

General Information

Environmental Precautions

Overview

This section provides general information which can help to reduce the environmental impacts from the activities carried out in workshops.

Emissions to Air

Many of the activities that are carried out in workshops emit gases and fumes which contribute to global warming, depletion of the ozone layer and/or the formation of photochemical smog at ground level. By considering how the workshop activities are carried out, these gases and fumes can be minimised, thus reducing the impact on the environment.

Solvents

Some of the cleaning agents used are solvent based and will evaporate to atmosphere if used improperly, or if cans are left unsealed. All solvent containers should be firmly closed when not needed and solvent should be used sparingly. Suitable alternative materials may be available to replace some of the commonly used solvents. Similarly, many paints are solvent based and the spray should be minimised to reduce solvent emissions.

Refrigerant

Discharge and replacement of refrigerant from air conditioning units should only be carried out by qualified staff using the correct equipment.

Thinners:

- Always keep containers of solvents sealed;
- Only use the minimum quantity;
- Consider alternative materials;
- Minimise over-spray when painting.

Gases:

- Always use the correct equipment for collecting refrigerants;
- Don't burn rubbish on site.

Discharges to Water

Lubricating oil, solvent, acids, hydraulic oil, antifreeze and other such substances should never be poured down the drain and every precaution must be taken to prevent spillage reaching the drains.

Handling of such materials must take place well away from the drains and preferably in an area with a kerb or wall around it, to prevent discharge into the drain. If a spillage occurs, it should be soaked up immediately. Having a spill kit available will make this easier.

Checklist

Always adhere to the following disposal and spillage prevention instructions.

- Never pour anything down a drain without first checking that it is environmentally safe to do so, and that it does not contravene any local regulations.
- Store liquids in a walled area.
- Make sure that taps on liquid containers are secure and cannot be accidentally turned on.
- Protect bulk storage tanks from vandalism by locking the valves.
- Transfer liquids from one container to another in an area away from open drains.
- Ensure lids are replaced securely on containers.
- Have spill kits available near to points of storage and handling of liquids.

Spill Kits

Special materials are available to absorb a number of different substances. They can be in granular form, ready to use and bought in convenient containers for storage. Disposal of used spill-absorbing material is dealt with in the 'Waste Management' section.

Land Contamination

Lubricating oil, solvent, etc. can contaminate any soil that they are allowed to contact. Such materials should never be disposed of by pouring onto soil and every precaution must be taken to prevent spillage reaching soil. Waste materials stored on open ground could also leak, or have polluting substances washed off them that would contaminate the land. Always store these materials in suitable robust containers.

Checklist

Always adhere to the following:

- Never pour or spill anything onto the soil or bare ground.
- Never store waste materials on bare ground.

Local Issues

A number of environmental issues will be of particular concern to residents and other neighbours close to the site. The sensitivity of these issues will depend on the proximity of the site and the layout and amount of activity carried on at the site.

Car alarm testing, panel beating, hammering and other such noisy activities should, whenever possible, be carried out indoors with doors and windows shut or as far away from residential area as possible.

Be sensitive to the time of day when these activities are carried out and minimise the time of the noisy operation, particularly in the early morning and late evening.

Another local concern will be the smell from the various materials used. Using less solvent, paint and petrol could help prevent this annoyance.

Charger Filler Flap

Service Procedures

Slow Charging Port Door Release Cable and Case Assembly

Remove

1. Turn off the ignition key and wait for more than 5 min before removing.

Caution: Please wait 5 minutes after the vehicle power system has been switched off to allow any power stored within the PEB capacitors to have been discharged.

2. Disconnect the negative battery cable.
3. Remove the manual service disconnect.

 Manual Service Disconnect Remove

4. Remove the slow charging port door release cable from the slow charging port door release handle.
5. Remove the A pillar lower trim panel.

 A Pillar Lower Trim Panel Remove

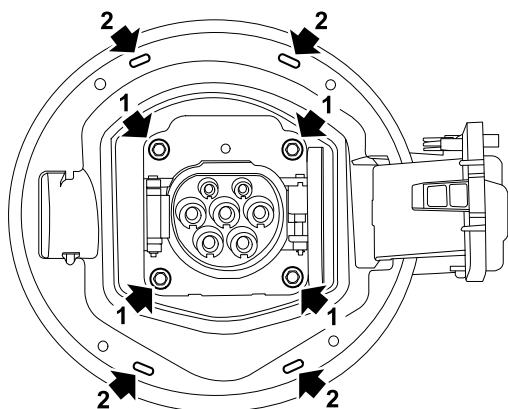
6. Remove the door sill trim panel assembly.

 Door Sill Trim Panel Assembly Remove

7. Remove the right luggage compartment side trim panel assembly.

 Luggage Compartment Side Trim Panel Assembly Remove

8. Pry up the edge of the carpet, and remove the retaining clip fixing the slow charging port door release cable to the body.
9. Squeeze the slow charging port door lock from inside, push the slow charging port door lock out, and pull the charging port door release cable out of the slow charging port door case.
10. Remove 4 bolts (1) connecting the slow charging port to the body, pry off the 4 openings (2) reserved for the retaining clips with a flat-bladed tool, and loosen the 4 clips fixing the slow charging port door case to the body in sequence.



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11. Push out the slow charging port door case assembly from the inside to the outside of the panel.

Refit

1. Pass the slow charging port door release cable through the charging port door case.
2. Pass the charging port through the charging port door case assembly, locate the charging port door case assembly to the body. Please adjust the gap around the charging port to avoid contact with the side panel. Ensure the clip is fitted in place.
3. Fit 4 bolts fixing the charging port to the bracket, tighten them to **5-7Nm**, and check the torque.
4. Push the charging port door lock into the clip in place, and fit the clip fixing the charging port door release cable to the body.
5. Fit the right luggage compartment lid side trim panel assembly.

 Luggage Compartment Side Trim Panel Assembly Refit

6. Fit the door sill trim panel assembly.

 Door Sill Trim Panel Assembly Refit

7. Fit the A pillar lower trim panel.

 A Pillar Lower Trim Panel Refit

8. Fix the charging port door release cable to the charging port door release handle.
9. Close the charging port door.
10. Fit the manual service disconnect.

 Manual Service Disconnect Refit

11. Connect the negative battery cable.

Welding Process

Overview of Welding Methods

For repair of vehicles damaged by collision, welding is a very effective method, which has the following characteristics:

- Not restricted by shape, it is suitable for connecting integral body structure, which, after being welded, can still maintain its intactness;
- With no adapting piece needed, it can reduce the weight;
- Outstanding sealing performance against air and water;
- High productivity;
- Strength of the welded joint will be affected by the operator's technical level;
- In case of overheating, the surrounding panels will be deformed.

For welding in body repair, Hyundai Motor usually employ inert-gas welding, resistance spot welding and braze welding. When the panel should be welded for repair, based on specific conditions, it is required to adopt an optimal welding method that will not reduce original strength and durability of the body; it is advisable to use spot welding or inert-gas welding where possible. Oxygen-acetylene welding is generally not used for new models; except for the parts subject to braze welding during manufacturing, braze welding is generally not used for body parts.

Inert-gas Welding

Inert-gas welding machine is mainly applied to welding of low alloy steel body with high strength, aluminum casting, etc. Inert-gas welding has the following benefits:

- The operation method is easy to be mastered;
- It can 100% melt a variety of base metals; when being applied to a thin metal, it can use weak current to reduce the damage to the strength of adjacent parts;
- The arc is stable and easy to be controlled;
- It is suitable for welding of parts with gaps and mismatches;
- Able to control the welding temperature and duration, it can shorten heating time of the welded zone, thus reducing fatigue and deformation of the base metal.

Typical welding positions and welding methods:

- Butt welding. Mount two adjacent metal edges together, and then conduct welding along the edge of the two metal plates mated or butted with each other;
- Overlap welding. Weld two metal plates overlapped with each other;
- Plug welding. Punch a hole in one or several workpieces outside to make the arc access the workpiece inside

through the hole that then will be filled with molten metal;

- Spot welding. When the timing pulse for wire feeding is triggered, the current will be introduced into the two metal plates to be welded.

While applying inert gas shielded welding to galvanized metals, do not remove the zinc so as to avoid a lower metal strength as a result of a smaller thickness.

Resistance Spot Welding

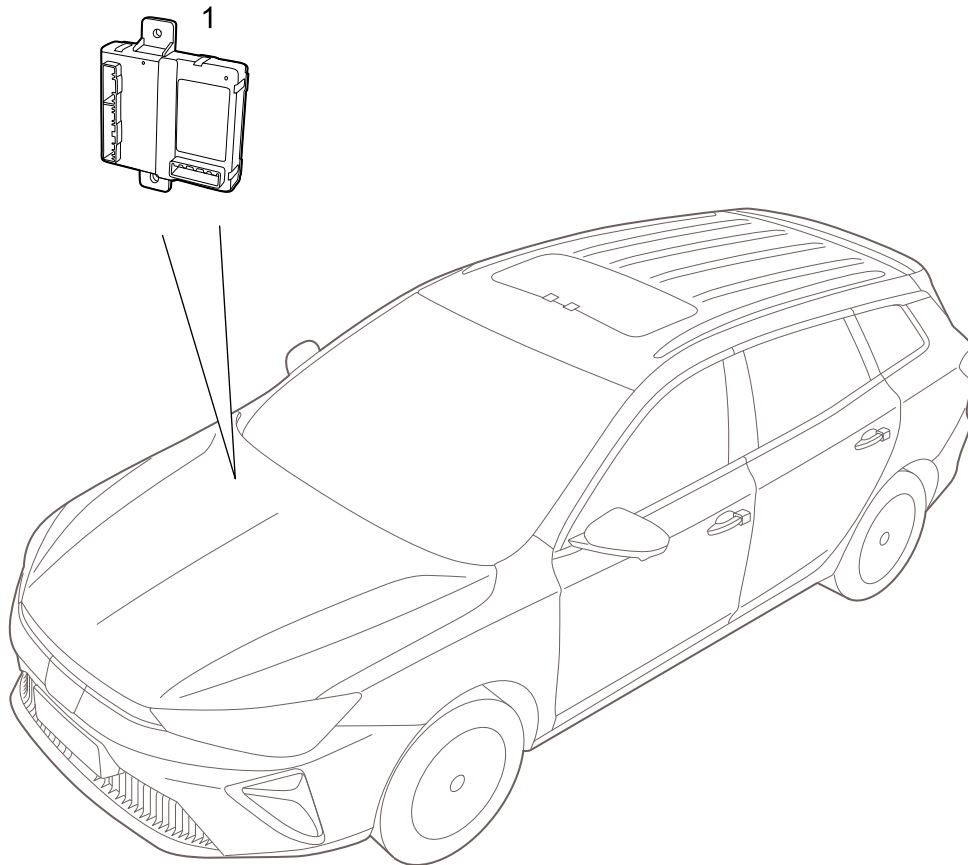
As the most commonly used method for welding of the integral body, resistance spot welding is suitable for thin steel plates of the body requiring high welding strength with no deformation caused. Roof, door window, door sill plate, external components, etc. Welding quality of the resistance spot welding will be affected by the voltage, current, pressurized time, thickness of the welded metal plate, and other related factors, which are expounded as follows:

- Material and degree of cleanliness of the weldment: both the contact points between two weldments and between the weldment and the electrode should be carefully polished clean;
- Electrode pressing force: if the pressure is insufficient, welding spatter will be caused at the contact point; if the pressure is excessive, although the current flowing through is large, owing to the enlarged heat distribution area, the welding spot diameter and weld penetration will become smaller instead;
- Welding current: both welding spot diameter and welding strength will be increased with the increase of welding current; however, when the current is excessive but the pressure is insufficient, the welding spatter will also be caused between the plates, whereas it may be minimized;
- Power-on duration: the effects exerted by long power-on duration on the welding spot include abundant heat generated, large welding spot, and deep weld penetration. However, if the power-on duration is excessively prolonged, electrode indentation and thermal deformation will be caused instead of increased welding spot;
- Arrangement of welding spot: both spacing and margin (the distance from the welding spot to the plate edge) of the welding spot will also impose a decisive effect on the strength of the welding spot. Although shortening spacing of the welding spot can improve the connection strength of the weldment, in fact, there is a limit, because when the spacing exceeds a certain limit, the welding current will be diverted and leaked through the last welding spot; at this point, the increased welding spot will lose its effect to enhance the connection strength of the

Gateway

Description and Operation

System Layout



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I. Gateway Module

Cooling Fan Running All the Time

Test Condition	Detail/Result/Action
1. Check related circuits or connectors of cooling fan	A. Check related harness connectors for looseness. If yes: after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step B. B. Disconnect the harness connector of the cooling fan motor, check the conductivity of the corresponding pin, and check for short to battery. If yes: repair/replace related circuits; after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step C. C. Disconnect the cooling fan motor harness connector from the BCM, check the conductivity of the corresponding pin of signal line, and check for short to ground or short to battery. If yes: repair/replace related circuits; after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step 2.
2. Check VCU	After the VCU is refreshed, confirm if the cooling fan works normally. If yes, diagnosis is completed; if still not, replace the VCU.

Reference Information	
Circuit Diagram	Vehicle Control System

Front Wiper Fails to Return to Original Position

Test Condition	Detail/Result/Action
1 Check the windscreen wiper arm	Check the windscreen wiper arm for any signs of deformation or damage. If yes: after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step 2.
2 Check the windscreen wiper arm for refit	Check the windscreen wiper arm for any signs of looseness, damage or loss of retaining bolts. If yes: after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step 3.
3 Check the windscreen wiper linkage mechanism	Check the windscreen wiper arm for any signs of deformation or damage. If yes: after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step 4. If the above causes are excluded, it indicates that the front wiper motor mounting position may have failed, tighten/fit the retaining bolts of the front wiper motor. After the replacement, confirm that the system works normally.
4 Check the windscreen wiper linkage mechanism for refit	Check the windscreen wiper linkage mechanism for any signs of looseness, damage or loss of retaining bolts. If yes: after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Go to Step 5.
5. Check related circuits or connectors of the front wiper motor	Disconnect the front wiper motor harness connector from the BCM, and check for continuity of corresponding Pins of signal lines. If yes: repair/replace related circuits; after the repair/replacement, confirm if the symptom disappears. • Yes → Diagnosis is completed. • No → Check for other causes.

Reference Information	
Circuit Diagram	Wiper System

PIFC5**DTC Description**

DTC	FTB	Failure Description
PIFC5	96	The temperature sensor in onboard charging socket is failure

Subsystem Principle

The slow charging port is connected with the CCU, which is mainly used as the connection port for supplying civil electricity to the CCU. The 220V AC power of civil electricity is supplied to the CCU via this charging port. It also detects the charging state by a temperature sensor in the charging port.

Conditions for Running DTCs

- After the vehicle is powered on for 1s.
- DTC is enabled.

Conditions for Setting DTCs

The temperature sensor voltage is greater than 3.3V or less than 0.03V for more than 5s.

Operations of ECU after Failure

Reset 5 times; if the DTC exists, limit the output power supply and the input current should be less than 16A.

Conditions for Clearing DTCs

- The temperature sensor voltage is between 0.03V and 3.3V for more than 1s.
- History DTCs will be cleared after 40 power-on and power-off cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Slow charging port failure.
- Combined charging unit failure.
- VCU failure.

Reference Information

Reference Circuit Information

Charging control system

Reference Connector End View Information

EB217-2, EB216 and EB079

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Check the connectivity of connectors:

- Check harness connector EB216 of the slow charging port, harness connector EB217-2 of the CCU, and harness connector EB079 of the VCU for looseness,

poor contact, distortion, corrosion, contamination, deformation, etc.

- Clean, lubricate, repair or replace the faulty parts found in visual check.
- After the test/repair of relevant failures, turn off the start switch and turn it on again, read DTCs again and confirm if the DTC still exists.
 - Yes → Go to Step 2;
 - No → Diagnosis is completed.

2. Test related circuits:

- Place the start switch in "OFF" position, keep the vehicle in standstill for more than 5min, operate the manual service disconnect to cut off the high-voltage battery power supply, and disconnect the negative battery cable.
- Disconnect harness connector EB217-2 of the CCU, harness connector EB216 of the slow charging port, and harness connector EB079 of the VCU.
- Test if the resistance between terminals of VCU harness connector, terminals of CCU harness connector and terminals of slow charging port harness connector is less than 5Ω.

- Terminal EB079-37 and Terminal EB216-8
- Terminal EB079-65 and Terminal EB216-9
- Terminal EB217-2-B2 and Terminal EB216-6
- Terminal EB217-2-D2 and Terminal EB216-7

If it is not within the specified range, test/repair the circuit for open circuit or high resistance.

- Test if the resistance between terminals of VCU harness connector, terminals of CCU harness connector or terminals of slow charging port harness connector and the ground is infinite.
 - Terminal EB079-37 or Terminal EB216-8
 - Terminal EB079-65 or Terminal EB216-9
 - Terminal EB217-2-B2 or Terminal EB216-6
 - Terminal EB217-2-D2 or Terminal EB216-7

If it is not within the specified range, test/repair the circuit for short to ground.

- Test if the resistance between terminals of VCU harness connector, terminals of CCU harness connector or terminals of slow charging port harness connector and the power supply is infinite.
 - Terminal EB079-37 or Terminal EB216-8
 - Terminal EB079-65 or Terminal EB216-9
 - Terminal EB217-2-B2 or Terminal EB216-6
 - Terminal EB217-2-D2 or Terminal EB216-7

P3188**DTC Description**

DTC	FTB	Failure Description
P3188	00	Shutdown Path Test Fail

Subsystem Principle

The power electronic box (PEB) carries out a self-check for internal failures, not involving external circuits.

Conditions for Running DTCs

- The start switch is in "ON" position.

Conditions for Setting DTCs

Line turn-off test fails.

Operations of ECU after Failure

- Active short circuit.
- SVS MIL turns on.

Conditions for Clearing DTCs

- If the conditions for setting the DTCs are not present, the DTC will be cleared.
- History DTC's will be cleared and the MIL will go out after 40 wake-up/standby cycles.

Possible Causes

- Electric drive transmission failure.
- PEB failure.

Reference Information

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Check the mounting position of PEB and electric drive transmission connectors, the harnesses and the connectors for wear or corrosion. Re-adjust if any failure found in visual check.
2. Connect the scan tool, and place the start switch in "ON" position. Read DTCs with the scan tool, and make records.
3. Confirm that no PEB DTC other than DTC P3188 is set.
4. After clearing the DTC, confirm that DTC P3188 is not set.
5. If the DTC is reset, test/replace the PEB or the electric drive transmission.
6. If there is a requirement to remove covers etc for inspection or repair please ensure that only authorised and trained personnel carry out the operation.

Service Guide

Please refer to the relevant sections of service manual (Remove & Refit) and self learning programming manual.

P303B**DTC Description**

DTC	FTB	Failure Description
P303B	00	Speed assist system monitor fault

Subsystem Principle

When the front view camera module (FVCM) detects the failure of the speed assist system, communicates with the vehicle control unit (VCU) through gateway (GW).

Conditions for Running DTCs

- The battery voltage is normal.
- The Start/Stop switch is in "ON" position.

Conditions for Setting DTCs

The actual state of the speed assistant system is different from that of the TQM speed assistant system.

Operations of ECU after Failure

Prohibit SAS.

Conditions for Clearing DTCs

- The actual state of the speed assistant system is the same as that of the TQM speed assistant system.
- Historic DTC's will be cleared and the MIL will go out after 40 wake-up/standby cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Vehicle control unit failure.
- Gateway failure.

Reference Information

Reference Circuit Information

BUS System - Powertrain High Speed Controller Area Network

Reference Connector End View Information

EB079, FA040

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Check the connectivity of connectors:

- Check harness connector EB079 of the VCU and harness connector FA040 of the GW for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.
- Clean, repair or replace the faulty parts found in visual check.

- After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.

- Yes → Go to Step 2;
- No → Diagnosis is completed.

2. Test related circuits:

- Refer to "Integrity Inspection of Power HS CAN Network". If other module tests are normal, continue the following inspection procedures.
- Place the Start/Stop switch in "OFF" position, let the vehicle stand for more than 5min, disconnect the negative battery cable, and operate the MSD to disconnect the high-voltage battery power supply.
- Disconnect harness connector EB079 of the VCU and harness connector FA040 of the GW.
- Test if the resistance between terminals of harness connector EB079 of the VCU and terminals of harness connector FA040 of the GW is less than 5Ω.

- Terminal EB079-17 and Terminal FA040-15

- Terminal EB079-18 and Terminal FA040-16

If it is not within the specified range, test/repair the circuit for open circuit or high resistance.

- Test if the resistance between terminals of harness connector EB079 of the VCU or terminals of harness connector FA040 of the GW and the ground is infinite.

- Terminal EB079-17 or Terminal FA040-15

- Terminal EB079-18 or Terminal FA040-16

If it is not within the specified range, test/repair the circuit for short to ground.

- Connect the negative battery cable, place the Start/Stop switch in "ON" position, and test if the voltage between terminals of harness connector EB079 of the VCU or terminals of harness connector FA040 of the GW and the ground is 2-3V.

- Terminal EB079-17 or Terminal FA040-15

- Terminal EB079-18 or Terminal FA040-16

If it is not within the specified range, test/repair the circuit for short to battery.

- After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.

- Yes → Go to Step 3;
- No → Diagnosis is completed.

3. Test/replace the VCU or the GW:

B1116 and B112C**DTC Description**

DTC	FTB	Failure Description
B1116	71	Local Rear Left Door Window Switch Stuck
B112C	71	Left Rear Window Switch Stuck
	04	Left Rear Window Switch Internal Fault

Subsystem Principle

Power window switches of front passenger door and rear doors are on the door interior trim panel. Each power window switch is provided with a printed circuit board (PCB), and electronic components and connectors are installed on the circuit board. The upper surface of PCB is covered with a layer of rubber membrane with a protruding pin on each of the switches, providing each switch with the force to return to the centre position. There is a carbon contact on the lower surface of each protruding pin forming a complete loop on the board when the corresponding switch is pressed.

Conditions for Running DTCs

The Start/Stop switch is in "ACC" or "ON" position.

Conditions for Setting DTCs

B1116 71: The switch input signal is valid

B112C 71: Request signal from the switch is detected for 20s.

B112C 04: Request signal from the switch is detected for 20s.

Operations of ECU after Failure

B1116 71: Request signal from the switch is ignored.

B112C 71, 04: None.

Conditions for Clearing DTCs

B1116 71:

- It is detected that the switch is successfully released once.
- Historic DTC's will be cleared after 40 failure-free power on/off cycles.

B112C 71, B112C 04:

- Signal is reset.
- Historic DTC's will be cleared after 40 failure-free power on/off cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Rear door window regulator switch failure.

Reference Information

Reference Circuit Information

Power Windows Lifting (I)

Reference Connector End View Information

BY089, RLD003

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Read relevant parameters or perform the forced output with a scan tool, then determine the failure state:
 - a. Connect the scan tool, and place the Start/Stop switch in "ON" position.
 - b. Read the "Rear Left Window Open Request - Entertainment Panel" to check whether it is within the rational value range (refer to the Appendix for rational value range).
 - c. Perform the forced output of "Rear Left Window One-touch Up/Down Command" and observe the rear left window for relevant response or action.
 - Yes → Test/replace the BCM;
 - No → Go to Step 2.
2. Check the connectivity of connectors:
 - a. Check harness connector RLD003 of rear left passenger window switch and harness connector BY089 of the BCM for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.
 - b. Clean, lubricate, repair or replace the faulty parts found in visual check.
 - c. After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.
 - Yes → Go to Step 3;
 - No → Diagnosis is completed.
3. Test related circuits:
 - a. Place the Start/Stop switch in "OFF" position, and disconnect the negative battery cable.
 - b. Disconnect harness connector RLD003 of rear left passenger window switch and harness connector BY089 of the BCM.
 - c. Test if the resistance between terminals of harness connector RLD003 of rear left passenger window switch and terminals of harness connector BY089 of the BCM is less than 5Ω.
 - Terminal BY089-I6 and Terminal RLD003-6

U0140**DTC Description**

DTC	FTB	Failure Description
U0140	87	Lost Communication with Body Control Module (BCM)

Subsystem Principle

The gateway (GW) communicates with the BCM via the CAN bus.

Conditions for Running DTCs

- Is after wake-up.
- The system voltage is normal.
- DTC U0075 is not set.

Conditions for Setting DTCs

The DTC will be set if the specified data frame sent from the BCM cannot be received within 2s.

Operations of ECU after Failure

The GW retains the last valid value signal received from the BCM.

Conditions for Clearing DTCs

- The corresponding data frame is received for 100 consecutive times.
- Historic DTC's will be cleared after 40 wake-up/standby cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Gateway failure.
- Body control module failure.

Reference Information

Reference Circuit Information

BUS System - Body High Speed Controller Area Network

Reference Connector End View Information

FA040, BY089

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

- I. Read relevant parameters or perform the forced output with a scan tool, then determine the failure state:
 - a. Connect the scan tool, and place the Start/Stop switch in "ON" position.
 - b. Read "BCM Communication Status" to check whether it is within the rational value range (refer to the Appendix for rational value range).
 - Yes → Go to Step 2;
 - No → Test/replace the GW.
2. Check the connectivity of connectors:
 - a. Check harness connector FA040 of the GW and harness connector BY089 of the BCM for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.
 - b. Clean, repair or replace the faulty parts found in visual check.
 - c. After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.
 - Yes → Go to Step 3;
 - No → Diagnosis is completed.
3. Test related circuits:
 - a. Refer to "Integrity Inspection of Body HS CAN Network". If other module tests are normal, continue the following inspection procedures.
 - b. Place the Start/Stop switch in "OFF" position, disconnect the negative battery cable, and disconnect harness connector FA040 of the GW and harness connector BY089 of the BCM.
 - c. Test if the resistance between the following terminals of harness connector FA040 of the GW and terminals of harness connector BY089 of the BCM is less than 5Ω.
 - Terminal FA040-19 and Terminal BY089-52
 - Terminal FA040-20 and Terminal BY089-51

If it is not within the specified range, test/repair the circuit for open circuit or high resistance.
 - d. Test if the resistance between the following terminals of harness connector FA040 of the GW or terminals of harness connector BY089 of the BCM and the ground is infinite.
 - Terminal FA040-19 or Terminal BY089-52
 - Terminal FA040-20 or Terminal BY089-51

If it is not within the specified range, test/repair the circuit for short to ground.
 - e. Connect the negative battery cable, place the Start/Stop switch in "ON" position, and test if the voltage between the following terminals of harness connector FA040 of the GW or terminals of harness connector BY089 of the BCM and the ground is 2-3V.

B0020**DTC Description**

DTC	FTB	Failure Description
B0020	I1	Left Side Airbag Short to Ground
	I2	Left Side Airbag Short to Battery
	IA	Left Side Airbag Resistance too Low
	IB	Left Side Airbag Resistance too High
	56	Left Side Airbag Incompatible Configuration

Subsystem Principle

The seat side airbag is located outside the seat bracket below the seat upholstery. It can protect the rib, pelvis and upper visceral organs in case of a side collision. In case of a side collision, if the severity is enough to deploy the seat side airbag, the SDM will send a control signal to trigger the seat side airbag.

Conditions for Running DTCs

The start switch is in "ON" position.

Conditions for Setting DTCs

B0020 I1: Left seat side airbag circuit is short to ground.

B0020 I2: Left seat side airbag circuit is short to battery.

B0020 IA: Deployment circuit resistance is lower than the threshold. The detected resistance of left seat side airbag is within any of the following ranges: (gray area) $0.9\Omega < R < 1.8\Omega$, (guarantee area) $R < 0.9\Omega$.

B0020 IB: Deployment circuit resistance is higher than the threshold. The detected resistance of left seat side airbag is within any of the following ranges: (gray area) $2.4\Omega < R < 5.8\Omega$, (guarantee area) $R > 5.8\Omega$.

B0020 56:

- The deployment circuit is not configured and is detected to be normal within 6s after power-on, or the deployment circuit is short to battery/short to ground or the output is short-circuited.
- If the deployment circuit is configured, and the external connection is not detected within 6s after power-on. (For the DTC of high circuit resistance, the DTC of airbag deployment circuit configuration mismatch will be recorded within 6s after power-on).

Operations of ECU after Failure

The module still has the function of deploying airbags; the SDM warning lamp turns on.

Conditions for Clearing DTCs

B0020 I1:

- The resistance of left seat side airbag circuit to ground returns to normal.

- After 40 power-on and power-off cycles, the history DTCs will be cleared and the airbag warning lamp will be Off.

B0020 I2:

- The resistance of left seat side airbag circuit to battery returns to normal.
- After 40 power-on and power-off cycles, the history DTCs will be cleared and the airbag warning lamp will be Off.

B0020 IA and IB:

- The deployment circuit resistance returns to normal.
- After 40 power-on and power-off cycles, the history DTCs will be cleared and the airbag warning lamp will be Off.

B0020 56:

- The configuration is correct.
- After 40 power-on and power-off cycles, the history DTCs will be cleared and the airbag warning lamp will be Off.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Supplemental restraint system sensing and diagnostic module failure.
- Left seat side airbag failure.

Reference Information

Reference Circuit Information

Supplemental Restraint System(2)

Reference Connector End View Information

BY057 and BY209

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Measurement Steps

- I. Read relevant parameters or perform the forced output with a scan tool, then determine the failure state:
 - a. Place the start switch in "ON" position, the airbag warning lamp is ON, and the SDM carries out a self-check. If the SDM has no failure, the warning lamp goes out about 4s later.
 - b. Connect the scan tool, and place the start switch in "ON" position.

PIE48, PIE49, PIE96, PIECI, UI562 and UI563**DTC Description**

DTC	FTB	Failure Description
PIE48	00	12V Supply Circuit Failed Low
PIE49	00	12V Supply Circuit Failed High
PIE96	00	12V Battery Voltage Out of Range
PIECI	00	Aux Battery is Too Low before Closing Relays
UI562	17	Battery Voltage High
UI563	16	Battery Voltage Low

Subsystem Principle

The traction battery management module (BMS) requires the low-voltage system of the vehicle to input a voltage of about 12V to meet its own work requirements. BMS will monitor the input voltage value to ensure the normal working of the system.

Conditions for Running DTCs

PIE48, PIE49, PIE96, UI562 and UI563:

- The start switch is in "ON" position.
- The BMS is powered on.

PIECI: Place the start switch in "ON" position.

Conditions for Setting DTCs

PIE48: The circuit voltage of the relay control power supply is lower than 9V, which lasts for more than 1s accumulatively.

PIE49: The circuit voltage of the relay control power supply is higher than 16V, which lasts for more than 1s accumulatively.

PIE96: 12V supply voltage is lower than 6V or higher than 19V for more than 1s.

PIECI: After the BMS receives the driver's high voltage request, the battery voltage is lower than the relay closing drive voltage.

UI562: The supply voltage is greater than 16V for more than 1s.

UI563: The supply voltage is less than 9V for more than 1s.

Operations of ECU after Failure

PIE48, PIE49: None.

PIE96: High-voltage battery MIL illuminates.

PIECI: Unable to power up.

UI562, UI563: Record the DTC.

Conditions for Clearing DTCs

PIE48:

- The circuit voltage of the relay control power supply is higher than 9V and the time accumulated is over 1s.
- History DTCs will be cleared after 40 wake-up/standby cycles.

PIE49:

- The circuit voltage of the relay control power supply is lower than 16V, which lasts for more than 1s accumulatively.
- History DTCs will be cleared after 40 wake-up/standby cycles.

PIE96:

- The 12V supply voltage is within 6V ~ 19V for 1s.
- History DTCs will be cleared and the MIL will go out after 40 wake-up/standby cycles.

PIECI:

- The battery voltage recovers.
- History DTCs will be cleared after 40 wake-up/standby cycles.

UI562:

- The supply voltage is less than 16V for more than 1s.
- History DTCs will be cleared after 40 wake-up/standby cycles.

UI563:

- The supply voltage is greater than 9V for more than 1s.
- History DTCs will be cleared after 40 wake-up/standby cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Battery failure.
- Manual service disconnect failure.
- Traction battery management module failure.
- Electric distribution module failure.

Reference Information

Reference Circuit Information

Charging Control System, ESS Internal Circuit-NCM 61.1kWh

Reference Connector End View Information

EB212, EB197, J1C, J17C and J7C

Reference Electrical Information

Basic Methods of Circuit Inspection

U0073**DTC Description**

DTC	FTB	Failure Description
U0073	88	CAN Bus Off

Subsystem Principle

The Electric Power Steering System control module (EPS) communicates with other control modules via the CAN bus.

Conditions for Running DTCs

- Is after wake-up.
- Is after the voltage returns to normal.
- DTC settings are activated.
- The power mode is ON or the power mode signal is lost and enabling wakes up.

Conditions for Setting DTCs

When the controller has the transmission error for certain times, "Bus Off" state will appear. The DTC will be set if "Bus Off" state appears for 5 consecutive times.

Operations of ECU after Failure

- Provide default power assist.
- Yellow EPS MIL turns on.

Conditions for Clearing DTCs

- "Bus Off" state does not appear within 5s.
- Historic DTC's will be cleared and the MIL will be off after 40 failure-free power on/off cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Steering column assembly failure.
- Gateway failure.

Reference Information

Reference Circuit Information

BUS System - Chassis High Speed Controller Area Network

Reference Connector End View Information

EB021, FA022

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Check the connectivity of connectors:

- Check the mounting position of the EPS motor, the harness and connector for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.

- Clean, repair or replace the faulty parts found in visual check.
- After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.

- Yes → Go to Step 2;
- No → Diagnosis is completed.

2. Test related circuits:

- Refer to "Integrity Inspection of Chassis HS CAN Network". If other module tests are normal, continue the following inspection procedures.
- Place the Start/Stop switch in "OFF" position, disconnect the negative battery cable, and disconnect harness connector EB021 of the EPS control module and harness connector FA022 of the GW.
- Test if the resistance between the following terminals of harness connector EB021 of the EPS control module and terminals of harness connector FA022 of the GW is less than 5Ω.

- Terminal EB021-2 and Terminal FA022-2
- Terminal EB021-4 and Terminal FA022-1

If it is not within the specified range, test the circuit for open circuit/high resistance.

- Test if the resistance between the following terminals of harness connector EB021 of the EPS control module or terminals of harness connector FA022 of the GW and the ground is infinite.

- Terminal EB021-2 or Terminal FA022-2
- Terminal EB021-4 or Terminal FA022-1

If it is not within the specified range, test the circuit for short to ground.

- Connect the negative battery cable, and test if the voltage between terminals of harness connector EB021 of the EPS control module or terminals of harness connector FA022 of the GW and the ground is 2-3V.

- Terminal EB021-2 or Terminal FA022-2
- Terminal EB021-4 or Terminal FA022-1

If it is not within the specified range, test the circuit for open circuit or short to battery.

- After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.

- Yes → Go to Step 3;
- No → Diagnosis is completed.

3. Test/replace the EPS module or the GW:

BIA62**DTC Description**

DTC	FTB	Failure Description
BIA62	11	Radio Broadcast Receiving Module (RBRM) DAB antenna circuit short to ground
	13	Radio Broadcast Receiving Module (RBRM) DAB antenna circuit open

Subsystem Principle

The digital antenna of the digital audio broadcasting module (DAB) is mainly used for receiving radio broadcasting signal.

Conditions for Running DTCs

- The Start/Stop switch is in “ON” or “ACC” position.
- The system voltage is normal.

Conditions for Setting DTCs

BIA62 11: The feedback voltage of the antenna module is detected to be less than 0.5V for 1s.

BIA62 13: The feedback current of the antenna module is detected to be less than 40mA for 1s.

Operations of ECU after Failure

Unable to change channels.

Conditions for Clearing DTCs

BIA62 11:

- The feedback voltage of the antenna module is detected to be between 0.8V and 13V for 1s.
- Historic DTC's will be cleared after 40 failure-free power on/off cycles.
-

BIA62 13:

- The feedback current of the antenna module is detected to be between 40mA and 199mA for 1s.
- Historic DTC's will be cleared after 40 failure-free power on/off cycles.

Possible Causes

- Related circuits failure.
- Connector failure or poor fit.
- Radio antenna failure.
- Front infotainment control module failure.

Reference Information

Reference Circuit Information

Radio Broadcasting Reception Module

Reference Connector End View Information

FA209, FA210

Reference Electrical Information

Basic Methods of Circuit Inspection

Diagnostic Test Steps

1. Read relevant parameters or perform the forced output with a scan tool, then determine the failure state:

Read “Radio Antenna Voltage” to check whether it is within the rational value range (refer to the Appendix for rational value range).
 - Yes → Test the radio antenna;
 - No → Go to Step 2.
2. Check the connectivity of connectors:
 - a. Check harness connector FA210 of the radio antenna and harness connector FA209 of the RBRM for looseness, poor contact, distortion, corrosion, contamination, deformation, etc.

Clean, lubricate, repair or replace the faulty parts found in visual check.
 - b. After the test/repair of relevant failures, turn off the Start/Stop switch and turn it on again, read the DTCs again and confirm if there remains any DTC.
 - Yes → Go to Step 3;
 - No → Diagnosis is completed.
3. Test related circuits:
 - a. Place the Start/Stop switch in “OFF” position, disconnect the negative battery cable, and disconnect harness connector FA210 of the radio antenna and harness connector FA209 of the RBRM.

Test if the resistance between terminals of harness connector FA210 of the radio antenna and terminals of harness connector FA209 of the RBRM is less than 5Ω.
 - Terminal FA210-INNER and Terminal FA209-INNER
 - Terminal FA210-OUTER and Terminal FA209-OUTER
 If it is not within the specified range, test/repair the circuit for open circuit or high resistance.
 - b. Test if the resistance between terminals of harness connector FA210 of the radio antenna or terminals of harness connector FA209 of the RBRM and the ground is infinite.
 - Terminal FA210-INNER or Terminal FA209-INNER
 - Terminal FA210-OUTER or Terminal FA209-OUTER
 If it is not within the specified range, test/repair the circuit for short to ground.