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INSTRUMENT CLUSTER SYSTEM

Warnings and precautions

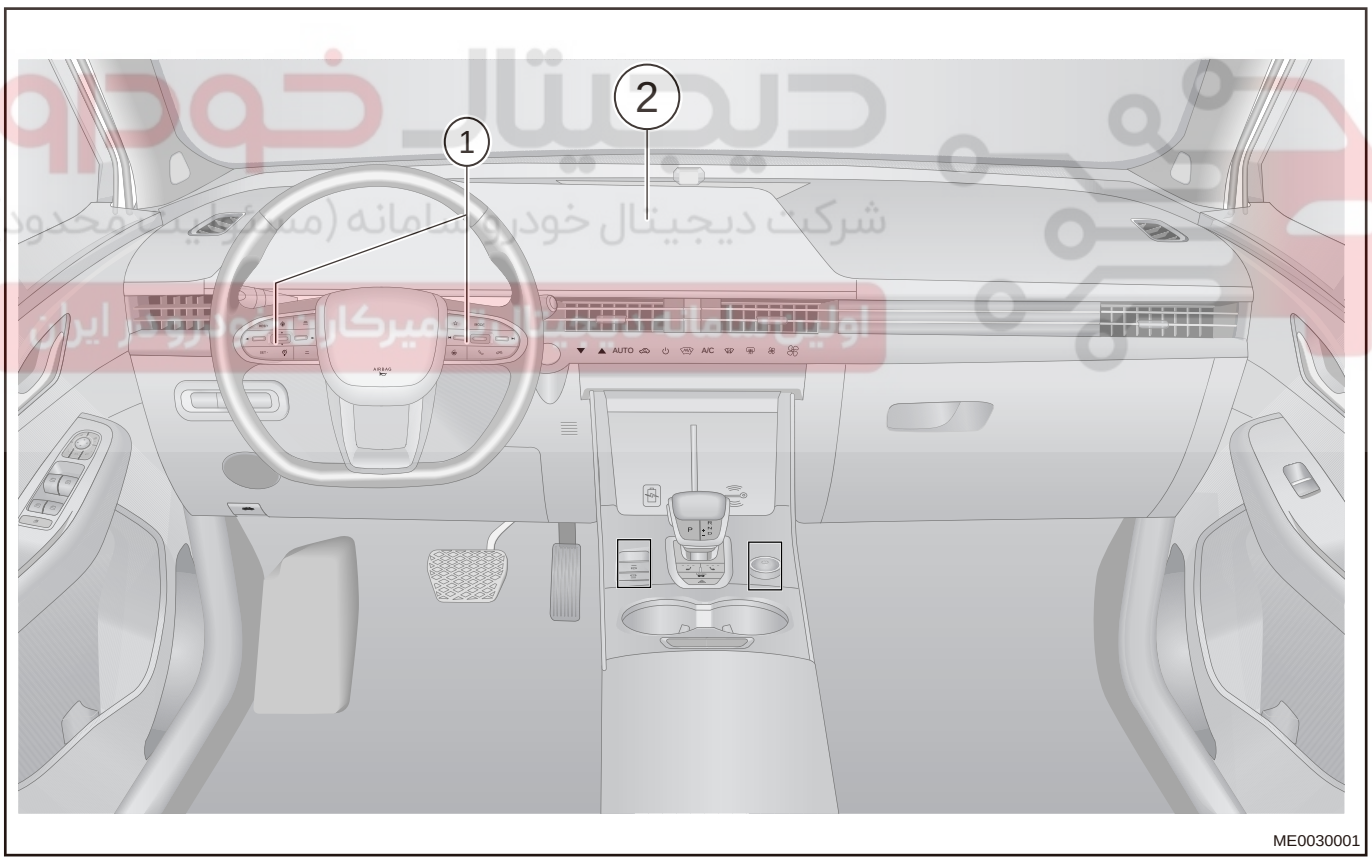
Precautions

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 meter needle and dial from deviating from initial position or becoming looseness caused by collisions.

System Overview

System Components Diagram



ME0030001

1	Steering Wheel Quick Button	2	Hyperscreen

System Principle

Instrument cluster is located above the upper left of instrument panel assembly, which is used to monitor and display the operation status of each system and component in vehicle. Instrument cluster receives signals from each sensor and switch, and displays the operation status of each system through instrument

cluster, operation/malfunction indicator. As a result, it will be helpful for driver to eliminate possible troubles in time, thus avoiding malfunctions or accidents efficiently.

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.
Front Fog Indicator		Turn on front fog 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 Chery service station for inspection and repair as soon as possible.
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.

Name	Indicator	Description
Second Row Seat Belt Indicator (If Equipped)		The indicator is used to remind that the second row seat belt is unfastened or improperly fastened, fasten the seat belt before driving. Note: Second row seat belt unfastened red indicator remains on, seat belt fastened green indicator remains on, all seat belts fastened indicator turns off.
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 Chery 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 Chery 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 Chery dealer for inspection and repair as soon as possible.
Hill Descent Control System (HDC) Indicator		This 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 Chery service station for inspection and repair as soon as possible.
Electronic Stability Program System (ESP) Indicator		If the indicator flashes, it means the Electronic Stability Program System (ESP) is in operation status. If the indicator remains on, it is used to remind the driver that Electronic Stability Program System (ESP) is faulty, please

Name	Indicator	Description
		go to Chery 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 Program System (ESP) is in shielded status.
Lane Keeping Assist System (LKA) Indicator		This indicator is used to show that Lane Keeping Assist System (LKA) is in operation.
Lane Keeping Assist System (LKA) Malfunction Indicator		This indicator is used to remind the driver that Lane Keeping Assist System (LKA) is faulty. Please go to Chery service station for inspection and repair as soon as possible.
Lane Departure Warning System (LDW) Indicator		This indicator flashes to show that the Lane Departure Warning System (LDW) is in operation. This indicator remains on, it is used to remind the driver that Lane Departure Warning System (LDW) is faulty. Please go to Chery service station for inspection and repair as soon as possible.
Auto Emergency Brake System (AEB) Indicator		This indicator remains on, it is used to show that Auto Emergency Brake System (AEB) is in operation.
Auto Emergency Brake System (AEB) Malfunction Indicator		This indicator remains on, it is used to remind the driver that Auto Emergency Brake System (AEB) is faulty. Please go to Chery service station for inspection and repair as soon as possible.
Traffic Congestion Assistance System (TJA) / Integrated Cruise Assist System (ICA) Malfunction Indicator		This indicator remains on, it is used to remind the driver that Traffic Congestion Assistance System (TJA) / Integrated Cruise Assist System (ICA) is faulty. Please go to Chery service station for inspection and repair as soon as possible.
Idle Start and Stop System Indicator		This indicator remains on, it is used to show that idle start and stop system meets the operating conditions.

Name	Indicator	Description
Idle Start and Stop System Malfunction Indicator		This indicator flashes, it is used to remind the driver that idle start and stop system is in fault status. Please go to Chery service station for inspection and repair as soon as possible. This indicator remains on, it is used to show idle start and stop system does not meet the safety start condition or is 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		This indicator remains on, it is used to remind the driver that Gasoline Particulate Filter (GPF) is faulty. Please go to Chery service station for inspection and repair as soon as possible.
4WD System Malfunction Indicator		This indicator remains on, it is used to remind the driver that 4WD system is faulty. Please go to Chery service station for inspection and repair as soon as possible.
Airbag Malfunction Indicator		This indicator remains on, it is used to remind the driver that airbag is faulty. Please go to Chery service station for inspection and repair as soon as possible.
Tire Pressure Monitoring System (TPMS) Malfunction Indicator		This indicator remains on, it is used 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 Chery service station for inspection and repair as soon as possible.
Electronic Power Steering System (EPS) Malfunction Indicator		This indicator remains on, it is used to remind the driver that Electronic Power Steering System (EPS) is faulty. Please contact Chery service station for inspection and repair immediately.

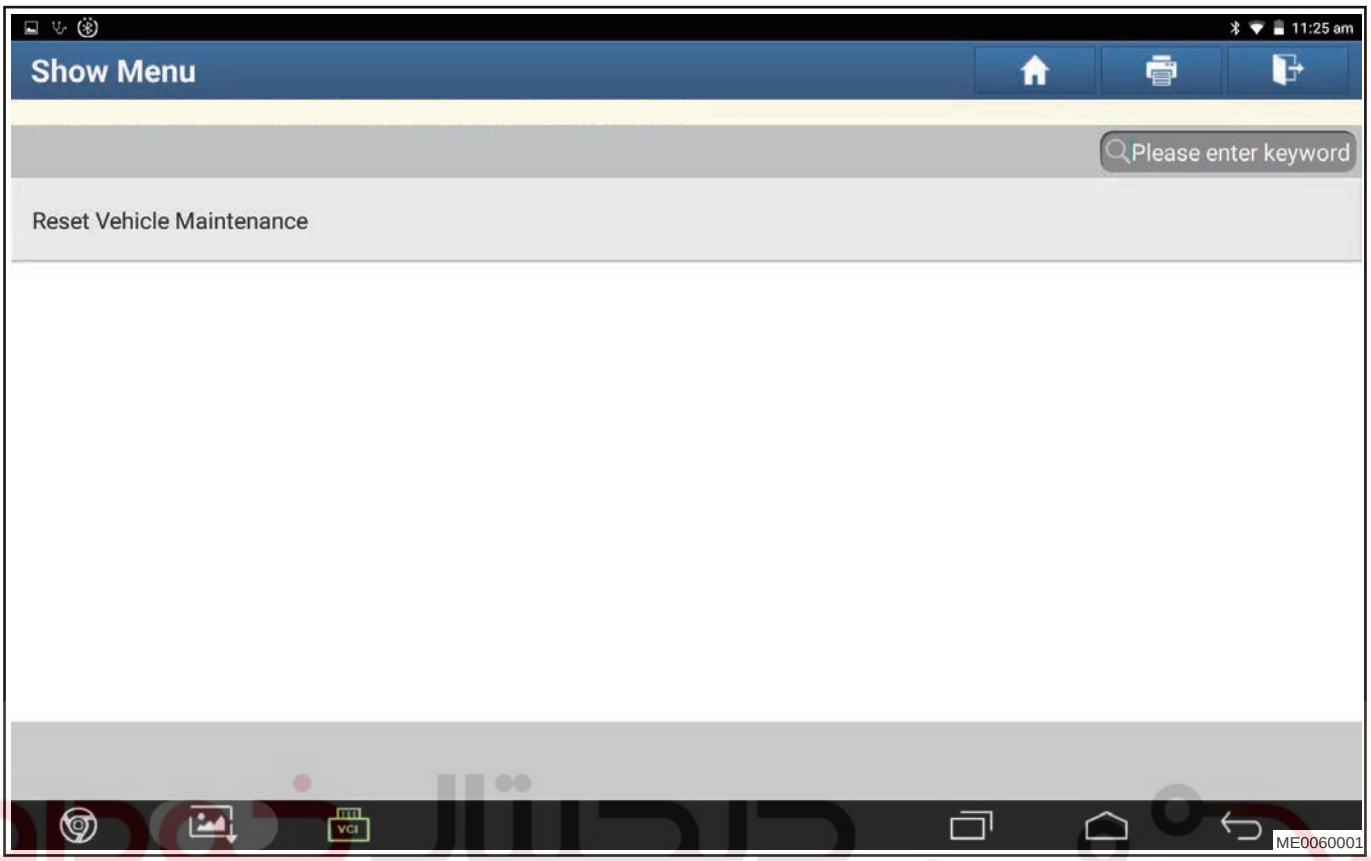
Name	Indicator	Description
EPC Malfunction Indicator	EPC	This indicator remains on, it is used to remind the driver that engine system is faulty. Please contact Chery service station for inspection and repair immediately.
Engine Malfunction Indicator		This indicator remains on to remind the driver that the engine is malfunctioning. Please contact Chery dealer for check and repair immediately.
Transmission Malfunction Indicator		This indicator remains on to remind the driver that the driver that the transmission system is malfunctioning. Please contact Chery dealer for check and repair immediately.
Engine Warm-up Indicator		This indicator remains on, it is used to show that the engine is warming up. When the water temperature rises, the indicator turns off, indicating that the engine is warmed up.
Hight Coolant Temperature Warning Light		This indicator remains on, it is used 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 Chery service station for inspection and repair immediately.
Maintenance Indicator		This indicator remains on, it is used to remind the driver that it is necessary to perform vehicle maintenance. Please go to Chery service station for inspection and repair as soon as possible.
Warning Indicator		This indicator remains on, it is used to remind the driver that there is fault or abnormal information in the vehicle. Relevant warning information can be queried in fault inquiry screen. If it cannot be solved, please contact Chery service station immediately.

Name	Indicator	Description
Fatigue Driving Indicator		This indicator remains on, it is used to remind the driver that the driving time has exceeded the set time and pay attention to rest.
Overspeed Warning Indicator		This indicator remains on, it is used to remind the driver that the vehicle speed has exceeded the set limit value and pay attention to vehicle speed.
Low Oil Pressure Warning Indicator		This indicator remains on to remind the driver that the engine oil pressure is low, drive the vehicle to a safe area and stop. Please contact Chery dealer for check and repair immediately.
Charging System Indicator		This indicator remains on, it is used to show charging system status. If indicator does not remain on when switching power supply to ON mode, or this indicator remains on after starting engine, please go to Chery service station for inspection and repair as soon as possible.
Low Fuel Level Warning Light		This indicator remains on, it is used to remind the driver that the vehicle fuel is insufficient, please add fuel as soon as possible.

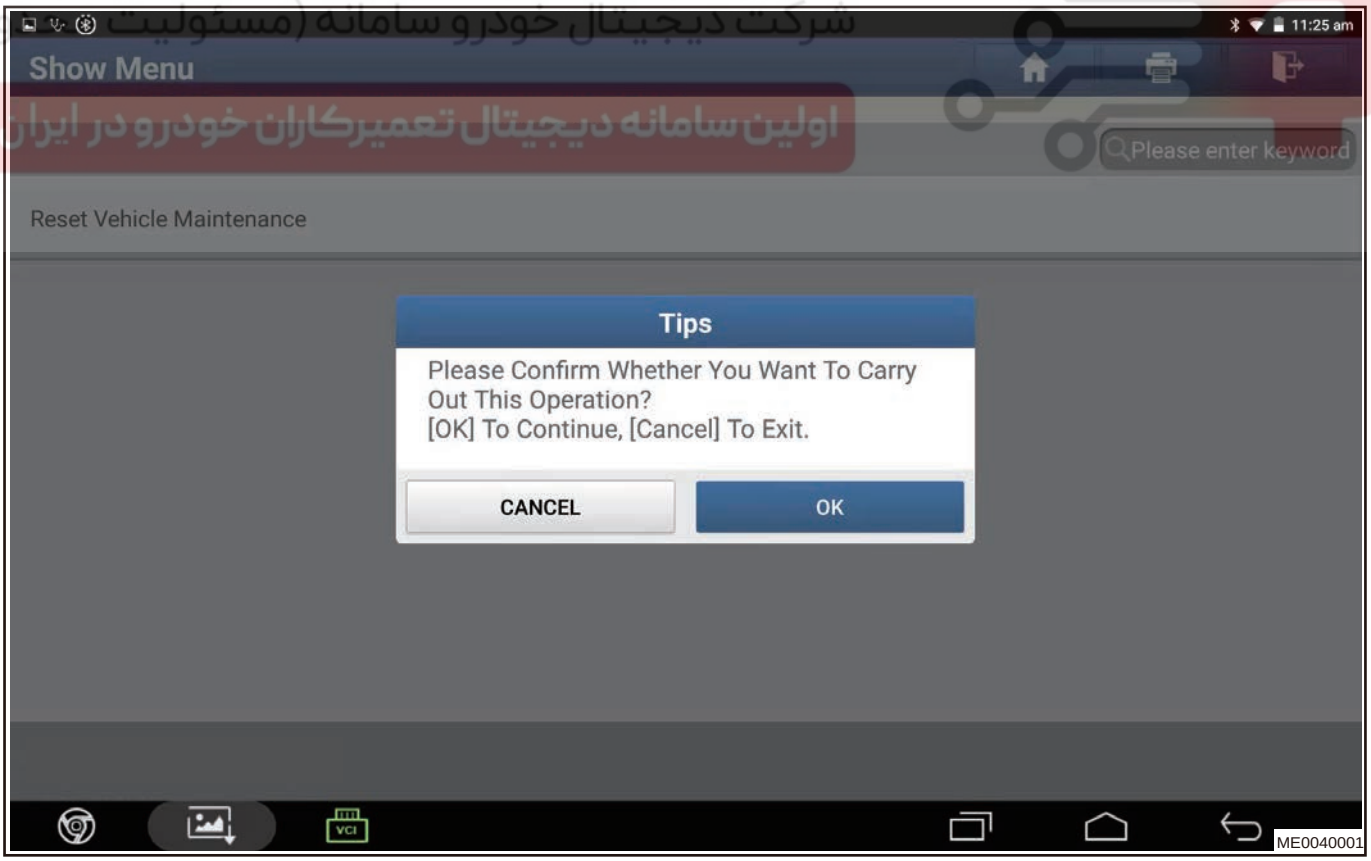
Maintenance Indicator Clearing

Diagnostic tester clearing

1. Connect diagnostic tester, enter the system, select model and click “Special Function”.
2. Enter next screen and click “Reset Vehicle Maintenance”.



3. Click “OK”.



4. Finished

Manual clearing
Press the multi-function steering wheel “OK” button to select “Maintenance Mileage Reset”, select “Yes” and press the “OK” button to eliminate it manually.

Diagnosis & Testing

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
	Instrument Cluster
	Wire harness or connector
Vehicle speed displays abnormally	Wheel speed sensor
	Wire harness or connector
	Instrument Cluster
Tachometer is abnormal	Engine speed sensor
	Instrument Cluster
	Wire harness or connector
	Engine Control Module (ECM)
Fuel gauge is abnormal	Fuel level sensor
	Instrument Cluster
	Wire harness or connector
Position indicator is abnormal	Position light switch (combination light switch assembly)
	Wire harness or connector
	Instrument Cluster
	Body Control Module (BCM)
Turn signal indicator is abnormal	Turn signal light switch (combination light switch assembly)
	Body Control Module (BCM)
	Instrument Cluster
	Wire harness or connector
High beam indicator is abnormal	High beam switch (combination light switch assembly)
	Body Control Module (BCM)
	Instrument Cluster

Symptom	Suspected Area
	Wire harness or connector
Rear fog indicator is abnormal	Rear fog light switch (combination light switch assembly)
	Body Control Module (BCM)
	Instrument Cluster
	Wire harness or connector
Charging system warning light is abnormal	Generator
	Instrument Cluster
	Wire harness or connector
Low engine oil pressure warning light is abnormal	Engine oil level
	Engine oil pressure switch
	Wire harness or connector
	Instrument Cluster
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
	Instrument Cluster
	Body Control Module (BCM)
Engine malfunction warning light is abnormal	CAN line or connector
	Engine Control Module (ECM)
	Instrument Cluster
SRS warning light is abnormal	CAN line or connector
	Airbag control module (SRS)
	Instrument Cluster
Driver seat belt reminder light is abnormal	Driver seat belt buckle switch
	Wire harness or connector
	Instrument Cluster
Front passenger seat belt reminder light is abnormal (If equipped)	Front passenger seat belt buckle switch
	Wire harness or connector
	Instrument Cluster

Symptom	Suspected Area
Brake system warning light is abnormal	Low brake fluid level
	Parking brake switch
	Instrument Cluster
Cruise indicator is abnormal	Cruise switch (multi-function switch)
	Wire harness or connector
	Instrument Cluster
Transmission malfunction warning light is abnormal	Transmission Control Unit (TCU)
	CAN line or connector
	Instrument Cluster
Low tire pressure warning light is abnormal	Low or high tire pressure (tire pressure is not within specified range)
	Instrument Cluster

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.

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.

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.

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1100-13	Power Supply Voltage	/	• Instrument cluster fault • Battery fuse fault • Wire harness fault	Check corresponding wire harness, if the fault still occurs, replace the instrument cluster
B1100-16	Power Supply Voltage			
B1100-17	Power Supply Voltage			
B1101-11	Fuel System Short Circuit	/	• Instrument cluster fault • Fuel pump malfunction • Fuel pump wire harness fault	Check corresponding wire harness, if the fault still occurs, replace the instrument cluster
B1101-15	ICM Fuel System Fault			
B110C-11	Fuel PIN21 Short to Ground			
B110C-13	Fuel PIN21 Open			
B110D-11	Fuel PIN22 Short to Ground			
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	/		

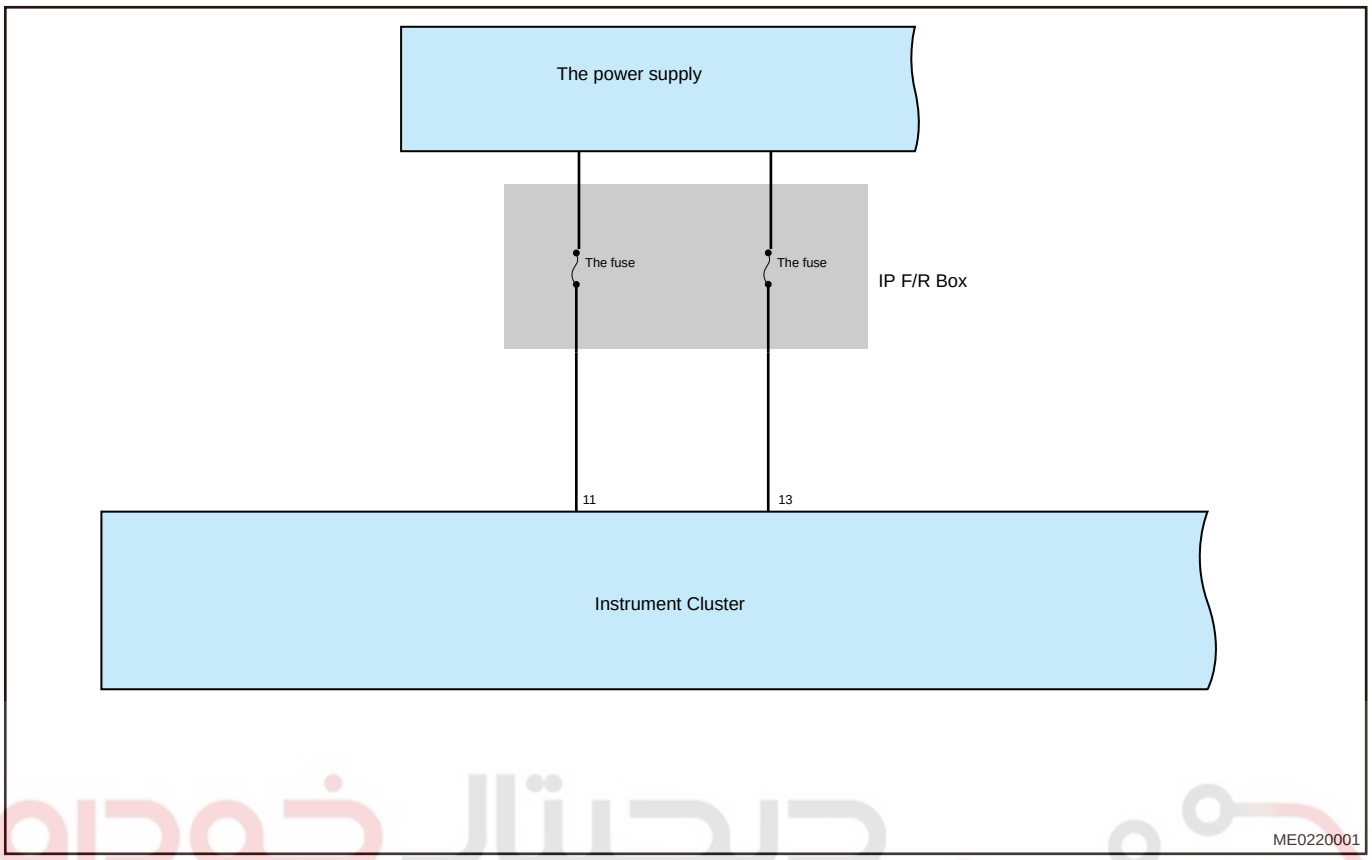
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1111-04	Display Video Signal Failure	/		
B1112-04	Display Backlight Level Missing	/		
B1113-04	Communication Failure between Display and IHU	/		
U0073-88	BD CAN Busoff	/	• Instrument panel internal fault • Wire harness connector fault • Each module malfunction	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 Passive Entry Passive Start (PEPS)	/		
U0164-87	Lost Communication With CLM	/		
U0141-87	Lost Communication with Reversing Radar	/		
U0142-87	Lost Communication with Around View Monitor Module	/		
U0230-87	Lost Communication with PLG	/		
U0100-87	Lost Communication with EMS	/		
U0129-87	Lost Communication With Brake System Control Module	/		
U0101-87	Lost Communication with TCU	/		
U0151-87	Lost Communication With ABM	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
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

DTC Diagnosis Procedure

DTC	**B1100-13**	**Power Supply Voltage**
DTC	**B1100-16**	**Power Supply Voltage**
DTC	**B1100-17**	**Power Supply Voltage**

Description
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:

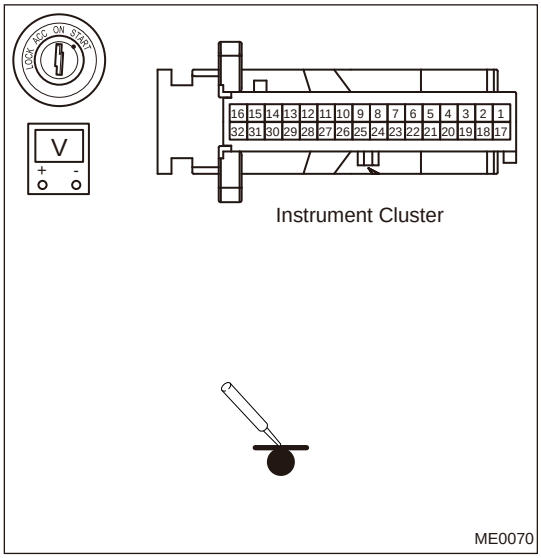
(a) Check if fuse is normal.

NG → **Replace faulty fuse.**

OK

2	**Check related wire harness and connector**

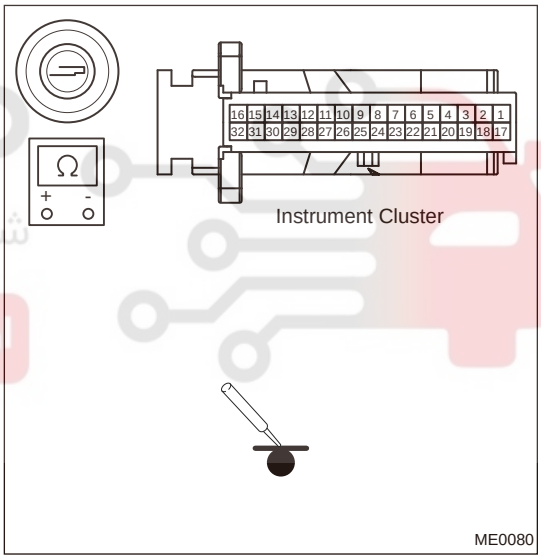
(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.
(b) Disconnect the instrument cluster connector.
(c) Check if related wire harnesses are worn, pinched or broken.
(d) Check if related connector terminals are loose, broken, bent or corrosive.
(e) Check if related connector pins are in good condition.
(f) Turn ENGINE START STOP switch to ON.
(g) Using a digital multimeter, check if the voltage between instrument cluster connector and body ground is normal according to table below.



Multimeter Connection	Specified Condition
Instrument cluster (11) - Body ground	Not less than 12 V
Instrument cluster (13) - Body ground	Not less than 12 V

(h) Using a digital multimeter, check if the continuity between connector I-016 (3) and body ground is normal.

Multimeter Connection	Specified Condition
I-016 (3) - Body ground	< 1 Ω



NG → **Repair or replace wire harness and connector.**

OK ↓

3	Reconfirm DTCs

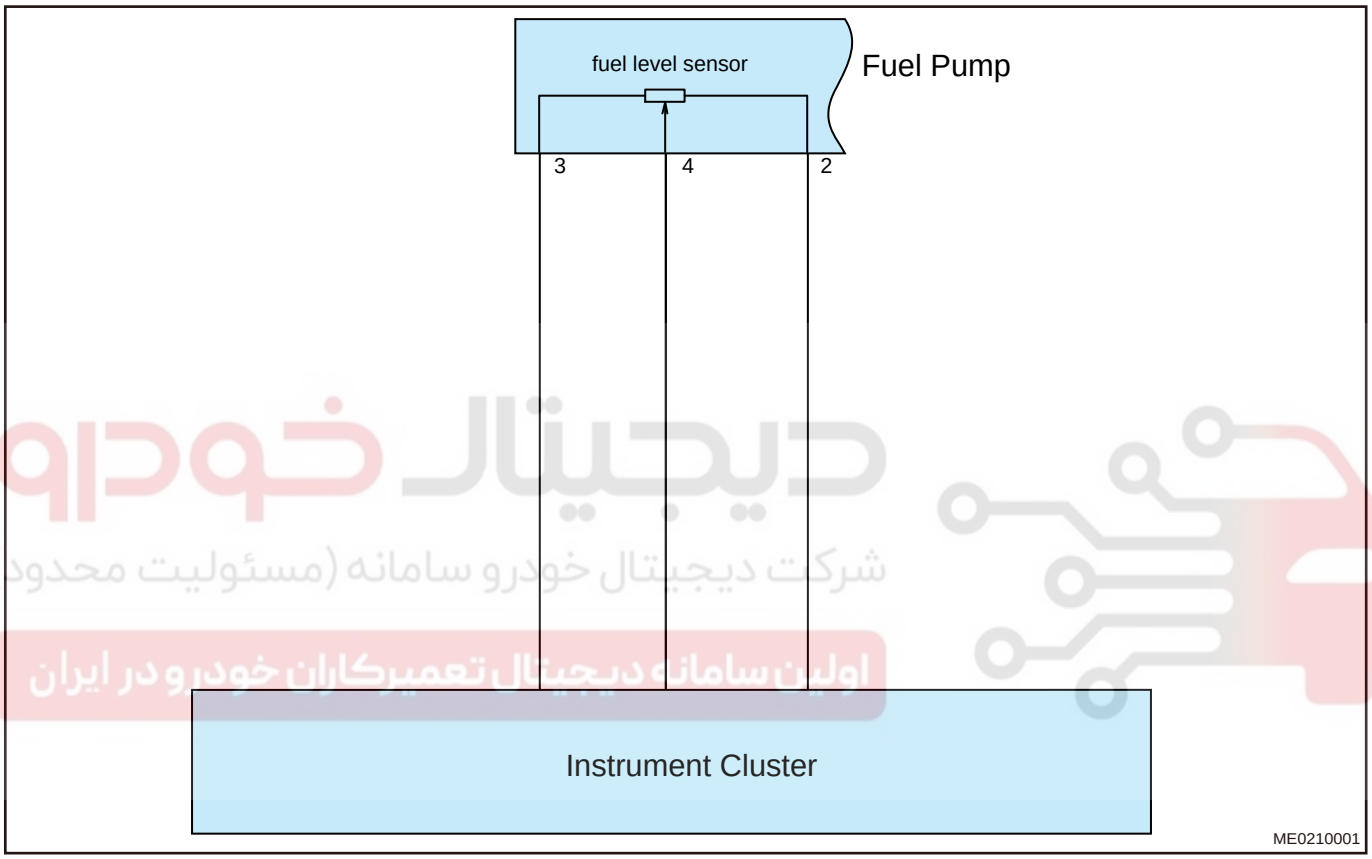
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace instrument cluster.**

OK → **System operates normally.**

DTC	**B1101-11**	**Fuel System Short Circuit**
DTC	**B1101-15**	**ICM Fuel System Fault**
DTC	**B110C-11**	**Fuel PIN21 Short to Ground**
DTC	**B110C-13**	**Fuel PIN21 Open**
DTC	**B110D-11**	**Fuel PIN22 Short to Ground**

Description
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 fuel pump wire harness connector and instrument panel 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 2 and terminal 4, and terminal 3 and terminal 4 of fuel pump change continuously.

NG → **Replace fuel pump assembly**

OK

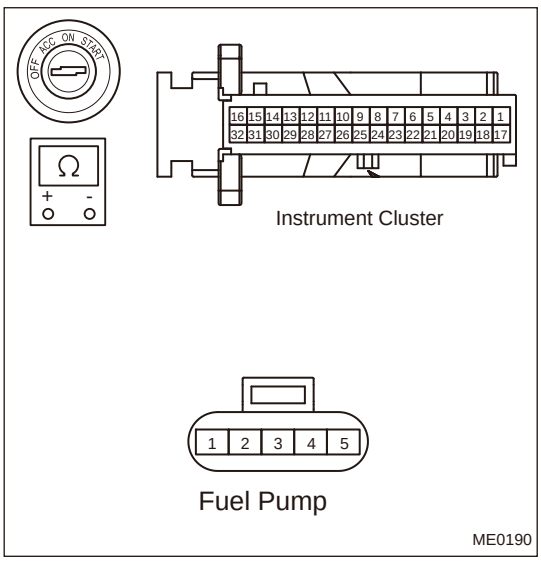
3	**Check fuel pump wire harness**

(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 digital multimeter, check resistance between fuel pump wire harness connector and terminals of instrument panel wire harness connector to check if there is an open circuit in fuel pump wire harness according to the table below.

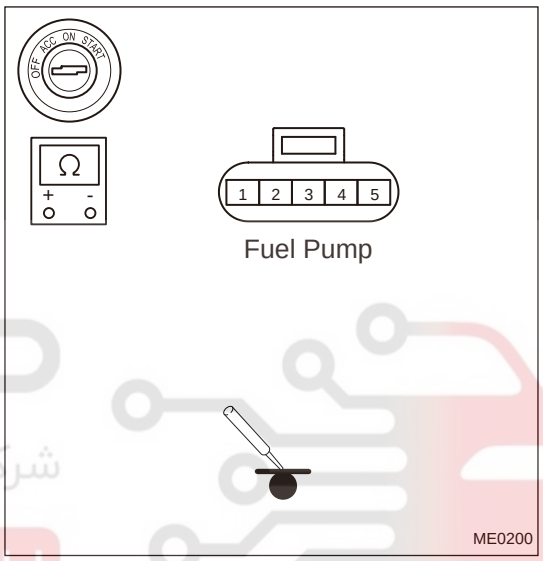
Multimeter Connection	Condition	Specified Condition
Fuel pump (2) - Instrument cluster (- connected terminal)	ENGINE START STOP switch “OFF”	< 1 Ω



Multimeter Connection	Condition	Specified Condition
Fuel pump (3) - Instrument cluster (- connected terminal)		< 1 Ω
Fuel pump (4) - 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 (2) - Body ground	ENGINE START STOP switch "OFF"	∞
Fuel pump (3) - Body ground		∞
Fuel pump (4) - Body ground		∞



NG → **Repair or replace instrument panel 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.

NG → **Replace instrument cluster assembly.**

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

DTC	B1104-41	Instrument Cluster EEPROM Data Checksum 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	**Power off test**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable and wait for 3 minutes to 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.

NG → **Replace instrument cluster.**

OK → **System operates normally.**

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	**B1113**	**Communication Failure between Display and IHU**

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 instrument cluster assembly.**

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

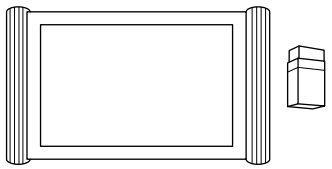
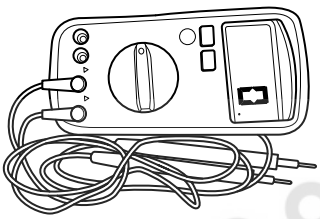
DTC	U0073-88	BD CAN Busoff
DTC	U1010-88	IFT CAN Busoff
DTC	U0140-87	Lost Communication with BCM
DTC	U0214-87	Lost Communication with Passive Entry Passive Start (PEPS)
DTC	U0164-87	Lost Communication With CLM
DTC	U0141-87	Lost Communication with Reversing Radar
DTC	U0142-87	Lost Communication with Around View Monitor Module
DTC	U0230-87	Lost Communication with PLG
DTC	U0100-87	Lost Communication with EMS
DTC	U0129-87	Lost Communication With Brake System Control Module
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

Refer to CAN communication system

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206

Torque Specifications

Description	Torque (N·m)
Hyperscreen Fixing Bolt	5 ± 1 N·m

Instrument cluster

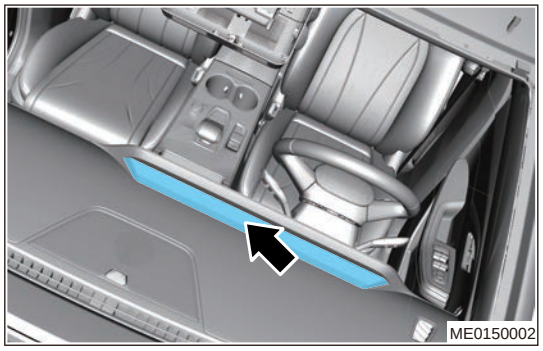
Removal

Warning

- Be sure to wear necessary safety equipment to prevent accidents, when removing instrument cluster.
- Appropriate force should be applied, when removing instrument cluster. 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 instrument cluster connector from dual LCD, and remove dual LCD.

Installation

⚠ Caution

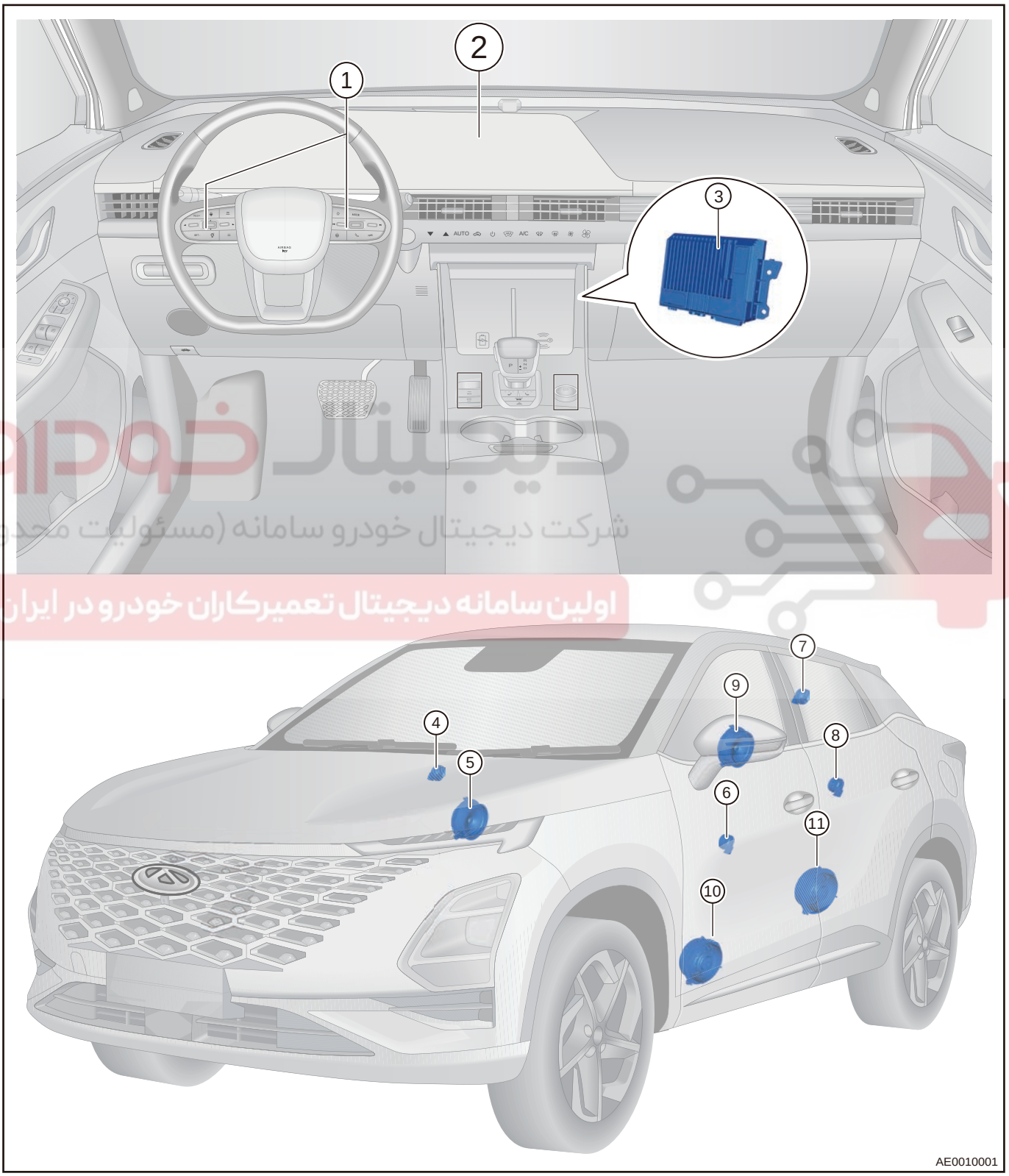
- Tighten fixing nut to specified torque, when installing dual LCD.
- Install connector into place when installing dual LCD.
- Check audio system for proper operation, after installing dual LCD.

1. Installation is in the reverse order of removal.

AUDIO/VISUAL SYSTEM

System Overview

System Components Diagram



1	Steering Wheel Quick Button	2	Hyperscreen
3	Domain controller	4	Front Right Tweeter
5	Front Right Woofer	6	Front Left Tweeter
7	Rear Right Tweeter	8	Rear Left Tweeter
9	Rear Right Woofer	10	Front Left Woofer
11	Rear Left Woofer		

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 vehicle, domain controller integrates audio head unit module (RRM) and panoramic view monitor system into one module, but 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.

Diagnosis & Testing

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

Current Status	Symptom	Possible Cause and Solution
	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 can not support all formats files. There are many audio and video formats nowadays. Even file formats supported by audio 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
	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

Current Status	Symptom	Possible Cause and Solution
		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 Chery 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.

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.

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.

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.

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

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1800-16	Power Supply Voltage Failure	/	• Fuse • Charging system • Wire harness connector • Domain controller	Check for short or open in battery, fuse and each wire harness terminal
B1800-17	Power Supply Voltage Failure	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1813-00	Speakers Connected to Amplifier Failure	/	• Speaker • Wire harness connector • Domain controller	Check for short or open in speaker and each wire harness terminal
B1830-04	Amplifier R/W Failure	/		
B1814-00	Tuner Antenna Abnormal	/	• Wire harness connector • Domain controller	Check for short or open in each wire harness terminal
B1832-04	Tuner IC R/W Failure	/		
B1835-04	Communication Failure Between MCU and Main Processor	/	• Domain controller	Perform power off test, replace domain controller if the fault still exists
B1840-4B	MMI Over Temperature	/		
B1847-04	Connecting Fault with Audio Display	/	• Hyperscreen • Wire harness connector • Domain controller	Check for short or open in each wire harness terminal
B1848-04	Connecting Fault with Instrument Cluster Display	/		
B184D-04	Connection Fault With Touchpad	/		
B1834-04	Voice Recognition IC R/W Failure	/	• Domain controller	Perform power off test, replace domain controller if the fault still exists
B1831-04	EEPROM R/W Failure	/		
B181F-04	Display Backlight Level Missing	/	• Hyperscreen • Domain controller	Perform power off test, replace domain controller if the fault still exists
B181E-04	Display Video Signal Failure	/		
B181A-04	Display Overall Function Failure (-Including but Not Limited to Display and Touch)	/		
B184C-04	Microphone Fault	/	• Microphone • Wire harness connector • Domain controller	Check for short or open in microphone and each wire harness terminal
U1007-88	Control Module BD CAN Communication	/	• Wire harness connector failure	Refer to “CAN network system”

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
	Bus Off BD CAN Busoff		• Each module malfunction • Domain controller malfunction	for inspection and repair
U0073-88	Control Module IFT CAN Communication Bus Off IFT CAN Busoff	/		
U0140-87	Lost Communication with BCM	/		
U0214-87	Lost Communication with Passive Entry Passive Start (PEPS)	/		
U0164-87	Lost Communication With CLM	/		
U0141-87	Lost Communication with Reversing Radar	/		
U0142-87	Lost Communication with Around View Monitor Module	/		
U0230-87	Lost Communication with PLG	/		
U0100-87	Lost Communication with EMS	/		
U0129-87	Lost Communication With Brake System Control Module	/		
U0101-87	Lost Communication with TCU	/		
U0151-87	Lost Communication With ABM	/		
U1157-87	Lost Communication with Blind Spot Detection	/		

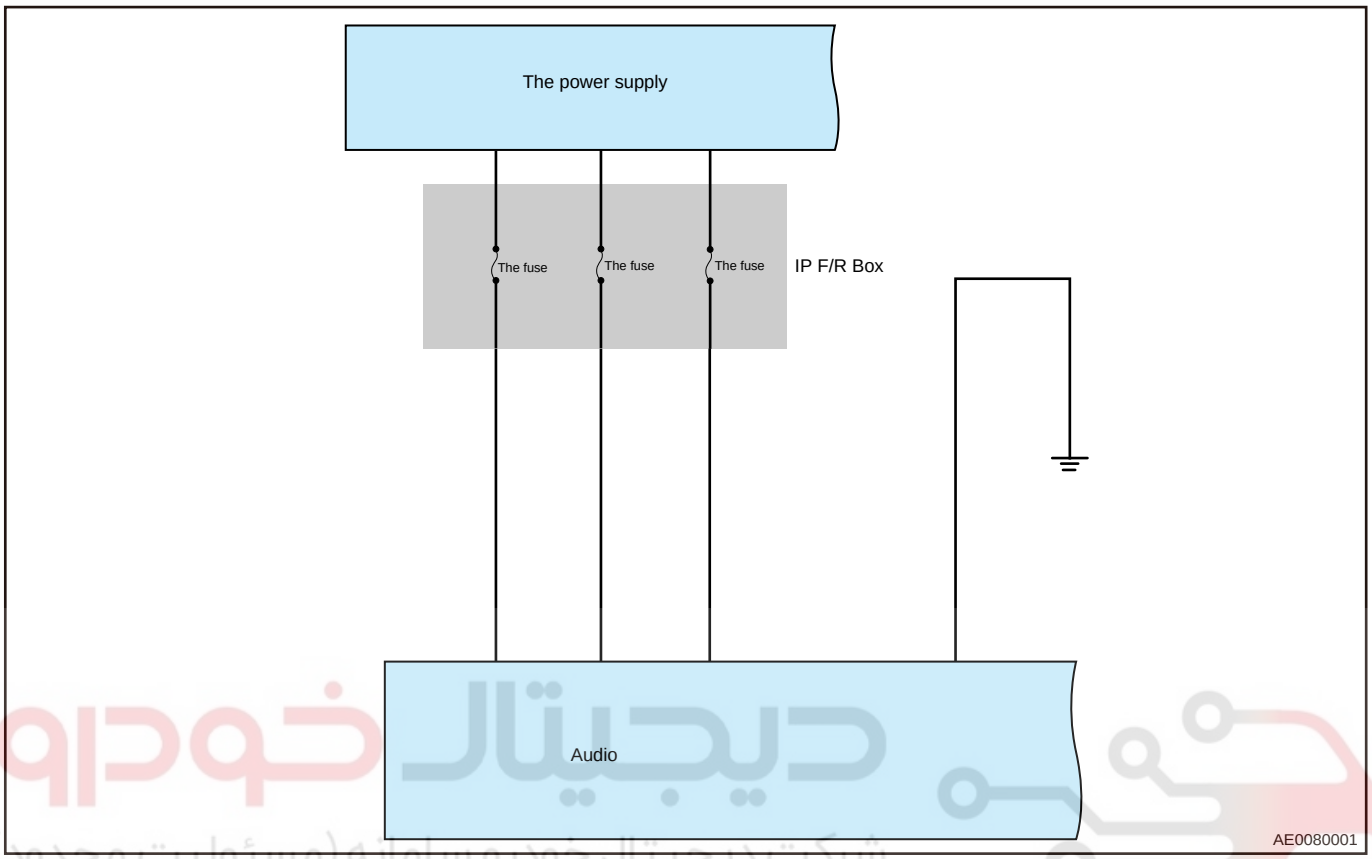
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0131-87	Lost Communication with Electronic Power Steering Module	/		
U1162-87	Lost Communication with Front Camera Module	/		
U1163-87	Lost Communicate with Front Radar	/		
U1193-87	Lost Communication with Electric Shifting Controller	/		
U1189-87	Lost Communication with MFS	/		
U0126-87	Lost Communication with SAM	/		
U1194-87	Lost Communication with Wireless Charging Module	/		
U1160 - 87	Lost Communication with Auto A/C Panel	/		
U0208-87	Lost Communication with Seat Module Controller	/		
U0193-87	Lost Communication with Audio Control Panel Controller	/		
U1300-55	Software Configuration Error	/	• Software information configuration error	Reconfiguration

DTC Diagnosis Procedure

DTC	B1800-16	Power Supply Voltage Failure
DTC	B1800-17	Power Supply Voltage Failure

Description

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**

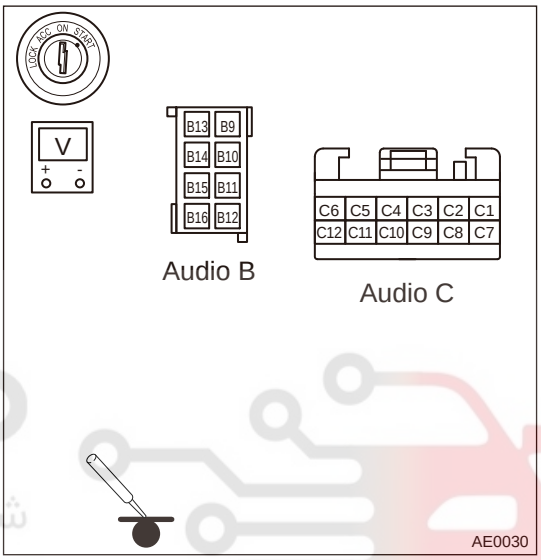
(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery cable.
(c) Check if pow supply fuse is normal.

NG → **Replace fuse.**

OK

3	**Check wire harness and connector**

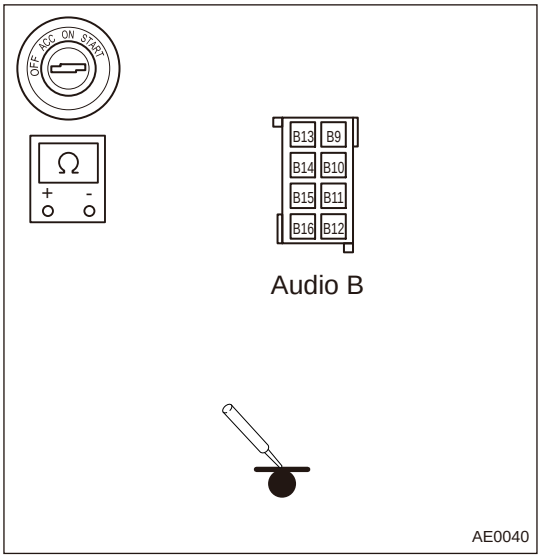
(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery cable.
(c) Disconnect the domain controller audio connector.
(d) Connect the negative battery cable.
(e) Turn ENGINE START STOP switch to ON.
(f) Using a digital multimeter, measure voltage between domain controller audio power supply terminal and body, and detect it with a 21 W test lamp according to table below.



Multimeter Connection	Condition	Specified Condition
Domain controller audio power supply terminal (1) - Body ground	ENGINE START STOP switch “ON”	Not less than 12 V
Domain controller audio power supply terminal (2) - Body ground		Not less than 12 V
Domain controller audio power supply terminal (3) - Body ground		Not less than 12 V

(g) Using a digital multimeter, measure resistance between domain controller audio connector ground terminal and body according to table below.

Multimeter Connection	Condition	Specified Condition
Domain controller audio connector ground terminal - Body ground	Ignition switch OFF	Less than 1 Ω



NG → **Repair or replace wire harness or connector.**

OK →

4	Confirm DTCs again

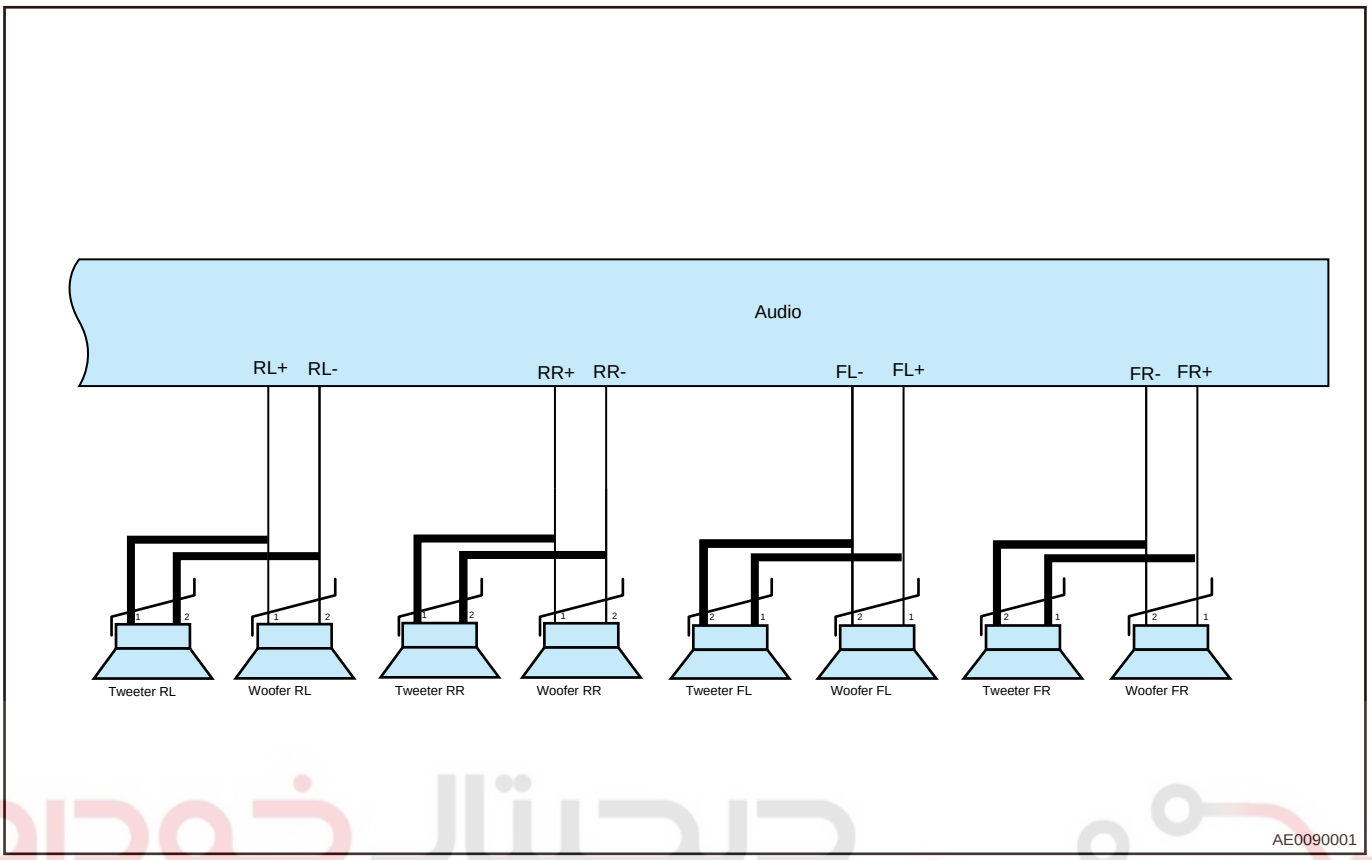
(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace domain controller**

DTC	B1813-00	Speakers Connected to Amplifier Failure
DTC	B1830-04	Amplifier R/W Failure

Description
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**

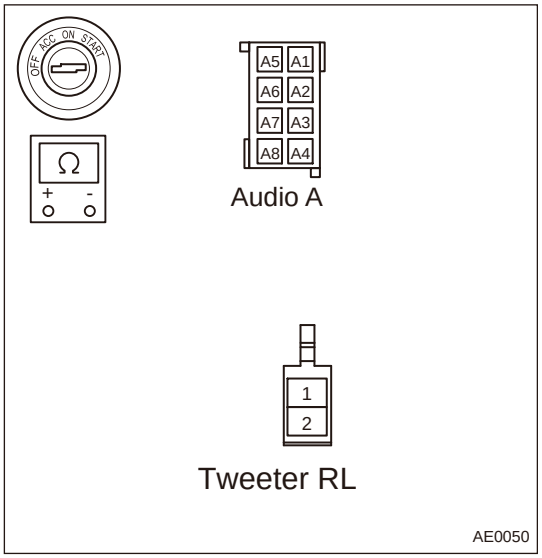
(a) Play music to check for speakers failing to operate on vehicle.

(b) Take the front right tweeter failing to operate as an example.

(c) Turn ignition switch to OFF and disconnect the negative battery cable.

(d) Disconnect front right tweeter connector and domain controller audio connector.

(e) Check for continuity between front right tweeter connector and domain controller audio connector.

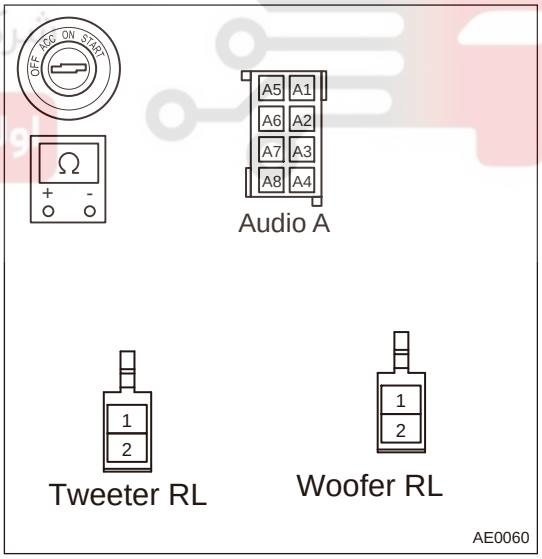


Multimeter Connection	Condition	Specified Condition
Front right tweeter (1) - Domain controller audio (corresponding terminal)	Ignition switch OFF	Less than 1 Ω
Front right tweeter (2) - Domain controller audio (corresponding terminal)		

(f) Take front right tweeter and front right woofer failing to operate as an example.

(g) Disconnect front right tweeter connector, front right woofer connector 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 (corresponding terminal)	Ignition switch OFF	Less than 1 Ω
Front right tweeter (2) - Domain controller audio (corresponding terminal)		

Multimeter Connection	Condition	Specified Condition
Front right woofer (1) - Domain controller audio (corresponding terminal)		
Front right woofer (2) - Domain controller audio (corresponding 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	**B1847-04**	**Connecting Fault with Audio Display**
DTC	**B1848-04**	**Connecting Fault with Instrument Cluster Display**
DTC	**B184D-04**	**Connection Fault With Touchpad**

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 ignition 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**

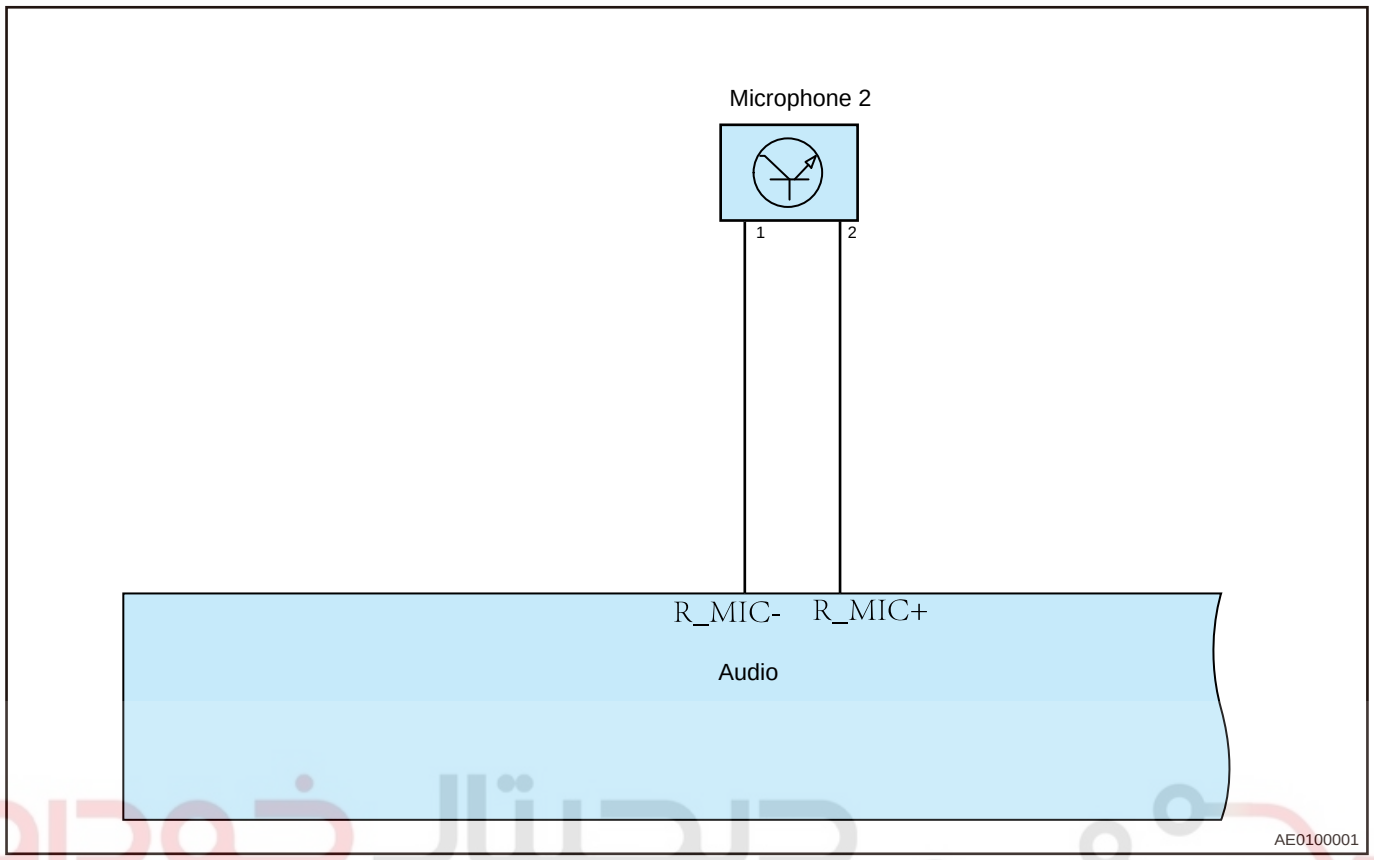
(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Use diagnostic tester to clear DTCs.
(d) Start the engine.
(e) Check if the same DTCs are still output.

OK → **Confirm that system is normal**

NG → **Replace domain controller**

DTC	**B184C-04**	**Microphone Fault**

Description
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

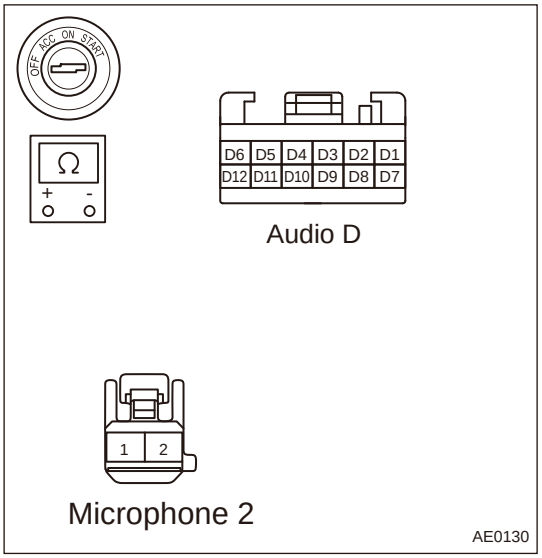
2	**Check wire harness connector between domain controller and microphone 2**

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.

(b) Disconnect microphone 2 connector and instrument cluster wire harness domain 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 (corresponding terminal)	ENGINE START STOP switch "OFF"	< 1 Ω
Microphone 2 connector (2) - Domain controller audio (corresponding 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	**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	**B1834-04**	**Voice Recognition IC R/W Failure**
DTC	**B1831-04**	**EEPROM 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	**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 ignition switch to ON to check if the fault occurs again.

OK	**System is normal**

NG

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	**B181F-04**	**Display Backlight Level Missing**
DTC	**B181E-04**	**Display Video Signal Failure**
DTC	**B181A-04**	**Display Overall Function Failure (Including but Not Limited to Display and Touch)**

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 ignition switch to ON to check if the fault occurs again.

OK → **System is normal**

NG

2	**Check display**

(a) Turn ENGINE START STOP switch to OFF and disconnect the negative battery cable.
(b) Replace the original display with a new one for running test.

OK → **Replace display**

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 domain controller**

DTC	U0140-87	Lost Communication with BCM
DTC	U0214-87	Lost Communication with Passive Entry Passive Start (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
DTC	U0230-87	Lost Communication with PLG
DTC	U0100-87	Lost Communication with EMS
DTC	U0129-87	Lost Communication With Brake System Control Module
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
Refer to CAN communication system

On-vehicle Service

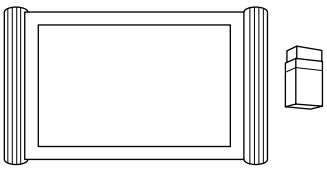
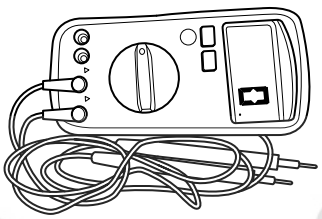
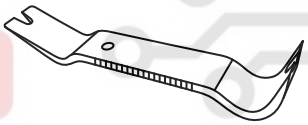
Torque

Torque Specifications

Description	Torque (N·m)
Combined Antenna Fixing Nut	5 ± 1
Woofer Fixing Screw	1.5 ± 0.5
Front Tweeter Fixing Screw	1.5 ± 0.5
Domain Controller Fixing Bolt	5 ± 1

Tools

General Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206
Interior Crow Plate	 RCH002506

Domain controller

Removal

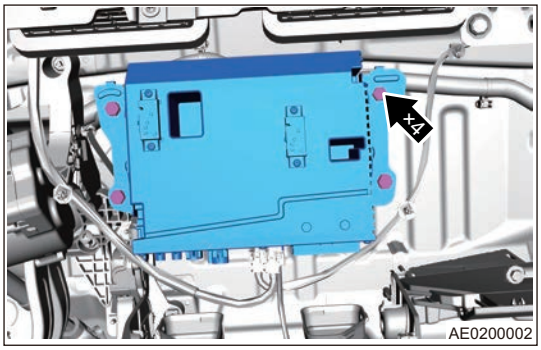
Hint:

- 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 instrument panel assembly.

4. Remove 4 fixing bolts from domain controller.

   Tightening Torque
   5 ± 1 N·m



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. Installation is in the reverse order of removal.

Front Left Tweeter

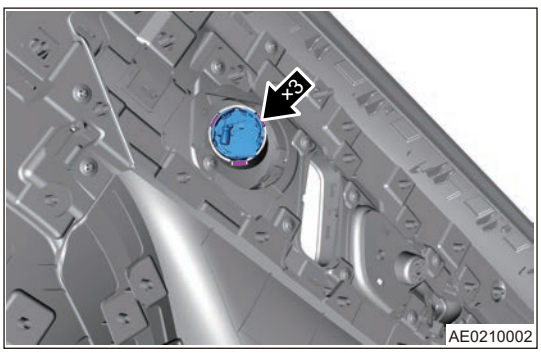
Removal

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 front left tweeter.
- Appropriate force should be applied when removing front 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 left door protector assembly.
4. Pry up 3 fixing clips from front left tweeter and remove front left tweeter.



Installation

⚠ Caution
• Check front left tweeter for proper operation, after installing front left tweeter.

1. Installation is in the reverse order of removal.

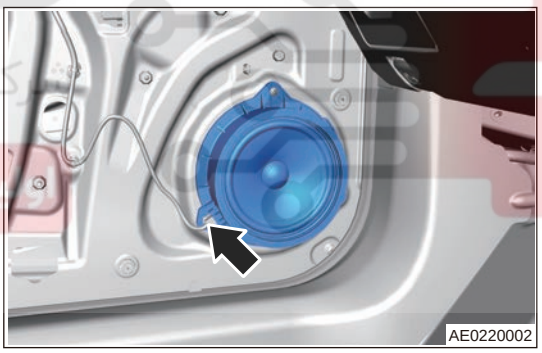
Front Left Woofer

Removal

Hint:
Use same procedures for right and left sides (take left side as an example).

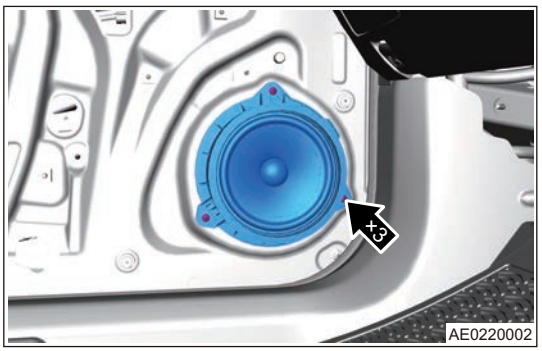
⚠ Caution
• Be sure to wear safety equipment to prevent accidents, when removing front left woofer. • Appropriate force should be applied when removing front left woofer. Be careful not to operate roughly.

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 front left woofer connector.



5. Remove 3 fixing screws from front left woofer and remove front left woofer.

   Tightening Torque
   1.5 ± 0.5 N·m



Installation

⚠ Caution
• Be sure to tighten fixing bolts to specified torque, when installing front left woofer. • Check front left woofer for proper operation, after installing front left woofer.

1. Installation is in the reverse order of removal.

Rear Left Tweeter

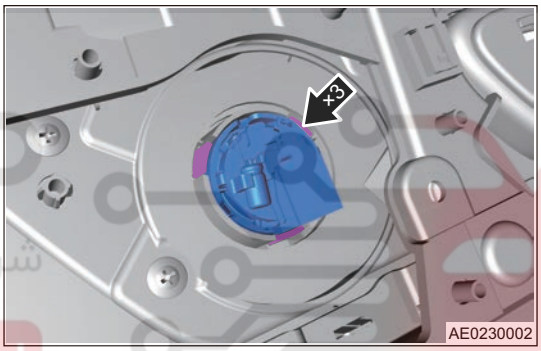
Removal

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. Pry up 3 fixing clips from rear left tweeter and remove rear left tweeter.



Installation

⚠ Caution

- Check rear left tweeter for proper operation, after installing rear left tweeter.

1. Installation is in the reverse order of removal.

Rear Left Woofer

Removal

Hint:
Use same procedures for right and left sides (take left side as an example).

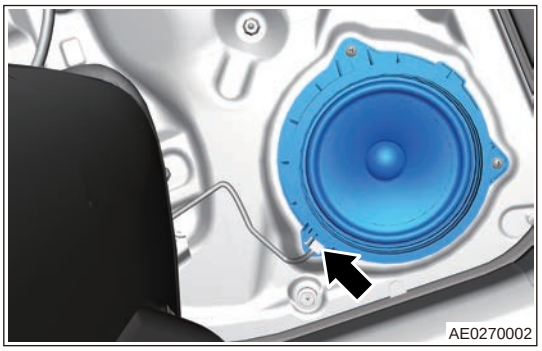
⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing rear left woofer.
- Appropriate force should be applied when removing rear left woofer. Be careful not to operate roughly.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.

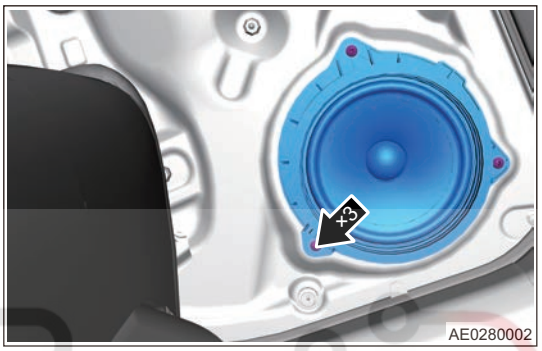
3. Remove the rear left door protector assembly.

4. Disconnect the rear left woofer connector.



5. Remove 3 fixing screws from rear left woofer and remove rear left woofer.

   Tightening Torque
   1.5 ± 0.5 N·m



Installation

⚠ Caution

- Be sure to tighten fixing bolts to specified torque, when installing rear left tweeter.
- Check rear left tweeter for proper operation, after installing rear left tweeter.

1. Installation is in the reverse order of removal.

Combined Antenna

Removal

Hint:

- Be sure to wear safety equipment to prevent accidents, when removing combined antenna.
- Appropriate force should be applied when removing combined antenna. Be careful not to operate roughly.

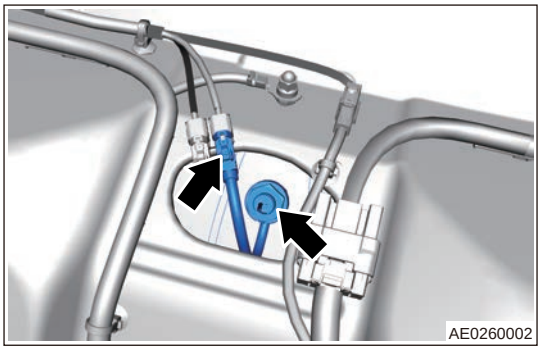
1. Turn off all electrical equipment and ENGINE START STOP switch.

2. Disconnect the negative battery cable.

3. Remove the rear part of interior ceiling.

4. Disconnect combined antenna connector and remove fixing nut from combined antenna.

   Tightening Torque
   5 ± 1 N·m



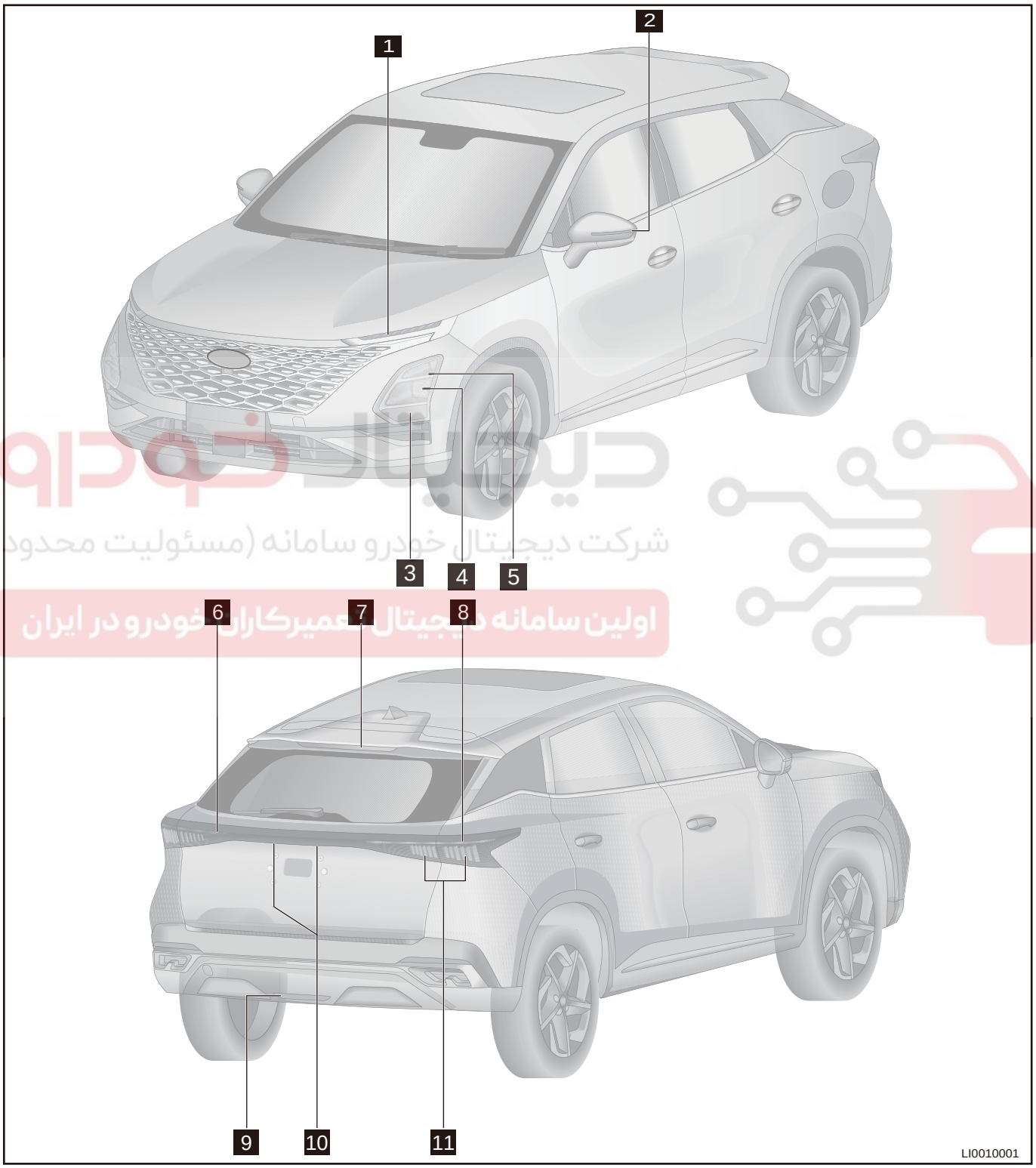
Installation

1. Installation is in the reverse order of removal.

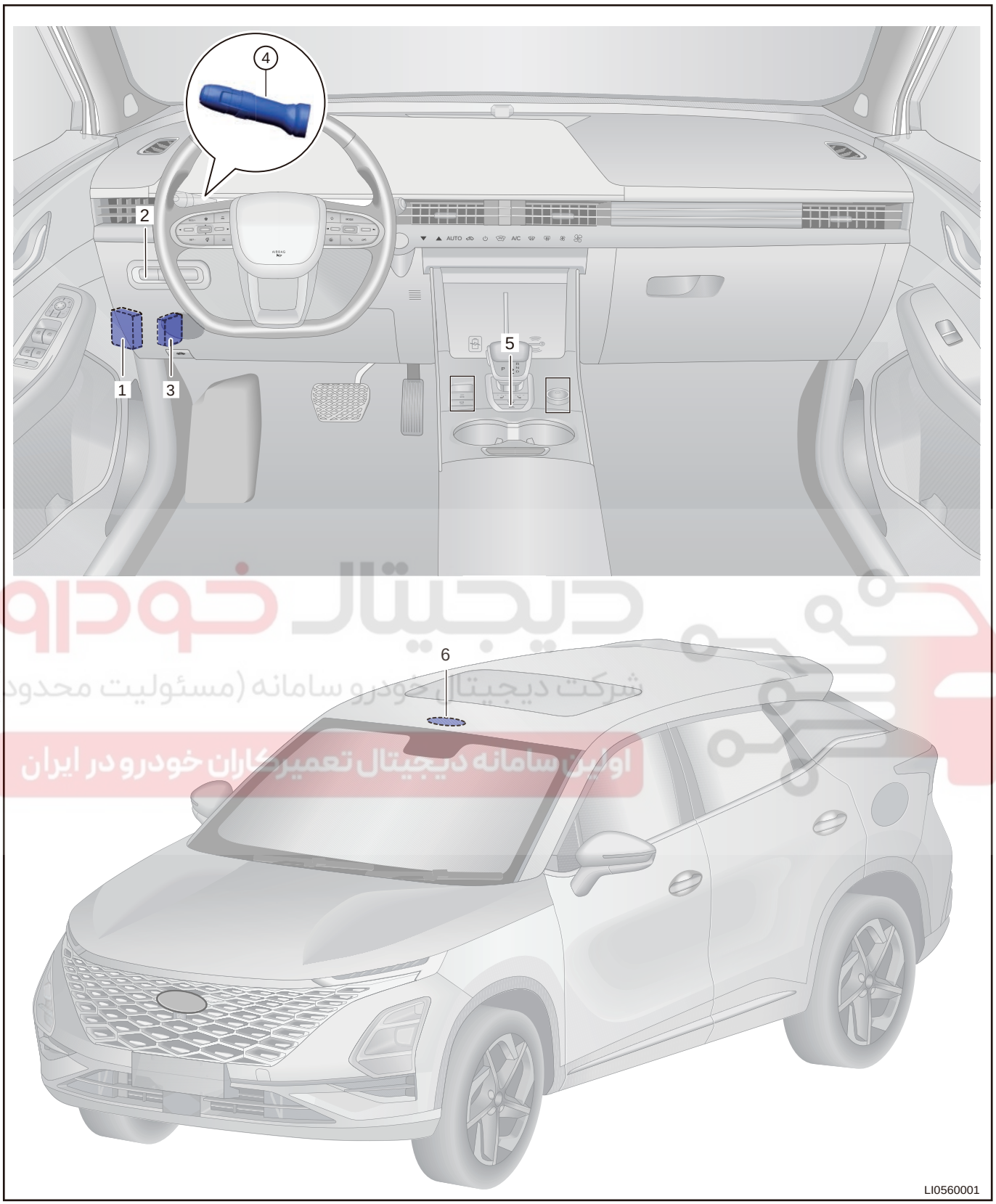
LIGHTING SYSTEM

System Overview

System Components Diagram



1	Position Light/Front Turn Signal Light/ Daytime Running Light	2	Side Turn Signal Light
3	Front Fog Light	4	Low Beam Light
5	High Beam Light	6	Back-up Light
7	High Mounted Stoplight	8	Rear Turn Signal Light
9	Rear Fog Light	10	License Plate Light
11	Stop Light/Rear Position Light		



1	Body Control Module (BCM)	2	Headlight Leveling Switch
3	Instrument Panel Relay Box	4	Combination Switch
5	Hazard Warning Light Switch	6	Dome Light Switch

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 (high beam (auxiliary high beam)/low beam), front position light, turn signal light, daytime running light), side turn signal light, front dome light, foot light and door scuff plate light, instrument panel backlight, rear combination light assembly (including turn signal light, rear position light, brake light), rear fog light (rear fog light and reflector), back-up light, license plate light, high mounted stop light and luggage compartment light. Headlight assembly and rear combination light assembly use semi-closed structure for easy inspection and repair.

Lighting Control Principle

Turn Signal Light Function

1. Left turn signal light operating conditions: IGN ON; left turn signal light switch is activated.
2. When left turn signal light is operating: The flashing frequency of left turn signal light is 400 ms on and 400 ms off.
   - When left turn signal light is operating: Key is switched from ON to OFF, left turn signal light stops operating and meter stops flashing.
3. When left turn signal light is operating: The corresponding bulb is intact, BCM sends LHTurnLightSts (-Bcan) and the load operating frequency is the same as that of left turn signal light; If the corresponding 21W bulb is damaged, BCM will send LHTurnLightSts and the frequency will be 2 times of normal operating frequency of bulb. No matter whether the bulb is damaged or not, BCM will send DirectionIndLeft (Bcan) signal all the time.
4. Operating conditions for right turn signal light: IGN-ON; right turn signal light switch is activated.
5. When right turn signal light is operating: The load flashing frequency of right turn signal light is 400 ms on and 400 ms off.
   - When right turn signal light is operating: Key is switched from ON to OFF, right turn signal light stops operating and meter stops flashing.
6. When right turn signal light is operating: The corresponding bulb is intact, BCM sends RHTurnsignalSts and the load operating frequency is the same as that of right turn signal light; If the corresponding 21W bulb is damaged, BCM will send RHTurnsignalSts and the frequency will be 2 times of normal operating frequency of bulb. No matter whether the bulb is damaged or not, BCM will send DirectionIndRight signal all the time.
7. When left/right turn signal light is operating: Left/right turn signal light input is deactivated, left/right turn signal light should stop operating immediately.
8. When left/right turn signal light is operating: key is switched from IGN ON to ACC or OFF, and left/right turn signal light stops operating immediately.

Lane Change Function

1. Operating conditions for left lane change: IGN ON; left turn signal light switch activates shortly (50 ms ~ 1,000 ms).
2. When left lane change is operating: Left turn signal light flashes 3 times at frequency of 400 ms on and 400 ms off.
3. When left lane change is operating: The corresponding bulb is intact, BCM sends LHTurnsignalSts and load operating frequency is the same as that of left turn signal light; If the corresponding 21 W bulb is damaged, BCM will send LHTurnsignalSts and the frequency will be 2 times of that when bulb is intact. No matter whether the bulb is damaged or not, BCM will work and send DirectionIndLeft signals.

4. During left lane change operation: Left turn signal light switch is activated (50 ms ~ 1000 ms) shortly again, and left turn signal light flashes 3 times again.
5. When left lane change is operating: Left turn signal switch remains active (> 1000 ms) and automatically switches to left turn signal light operating logic.
6. When left lane change is operating: key is switched from IGN ON to ACC or OFF, and left turn signal light stops operating immediately.
7. When left lane change is operating: after flashing 3 times, left turn signal light should stop operating immediately.
8. Operating conditions for right lane change: IGN ON; right turn signal light switch activates shortly (50 ms ~ 1,000 ms).
9. When right lane change is operating: Right turn signal light flashes 3 times at frequency of 400 ms on and 400 ms off.
10. When right lane change is operating: The corresponding bulb is intact, BCM sends RHTurnsignalSts and load operating frequency is the same as that of right turn signal light; the corresponding bulb is damaged, BCM will send RHTurnsignalSts and the frequency will be 2 times as that when bulb is intact. No matter whether the bulb is damaged or not, BCM will send DirectionIndRight signal all the time.
11. During right lane change operation: Right turn signal light switch is activated (50 ms ~ 1,000 ms) shortly again, and right turn signal light flashes 3 times again.
12. When right lane change is operating: Right turn signal switch remains active (> 1,000 ms) and automatically switches to right turn signal light operating logic.
13. When right lane change is operating: key is switched from IGN ON to ACC or OFF, and right turn signal light stops operating immediately.
14. When right lane change is operating: after flashing 3 times, right turn signal light should stop operating immediately.

Hazard Warning Light Function

1. Hazard warning light function activation conditions: Hazard warning light switch is activated when hazard warning light is not activated.
2. When hazard warning light is activated: Flashing frequency of left/right turn signal light and hazard warning light indicator are 400 ms on and 400 ms off.
3. When hazard warning light is activated: The corresponding bulb is intact, BCM sends LHTurnsignalSts and RHTurnsignalSts and load operating frequency is the same as that of turn signal light; If any 21 W bulb is damaged, the flashing frequency of turn signal light CAN signal (LHTurnsignalSts and RHTurnsignalSts) and hazard warning light will be 2 times of that when bulb is intact.
4. When hazard warning light is activated: Hazard warning light switch is activated again and hazard warning light function is turned off; left/right turn signal light stops operating immediately.
5. When ABM sends a collision signal, hazard warning light function should be activated automatically (CAN signal of left/right turn signal light, indicator and turn signal light). Automatically activated hazard warning light function due to collision can be canceled as key is switched to OFF, then to ON or hazard warning light button is pressed.
6. When turn signal light function and hazard warning light function are both effective, BCM should perform the next action.

Hint:
In a ignition cycle, BCM responds to one collision signal only.

Position Light

1. Activation conditions for position light: IGN ON or ACC; position light input or low beam light input is activated.
2. When position light is operating: BCM should send ParkLightSts =1(Bcan).
3. When position light is operating: When position light input and low beam input are deactivated, position light stops operating.
4. When position light is operating: When key is switched to OFF, small light stops operating and sends ParkLightSts=0(Bcan).

Parking light

1. Activation conditions for parking light: Key is switched to OFF; position light switch is activated.
2. When parking light is activated: Position light comes on and BCM should send ParkLightSts = 1 (Bcan).
3. When parking light is activated: Position light switch is deactivated and position light is turned off, BCM should send ParkLightSts = 0 (Bcan).

Low Beam Light

1. Low beam light activation conditions: IGN ON; low beam light switch is activated.
2. When low beam light is activated: BCM sends LowBeamSts=1.
3. When low beam light is activated: When low beam light switch input is canceled, low beam light turns off immediately.
4. When low beam light is activated: When key is turned from IGN ON to ACC or OFF, low beam light turns off immediately.

Follow Me Home

1. Light is in manual mode
   a. FMH function activation condition: Flash switch is activated within 2 minutes after key is switched to OFF, and it can be activated again within 2 minutes regardless of whether FMH function is manually turned off or automatically turned off due to overtime.
   b. When FMH function is activated: Low beam light and small light are illuminated, and both LowBeamSts=1 and ParkTailLightSts=1(Bcan) and FMH time FollowMeTime are sent.
   c. When FMH function is activated: Default duration is 30 S. Activating Flash switch again for a short time will increase duration of FMH function by 30 S each time, but no more than 8 times.
   d. When FMH function is activated: Flash switch is activated for 2 seconds, FMH function will be manually turned off - low beam light and position light will turn off immediately and cumulative duration of FMH will be reset.
   e. When FMH function is activated: Key is switched to ACC or IGN ON, FMH function will be turned off - low beam light and position light will turn off immediately and cumulative duration of FMH will be reset.
   f. When FMH function is activated: FMH function will be automatically turned off after set FMH working time is reached: low beam light and position light will turn off immediately.
2. Light is in automatic mode
   a. The vehicle has fortification condition, light combination switch is in AUTO, remote controller lock button is pressed, and BCM receives valid signal sent from rain sensor, and low beam light and position light are automatically turned on for 30s.
   b. After 30 S or ignition key is switched to OFF/ON/ACC or light combination switch is switched from AUTO, low beam light and position light are turned off.

Lead me to the car

1. Light is in manual mode
   a. Activation condition for LMC function: IGN OFF; FMH is activated in this same ignition cycle (ON->ACC->OFF) and automatically turns off due to timeout; Remote control unlock signal is received; Four doors are closed.
   b. When LMC function is activated: Low beam light and small light are on and send ParkTailLightSts= 1(Bcan).
   c. When LMC function is activated: FMH function cannot be activated, low beam light and small light operate in LMC mode.
   d. When LMC function is activated: Remote control lock signal (four doors are closed) is received, LMC function is turned off - low beam light and position light are off.
   e. When LMC function is activated: Any door is opened, LMC function is turned off - low beam light and small light are off.
   f. When LMC function is activated: Any key is switched to ACC or IGN ON, LMC function is turned off - low beam light and position light are off.

g. When LMC function is activated: After receiving remote control unlock signal, LMC function delays 60 s (subject to remote control unlock time received)
h. When LMC function is activated: Longest duration is 60 s, LMC function will turn off automatically after overtime.

2. Light is in automatic mode
   a. The key is in OFF, light combination switch is in AUTO, remote controller unlock button is pressed, and BCM receives valid signal sent from rain sensor, and low beam light and position light turn on for 30 seconds.
   b. After 30 seconds or ignition key is switched to ACC, low beam light and position light are turned off.
   c. When “Lead me to the car” function is activated, if the activation conditions are met again or “Follow me home” function is activated, it counts for 30 seconds again and the light will not flash.

Automatic Lighting

1. Low beam light and position light turn on if the following conditions are met.
   a. IGN=ON
   b. Light switch is switched to AUTO
   c. LIN valid signal sent from rain sensor is received
2. After automatic lighting is activated, BCM sends low beam light and position light CAN signal to the instrument panel.
3. Low beam lights go out if any condition is met
   a. IGN≠ON
   b. Light switch is switched away from AUTO
   c. Rain sensor LIN signal is invalid
4. Position lights go out if any condition is met.
   a. IGN=ON
   b. After light switch is switched away from AUTO for 2 seconds
   c. After rain sensor LIN signal becomes invalid for 5 seconds

High Beam Light

1. High beam light operating conditions: IGN ON; low beam lights are in activating status, high beam light switch is activated.
2. When high beam light is operating: High beam lights come on and send HighBeamSts=1.
3. When high beam light is operating: When vehicle cranks, high beam lights temporarily stop operating but CAN data will be sent continuously and resume operation after cranking.
4. When high beam light is operating: When high beam light switch is deactivated, high beam light turns off.
5. When high beam light is operating: When low beam light switch is deactivated, high beam light turns off.
6. When high beam light is operating: When key is turned from IGN ON to ACC or OFF, high beam light turns off.

Flash Function

1. Flash operating conditions: IGN-ON; Flash switch is activated.
2. When Flash is operating: High beam lights come on and send HighBeamSts=1.
3. When Flash is operating: When vehicle cranks, high beam lights temporarily stop operating, but CAN data will be sent continuously, and resume operation after cranking.
4. When Flash is operating: When Flash switch is deactivated, high beam lights turn off.
5. When Flash is operating: key is switched from IGN ON to ACC or OFF, high beam lights turn off.

Rear Fog Light Control

1. Operating conditions for rear fog light: IGN-ON; Front fog light or low beam lights are activated; Rear fog light switch is activated.
2. When rear fog light is operating: Rear fog light comes on and send RearFogLightSts=1.

3. When rear fog light is operating: When rear fog light switch is activated again, rear fog light turns off.
4. When rear fog light is operating: key is switched from IGN ON to ACC or OFF, rear fog light is turned off.
5. When rear fog light is operating: When low beam light or front fog light load is turned off, rear fog lights turn off at the same time.

Daytime Running Light

1. Daytime running light operating conditions: Engine starts; low and high beam lights and front fog lights are not activated.
2. When daytime running light is operating: When engine is stopped, daytime running light function turns off.
3. When daytime running light is operating: The activation of position light, low beam light and front fog light will cause daytime running lights to be turned off.
4. When daytime running light is operating: Flash function does not affect daytime running light operation.

Battery Save

1. Battery save function remains active during IGN ON or IGN ACC.
2. Battery save function remains active without other wake-up sources within 15 minutes after IGN OFF.
3. Within 15 minutes of battery save timing after key is switched to OFF: Opening any door or luggage compartment door, receiving remote unlock signal, inserting and removing key will reset timing to 15 minutes.

   Hint:
   Battery save load includes: Key light, dome light and luggage compartment light.
4. BCM enters sleeping mode after 3 minutes when fortifying is successful.

   Hint:
   Battery Save can be woken up by central control unlock or mechanical unlock after Battery Save is turned off.

Dome Light

1. Key insertion and removal, dome light and key light control:
   a. When key is removed, BCM turns on dome light and key light for 3 minutes (fades in and fades out).
   b. Within 3 minutes of dome light operation: Key insertion does not affect the operation timing of dome light and key light.
   c. Within 3 minutes of dome light operation: When the key is turned to IGN ON, dome light and key light will fade out immediately.
   d. Within 3 minutes of dome light operation: If all doors are closed after any door is opened, dome light and key light continue to work for 8 seconds, and then fade out.
2. Door status, dome light and key light control:
   a. If any of doors is opened and remains open, dome light comes on for 3 minutes (fades in and fades out).
   b. Within 3 minutes of dome light operation: If another door is opened while one door remains open, dome light timing reset - continues to come on for 3 minutes, and then fades out.
   c. Within 3 minutes of dome light operation: When key is turned to ON, all doors are closed, dome light will fade out immediately.
   d. Within 3 minutes of dome light operation: When the key is turned to OFF or ACC and all doors are closed, dome light will fade out after 8 s; if the key is turned to IG ON within 8 s, dome light will fade out immediately.
3. Remote control key, dome light and key light control:
   a. When BCM receives unlock signal from remote controller: No matter what status the door is in, dome light comes on for 15 seconds (fades in and fades out).
   b. Within 15 seconds of dome light operation: When the key is turned to ING ON, the dome light will fade out immediately.

c. Within 15 s of dome light operation: When RF is fortified successful, dome light will come off immediately.
d. Within 15 s of dome light operation: When any door is opened, dome light enters into mode 2.

4. Collision signal, dome light and key light control:
   a. With IGN-ON, regardless of door status, if the received collision output is a valid CAN signal sent by airbag controller, BCM will illuminate dome light for 30 minutes. There is no fade-in process, including fade-out process.
   b. Within 30 minutes of dome light illumination: If key is switched to OFF, dome light will fade out immediately.
   c. Within 30 minutes of dome light illumination: If BCM receives RF key lock signal, dome light turns off immediately and there is no fade-out process.

⚠ Warning

- Please turn rear dome light switch to door control gear to test above function logic.
- In any of above conditions (key insertion and removal, door status, remote control key) triggers dome light to come on, another event is triggered again, and dome light illumination time is reset.

3rd Row Dome Light

1. 3rd row dome light operating conditions: Luggage compartment is opened and luggage compartment light continuously turns on for 15 minutes.
2. 3rd row dome light is operating: Luggage compartment is closed and luggage compartment light turns off immediately.

Back-up Light Control

1. Operating conditions for back-up light: IGN=ON.
2. When receiving reverse switch signal or CAN signal sent from TCU, BCM turns on backup light.
3. If there is no switch signal and CAN signal, it will turn off back-up light.

Sudden Braking Hazard Warning Light Alarm Function

1. If the following conditions are met, hazard warning light is activated (left/right turn signal light, indicator light and turn signal light flash):
   a. The key position is in ON position.
   b. CAN signal sent from ESP is received (a signal that requires the light to flash).
2. If any of following conditions is met, stop the hazard warning light (left/right turn signal light, indicator light and turn signal light CAN signal) flashes:
   a. CAN signal sent from ESP is received (a signal that requires the light to stop flashing);
   b. Key position is in OFF position.

⚠ Warning

- When hazard warning light of this function is operating, operate hazard warning light switch, this function stops immediately.
- During this operation, BCM receives collision signal and function stops immediately.

Assist Steering Illumination

1. When following conditions are met for starting of fog light auxiliary lighting function:
   a. IGN=ON
   b. Turn signal light turns on or steering column is turned by more than 45° (corresponding CAN signal is SteeringAngle)
   c. Low beam light is turned on
   d. Vehicle speed is lower than 40 km/h

2. Fog light auxiliary lighting function will be turned off when any of the following conditions is met:
   a. IGN=ACC or OFF
   b. Turn signal light turns off and steering column is turned by less than 10° (corresponding CAN signal is SteeringAngle)
   c. Low beam light is turned on
   d. Vehicle speed is more than 40km/h
3. When fog light auxiliary light is activated, meter indicator is not activated.
4. This function can be configured on line.

Brake Light Control

1. When any of following conditions is met, turn on the brake light function:
   a. When brake switch is pressed, brake switch is a high level self-locking switch.
   b. CAN signal sent from EPB is received (a signal that requires the light to turn on).
   c. CAN signal sent from ESP is received (a signal that required the light to turn on).
2. When brake light function is turned on, left and right brake lights and high mounted stop light turn on at the same time.
3. When all the above conditions are not met, left and right brake lights and high mounted stop light will turn off simultaneously.

LIN Ambient Light

1. Initial status
   a. After vehicle is off-line and powered on for the first time or battery is powered on again after battery is disconnected from vehicle, ambient light function is set to ON by default, after that, system turns on/off according to DVD settings
2. Ambient light turns on / off
   a. When all the following conditions are met, BCM sends LIN signal TheaterDimmingRequest=01 (ON) (Ambient light turns on). The position light output is in activated condition.
   b. DVD setting is turned on
   c. Position light output is deactivated or DVD setting is OFF, ambient light turns off.
3. Door control logic related to ambient light
   a. When all following conditions are met, BCM sends LIN signal TheaterDimmingRequest=01 (ON) (-ambient light ON)
   b. Position light output is deactivated
   c. Vehicle is in fortifying deactivation mode
   d. Any door is open
   e. DVD setting is turned on
4. Ambient light is opened and continues 3 minutes.
5. Close all doors within 3 minutes after ambient light comes on, and the light turns off after 8 seconds delay
6. Open any other door within 3 minutes after ambient light comes on, and then count again for 3 minutes after last door is opened.
7. With position light output is not activated, if one of following conditions is met, BCM sends LIN signal TheaterDimmingRequest=00 (OFF) immediately (ambient light turns off)
   a. Vehicle enters fortifying mode successfully
   b. DVD setting is turned off
8. Ambient light color
   a. Initial status
   b. After the vehicle is powered on first time after leaving production line or powered on after battery is disconnected and reconnected from vehicle, the related driving mode is OFF by default. Then turn on/off according to DVD settings.

c. When the related driving mode is OFF: Ambient light colour is blue by default, then choose different colour according to DVD settings.
d. When related driving mode is turned on
e. In ECO mode, ambient light is green
f. In Sport mode, ambient light is red
g. In normal mode, ambient light is blue

9. Ambient light brightness (musical rhythm)
   a. Initial status
   b. When vehicle rolls from the line and powered on for the first time or vehicle battery is powered on again after disconnection, musical rhythm mode default is off.
   c. When musical rhythm mode is off: Ambient light brightness is Level 3, and different levels can be selected according to DVD setting.
   d. When musical rhythm mode is on: According to different brightness level signals sent from IHU, it changes levels from zero with the musical rhythm

Intelligent Headlight

Function Description

1. The main function of intelligent headlight control system is the intelligent low/high beam switching. The system can request high beam ON/OFF according to the traffic and environmental factors. If there are no relevant traffic participants in front, the system will activate high beam; With system activated, if there is a meeting or following vehicle or street lighting, high beam will be turned off.

Control principle

1. After IGN ON, system switch is turned to ON, and headlight is in AUTO, camera will detect vehicle status, surrounding environment and road condition in front. If IHC opening conditions are met, system will request high beam to be turned ON; When followings, oncomings or vehicles related environment (including the existence of multiple street lights, if external environment brightness is higher than the threshold, etc.) do not meet the IHC open conditions, system will request high beam to be turned off, once the system ON conditions resume, system will follow a certain delay mechanism and send high beam request without interfering with other traffic participants (ECE48 defined vehicles driving in opposite or same directions, ECE50 defined motorbikes driving in opposite or same directions, electric motorcars with light as well as bicycles with light driving in same direction, light size must be more than 150*150 mm and light intensity is greater than 30 cd). The request of low/high beam switching is transmitted to BCM from multi-function front camera via CAN signal, and driver can change lighting state at any time using light rod.

System operating precondition

1. IGN ON
2. Headlight switch is in AUTO
3. Low beam light turns on automatically
4. BCM judges that all the above conditions are met, then BCM sends corresponding system switch requests according to functional logic. If any condition is not met, it will send HWASW = 0 continuously and system cancels activation requests

High Beam Light Request Condition

1. IHC function is activated
2. Vehicle speed $\geqslant$ 40 km/h
3. Ambient light $<$ 6 lux
4. There is no related light source ahead
5. If all the above high beam light ON conditions are met and related suppression conditions are not met, the system requests high beam light to be turned on

Minimum ON Time of High Beam Light

1. To avoid frequent switching between low beam and high beam, it is recommended to follow the following delay strategy when turning on high beam light

If following several traffic conditions are detected, the system will request to use high beam light. After the relevant traffic participants leave the corresponding conditions, there will be a delay in the corresponding light state switching, refer to table below for details.

Low Beam Light Operation Condition			High Beam Light Switching Request Condition	Delay Time
Operating Condition		Operation condition range		
Driving in same direction	Overtaking	< 50 m	The vehicle in front is detected within 50 m of your vehicle and overtook by your vehicle (regardless of left or right);	4 s
	Following	< 50 m	The vehicle in front is detected within 50 m of your vehicle and then disappears;	2 s
	Following	50 - 200 m	The vehicle in front is detected within 50 - 200 m of your vehicle and then disappears;	3 s
	There is a vehicle in front	> 200 m	The vehicle in front is detected within 200 m of your vehicle and then disappears;	2 s
Driving in opposite direction	Meeting	< 50 m	The vehicle in front is detected within 50 m of your vehicle and meets with your vehicle on the left;	0.5 s
	Driving in opposite direction	50 - 200 m	The vehicle in front is detected within 50 - 200 m of your vehicle and then disappears;	2 s
	There is a vehicle in front	> 200 m	The vehicle in front is detected within 200 m of your vehicle and then disappears;	2 s

High Beam OFF Request

1. With system turned off, system will send 0x0 signal by default and request high beam light to be turned off.
2. The system will request high beam light to be turned off if following faults occur in multi-function front camera:
   a. Permanent system hardware failure
   b. Temporary system hardware failure
   c. Permanent lighting failure (lighting failure time is more than 45 minutes)
   d. Temporary lighting failure
   e. Overheating protection
   f. Overvoltage
   g. Hot restart
   h. Communication fault
   i. Signal fault
3. The system will request high beam light to be turned off when multi-function front camera detects the following auto-glare status
   a. Heavy fog weather
   b. Fog light is activated
   c. Wiper running speed achieves second level (continue fast signal) or above
4. Road lighting
   a. If three or more street lights (including tunnels) are detected, the system will request high beam light to be turned off. Reflectors on the side of highway are not allowed to be misidentified as lighting sources
5. Ambient brightness
   a. If ambient brightness is too high (ambient light > 12 lux, which is directly obtained from the camera), the system will request high beam light to be turned off.
6. Vehicle speed
   a. The system will request high beam light to be turned off when vehicle speed is lower than 30 km/h (adjustable).
7. Traffic condition
   a. If a traffic participant is detected in front of your vehicle, the system will request high beam light to be turned off.
   b. Signs on the road are not allowed to be misidentified as vehicles driving in opposite or same direction.
8. Other descriptions
   a. Auto position: System status light is allowed to be turned on only when system is in Auto position and low beam light ON conditions are met
   b. Low beam light status: In Auto position, the system is allowed to be turned on after low beam light comes on automatically
   c. High beam OFF request: System can request high beam light to be turned off when any of high beam OFF request condition is met
   d. High priority light changing suppression: System does not change the light distribution request of the vehicle's current state under high priority light suppression conditions
   e. Low priority light changing suppression: System will maintain the light distribution request of the vehicle's current state under low priority light suppression condition. At this time, if the system is in low beam light state and the conditions of high beam light are met, it is not allowed to switch to the high beam light state; If the system is in high beam light state and the conditions of low beam light are met, it is allowed to switch to low beam light state.
   f. High beam request: Under the function activation condition, the system will request high beam to be turned on if all low beam requests and suppression conditions are not met.
   g. Priority mechanism: Driver can change light distribution using headlight lever at any time.

h. HC function switch: Multi-function front camera memorizes the IHC function audio setting items. After the next power on, the last memorized switch state will be sent.

Diagnosis & Testing

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.
Rear combination light fixed part consists of 2 brake light bulbs and 2 position light bulbs. If one damaged bulb and the other does not come on, you need to check the two bulbs simultaneously and contact CHERY service station to check and repair if necessary.

Symptom	Suspected Area
Low beam light does not come on (one side)	Fuse
	Headlight bulb
	Wire harness or connector
Low beam lights do not come on (both sides)	Fuse
	Headlight bulb
	Combination light switch assembly
	Low beam relay
	Wire harness or connector
	Body Control Module (BCM)
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
	Body Control Module (BCM)
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
	Body Control Module (BCM)

Daytime Running Light

Symptom	Suspected Area
Daytime running light does not come on	Daytime running light bulb
	Wire harness or connector
	Body Control Module (BCM)

Rear fog light

Symptom	Suspected Area
Rear fog light does not come on	Rear fog light bulb
	Combination light switch
	Wire harness or connector
	Body Control Module (BCM)

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
	Body Control Module (BCM)
	Hazard warning light switch
Hazard warning light does not come on (hazard warning light is normal)	Hazard warning light switch
	Wire harness or connector
	Body Control Module (BCM)
Turn signal light does not come on (hazard warning light is normal)	Combination light switch
	Wire harness or connector
	Body Control Module (BCM)

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
	Body Control Module (BCM)

Brake light

Symptom	Suspected Area
Brake lights do not come on (all)	Fuse
	Brake light bulbs (all)
	Brake light switch
	Wire harness connector
	Body Control Module (BCM)
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
	Body Control Module (BCM)

Back-up light

Symptom	Suspected Area
Back-up lights do not come on (all)	Transmission Control Unit (TCU)
	Back-up light bulb
	Back-up light switch (MT)
	Body Control Module (BCM)
	Wire harness or connector
	Gear switch

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.

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.

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.

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1001-11	Left Side Turn Lamp Control Circuit-Circuit Short to Ground	/	• Bulb damaged • Turn signal light switch • Wire harness or connector damaged • BCM	/
B1001-13	Left Side Turn Lamp Control Circuit-Circuit Open	/		/

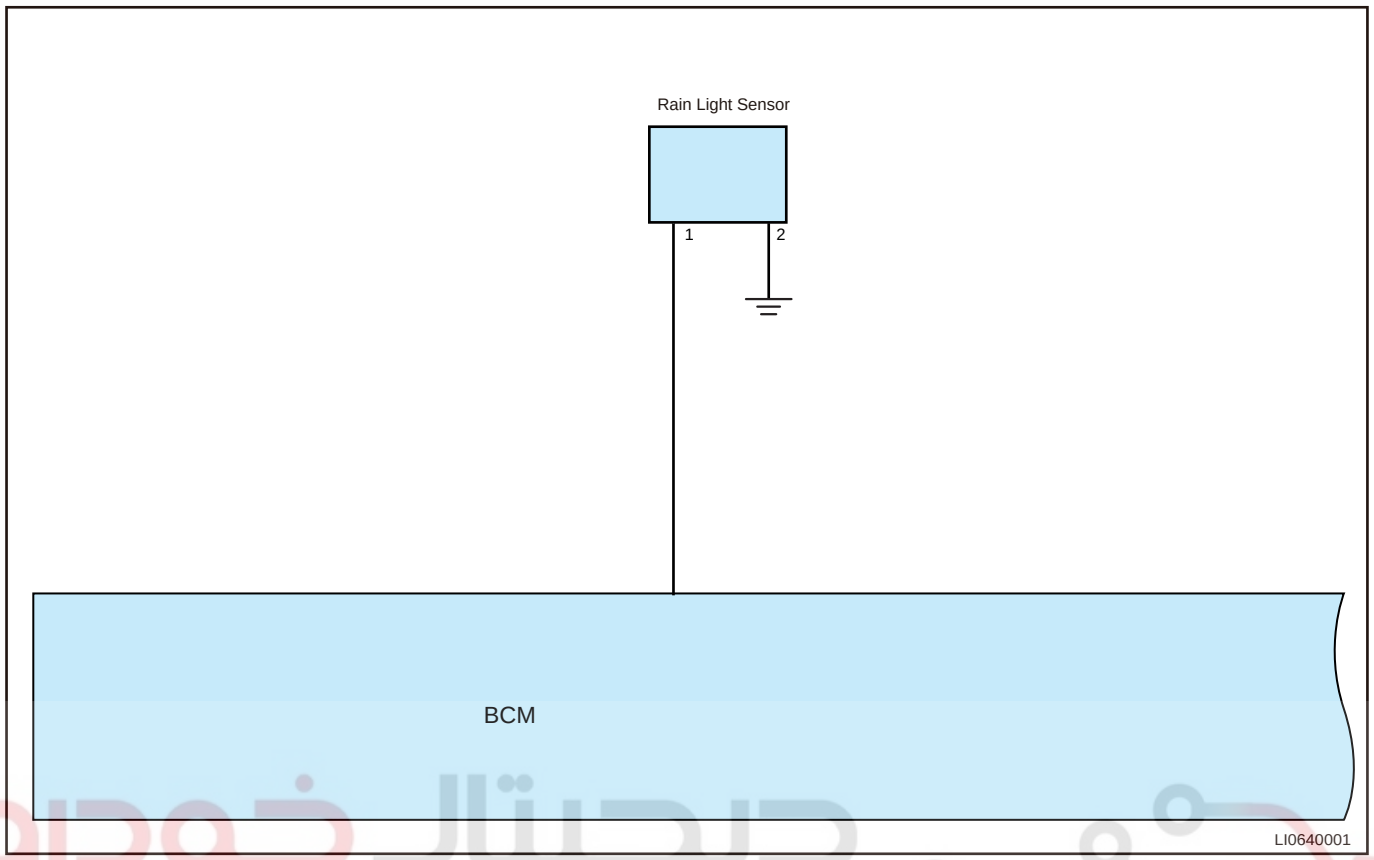
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1002-11	Right Side Turn Lamp Control Circuit-Circuit Short to Ground	/	• Bulb damaged • Turn signal light switch • Wire harness or connector damaged • BCM	/
B1002-13	Right Side Turn Lamp Control Circuit-Circuit Open	/		/
B1005-11	Front Park Light Output Control Circuit-Circuit Short to Ground	/	• Wire harness or connector damaged • Bulb damaged • Position light switch • BCM	/
B1005-13	Front Park Light Output Control Circuit-Circuit Open	/		/
B1006-11	Rear Park Light Output Control Circuit-Circuit Short to Ground	/	• Wire harness or connector damaged • Bulb damaged • Position light switch • BCM	/
B1006-13	Rear Park Light Output Control Circuit-Circuit Open	/		/
B1008-11	Rear Fog Control Circuit-Circuit Short to Ground	/	• Wire harness or connector damaged • Damaged rear fog light • BCM	/
B1008-13	Rear Fog Control Circuit-Circuit Open	/		/
B1008-71	Rear Fog Control Circuit-Actuator Stuck	/		/
B101E-11	L-DRL Control Circuit-Circuit Short to Ground	/	• Wire harness or connector damaged • Daytime running light damaged • BCM	/
B101E-13	L-DRL Control Circuit-Circuit Open	/		/
B101F-11	R-DRL Control Circuit-Circuit Short to Ground	/		/
B101F-13	R-DRL Control Circuit-Circuit Open	/		/

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1035-11	Brake Light Control Circuit-Circuit Short to Ground	/	• Wire harness or connector damaged • Brake light damaged • Brake light switch damaged • Fuse • BCM	/
B1035-13	Brake Light Control Circuit-Circuit Open	/		/
B1036-11	H-Brake Light Control Circuit-Circuit Short to Ground	/		/
B1036-13	H-Brake Light Control Circuit-Circuit Open	/		/
B1039-11	NTC Output Circuit / Reversing Lamp Control Circuit-Circuit Short to Ground	/	• Wire harness or connector damaged • Back-up light damaged • BCM	/
B1039-13	NTC Output Circuit / Reversing Lamp Control Circuit-Circuit Open	/		/
B1047-62	Optical Rain Sensor Signal Compare Failure	/	• Module failure	/
B1027-11	Battery Save Control Circuit	/	• Module failure	/

DTC Diagnosis Procedure

DTC	B1047-62	Optical Rain Sensor Signal Compare Failure

Description
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 optical rain 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) Replace the original optical rain sensor with a new one for running test.

OK → **Replace optical rain sensor**

NG

2	**Check for open or short in 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 cable.

(c) Disconnect optical rain sensor connector and body control 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) Using ohm band of digital multimeter, check for continuity between optical rain sensor (1) and BCM to check circuit for open.

Multimeter Connection	Condition	Specified Condition
Optical rain sensor (1) - Body control module (to terminal)	Always	⩽ 1 Ω

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

(h) Using ohm band of digital multimeter, check for continuity between optical rain sensor (2) and body ground.

Multimeter Connection	Condition	Specified Condition
Optical rain sensor (2) - Body ground	Always	⩽ 1 Ω

NG → **Replace wire harness**

OK

3	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 body control module**

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

DTC	B1027-11	Battery Save Control Circuit

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 → **Turn off vehicle power supply (- disconnect the negative battery cable), then clear DTC**

OK

2	**Reconfirm DTCs**

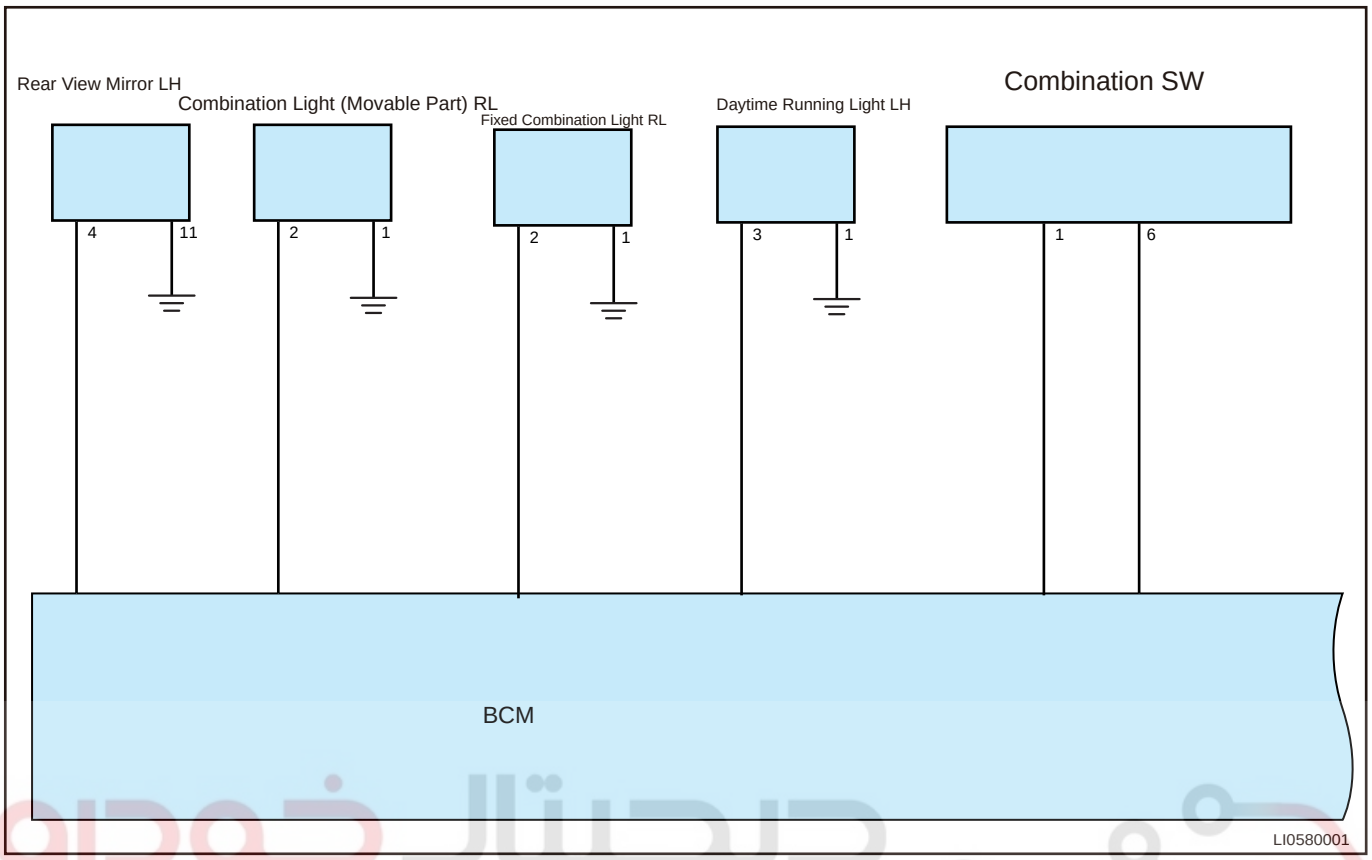
Use circuit diagram as a guide to perform the following inspection procedures:
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

DTC	**B1001-11**	**Left Side Turn Lamp Control Circuit-Circuit Short to Ground**
DTC	**B1001-13**	**Left Side Turn Lamp Control Circuit-Circuit Open**

Description
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 left turn signal light bulb**

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 cable.

(c) Remove the left turn signal light bulb, and check if left turn signal light bulb filament is blown.

NG → **Replace left turn signal light bulb**

-

OK

2	**Using diagnostic tester to perform active test**

(a) Turn ENGINE START STOP switch to ON.
(b) Connect the diagnostic tester, perform active test for left turn signal light.

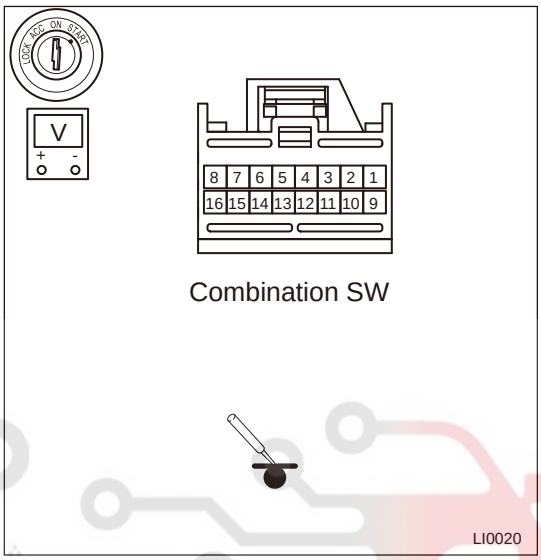
NG → **Check actuator circuit wire harness**

OK

3	**Check left turn signal light control circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the light switch connector.
(d) Connect the negative battery cable.
(e) Turn ENGINE START STOP switch to ON.
(f) Using a digital multimeter, measure voltage between light switch connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Light switch (6) - Body ground	Always	Not less than 12 V



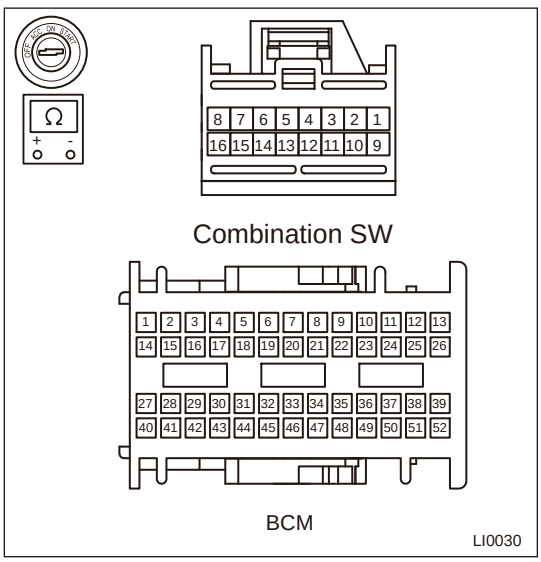
NG → **Repair or replace faulty wire harness**

OK

4	**Check combination switch control circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the body control module connector.
(d) Disconnect the light switch connector.
(e) Using a digital multimeter, measure if resistance between light switch connector and BCM is normal according to table below.

Multimeter Connection	Condition	Specified Condition
Light switch (1) - BCM (- corresponding terminal)	Always	⩽ 1 Ω



NG → **Repair or replace faulty wire harness**

OK

5	Check combination switch

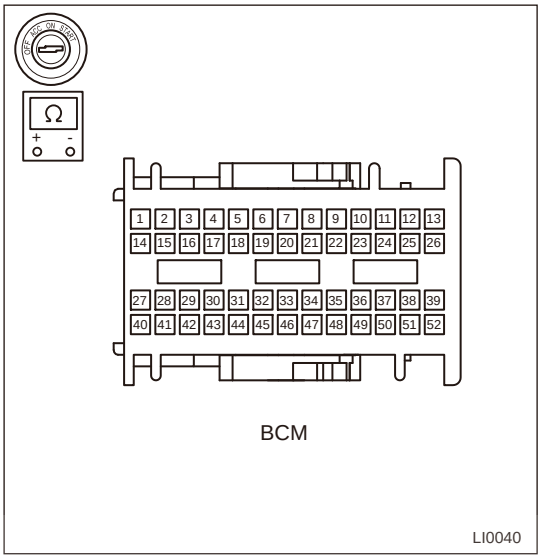
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the body control module connector.

(d) Using a digital multimeter, measure if resistance between BCM connectors is normal when turning on left turn signal light according to table below.

Multimeter Connection	Condition	Specified Condition
BCM (- combination light switch) - BCM (- analog ground)	Always	1000 Ω



NG → Replace combination switch

OK

6	Check left turn signal light output circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

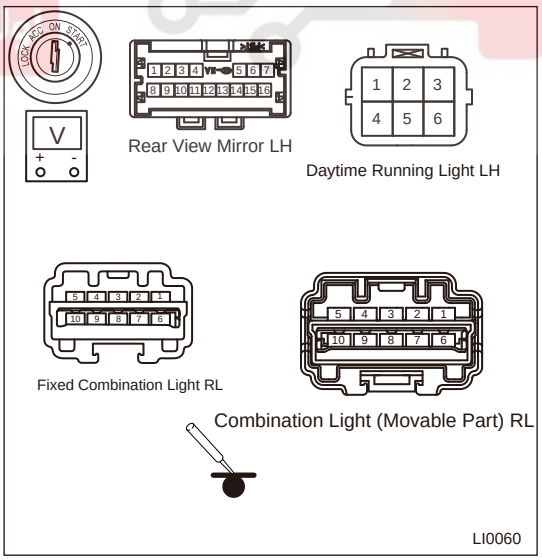
(c) Disconnect the left turn signal light connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

(f) Using a digital multimeter, measure voltage between left turn signal light connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Left rear view mirror (4) - Body ground	Always	Not less than 12 V
Movable part of rear left combination light (2) - Body ground		
Fixed part of rear left combination light (2) - Body ground		



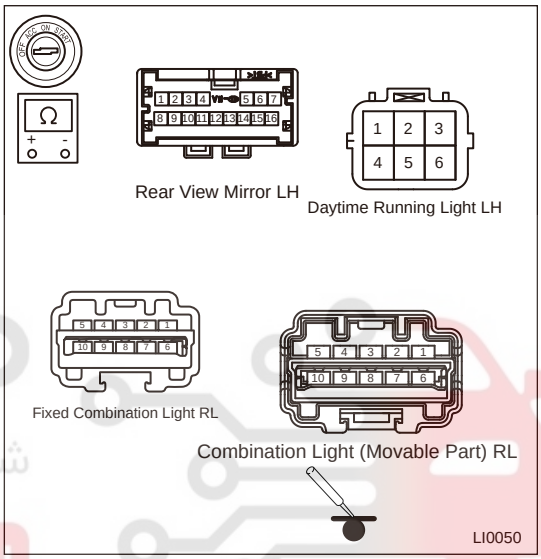
Multimeter Connection	Condition	Specified Condition
Left daytime running light (3) - Body ground		

NG → **Repair or replace faulty wire harness**

OK

7	Check output circuit ground for continuity

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the left turn signal light connector.
(d) Using a digital multimeter, check for continuity between left turn signal light connector and body ground according to table below.



Multimeter Connection	Condition	Specified Condition
Left rear view mirror (11) - Body ground	Always	⩽ 1 Ω
Movable part of rear left combination light (1) - Body ground		
Fixed part of rear left combination light (1) - Body ground		
Left daytime running light (1) - Body ground		

NG → **Repair or replace faulty wire harness**

OK

8	Reconfirm DTCs

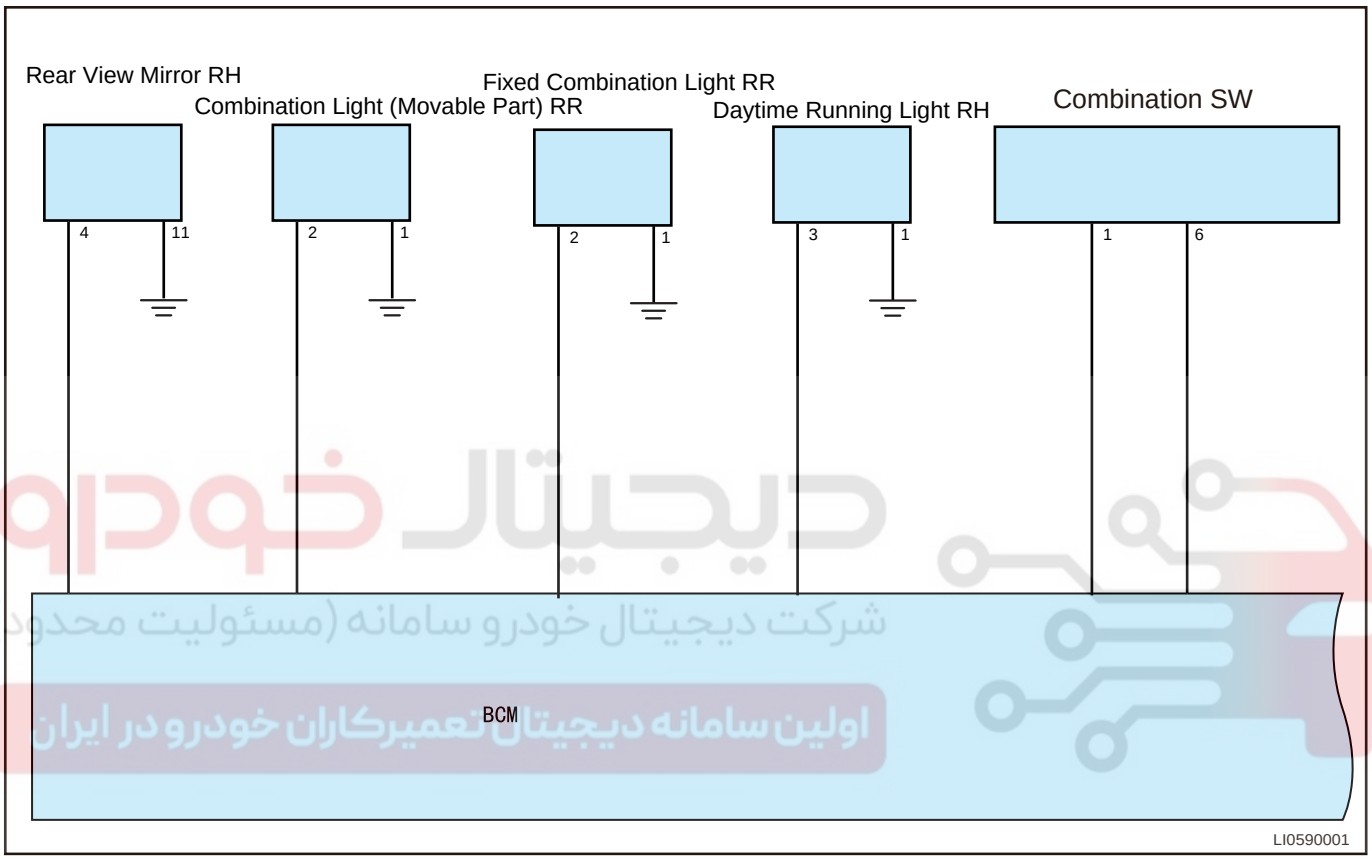
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

DTC	**B1002-11**	**Right Side Turn Lamp Control Circuit-Circuit Short to Ground**
DTC	**B1002-13**	**Right Side Turn Lamp Control Circuit-Circuit Open**

Description
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 right turn signal light bulb**

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 cable.

(c) Remove right turn signal light bulb, and check if right turn signal light bulb filament is blown.

NG → **Replace right turn signal light bulb**

OK

2	Using diagnostic tester to perform active test

(a) Turn ENGINE START STOP switch to ON.

(b) Connect the diagnostic tester, perform active test for right turn signal light.

NG → **Check actuator circuit wire harness**

OK

3	Check control circuit output voltage

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

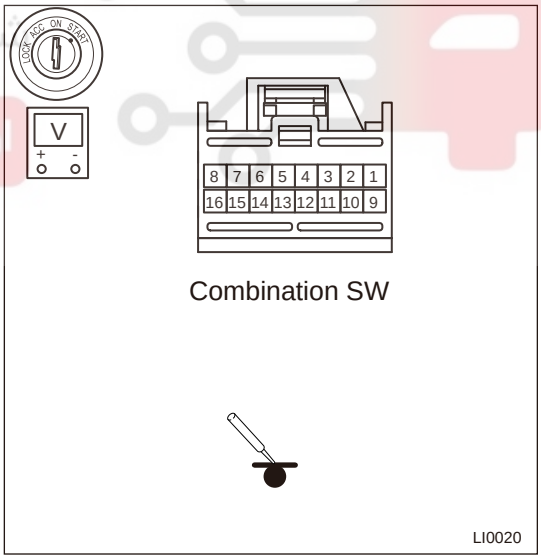
(c) Disconnect the light switch connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

(f) Using a digital multimeter, measure voltage between light switch connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Light switch (6) - Body ground	Always	Not less than 12 V



Combination SW

NG → **Repair or replace faulty wire harness**

OK

4	Check combination switch control circuit

(a) Turn ENGINE START STOP switch to OFF.

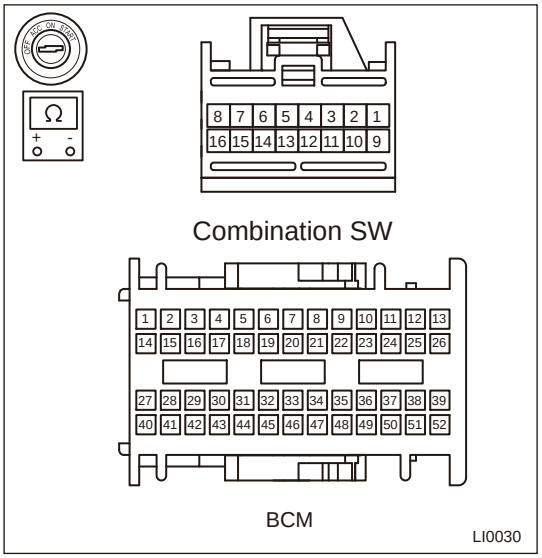
(b) Disconnect the negative battery cable.

(c) Disconnect the body control module connector.

(d) Disconnect the light switch connector.

(e) Using a digital multimeter, measure if resistance between light switch and BCM is normal according to table below.

Multimeter Connection	Condition	Specified Condition
Light switch (1) - BCM (- corresponding terminal)	Always	⩽ 1 Ω



NG → **Repair or replace faulty wire harness**

OK →

5	Check combination switch

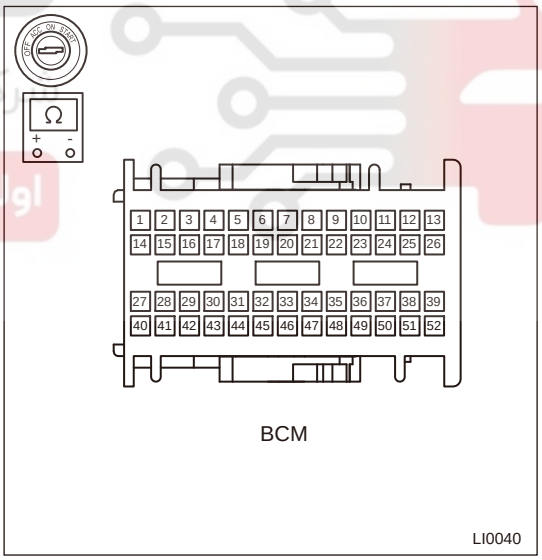
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the body control module connector.

(d) Using a digital multimeter, measure if resistance between connector BCM terminals is normal when turning on right turn signal light according to table below.

Multimeter Connection	Condition	Specified Condition
BCM (turn signal light switch) - BCM (analog ground)	Always	3000 Ω

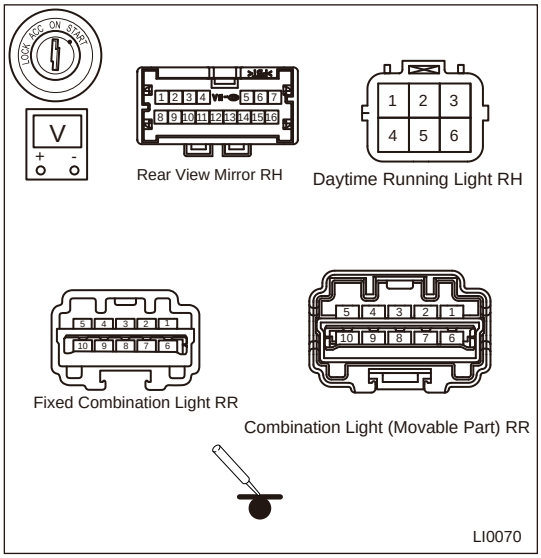


NG → **Replace combination switch**

OK →

6	Check right turn signal light output circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the right turn signal light connector.
(d) Connect the negative battery cable.
(e) Turn ENGINE START STOP switch to ON.
(f) Using a digital multimeter, measure voltage between right turn signal light connector and body ground according to table below.



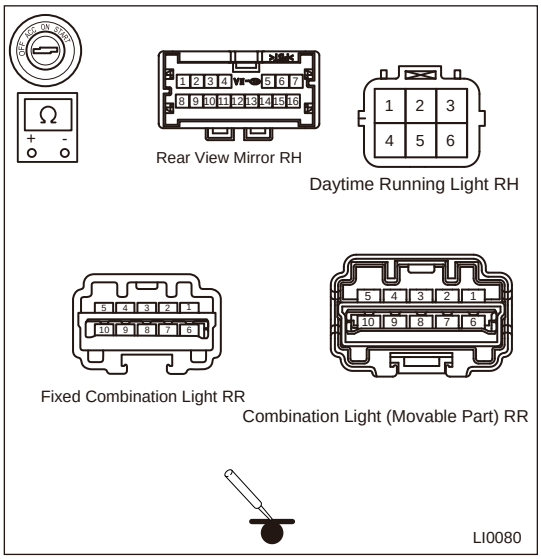
Multimeter Connection	Condition	Specified Condition
Right rear view mirror (4) - Body ground	Always	Not less than 12 V
Movable part of rear right combination light (2) - Body ground		
Fixed part of rear right combination light (2) - Body ground		
Right daytime running light (3) - Body ground		

NG → **Repair or replace faulty wire harness**

OK →

7	**Check output circuit ground for continuity**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the right turn signal light connector.
(d) Using a digital multimeter, check for continuity between right turn signal light connector and body ground according to table below.



Multimeter Connection	Condition	Specified Condition
Right rear view mirror (11) - Body ground	Always	⩽ 1 Ω
Movable part of rear right combination light (1) - Body ground		

Multimeter Connection	Condition	Specified Condition
Fixed part of rear right combination light (1) - Body ground		
Right daytime running light (1) - Body ground		

NG → **Repair or replace faulty wire harness**

OK

8	Reconfirm DTCs

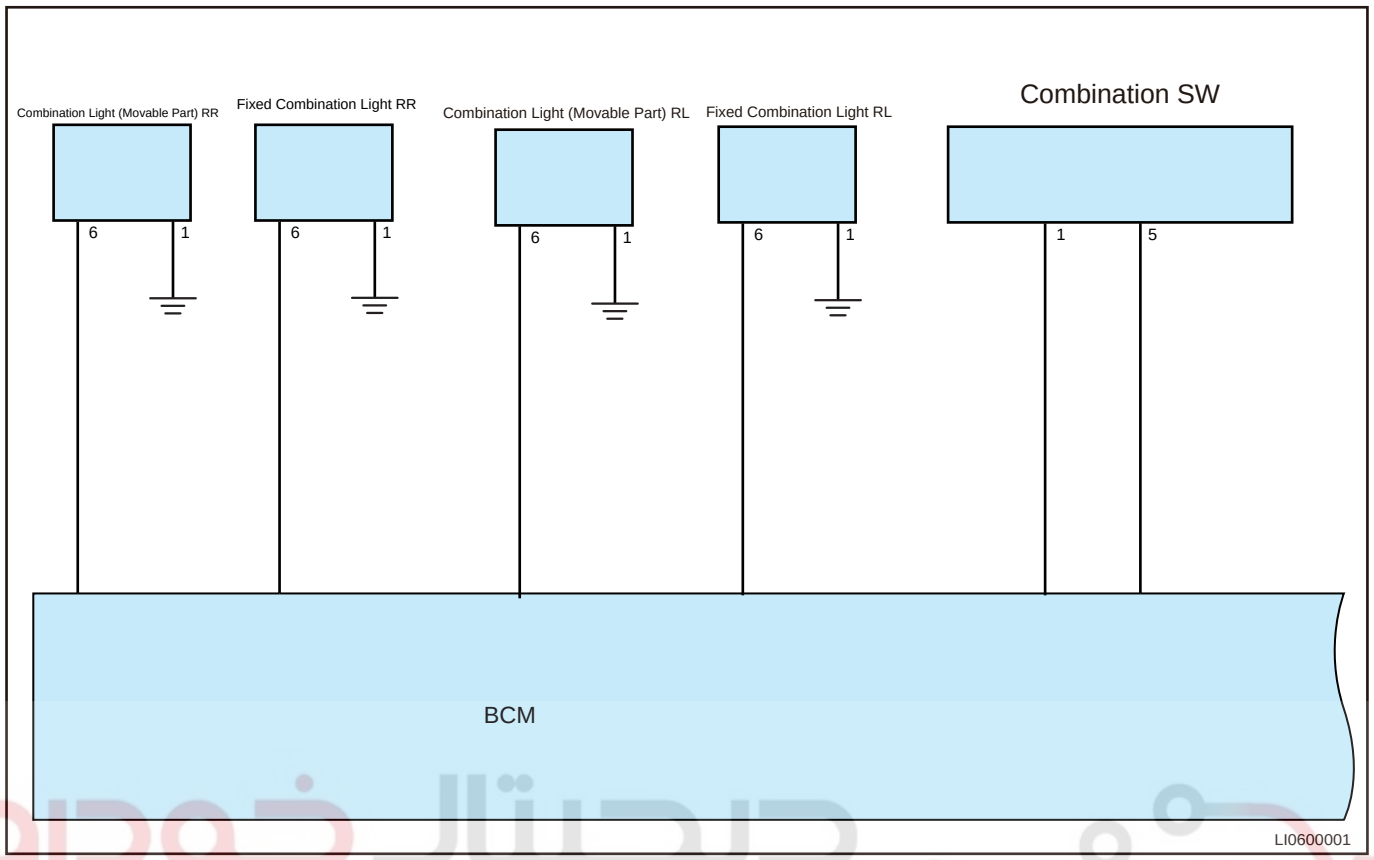
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

DTC	B1006-11	Rear Park Light Output Control Circuit-Circuit Short to Ground
DTC	B1006-13	Rear Park Light Output Control Circuit-Circuit Open

Description
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 front position light bulb**

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 cable.

(c) Remove the rear position light bulb, and check if rear position light bulb is blown.

NG → **Replace rear position light bulb**

OK

2	**Using diagnostic tester to perform active test**

(a) Turn ENGINE START STOP switch to ON.
(b) Connect the diagnostic tester, perform active test for rear position light.

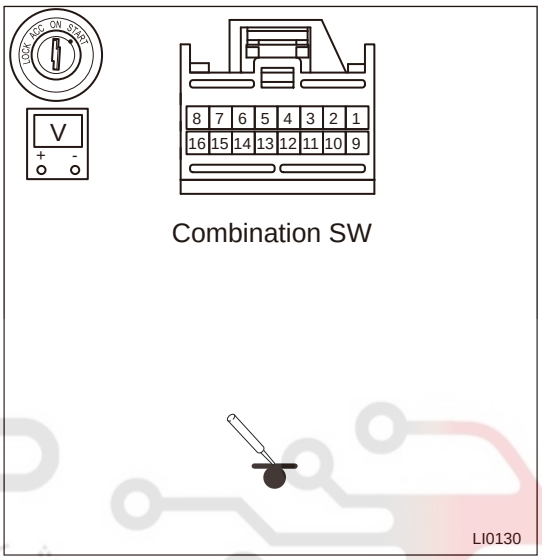
NG → **Check actuator circuit wire harness**

OK

3	**Check rear position light control circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the combination switch connector.
(d) Connect the negative battery cable.
(e) Turn ENGINE START STOP switch to ON.
(f) Using a digital multimeter, measure voltage between combination switch connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Combination switch (5) - Body ground	Always	Not less than 12 V



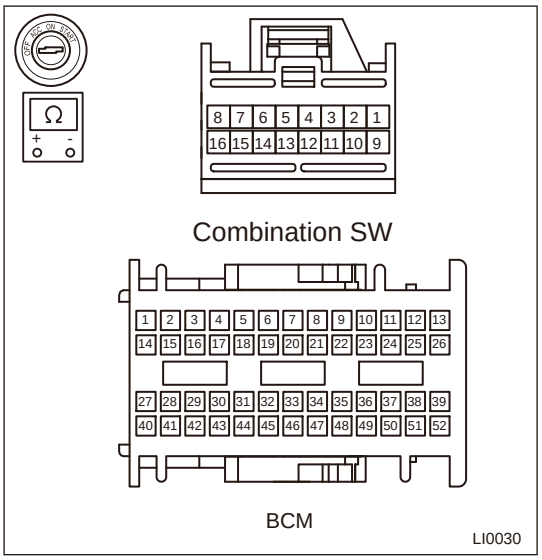
NG → **Repair or replace faulty wire harness**

OK

4	**Check combination switch control circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the body control module connector.
(d) Disconnect the combination switch connector.
(e) Using a digital multimeter, measure if resistance between combination switch connector and BCM is normal according to table below.

Multimeter Connection	Condition	Specified Condition
Combination switch (1) - BCM (45)	Always	⩽ 1 Ω



NG → **Repair or replace faulty wire harness**

OK

5	Check combination switch

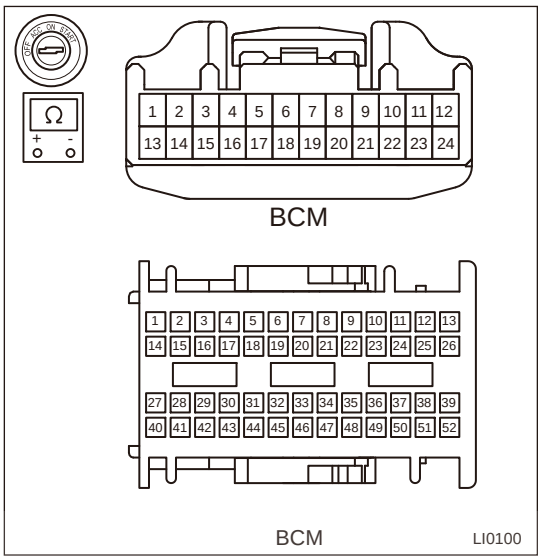
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the body control module connector.

(d) Using a digital multimeter, measure if resistance between connector BCM terminals is normal when turning on position light according to table below.

Multimeter Connection	Condition	Specified Condition
BCM (lighting input) - BCM (- analog ground)	Always	3000 Ω



NG → **Replace combination switch**

OK

6	Check rear position light output circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

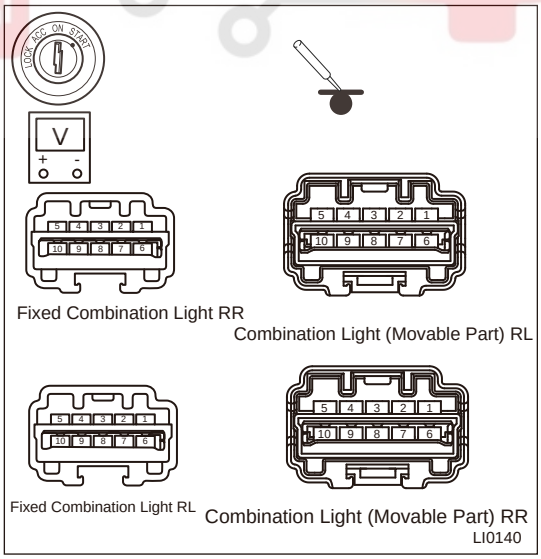
(c) Disconnect the rear position light connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

(f) Using a digital multimeter, measure voltage between rear position light connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Movable part of rear right combination light (6) - Body ground	Always	Not less than 12 V
Fixed part of rear right combination light (6) - Body ground		



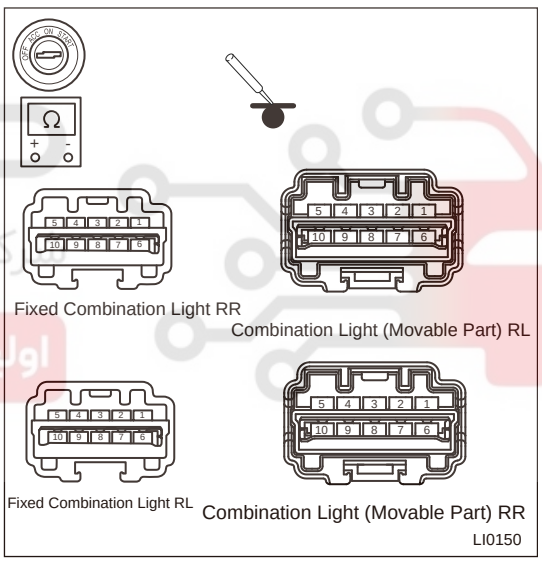
Multimeter Connection	Condition	Specified Condition
Movable part of rear left combination light (6) - Body ground		
Fixed part of rear left combination light (6) - Body ground		

NG → **Repair or replace faulty wire harness**

OK

7	Check output circuit ground for continuity

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the rear position light connector.
(d) Using a digital multimeter, check for continuity between rear position light connector and body ground according to table below.



Multimeter Connection	Condition	Specified Condition
Movable part of rear right combination light (1) - Body ground	Always	⩽ 1 Ω
Fixed part of rear right combination light (1) - Body ground		
Movable part of rear left combination light (1) - Body ground		
Fixed part of rear left combination light (1) - Body ground		

NG → **Repair or replace faulty wire harness**

OK

8	Reconfirm DTCs

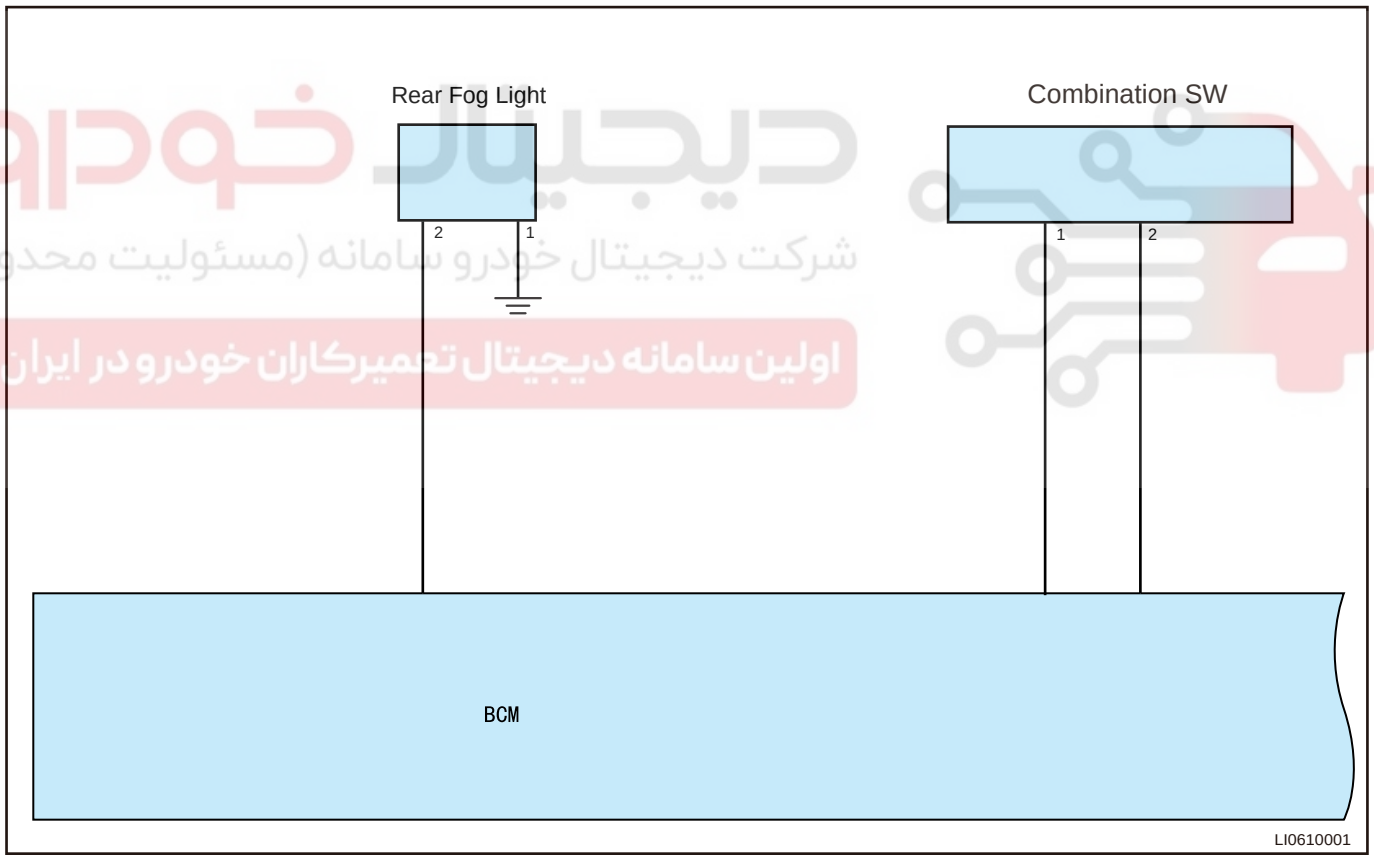
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

DTC	**B1008-11**	**Rear Fog Control Circuit-Circuit Short to Ground**
DTC	**B1008-13**	**Rear Fog Control Circuit-Circuit Open**
DTC	**B1008-71**	**Rear Fog Control Circuit-Actuator Stuck**

Description
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 rear fog light bulb

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 cable.

(c) Remove the rear fog light bulb, and check if bulb filament is blown.

NG → **Replace rear fog light bulb**

OK

2	Using diagnostic tester to perform active test

(a) Turn ENGINE START STOP switch to ON.

(b) Connect the diagnostic tester, perform active test for rear position light.

NG → **Check actuator circuit wire harness**

OK

3	Check rear fog light control circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

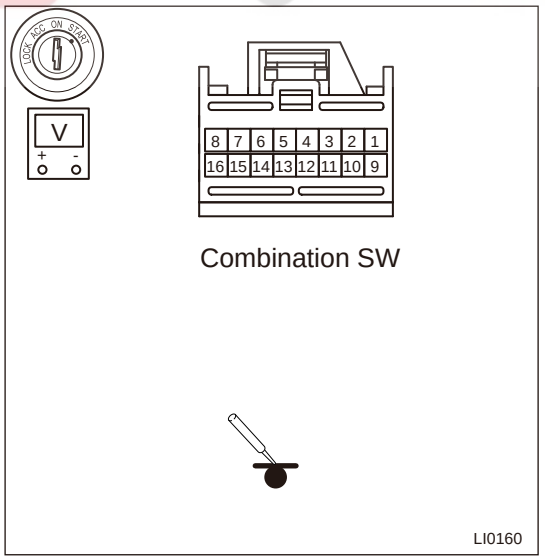
(c) Disconnect the combination switch connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

(f) Using a digital multimeter, measure voltage between combination switch connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Combination switch (2) - Body ground	Always	Not less than 12 V



NG → **Repair or replace faulty wire harness**

OK

4	Check combination switch control circuit

(a) Turn ENGINE START STOP switch to OFF.

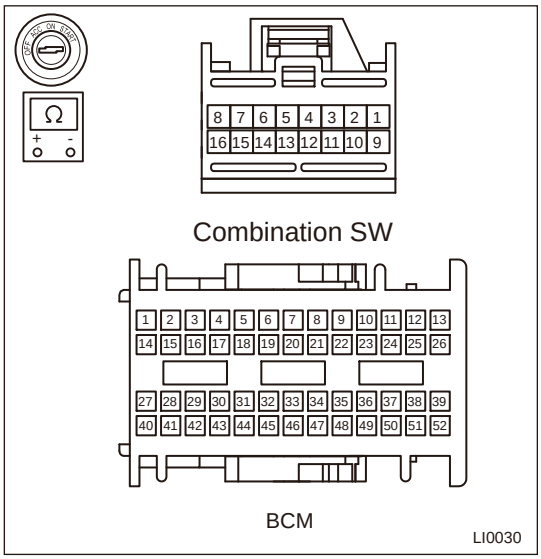
(b) Disconnect the negative battery cable.

(c) Disconnect the body control module connector.

(d) Disconnect the combination switch connector.

(e) Using a digital multimeter, measure if resistance between combination switch and BCM is normal according to table below.

Multimeter Connection	Condition	Specified Condition
Combination switch (1) - BCM (corresponding terminal)	Always	⩽ 1 Ω



NG → **Repair or replace faulty wire harness**

OK

5	Check combination switch

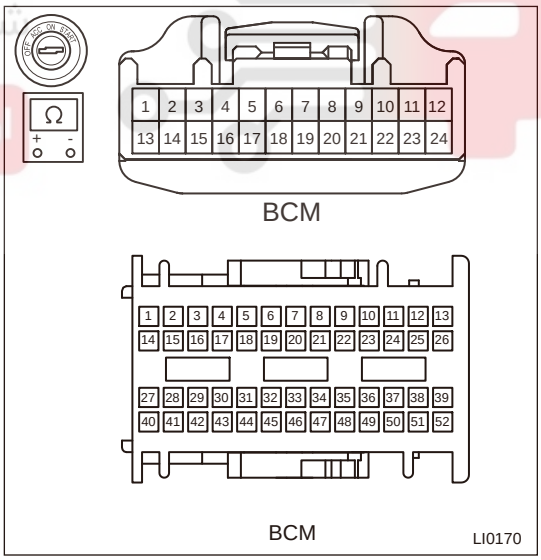
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the body control module connector.

(d) Using a digital multimeter, measure if resistance between connector BCM terminals is normal when turning on fog light according to table below.

Multimeter Connection	Condition	Specified Condition
BCM (rear fog light output) - BCM (analog ground)	Always	⩽ 1 Ω



NG → **Replace combination switch**

OK

6	Check rear fog light output circuit

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

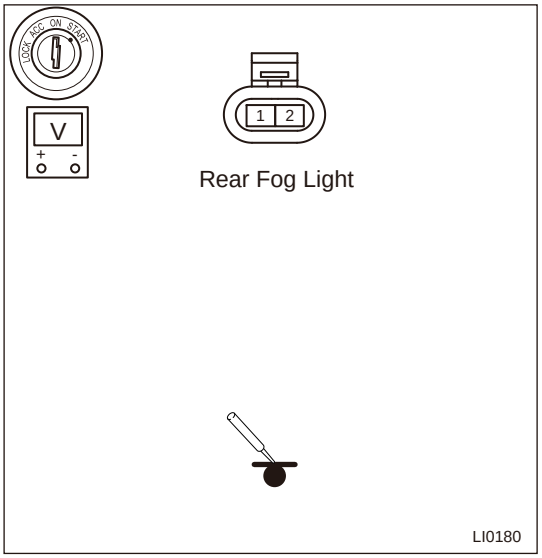
(c) Disconnect the rear fog light connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

(f) Using a digital multimeter, measure voltage between rear fog light connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Rear fog light (2) - Body ground	Always	Not less than 12 V



NG → **Repair or replace faulty wire harness**

OK

7	Check output circuit ground for continuity

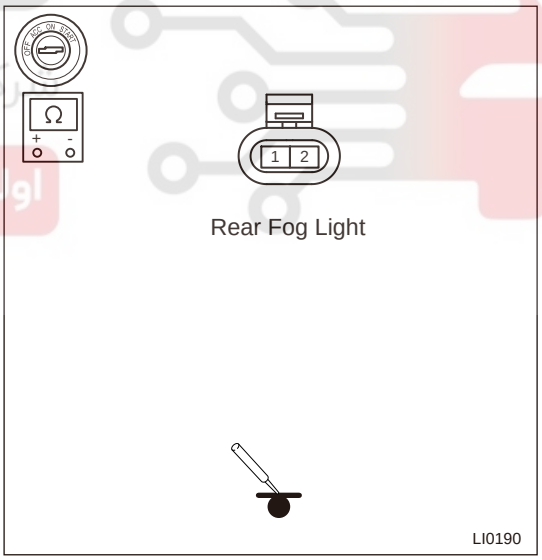
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the rear fog light connector.

(d) Using a digital multimeter, check for continuity between rear fog light connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
Rear fog light (1) - Body ground	Always	⩽ 1 Ω



NG → **Repair or replace faulty wire harness**

OK

8	Reconfirm DTCs

(a) Connect diagnostic tester and clear DTCs.

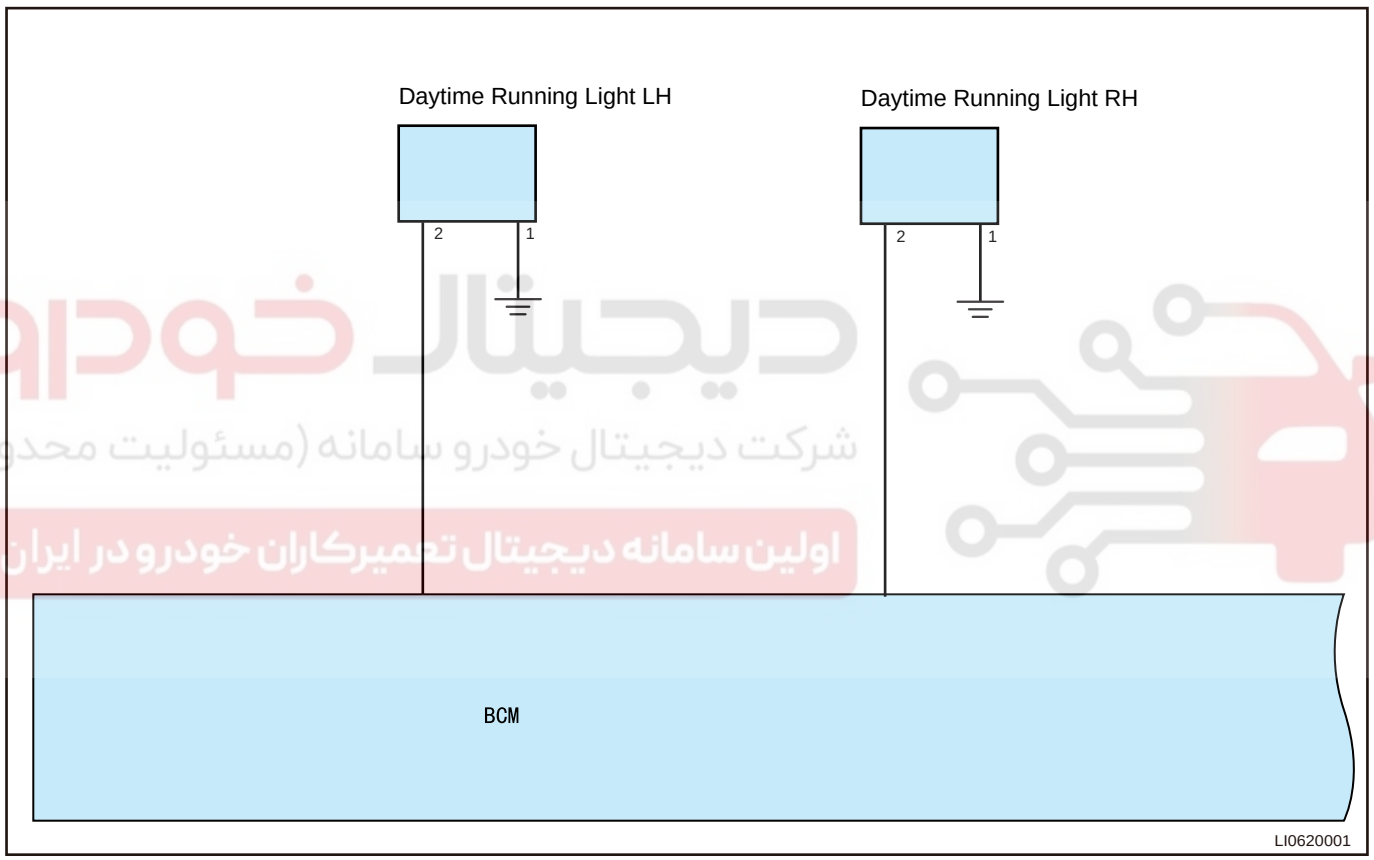
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.

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

NG	**Replace body control module**
OK	**Conduct test and confirm malfunction has been repaired.**

DTC	**B101E-11**	**L-DRL Control Circuit-Circuit Short to Ground**
DTC	**B101E-13**	**L-DRL Control Circuit-Circuit Open**
DTC	**B101F-11**	**R-DRL Control Circuit-Circuit Short to Ground**
DTC	**B101F-13**	**R-DRL Control Circuit-Circuit Open**

Description
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 for output voltage of daytime running light**

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

(a) Turn ENGINE START STOP switch to OFF.

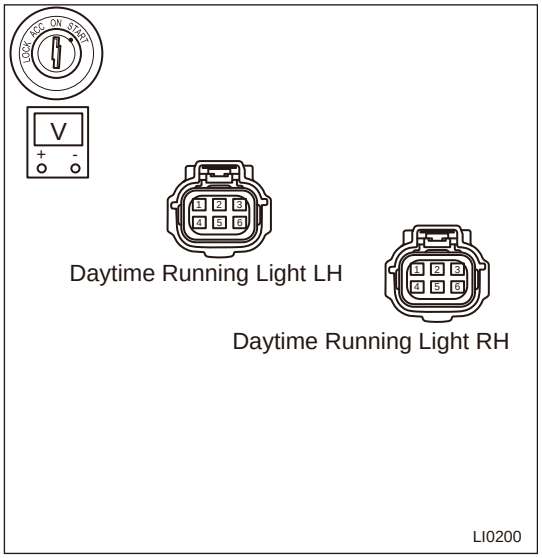
(b) Disconnect the negative battery cable.

(c) Disconnect the daytime running light connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

(f) Using a digital multimeter, measure daytime running light connector to check its output voltage and ground according to table below.



Multimeter Connection	Condition	Specified Condition
Left daytime running light (1) - Left daytime running light (2)	Always	Not less than 12 V
Right daytime running light (1) - Right daytime running light (2)		

NG → **Replace daytime running light**

OK →

2	**Check daytime running light wire harness**

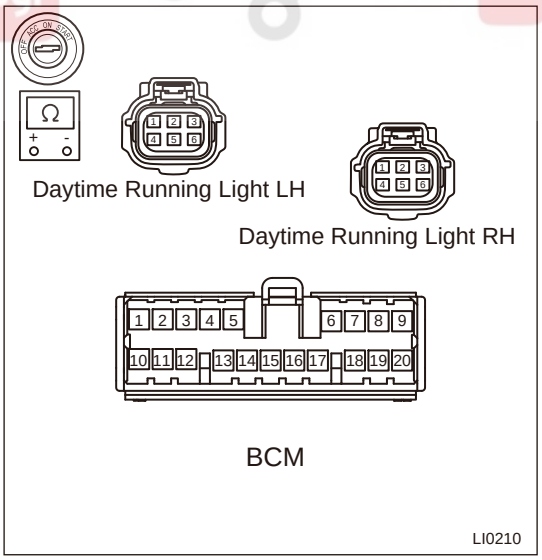
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the body control module.

(d) Disconnect the daytime running light connector.

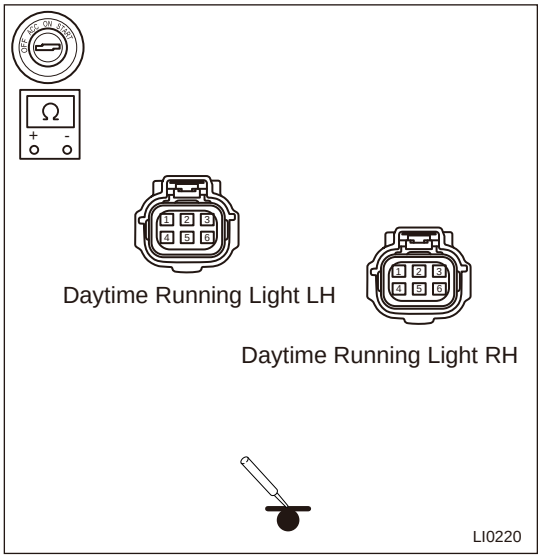
(e) Using a digital multimeter, measure if resistance between connector BCM and daytime running light connector is normal according to table below.



Multimeter Connection	Condition	Specified Condition
Left daytime running light (2) - BCM (- corresponding terminal)	Always	⩽ 1 Ω
Right daytime running light (2) - BCM (- corresponding terminal)		

(f) Using a digital multimeter, measure if resistance between daytime running light connector and body ground is normal according to table below.

Multimeter Connection	Condition	Specified Condition
Left daytime running light (1) - Body ground	Always	⩽ 1 Ω
Right daytime running light (1) - Body ground		



NG → **Repair or replace faulty wire harness**

OK →

3	Reconfirm DTCs

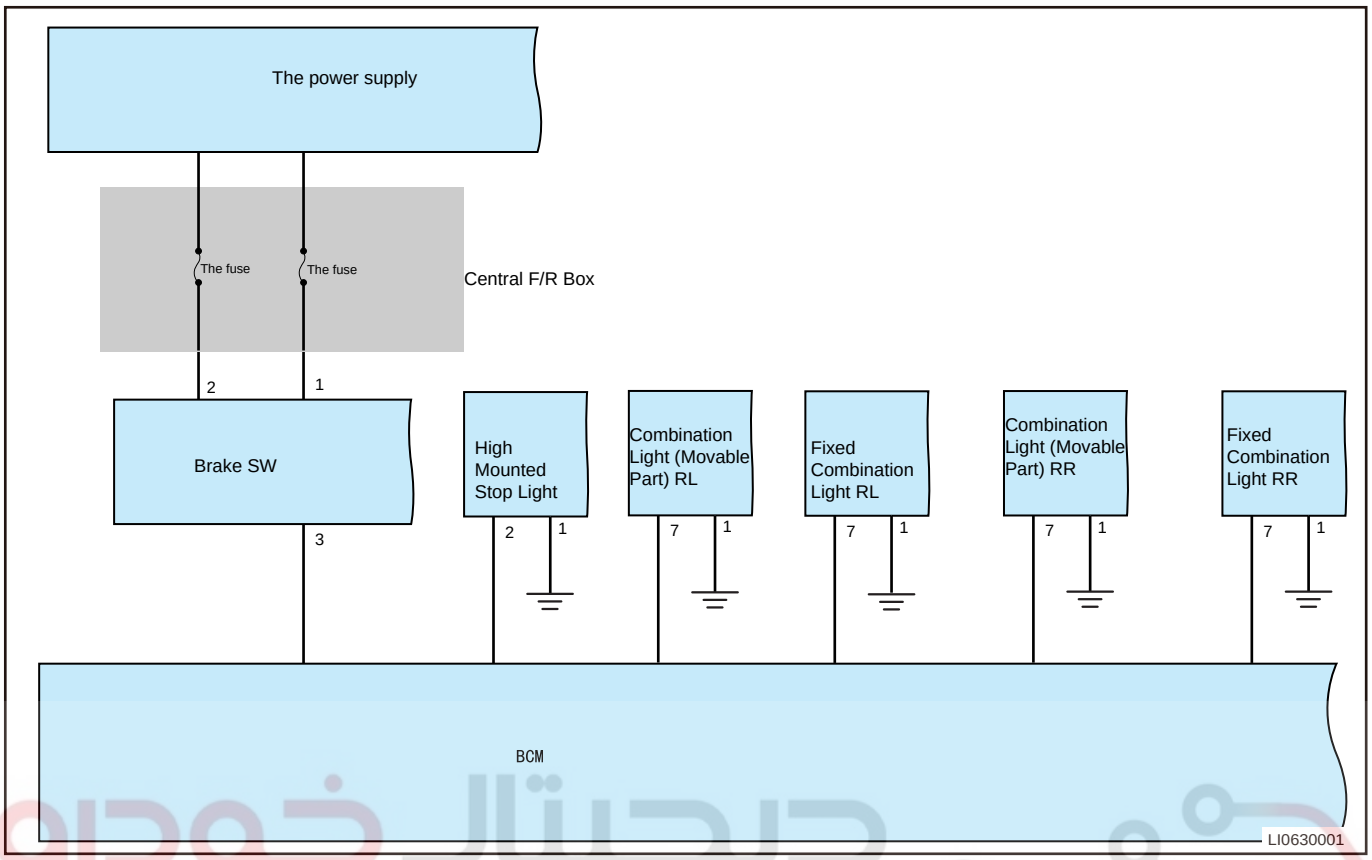
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

DTC	B1036-11	H-Brake Light Control Circuit-Circuit Short to Ground
DTC	B1036-13	H-Brake Light Control Circuit-Circuit Open
DTC	B1035-11	Brake Light Control Circuit-Circuit Short to Ground
DTC	B1035-13	Brake Light Control Circuit-Circuit Open

Description
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**

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) Remove the fuse from engine compartment fuse and relay box.

(d) Check if fuse is blown.

NG → **Replace fuse**

OK

2	**Check brake light bulb**

(a) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery cable.
(c) Remove the brake light bulb, and check if bulb filament is blown.

NG → **Replace brake light bulb**

OK

3	**Check brake switch**

(a) Replace the old switch with a new one.
(b) Check vehicle again.

OK → **Replace brake switch**

NG

4	**Using diagnostic tester to perform active test**

(a) Turn ENGINE START STOP switch to ON.
(b) Connect the diagnostic tester, perform active test for brake light.

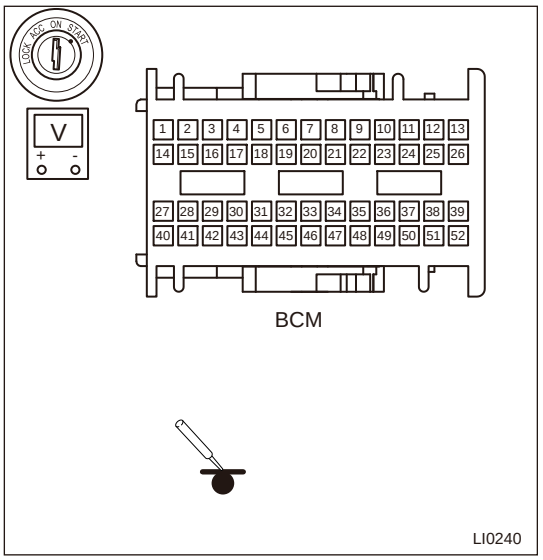
NG → **Check actuator circuit wire harness**

OK

5	**Check brake light control circuit**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the body control module connector.
(d) Connect the negative battery cable.
(e) Turn ENGINE START STOP switch to ON, depress brake pedal.
(f) Using a digital multimeter, measure the voltage between body control module connector and body ground according to table below.

Multimeter Connection	Condition	Specified Condition
BCM (Brake switch Input) - Body ground	Always	Not less than 12 V

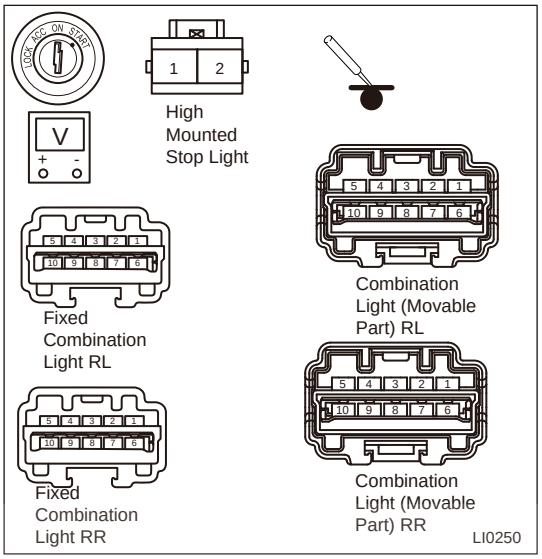


NG → **Repair or replace faulty wire harness**

OK

6	Check brake light output circuit

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the brake light connector.
(d) Connect the negative battery cable.
(e) Turn ENGINE START STOP switch to ON.
(f) Using a digital multimeter, measure voltage between brake light connector and body ground according to table below.



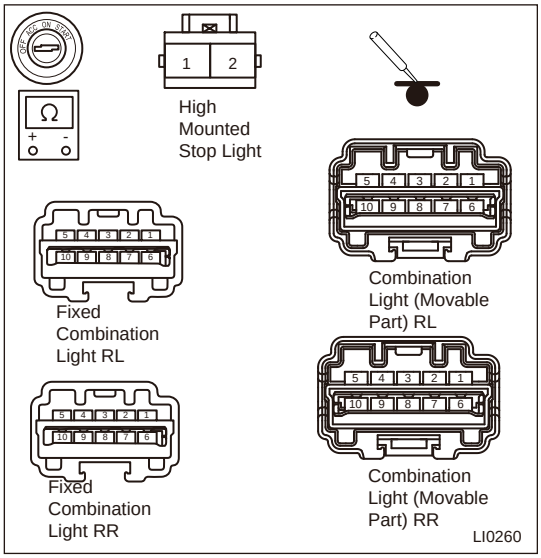
Multimeter Connection	Condition	Specified Condition
High mounted stop light (2) - Body ground	Always	Not less than 12 V
Movable part of rear left combination light (7) - Body ground		
Fixed part of rear left combination light (7) - Body ground		
Movable part of rear right combination light (7) - Body ground		
Fixed part of rear right combination light (7) - Body ground		

NG → **Repair or replace faulty wire harness**

OK

7	Check output circuit ground for continuity

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the brake light connector.
(d) Using a digital multimeter, check for continuity between brake light connector and body ground according to table below.



Multimeter Connection	Condition	Specified Condition
High mounted stop light (1) - Body ground	Always	⩽ 1 Ω
Movable part of rear left combination light (1) - Body ground		
Fixed part of rear left combination light (1) - Body ground		
Movable part of rear right combination light (1) - Body ground		
Fixed part of rear right combination light (1) - Body ground		

NG → **Repair or replace faulty wire harness**

OK

8	Reconfirm DTCs

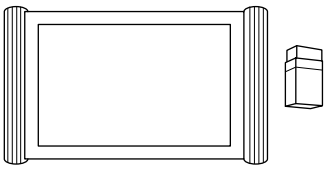
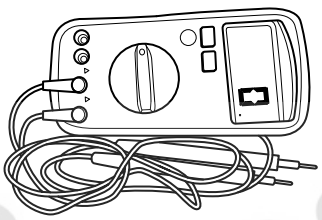
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206

Torque Specifications

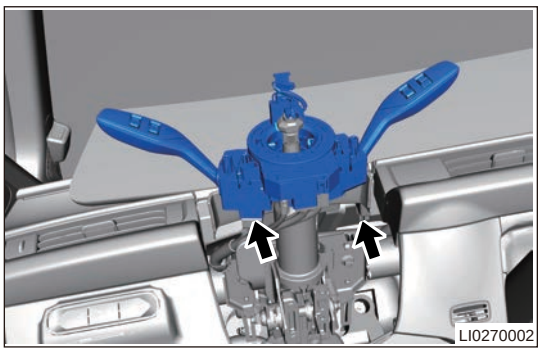
Description	Torque (N·m)
Headlight Assembly Fixing Bolt	3.5 ± 0.5
High Mounted Stop Light Fixing Nut	2.0 ± 0.5
Rear Fog Light Fixing Screw	1.5 ± 0.5
Interior Front Dome Light Fixing Screw	2.5 ± 0.5
Rear Combination Light Movable Part Nut	3.5 ± 0.5
Rear Tail Light Fixed Part Nut	1.5 ± 0.5
Back Door Ornament Light Fixing Nut	3.5 ± 0.5
License Plate Light Protector Fixing Screw	1.5 ± 0.5

Combination light switch assembly

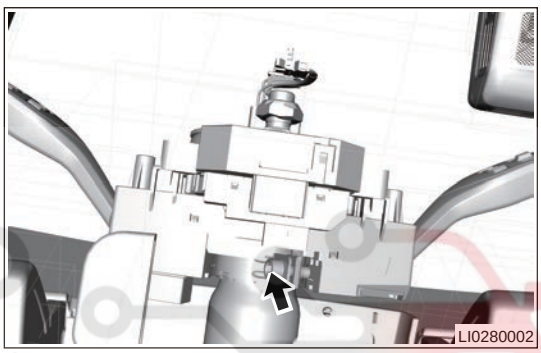
Removal

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.
   a. Disconnect the combination switch connector.



   b. 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. Installation is in the reverse order of removal.

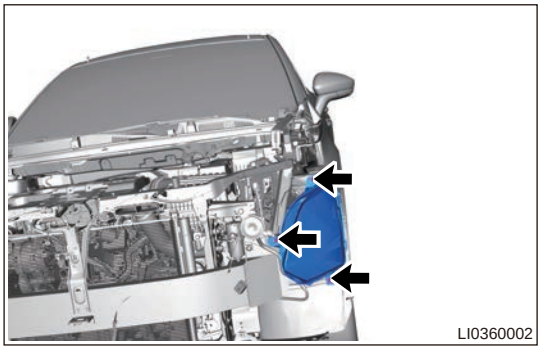
Headlight assembly

Removal

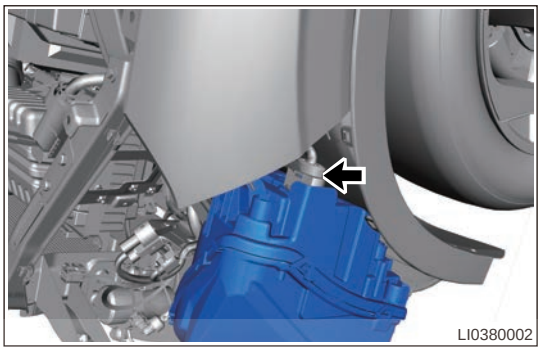
Hint:
Use same procedures for right headlight assembly and left headlight assembly. Operation procedures listed below are for left headlight assembly.

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.

a. Remove 3 fixing bolts from upper part of headlight assembly.



b. 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. Installation is in the reverse order of removal.

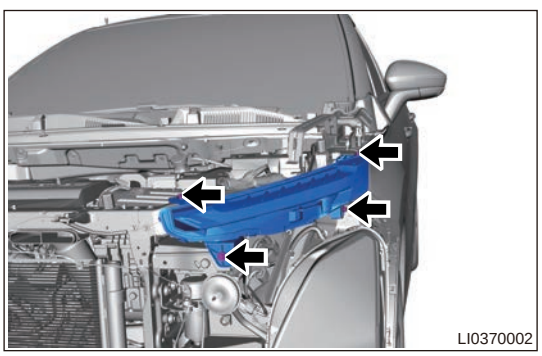
Front Signal Light Assembly

Removal

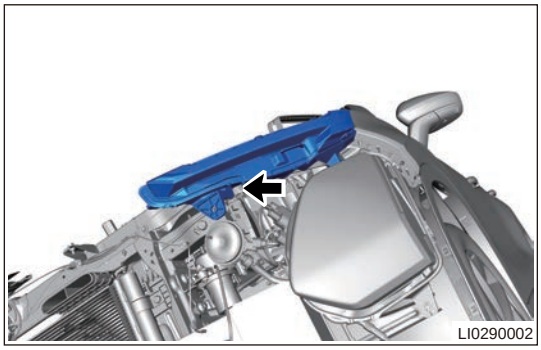
Hint:
Use same procedures for front right signal light assembly and front left signal light assembly. Operation procedures listed below are for front left signal light assembly.

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 signal light assembly.

a. Remove 4 fixing bolts from upper part of front signal light assembly.



b. Disconnect wire harness connector (arrow) from front signal light assembly and remove front signal light assembly.



Installation

⚠ Caution

- When installing front signal light assembly, make sure front signal light assembly is well fitted with hood, front wing and front bumper. Adjust it as necessary.

1. Installation is in the reverse order of removal.

Rear Combination Light Assembly (Fixed Part)

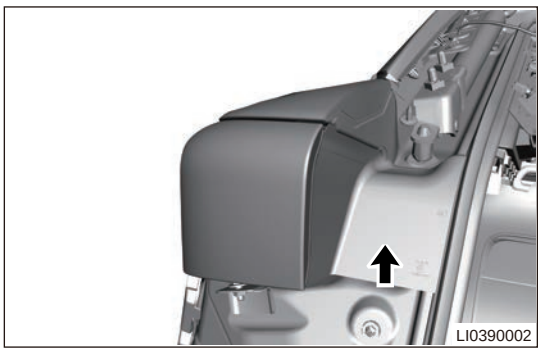
Removal

⚠ Caution

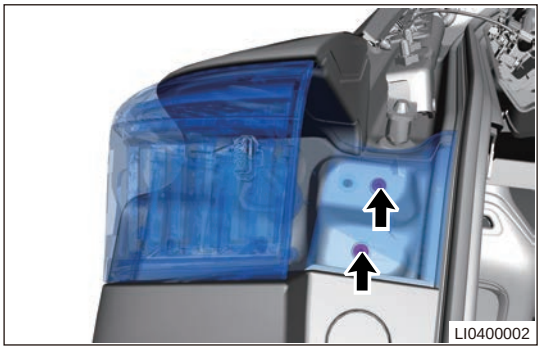
- Use same procedures for rear right combination light assembly (fixed part) and rear left combination light assembly (fixed part).
- Procedures listed below are for rear left combination light assembly (fixed part).

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the rear combination light assembly (fixed part).

a. Using a screwdriver wrapped with protective tape, pry off rear left combination light plugs (arrow).



b. Remove 2 fixing screws from rear left combination light assembly, and disconnect rear left combination light connector.



Tightening Torque
1.5 ± 0.5N·m

c. Remove the rear left combination light assembly (fixed part).

Installation

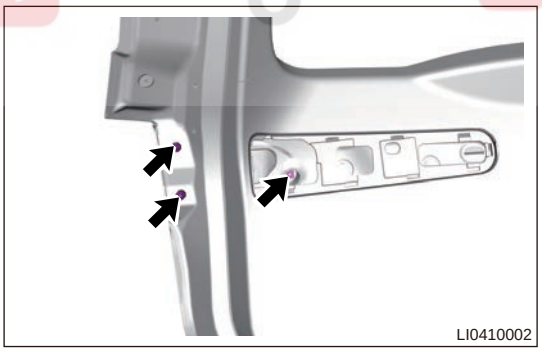
⚠ Caution
• When installing rear combination light assembly (fixed part), make sure rear combination light assembly is well fitted with luggage compartment and rear bumper. Adjust it as necessary.

1. Installation is in the reverse order of removal.

Rear Combination Light Assembly (Movable Part)

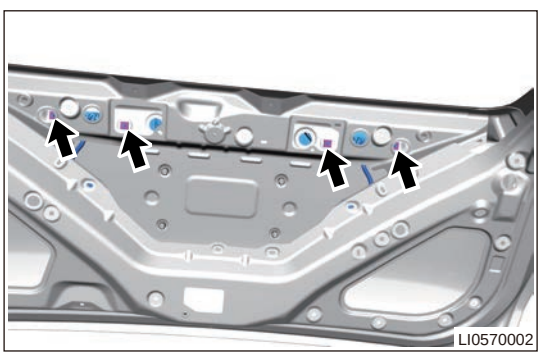
Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the rear combination light assembly (movable part).
   a. Remove the back door trim board.
   b. Remove 3 fixing nuts (arrow) from left side of rear combination light assembly (movable part).
   c. Remove 3 fixing nuts (arrow) from right side of rear combination light assembly (movable part).



Tightening Torque
3.5 ± 0.5 N·m

   d. Disconnect wire harness connector from both sides of rear combination light assembly (movable part).
   e. Remove 4 fixing nuts (arrow) from middle part of rear combination light assembly (movable part).



Installation

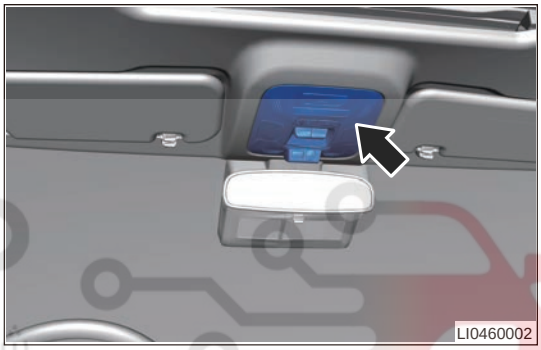
⚠ Caution
• When installing rear combination light assembly (movable part), make sure rear combination light assembly is well fitted with luggage compartment and rear bumper. Adjust it as necessary.

1. Installation is in the reverse order of removal.

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.
   a. Pry off dome light with an interior crow plate, disconnect connector and remove dome light.



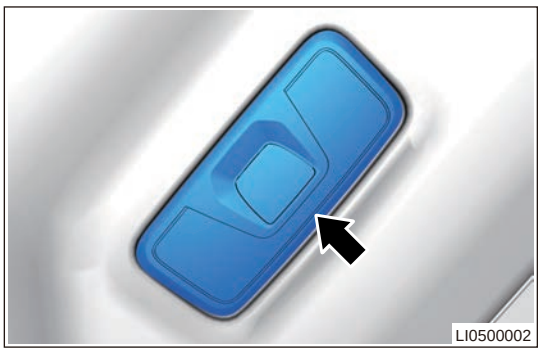
Installation

1. Installation is in the reverse order of removal.

Second Row Dome Light

Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the second row dome light.
   a. Pry off dome light with an interior crow plate, disconnect connector and remove dome light.



Installation

1. Installation is in the reverse order of removal.

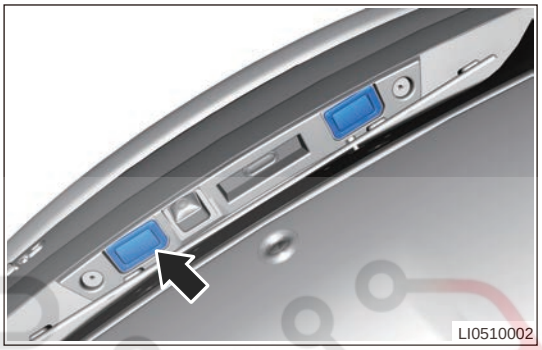
License Plate Light Assembly

Removal

Hint:

- Operation steps of right license plate light are same as that of left license plate light. Procedures listed below are for left side.

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 license plate light assembly.
   a. Using a screwdriver wrapped with protective tape to pry off left license plate light, disconnect left license plate light connector to remove left license plate light assembly.



   b. Remove the left license plate light assembly.

Installation

1. Installation is in the reverse order of removal.

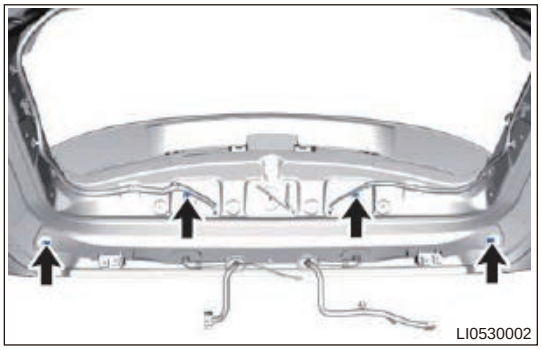
High Mounted Stop Light Assembly

Removal

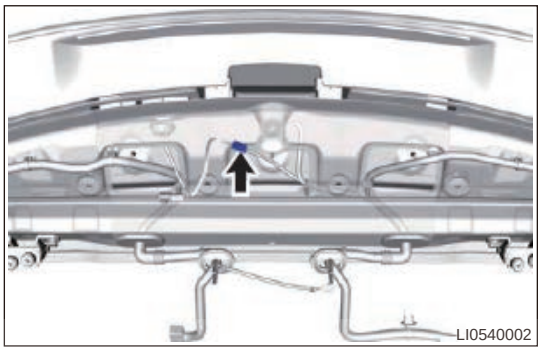
1. Open the back door.
2. Turn off all electrical equipment and ENGINE START STOP switch.
3. Disconnect the negative battery cable.
4. Remove back door upper protector assembly.
5. Remove the high mounted stop light assembly.
   a. Remove 2 rubber plugs (arrow) from back door.

b. Remove 4 spoiler fixing nuts (arrow) from back door.

Tightening Torque
5 ± 1 N·m



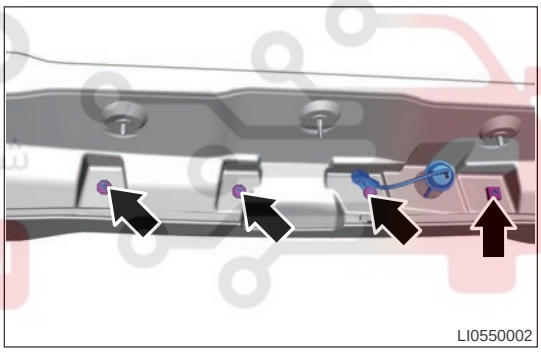
c. Disconnect the high mounted stop light connector (arrow).



d. Remove rear spoiler plate from back door.

e. Remove 4 fixing screws (arrow) of high mounted stop light from rear spoiler plate, and remove high mounted stop light.

Tightening Torque
2 ± 0.5 N·m



Installation

1. Installation is in the reverse order of removal.

WIPER AND WASHER

System Overview

Description

Wiper And Washer

1	Rear Wiper Arm Trim Cap	10	Sub Wiper Arm Assembly
2	Rear Wiper Arm Assembly	11	Sub Wiper Blade
3	Rear Wiper Blade	12	Front Windshield Lower Support Assembly
4	Rear Nozzle Assembly	13	Front Wiper Nozzle
5	Seal Ring	14	Front Wiper Motor Link Rod Assembly
6	Rear wiper motor assembly	15	Washer Line Assembly
7	Front Wiper Arm Trim Cap	16	Guide Pipe Assembly
8	Main Wiper Arm Assembly	17	Washer Pump
9	Main Wiper Blade	18	Washer Fluid Reservoir Assembly

Wiper and washer are important equipment for cleaning the front windshield assembly. which can operate only with ENGINE START STOP switch ON. Driver can control all operations of wiper and washer by moving switch control lever.

Wiper Service Mode

- With ignition ON, then turn ignition switch to OFF and turn wiper switch to MIST position to enter wiper service mode.

Diagnosis & Testing

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
	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

Symptom	Suspected Area
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 original position when front wiper switch is turned off	Front wiper motor assembly
	Wire harness or connector
	BCM
Both rear wiper and washer systems do not operate	Fuse
	Wiper switch assembly
	Rear wiper motor assembly
	Washer pump
	Wire harness or connector
	BCM
Washer system does not operate	Nozzle assembly
	Wiper switch assembly
	Washer pump
	Wire harness or connector
	BCM

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.

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.

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.

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1014-71	Front Wiper Low Speed Control Circuit	/	• Wire harness or connector damaged • Wiper Motor	/
B1015-71	Front Wiper High Speed Control Circuit	/		/
B1016-71	Rear Washer Control Circuit	/	• Wire harness or connector damaged • Washer Motor	/
B1017-71	Front Washer Control Circuit	/		/
B103A-11	Front Washer Heating Control Circuit	/	• Wire harness or connector damaged • Nozzle heating damaged • Body control module fault	/
B103A-13	Front Washer Heating Control Circuit			

DTC Diagnosis Procedure

DTC	B1014-71	Front Wiper Low Speed Control Circuit
DTC	B1015-71	Front Wiper High Speed Control Circuit

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) Turn off all electrical equipment and ENGINE START STOP switch.
(b) Disconnect the negative battery cable.
(c) Remove fuse, check if fuse is blown.

NG → **Replace fuse**

OK

2	**Check relay**

(a) Replace the old relay with a new one.
(b) Perform running test.

OK → **Replace relay**

NG

3	**Check wire harness between central fuse and relay box and wiper motor**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the connector.
(d) Check for continuity in wire harness between central fuse and relay box and wiper motor

NG → **Repair or replace faulty wire harness**

OK

4	**Check wire harness between motor and BCM**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the connector.
(d) Check for continuity in wire harness between motor and BCM.

NG → **Repair or replace faulty wire harness**

OK

5	**Check motor**

(a) Replace the old motor with a new one for running test.

OK → **Repair or replace motor**

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.

NG → **Replace body control module**

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

DTC	**B1016-71**	**Rear Washer Control Circuit**
DTC	**B1017-71**	**Front Washer Control Circuit**

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 between washer motor and BCM**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the connector.
(d) Check for continuity in wire harness between washer motor and BCM.

NG → **Repair or replace faulty wire harness**

OK

2	Check motor

(a) Replace the old motor with a new one for running test.

OK → **Repair or replace motor**

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.

NG → **Replace body control module**

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

DTC	B103A-11	Front Washer Heating Control Circuit
DTC	B103A-13	Front Washer Heating Control Circuit

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 between front washer heating and BCM

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the connector.
(d) Check for continuity in wire harness between front washer heating and BCM.

NG → **Repair or replace faulty wire harness**

OK

2	Check the nozzle

(a) Replace the old nozzle with a new one for running test.

OK → **Repair or replace the nozzle**

NG

3	Reconfirm DTCs

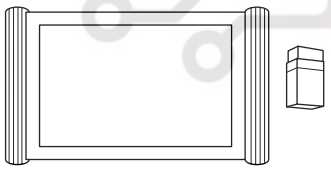
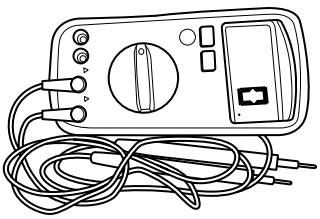
(a) Connect diagnostic tester and clear DTCs.
(b) Run the vehicle as specified procedure. The operating way should meet the conditions for corresponding fault diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206

Torque Specifications

Description	Torque (N·m)
Front Wiper Arm Assembly Fixing Nut	18 ± 2
Wiper Motor and Link Rod Assembly Fixing Bolt	9.5 ± 1.5

Description	Torque (N·m)
Rear Wiper Arm Assembly Upper Fixing Nut	10 ± 1.5
Rear Wiper Motor Assembly Fixing Bolt	10 ± 1.5
Washer Fluid Reservoir Assembly Fixing Bolt	7 ± 1
Front Wiper Motor Fixing Bolt	10 ± 1.5
Guide Pipe Fixing Bolt	5 ± 1

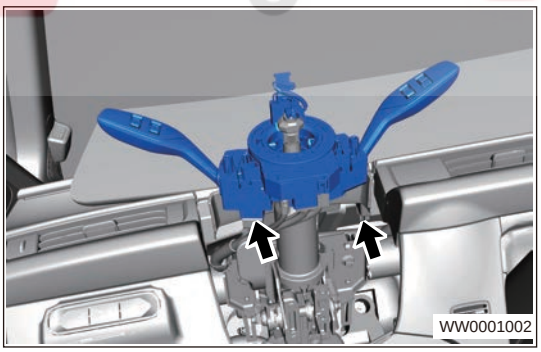
Wiper switch assembly

Removal

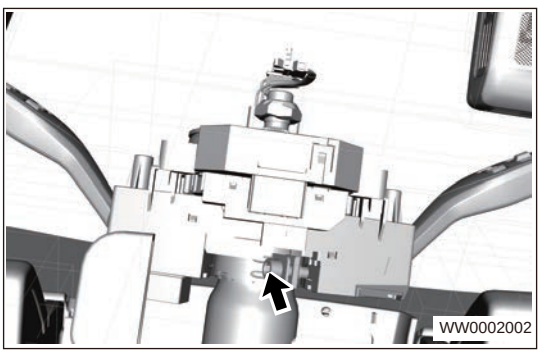
Hint:

- Be sure to wear safety equipment to prevent accidents, when removing wiper switch assembly.
- Appropriate force should be applied, when removing wiper switch assembly. Be careful not to operate roughly.
- Try to prevent interior and body paint surface from being scratched, when removing wiper switch assembly.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the combination switch lower cover.
4. Remove the combination switch upper cover.
5. Remove the wiper switch assembly.
   a. Disconnect the combination switch connector.



   b. Remove the fixing bolt, and remove the combination switch assembly.



Installation

⚠ Caution
• Always operate carefully to prevent components from being damaged, when installing wiper switch assembly. • Install connectors in place, when installing wiper switch assembly. • Check wiper switch for proper operation, after installing wiper switch assembly.

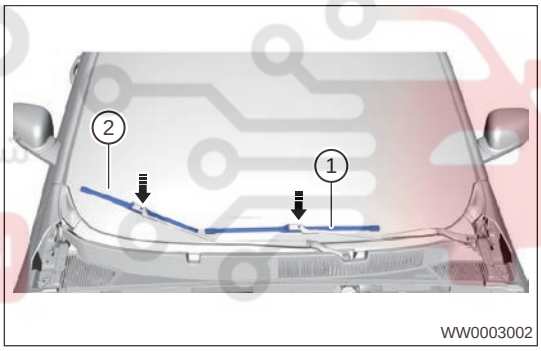
1. Installation is in the reverse order of removal.

Front Wiper Blade Assembly

Removal

⚠ Caution
• Be sure to wear safety equipment to prevent accidents, when removing front wiper blade assembly.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front wiper blade assembly.
   a. Press the clip (arrow), remove wiper blade (1) as shown in illustration.



Installation

1. Installation is in the reverse order of removal.

Front Wiper Arm Assembly

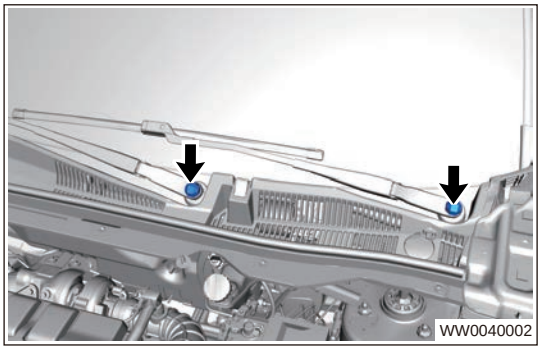
Removal

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.

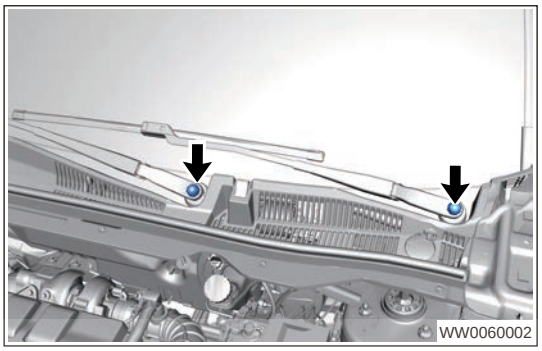
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Open the hood.
3. Disconnect the negative battery cable.
4. Remove the front wiper arm assembly.

a. Using a screwdriver wrapped with protective tape, remove front wiper arm trim caps (arrow).

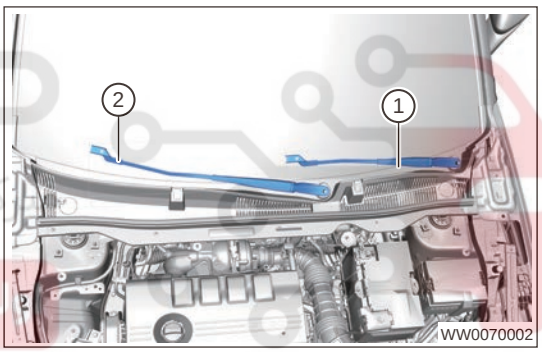


b. Remove 2 fixing nuts (arrow) from front wiper arm assembly.

Tightening Torque
18 ± 2 N • m



c. Remove the 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. Installation is in the reverse order of removal.

Front Wiper Motor and Link Rod Assembly

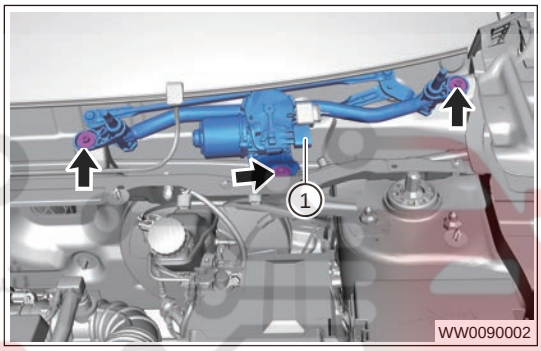
Removal

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 the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front right wing assembly.
4. Remove the front windshield lower support assembly.
5. Remove the wiper motor and link rod assembly.
   a. Disconnect the connector (1) from wiper motor and link rod assembly.
   b. Remove 3 fixing bolts (arrow) from wiper motor and link rod assembly.

      Tightening Torque
      9.5 ± 1.5 N·m



   c. Remove the wiper motor and link rod assembly.

Inspection

1. Check the front wiper motor assembly.
   a. Check the LO operation.

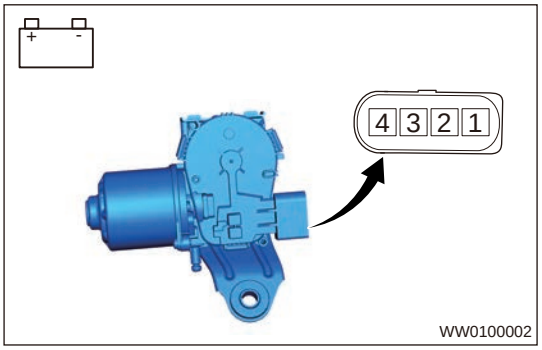
Measurement Condition	Specified Condition
Battery negative (-) - Terminal 4	Motor running at low speed (LO)
Battery positive (+) → Terminal 2	

   If result is not as specified, replace front wiper motor assembly.
   b. Check the HI operation.

Measurement Condition	Specified Condition
Battery negative (-) - Terminal 4	Motor running at low speed (HI)
Battery positive (+) → Terminal 1	

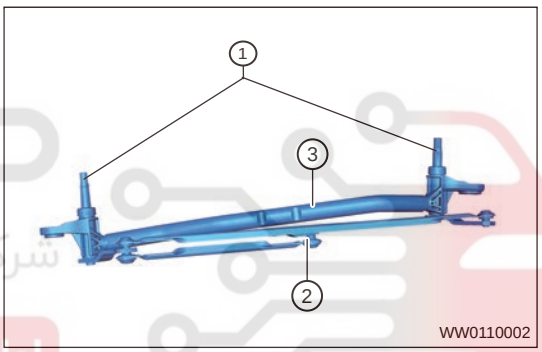
c. Check the auto reset function.

- 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.

a. 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. Installation is in the reverse order of removal.

Front Nozzle Assembly

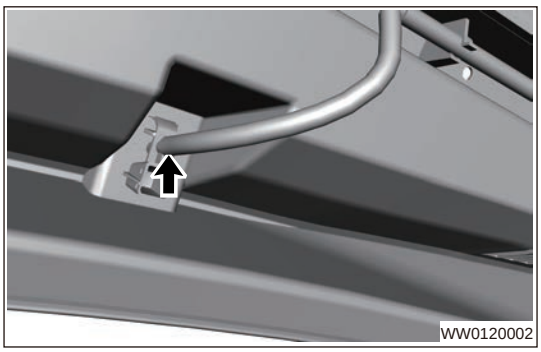
Removal

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.

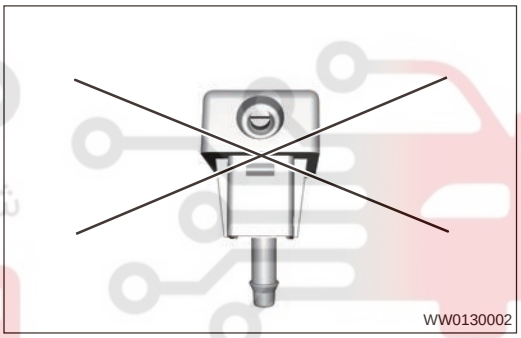
1. Turn off all electrical equipment and ENGINE START STOP switch.

2. Disconnect the negative battery cable.
3. Remove the front windshield lower support assembly.
4. Remove the front nozzle assembly.
    a. Loosen front nozzle assembly and disconnect water spray hose as shown in illustration.

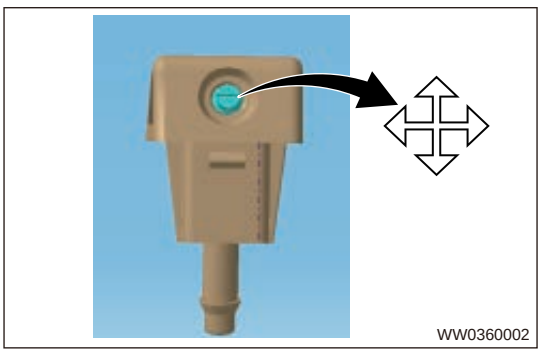


Inspection

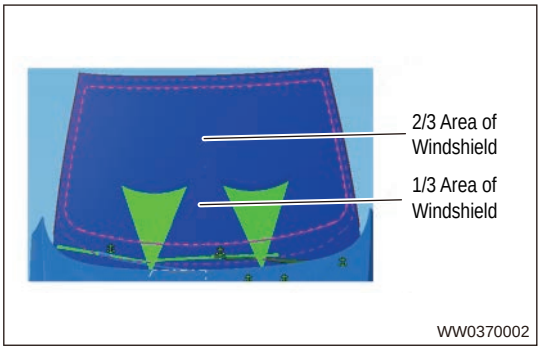
1. Check the front washer nozzle assembly.
    a. Check front nozzle for blockage, deformation or damage. Replace the front nozzle if necessary.



2. Adjust nozzle angle.
    a. Adjust the nozzle bead up and down to adjust the nozzle angle, so as to reach the ideal injection position.



b. Adjust the nozzle to spray the washer fluid at a position about 1/3 - 2/3 of the front windshield



c. 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. Installation is in the reverse order of removal.

Rear Wiper Arm Assembly

Removal

⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing rear wiper arm assembly.
- Appropriate force should be applied when removing rear wiper arm assembly. Be careful not to operate roughly.
- Try to prevent rear windshield assembly from being scratched, when removing rear wiper arm assembly.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the rear wiper blade.

a. Lift the rear wiper arm assembly in the direction of arrow as shown in illustration.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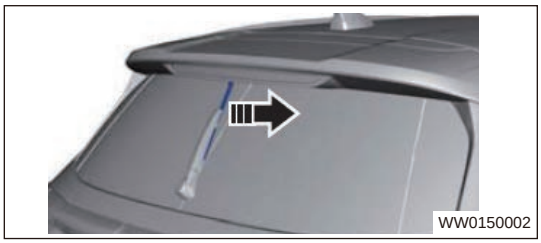
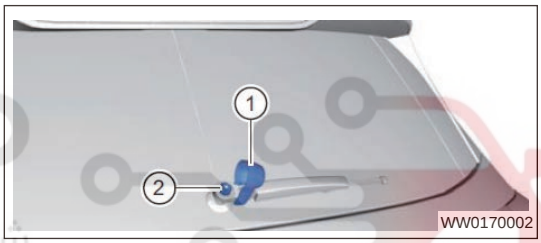
b. Pull the rear wiper arm blade from rear wiper arm assembly in the direction of arrow as shown in illustration.


WW0150002

4. Remove the rear wiper arm assembly.
   a. Remove the rear wiper arm trim cap (1).
   b. Remove fixing nut (2) from rear wiper arm assembly.

      Tightening Torque
      10 ± 1.5 N·m



WW0170002

   c. Remove the rear wiper arm assembly.

Installation

⚠ Caution

- Operate carefully to prevent other components from being damaged when installing rear wiper arm assembly.
- Be sure to tighten fixing nuts to the specified torque, when installing rear wiper arm assembly.
- Check rear wiper arm assembly for proper operation after installation.

1. Installation is in the reverse order of removal.

Rear wiper motor assembly

Removal

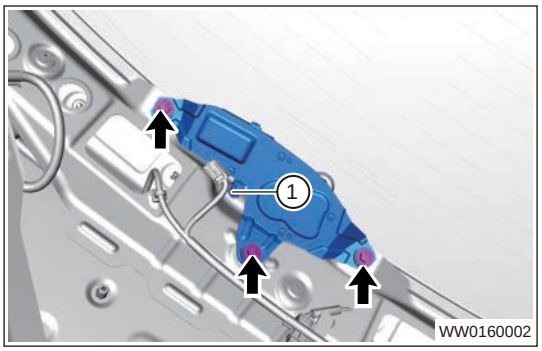
⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing rear wiper motor assembly.
- Appropriate force should be applied when removing rear wiper motor assembly. Be careful not to operate roughly.
- Try to prevent rear windshield assembly from being scratched, when removing rear wiper motor assembly.

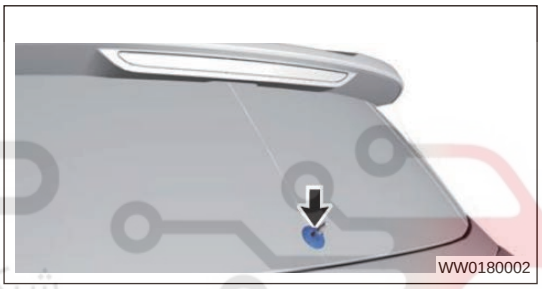
1. Turn off all electrical equipment and the ignition switch.

2. Disconnect the negative battery cable.
3. Remove the rear wiper arm assembly.
4. Remove the luggage compartment protector assembly.
5. Remove the rear wiper motor assembly.
   a. Disconnect the rear wiper motor assembly connector (1).
   b. Remove 3 fixing bolts (arrow) from rear wiper motor assembly.

      Tightening Torque
      10 ± 1.5 N·m



   c. Using a screwdriver wrapped with protective tape, pry off the gasket (arrow).

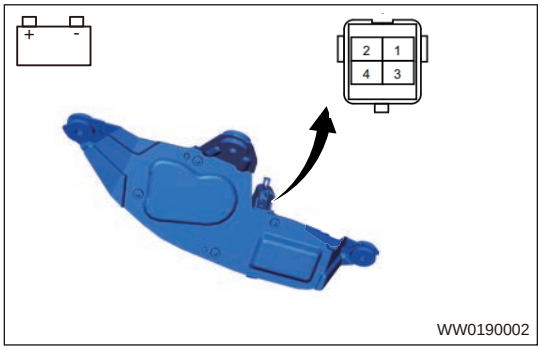


   d. Remove the rear wiper motor assembly.

Inspection

1. Check the rear wiper motor assembly.

a. Check the rear wiper motor assembly operation.



Pin	Function	Rated Current	Current		Signal Type	Optional Line Diameter
			Imin (A)	Imax (A)		
1	Positive (red)	1.5 A	⩽ 2 A	⩽ 11 A	DC	0.75
2	Reset (black)	1.5 A	⩽2 A	⩽ 11 A	DC	0.75
3	Negative (blue)	1.5 A	⩽ 2 A	⩽ 11 A	DC	0.75

If result is not as specified, replace rear wiper motor assembly.

Installation

⚠ Caution

- Always operate carefully to prevent other components from being damaged, when installing rear wiper motor assembly.
- Be sure to tighten fixing nuts to specified torque, when installing rear wiper motor assembly.
- Check wiper arm assembly for proper operation, after installing rear wiper motor assembly.

1. Installation is in the reverse order of removal.

Rear Nozzle Assembly

Removal

⚠ Caution

- Be sure to wear safety equipment to prevent accidents when removing rear nozzle assembly.
- Appropriate force should be applied when removing rear nozzle assembly. Be careful not to operate roughly.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the rear spoiler assembly.
4. Remove the rear nozzle assembly.

a. Remove the rear nozzle assembly (arrow) with a interior crow plate and disconnect connecting water pipe.

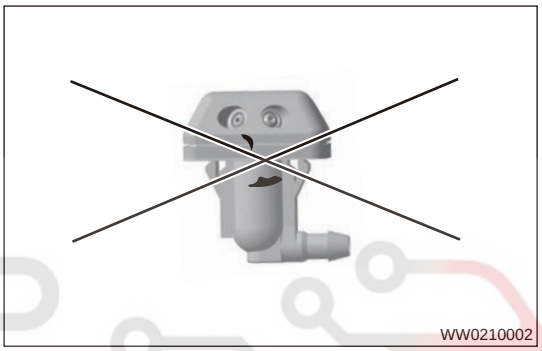

WW0200002

b. Remove the rear nozzle assembly.

Inspection

1. Check the rear nozzle assembly.

a. Check rear nozzle assembly for blockage, deformation or damage. Replace rear nozzle if necessary.


WW0210002

Installation

⚠ Caution

- Always operate carefully to prevent components from being damaged when installing rear nozzle assembly.
- Install washer line joints in place when installing rear nozzle assembly.
- Check rear nozzle for proper operation after installing rear nozzle assembly.

1. Installation is in the reverse order of removal.

Washer Pump Assembly

Removal

⚠ Caution

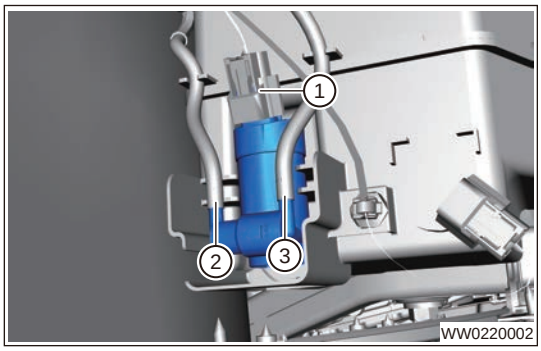
- Be sure to wear safety equipment to prevent accidents, when removing washer pump assembly.
- Appropriate force should be applied, when removing washer pump assembly. Be careful not to operate roughly.
- Try to prevent body paint surface from being scratched, when removing washer pump assembly.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly.

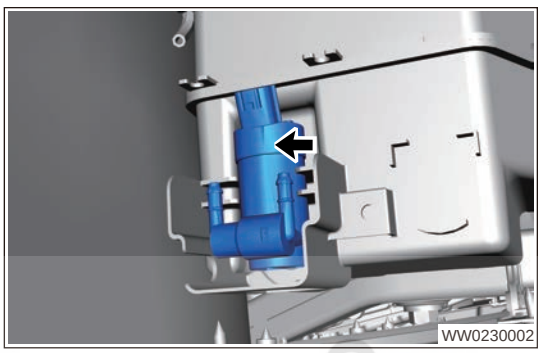
4. Remove the washer pump assembly.

a. Disconnect the front and rear washer pump connectors (1).

b. Disconnect joint (3) between rear washer line and washer pump and joint (2) between front washer line and washer pump.



c. Remove the washer pump assembly.



Inspection

1. Check the washer pump assembly.

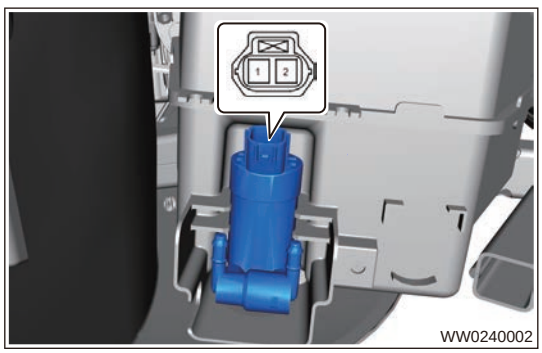
a. Fill washer fluid reservoir assembly with washer fluid.

b. Connect positive (+) battery lead to terminal 1 of washer pump, and connect negative (-) battery lead to terminal 2.

c. 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.

d. Connect positive (+) battery lead to terminal 1 of washer pump, and connect negative (-) battery lead to terminal 2.

e. 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. Installation is in the reverse order of removal.

Washer Fluid Reservoir Assembly

Removal

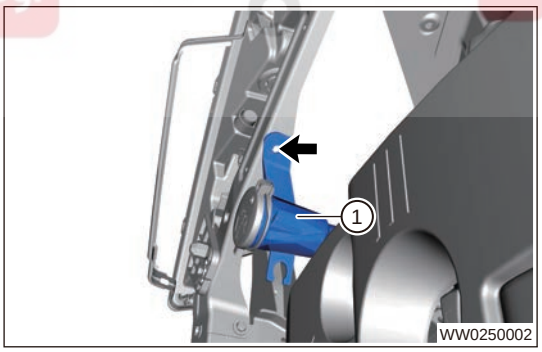
⚠ Caution

- 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.

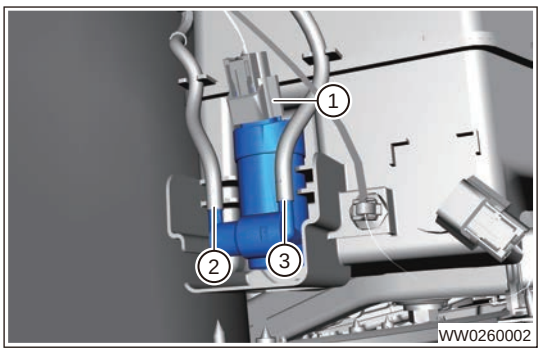
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly.
4. Remove the guide pipe assembly.
   a. Remove the fixing bolt (arrow) from guide pipe assembly.

      Tightening Torque
      5 ± 1 N·m

   b. Remove guide pipe assembly (1) from washer fluid reservoir assembly.

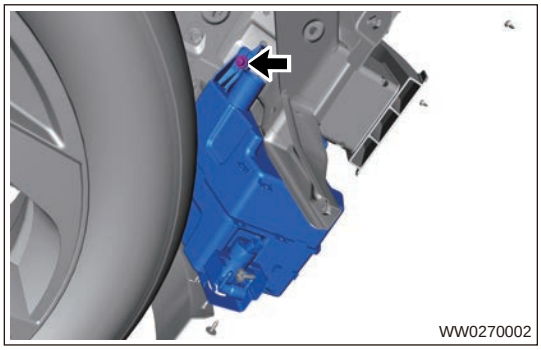


5. Remove the washer fluid reservoir assembly.
   a. Disconnect the front and rear washer pump connectors (1).
   b. Disconnect joint (3) between rear washer line and washer pump and joint (2) between front washer line and washer pump.



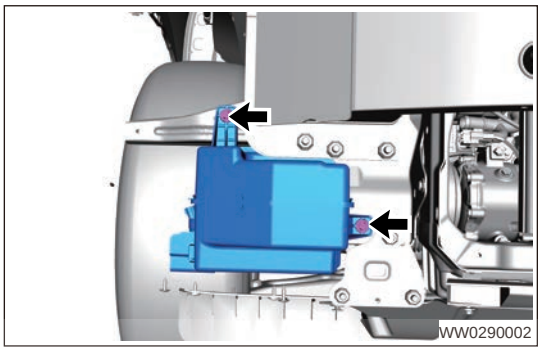
c. Remove 1 fixing nut (arrow) from side of washer fluid reservoir assembly.

Tightening Torque
7 ± 1 N·m


WW0270002

d. Remove 2 fixing nuts (arrow) from front of washer fluid reservoir assembly, and remove washer fluid reservoir assembly.

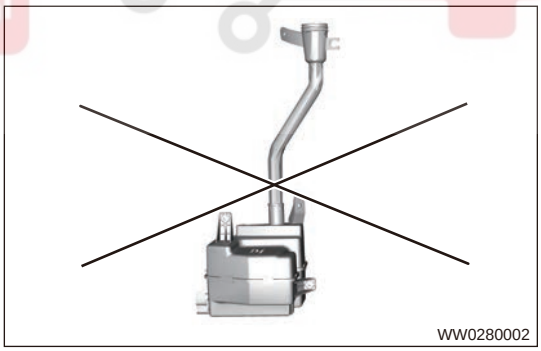
Tightening Torque
7 ± 1 N·m


WW0290002

Inspection

1. Check the washer fluid reservoir assembly.

a. Check washer fluid reservoir assembly for leakage, deformation or damage. Replace washer fluid reservoir assembly if necessary.
b. Check internal and external sides of washer fluid reservoir for dirt. Remove dirt or replace washer fluid reservoir assembly if necessary.
c. Check grommet for damage. Replace grommet if necessary.


WW0280002

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. Installation is in the reverse order of removal.

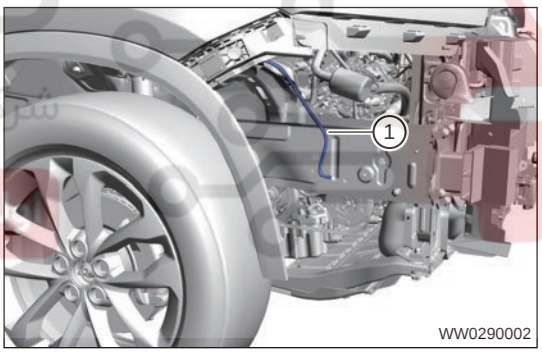
Front Washer Line Assembly

Removal

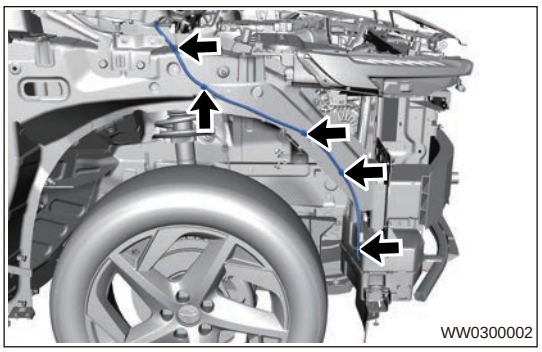
⚠ Caution

- 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.

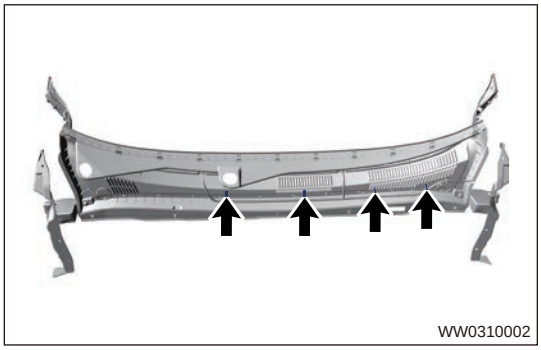
1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly.
4. Remove the front right wheel house protector assembly.
5. Remove the front windshield trim board assembly.
6. Remove the front nozzle assembly.
7. Remove the front washer line assembly.
   a. Disconnect the joint (1) between front washer line and front washer pump.



   b. Remove the clips (arrow) from washer line on the inner side of wing.



c. Remove 4 clips (arrow) from washer line on the front windshield trim board.



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. Installation is in the reverse order of removal.

Rear Washer Line Assembly

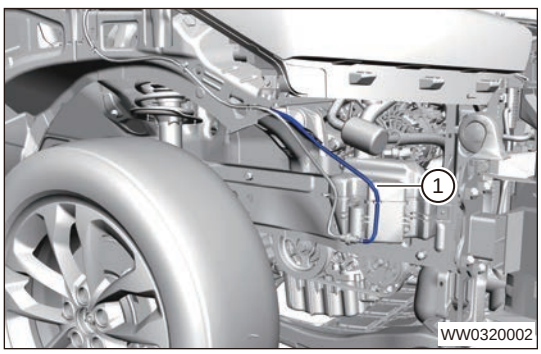
Removal

⚠ Caution

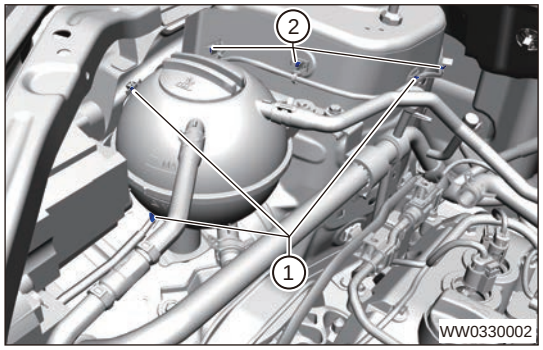
- Be sure to wear necessary safety equipment to prevent accidents when removing rear washer line assembly.
- Appropriate force should be applied when removing rear washer line assembly. Be careful not to operate roughly.
- Try to prevent body paint surface from being scratched when removing rear washer line assembly.

1. Turn off all electrical equipment and the ignition switch.
2. Disconnect the negative battery cable.
3. Remove the front bumper assembly.
4. Remove the rear washer line assembly.

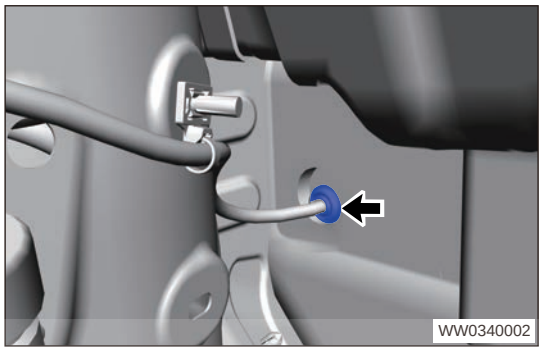
a. Disconnect the joint (1) between rear washer line and rear washer pump.



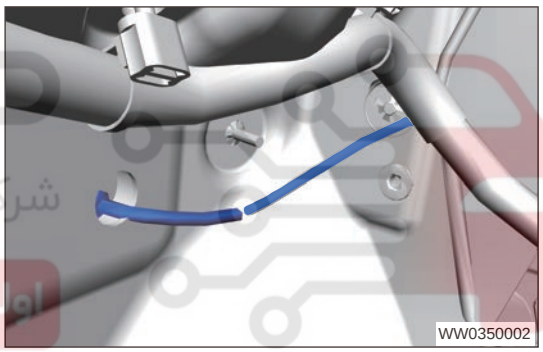
b. Remove 3 fixing clips (1) and 3 band clips (2) of pipe from projection welding stud along pipe.



c. Separate 2-way connector (arrow) of washer pipe and wire harness end pipe.



d. Remove grommet with pipe from front baffle plate.



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. Installation is in the reverse order of removal.

WINDOW/SLIDING ROOF

Warnings and precautions

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 auto 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. During operation, prevent the sliding roof fixing bracket from dropping, which may cause an accident.

Precautions

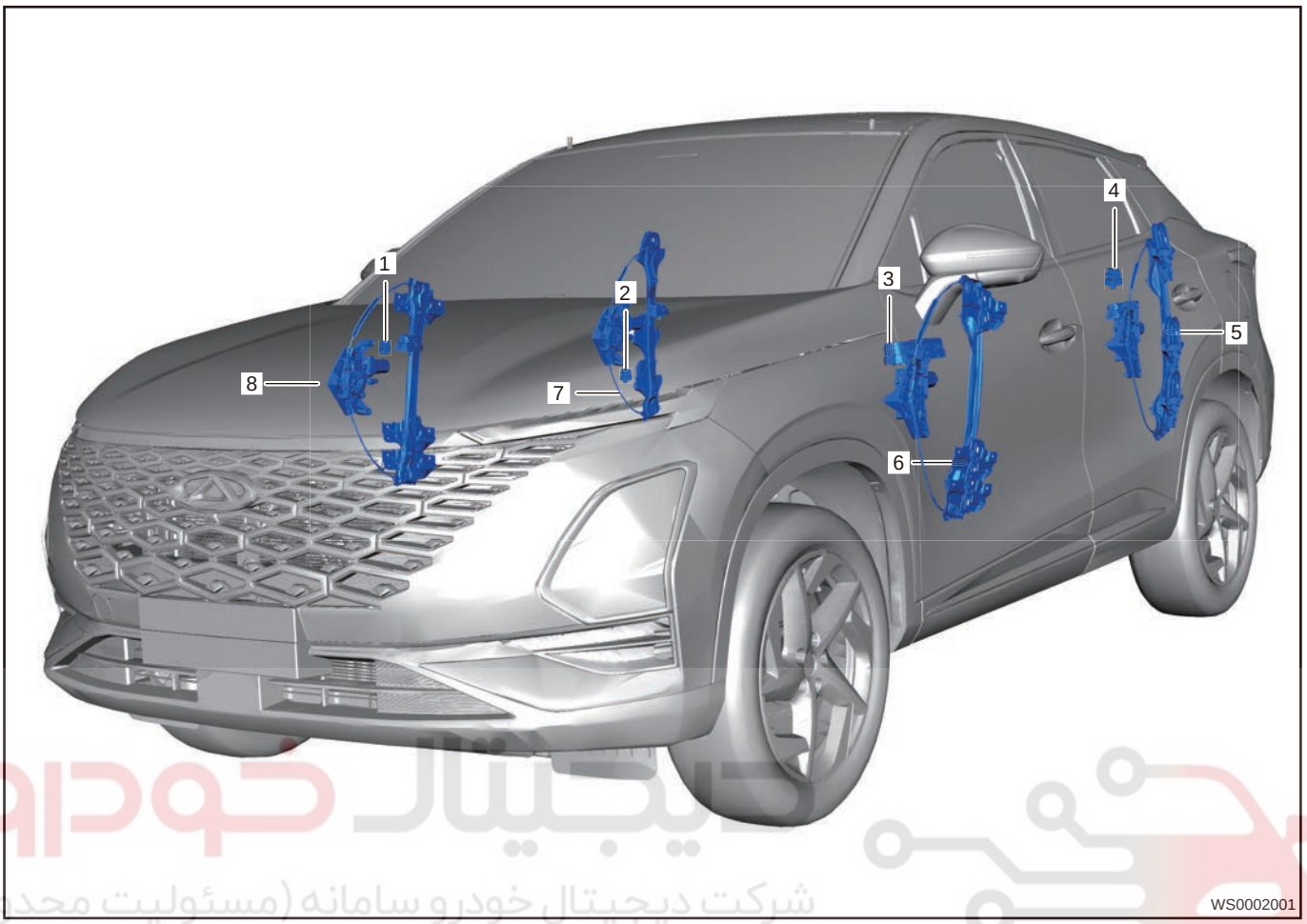
In order to avoid dangerous operation and damage to the vehicle, always follow the instructions below before repair.

1. Be sure to wear safety equipment to prevent accidents, when removing glass 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.

System Overview

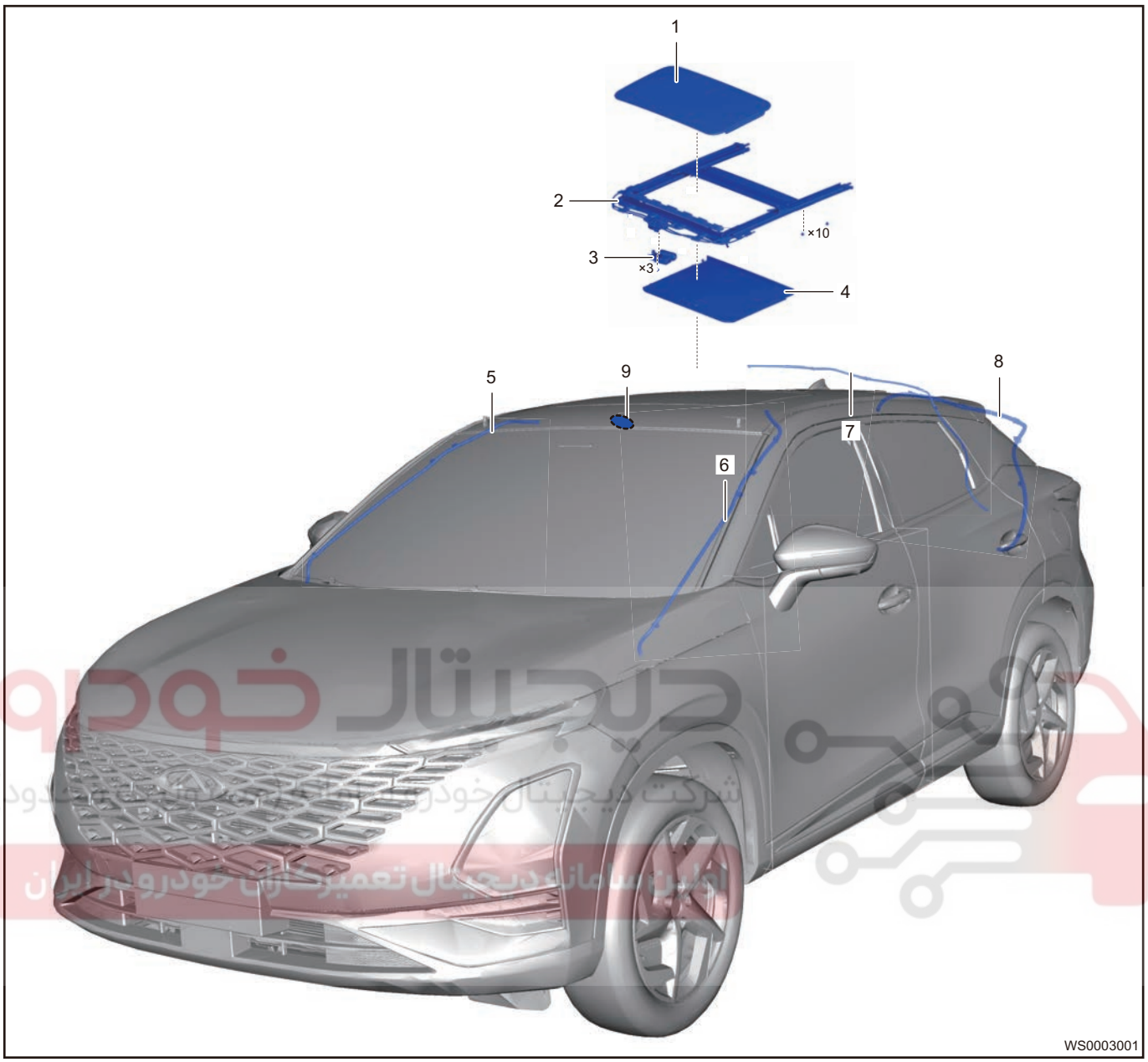
System Components Diagram

1	Front Windshield Assembly	5	Front Right Side Door Quarter Window Glass Assembly
2	Front Left Side Door Quarter Window Glass Assembly	6	Front Right Side Door Glass Assembly
3	Front Left Side Door Glass Assembly	7	Rear Right Side Door Glass Assembly
4	Rear Left Side Door Glass Assembly	8	Rear Windshield Assembly



1	Front Right Door Glass Regulator Switch Assembly	5	Rear Left Door Glass Regulator
2	Rear Right Door Glass Regulator Switch Assembly	6	Front Left Door Glass Regulator
3	Front Left Door Glass Regulator Switch Assembly	7	Rear Right Door Glass Regulator
4	Rear Left Door Glass Regulator Switch Assembly	8	Front Right Door Glass Regulator

Power window control system controls each window glass UP/DOWN function by operating the glass regulator control switches on door inner protector assembly. Main control devices of this system include: Front left door glass regulator switch (built into driver side door) and glass regulator switches (built into front and rear passenger side doors). Press the front left door glass regulator switch or any switch on glass regulator switch, to transmit the UP/DOWN signal to corresponding power glass regulator motor, thus controlling UP/DOWN operation of corresponding power window glass.



1	Sliding Roof Glass Assembly	6	Sliding Roof Front Left Drain Hose Assembly
2	Sliding Roof Bracket Assembly	7	Sliding Roof Rear Right Drain Hose Assembly
3	Sliding Motor Assembly	8	Sliding Roof Rear Left Drain Hose Assembly
4	Sliding Roof Sun Visor	9	Sliding Roof Switch Assembly
5	Sliding Roof Front Right Drain Hose Assembly		

On this model, panoramic sliding roof consists of sliding roof switch, sliding roof glass, electronic sun visor, glass motor, sun visor motor, control module, wire harness and sliding roof drain hose.

Turn on the rear defroster switch, heat the rear defroster heat wire to remove fog, frost or water steam on the rear windshield, gaining clear view. To turn on the rear defroster, it is necessary to turn ENGINE START STOP switch to “ON” and press rear defroster switch. Rear defroster switch indicator comes on, while the indicator on rear defroster switch starts to work. Rear defroster stops operating and the indicator goes off after the rear defroster switch is pressed again.

System Principle

Main Component Function

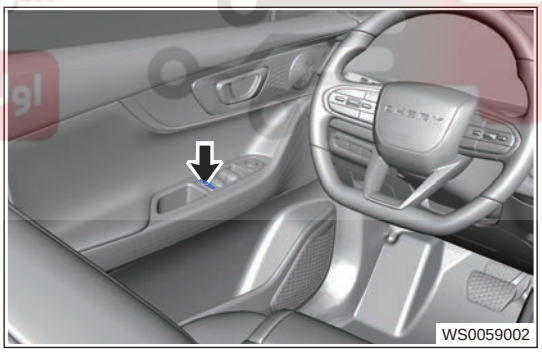
Item	Description
Power window lock switch	• Located on front left door inner protector assembly. It controls the operation of front and rear passenger side glass regulator switches. • When power window lock switch is in lock position, only driver side glass regulator switch can control UP/DOWN operation of power window glass.
Power glass regulator switch	• Located on door inner protector assembly. • Each power glass regulator switch controls UP/DOWN operation of corresponding power window glass.
Power glass regulator	• It can change position of power window glass.

System Function

Function	Description
Manual UP function	• Power window glass goes up when glass regulator control switch is pulled up and held while it stops as the switch is released.
Manual DOWN function	• Power window glass goes down when glass regulator control switch is pushed down and held while it stops as the switch is released.
Auto DOWN	• Power window glass goes down automatically when glass regulator control switch is pressed shortly. To stop it partway, push or pull the switch again.
Power window lock function	• Operation of corresponding power window glass is impossible with all passenger side power glass regulator switches when power window lock switch is pressed. At this time, only operation of driver side power window glass is possible. This function can be canceled only when power window lock switch is pressed again.

Operation Inspection

1. Check the power window lock switch.
   a. Check that front and rear passenger side power window glasses cannot be operated with front and rear passenger side power glass regulator switches, when power window lock switch is pressed.
      • OK: Operation of front and rear passenger side power glass regulator switches is invalid.



   b. Check that front and rear passenger side power window glasses can be operated with front and rear passenger side power glass regulator switches, when power window lock switch is pressed again.
      • OK: Operation of front and rear passenger side power glass regulator switches is possible.
2. Check the manual UP/DOWN function.
   a. Check that driver side power window glass operates as follows:

OK

Condition	Front Left Door Glass Regulator Switch	Switch Operation	Power Window Glass
Turn ENGINE START STOP switch to “OFF”	Driver side	Pulled	UP (close)

Condition	Front Left Door Glass Regulator Switch	Switch Operation	Power Window Glass
		Pressed	DOWN (open)

b. Check that power window glass other than driver side power window glass operates as follows:

OK

Condition	Front Left Door Glass Regulator Switch	Switch Operation	Power Window Glass
Turn ENGINE START STOP switch to “OFF” and window lock switch to OFF position	Passenger side	Pulled	UP (close)
		Pressed	DOWN (open)
	Rear left side	Pulled	UP (close)
		Pressed	DOWN (open)
	Rear right side	Pulled	UP (close)
		Pressed	DOWN (open)

3. Check the remote manual UP/DOWN function.
   a. Check that driver side power window glass operates as follows:

OK

Condition	Front Left Door Glass Regulator Switch	Switch Operation	Power Window Glass
Turn ENGINE START STOP switch to “OFF”	Driver side	Fully pulled up	UP (close)
		Fully pushed	DOWN (open)

b. Check that power window glass other than driver side power window glass operates as follows:

OK

Condition	Front Left Door Glass Regulator Switch	Switch Operation	Power Window Glass
Turn ENGINE START STOP switch to “OFF” and window lock switch to “OFF” position	Passenger side	Pulled	UP (close)
		Pressed	DOWN (open)
	Rear left side	Pulled	UP (close)
		Pressed	DOWN (open)
	Rear right side	Pulled	UP (close)
		Pressed	DOWN (open)

Window Jam Protection System

Composition

It consists of 1 front left door glass regulator switch, 3 single glass regulator switches, 4 glass regulators and Body Control Module (BCM).

Function Introduction

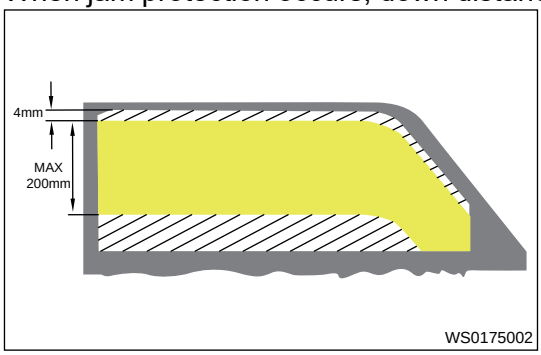
"Jam protection" is window regulating system with jam protection function, which mainly reflects on: When operating window auto UP or remote one-button UP, and passenger is caught carelessly by window which

raises automatically, jam protection control module will control glass 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 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 remote 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 auto 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.
   a.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.
   b.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.

Perform Jam Protection Module Self-learning in Following Conditions:

1. After locking occurs twice continuously.
2. After replacing body control module.
3. After replacing power glass regulator.
4. After vehicle powers off.

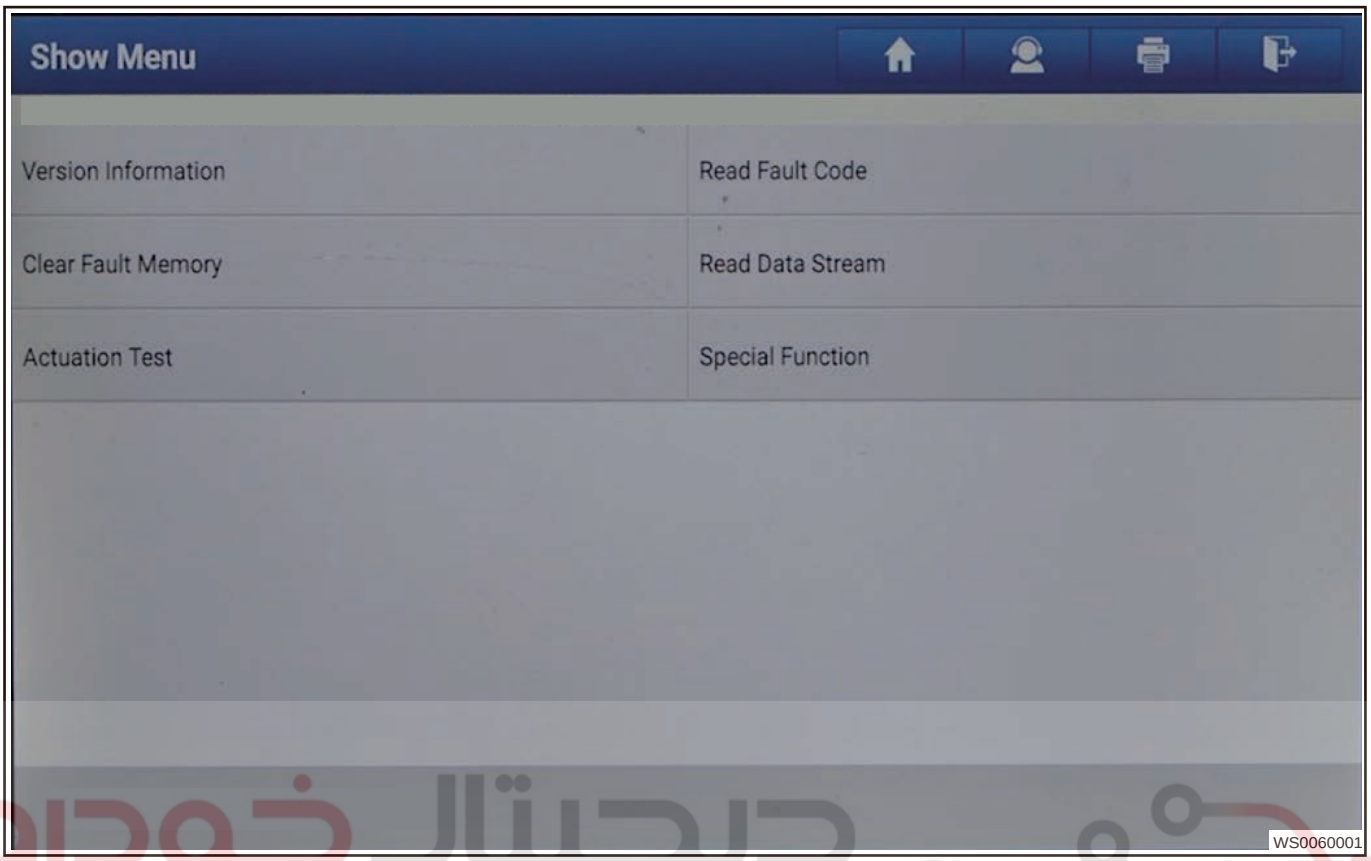
Learning Function (Jam Protection Module Initialization)

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 glass 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:
   a. Turn ENGINE START STOP switch to ON.
   b. Operate window glass to raise until reaching top manually and lock it for 2 seconds.
   c. Release the switch.
   d. Operate window glass to go down until reaching bottom manually and keep it lock for 2 seconds.
   e. Release the switch.
   f. Try the auto window UP function.

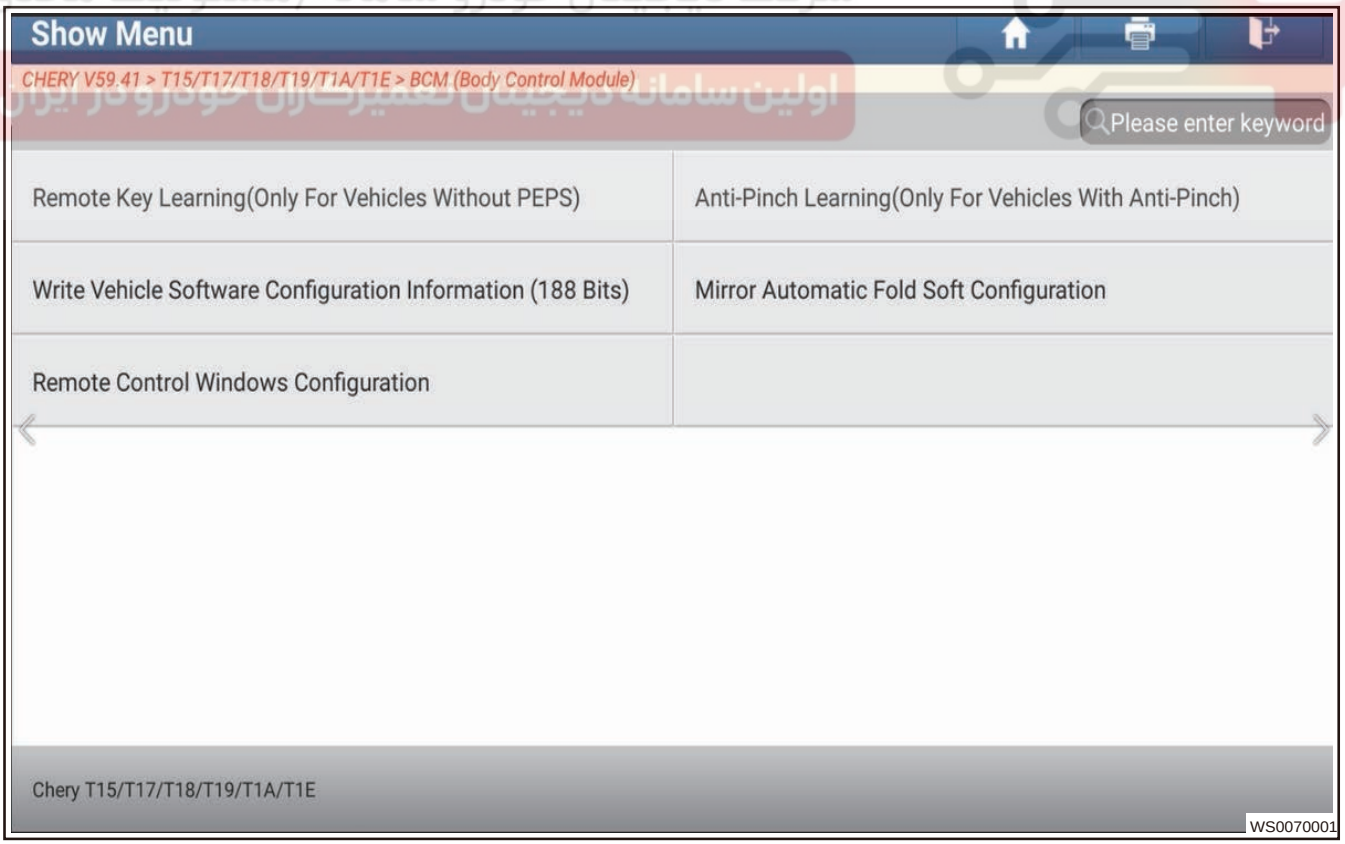
Matching Learning

Window Jam Protection Learning with Diagnostic Tester

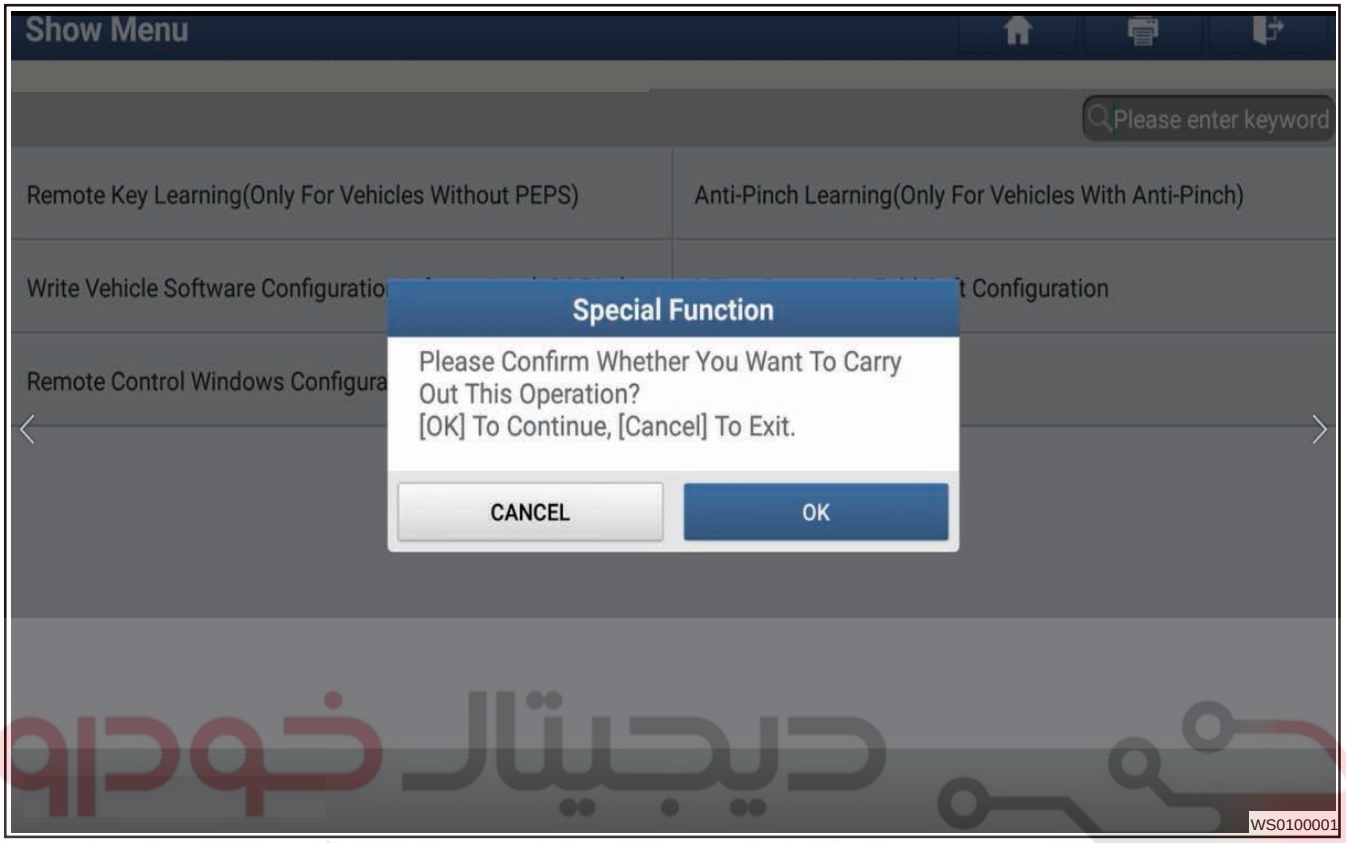
1. Enter diagnostic interface, select “BCM (Body Control Module)” on diagnostic tester interface to enter next interface.
2. Select "Special function" on diagnostic tester interface and click it to enter.



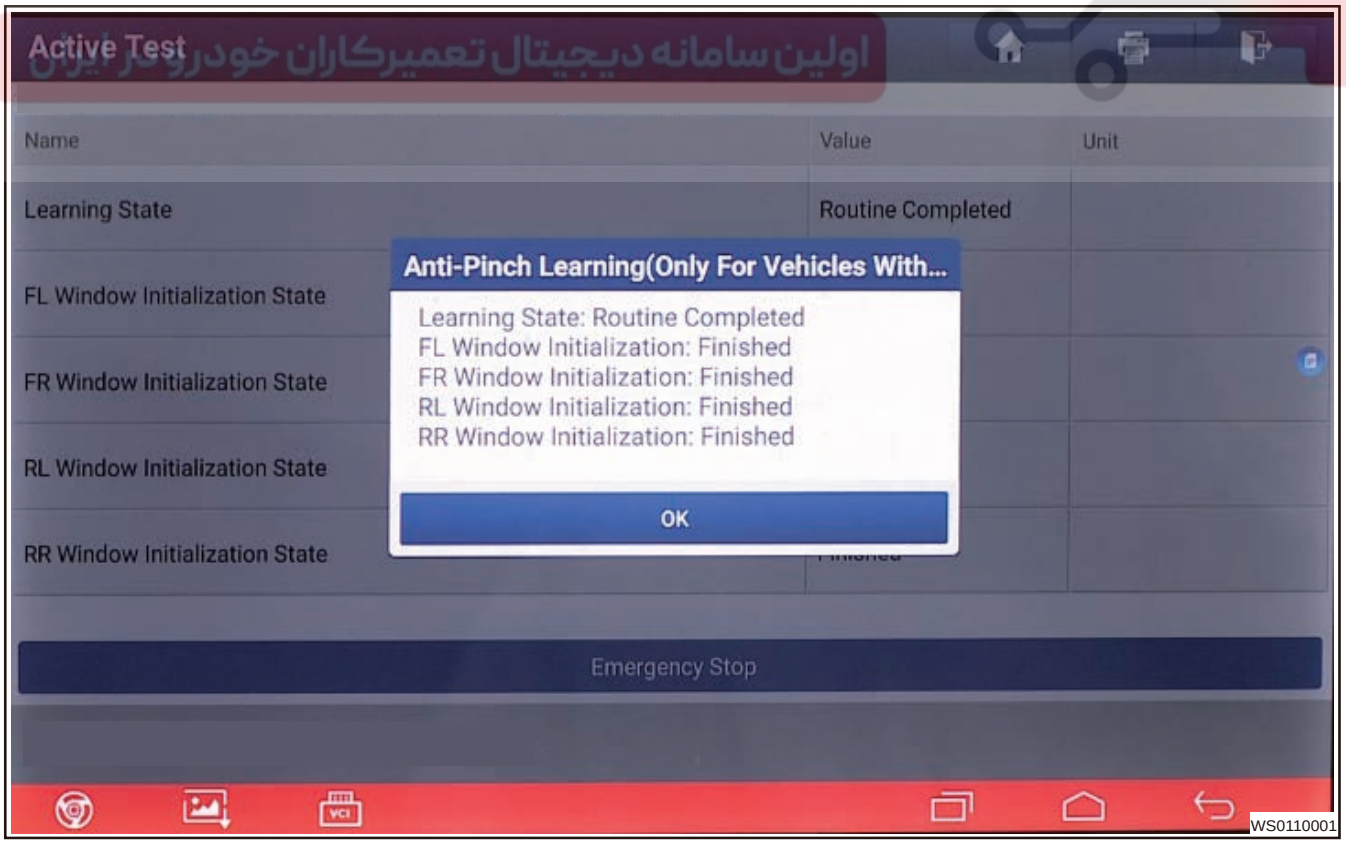
3. Select "Anti-Pinch Learning (Only For Vehicles With Anti-Pinch)" on diagnostic tester interface and click it to enter.



4. “Please Confirm Whether You Want To Carry Out This Operation? [OK] To Continue, [Cancel] To Exit.” is displayed on the diagnostic tester, click “OK”.



5. At this time, window jam protection learning will be performed.



6. Window glass self-learning is succeeded.

Sliding Roof Self-learning

To avoid the accidental failing to close sliding roof problem, perform self-learning of sliding roof once manually after vehicle rolls from the line. The specific learning method is: In fully closed position, long press the window closing button until the reset action occurs, use the automatic function to operate glass to the half open position, and long press the closing button until it reaches the fully closed position, then the whole self-learning is finished.

Check Sliding Roof Switch

⚠ Caution
• When performing electrical equipment diagnosis and test, always refer to circuit diagram for related circuit and component information.

a. Turn ENGINE START STOP switch to OFF.
b. Disconnect the sliding roof switch connector.
c. Using a digital multimeter, check for continuity between terminals of connector to check if sliding roof switch function is normal according to the table below.

Multimeter Connection	Condition	Specified Condition
Sliding roof switch (2) - Sliding roof switch (5)	“Sliding Roof Glass Open” button pressed	⩽ 1 Ω
Sliding roof switch (1) - Sliding roof switch (6)	“Sliding Roof Glass Closed” button pressed	⩽ 1 Ω
Sliding roof switch (6) - Sliding roof switch (8)	“Sun Visor Open” button pressed	⩽ 1 Ω
Sliding roof switch (7) - Sliding roof switch (9)	“Sun Visor Closed” button pressed	⩽ 1 Ω

d. If result is not as specified, replace sliding roof switch.

Diagnosis & Test

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

Rear Windshield Problem Symptoms Table

Symptom	Suspected Area
Rear defroster switch is turned on but does not operate	Fuse
	Rear defroster switch
	Rear defroster wire
	Wire harness or connector
	Ground

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 glass regulator switch	Power supply, fuse
	Driver side glass regulator switch
	Driver side/passenger side power glass regulator
	Wire harness or connector
	Body Control Module (BCM)
Passenger side power window glass cannot be operated with passenger side glass regulator control switch	Power supply, fuse
	Passenger side power glass regulator switch
	Passenger side power glass regulator
	Wire harness or connector
	Body Control Module (BCM)
Power window glass has intermittent problem	Ground
	Wire harness or connector

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.

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.

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.

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**

Diagnostic Trouble Code (DTC) Chart

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
B100C-13	Front Left Window Up Control Circuit-Circuit Open	Input continuously for 20 s, the software collects once every 10 ms, detect continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A	• Ground • Line connector • Glass regulator switch • Glass regulator motor • BCM module • Jam protection learning is not performed	/
B100C-71	Front Left Window Up Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more		/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
		than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		
B100D-13	Front Left Window Down Control Circuit-Circuit Open	Input continuously for 20 s, the software collects once every 10 ms, detect continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A		/
B100D-71	Front Left Window Down Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		/
B100E-13	Front Right Window Up	Input continuously for 20 s, the software collects		/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
	Control Circuit-Circuit Open	once every 10 ms, detect continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A		
B100E-71	Front Right Window Up Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		/
B100F-13	Front Right Window Down Control Circuit-Circuit Open	Input continuously for 20 s, the software collects once every 10 ms, detect continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A		/
B100F-71	Front Right Window Down Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power		/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
		supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		
B1010-13	Rear Left Window Up Control Circuit-Circuit Open	Input continuously for 20 s, the software collects once every 10 ms, detect continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A		/
B1010-71	Rear Left Window Up Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		/
B1011-13	Rear Left Window Down Control Circuit-Circuit Open	Input continuously for 20 s, the software collects once every 10 ms, detect continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A		/
B1011-71	Rear Left Window Down Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more than 100 MS, the		/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
		software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		
B1012-13	Rear Right Window Up Control Circuit-Circuit Open	Input continuously for 20 s, the software collects once every 10 ms, detect continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A		/
B1012-71	Rear Right Window Up Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		/
B1013-13	Rear Right Window Down Control Circuit-Circuit Open	Input continuously for 20 s, the software collects once every 10 ms, detect		/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
		continuously for 5 times after a delay of 20 s, and the circuit current is less than 1 A		
B1013-71	Rear Right Window Down Control Circuit-Actuator Stuck	The error is less than 10%, the time of duration is more than 100 MS, the software will detect once every 10MS, and it will be determined after at least 3 consecutive times of detection. The detection will start after 2 seconds since power supply is turned on. Regardless of key position, load will be output as long as operating conditions of load are met.		/
B1022-71	FL Window Button-Actuator Stuck	It is detected that the switch input state has not changed for 20 s		/
B1023-71	FR Window Button-Actuator Stuck	It is detected that the switch input state has not changed for 20 s		/
B1033-71	RL Window Button-Actuator Stuck	It is detected that the switch input state has not changed for 20 s		/
B1025-71	RR Window Button-Actuator Stuck	It is detected that the switch input state has not changed for 20 s		/
B1026-71	Passenger FR Window Button-Actuator Stuck	It is detected that the switch input state has not changed for 20 s		/
B1034-71	Passenger RL Window Button-Actuator Stuck	It is detected that the switch input		/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
		state has not changed for 20 s		
B1028-71	Passenger RR Window Button Short-Actuator Stuck	It is detected that the switch input state has not changed for 20 s		/
B1029-71	FL Window Relay-Actuator Stuck	It is detected that the output valid state of glass up or down relay has not changed for 20 s		/
B102A-71	FR Window Relay-Actuator Stuck	It is detected that the output valid state of glass up or down relay has not changed for 20 s		/
B102B-71	RL Window Relay-Actuator Stuck	It is detected that the output valid state of glass up or down relay has not changed for 20 s		/
B102C-71	RR Window Relay-Actuator Stuck	It is detected that the output valid state of glass up or down relay has not changed for 20 s		/
B102E-86	FL Window Motor Position Signal-Signal Invalid	It is calculated that the window position exceeds the top position or bottom position by 25 mm		/
B102F-86	FR Window Motor Position Signal-Signal Invalid	It is calculated that the window position exceeds the top position or bottom position by 25 mm		/
B1030-86	RL Window Motor Position Signal-Signal Invalid	It is calculated that the window position exceeds the top position or bottom position by 25 mm		/
B1031-86	RR Window Motor Position Signal-Signal Invalid	It is calculated that the window position exceeds the top position or		/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
		bottom position by 25 mm		
B102D-96	Anti-pinch Module Controller	MCU Internal Failure	• Circuit voltage below threshold; • Circuit voltage above threshold; • Component internal fault	/
B1021-17	Anti-pinch Module Power Supply-Circuit Voltage Above Threshold	It is detected that the battery voltage is > 16.5 V for 1000 ms		/
B1021-16	Anti-pinch Module Power Supply-Circuit Voltage Below Threshold	It is detected that the battery voltage is < 8.5 V for 5000 ms		/
B1032-87	Lost Communication With Anti-pinch Module MCU-Missing Message	/	• BCM module	/

DTC Diagnosis Procedure

DTC	B1032-87	Lost Communication With Anti-pinch Module MCU-Missing Message

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 → **Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTC**

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

DTC	**B1021-17**	**Anti-pinch Module Power Supply-Circuit Voltage Above Threshold**
DTC	**B1021-16**	**Anti-pinch Module Power Supply-Circuit Voltage Below Threshold**
DTC	**B102D-96**	**Anti-pinch Module 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.

1	**Check battery voltage**

(a) Connect negative battery cable, and turn ENGINE START STOP switch to ON to make engine run normally.

(b) Using voltage band of multimeter, check the power of battery.

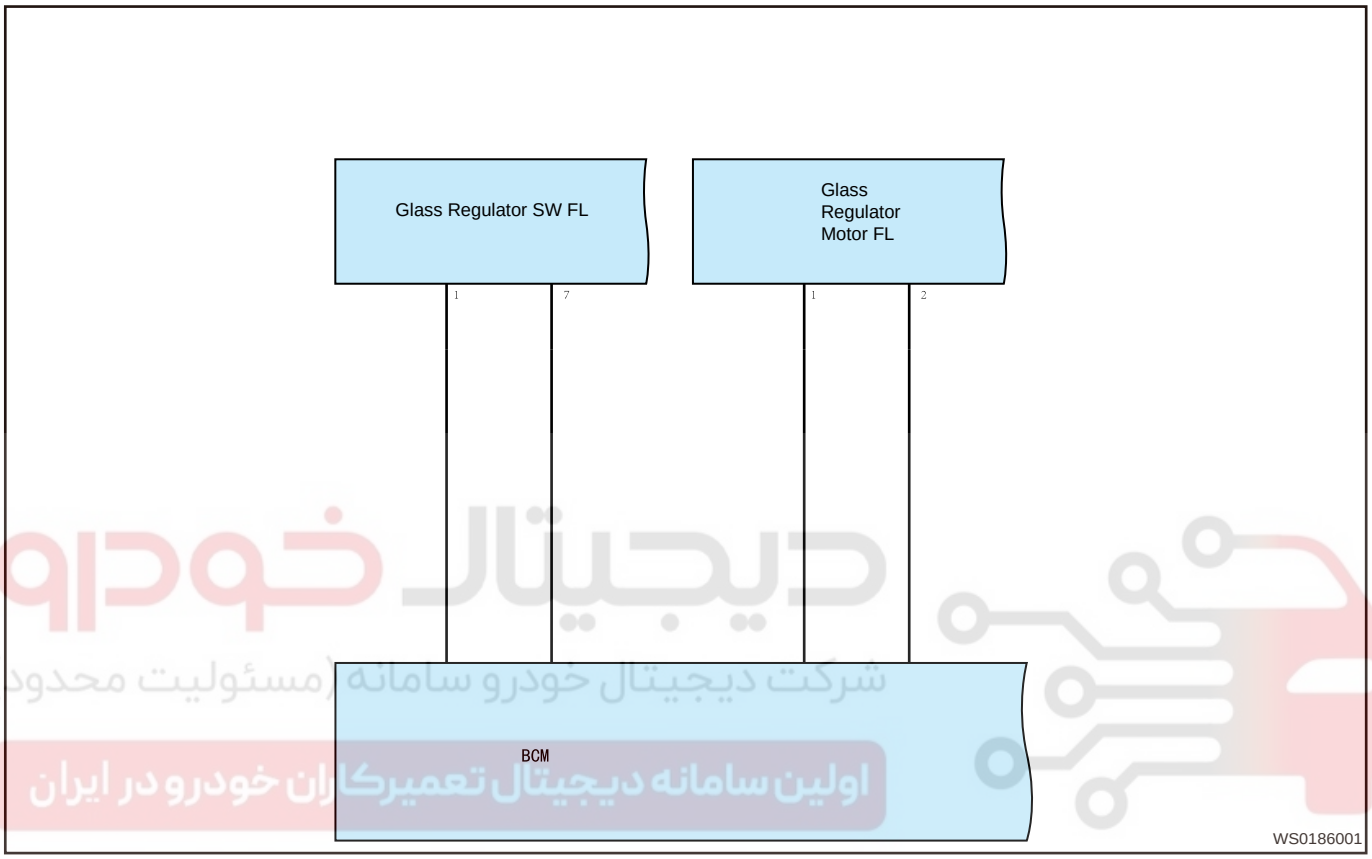
Multimeter Connection	Condition	Specified Condition
Battery (+) - Battery (-)	ENGINE START STOP switch “ON”	⩾ 12V

OK	**Replace BCM**
NG	**Replace and repair wire harness and connector**

DTC	**B100C-13**	**Front Left Window Up Control Circuit-Circuit Open**
DTC	**B100C-71**	**Front Left Window Up Control Circuit-Actuator Stuck**
DTC	**B100D-13**	**Front Left Window Down Control Circuit-Circuit Open**
DTC	**B100D-71**	**Front Left Window Down Control Circuit-Actuator Stuck**

DTC	**B1022-71**	**FL Window Button-Actuator Stuck**
DTC	**B1029-71**	**FL Window Relay-Actuator Stuck**
DTC	**B102E-86**	**FL Window Motor Position Signal-Signal Invalid**

Description
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 ground point**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to OFF.
(b) Check the BCM ground point.

NG → **Repair or replace ground wire harness or ground point**

OK

2	Use diagnostic tester to perform active test for window system

OK → Check front left door glass control circuit

NG

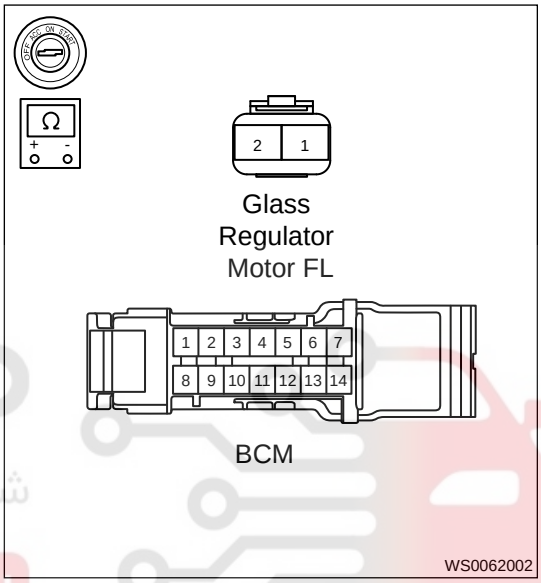
3	Check execution circuit of front left window system

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to “OFF”.

(b) Disconnect front left door glass regulator motor connector and BCM connector.

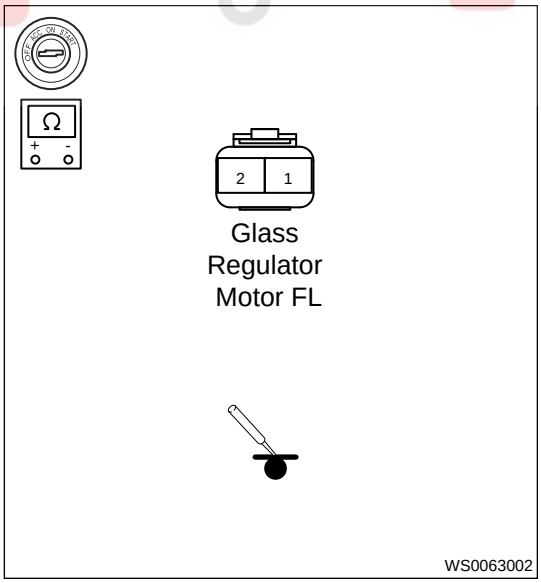
(c) Using ohm band of multimeter, check for continuity between front left door glass regulator motor and BCM.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator motor (1) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Front left door glass regulator motor (2) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between front left door glass regulator motor and ground.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator motor (1) - Ground	ENGINE START STOP switch “OFF”	∞
Front left door glass regulator motor (2) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between front left door glass regulator motor (1) and battery (+), front left door glass regulator motor (2) and battery (+) respectively.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator motor (1) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Front left door glass regulator motor (2) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK

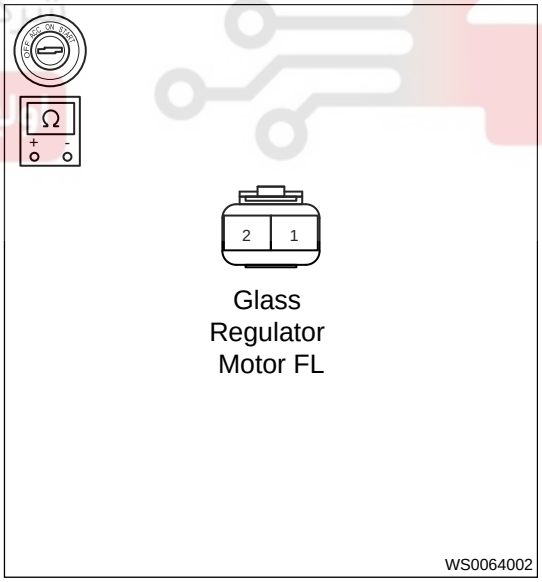
4	**Check front left window regulator motor**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to "OFF".

(b) Disconnect the front left window regulator motor connector.

(c) Using ohm band of multimeter, check resistance between front left window regulator motor (1) and (2).

Multimeter Connection	Condition	Specified Condition
Front left window regulator motor (1) - Front left window regulator motor (2)	ENGINE START STOP switch "OFF"	< 1 Ω



(d) Apply 12 V voltage to both terminals of front left window regulator motor connector, and observe if operation of window regulator is faulty.

OK → **Replace BCM**

NG → **Replace front left window regulator motor**

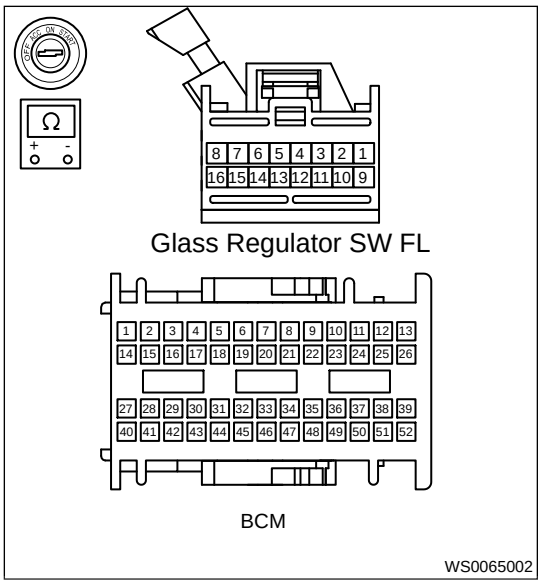
5	**Check front left door glass control circuit**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Disconnect the front left door glass regulator switch and BCM connector.

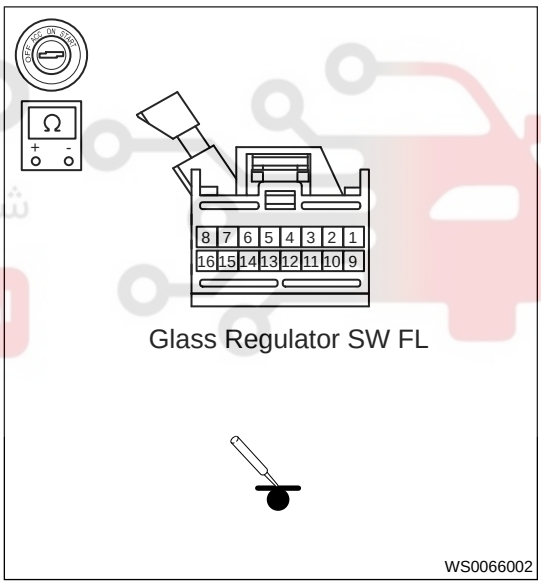
(c) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and BCM.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (1) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Front left door glass regulator switch (7) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and ground.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (1) - Ground	ENGINE START STOP switch “OFF”	∞
Front left door glass regulator switch (7) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between front left door glass regulator switch (1) and battery (+), front left door glass regulator switch (7) and battery (+).

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (1) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Front left door glass regulator switch (7) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK →

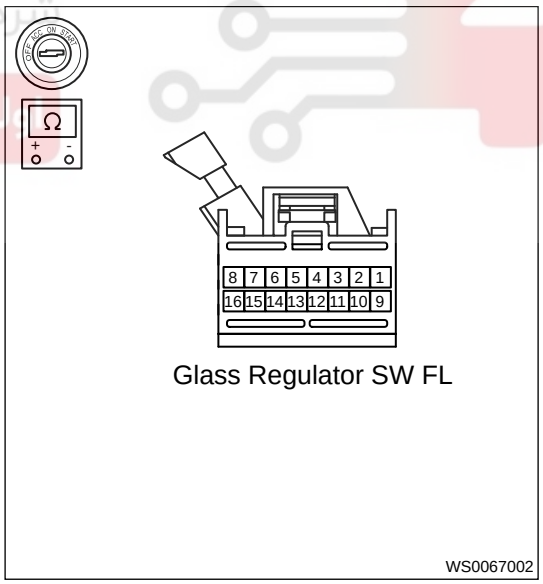
6	**Check front left door power glass regulator switch**

(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(b) Remove the front left door power glass regulator switch.

(c) Use ohm band of multimeter to measure resistance of front left door power glass regulator switch.

Multimeter Connection	Condition	Specified Condition
Front left door power glass regulator switch (1) - Front left door power glass regulator switch (7)	Auto DOWN	⩽ 5 Ω
	Manual DOWN	332 Ω
	Manual UP	3000 Ω
	Auto UP	1500 Ω



Glass Regulator SW FL
WS0067002

(d) Check glass regulator switch for stuck, damage.

NG → **Replace front left door glass regulator switch**

OK →

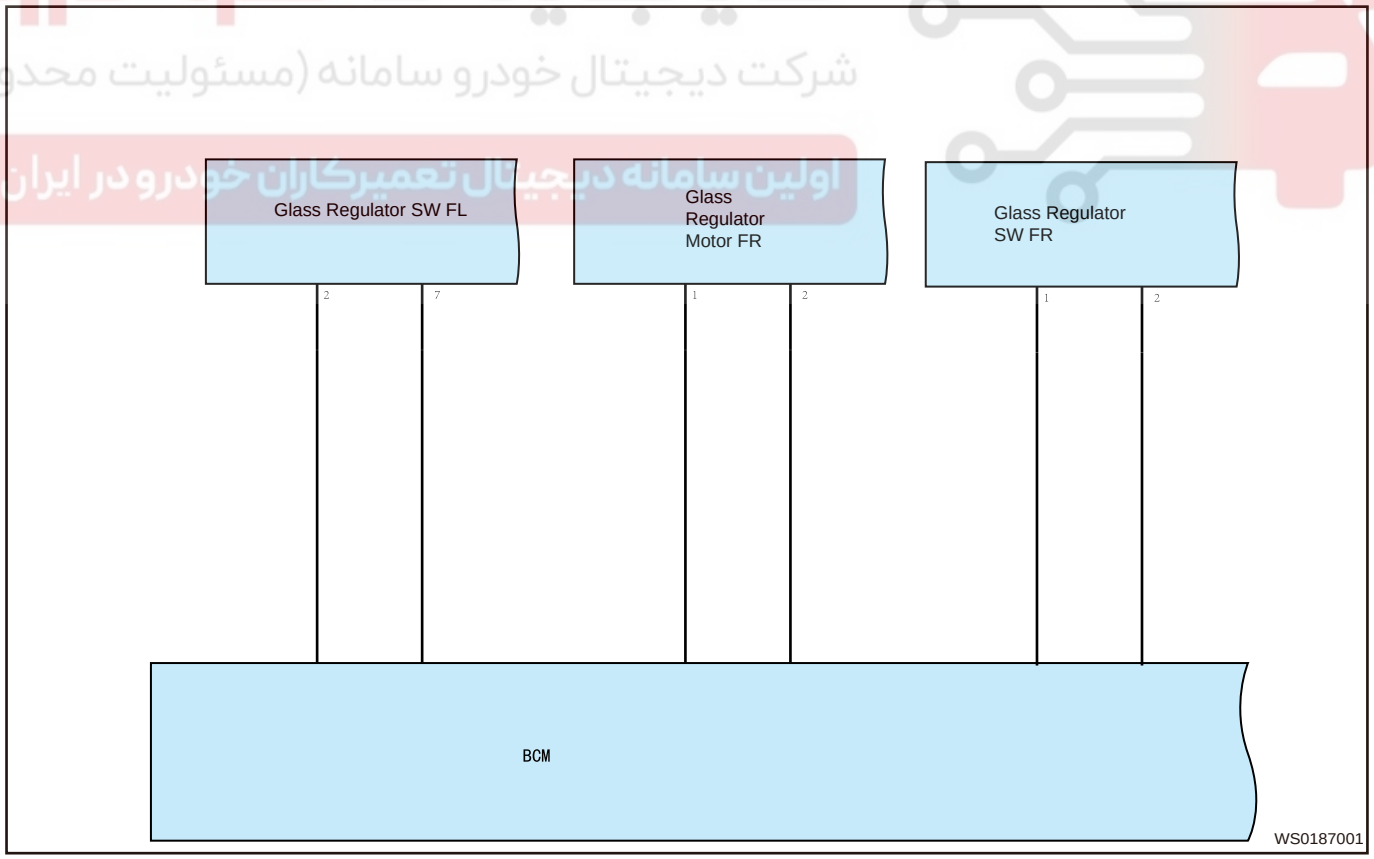
7	**Reconfirm DTCs**

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “OFF”.
(d) Use diagnostic tester (the latest software) to read the DTCs stored in body control system again.

OK	**System operates normally**
NG	**Replace Body Control Module (BCM)**

DTC	**B100E-13**	**Front Right Window Up Control Circuit-Circuit Open**
DTC	**B100E-71**	**Front Right Window Up Control Circuit-Actuator Stuck**
DTC	**B100F-13**	**Front Right Window Down Control Circuit-Circuit Open**
DTC	**B100F-71**	**Front Right Window Down Control Circuit-Actuator Stuck**
DTC	**B1023-71**	**FR Window Button-Actuator Stuck**
DTC	**B1026-71**	**Passenger FR Window Button-Actuator Stuck**
DTC	**B102A-71**	**FR Window Relay-Actuator Stuck**
DTC	**B102F-86**	**FR Window Motor Position Signal-Signal Invalid**

Description
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 ground point**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to “OFF”.

(b) Check the BCM ground point.

NG → **Repair or replace ground wire harness or ground point**

OK

2	**Use diagnostic tester to perform active test for window system**

OK → **Check control circuit of front right glass regulator**

NG

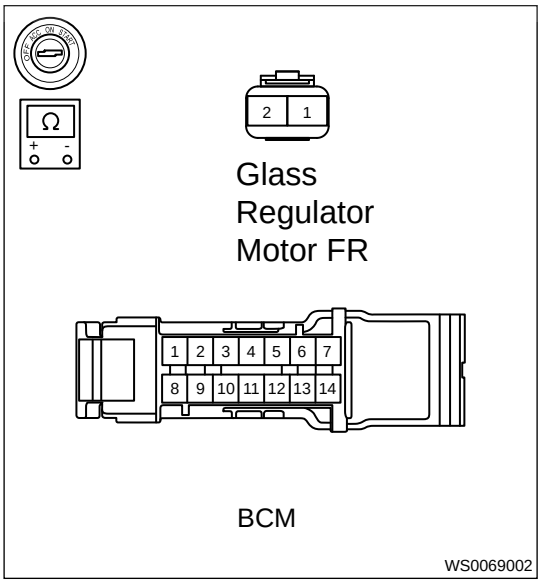
3	**Check executive circuit of front right window system.**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to “OFF”.

(b) Disconnect front right door glass regulator motor connector and BCM connector.

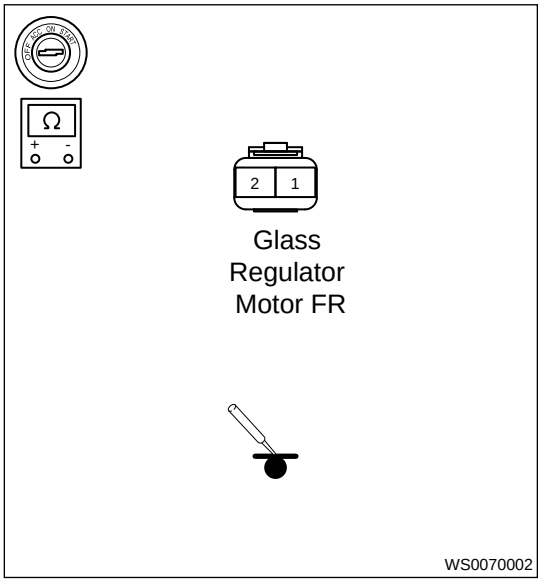
(c) Using ohm band of multimeter, check for continuity between front right door glass regulator motor and BCM.

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator motor (1) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Front right door glass regulator motor (2) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between front right door glass regulator motor and ground.

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator motor (1) - Ground	ENGINE START STOP switch "OFF"	∞
Front right door glass regulator motor (2) - Ground	ENGINE START STOP switch "OFF"	∞



(e) Using ohm band of multimeter, check for continuity between front right door glass regulator motor (1) and battery (+), front right door glass regulator motor (2) and battery (+) respectively.

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator motor (1) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Front right door glass regulator motor (2) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK →

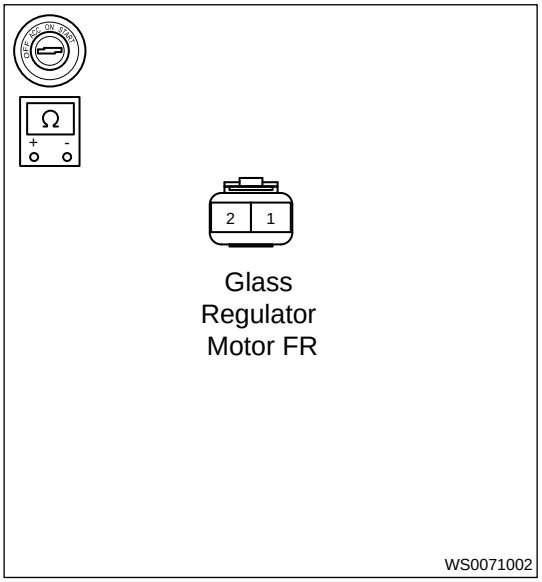
4	**Check front right window regulator motor**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to "OFF".

(b) Disconnect the front right window regulator motor connector.

(c) Using ohm band of multimeter, check resistance between front right door glass regulator motor (1) and (2).

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator motor (1) - Front right door glass regulator motor (2)	ENGINE START STOP switch “OFF”	＜ 1 Ω



(d) Apply 12 V voltage to both terminals of front right window regulator motor connector, and observe if operation of window regulator is faulty.

OK	**Replace BCM**
NG	**Replace rear right window regulator motor**

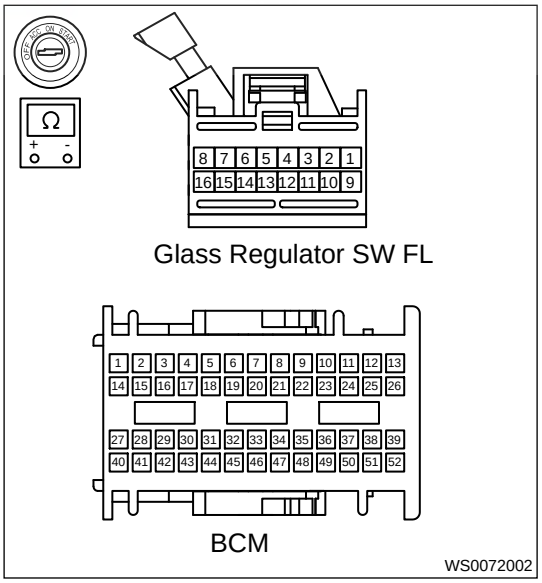
5	**Check front left glass regulator switch assembly (which controls front right regulator) wire harness connector**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Disconnect the front left door glass regulator switch and BCM connector.

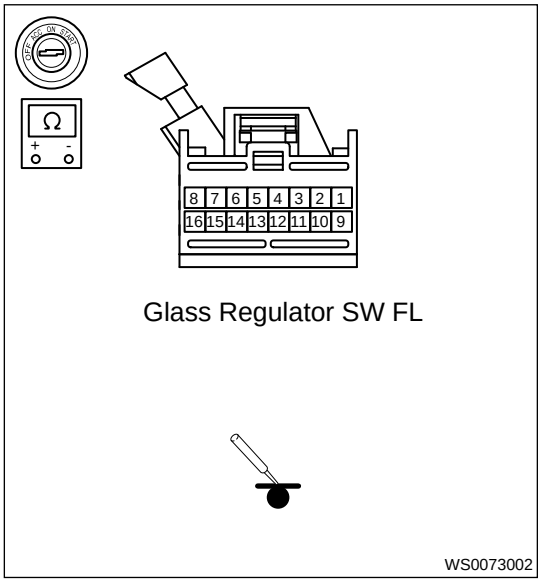
(c) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and BCM.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (2) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Front left door glass regulator switch (7) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and ground.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (2) - Ground	ENGINE START STOP switch "OFF"	∞
Front left door glass regulator switch (7) - Ground	ENGINE START STOP switch "OFF"	∞



(e) Using ohm band of multimeter, check for continuity between front left door glass regulator switch (2) and battery (+), front left door glass regulator switch (7) and battery (+).

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (2) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Front left door glass regulator switch (7) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK

6	**Check front left glass regulator switch assembly (which controls front right glass regulator)**

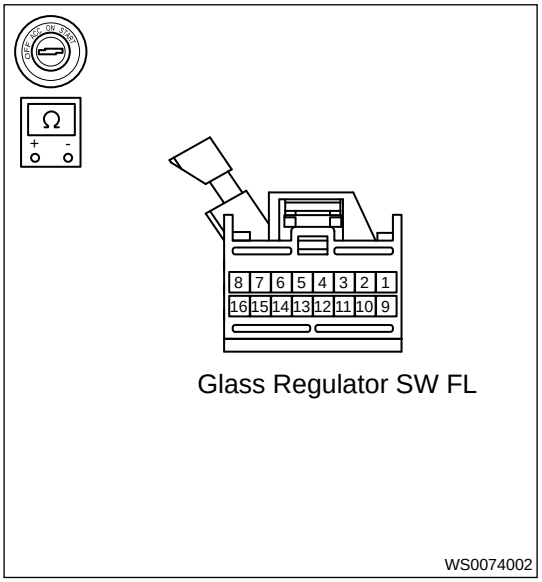
(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(b) Remove the front left door power glass regulator switch.

(c) Use ohm band of multimeter to measure resistance of front left door glass regulator switch.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (2) - Front left door glass regulator switch (7)	Auto DOWN	⩽ 5 Ω
	Manual DOWN	332 Ω
	Manual UP	3000 Ω
	Auto UP	1500 Ω

(d) Check glass regulator switch for stuck and damage.



NG → **Replace front left door glass regulator switch assembly**

OK →

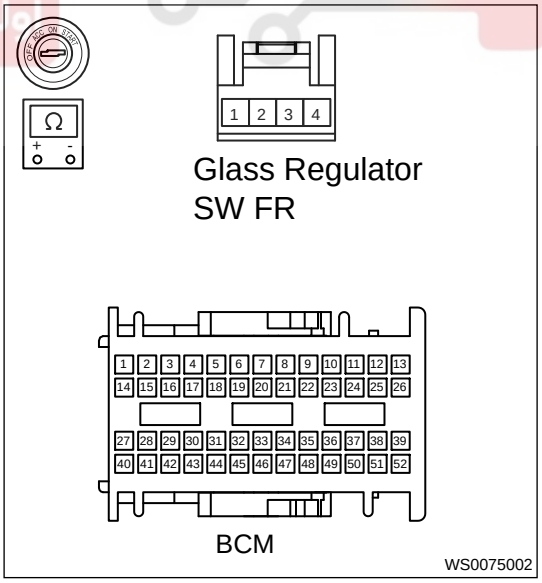
7	Check control circuit of front right door glass

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Disconnect the front right door glass regulator switch and BCM connector.

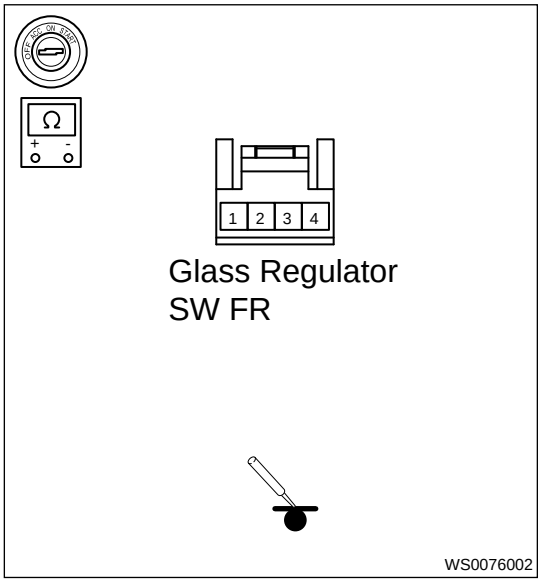
(c) Using ohm band of multimeter, check for continuity between front right door glass regulator switch and BCM.

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator switch (2) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Front right door glass regulator switch (1) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between front right door glass regulator switch and ground.

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator switch (2) - Ground	ENGINE START STOP switch “OFF”	∞
Front right door glass regulator switch (1) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between front right door glass regulator switch (2) and battery (+), front right door glass regulator switch (1) and battery (+).

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator switch (2) - Battery (+)	ENGINE START STOP switch “OFF”	∞
Front right door glass regulator switch (1) - Battery (+)	ENGINE START STOP switch “OFF”	∞

NG → **Replace wire harness and connector**

OK →

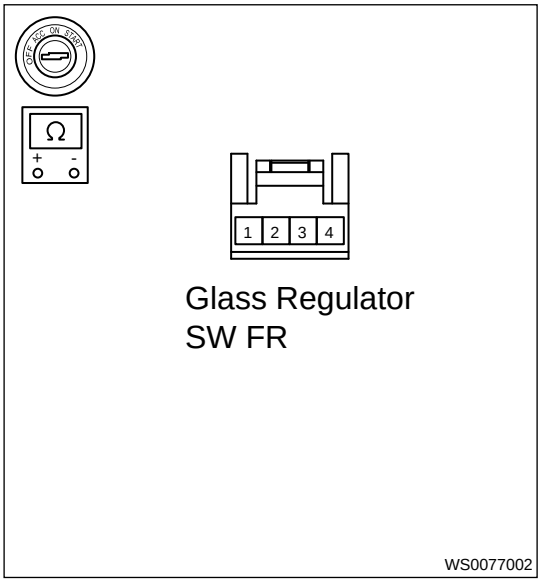
8	**Check front right door power glass regulator switch**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Remove the front right door power glass regulator switch.

(c) Use ohm band of multimeter to measure resistance of front right door glass regulator switch.

Multimeter Connection	Condition	Specified Condition
Front right door glass regulator switch (1) - Front right door glass regulator switch (2)	Auto DOWN	⩽ 5 Ω
	Manual DOWN	332 Ω
	Manual UP	3000 Ω
	Auto UP	1500 Ω



(d) Check glass regulator switch for stuck and damage.

NG → **Replace front right door glass regulator switch**

OK

9	Reconfirm DTCs

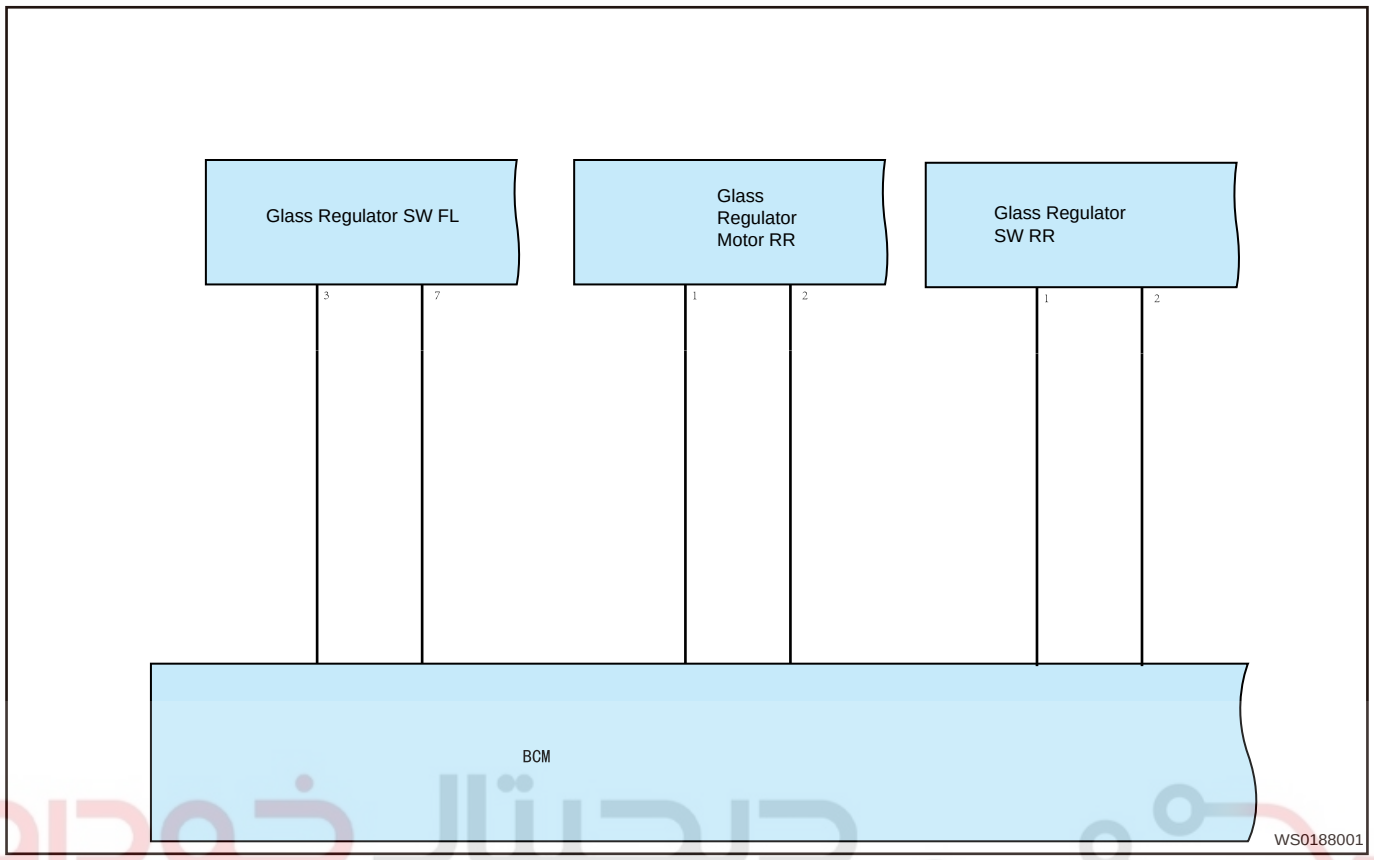
(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “OFF”.
(d) Use diagnostic tester (the latest software) to read the DTCs stored in body control system again.

OK → **System is normal**

NG → **Replace Body Control Module (BCM)**

DTC	**B1010-13**	**Rear Left Window Up Control Circuit-Circuit Open**
DTC	**B1010-71**	**Rear Left Window Up Control Circuit-Actuator Stuck**
DTC	**B1011-13**	**Rear Left Window Down Control Circuit-Circuit Open**
DTC	**B1011-71**	**Rear Left Window Down Control Circuit-Actuator Stuck**
DTC	**B102B-71**	**RL Window Relay-Actuator Stuck**
DTC	**B1030-86**	**RL Window Motor Position Signal-Signal Invalid**

Description
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 ground point**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to “OFF”.

(b) Check BCM ground point

NG → **Repair or replace ground wire harness or ground point**

OK

2	**Use diagnostic tester to perform active test for window system**

OK → **Check control circuit of rear left glass regulator**

NG

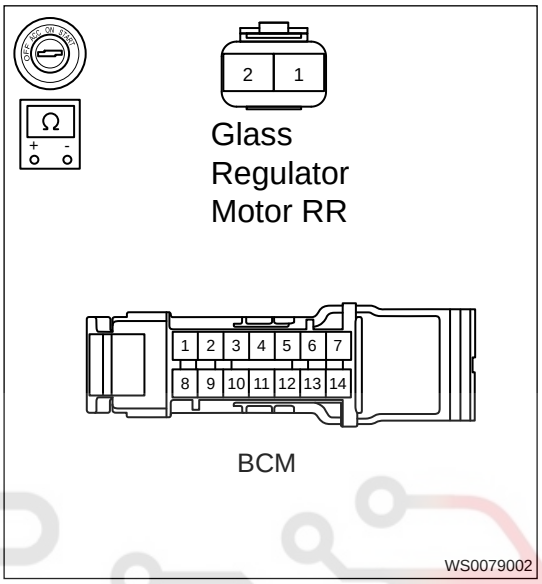
3	Check execution circuit of rear left window system

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to “OFF”.

(b) Disconnect rear left door glass regulator motor connector and BCM connector.

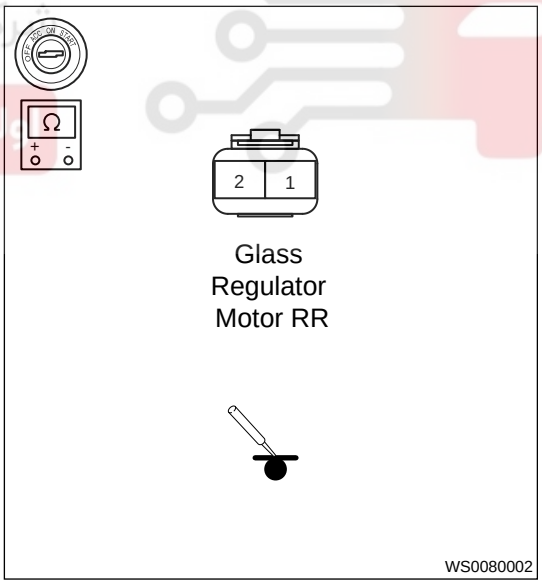
(c) Using ohm band of multimeter, check for continuity between rear left door glass regulator motor and BCM.

Multimeter Connection	Condition	Specified Condition
Rear left door glass regulator motor (1) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Rear left door glass regulator motor (2) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between rear left door glass regulator motor and ground.

Multimeter Connection	Condition	Specified Condition
Rear left door glass regulator motor (1) - Ground	ENGINE START STOP switch “OFF”	∞
Rear left door glass regulator motor (2) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between rear left door glass regulator motor (1) and battery (+), rear left door glass regulator motor (2) and battery (+) respectively.

Multimeter Connection	Condition	Specified Condition
Rear left door glass regulator motor (1) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Rear left door glass regulator motor (2) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK →

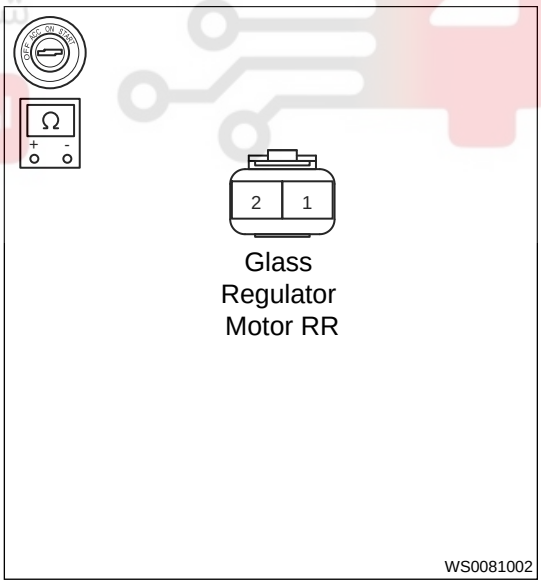
4	**Check rear left window regulator motor**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to "OFF".

(b) Disconnect the rear left window regulator motor connector.

(c) Using ohm band of multimeter, check resistance between rear left door glass regulator motor (1) and (2).

Multimeter Connection	Condition	Specified Condition
Rear left door glass regulator motor (1) - Rear left door glass regulator motor (2)	ENGINE START STOP switch "OFF"	< 1 Ω



(d) Apply 12 V voltage to both terminals of rear left window regulator motor connector, and observe if operation of window regulator is faulty.

OK → **Replace BCM**

NG → **Replace rear left window regulator motor**

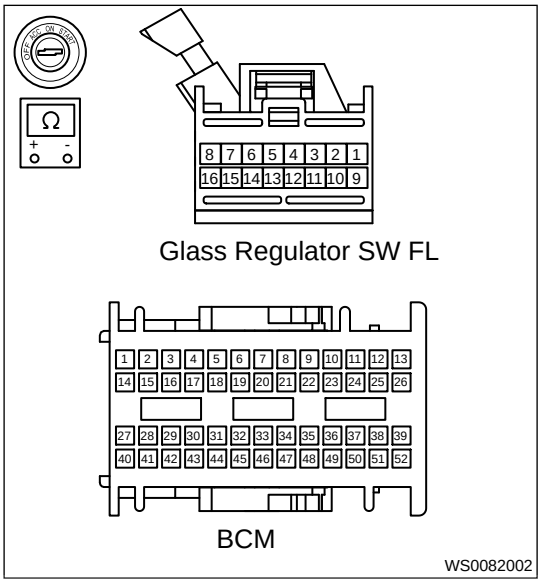
5	**Check control circuit of rear left glass regulator**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Disconnect the front left door glass regulator switch and BCM connector.

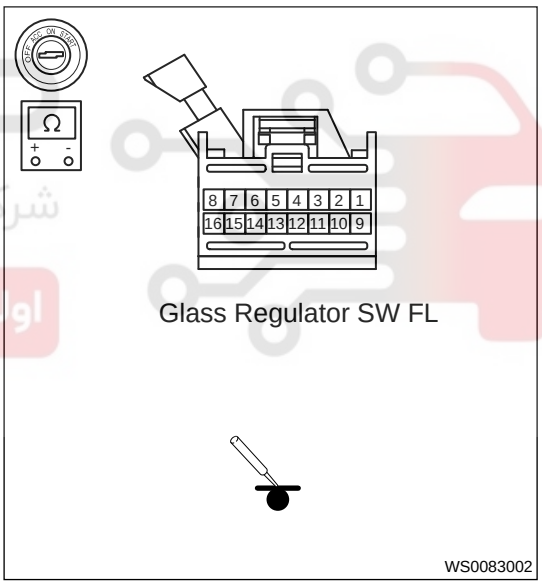
(c) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and BCM.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (3) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Front left door glass regulator switch (7) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and ground.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (3) - Ground	ENGINE START STOP switch “OFF”	∞
Front left door glass regulator switch (7) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between front left door glass regulator switch (3) and battery (+), front left door glass regulator switch (7) and battery (+).

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (3) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Front left door glass regulator switch (7) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK →

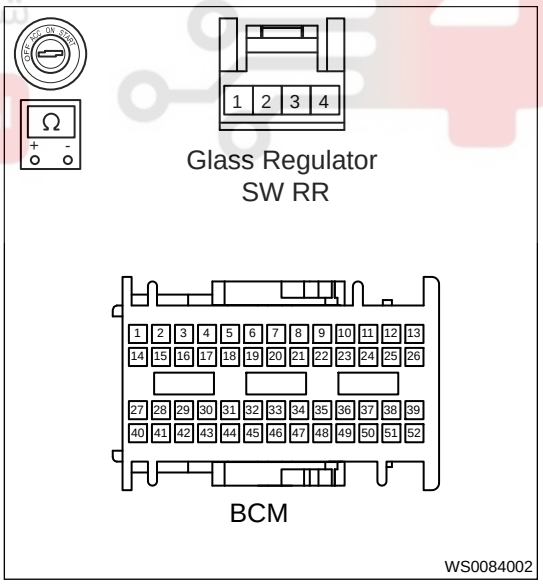
6	Check control circuit of rear left door glass

(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(b) Disconnect rear left door glass regulator switch and BCM connector.

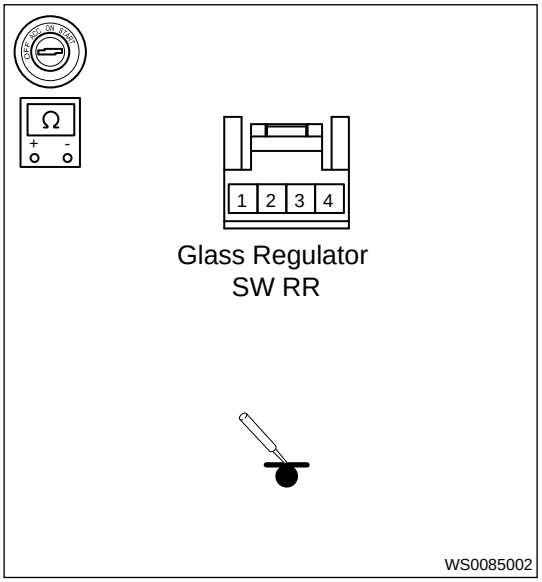
(c) Using ohm band of multimeter, check for continuity between rear left door glass regulator switch and BCM.

Multimeter Connection	Condition	Specified Condition
Rear left door glass regulator switch (2) - BCM (corresponding terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω
Rear left door glass regulator switch (1) - BCM (corresponding terminal)	ENGINE START STOP switch "OFF"	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between rear left door glass regulator switch and ground.

Multimeter Connection	Condition	Specified Condition
Rear left door glass regulator switch (2) - Ground	ENGINE START STOP switch "OFF"	∞
Rear left door glass regulator switch (1) - Ground	ENGINE START STOP switch "OFF"	∞



(e) Using ohm band of multimeter, check for continuity between rear left door glass regulator switch (2) and battery (+), rear left door glass regulator switch (1) and battery (+).

Multimeter Connection	Condition	Specified Condition
Rear left door glass regulator switch (2) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Rear left door glass regulator switch (1) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK

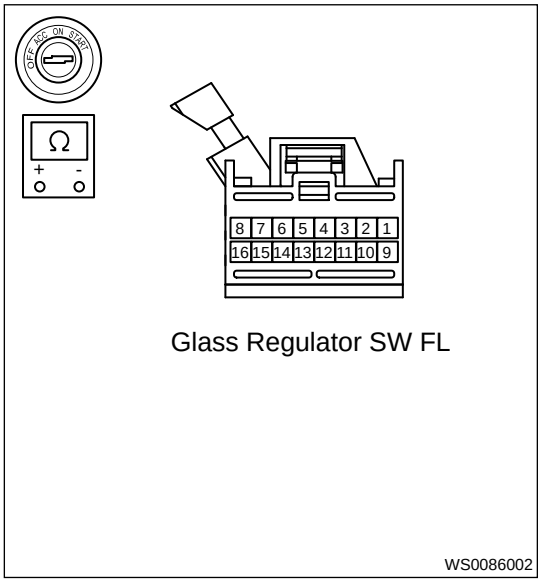
7	**Check front left door glass regulator switch assembly (which controls rear left glass regulator)**

(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(b) Remove the front left door power glass regulator switch.

(c) Use ohm band of multimeter to measure resistance of front left door glass regulator switch.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (3) - Rear left door glass regulator switch (7)	Auto DOWN	⩽ 5 Ω
	Manual DOWN	332 Ω
	Manual UP	3000 Ω
	Auto UP	1500 Ω



(d) Check glass regulator switch for stuck and damage.

NG → **Replace front left door glass regulator switch assembly**

OK

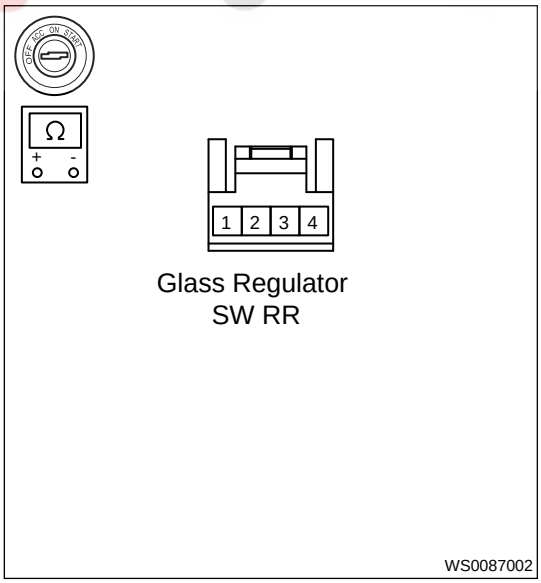
8	**Check rear left door glass regulator switch**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Remove the rear left door power glass regulator switch.

(c) Use ohm band of multimeter to measure resistance of rear left door power glass regulator switch.

Multimeter Connection	Condition	Specified Condition
Rear left door power glass regulator switch (1) - Rear left door power glass regulator switch (2)	Auto DOWN	⩽ 5 Ω
	Manual DOWN	332 Ω
	Manual UP	3000 Ω
	Auto UP	1500 Ω



(d) Check glass regulator switch for stuck and damage.

NG → **Replace rear left door glass regulator switch**

OK

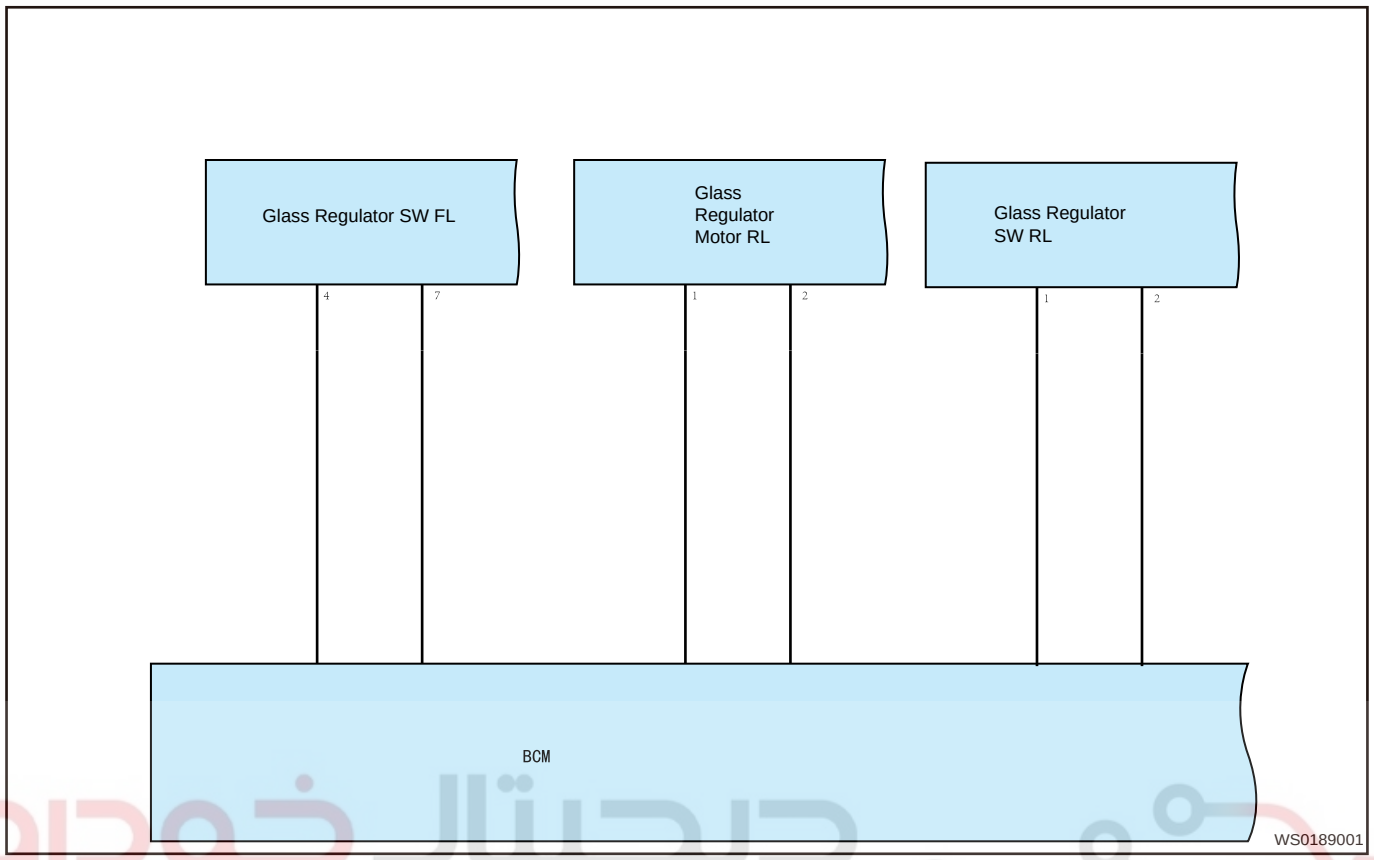
9	Reconfirm DTCs

(a) Connect all the connectors.
(b) Connect the negative battery cable.
(c) Turn ENGINE START STOP switch to “OFF”.
(d) Use diagnostic tester (the latest software) to read the DTCs stored in body control system again.

OK	**System is normal**
NG	**Replace Body Control Module (BCM)**

DTC	**B1012-13**	**Rear Right Window Up Control Circuit-Circuit Open**
DTC	**B1012-71**	**Rear Right Window Up Control Circuit-Actuator Stuck**
DTC	**B1013-13**	**Rear Right Window Down Control Circuit-Circuit Open**
DTC	**B1013-71**	**Rear Right Window Down Control Circuit-Actuator Stuck**
DTC	**B1025-71**	**RR Window Button-Actuator Stuck**
DTC	**B1028-71**	**Passenger RR Window Button Short-Actuator Stuck**
DTC	**B102C-71**	**RR Window Relay-Actuator Stuck**
DTC	**B1031-86**	**RR Window Motor Position Signal-Signal Invalid**

Description
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 ground point**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to “OFF”.

(b) Check the BCM ground point.

NG → **Repair or replace ground wire harness or ground point**

OK

2	**Use diagnostic tester to perform active test for window system**

OK → **Check control circuit of rear right door glass regulator**

NG

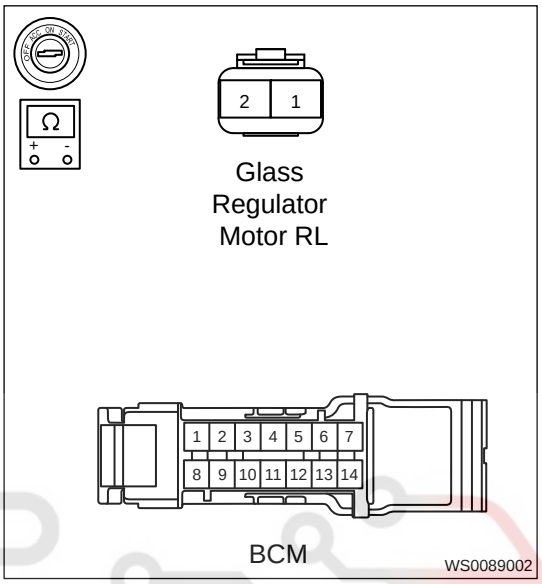
3	Check execution circuit of rear right window system

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to “OFF”.

(b) Disconnect rear right door glass regulator motor connector and BCM connector.

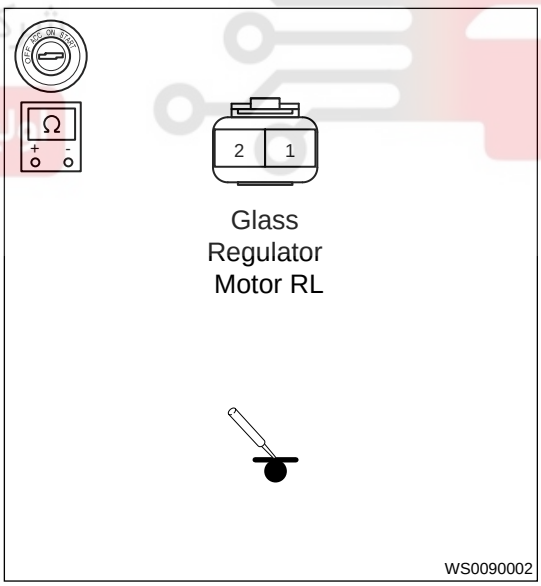
(c) Using ohm band of multimeter, check for continuity between rear right door glass regulator motor and BCM.

Multimeter Connection	Condition	Specified Condition
Rear right door glass regulator motor (1) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Rear right door glass regulator motor (2) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between rear right door glass regulator motor and ground.

Multimeter Connection	Condition	Specified Condition
Rear right door glass regulator motor (1) - Ground	ENGINE START STOP switch “OFF”	∞
Rear right door glass regulator motor (2) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between rear right door glass regulator motor (1) and battery (+), rear right door glass regulator motor (2) and battery (+) respectively.

Multimeter Connection	Condition	Specified Condition
Rear right door glass regulator motor (1) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Rear right door glass regulator motor (2) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK

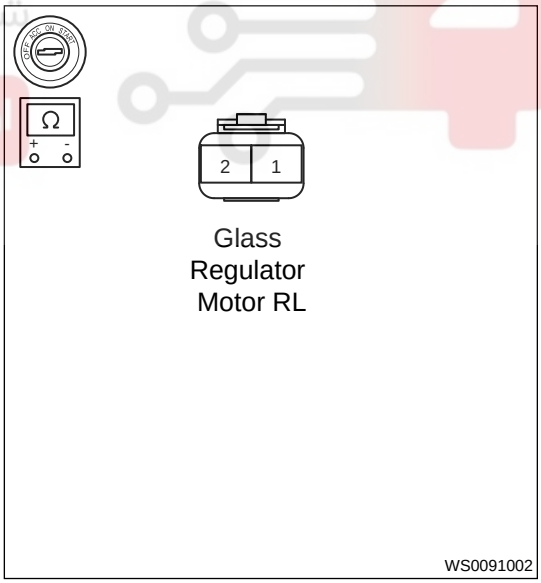
4	**Check rear right window regulator motor**

(a) Disconnect negative battery cable, and turn ENGINE START STOP switch to "OFF".

(b) Disconnect the rear right window regulator motor connector.

(c) Use ohm band of multimeter to check resistance of rear right window regulator motor.

Multimeter Connection	Condition	Specified Condition
Rear right window regulator motor (1) - Rear right window regulator motor (2)	ENGINE START STOP switch "OFF"	< 1 Ω



(d) Apply 12 V voltage to both terminals of rear right window regulator motor connector, and observe if operation of window regulator is faulty.

OK → **Replace BCM**

NG → **Replace rear right window regulator motor**

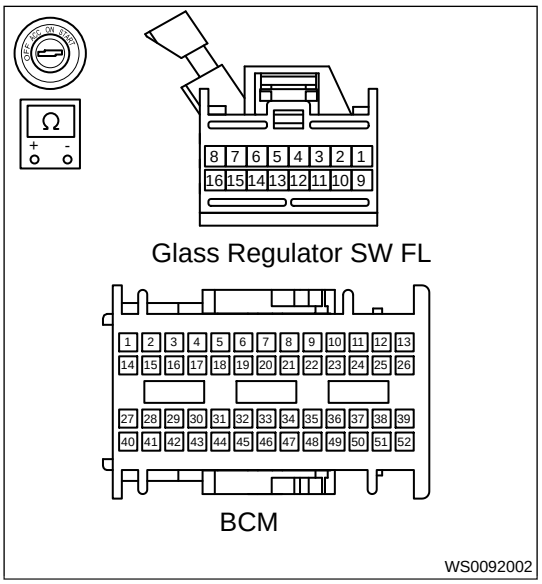
5	**Check control circuit of rear right door glass regulator**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Disconnect the front left door glass regulator switch and BCM connector.

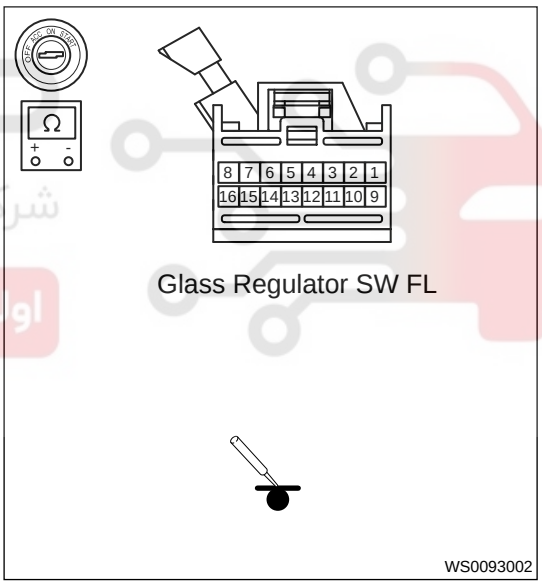
(c) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and BCM.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (4) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Front left door glass regulator switch (7) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between front left door glass regulator switch and ground.

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (4) - Ground	ENGINE START STOP switch “OFF”	∞
Front left door glass regulator switch (7) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between front left door glass regulator switch (4) and battery (+), front left door glass regulator switch (7) and battery (+).

Multimeter Connection	Condition	Specified Condition
Front left door glass regulator switch (4) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Front left door glass regulator switch (7) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK →

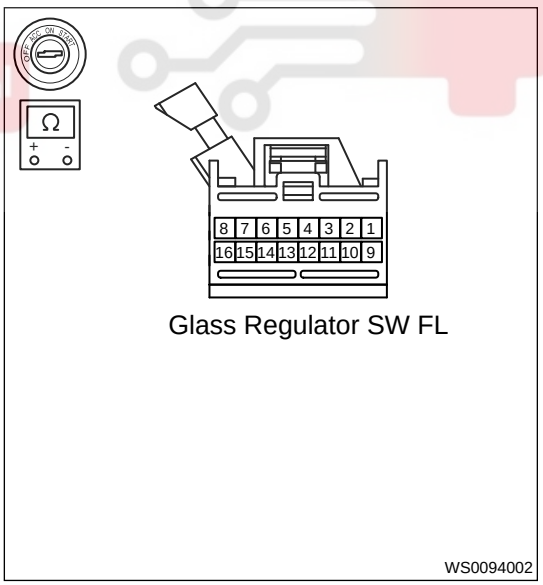
6	**Check front left door glass regulator switch assembly (which controls rear right glass regulator circuit)**

(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(b) Remove the front left door power glass regulator switch.

(c) Use ohm band of multimeter to measure resistance of front left door power glass regulator switch.

Multimeter Connection	Condition	Specified Condition
Front left door power glass regulator switch (4) - Front left door power glass regulator switch (7)	Auto DOWN	⩽ 5 Ω
	Manual DOWN	332 Ω
	Manual UP	3000 Ω
	Auto UP	1500 Ω



Glass Regulator SW FL

(d) Check glass regulator switch for stuck and damage.

NG → **Replace front left door glass regulator switch assembly**

OK →

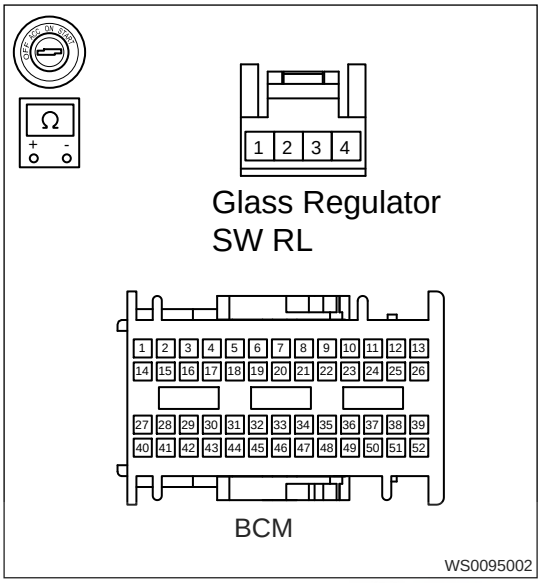
7	**Check control circuit of rear right door glass**

(a) Turn ENGINE START STOP switch to “OFF”, disconnect the negative battery cable.

(b) Disconnect rear right door glass regulator switch and BCM connector.

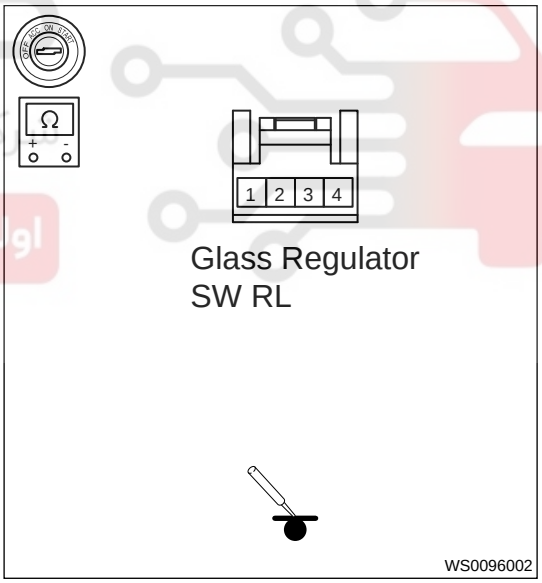
(c) Using ohm band of multimeter, check for continuity between rear right door glass regulator switch and BCM.

Multimeter Connection	Condition	Specified Condition
Rear right door glass regulator switch (2) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω
Rear right door glass regulator switch (1) - BCM (corresponding terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω



(d) Using ohm band of multimeter, check for continuity between rear right door glass regulator switch and ground.

Multimeter Connection	Condition	Specified Condition
Rear right door glass regulator switch (2) - Ground	ENGINE START STOP switch “OFF”	∞
Rear right door glass regulator switch (1) - Ground	ENGINE START STOP switch “OFF”	∞



(e) Using ohm band of multimeter, check for continuity between rear right door glass regulator switch (2) and battery (+), rear right door glass regulator switch (1) and battery (+).

Multimeter Connection	Condition	Specified Condition
Rear right door glass regulator switch (2) - Battery (+)	ENGINE START STOP switch "OFF"	∞
Rear right door glass regulator switch (1) - Battery (+)	ENGINE START STOP switch "OFF"	∞

NG → **Replace wire harness and connector**

OK

8	Check rear right door power glass regulator switch

(a) Turn ENGINE START STOP switch to "OFF", disconnect the negative battery cable.

(b) Remove the rear right door power glass regulator switch.

(c) Use ohm band of multimeter to measure resistance of rear right door power glass regulator switch.

Multimeter Connection	Condition	Specified Condition
Rear right door power glass regulator switch (1) - Rear right door power glass regulator switch (2)	Auto DOWN	⩽ 5 Ω
	Manual DOWN	332 Ω
	Manual UP	3000 Ω
	Auto UP	1500 Ω

(d) Check glass regulator switch for stuck and damage.

NG → **Replace rear right door glass regulator switch**

OK

9	Reconfirm DTCs

(a) Connect all the connectors.

(b) Connect the negative battery cable.

(c) Turn ENGINE START STOP switch to "OFF".

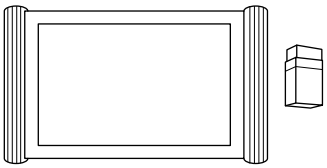
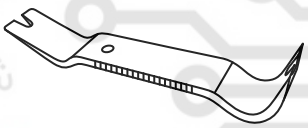
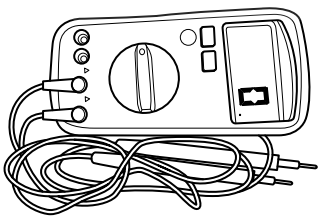
(d) Use diagnostic tester (the latest software) to read the DTCs stored in body control system again.

OK	**System is normal**
NG	**Replace Body Control Module (BCM)**

On-vehicle Service

Tools

General Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Interior Crow Plate	 RCH002506
Digital Multimeter	 RCH000206

Torque Specifications

Description	Torque (N·m)
Sliding Roof Switch Assembly Fixing Screw	2.5 ± 0.5
Sliding Roof Mounting Bracket Fixing Bolt	9.0 ± 1.5
Motor Mounting Screw	4.0 ± 0.5
Glass Assembly Bracket Fixing Screw	5.5 ± 0.5
Outer Weather Bar Fixing Screw	1.0 ± 0.2

Description	Torque (N·m)
Front Door Glass Rear Guide Rail Fixing Bolt	7 ± 1.0
Power Glass Regulator Fixing Bolt	9 ± 1.5
Power Glass Regulator Fixing Nut	9 ± 1.5
Rear Door Glass Rear Guide Rail Fixing Screw	1.5 ± 0.5
Rear Door Glass Rear Guide Rail Fixing Bolt	7 ± 1.0

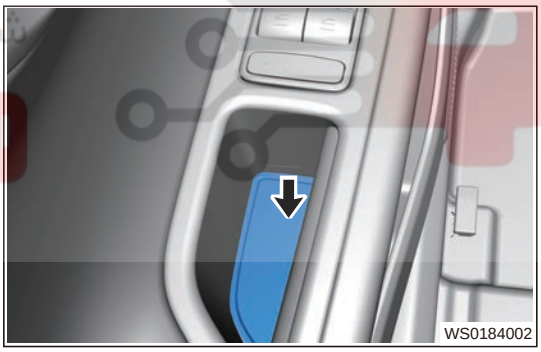
Front Left Door Power Glass Regulator Switch

Removal

⚠ Caution

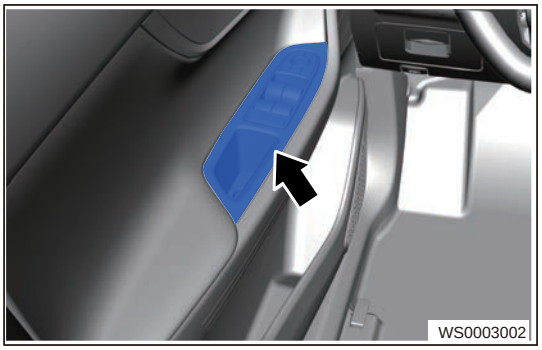
- Be sure to wear safety equipment to prevent accidents, when removing front left door power glass regulator switch.
- Appropriate force should be applied when removing front left door glass regulator switch. Be careful not to operate roughly.
- Try to prevent front door inner protector assembly from being scratched, when removing front left door glass 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 glass regulator switch.
   a. Remove the power glass regulator switch rubber pad.



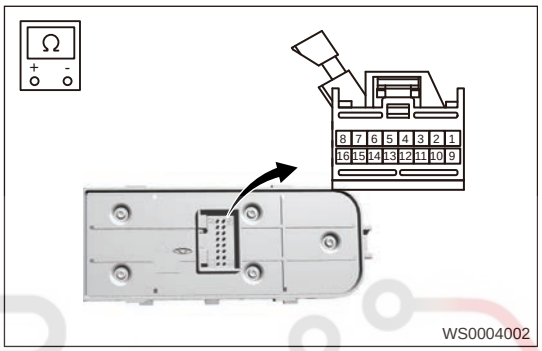
   b. Remove the fixing bolt (arrow).

c. Using an interior crow plate, pry off power glass regulator switch and remove the power glass regulator switch.



Inspection

1. Check the front left door glass regulator switch.
   a. Using a digital multimeter, check for continuity between terminals of front left door glass regulator switch according to table below.



Compone-nt	Multimeter Connecti-on	Switch Condition	Specified Condition
Front left door glass regulator switch	1 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Front right door glass regulator switch	2 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear left door glass regulator switch	3 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear right door glass regulator switch	4 - 7	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω

b. If result is not as specified, replace front left door glass regulator switch.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Check if connector is correctly installed, when installing front left door glass regulator switch.
- Check if front left door glass regulator switch can be operated normally after installation.

Front Door Weather Bar

Removal

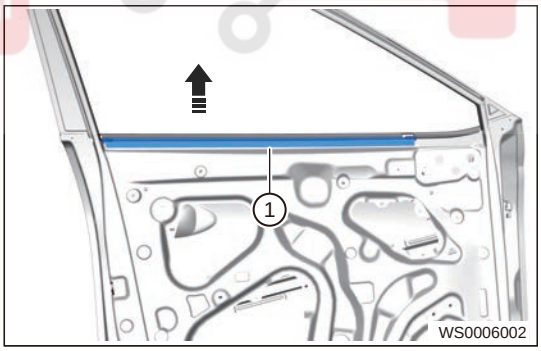
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

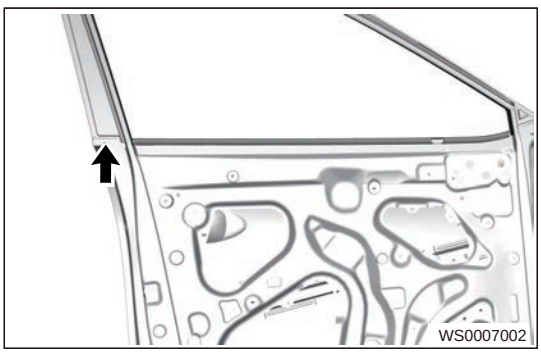
⚠ Caution

- 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.

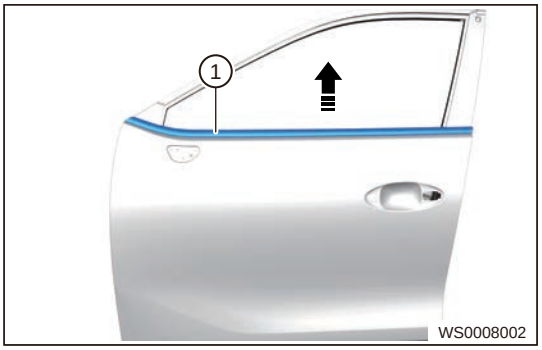
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front left door inner weather bar.
   a. Remove the front left door inner protector assembly.
   b. Using an interior crow plate, remove front door inner weather bar (1) in direction of arrow.



4. Remove the front left door outer weather bar.
   a. Remove the outside rear view mirror assembly.
   b. Remove 1 fixing screws (arrow).
      Tightening torque: 1.0 ± 0.2N • m



c. Using an interior crow plate, remove front door outer weather bar (1) from slot in direction of arrow.



Installation

1. Installation is in the reverse order of removal.

Front Door Upper Glass Run

Removal

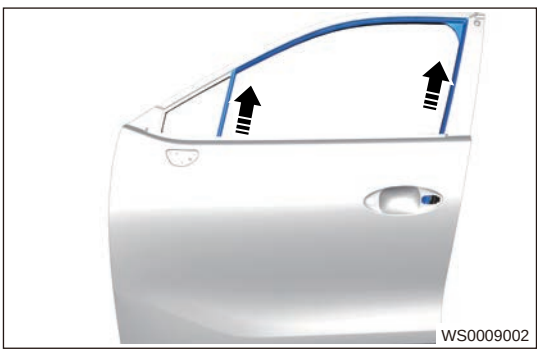
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

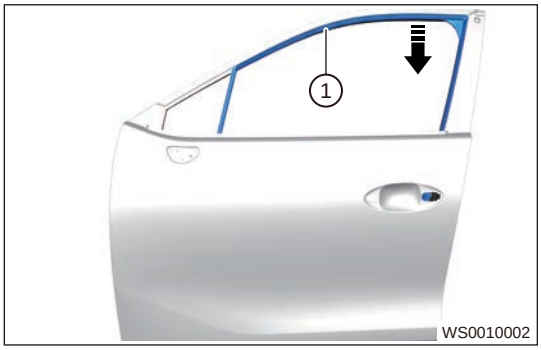
⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing front door upper glass run.
- Appropriate force should be applied when removing front door upper glass 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 upper glass run.
   a. Lower the front door glass assembly and pull the lower part of front door upper glass run out from slot in direction of arrow.



b. Remove front left door glass upper run (1) from slot in direction of arrow as shown in illustration.



Installation

1. Installation is in the reverse order of removal.

Front Door Glass Assembly

Removal

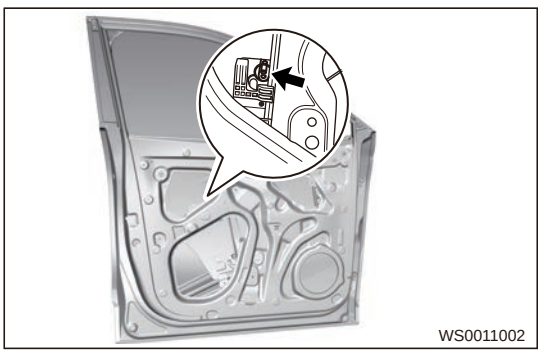
Hint:

- 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.
   a. Raise front door glass assembly to a proper position.
   b. 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.



Installation

1. Installation is in the reverse order of removal.

Front Door Rear Glass Guide Rail Assembly

Removal

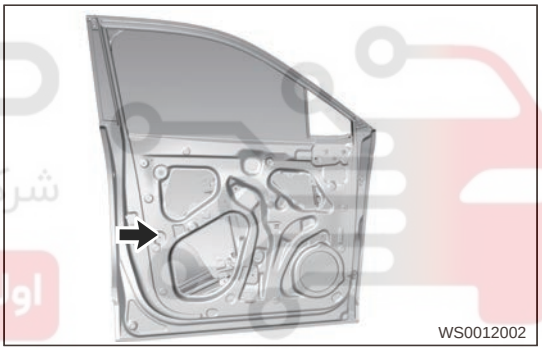
Hint:

- 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.
   a. Remove fixing bolt (arrow) from front door rear glass guide rail assembly, and remove front left door rear glass guide rail assembly.
      Tightening torque: 7 ± 1.0N • m



Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- 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.

Front Door Power Glass Regulator

Removal

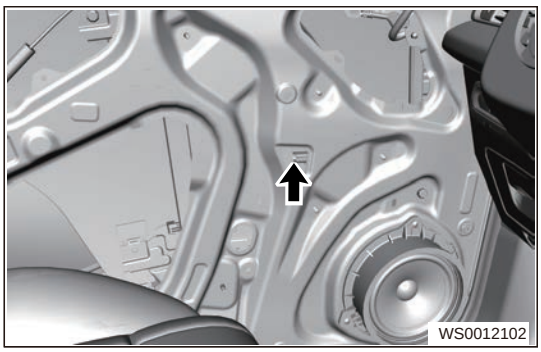
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

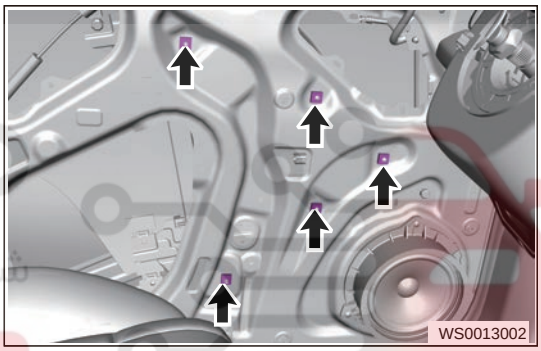
- Be sure to wear safety equipment to prevent accidents, when removing front door power glass regulator.
- Appropriate force should be applied when removing front door power glass regulator. Be careful not to operate roughly.

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 glass regulator.
   a. Disconnect the front power glass regulator connector (arrow).



   b. Remove 4 fixing nuts and 1 fixing bolts (arrow) from front door power glass regulator, and remove front left door power glass regulator assembly.

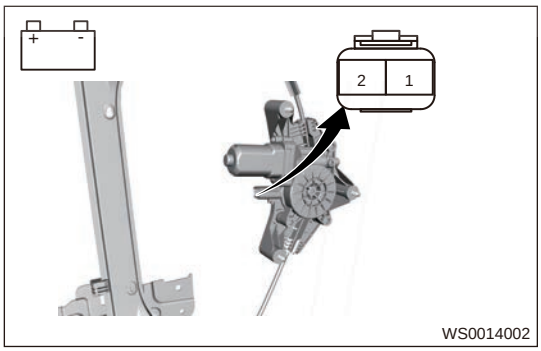
   Tightening torque: 9 ± 1.5N • m



Inspection

1. Check the front door power glass regulator.
   a. Apply battery voltage to the terminals of power glass regulator motor connector, and check the operation of front door power glass regulator motor according to table below.

Battery positive (+)	Battery negative (-)	Specified Condition
1	2	UP smoothly
2	1	DOWN smoothly



   b. If result is not as specified, replace front door power glass regulator.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- After installing front door power glass regulator is installed, make sure that window glass can go up and down smoothly and freely without any vibration, chattering or shocking, etc.

Rear Left Door Power Glass Regulator Switch

Removal

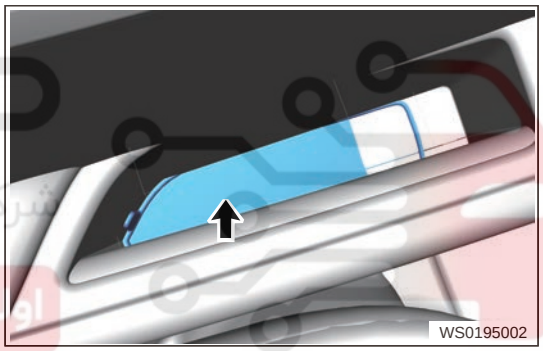
Hint:

- Use same procedures for front right, rear right and rear left sides.
- Procedures listed below are for rear left side.

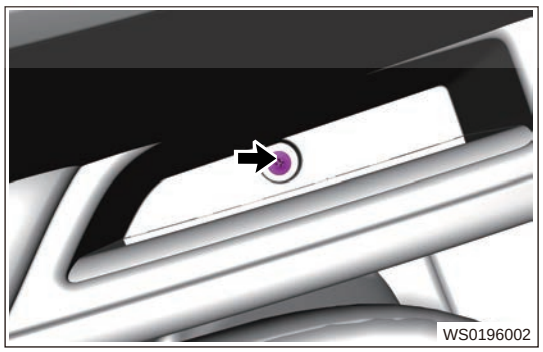
⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing power glass regulator switch.
- Appropriate force should be applied when removing power glass regulator switch. Be careful not to operate roughly.
- Try to prevent door inner protector assembly from being scratched, when removing power glass 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 glass regulator switch.
   a. Remove the power glass regulator switch rubber pad.



   b. Remove the fixing bolt (arrow).

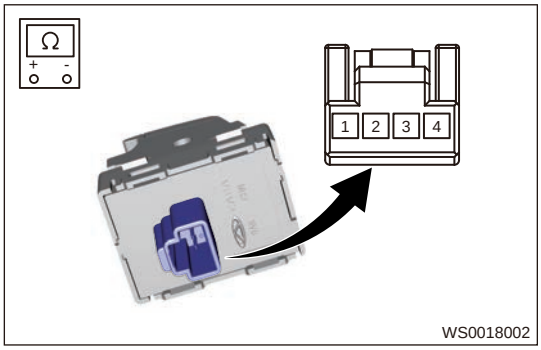


   c. Using an interior crow plate, pry off power glass regulator switch and remove the power glass regulator switch.

Inspection

1. Check the power glass regulator switch.

a. Using a digital multimeter, check for continuity between terminals of other three power glass regulator switches according to table below.



Compone-nt	Multimeter Connecti-on	Switch Condition	Specified Condition
Front right door glass regulator switch	2 - 1	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear left door glass regulator switch	2 - 1	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω
Rear right door glass regulator switch	2 - 1	Auto DOWN	⩽ 5 Ω
		Manual DOWN	332 Ω
		Manual UP	3000 Ω
		Auto UP	1500 Ω

b. If result is not as specified, replace power glass regulator switch.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- Check if connector is installed in place, when installing power glass regulator switch.
- Check if power glass regulator switch can be operated normally after installation.

Rear Door Weather Bar

Removal

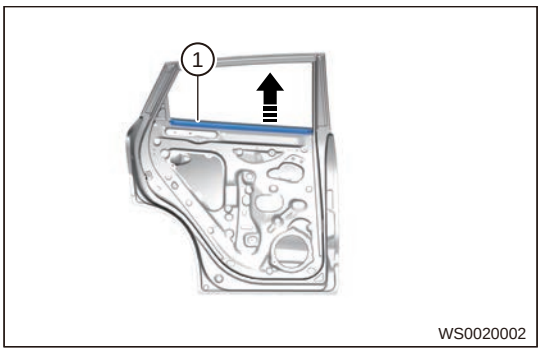
⚠ Caution

- 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 inner weather bar.

a. Remove the rear left door inner protector assembly.

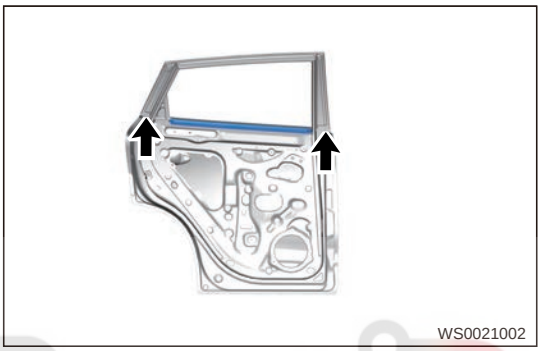
b. Using an interior crow plate, remove rear door inner weather bar (1) from slot in direction of arrow.



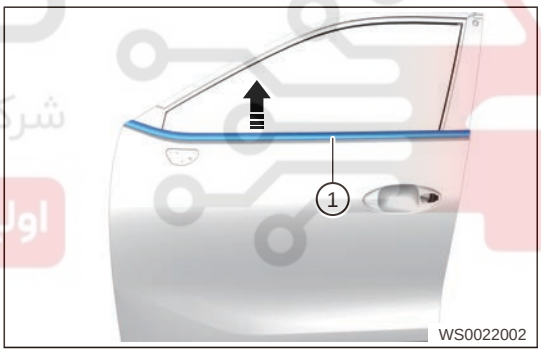
4. Remove the rear left door outer weather bar.

a. Remove 2 fixing screws (arrow).

Tightening torque: 1.0 ± 0.2N • m



b. Using an interior crow plate, remove rear door outer weather bar (1) from slot in direction of arrow.



Installation

1. Installation is in the reverse order of removal.

Rear Door Upper Glass Run

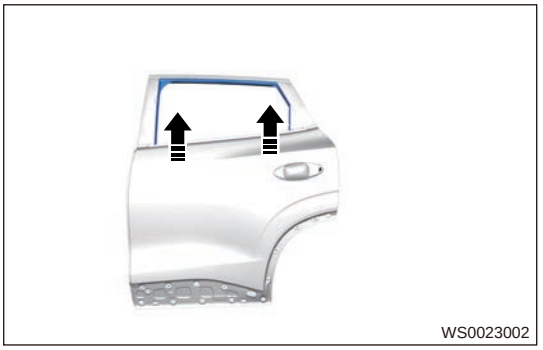
Removal

Hint:

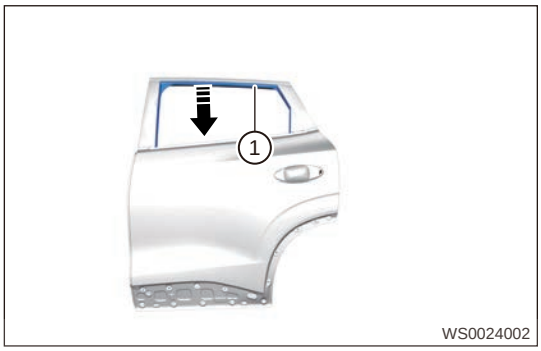
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

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 upper glass run.

a. Lower rear door glass assembly and pull lower part of rear door upper glass run out from slot in direction of arrow.



b. Remove rear left door glass upper run (1) in direction of arrow as shown in illustration.



Installation

1. Installation is in the reverse order of removal.

Rear Door Glass Assembly

Removal

Hint:

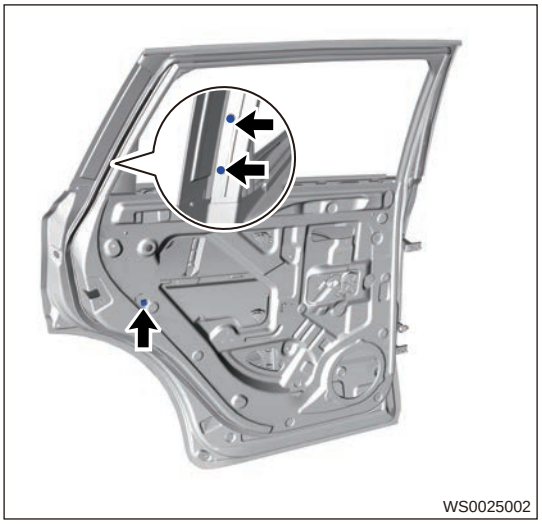
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

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 upper glass run.
7. Remove the rear left door glass rear guide rail assembly.

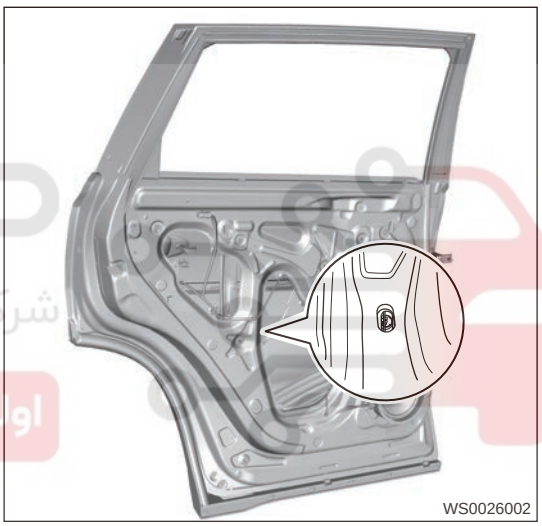
a. Remove 2 fixing screws and 1 fixing bolt (arrow) from rear left door guide rail, and remove rear left door glass guide rail.

Tightening torque: 1.5 ± 0.5 N • m

Tightening torque: 7 ± 1.0N • m



8. Remove the rear left door glass assembly.
   a. Raise front door glass assembly to a proper position.
   b. Detach snap pin from rear door glass assembly, and remove rear left door glass assembly.



Installation

1. Installation is in the reverse order of removal.

⚠ Caution
• Try to prevent window glass from dropping which will cause damage, when installing rear door glass assembly.

Rear Door Power Glass Regulator

Removal

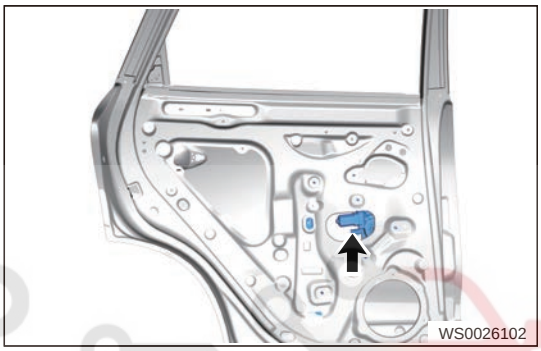
Hint:

- Use same procedures for right and left sides.
- Procedures listed below are for left side.

⚠ Caution

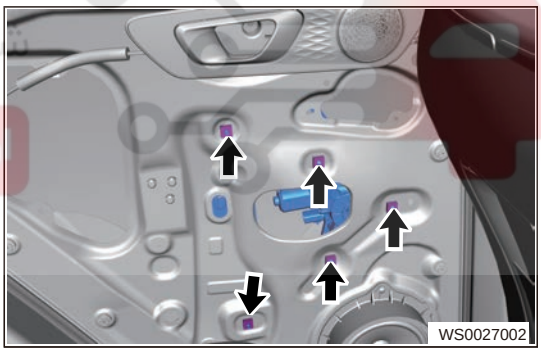
- Be sure to wear safety equipment to prevent accidents, when removing rear door power glass regulator.
- Appropriate force should be applied when removing rear door power glass regulator. Be careful not to operate roughly.

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 glass regulator.
   a. Disconnect the rear door power glass regulator connector (arrow).



   b. Remove 5 fixing nuts (arrow) from rear door power glass regulator.

      Tightening torque: 9 ± 1.5N • m



Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- After installing rear door power glass regulator, make sure that window glass can go up and down smoothly and freely without any vibration, chattering or shocking, etc.

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.

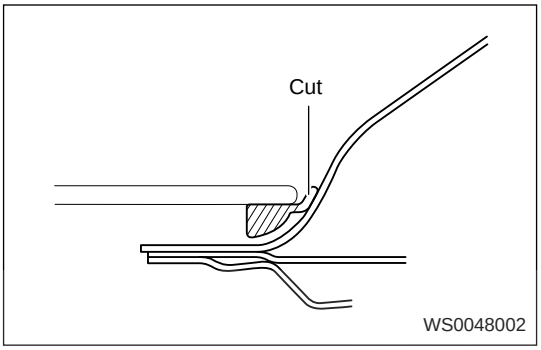
⚠ Caution

- 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 board assembly.
7. Remove the front windshield weatherstrip.
8. Remove the front windshield assembly
   a. Using a knife, cut off the adhesive.

⚠ Caution

- Try to prevent body paint surface from being scratched, when cutting off the adhesive.

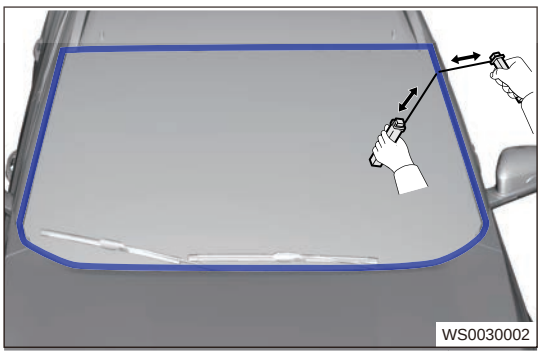


   b. Apply protective tape to the outer surface of body to prevent scratches.

⚠ Caution

- To prevent instrument panel upper body assembly from being scratched, place a plastic sheet between piano wire and instrument panel upper body assembly.

   c. Pass a piano wire through the seam between body and front windshield assembly.
   d. 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.

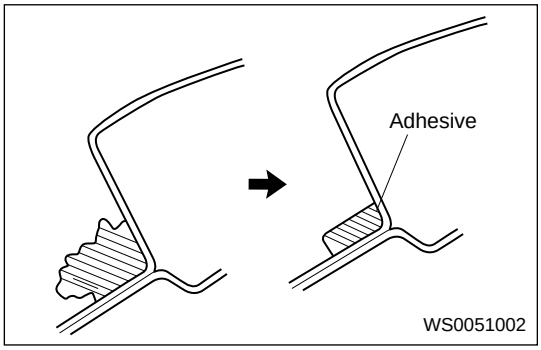


⚠ Caution

- 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.

a. 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.

b. Clean the contact surface of vehicle body with cleaner.

⚠ Caution

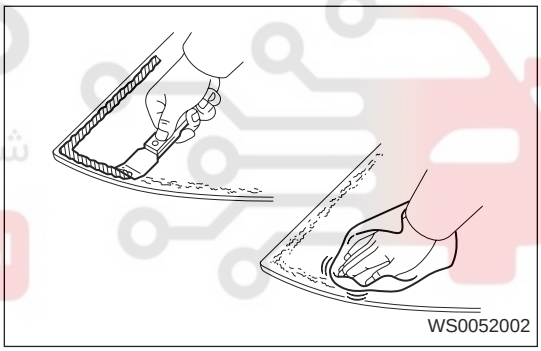
- Even if all adhesive has been removed, cleaning of vehicle body would be necessary.

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.

a. Using a scraper, remove the adhesive sticking to glass.



b. Clean the outer edges of glass with cleaner.

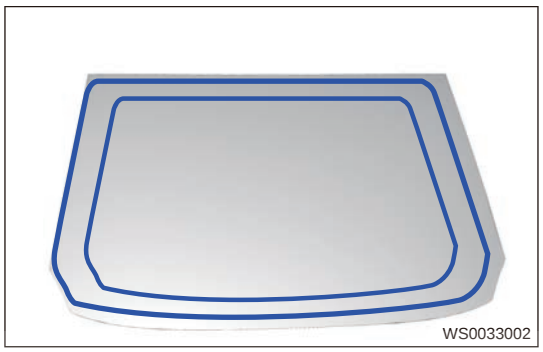
Installation
Installation condition

- Scan the code to confirm the part number and name before assembly 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.
- 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

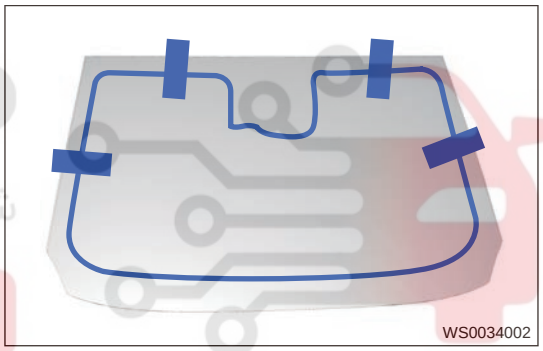
the height after being compressed is 5 - 7 mm. There should be no uneven gum and gum deviation from application line. There also no gum leakage or fluid overflowing; if gum overflowing from glass occurs, it is necessary to remove it.

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).
   a. 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

   b. 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

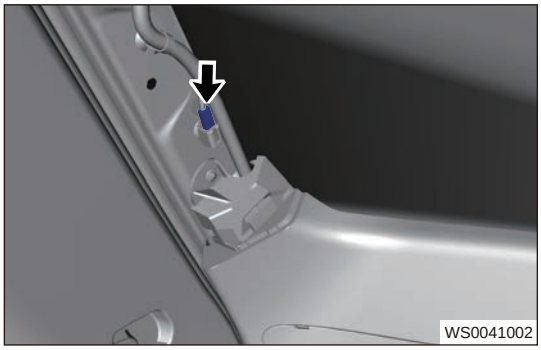
7. Install the front windshield lower trim board assembly.
8. Install the wiper arm assembly.
9. Install the inside rear view mirror assembly.
10. Install the roof assembly.
11. Connect the negative battery cable.

Rear Windshield Assembly

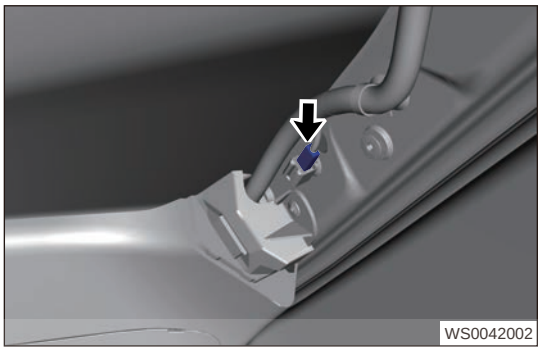
Removal

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 wiper arm assembly.
5. Remove the rear wiper motor assembly.
6. Remove the rear spoiler assembly.
7. Remove the defroster wire harness assembly.

a. Remove the left defroster connector (arrow).



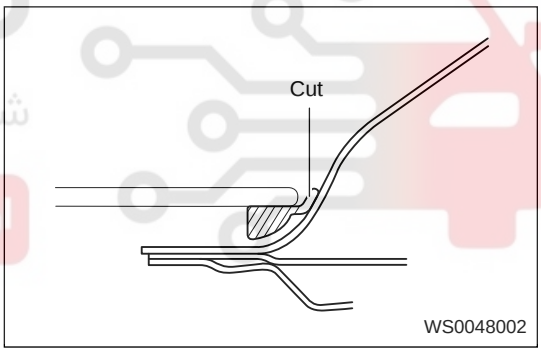
b. Remove the right defroster connector (arrow).



8. Remove the rear windshield weatherstrip.
9. Remove the rear windshield assembly.
   a. Using a knife, cut off the adhesive.

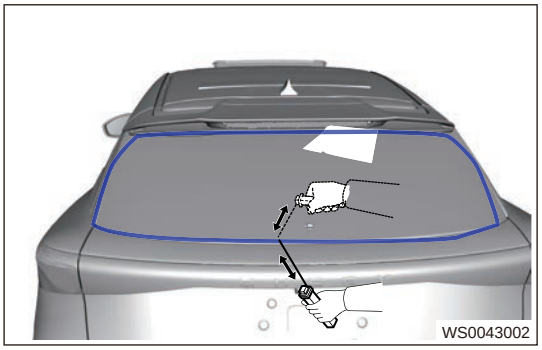
⚠ Caution

- Try to prevent body paint surface from being scratched, when cutting off the adhesive.



   b. Apply protective tape to the outer surface of body to prevent scratches.
   c. Pass a piano wire through the seam between body and rear windshield assembly.

d. 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.

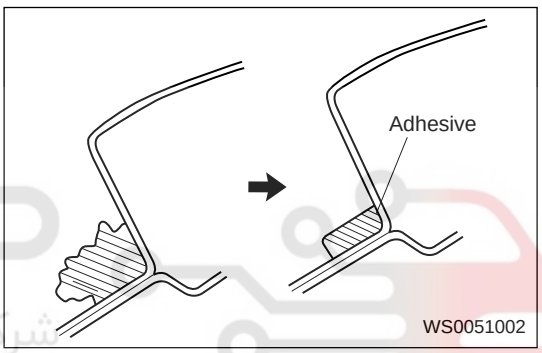


⚠ Caution

- 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.

10. Clean the vehicle body.

a. 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.

b. Clean the contact surface of vehicle body with cleaner.

⚠ Caution

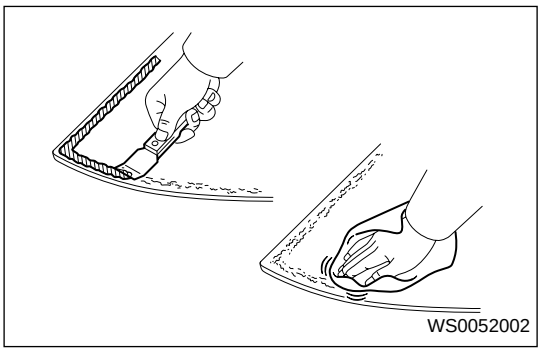
- Even if all adhesive has been removed, cleaning of vehicle body would be necessary.

11. Clean the removed glass.

⚠ Caution

- DO NOT touch the glass after cleaning it.

a. Using a scraper, remove the adhesive sticking to glass.



b. Clean the outer edges of glass with glass cleaner.

Installation

1. Detailed description and technology requirements during assembly.

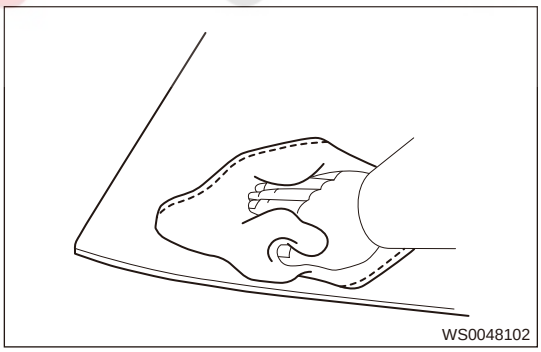
a. Before assembling, check the number of accessories and whether stopper is lost and whether small cracks or bubbles exist around windshield. Never install unqualified windshield to vehicle.
b. Check if gum application surface on the sheet metal is flat before assembly.
c. After glass is applied with 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:
   a. Wipe the primer area with alcohol cloth and width is 20 - 24 mm;
   b. 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.
   c. Using cleaner A11-4105017 (accelerant), clean the area around gum application and make sure cleaning width is 15 - 17 mm;
   d. 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;
   e. 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);
   f. 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.
   g. 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.

   a. 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.

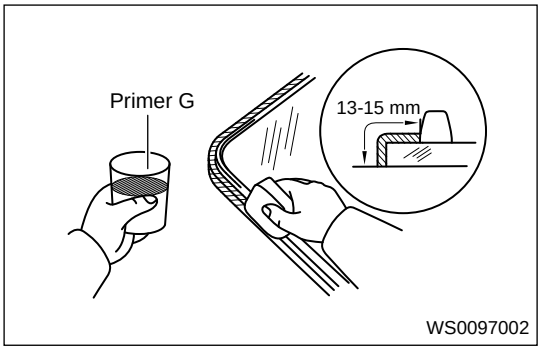
⚠ Caution

- 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.

   a. Using a brush, apply a coat of primer to glass edge and contact surface.

b. Wipe off any excess primer with a clean cloth before drying.

c. Width of primer is 13 to 15 mm.



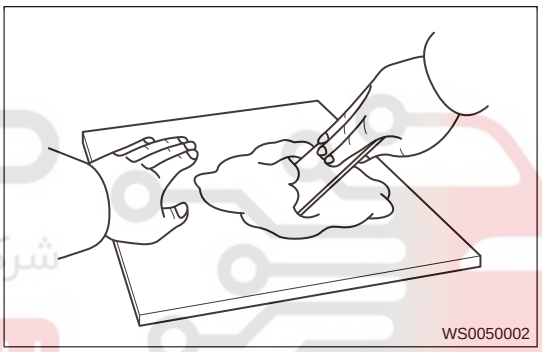
5. Mix the adhesive.

⚠ Caution

- Adhesive should be mixed thoroughly within 5 minutes.

a. Using a solvent, thoroughly clean the mixing board and scraper.

b. Using a scraper, thoroughly mix 500 g main adhesive and 75 g hardener on the mixing board.



6. Apply the adhesive.

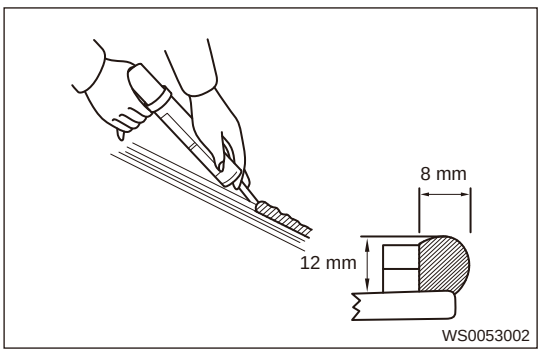
a. Cut off the tip of cartridge nozzle and add adhesive.

b. Install the cartridge to sealer gun.

c. Apply adhesive evenly to rear windshield assembly as shown in illustration.

Adhesive width: 8 mm

Adhesive height: 12 mm

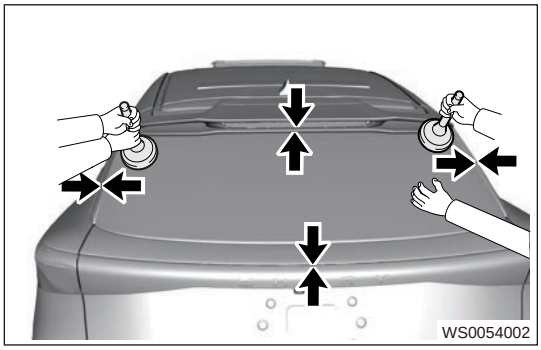


7. Install the rear windshield assembly.

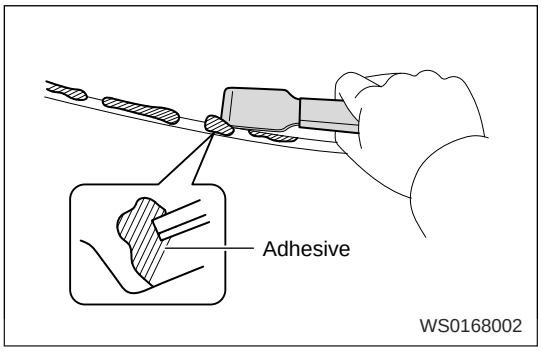
⚠ Caution

- 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.

a. Align the matchmarks on glass and vehicle body, and gently press in glass along the edge.



b. Using a scraper, uniformly apply adhesive to the glass edge.



c. Remove any excess or spilled adhesive with the scraper.
d. Apply tape all the way around, and do not remove them until the adhesive hardens.

8. Check and repair the sealing of glass.
   a. Check the glass for leakage after adhesive has completely hardened.
   b. If it leaks, seal the leaks by adding adhesive.
9. Connect the negative battery cable.

Sliding Roof Switch Assembly

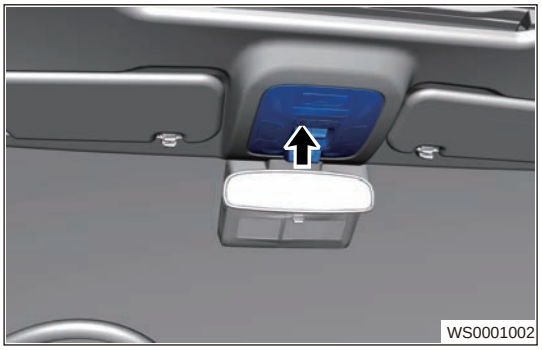
Removal

⚠ 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.

a. Using an interior crow plate, remove sliding roof switch assembly and disconnect wire harness connector.



Installation

1. Installation is in the reverse order of removal.

⚠ Caution
• Make sure that sliding roof switch functions properly, after installing sliding roof switch assembly.

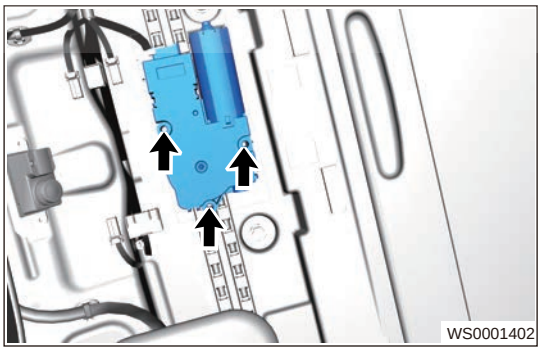
Sliding Roof Glass Motor

Removal

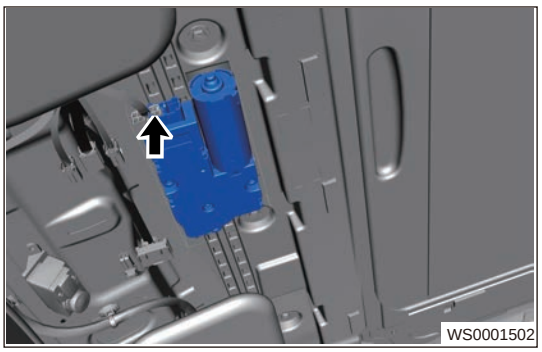
⚠ Caution
• Be sure to wear safety equipment to prevent accidents, when removing sliding roof glass motor. • Appropriate force should be applied, when removing sliding roof glass motor. Be careful not to operate roughly.

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.
   a. Remove 3 fixing screws (arrow) from sliding roof glass motor assembly.

      Tightening torque: 5 ± 1.0 N • m



   b. Disconnect wire harness connector (arrow) from sliding roof glass motor assembly.



c. Remove the sliding roof glass motor assembly.

Installation

1. Installation is in the reverse order of removal.

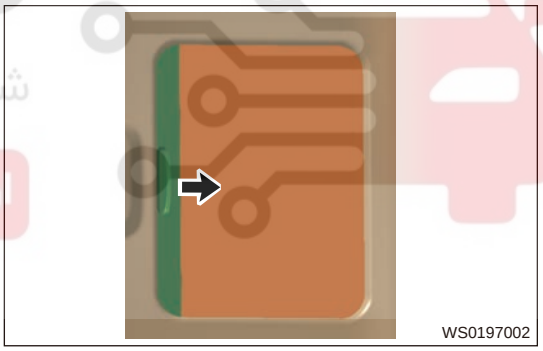
> **⚠ Caution**
>
> - Connect connector in place and tighten fixing screw to specified torque, when installing sliding roof glass motor assembly.
> - After sliding roof glass motor is installed, there should be no abnormal noise and resistance when opening and closing the sliding roof glass.

Sliding Roof Glass

Removal

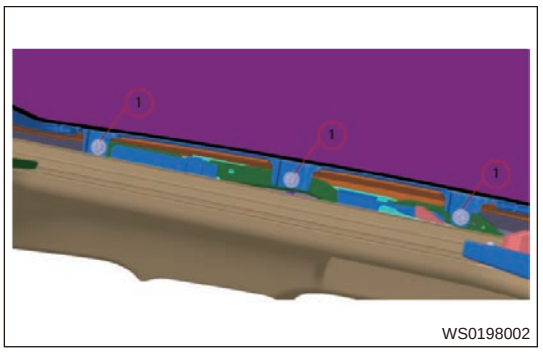
> **⚠ Caution**
>
> - Be sure to wear safety equipment to prevent accidents, when removing sliding roof glass.
> - Appropriate force should be applied when removing sunroof glass. Be careful not to operate roughly to prevent sunroof glass from being damage.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the sliding roof glass.
   a. Open the sun visor in direction of arrow



   b. Remove 3 fixing bolts from left side of sliding sunroof glass. (Use same method for right side)

   Tightening torque: 5 ± 0.5N·m



   c. Remove the sliding sunroof glass carefully from the roof.

Installation

1. Installation is in the reverse order of removal.

⚠ Caution

- The matching levelness tolerance between sliding roof front glass and tonneau cover is -2 ~ 1 mm, the matching levelness tolerance between sliding roof rear glass and tonneau cover is -1 ~ 2 mm, and the matching surface difference between sliding roof glasses at left/right sides and tonneau cover is -1.5 ~ 1.5 mm. Interference fit between glass weatherstrip and tonneau cover should be ensured without any gap, so as to seal and prevent water leakage.
- When the matching between sliding roof glass and tonneau cover does not meet the requirements, the adjustment of sliding roof should be performed by two operators (One operator adjusts inside the vehicle, and the other operator assists outside the vehicle). 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 matching indicated by the operator outside the vehicle meets the requirements, the operator inside the vehicle should tighten the bolt (torque is 5 ± 0.5 N·m).

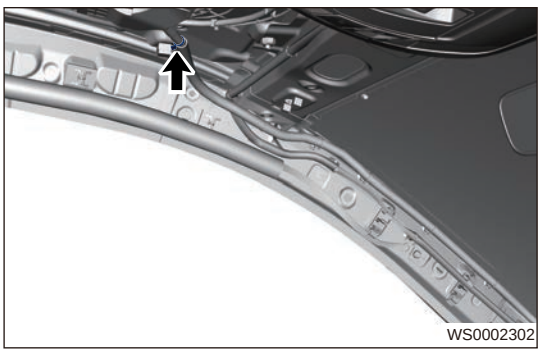
Sliding Roof Drain Hose

Removal

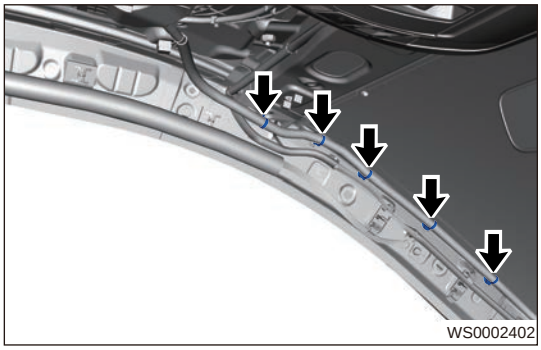
⚠ Caution

- 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.

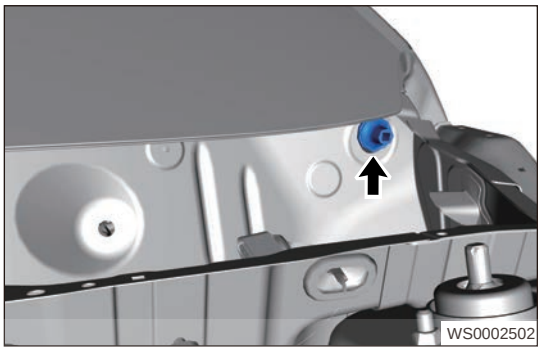
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front windshield lower trim board assembly.
4. Remove the left A-pillar upper protector assembly.
5. Remove the left B-pillar upper protector assembly.
6. Remove the left C-pillar upper protector assembly
7. Remove the roof assembly.
8. Remove the front left drain hose.
   a. Using clamp pliers, remove clamp (arrow) from front left drain hose.



b. Using an interior pry bar, carefully pry off band (arrow) from front left drain hose.



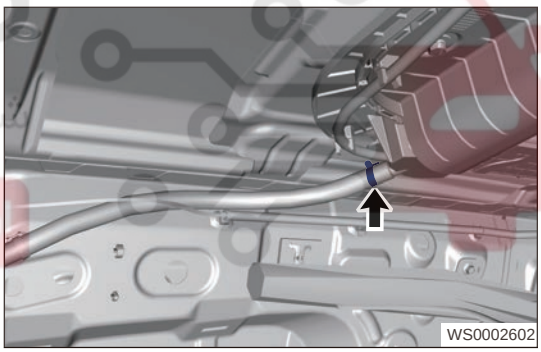
c. Disengage lower part of sliding roof front drain hose (-arrow) from plug hole on big round hole.



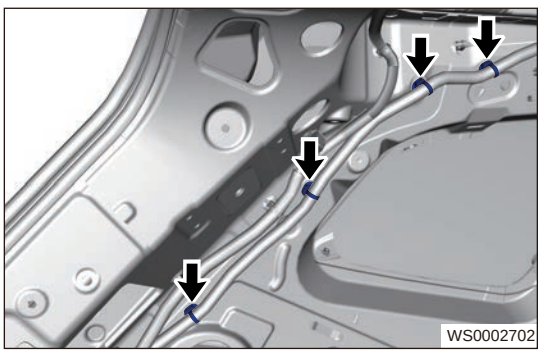
d. Remove the sliding roof front left drain hose.

9. Remove the sliding roof rear drain hose assembly.

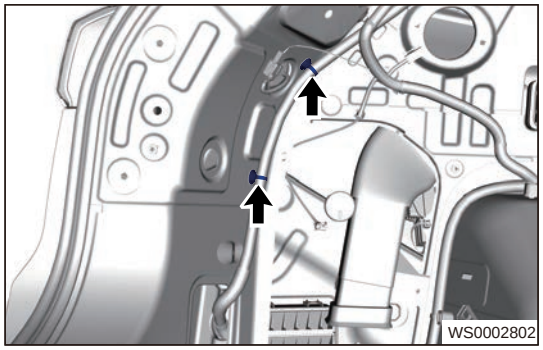
a. Using clamp pliers, remove clamp (arrow) from rear left drain hose.



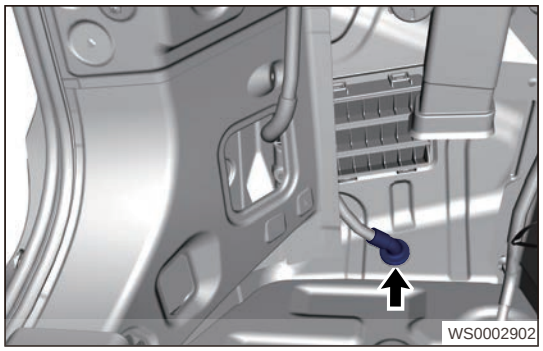
b. Using an interior pry bar, carefully pry off band (arrow) from rear left drain hose.



c. Using an interior pry bar, carefully pry off band (arrow) from rear left drain hose.



d. Disengage the connection (arrow) between sliding roof rear drain hose and sliding roof drain hose, remove sliding roof rear drain hose.



Installation

1. Installation is in the reverse order of removal.

⚠ 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.

Sliding Roof Assembly

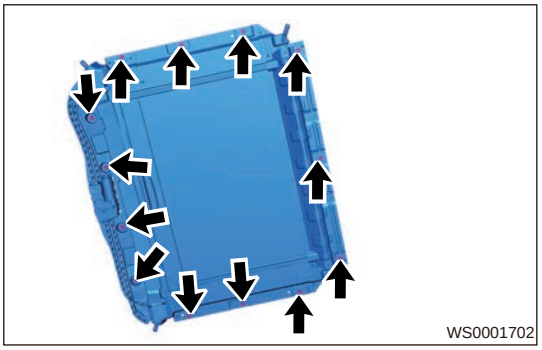
Removal

⚠ 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.

a. Remove fixing screws (arrow) from sliding roof assembly, and remove sliding roof assembly carefully.



Installation

1. Installation is in the reverse order of removal.

⚠ 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.

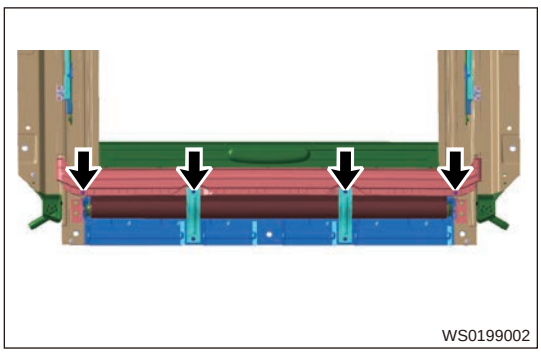
Remove Sliding Roof Sun Visor Assembly

Removal

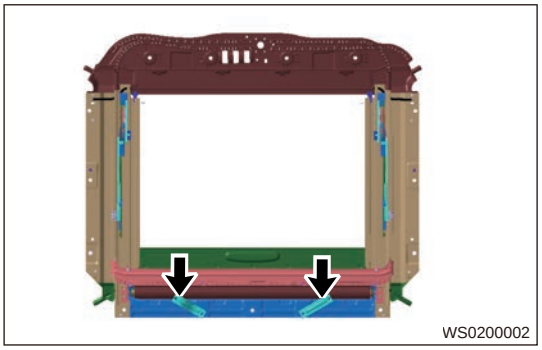
⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing sliding roof sun visor assembly.
- Try to prevent interior from being scratched during operation, when removing sliding roof sun visor assembly.

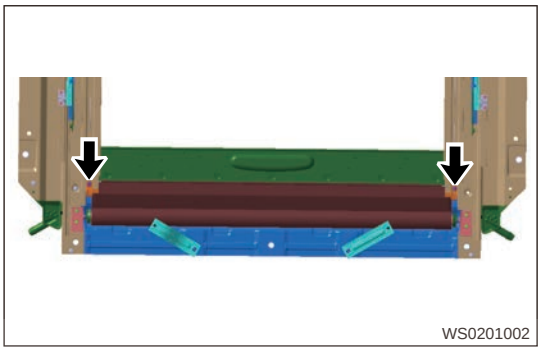
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the sliding roof sun visor.
   a. Remove the drain channel first, and then remove 4 screws with a cross screwdriver.



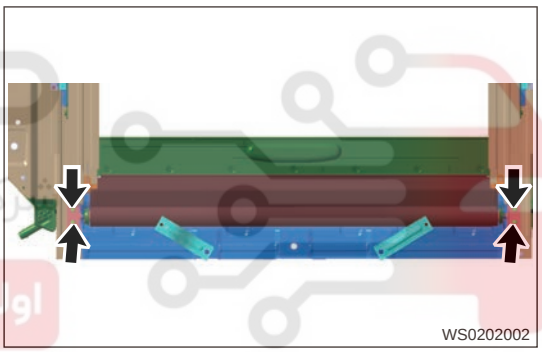
b. Rotate the connecting bracket, and then take out the drain channel horizontally



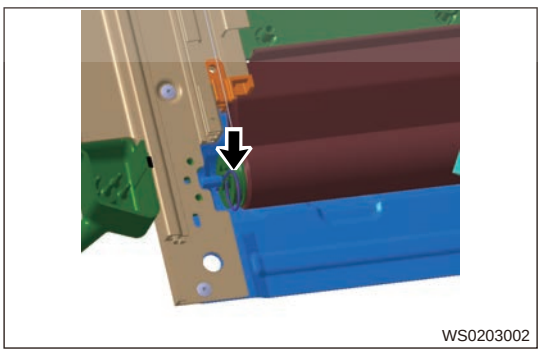
c. Remove the buffer block with a cross screwdriver.



d. Remove the sun visor press block with a cross screwdriver.



e. Insert a Ø3mm pin as shown in the illustration (also insert a Ø3mm pin for the other side).



f. Remove the nylon cord on the sun visor from the roller and carefully pull the sun visor handle out of the guide rail in parallel to avoid damage.

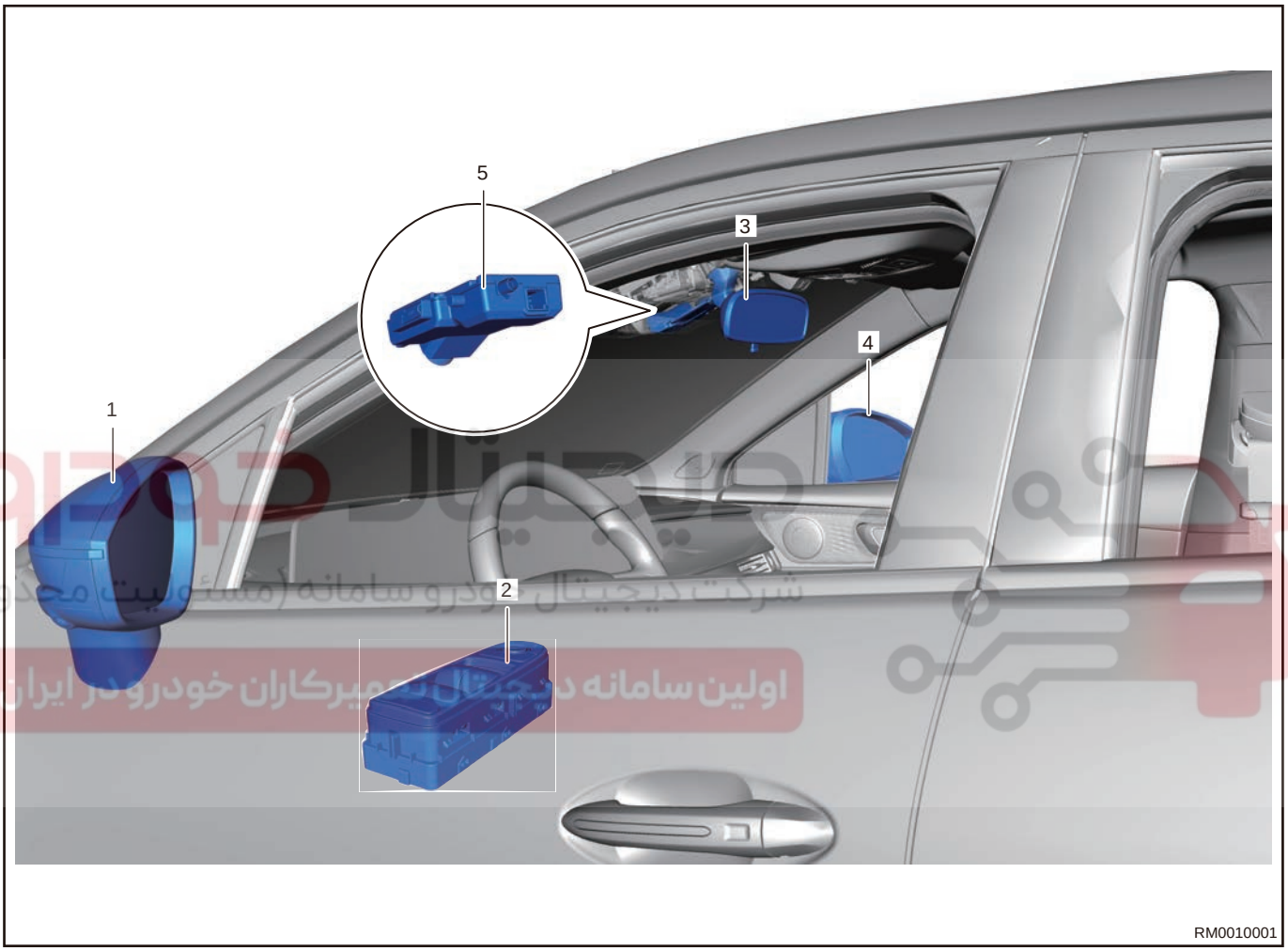
Installation

1. Installation is in the reverse order of removal.

INSIDE AND OUTSIDE REAR VIEW MIRROR/DRIVE RECORDER

System Description

System Components

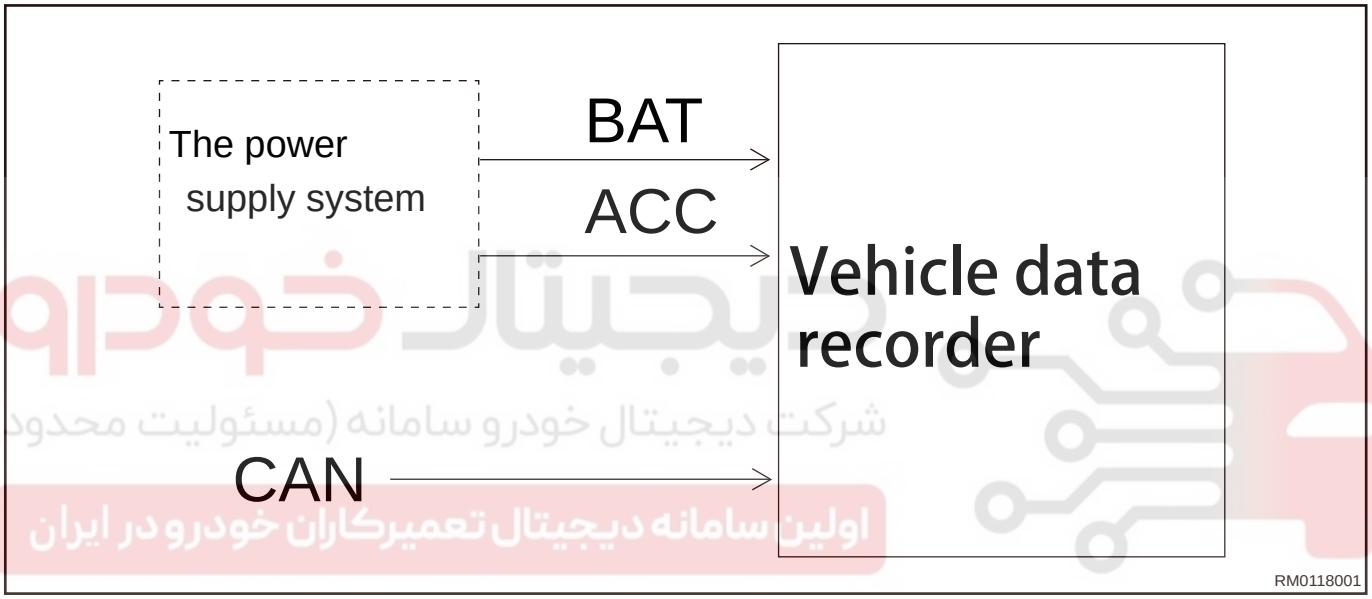


1	Left Outside Rear View Mirror Assembly	4	Right Outside Rear View Mirror Assembly
2	Rear View Mirror Folding Switch	5	Drive Recorder
3	Inside Rear View Mirror Assembly		

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 on front left door protector. 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.

System ON



System ON Logic Is as Shown in Table Below

BAT	ON (KL15)	CAN Communication	Parking monitoring	System Condition
OK	OFF	Available	ON or OFF	System starts and starts to record automatically
		Not available	ON	When vibration intensity of vehicle exceeds the set threshold, the drive 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

BAT	ON (KL15)	CAN Communication	Parking monitoring	System Condition
				down automatically. (- There is time watermark, but there is no driving behavior information)
			OFF	Vehicle vibrates and drive 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)

System OFF

System OFF Logic Is as Shown in Table Below

BAT	ON (KL15)	CAN Communication	System Condition
OK	ON	Available	System operates normally
		Interrupted	Drive recorder can record video properly, but CAN related function cannot operate properly
	OFF	Available	System is in normal operating status, recording is normal and system does not turn off
		Interrupted	System off
NG	/	/	System off

Ambient Temperature

1. Operating temperature range: -40℃ to 85℃;
2. Storage temperature without load: -40℃ to 95℃.
3. Relative humidity: 0 to 85%.

Operating Current

1. Single head unit: ⩽ 300 mA

Static Current

1. Drive recorder system: ⩽ 0.1mA.
2. Start drive 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.

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	/
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	/

Function	Description	Note
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
Drive 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 Features

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
	Sound recording switch	ON/OFF	Sound recording OFF by default

Primary Function	Secondary Function	Description	Note
	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	/

Primary Function	Secondary Function	Description	Note
		has been full, new emergency video will replace the oldest emergency video.	
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”

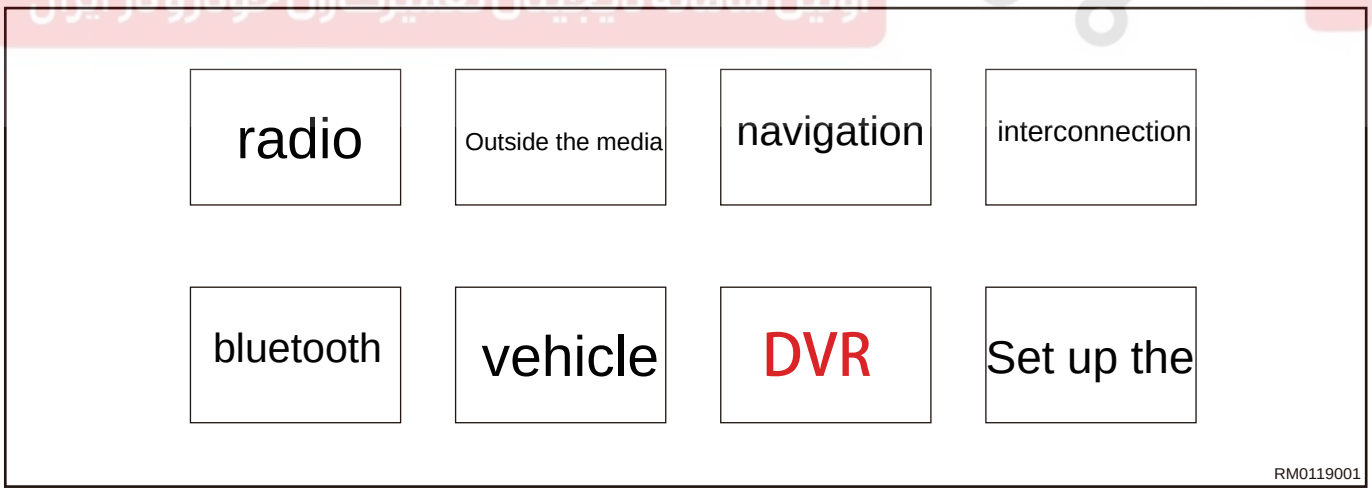
Primary Function	Secondary Function	Description	Note
			button is pressed again
Playback	Video playback	Play the video file recorded by driving recorder in TF card on central control navigation head unit.	/
	Photo playback	Play the photo file recorded by driving recorder in TF card on central control navigation head unit.	/
File management	File management	Manage (delete) the video (common and emergency video) and photo file stored in TF card of DVR 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	/

Primary Function	Secondary Function	Description	Note
		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 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	/

Primary Function	Secondary Function	Description	Note
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 1Hz

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.



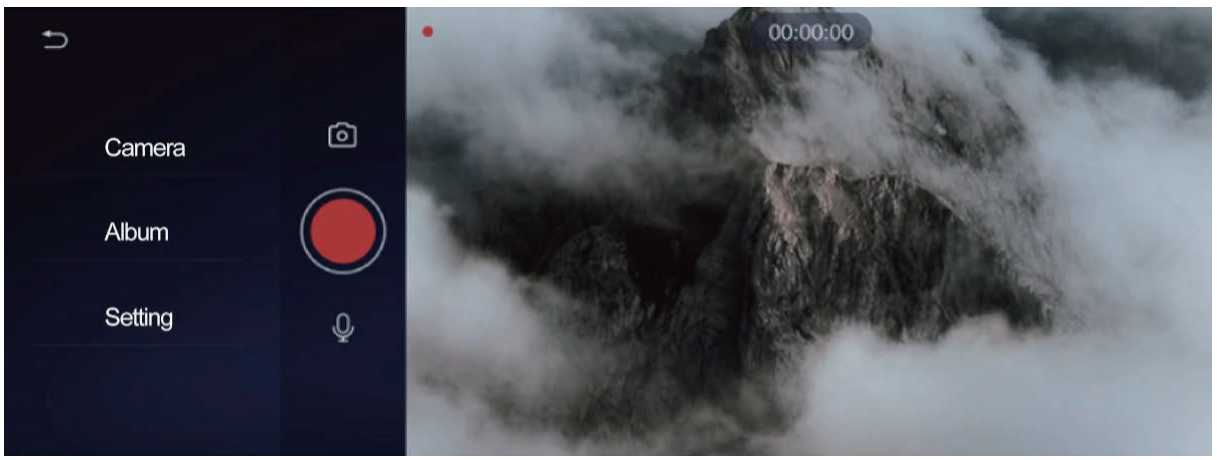
Driving Recorder Connection

- 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 disconnect 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.



RM0263001

TF Card Album Folder

1. General video folder
   - Folder name: “NOR”

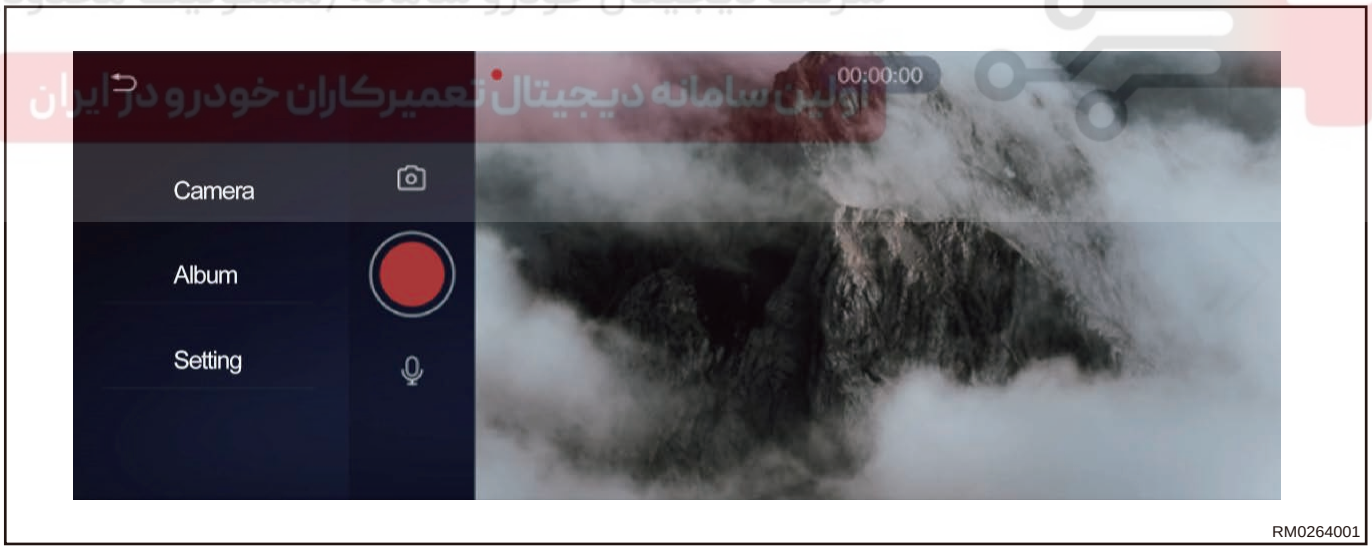
- Internal file name: NOR_date_time A.MP4 (NOR_20180723_123233A.MP4)
- Storage space = (total capacity of TF card - 500M (reserved buffer space) - 200M (photo folder space)) *3/4

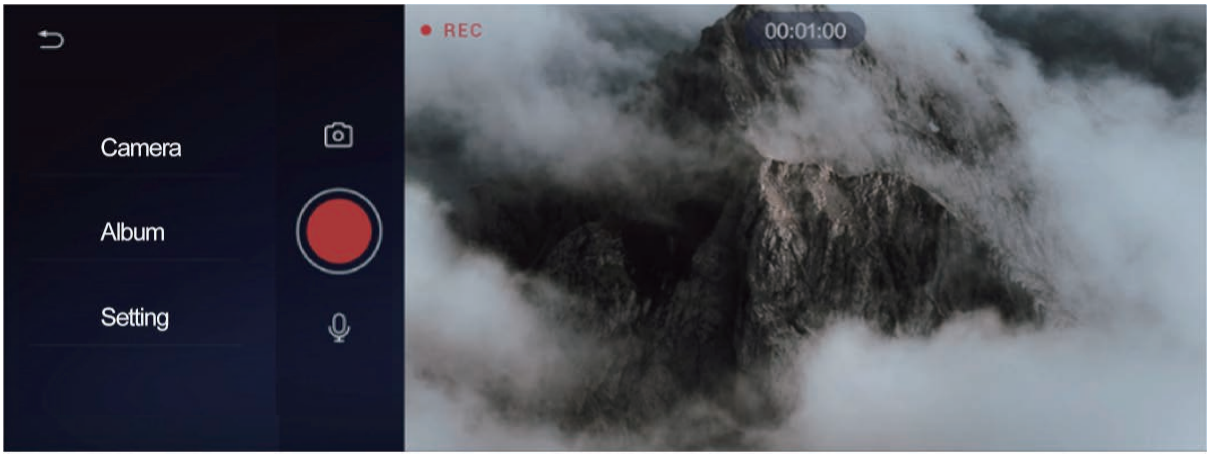
2. Emergency video folder
   - Folder name: “EVT”
   - Internal file name: EVT_date_time A.MP4 (EVT_20180723_123233A.MP4)
   - Storage space = (total capacity of TF card - 500M (reserved buffer space) - 200M (photo folder space)) *1/4
3. Photo folder
   - Folder name: “PHO”
   - Internal file name: PHO_date_time A.JPG (PHO_20180723_123233A.JPG)
   - Storage space = 200M

General Recording

Recording Interface

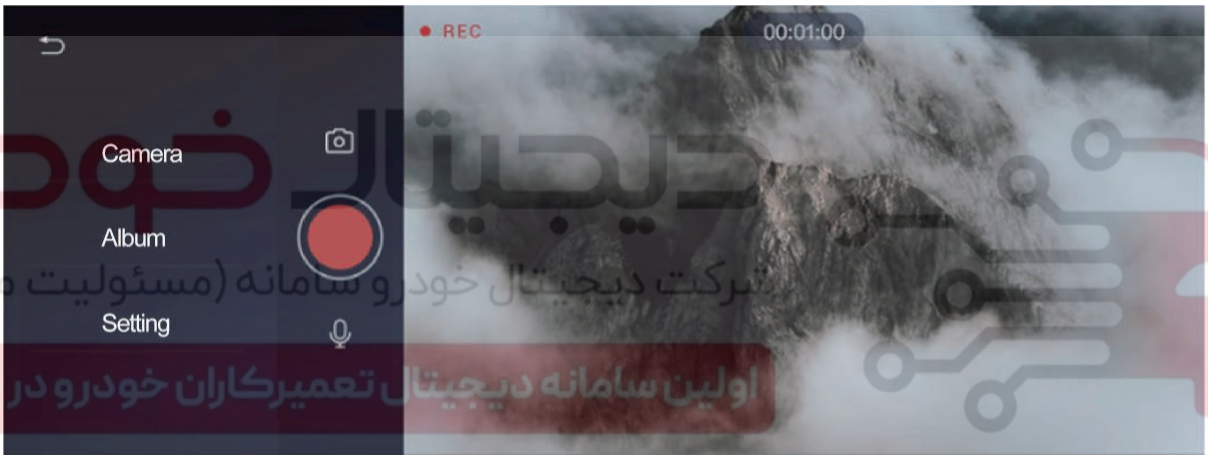
1. When B+ and ON signal are powered on, or B+ is powered on and CAN network communication is normal, and voltage and power circuits are normal, driving recorder will automatically start recording.
2. After the central control navigation is connected with driving recorder, it will enter the real-time preview interface to view the real-time image of the recorder. If the drive recorder is recording video normally, there is REC on the interface accompanied with red dot flashing. If the drive recorder is not recording video normally, only one red dot is always ON but not flashing, and there is no REC.





RM0265001

Video Operation



RM0266001

1. When the driving recorder is paused, click ICON to continue recording; ICON changes to with a REC logo and a red dot flashing (1 Hz frequency). When the driving recorder is in the recording state, click ICON to pause recording; ICON changes to , there is no REC logo and red dot flashing.
2. The driving recorder is equipped with MIC, which can record audio synchronously while recording video. The user can turn off or turn on the sound recording through the central control navigation screen. Sound recording is OFF by default. In the real-time preview interface, click ICON to turn on sound recording, ICON changes to . Click ICON to turn off sound recording, ICON changes to .

Video Recording

1. The video recording of the drive 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 drive 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.

Emergency Video Recording

Emergency Video Trigger

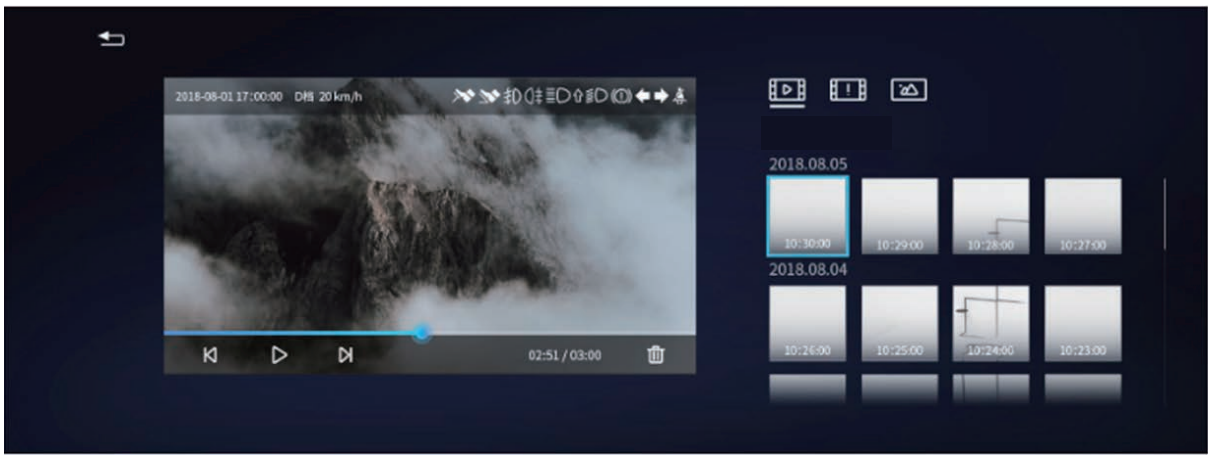
1. There are two sources of signals that trigger emergency recording: G-sensor of drive recorder and acceleration value of vehicle body. The vehicle transmits the key position status to driving recorder through CAN. When the driving recorder receives the key position status (ignition action) sent by the vehicle, it triggers the emergency recording by judging whether the body gravity acceleration value exceeds the set threshold value (the threshold value needs to be set according to the actual vehicle verification).
2. When the driving recorder receives the vehicle key position state turns to ON position signal disconnection state after ignition, during ON position signal disconnection and next ignition state, the driving recorder triggers emergency recording through its own G-sensor signal. When the acceleration of vibration exceeds the threshold set by G-sensor, the recorder will be triggered to store an emergency video.
3. The inductive sensitivity of G-sensor can be set to "high", "medium" and "low" through the large screen navigation of central control. The default is "medium".

Emergency Video Storage Mechanism

1. The emergency video is a 20s video, which is stored in the "emergency video" folder. The 20s video consists of 10s video before and after the time when the vibration is sensed. The resolution of the emergency video is the same as that of the normal video currently set. If the normal video is set to 1080P or 720P, the resolution of the emergency video is also 1080P or 720P.
2. Due to the space of the "emergency video" folder is also limited, the memory card in "emergency video" folder will also be full, so the emergency video folder also adopts the mechanism of circular coverage. When the “emergency video” folder is full, the newly generated emergency video will cover the earliest recorded emergency video. When the “emergency video” folder is full, a prompt box will pop up on the IHU interface: “Emergency video folder of recorder is full”.

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

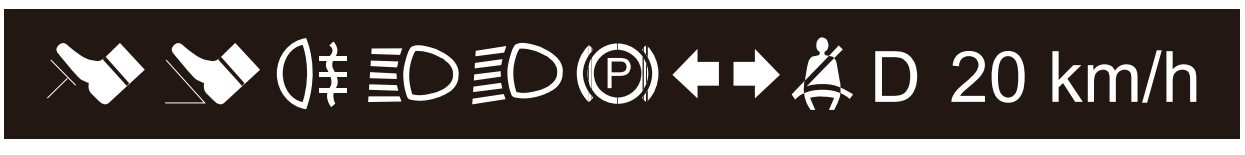
Driving Information Overlay

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:



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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 "-".

Video Storage Protection with Power Off

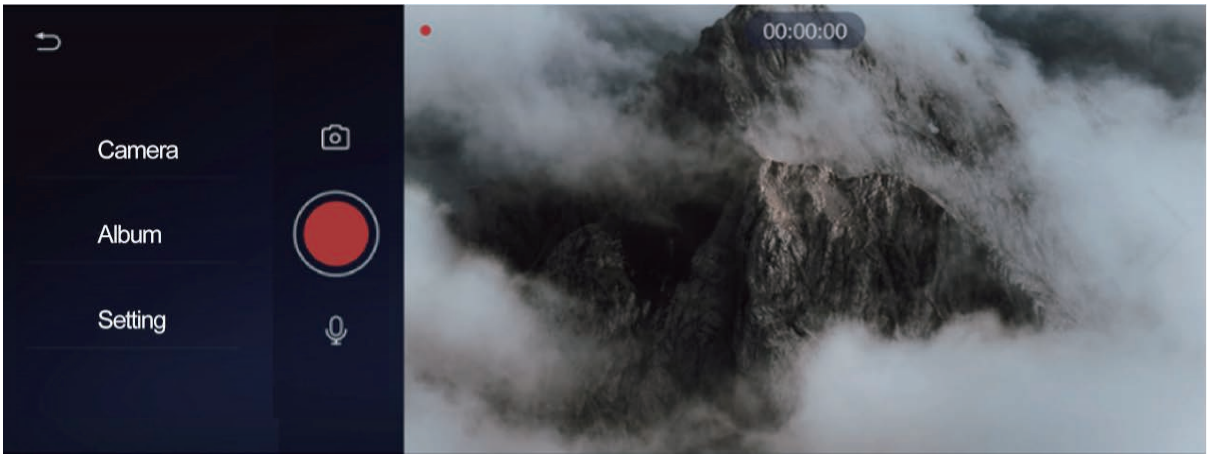
1. Under the condition of B+ power normal working, when the system detects the shutdown command (ON power off), the system will immediately stop recording and start video saving, and use the battery to complete the saving of the video file before shutdown.
2. The driving recorder has built-in super capacitor. 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.

Parking Monitoring

1. If the user sets the parking monitoring function as ON, when the vehicle stops and stalls, the ON gear is power off, and the driving recorder is shut down, if the vehicle vibrates and the vibration acceleration value exceeds the threshold value of G-sensor, the driving recorder will be awakened and recorded for a period of 20s video after awakening, which is stored in the "emergency video" folder. After recording this video, if G-sensor continues to sense vibration exceeding the threshold value, it will continue to record a 20s video. If the G-sensor does not continue to sense vibration exceeding the threshold value, the driving recorder will shutdown. The CAN network of the whole vehicle cannot be woken up during the parking monitor awakens recorder.
2. When the parking monitor function is turned on, if the system detects that the battery voltage is lower than 12V, the stall state can only be awakened for 3 times.
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.

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.

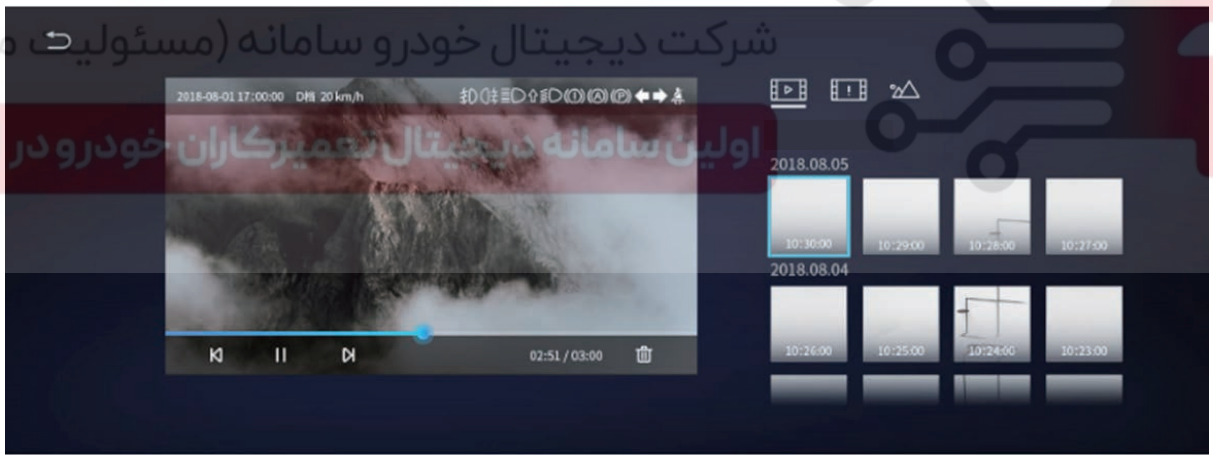


RM0268001

Photograph Storage

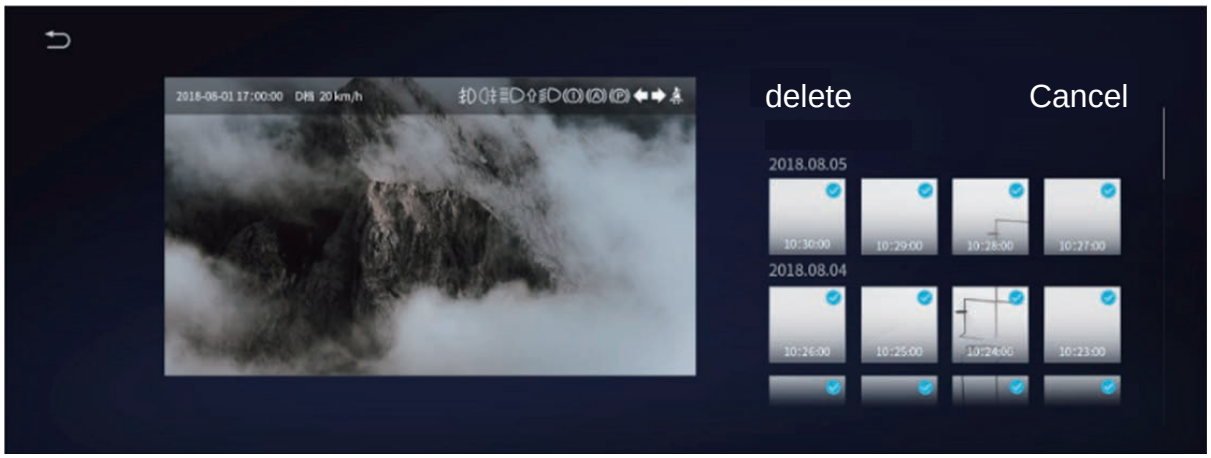
1. The photos taken are consistent with the currently set video resolution, such as if the set video is 1080P or 720P, and the photos taken are also 1080P or 720P. Photographs are taken during the video recording process, and the video recording is not affected. Photograph storage uses the logic of circular overlay. When the "Photograph" folder is full, the latest photograph will overwrite the earliest photograph.

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.

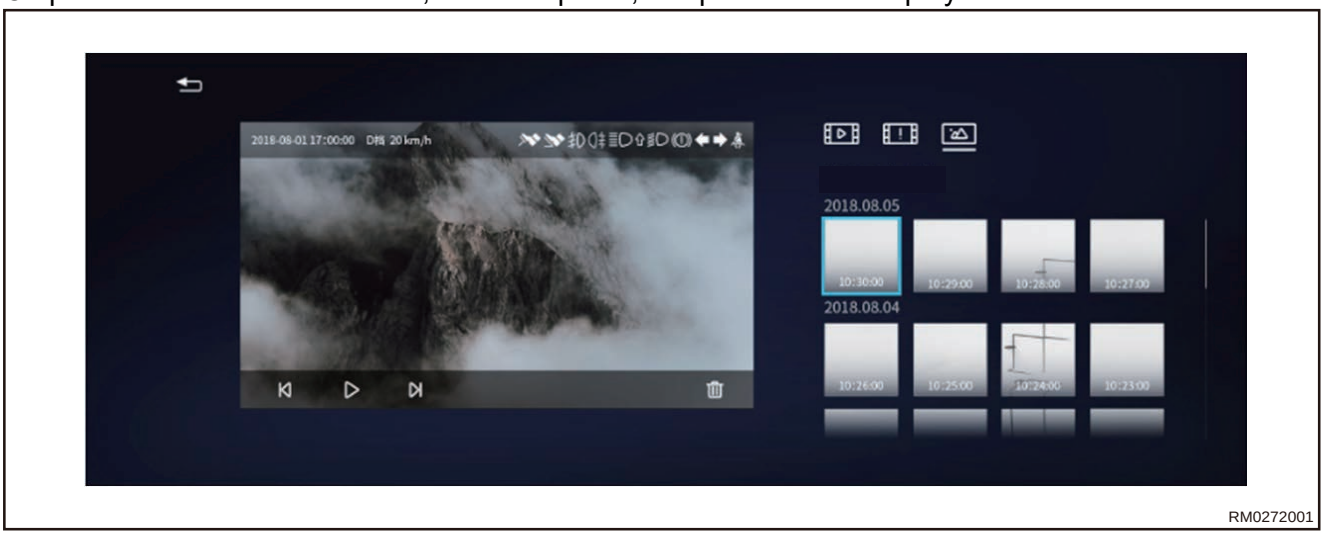
RM0271001

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, it will change to previous (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, click “⮌” again to exit playback interface to return to DVR main interface.

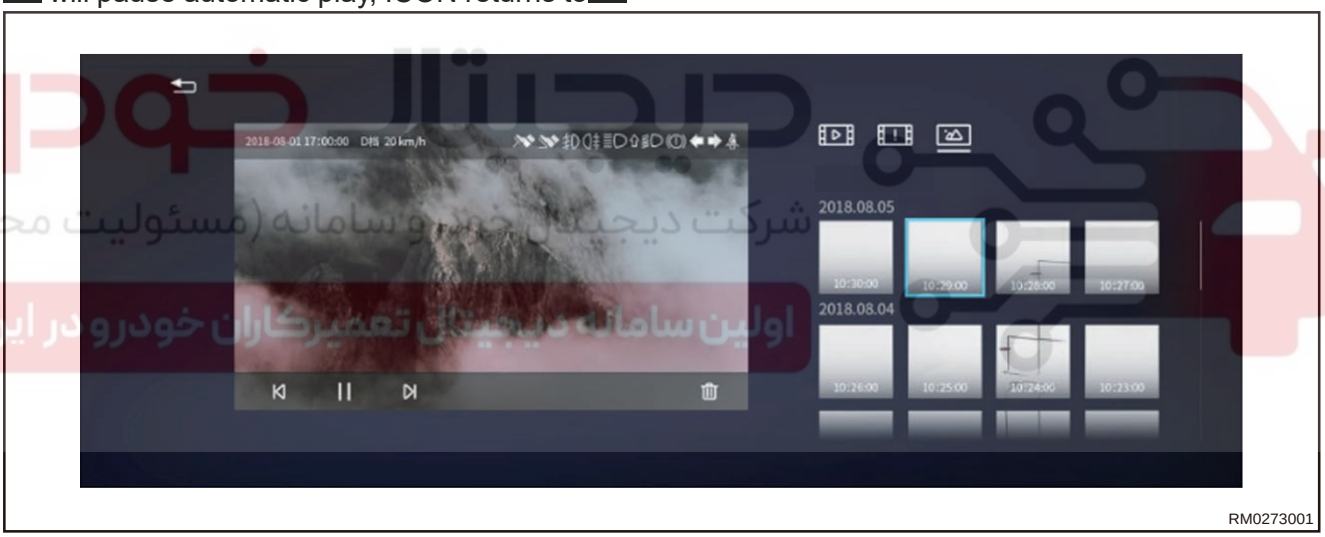
Playback and Deleting of Photos in TF Card

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.



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 ▷



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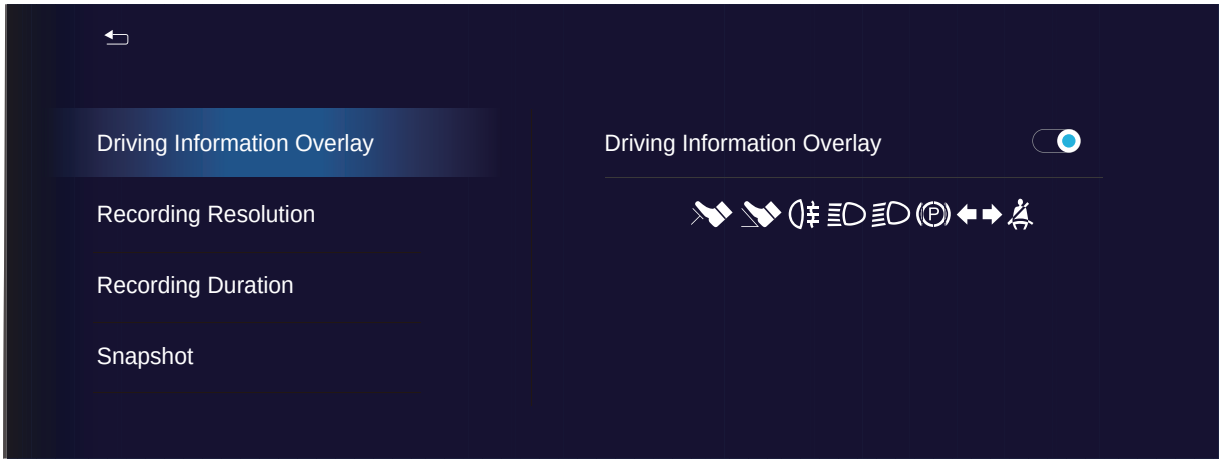
4. Click “⏮” or “⏭” ICON, it will change to previous picture (recorded earlier) or next picture (-recorded later).
5. Click the non-touch area of picture to enter full screen interface, the picture ratio took by DVR is 16:9. It cannot be fully displayed on the 8:3 display screen in full screen, and the area above the screen will be intercepted to cover the display screen. Click “⮌” to exit full screen playback interface, click “⮌” again to exit playback interface to return to DVR main interface.

Setting

1. On the real-time preview interface, click setting ICON to enter setting menu interface of drive recorder, setting items of drive recorder contains the following:



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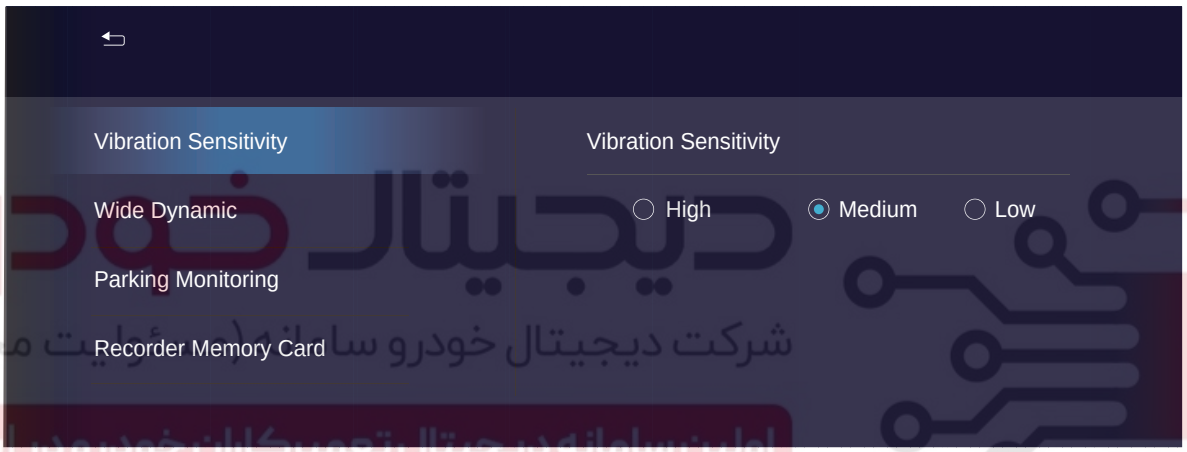

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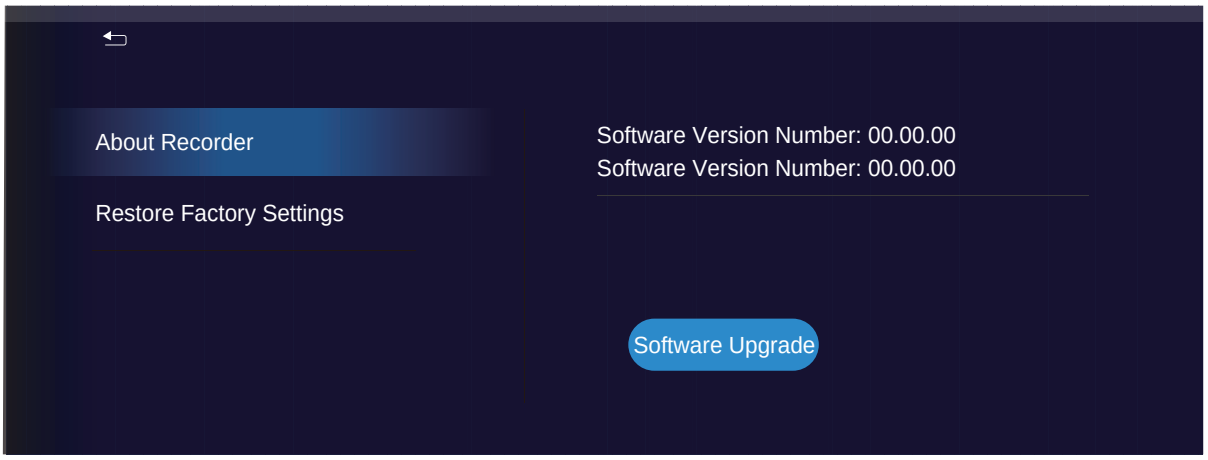


RM0262001

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

a. 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.

b. 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.

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.

AR Navigation Video Requirement

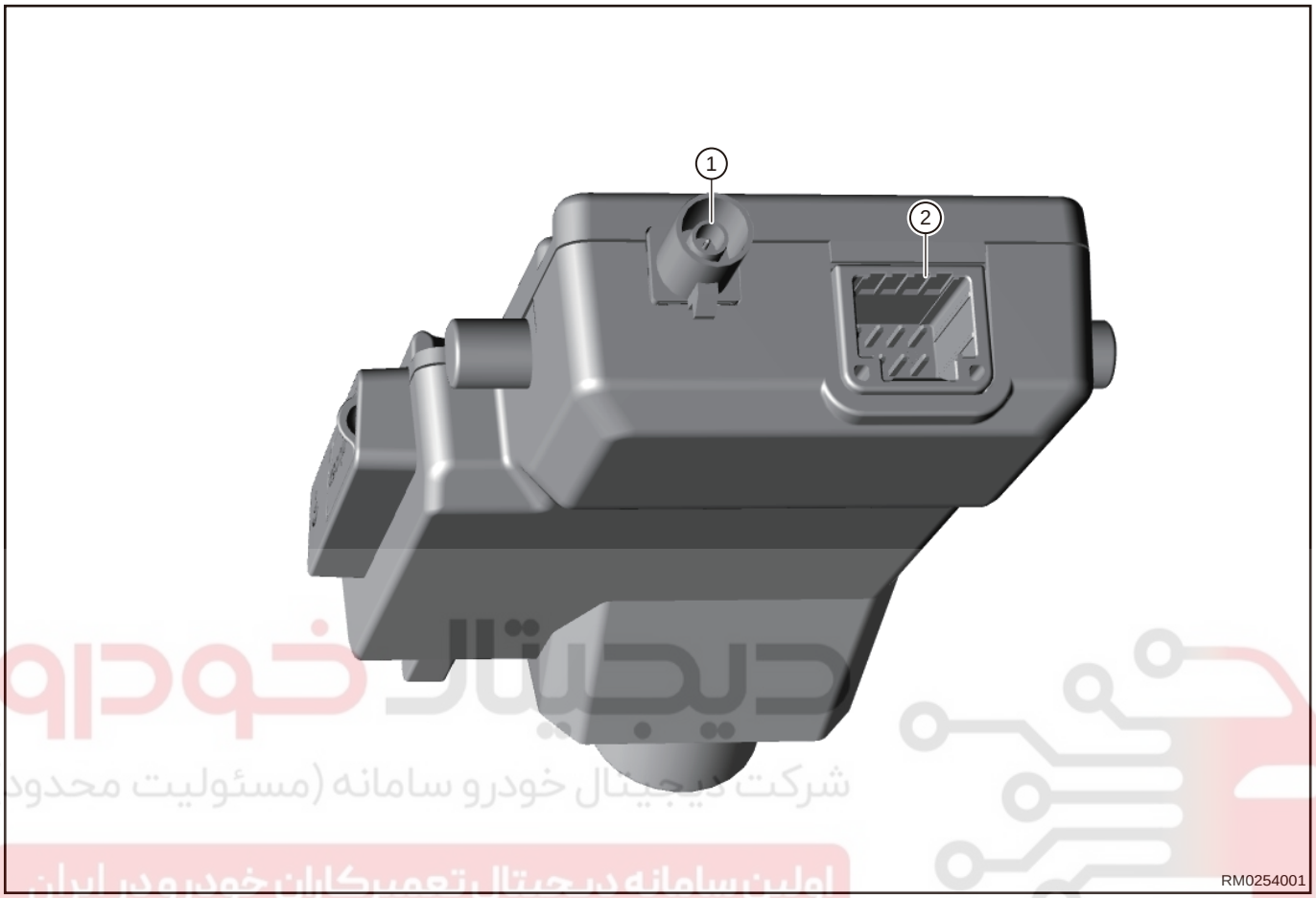
1. DVR head unit intercepts the video at the center of the camera with a resolution of 1488*616 (-tentative), transmits it to central control navigation head unit via LVDS, for AR navigation map analysis and processing; Output video frame rate requires 30 frames;
2. If user changes the recording resolution 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.

Status Indication

Status indicator is located next to the TF card slot, indicator 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;

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)	300MA	0.1MA	500MA	Power Supply	/
2	IGN (ON Signal)	10MA	0MA	10MA	Signal Wire	/

3	CAN_H (CAN Bus Positive)	100MA	10uA	100MA	Signal Wire	/
4	SWC+ (-Photograph Button Positive)	10MA	0MA	10MA	Signal Wire	Reserved
5	GND (-Battery Negative)	300MA	0.1MA	500MA	GND	/
6	NC (Vacant)	/	/	/	/	/
7	CAN_L (CAN Bus Negative)	100MA	10uA	100MA	Signal Wire	/
8	SWC- (-Photograph Button Negative)	10MA	0MA	10MA	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+	100MA	0.1MA	100MA	High Speed Signal Wire	/
2	GND	100MA	0.1MA	100MA	GND	/

Indicator Color Definition

LED Indicator	Red	Blue

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 drive recorder snapshot. If it is defined as drive recorder snapshot, you can perform drive 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)

Interaction Between DVR and Central Control

Drive recorder function involves the interaction among central control IHU, central control APK and drive 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 name 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	The status of card includes: 1. TF card status is normal

Command Type	Parameter Length	Sending Timing	Note
		2. DVR is sent passively when APK requires actively (when APK starts)	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) 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: the 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: the photo 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

Diagnosis & Testing

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

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.

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.

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.

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	Go 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	Go 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	Go to
Delivery inspection is failed	A
Delivery inspection is qualified	B

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

B

6	**Finished**

Diagnostic Trouble Code (DTC) Chart

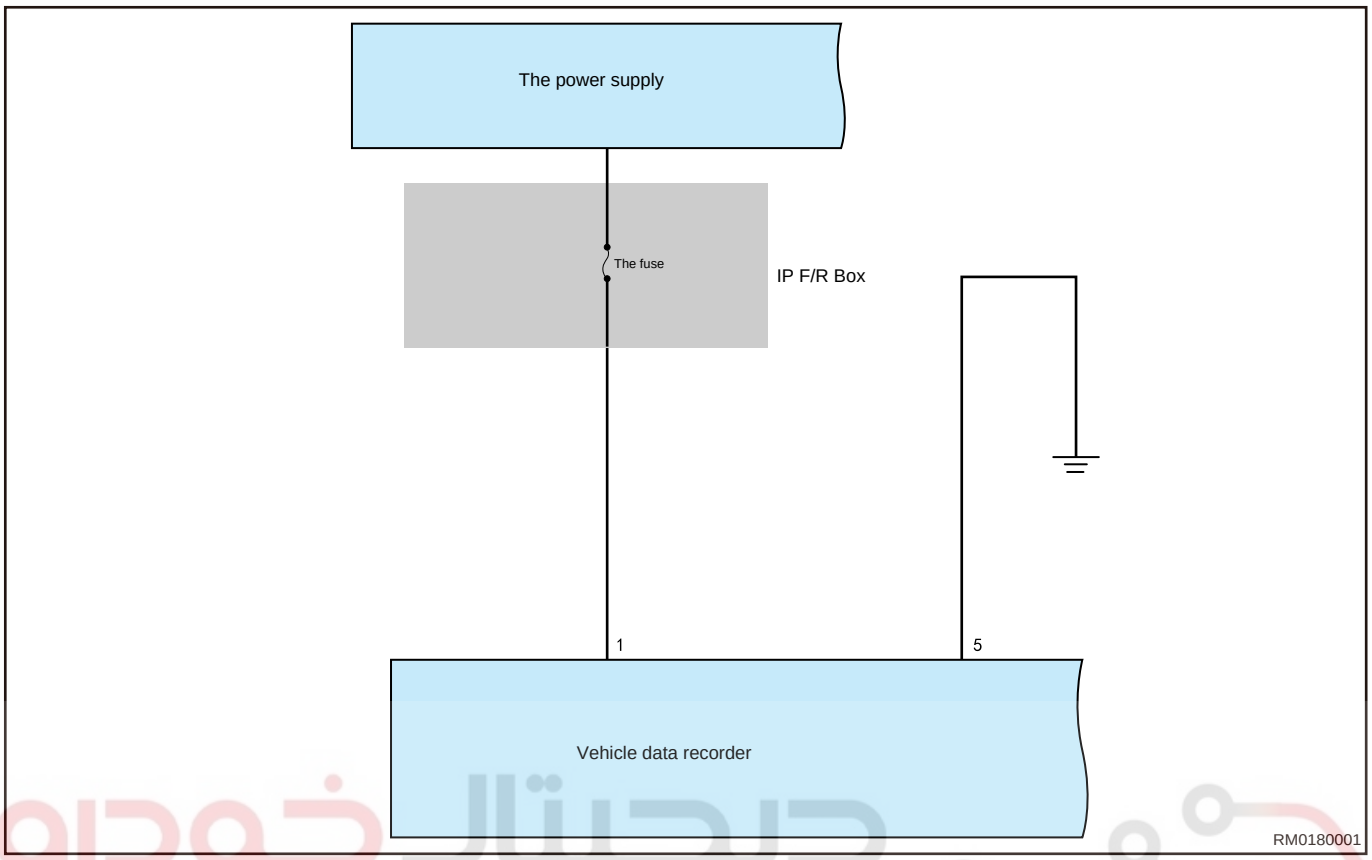
DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
B1000-16	Power Supply Circuit Voltage Below Threshold	/	Fuse/battery/wire harness/module damaged	/
B1000-17	Power Supply Circuit Voltage Above Threshold	/		/
B1B50-00	Abnormal Image Acquisition	/	Module damaged	/
B1B51-00	DSP Failure	/	Module damaged	/
B1B52-00	WIFI module abnormal	/	Module damaged	/

DTC	DTC	Detection Condition	Possible Cause	Maintenance Advice
B1B53-00	Abnormal collision sensing	/	Module damaged	/
B1B54-4A	Low Write Speed of Memory Card/ Serious Fragmentation of Memory Card/ Memory Card Damage	/	Memory card damaged	/
U0073-88	CAN Bus Error	/	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	/		/

DTC Diagnosis Procedure

DTC	B1000-16	Power Supply Circuit Voltage Below Threshold
DTC	B1000-17	Power Supply Circuit Voltage Above Threshold

Description
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 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 cable.

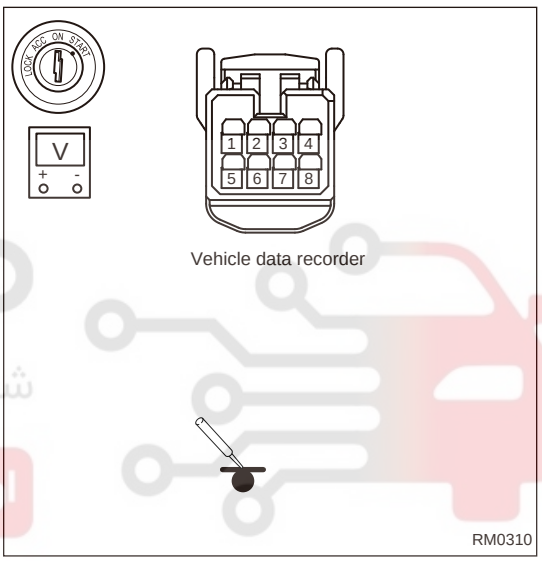
(c) Disconnect the drive recorder connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

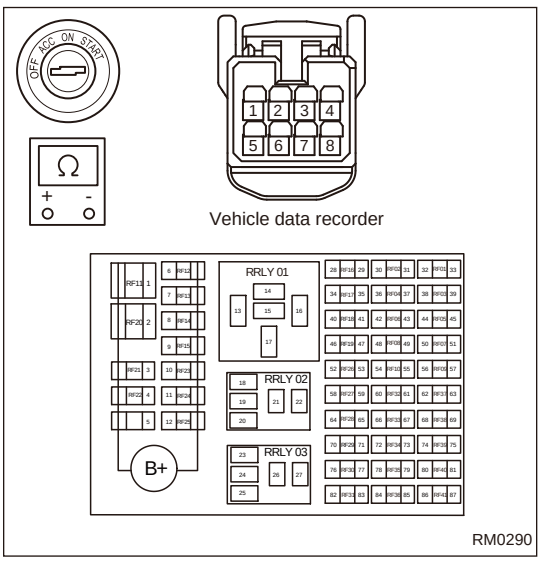
(f) Using a digital multimeter, measure voltage between drive recorder connector power supply terminal and ground according to table below.

Multimeter Connection	Condition	Specified Condition
Drive recorder connector power supply terminal - Body ground	ENGINE START STOP switch "ON"	Not less than 12 V



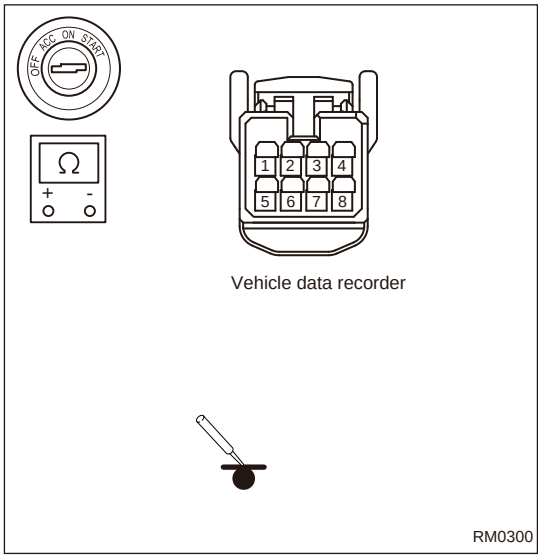
(g) Using a digital multimeter, measure resistance between drive recorder connector and instrument panel fuse and relay box according to table below.

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
Drive 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 drive recorder module**

OK → **System is normal**

DTC	**B1B50-00**	**Abnormal Image Acquisition**
DTC	**B1B51-00**	**DSP Failure**
DTC	**B1B52-00**	**WIFI module abnormal**
DTC	**B1B53-00**	**Abnormal collision sensing**

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 drive recorder.**
OK	**System is normal**

DTC	B1B54-4A	Low Write Speed of Memory Card/Serious Fragmentation of Memory Card/Memory Card Damage

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 drive recorder.**
OK	**System is normal**

DTC	U0073-88	CAN Bus Error
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.

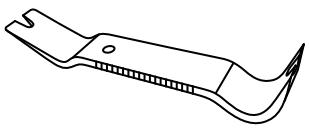
1	**Refer to CAN network system**

On-vehicle Service

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

Tool

Tool Name	Tool Drawing
Interior Crow Plate	 RCH002506

Outside Rear View Mirror Assembly

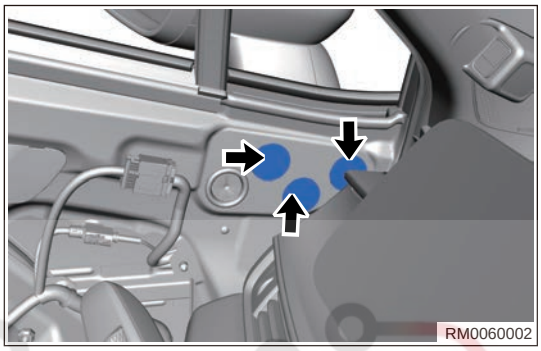
Removal

Hint:
- Use same procedures for right and left sides.
- Procedures listed below are for left side.

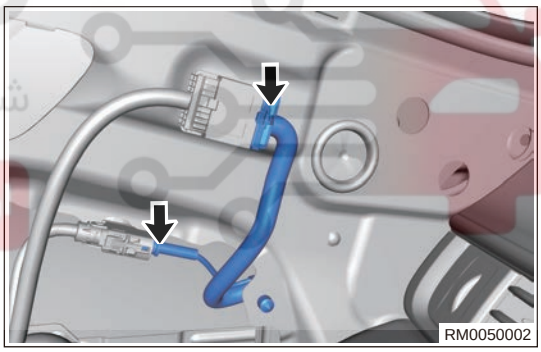
⚠ Caution

- 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.

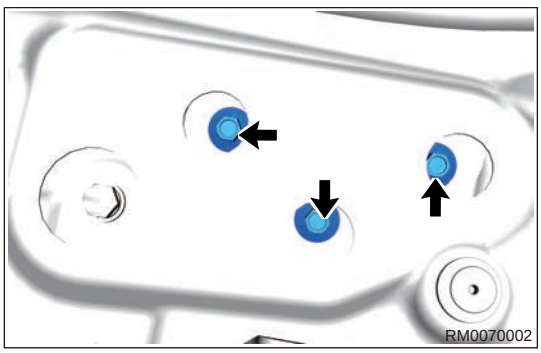
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the front left door inner protector assembly.
4. Remove the left outside rear view mirror assembly.
   a. Remove the front left door protector block cover.



   b. Disconnect the left outside rear view mirror connector.



   c. Remove 3 fixing bolts from left outside rear view mirror.
      Tightening torque: 7.0 ± 1.5 N·m



Installation

1. Installation is in the reverse order of removal.

⚠ 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).

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.
   a. Press the outside rear view mirror surface to tilt it.
   b. Apply protective tape around exterior frame of outside rear view mirror.
   c. Using an interior crow plate, pry off the claws of outside rear view mirror lens assembly.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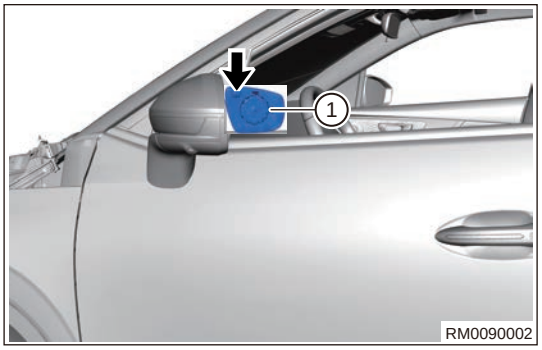
   d. Disconnect the connector (arrow) from rear view mirror lens assembly, and remove left outside rear view mirror lens assembly (1) (if equipped with rear view mirror heater).



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Inspection

1. Check the outside rear view mirror lens assembly. (If equipped with rear mirror heater)

a. 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. Installation is in the reverse order of removal.

⚠ Caution

- Make sure the lens can move smoothly, flexibly and reliably after installing outside rear view mirror lens assembly.

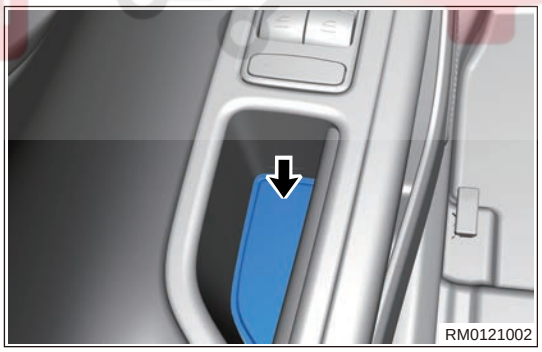
Outside Rear View Mirror Adjustment Switch

Removal

⚠ Caution

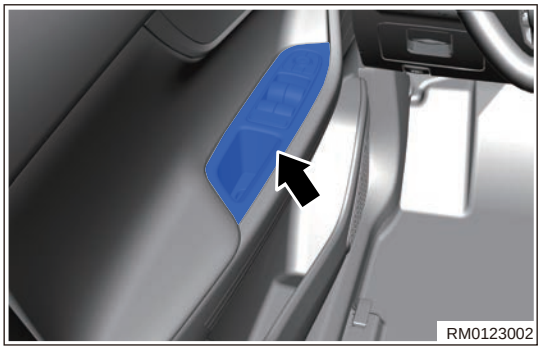
- Be sure to wear safety equipment to prevent accidents, when removing outside rear view mirror adjustment switch.
- DO NOT scratch instrument panel assembly when removing outside rear view mirror adjustment switch.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the outside rear view mirror adjustment switch.
   a. Remove the power glass regulator switch rubber pad.



   b. Remove the fixing bolt (arrow).

c. Using an interior crow plate, pry off outside rear view mirror adjustment switch and remove the outside rear view mirror adjustment switch.



Installation

1. Installation is in the reverse order of removal.

⚠ 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.

Inside Rear View Mirror Assembly (Low Configuration)

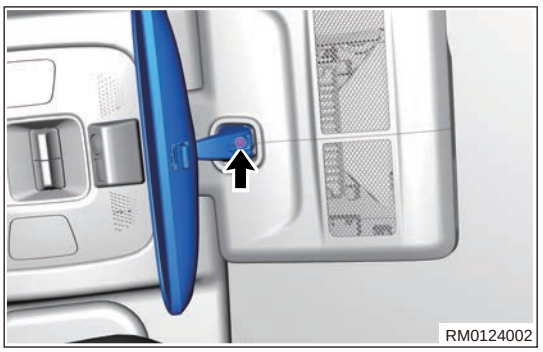
Removal

⚠ 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.
   a. Remove inner hexagon head bolt (arrow) from inner rear view mirror base and remove inner rear view mirror assembly.

      Tightening torque: 1.5 ± 0.5 N • m



Installation

1. Installation is in the reverse order of removal.

⚠ 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.

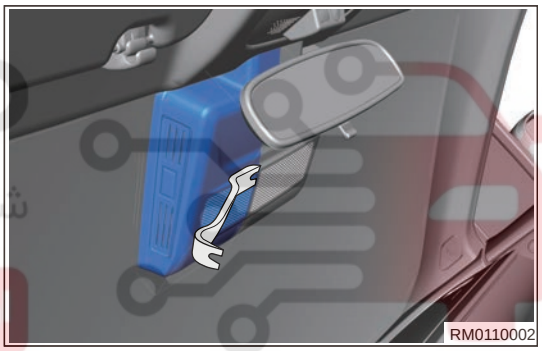
Inside Rear View Mirror Assembly (High Configuration)

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.

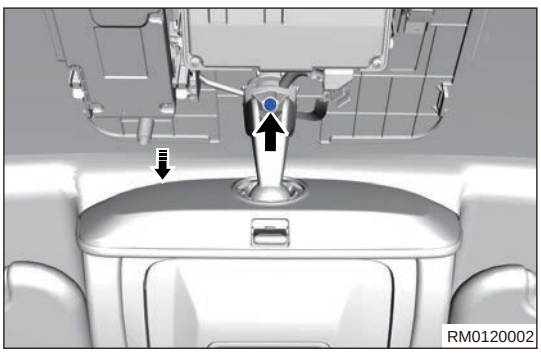
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the inside rear view mirror assembly.
   a. Using an interior crow plate, pry off the inner rear view mirror left protective cover.



   b. Using an interior crow plate, pry up the inner rear view mirror right protective cover.

   c. Remove screw (arrow) from inner rear view mirror base and remove inner rear view mirror assembly in direction of arrow.

   Tightening torque: 1.5 ± 0.5 N·m



Installation

1. Installation is in the reverse order of removal.

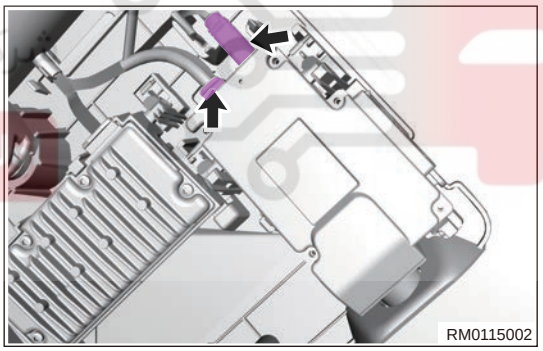
> **⚠ Caution**
>
> - Before installation, check if there is any obvious appearance defects (such as scratches, material missing, damage, etc.) and select the qualified parts.
> - The inside rear view mirror should be within the normal range required by view and the lens assembly should be matched with lens base assembly firmly without any looseness.
> - Driving recorder SD card interface position should be matched correctly with the gap between left and right covers.

Drive Recorder

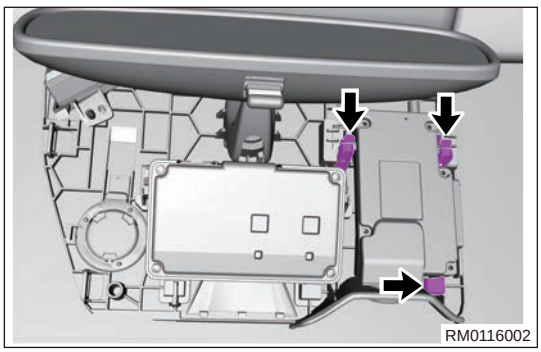
Removal

> **⚠ 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.
   a. Remove the drive recorder connectors (arrow).



   b. 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. Installation is in the reverse order of removal.

HORN SYSTEM

System Overview

Description

1	Horn Switch	2	Engine Compartment Fuse and Relay Box
3	Middle Pitched Horn	4	Anti-theft Horn

This vehicle is equipped with electronic horn system. Horn system consists of following components:

- 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.

Diagnosis & Testing

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)

Symptom	Suspected Area
	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)

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
Button horn sounds, but wireless door locking does not sound	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 BCM 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

Troubleshooting for Abnormal Horn Sound

1. If horn sound is obviously abnormal, perform the following routine inspection:
   a. Check terminals for poor contact; repair any poor contact problem;
   b. Check ground circuit; if there is poor contact, repair it;
   c. Make sure horn assembly fixing bolt is properly fastened;
   d. 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:
   a. Determine the type of sound produced by horn: Grave, sharp.

b. If it is obviously grave, it indicates that the current is too high and the horn assembly must be replaced.
c. If it is obviously sharp, foreign matters may attach to horn, remove horn assembly and check for foreign matters.
d. Remove any attached foreign matters and reinstall the horn assembly.

⚠ Warning
If no foreign matter is found, or if the foreign matter cannot be removed, replace horn assembly.

Horn Fuse Inspection

1. Identify the horn fuse in engine compartment fuse and relay box.
2. Check the horn fuse.
   a. Using a fuse puller, remove the horn fuse.
   b. 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.

Horn Relay Inspection

1. Identify the horn relay in engine compartment fuse and relay box.
2. Check the horn relay.
   a. Remove the 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.

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.

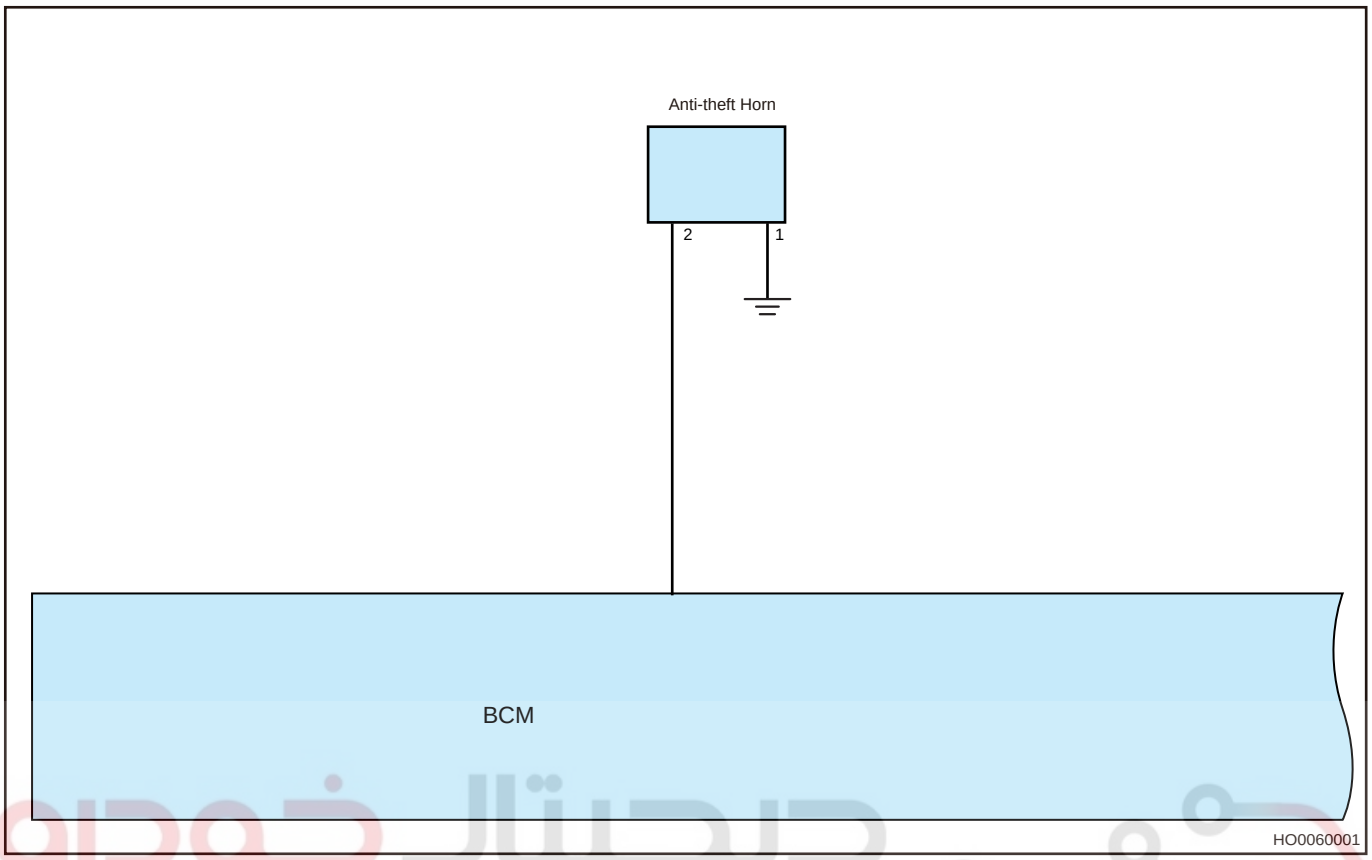
Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
B101D-11	Siren Output Control Circuit	/	• Horn failure • Module failure	/

DTC Diagnosis Procedure

DTC	B101D-11	Siren Output Control Circuit

Description
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.

1	**Check anti-theft horn**

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) Replace the original anti-theft horn with a new one for running test.

OK → **Replace anti-theft horn**

NG

2	**Check for open or short in 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 cable.

(c) Disconnect anti-theft horn connector and body control 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) Using ohm band of digital multimeter, check for continuity between anti-theft Horn (2) and BCM to check circuit for open.

Multimeter Connection	Condition	Specified Condition
Anti-theft horn (2) - Body control module (to terminal)	Always	⩽ 1 Ω

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

(h) Using ohm band of digital multimeter, check for continuity between anti-theft Horn (1) and body ground.

Multimeter Connection	Condition	Specified Condition
Anti-theft horn (1) - Body ground	Always	⩽ 1 Ω

NG → **Replace wire harness**

OK

3	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.

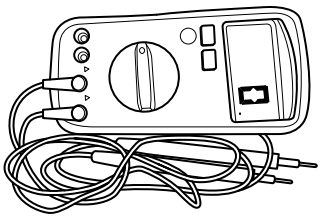
(c) Read the fault information and confirm that the fault has been solved.

NG → **Replace body control module**

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

On-vehicle Service

Tool

Tool Name	Tool Drawing
Digital Multimeter	 RCH000206

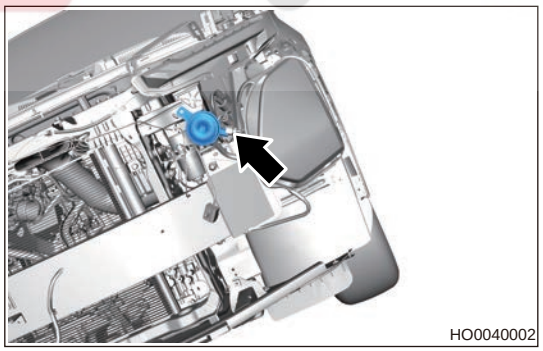
Torque Specifications

Description	Torque (N·m)
Horn Bracket Fixing Nut	16 ± 2

Horn Assembly

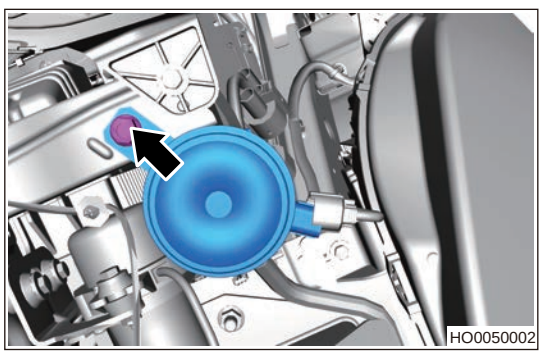
Removal

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.


HO0040002

5. Remove the horn fixing nut.

   Tightening Torque
   16 ± 2 N·m


HO0050002

Installation

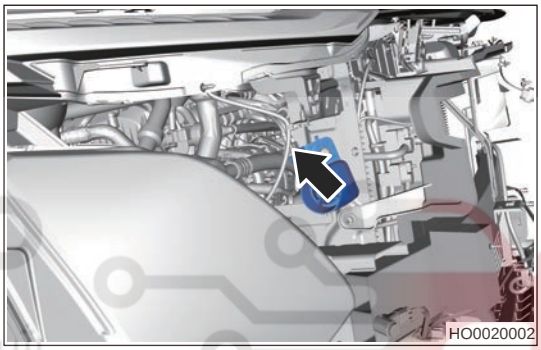
⚠ Caution
• Tighten fixing nut to the specified torque. • Install connectors securely.

1. Installation is in the reverse order of removal.

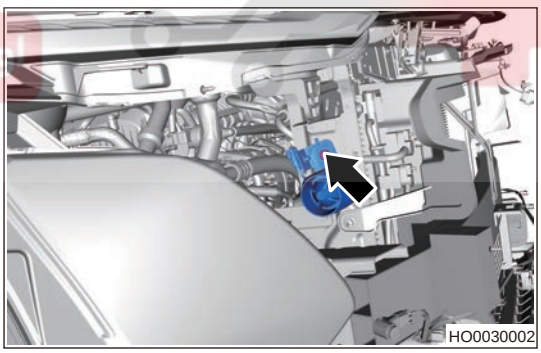
Anti-theft Horn Assembly

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 anti-theft horn wire harness connector.



5. Remove the anti-theft horn fixing nut.



Installation

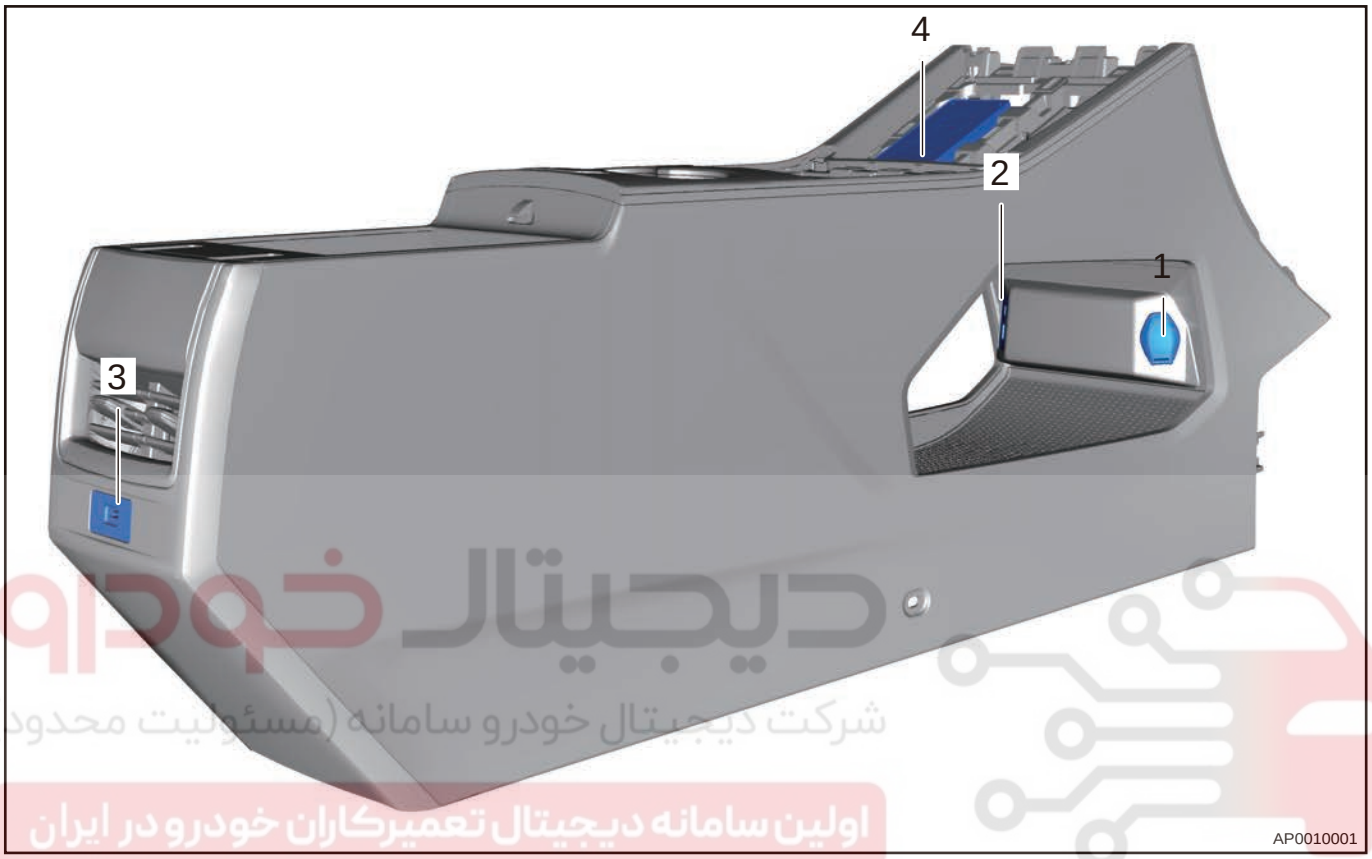
⚠ Caution
• Tighten fixing nut to the specified torque. • Install connectors securely.

1. Installation is in the reverse order of removal.

WIRELESS CHARGING SYSTEM

System Overview

System Components Diagram



1	Backup Power Supply Assembly	2	Multi-function Interface
3	USB Charging Module	4	Mobile Phone Wireless Charging Module

This vehicle is equipped with a 12 V backup power supply, which is located on the USB panel assembly for easy charging at any time.Wireless charging adopts an electromagnetic induction technology with convenience, versatility, novelty and safety, so that you can have a better experience while driving.

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 8 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	
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	

Diagnosis & Testing

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.

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.

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.

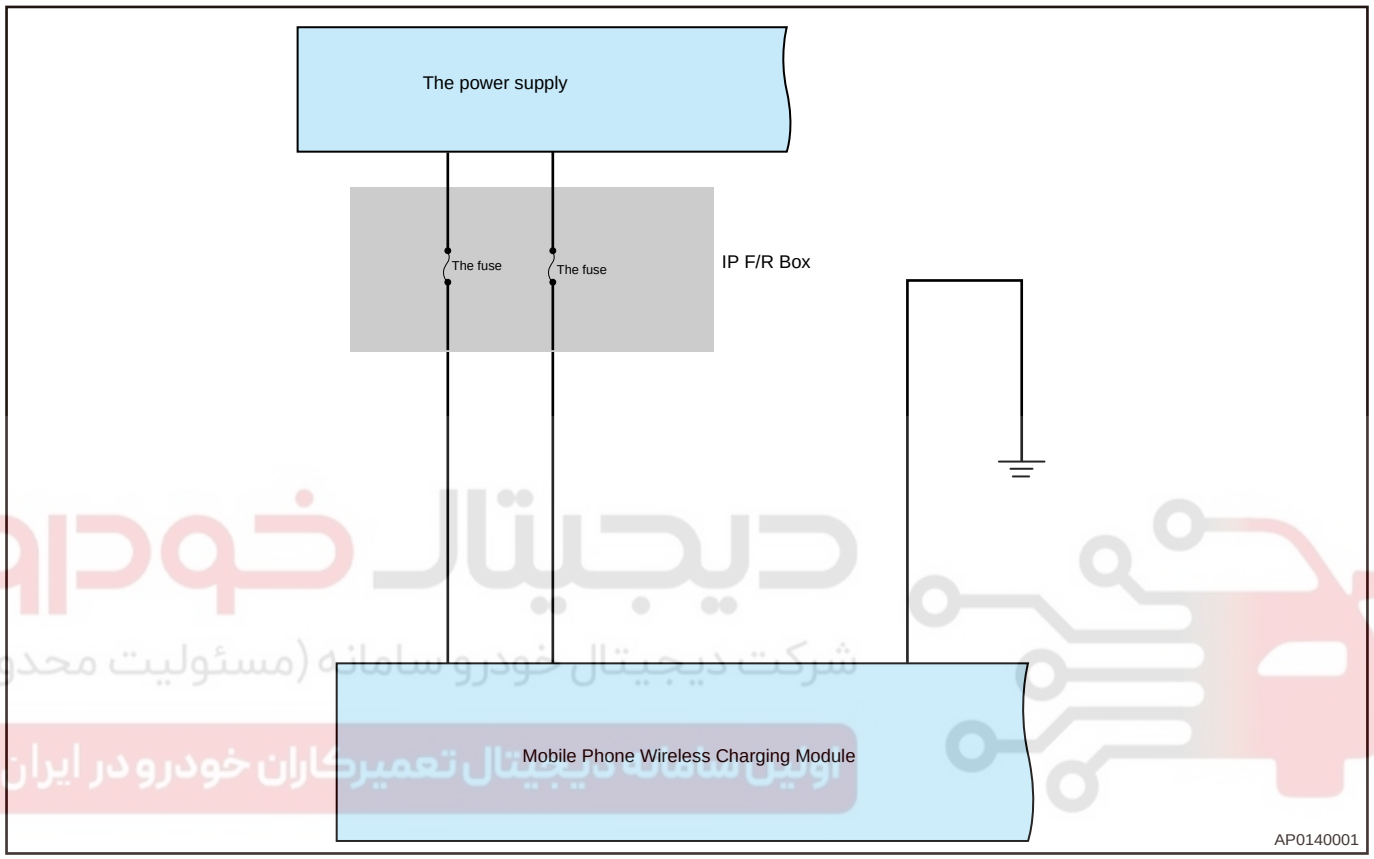
Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
B1B32-16	Power Supply Circuit Voltage Below Threshold	/	• 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	Power Supply Circuit Voltage Above Threshold	/		/
B1B30-92	Foreign Matters Exist - 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	Component or System Temperature Too High	/		/
U0073-88	CAN Bus Off	/	Refer to CAN communication system	/
U0140-87	Lost Communication with BCM	/		/
U0214-87	Lost Communication With PEPS	/		/
U1300-55	Software Configuration Error	/		/

DTC Diagnosis Procedure

DTC	**B1B32-16**	**Power Supply Circuit Voltage Below Threshold**
DTC	**B1B33-17**	**Power Supply Circuit Voltage Above Threshold**

Description
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	**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 instrument panel 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

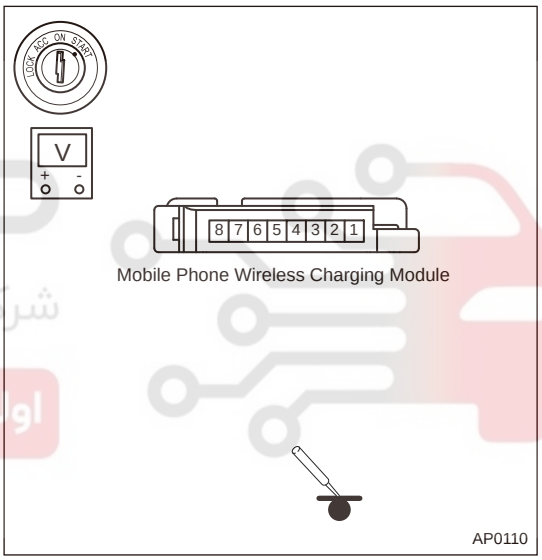
2	**Check instrument panel power supply voltage**

(a) Turn ENGINE START STOP switch to OFF, and disconnect the negative battery cable.

(b) Disconnect the wireless charging 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 connector power supply terminal and ground to check if there is an open in instrument panel power supply circuit according to the table below.



Multimeter Connection	Specified Voltage
Wireless charging connector (1) - Ground	Not less than 12 V
Wireless charging connector (2) - Ground	Not less than 12 V

NG → **Check if instrument panel fuse is burnt**

OK

3	**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 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 instrument panel 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 or replace instrument panel wire harness or connector**

OK

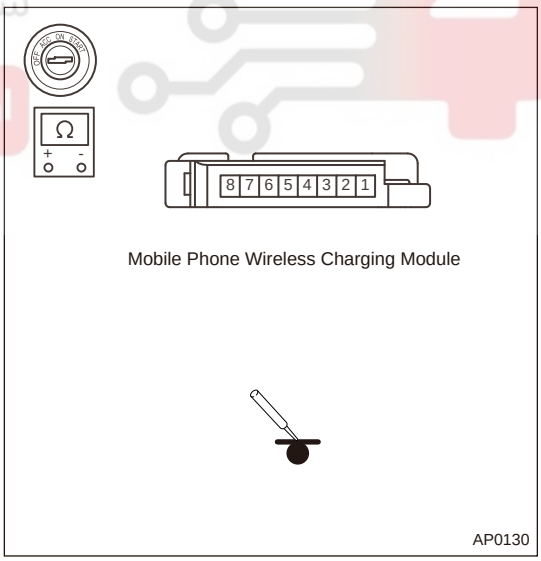
4	**Check ground**

(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 connector ground terminal and ground and check if it is open according to the table below.

Multimeter Connection	Condition	Specified Condition
Wireless charging connector (- ground terminal) - Body ground	Always	⩽ 1 Ω



NG → **Check and repair instrument panel ground wire harness and ground point.**

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 malfunction 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 Matters Exist - Performance or Incorrect Operation**
DTC	**B1B31-98**	**Component or System Temperature Too High**

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 wireless charging 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 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

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

NG → **Replace wireless charging module**

OK → **System operates normally**

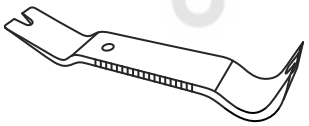
DTC	U0073-88	CAN Bus Off
DTC	U0140-87	Lost Communication with BCM
DTC	U0214-87	Lost Communication With PEPS
DTC	U1300-55	Software Configuration Error

DTC Confirmation Procedure
Refer to CAN communication system

On-vehicle Service

Tool

General Tool

Tool Name	Tool Drawing
Interior Crow Plate	 RCH002506

Fasteners Torque List

Torque Specifications

Item	Tightening Torque
Wireless Charging Module Fixing Bolt	1.5 ± 0.5 N·m

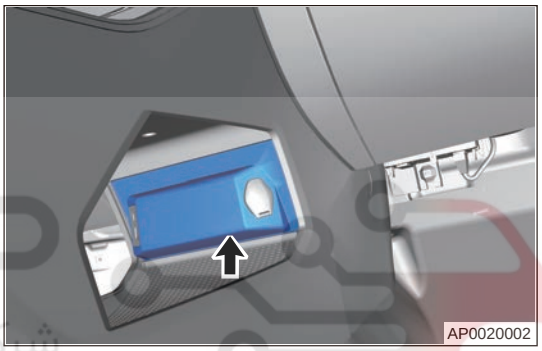
Front Backup Power Supply

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.
   a. Pry off clip from USB panel assembly and release the panel.



   b. Disconnect connector from backup power supply.
   c. Press fixing clip 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. Installation is in the reverse order of removal.

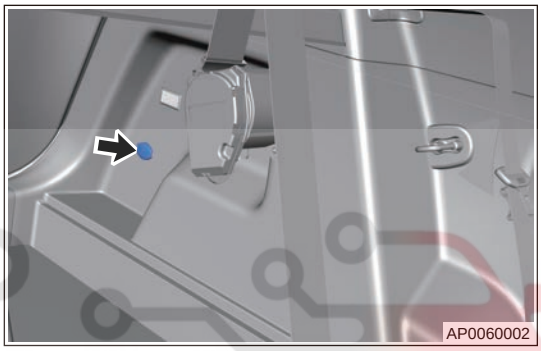
Rear Backup Power Supply

Removal

⚠ Caution

- Be sure to wear safety equipment to prevent accidents, when removing rear backup power supply.
- Appropriate force should be applied, when removing rear backup power supply. Be careful not to operate roughly.
- Try to prevent protector from being scratched, when removing rear backup power supply.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the rear backup power supply.
   a. Pry off rear backup power supply, disconnect the connector and remove rear backup power supply.



Installation

⚠ Caution

- Check backup power supply for proper operation after installing backup power supply assembly.

1. Installation is in the reverse order of removal.

Multi-function Interface

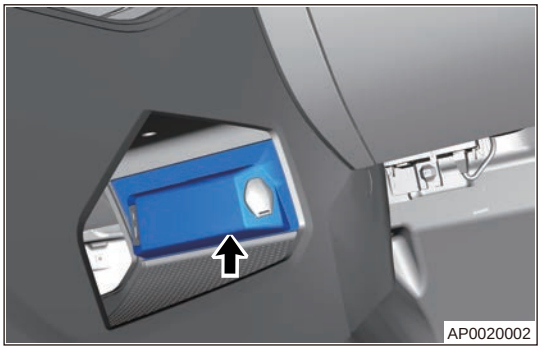
Removal

⚠ Caution

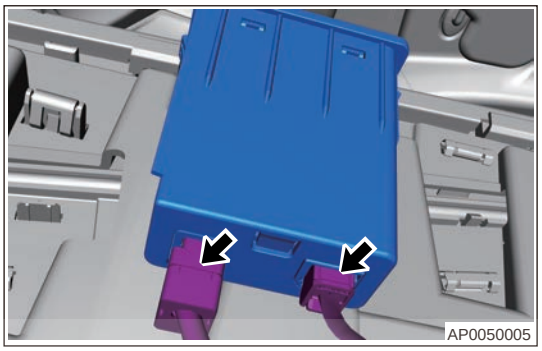
- Be sure to wear safety equipment to prevent accidents, when removing multi-function interface assembly.
- Appropriate force should be applied when removing multi-function interface assembly. Be careful not to operate roughly.
-

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the multi-function interface assembly.

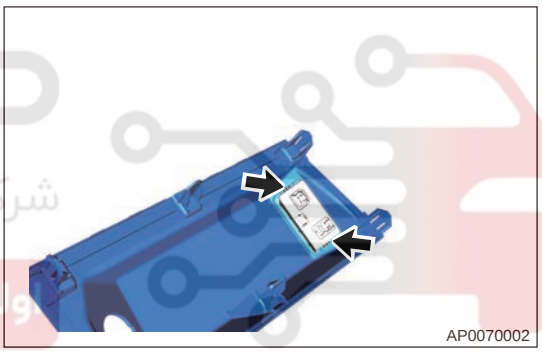
a. Pry off clip from USB panel assembly and release the panel.



b. Disconnect connector from backup power supply.



c. Press 2 clips and remove multi-function interface.



Installation

⚠ Caution

- Check multi-function interface for proper operation after installing the multi-function interface assembly.

1. Installation is in the reverse order of removal.

USB Charging Module

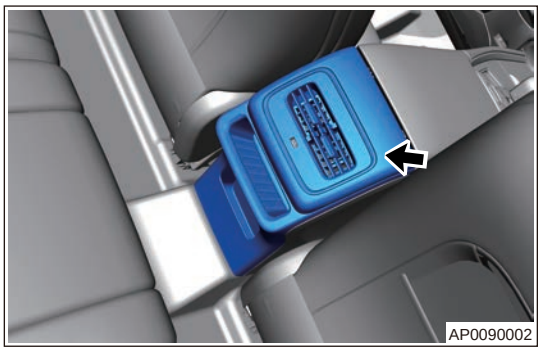
Removal

⚠ Caution

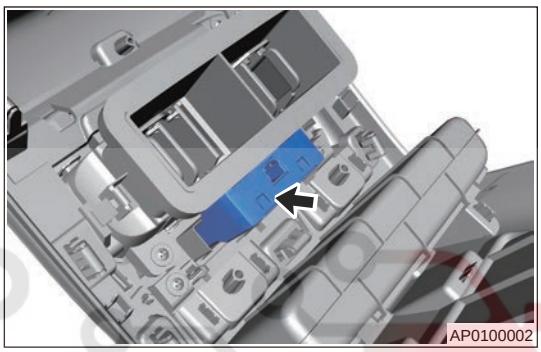
- When removing USB charging module, be sure to wear safety equipment to prevent accidents.
- Appropriate force should be applied, when removing USB charging module assembly. Be careful not to operate roughly.
- Try to prevent auxiliary fascia console rear cover assembly from being scratched, when removing USB charging module assembly.

1. Turn off all electrical equipment and ENGINE START STOP switch.

2. Disconnect the negative battery cable.
3. Remove the USB charging module.
   a. Remove the auxiliary fascia console rear cover assembly.



   b. Disconnect the USB charging module connector.
   c. Press the clip, remove the USB charging module.



Installation

⚠ Caution

- Check USB charging module for proper operation after installing USB charging module assembly.

1. Installation is in the reverse order of removal.

Wireless Charging Module

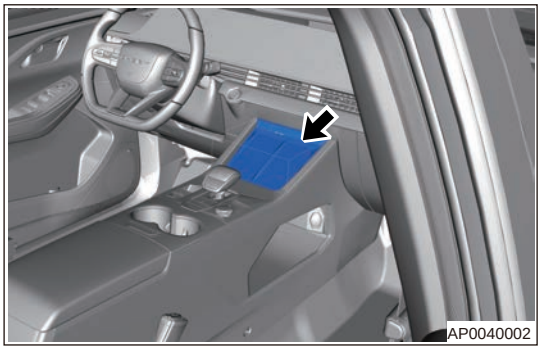
Removal

⚠ Caution

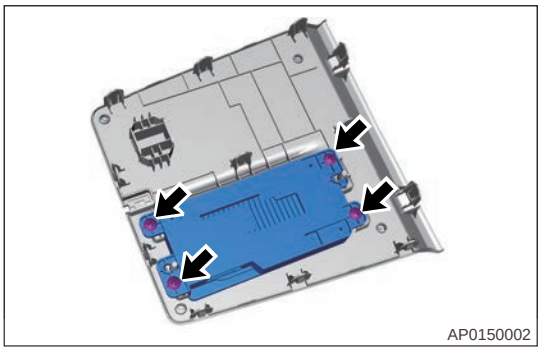
- Be sure to wear safety equipment to prevent accidents, when removing wireless charging module assembly.
- Appropriate force should be applied, when removing wireless charging module assembly. Be careful not to operate roughly.
- Try to prevent auxiliary fascia console assembly from being scratched, when removing wireless charging module assembly.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the wireless charging module.

a. Pry off the storage box cover plate assembly with interior crow plate, and disconnect mobile phone wireless charging module connector.



b. Remove 4 fixing screws from wireless charging module.



c. Remove the wireless charging module.

Installation

⚠ Caution

- Check wireless charging module for proper operation after installing wireless charging module assembly.

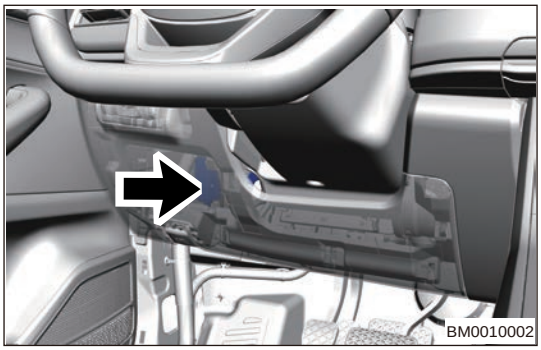
1. Installation is in the reverse order of removal.

BODY CONTROL SYSTEM

System Overview

Description

Body control module is called BCM for short which integrates most of vehicle electrical appliances, and it is an important part of the body electrical system.



Function Description

1. Tire pressure monitoring function (if the vehicle is equipped with tire pressure monitoring function): Tire pressure monitoring system is an active safety device, which can monitor tire pressure and temperature in real time and display tire pressure and temperature on meter. When tire pressure is too low or temperature is too high, tire pressure monitoring system will warn the driver of driving danger.
2. Window jam protection function (if the vehicle is equipped with jam protection function): When window auto up or remote one-button window up function is operated, if a passenger is jammed by automatically rising window due to carelessness, the jam protection control module control glass regulator motor to operate in reverse before motor reaches the jam protection set force, so that window glass lowers at a certain distance and prevent passenger being jammed.
3. 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, high beam, passing light, rear fog light control, daytime running light, battery save, dome light, third row dome light, rear view mirror ground light, window, PEPS button background light control, anti-theft management, trunk opening management (with PLG), 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, assist steering illumination, brake light control, rear view mirror folding, DVD settings, remote control function, LIN ambient light.

BCM Installation Position

It is installed on body under instrument panel.

BCM Function Test Reporter

Defrost Function

1. Defroster operation conditions: (1) IGN ON; (2) defroster signal active
   a. Active the defroster switch when the key is in OFF, ACC or START, the defroster will not operate.
2. When defroster is operating: Defroster stopped when 20 minutes elapsed
3. When defroster is operating: Active the defroster signal again, defroster stops
4. When defroster is operating: Key is switched from IGN ON to ACC or OFF, defroster stops
5. When defroster is operating: After the operation time reaches to 20 min ± 5 s, defroster stops

6. When defroster is operating: When it is in Crank, defroster is paused. After Crank is finished, defroster resumes

Hint:
When voltage is below 11.5 V for more than 5 s, defroster output is shut down temporarily. If voltage is above 12.5 V for more than 15 s in the following counting time, the output will be restarted.

Turn Signal Light Function

1. Left turn signal light operating conditions: IGN ON; left turn signal light switch is activated
2. When left turn signal light is operating: the flashing frequency of left turn signal light is 400 ms on and 400 ms off.
   a. When left turn signal light is operating: Key is switched from ON to OFF, left turn signal light stops operating and meter stops flashing.
3. When left turn signal light is operating
   a. The corresponding bulb is intact, BCM sends CAN signal and the frequency is the same as left turn signal light;
   b. If the corresponding 21 W bulb is damaged, BCM sends CAN signal and the frequency is 2 times of normal operating frequency. No matter whether the bulb is damaged or not, BCM will work and send signals.
4. Right turn signal light operating conditions: IGN ON; right turn signal light switch is activated
5. When right turn signal light is operating: the flashing frequency of right turn signal light is 400 ms on and 400 ms off.
   a. When right turn signal light is operating: key is switched from ON to OFF, right turn signal light stops operating and meter stops flashing.
6. When right turn signal light is operating
   a. The corresponding bulb is intact, BCM sends CAN signal and the frequency is the same as right turn signal light;
   b. If the corresponding 21 W bulb is damaged, BCM sends signal and the frequency is 2 times of normal operating frequency. No matter whether the bulb is damaged or not, BCM will work and send signals.
7. When left/right turn signal light is operating: left/right turn signal light input is deactivated, left/right turn signal light should stop operating immediately
8. When left/right turn signal light is operating: Key is switched from IGN ON to ACC or OFF, and left/right turn signal light stops operating immediately.

Lane Change Function

1. Left lane change operating conditions: IGN ON; left turn signal light switch activates shortly (50 ms～1000 ms)
2. When left lane change is operating: left turn signal light flashes 3 times at frequency of 400 ms on and 400 ms off
3. When left lane change is operating
   a. The corresponding bulb is intact, BCM sends CAN signal and the frequency is the same as left turn signal light;
   b. If the corresponding 21 W bulb is damaged, BCM sends CAN signal and the frequency is 2 times of normal operating frequency. No matter whether the bulb is damaged or not, BCM will work and send CAN signals.
4. During left lane change operation: left turn signal light switch is activated (50 ms～1000 ms) shortly again, and left turn signal light flashes 3 times again
5. When left lane change is operating: Left turn signal switch remains active (> 1000 ms) and automatically switches to left turn signal light operating logic.
6. When left lane change is operating: Key is switched from IGN ON to ACC or OFF, and left turn signal light stops operating immediately.

7. When left lane change is operating: After flashing 3 times, left turn signal light should stop operating immediately.
8. Right lane change operating conditions: IGN ON; right turn signal light switch activates shortly (50 ms ～1000 ms)
9. When right lane change is operating: right turn signal light flashes 3 times at frequency of 400 ms on and 400 ms off
10. When right lane change is operating
    a. The corresponding bulb is intact, BCM sends CAN signal and the frequency is the same as left turn signal light;
    b. If the corresponding 21 W bulb is damaged, BCM sends CAN signal and the frequency is 2 times of normal operating frequency. No matter whether the bulb is damaged or not, BCM will work and send CAN signals.
11. During right lane change operation: right turn signal light switch is activated (50 ms～1000 ms) shortly again, and right turn signal flashes 3 times again
12. When right lane change is operating: Right turn signal switch remains active (>1000 ms) and automatically switches to right turn signal light operating logic
13. When right lane change is operating: key is switched from IGN ON to ACC or OFF, and right turn signal light stops operating immediately
14. When right lane change is operating: After flashing 3 times, right turn signal light should stop operating immediately

Hazard Warning Light Function

1. Hazard warning light function activation conditions: hazard warning light switch is activated when hazard warning light is not activated
2. When hazard warning light is activated: Flashing frequency of left/right turn signal light and hazard warning light indicator are 400 ms on and 400 ms off
3. When hazard warning light is activated
    a. The corresponding bulb is intact, BCM sends CAN signal and the frequency is the same as turn signal light;
    b. If any 21 W bulb is damaged, the CAN signal frequency of turn signal light and the flashing frequency of hazard warning indicator will be 2 times of normal operating frequency.
4. When hazard warning light is activated: hazard warning light switch is activated again and hazard warning light function is turned off; left/right turn signal light stops operating immediately
5. When ABM sends a collision signal, hazard warning light function should be activated automatically (CAN signal of left/right turn signal light, indicator and turn signal light). Automatically activated hazard warning light function due to collision can be canceled as key is switched to OFF, then to ON or hazard warning light button is pressed
6. When turn signal light function and hazard warning light function are both effective, BCM should perform the next action

Hint:
In a ignition cycle, BCM responds to one collision signal only.

Position Light

1. Position light activation conditions: IGN ON or ACC; small light input or low beam light input is activated
2. When position light is operating: BCM should send CAN signal
3. When position light is operating: When small light input and low beam input are deactivated, small light stops operating
4. When position light is operating: when key is switched to OFF, small light stops operating and sends CAN signal

Parking Light

1. Parking light activation conditions: Key is switched to OFF; small light switch is activated

2. When parking light is activated: small light comes on and BCM should send CAN signal
3. When parking light is activated: small light switch is deactivated and small light is turned off, BCM should send CAN signal

Low Beam Light

1. Low beam light activation conditions: IGN ON; low beam light switch is activated
2. When low beam light is activated: BCM sends signal
3. When low beam light is activated: when low beam switch input is canceled, low beam light turns off immediately
4. When low beam light is activated: Key is switched from IGN ON to ACC or OFF, low beam light turns off immediately.

Follow Me Home

1. Light is in manual mode
   a. FMH function activation condition: Flash switch is activated within 2 minutes after key is switched to OFF, and it can be activated again within 2 minutes regardless of whether FMH function is manually turned off or automatically turned off due to overtime.
   b. When FMH function is activated: Low beam light and small light are illuminated, and both CAN signal and FMH time are sent
   c. When FMH function is activated: default duration is 30 S. Activating Flash switch again for a short time will increase duration of FMH function by 30 S each time, but no more than 8 times
   d. When FMH function is activated: Flash switch is activated for 2 seconds, FMH function will be manually turned off - low beam light and small light will turn off immediately and cumulative duration of FMH will be reset.
   e. When FMH function is activated: key is switched to ACC or IGN ON, FMH function will be turned off - low beam light and small light will turn off immediately and cumulative duration of FMH will be reset.
   f. When FMH function is activated: FMH function will be automatically turned off after set FMH working time is reached: low beam light and small light will turn off immediately.
2. Light is in automatic mode
   a. The vehicle has fortification condition, light combination switch is in AUTO, remote controller lock button is pressed, and BCM receives valid signal sent from rain sensor, and low beam light and position light are automatically turned on for 30s.
   b. After 30 S or ignition key is switched to OFF/ON/ACC or light combination switch is switched from AUTO, low beam light and position light are turned off.

Car Locating

1. Light is in manual mode
   a. LMC function activation condition: IGN OFF; FMH is activated in this same ignition cycle (-ON⩾ACC⩾OFF) and automatically turns off due to overtime; remote control unlock signal is received; four doors are closed.
   b. When LMC function is activated: Low beam light and small light are on and send CAN signal.
   c. When LMC function is activated: FMH function cannot be activated, low beam light and small light operate in LMC mode.
   d. When LMC function is activated: Remote control lock signal (four doors are closed) is received, LMC function is turned off - low beam light and small light are off.
   e. When LMC function is activated: Any door is opened, LMC function is turned off - low beam light and small light are off.
   f. When LMC function is activated: Any key is switched to ACC or IGN ON, LMC function is turned off - low beam light and small light are off.
   g. When LMC function is activated: After receiving remote control unlock signal, LMC function delays 60 s (subject to remote control unlock time received)

h. When LMC function is activated: Longest duration is 60 s, LMC function will turn off automatically after overtime.

2. Light is in automatic mode
   a. The key is in OFF, light combination switch is in AUTO, remote controller unlock button is pressed, and BCM receives valid signal sent from rain sensor, and low beam light and position light turn on for 30 seconds.
   b. After 30 seconds or ignition key is switched to ACC, low beam light and position light are turned off.
   c. When LMC function is activated, if the activation conditions are met again or FMH function is activated, it counts down from 30 s again and the light will not flash.

Automatic Lighting

1. Automatic light activation conditions: IGN in ON position; light switch in AUTO; LIN valid signal sent from rain sensor received
2. After automatic light ON function is activated, BCM sends low beam light and position light CAN signals to instrument cluster.
3. Low beam lights turn off if any condition is met
   a. IGN switch is not in ON position.
   b. Light switch is switched from AUTO.
   c. Rain sensor LIN signal is invalid.
4. Position lights go out if any condition is met.
   a. IGN switch is not in ON position.
   b. After light switch is switched away from AUTO for 2 s.
   c. After rain sensor LIN signal is valid for 5 s.

High Beam Light

1. High beam light operating conditions: IGN ON; low beam lights are in activating status, high beam light switch is activated
2. When high beam light is operating: high beam lights come on and send CAN signal
3. When high beam light is operating: when vehicle is in Crank, high beam lights temporarily stop operating but CAN data will be sent continuously and resume operation after Crank.
4. When high beam light is operating: High beam light switch is deactivated and high beam lights turn off
5. When high beam light is operating: Low beam light switch is deactivated and high beam lights turn off
6. When high beam light is operating: Key is switched from IGN ON to ACC or OFF, high beam lights turn off.

Flash Function

1. Flash operating conditions: IGN ON; Flash switch is activated
2. When Flash is operating: high beam lights come on and send signal
3. When Flash is operating: when vehicle is in Crank, high beam lights temporarily stop operating, but CAN data will be sent continuously, and resume operation after Crank
4. When Flash is operating: When Flash switch is deactivated, high beam lights turn off
5. When Flash is operating: Key is switched from IGN ON to ACC or OFF, high beam lights turn off.

Front Fog Light Control

1. Front fog light operating conditions: IGN ON; position lights are in activating status, front fog lights switch is activated
2. When front fog lights are operating: Front fog lights come on and sends CAN signal
3. When front fog light is operating: Front fog switch activation is canceled and front fog lights go out
4. When front fog lights are operating: Key is switched from IGN ON to ACC or OFF, front fog lights go out
5. When front fog light is operating: Small light is turned off; front fog lights go out and send CAN signal

Rear Fog Light Control

1. Rear fog light operating conditions: IGN-ON; front fog light or low beam light load is activated; rear fog light switch is activated.
2. When rear fog light is operating: Rear fog light comes on and sends CAN signal.
3. When rear fog light is operating: When rear fog light switch is activated again, rear fog lights turn off.
4. When rear fog light is operating: When key is switched from IGN ON to ACC or OFF, rear fog lights turn off.
5. When rear fog light is operating: When low beam light or front fog light is turned off, rear fog light turns off at the same time.

Daytime Running Light

1. Daytime running light operating conditions: engine is started; low and high beam lights are not activated
2. When daytime running light is operating: when engine is stopped, daytime running light function is turned off
3. When daytime running light is operating: The activation of position light, low beam light and front fog light will cause daytime running lights to be turned off
4. When daytime running light is operating: Flash function does not affect daytime running light

Battery Save

1. Battery save function remains active during IGN ON or IGN ACC
2. Battery save function remains active without other wake-up sources within 15 minutes after IGN OFF
3. Battery save timing within 15 minutes after key is turned to OFF: Any door or back door unlocking signal received, key insertion or removal will reset timing to 15 minutes

Hint:

- Battery save load includes: Key light, dome light and luggage compartment light.
- Battery Save can be woken up by central control unlock or mechanical unlock after Battery Save is turned off.

Dome Light

1. Key insertion and removal, dome light and key light control
   a. When key is removed, BCM turns on dome light and key light is on for 3 minutes (fades in and fades out).
   b. Within 3 minutes of dome light operation: Key insertion does not affect the operation timing of dome light and key light.
   c. Within 3 minutes of dome light operation: When the key is turned to IGN ON, dome light and key light will fade out immediately.
   d. Within 3 minutes of dome light operation: If all doors are closed after any door is opened, dome light and key light continue to work for 8 seconds, and then fade out.
2. Door status, dome light and key light control
   a. If any of doors is opened and remains open, dome light comes on for 3 minutes (fades in and fades out).
   b. Within 3 minutes of dome light operation: If another door is opened while one door remains open, dome light continues to come on for 3 minutes, and then fads out.
   c. Within 3 minutes of dome light operation: When the key is turned to ON, all doors are closed, dome light will fade out immediately.
   d. Within 3 minutes of dome light operation: When the key is turned to OFF or ACC and all doors are closed, dome light will fade out after 8 s; if the key is turned to IG ON within 8 s, dome light will fade out immediately.
3. Remote control key, dome light and key light control
   a. When BCM receives unlock signal from remote controller: No matter what status the door is in, dome light comes on for 15 seconds (fades in and fades out).

b. Within 15 seconds of dome light operation: When the key is turned to ING ON, the dome light will fade out immediately.
c. Within 15 s of dome light operation: When RF is fortified successful, dome light will come off immediately.
d. Within 15 s of dome light operation: When any door is opened, dome light enters into mode 2.

4. Collision signal, dome light and key light control
   a. When the key is turned to IG ON, if CAN signal value is not “00”, BCM will illuminate dome light for 30 minutes. There is no fade-in process, including fade-out process.
   b. Within 30 minutes of dome light illumination: If key is switched to OFF, dome light will fade out immediately.
   c. Within 30 minutes of dome light illumination: If BCM receives RF key lock signal, dome light turns off immediately and there is no fade-out process.

Hint:
- Please turn rear dome light switch to door control gear to test above function logic.
- In any of above conditions (key insertion and removal, door status, remote control key) triggers dome light to come on, another event is triggered again, and dome light illumination time is reset.

Luggage Compartment Light

1. Luggage compartment light operating conditions: Luggage compartment is opened and luggage compartment light continuously turn on for 15 minutes.
2. Luggage compartment light is operating: Luggage compartment is closed and luggage compartment light turns off immediately.

Rear View Mirror Foot Light

1. Remote control and foot light function
   a. With key in OFF/ACC, perform unlock operation through key or remote function, foot light turns on for 15 seconds.
   b. In OFF status, BCM receives wireless fortifying/remote fortifying/PLG fortifying signal, and vehicle enters fortifying mode successfully, foot light turns on for 15 seconds.
   c. With key in ON or after counting down for 15 seconds, foot light turns off.
2. Foot light function controlled by door status signal
   a. With key in OFF/ACC/ON, open any door, BCM controls the foot light to turns on for 3 minutes.
   b. Within 3 minutes of foot light operation: If another door is opened while one door remains open, foot light continues to come on for 3 minutes, and then fades out.
   c. In OFF/ACC status, foot light comes on, four doors close, BCM controls foot light to come on for 8 seconds and then go off; Turn key to ON within 8 seconds after foot light is on, and foot light turns off immediately.
   d. When ground light comes on, with IGN in ON condition, the ground light will go out immediately if four doors are closed.

Hint:
- When ground light comes on, BCM enters door condition signal control ground light logic if any door is opened.
- Ground light will not illuminate if back door is opened.
- When the ground light comes on, if BCM is fortified or unfortified, BCM enter remote control signal/ PEPS signal control ground light logic.

Window

1. Window activating conditions: Within 2 minutes since IGN ON or IGN switches away from ON position and both front doors were not opened; enable window switch
2. Window switch has 4 states
   a. Manual UP: When switch is in this position, window is moving up. When switch leaves this position, window stops;

b. Manual DOWN: When switch is in this position, window is moving down. When switch leaves this position, window stops;
c. Auto UP: When switch is in this position, window is moving up automatically until it stops due to block or position changed;
d. Auto DOWN: When switch is in this position, window is moving down automatically until it stops due to block or position changed.

3. When window is operated under auto mode: Press corresponding window up or down switch again to stop the operation.
4. When window is operated under auto mode: For example, after 2 minutes which described in point 1, the operating window stops after finishing this operation.
5. When window is operated under manual mode: For example, after 2 minutes which described in point 1, the operating window stops immediately.
6. Within 2 minutes when key is in ACC or OFF: If any front door opens, window function is disabled.
7. When window disable switch is activated: Input of passenger side will be disabled; if the operating window is activated by switch of passenger side, it will stop immediately. When window disable switch cancel is activated, passenger side input disable is canceled and window disable indicator goes off
8. When key is in ACC or OFF: Window switch input will be invalid if any front door is opened (it is still invalid when closing the door after front door is opened); And if window is operating when front door is opened, stop the window immediately.
9. When engine starts, the operating window will stop immediately and it cannot resume after engine has started

PEPS ENGINE START STOP switch backlight control

1. When position light is on: BCM continuously sends CAN signal to illuminate PEPS backlight
2. When small light is off
   a. The door status changes as follows:

- When any door is opened, BCM continuously sends CAN signal to turn on the backlight for 3 minutes, and then sends CAN signal after 3 minutes to turn off the backlight.
- Within 3 minutes of backlight illumination, if another door is opened, timing will restart again.
- In IGN-ON state, during 3 minutes of backlight illumination, if all doors are closed, backlight will be turned off after 3 seconds.
- In IGN-OFF/ACC status, within 3 minutes of backlight illumination, if all doors are closed, backlight will turn off after continuously turning on for 11 s.

   b. PEPS SMART/RKE control:

- When BCM receives locking failure signal (regardless of door status) for 2 times, BCM continuously illuminates backlight for 18 s and then turn it off after 18 s.
- If key is switched to ON within 18 s, backlight will turn off immediately.
- If key LOCK signal is received within 18 s, backlight will be turned off immediately.
- If any door is opened within 18 S, it is performed according to door status control strategy.

Anti-theft Management

1. Fortifying mode
   a. Trigger conditions:

- IGN is in OFF (it is not in IGN ON or ACC)
- Four doors & two covers are closed;
- BCM receives remote control lock command.
  b. BCM feedback when fortifying mode is entered:

- Turn signal light flashes once (turn on for 500 ms) and sends the corresponding CAN signal;
- Theft deterrent indicator is continuous flash at frequency of 100ms, 1900ms.
- Actuate the anti-theft horn 50 ms and high and low pitched horns 15 ms.

2. Fortifying failure mode
   a. Trigger conditions:

- IGN is in OFF (it is not in IGN ON or ACC)
- Any of four doors & two covers is open;
- BCM receives remote control lock command.
  b. BCM light feedback when fortifying failure mode is entered:
- Turn signal light flashes two times (flashing for 500 ms, interval time is 1s) and sends the corresponding CAN signal.
  c. When entering fortifying failure mode:
- If four doors are closed and any of the two covers is opened, BCM will perform central control lock once;
- If two covers are closed and any of the doors is opened, BCM will perform central control lock then unlock (the interval time is 500 ms)

3. Intrusion mode
   a. Trigger conditions: BCM will enter to alarm status after the following conditions are met when the vehicle is in fortifying mode:

- Doors or engine hood is opened;
- Key is turned to IGN ON;
- Luggage compartment is opened forcibly.
  b. After entering to intrusion mode, BCM feedback the conditions within one alarm cycle (30 s):
- Anti-theft horn (high and low pitched horns sound at frequency of 500 ms ON and 500 ms OFF) operates for 28 ± 2s, pause for 5s;
- Left and right turn signal lights flash 28s at frequency of 75 times/min (400 ms on, 400 ms off) and pause for 5s, and send the corresponding signals;
- Anti-theft indicator continuously flashes at frequency of 100 ms on, 200 ms off, 100 ms on, 600 ms off.
  c. All doors, engine hood, luggage compartment and IGN ON illegal activation action are alarm trigger sources:
- In the same alarm source, a single trigger source can trigger 3 alarm cycles at most;
- In multiple alarm trigger sources, BCM can trigger 8 alarm cycles at most (after 8 alarm cycles, the sound and light alarm will stop);
- If the intrusion ends, BCM will stop alarm after the current alarm cycle. If the same alarm source is triggered again after the alarm is over, BCM will perform the remaining alarm cycles.
- If the four doors & two covers are closed at the end of the alarm, BCM will enter fortifying mode.

4. Fortifying deactivation mode
   a. Activation conditions: vehicle is in alarm mode; BCM receives RF unlock command or BCM detects signals for 1 s continuously after 2 s when the key is switched to IGN ON.
   b. When the alarm is released: vehicle exits anti-theft function mode; anti-theft horn (high and low pitched horns (if equipped)) stops working, and the turn signal light stops flashing.
   c. After alarm is released, if key is not in IGN ON, anti-theft indicator light still flashes at a frequency of 100 ms on, 200 ms off, 100 ms on and 600 ms off; if the key is in IGN ON, anti-theft indicator light stops flashing.
5. Re-fortifying mode
   a. Trigger conditions:

- Vehicle is in fortifying mode;
- BCM receives remote control unlock command.

b. BCM feedbacks when fortifying mode is released.

- Theft deterrent indicator turns off immediately;
- Turn signal light flashes 2 times at frequency of 500 ms on and 500 ms off, and sends the corresponding CAN signals.

c. Within 30 ± 2 seconds after fortifying mode is released:

- If any of all doors, engine hood or luggage compartment are open, BCM exits anti-theft mode;
- If all doors, engine hood and luggage compartment are always closed, BCM will lock automatically and enter the fortifying state after 30 s, and anti-theft indicator will flash at the frequency of 100 ms on and 1900 ms off.

6. Luggage compartment opening mode

a. Trigger conditions:

- Vehicle is in fortifying mode;
- BCM receives the remote control luggage compartment open command for more than 1.5 s.

b. BCM feedback when luggage compartment opening mode is triggered:

- Turn signal light illuminates for 1 s and sends the corresponding signals.
- Luggage compartment is open and no alarm is triggered.

c. Then close the luggage compartment, vehicle returns to the fortifying state, and if there is no legal key, the luggage compartment switch cannot open luggage compartment.

d. After using remote control to open the luggage compartment: After BCM receives remote control lock command, vehicle will immediately lock and return to fortifying state, but the turn signal light prompts fortifying failure.

e. After using remote control to open the luggage compartment and close it again: After BCM receives remote control lock command, vehicle will immediately lock and return to fortifying state, but the turn signal light prompts fortifying successfully. If there is no registered key after the luggage compartment closed, the switch will not open the luggage compartment.

Luggage Compartment Opening Management (without PLG)

1. When the central control lock is in unlock state
   a. When the luggage compartment opening switch is activated, the luggage compartment opens.
2. When the central control lock is in lock state
   a. Luggage compartment is opened

- IGN OFF;
- BCM receives RF open trunk command for more than 1.5s.
- Turn signal light illuminates and sends CAN signals to open trunk;

3. After luggage compartment is opened by remote control, close it manually, if there is no registered key (PKE), the luggage compartment will not open by the luggage compartment button.

⚠ Caution

- When luggage compartment is opened, the luggage compartment light turns on.
- When luggage compartment is opened, the actuate time of motor is 200 ms.
- When the vehicle speed reaches 10km/h, the luggage compartment will not be opened (please note that the ignition remains in IGN while testing - BSM is 15 nodes).

Luggage Compartment Opening Management (with PLG)

1. When vehicle is in fortifying deactivation mode
   a. When trunk switch is activated, trunk opens/closes; Turn signal light flashes twice with a frequency of 200 ms ON - 200 ms OFF.
   b. During back door opening/closing, short press remote controller to stop back door at current position.

c. With global fortifying, BCM performs vehicle fortifying after trunk closer switch is pressed and the following conditions are met:

- IGN OFF;
- Four doors and engine hood are closed;
- Back door is locked within 10 s.

2. When vehicle is in fortifying deactivation mode

a. Luggage compartment is open/closed

- IGN OFF/ACC position.
- BCM receives remote control trunk command for more than 1.5 s with turn signal light flashing twice at a frequency of 200 ms on - 200 ms Off.

b. During back door opening/closing, short press remote controller to stop back door at current position.

c. After back door is closed, the vehicle returns to fortifying state.

Door, Hood and Luggage Compartment Door Status

1. BCM sends CAN signal to open/close front left door.
2. BCM sends CAN signal to open/close front right door.
3. BCM sends CAN signal to open/close rear left door.
4. BCM sends CAN signal to open/close rear right door.
5. BCM sends CAN signal to open/close engine compartment cover
6. BCM sends CAN signal to open/close trunk.

Central Control Lock

1. Central control lock activation conditions

- Close all four doors;
- Vehicle is not in anti-theft state;
- Central control lock locked switch is activated.

2. Central control unlock activation conditions

- Central control lock unlocked switch is activated;
- Vehicle is not in anti-theft state.

3. Mechanical lock locked/unlocked activation conditions

- Central control lock or mechanical lock locked switch is activated;
- Vehicle is not in anti-theft state.

4. Auto unlock (if equipped) activation conditions

- Vehicle speed is 0 km/h;
- Door lock is locked;
- Key is switched to OFF from other positions.

Hint:
The bench testing needs to ensure that there is no speed signal after IGN is turned off.

5. Collision unlock

- After BCM receives CAN signal when IGN ON: BCM performs central control unlocking twice and the interval time is 1 s (regardless of the door state); locking is prohibited; key is switched to OFF, prohibit locking is canceled.

⚠ Caution

- BCM receives unlocking or locking command twice in 1 S and the second time will be ignored.
- BCM is powered on again after powered off, BCM has no lock or unlock action.
- For remote control lock and unlock function, please refer to lock and unlock contents in anti-theft management.

Front Wiper Control

1. Low speed wiper mode (Note: Wiper switch)
   a. Activation conditions: IGN ON; low speed range switch of the wiper is activated.
   b. When low speed wiper is operating: When wiper switch is switched to other operation mode, the wiper will work in other modes immediately.
   c. When wiper switch is switched to OFF from low speed range, the wiper will operate at low speed automatically until it returns to wiper stop position (whether it is IGN ON or not).
2. High speed wiper mode
   a. Activation conditions: IGN ON; high speed range switch of the wiper is activated.
   b. When high speed wiper is operating: When wiper switch is switched to other operation mode, the wiper will work in other modes immediately.
   c. When wiper switch is switched to OFF from high speed range, the wiper will operate at low speed automatically until it returns to wiper stop position (whether it is IGN ON or not).
3. Intermittent wiper mode (without rain sensor)
   a. Activation conditions: IGN ON; wiper intermittent/automatic switch is activated.
   b. There are 4 gear positions on wiper sensitivity switch: 13 s, 8 s, 4 s, 2 s.
   c. When the intermittent wiper activation status switches intermittent time to other gear positions, the operation status of wiper is as below:

- When new time interval is shorter than the original one: If wiper is in pause status, wiper will operate at new interval at once; If wiper is in moving status, wiper will operate at new interval since it is paused.
- When new time interval is longer than the original one: If wiper is in pause status, wiper will operate in new intermittent since it is paused at the next time after completing the current cycle; If wiper is in moving status, wiper will operate at new interval since it is paused.

4. Auto wiper (with rain sensor)
   a. With switch in Auto, BCM receives LIN signal sent from rain sensor, and drives wiper to operate.
   b. Once LIN signal S_AUTO_H is received, high speed wiper operates.
   c. Once LIN signal S_AUTO_L is received, low speed wiper operates.
   d. When LIN signal is interrupted or ignition key is out of ON position, if wiper is not in Park position, it will continue to operate until reaching Park position.
   e. Operation stops during ignition and restores when ignition is finished.

Front Washer Control

1. Front washer operation condition: IGN ON
2. Front washer operation will keep on outputting when front washer is activated
3. Washing starts operating after IGN-CRANK stops operating and resumes operating after starting
4. When front washer operation is over

- When wiper switch is in OFF position, wiper will operate for 3 cycles at low speed, and it operates for 1 cycle again after 6 ± 0.2 seconds; If BCM receives new front washer operation requirements during 3 cycles and 6 seconds of this wiper, wiper will perform new operation.
- When wiper is in intermittent mode, wiper will operate for 3 cycles at low speed, and then it keeps the intermittent mode.

Rear Wiper Control

1. Activation conditions: IGN ON; rear wiper is activated
2. During rear wiper is operating, if rear wiper switch is turned to OFF and rear wiper is not in Stop position, rear wiper will continue to operate until it stops at stopping position
3. During rear wiper is operating, if ignition key is turned to ON and rear wiper is not in Stop position, rear wiper will continue to operate until it stops at stopping position
4. During rear wiper operation, the rear wiper when engine starts, and resumes operating after engine has started.
5. When BCM judges front wiper is opened and reverse gear is input, rear wiper operates automatically with interval of 4 s. When either front wiper or reverse gear is closed, rear wiper stops.

Rear Washer Control

1. Rear washer operation condition: IGN ON
2. Rear washer operation will keep on outputting when front washer is activated
3. Rear washing starts operating after IGN-CRANK stops operating and resumes operating after starting
4. When rear washer operation is finished

- When wiper switch is in OFF position, wiper will operate for 3 cycles at low speed; If BCM receives new rear reset operation requirements during 3 cycles, wiper will perform new operation.
- When wiper is in sweeping mode, wiper will sweep in original condition and continue to keep original condition after washer switch is released.

Back-up Light Control

1. Back-up light operating conditions: IGN in ON
2. After receiving reverse switch signal or CAN signal sent from TCU, BCM turns on backup light.
3. If there is no switch signal and CAN signal, it will turn off back-up light.

Key Status Position Signal

1. BCM sends the corresponding KeySts according to the actual location of the key
2. The continuous activation time is up to 10 s when engine starts, and KeySts is sent after 10s. If ACC and ON positions change, BCM sends the corresponding key KeySts according to the actual position of key.

Sudden Braking Hazard Warning Light Alarm Function

1. If the following conditions are met, hazard warning light is activated (CAN signals of left/right turn signal light, indicator light and turn signal light flash at frequency of 140 ms on/140 ms off)

- The key position is in ON position.
- CAN signal sent from ESP is received.

2. If any of following conditions is met, stop the hazard warning light (left/right turn signal light, indicator light and turn signal light CAN signal) flashes

- CAN signal sent from ESP is received;
- Key position is in OFF position.

⚠ Caution

- When hazard warning light of this function is operating, operate hazard warning light switch, this function stops immediately.
- During this operation, BCM receives collision signal and function stops immediately.

Assist Steering Illumination

1. When following conditions are met, turn on the fog light auxiliary light function
- Key position is in ON position.
- The turn signal light turns on or steering column rotates by 45° or more.
- Low beam light turns on.
- Vehicle speed is less than 40km/h.
2. When any of following conditions is met, turn off the fog light auxiliary light function
- Key position is in ACC or OFF position.
- Turn signal light turns off and steering column is turned by less than 10°.
- Low beam light turns on.
- Vehicle speed is less than 40km/h.
3. When fog light auxiliary light is activated, meter indicator is not activated
4. This function can perform a on-line configuration.

Brake Light Control

1. When any of following conditions is met, turn on the brake light function.
- When brake switch is pressed, brake switch is a high level self-locking switch;
- CAN signal sent from EPB is received;
- CAN signal sent from ESP is received.
2. When brake light function is turned on, left and right brake lights and high mounted stop light turn on at the same time.
3. When all the above conditions are not met, left and right brake lights and high mounted stop light turn off simultaneously.

Rear View Mirror Folding

1. The switch is point contact type. Press the folding switch, the mirror is automatically folded, and press it again, the mirror is automatically unfolded
2. When it is powered on again after powered off, BCM stores the switch state before powered off
3. When the vehicle speed is greater than 10km/h, the folding function is shielded and the unfolding function works
4. When the vehicle is in Crank, the unfold/fold function is paused and the function is restored after crank is finished

DVD Settings

1. Daytime running light function
- DVD setting is ON to turn on the daytime running light function; DVD setting is OFF to turn off the daytime running light function.
2. Fortifying prompt
- DVD is set to Light, turn signal light flashes once and horn does not sound when it is fortified;
- DVD is set to Horn, horn sounds and turn signal light does not flash when it is fortified;
- DVD setting is light and Horn that turn signal light flashes and horn sounds when it is fortified.
3. Auto lock
- DVD is set to ON to turn on the auto lock function; DVD setting is OFF to turn off the auto lock function.
4. Headlight delay
- DVD is set to On to turn on the headlight delay function; DVD is set to off to turn off the headlight delay function.

5. Rear view mirror folding

- DVD is set to On to turn on the rear view mirror folding function; DVD is set to off to turn off the rear view mirror folding function.

Remote Control Function

1. Remote fortifying mode
   a. Trigger conditions:

- IGN is in OFF (it is not in IGN ON or ACC)
- Four doors & two covers are closed;
- BCM receives remote fortifying command.
  b. BCM feedback when fortifying mode is entered:
- Turn signal light flashes once (turn on for 500 ms) and sends the corresponding signal;
- Theft deterrent indicator is continuous flash at frequency of 100ms, 1900ms.
- Actuate the anti-theft horn 50 ms and high and low pitched horns 15 ms.

2. Remote fortifying deactivation mode
   a. Trigger conditions:

- IGN is in OFF (it is not in IGN ON or ACC)
- Four doors & two covers are closed;
- BCM receives remote fortifying command.
  b. BCM feedback when remote fortifying deactivation mode is entered:
- BCM performs fortifying deactivation, four doors and luggage compartment unlocks and left/right turn signal lights flash twice (500 ms on and 500 ms off, continuous for two times)

3. Remote open luggage compartment mode
   a. Trigger conditions:

- Key position is in OFF;
- BCM receives remote open luggage compartment command.
  b. BCM feedback when luggage compartment opening mode is triggered:
- Turn signal light illuminates for 1 s and sends the corresponding signals.
- Trunk is open to start motor and no alarm is triggered.

4. Remote car location mode
   a. Trigger conditions:

- IGN-OFF/IGN-ACC;
- BCM receives car location function command.
  b. BCM feedback when remote start mode is entered
- High and low pitched horns sound 3 s, left and right turn signal lights flash 3 s and low beam light turns on 15 s.

5. Remote start mode
   a. Trigger conditions: BCM receives PEPS signal
   b. BCM feedback when remote start mode is entered

- Anti-theft alarm function caused by ON gear position is shielded, but caused by four doors, engine hood and back door is not shielded.
- After BCM shields the alarm, it sends signals (CAN1) to PEPS and (CAN2) to CLM (when PEPS receives the signals, it will control the vehicle to start).
- After BCM receives engine state signal, it will turn on position light and send signals.
  c. Exit remote start mode: Turn the key to OFF position

d. BCM feedback when remote start mode is exited:

- BCM will not shield the anti-theft alarm caused by ON gear position.
- BCM sends signals.

LIN Ambient Light

1. Initial status
   - When vehicle rolls from the line and powered on for the first time or vehicle battery is powered on again after disconnection, ambient light function default is on, and it turns on/off according to DVD setting.
2. Ambient light turns on/off
   a. When all the following conditions are met, BCM sends LIN signals (ambient light ON)
   - The position light output is in activated condition.
   - DVD setting is ON.

   b. Position light output is deactivated or DVD setting is OFF, ambient light turns off.
3. Door control logic related to ambient light
   a. When all the following conditions are met, BCM sends LIN signals (ambient light ON)
   - Position light output is not activated.
   - Vehicle is in fortifying deactivation mode.
   - Any door is opened.
   - DVD setting is ON.

   b. Ambient light turns on for 3 minutes
   c. Close all doors within 3 minutes after ambient light comes on, and the light turns off after 8 seconds delay
   d. Open any other door within 3 minutes after ambient light is turned on, then count again for 3 minutes after the last door is opened
   e. When the position light output is not activated, if any condition is met, BCM will immediately send LIN signal (ambient light turns off)
      - The vehicle is fortified successfully.
      - DVD settings are turned off.
4. Ambient light color
   a. After the vehicle is powered on first time after leaving production line or powered on after battery is disconnected and reconnected from vehicle, the related driving mode is OFF by default. Then turn on/off according to DVD settings.
   b. When the related driving mode is OFF: Ambient light colour is blue by default, then choose different colour according to DVD settings.
   c. When related driving mode is turned on
      - In ECO mode, ambient light illuminates in green.
      - In SPORT mode, ambient light illuminates in red.
      - In NORMAL mode, ambient light illuminates in blue.
5. Ambient light brightness (musical rhythm)
   a. Initial status
      - When vehicle rolls from the line and powered on for the first time or vehicle battery is powered on again after disconnection, musical rhythm mode default is off.

   b. When musical rhythm mode is off: Ambient light brightness is Level 3, and different levels can be selected according to DVD setting.
   c. When musical rhythm mode is on: According to different brightness level signals sent from IHU, it changes levels from zero with the musical rhythm

Matching Learning

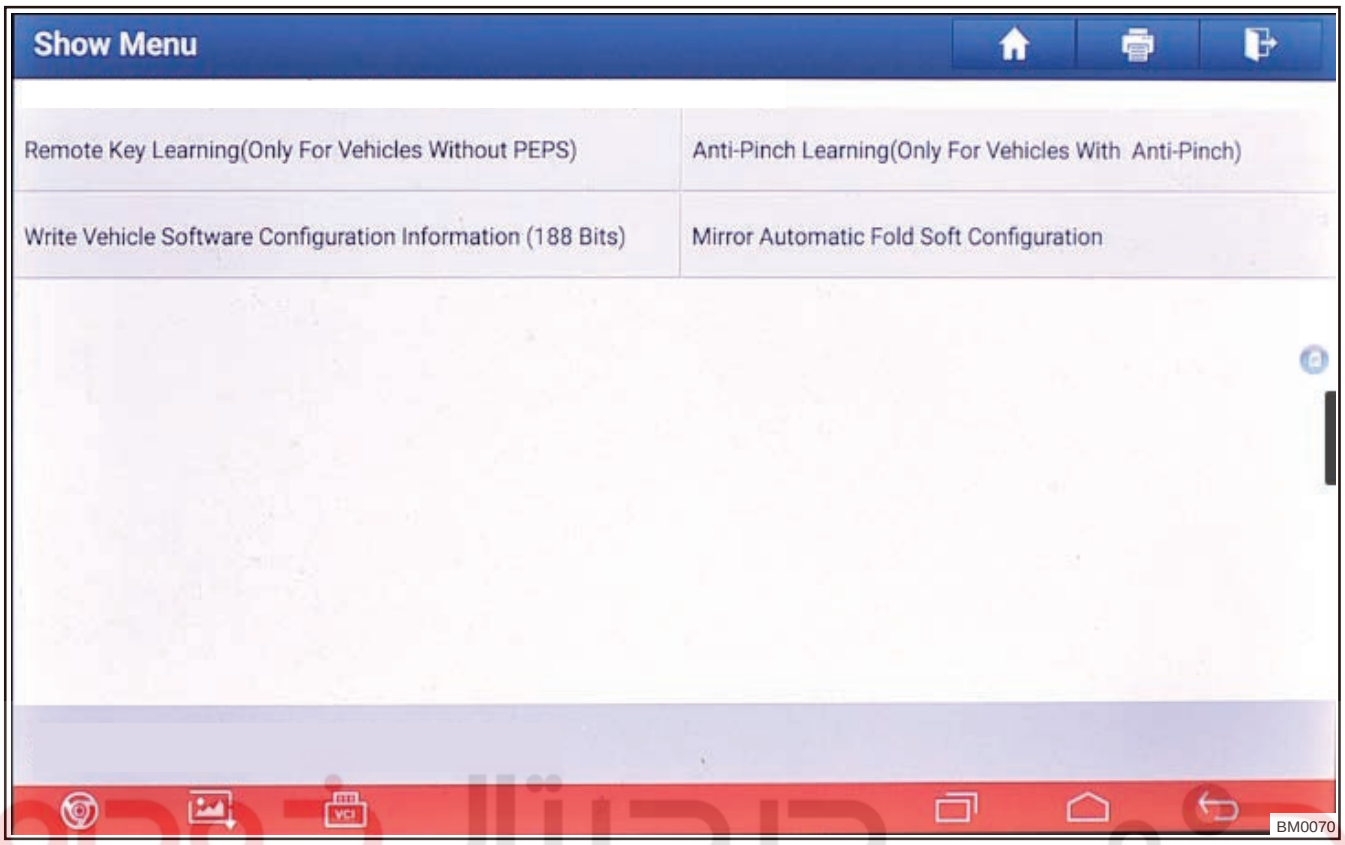
Software Configuration Information Writing

⚠ Caution

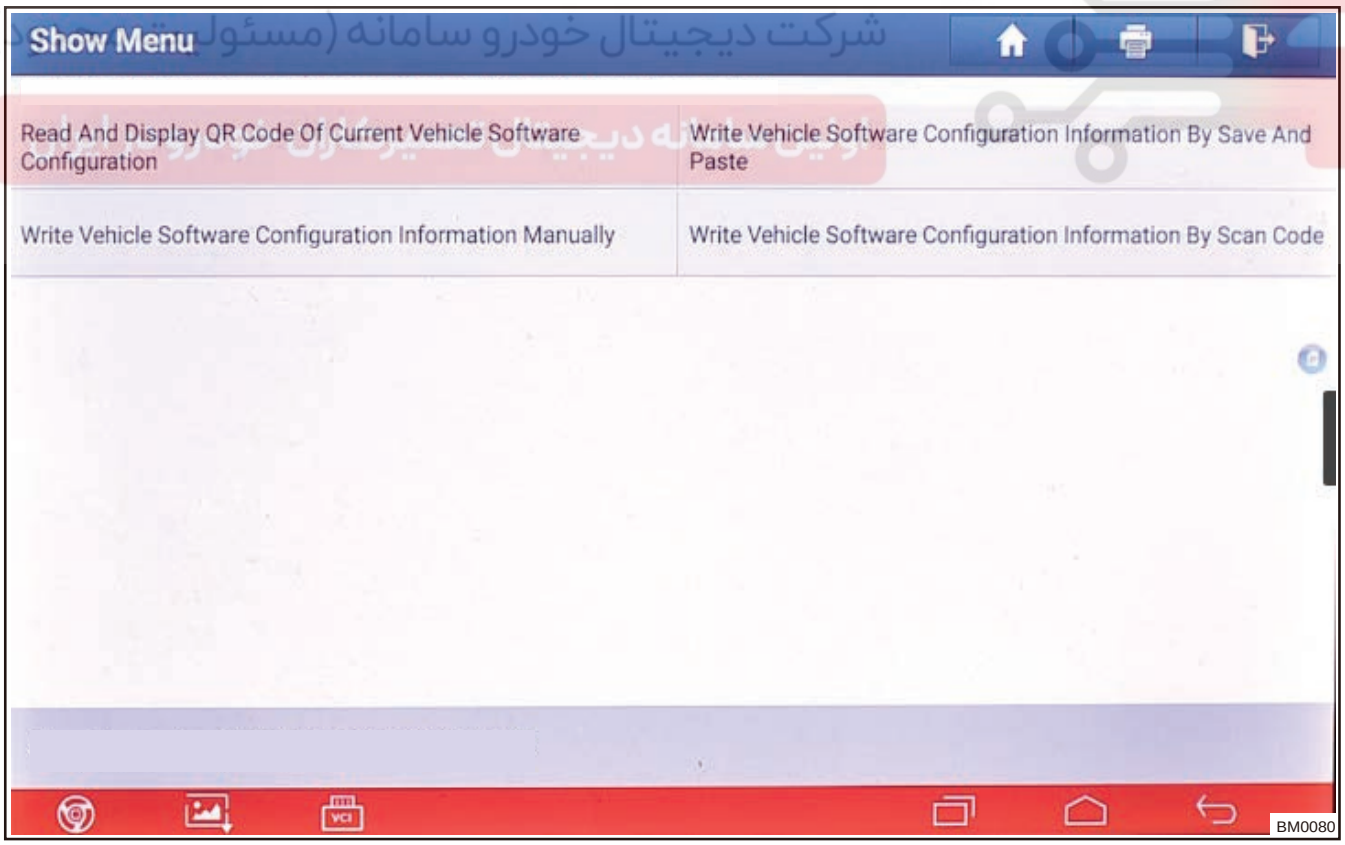
- Write the configuration code after replacing BCM with a new one.
- If it is a non-PEPS model and has engine immobilizer configuration, it needs to be configured for anti-theft matching and then for remote control matching, if it is a PEPS model, there is no need to do the operation in this step.
- Perform tire pressure sensor learning if the vehicle has a tire pressure configuration.
- Perform jam protection learning if the vehicle has a window jam protection configuration.

1. Use the diagnostic tester to connect the vehicle to enter the system. Click Body Control Module (BCM).
2. Click Special Function.

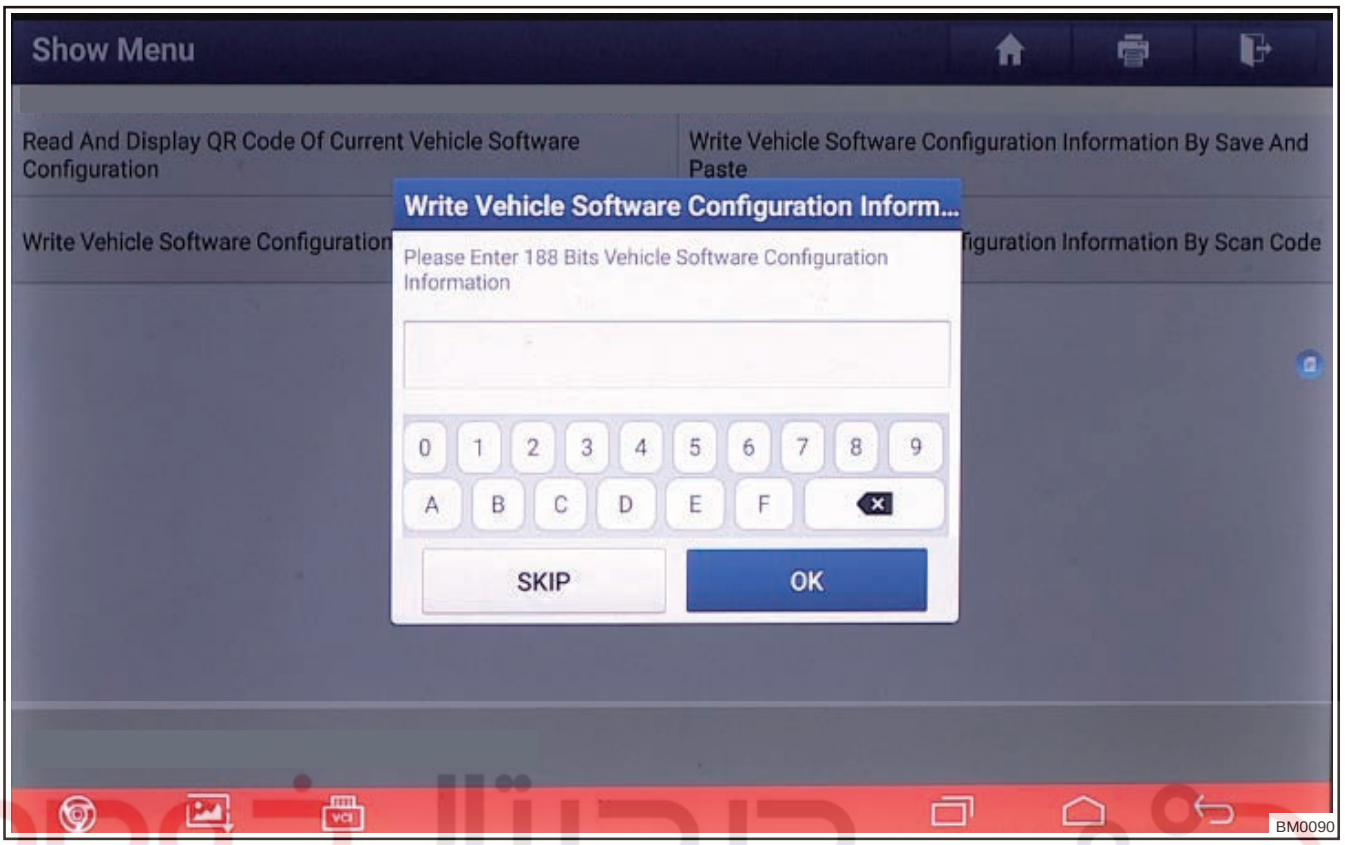
3. Click “Write Vehicle Software Configuration Information”.



4. Click “Write Vehicle Software Configuration Information Manually”.



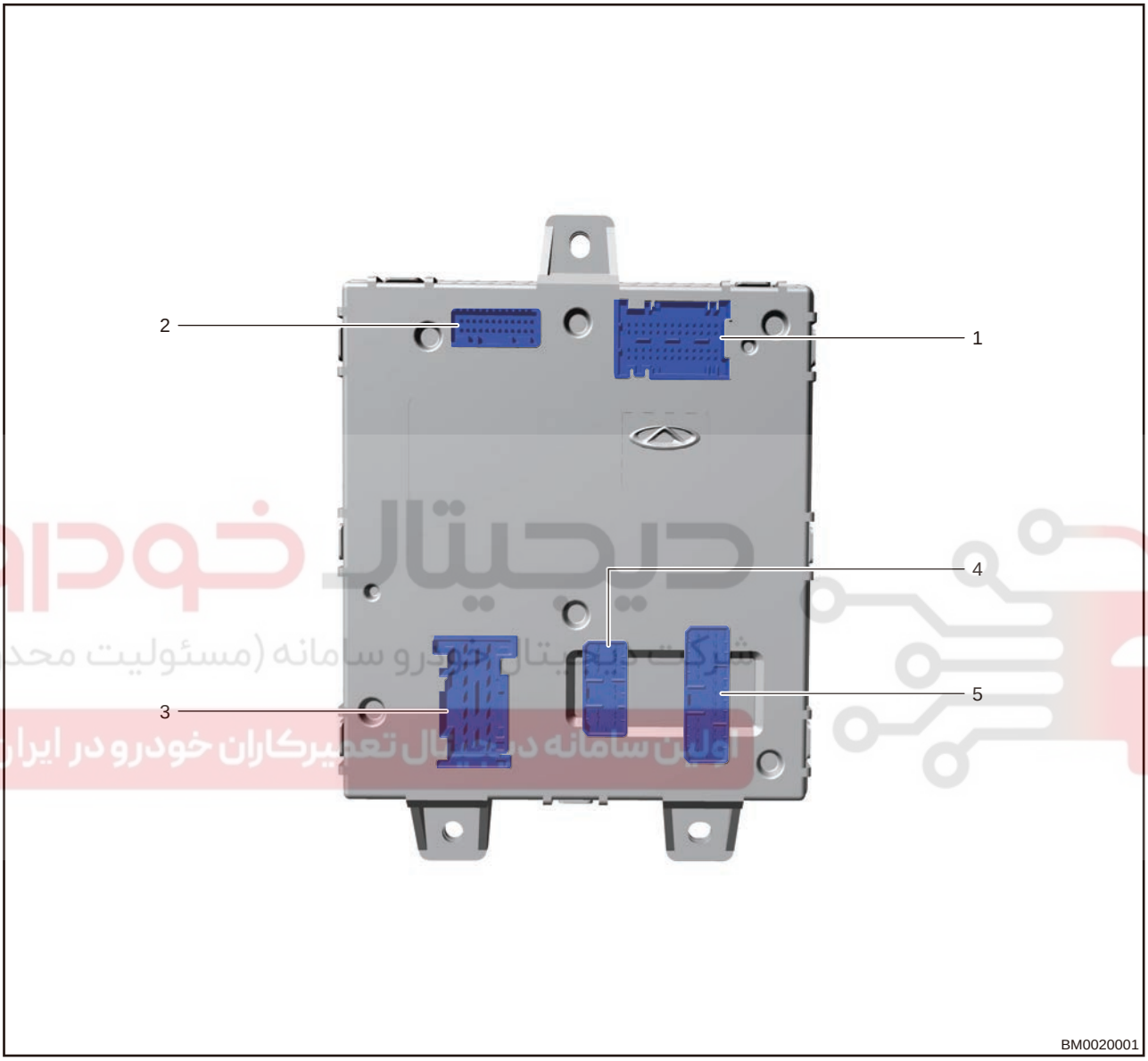
5. Enter software configuration information according to prompt, and click “OK”.



Diagnosis & Testing

Body Control Module Terminal Definition

Terminal Definition



1-52	Pin Connector	2-24	Pin Connector
3-14	Pin Connector	4-12	Pin Connector
5-20	Pin Connector		

52-Pin connector terminal definition

PIN	Description	PIN	Description
1-01	-	1-27	Dome Light Output
1-02	-	1-28	Luggage Compartment Light Output

PIN	Description	PIN	Description
1-03	LIN	1-29	Rear Defroster Output
1-04	Central Lock Switch Lock Indicator	1-30	High Speed Wiper Output
1-05	Front Windshield Heating 1	1-31	Steering Wheel Heating Relay
1-06	Front Windshield Heating 2	1-32	-
1-07	Hard Wire Crash	1-33	Front Window Regulator SW RH
1-08	Movable Side Rear Turn Light Diagnosis	1-34	Front Left Window Regulator Switch
1-09	Front Turn Light Diagnosis	1-35	-
1-10	Rear Left Door Open Signal	1-36	Passenger Side Window Regulator Disabled SW
1-11	Headlight Leveling	1-37	Front Right Door Open Signal
1-12	Rear Right Door Open Signal	1-38	-
1-13	Left Front Door Lock Status Signal	1-39	Brake SW Input
1-14	Rear View Mirror Ground Light Output	1-40	Passenger Side Window Regulator Disabled Switch Operation Indicator
1-15	-	1-41	NTC+
1-16	LIN Signal (Shifting Module)	1-42	Low Speed Wiper Output
1-17	-	1-43	Low Beam Light Output
1-18	High Beam Light Output	1-44	Horn Output
1-19	Rear Window Regulator SW RH	1-45	Analog Ground
1-20	Passenger Side Front Right Window Regulator Switch	1 - 46	Turn Light SW
1-21	Passenger Side Rear Left Window Regulator Switch	1 - 47	Rear Window Regulator SW LH
1-22	Passenger Side Rear Right Window Regulator Switch	1-48	-

PIN	Description	PIN	Description
1-23	Front Left Door Open Signal	1-49	Central Control Lock SW Input
1-24	Front Wiper Stop Position Signal	1 - 50	Central Control Unlock SW Input
1-25	Steering Wheel Heating Input	1-51	Fixing Side Rear Turn Light Diagnosis
1-26	Rear Wiper Stop Position Signal	1-52	Engine Hood Contact Switch

24-Pin connector terminal definition

PIN	Description	PIN	Description
2-01	Steering Wheel Heating Signal	2-13	Turn Light Enable
2-02	B-CAN L	2-14	Hazard Light Operation Indicator Light
2-03	DA-CAN L	2-15	B-CAN H
2-04	-	2-16	DA-CAN H
2-05	ACC Signal Input	2-17	IGN Signal Input
2-06	Front Fog Light Input	2-18	-
2-07	Rear Fog Light Input	2-19	Rear Washer Input
2-08	Front Wiper Input	2-20	Front Washer Input
2-09	The driver opens the back door	2-21	Rear Wiper Input
2-10	Rear View Mirror Folding Input	2-22	Front Wiper Input
2-11	Hazard Warning Light Input	2-23	Lighting Input
2-12	High Beam - Flash Input	2-24	Wiper Sensitivity Switch

14-Pin connector terminal definition

PIN	Description	PIN	Description
3-01	Power Source 3	3-08	Rear Left Window Up Output
3-02	Power Source 6	3-09	Rear Left Window Down Output
3-03	Ground 1	3-10	Power Source 1
3-04	Ground 2	3-11	Front Right Window Up Output

PIN	Description	PIN	Description
3-05	Rear Right Window Down Output	3-12	Front Right Window Down Output
3-06	Rear Right Window Up Output	3-13	Front Left Window Up Output
3-07	Power Source 2	3-14	Front Left Window Down Output

12-Pin connector terminal definition

PIN	Description	PIN	Description
4-01	Fog Light FR	4-07	Welcome Light Enable
4-02	Central Control Unlock Output	4-08	-
4-03	Central Control Lock Output	4-9	Power Source 5
4-04	-	4-10	Rear Wiper Output
4-05	Front Washer Output	4-11	-
4-06	Fog Light FL	4-12	Rear Washer Output

20-Pin connector terminal definition

PIN	Description	PIN	Description
5-01	-	5-11	High Mounted Stop Light Output
5-02	Outer Rear View Mirror Unfolding Output	5-12	-
5-03	Outer Rear View Mirror Folding Output	5-13	Nozzle Heater
5-04	Left Turn Light Output	5-14	Left Daytime Running Light Output
5-05	Right Turn Light Output	5-15	Right Daytime Running Light Output
5-06	Horn Output	5-16	Battery Save Output
5-07	Back-up Light Output	5-17	Rear Fog Light Output
5-08	Left and Right Brake Light Output	5-18	-
5-09	Front Position Light + Backlight	5-19	-
5-10	Rear Position Light Output	5-20	Power Source 4

Problem Symptoms Table

Symptom	Probable Cause and Recommended Countermeasures
Remote controller failure or distance of remote control is close	(For PEPS model, remote controller failure has nothing to do with BCM. BCM cannot be replaced) • Battery voltage of remote controller is low - Replace the battery. (Voltage of new replaced battery should be more than 2.9 V), it needs to rematch • Metallic films are attached to windows, which causes signal to be shielded and vehicle is malfunctioning without any reason. Peel off the metallic films to solve the problem. • There is electromagnetic interference. Perform the test at another place. • If remote controller is damaged, replace and rematch it.
Rear defroster does not operate	Refer to operation principle (control logic). Check the input and output signal. For diagnosis, please refer to "Perform Diagnosis According to Symptoms"
Turn signal light does not come on	
Small light does not come on	
High beam light does not come on	
Fog light does not come on	
Daytime running light does not come on	
Glass cannot raise up and down	
Door lock cannot lock/unlock/luggage compartment cannot open	
Wiper washer dose not operate or operate abnormally	
Only horn alarms or only turn signal light flashes when it fortifies	It can be set on DVD/navigation interface, refer to On-vehicle Service section

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.

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.

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.

Malfunction Diagnosis Repair Flow

⚠ Caution
When reading DTCs, some DTCs are not related to trouble symptom. And these functions are normal and not affect vehicle use, clear them.

1. Check if DTC occurs again

- If malfunction does not occur, check and repair the suspected wire harness and electrical connector. Proceed to the next step if malfunction occurs again.

2. Check for DTCs

- Perform reading to check whether there is any DTC. Proceed to the diagnostic procedures based on malfunction symptoms when there is no DTC. Proceed to the next step when DTC is found:

3. Clear and read DTCs again

- Record DTCs and clear them. Perform test and read DTC again to check whether there is any DTC. Proceed to the diagnostic procedures based on malfunction symptoms when there is no DTC. Proceed to the next step when DTC related to malfunction symptom is found.

4. Deal with the malfunction symptom according to DTC
5. After inspection and repair, perform test again according to DTC strategy

- Check and repair it again if malfunction has not been solved.

6. After malfunction has been solved, prevent the malfunction from reoccurring according to malfunction causes.
7. Malfunction diagnosis ends.

Trouble Symptom Diagnosis

⚠ Caution

- If a function of BCM is failed, but there is no DTC, perform diagnosis according to trouble symptom.
- This diagnosis needs to combine with control logic (see Operation section). Check input/output signal of BCM for normal operation. If input/output is normal, there is a malfunction in BCM. Otherwise, check the input or output part.

1. Check if DTC occurs again

- If malfunction does not occur, check and repair the suspected wire harness and electrical connector. Proceed to the next step if malfunction occurs again.

2. Check if power supply and ground of controller are normal

- If it is abnormal, repair the power supply and ground based on the electronic diagram. Proceed to the next step if it is normal.

3. According to the control logic, read related data stream with diagnostic tester and check if it is normal

- If it is abnormal, repair the related input signals based on the circuit diagram. Proceed to the next step if it is normal.

4. Perform operation test using diagnostic tester to see if there is any related operations performed by diagnostic tester.

- If it is normal, input part has no malfunction. Otherwise, proceed to the next step.

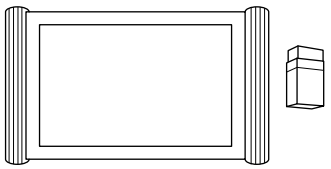
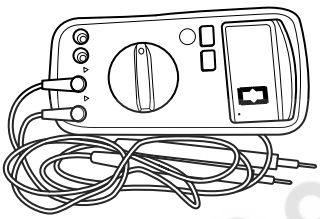
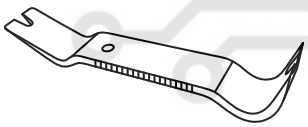
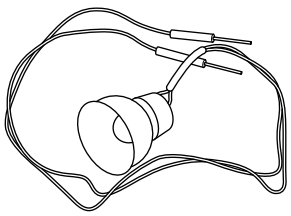
5. Check if actuator is normal.

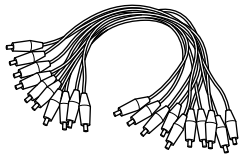
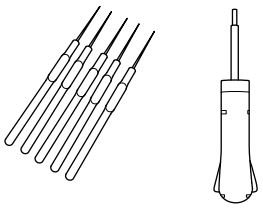
- If result is abnormal, check and repair actuator.

6. If above diagnostic results are normal, replace BCM.

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206
Interior Crow Plate	 RCH002506
Bulb Test Light (21 W)	 RCH008706

Tool Name	Tool Drawing
Jumper Wire	 RCH008806
Wire Harness Terminal Tools	 RCH008906

Torque Specifications

Description	Torque (N · m)
Body Control Module Bracket Fixing Nut	7 ± 1
Instrument Panel Lower Left Protector Assembly	1.5 ± 0.5
Instrument Panel Fuse and Relay Box Fixing Nut	7 ± 1

Body Control Module

Removal

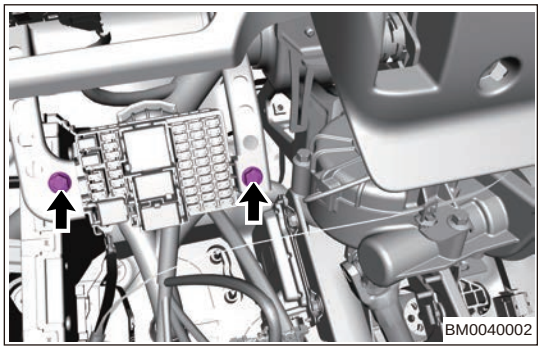
Hint:

- Before replacing BCM, 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 control module.
   a. Remove the instrument panel left end panel assembly.
   b. Remove the instrument panel left lower protector assembly.
   c. Remove the instrument panel left lower protector assembly.

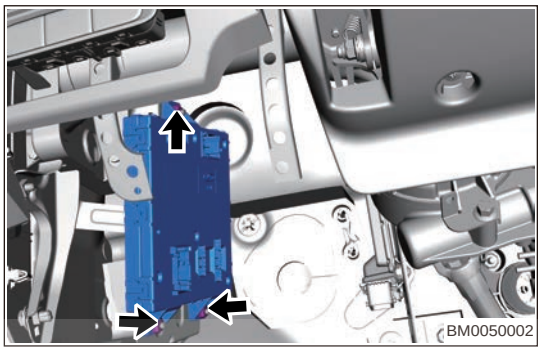
d. Remove 2 bolts from instrument panel fuse and relay box, and move away instrument panel fuse and relay box.

Tightening Torque
7 ± 1 N • m



e. Detach the BCM wire harness connector, remove bolts from BCM and then remove BCM.

Tightening Torque
5 ± 1 N • m



Installation

1. Installation is in the reverse order of removal.

DRIVING ASSIST SYSTEM

Warnings and Precautions

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.

System Overview

System Components Diagram

1	Microwave Radar Module	2	Multi-function Front Camera
3	Multi-function Steering Wheel Button	4	Hyperscreen

System Function Description

Constant Speed Cruise/Active Speed Limit

Turn on the constant speed cruise control switch after vehicle reaches a certain speed, and the set vehicle speed can be maintained by constant speed cruise control, without accelerator depressed. When active speed limit function is turned on, vehicle speed does not exceed the speed limit set. Cruise control system consists of the following components:

- Constant speed cruise control switch (multi-function switch).
- Instrument Cluster Meter (ICM).
- Engine Control Module (ECM).
- Transmission Control Unit (TCU).
- ABS/ESP control module.
- Accelerator pedal.
- Brake switch.
- Clutch switch.

⚠ Caution

Do not use cruise control in the following situations. Otherwise, it may result in a loss of vehicle control and cause an accident, resulting in serious injury or even death.

- In traffic congestion areas.
- On roads with sharp bends.
- On winding roads.
- On wet and slippery roads, such as those covered with rain, ice or snow.
- On steep hills. Vehicle speed may be higher (or lower) than the set speed. It will cause that engine speed rises sharply and briefly to increase the vehicle speed to the set speed range.

Operation

Engine Control Module (ECM) receives button signal from constant speed cruise control switch (multi-function switch), and then Engine Control Module (ECM) turns on the indicator on the meter via CAN net. According to speed signal, brake signal, acceleration and deceleration signal and current working conditions, ECM determines whether to enter or cancel cruise state. After entering state, ECM controls throttle opening angle to stabilize the vehicle within the set vehicle speed range.

Function Description

1. Cruise control mode inspection
   - With ENGINE START STOP switch ON, when the cruise main switch is pressed, cruise indicator on instrument cluster illuminates and blinks (pre-cruise state, normal condition).
   - When vehicle is driving at speed range of 40 km/h - 150 km/h, for example, press SET/- button of cruise when vehicle speed is 45 km/h, vehicle will drive at constant cruise speed of 45 km/h (the speed when SET/- button is pressed). Meanwhile, cruise indicator on the meter is always on without blinking. If the meter is color screen, it will be displayed on upper left corner of the screen.
2. Cruise setting
   - Under the cruise state, depress the accelerator pedal or brake pedal to increase or decrease vehicle speed. Press SET/- button of cruise system while release the accelerator pedal or brake pedal, vehicle is cruising at new vehicle speed, and indicator on the meter remains on. If the meter is color screen, the new set speed will be displayed on the screen.
3. Cruise short/long press to acceleration
   - In the cruise state, short press RES/+ button once (over 0.02 seconds) to increase vehicle speed by 2 km/h. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom will increases by 1km/h.

- Under the cruise state, long press the RES/+ button (over 0.4 seconds) to accelerates vehicle continuously. Release the RES/+ button to stop acceleration, and vehicle is cruising under the speed while the RES/+ button is released. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom changes simultaneously with actual speed.

4. Cruise short/long press to declaration
   - In the cruise state, short press SET/- button once (over 0.02 seconds) to decrease vehicle speed by 2km/h. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom will decrease by 1km/h.
   - Under the cruise state, long press the SET/- button (over 0.4 seconds) to decelerate vehicle continuously. Release the SET/- button to stop acceleration, and vehicle is cruising at speed when the SET/- button is released. Cruise indicator on the meter remains on. If the meter is color screen, the target cruise speed displayed on left bottom changes simultaneously with actual speed.
5. Cruise resume
   - In the cruise state, depress the brake pedal to flash the cruise indicator on the meter (pre-cruise state, normal condition), and the vehicle speed decreases.
   - When vehicle speed is over 40 km/h, release the brake pedal and press RES/+ button, then the vehicle accelerates until the cruise state before depressing the brake pedal is returned. Cruise indicator on the meter remains on.
   - When vehicle speed is below 40 km/h, release the brake pedal and press RES+ button, the vehicle can not return to the cruise state before depressing the brake pedal. However, further depress the accelerator until vehicle speed is over 40 km/h, release the brake pedal and press RES+ button, the vehicle accelerates until the cruise state before depressing the brake pedal is returned. Cruise indicator on the meter remains on.
6. Cruise cancellation
   - Press the cruise main switch under the cruise state to cancel the cruise state and indicator on the meter turns off.
   - Press the CANCEL button to cancel the cruise state and cruise indicator on the meter blinks (- enters the pre-cruise state). If the meter is color screen, it will be displayed on upper left corner of the screen;
   - Pull up the EPB button, depress brake pedal, engine speed exceeds set range (600 - 6240), gear shift exceeds set range (1 - -6), and vehicle speed exceeds set range (35 - 155), the cruise state is canceled, and indicator on the cruise indicator blinks. If the meter is color screen, it will be displayed on upper left corner of the screen.

Function Description of Active Speed Limit

1. Active speed limit entering
   - With ENGINE START STOP switch ON, when active speed limit LIM button is pressed, active speed limit indicator on the meter (left bottom of middle color screen) illuminates and sends default target limit vehicle speed “30 km/h” and blinks indicating pre-limit state is entered.
   - Vehicle does not start or vehicle speed is below 30 km/h while driving, press SET- button of the active speed limit function to set the target limit vehicle speed to 30 km/h. Meanwhile, active speed limit on the meter displays ON.
   - When vehicle is driving at speed range of 30 - 200 km/h, for example, press SET/- button of active speed limit function when vehicle speed is 110 km/h, vehicle perform speed limit function at the target speed when SET/- button is pressed. Meanwhile, active speed limit on the meter displays ON.
2. Active speed limit cancellation
   - Press active speed limit LIM button.
   - Press the CANCEL button to cancel the speed limit state and active speed limit indicator on the meter displays.

- When KD is canceled, low voltage is too low (ub < 7 V), engine speed exceeds specified range (600 - 6240), active speed limit is canceled, active speed limit indicator on the meter blinks.

3. Active speed limit KD cancellation
   - In the active speed limit state, when driver fully depresses the accelerator pedal for overtaking or others, speed limit state is canceled temporarily. Active speed limit indicator on the meter blinks.
   - When actual vehicle speed is higher than the limited speed set previously after KD, speed limit state or overtaking state is not entered. Vehicle speed can be increased or decreased regardless of accelerator depressing level. Active speed limit indicator on the meter blinks. When actual speed is lower than the limited speed set previously, speed limit state is entered again and active speed limit on the meter displays ON.
4. Active speed limit overtaking state
   - During the active speed limit, if target limit speed is lower than actual vehicle speed through short press or long press, vehicle enters over speed state and active speed limit indicator on the meter blinks and buzzer sounds for 3 times until the actual speed is lower than new limit speed again. Vehicle enters speed limit state again and active speed limit on the meter displays ON.
5. Active speed limit short/long press to accelerate
   - In the active speed limit state, short press RES/+ button once (over 0.02 seconds) to increase target limit speed by 1 km/h. Active speed limit on the meter displays ON.
   - In active speed limit state, long press RES/+ button (over 0.4 seconds) to increase target limit speed from current speed to 5 times of current speed and then increases by unit of 5 km/h. Active speed limit on the meter displays ON.
6. Active speed limit short/long press to decelerate
   - In the active speed limit state, short press SET- button once (over 0.02 seconds) to decrease target limit speed by 1 km/h. Active speed limit on the meter displays ON.
   - In the active speed limit state, long press SET- button (over 0.4 seconds) to decrease target limit speed from current speed to 5 times of current speed and then decreases by unit of 5 km/h. Active speed limit on the meter displays ON.
7. Inspection with cruise exiting active speed limit function
   - In the active speed limit process, if cruise main switch is pressed, active speed limit is canceled, active speed limit indicator turns off, cruise indicator on the meter flashes, pre-cruise state is entered.

Adaptive Cruise

Adaptive Cruise Control System (ACC) can keep vehicle driving at the speed set by the driver. When it detects a preceding vehicle and its speed is lower than the speed set by own vehicle, the system will keep the vehicle to drive with the set safety distance to preceding vehicle. The stop-and-go adaptive cruise control system can also follow the preceding vehicle to decelerate until vehicle stops. It can also start vehicle and follow the preceding vehicle automatically, or start driving according to driver’ s command.

⚠ Caution

Do not use adaptive cruise control in the following situations. Otherwise, it may result in a loss of vehicle control and cause an accident, resulting in serious injury or even death.

- In traffic congestion areas.
- On roads with sharp bends.
- On winding roads.
- On wet and slippery roads, such as those covered with rain, ice or snow.
- On steep hills. Vehicle speed may be higher (or lower) than the set speed. It will cause that engine speed rises sharply and briefly to increase the vehicle speed to the set speed range.

Function Description

Adaptive Cruise System (ACC), Automatic Emergency Braking System (AEB) and Front Collision Warning System (FCW) share a radar and camera sensor.

⚠ Caution

- ACC system can not violate the laws full screwdriver with a flat physics and there are some limitations, driver must always control the vehicle and take full responsibility for the vehicle.
- ACC system can not respond to stationary objects and vehicles, crossing vehicles, oncoming vehicles, pedestrians, bicycles, and animals.
- ACC system can only realize limited braking, if the vehicle ahead applies emergency braking suddenly, another vehicle cuts in front of the vehicle quickly, ACC 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., ACC system may not be able to recognize vehicle ahead. In this case, ACC system should be turned off.
- ACC 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 ACC 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, ACC system will control the vehicle to accelerate to set speed.
- If the vehicle is too close to a vehicle in adjacent lane, ACC system may select the vehicle as a front tracking target to respond.
- When following the vehicle ahead to stop, ACC 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
- When ACC 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 the ACC system controls the vehicle, do not inadvertently step on accelerator pedal, otherwise, ACC system will not apply brake to vehicle, driver should be ready to brake actively at any time to ensure safety.
- 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 ACC 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, recalibrate the sensor.
- When ACC system function fails, yellow warning light on instrument cluster turns on, the ACC will not function at this time and need to be repaired.
- 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.

1. Turning on adaptive cruise
   - Start the engine and press ACC ON/OFF button on steering wheel, then ACC system is ON and enters stand-by status. Gray icon on instrument cluster turns on. If a preceding vehicle is identified, gray icon on instrument cluster displays and it will not display without target.
2. System activation
   - When activation condition is met after ACC system is ON, press SET- button while driving to enable ACC function; With vehicle stopped and brake pedal depressed by driver, press SET- button and

release brake pedal within 3 seconds (slightly depress acceleration pedal after 3 seconds) to enable ACC function. ACC icon turns to green after activation and default vehicle speed is 30 km/h.

- When parking brake is applied, that is electronic parking brake system (EPB) or automatic parking (AVH) is in activated state, after SET- button is pressed to enable ACC system, 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 the prompt.

3. Cruise speed setting

- Increase set speed: After ACC function is enabled, press RES+ button to increase set speed. Shortly press it once to increase speed by 1 km/h and long press it once to increase speed by 5 km/h. The speed can be increased to 150 km/h. When set speed is over 80 km/h, long press it once to increase speed by 10 km/h.
- Decrease set speed: After ACC function is enabled, for example, current set speed is more than 30 km/h, press SET- button to reduce set speed. Shortly press it once to decrease the speed by 1 km/h and long press it once to decrease the speed by 5 km/h. The speed can be decreased to 30 km/h. When set speed value is over 80 km/h, long press it once to reduce speed by 10 km/h.
- There are no vehicles ahead in the same lane of this vehicle, or there are vehicles ahead in the same lane and driving speed is higher than set speed, the vehicle will drive at set speed.
- There are vehicles ahead in the same lane and driving speed is not higher than set speed of the vehicle, ACC system will control the vehicle to follow the vehicles ahead.
- When driving uphill, speed will be slightly lower than set speed, and when driving downhill, speed will be slightly higher than set speed.

4. Following distance adjustment

- Press following distance adjustment button to adjust following distance, the distance is divided into three grades (“maximum distance”, “standard distance” and “minimum distance”). Grade is changed once when the button is pressed once. The instrument cluster synchronously shows the current grade. Following distance adjustment and memory function can be set on DVD head unit. Setting method is as follows: Enter “Vehicle Setting”→“Assist Driving Setting”, and set options of “Adaptive Cruise System”. When memory function is not set, system default following distance is“standard distance”.
- Though following distance is in the same grade, distance between own vehicle and preceding vehicle changes according to vehicle speed of own vehicle. The distance increases with increase of speed.
- If the following distance is “minimum distance”, 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.

5. Function exiting

During normal operation of ACC system, if one or more of the following situations occur, ACC system functions will exit, and ACC icon on instrument cluster will change from green to gray.

- Depress brake pedal;
- Pull up electronic parking button;
- Change shift lever to position other than forward position;
- Press the pause button;
- Turn off the electronic stability system;
- Electronic stability system is activated;
- Anti-lock brake system is activated;
- Hill descent system is on;
- Driver door is open;
- Driver seat belt is unfastened;
- Acceleration pedal is depressed for more 15 minutes by driver;

- Automatic emergency braking system is activated.

6. Function restore
   - After the above conditions that cause function to exit are restored, press RES+ button, ACC system function is activated again and restore the state before exiting.
7. Exceeding set speed
   - During normal operation of ACC system, driver can depress acceleration pedal to override ACC control. After acceleration pedal is released, ACC returns to previous control state. During exceeding set speed, if the distance from vehicle ahead is too small, the instrument cluster will pop up “Ask the driver to take over vehicle”, accompanied by rapid alarm sound to remind driver to take a avoidance measures.
8. Curve speed control
   - When the vehicle controlled by ACC system is driving into a curve , driving speed will be decreased appropriately to assist the driver to safely pass through the curve.
   - This function can assist driving only in certain level. Driver should operate vehicle at all time and decreases vehicle speed while vehicle is driving into a curve.
   - When driving into a curve, due to the limitation of radar sensor in detecting the target, the system 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.
9. Stop-and-go function

   During driving following the vehicle ahead with stop-and-go ACC system, if the vehicle ahead decreases speed to stop, the vehicle also decreases speed to stop, after stopping:
   - Vehicle ahead starts to drive away within 3 seconds and the vehicle starts automatically to follow vehicle ahead.
   - If the vehicle ahead stops for more than 3 seconds, and starts to drive away within 3 seconds to 10 minutes, driver needs to depress acceleration pedal lightly to activate ACC system.
   - During 10 minutes of parking, when driver unfastens seat belt or opens driver door, Electrical Parking Brake (EPB) system will activate automatically for parking.
   - If parking for more than 10 minutes, ACC system exits and Electrical Parking Brake (EPB) system will activate automatically for parking.
   - Electronic stability system continues to brake during decreasing speed following the vehicle ahead, motor rotation can generate operating sound, this is normal.
   - When driving following the vehicle ahead, always pay attention to whether ACC icon is in green filled state. If it is in non-filled state, it means that the target ahead of ACC system has been lost, and the vehicle will accelerate according to set speed.
10. Power adaption mode
    - Power system has ECO and SPORT modes. ACC system will match different control strategies according to the power mode selected by the driver. In the ECO mode, ACC system has a soft acceleration, and it has a fast acceleration in the SPORT mode.
11. Turning off adaptive cruise system
    - With ACC system ON, ACC system is turned off when pressing ACC ON/OFF button on steering wheel or active speed limit switch to turn on active speed limit function.

Front Collision Warning System

For Front Collision Warning System (FCW), when FCW system detects that there is a dangerous situation ahead, it will firstly trigger pre-alarm function. If driver does not brake or steer to avoid, the dangerous situation will continue to deteriorate, and FCW system will trigger emergency alarm function. In some sudden situations (such as fast cut in or strong braking of vehicle ahead), both alarms may be triggered at the same time.

⚠ Caution

- Pre-collision system will not sound an alarm when the vehicle speed is lower than 30 km/h. For static target ahead, the system will not sound an alarm when the vehicle speed is higher than 85 km/h.
- FCW and AEB share a same sensor, and detectable target is the same as AEB system. See the description of AEB system below for details.
- When FCW sounds an alarm continuously, if the driver actively depresses brake pedal, it should be depressed with a large force to trigger emergency brake assist function, achieving the best braking effect.
- System does not work if seat belt is not fastened and doors are not closed.
- System does not work if electronic stability system and FCW are not in ON.
- If yellow alarm symbol on instrument cluster comes on, please go to the Chery service station for inspection and repair.

Usage Description

1. Alarm type
   - FCW is ON by default when the vehicle is powered on, if user does not turn off this function and the speed is higher than 30 km/h, when system judges that there is potential collision risk, pre-alarm function will be triggered, an alarm symbol and warning text “Front Collision Warning System ON” pop up on instrument cluster accompanied by rapid alarm sound to remind driver to take avoidance measures.
   - If collision risk continues to deteriorate and upgrade, the emergency alarm function will be activated, and a alarm symbol and warning text “Front Collision Warning System ON” also pop up on instrument cluster. At the same time, the system will adopt short brake to remind driver to take avoidance measures.
   - When vehicle speed exceeds 65 km/h and is close to the vehicle ahead for a long time, a safety distance alarm message “Attention, vehicle/pedestrian approaches” pops up on instrument cluster to remind driver to adjust following distance properly.
2. System off
   - FCW system and safe distance alarm can be turned on or off through DVD head unit, After setting FCW system, it will still return to ON state at next ignition. After setting safe distance alarm, the previous setting options will be memorized.
3. Sensitivity setting
   - Alarm trigger time can be set on the DVD unit head. When the next ignition is performed after completing setting, system will memorize the last setting options and the setting options are divided into three distance levels: "Long", "Standard" and “Short". Distance level represents the different distance between the vehicle and the potential collision target when alarm function is triggered. If the setting is "Long", the alarm will be triggered earlier.

Automatic Emergency Braking System (AEB)

For Automatic Emergency Braking System (AEB), after FCW alarm function is activated (there is no FCW alarm when speed is lower than 30 km/h), if driver does not take measures, collision risk will continue to deteriorate, and system will start AEB automatically when the conditions are met, trying to avoid possible collision or reduce the speed during collision and reduce the loss caused by collision.

Usage Description

AEB is ON by default when the vehicle is powered on. It can be turned off on DVD head unit as necessary, but it will still be ON by default at the next ignition. Setting method are as follows: Enter "Vehicle Setting" → "Assist Driving Setting" to set options of "Automatic Emergency Braking System".

⚠ Caution

- System does not work if seat belt is not fastened and doors are not closed.
- System does not work if electronic stability system and AEB are not in ON.
- 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, if driver turns steering wheel quickly or depresses accelerator pedal firmly, AEB function will exit.
- AEB activation speed is higher than 4 km/h, the collision can not be avoided completely if the speed is higher than 40 km/h.
- For stationary vehicle, operating speed range of AEB is 4 km/h to 53 km/h. For pedestrians and cyclists, operating speed range of AEB is 4 km/h to 64 km/h.
- If yellow alarm symbol on instrument cluster turns on, system will not work, please go to the Chery service station for inspection and repair.

Detection Target

- Vehicle target: Targets can be detected by the 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.
- Bicycle target: Only when the system detects the contours information of body and bicycle, as well as movements of normal ride, it can play its best role. System does not regard an oncoming cyclist as a target.
- Pedestrian target: Only when the 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 system.

⚠ Caution

- 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.
- System does not respond to animals or crossing vehicles, as well as oncoming vehicles, bicycles or pedestrians.
- Under some special circumstances, the 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.
- 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 AEB system is triggered.
- 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 system performance degradation or no function. In this case, recalibrate the sensor.
- When system function fails, yellow warning light on instrument cluster turns on, the system will not function at this time and need to be repaired.
- When installing non-full size spare tire, it is recommended to turn off FCW and AEB systems and replace original full size tire in time.
- 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.

Lane Departure Warning System (LDW)

Lane Departure Warning System (LDW) can help drivers reduce traffic accidents caused by lane departure and improve driving safety by providing alarm. This model adopts independent LDW. The system consists of a multi-function front camera and hyperscreen. On the instrument cluster, it warns (-sound and image) for unconscious (turn signal light is not on) deviation from the lane. When lane departure warning system is ON, camera will detect lane marking all the time and obtain the position parameters of the vehicle in the current lane through image processing. When it detects vehicle deviates from the lane, sensor will collect data and operation condition of driver, and then controller sends alarm message to remind immediately. If driver turns on turn signal light (active lane departure) and drive the vehicle to another lane, lane departure system will not make any alarm.

- System allows instrument cluster to send alarm signal (acoustic, visual), including two alarm methods.
- Support white solid line, continuous long white line, yellow solid line and continuous long yellow line lane detection. When one side of the lane line is missing or undetectable, a substituted virtual line and warning line on the virtual line side will be marked automatically (default width between two lanes is 3.75 m).

Function ON

1. Lane departure warning system will be turned on when following conditions are met at the same time:
   - Camera initialization is completed.
   - Driver turns on LDW function by hard switch or software, or it was turned on in the previous ignition cycle.
   - LDW does not detect trouble code.

- LDW is turned on through vehicle configuration code.

⚠ Caution

- Drive the vehicle carefully, even though the vehicle is equipped with lane departure warning system.
- During the whole operation, you are responsible for controlling vehicle, monitoring management system, and intervening as necessary.
- If sensor is interfered, system will not function.
- Sensor may be misled by temporary construction markings line on the road, etc., resulting in false and incorrect alarms.
- In the cold or bad weather, system may not operate. Rain, snow, fog or intensive illumination can affect the sensor.
- If sensor can not trace road lines on the ground, system will not operate.
- The system may not operate in the road construction area.
- The system may not operate at sharp curve or narrow road.
- If suspension components of the vehicle are not approval by us, the system may not operate normally.
- Make sure the left and right cameras are free of foreign objects, such as bird dung, insect and ice etc.
- The system may not operate on the cement roads and other non-standard lanes.
- The system may not operate when there is only a single lane line or lane line is damaged.
- The system operates only when vehicle speed is more than 65 Km/h, and stops operating when vehicle speed decreases to 60 Km/m or less.

Function OFF

1. LDW will be deactivated if all of the following conditions are met.
   - Driver turns off LDW function by switch or soft switch, or function was turned off in the previous ignition cycle;
   - When LDW detects a permanent malfunction, driver needs to turn on the function again after malfunction is cleared.

   Hint:

   - Power voltage is more than 20.5 V.
   - Power voltage is lower than 4.5 V.
   - Camera permanent lighting failure (more than 45 minutes).
   - Temperature is high, outside sensor temperature is more than 100 ℃.

Threshold Speed and Switch

Threshold ON speed is 65 km/h, threshold OFF speed is 60 km/h.

1. Vehicle has physical switch configuration
   - LDW and LKA shares one hard switch which connects to instrument cluster and can be selected to operate detailed function; The signal is sent to central gateway through instrument cluster to indicate which function is selected by customer. System runs the previous option selected by customer in each ignition cycle. MPC2 memorizes customer option. IGN ON, after instrument cluster sends signal “LDWLKA_LaneAssitTypeReq=0X0”, and receives feedback signal “LDWLKA_LaneAssitTypefeedback” feedback value from MPC2, it synchronizes with MPC2.
2. Vehicle has no physical switch configuration
   - LDW switch is soft switch on audio unit. System runs the previous option selected by customer in each ignition cycle. MPC2 memorizes the option. IGN ON, after IHU sends signal “LDWonoffReq=0x2 default” and receives signal “LDWonoffsts” from MPC2, IHU synchronizes with MPC2. LDW function will be turned on by default next time.

Detection Requirement
Identification of Lane Line Types

No.	Road Type	Performance Requirements
1	Applicable road curvature radius	More than 250m (class II highway standard)
2	Effective lane width	(2.5 m, 5.2 m)
3	Effective lane marker line width	(8 cm, 60 cm)
4	Visible range of lane line	Influenced by environmental factors, the farthest visible range of lane line is 60-100 m
5	Lane line definition	Visible to the naked eye
6	Judging accuracy of distance between vehicle and lane line	The error is less than 4 cm
7	Lane line types	Double line, solid line, virtual solid line, dotted line
8	Lane line colors	White, yellow, orange, blue
9	Road geometry	Straight, curve
10	Road conditions	Asphalt, cement

Alarm Threshold

- Furtherest warning line position from vehicle lane: After departure, 0.3 m away from inner edge of lane.
- Unconditional warning ending position: After departure, 0.75 m from inner edge of lane.
- Lateral departure speed variable threshold is supported. Detailed logic is shown as follows:

Warning Line Position (m)	Low Sensitivity	High Sensitivity
/	Wheels are 0 m from inner edge of lane	Wheels are 0.1 m from inner edge of lane

Function Strategy

1. System performs self-inspection. MPC sends signal to instrument cluster. Instrument cluster turns LDW system icon to green. After 3 seconds, MPC sends LDW-LKA-status to meter according to speed value.
2. The sensitivity can be adjusted through audio head unit. High and low options are available, and default value is low.
3. When vehicle speed is more than 65 km/h, WLDW function operates. LDW starts to alarm if lane departure is detected and the turn signal switch on the appropriate side is not operated.
4. When vehicle speed is more than 65 m/h, LDW function operates. LDW will not alarm under following conditions if there is no other restraint conditions.
   - When vehicle passes curve and drives over the marking line at speed of more than 65 km/h, system will virtually move lane edge to inner side of lane by 10 cm as warning line, in order to avoid alarms that disturb the driver.
   - In the case of lane merging, the own lane narrows down gradually. If no departure occurs and vehicle drives over the marking line, LDW will not alarm.
   - If lane is too narrow (less than 2.5 m), system will virtually expand the left and right lane lines by 10cm as the warning lines to delay the alarm.

- If there is only one marking line on the road, LDW only alarms for the side where lane marking line exists.

Lane Keeping Assist System

Lane keeping assist system is a assist system which can be used to assist driver, however, it can not replace the driver in driving. When selecting the lane keeping assist system, the driver has to always concentrate all his attention and hold the steering wheel. Get ready to correct the steering wheel or take over the vehicle at any time, otherwise it may cause an accident and personal injury. The lane keeping assist system is not able to recognize the lane line all the time. Sometimes it may mistake poor quality road surfaces, certain road structures or objects for the lane line. In this situation, be sure to turn off the lane assist system immediately. 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 60 km/h and exits when the speed is lower than 55 km/h.

1. Though the lane keeping assist system is turned on, but the function will exit or cannot be activated under the following conditions:
   - 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;
   - When the lane line is too thin, broken, blurred;
   - When driving on a curve with a small turning radius;
   - Road is too narrow;
   - Driving on a road without lane marking line;
   - The vehicle has just entered the road with road lanes;
   - Vehicle is changing lanes;
   - The vehicle swings too fast in lateral direction;
   - Vehicle speed is lower than 55 km/h or higher than 180 km/h;
   - Driver turns on the turn signal light;
   - Driver turns on the hazard warning light;
   - Driver rapidly depresses accelerator pedal or deeply depresses brake pedal.
2. It is recommended to turn off the lane keeping assist system in the following situations:
   - Drive the car in sport mode;
   - Under bad whether, such as rain, snow, heavy fog;
   - At night or surrounding light is dark;
   - When driving on road with bad conditions;
   - When driving on paved road;
   - When driving on road with multiple curves.

⚠ 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.

Speed Limit Marking Recognition Function

Speed limit marking recognition function detects speed limit traffic mark on the road and displays the detected speed limit value on the instrument cluster. The displayed sign will disappear after driving for a certain distance or time. If a new sign is detected when it displays, the speed limit value displayed on the

instrument cluster will be updated. If current speed is more than displayed value, instrument cluster will zoom in the icon or make a sound alarm.

Function ON and OFF

TSR function can be turned on and off in the instrument setting menu. After function is turned on, user can select options between visual warning and visual warning + audio warning. Vehicle will record setting value in the previous ignition cycle.

System State Instrument Cluster Display

When the setting is image display only, if the speed limit sign is detected, the instrument cluster will display correspondingly. The displayed speed limit sign will disappear after driving for a period of time or distance. If there is a new speed limit sign, the display will be updated. When the vehicle speed is greater than the detected vehicle speed by 5 km/h, instrument cluster will zoom in the icon to alert the driver that vehicle is over speed. When the setting is imagine display + audio alert, if the speed limit sign is detected, the instrument cluster will display correspondingly. The displayed speed limit sign will disappear after driving for a period of time or distance. If there is a new speed limit sign, the display will be updated. When the vehicle speed is greater than the detected vehicle speed by 5 km/h, instrument cluster zoom in the icon to alert the driver that vehicle is over speed.

Traffic Jam Assist (TJA) and Integrated Cruise Assist (ICA)

1. System introduction

   - For traffic jam assist system and integrated cruise assist system (TJA and ICA), 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.
   - It is called TJA when speed range is below 60 km/h, 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.
   - It is called ICA when speed range is 60 km/h - 150 km/h, 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.

2. System activation

   Just like the method for activating ACC, when all ACC activation conditions are met, press "SET-" button to activate ACC function first. Meanwhile, camera determines if there is a lane line or a vehicle ahead as a target. When activation conditions are met, green operating indicator on instrument cluster turns on, and cruising speed and following distance will be adjusted as ACC system.

3. Function exiting

   During normal operation of TJA/ICA system, if one or more of the following situations occur, system functions will exit, and icon on instrument cluster will change from green to gray.

   - 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;
   - Turn on hazard warning light;
   - Vehicle speed is lower than 1 km/h.

⚠ Caution

Be sure to carefully read the following precautions when using TJA/ICA system:

- 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 (LKA). All precautions of ACC and LKA systems are also applicable to this system.
- This 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.
- 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 warning light on instrument cluster turns on, TJA/ICA will not function at this time and contact Chery 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.

Matching Learning

FCM and FRM Software Package Refresh

Description

This operation process can be used as a reference for manual matching of newly installed FCM and FRM modules and operation of replacement parts for after-sales service in Chery. After installing FCM and FRM modules with full state, the calibration program needs to be refreshed and can be used normally after ADAS station calibration or after-sales calibration.

⚠ Caution

FRM&FCM software can only be refreshed in ON position, and the refresh will report failure in start condition.

FCM and FRM After-sales Refresh Update and Model Corresponding Table

Part No.	Assembled Configuration Model	Refresh File (Drive)	Refresh File (-Calibration Parameters)
704000454AA (FCM) Main software: TBD	Exalted	S0000000059.CBF	TBD
704000453AA (FRM) Software: TBD	Luxury, exalted	/	TBD
			TBD

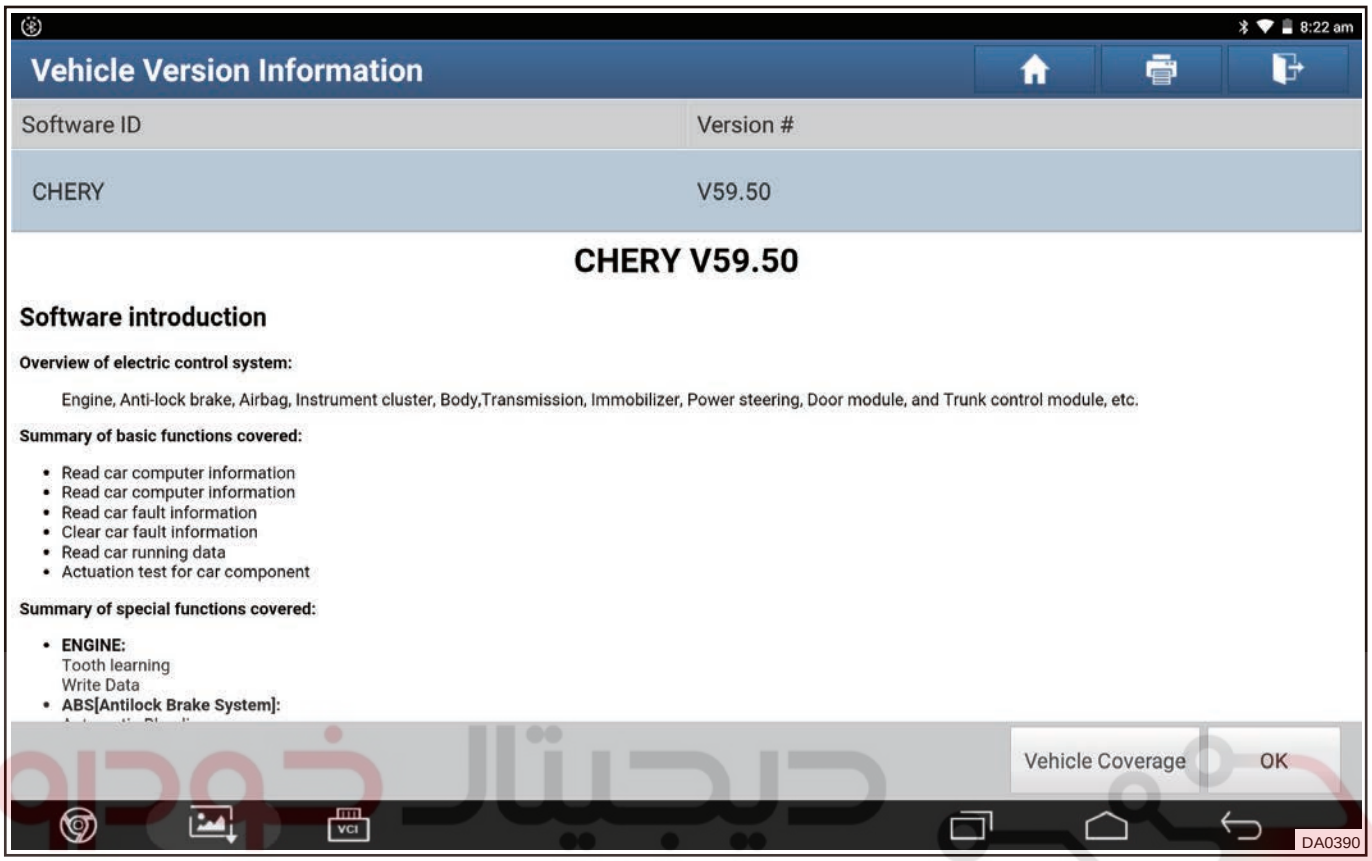
⚠ Caution

The version "VXX" of the refresh file is real-time, please refer to the refresh file provided after-sales.

FCM/FRM Calibration Program Refresh Operation Flow

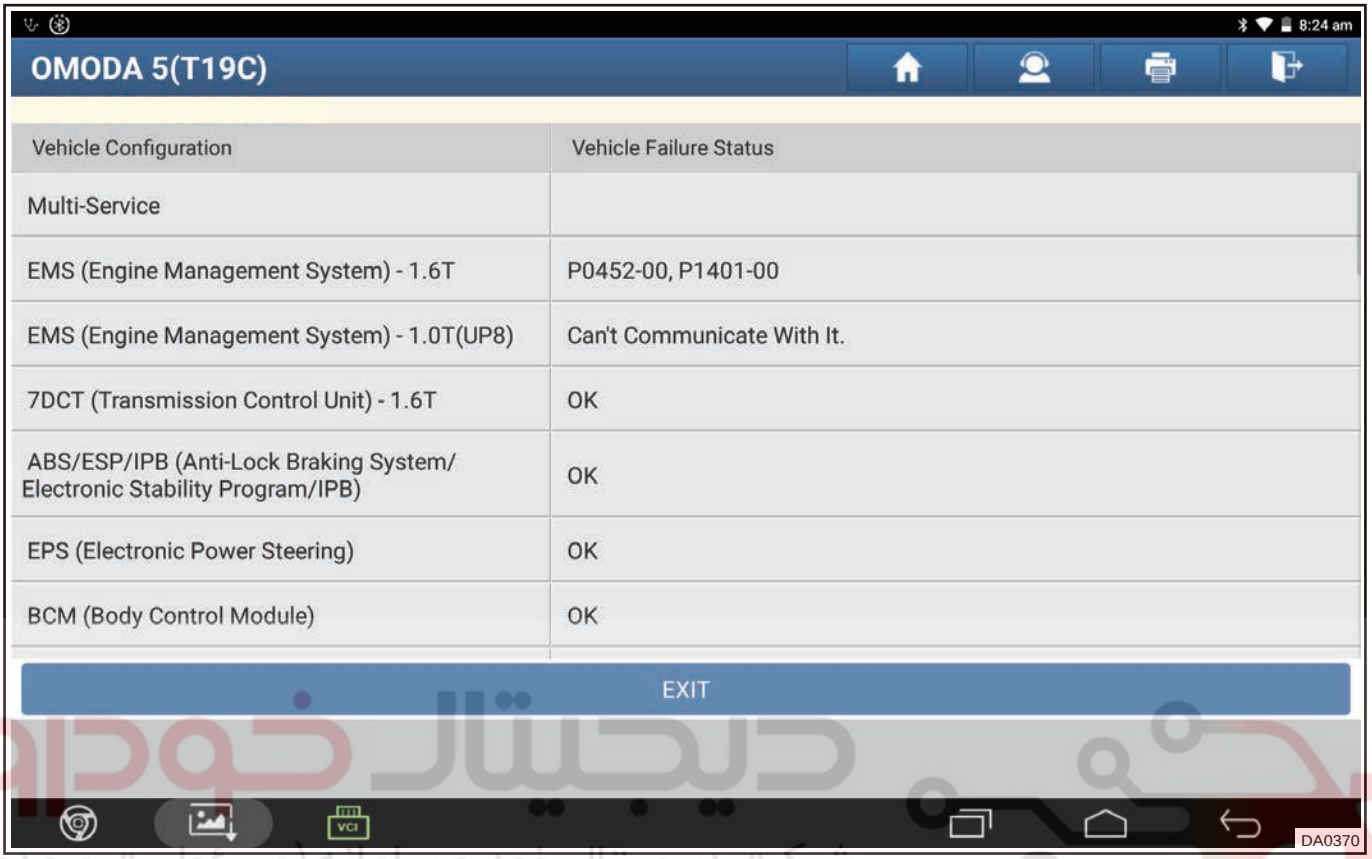
1. Turn on diagnostic tester operation interface, select “Chery Automobile Only”.
2. Select “Chery Only”.

3. Select diagnostic tester version and click OK.

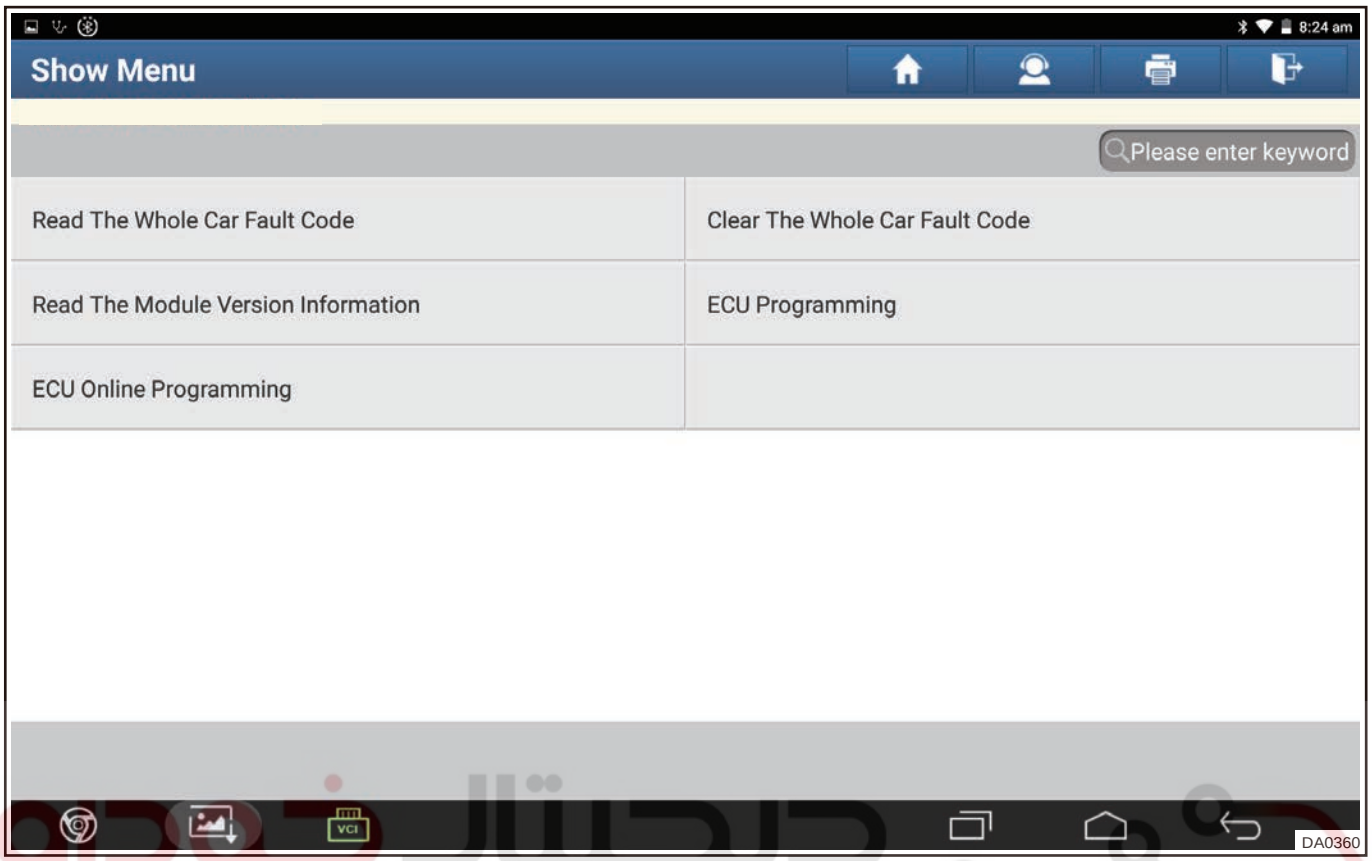


4. Select the model.

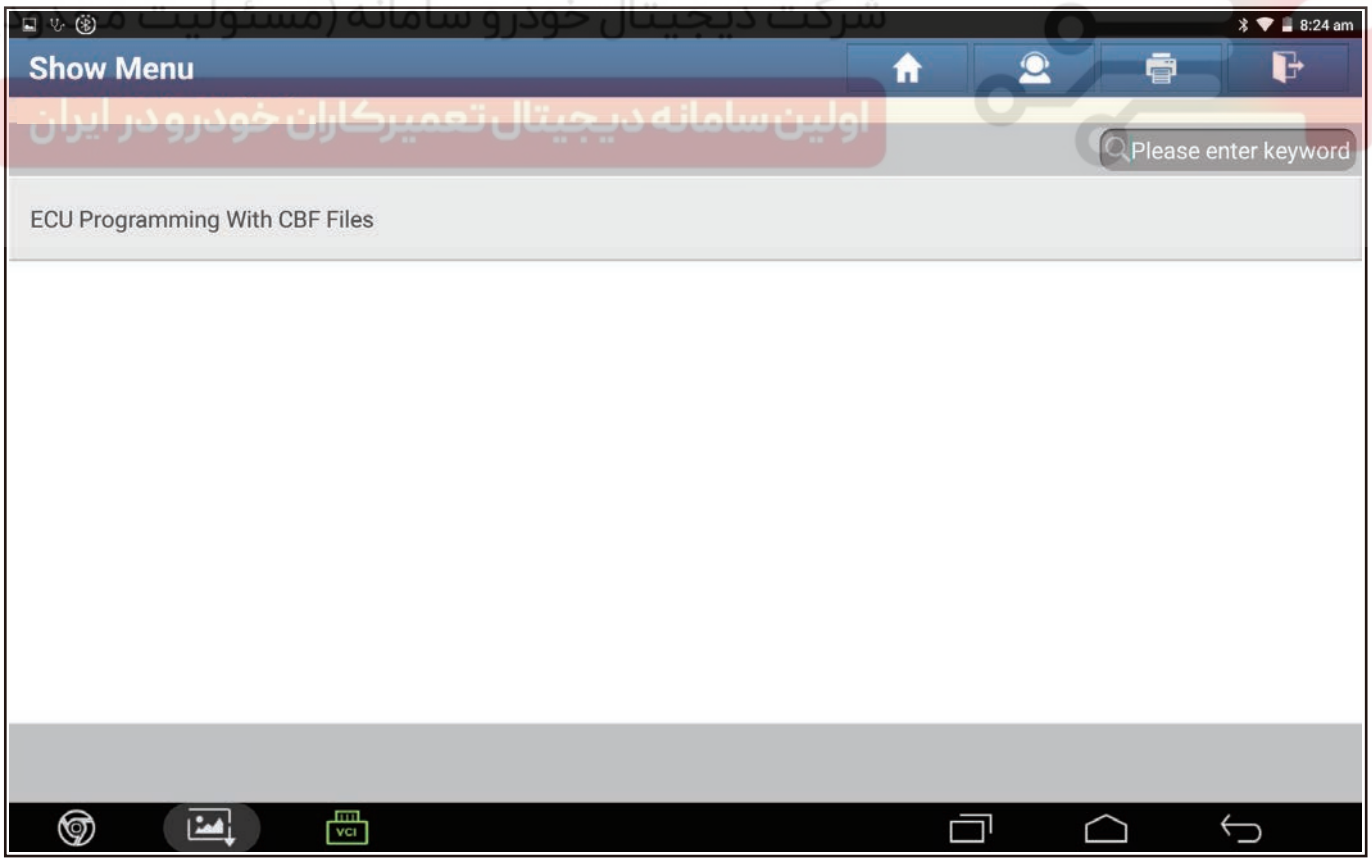
5. Wait for diagnostic tester to scan fault status of controller of whole vehicle. If the operation cannot be performed during scanning process, select "Multi-Service" after the scanning is completed.

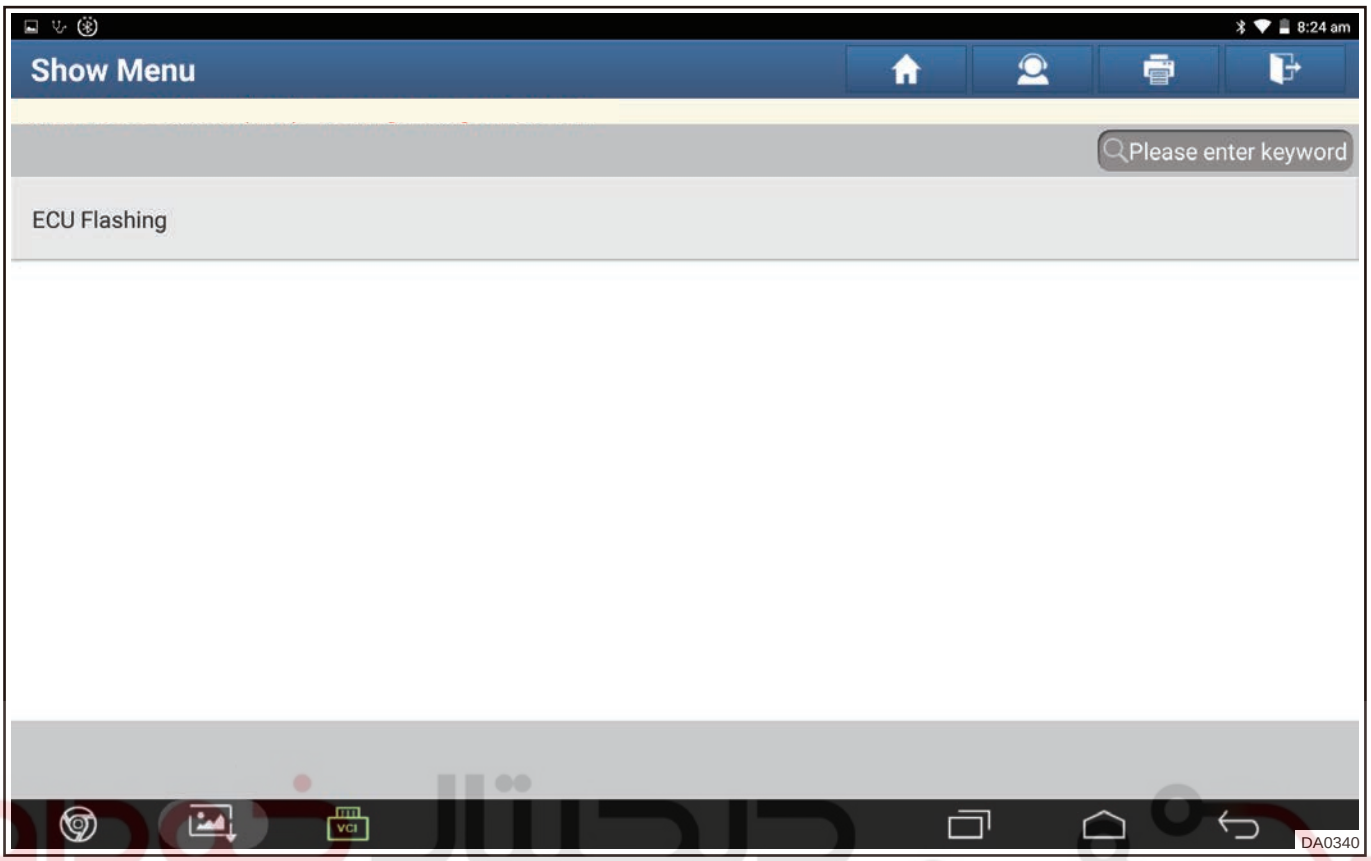


6. Select “ECU Programming”.

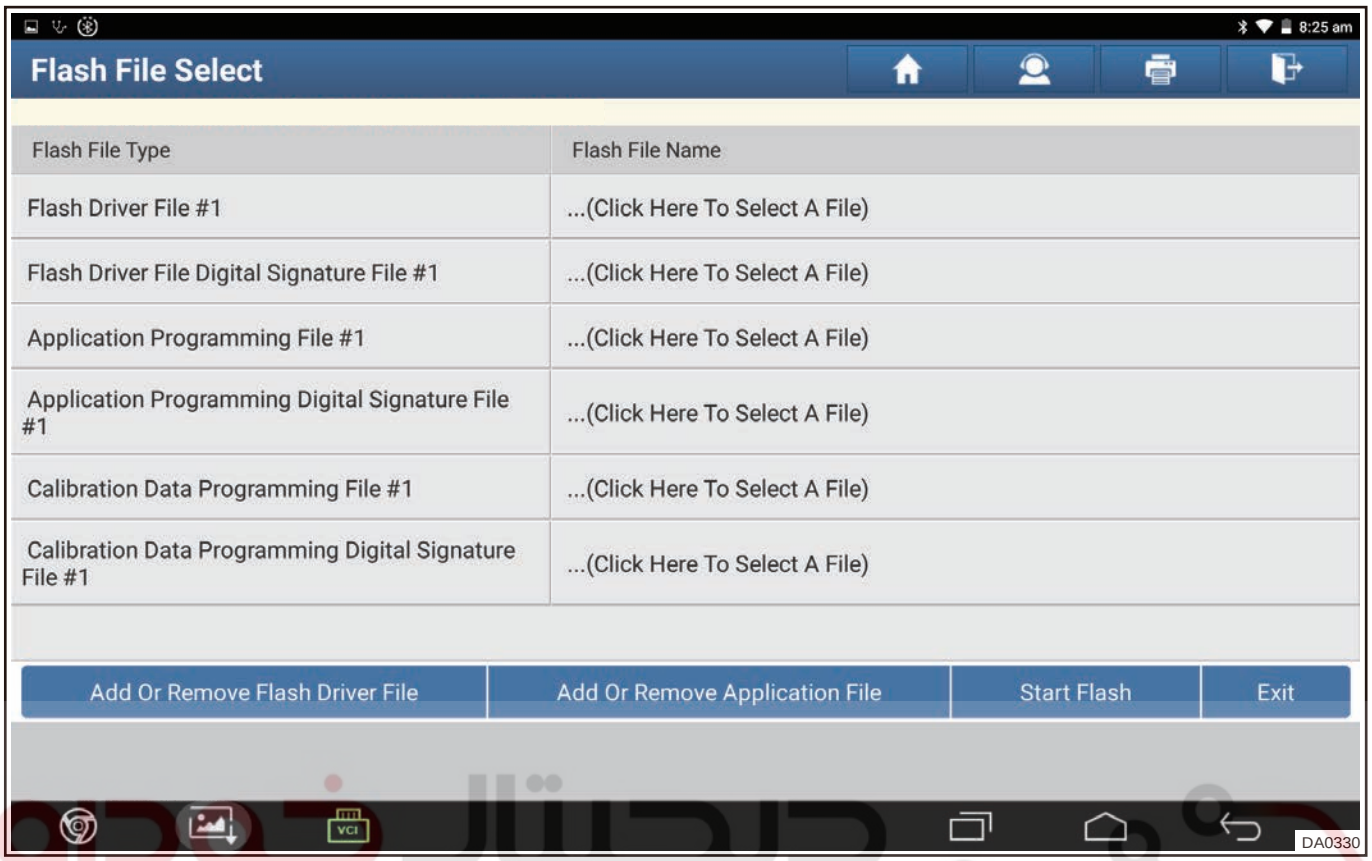


7. Select “CBF Refresh, ECU Refresh, CBF General File Refresh” after entering.

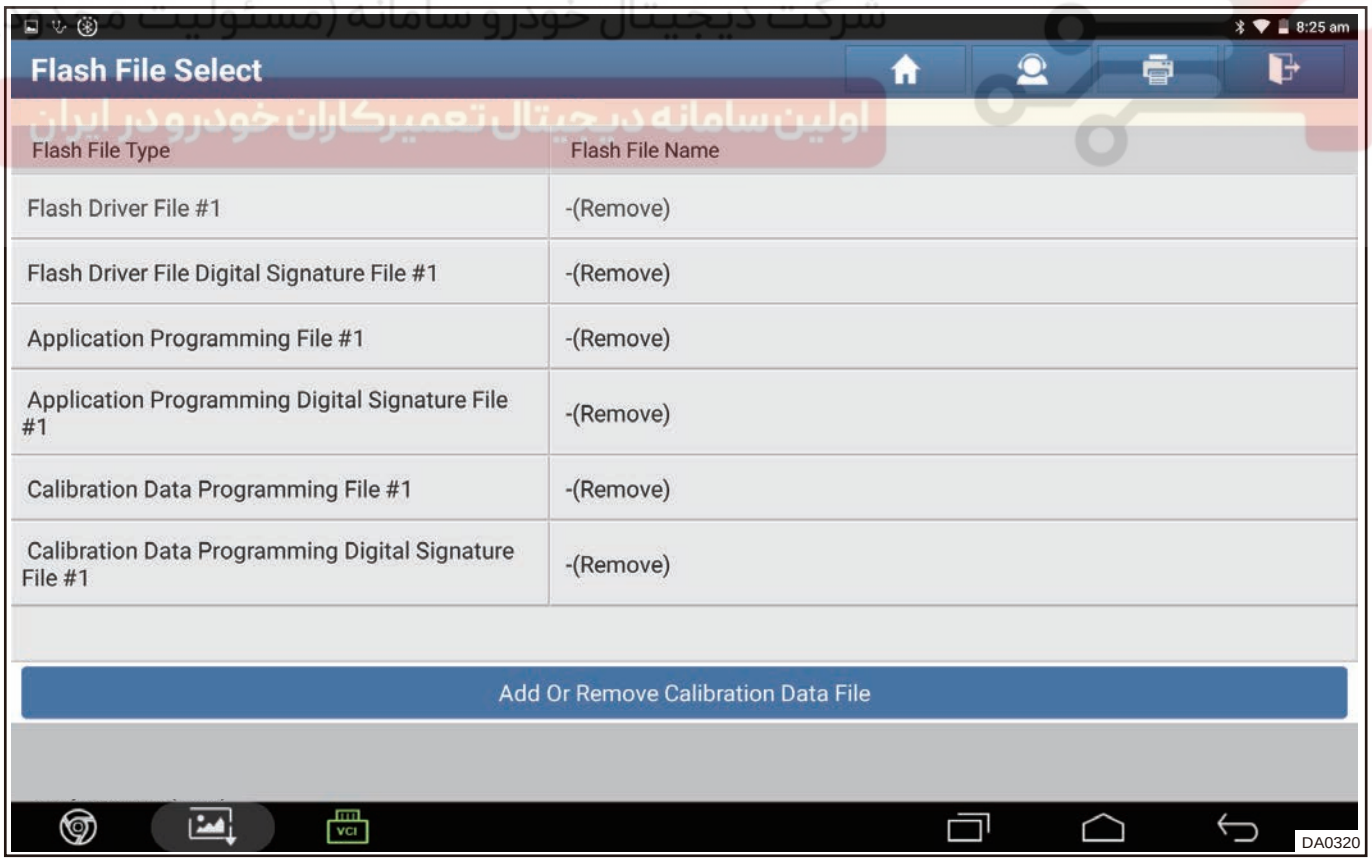




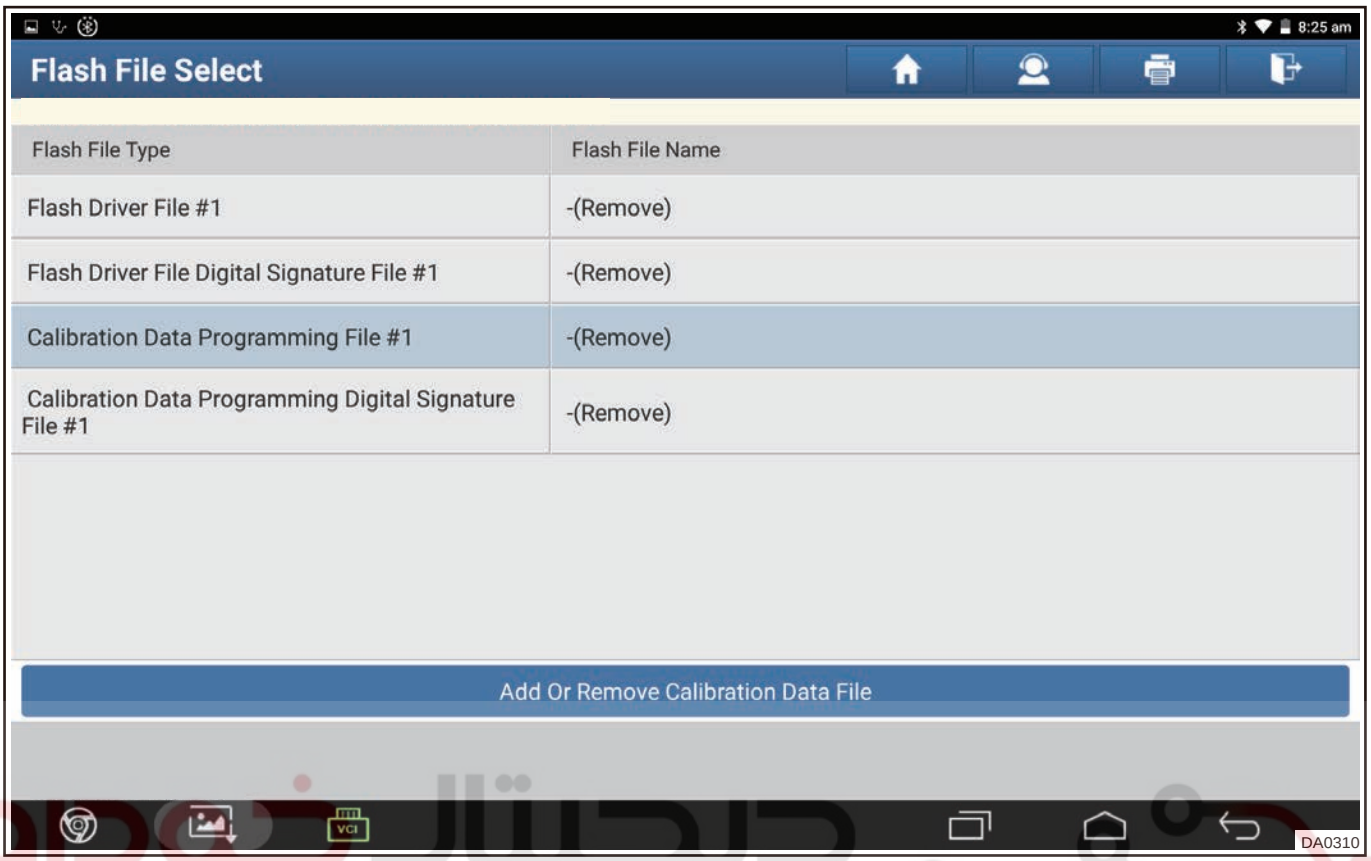
8. Select “FCM/FRM Refresh File”.
   a. According to the model, select the corresponding software package, after-sales calibration only needs to refresh the calibration file, so it is necessary to delete the application file selection to reduce file first.



b. Click application refresh file and delete the application refresh file bar.



c. As shown in the picture after deleting, click “Return To File Select”.



d. Select Driver Refresh File → Driver Refresh Signature File → Calibration Refresh File → Calibration Refresh Signature File in order, which can be distinguished by software number, intermediate file attribute name and file suffix.

9. After selecting the file, click “Start Refresh”.
10. On the pop-up screen, part number and version information of new and old calibration files can be viewed. Select “Yes” after confirming that it is correct.
11. Enter the refresh process.

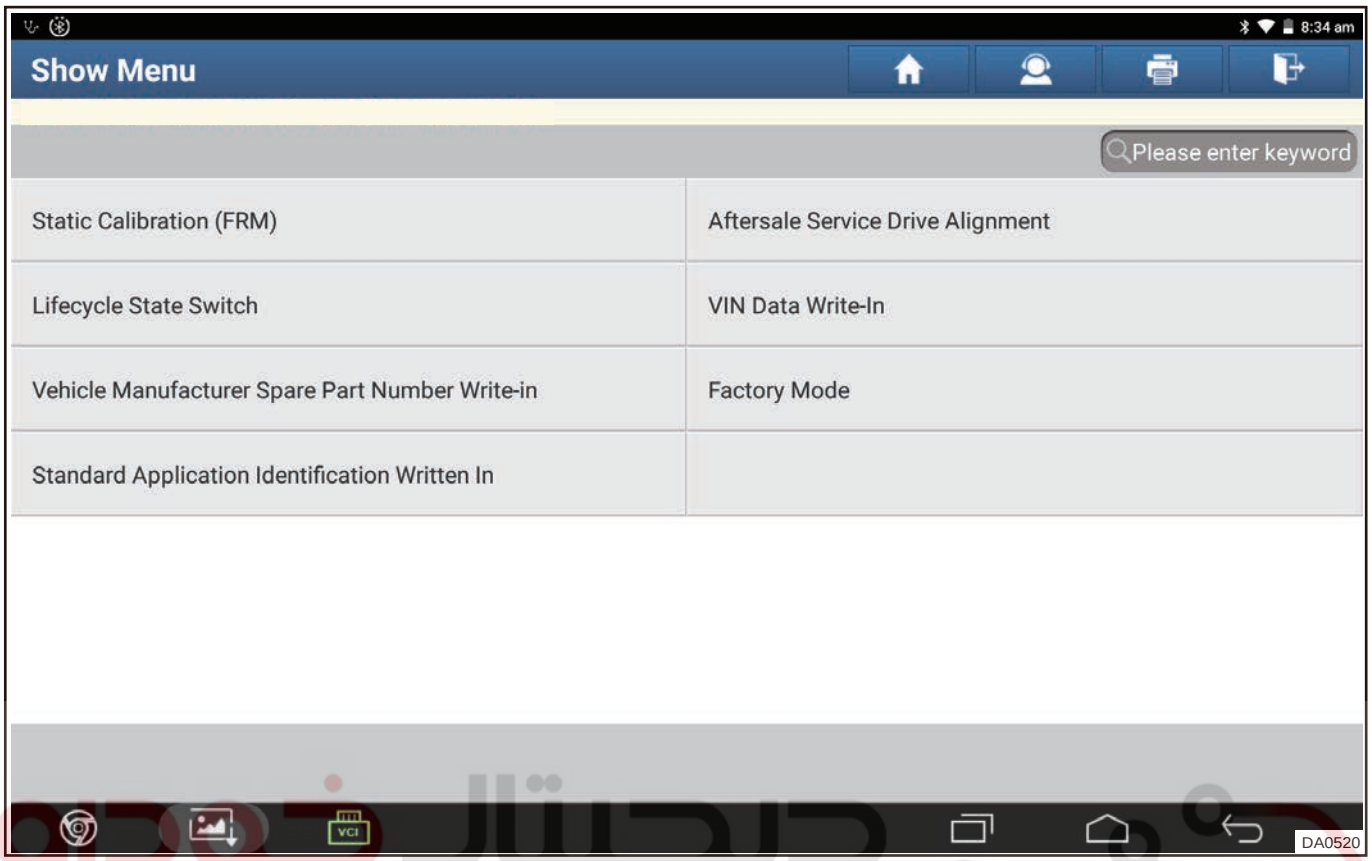
⚠ Caution

If FCM and FRM cannot work normally after refreshing, they must be calibrated at ADAS station of the production line (new off-line vehicles) or calibrated with after-sales calibration program (after-sales replacement parts). For details, refer to after-sales calibration methods of FCM and FRM below.

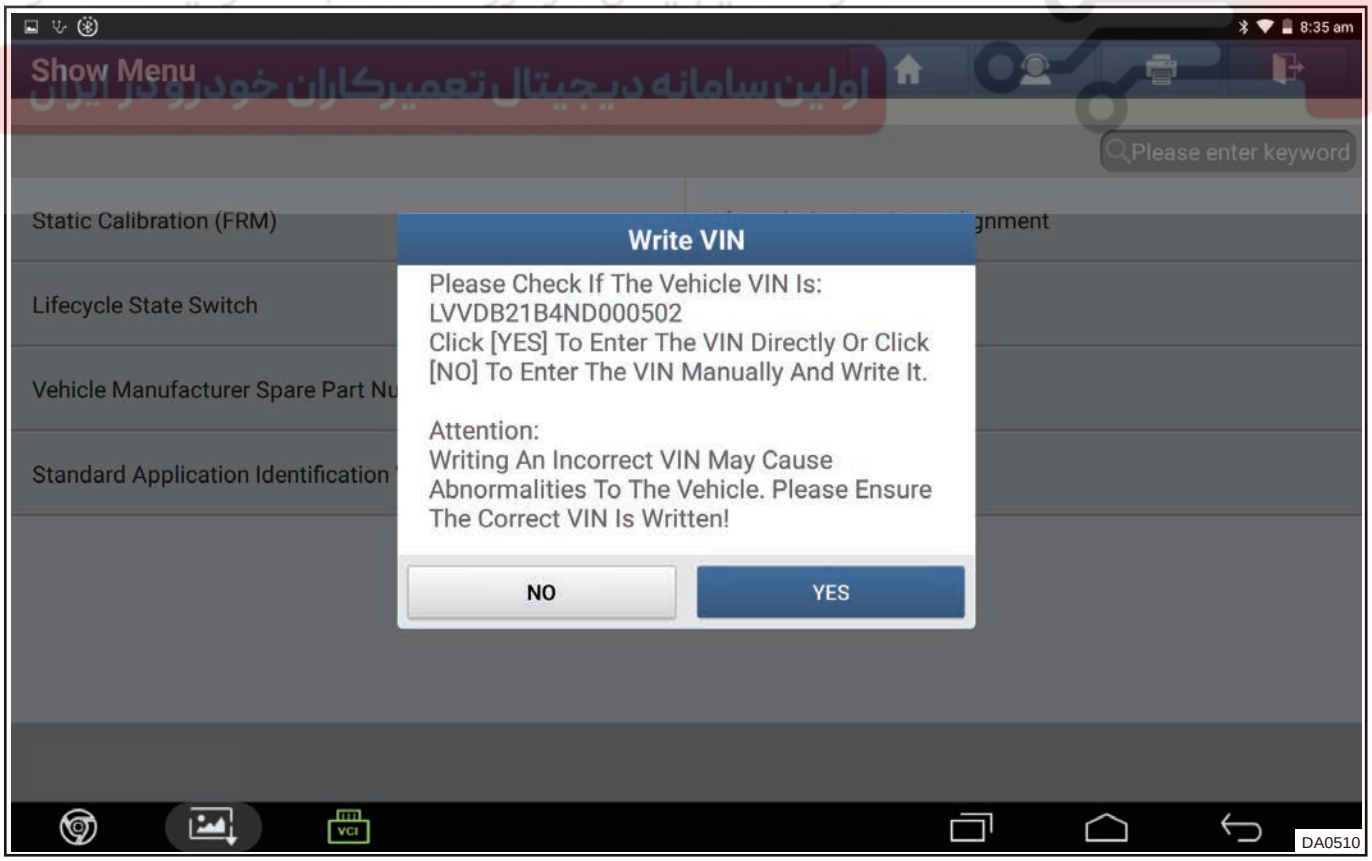
Microwave Radar

Write VIN Code

1. Connect diagnostic tester, enter the system, select model and click “Special Function”.
2. Click “VIN Data Write-In”



3. Compare VIN code displayed on screen with vehicle. If the code is same, click “YES”, otherwise click “NO” and input it manually.



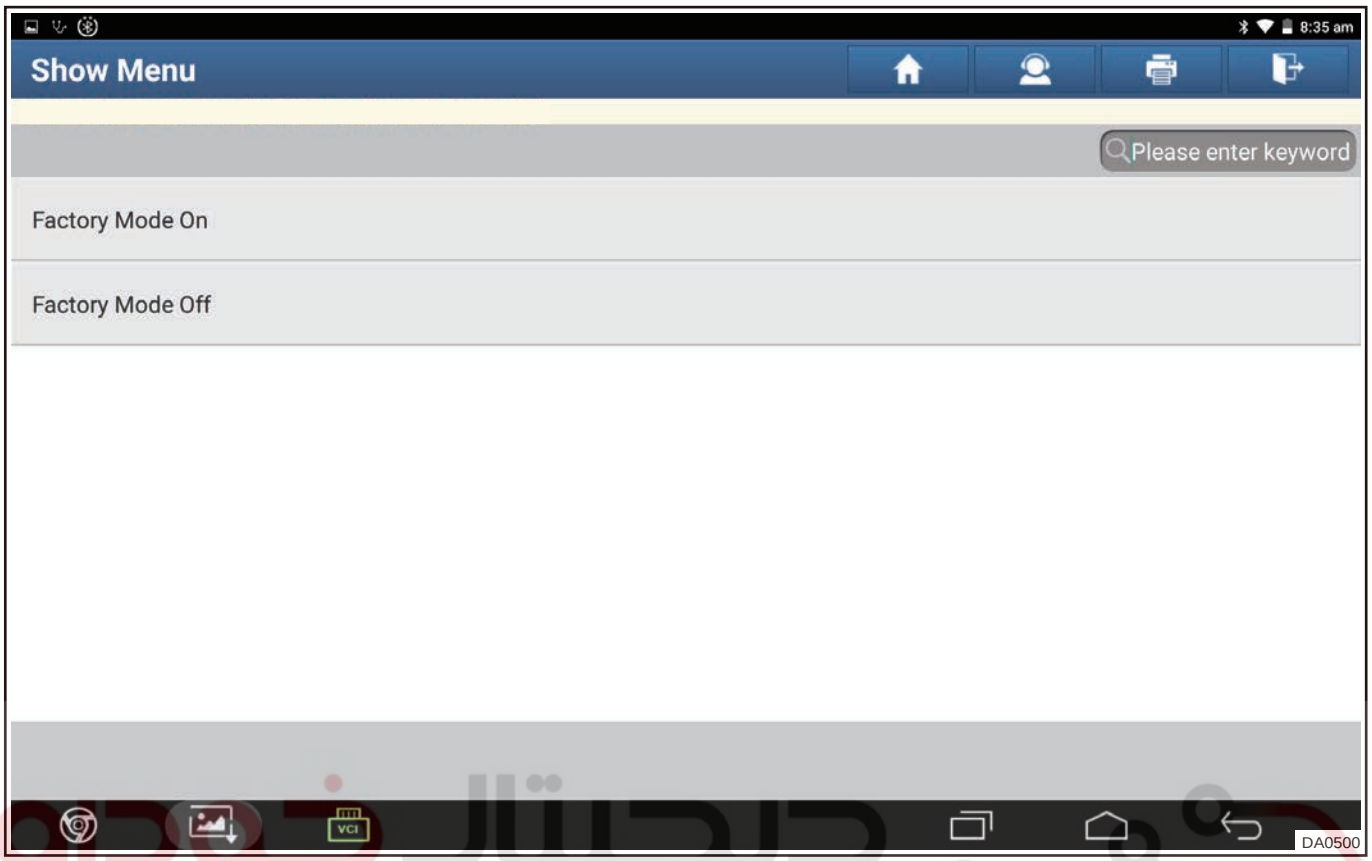
4. Input corresponding VIN code and click “OK”.

Factory Mode

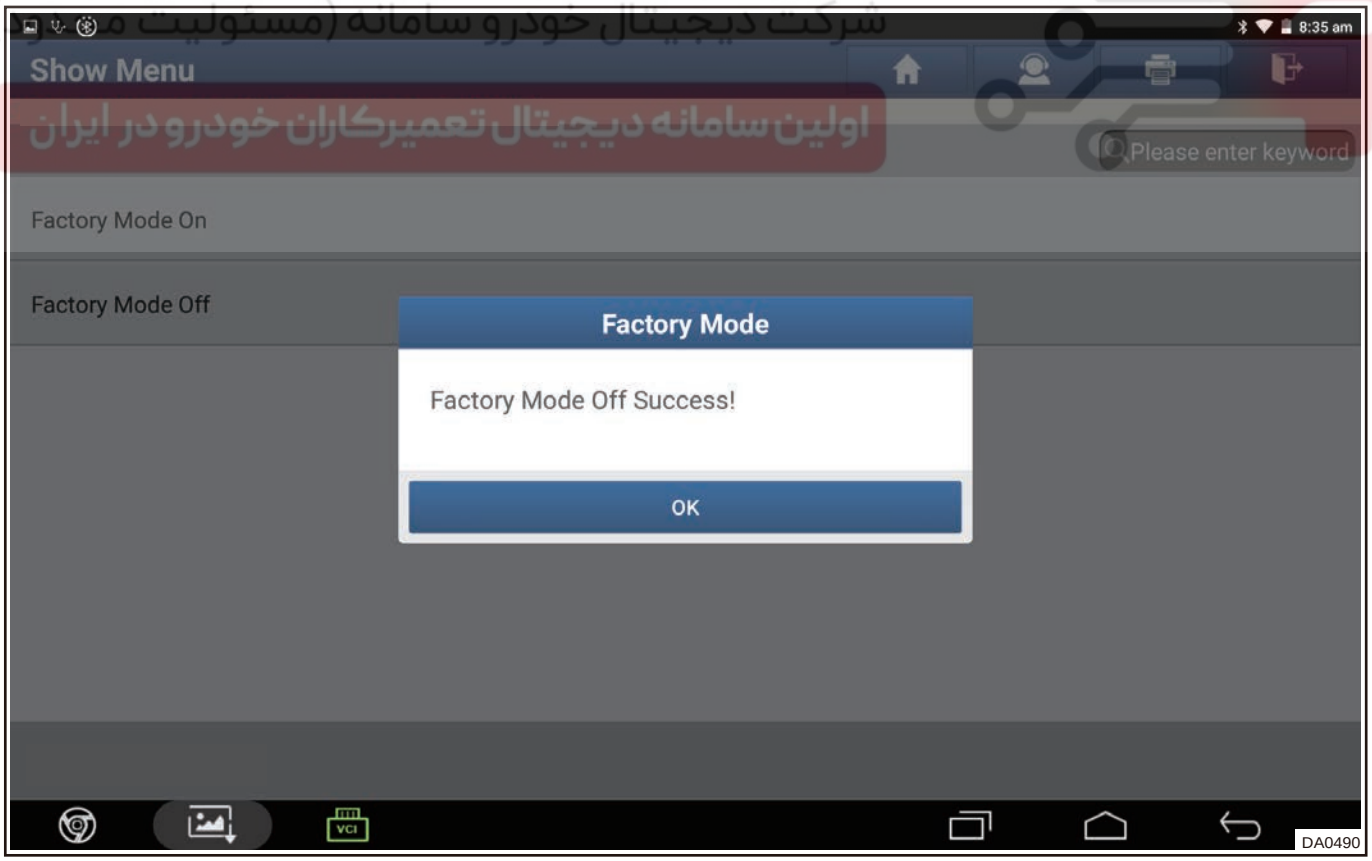
Hint:
Turn off factory mode before calibration

1. Connect diagnostic tester, enter the system, select model and click “Special Function”.
2. Click “Factory Mode”.

3. Click “Factory Mode Off”.



4. Click “OK”.



Front Radar Driving Calibration

1. Click “Front Radar Driving Calibration (For after sales only)”.

2. Enter calibration screen after confirmation.

3. The progress bar jumps to 100%. Radar calibration is completed.

⚠ Caution

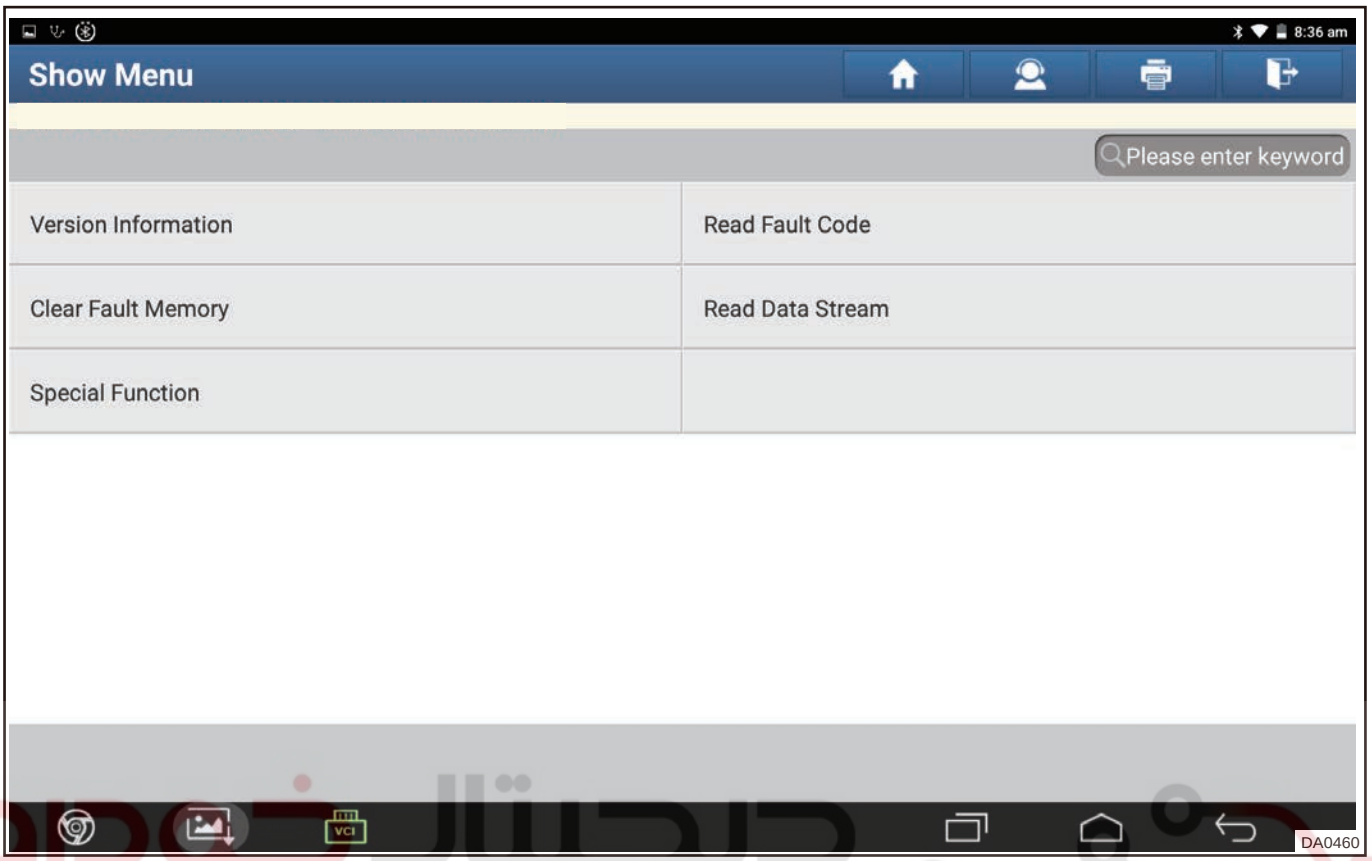
- Driving conditions always do not meet requirements: Surrounding references, road conditions.
- Communication between diagnostic tester and body is interrupted during calibration.
- Installation deviation of radar is too large.

Front Camera

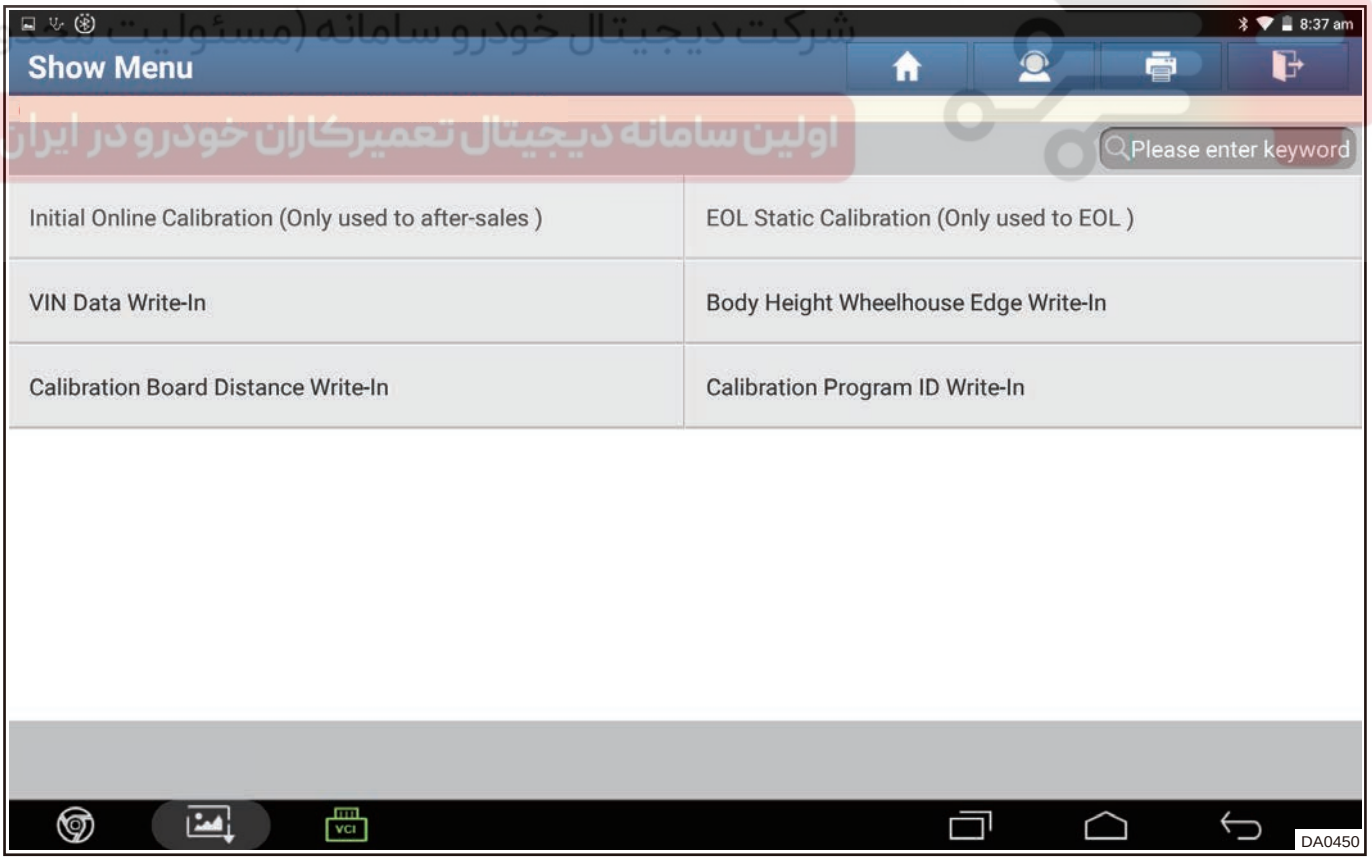
Matching Learning

Writing VIN code

1. Connect diagnostic tester, enter the system, select model and click “Special Function”.



2. Click “VIN Data Write-In”



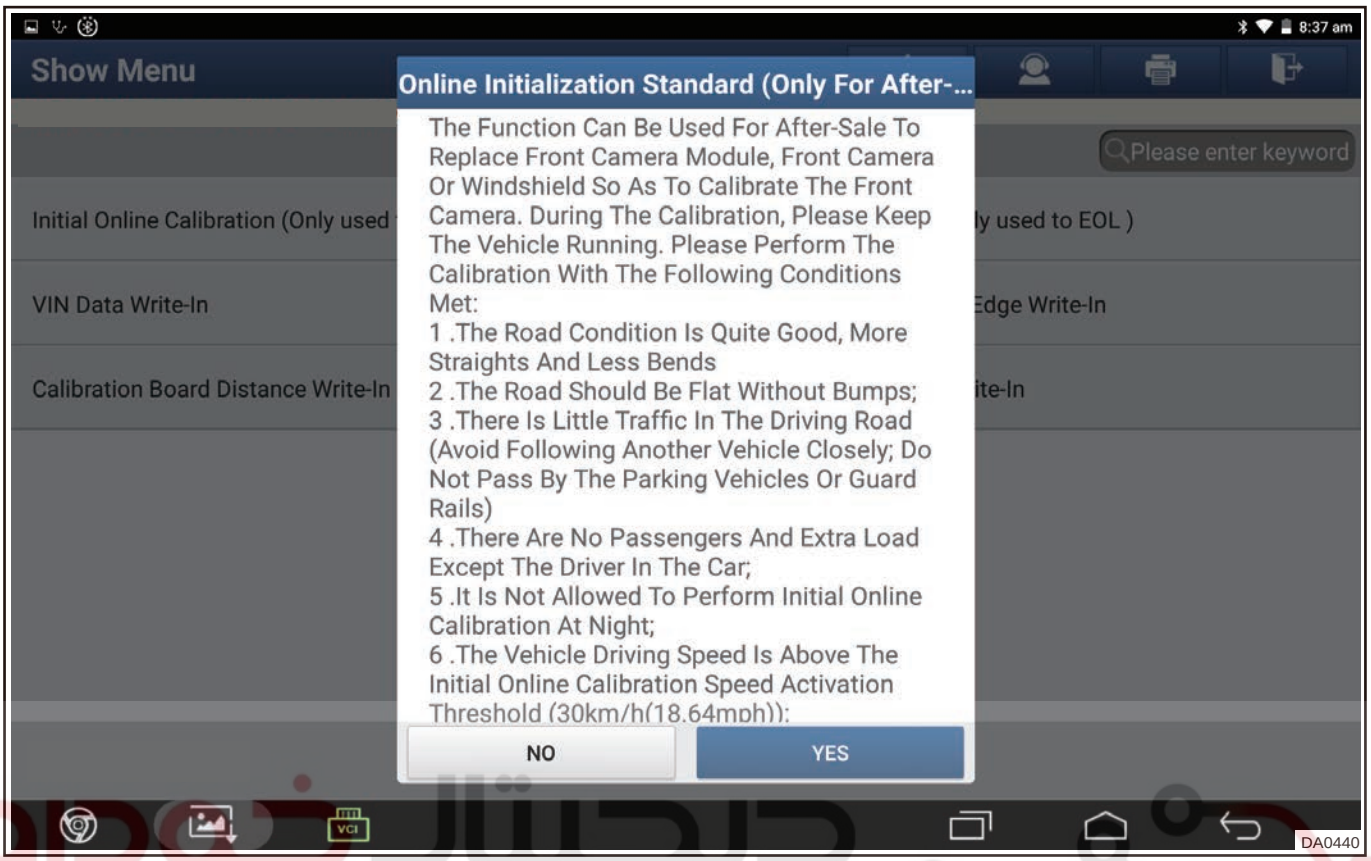
3. Compare VIN code displayed on screen with vehicle. If the code is same, click “YES”, otherwise click “NO” and input it manually.

4. Input corresponding VIN code and click “OK”.

Online Initialization Calibration

1. Click “Initial Online Calibration (Only used to after-sales)”.

2. Carefully read calibration precautions, confirm and click “YES”.



3. Pop up calibration progress screen.
4. During driving, the progress bar jumps and the time does not complete countdown. If the calibration is not completed after the end of countdown, it is regarded as calibration failure. Generally, the completion time is 1~2 minutes.
5. After calibration, the calibration completion screen pops up.

Diagnosis & Test

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	Suspected Area
LDW/LKA malfunction indicator ON	Fuse
	Wire harness fault
	Front camera module
CAN network fault	Fuse
	Wire harness fault
	Central gateway
	Front camera module

Symptom	Suspected Area
Vehicle speed can not be set (Meter indicator does not illuminate)	Wire harness or connector
	Instrument cluster
	Engine control module
Vehicle speed can not be set (Meter indicator comes on normally)	Constant speed cruise control switch
	Brake switch
	ESP and EPB
	Wire harness or connector
	Body control module
	Engine control module

DTC Confirmation Procedure

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

1. Turn ENGINE START STOP switch to LOCK.
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 detection system.
5. Turn ENGINE START STOP switch to LOCK and wait for a few 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.

Diagnostic Help

1. Connect diagnostic tester X-431 PAD (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.

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.

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.

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 Failure	/	MPC camera is faulty	(1) Turn off the ignition switch (2) Check front of camera for obstruction (3)

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				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
C1403-98	ECU Temperature Exceeds Maximum Value	/	ECU temperature exceeds the 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 Failure	/	ECU internal electrical malfunction	
C1406-55	Calibration Data Error	/	Calibration data is wrong	(1) Refresh the correct software and DATASET again (2) Power on

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1406-57	Mismatch between Calibration Data and Main Software	/		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
C1407-48	ECU Software Fault	/	ECM 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) 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 Temporary Fault	/	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/

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				active: (5) Replace MPC
C140A-54	MPC No Calibration Fault	/	MPC no calibration failure	(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 out of 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
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
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

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1412-00	EPB System Fault	/		Check EPB
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	/		
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	/		

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
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	/		
U0423-81	ICM Signal Invalid	/		
U0424-81	CLM Signal Invalid	/		
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	/		
U12A1-88	Private CAN Network Bus Off	/		
U1300-55	ECU Configuration Information Not Written	/		Check CAN configuration
U1435-81	RLCR Signal Invalid	/		Check CAN bus or replace ECU
U1436-81	RRCR Signal Invalid	/		

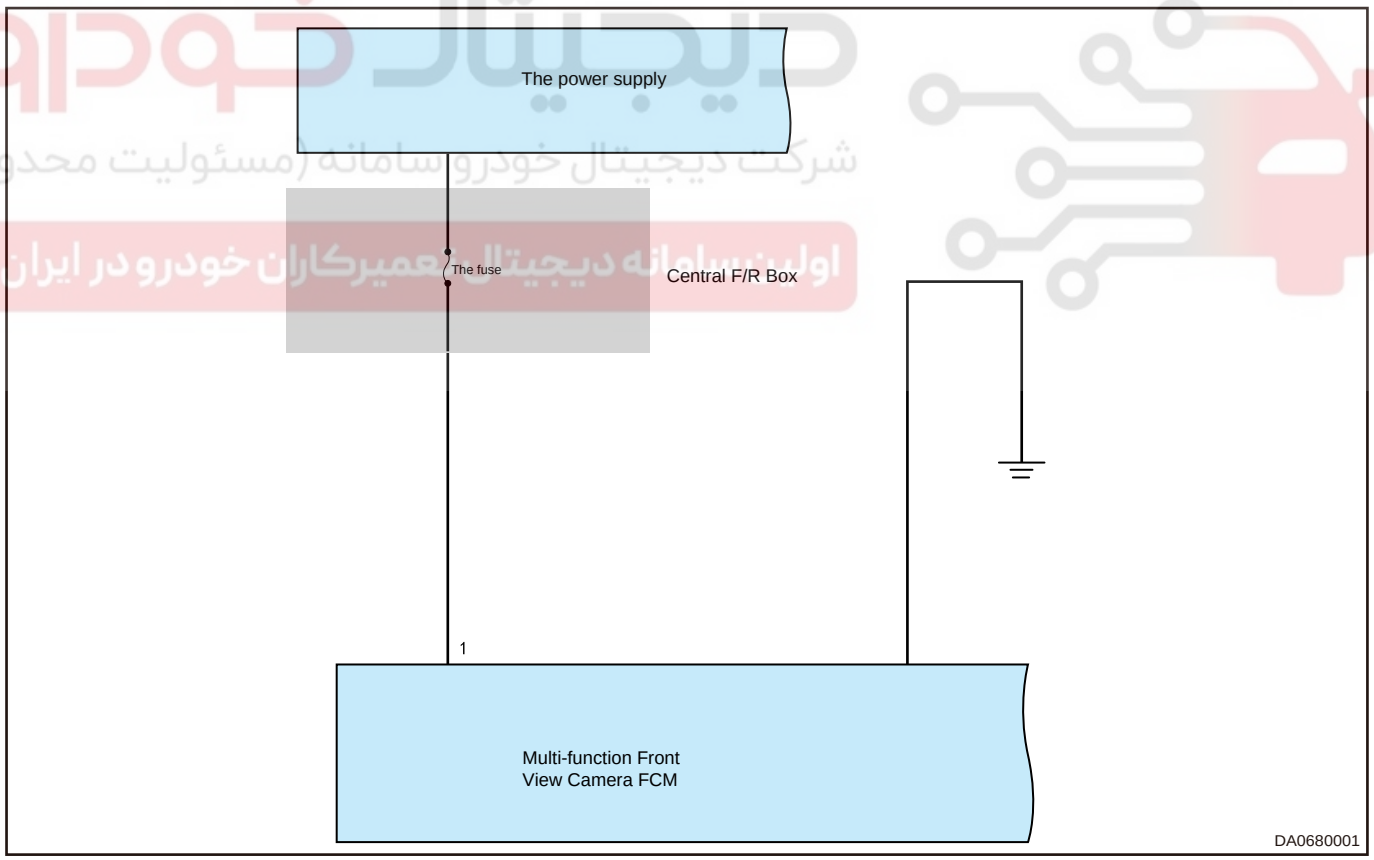
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U3000-51	Calibration Data Missing	/		(1) Refresh the correct software and DATASET again (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: MPC can be reused. If DTC is still active: (5) Replace MPC

DTC Diagnosis Procedure

DTC	C1400-16	Voltage Too Low
DTC	C1400-17	Voltage Too High

Description

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 ENGINE START STOP 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 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 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 (connected terminal)	ENGINE START STOP switch “OFF”	⩽ 1 Ω

NG	**Repair or replace related wire harness.**
OK	**Replace front camera module.**

Power Supply Voltage Fault

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 malfunction 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 DTC 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 DTC again.**

DTC	**C1405-49**	**ECU Internal Hardware Fault**
DTC	**C1406-49**	**Internal Circuit 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 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 malfunction 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	**C1406-57**	**Mismatch between Calibration Data and Main Software**
DTC	**C1407-57**	**Data Fusion Failure**
DTC	**C140A-54**	**MPC No Calibration Fault**

DTC	**C140B-57**	**MPC Online Calibration Out of Range**
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 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	**Reinstall it**

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 malfunction 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 malfunction 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	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	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	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	U12A1-88	Private CAN Network Bus Off
DTC	U1300-55	ECU Configuration Information Not Written
DTC	U1435-81	RLCR Signal Invalid
DTC	U1436-81	RRCR Signal Invalid
DTC	U3000-51	Calibration Data Missing

DTC Confirmation Procedure
Refer to CAN communication system.

Front Radar Module (FRM) DTC Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1300-17	Voltage Too High	/	Battery, wire harness, radar module	Check battery voltage. Check charging system. Check ground circuit. Check ignition switch circuit. Check wire harness for obvious sign of damage. Replace radar sensor
C1300-16	Voltage Too Low	/		
C131B-00	Calibration File Not Written	/	Calibration file refresh is improper	Refresh proper calibration file
C131C-00	Calibration File Invalid	/		
C1304-53	Factory Mode On	/	Factory mode turns on	Check factory mode status and it is turned off by diagnostic service
C1302-78	No Calibration	/	Calibration is not performed	Calibration is performed
C1303-78	Calibration Failure	/	Calibration failure	Adjust radar and recalibrate
C131A-76	Radar Blocked	/	Radar is blocked	1. Power radar again 2. Check whether radar surface is covered with debris
C1305-78	Radar Horizontal Misalignment	/	Radar is misaligned horizontally	Recalibrate it
C1306-78	Radar Vertical Misalignment	/	Radar is misaligned vertically	Check bracket for proper installation. Check if sensor in bracket is proper. Check bracket for damage. Replace radar sensor only when there is visible damage. If the front of vehicle is damaged in an accident, replace bracket and sensor assembly. Run SDA for horizontal alignment

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1301-09	Driver Test Mode Failed	/	Module damaged	Replace hardware
C1307-52	Factory Data Error	/		
C1308-41	PFlash Checksum Error	/	Module damaged	(1) Power radar again or turn off the ignition switch (2) Check whether the radar is installed correctly (3) Power on again and wait for 5 seconds (4) Clear DTC (5) Read DTC. If there is no DTC: Radar can be reused. If DTC is still present/active: (6) Replace hardware
C1309-47	Power Supply Management System Fault	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/active: (5) Replace hardware
C1305-04	UC Internal System Fault	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/active: (5) Replace hardware
C130A-96	Hardware Fault	/		Replace hardware
C130B-17	PMIC Processor Over-voltage Fault	/		(1) Power radar again or turn off the ignition switch (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				is no DTC: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C130C-17	MMIC Over-voltage Fault	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C130D-16	PMIC Processor Under-voltage Fault	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C130E-16	MMIC Under-voltage Fault	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C130F-05	Radar Adjustment Configuration Failed	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				active: (5) Replace hardware
C1310-03	Radar Modulation Failed	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1311-48	Software Error	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1312-8F	Radar Front Area Data Processing Failed	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1313-48	Software Temporary Fault	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1314-4B	UC Temperature Out of Normal Range	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1315-98	MMIC Temperature Out of Normal Range	/	Temperature Too High	(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1316-98	MMIC Temperature Out of Process Value	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1317-96	ADC Self-check Fault	/	Module damaged	(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1318-53	VMC Does not Work	/		(1) Power radar again or turn off the ignition switch (2) Power on again and

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
				wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
C1319-09	DA Core Value Higher Than Specifications	/		(1) Power radar again or 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: Radar can be reused. If DTC is still present/ active: (5) Replace hardware
U0131-87	Lost Communication with EPS	/	Refer to “CAN” system	Check CAN bus or replace ECU
U0420-81	Invalid Data Received from EPS	/		
U1189-87	Lost Communication with MFS	/		
U059B-81	Invalid Data Received from MFS	/		
U0164-87	Lost Communication with CLM	/		
U0424-81	Invalid Data Received from CLM	/		
U0129-87	Lost Communication with ESP	/		
U0418-81	Invalid Data Received from ESP	/		
U0128-87	Lost Communication with EPB	/		
U0417-81	Invalid Data Received from EPB	/		

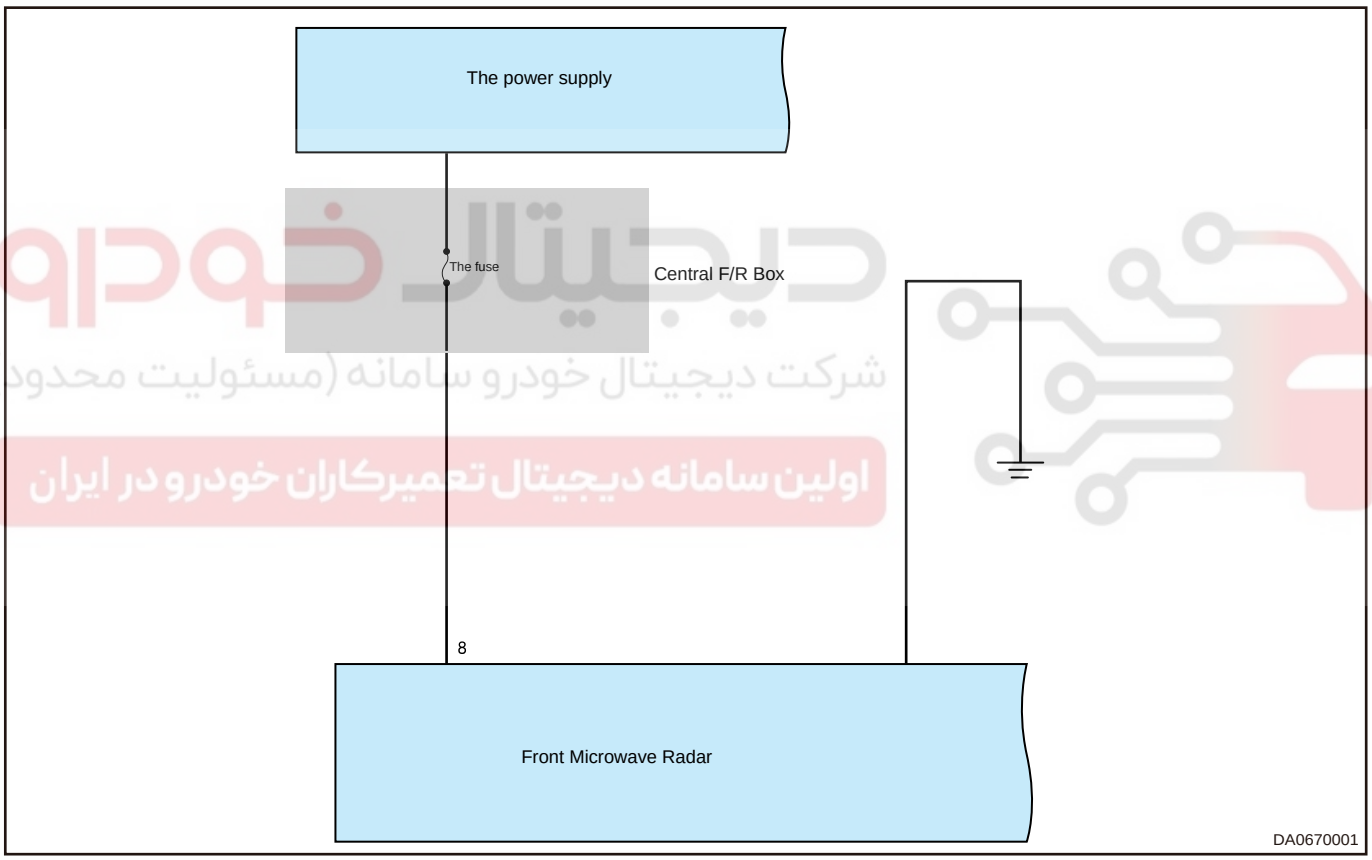
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0151-87	Lost Communication with YAS	/		
U0452-81	Invalid Data Received from YAS	/		
U0140-87	Lost Communication with BCM	/		
U0422-81	Invalid Data Received from BCM	/		
U0155-87	Lost Communication with ICM	/		
U0423-81	Invalid Data Received from ICM	/		
U0245-87	Lost Communication with IHU	/		
U0546-81	Invalid Data Received from IHU	/		
U0100-87	Lost Communication with EMS	/		
U0401-81	Invalid Data Received from EMS	/		
U0101-87	Lost Communication with TCU	/		
U0402-81	Invalid Data Received from TCU	/		
U1162-87	Lost Communication with FCM	/		
U1405-81	Invalid Data Received from FCM	/		
U0073-88	Lost Communication with Public CAN	/		
U0038-88	Lost Communication with Private CAN	/		

DTC Diagnosis Procedure

Power Supply Voltage Fault

DTC	C1300-17	Voltage Too High
DTC	C1300-16	Voltage Too Low
DTC	C130B-17	PMIC Processor Over-voltage Fault
DTC	C130C-17	MMIC Over-voltage Fault
DTC	C130D-16	PMIC Processor Under-voltage Fault
DTC	C130E-16	MMIC Under-voltage Fault

Description
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**

(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 assembly.**

OK

2	**Check fuse**

(a) Check if fuse is blown.

NG → **Replace fuse.**

OK

3	**Check output voltage of instrument panel fuse and relay box**

(a) Turn ENGINE START STOP 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 instrument panel fuse and relay box assembly.**

OK

4	**Check for open in wire harness**

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect front radar module connector and instrument panel fuse and relay box connector.

(d) Using ohm band of digital multimeter, measure resistance of front radar module connector, instrument panel fuse and relay box connector to check wire harness for open.

Multimeter Connection	Condition	Normal Condition
Instrument panel fuse and relay box (connected terminal) - Front radar module (8)	ENGINE START STOP switch "OFF"	⩽ 1 Ω

NG → **Repair or replace related wire harness.**

OK → **Replace radar module.**

DTC	**C131B-00**	**Calibration File Not Written**
DTC	**C131C-00**	**Calibration File 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 DTC**

(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	**Rewrite calibration file**

NG → **Replace radar module.**

OK → **Turn off vehicle power supply (- disconnect the negative battery cable), then clear DTC again.**

DTC	C1304-53	Factory Mode On

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 factory mode status and it is turned off by diagnostic service

DTC	C1302-78	No Calibration
DTC	C1303-78	Calibration 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.
The following detection takes rear bumper antenna as an example.

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	Adjust radar and recalibrate

NG → **Replace radar module.**

OK → **Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTC again.**

DTC	C131A-76	Radar 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 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 DTC again.**

DTC	**C1314-4B**	**UC Temperature Out of Normal Range**
DTC	**C1315-98**	**MMIC Temperature Out of Normal Range**
DTC	**C1316-98**	**MMIC Temperature Out of Process 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.

1	**Clear DTC to relieve overheat protection**

DTC	**C1305-78**	**Radar Horizontal Misalignment**
DTC	**C1306-78**	**Radar Vertical Misalignment**

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:
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	**C1301-09**	**Driver Test Mode Failed**
DTC	**C1307-52**	**Factory Data Error**
DTC	**C1308-41**	**PFlash Checksum Error**
DTC	**C1309-47**	**Power Supply Management System Fault**
DTC	**C1305-04**	**UC Internal System Fault**
DTC	**C130A-96**	**Hardware Fault**
DTC	**C130F-05**	**Radar Adjustment Configuration Failed**
DTC	**C1310-03**	**Radar Modulation Failed**
DTC	**C1311-48**	**Software Error**
DTC	**C1312-8F**	**Radar Front Area Data Processing Failed**
DTC	**C1313-48**	**Software Temporary Fault**
DTC	**C1317-96**	**ADC Self-check Fault**
DTC	**C1318-53**	**VMC Does not Work**
DTC	**C1319-09**	**DA Core Value Higher Than Specifications**

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

NG → **Replace front radar module.**

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

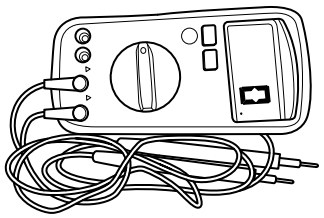
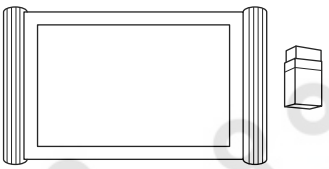
DTC	**U0131-87**	**Lost Communication with EPS**
DTC	**U0420-81**	**Invalid Data Received from EPS**
DTC	**U1189-87**	**Lost Communication with MFS**
DTC	**U059B-81**	**Invalid Data Received from MFS**
DTC	**U0164-87**	**Lost Communication with CLM**
DTC	**U0424-81**	**Invalid Data Received from CLM**
DTC	**U0129-87**	**Lost Communication with ESP**
DTC	**U0418-81**	**Invalid Data Received from ESP**
DTC	**U0128-87**	**Lost Communication with EPB**
DTC	**U0417-81**	**Invalid Data Received from EPB**
DTC	**U0151-87**	**Lost Communication with YAS**
DTC	**U0452-81**	**Invalid Data Received from YAS**
DTC	**U0140-87**	**Lost Communication with BCM**
DTC	**U0422-81**	**Invalid Data Received from BCM**
DTC	**U0155-87**	**Lost Communication with ICM**
DTC	**U0423-81**	**Invalid Data Received from ICM**
DTC	**U0245-87**	**Lost Communication with IHU**
DTC	**U0546-81**	**Invalid Data Received from IHU**
DTC	**U0100-87**	**Lost Communication with EMS**
DTC	**U0401-81**	**Invalid Data Received from EMS**
DTC	**U0101-87**	**Lost Communication with TCU**
DTC	**U0402-81**	**Invalid Data Received from TCU**
DTC	**U1162-87**	**Lost Communication with FCM**
DTC	**U1405-81**	**Invalid Data Received from FCM**
DTC	**U0073-88**	**Lost Communication with Public CAN**
DTC	**U0038-88**	**Lost Communication with Private CAN**

DTC Confirmation Procedure
Refer to CAN communication system.

On-vehicle Service

Tools

General Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH000206
X-431 PAD Diagnostic Tester	 RCH0001006

Microwave Radar Replacement

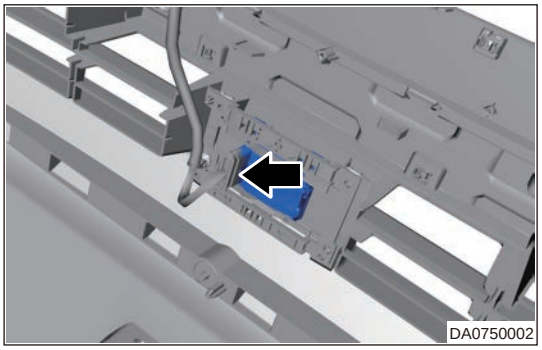
Removal

Caution

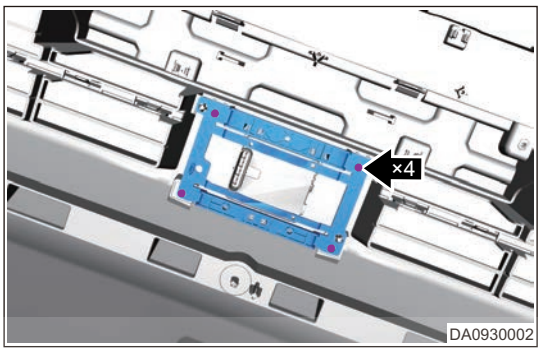
- Be sure to wear necessary safety equipment to prevent accidents, when removing front bumper assembly.
- Appropriate force should be applied, when removing front bumper assembly. Be careful not to operate roughly.
- Avoid breaking claws, when disassembling front bumper assembly.
- Avoid damage when 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.

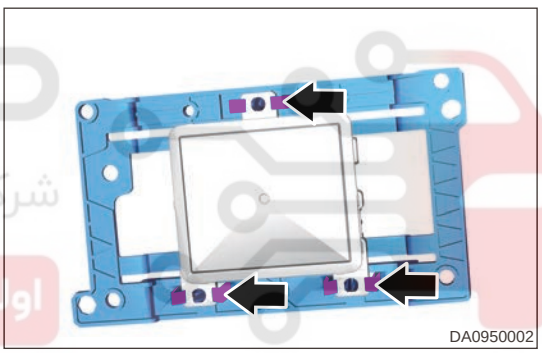
4. Disconnect the microwave radar connector.



5. Remove the 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.

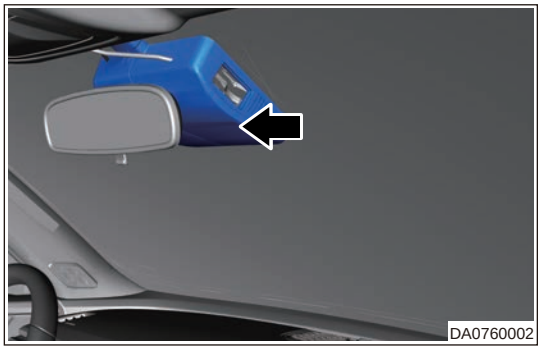
1. Installation is in the reverse order of removal.

Front Camera Replacement

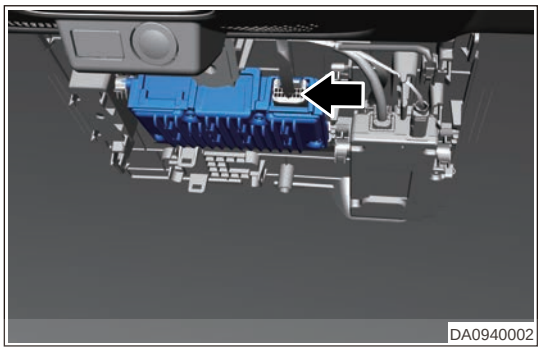
Removal

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.

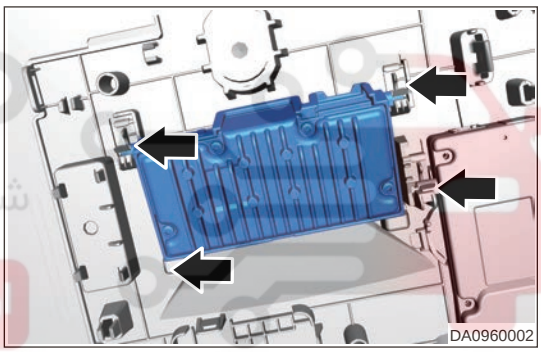
3. Remove left and right protective covers from inside rear view mirror.



4. Disconnect the front camera connector.



5. Remove 4 fixing clips and front camera.



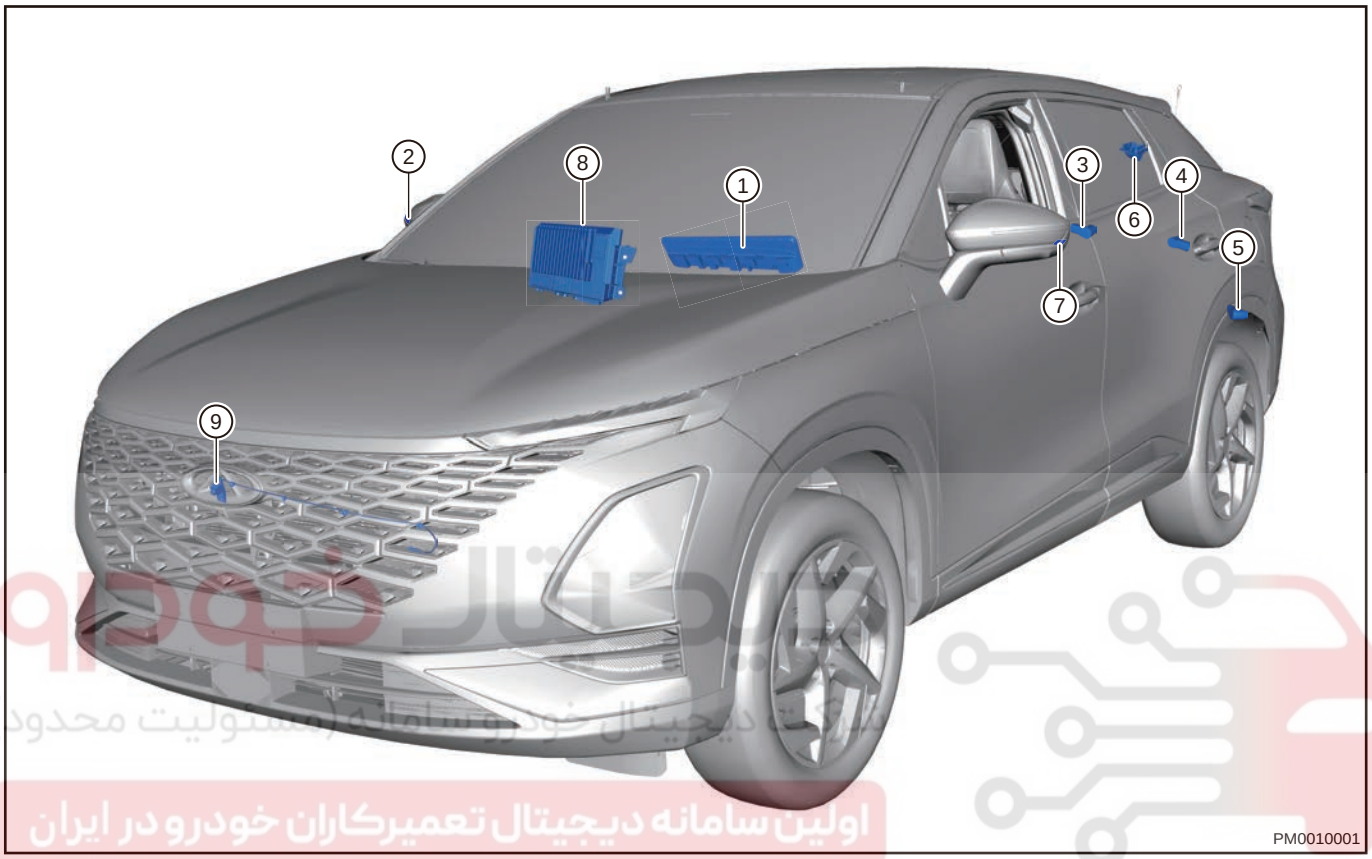
Installation

1. Installation is in the reverse order of removal.

PARKING RADAR SYSTEM

System Overview

Description



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	Domain Controller
9	Front Camera Assembly		

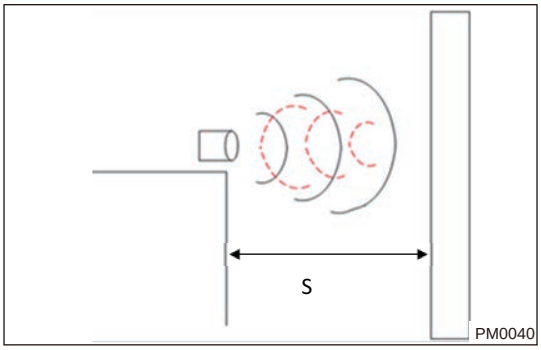
Reversing Radar System

System Schematic Diagram

Parking radar auxiliary system 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.

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.



System Composition

Reversing radar system consists of instrument cluster, 1 radar control module and 4 sensors (digital ultrasonic sensors) or 8 sensors. Sensors adopt separated structure. Sensor bodies are same, but installation angles are different. Parts related to system consist of ENGINE START STOP switch, reverse switch, instrument cluster or DVD, 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; Instrument cluster or DVD 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.

Reversing Radar Normal Alarm Display

When ENGINE START STOP switch is turned on, shift lever is moved to R and vehicle is reversing at a speed below 5 km/h, reversing radar is activated. The corresponding measured message will be displayed on multi-information display and alarms with buzzer in instrument cluster.The response way of reversing radar system is buzzer sounding. The table below shows the correspondence between buzzer response frequency and actual obstacle distance:

Alarm Type	1st Section	2nd Section	3rd Section	4th Section	5th Section
Displayed Area	Safe area	Pre-warning area	Amble area	Park area	Park area
Alarm Distance Range (cm)	＞ 150	95 - 150	65 - 90	40 - 60	⩽ 35
Buzzer Sound Frequency	No sound (OFF)	1Hz (ON 500 ms / OFF 500 ms)	2Hz (ON 250ms / OFF 250 ms)	4Hz (ON 125 ms / OFF 125 ms)	Continuous sound

⚠ Caution

- When ignition switch is ON and shift lever is in R, small vehicle screen is displayed on instrument cluster. If no obstacle information is detected (obstacle distance is more than 150 cm), only small vehicle is displayed on instrument cluster, while arc is not displayed.
- If multiple sensors have detected an obstacle, instrument cluster will display distances between each sensor and obstacle, sound alarm will be sound from nearest obstacle, and processed based on signal from radar.

Dynamic Track HD Visual Parking Assist System

Operation

Composition: Instrument cluster, navigation, camera, 4 rear radar sensors and radar module.Reversing view monitor system consists of radar sensor (sensor), camera, control module and display alarm device etc. After starting vehicle, reversing radar system functions when shifting to reverse gear. When the radars

detects an obstacle, multi-information display in instrument cluster will display distance information and buzzer sounds. Navigation system 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.

Reversing View 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.

360 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

Function	Description
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
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

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.

- 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.

<table>
<tr><th colspan="2">Activation Condition</th><th rowspan="2">System Activation</th><th colspan="2">Exit Condition</th></tr>
<tr><th>Preconditions</th><th>Trigger Condition</th><th>Corresponding Exit Condition</th><th>Priority Exit Condition</th></tr>
<tr><td rowspan="6">Vehicle speed < 20 km/h</td><td>Shift to R</td><td>R is activated</td><td>Exit R position, the duration is longer than 15 seconds, and there is no effective operation within the duration</td><td rowspan="6">Vehicle speed > 30 km/h</td></tr>
<tr><td rowspan="2">AVM switch is pressed</td><td rowspan="2">AVM switch is activated</td><td>Press AVM switch again</td></tr>
<tr><td>Operate other high priority switches</td></tr>
<tr><td rowspan="2">Turn on the turn signal light</td><td rowspan="2">Turn signal light is activated</td><td>Turn off the turn signal light and there is no effective operation within 500 ms</td></tr>
<tr><td>Operate other high priority switches</td></tr>
<tr><td>Steering wheel angle > 190°</td><td>Steering wheel angle is activated</td><td>Steering wheel angle is less than 180° and the duration is longer</td></tr>
</table>

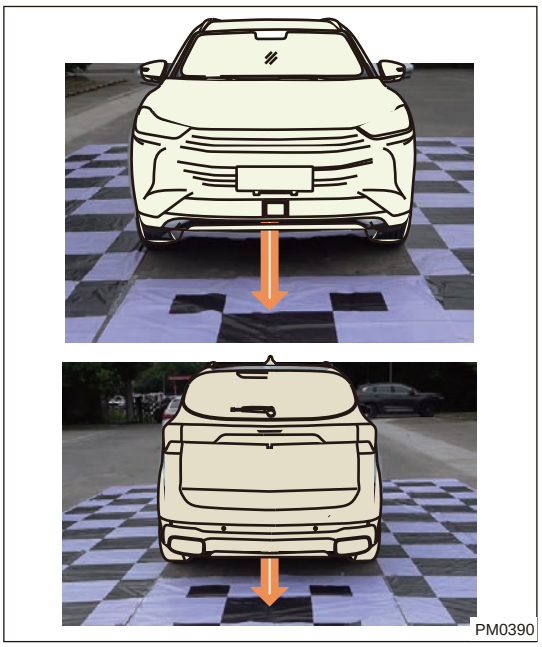
Activation Condition		System Activation	Exit Condition	
Preconditions	Trigger Condition		Corresponding Exit Condition	Priority Exit Condition
			than 1 seconds, and there is no effective operation within the duration time	
			Operate other high priority switches	
D	Parking radar obstacle distance signal 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	
Vehicle speed = 0KM/h, remote start mode	Remote AVM request to turn on	Remote AVM is activated	Remote AVM request to turn off	Remote start mode is exited

Matching Learning

Panoramic Control System

Camera Calibration

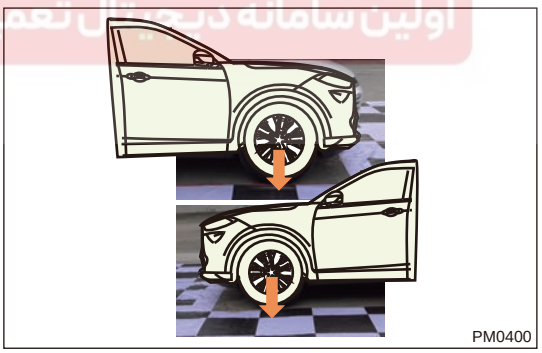
1. Situations needs to perform camera calibration:
   a. When service station removes or installs camera or rear view mirror with camera.
   b. When camera position changes due to vehicle accident.
   c. After replacing panoramic view monitor system controller.
   d. When removing and installing front and rear bumpers.
2. Calibration method:
   a. Park vehicle at the fixed location.
   b. 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.

c. 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.

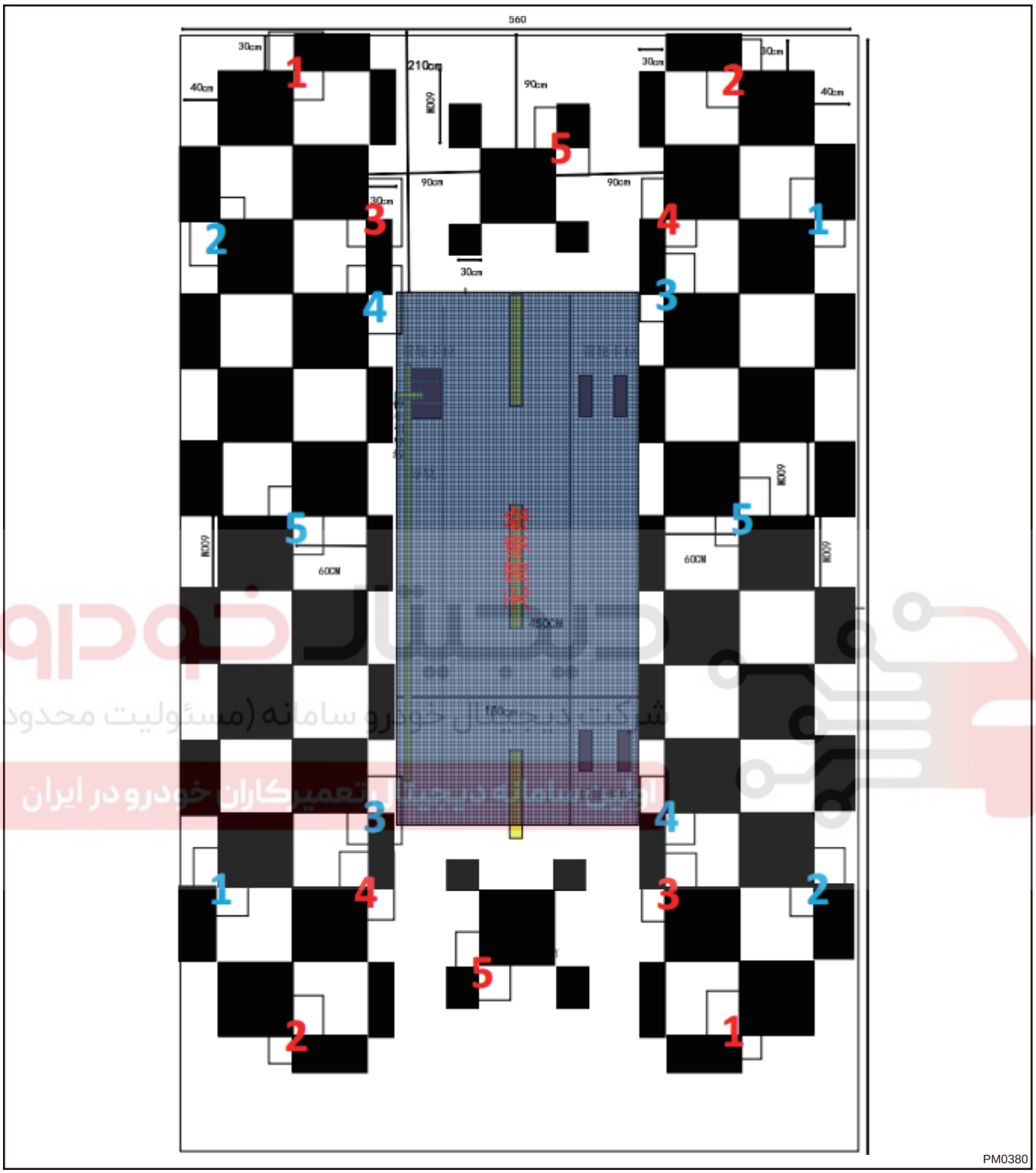


d. Enter calibration mode (calibration function is activated): when ignition switch is on, touch MVM switch, and panoramic image interface is displayed. Click 3 times on left and 3 times on right to enter panoramic image calibration interface.

3. Switch view
   a. Enter panoramic monitoring, press back button to exit panoramic monitoring setting
   b. Enter panoramic display, touch 2D/3D button to switch 2D/3D angle.
   c. Enter panoramic display, touch front/rear wide-angle button to switch front/rear wide-angle.
   d. Enter panoramic display and click button to switch to corresponding view.
   e. Enter panoramic monitoring, click shortcut button on right side of panoramic monitoring to enter panoramic monitoring settings.
4. Calibration environment requirement
   a. 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.
   b. 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.
   c. 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.
   d. 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.

5. Calibration cloth drawing



Diagnosis & Testing

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 reversing 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

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.

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.

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.

Reversing Radar System Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1A01-25	Front Left Sensor Failure - Waveform Failure	/	• Signal or wire harness connector damaged • Main reversing radar damaged	It is recommended to check and repair parking radar assist system
B1A02-25	Front Left Center Sensor Failure - Waveform Failure	/		
B1A03-25	Front Right Center Sensor Failure - Waveform Failure	/		
B1A04-25	Front Right Sensor Failure - Waveform Failure	/		
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	/		
UO140-87	Lost Communication with BCM	/	Refer to CAN communication system	
U0129-87	Lost Communication with Brake System Control Module	/		

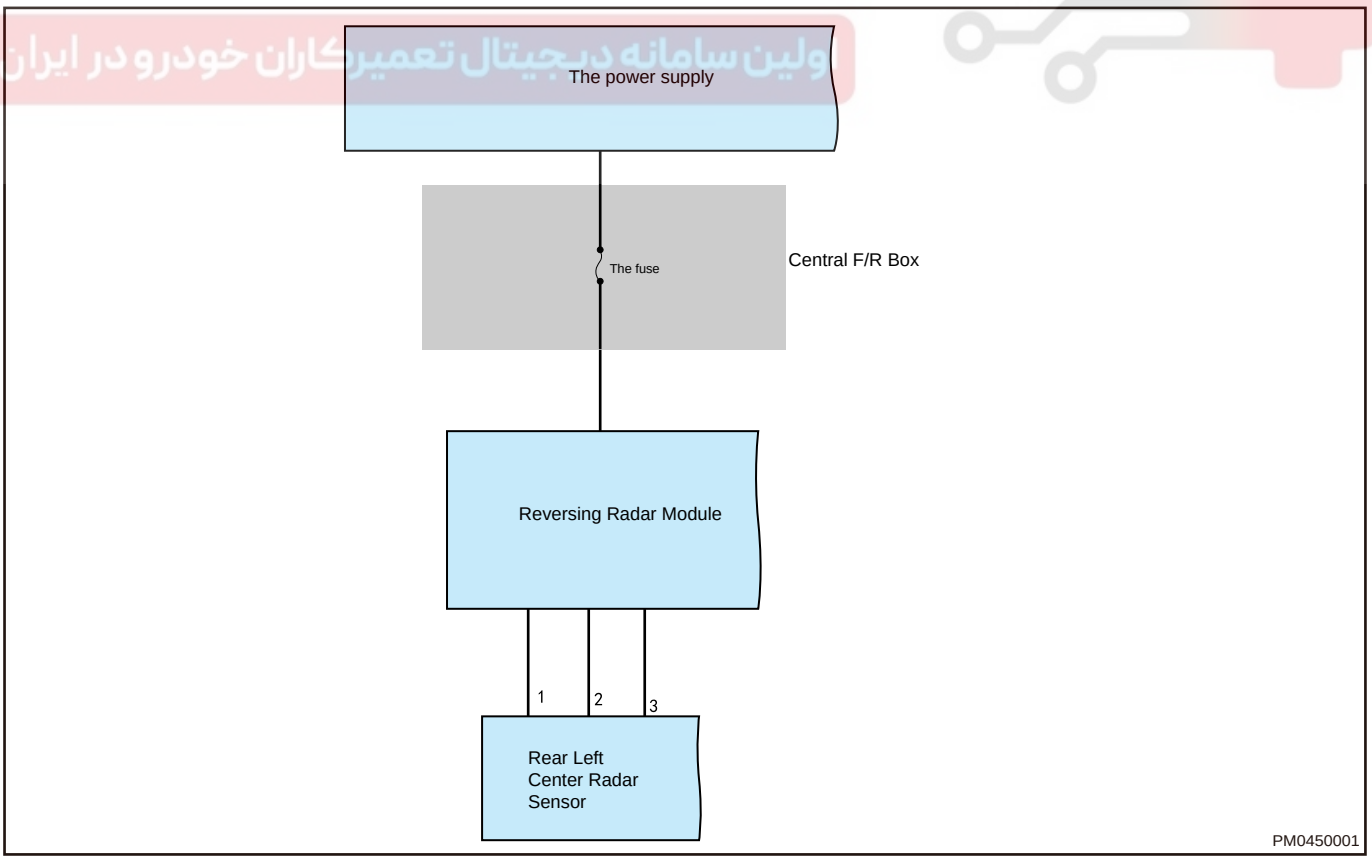
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0155-87	Lost Communication with Instrument Panel Cluster (IPC) Control Module	/		

DTC Diagnosis Procedure

DTC	**B1A01-25**	**Front Left Sensor Failure - Waveform Failure**
DTC	**B1A02-25**	**Front Left Center Sensor Failure - Waveform Failure**
DTC	**B1A03-25**	**Front Right Center Sensor Failure - Waveform Failure**
DTC	**B1A04-25**	**Front Right Sensor Failure - Waveform Failure**
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 center radar as an example.

Description
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:

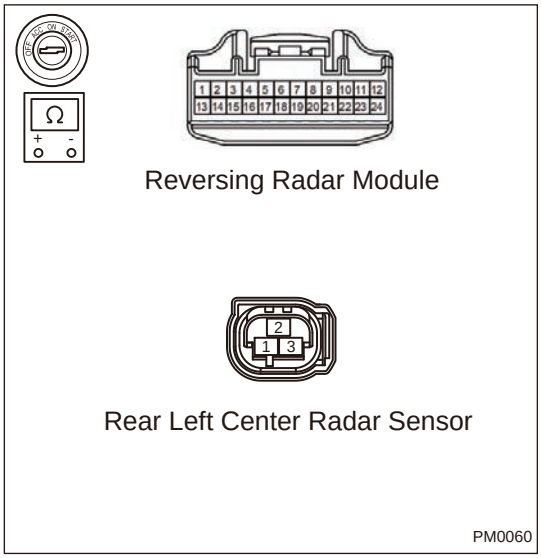
(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect reversing radar module connector and radar sensor connector.

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

(c) Using ohm band of multimeter, check for continuity between reversing radar module and sensor separately

Multimeter Connection	Condition	Specified Condition
Reversing radar module (- connected terminals) - Sensor (1)	Always	⩽ 1 Ω
Reversing radar module (- connected terminals) - Sensor (2)		⩽ 1 Ω
Reversing radar module (- connected terminals) - 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 malfunction diagnosis.

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

NG → **Replace reversing radar module**

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

DTC	**UO140-87**	**Lost Communication with BCM**
DTC	**U0129-87**	**Lost Communication with Brake System Control Module**
DTC	**U0155-87**	**Lost Communication with ICM**

DTC Confirmation Procedure

Refer to CAN communication system

Panoramic Control System (AVM) Diagnostic Trouble Code (DTC) Chart

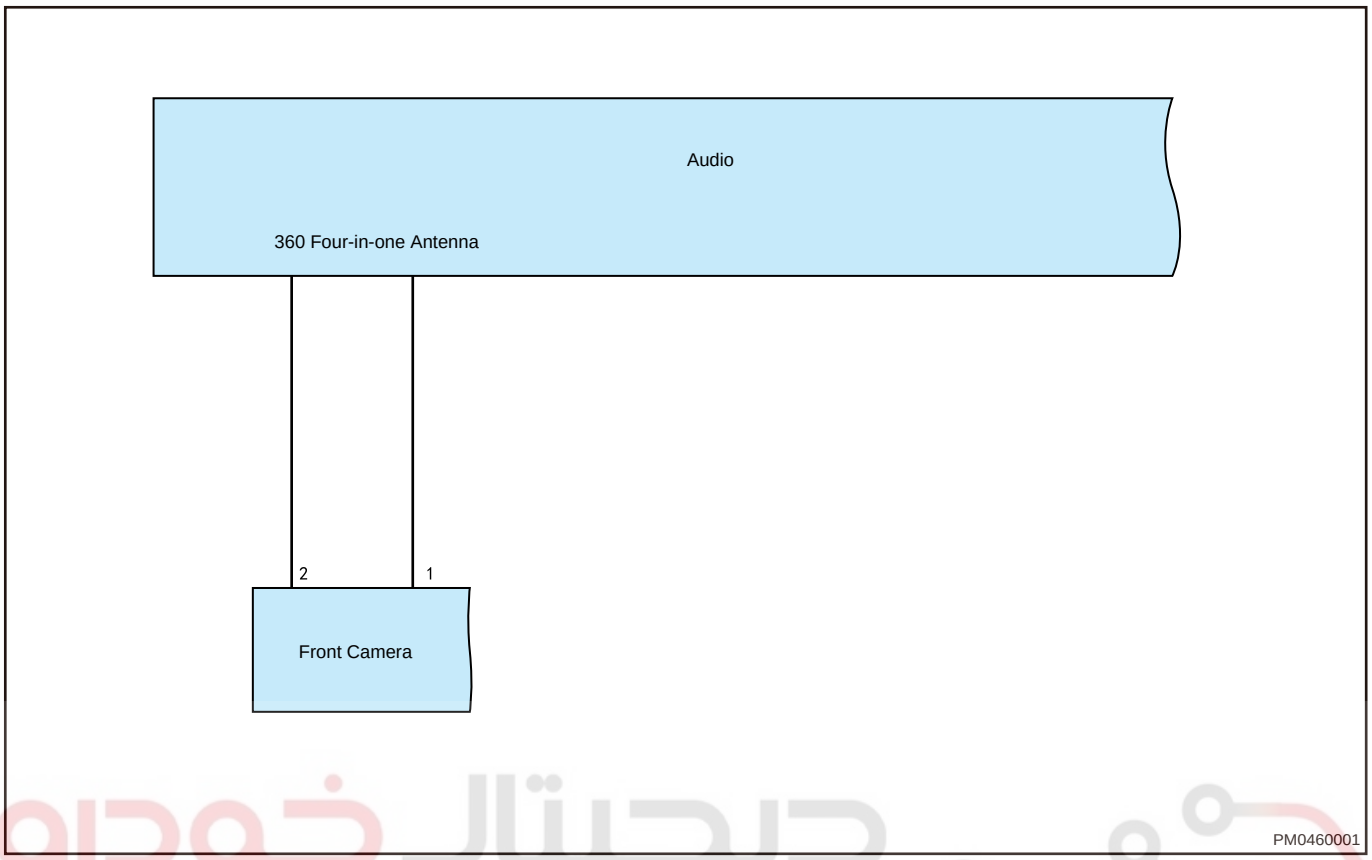
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B1850	AVM Front Camera Power Short to Ground	/	• Camera • Wire harness • Domain Controller	/
B1851	AVM Front Camera Power Short to Battery Positive	/		/
B1852	AVM Front Camera LVDS Cable Open	/		/
B1853	AVM Rear Camera Power Short to Ground	/		/
B1854	AVM Rear Camera Power Short to Battery Positive	/		/
B1855	AVM Rear Camera LVDS Cable Open	/		/
B1856	AVM Left Camera Power Short to Ground	/		/
B1857	AVM Left Camera Power Short to Battery Positive	/		/
B1858	Open in AVM Left Camera Wire Harness	/		/
B1859	AVM Right Camera Power Short to Ground	/		/
B185A	AVM Right Camera Power Short to Battery Positive	/		/
B185B	Open in AVM Right Camera Wire Harness	/		/
B185C	AVM No Calibration	/	Recalibrate it	/
B1849	Panoramic Controller Connection Failure - System Internal Failure	/	Module failure	/

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U014087	Lost Communication with BCM	/	Refer to CAN communication system	/
U015587	Lost Communication with ICM	/		/
U014187	Lost Communication with Reversing Radar	/		/
U012687	Lost Communication with SAM	/		/
U024587	Lost Communication with MMI (RRM)	/		/
U010187	Lost Communication with Transmission	/		/
U010087	Lost Communication with EMS	/		/
U012987	Lost Communication with ESC	/		/
U007388	CAN Bus Off	/		/

DTC Diagnosis Procedure

DTC	**B1850**	**AVM Front Camera Power Short to Ground**
DTC	**B1851**	**AVM Front Camera Power Short to Battery Positive**
DTC	**B1852**	**AVM Front Camera LVDS Cable Open**

Description
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**

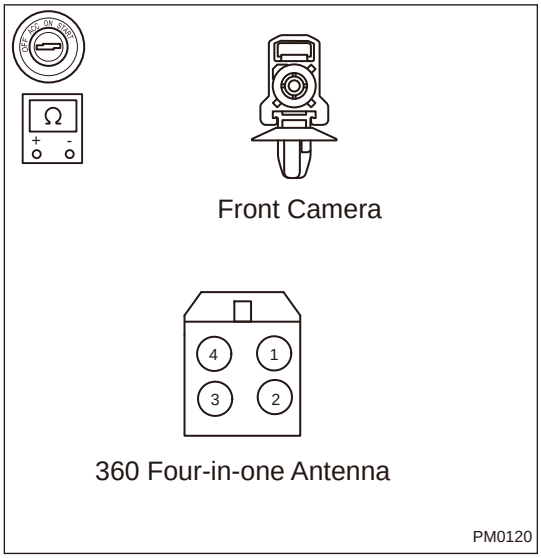
NG

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 (- connected terminal) - Front camera (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 malfunction diagnosis.

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

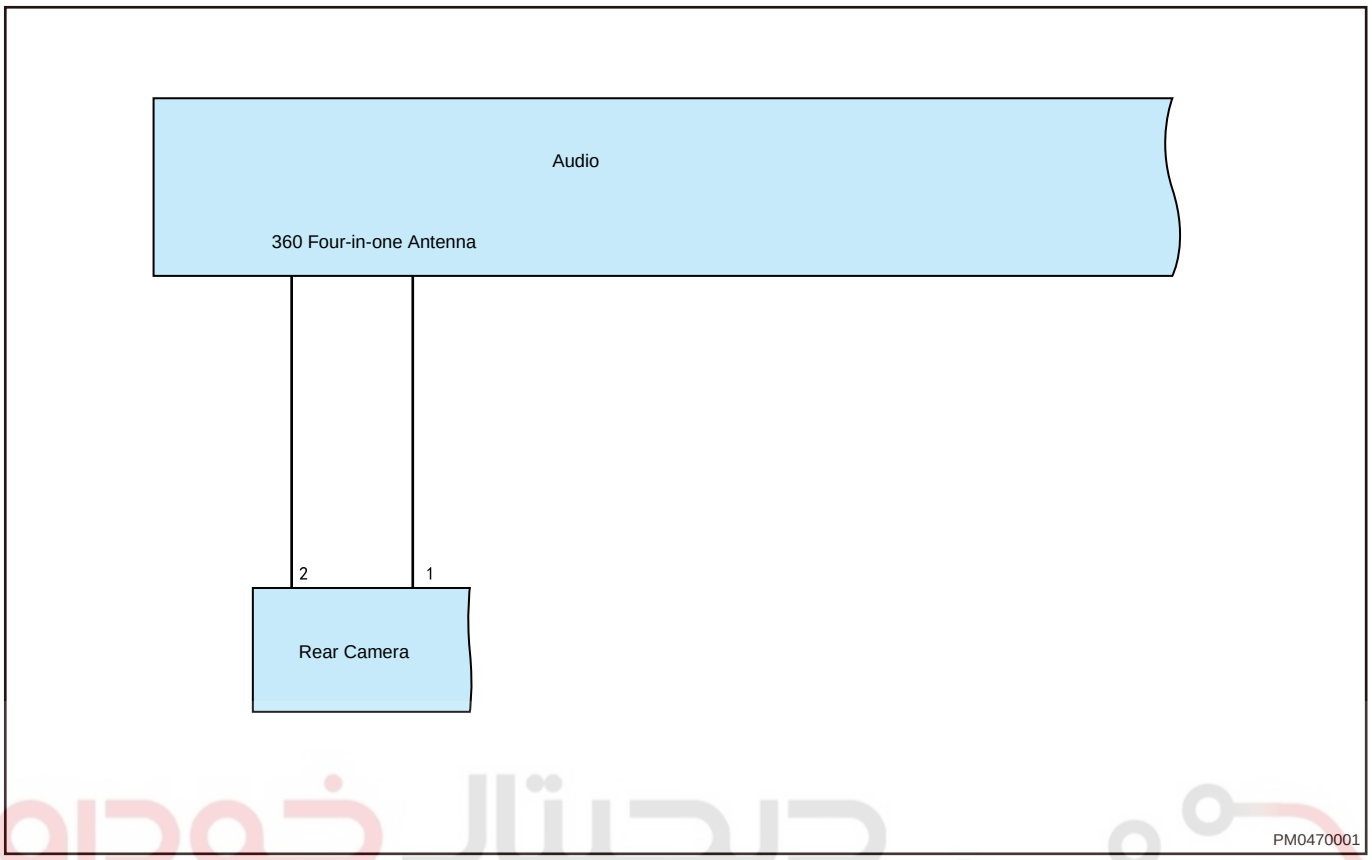
NG → **Replace domain controller**

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

DTC	**B1853**	**AVM Rear Camera Power Short to Ground**
DTC	**B1854**	**AVM Rear Camera Power Short to Battery Positive**
DTC	**B1855**	**AVM Rear Camera LVDS Cable Open**

Description

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**

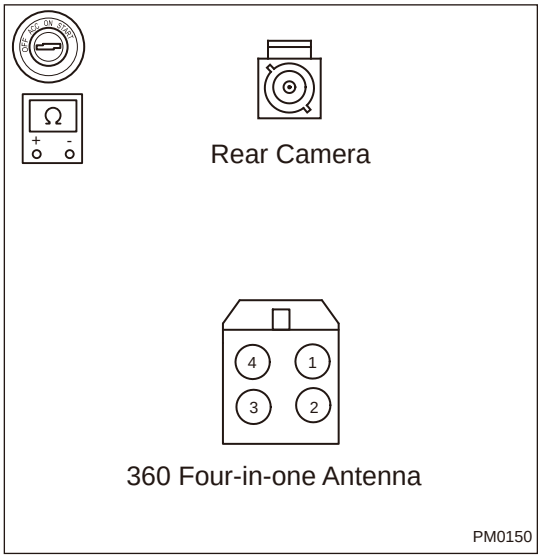
NG

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 connector (- connected terminal) - Rear camera connector (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 malfunction diagnosis.

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

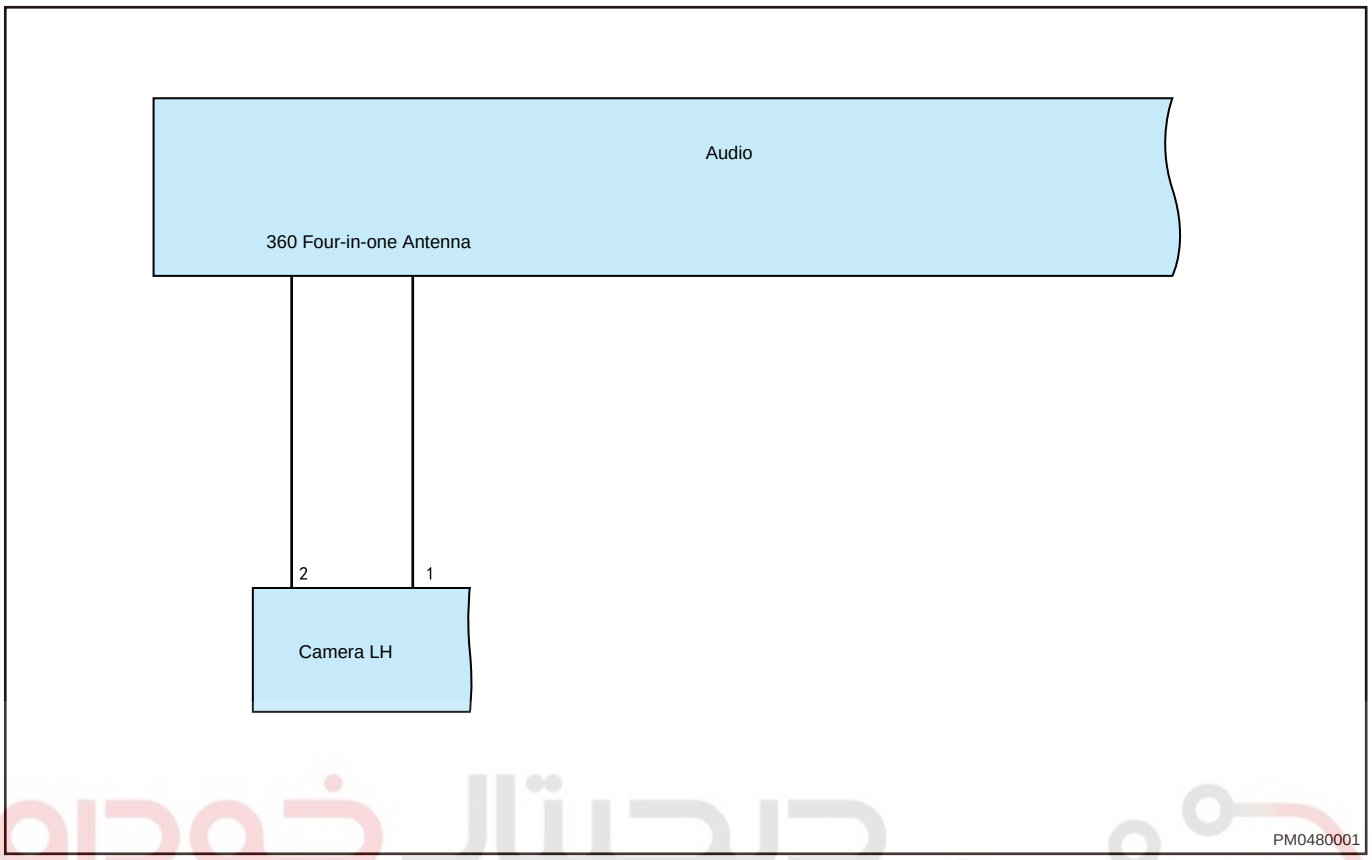
NG → **Replace domain controller**

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

DTC	**B1856**	**AVM Left Camera Power Short to Ground**
DTC	**B1857**	**AVM Left Camera Power Short to Battery Positive**
DTC	**B1858**	**Open in AVM Left Camera Wire Harness**

Description

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**

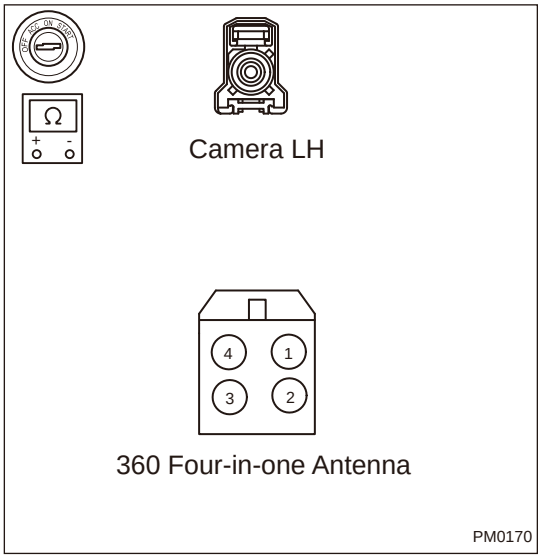
NG

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 (- connected terminal) - Left camera (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 malfunction diagnosis.

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

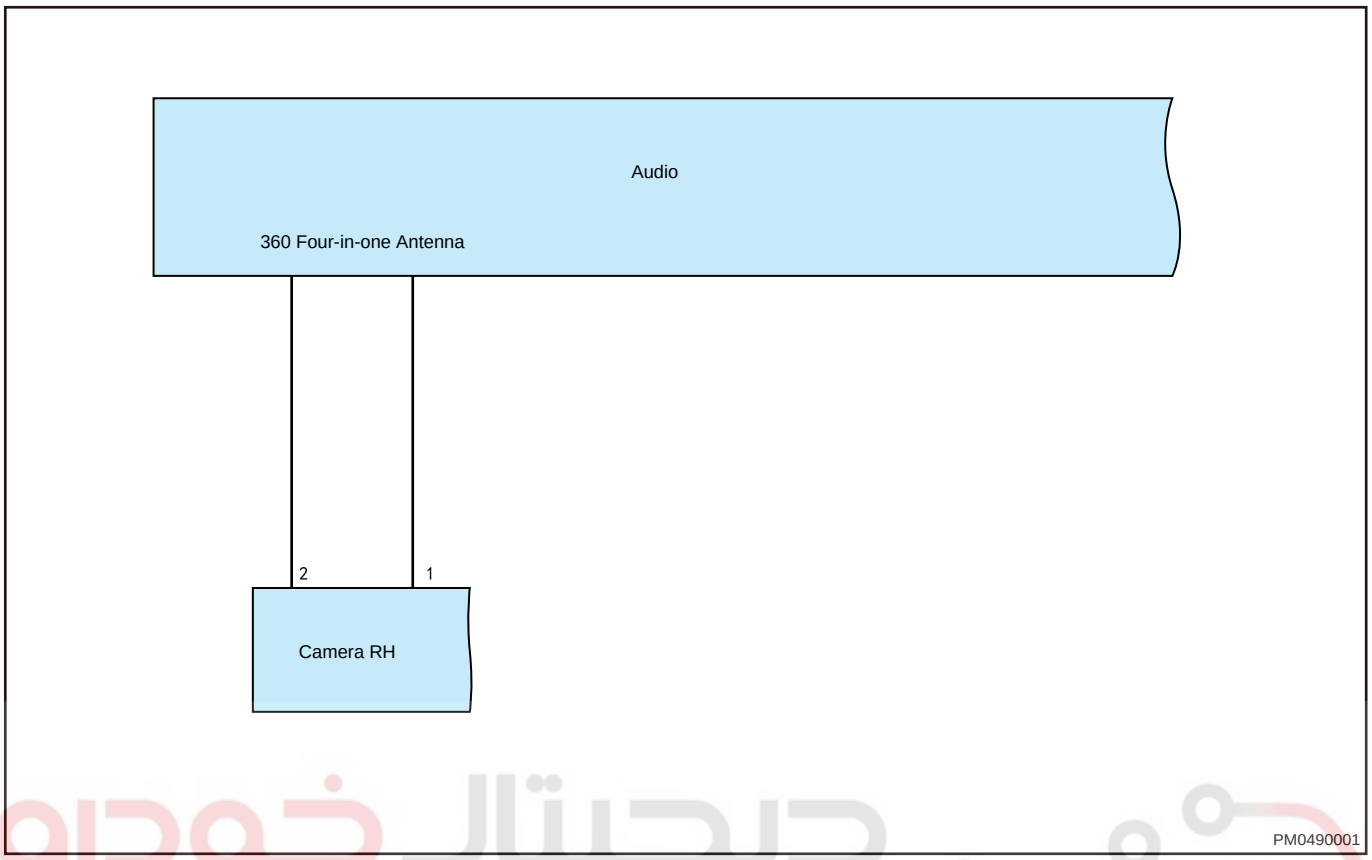
NG → **Replace domain controller**

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

DTC	**B1859**	**AVM Right Camera Power Short to Ground**
DTC	**B185A**	**AVM Right Camera Power Short to Battery Positive**
DTC	**B185B**	**Open in AVM Right Camera Wire Harness**

Description

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**

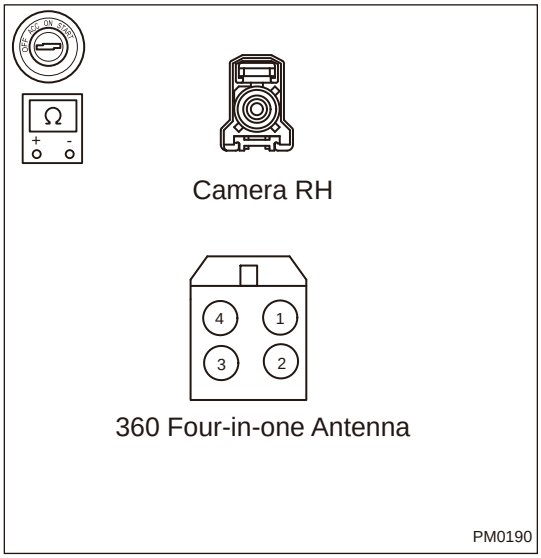
NG

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 malfunction 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	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 malfunction 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	B1849	Panoramic Controller Connection Failure - System 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 OFF.
- Connect the diagnostic tester (the latest software).
- Start engine and warm it up, and then read DTC again. If DTC is detected, malfunction is current.
- If DTC is 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 malfunction diagnosis.
(c) Read the fault information and confirm that the fault has been solved.

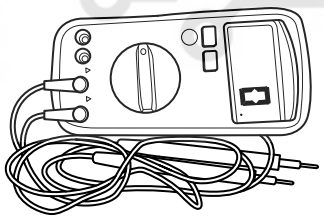
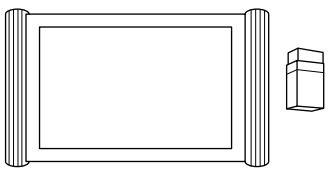
NG	**Replace with a new module to check if fault reoccurs.**
OK	**Conduct test and confirm malfunction has been repaired.**

DTC	**U014087**	**Lost Communication with BCM**
DTC	**U015587**	**Lost Communication with ICM**
DTC	**U014187**	**Lost Communication with Reversing Radar**
DTC	**U012687**	**Lost Communication with SAM**
DTC	**U024587**	**Lost Communication with MMI (RRM)**
DTC	**U010187**	**Lost Communication with Transmission**
DTC	**U010087**	**Lost Communication with EMS**
DTC	**U012987**	**Lost Communication with ESC**
DTC	**U007388**	**CAN Bus Off**

DTC Confirmation Procedure
Refer to CAN communication system

On-vehicle Service

Tools

Tool Name	Tool Drawing
Digital Multimeter	 RCH000206
X-431 PAD Diagnostic Tester	 RCH0001006

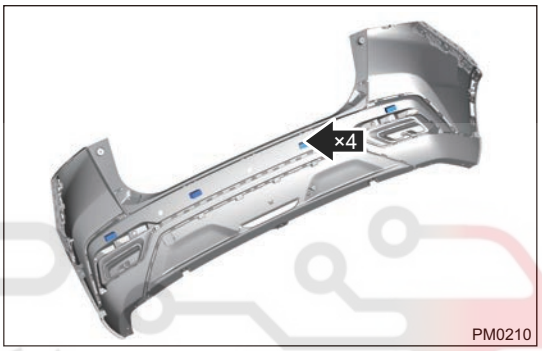
Reversing Radar Sensor

Removal

⚠ Warning

- Be sure to wear necessary safety equipment to prevent accidents, when removing reversing radar sensors.
- Operate carefully to avoid damaging reversing radar sensors, when removing reversing 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 reversing radar sensor connector.



5. Remove reversing radar sensor from slots of rear bumper assembly.

Installation

⚠ Warning

When installing reversing radar sensor, align the boss at end of reversing radar sensor with the slot on rear bumper assembly, and then firmly install reversing radar sensor.

⚠ Caution

- Install connectors in place when installing reversing radar sensors.
- Check reversing radar system for proper operation, after installing reversing radar sensors.

1. Installation is in the reverse order of removal.

Rear Camera Assembly (If Equipped)

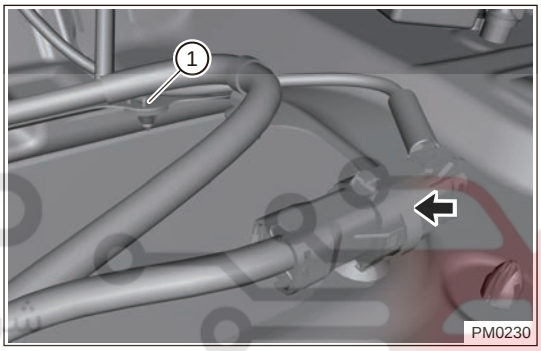
Removal

⚠ 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 back door lower protector assembly.
4. Pry off rear camera from outside with an interior crow plate.

5. Disconnect rear camera connector, pry up fixing clip (1) from camera connector and remove rear camera.



6. Remove the rear camera assembly.

Installation

1. Installation is in the reverse order of removal.

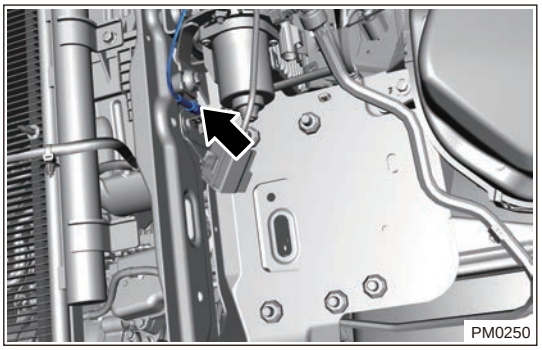
Front Camera Assembly (If Equipped)

Removal

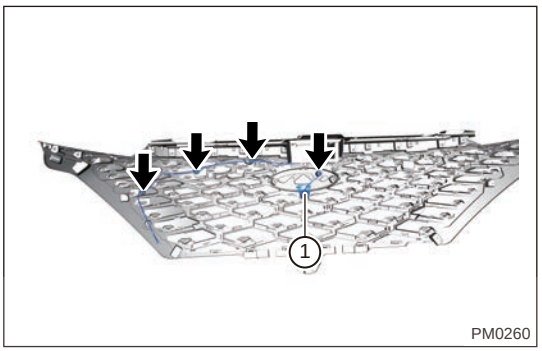
⚠ Warning
• Be sure to wear necessary safety equipment to prevent accidents, when removing front camera assembly. • Appropriate force should be applied when removing front camera assembly. Be careful not to operate roughly.

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 2 fixing bolts (arrow) from camera with a cross screwdriver, then pry off clips and remove camera (1).



Installation

1. Installation is in the reverse order of removal.

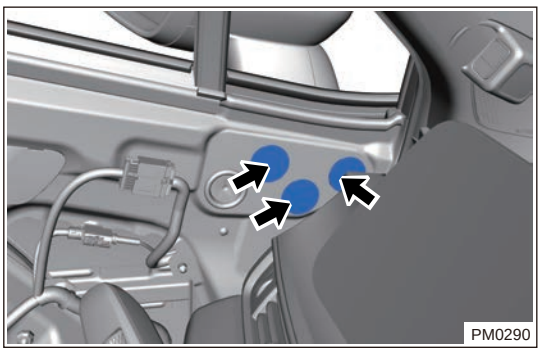
Side Camera Assembly (Both Sides) (If Equipped)

Removal (Take left side as an example)

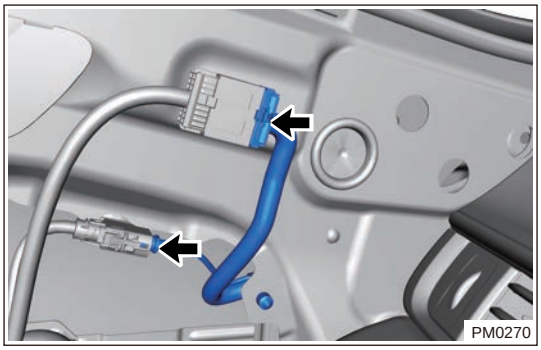
Warning

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 protector block cover.

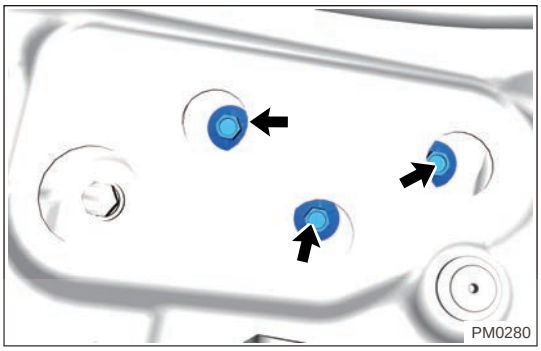


5. Disconnect the left outside rear view mirror connector.


PM0270

6. Remove 3 fixing bolts from left outside rear view mirror.

   Tightening Torque
   7 ± 1 N·m


PM0280

7. Remove the left outside rear view mirror assembly.

Installation

⚠ Caution

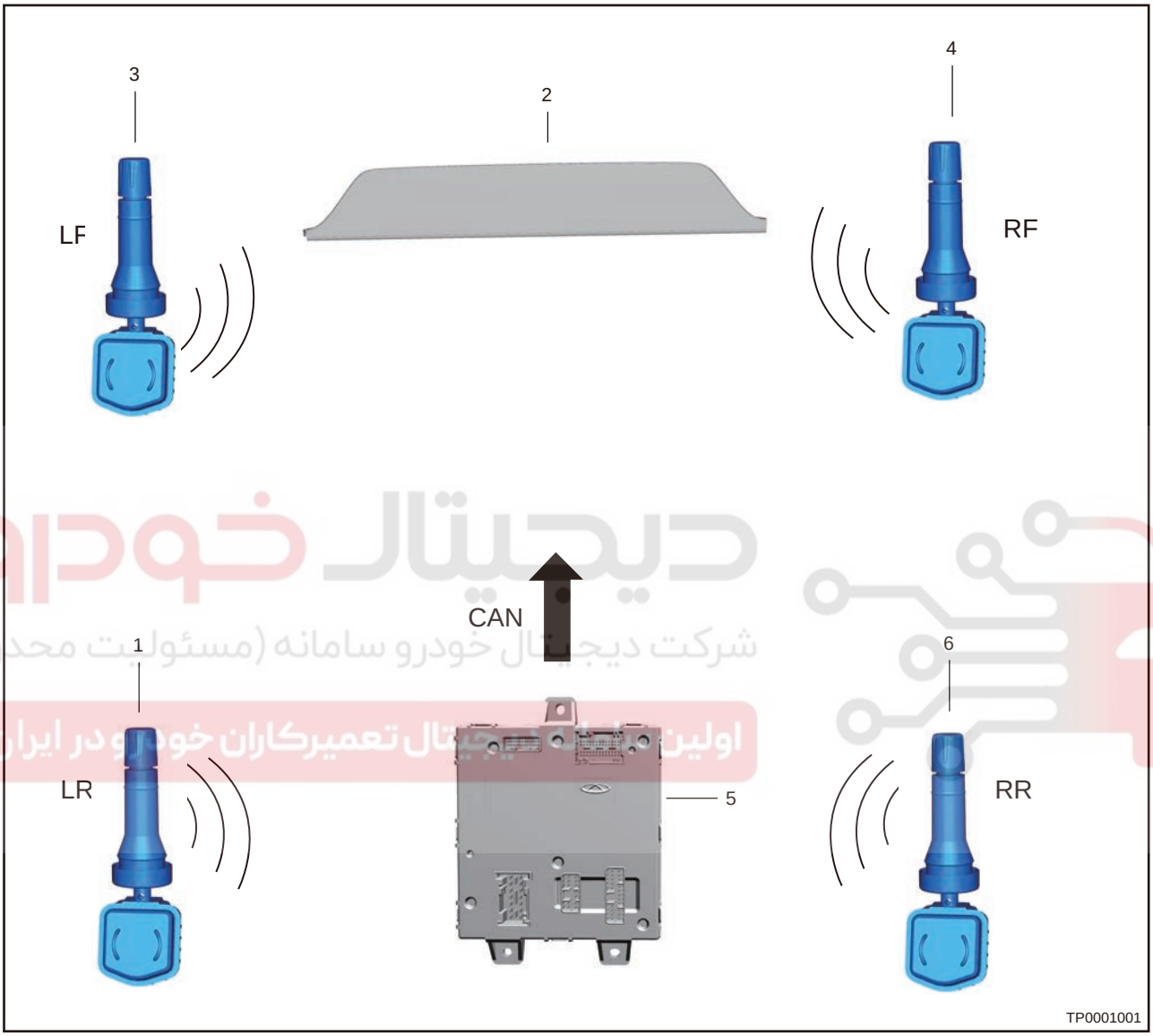
- Install connector in place and tighten fixing nuts to the specified torque, when installing the outside rear view mirror assembly.
- Make sure the outside rear view mirror assembly can move smoothly, flexibly and reliably after installing.
- After installing outside rear view mirror assembly, it is necessary to perform panoramic image calibration.

1. Installation is in the reverse order of removal.

TIRE PRESSURE MONITORING SYSTEM

System Overview

Description



1	Rear Left Tire Pressure Sensor	2	Front Left Tire Pressure Sensor
3	Instrument Cluster	4	Front Right Tire Pressure Sensor
5	Rear Right Tire Pressure Sensor	6	Body Control Module

Tire Pressure Monitoring System (TPMS) is an active safety device, which can monitor tire pressure and temperature in real time and display tire pressure and temperature on meter. When tire pressure is too low or temperature is too high, tire pressure monitoring system will warn the driver of driving danger.

Operation

Tire pressure sensor is the transmitting terminal of tire information, body 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 such as pressure, temperature inside tire, and sends these data to body control module as radio-frequency signal. The wireless communication frequency between tire pressure sensor and body control module is 433 MHz.The body control module receives radio-frequency signal sent from tire pressure sensor and processes these data. Body control module processes data of tire pressure sensor, then sends them to meter via CAN bus. Tire pressure value is displayed on meter via CAN bus signal. When tire pressure is too high or too low, or temperature is too high, it informs driver of abnormal tire.

Tire Pressure System Warning Information

High Temperature or Low Pressure

When there is a low pressure or high temperature alarm due to abnormal pressure or temperature inside the wheel, the tire pressure warning light on meter illuminates immediately and the meter switches to tire pressure monitoring system display screen automatically from normal display screen and indicates which tire is sending the alarm.

System Malfunction

When system malfunction is received by meter, the tire pressure warning light on meter flashes for 75 seconds and then remains on, the center meter display will display “Please inspect the tire pressure monitoring system”, and then the meter switches to tire pressure monitoring system display screen automatically from normal screen.

Low Pressure Alarm

When vehicle tire pressure is less than 1.8 bar, 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 1.8 bar. When there is a low pressure alarm, the waring light remains on and normal screen switches into tire pressure screen directly: The tire with low pressure (e.g., front right tire) will flash and its tire pressure and temperature will be displayed.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.Please resume the tire pressure to 2.3 bar (with an error limit of 0.1 bar). When the vehicle tire pressure resumes to 2.3 bar (with an error limit of 0.1 bar) and the vehicle is continuously driving with a speed higher than 30 Km/h, the system will deactivate the low pressure alarm automatically within 5 minutes.

High Temperature Alarm

When the vehicle tire temperature is higher than 85 ℃ 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 ℃.When temperature of front wheel reaches 88 ℃, which is higher than high temperature alarm threshold (85 ℃), the system will send high temperature alarm, front left wheel symbol will flash, the tire pressure and temperature values will be displayed and tire pressure warning light remains on.When there is a high temperature alarm, the warning light remains on and normal screen switches to tire pressure screen directly: The tire with high temperature (e.g., front right tire) will flash and its tire pressure and temperature values will be displayed. 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 the vehicle wheel temperature is lower than 80 ℃ and the vehicle is continuously driving with a speed higher than 30 Km/h, the system will deactivate high temperature alarm automatically within 5 minutes. The system stores the history DTCs.

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 “Please inspect and repair the tire pressure monitoring system”, and the

indication symbol will remain on after flashing for 75 seconds. The meter system will also switch to tire pressure monitoring system display screen automatically.

High Pressure Display

- If the tire pressure is higher than 3.5 bar, the tire pressure will be displayed as –; but the temperature will be displayed normally.
- If the tire pressure is less than 3.50 bar, it will resume normal display within 5 minutes.
- If the alarm is caused by high tire pressure, just resume it to 2.3 bar.

Detection Requirements of Tire Pressure Sensor
If assembly of tire pressure sensor is performed in tire sub assembly workshop, it is necessary to perform test after tire assembly is assembled. After tire assembly is assembled, the sensor should meet:

- The low frequency wake-up function of tire pressure sensor is intact, that is, low frequency trigger device can wake up the tire pressure sensor.
- Detection function of tire pressure sensor is intact, that is, sensor can detect pressure value and temperature value inside tires.
- Communication function of tire pressure sensor is intact, that is, sensor can send pressure value and temperature value inside tires as high frequency signal.

Configuration & Learning for Tire Pressure Monitoring System

Tire Pressure Sensor Learning Methods

Precautions

No.	Precautions	Details
1	Avoid error learning of tire	Tire learned on diagnostic tester menu must be matched with bleeding tire
2	Avoid error learning of tire	Only operate one tire every time, and do not bleed (or inflate) other tires at this time
3	Avoid error learning of tire	Keep away from other vehicles with tire pressure sensor, avoiding error learning or interference

If only one tire is to be replaced, other tires should not be replaced and their positions should not be changed, only learn one tire separately.

Correction Methods for Tire Pressure Monitoring System Are As Follows:

- Keep vehicle speed more than 30 Km/h for about 45 seconds.
- If tire pressure monitoring system can operate normally, pressure information of four tires will be displayed.
- If certain tire pressure information is still not displayed, tire configuration may error and needs to be relearned.

Tire Pressure Learning Method for Inflating/Bleeding
Learning Process

Hint:
After learning is finished, use tire pressure gauge to inflate tire to standard pressure, then perform correction on tire pressure monitoring system with vehicle speed higher than 30 Km/h for 45 seconds.

1	**Start**

Next

2	There is enough pressure in tire (full loaded pressure is recommended)

Next

3	Tire pressure monitoring system enters learning status by operating diagnostic tester

Next

4	Perform tire pressure bleeding (for about 20 seconds)

Next

5	Learned tire pressure value can be displayed on meter

Next

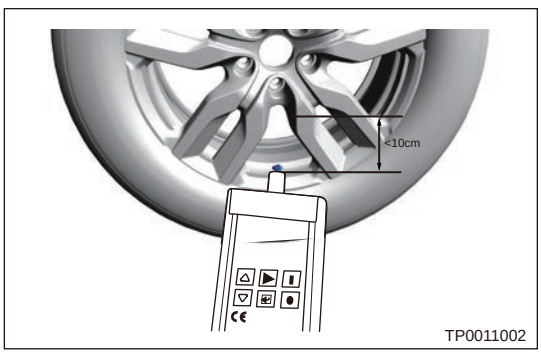
6	Learning is successful

Next

7	End

Tire Pressure Learning Method for Low-Frequency Trigger

1. If the malfunction is suspected in tire pressure sensor, use the low-frequency trigger to perform test.
2. After turning the 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.
3. Distance between low-frequency trigger and tire pressure sensor is less than 10 cm. Place the antenna of low-frequency trigger near the tire with 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.



TP0011002

1	Start

Next

2	**ENGINE START STOP switch is in IGN-ON**

Next

3	**Tire pressure monitoring system enters learning status by operating diagnostic tester**

Next

4	**Trigger tire pressure sensor to be learned using low-frequency trigger**

Next

5	**Tire pressure sensor ID, temperature and pressure values are displayed on low-frequency trigger**

Next

6	**Learning is successful**

Next

7	**End**

Inspection of Tire Pressure Monitoring System Learning Status

1. After reconfiguring tire pressure monitoring system, use reading datastream function to perform inspection for each tire pressure sensor learning status in tire pressure monitoring system (take front left wheel as an example).
   a. Front left sensor ID can be read using diagnostic tester, if learning status is successful, it indicates that body control module is matched with front left sensor successfully. If not, it indicates that the match is not successful and front left wheel sensor should be relearned.
2. Use diagnostic tester to read following datastreams with vehicle speed higher than 30 Km/h for more than 45 seconds:
   a. Front left sensor pressure: 2.2 Bar
   b. Front left sensor temperature: 26 ˚C
   c. Temperature is not default and tire pressure is close to the value displayed on meter, which indicate that body control module can receive wireless signals from front left tire pressure sensor. Or, it indicates that learning is not successful or tire pressure sensor is faulty.

Diagnosis & Testing

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 flashes)	Tire pressure is less than 1.9 bar	Check and charge tire pressure
	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Body Control Module (BCM) damage	Replace body control module and perform sensor learning
High temperature alarm (warning light remains on, wheel symbol flashes)	Tire temperature is higher than 85°C	Cool down naturally
	Tire pressure sensor function is disabled	Replace, perform configuration and learning
	Body Control Module (BCM) damage	Replace body 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 value of corresponding wheel does not display and wheel symbol will flash)	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 Control Module (BCM) damage	Replace
	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 45 seconds
	Replaced tire pressure sensor is not configured correctly, sensor is not learned	Perform configuration and learning
	Body Control Module (BCM)	Replace body 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 pressure information displays as “–”)	Tire pressure sensor function is disabled	Replace, perform configuration and learning

Symptom	Suspected Area	Troubleshooting
	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 Control Module (BCM) damage	Replace
	Tire pressure system set	Check and repair

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.

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.

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.

Precautions for Maintaining Tire Pressure Monitoring System

Tire Inflation

- 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. Do not inflate tires with high tire temperature, which will cause serious damage to the tire, even blowouts, resulting in accidents.

Tire Pressure Sensor

- When system is faulty or disabled, check tire pressure sensor and judge if it is the tire pressure sensor in Tiggo 5x of Chery Automobile Co., Ltd. If tire pressure sensor of other manufacturers (not in Chery Automobile Co., Ltd.) is used by customer, configuration and learning for tire pressure sensor cannot be performed and system is abnormal or disabled.
- 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, it is not necessary to remove nut from the sensor. If the tire pressure sensor nut is removed with tire pressure higher than atmosphere pressure, there is possibility of danger.
- Always use torque wrench when installing tire pressure sensor, with a torque of 8 ±1 N·m. If the torque is relatively low, air leakage may occur, resulting in a risk of danger; if the torque is relatively high, tire pressure sensor or related components may be damaged, resulting in a risk of danger.

Tire Pressure Value Increasing

- When vehicle is driving normally, heat is generated in the tire due to friction, which will cause tire pressure to increase. For every 10°C increase in tire temperature, tire pressure will increase by about 0.1 bar.

Tires Replacement

- If replacing tires with tire pressure monitoring system with ones without tire pressure monitoring system, system malfunction alarm will occur. If replacing with tire equipped with tire pressure sensor (-Tiggo 5x of Chery Automobile Co., Ltd.), system malfunction alarm still will occur without performing configuration and learning. Spare tire in Tiggo 5x is not equipped with tire pressure sensor, so tire pressure monitoring system is still malfunctioning when spare tire is used in vehicle with tire pressure monitoring system.
- When replacing tire, perform operations following assembly specification of tire pressure, to avoid damaging tire pressure sensor during replacement. For installation and removal of tire, refer to Installation and Removal of Tire Pressure Sensor sections. Never allow tire bead breaker and tire tread to squeeze the sensor.

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
C1403-29	Front Left Hand Sensor Signal Invalid	/	Tire pressure sensor fails to send RF signal or the sent signal is too weak. The reception effect of body control module is poor, and no RF signal is received.	/
C1403-55	Front Left Hand Sensor Not Configured	/	Perform BCM function configuration, learning function is not finished.	/
C1403-96	Front Left Hand Sensor Component Internal Fail	/	Sensor operates abnormally, and RF data sent shows a malfunction in sensor.	/
C1404-29	Front Right Hand Sensor Signal Invalid	/	Tire pressure sensor fails to send RF signal or the sent signal is too weak. The reception effect of body control module is poor, and no RF signal is received.	/
C1404-55	Front Right Hand Sensor Not Configured	/	Perform BCM function configuration, learning function is not finished.	/
C1404-96	Front Right Hand Sensor Component Internal Fail	/	Sensor operates abnormally, and RF data sent shows a malfunction in sensor.	/
C1405-29	Rear Left Hand Sensor Signal Invalid	/	Tire pressure sensor fails to send RF signal or the sent signal is too weak. The reception effect of body control	/

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
			module is poor, and no RF signal is received.	
C1405-55	Rear Left Hand Sensor Not Configured	/	Perform BCM function configuration, learning function is not finished.	/
C1405-96	Rear Left Hand Sensor Component Internal Fail	/	Sensor operates abnormally, and RF data sent shows a malfunction in sensor.	/
C1406-29	Rear Right Hand Sensor Signal Invalid	/	Tire pressure sensor fails to send RF signal or the sent signal is too weak. The reception effect of body control module is poor, and no RF signal is received.	/
C1406-55	Rear Right Hand Sensor Not Configured	/	Perform BCM function configuration, learning function is not finished.	/
C1406-96	Rear Right Hand Sensor Component Internal Fail	/	Sensor operates abnormally, and RF data sent shows a malfunction in sensor.	/
C1413-98	Front Left Hand Tire Temperature Component or System Over Temperature	/	Sensor operates abnormally, and RF data sent shows a malfunction in sensor. Sensor operates abnormally, and RF data sent shows a malfunction in sensor.	/
C1414-98	Front Right Hand Tire Temperature Component or System Over Temperature	/		/
C1415-98	Rear Left Hand Tire Temperature Component or	/		/

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
	System Over Temperature			
C1416-98	Rear Right Hand Tire Temperature Component or System Over Temperature	/		/
C1417-16	Front Left Hand Sensor Voltage, Component or System Low Voltage	/	Battery is depleted	/
C1418-16	Front Right Hand Sensor Voltage, Component or System Low Voltage	/		/
C1419-16	Rear Left Hand Sensor Voltage, Component or System Low Voltage	/		/
C141A-16	Rear Right Hand Sensor Voltage, Component or System Low Voltage	/		/
C142A-49	Receiver Internal Electronic Failure	/	CAN system fault	/

DTC Diagnosis Procedure

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**

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 body control module

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

(a) Using a digital multimeter, measure voltage between power supply terminal of body 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 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.

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 Control Module (BCM)

(a) After replacement, it is necessary to perform configuration.

NG → **Repair or replace Body Control Module (BCM).**

OK → **System operates normally.**

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**

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 body control module**

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

(a) Using a digital multimeter, measure voltage between power supply terminal of body 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 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.

NG → **Reconfigure tire pressure sensor of malfunctioning wheel.**

OK

4	**Check body control module of malfunctioning wheel**

(a) After replacement, perform configuration and test.

NG → **Replace body control module of malfunctioning wheel.**

OK

5	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 → **System operates normally.**

DTC	C1403-96	Front Left Hand Sensor Component Internal Fail
DTC	C1404-96	Front Right Hand Sensor Component Internal Fail
DTC	C1405-96	Rear Left Hand Sensor Component Internal Fail
DTC	C1406-96	Rear Right Hand Sensor Component Internal Fail

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 body control module

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

(a) Using a digital multimeter, measure voltage between power supply terminal of body 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 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.

NG → **Reconfigure tire pressure sensor of malfunctioning wheel.**

OK

4	**Check body control module of malfunctioning wheel**

(a) After replacement, perform configuration and test.

NG → **Replace body control module of malfunctioning wheel.**

OK

5	**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 → **System operates normally.**

DTC	**C1413-98**	**Front Left Hand Tire Temperature Component or System Over Temperature**
DTC	**C1414-98**	**Front Right Hand Tire Temperature Component or System Over Temperature**
DTC	**C1415-98**	**Rear Left Hand Tire Temperature Component or System Over Temperature**
DTC	**C1416-98**	**Rear Right Hand Tire Temperature 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 power supply voltage of body control module

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

(a) Using a digital multimeter, measure voltage between power supply terminal of body 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 control module ground circuit.**

OK

3	Check configuration of tire pressure monitoring system

(a) When the temperature of one or more tires is higher than 85 ˚C and the vehicle is continuously driving with a speed higher than 30 Km/h for certain period of time, the system will send a high temperature alarm.

(b) When a high temperature alarm occurs, stop vehicle to cool the tire naturally, otherwise there is a danger of accident.

(c) When tire temperature is too high, never cool the tire by pouring cold water, otherwise, tire may be damaged, resulting in an accident.

(d) When the vehicle is continuously driving with a speed higher than 30 Km/h for certain period of time and tire temperature is less than 85 ˚C, the high temperature alarm can be deactivated automatically.

NG → **Cool down naturally.**

OK

4	Check body control module of malfunctioning wheel

(a) After replacement, perform configuration and test.

NG → **Replace body control module of malfunctioning wheel.**

OK

5	**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 → **System operates normally.**

DTC	**C1417-16**	**Front Left Hand Sensor Voltage, Component or System Low Voltage**
DTC	**C1418-16**	**Front Right Hand Sensor Voltage, Component or System Low Voltage**
DTC	**C1419-16**	**Rear Left Hand Sensor Voltage, Component or System Low Voltage**
DTC	**C141A-16**	**Rear Right Hand Sensor Voltage, Component or System Low Voltage**

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 body control module**

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

(a) Using a digital multimeter, measure voltage between power supply terminal of body 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 control module ground circuit.**

OK

3	Check if tire pressure information is displayed

(a) If tire pressure information of malfunctioning wheel is still not displayed, it is necessary to replace tire pressure sensor.

NG → **Replace tire pressure sensor.**

OK

4	Check body control module of malfunctioning wheel

(a) After replacement, perform configuration and test.

NG → **Replace body control module of malfunctioning wheel.**

OK → **System detection is normal.**

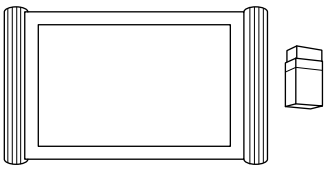
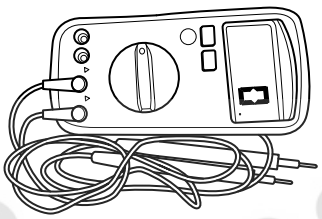
DTC	C142A-49	Receiver Internal Electronic Failure

⚠ Caution

- When above DTCs occur, perform inspection on CAN system of entire vehicle to find out the trouble area and perform troubleshooting.

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206
Low Frequency Trigger	 RCH009806

Torque Specifications

Description	Torque (N·m)
Body Control Module Fixing Nut	5 ± 1
Tire Pressure Sensor Fixing Nut	5 ± 1

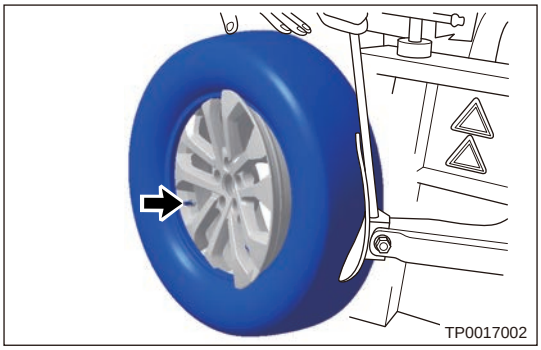
Tire

Removal

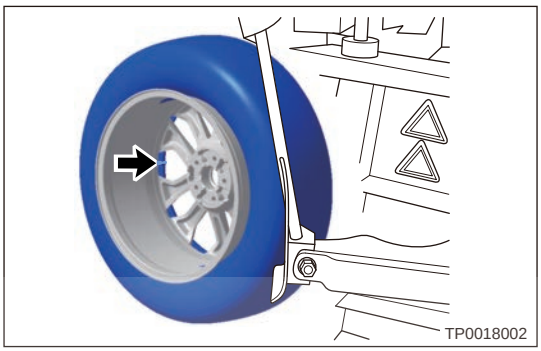
1. Remove tire and deflate tire completely.

   Hint:
   During tire bead breaking, follow the operation specification, never damage the tire pressure sensor.

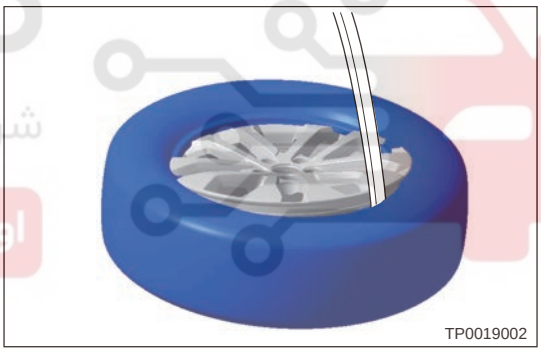
2. Keep one side with tire pressure sensor 30 cm away from separation shovel (arrow), and put shovel block between rim and tire, then depress the pedal to separate rim and tire.



3. Turn over tire to keep one side with tire pressure sensor 30 cm away from separation shovel (arrow), and put shovel block between rim and tire, then depress the pedal to separate rim and tire.

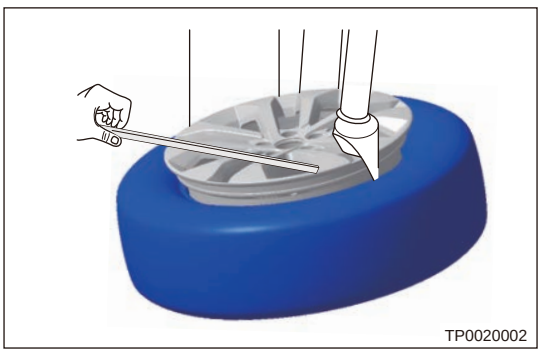


4. Lock tire on wheel, lower replacer head and keep it 5 - 15 cm away from sensor.



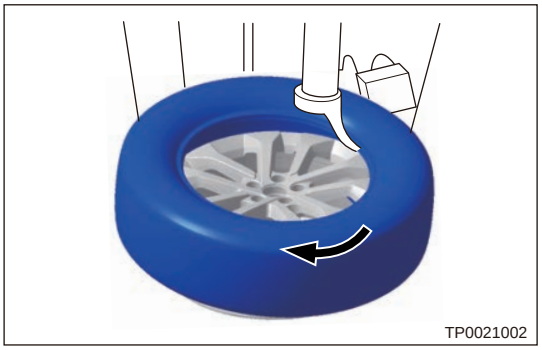
5. Use crowbar to pry out outside tire, and sleeve it to replacer head, then take away crowbar.

   Hint:
   Both crowbar and tire cannot contact with sensor!

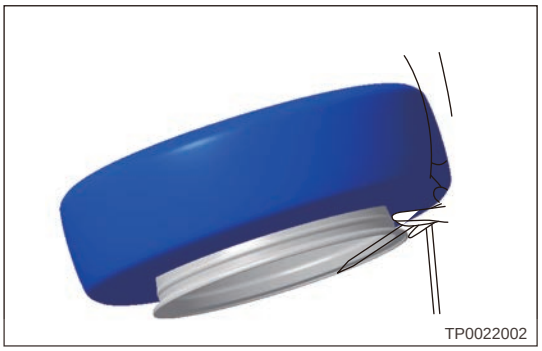


6. Remove the wheel.

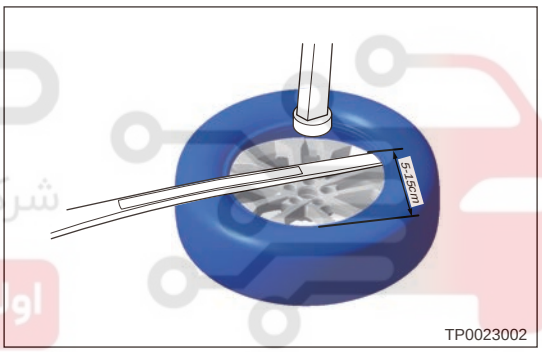
a. Rotate wheel, and the movable direction of wheel should be the direction that replacer head is gradually kept away from tire pressure sensor (rotation arrow), then remove upper part of tire.



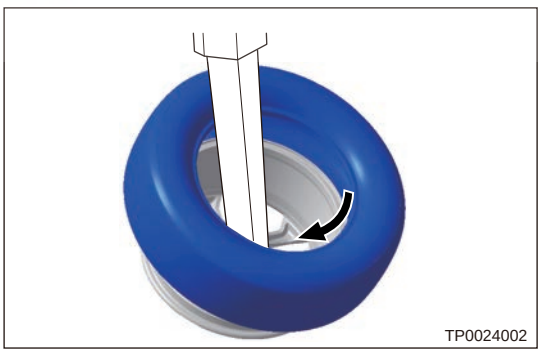
b. Lift tire and pry out lower part of tire using crowbar.



c. 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.



d. Rotate wheel, and the movable direction of wheel should be the direction that replacer head is gradually kept away from tire pressure sensor (rotation arrow), then pry out tire completely.



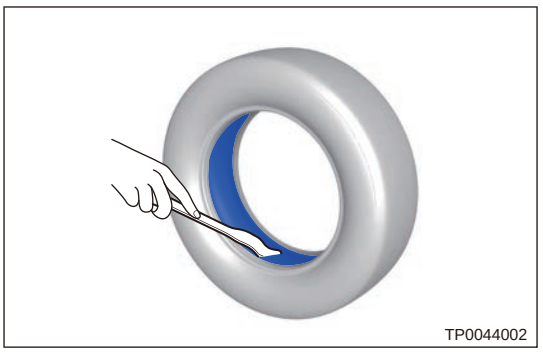
Installation

⚠ Caution

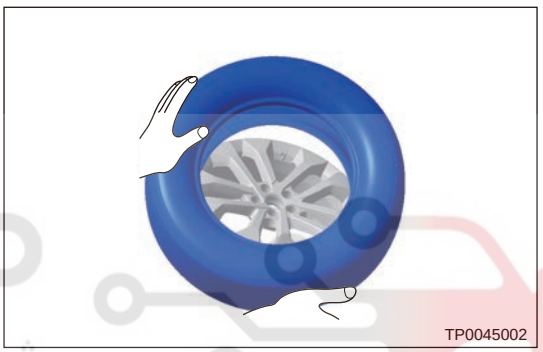
- Be sure to observe the operation regulation to prevent tire pressure sensor from being damaged.
- Both crowbar and tire cannot contact with sensor.
- Confirm that distance between intersection and valve stem is proper.

1. When the tire is packaged, the position of the tire pressure sensor should be 270° ± 10°, so as not to damage the tire pressure sensor directly or indirectly during the installation process.

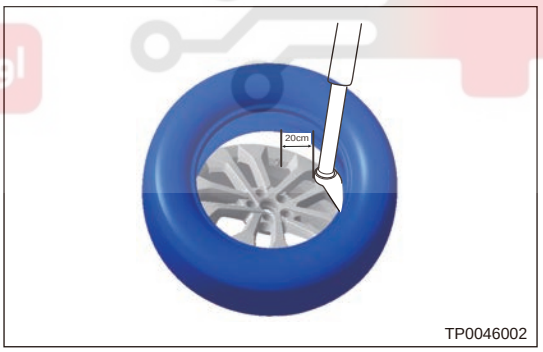
2. Installation is the same as common tire. Before loading tire, apply soapy water or glycerin to tire bead along inner circle.



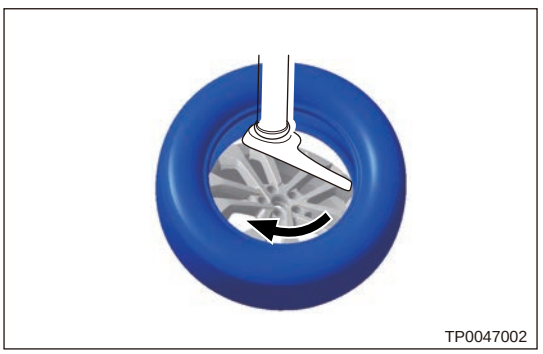
3. Put tire on hub and keep intersection between hub and tire edge 15 - 20 cm away from valve stem.



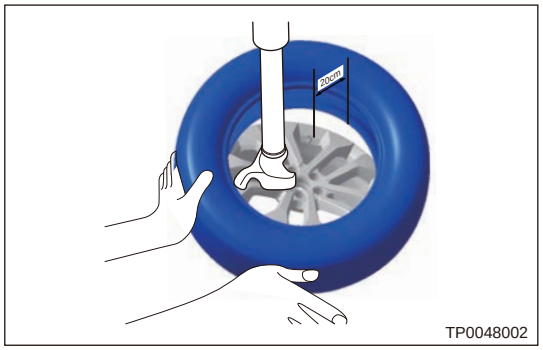
4. Install bottom tire to make sure the distance between intersection and valve stem is about 20 cm.



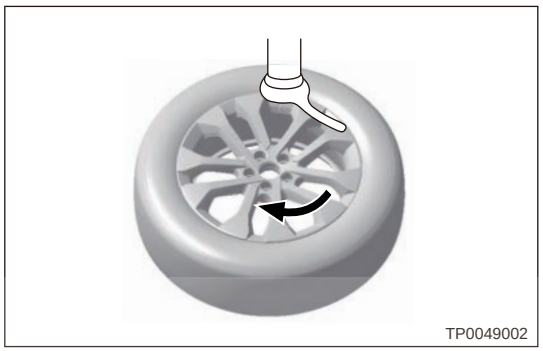
5. Rotate wheel to install one side of tire into hub. Rotation direction of wheel (rotation arrow) should be the direction that makes replacer head get farther and farther away from sensor.



6. Put another side of tire in place, so that intersection between tire edge and hub is 20 cm away from valve stem. Curving arrow indicates rotation direction of wheel.



7. Rotate wheel to install another side of tire into hub.



Tire Pressure Sensor

Removal

⚠ Caution

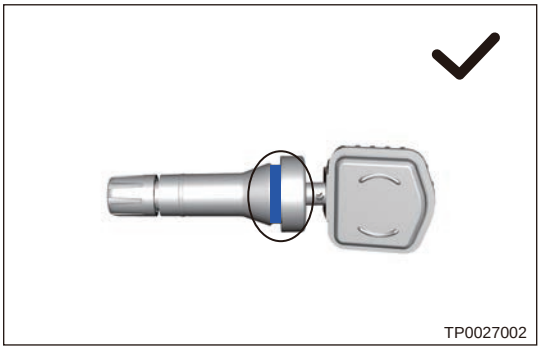
- Avoid dropping the sensor. If tire pressure sensor is dropped from a place 1m high to the ground, it is interpreted as fault in tire pressure sensor.
- Tire pressure sensor must be installed on clean and dry hub.
- Valve cap must be on the valve, except inflation, deflation, air pressure inspection, etc.
- Sensor air pressure inlet cannot be covered partially or completely by lubricant or other materials.
- During removal and installation of tire, used tools cannot contact with tire pressure sensor, and tires cannot extrude tire pressure sensor, to avoid damage to the tire pressure sensor.

1. Remove tire from wheel hub.
2. Remove tire pressure sensor from wheel hub.

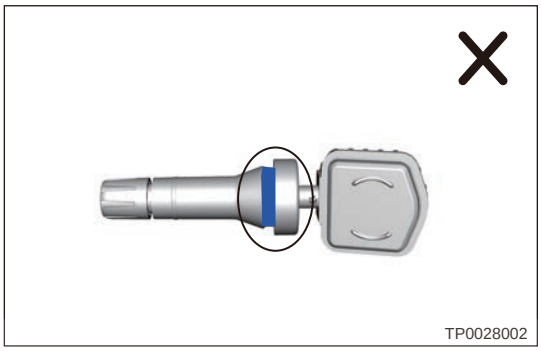
Installation

1. Adjust plane direction of seal washer cutout.
   a. When removing sensor body, first check if seal washer cutout plane is parallel with the polyester plane. If they are not parallel and there is an angle between two planes, turn seal washer to make seal washer cutout plane parallel with polyester plane.

b. If seal washer cutout plane is parallel with polyester plane, it indicates that assembly is qualified.

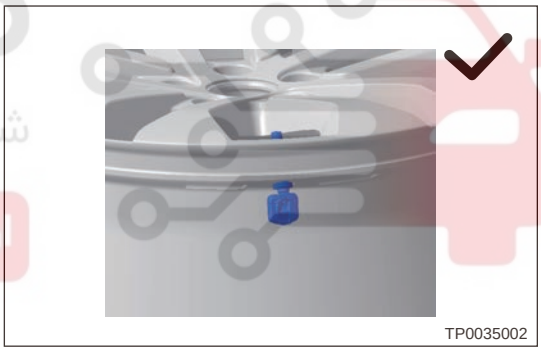


c. If seal washer cutout plane is not parallel with polyester plane and there is a large angle between two planes, it indicates that assembly is not qualified.



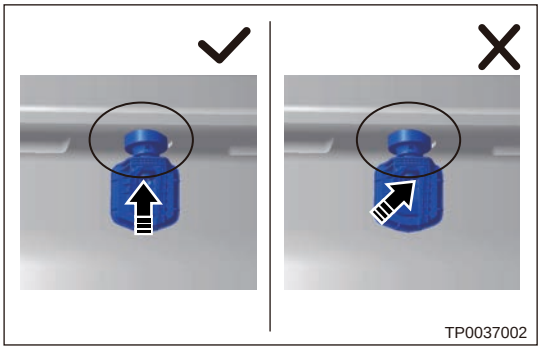
2. Insert valve stem of tire pressure sensor into hub.

a. If valve stem is fully seated into the groove, sensor is fully fixed without any movement and sensor housing is pressed against rim firmly, it indicates that assembly is qualified.

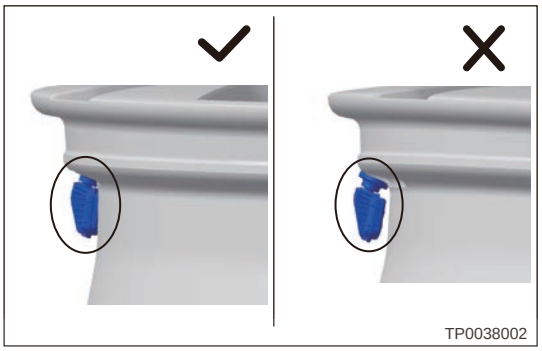


b. If the pretightened nut is not tightened into place with too much valve stem screw exposed and sensor is not fixed, it indicates that assembly is unqualified.

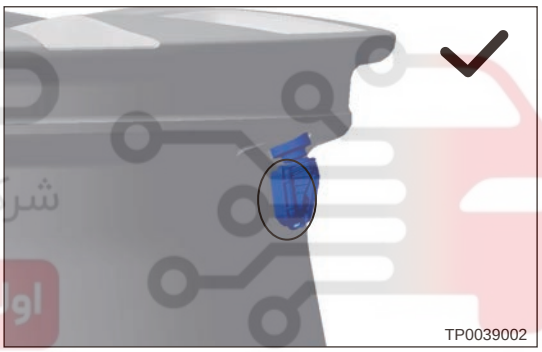
c. If the sensor valve stem slides out form metal groove after a horizontal inward component force is applied, it indicates that assembly is unqualified.



d. If right side of sensor is not pressed against the rim firmly, it indicates that assembly is unqualified.



e. If left side of sensor is pressed against the rim firmly, it indicates that assembly is qualified.

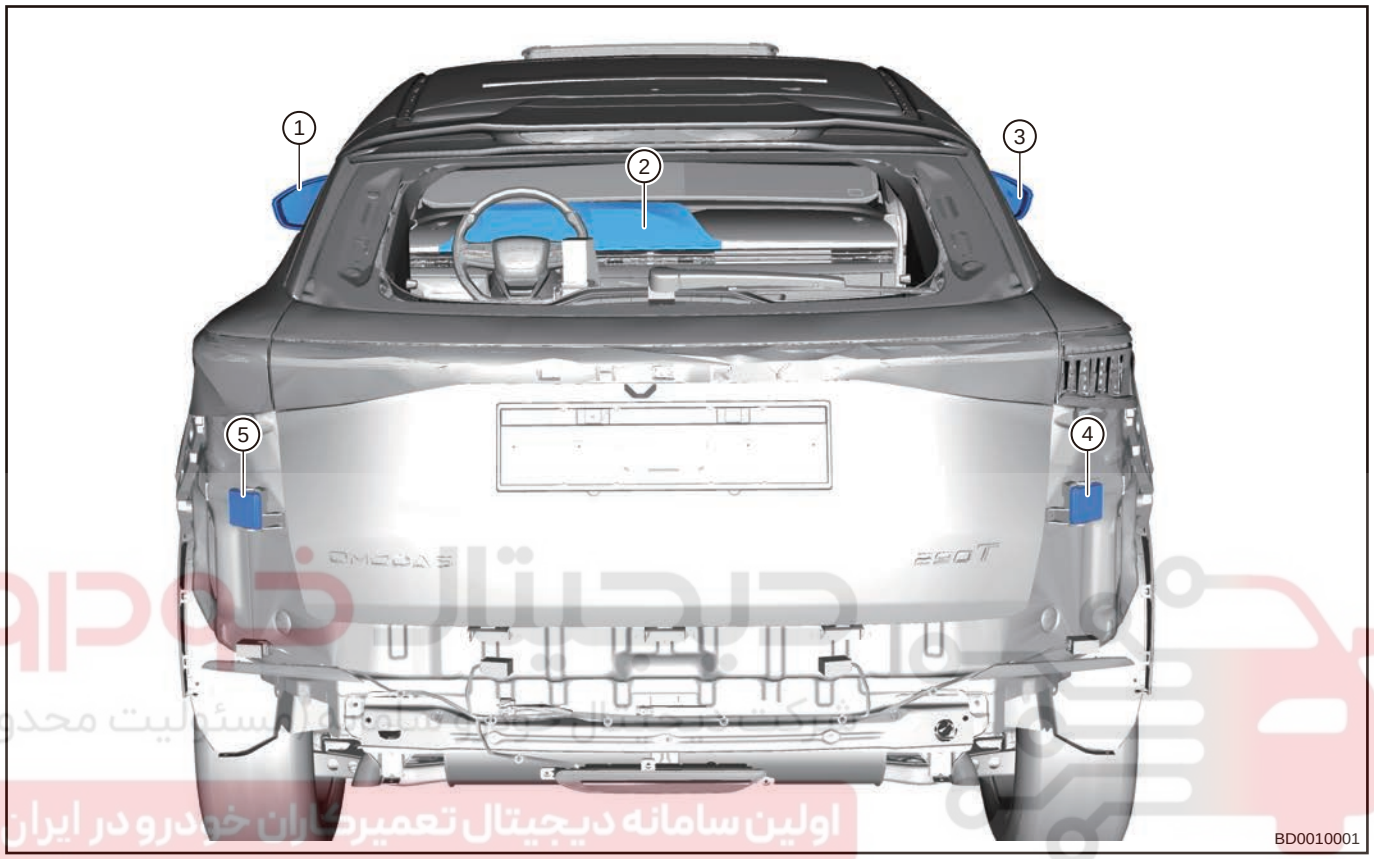


f. If left side of sensor is not pressed against the rim firmly, it indicates that assembly is unqualified.

BLIND SPOT DETECTION STSTEM

System Overview

Description



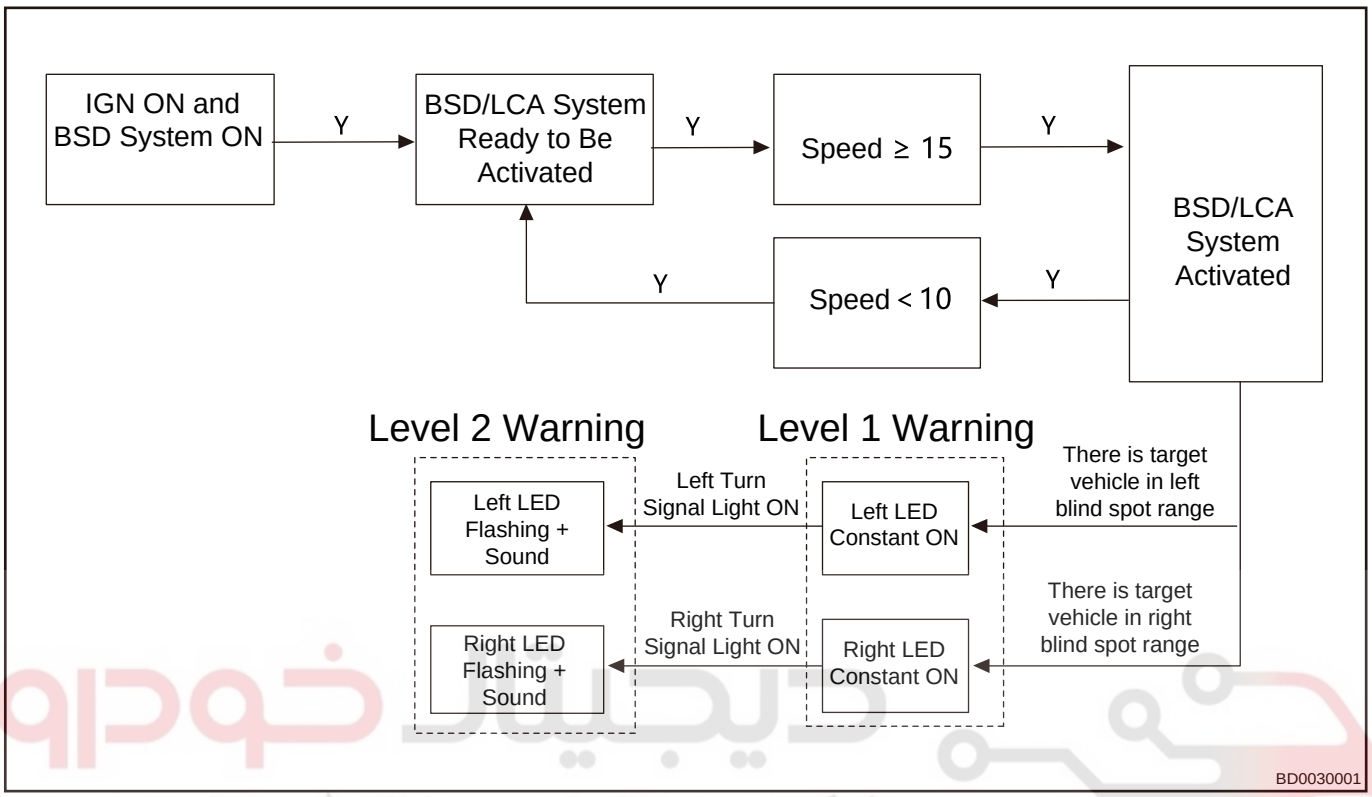
1	Left LED Light	2	Hyperscreen
3	Right LED Light	4	Sub Blind Spot Detection Module
5	Master Blind Spot Detection Module		

System Principle

Blind spot detection (SBD), 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.

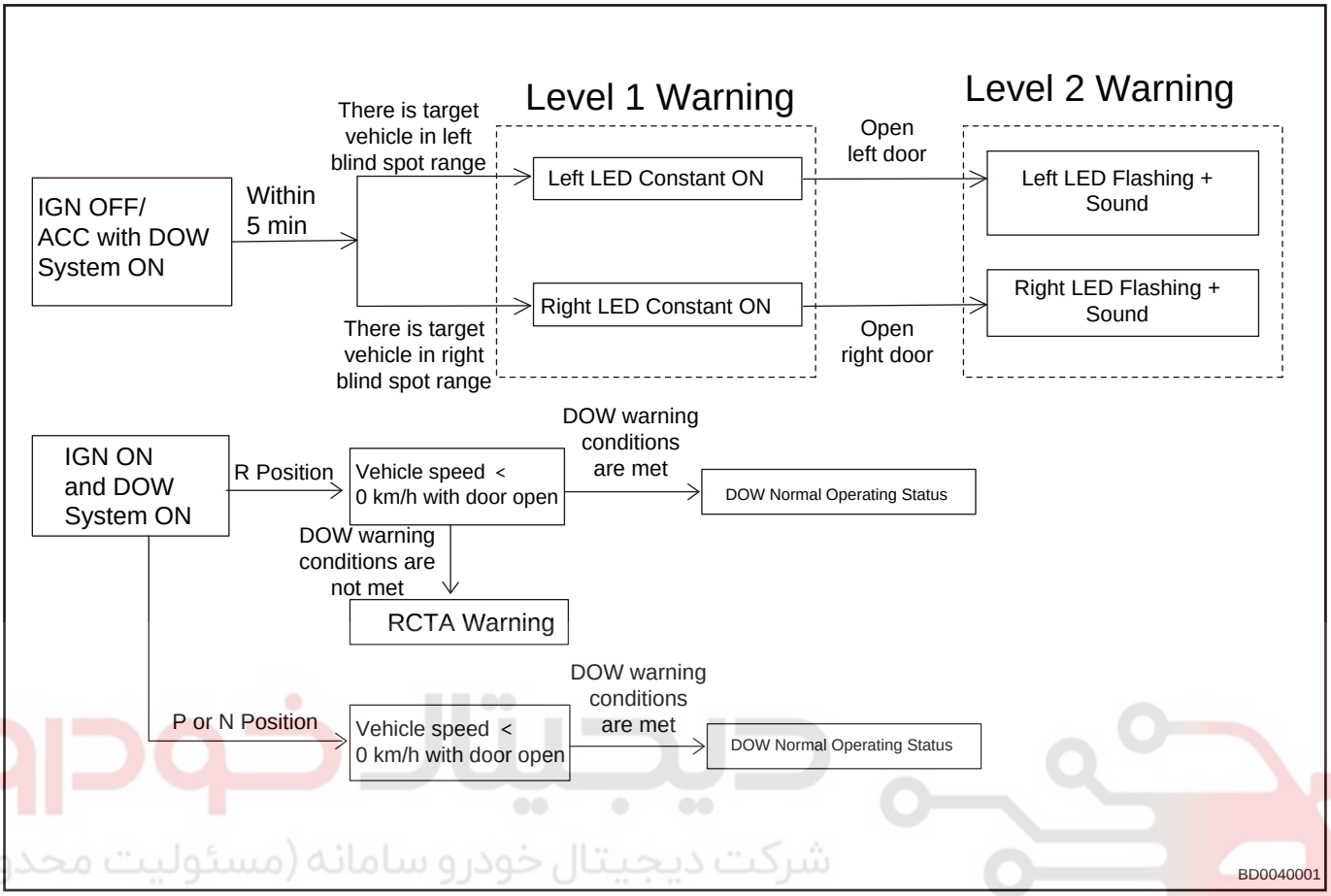
System Function

Blind Spot Detection (BSD)/Lane Change Assist (LCA)



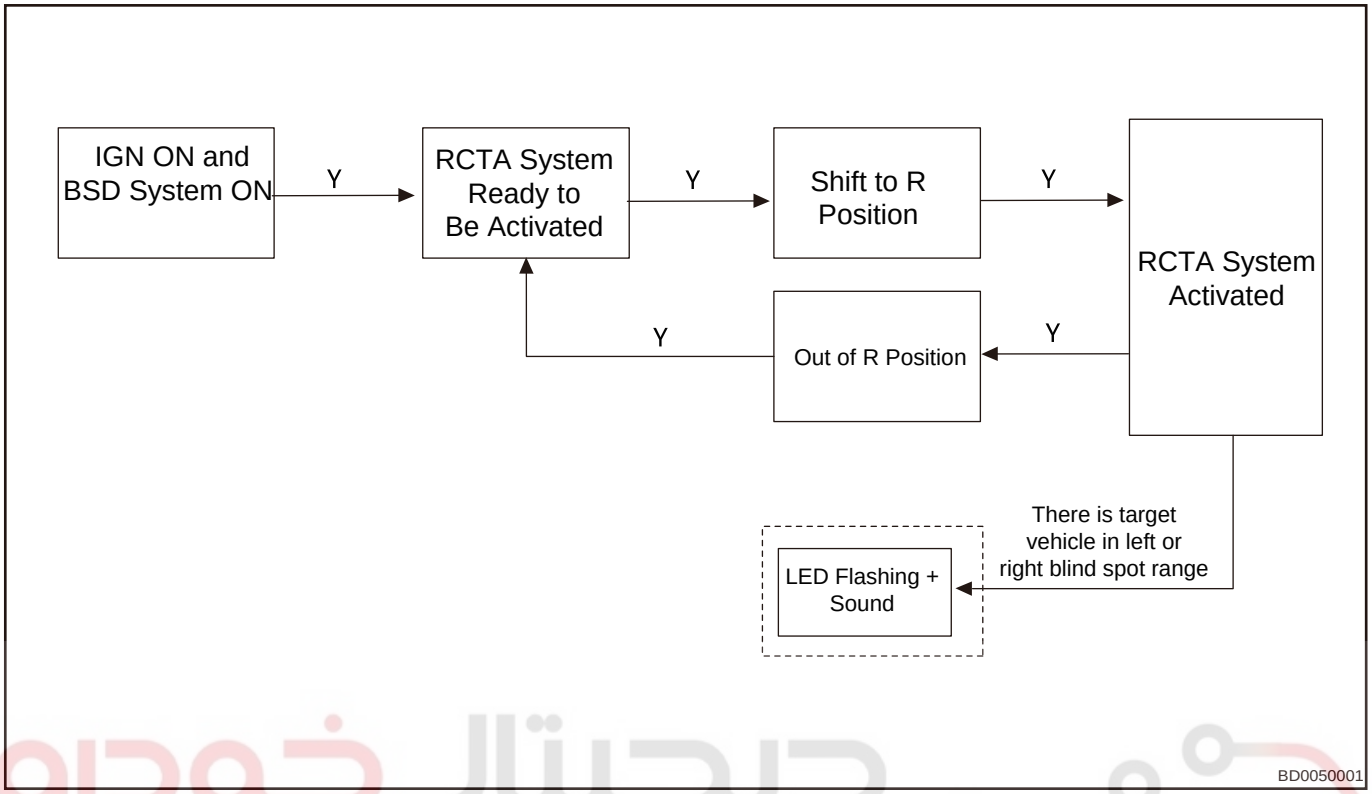
Blind spot detection/lane change assist monitors whether there are moving vehicles in the rear area of left and right sides of vehicle, and sends the information to driver to remind the driver to pay attention to driving safety and lane change safety. This system also extends door open collision warning system, rear cross traffic alert and rear approach warning system.

Door Open Collision Warning System (DOW)



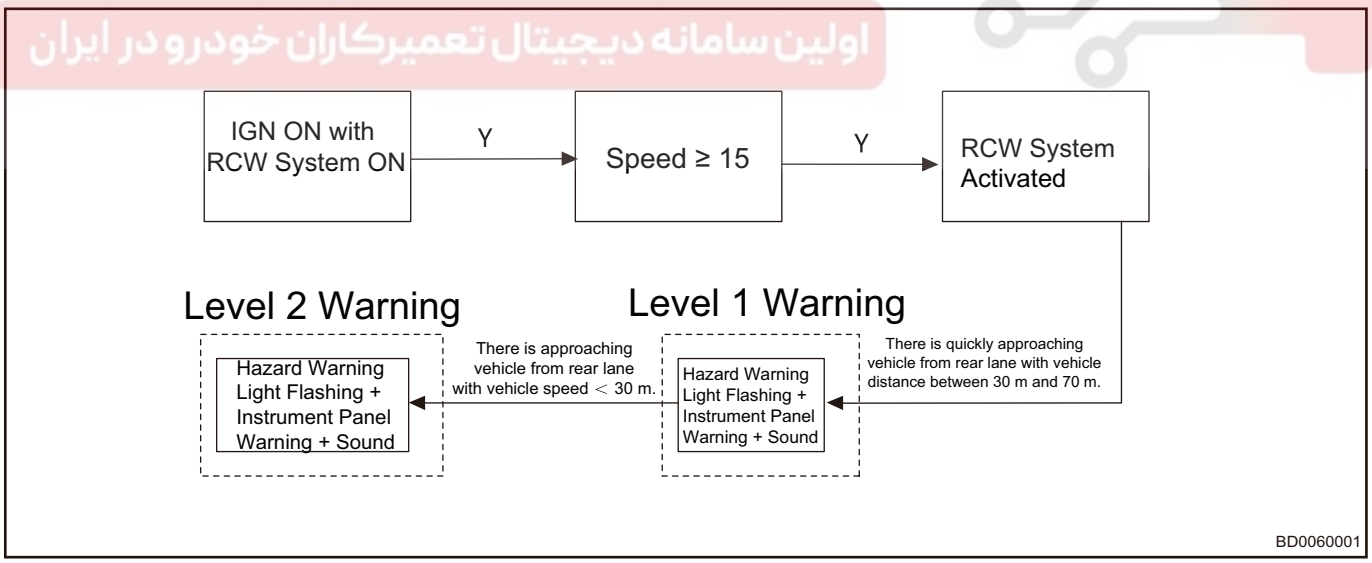
When the vehicle is stationary, blind spot detection detects that there are approaching vehicles on left and right sides and the door is opened, door open collision warning system will give an alarm to remind the driver/occupant to pay attention to the vehicle from rear side when exiting the vehicle 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.

Component Operation Description

Main/Sub Blind Spot Detection Radar

Blind spot detection uses 77 GHz microwave radar technology to detect through the principle of ultrasonic reflection. Main/sub blind spot detection radar sends out ultrasonic and receive 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.

Diagnosis & Testing

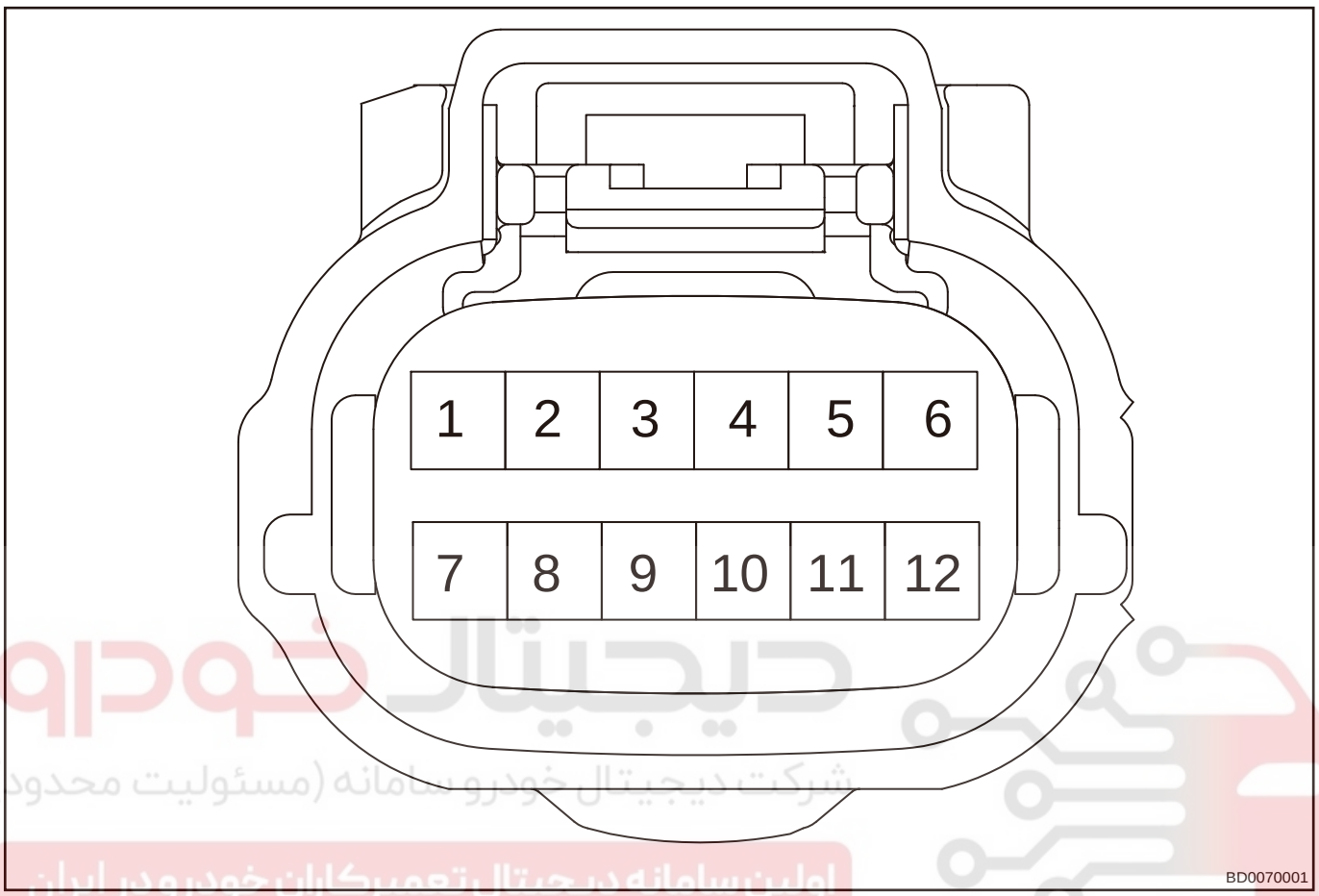
Problem Symptoms Table

Hint:
Use symptoms table below to help determine cause of problem. Check each suspected area in sequence. Repair or adjust faulty components, or replace 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 fault	Fuse
	Wire harness fault
	Central gateway (CGW)
	Main/sub blind spot detection radar

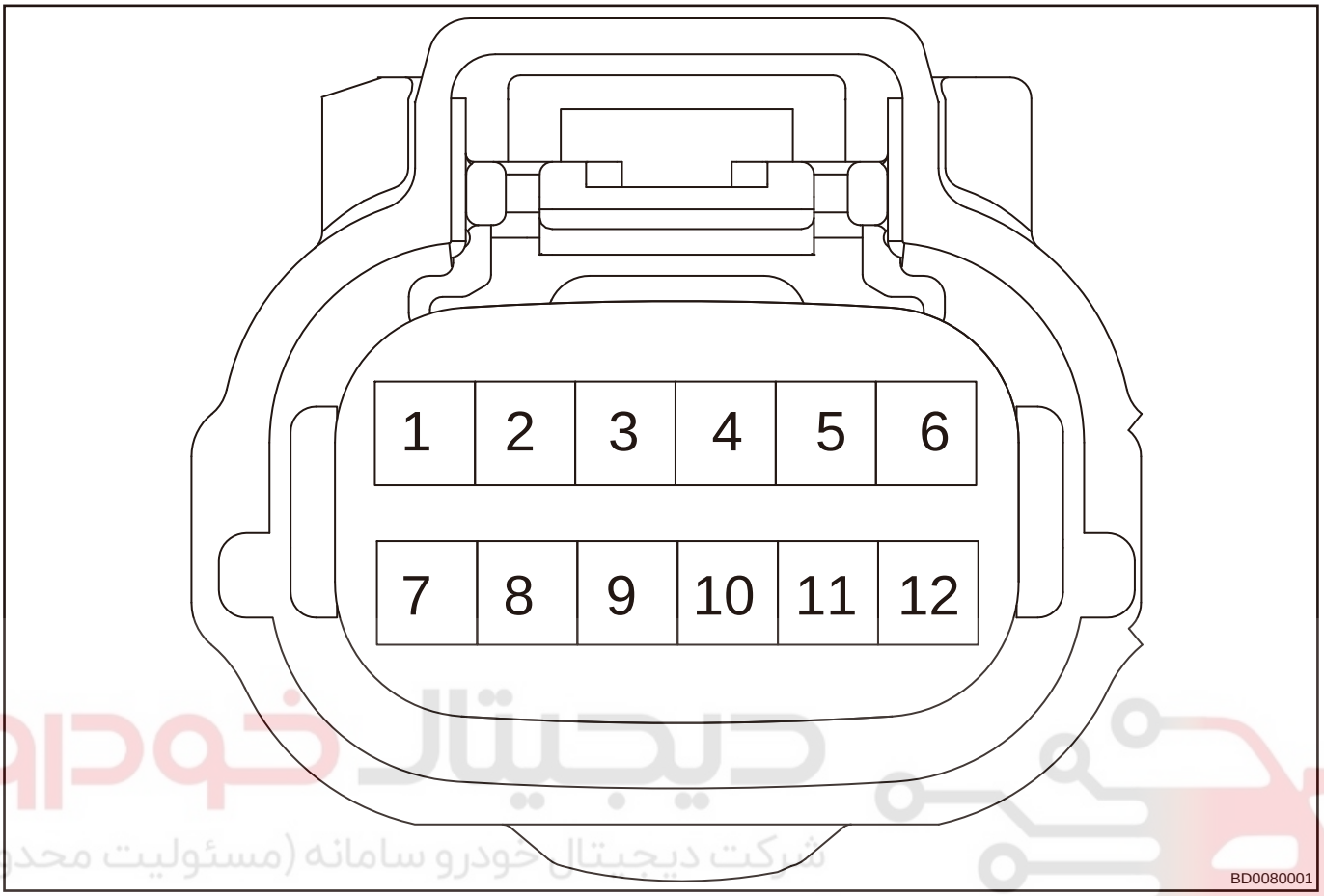
Blind Spot Detection Module Terminal Definition

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	-
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	-
11	Ground	12	Ground

DTC Confirmation Procedure

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

1. Turn ENGINE START STOP switch to LOCK.
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 LOCK and wait for a few 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.

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.

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.

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.

Diagnostic Trouble Code (DTC) Chart

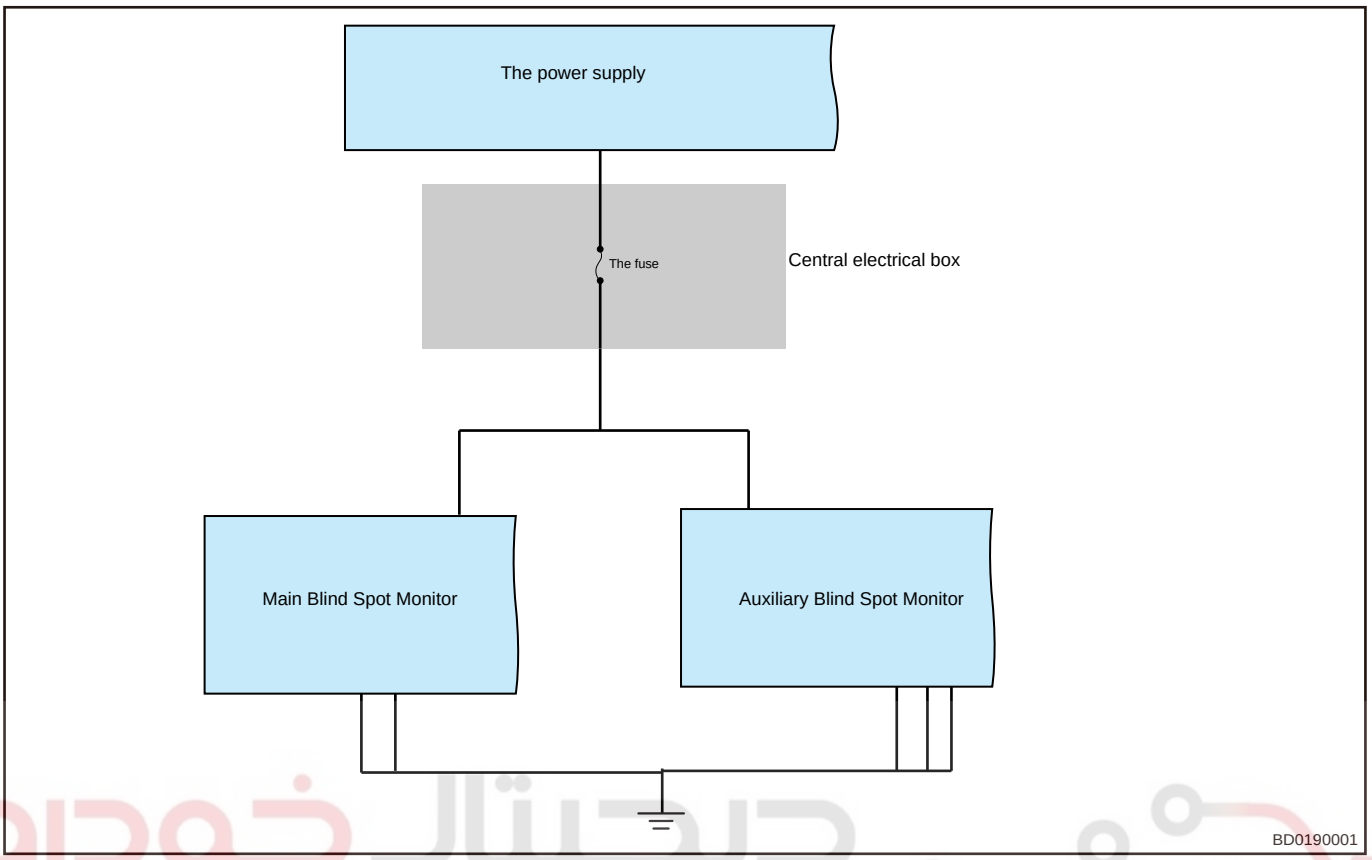
DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
C1700-16	Low Power Supply Voltage	/	Battery, alternator or wire harness	Check battery, alternator or wire harness
C1701-17	High Power Supply Voltage	/	Battery, alternator or wire harness	Check battery, alternator or wire harness
C1702-76	Radar Installation Angle Failure	/	Installation error	Check installation of BSD
C1703-11	LED Short Circuit Fault	/	Outside rear view mirror indicator or wire harness	Check outside rear view mirror BSD indicator
C1704-92	Radar Blockage	/	Radar is blocked	Remove foreign object from radar surface
C1705-56	Invalid Configuration	/	Software configuration error	Check software configuration
U0073-88	VCAN Bus Off	/	Refer to “CAN” system	Check CAN bus or replace ECU
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

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
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
U3000-51	Calibration File Not Refreshed	/	Calibration file is not refreshed	(1) Refresh correct software and calibration file again (2) Power on again and wait for 5 seconds (3) Clear DTC (4) Read DTC. If there is no DTC: ECU can be reused. If DTC is still active: (5) Replace ECU
U1300-55	CAN Not Configured	/	Not configured	Check vehicle CAN configuration

DTC Diagnosis Procedure

DTC	C1700-16	Low Power Supply Voltage
DTC	C1701-17	High Power Supply Voltage

Description
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 fuse

NG → **Replace fuse**

OK

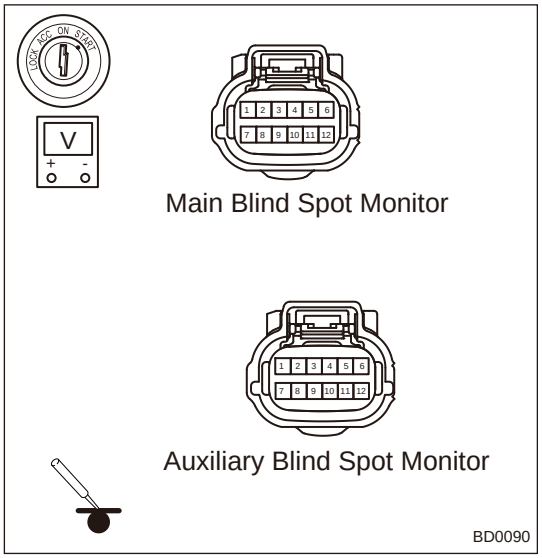
2	**Check wire harness and connector**

(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.

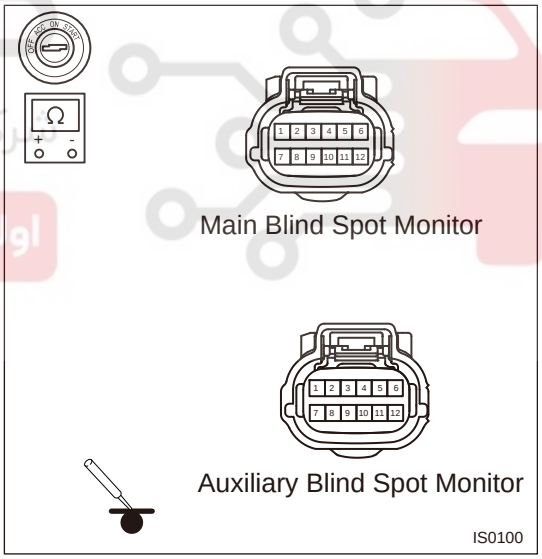
(c) Turn ENGINE START STOP switch to ON.

(d) Using ohm 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
Sub 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.

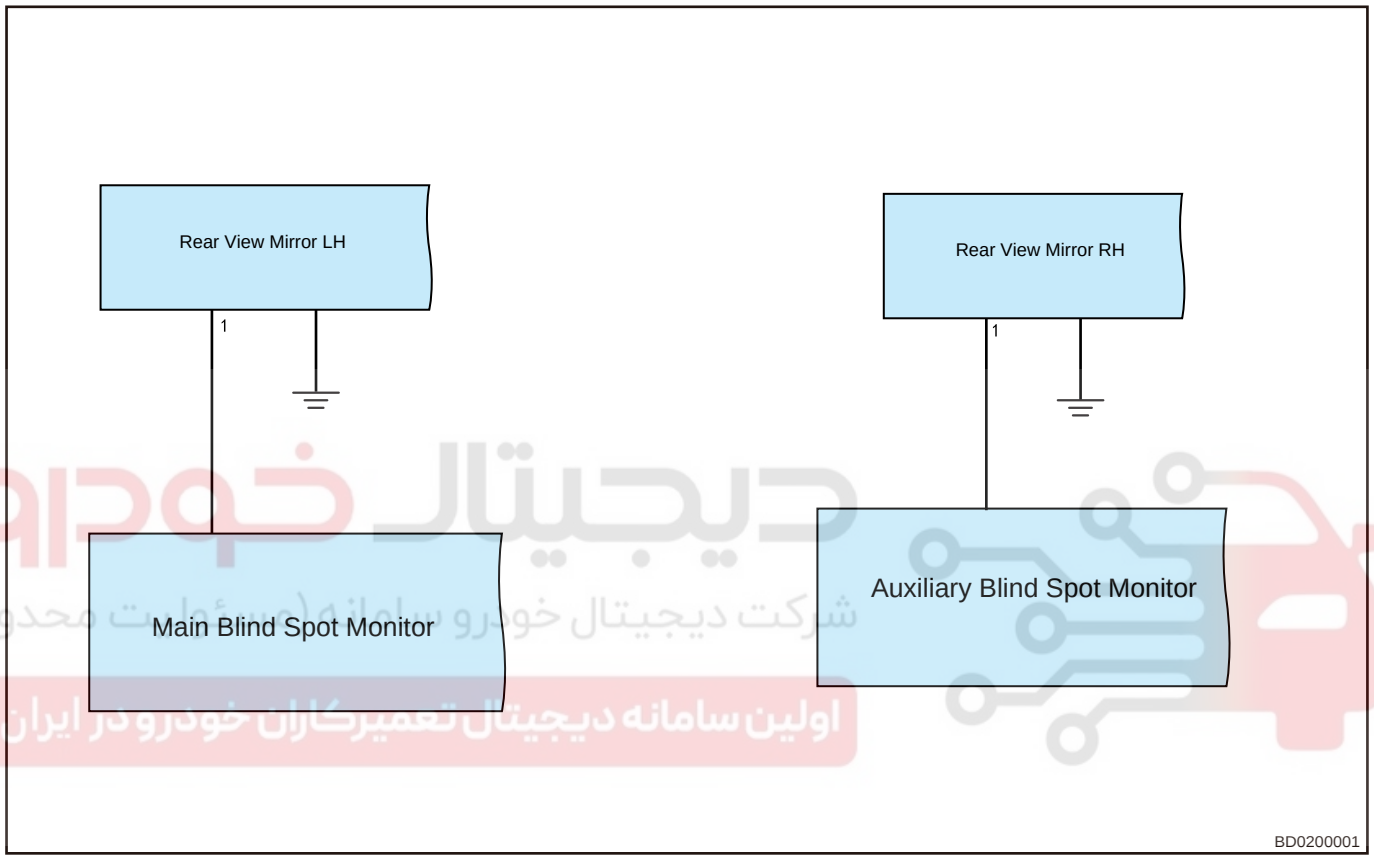
(e) Check if the same DTCs are still output.

OK	**Confirm that system is normal**
NG	**Replace main/sub blind spot detection module**

DTC	C1703-11	LED Short Circuit Fault

Description

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.

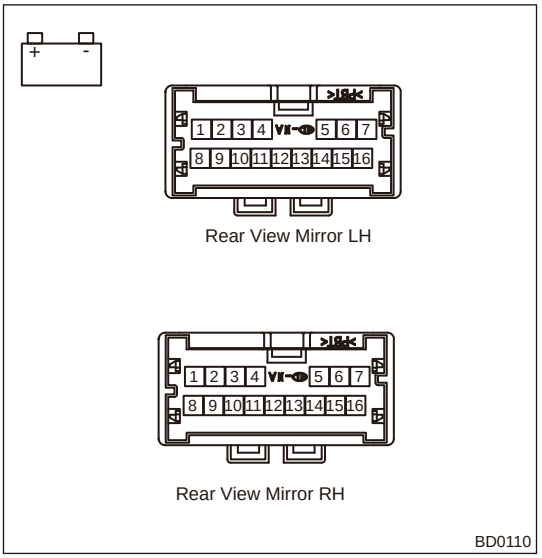
1	**Check LED light**

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 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**

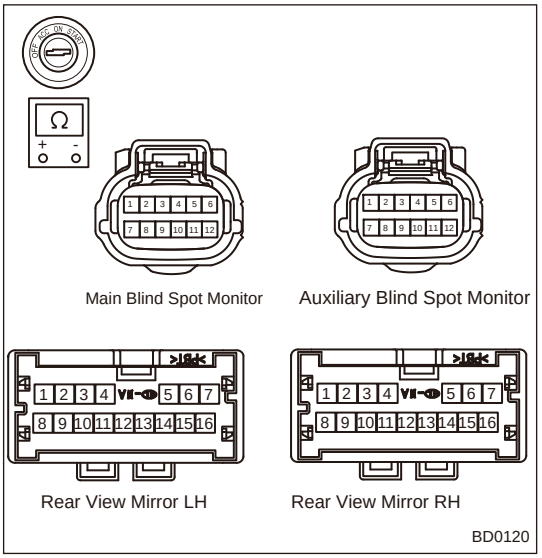
OK →

2	**Check wire harness and connector**

(a) Disconnect main and sub blind spot detection module, left and right rear view mirror connectors separately.

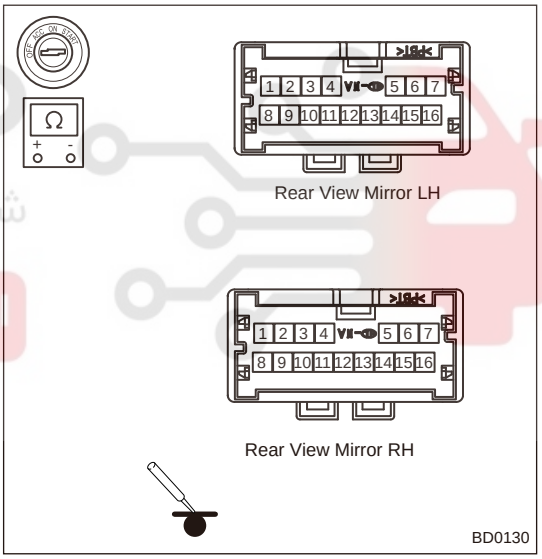
(b) Using ohm band of multimeter, check for continuity between main and sub blind spot detection modules, left and right rear view mirrors separately.

Multimeter Connection	Condition	Specified Condition
Main blind spot detection module (connected terminal) - Left rear view mirror (1)	ENGINE START STOP switch OFF	⩽ 1 Ω
Sub blind spot detection module (connected terminal) - Right rear view mirror (1)		⩽ 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 sub 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 cable.

(c) Check whether the module is improperly installed.

NG	**Reinstall it**

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 cable.

(c) Check if module is blocked.

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	C1705-56	Invalid Configuration

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 malfunction 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.**

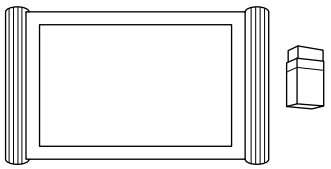
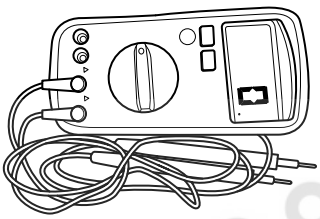
OK → **Conduct test and confirm malfunction has been repaired.**

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	**U3000-51**	**Calibration File Not Refreshed**
DTC	**U1300-55**	**CAN Not Configured**

DTC Confirmation Procedure
Refer to CAN communication system

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206

Blind Spot Detection Module

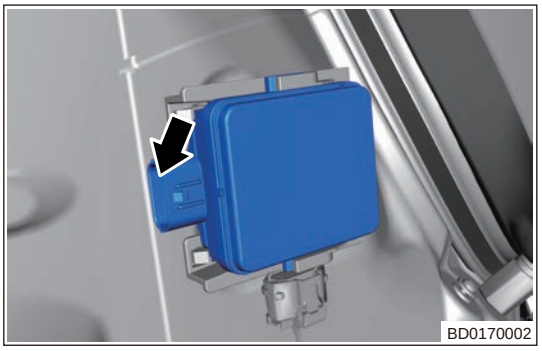
Removal

Warning

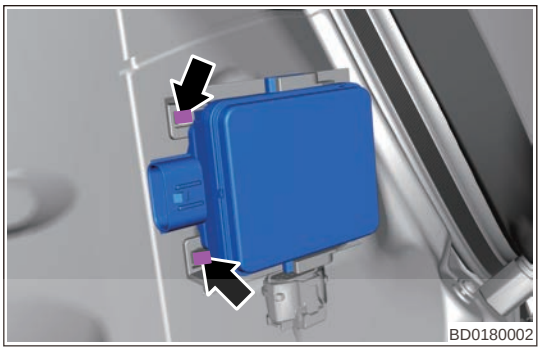
- Be sure to wear safety equipment to prevent accidents, when removing blind spot detection module.
- Operate carefully to prevent damage to blind spot detection module, when removing blind spot detection module.
- Removal and installation steps of main and sub blind spot detection modules are the same. 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 for more than 1 minute.
3. Remove the rear bumper assembly.
4. Remove the main blind spot detection radar module.

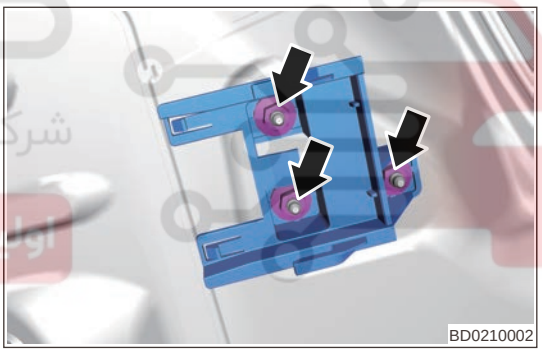
a. Disconnect the main blind spot detection radar module connector.



b. Press fixing clips from main blind spot detection module, and remove main blind spot detection module.



c. Remove 3 fixing screws from blind spot detection module bracket, and remove the bracket.



Installation

⚠ Caution

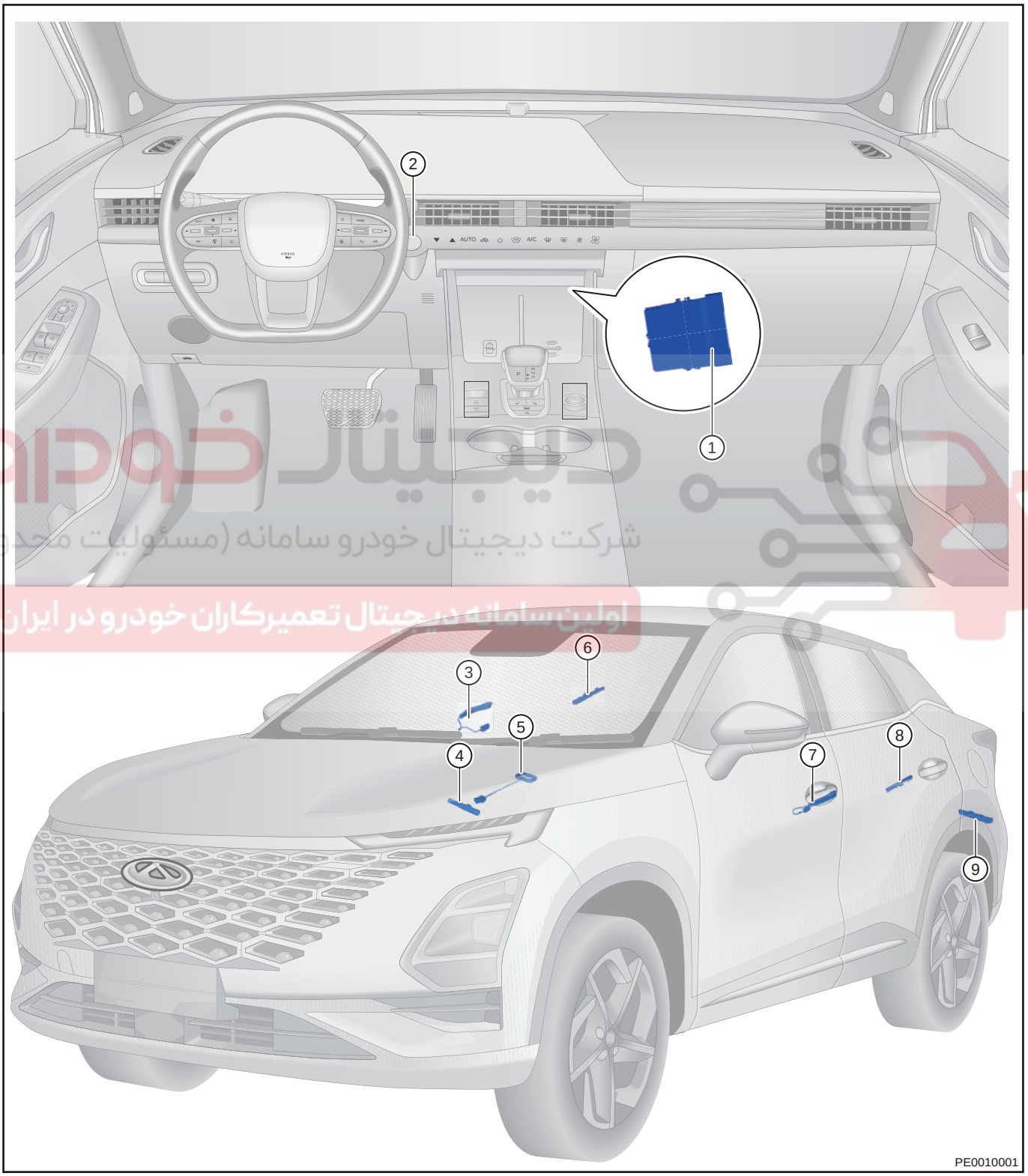
- Install connector in place, when installing blind spot detection module.
- Check blind spot detection module system for proper operation, after installing blind spot detection module.
- When sheet metal paint operation is performed on the rear bumper, there should not be a sudden change in the thickness of rear bumper. Dielectric constant of paint ＜ 100: Thickness of paint is less than 15um, weight of metal component is about 7％) dielectric constant of paint ＜ 50 (Thickness of paint is less than 45um)

1. Installation is in the reverse order of removal.

PEPS SYSTEM

System Overview

Description



1	PEPS module	2	ENGINE START STOP Switch
3	Front Right Door Outside Handle Sensor	4	Front Interior Low Frequency Antenna
5	Anti-theft Coil	6	High Performance Antenna
7	Front Left Door Outside Handle Sensor	8	High Performance Antenna
9	Rear Low Frequency Antenna (on Rear Bumper Crossmember Body)		

PEPS system consists of PEPS controller, ENGINE START STOP switch, built-in low frequency antenna (A total of 2 low-frequency antennas and 2 high-performance antenna are equipped in vehicle to detect key position), immobilizer coil for back up starting, front left/right door handle sensor (front left/right door handle), ESCL module (for MT models), back door microswitch, smart bracelet and remote controller (also called smart key).

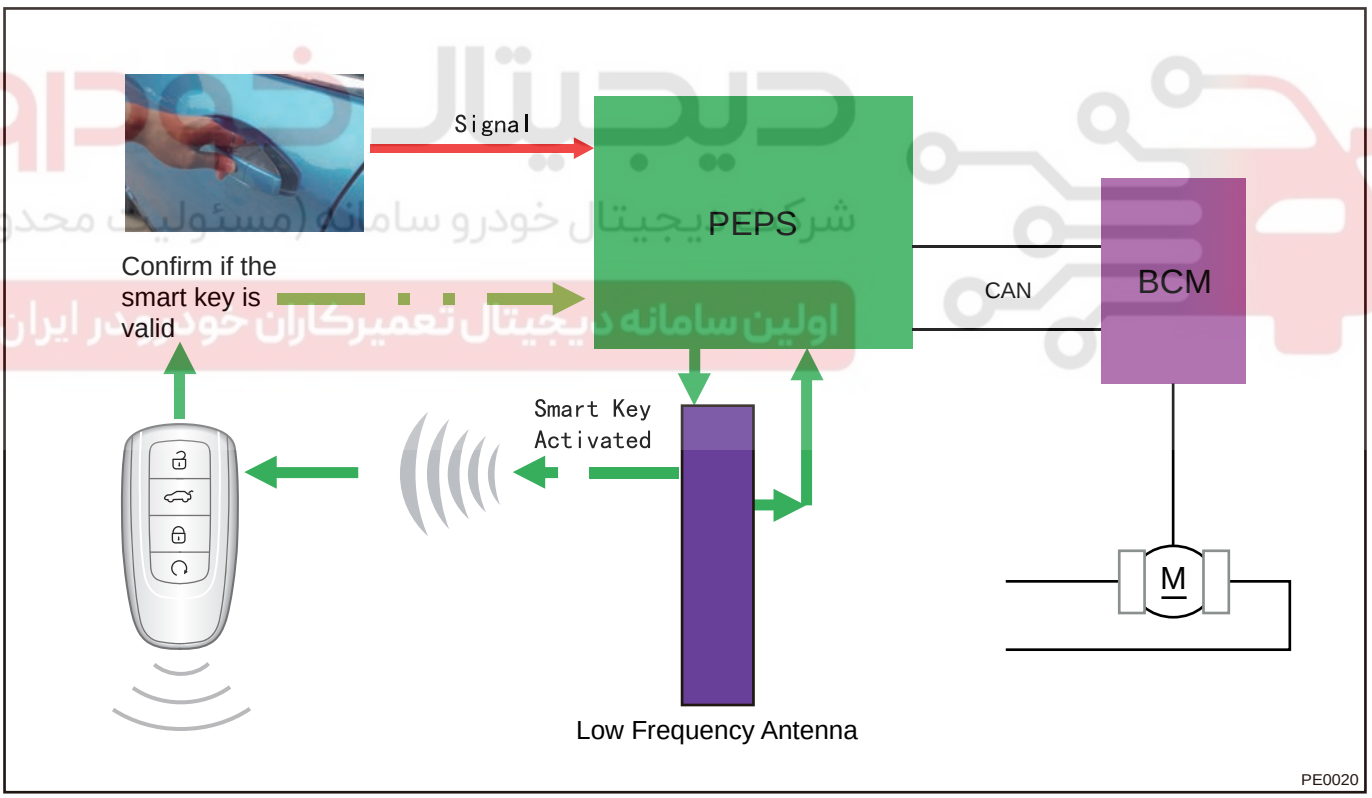
Function Introduction

Function	
1 - Smart Entry Function	2 - Keyless Entry Function
3 - Mechanical Entry Function	4 - One-button Start Function
5 - One-button Stop Function	6 - Emergency Stop Function
7 - Back Up Start Function	8 - Emergency Start Function
9 - Starting Times Limit Function	10 - Electric Steering Column Lock Control Function
11 - Prompt Function	12 - Engine Immobilizer Function

Smart Entry Function

⚠ Caution

- For safety, when remote control/central control or mechanical control is used to lock vehicle, if there is a smart key inside vehicle, system will disable door handle switch while remote control still can be used.
- In order to successfully perform door handle switch operation, do not rapidly operate door handle switch in succession within 0.5 second. and also do not rapidly operate luggage compartment external electronic switch.
- Smart keyless unlock and lock are only valid when power supply is shut off and four doors are closed properly, or system will not operate.
- Smart keyless unlock and lock are only valid when power supply is shut off and four doors are closed properly, or system will not operate.
- For power saving purpose, after vehicle is parked for 15 days, smart entry for front right door handle will be invalid, only smart entry for front left door handle can be used (it will return to normal if performing remote control unlock once or front left door HSU (door handle sensor) unlock once).
- In some particular situations, such as smart key is too close to door, system may determine the key is inside vehicle, induced door handle to be disabled. In this case, keyless entry function will not operate normally. At this time, it is necessary to use remote control to lock and unlock vehicle.



Smart Door Unlock (Keyless Fortifying Deactivation)

1. When the doors are locked, carry the smart key and touch the unlock sensing area of the door outside handle with four fingers. The system automatically recognizes the legitimacy of the smart key and the doors are automatically unlocked.

   Hint:
   Only front left and front right doors are equipped with sensing outside handle.

2. When bringing a smart key close to vehicle, the courtesy light turns on, the system automatically recognizes the legitimacy of the smart key and the doors are automatically unlocked.

3. No matter where the smart key is (put in pocket, hang in the belt or put in bag), as long as the key is within approximately 2.5 m of door handle, touch the sensing area of the door handle with four fingers, vehicle will enter fortifying deactivation mode (turn signal lights will flash twice and four doors will be unlocked).
4. If any of following operations is not performed within 30 seconds after touching the sensing area (-fortifying deactivation) of the door handle under fortifying mode, all doors will be locked automatically.
   - Open any door
   - Press the ENGINE START STOP switch
   - ENGINE START STOP switch is in ACC or ON position

Smart Door Lock (Keyless Fortifying)

1. When the doors are unlocked, carry the smart key and touch the lock sensing area with fingers. The system automatically recognizes the legitimacy of the smart key and the doors are automatically locked.
2. When exiting vehicle with smart key, the system automatically recognizes the legitimacy of the smart key and the doors are automatically locked.

   Hint:
   If any door is not closed properly, it will be unlocked automatically after locking to avoid leaving key inside vehicle.
3. Operation range:
   - Only distance between smart key and door outside handle is within specified operation range, smart key function can be used.
   - When smart key battery is discharged or there is strong radio wave in operation position, smart key system also will not operate normally.
   - It is recommended that do not place smart key together with mobile phone and other radio equipment.
   - Operation range is within about 250cm from sensing areas of two front door handles.

- If smart key is too close to door glass, handle or rear bumper, door handle sensor cannot be used.
- When smart key is within operation range, any one even without carrying smart key can press door handle sensing area on corresponding side to lock/unlock door.

4. When using smart key system, door handle sensor will not function in following conditions:
   - When ENGINE START STOP switch is in following positions (ACC or ON position).
   - Smart key is left in cab or luggage compartment (at this time, alarm will sound, turn signal lights will flash and “Smart Key inside Vehicle” will be prompted on instrument cluster if pressing door handle sensor.)
   - When smart key is not within exterior operation range.
   - When any door is opened or not closed properly.
   - When the smart key battery is discharged.

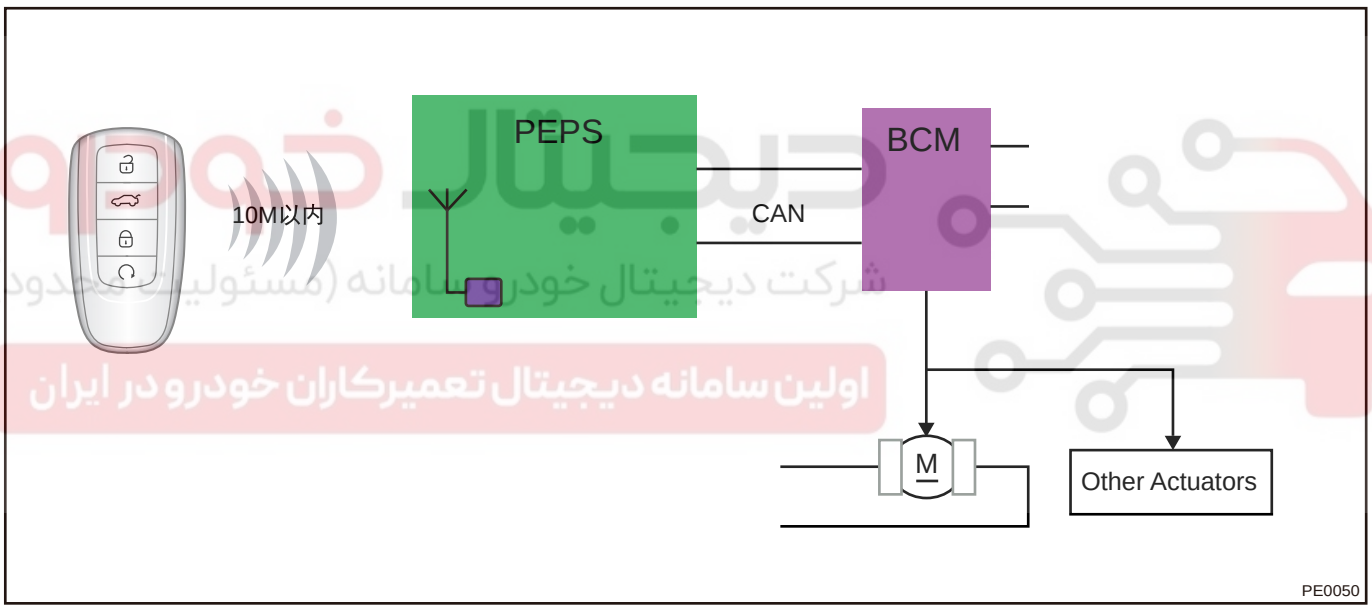
Smart Keyless Luggage Compartment Open

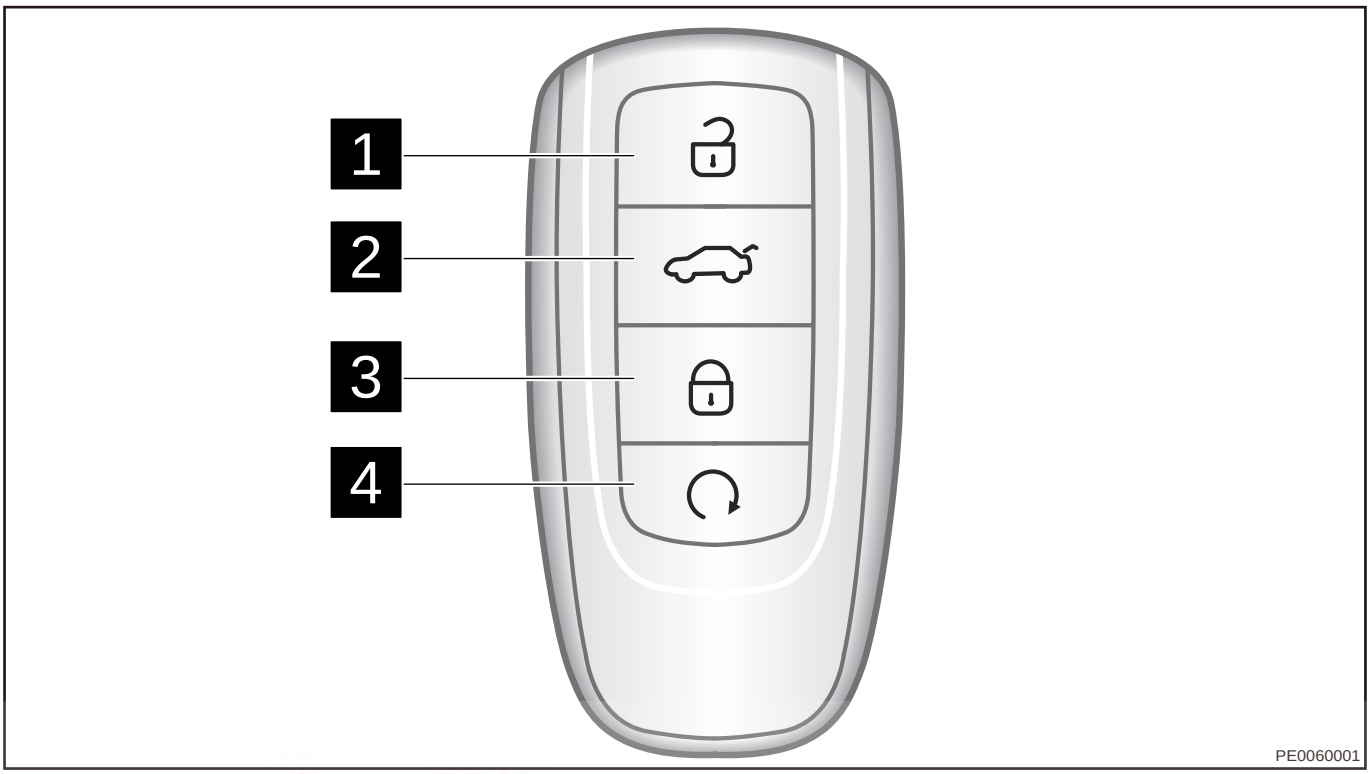
1. If all doors are unlocked, the luggage compartment external electronic switch is activated. At this time, press the switch to open luggage compartment without necessity of carrying smart key.
2. If door is under central lock state, luggage compartment external electronic switch will be disabled. At this time, it is necessary to bring smart key close to rear of vehicle and press electronic switch to open luggage compartment.

⚠ Caution

- For safety, when remote control/central control or mechanical control is used to lock vehicle, if there is a smart key inside vehicle, system will disable door handle switch while remote control still can be used.
- In order to successfully perform door handle switch operation, do not rapidly operate door handle switch in succession within 0.5 second. and also do not rapidly operate luggage compartment external electronic switch.
- Smart keyless unlock and lock are only valid when power supply is shut off and four doors are closed properly, or system will not operate.
- For power saving purpose, after vehicle is parked for 15 days, smart entry for front right door handle will be invalid, only smart entry for front left door handle can be used (it will return to normal if performing remote control unlock once or front left door HSU (door handle sensor) unlock once).
- In some particular situations, such as smart key is too close to door, system may determine the key is inside vehicle, induced door handle to be disabled. In this case, keyless entry function will not operate normally. At this time, it is necessary to use remote control to lock and unlock vehicle.

Remote Entry Function





1	Unlock Button	2	Back Door Open Button
3	Lock Button	4	Remote Start Button

Remote Lock (Fortifying) Function

Press lock button on smart key with power supply OFF, door will be locked, turn signal lights will flash (-once), horn will sound (once) and vehicle will enter fortifying mode.

1. Press lock button with four doors & two covers closed properly, door will be locked, body anti-theft system will be turned on and vehicle will enter fortifying mode.
2. If any door is not closed properly, lock system will not operate.
3. If power supply is in ACC or ON position, remote lock function will not operate to avoid misoperation.
4. If doors are closed properly while hood or luggage compartment door is not closed properly, lock system will lock doors, but body anti-theft system cannot be turned on and vehicle will not enter fortifying mode.

Remote Lock (Fortifying Deactivation) Function

Press the remote control unlock button, 4 door locks are unlocked, and turn signal lights flash twice, the vehicle enters the fortifying deactivation state.

Hint:

If any of following operations is not performed within 30 seconds after pressing remote unlock button (-fortifying deactivation) under fortifying mode, all doors will be locked automatically.

1. Open any door
2. Press the ENGINE START STOP switch
3. ENGINE START STOP switch is in ACC or ON position

⚠ Caution

- Press unlock button, so that door will be unlocked and luggage compartment door external switch will be activated (at this time, press luggage compartment external switch to open luggage compartment even if user does not bring valid key).
- Under fortifying or anti-theft alarm mode, press unlock button to cancel body anti-theft alarm system.

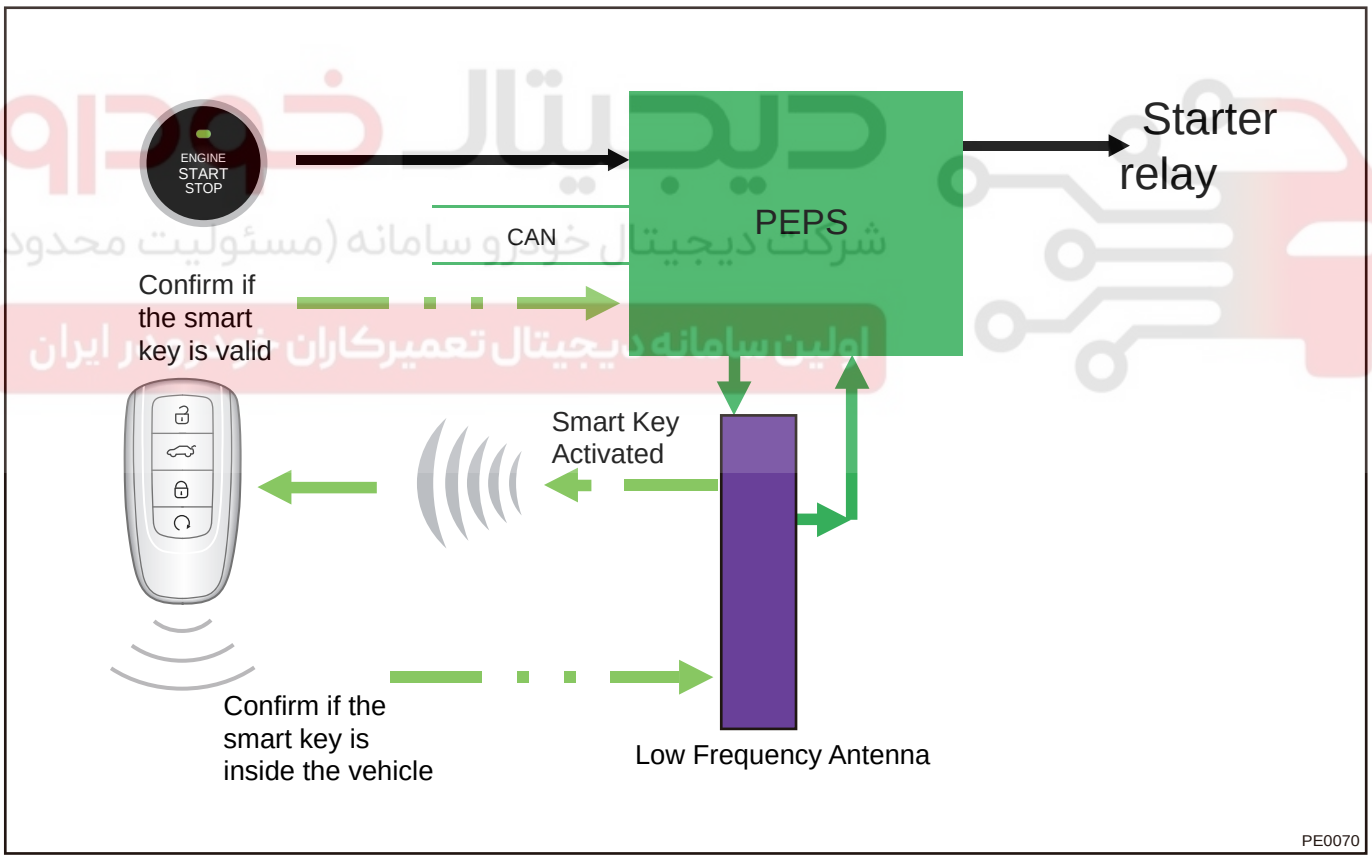
Remote Back Door Function
Long press remote luggage compartment button (about 1.5 seconds), luggage compartment door will be unlocked, at this time, it is still necessary to press back door release switch to open back door (for vehicles without power back door). For vehicles with power back door, the back door will be unlocked automatically.

Hint:
Opening back door by remote control cannot cancel vehicle fortifying.

One-button Start Function

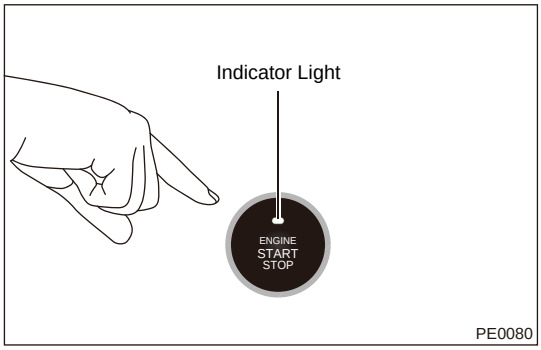
⚠ Caution

- For MT models: If clutch pedal is not depressed fully, system will not perform starting operation. For DCT models, if it is not in P or N position, system will not perform starting operation.
- During starting, if brake pedal (for DCT models) or clutch pedal (for MT models) is released halfway, system will suspend starting.
- Press ENGINE START STOP switch and then release it when starting, system will judge if starting is successful and stop starting properly.
- For AT models, if it is not in P position, vehicle power supply state (ACC, IGN) will not return to OFF state.

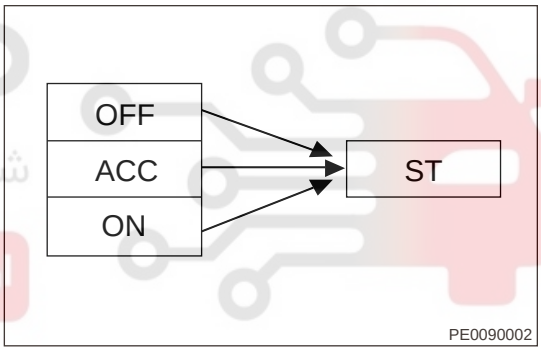


1. Indicator does not come on

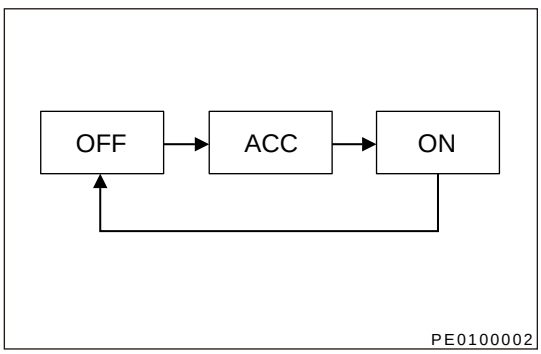
a. Power supply is OFF and brake pedal (for DCT models) or clutch pedal (for MT models) is not depressed, or engine has been started.



2. Amber
   a. Power supply state: ACC or ON, brake pedal (for DCT models) or clutch pedal (for MT models) is not depressed.
3. Green
   a. Brake pedal (for DCT models) or clutch pedal (for MT models) is depressed, and engine will start once pressing the button.
4. One-button start function: It can be activated at any power supply state (OFF, ACC, IGN) with legal smart key inside vehicle. Depress brake pedal (for DCT models) or clutch pedal (for MT models), press ENGINE START STOP switch to start engine.
   a. Switching power supply state



5. There are four positions for vehicle power supply: OFF, ACC, ON, ST (ignition). With brake pedal (for DCT models) or clutch pedal (for MT models) not depressed, press ENGINE START STOP switch:
   a. Switching power supply state



One-button Stop Function

For common engine stop mode, 4 km/h of vehicle speed must be met.

Hint:

- For DCT models, if it is not in P position, vehicle power supply mode cannot return to OFF, you must shift to P position before leaving vehicle after stopping. And check if power supply state is in OFF. Make sure that vehicle power supply is in OFF state and then leave vehicle. Otherwise, door cannot be locked.
- Simple method for distinguishing power supply in ACC or OFF:
  1. Judged by color of indicator on ignition switch.
  2. Under ACC state, instrument cluster will illuminate center display edge of LCD.
  3. Operate buttons on remote controller, if lock operation is failed and unlock operation is successful, it indicates that vehicle power supply is not in OFF position.

Emergency Stop Function

In order to stop engine in emergency, this system has emergency stop mode.

Hint:

- When vehicle speed is more than 4 km/h, press ENGINE START STOP switch for more than 3 seconds in succession.
- If pressing ENGINE START STOP switch for 3 times within 2 seconds with vehicle speed more than 4 km/h, engine will stop and power supply will return to ACC.

⚠ Caution

- If this condition is not met, engine will not shut down and ignition switch is kept in ON.
- During driving, emergency stop will seriously affect normal driving. Do not use this function unless in emergency.

Back Up Start Function

1. If key cannot be recognized by system due to weak battery or interference, PEPS system will not operate normally. At this time, system provides a method to back up engine start, following method can be used to start engine or turn on power supply.
   a. Lay key on bottom of rear cup holder with face up, and do not depress brake pedal (for DCT models) or clutch pedal (for MT models).
   b. Press the ENGINE START STOP switch once. Power supply state will switch to ON, and “Verification is Successful, it is Possible to Start” is displayed on instrument cluster.
   c. Depress brake pedal (for DCT/CVT models) or clutch pedal (for MT models) fully, press ENGINE START STOP switch to start engine.

Hint:
For MT models, communication between ESCL and PEPS is failed or verification does not pass, electric steering column lock cannot be unlocked successfully, power supply cannot switch to ON, engine cannot be started, so back up start function is invalid.

Emergency Start Function

1. To prevent engine cannot be started due to signal failure of brake pedal position (for DCT models) or clutch pedal position (For MT models) detected, this system has emergency start mode.

Hint:
Please contact service station for inspection and repair as soon as possible.

Starting Times Limit Function

⚠ Caution

- Only MT models have this function.
- Keyless entry and PEPS system obtains wheel speed signal from brake controller (ABS/ESP), if any wheel speed signal is malfunctioning, ABS/ESP system warning light in instrument cluster will come on.
- If malfunction does not be repaired and maximum start times is reached, it is not allowed to start vehicle. Please contact Chery service station for repair immediately and reset "rest start times" with diagnostic tester. Otherwise, if same malfunction occurs next time, start times offered by system will be less than 10 times. (Specific value depends on residual times last time malfunction occurs.)

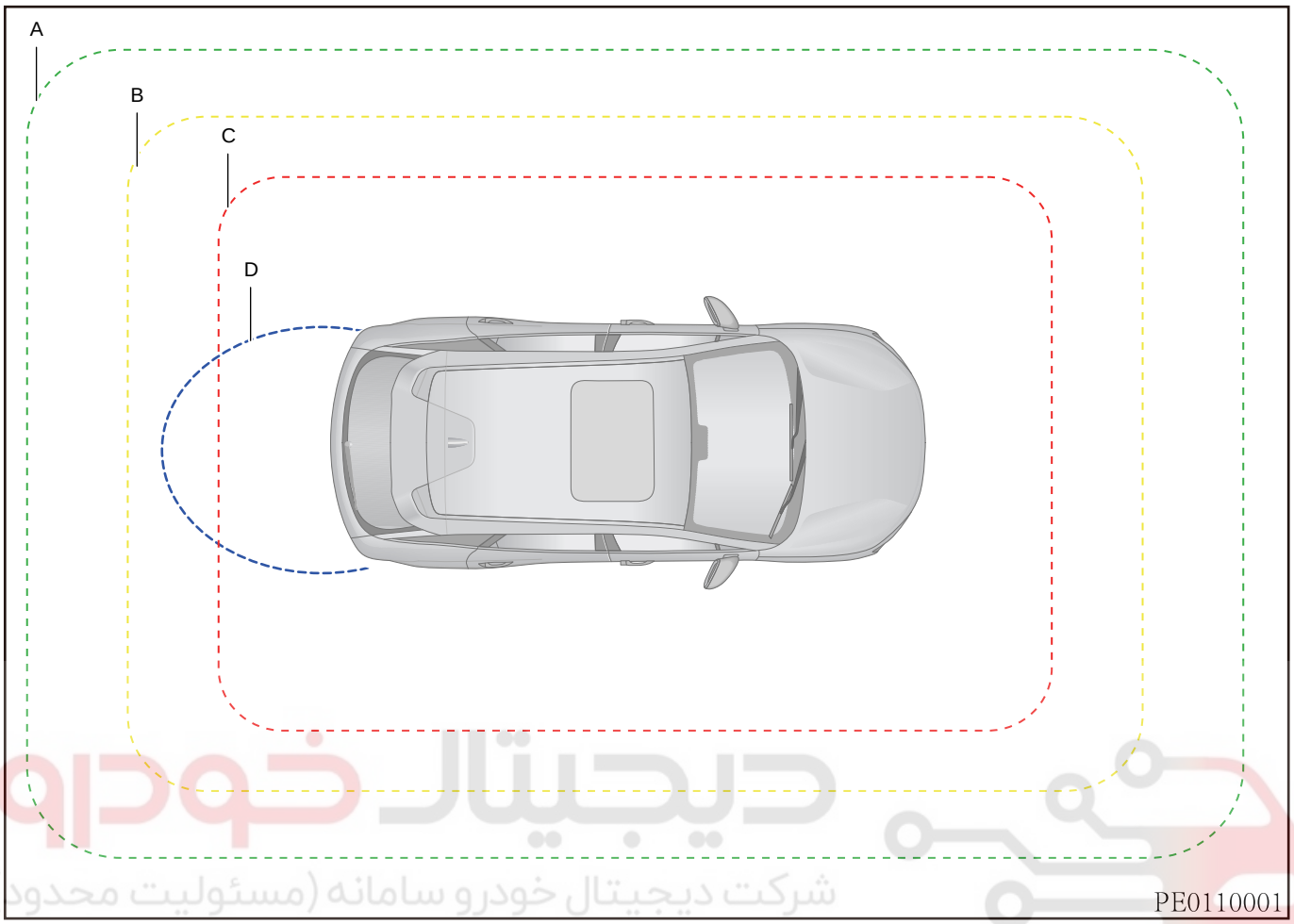
When serious damage occurs in system, in order to ensure driving safety and prevent steering system locking incorrectly, system will not allow user to start engine limitlessly and engine only can be started for 10 time. And each time engine starts successfully and travel, rest times will reduce one. Please contact Chery service station for repair as soon as possible.

Hint:
This system malfunction may be caused by any or several of the following reasons:

- Serious malfunction in the electric steering column lock
- Speed signal malfunction of front right wheel
- Speed signal malfunction of other three wheels

Intelligent Searching Function

This part includes three functions: Welcome function, approach unlocking function, exit locking function.



1. Welcome function
   - Customer enters into area A, PEPS controls courtesy light on the vehicle to turn on, realizing welcome function.
2. Approach unlocking function
   - Customer enters into area C, PEPS controls the vehicle to unlock.

     Hint:
     PEPS search strategy for enter unlocking: Within 3 days, if the vehicle searches a legal key, the search cycle is 400 ms; if the vehicle does not search a legal key, the search cycle is 1000 ms; 3 days later, the search stops.
3. Exit locking function
   - After customer gets off the vehicle and closes all doors, if there is no key in the vehicle, PEPS controls the vehicle to lock when customer gets off and enters the yellow area.

     Hint:
     PEPS search strategy for exit locking: Within 3 days, if the vehicle searches a legal key, the search cycle is 400 ms; if the vehicle does not search a legal key, the search cycle is 1000 ms; 3 days later, the search stops.

Prompt Function

To reduce misunderstanding of PEPS features from users and to facilitate the daily diagnosis of simple problems, system will prompt corresponding message to users through instrument cluster display, buzzer and external horn. Regardless of power supply state (OFF, ACC or ON), once PEPS sends information, instrument cluster will handle and display it.

Text Message Prompt	Buzzer	External Horn	Possible Cause
Smart key is not detected	Sound	\	There is no key in vehicle
Smart key is not detected	Sound	\	If you are in vehicle, find smart key and place it in vehicle, or check if passenger brings the key outside
System malfunction, it is allowed to start X times	Sound	\	Please contact Chery Service Station for repair immediately
Please check and repair PEPS system	Sound	\	Please contact Chery Service Station for repair immediately
Please shift to P or N to start	Sound	\	If you want to start engine, please shift to P or N.
If you want to start engine, depress brake pedal	Sound	\	If you want to start engine, depress brake pedal (for DCT models).
Please shift to P	Sound	\	Please shift to P and press ENGINE START STOP switch to turn off power supply.
Please pay attention that smart key is in vehicle	Sound	Sound 6 times	Be sure to carry smart key on person when leaving vehicle. Caution: Door handle switch will be disabled by system temporarily, please use remote controller to lock and unlock.
Verification is successful and it is possible to start	Sound	\	It is displayed only when performing back up start and verification passed, and key battery is fully discharged usually
Please turn off power supply	Sound	\	User may leave vehicle with shift position not in P and power supply not in OFF
Smart key battery is low	Sound	\	Key battery still can be used, but it comes to failure due to low voltage, it is necessary to replace battery

Engine and Vehicle Anti-theft Function

1. Anti-theft for models with PEPS can be divided into two types.
2. For DCT models, anti-theft can be divided into two separate parts - “PEPS and ECU encryption engine immobilizer”.
3. For MT models, anti-theft can be divided into two separate parts - “PEPS and ECU encryption engine immobilizer” and “PEPS and ESCL encryption steering column lock anti-theft”.

a. For DCT models

- After power supply is turned to ON, ECU will send one frame of validation data to PEPS via CAN bus to verify. Then PEPS will feedback one frame of validation data as response and send to ECU. If response from PEPS is correct, ECU determines that anti-theft is released. Otherwise, ECU will not inject fuel and ignite.

b. For MT models

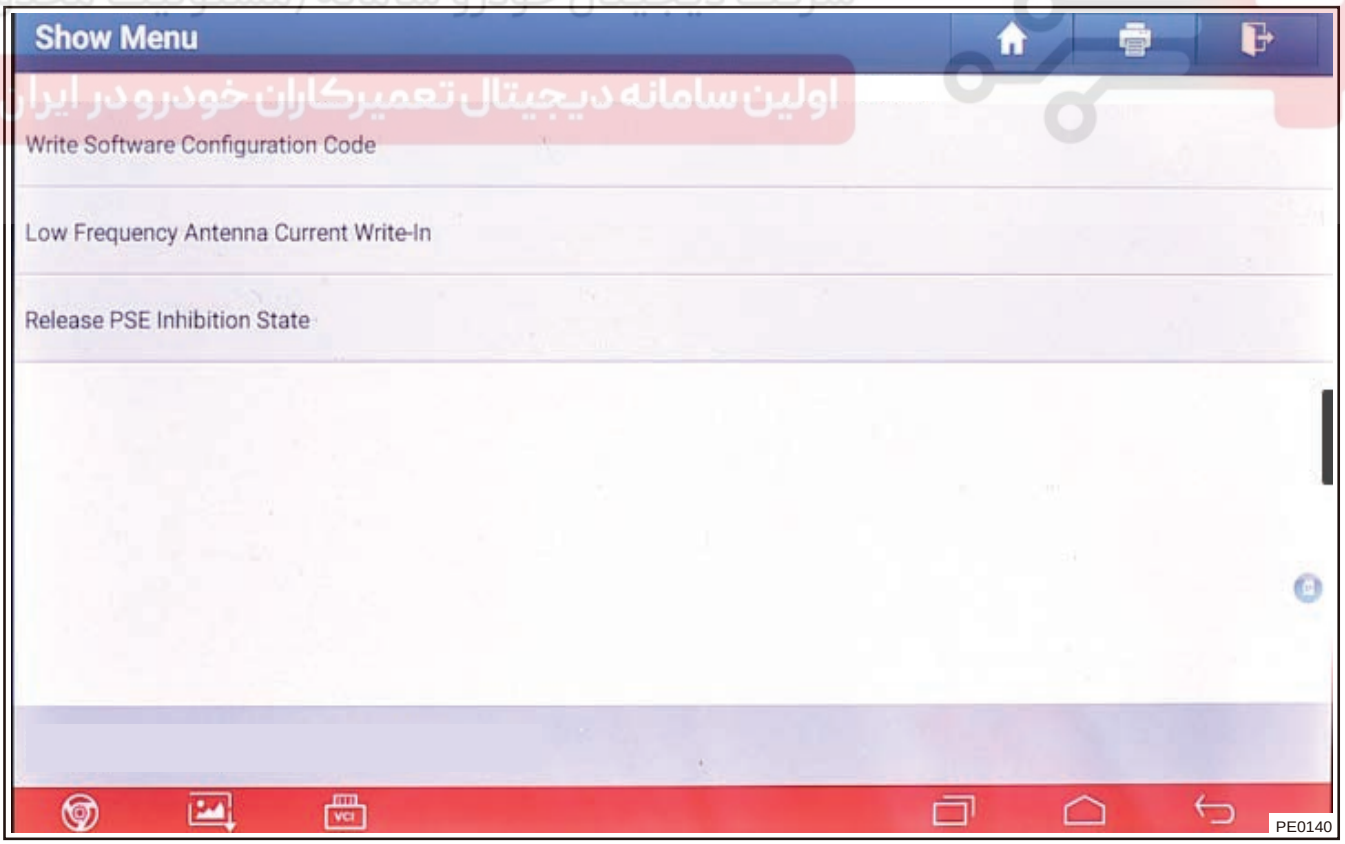
- After power supply is turned to ACC, PEPS will perform encrypted anti-theft validation with ESCL via special LIN line. If validation passes, ESCL will unlock, or ESCL keeps locking and steering wheel cannot be turned. And power supply cannot be turned to ON.
- After power supply is turned to ON, ECU will send one frame of validation data to PEPS via CAN bus to verify. Then PEPS will feedback one frame of validation data as response and send to ECU. If response from PEPS is correct, ECU will determine anti-theft can be canceled. Otherwise, ECU will not inject fuel and ignite.

Anti-theft Matching

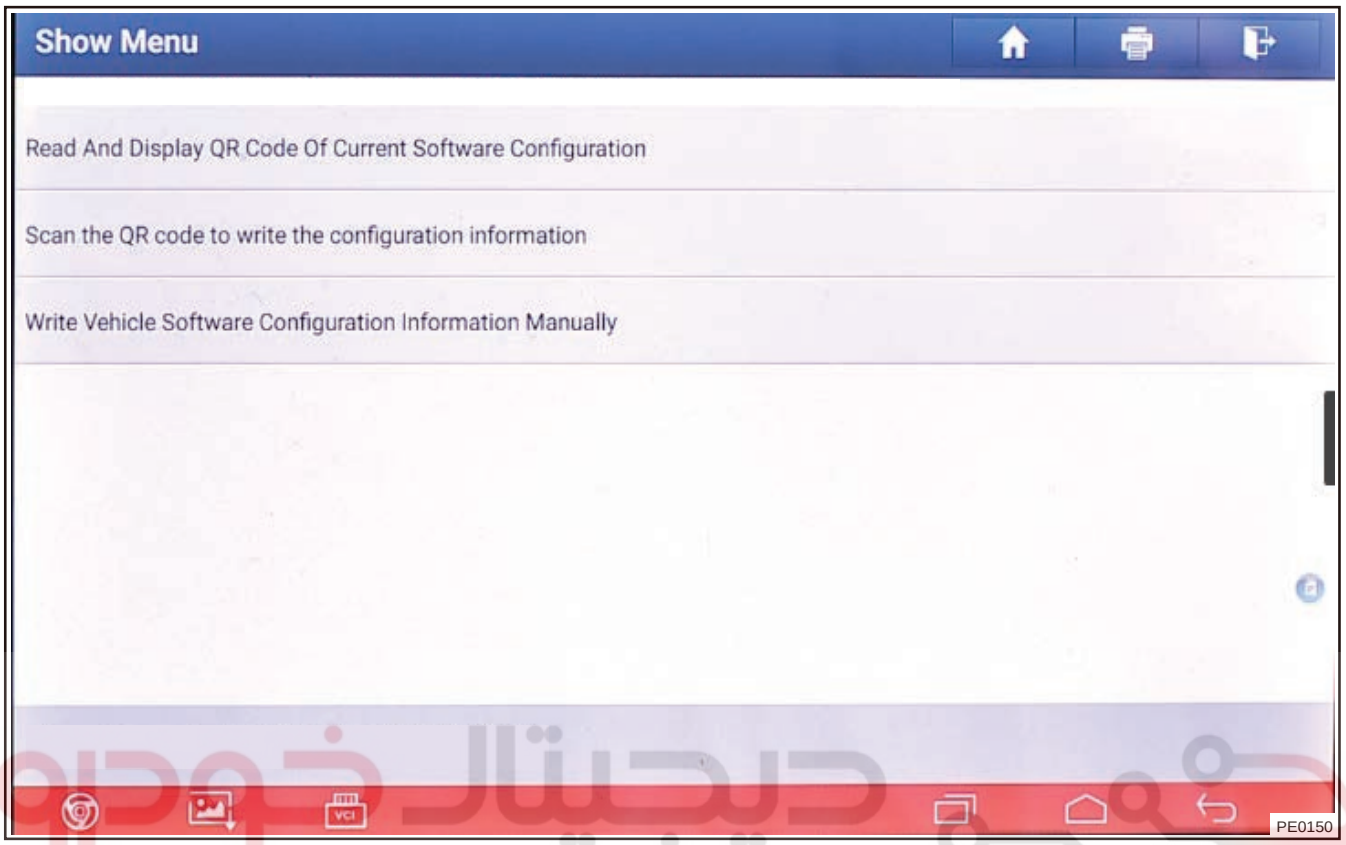
Software Configuration Code Writing

1. Click “PEPS (Passive Entry And Passive Start System)”.
2. Select and click “Special Function”.

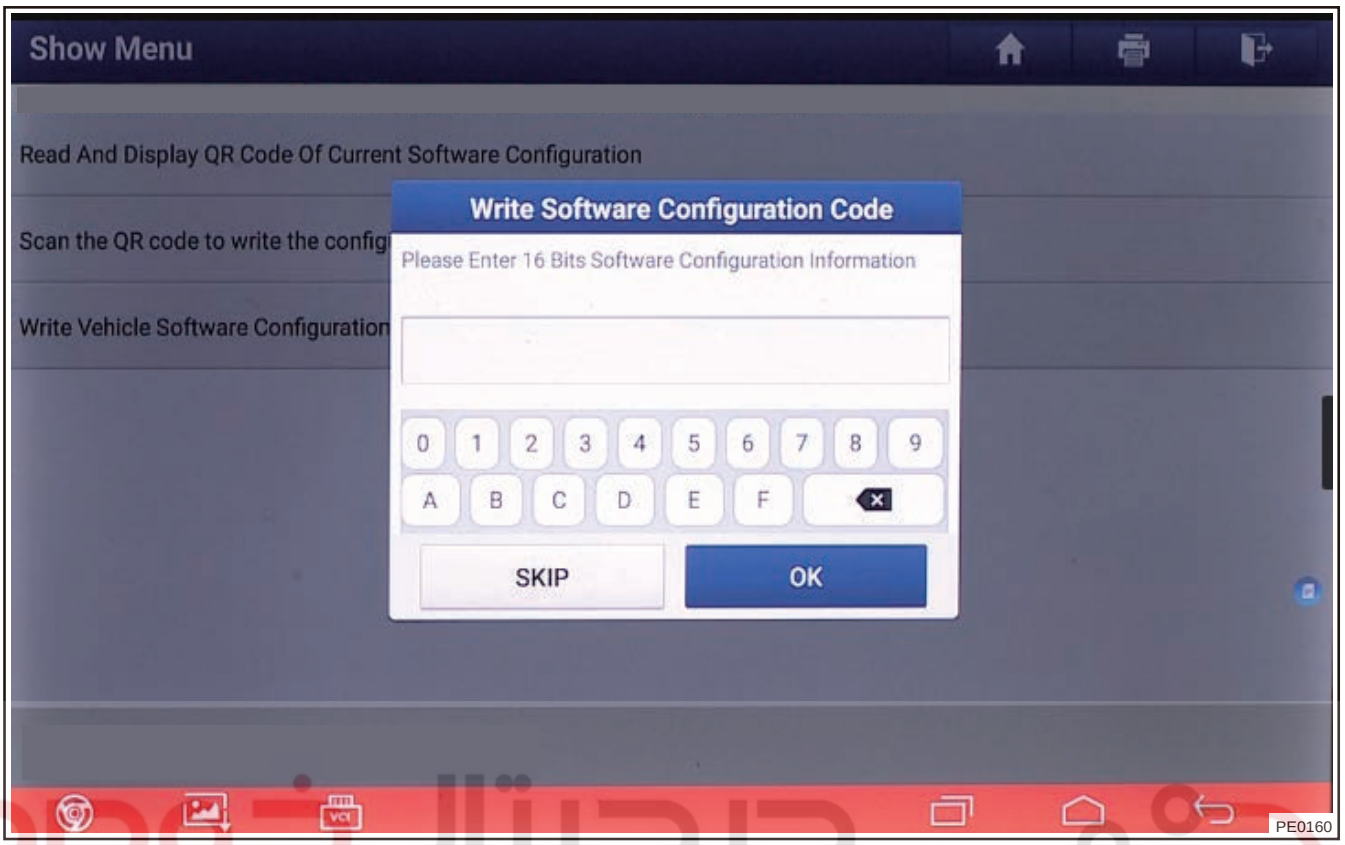
3. Click “Write Software Configuration Code”.



4. Click “Write Vehicle Software Configuration Information Manually”.



5. Input corresponding configuration information and click “OK”.



Smart Key Replacement After Vehicle Sold

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:
   a. Technician reads VIN in EMS of user’s vehicle with diagnostic tester, then obtain PIN through VIN.
   b. 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.

c. 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:
   a. Technician reads VIN in EMS of user’s vehicle with diagnostic tester, then obtain PIN through VIN.
   b. Enter anti-theft control system program on diagnostic tester, select “Delete all keys” menu.
   c. 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.
   d. 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.

PEPS Module Replacement After Vehicle Sold

⚠ Caution

- Please contact Chery service station to obtain PIN.
- Unmatched smart keyless entry and PEPS can switch power supply from IGN OFF to IGN ON for 50 times. Once it exceeds 50 times, PEPS cannot be used. So, do not turn on and off power supply at will with PEPS unmatched.
- If ESCL accidentally enters “Anti-scanning” safe mode , it is necessary to perform “Delete ESCL”.

1. Technician reads VIN in EMS with diagnostic tester, then obtains PIN through VIN.
2. If vehicle is equipped with ESCL, make sure that ESCL is unlocked. After new PEPS is assembled successfully, press ignition switch (IG) to turn on power supply.
3. 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”.
4. Then match previous keys one by one according to instructions of “Add old key”.
5. If vehicle is equipped with ESCL, enter anti-theft control system program on diagnostic tester and complete “Add old key”, then keep power supply in OFF position, check state of ESCL with diagnostic tester, if ESCL is not in Anti-scanning state, replacement is completed, if ESCL is in Anti-scanning state, select “Delete ESCL”, input PIN according to prompt on diagnostic tester, ESCL will be deleted successfully after about 10 minutes, then match ESCL according to description for ESCL replacement.

Engine Management System (EMS) Replacement After Vehicle Sold

1. Technician reads VIN in old EMS or smart keyless entry and PEPS 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)/clutch pedal (for MT 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.

Electric Steering Column Lock (ESCL) Replacement After Vehicle Sold

⚠ Caution
• Only apply to PEPS + MT models • Please contact Chery service station to obtain PIN.

1. Technician reads VIN in old EMS or smart keyless entry and PEPS unit with diagnostic tester, then obtains PIN through VIN.
2. After new ESCL is assembled successfully, keep power supply in OFF position.
3. Enter immobilizer control system program on diagnostic tester, select Program ESCL menu; Input PIN according to prompt on diagnostic tester, after Program ESCL is successful, “ESCL matching is successful” will be displayed on diagnostic tester.
4. Press ignition switch to switch power supply to IGN OFF state, open driver door and close it again, check if lock sound can be heard, then check if steering wheel can be turned. If lock sound can be heard and steering wheel cannot be turned, electric steering column lock is locked successfully.
5. Press ignition switch to switch vehicle power supply to IGN ON state, check if unlock sound can be heard, then check if steering wheel can be turned. If unlock sound can be heard and steering wheel can be turned, electronic steering column lock is unlocked successfully, ESCL matching is successful, or matching fails.

Diagnosis & Testing

Problem Symptoms Table

Symptom	Suspected Area
Luggage compartment cannot be opened	Back door switch fails (open, water leakage or sticking)
	Back door lock malfunction
	PEPS malfunction
	Short or open in wire harness
	BCM malfunction
Vehicle cannot be started (PEPS) (starter runs)	Anti-theft verification does not pass
Vehicle cannot be started (PEPS) (starter does not run)	Gear position is not in P/N (for DCT models)
	Clutch (for MT models)/brake switch (for DCT models) is abnormal
	ENGINE START STOP switch malfunction
	Circuit or starter relay is abnormal
	Starter malfunction
	Start times limit is activated

Symptom	Suspected Area
ESCL cannot be locked or unlocked	Vehicle is parked on slope (lock pin is stuck)
	Door signal is abnormal
	ENGINE START STOP switch cannot be turned on or off
	Short or open in wire harness
	Anti-theft verification fails
	Network communication malfunction

Problem Repair (No DTC)

If PEPS system has problems, but no DTC is stored in PEPS system, this problem is called a problem without DTC. Problems without DTC for PEPS system are divided into following types:

1. Indicator in instrument cluster does not come on or illuminates constantly (incorrect wire harness connection or indicator is damaged).
2. Troubleshooting recommendation: Check corresponding components according to problem symptom, and troubleshoot by following the vehicle repair manual.

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.

Intermittent DTC Troubleshooting

If malfunction is intermittent, perform the followings:

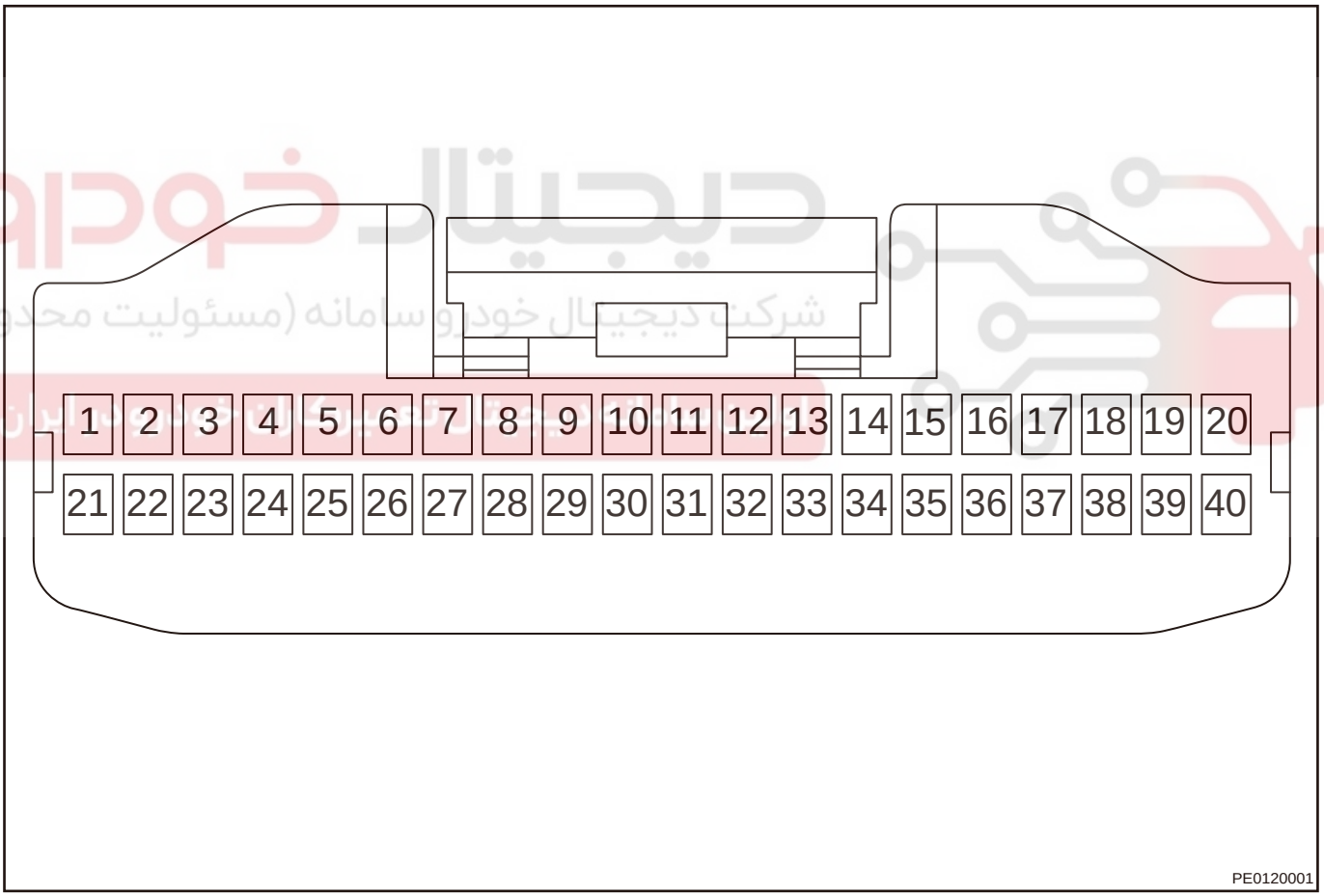
- Check if connector is loose.
- Check if wire harness is worn, pierced, pinched or partially broken.
- Monitor diagnostic tester (the latest software) data that is related to this circuit.
- Wiggle related wire harnesses and connectors and observe if signal is interrupt in related circuit.
- If possible, 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.

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.

PEPS Control Module Assembly Terminal List



Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
1	–	21	–
2	–	22	–
3	CAN_H	23	–
4	CAN_L	24	–

Terminal No.	Terminal Definition	Terminal No.	Terminal Definition
5	–	25	SWIL ENGINE START STOP Switch Indicator (White)
6	Trunk Unlock Switch	26	STP Brake SW
7	ENGINE START STOP SW 2	27	–
8	ENGINE START STOP SW 1	28	ENGINE START STOP Switch GND
9	–	29	–
10	Rear Left Door High Performance Antenna (+)	30	Rear Left Door High Performance Antenna (-)
11	BACKUP ANT2 Anti-theft Coil (-)	31	BACKUP ANT1 Anti-theft Coil (+)
12	Rear Right Door High Performance Antenna (+)	32	Rear Right Door High Performance Antenna (-)
13	Front Low Frequency Antenna (+)	33	Front Low Frequency Antenna (-)
14	Rear Bumper Low Frequency Antenna (+)	34	Rear Bumper Low Frequency Antenna (-)
15	–	35	–
16	LH PSU/HSU +	36	LH PSU/HSU-
17	IG1 Feedback Input	37	Ground
18	IG1 Relay Drive (High)	38	Starter Relay Detection
19	–	39	Starter Relay
20	Ignition Signal	40	ACCD Relay Drive (High)

Diagnostic Trouble Code (DTC) Chart

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
B1300-00	Internal Control Module	/	PEPS module	/
B1301-00	Immobilizer and ECM Authenticatio-n Failed	/	It may be necessary to perform anti-theft match for PEPS and EMS module again	/

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
B1515-45	ROM Checksum Failure	/		/
B1302	VIN Not Programmed	/	It may be necessary to input VIN into PEPS again	/
B1305-00	Immobilizer with No Key Stored	/	PEPS control module assembly is damaged	/
B1306	Security Code Not Programmed	/	PEPS control module assembly is damaged	/
B1500	Open Circuit of Driver Door Outside LF Antenna	/	PEPS control module or interior wire harness is damaged	/
B1524	Short Circuit Of (Driver Side) Rear Left LF Antenna	/	PEPS control module or interior wire harness is damaged	/
B1525	Short Circuit Of (-Passenger Side) Rear Right LF Antenna	/	PEPS control module or interior wire harness is damaged	/
B1501	Open Circuit of Passenger Door Outside LF Antenna	/	PEPS control module or interior wire harness is damaged	/
B1522	Open Circuit on Drive Door PSU	/	PEPS control module or interior wire harness is damaged	/
B1523	Open Circuit on Passenger Door PSU	/	PEPS control module or interior wire harness is damaged	/
B1529	Short Circuit on Driver Door HSU/ PSU	/	PEPS control module or interior wire harness is damaged	/
B152A	Short Circuit on Passenger Door HSU/ PSU	/	PEPS control module or interior wire harness is damaged	/

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
B152B	Stuck on Driver Door HSU/PSU	/	PEPS control module or interior wire harness is damaged	/
B152C	Stuck on Passenger Door HSU/ PSU	/	PEPS control module or interior wire harness is damaged	/
B1502-13	Open Circuit of Front Internal LF Antenna	/	Front internal low frequency antenna or interior wire harness is damaged	/
B1526	Short Circuit of Front Internal LF Antenna	/		/
B1505	Open Circuit of Bumper LF Antenna	/	Low frequency antenna or wire harness is damaged	/
B1527	Short Circuit of Bumper LF Antenna	/		/
B152D	SSB Stuck	/	PEPS control module is damaged, ignition switch has failed, wire harness is damaged	/
B1506	Engine Switch Failure	/	PEPS control module is damaged, ignition switch has failed, wire harness is damaged	/
B1507	IG Circuit Failure	/	PEPS control module is damaged, ignition switch has failed, wire harness is damaged	/
B152E	START Fail	/	PEPS control module is damaged, ignition switch has failed, wire harness is damaged	/
B1508	ACC Circuit Failure	/	ACC relay, body ground and wire harness malfunction	/
B1509	Abnormality in Brake Signal	/	Wire harness, PEPS controller or brake switch is damaged	/

DTC	DTC Definition	Fault Detection Condition	Possible Causes	Maintenance Advice
B1518	Trunk/Back Door Unlock Switch Stuck Failure	/	Back door lock button, wire harness or PEPS control module is damaged	/
B152F	Battery Voltage Low Detection	/	Battery, wire harness or PEPS control module is damaged	/
B1530	Battery Voltage High Detection	/	Battery, wire harness or PEPS control module is damaged	/
U1300-55	Software Configuration Error	/	Configuration has error	/
B1521	Open Circuit Of Backup Antenna	/	PEPS control module is damaged	/
B1528	Short Circuit Of Backup Antenna	/		/

DTC Diagnosis Procedure

DTC	B1521	Open Circuit Of Backup Antenna
DTC	B1528	Short Circuit Of Backup Antenna

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 with a new PEPS module to check if fault reoccurs.**

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

DTC	**B1300**	**Internal Control Module**

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 with a new PEPS module to check if fault reoccurs.**

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

DTC	**B1301**	**Immobilizer and ECM Authentication Failed**
DTC	**B1515**	**ROM Checksum 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 DTC and read DTC again.
(b) Check if DTC occurs again.

NG → **It may be necessary to perform anti-theft match for PEPS and EMS module again.**

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 PEPS module to check if fault reoccurs.**

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

DTC	**B1302**	**VIN 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.

1	**Check for DTCs**

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTCs occur again.

NG → **Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTC**

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 → **Input VIN into PEPS again**

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

DTC	B1305	Immobilizer with No Key Stored

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 → **Enter anti-theft system and add key**

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 PEPS control module to check if fault reoccurs**

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

DTC	B1306	Security Code 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.

1	Check for DTCs

(a) Using diagnostic tester, clear DTC and read DTC again.
(b) Check if DTCs occur again.

NG → **Rematch PEPS 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 PEPS control module to check if fault reoccurs**

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

DTC	B1500	Open Circuit of Driver Door Outside LF Antenna
DTC	B1501	Open Circuit of Passenger Door Outside LF Antenna
DTC	B1521	Short Circuit Of (Driver Side) Rear Left LF Antenna
DTC	B1501	Short Circuit Of (Passenger Side) Rear Right LF Antenna
DTC	B1522	Open Circuit on Drive Door PSU
DTC	B1523	Open Circuit on Passenger Door PSU
DTC	B1529	Short Circuit on Driver Door HSU/PSU
DTC	B152A	Short Circuit on Passenger Door HSU/PSU

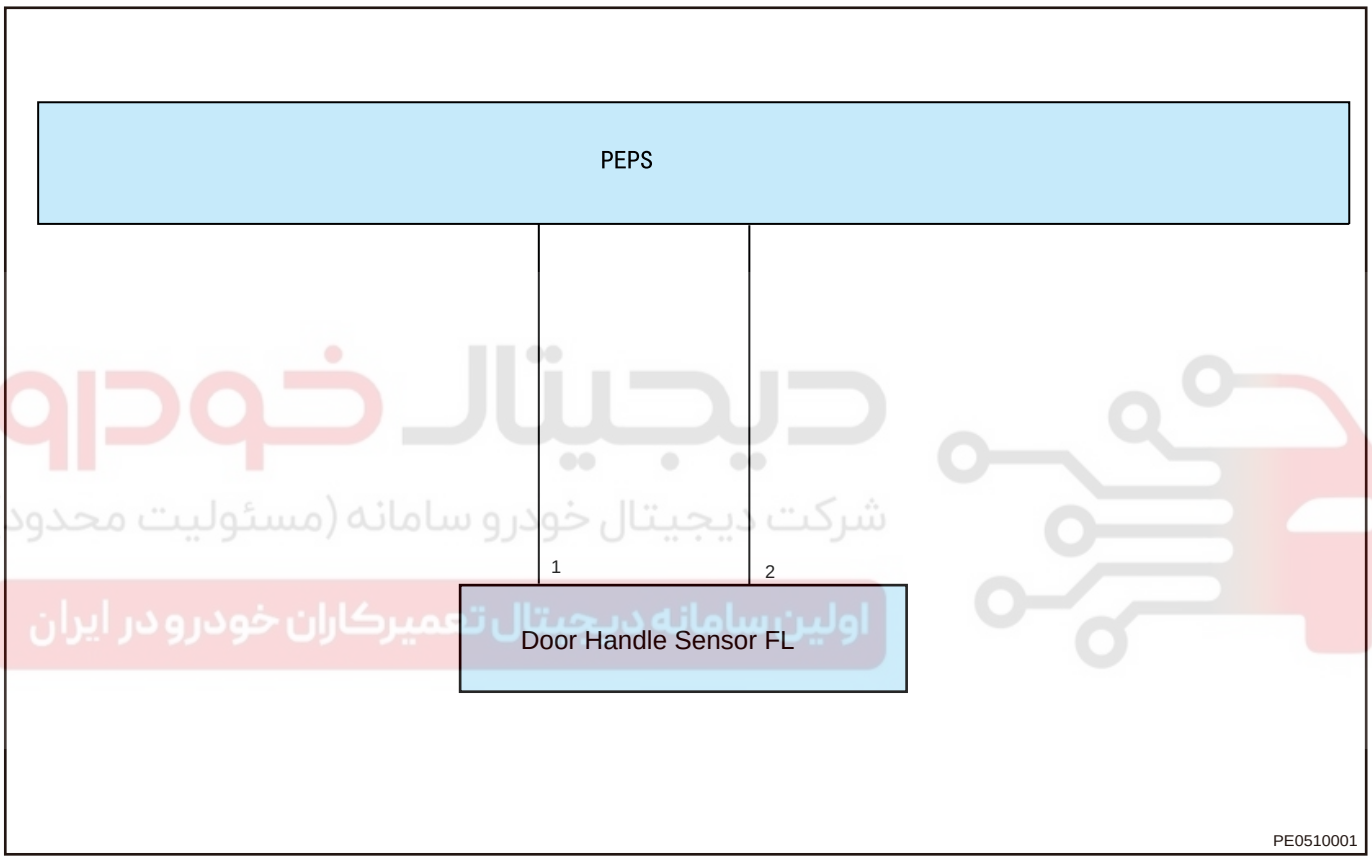
DTC	**B152B**	**Stuck on Driver Door HSU/PSU**
DTC	**B152C**	**Stuck on Passenger Door HSU/PSU**

Hint:

- Take the front left door handle sensor as an example to describe the troubleshooting steps. For other switches, refer to these steps.
- When performing circuit diagnosis and test, always refer to the circuit diagram for specific circuit and component information.

Description

System Schematic Diagram



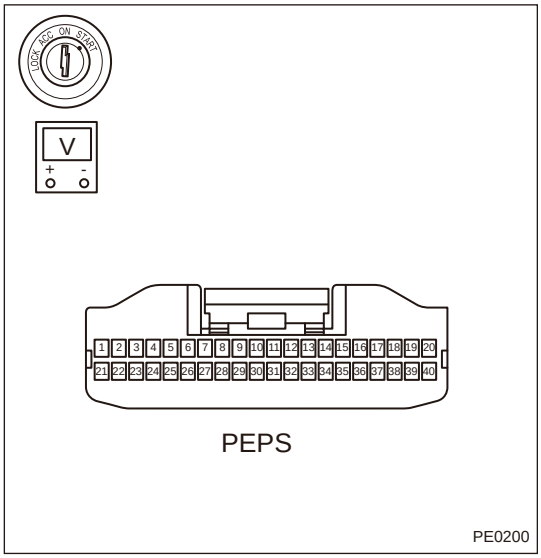
DTC Confirmation Procedure

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.

1	**Check if PEPS module output voltage is normal**

(a) Turn ignition switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the PEPS 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, turn ENGINE START STOP switch to ON, use DC voltage band of digital multimeter to measure if voltage between PEPS power supply terminal and ground terminal.



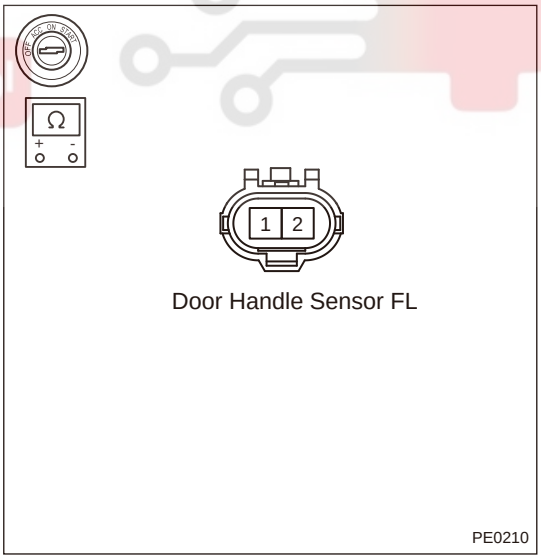
Multimeter Connection	Condition	Specified Condition
PEPS module (- power supply terminal) - PEPS module (ground terminal)	Always	12 V

NG → **Replace PEPS control module assembly**

OK

2	Check door handle sensor

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the front left door sensor 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) The outside handle is capacitive sensing type. Using ohm band of digital multimeter, measure the resistance of front left door outside handle.



Multimeter Connection	Condition	Specified Condition
Front left door sensor (1) - Front left door sensor (2)	OK	No continuity

NG → **Replace left door handle sensor**

OK

3	Check front left door wire harness for open or short

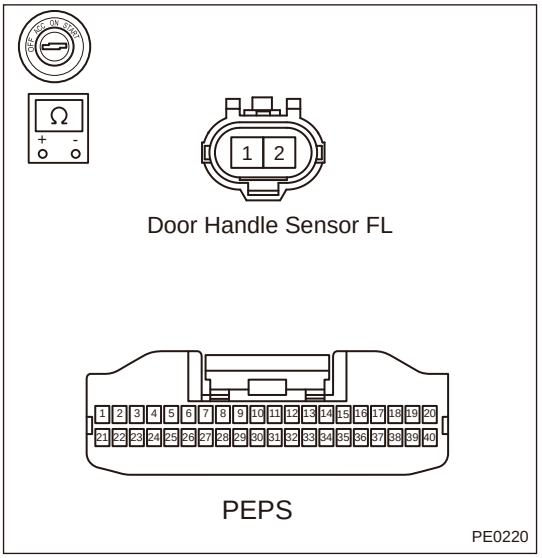
(a) Disconnect the front left door outside handle wire harness connector F-014.

(b) Check if wire harnesses are worn, pierced, pinched or partially broken.

(c) Check for broken, bent, protruded or corroded terminals.

(d) Check if related connector pins are in good condition.

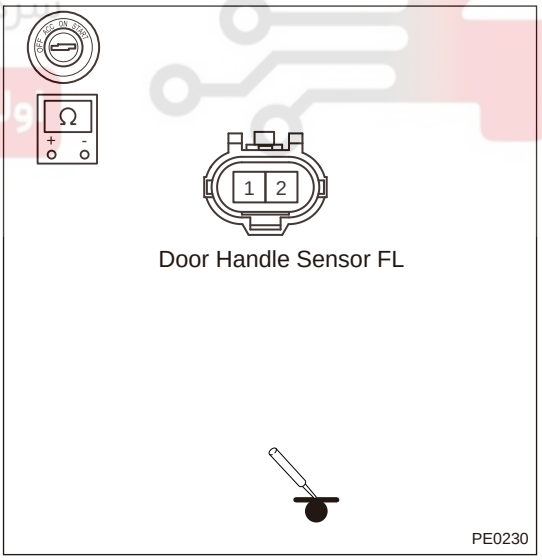
(e) Using ohm band of digital multimeter, check for continuity between terminals 1, 2 of front left door sensor and corresponding terminals of PEPS module connector to check for open in front left door wire harness.



Multimeter Connection	Condition	Specified Condition
Front left door sensor (1) - PEPS module (- connected terminals)	Always	⩽ 1 Ω
Front left door sensor (2) - PEPS module (- connected terminals)	Always	⩽ 1 Ω

NG → **Repair or replace ground circuit of front left door handle sensor**

(f) Using ohm band of digital multimeter, measure resistance between terminals 1, 2 of front left door wire harness connector and body ground separately to check for short to body ground in front left door wire harness.



Multimeter Connection	Condition	Specified Condition
Front left door sensor (1) - Body ground	Always	No continuity
Front left door sensor (2) - Body ground	Always	No continuity

NG → **Replace interior wire harness**

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.

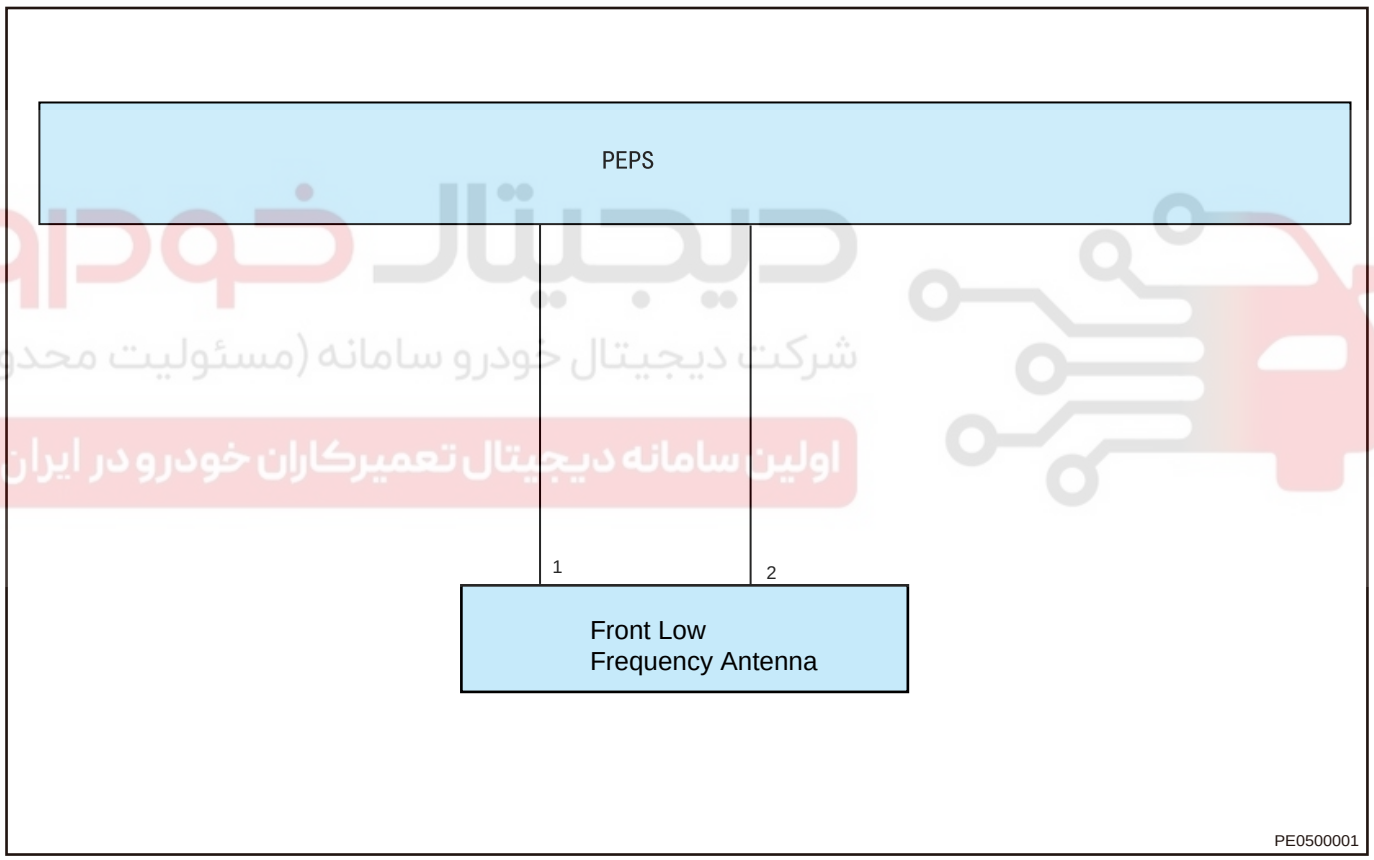
(c) Read the fault information and confirm that the fault has been solved.

NG	**Replace PEPS module.**
OK	**Conduct test and confirm malfunction has been repaired.**

DTC	**B1502**	**Open Circuit of Front Internal LF Antenna**
DTC	**B1526**	**Short Circuit of Front Internal LF Antenna**

Description

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 PEPS module software configuration code is correct

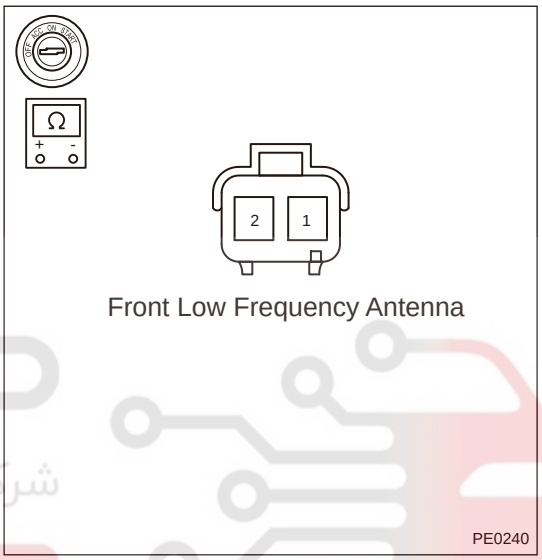
(a) Use diagnostic tester to enter PEPS system.
(b) Read software configuration code and check if it is correct.

NG → **Write configuration code again and clear DTC**

OK

2	Measure resistance of front low frequency antenna

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 the connector from front low frequency antenna.
(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) Using ohm band of digital multimeter, measure if resistance between terminals 1 and 2 of front low frequency antenna connector is normal.



Front Low Frequency Antenna

Multimeter Connection	Condition	Specified Condition
Front low frequency antenna (1) - Front low frequency antenna (2)	Always	Always ≈ 10 KΩ

NG → **Replace low frequency antenna**

OK

3	Check interior wire harness for open or short

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.

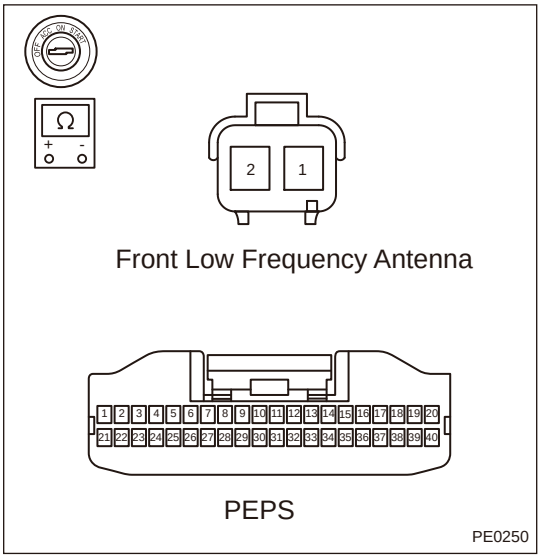
(c) Disconnect front low frequency antenna connector and PEPS module connector.

(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.

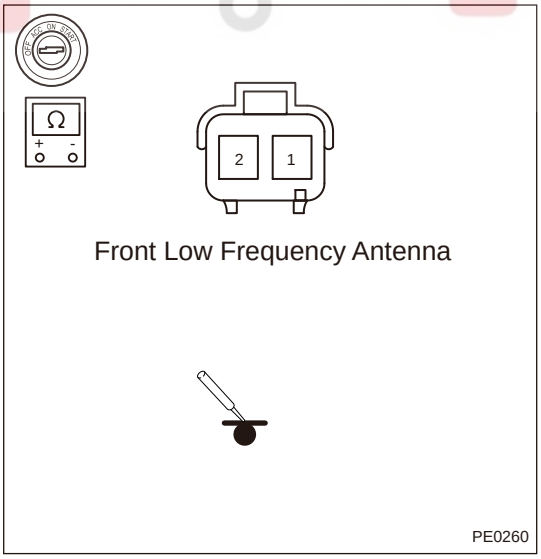
(g) Using ohm band of digital multimeter, check for continuity between terminals 1, 2 of front low frequency antenna and PEPS module (connected terminals) to check for open in instrument panel wire harness.



Multimeter Connection	Condition	Specified Condition
Front low frequency antenna (1) - PEPS module (- connected terminals)	Always	⩽ 1 Ω
Front low frequency antenna (2) - PEPS module (- connected terminals)	Always	⩽ 1 Ω

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

(h) Using ohm band of digital multimeter, check for continuity between terminals 1, 2 of connector and body ground to check for short to ground in instrument panel wire harness.



Multimeter Connection	Condition	Specified Condition
Front low frequency antenna (1) - Body ground	Always	No continuity
Front low frequency antenna (2) - Body ground	Always	No continuity

NG → **Replace instrument panel wire harness**

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.

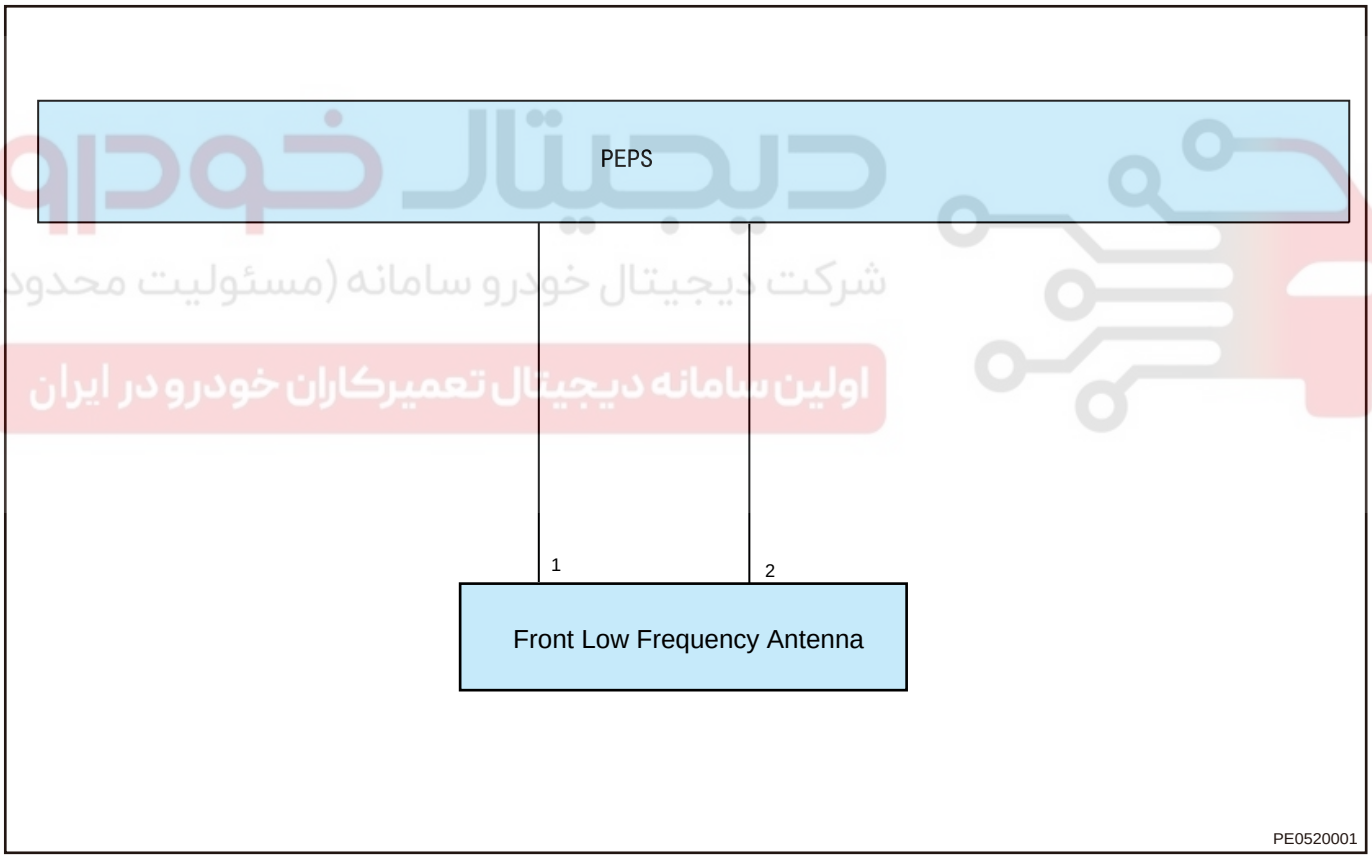
NG → **Replace PEPS module**

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

DTC	**B1505**	**Open Circuit of Bumper LF Antenna**
DTC	**B1527**	**Short Circuit of Bumper LF Antenna**

Description

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 PEPS module software configuration code is correct**

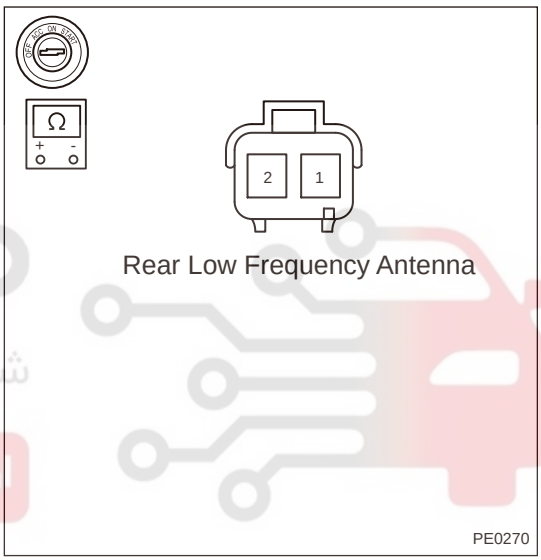
(a) Use diagnostic tester to enter PEPS system.
(b) Read software configuration code and check if it is correct.

NG → **Input configuration code again and clear DTC**

OK

2	**Measure resistance of bumper low frequency antenna**

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 the bumper low frequency antenna 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) Using ohm band of digital multimeter, measure if resistance between terminals 1 and 2 of front low frequency antenna connector is normal.



Multimeter Connection	Condition	Specified Condition
Bumper low frequency antenna (1) - Bumper low frequency antenna (2)	Always	≈ 10 KΩ

NG → **Replace bumper low frequency antenna**

OK

3	**Check interior wire harness for open or short**

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.

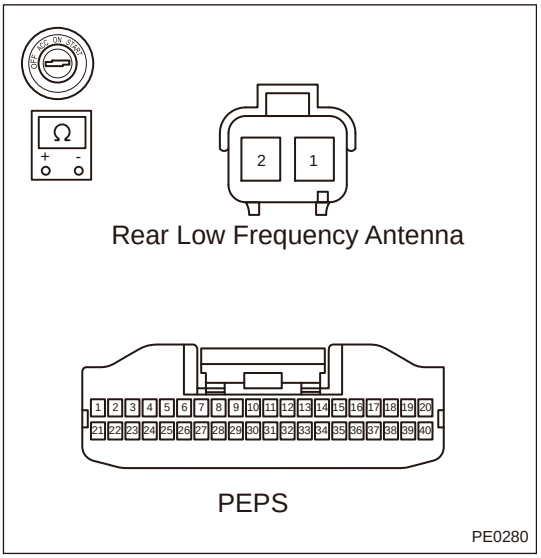
(c) Disconnect the bumper low frequency antenna connector and PEPS module connector.

(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.

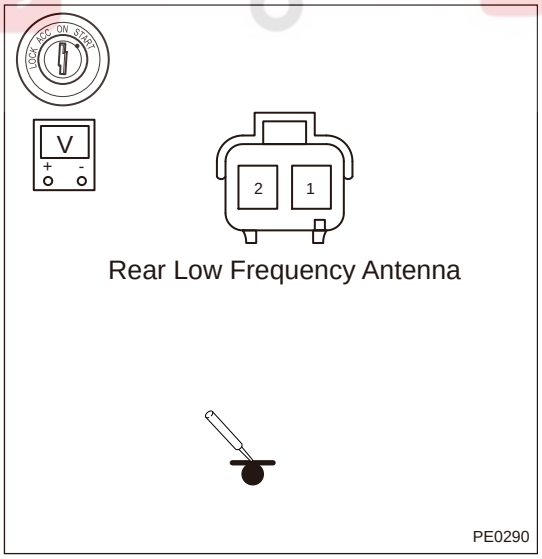
(g) Using ohm band of digital multimeter, check for continuity between terminals 1, 2 of bumper low frequency antenna and PEPS module (connected terminals) respectively to check for open in instrument panel wire harness.



Multimeter Connection	Condition	Specified Condition
Bumper low frequency antenna (1) - PEPS module (- connected terminals)	Always	⩽ 1 Ω
Bumper low frequency antenna (2) - PEPS module (- connected terminals)	Always	⩽ 1 Ω

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

(h) Using digital multimeter, measure voltage between terminal 1 of bumper low frequency antenna and body ground to check if the PEPS module has power output.

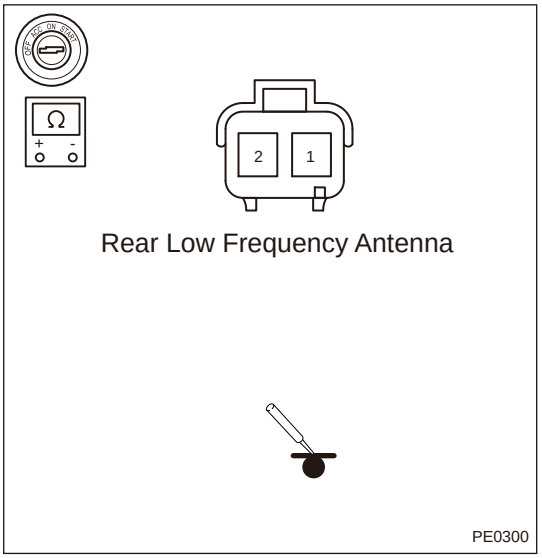


Multimeter Connection	Condition	Specified Condition
Bumper low frequency antenna (1) - Body ground	Always	12 V

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

(i) Using ohm band of digital multimeter, check for continuity between terminals 1, 2 of bumper low frequency antenna and body ground to check for short to ground in instrument panel wire harness.

Multimeter Connection	Condition	Specified Condition
Bumper low frequency antenna (1) - Body ground	Always	No continuity
Bumper low frequency antenna (1) - Body ground	Always	No continuity



NG → **Replace instrument panel wire harness**

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.

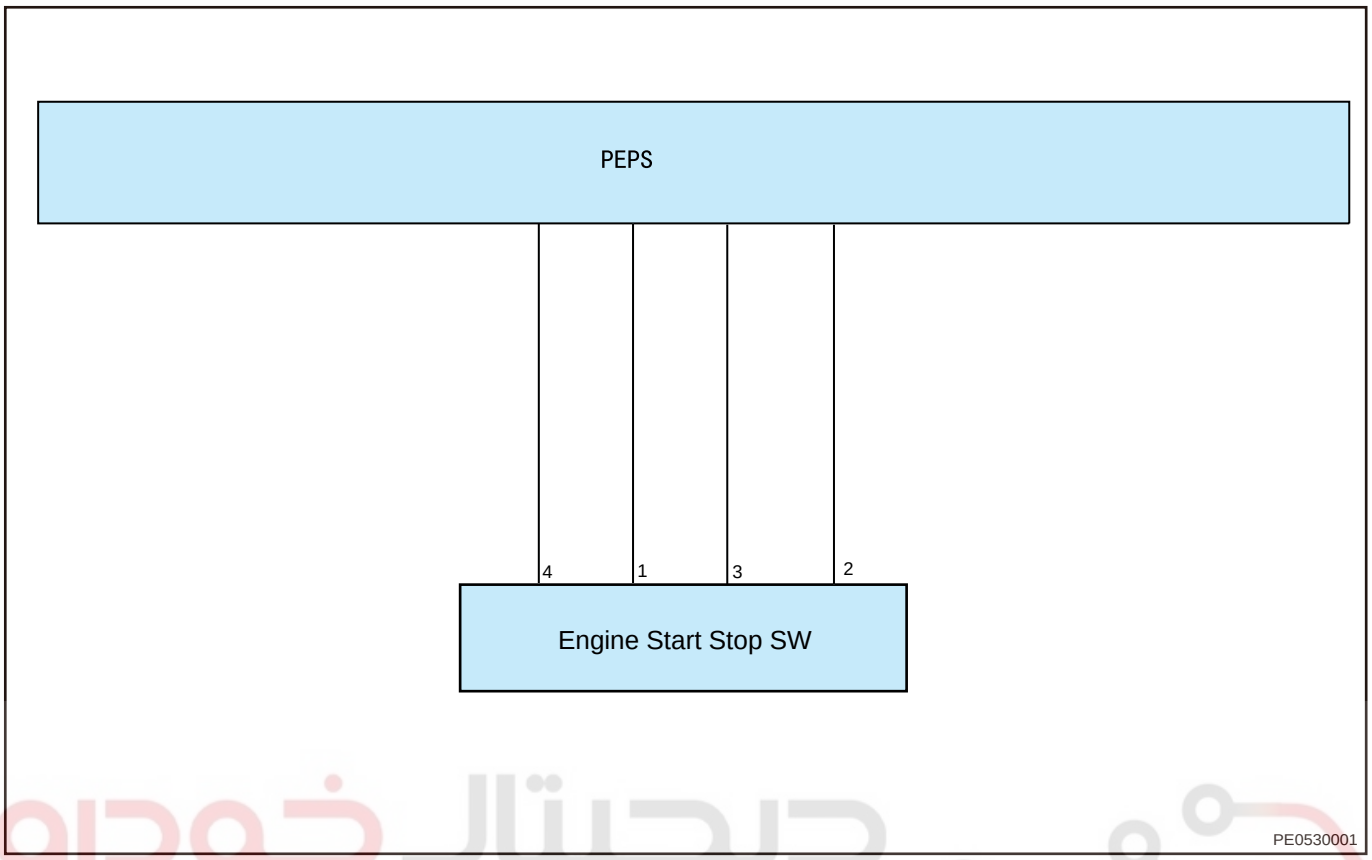
NG → **Replace PEPS module**

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

DTC	**B152D**	**SSB Stuck**
DTC	**B1506**	**Engine Switch Failure**
DTC	**B1507**	**IG Circuit Failure**
DTC	**B152E**	**START Fail**

Description

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	**Enter PEPS system and read related datastream**

(a) Read datastream “Power Supply Management and Starting State” and “Engine Switch Backlight State”.

(b) Press ENGINE START STOP switch, check datastream conversion activation state and backlight illumination state, To determine whether the ENGINE START STOP switch input is normal.

OK → **Turn off vehicle power supply (-disconnect the negative battery cable), then clear DTC again**

NG

2	**Check ENGINE START STOP switch**

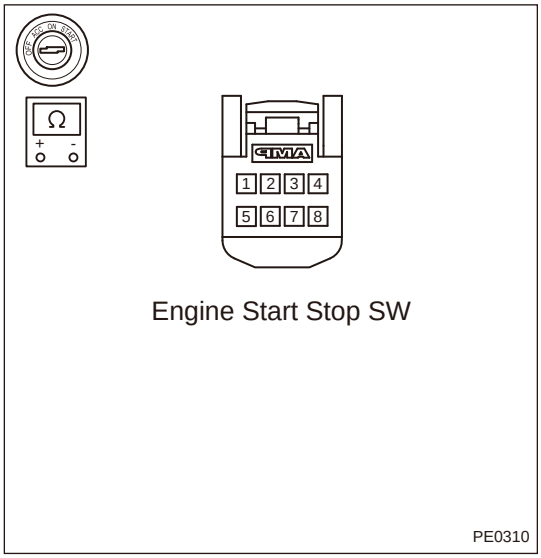
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to OFF.

(b) Disconnect the negative battery cable.

(c) Disconnect the ENGINE START STOP switch connector.

(d) Using ohm band of digital multimeter, measure resistance of ENGINE START STOP switch to check if ENGINE START STOP switch is normal.



Engine Start Stop SW

PE0310

Multimeter Connection	Condition	Specified Condition
ENGINE START STOP switch terminal 2 - 1	Not pressed	No continuity
ENGINE START STOP switch terminal 2 - 1	Pressed	⩽ 1 Ω
ENGINE START STOP switch terminal 2 - 3	Not pressed	No continuity
ENGINE START STOP switch terminal 2 - 3	Pressed	⩽ 1 Ω
ENGINE START STOP switch terminal 1 - 3	Not pressed	No continuity
ENGINE START STOP switch terminal 1 - 3	Pressed	⩽ 1 Ω
ENGINE START STOP switch terminal 4 - 2	Not pressed	≈ 6.33 KΩ

NG → **Replace ENGINE START STOP switch**

OK

3	**Check instrument cluster wire harness for open or short**

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.

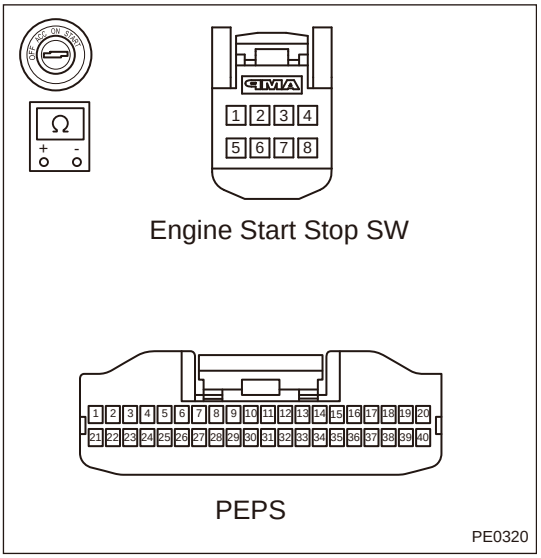
(c) Disconnect ENGINE START STOP switch connector and PEPS module connector.

(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.

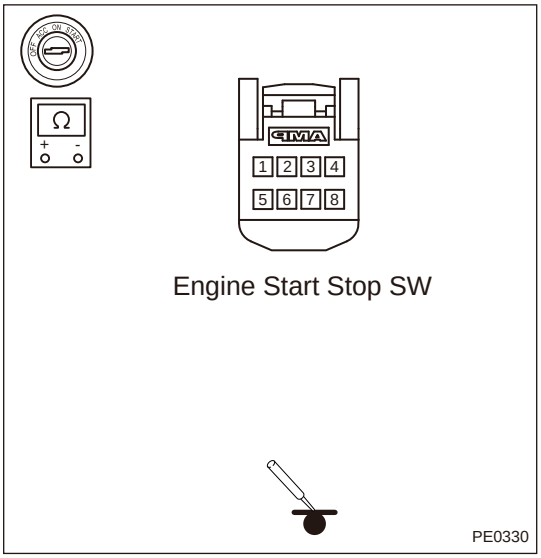
(g) Using ohm band of digital multimeter, check for continuity between ENGINE START STOP switch (1) and I-028 (8), ENGINE START STOP switch (2) and I-028 (28), ENGINE START STOP switch (3) and I-028 (7), ENGINE START STOP switch (4) and I-028 (25) to check circuit for open.



Multimeter Connection	Condition	Specified Condition
ENGINE START STOP switch (1) - PEPS module (- connected terminals)	Always	⩽ 1 Ω
ENGINE START STOP switch (2) - PEPS module (- connected terminals)	Always	⩽ 1 Ω
ENGINE START STOP switch (3) - PEPS module (- connected terminals)	Always	⩽ 1 Ω
ENGINE START STOP switch (4) - PEPS module (- connected terminals)	Always	⩽ 1 Ω

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

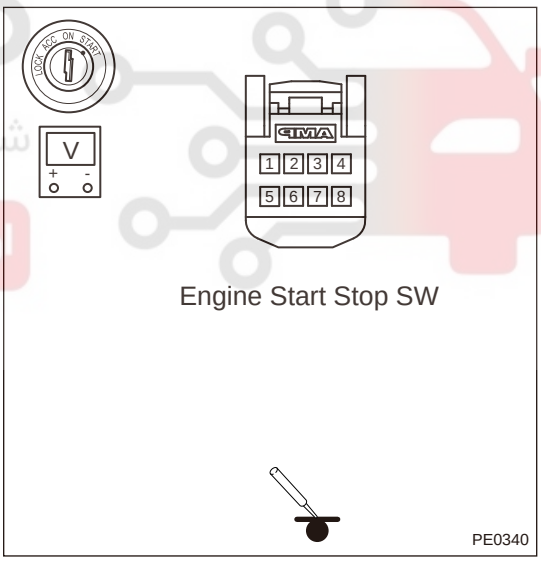
(h) Using ohm band of digital multimeter, check for continuity between terminals 1, 2, 3 and 4 of ENGINE START STOP switch and body ground to check for short to ground in instrument panel wire harness.



Multimeter Connection	Condition	Specified Condition
ENGINE START STOP switch (1) - Body ground	Always	No continuity
ENGINE START STOP switch (2) - Body ground	Always	No continuity
ENGINE START STOP switch (3) - Body ground	Always	No continuity
ENGINE START STOP switch (4) - Body ground	Always	No continuity

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

(i) Connect the negative battery cable (confirm ENGINE START STOP switch and PEPS module connector are disconnected). Bridge joint ACC relay and IGN1 relay (- ENGINE START STOP switch is disabled). Using DC voltage band of digital multimeter, measure voltage between terminals 1, 2, 3 and 4 of ENGINE START STOP switch and body ground to check for short to power supply in instrument panel wire harness.



Multimeter Connection	Condition	Specified Condition
ENGINE START STOP switch (1) - Body ground	Always	0 V
ENGINE START STOP switch (2) - Body ground	Always	0 V
ENGINE START STOP switch (3) - Body ground	Always	0 V
ENGINE START STOP switch (4) - Body ground	Always	0 V

NG	**Replace instrument panel wire harness**

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 PEPS module**

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

DTC	B1508	ACC Circuit 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 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 if fuse base jack is abnormal

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

(a) Remove fuse SB02-15A in engine compartment fuse and relay box, and check fuse base jack for excessive clearance.

NG → **Adjust fuse base jack**

OK

3	Exchange ACC relay

NG → **Replace ACC relay**

OK

4	Check if relay switch power supply is normal

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

(a) Unplug relay in engine compartment fuse and relay box.

(b) Using 21 W test light or digital multimeter, measure if power supply of ACC relay base No.30 jack is normal.

Multimeter Connection	Condition	Specified Condition
ACC relay base 30 - Body ground (digital multimeter)	Always	Not less than 12 V
ACC relay base 30 - Body ground (21 W test light)	Always	ON

NG → **Replace front bumper wire harness**

OK

5	Short connect the ACC relay base jack control switch

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

(a) Use a wire to bridge joint jacks 30 and 87 of relay base in engine compartment fuse and relay box, and check for open in engine compartment fuse and relay box.

NG → **Replace front bumper wire harness**

OK

6	Check ACC relay control body ground

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

(a) Using ohm band of digital multimeter, check for continuity between jack 86 of ACC relay base and terminal (- corresponding terminal) of engine compartment fuse and relay box to check engine compartment fuse and relay box for open.

Multimeter Connection	Condition	Specified Condition
ACC relay base 86 - Engine compartment fuse and relay box (- corresponding terminal)	Always	⩽ 1 Ω

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

(b) Using ohm band of digital multimeter, check for continuity between terminal (corresponding terminal) of engine compartment fuse and relay box and ground point to check if ground circuit is normal.

Multimeter Connection	Condition	Specified Condition
ACC relay (- ground terminal) - Ground point	Always	⩽ 1 Ω

NG → **Adjust ground position or replace front bumper wire harness.**

OK

7	**Check ACC relay control power supply terminal**

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

(a) Disconnect the negative battery cable.

(b) Disconnect the PEPS 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.

(f) Using ohm band of digital multimeter, measure resistance of wire harness between engine compartment fuse and relay box (signal terminal) and PEPS module (connected terminal).

Multimeter Connection	Condition	Specified Condition
Engine compartment fuse and relay box (signal terminal) - PEPS module (- connected terminal)	Always	⩽ 1 Ω

NG → **Replace wire harness**

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.

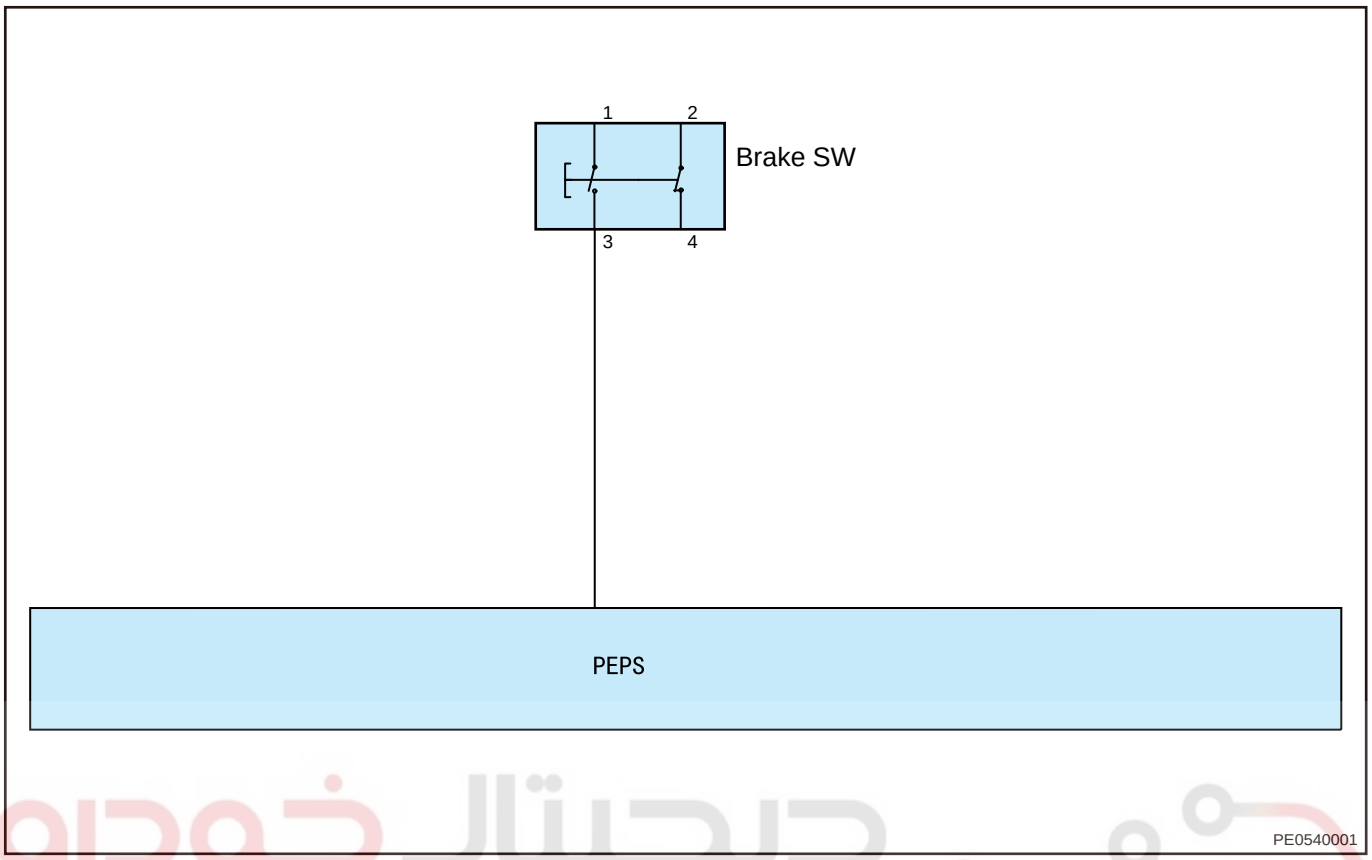
NG → **Replace PEPS module**

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

DTC	B1509	Abnormality in Brake Signal

Description

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 for DTCs**

(a) Using diagnostic tester, clear DTC and read PEPS control module assembly DTC again.

(b) Check if DTCs occur again.

OK → **System is normal**

NG

2	**Using diagnostic tester, enter other system**

(a) Using diagnostic tester, enter other system (such as ESP module, TCU) and check if same DTC occurs.

NG

3	Check interior 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.

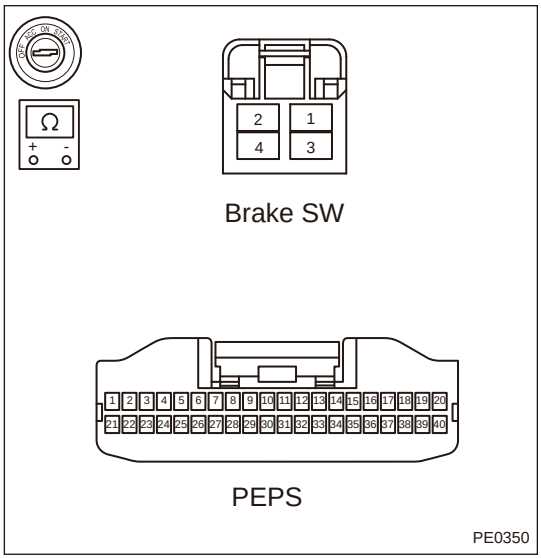
(c) Disconnect instrument panel wire harness connector, interior wire harness connector and PEPS module connector.

(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.

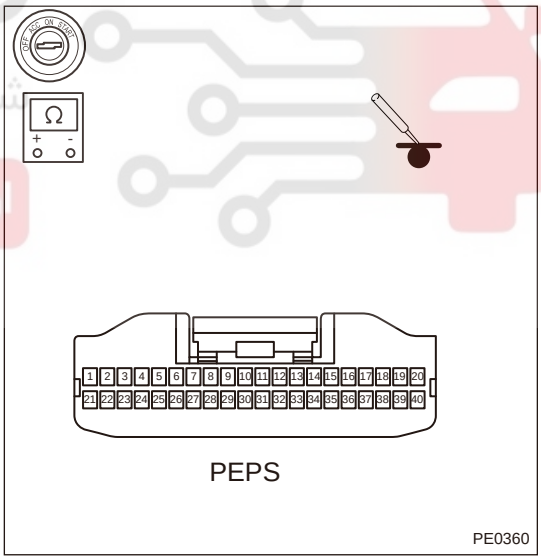
(g) Using ohm band of digital multimeter, check for continuity between terminal of PEPS module (connected terminal) and brake switch (3) to check circuit for open.



Multimeter Connection	Condition	Specified Condition
PEPS module (- connected terminal) - Brake switch (3)	Always	⩽ 1 Ω

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

(h) Using ohm band of digital multimeter, check for continuity between terminal of PEPS module (brake signal) and body ground to check for short to body ground.



Multimeter Connection	Condition	Specified Condition
PEPS module (- brake signal terminal) - Body ground	Always	No continuity

NG → **Replace interior wire harness**

OK → **Replace PEPS module**

4	Check fuse

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

(a) Measure corresponding fuse in engine compartment fuse and relay box with 21 W test light.

NG → **Replace fuse**

OK

5	Check brake switch

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.

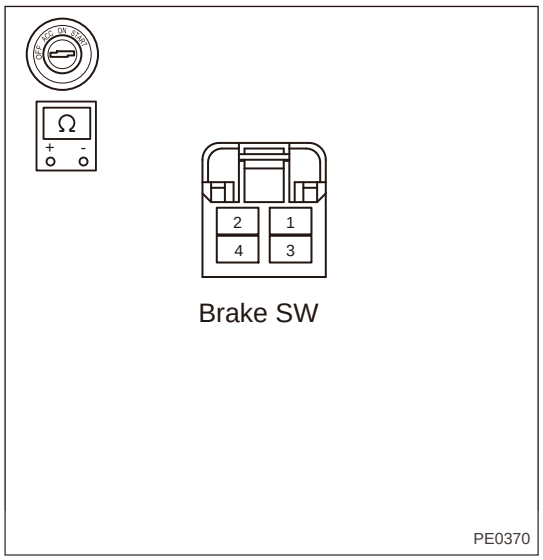
(c) Disconnect the brake switch connector.

(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) Using digital multimeter, measure internal resistance of brake switch to check if brake switch is abnormal



Multimeter Connection	Condition	Specified Condition
Brake switch (1) - Brake switch (3)	Brake pedal not depressed	No continuity
Brake switch (1) - Brake switch (3)	Brake pedal depressed	⩽ 1 Ω
Brake switch (2) - Brake switch (4)	Brake pedal not depressed	⩽ 1 Ω
Brake switch (2) - Brake switch (4)	Brake pedal depressed	No continuity

NG → **Replace brake switch**

OK → **Turn on power supply again and clear DTC**

6	Check fuse base jack

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) Remove corresponding fuse in engine compartment fuse and relay box and check base jack for excessive clearance.

NG → **Adjust fuse jack clearance**

OK

7	Check fuse base jack input power supply

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

(a) Connect the negative battery cable.

(b) Turn ignition switch to ON.

(c) Measure fuse jack input power supply with 21 W test light and check if test light comes on.

NG	**Replace relative fuse**

8	**Check brake switch power supply voltage**

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

(a) Connect the negative battery cable.

(b) Turn ignition switch to ON.

(c) Use a digital multimeter to check whether there is 12 V voltage between terminal of engine compartment fuse and relay box (brake switch power supply) and body ground.

(d) Using digital multimeter, check for continuity between terminal E9 of engine compartment fuse and relay box B-022 and terminal 1 of brake light switch B-101 to check for open in wire harness.

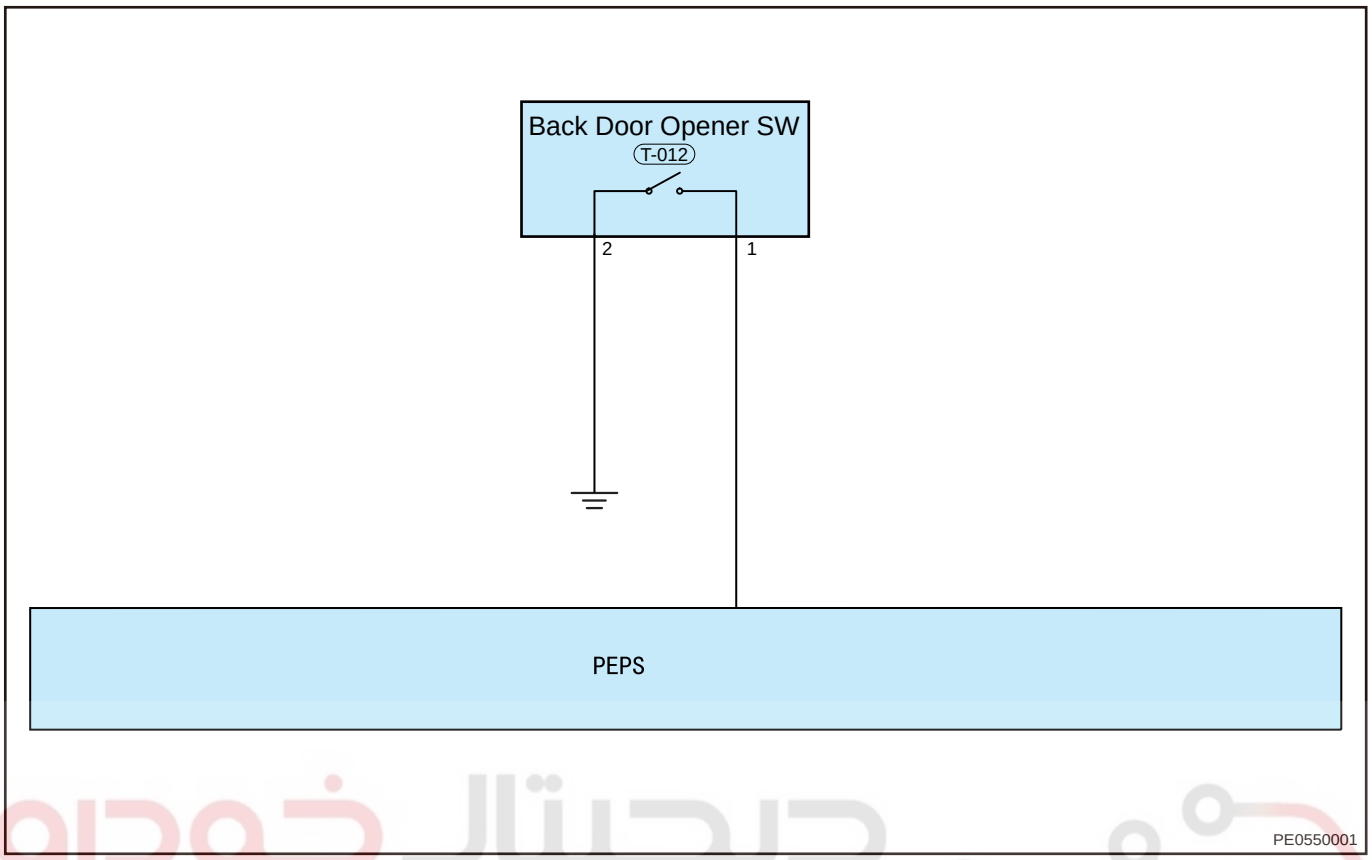
Multimeter Connection	Condition	Specified Condition
Engine compartment fuse and relay box (- brake switch power supply) - Brake switch (1)	Brake pedal not depressed	⩽ 1 Ω

NG	**Replace interior wire harness**
OK	**Replace PEPS module**

DTC	**B1518**	**Trunk/Back Door Unlock Switch Stuck Failure**

Description

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 vehicle malfunction condition**

(a) Press back door release switch to check if back door is open.

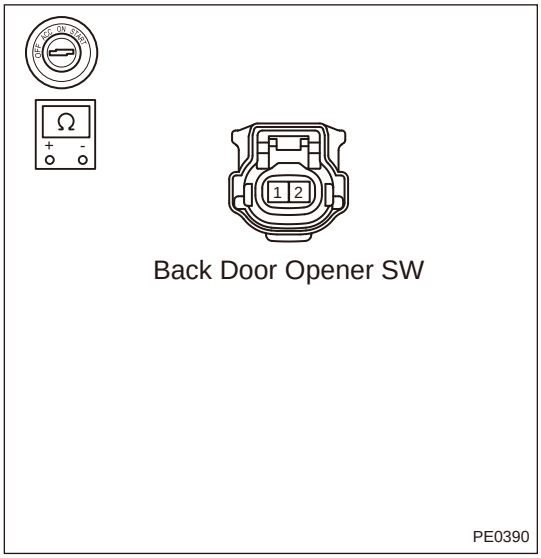
NG

Turn off vehicle power supply (-disconnect the negative battery cable), then turn on power supply again and clear DTC.

OK

2	**Check back door release switch**

(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the negative battery cable.
(c) Disconnect the back door release switch 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) Using ohm band of digital multimeter, measure resistance of back door release switch to check if back door release switch is damaged.



Multimeter Connection	Condition	Specified Condition
Back door release switch (1) - Back door release switch (2)	Not pressed	No continuity
Back door release switch (1) - Back door release switch (2)	Pressed	⩽ 1 Ω

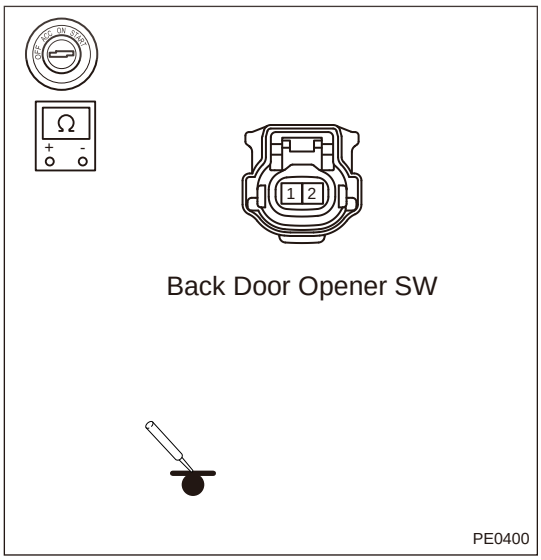
NG → **Replace back door release switch**

OK

3	**Check back door release switch ground side**

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

(a) Using ohm band of digital multimeter, check for continuity between terminal 2 of back door release switch and ground point to check if ground side is normal.



Multimeter Connection	Condition	Specified Condition
Back door release switch (2) - Ground point	Always	⩽ 1 Ω

NG → **Handle ground point**

OK

4	Check back door release switch circuit signal voltage

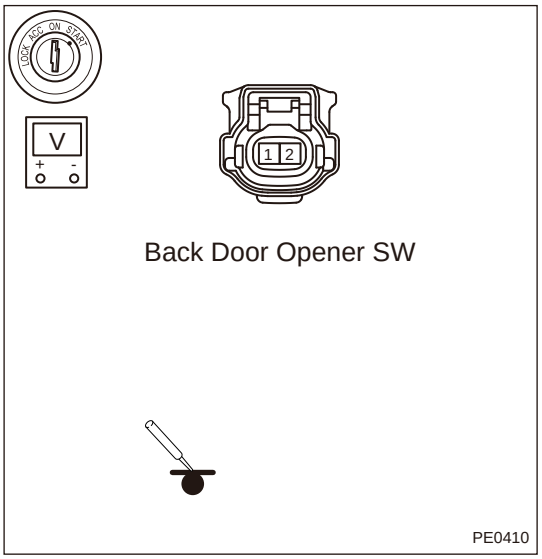
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Connect the negative battery cable.

(b) Turn ENGINE START STOP switch to ON.

(c) Using DC voltage band of digital multimeter, measure if signal voltage at terminal of back door release switch (1) is normal.

Multimeter Connection	Condition	Specified Condition
Back door release switch (1) - Body ground	ON state	Approximately 12 V



NG → **Repair or replace back door wire harness**

OK

5	Check interior wire harness for open or short

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

(a) Disconnect the PEPS module connector.

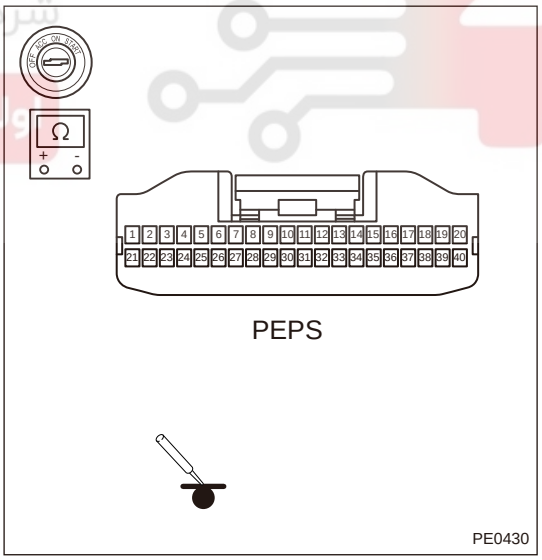
(b) Check if wire harnesses are worn, pierced, pinched or partially broken.

(c) Check for broken, bent, protruded or corroded terminals.

(d) Check if related connector pins are in good condition.

(e) Using ohm band of digital multimeter, measure resistance between terminal 6 of PEPS module and body ground to check for short to ground in interior wire harness.

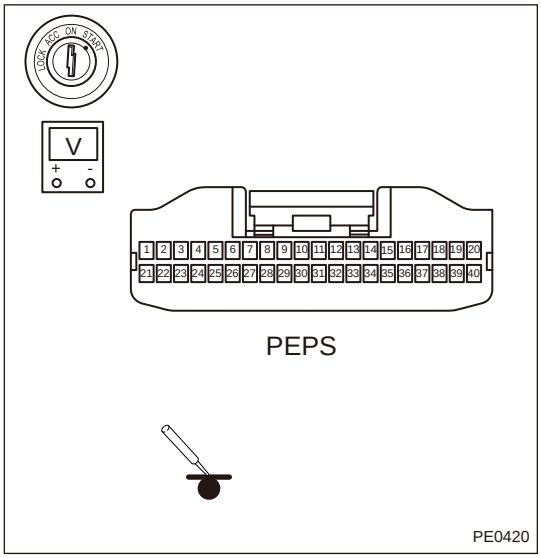
Multimeter Connection	Condition	Specified Condition
PEPS module (- connected terminal) - Body ground	Always	No continuity



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

(f) Using voltage band of digital multimeter, measure voltage between terminal 6 of PEPS module and body ground to check for short to power supply in interior wire harness.

Multimeter Connection	Condition	Specified Condition
PEPS module (- connected terminal) - Body ground	Always	Approx. 0V



NG → **Replace interior wire harness**

OK →

6	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.

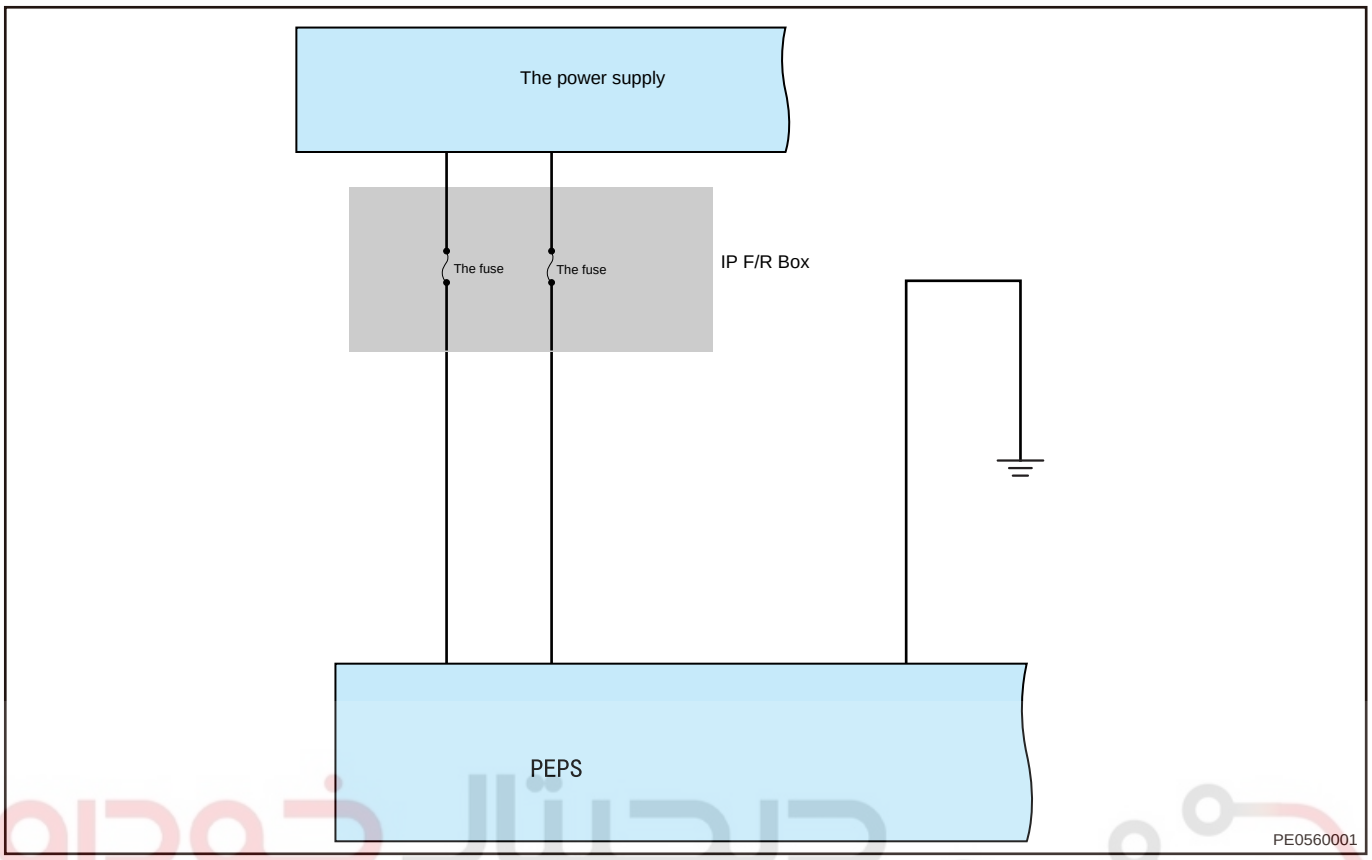
NG → **Replace PEPS module**

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

DTC	**B152F**	**Battery Voltage Low Detection**
DTC	**B1530**	**Battery Voltage High Detection**

Description

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**

(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**

Use circuit diagram as a guide to perform the following inspection procedures:
(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 (13.5V-14.8V).

NG → **Repair or replace positive and negative battery cables and alternator**

OK

3	**Check PEPS module power supply fuse**

Use circuit diagram as a guide to perform the following inspection procedures:
(a) Turn ENGINE START STOP switch to OFF.
(b) Check if PEPS module power supply fuse is blown.

NG → **Replace power supply fuse**

OK

4	**Check engine compartment fuse and relay box**

Use circuit diagram as a guide to perform the following inspection procedures:
(a) Turn ENGINE START STOP switch to OFF.
(b) Disconnect the engine compartment fuse and relay box connector.
(c) Using digital multimeter, check for continuity between fuse and corresponding pin of fuse and relay box.
(d) Using digital multimeter, check for continuity between fuse and corresponding pin of engine compartment fuse and relay box.

Multimeter Connection	Condition	Normal Condition
Fuse - Fuse and relay box (- connected terminal)	Always	⩽ 1 Ω
Fuse - Fuse and relay box (- connected terminal)	Always	⩽ 1 Ω

NG → **Replace engine compartment fuse and relay box**

OK

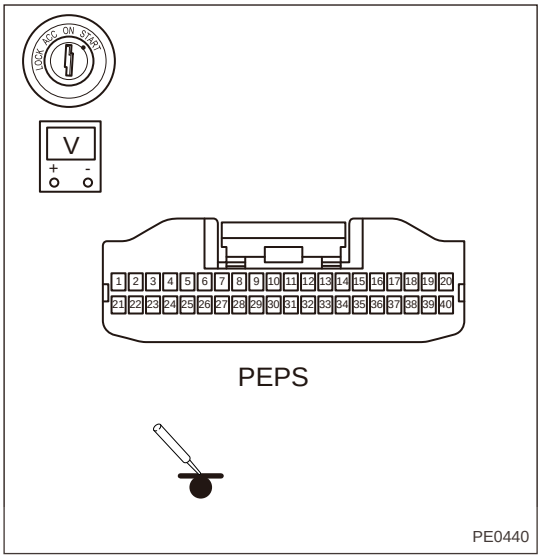
5	Check PEPS module power wire harness

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

(a) Turn ENGINE START STOP switch to ON.

(b) Disconnect the PEPS connector.

(c) Using a digital multimeter, check if the voltage between PEPS module power supply terminal and body ground is normal.



Multimeter Connection	Condition	Normal Condition
PEPS module (- connected terminal with power supply) - Body ground	Always	Not less than 12 V
PEPS module (- connected terminal with power supply) - Body ground	Always	Not less than 12 V

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

(d) Using digital multimeter, check for continuity between PEPS module connector (terminal 20 of power supply) and instrument panel fuse and relay box (corresponding terminal), PEPS module (terminal 17 of power supply) and terminal (corresponding terminal) of instrument panel fuse and relay box to check for open in power supply wire harness.

Multimeter Connection	Condition	Normal Condition
PEPS module (- power supply terminal) - Instrument panel fuse and relay box (- corresponding terminal)	Always	⩽ 1 Ω
PEPS module (- power supply terminal) - Instrument panel fuse and relay box (- corresponding terminal)	Always	⩽ 1 Ω

NG → **Repair or replace instrument panel wire harness**

OK

6	Check the PEPS module ground circuit

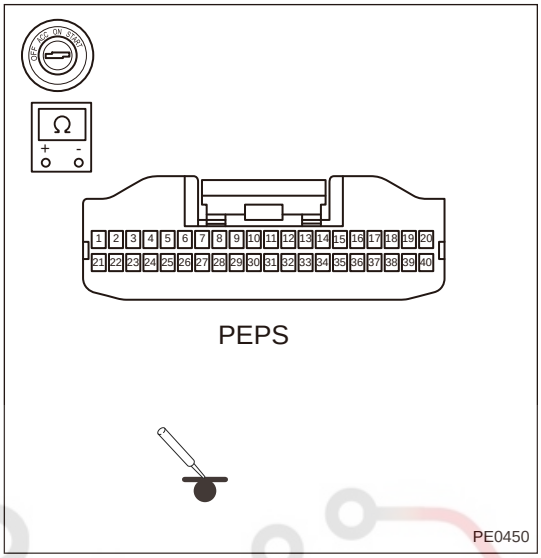
Use circuit diagram as a guide to perform the following inspection procedures:

(a) Turn ENGINE START STOP switch to ON.

(b) Disconnect the PEPS module connector.

(c) Using digital multimeter, check for continuity between PEPS module (terminal 20) and ground wire harness to check ground wire harness for open.

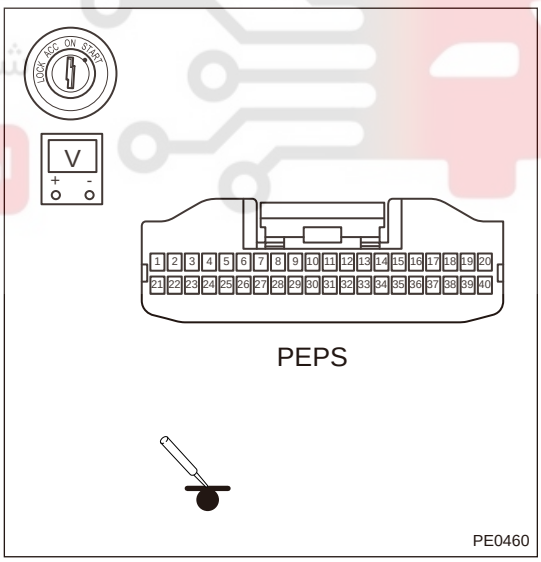
Multimeter Connection	Condition	Normal Condition
PEPS module (-terminal 20) - Ground point	Always	⩽ 1 Ω



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

(d) Using voltage band of digital multimeter, measure voltage between terminal 17 of PEPS module and body ground to check for short to power supply.

Multimeter Connection	Condition	Normal Condition
PEPS module (-terminal 17) - Body ground	Always	0 V



NG → **Replace instrument panel wire harness**

OK → **Replace PEPS module**

DTC	B150F	ESCL Anti Scanning (Only for MT)

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	**Electric steering column lock enters anti-scanning state**

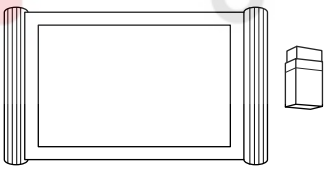
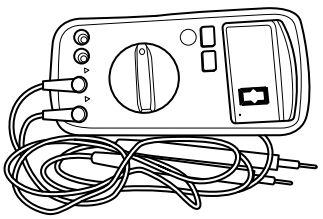
(a) Enter anti-theft control system, delete and learn ESCL.

DTC	**U0100**	**Lost of Communication with EMS**
DTC	**U0129**	**Lost Communication with BSM**
DTC	**U0140**	**Lost Communication with BCM**
DTC	**U0329**	**Lost Communication with Electronic Steering Column Lock**
DTC	**U0101**	**Lost of Communication with TCM**
DTC	**U0155**	**Lost Communication with ICM**
DTC	**U0230**	**Lost Communication with PLG**

DTC Confirmation Procedure
Refer to CAN communication system

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206

Torque Specifications

Description	Torque (N·m)
Hexagon Flange Nut	7 ± 1

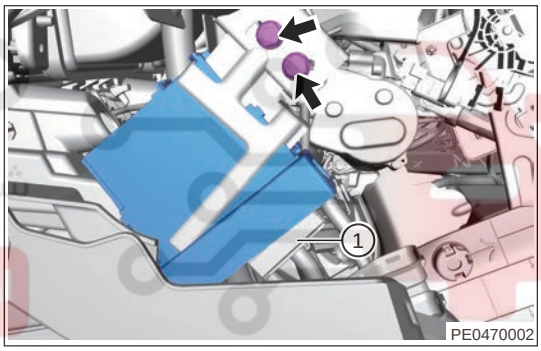
PEPS Control Module Assembly

Removal

⚠ Caution

- DO NOT separate PEPS controller and fixing bracket at will, or clamping structure of controller will be damaged, unless controller malfunction is confirmed by troubleshooting result, it can be removed and cannot be reused.
- DO NOT replace PCB board of PEPS controller at will, or it cannot be traced back and may make abnormal sound.
- After replacing PEPS controller assembly, before performing key learning and anti-theft matching, do not press ENGINE START STOP switch at will if nor necessary, to prevent PEPS controller from being locked and causing vehicle power supply not to be turned on.

1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.
3. Remove the glove box assembly.
4. Remove the PEPS module.
   a. Remove 2 coupling bolts (arrow) between PEPS module mounting bracket and instrument panel crossmember, and disconnect PEPS module connector (1).



Tightening Torque
7 ± 1 N·m

   b. Carefully remove the PEPS module and mounting bracket assembly.

Installation

1. Installation is in the reverse order of removal.

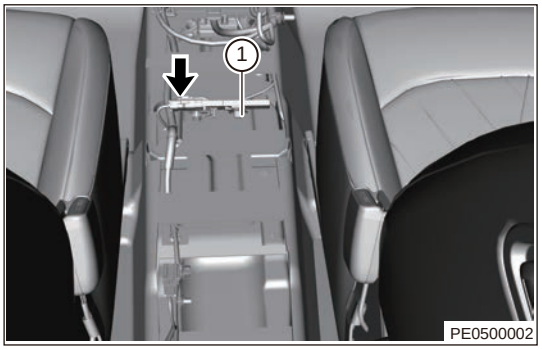
Front Low Frequency Antenna

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 front low frequency antenna.

a. Disconnect the connector (arrow) from front low frequency antenna.

b. Using an interior crow plate, detach low frequency antenna fixing clip from mounting bracket, and remove low frequency antenna assembly (1).



Hint:
DO NOT repeatedly remove and install it, and dispose it if it becomes loosen.

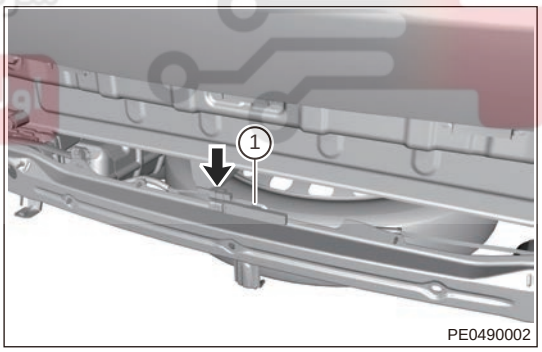
Installation

1. Installation is in the reverse order of removal.

Rear Bumper Low Frequency Antenna

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 low frequency antenna assembly.
   a. Disconnect the connector (arrow) from rear bumper low frequency antenna.
   b. Using a tool, detach low frequency antenna fixing clip (1) from rear bumper crossmember.



Hint:
DO NOT repeatedly remove and install it, and dispose it if it becomes loosen.

Installation

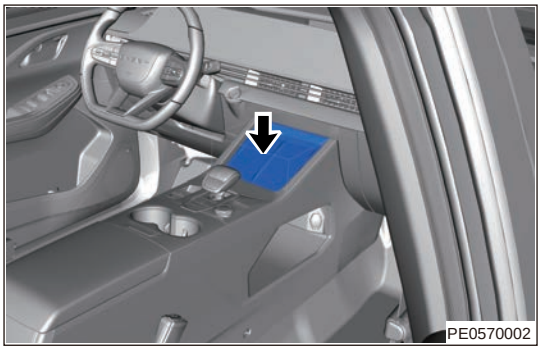
1. Installation is in the reverse order of removal.

Anti-theft Coil

Removal

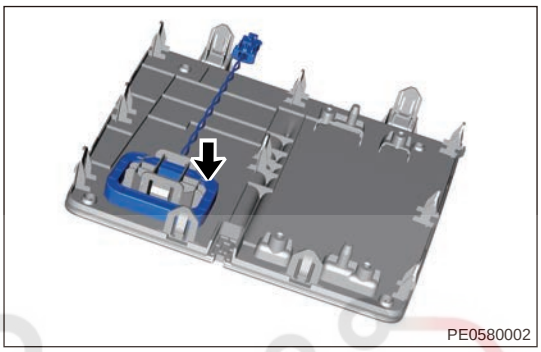
1. Turn off all electrical equipment and ENGINE START STOP switch.
2. Disconnect the negative battery cable.

3. Remove the front storage box assembly.



4. Unplug the anti-theft coil connector.

5. Press two clips with left hand while hold coil with right hand, and unplug it in opposite direction of installation direction with large force.



Installation

> **⚠ Caution**
>
> The anti-theft coil must be installed with a smooth surface against the mounting surface, and ensure it is installed in place, otherwise it may fall off from the bracket, thus failing to carry out normal key learning and anti-theft matching.

1. Installation is in the reverse order of removal.

CAN SYSTEM

System Description

Description

CAN bus is a serial data communication protocol developed by German BOSCH company from the early 1980s to solve the data exchange between many control and test instruments in modern automobiles. It is a multi-main bus, and the communication medium can be twisted pair, coaxial cable or optical fiber. CAN bus communication interface integrates the physical layer and data link layer functions of CAN protocol, which can complete the framing processing of communication data, including bit stuffing, data block coding, cyclic redundancy check, priority distinguishing, etc.CAN protocol adopts CRC check and can provide corresponding error handling function, which ensures the reliability of data communication. With its excellent characteristics, extremely high reliability and unique design, CAN is especially suitable for the interconnection of industrial process monitoring equipment. Therefore, it has been paid more and more attention by the industry and has been recognized as one of the most promising field buses.

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.

Composition

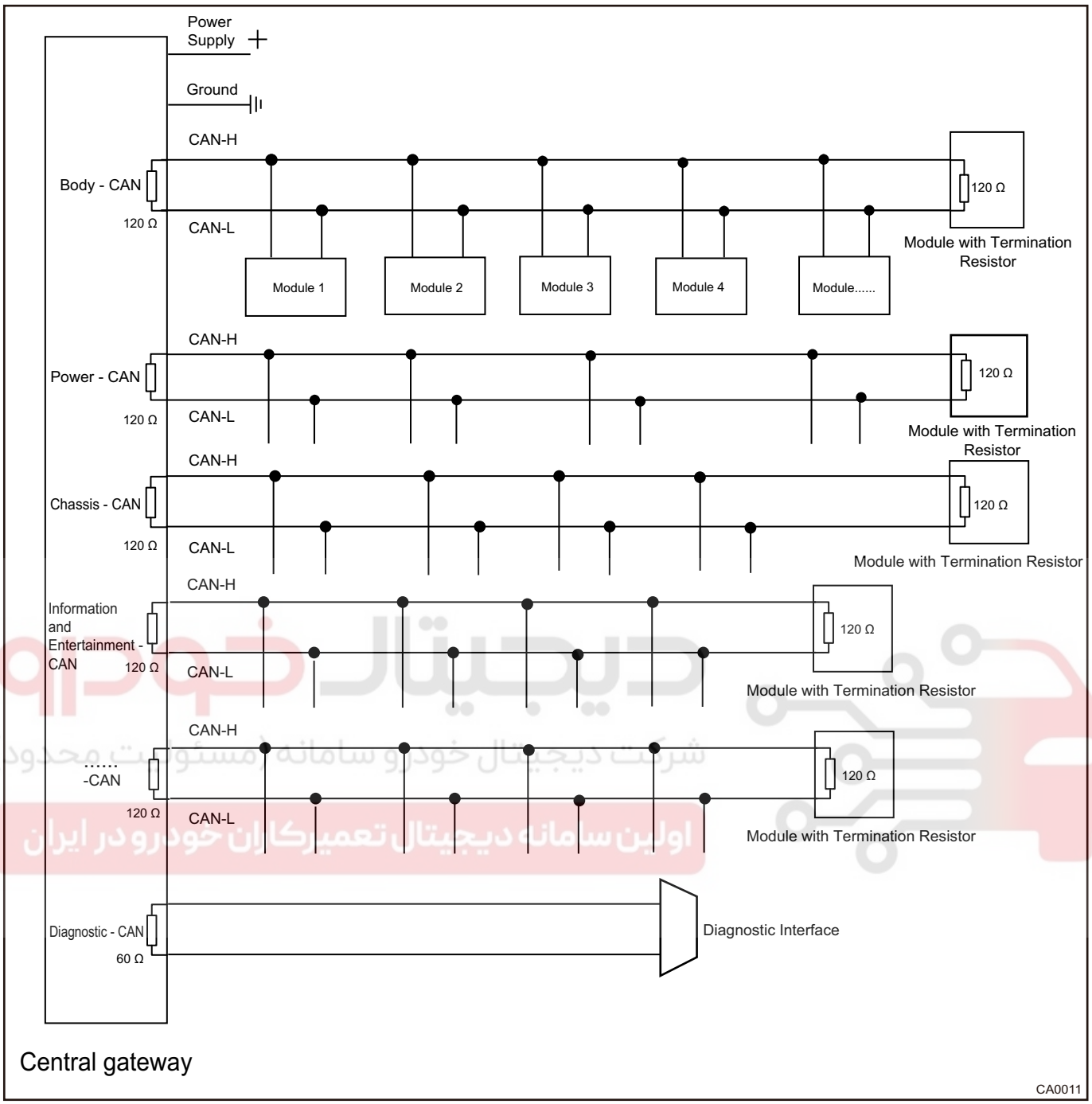
Equipped with Central Gateway Module, Vehicle Network Layout

1. Central Gateway
   - CAN gateway is the core of the entire CAN network and controls the transmitting and processing of various signals from different CAN buses (such as: body CAN, chassis CAN, power CAN, etc.) of the vehicle.
   - CAN gateway can receive network signals of different transmission rates from any CAN bus (and LIN bus). CAN gateway processes these signals according to certain standards and then broadcasts them to the vehicle network.
   - **CAN central gateway (CAN bridge)** is the infrastructure components of complex network structures that can be implemented. One CAN bridge can connect CAN networks with mutually different bit rates or protocols. It is based on the storage (modification) and transmitting principle, where CAN messages are received by the subnetwork and then transmitted to another subnetwork. Translation and filtering rules can also be used to allow porting of protocols between sub-networks to be performed.
   - CAN bridge is suitable for setting up hierarchical network, and only the information of the corresponding connected subnets is transmitted through the bridge. The bridging function can also be performed with the aid of other transmission systems. As an extension of CAN bridge, **CAN gateway** allows access to CAN network via other communication systems. In each case, the protocol of the connected bus system is mapped to another communication model.
   - Basic function includes:
     - 1. Connect CAN bus/LIN bus with different baud rate (transmission speed) to realize gateway relay function of CAN network.
     - 2. Diagnostic message/non-diagnostic message transmission
     - 3. Diagnostic firewall management
     - 4. Node online monitoring
     - 5. Gateway sleep and wakeup management

- 6. ECU upgrade/gateway upgrade
- 7. Voltage management

2. CAN bus

- Each CAN bus is generally composed of twisted pair consisting of 2 wires, one CAN_high (CAN-H) and one CAN_low (CAN-L) representing high level and low level respectively. Generally, different models have different CAN networks, which can be divided into the following buses:
  - PT CAN (PowerTrain CAN) bus. The following ECUs are generally available on the PT CAN bus: ECM (Engine Control Module), TCU (Transmission Control Unit), ESP (Electronic Stability Program). PT CAN is responsible for vehicle power and is a CAN bus with the highest signal priority and signal transmission rate in the vehicle CAN network.
  - CH CAN (Chassis CAN) bus. The following ECUs are generally available on the CH CAN bus: ABS (Antilock Brake System), ESP (Electronic Stability Program), EPS (Electric Power Steering) ⋯⋯ CH CAN is responsible for the vehicle chassis and the braking/stabilization/ steering of 4 wheels. Since it involves vehicle braking/power steering, etc., its network signal priority is also high.
  - Body CAN bus. The following ECUs are generally available on the Body CAN bus: AC (Air Condition), AVM (Around View Monitor), BCM (Body Control Module), sliding roof, window, fog light, turn signal light, wiper, IMMO (Immobilizer) ⋯⋯ Body CAN is responsible for the management and control of some intelligent hardwares on the body to improve comfort/safety, and its network signal has a lower priority, because the above devices are auxiliary devices.
  - Info CAN (Infomercial CAN) bus. The following ECUs are generally available on the Info CAN bus: On-board entertainment system (central control), IPK (Instrument Pack), current digital meter, having basic entertainment functions such as music, maps, calls, etc. ⋯⋯ Info CAN is an auxiliary optional equipment, so the priority is also low, and it is mainly responsible for the management and control of some intelligent hardwares on the body to improve entertainment.
  - DiagCAN (Diagnose CAN) bus. DiagCAN bus mainly provides diagnostic function and has only one diagnostic interface.



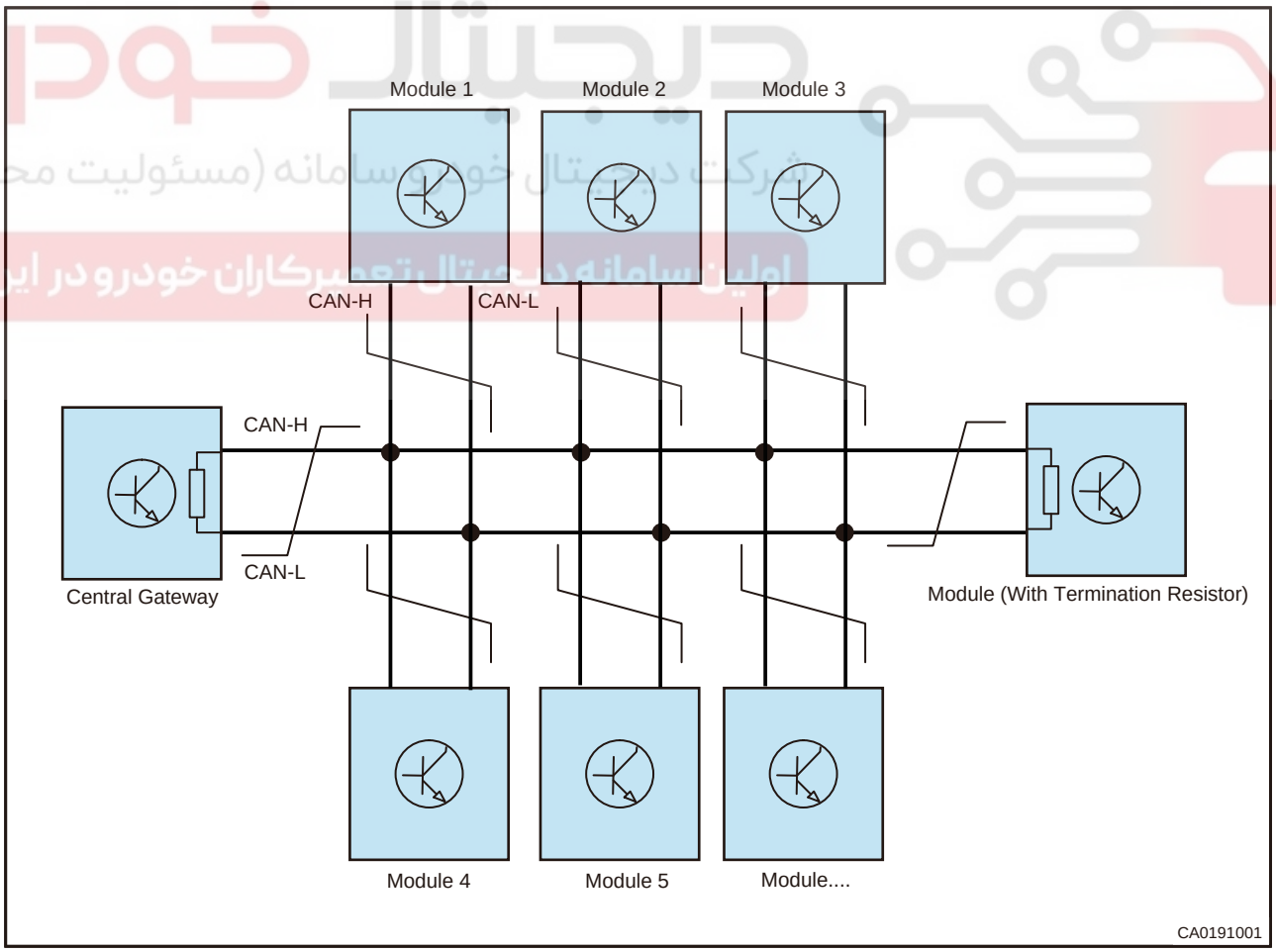
CAN Bus Composition

1. Single CAN bus composition

- Transceiver (module in this CAN network): The data provided by the CAN controller is converted into electrical signals, and then sent out through the data bus, and also receives the bus data and transmits them to the CAN controller. The on-board network CAN transceiver is a monolithic integrated circuit that combines CAN data transmitter with data receiver.
- Termination resistor: One CAN network is equipped with 2 terminal resistors, which are respectively integrated in the central gateway and the corresponding module with termination resistor (the resistance of termination resistor in a single module is about 120 Ω). Main functions:
  - 1. Improve anti-interference ability, allowing high-frequency and low-energy signals to be quickly eliminated;

- 2. Make sure the bus goes into a recessive state quickly, allowing the energy of the parasitic capacitance to be quickly eliminated;
- 3. Improve signal quality by placing at both ends of the bus to reduce reflected energy.

- Twisted pair: A part of a CAN network that uses two intertwined wires of CAN-L and CAN-H to transmit data in the network. CAN-H means that the voltage of the network cable is high in the dominant state, CAN-L means that the voltage is low in the dominant state. Twisted pair consists of two mutually insulated wires intertwined with each other. It is especially suitable for differential signal transmission occasions. Compared with parallel wires, it can suppress interference more effectively.
  - Difference between CAN-L and CAN-H:
    - 1. The two wires are different colors.
    - 2. One of the two wires is called CAN-High and the other is called CAN-Low. In the static state, the voltage of the two wires to the ground is 2.5 V. At this time, the voltage difference between the two wires is 0 V. This state is called a recessive state, and its digital signal is represented by 1. When the voltage to ground of CAN-High is 3.5 V, and the voltage to ground of CAN-Low is 1.5 V, the voltage difference between the two wires of CAN-High and CAN-Low at this time is 2 V, this state is called a dominant state, and its digital signal is represented by 0.
    - 3. Part of the CAN-H in body network transmission mode is the high data line, CAN-L is the low data line, and the two are twisted together, which can make the CAN bus insensitive to electromagnetic interference.



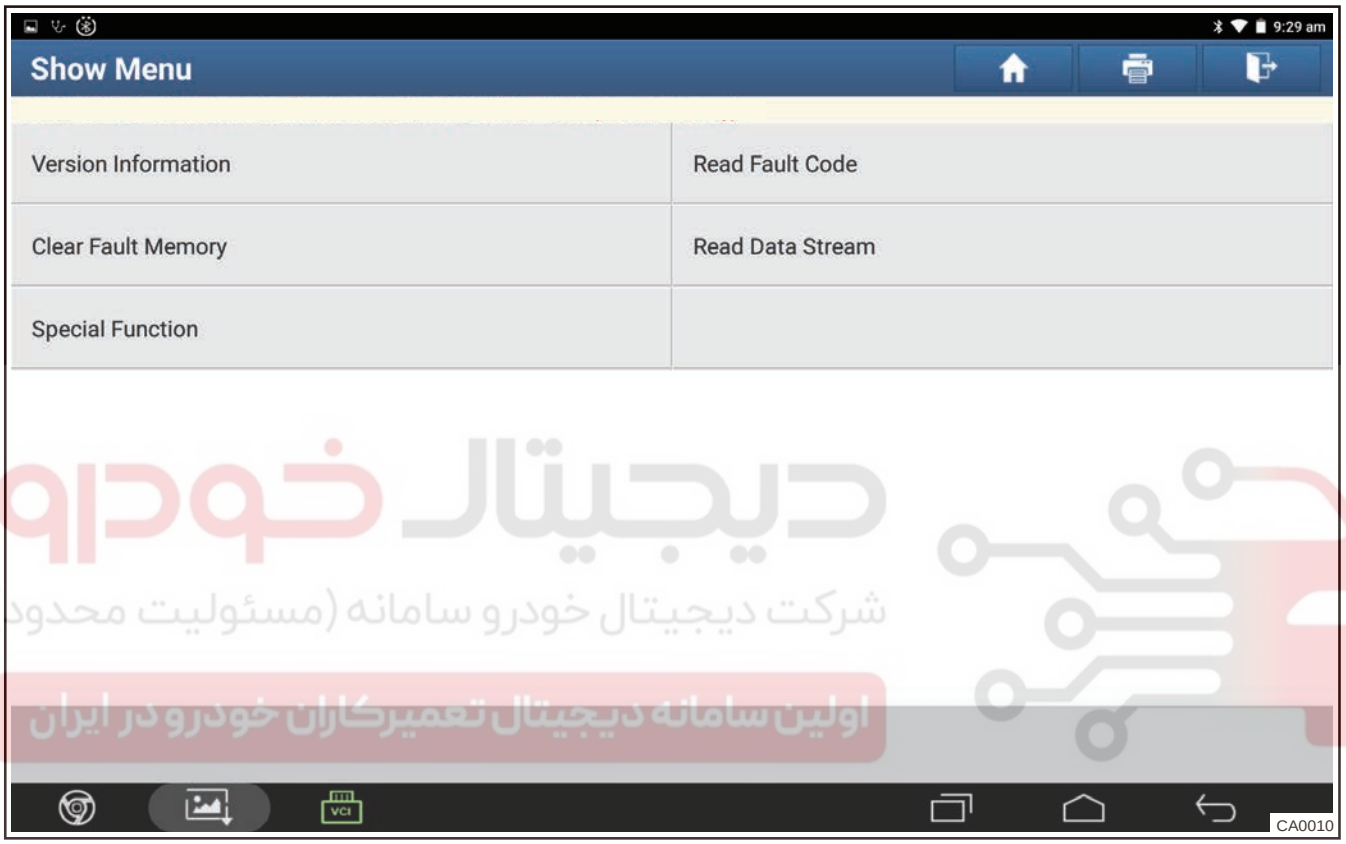
- Bus speed is: 500 Kbit/s;
- Cannot run in single line - If a CAN line of module is disconnected, CAN signal of this module cannot be transmitted;

- Vehicle driving CAN diagnosis is performed through No.6 pin and No.14 pin of diagnostic interface.

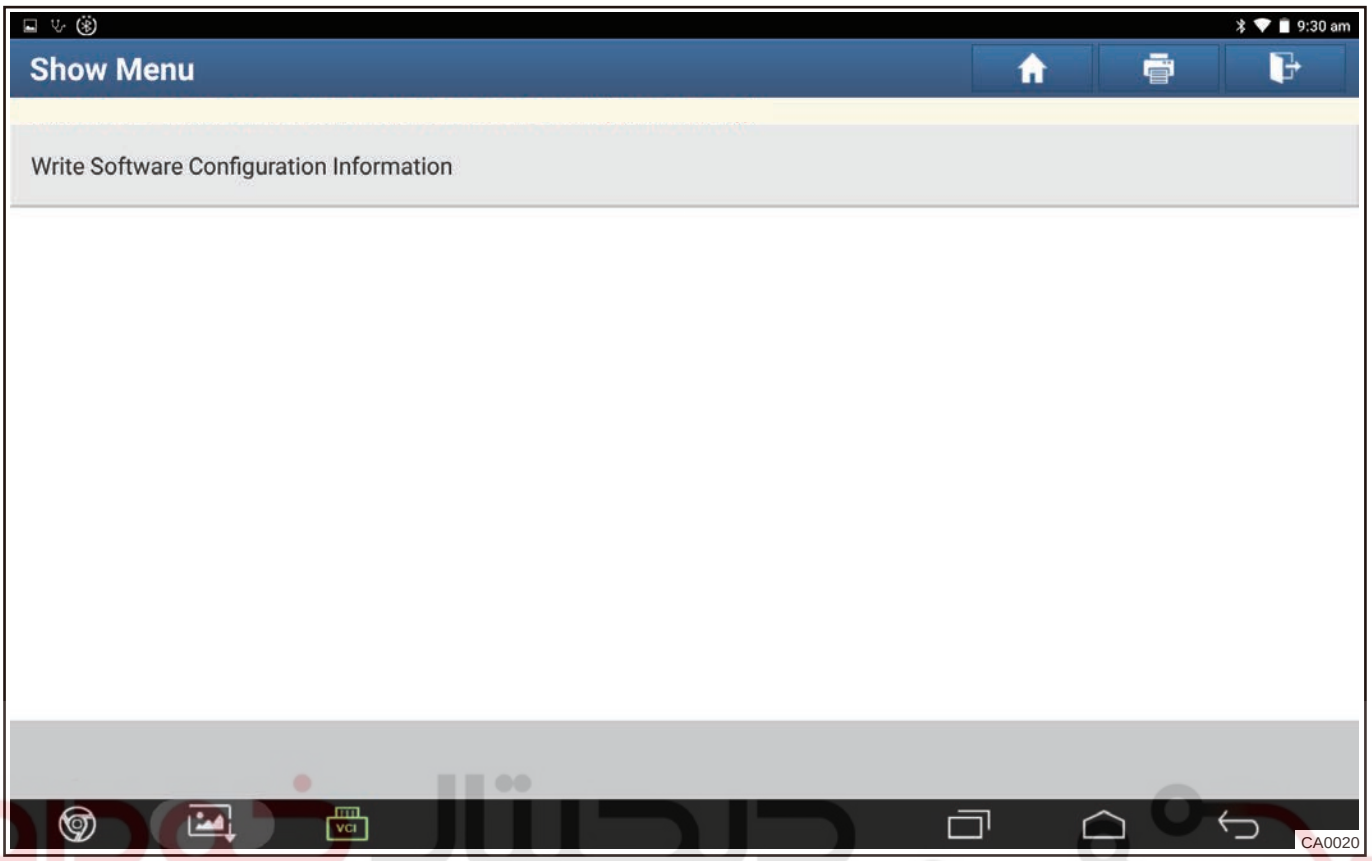
Matching Learning

Software Configuration Information Writing

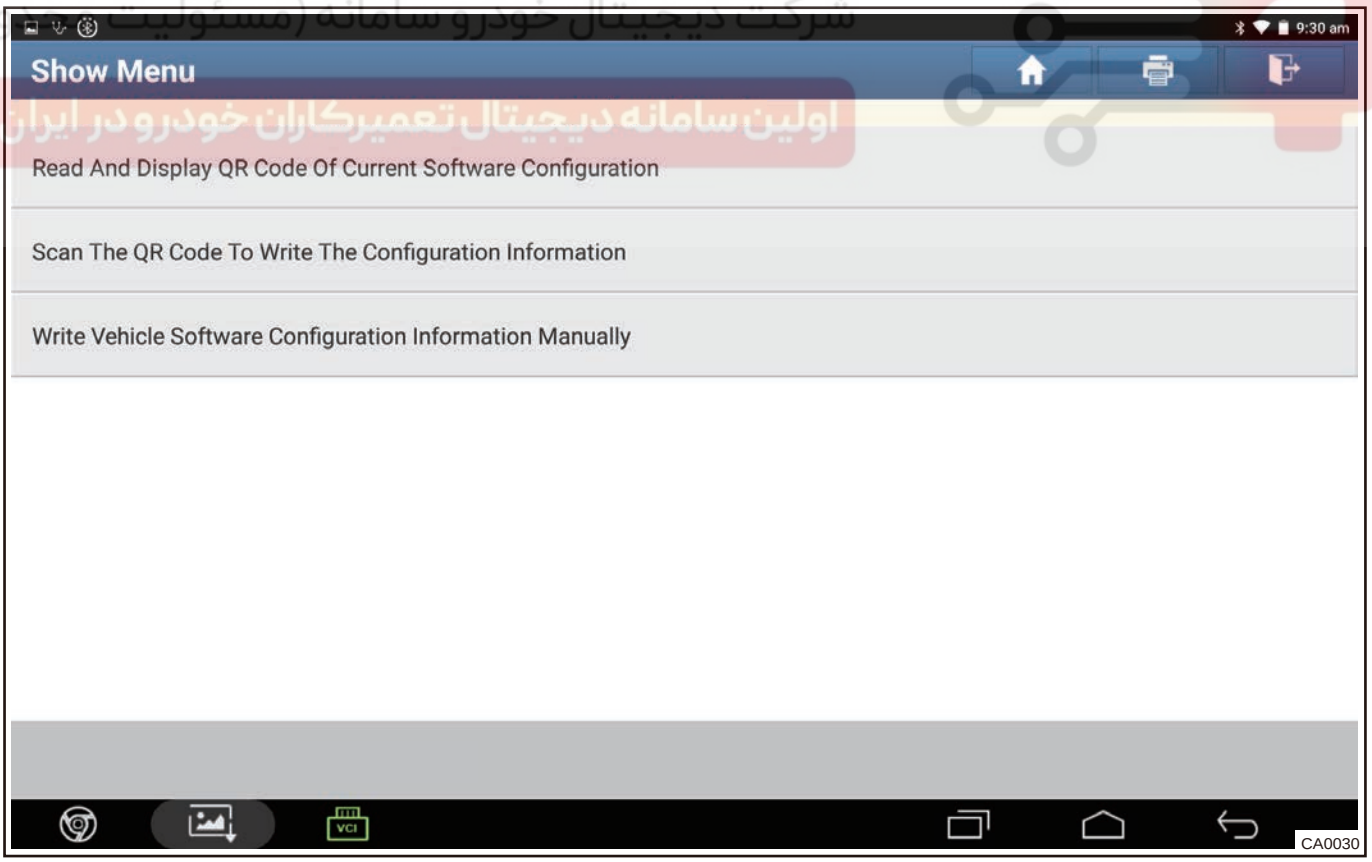
1. Connect the diagnostic tester, turn ENGINE START STOP switch to ON and select “T1E” model, then enter “CGW”.
2. Click “Special Function”.



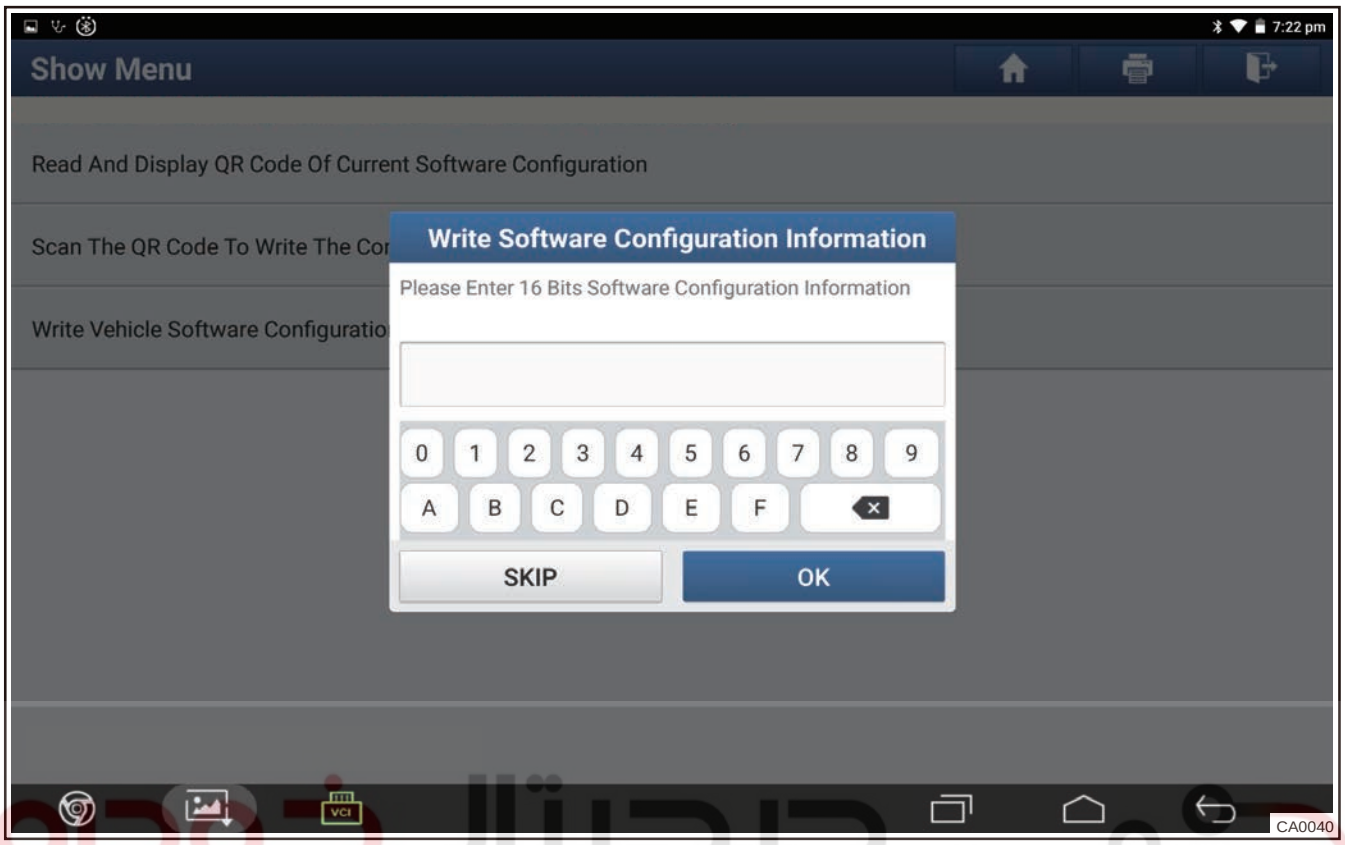
3. Enter next screen and click “Write Software Configuration Information”.



4. Enter next screen and click “Write Vehicle Software Configuration Information Manually”.



5. Input corresponding configuration information and click “OK”.



Diagnosis & Test

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
	EPB module
Airbag system failure	ECM
	Wire harness and connector

Symptom	Possible Cause
	Airbag module failure
Body electrical failure	Body Control Module (BCM) failure
	Wire harness or connector
	Instrument cluster
Transmission failure	Transmission Control Module (TCU) failure
	Wire harness or connector
	ECM

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	Go 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	Go 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	Go to
Delivery inspection is failed	A
Delivery inspection is qualified	B

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

B

6	**Finished**

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. Go to inspection procedure - Step 1.
- 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 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.

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:

   a. Receive continuous invalid signals: This type of fault indicates communication effective bit received by control module is “invalid” or invalid signal after processing.
   b. Signal is below normal range: This type of fault indicates serial data bus signal is below normal range.
   c. Signal is above normal range: This type of fault indicates serial data bus signal is above normal range.
   d. Invalid signal: This type of fault indicates serial data bus signal does not match specified execution condition.
   e. Lost signal: This type of fault indicates specified no specified information is received.
   f. Bus closed: This type of fault indicates bus is out of work.
   g. 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.

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 $\leqslant$ U $\leqslant$ 16 V. CAN network communication voltage range: 6 V $\leqslant$ U $\leqslant$ 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).

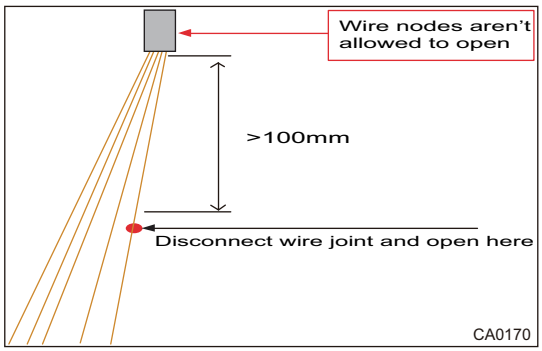
6. Link malfunction.

   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.

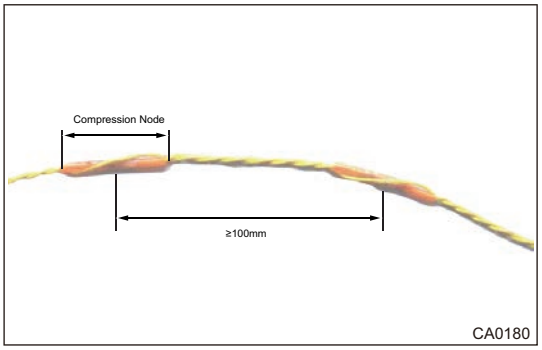
   a. Maintenance instructions for CAN line.

      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;



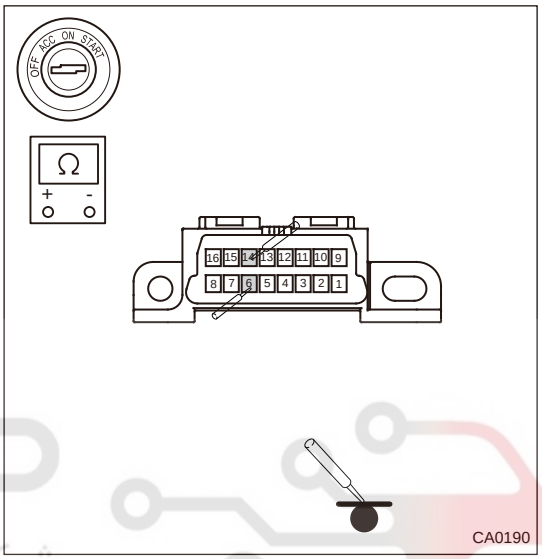
- If the CAN line is to be disconnected, it is only allowed to be carried out at a distance of ⩾ 100 mm from next pressure node; The twisting of CAN lines have decisive significance to the interference effect of CAN. Only if the twisting is not damaged, the CAN can be protected from interference, so keep as little interference with the twisting as possible during maintenance.



CA0180

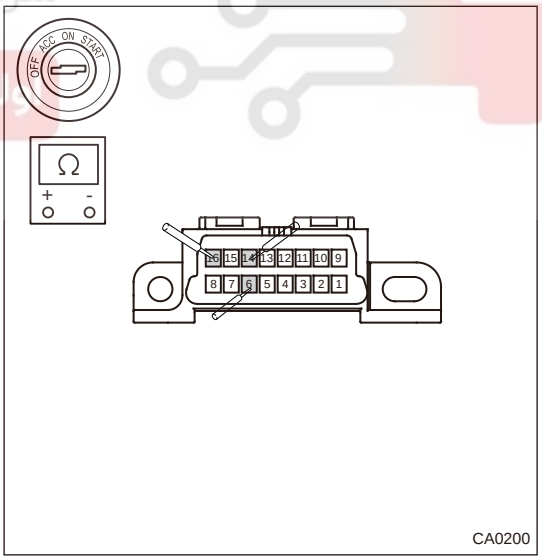
b. Use a multimeter to measure the resistance to ground and power supply of CAN-H and CAN-L.

  - 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.



CA0190

- 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.



CA0200

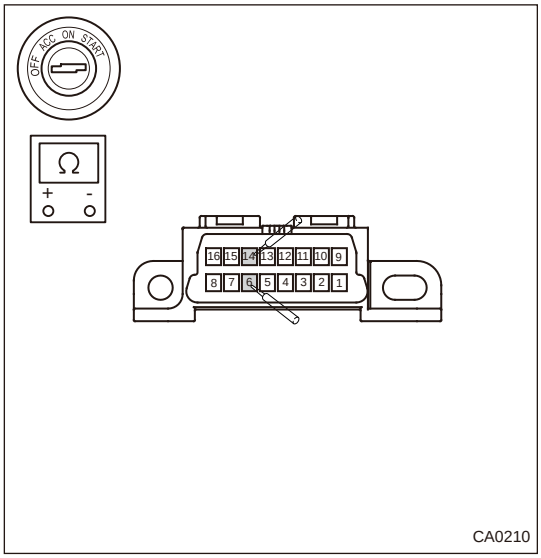
c. Termination resistor.

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 ∞.

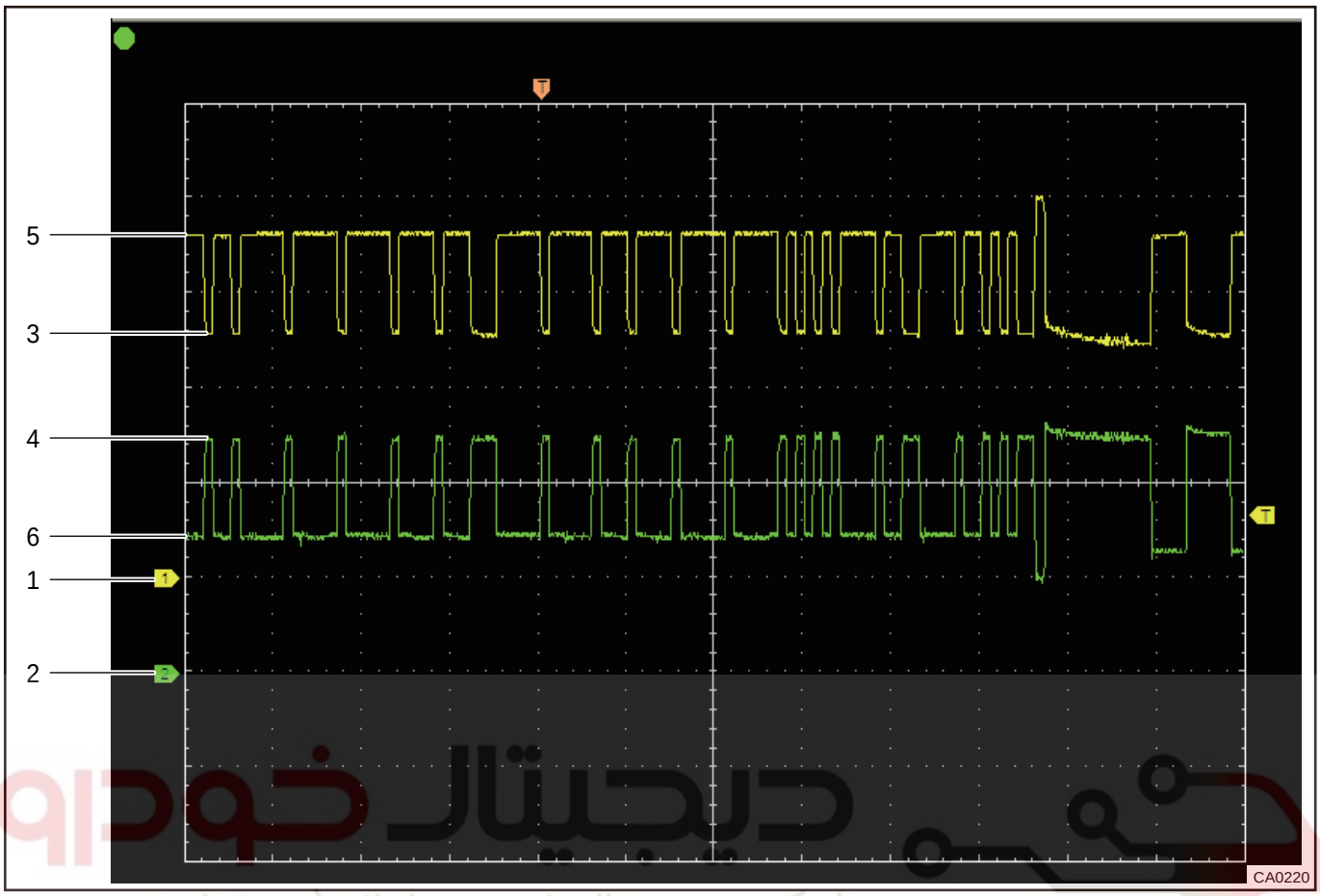


Oscilloscope Analysis

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:

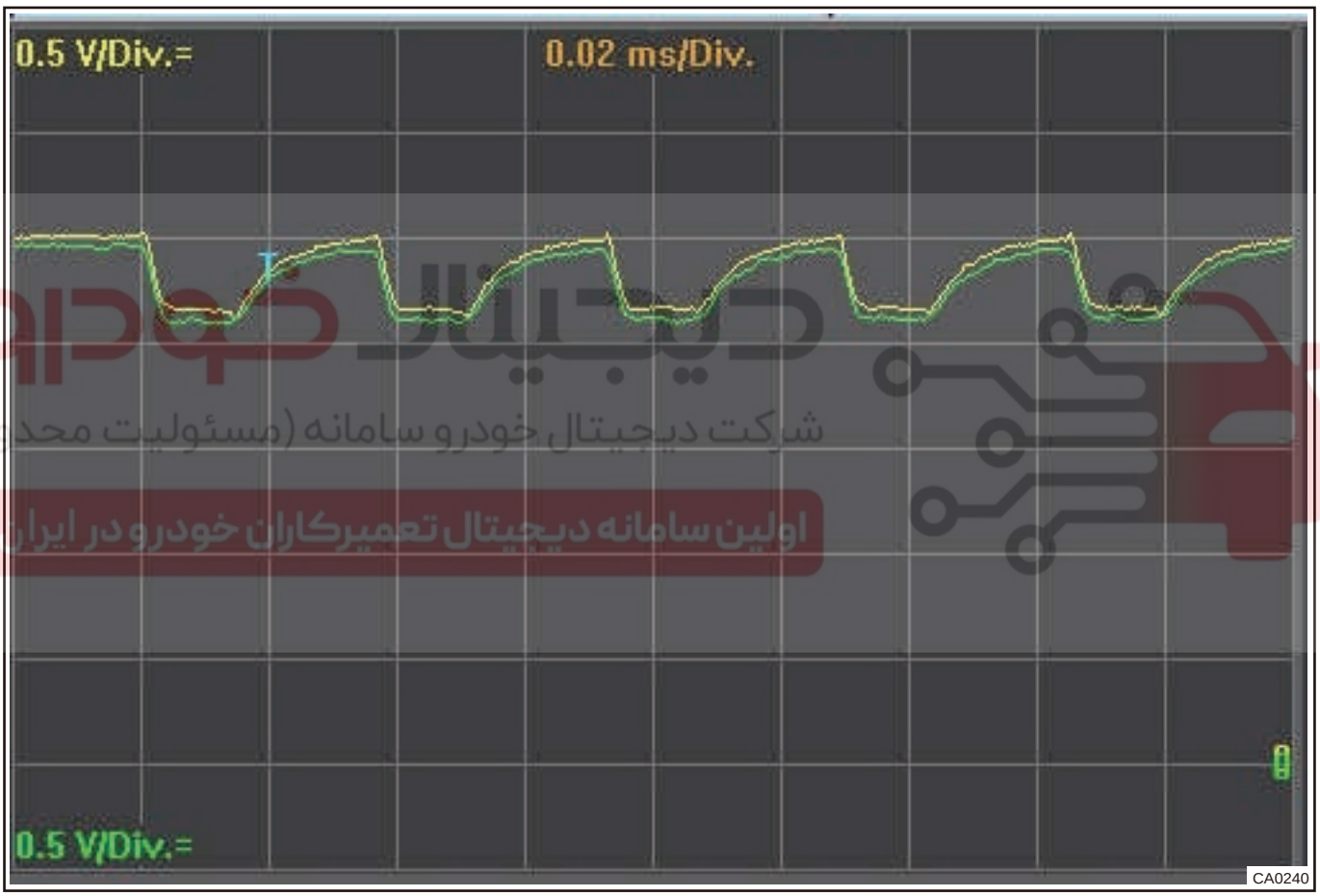
a. Always use voltage difference between two lines to confirm data. When voltage of CAN-H rises, the voltage of CAN-L decreases accordingly. The waveform is rectangular and symmetrical.

b. 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.

c. The difference between measured voltage value and standard value is approximately 100 mV.

d. 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.

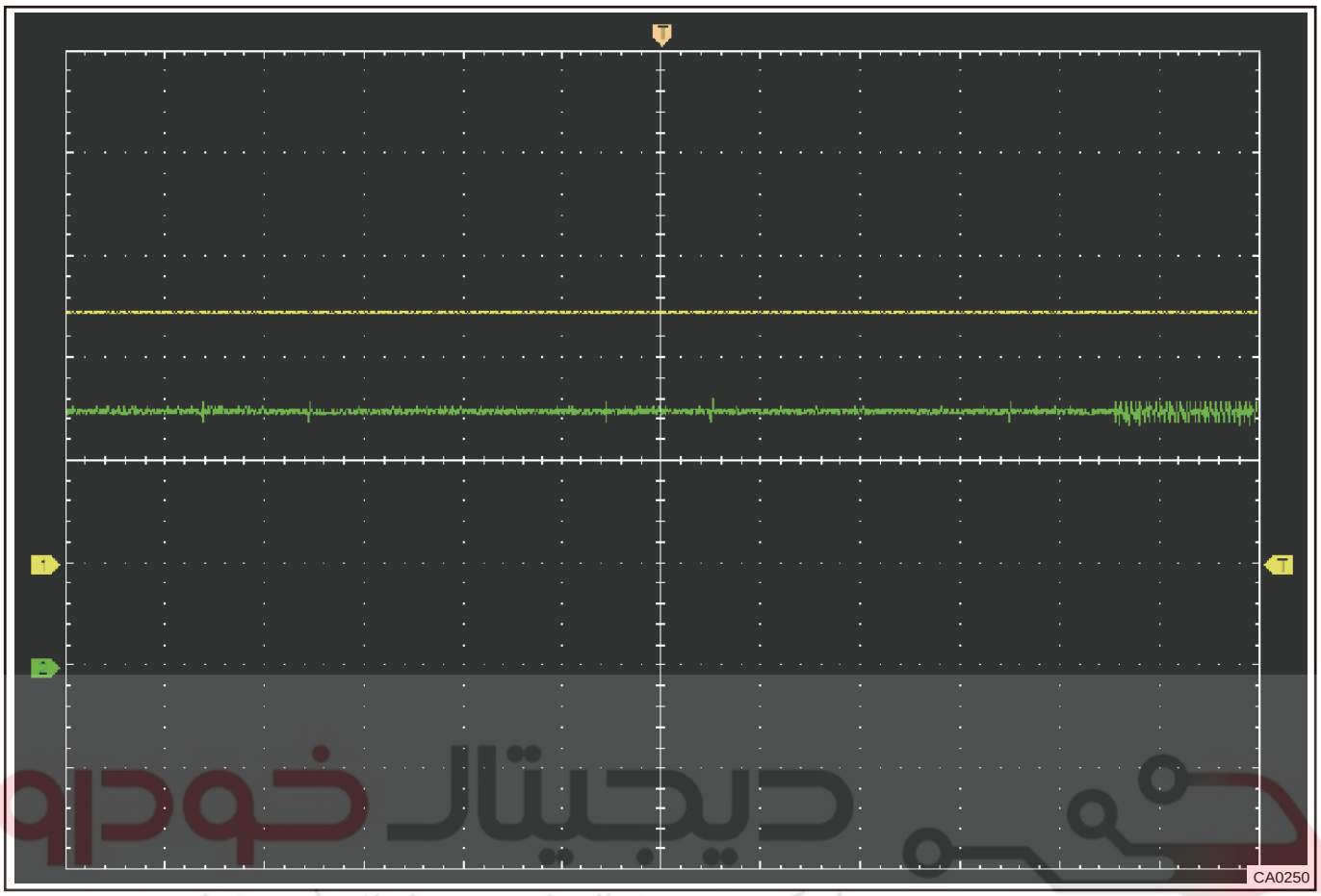
2. Short point (arrow) between CAN-H and CAN-L



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:

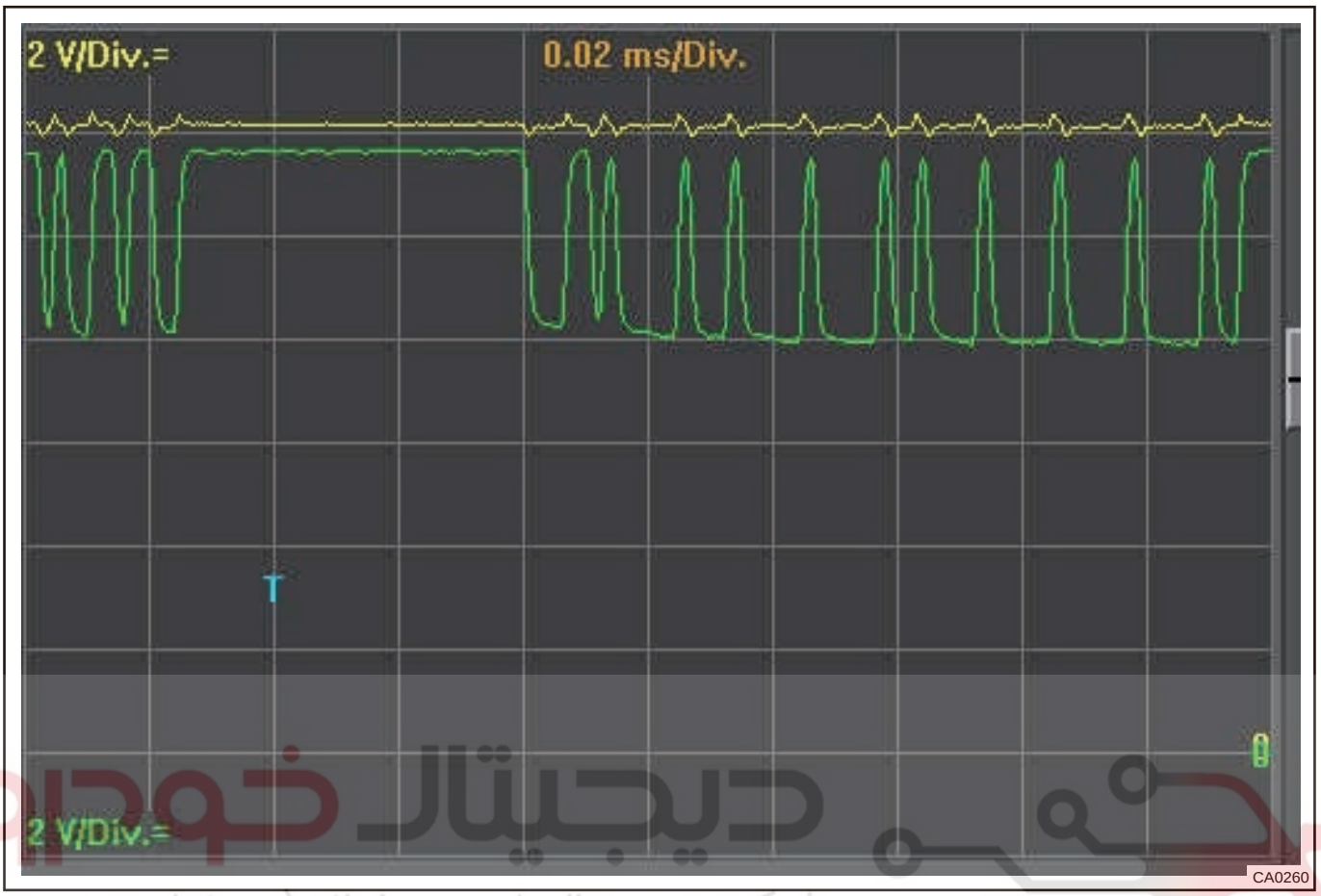
a. By plugging and unplugging control unit on CAN bus one by one and observing oscilloscope waveform at the same time, it can be judged whether it is a short circuit caused by the control unit or by the CAN-H and CAN-L line connection;

b. If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;

c. 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;

d. 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.

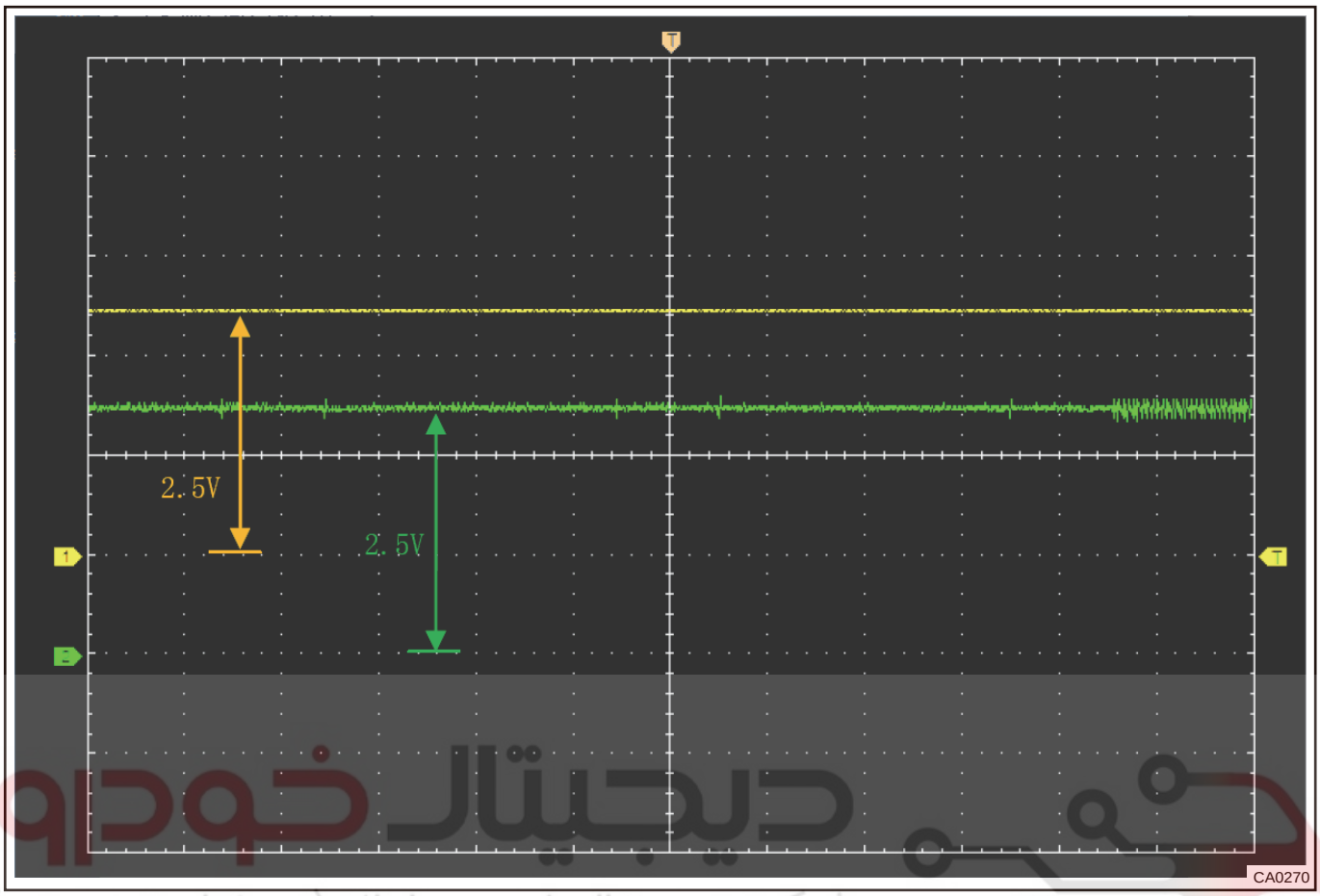
  Troubleshooting procedures:

  a. 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;

  b. If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;

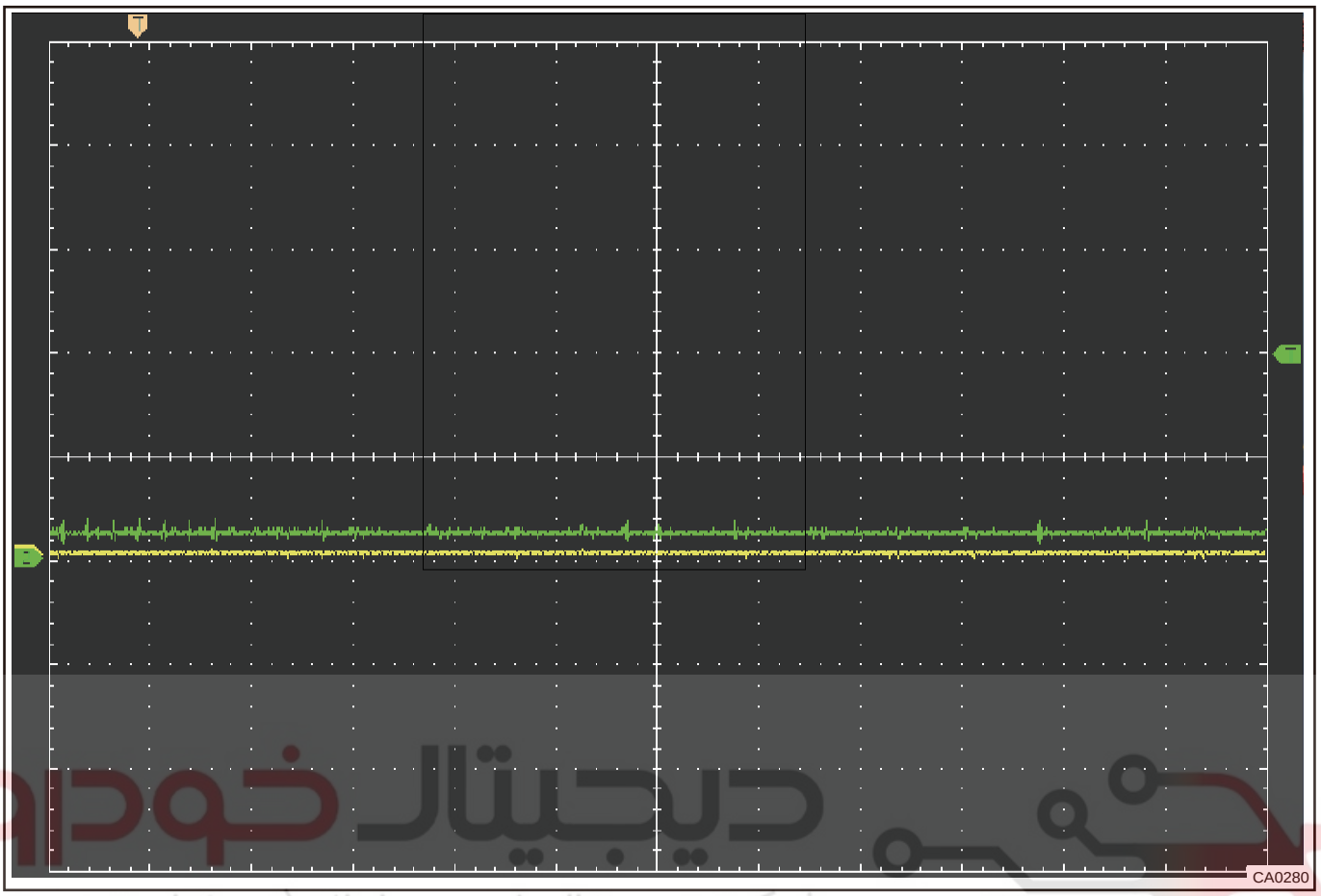
  c. When there is no other measurement method, only CAN line can be disconnected from line connection point. Pay attention to maintenance instructions of CAN line.

- 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:

a. Plug and unplug control unit on CAN bus one by one, and observe if the oscilloscope waveform becomes normal?

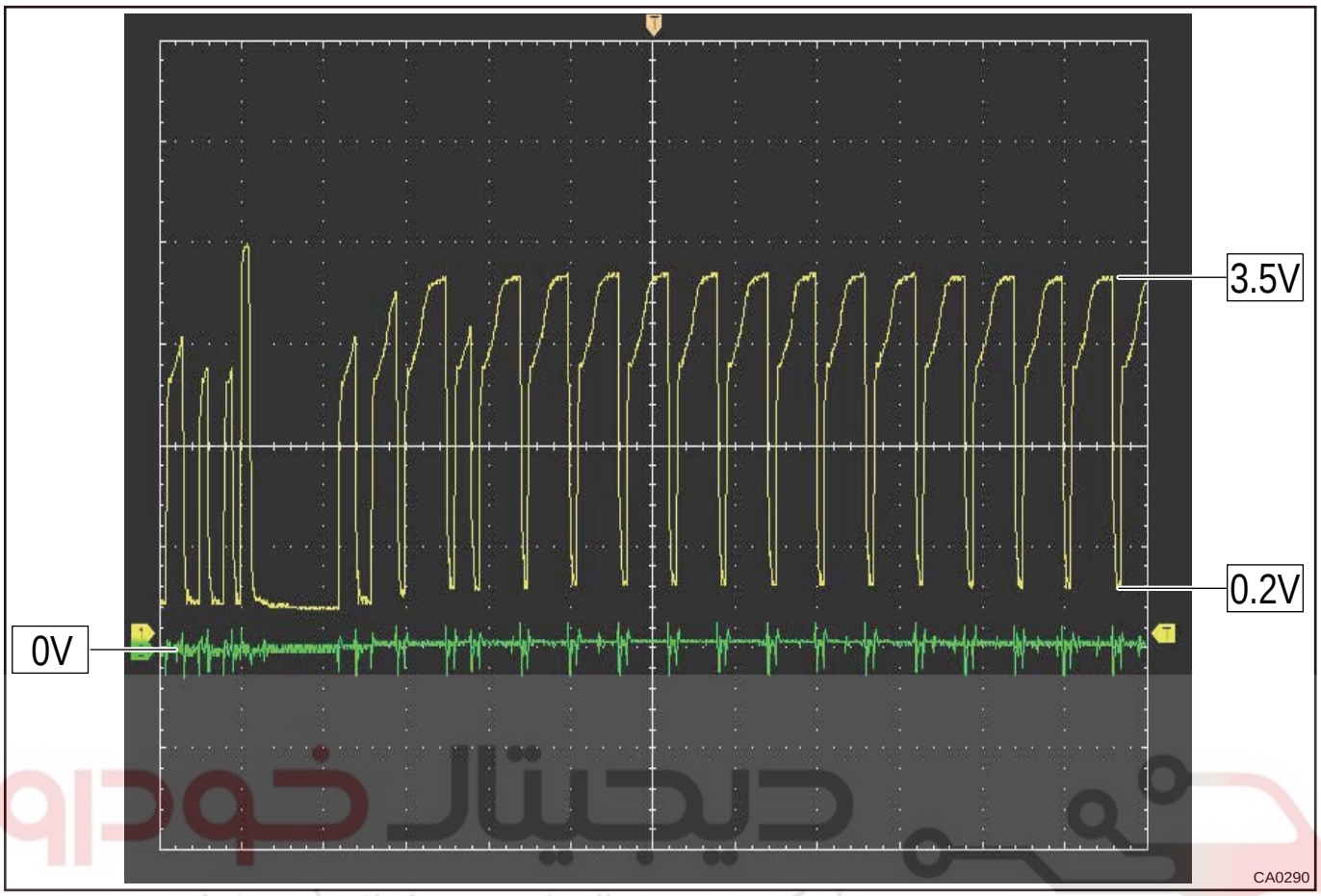
b. If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;

c. 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.

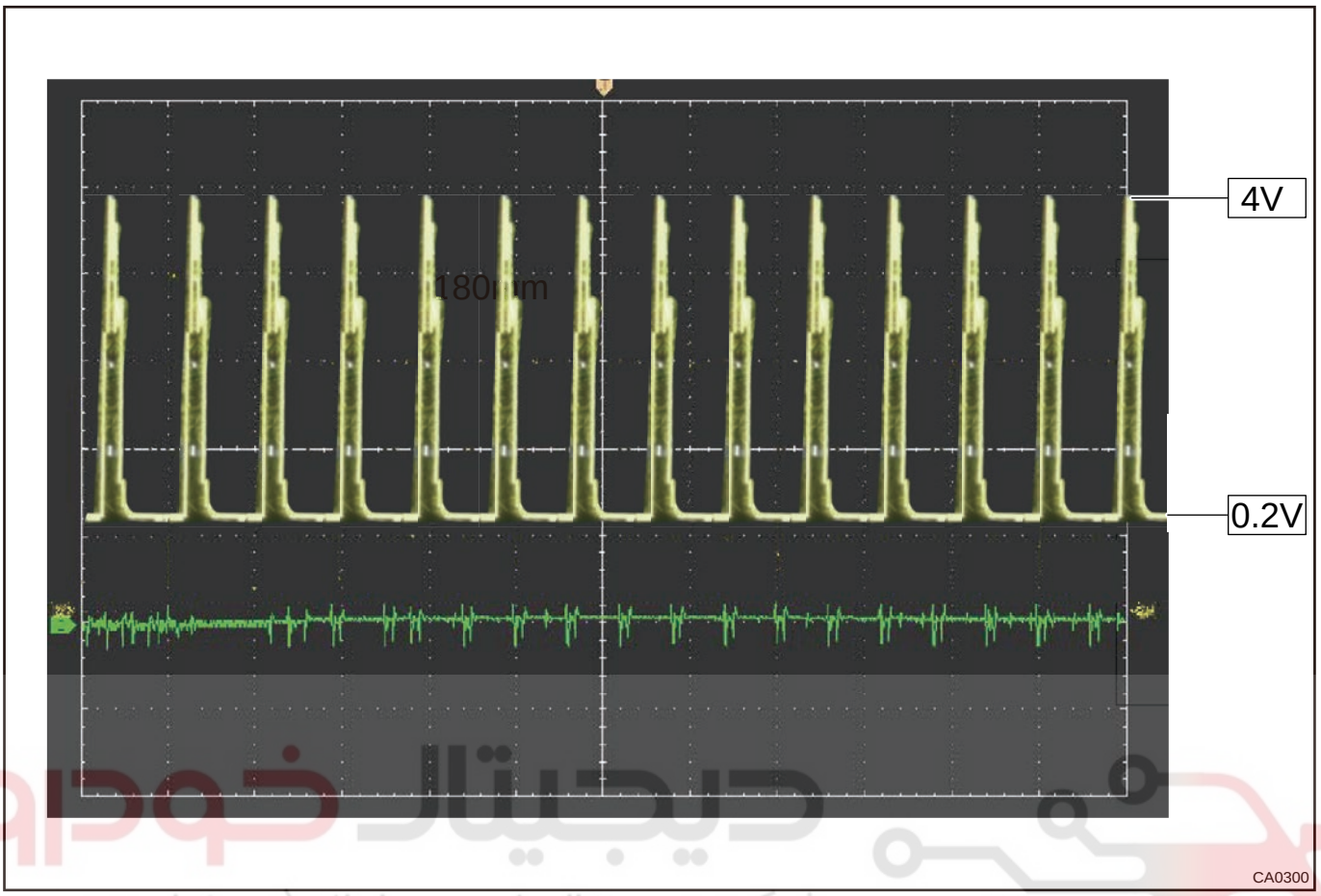
In the short circuit waveform to ground in CAN-H during actual vehicle test, the voltage potential of CAN-H line is placed at 0 V, and the recessive voltage of CAN-L line is placed at approximately 0.2 V. Power CAN and body CAN, CAN-H short to ground, vehicles can not start.

5. Short to ground in CAN-L

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:

a. 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;

b. If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;

c. 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 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:

  a. 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;

  b. If the waveform returns to normal when unplugging the connector of a module, this module is malfunctioning;

  c. 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.

Diagnostic Trouble Code (DTC) Chart

Module Power Supply Fault

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
B160116	Power Supply Fault-Circuit Voltage Below Threshold	Measured voltage is < 9 V within 500 ms;	• Fuse • Wire harness • Central gateway module	• Check fuse • Check wire harness • Check central gateway module
B160117	Power Supply Fault-Circuit Voltage Above Threshold	Measured voltage is > 16 V within 500 ms;		

Fault Summary for Node Missing and Communication Loss

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0100-87	**Lost Communication with EMS Node**	\	**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**	**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**
U0101-87	**Lost Communication with TCU Node**	\		
U0128-87	**Lost Communication with EPB**	\		
U0129-87	**Lost Communication with ABS_ESP Node**	\		
U0131-87	**Lost Communication with EPS Node**	\		
U0140-87	**Lost Communication with BCM Node**	\		
U0146-87	**Lost Communication with CGW Node**	\		
U0151-87	**Lost Communication with YAS Node**	\		

U0155-87	Lost Communication with ICM Node	\	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 other disturbances in the surrounding environment	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, 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
U0164-87	Lost Communication with CLM	\		
U0245-87	Lost Communication with TIHU_IHU Node	\		
U1161-87	Lost Communication with RLCR Node	\		
U1169-87	Lost Communication with RRCR Node	\		
U1189-87	Lost Communication with MFS Node	\		
U0151-87	Lost Communication With ABM	\		
U0214-87	Lost Communication with Passive Entry Passive Start Unit	\		
U0230-87	Lost Communication with PLG	\		
U1194-87	Lost Communication with Wireless Charging Module	\		
U0209-87	Lost Communication with First Row Driver Seat Heating Module	\		
U0210-87	Lost Communication with First	\		

	Row Passenger Seat Heating Module			• 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	\		
U0160-87	Lost Communication with Auto A/C Control Panel	\		
U0128-87	Lost Communication with EPB	\		
U1162-87	Lost Communication with FCM	\		
U0126-87	Lost Communication with Steering Angle Sensor Module (ESP Only)	\		
U0146-87	Lost Communication with CLM	\		
U1190	Lost Communication with ESCL	\		
U0100-00	Lost Communication with YAS	\		
U0170-04	Lost Communication with SCM	\		
U1193-87	Lost	\		

	Communication with Electric Shifting Controller			
U0293-87	Lost Communication with Hybrid Control Unit-Missing Message	\		
U0109-87	Lost Communication with DECOS (Oil Pump) Module	\		
U1163-87	Lost Communicate with Front Radar	\		

Fault Summary for Invalid Node Reception and Network Signal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0401-81	Invalid Data Received From EMS Node	\	1. Check if the data sent by the sender contains invalid data; · Module power supply stability · Module configuration problem · Signal interference · Module itself fault 2. CAN line connection fault 3. If the module itself receives data normally. · Module power supply stability · Module configuration problem	1. Check if the data sent by the sender contains invalid data; · Module power supply stability · Module configuration problem · Signal interference · Module itself fault 2. Check CAN line connection fault 3. Check If the module itself receives data normally. · Module power supply stability · Module configuration problem
U0402-81	Invalid Data Received From TCU Node	\		
U0418-81	Invalid Data Received From ABS_ ESP Node	\		
U0420-81	Invalid Data Received From EPS Node	\		
U0422-81	Invalid Data Received From BCM Node	\		
U0423-81	Invalid Data Received From ICM Node	\		

U0447-81	Invalid Data Received From CGW Node	\	• Signal interference • Module itself fault	• Signal interference • Module itself fault
U0452-81	Invalid Data Received From YAS Node	\		
U0546-81	Invalid Data Received From TIHU_IHU Node	\		
U059B-81	Invalid Data Received From MFS Node	\		
U1435-81	Invalid Data Received From RLCR Node	\		
U1436-81	Invalid Data Received From RRCR Node	\		
U0417-81	Invalid Data Received From EPB	\		
U1405-81	Invalid Data Received From FCM	\		
U0531	Invalid Data Received From PLG	\		
U059C	Invalid Data Received From ESCL	\		
U0170-08	Invalid Data Received From SCM	\		
U0404-04	Invalid Data Received From YAS	\		
U0428-81	Invalid Data Received From Steering Angle Sensor Module (ESP Only)	\		

U0433-81	Invalid Data Received From ACC (ESP Only)	\		
U0447-81	Invalid Data Received From CLM	\		
U1417-81	AccPedalNet_ InvalidValue	\		
U1418-81	BTMNet_ InvalidValue	\		
U1421-81	SClutch_ InvalidValue	\		
U1422-81	EngineNet_ InvalidValue	\		
U1424-81	TCUNet_ InvalidValue	\		
U1425-81	VLCNet_ InvalidValue	\		
U1427-81	EngineNet_ InvalidValue	\		
U0424-81	CLM Signal Invalid	\		
U0170-81	SCM Invalid Value	\		

Fault Summary for Invalid Node Reception and Network Signal

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U040186-h	Engine Speed Signal Invalid	\	1. Check if the data sent by the sender contains invalid data; · Module power supply stability · Module configuration problem · Signal interference · All the histories on ECU are faulty · Module itself fault	1. Check if the data sent by the sender contains invalid data; · Module power supply stability · Module configuration problem · Signal interference · Module itself fault 2. Check all the related control units, including connectors
U040186-h	Engine Start/ Stop Status Signal Invalid	\		
U040186-h	Engine Idling Signal Invalid	\		
U040186-h	Engine Temperature Signal Invalid	\		
U040186-h	Accelerator Pedal Signal Invalid	\		
U040186-h	Driver Expected Torque Signal Invalid	\		

U040186-h	Engine Torque Signal Invalid	\	2. Check all the related control units, including connectors 3. CAN line connection fault 4. If the module itself receives data normally. · Module power supply stability · Module configuration problem · Signal interference · Module itself fault	3. Check CAN line connection fault 4. Check If the module itself receives data normally. · Module power supply stability · Module configuration problem · Signal interference · Module itself fault
U040186-h	Maximum Instantaneous Torque Signal invalid	\		
U040186-h	Minimum Instantaneous Torque Signal invalid	\		
U042386-h	Environment Temperature Signal Invalid	\		
U040186-h	Brake Pedal Signal Invalid	\		
U041686-h	Brake Pressure Signal Invalid	\		
U041786-h	Hand Brake Signal Invalid	\		
U041686-h	Front Left Wheel Speed Signal Invalid	\		
U041686-h	Front Right Wheel Speed Signal Invalid	\		
U041686-h	Rear Left Wheel Speed Signal Invalid	\		
U041686-h	Rear Right Wheel Speed Signal Invalid	\		
U040486-h	Shift Lever Signal Invalid	\		
U240586-h	Shift Signal Invalid	\		
U010000-h	Engine Node 1 Timeout	\		
U040182-h	Engine Node 1 Activated	\		
U040183-h	Engine Node 1 CRC	\		
U015100-h	Brake System Node 1 Timeout	\		

U011400-h	Brake System Node 2 Timeout	\		
U014000-h	Brake System Node 3 Timeout	\		
U042282-h	Brake System Node 3 Activated	\		
U042283-h	Brake System Node 3 CRC	\		
U012800-h	Brake System Node 4 Timeout	\		
U041782-h	Brake System Node 4 Activated	\		
U041783-h	Brake System Node 4 CRC	\		
U012200-h	Brake System Node 5 Timeout	\		
U041682-h	Brake System Node 5 Activated	\		
U041683-h	Brake System Node 5 CRC	\		
U015500-h	Instrument Cluster Node 1 Timeout	\		
U024800-h	Shift Module Node 1 Timeout	\		
U010300-h	Shift Module Node 1 Timeout	\		
U040482-h	Shift Module Node 1 Activated	\		
U040483-h	Shift Module Node 1 CRC	\		
U240500-h	Shift Module Node 2 Timeout	\		
U240582-h	Shift Module Node 2 Activated	\		

U240583-h	Shift Module Node 2 CRC	\		
U021200-h	Steering Node 1 Timeout	\		
U040486	Parking (P Position) Button Signal Invalid	\		

Faults for Other Categories

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U0073-88	Common 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
U240088-h	Vehicle CAN Bus Disconnected	\		
U12A1-88	Private CAN Bus Off	\		
U1003-88	EV Network Segment Bus Off	\		
U1004-88	Power Bus Off	\		
U1005-88	Chassis Bus Off	\		
U1006-88	Information and Entertainment Bus Off	\		
U1007-88	Body CAN Bus Off	\		
U1008-88	Diagnostic Bus Off	\		
U1009-88	Support Network Segment Bus Off	\		
U100A-88	Support Network Segment Bus Off	\		

Faults for Bus Off

DTC	DTC Definition	Detection Condition	Possible Cause	Maintenance Advice
U1300-55	Vehicle CAN Configuration Not Written	\	Vehicle CAN configuration error	Check vehicle CAN configuration

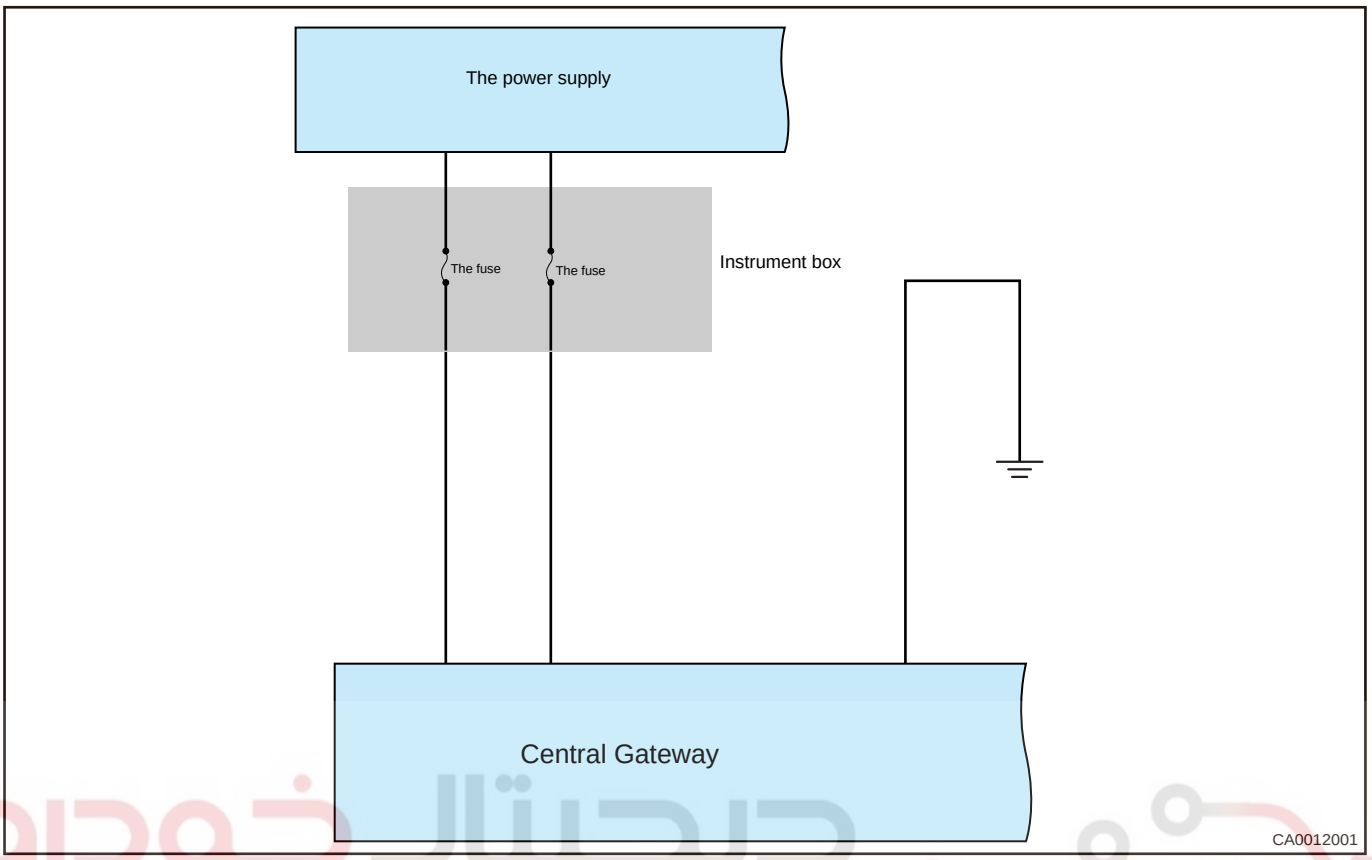
U3000-51	**Calibration Data Missed**	\	**Control module not programmed**	**Programming module**
U0005-00	**High Speed CAN Communicati-on Bus (+) High**	\	• **Intermittent problem** • **CAN line (CAN line is short to power supply)** • **Module failure** • **Central gateway**	• **Power on again** • **Check peripheral signal interference, etc.** • **Check central gateway** • **Check CAN line** • **Check module failure**
U0007-00	**High Speed CAN Communicati-on Bus (-) Low**	\	• **Intermittent problem** • **Vehicle configuration problem** • **CAN line (CAN line is short to ground)** • **Module failure** • **Central gateway**	• **Power on again** • **Check peripheral signal interference, etc.** • **Check central gateway** • **Check CAN line** • **Check module failure**

DTC Diagnosis Procedure

Module Power Supply Fault

DTC	**B1E8016**	**Power Supply Circuit Voltage Below Threshold**
DTC	**B1E8017**	**Power Supply Circuit Voltage Above Threshold**

Description
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 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 cable.

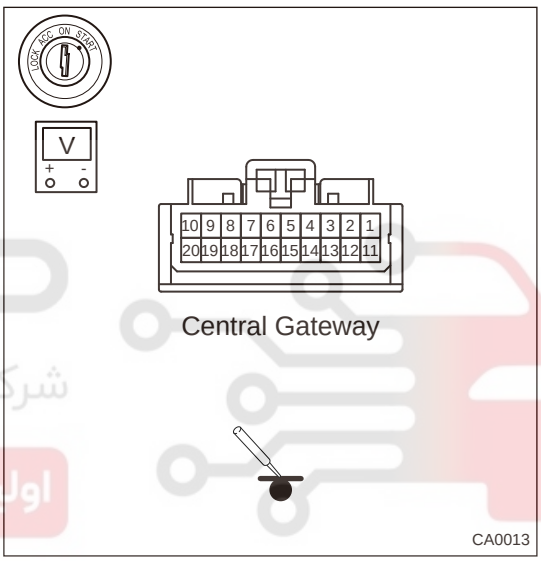
(c) Disconnect the central gateway connector.

(d) Connect the negative battery cable.

(e) Turn ENGINE START STOP switch to ON.

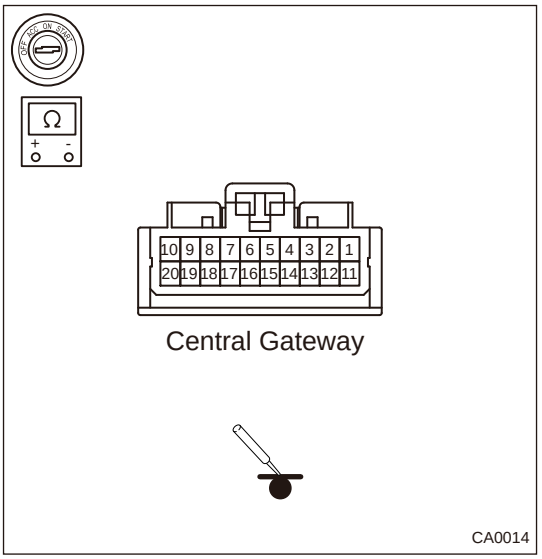
(f) Using a digital multimeter, measure voltage between central gateway connector power supply terminal and ground according to table below.

Multimeter Connection	Condition	Specified Condition
Central gateway power supply terminal - Body ground	ENGINE START STOP switch “ON”	Not less than 12 V



(g) Using a digital multimeter, measure resistance between central gateway ground terminal and ground according to table below.

Multimeter Connection	Condition	Specified Condition
Central gateway 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 central gateway module.**

OK → **System is normal**

Fault Summary for Node Missing and Communication Loss

DTC	U0100-87	Lost Communication with EMS Node
DTC	U0101-87	Lost Communication with TCU Node
DTC	U0128-87	Lost Communication with EPB
DTC	U0129-87	Lost Communication with ABS_ESP Node
DTC	U0131-87	Lost Communication with EPS Node
DTC	U0140-87	Lost Communication with BCM Node
DTC	U0146-87	Lost Communication with CGW Node
DTC	U0151-87	Lost Communication with YAS Node
DTC	U0155-87	Lost Communication with ICM Node
DTC	U0164-87	Lost Communication with CLM
DTC	U0245-87	Lost Communication with TIHU_IHU Node
DTC	U1161-87	Lost Communication with RLCR Node
DTC	U1169-87	Lost Communication with RRCR Node
DTC	U1189-87	Lost Communication with MFS Node
DTC	U0151-87	Lost Communication With ABM
DTC	U0214-87	Lost Communication with Passive Entry Passive Start Unit
DTC	U0230-87	Lost Communication with PLG
DTC	U1194-87	Lost Communication with Wireless Charging Module
DTC	U0209-87	Lost Communication with First Row Driver Seat Heating Module
DTC	U0210-87	Lost Communication with First Row Passenger Seat Heating Module
DTC	U0211-87	Lost Communication with Second Row Left Seat Heating Module
DTC	U0247-87	Lost Communication with Second Row Right Seat Heating Module

DTC	U0160-87	Lost Communication with Auto A/C Control Panel
DTC	U0128-87	Lost Communication with EPB
DTC	U1162-87	Lost Communication with FCM
DTC	U0126-87	Lost Communication with Steering Angle Sensor Module (ESP Only)
DTC	U0146-87	Lost Communication with CLM
DTC	U1190	Lost Communication with ESCL
DTC	U0100-00	Lost Communication with YAS
DTC	U0170-04	Lost Communication with SCM
DTC	U1193-87	Lost Communication with Electric Shifting Controller
DTC	U1163-87	Lost Communicate with Front Radar
DTC	U0293-87	Lost Communication with Hybrid Control Unit-Missing Message
DTC	U0109-87	Lost Communication with DECOS (Oil Pump) 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.

Module Not Programmed Fault

DTC	U1300-55	Vehicle CAN Configuration Not Written

1	Check if module power supply and ground are normal.

NG → Check and repair power supply or ground, verify the fault phenomenon again.

OK

2	Check if line and node are connected normally.

NG → Check and repair line and node, verify the fault phenomenon again.

OK

3	Refresh calibration data.

OK → Verify the fault phenomenon again.

NG

4	Replace module, check and repair, then verify the fault phenomenon again.

Faults for Invalid Node Reception and Network Signal

DTC	U0401-81	Invalid Data Received From EMS Node
DTC	U0402-81	Invalid Data Received From TCU Node
DTC	U0418-81	Invalid Data Received From ABS_ESP Node
DTC	U0420-81	Invalid Data Received From EPS Node
DTC	U0422-81	Invalid Data Received From BCM Node
DTC	U0423-81	Invalid Data Received From ICM Node
DTC	U0447-81	Invalid Data Received From CGW Node
DTC	U0452-81	Invalid Data Received From YAS Node
DTC	U0546-81	Invalid Data Received From TIHU_IHU Node
DTC	U059B-81	Invalid Data Received From MFS Node
DTC	U1435-81	Invalid Data Received From RLCR Node
DTC	U1436-81	Invalid Data Received From RRCR Node
DTC	U0417-81	Invalid Data Received From EPB
DTC	U1405-81	Invalid Data Received From FCM
DTC	U0531	Invalid Data Received From PLG
DTC	U059C	Invalid Data Received From ESCL
DTC	U0170-08	Invalid Data Received From SCM
DTC	U0404-04	Invalid Data Received From YAS
DTC	U0428-81	Invalid Data Received From Steering Angle Sensor Module (ESP Only)
DTC	U0433-81	Invalid Data Received From ACC (ESP Only)
DTC	U0447-81	Invalid Data Received From CLM
DTC	U1417-81	AccPedalNet_InvalidValue
DTC	U1418-81	BTMNet_InvalidValue
DTC	U1421-81	SClutch_InvalidValue
DTC	U1422-81	EngineNet_InvalidValue
DTC	U1424-81	TCUNet_InvalidValue
DTC	U1425-81	VLCNet_InvalidValue
DTC	U1427-81	EngineNet_InvalidValue
DTC	U0424-81	CLM Signal Invalid
DTC	U0170-81	SCM Invalid Value
DTC	U040186h	Engine Speed Signal Invalid
DTC	U040186h	Engine Start/Stop Status Signal Invalid

DTC	U040186h	Engine Idling Signal Invalid
DTC	U040186h	Engine Temperature Signal Invalid
DTC	U040186h	Accelerator Pedal Signal Invalid
DTC	U040186h	Driver Expected Torque Signal Invalid
DTC	U040186h	Engine Torque Signal Invalid
DTC	U040186h	Maximum Instantaneous Torque Signal invalid
DTC	U040186h	Minimum Instantaneous Torque Signal invalid
DTC	U042386h	Environment Temperature Signal Invalid
DTC	U040186h	Brake Pedal Signal Invalid
DTC	U041686h	Brake Pressure Signal Invalid
DTC	U041786h	Hand Brake Signal Invalid
DTC	U041686h	Front Left Wheel Speed Signal Invalid
DTC	U041686h	Front Right Wheel Speed Signal Invalid
DTC	U041686h	Rear Left Wheel Speed Signal Invalid
DTC	U041686h	Rear Right Wheel Speed Signal Invalid
DTC	U040486h	Shift Lever Signal Invalid
DTC	U240586h	Shift Signal Invalid
DTC	U040486	Parking (P Position) Button Signal Invalid
DTC	U010000h	Engine Node 1 Timeout
DTC	U040182h	Engine Node 1 Activated
DTC	U040183h	Engine Node 1 CRC
DTC	U015100h	Brake System Node 1 Timeout
DTC	U011400h	Brake System Node 2 Timeout
DTC	U014000h	Brake System Node 3 Timeout
DTC	U042282h	Brake System Node 3 Activated
DTC	U042283h	Brake System Node 3 CRC
DTC	U012800h	Brake System Node 4 Timeout
DTC	U041782h	Brake System Node 4 Activated
DTC	U041783h	Brake System Node 4 CRC
DTC	U012200h	Brake System Node 5 Timeout
DTC	U041682h	Brake System Node 5 Activated
DTC	U041683h	Brake System Node 5 CRC

DTC	U015500h	Instrument Cluster Node 1 Timeout
DTC	U024800h	Shift Module Node 1 Timeout
DTC	U010300h	Shift Module Node 1 Timeout
DTC	U040482h	Shift Module Node 1 Activated
DTC	U040483h	Shift Module Node 1 CRC
DTC	U240500h	Shift Module Node 2 Timeout
DTC	U240582h	Shift Module Node 2 Activated
DTC	U240583h	Shift Module Node 2 CRC
DTC	U021200h	Steering Node 1 Timeout

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 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

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 → Unplug or replace module, verify the fault phenomenon again.

OK

6	Replace module, check and repair, then verify the fault phenomenon again.

Bus Off Fault

DTC	U0073-88	Common CAN Bus Off
DTC	U240088h	Vehicle CAN Bus Disconnected
DTC	U12A1-88	Private CAN Bus Off
DTC	U1003-88	EV Network Segment Bus Off
DTC	U1004-88	Power Bus Off
DTC	U1005-88	Chassis Bus Off
DTC	U1006-88	Information and Entertainment Bus Off
DTC	U1007-88	Body CAN Bus Off
DTC	U1008-88	Diagnostic Bus Off
DTC	U1009-88	Support Network Segment Bus Off
DTC	U100A-88	Support Network Segment 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.

CAN Configuration Error

DTC	U1300-55	Vehicle CAN Configuration Not Written

1	Use diagnostic tester to check the configuration codes of the faulty module or sensor.

NG → Write correct configuration code to faulty module or sensor, 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 modules in network.

NG → **Unplug or replace module, verify the fault phenomenon again.**

OK ↓

4	**Replace module, check and repair, then verify the fault phenomenon again.**

Calibration Data Missed

DTC	**U3000-51**	**Calibration Data Missed**
1	**Using diagnostic tester, check calibration data for faulty module or sensor.**	

NG → **Write correct calibration data to faulty module or sensor, 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 modules in network.**

NG → **Unplug or replace module, verify the fault phenomenon again.**

OK ↓

4	**Replace module, check and repair, then verify the fault phenomenon again.**

CAN Line Fault

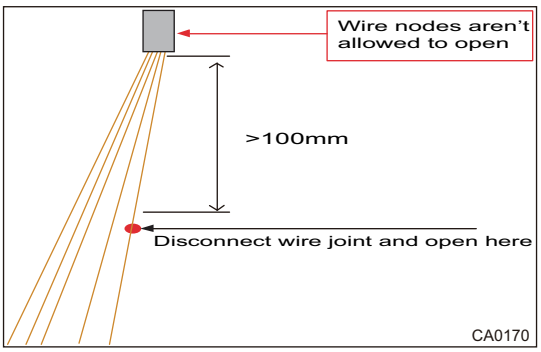
DTC	**U0005-00**	**High Speed CAN Communication Bus (+) High**
DTC	**U0007-00**	**High Speed CAN Communication Bus (-) Low**

1. Link malfunction.

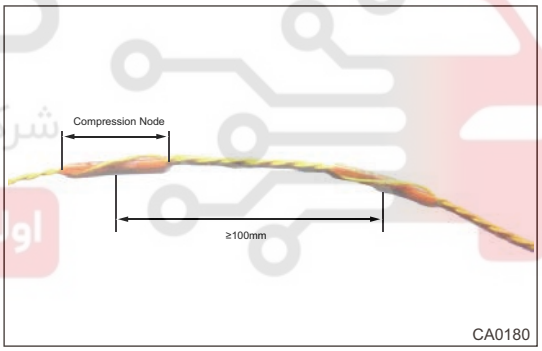
Link refers to a communication connection line between nodes. Link malfunction refers to malfunction of data communication lines, such as short circuit, open circuit and communication signal attenuation or distortion caused by changes in physical properties of the lines. These factors often cause multiple 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.

a. 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:

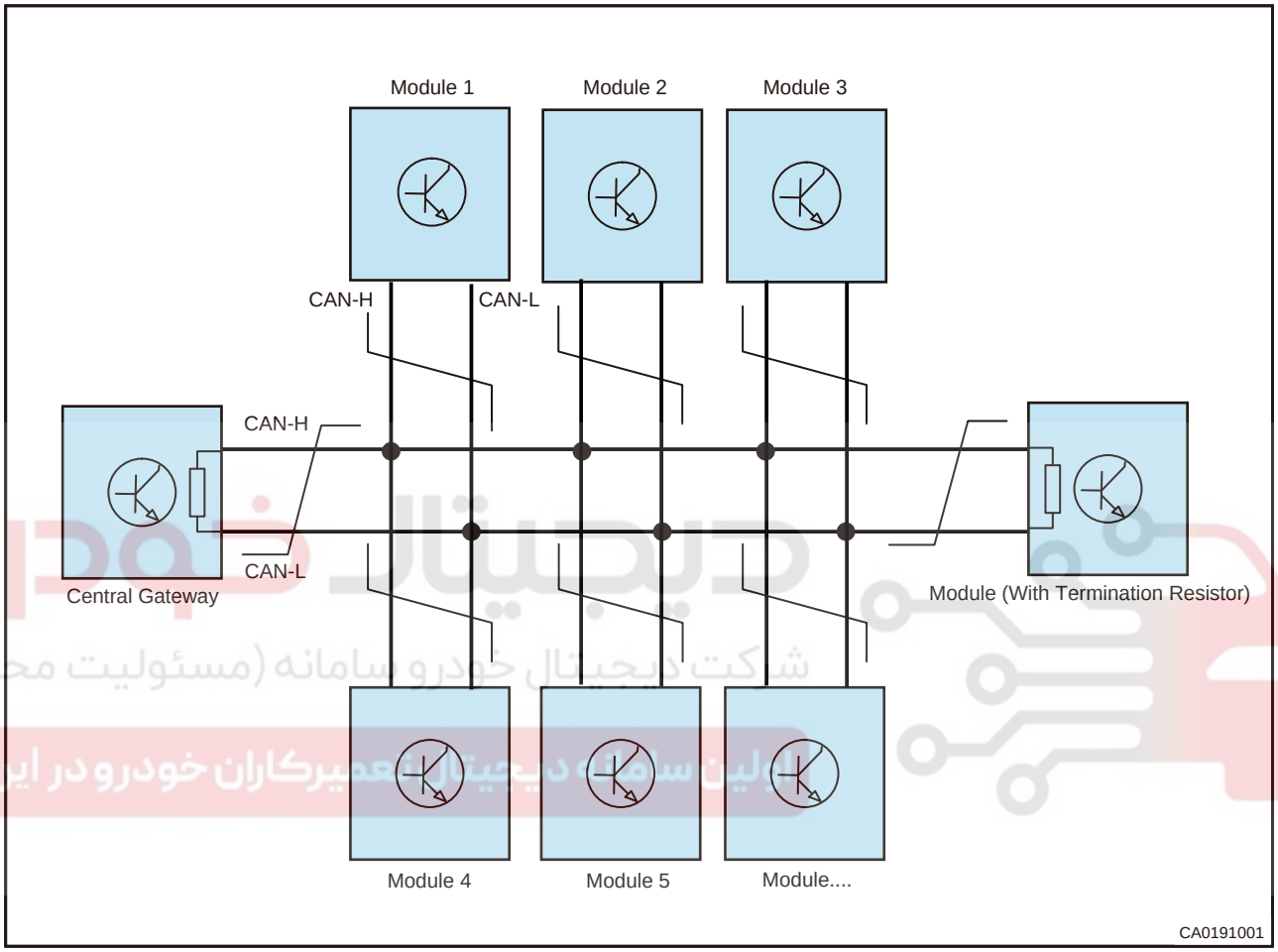


- During CAN bus maintenance, the disconnection point is required to be at least 100 mm away from the line node, and the line node must never be opened, maintained and updated;
- If the CAN line is to be disconnected, it is only allowed to be carried out at a distance of ⩾ 100 mm from next pressure node; The twisting of CAN lines have 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.



b. Use a multimeter to measure the resistance to ground and power supply of CAN-H and CAN-L.

- Unplug any non-termination resistor module (easy to remove and install), after disconnecting battery for 5 minutes, the measured resistance values between diagnostic interfaces CAN-H and CAN-L and ground are both 32 MΩ.
- Unplug any non-termination resistor module (easy to remove and install), after disconnecting battery for 5 minutes, the measured resistance values between diagnostic interfaces CAN-H and CAN-L and ground are both about 33.5 MΩ.



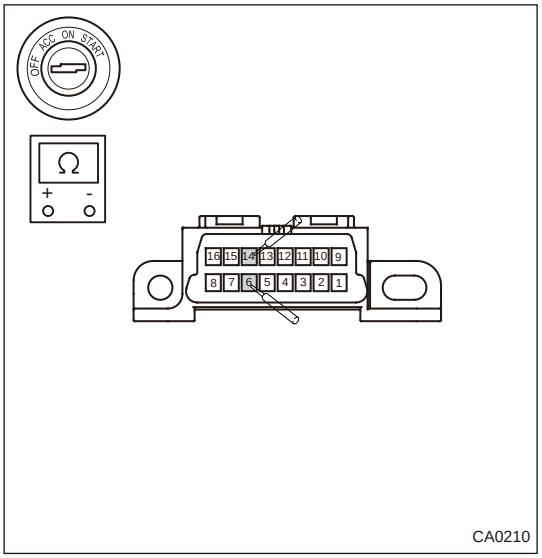
c. Termination resistor.

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 non-termination resistor modules (unplug any module which is easy to remove and install in CAN network, find terminals CAN-H and CAN-L according to circuit diagram) (-standard resistance is 60 Ω).

Measured value (for reference only): The measured resistance between terminals CAN-H and CAN-L (-parallel value of two termination resistors) is 58.7 Ω, unplug a module with termination resistor, and the measured resistance between terminals CAN-H and CAN-L is about 120 Ω.



OK

1	**Check modules in network.**

NG

Unplug each module one by one or replace each module, verify the fault phenomenon again.

OK

2	**Replace module, check and repair, then verify the fault phenomenon again.**

Diagnostic tester cannot communicate with all modules

1	**Check diagnostic interface power supply and ground**

NG

Check diagnostic interface power supply and ground, and verify the fault phenomenon again.

OK

2	Check if diagnostic CAN bus is 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 diagnostic CAN bus and node, verify the fault phenomenon again.

OK

3	Check if other CAN buses and nodes 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 other CAN buses and nodes, verify the fault phenomenon again.

OK

4	Check central gateway module.

NG → Check central gateway module, verify the fault phenomenon again.

OK

5	Check other modules in network.

NG → Unplug or replace faulty module, verify the fault phenomenon again.

OK

6	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

7	**Determine type of fault waveform, inspect and repair, then reconfirm the fault phenomenon again.**

Diagnostic tester cannot communicate with several modules

1	**Check power supply and ground of module that has lost communication**

NG → **Check power supply and ground of module that has lost communication, verify the fault phenomenon again.**

OK

2	**Check if main CAN bus is 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 main CAN bus and node, verify the fault phenomenon again.**

OK

3	**Check central gateway module.**

NG → **Check central gateway module, verify the fault phenomenon again.**

OK

4	**Check other modules in network.**

NG → **Unplug or replace faulty module, verify the fault phenomenon again.**

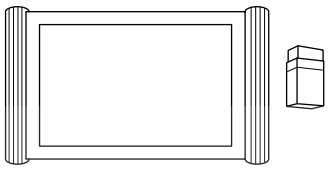
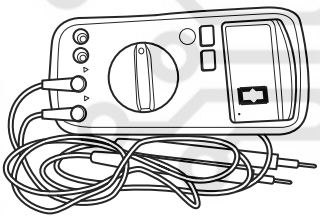
OK

5	**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.**

On-vehicle Service

Tools

Tool Name	Tool Drawing
X-431 PAD Diagnostic Tester	 RCH0001006
Digital Multimeter	 RCH000206
Oscilloscope	 RCH006106

Hint:

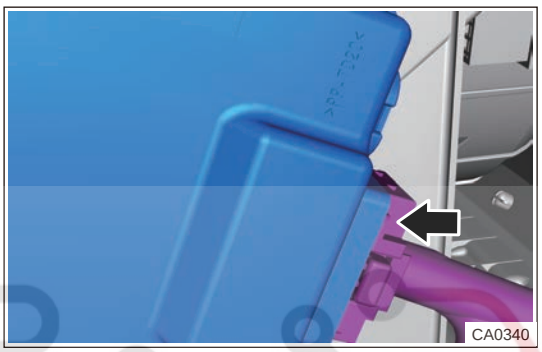
- Oscilloscopes are available in the market as a general tool. Chery does not provide this tool.
- As a general diagnostic method, oscilloscope diagnosis can be replaced by other diagnostic methods.

Gateway Module (CGW)

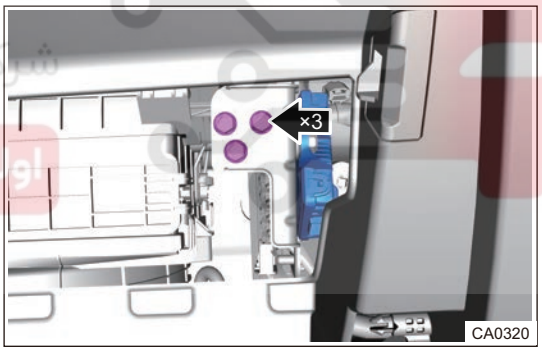
Removal

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.

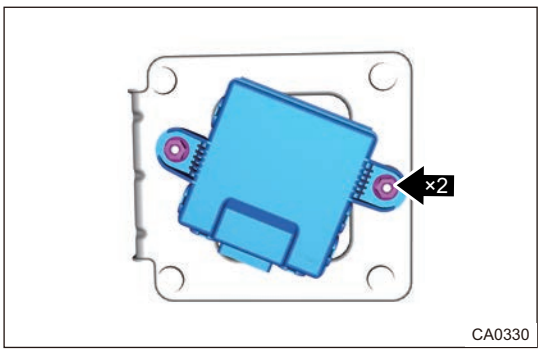
1. Turn ENGINE START STOP switch to OFF.
2. Disconnect the negative battery cable.
3. Remove the glove box assembly.
4. Remove the gateway module.
   a. Disconnect the gateway module connector (arrow).



   b. Remove 3 fixing bolts (arrow) from gateway bracket.



   c. Remove 2 fixing nuts (arrow) from gateway module secured on gateway bracket.



   d. Remove the gateway module.

Installation

1. Installation is in the reverse order of removal.
2. Write configuration code with diagnostic tester to check module for proper operation after installation.