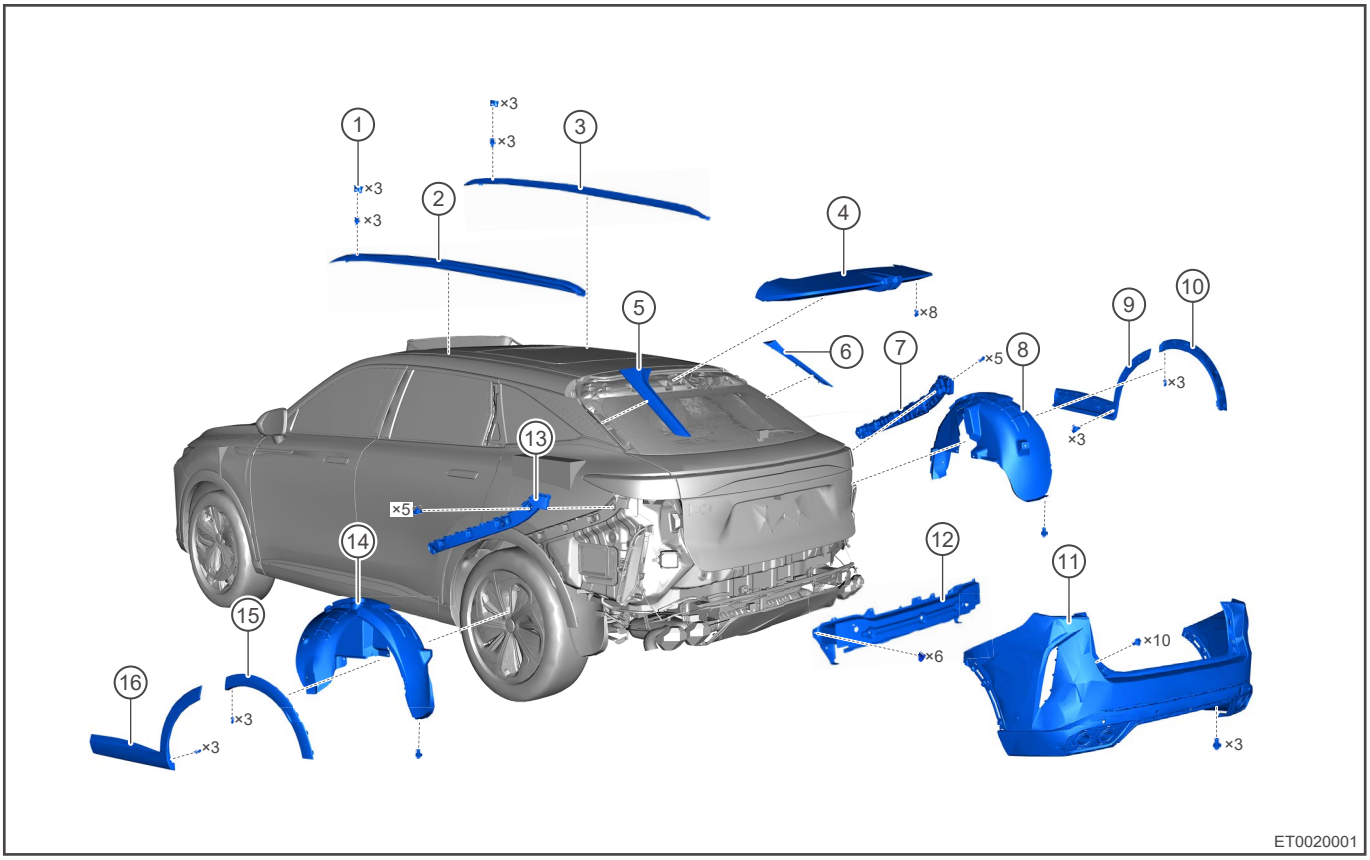
■ **Front View**



1	Right Wing Body	12	Front Left Wheel Arch Ornament Assembly
2	Front Right Wheel Arch Ornament Assembly	13	Front Left Wheel House Protector Assembly

3	Front Right Wheel House Protector Assembly	14	Engine Lower Protector
4	Front Signal Light Assembly	15	Wing Spacer
5	Front Right Windshield Lower Trim Panel Cover Plate	16	Front Bumper Left Bracket
6	Right Block Cover	17	Front Bumper Upper Body
7	Front Windshield Lower Finish Panel Body	18	Front Bumper Right Bracket
8	Left Block Cover	19	Lower Impact Beam Assembly
9	Front Left Windshield Lower Trim Panel Cover Plate	20	Front Impact Crossmember Assembly
10	Front Left Door Trim Panel Assembly	21	Upper Grille Reinforcement bracket
11	Left Wing Body	22	Wing Spacer

■ **Rear View**



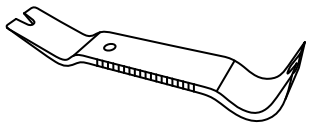
1	Center Trim Cover	9	Rear Right Door Trim Panel Assembly
2	Left Roof Rack Assembly	10	Rear Right Wheel Arch Ornament Assembly
3	Right Rack Assembly	11	Rear Bumper Body
4	Spoiler Assembly	12	Rear Impact Beam Assembly
5	Left D-pillar Trim Board Assembly	13	Rear Bumper Left Mounting Bracket
6	Right D-pillar Trim Board Assembly	14	Rear Left Wheel House Protector Assembly

7	Rear Bumper Right Mounting Bracket	15	Rear Left Wheel Arch Ornament Assembly
8	Rear Right Wheel House Protector Assembly	16	Rear Left Door Trim Board Assembly

3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020

3.2 Fasteners Torque List

■ Torque Specifications

Item	Tightening torque
Front Wheel House Protector Fixing Screw	1.5 ± 0.5 N·m
Front Bumper Fixing Screw	1.5 ± 0.5 N·m
Front Wheel Arch Fixing Screw	1.5 ± 0.5 N·m
Front Bumper Fixing Bolt	5.0 ± 1.0 N·m
Front Bumper Bracket Fixing Bolt	5 ± 1 N·m
Front Impact crossmember Assembly Fixing Nut	48 ± 7 N·m
Lower Impact Crossmember Assembly Fixing Bolt	25 ± 3 N·m
Upper Grille Reinforcement bracket Fixing Bolt	5 ± 1 N·m
Wing Assembly Fixing Bolt	10 ± 1.5 N·m
Roof Rack Fixing Bolt	9 ± 1.5 N·m
Spoiler Assembly Fixing Bolt	5 ± 1 N·m
Engine Compartment Lower Protector Assembly Fixing Bolt	5 ± 1 N·m
Rear Bumper Assembly Fixing Bolt	5.0 ± 1.0 N·m
Rear Bumper Assembly Fixing Screw	1.5 ± 0.5 N·m
Rear Bumper Mounting Bracket Fixing Screw	1.5 ± 0.5 N·m
Rear Bumper Crossmember Assembly Fixing Nut	25 ± 3.5 N·m
Front Door Trim Panel Assembly Fixing Screw	1.5 ± 0.5 N·m

Item	Tightening torque
Rear Door Trim Panel Assembly Fixing Screw	1.5 ± 0.5 N·m
Rear Wheel House Protector Assembly Fixing Screw	1.5 ± 0.5 N·m

3.3 Front Bumper Assembly

■ Removal

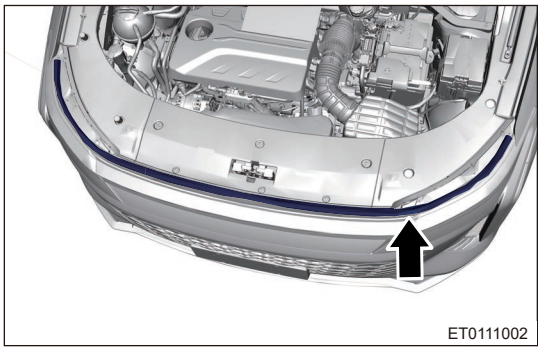
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing front bumper assembly.**
- **Appropriate force should be applied, when removing front bumper assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing front bumper assembly.**
- **Avoid breaking claws, when removing front bumper assembly.**

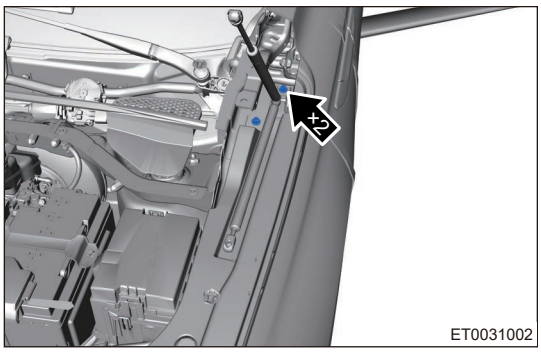
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

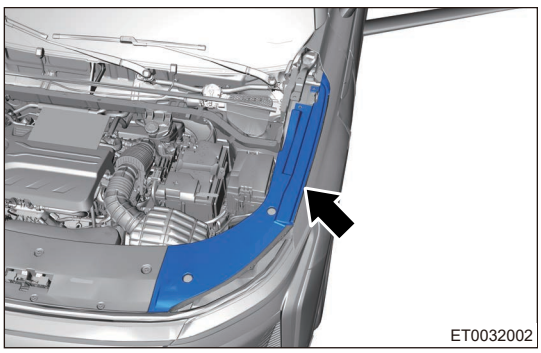
(3) Disengage clips from engine hood front weatherstrip and remove engine hood front weatherstrip.



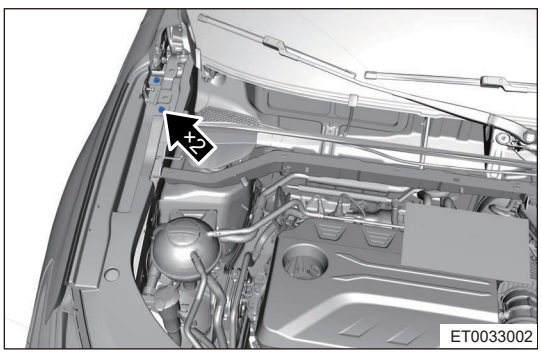
(4) Remove 2 plastic clip assemblies from left engine compartment trim cover assembly.



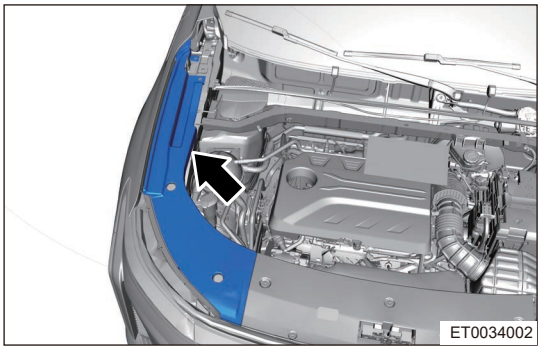
(5) Using an interior crow plate, pry off left engine compartment trim cover assembly carefully.



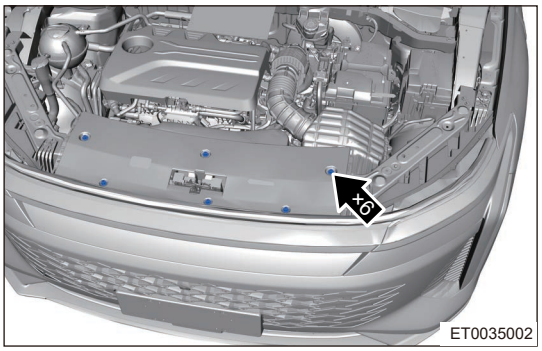
(6) Remove 2 plastic clip assemblies from right engine compartment trim cover assembly.



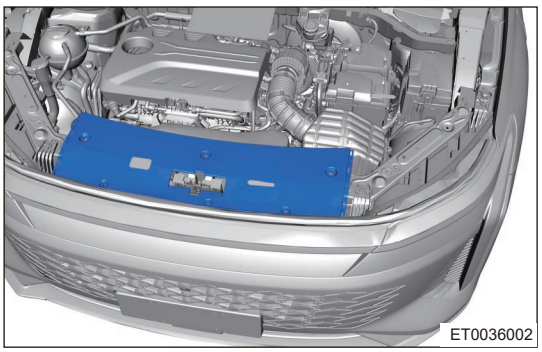
(7) Using an interior crow plate, pry off right engine compartment trim cover assembly carefully.



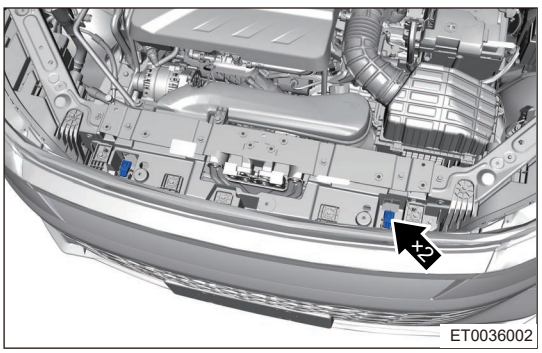
(8) Remove 6 plastic clip assemblies from engine compartment trim cover front assembly.



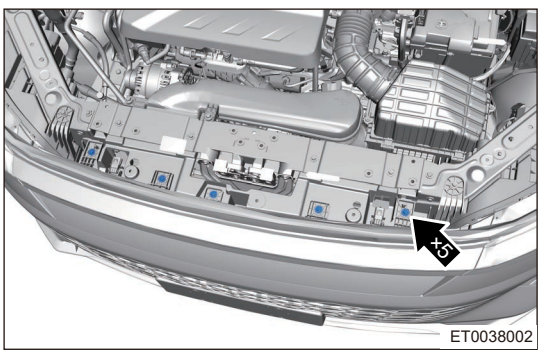
(9) Using an interior crow plate, pry off engine compartment trim cover front assembly carefully.



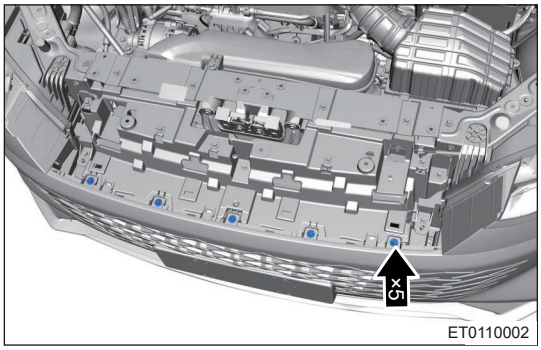
(10) Disconnect the front position light connector.



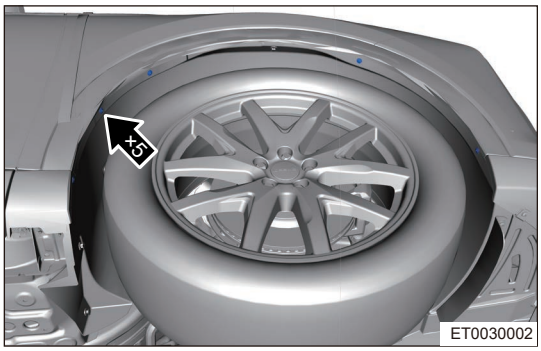
(11) Remove 5 fixing bolts from front signal light.



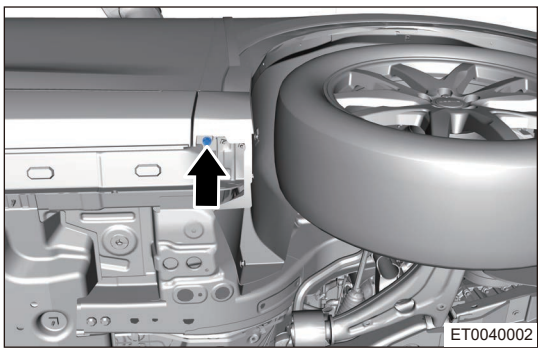
(12) Remove 5 fixing bolts from upper part of front bumper.



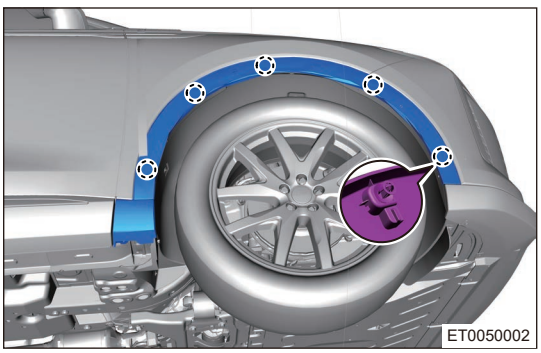
(13) Remove 5 fixing screws from front wheel arch. (Take right side as an example)



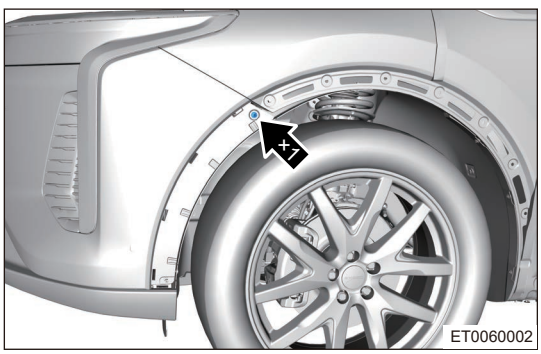
(14) Remove 1 snap fastener from front wheel arch.



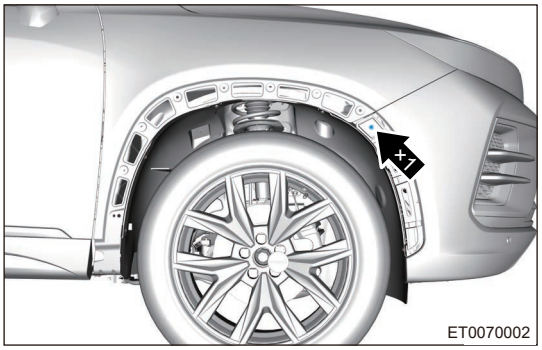
(15) Using an interior crow plate, carefully pry up fixing clips from front right wheel arch, and remove front right wheel arch assembly.



(16) Remove 1 fixing screw from left side of front bumper.

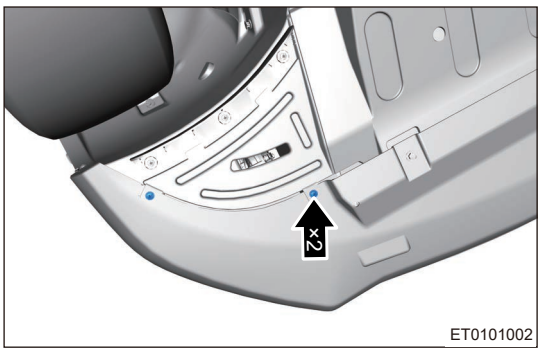


(17) Remove 1 fixing screw from right side of front bumper.

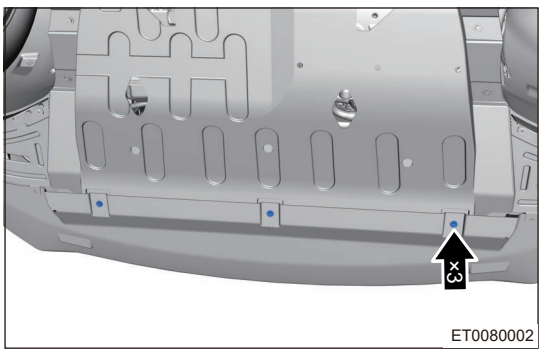


(18) Remove 2 fixing screws from lower part of front right wheel house protector.

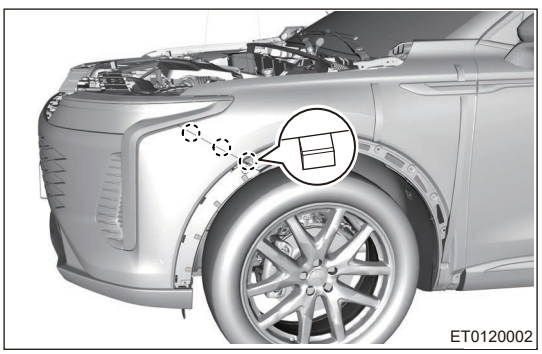
(19) Remove 2 fixing screws from lower part of front left wheel house protector.



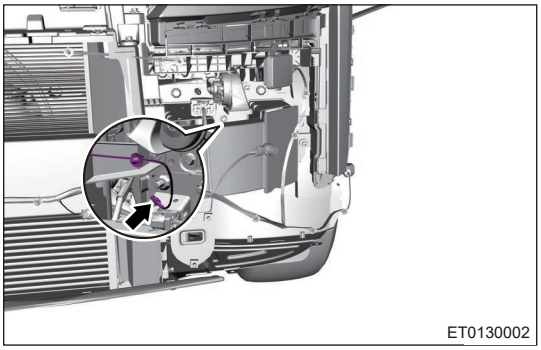
(20) Raise vehicle and remove 3 fixing bolts between lower part of front bumper assembly and engine compartment lower protector.



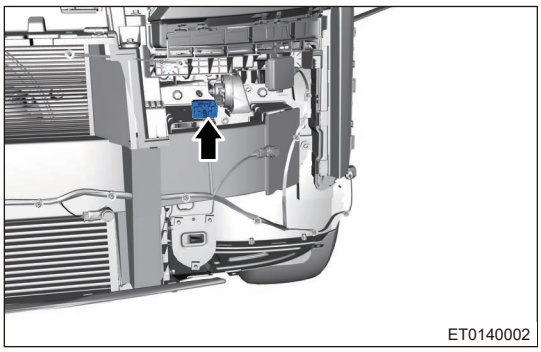
(21) Disengage claws from front bumper assembly (take left side as an example).



(22) Disconnect the front camera connector.



(23) Disconnect the front bumper wire harness connector.



(24) Remove the front bumper assembly.

■ **Installation**

⚠ **Caution**
After installing front bumper, perform panoramic view monitor calibration.

(1) Install the front bumper assembly to a proper position on body.
(2) Connect the front bumper wire harness connector.
(3) Connect the front camera connector.
(4) Install 3 fixing bolts between lower part of front bumper assembly and engine compartment lower protector.

Torque: 7.0 ± 1.0 N · m

(5) Install 2 fixing screws to lower part of front left wheel house protector.

Torque: 1.5 ± 0.5 N · m

(6) Install 2 fixing screws to lower part of front right wheel house protector.

Torque: 1.5 ± 0.5 N · m

(7) Install 1 fixing screw to right side of front bumper.

Torque: 1.5 ± 0.5 N · m

(8) Install 1 fixing screw to left side of front bumper.

Torque: 1.5 ± 0.5 N · m

(9) Install the front left wheel arch assembly.
(10) Install 1 snap fastener to front wheel arch.
(11) Install 5 fixing screws to front wheel arch. (Take left side as an example)

Torque: 1.5 ± 0.5 N · m

(12) Install 5 fixing bolts to upper part of front bumper.

Torque: 5.0 ± 1.0 N · m

(13) Install 5 fixing bolts to front signal light.

Torque: 3.5 ± 0.5 N · m

(14) Connect the front position light connector.

(15) Install the engine compartment trim cover front assembly.

(16) Install 6 plastic clip assemblies to engine compartment trim cover front assembly.

(17) Install the right engine compartment trim cover assembly.

(18) Install 2 plastic clip assemblies from right engine compartment trim cover assembly.

(19) Install the left engine compartment trim cover assembly.

(20) Install 2 plastic clip assemblies to left engine compartment trim cover assembly.

(21) Install engine hood front weatherstrip.

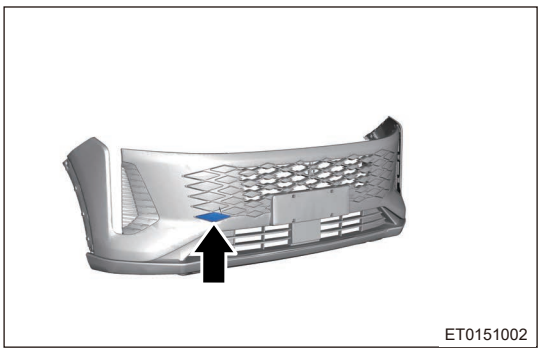
(22) Connect the negative battery cable.

■ **Disassembly**

⚠ Warning

- **Appropriate force should be applied, when disassembling front bumper assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when disassembling front bumper assembly.**
- **Avoid breaking claws, when disassembling front bumper assembly.**

(1) Using a screwdriver wrapped with protective tape, pry off the front bumper towing hook cover.



■ **Assembly**

⚠ Caution

- **Appropriate force should be applied, when assembling front bumper assembly. Be careful not to operate roughly.**
- **Avoid breaking claws, when assembling front bumper assembly.**

(1) Install the front bumper towing hook cover to a proper position on front bumper assembly.

3.4 Front Bumper Mounting Bracket

■ **Removal**

⚠ Caution

- **Appropriate force should be applied, when removing front bumper mounting bracket. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing front bumper mounting bracket.**

Hint:

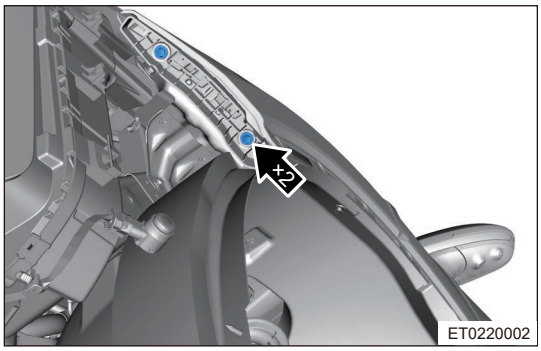
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

(4) Remove 2 fixing bolts from front bumper mounting bracket.



(5) Remove the front bumper mounting bracket.

■ Installation

⚠ Caution

Try to prevent body paint surface from being scratched, when installing front bumper mounting bracket.

(1) Install the front bumper mounting bracket to a proper position on body.

(2) Install 2 fixing bolts to front bumper bracket.

Torque: 5 ± 1 N · m

(3) Install the front bumper assembly.

(4) Connect the negative battery cable.

3.5 Front Impact Crossmember Assembly

■ Removal

⚠ Caution

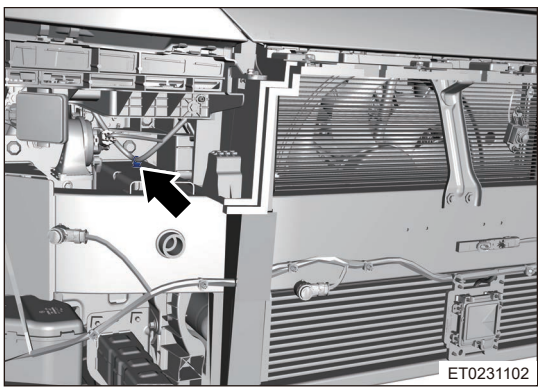
- **Be sure to wear safety equipment to prevent accidents, when removing front impact crossmember assembly.**
- **Try to prevent body paint surface from being scratched, when removing front impact crossmember assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

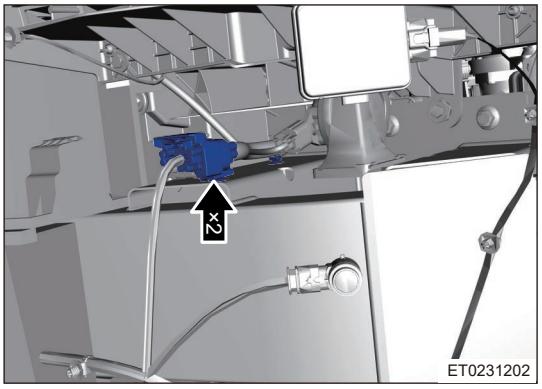
(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

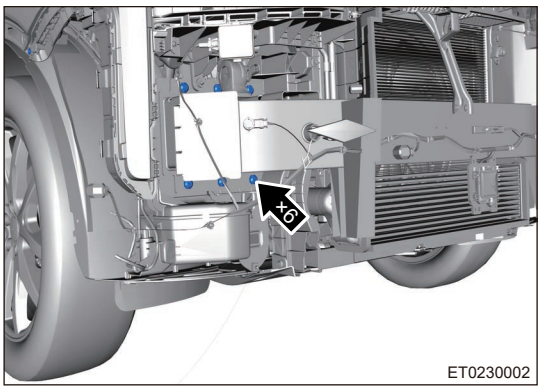
(4) Using an interior crow plate, carefully pry off the clip.



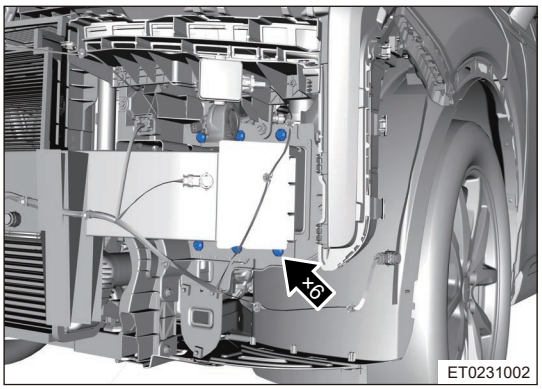
(5) Using an interior crow plate, carefully pry off the clips from connector.



(6) Remove 6 fixing nuts from front impact crossmember assembly.



(7) Remove 6 fixing nuts from front impact crossmember assembly.



(8) Remove the front impact crossmember assembly.

■ Installation

⚠ Caution

- **Try to prevent body paint surface from being scratched, when installing front impact crossmember assembly.**
- **There should be no looseness, shaking and deformation, after installing front impact crossmember assembly.**

(1) Install front impact crossmember assembly to a proper position on body.

(2) Install 6 fixing nuts to front impact crossmember assembly.

Torque: 48 ± 7 N · m

(3) Install 6 fixing nuts to front impact crossmember assembly.

Torque: 48 ± 7 N · m

(4) Install the front bumper assembly.

(5) Connect the negative battery cable.

3.6 Lower Impact Crossmember Assembly

■ Removal

⚠ Caution

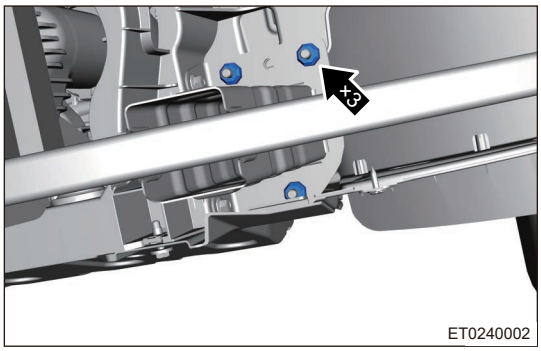
- **Be sure to wear safety equipment to prevent accidents, when removing lower impact crossmember assembly.**
- **Try to prevent body paint surface from being scratched, when removing lower impact crossmember assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

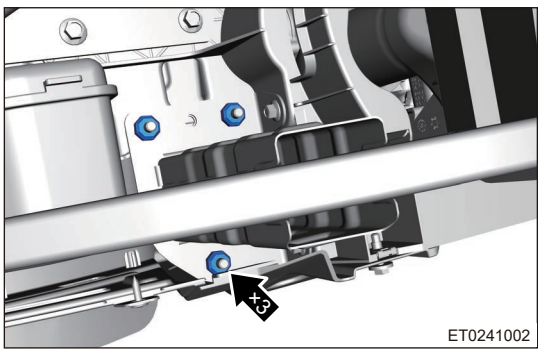
(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

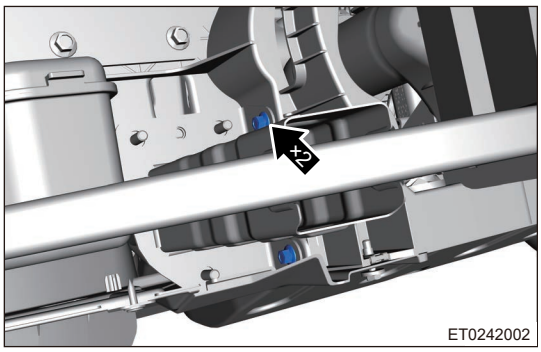
(4) Remove 3 fixing nuts from lower impact crossmember assembly.



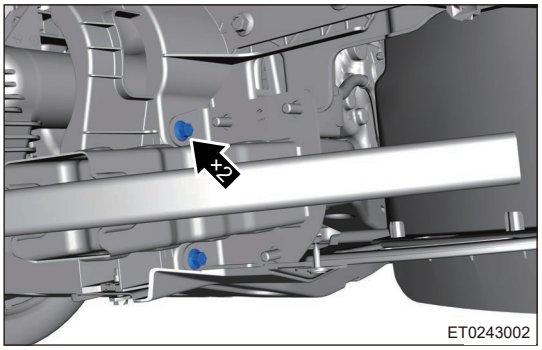
(5) Remove 3 fixing nuts from lower impact crossmember assembly.



(6) Remove 2 fixing bolts from lower impact crossmember assembly.



(7) Remove 2 fixing bolts from lower impact crossmember assembly.



(8) Remove the lower impact crossmember assembly.

■ **Installation**

⚠ Caution
Try to prevent body paint surface from being scratched, when installing lower impact crossmember assembly.

(1) Install lower impact crossmember assembly to a proper position on body.

(2) Install 2 fixing bolts to lower impact crossmember assembly.

Torque: 25 ± 3 N · m

(3) Install 2 fixing bolts to lower impact crossmember assembly.

Torque: 25 ± 3 N · m

(4) Install 3 fixing nuts to lower impact crossmember assembly.

Torque: 25 ± 3 N · m

(5) Install 3 fixing nuts to lower impact crossmember assembly.

Torque: 25 ± 3 N · m

(6) Install the front bumper assembly.

(7) Connect the negative battery cable.

3.7 Upper Grille Reinforcement bracket

■ **Removal**

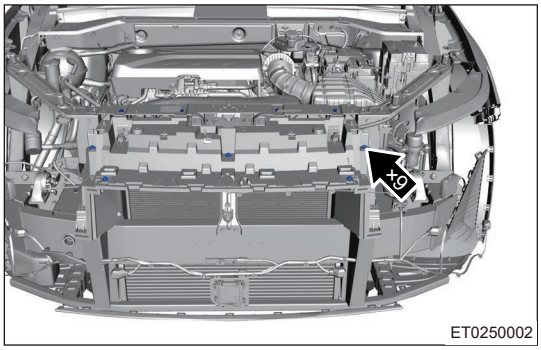
⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing upper grille reinforcement bracket.** • **Try to prevent body paint surface from being scratched, when removing upper grille reinforcement bracket.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

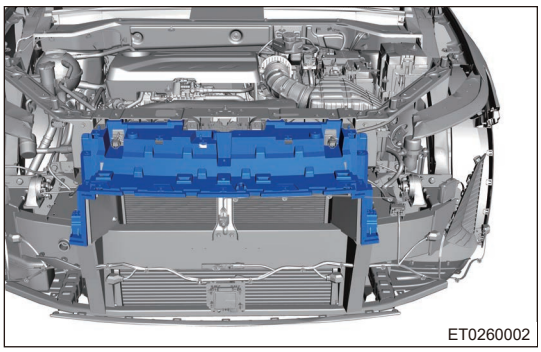
(2) Disconnect the negative battery cable.

(3) Remove the front bumper assembly.

(4) Remove 9 fixing bolts from upper grille reinforcement bracket.



(5) Remove the upper grille reinforcement bracket.



■ **Installation**

⚠ Caution
Try to prevent body paint surface from being scratched, when installing upper grille reinforcement bracket.

(1) Install upper grille reinforcement bracket to a proper position on body.

(2) Install 9 fixing bolts to upper grille reinforcement bracket.

Torque: 5 ± 1 N · m

(3) Install the front bumper assembly.

(4) Connect the negative battery cable.

3.8 Front Wheel House Protector Assembly

■ **Removal**

Hint:

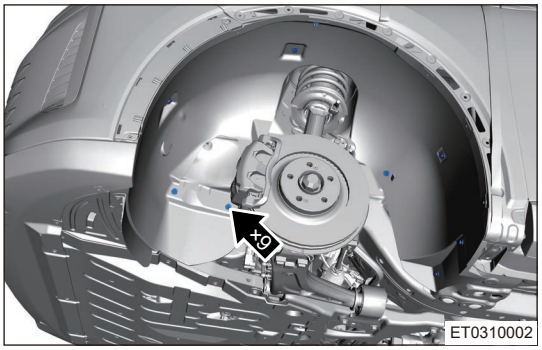
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing front wheel house protector assembly.** • **Try to prevent body paint surface from being scratched, when removing front wheel house protector assembly.**

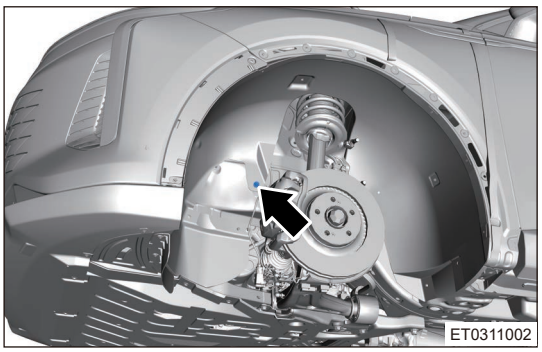
(1) Remove the front left wheel.

(2) Remove the front wheel arch assembly.

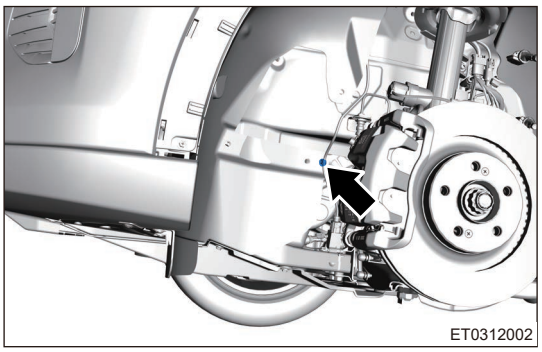
(3) Remove 9 plastic snap fasteners from front wheel house protector.



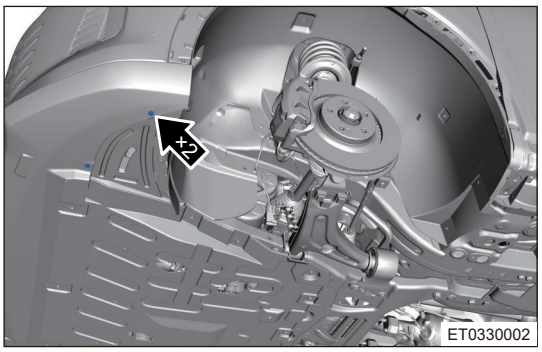
(4) Remove 1 plastic snap fastener from front wheel house protector.



(5) Remove clip from the front wheel house protector wire harness.



(6) Remove 2 fixing screws from lower part of front wheel house protector.



(7) Remove the front wheel house protector assembly.

■ Installation

⚠ Caution

Try to prevent body paint surface from being scratched, when installing front wheel house protector assembly.

(1) Install front wheel house protector assembly to a proper position on body.

(2) Install 2 fixing screws to lower part of front wheel house protector.

Torque: 1.5 ± 0.5 N · m

(3) Install clip to the front wheel house protector wire harness.
(4) Install 1 plastic snap fasteners of front wheel house protector.
(5) Install 9 plastic snap fasteners of front wheel house protector.
(6) Install the front wheel arch assembly.
(7) Install the front left wheel.

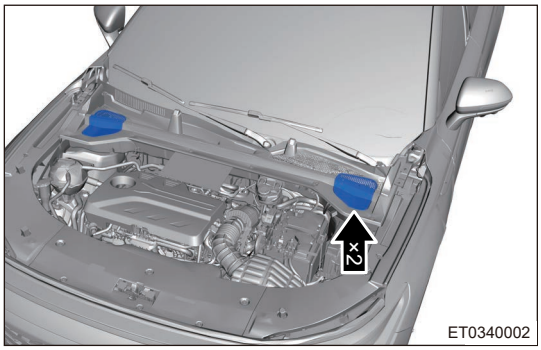
3.9 Front Windshield Lower Trim Panel Assembly

■ Removal

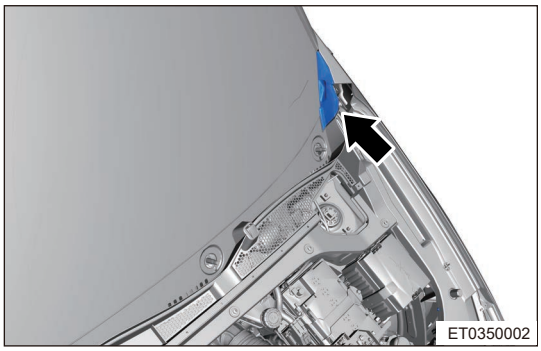
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front windshield lower trim panel assembly.**
- **Try to prevent body paint surface from being scratched, when removing front windshield lower trim panel assembly.**

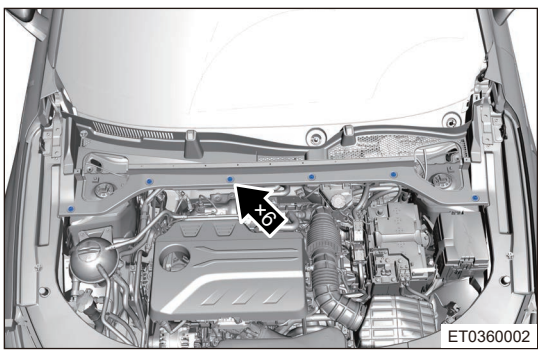
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front wiper arm assembly.
(4) Using an interior crow plate, carefully pry off and right block covers.



(5) Using an interior crow plate, pry off front windshield lower trim panel left cover plate (Use same procedures for right and left sides).



(6) Remove 6 fixing clips from front windshield lower trim panel.



(7) Remove the front windshield lower trim panel.

■ **Installation**

⚠ Caution
Try to prevent body paint surface from being scratched, when installing front windshield lower trim panel assembly.

(1) Install front windshield lower trim panel to a proper position on body.
(2) Install 6 fixing clips to front windshield lower trim panel.
(3) Install front windshield lower trim panel left cover plate (Use same procedures for right and left sides).
(4) Install left and right block covers.
(5) Install the front wiper arm assembly.
(6) Connect the negative battery cable.

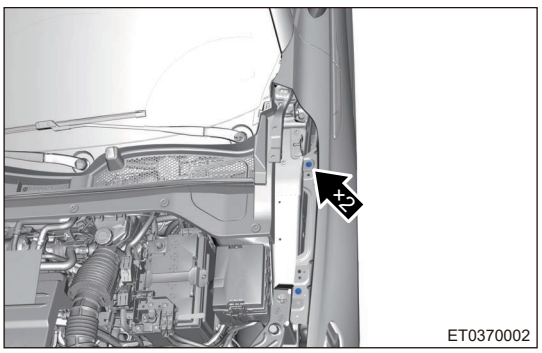
3.10 Wing Assembly

■ **Removal**

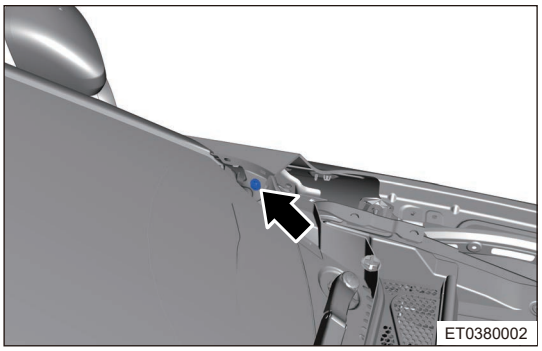
Hint:
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing wing assembly.** • **Try to prevent body paint surface from being scratched, when removing wing assembly.**

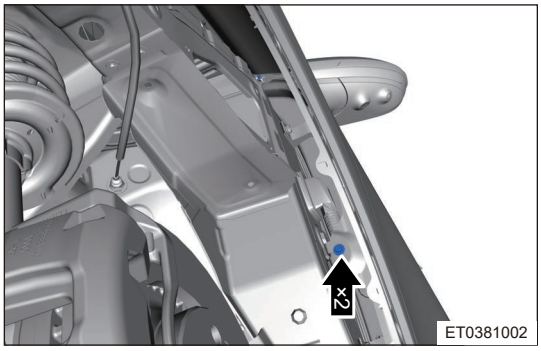
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left wheel assembly.
(4) Remove the front left wheel arch assembly.
(5) Remove the front bumper assembly.
(6) Remove the left headlight assembly.
(7) Remove the front left whee house assembly.
(8) Remove the left front bumper bracket.
(9) Remove 2 fixing bolts between upper part of wing assembly and body.



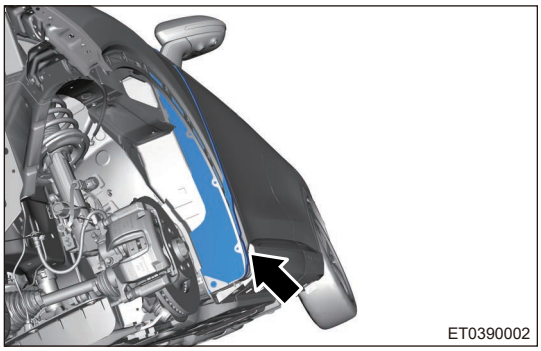
(10) Remove 1 fixing bolt between front part of wing assembly and body.



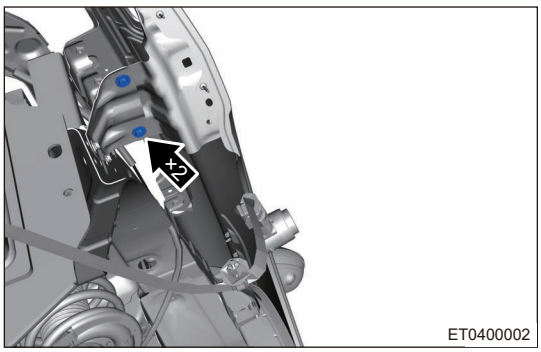
(11) Remove 2 fixing bolts between inner part of wing assembly and body.



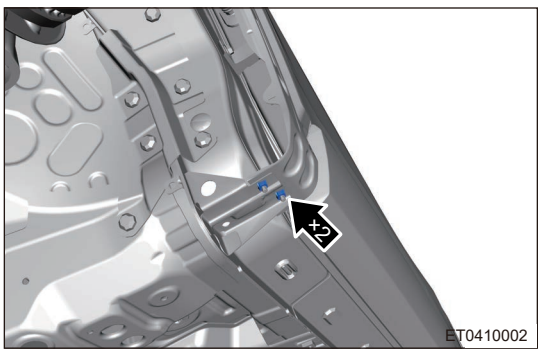
(12) Remove the wing spacer.



(13) Remove 2 fixing bolts between inner part of wing assembly and front end of body.



(14) Remove 2 fixing bolts between lower part of wing assembly and body.



(15) Remove the wing assembly.

■ Installation

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing front wing.**
- **Try to prevent body paint surface from being scratched, when installing front wing.**
- **Make sure that front wing is installed correctly and fitting clearance between front wing and body is appropriate, when installing front wing.**
- **After assembly, it is not allowed to exceed the sheet metal flanging, end stay outside, and obstruct the installation hole of front wheel arch ornament.**

(1) Install the wing assembly to a proper position on body.

(2) Install 2 fixing bolts between lower part of wing assembly and body.

Torque: 10 ± 1.5 N · m

(3) Install 2 fixing bolts between inner part of wing assembly and front end of body.

Torque: 10 ± 1.5 N · m

(4) Install the wing spacer.

(5) Install 2 fixing bolts between inner part of wing assembly and body.

Torque: 10 ± 1.5 N · m

(6) Install 1 fixing bolt between front part of wing assembly and body.

Torque: 10 ± 1.5 N · m

(7) Install 2 fixing bolts between upper part of wing assembly and body.

Torque: 10 ± 1.5 N · m

(8) Install the front bumper bracket.

(9) Install the front left wheel house assembly.

(10) Install the left headlight assembly.

(11) Install the front bumper assembly.

(12) Install the front left wheel arch assembly.

(13) Install front left wheel assembly.

(14) Connect the negative battery cable.

3.11 Roof Rack

■ Removal

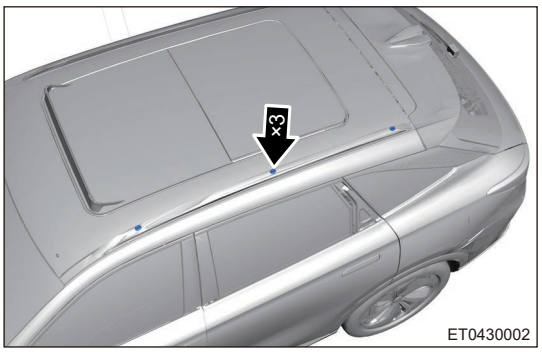
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

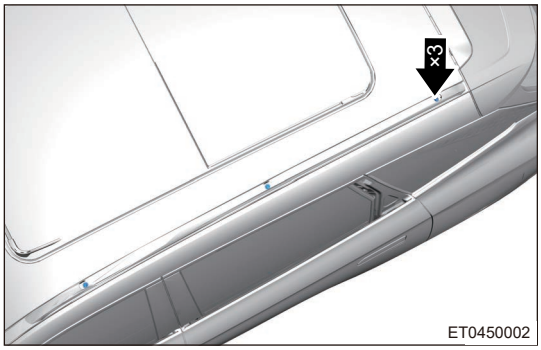
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing roof rack.**
- **Try to prevent body paint surface from being scratched, when removing roof rack.**

(1) Using an interior crow plate, carefully pry off center trim cover.



(2) Remove 3 fixing bolts from roof rack.



■ **Installation**

⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when installing roof rack.** • **Try to prevent body paint surface from being scratched, when installing roof rack.**

(1) Install 3 fixing bolts to roof rack.

Torque: 9 ± 1.5 N · m

(2) Install the center trim cover.

3.12 Spoiler Assembly

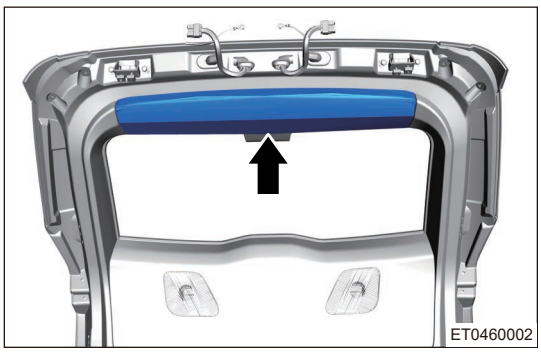
■ **Removal**

⚠ Caution
• **Be sure to wear safety equipment to prevent accidents, when removing spoiler assembly.** • **Try to prevent body paint surface from being scratched, when removing spoiler assembly.**

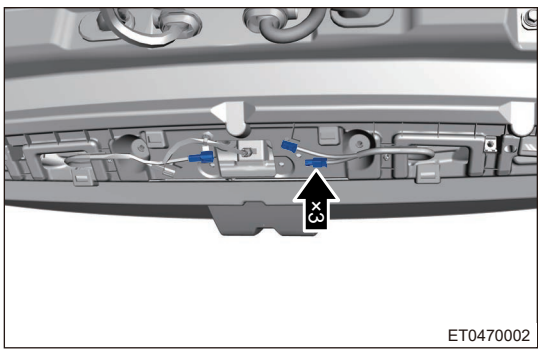
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

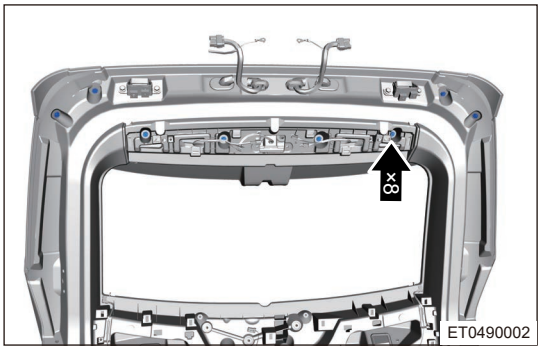
(3) Remove back door upper protector assembly.



(4) Disconnect the connector from back door.



(5) Remove 8 fixing bolts from spoiler assembly.



(6) Using an interior crow plate, carefully pry off the spoiler assembly.

■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing spoiler assembly.**
- **Try to prevent body paint surface from being scratched, when installing spoiler assembly.**

(1) Install the spoiler assembly to a proper position on body.

(2) Install 8 fixing bolts to spoiler assembly.

Torque: 5 ± 1 N · m

(3) Connect connector to back door.

(4) Install the back door upper protector assembly.

(5) Connect the negative battery cable.

3.13 Engine Compartment Lower Protector Assembly

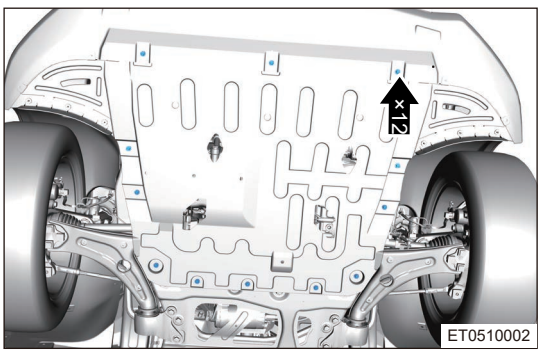
■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing engine compartment lower protector assembly.**
- **Try to prevent body paint surface from being scratched, when removing engine compartment lower protector assembly.**

(1) Raise the vehicle to a proper position.

(2) Remove 12 fixing bolts from engine compartment lower protector assembly.



(3) Remove the engine compartment lower protector assembly.

■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing engine compartment lower protector assembly.**
- **Try to prevent body paint surface from being scratched, when installing engine compartment lower protector assembly.**

(1) Install 12 fixing bolts to engine compartment lower protector assembly.

Torque: 5 ± 1 N · m

(2) Lower the vehicle to a proper position.

3.14 Rear Bumper Assembly

■ **Removal**

⚠ Warning

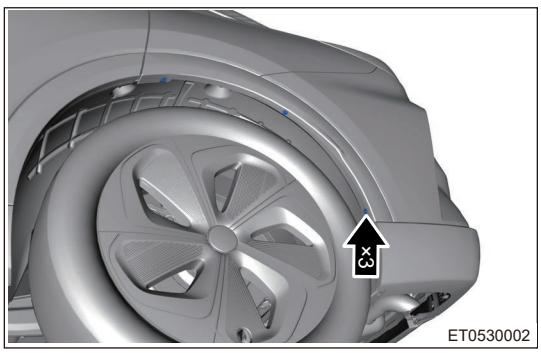
- **Be sure to wear necessary safety equipment to prevent accidents, when removing rear bumper assembly.**
- **Appropriate force should be applied, when removing rear bumper assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing rear bumper assembly.**
- **Avoid breaking claws, when disassembling rear bumper assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

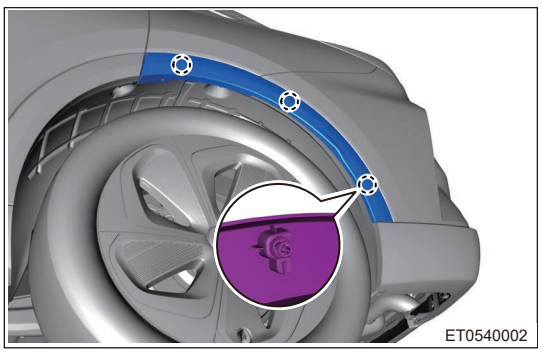
(2) Disconnect the negative battery cable.

(3) Remove the rear combination light (fixed) assembly.

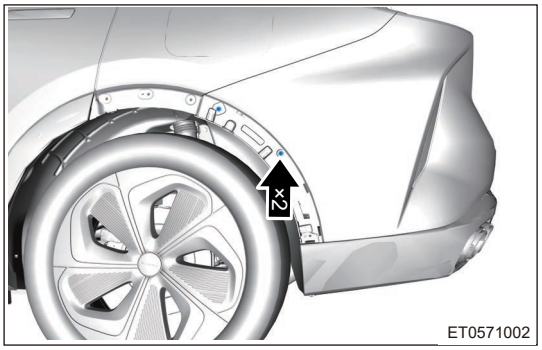
(4) Remove 3 fixing screws from rear wheel arch. (Take left side as an example)



(5) Using an interior crow plate, carefully pry up fixing clips from rear left wheel arch, and remove rear left wheel arch assembly.



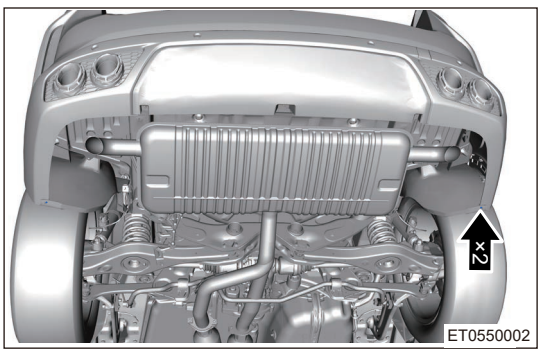
(6) Remove 2 fixing screws from the rear bumper assembly. (Take left side as an example)



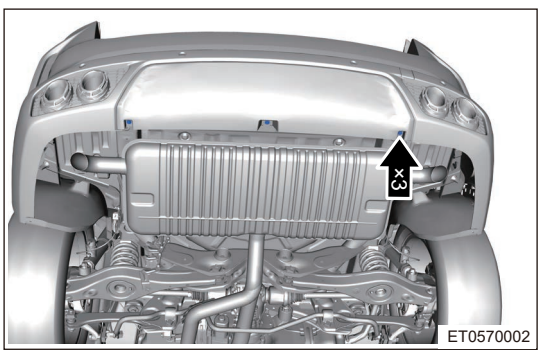
(7) Remove 4 fixing block covers from the upper part of rear bumper assembly.

(8) Remove 4 fixing screws from the upper part of rear bumper assembly.

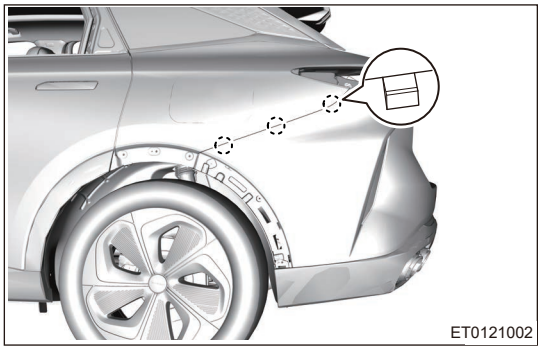
(9) Remove 2 fixing screws from lower side of rear bumper.



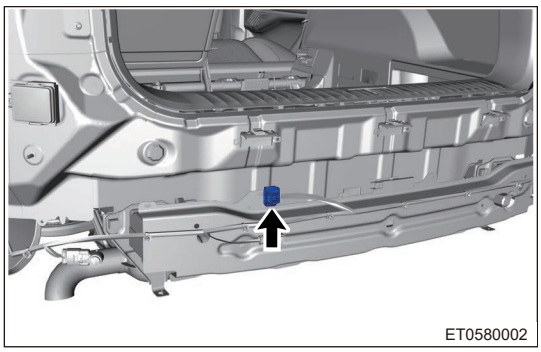
(10) Raise vehicle and remove 3 fixing bolts from lower part of rear bumper assembly.



(11) Disengage claws from rear bumper assembly (take left side as an example).



(12) Disconnect the connector from rear bumper wire harness, and remove the rear bumper assembly.



■ Installation

⚠ Caution

- **Try to prevent body paint surface from being scratched, when installing rear bumper assembly.**
- **Make sure that rear bumper is installed correctly and fitting clearance between rear bumper and body is appropriate, when installing rear bumper assembly.**

(1) Connect the connector to rear bumper wire harness, and install the rear bumper assembly.

(2) Install 3 fixing bolts to the lower part of rear bumper assembly.

Torque: 5.0 ± 1.0 N · m

(3) Install 2 fixing screws to the lower side of rear bumper.

Torque: 1.5 ± 0.5 N · m

(4) Install 4 fixing screws to the upper part of rear bumper assembly.

Torque: 1.5 ± 0.5 N · m

(5) Install 4 fixing block covers to the upper part of rear bumper assembly.

(6) Install 2 fixing screws to rear bumper assembly. (Take left side as an example)

Torque: 1.5 ± 0.5 N · m

(7) Install the rear left wheel arch assembly. (Take left side as an example)

(8) Install 3 fixing screws to rear wheel arch. (Take left side as an example)

(9) Install the rear combination light (fixed) assembly.

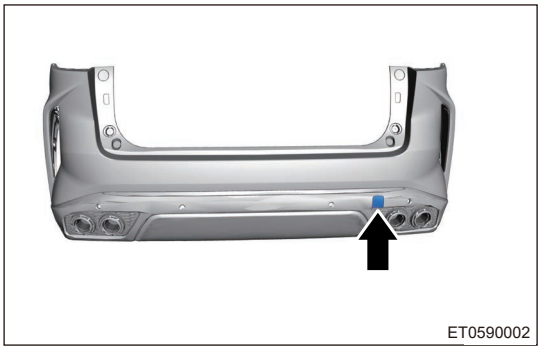
(10) Connect the negative battery cable.

■ **Disassembly**

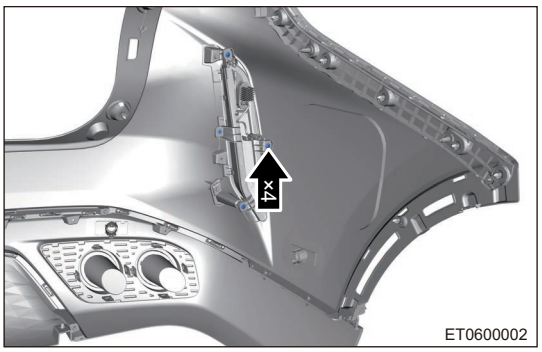
⚠ Warning

- **Appropriate force should be applied, when disassembling rear bumper assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when disassembling rear bumper assembly.**
- **Avoid breaking claws, when disassembling rear bumper assembly.**

(1) Using an interior crow plate, pry off rear bumper towing hook cover claw and remove the rear bumper towing hook cover.



(2) Remove 4 fixing screws from rear fog light and retro-reflector assembly.



(3) Remove the rear fog light and retro-reflector assembly.

■ **Assembly**

⚠ Caution

- **Appropriate force should be applied, when assembling rear bumper assembly. Be careful not to operate roughly.**
- **Avoid breaking claws, when assembling rear bumper assembly.**

(1) Install rear fog light and retro-reflector assembly to a proper position on rear bumper.

(2) Install 4 fixing screws to rear fog light and retro-reflector assembly.

Torque: 1.5 ± 0.5 N · m

(3) Install rear bumper towing hook cover.

3.15 Rear Bumper Mounting Bracket

■ **Removal**

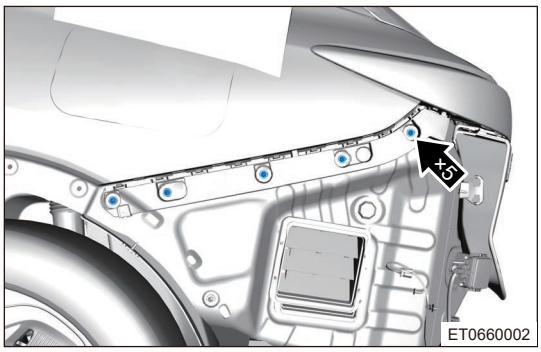
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Appropriate force should be applied, when removing rear bumper mounting bracket. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing rear bumper mounting bracket.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear bumper assembly.
(4) Remove 5 fixing screws from rear bumper mounting bracket.



(5) Remove the front bumper mounting bracket.

■ Installation

⚠ Caution

Try to prevent body paint surface from being scratched, when installing rear bumper mounting bracket.

(1) Install the rear bumper mounting bracket to a proper position.
(2) Install 5 fixing screws to rear bumper bracket.

Torque: 1.5 ± 0.5 N · m

(3) Install the rear bumper assembly.
(4) Connect the negative battery cable.

3.16 Rear Impact Beam Assembly

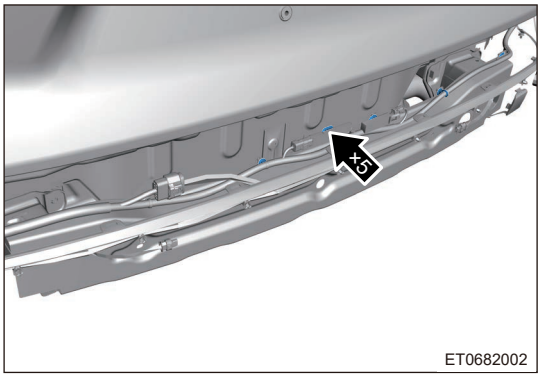
■ Removal

⚠ Caution

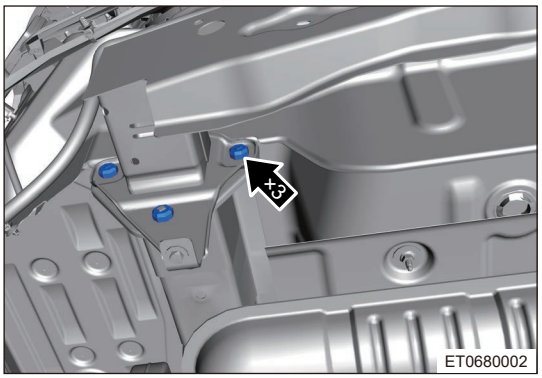
- **Appropriate force should be applied when removing rear impact beam assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing rear impact beam assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the rear bumper assembly.

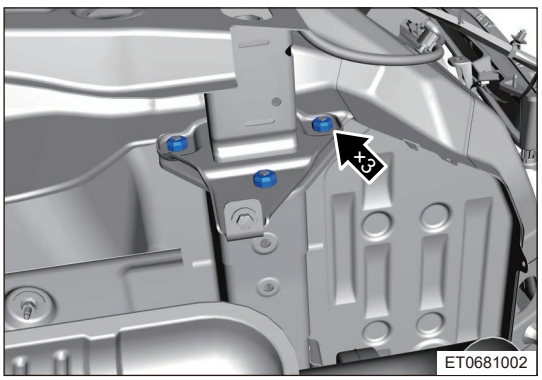
(4) Remove clips from the rear bumper crossmember assembly.



(5) Remove 3 fixing nuts from rear bumper crossmember assembly.



(6) Remove 3 fixing nuts from rear bumper crossmember assembly.



(7) Remove the rear bumper crossmember assembly.

■ Installation

⚠ Caution

- **Try to prevent body paint surface from being scratched, when installing rear bumper crossmember.**
- **There should be no looseness, shaking and deformation after installing rear bumper crossmember.**

(1) Install the rear bumper crossmember to a proper position on body.

(2) Install 6 fixing nuts to rear bumper crossmember assembly.

Torque: 25 ± 3.5 N · m

(3) Fix the fixing clip on the rear bumper wire harness connector.

(4) Install the rear bumper assembly.

(5) Connect the negative battery cable.

3.17 Front Door Trim Panel Assembly

■ Removal

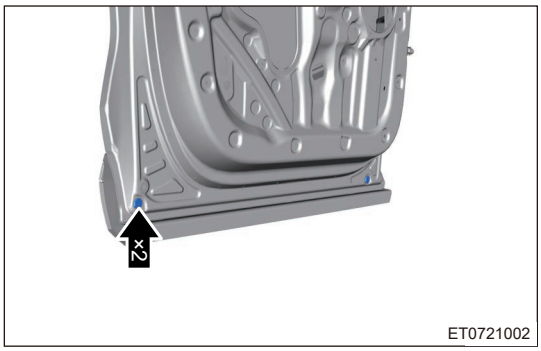
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

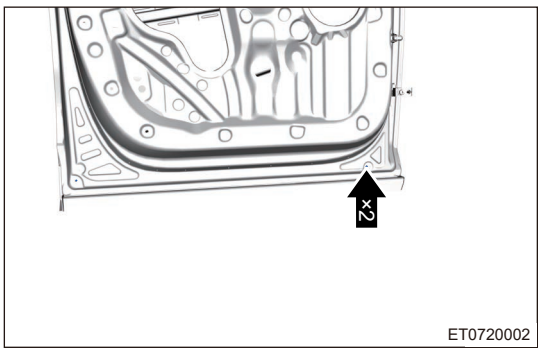
⚠ Caution

- **Appropriate force should be applied, when removing front door trim panel assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing front door trim panel assembly.**

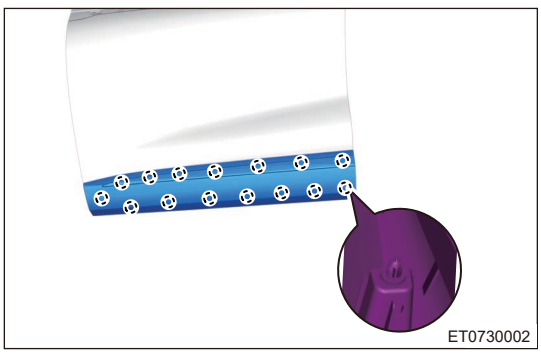
(1) Remove 2 block covers from the front door trim panel assembly.



(2) Remove 2 fixing screws from front door trim panel assembly.



(3) Using an interior crow plate, pry off fixing clips from front door trim panel assembly.



■ Installation

⚠ Caution

- **Appropriate force should be applied, when installing front door trim panel assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when installing front door trim panel assembly.**
- **After assembly, make sure that the upper edge of trim panel fits the sheet metal and the two ends of trim board are not sticking out of sheet metal.**

(1) Install front door trim panel assembly to a proper position and fix the clip.

(2) Install 2 fixing screws to front door trim panel assembly.

Torque: 1.5 ± 0.5 N · m

(3) Install 2 block covers to the front door trim panel assembly.

3.18 Rear Door Trim Panel Assembly

■ Removal

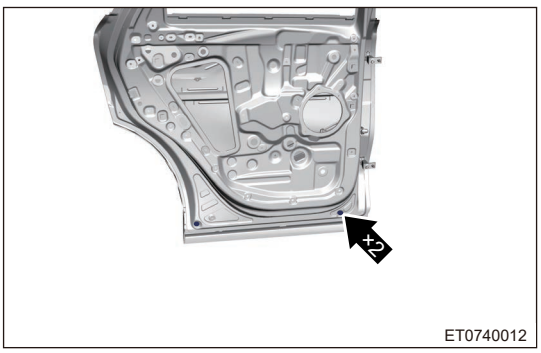
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

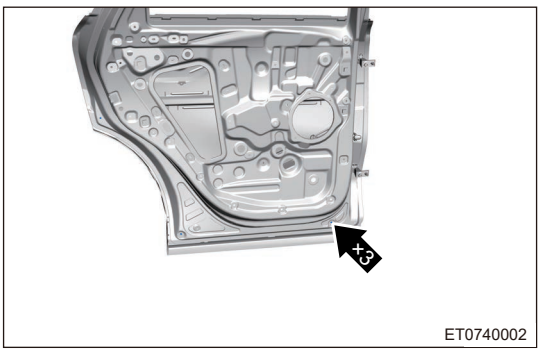
⚠ Caution

- **Appropriate force should be applied, when removing rear door trim panel assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing rear door trim panel assembly.**

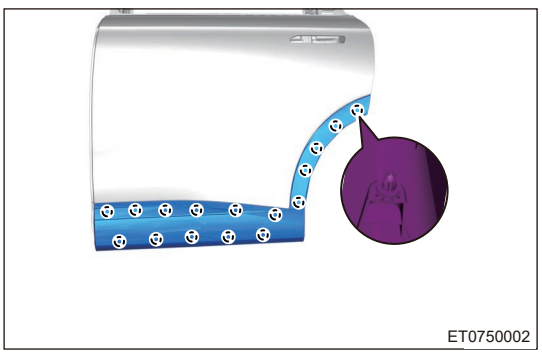
(1) Remove 2 block covers from the rear door trim panel assembly.



(2) Remove 3 fixing screws from rear door trim panel assembly.



(3) Using an interior crow plate, pry off fixing clips from rear door trim panel assembly.



■ **Installation**

⚠ Caution

- **Appropriate force should be applied, when installing rear door trim panel assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when installing rear door trim panel assembly.**
- **After assembly, make sure that the upper edge of trim panel fits the sheet metal and the two ends of trim board are not sticking out of sheet metal.**

(1) Install rear door trim panel assembly to a proper position and fix the clip.

(2) Install 3 fixing screws to rear door trim panel assembly. (Note: Hold rear door trim panel mounting screw by hand)

Torque: 1.5 ± 0.5 N · m

(3) Install 3 block covers to the rear door trim panel assembly.

3.19 Rear Wheel House Protector Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

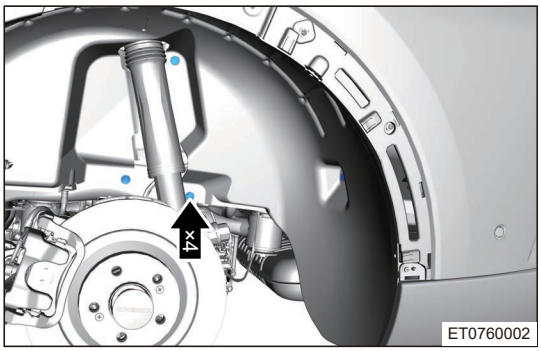
⚠ Caution

- **Appropriate force should be applied, when removing rear wheel house protector assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing rear wheel house protector assembly.**

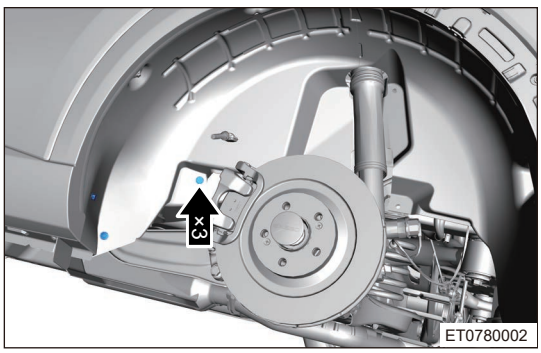
(1) Remove the rear left wheel.

(2) Remove the rear left wheel arch assembly.

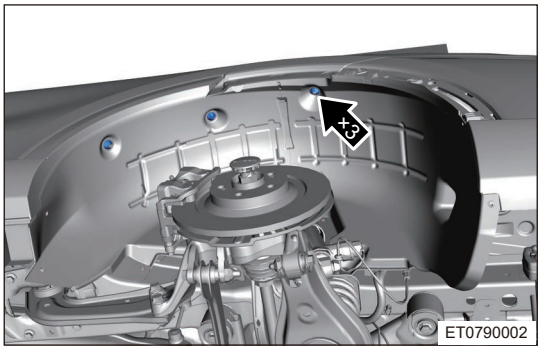
(3) Remove 4 fixing clips from rear wheel house protector.



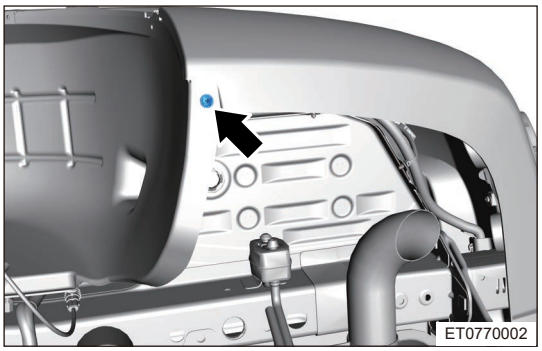
(4) Remove 3 fixing clips from rear wheel house protector.



(5) Remove 3 plastic nuts from rear wheel house protector.



(6) Remove 1 fixing screw between rear bumper and rear wheel house protector.



(7) Remove the rear wheel house protector assembly.

■ **Installation**

⚠ Caution

- **Appropriate force should be applied, when installing rear wheel house protector assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when installing rear wheel house protector assembly.**

(1) Install rear wheel house protector assembly to a proper position on body.
(2) Install 1 fixing screw between rear bumper and rear wheel house protector.
Torque: 1.5 ± 0.5 N · m

(3) Install 3 plastic nuts to rear wheel house protector.
Torque: 1.5 ± 0.5 N · m

(4) Install 3 fixing clips to rear wheel house protector.
(5) Install 4 fixing clips to rear wheel house protector.
(6) Install the rear left wheel arch assembly.
(7) Install the rear left wheel.

3.20 D-pillar Trim Board Assembly

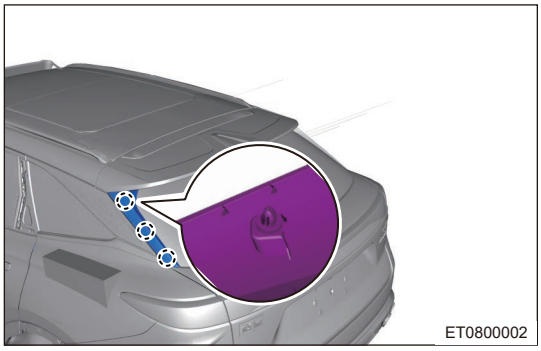
■ **Removal**

Hint:
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Appropriate force should be applied, when removing D-pillar trim board assembly. Be careful not to operate roughly.**
- **Try to prevent body paint surface from being scratched, when removing D-pillar trim board assembly.**

(1) Using an interior crow plate, pry off fixing clips from D-pillar trim board assembly.



■ **Installation**

⚠ Caution
• **Appropriate force should be applied, when installing D-pillar trim board assembly. Be careful not to operate roughly.** • **Try to prevent body paint surface from being scratched, when installing D-pillar trim board assembly.**

(1) Install D-pillar trim board assembly and fix the clip on rear door trim board assembly.

3.21 EXEED Name Plate

■ **Installation**

⚠ Caution
Name plate "RX" is an outsourcing part, installation method is pasting. The name plate is pasted on left side of back door outer panel, the specific pasting position is as shown in illustration:

(1) First clean the places in which back door may be in contact with name plate tape. Do not allow any dirt or grease to remain, doing so may affect performance of tape.

(2) Then, make sure the adhesive dose not disabled, then tear off the release paper of name plate, avoid the contact between hand and 3M adhesive.

(3) Finally, place EXEED name plate and positioning paperboard into auxiliary tool mounting box, then press twice with rolling fixture (rolling force that is perpendicular to installation surface is not less than 30 N).

(4) It is recommended to heat components when ambient temperature is below 16˚C (optimal pasting temperature range is 25˚C to 35 ˚C); b) The rain test should be carried out after it is pasted for at least 20 minutes (-recommended time is more than 1 hour).

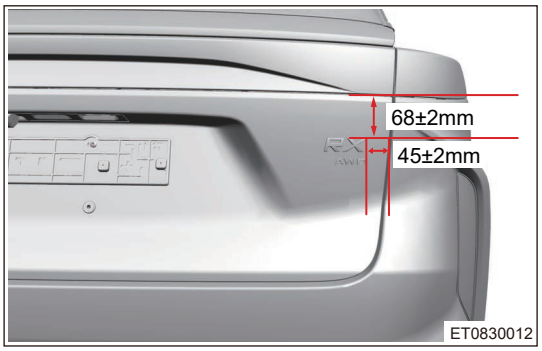
3.22 RX Name Plate

■ Installation

⚠ Caution

Name plate "RX" is an outsourcing part, installation method is pasting. The name plate is pasted on right side of back door outer panel, the specific pasting position is as shown in illustration:

(1) First clean the places in which back door may be in contact with name plate tape. Do not allow any dirt or grease to remain, doing so may affect performance of tape.



(2) Then, make sure the adhesive dose not disabled, then tear off the release paper of name plate, avoid the contact between hand and 3M adhesive.

(3) Finally, place STELLAR name plate and positioning paperboard into auxiliary tool mounting box, then press twice with rolling fixture (rolling force that is perpendicular to installation surface is not less than 30 N).

(4) It is recommended to heat components when ambient temperature is below 16℃ (optimal pasting temperature range is 25℃ to 35 ℃); b) The rain test should be carried out after it is pasted for at least 20 minutes (-recommended time is more than 1 hour).

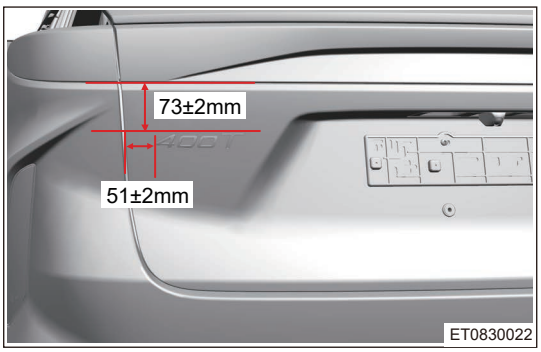
3.23 400T Name Plate

■ Installation

⚠ Caution

Name plate "400T" is an outsourcing part, installation method is pasting. The name plate is pasted on right side of back door outer panel, the specific pasting position is as shown in illustration:

(1) First clean the places in which back door may be in contact with name plate tape. Do not allow any dirt or grease to remain, doing so may affect performance of tape.



(2) Then, make sure the adhesive dose not disabled, then tear off the release paper of name plate, avoid the contact between hand and 3M adhesive.

(3) Finally, place 400T name plate into auxiliary tool mounting box, then press twice with rolling fixture (-rolling force that is perpendicular to installation surface is not less than 30 N).

(4) It is recommended to heat components when ambient temperature is below 16℃ (optimal pasting temperature range is 25℃ to 35 ℃); b) The rain test should be carried out after it is pasted for at least 20 minutes (-recommended time is more than 1 hour).

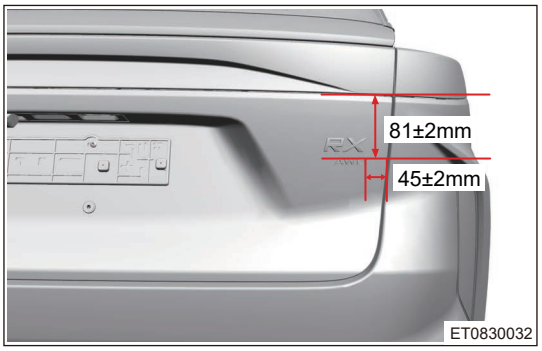
3.24 AWD Name Plate

■ Installation

⚠ Caution

Name plate "AWD" is an outsourcing part, installation method is pasting. The name plate is pasted on right side of back door outer panel, the specific pasting position is as shown in illustration:

(1) First clean the places in which back door may be in contact with name plate tape. Do not allow any dirt or grease to remain, doing so may affect performance of tape.



(2) Then, make sure the adhesive dose not disabled, then tear off the release paper of name plate, avoid the contact between hand and 3M adhesive.

(3) Finally, place AWD name plate into auxiliary tool mounting box, then press twice with rolling fixture (-rolling force that is perpendicular to installation surface is not less than 30 N).

(4) It is recommended to heat components when ambient temperature is below 16℃ (optimal pasting temperature range is 25℃ to 35 ℃); b) The rain test should be carried out after it is pasted for at least 20 minutes (-recommended time is more than 1 hour).

1.4 INTERIOR

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair:

(1) Be sure to wear safety equipment to prevent accidents, when removing doorsill pressure plate assembly, door opening weatherstrip, protector assembly, etc.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle before repair in this section, always follow the instructions below before repair:

(1) Appropriate force should be applied, when removing doorsill pressure plate assembly, door opening weatherstrip, protector assembly, etc. Be careful not to operate roughly.

(2) Try to prevent interior and body paint surface from being scratched, when removing doorsill pressure plate assembly, door opening weatherstrip, protector assembly, etc.

(3) Try to prevent door opening weatherstrip from being damaged by excessive force, when removing door opening weatherstrip.

(4) Replace damaged clips and install doorsill pressure plate assembly in place, when installing doorsill pressure plate assembly.

(5) After installation, check for looseness, neglected installation, etc.

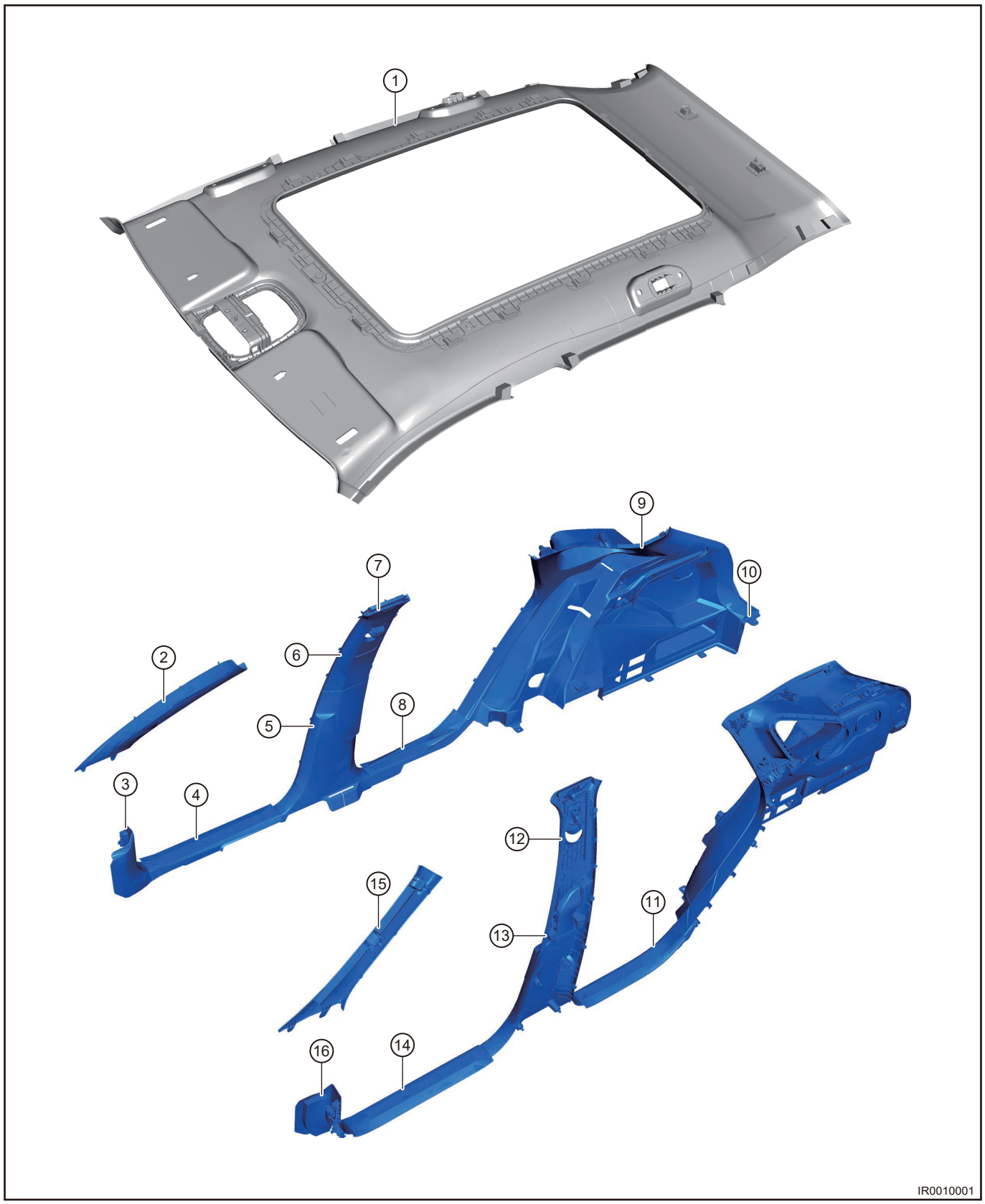
(6) Door opening weatherstrip and body should be fitted with a certain amount of clamping force and the weatherstrip should not fall off easily, when installing door opening weatherstrip.

(7) When installing door opening weatherstrip, tap all around uniformly with a rubber hammer to install it in place. The surface of weatherstrip should have no defects, such as tapped dents, deformation and warpage after installation.

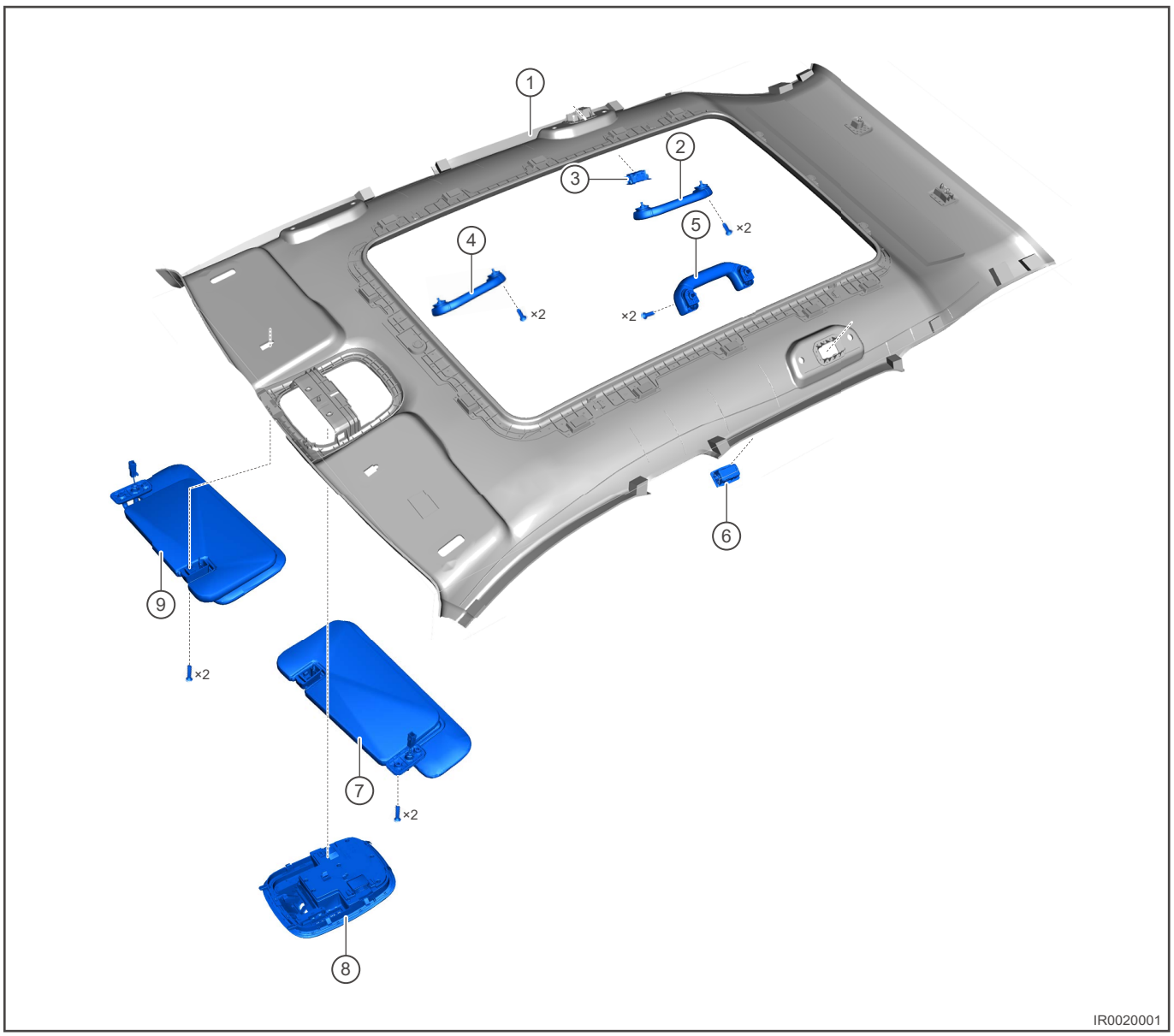
(8) After installing door opening weatherstrip, do not remove or install it unless it is necessary. Otherwise the installation holding force of weatherstrip may be reduced.

2 System Overview

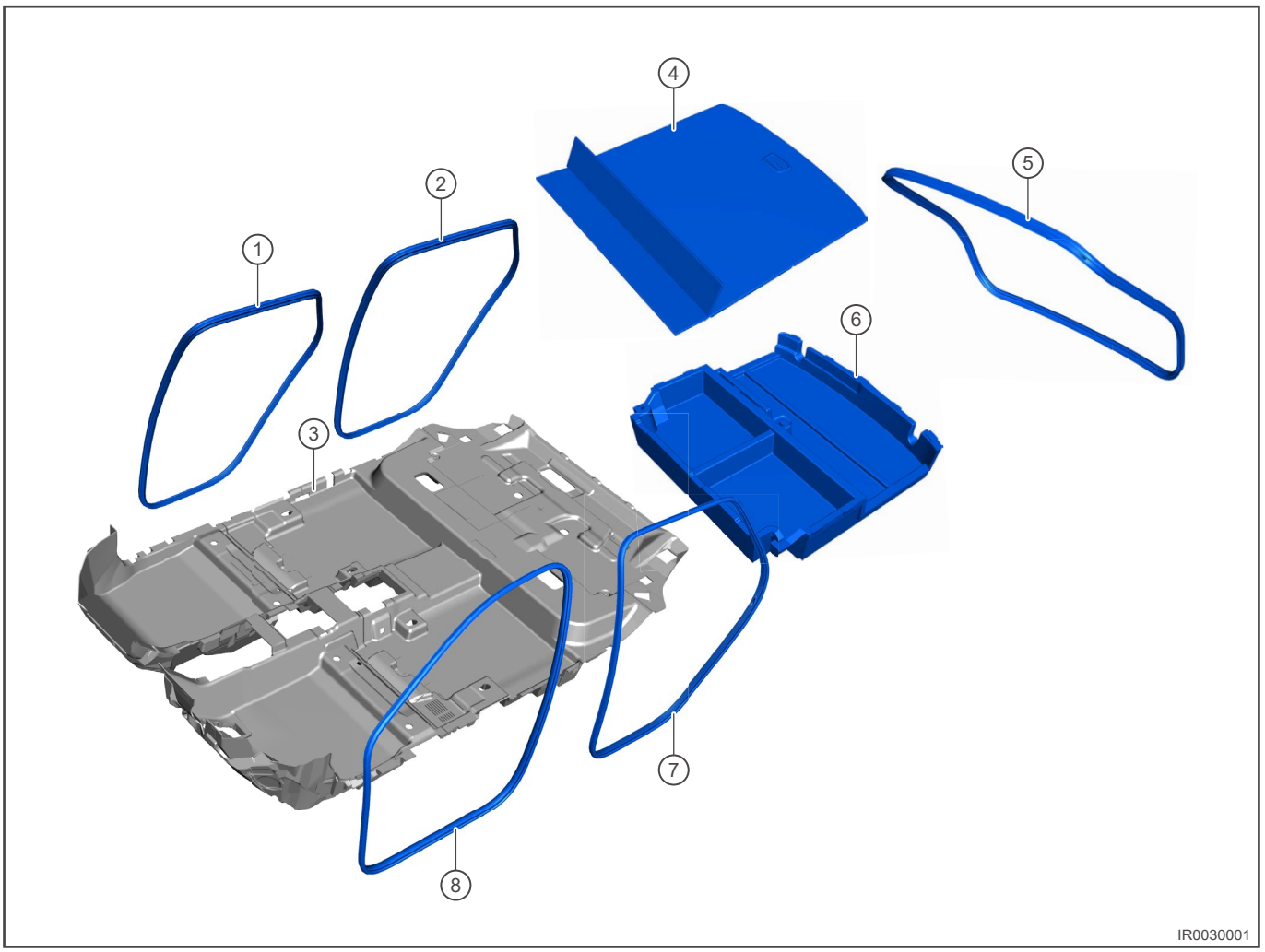
2.1 System Components Diagram



1	Roof Assembly	9	Right C-pillar Upper Protector Assembly
2	Right A-pillar Upper Protector Assembly	10	Luggage Compartment Wheel House Assembly
3	Right A-pillar Lower Protector Assembly	11	Rear Left Doorsill Pressure Plate Assembly
4	Front Right Doorsill Pressure Plate Assembly	12	Left B-pillar Upper Protector Assembly
5	Right B-pillar Lower Protector Assembly	13	Left B-pillar Lower Protector Assembly
6	Right B-pillar Upper Protector Assembly	14	Front Left Doorsill Pressure Plate Assembly
7	Screw Block Cover	15	Left A-pillar Upper Protector Assembly
8	Rear Right Doorsill Pressure Plate Assembly	16	Left A-pillar Lower Protector Assembly



1	Roof Assembly	6	Left Dome Light Assembly
2	Rear Right Passenger Grip Assembly	7	Left Sun Visor Assembly
3	Right Dome Light Assembly	8	Interior Front Dome Light Assembly
4	Front Right Passenger Grip Assembly	9	Right Sun Visor Assembly
5	Rear Left Passenger Grip Assembly		

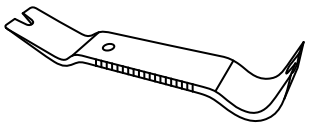
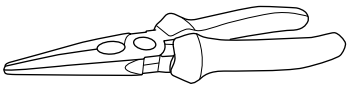


1	Front Right Door Opening Weatherstrip Assembly	5	Back Door Opening Weatherstrip Assembly
2	Rear Right Door Opening Weatherstrip Assembly	6	Luggage Compartment Storage Box
3	Carpet Assembly	7	Rear Left Door Opening Weatherstrip Assembly
4	Luggage Compartment Carpet Assembly	8	Front Left Door Opening Weatherstrip Assembly

3 On-vehicle Service

3.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020
Needle Nose Plier	 S00098

3.2 Fasteners Torque List

■ Torque Specifications

Item	Tightening torque
Back Doorsill Pressure Plate Assembly Fixing Screw	1.5 ± 0.5 N·m
B-pillar Upper Protector Fixing Bolt	3.5 ± 0.5 N·m
B-pillar Upper Protector Fixing Screw	1.5 ± 0.5 N·m
C-pillar Upper Protector Assembly Fixing Screw	1.5 ± 0.5 N·m
Side Sun Visor Assembly Fixing Bolt	5 ± 1 N·m
Passenger Grip Fixing Screw	3 ± 0.5 N·m
Luggage Compartment Wheel House Fixing Screw	1.5 ± 0.5 N·m

3.3 Front Doorsill Pressure Plate Assembly

■ Removal

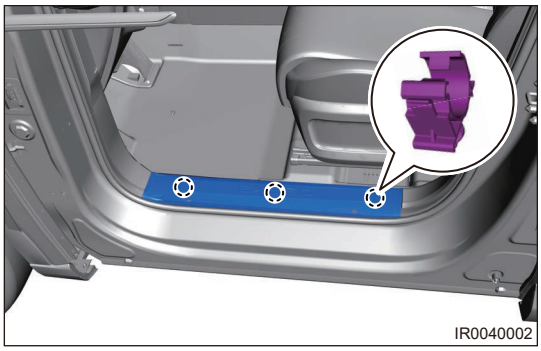
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

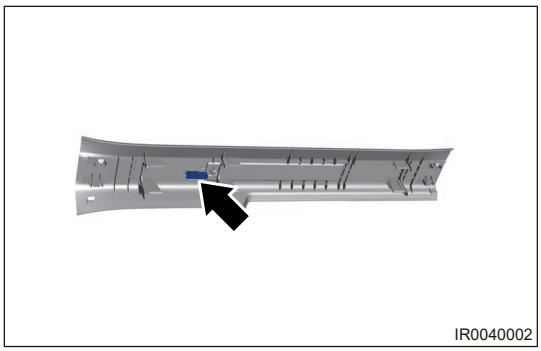
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front doorsill pressure plate assembly.**
- **Appropriate force should be applied, when removing front doorsill pressure plate assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing front doorsill pressure plate assembly.**

(1) Using an interior crow plate, pry off 3 fixing clips from front left doorsill pressure plate assembly.


IR0040002

(2) Disconnect connector, and remove front left doorsill pressure plate assembly.


IR0040002

■ **Installation**

⚠ Caution

- **Replace damaged clips and install front doorsill pressure plate assembly in place, when installing front doorsill pressure plate assembly.**
- **Make sure that front doorsill pressure plate assembly is well fitted with B-pillar lower protector assembly and A-pillar lower protector assembly, after installing front doorsill pressure plate assembly.**
- **After installation, check for looseness, neglected installation, etc.;**

(1) Fix LED connector and wire harness connector terminal (only for high configuration doorsill pressure plate with light and strip).

(2) Clamp limit attachment structure near B-pillar lower protector of doorsill pressure plate into corresponding hole of B-pillar lower protector.

(3) Then slap the doorsill claws into 3 corresponding doorsill fixing clips from rear to front.

(4) Slap attachment structure near A-pillar lower protector of doorsill pressure plate into corresponding hole of A-pillar lower protector.

3.4 Rear Doorsill Pressure Plate Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing rear doorsill pressure plate assembly.**
- **Appropriate force should be applied, when removing rear doorsill pressure plate assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing rear doorsill pressure plate assembly.**

(1) Using an interior crow plate, pry off fixing clips from rear left doorsill pressure plate assembly.


IR0060002

(2) Remove the rear left doorsill pressure plate assembly.

■ Installation

⚠ Caution

- **Replace damaged clips and install rear doorsill pressure plate assembly in place, when installing rear doorsill pressure plate assembly.**
- **Make sure that rear doorsill pressure plate assembly is well fitted with B-pillar lower protector assembly, luggage compartment wheel house assembly and protector assembly, after installing rear doorsill pressure plate assembly.**
- **After installation, check for looseness, neglected installation, etc.**

(1) Clamp limit attachment structure near B-pillar lower protector of doorsill pressure plate into corresponding hole of B-pillar lower protector.

(2) Clamp the doorsill claws into 2 corresponding doorsill fixing clips from front to rear.

(3) Finally, slap attachment structure near luggage compartment wheel house of doorsill pressure plate into corresponding hole.

3.5 Back Doorsill Pressure Plate Assembly

■ Removal

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing back doorsill pressure plate assembly.**
- **Appropriate force should be applied, when removing back doorsill pressure plate assembly. Be careful not to operate roughly.**
- **Prevent interior and body paint from being scratched, when removing back doorsill pressure plate assembly.**

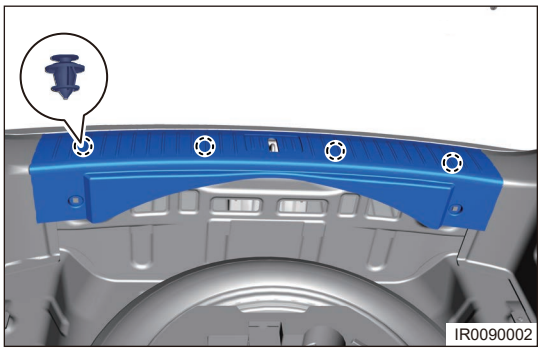
(1) Remove the back door opening weatherstrip.

(2) Remove the luggage compartment carpet assembly.

(3) Remove the luggage compartment storage box.

(4) Remove 2 fixing screws from back doorsill pressure plate assembly.

(5) Using an interior crow plate, careful pry off 4 clips from back doorsill pressure plate assembly.



(6) Remove the back doorsill pressure plate assembly.

■ **Installation**

⚠ Caution

- **Replace damaged clips and install back doorsill pressure plate assembly in place, when installing back doorsill pressure plate assembly.**
- **After installation, check for looseness, neglected installation, etc.**

(1) Align the back doorsill pressure plate clip with corresponding opening, and then tap the 4 clips into corresponding holes from left to right.

(2) Install 2 fixing screws of back doorsill pressure plate assembly.

Torque: 1.5 ± 0.5 N · m

(3) Install the luggage compartment storage box.

(4) Install the luggage compartment carpet assembly.

(5) Install the back door opening weatherstrip.

3.6 Front Door Opening Weatherstrip

■ **Removal**

Hint:

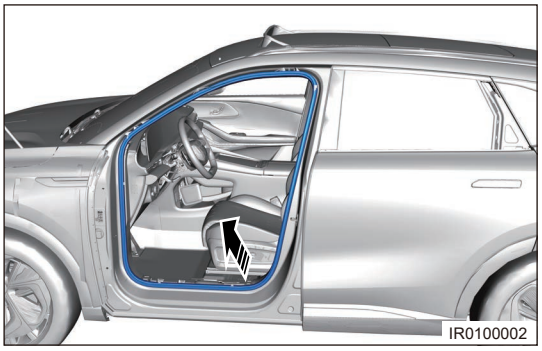
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front door opening weatherstrip.**
- **Appropriate force should be applied, when removing front door opening weatherstrip. Be careful not to operate roughly.**
- **Try to prevent front door opening weatherstrip from being damaged, when removing front door opening weatherstrip.**

(1) Remove the front left doorsill pressure plate assembly.

(2) Remove the front left door opening weatherstrip by gently pulling it along edges from one corner of front door opening weatherstrip.



■ **Installation**

⚠ Caution

- **Front door opening weatherstrip and body should be fitted with a certain amount of clamping force and the weatherstrip should not fall off easily, when installing front door opening weatherstrip.**
- **When installing front door opening weatherstrip, tap all around uniformly with a rubber hammer to install it in place. The surface of weatherstrip should have no defects, such as tapped dents, deformation and warpage after installation.**
- **After installing front door opening weatherstrip, do not remove or install it unless it is necessary. Otherwise the installation holding force of weatherstrip may be reduced.**

(1) Place the front left door opening weatherstrip to a proper position, tap all around uniformly with a rubber hammer to install it in place.

(2) Install the front left doorsill pressure plate assembly.

3.7 Rear Door Opening Weatherstrip

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing rear door opening weatherstrip.**
- **Appropriate force should be applied, when removing rear door opening weatherstrip. Be careful not to operate roughly.**
- **Try to prevent rear door opening weatherstrip from being damaged, when removing rear door opening weatherstrip.**

(1) Remove the rear left doorsill pressure plate assembly.

(2) Remove rear left door opening weatherstrip by gently pulling it along edges from one corner of rear door opening weatherstrip.

■ **Installation**

⚠ Caution

- **Rear door opening weatherstrip and body should be fitted with a certain amount of clamping force and the weatherstrip should not fall off easily, when installing rear door opening weatherstrip.**
- **When installing rear door opening weatherstrip, tap all around uniformly with a rubber hammer to install it in place. The surface of weatherstrip should have no defects, such as tapped dents, deformation and warpage after installation.**
- **After installing rear door opening weatherstrip, do not remove or install it unless it is necessary. Otherwise the installation holding force of weatherstrip may be reduced.**

(1) Place the rear left door opening weatherstrip to a proper position, tap all around uniformly with a rubber hammer to install it in place.

(2) Install the rear left doorsill pressure plate assembly.

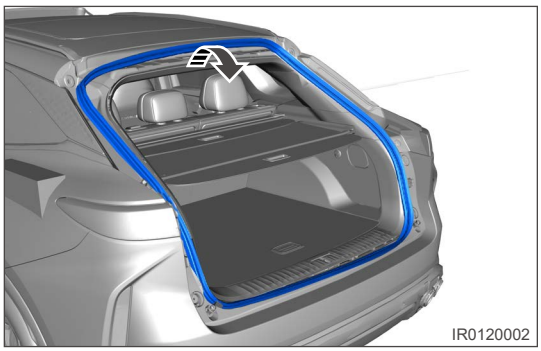
3.8 Back Door Opening Weatherstrip

■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing back door opening weatherstrip.**
- **Appropriate force should be applied when removing back door opening weatherstrip. Be careful not to operate roughly.**
- **Try to prevent back door opening weatherstrip from being damaged, when removing back door opening weatherstrip.**

(1) Remove back door opening weatherstrip by gently pulling it along edges from one corner of back door opening weatherstrip.



■ **Installation**

⚠ Caution

- **Back door opening weatherstrip and body should be fitted with a certain amount of clamping force and the weatherstrip should not fall off easily, when installing back door opening weatherstrip.**
- **When installing back door opening weatherstrip, tap all around uniformly with a rubber hammer to install it in place. The surface of weatherstrip should have no defects, such as tapped dents, deformation and warpage after installation.**
- **After installing back door opening weatherstrip, do not remove or install it unless it is necessary. Otherwise the weatherstrip holding force of installation may be reduced.**

(1) Place the back door opening weatherstrip to a proper position, tap all around uniformly with a rubber hammer to install it in place.

3.9 A-pillar Upper Protector Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing A-pillar upper protector assembly.**
- **Appropriate force should be applied, when removing A-pillar upper protector assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing A-pillar upper protector assembly.**
- **Needle-nose pliers are required for installation and removal.**

(1) Remove the front left door opening weatherstrip.

(2) Apply Y-direction force along the protector and sheet metal matching edge with both hands until the first airbag clip is disengaged.

(3) Use needle nose pliers to clamp the dovetail of airbag clip and rotate it 90° to detach the first section of dovetail from protector clip hole. Rotate it 90° again to detach the second section of dovetail from protector clip hole, then remove A-pillar upper protector.

■ Installation

⚠ Caution

- **Make sure that damaged clips are replaced and A-pillar upper protector assembly is installed in place, when installing A-pillar upper protector assembly.**
- **A-pillar upper protector assembly should be well fitted with instrument panel and roof headlining, after installing A-pillar upper protector assembly.**
- **A-pillar upper protector assembly and front door opening weatherstrip should be fitted closely, after installing A-pillar upper protector assembly.**
- **Needle-nose pliers are required for installation.**
- **After installation, check for looseness, neglected installation, etc.**

(1) Before installation, check if CAB, wire harness and drain hose are in correct assembly position to prevent 2 second clips at A from being installed.

(2) First assemble 2 claws at "B" into the corresponding holes of instrument panel frame. Please be careful that you need to push it to the foremost end in Y direction by hand to make sure clips between the lower part and IP matching area are fitted in place, when assembling A-pillar upper protector.

(3) Assemble the second clip at "A" on upper part of A-pillar upper protector into the corresponding sheet metal opening hole.

3.10 A-pillar Lower Protector Assembly

■ Removal

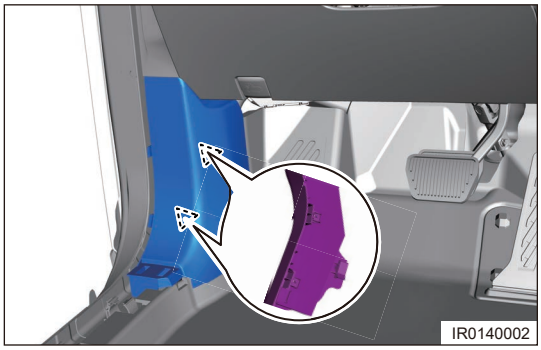
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing A-pillar lower protector assembly.**
- **Appropriate force should be applied, when removing A-pillar lower protector assembly. Be careful not to operate roughly.**
- **Prevent interior and body paint from being scratched, when removing A-pillar lower protector assembly.**

(1) Remove the front left doorsill pressure plate assembly.
(2) Remove the front left door opening weatherstrip.
(3) Using an interior crow plate, pry off 2 fixing clips from left A-pillar lower protector assembly.



(4) Remove the left A-pillar lower protector assembly.

■ **Installation**

⚠ Caution

- **Replace damaged metal clip and install A-pillar lower protector assembly in place, when installing A-pillar lower protector assembly.**
- **A-pillar lower protector assembly and front door opening weatherstrip should be fitted closely, after installing A-pillar lower protector assembly.**
- **After installation, check for looseness, neglected installation, etc.**

(1) Insert A-pillar lower protector into the lower part of instrument panel.

⚠ Caution

During and after installation, the A-pillar lower protector should be kept inserted into instrument panel body and the instrument panel side end panel.

(2) Install protector opening hole to plant welding stud on sheet metal.
(3) Rotate 2 metal clamps on the protector into the corresponding sheet metal opening.
(4) Install the front left door opening weatherstrip.
(5) Install the front left doorsill pressure plate assembly.

3.11 B-pillar Lower Protector Assembly

■ **Removal**

Hint:

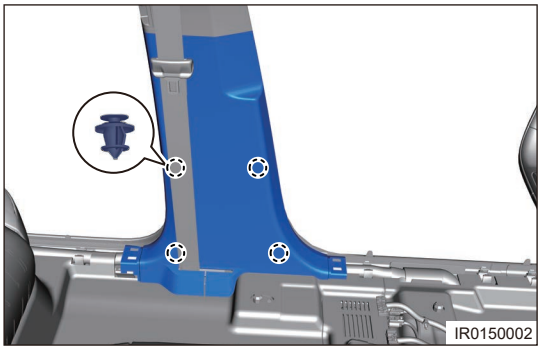
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing B-pillar lower protector assembly.**
- **Appropriate force should be applied, when removing B-pillar lower protector assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing B-pillar lower protector assembly.**

(1) Remove the front left doorsill pressure plate assembly.
(2) Remove the front left door opening weatherstrip.
(3) Remove the rear left doorsill pressure plate assembly.
(4) Remove the rear left door opening weatherstrip.

(5) Pass the webbing through the lower end of B-pillar lower protector. Using an interior crow plate, pry off fixing clips from left B-pillar lower protector assembly.



(6) Remove the left B-pillar lower protector assembly.

■ **Installation**

⚠ Caution

- **Make sure that damaged clips are replaced and B-pillar lower protector assembly is installed, in place when installing B-pillar lower protector assembly.**
- **B-pillar lower protector assembly should be well fitted with front and rear doorsill pressure plate assemblies, after installing B-pillar lower protector assembly.**
- **B-pillar lower protector assembly and front and rear door opening weatherstrips should be fitted closely, after installing B-pillar lower protector assembly.**
- **After installation, check for looseness, neglected installation, etc.**

(1) Clamp 2 injection-molded clips on upper end of B-pillar lower protector into B-pillar upper protector.

(2) Tap 4 clips of B-pillar lower protector into sheet metal holes in sequence from top to bottom, and fix them with the sheet metal.

(3) Install the rear left door opening weatherstrip.

(4) Install the rear left doorsill pressure plate assembly.

(5) Install the front left door opening weatherstrip.

(6) Install the front left doorsill pressure plate assembly.

3.12 B-pillar Upper Protector Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing B-pillar upper protector assembly.**
- **Appropriate force should be applied, when removing B-pillar upper protector assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing B-pillar upper protector assembly.**

(1) Remove the front left doorsill pressure plate assembly.

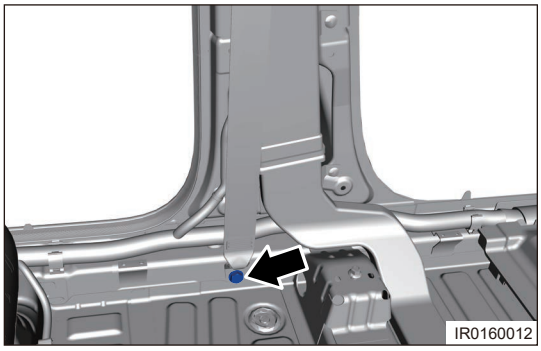
(2) Remove the front left door opening weatherstrip.

(3) Remove the rear left doorsill pressure plate assembly.

(4) Remove the rear left door opening weatherstrip.

(5) Remove the left B-pillar lower protector assembly.

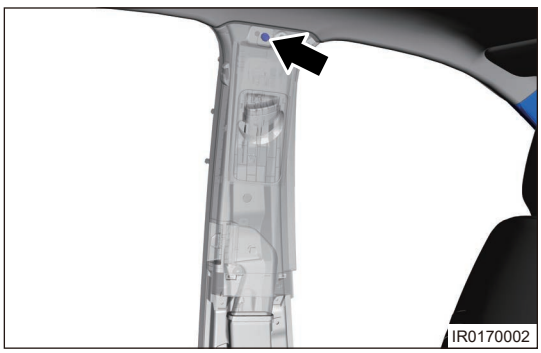
(6) Remove fixing bolt from front left seat belt lower end.



(7) Using a interior crow plate, pry off screw block cover from left B-pillar upper protector.

(8) Remove 2 fixing screws from lower part of left B-pillar upper protector.

(9) Remove 1 fixing bolt from upper part of left B-pillar upper protector.



(10) Using an interior crow plate, pry off left B-pillar upper protector assembly.

■ **Installation**

⚠ Caution

- **B-pillar upper protector assembly should be well fitted with B-pillar lower protector assembly and roof headlining, after installing B-pillar upper protector assembly.**
- **B-pillar upper protector assembly and front and rear door opening weatherstrips should be fitted closely, after installing B-pillar upper protector assembly.**
- **After installation, check for looseness, neglected installation, etc.**

(1) Install left B-pillar upper protector assembly to a proper position.

(2) Install 1 fixing bolt to upper part of left B-pillar upper protector.

Torque: 3.5 ± 0.5 N · m

(3) Install 2 fixing screws to lower part of left B-pillar upper protector.

Torque: 1.5 ± 0.5 N · m

(4) Install screw block cover of left B-pillar upper protector.

(5) Install fixing bolt to front left seat belt lower end.

(6) Install the left B-pillar lower protector assembly.

(7) Install the rear left door opening weatherstrip.

(8) Install the rear left doorsill pressure plate assembly.

(9) Install the front left door opening weatherstrip.

(10) Install the front left doorsill pressure plate assembly.

3.13 C-pillar Upper Protector Assembly

■ **Removal**

Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing C-pillar upper protector assembly.**
- **Appropriate force should be applied, when removing C-pillar upper protector assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing C-pillar upper protector assembly.**

(1) Remove the luggage compartment carpet assembly.

(2) Remove the luggage compartment storage box.

(3) Remove the rear seat cushion assembly.

(4) Remove the rear seatback assembly.

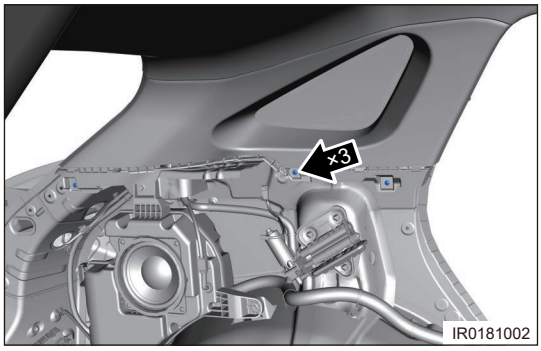
(5) Remove the rear door opening weatherstrip.

(6) Remove the rear doorsill pressure plate assembly.

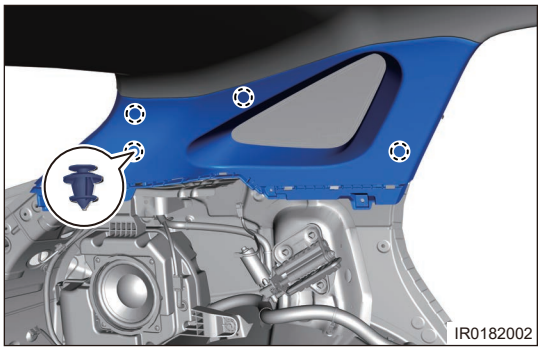
(7) Remove the back doorsill pressure plate assembly.

(8) Remove the luggage compartment rear left wheel house assembly.

(9) Remove 3 fixing screws from the lower part of C-pillar upper protector assembly.



(10) Using a interior crow plate, pry off fixing clips from C-pillar upper protector and remove C-pillar upper protector assembly.



■ **Installation**

⚠ Caution

- **Replace damaged clips and install C-pillar upper protector assembly in place, when installing C-pillar upper protector assembly.**
- **C-pillar upper protector assembly should be well fitted with roof headlining, after installing C-pillar upper protector assembly.**
- **C-pillar upper protector assembly and rear door opening weatherstrip should be fitted closely, after installing C-pillar upper protector assembly.**

(1) Tap fixing clips on C-pillar upper protector into the corresponding sheet metal holes in turn along all sides.

(2) Install 3 fixing screws to lower part of C-pillar upper protector assembly.

Torque: 1.5 ± 0.5 N · m

(3) Install the luggage compartment rear left wheel house assembly.

(4) Install the back doorsill pressure plate assembly.

(5) Install the rear doorsil pressure plate assembly.

(6) Install the rear door opening weatherstrip.

(7) Install the rear seatback assembly.

(8) Install the rear seat cushion assembly.

(9) Install the luggage compartment storage box.

(10) Install the luggage compartment carpet assembly.

3.14 Double-layer Sun Visor Assembly

■ **Removal**

Hint:

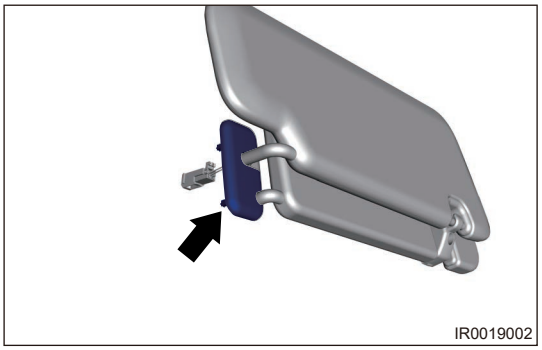
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

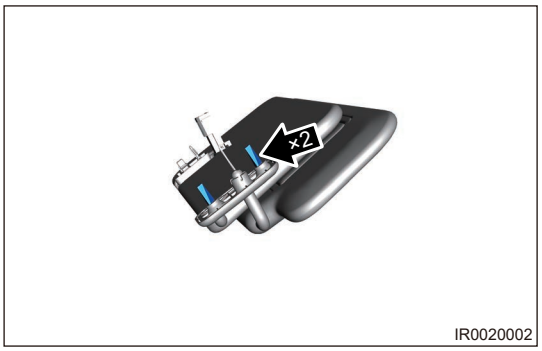
- **Be sure to wear safety equipment to prevent accidents, when removing double-layer sun visor assembly.**
- **Appropriate force should be applied, when removing double-layer sun visor assembly. Be careful not to operate roughly.**
- **Try to prevent interior and roof from being damaged, when removing double-layer sun visor assembly.**

Remove the left sun visor assembly.

(1) Using an interior crow plate, pry off trim cover from sun visor holder.

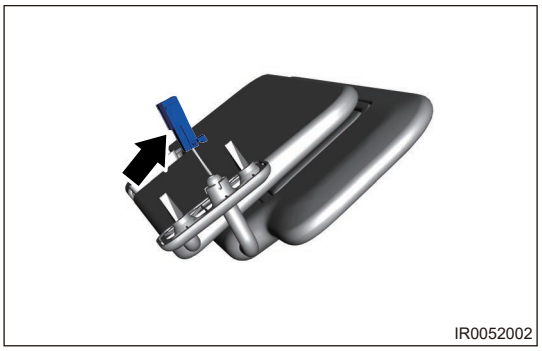

IR0019002

(2) Detach sun visor assembly from one side of the holder B, and remove 2 fixing screws from front left sun visor.



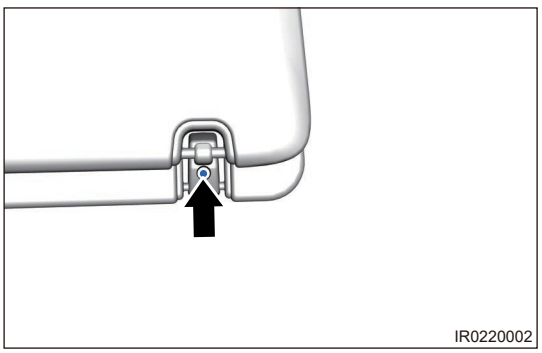
IR0020002

(3) Disconnect sun visor connector and remove sun visor assembly.


IR0052002

Remove the left sun visor holder B.

(4) Remove 1 fixing screw from sun visor holder B.


IR0220002

(5) Using a flat tip screwdriver wrapped with protective tape, pry off the left sun visor holder B.

■ **Installation**

⚠ Caution

- **During normal operation, sun visor should move normally without any noise, seizing, etc.**
- **Sun visor should be fixed by holder securely without any falling off during use.**
- **Mounting seat, holder should be well fitted with roof with appearance not being affected.**

Install the left sun visor holder B.

(1) Install the sun visor holder B to roof.

(2) Install 1 fixing screw to sun visor holder B.

Torque: 2 ± 0.5 N · m

Install the left sun visor assembly.

(1) Fix the left sun visor assembly holder in the body mounting hole with 2 bolts (for high configuration sun visors, connect the wire harness connectors before fixing the screws).

Torque: 5 ± 1 N · m

(2) Clamp the holder trim cover into holder.

(3) Insert the sun visor half shaft sleeve into the holder B normally, and then adjust the sun visor to make it in closed state.

3.15 Passenger Grip Assembly

■ **Removal**

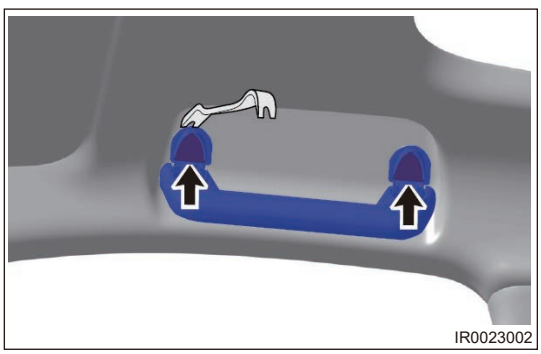
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.
- The installation method of front and rear passenger grips are same.

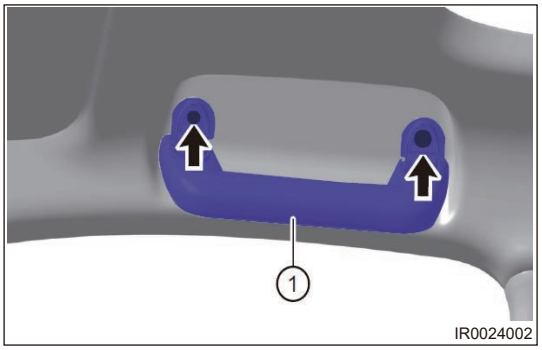
⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing passenger grip assembly.**
- **Appropriate force should be applied, when removing passenger grip assembly. Be careful not to operate roughly.**
- **Try to prevent interior and roof from being damaged, when removing passenger grip assembly.**

(1) Using an interior crow plate, pry off grip fixing screw block cover carefully.



(2) Using a cross screwdriver, remove 2 fixing screws from passenger grip assembly, and remove the front right passenger grip assembly.



■ **Installation**

⚠ Caution

- **After installation, check for looseness, neglected installation, etc.**
- **Grip should return normally without any noise during operation.**
- **Grip should be well fitted with roof and peripheral clearance should be even when it is not in use.**

(1) Install 2 fixing screws to passenger grip assembly.

Torque: 3 ± 0.5 N · m

(2) Install the fixing screw block cover to passenger grip assembly.

3.16 Curtain Assembly

■ **Removal**

(1) Put up the curtain.

(2) First apply force to press the right side along the direction of arrow, then remove the wheel house slot on the right side, and then remove the left side in direction of arrow.

■ **Installation**

⚠ Caution

- **Install from the left to the right, and remove from the right to the left.**
- **During installation, no jamming, noise, falling off and other phenomena are allowed. After installation, PVC curtain fabric is not allowed to wrinkle, collapse and other phenomena. After installation, the design state of the curtain is not pulled open.**

(1) Clip left end cover of curtain into slot on left side of luggage compartment protector.

(2) Apply force to press the right side along the direction of arrow, then place right outer seal cover into the corresponding slot of wheel house.

3.17 Luggage Compartment Carpet Assembly

■ Removal

(1) Lift the luggage compartment carpet grip and lift the rear end of luggage compartment carpet.

(2) Pull the luggage compartment carpet assembly backward and take it out.

■ Installation

⚠ Caution

- **Make sure that the left and right sides of luggage compartment carpet assembly are fitted in place, when installing luggage compartment carpet assembly.**
- **After installation, check whether the luggage compartment carpet is flat and free of wrinkles.**

(1) Put the luggage compartment carpet into luggage compartment, lap it on the luggage compartment storage box, and push it toward the front of vehicle until the carpet dowel pin is inserted into the hole of doorsill pressure plate.

3.18 Luggage Compartment Wheel House Assembly

■ Removal

Hint:

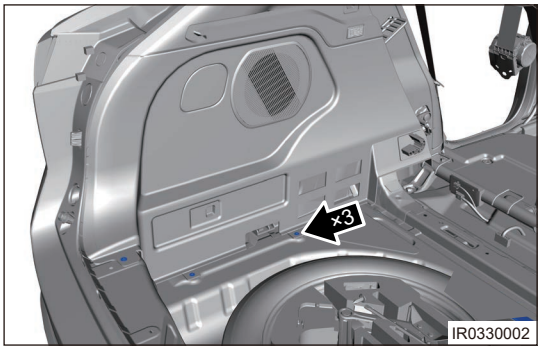
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

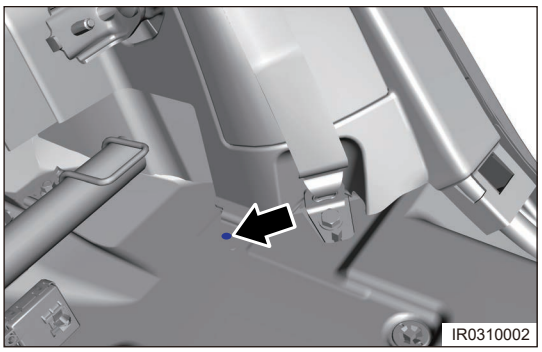
- **Be sure to wear safety equipment to prevent accidents, when removing luggage compartment wheel house assembly.**
- **Appropriate force should be applied, when removing luggage compartment wheel house assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing luggage compartment wheel house assembly.**

(1) Remove the luggage compartment carpet assembly.
(2) Remove the luggage compartment storage box.
(3) Remove the rear seat cushion assembly.
(4) Remove the rear seatback assembly.
(5) Remove the rear door opening weatherstrip.
(6) Remove the rear doorsill pressure plate assembly.
(7) Remove the back doorsill pressure plate assembly.

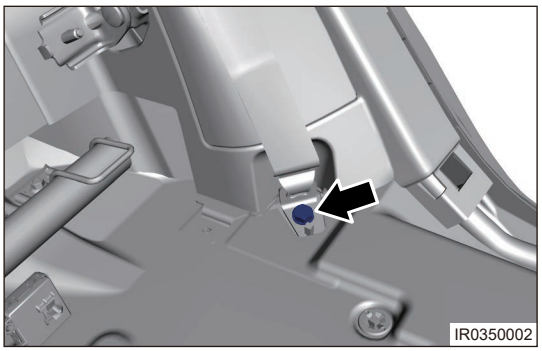
(8) Remove 3 fixing screws from lower end of luggage compartment left wheel house assembly.



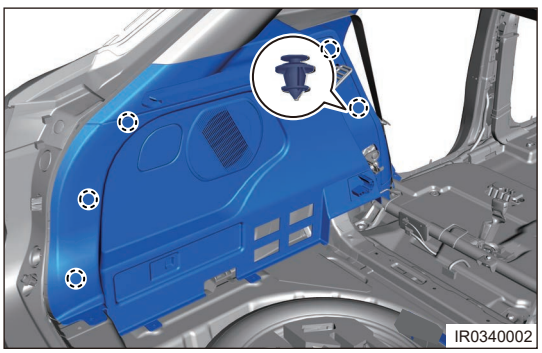
(9) Remove 1 fixing screw from lower end of luggage compartment left wheel house assembly.



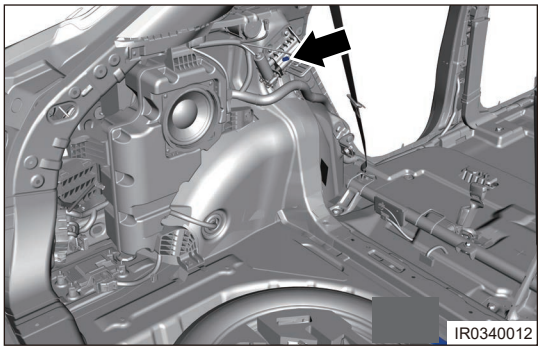
(10) Remove the seat belt fixing bolt.



(11) Using an interior crow plate, pry off clips from luggage compartment protector assembly, and separate luggage compartment left wheel house assembly from vehicle body.



(12) Disconnect luggage compartment light connector, and remove luggage compartment protector assembly.



■ **Installation**

⚠ Caution

- **After installation, check for looseness, neglected installation, etc.;**
- **Installation requirements for U-shaped groove: when installing weatherstrip, it is required to check whether U-shaped groove and sheet metal are attached. If not, press the protector to make it attach to sheet metal, and then install weatherstrip. After installing weatherstrip, check whether weatherstrip frame is stuck in U-shaped groove.**

(1) Connect the connector of luggage compartment light and clamp luggage compartment light into the corresponding hole of wheel house (This step is not performed on the right wheel house).
(2) Tap luggage compartment wheel house clips into sheet metal holes and C-pillar upper protector clip holes from front to back, and fix with the sheet metal and C-pillar upper protector.
(3) Install seat belt fixing bolt.

Torque: 50 ± 5 N · m

(4) Install 4 fixing screws in lower part of luggage compartment left wheel house assembly.

Torque: 1.5 ± 0.5 N · m

(5) Install the back doorsill pressure plate assembly.
(6) Install the rear doorsil pressure plate assembly.
(7) Install the rear door opening weatherstrip.
(8) Install the rear seatback assembly.
(9) Install the rear seat cushion assembly.
(10) Install the luggage compartment storage box.
(11) Install the luggage compartment carpet assembly.

3.19 Roof Assembly

■ **Removal**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing roof assembly.**
- **Appropriate force should be applied, when removing roof assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing roof assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the interior front dome light assembly.
(4) Remove the front door opening weatherstrip.
(5) Remove the rear door opening weatherstrip.
(6) Remove the back door opening weatherstrip.

(7) Remove the A-pillar upper protector assembly.

(8) Remove the B-pillar upper protector assembly.

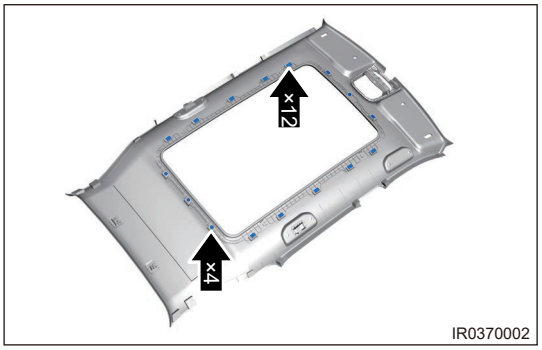
(9) Remove the C-pillar upper protector assembly.

(10) Remove the sun visor assembly.

(11) Remove the sun visor holder B.

(12) Remove the passenger grip assembly.

(13) Disconnect 12 magical buckles and 4 magnet clips from the ceiling and the roof evenly and downward.



(14) Remove the roof assembly.

■ **Installation**

⚠ Caution

- **After removing roof, first check its appearance for damage and scratch, and check if any accessories have fallen off. Confirm that there are no problems before installing it to the vehicle.**
- **The position of sun visor, passenger grip and roof clip installation hole should correspond to the position of body mounting hole to ensure that the sun visor, passenger grip and fixing clip are installed in place without affecting the appearance;**
- **The edge of roof and door opening weatherstrip should be well matched, and phenomenon of exposed roof corners and loose edge pressing is not allowed. The corners of roof are not allowed to be upturned or sunken, which leads to uneven assembly of the door opening weatherstrip.**
- **Roof should be well matched with A, B, C pillars upper protector.**
- **Roof should be well matched with interior dome light.**

(1) 2. Two people hold each end of roof and carefully put the rear end of roof into the vehicle from front windshield.

(2) Connect sun visor vanity light wire harness connector and fix the vanity light on the roof.

(3) Install holder B in front right side of roof assembly.

(4) Install holder B in front left side of roof assembly.

(5) Install the interior front dome light assembly.

(6) Appropriately press the corresponding roof profile of mushroom buckles in sliding roof area to make the mushroom buckle stick tightly on the sliding roof.

(7) Install the B-pillar upper protector assembly.

(8) Install the passenger grip assembly.

(9) Install the C-pillar upper protector assembly.

(10) Install the A-pillar upper protector assembly.

(11) Install the back door opening weatherstrip.

(12) Install the rear door opening weatherstrip.

(13) Install the front door opening weatherstrip.

(14) Install the sun visor assembly.

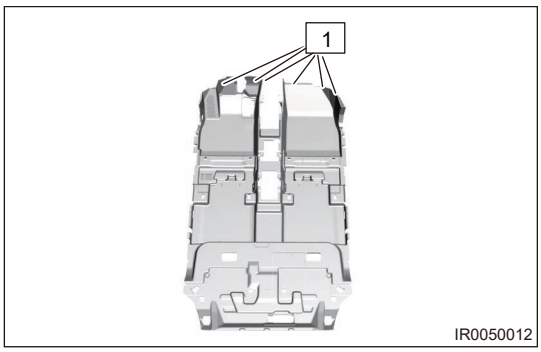
3.20 Front Floor Carpet Assembly

■ Removal

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing front floor carpet assembly.**
- **Appropriate force should be applied, when removing front floor carpet assembly. Be careful not to operate roughly.**
- **Prevent interior and body paint from being scratched, when removing front floor carpet assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the auxiliary fascia console assembly.
(4) Remove the front seat assembly.
(5) Remove the rear seat assembly.
(6) Remove the front doorsill pressure plate assembly.
(7) Remove the front door opening weatherstrip.
(8) Remove the rear doorsill pressure plate assembly.
(9) Remove the rear door opening weatherstrip.
(10) Remove the A-pillar lower protector assembly.
(11) Remove the B-pillar lower protector assembly.
(12) Loosen 6 magical buckles (1) at the front of carpet.



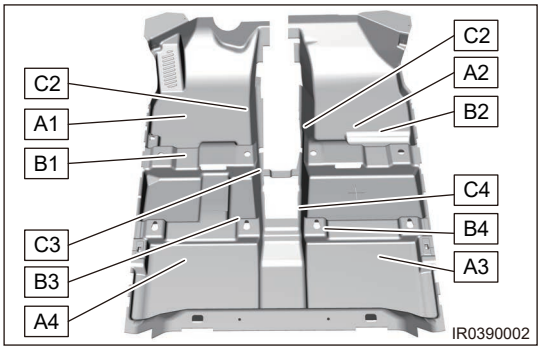
(13) Remove the front carpet assembly.

■ Installation

⚠ Caution

- **After placing the carpet, check if seat and seat belt are centered. If the condition is not satisfied, adjust the carpet to ensure that holes are centered.**
- **Duct outlet must be exposed from carpet surface;**
- **After assembly, carpet surface must be even without bumps, wrinkles and unevenness, especially front carpet double lock must be fitted in place;**
- **During assembly, it is not allowed to trample on areas without protective film on the surface of the carpet, resulting in dirt, wrinkles, and collapses of the carpet;**
- **Overlap between rear carpet and front floor carpet should be fitted without gap.**

(1) Remove 1 front floor carpet assembly make A1/A2 surface fit the floor sheet metal to restrict the movement of the carpet in Z direction. Then, pass A/C pipe through the gap in the carpet and install it. Then, make the B1 and C1 surfaces fit the seat crossmember and the center passage damping pad surfaces to restrict the movement of the carpet in X and Y directions. Install the double lock to the front baffle internal damping pad without evenness.



(2) Install B-pillar lower protector assembly.
(3) Install A-pillar lower protector assembly.
(4) Install the rear door opening weatherstrip.
(5) Install the rear doorsill pressure plate assembly.
(6) Install the front door opening weatherstrip.
(7) Install the front doorsill pressure plate assembly.
(8) Install the rear seat assembly.
(9) Install the front seat assembly.
(10) Install the auxiliary fascia console assembly.
(11) Connect the negative battery cable.

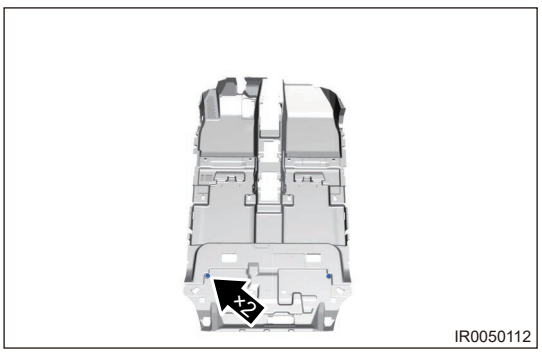
3.21 Rear Carpet Assembly

■ Removal

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when removing rear carpet assembly.**
- **Appropriate force should be applied when removing rear carpet assembly. Be careful not to operate roughly.**
- **Prevent interior and body paint from being scratched, when removing rear carpet assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the luggage compartment carpet assembly.
(4) Remove the luggage compartment storage box.
(5) Remove the rear seat cushion assembly.
(6) Remove the rear seatback assembly.
(7) Remove the rear door opening weatherstrip.
(8) Remove the rear doorsill pressure plate assembly.
(9) Remove the back doorsill pressure plate assembly.
(10) Remove the luggage compartment wheel house assembly.
(11) Remove 2 clamping washers from rear carpet assembly.



(12) Remove the rear carpet assembly.

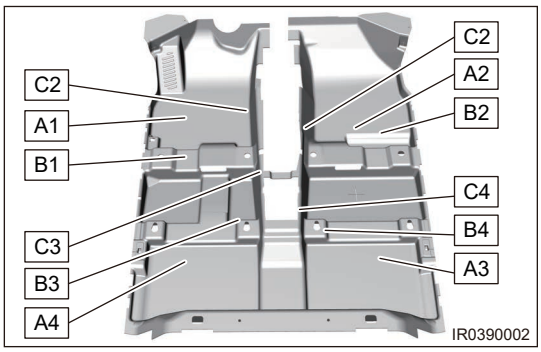
■ **Installation**

⚠ Caution

- **After placing the carpet, check if seat and seat belt are centered. If the condition is not satisfied, adjust the carpet to ensure that holes are centered.**
- **Duct outlet must be exposed from carpet surface;**
- **After assembly, carpet surface must be even without bumps, wrinkles and unevenness, especially front carpet double lock must be fitted in place;**
- **During assembly, it is not allowed to trample on areas without protective film on the surface of the carpet, resulting in dirt, wrinkles, and collapses of the carpet;**
- **Overlap between rear carpet and front floor carpet should be fitted without gap.**

(1) Remove 1 rear carpet assembly, pass left/right feet duct through the carpet surface and adjust it, make A3/A4 surface fit the floor sheet metal to restrict the movement of the carpet in Z direction. Then, pass carpet through the seat mounting bracket and adjust the carpet. Then, make B3/B4 and C3/C4 surfaces fit the seat crossmember and the center passage damping pad surfaces to restrict the movement of the carpet in X and Y directions;

(2) Tighten rear carpet assembly with 2 clamping washers.



(3) Install the luggage compartment wheel house assembly.

(4) Install the back doorsill pressure plate assembly.

(5) Install the rear doorsil pressure plate assembly.

(6) Install the rear door opening weatherstrip.

(7) Install the rear seatback assembly.

(8) Install the rear seat cushion assembly.

(9) Install the luggage compartment storage box.

(10) Install the luggage compartment carpet assembly.

(11) Connect the negative battery cable.

3.22 Luggage Compartment Storage Box

■ **Removal**

⚠ Caution

- **Be sure to wear necessary safety equipment to prevent accidents, when removing luggage compartment storage box.**
- **Appropriate force should be applied when removing luggage compartment storage box. Be careful not to operate roughly.**
- **Try to prevent interior and body paint from being damaged, when removing luggage compartment storage box.**

(1) Remove the luggage compartment carpet assembly.

(2) Remove the luggage compartment storage box.

■ **Installation**

(1) Place the luggage compartment storage box into vehicle in Z direction.

(2) Install the luggage compartment carpet assembly.

1.5 SEAT

1 Warnings and Precautions

1.1 Precautions

Precautions for Seat Assembly

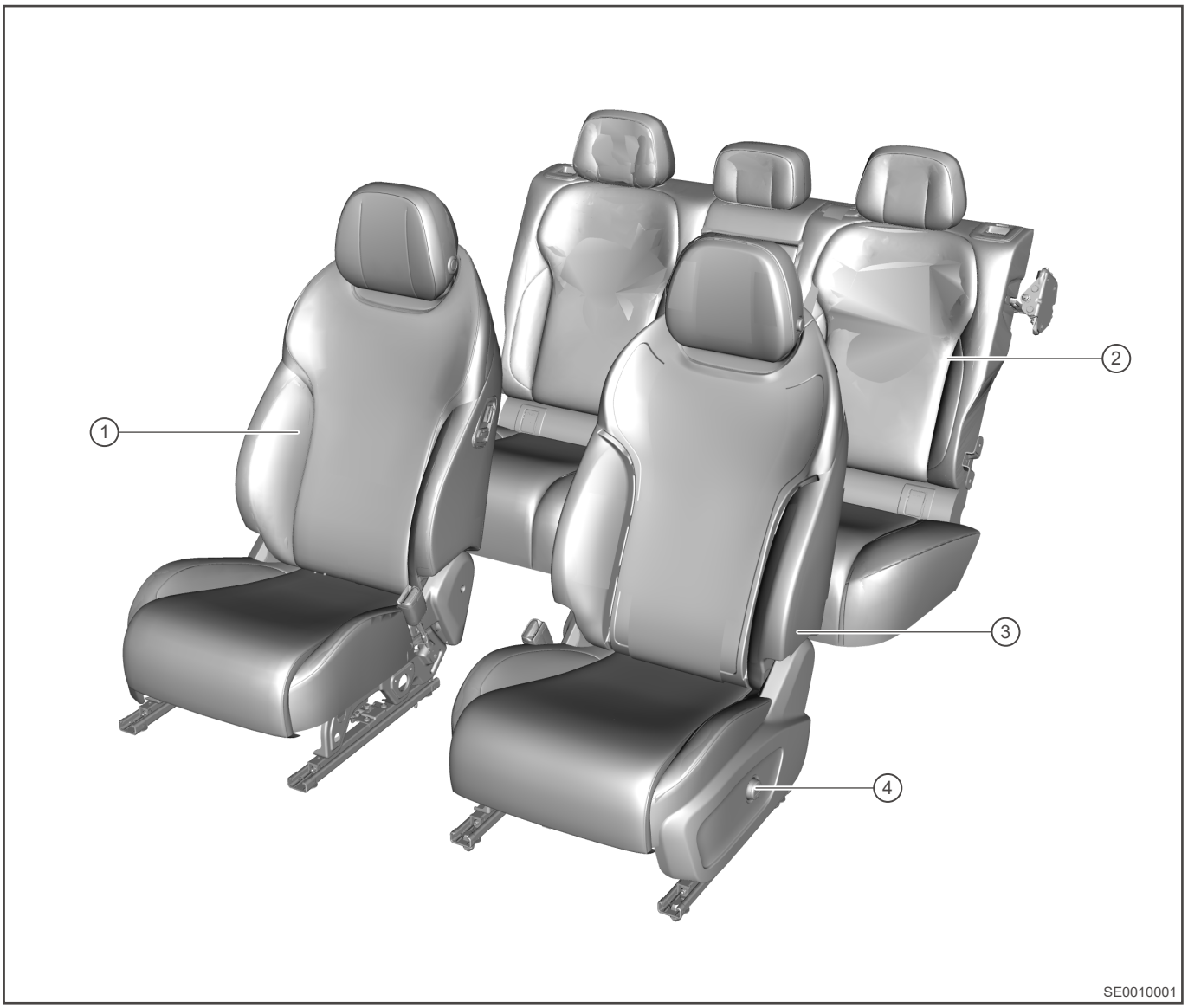
(1) The whole set of seat fabric has no obvious wrinkles and wear caused by installation;

(2) It is not necessary to remove the plastic protective film provided by the seat during the assembly process so as to protect the seat;

(3) Assembly methods of driver seat and front passenger seat are the same, and there is no difference in the assembly methods of all configured seats. It should be noted that the wire harness installation methods are different in each configuration.

2 System Overview

2.1 System Components Diagram



1	Front Passenger Seat Assembly	3	Driver Seat Assembly
2	Rear Seat Assembly	4	Lumbar Support Adjustment Switch

- Front seat assembly can be moved forward and backward by front-back adjustment switch, and can be moved upward and downward by seat height adjustment switch (for driver side power seat), and seatback inclination angle can be adjusted by seatback adjustment switch.

2.2 Usage Description of Seat Control Module (SCU) Seat Memory Function

■ Seat Memory Function (If Equipped)

(1) Seat position memory:

1)First adjust to seat to the desired storage position, and then long press the M button next to the seat adjustment switch for 1 second. After a "boom" sound is heard, long press 1 button or 2 button/3 button below the M button for 1 second. If the instrument cluster displays that the memory position has been completed, this position has been stored in the corresponding button that has been pressed.

2)During adjusting seat, head unit large display pops up a dialog box that whether to save the current position to driving position, leisure position, backup position. Long press to update and save the memory position, and short press to recall the memory position.

(2) Seat position recall:

1)When you need recall the seat memory position (current smart key ID), long press 1 button or 2 button/3 button to move the seat to the position remembered. Or click driving position, leisure position or backup position on head unit setting screen to move the seat to the position remembered.

⚠ Caution

- **2 smart keys equipped with vehicle are 2 smart key IDs to unlock and identify ID source. If the binding of position memory and key is turned off, door protector hard switch memory function can be used normally, and memory function on head unit large display cannot be used.**
- **3 memory positions on door protector are not associated with 3 memory positions on large display, and 6 different positions are supported.**
- **For face recognition and key ID auto recall memory position, driving position on head unit large display is recalled first. (If the function is equipped)**

(3) Seat convenient access function:

1) Switch ENGINE START STOP switch from ON mode to OFF mode. Open driver side door, the driver seat moves backward for a certain distance automatically so that the driver can exit the vehicle easily.

2) Switch ENGINE START STOP switch from OFF mode to ACC mode. The driver seat moves forward for a certain distance automatically so that the driver can enter the driving position easily.

⚠ Caution

- **When starting engine, vehicle current is excessive, it is not allowed to adjust the seat. Therefore, this function is invalid when engine is started directly with ENGINE START STOP switch OFF.**
- **When the binding of seat position memory and key/seat convenient access function are turned on, make sure that no one is caught. If someone is caught, move seat adjustment button to stop the operation of seat convenient access function. Do not leave children in vehicle alone, they may be caught due to mis-operation of seat convenient access function.**

■ Outside Rear View Mirror Memory Function (If Equipped)

(1) Outside rear view mirror memory:

1)Outside rear view mirror memory and seat position memory are saved and recalled simultaneously, and the operating methods are same, please refer to the seat memory function in previous section.

(2) Outside rear view mirror auto turning-down function when reversing (set once by the user manually)

1)When turning on large display setting item, outside rear view mirror turns down automatically when reversing. When reversing (transmission is in R), adjust rear view mirror downward to the angle that is easy for the user to reverse the vehicle, exit R position after adjustment, the position is saved automatically. Whenever shifting to R position in the future, rear view mirror will automatically adjust to the saved position.

2)After the function is turned on, whenever adjusting rear view mirror manually in R gear, the update will be automatically saved after exiting.
3)Outside rear view mirror auto turning-down function when reversing will return to the position before turning down in the following conditions:
4)When exiting R position.
5)When vehicle speed is higher than 10 km/h.
6)When ENGINE START STOP switch is turned to OFF.

2.3 Seat Control Module After-Sales Replacement Parameter Flashing and Self-Learning Operation Steps and Precautions

■ SCU after-sales replacement operation steps and precautions are as follows:

(1) Operation steps for after-sales replacement:

1) After unlocking, enter the vehicle and disconnect battery positive terminal:
2) Refer to repair manual, replace SCU according to removal and installation steps;
3) Connect battery positive terminal; turn the vehicle power to ON;
4) Open storage box on left side of instrument panel ,and connect the fault diagnostic tester and diagnostic interface;
5) Read the replaced SCU software version number by diagnostic tester, compare the read software version number;
6) Write the configuration file in accordance with operating process of diagnostic tester (see attachment for details); Prompt whether the read configuration file version is consistent with the requirements after writing successfully (XML file is subject to the one issued by EXEED);

(2) After-sales inspection after replacement:

1) Turn the vehicle power to ON, check the following functions:

Table 1 Function Inspection Table

No.	Inspection Items	Inspection Method	Correct Result	Note
1	Seat Learning	A. First clear initialization by diagnostic tester.		
B. The seat starts to move after operating seat automatic learning interface on diagnostic tester	Observe if seat height axis, horizontal axis, seatback axis move automatically until it stops at blocking position	During seat self-learning, do not operate the seat manually		
2	Manual Adjustment	A. Manually press front and rear adjustment switch		
B. Manually press up and down adjustment switch				
C. Manually press front and rear adjustment switch of seatback	Observe whether height axis, horizontal axis, seatback axis are normal during adjustment			

3	Position recall	A. The vehicle power is in ON, switch IHU interface to personalized seat interface, save a position B. Recall this position after adjusting seat and rear view mirror	Observe whether seat and rear view mirror move to the recalling position.	
4	Seat heating function	A. Start engine;		
B. Press seat heating switch on air conditioner operation panel, press it three times in succession, with an interval of more than 2 seconds each time	Press the switch once, 2 indicators on the switch should come on; press it twice, 1 indicator on the switch should come on, press it three times, 2 indicators on the switch should go off;			
5	Seat Ventilation Function	A. Start engine;		
B. Press seat ventilation switch on air conditioner operation panel, press it three times in succession, with an interval of more than 2 seconds each time	Press the switch once, 2 indicators on the switch should come on; press it twice, 1 indicator on the switch should come on, press it three times, 2 indicators on the switch should go off;			
6	Outside rear view mirror turns down when reversing	A. Start the engine;		
B. Shift to R	Observe whether the mirror surface of rear view mirror is turned down	The rear view mirror to be turned down can be selected in the vehicle settings screen		
7	DTC check	A. First clear DTC and then read the related DTC for seat	There is no related DTC for seat	

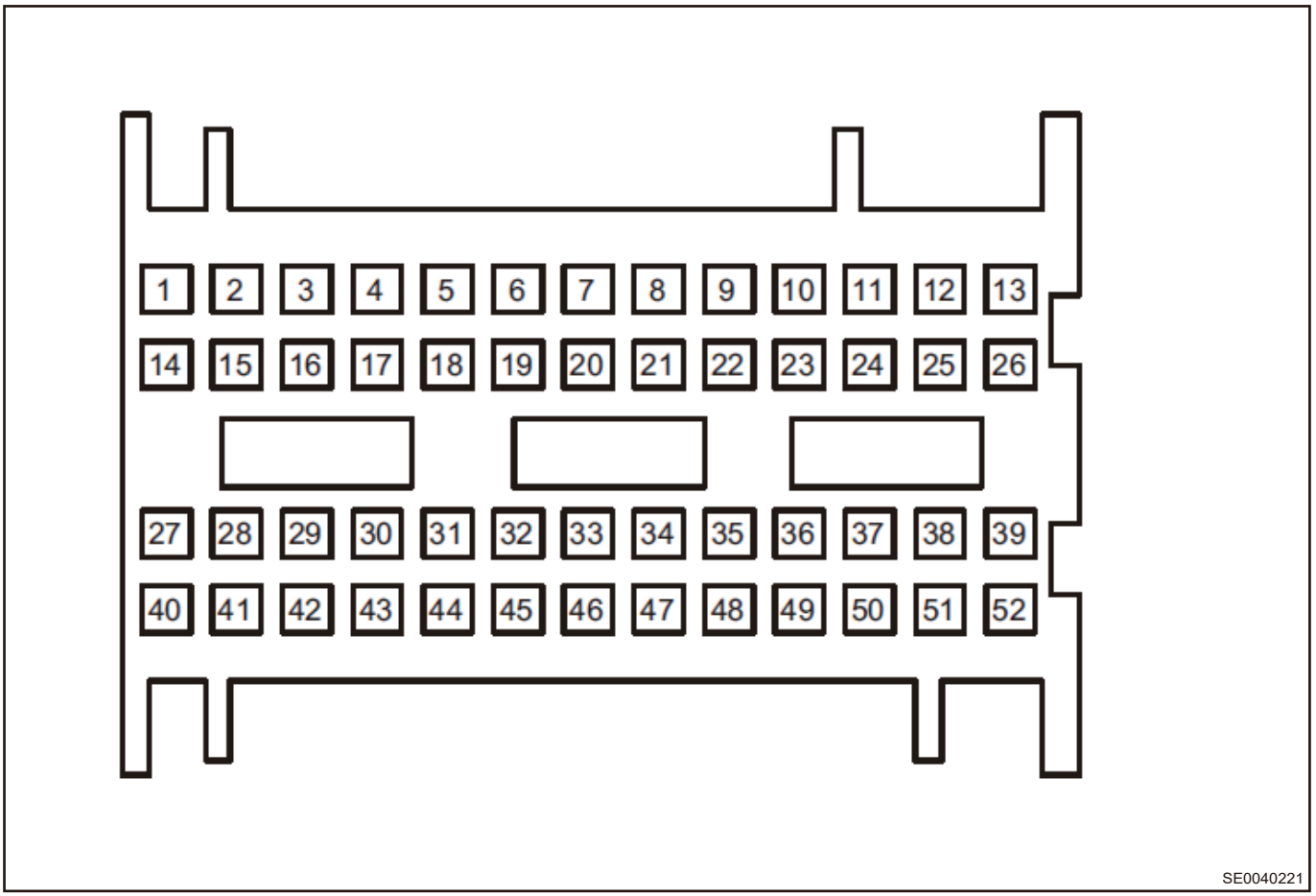
(3) Precautions:

1) The version number is "00.01.01" after the SCU after-sales replacement;
2) During testing after replacement, keep sufficient vehicle battery power (voltage needs to be greater than 11.5 V), otherwise the seat adjustment may not operate due to low voltage;
3) During after-sales replacement, keep the vehicle current state and do not operate other functions;
4) If a malfunction is found during function inspection, repair the malfunction according to repair manual;
5) When checking seat heating or ventilation function, after starting engine, do not operate shift lever and electronic parking brake, keep gear position at P position and electronic parking brake is pulled;

6) After checking seat heating or ventilation function and engine stalls, check that power state is in OFF (indicator on ignition switch goes off);

3 System Circuit Diagram

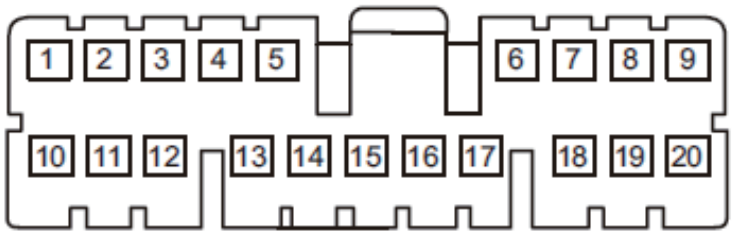
3.1 Seat Controller-1 Terminal Definition



Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1-1	IGN_IN	1-27	Rear view mirror position sensor ground
1-2	Height adjustment input (reserved)	1-28	Reserved low drive
1-3	Horizontal adjustment input (reserved)	1-29	Reserved low drive
1-4	Seatback adjustment input (reserved)	1-30	Reserved input
1-5	Seat cushion adjustment input (reserved)	1-31	Foot rest adjustment HALL input
1-6	Leg rest up and down adjustment input (reserved)	1-32	Leg rest adjustment HALL input
1-7	Foot rest up and down adjustment input (reserved)	1-33	Height adjustment HALL input
1-8	Reserved memory switch	1-34	Horizontal adjustment HALL input
1-9	Memory setting M & memory switch 1/2/3 (reserved)	1-35	Seatback adjustment HALL input

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1-10	Right rear view mirror position sensor horizontal input	1-36	Seat cushion adjustment HALL input
1-11	Left rear view mirror position sensor horizontal input	1-37	Right rear view mirror vertical adjustment output
1-12	Right rear view mirror position sensor vertical input	1-38	Right rear view mirror horizontal adjustment output
1-13	Left rear view mirror position sensor vertical input	1-39	Right rear view mirror adjustment common terminal
1-14	Rear view mirror adjustment sensor power supply	1-40	Ventilation PWM output (reserved)
1-15	Reserved HALL power supply	1-41	Ventilation PWM output (reserved)
1-16	Front right NTC input	1-42	Front left ventilation PWM output
1-17	Front left NTC input	1-43	Front right ventilation PWM output
1-18	Reserved	1-44	HALL signal ground
1-19	Analog ground (reserved)	1-45	Front left NTC ground
1-20	Rear view mirror adjustment switch (up adjustment and right adjustment) (reserved)	1-46	Front right NTC ground
1-21	Rear view mirror adjustment left/right selection switch (reserved)	1-47	Communication
1-22	Rear view mirror adjustment switch (left adjustment and down adjustment) (reserved)	1-48	Communication
1-23	Reserved	1-49	Reserved
1-24	Reserved	1-50	Left rear view mirror horizontal output
1-25	Reserved input	1-51	Left rear view mirror adjustment common terminal
1-26	Rear view mirror adjustment switch (5th) (reserved)	1-52	Left rear view mirror vertical output

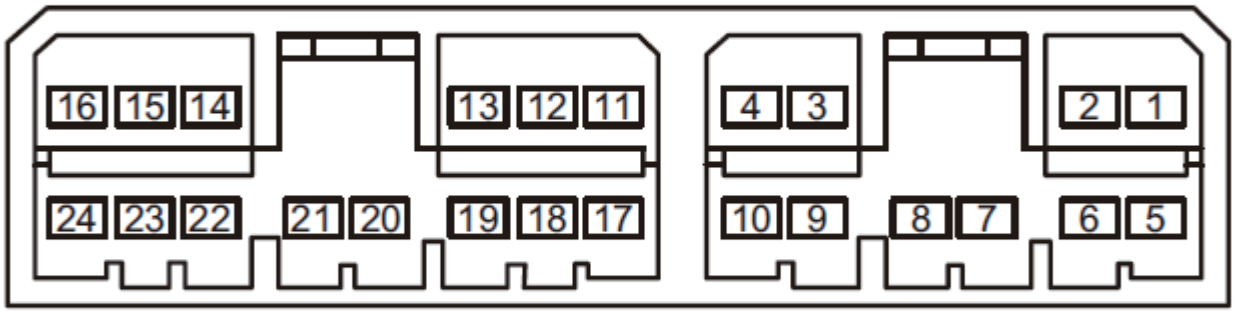
3.2 Seat Controller-2 Terminal Definition



SE0040231

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
2-1	Front right seat heating-	2-11	seatback/cushion adjustment common terminal
2-2	Leg rest adjustment	2-12	Seatback adjustment output
2-3	Leg rest adjustment	2-13	Seat cushion adjustment output
2-4	Left rear view mirror selection indicator (reserved)	2-14	Power Supply 2
2-5	Right rear view mirror selection indicator (reserved)	2-15	Ground
2-6	Foot rest adjustment (reserved)	2-16	Ground
2-7	Foot rest adjustment (reserved)	2-17	Power Supply 1
2-8	Front left seat heating-	2-18	Height adjustment output
2-9	Front left seat heating+	2-19	Horizontal adjustment output
2-10	Front right seat heating+	2-20	Height/horizontal adjustment common terminal

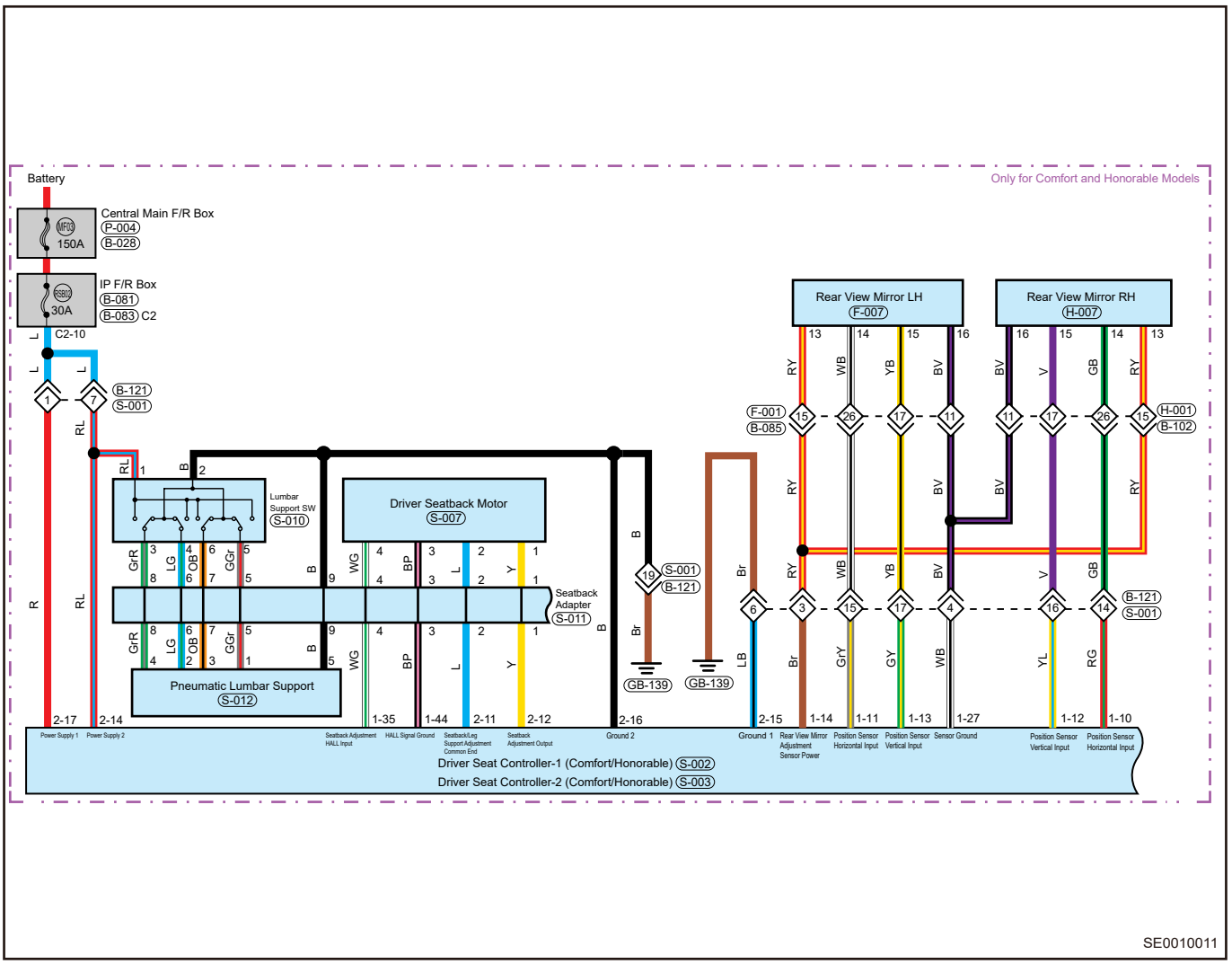
3.3 Front Passenger Seat Controller Terminal Definition

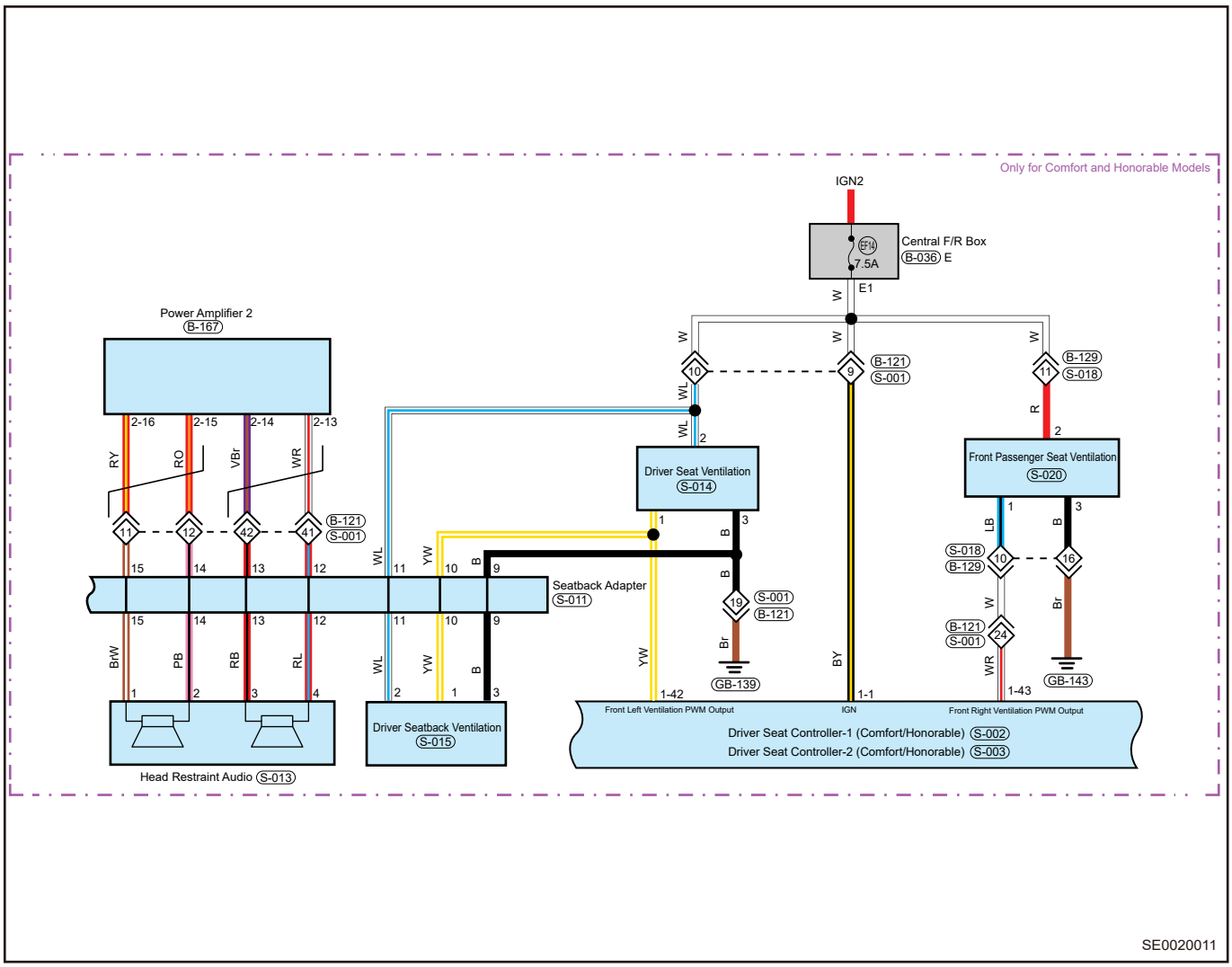


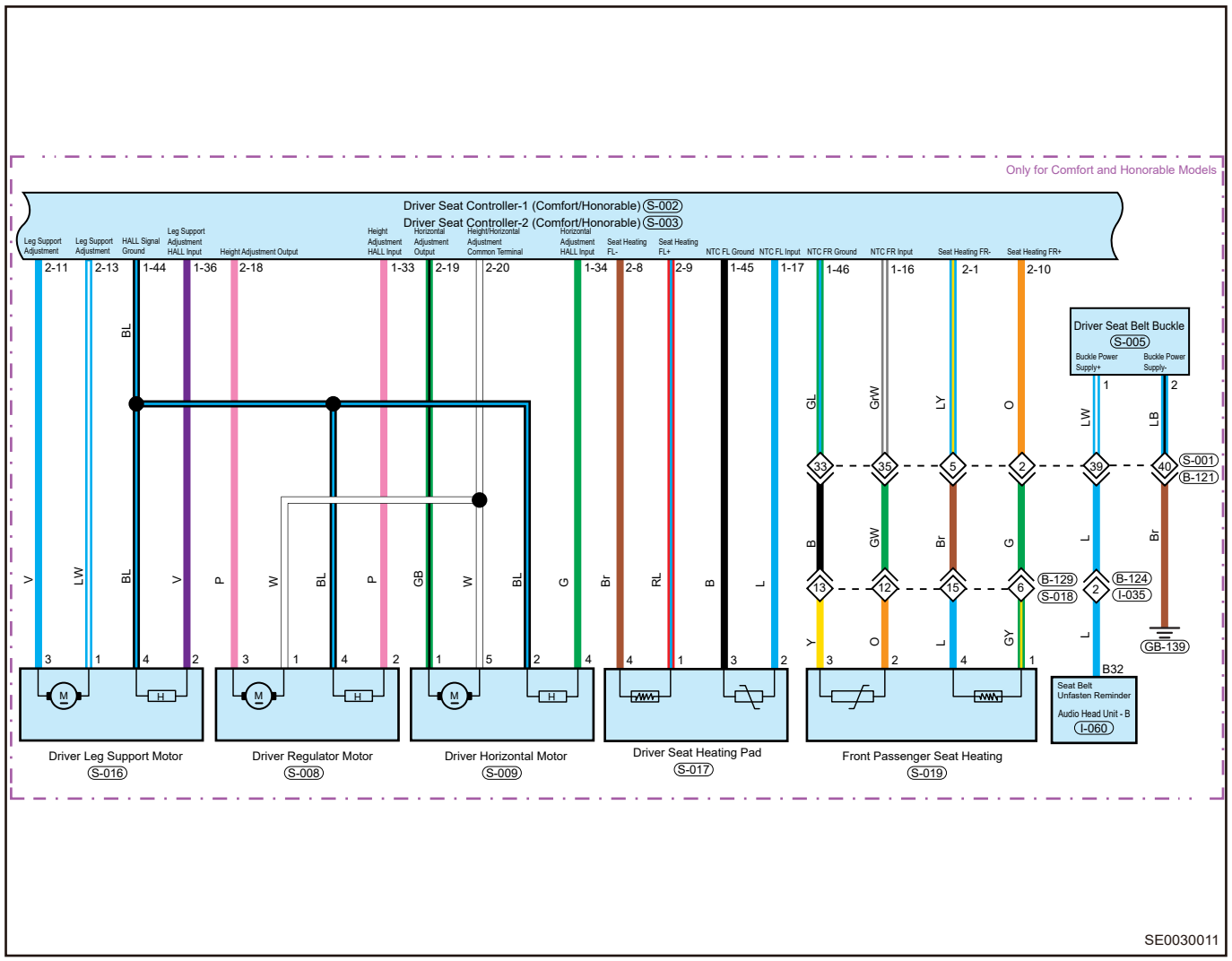
SE0040231

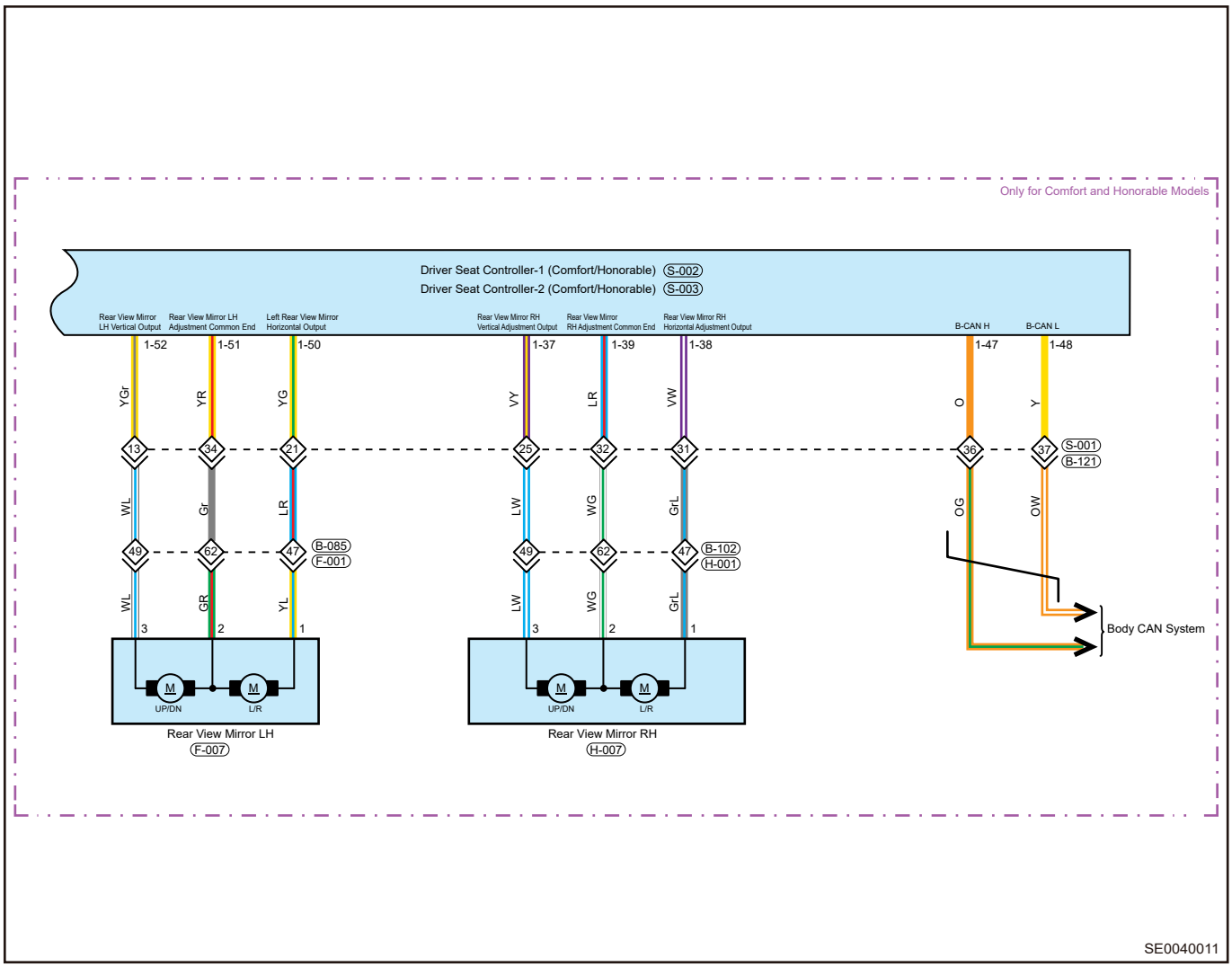
Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	Foot rest adjustment output UP	13	Height adjustment - up
2	V-BAT-2	14	Horizontal adjustment - front
3	Leg rest/foot rest adjustment common terminal DOWN	15	V-BAT-1
4	GND	16	Seatback adjustment - back
5	Leg rest adjustment output UP	17	Coding2-IN
6	Seat front-back, up-down adjustment	18	Foot rest switch input
7	Boss button front-back, up-down adjustment	19	Leg rest switch input
8	Seatback angle front-back adjustment	20	Reserved LIN
9	Front-back adjustment of boss button seatback angle	21	CAN-L
10	Coding1-IN	22	CAN-H
11	Seat horizontal/height adjustment common terminal - down/back	23	AGND
12	GND	24	Seatback adjustment - front

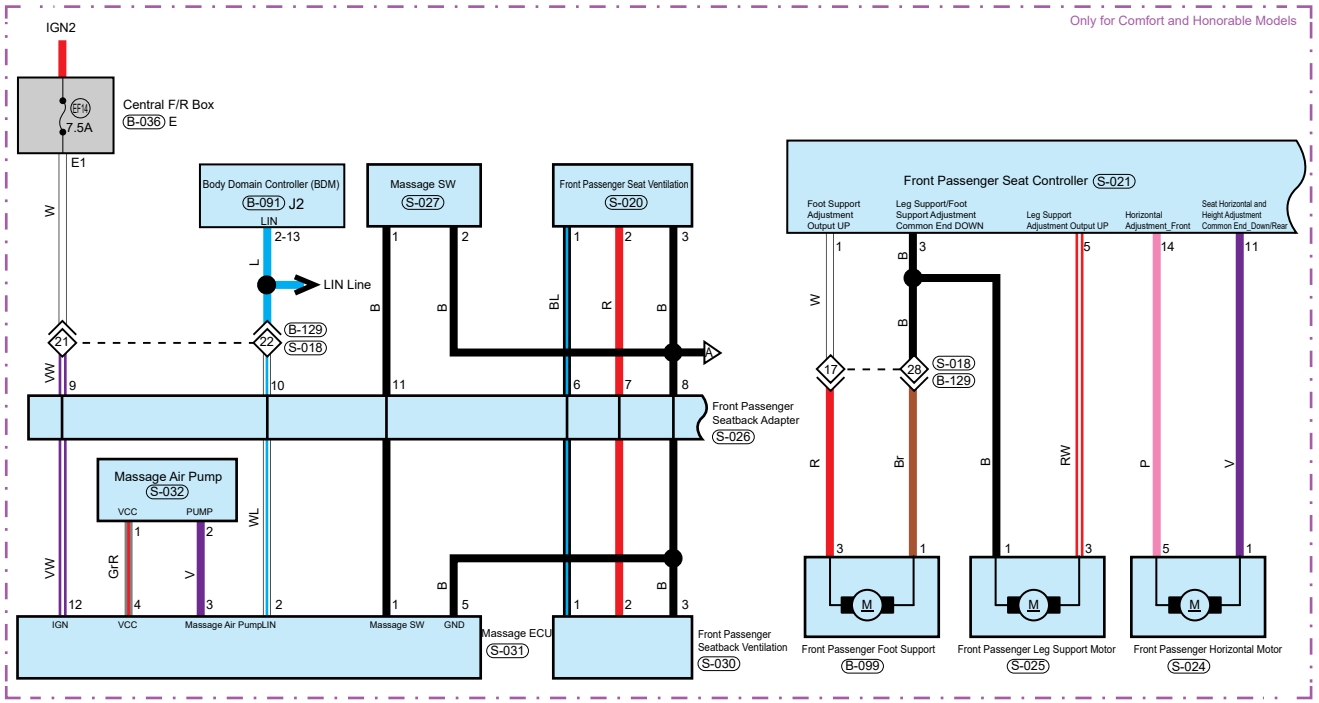
3.4 Circuit Diagram

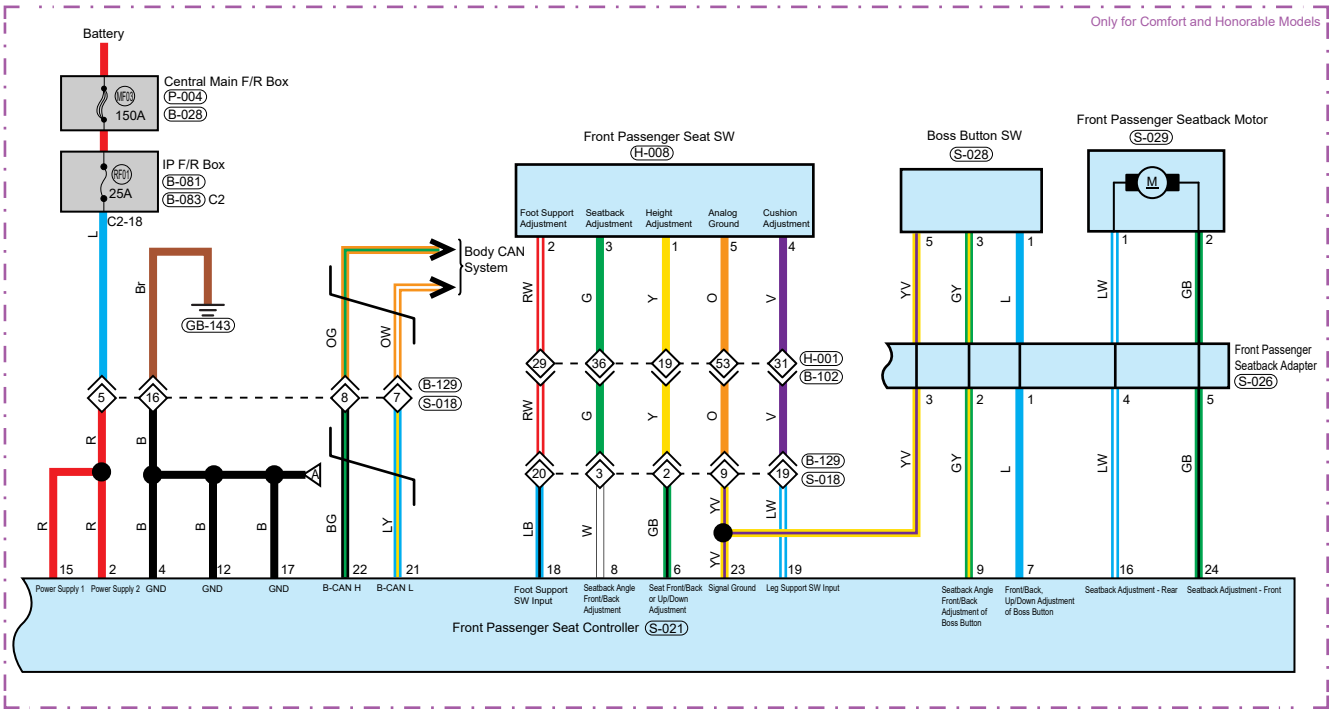


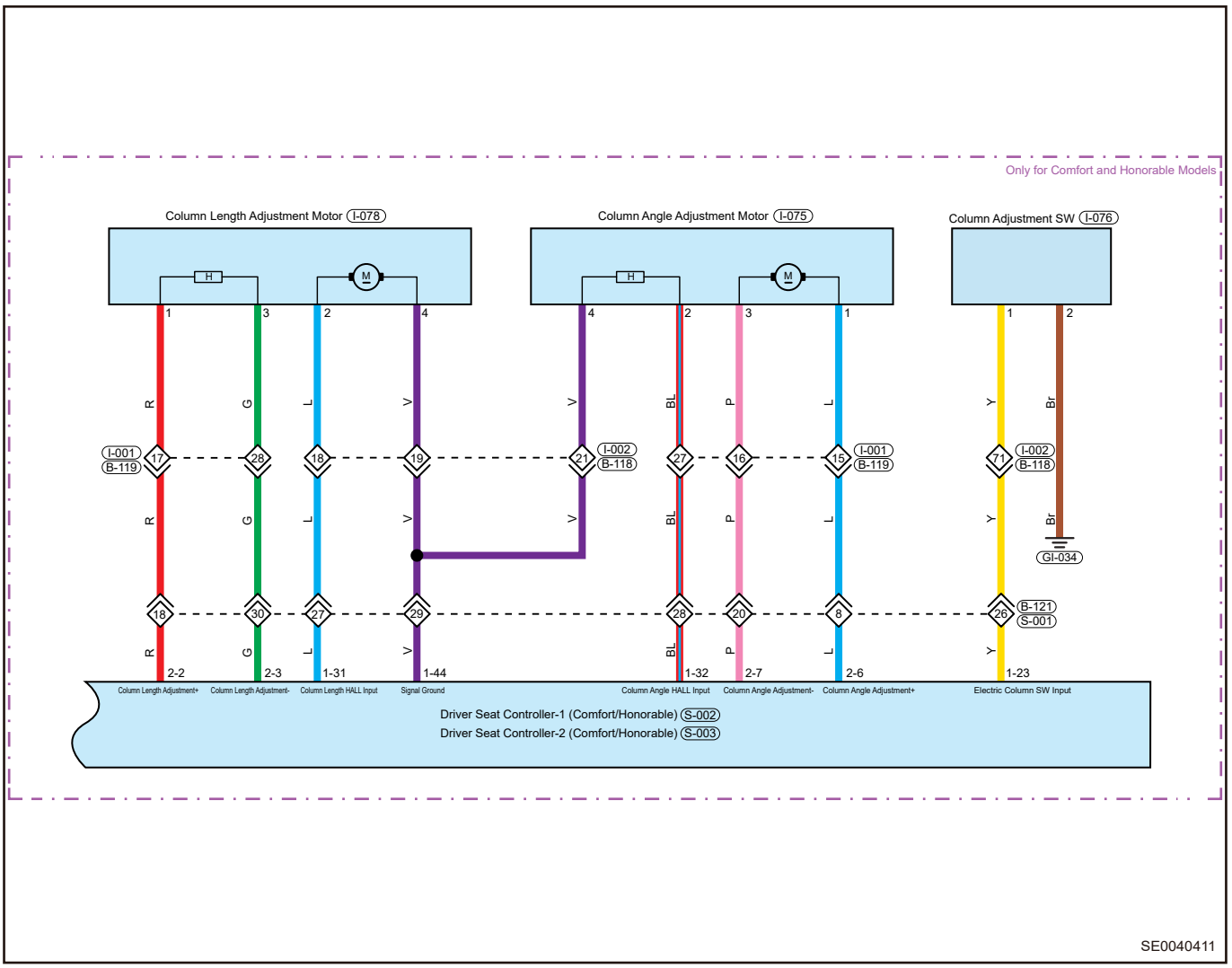

Only for Comfort and Honorable Models
IGN2
Central F/R Box
B-036 E
7.5A
E1
Power Amplifier 2
B-167
2-16
2-15
2-14
2-13
RY
RO
VBr
WR
B-121
S-001
Driver Seat Ventilation
S-014
Front Passenger Seat Ventilation
S-020
B-129
S-018
Seatback Adapter
S-011
S-001
B-121
GB-139
GB-143
Driver Seatback Ventilation
S-015
Head Restraint Audio
S-013
Front Left Ventilation PWM Output
IGN
Front Right Ventilation PWM Output
Driver Seat Controller-1 (Comfort/Honorable)
S-002
Driver Seat Controller-2 (Comfort/Honorable)
S-003
SE0020011

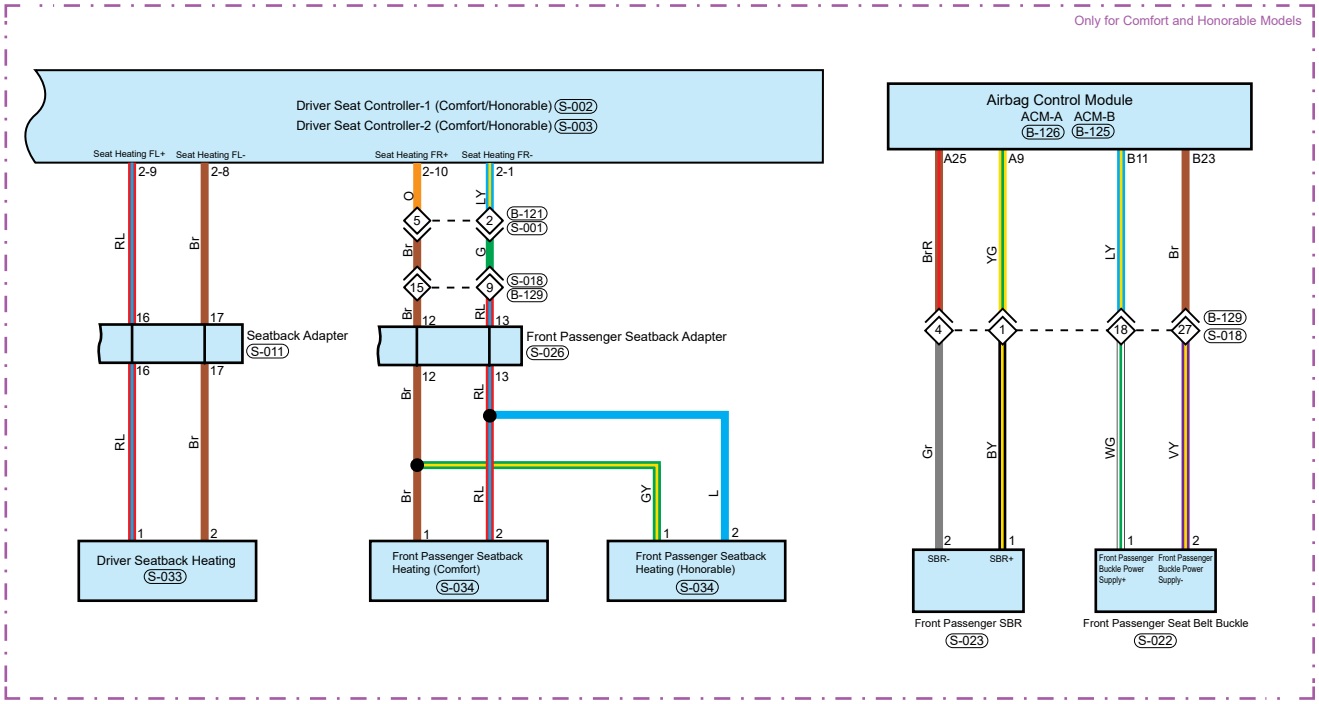

Only for Comfort and Honorable Models
Driver Seat Controller-1 (Comfort/Honorable) S-002
Driver Seat Controller-2 (Comfort/Honorable) S-003
Leg Support Adjustment
Leg Support Adjustment
HALL Signal Ground
Leg Support Adjustment HALL Input
Height Adjustment Output
Height Adjustment HALL Input
Horizontal Adjustment Output
Height/Horizontal Adjustment Common Terminal
Horizontal Adjustment HALL Input
Seat Heating FL-
Seat Heating FL+
NTC FL Ground
NTC FL Input
NTC FR Ground
NTC FR Input
Seat Heating FR-
Seat Heating FR+
2-11 2-13 1-44 1-36 2-18 1-33 2-19 2-20 1-34 2-8 2-9 1-45 1-17 1-46 1-16 2-1 2-10
V LW BL V P W BL P GB W BL G Br RL B L GL GW LY O LW LB
33 35 5 2 39 40
B GW Br G L Br
13 12 15 6 2
Y O L GY L
B-129 S-018 B-124 I-035 S-001 B-121 GB-139
Driver Seat Belt Buckle S-005
Buckle Power Supply+
Buckle Power Supply-
1 2
B32
Seat Belt Unfasten Reminder
Audio Head Unit - B I-060
3 1 4 2 3 1 4 2 1 5 2 4 4 1 3 2 3 2 4 1
M H
Driver Leg Support Motor S-016
Driver Regulator Motor S-008
Driver Horizontal Motor S-009
Driver Seat Heating Pad S-017
Front Passenger Seat Heating S-019
SE0030011

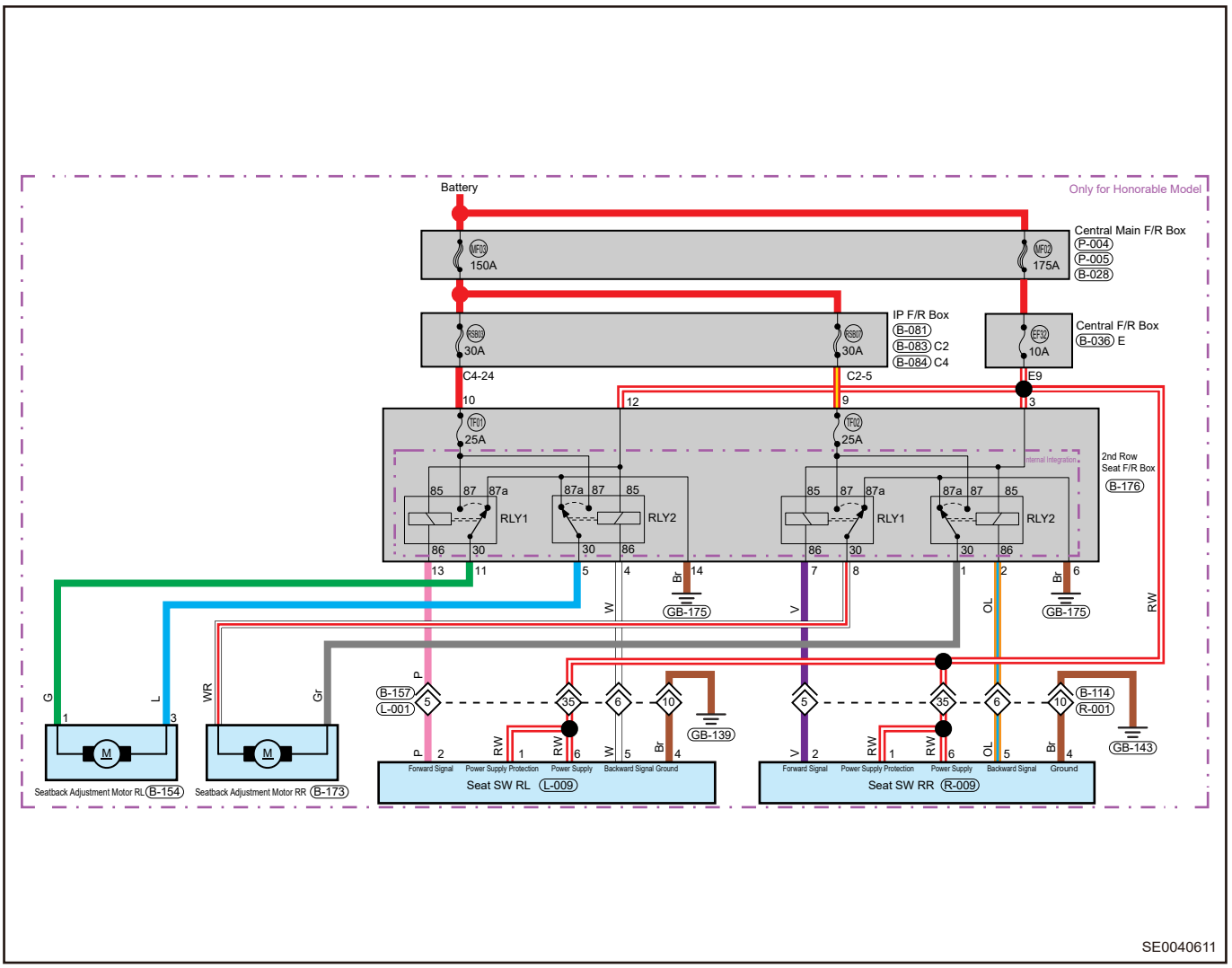

Only for Comfort and Honorable Models
Driver Seat Controller-1 (Comfort/Honorable) S-002
Driver Seat Controller-2 (Comfort/Honorable) S-003
Rear View Mirror LH Vertical Output
Rear View Mirror LH Adjustment Common End
Left Rear View Mirror Horizontal Output
Rear View Mirror RH Vertical Adjustment Output
Rear View Mirror RH Adjustment Common End
Rear View Mirror RH Horizontal Adjustment Output
B-CAN H
B-CAN L
1-52
1-51
1-50
1-37
1-39
1-38
1-47
1-48
YGr
YR
YG
VY
LR
VW
O
Y
13
34
21
25
32
31
36
37
S-001
B-121
WL
Gr
LR
LW
WG
GrL
OG
OW
49
62
47
B-085
F-001
B-102
H-001
WL
GR
YL
LW
WG
GrL
3
2
1
3
2
1
M
UP/DN
M
L/R
Rear View Mirror LH
F-007
Rear View Mirror RH
H-007
Body CAN System
SE0040011

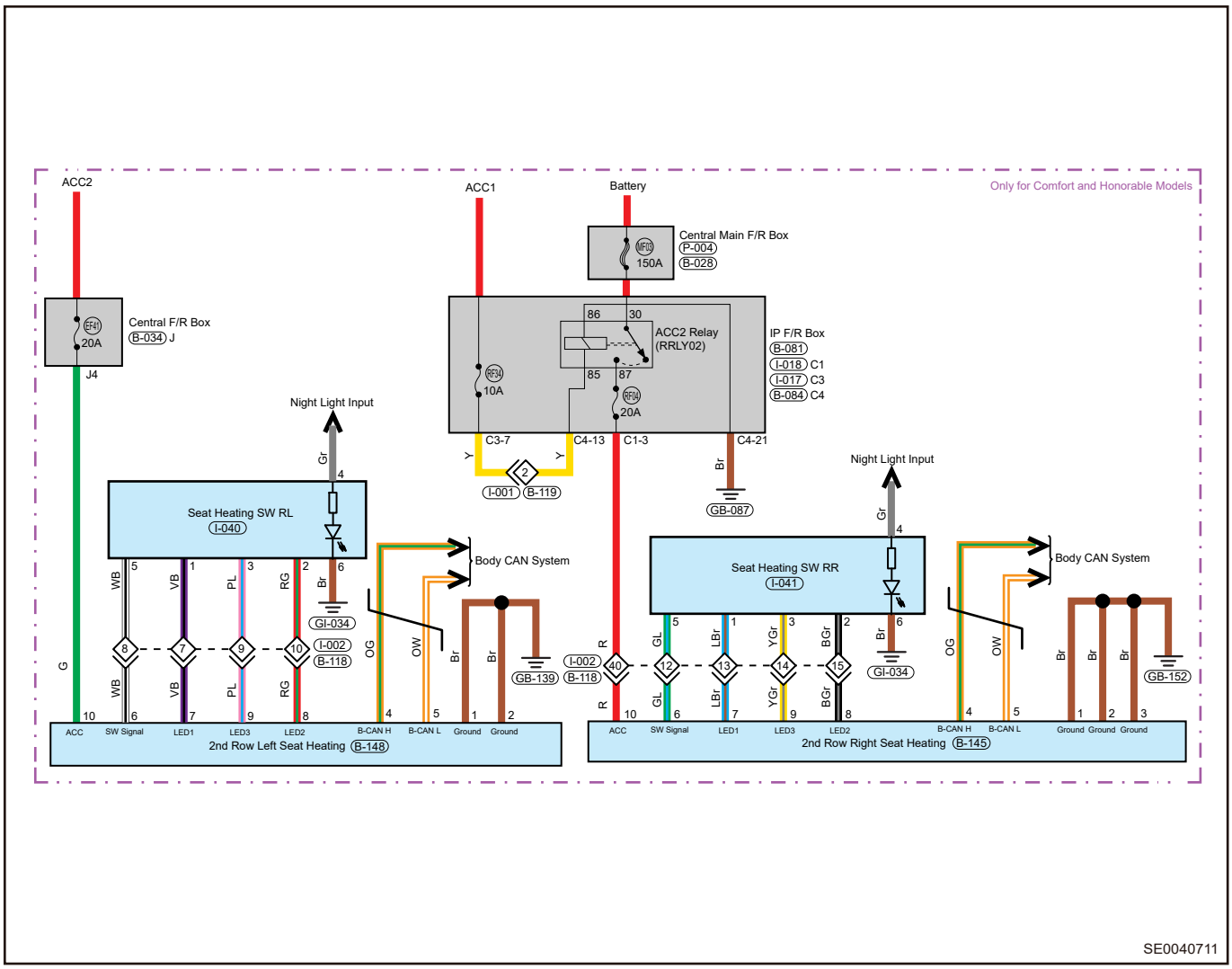

Only for Comfort and Honorable Models
IGN2
EF4
7.5A
Central F/R Box
B-036 E
E1
W
Body Domain Controller (BDM)
B-091 J2
LIN
2-13
L
LIN Line
21
22
B-129
S-018
VW
9
10
B
11
Massage SW
S-027
1
2
B
Front Passenger Seat Ventilation
S-020
1
2
3
BL
R
B
A
6
7
8
Front Passenger
Seatback Adapter
S-026
Massage Air Pump
S-032
VCC
PUMP
1
2
WL
VW
GrR
V
12
4
3
2
IGN
VCC
Massage Air Pump
LIN
1
B
5
Massage SW
GND
Massage ECU
S-031
1
2
3
B
Front Passenger
Seatback Ventilation
S-030
Front Passenger Seat Controller S-021
Foot Support Adjustment Output UP
Leg Support/Foot Support Adjustment Common End DOWN
Leg Support Adjustment Output UP
Horizontal Adjustment_Front
Seat Horizontal and Height Adjustment Common End_Down/Rear
1
3
5
14
11
W
B
B
17
28
S-018
B-129
R
Br
B
RW
P
V
3
1
1
3
5
1
M
M
M
Front Passenger Foot Support
B-099
Front Passenger Leg Support Motor
S-025
Front Passenger Horizontal Motor
S-024
SE0040211

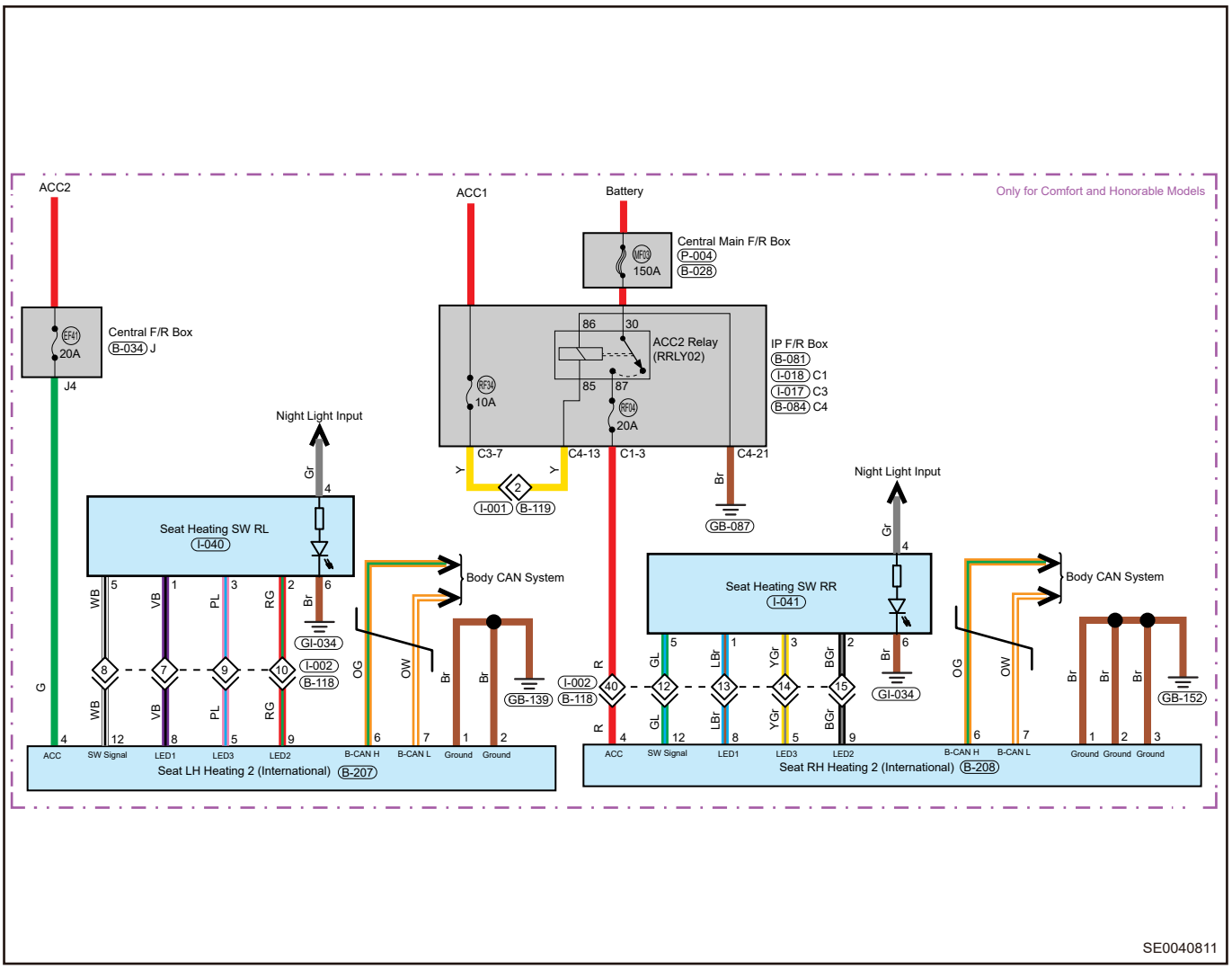

Only for Comfort and Honorable Models
Battery
Central Main F/R Box
P-004
B-028
150A
IP F/R Box
B-081
B-083
C2
25A
C2-18
GB-143
Body CAN System
B-129
S-018
Front Passenger Seat SW
H-008
Foot Support Adjustment
Seatback Adjustment
Height Adjustment
Analog Ground
Cushion Adjustment
H-001
B-102
Boss Button SW
S-028
Front Passenger Seatback Motor
S-029
Front Passenger Seatback Adapter
S-026
Power Supply 1
Power Supply 2
GND
GND
GND
B-CAN H
B-CAN L
Foot Support SW Input
Seatback Angle Front/Back Adjustment
Seat Front/Back or Up/Down Adjustment
Signal Ground
Leg Support SW Input
Seatback Angle Front/Back Adjustment of Boss Button
Front/Back, Up/Down Adjustment of Boss Button
Seatback Adjustment - Rear
Seatback Adjustment - Front
Front Passenger Seat Controller
S-021
SE0040311


Only for Comfort and Honorable Models
Column Length Adjustment Motor I-078
Column Angle Adjustment Motor I-075
Column Adjustment SW I-076
H
M
I-001 B-119
I-002 B-118
GI-034
B-121 S-001
Column Length Adjustment+
Column Length Adjustment-
Column Length HALL Input
Signal Ground
Column Angle HALL Input
Column Angle Adjustment-
Column Angle Adjustment+
Electric Column SW Input
Driver Seat Controller-1 (Comfort/Honorable) S-002
Driver Seat Controller-2 (Comfort/Honorable) S-003
SE0040411


Only for Comfort and Honorable Models
Driver Seat Controller-1 (Comfort/Honorable) S-002
Driver Seat Controller-2 (Comfort/Honorable) S-003
Seat Heating FL+
Seat Heating FL-
Seat Heating FR+
Seat Heating FR-
2-9
2-8
2-10
2-1
RL
Br
O
LY
G
B-121
S-001
S-018
B-129
Seatback Adapter
S-011
Front Passenger Seatback Adapter
S-026
Driver Seatback Heating
S-033
Front Passenger Seatback Heating (Comfort)
S-034
Front Passenger Seatback Heating (Honorable)
S-034
GY
L
Airbag Control Module
ACM-A ACM-B
B-126 B-125
A25
A9
B11
B23
BrR
YG
LY
Gr
BY
WG
VY
SBR-
SBR+
Front Passenger SBR
S-023
Front Passenger Buckle Power Supply+
Front Passenger Buckle Power Supply-
Front Passenger Seat Belt Buckle
S-022
SE0040511


Battery
Only for Honorable Model
Central Main F/R Box
P-004
P-005
B-028
MF19
150A
MF10
175A
IP F/R Box
B-081
B-083 C2
B-084 C4
EB01
30A
EB07
30A
Central F/R Box
B-036 E
EF32
10A
C4-24
C2-5
E9
10
12
9
3
TP11
25A
TP12
25A
2nd Row
Seat F/R Box
B-176
RLY1
RLY2
85
87
87a
86
30
13
11
5
4
14
7
8
1
2
6
Br
W
V
OL
RW
GB-175
GB-139
GB-143
G
L
WR
Gr
P
B-157
L-001
B-114
R-001
Seatback Adjustment Motor RL B-154
Seatback Adjustment Motor RR B-173
Seat SW RL L-009
Seat SW RR R-009
Forward Signal
Power Supply Protection
Power Supply
Backward Signal
Ground
SE0040611


Only for Comfort and Honorable Models
ACC2
ACC1
Battery
Central Main F/R Box
P-004
B-028
MF10
150A
Central F/R Box
B-034 J
EF41
20A
J4
86
30
ACC2 Relay
(RRLY02)
85
87
IP F/R Box
B-081
I-018 C1
I-017 C3
B-084 C4
RF14
10A
RF8
20A
C3-7
C4-13
C1-3
C4-21
I-001
B-119
GB-087
Night Light Input
Seat Heating SW RL
I-040
Seat Heating SW RR
I-041
Body CAN System
GI-034
I-002
B-118
GB-139
GB-152
2nd Row Left Seat Heating B-148
2nd Row Right Seat Heating B-145
ACC
SW Signal
LED1
LED3
LED2
B-CAN H
B-CAN L
Ground
SE0040711



4 Diagnostic Information and Steps

4.1 Diagnostic tester Calibration Parameters Flashing and Self-learning

Application: With DTC, seat memory/heating/ventilation function failure

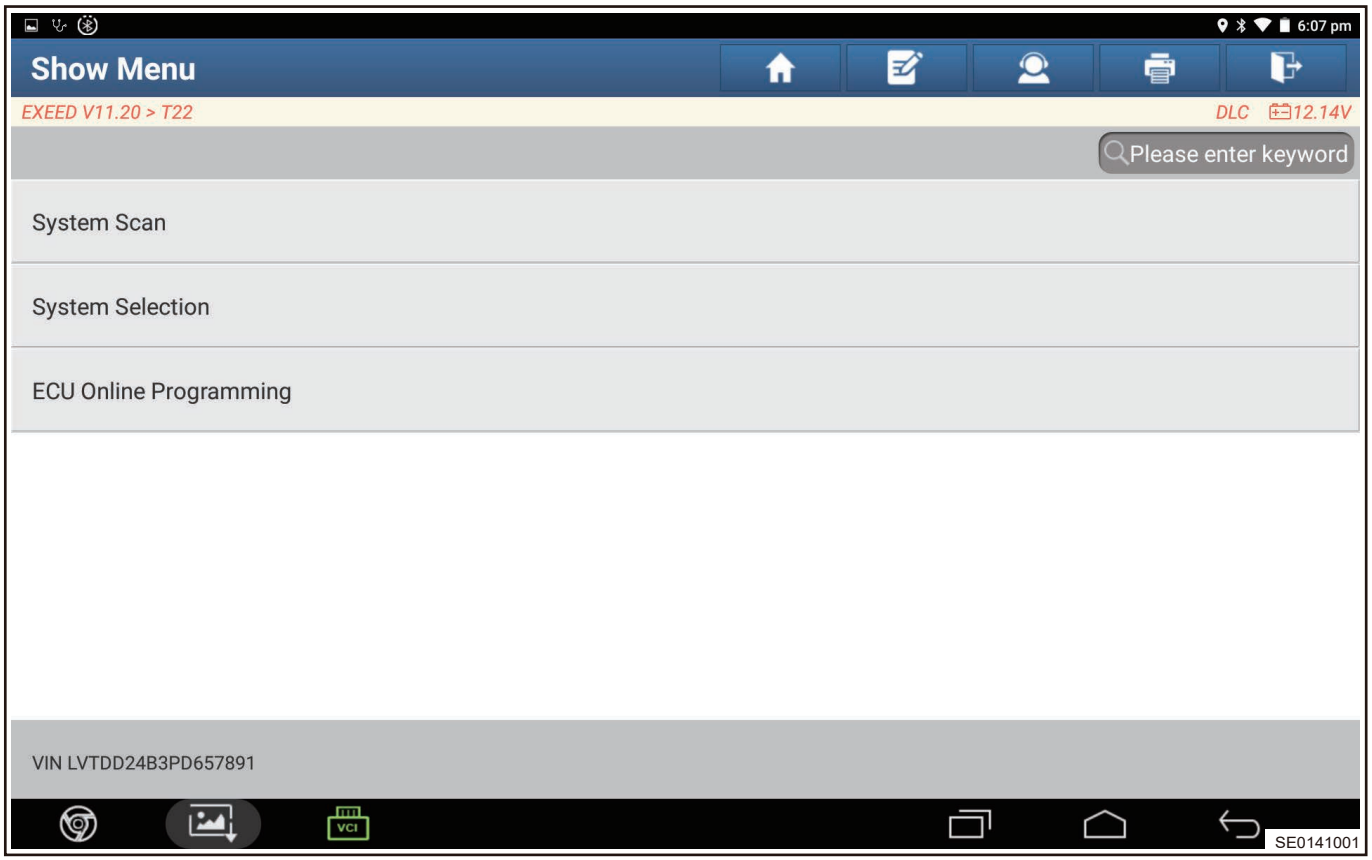
■ Calibration Data Writing

(1) Connect the diagnostic tester.

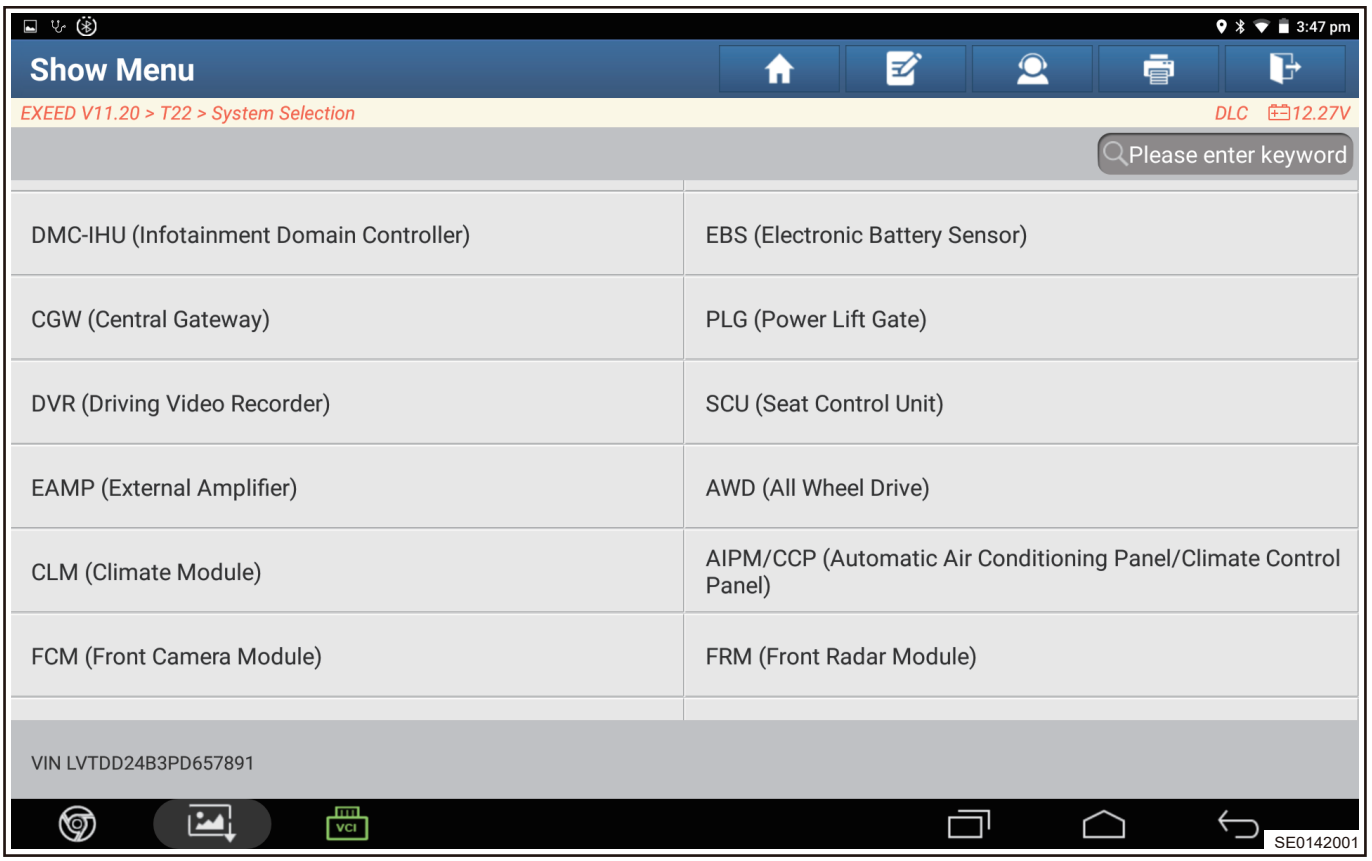
(2) Turn ENGINE START STOP switch to ON.

(3) Select "T22" model.

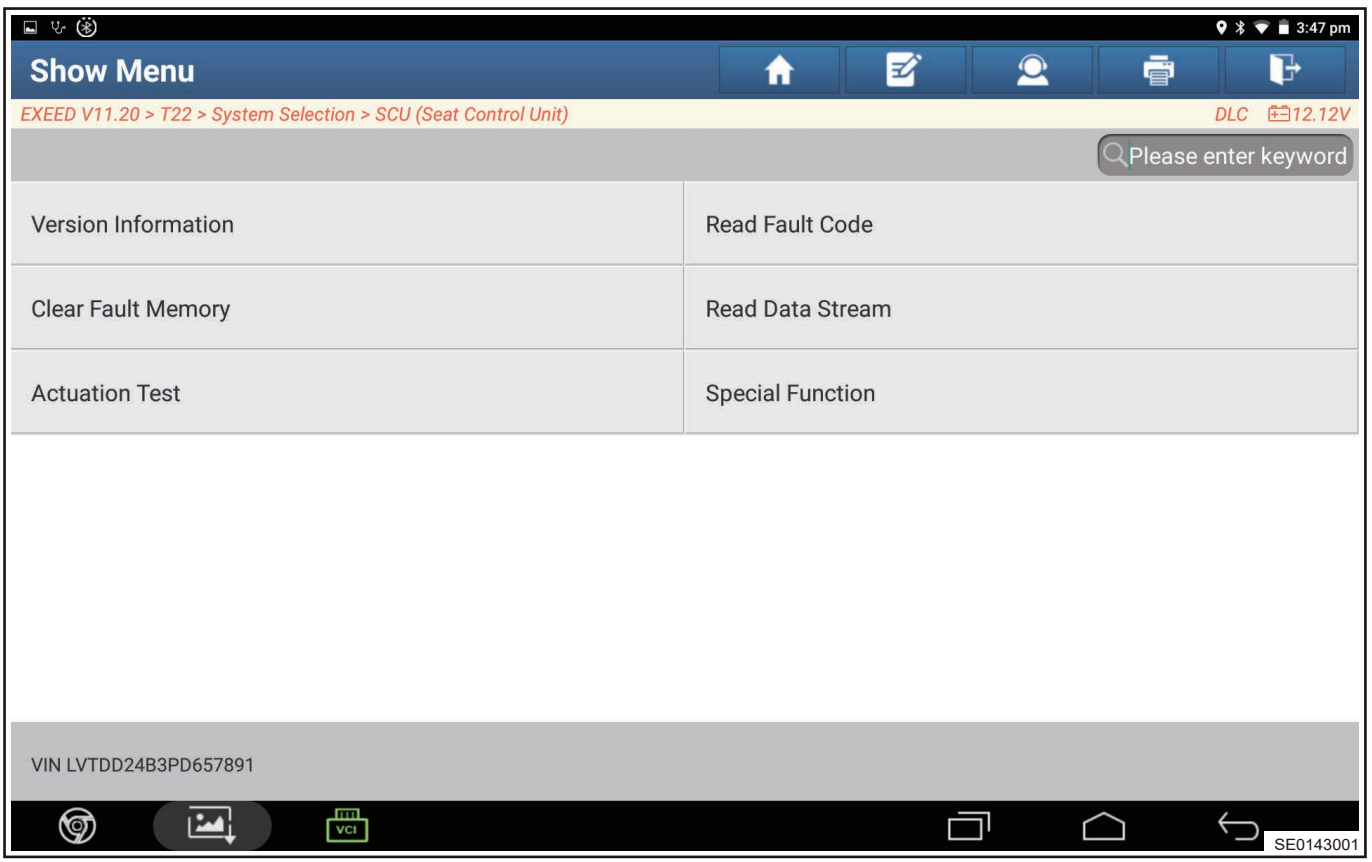
(4) Click "System Selection".



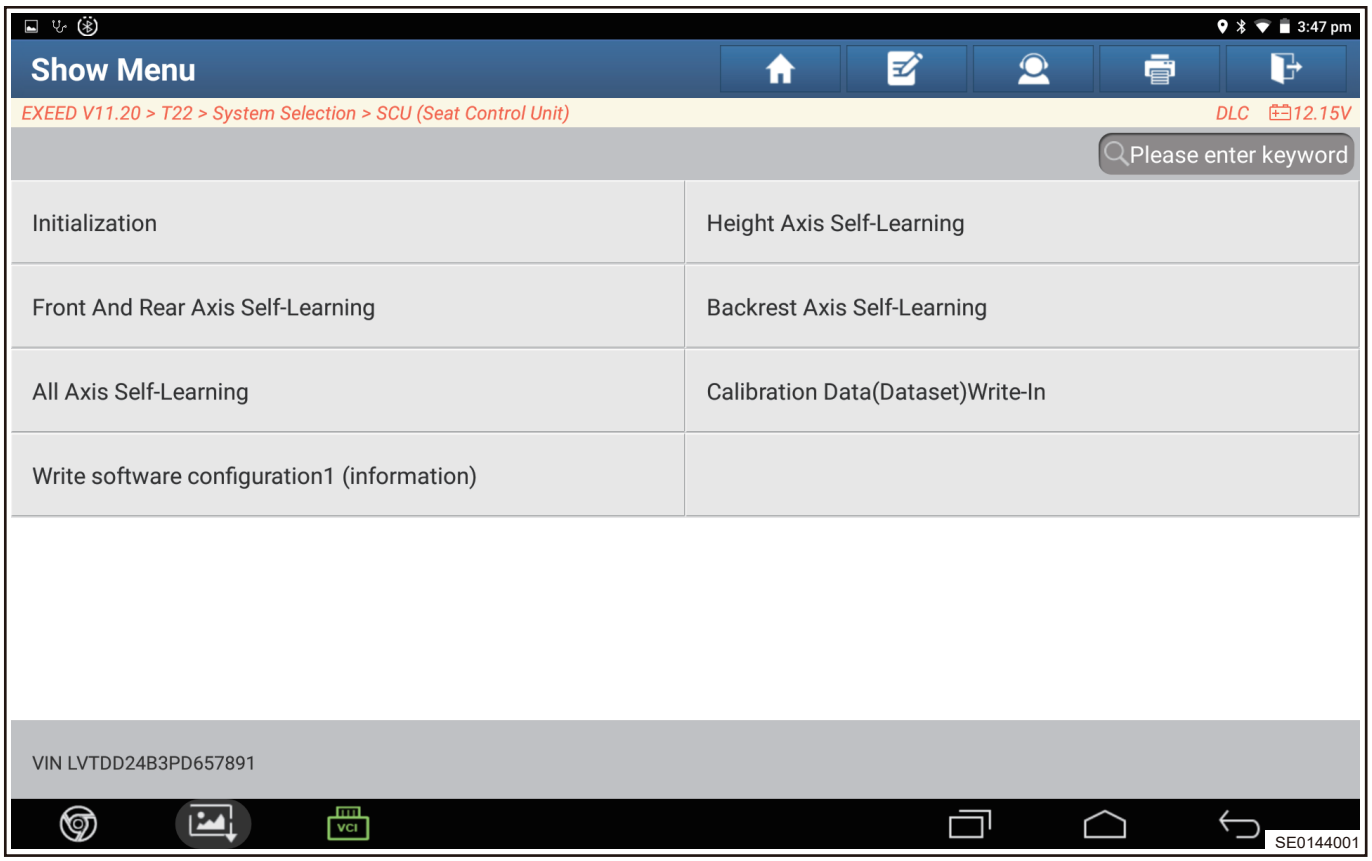
(5) Select "SCU (Seat Control Unit)".



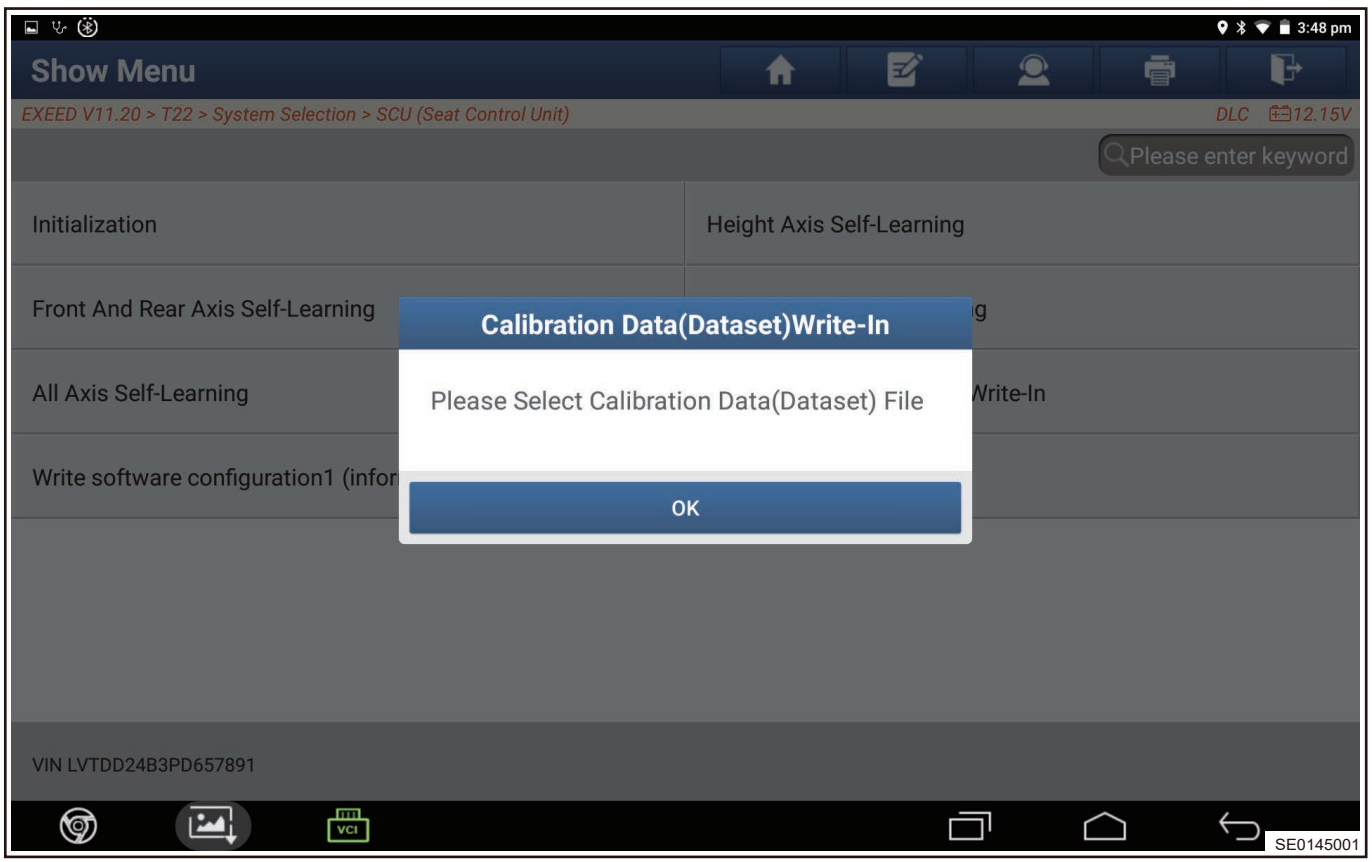
(6) Select "Special Function".



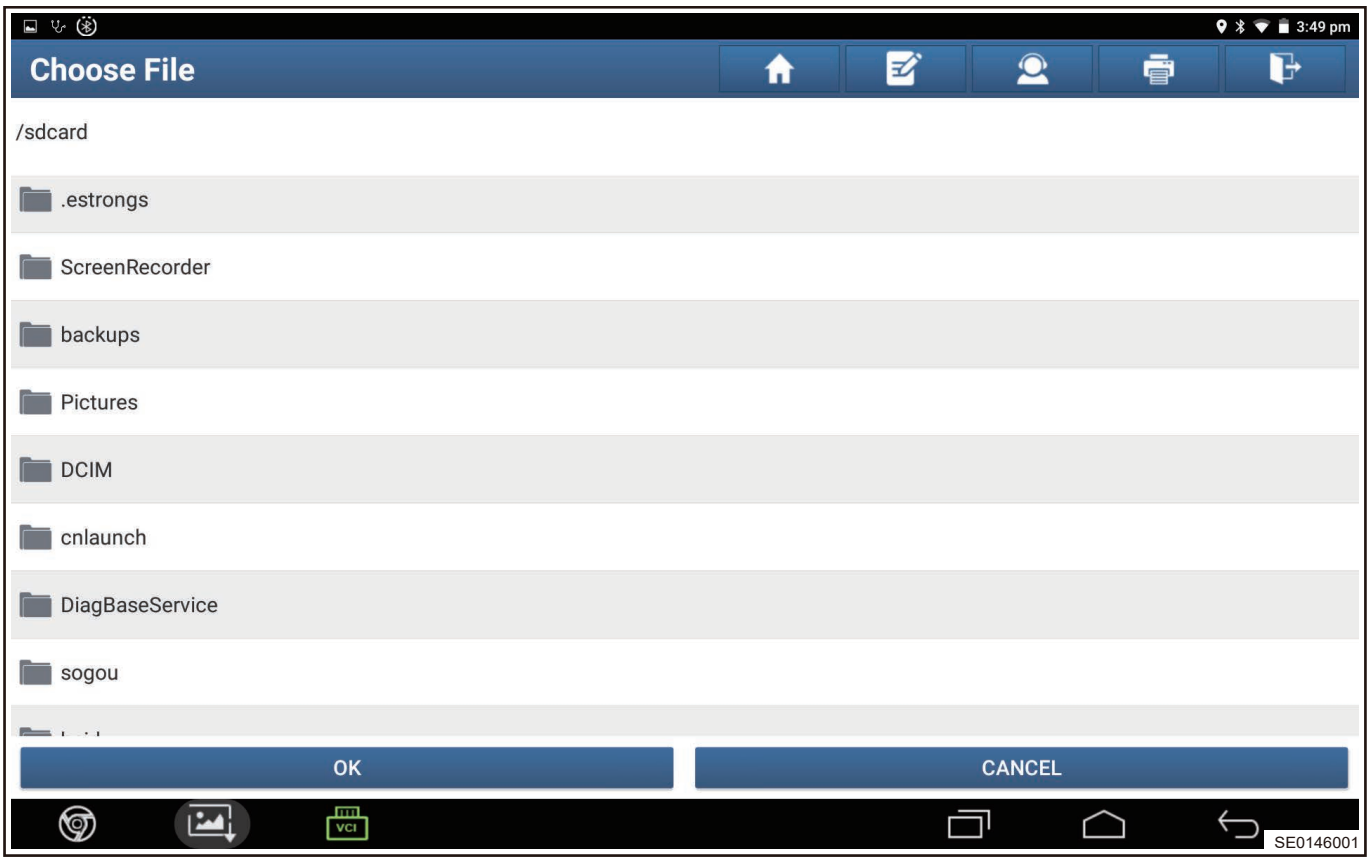
(7) Select "Calibration Data (Dataset) Written-in".



(8) Display "Please Select Calibration Data (Dataset) File", click "OK".



(9) Find ".xml" file and select T22.SCM08JU.v01.xml, a pop-up window displays "Please wait".



(10) After success, click "OK".

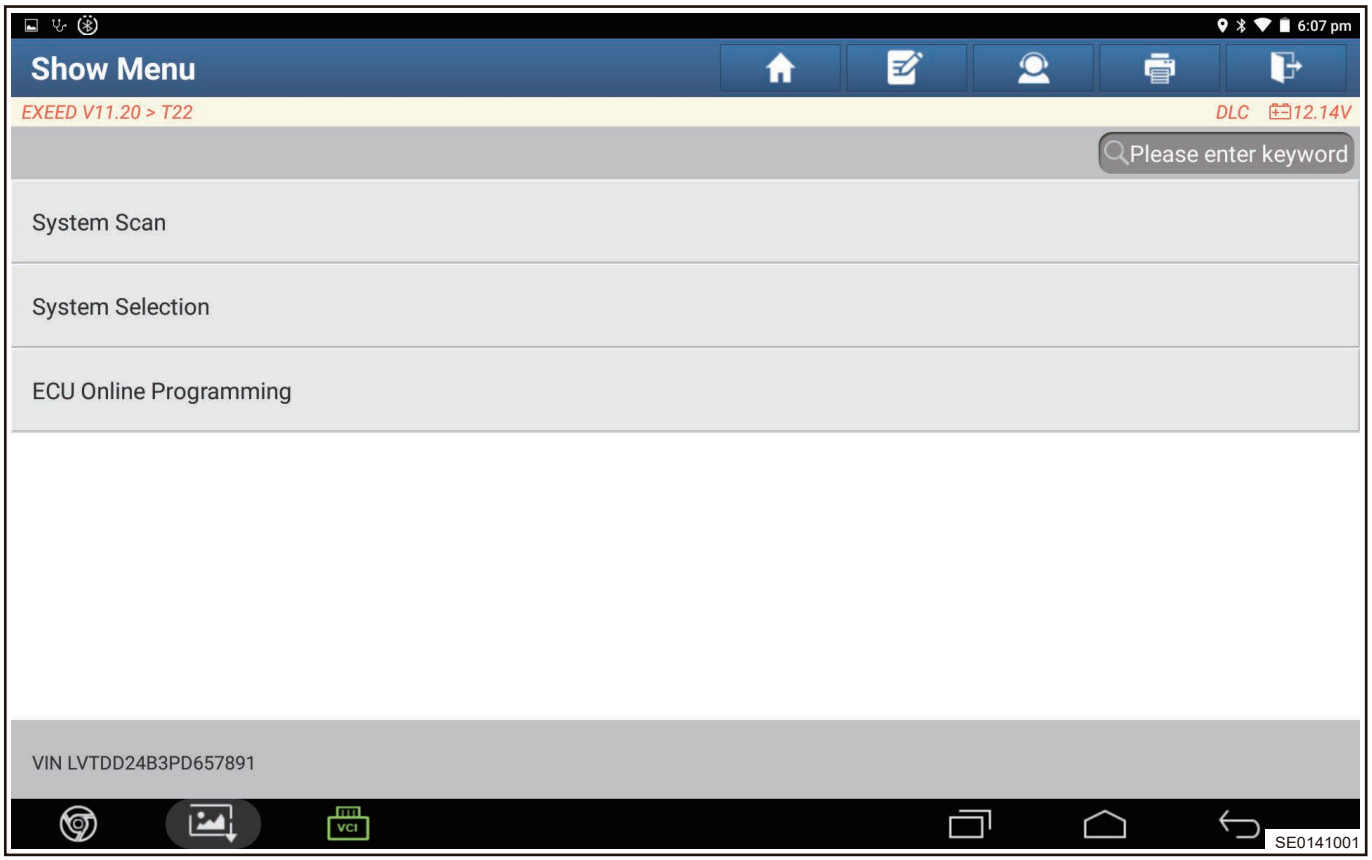
■ **Initialization**

(1) Connect the diagnostic tester.

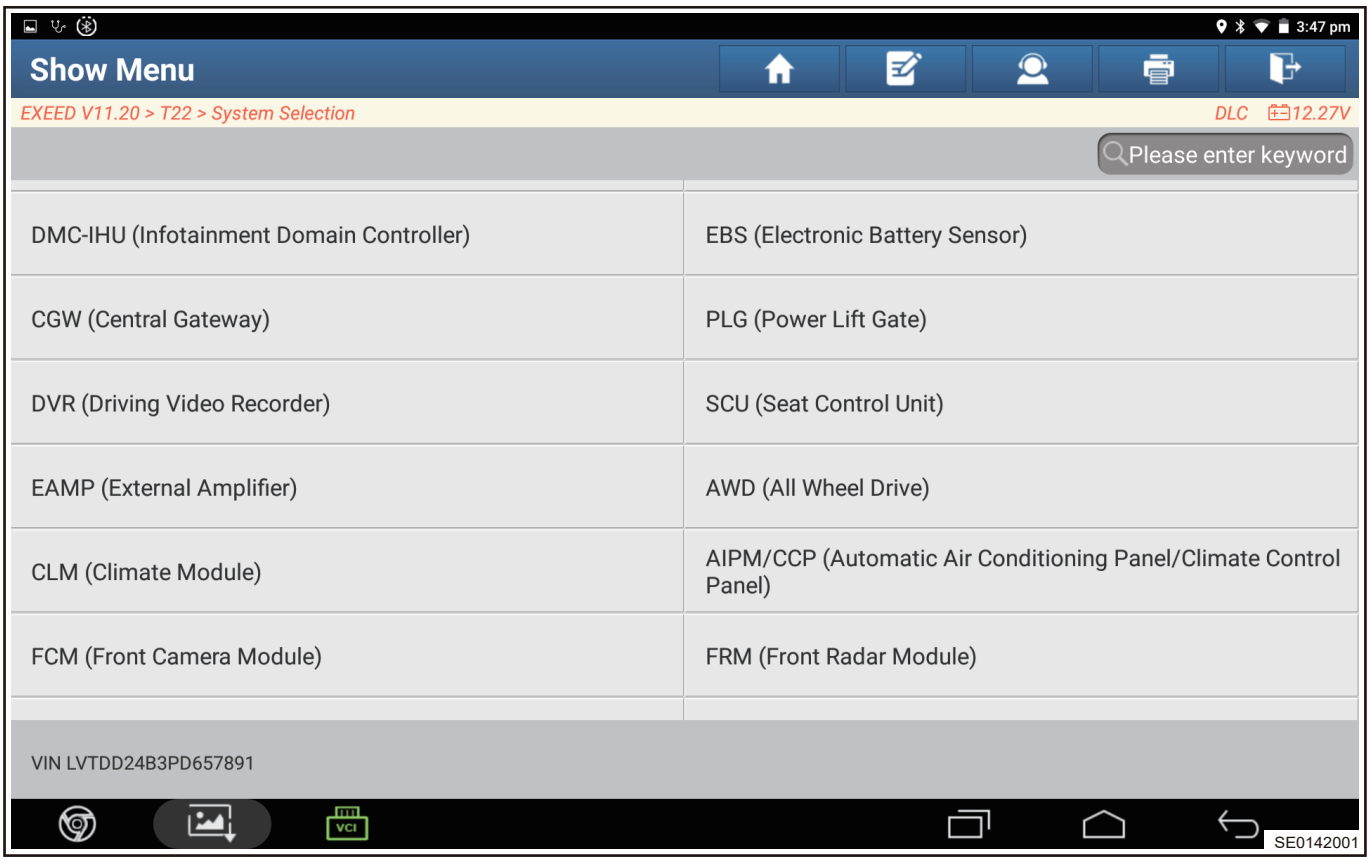
(2) Turn ENGINE START STOP switch to ON.

(3) Select "T22" model.

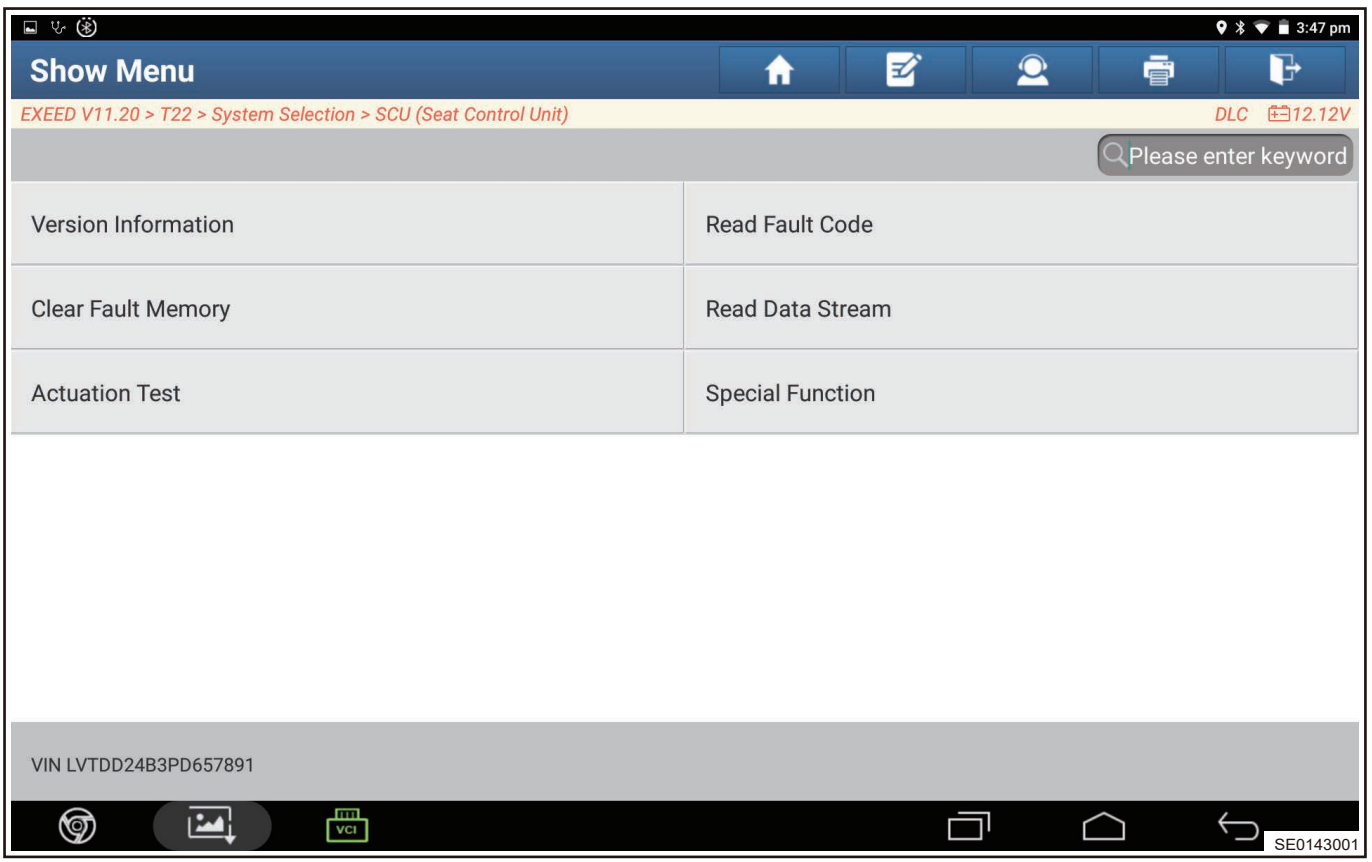
(4) Click "System Selection".



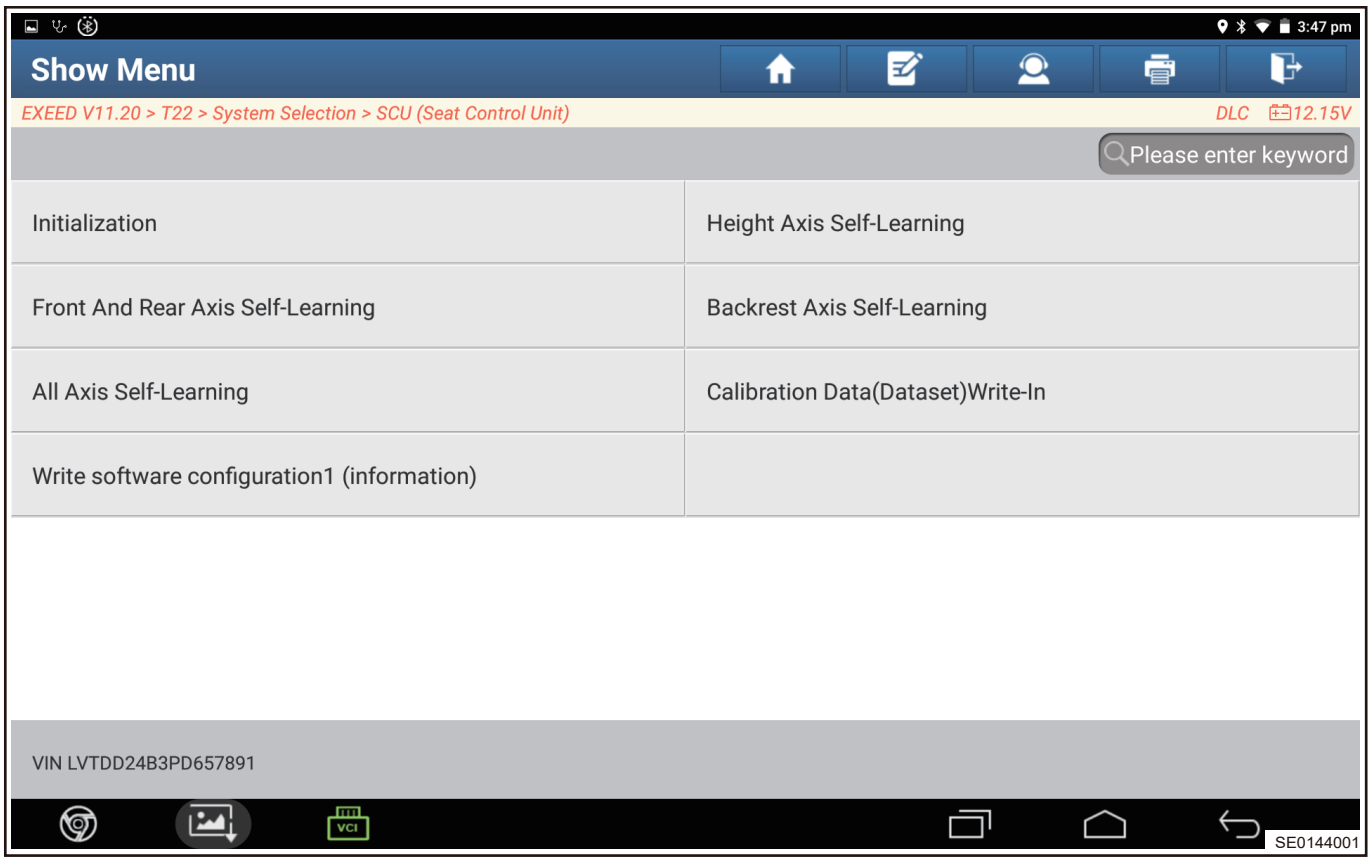
(5) Select "SCU (Seat Control Unit)".



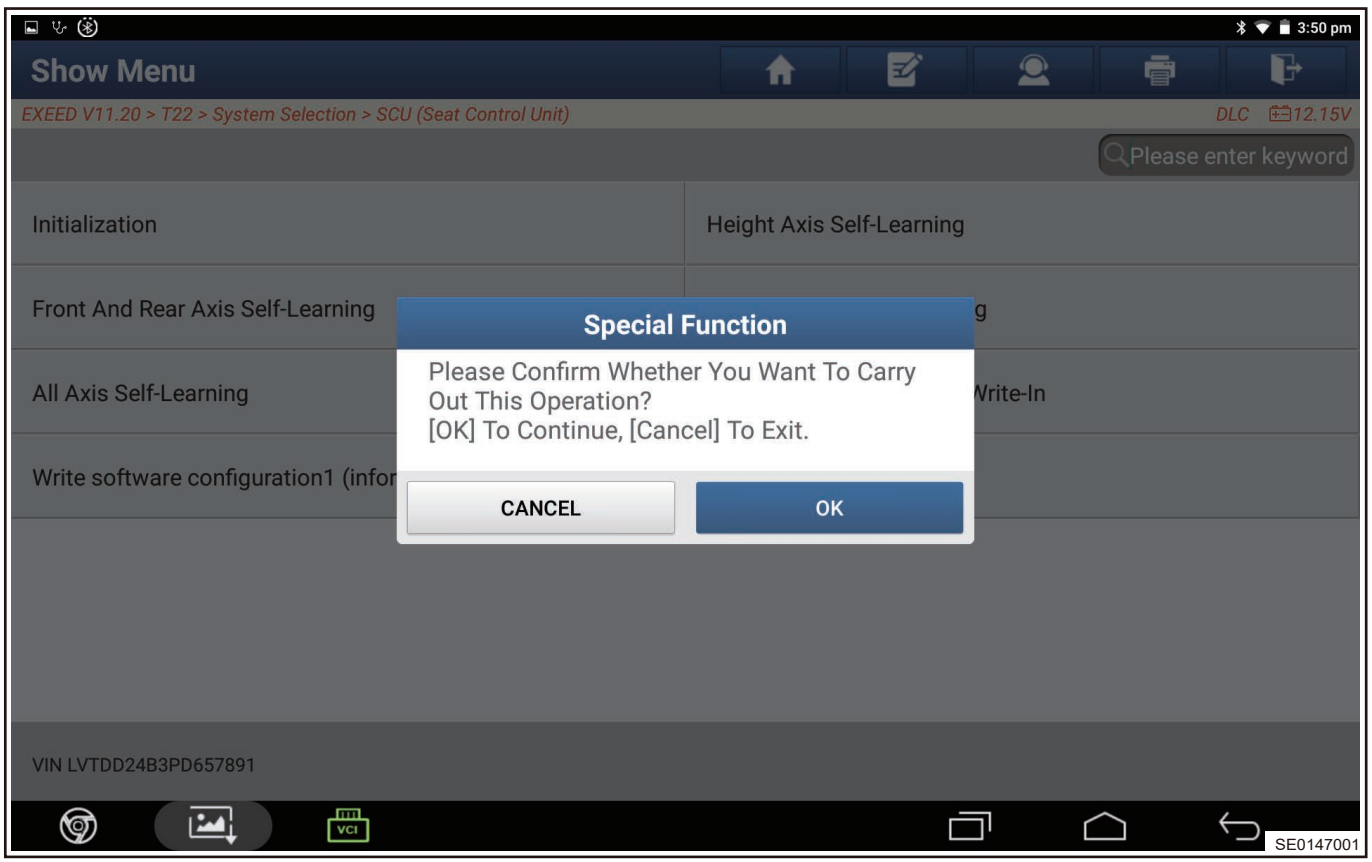
(6) Select "Special Function".



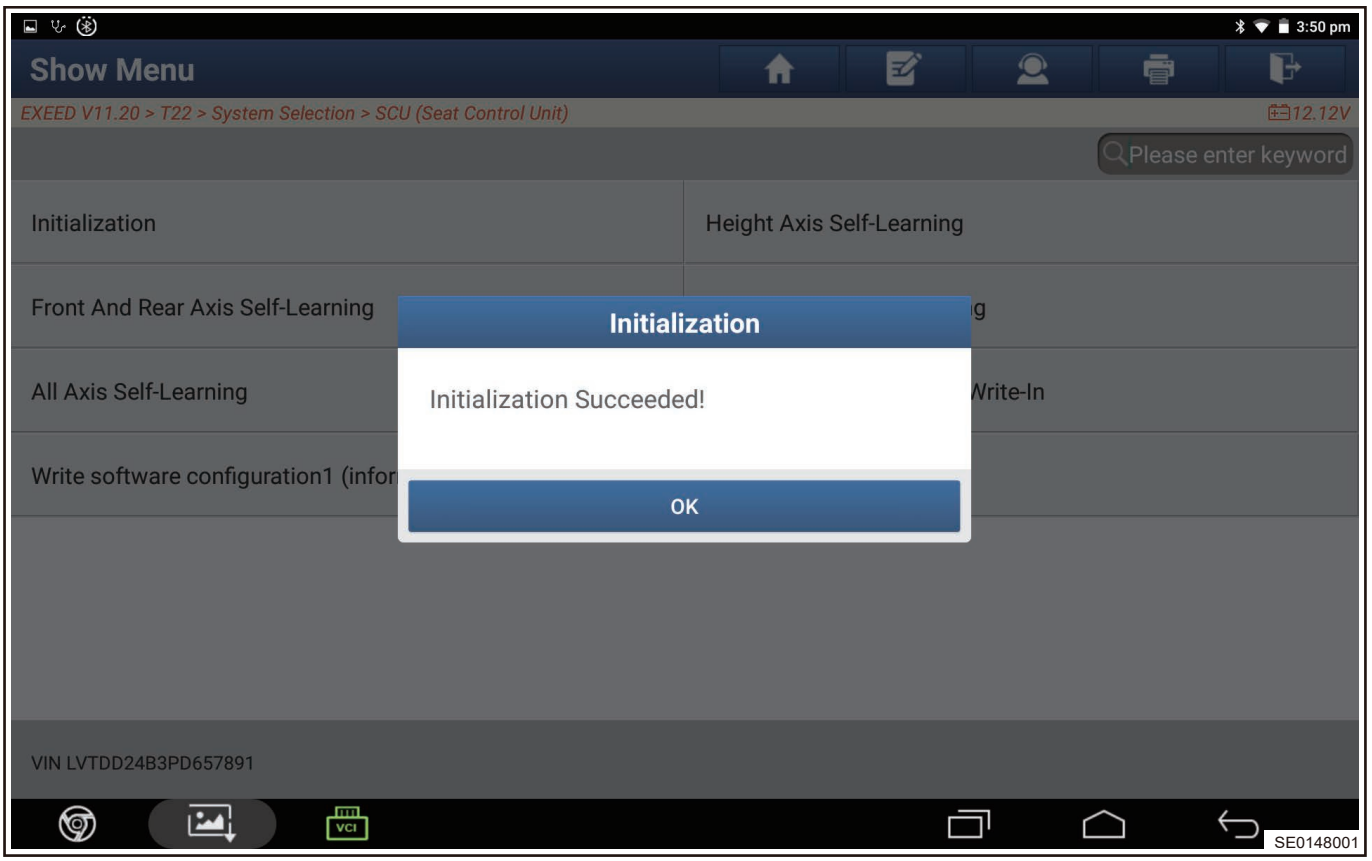
(7) Select "Initialization".



(8) Confirm the prompt and click "OK".



(9) Display "Initialization Succeeded!", click "OK".



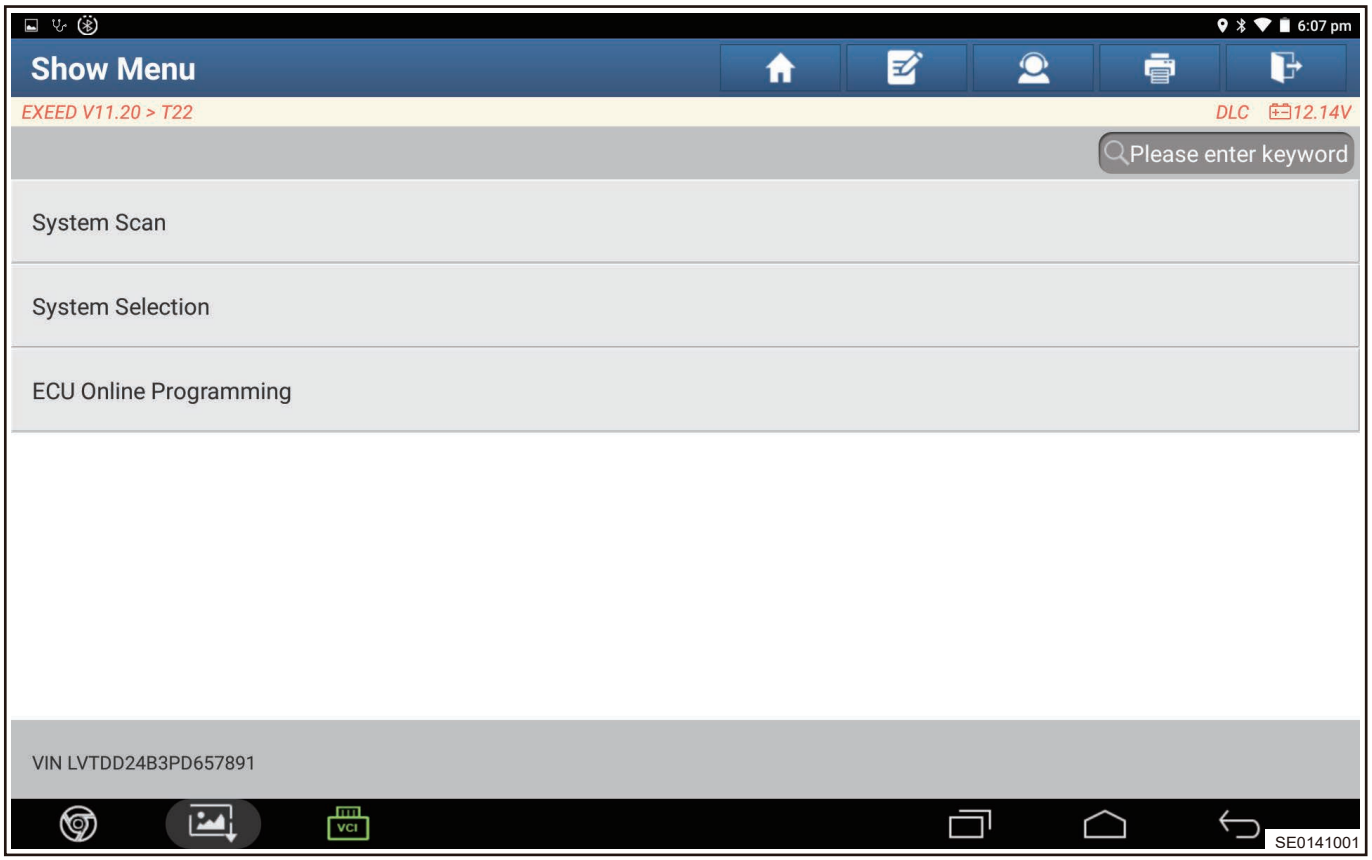
■ **All shafts Self-learning**

(1) Connect the diagnostic tester.

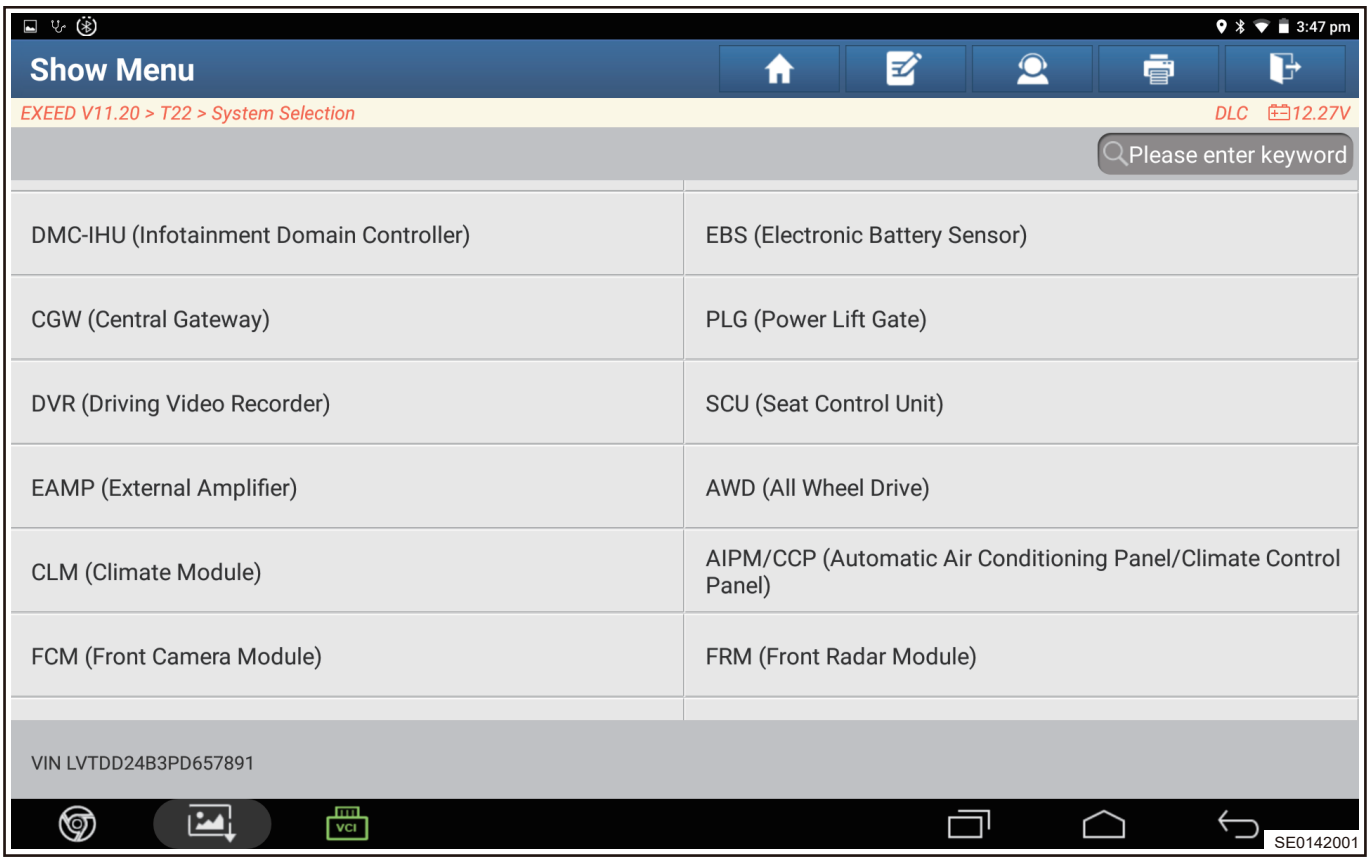
(2) Turn ENGINE START STOP switch to ON.

(3) Select "T22" model.

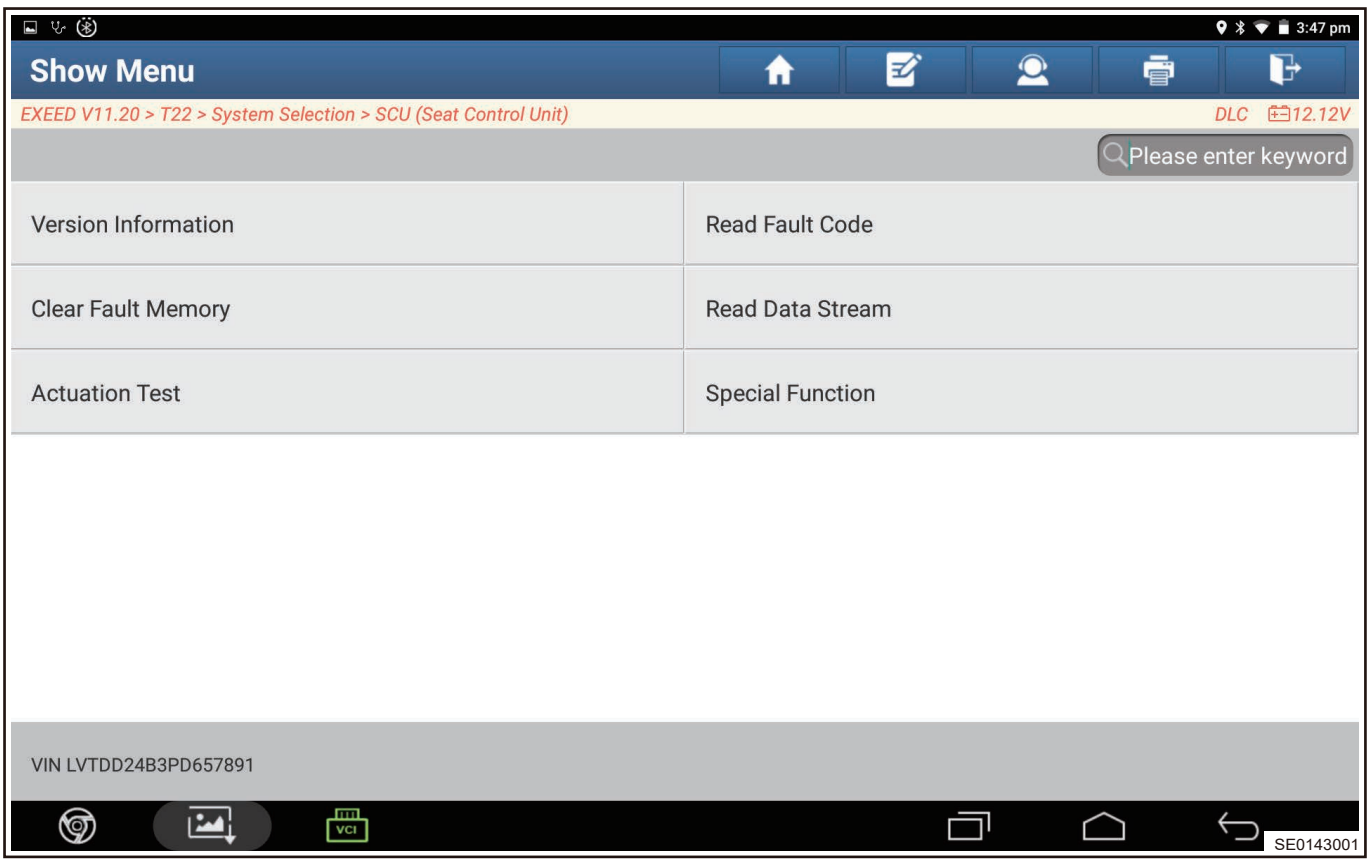
(4) Click "System Selection".



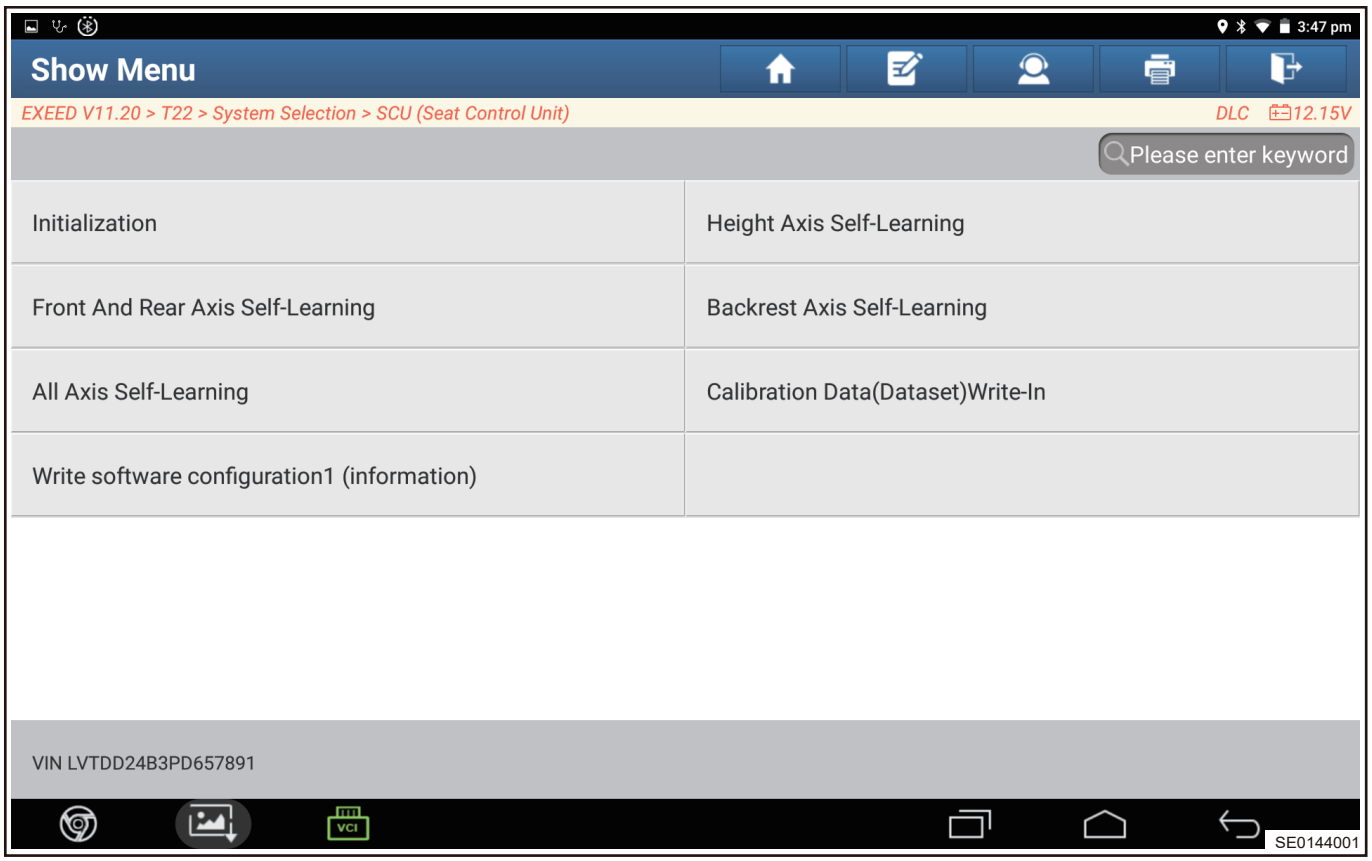
(5) Select "SCU (Seat Control Unit)".



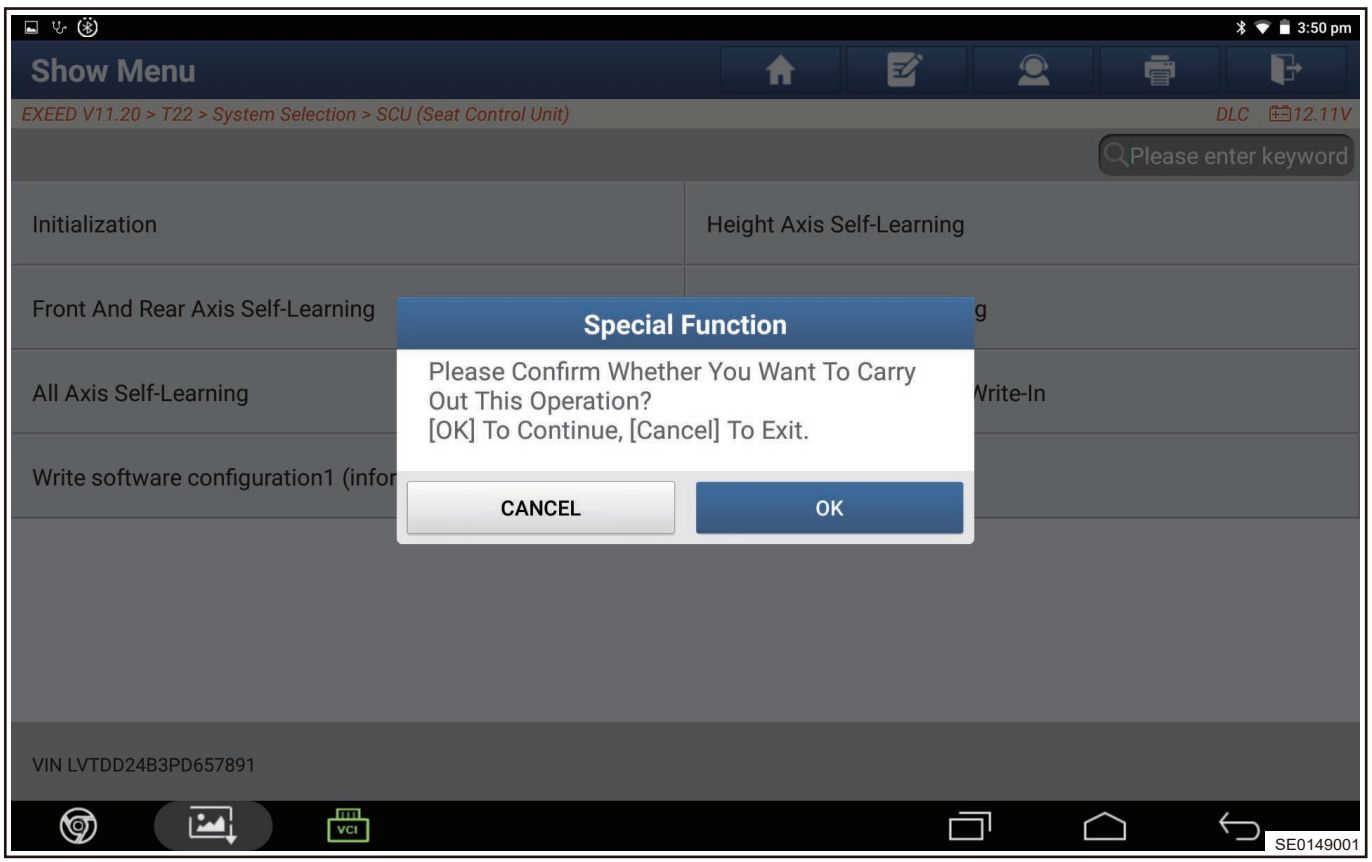
(6) Select "Special Function".

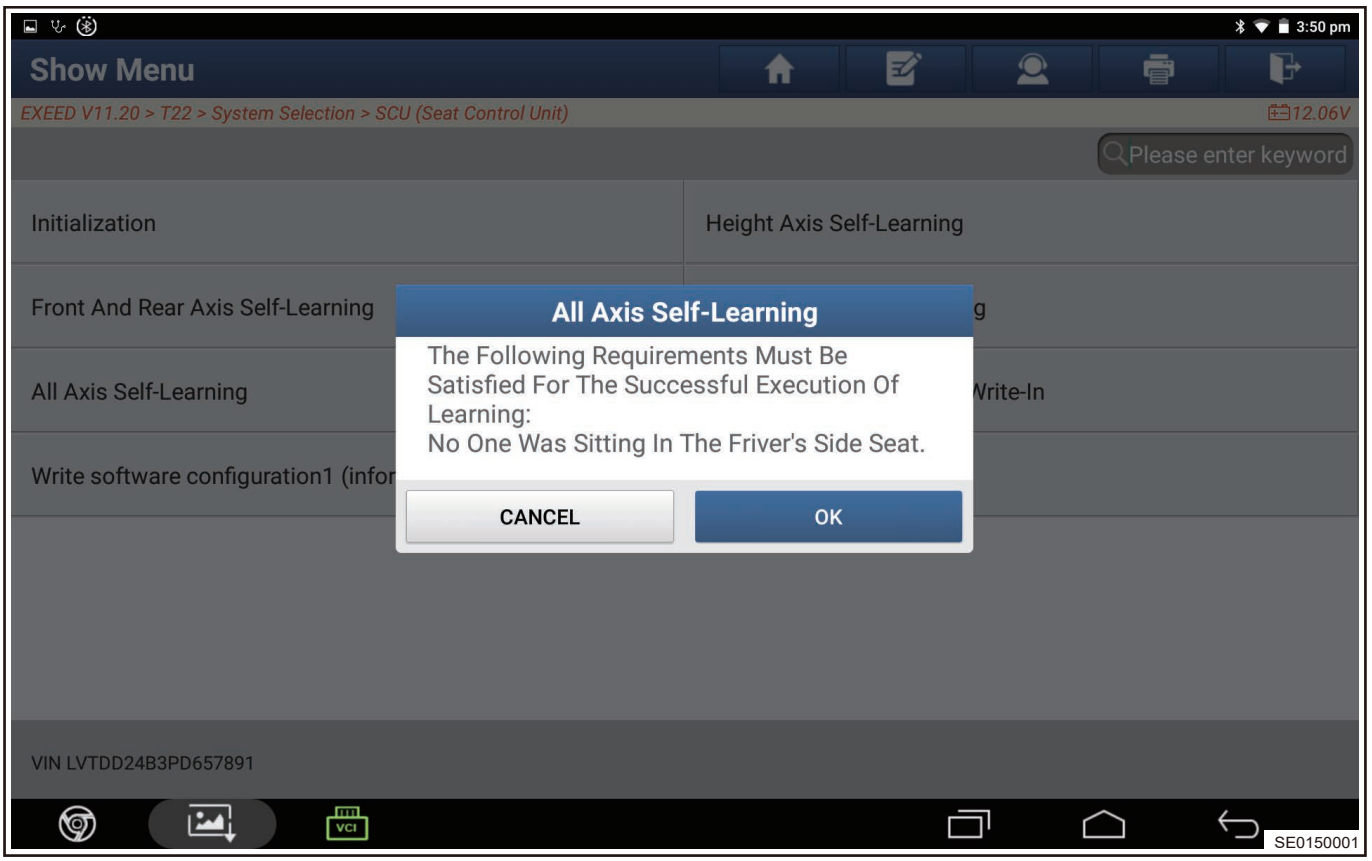


(7) Select "All Axis Self-Learning".

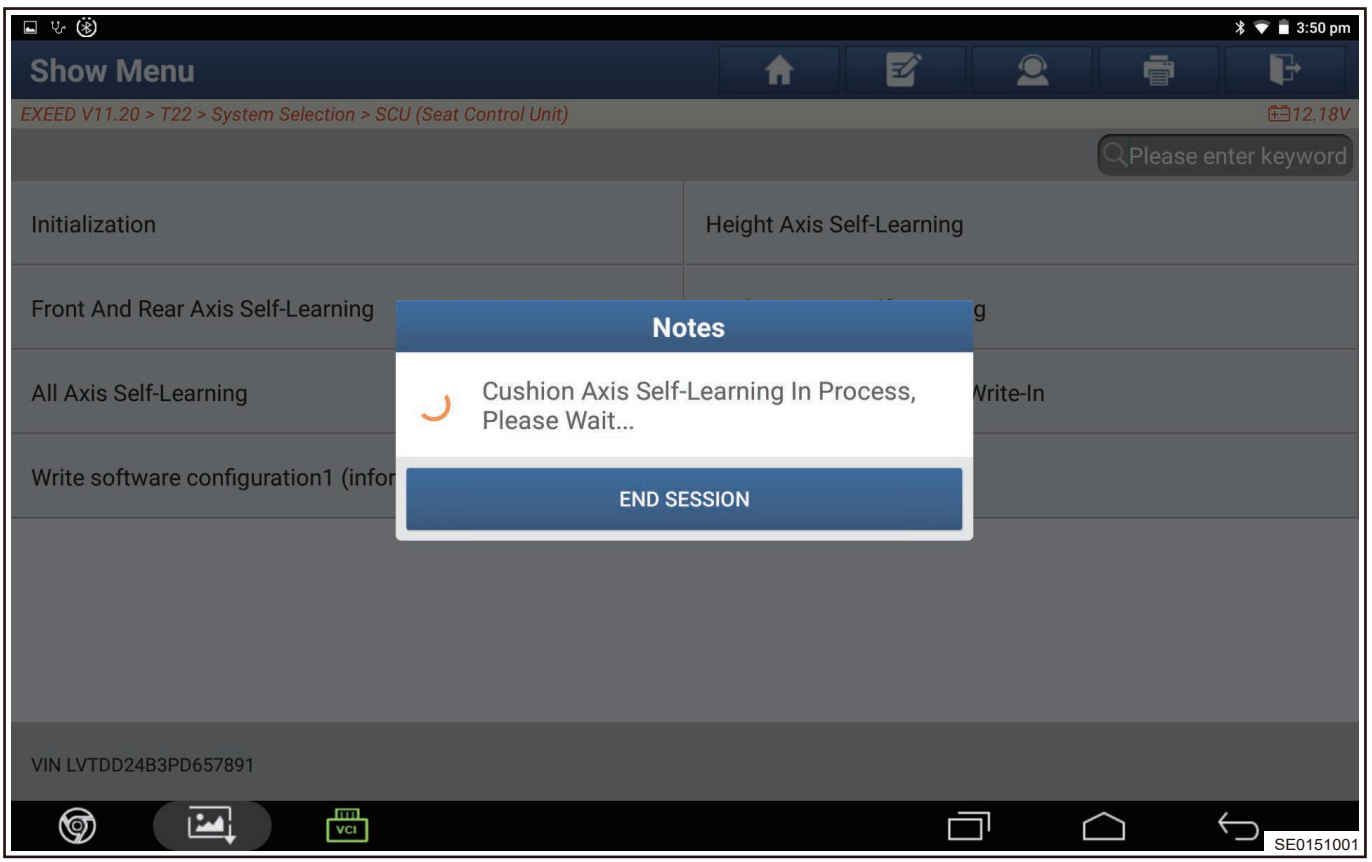


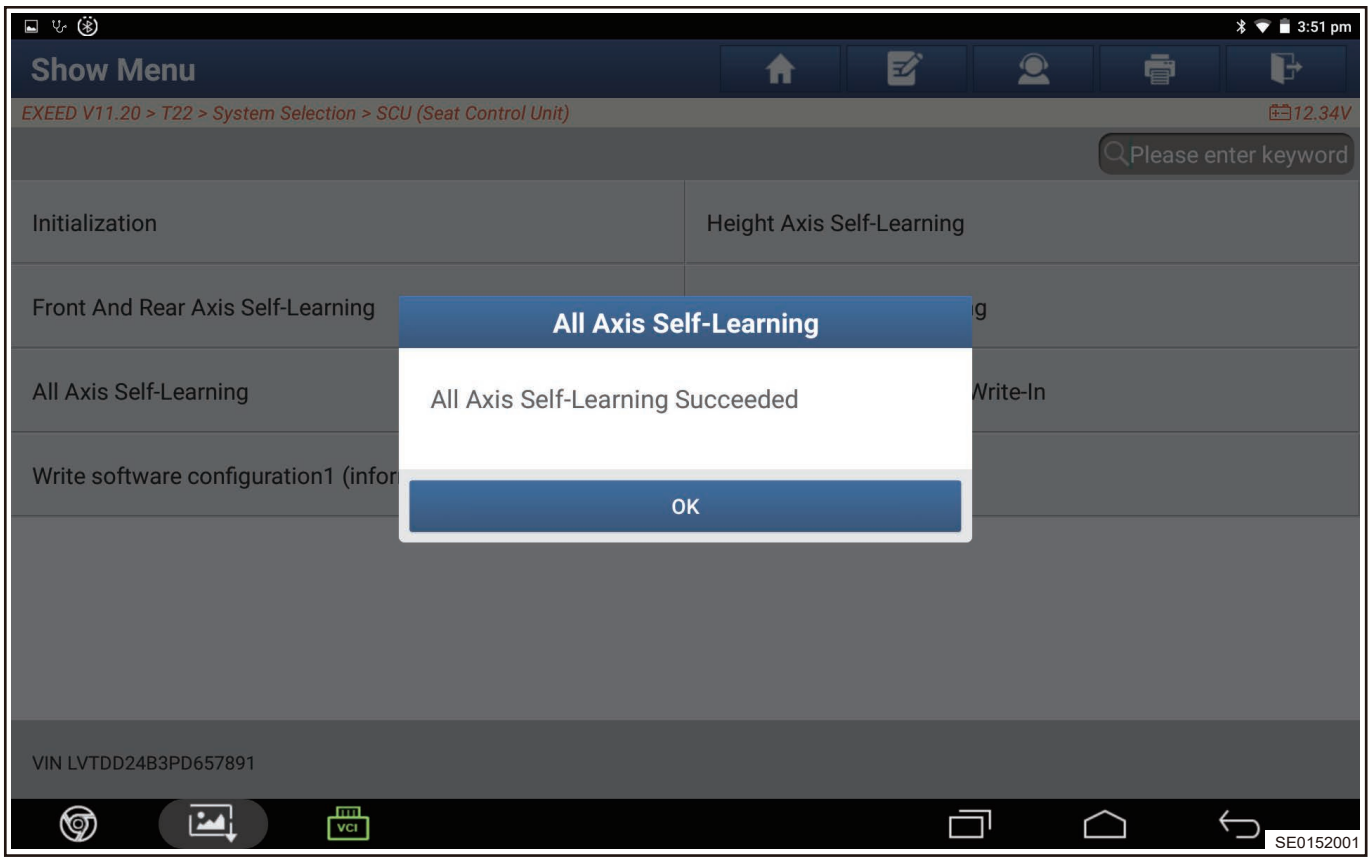
(8) Confirm the prompt and click "OK".





(9) Wait for a while, display "All Axis Self-Learning Succeeded".





4.2 Diagnostic Tester Software Refresh

Application: If software version is inconsistent and function is not complete:

(1) T2X-integrated service-SCU-ECU software refresh:

(2) Select drive file: scu_Chery_T22_S32K144_FlashDriver_vo1.s19;

(3)

(4) Select application file: scu_Chery_T22_S32K144_CAL_20221111_v00_00_46.s19;

(5) Confirmation.

4.3 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.
Seats:

Symptom	Suspected Area
Seat positions cannot be memorized and portable functions are disabled	Manual learning seat position
	Seat module assembly
	Wire harness connector
Seat position cannot be adjusted	Fuse
	Wire harness or connector
	Switch
	Actuator motor

4.4 DTC Chart

DTC	DTC Definition
B1B70-16	Circuit Voltage Below Threshold
B1B70-17	Circuit Voltage Above Threshold
B1B71-18	Driver Seat Heating Control Circuit Low Current
B1B71-19	Driver Seat Heating Control Circuit High Current
B1B72-18	Front Passenger Seat Heating Control Circuit Low Current
B1B72-19	Front Passenger Seat Heating Control Circuit High Current
B1B73-19	Height Adjustment Control Circuit High Current
B1B73-18	Height Adjustment Control Circuit Low Current
B1B74-19	Horizontal Adjustment Control Circuit High Current
B1B74-18	Horizontal Adjustment Control Circuit Low Current
B1B75-49	Seat Height Adjustment and Horizontal Control Circuit Internal Failure
B1B76-19	Backrest Adjustment Control Circuit High Current
B1B76-18	Backrest Adjustment Control Circuit Low Current
B1B7A-49	Backrest Adjustment Control Circuit Internal Fault
B1B78-19	Foot Rest Adjustment Control Circuit High Current
B1B78-18	Foot Rest Adjustment Control Circuit Low Current
B1B79-19	Leg Rest Adjustment Control Circuit High Current
B1B79-18	Leg Rest Adjustment Control Circuit Low Current
B1B7D-49	Foot Rest Adjustment Control Circuit Internal Fault
B1B7D-19	Leg Rest Adjustment Control Circuit Internal Fault
B1B80-1A	Driver Heating NTC Input Value Small
B1B80-1E	Driver Heating NTC Input Value Nnchanged
B1B81-1A	Passenger Heating NTC Input Value Small
B1B81-1E	Passenger Heating NTC Input Value Nnchanged
B1B82-29	Height HALL Signal Input Signal Lost
B1B83-29	Length HALL Signal Input Signal Lost
B1B84-29	Backrest HALL Signal Input Signal Lost
B1B86-1A	Foot Rest HALL Signal Input Signal Lost
B1B86-1E	Leg Rest HALL Signal Input Signal Lost
B1B85-29	Switch Button Stuck

DTC	DTC Definition
B1B87-54	Rear View Mirror Switch Button Stuck
B1B85-54	No Learning by Seat
U0073-88	CAN Bus Off
U0140-87	Lost Communication with BCM
U0214-87	Lost Communication With PEPS
U0100-87	Lost Communication with EMS
U0101-87	Lost Communication with TCU
U0151-87	Lost Communication with ABM
U0129-87	Lost Communication with BSM
U3000-51	Control Module Not Programmed
U1300-55	Software Configuration Error

4.5 DTC Trouble Diagnosis Flow

DTC	**U0073-88**	**CAN Bus Off**
DTC	**U0140-87**	**Lost Communication with BCM**
DTC	**U0214-87**	**Lost Communication with PEPS**
DTC	**U0100-87**	**Lost Communication with EMS**
DTC	**U0101-87**	**Lost Communication with TCU**
DTC	**U0151-87**	**Lost Communication with ABM**
DTC	**U0129-87**	**Lost Communication with BSM**
DTC	**U1300-55**	**Software Configuration Error**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Refer to CAN communication system

DTC	**U3000-51**	**Control Module Not Programmed**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Repair it at 4S shop, diagnostic tester refreshes calibration parameters

DTC	**B1B70-16**	**Circuit Voltage Below Threshold**
DTC	**B1B70-17**	**Circuit Voltage Above Threshold**

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

1	**Check fuse**

(a) Check if fuses of center main fuse and relay box and instrument panel fuse and relay box are blown.

NG → **Replace fuse**

OK

2	**Check output voltage of instrument panel fuse and relay box**

(a) Turn ENGINE START STOP switch to ON.

(b) Disconnect the instrument panel fuse and relay box connector.

(c) Using a digital multimeter, measure voltage between instrument panel fuse and relay box (seat controller power supply) connector and body ground.

Multimeter Connection	Condition	Operating Voltage
Instrument panel fuse and relay box (seat controller power supply) - Body ground	ENGINE START STOP switch "ON"	⩽ 12V

NG → **Replace instrument panel fuse and relay box assembly**

OK →

3	Check for open in wire harness

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery terminal cable.

(c) Disconnect the driver seat controller connector and instrument panel fuse and relay box connector.

(d) Using a digital multimeter, measure if resistance of connector between driver seat controller and instrument panel fuse and relay box is normal to check wire harness for open.

Multimeter Connection	Condition	Specified Condition
Driver seat controller (power supply terminal) - Instrument panel fuse and relay box (connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seat controller (power supply terminal) - Instrument panel fuse and relay box (connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seat controller (ground terminal) - Body ground	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK → **Replace seat assembly**

NG → **Handle and repair related wire harness**

DTC	B1B73-19	Height Adjustment Control Circuit High Current
DTC	B1B73-18	Height Adjustment Control Circuit Low Current
DTC	B1B75-49	Seat Height Adjustment and Horizontal Control Circuit Internal Failure

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	**Height Adjustment Control Circuit High Current**

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.
(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.
(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.
(d) Disconnect the driver seat controller.

(e) Using ohm band of multimeter, detect driver seat controller and driver regulator motor separately.

Multimeter Connection	Condition	Specified Condition
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replace seat module assembly**
NG	**Handle and repair related wire harness**

DTC	**B1B74-19**	**Horizontal Adjustment Control Circuit High Current**
DTC	**B1B74-18**	**Horizontal Adjustment Control Circuit Low Current**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	Horizontal Adjustment Control Circuit High Current

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.

(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.

(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(d) Disconnect driver seat controller connector.

(e) Using ohm band of multimeter, detect driver seat controller and driver horizontal motor separately.

Multimeter Connection	Condition	Specified Condition
Driver horizontal motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver horizontal motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver horizontal motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver horizontal motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replace seat module assembly**
NG	**Handle and repair related wire harness**

DTC	**B1B76-19**	**Backrest Adjustment Control Circuit High Current**
DTC	**B1B76-18**	**Backrest Adjustment Control Circuit Low Current**
DTC	**B1B7A-49**	**Backrest Adjustment Control Circuit Internal Fault**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.

- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	Backrest Adjustment Control Circuit High Current

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.
(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.
(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.
(d) Disconnect the driver seat controller connector.
(e) Using ohm band of multimeter, detect driver seat controller and driver seatback motor separately.

Multimeter Connection	Condition	Specified Condition
Driver seatback motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seatback motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seatback motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seatback motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replace seat module assembly**
NG	**Handle and repair related wire harness**

DTC	**B1B77-19**	**Seat Cushion Adjustment Control Circuit High Current**
DTC	**B1B77-18**	**Seat Cushion Adjustment Control Circuit Low Current**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.

- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	**Seat Cushion Adjustment Control Circuit High Current**

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.

(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.

(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(d) Disconnect the seat connector.

(e) Turn ENGINE START STOP switch to ON and make all accessories operate.

(f) Using voltage band of multimeter, detect seat cushion ground and seat cushion power supply separately.

Multimeter Connection	Condition	Operating Voltage
Seat cushion (- power supply) - Ground	ENGINE START STOP switch "ON"	12 V
Seat cushion (- ground terminal) - Ground	ENGINE START STOP switch "ON"	0V

OK	**Replace seat assembly**
NG	**Handle and repair related wire harness**

DTC	**B1B71-18**	**Driver Seat Heating Control Circuit Low Current**
DTC	**B1B71-19**	**Driver Seat Heating Control Circuit High Current**
DTC	**B1B80-1A**	**Driver Heating NTC Input Value Small**
DTC	**B1B80-1E**	**Driver Heating NTC Input Value Nnchanged**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.

- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	Driver Seat Heating Control Circuit High Current

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.
(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.
(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.
(d) Disconnect the driver seat controller connector.
(e) Using ohm band of multimeter, detect driver seat heating cushion and driver seat controller separately.

Multimeter Connection	Condition	Specified Condition
Driver seat heating cushion (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seat heating cushion (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seat heating cushion (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver seat heating cushion (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replace seat module assembly**
NG	**Handle and repair related wire harness**

DTC	B1B72-18	Front Passenger Seat Heating Control Circuit Low Current
DTC	B1B72-19	Front Passenger Seat Heating Control Circuit High Current
DTC	B1B81-1A	Passenger Heating NTC Input Value Small
DTC	B1B81-1E	Passenger Heating NTC Input Value Nnchanged

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	**Front Passenger Seat Heating Control Circuit High Current**

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.
(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.
(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.
(d) Disconnect the driver seat controller connector.

(e) Using ohm band of multimeter, detect front passenger seat heating and driver seat controller separately.

Multimeter Connection	Condition	Specified Condition
Front passenger seat heating (- connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Front passenger seat heating (- connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Front passenger seat heating (- connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Front passenger seat heating (- connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replace seat assembly**
NG	**Handle and repair related wire harness**

DTC	**B1B73-19**	**Height Adjustment Control Circuit High Current**
DTC	**B1B73-18**	**Height Adjustment Control Circuit Low Current**
DTC	**B1B75-49**	**Seat Height Adjustment and Horizontal Control Circuit Internal Failure**
DTC	**B1B82-29**	**Height HALL Signal Input Signal Lost**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	**Height Hall (Hall Sensor) Signal Input Signal Lost**

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.
(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.
(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.
(d) Disconnect the driver seat controller connector.
(e) Using ohm band of multimeter, detect driver regulator motor and driver seat controller separately.

Multimeter Connection	Condition	Specified Condition
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Driver regulator motor (connected terminal) - Driver seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replace seat module assembly**
NG	**Handle and repair related wire harness**

DTC	**B1B78-19**	**Foot Rest Adjustment Control Circuit High Current**
DTC	**B1B78-18**	**Foot Rest Adjustment Control Circuit Low Current**
DTC	**B1B79-19**	**Leg Rest Adjustment Control Circuit High Current**
DTC	**B1B79-18**	**Leg Rest Adjustment Control Circuit Low Current**
DTC	**B1B7D-49**	**Foot Rest Adjustment Control Circuit Internal Fault**

DTC	B1B7D-19	Leg Rest Adjustment Control Circuit Internal Fault
DTC	B1B86-1A	Foot Rest HALL Signal Input Signal Lost
DTC	B1B86-1E	Leg Rest HALL Signal Input Signal Lost

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

Hint:
If the seat control module has similar faults, please refer to "Abnormal Seat Height and Horizontal Adjustment Control Circuit - Seat Adjustment Height and Horizontal Control Circuit Internal Failure" for troubleshooting.

1	**Foot Rest Adjustment Control Circuit High Current**

(a) Check sensor connectors, controller connectors for corrosion, poor contact, displacement and repair it if any symptom occurs.
(b) Check the continuity of sensor wire harness and replace wire harness if open circuit malfunction occurs.
(c) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.
(d) Disconnect the driver seat controller connector.

(e) Using ohm band of multimeter, detect driver leg rest motor and driver seat controller separately.

Multimeter Connection	Condition	Specified Condition
Foot rest motor (- connected terminal) - Front passenger seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Foot rest motor (- connected terminal) - Front passenger seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Foot rest motor (- connected terminal) - Front passenger seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Foot rest motor (- connected terminal) - Front passenger seat controller (- connected terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replace seat assembly**
NG	**Handle and repair related wire harness**

DTC	B1B85-54	Seat Missing Calibration

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution

- **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

1	**Seat Missing Calibration**

(a) Seat performs learning.

DTC	B1B85-29	Switch Button Stuck

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

1	**Switch damages**

(a) Replace switch.

DTC	B1B87-54	Rear View Mirror Switch Button Stuck

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to ON.
- Connect diagnostic tester (the latest software) to Data Link Connector (DLC).
- Confirm that malfunction is current, and carry out diagnostic test and repair procedures.
- If DTC cannot be cleared, malfunction is current.
- Only use a digital multimeter to measure voltage of electronic system.
- Refer to any Technical Bulletin that may apply to this malfunction.
- Visually check the related wire harness.
- Check and clean grounds related to the latest DTC.
- If multiple trouble codes were set, use circuit diagrams and look for any common ground circuit or power supply circuit applied to DTC.

⚠ Caution
• **When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.**

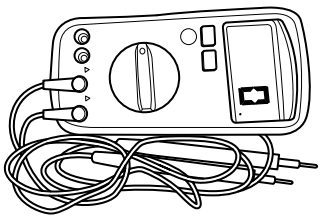
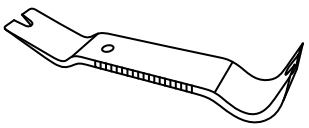
1	**Switch damages**

(a) Replace switch.

5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Digital Multimeter	 S00002
Interior Crow Plate	 S00020

5.2 Fasteners Torque List

■ Torque Specifications

Item	Tightening torque
Seat Control Module Fixing Bolt	2.5 ± 0.5 N·m
Seat Assembly Fixing Bolt	50 ± 5 N·m
Pipe Beam Fixing Bolt	50 ± 5 N·m
Pipe Beam Fixing Nut	50 ± 5 N·m
Double Buckle Assembly and Small Buckle Lock Assembly Fixing Bolt	50 ± 5 N·m
Rear Seatback Left Hook Assembly Bolt	25 ± 4 N·m
Seatback Left Connecting Bracket Assembly Bolt	50 ± 5 N·m
Left Power Seat Adjustment Switch Fixing Screw	1.5 ± 0.5 N·m
Right Power Seat Adjustment Switch Fixing Screw	1.5 ± 0.5 N·m
Rear Left Seat Adjustment Switch Assembly Fixing Screw	1.5 ± 0.5 N·m
Foot Rest Bracket Assembly Fixing Bolt	50 ± 5 N·m
Foot Rest Support Plate Assembly Fixing Bolt	50 ± 5 N·m

5.3 Seat Function Inspection

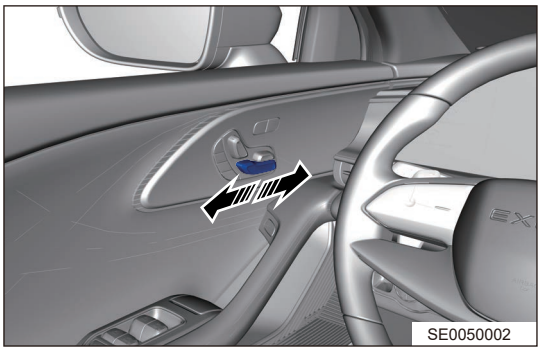
■ Seat Travel

Items	Front seat	Rear Seat
Front-back Adjustment	At designed position, the seat is adjustable from 180 mm forward and 60 mm backward.	/
Front-back Adjustment (-Front Passenger with Feet Rest)	At designed position, the seat is adjustable from 180 mm forward and 80 mm backward.	/
Seatback Angle	At designed position, the seat is adjustable from 30° forward and 50° backward.	Manual: Overall angle is 5°; Power: Overall angle is 7°.
Height Angle	At designed position, the seat is adjustable from 40 mm upward and 20 mm downward.	/
Driver Seat Foot Rest Adjustment	Overall stroke is 50 mm.	/

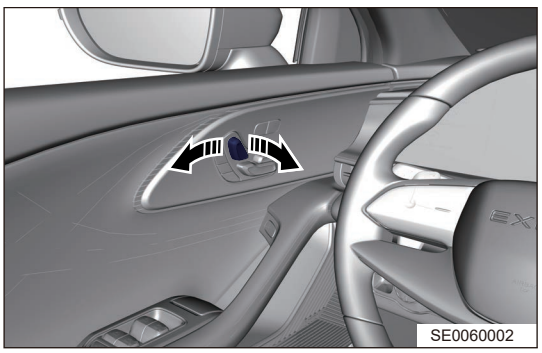
■ Inspection

After installation of seat assembly is completed, check the basic functions of seat assembly, and confirm that the following functions operate normally:

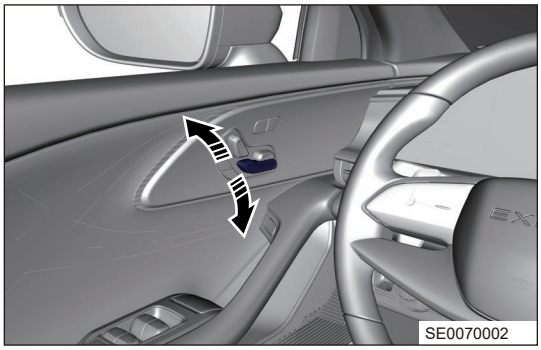
(1) When sliding seat to the foremost and rearmost positions by pressing the power seat adjustment switch, check if the following malfunctions of seat occur: heavy operation, high sliding resistance, stuck and motor noise. If above conditions occur, repair or replace in time.



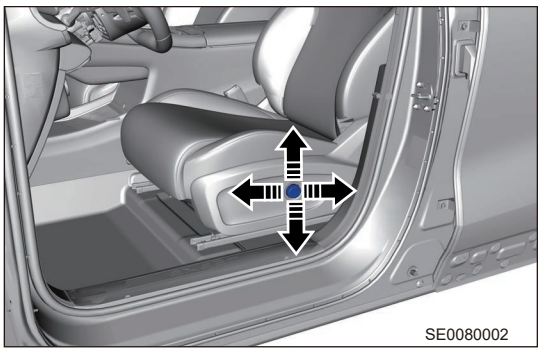
(2) Adjust the seat reclining to the maximum and minimum angles by pressing the power seat reclining adjustment switch, to check if seatback is heavily turned over and stuck, motor noise, etc. If above conditions occur, repair or replace in time.



(3) Adjust seat to the highest position and the lowest position by pressing power seat height adjustment switch (for driver side), to check if the operation of seat is heavy and stuck, and motor noise, etc. If above conditions occur, repair or replace in time.



(4) Press 4-way lumbar support adjustment switch (for driver side) to adjust seat to the limit positions of up, down, left and right to check if lumbar support stretches or retracts difficultly, air pocket is leaked and there is abnormal sound in air pump, etc. If above conditions occur, repair or replace in time.



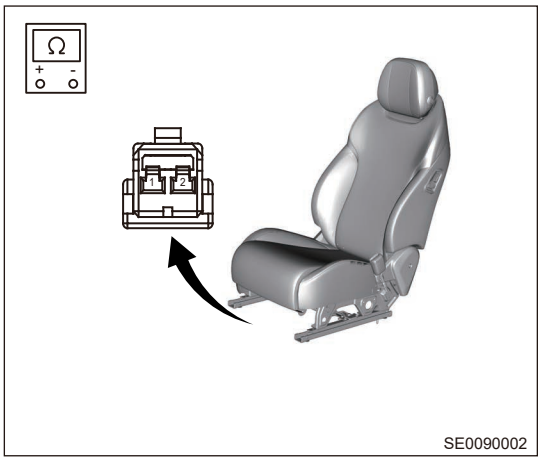
(5) Turn power switch to ON, seat belt reminder warning light on instrument cluster should be illuminated, after inserting the front seat belt tab into front seat belt buckle, seat belt reminder warning light should go off (only for seat with Seat Belt Unfasten Reminder (SBR)).

(6) For front passenger seat with SBR, when a passenger is detected in front passenger seat but the seat belt is not fastened, warning light on instrument cluster should be illuminated, after inserting the seat belt tab into seat belt buckle, seat belt reminder warning light should go off.

(7) Check the seat occupancy sensor (for front passenger side).

(8) Measure the resistance of occupancy sensor with a digital multimeter, standard resistance is shown in the table below:

Multimeter Connection	Condition	Specified Condition
Terminal 1 and Terminal 2	Occupied	< 100 Ω
Terminal 1 and Terminal 2	No occupied	> 400 Ω



5.4 Front Seat Assembly

■ Removal

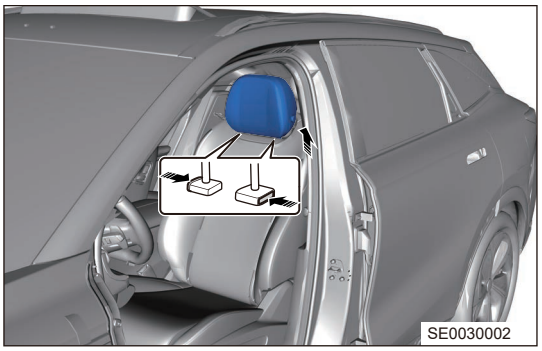
⚠ Warning

- **When removing driver seat assembly, be sure to wear safety equipment to prevent accidents.**
- **When removing driver seat assembly, appropriate force should be applied. Be careful not to operate roughly.**
- **DO NOT scratch interior and body paint when removing driver seat assembly.**

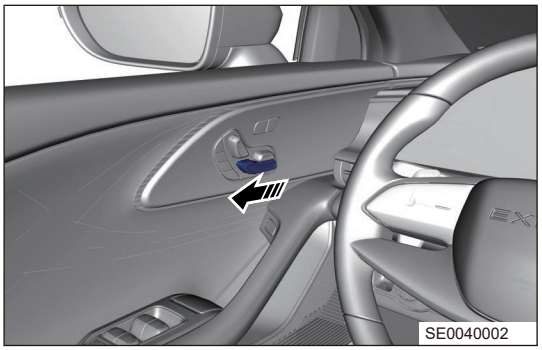
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

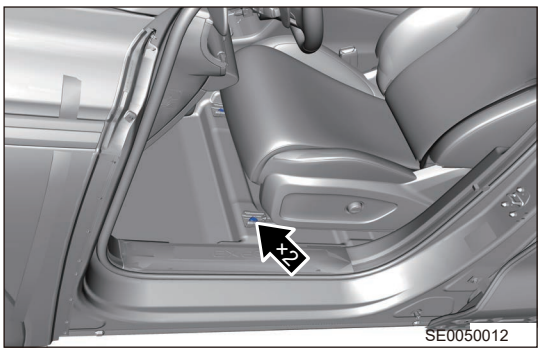
(3) When the seatback is adjusted to a higher angle backward, press the release button of seat headrest guide at the same time, and remove driver seat headrest assembly.



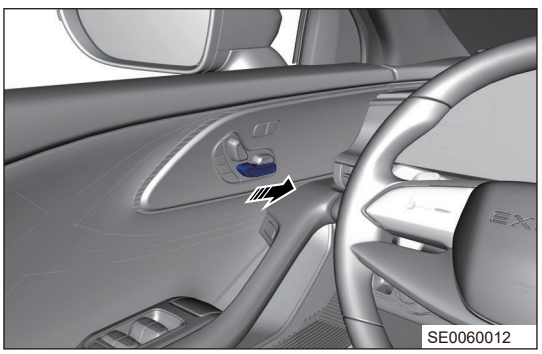
(4) Press power seat front-back adjustment switch, and move seat assembly to rearmost position.



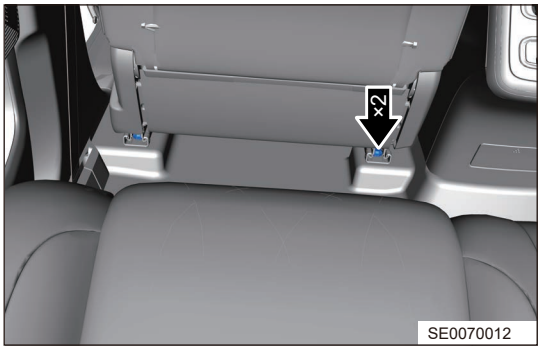
(5) Remove 2 fixing bolts from front side of seat assembly.



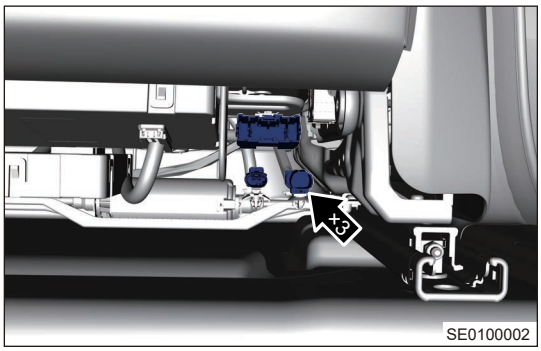
(6) Press power seat front-back adjustment switch, and move seat assembly to foremost position.



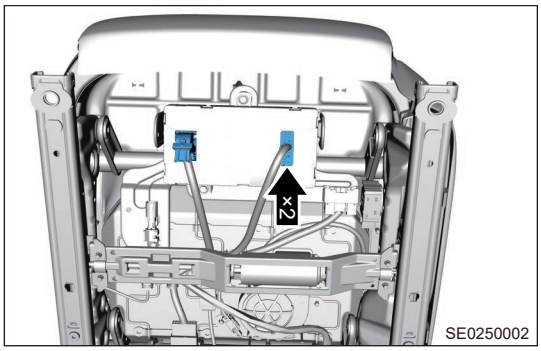
(7) Remove 2 fixing bolts from rear side of seat assembly.



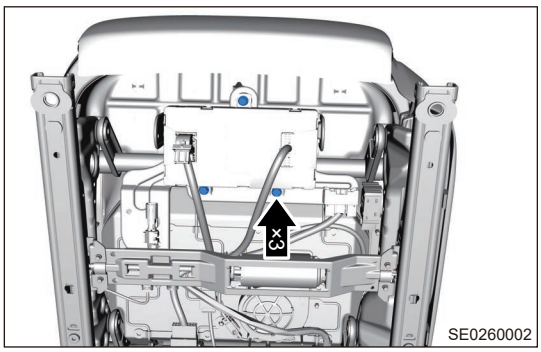
(8) Disconnect the wire harness connector associated with driver seat assembly, and remove the driver seat assembly.



(9) Disconnect the driver seat control module wire harness.



(10) Remove 3 fixing bolts from driver seat control module.



(11) Remove the driver seat control module.

■ Installation

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing seat assembly.**
- **When installing seat assembly, be careful not to damage the body paint surface.**
- **Try to prevent carpet from being scratched or damaged, when installing seat assembly.**

(1) Install 3 fixing bolts of driver seat control module.

Torque: 2.5 ± 0.5 N · m

(2) Install the driver seat control module wire harness.

(3) Install driver seat assembly, and connect wire harness connector associated with driver seat assembly.

(4) Install 2 fixing bolts to rear side of seat assembly.

Torque: 50 ± 5 N · m

(5) Press power seat front-back adjustment switch, and move seat assembly to rearmost position. Install 2 fixing bolts to front side of seat assembly.

Torque: 50 ± 5 N · m

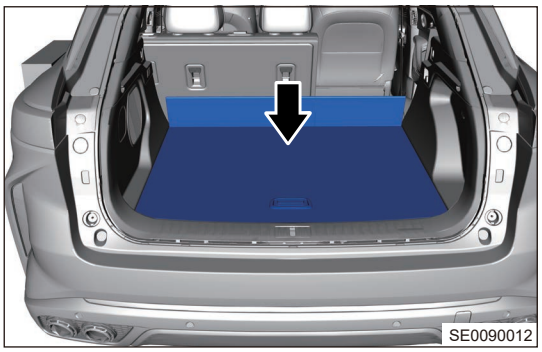
(6) Install driver seat headrest assembly.

(7) Connect the negative battery cable.

5.5 Rear Seat Assembly

■ Removal

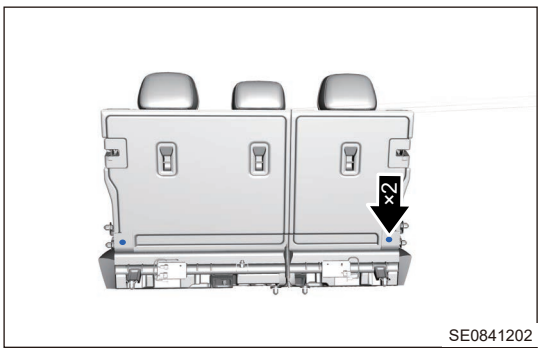
(1) Remove the luggage compartment carpet assembly.



(2) Remove the luggage compartment storage box.

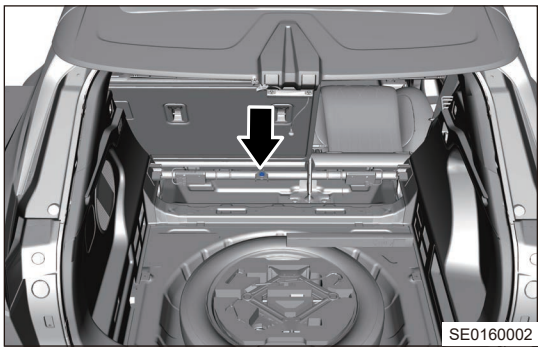
(3) Fold down the seatback and put it flat on the seat cushion.

(4) Remove 2 connecting bolts between seatback and rotary bracket.

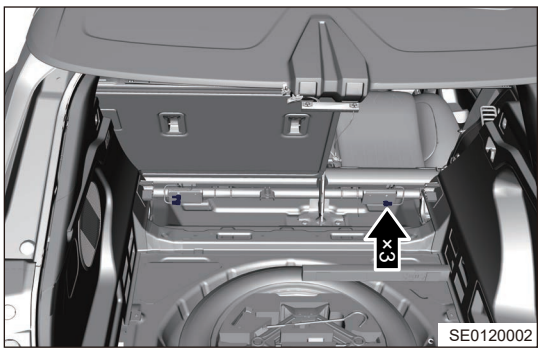


(5) Find a suitable angle and rotate rear right seatback to detach iron clip from rear right seatback, then remove rear right seatback.

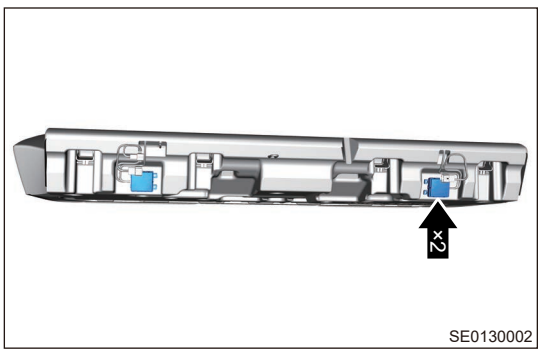
(6) Remove 1 fixing bolt from hook behind seat cushion.



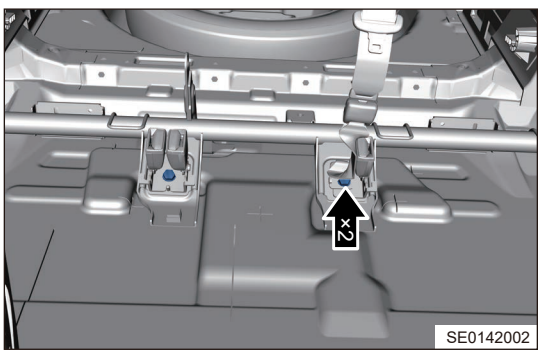
(7) Disconnect rear seat module connector, and remove the rear seat cushion.



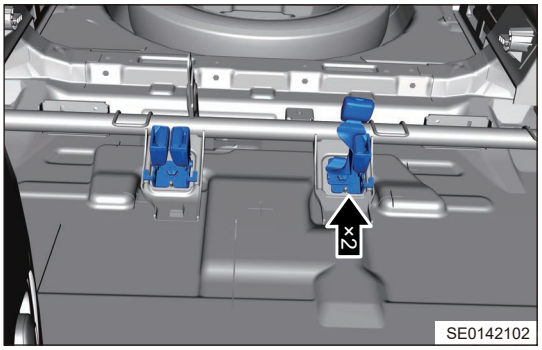
(8) Using an interior crow plate, carefully pry off module.



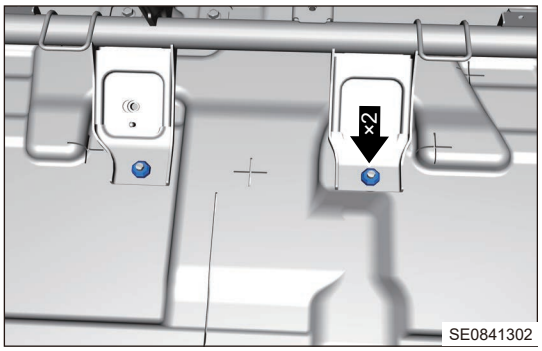
(9) Remove the fixing bolt from double buckle assembly and small buckle lock assembly.



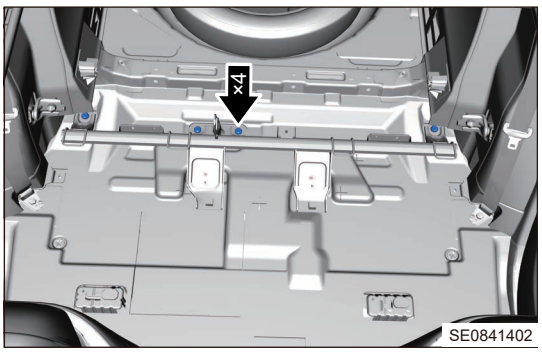
(10) Remove double buckle assembly and small buckle lock assembly.



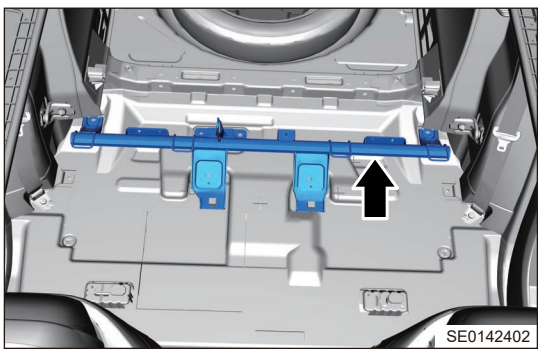
(11) Remove 2 fixing nuts from pipe beam.



(12) Remove 4 fixing bolts from pipe beam.



(13) Remove the pipe beam.



■ Installation

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing seat assembly.**
- **When installing seat assembly, be careful not to damage the body paint surface.**
- **Try to prevent carpet from being scratched or damaged, when installing seat assembly.**

(1) Install pipe beam to a proper position on body.

(2) Install 4 fixing bolts to pipe beam.

Torque: 50 ± 5 N · m

(3) Install 2 fixing nuts to pipe beam.

Torque: 50 ± 5 N · m

(4) Install double buckle assembly and small buckle lock assembly.

(5) Install the fixing bolt to double buckle assembly and small buckle lock assembly.

Torque: 50 ± 5 N · m

(6) Install the module.

(7) Connect rear seat module connector, and Install the rear seat cushion.

(8) Install 1 bolt from hook behind seat cushion.

(9) Put the rear left seatback assembly into vehicle from the door. Fold down the seatback and put it flat on the seat cushion, then insert the center pivot of the seatback into the round holes of ISOFIX bracket. Then, straighten up the seatback so that the claws on the seatback connecting bracket can smoothly clip into the square holes of seatback frame. Pre-tighten bolts, first pre-tighten the inner round holes (main positioning) and then pre-tighten the outer waist-shaped holes (auxiliary positioning), and confirm that the bolts and nuts on the seatback are not loose, then put the right seatback into vehicle from the door. Fold down the seatback and put it flat on the seat cushion, then insert the center rotary hole of the seatback into the pivot of the left rear seatback. Then, straighten up the seatback so that the claws on the seatback connecting bracket can smoothly clip into the square holes of seatback frame

(10) Install 2 bolts between seatback and rotary bracket.

(11) Install the luggage compartment storage box.

(12) Install the luggage compartment carpet assembly.

5.6 Rear Seatback Left Hook Assembly

■ Removal

⚠ Warning

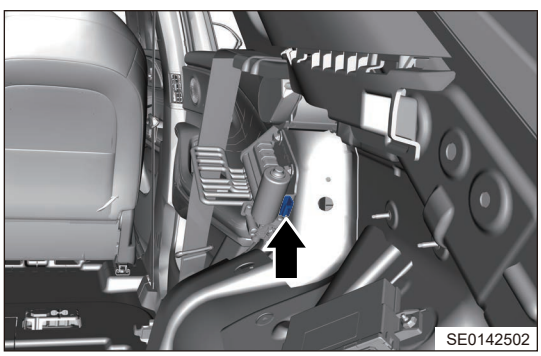
- **Be sure to wear safety equipment to prevent accidents, when removing rear seatback left hook assembly.**
- **Appropriate force should be applied, when removing rear seatback left hook assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing rear seatback left hook assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

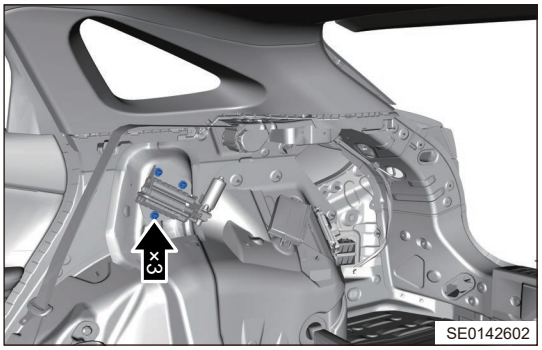
(2) Disconnect the negative battery cable.

(3) Remove the luggage compartment wheel house assembly.

(4) Disconnect rear seatback left hook assembly connector.



(5) Remove 3 fixing bolts and rear seatback left hook assembly.



■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing rear seatback left hook assembly.**
- **When installing rear seatback left hook assembly, be careful not to damage the body paint surface.**
- **When installing rear seatback left hook assembly, try to prevent carpet from being scratched or damaged.**

(1) Install the rear seatback left hook assembly to a proper position on body.

(2) Install 3 fixing bolts to rear seatback left hook assembly.

Torque: 25 ± 4 N · m

(3) Connect rear seatback left hook assembly connector.

(4) Install the luggage compartment wheel house assembly.

(5) Connect the negative battery cable.

5.7 Seatback Left Connecting Bracket Assembly

■ **Removal**

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing seatback left connecting bracket assembly.**
- **Appropriate force should be applied, when removing seatback left connecting bracket assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing seatback left connecting bracket assembly.**

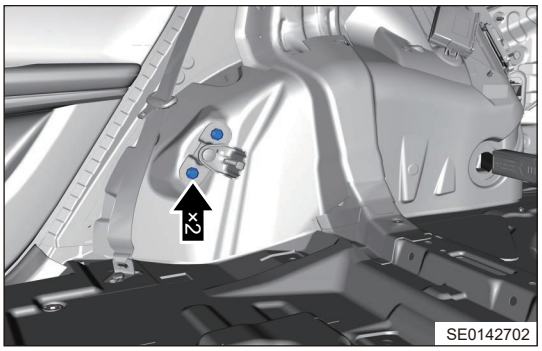
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the luggage compartment wheel house assembly.

(4) Remove 2 fixing bolts from seatback left connecting bracket assembly.

(5) Remove the seatback left connecting bracket assembly.



■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing seatback left connecting bracket assembly.**
- **When installing seatback left connecting bracket assembly, be careful not to damage the body paint surface.**
- **When installing seatback left connecting bracket assembly, try to prevent carpet from being scratched or damaged.**

(1) Install the seatback left connecting bracket assembly to a proper position on body.

(2) Install 2 fixing bolts to seatback left connecting bracket assembly.

Torque: 50 ± 5 N · m

(3) Install the luggage compartment wheel house assembly.

(4) Connect the negative battery cable.

5.8 Left Power Seat Adjustment Switch

■ **Removal**

⚠ Warning

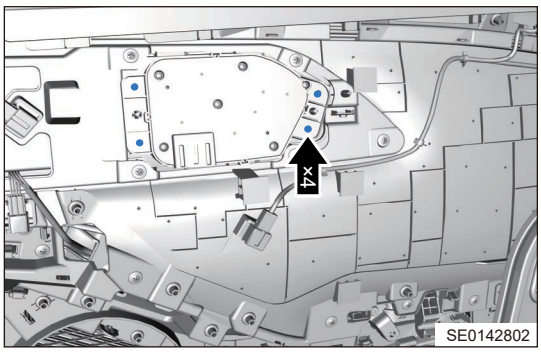
- **Be sure to wear safety equipment to prevent accidents, when removing left power seat adjustment switch.**
- **Appropriate force should be applied when removing left power seat adjustment switch. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing the left power seat adjustment switch.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

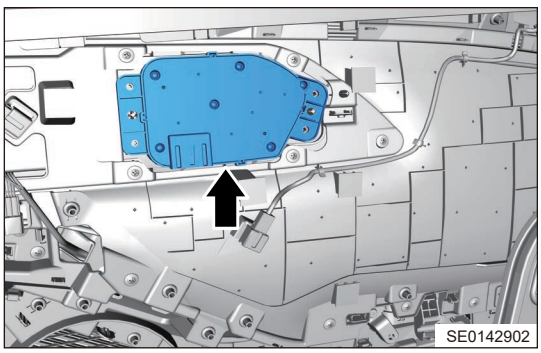
(2) Disconnect the negative battery cable.

(3) Remove the front left door protector assembly.

(4) Remove 4 fixing screws from left power seat adjustment switch.



(5) Remove the left power seat adjustment switch.



■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing left power seat adjustment switch.**
- **When installing left power seat adjustment switch, be careful not to damage the body paint surface.**
- **Try to prevent carpet from being scratched or damaged, when installing left power seat adjustment switch.**

(1) Install left power seat adjustment switch to proper position door protector handle.

(2) Install 4 fixing screws to left power seat adjustment switch.

Torque: 1.5 ± 0.5 N · m

(3) Install the front left door protector assembly.

(4) Connect the negative battery cable.

5.9 Right Power Seat Adjustment Switch

■ **Removal**

⚠ Warning

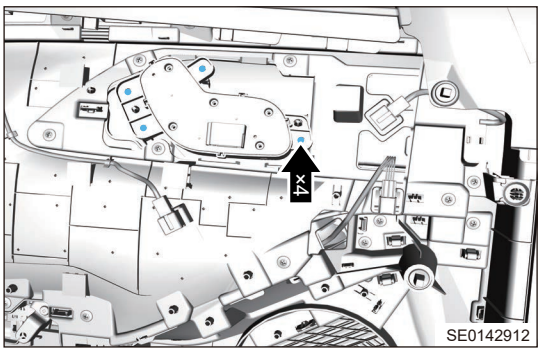
- **Be sure to wear safety equipment to prevent accidents, when removing right power seat adjustment switch.**
- **Appropriate force should be applied when removing right power seat adjustment switch. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing the right power seat adjustment switch.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

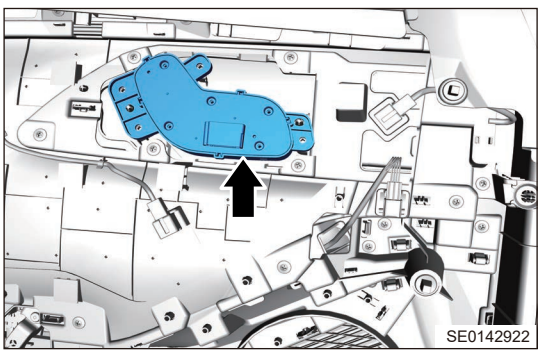
(2) Disconnect the negative battery cable.

(3) Remove the front right door protector assembly.

(4) Remove 4 fixing screws from right power seat adjustment switch.



(5) Remove the right power seat adjustment switch.



■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing right power seat adjustment switch.**
- **When installing right power seat adjustment switch, be careful not to damage the body paint surface.**
- **Try to prevent carpet from being scratched or damaged, when installing right power seat adjustment switch.**

(1) Install right power seat adjustment switch to proper position door protector handle.

(2) Install 4 fixing screws to right power seat adjustment switch.

Torque: 1.5 ± 0.5 N · m

(3) Install the front right door protector assembly.

(4) Connect the negative battery cable.

5.10 Rear Left Seat Adjustment Switch Assembly

■ **Removal**

⚠ Warning

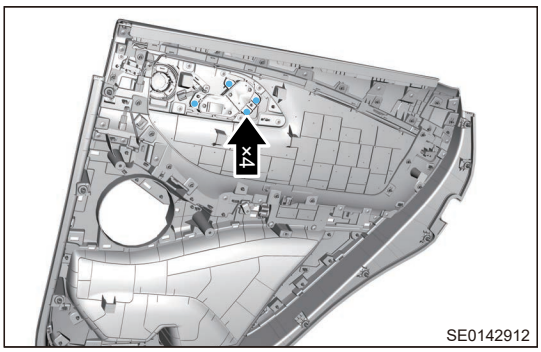
- **Be sure to wear safety equipment to prevent accidents, when removing rear left seat adjustment switch assembly.**
- **Appropriate force should be applied, when removing rear left seat adjustment switch assembly. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, assembly when removing the rear left seat adjustment switch assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

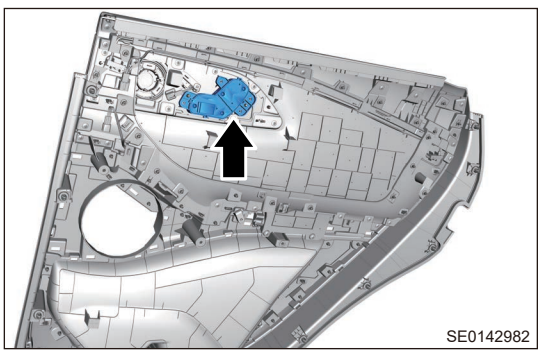
(3) Remove the rear left door protector assembly.

(4) Remove 4 fixing screws from rear left seat adjustment switch assembly.



SE0142912

(5) Remove the rear left seat adjustment switch assembly.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■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installingear left seat adjustment switch assembly.**
- **When installing rear left seat adjustment switch assembly, be careful not to damage the body paint surface.**
- **Try to prevent carpet from being scratched or damaged, when installing rear left seat adjustment switch assembly.**

(1) Install rear left seat adjustment switch assembly to proper position door protector handle.

(2) Install 4 fixing screws to rear left seat adjustment switch assembly.

Torque: 1.5 ± 0.5 N · m

(3) Install the rear left door protector assembly.

(4) Connect the negative battery cable.

5.11 Rear Seat Heating Switch

■ **Removal**

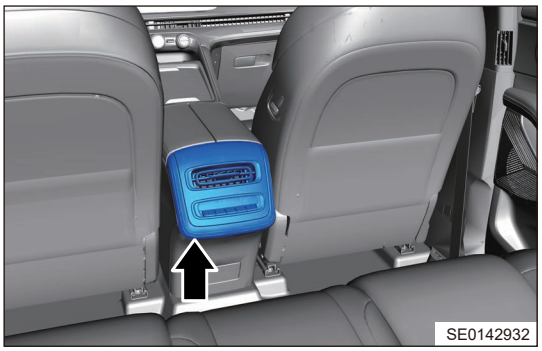
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing the rear seat heating switch.**
- **Appropriate force should be applied, when removing the rear seat heating switch. Be careful not to operate roughly.**
- **Try to prevent interior and body paint surface from being scratched, when removing the rear seat heating switch.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Using an interior crow plate, carefully pry off rear seat heating switch.



(4) Disconnect rear seat heating switch connector, and remove the rear seat heating switch.

■ **Installation**

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing the rear seat heating switch.**
- **When installing the rear seat heating switch, be careful not to damage the body paint surface.**
- **Try to prevent carpet from being scratched or damaged, when installing the rear seat heating switch.**

(1) Connect rear seat heating switch connector, and install the rear seat heating switch to a proper position on auxiliary fascia console.

(2) Connect the negative battery cable.

5.12 Foot Rest Bracket Assembly

■ Removal

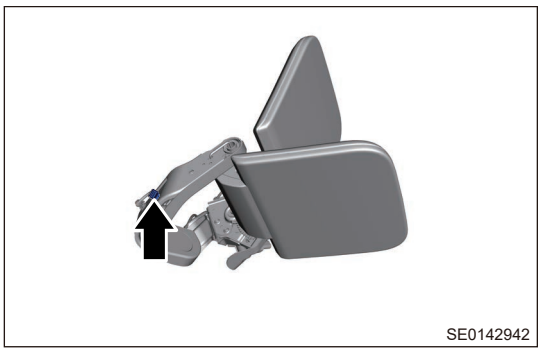
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing foot rest bracket assembly.**
- **Appropriate force should be applied, when removing foot rest bracket assembly. Be careful not to operate roughly.**
- **Prevent interior and body paint from being scratched, when removing foot rest bracket assembly.**

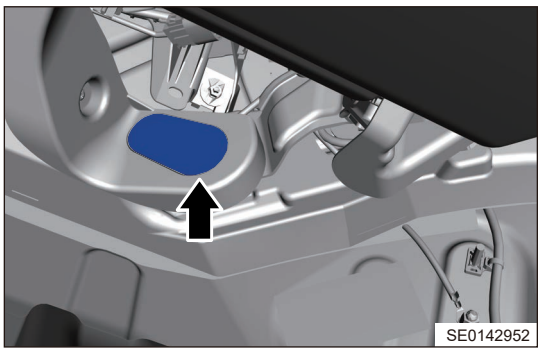
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

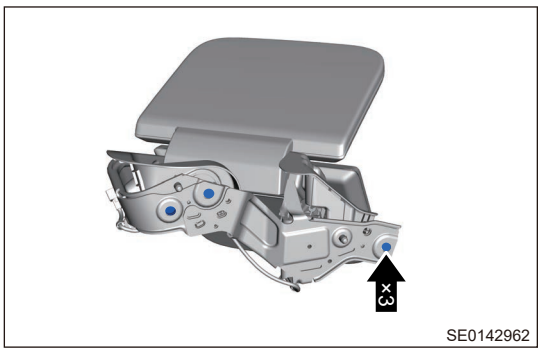
(3) Disconnect the foot rest connector.



(4) Using an interior crow plate, carefully pry off foot rest left bracket ornament.



(5) Remove 3 fixing bolts and foot rest carefully.



■ Installation

⚠ Caution

- **The foot rest left bracket ornament cover is hung on the bracket, therefore, pay attention to whether there are any missing parts when taking it out.**
- **The lowest position of the limit tooth plate: The limit position where limit tooth plate is rotated downwards to the limit bolt.**
- **During assembly, be careful not to squeeze the wire harness and water pipe after the procedure of instrument panel.**

(1) First check for damage and scratches, and check if any accessory has fallen off, then install qualified parts to the vehicle.

(2) Install the foot rest bracket assembly dowel pin into the sheet metal positioning hole, ensuring that the bracket installation hole is aligned with the sheet metal hole.

(3) Install 3 fixing bolts to foot rest.

Torque: 50 ± 5 N · m

(4) Rotate limit tooth plate to the lowest position, and confirm that motor is in closed state.

(5) Connect the foot rest bracket assembly circuit wire harness.

(6) Clip foot rest left bracket ornament cover into foot rest bracket assembly.

5.13 Foot Rest Support Plate Assembly

■ Removal

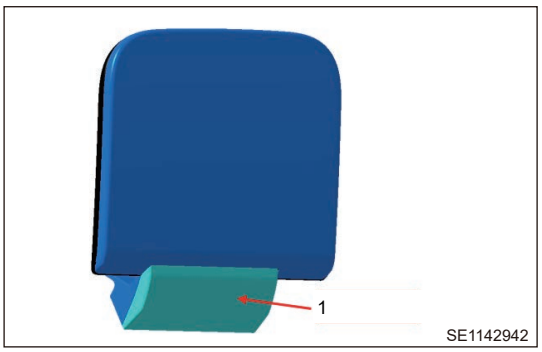
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing foot rest support plate assembly.**
- **Appropriate force should be applied, when removing foot rest support plate assembly. Be careful not to operate roughly.**
- **Prevent interior and body paint from being scratched, when removing foot rest support plate assembly.**

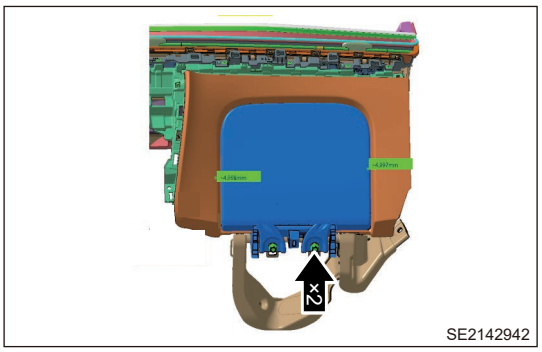
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Using an interior crow plate, carefully pry off lower trim cover (1).



(4) Remove 2 fixing bolts from foot rest support plate assembly.



(5) Remove the foot rest support plate.

■ Installation

⚠ Caution

- **The lower trim cover is packed separately, therefore, pay attention to whether there are any missing parts when taking it out.**
- **Foot rest support plate assembly fixing hole is an oval hole, and the clearance with instrument panel should be adjusted.**

(1) First check for damage and scratches, and check if any accessory has fallen off, then install qualified parts to the vehicle.
(2) Align foot rest support plate assembly fixing hole with bracket installation hole, and pre-tighten with standard parts.
(3) Adjust the clearance between support plate assembly and instrument panel, and tighten them finally.

Torque: 50 ± 5 N · m

(4) Clip lower trim cover into foot rest support plate assembly.
(5) Finally adjust foot rest support plate assembly to make it in closed state.

1.6 DOOR LOCK

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Be sure to wear necessary safety equipment to prevent accidents, when removing dual pull engine hood lock assembly.

(2) Be sure to wear safety equipment to prevent accidents, when removing engine hood cable assembly.

(3) Be sure to wear safety equipment to prevent accidents, when removing concealed door handle.

(4) Be sure to wear necessary safety equipment to prevent accidents, when removing front door key cylinder assembly.

1.2 Precautions

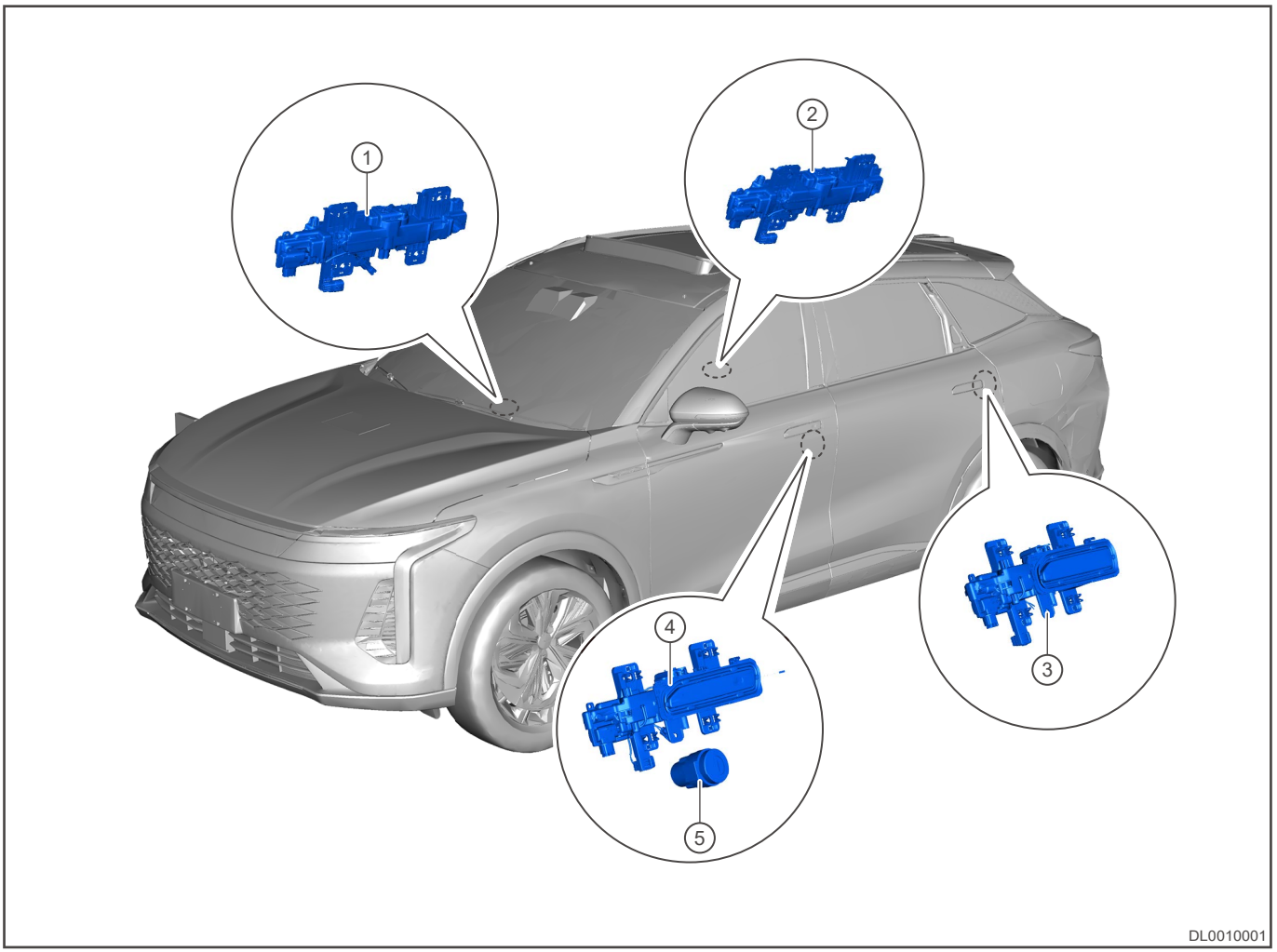
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Side door lock is secured to door inner panel with 3 bolts, evenly apply appropriate amount of thread lock adhesive to 5 to 7 teeth of 3 door lock mounting bolts in advance; pay attention to keep child lock being locked when assembling rear door lock.

(2) Align middle lines in up-down and left-right directions on lock striker with line on quarter, which should be ensured at the center of lock mechanism to ensure flexible locking and unlocking.

2 System Overview

2.1 System Components Diagram



1	Right Concealed Door Handle	4	Front Left Concealed Door Handle
2	Rear Right Concealed Door Handle	5	Key Cylinder Assembly
3	Rear Left Concealed Door Handle		

Door lock system is a device mounted on the door and its pillar, which can reliably lock the door and realize the opening and locking functions through its internal mechanism. It is a very important accessory of body. It has safety protection function, which must guarantee reliable locking of door in the normal use, preventing the door accident/unintentional recognition to open. It also guarantee that door needs to open smoothly, to ensure that door can open in normal or when an emergency occurs, so as not to cause casualties and property losses which belongs to safety regulations.

2.2 Concealed door handle system control strategy

■ Welcome function is activated and door handle is extended

(1) Precondition: (1&2)
1)Power mode: OFF;
2)Four door handles are in incomplete extended position (closed position/middle position);

(2) Trigger condition:
1)Receive a frame of welcome function status sent from BDM.

■ Switch power mode to OFF and extend door handle

(1) Precondition: (1&2&3)

1)Power mode: not OFF;
2)Four door handles are in incomplete extended position (closed position/middle position);
3)The vehicle is in central control unlocking status

(2) Trigger condition:
1)Detect that a frame of power mode is switched to OFF.

■ **Center control is unlocked, door handle is extended**

(1) Precondition: (1&2)
1)Four door handles are in incomplete extended position (closed position/middle position);

(2) Trigger condition:
1)Receive a frame of central control locking operation instruction sent from BDM (driver unlocking) or (passenger side unlocking) or (four-door unlocking)

■ **Door is opened, door handle is extended**

(1) 1. Operate either door inner handle

(2) Precondition: (1&2&3)
1)Power mode: OFF or ACC or ON or Crank or Running;
2)Four door handles are in incomplete extended position (closed position/middle position);

(3) Trigger condition:
1)Receive any door opening signal sent from BDM

■ **Vehicle crash occurs, door handle is extended**

(1) Precondition: (1&2)
1)Power mode: ON or Running;
2)Driver side door handle is in incomplete extended position (closed position/middle position);

(2) Trigger condition:
1)Receive a frame signal that CGW transmits ABM collision or a valid hard wire collision.

■ **If speed is greater than N, door handle retracts**

(1) Power mode: Running;

(2) Four door handles are in incomplete closed position;

(3) Receive four door closed signals sent from BDM.

(4) Trigger condition:
1)Vehicle speed ⩾ 5 km/h

■ **Keep away from WEL area, door handle retracts**

(1) Precondition: (1&2&3)
1)Power mode: OFF or remote mode;
2)Four door handles are in incomplete closed position;
3)The vehicle is in central control locking status.

(2) Trigger condition:
1)Receive a frame of welcome function status sent from BDM.

■ **Center control is locked, door handle retracts**

(1) Precondition: (1)
1)Door handle is in incomplete closed position;

(2) Trigger condition:
1)Receive a frame of central control locking operation instruction sent from BDM;

2.3 Electric releasing function specification

■ **In unlocked status, external/internal electric releasing microswitch, electric releasing is achieved**

(1) Precondition: (1&283&)

(2) Power mode: OFF, ACC, ON, Crank, Running;

(3) Receive Unlock status signal sent from BDM;

(4) Trigger condition: (1)

(5) Any door external/internal electric releasing microswitch signal jumps (from open to engage)

(6) Perform drive output: (1&2)

(7) Perform the corresponding door electric releasing;

(8) DCM sends door status signal and half latch signal in real time;

(9) Stop drive condition: (1&2)

(10) The corresponding door Open&Ajar signal is in door opening state;
(11) Electric releasing time > 300 ms (specific data to be calibrated);
(12) In locked state, prohibit external microswitch and shielded electric releasing
(13) Precondition: (1&2)
(14) Power mode: OFF, ACC, ON, Crank, Running;
(15) Trigger condition: (1)
(16) Receive LOCK status signal sent from BDM;
(17) Perform drive output: (1)
(18) Shield external microswitch signal input;
(19) In locked state, trigger internal microswitch, perform vehicle unlocking, activate electric releasing
(20) Precondition: (1&2&3&4)
(21) Power mode: OFF, ACC, ON, Crank, Running;
(22) Central control locking status sent from BDM is locking status;
(23) Vehicle speed ＜ 5 km/h;
(24) Trigger condition: (1)
(25) Trigger internal electric releasing switch twice;
(26) Perform drive output: (1&2)
(27) Press driver door switch once to perform vehicle central control unlocking, and press again to perform driver door electric releasing;
(28) In addition to driver door, press other door switches for the first time and start to time (at this time, do not cancel the vehicle central control, press the switch for the second time within 2s, perform the corresponding door electric releasing, and unlock the corresponding door lock; If the switch is pressed for the second time out of 2s, restart to time;
(29) Precondition: (1&2&3&4)
(30) Power mode: not OFF;
(31) Power position changes from ON to OFF within 1s;
(32) Receive collision status signal or hard wire signal sent from airbag;
(33) Trigger condition: (1)
(34) After receiving collision signal for 6s, detect enabled electric releasing switch (enabled electric releasing switch can be detected after 6s); (shield electric releasing function within 6s, cancel shielded electric releasing function after 6s).
(35) Perform drive output: (1)
(36) Activate enabled electric releasing switch, at this time, activate microswitch to activate electric releasing.
(37) Receive children lock locking feedback signal, shield electric releasing
(38) Precondition: (1&2&3)
(39) Power mode: OFF, ACC, ON, Crank, Running;
(40) Rear children lock is locked;
(41) Trigger condition: (1)
(42) Receive children lock locking feedback signal:
(43) ChildSafetySts==0x2: Lock;
(44) Perform drive output: (1)
(45) Shield rear internal door electric releasing function;
(46) Receive vehicle speed signal, shield electric releasing
(47) Precondition: (1&2)
(48) Power mode: ON, CRANK, Running;
(49) Vehicle mode; expect transport mode;
(50) Trigger condition: (1)
(51) Vehicle speed ⩾ 5 Km/h;
(52) Perform drive output: (1)
(53) Shield internal/external electric releasing switch enable signal;

(54) Abnormal scenario

(55) Electric releasing function mainly has the following exception handling strategies: stuck: (1) During electric releasing, if Ajar&Open signal jump is not detected for a period of 300 ms (specific data calibration), perform scenario (2) logic: The full output is performed up to three times. If there is no jump all the time, DCM will give a feedback of error message through CAN bus, and instrument panel will display the current error "electric door failure" and perform reset routine; (2) DCM detects that Ajar signal changes, and performs scenario (3) logic: electric releasing door lock enters the snow load mode and waits for 5s; Within 5s, when Door Open signal is detected to change, DCM directly performs reset operation to complete electric releasing. After 5s, DCM directly drives electric releasing door lock reset, and then determines Door Open signal again after resetting. If Door Open signal still does not change, enter the process of Scenario 1:

⚠ Caution

- **After electric releasing function fails, electric releasing function completes a new cycle, and the current fault is considered to disappear.**
- **After the vehicle is powered off, it will be powered on again for 30 times, and DCM will reset electric releasing motor once;**
- **The priority is electric releasing, electric reset, central control locking and children lock**

(56) Locking function

(57) Precondition: (1)

(58) Power mode: OFF, ACC, ON, Crank, Running;

(59) Trigger condition: (1)

(60) DCM receives locking command sent from BDM;

(61) Perform drive output: (1)

(62) DCM outputs 200 ms ± 50 ms drive door locking motor, perform four-door locking;

(63) Unlocking function

(64) Precondition: (1 & 2)

(65) Power mode: OFF, ACC, ON, Crank, Running;

(66) Trigger condition: (1&2&3)

(67) DCM receives unlocking command sent from BDM;

(68) DCM receives unlocking command sent from BDM;

(69) DCM receives unlocking command sent from BDM;

(70) Perform drive output: (1&2&3)

(71) DCM outputs 200 ms ± 50 ms drive door locking motor, perform driver door unlocking output;

(72) DCM outputs 200 ms ± 50 ms drive door locking motor, perform other door unlocking output expect driver door;

(73) DCM outputs 200 ms ± 50 ms drive door locking motor, perform driver door + other door unlocking output;

(74) Collision unlocking

(75) Precondition: (1&2)

(76) Power mode: ON, Crank, Running;

(77) Ignition switch is switched to OFF from ON within 1s;

(78) Trigger condition: (1)

(79) DCM receives a valid CAN collision signal. CrashOutputSts status is changed from 0 to non-0 || valid hard wire collision signal.

(80) Perform drive output: (1)

(81) DCM immediately drives locking motor to perform 2 unlocking operations: Driver door unlocking output and passenger door unlocking output are valid for 200 ms at the same time, children lock unlocking output is 200 ms after waiting for 100 ms, this is a collision unlocking operation after waiting for 100 ms Perform collision unlocking operation again after waiting for 400 ms;

(82) Children lock locking function

(83) Precondition: (1)

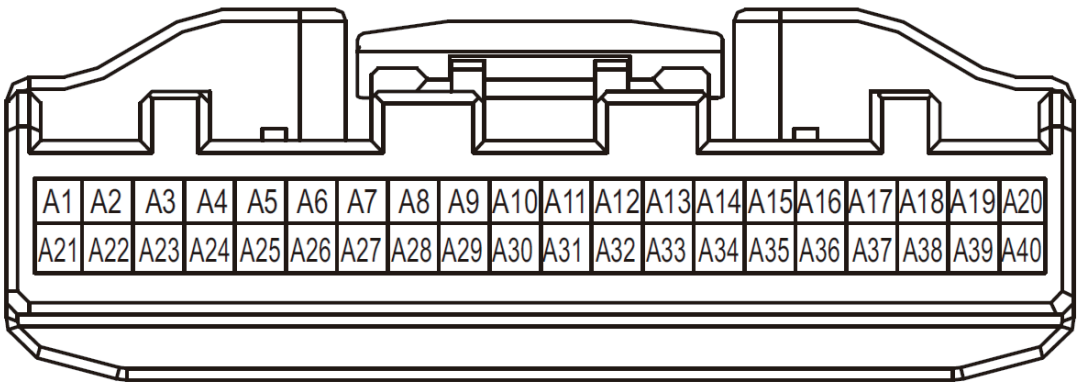
(84) Electronic children lock configuration word is 0x1:Present;
(85) Trigger condition: (1)
(86) Perform drive output: (1)
(87) Perform children lock locking output for 200 ms;
(88) Children lock unlocking function
(89) Precondition: (1)
(90) Electronic children lock configuration word is 0x1:Present;
(91) Trigger condition: (1)
(92) DCM receives children lock unlocking command sent from BDM;
(93) Perform drive output: (1)
(94) Perform children lock unlocking output for 200 ms;

			Logic level					
			Electric releasing	Reset	Locking	Unlocking	Children lock locking	Children lock unlocking
Driver	20 - 2	Electric releasing motor jump	1	0	0	1	/	/
	20 - 1	Electric releasing motor reset (- common terminal)	0	1	0	1	/	/
	20 - 10	Head unit central control lock motor +	0	1	1	0	/	/
Front Passeng-er	20 - 11	Front passenger central control lock motor +	0	1	1	0	/	/
	20 - 5	Electric releasing motor reset (- common terminal)	0	1	0	1	/	/
	20 - 4	Electric releasing motor jump	1	0	0	1	/	/
Rear Left Door	20 - 13	Rear left children lock motor	0	1	0	1	0	1
	20 - 14	Rear left door lock motor +	0	1	1	0	1	0

	20 - 7	Rear left releasing motor +	1	0	0	1	1	0
	20 - 6	Left rear common terminal	0	1	0	1	1	0
Rear Right Door	20 - 15	Rear right children lock motor -	0	1	0	1	0	1
	20 - 16	Rear right door lock motor +	0	1	1	0	1	0
	20 - 20	Rear right releasing motor +	1	0	0	1	1	0
	20 - 9	Rear right common terminal	0	1	0	1	1	0

3 System Schematic Diagram

3.1 Door Module A Terminal Definition

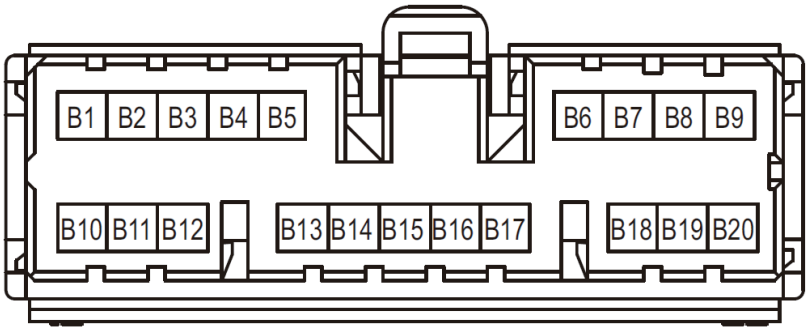


DL0086101

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
A1	Front Left Door- Concealed Door Handle Motor +	A21	-
A2	Front Left Door- Concealed Door Handle Motor -	A22	-
A3	Front Right Door- Concealed Door Handle Motor +	A23	-
A4	Front Right Door- Concealed Door Handle Motor -	A24	Front Left Door- Concealed Door Handle Switch +

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
A5	Rear Left Door- Concealed Door Handle Motor +	A25	Front Right Door- Concealed Door Handle Switch +
A6	Rear Left Door- Concealed Door Handle Motor -	A26	Rear Left Door- Concealed Door Handle Switch +
A7	Rear Right Door- Concealed Door Handle Motor +	A27	Rear Right Door- Concealed Door Handle Switch +
A8	Rear Right Door- Concealed Door Handle Motor -	A28	Front Left Door Electric Releasing Switch
A9	Analog Ground	A29	Collision Signal Input
A10	B-CAN H	A30	Front Right- Door Lock Motor Door Open Signal
A11	B-CAN L	A31	Rear Left- Door Lock Motor Door Open Signal
A12	-	A32	Rear Right- Door Lock Motor Door Open Signal
A13	-	A33	Front Left- Door Lock Motor Door Open Signal
A14	-	A34	Front Right- Door Lock Motor Door Open Signal
A15	-	A35	Rear Left- Door Lock Motor Door Open Signal
A16	Front Left Door- Concealed Door Handle HALL +	A36	Rear Right- Door Lock Motor Door Open Signal
A17	Front Right Door - Concealed Door Handle HALL +	A37	Front Right Door Electric Releasing Switch
A18	Rear Left Door- Concealed Door Handle HALL +	A38	Rear Left Door Electric Releasing Switch
A19	Rear Right Door- Concealed Door Handle HALL +	A39	Rear Right Door Electric Releasing Switch
A20	Front Left- Door Lock Motor Door Open Signal	A40	-

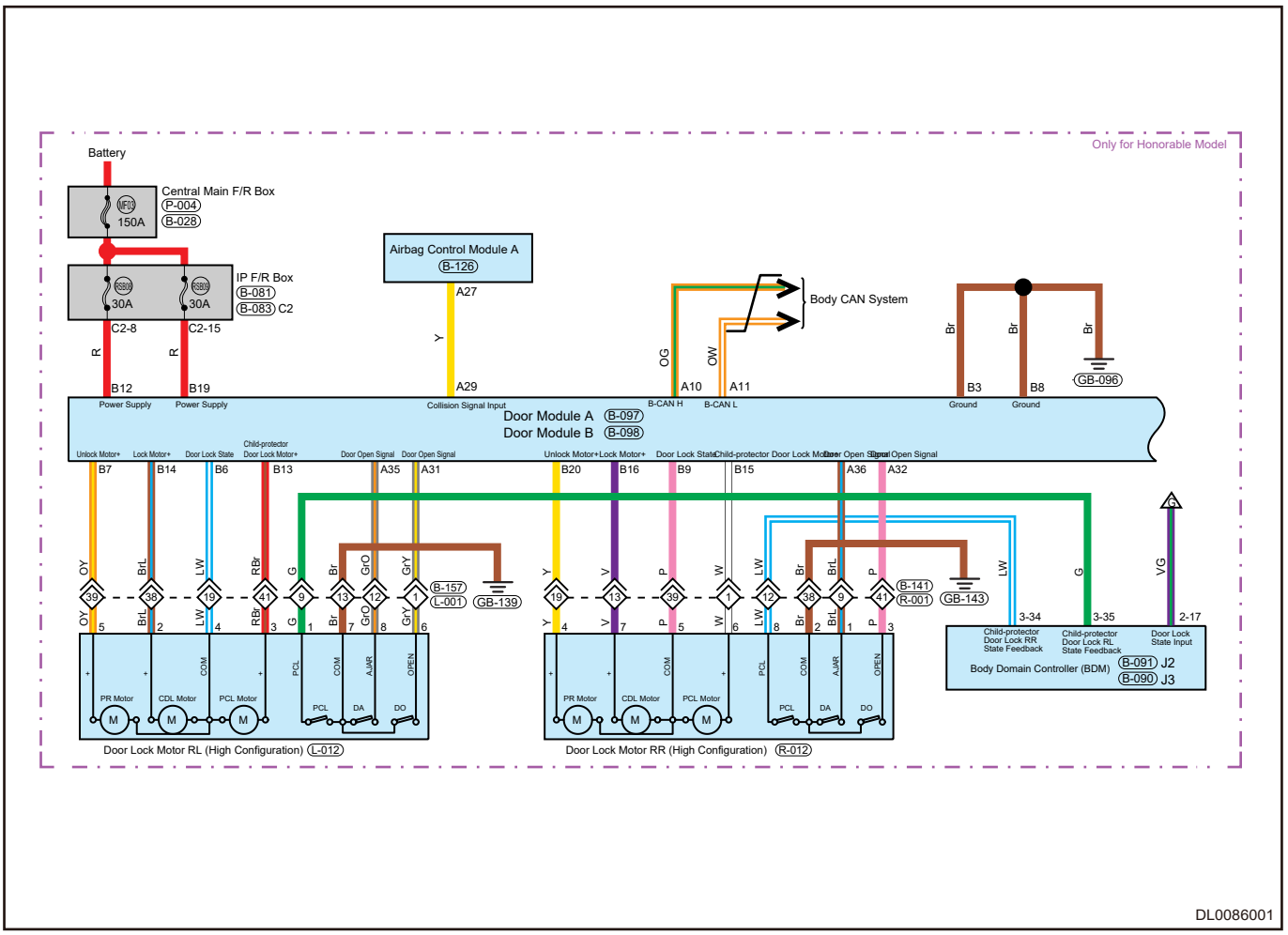
3.2 Door Module B Terminal Definition



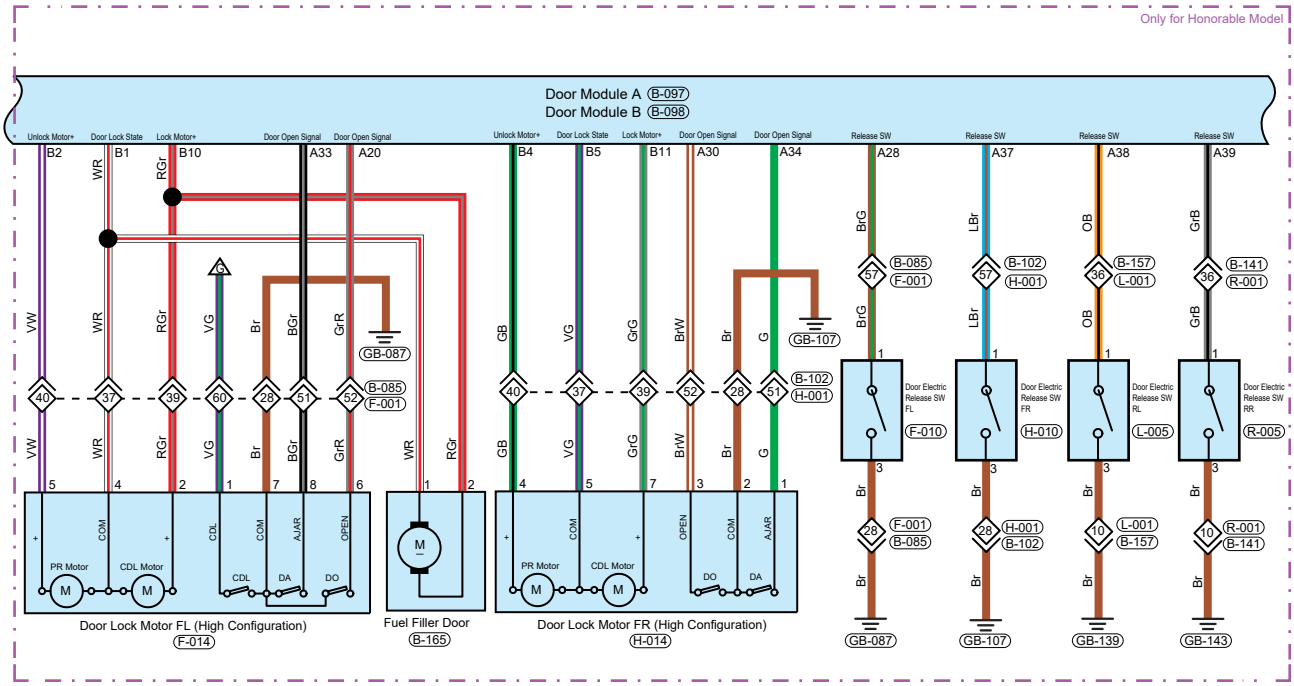
DL0086201

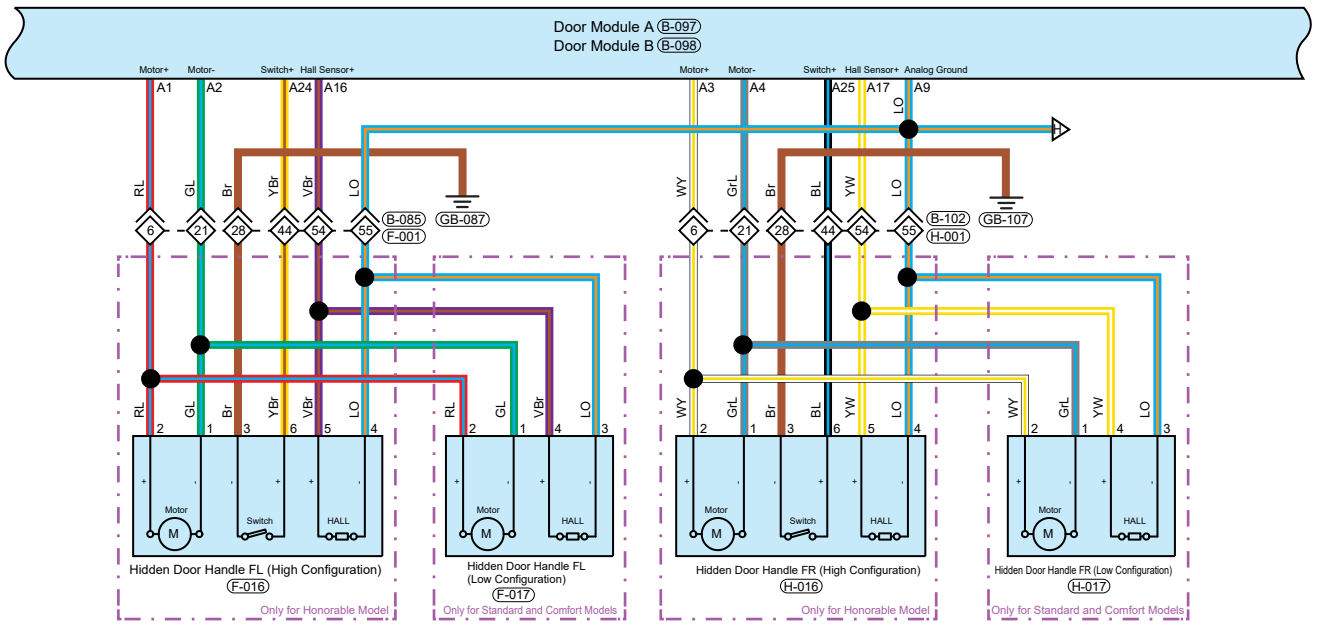
Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
B1	Front Left- Door Lock Motor/Fuel Filler Cap Door Lock Status	B11	Front Right- Door Lock Motor Locking Motor +
B2	Front Left- Door Lock Motor Unlocking Motor +	B12	Power Supply
B3	Ground	B13	Rear Left- Door Lock Motor Children Lock Motor +
B4	Front Right- Door Lock Motor Unlocking Motor +	B14	Rear Left- Door Lock Motor Locking Motor +
B5	Front Right- Door Lock Motor Door Lock Status	B15	Rear Right- Door Lock Motor Children Lock Motor +
B6	Rear Left- Door Lock Motor Door Lock Status	B16	Rear Right- Door Lock Motor Locking Motor +
B7	Rear Left- Door Lock Motor Unlocking Motor +	B17	-
B8	Ground	B18	-
B9	Rear Right- Door Lock Motor Door Lock Status	B19	Power Supply
B10	Front Left- Door Lock Motor/Fuel Filler Cap Locking Motor +	B20	Rear Right- Door Lock Motor Unlocking Motor +

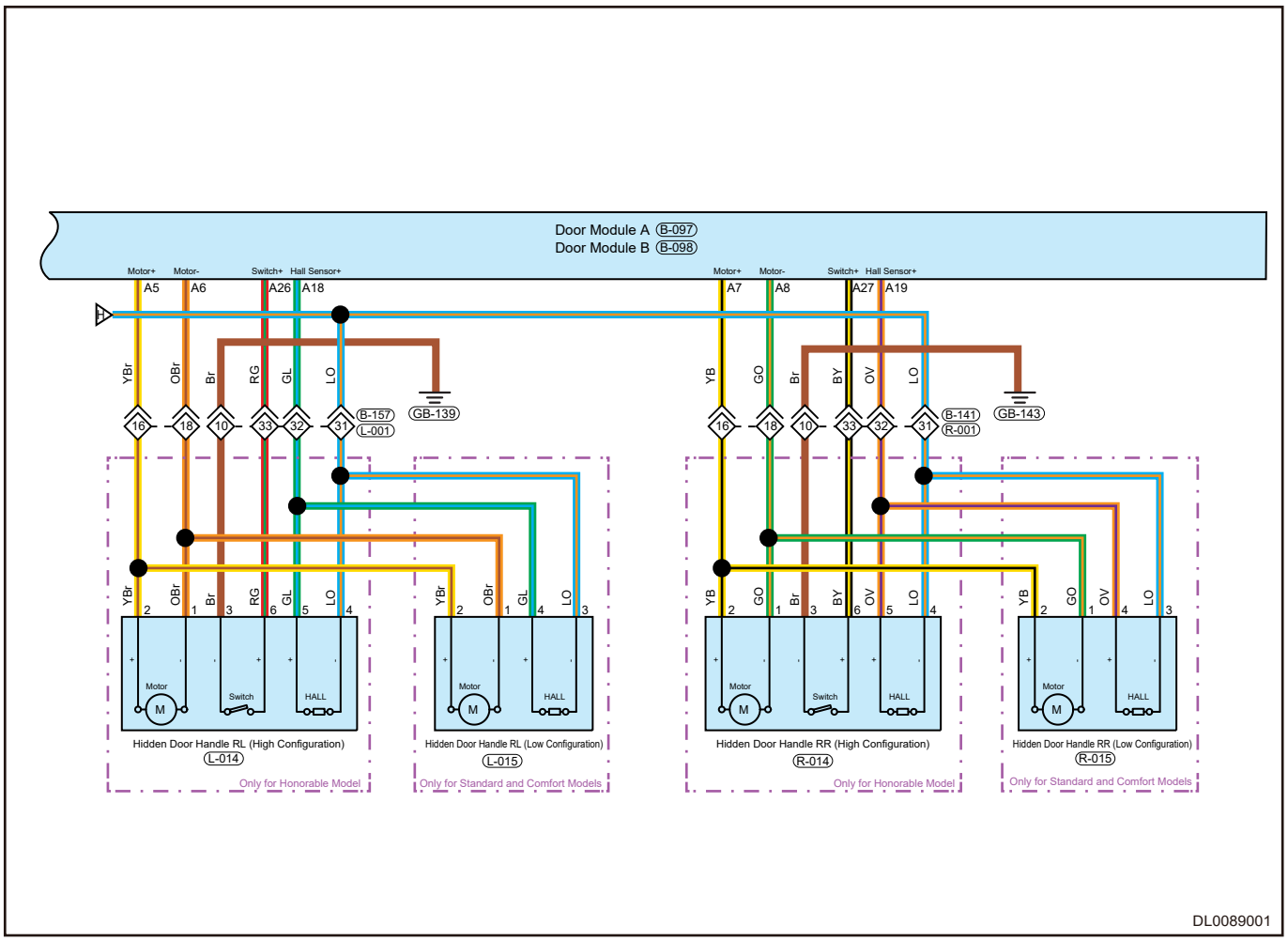
3.3 Circuit Diagram



DL0086001


Only for Honorable Model
Door Module A B-097
Door Module B B-098
Unlock Motor+
Door Lock State
Lock Motor+
Door Open Signal
Door Open Signal
B2
B1
B10
A33
A20
B4
B5
B11
A30
A34
A28
A37
A38
A39
Release SW
GB-087
GB-107
B-085
F-001
B-102
H-001
B-157
L-001
B-141
R-001
F-010
H-010
L-005
R-005
Door Electric Release SW FL
Door Electric Release SW FR
Door Electric Release SW RL
Door Electric Release SW RR
PR Motor
CDL Motor
COM
CDL
AJAR
OPEN
DA
DO
Door Lock Motor FL (High Configuration)
F-014
Fuel Filler Door
B-165
Door Lock Motor FR (High Configuration)
H-014
GB-139
GB-143
DL0087001


Door Module A B-097
Door Module B B-098
Motor+ Motor- Switch+ Hall Sensor+
A1 A2 A24 A16
RL GL Br YBr VBr LO
6 21 28 44 54 55
B-085 F-001
GB-087
Motor+ Motor- Switch+ Hall Sensor+ Analog Ground
A3 A4 A25 A17 A9
WY GrL Br BL YW LO
6 21 28 44 54 55
B-102 H-001
GB-107
Hidden Door Handle FL (High Configuration)
F-016
Only for Honorable Model
Hidden Door Handle FL (Low Configuration)
F-017
Only for Standard and Comfort Models
Hidden Door Handle FR (High Configuration)
H-016
Only for Honorable Model
Hidden Door Handle FR (Low Configuration)
H-017
Only for Standard and Comfort Models
Motor
Switch
HALL
DL0088001



4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

Hint:

Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Power door lock control system:

Symptom	Suspected Area
All door lock/unlock functions do not operate	Body Domain Controller (BDM) fuse
	Power door unlock/lock switch button
	Front left door lock assembly
	Other door lock assemblies
	Wire harness or connector
	Body Domain Controller (BDM)
Only driver side door lock/unlock function does not operate	Power door unlock/lock switch button
	Front left door lock assembly
	Wire harness or connector

Symptom	Suspected Area
	Body Domain Controller (BDM)
Only passenger side door lock/unlock function does not operate	Front right door lock assembly
	Wire harness or connector
	Body Domain Controller (BDM)
Only rear left door lock/unlock function does not operate	Rear left door lock assembly
	Wire harness or connector
	Body Domain Controller (BDM)
Only rear right door lock/unlock function does not operate	Rear right door lock assembly
	Wire harness or connector
	Body Domain Controller (BDM)
Only back door open/close function does not operate	Back door lock assembly
	Wire harness or connector
	Body Domain Controller (BDM)

Wireless door lock control system:

Symptom	Suspected Area
Only wireless control function does not operate	Wireless key battery
	Anti-theft matching
	Wire harness or connector
	Body Domain Controller (BDM)

4.2 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the door lock system.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

OK

Standard voltage: Not less than 12 V.

Result

Result	Proceed to
OK	A
NG	B

B → Replace battery

A

3	Customer problem analysis

Next

4	Read DTCs

Result

Result	Proceed to
DTC occurs	A
No DTC	B

B → Customer problem analysis

Next

5	Conduct test and confirm malfunction has been repaired

Next → End

4.3 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.4 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check door lock system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.

- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.5 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.6 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Possible Cause
U0129-87	Lost Communication with BSM	Network fault
U0151-87	Lost Communication with ABM	
U0140-87	Lost Communication with BCM	
U1300-55	Software Configuration Error	
U0073-88	Control Module Communication Bus Off CAN Busoff	
U3000-51	Control Module Not Programmed	

DTC	**U0129-87**	**Lost Communication with BSM**

DTC	**U0151-87**	**Lost Communication with ABM**

DTC	**U0140-87**	**Lost Communication with BCM**

DTC	**U1300-55**	**Software Configuration Error**

DTC	**U0073-88**	**Control Module Communication Bus Off CAN Busoff**

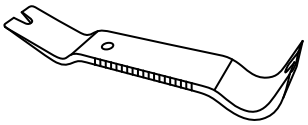
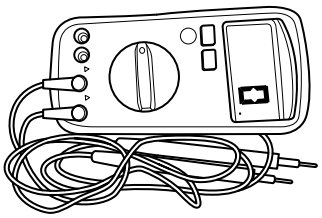
DTC	**U3000-51**	**Control Module Not Programmed**

Refer to CAN communication system for the above fault.

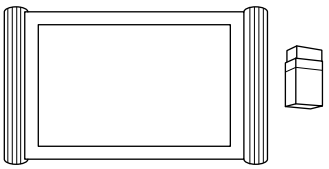
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020
Digital Multimeter	 S00002

■ Special Tool

Tool Name	Tool Drawing
Diagnostic tester	 S00001

5.2 Specifications

■ Torque Specifications

Item	Tightening torque
Dual Pull Engine Hood Lock Fixing Bolt	10 ± 1.5 N·m
Concealed Door Handle Fixing Screw	5 ± 1 N·m
Key Cylinder Fixing Screw	5 ± 1 N·m
Side Door Lock Striker Fixing Screw	25 ± 3 N·m
Door Lock Fixing Screw	9 ± 1.5 N·m
Back Door Lock Fixing Bolt	25 ± 3 N·m

5.3 Dual Pull Engine Hood Lock Assembly

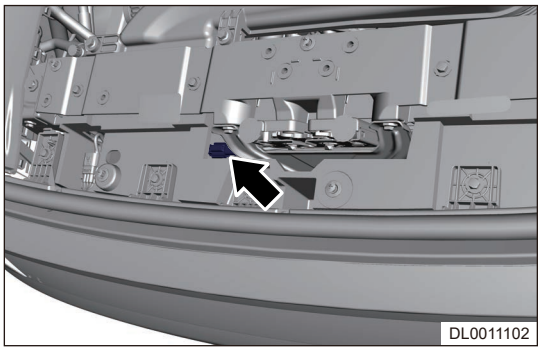
■ Removal

⚠ Warning

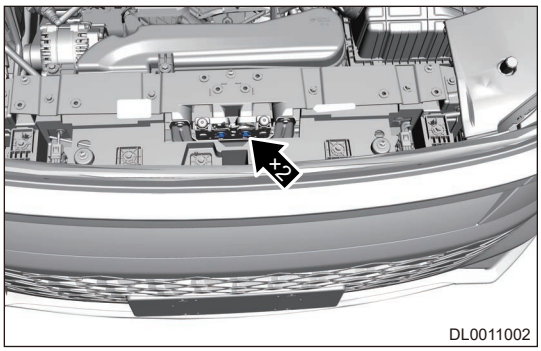
- **Be sure to wear necessary safety equipment to prevent accidents, when removing dual pull engine hood lock assembly.**
- **Try to prevent body paint surface from being scratched when removing dual pull engine hood lock assembly.**

(1) Remove the engine compartment trim cover front assembly.

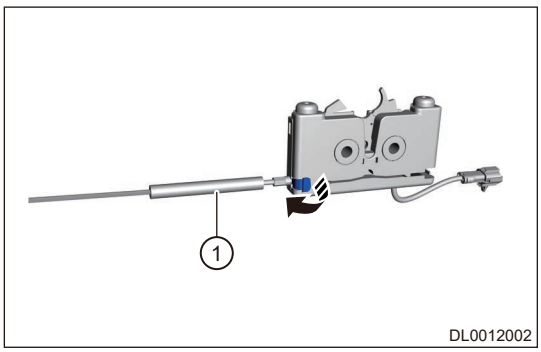
(2) Disconnect the connector.



(3) Remove 2 fixing bolts from dual pull engine hood lock assembly.



(4) Release clip, disengage dual pull engine hood lock cable assembly ① from slot and remove dual pull engine hood lock assembly.



■ Installation

⚠ Caution

- **Check if dual pull engine hood lock operates properly after installing dual pull engine hood lock assembly.**
- **Be careful not to install cable with anti-misoperation mark reversed.**
- **Be sure to clamp in place, otherwise, there will be a risk of falling off.**

(1) First clamp engine hood lock cable on lock body firmly without looseness and press clip before installing engine hood lock.

(2) Install dual pull engine hood lock assembly to tank upper crossmember assembly, and then tighten 2 fixing bolts.

Torque: 10 ± 1.5 N·m

(3) Connect the connector.

(4) Install the engine compartment trim cover front assembly.

5.4 Engine Hood Cable Assembly

■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing engine hood cable assembly.**
- **Try to prevent interior and body paint from being scratched, when removing engine hood cable assembly.**

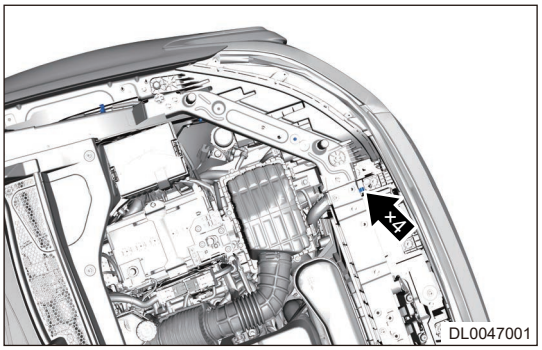
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

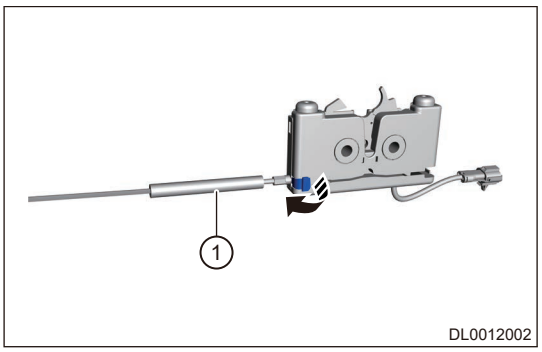
(3) Remove the wing assembly.

(4) Remove dual pull engine hood lock assembly.

(5) Disengage fixing clip from engine hood cable assembly.

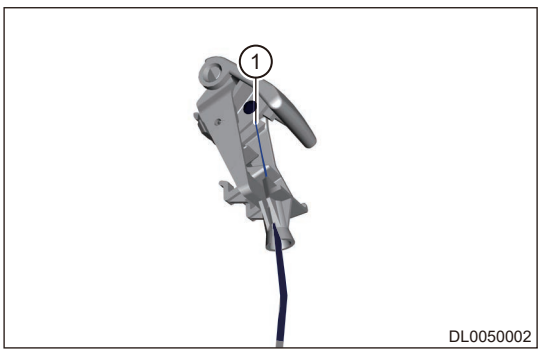


(6) Release clip, disengage dual pull engine hood lock cable assembly ① from slot and remove dual pull engine hood lock assembly.



(7) Remove the instrument panel lower left protector assembly.

(8) Disengage dual pull engine hood lock cable assembly (1) from engine hood grip assembly.



(9) Remove dual pull engine hood lock cable assembly.

■ **Installation**

⚠ Caution

- **Check if dual pull engine hood lock operates properly after installing dual pull engine hood lock assembly.**
- **Be careful not to install cable with anti-misoperation mark reversed.**
- **Be sure to clamp in place, otherwise, there will be a risk of falling off.**

(1) Install dual pull engine hood lock cable to a proper position of engine hood grip.
(2) Install the instrument panel lower left protector assembly.
(3) Install dual pull engine hood lock cable to a proper position of engine hood lock and press clip.
(4) Install fixing clip to engine hood cable assembly.
(5) Install dual pull engine hood lock assembly.
(6) Install the wing assembly.
(7) Connect the negative battery cable.

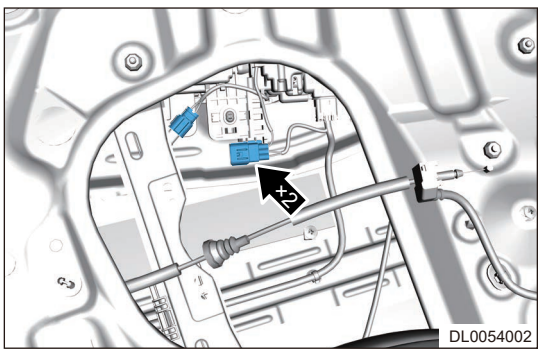
5.5 Concealed Door Handle Assembly

■ **Removal**

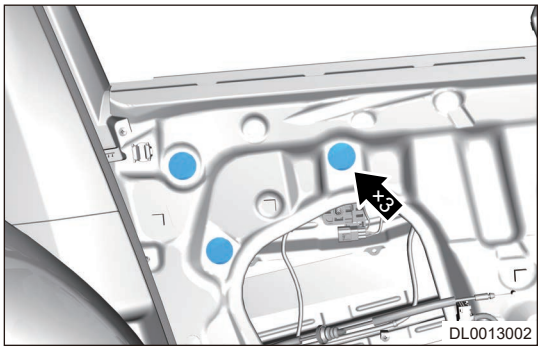
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, assembly when removing concealed door handle assembly.**
- **Try to prevent interior and body paint surface from being scratched, when removing concealed door handle assembly.**
- **Use the same removal/installation method for other three door handles and front left concealed door handle (key cylinder sub-assembly is only for driver door, not for the other three doors).**

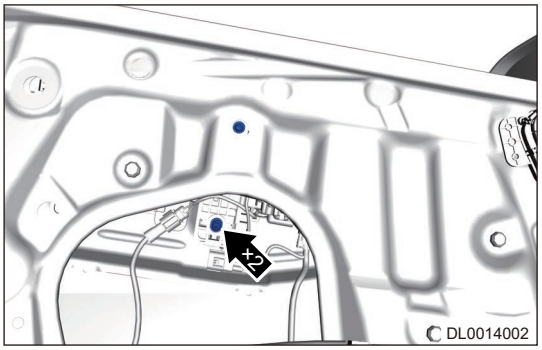
(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left door inner protector assembly.
(4) Remove the front left door glass assembly.
(5) Remove the front left door glass regulator assembly.
(6) Disconnect the concealed door handle connector.



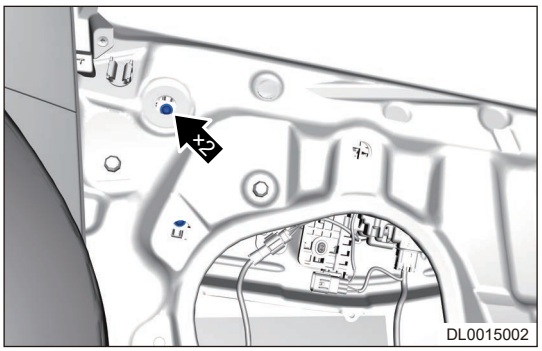
(7) Remove 3 block covers.



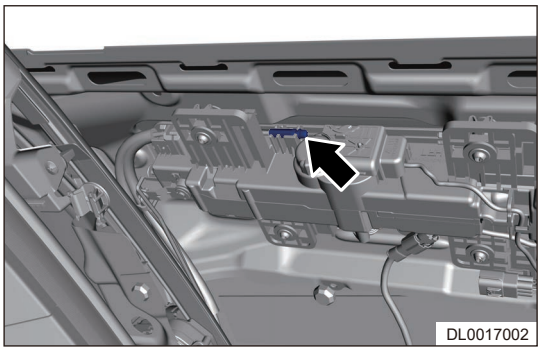
(8) Remove 2 fixing screws from concealed door handle.



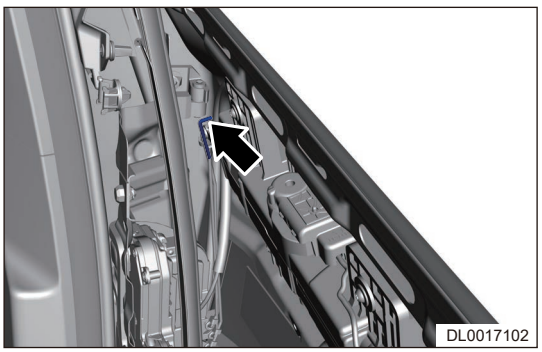
(9) Remove 2 fixing screws from concealed door handle.



(10) Disengage front door outside push rod from slot of front door handle base.



(11) Detach connecting clip from front door key cylinder pull rod.



(12) Remove the concealed door handle.

■ Installation

⚠ Caution

- **Check if connector is installed correctly when installing concealed door handle.**
- **Install clips and cables in place when installing concealed door handle.**
- **Check if front door lock operates properly after installing concealed door handle.**

(1) Install concealed door handle to a proper position of body.

(2) Install the front door key cylinder pull rod.

(3) Install the front door outside push rod.
(4) Install 2 fixing screws to concealed door handle.
Torque: 5 ± 1 N·m

(5) Install 2 fixing screws to concealed door handle.
Torque: 5 ± 1 N·m

(6) Install 3 block covers.
(7) Connect the concealed door handle connector.
(8) Install the front left door glass regulator assembly.
(9) Install the front left door glass assembly.
(10) Install the front left door inner protector assembly.
(11) Connect the negative battery cable.

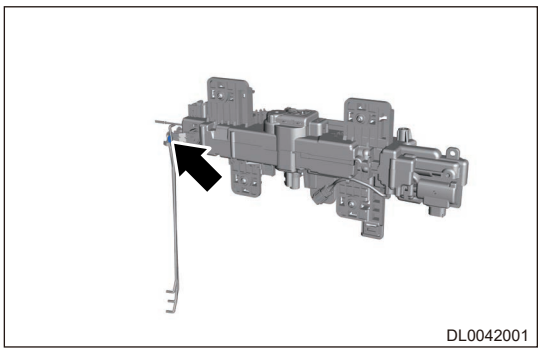
5.6 Front Door Key Cylinder Assembly

■ Removal

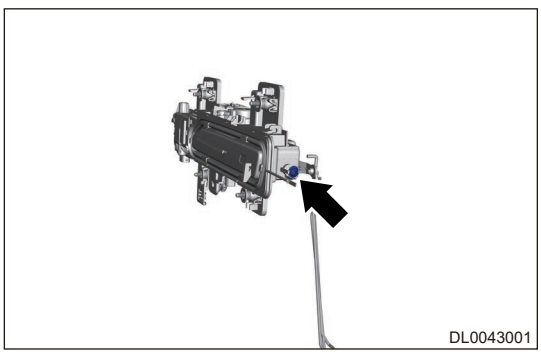
⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing front door key cylinder assembly.**
- **Try to prevent body paint surface from being scratched, when removing front door key cylinder assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left door inner protector assembly.
(4) Remove the front left door glass assembly.
(5) Remove the front left door glass regulator assembly.
(6) Remove the concealed door handle.
(7) Disengage the key cylinder lever.


DL0042001

(8) Remove 1 fixing screw from side of key cylinder.


DL0043001

(9) Remove the key cylinder assembly.

■ **Installation**

⚠ Caution

- **Install clip on lever in place when installing front door key cylinder assembly.**
- **Check if front door key cylinder operates properly, after installing front door key cylinder assembly.**

(1) Install key cylinder assembly to a proper position of body.
(2) Install 1 fixing screw to side of key cylinder.
Torque: 5 ± 1 N·m
(3) Install the key cylinder lever.
(4) Install the concealed door handle.
(5) Install the front left door glass regulator assembly.
(6) Install the front left door glass assembly.
(7) Install the front left door inner protector assembly.
(8) Connect the negative battery cable.

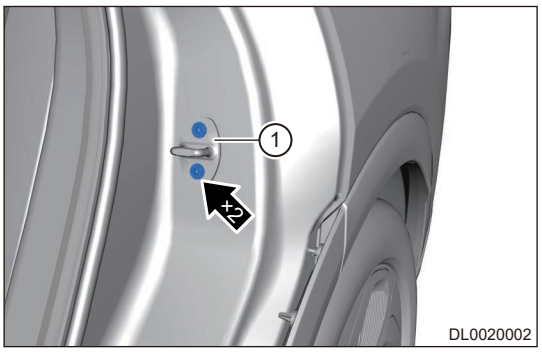
5.7 Front Door Lock Striker

■ **Removal**

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing front door lock striker assembly.**
- **Try to prevent body paint surface from being scratched, when removing front door lock striker assembly.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

(1) Remove 2 fixing screws from front door lock striker assembly, and remove front left door lock striker assembly (1).



■ **Installation**

⚠ Caution

After installing lock striker to body, make left side of lettering face up and right side face down.

(1) Install 2 fixing screws to front door lock striker assembly.
Torque: 25 ± 3 N·m

5.8 Front Left Door Lock Assembly

■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing front left door lock assembly.**
- **Try to prevent interior and body paint surface from being scratched, when removing front left door lock assembly.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

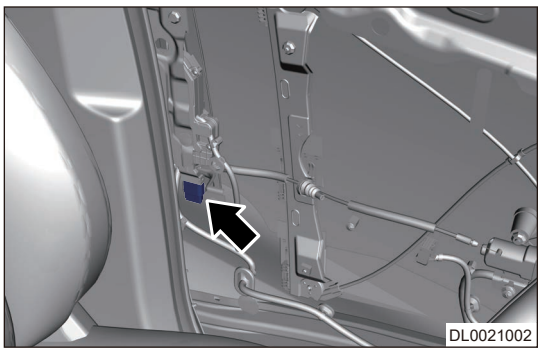
(2) Disconnect the negative battery cable.

(3) Remove the front left door inner protector assembly.

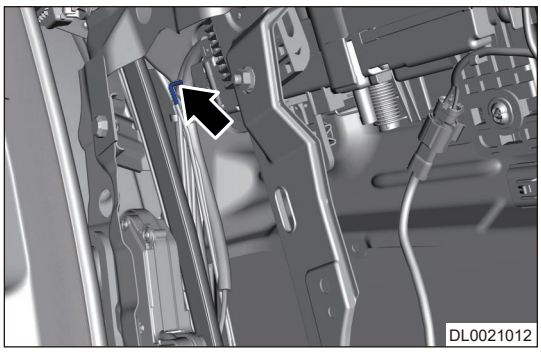
(4) Remove the front left door glass assembly.

(5) Remove the front left door glass regulator.

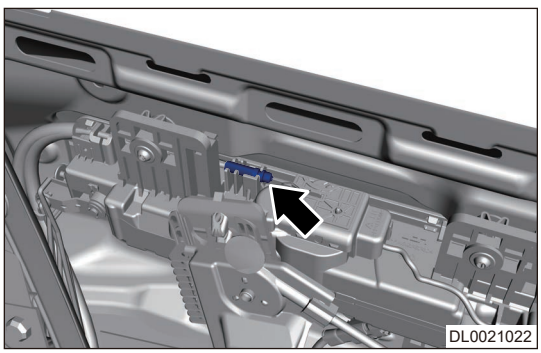
(6) Disconnect the door lock connector.



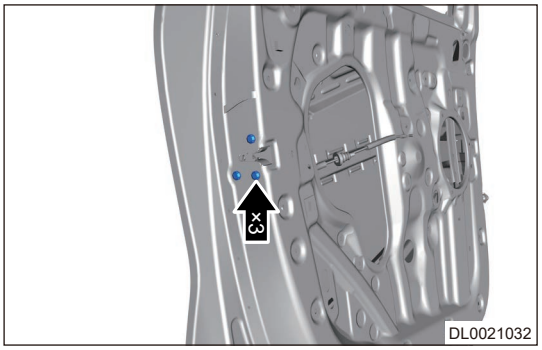
(7) Detach connecting clip from front door key cylinder pull rod.



(8) Disengage front door outside push rod from slot of front door handle base.



(9) Remove 3 fixing screws and the front door lock assembly.



■ **Installation**

⚠ Caution

- **Check if connector is installed correctly, when installing front door lock assembly.**
- **Install the clips and cables in place, when installing front door lock assembly.**
- **Check if front door lock operates properly, after installing front door lock assembly.**

(1) Install front door lock assembly to a proper position of body, and install 3 fixing screws to front door lock assembly.

Torque: 9 ± 1.5 N·m

(2) Install the front door outside push rod.

(3) Install the front door key cylinder pull rod.

(4) Install the door lock connector.

(5) Install the front left door glass regulator.

(6) Install the front left door glass assembly.

(7) Install the front left door inner protector assembly.

(8) Connect the negative battery cable.

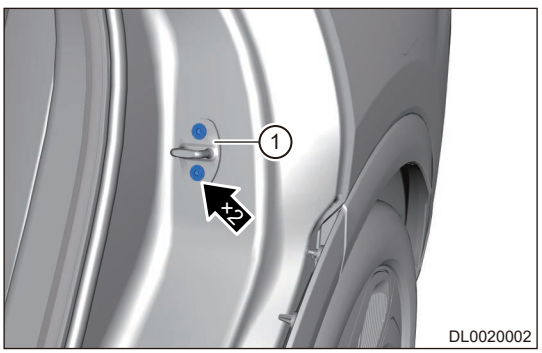
5.9 Rear Door Lock Striker

■ **Removal**

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing rear door lock striker.**
- **Try to prevent body paint surface from being scratched, when removing rear door lock striker.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

(1) Remove 2 fixing screws from rear door lock striker, and remove rear door lock striker assembly (1).



■ **Installation**

⚠ Caution
After installing lock striker to body, make left side of lettering face up and right side face down.

(1) Install 2 fixing screws to rear door lock striker .

Torque: 25 ± 3 N·m

5.10 Back Door Lock Assembly

■ **Removal**

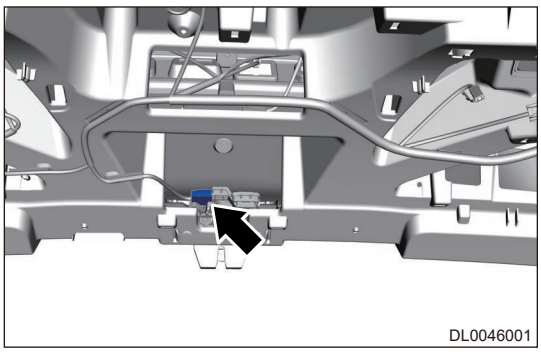
⚠ Warning
• **Be sure to wear necessary safety equipment to prevent accidents, when removing back door lock assembly.** • **Try to prevent interior and body paint from being scratched, when removing back door lock assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

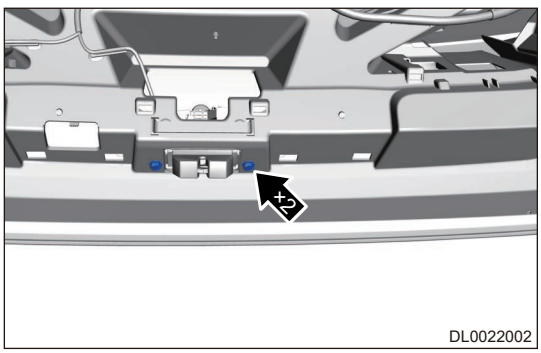
(2) Disconnect the negative battery cable.

(3) Remove the back door lower protector assembly.

(4) Disconnect connector from back door lock assembly.


DL0046001

(5) Remove 2 fixing bolts (arrow) from back door lock assembly, and remove the back door lock assembly.


DL0022002

■ **Installation**

⚠ Caution
• **Check if connector is installed correctly, when installing back door lock assembly.** • **Check if back door lock assembly operates properly, after installing back door lock assembly.**

(1) Install 2 fixing bolts to back door lock assembly.

Torque: 25 ± 3 N·m

⚠ Caution
There is no clearance in the mating surface between lock body back plate and sheet metal to prevent lead being pressed.

(2) Connect connector to back door lock assembly.

(3) Install the back door lower protector assembly.

(4) Connect the negative battery cable.

5.11 Back Door Lock Striker Assembly

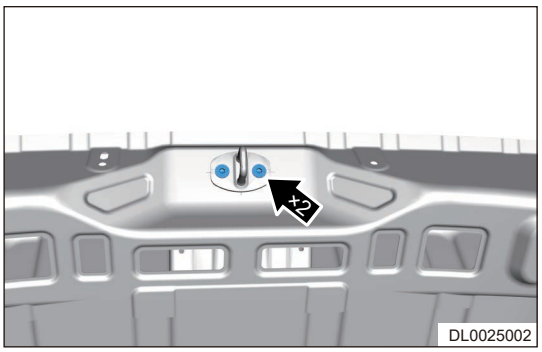
■ Removal

⚠ Warning

- **Be sure to wear necessary safety equipment to prevent accidents, when removing back door lock striker assembly.**
- **Try to prevent body paint surface from being scratched, when removing back door lock striker assembly.**

(1) Remove the luggage compartment carpet.

(2) Remove 2 fixing screws from back door lock striker assembly, and remove back door lock striker assembly.



■ Installation

(1) Install 2 fixing screws to back door lock striker assembly.

Torque: 25 ± 3 N·m

(2) Install the luggage compartment carpet.

5.12 Front Left Door Power Switch

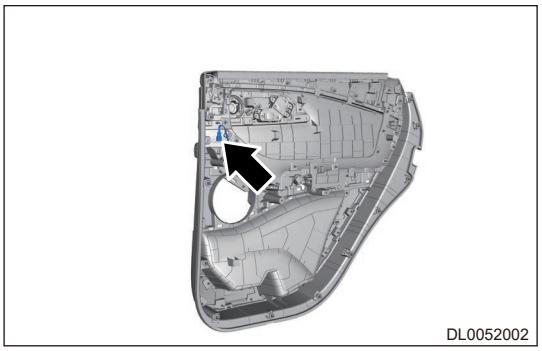
■ Removal

⚠ Warning

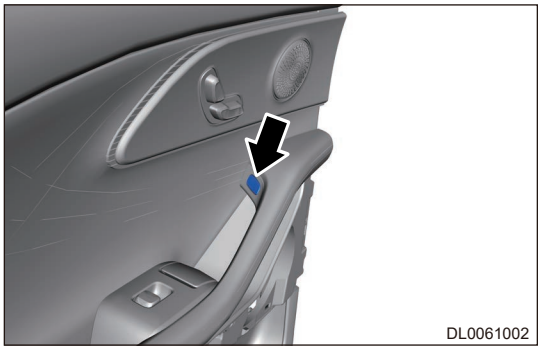
- **Be sure to wear safety equipment to prevent accidents, when removing front left door power switch.**
- **Try to prevent interior from being scratched, when removing front left door power switch.**
- **Use the same assembly method for rear left door power switch, rear right door power switch, front right door power switch and front left door power switch.**

(1) Remove the front left door protector assembly.

(2) Disconnect the front left door power switch connector.



(3) Remove switch from base.



■ Installation

(1) Install the front left door power switch to a proper position of door protector.
(2) Connect the front left door power switch connector.
(3) Install the front left door protector assembly.

1.7 DOOR

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) When removing front door assembly, an assistant is needed to hold it, to prevent front door from falling down during operation, resulting in accidents.

(2) When removing rear door assembly, an assistant is needed to hold it, prevent rear door from falling down during operation, resulting in accidents.

(3) When removing engine hood gas spring assembly, an assistant is needed to hold engine hood. Try to prevent engine hood from falling down or closing suddenly during operation, resulting in accidents.

(4) When removing engine hood assembly, an assistant is needed to hold engine hood. Try to prevent engine hood from falling down or closing suddenly during operation, resulting in accidents.

(5) When removing engine hood hinge assembly, an assistant is needed to hold engine hood. Try to prevent engine hood from falling down or closing suddenly during operation, resulting in accidents.

(6) When removing back door assembly, an assistant is needed to hold the trunk lid. Try to prevent trunk lid from falling down or closing suddenly during operation, resulting in accidents.

(7) When removing back door electric support rod assembly, pay attention not to bend electric support rod by lateral force during removal, and an assistant is needed to hold back door; Try to prevent back door from falling down or closing suddenly during operation, resulting in accidents.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Replace damaged clips and install front door inner protector assembly in place, when installing inner protector assembly.

(2) Be sure to wear safety equipment to prevent accidents, when removing engine hood left gas spring assembly.

(3) Be sure to wear safety equipment to prevent accidents, when removing engine hood assembly.

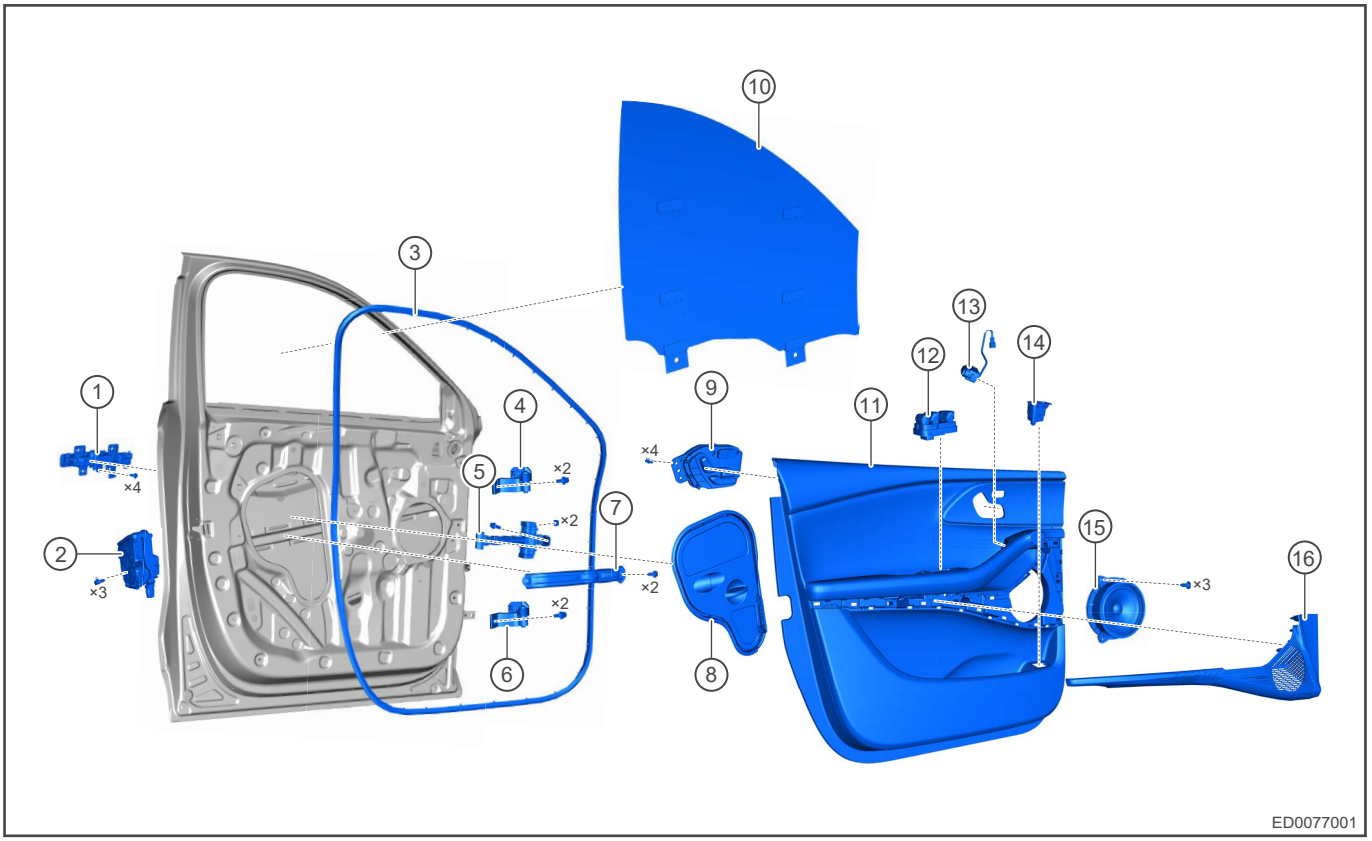
(4) When removing engine hood hinge assembly, try to prevent engine hood from falling down during operation, resulting in damage to body or front windshield.

(5) Try to prevent body paint surface from being scratched, when removing back door assembly.

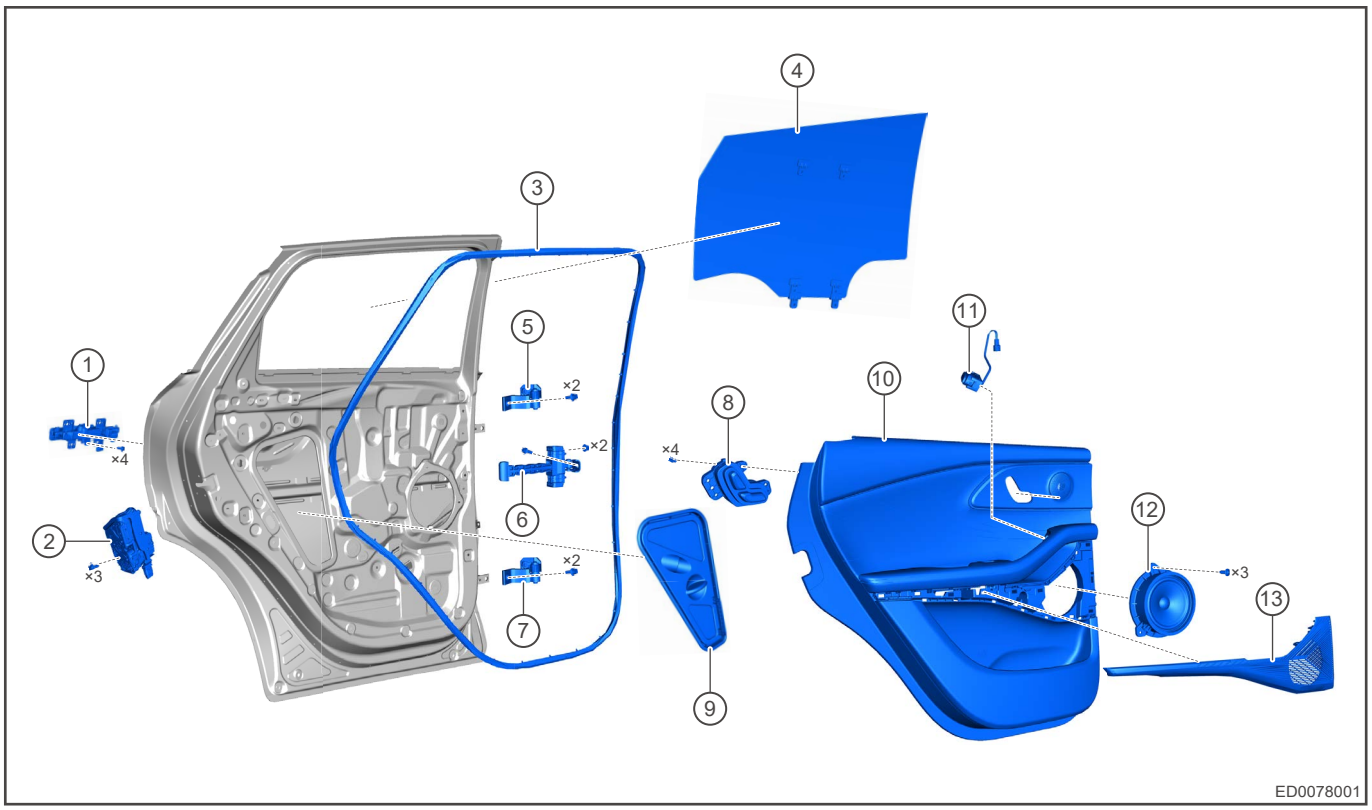
(6) Handle the removed electric support rod assembly carefully and avoid it falling down. Once it falls down, internal mechanical damage may occur, which may cause it impossible to use.

2 System Overview

2.1 System Components Diagram

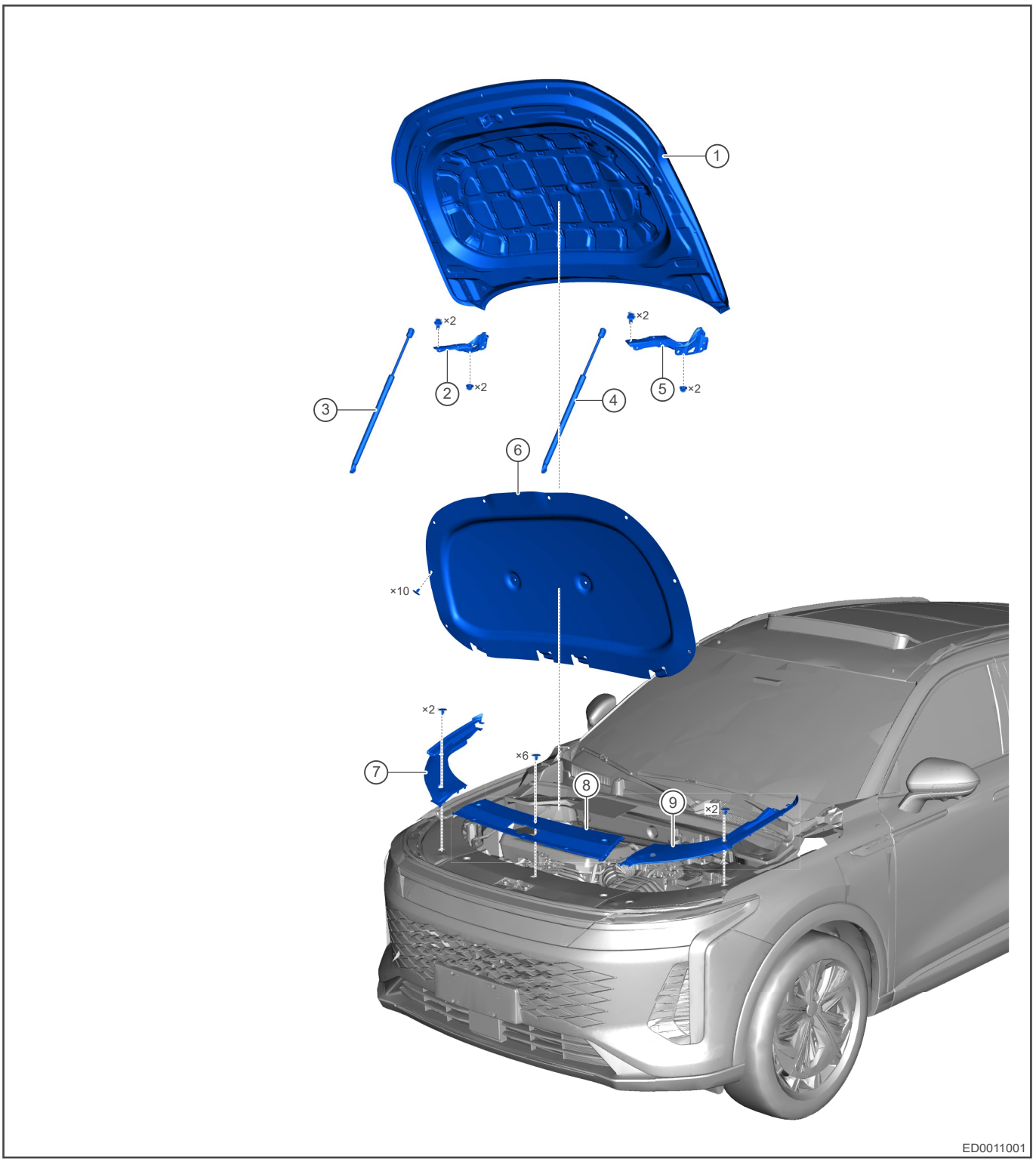


1	Front Left Outside Handle Assembly	9	Front Left Seat Adjustment Switch Assembly
2	Front Left Electric Releasing Door Lock Assembly	10	Front Left Side Door Glass Assembly
3	Front Left Door Frame Weatherstrip	11	Front Left Door Protector Assembly
4	Left Door Upper Hinge Assembly	12	Driver Glass Regulator Switch
5	Front Door Stopper Assembly	13	Front Left Door Power Switch
6	Left Door Lower Hinge Assembly	14	Back Door Switch Assembly
7	Front Left Door Metal Bracket	15	Woofer
8	Front Left Door Inner Sealing Board Assembly	16	Front Left Door Woofer Cover



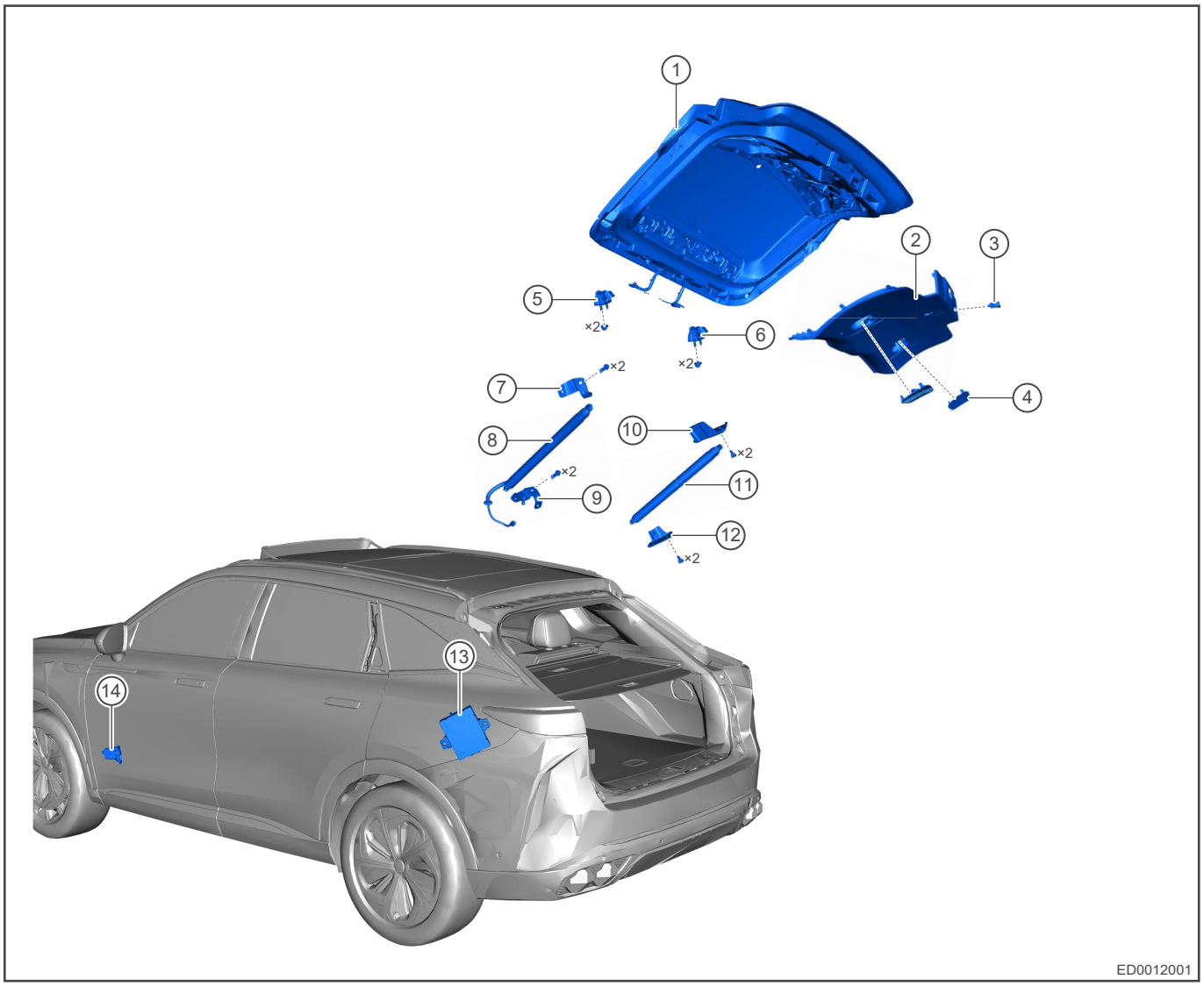
1	Rear Left Outside Handle Assembly	8	Rear Left Seat Adjustment Switch Assembly
2	Rear Left Electric Releasing Door Lock Assembly	9	Rear Left Door Inner Sealing Board Assembly
3	Rear Left Door Frame Weatherstrip	10	Rear Left Door Protector Assembly
4	Rear Left Side Door Glass Assembly	11	Rear Left Door Power Switch
5	Left Door Upper Hinge Assembly	12	Woofer
6	Rear Door Check Assembly	13	Rear Left Door Woofer Cover
7	Left Door Lower Hinge Assembly		

Doors provide driver and passengers with access to and from vehicles, and insulate the outside interference, reduce the side impact to a certain extent, thus protecting passenger. Aesthetic of vehicle is also related to the door modeling. The quality of doors is mainly reflected in anti-collision performance, sealing performance and opening & closing convenience of doors, of course, and there are other usage function targets, etc. Anti-collision performance is particularly important, as when vehicle is involved in a side collision, it is easy to cause inside personal injury due to the very short buffer distance.



1	Engine Hood Assembly	6	Engine Hood Sound Insulator Pad
2	Engine Hood Left Hinge	7	Front Right Compartment Trim Cover Assembly
3	Engine Hood Left Air Spring Assembly	8	Engine Compartment Trim Cover Front Assembly

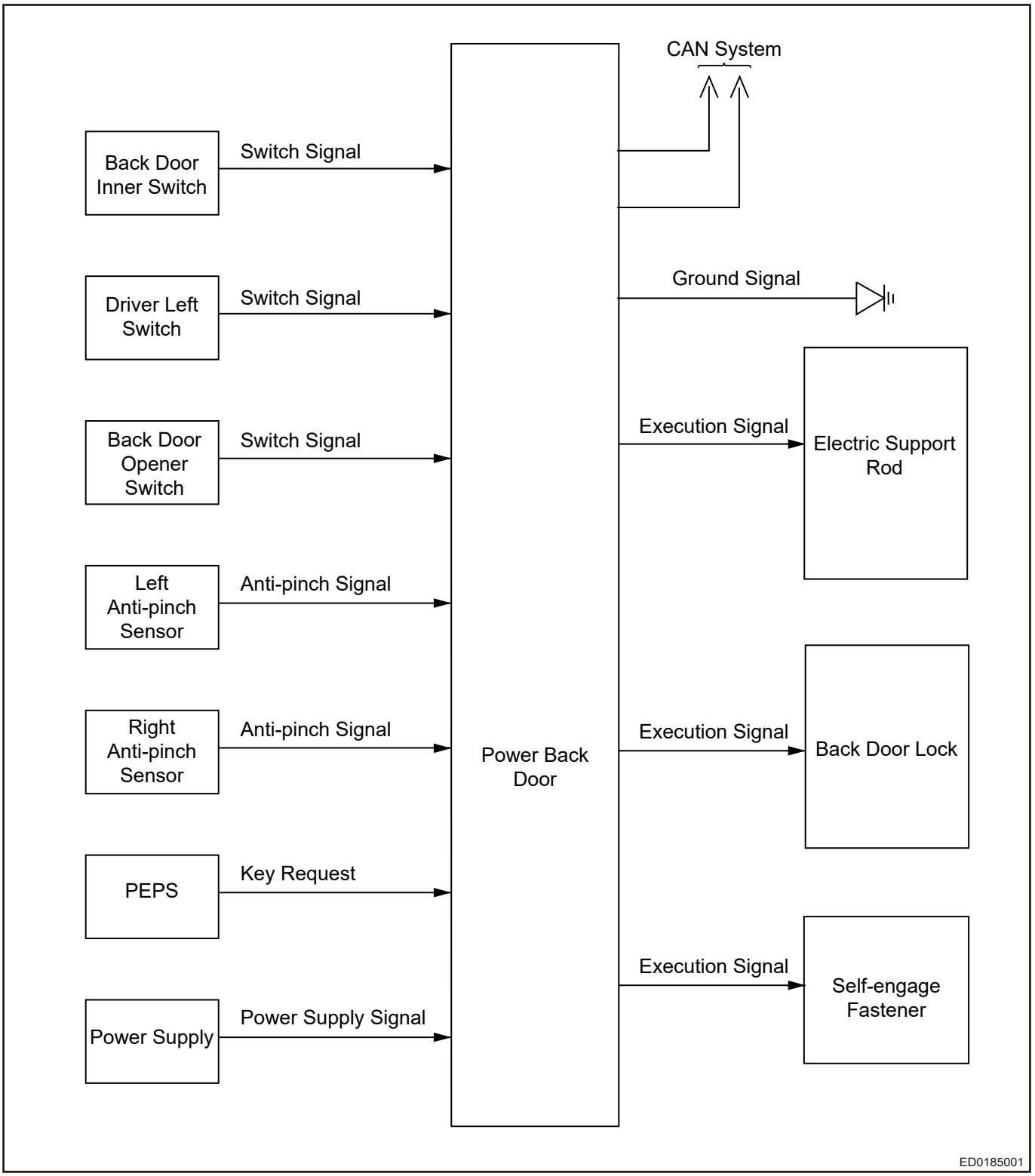
4	Engine Hood Right Air Spring Assembly	9	Front Left Compartment Trim Cover Assembly
5	Engine Hood Right Hinge		



1	Back Door	8	Left Electric Support Assembly
2	Back Door Lower Protector Assembly	9	Rear Cover Upper Left Bracket
3	Back Door Closer Switch	10	Rear Trunk Lid Lower Right Bracket
4	Back Door Protector Speaker Cover	11	Right Balance Bar Assembly
5	Back Door Hinge Assembly	12	Rear Cover Upper Right Bracket
6	Back Door Hinge Assembly	13	Power Back Door Module
7	Rear Trunk Lid Lower Left Bracket	14	Back Door Closer Switch

Power back door is equipped on the vehicle (for high configuration) (power back door system consists of PLG module, electric support, various functional switches, back door lock and self-engage mechanism, etc. Once system receives functional switch signal, it will open or close back door a motor-driven manner).

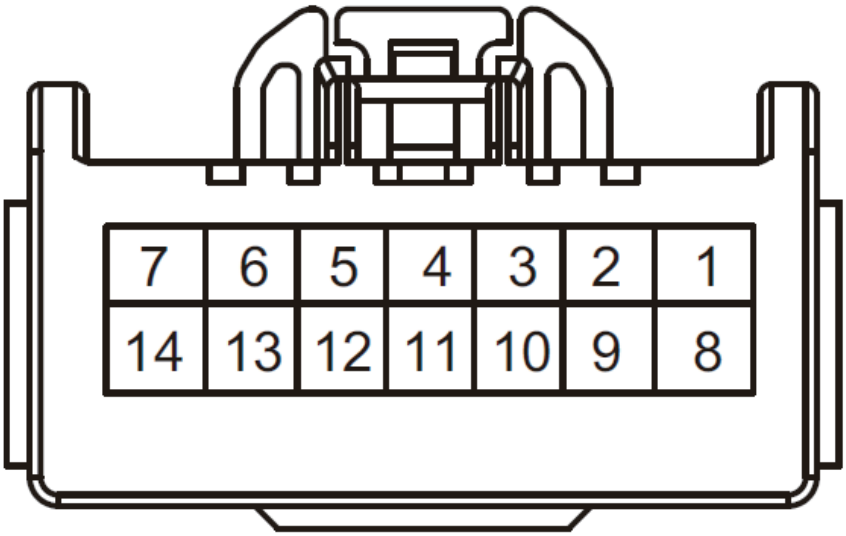
2.2 System Schematic Diagram



Battery provides power supply to power back door module (PLG). Power back door module collects information of each sensor and switch command to perform back door action.

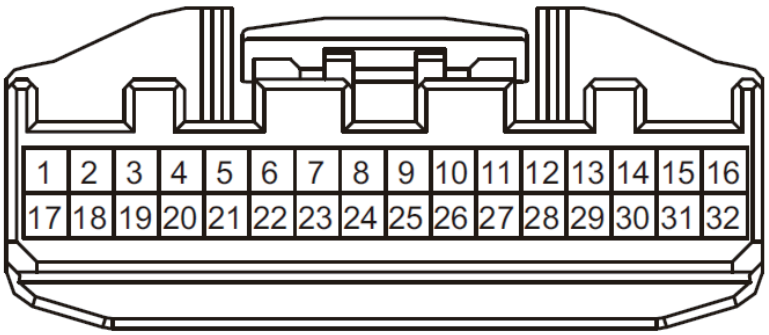
3 System Circuit Diagram

3.1 Power Back Door Module PLG Terminal Definition



ED0153001

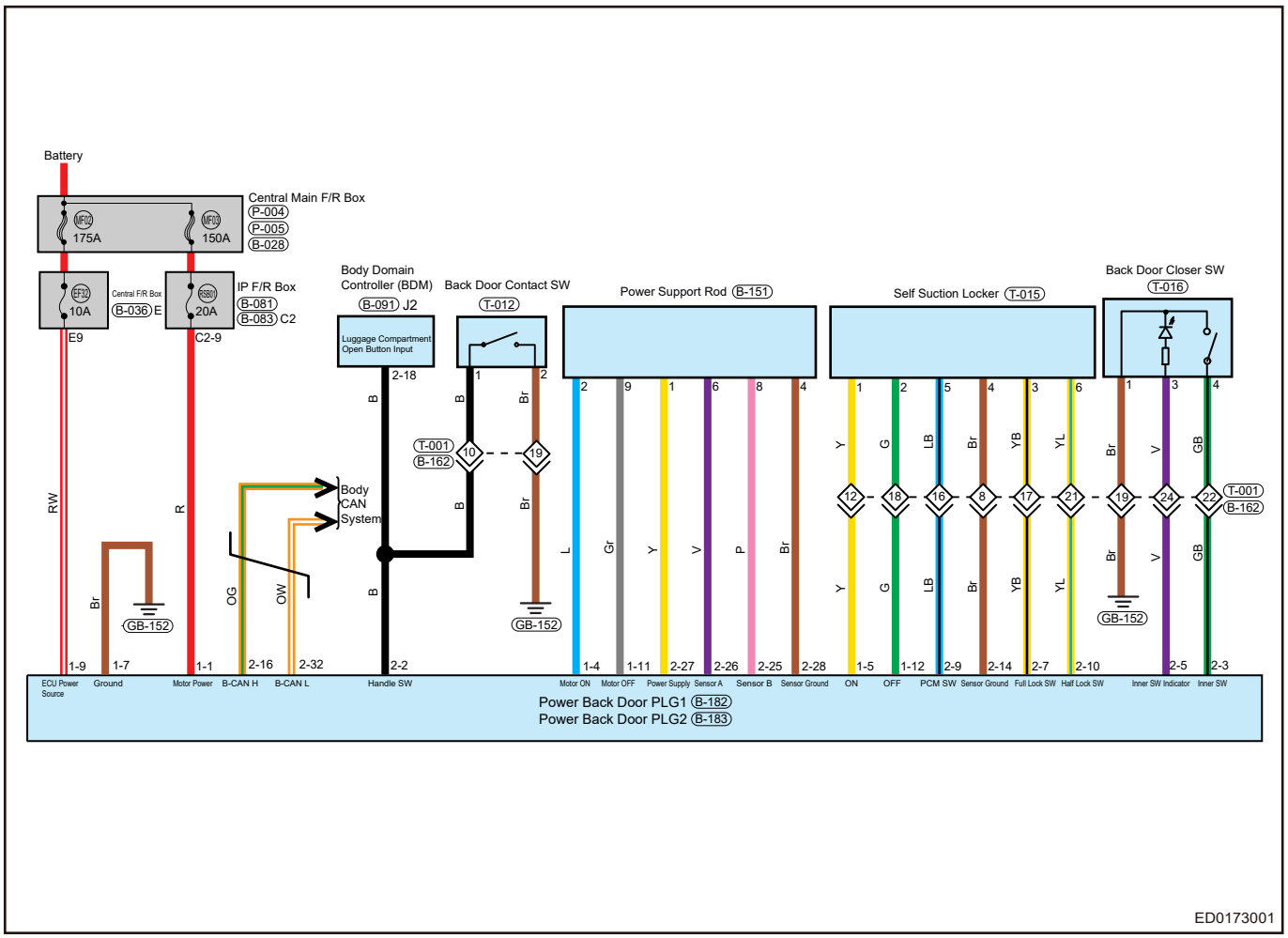
Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1 - 1	Motor Power Supply	1 - 8	-
1 - 2	-	1 - 9	ECU Power Supply
1 - 3	-	1 - 10	-
1 - 4	Electric Support Rod Motor Opening	1 - 11	Electric Support Rod Motor Closing
1 - 5	Self-engage Fastener Opening	1 - 12	Self-engage Fastener Closing
1 - 6	-	1 - 13	-
1 - 7	Ground	1 - 14	-



ED0154001

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
2 - 1	-	2 - 17	-
2 - 2	Luggage compartment Handle Switch	2 - 18	-
2 - 3	Back Door Inner Handle Switch	2 - 19	-
2 - 4	-	2 - 20	-
2 - 5	Back Door Inner Handle Switch Indicator	2 - 21	-
2 - 6	-	2 - 22	-
2 - 7	Self-engage Fastener Full Latch Switch	2 - 23	-
2 - 8	-	2 - 24	-
2 - 9	Self-engage Fastener PCM Switch	2 - 25	Electric Support Rod Sensor B
2 - 10	Self-engage Fastener Half Latch Switch	2 - 26	Electric Support Rod Sensor A
2 - 11	-	2 - 27	Electric Support Rod Power Supply
2 - 12	-	2 - 28	Electric Support Rod Sensor Ground
2 - 13	-	2 - 29	-
2 - 14	Self-engage Fastener Sensor Ground	2 - 30	-
2 - 15	-	2 - 31	-
2 - 16	B-CAN H	2 - 32	B-CAN L

3.2 Circuit Diagram



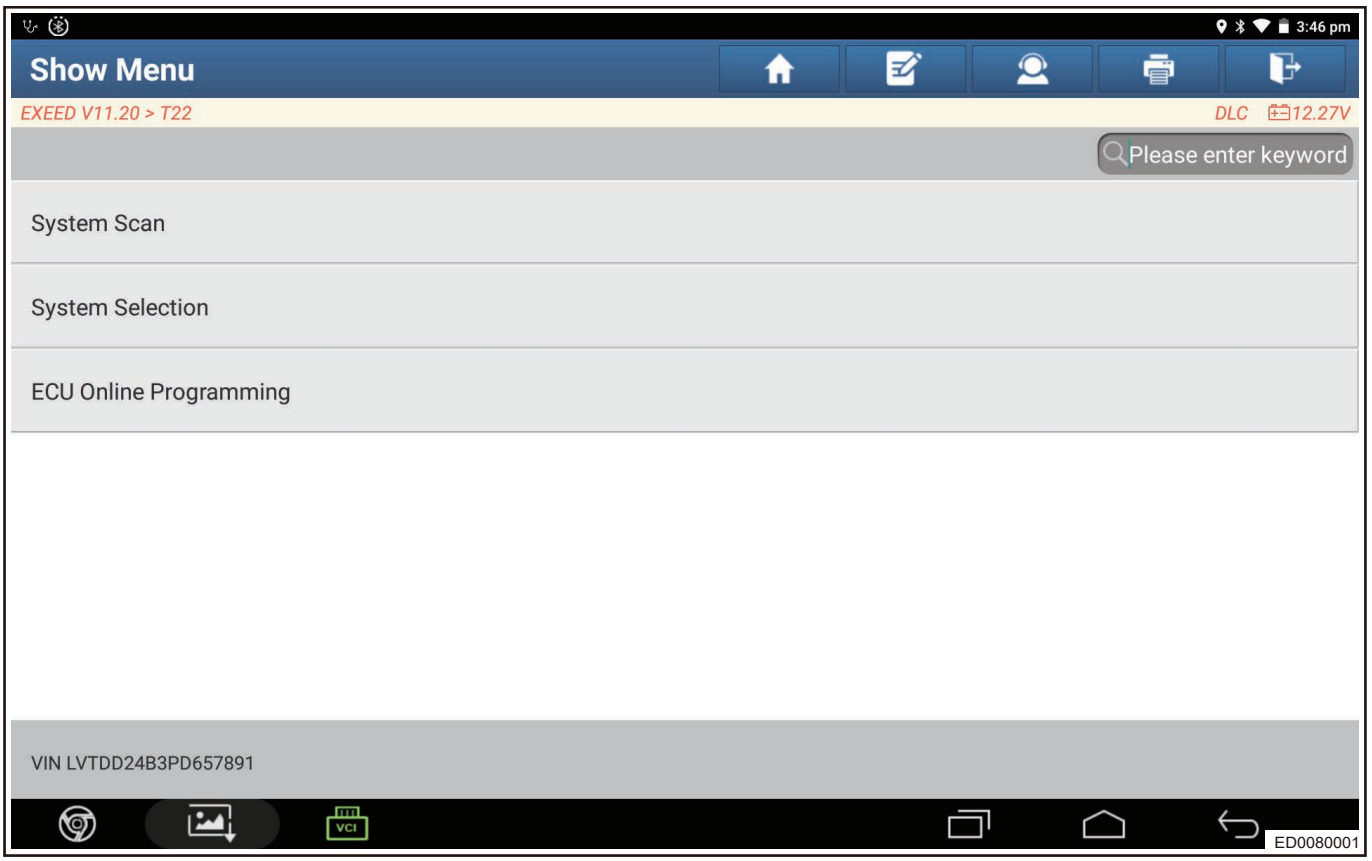
4 Diagnostic Information and Steps

4.1 PLG System

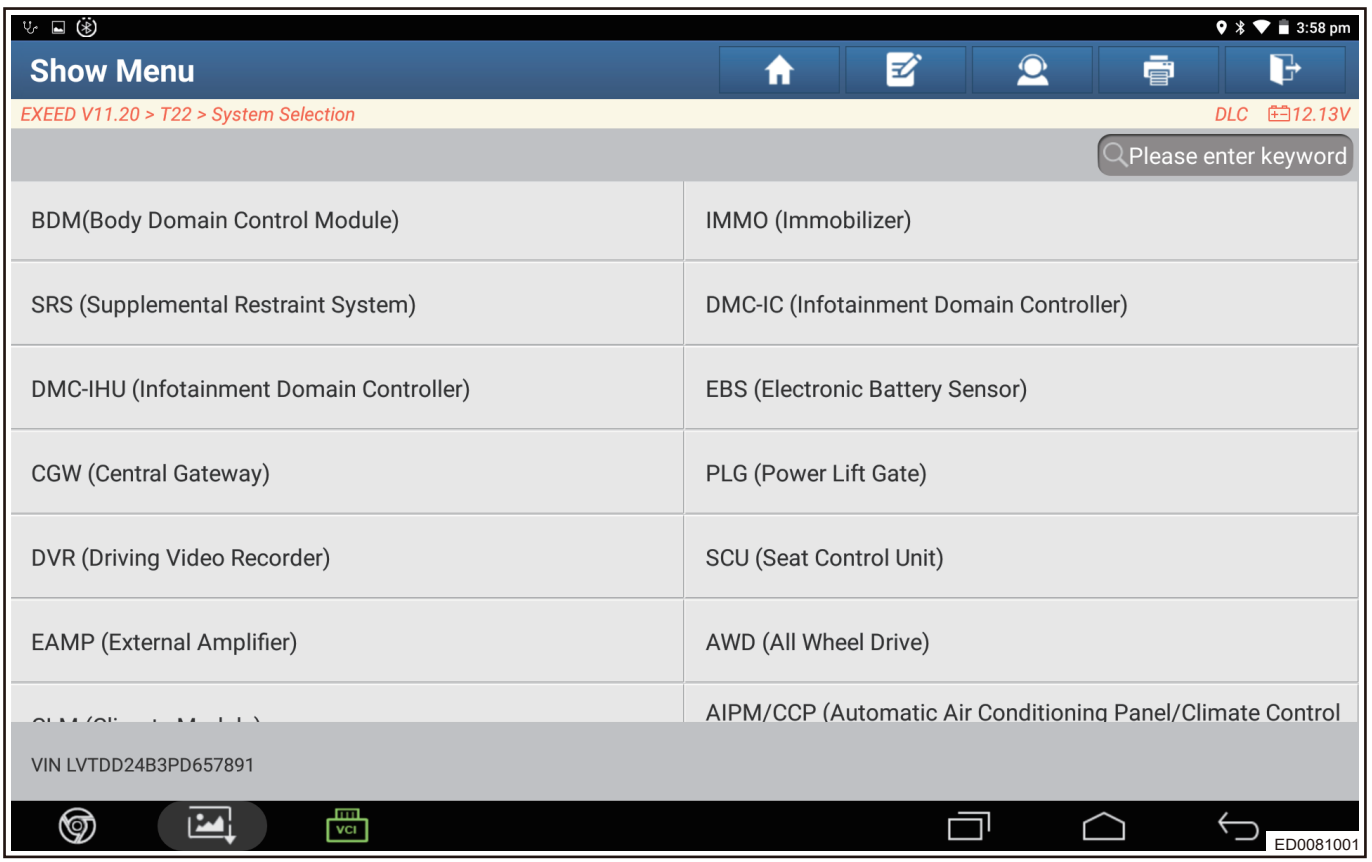
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

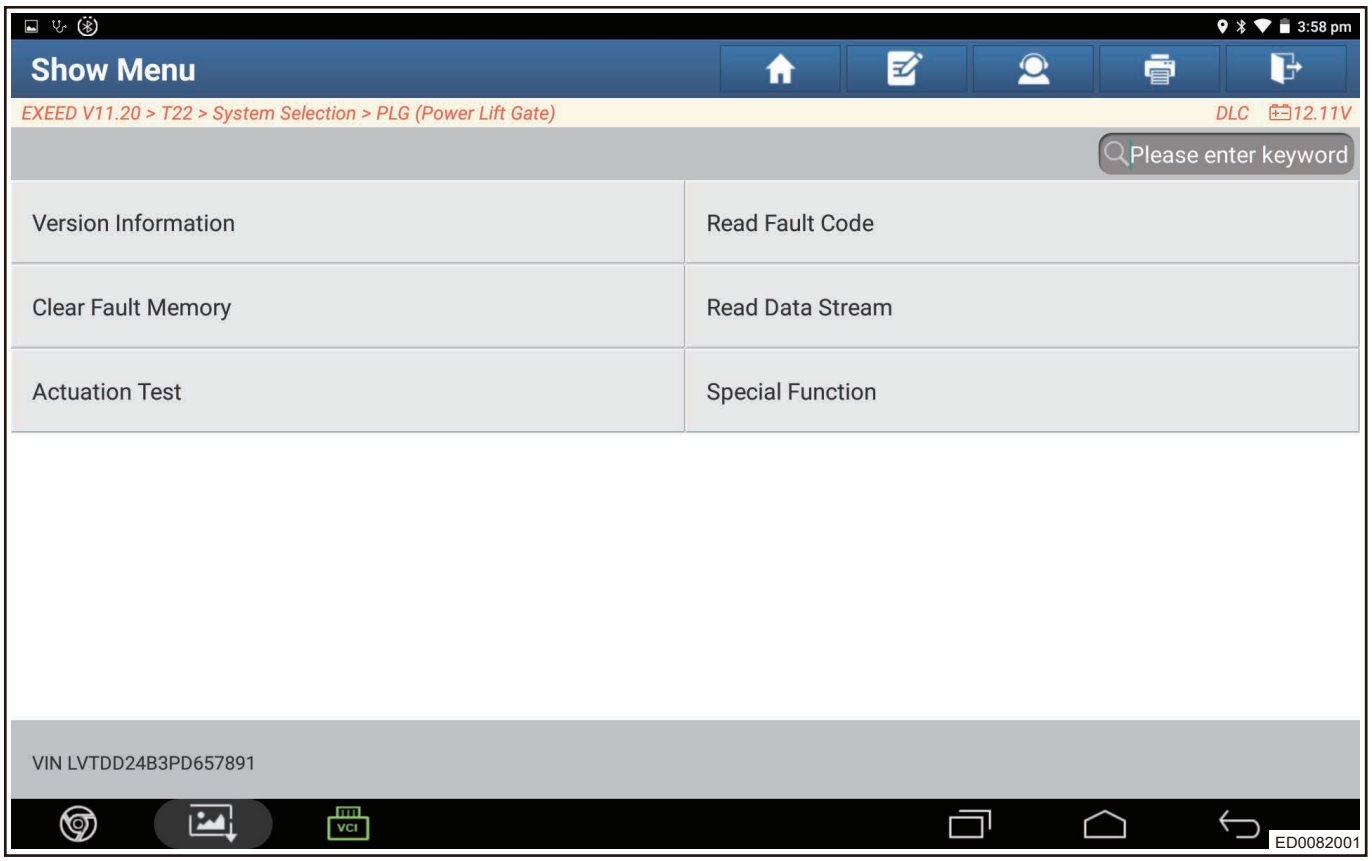
(3) Enter next screen and click “System Selection”.



(4) Enter next screen, and click “PLG (Power Back Door Module)”.

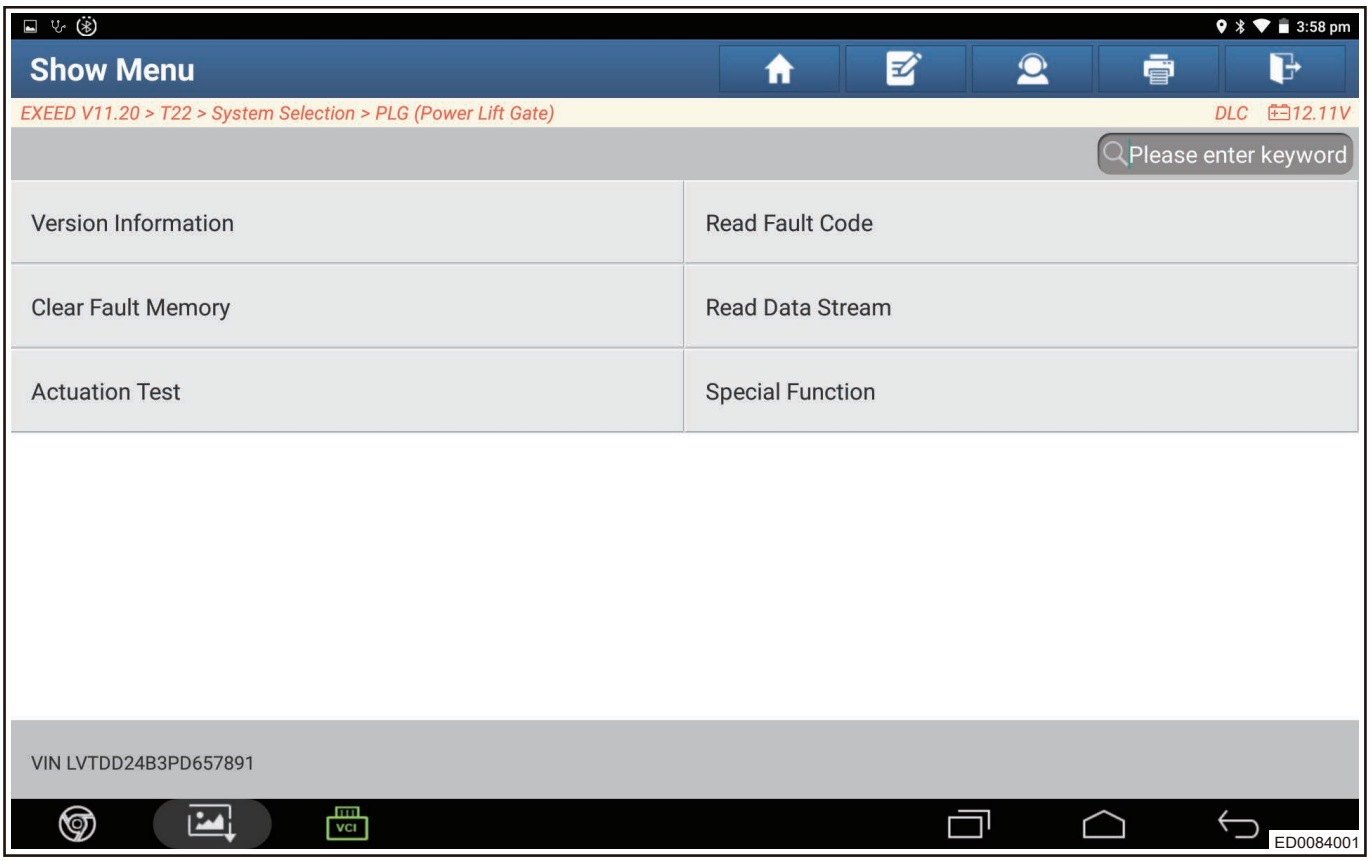


(5) Enter next screen and click “Version Information”.

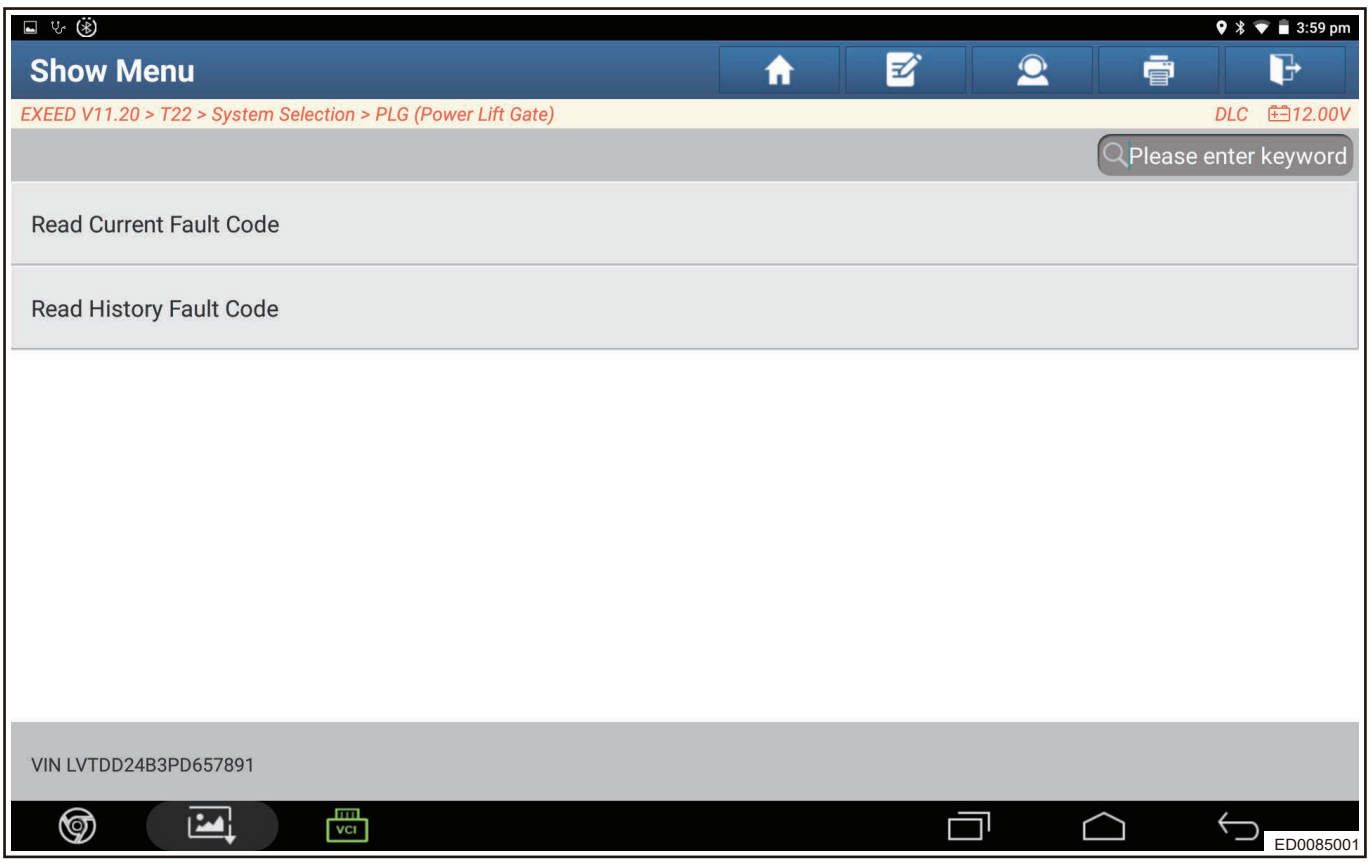


(6) Screen displays.

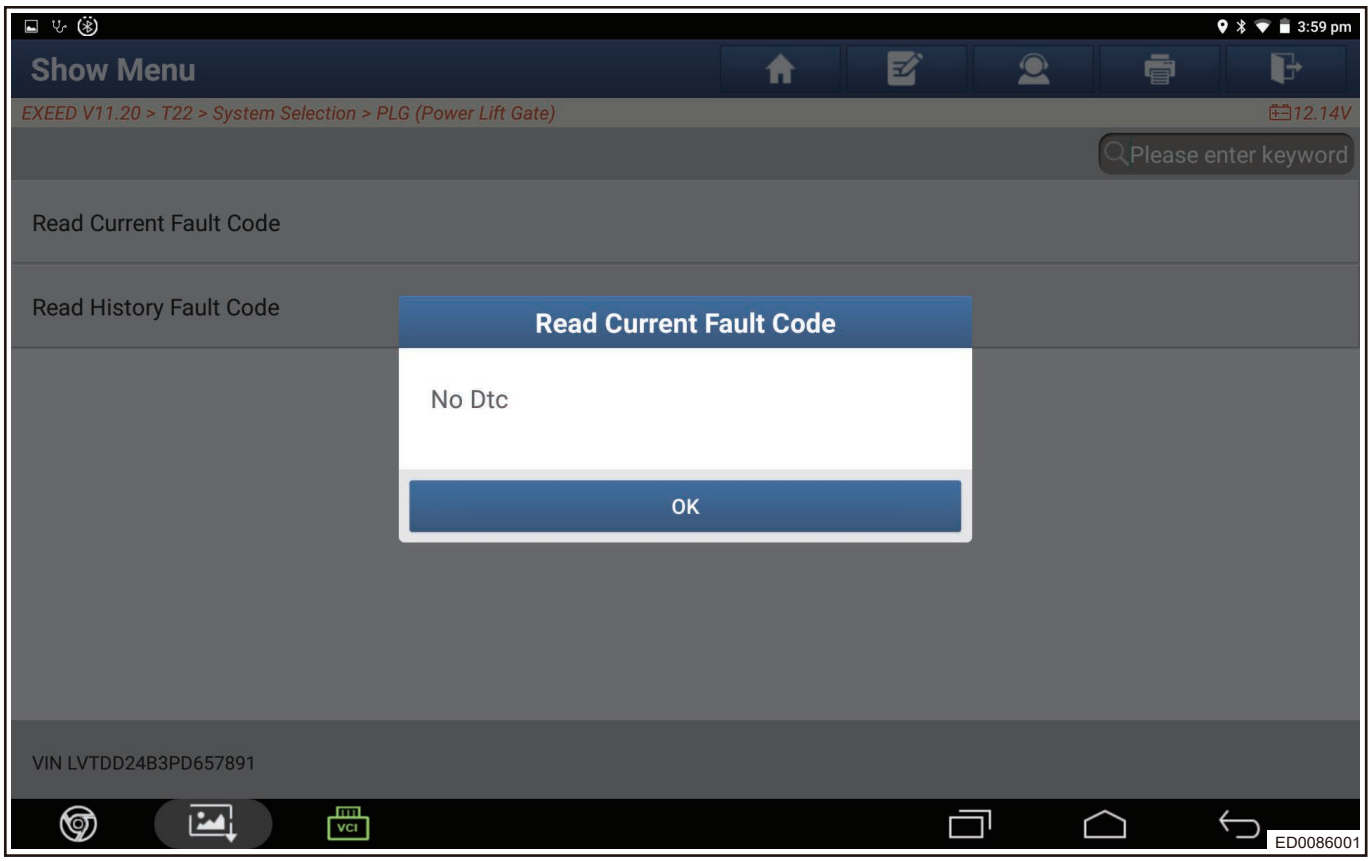
(7) Back and click “Read DTC”.



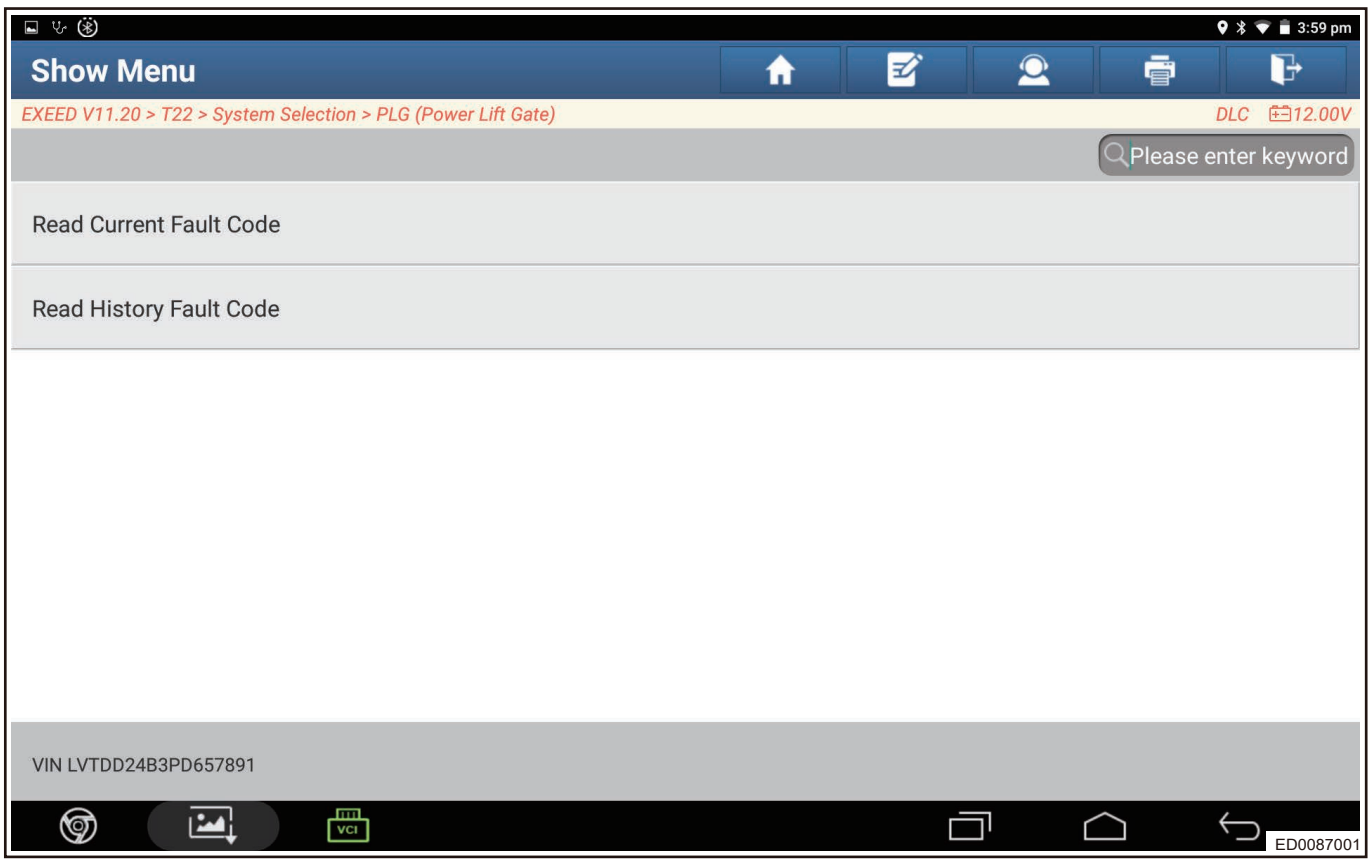
(8) Enter next screen and click “Read Current DTC”.



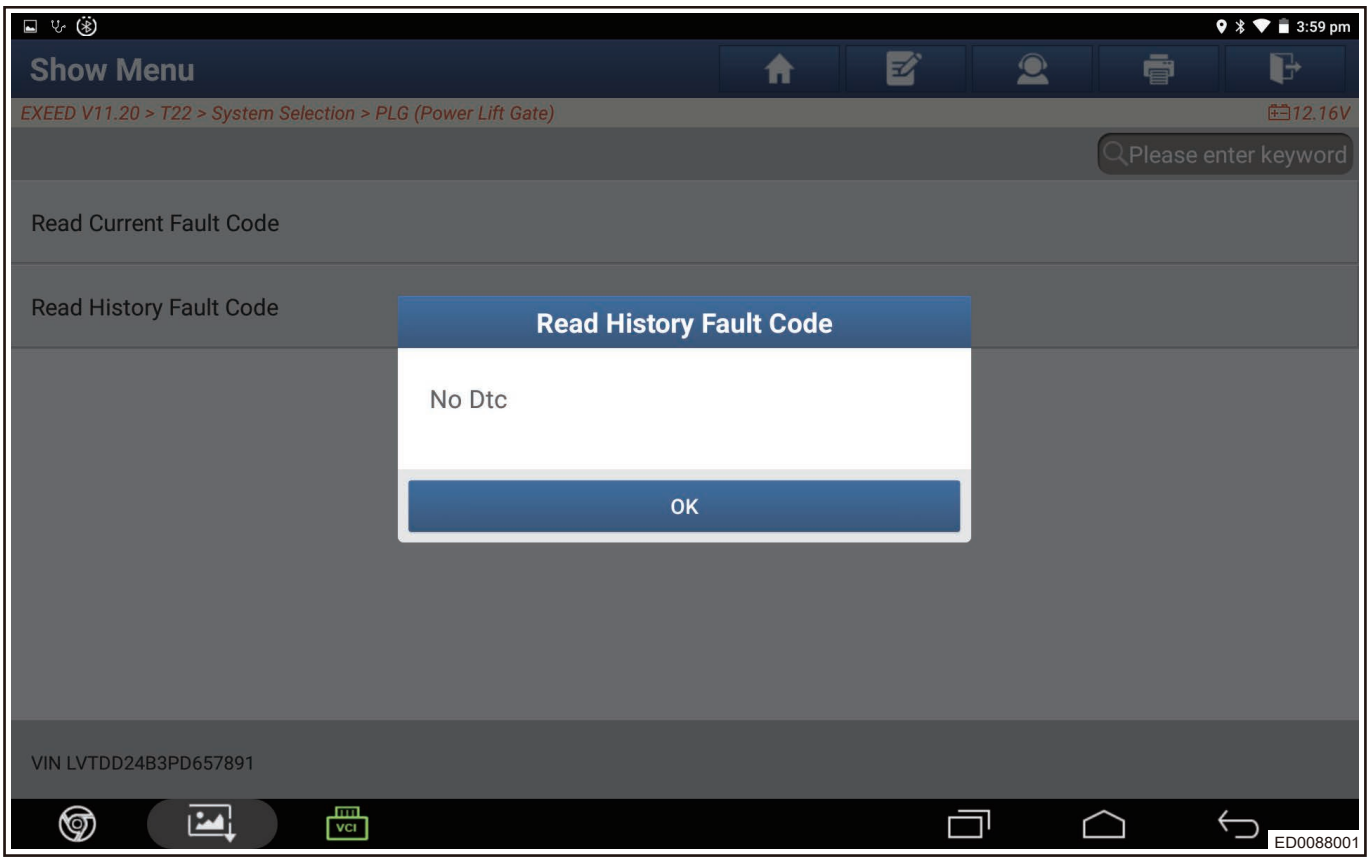
(9) The screen displays “No DTC”.



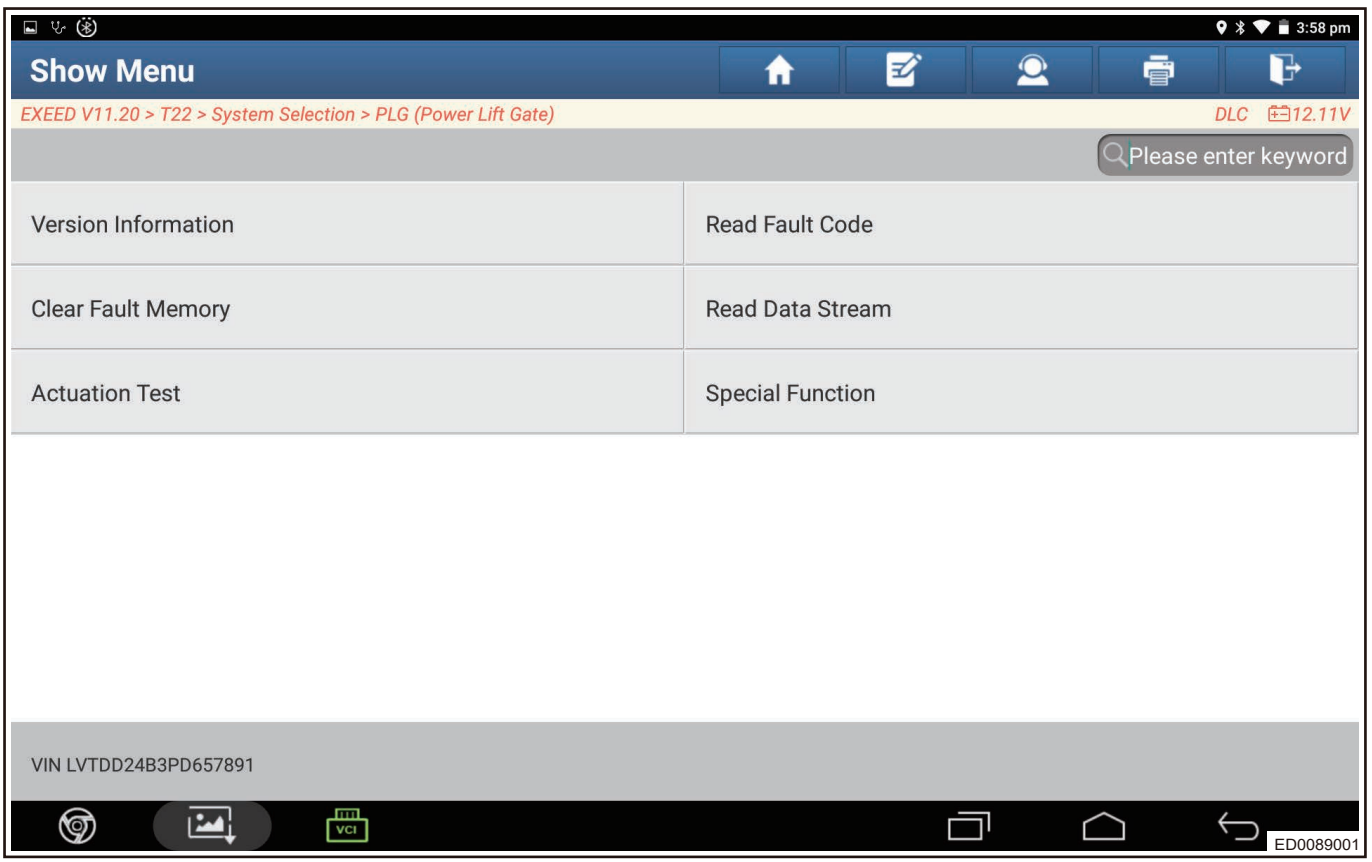
(10) Back and click “Read History DTC”.



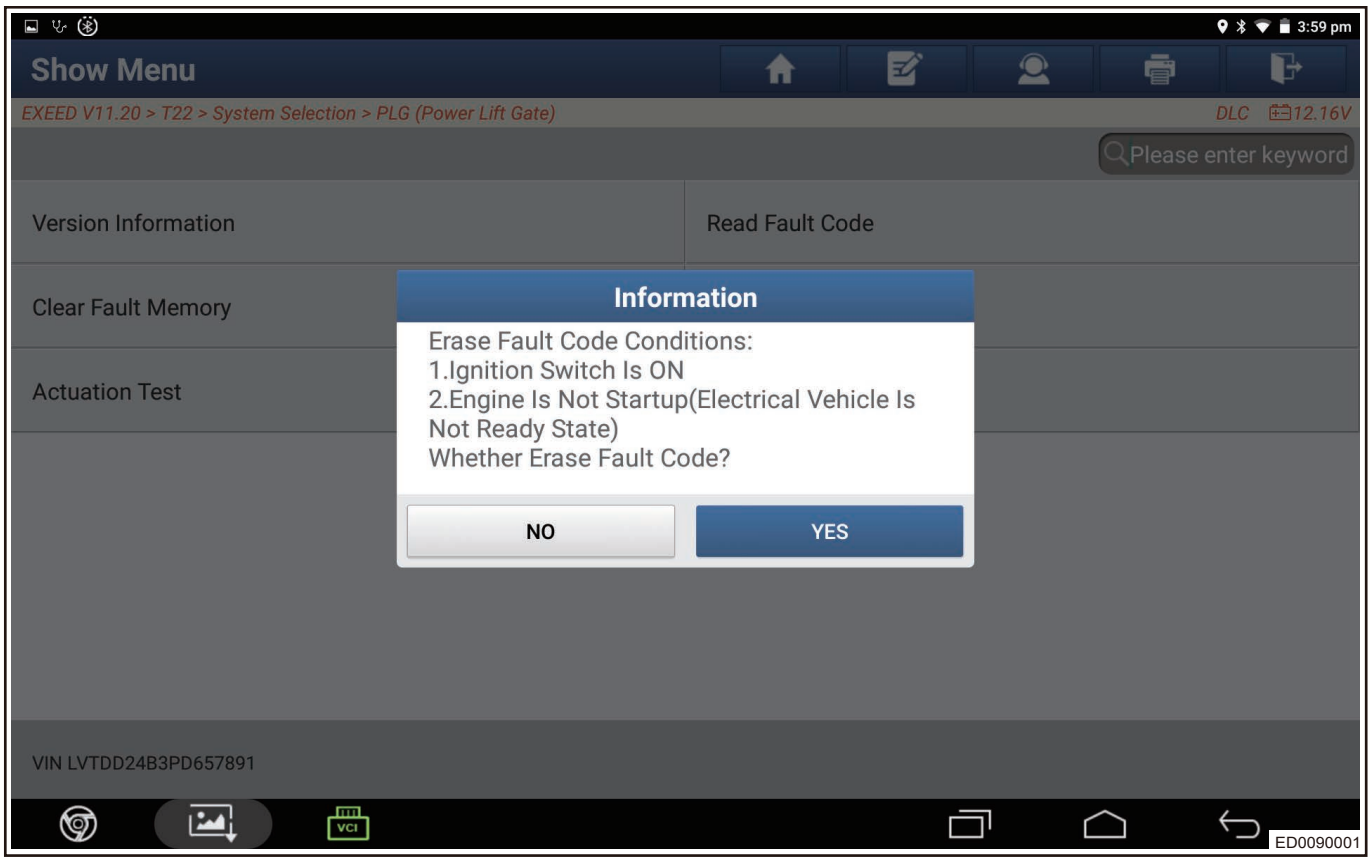
(11) Screen displays.



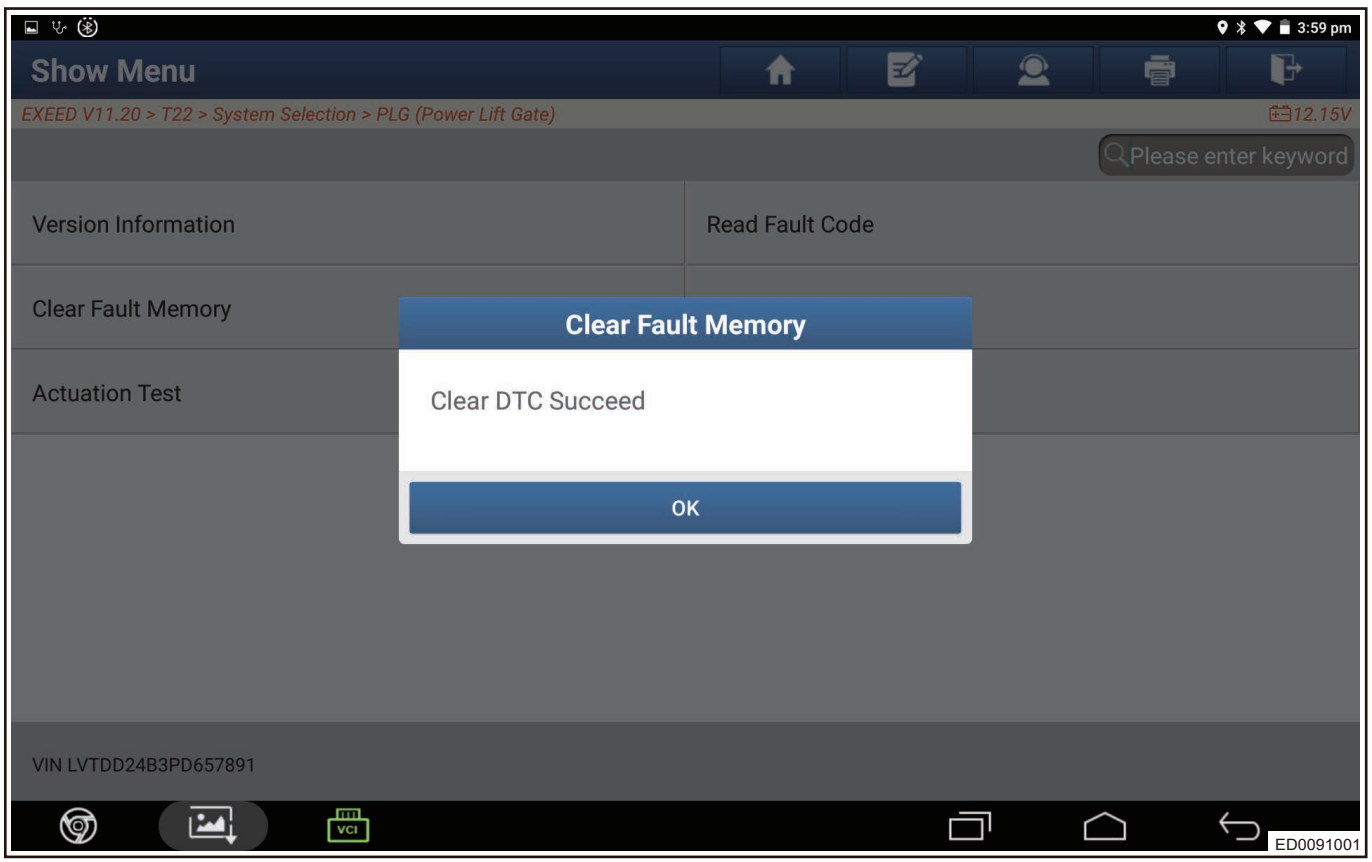
(12) Back and click “Clear DTC”.



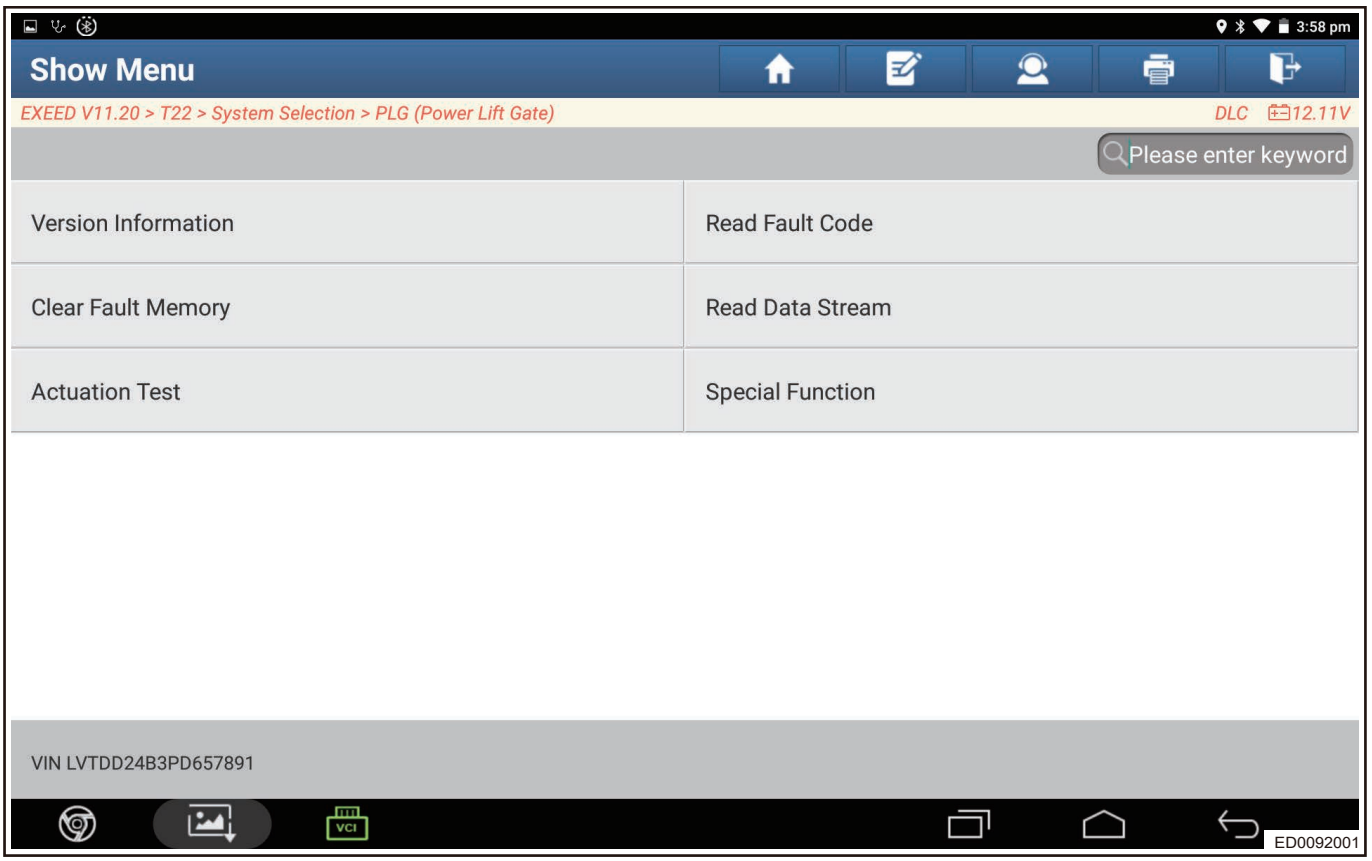
(13) The screen displays information and click “OK”.



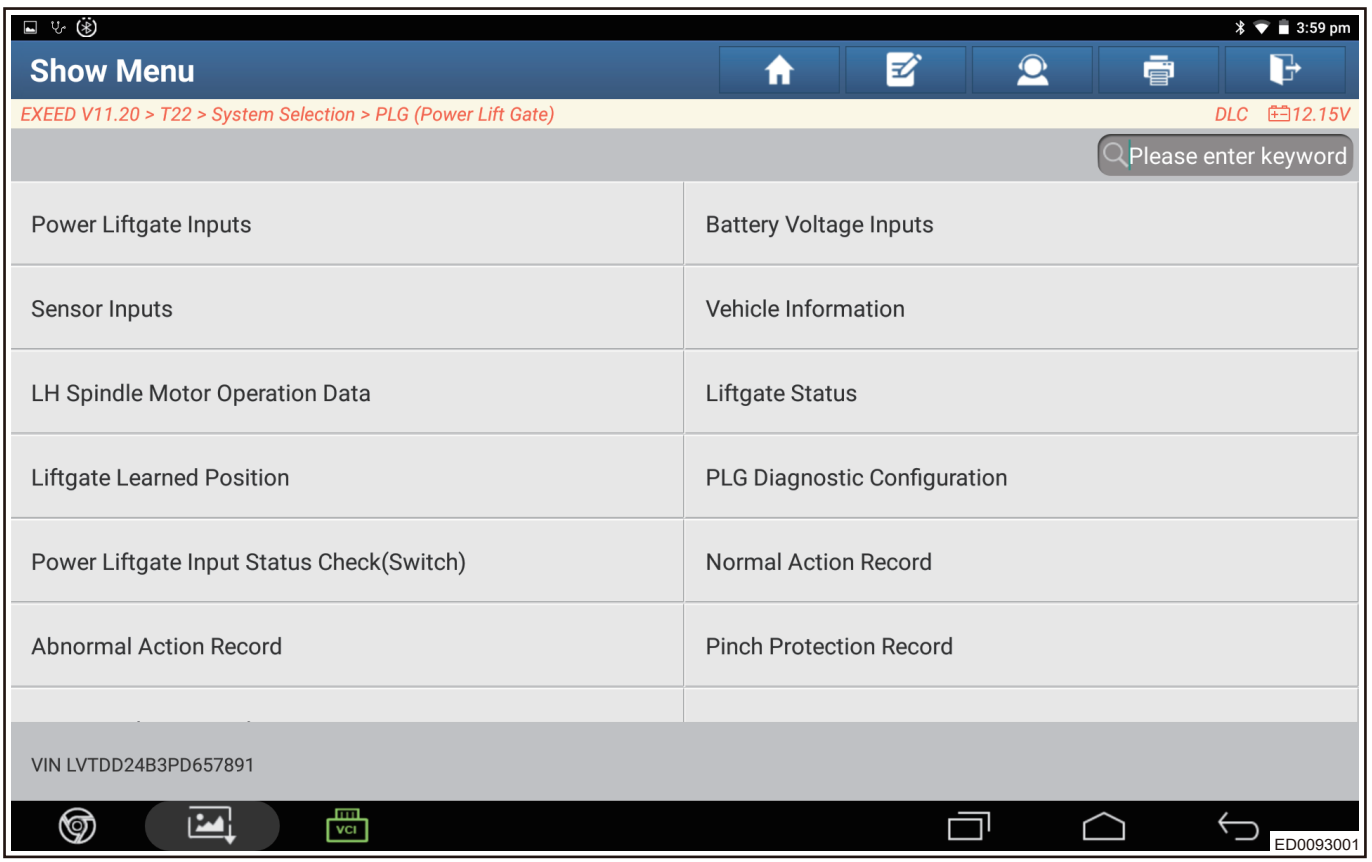
(14) The screen displays “Clear DTC succeed”.



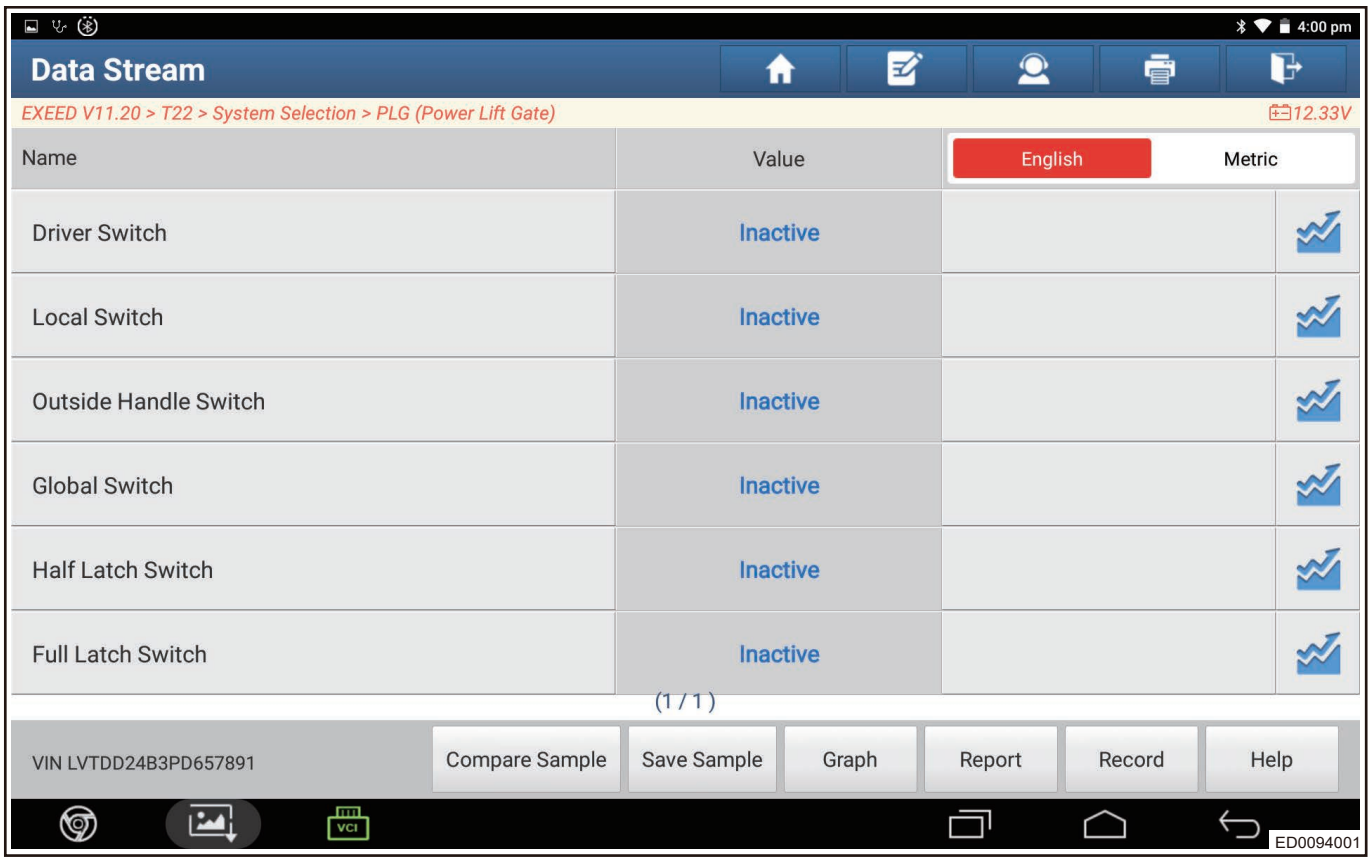
(15) Back and click “Read Datastream”.



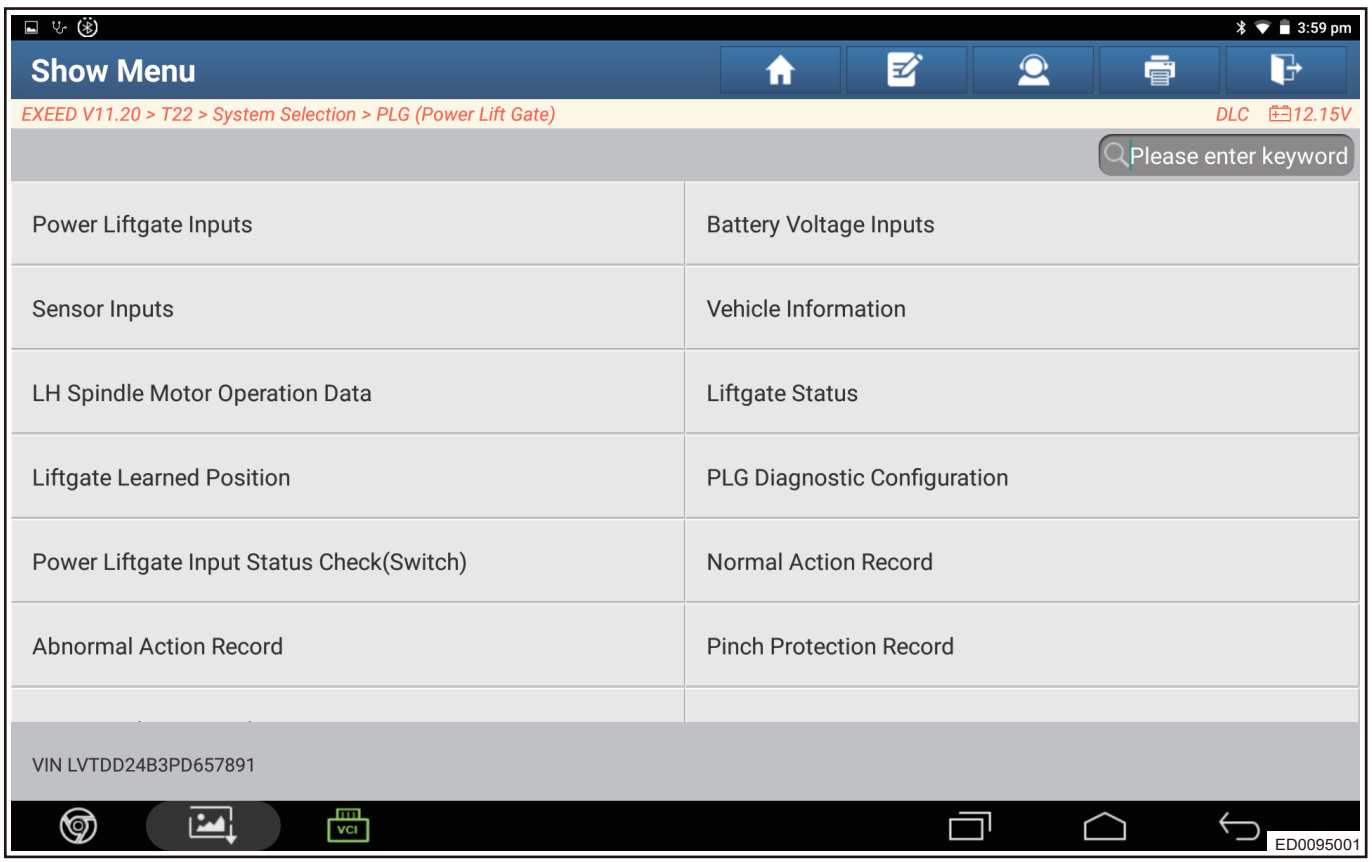
(16) Enter next screen and click “Back Door Input Status”.



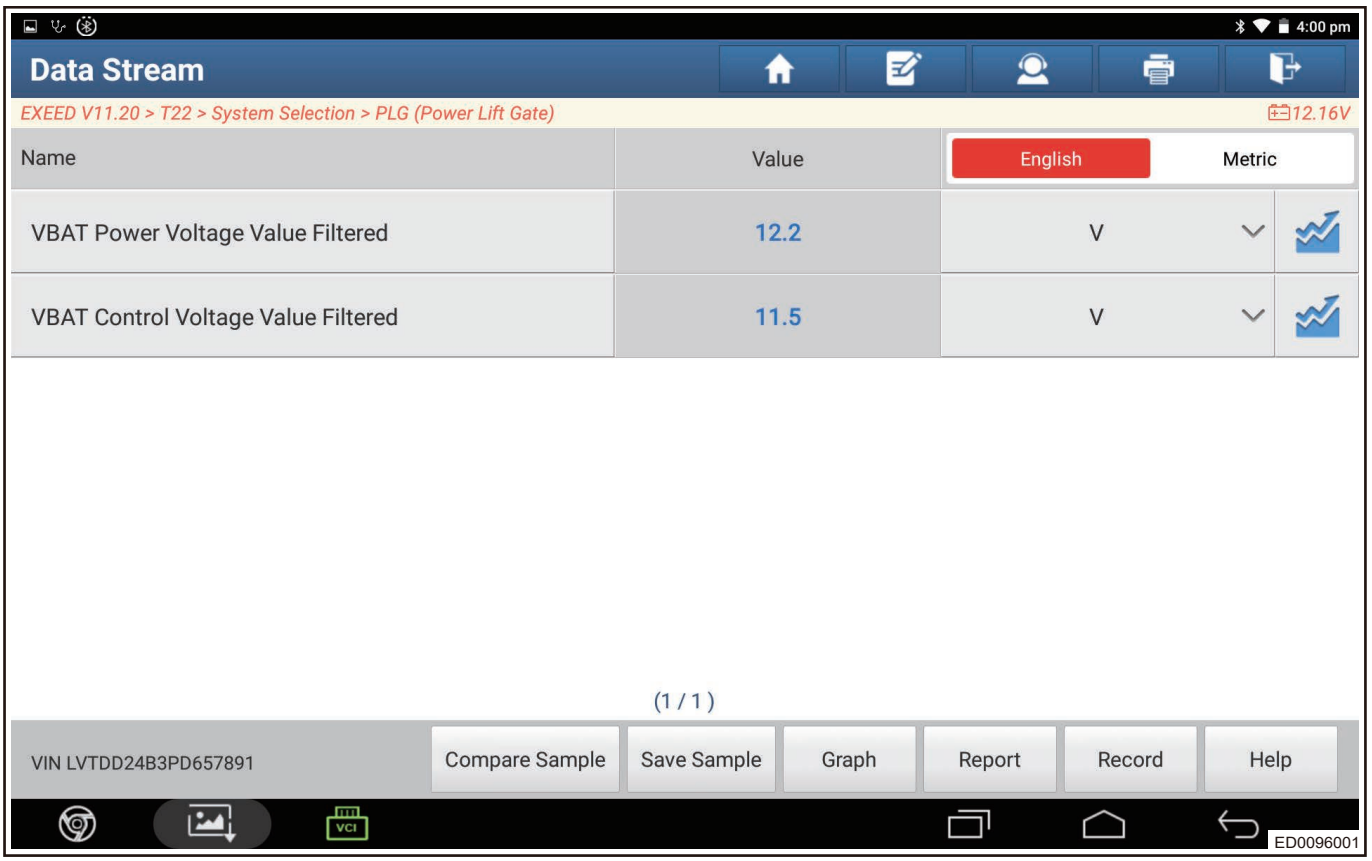
(17) Screen displays.



(18) Go back to enter screen and click “Power Supply Voltage Status”.



(19) Screen displays.

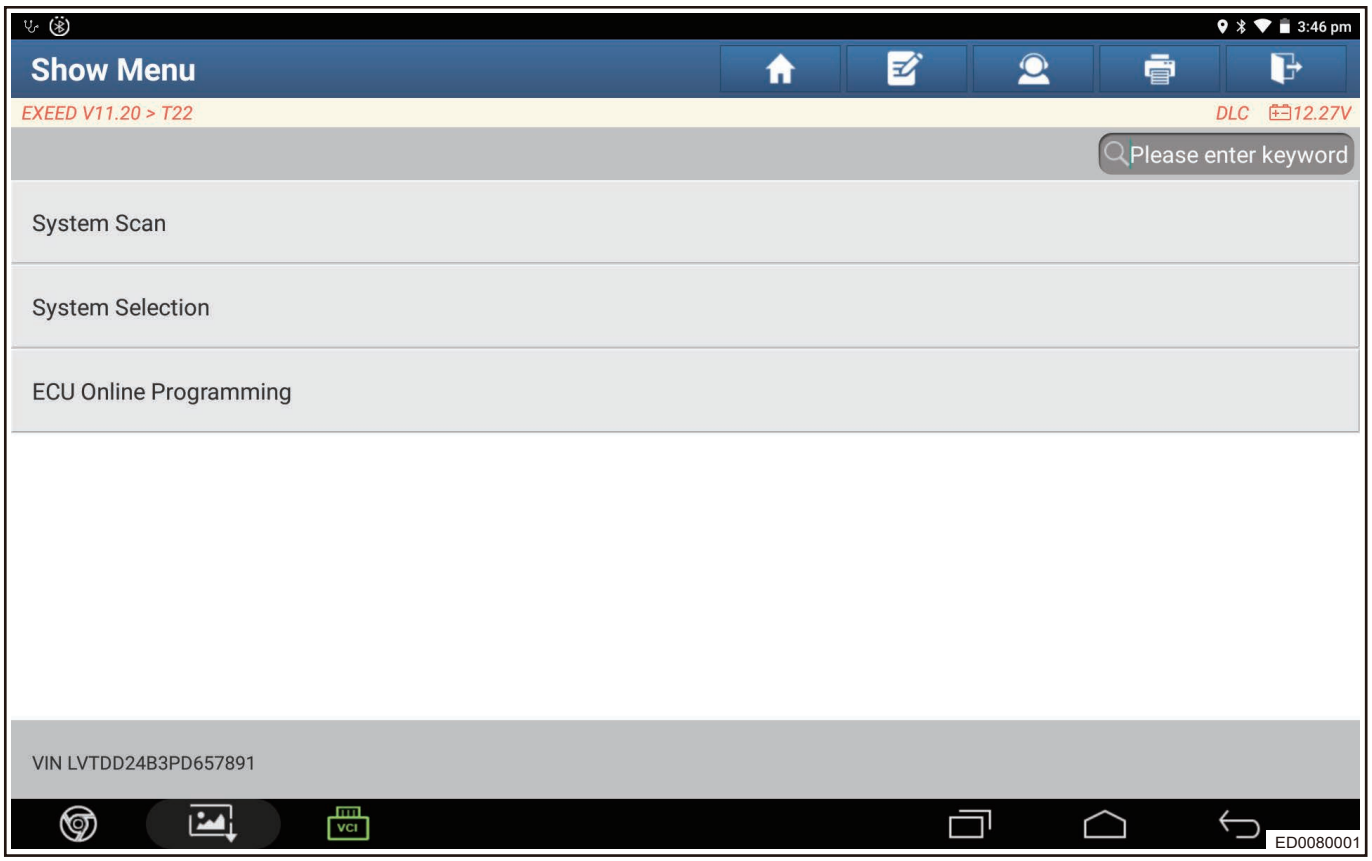


4.2 Power Back Door Module Matching Procedure

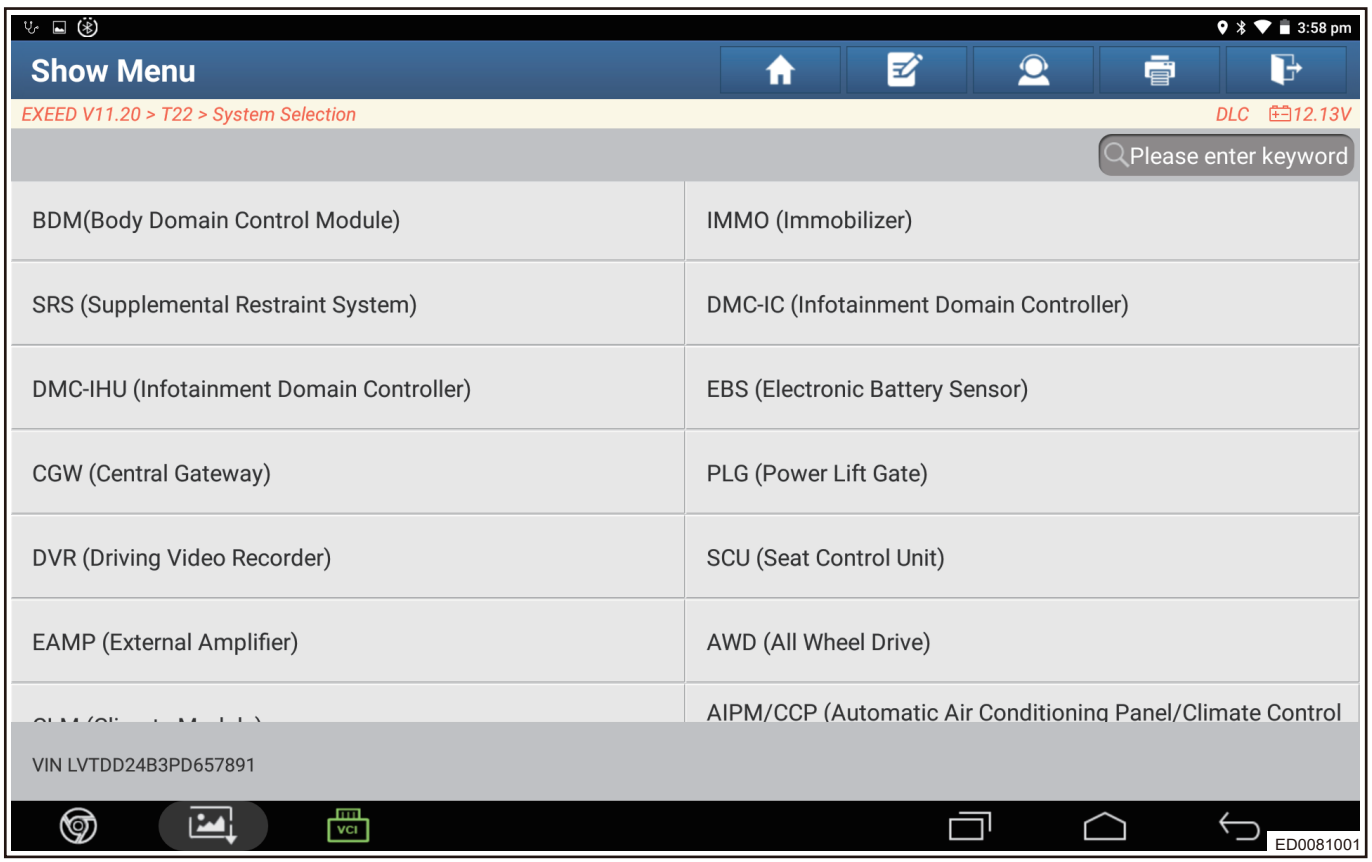
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

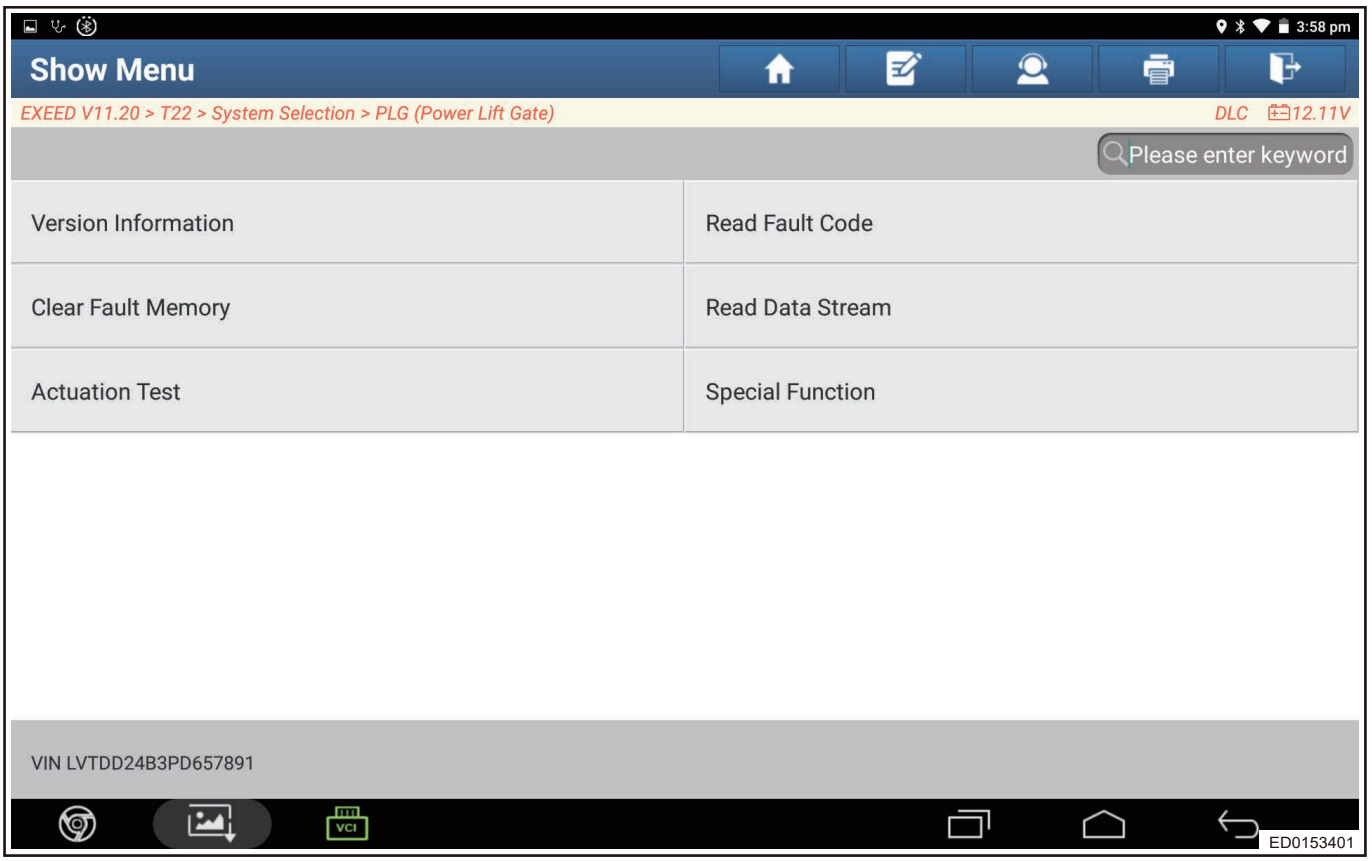
(3) Enter next screen and click “System Selection”.



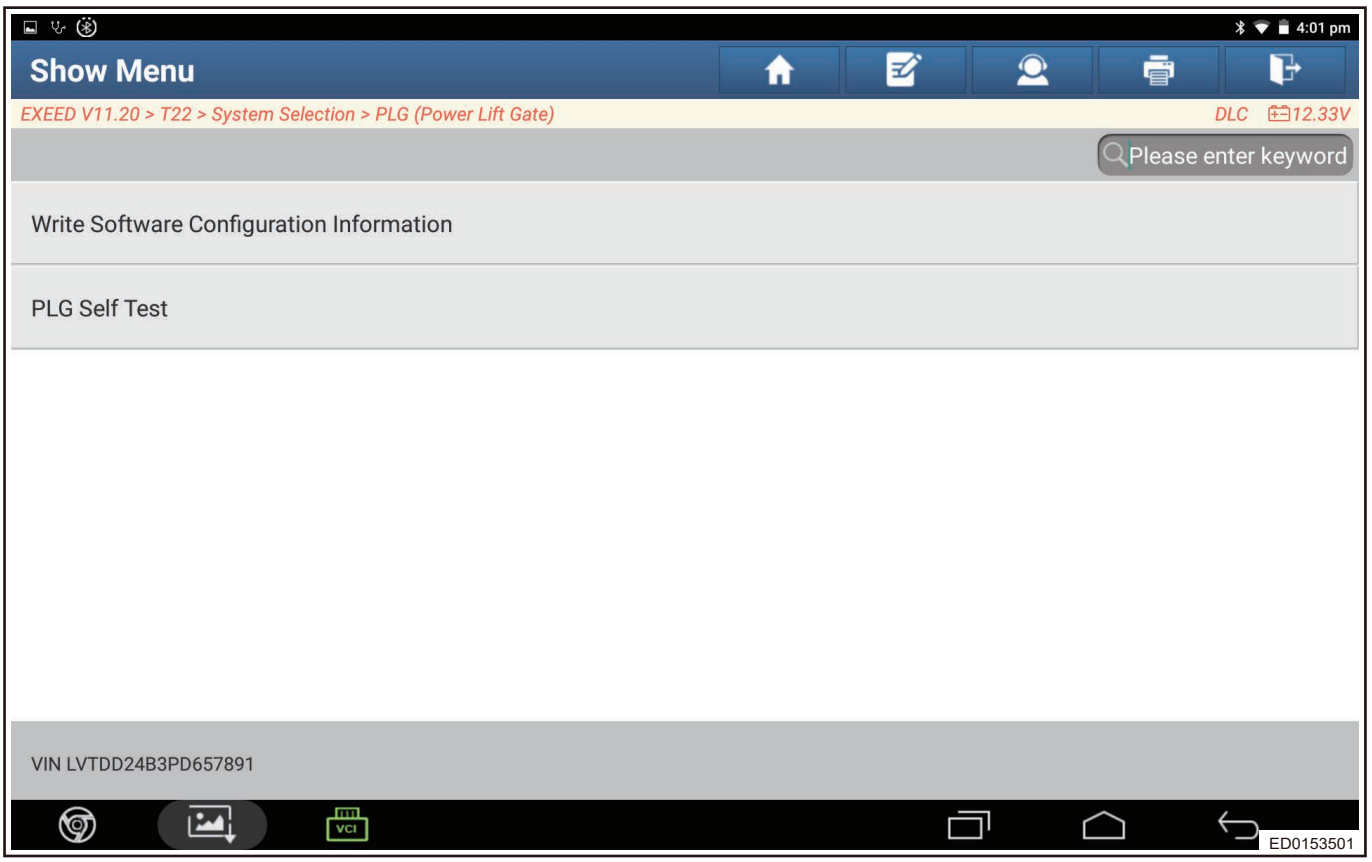
(4) Enter next screen, and click “PLG (Power Back Door Module)”.



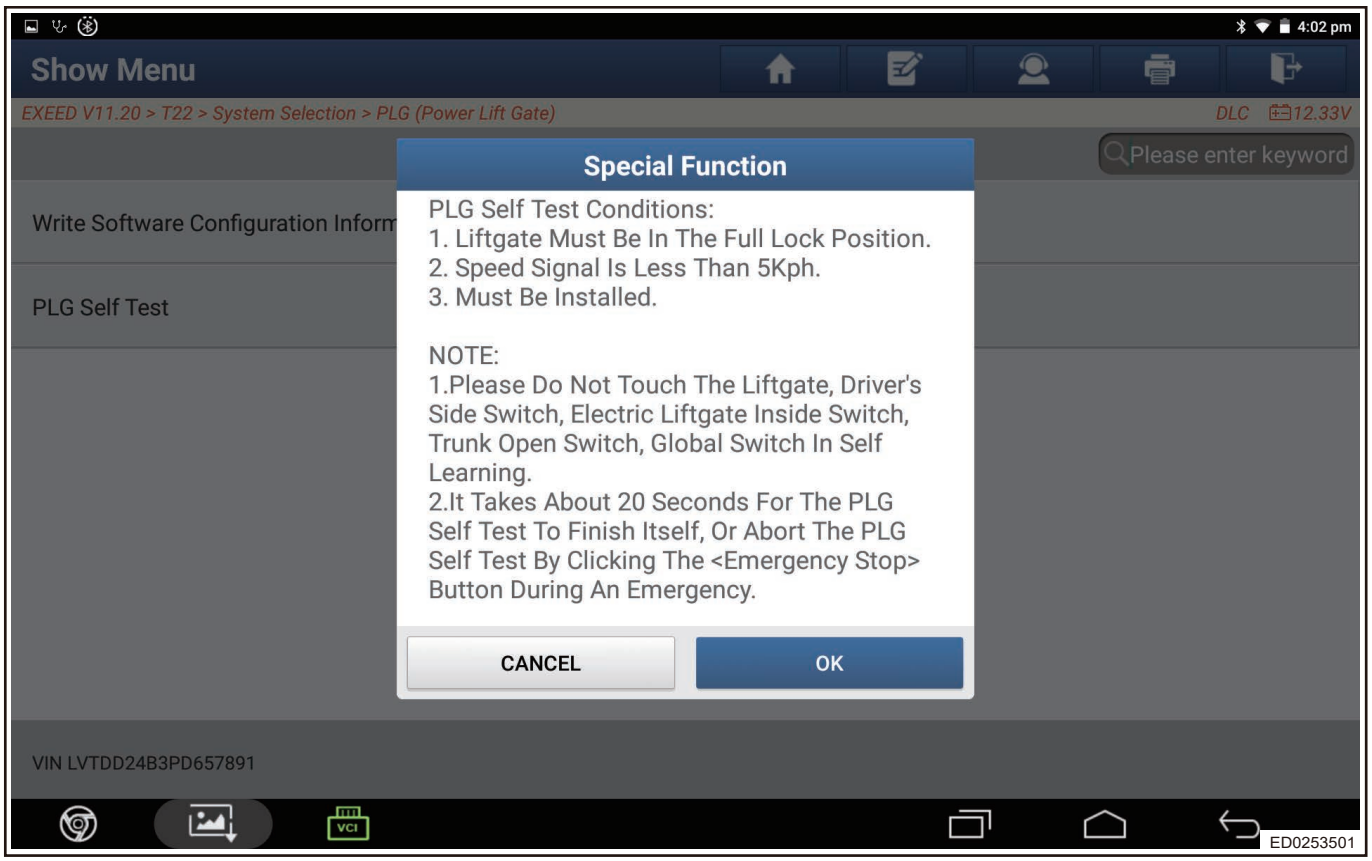
(5) Select “Special Function”.



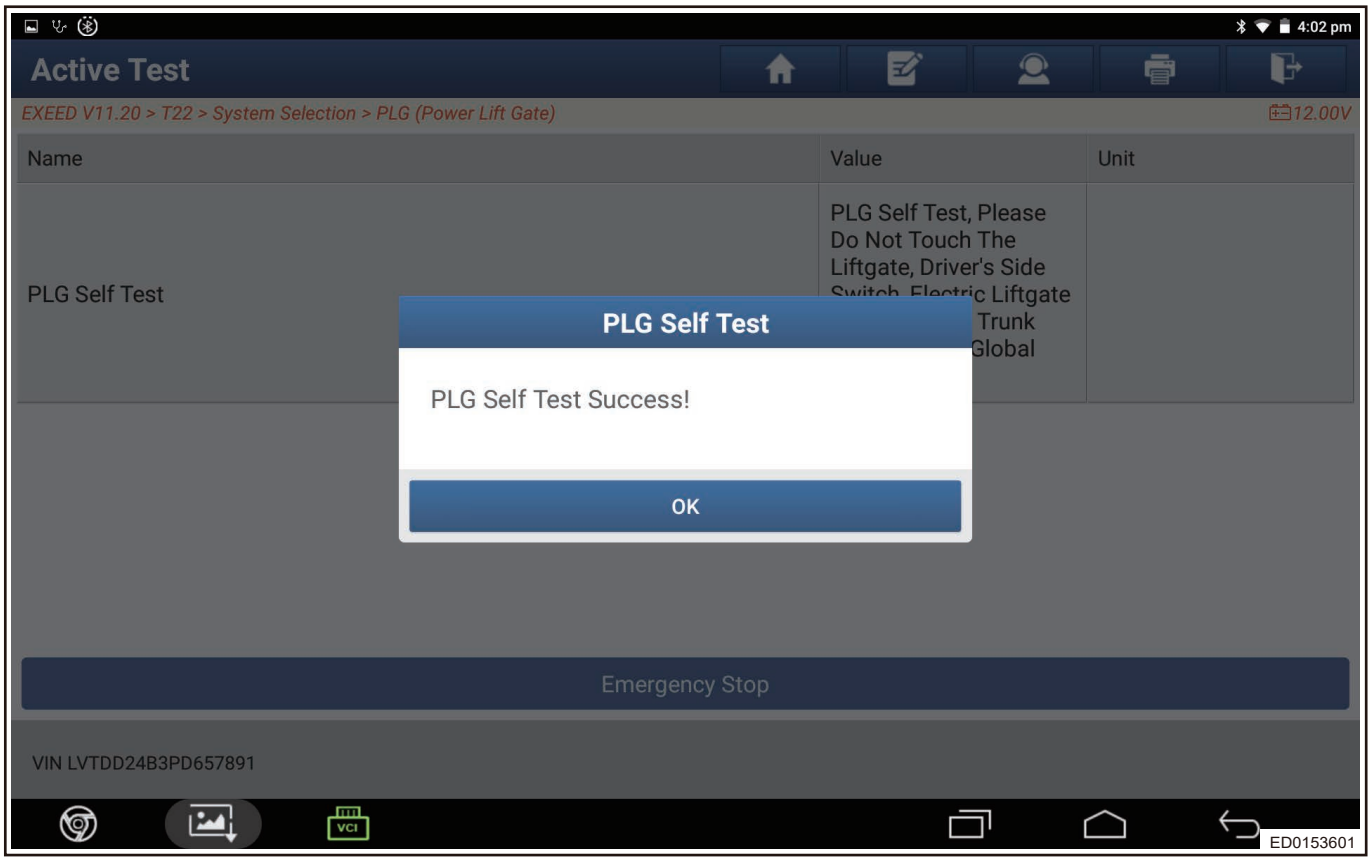
(6) Select "PLG Self-learning" Ensure that before learning: The vehicle power is in ON, transmission is in P, back door is completely closed.



(7) Interface shows self-learning condition.



(8) The successful learning prompt is shown below. After learning is successfully, press back door switch to confirm if it can be opened and closed electrically.



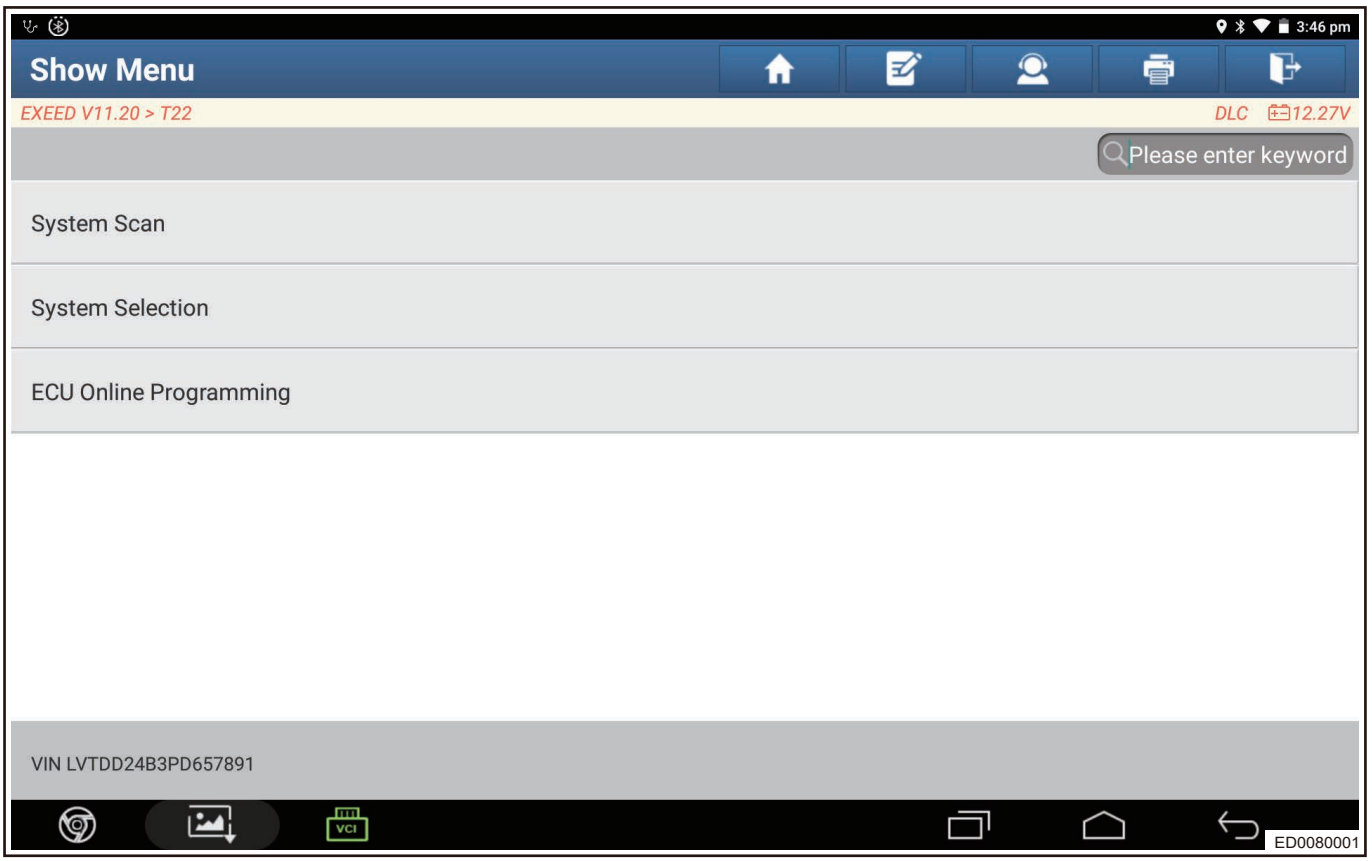
(9) For pressing remote control key to unlocking or locking button. Before using power back door switch on driver side for the first time, it is necessary to press remote control key unlocking or locking button to make sure that remote control key has been operated.

4.3 Door Module System

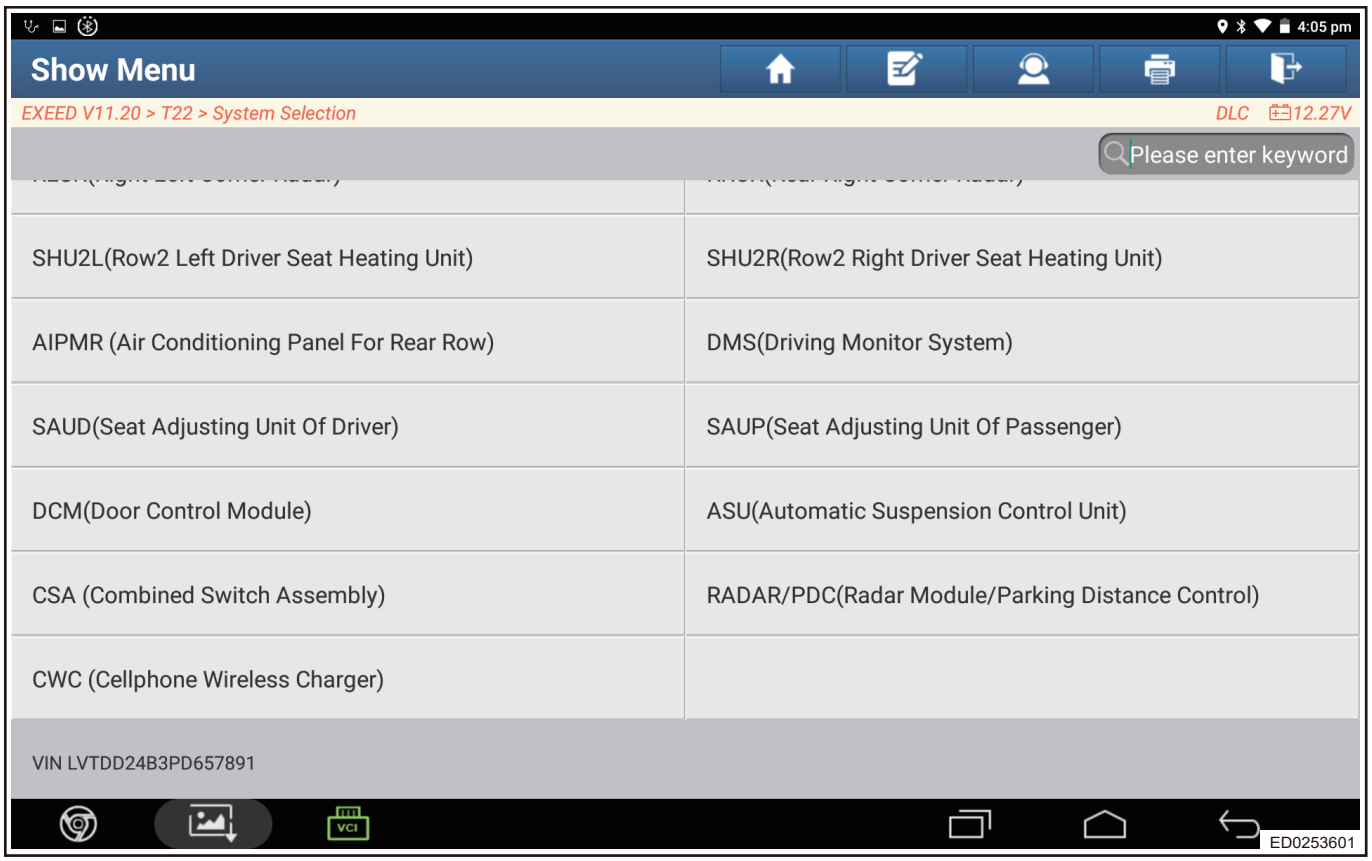
(1) Connect diagnostic tester, turn ENGINE START STOP switch to ON.

(2) Select “T22” model.

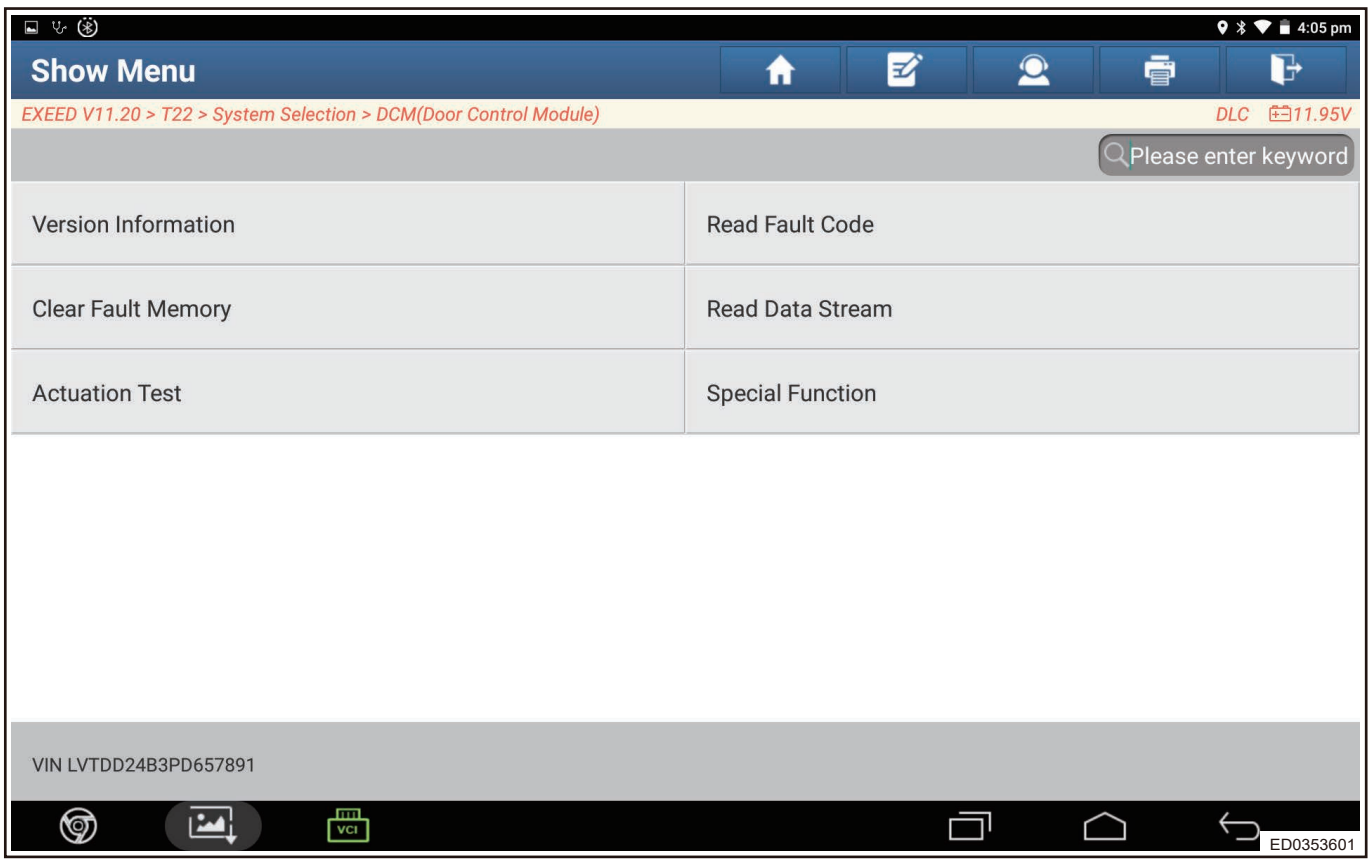
(3) Enter next screen and click “System Selection”.



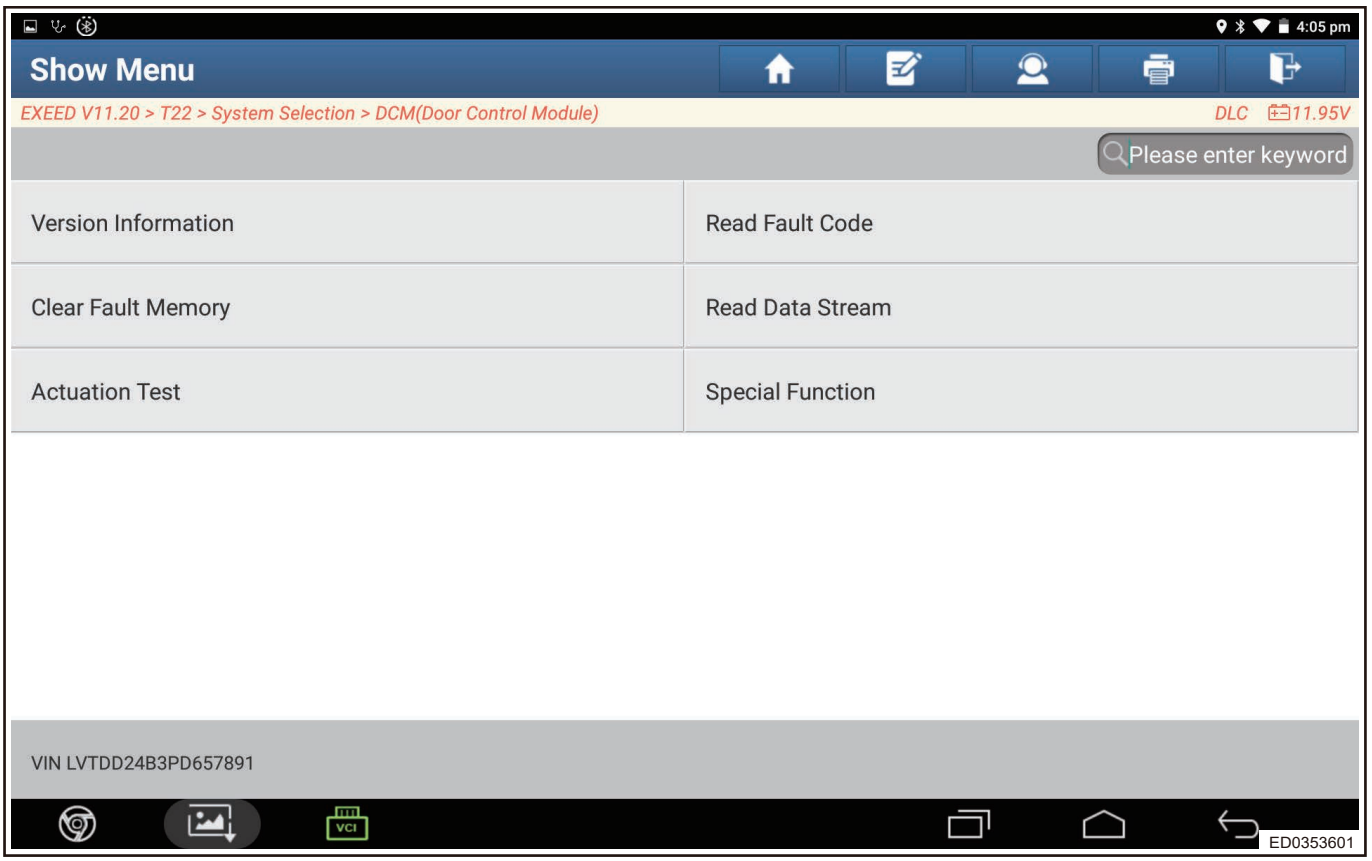
(4) Enter next screen, and click “DCM (Door Module)”.



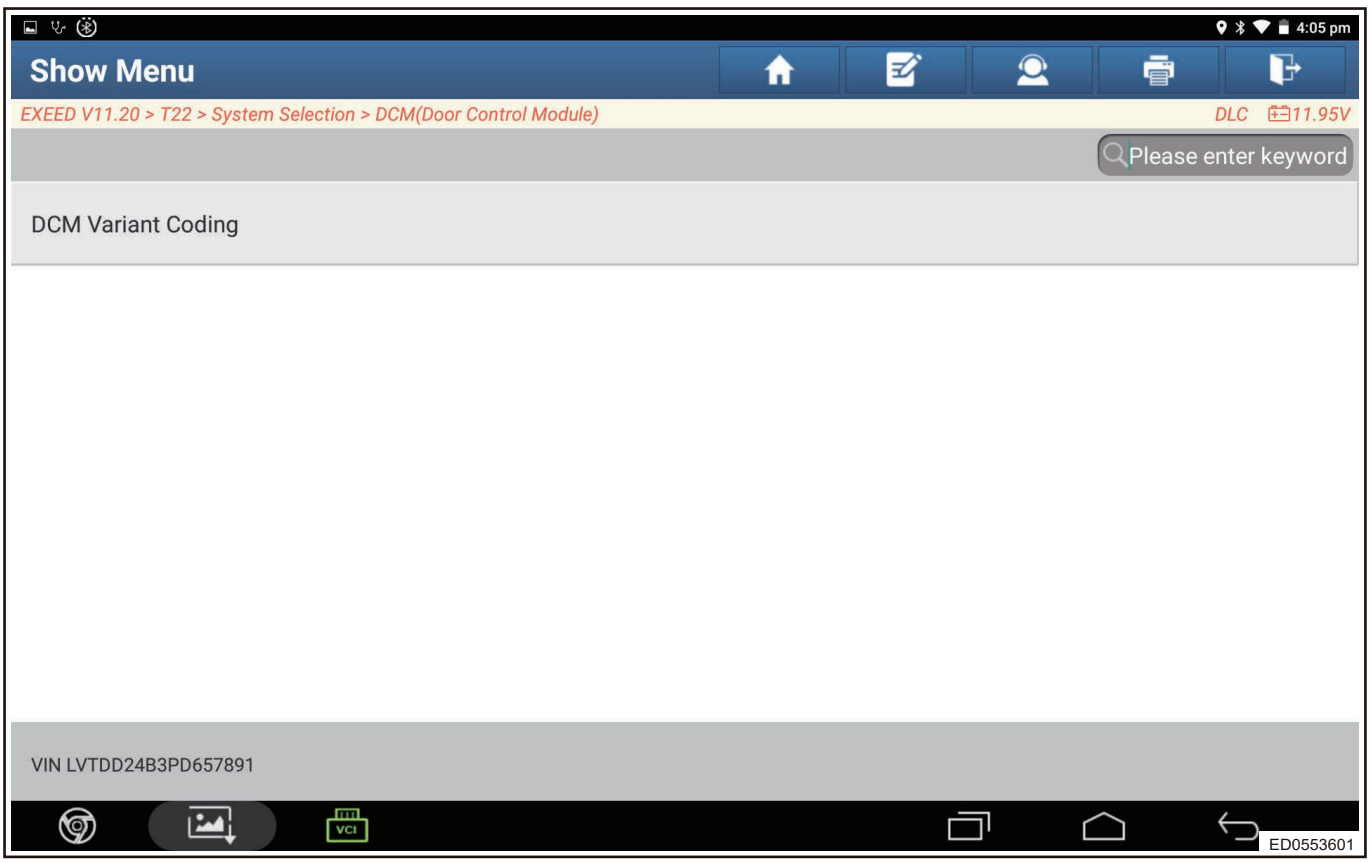
(5) Enter next screen and click “Version Information”.



(6) Return, click “Special Function”.



(7) Enter next screen, and click “Writing Door Module Configuration”.



(8) Screen displays.

4.4 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair, replace or adjust faulty components as necessary.

Symptom	Suspected Area
Back door cannot be opened	Switch failed
	Main shaft motor is damaged
	Module damaged
Back door jam protection fails	Main shaft motor stuck
	Hall sensor damaged
Back door cannot be closed	Door lock/pillar (deformed or damaged)
	Door opening weatherstrip not installed correctly

4.5 Diagnosis Procedure

Hint:
Use following procedures to troubleshoot the power back door.

1	**Vehicle brought to workshop**

Next

2	**Check battery voltage**

Check if battery voltage is normal.

OK

Standard voltage: Not less than 12 V.

Result

Result	Proceed to
OK	A
NG	B

B → **Replace battery**

A

3	**Customer problem analysis**

Next

4	**Read DTCs**

Result

Result	Proceed to
DTC occurs	A
No DTC	B

B → **Perform repair according to problem symptoms table**

A

5	**Read DTCs (current DTC and history DTC)**

Result

Result	Proceed to
DTC occurs	A
No DTC	B

B → **Troubleshoot according to Intermittent DTC malfunction procedures**

A

6	**Repair according to Diagnostic Trouble Code (DTC) Chart**

Next

7	Adjust, repair or replace

Next

8	Conduct test and confirm malfunction has been repaired

Next → End

4.6 DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

4.7 Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Wiggle related wire harness and connector and observe if signal in related circuit is interrupted.
- If possible, try to duplicate conditions under which DTC was set.
- Look for data that has changed or DTC to reset during wiggling test.
- Check for broken, bent, protruded or corroded terminals.
- Check power back door system components and mounting areas for damage, foreign matter, etc. that will cause incorrect signals.
- Check and clean all wire harness connectors and ground parts related to DTC.
- If multiple trouble codes were set, refer to circuit diagrams to look for any common ground circuit or power supply circuit applied to DTC.
- Refer to any Technical Bulletin that may apply to this malfunction.

4.8 Ground Inspection

Ground points are very important to the proper operation of circuits. Ground points are often exposed to moisture, dirt and other corrosive environments. Corrosion (rust) may increase load resistance. This situation may change the way in which a circuit operates. Circuits are very sensitive to proper grounding. A loose or corroded ground can seriously affect the control circuit. Check the ground points as follows:

- Remove ground bolt or nut.
- Check all contact surfaces for tarnish, dirt and rust, etc.
- Clean as necessary to ensure that contact is in good condition.
- Reinstall ground bolt or nut securely.
- Check if any additional accessories interfere with ground circuit.
- If several wire harnesses are crimped into one ground terminal, check for proper crimp condition. Make sure that all wire harnesses are clean and securely fastened while providing a proper ground path.

4.9 Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Possible Cause
U0073-88	CAN Busoff Failure	Network fault
U0140-87	Lost Communication with BCM	
U0214-87	Lost Communication With PEPS	
U0151-87	Lost Communication with ABM	
U0164-87	Lost Communication with CLM	
U0155-87	Lost Communication with ICM	
U0101-87	Lost Communication with TCU	
U0129-87	Lost Communication With BSM	
U0100-87	Lost Communication with EMS	
U1300-55	Software Configuration Error	
U1191-87	PLG Lost Communication with KSM	
B1A90-16	Power Supply Fault - Circuit Open	• Fuse failure • Power supply system failure • Wire harness or connector failure • Power back door module fault
B1A91-15	LH Pinch Strip Sensor Failure	/
B1A92-15	RH Pinch Strip Sensor Failure	/
B1A93-07	Driver Switch Failure	• Switch fault • Wire harness or connector failure • Power back door module fault
B1A94-07	Handle Switch Failure	
B1A95-07	Inner Switch Failure	
B1A96-07	Global Switch Failure	
B1A97-01	LH Hall Pulse is Out of Range	• Electric support rod fault • Wire harness or connector failure • Power back door module assembly fault
B1A98-13	LH Hall Sensor Failure (LH Spindle Unit Failure)	
B1A99-14	LH Hall Sensor Power Supply Failure	
B1A9A-1C	LH Spindle Motor Output Failure	• Electric support rod assembly fault • Wire harness or connector failure • Power back door module assembly fault
B1A9B-1D	LH Spindle Motor Overload	
B1A9C-01	RH Hall Pulse is Out of Range	/
B1A9D-13	RH Hall Sensor Failure (RH Spindle Unit Failure)	/
B1A9E-14	RH Hall Sensor Power Supply Failure	/

DTC	DTC Definition	Possible Cause
B1A9F-1C	RH Spindle Motor Output Failure	/
B1AA0-1D	RH Spindle Motor Overload	/
B1AA1-1C	Cinch Latch Motor Output Failure	• Fastener assembly fault • Wire harness or connector failure • Power back door module assembly fault
B1AA2-1D	Cinch Latch Motor Overload	
B1AA3-1C	Release Motor Output Failure	• Back door lock assembly fault • Wire harness or connector failure • Power back door module assembly fault
B1AA4-07	Half/Full Latch Abnormality	• Back door lock assembly fault • Wire harness or connector failure • Power back door module assembly fault
B1AA5-07	PCM Switch Failure	
B1AA6-07	PLG Position is Out of Range	• Wire harness or connector failure • Support rod fault
B1AA7-07	Dual Spindles Position Misalignment	
B1AA8-07	Cinch Failure	• Wire harness or connector failure • Fastener fault
B1AAA-04	ECU fault	• Power back door module assembly fault
B1AAB-17	Ks Over Voltage Error	/
B1AAC-16	Ks Under Voltage Error	/
B1AAD-01	Ks Electrode Error	/
B1AAE-45	Ks ECU ROM Error	/
B1AAF-87	Ks LIN Response Error	/

DTC	**U0073-88**	**CAN Busoff Failure**
DTC	**U0140-87**	**Lost Communication with BCM**
DTC	**U0214-87**	**Lost Communication With PEPS**
DTC	**U0151-87**	**Lost Communication with ABM**
DTC	**U0164-87**	**Lost Communication with CLM**
DTC	**U0155-87**	**Lost Communication with ICM**
DTC	**U0101-87**	**Lost Communication with TCU**
DTC	**U0129-87**	**Lost Communication With BSM**

DTC	U0100-87	Lost Communication with EMS
DTC	U1300-55	Software Configuration Error

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

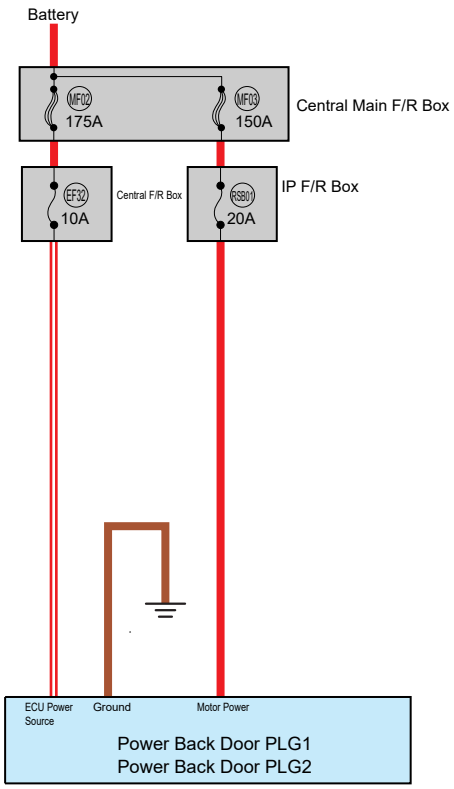
⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

Refer to CAN communication system for the above fault.

DTC	B1A90-16	Power Supply Fault - Circuit Open

■ **Circuit Diagram**



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■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check fuse

(a) Check if fuses in center fuse and relay box, instrument panel fuse and relay box are blown.

NG → **Replace fuse**

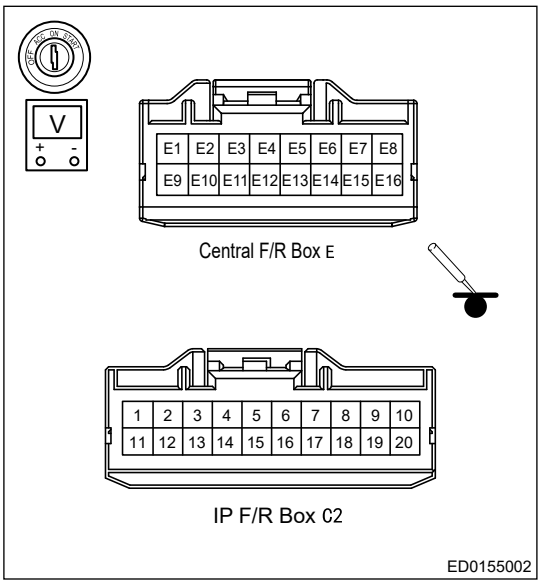
OK →

2	Check engine compartment fuse and relay box output voltage

(a) Turn ENGINE START STOP switch to ON.

(b) Check the voltage between center fuse and relay box E (power back door module power supply terminal), instrument panel fuse and relay box C2 (power back door module power supply terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
Center fuse and relay box E (power back door module power supply terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V
Instrument panel fuse and relay box C2 (power back door module power supply terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



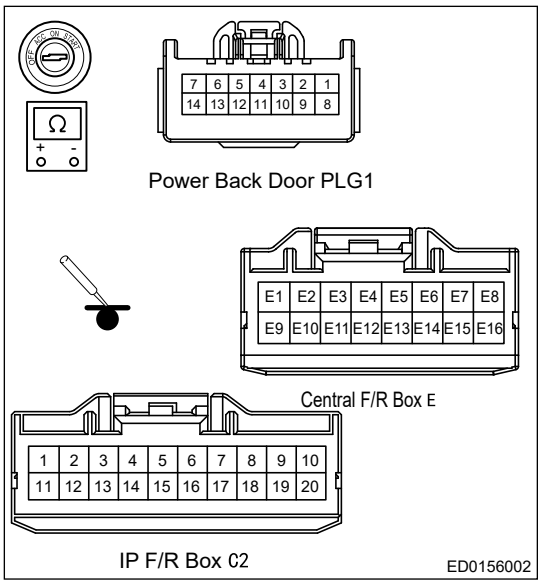
Result

NG → **Replace instrument panel fuse and relay box or center fuse and relay box**

OK →

3	Check for open in wire harness

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery terminal cable.
(c) Disconnect connectors from power back door module, center fuse and relay box and instrument panel fuse and relay box.
(d) Using ohm band of digital multimeter, measure if resistance of power back door module (power supply terminal) center fuse and relay box (corresponding terminal), instrument panel fuse and relay box (corresponding terminal) is normal to check wire harness for open.
(e) Using ohm band of digital multimeter, measure if resistance of power back door module (ground terminal) and body ground is normal to check wire harness for open.



Multimeter Connection	Condition	Specified Condition
Power back door module (power supply terminal) - Instrument panel fuse and relay box (corresponding terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Power back door module (power supply terminal) - Center fuse and relay box (- corresponding terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Power back door module (- corresponding terminal) - Body ground	ENGINE START STOP switch "OFF"	⩽ 1 Ω

OK	**Replacement of Power Back Door Module Assembly**
NG	**Handle and repair related wire harness**

DTC	**B1A93-07**	**Driver Switch Failure**
DTC	**B1A94-07**	**Handle Switch Failure**

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

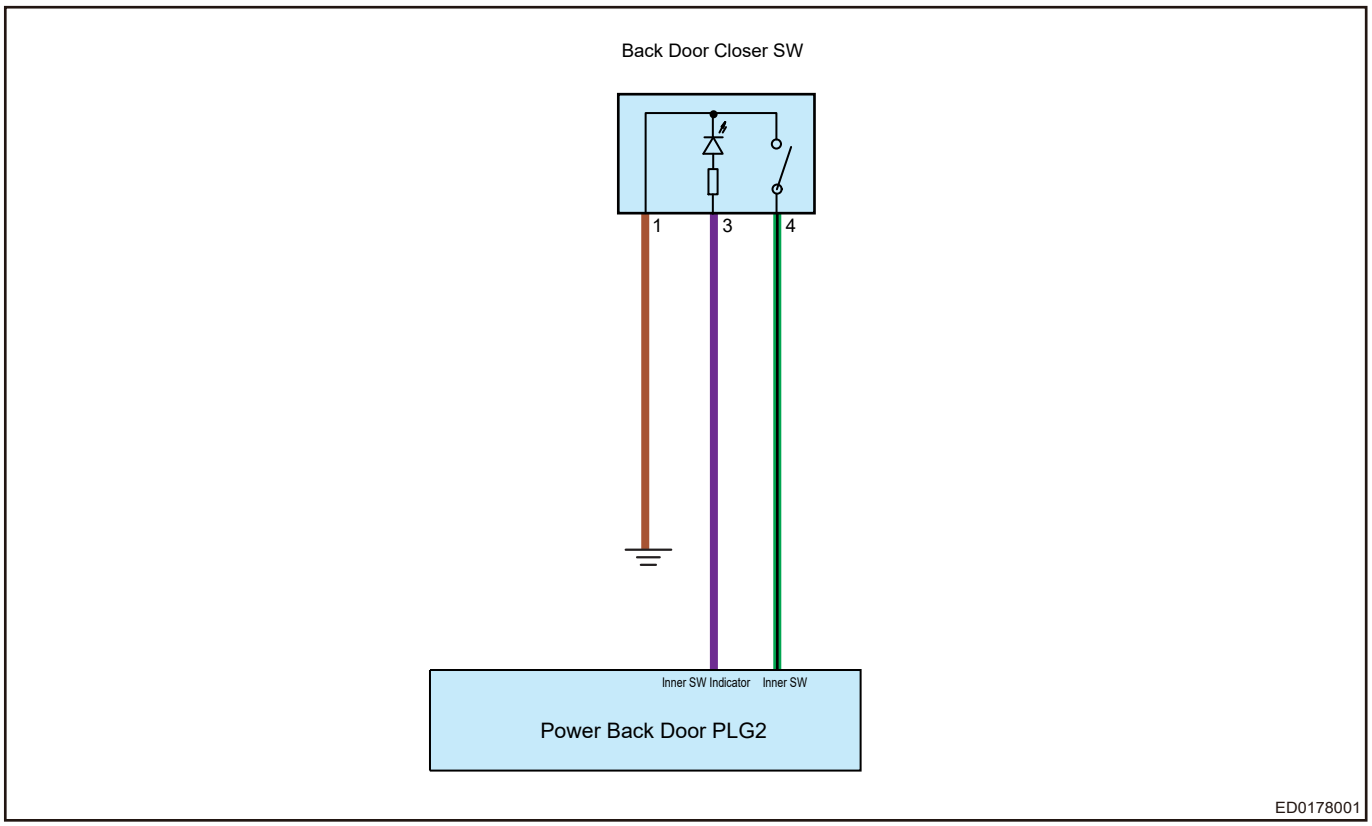
⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Refer to PEPS System**

DTC	**B1A95-07**	**Inner Switch Failure**
DTC	**B1A96-07**	**Global Switch Failure**

■ Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check vehicle malfunction condition**

(a) Press back door closer switch to check if back door can close normally.

NG → **Turn off vehicle power supply (disconnect the negative battery cable), then turn on power supply again and clear DTC**

OK

2	Check wire harness and connector

(a) Disconnect the back door closer switch.
(b) Check if wire harnesses are worn, pierced, pinched or partially broken.
(c) Check for broken, bent, protruded or corroded terminals.
(d) Check if terminal contact pins of related connectors are in good condition.

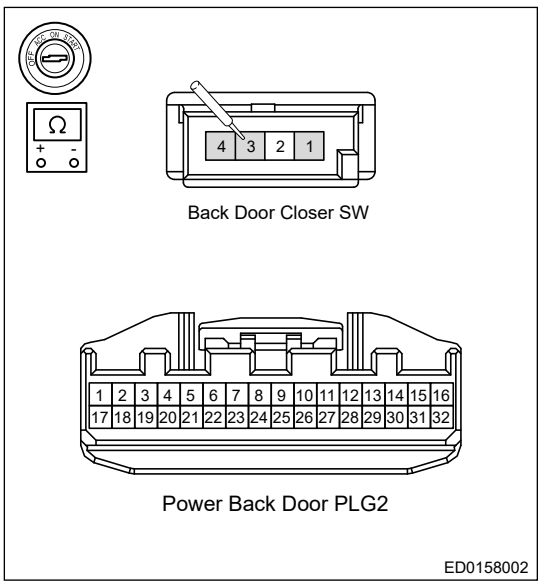
NG → **Repair or replace wire harness connector**

OK

3	Check back door closer switch wire harness

(a) Turn ENGINE START STOP switch to "OFF".
(b) Disconnect back door closer switch, disconnect connector from power back door module.
(c) Using ohm band of multimeter, measure resistance between back door closer switch terminal and power back door module (-corresponding terminal).
(d) Using ohm band of multimeter, measure resistance between back door closer switch (corresponding terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
Back door closer switch (1) - Body ground	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Back door closer switch (3) - power back door module (-corresponding terminal)		⩽ 1 Ω
Back door closer switch (4) - power back door module (-corresponding terminal)		⩽ 1 Ω



NG → **Repair or replace back closer switch wire harness**

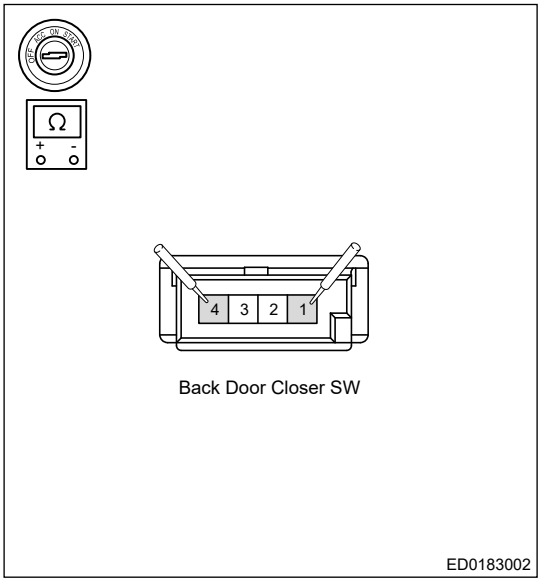
OK

4	Check back door closer switch

(a) Turn ENGINE START STOP switch to "OFF".
(b) Disconnect the back closer switch connector.

(c) Using ohm band of multimeter, measure resistance between back door closer switch connectors.

Multimeter Connection	Switch Condition	Specified Condition
Back door closer switch (1) - Back door closer switch (4)	Pressed	⩽ 1 Ω
	Not pressed	∞



NG → **Replace back door closer switch**

OK

5	Reconfirm DTCs

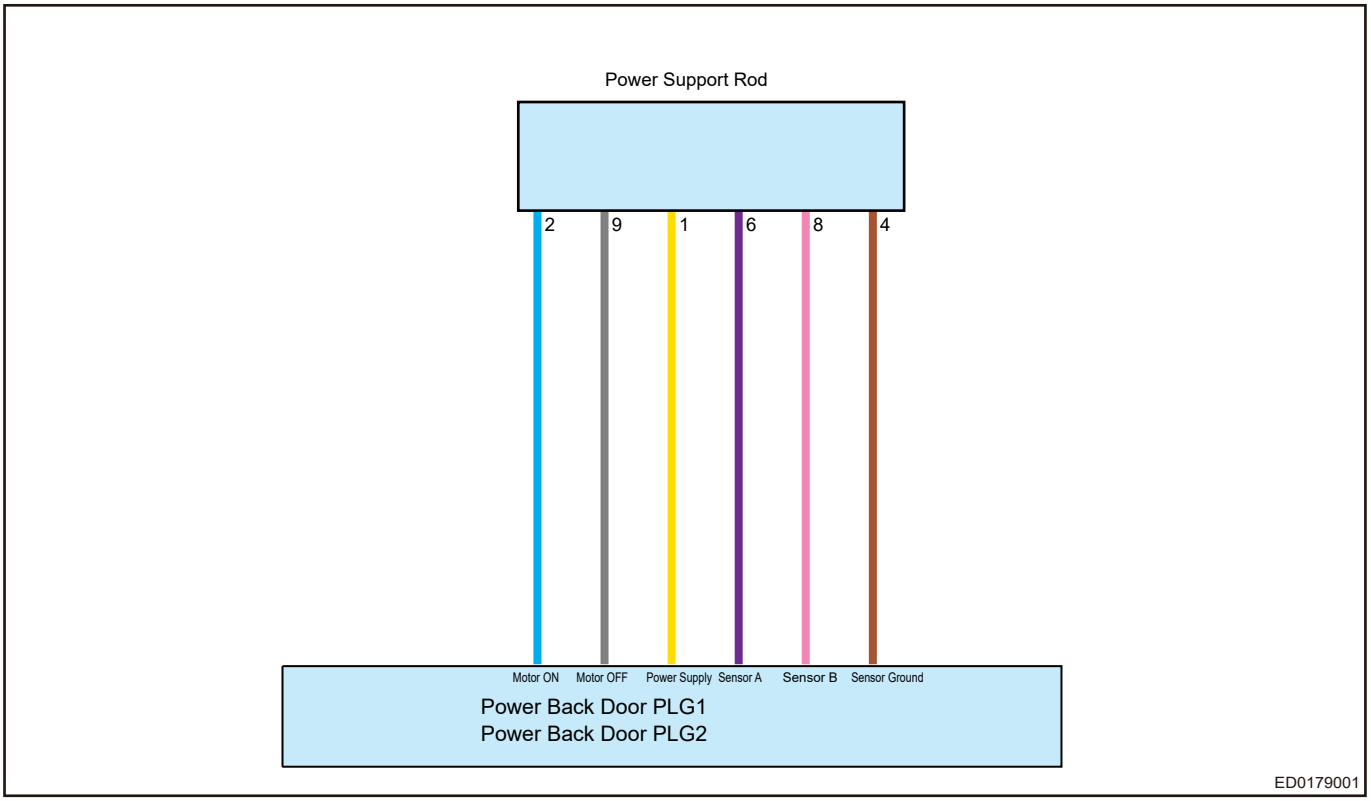
(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to "ON".
(d) Use diagnostic tester (the latest software) to reread DTC in system.

OK → **System is normal**

NG → **Replace PLG module assembly**

DTC	**B1A97-01**	**LH Hall Pulse is Out of Range**
DTC	**B1A98-13**	**LH Hall Sensor Failure (LH Spindle Unit Failure)**
DTC	**B1A99-14**	**LH Hall Sensor Power Supply Failure**

■ Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check electric support rod wire harness and connector**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the electric support rod connector.
(b) Check for broken, bent, protruded or corroded terminals.
(c) Check if wire harnesses are worn, pierced, pinched or partially broken.

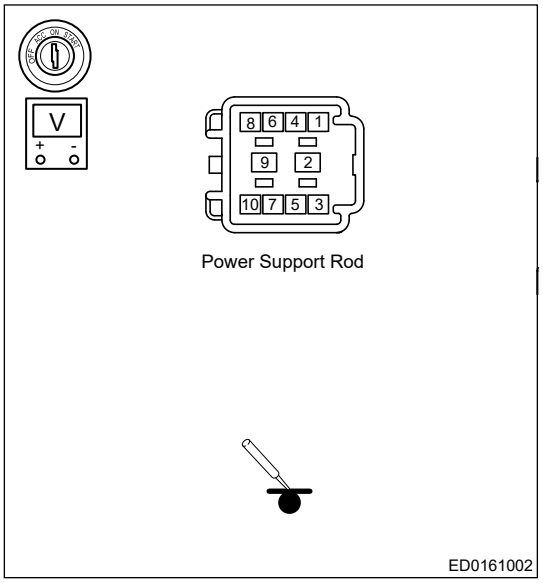
NG → **Repair or replace wire harness connector**

OK

2	**Check sensor power supply**

(a) Turn ENGINE START STOP switch to “ON”.

(b) Disconnect electric support rod connector, use a multimeter to measure voltage between power supply terminal and body ground.



OK

Multimeter Connection Terminal	Condition	Specified Condition
Electric support rod (power supply) - Body ground	ENGINE START STOP switch "ON"	⩾ 12 V

NG → **Repair or replace wire harness connector**

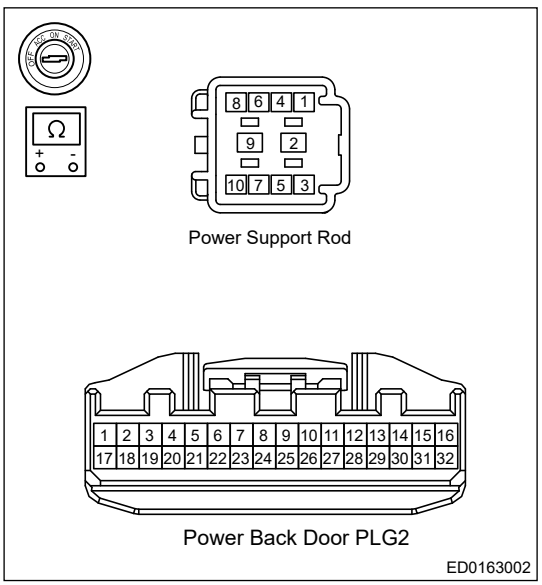
OK

3	Check power supply wire harness

(a) Turn ENGINE START STOP switch to “OFF”.

(b) Disconnect power back door module connector and electric support rod connector.

(c) Using ohm band of multimeter, check for continuity between power back door module (corresponding terminal) and electric support rod (power supply terminal).



Multimeter Connection Terminal	Condition	Specified Condition
Power back door PLG2 (-corresponding terminal) - Electric support rod (power supply terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

Result

NG → **Repair or replace wire harness connector**

OK

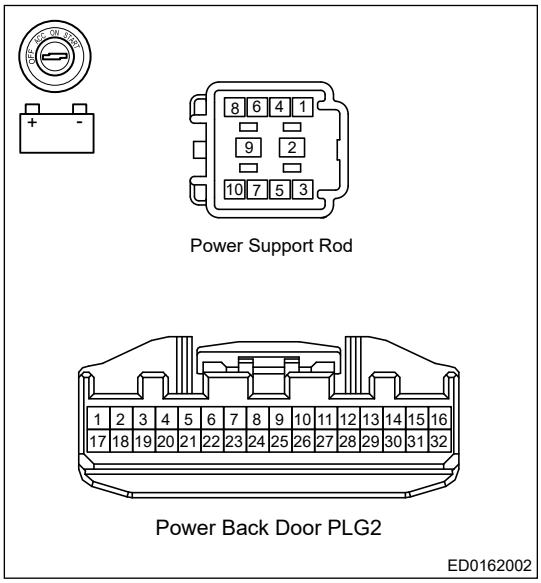
4	Check hall sensor ground

(a) Turn ENGINE START STOP switch to “OFF”.

(b) Disconnect power back door module connector and electric support rod connector.

(c) Using ohm band of multimeter, check for continuity between power back door module (corresponding terminal) and electric support rod (ground terminal).

Multimeter Connection Terminal	Condition	Specified Condition
Power back door PLG2 (- corresponding terminal) - Electric support rod (- corresponding terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω



NG → **Repair or replace wire harness connector**

OK

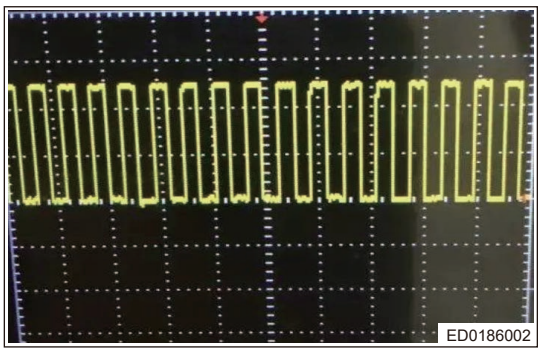
5	Check electric support rod hall sensor AB

(a) Turn ENGINE START STOP switch to “OFF”.

(b) Using an oscilloscope, measure electric support rod hall sensor, clip ground, channel 1, channel 2. Use probes to clamp power back door module (sensor A) and power back door module (sensor B) separately.

(c) Turn ENGINE START STOP switch to “ON”.

(d) Press or close power back door, oscilloscope will display waveform, correct waveform is as shown in illustration.



NG → **Repair or replace electric support rod**

OK

6	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to "ON".
(d) Use diagnostic tester (the latest software) to reread DTC in system.

OK	System is normal
NG	Replace PLG module assembly

DTC	B1AA6-07	PLG Position is Out of Range

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check appearance of electric support rod

(a) Check appearance of electric support rod for deformation or damage.

NG	Replace electric support rod

OK

2	Check electric support rod

(a) Install electric support rod to a new vehicle, observe whether the same fault phenomenon occurs.

NG	Replace electric support rod

OK

3	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “ON”.
(d) Use diagnostic tester (the latest software) to reread DTC in system.

OK	System is normal
NG	Replace PLG module assembly

DTC	B1A9A-1C	LH Spindle Motor Output Failure
DTC	B1A9B-1D	LH Spindle Motor Overload

■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	**Check left support motor connector**

(a) Turn ENGINE START STOP switch to "OFF".

(b) Disconnect the connector from electric support rod, check if connector terminals are damaged or displaced.

NG → **Repair or replace electric support rod**

OK

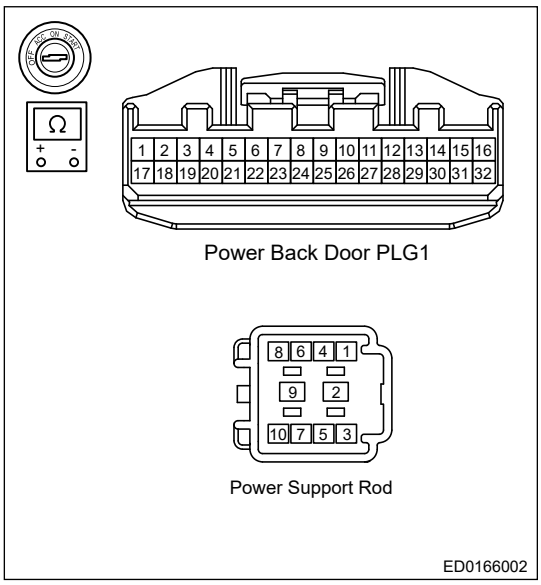
2	**Check motor wire harness.**

(a) Turn ENGINE START STOP switch to "OFF".

(b) Disconnect power back door module connector and electric support rod connector.

(c) Using ohm band of multimeter, check for continuity between power back door module connector (corresponding terminal) and electric support rod connector (motor terminal).

Multimeter Connection	Condition	Resistance
Power back door PLG2 (- corresponding terminal) - Electric support rod (motor opening terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Power back door PLG2 (- corresponding terminal) - Electric support rod (motor closing terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω



NG → **Repair or replace electric support rod**

OK

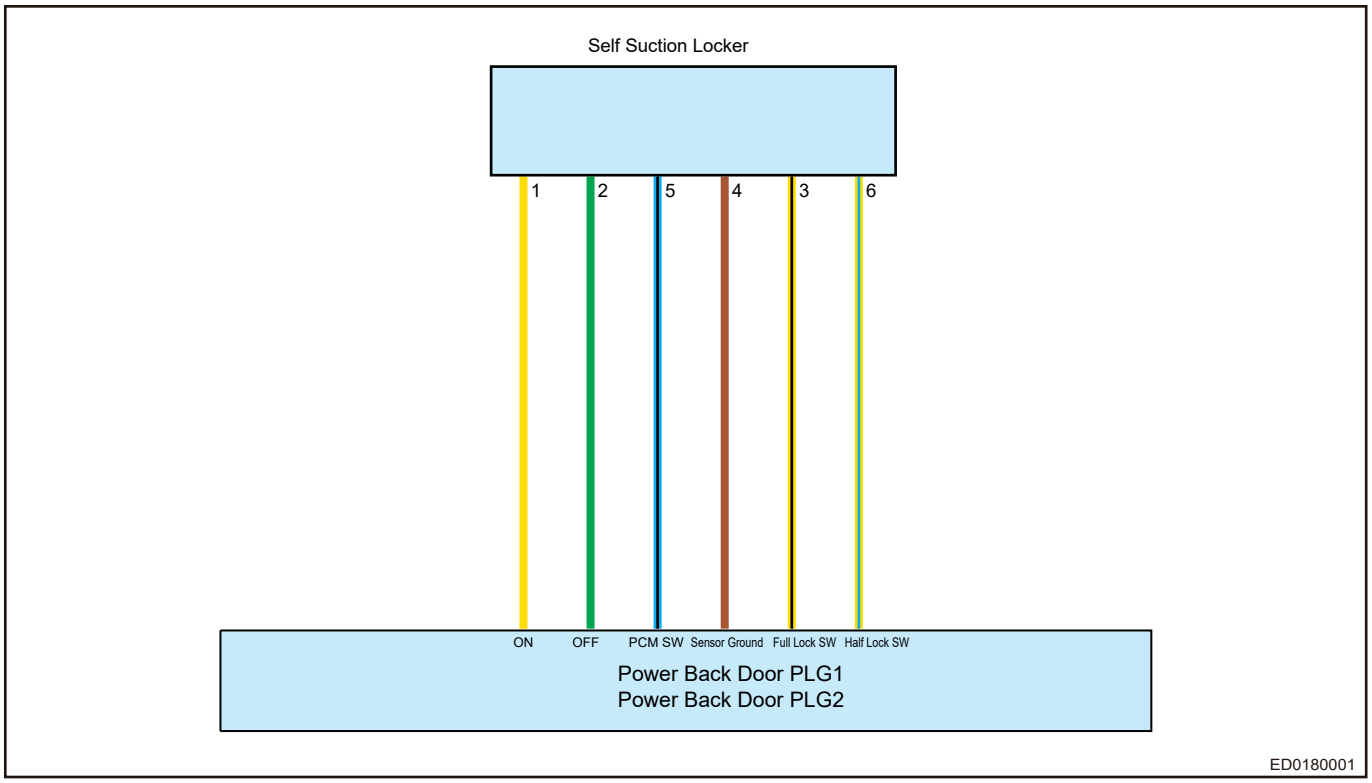
3	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “ON”.
(d) Use diagnostic tester (the latest software) to reread DTC in system.

OK	System is normal
NG	Replace PLG module assembly

DTC	B1AA2-1D	Cinch Latch Motor Overload
DTC	B1AA1-1C	Cinch Latch Motor Output Failure

■ Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check lock motor connector

(a) Turn ENGINE START STOP switch to "OFF".
(b) Disconnect self-engage fastener connector and check terminal.

NG → **Repair or replace motor wire harness**

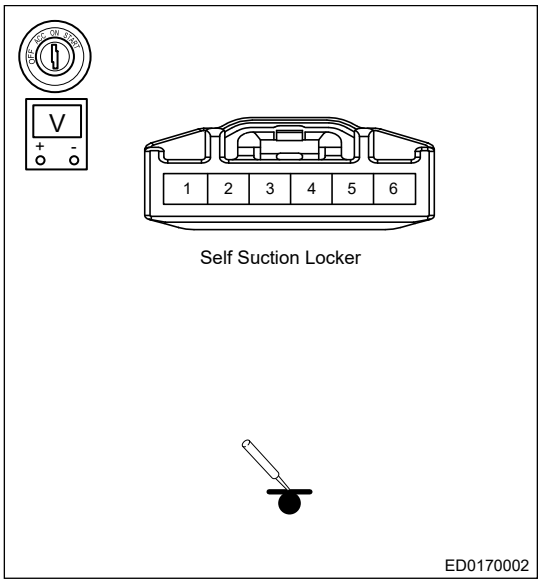
OK

2	Check lock motor signal voltage

(a) Turn ENGINE START STOP switch to "ON".

(b) Using a multimeter, measure voltage between self-engage fastener (PCM switch terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
Self-engage fastener (PCM switch terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



NG → **Repair or replace motor wire harness**

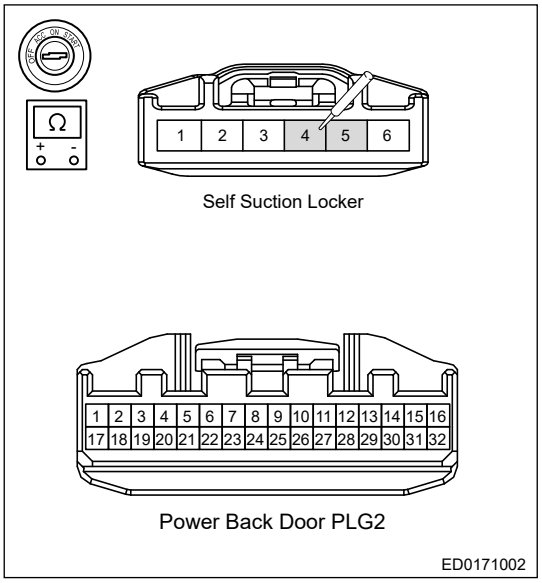
OK

3	Check lock motor wire harness

(a) Turn ENGINE START STOP switch to "OFF".
(b) Disconnect self-engage fastener connector and power back door connector.

(c) Using ohm band of multimeter, check for continuity between self-engage fastener and power back door connector.

Multimeter Connection	Condition	Specified Condition
Self-engage fastener (5) - Power back door PLG2 (- corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Self-engage fastener (4) - Power back door PLG2 (- corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



NG → **Repair or replace motor wire harness**

OK →

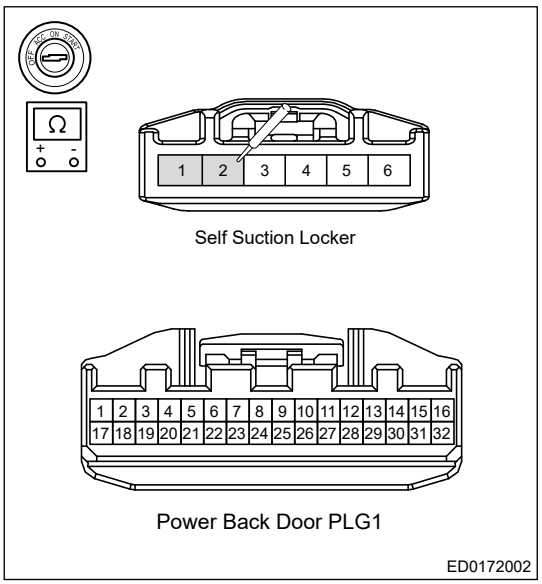
4	Check motor control circuit

(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(b) Disconnect self-engage fastener connector and power back door connector.

(c) Using ohm band of multimeter, check for continuity between self-engage fastener connectors (1, 2) and power back door connector (corresponding terminal).

Multimeter Connection	Condition	Specified Condition
Self-engage fastener (1) - Power back door PLG1 (- corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Self-engage fastener (2) - Power back door PLG1 (- corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



NG → **Repair or replace wire harness**

OK →

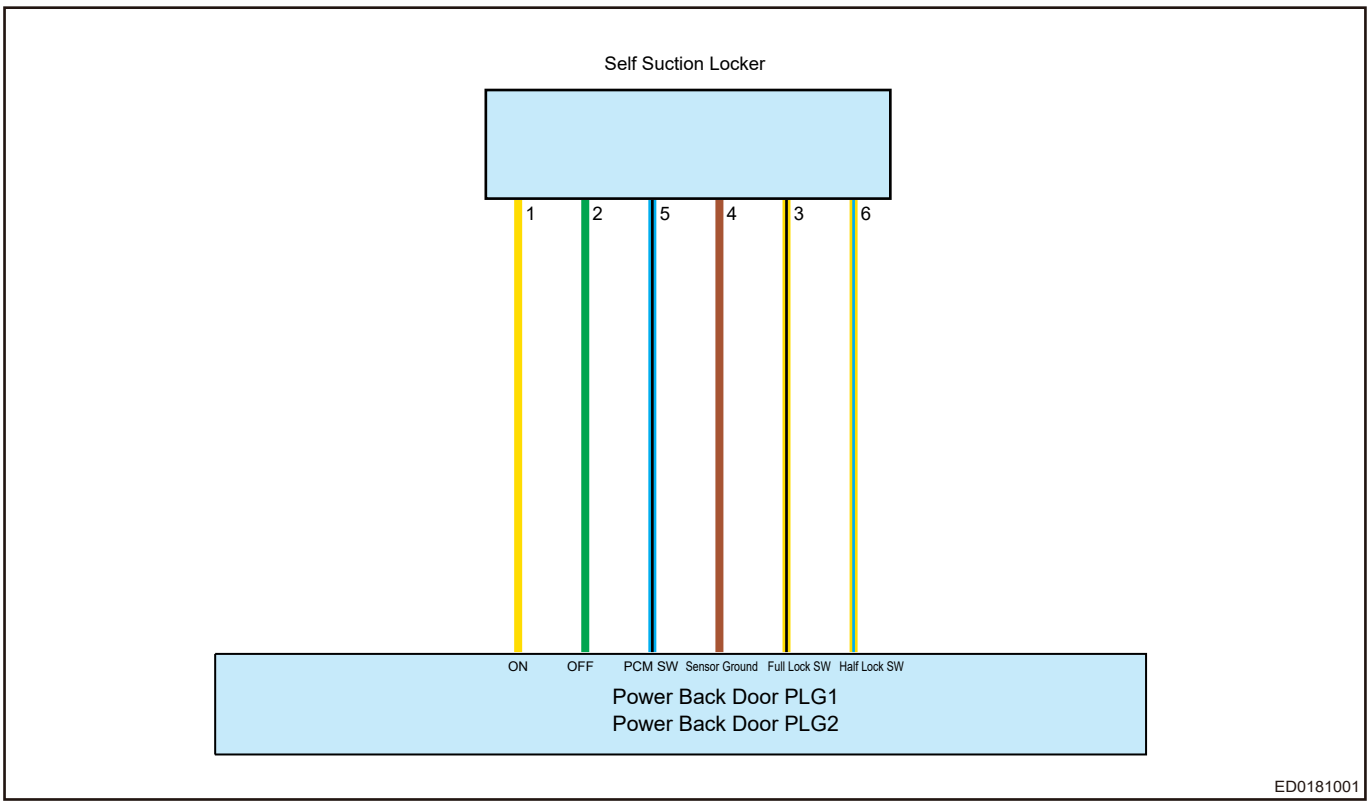
5	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “ON”.
(d) Use diagnostic tester (the latest software) to reread DTC in system.

OK	System is normal
NG	Replace fastener assembly

DTC	B1AA3-1C	Release Motor Output Failure

■ Circuit Diagram



■ DTC Confirmation Procedure

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check unlock motor connector

(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.
(b) Disconnect back door lock connector.
(c) Check if wire harnesses are worn, pierced, pinched or partially broken.
(d) Check for broken, bent, protruded or corroded terminals.

NG → **Repair or replace back door lock wire harness**

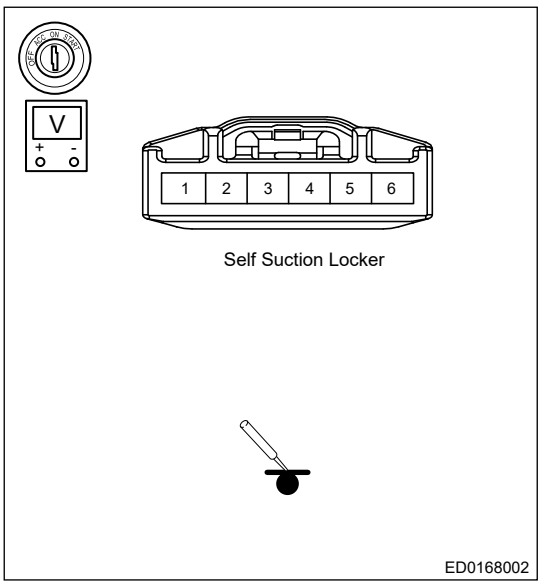
OK

2	Check unlock motor wire harness connector

(a) Disconnect back door lock connector.
(b) Turn ENGINE START STOP switch to "ON".

(c) Using a multimeter, check that the voltage between self-engage fastener (opening terminal) and body ground should not be less than 12 V.

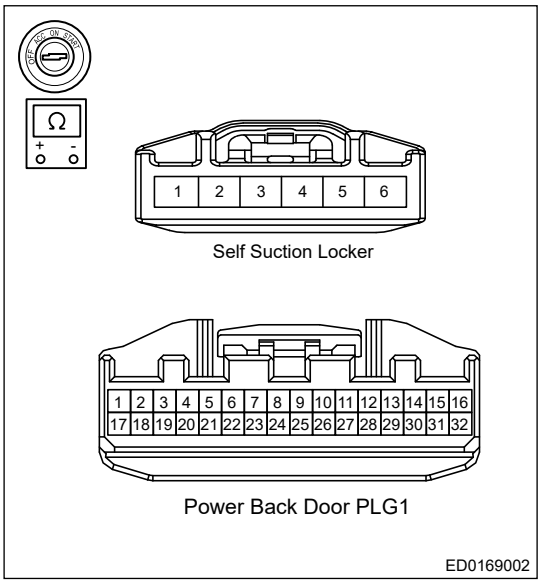
Multimeter Connection	Condition	Specified Condition
Self-engage fastener (opening terminal) - Body ground	ENGINE START STOP switch "ON"	⩾ 12 V



(d) Using ohm band of multimeter, measure resistance between self-engage fastener (opening terminal) and power back door module (corresponding terminal).

Check for open

Multimeter Connection	Condition	Specified Condition
Self-engage fastener (opening terminal) - Power back door PLG1 (- corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



NG → **Repair or replace back door lock wire harness**

OK

3	Check back door lock

(a) Install back door lock of malfunctioning vehicle to new vehicle, and test if inspection is normal.

NG → Replace back door lock

OK

4	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “ON”.
(d) Use diagnostic tester (the latest software) to reread DTC in system.

OK → System is normal

NG → Replace PLG module assembly

DTC	B1AA4-07	Half/Full Latch Abnormality
DTC	B1AA5-07	PCM Switch Failure

■ **DTC Confirmation Procedure**

Confirm that battery voltage is not less than 12 V before performing the following procedures.

- Turn ENGINE START STOP switch to OFF.
- Connect the diagnostic tester (the latest software).
- Turn ENGINE START STOP switch to ON.
- Use the diagnostic tester to record and clear DTCs stored in the system.
- Turn ENGINE START STOP switch to OFF and wait several seconds.
- Turn ENGINE START STOP switch to ON and check DTCs in the system again.
- If DTC is detected, it indicates current malfunction.
- If no DTC is detected, malfunction indicated by the DTC is intermittent.

⚠ Caution

- **When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.**

1	Check back door lock wire harness connector

(a) Disconnect the self-engage fastener connector.
(b) Check if wire harnesses are worn, pierced, pinched or partially broken.

NG → Repair or replace back door lock wire harness

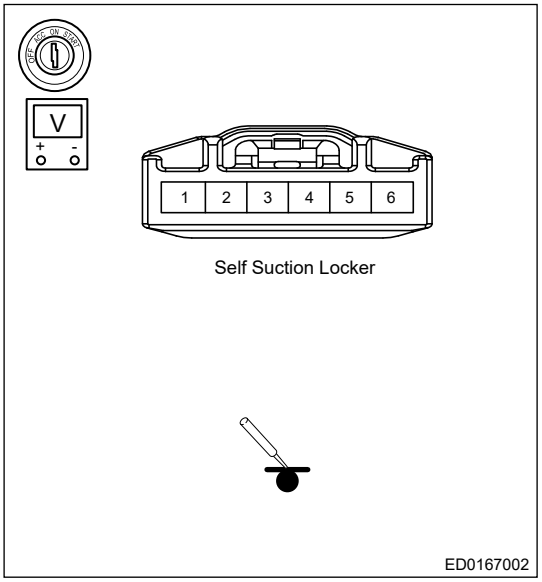
OK

2	Check half-lock/full-lock position signals

Check signal voltage

(a) Disconnect the self-engage fastener wire harness connector.
(b) Turn ENGINE START STOP switch to "ON".
(c) Using a multimeter, measure voltage between self-engage fastener (full latch switch terminal), self-engage fastener (half latch switch terminal) and body ground.

Multimeter Connection	Condition	Specified Condition
Self-engage fastener (full latch switch terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V
Self-engage fastener (half latch switch terminal) - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



NG → **Repair or replace back door lock wire harness**

OK

3	Check back door lock

(a) Install back door lock of malfunctioning vehicle to new vehicle, and test if inspection is normal.

NG → **Replace back door lock**

OK

4	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “ON”.
(d) Use diagnostic tester (the latest software) to reread DTC in system.

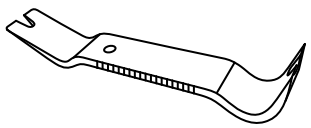
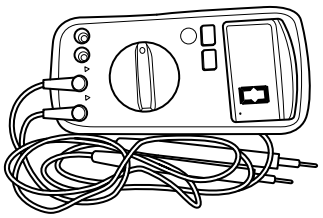
OK → **System is normal**

NG → **Replace PLG module assembly**

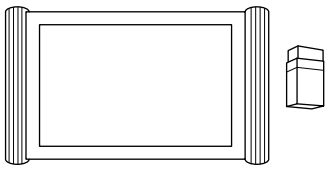
5 On-vehicle Service

5.1 Tools

■ General Tools

Tool Name	Tool Drawing
Interior Crow Plate	 S00020
Digital Multimeter	 S00002

■ Special Tool

Tool Name	Tool Drawing
Diagnostic tester	 S00001

5.2 Specifications

■ Torque Specifications

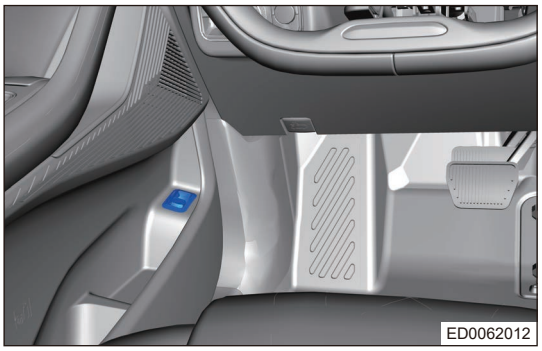
Item	Tightening torque
Door Protector Fixing Screw	1.5 ± 0.5 N·m
Door Lower Hinge Fixing Bolt	24 ± 3 N·m
Door Upper Hinge Fixing Bolt	24 ± 3 N·m
Door Stopper Fixing Nut	9 ± 1.5 N·m
Door Stopper Fixing Bolt	32 ± 4.0 N·m
Rear Door Inside Protector Assembly Fixing Screw	1.5 ± 0.5 N·m

Item	Tightening torque
Back Door Lower Hinge Fixing Bolt	24 ± 3 N·m
Rear Door Upper Hinge Fixing Bolt	24 ± 3 N·m
Engine Hood Hinge Fixing Bolt	23 ± 2.0 N·m
Back Door Lower Protector Fixing Screw	1.5 ± 0.5 N·m
Back Door Left/Right Hinge Fixing Bolt	25 ± 3 N·m
Back Door Wire Harness Ground Nut	9 ± 1.5 N·m
Rear Cover Upper Bracket Fixing Bolt	25 ± 3 N·m
Power Back Door Module Fixing Bolt	7 ± 1 N·m

5.3 Power Back Door Opening Method

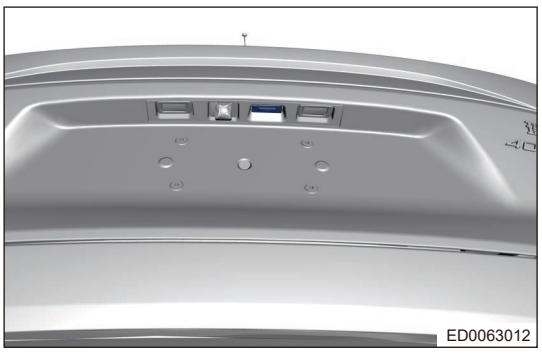
■ Back Door Switch (Interior)

(1) Switch the ENGINE START STOP switch to OFF, ACC or ON mode with shift lever is in P and vehicle is in fortifying deactivation mode, pull out power back door switch, turn signal light comes on and power back door opens/closes.

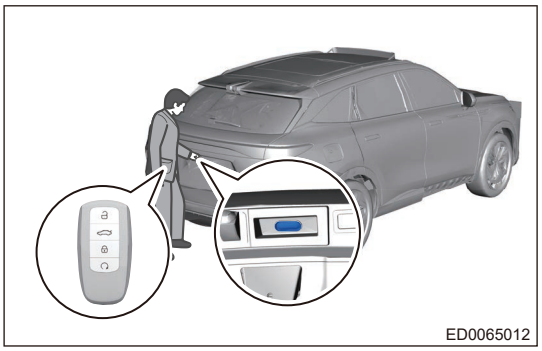

ED0062012

■ Back Door Switch

(1) Central control lock is in unlocking status, press back door switch, turn signal light comes on and power back door opens/closes.


ED0063012

(2) Central control lock is in locked state, approach the back of vehicle with a smart key, press back door switch, turn signal light comes on and power back door opens/closes.


ED0065012

■ Back Door Closer Switch

(1) Central control lock is in unlocking status, press back door button, turn signal light comes on and power back door closes.


ED0064012

■ Induction Opening

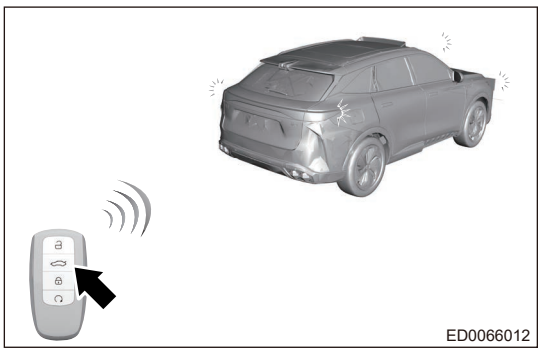
Hint:

- Smart key induction back door opening shall be set in the audio system.
- Power back door only supports sensing opening, does not support sensing closing.
- During intelligent back door sensing reminder, press back door button on smart key to stop intelligent back door sensing opening process.
- Be careful that when carrying smart key to do other things near back door, such as washing the car, it may cause back door to automatically open, pay attention to avoid accidents.

(1) Switch the ENGINE START STOP switch to OFF mode or remotely start the vehicle, four doors are closed, approach the back of vehicle with a smart key, system automatically recognizes the legitimacy of the smart key. After the turn signal light comes on, step back and power back door opens.

■ Remote Opening and Closing

(1) One button open/close: When ENGINE START STOP switch is switched to OFF/ACC mode, long press back door open button on smart key, turn signal light comes on and power back door opens/closes.


ED0066012

5.4 Power Back Door Opening Height Setting

■ Perform setting via audio and entertainment system

(1) Touch “Vehicle Setting” in audio head unit screen, and enter vehicle setting screen.
(2) Touch “Luggage Compartment Opening Angle Setting” on “Vehicle Setting” screen to adjust opening height of luggage compartment.
(3) Range of back door adjustment height: 50% ~ 100%.

■ **Perform setting by back door closing switch**

(1) First open the back door and adjust back door to a height position that you want to set.

⚠ Caution
If height of back door is too low or high, the opening height of back door cannot be set.

(2) Long press the switch button until light comes on, which indicates that back door opening height is set successfully.

5.5 Power Back Door Jam Protection Function

(1) When back door is opened/closed, if there is resistance (such as children, luggage compartment, etc.), back door will perform operation in the opposite direction until it is fully opened/closed, effectively preventing injury to children or damage to the vehicle.

⚠ Warning
Although the vehicle is equipped with anti-pinch function, never use any part of body to test this function, so as to avoid personal injury.

5.6 Anti-play Mode Function

(1) During opening/closing back door, pausing or jam protection occurs for several times. In order to protect motor and system, power back door may not operate, and it is necessary to manually close back door. At this time, power back door function is restored.

5.7 Inspection and Adjustment

■ **Inspection**

(1) Check engine hood for wear or deformation during installation, and repair as necessary.

(2) Check if the surroundings of sound insulator is properly installed and if it fits well with sheet metal. Adjust in time if there are any problems.

(3) Check if fixing nuts are installed in place. Tighten them to specified torque as necessary.

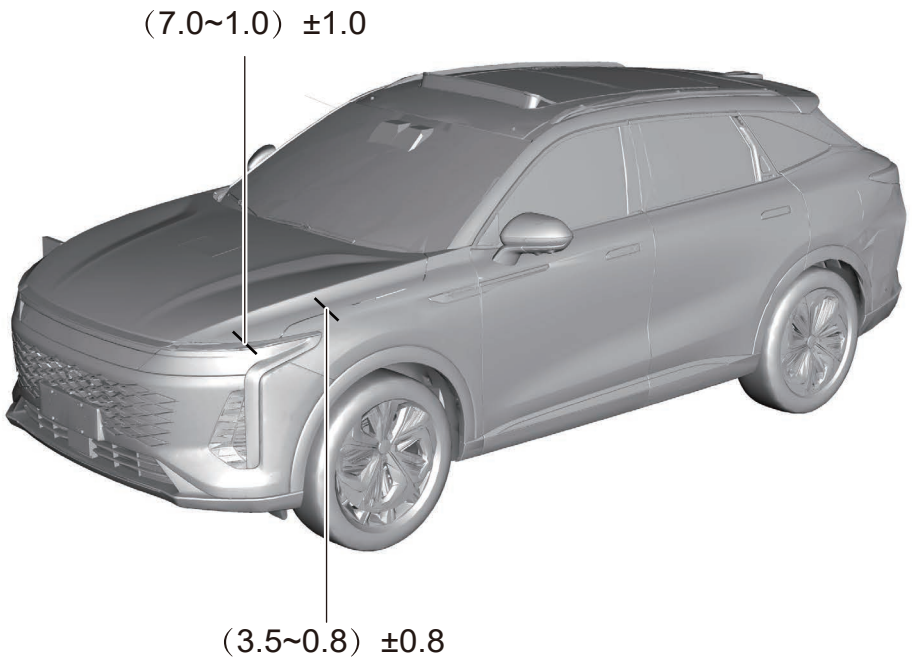
(4) Check if clearance and alignment between engine hood assembly installation position and each part are within the specified range. Adjust as necessary.

■ **Adjust the engine hood assembly.**

(1) Loosen fixing bolts of engine hood hinge assembly.

(2) Adjust the clearance of engine hood assembly within standard range and pre-tighten fixing bolts of engine hood hinge assembly.

(3) Standard ranges of clearance between installation position of engine hood assembly and each part are as in illustration.



ED0036001

(4) After adjustment, tighten fixing bolts between engine hood hinge assembly and engine hood assembly to specified torque.

Torque: 22 ± 1.0 N·m

(5) After adjustment, tighten fixing bolts between engine hood hinge assembly and body to specified torque.

Torque: 22 ± 1.0 N·m

■ Adjust the height of engine hood front end with adjustable buffer blocks.

(1) Raise or lower the hood front end by rotating the adjustable buffer blocks clockwise or counterclockwise.

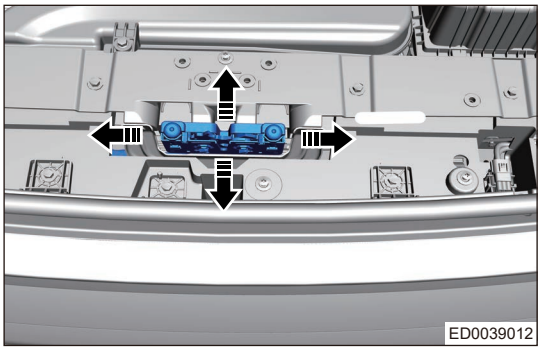
ED0037012

(2) After adjustment, make sure that alignment between engine hood assembly and wing assembly is within the standard range.

(3) After adjustment, make sure that alignment between engine hood assembly and front combination light is within the standard range.

■ Adjust the engine hood lock assembly.

(1) Slightly loosen the fixing nuts of engine hood lock assembly, and adjust the engine hood lock assembly in direction of arrow.

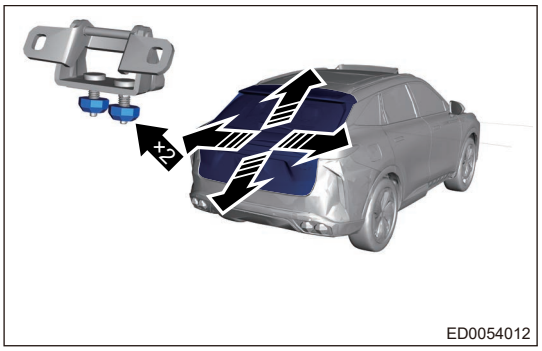


(2) Tighten the engine hood lock assembly fixing nuts to specified torque after adjustment.

Torque: 10 ± 1.5 N·m

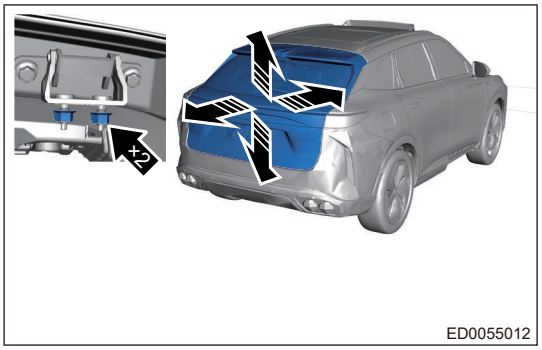
■ Adjust the back door assembly.

(1) Loosen fixing bolts of body, and adjust back door assembly position in direction of arrow as shown in illustration.



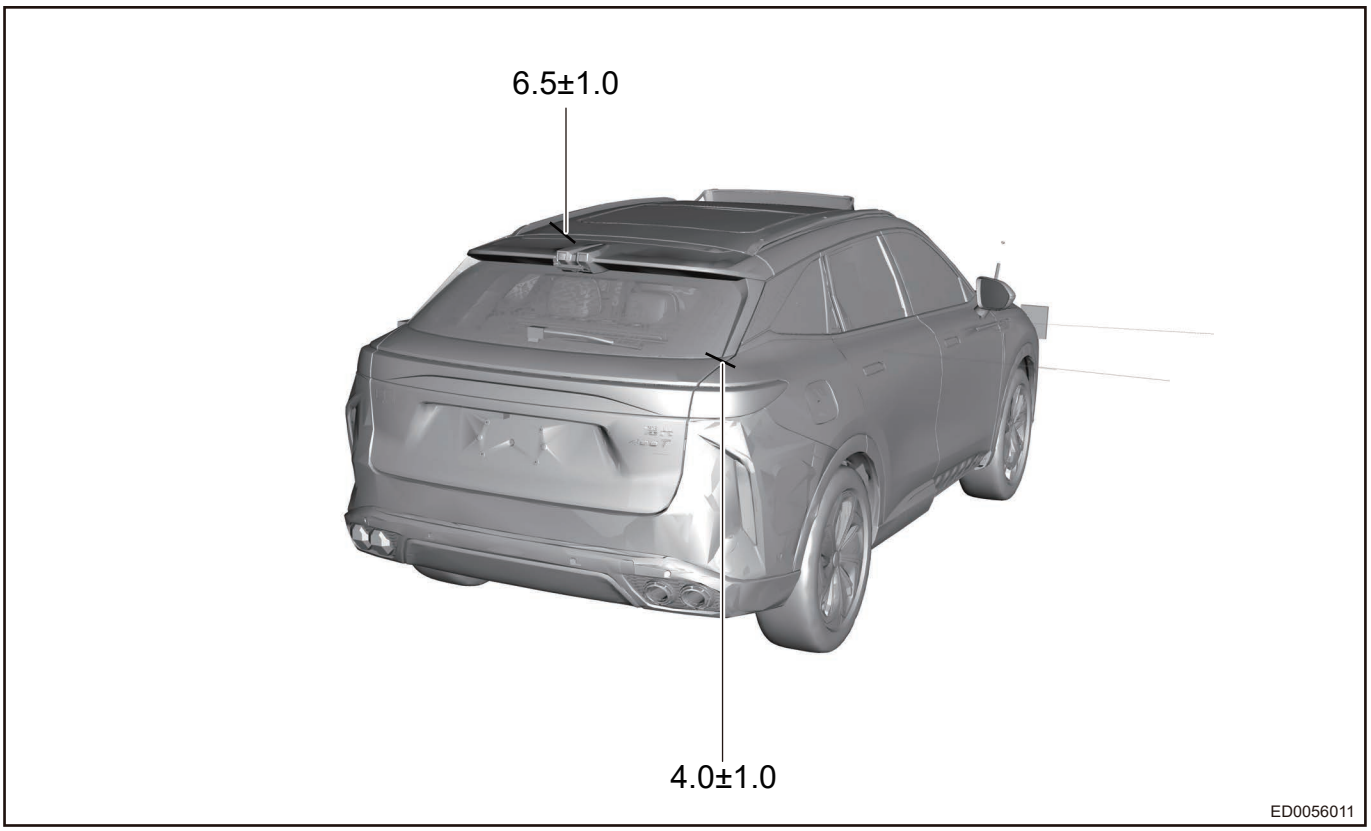
(2) Tighten fixing bolts of body to specified torque after adjustment.

(3) Loosen the fixing nuts on back door assembly and adjust back door assembly position in direction of arrow.



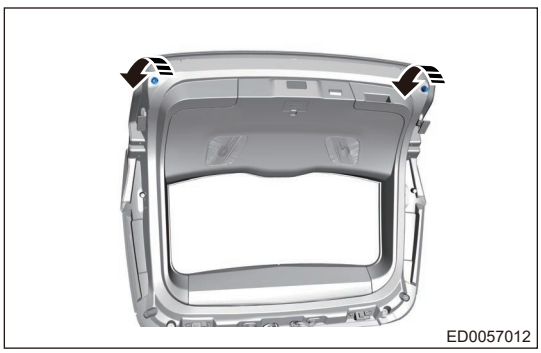
(4) Tighten back door assembly fixing bolts to specified torques after adjustment.

(5) Standard ranges of clearance between installation position of back door assembly and each part are as shown in illustration.



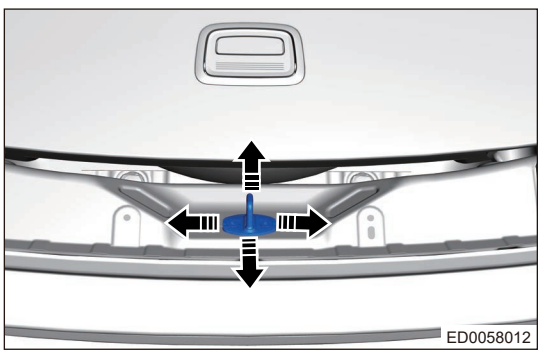
■ **Adjust the height of back door assembly with back door assembly adjustable buffer block.**

(1) Lower or raise the back door by rotating the back door assembly adjustable buffer blocks clockwise or counterclockwise.



■ **Adjust the back door assembly.**

(1) Slightly loosen the fixing bolts on back door lock striker assembly, and tap it with a plastic hammer in direction of arrow as shown in illustration to adjust the back door assembly position.



(2) Tighten the fixing bolts on back door lock striker assembly to specified torque after adjustment.

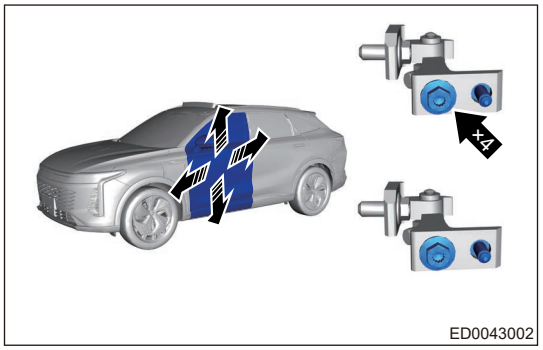
Torque: 23 ± 2.0 N·m

■ Inspection

(1) Check back door for wear or deformation during installation, and repair as necessary.
(2) Check if fixing bolts, fixing screws are set in position. Tighten them to specified torque as necessary.
(3) Check if clearance and alignment between back door assembly installation position and each part are within the specified range. Adjust as necessary.

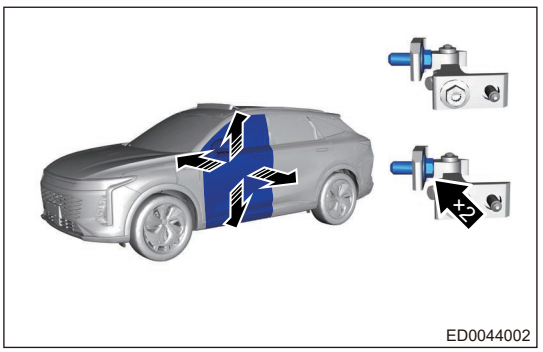
■ Adjust the front door assembly.

(1) Loosen 4 fixing bolts between front door hinge assembly and quarter, and adjust front door assembly position in direction of arrow as shown in illustration.

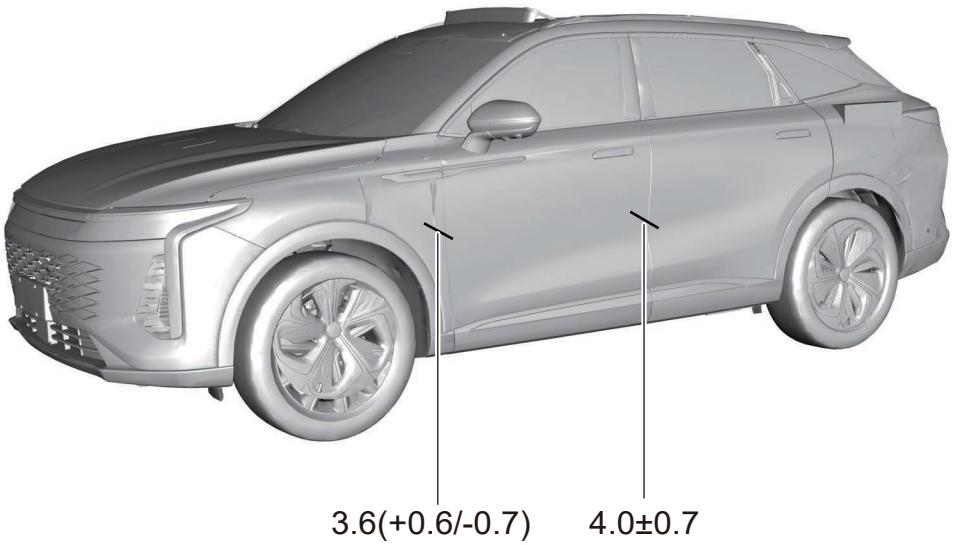


(2) After adjustment, tighten fixing bolts on front door hinge assembly to specified torque.

(3) Loosen 2 fixing bolts between front door hinge assembly and door, and adjust the front door assembly position in direction of arrow as shown in illustration.



(4) After adjustment, tighten fixing bolts on front door hinge assembly to specified torque.
(5) Standard ranges of clearance between installation positions of front door assembly and each part are as shown in illustration.



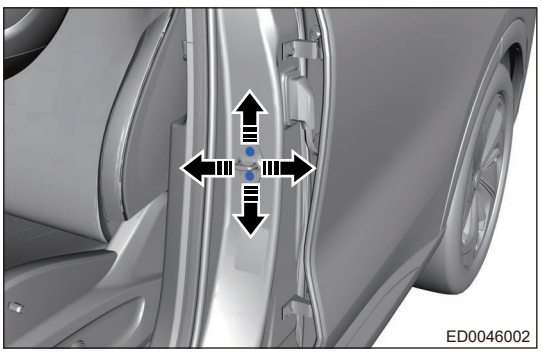
ED0045001

(6) After adjustment, make sure that alignment between front door assembly and rear door assembly is within standard range.

(7) After adjustment, make sure that alignment between front door assembly and wing assembly is within standard range.

■ Adjust the front door lock striker.

(1) Slightly loosen the fixing bolts on front door lock striker and tap it with a plastic hammer in direction of arrow to adjust the lock striker position.



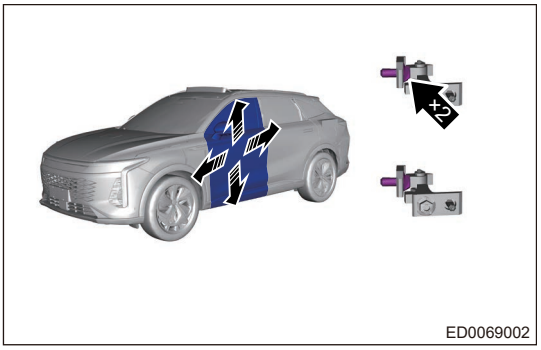
ED0046002

⚠ Caution
Align the middle scale of lock striker with scale of quarter.

(2) Tighten fixing bolts on front door lock striker to specified torque after adjustment.

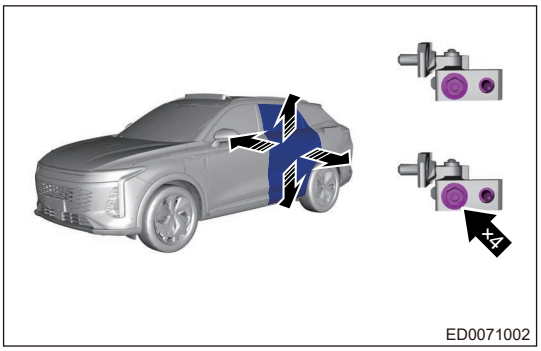
■ **Adjust the rear door assembly.**

(1) Loosen 2 fixing bolts between rear door hinge assembly and door, and adjust rear door assembly position in direction of arrow as shown in illustration.



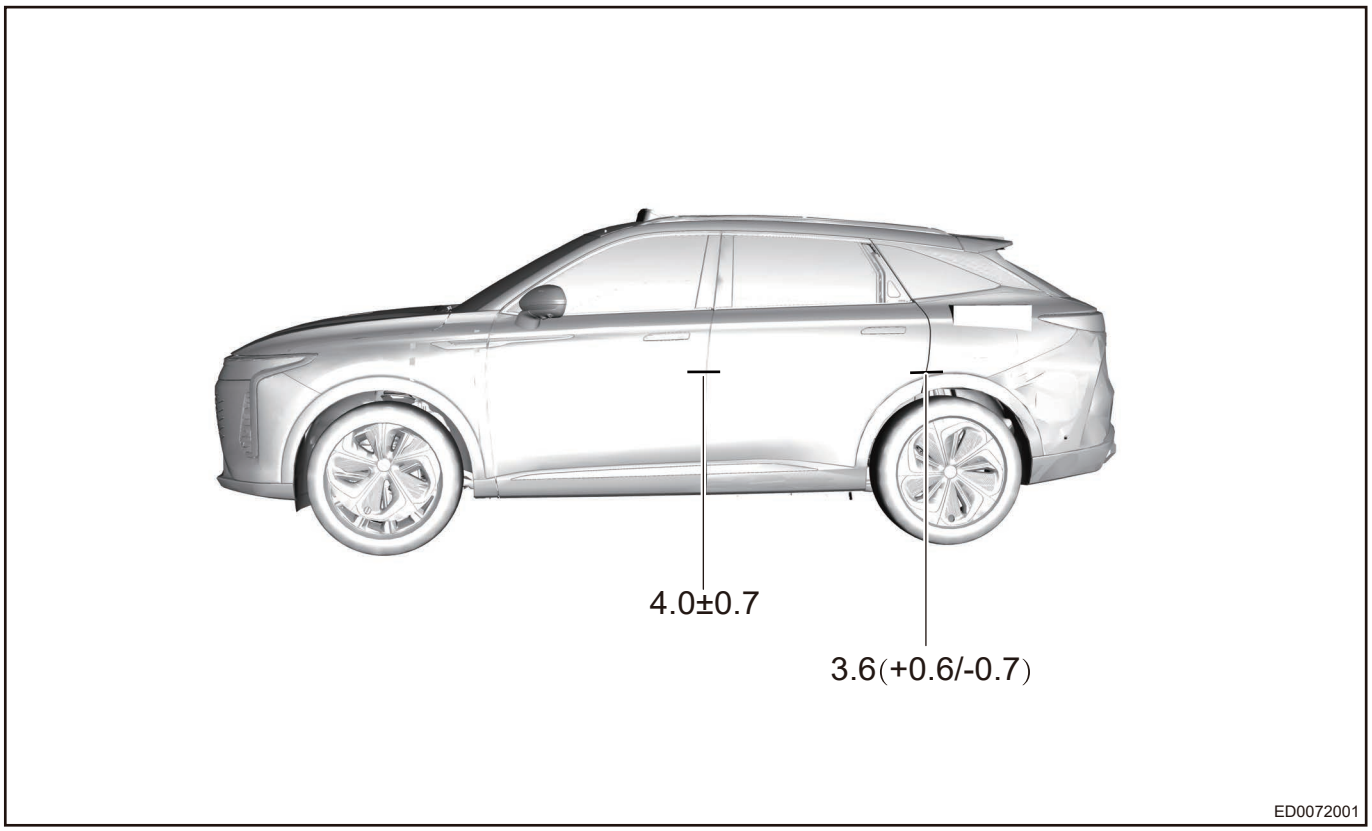
(2) After adjustment, tighten fixing bolts on rear door hinge assembly to specified torque.

(3) Loosen 4 fixing bolts between rear door hinge assembly and quarter, and adjust rear door assembly position in direction of arrow as shown in illustration.



(4) After adjustment, tighten fixing bolts on rear door hinge assembly to specified torque.

(5) Standard ranges of clearance between installation position of rear door assembly and each part are as shown in illustration.

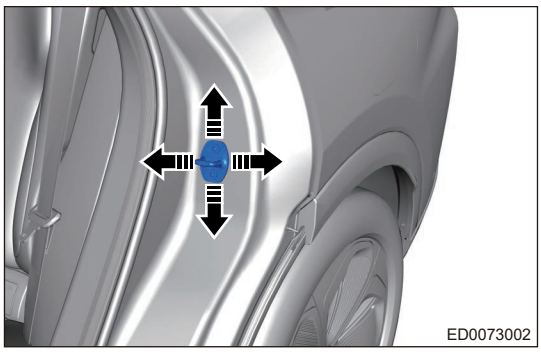


(6) After adjustment, make sure that alignment between rear door assembly and front door assembly is within standard range.

(7) After adjustment, make sure that alignment between rear door assembly and body outside panel is within standard range.

■ **Adjust the rear door lock striker.**

(1) Slightly loosen fixing bolts on rear door lock striker and tap it with a plastic hammer in direction of arrow to adjust the lock striker position.



⚠ Caution
Align the middle scale of lock striker with scale of quarter.

(2) Tighten fixing bolt on rear door lock striker assembly to specified torque after adjustment.

5.8 Front Door Inside Protector Assembly

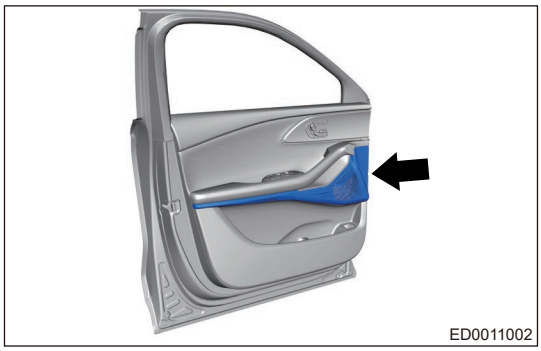
■ **Removal**

⚠ Warning
Be sure to wear safety equipment to prevent accidents, when removing front door inner protector assembly.

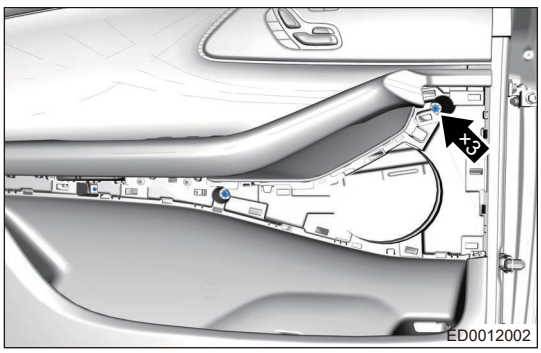
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

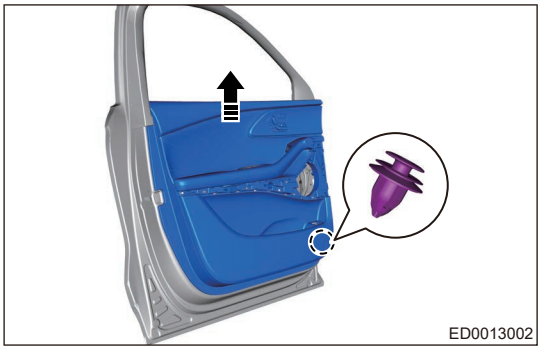
(3) Using an interior crow plate, carefully pry off the woofer cover assembly.



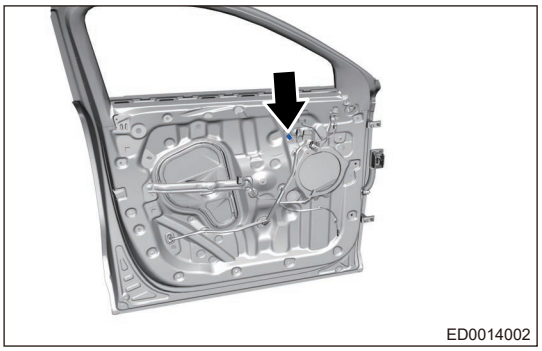
(4) Remove 3 fixing screw from door protector.



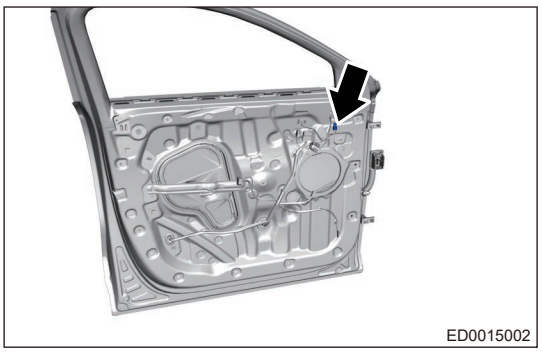
(5) Using an interior crow plate, separate waterproof clips from door protector in order.


ED0013002

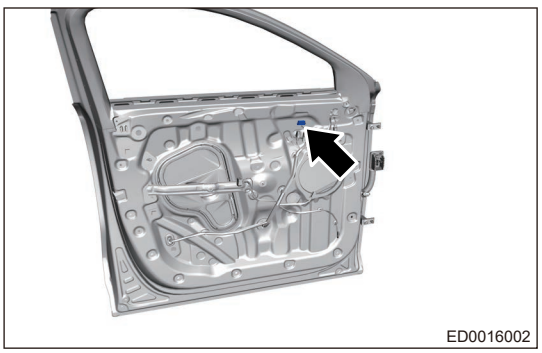
(6) Disconnect the connector.


ED0014002

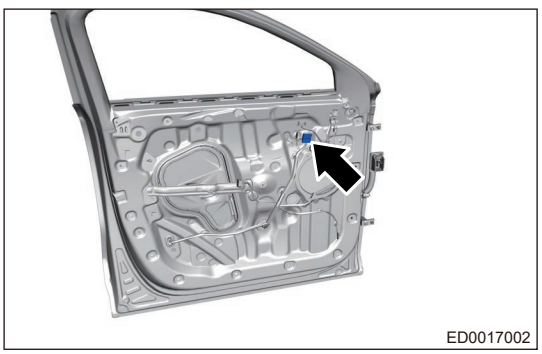
(7) Disconnect the connector.


ED0015002

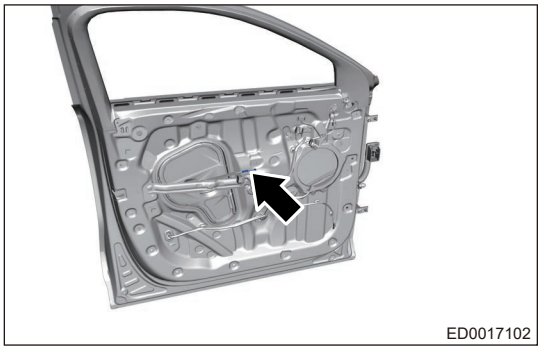
(8) Disconnect the connector.


ED0016002

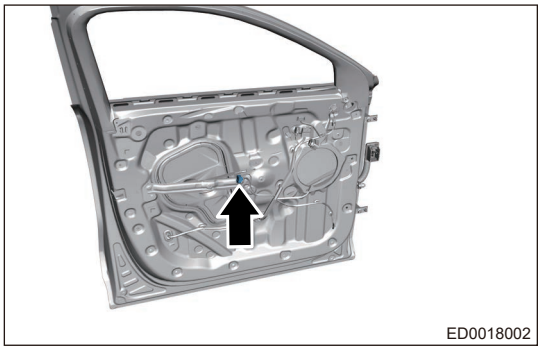
(9) Disconnect the connector.


ED0017002

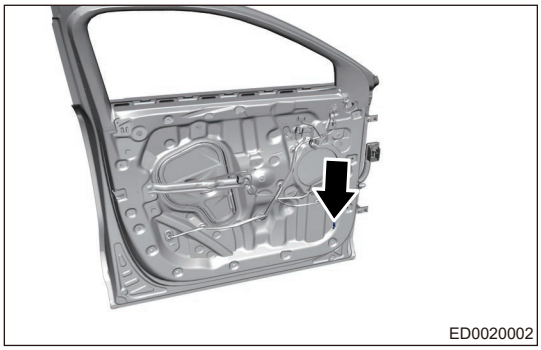
(10) Disengage front door inside handle cable from front door inside handle.


ED0017102

(11) Disconnect the connector.


ED0018002

(12) Disconnect the connector.


ED0020002

(13) Remove the front left door protector assembly.


ED0022002

■ Installation

⚠ Caution

- **Replace damaged clips and install front door inner protector assembly in place, when installing front door inner protector assembly.**
- **Install connectors in place, when installing front door inner protector assembly.**
- **Check that each function can operate properly, after installing front door inner protector assembly.**

(1) Connect the connector in order.

(2) Connect cable connector of front left door inner cable assembly to slot of front left door inside handle.

(3) Hang the upper end of door protector on the sheet metal, align door protector clip with the sheet metal hole, and clamp clips to the corresponding mounting holes on sheet metal in the order from up to down.

(4) Install 3 fixing screw on the door protector.

Torque: 1.5 ± 0.5 N·m

(5) Install the woofer cover assembly.

(6) Connect the negative battery cable.

5.9 Front Door Assembly

■ Removal

⚠ Warning

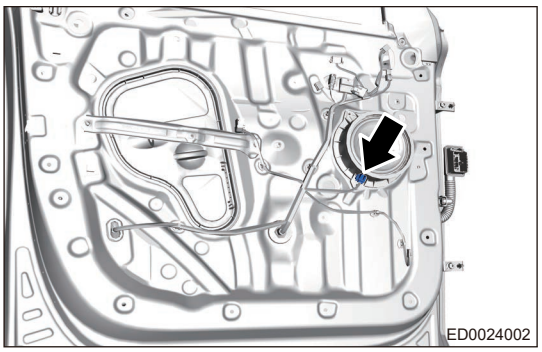
- **Be sure to wear safety equipment to prevent accidents, when removing front door assembly.**
- **Try to prevent body paint surface from being scratched, when removing front door assembly.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**
- **When removing front door assembly, an assistant is needed to hold it, to prevent front door from falling down during operation, resulting in accidents.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

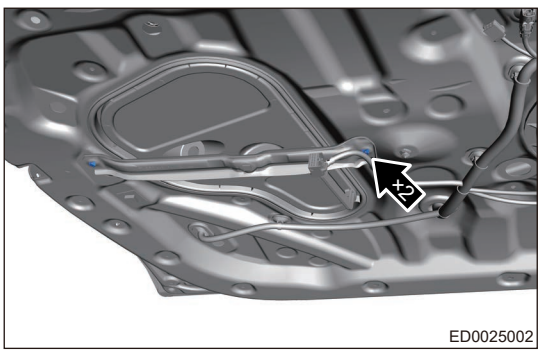
(2) Disconnect the negative battery cable.

(3) Remove the front left door inner protector assembly.

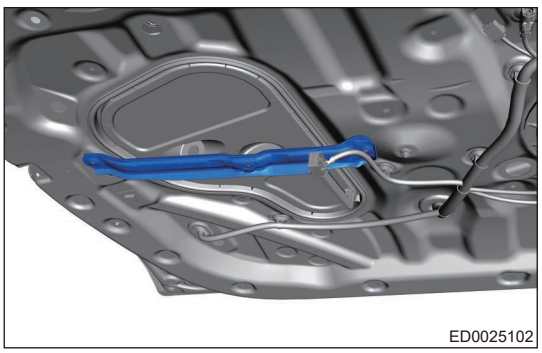
(4) Disconnect the woofer connector.


ED0024002

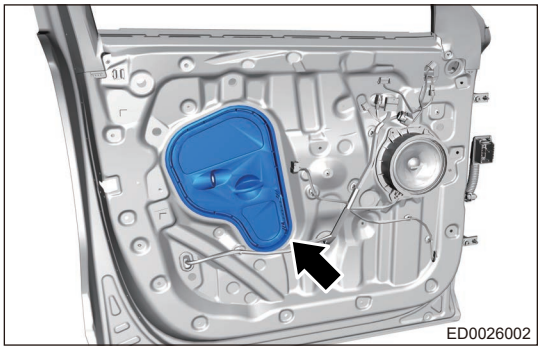
(5) Remove 2 fixing bolts from front left door metal bracket.


ED0025002

(6) Remove the front left door metal bracket.


ED0025102

(7) Remove the rear left door sealing board assembly.



(8) Remove the front left door woofer.

(9) Remove the left outside rear view mirror.

(10) Remove the front left door weather bar.

(11) Remove the front door glass assembly.

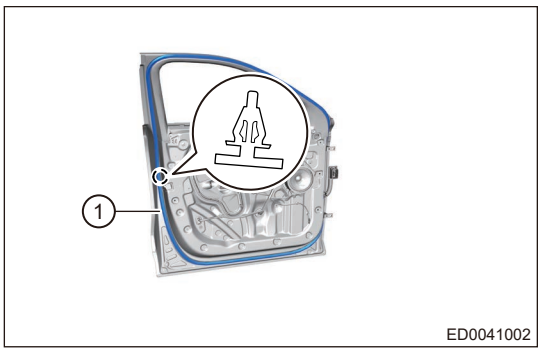
(12) Remove the front door glass run.

(13) Remove the front door glass guide rail assembly.

(14) Remove the front door power glass regulator.

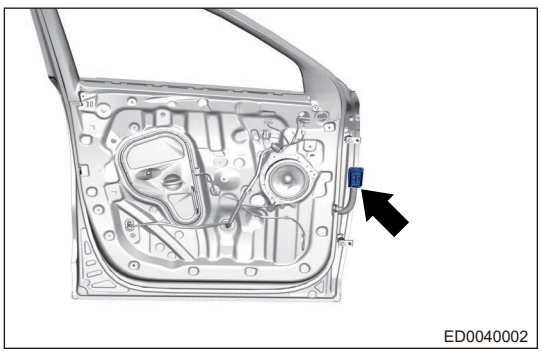
(15) Remove the front left door lock assembly.

(16) Disengage clips from front door frame weatherstrip, and remove front left door frame weatherstrip (1).

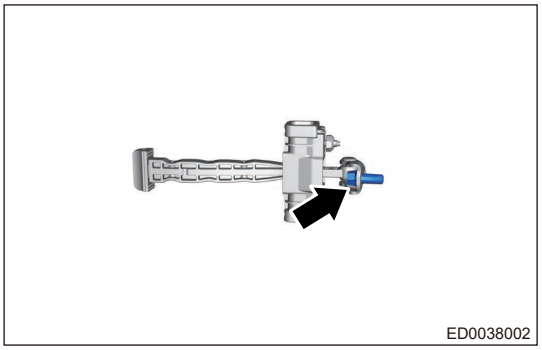


(17) Using a screwdriver wrapped with protective tape, pry off front door wire harness dust boot.

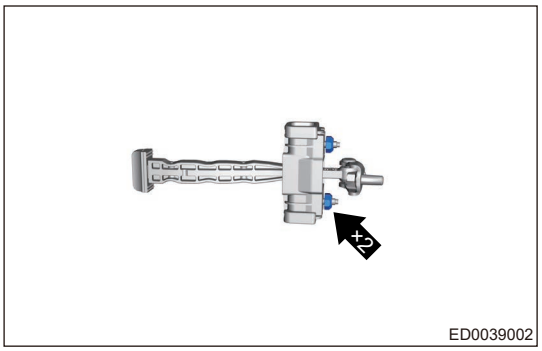
(18) Disconnect the front left door wire harness connector.



(19) Remove the coupling bolt between door check and front left door.


ED0038002

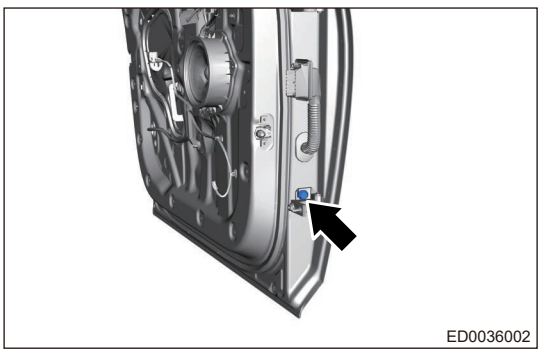
(20) Remove the coupling nuts between door check and door.


ED0039002

(21) Remove 1 fixing bolt between door and upper hinge.


ED0037002

(22) Remove 1 fixing bolt between door and lower hinge.


ED0036002

(23) Remove the front left door assembly.

■ Installation

⚠ Caution

- **Replace damaged clips and install front door inner protector in place, when installing front door inner protector.**
- **When installing front door assembly, an assistant is needed to hold it, to prevent front door from falling down during operation, resulting in accidents.**
- **Be sure to wear necessary safety equipment to prevent accidents, when installing front door assembly.**

(1) Install the door to a proper position of body.
(2) Install 1 fixing bolts between door and lower hinge.
Torque: 24 ± 3 N·m

(3) Install 1 fixing bolt between door and upper hinge.
Torque: 24 ± 3 N·m

(4) Install the coupling nuts between door check and door.
Torque: 9 ± 1.5 N·m

(5) Install coupling bolt between door check and front left door.
Torque: 32 ± 4.0 N·m

(6) Connect the front left door wire harness connector.
(7) Install the front door wire harness dust boot.
(8) Install the front left door frame weatherstrip.
(9) Install the front left door lock assembly.
(10) Install the front door power glass regulator.
(11) Install the front door glass guide rail assembly.
(12) Install the front door glass run.
(13) Install the front door glass assembly.
(14) Install the front left door weather bar.
(15) Install the left outside rear view mirror.
(16) Install the front left door woofer.
(17) Install the rear left door sealing board assembly.
(18) Install the front left door metal bracket.
(19) Install 2 fixing bolts to front left door metal bracket.
(20) Connect the woofer connector.
(21) Install the front left door inner protector assembly.
(22) Connect the negative battery cable.

5.10 Rear Door Inside Protector Assembly

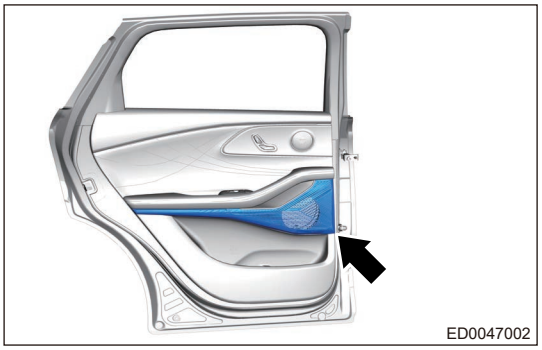
■ Removal

⚠ Warning

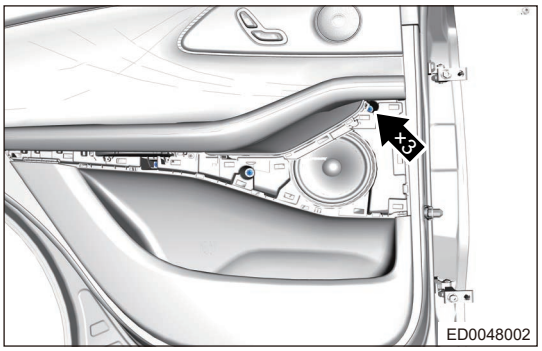
- **Be sure to wear safety equipment to prevent accidents, when removing rear door inner protector assembly.**
- **Try to prevent rear door inner protector surface from being damaged, when removing rear door inner protector assembly.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.

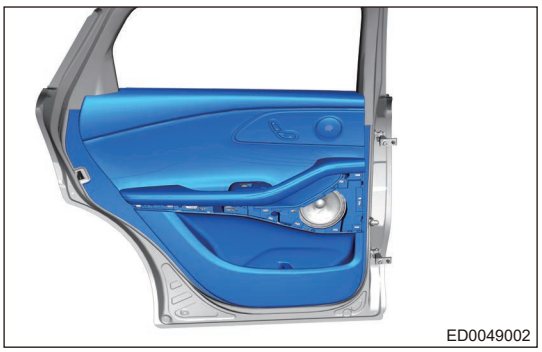
(3) Using an interior crow plate, carefully pry off the woofer cover.



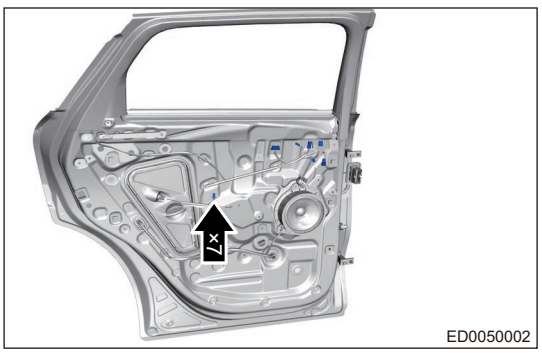
(4) Remove 3 fixing screw from door protector.



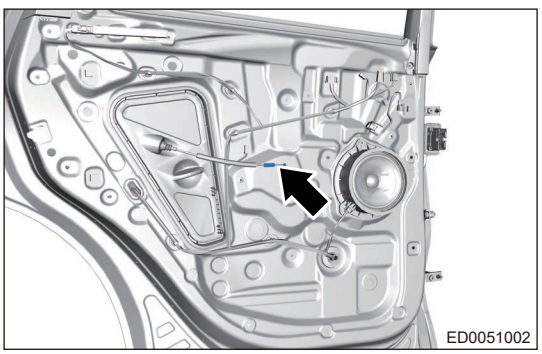
(5) Using an interior crow plate, carefully pry off door protector assembly.



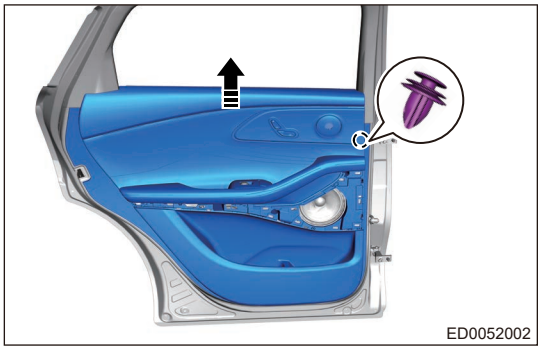
(6) Disconnect connectors in order.



(7) Disengage rear door inside handle cable from rear door inside handle.



(8) Using an interior crow plate, pry up clips on rear door inside protector assembly, and remove rear door inside protector assembly in direction of arrow as shown in illustration.


ED0052002

■ **Installation**

⚠ Caution

- **Replace damaged clips and install rear door inner protector assembly in place, when installing rear door inner protector assembly.**
- **Install the connectors in place, when installing rear door inner protector assembly.**
- **Check that each function can operate properly, after installing rear door inner protector assembly.**

(1) Connect the connector in order.

(2) Connect cable connector of rear left door inner cable assembly to slot of rear left door inside handle.

(3) Hang the upper end of door protector on the sheet metal, align door protector clip with the sheet metal hole, and clamp clips to the corresponding mounting holes on sheet metal in the order from up to down.

(4) Install 3 fixing screw on the door protector.

Torque: 1.5 ± 0.5 N·m

(5) Install the woofer cover.

(6) Connect the negative battery cable.

5.11 Rear Door Assembly

■ **Removal**

⚠ Warning

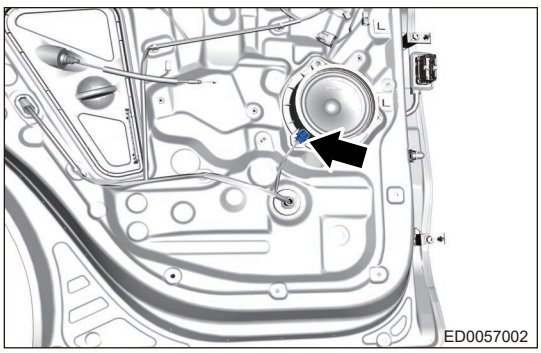
- **Be sure to wear safety equipment to prevent accidents, when removing rear door assembly.**
- **Try to prevent body paint surface from being scratched, when removing rear door assembly.**
- **When removing rear door assembly, an assistant is needed to hold it, prevent rear door from falling down during operation, resulting in accidents.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

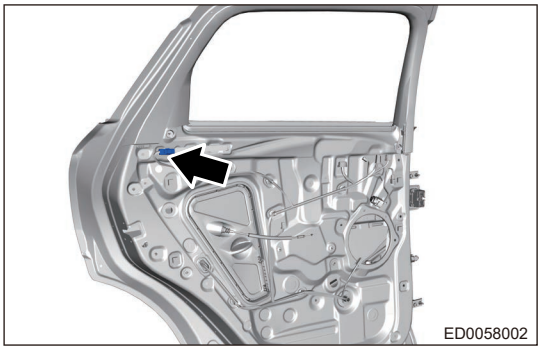
(2) Disconnect the negative battery cable.

(3) Remove the rear left door inner protector assembly.

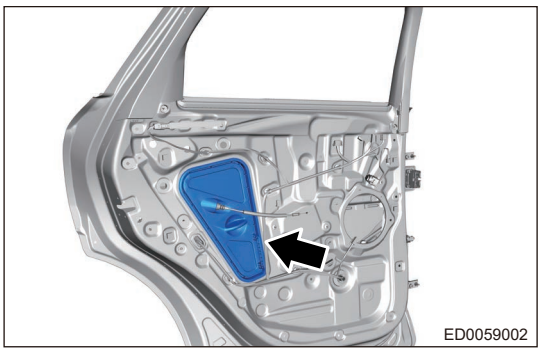
(4) Disconnect the woofer connector.


ED0057002

(5) Disconnect the high frequency antenna connector.



(6) Using an interior crow plate, carefully pry off sealing board.



(7) Remove the rear left door woofer.

(8) Remove the rear left door weather bar.

(9) Remove the rear door glass upper run.

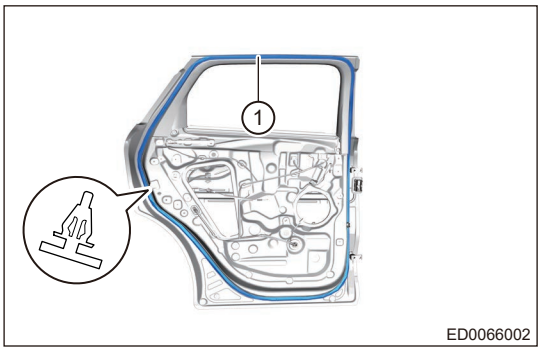
(10) Remove the rear door glass assembly.

(11) Remove the rear door glass guide rail assembly.

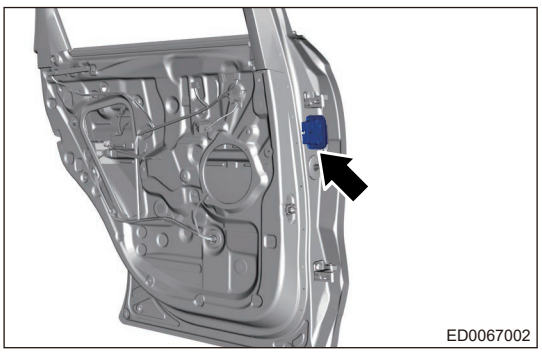
(12) Remove the rear door power glass regulator.

(13) Remove the rear left door lock assembly.

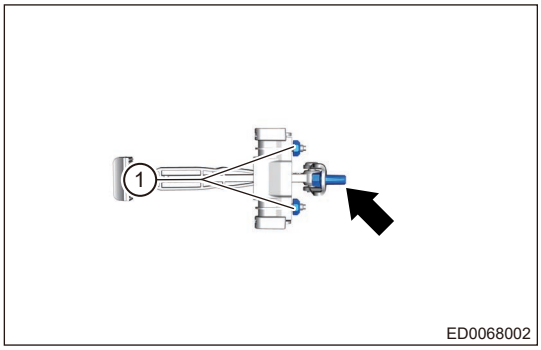
(14) Disengage clips from rear door frame weatherstrip, and remove rear left door frame weatherstrip (1).



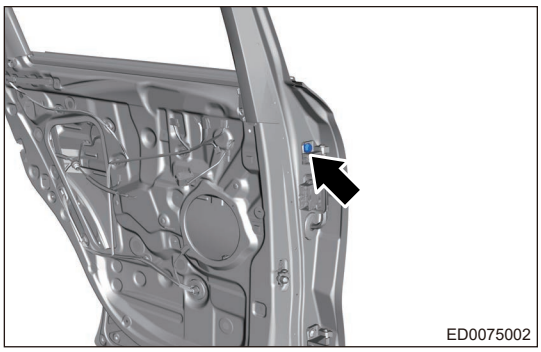
(15) Using an interior crow plate, pry up the rear door dust boot, and disconnect the rear left door wire harness connectors.



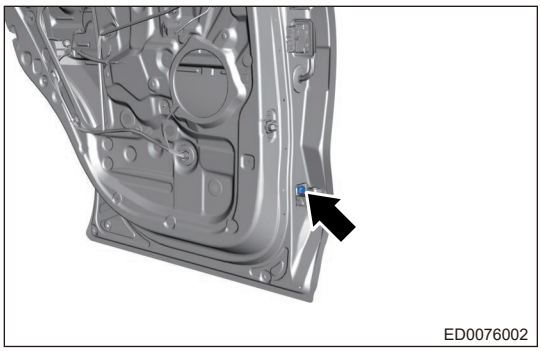
(16) Remove 2 coupling nuts (1) between door check and rear left door, and remove the coupling bolt between door check and body.



(17) Remove 1 fixing bolts between rear door upper hinge assembly and rear door assembly.



(18) Remove 1 fixing bolt between rear door lower hinge assembly and rear door assembly.



(19) Remove the rear left door assembly.

■ Installation

⚠ Caution

- **Replace damaged clips and install rear door inner protector in place, when installing rear door inner protector.**
- **Be sure to wear safety equipment to prevent accidents, when installing rear door assembly.**
- **When installing rear door assembly, an assistant is needed to hold it, prevent rear door from falling down during operation, resulting in accidents.**

(1) Install the rear left door assembly to a proper position of body.

(2) Install 1 fixing bolts between rear door lower hinge assembly and rear door assembly.

Torque: 24 ± 3 N·m

(3) Install 1 fixing bolt between rear door upper hinge assembly and rear door assembly.

Torque: 24 ± 3 N·m

(4) Install 2 coupling nuts between door check and rear left door, and install coupling bolt between door check and body.

Stopper nut torque: 9 ± 1.5 N·m

Stopper bolt torque: 32 ± 4 N·m

(5) Connect the rear left door wire harness connector, and install the rear door dust boot.

(6) Install the rear left door frame weatherstrip.

(7) Install the rear left door lock assembly.

(8) Install the rear door power glass regulator.

(9) Install the rear door glass guide rail assembly.

(10) Install the rear door glass assembly.

(11) Install the rear door upper glass run.

(12) Install the rear left door weather bar.

(13) Install the rear left door woofer.

(14) Install the sealing board.

(15) Connect the high frequency antenna connector.

(16) Connect the woofer connector.

(17) Install the rear left door inner protector assembly.

(18) Connect the negative battery cable.

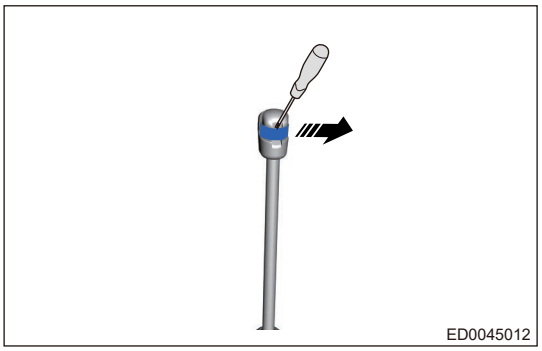
5.12 Engine Hood Gas Spring Assembly

■ Removal

⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing engine hood gas spring assembly.**
- **When removing engine hood gas spring assembly, an assistant is needed to hold engine hood. Try to prevent engine hood from falling down or closing suddenly during operation, resulting in accidents.**
- **There may be a certain starting force on gas spring when it is used firstly, although the supplier will run-in to solve this problem before leaving the factory, closing force may too strong after long term storage. For personal safety, it is necessary to close engine hood slowly at the first time, If it cannot be closed, it is necessary to replace gas spring. The gas spring is a product with internal high pressure storage. User is prohibited to approach the gas spring to the fire and heat sources; Never strike gas spring fiercely; Prevent explosion which will cause the unnecessary personal injury. It is forbidden absolutely to disassemble gas spring without site guidance of specialized person. Any small mis-operation during disassembly may lead to piston rod injection or cylinder burst, causing personal injury and accidents.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

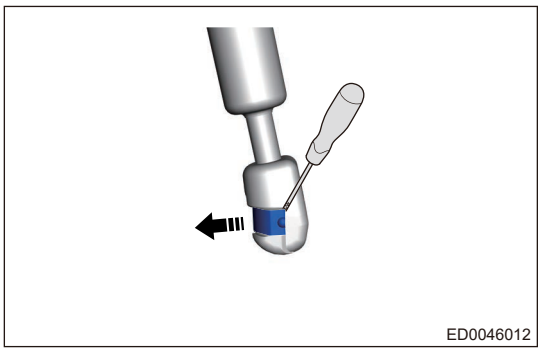
(1) Insert a flat-head screwdriver into the slot between C-shaped snap spring and plastic ball socket, tilt C-shaped snap spring to a proper position, hold the area nearest to ball socket with a hand, and pull end of gas spring lightly in the opposite direction to remove it.



⚠ Caution

- **When removing gas spring, avoid using tools to knock and removing forcibly.**
- **It is not allowed absolutely to hold center part of gas spring to remove it forcibly.**

(2) Insert a flat-head screwdriver into the slot between C-shaped snap spring and plastic ball socket, tilt C-shaped snap spring to a proper position, hold the area nearest to ball socket with a hand, and pull end of gas spring lightly in the opposite direction to remove it.



⚠ Caution

- **When removing gas spring, avoid using tools to knock and removing forcibly.**
- **It is not allowed absolutely to hold center part of gas spring to remove it forcibly.**

(3) Remove the engine hood left gas spring assembly.

■ Installation

⚠ Caution

- **When installing engine hood left gas spring assembly, an assistant is needed to hold engine hood. Try to prevent engine hood from falling down or closing suddenly during operation, resulting in accidents.**
- **Pay attention to the installation direction and installation sequence, clamp the piston rod end to engine hood gas spring left mounting bracket, and then clamp the cylinder end to engine hood, so that ball socket cannot slide out.**
- **When installing engine hood end after gas spring ball socket of the engine hood gas spring left mounting bracket is installed, if ball pin of engine hood is not aligned with gas spring ball socket, rotate the gas spring cylinder clockwise and insert ball socket into the ball pin of engine hood when ball socket is aligned with ball pin. (This assembly method can ensure that the assembled gas spring ball socket is tightened and not loose. If it is not assembled in this order, it may cause looseness of gas spring ball socket during assembly.)**

(1) Apply grease to ball socket of gas spring body, and ensure appearance is not being affected, and then clamp the body to ball pin separately.

(2) Install the C-shaped snap spring at the lower end of engine hood left gas spring assembly.

(3) Install the C-shaped snap spring at the upper end of engine hood left gas spring assembly.

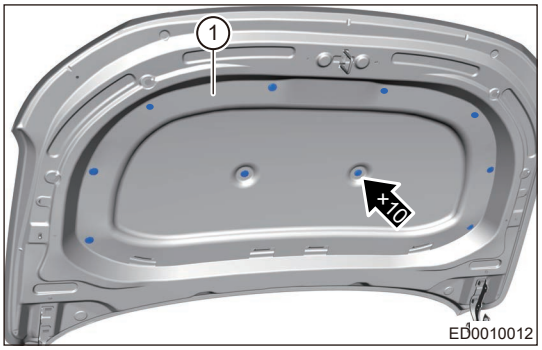
5.13 Engine Hood Assembly

■ Removal

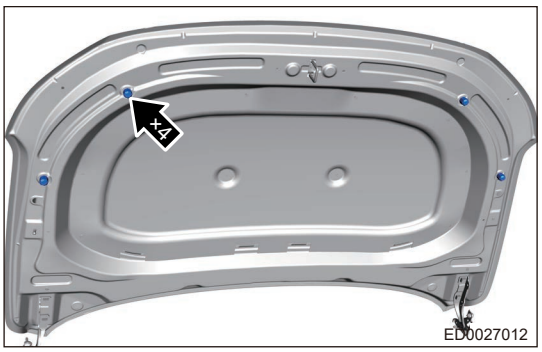
⚠ Warning

- **Be sure to wear safety equipment to prevent accidents, when removing engine hood assembly.**
- **When removing engine hood assembly, try to prevent engine hood from falling down during operation, resulting in damage to body or front windshield.**
- **When removing engine hood assembly, an assistant is needed to hold engine hood. Try to prevent engine hood from falling down or closing suddenly during operation, resulting in accidents.**

(1) Remove clips from engine hood sound insulator pad, and remove the engine hood sound insulator pad (1).

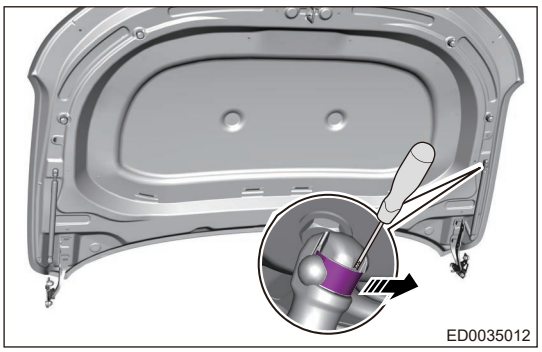


(2) Rotate engine hood adjustable buffer block counterclockwise and remove it.

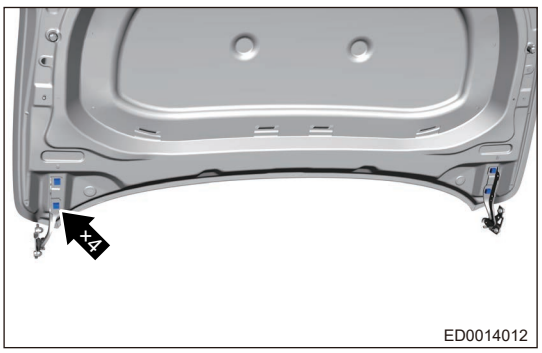


(3) Remove the front washer pipeline assembly.

(4) Using a screwdriver wrapped with protective tape, pry off fixing clip from upper end of engine hood left/right gas spring assembly.



(5) Remove 4 fixing nuts between engine hood assembly and engine hood both sides hinge assembly, and remove engine hood assembly.



5.14 Engine Hood Hinge

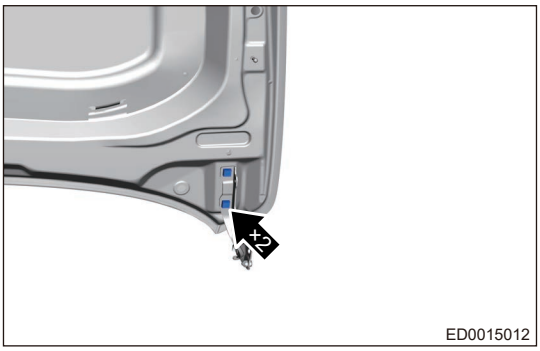
■ Removal

⚠ Warning

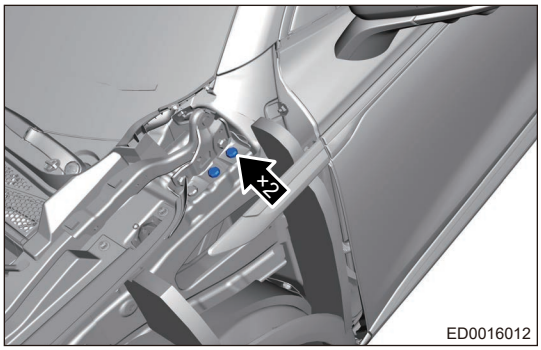
- **Be sure to wear safety equipment to prevent accidents, when removing engine hood hinge assembly.**
- **When removing engine hood hinge assembly, try to prevent engine hood from falling down during operation, resulting in damage to body or front windshield.**
- **When removing engine hood hinge assembly, an assistant is needed to hold engine hood. Try to prevent engine hood from falling down or closing suddenly during operation, resulting in accidents.**
- **Use same procedures for right and left sides, procedures listed below are for left side.**

(1) Remove the wing assembly.

(2) Remove 2 fixing nuts between left hinge assembly and engine hood assembly.



(3) Remove 2 fixing bolts between engine hood left hinge assembly and body.



(4) Remove the engine hood left hinge assembly.

■ Installation

(1) Install the engine hood left hinge assembly to a proper position of body.

(2) Install 2 fixing bolts between engine hood left hinge assembly and body.

Torque: 23 ± 2.0 N·m

(3) Install 2 fixing nuts between left hinge assembly and engine hood assembly.

Torque: 23 ± 1.0 N·m

(4) Install the wing assembly.

5.15 Back Door Protector Assembly

■ Removal

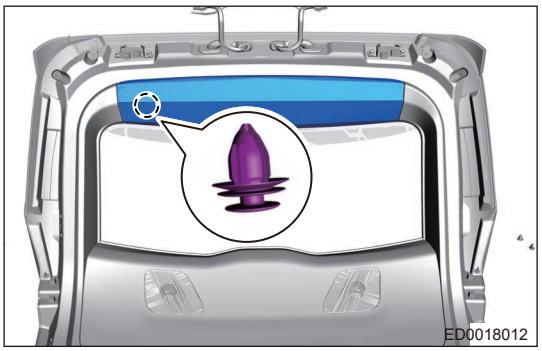
⚠ Warning

- **Be sure to wear safety equipment when removing back door protector assembly.**
- **Try to prevent body paint surface from being scratched, when removing back door protector assembly.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

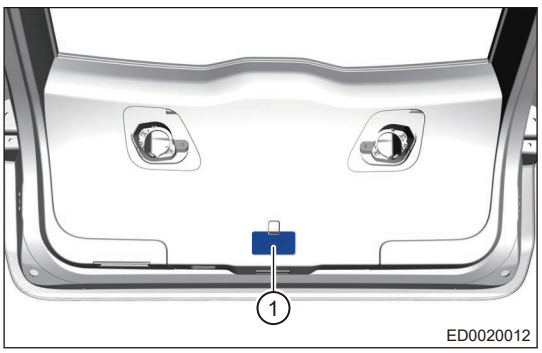
(2) Disconnect the negative battery cable.

(3) Using an interior crow plate, pry off plastic clip from back door upper protector assembly carefully.

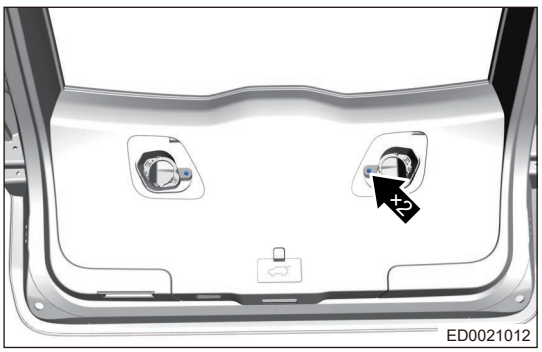


(4) Using an interior crow plate, pry off plastic clip from back door left/right protector assembly carefully.

(5) Using an interior crow plate, pry off claw from emergency cable hole block cover carefully, and remove emergency cable hole block cover (1).



(6) Remove 2 fixing screw from back door lower protector.



(7) Using an interior crow plate, carefully detach the fixing clip from back door lower protector, and remove back door lower protector.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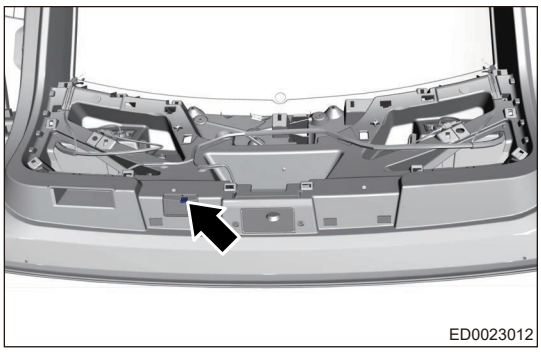
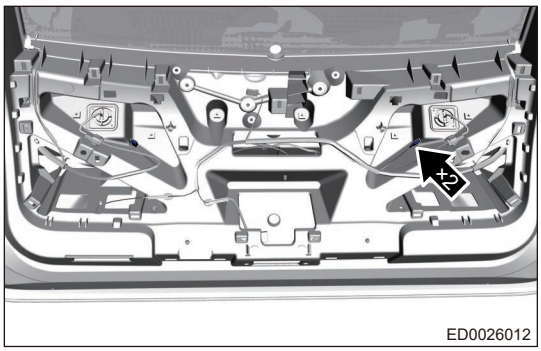
(8) Disconnect the back door closer switch connector.


ED0023012

(9) Disconnect horn connector from back door lower protector.


ED0026012

(10) Remove the back door lower protector assembly.

■ Installation

⚠ Caution

- **Be sure to wear safety equipment to prevent accidents, when installing back door protector assembly.**
- **Try to prevent body paint surface from being scratched, when installing back door protector assembly.**

(1) Connect Horn connector to back door lower protector.
(2) Connect the back door closer switch connector.
(3) Install the back door lower protector assembly to a proper position of body.
(4) Install 2 fixing screws to back door lower protector.
Torque: 1.5 ± 0.5 N·m
(5) Install the emergency cable hole block cover.
(6) Install the back door left/right protector assembly.
(7) Install the back door upper protector assembly.
(8) Connect the negative battery cable.

5.16 Back Door Assembly

■ Removal

⚠ Warning

- **Be sure to wear safety equipment when removing back door assembly.**
- **Try to prevent body paint surface from being scratched, when removing back door assembly.**
- **When removing back door assembly, an assistant is needed to hold the trunk lid. Try to prevent trunk lid from falling down or closing suddenly during operation, resulting in accidents.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the back door protector assembly.

(4) Remove the back door wiper arm.

(5) Remove the back door wiper motor assembly.

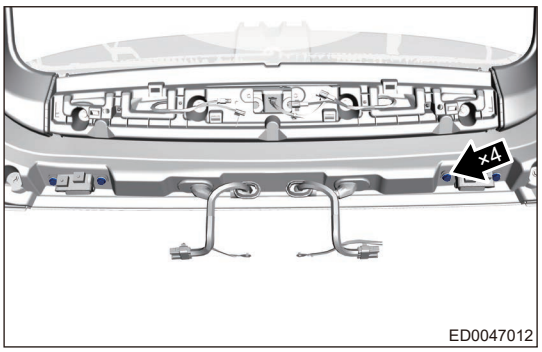
(6) Remove the back door lock assembly.

(7) Remove the rear combination light assembly (back door part).

(8) Remove the rear spoiler plate.

(9) Remove the roof assembly.

(10) Remove 4 fixing bolts from back door left and right hinges assembly.



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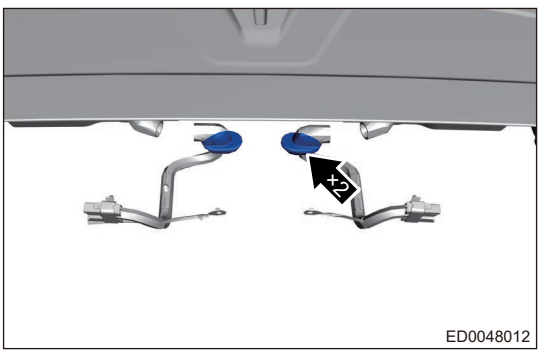
(11) Using an interior crow plate, pry off back door wire harness dust boot carefully.



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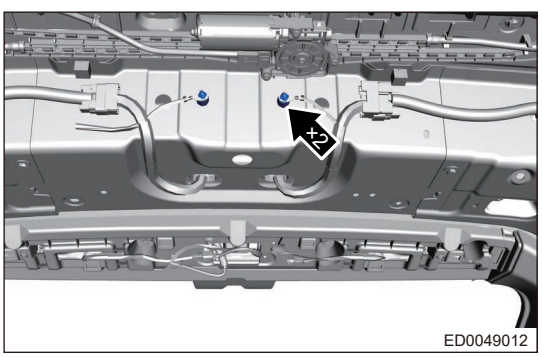
(12) Remove the back door wire harness ground nut.



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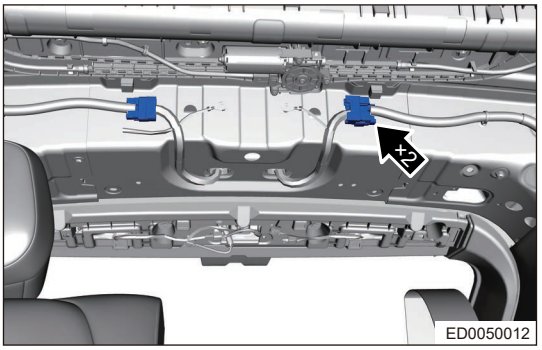
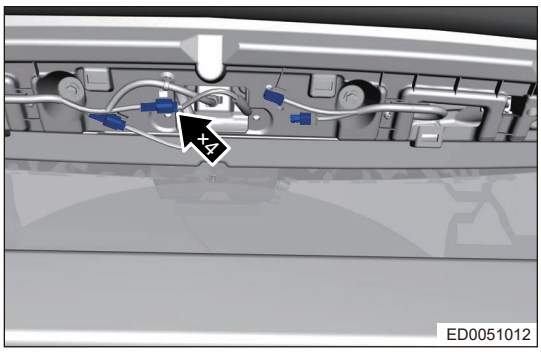
(13) Disconnect the back door wire harness assembly connector.



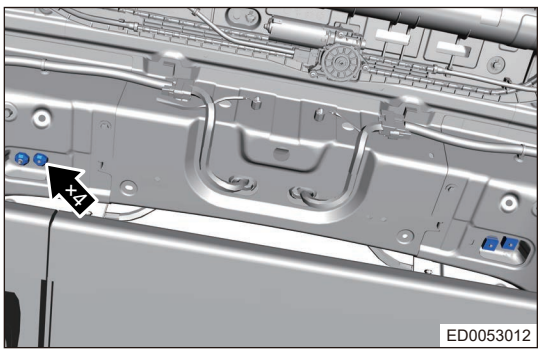
(14) Disconnect the back door wire harness connector.



(15) Using a screwdriver wrapped with protective tape, pry off the upper fixing clips between left electric support rod and right balance bar carefully.

(16) Remove the back door assembly.

(17) Remove 4 fixing nuts from back door left and right hinges assembly.



(18) Remove the back door hinge assembly.

■ **Installation**

⚠ Caution

- **When installing back door hinge assembly, an assistant is needed to hold back door. Try to prevent back door from falling down or closing suddenly during operation, which may cause an accident.**
- **Be sure to wear safety equipment to prevent accidents, when installing back door assembly.**
- **Try to prevent body paint surface from being scratched, when installing back door assembly.**
- **After installing back door assembly, it is necessary to perform panoramic image calibration.**

(1) Install the engine hood hinge assembly to a proper position of body.
(2) Install 4 fixing bolts on the back door left and right hinges assembly.
Torque: 25 ± 3 N·m
(3) Install the engine hood assembly to a proper position of body.
(4) Install the electric support rod and right balance bar.
(5) Connect the back door wire harness connector.
(6) Connect back door wire harness assembly connector plug.
(7) Install the back door wire harness ground nut.
Torque: 9 ± 1.5 N·m
(8) Install the back door wire harness dust boot.
(9) Install 4 fixing bolts on the back door left and right hinges assembly.
Torque: 25 ± 2 N·m
(10) Install the roof assembly.
(11) Install the rear spoiler plate.
(12) Install the rear combination light assembly (back door part).
(13) Install the back door lock assembly.
(14) Install the back door wiper motor assembly.
(15) Install the back door wiper arm.
(16) Install the back door protector assembly.
(17) Connect the negative battery cable.

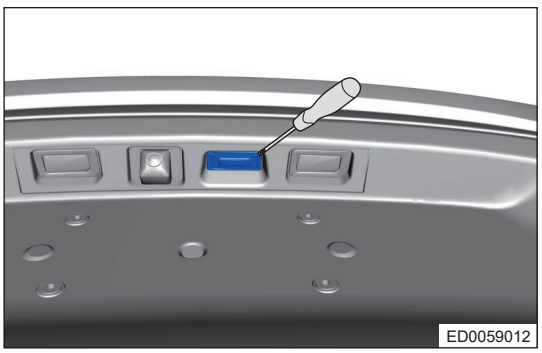
5.17 Back Door Switch Assembly

■ **Removal**

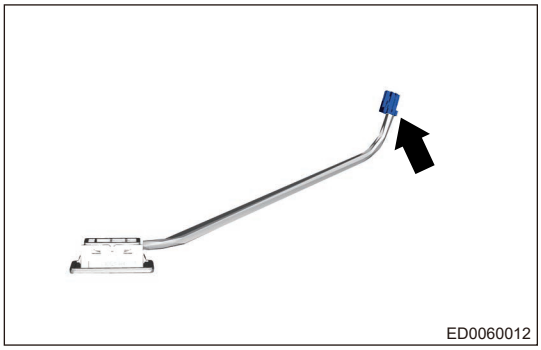
⚠ Warning

Be sure to wear safety equipment to prevent accidents, when removing back door switch assembly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the back door lower protector.
(4) Using a screwdriver wrapped with protective tape, carefully pry off the back door switch assembly.



(5) Disconnect the back door switch assembly connector.



(6) Remove the back door switch assembly.

■ **Installation**

⚠ Caution

- **After back door opener switch assembly is installed, install the connector into place.**
- **After back door opener switch assembly is installed, it is necessary to confirm that the function can operate normally.**
- **After installing back door opener switch assembly, it is necessary to perform panoramic image calibration.**

(1) Install the back door switch assembly to a proper position of back door.

(2) Connect the connector on the back door switch assembly.

(3) Press back door switch assembly tightly.

(4) Install the back door lower protector.

(5) Connect the negative battery cable.

5.18 Back Door Left Electric Support Rod Assembly

■ **Removal**

⚠ Warning

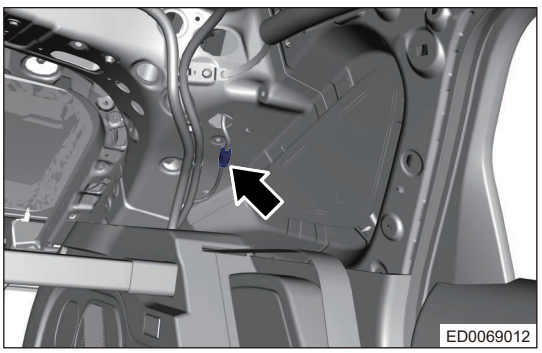
- **Left side is electric support rod with wire harness and right side is balance bar without wire harness.**
- **Be sure to wear safety equipment to prevent accidents, when removing back door electric support rod assembly.**
- **When removing back door electric support rod assembly, pay attention to not bend electric support rod by lateral force during removal, one assistance is needed to hold back door; avoid back door falling down or closing suddenly during operation, resulting in accidents.**
- **Handle the removed electric support rod assembly carefully and avoid it falling down. Once it falls down, internal mechanical damage may occur, which may cause it impossible to use.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

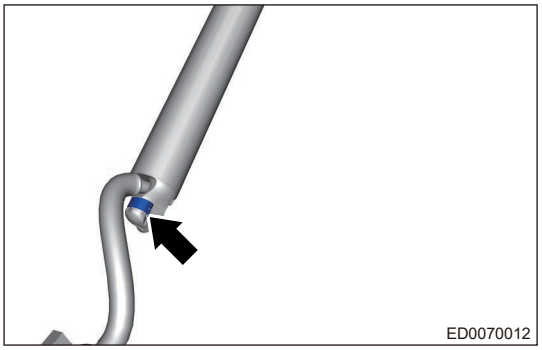
(2) Disconnect the negative battery cable.

(3) Remove the left C-pillar upper protector.

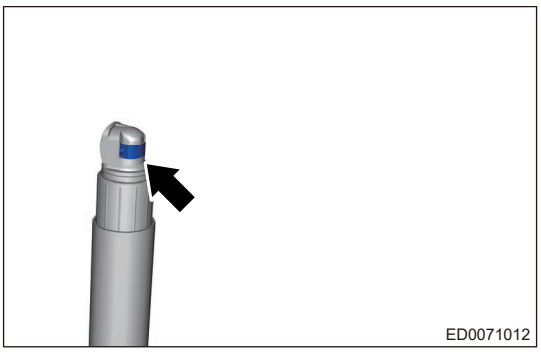
(4) Disconnect the left electric support rod assembly wire harness connector.



(5) Insert a flat-head screwdriver into the slot between C-shaped snap spring and plastic ball socket, tilt C-shaped snap spring to a proper position, and pull electric support rod lightly in the opposite direction.



(6) Insert a flat-head screwdriver into the slot between C-shaped snap spring and plastic ball socket, tilt C-shaped snap spring to a proper position, and pull electric support rod lightly in the opposite direction.



(7) Remove the back door left electric support rod assembly.

■ **Installation**

⚠ Caution

- **Pay attention to the installation direction and installation sequence, clamp the thick end of ball socket to gutter channel side mounting bracket, and then clamp the thin end to back door bracket. Ball socket cannot slide out, it indicates that the matching is tight.**
- **It is necessary for wire harness grommet to be installed in place. If not, water leakage may occur at this area.**
- **When installing back door end after electric support rod ball socket of the gutter channel end is installed, if ball pin of back door bracket is not aligned with electric support rod ball socket, rotate the fixing end of electric support rod clockwise and insert ball socket into the ball pin of back door bracket when ball socket is aligned with ball pin. (This assembly method can ensure that the assembled electric support rod ball socket is tightened and not loose. If assembly is not in this order, it may cause electric support rod ball socket is loose during assembly.)**

(1) Apply grease to ball socket of electric support rod body, and ensure appearance is not being affected, and then clamp the body to ball pin separately.

(2) Align the center of upper ball socket with the center of ball, and hit ball socket by hand.

(3) Align the center of lower ball socket with the center of ball, and hit ball socket by hand.

(4) Connect the left electric support rod assembly wire harness connector.

(5) Install the left C-pillar upper protector.

(6) Connect the negative battery cable.

5.19 Back Door Right Balance Bar

■ Removal

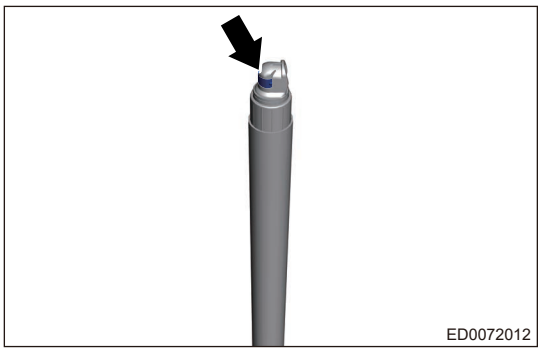
⚠ Warning

- **Left side is electric support rod with wire harness and right side is balance bar without wire harness.**
- **Be sure to wear necessary safety equipment to prevent accidents, when removing back door right balance bar assembly.**
- **When removing back door right balance bar assembly, one assistance is needed to hold back door; Try to prevent back door from falling down or closing suddenly during operation, resulting in accidents.**

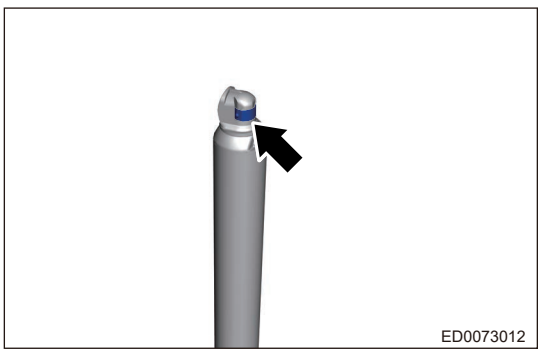
(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Insert a flat-head screwdriver into slot between C-shaped snap spring and plastic ball socket, tilt C-shaped snap spring to a proper position, and pull balance bar lightly in the opposite direction.


ED0072012

(4) Insert a flat-head screwdriver into slot between C-shaped snap spring and plastic ball socket, tilt C-shaped snap spring to a proper position, and pull balance bar lightly in the opposite direction.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(5) Remove the back door right balance bar.

■ Installation

⚠ Caution

- **It is necessary for wire harness grommet to be installed in place. If not, water leakage may occur at this area.**
- **After installing balance bar ball socket of the gutter channel end, when installing the back door end, if the ball pin of back door bracket is not aligned with balance bar ball socket, rotate the fixing end of balance bar clockwise and insert ball socket into the ball pin of back door bracket when ball socket is aligned with ball pin. (This assembly method can ensure that the assembled balance bar ball socket is tightened and not loose. If assembly is not in this order, it may cause balance bar ball socket is loose during assembly.)**

(1) Apply grease to ball socket of balance bar body, and ensure appearance is not being affected, and then clamp the body to ball pin separately.

(2) Align the center of upper ball socket with the center of ball, and hit ball socket by hand.

(3) Align the center of lower ball socket with the center of ball, and hit ball socket by hand.

(4) Connect the negative battery cable.

5.20 Rear Cover Upper Bracket

■ Removal

⚠ Warning

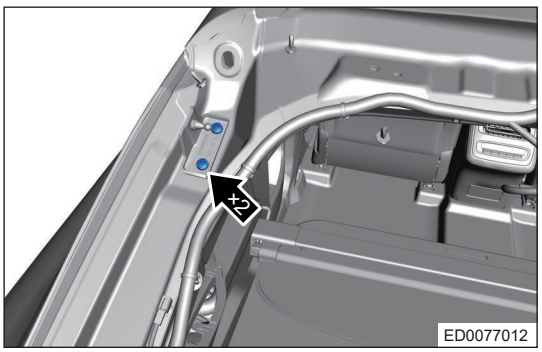
- **Be sure to wear safety equipment to prevent accidents, when removing rear cover upper bracket assembly.**
- **When removing back door gas spring assembly, an assistant is needed to hold back door; Try to prevent back door from falling down or closing suddenly during operation, resulting in accidents.**
- **Use the same procedures for rear cover upper bracket and gas spring rear cover bracket, procedures listed below are for rear cover upper left bracket.**

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the back door left electric support rod.

(4) Remove 2 fixing screws from rear cover upper bracket.



(5) Remove the rear cover upper bracket.

■ Installation

⚠ Caution

- **When installing gutter channel mounting bracket, pay attention to the direction of ball pin and install it in opposite inward direction; When installing the gutter channel upper bracket, pay attention to left and right parts which left part has "L" mark and right part has "R" mark.**
- **It is necessary to pre-tighten the upper mounting hole and then pre-tighten the lower mounting hole when installing bolts. When installing bracket tightening bolt, pay attention to installation sequence of the upper and lower mounting holes (pre-tighten round hole first and then waist-shaped hole).**
- **For convenience installing, after bracket is aligned with the hole, pre-tighten bolt to 2-3 threads by hand, and then install, pre-tighten and re-tighten it with tools.**

(1) After aligning rear cover upper bracket with hole on gutter channel, pre-tighten 2 fixing bolts.

Torque: 5 ± 1 N·m

(2) After pre-tightening, re-tighten them.

Torque: 25 ± 3 N·m

(3) Connect the back door left electric support rod.

(4) Connect the negative battery cable.

5.21 Power Back Door Module Assembly

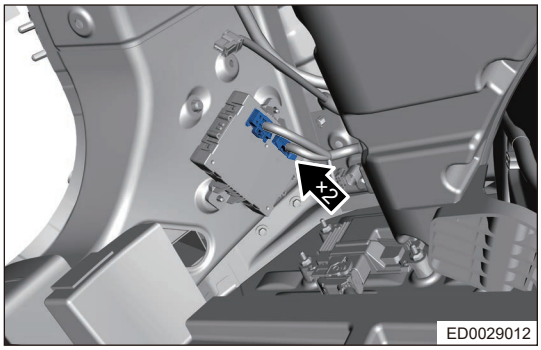
■ Removal

⚠ Warning

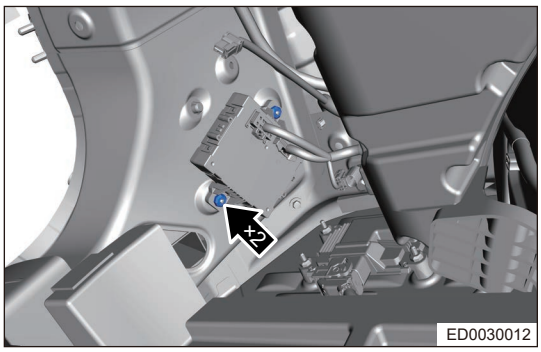
Be sure to wear safety equipment to prevent accidents, when removing power back door module assembly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.
(3) Remove the luggage compartment carpet assembly.
(4) Remove the luggage compartment door doorsill pressure plate assembly.
(5) Remove the luggage compartment left wheel house assembly.
(6) Disconnect the power back door module assembly wire harness connectors.


ED0029012

(7) Remove 2 fixing bolts from power back door module assembly.


ED0030012

(8) Remove the power back door module assembly.

■ **Installation**

⚠ Caution
After replacing power back door module, use diagnostic tester to perform self-learning operation, perform corresponding operation on each functional switch after learning is successful, so as to check each function of power back door operates normally.

(1) Install 2 fixing bolts to power back door module assembly.

Torque: 7 ± 1 N·m

(2) Connect the power back door module assembly wire harness connectors.
(3) Install the luggage compartment left wheel house assembly.
(4) Install the back door doorsill pressure plate assembly.
(5) Install the luggage compartment carpet assembly.
(6) Connect the negative battery cable.
(7) Connect diagnostic tester, read and clear DTCs.

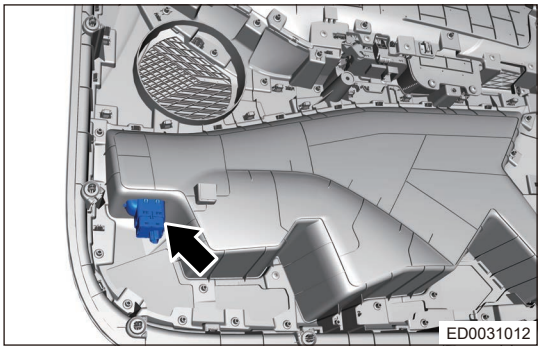
5.22 Back Door Switch (Interior)

■ **Removal**

⚠ Warning
Be sure to wear safety equipment to prevent accidents, when removing back door switch (interior) assembly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.
(2) Disconnect the negative battery cable.
(3) Remove the front left door protector assembly.

(4) Press the switch clip from the back, and push switch out of mounting hole of door protector.



■ **Installation**

⚠ Caution
• **Install back door switch assembly (interior) into place and connector into place.** • **Install back door switch (interior), ensure that it can be used normally.**

(1) Install back door switch (interior) to a proper position of door protector.

(2) Install the front left door protector assembly.

(3) Connect the negative battery cable.

5.23 Back Door Closer Switch

■ **Removal**

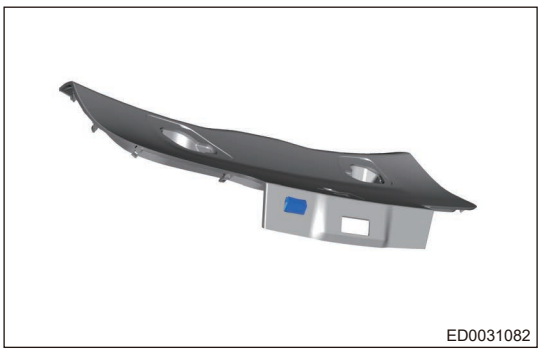
⚠ Warning
Be sure to wear safety equipment to prevent accidents, when removing back door closing switch.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

(2) Disconnect the negative battery cable.

(3) Remove the back door lower protector assembly.

(4) Press clip from the back of switch, remove switch.



■ **Installation**

⚠ Caution
• **Install back door closing switch and connector into place.** • **Install back door closing switch, ensure that it can be used normally.**

(1) Install back door closing switch to a proper position of body.

(2) Install the back door lower protector assembly.

(3) Connect the negative battery cable.

5.24 Door Module Assembly

■ Removal

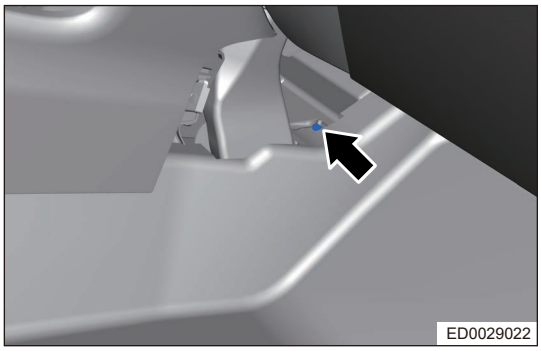
⚠ Warning
Be sure to wear safety equipment to prevent accidents, when removing door module assembly.

(1) Turn off all electrical equipment and ENGINE START STOP switch.

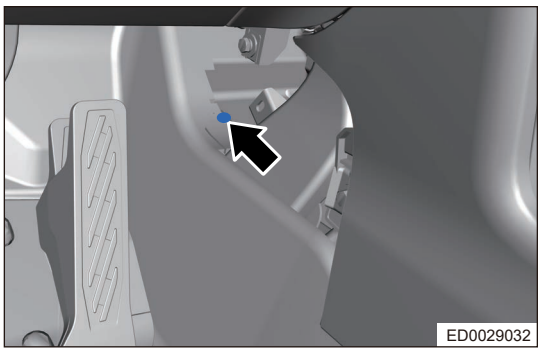
(2) Disconnect the negative battery cable.

(3) Remove the auxiliary front left/right fascia console protector assembly.

(4) Remove 1 fixing nut from right part of door module assembly.



(5) Remove 1 fixing nut from left part of door module assembly.



(6) Disconnect the door module connector.

(7) Remove the door module assembly.

■ Installation

(1) Install door module assembly to a proper position of body.

(2) Connect the door module connector.

(3) Install 1 fixing nut to left part of door module assembly.

(4) Install 1 fixing nut to right part of door module assembly.

(5) Install the auxiliary front left/right fascia console protector assembly.

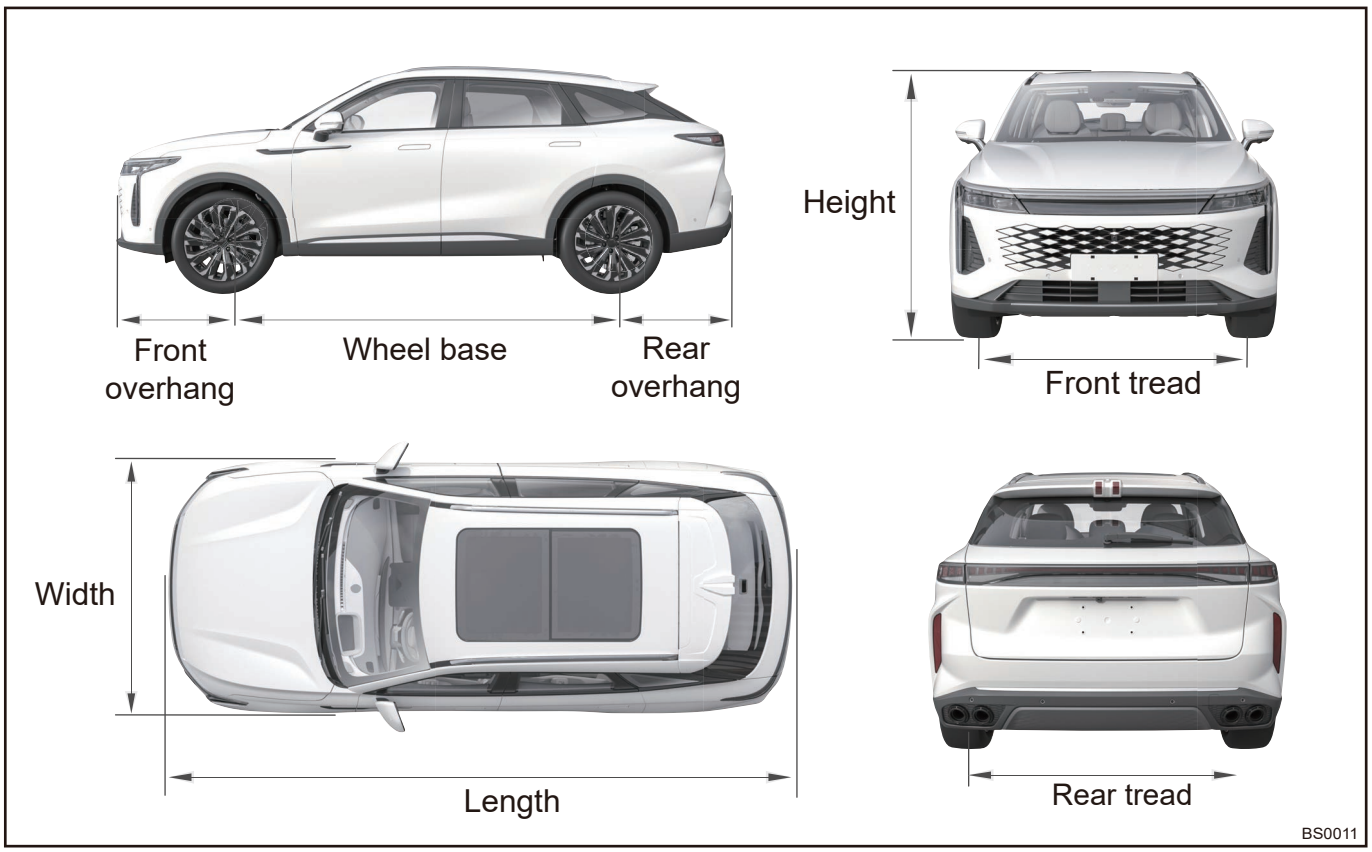
(6) Connect the negative battery cable.

1.8 Body DIMENSIONS

1 General Information

1.1 Description

- The main dimensions of the vehicle shall conform to the following table.
- All dimensions are shown in millimeters (mm).



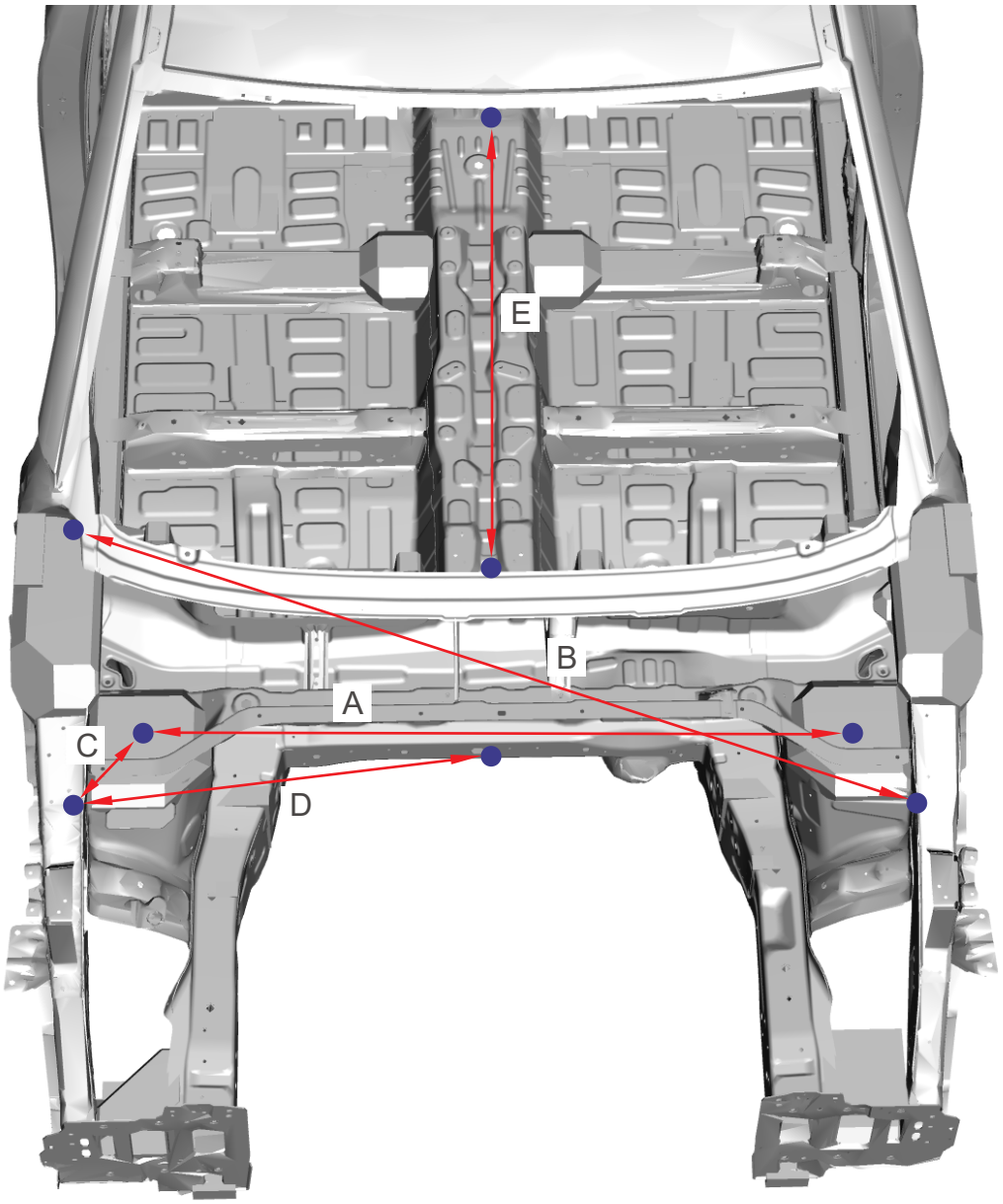
Vehicle Model		SQR6480T22TBG	SQR6480T22CBG
Overall size	Length (mm)	4,781	
	Width (mm)	1,920	
	Height (mm)	1,671	1,668
Wheel base (mm)		2,815	
Tread	Front (mm)	1,641	
	Rear (mm)	1,642	
Overhang	Front suspension (mm)	936	
	Rear suspension (mm)	1,030	

1.2 Body Dimensions

Hint:

- Gap dimensions are always in millimeter/inch.
- Use plastic gap adjustment gauge to adjust or check gap dimensions.

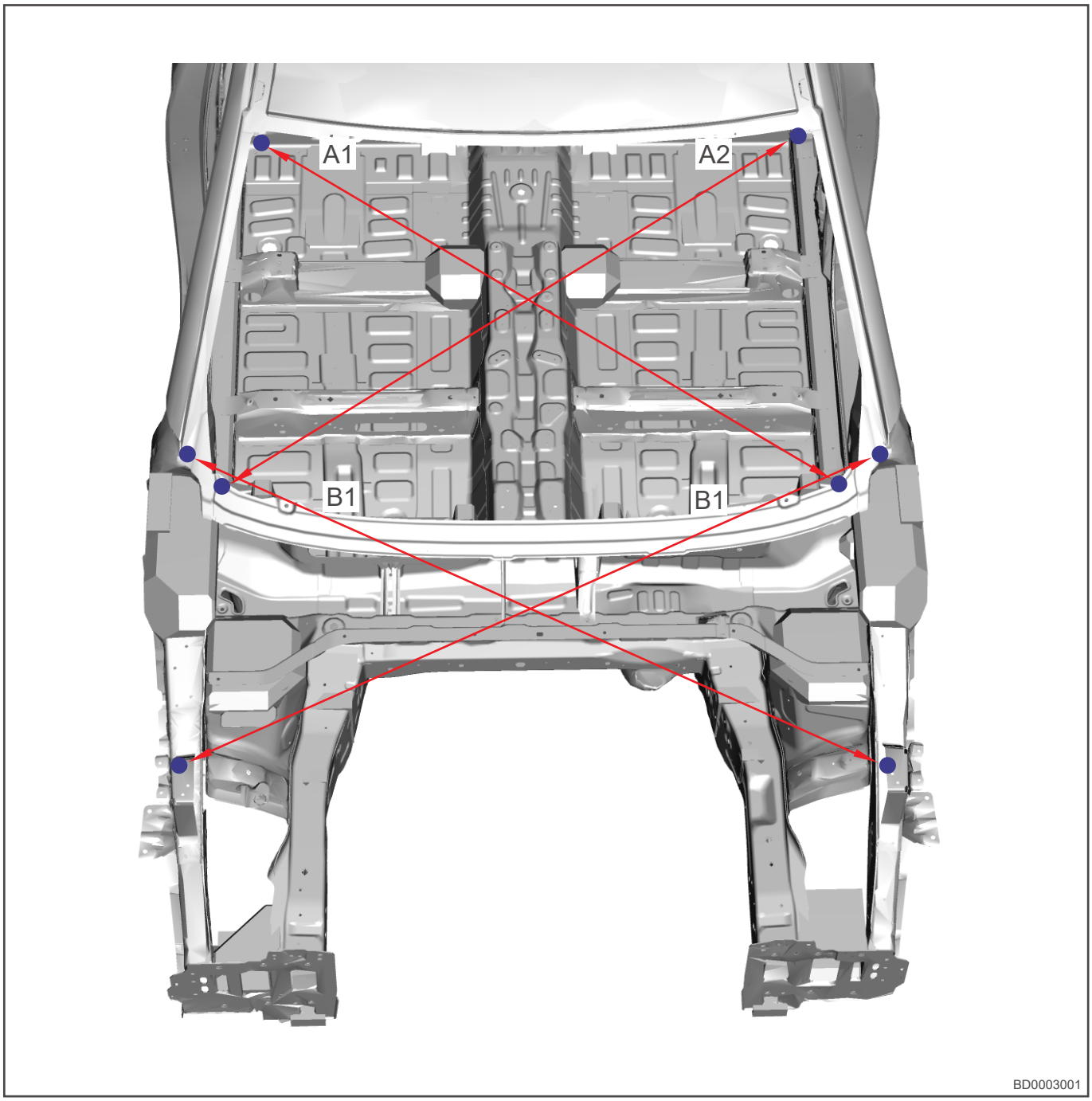
■ Dimensions of Engine Compartment and Windshield Frame



BD0002001

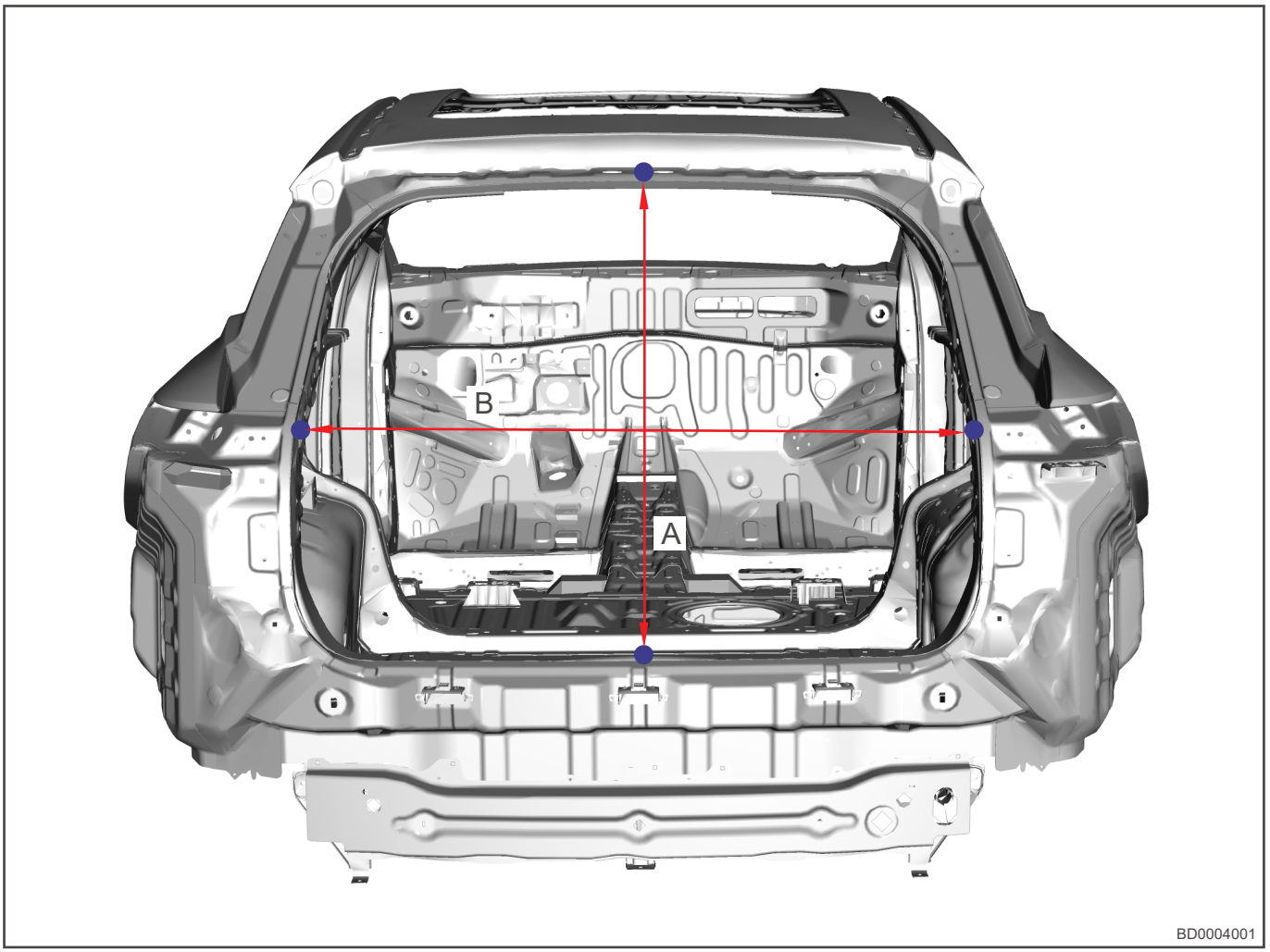
Dimension Code	Standard Value	Measuring Area
A	1195.238	Front suspension installation center
B	1686.384	Diagonal of wing fixing bolts
C	413.46	Distance between front suspension installation center and wing
D	791.329	Distance between front baffle plate center and wing fixing bolt
E	809.648	Front windshield opening

■ Dimensions of Engine Compartment and Windshield Frame



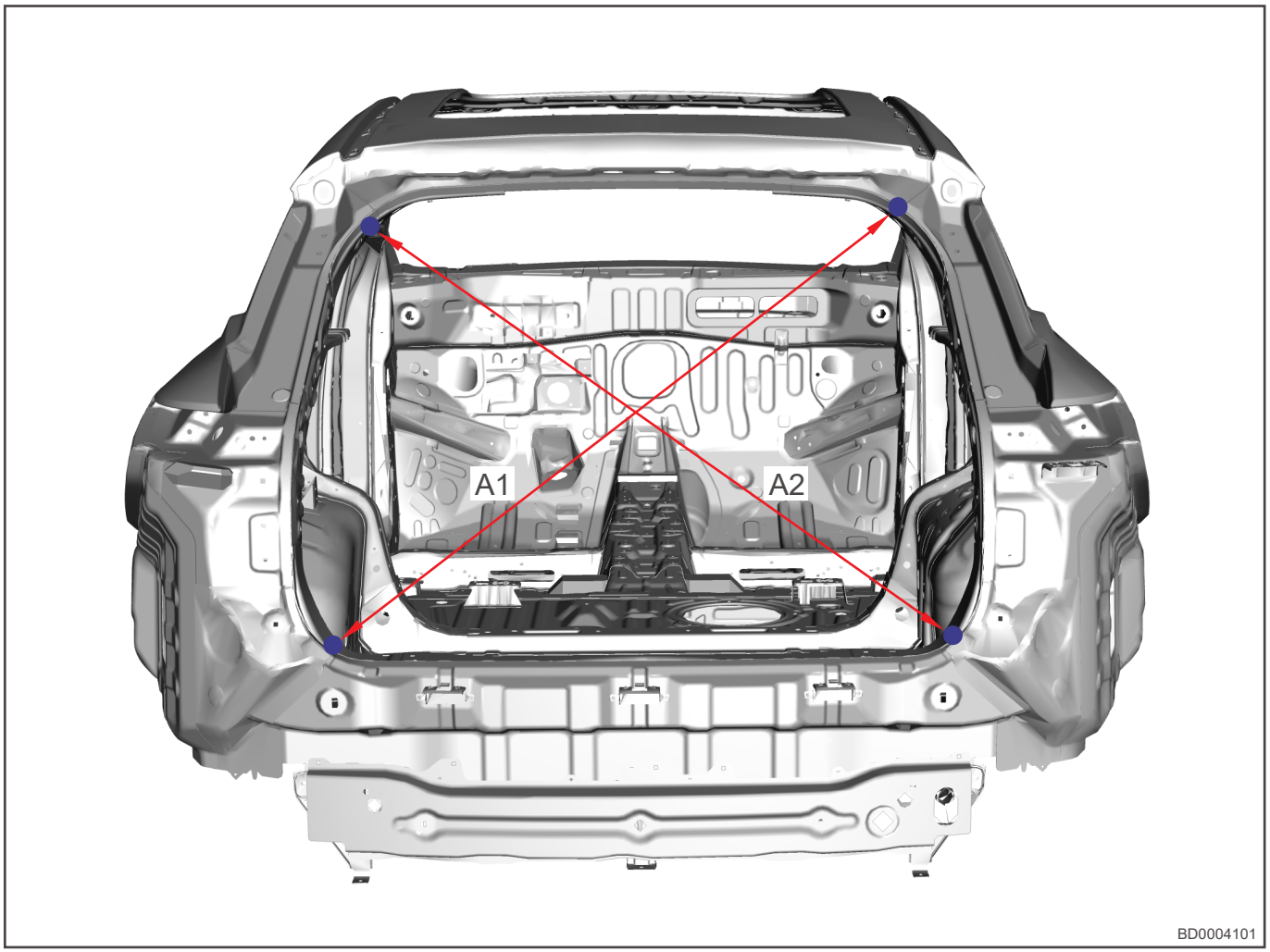
Check diagonal distance between engine compartment and windshield outer frame The values of a set of diagonals should be equal	
A1 = A2	B1 = B2

■ Check Dimension of Luggage Compartment Opening



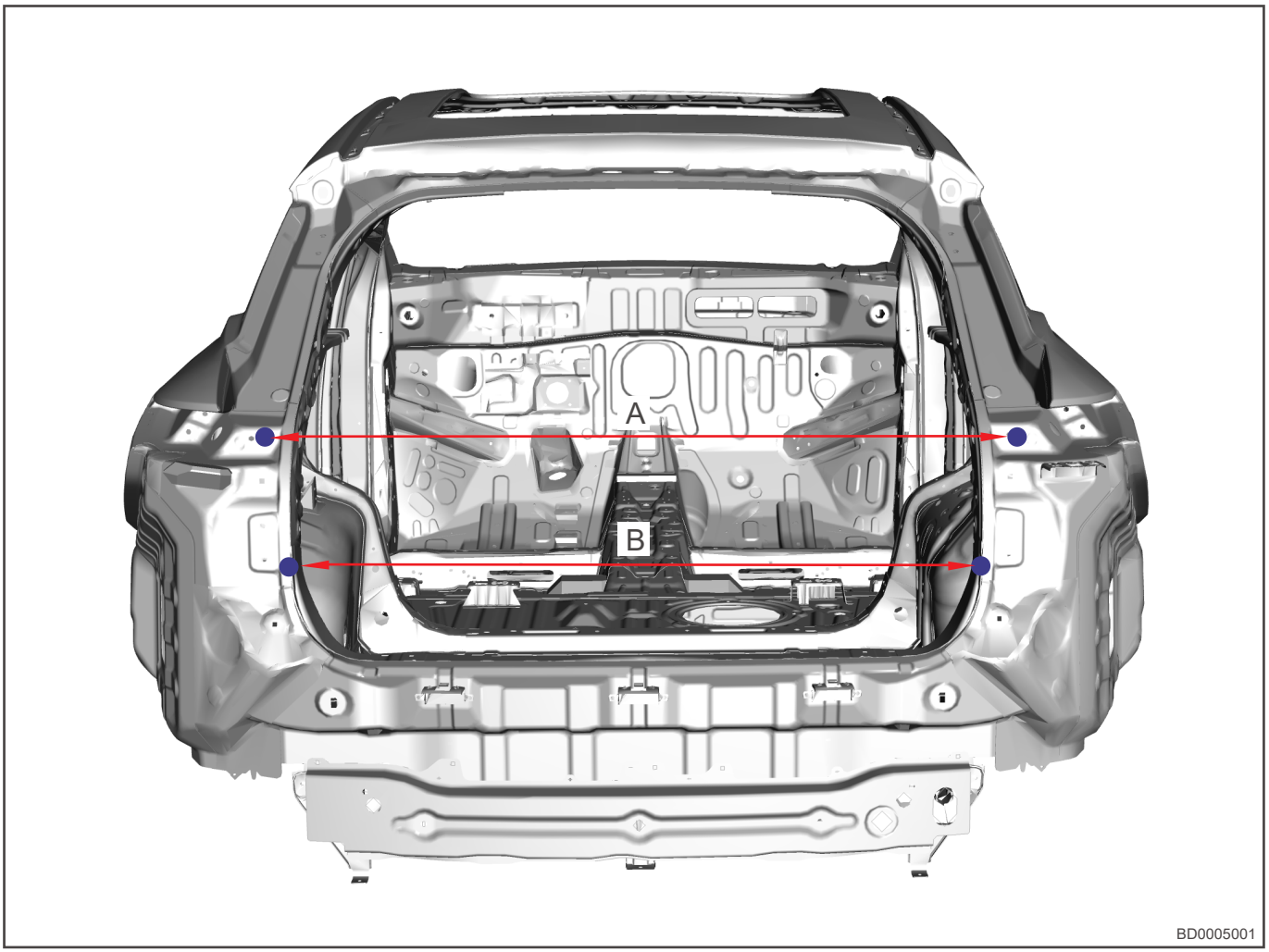
Dimension Code	Standard Value	Measuring Area
A	1036.615	Luggage compartment opening
B	1139.739	Y-direction distance of luggage compartment

■ **Check opening dimension of luggage compartment**



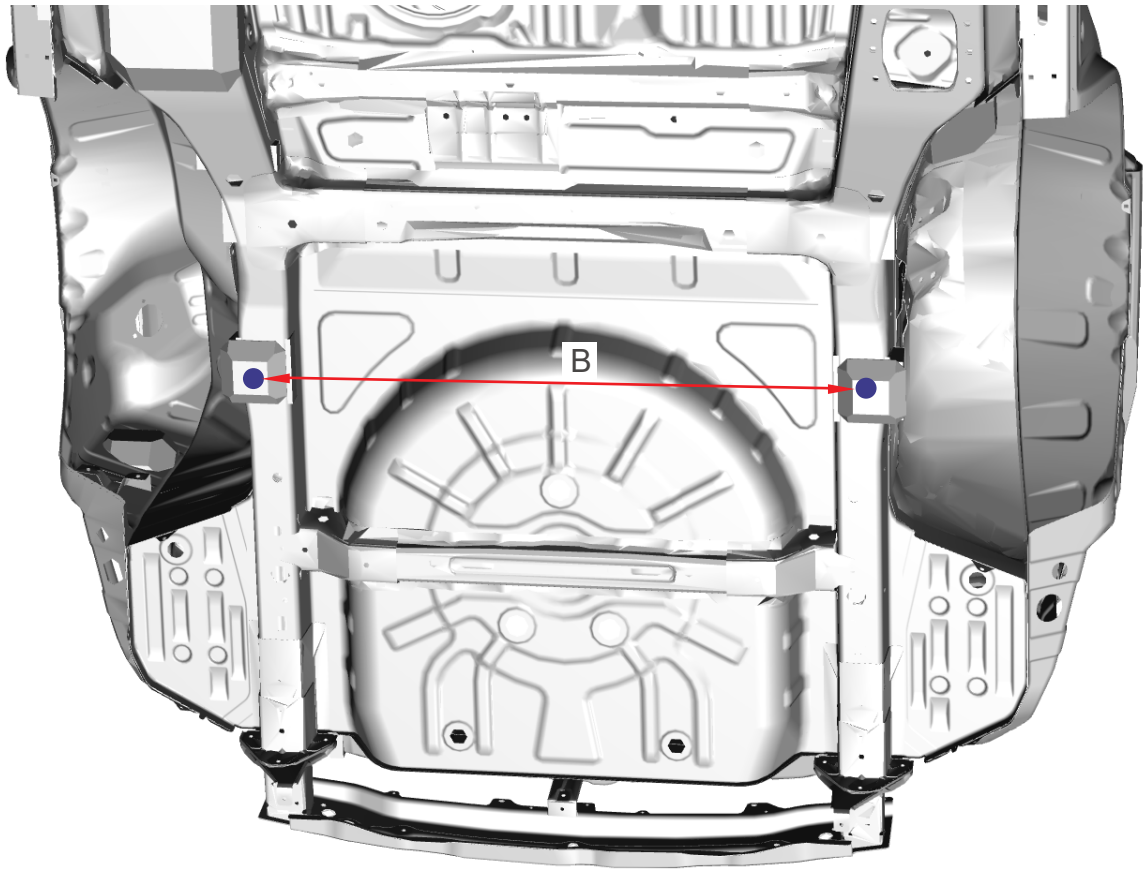
Check diagonal distance of luggage compartment outer frame The values of a set of diagonals should be equal
1357

■ **Check Dimension Between Body B-pillar and C-pillar**



Dimension Code	Standard Value	Measuring Area
A	1638.697mm	Y-direction distance of front door B-pillar lock pillar installation position
B	1493mm	Y-direction distance of front seat front outer belt lower holder
C	1039.17mm	Y-direction distance of rear suspension spring seat installation center position
D	1649mm	Y-direction distance of rear door C-pillar lock pillar installation position

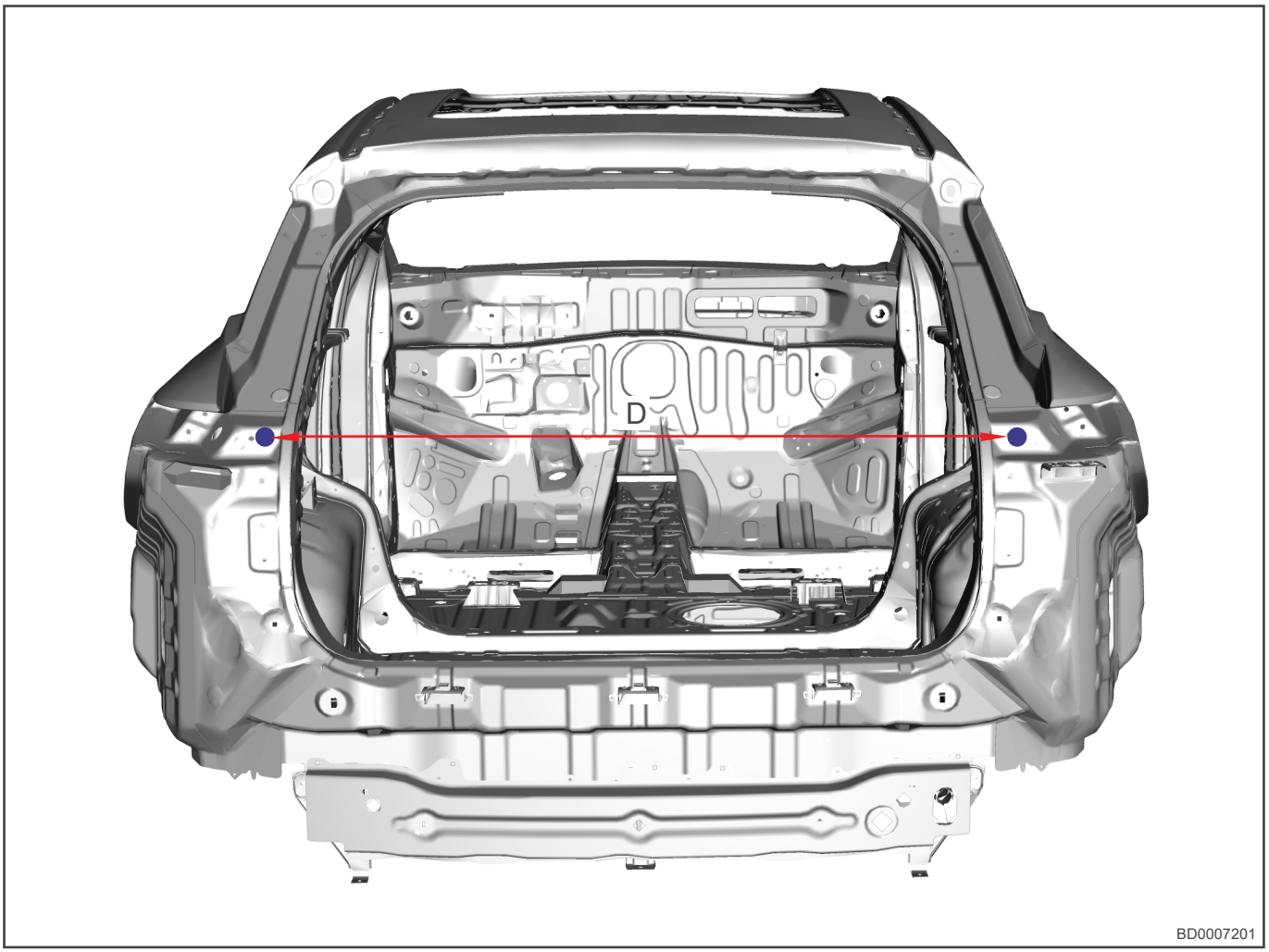
■ Check Dimension Between Body B-pillar and C-pillar



BD0007101

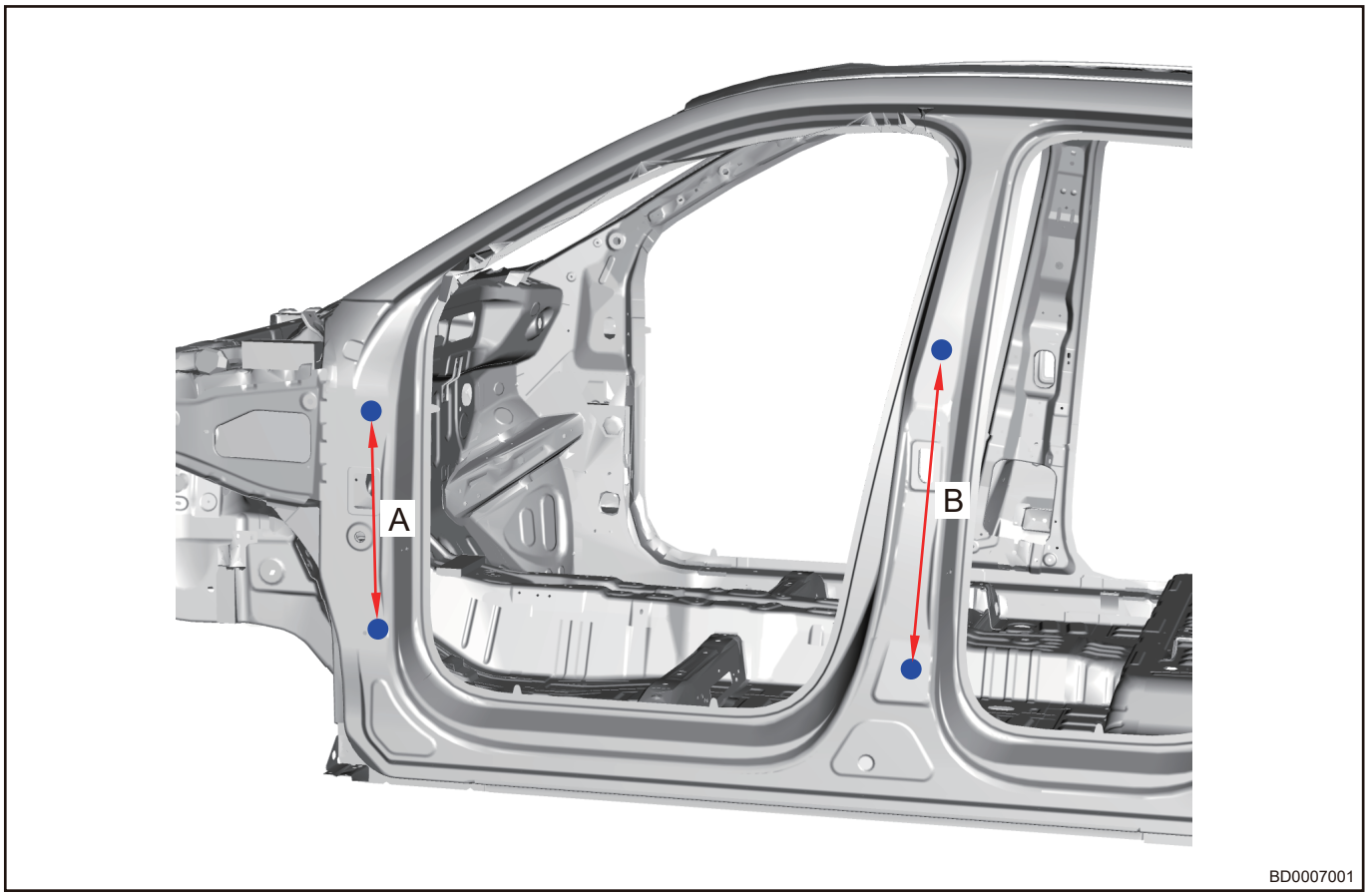
Dimension Code	Standard Value	Measuring Area
C	1039.17mm	Y-direction distance of rear suspension installation center position

■ **Check Dimension Between Body B-pillar and C-pillar**



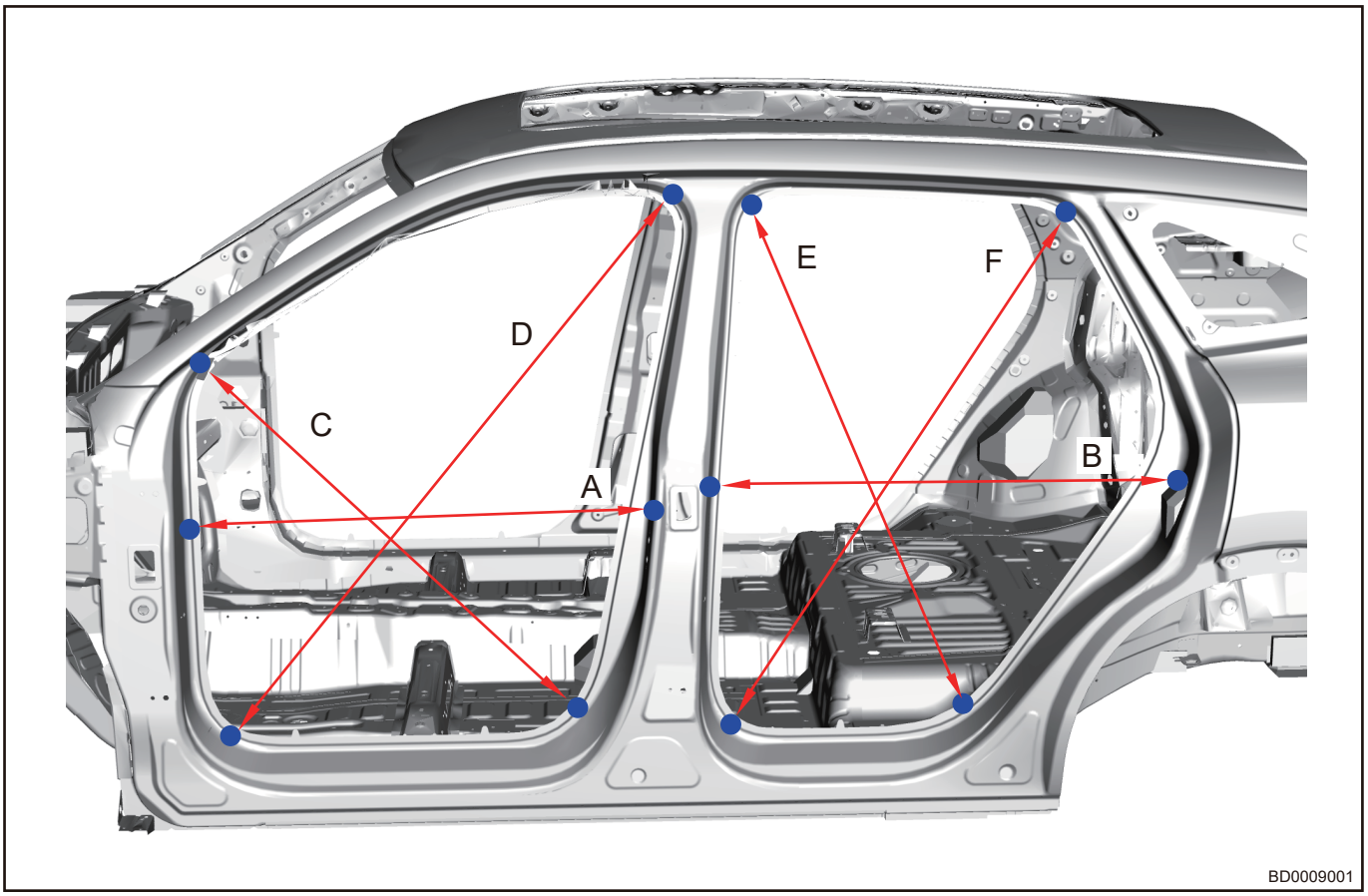
Dimension Code	Standard Value	Measuring Area
D	1657.959mm	Y-direction distance of rear wing lock pillar installation position

■ Check Distance Dimension Between Body A-pillar Hinges



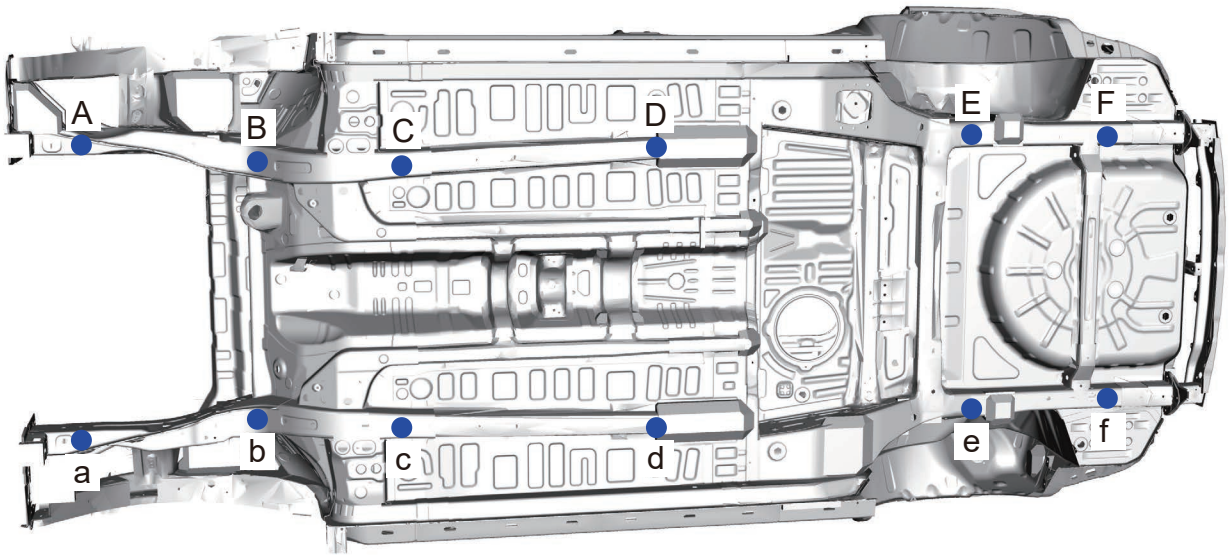
Dimension Code	Standard Value	Measuring Area
A	420	Z-direction distance of A-pillar hinge
B	455	Z-direction distance of A-pillar hinge

■ Check Dimension of Front and Rear Doors Opening



Dimension Code	Standard Value	Measuring Area
A	898.543	Distance between A-pillar and B-pillar lock pillar installation position
B	897.499	Distance between B-pillar and rear door lock pillar installation position
C	994.68	Front door opening
D	1378.915	Front door opening
E	1115.596	Rear door opening
F	1216.285	Rear door opening

■ Check Dimension of Body Deck



Point A-a: Locating holes of front side rail;
Point B-b: Mounting holes of front sub frame;
Point C-c: Locating holes of front floor;
Point D-d: Front locating holes of rear side rail;
Point E-e: Installation point of spring seat;
Point F-f: Rear locating holes of rear side rail;

Dimension Code	Standard Value	Measuring Area
1	998 ± 1 mm	Between A and a
2	919 ± 1 mm	Between B and b
3	650 ± 1 mm	Between C and c
4	875 ± 1 mm	Between C and D
5	1204 ± 1 mm	Between D and d
6	1039 ± 1 mm	Distance between E and e
7	980 ± 1 mm	Between F and f

1.9 SERVICE OF COLLISION

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repairing metal plate.

(1) It’s necessary to wear protective clothing, goggles, gloves and working shoes when performing body metal plate welding, cutting and polishing.

(2) Ensure the ventilation is well in welding area.

(3) Disconnect battery and cover the post before welding.

(4) If spark may be generated when working near the battery, it’s necessary to remove the battery.

(5) Before removing the vehicle parts, the vehicle should be fixed on the lifting frame to avoid the change of the vehicle gravity, which may affect the operation safety.

(6) Connect the ground wire of the welding device directly to the parts that need to be welded, and ensure that there is no conductive part between the ground point and the welding point when operating.

(7) Ground wire or welding electrode is forbidden to contact with electronic control unit and cable.

(8) Never park an unprotected vehicle in the body service area, because splashing sparks may cause fire, damage paint surface and glass.

(9) Special care should be taken when polishing and welding near fuel tank or other components that contain fuel, and all suspected components that may affect safety should be removed.

(10) Never weld, hard solder or soft solder any compartment of air conditioning system that contains refrigerant, or weld other parts of vehicle that may cause the temperature of air conditioning system components to rise, which may cause explosion of the air conditioning system. If it’s necessary to carry out electric welding near the refrigerant hose, the refrigerant must be recovered, because the invisible ultraviolet ray generated when performing electric welding can penetrate the refrigerant hose and cause the refrigerant to decay.

(11) It’s necessary to disconnect the battery ground wire when operating the airbag system or carrying out body calibration; the temperature around airbag components should not exceed 100 ℃.

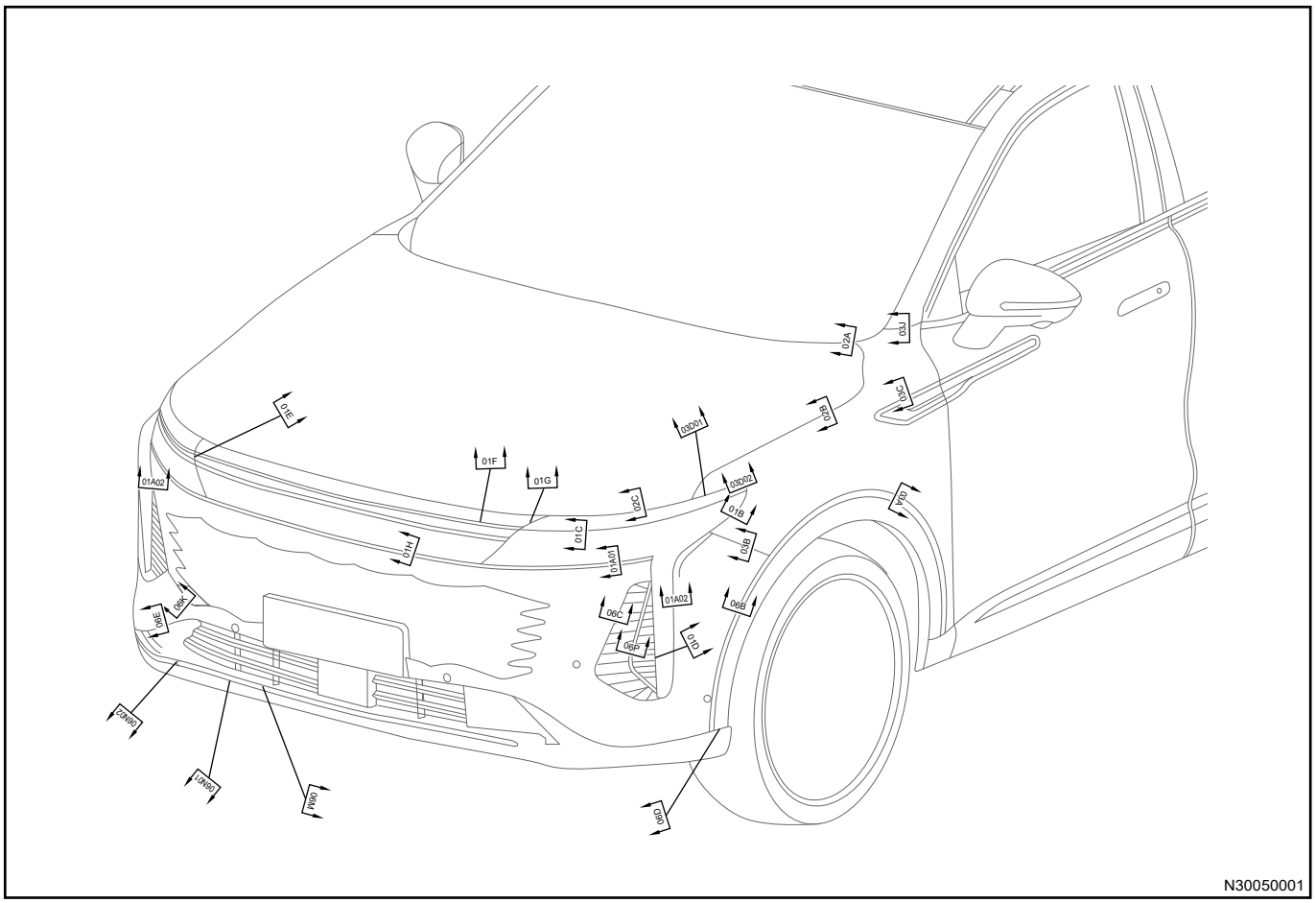
2 Body Surface Gap/Surface Difference

2.1 Description of Body Dimension Figure

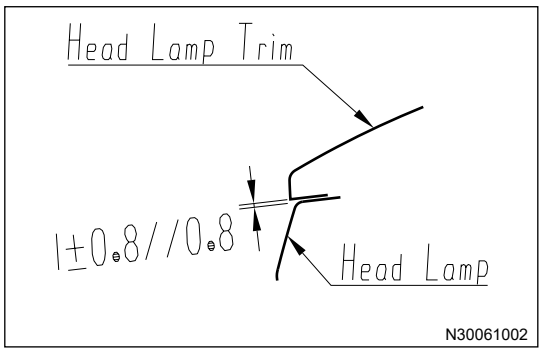
■ Figure Description

- Gap: Gap
- Flush: Flush
- //: Uniformity
- L/R: Range for left and right
- N/A: No size requirements, shape of gradual transition
- F/A: X direction of body is reference direction and front to rear relation
- C/C: Y direction of body is reference direction and left to right relation
- U/D: Z direction of body is the reference direction and up to down relation

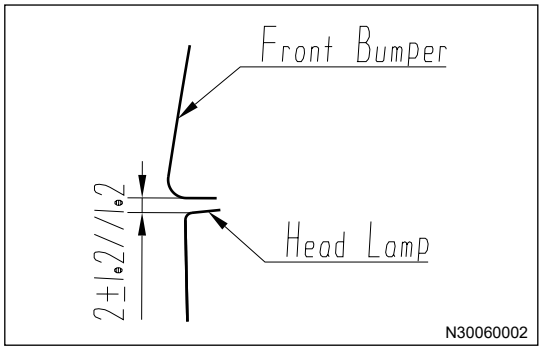
2.2 Body Surface Gap/Flush View 1



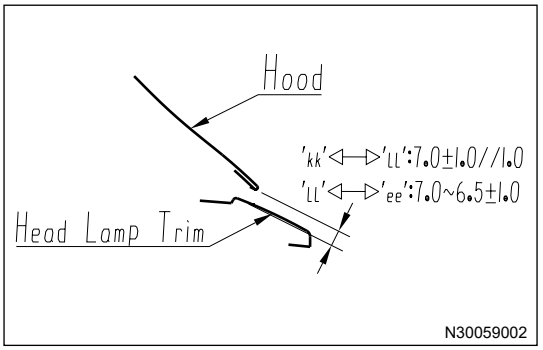
(1) Assembly clearance between headlight trim strip and headlight.



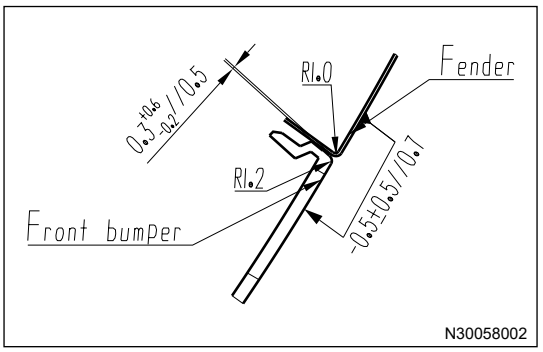
(2) Assembly clearance between front bumper and headlight.



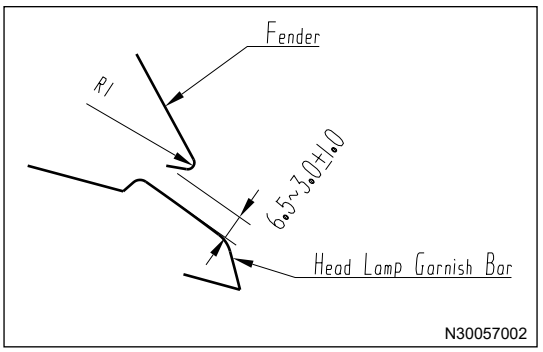
(3) Assembly clearance between headlight trim strip and engine hood.



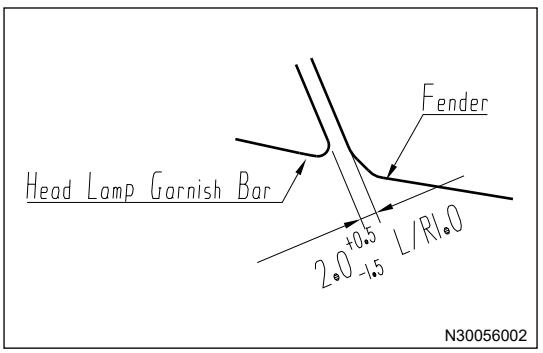
(4) Assembly clearance between front bumper and wing.



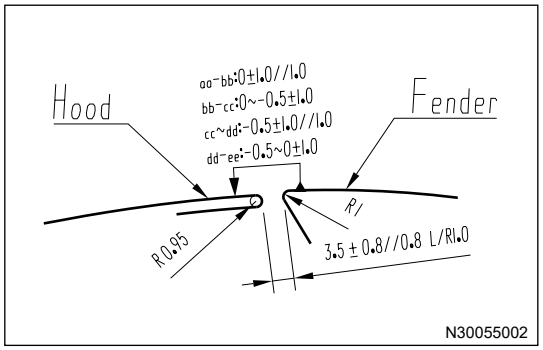
(5) Assembly clearance between wing and headlight trim strip.



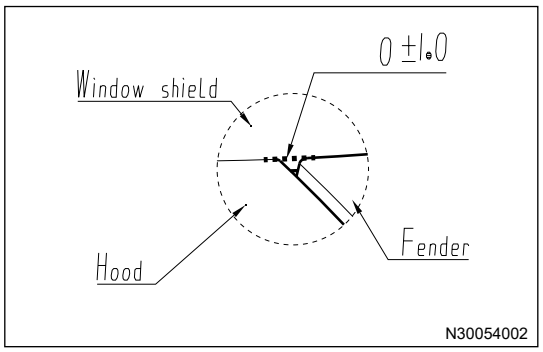
(6) Assembly clearance between headlight trim strip and wing.



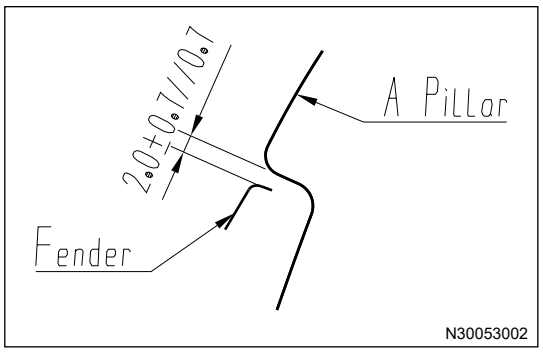
(7) Assembly clearance between engine hood and wing.



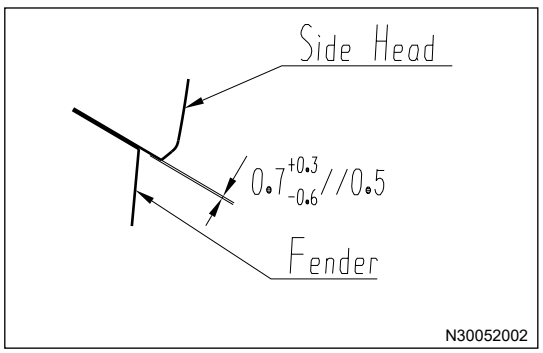
(8) Assembly clearance between front windshield and engine hood/wing.



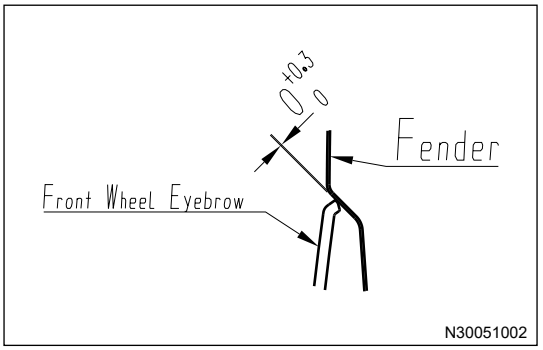
(9) Assembly clearance between wing and A-pillar.



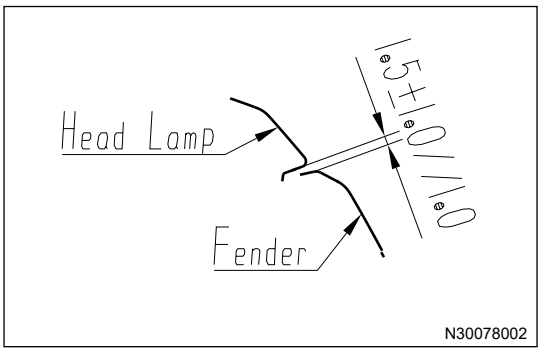
(10) Assembly clearance between side head and wing.



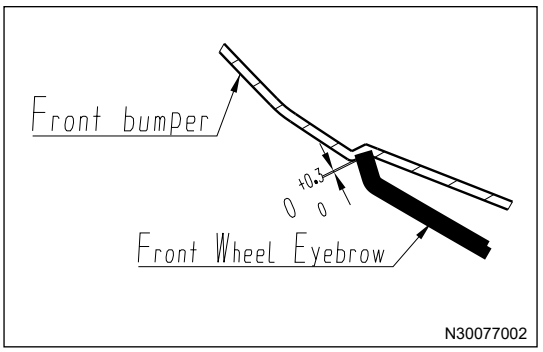
(11) Assembly clearance between front wheel arch trim panel and wing.



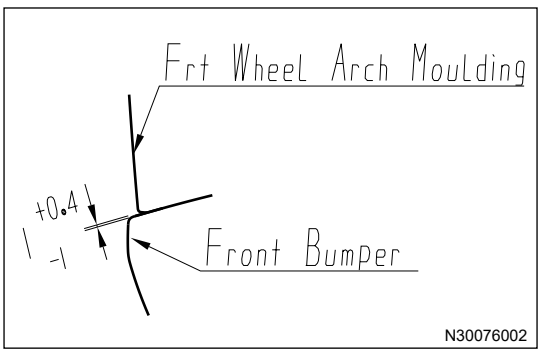
(12) Assembly clearance between headlight and wing.



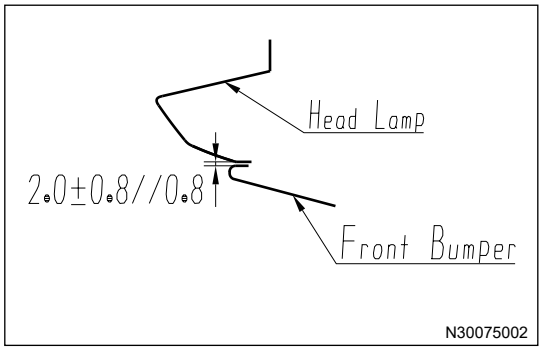
(13) Assembly clearance between front bumper and front wheel arch trim panel.



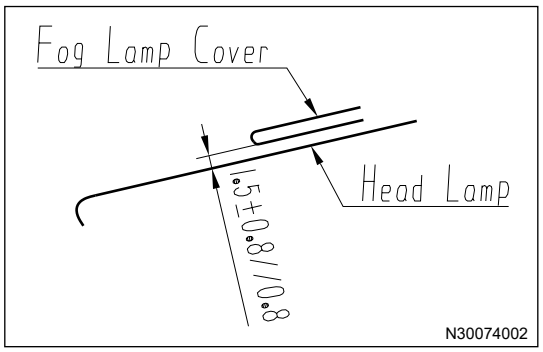
(14) Assembly clearance between front wheel arch trim panel and front bumper.



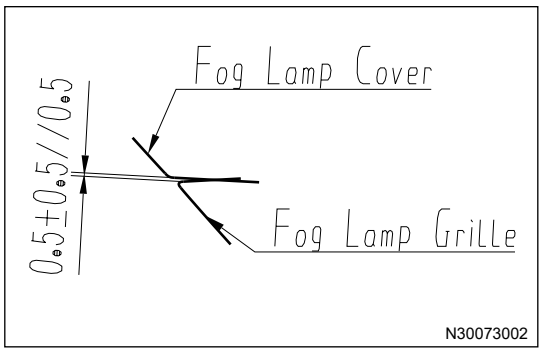
(15) Assembly clearance between headlight and front bumper.



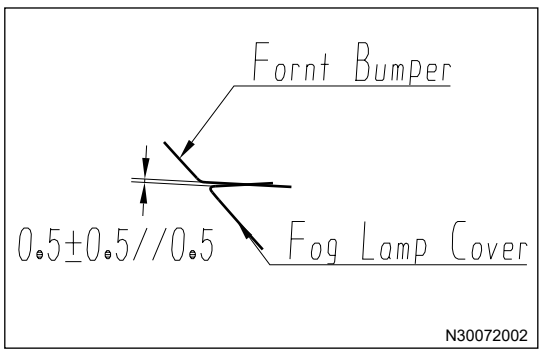
(16) Assembly clearance between fog light trim cover and headlight.



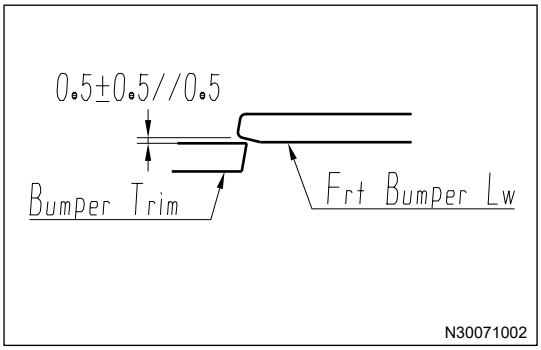
(17) Assembly clearance between fog light trim cover and fog light grille.



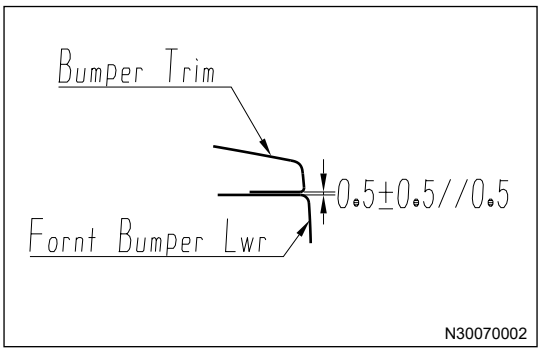
(18) Assembly clearance between front bumper and fog light trim cover.



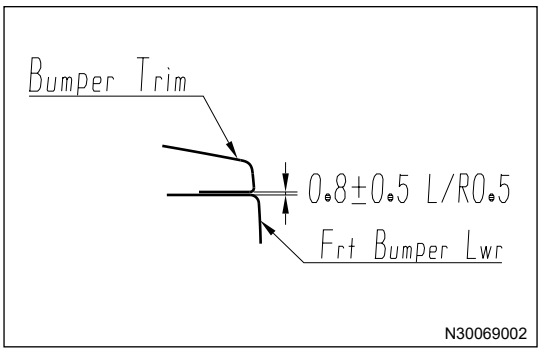
(19) Assembly clearance between front bumper strip and front bumper lower finish panel.



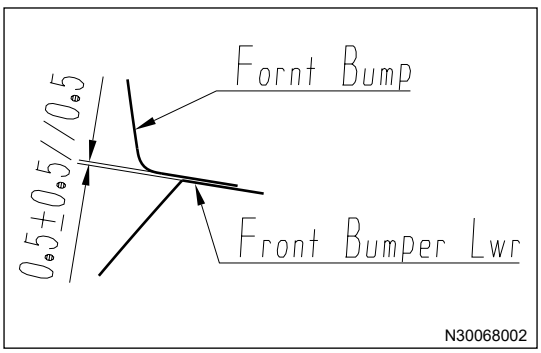
(20) Assembly clearance between front bumper lower trim strip and front bumper lower body.



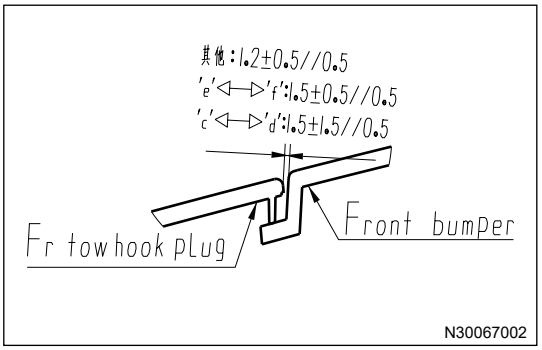
(21) Assembly clearance between front bumper lower trim strip and front bumper lower body.



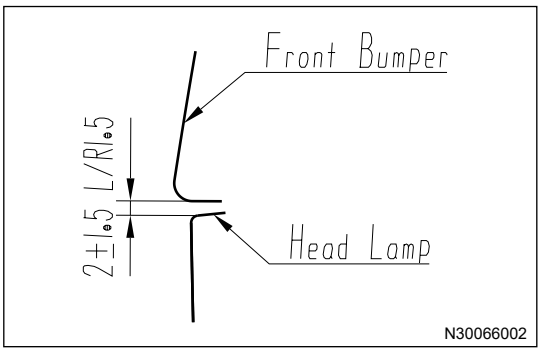
(22) Assembly clearance between front bumper and front bumper lower finish panel.



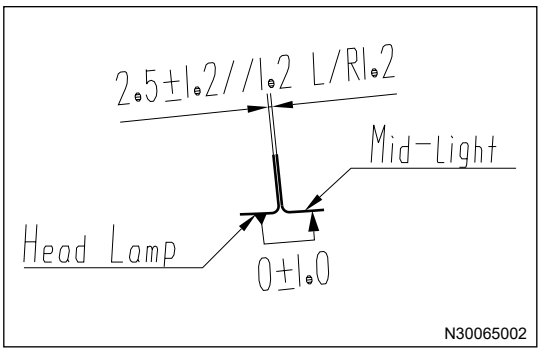
(23) Assembly clearance between front towing hook cover and front bumper.



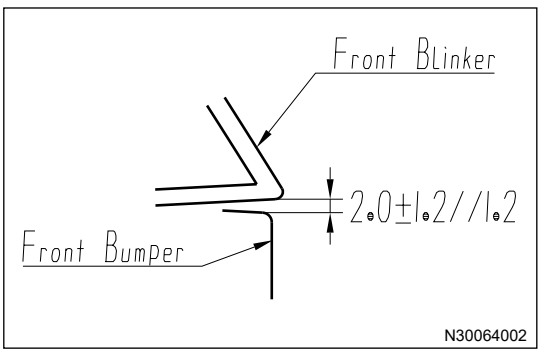
(24) Assembly clearance between front bumper and headlight.



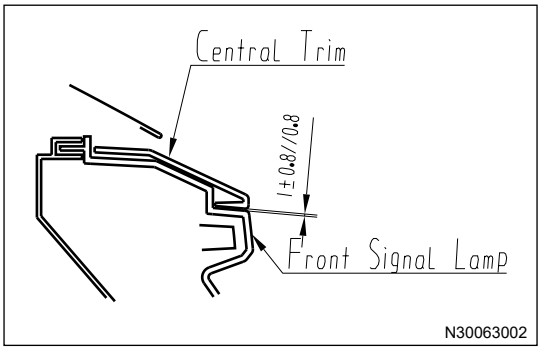
(25) Assembly clearance between headlight and middle light.



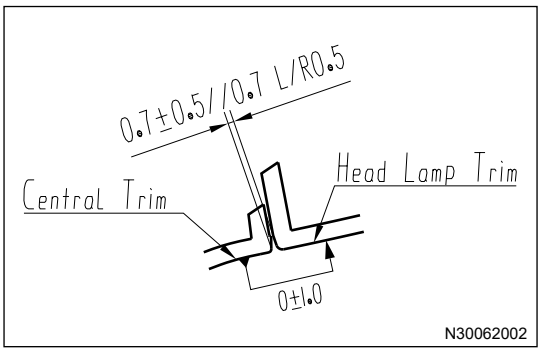
(26) Assembly clearance between front bumper body and front signal light.



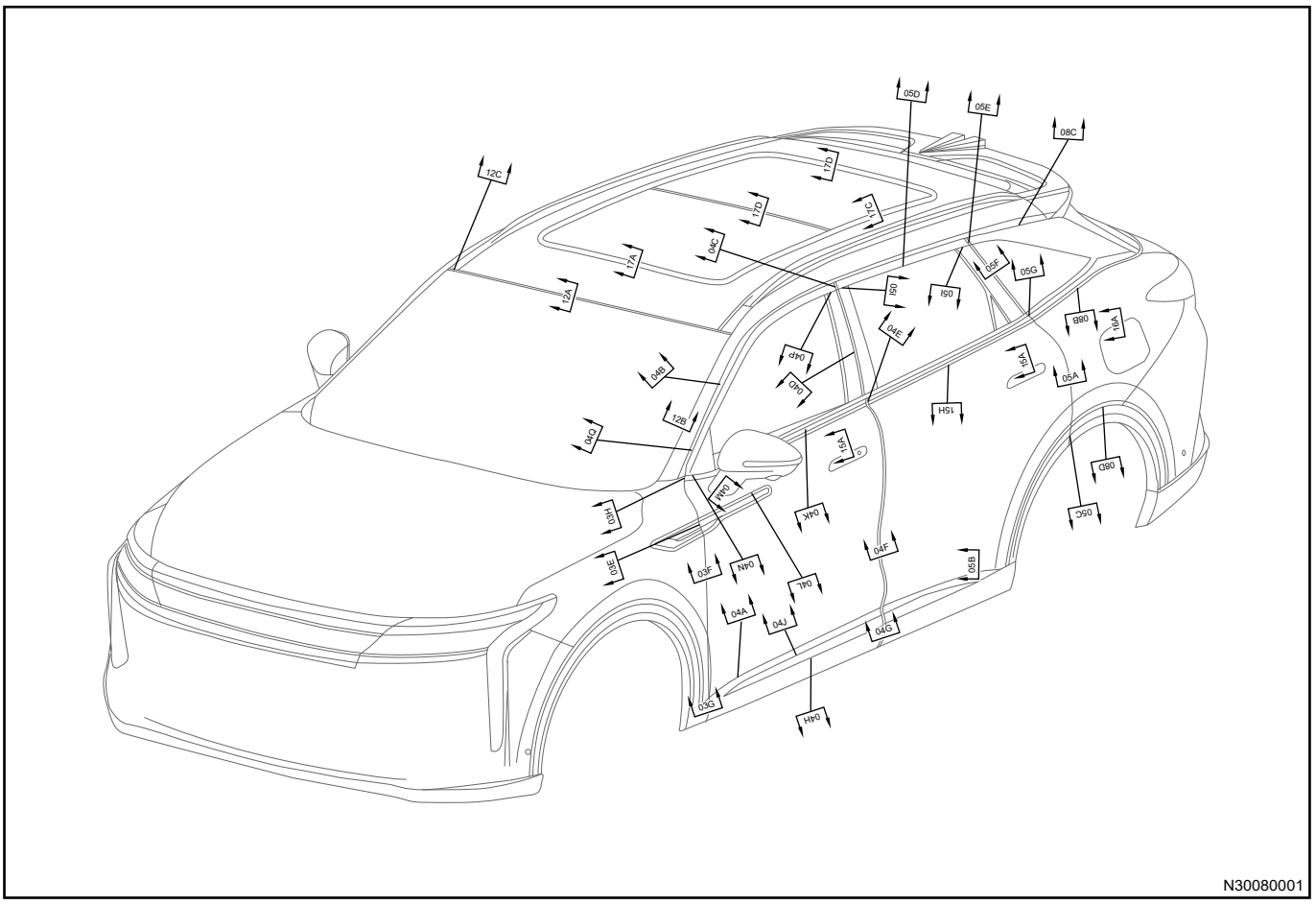
(27) Assembly clearance between middle trim strip and front signal light.



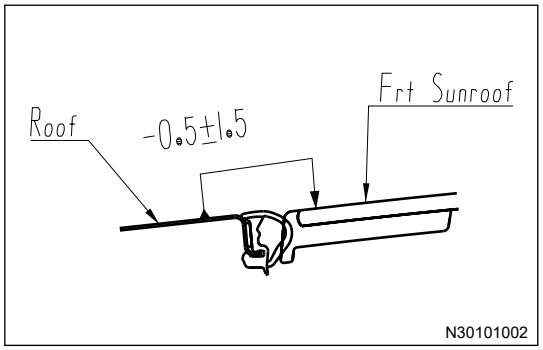
(28) Assembly clearance between middle trim strip and headlight strip.



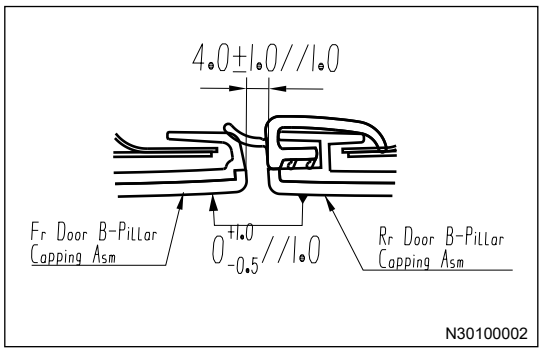
2.3 Body Surface Gap/Flush View 2



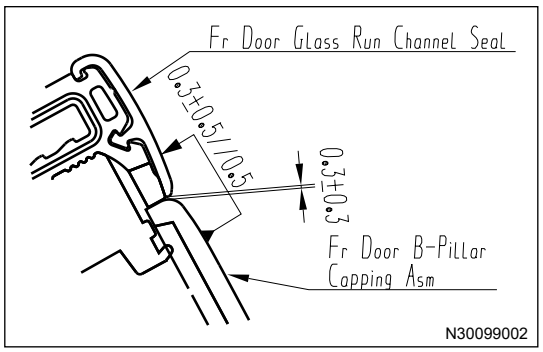
(29) Assembly clearance between roof cover and front roof.



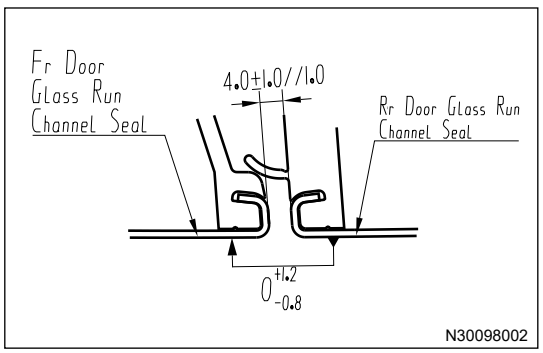
(30) Assembly clearance between front door B-pillar cover plate and rear door B-pillar cover plate.



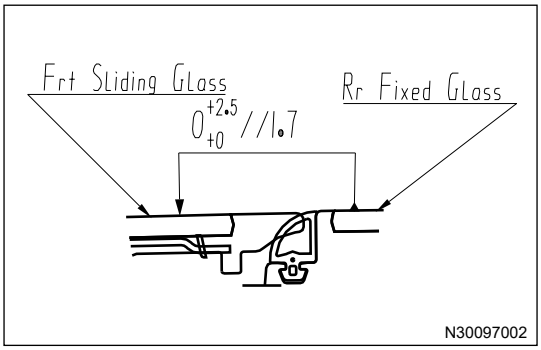
(31) Assembly clearance between front door run and front door B-pillar cover plate.



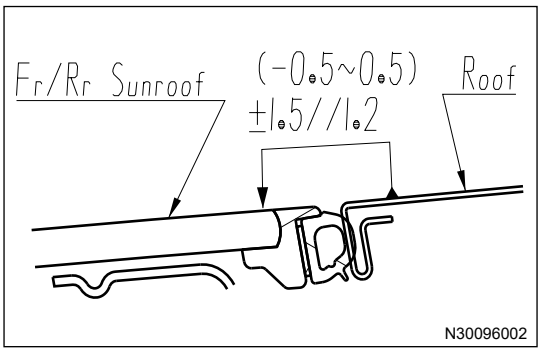
(32) Assembly clearance between front door run and rear door run.



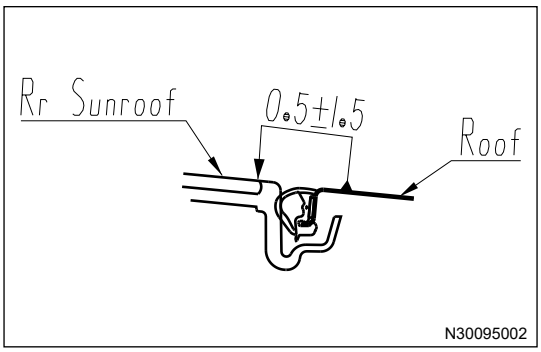
(33) Assembly clearance between front sliding roof and rear fixing roof.



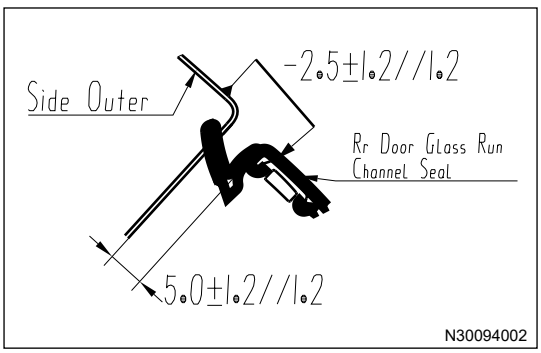
(34) Assembly clearance between front/rear roof and roof cover.



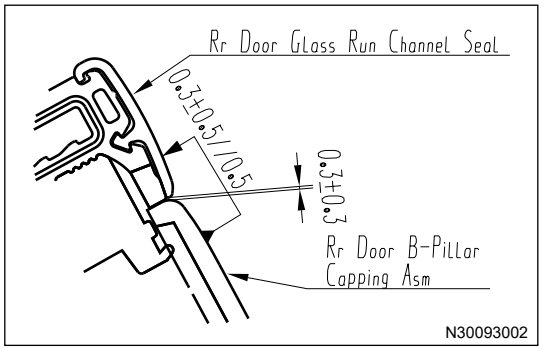
(35) Assembly clearance between rear roof and roof cover.



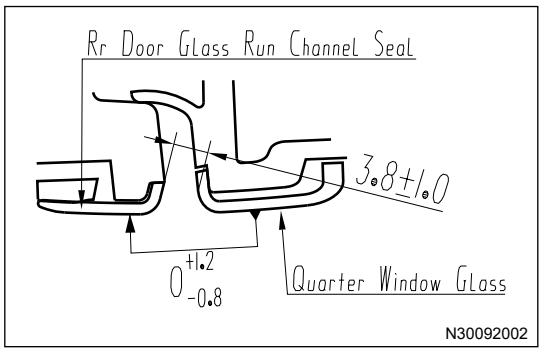
(36) Assembly clearance between quarter outer panel and rear door run.



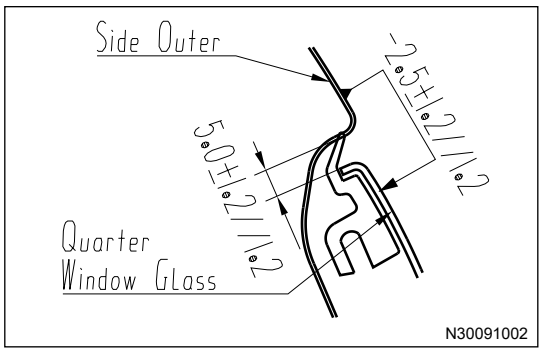
(37) Assembly clearance between rear door run and rear door B-pillar cover plate.



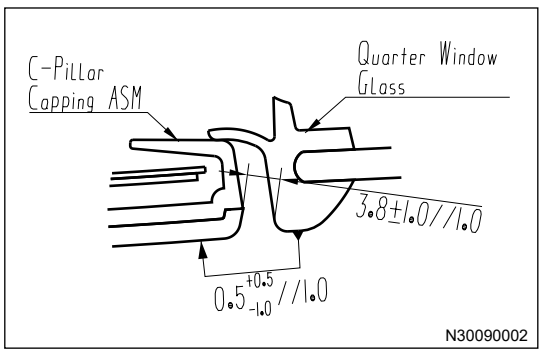
(38) Assembly clearance between rear door run and rear quarter window.



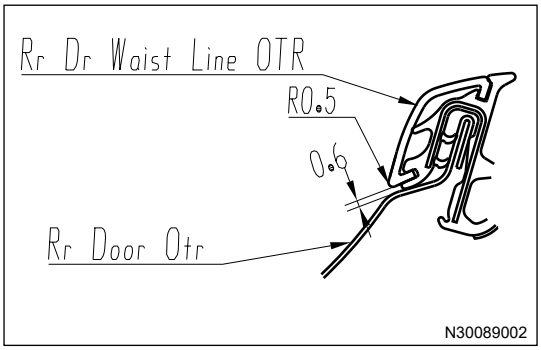
(39) Assembly clearance between quarter outer panel and rear quarter window.



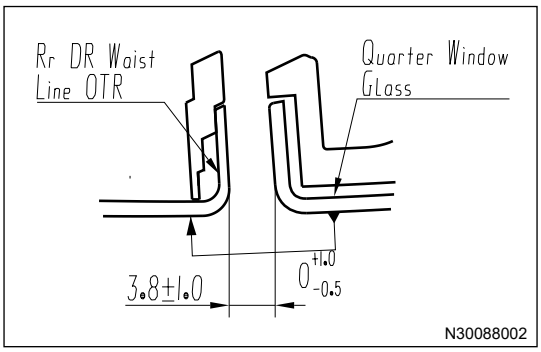
(40) Assembly clearance between C-pillar cover plate and rear quarter window.



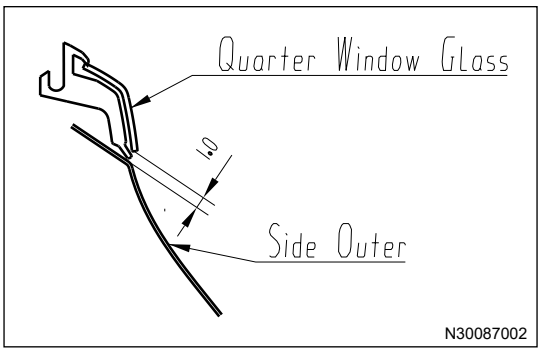
(41) Assembly clearance between rear door glass outer weather bar and rear door outer panel.



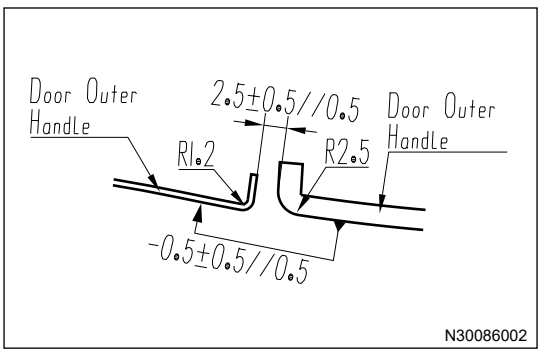
(42) Assembly clearance between rear door glass outer weather bar and rear quarter window.



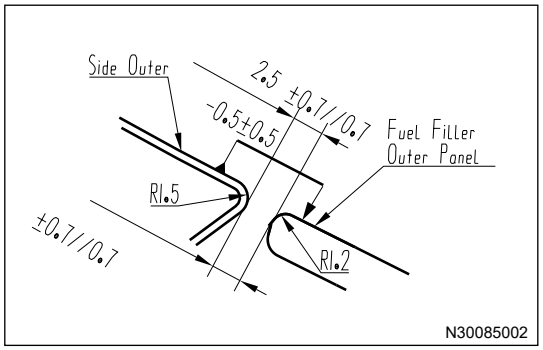
(43) Assembly clearance between rear quarter window and quarter outer panel.



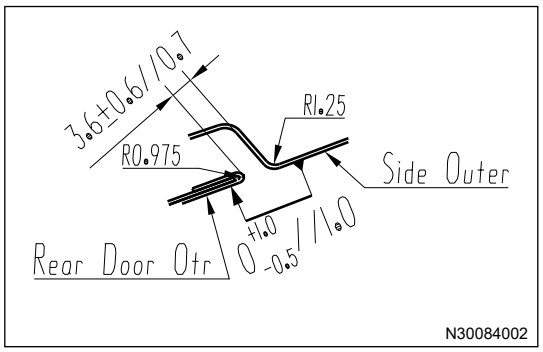
(44) Assembly clearance between door handle and door handle.



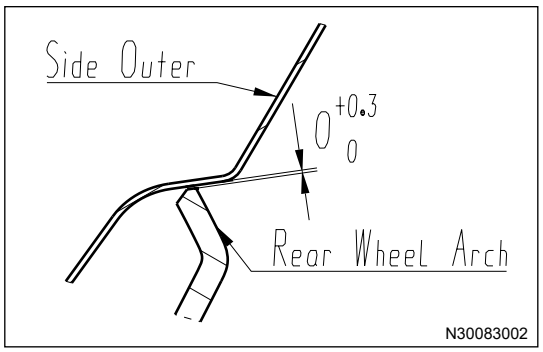
(45) Assembly clearance between quarter outer panel and fuel filler cap outer panel.



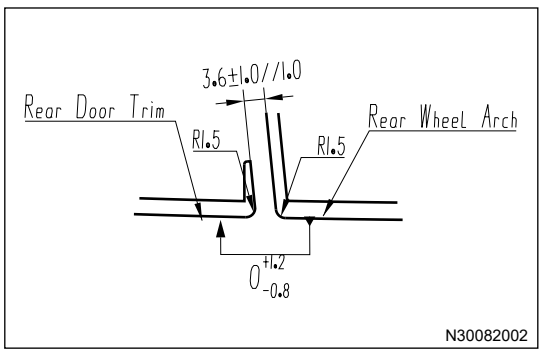
(46) Assembly clearance between rear door outer panel and quarter outer panel.



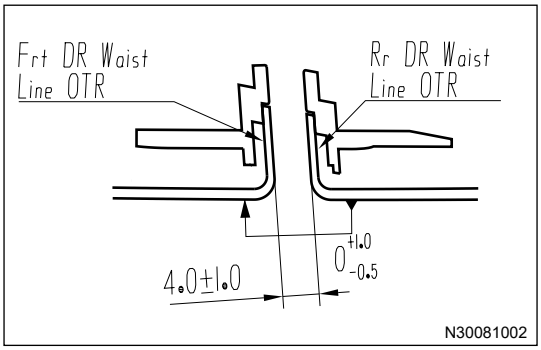
(47) Assembly clearance between quarter outer panel and rear wheel arch ornament.



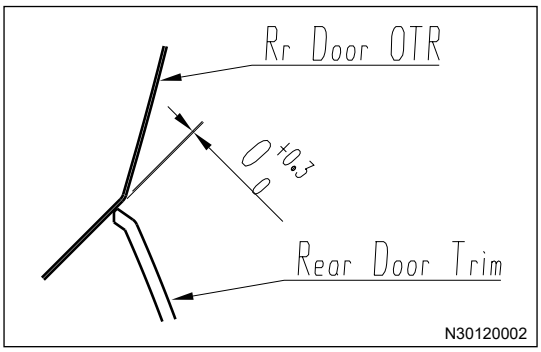
(48) Assembly clearance between rear door ornament and rear wheel arch ornament.



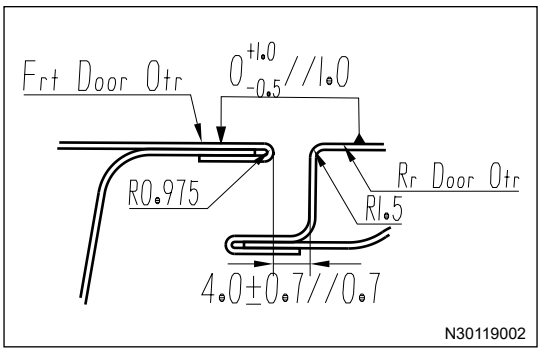
(49) Assembly clearance between front door glass outer weather bar and rear door glass outer weather bar.



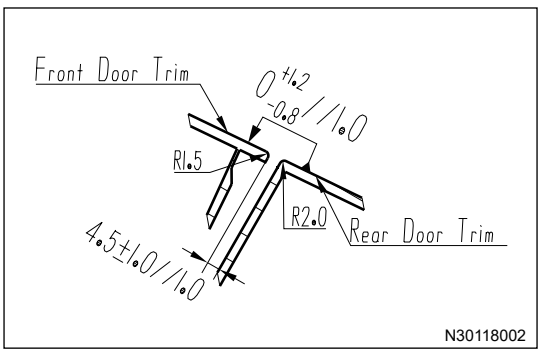
(50) Assembly clearance between rear door outer panel and rear door ornament.



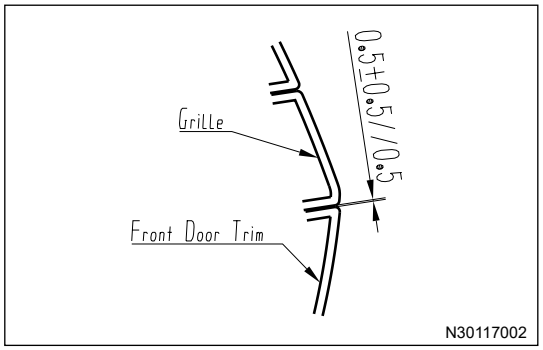
(51) Assembly clearance between front door outer panel and rear door outer panel.



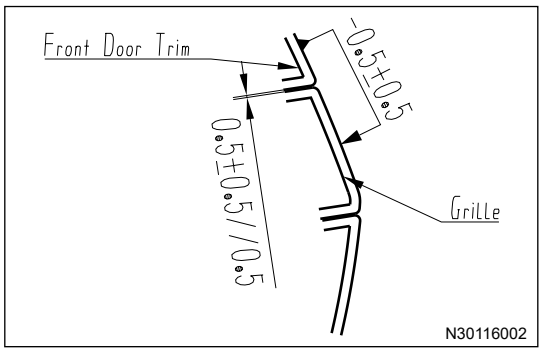
(52) Assembly clearance between front door ornament and rear door ornament.



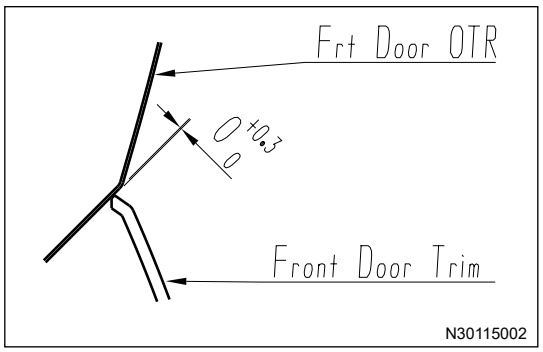
(53) Assembly clearance between strip and front door ornament.



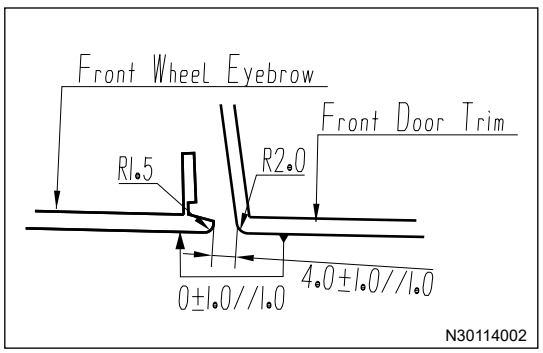
(54) Assembly clearance between front door ornament and strip.



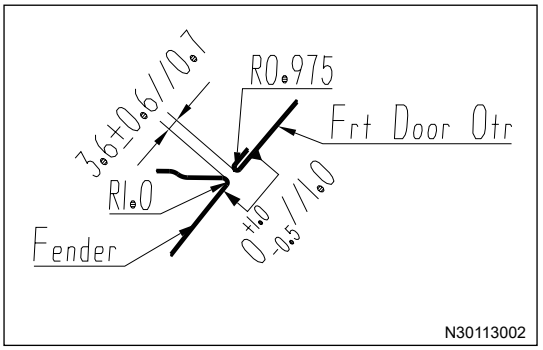
(55) Assembly clearance between front door outer panel and front door ornament.



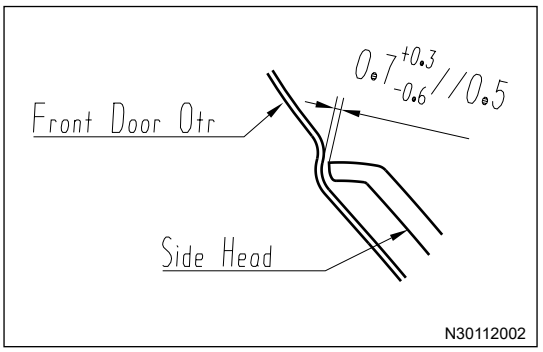
(56) Assembly clearance between front wheel arch trim panel and front door ornament



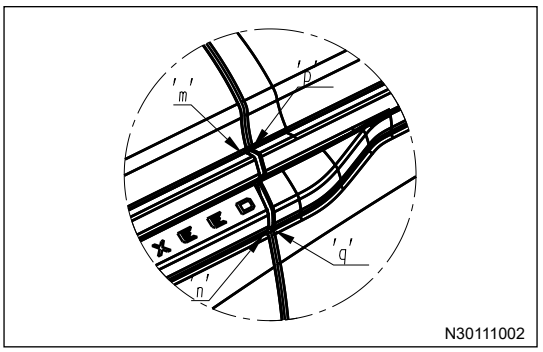
(57) Assembly clearance between wing and front door outer panel.



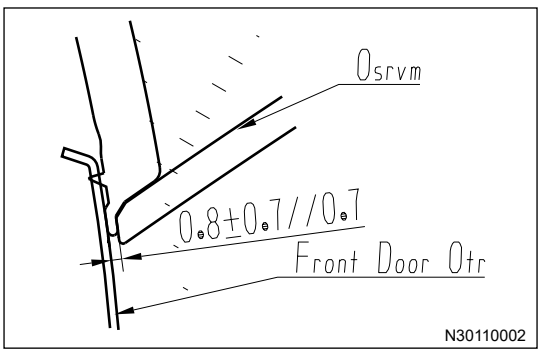
(58) Assembly clearance between front door outer panel and side head.



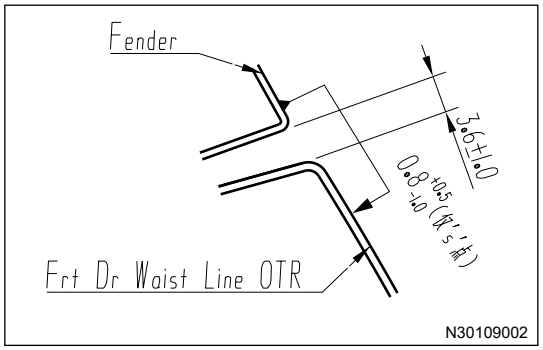
(59) Z-direction alignment between fender side head and front door side head.



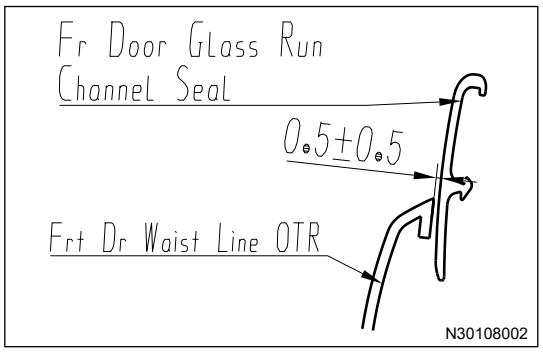
(60) Assembly clearance between outside rear view mirror and front door outer panel.



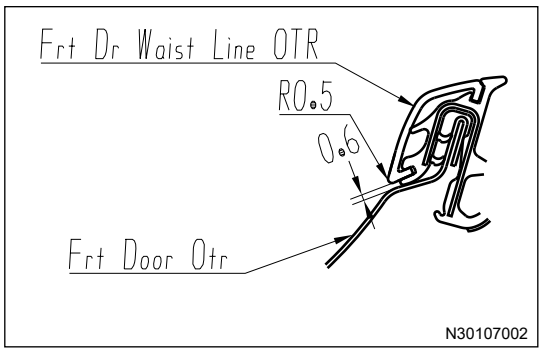
(61) Assembly clearance between wing and front door glass outer weather bar.



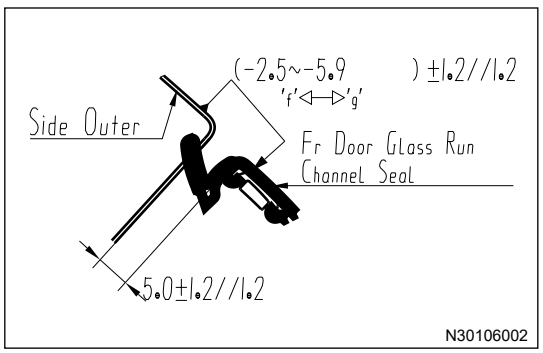
(62) Assembly clearance between front door run and front door glass outer weather bar.



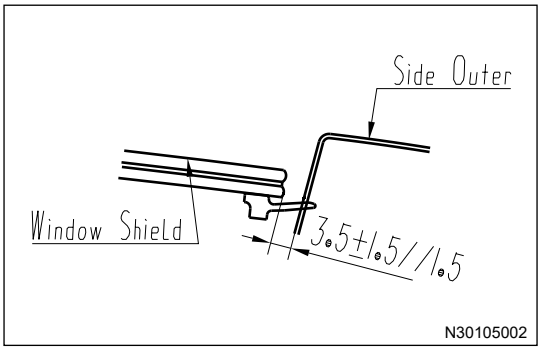
(63) Assembly clearance between front door glass outer weather bar and front door outer panel.



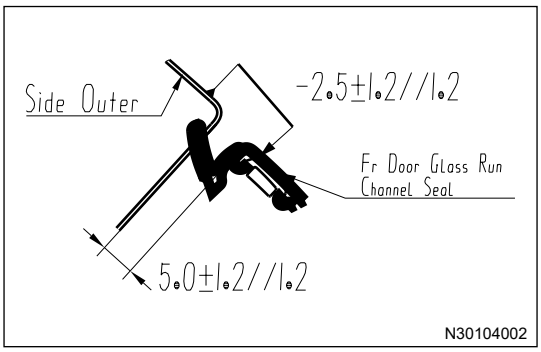
(64) Assembly clearance between quarter outer panel and front door run.



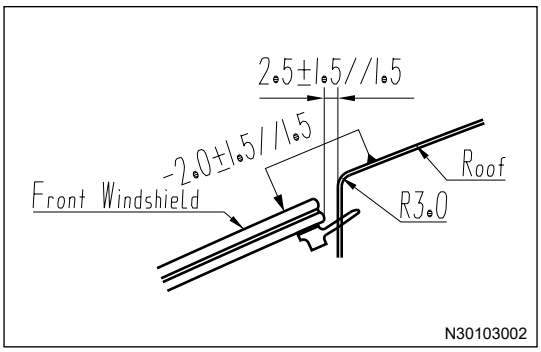
(65) Assembly clearance glass between front windshield and quarter outer panel.



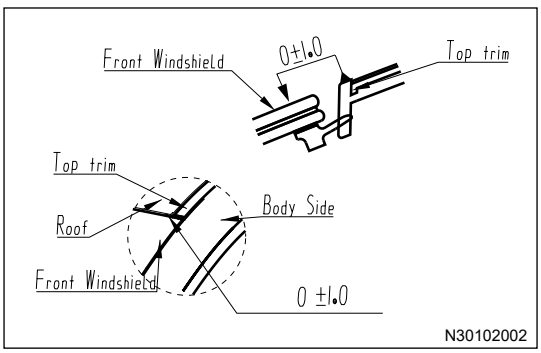
(66) Assembly clearance between quarter outer panel and front door run.



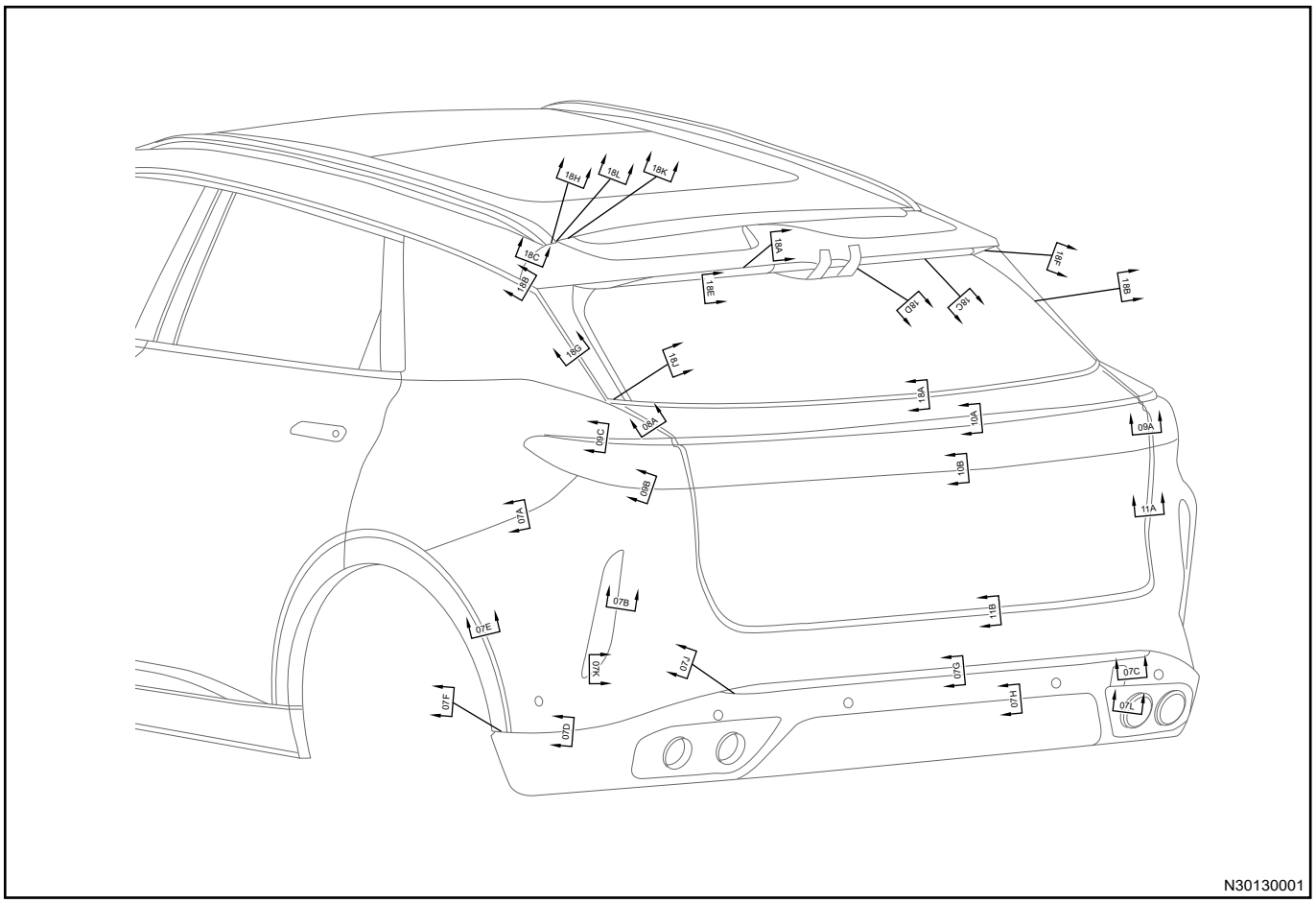
(67) Assembly clearance between front windshield and roof cover.



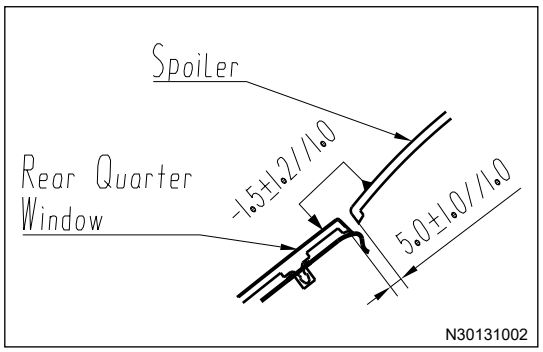
(68) Assembly clearance between front windshield and top trim.



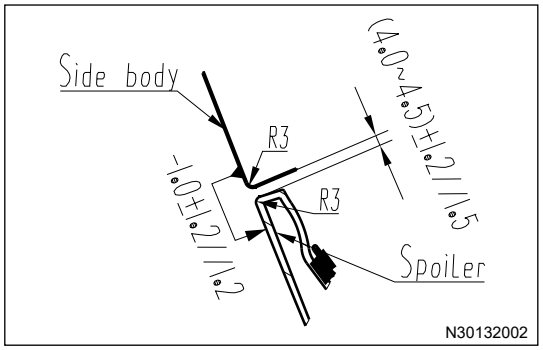
2.4 Body Surface Gap/Flush View 3



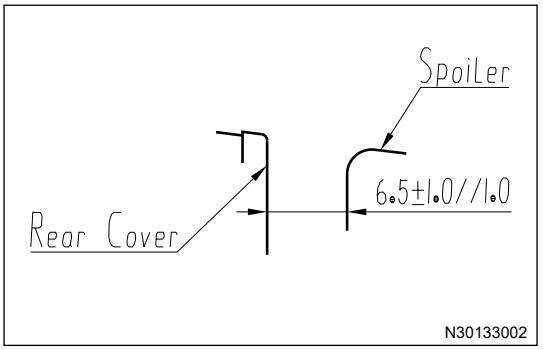
(69) Assembly clearance between spoiler and rear triangular window.



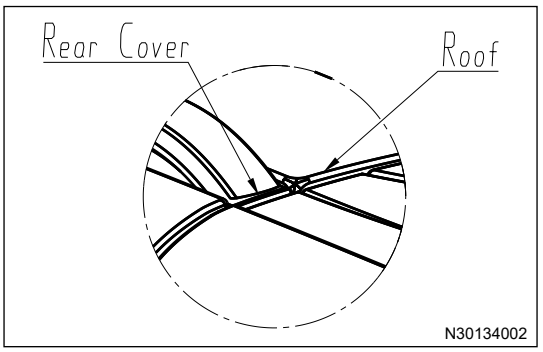
(70) Assembly clearance between quarter outer panel and spoiler.



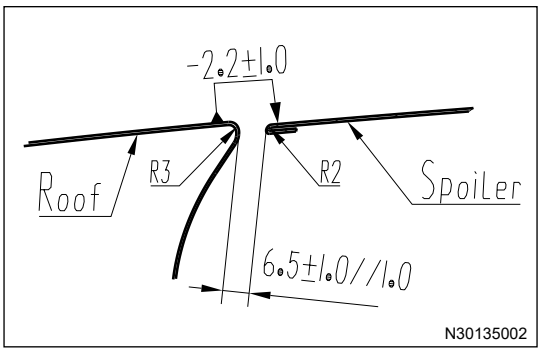
(71) Assembly clearance between rack rear end cover top trim and spoiler.



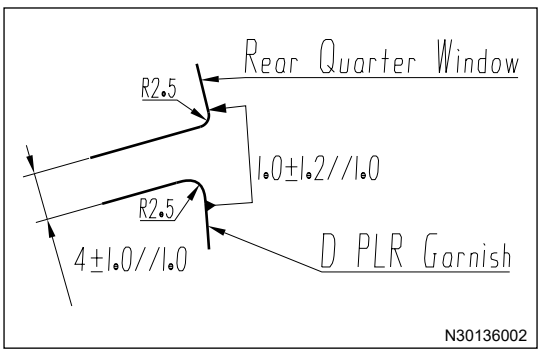
(72) Assembly clearance between rack rear end cover top trim and roof cover.



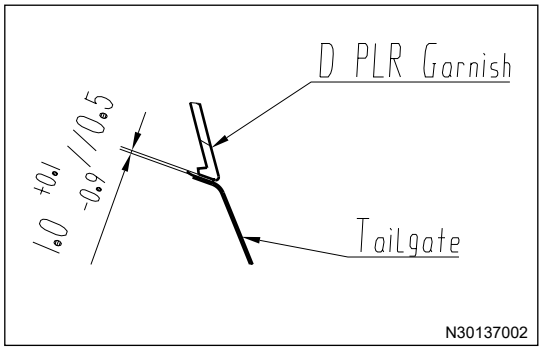
(73) Assembly clearance between roof cover and spoiler.



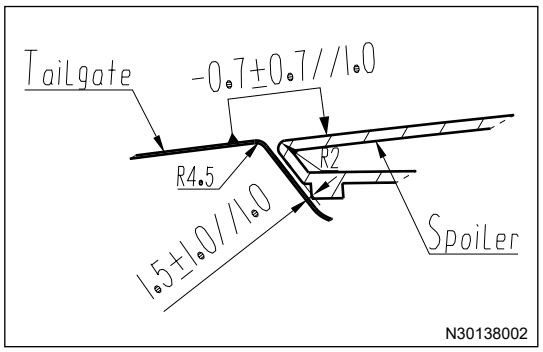
(74) Assembly clearance between rear triangular window and D-pillar trim panel.



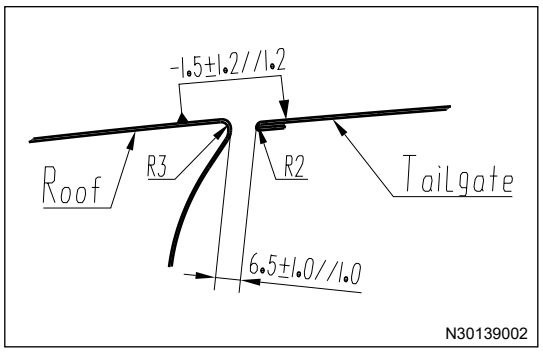
(75) Assembly clearance between D-pillar trim panel and back door outer panel.



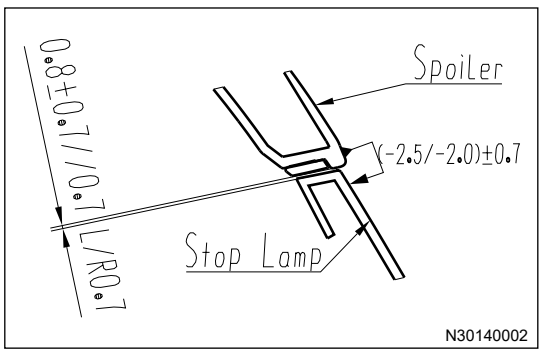
(76) Assembly clearance between back door and spoiler.



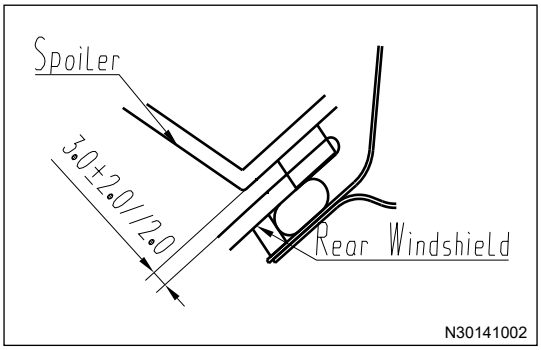
(77) Assembly clearance between roof cover and back door.



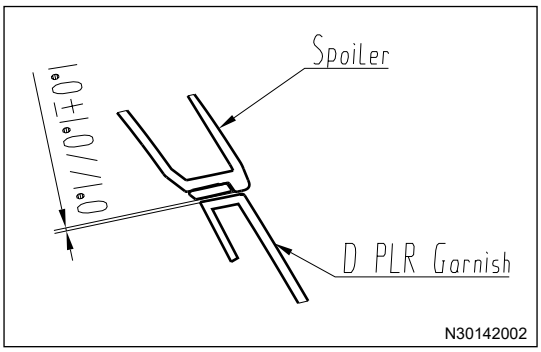
(78) Assembly clearance between spoiler and high mounted brake light.



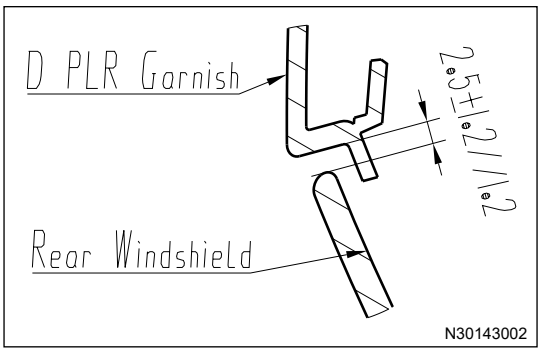
(79) Assembly clearance between spoiler and rear windshield.



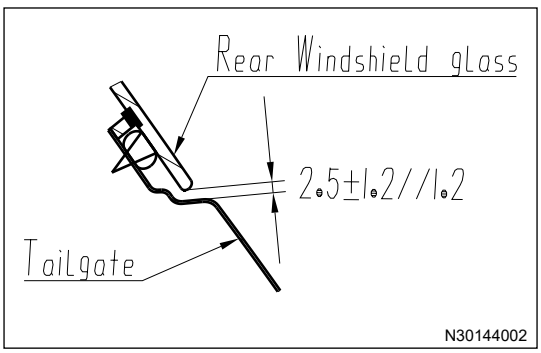
(80) Assembly clearance between spoiler and D-pillar trim panel.



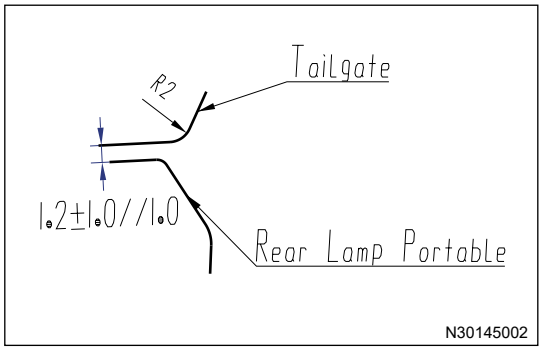
(81) Assembly clearance between D-pillar trim panel and rear windshield.



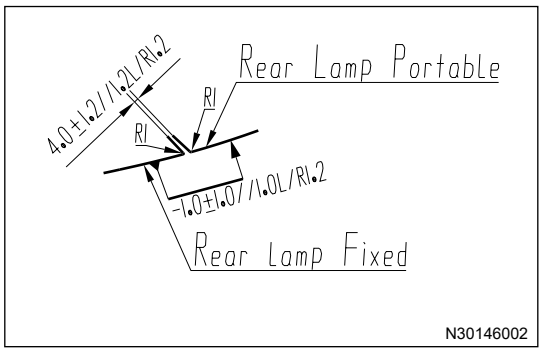
(82) Assembly clearance between rear windshield and back door outer panel.



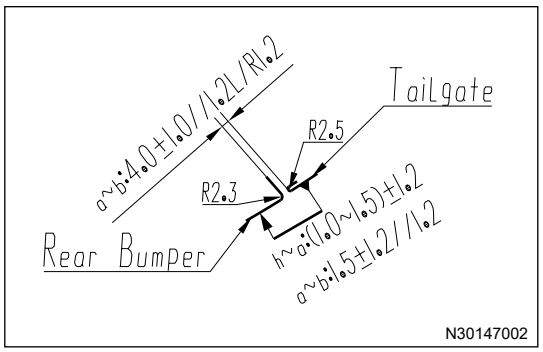
(83) Assembly clearance between back door and combination light (movable).



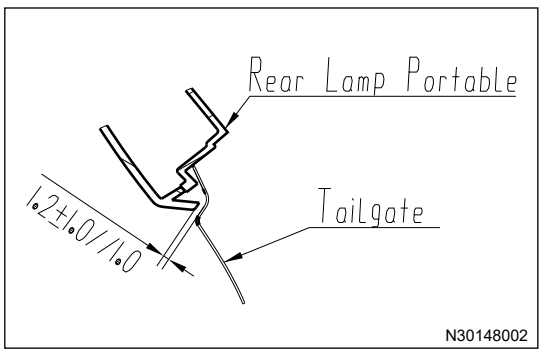
(84) Assembly clearance between combination light (-movable) and combination light (fixed).



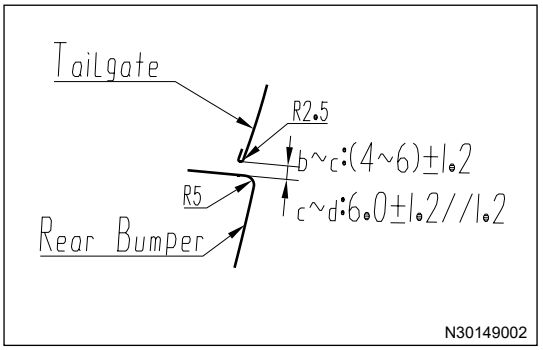
(85) Assembly clearance between rear bumper and back door.



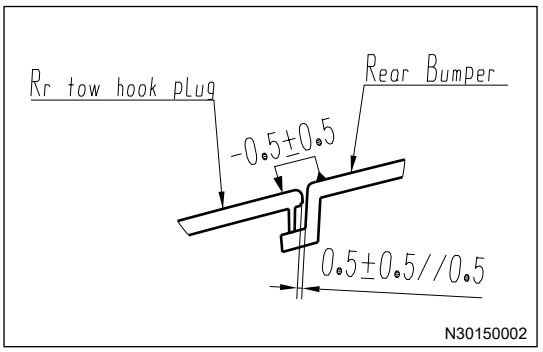
(86) Assembly clearance between combination light (-movable) and back door.



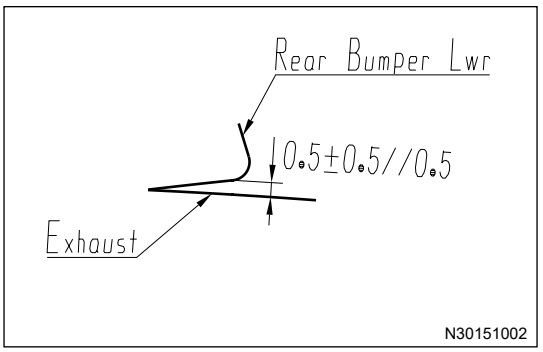
(87) Assembly clearance between back door outer panel and rear bumper body.



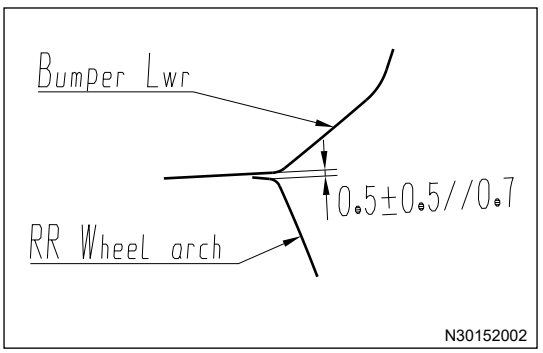
(88) Assembly clearance between rear towing hook cover and rear bumper.



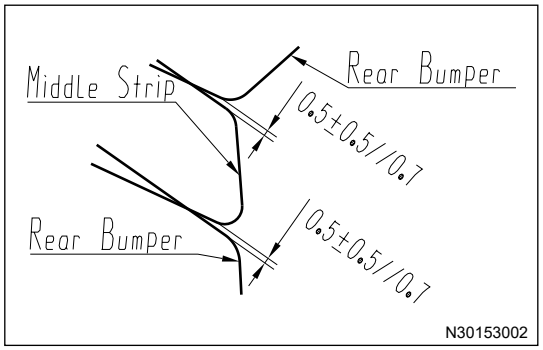
(89) Assembly clearance between rear bumper lower trim panel and exhaust tailpipe.



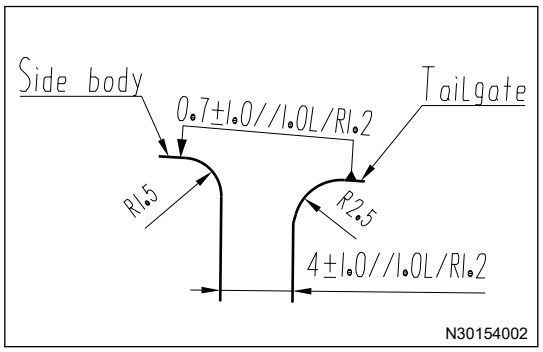
(90) Assembly clearance between rear bumper lower body and rear wheel arch.



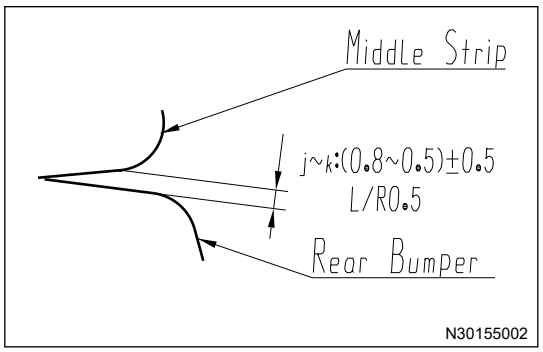
(91) Assembly clearance between middle trim strip and rear bumper.



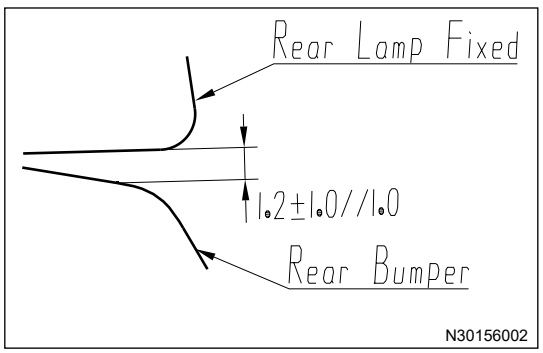
(92) Assembly clearance between quarter outer panel and back door.



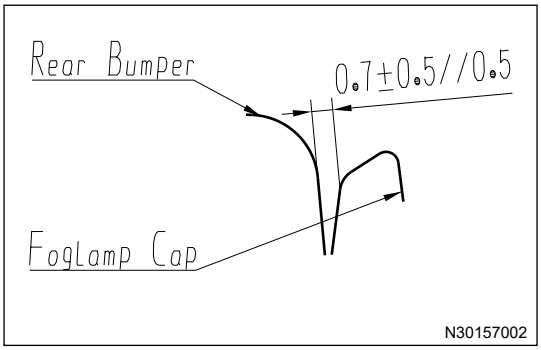
(93) Assembly clearance between middle trim strip and rear bumper lower body.



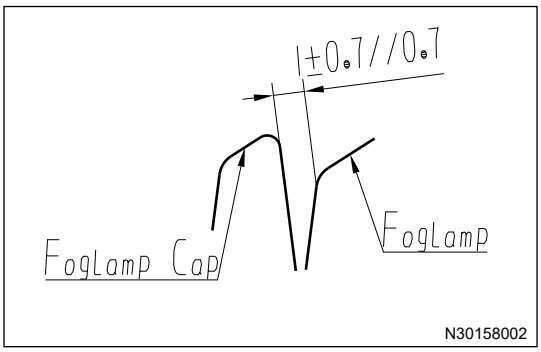
(94) Assembly clearance between combination light (fixed) and rear bumper.



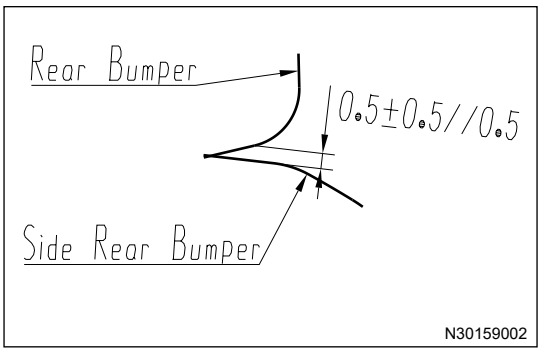
(95) Assembly clearance between rear bumper and fog light cover.



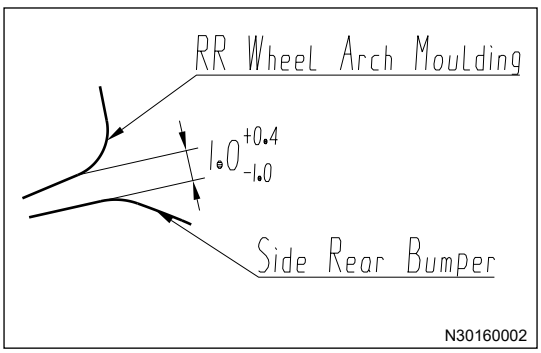
(96) Assembly clearance between fog light cover and fog light.



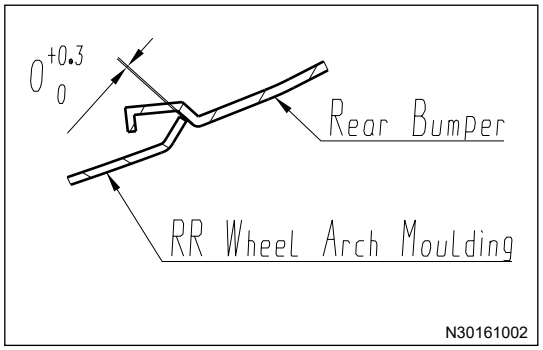
(97) Assembly clearance between rear bumper body and rear bumper left body.



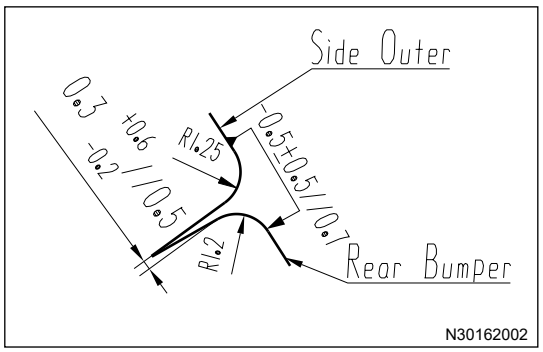
(98) Assembly clearance between rear wheel arch trim panel and rear bumper left body.



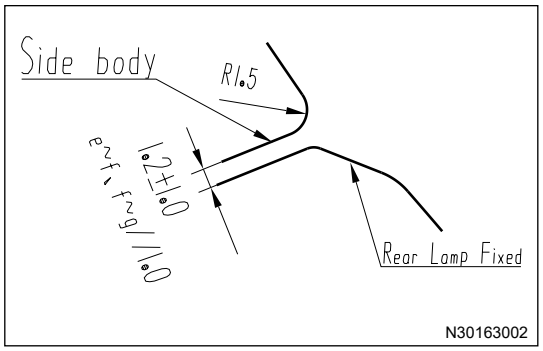
(99) Assembly clearance between rear bumper and rear wheel arch trim panel.



(100)Assembly clearance between quarter outer panel and rear bumper.



(101)Assembly clearance between quarter outer panel and fixed combination light.



3 Description & Operation for Sheet Metal Operation

3.1 Safety Precautions

- It’s necessary to wear protective clothing, goggles, gloves and working shoes when performing body metal plate welding, cutting and polishing.
- Ensure the ventilation is well in welding area.
- Disconnect battery and cover the post before welding.
- If spark may be generated when working near the battery, it’s necessary to remove the battery.
- Before removing the vehicle parts, the vehicle should be fixed on the lifting frame to avoid the change of the vehicle gravity, which may affect the operation safety.
- Connect the ground wire of the welding device directly to the parts that need to be welded, and ensure that there is no conductive part between the ground point and the welding point when operating.
- Ground wire or welding electrode is forbidden to contact with electronic control unit and cable.
- Never park an unprotected vehicle in the body service area, because splashing sparks may cause fire, damage paint surface and glass.
- Special care should be taken when polishing and welding near fuel tank or other components that contain fuel, and all suspected components that may affect safety should be removed.

- Special care should be taken when polishing and welding near fuel tank or other components that contain fuel, and all suspected components that may affect safety should be removed.
- It’s necessary to disconnect the battery ground wire when operating the airbag system or carrying out body calibration; the temperature around airbag components should not exceed 100 ℃.

3.2 State of Components

Before the repaired car or parts are sent to the paint shop for painting, its surface must be flat, filled and polished with abrasive paper. The preparation process is completed by metal plate worker. The body and floor components are mainly formed by cold stamping with steel plates. Therefore, the same method should be used to restore the shape of the damaged area caused by an accident. If the damaged area cannot be restored to the original appearance, the adjacent area should be calibrated, the damaged area should be removed and replaced according to the integrity of the parts. Do not cut the parts separately. The rigidity, driving safety and service convenience of the vehicle will be affected after cutting and welding.

3.3 Description of Welding Types

Common welding types include spot welding, gas shielded welding and soldering. Never reduce the number of welding spots when performing spot welding. Generally speaking, when the spot welding device can not be carried out, plug welding can be carried out by means of gas shielded welding after drilling it. When spot welding is used for connection between three layers of plates, replace the outer plate only and the welding points must be placed on the original welding points. When spot welding is used, single weld, double weld and double offset weld can be generated. When gas shielded welding is used, lap weld, continuous weld and continuous weld (intermittent) can be generated. Soldering is often used to weld and repair areas with low tensile strength and relatively thinner component thickness.

3.4 Anti-corrosion Treatment

(1) It’s necessary to use approved materials to restore standard anti-corrosion layer after service.

(2) It’s necessary to apply primer to inside and outside of all welds before sealing.

(3) It’s necessary to apply sealant to metal plates with primer coating.

(4) It’s necessary to seal lap metal plates, metal edges, butt welds and welds with sealant.

(5) Apply long-term deck protection agent to the vehicle deck.

(6) It’s necessary to deal with the cavity in the service area with the protection material in the cavity after spraying the finish paint.

(7) Clean drain after the protection material in the cavity is dry.

3.5 Environment Protection Treatment Method of Car Disposal Parts

(1) It’s necessary to collect disposal materials according to the types after car maintenance or service.

(2) Classify disposal materials and check if they can be used repeatedly.

4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

Hint:
In the procedure of repairing body, professional technicians need to use beam calibrator, electronic measurement system, body metal plate repair machine, welding machine and various polishing and cutting tools to ensure that the vehicle can restore to the original level in terms of geometric dimensions and usage performance. However, sometimes faulty points are missed, such as driving system failure and mounting failure that may cause serious results when repairing the accident vehicle. Therefore, in addition to checking the necessary body geometric dimensions, special attention must be paid to the following components:

- Check to make sure that the steering mechanism and steering link can operate correctly within the number of rotations of steering wheel, and visually check for bent or cracked parts.
- Check all components of the driving system (such as fork pipe/rail arm, suspension sliding arm, steering knuckle, lateral stabilizer bar, frame, and mounting) for bending, twist and crack.
- Check wheel and tire for damage, concentric rotation and unbalance. Check the tire pattern and tire wall for cuts, and check the tire pressure.
- Check engine/transmission/exhaust system mounting for damage.
- Perform a road test to ensure vehicle driving ability, finally deliver the vehilcle to users.

5 Removal and Installation

5.1 Removal and Installation

■ Removal

⚠ Caution

- **Before replacing the critical parts of the body, it’s necessary to use the universal body calibration frame to calibrate the body, and then determine the damaged parts to be replaced. Before welding, it is necessary to perform accurate positioning of components, and then carry out measurement to ensure that the components meet the requirements of body dimensions before welding. In the process of welding, measure frequently to ensure the correct assembly.**
- **It’s necessary to understand the welding and assembly relationship among body metal plates before removal. Please refer to Body Metal Plate Components View. Cutting the parts separately is not suggested. The rigidity, driving safety and service convenience of the vehicle will be affected after cutting and welding.**

(1) Remove all plates and components related to the components to be replaced.
(2) Remove sealant and anti-corrosion materials if necessary.
(3) Locate, mark and drill all factory welding points that connect components to be replaced.
(4) Remove the damaged component to be replaced.
(5) Remove the residue material.

■ Installation

⚠ Caution

- **After installation, check whether the fastening is firm and there can be no looseness.**

(1) Treat the mating surface beforehand if necessary.
(2) Select the correct welding method according to original vehicle welding type. Use shielded welding where it’s inconvenient for resistance welding. If plug welding is selected, drill holes for plug welding on new parts, and determine the diameters and spaces of plug welding holes according to the original welding points.
(3) Place new parts on the vehicle temporally.
(4) Assemble and secure the new components with the calibration support (locate service plate correctly).
(5) Measure positions of new parts to ensure their correct assembly dimensions.
(6) Perform the corresponding welding.
(7) Clear all welding surfaces.
(8) Spray the primer.
(9) Spray the sealant and anti-corrosion materials if necessary.
(10) Install all related plates and components.

1.10 Information and Repair of Plastic Panel

1 Warnings and Precautions

1.1 Warnings

In order to avoid possible property loss, personal injury or death, always follow the instructions below before repair.

(1) Use service materials in a well ventilated environment because the soot particles produced by the service materials are toxic.

(2) Apply protective cream to exposed skin to prevent skin irritation.

1.2 Precautions

In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

(1) Wear rubber gloves.

(2) Wear protective glasses when using compressed air and sanding.

(3) Immediately clear any mixture that contacts your skin because mixture solidifies quickly.

(4) Wear dust boot and protective glasses when grinding or sanding.

(5) Clean your skin with cold water to reduce the slight irritation of resin dust on your skin.

(6) Avoid service materials sticking to your clothes.

(7) After using, close all service material containers. Dust or moisture will pollute service materials and reduce service effect.

2 System Overview

2.1 System Description

- The materials of interior and exterior surface covering parts are modified PP, ABS, PC + ABS and PVC (-artificial leather materials), which are all thermoplastic plastics and its modified materials. The materials of interior and exterior non-surface covering parts also uses POM, PA and HDPE materials etc. Thermosetting plastic is mainly used as construction part in electronic appliance and safety component. Repairing thermoplastic part uses hot soldering iron plastic materials to fill the welding machine, but the common service uses replacement method. Thermosetting plastic can use epoxy resin or other harder two-component service materials. In this chapter, its service method is simply introduced while the service is not suggested.
- Thermosetting plastic refers to the plastic that can solidify or has insoluble (melting) characteristics under heating or other conditions, such as phenolic plastic, epoxy plastic, etc. Thermoplastic refers to the plastic that can be repeatedly heated, softened, cooled and hardened within a specific temperature range, such as polyethylene, polytetrafluoroethylene, etc. Thermoplastic and thermosetting plastics can be either hard plastic or soft plastic.

3 Inspection and Adjustment

3.1 Repair of Thermosetting Plastic Dent

■ Repair

⚠ Warning
• **Wear rubber gloves.**

(1) Clean and dry the components to be repaired.

(2) Heat the dent position with a hot air blower until the dent can be flattened with an appropriate tool.

(3) Polish the dent area with abrasive paper/emery paper.

(4) Then clean service area with cleaner and dry it out for 5 minutes.

(5) Apply a thin layer of adhesive on it and dry it out for 10 minutes.

(6) Fill the uneven surface with adhesive and smooth it with trowel.
(7) Accelerate solidifying process with infrared lamp, adjust the temperature to 60 - 70 ˚C and heat it for 15 minutes.
(8) Polish the dent area with abrasive paper.
(9) Remove dust and debris.
(10) Apply a thin layer of adhesive on it and dry it out for 10 minutes.
(11) Restore paint surface according to the repairing procedure on paint surface of plastic parts.

3.2 Repair of Thermosetting Plastic Scratch

■ **Repair**

⚠ **Warning**
• **Wear rubber gloves.**

(1) Clean and dry the components to be repaired.
(2) Remove protruding materials with abrasive paper.
(3) Then clean service area with cleaner and dry it out for 5 minutes.
(4) Apply a layer of adhesive on it and dry it out for 10 minutes.
(5) Fill the uneven surface with adhesive and smooth it with trowel.
(6) Accelerate solidifying process with infrared lamp, adjust the temperature to 60 - 70 ˚C and heat it for 15 minutes.
(7) Polish the dent area with abrasive paper.
(8) Remove dust and debris.
(9) Apply a thin layer of adhesive on it and dry it out for 10 minutes.
(10) Restore paint surface according to the repairing procedure on paint surface of plastic parts.

3.3 Repair of Thermosetting Plastic Crack (The Length is Less Than 100 mm)

■ **Repair**

⚠ **Warning**
• **Wear rubber gloves.**

(1) Clean and dry the components to be repaired.
(2) Chisel crack end for 5 mm and polish crack to V-shape to eliminate internal stress and protruding area.
(3) Then clean service area with cleaner and dry it out for 5 minutes.
(4) Apply a layer of adhesive on it and dry it out for 10 minutes.
(5) Stick reinforcing tape to the back of service part with adhesive and overlap the damaged part for at least 20 mm.
(6) Accelerate solidifying process with infrared lamp, adjust the temperature to 60 - 70 ˚C and heat it for 15 minutes.
(7) Fill the front part of crack with adhesive and smooth it with trowel.
(8) Accelerate solidifying process of the front part of crack with infrared lamp.
(9) Polish the dent area with abrasive paper.
(10) Apply a thin layer of adhesive on it and dry it out for 10 minutes.
(11) Remove dust and debris.
(12) Apply a layer of adhesive on it and dry it out for 10 minutes.
(13) Restore paint surface according to the repairing procedure on paint surface of plastic parts.

1.11 PAINT COATING

1 Warnings and Precautions

1.1 Warnings

Be sure to observe the following instructions before mixing paint and painting, to prevent property damage, personal injury or even death.

(1) In the process of mixing and spraying paint, diffuse solvents can cause serious respiratory disease. It's necessary to operate by strictly following the manufacturers' instruction manual of paint, device and safety device. When performing the operation of this procedure, wear special labor protection appliances such as gas mask, anti-static clothing, protective glasses and gloves etc. to prevent injury.

1.2 Precautions

Never mix paint systems of different manufacturers or substitute products before mixing paint and painting. When incompatible products are mixed, the following phenomena will occur:

(1) Primer peels off.

(2) Adhesion between coatings is poor.

(3) Curing is not completely.

(4) Gloss is reduced.

(5) Color accuracy is poor.

(6) Coating is damaged (dent, bubble, wrinkle without gloss).

1.3 Precautions during Finish Varnish Maintenance and Repair

(1) Avoid washing vehicle in direct sunlight.

(2) Avoid using strong soap and chemical detergent.

(3) Use the brushless automatic car-cleaning equipment.

(4) Avoid using products containing acid and alkali.

(5) Do not use a brush or broom to remove snow or ice.

(6) After cleaning it completely, wipe the remaining rinse water immediately and forbid to make it dry on the surface. It is recommended to dry it with soft chamois leather.

(7) When the defect on the surface can be eliminated by polishing, the vehicle can be polished.

(8) If the surface defect is not serious, try to eliminate the repairing area.

(9) Avoid removing too much celluloid paint, otherwise it will cause the paint damage prematurely.

(10) Use electric polishing device in strict accordance with the requirements recommended by the polishing manufacturer. Do not use wax or silicone products to cover the vortex imprinting (the imprinting will reappear soon and make the user unsatisfied).

1.4 Precautions of Anti-corrosion Treatment

(1) When spraying sound insulation or anti-corrosive materials, preventive measures must be taken to avoid spraying into component openings (such as door locks, window regulator slots, window regulators and seat belt retractors) and any moving and rotating components. After spraying the materials, make sure that all drain holes on the body are open.

(2) When using open flame to repair the body, it's necessary to remove the foamed sound insulation materials at the repair areas. When reinstalling the sound insulation materials, avoid inhaling dust that is harmful to the human body.

(3) When performing the operation of this procedure, wear special protective glasses and gloves to prevent injury.

(4) When vehicle leaves the factory, it's necessary to deal with the body metal plates by means of spraying electrophoretic primer. After repairing and / or replacing parts, it's necessary to deal with all exposed metal surfaces with anti-rust primer.

(5) If the original coating or anti-corrosive material is burnt during welding or heating operation, remove it and carry out anti-corrosion treatment again.

(6) When carrying out collision service, the metal will be exposed, and it’ s necessary to spray these surfaces with special anti-corrosion materials.

(7) Sealant can prevent water and dust from entering the vehicle and it has anti-corrosion function. The original sealed joint is obvious, if these seals are damaged, reseal to calibrate them. Reseal the connection of the newly replaced plate. The sealant used should be flexible after curing and painting. Fill the opening seams sealed with sealant with high consistency filler. Perform operation according to the instructions for the selected material.

(8) The sound insulation material can control the general noise level in the vehicle. When the sound insulation layer is damaged due to service operation or replacing new panels, it’ s necessary to replace it with the same material.

2 System Overview

2.1 Description & Operation

■ Paint Coating Description

Paint is a kind of mixed liquid, which can be applied on a variety of base material. After the paint is dry, it forms a solid paint film to protect the base material and beautify the appearance. When the vehicle is delivered out of the factory, the following four layers of paint have been applied to make it have good anti-corrosion and gloss. It mainly consists of the following types:

- Electrophoretic primer
- Intermediate paint
- Pigmented paint
- Celluloid paint (transparent external coating)

■ Main functions of electrophoretic primer:

- Anti-rust
- Improve the adhesion during working
- Provide limited filling capability

■ Functions of intermediate paint:

- Filling capability
- Isolation/sealing
- Serve as the pigmented paint

■ Main functions of pigmented paint:

- Enrich the color
- Improve the gloss

■ Functions of celluloid paint:

- It contains ultraviolet-proof materials, which can resist the ultraviolet rays in the sun.
- Resist the corrosion of environmental dust (acid rain) on the paint surface.
- Make the paint surface friction resistant.
- Make paint surface have better gloss.

■ Requirements of spraying paint

- Restore the repaired part to its original appearance; During repair, it is necessary to observe the spraying paint process specified by the manufacturer, refer to Tips on Spraying Process of Paint with Rigid Surface.

2.2 Daily Maintenance of Vehicle Paint Surface

The maintenance of body aims mainly to prevent the early aging and damage of the coating to keep the body clean and beautiful. In addition, keeping the body clean helps to find the damage of the body coating at any time to repair it in time.

■ Washing Body

- It’ s necessary to wash the body frequently to keep good paint surface and beauty of the body. However, it should not be performed in strong sunlight or in low temperature condition. In any case, do not wash it until body surface cools. Wash the dirt on the body surface with pressure water flow when using spraying-water washing, and then scrub the body surface with soft and clean sponge or towel from top to bottom. If car detergent is used, wash it with large amount of water. When using the high-pressure washing machine, do not turn the nozzle directly to transmission, steering gear, radiator, engine cover, rubber

protective parts of various components and external ornaments. After washing the car, use high-quality white gauze to dry the body surface. Never use gasoline, kerosene, trichloroethylene, strong alkaline water and alcohol to scrub the body surface and organic glass surface.

■ Cleaning Body

- Before using the wax on the car body coating, remove the oxide, road dirt, oil stain and the dirt that cannot be cleaned firstly. Do not scrape off the asphalt or gasoline stains on the body and bumper, and do not use gasoline or fabric decontamination agent, but use special decontamination products to remove them in time.
- For cleaning of body exterior ornaments and light alloy, firstly use soapy water or water that adds a small amount of decontamination agent or detergent, and then wash with a large amount of water. For scrubbing of windshield and door glass, it is better to use the washer fluid supplied by EXEED service station so as to obtain high-quality scrubbing effect, instead of using silicone based products.

■ Waxing and Polishing Body

- Waxing the body surface is an effective method to protect the gloss of paint coating surface. Wax can protect the paint coating surface well because after waxing, enough grease is kept on the paint surface, which cuts off the contact between water, air and the paint coating, and the coating is free from oxidization, which can effectively prevent the body surface from being eroded. Before waxing, make sure that the body surface is clean and dry; if the paint surface is discolored or oxidized, it’s necessary to paint it before waxing.
- It’s better to use the waxing tool for polishing wax. If not, wax it with a soft napkin or a soft and lint-free cotton or flannel. Because waxing will change in the sunlight in most cases, sometimes there will be spots on the body surface when waxing in the sunlight, do not wax it in the direct sunlight.
- Water droplet test can be used to check if body is waxed well. If the water forms a water ball on the body surface, it proves there is the wax layer, otherwise, it needs to be cleaned and waxed.
- Do not wipe off the wax on the body too early and polish it after drying. Polishing the body paint should be carried out when the surface is clean and dry with a polisher (or by hand). Polishing any plastic parts is forbidden.

■ Restoring Scratch on Body Surface

- When the scratch on the body surface is not serious and does not reach the metal, the special paint repair spraying tank can be used. Spraying the paint marked the same color to the scratch surface. The repaired paint will be dry in the air.
- If the scratch on the body surface has damaged the metal with rust stain, remove the rust firstly, then scratch the putty with rubber or nylon scraper, and then perform general repair treatment for the paint and coating surface.

■ Maintenance of Bottom Protective Layer

- There is a protective layer on the bottom of the car, which has a permanent anti-chemical corrosion and mechanical trauma. The car bottom may contact with the road during driving, causing damage to the protective layer of the car bottom. It needs regular inspection and timely service.

■ Treatment of Cavity Anti-corrosion

- If the external temperature is very high, the wax may flow out of the cavity, which can be removed with a plastic scraper. At this time, pay attention to safety and environmental protection. All cavities that may be corroded on the car have been filled with wax for anti-corrosion before leaving factory. Maintenance is free in general condition.

3 Specifications

3.1 Paint Specifications

No.	Material Name	Note
1	Khaki white pearl paint	/
2	Blood red flashing finish paint	/
3	Imperial blue metallic finish paint	/
4	Dazzling orange metallic finish paint	/

No.	Material Name	Note
5	Carbon crystal black metallic finish paint	/
6	Celadon gray metallic finish paint	/

4 Diagnostic Information and Steps

4.1 Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. The black box in the table means the treatment method of product defects.

Symptom	Cause Analysis	Treatment Method
Efflorescence	1. The paint film is strongly eroded. such as strong ultraviolet ray. 2. The paint mix ratio is not correct during application. 3. Light and weather resistance of coating is poor. 4. Do not wash the car frequently or do not wash it completely. 5. The selected car cleaner is not suitable or the polishing wax is too coarse.	1. Polishing and beatifying treatment. ☐ 2. General grinding, polishing and beatifying treatment. ☐ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair. ■
Peeled off Paint on Plastic Parts	1. The adhesion between the coating and the base material is too poor or the upper coating is harder than the lower coating. 2. The coating is too thick, and the paint film is eroded by moisture, acid and alkali in the air. 3. The recoatability of the lower coating is not good, or the treatment is not good; the upper coating have defects such as pinholes, exposed bottom, etc.	1. Polishing and beatifying treatment. ☐ 2. General grinding, polishing and beatifying treatment. ☐ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair. ■
Honeycomb Cracks	1. Do not mix primer coating completely before spraying it. 2. Finish paint coating is too thick. 3. Floating coating is too thick.	1. Polishing and beatifying treatment. ☐ 2. General grinding, polishing and beatifying treatment. ☐ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair. ■
Bird Droppings Erosion	1. Bird droppings erode.	1. Polishing and beatifying treatment (mild erosion). ■ 2. General grinding, polishing and beatifying treatment (moderate erosion). ■ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair (- severe erosion). ■
Abrasion Imprinting	1. The paint film harness is not enough. 2. Hard objects scratch.	1. Polishing and beatifying treatment (minor scratches). ■

Symptom	Cause Analysis	Treatment Method
		2. General grinding, polishing and beatifying treatment (rough scratches). ■ 3. Depth grinding, polishing and refurbishing treatment. □ 4. Local spraying paint and repair (-scratch). ■
Corrosion	1. The paint film at the edge is thinner. 2. Collision damage causes corrosion. 3. Acid and alkali erode.	1. Polishing and beatifying treatment. □ 2. General grinding, polishing and beatifying treatment. □ 3. Depth grinding, polishing and refurbishing treatment. □ 4. Local spraying paint and repair (It is necessary to repair metal plate before spraying paint and repairing if there is serious corrosion). ■

Symptom	Cause Analysis	Treatment Method
Peeled off Paint	1. The adhesion between the coating and the base material is too poor or the upper coating is harder than the lower coating. 2. The coating is too thick, and the paint film is eroded by moisture, acid and alkali in the air. 3. The recoatability of the lower coating is not good, or the treatment is not good. 4. The upper coating have defects such as pinholes, exposed bottom, etc.	1. Polishing and beatifying treatment. ☐ 2. General grinding, polishing and beatifying treatment. ☐ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair (It is necessary to repair metal plate before spraying paint and repairing if there is serious corrosion). ■
Acid Rain Erosion	1. Acid rain erodes	1. Polishing and beatifying treatment (mild erosion). ■ 2. General grinding, polishing and beatifying treatment (moderate erosion). ■ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair (-severe erosion). ■
Loss of Gloss	1. The paint film is strongly eroded by acid, alkali, electric arc, sea water and salt mist. 2. The maintenance method of the paint film is not correct in the severe condition. 3. Durability of paint itself is not enough. 4. When the paint is applied, the incorrect mix ratio causes poor durability of the paint film.	1. Polishing and beatifying treatment (mild loss of gloss). ■ 2. General grinding, polishing and beatifying treatment (moderate loss of gloss). ■ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair (-severe loss of gloss). ■
Bubble	1. When the paint film is exposed to the humid environment for a long time, the moisture penetrates into the paint film and moisture raises bubbles when the temperature rises. 2. Base materials are corroded by penetrating materials. 3. The paint film is eroded by gasoline, acid and alkali.	1. Polishing and beatifying treatment. ☐ 2. General grinding, polishing and beatifying treatment. ☐ 3. Depth grinding, polishing and refurbishing treatment. ☐ 4. Local spraying paint and repair (It is necessary to repair metal plate before spraying paint and repairing if there is serious corrosion). ■

5 Removal and Installation

5.1 Examples of Common Paint Film Defects Treatment Process

(1) Clean the surface to be polished with degreasing material before polishing.

(2) Make the sponge wet firstly and squeeze out the excessive water.

(3) Apply a small amount of polishing wax to the surface to be polished, and adjust the speed of polishing machine.

(4) After the sponge contacts the paint surface, start the machine with the speed of 2500 - 3000 r/min. Then press it for 3 - 5 seconds gently before polishing.

⚠ Caution

- **During operation, keep the machine moving smoothly and gently, and never allow it to operate for a long time to avoid overheating and burning the paint surface.**

(5) Wipe off excessive polishing wax with waxing cloth.

5.2 Example of General Grinding, Polishing and Beatifying Treatment Process

(1) Clean the surface to be polished with degreasing material before polishing.

(2) Apply a appropriate amount of polishing paste to the surface to be polished, adjust the speed of polishing machine.

(3) After the polishing wool pad contacts the paint surface, start the machine with the speed of 2500 - 3000 r/min.

⚠ Caution

- **Keep the machine moving smoothly and gently and avoid grinding too much. Make sure that the grinding time is as short as possible and the grinding area is as small as possible.**

(4) Make the sponge wet firstly and squeeze out the excessive water; Apply a small amount of polishing wax to the surface to be polished, and start the machine with the speed of 2500 - 3000 r/min after the sponge contacts the paint surface. Then press it for 3 - 5 seconds gently before polishing.

⚠ Caution

- **During operation, keep the machine moving smoothly and gently, and never allow it to operate for a long time to avoid overheating and burning the paint surface.**

5.3 Example of Depth Grinding and Polishing Treatment Process

(1) Grind the damaged paint surface with # 2000 waterproof abrasive paper, make it parallel and contact with the paint surface to be ground, and carry out circular grinding.

(2) Clean grinding dust on the surface.

(3) Apply a appropriate amount of polishing paste to the surface to be polished, adjust the speed of polishing machine.

(4) After the polishing wool pad contacts the paint surface, start the machine with the speed of 2500 - 3000 r/min.

⚠ Caution

- **Keep the machine moving smoothly and gently and avoid grinding too much. Make sure that the grinding time is as short as possible (3- 5 seconds) and the grinding area is as small as possible.**

(5) Make the sponge wet firstly and squeeze out the excessive water; Apply a small amount of polishing wax to the surface to be polished, and start the machine with the speed of 2500 - 3000 r/min after the sponge contacts the paint surface. Then press it for 3 - 5 seconds gently before polishing.

⚠ Caution

- **During operation, keep the machine moving smoothly and gently, and never allow it to operate for a long time to avoid overheating and burning the paint surface.**

5.4 Tips on Spraying Process of Paint with Rigid Surface

Hint:
Take the wing as an example to illustrate the local spraying (paint repair) process.

⚠ Caution

- **All repairs of paint with rigid surface must comply with GEELY standards. Confirm the repair area and select the repair scope, such as partial repair, whole pair repair, and whole vehicle repair; If it is collision damage, perform the corresponding repair after repairing metal plate or spray paint after replacing parts according to the damage condition.**

(1) If the scratch on the wing is severe, use local spraying (paint repair) process.
(2) Grind (circularly grind) the damaged paint surface with # P500 wet (waterproof) abrasive paper.
(3) Degrease and clean it with degreasant after grinding.
(4) When spraying he primer, try to control the scope of the primer and make sure the coating at the edge should be gradual instead of stair-step shape.
(5) Flash off for 4 - 5 minutes, and dry it and bake it for 20 - 30 minutes. The temperature of baking finish house is 70 - 80 ˚C.
(6) After baking, carry out the wet polishing with # P800 - 1000 abrasive paper.
(7) Grind it with # 2000 fine waterproof abrasive paper and expand grinding range.
(8) After polishing is completed, use sticky gauze to remove dust before spraying the paint.
(9) Spray the base coat.
- Air pressure: 150 - 200 kPa
- Spraying distance: 20 - 30 cm

⚠ Caution

- **The spraying range is slightly wider in one layer than in one layer for transition.**

(10) Flash off for 2 - 3 minutes, and spray the second base coat until the interface position is not obvious.
- Air pressure: 150 - 200 kPa
- Spraying distance: 20 - 30 cm

(11) Flash off for 4 - 5 minutes, and dry it for 20 - 30 minutes.
- The temperature of baking finish house is 70 - 80 ˚C

(12) After drying is completed, use sticky gauze to remove dust before spraying the varnish.
(13) When spraying celluloid paint, the spraying range should cover the base coat range completely.
- Air pressure: 150 - 200 kPa
- Spraying distance: 20 - 30 cm

(14) Flash off for 2 - 3 minutes, and spray the second celluloid paint, the spraying range should cover the first varnish range completely.
- Air pressure: 150 - 200 kPa
- Spraying distance: 20 - 30 cm

(15) After spraying celluloid paint is completed, immediately replace it with barge saliva or add interface additive or thiner into the original celluloid paint.
(16) Spray barge saliva or diluted celluloid paint for 2 - -3 times at interface position.
(17) Bake it for 20 - 30 minutes in the baking finish house.
- The temperature of baking finish house is 70 - 80 ˚C

5.5 Repairing Procedure of Paint Surface on Plastic Part Surface

Three basic requirements for the paint surface repairing on plastic part surface:

- The paint and plastic have certain adhesion without damaging mechanical properties.
- The paint film shall be flexible enough to deform with the plastic without cracks.
- The original particles and coarse texture on some plastic part surfaces.

Repairing procedure of paint surface on plastic part surface:

- Repairing of paint surface on plastic primer refers to the above local spraying process, and pay attention to low-temperature baking.

- Baking condition is 70 - 80 ˚C for 20 - 30 minutes.

Abbreviation

2.1 Abbreviation

1 Abbreviation

Abbreviation	English
A/B	Airbag
ABA	Adaptive Brake Assist
ABM	Air Bag Module
ABP	Automatic Brake Pre-fill
ABS	Anti-lock Break System
ACC	Adaptive Cruise Control
ACM	Airbag Control Module
ACP	Audio Control Panel
ACU	Airbag Control Unit.
AEB	Automatic Emergency Braking
AFS	Adaptive Front-lighting System
AIPM	Integrated Panel Module
APA	Auto Parking Assist
AR	Augmented Reality
ASIC	Application Specific Integrated Circuit
ASLF	Adjustable Speed Limitation Function
AVM	Around View Module
AWB	Automatic Warning Brake
AWD	All Wheel Drive
BCM	Body Control Module
BDM	Body Domain Module
BKV	/
BMS	Battery Management System
BRS	Boost Recuperation System
BSD	Blind Spot Detection
BSDL	Blind Spot Detection Left
BSDR	Blind Spot Detection Right
BSM	Brake System Module
BTM	/
CAN	Controller Area Network
CDD	Controlled Deceleration for DAS

Abbreviation	English
CGW	Central Gateway
CLM	Climate Module
CWC	Cellphone Wireless Charger
CVBOX	\
OMS	\
DMS	\
DC/DC	DC/DC
DCM	Door Control Module
DMC	Domain Controller
DTC	Diagnostic Trouble Code
DVR	Driving Video Record
EBS	Electronic Battery Sensor
EC	European Community
EEPROM	Electrical Erasable Programmable Read Only Memory
EGS	Electrical Gear Shifter
EMS	Engine Management System
EPS	Electric Power Steering
ESP	Electronic Stability Program
FCM	Front Camera Module
FIS	Front Impact Sensor
FRM	Front Radar Module
GPF	Gasoline Particle Filter
HDC	/
HMI	Human Machine Interface
IBS	/
ICM	Instrument Cluster Meter
IG	Ignition
IHU	Radio Receiver Module
IMMO	Immobilizer
IPM	Integrated Panel Module
ISO	ISO InternatonalOrganization for Standardization
KL15	Ignition
KL30	Battery
LDW	Lane Departure Warning

Abbreviation	English
LED	Light Emitting Diode
LVDS	Low Voltage Differential Signaling
MPC	Multi Purpose Camera
NAVI	Navigation
P/T	Pretensioner
PBT	Polybutene p-phthalate resin
PDC	Parking Distance Control
PEPS	Passive Entry Passive Start Unit
PLG	Power Lift Gate
PPK	Pulse Per Kilometre
PSU/HSU	/
RADAR	RADAR
RAM	Random Access Memory
RLS	/
ROM	Read Only Memory
RSU	Remote Sensor Unit
SAM	Steering Angle Module
SBR	Seat Belt Reminder
SCU	Seat Control Unit
SIS	Side Impact Sensor
SLD	Speed Limit Device
SPI	Serial Peripheral Interface
SRS	Supplemental Restraint System
SW	Switch
TBC	To Be Confirmed
TBD	To Be Defined
TCU	Transmission Control Unit
TGW	Telematics Gateway
TPM	Tyre Pressure Module
V_{adj}	Adjustable limit speed
VGW	Vehicle Gateway
VLC	/
W/D	Watchdog
WL	Warning Lamp