

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:

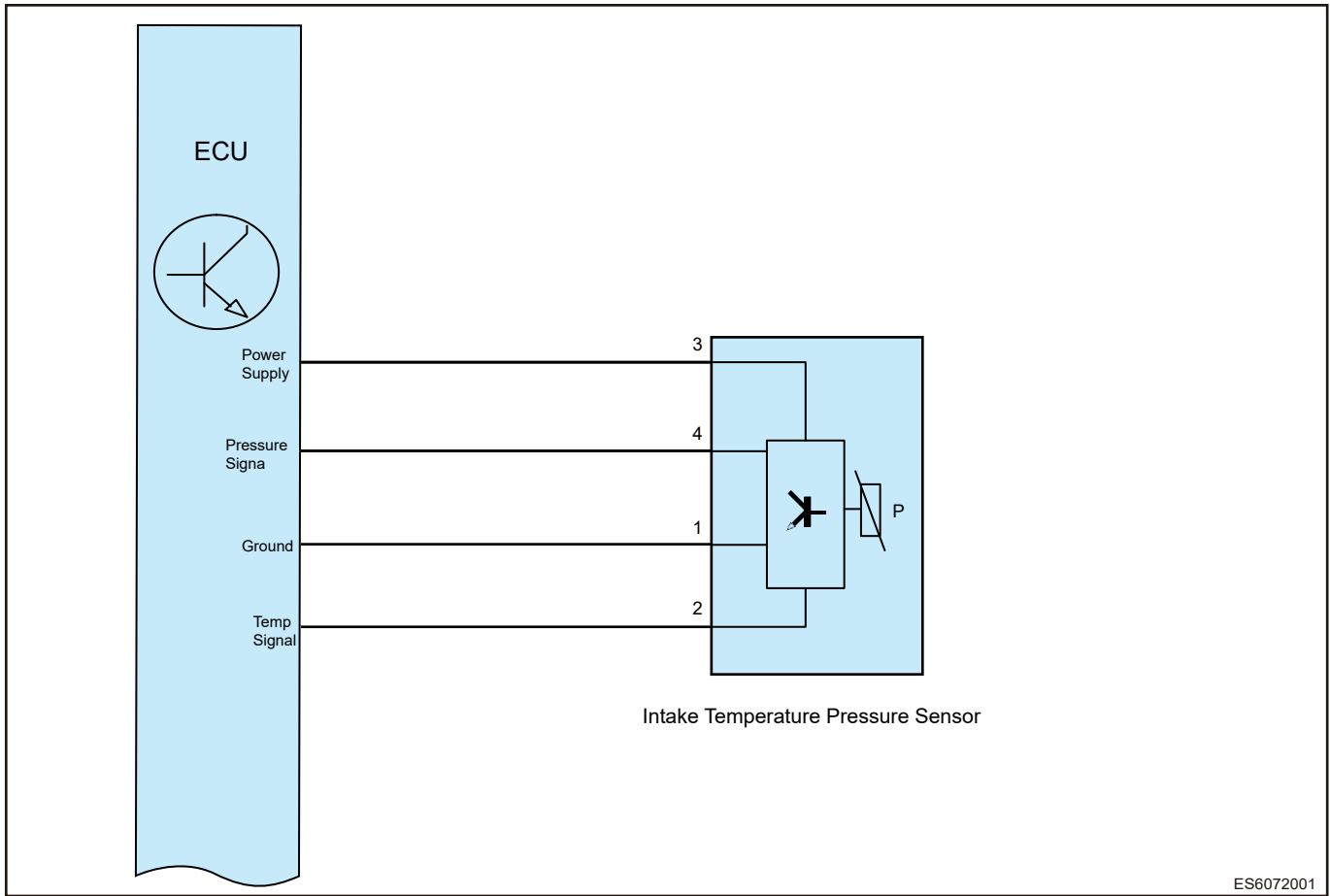
- Diagnostic Trouble Code (DTC)
DTC is an important hint when troubleshooting is difficult to simulate. The malfunction can be diagnosed quickly and accurately by performing specified DTC diagnosis and check.
- Problem symptoms table
Malfunction locations can be determined quickly by troubleshooting in accordance with symptom type.

(4) Specifications

This manual categorizes specifications as below:

- Torque specifications
- Clearance specifications
- Capacity specifications

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 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

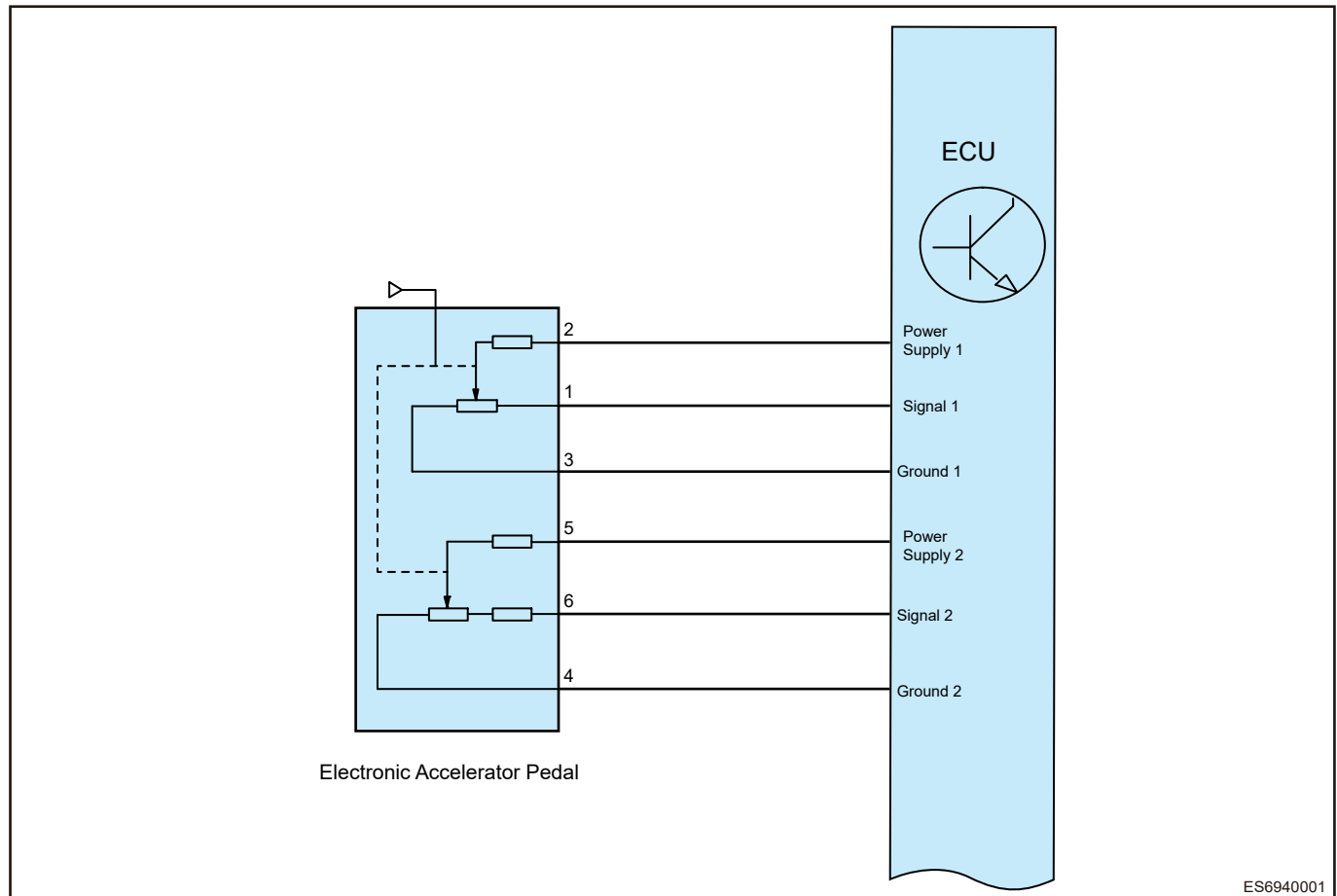
OK

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

■ 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.

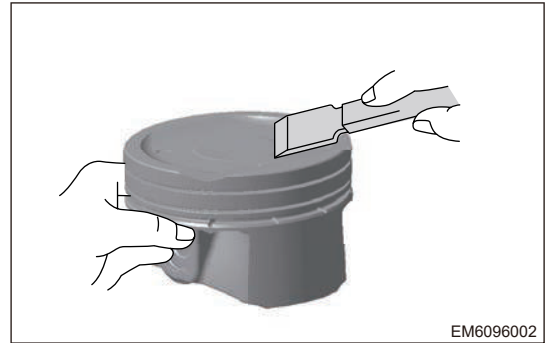
Hint:

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

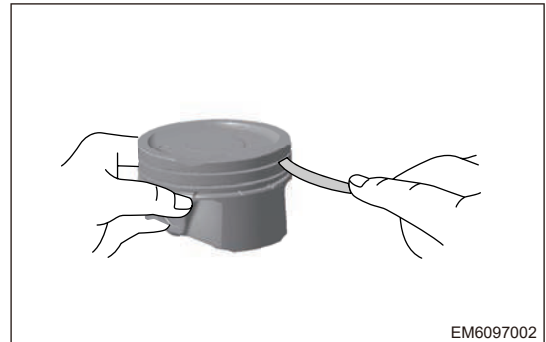
1 Check electronic accelerator pedal connector

- Disconnect the negative battery.
- Check electronic accelerator pedal connector for looseness or poor contact.

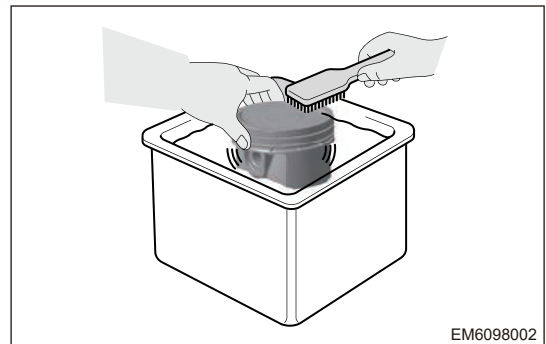
- 1) Using a scraper, remove carbon deposits on piston top.



- 2) Using a piston ring, remove carbon deposits from piston ring grooves.



- 3) Using a brush and solvent, thoroughly clean piston.



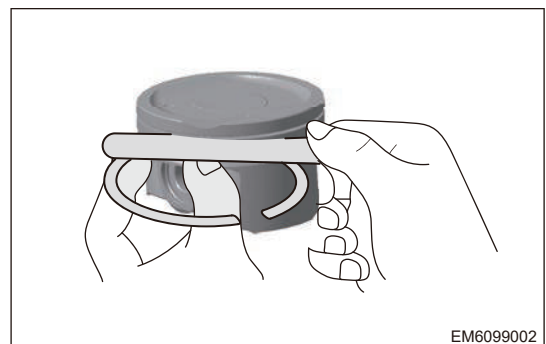
- (5) Check the piston ring.

- 1) Using a feeler gauge, measure clearance between new piston ring and ring groove side.

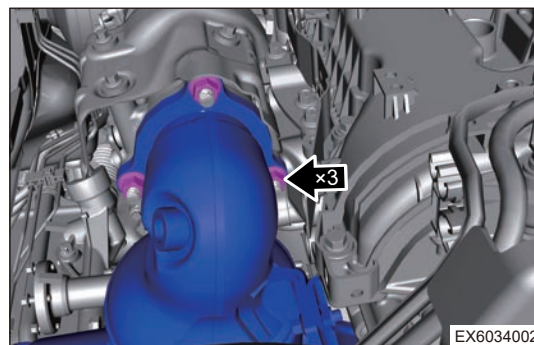
Measurement Item	Specification (mm)
First Compression Ring Groove Side Clearance	0.035 - 0.075
Second Compression Ring Groove Side Clearance	0.03 - 0.07

Hint:

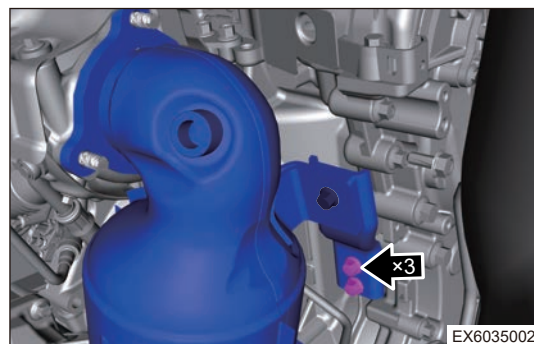
If piston ring side clearance exceeds specified range, replace piston ring and piston assembly.



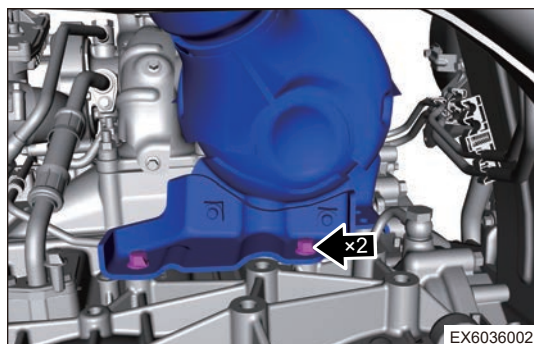
- (11) Remove 3 fixing nuts between precatalytic converter and turbocharger.



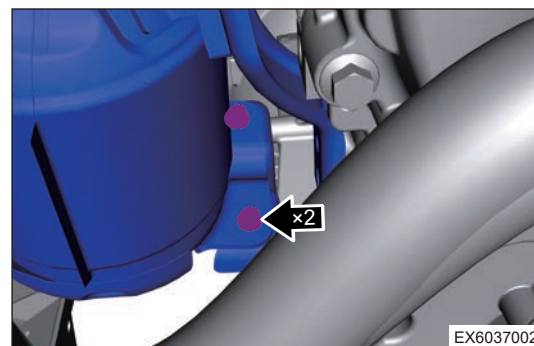
- (12) Remove 1 bolt between precatalytic converter upper bracket and precatalytic converter.
- (13) Remove 2 fixing bolts between precatalytic converter upper bracket and cylinder block, and remove precatalytic converter upper bracket.



- (14) Remove 2 coupling bolts between bracket and cylinder block.



- (15) Remove 2 coupling bolts between bracket and precatalytic converter, and remove bracket.



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.

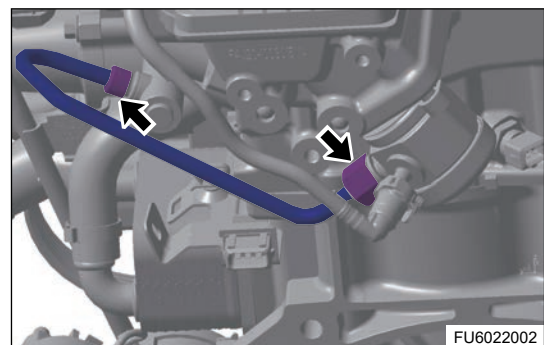
(1) Release the high pressure fuel system pressure.

(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.

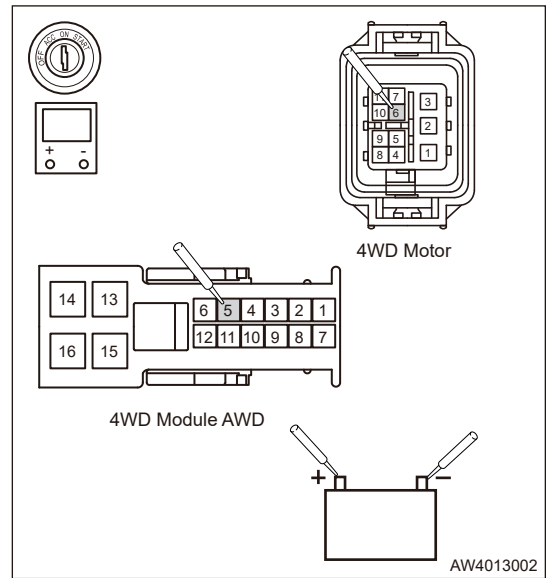
(5) After pressure of high pressure fuel system is released completely, use a wrench to remove nuts on both sides of high pressure fuel pipe completely.



(6) Remove high pressure fuel pipe.

- (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

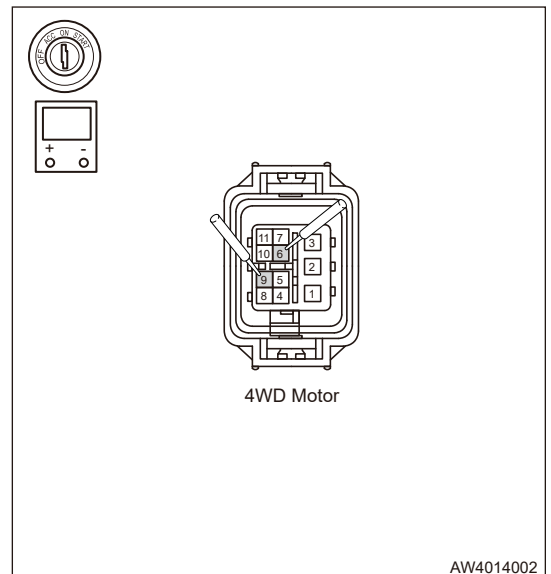
Repair or replace wire harness or connector

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 K Ω



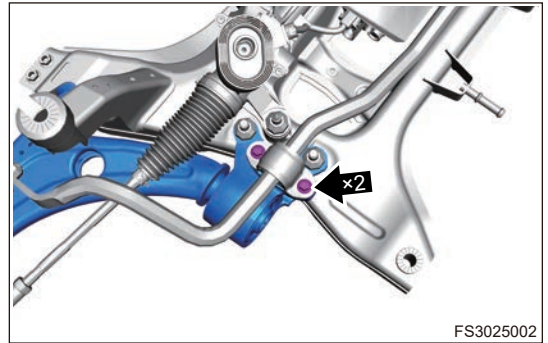
NG

Replace 4WD motor

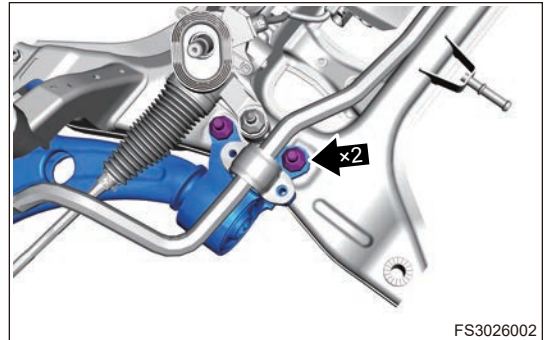
OK

3 Reconfirm DTCs

- (10) Remove 2 coupling bolts between front left stabilizer bar clamp and front left control arm rear bushing bracket.



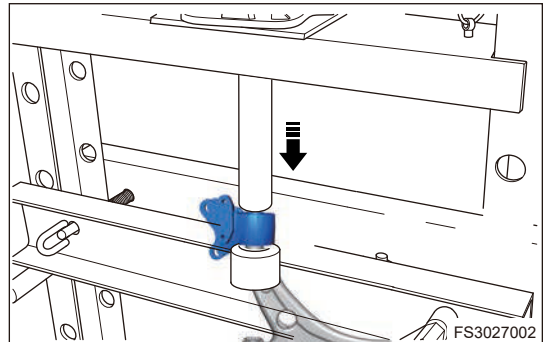
- (11) Remove 2 coupling bolts and nuts between front left control arm rear bushing bracket and front sub frame welding assembly.



- (12) Remove the front left control arm assembly.

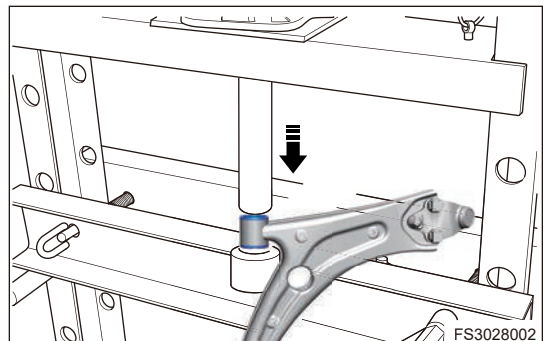
- (13) Remove the front control arm rear rubber bushing assembly.

- 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.



4.8 Diagnostic Tester Interface Information

3:53 pm

Show Menu

EXEED V11.20 > T22 > System Selection > ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPB) DLC 12.28V

Please enter keyword

Yaw Sensor Calibration(ESP Only)	Repair Bleed
Write E&F Process Control Byte	Enter PBC Maintenance Mode
Exit PBC Maintenance Mode	Assembly Test
Apply Both Park Brake	Release Both Park Brake
Apply Left Park Brake	Apply Right Park Brake
Release Left Park Brake	Release Right Park Brake
	Manual bleeding (applicable for IPB (Integrated Brake

VIN LVTDD24B3PD657891

BR1033001

4:08 pm

Show Menu

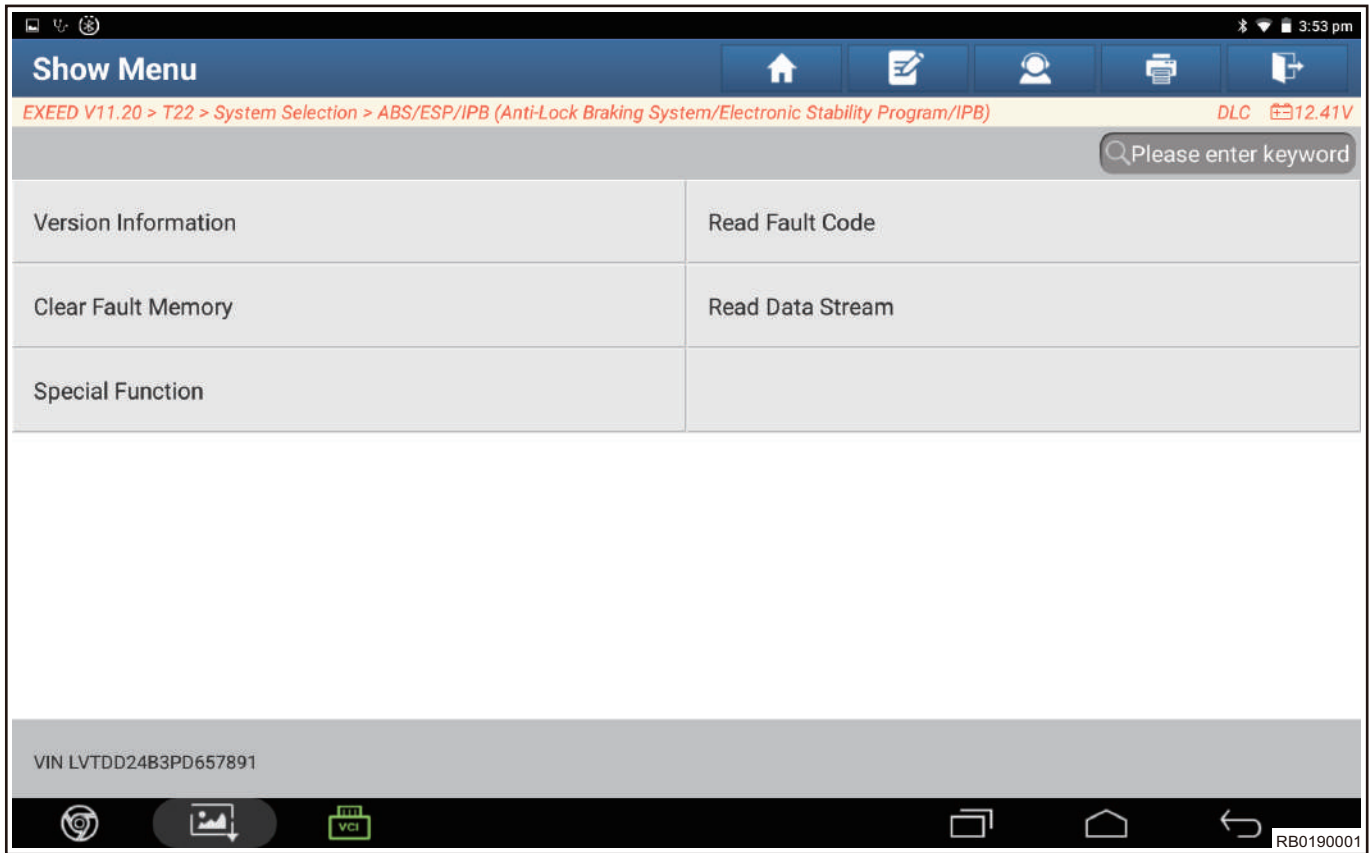
EXEED V11.20 > T22 > System Selection > ABS/ESP/IPB (Anti-Lock Braking System/Electronic Stability Program/IPB) DLC 12.09V

Please enter keyword

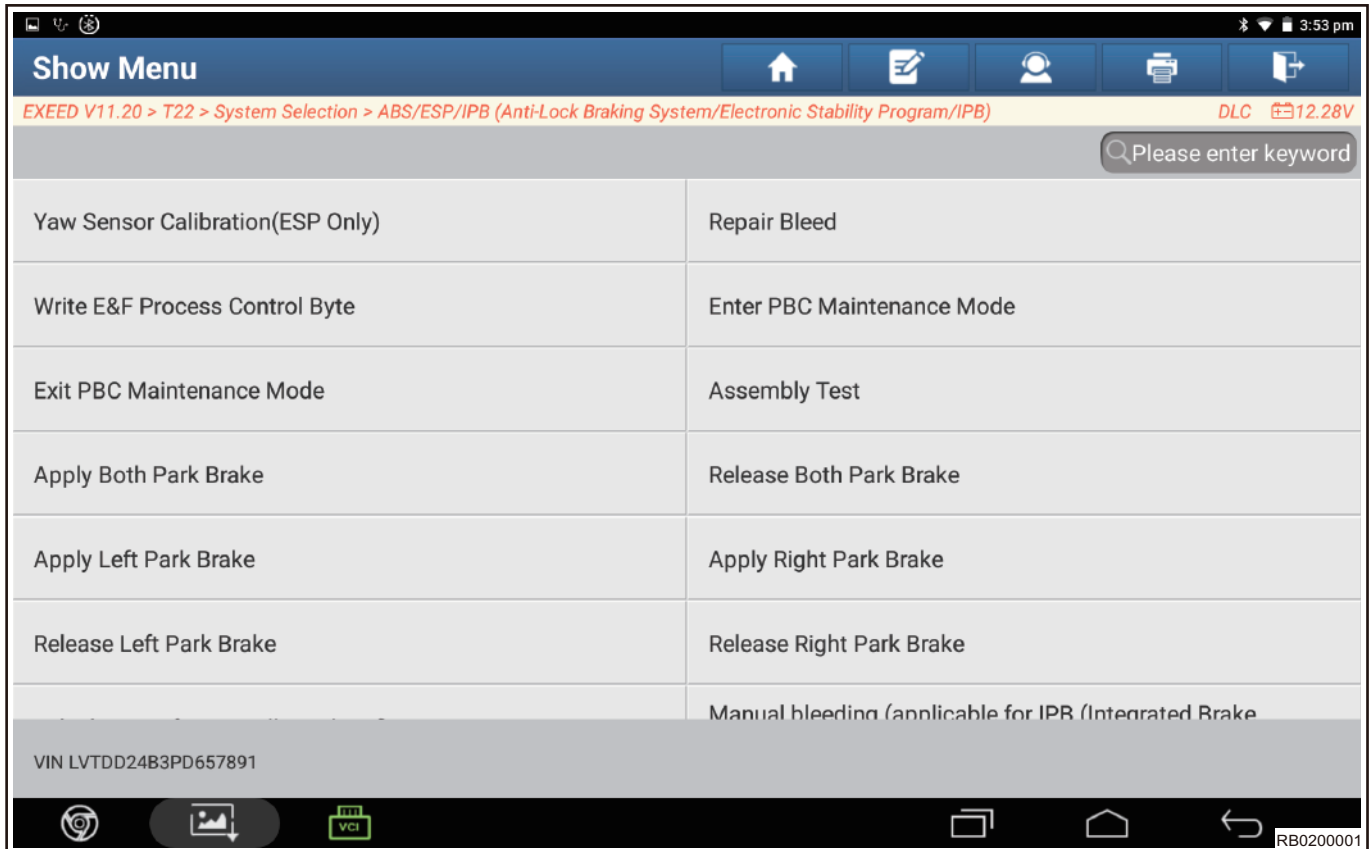
Exit PBC Maintenance Mode	Assembly Test
Apply Both Park Brake	Release Both Park Brake
Apply Left Park Brake	Apply Right Park Brake
Release Left Park Brake	Release Right Park Brake
Vehicle Manufacture Filling-Identification Write-In	Manual bleeding (applicable for IPB (Integrated Brake Controller Assembly))
IPB (Integrated Brake Controller Assembly) assembly mode switching	Drum Mode

VIN LVTDD24B3PD657891

BR1034001



(9) Click “Enter PBC Maintenance Mode ” , enter maintenance mode.



2.3 Component Operation Description

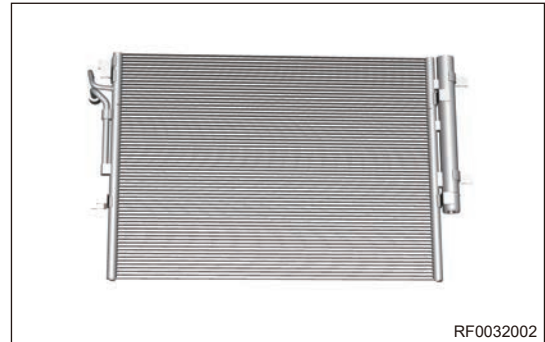
■ A/C Compressor

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.



■ 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.



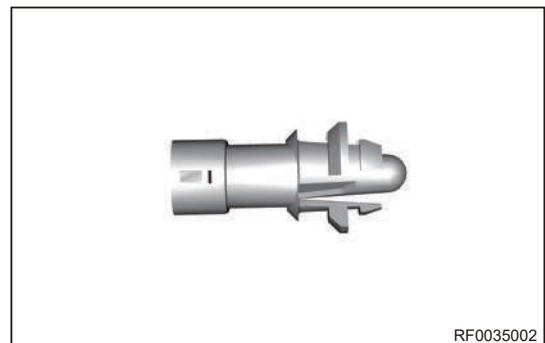
■ A/C Pressure Sensor

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.



■ 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.

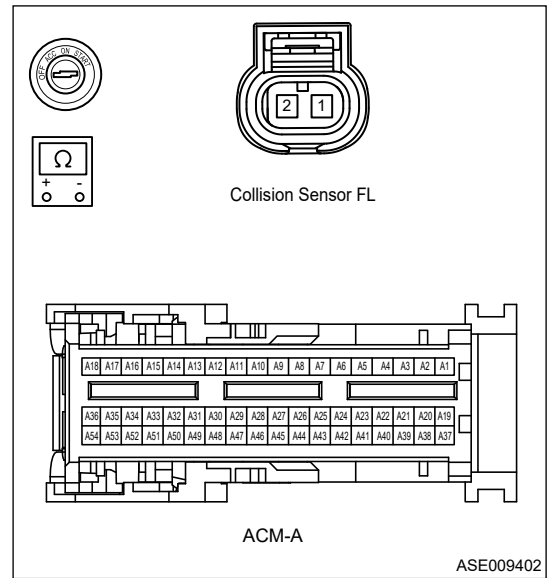


9 - SAFETY AND RESTRAIN SYSTEM

Use circuit diagram as a guide to perform the following inspection procedures:

- Disconnect front left collision sensor.
- Disconnect the airbag connector.
- Turn ENGINE START STOP switch to OFF.
- 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

- Replace the collision sensor.
- Check if DTC exists.

OK → **Replace collision sensor**

NG

5 Reconfirm DTCs

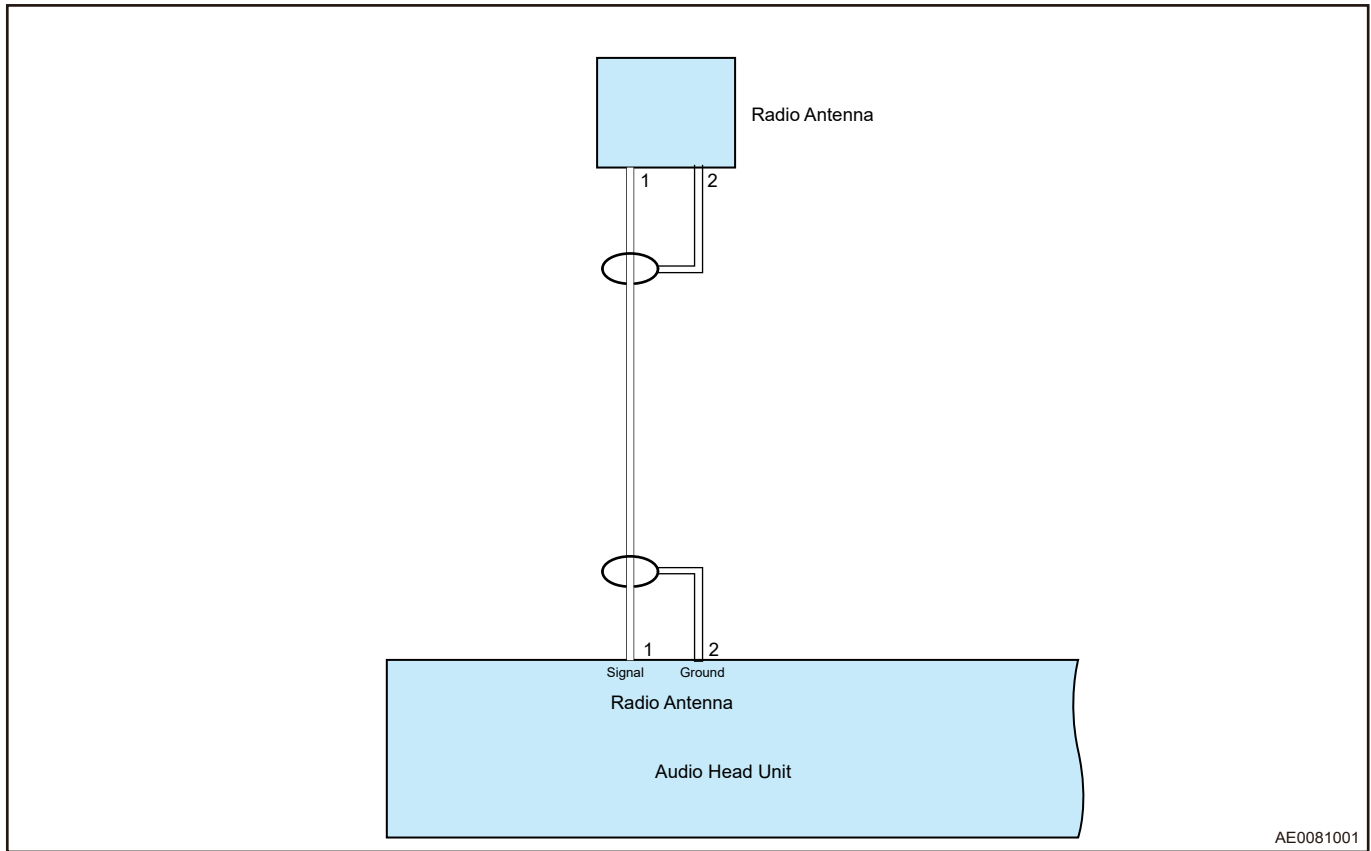
For preparations, refer to "Preparations before dealing with airbag system wire harness malfunction".

- Connect diagnostic tester and clear DTCs.
- Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
- 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



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■ 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.

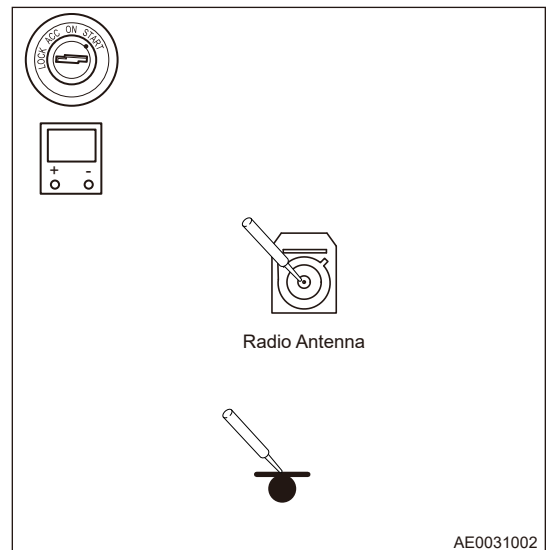
Hint:

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

1 Check wire harness and connector

- Turn off all electrical equipment and ENGINE START STOP switch.
- Disconnect the negative battery terminal cable.
- Turn ENGINE START STOP switch to OFF.
- Disconnect the domain controller radio antenna connector.
- 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"	∞



AE0031002

⚠ 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

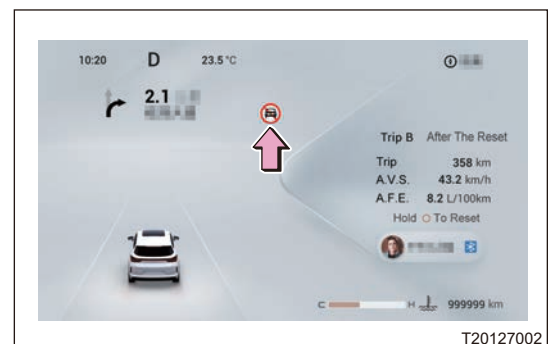
- When lane is added or merged, driver needs to take active control.
- When driving in complex traffic environment (such as road crossing, traffic congestion), driver needs to take active control.
- When driving on a sharp curve, driver needs to take active control.

⚠ 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.