CENNTRO

Repair Manual

LOGISTAR 260

Edition A
This manual effective Nov. 5, 2022

Foreword

1. This Manual is the repair manual of LOGISTAR 260.
2. Reading and mastering this Manual is very important for carrying out the correct repair and maintenance. This Manual should be stored in a place convenient for quick reference.
3. The contents of this manual, including all pictures and specifications, are the latest data until they are printed.
4. CENNTRO reserves all rights to this Manual. The specifications and contents in this Manual are subject to change without notice, and CENNTRO does not assume any legal obligations and responsibilities.
5. Without the written permission of CENNTRO, no unit or individual may use any form or method to duplicate, copy or transmit this Manual on the network in any form for any purpose.

Warning:

This Manual is only for professional technicians. CENNTRO will not be responsible for any damage to the customer's vehicle or injury to himself or others around caused by non-professional personnel or individuals who have not yet obtained qualifications who refer to this Manual without permission or do not use appropriate equipment and tools to repair and maintain the vehicle.

To avoid dangerous operation and damage to the vehicle, the following instructions must be observed:

※ Read this Manual thoroughly.

※ Before maintenance, be sure to wear protective tools correctly to avoid personal injury.

※ If parts need to be replaced, the genuine CENNTRO parts or specified parts must be used. Do not use inferior parts.

※ "Warning" and "Caution" in this Manual must be carefully observed, so as to effectively avoid personal injury and vehicle damage caused by operation errors during repair and maintenance.

General Catalog

Introduction

1.1 General

The maintenance is divided into the following three main processes:

1. Diagnosis.
2. Disassembly/installation, replacement, disconnection/reassembly, inspection and adjustment.
3. Final inspection.

The following steps are omitted in this Manual:

1. Use a jack or lift for operation.
2. Clean all removed parts.
3. Perform a visual inspection before and after any operation.

It may be necessary to use special tools and materials for maintenance during maintenance operation. Be sure to use it when necessary, and strictly follow the correct maintenance procedures.

Some illustrations in this Manual will use illustrations of similar models. In this case, some details may differ slightly from the actual model. Please refer to the actual model.

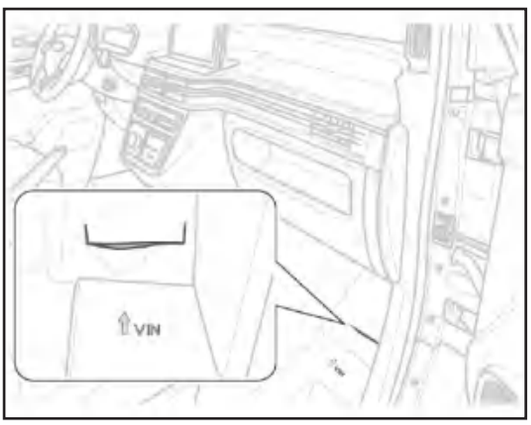
Warning:
※ Indicates possible personal injury to you or others.

Caution:
※ Indicates that the repaired parts may be damaged.

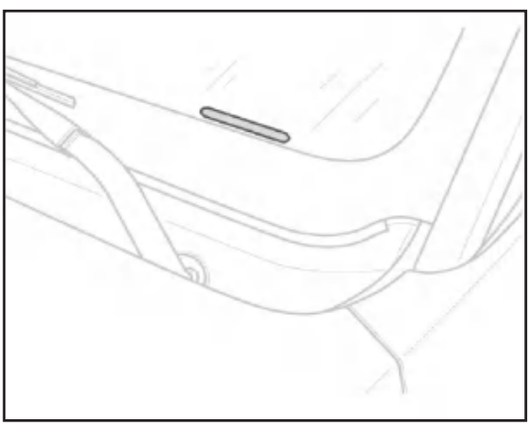
Tips:
※ Provides additional information to help you effectively improve maintenance efficiency.

1.2 Vehicle Identification Number (VIN) and Label

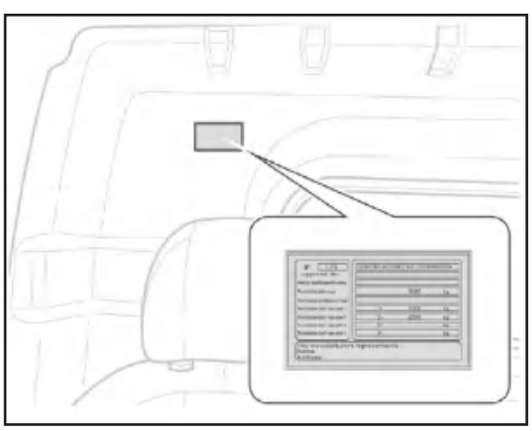
The VIN code of LOGISTAR 260 is marked on the front right door sill.



The VIN plate of LOGISTAR 260 is permanently marked on the instrument panel near the windshield.



The vehicle product label is on the upper right of the rear partition plate.



1.3 Precautions

Precautions related to high voltage

※ Operation tips

① The electric vehicle has a high voltage that exceeds the safety voltage of the human body, so it must be inspected and maintained by professionals who have received relevant training, and must be operated in the correct way.

② In case of vehicle failure, the personnel wearing cardiac pacemaker, insulin pump and other electronic medical devices shall not be allowed to approach the vehicle and operate.

③ When operating the vehicle, avoid wearing metal ornaments such as watches to avoid short circuit accidents.

※ Preparation

Preparation items	Description
Special operation site	Irrelevant personnel shall be prohibited from approaching to prevent electric shock accidents caused by misoperation of irrelevant personnel
Insulating gloves and shoes	The rated voltage of insulating gloves shall not be less than 500VAC/700VDC to prevent electric shock accidents caused by direct contact with high-voltage live parts
Insulating tape	The color of insulating tape shall be orange, used for winding damaged or exposed high-voltage live parts
High voltage hazard warning board	It should be placed on the roof to prevent irrelevant personnel from approaching the vehicle and misoperation

※ Safe operation procedures for disconnecting the high-voltage circuit

1. Turn the ignition switch to OFF.
2. Disconnect the negative pole of the low voltage battery.
3. Check the model of insulating gloves and confirm that its rated voltage exceeds 500VAC/700VDC; confirm that the insulating gloves are dry and free of dirt and air leakage, and put the sleeves in the gloves when wearing.

4. Remove the high-voltage maintenance switch and put it in your pocket to avoid the risk of electric shock caused by other people's misoperation.
5. Wait 5 minutes and wait for the discharge of the capacitor in the high voltage circuit to finish.
6. Use insulating tape and other insulating devices to protect the exposed high-voltage live parts from direct contact.
7. Disconnect the negative pole of the low voltage battery.

Warning:
※ If the operation of disconnecting the high-voltage circuit is not carried out correctly before disassembling the vehicle, it may cause serious electric shock accident or even death. Even after the high voltage circuit is disconnected, the high voltage battery still carries high voltage. It is forbidden to touch the high voltage battery shell and its interior with bare hands. ※ If the vehicle is connected to the charging gun, pull out the charging gun first. The high voltage capacitor in the motor control unit and DCDC as well as other high voltage parts still retains some electric energy after the high voltage system is powered off, and the residual electric energy will be reduced to below 60VDC within 2 minutes, and will be fully released within 5 minutes.

※ Safe operation procedures for restoring the high-voltage circuit

1. Check the model of insulating gloves and confirm that its rated voltage exceeds 500 V AC / 700 V DC; confirm that the insulating gloves are dry and free of dirt and air leakage, and put the sleeves in the gloves when wearing.
2. Remove insulating devices such as insulating tape.
3. Install the maintenance switch.
4. Connect the negative pole of battery.
5. Turn the ignition switch to ON, and the instrument displays Ready status.

1.4 Tips for basic maintenance

※ Operation tips

*1	Clothing	※ Be sure to wear clean work clothes. ※ Must wear the helmet and safety footwear.
*2	Vehicle protection	※ Before starting operation, prepare radiator grille cover, fender shield, seat cover and floor mat.
*3	Safe operation	※ When working with two or more people, be sure to check each other's safety. ※ When repairing parts with high temperature, high pressure, rotation, movement or vibration, be sure to wear appropriate safety equipment, and take extra care not to hurt yourself or others. ※ When jacking up the vehicle, be sure to use a safety base to support the specified position. ※ Use appropriate safety equipment when lifting the vehicle.
*4	Prepare tools and measuring instruments	※ Before starting the operation, prepare the tool table, SST, measuring equipment and all required replacement parts.

*5	Disassembly and installation, disconnection and assembly operation	※ Diagnose the fault after fully understanding the correct repair procedure and the fault reported. ※ Before removing the parts, check the overall condition of the assembly to confirm whether it is deformed or damaged. ※ If the process is complex, make records. For example, record the total number of removed electrical connections, bolts, or hoses. Add assembly marks to ensure that all parts are reassembled to their original positions. If necessary, temporarily mark the hose and its fittings. ※ If necessary, clean the removed parts. Assemble these parts after thorough inspection.
*6	Removed parts	※ The removed parts should be placed in a separate box to avoid confusion with or contamination of the new parts. ※ Non-reusable parts (such as gaskets, O-rings, self-locking nuts, etc.) shall be replaced with new parts according to the instructions in this Manual. ※If required by the customer, keep the removed parts for the customer's inspection.
*7	Inspection after completion of work	※ Ensure that the removed and installed parts are correctly installed/fastened. ※ Make sure that the cloth or tools used are not left in the front cabin or in the vehicle.

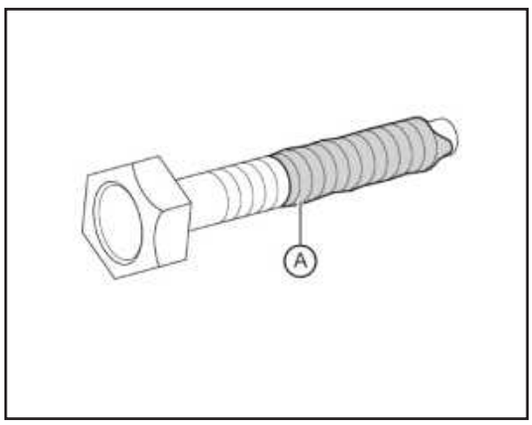
Warning:
※ Be sure to carry out these inspections correctly. Failure to carry out these inspections correctly after completing the work will cause serious accidents or injuries.

※ Jacking and supporting the vehicle

① Be careful when jacking and supporting the vehicle. Make sure the vehicle is jacked and supported in the correct position.

※ Precoated parts

*A	Sealing locking compound



① Precoated parts refer to parts that have been coated with sealing locking agent in the factory, such as bolts and nuts.

② If the precoated parts are retightened, loosened or moved in any way, they must be coated again with the specified locking compound.

③ When using the precoated parts again, be sure to remove the old locking compound and dry it with compressed air. Then apply an appropriate amount of new sealing sealant to the parts.

④ Some sealing locking compound cures slowly. You may need to wait for a period of time for the sealing locking compound to cure.

※ Gasket

① If necessary, apply sealant to the gasket to prevent leakage.

※ Bolts, nuts and screws

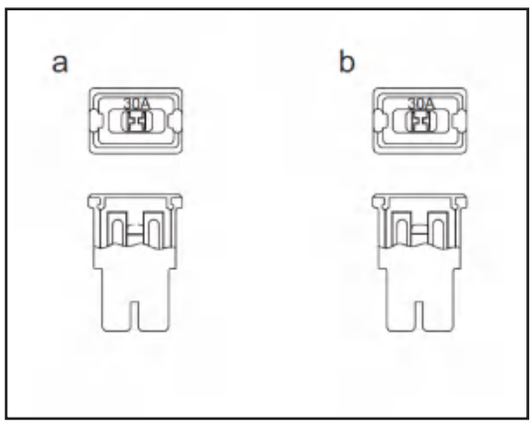
① Strictly observe all repair specifications for tightening torque. Always use a torque wrench.

② When tightening bolts and nuts, ensure that there is no foreign matter (burr, paint, etc.) under the bolt head and nut head.

※ Fuse

① Check and confirm that the wire of the fuse is not broken.

*a	Wrong
*b	Right

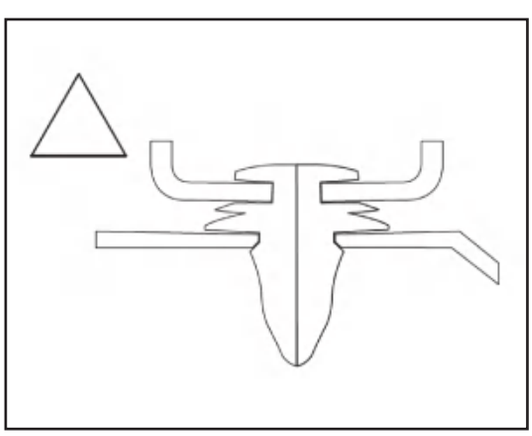
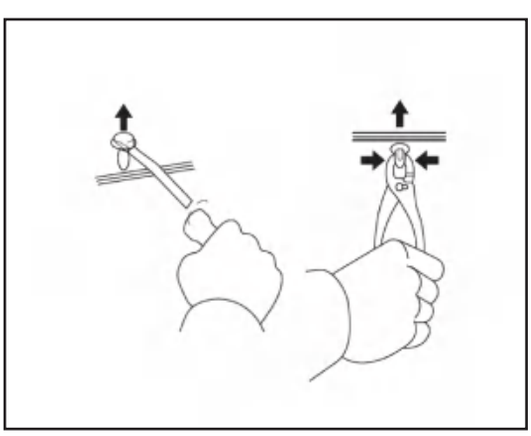
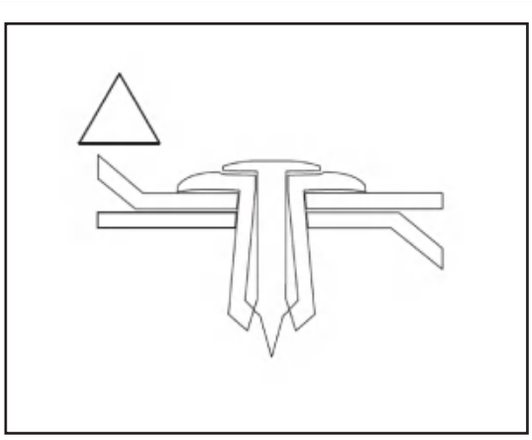
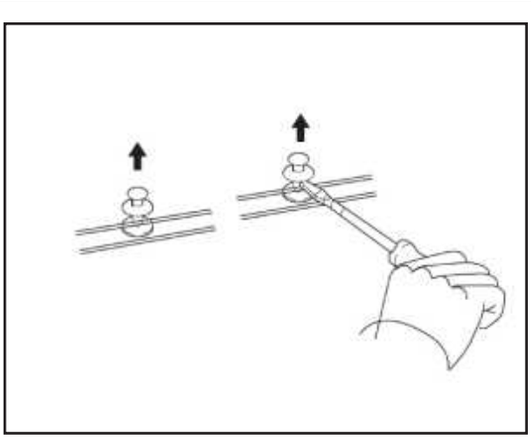


② If the wire of the fuse is broken, it can be confirmed that there is a short circuit in the circuit.

③ When replacing the fuse, you must use a fuse with the same amperage rating.

※ Buckle

① The removal and installation methods of conventional buckles used for vehicle body parts are shown in the following table.

Shape (example)	Removal/installation
	
	

Tips:
※ If the buckle is damaged during operation, be sure to replace it with a new one.

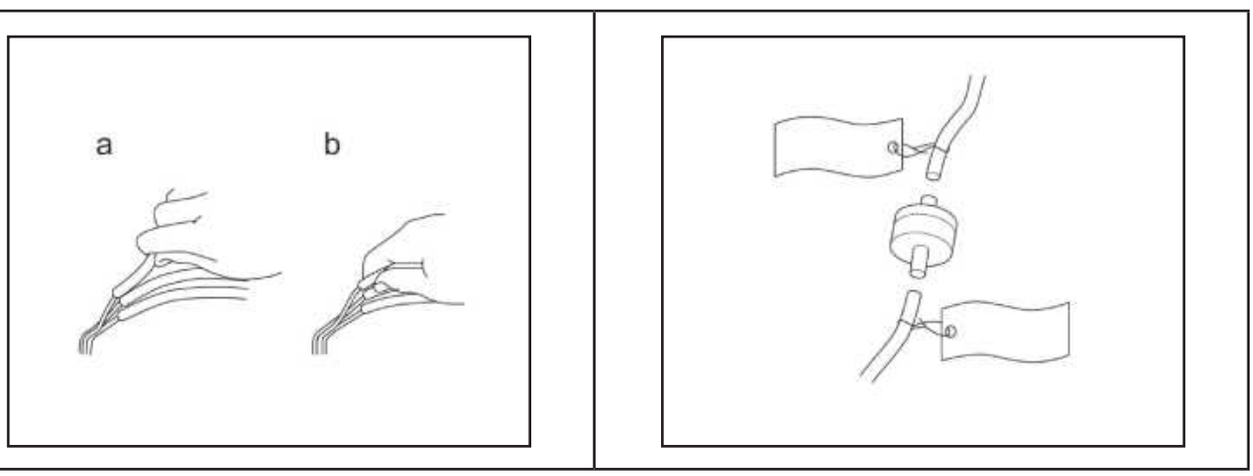
※ Claw

① Conventional claws used for vehicle body parts.

Tips:
※ If the claw is damaged during operation, be sure to replace it with a new one.

※ Removal and installation of vacuum hose

*a	Wrong
*b	Right



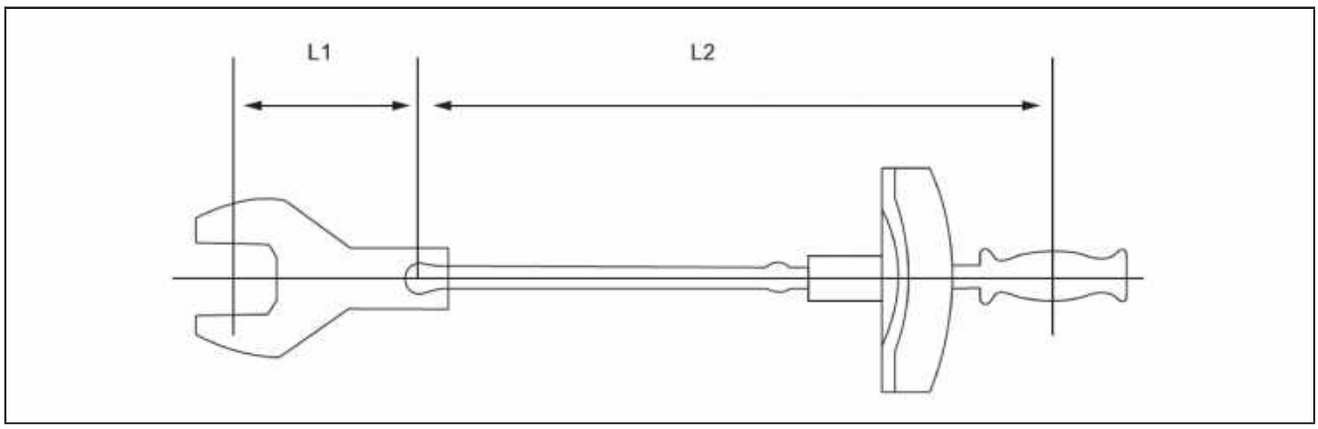
① Pull and twist the end of the hose to disconnect the vacuum hose. Do not pull the middle part of the hose, otherwise the hose may be damaged.

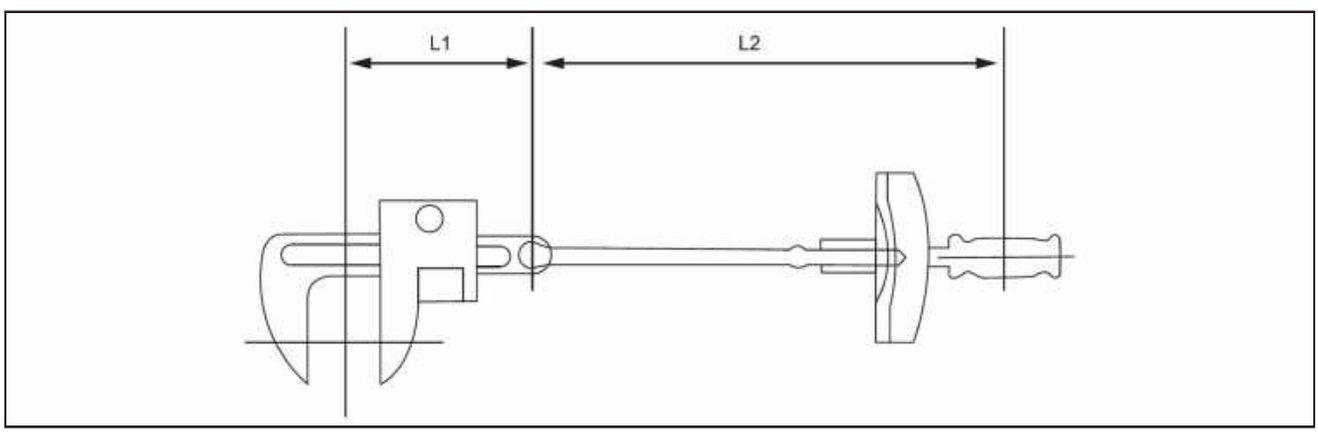
② When disconnecting the vacuum hose, use a label to identify its reconnection position.

③ After any hose repair, carefully check the vacuum hose connection.

④ When using the vacuum gauge, do not force the hose to be connected to the oversized one. Once the hose is overstretched, it may cause air leakage. Use adapters if necessary.

※ Torque when torque wrench is used with extension tool





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

① Use the following formula to calculate the special torque value when SST or extension tool is used with torque wrench.

Formula： T'= (L2/(L1 + L2))*T

Caution:
※ When an extension tool or SST is used with a torque wrench, if it is used to tighten to the torque specification specified in this Manual, the actual torque will be too large and the parts will be damaged.

Inspection or maintenance of headlamp

When the headlamp is turned on, do not touch the high-voltage socket area of the discharged headlamp.

Cautio:
※ During inspection or maintenance, strictly follow the precautions for discharging the headlamp. Because the outer lens of the headlamp is made of resin, the heat generated during covering for a long time may cause it to deform.

When testing the brake, speedometer, etc.

When using the speedometer test table

※ When inspecting the front wheel.

※ The maximum speed must be less than 60 km/h(37 mph) (when using free rollers to support the front wheel, the vehicle speed must be less than 50 km/h (31 mph)).

※ The driving time should be less than 1 minute.

※ Follow all operation instructions and safety precautions of the speedometer test table in the operation manual.

① Place the front wheel on the roller.

② Disable ESP control.

③ Secure the vehicle with a suitable chain or belt.

④ Start the vehicle, then gradually accelerate and measure the vehicle speed.

⑤ After the test, slow down gradually and then stop.

When using the brake test bench

※ High-speed brake test bench cannot be used.

※ The vehicle speed shall be less than 0.5 km/h (0.3 mph)

※ Follow all operation instructions and safety precautions of the brake test table in the operation manual.

① Disable ESP control.

② Place the front wheel to be tested on the test bench.

③ Move the shift lever to N.

④ Start the vehicle to make the brake booster work normally.

⑤ Operate the brake for the test.

Precautions for towing the vehicle

The vehicle shall be towed using one of the following methods.

1. If the vehicle chassis or transmission system fails, use a flatbed truck.
2. If the truck cannot be towed in an emergency, the vehicle can be temporarily towed by fixing the vehicle to the emergency towing ring with a cable or chain. This method can only be used on hardened roads. The driving distance should be less than 80 km(50 miles) and the traction speed should be less than 30 km/h (19 mph). The driver must

conduct steering and braking operations in the vehicle. The wheels, transmission system, axle, steering and braking system of the vehicle must be in good condition.

Caution:
※ Do not use any traction method other than the above methods.
※ If the traction speed or distance exceeds the specified limit, or the vehicle is pulled backward with the front wheels on the ground, the transaxle may be damaged.

※ Emergency traction

① Turn the ignition switch to ON.

② Press the brake pedal and move the shift lever to N.

③ Release the parking brake.

④ Slowly release the brake pedal.

Caution:
※ Take great care when towing the vehicle. Avoid sudden starting or unstable driving operation, because it will cause excessive tension on the emergency towing ring and cable or chain.
※ Do not turn the ignition switch to OFF. Turning the ignition switch to the OFF position may cause the steering lock to engage, thus causing danger or accident.

3. The traction method shown below is dangerous and may damage the vehicle, so do not use it.

① Do not tow the vehicle backward with the front wheels on the ground.

Caution:
※ If the vehicle is towed backward with the front wheels on the ground, the transmission system may overheat and be damaged.
※ In addition, if the vehicle is equipped with VSC system, the system may apply braking to the rotating wheels.

② Do not use the lifting traction method to pull from the front or rear of the vehicle.

Caution:
※ If a lifting trailer is used, the vehicle body may be damaged.

1.5 Vehicle lifting and support position

Precautions for vehicle condition when lifting the vehicle

1. The vehicle must be empty before jacking or lifting. Do not jack or lift the heavy vehicle.
2. When removing heavy parts such as power motor or reducer, the center of gravity of the vehicle will move. Please place a balance weight to prevent the vehicle from swinging, or use a jack to support it.

Precautions for using 4-pillar lift

1. Please follow the instructions to ensure safety.
2. Do not make the free wheel beam damage the tire or wheel.
3. Secure the vehicle with wheel stoppers.

Precautions for using jack and safety base

1. Always use wheel stoppers when working on flat ground.
2. Please use the safety base with rubber and support block.
3. Use the jack and safety base correctly to support the specified position.
4. When jacking up the front wheel, release the parking brake and only place the wheel stopper behind the rear wheel. When jacking up the rear wheel, you only need to place the wheel stopper in front of the front wheel.
5. Do not use the jack only to support the vehicle or operate it. Make sure to use a safety base to support the vehicle.
6. When jacking up only the front or rear wheels, place wheel stoppers on both sides of the wheels that contact the ground.
7. When using the jack to lower the vehicle with the front wheels jacked up, the parking brake should be released and only the wheel stopper should be placed in front of the rear wheels. When the jack is used to lower the vehicle with the rear wheel jacked up, only the wheel stopper needs to be placed behind the front wheel.
8. When lowering the vehicle with the front or rear wheels jacked up.

Caution:
※ Before lowering the front wheel, make sure to put the wheel stopper in front of the rear wheel. ※ Before lowering the rear wheel, make sure to put the wheel stopper behind the front wheel.

Warning:
※ When jacking the vehicle, make sure that there is no additional load on the vehicle.

Precautions for using rocker lift

1. Please follow the lift instructions to ensure safety.
2. Please use the bracket with rubber and support block.
3. Adjust the vehicle so that the center of gravity of the vehicle is as close to the center of the lift as possible.
4. Adjust the height of the bracket to keep the vehicle level, and accurately align the bracket groove with the support position of the safety base.
5. Make sure that the rocker arm is locked during operation.
6. Lift the vehicle until the tire is suspended, and shake the vehicle to ensure the vehicle is stable.

Precautions for using flat lift

1. Please follow the lift instructions to ensure safety.
2. Use the additional support block (rubber lifting block) of the flat lift on the top of the platform.
3. Make sure the vehicle is fixed in the specified position.

Left and right fixed positions	※ Place the vehicle in the middle of the lift.
Front and rear fixed positions	※ Align the rubber end of the buffer pad of the connecting plate with the lower end of the additional support block. ※ Align the upper end of the additional support block with the front groove of the sill flange.

4. Make sure that the flat lift or rubber lifting block does not touch the body coating or lower protective strip.

5. Lift the vehicle until the tire is slightly suspended, and shake the vehicle to ensure the vehicle is stable.

1.6 Initialization

Action required to disconnect/reconnect battery terminals

Necessary operation	Impact/function failure when the required operation is not performed
Battery sensor initialization	Invalidity of SOC and other parameters output by battery sensor
Initialize the power windows	The automatic lifting function of power windows may fail
Initialization of EPS	Power steering system may fail

1.7 Troubleshooting

A large number of VCU control systems are used in the vehicle. It is generally believed that VCU control system is very complex and requires high-level technical knowledge to troubleshoot. However, most fault checks only involve checking the circuits of VCU control system one by one. As long as you have a full understanding of the system and master basic electrical knowledge, it is sufficient to carry out effective troubleshooting, accurate diagnosis and necessary maintenance. About the use of QRJT91 diagnostic instrument: please read the operation manual of the diagnostic instrument carefully before use. If the diagnostic instrument is still unable to communicate with the VCU control system after the diagnostic instrument has been connected to DLC2 (Data Link Connector 2), the ignition switch has been set to the ON position and the diagnostic instrument has been turned on, there is a fault on the vehicle side or the diagnostic instrument side. If the communication is normal after connecting the diagnostic instrument to other vehicles, check the diagnostic data link (bus (+) line) or VCU power circuit of the vehicle. If the communication is still abnormal after connecting the diagnostic instrument to other vehicles, it is likely that the diagnostic instrument itself has a fault. Perform the self-test described in the operation manual of the diagnostic instrument.

Troubleshooting

1. Troubleshooting includes the diagnosis when DTC (Diagnostic Trouble Code) is stored and the diagnosis when DTC is not stored. The following table is its basic summary.

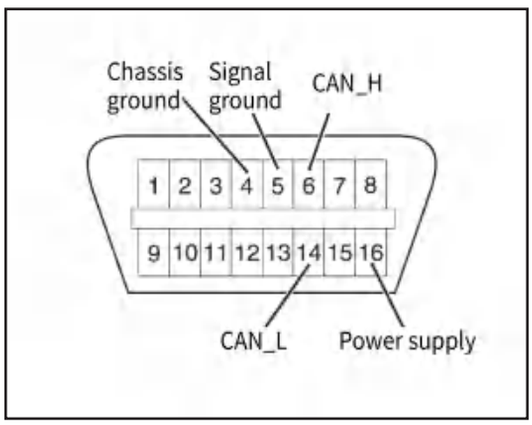
Operation type	Details	Troubleshooting
DTC based diagnosis	Diagnosis is based on the stored DTC	Use the method of exclusion to confirm the faulty parts according to the DTC detection conditions. Use X-431PRO3 and check relevant parts to eliminate possible faulty parts one by one
Symptom-based diagnosis (no DTC stored)	Diagnosis is based on fault symptoms	Use the method of exclusion to confirm the faulty parts according to the fault symptoms. Use X-431PRO3 and check relevant parts to eliminate possible faulty parts one by one

2. The vehicle system is complex and uses multiple electronic control units that are difficult to check independently. Therefore, use the method of exclusion to check the parts that can be checked independently. If no fault is found in these parts, it can be determined that the relevant electronic control unit is faulty and replaced.
3. It is very important to ask the customer about the conditions and environment when the fault occurs (customer fault analysis). This can simulate the situation and confirm the symptoms. If the symptom cannot be confirmed or the DTC does not recur, the faulty parts may not be determined by troubleshooting operation. Even if the fault does not occur, replace the electronic control unit of the relevant system. If this happens, the original fault cannot be resolved.
4. In order to avoid the increasing number of troubleshooting, it is assumed that multiple faults will not occur at the same time when a single fault symptom occurs when writing the troubleshooting procedure.
5. To confirm the faulty parts, the target range can be reduced by separating the parts, electronic control unit and harness during the inspection. If the harness is determined to be the cause of the fault, it is necessary to check not only the connecting wire between the parts and the electronic control unit, but also all harness connectors between the parts and the electronic control unit.
6. Individual system data and diagnostic trouble codes (DTCs) can be read from the

vehicle's data link connector 2 (DLC2). When the system may have faults, use QRJT91 diagnostic instrument to check for faults and repair them.

Check DLC2

Terminal number (symbol)	Terminal description	Condition	Specified state
4 - body grounding	Chassis ground	Always	Less than 1 Ω
5 - body grounding	Signal ground	Always	Less than 1 Ω
16 - body grounding	Power supply	14 - CANL	11 to 14 V
6-14	CAN bus	Ignition switch OFF*	120 Ω
6-4	High level CAN bus	Ignition switch OFF*	
14-4	Low level CAN bus	Ignition switch OFF*	
6-16	High level CAN bus	Ignition switch OFF*	
14-16	Low level CAN bus	Body ground	



Caution:

※ Before starting to measure the resistance, keep the vehicle in its original state for at least 1 minute. Do not operate the vehicle start switch and any other switches or doors. If the result is not as specified, DLC2 may have a fault. Repair or replace the harness and connector.

Tips:

※ If the communication is normal when connecting the X-431PRO3 diagnostic instrument to other vehicles, check the DLC2 on the original vehicle.

※ If the communication is still abnormal after connecting the X-431PRO3 diagnostic instrument to other vehicles, it is likely that the X-431PRO3 diagnostic instrument itself has a fault. Please consult the CENNTRO Authorized Service Center.

1.8 How to carry out troubleshooting

1. Operation process

Tips:
※ Perform troubleshooting as follows. The following content is only the basic operation of troubleshooting. First confirm that the troubleshooting operation is applicable to the circuit, and then start troubleshooting.

2. Send the vehicle to the repair workshop
3. Customer fault analysis

   ① Ask the customer about the conditions and environment when the fault occurred.
4. Check the battery voltage

   ① Measure the battery voltage

   The standard voltage is 11 to 14 V. If the voltage is lower than 11 V, recharge or replace the battery before continuing operation.
5. Symptom confirmation and DTC check

   ① Visually inspect the harness, connector and fuse for open circuit and short circuit.

   ② Confirm the fault symptoms and conditions, and check the DTC.

Results	Go to
DTC Output	Go to step 5
No DTC output	Go to step 6

6. Diagnostic trouble code table

   ① Check the results obtained in step 4. Then look up the output DTC in the diagnostic trouble code table. Find the possible faulty circuit and/or parts in the "fault location" column.
7. Fault symptom table

   ① Check the results obtained in step 4. Then find the fault symptom in the fault symptom table. Find the possible faulty circuit and/or parts in the "suspected parts" column.
8. Circuit inspection or parts inspection

   ① Determine the faulty circuit or parts.
9. Adjust, repair or replace

① Adjust, repair or replace the faulty circuit or parts.

10. Confirmation test

① After adjustment, repair or replacement, confirm that the fault does not occur again. If the fault does not recur, the confirmation test shall be conducted under the same conditions and environment as when the fault first occurred.

② End.

11. Customer fault analysis

Tips:
※ During troubleshooting, make sure that the fault symptoms have been correctly identified. Assumptions should be abandoned in order to make correct judgments. In order to find out the fault symptoms, it is very important to ask the customer about the symptoms and conditions when the fault occurred. ※ Collect as much information as possible for reference. Seemingly unrelated failures in the past may be also helpful. ※The following five items are the key points in fault analysis.

What	Model and system name
When	Date, time and frequency
Where	Road conditions
Under what conditions	Driving conditions, weather conditions
How to occur	Fault symptom

12. Symptom confirmation and diagnostic trouble codes

The vehicle's diagnosis system has the following functions:

① The first function is diagnostic trouble code (DTC) check. DTC is the code stored in VCU memory when the signal circuit to VCU fails. When checking the DTC, the technician can check the DTC of the previous fault during troubleshooting.

② Another function is the input signal check, which checks whether the signal from each switch is correctly sent to the VCU. By using these functions, you can narrow the scope of fault location and carry out more effective troubleshooting. Diagnostic functions are integrated in the following systems of the vehicle.

③ When checking the DTC, it is necessary to determine whether the fault indicated by

the DTC has the following conditions: 1) It still exists; 2) It happened before, but then returned to normal. In addition, DTCs should be compared with fault symptoms to determine whether they are related. Therefore, check the DTC (whether the fault symptom exists) before and after confirming the fault symptom to determine the current system condition.

④ Do not skip the DTC check. If troubleshooting is carried out only by relying on the fault symptoms without DTC inspection, unnecessary troubleshooting or maintenance operations unrelated to the fault may be carried out for the normal operating system.

13. DTC inspection

14. Record the displayed DTC and clear the memory

15. Symptom confirmation

Results	Go to
No symptom	Go to step 4
Have symptom	Go to step 5

16. Simulation test using symptom simulation method

17. DTC inspection

Results	Go to
No DTC output	Go to step 6
DTC Output	Troubleshooting of the fault indicated by DTC

18. Symptom confirmation

Results	Go to
No symptom	Troubleshooting of each fault symptom
Have symptom	The system is normal

If a DTC is displayed during the initial DTC check, the harness or connector of the circuit may have failed before. Check the harness and connector. If after troubleshooting of each fault symptom, the fault still exists, but does not appear in the diagnostic circuit (the first displayed DTC may be a previous fault or a secondary fault).

19. Symptom simulation

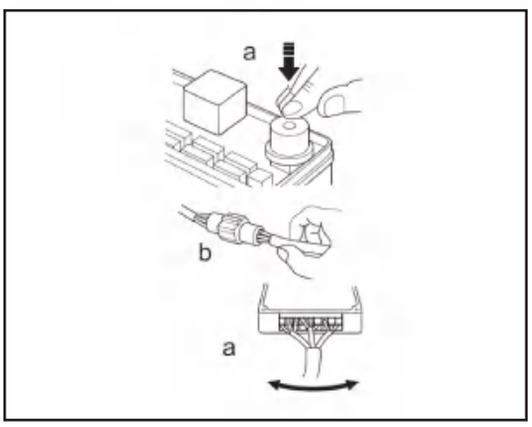
Tips:
※ The most difficult situation in troubleshooting is that there is no fault symptom. Under such situation, comprehensive fault analysis must be carried out. The same or similar simulation must be carried out for the conditions and environment when the customer's vehicle fails. No matter how skilled or experienced the technician is, if the fault symptom is not confirmed during troubleshooting, important maintenance may be ignored and errors or delays may be caused. ※ For example, for the faults that only occur when the vehicle is driving on uneven roads, if the vehicle is stationary and the symptom check is carried out, these faults cannot be found. Faults caused by vibration, high temperature or water seepage (humidity) are difficult to recur. The following symptom simulation test is very effective for this situation and can be applied to stationary vehicles. Key points in the symptom simulation test: in the fault symptom simulation test, the fault symptom and fault area or faulty parts must be confirmed. First, narrow the range of possible faulty circuits according to symptoms. Then, connect the diagnostic instrument and conduct a symptom simulation test to determine whether the detected circuit is faulty or normal. At the same time, confirm the fault symptoms. Please refer to the fault symptom table of each system to narrow the range of possible causes.

※ Vibration method: this method is used when the fault seems to be caused by vibration.

*a	Gently vibrate
*b	Gently shake

① Gently shake the connector vertically and horizontally.

② Gently shake the harness vertically and horizontally.



Tips:
※ Thoroughly inspect important parts such as connector joint and vibration fulcrum.

※ Heating method: This method is used when the fault seems to occur in the suspected parts.

① Heat the suspected parts with a hair dryer or similar device. Check whether the fault occurs.

Caution:
※ Do not heat more than 60 ° C (140 °F). Exceeding this temperature may damage parts.
※ Do not directly heat the parts in the VCU.

※ Water spray method: This method is used when the fault seems to occur in rainy days or very wet conditions.

① Spray water on the vehicle to check whether the fault occurs.

Caution:
※ Do not spray water directly into the front cabin. It is also not allowed to change the temperature and humidity indirectly by spraying water at the front of the radiator.
※ Do not spray water directly on electronic parts.

Tips:
※ If the vehicle has or has had water leakage, the leakage may have caused damage to the VCU or connection parts. Look for signs of corrosion or short circuit. Be careful when testing.

※ High electrical load method: This method is used when the fault seems to occur in the case of excessive electrical load.

① Turn on the heater blower, headlamp, rear window defogger and all other electrical equipment. Check whether the fault occurs again.

20.Diagnostic trouble code table

Find the output diagnostic trouble code (DTC) in the diagnostic trouble code table of the corresponding chapter (obtained from the DTC check). Use this table to determine the fault location and appropriate inspection. The columns in the table are described below.

Items	Description
DTC code	Indicates diagnostic trouble code
Inspection items	Indicates the faulty system or fault details

Items	Description
DTC detection conditions	Indicates the condition under which the DTC is stored.
Fault location	Indicates the suspicious parts of the fault
Reference page	Indicates the page number of the inspection procedure for each circuit, or provides instructions for inspection and maintenance

21.Fault symptom table

When the "normal" code is output in the DTC check, but the fault still occurs, use the fault symptom table. The suspicious parts (circuits or parts) of each fault symptom are shown in the table. The suspicious locations are listed in the order of possibility. The following table describes each column in the figure.

Tips:
※ In some cases, the diagnosis system may not detect the fault even if the fault symptom has occurred. This may be because the fault occurs outside the detection range of the diagnostic system or in another completely different system.

Items	Description
Fault symptom	
Suspicious parts	Indicates the order in which the circuit needs to be checked
Reference page	Indicates the page where the inspection procedure is located

22.Circuit check

The following table shows the main parts of each circuit inspection.

Items	Description
Circuit description	Explain the main functions and operation of circuits and parts.
DTC code and test items	Indicates the diagnostic trouble code, the diagnostic trouble code setting and the suspicious parts of the fault.

Items	Description
Circuit diagram	A circuit diagram showing the circuit. Wire color is indicated by letter code. B=black, L=blue, R=red, BR=brown, LG=light green, V=purple, G=green, O=orange, W=white, GR=gray, P=pink, Y=yellow. The first letter represents the basic color of the wire, and the second letter represents the stripe color.
Inspection procedure	Use the inspection procedure to determine whether the circuit is normal. If abnormal, use the inspection procedure to determine that the fault is in the sensor, actuator, harness or VCU.
Illustration of VCU connector during inspection	The connector currently checked is connected. The connection of the multimeter is indicated by (+) or (-) after the terminal name. The connector currently checked is disconnected. Check between connector and grounding. The grounding information is not shown in the illustration.

1.9 Circuit check

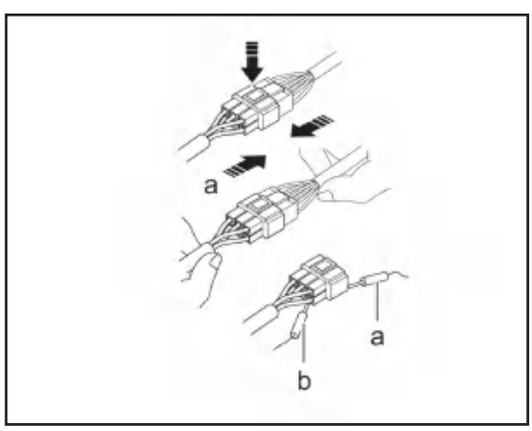
1. Basic inspection

※ When measuring the resistance of electronic parts

① Unless otherwise specified, all resistance measurements shall be made at an ambient temperature of 20 ° C. If the resistance is measured at high temperature (such as after the vehicle has just driven), the measured value of resistance may be inaccurate. The measurement shall be carried out after the vehicle has cooled sufficiently.

※ Connector handling

*a	Wrong
*b	Right



① When disconnecting the connector, first press the mating parts at both ends of the connector together to unlock it, then press down the locking claw and separate the connector.

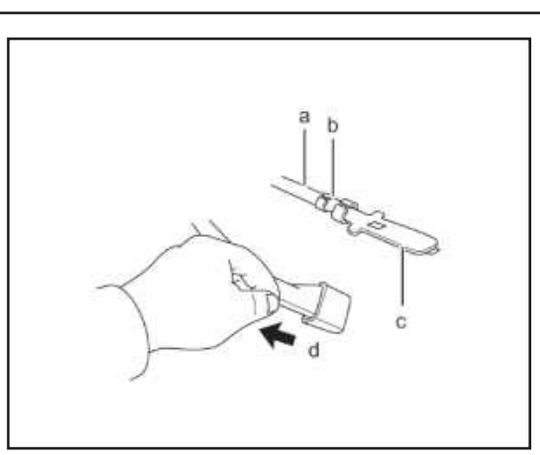
② When disconnecting the connector, do not pull the harness hard. Grasp the connector directly and separate it.

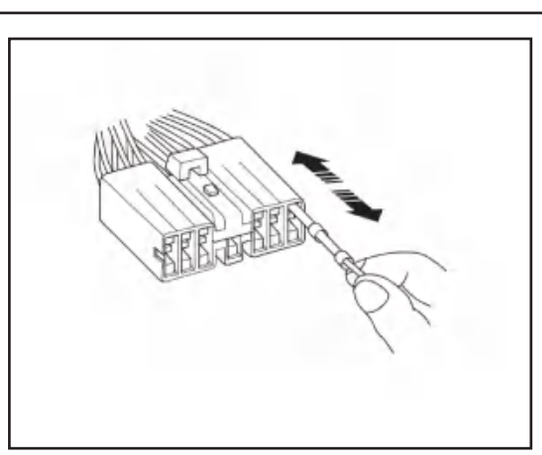
③ Before connecting the connector, check and confirm that the terminal is not deformed, damaged, loose or missing.

④ When connecting the connector, press firmly until the connector locks with a "click" sound.

Caution:
※ Since the waterproof connector cannot be checked from the rear, it should be checked by connecting the branch harness.
※ Do not move the inserted multimeter probe to avoid damaging the terminal.

※ Check connectors





*a	Core wire
*b	Loose crimp
*c	Terminal deformation
*d	Pull lightly

① Check when the connector is connected: squeeze the connector to confirm that it is fully connected and locked.

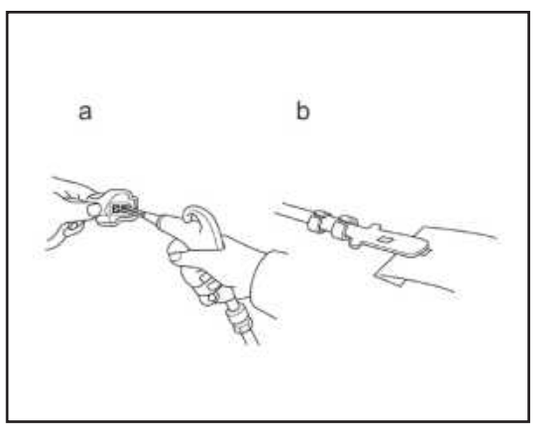
② Check after disconnecting the connector: gently pull the harness from the rear of the connector to check. Check whether the terminal is loose or missing, and whether the crimp is loose and the wire is broken. Visually check for corrosion, metal chips or foreign matters and water, and check whether the terminals are bent, rusted, overheated, dirty or deformed.

③ Check the contact pressure of the terminal: prepare a spare male terminal. Insert it into the female terminal and check the tension during insertion and after full lapping.

Caution:
※ When testing the gold-plated female terminal, be sure to use the gold-plated male terminal.

※ Repair method of connector terminal

*a	Right
*b	Wrong



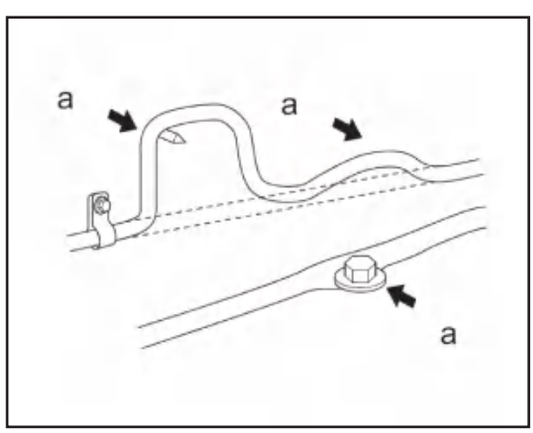
① If there are foreign matters on the terminals, clean the contact points with compressed air or cloth. It is forbidden to use abrasive paper to rub the contact point, which will cause the coating to fall off.

② If the contact pressure is abnormal, replace the female terminal. If the male terminal is gold-plated (gold), the gold-plated female terminal shall be used; if the male terminal is silver plated (silver), the silver plated female terminal shall be used.

③ If the terminal is damaged, deformed or corroded, replace it. If the terminal cannot be locked in the housing, the housing must be replaced.

※ Treatment of harness

*a	Wrong



① If the harness is to be removed, check the wiring and clamp position before starting so that it can be reinstalled.

② Do not over twist, pull or release the harness.

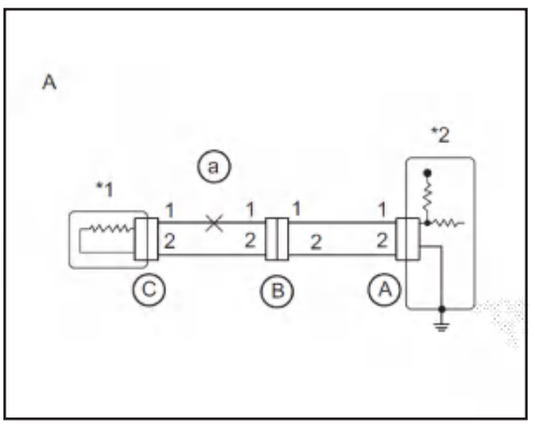
③ Do not let the harness come into contact with hot, rotating, moving, vibrating or sharp parts. Avoid contact with panel edges, screw tips and other sharp objects.

④ Do not squeeze the harness when installing parts.

⑤ It is forbidden to scratch or damage the outer skin of the harness. If the skin is scratched or cracked, replace the harness or use PVC insulating tape for repair.

2. Check for open circuit

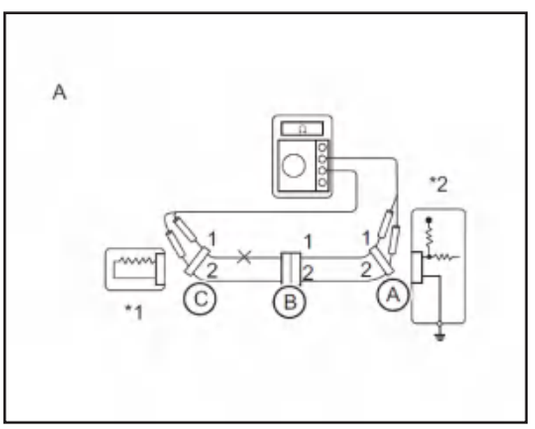
※ For the open circuit of the harness in the figure, measure the resistance and voltage as described below.



*A	Fig. 1
*1	Sensor
*2	VCU
*a	Open circuit

※ Check the resistance

① Disconnect connectors A and C and measure the resistance between connector terminals.



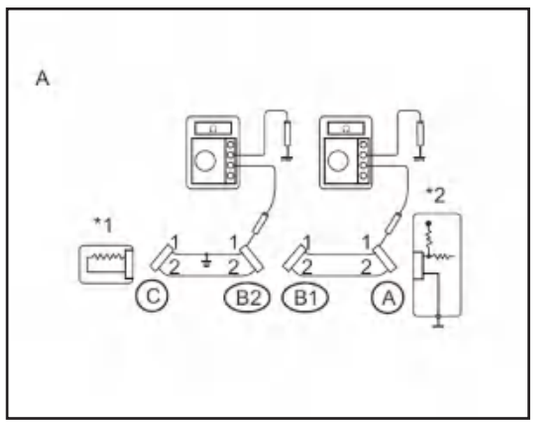
*A	Fig. 2
*1	Sensor
*2	VCU

Standard resistance (Fig. 2)

Multimeter connection	Specified state
Connector A terminal 1 - connector C terminal 1	10 kΩ or greater
Connector A terminal 2 - connector C terminal 2	Less than 1 Ω

Tips:
※ Measure the resistance when gently shaking the harness vertically and horizontally. If the result is consistent with the above specified value, there is an open circuit between terminal 1 of connector A and terminal 1 of connector C.

② Disconnect connector B and measure the resistance between connector terminals.



*A	Fig. 3
*1	Sensor
*2	VCU

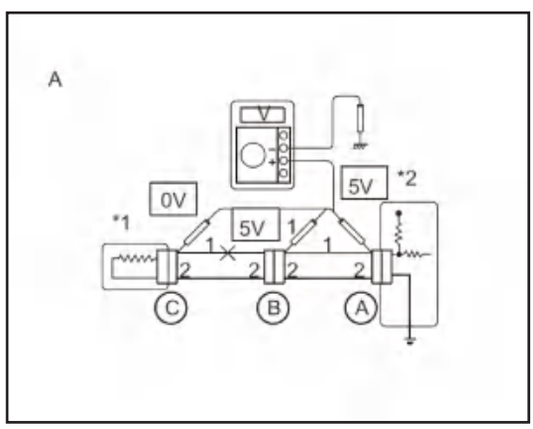
Standard resistance (Fig. 3)

Multimeter connection	Specified state
Connector A terminal 1 - connector C terminal 1	Less than 1 Ω
Connector B2 terminal 1 - connector C terminal 1	10kΩ or greater

If the result is consistent with the above specified value, there is an open circuit between terminal 1 of connector B2 and terminal 1 of connector C.

※ Check the voltage

① In the circuit that applies voltage to the VCU connector terminal, check the circuit for open circuit by checking the voltage.



*A	Fig. 4
*1	Sensor
*2	VCU

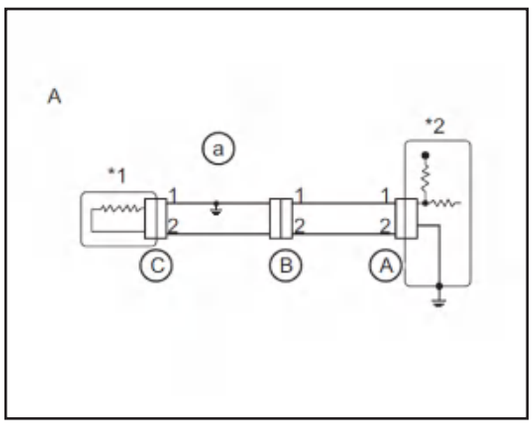
Standard voltage (Fig. 4)

Multimeter connection	Specified state
Connector A terminal 1 - grounding	5 V
Connector B terminal 1 - grounding	5 V
Connector C terminal 1 - grounding	Lower than 1 V

If the result is consistent with the above specified value, there is an open circuit in the harness between terminal 1 of connector B and terminal 1 of connector C.

3. Check for short circuit

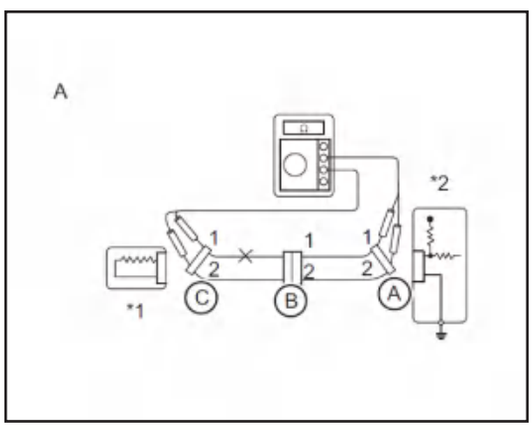
※ If the harness is short-circuited to the ground (Fig. 5), check the grounding resistance to find out the short circuit part (as described below).



*A	Fig. 5
*1	Sensor
*2	VCU
*a	Short circuit

※ Check the grounding resistance

① Disconnect connectors A and C and measure the resistance.



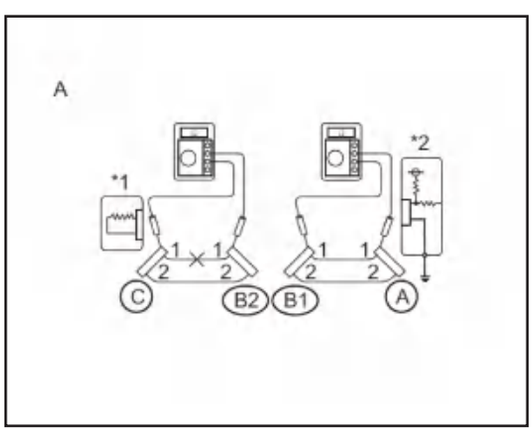
*A	Fig. 6
*1	Sensor
*2	VCU

Standard resistance (Fig. 6)

Multimeter connection	Specified state
Connector A terminal 1 - grounding	Less than 1 Ω
Connector A terminal 2 - grounding	10 kΩ or greater

Tips:
※ Measure the resistance when gently shaking the harness vertically and horizontally. If the result is consistent with the above specified value, there is a short circuit between terminal 1 of connector A and terminal 1 of connector C.

② Disconnect connectors B and measure the resistance.



*A	Fig. 7
*1	Sensor
*2	VCU

Standard resistance (Fig. 7)

Multimeter connection	Specified state
Connector A terminal 1 - grounding	10 kΩ or greater
Connector B2 terminal 1 - grounding	Less than 1 Ω

If the result is consistent with the above specified value, there is a short circuit between terminal 1 of connector B2 and terminal 1 of connector C.

4. Check and replace

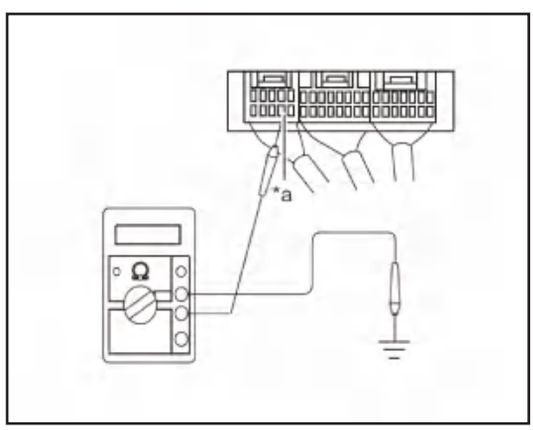
Caution:
※ Do not disconnect the connector from the VCU. Perform the inspection from the rear side of the harness side connector.
※ If the measurement conditions are not specified, stop the vehicle and turn the ignition switch to the ON position before performing the inspection.
※ Check and confirm that the connector is fully located. Check for loose, corroded or broken wires.

※ Check the VCU grounding circuit first. If there is a fault, repair it. If normal, the VCU may be faulty. Temporarily replace the original VCU with a VCU with normal function, and check whether the symptom appears. If the fault symptom disappears, replace the VCU.

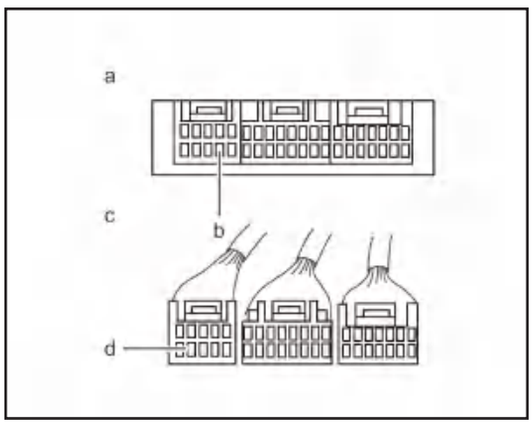
① Measure the resistance between VCU grounding terminal and grounding.

*a	Grounding

Standard resistance is less than 1 Ω.



② Disconnect the VCU connector. Check the grounding terminals on the VCU side and harness side for bending, corrosion or foreign matters. Then check the contact pressure of the female terminal.



*a	VCU side
*b	Grounding
*c	Harness side
*d	Grounding

1.10 Abbreviations used in this Manual

Abbreviations	Meaning
A/C	Air conditioner
ABS	Anti-lock braking system
ACU	Airbag control unit
BCM	Body control module
VCU/VMS	Vehicle control unit
EPS	Electric power steering control unit
IC	Combination instrument
MCU	Motor control unit
Charger	Charger
T-box	On-board telecommunication terminal
DC/DC	DC-DC converter
BMS	Battery management system
B+	Battery positive voltage
BLS	Brake lamp switch
CheckSum	Verification
DTC	Diagnostic Trouble Code
EEPROM	Electrically Erasable Read-Only Memory
FL	Left front
FR	Right front
GND	Ground
KL15 ON	The ignition switch is in the ON position
MIL	Fault indicator lamp
PWM	Pulse width modulation

Abbreviations	Meaning
RAM	Random access memory
RL	Left rear
ROM	Read-only memory
RPS	Motor rotor position sensor
RR	Right rear
SAS	Steering wheel angle sensor
VIN	Vehicle identification number

Maintenance

2.1 Routine maintenance plan

Tips:
※ The following maintenance schedule is applicable to the following models: LOGISTAR 260, please go to the CENNTRO authorized service center for maintenance every 6 months or 5000 km (3100 miles) (whichever comes first).

S/N	Maintenance items	Maintenance interval mileage			
		5000km (3100 miles)	10000km (6200 miles)	15000km (9300 miles)	20000km (12400 miles)
1	Check whether the charging and discharging are normal, whether the drive motor works normally, whether the reducer leaks, and whether the drive motor and reducer are fastened	★	★	★	★
2	Visually check whether the power battery is damaged, and whether the high-voltage end harness is melted or rusted	★	★	★	★
3	Check whether the VCU bracket is loose, whether the VCU controller bolts are loose, whether the line speed plug-in is loose, read the fault code with the diagnostic instrument, and check whether the VCU works normally	★	★	★	★
4	Check whether the mounting bolts of MCU bracket are loose, whether the bolts of high-voltage bus and three wires are loose, and whether the high-voltage DC output (junction box) plug-ins and signal plug-ins are loose. Read the fault code with the diagnostic instrument. Check whether MCU works normally	★	★	★	★
5	Check whether the communication between the BMS and the whole vehicle is normal, whether the BMS sampling is normal, and whether the BMS system alarms	★	★	★	★

S/N	Maintenance items	Maintenance interval mileage			
		5000km (3100 miles)	10000km (6200 miles)	15000km (9300 miles)	20000km (12400 miles)
6	Check whether the two-in-one controller works normally, and check whether the fastening bolt, high-voltage input connector and control signal plug-in are loose, whether the low-voltage DC output connection (including fuse) is loose, whether the harness and corrugated pipe skin are aging, cracking and falling off, and whether the harness terminal bolt is loose	★	★	★	★
7	Check whether the high and low voltage harnesses are normal, whether there is melting, corrosion and other phenomena, whether the contactor is normally closed, whether the electric control fan works normally, and whether the relay module works normally	★	★	★	★
8	Check the appearance of the vehicle and record the mileage in detail	★	★	★	★
9	Light inspection (high and low beam lamps, turn signal lamp, fog lamp, double flashing warning, brake lamp, reversing lamp, license plate lamp, interior lamp)	★	★	★	★
10	Check the horn	★	★	★	★
11	Check the steering wheel	★	★	★	★
12	Check the air conditioning buttons and the air outlet status	★	★	★	★
13	Check all indicator lamps of the instrument	★	★	★	★
14	Check the controllability of the gear shift handle and parking handle	★	★	★	★
15	Check the brake pedal and accelerator pedal	★	★	★	★
16	Check the wiper blade and cleaner nozzle, and add cleaning fluid if necessary	★	★	★	★
17	Check all buttons on the dashboard (wiper switch, headlamp combination switch, backlight adjustment switch and automatic headlamp switch)	★	★	★	★
18	Check whether the exterior handle, interior handle and door switch are free	★	★	★	★

S/N	Maintenance items	Maintenance interval mileage			
		5000km (3100 miles)	10000km (6200 miles)	15000km (9300 miles)	20000km (12400 miles)
19	Check the exterior rearview mirror and interior rearview mirror	★	★	★	★
20	Check seat and safety belt	★	★	★	★
21	Check glass lifter switch	★	★	★	★
22	Check USB interface and sun visor	★	★	★	★
23	Check the central door lock, four door locks and four door hinges	★	★	★	★
24	Check 12V battery	★	★	★	★
25	Power battery status inspection and power battery balance maintenance	★	★	★	★
26	Check whether the two-in-one controller works normally	★	★	★	★
27	Check whether the reducer oil leaks	★	★	★	★
28	Check the brake fluid level	★	★	★	★
29	Check the coolant level	★	★	★	★
30	Check the air conditioning pipeline and cooling pipeline for leakage	★	★	★	★
31	Check the shock absorber	★	★	★	★
32	Check the brake friction plate				★
33	Check the hub bearing for abnormal noise			★	
34	Check the tire pressure, appearance and tread depth and tightening wheel bolt torque	★	★	★	★
35	Check the torque of the chassis bolts	★	★	★	★
36	Check the related pipelines of chassis for leakage	★	★	★	★
37	Check the steering transmission shaft and steering tie rod	★	★	★	★
38	Check whether the universal joint sheath of the steering transmission shaft is damaged	★	★	★	★
39	Check the steering knuckle ball joint sheath and clearance	★	★	★	★
40	Check whether the electric power steering works normally	★	★	★	★
41	Check the four-wheel alignment	★	★	★	★

S/N	Maintenance items	Maintenance interval mileage			
		5000km (3100 miles)	10000km (6200 miles)	15000km (9300 miles)	20000km (12400 miles)
42	Check whether the electronic water pump works normally	★	★	★	★
43	Check whether the vacuum tank leaks	★	★	★	★
44	Test run and check whether the functions of each mechanism are normal	★	★	★	★
45	Accompany the user to check the vehicle and pay	★	★	★	★
46	Remind the user of the next service, thank the user, and watch the user leave				
The rear axle oil must be replaced every 6 months or 5000 km (3100 miles) , and the brake fluid and antifreeze must be replaced every 2 years or 40000 km (24800 miles) (mileage or time whichever comes first); it is recommended to carry out tire rotation every 10000 km (6200 miles), and it is recommended to check the four-wheel alignment every 20000 km (12400 miles), and adjust it if necessary.					

2.2 Exterior parts of the vehicle

2.2.1 General maintenance

The following inspection and maintenance items can be checked and maintained by the user or by the CENNTRO authorized service center. In most cases, the user can check the inspection items without special tools.

General maintenance and inspection items are as follows:

1. General precautions

   ※ The maintenance and inspection requirements shall be carried out according to the User Manual or Maintenance Manual.

   ※ The time of vehicle maintenance shall be determined according to the mileage or the time (month) traveled, whichever comes first.

2. Tire

   ※ Check the tire pressure with a barometer. Adjust if necessary.

   ※ Inspect the tire surface for openings, damage, or excessive wear.

3. Wheel nut

※ Check whether the nut is loose or missing. Tighten the nuts if necessary.

4. Windshield wiper blade

※ If the wiper blade cannot clean the windshield, check whether it is worn or cracked. Replace it if necessary.

5. Liquid leakage

※ Check whether there is leakage of water and other liquids under the vehicle.

Caution:
※ If any leakage is found, find the cause and correct it.

6. Door and front cabin cover

※ Check and confirm that all doors and front cabin cover can be opened and closed smoothly and all latches can be locked firmly.

2.3 Interior parts of the vehicle

2.3.1 General maintenance

The following inspection and maintenance items can be checked and maintained by the user or by the CENNTRO authorized service center. In most cases, the user can check the inspection items without special tools.

1. General precautions

※ The maintenance and inspection requirements shall be carried out according to the User Manual or Maintenance Manual.

※ The time of vehicle maintenance shall be determined according to the mileage or the time (month) traveled, whichever comes first.

2. Vehicle lamps

※ Check and confirm that the headlamps, brake lamps, tail lamps, turn signal lamps and other lamps are on or flashing normally. At the same time, check whether the illumination brightness is sufficient.

※ Check and confirm that the headlamp beam is accurate.

3. Warning lamp and buzzer

※ Check and confirm that all warning lamps and buzzers work.

4. Horn

※ Check whether the horn works correctly.

5. Windshield

※ Check for scratches, dents or wear.

6. Windshield wiper and cleaner

※ Check and confirm that the cleaner position is correct. In addition, check and confirm that the cleaning fluid is sprayed into the center of each wiper operating range on the windshield.

※ Check the wiper for streaks. Replace it if necessary.

7. Windshield defroster

※ When the air conditioner is in the defroster setting, check and confirm the air outlet of the defroster.

8. Rearview mirror

※ Check and confirm that the rearview mirror is firmly installed.

9. Sun visor

※ Check and confirm that the sun visor can move freely and be installed firmly.

10. Steering wheel

※ Check and confirm that the free travel of the steering wheel is correct. At the same time, check whether the steering is difficult and makes abnormal noise.

11. Seat

※ Check and confirm that the seat can be adjusted smoothly and smoothly.

※ Check and confirm that the locking bolts in all positions can be locked securely.

※ Check and confirm that the locks in all positions can be locked securely.

※ Check and confirm that the headrest can move up and down smoothly.

※ Check the function of power seat (power seat).

Operate the power seat switch to check and confirm all functions of the seat

① Slide function

② Front height adjustment function

③ Lifting function

④ Backrest inclination adjustment function

⑤ Lumbar support adjustment function (with lumbar support)

12. Safety belt of the seat

※ Check and confirm that the safety belt parts (such as buckle, retractor and anchor) can work normally and smoothly.

※ Check and confirm that the safety belt is not cut, worn or damaged.

13. Accelerator pedal

※ Check and confirm that the pedal operates smoothly. Check and confirm that the pedal resistance is uniform and will not be stuck in a certain position.

14. Brake pedal

※ Check and confirm that the brake pedal operates smoothly.

※ Check and confirm that the pedal has correct stroke margin and free stroke.

※ Start the vehicle and check the brake booster function.

※ Start the vehicle and check the brake system indicator lamp.

15. Brake

※ In a safe place, check and confirm that the vehicle does not pull to one side when applying the brake.

16. Parking brake system

※ Check and confirm that the handle has the correct movement range.

※ Check and confirm that the vehicle can be stopped stably only by using the parking brake on a gentle slope.

17. Floor mat

※ Check and confirm that the correct floor mat is used and installed correctly.

2.4 Front cabin

2.4.1 General maintenance

1. General precautions

※ The maintenance and inspection requirements shall be carried out according to the User Manual or Maintenance Manual.

※ The time of vehicle maintenance shall be determined according to the mileage or the time (month) traveled, whichever comes first.

2. Windshield glass cleaning fluid

   ※ Check and confirm that there is enough cleaning fluid in the reservoir.

3. Coolant level

   ※ Check and confirm that the coolant level is between the "MAX" and "MIN" marks on the reservoir.

4. Radiator and hose

   ※ Check and confirm that the front of the radiator is clean and free from leaves, dust and insects.

   ※ Check whether the hose is broken, twisted, rotten or loose.

5. Brake fluid level

   ※ Check and confirm that the brake fluid level is near the MAX scale line of the reservoir.

6. Reducer oil

   ※ Visually inspect the overflow plug and for fluid leakage or oil stains.

2.5 Power motor

2.5.1 General maintenance

The following inspection and maintenance items can be checked and maintained by the user or by the CENNTRO authorized service center. In most cases, the user can check the inspection items without special tools.

1. General precautions

   ※ The maintenance and inspection requirements shall be carried out according to the User Manual or Maintenance Manual.

   ※ The time of vehicle maintenance shall be determined according to the mileage or the time (month) traveled, whichever comes first.

2. Check the appearance of power motor

   ※ Check and confirm whether the appearance of the power motor is damaged and whether the harness plug is firmly connected.

3. Check the cooling system

   ※ Check and confirm that the radiator and condenser are not blocked by leaves, dust or insects, and remove them if necessary. At the same time, check the installation

and corrosion of the hose connection.

4. Inspection of coolant leve

※ Check and confirm that the coolant level is between the "MAX" and "MIN" marks on the reservoir.

5. Check battery

2.6 Braking system

1. Check the brake pedal and parking brake
2. Check the brake friction plate, brake pad and brake disc

※ Check the parking brake friction plate.

3. Check the brake fluid
4. Change the brake fluid
5. Check brake lines and hoses

Tips:
※ Work in a well-lit area. Turn the front wheel to the rightmost or leftmost position before starting the inspection.

※ Check the entire circumference and length of the brake pipes and hoses to see if there are any of the following conditions:

① Damage

② Wear

③ Deformation

④ Fracture

⑤ Kink

⑥ Corrosion

⑦ Leakage

⑧ Bend

⑨ Twist

※ Check whether all clips are tight and whether there is leakage at the connection.

※ Check and confirm that hoses and pipes are away from sharp parts and moving parts.

2.7 Chassis

2.7.1 General maintenance

1. Check the steering transmission mechanism and steering gear

   ※ Check the free stroke of steering wheel.

   ※ Check whether the steering transmission mechanism is loose or damaged.

   ① Check and confirm that the tie rod joint has no clearance.

   ② Check and confirm that the dust seal and dust boot are not damaged.

   ③ Check and confirm that the dust cover clamp is not loose.

   ④ Check and confirm that the steering gear is not damaged.

2. Check the ball joint and dust cover

   ※ Check whether the ball joint is too loose.

   ① Jack up the front of the vehicle with a jack and place a wooden block with a height of 180 mm (7.1 in.) to 200 mm (7.9 in.) under the front tire.

   ② Lower the vehicle until its front coil spring reaches half of its normal load. For safety, place the bench under the vehicle.

   ③ Check and confirm that the front wheels of the vehicle are facing forward. All four wheels are fixed with wheel chocks.

   ④ Use a crowbar to pry the end of the lower arm. Check the amount of clearance. The maximum vertical clearance of ball joint is 0mm. If there is any clearance, replace the ball joint.

   ※ Check the dust cover for damage.

3. Check the reducer oil

   ※ Visually inspect the reducer for fluid leakage. If the oil leaks, find the cause and repair it.

4. Check the front and rear suspensions

2.8 Vehicle body

2.8.1 General maintenance

1. Tighten the bolts and nuts on the chassis and vehicle body

   ※ If necessary, tighten the bolts and nuts of the following chassis parts.

   ① Front axle and suspension

   ② Transmission system

   ③ Rear axle and suspension

   ④ Brake system

   ⑤ Power motor bracket

   ⑥ Other chassis parts

   ※ If necessary, tighten the bolts and nuts of the following vehicle body parts.

   ① Safety belt system of the seat

   ② Seat

   ③ Door and engine hood

   ④ Other body parts

2. Check tires and tire pressures

   ※ Check whether the tires are worn and whether the air pressure is normal.

3. Check the lamps, horn, wiper and cleaner
4. Check the refrigerant volume of the air conditioner
5. Road test

   ※ Check the power motor and chassis for abnormal noise.

   ※ Check that the vehicle does not pull to one side.

   ※ Check and confirm that the brake works normally without dragging.

6. Corrosion inspection
7. Body inspection

   ※ Check whether the body outer panel is dented, scratched or rusted.

   ※ Check whether the underbody is rusted or damaged. If necessary, replace or repair the damaged parts.

8. Final inspection

   ※ Check the operation of body parts.

① Front cabin cover

The front cabin cover is securely locked when closed.

② Front and rear doors

The door lock works normally.

The door closes normally.

③ Backdoor

The door closes normally.

④ Seat

The seat can be adjusted freely and locked firmly at any position.

⑤ Ensure delivery of clean vehicle. Make sure to check the following items:

Steering wheel

Gearshift lever

All switches and buttons

Door handle

Seat

2.9 Electrical system

2.9.1 General maintenance

1. Battery power test
2. All electrical systems

   ※ Visually inspect the harness and connectors for cracks, loose connectors or deformation.
3. Instrument built-in maintenance mileage setting

   ※ Set through the instrument mode key

Vehicle control unit

3.1 Functional specifications

3.1.1 Technical parameters of vehicle control unit

Parameter name	Technical indicators
Nominal voltage	12 V
Normal operating voltage range	9–16 V
Rated/peak power	3 / 85 W
Quiescent current	≦ 1 mA
Protection grade	IP67
Working temperature	-40–5 °C (-40~41 °F)
Storage temperature	-40–125 °C (-40~257 °F)
Operating humidity range	＜ 90 %
Cooling mode	Natural cooling
Main communication methods	CAN bus

3.1.2 VCU function description

1. Torque analysis to realize vehicle drive

   ※ According to the throttle pedal opening, gear position, current vehicle conditions (including output torque, speed, power), and the working conditions of various parts (including but not limited to battery pack management system, motor), calculate the torque value that the vehicle currently needs and can provide.

2. Braking energy recovery function

   ※ VCU detects the SOC value of high voltage battery, BMS charging power, vehicle speed and MCU torque limit to determine whether the braking energy can be recovered by comprehensively considering the vehicle safety factors.

3. Ensure braking priority function

   ※ During vehicle driving, VCU detects the working status of the whole vehicle power system in real time. If the braking signal of the whole vehicle system is detected, the VCU sends the drive stop command through CAN.

4. Vehicle low-voltage power management function

   ※ As the core component of the vehicle control, VCU needs to carry out low-voltage management for some EV system electrical equipment, relays and accessories of all controllers to meet the working requirements of relevant controllers.

5. Vehicle high-voltage energy management function

   ※ VCU drives and controls all high-voltage relays to meet the power-on and power-off requirements of high-voltage load under various conditions, and adjusts the high-voltage usage of the whole vehicle according to the status of the whole vehicle.

6. VCU has gear management function

   ※ VCU receives the CAN signal sent by the gear controller and parses the current gear signal according to the current speed and other gear shifting conditions.

7. Function of fault diagnosis and calibration for the whole vehicle system

   ※ Under the premise of supporting UDS diagnosis protocol, the vehicle control unit has the following functions in diagnosis and calibration: realizing fault record storage, online calibration and quantitative calibration, and data acquisition and observation.

8. Function of controlling and managing other accessories such as water pump, fan and air conditioner

   ※ For example, a large amount of heat will be generated during the operation of high-power devices such as motors and their controllers, which need to be cooled by water. VCU controls the water pump and electronic fan according to the motor temperature, motor control temperature, OBC and DCDC controller temperature to realize the cooling of drive system parts.

9. Function of safety management and system protection for the whole vehicle system

   ※ VCU judges and makes safer handling measures according to the information reported by various parts of the vehicle and the driver's operation.

3.1.3 Functional specifications of VCU

1. Power-on system function

Tips:
※ The whole vehicle control unit controls the power on of the whole vehicle in two parts: low voltage power on and high voltage power on.

※ Low voltage power on

① When the driver turns the ignition switch to the ON gear, the VCU is awakened by the ON gear signal and enters the self-test mode. If a response fault is detected during the self-test process, VCU lights up relevant fault indicator lamps of the instrument through the CAN signal. (Caution: VCU only lights up the fault lamp signal controlled by VCU). On the contrary, the instrument can enter the next step if there is no serious fault; (When the fault level of the whole vehicle is ≧ 2, it is a serious fault).

※ High voltage power on

① The driver confirms whether the gear is in the neutral gear, then steps down the brake switch, and turns the ignition switch into the Start gear (about 1 second, without maintaining the key in the Start gear for a long time). When VCU receives the Start signal, it will enter the high voltage power on process:

VCU sends high voltage power on command signal: VCUControl01;

BMS closes the main negative, pre-charge and main positive relays;

VCU sends MCU enable signal: MCUEable1;

VCU sends Ready indicator lamp signal: ReadyLightSts1;

VCU sends DCDC enable signal and target request voltage: DCDC_stCtrlReq01, DCDC_Trarget:(14 V);

BMS closes slow charging relay signal and BMS status display as: discharge driving.

Tips:
※ When the above process is met, the whole vehicle is in high voltage state and has driving conditions.

2. Dynamic function

Tips:
※ The vehicle is divided into 1 driving mode: Eco mode.

※ When the vehicle is powered on, the default mode is Eco mode. VCU will send the Eco mode through CAN signal: VCU_ DriveMode01, sent to the instrument, the instrument will light up the mode indicator lamp.

① Advantages: In this mode, the energy consumption is small (the range is longer) and the energy recovery is large.

② Disadvantages: The acceleration of the vehicle becomes slow (poor power).

3. Braking system function

Tips:
※ When the driver steps on the brake pedal, the negative pressure generated by the vacuum pump will assist the brake pedal, so that the vehicle can be braked to achieve the purpose of deceleration or parking.

※ Introduction to vacuum pump system

① VCU controls the vacuum pump system: internal pressure sensor, external pressure sensor and vacuum pump.

② Internal pressure sensor: monitors the air pressure in the vacuum tank (the internal pressure sensor is negative pressure).

③ External pressure sensor: monitors the air pressure outside the vehicle (the external pressure sensor is positive pressure).

④ Vacuum pump: compress the external air and input it into the vacuum tank.

※ Control principle

① When the driver is stepping on the brake, the VCU will control the vacuum pump to work when it detects that the negative pressure inside the vacuum tank cannot reach the effect of brake assistance. When enough negative pressure is generated in the vacuum tank, VCU stops controlling the vacuum pump. In this way, the cycle will be repeated until the whole vehicle is powered off.

4. Air conditioning system control strategy

※ Refrigeration system control strategy

① Starting conditions of VCU enabling compressor: the whole vehicle is Ready, SOC > 15 %, AC switch is effective, fan gear ⩾ 4.

1) AC (air conditioning key) high level signal enters VCU through high and low level switch, VCU receives high level signal and compressor starts (see above), otherwise cancel AC switch signal, VCU receives low level signal and compressor stops working.

2) VCU adjusts the compressor speed according to the evaporator temperature sensor temperature, as shown below:

Relation between evaporator temperature and compressor speed		
Evaporator temperature sensor T	**Compressor speed message**	**Compressor enable message**
>12 °C (54 °F)	3500	ON
12°C (54 °F) ≧ T ≧ 6°C (43 °F)	3000	ON
6°C (43 °F) ≧ T ≧ 2°C (36 °F)	1000	ON
2°C (36 °F) ≧ T	Air conditioning compressor disconnected	OFF

3) Operating principle of evaporator temperature sensor

The temperature sensor is a passive component - thermistor (NTC), whose temperature resistance value changes with the temperature value in the evaporator. VCU collects its resistance value and converts it into voltage value for identification, and monitors the temperature value in the evaporator in real time to provide reference basis for the operation strategy of the air conditioner. See Table 3 for its R-T characteristics.

Temperature		Lower limit value (kΩ)	Standard value (kΩ)	Upper limit value (kΩ)
°C	°F			
-20	-4	14.139	14.710	15.281
-15	5	10.736	11.146	11.556
-10	14	8.209	8.505	8.801
-9	16	7.782	8.064	8.342
-8	18	7.388	7.648	7.908

Temperature		Lower limit value (kΩ)	Standard value (kΩ)	Upper limit value (kΩ)
℃	°F			
-7	19	7.011	7.255	7.499
-6	21	6.656	6.885	7.113
-5	23	6.320	6.534	6.749
-4	25	6.003	6.204	6.405
-3	27	5.703	5.892	6.080
-2	28	5.420	5.597	5.733
-1	30	5.152	5.318	5.484
0	32	4.899	5.055	5.211
1	34	4.660	4.806	4.952
2	36	4.434	4.571	4.708
3	37	4.218	4.348	4.479
4	39	4.016	4.140	4.264
5	41	3.818	3.938	4.058
6	43	3.634	3.750	3.865
7	45	3.459	3.571	3.682
8	46	3.294	3.20	3.509
9	48	3.139	3.242	3.346
10	50	2.990	3.091	3.191
15	59	2.359	2.443	2.527
20	68	1.875	1.946	2.017
25	77	1.501	1.560	1.620
30	86	1.209	1.260	1.311
35	95	0.979	1.023	1.066
40	104	0.798	0.835	0.872

※ Air conditioning and heating (PCC) system control strategy

① Starting conditions of heating system: the whole vehicle is Ready, SOC > 15 %, there is no AC signal and the heating gear is valid.

1) VCU control principle: VCU receives PTC low level request signal and drives PTC relay.

5. Cooling system control strategy

※ Drive circulating water pump control

① VCU receives the values of motor temperature, motor control unit (inverter)

temperature and DCDC temperature through CAN, and adjusts the working speed of the water pump according to each temperature value. There is only one driving water pump and only one fixed gear. VCU controls the operation of the driving water pump by controlling the pump relay to provide 12 V power supply. As long as VCU provides 12 V low-voltage power supply, the driving water pump operates in a fixed gear; after IGNOFF, it can only run for 5 mins at most.

② Start conditions of water pump: under any condition of 1, 2 and 3, it can start working.

1) Fast charging connection

2) Slow charging connection

3) The whole vehicle is in Ready status

※ Electronic fan control

① There is only one cooling fan with two fixed gears; only one of the low and high gears can be closed at a time. VCU can comprehensively judge the motor temperature, motor control unit (inverter) temperature, DCDC temperature and the control status of the air conditioner, control the low gear relay and high gear relay to control the operation of the cooling fan. After IGNOFF, it can only continue to operate for 5min at most.

② The fan operation includes two high pressure conditions, the high pressure control module temperature or the air conditioning system demand, as long as either condition is met, it can work.

1) When the temperature of motor, motor control unit and DCDC reaches the threshold condition and meets any of the following conditions, VCU controls the fan to switch from off to low speed:

Motor temperature ＞ 75 ℃ (167 °F)

Motor control unit (inverter) temperature ＞ 39 ℃ (102 °F)

DCDC temperature ＞ 42 ℃ (108 °F)

2) When the following conditions are met simultaneously, VCU controls the fan to switch from low speed to off:

Motor temperature ≦ 70 ℃ (158 °F)

Motor control unit (inverter) temperature ≦ 36 ℃ (97 °F)

DCDC temperature ≦ 38 ℃ (100 °F)

3) When any of the following conditions is met, VCU controls the fan to switch from off/low speed to high speed:

Motor temperature ≧ 85 ℃ (185 °F)

Motor control unit (inverter) temperature ≧ 45 ℃ (113 °F)

DCDC temperature ≧ 50 ℃ (122 °F)

4) When the following conditions are met simultaneously, VCU controls the fan to switch from high gear to low gear:

Motor temperature ≦ 80 ℃ (176 °F)

Motor control unit (inverter) temperature ≦ 42 ℃ (108 °F)

DCDC temperature ≦ 46 ℃ (115 °F)

※ As long as VCU sends the enable command to the high pressure air conditioner, the electronic fan will operate at low speed; when the compressor medium pressure switch input signal is valid, VCU first turns off the low gear of the fan, and then turns on the high gear of the fan.

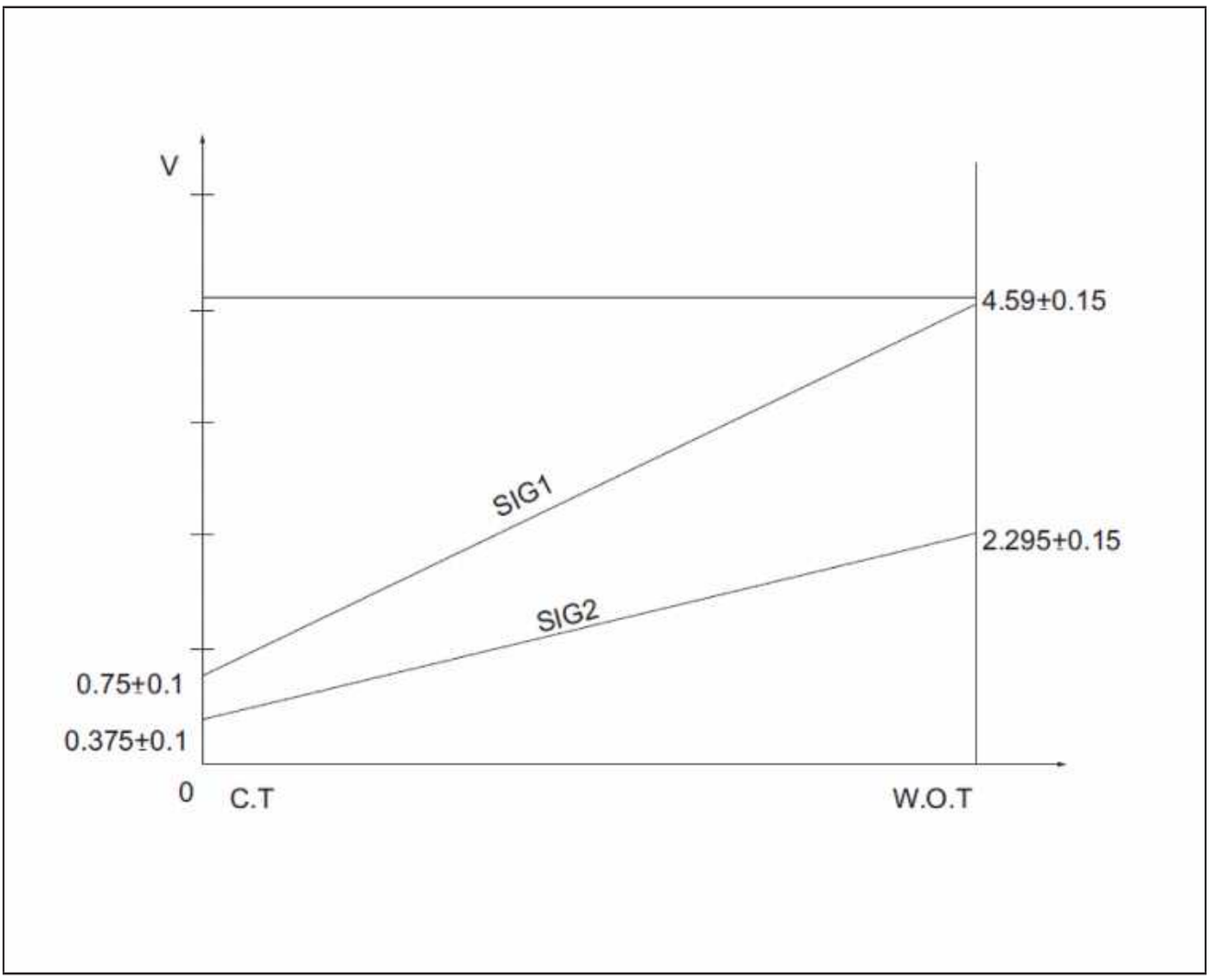
6. Gear signal logic

※ At the same time, VCU collects the mechanical gear, determines the functional logic gear according to the pedal status and other vehicle status, and outputs the signal to the instrument to display. Logic signals are shown in Table 4:

Gear	Level signal 1	Level signal 2	Level signal 3	Level signal 4
R	1	0	1	0
N	0	1	1	0
D	1	1	0	0
N/A	0	0	0	0

Caution:
※ Except for the gear signal combination corresponding to R/N/D, other gear signal combinations are determined as gear signal failure.

7. Accelerator pedal signal control strategy



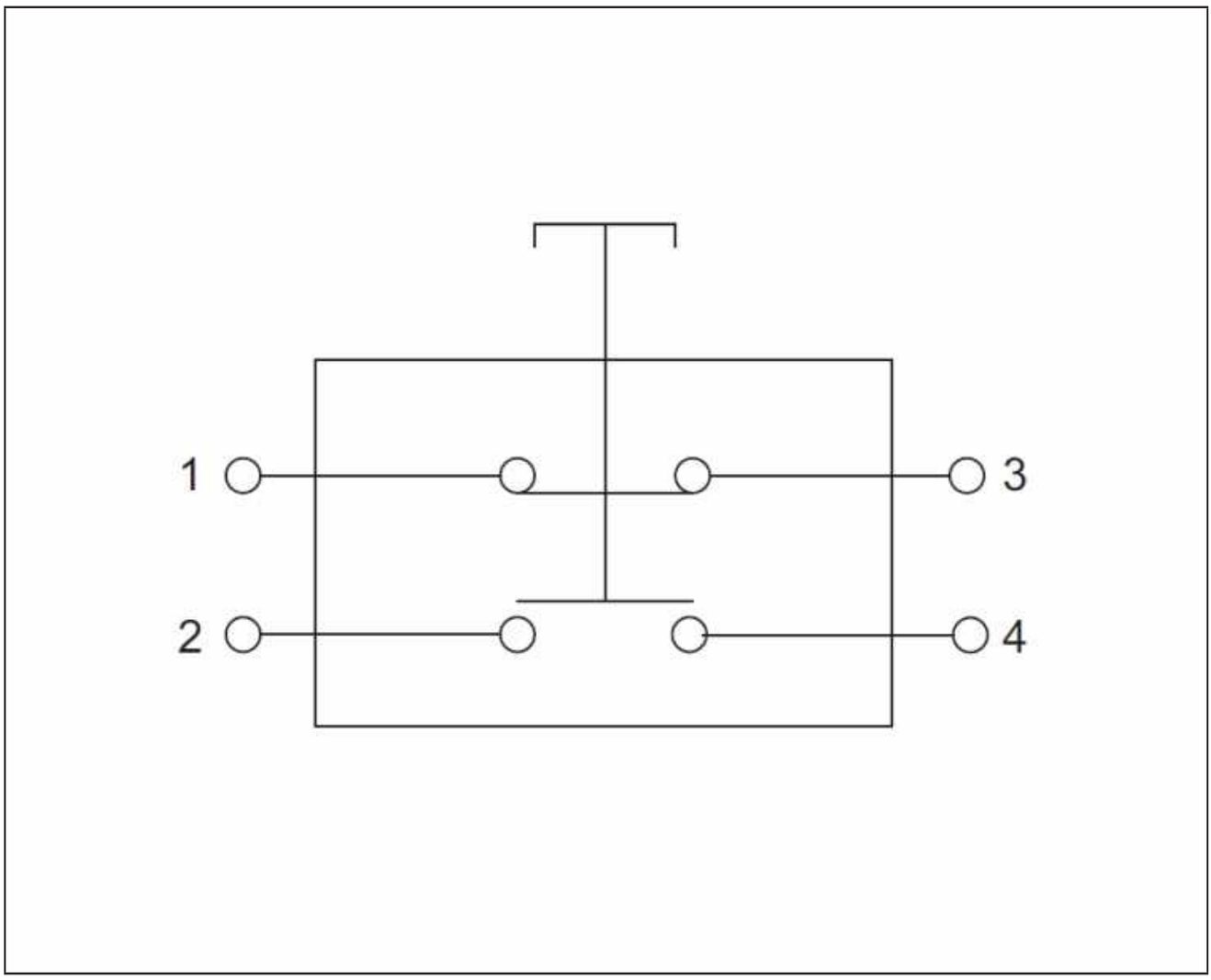
8. Brake pedal signal control strategy

※ The switch is in the mutually exclusive state. When it is not in the mutually exclusive state, the VCU determines that it is in the fault state.

※ Fault handling strategy: VCU enters the limp home mode and simultaneously lights up the instrument power limiting fault lamp and the vehicle system fault lamp.

※ When the pedal is not pressed: 1 and 3 are disconnected, 2 and 4 are connected.
When the pedal is pressed: 1 and 3 are connected, 2 and 4 are disconnected.

※ Initial state of brake switch



9. Remote interaction

※ Data upload

① International data upload: vehicle status, speed, DCDC status, gear information, accelerator pedal, brake pedal.

② TBOX anti-theft function

1) TBOX anti-theft function: the whole vehicle is in Ready state, but it cannot drive the vehicle. VCU lights up the power limit indicator lamp and the vehicle system fault indicator lamp. If the fault persists, it can only be temporarily removed through the diagnostic instrument. Drive the vehicle into the CENNTRO authorized service center for troubleshooting.

2) VCU fault judgment:

Before Ready, the TBOX message is lost or the TBOX limit command is received: the remote limit start triggers the TBOX anti-theft function. If the

TBOX message is reconnected or the TBOX restriction cancellation command is received before Ready, the TBOX anti-theft function is automatically cancelled (the key can be reset to ON under special circumstances);

After Ready, the whole vehicle will not respond to the TBOX anti-theft function until the whole vehicle is powered on again and the whole vehicle enters Ready again.

10. Charging function

※ The vehicle has two charging functions: fast charging and slow charging.

① Fast charging: VCU wakes up and self-checks when it detects 12 V fast charging signal. After receiving the fast charging connection signal sent by BMS, it is allowed to enter the charging mode after judging that the vehicle status meets the requirements.

② Slow charging: VCU wakes up and self-checks when it detects 12 V slow charging signal. After receiving the fast charging connection signal sent by BMS, it is allowed to enter the charging mode after judging that the vehicle status meets the requirements.

※ When VCU detects a serious fault or BMS sends a full charge signal or a disable charge signal. VCU will send the command that charging is not allowed.

11. Energy recovery system function

Tips:
※ The vehicle has three energy recovery functions, which can maximize the range and braking performance.

※ Taxiing energy recovery

① The whole vehicle is Ready, and the SOC value is between 0 – 95 %, and the vehicle speed is >10 km/h (6.2 mph). When the accelerator pedal is fully released, VCU sends the negative torque to MCU according to the vehicle status, and the whole vehicle enters the energy recovery mode.

※ Braking energy recovery

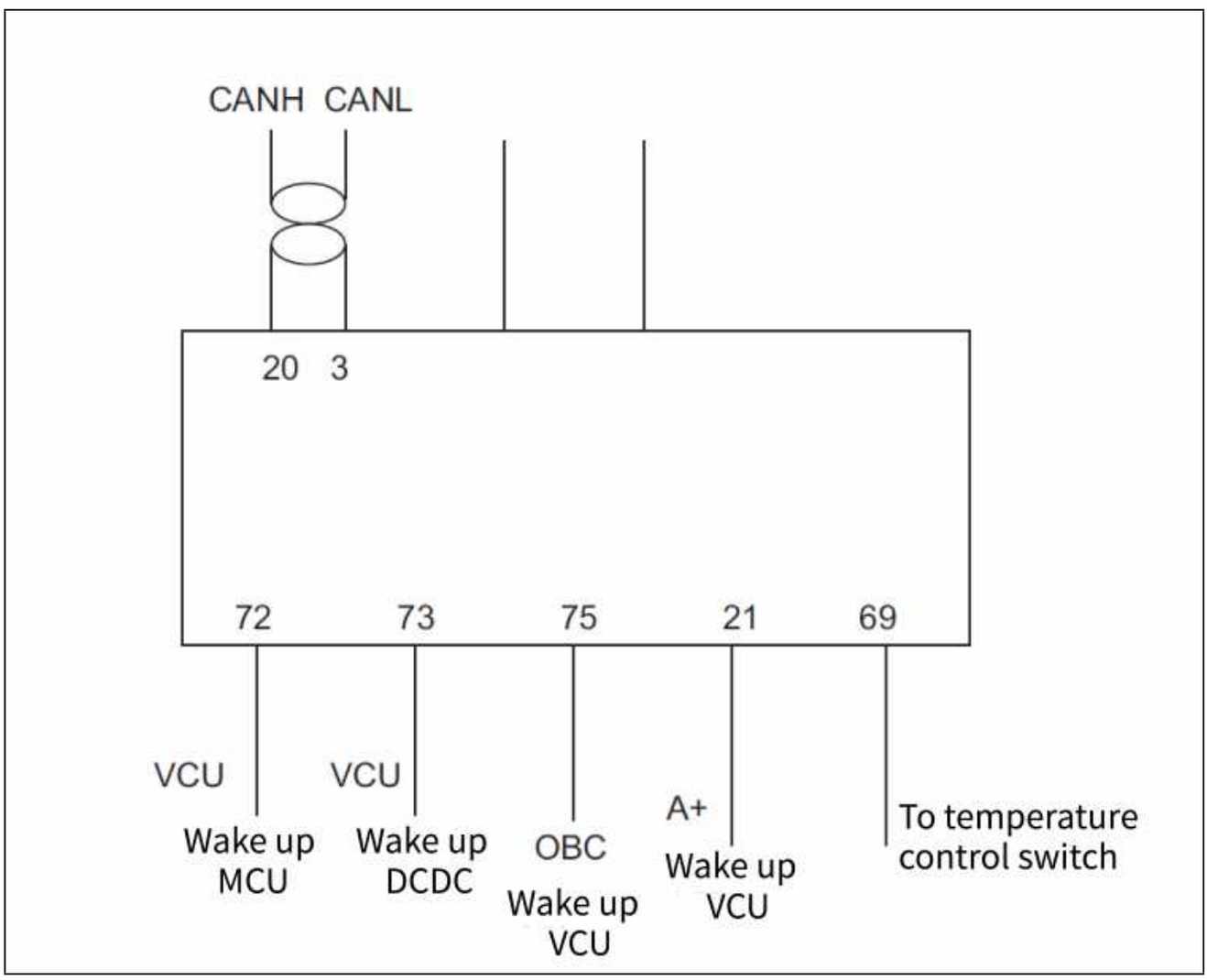
① The whole vehicle is Ready, and the SOC value is between 0 – 95 %, and the vehicle speed is >10 km/h (6.2 mph). When the brake pedal is pressed, VCU sends

the negative torque to MCU according to the vehicle status, and the whole vehicle enters the energy recovery mod.

※ Single pedal function

① The vehicle is ready, and the SOC value is between 0 – 95 %, the vehicle speed is>10 km/h (6.2 mph), and the accelerator pedal opening is 0 – 40, for example, when the pedal opening is between 35 % and 20 %, the VCU sends the negative torque to the MCU according to the vehicle status, and the vehicle enters the energy recovery mode. The biggest difference from taxiing energy recovery is that the accelerator pedal does not need to be fully released. Mediatability is good)

3.1.4 Schematic diagram of vehicle control unit



3.1.5 VCU terminal definition

Pin No.	Function definition	Pin No.	Function definition
1	KL30	41	Reserved
2	ON gear enable	42	Reserved
3	CAN_L	43	Reserved
4	Reserved	44	Evaporator temperature sensor D2
5	Reserved	45	Accelerator pedal signal 1
6	Reserved	46	Reserved
7	Accelerator pedal sensor 1 power supply negative	47	Reserved
8	Accelerator pedal sensor 2 power supply negative	48	External pressure sensor signal
9	Reserved	49	Reserved
10	External pressure sensor power supply negative	50	Reserved
11	Reserved	51	Reserved
12	Internal atmospheric pressure sensor power supply negative	52	Reserved
13	Brake vacuum pump relay control signal	53	Compressor medium pressure switch signal
14	PTC request signal	54	Brake switch signal 2
15	KL30	55	Brake switch signal 1
16	Reserved	56	Gear shift signal 1
17	Reserved	57	Gear shift signal 2
18	Evaporator temperature sensor D1	58	Reserved
19		59	KL30
20	Sport switch	60	keystart signal
21	Fast charging level wake-up (A+)	61	Compressor high/low pressure switch signal
22	Reserved	62	Gear shift signal 3
23	Reserved	63	Gear shift signal 4
24	Reversing lamp relay	64	Reserved
25	Cooling fan high speed relay control signal	65	Reserved
26	Cooling fan low speed relay control signal	66	KL30

Pin No.	Function definition	Pin No.	Function definition
27	KL31	67	Reserved
28	KL31	68	Pedestrian reminder switch
29	CAN_H	69	PTC temperature control switch power enable signal
30	Reserved	70	Reserved
31	Reserved	71	Reserved
32	Reserved	72	MCU activation signal
33	Accelerator pedal sensor 1 power supply positive	73	DCDC activation signal
34	Accelerator pedal signal 2	74	Reserved
35	Accelerator pedal sensor 2 power supply positive	75	Slow charging level wake-up (OBC)
36	Reserved	76	Reserved
37	External pressure sensor power supply positive	77	Reserved
38	Internal atmospheric pressure sensor signal	78	Reserved
39	Internal atmospheric pressure sensor power supply positive	79	Low-voltage main relay control signal
40	Cooling water pump relay control signal	80	KL31

3.2 Diagnosis and test

3.2.1 Vehicle fault level and handling strategy

1. VCU is divided into three levels of faults: first, second and third. The higher the level, the more serious the fault.
2. Level I fault: ① speed limit of 60 km/h (37 mph); ② speed limit of 20 km/h (12.4 mph).
3. Level II fault: switch off the high-voltage power under delay.
4. Level III fault: switch off the high-voltage power immediately.

3.2.2 Vehicle fault code and fault strategy

DTC	Fault type description	Fault maturity conditions	Fault removal conditions	Fault self-recovery conditions	Safety measures after fault determination	Cause of fault
P1E0116	Loop voltage belo lower limit	1.The voltage is less than 9V for 10s. 2.When the voltage returns to normal, VCU resets the fault detection, that is,the fault is detected again.	BAT+ ≧ 9 V, lasting for 20 s	BAT+ ≧ 9 V, lasting for 20 s	1.Do not switch on the high-voltage power 2.Switch off the high-voltage power	1.The power supply is unstable, and some loads may drop suddenly. 2.DCDC cannot be started due to charging failure of DCDC or insufficient power of high-voltage battery pack.
P1E0117	Loop voltage above upper limit	1.The voltage is greater 16V for 10s. 2.When the voltage returns to normal, VCU resets the fault detection, that is, the fault is detected again.	BAT+ ≦ 16 V, lasting for 20 s	BAT+ ≦ 16 V, lasting for 20 s	1.Do not switch on the high-voltage power 2.Switch off the high-voltage power	DCDC charging fault

DTC	Fault type description	Fault maturity conditions	Fault removal conditions	Fault self-recovery conditions	Safety measures after fault determination	Cause of fault
U007388	VCU judges CAN bus off	Bus-off detected	CAN message sent successfully on CAN bus	CAN message sent successfully on CAN bus	1.Do not switch on the high-voltage power 2.Switch off the high-voltage power	CAN bus fault
U029287	VCU judges communi-cation loss with MCU	MCU timeout	Receive correspond-ing node message	Receive corresponding node message	1.Do not switch on the high-voltage power 2.Switch off the high-voltage power	MCU fault, CAN bus fault
U011187	VCU judges communi-cation loss with BMS	BMS timeout	Receive correspond-ing node message	Receive corresponding node message	1.Do not switch on the high-voltage power 2.Switch off the high-voltage power	BMS fault, CAN bus fault
U012187	VCU judges communi-cation loss with ABS	ABS timeout	Receive correspond-ing node message	Receive corresponding node message	1.Do not switch on the high-voltage power 2.Switch off the high-voltage power	ABS fault, CAN bus fault
U029887	VCU judges communi-cation loss with DCDC	DCDC timeout	Receive correspond-ing node message	Receive corresponding node message	Use motor speed instead of vehicle speed and limit power operation	DCDC fault, CAN bus fault
U030887	VCU judges communi-cation loss with TBOX	TBOX timeout	Receive correspond-ing node message	Receive corresponding node message	It is Ready, and the vehicle speed is 0	TBOX fault, CAN bus fault
P1E0617	Accelerator pedal 1 sensor 5V supply voltage is abnormal	Accelerator pedal 1 supply voltage is above normal range	Accelerator pedal 1 supply voltage returned to range	Accelerator pedal 1 supply voltage returned to range	Enter the TBOX speed limit of 10 km/h (6.2 mph)	Pedal fault or pedal power supply fault

DTC	Fault type description	Fault maturity conditions	Fault removal conditions	Fault self-recovery conditions	Safety measures after fault determination	Cause of fault
P1E0616	Accelerator pedal 1 sensor 5V supply voltage is abnormal	Accelerator pedal 1 supply voltage is below normal range	Accelerator pedal 1 supply voltage returned to range	Accelerator pedal 1 supply voltage returned to range	1.Limit power 2.Limit vehicle speed	Pedal fault or pedal power supply fault
P1E0717	Accelerator pedal 2 sensor 5V supply voltage is abnormal	Accelerator pedal 2 supply voltage is above normal range	Accelerator pedal 2 supply voltage returned to range	Accelerator pedal 2 supply voltage returned to range	1.Limit power 2.Limit vehicle speed	Pedal fault or pedal power supply fault
P1E0716	Accelerator pedal 2 sensor 5V supply voltage is abnormal	Accelerator pedal 2 supply voltage is below normal range	Accelerator pedal 2 supply voltage returned to range	Accelerator pedal 2 supply voltage returned to range	1.Limit power 2.Limit vehicle speed	Pedal fault
P1E0822	Accelerator pedal 1 opening input out of range fault	Accelerator pedal 1 analog signal acquisition input is above normal range	When the power supply of accelerator pedal 1 is normal, the input signal is within the range	When the power supply of accelerator pedal 1 is normal, the input signal is within the range	1.Limit power 2.Limit vehicle speed	Pedal fault
P1E0821	Accelerator pedal 1 opening input out of range fault	Accelerator pedal 1 analog signal acquisition input is below normal range	When the power supply of accelerator pedal 1 is normal, the input signal is within the range	When the power supply of accelerator pedal 1 is normal, the input signal is within the range	1.Limit power 2.Limit vehicle speed	Pedal fault

DTC	Fault type description	Fault maturity conditions	Fault removal conditions	Fault self-recovery conditions	Safety measures after fault determination	Cause of fault
P1E0922	Accelerator pedal 2 opening input out of range fault	Accelerator pedal 2 analog signal acquisition input is above normal range	When the power supply of accelerator pedal 2 is normal, the input signal is within the range	When the power supply of accelerator pedal 2 is normal, the input signal is within the range	1.Limit power 2.Limit vehicle speed	Pedal fault
P1E0921	Accelerator pedal 2 opening input out of range fault	Accelerator pedal 2 analog signal acquisition input is below normal range	When the power supply of accelerator pedal 2 is normal, the input signal is within the range	When the power supply of accelerator pedal 2 is normal, the input signal is within the range	1.Limit power 2.Limit vehicle speed	Pedal fault
P1E1A28	The opening difference between accelerator pedals 1 and 2 is too large	The opening difference between accelerator pedals 1 and 2 is large	The opening difference between accelerator pedals 1 and 2 returns to the normal range	The opening difference between accelerator pedals 1 and 2 returns to the normal range	1.Limit power 2.Limit vehicle speed	Pedal 1 or 2 sensor is unstable
P1E1E22	Input signal of evaporating dish temperature sensor is out of range	Temperat-ure sensor signal is above normal range	Sensor signal returns to the normal range	Sensor signal returns to the normal range	1.Limit power 2.Limit vehicle speed	Sensor fault
P1E1E21	Input signal of evaporating dish temperat-ure sensor is out of range	temperat-ure sensor signal is below normal range	Sensor signal returns to the normal range	Sensor signal returns to the normal range		Sensor fault

DTC	Fault type description	Fault maturity conditions	Fault removal conditions	Fault self-recovery conditions	Safety measures after fault determination	Cause of fault
P1E1F17	Vacuum pressure sensor 5V supply voltage is abnormal	Vacuum pressure sensor supply voltage is above normal range	Vacuum pressure sensor supply voltage returns to the normal range	Vacuum pressure sensor supply voltage returns to the normal range		Sensor fault or power supply fault
P1E1F16	Vacuum pressure sensor 5V supply voltage is abnormal	Vacuum pressure sensor supply voltage is below normal range	Vacuum pressure sensor supply voltage returns to the normal range	Vacuum pressure sensor supply voltage returns to the normal range	1.Limit power 2.Limit vehicle speed	Sensor fault or power supply fault
P1E2022	Vacuum pressure sensor input signal is out of range	Pressure sensor signal is above normal range	Sensor signal returns to the normal range	Sensor signal returns to the normal range	1.Limit power 2.Limit vehicle speed	Sensor fault
P1E2021	Vacuum pressure sensor input signal is out of range	Pressure sensor signal is below normal range	Sensor signal returns to the normal range	Sensor signal returns to the normal range	1.Limit power 2.Limit vehicle speed	Sensor fault
P1E2821	Vacuum pressure sensor pressure too low fault	Vacuum pressure is less than 30 kPa (0.3 bar) for 10s (time and pressure value TBD)	When the vacuum pressure is ≧ 50 kPa (0.5 bar) for 10 consecutive cycles	When the vacuum pressure lasts for 10 consecutive cycles	1.Limit power 2.Limit vehicle speed	Vacuum system fault

DTC	Fault type description	Fault maturity conditions	Fault removal conditions	Fault self-recovery conditions	Safety measures after fault determination	Cause of fault
P1E2992	Vacuum pump system fault	When the vacuum pump is on and there is no brake, the vacuum pump pressure is less than 50 kPa (0.5 bar) for 30s (TBD)	When the air pressure is ≧ 50 kPa (0.5 bar) for 10 consecutive cycles	When the air pressure is ≧50 kPa (0.5 bar) for 10 consecutive cycles	1.Limit power 2.Limit vehicle speed	The vacuum pump system leaks or the vacuum pump does not work
P1E1F17	External pressure sensor 5V supply voltage is abnorma	External pressure sensor supply voltage is above normal range	External pressure sensor supply voltage returns to the normal range	External pressure sensor supply voltage returns to the normal range	1.Limit power 2.Limit vehicle speed	Sensor fault or power supply fault
P1E1F16	External pressure sensor 5V supply voltage is abnormal	External pressure sensor supply voltage is below normal range	External pressure sensor supply voltage returns to the normal range	External pressure sensor supply voltage returns to the normal range	1.Limit power 2.Limit vehicle speed	Sensor fault or power supply fault
P1E2022	External pressure sensor input signal is out of range	External pressure sensor signal is above normal range	Pressure sensor signal returns to the normal range	Pressure sensor signal returns to the normal range	1.Limit power 2.Limit vehicle speed	Pressure sensor fault
P1E2021	External pressure sensor input signal is out of range	External pressure sensor signal is below normal range	Pressure sensor signal returns to the normal range	Pressure sensor signal returns to the normal range	1.Limit power 2.Limit vehicle speed	Pressure sensor fault

DTC	Fault type description	Fault maturity conditions	Fault removal conditions	Fault self-recovery conditions	Safety measures after fault determination	Cause of fault
P1E2821	External pressure sensor pressure too low fault	External pressure is less than 30kPa (0.3 bar) for 10s (time and pressure value TBD)	When the vacuum pressure is ≧ 50kPa (0.5 bar) for 10 consecutive cycles	When the vacuum pressure is ≧ 50kPa (0.5 bar) for 10 consecutive cycles	1.Limit power 2.Limit vehicle speed	Vacuum system fault
B302B71	MCU hard wire wake-up drive feedback fault	Drive feedback indication fault	No fault in drive feedback	No fault in drive feedback	N/A	N/A
B301171	DCDC hard wire wake-up drive feedback fault	Drive feedback indication fault	No fault in drive feedback	No fault in drive feedback	Do not switch on the high-voltage power	Hardware or circuit fault
B301371	PTC heating relay drive feedback fault	Drive feedback indication fault	No fault in drive feedback	No fault in drive feedback	Disable DCDC enable	Hardware or circuit fault
B301671	Low voltage main relay drive feedback fault	Drive feedback indication fault	No fault in drive feedback	No fault in drive feedback	Prohibit driving PTC	Hardware or circuit fault

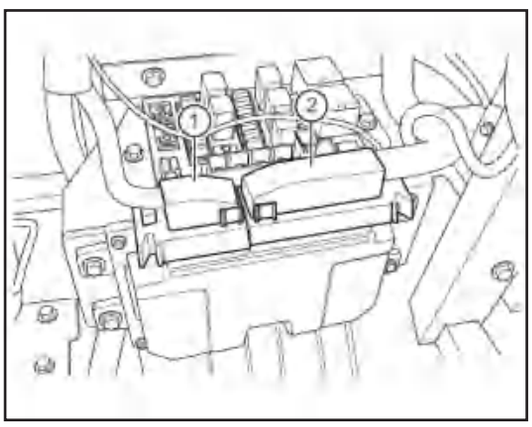
3.3 On-board maintenance

3.3.1 Vehicle control unit

Remova

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the vehicle control unit

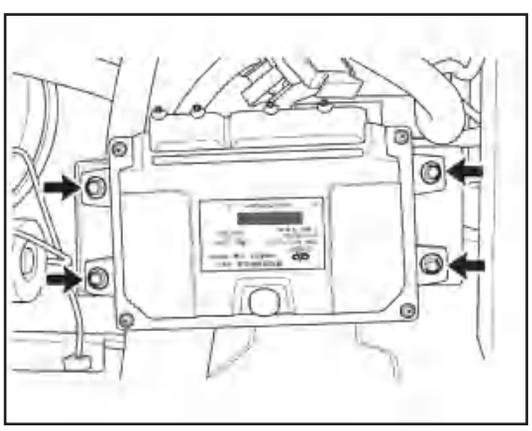
① Disconnect the vehicle control unit connectors (1) and (2).



② Remove 4 fixing bolts (arrows) from the vehicle control unit.

Tightening torque:

7±1 N·m (5.2±0.7 ft-lbs.)



③ Remove the vehicle control unit.

Installation

1. The sequence of installing the whole vehicle control unit is the reverse of the removal sequence.

3.3.2 System description

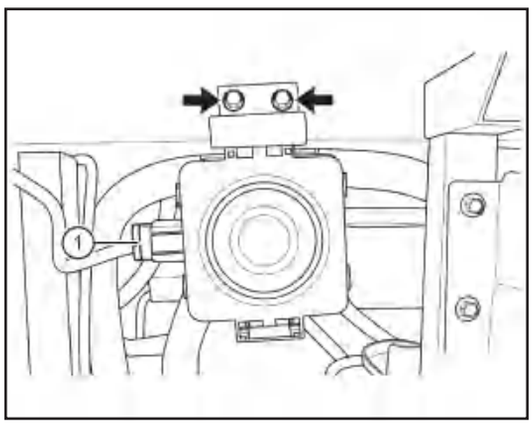
Main function of pedestrian reminder

LOGISTAR260 electric vehicle is equipped with low speed warning assembly.

Removal

1. Turn the ignition switch to OFF
2. Disconnect the negative pole of battery

3. Remove the front bumper assembly
4. Remove the pedestrian reminder device assembly



① Disconnect the pedestrian reminder connector (1).

② Remove two fixing bolts between the pedestrian warning device assembly and the upper crossbeam body of the water tank (arrow).

Tightening torque:

7±1N·m (5.2±0.7 ft-lbs.)

Installation

1. The sequence of installing the pedestrian reminder device is the reverse of the removal sequence.

Electric drive system

4.1 Functional specifications

4.1.1 Function

Main functions/effects

The electric drive system is mainly a transmission device that converts the power battery energy into mechanical energy. It mainly consists of motor control unit (MCU) and motor. The motor control unit consists of controller interface circuit, power conversion circuit, control circuit and drive circuit. The motor consists of three-phase winding, permanent magnet rotor, etc.

※ In the electric state, the controller converts the DC supplied by the power battery into three-phase AC with adjustable frequency and voltage amplitude to drive the motor.

※ In the braking state, the controller converts the braking energy into DC power to feed back the power battery pack, so as to save energy and reduce consumption and extend the driving mileage.

4.1.2 Technical parameters

Technical parameters of motor control unit

Parameters of motor control unit			
Rated capacity	52 kVA	Maximum capacity	111 kVA
Rated input voltage	336 VDC	Continuous working current	131 A(duration ≧ 60 min)
Maximum working voltage	420 VDC	Short-time working current	305 A(duration ≧ 30 s)
Minimum working voltage	250 VDC	Maximum working current	310 A(duration ≧ 5 s)
Control power supply	12 VDC	Control mode	Vector control
Protection grade	IP67	Output frequency range	0–800 Hz
Weight and tolerance	7.0±0.5 kg (15.4±1.1 lbs.)	Overall dimensions and tolerance	264x218x169.5(±1.5) mm(10.4x8.6x6.7(±0.06) in.)
Overvoltage protection	440 V	Undervoltage protection	200 V
Overcurrent protection	340 A	Overheating protection	95 °C (203 °F)
Cooling mode	Water cooling		

Technical parameters of motor

Motor parameters			
Type	Permanent magnet synchronous motor	Winding connection mode	3-phase, Y-type
Continuous power	41 kW	Peak power	80 kW
Continuous torque	110 N·m (81 ft-lbs.)	Rated rotation speed	3500 r/min
Peak torque	265 N·m (196 ft-lbs.)	Peak rotation speed	9000 r/min
Locked rotor torque	265 N·m (196 ft-lbs.)	Insulation class	H
Rated voltage	238 VDC	Protection grade	IP67
Working system	S9	Cold DC resistance and tolerance of stator winding	14.3±2 MΩ
Weight and tolerance	44±2 kg (97±4.4 lbs.)	Overall dimensions and tolerance	243x323(±2)mm (9.6x12.7(±0.08) in.)
Cooling mode	Water cooling		

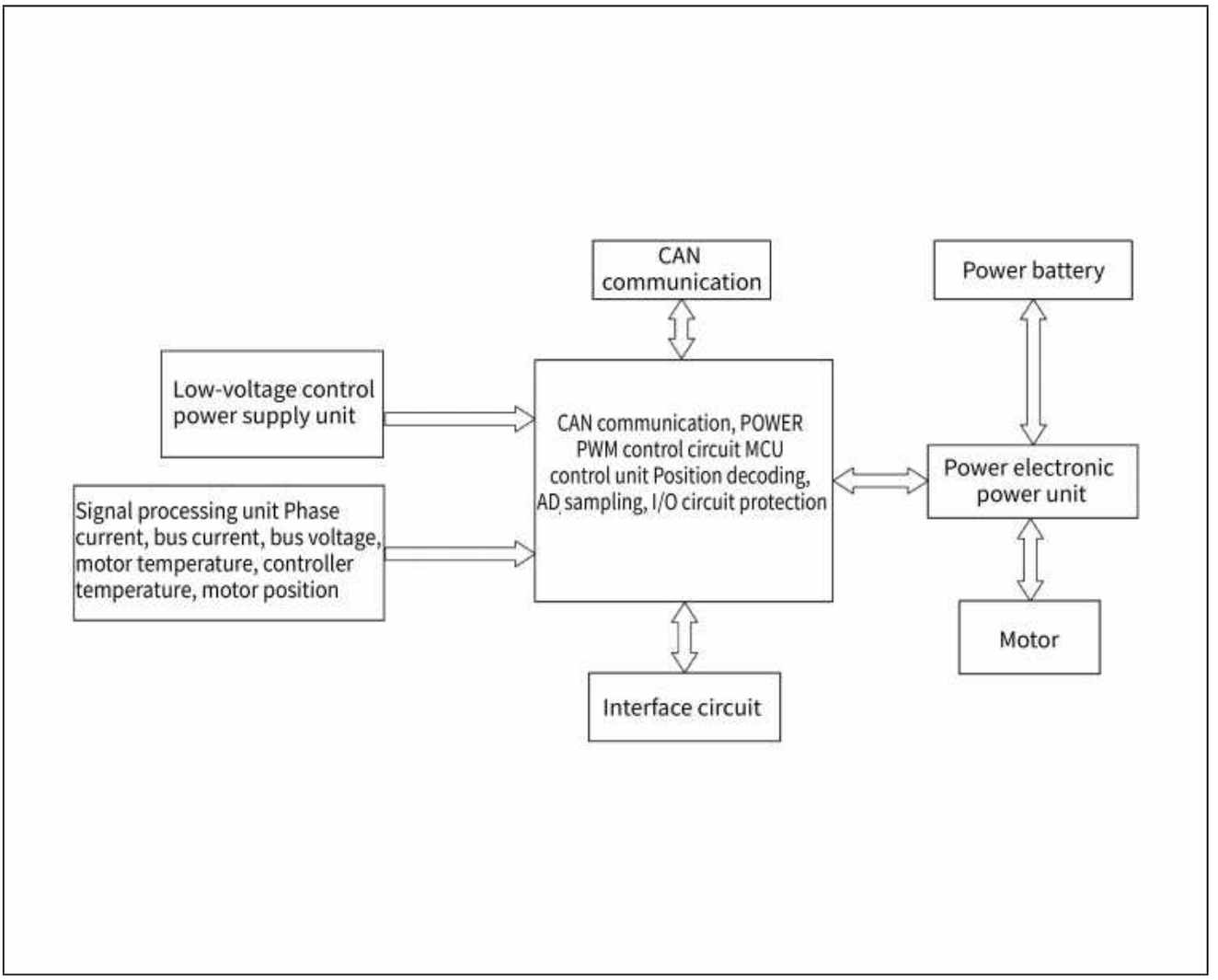
4.1.3 Function introduction

Functions of motor control unit

1. Protection functions such as overcurrent, overvoltage, over-temperature, undervoltage, overspeed, power polarity connection error, etc..
2. Torque monitoring function.
3. With CAN circuit interface for communication and CAN communication diagnosis function.
4. Control the operation of permanent magnet synchronous motor.

Composition of control unit hardware

The control unit hardware mainly consists of low-voltage control power supply unit, MCU control unit, power conversion unit, interface circuit and detection unit (temperature sensor and current sensor).



Motor function

The drive motor is designed with rotor magnetic steel embedded permanent magnet synchronous motor. Facing the requirements of low speed and high output, high speed and constant power, wide speed regulation, high efficiency and high reliability of the motor under vehicle operating conditions, the motor has the following advantages:

※ High torque density: the torque component has two parts. In addition to permanent magnet torque, there is a large proportion of reluctance torque. The torque per unit current is increased, and the torque density is improved.

※ High torque quality: adopting the patented technology unique to the motor company, effectively reducing the cogging torque and torque ripple, and maintaining a high power density level of the motor.

※ High back EMF quality: the patented technology of rotor surface shape of the motor company is adopted to effectively reduce the harmonic component of the back EMF, so that the back EMF of the motor still has good sine property without the use of inclined

pole or slot technology, which is not only convenient for control, but also convenient for industrialization in production.

※ Wide field weakening range: due to the high reluctance torque component, combined with the field weakening control method, the motor has a wide field weakening range and strong constant power speed regulation ability.

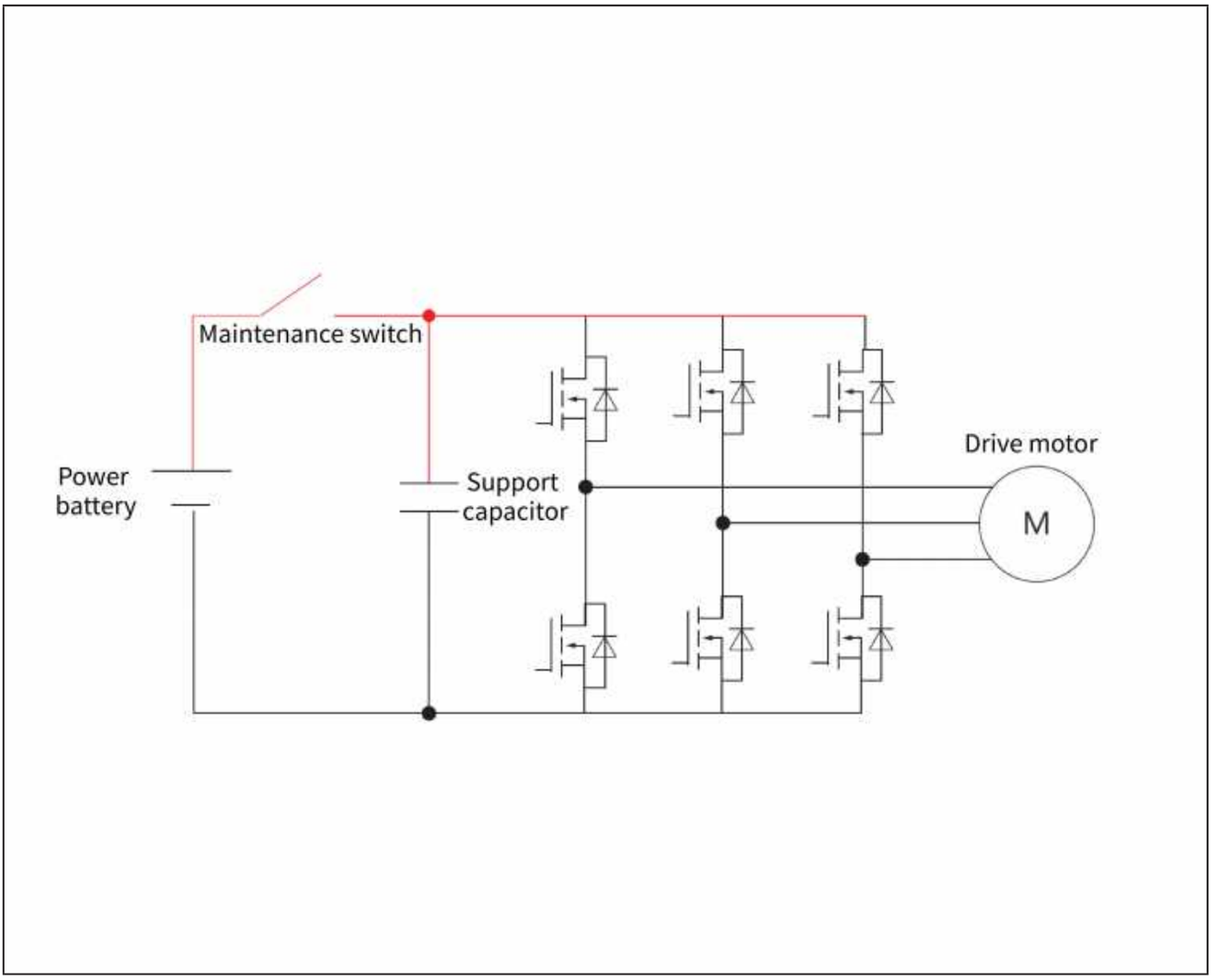
※ High efficiency: it not only eliminates the copper loss of the excitation coil in the traditional electric excitation motor, but also greatly improves the efficiency compared with the asynchronous motor; in addition, due to the large torque density, the efficiency of the motor is further improved.

※ Wide high efficiency area: the motor has high efficiency in a wide range of rotating speed due to the use of sintered NdFeB permanent magnet excitation.

※ Torque ripple and low vibration noise: due to the use of sine wave control, torque ripple is effectively controlled, thus reducing the vibration and noise of the motor.

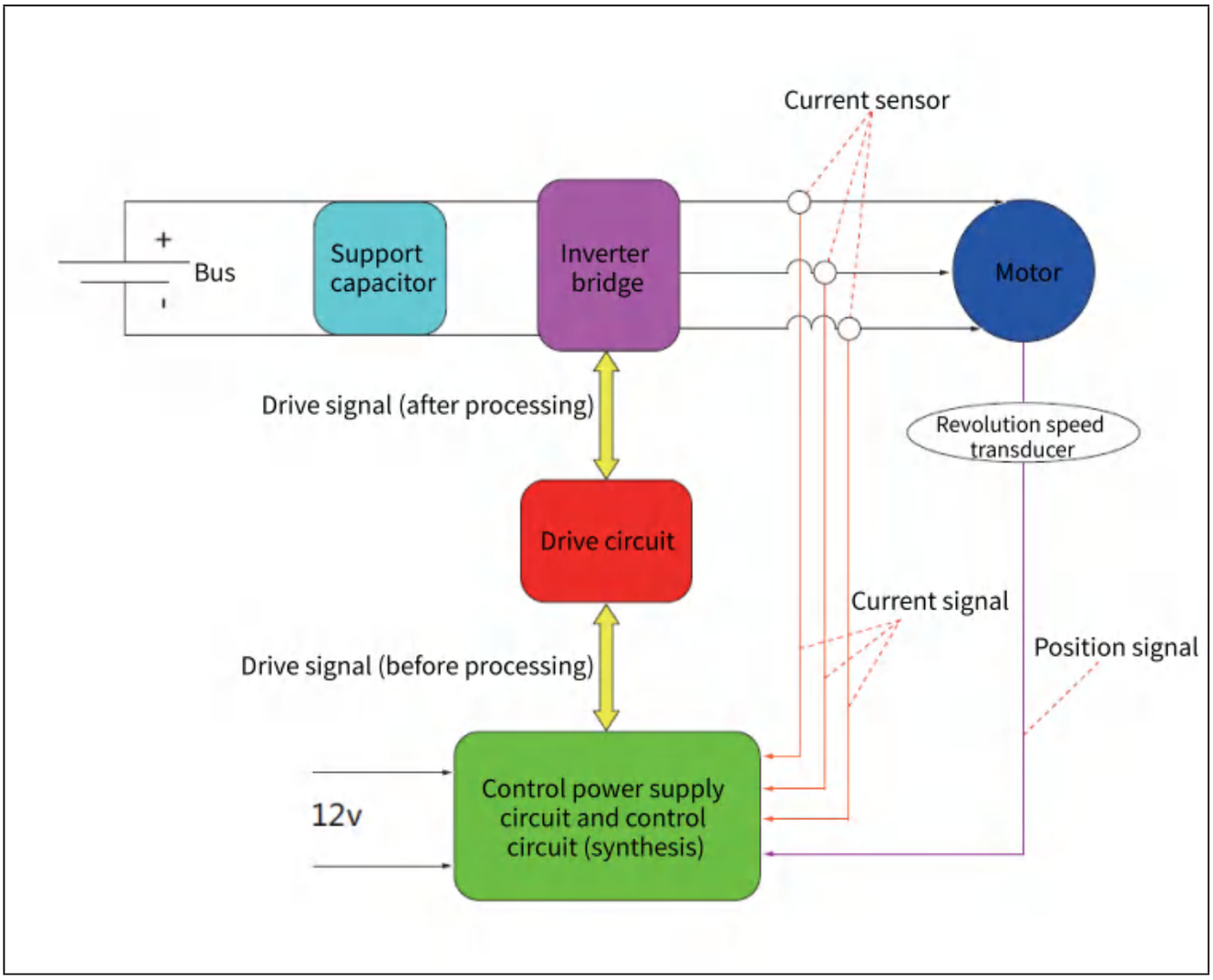
Tips:
※ Permanent magnet synchronous motor (PMSM) is the most popular type of vehicle motor in the field of electric vehicles because of its good speed regulation performance and power density.

4.1.4 Functional topology



The electric drive system consists of power battery, maintenance switch, support capacitor, IGBT and drive motor.

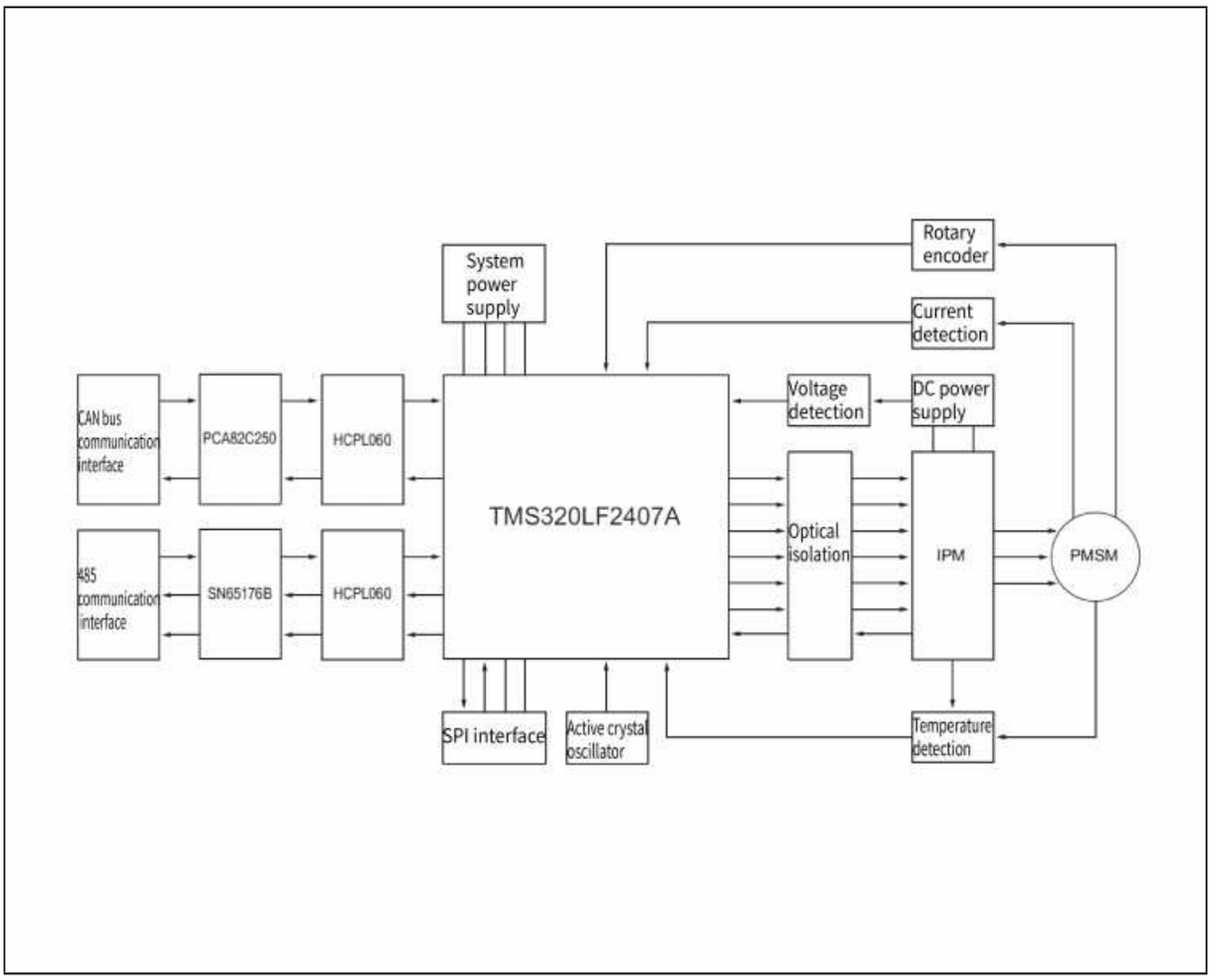
4.1.5 System principle



※ Electric: DC energy in the power battery flows into the support capacitor, and then through the inverter bridge, PWM control is performed by DSP to generate appropriate AC power, and then generate appropriate electric torque.

※ Power generation: When braking or coasting downhill, the AC energy on the motor is controlled by DSP through the inverter bridge to generate appropriate DC energy, and then flows into the support capacitor to charge the power battery.

Composition of vector control hardware



The control system mainly includes three parts: permanent magnet synchronous motor and its drive, motor control unit (DSP) and drive of rotary transformer. The working principle of the whole system is as follows:

※ The high voltage DC source comes from the power battery and supplies the IGBT module with three-phase AC inverter to drive the motor. The DC side input will detect the bus voltage to prevent the input overvoltage and undervoltage. The low-voltage power supply comes from the battery to supply power to the control unit and drive unit.

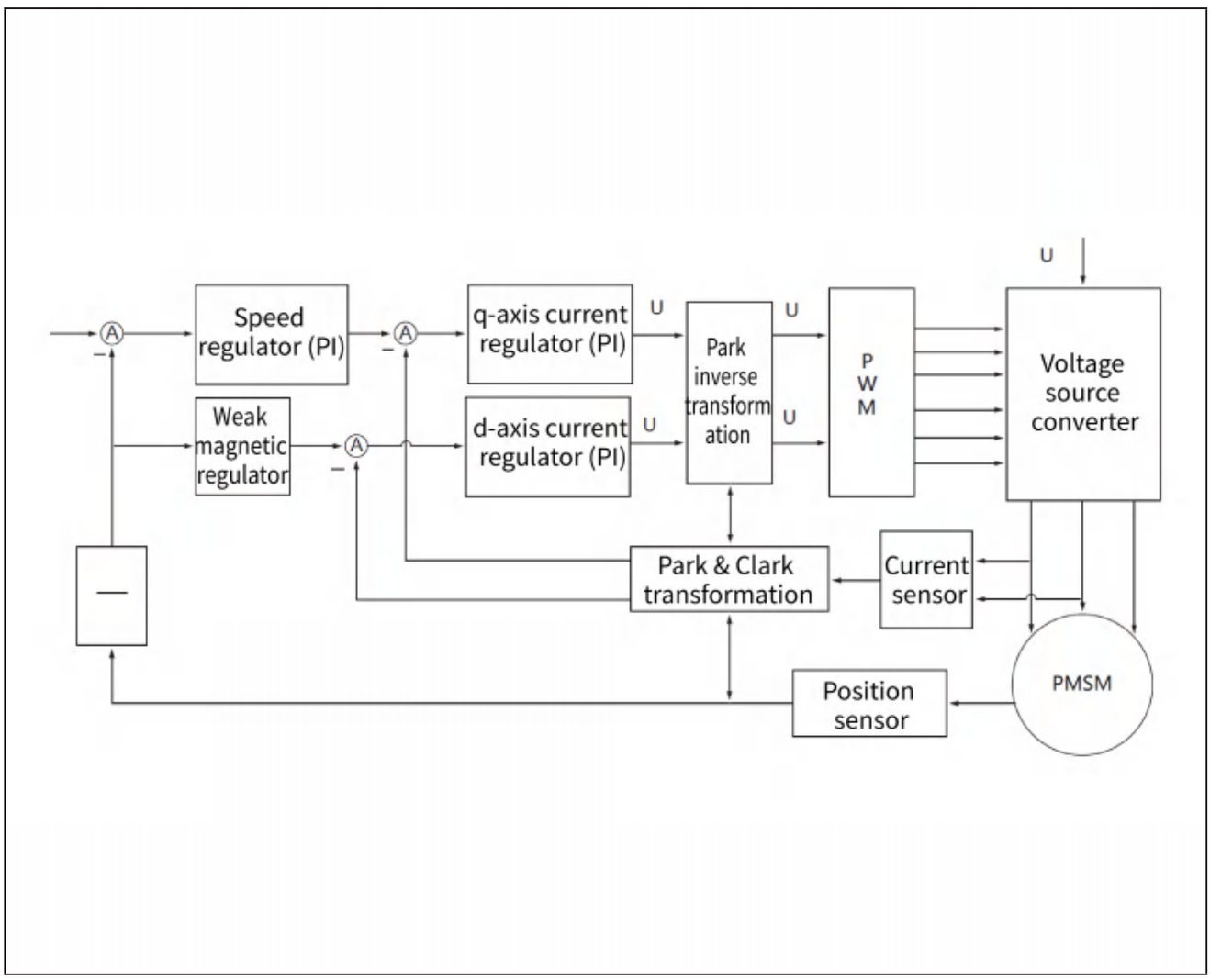
※ The current detection circuit uses Hall to detect the two phase AC current in the three-phase line (the other phase can be calculated), which is converted into digital signal through filtering and operational amplifier through AD sampling.

※ The rotary transformer circuit inputs the excitation signal and outputs the sine and cosine signals. The rotary transformer decoding circuit receives the signal and sends

it to the decoding chip for decoding. The position of the motor rotor and the speed of the motor are calculated and input into the vector control as important feedback quantities.

※ When the IGBT module overheats and has overcurrent fault, the fault detection circuit will protect the IGBT module.

Block diagram of vector control system



Overview of vector control system

The control mode of motor in the whole vehicle is generally divided into torque mode and speed mode.

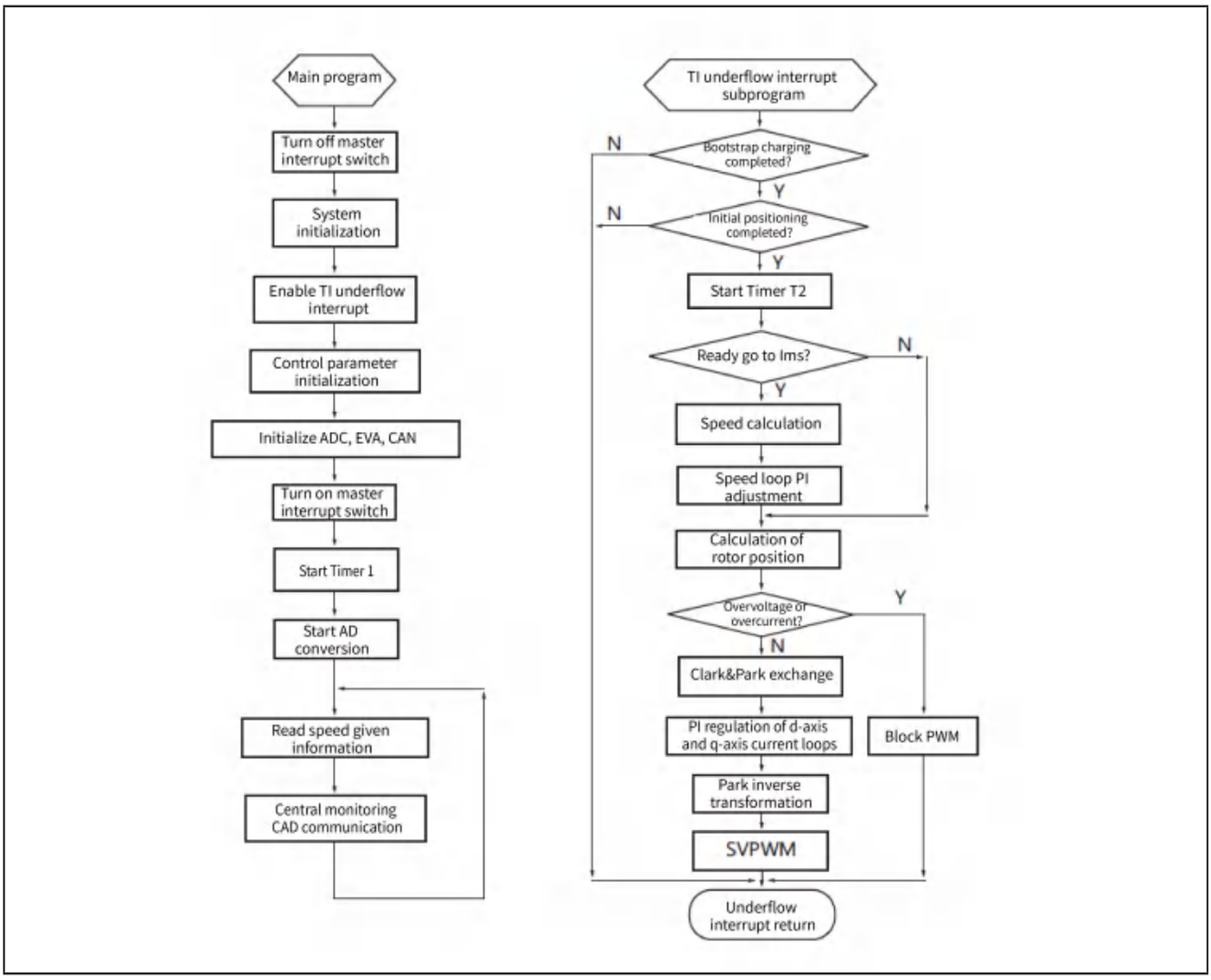
※ Torque mode control: VCU calculates the target torque and torque mode sent to the motor according to the accelerator pedal opening, battery, motor and other information. The motor control unit outputs the current torque of the motor after receiving the torque and whether to reduce the power (output torque by looking up the table). The table outputs the calibration data id, iq set value, and the rotor position

angle (the included angle θ between the d-axis and the A-phase axis) can be obtained through the rotary transformer). Measure three-phase AC current ia, ib, ic and angle θ through current sensor. Carry out Park and Clarke transformation to get the actual values of id and iq, and send the deviation between the given values of id and iq and the actual values into the current PI regulator of the d-axis and the q-axis respectively, and adjust the given values of Ud, Uq through PI, and Ud, Uq and angle θ. Perform Park inverse transformation output Uα, Uβ as the input of SVPWM, and the control unit power module is turned on and off.

※ Speed mode control: for example, when standing on the slope, the target speed (usually 0) and speed mode of the generator control unit under VCU, the actual speed measured by the rotary transformer is compared with the target speed, the difference is input to the speed PI regulator as input, and the actual speed is adjusted to the target speed by adjusting the output torque of the speed PI. After the output torque is filtered and whether to reduce the power, the current torque of the motor is output (output torque by looking up the table), and the calibration data id, iq given value are output by looking up the table. The process is the same as the above torque mode. Finally, the power module is turned on and off by SVPWM.

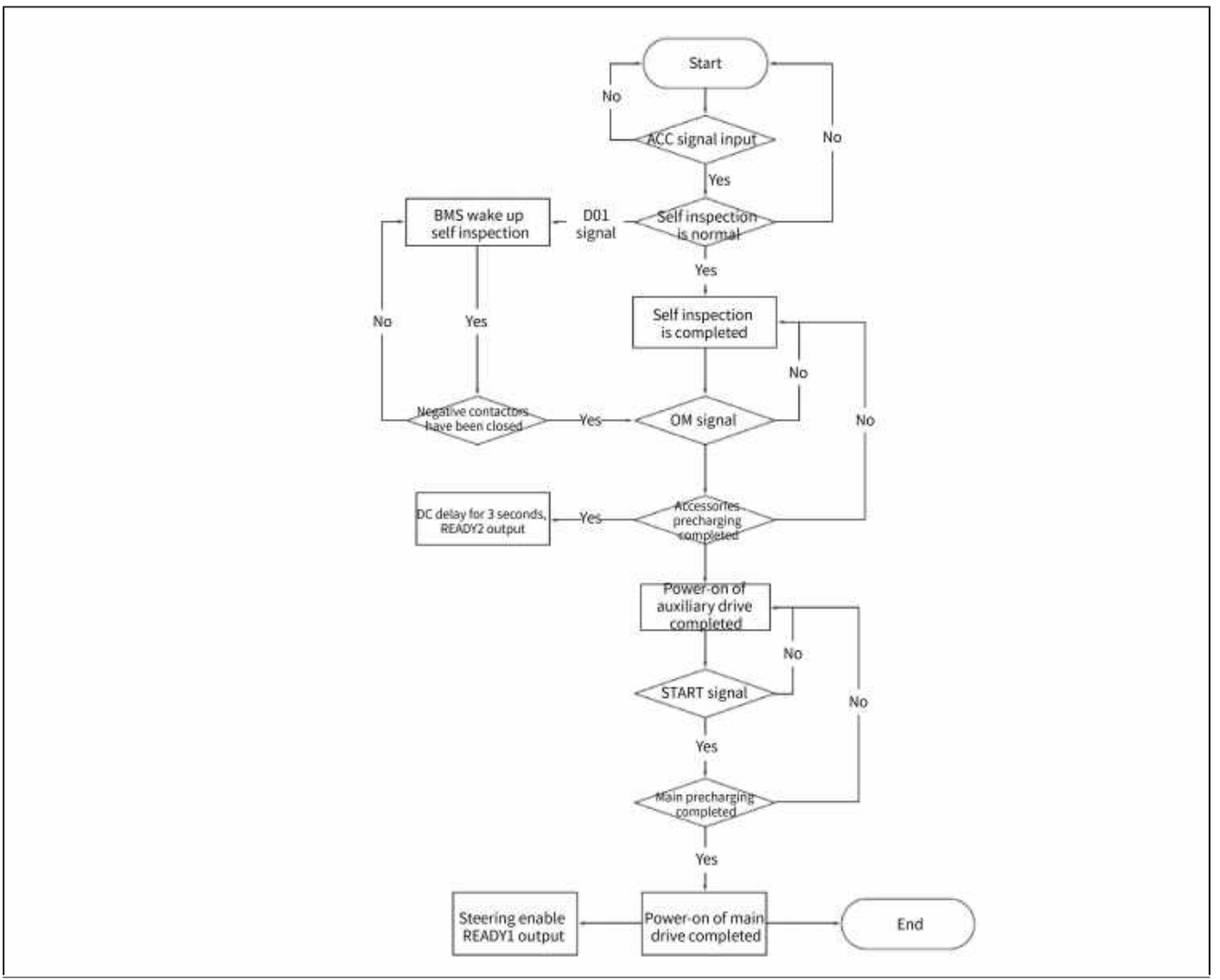
Tips:
※ Speed control has one more speed PI regulator than torque control. Generally, the motor will work in speed control mode only when standing on the slope, idling and shifting (with transmission).

Control system algorithm flow chart



4.1.6 Control strategy

Whole vehicle power-on and power-off logic



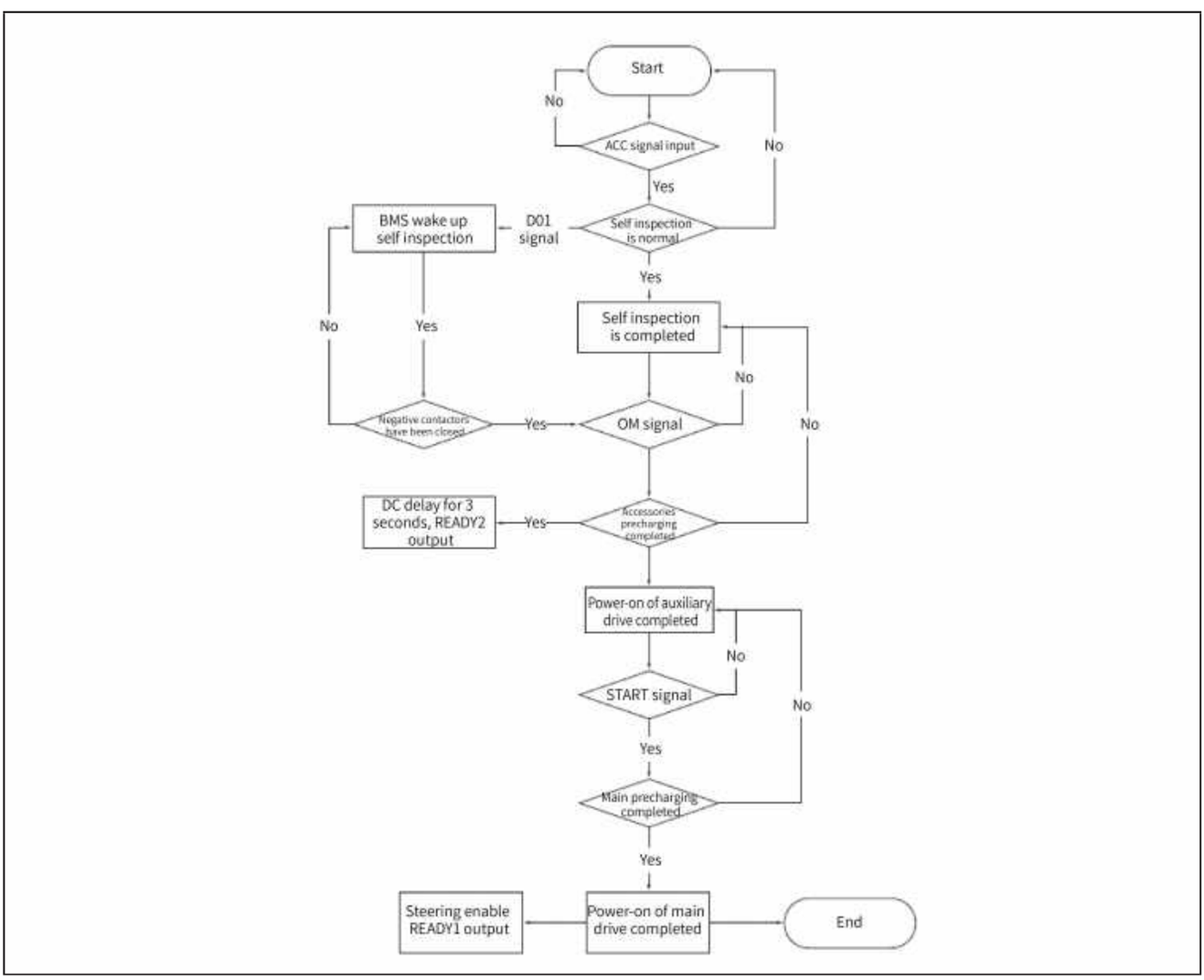
※ When the key is turned to the ACC position, the whole vehicle will provide the control unit with one way of ACC working power supply. At this time, the control unit will start initialization and self-inspection, and BMS wakes up and self-inspection passes.

※ When turning to the next gear ON, VCU provides one way of ON signal power supply. When the control unit confirms that the main and negative contactors have been closed, the accessory circuit completes the precharging synchronously.

※ When turning to the last ST gear, a ST signal is provided. When the vehicle control unit confirms that the main and negative contactors have been closed, the drive main circuit begins to precharging. After the drive main circuit has been pre-charged (that is, the main contactor has been closed), a 12 V+signal is fed back and output, which controls the water pump relay externally, and internally controls the working output enabling signal of the internal rotating control unit of the control unit. After initialization, the main positive contactor closing status shall be fed back to the bus in real time.

※ After the precharging of the accessory circuit is completed, the vehicle control unit will simultaneously start the delay control signal to keep the ACC relay inside the control unit working.

Power-off sequence



※ The key moves back from ON to ACC, the whole vehicle switches off the high-voltage power within 150 ms, and the delay signal is removed within 1 s after the ON signal disappears. VCU sends the high voltage command to the BMS, the battery main and negative contactors are disconnected, and the high voltage main circuit contactors are disconnected in turn. VCU checks that the voltage difference is greater than a certain value and sends the active discharge command to the MCU, and the MCU enters the current mode to reduce the bus voltage to the safe voltage within 3s; when the key is shifted from ACC to OFF, the VCU detects that the high voltage of the whole vehicle has dropped to the safe voltage, and then the low voltage power of the VCU peripheral signal power supply is completely cut off.

※ When the battery pack is in an abnormal state, BMS communication requests to power off and sends a message request to VCU to disconnect the main and negative contactors. After receiving the message for 2 s, VCU immediately executes the power limiting strategy (stop driving torque output).

Anti-slip function

In order to avoid back-slip during the switching between the brake pedal and the accelerator pedal when starting and stopping frequently on the ramp, the motor control unit will enter the speed loop according to the gear position and feedback speed information (no handbrake signal) to output torque to make the vehicle speed 0 (generator speed mode and target speed 0 under VCU) in the case of releasing the accelerator or braking (no handbrake signal) in the D/R gear to prevent the vehicle from sliding. The back-slip distance is generally less than 20 cm (8 in.), When the required output torque is greater than 140 N·m (103 ft-lbs.), the vehicle will maintain for 5-6 s, and this function will be stopped after the set time.

Misengaging protection

When the vehicle exceeds a certain safe speed (such as 5 km/h °C (194 °F)), the gear switch motor control unit does not respond to the gear request sent by the VCU, and still keeps the original gear to drive. There is no torque output when the vehicle is in gear and handbrake is pulled up.

Energy feedback function

※ When the vehicle is in the electric braking section and coasting, the motor works in the power generation state to charge the power battery, and generates the braking torque to provide the braking force for the whole vehicle. The control strategy of braking torque in the process of energy feedback is formulated by VCU, and the motor control unit responds to the corresponding negative torque in the torque mode.

※ VCU determines the distribution ratio of mechanical braking torque and electronic braking torque during braking through control strategy, and limits the feedback torque according to the power battery SOC, voltage, temperature and other states. The motor control unit responds to the power generation command and braking torque issued by VCU in torque mode, controls the motor in the power generation state, returns energy to the battery, and outputs the braking torque.

Power limiting output function

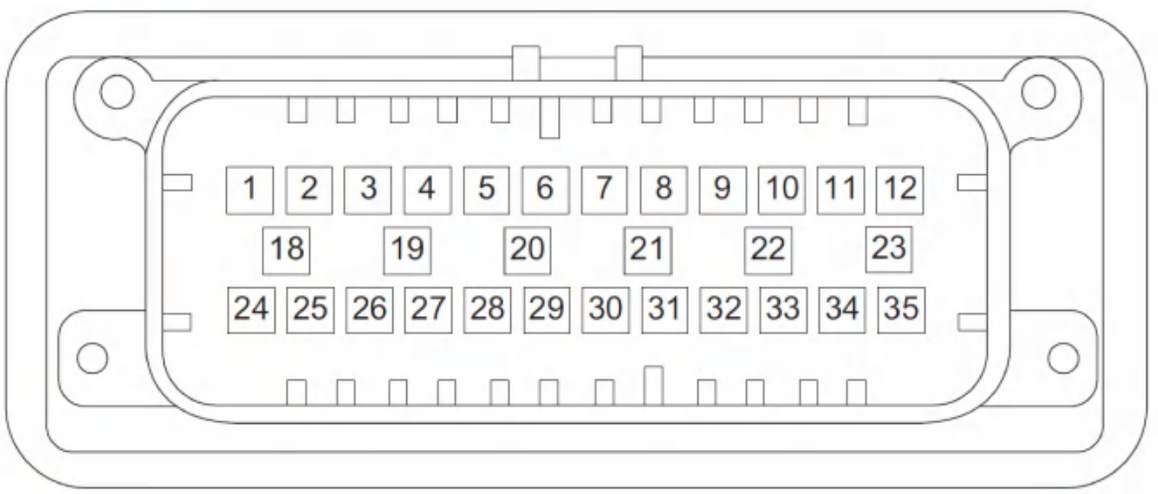
The limiting power of the drive system is mainly over-temperature power reduction (IGBT temperature>90 °C (194 °F), termination temperature>100 °C (212 °F), motor temperature>120 °C (248 °F), termination temperature>130 °C (266 °F)), over-voltage power reduction (bus voltage>420 V, termination 440 V), under-voltage power reduction (bus voltage<300 V, termination 250 V), over-speed power reduction (motor speed 4800 rpm, termination 5000 rpm), which can be seen through the parameter class - power reduction class. The power reduction status can be seen in the upper computer parameter observation (1 indicates no power reduction).

Active discharge function

During power-off, VCU detects that the voltage difference before and after is more than 30 V, and VCU sends an active discharge command to MCU. At this time, MCU enters the current control mode, and uses the current of id=10 Ad to put the high voltage into the safe voltage within 3 s through the motor winding.

4.1.7 Interface terminal definition

Low voltage signal plug-in of motor control unit



Base pin	Pin definition
1	EXC -
2	EXC +
7	CAN L
8	CAN H
12	12 V +
13	SIN -
14	SIN +
18	Ignition signal (key ON)
24	COS -
25	COS +
26	Temp1 (signal)
27	Temp1 (grounding)
35	12 V -

Low voltage signal plug-in of motor

Base pin	Pin definition
A	Rotary transformer excitation signal output
B	
C	Rotary transformer sine signal input
D	
E	Rotary transformer cosine signal input
F	
G	Positive terminal input of motor temperature detection
H	Negative terminal input of motor temperature detection

4.1.8 Fault definition

Fault type description	Prio-rity	Fault detection enabling condition	Fault maturity conditions	Fault matu-rity time	Fault removal conditions	Fault rem-oval time	Fault automatic recovery conditions	Safety measures during detection	Cause of fault	Troublesh-ooting steps
Phase current vercurrent fault	1	Put into gear	Occurs when the phase current is greater than or equal to (380A) or less than or equal to negative (380A)	625us	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Motor rotation angle deviation; faulter failure	Check the rotary transformer line; replace the control unit
Inverter fault	1	After ready	Over current, over voltage, over temperature, fault setting in hardware signal	12.5ns	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Motor temperature line; control unit failure	Check the rotary transformer line and motor emperature line; replace the control unit
Motor position sensor fault	1	Put into gear	Occurs when the rotary position sensor is not connected or the position decoding chip or signal is wrong	625us	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Rotary transformer line; control unit fault	Check the rotary transformer line; replace the control unit

Fault type description	Prio-rity	Fault detection enabling condition	Fault maturity conditions	Fault matu-rity time	Fault removal conditions	Fault rem-oval time	Fault automatic recovery conditions	Safety measures during detection	Cause of fault	Troublesh-ooting steps
Bus overvoltage warning	3	After ready	Report warning when bus voltage is greater than 420 V; 420-440 V power reduction	30 ms	Bus voltage is lower than 420 V; warning recovery	30 ms	Bus voltage is lower than 420 V; the warning is recovered and the speed is lower than 500 rpm	MCU power reduction processing	Abnormal battery voltage; rotary transformer line; control unit fault	Check the battery; the rotary transformer line; replace the control unit
DC bus overvoltage fault	1	Put into gear	Occurs when the bus voltage is greater than or equal to (460 V)	30 ms	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Abnormal battery voltage; rotary transformer line; control unit fault	Check the battery; the rotary transformer line; replace the control unit
Bus undervol-tage warning	3	After ready	Report warning when bus voltage is lower than 250 V; 250-220 V power reduction	30 ms	Bus voltage is higher than 250 V; warning recovery	-	Bus voltage is higher than 250 V; warning recovery	MCU power reduction processing	Abnormal battery voltage; rotary transformer line; control unit fault	Check the battery; the rotary transformer line; replace the control unit
DC bus undervol-tage fault	2	Put into gear	Occurs when the bus voltage is less than or equal to (200 V)	30 ms	When the voltage is greater than or equal to (200 V), low voltage power failure recovery	30 ms	When the voltage is greater than or equal to (200 V), low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Abnormal battery voltage; rotary transformer line; control unit fault	Check the battery; the rotary transformer line; replace the control unit
Motor over-temperature fault	1	Power on	Occurs when the motor temperature is greater than or equal to (155 °C)	30 ms	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Rotary transformer line, control unit failure; motor temperature line	Check the rotary transformer, temperature acquisition line, and replace the control unit

Fault type description	Prio-rity	Fault detection enabling condition	Fault maturity conditions	Fault matu-rity time	Fault removal conditions	Fault rem-oval time	Fault automatic recovery conditions	Safety measures during detection	Cause of fault	Troublesh-ooting steps
Control unit over-temperature fault	1	Power on	Occurs when the control unit temperature is greater than or equal to (100 °C)	30 ms	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Water pump, control unit fault	Check water pump; replace the control unit
Motor overspeed warning	1	Power on	Occurs when the motor speed exceeds (9000) rpm	-	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Rotary transformer line; control unit fault	Check the rotary transformer line; replace the control unit
Phase loss protection	3	Power on	When the electric control current of one phase is abnormally lower than that of other phases	625 us	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Three-phase line; control unit fault	Check the three-phase line; replace the control unit
Short circuit to ground	3	Power on	When the electric control phase contacts the ground	625 us	Low voltage power failure recovery	-	When the insulation of a phase is abnormal	Close MOSFET or IGBT and enter failure mode	Three-phase line; control unit fault	Check the three-phase line; replace the control unit
Motor over-temperature warning	3	Power on	Occurs when the motor temperature is greater than or equal to 140 °C (284 °F), 140-150 °C (284~302 °F) power reduction	30 ms	When the temperature is less than 140 °C (284 °F), the warning will resume	30 ms	When the temperature is less than 140 °C (284 °F), the warning will resume	MCU power reduction processing	Rotary transformer line, control unit failure; motor temperature line	Check the rotary transformer, temperature acquisition line, and replace the control unit

Fault type description	Prio-rity	Fault detection enabling condition	Fault maturity conditions	Fault matu-rity time	Fault removal conditions	Fault rem-oval time	Fault automatic recovery conditions	Safety measures during detection	Cause of fault	Troublesh-ooting steps
Inverter over-temperature warning	3	Power on	Occurs when the control unit temperature is greater than or equal to 85°C (185 °F), 85-95°C (185~203 °F) power reduction	30ms	When the temperature is less than 85°C (185 °F), the warning will resume	30ms	When the temperature is less than 85°C (185 °F), the warning will resume	MCU power reduction processing	Water pump, control unit fault	Check water pump; replace the control unit
CAN BUS OFF fault	2	Put into gear	Occurs when the MCU does not receive the CAN message sent by the VMS for 50 consecutive frames	1s	1. When receiving the CAN message from VMS, 2. Enter the OFF mode, 3. Low voltage power failure recovery	100 ms	1. When receiving the CAN message from VMS, 2. Enter the OFF mode, 3. Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	CAN resistance; CAN circuit	Check CAN circuit
Motor mode fault	2	Put into gear	Occurs when the request mode is not in the mode listed by MCU or the request mode does not meet the magic conversion requirements	30ms	1. Enter the OFF mode, 2. Low voltage power failure recovery	30ms	1. Enter the OFF mode, 2. Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	-	-
Control unit supply voltage fault	1	Power on	Occurs when the MCU power supply voltage is less than (8V)	30ms	1. When the voltage is less than or equalto (9V) 2. Low voltage power failure recovery	30ms	1. When the voltage is less than or equalto (9V) 2. Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	The battery is out of power; control unit exception	Replace the battery; replace the control unit

Fault type description	Prio-rity	Fault detection enabling condition	Fault maturity conditions	Fault matu-rity time	Fault removal conditions	Fault rem-oval time	Fault automatic recovery conditions	Safety measures during detection	Cause of fault	Troublesh-ooting steps
Door drive supply voltage fault	1	Power on	Occurs when the door drive supply voltage is less than (4.7V)	12.5ns	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Control unit fault	Replace the control unit
Module fault	1	Put into gear	IGBT drive output fault level	12.5ns	Low voltage power failure recovery	-	Low voltage power failure recovery	Close MOSFET or IGBT and enter failure mode	Control unit	Replace the control unit

4.2 On-board maintenance

4.2.1 Motor control unit (MCU)

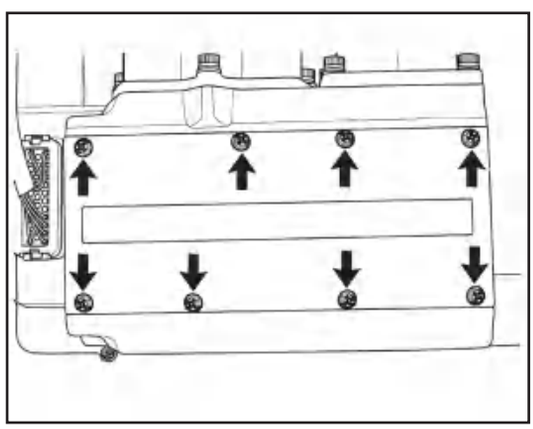
Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove motor control unit assembly

   ① Remove 8 fixing bolts (arrows) of the motor control unit protective cover plate and remove the protective cover plate.

   Tightening torque:

   3±1 N·m (2.2±0.7 ft-lbs.)

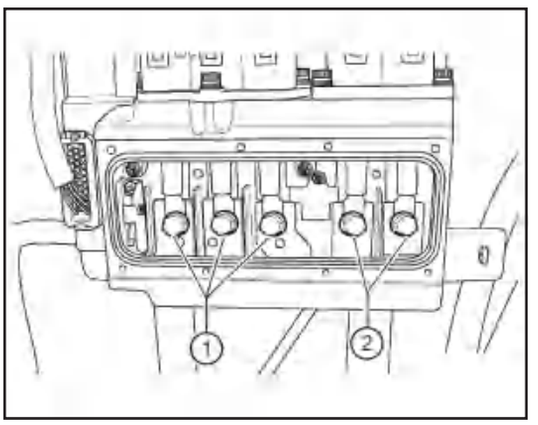


Caution:
※ The protective cover plate of the motor control unit has a loop interlock device. When the protective cover plate is removed, the cover removal protection switch is disconnected. Carry out high-voltage power-off.

② Remove the fixing bolts of three-phase cable fixing terminal (1) and DC bus fixing terminal (2) respectively.

Tightening torque:

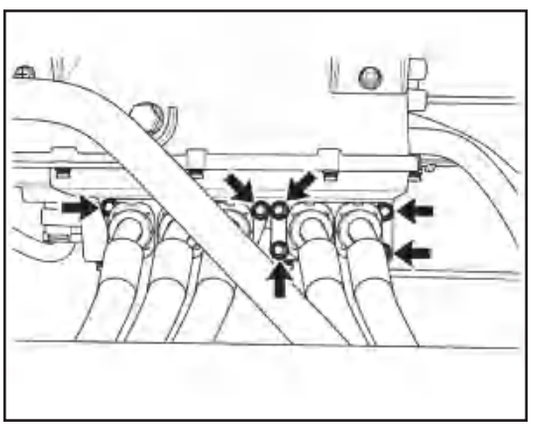
15±2 N·m (11.1±1.5 ft-lbs.)



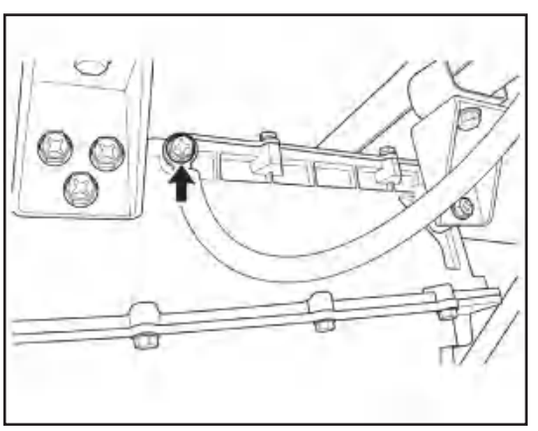
③ Remove the fixing bolts of three-phase cable connector and DC bus cable connector respectively (arrows). Carefully pull out the cable from the motor control unit.

Tightening torque:

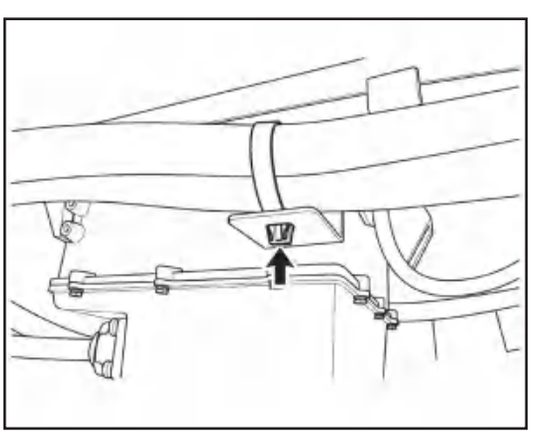
9±1 N·m (6.6±0.7 ft-lbs.)



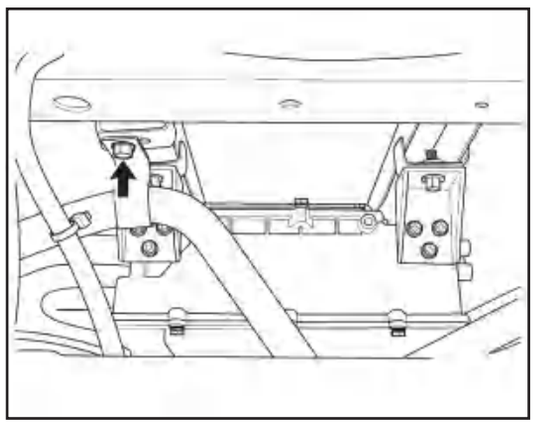
④ Remove the fixing bolts (arrow) of the grounding wire of the motor control unit housing.



⑤ Disengage the high-voltage cable fixing clip from the motor control unit mounting bracket (arrow).

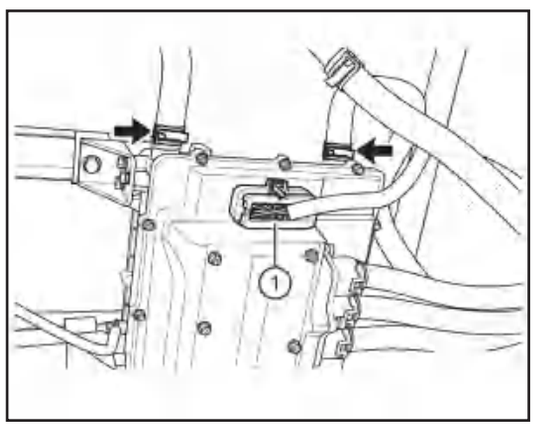


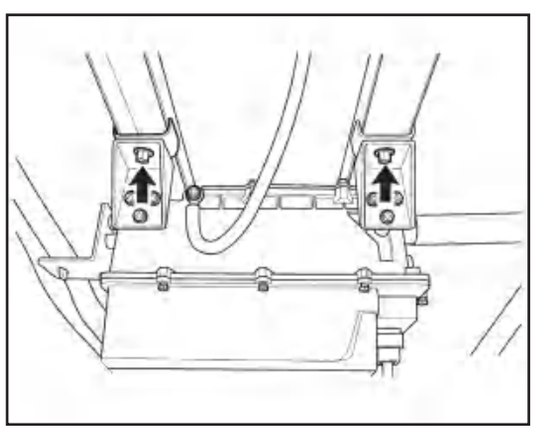
⑥ Remove 1 connecting bolt (arrow) from the water pipe fixing bracket.



⑦ Loosen the elastic clamp (arrows) and separate the water inlet and outlet pipes from the motor control unit.

⑧ Disconnect the motor control unit low-voltage signal plug-in connector (1).

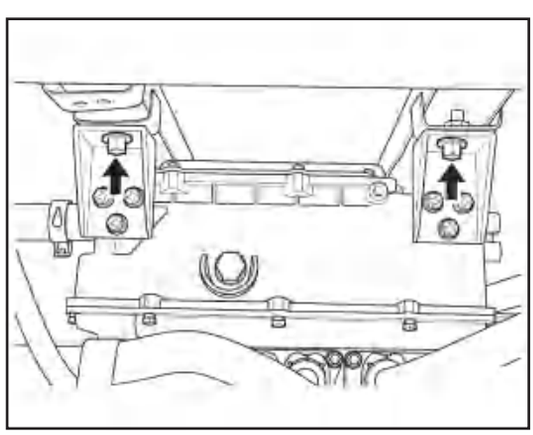




⑨ Remove 4 fixing bolts (arrows) of the motor control unit mounting bracket. Carefully remove the motor control unit assembly.

Tightening torque:

25±2 N·m (18.5±1.5 ft-lbs.)



Caution:
※ Due to the heavy weight of the motor control unit, it is necessary to use the corresponding module to support when removing the fixing bolts. Remove the motor control unit assembly with care. Prevent the motor control unit from falling, causing personal injury or component damage.

Installation

1. The sequence of installing the motor control unit is the reverse of the removal sequence.

Caution:
※ When installing the motor control unit, use corresponding module to support. Prevent the motor control unit from falling, causing personal injury or component damage. ※ When installing three-phase cables and DC bus cables, pay attention to phase sequence and polarity. The fixing bolts must be tightened. Avoid ablation. ※ After installing the rear motor control unit, it is necessary to replenish the coolant.

4.2.2 Drive motor

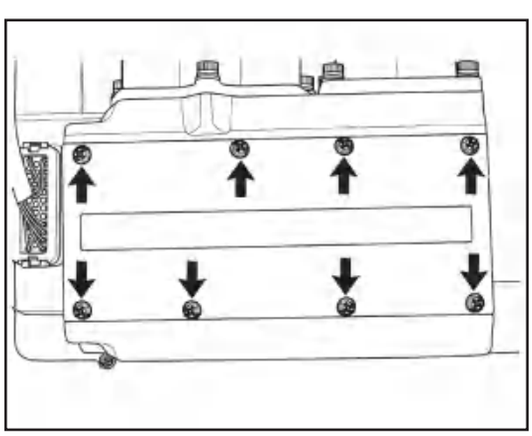
Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the drive motor assembly

   ① Remove 8 fixing bolts (arrows) of the motor control unit protective cover plate and remove the protective cover plate.

   Tightening torque:

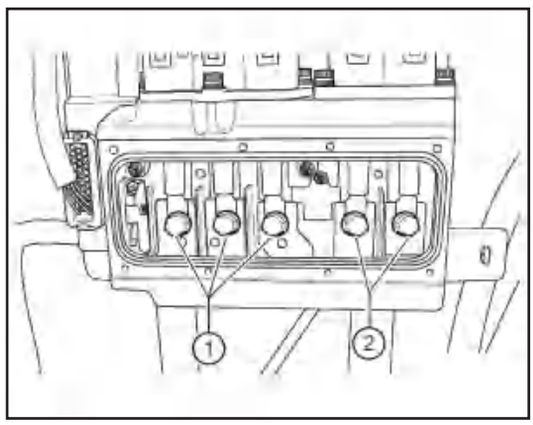
   3±1 N·m (2.2±0.7 ft-lbs.)



② Remove the fixing bolts of three-phase cable fixing terminal (1) and DC bus fixing terminal (2) respectively.

Tightening torque:

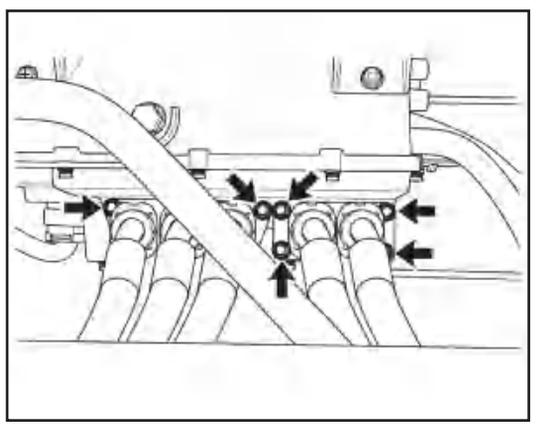
15±2 N·m (11.1±1.5 ft-lbs.)



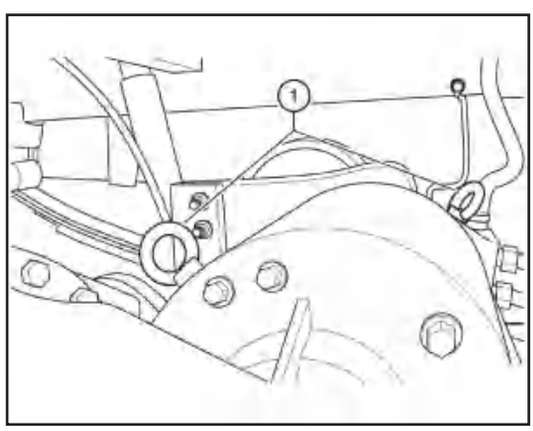
③ Remove the fixing bolts of three-phase cable connector and DC bus cable connector respectively (arrows). Carefully pull out the cable from the motor control unit.

Tightening torque:

9±1 N·m (6.6±0.7 ft-lbs.)



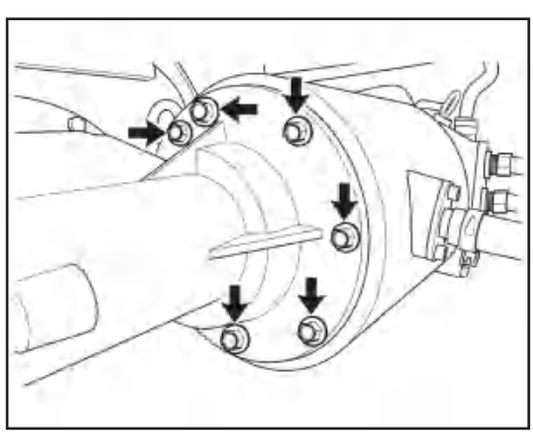
④ Due to the heavy weight of the motor, it is necessary to use a sling to lift the two lifting lugs (1) of the motor or use a module to support the motor before disassembling the motor. Prevent the motor from falling.



⑤ Remove 7 bolts (arrows) connecting the motor and the drive rear axle.

Tightening torque:

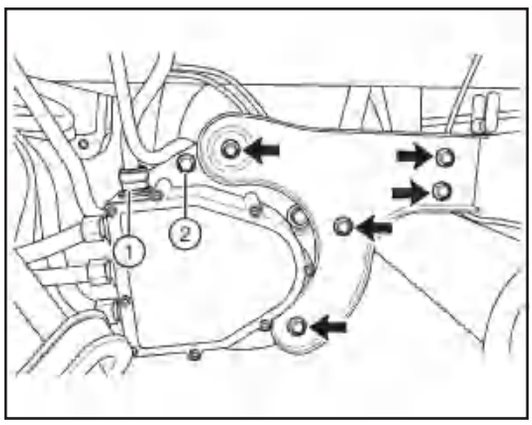
30±3 N·m (22.1±2.2 ft-lbs.)



⑥ Disconnect low voltage signal plug-in of motor (1).

⑦ Remove the fixing bolts (2) of the grounding wire of the motor housing.

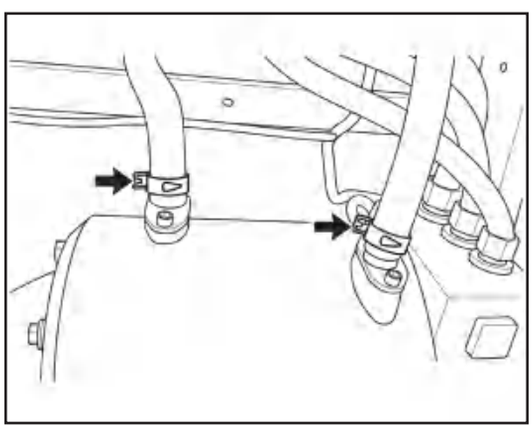
⑧ Remove 3 bolts (arrows) connecting the motor mounting bracket and 2 bolts (arrows) connecting the mounting bracket and the axle.



Tightening torque: 25±2 N·m (18.5±1.5 ft-lbs.)

45±5 N·m (33.2±3.7 ft-lbs.)

⑨ Loosen the elastic clamp (arrows) and disconnect the water inlet and outlet pipes from the motor assembly,Remove the motor assembly with care.



Installation

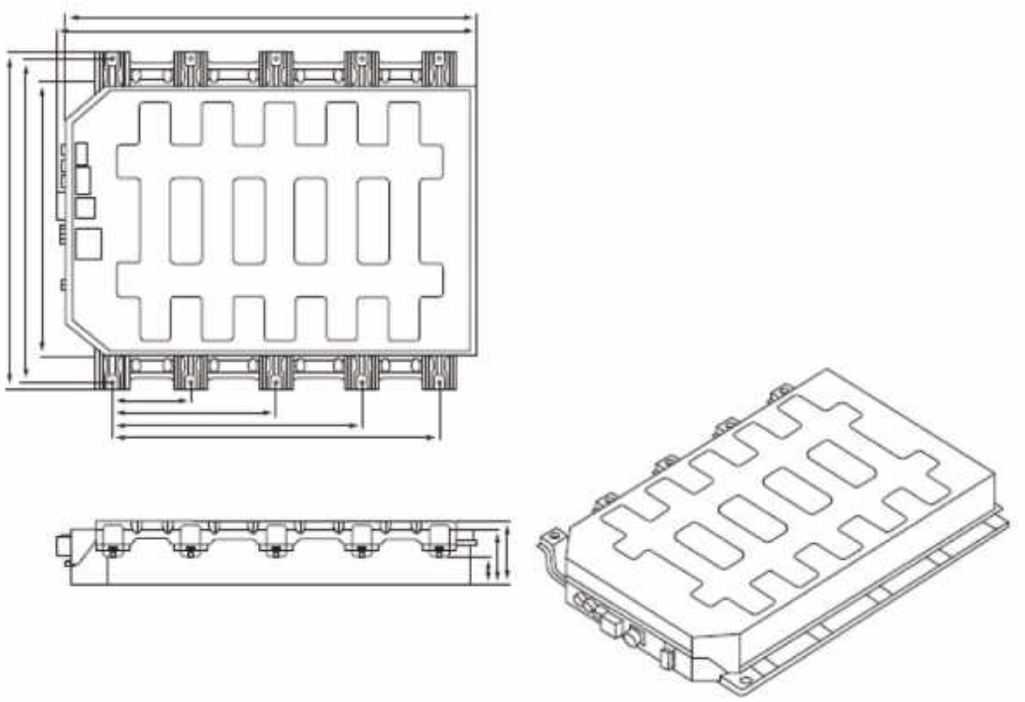
1. The sequence of installing the drive motor is the reverse of the removal sequence.

Caution:
※When installing the drive motor assembly, it is necessary to use the corresponding module to support or use the sling to lift the lifting lug; and prevent it from falling, causing personal injury or component damage. ※When installing three-phase cables and DC bus cables, pay attention to phase sequence and polarity. The fixing bolts must be tightened. Avoid ablation. ※When installing the connection between the drive motor and the rear axle, 7 fixing bolts can be installed and fastened only after being coated with thread sealant. Thread tightening adhesive model: Tyler (243 – SG) ※After installing the drive motor assembly, it is necessary to replenish the coolant.

Power battery

5.1 Functional specifications

5.1.1 Schematic diagram of power battery



5.1.2 Introduction to power battery system

Power battery system consists of battery module, box, battery management system (BMS), high voltage box (BDU), high/low voltage harness, thermal management system, etc.

Introduction to functions of various parts of power battery system:

※ Battery module: It is composed of one or several single cells assembled in series and parallel to provide energy storage and power output. Among them, series connection is used to increase voltage and parallel connection is used to increase capacity.

※ Box: used to load the battery module and fix it with the vehicle body.

※ Battery management system (BMS): It is the link between the user and the battery. It can monitor the estimation of the battery unit voltage, current, temperature and SOC in real time, and control (protect) the battery when its status exceeds the requirements of technical parameters.

※ High-voltage harness: It is mainly used to connect various battery modules in series and connect them with the power parts of the whole vehicle.

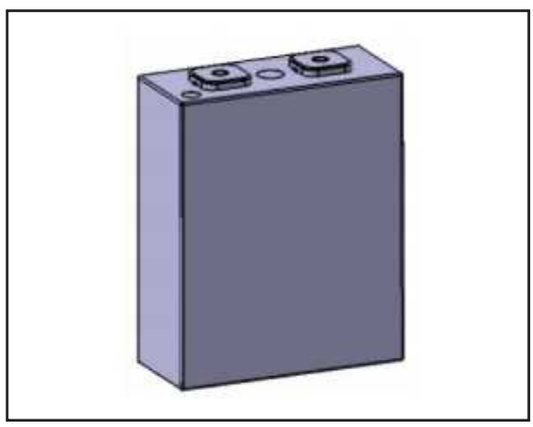
※ Low-voltage harness: It is mainly used to transmit the voltage, current, temperature and other signals of the battery and provide power connection for the battery management system.

※ Thermal management system: It is mainly used to control the temperature of the battery pack in the normal working range. The heating system uses liquid heating or heating film heating.

5.1.3 Introduction to battery pack

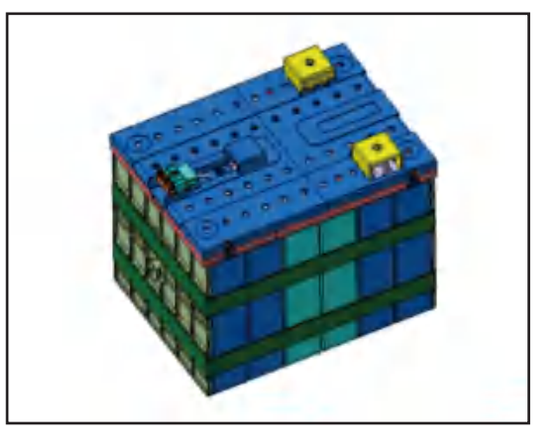
1. Cell model (lithium iron phosphate cell IFR32135-15Ah)

Model	IFP42100140A-63 Ah
Voltage	3.2 V
Capacity	63 Ah
Weight	1.024 kg (2.258 lbs.)
Dimensions	42*100*140 mm



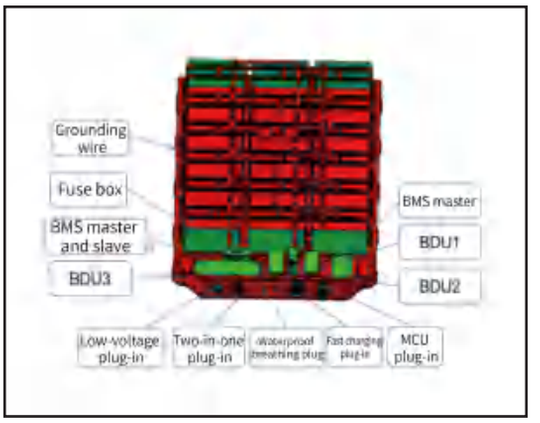
2. Battery module

Module parameters	
Group mode	2P6S
Module dimensions	274*204*174 mm (10.8*8.0*6.9 in.)
Weight	15.4 kg (34.0 lbs.)
Nominal content	126 Ah@1C
Nominal voltage	19.2 V@1/3C
Voltage range:	15 ～ 21.9 V



3. Full box of battery pack

The battery pack of this project is composed of 18 2 P6S modules in series, including 12 positive modules and 6 negative modules. The unit voltage is calculated as 3.2 V



Module data: voltage=3.2*6=19.2 V

capacity=63*2=126 Ah

Battery pack data: voltage=19.2*18=345.6 V, capacity=63*2=126 Ah

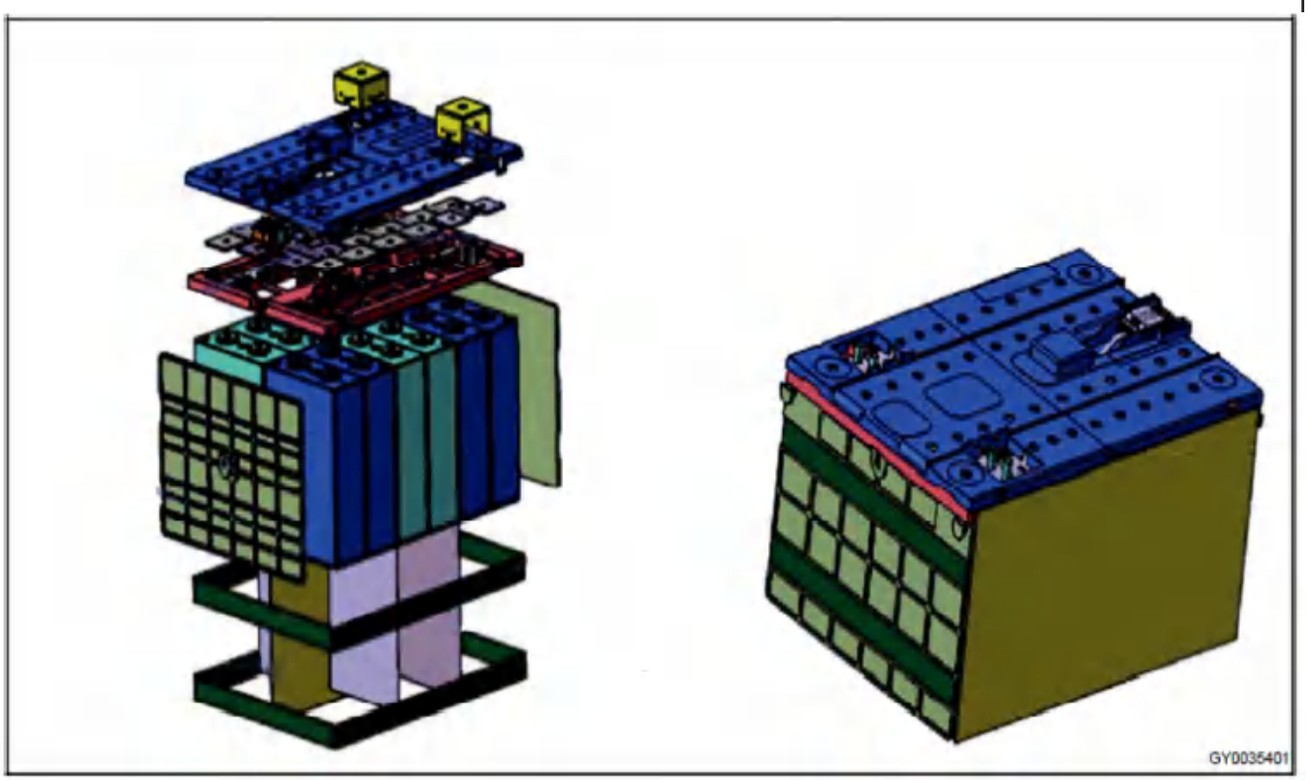
5.1.4 Main technical parameters

Parameters of battery system	
Item No.	DT2011
Cell	IFP42100140A-63 Ah
Group mode	2P108S
Total voltage	345.6 V
Operating voltage range	270 ～ 388.8 V
Total power	126 Ah
Total power of the system	43.55 kWh
Energy density	≧ 135 Wh/kg (61.2 Wh/lbs.)
SOC use window	5 %-100 %
Cooling mode	Natural cooling/heating film

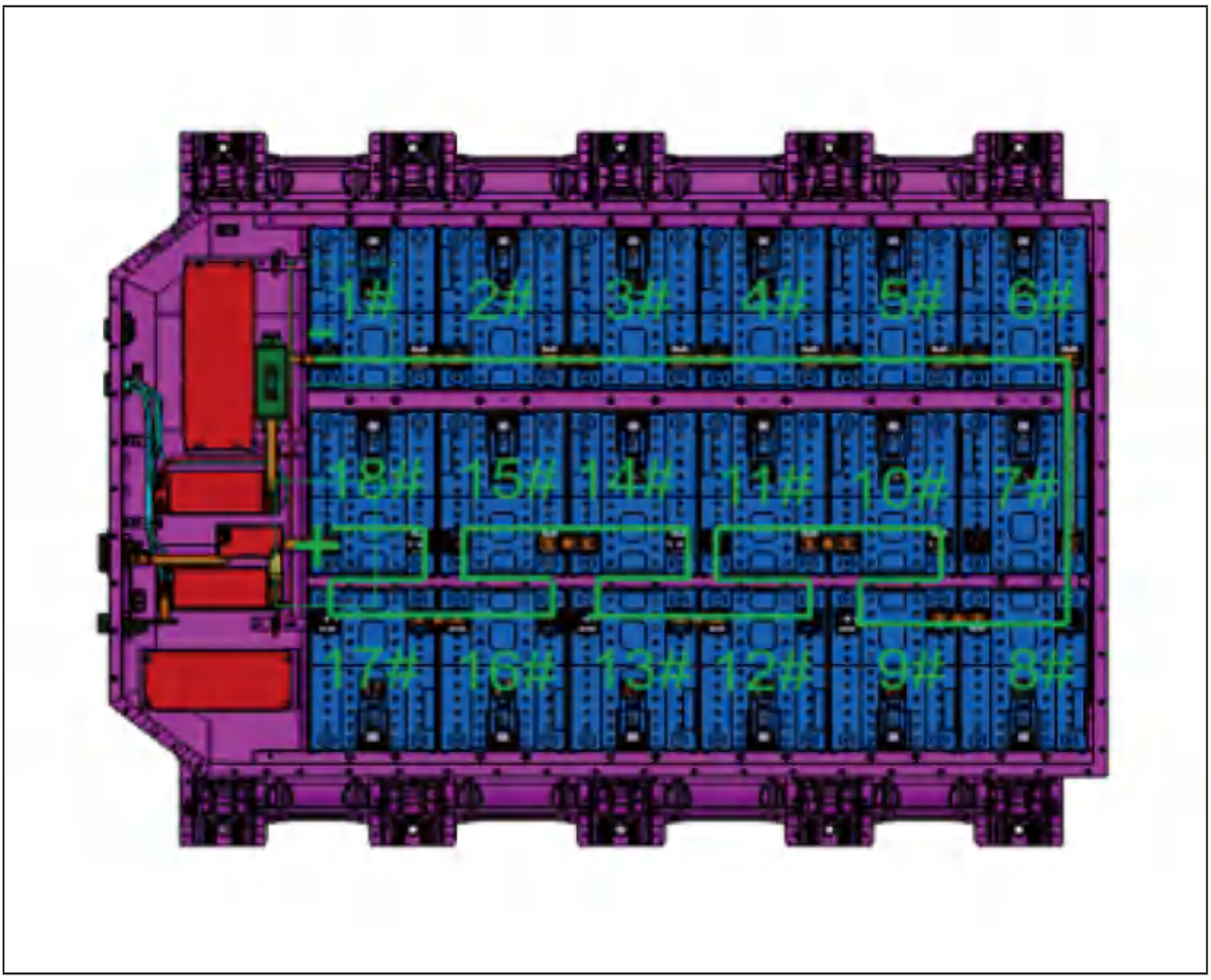
5.1.5 Composition of power battery system

Composition of battery pack

※ Module assembly:

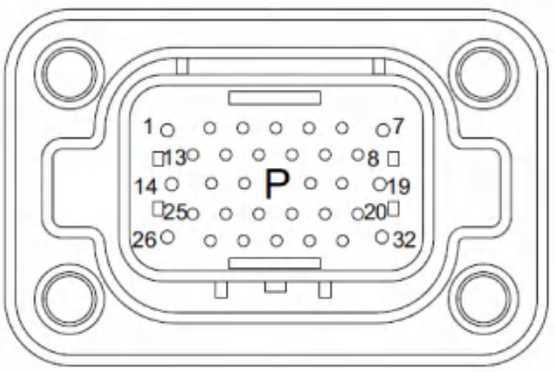


※ Schematic diagram of module arrangement in the battery box:



There are 18 modules in total: 1#-6#, 8#, 9#, 12#, 13#, 16#, 17#, 12 positive modules in total. There are 6 reverse modules in total, including 7 #, 10 #, 11 #, 14 #, 15 # and 18 #.

※ Low voltage signal plug-in



Battery pack side

Harness side

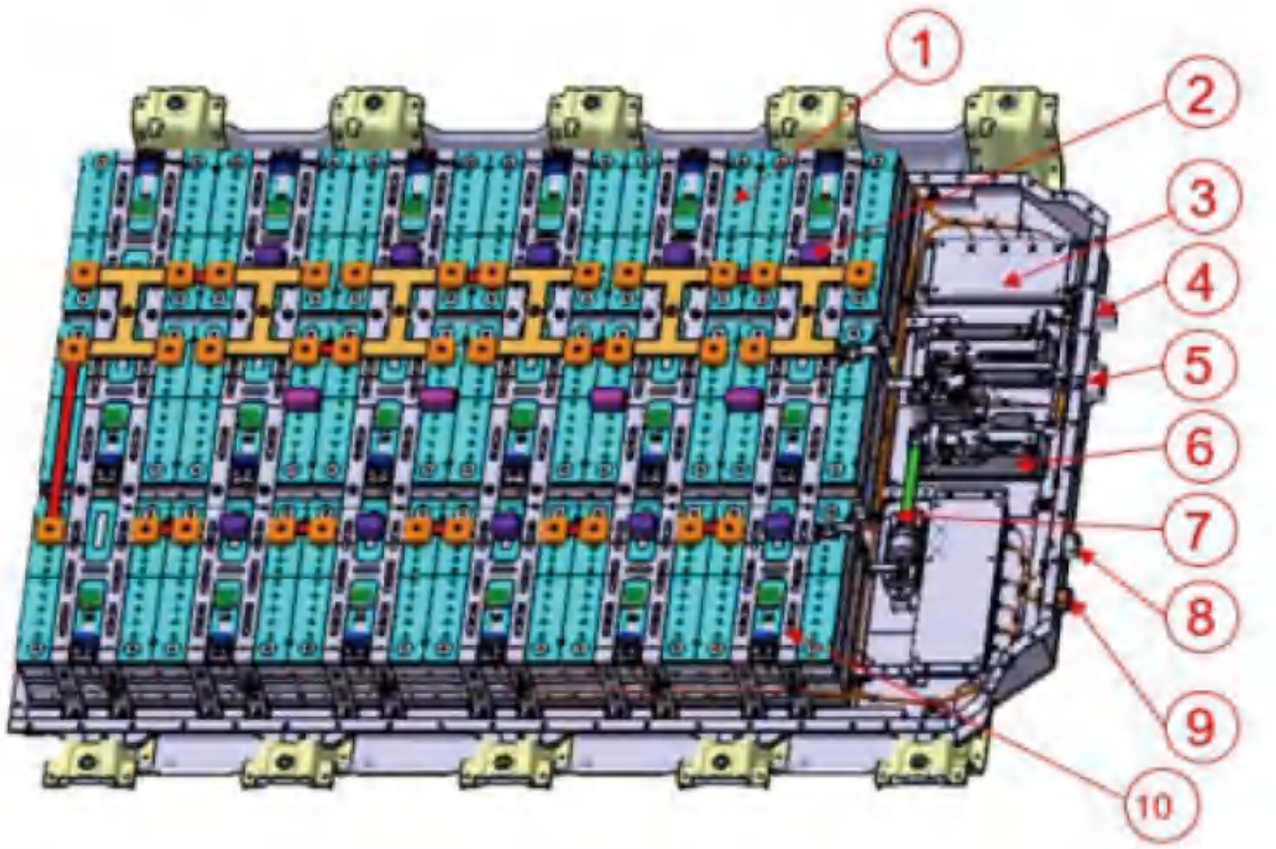
PIN No.	Function description	Working current(A)			
		Rated current	Minimum current	Maximum current	Signal type
1	BMS power supply 12 V power supply - lead acid 12 V positive	1.5	/	3	Power supply
2	High voltage circuit relay closing enable signal	0.5	/	1	Analog signal
3	Slow charging activation	0.02	/	0.05	Analog signal
4	Reserved	/	/	/	/
5	Reserved	/	/	/	/
6	CC OUT	0.02	/	0.05	Analog signal
7	Ignition signal of fast charging equipment	1.5	/	3	Power supply
8	DC charging guide circuit CC2 signal	0.02	/	0.05	Analog signal
9	Reserved	/	/	/	/
10	Vehicle CAN high	/	/	0.02	Digit

PIN No.	Function description	Working current(A)			
		Rated current	Minimum current	Maximum current	Signal type
11	Vehicle CAN low	/	/	0.02	Digit
12	Fast charging CAN network high	/	/	0.02	Digit
13	Fast charging CAN network low	/	/	0.02	Digit
14	Reserved	/	/	/	/
15	Reserved	/	/	/	/
16	Thermistor 1-fast charging socket temperature sensor T1+	/	/	/	/
17	Thermistor 1 grounding-fast charging socket temperature sensor T1-	/	/	/	/
18	Intranet CAN high - debug CAN	/	/	0.02	Digit
19	Reserved	/	/		
20	Intranet CAN low - debug CAN	/	/	0.02	Digit
21	Vehicle ignition signal - ON gear	0.02	/	0.05	Digit
22	Reserved	/	/	/	/
23	Thermistor 2-fast charging socket temperature sensor T2+	0.02	/	0.05	Analog signal
24	HV interlock (HV electrical box)	0.02	/	0.05	Analog signal
25	Electronic lock (reserved)	0.02	/	0.05	Analog signal
26	BMS power supply grounding - lead acid 12V negative	1.5	/	3	Ground
27	Reserved	/	/	/	/
28	Thermistor 2 grounding-fast charging socket temperature sensor T1-	0.02	/	0.05	Analog signal
29	Reserved	/	/	/	/
30	Reserved	/	/	/	/
31	Reserved	/	/	/	/
32	BMS power supply grounding -charging power supply 12V negative	1.5	/	3	Ground

※ Electrical information statistics

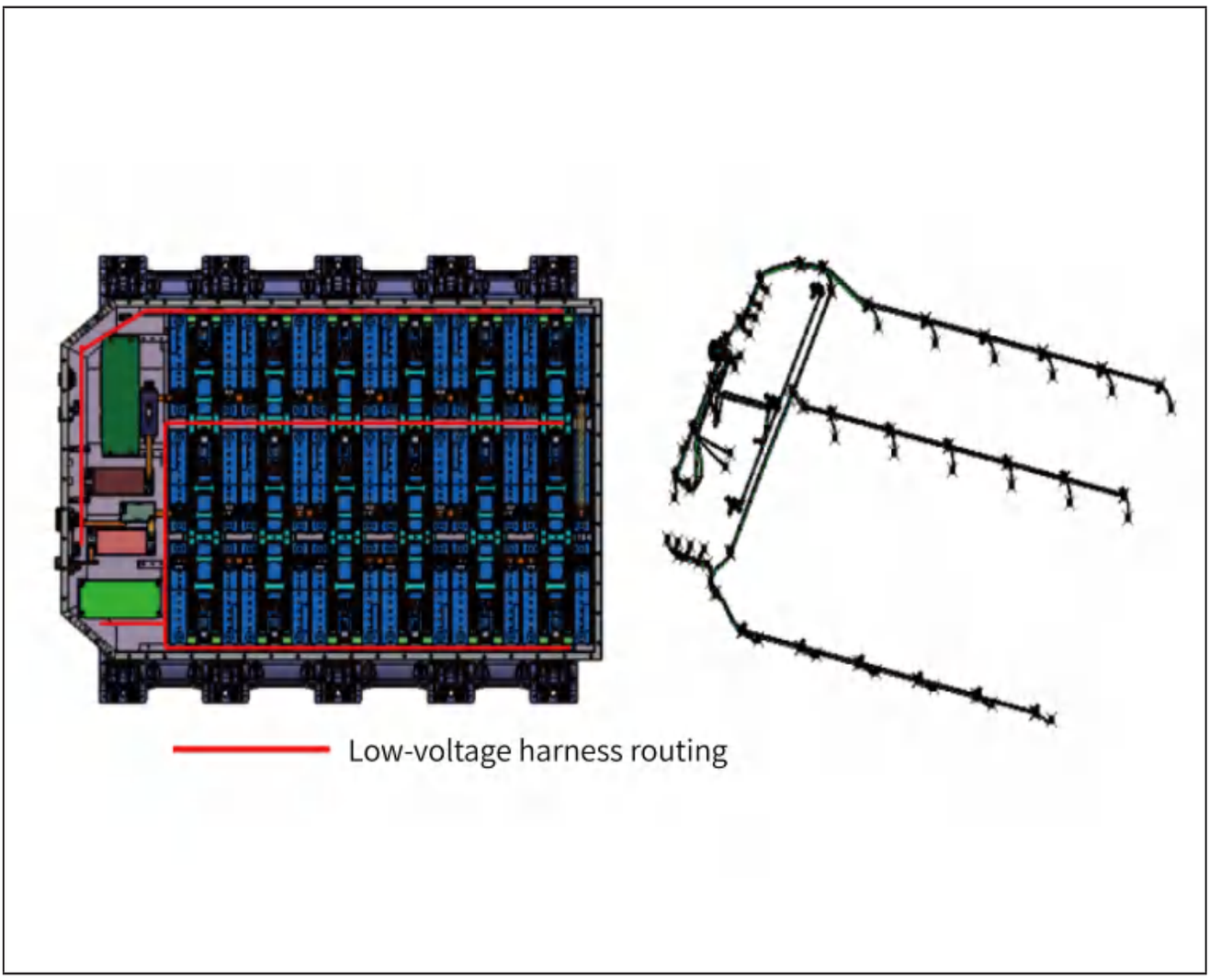
Operating voltage range:	9-16 V	Quiescent current (mA):	1 mA
Terminal coating requirements:	Tin coating	Grounding requirements:	N/A

※ Internal structure of battery box



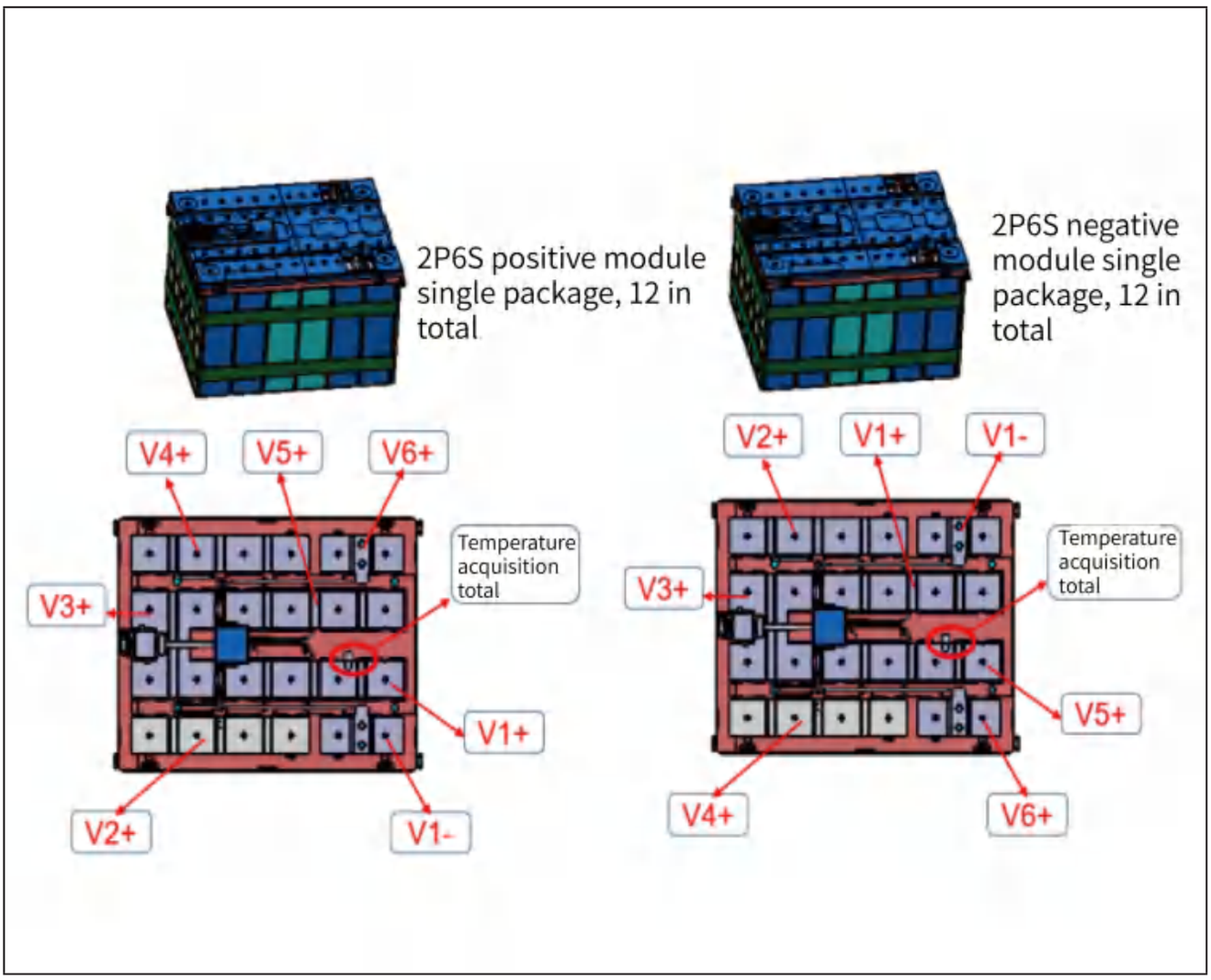
No.	Name	No.	Name
1	2 P108S module	6	BDU module
2	Foam pad in the box	7	Fuse
3	BMS module	8	Two-in-one plug-in
4	MCU plug-in	9	Communication plug-in
5	Fast charging plug-in	10	Module pressing plate

※ Low voltage acquisition line



※ Module temperature sensing point arrangement

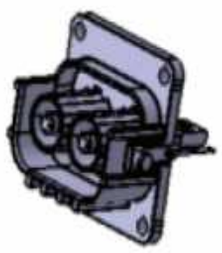
Each module in this project has one temperature sensor, and the specific location is shown in the figure below.



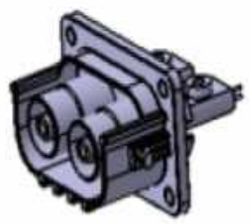
※ Type selection and design of electrical parts - high and low voltage plug-ins

Low-voltage communication plug-in

PDU+slow charging two-in-one high-voltage plug-in



Fast charging high-voltage plug-in



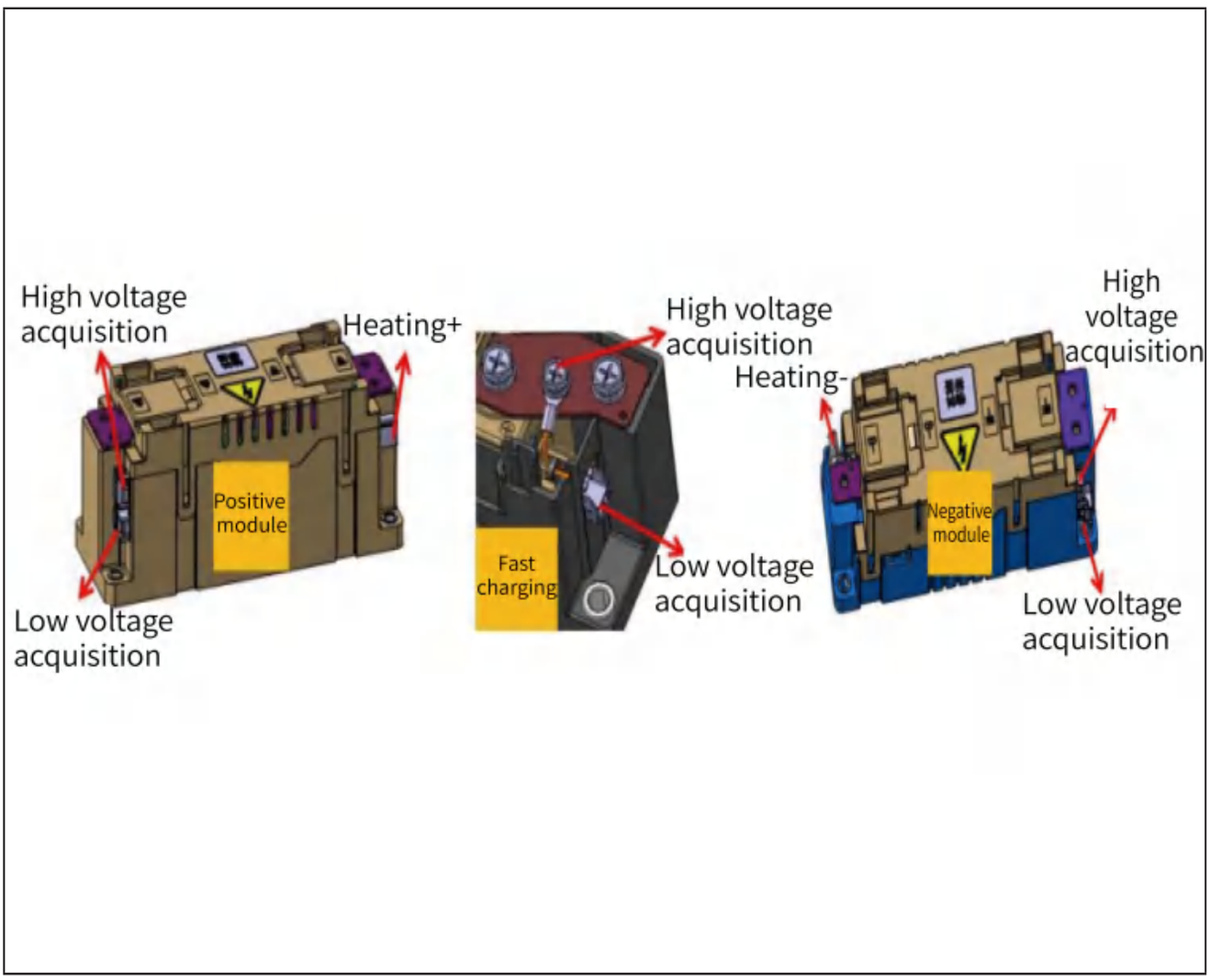
MCU high-voltage plug-in

Name	Model	PIN No.
Low voltage communication plug-in	HCO8B-P32R	32 PIN
Two-in-one high voltage plug-in	EVH2–N4ZJ-SA	2 PIN(with interlock)
MCU high voltage plug-in	EVH1A-F2ZJ-WA	2 PIN(with interlock)
Fast charging high voltage plug-in	EVH4–C2ZJ-HA G007	2 PIN(with interlock)

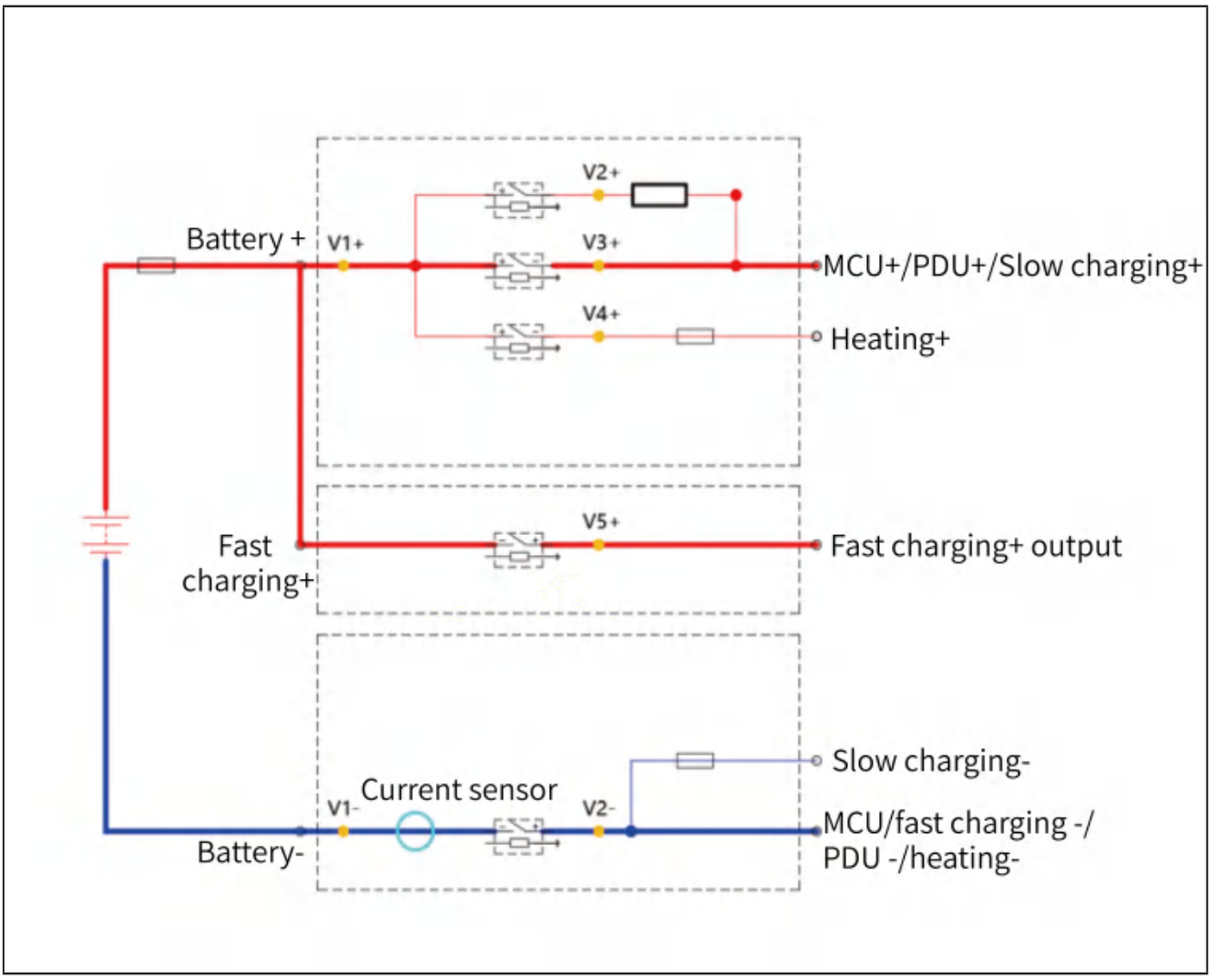
Composition of distribution box

※ Main parts of BDU

BDU design includes three modules, positive module, fast charging module and negative module, as follows:



※ Electrical schematic diagram of distribution box



Introduction to thermal management system

※ Heating scheme

① Natural cooling is adopted

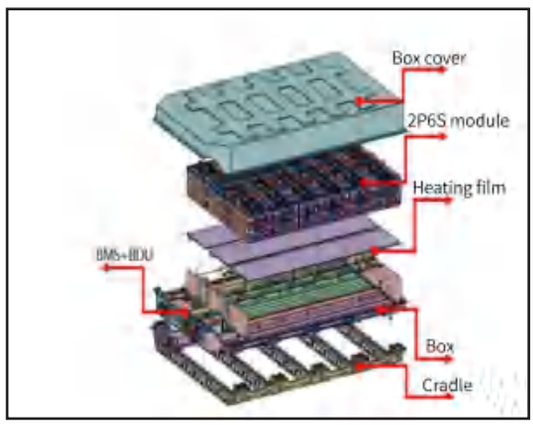
② Design of heating mode

Temperature rise rate: 15 ° C/h (59 °F /h)

Heating mode: module bottom heating

③ Integrated design of heating and insulation

CR foam at the back of the bottom of the heating film plays a role of heat preservation and cushioning.



※ Thermal control strategy

① Low temperature fast charging

1) The heating system can start normally under the environment of -20±2 °C (-4±36 °F);
2) -20 °C (-4 °F) ≦ Tmin ≦ 5 °C (41 °F), pure heating; 5 °C (41 °F)<Tmin ≦ 15 °C (59 °F), charging while heating, Tmin>15 °C (59 °F), pure charging, when Tmin drops to 5 °C (41 °F), it can automatically restart charging while heating, and switch to charging when heating to 15 °C (59 °F);
3) When heating from -20 °C (-4 °F) to 0 °C (32 °F), the heating time should be<1h30min; when heated from -20 °C (-4 °F) to 15 °C (59 °F), the time is less than 3h;
4) The temperature difference between batteries during the whole process is ≦ 15 °C (59 °F);
5) Total heating and charging time is <4 h.

② Low temperature slow charging

1) The heating system can start normally under the environment of -20±2 °C (-4±36 °F);
2) -20 °C (-4 °F) ≦ Tmin ≦ 10 °C (50 °F), pure heating; 15 °C (59 °F)<Tmin, pure charging. When Tmin drops to 0 °C (32 °F), it can automatically restart while heating, and switch to pure charging when heating 10 °C (50 °F);

3) When heating from -20 ℃ (-4 °F) to 10 ℃ (50 °F), the heating time should be<2 h; when heated from -20 ℃ (-4 °F) to 0 ℃ (32 °F), the time is less than 1 h 30 min;
4) The temperature difference between batteries during the whole process is ≦ 15 ℃ (59 °F).

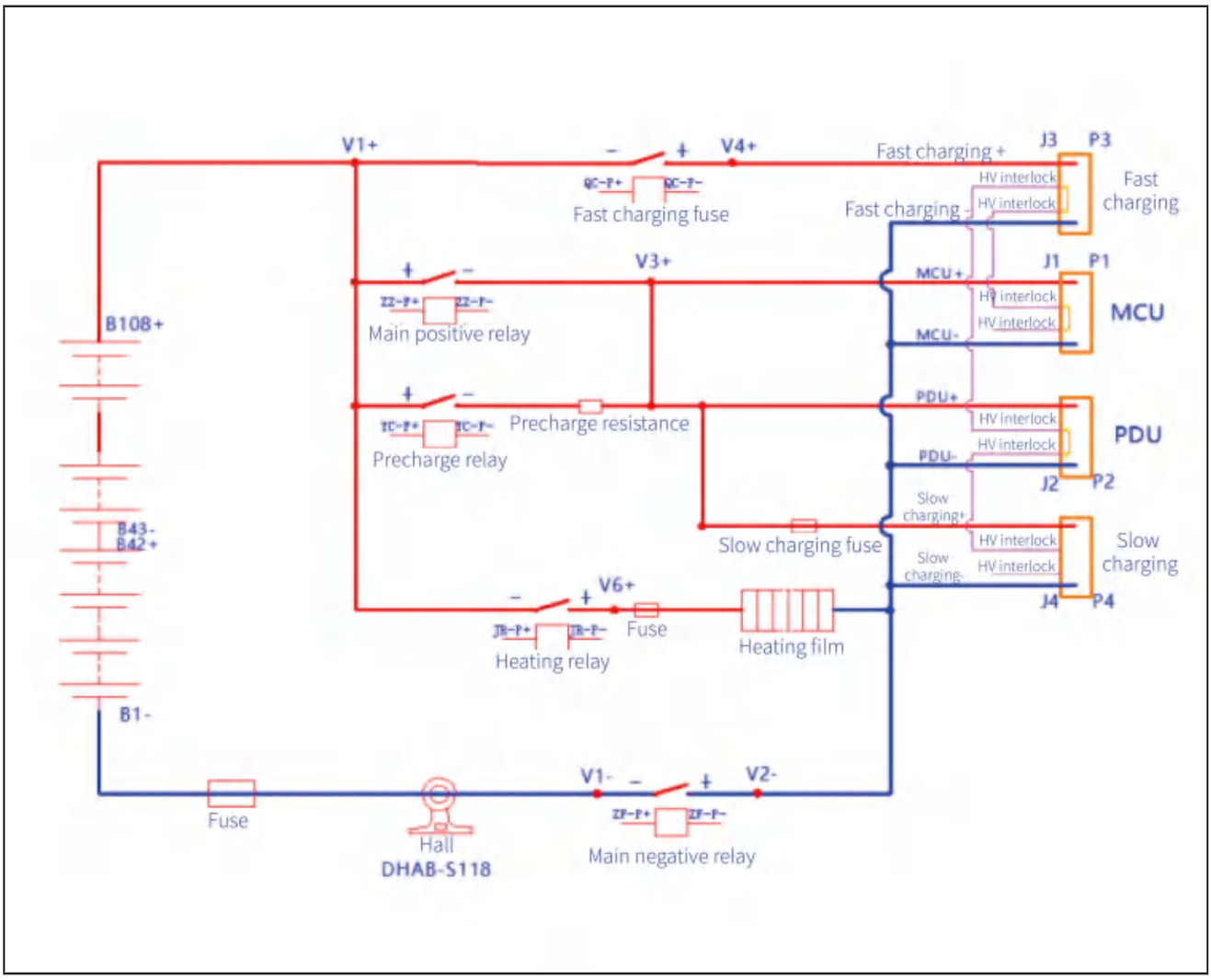
Composition of battery management system (BMS)

This project uses the Repower battery management system. Repower 48S master-slave integrated machine model: Y2B4816, Repower 72S slave model: M3B7220B.

※ BMS function and role introduction

Adopt 48S master-slave integrated machine+ one 72S combination mode	
48S master-slave integrated machine	M1 interface: low-voltage power interface
	M2 interface: low-voltage communication interface (CAN communication, relay control)
	H interface: high voltage sampling interface
	Three interfaces A, B and C mainly collect the voltage of 1S-36S and six temperature sensors
72S slave	Four interfaces A, B, C and D mainly collect the voltage of 37S-10 and 12 temperature sensors

※ Electrical schematic diagram



※ Main control module interface information

Y2B-D M1 interface	Y2B-D M2 interface	Pin definition/ number tube	Remarks
	12	Vehicle CAN-H	Vehicle CAN
	13	Vehicle CAN-L	
	32	Vehicle CAN-G	
	10	Intranet CAN-H	Intranet CAN
	11	Intranet CAN-L	
	31	Intranet CAN-G	
	8	Charging CAN-H	Charging CAN
	9	Charging CAN-L	
	30	Charging CAN-G	
	34	CC-OUT	High side signal input 2 (default high side detection)
	1	DcCC2	DC charging CC2

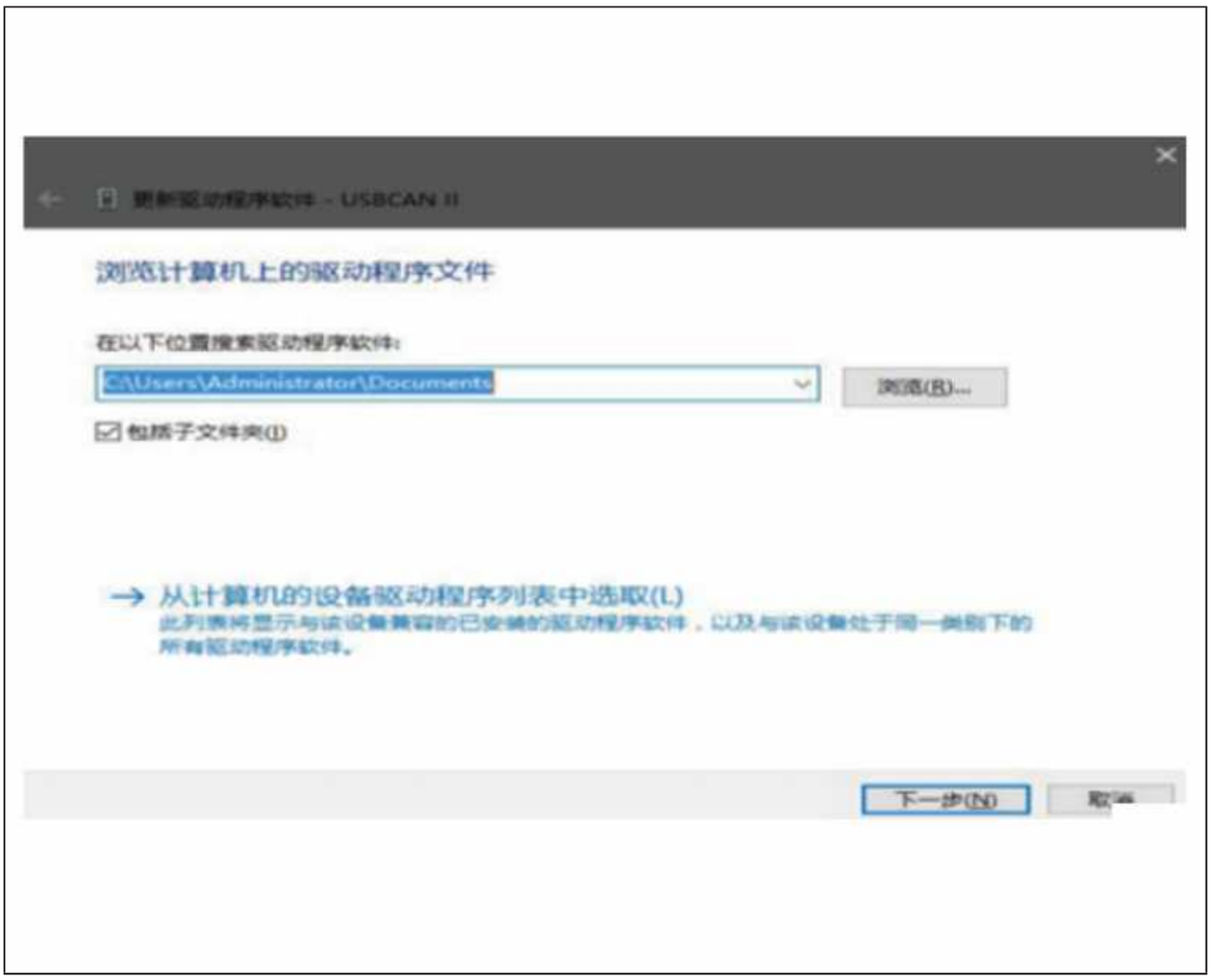
Y2B-D M1 interface	Y2B-D M2 interface	Pin definition/ number tube	Remarks
	17	Discharge control+	Main positive relay drive
	18	Main negative control+	Main negative relay drive
	22	Ha11Ch1	Hall channel 1
	23	Ha11Ch2	Hall channel 2
	28	+5VHALL	Hall power supply positive
	29	+5VGND	Hall power supply grounding
	39	Fast charging control+	DC charging relay
	19	Precharge control +	Precharge relay
	20	Heating control+	DCDC relay
	4	T1+	Temperature sensor acquisition 1
	3	T1–	Temperature sensor acquisition grounding
	24	T2+	Temperature sensor acquisition 2
	Integrated with 3	T2–	Temperature sensor acquisition grounding
5、6		12V+	UPS
11、12		12V-	Vehicle body grounding
4		Fast charging activation	A+
9		KL activation	KL hard wire activation
10		Slow charging activation	VCU hard wire activation

5.1.6 Installation and operation instructions of upper computer drive

Installation of equipment drive

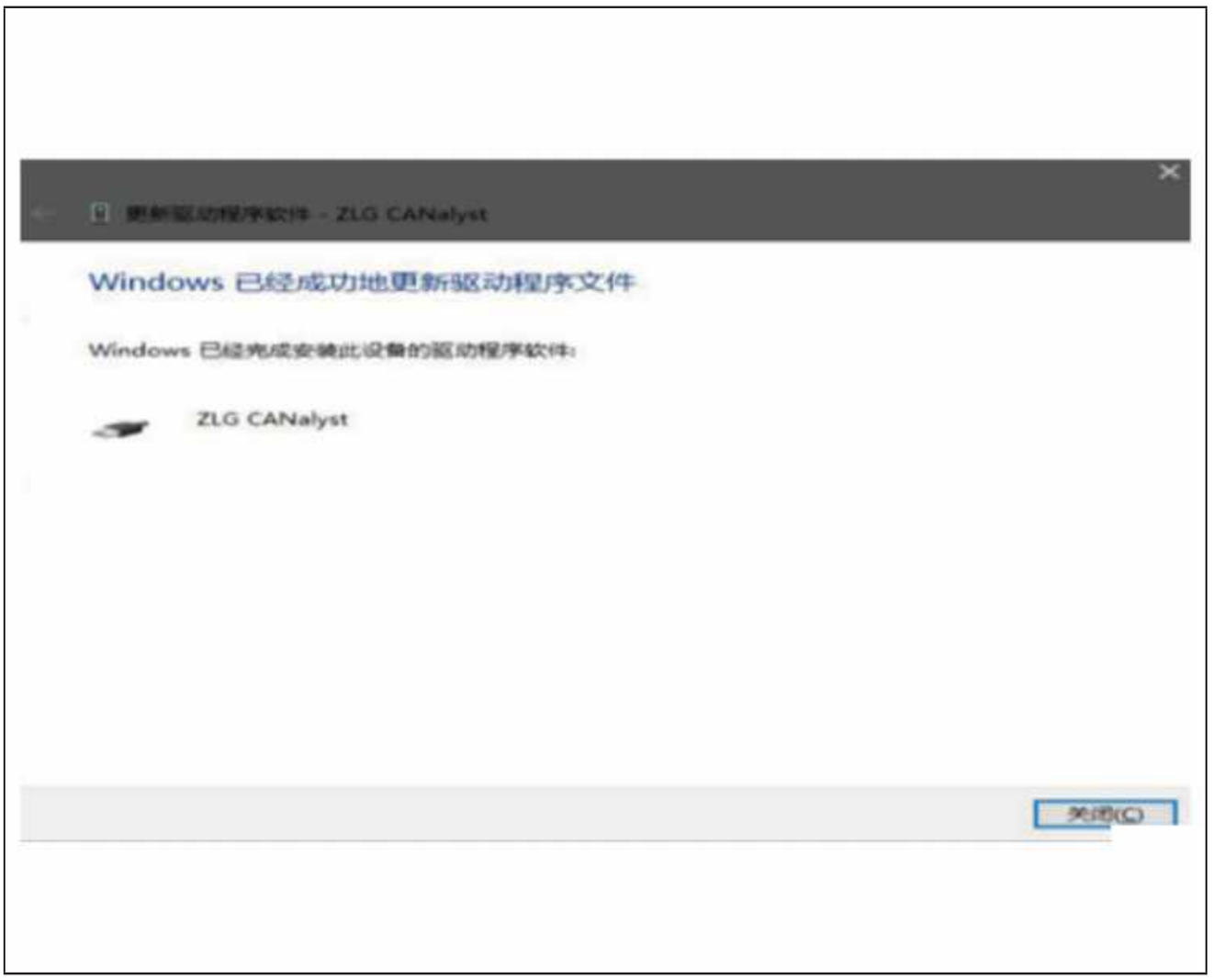
1. Connect the USBCAN II debugger to the USB interface of the PC through the USB cable, open the device manager, and see the USBCAN II in other devices as shown in the figure:

2. Right-click to update the driver, select "Browse Computer - Find Driver Software", and select the path of the software driver file, as shown in the figure:



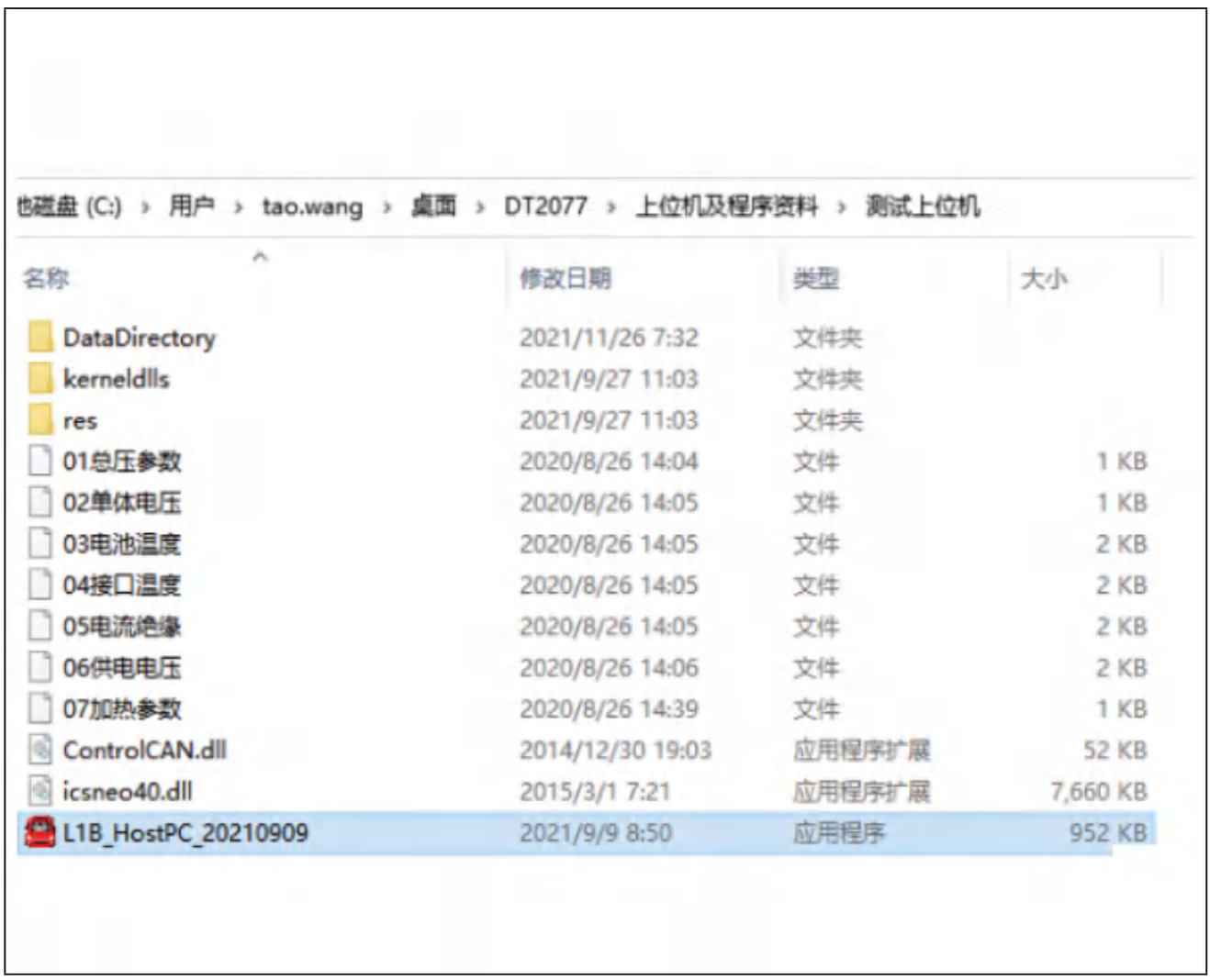
3. Select to always install this driver software, as shown in the figure:

4. Complete the drive installation, as shown in the figure:



Use and description of upper computer

1. Step 1: connect the CAN communication harness at the OBD port of the main driver's seat of the vehicle, turn on the low-voltage power supply, and let the BMS work normally.
2. Step 2: The Repower upper computer is free of installation. Click directly to run the Repower upper computer.



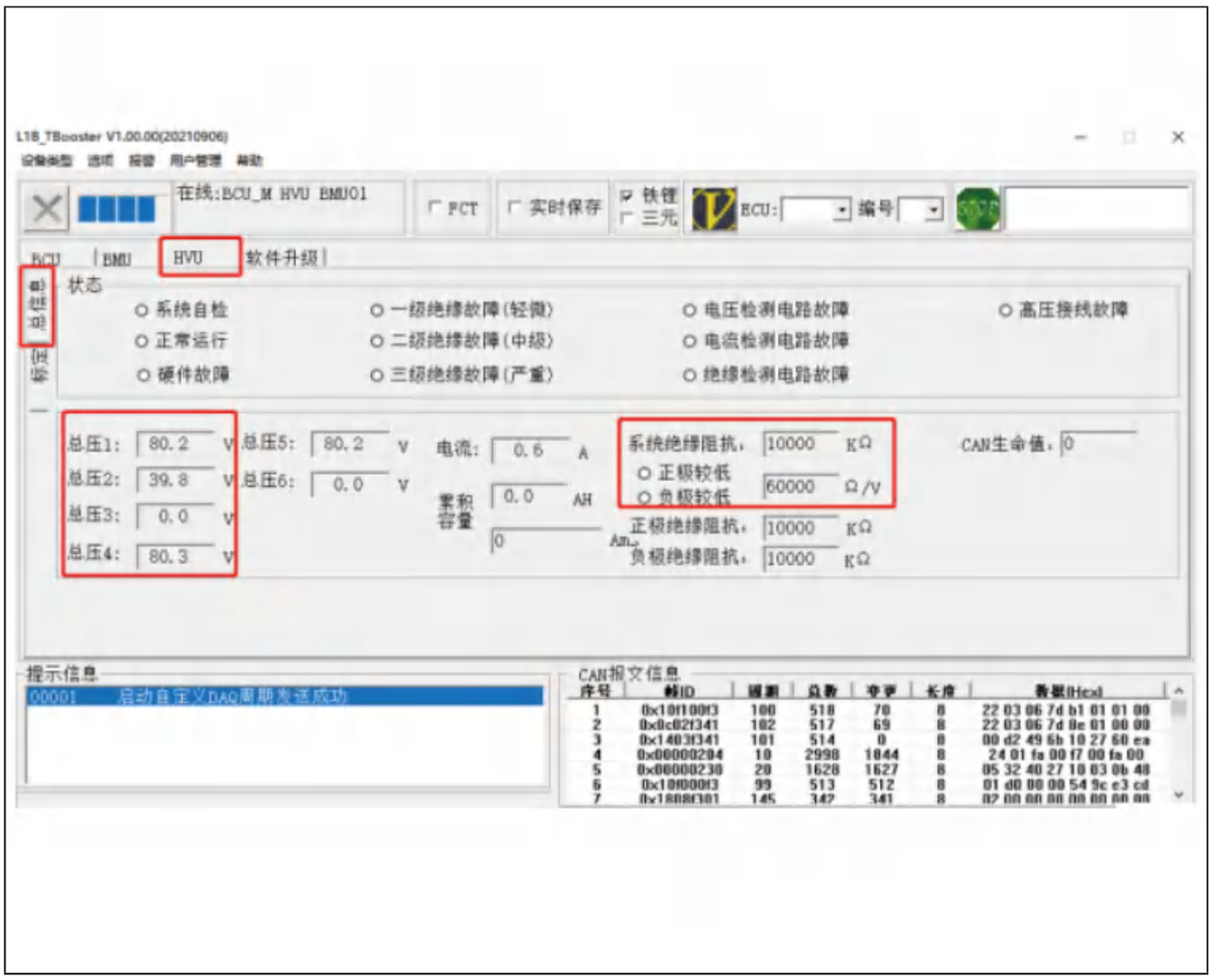
3. Step 3: click OK, select ordinary users, and click OK.

4. Step 4: Select the baud rate of 500 Kbps and click Connect.

5. Step 5: The Load File Configuration dialog box appears, click Close.

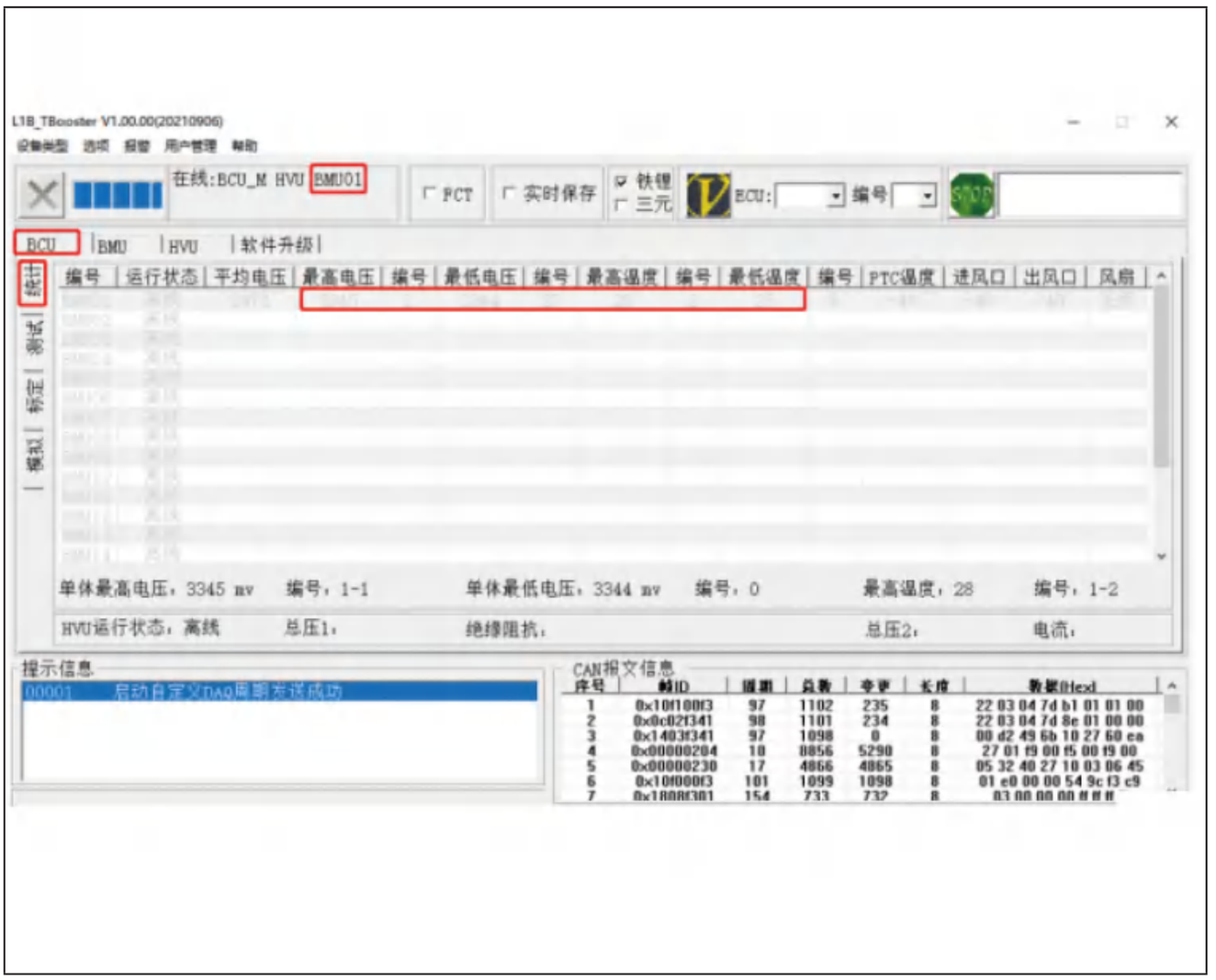
※ Monitoring interface

Click HVU to display the total information of the system.



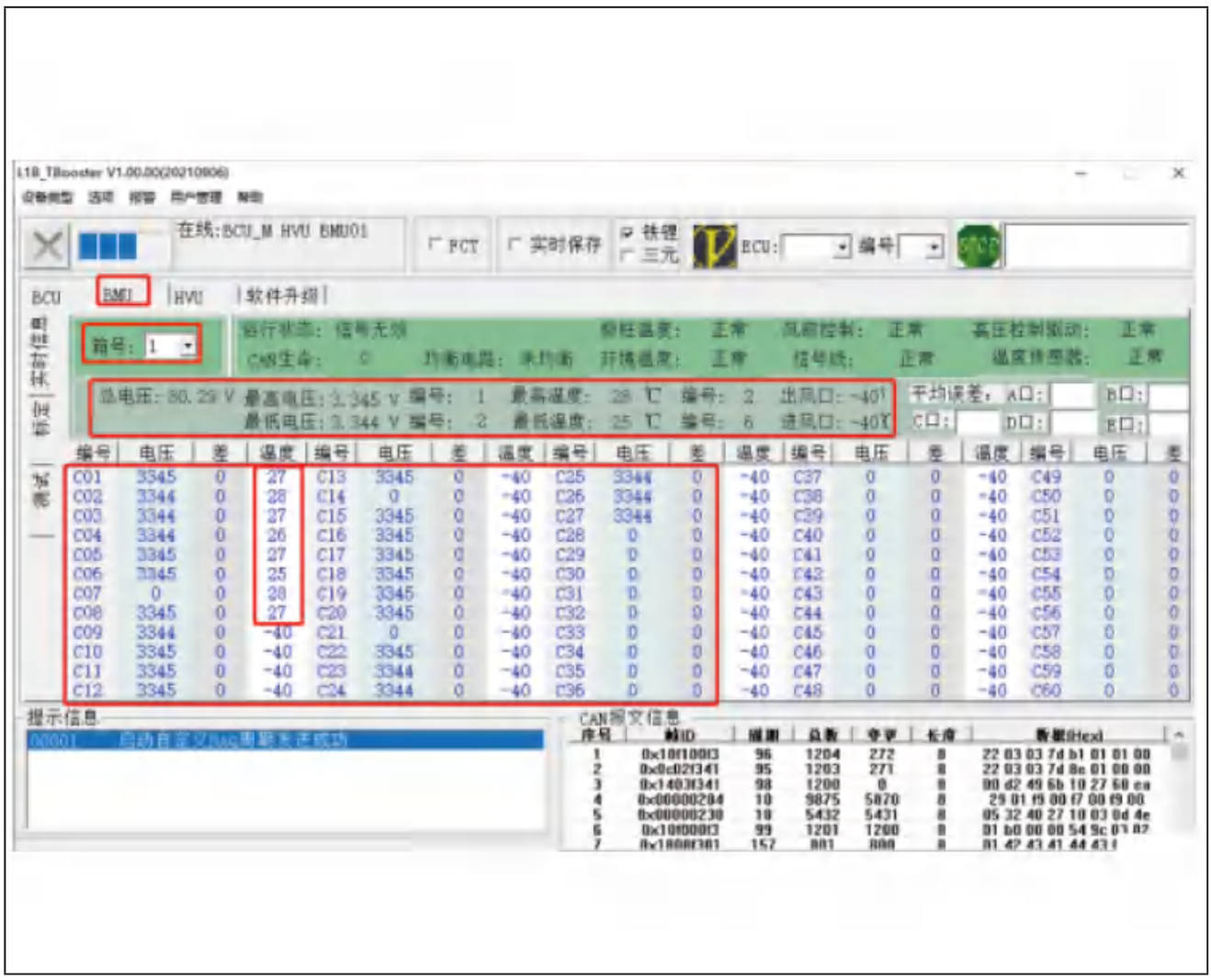
※ Slave interface

Real-time display of the average voltage, maximum voltage, minimum voltage and temperature information monitored by the slave.



※ Details on the interface

By selecting different BMU numbers, the voltage data and temperature information of each unit monitored by the slave are displayed in real time.



※ Fault interface

Click [DAQ] data acquisition, and you can see the information on the BCU test interface, and display the fault information in real time.

5.1.7 Common fault diagnosis and treatment

Fault symptom	Fault analysis	Solutions
Abnormal charging	Charger fault	Contact CENNTRO authorized service center
	Charging stand fault	Contact CENNTRO authorized service center
	Power supply management system failure	Contact CENNTRO authorized service center
	Abnormal high voltage circuit of battery pack	Check the recovery line
	Battery module failure	Replace the module
Abnormal data collection	Abnormal acquisition harness	Replace the acquisition harness
	Battery module failure	Replace the module/single charging and discharging/equalization treatment
	Temperature sensor acquisition failure	Replace the acquisition temperature sensor
	Thermal management system failure	Replace heating/cooling related parts
	Power supply management system failure	Contact CENNTRO authorized service center
Poor insulation	Vehicle HV/LV grounding	Contact CENNTRO authorized service center
	Poor performance of high pressure box (BDU)	Check and replace parts of high pressure box
	Abnormal high voltage harness of battery pack	Check and repair the faulty unit circuit
	Insulation detector failure	Replace insulation tester

Module fault, replace the module

Caution:
※ When removing screws, avoid screws and other metal objects falling into the box to cause internal short circuit. ※ Before lifting the upper cover of the box, gently lift the four corners of the box cover to prevent damage to the sealing gasket of the box. ※ Take out the module carefully to avoid damage caused by the module falling, and do not wear metal jewelry during the whole process. ※ The battery module should be placed on the epoxy board or clean workbench to prevent water stains and foreign matter intrusion.

Warning:
※ The spare parts module must be calibrated before replacement to prevent undervoltage fault caused by virtual voltage in the later stage.

1. Before the battery pack maintenance, the equipment shall be powered off, and the battery box shall be removed and placed on the maintenance platform;
2. Remove the fixing screws of the box cover with an electric screwdriver, remove the upper cover of the box, and disconnect the high-voltage series line;
3. When disassembling the module, disconnect the slave plug-in first, remove the screws and connectors related to the faulty module, disconnect the signal wire, and take insulation protection during operation;
4. The module can be taken out with lifting belt, and then replaced with a new module;
5. Reinstall the replaced new module into the box, and restore the removed relevant accessories. Confirm the torque value after fastening the screws;
6. Check whether the above operations are correctly restored (such as the position of the signal line). Refer to the screw torque standard. The screw installation should meet the standard torque requirements to prevent secondary rework after loading;
7. After loading, equipment power-on inspection shall be carried out to confirm that the whole vehicle can be used normally.

Abnormal voltage and temperature acquisition

1. Check the circuit and find the abnormal position according to the identification on the harness and FPC;
2. Check and confirm whether the temperature sensor or cell is abnormal;
3. Check and confirm whether the harness connection or BMS sampling is abnormal;
4. Confirm abnormal points and replace them;
5. Restore the position according to the installation requirements.

Insulation fault handling

1. Check whether the insulation of the box is abnormal due to IP67 failure;
2. Use the insulation meter to detect the insulation of the battery pack and eliminate the BMS false warning;
3. Confirm with CENNTRO authorized service center whether BMS, high-voltage box, harness, etc. are normal;
4. Check whether the insulation value of each small module of high-voltage circuit and isolation detection is normal;
5. Replace the parts with abnormal insulation;
6. Restore the position according to the installation requirements.

5.1.8 Battery pack maintenance

Maintenance interval

Items	Mileage
Level I maintenance	5000 km (3100 miles)
Level II maintenance	20000 km (12400 miles)
Level III maintenance	One year or 60000 km (37200 miles)
Capacity test	The first test will be implemented after two years or 10000 km (62000 miles), and then once a year

Maintenance content

※ Level I maintenance

S/N	Maintenance items	Maintenance nature	Technical requirements
1	Box	Inspection	1. There is no obvious dust on the surface of the box; 2. There is no obvious corrosion and deformation on the surface of the box; 3. The fixing screws/pins of the box shall be free of cracks, corrosion and falling off; 4. The box guide rail shall be free of obvious deformation and damage.
2	BMS	Inspection	1. The voltage display is normal (within the range of 2.5V-3.65V); 2. The temperature display is normal (within the range of -20 ~60 ° C (-4 ~140 °F)).
3	High voltage line	Inspection	1. The serial connection between the boxes is normal, without looseness, corrosion, cracking, etc; 2. The harness is fastened without shaking.

※ Level II maintenance

S/N	Maintenance items	Maintenance nature	Technical requirements
1	Box	Inspection	1. There is no obvious dust on the surface of the box; 2. There is no obvious corrosion and deformation on the surface of the box; 3. The fixing screws/pins of the box shall be free of cracks, corrosion and falling off; 4.The box guide rail shall be free of obvious deformation and damage.
2	Insulation	Inspection	1. The high voltage total positive/negative insulation value of the box to the shell is greater than 500 Ω/V.
3	BMS	Inspection	1. The voltage display is normal (within the range of 2.5~3.65 V); 2. The temperature display is normal (within the range of -20~60 ℃ (-4 ~140 °F)).
4	High voltage line	Inspection	1. The serial connection between the boxes is normal, without looseness, corrosion, cracking, etc; 2. The harness is fastened without shaking.

※ Level III maintenance

S/N	Maintenance items	Maintenance nature	Technical requirements
1	Box	Inspection	1. There is no obvious dust on the surface of the box; 2. There is no obvious corrosion and deformation on the surface of the box; 3. The fixing screws/pins of the box shall be free of cracks, corrosion and falling off; 4. The box guide rail shall be free of obvious deformation and damage; 5. There is no obvious dust in the box; 6. There is no water ingress or corrosion inside the box.
2	Insulation	Inspection	1. The high voltage total positive/negative insulation value of the box to the shell is greater than 500 Ω/V.
3	BMS	Inspection	1. The voltage display is normal (within the range of 2.5-3.65 V); 2. The temperature display is normal (within the range of -20~60 ° C (-4 ~140 °F)).
4	High voltage line	Inspection	1. The serial connection between the boxes is normal, without looseness, corrosion, cracking, etc; 2.The harness is fastened without shaking.
5	Low voltage harness	Inspection	1. 12 V low-voltage harness and communication harness are connected normally without looseness, needle withdrawal, damage; 2. The harness is fastened without falling off and disorder.
6	Screw fastening	Inspection	1. There is no torque reduction of screws in series between modules; 2. The fastening screws of the module are not loose; 3. The relay screws are fastened normally without looseness.
7	Battery module	Inspection	1. The appearance of the battery module is normal.
8	Voltage consistency	Detection/ equalization	1. After equalization, static voltage: when fully charged, the minimum voltage is not less than 3.65 V.

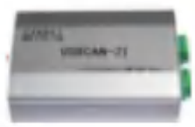
5.1.9 Precautions

Caution :
※ Please use the original special charger for charging. ※ The charging and discharging voltage must be set according to the voltage value specified in the technical parameter table. ※ Avoid charging in direct sunlight. ※ When the maximum temperature of the battery pack exceeds 60 ℃ (140 °F), it is not allowed to charge and discharge, and heat dissipation treatment shall be carried out immediately. ※ When the maximum temperature of the battery pack does not exceed 0 ℃ (32 °F), it shall not be charged, and shall be heated.

Warning:
※ Do not modify the battery without authorization. ※ It is forbidden to directly short circuit the output port of the battery pack with a wire. ※ The charging and discharging shall not exceed the maximum current specified in the technical parameters. ※ The battery shall not be near high temperature heat source. ※ Do not put the battery in damp places or water. ※ Do not apply external force to the battery or make it fall from a height.

5.1.10 Common tools

Tool name	Purpose	Tool picture
Digital multimeter	Measure voltage and resistance	
Insulation tester	Measure the insulation resistance value	

Tool name	Purpose	Tool picture
USBCAN	BMS and upper computer connection	
Clamp ammeter	Measure the current	
Equalizer	Equalization module	
Torque wrench	Screw fastening measurement	
Electric screwdriver	Remove or install battery screws	
Common sleeve	Remove or install battery pack screws	
Ratchet wrench	Remove or install battery pack screws	
Diagonal pliers	Cut ties	

Tool name	Purpose	Tool picture
Cross screwdriver	Remove or install battery pack screws	
Ties	For hoisting battery module	
Rubber hammer	For module installation	

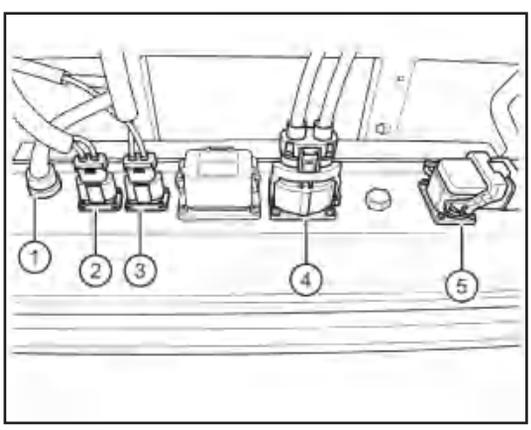
5.2 On-board maintenance

5.2.1 Power battery pack

Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the power battery assembly

① Disconnect the low voltage signal plug-in (1), slow charging input connector (2), high voltage distribution box output connector (3), fast charging input connector (4) and motor control unit (MCU) output connector (5) in turn.

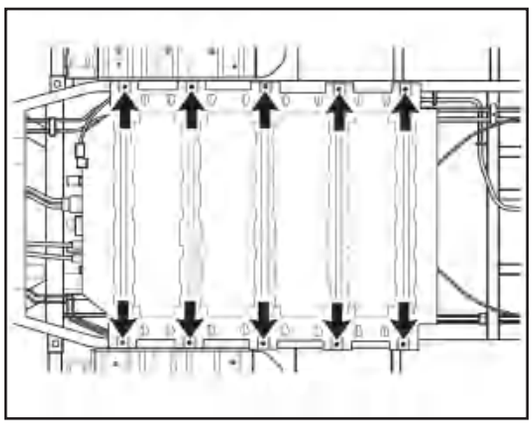


② Use the lifting bracket to support the power battery pack assembly.

③ Remove 10 bolts (arrows) fixed between the left and right sides of the power battery and the body chassis.

Tightening torque:

65–70 N·m (48~52 ft-lbs.)



④ After slowly lowering the lifting platform, push out the lifting platform.

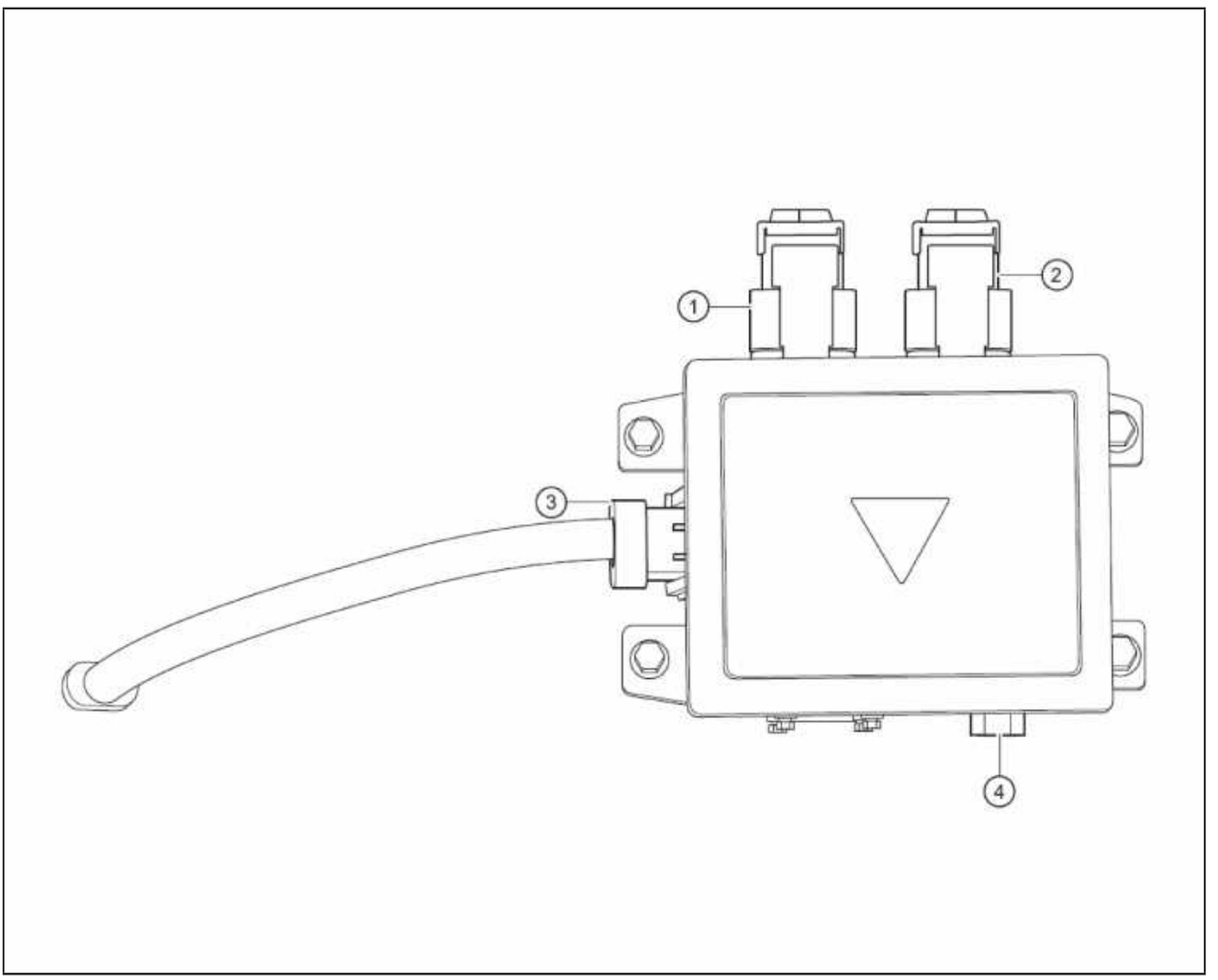
Installation

1. The sequence of installing the power battery pack is the reverse of the removal sequence.

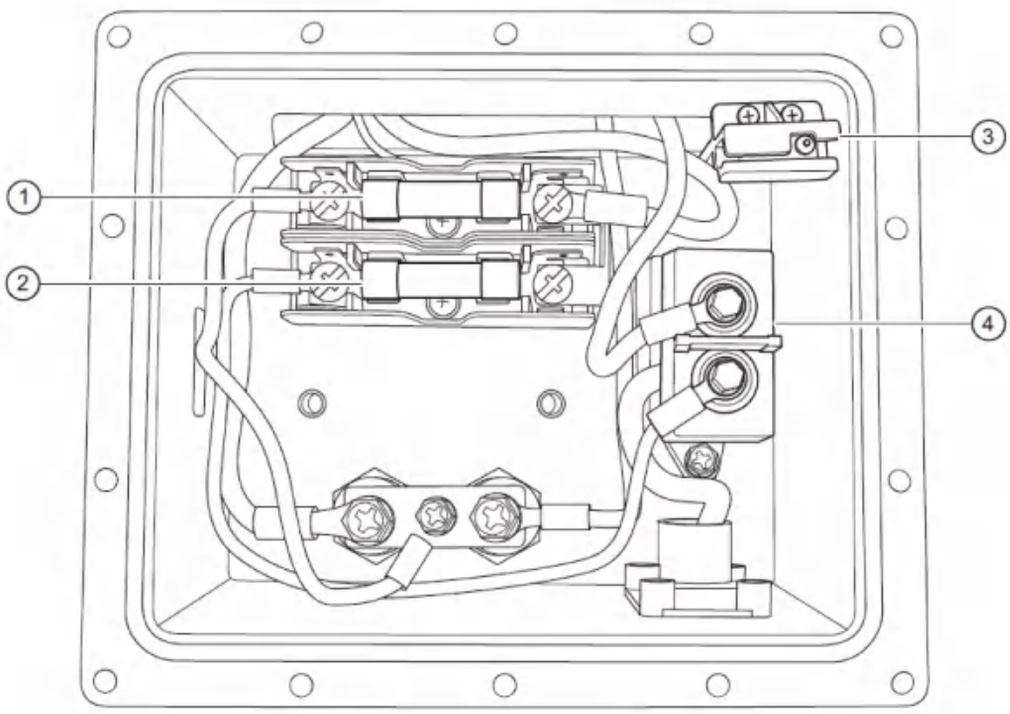
High voltage distribution box (loop interlock)

6.1 Functional specifications

6.1.1 Schematic diagram of high-voltage distribution box



S/N	Definition
1	Power battery input connection plug-in
2	PTC output connection plug-in
3	Air conditioning compressor output plug-in
4	Low voltage signal plug-in



S/N	Definition
1	Air conditioning compressor fuse
2	PTC fuse
3	Uncover protection switch
4	PTC control relay

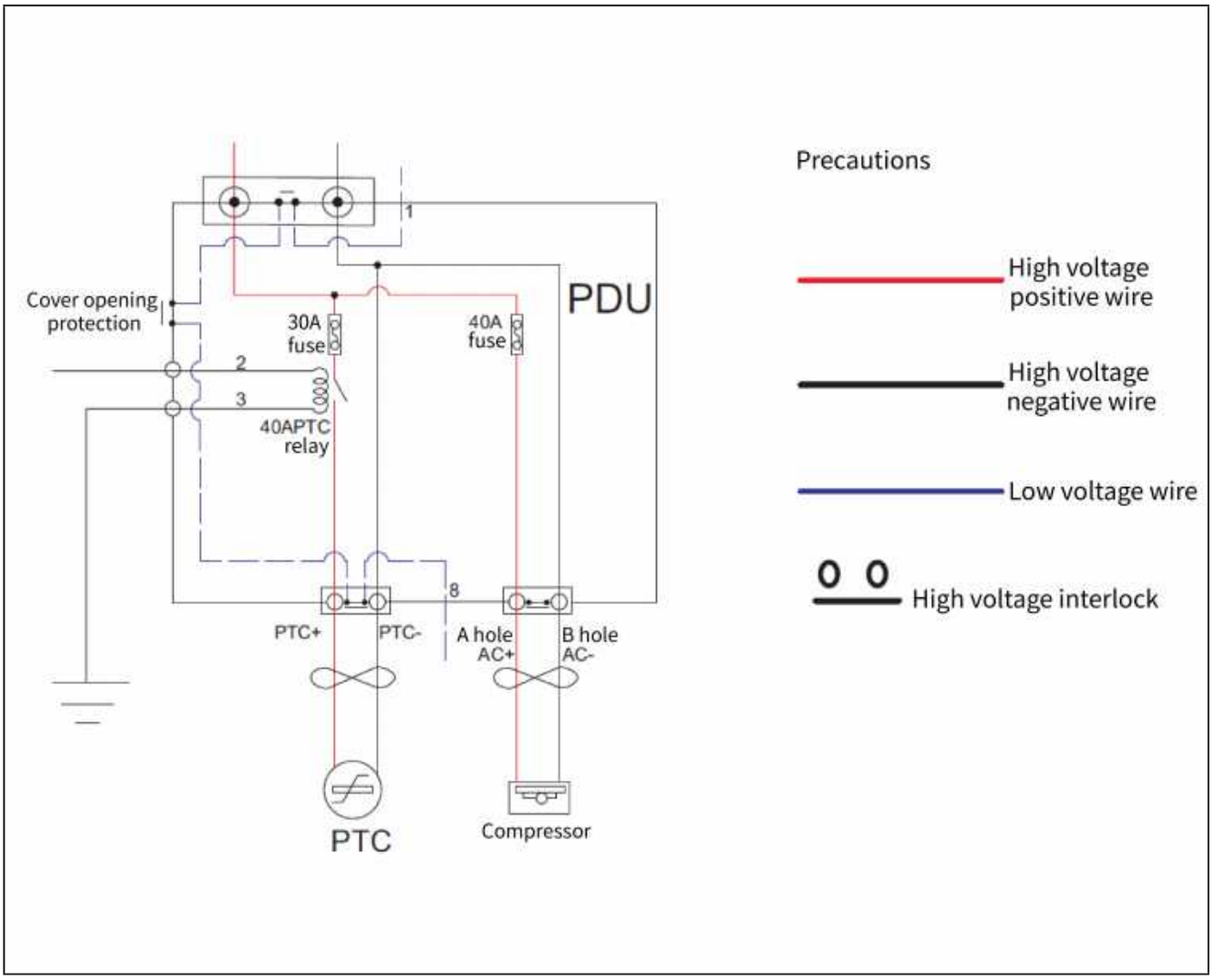
6.1.2 Technical parameters

Items		Specifications
Insulation resistance	High voltage	≧ 200 MΩ 1000V
Withstand voltage	High voltage	2500 V AC Last for 1 min
Shielding requirements		Shielding
Operating voltage	High voltage	306.6 V
Operating current	High voltage	40 A
Ambient temperature		-40 -85 °C (-40~185 °F)
Working temperature		-40 -85 °C (-40~185 °F)
Storage temperature		-5-35 °C (23~95 °F)
Salt mist		48 h
Waterproof grade		IP67

Fuse definition

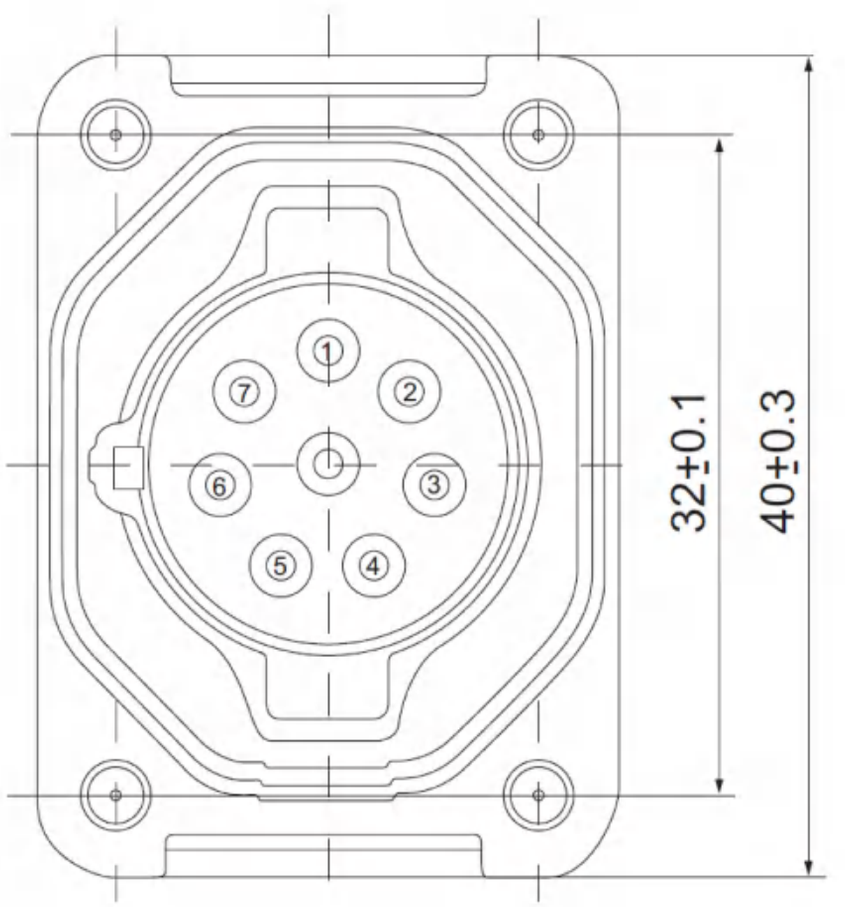
Fuse		
PTC fuse	30 A	Intermediate melting
AC fuse	40 A	

6.1.3 Schematic diagram of high-voltage distribution box



6.1.4 Definition of high-voltage distribution box terminal

Low voltage signal plug-in



Base pin	Function description	Rated current	Minimum current	Maximum current
1	Interlock positive	0.5 A	-	3 A
2	Temperature control switch	0.5 A	-	-
3	PTC relay	0.5 A	-	-
4	-	-	-	-
5	-	-	-	-
6	-	-	-	-
7	-	-	-	-
8	Interlock negative	0.5 A	-	3 A

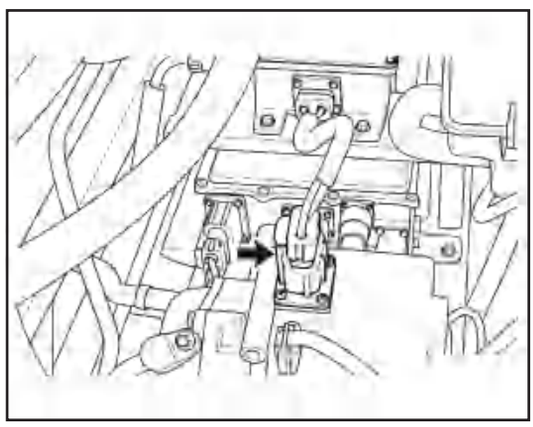
6.2 On-board maintenance

6.2.1 High voltage distribution box

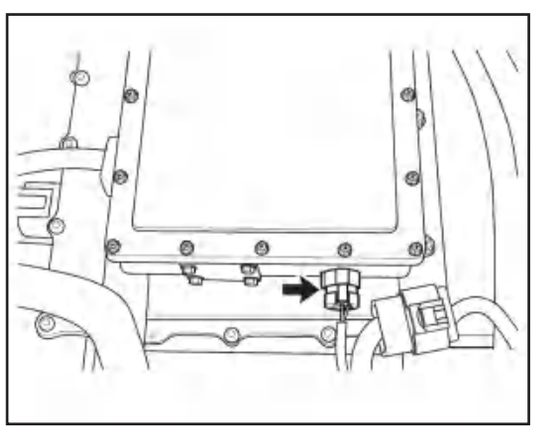
Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the high-voltage distribution box assembly

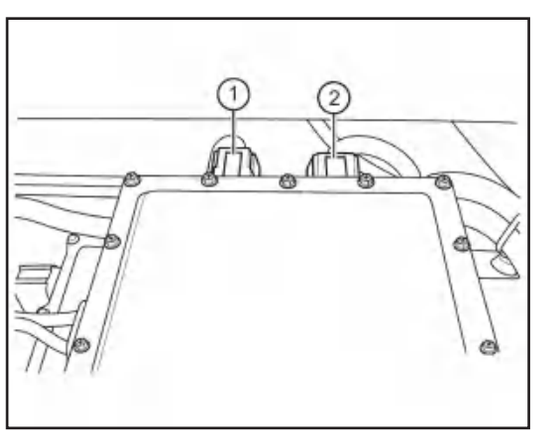
① Disconnect the input plug-in on the air conditioning compressor assembly (arrow).



② Disconnect the low-voltage signal plug-in of the high-voltage distribution box (arrow).



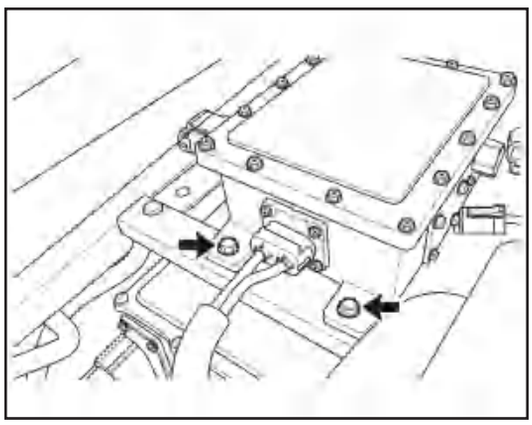
③ Disconnect the power battery input plug-in (1) and PTC output plug-in (2) on the high-voltage distribution box.

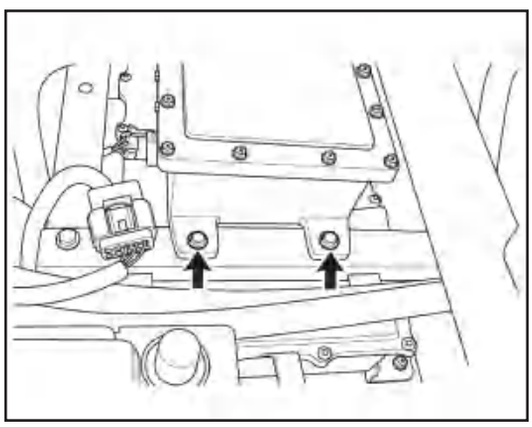


④ Remove 4 fixing bolts (arrows) on the left and right of the high-voltage distribution box. Carefully remove the high-voltage distribution box assembly.

Tightening torque:

7±1 N·m (5.2±0.7 ft-lbs.)





Installation

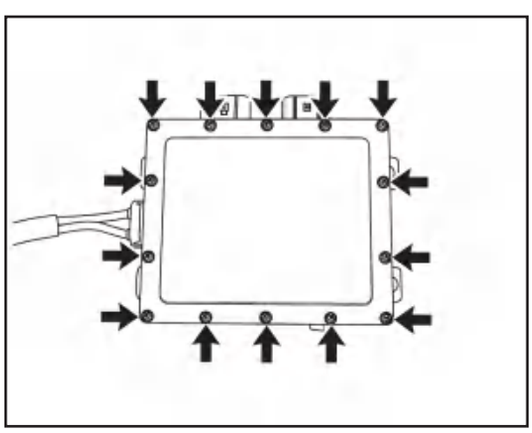
1. The sequence of installing the high voltage distribution box is the reverse of the removal sequence.

6.2.2 Replace the fuse

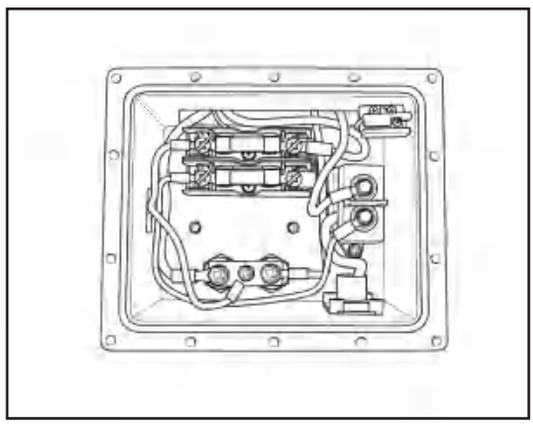
Replace

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove

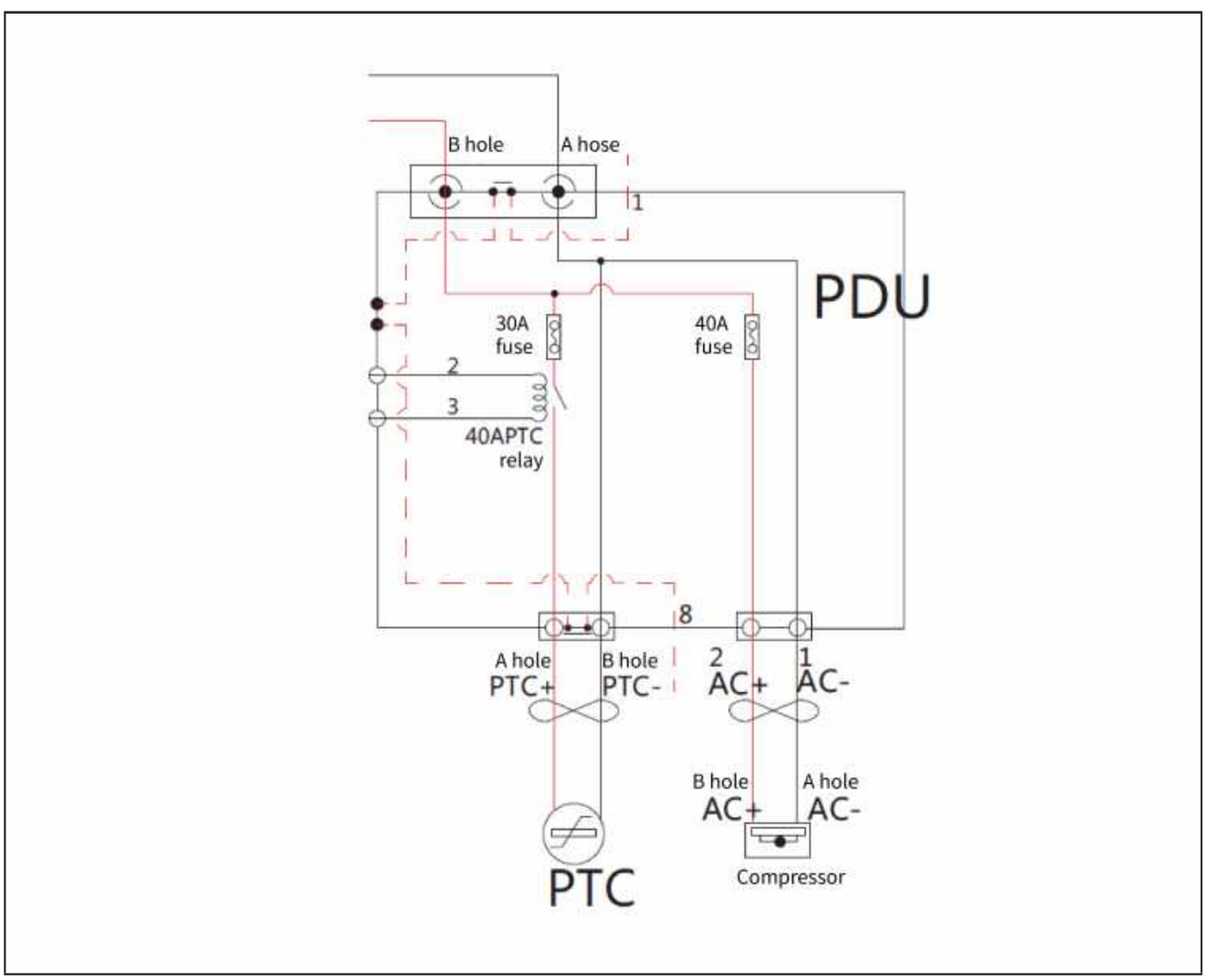
① Remove 14 fixing bolts on the cover plate of the high-voltage distribution box. Take off the cover plate.



② Replace the corresponding fuses.



6.3 High voltage box loop interlock



High voltage box loop interlock: low voltage plug-in 1 # of high voltage distribution box - input high voltage DC bus plug-in of high voltage distribution box - cover removal protection of high voltage distribution box - PTC output high voltage plug-in of high voltage distribution box - voltage plug-in 8 # of high voltage distribution box.

AC and DC charging

7.1 Functional specifications

7.1.1 Function

Main functions of charger

Charger: The charger is connected with the AC charging interface assembly, converts the 220VAC voltage into the rated DC voltage and inputs it to the battery pack for charging. It can communicate with BMS through the high-speed CAN bus, upload the working status, working parameters and fault/warning information of the charger, and accept the command to start or stop charging control.

※ Convert the electric energy of the public power grid into the direct current required by the battery pack, and charge the electric vehicle power battery pack safely and automatically;

※ Have constant voltage, constant current and constant power charging modes;

※ High speed CAN2.0 (500 kbps) bus;

※ It can dynamically adjust the charging current or voltage parameters according to the data provided by the power battery management system (BMS), execute corresponding actions and complete the charging process;

※ It can communicate with BMS and VCU through high-speed CAN bus, upload the working status, working parameters and fault/warning information of the charger, and accept the control command to start or stop charging;

※ Complete safety protection measures: input over-voltage and under-voltage protection functions, output over-voltage and under-voltage protection functions, output over-current/short-circuit protection functions, output anti-reverse connection function, over-temperature protection, input and output terminal interlock function, etc.

Main functions of DCDC

DCDC: DCDC is connected with the high-voltage box and the battery, which converts the high-voltage DC power of the power battery into the voltage required by the low-voltage electrical equipment in the vehicle (such as dashboard, light, etc.), and charges the low-voltage battery.

※ The step-down isolated DCDC converter converts the high-voltage DC power of the power battery into the voltage required by the low-voltage electrical equipment in the

vehicle (such as dashboard, light, etc.), and charges the low-voltage battery;

※ High speed CAN2.0 (500 kbps) bus;

※ It can dynamically adjust the output voltage or current parameters within a certain range according to the data provided by the vehicle control unit (VCU);

※ It can communicate with VCU through high-speed CAN bus, upload DCDC's working status, working parameters and fault/warning information, and accept the command to start or stop working;

※ Complete safety protection measures: input over-voltage and under-voltage protection functions, output over-voltage and under-voltage protection functions, output over-current/short-circuit protection functions, input anti-reverse connection function, over-temperature protection, input and output terminal interlock function, etc.

7.1.2 Technical parameters

Technical parameters of on-board charger

Parameter items	Support range	Parameter value
Input voltage range (V)	90–264	176–264
Input undervoltage protection (V)	80±4	166±10
Input undervoltage recovery (V)	90±4	176±10
Input overvoltage protection point (V)	273±8	274±10
Input overvoltage recovery point(V)	265±8	264±10
Voltage accuracy (%)	1	1
Current accuracy (%)	3	3
Output voltage range (V)	-	240–420
Output overvoltage protection (V)	-	430±5
Output undervoltage protection(V)	-	230±4
Maximum output current (A)	-	22
Input overcurrent protection (A)	-	24

DCDC technical parameters

Parameter items	Support range	Parameter value
Input voltage range (V)	250–450	240–420
Input rated voltage (V)	-	330
Input undervoltage protection (V)	240±10	230±5
Input undervoltage recovery (V)	250±10	240±5
Input overvoltage protection point (V)	460±10	430±5
Input overvoltage recovery point (V)	450±10	420±5
Overtemperature protection point	Derating:85±5 °C (185±9 °F) Shutdown: 100±5 °C (212±9 °F) Recovery:90±5 °C (194±9 °F)	Derating:75±5 °C (167±9 °F) Shutdown: 90±5 °C (194±9 °F) Recovery:80±5 °C (176±9 °F)
Output rated power (kW)	2	1.5
Efficiency (%)	90	-
Output peak power (kW)	2.4	1.8
Output rated voltage (V)	13.8	13.8
Output overvoltage protection (V)	17–18	-
Output undervoltage protection (V)	7–8	-
Output rated current (A)	145	107
Output current limiting protection point (A)	186	138

Environmental requirements for operation of charger+DCDC two-in-one system

Items	Technical indicators	Remarks
Working temperature	-40–85 °C (-40~185 °F)	Work for long time
Storage temperature	-40–105 °C (-40~221 °F)	Power failure
Relative temperature	5 %–95 %	No condensation during normal operation
Protection grade	IP67	-
Cooling mode	Liquid cooling	-
Altitude requirement	<5 km (3.1 miles)	-

Cooling requirements

Cooling system parameters	
Items	**Parameters**
Heat dissipation	0.462 kW
Allowable temperature of parts	85 ℃ (185 °F)
Corresponding water temperature demand	≦ 65 ℃ (149 °F)
Minimum water flow demand	8 L/min (2.1 us gal/min)
Flow resistance	≦ 1 kPa (0.01 bar)
Water channel volume	0.16 L (0.042 us gal)
Internal and external diameters of inlet and outlet interfaces	Inner diameter 12 mm, outer diameter 16 mm, step surface 18 mm

Voltage requirements

1. Charger: within ±15 % of the rated input voltage, the charger shall be able to work normally, that is, the voltage range is 187-253 V.
2. DCDC: voltage control accuracy: 0.15 % under the voltage of 30 % load, 0.03 % under the voltage of 60 % load and 0.22 % under the voltage of 100 % load.

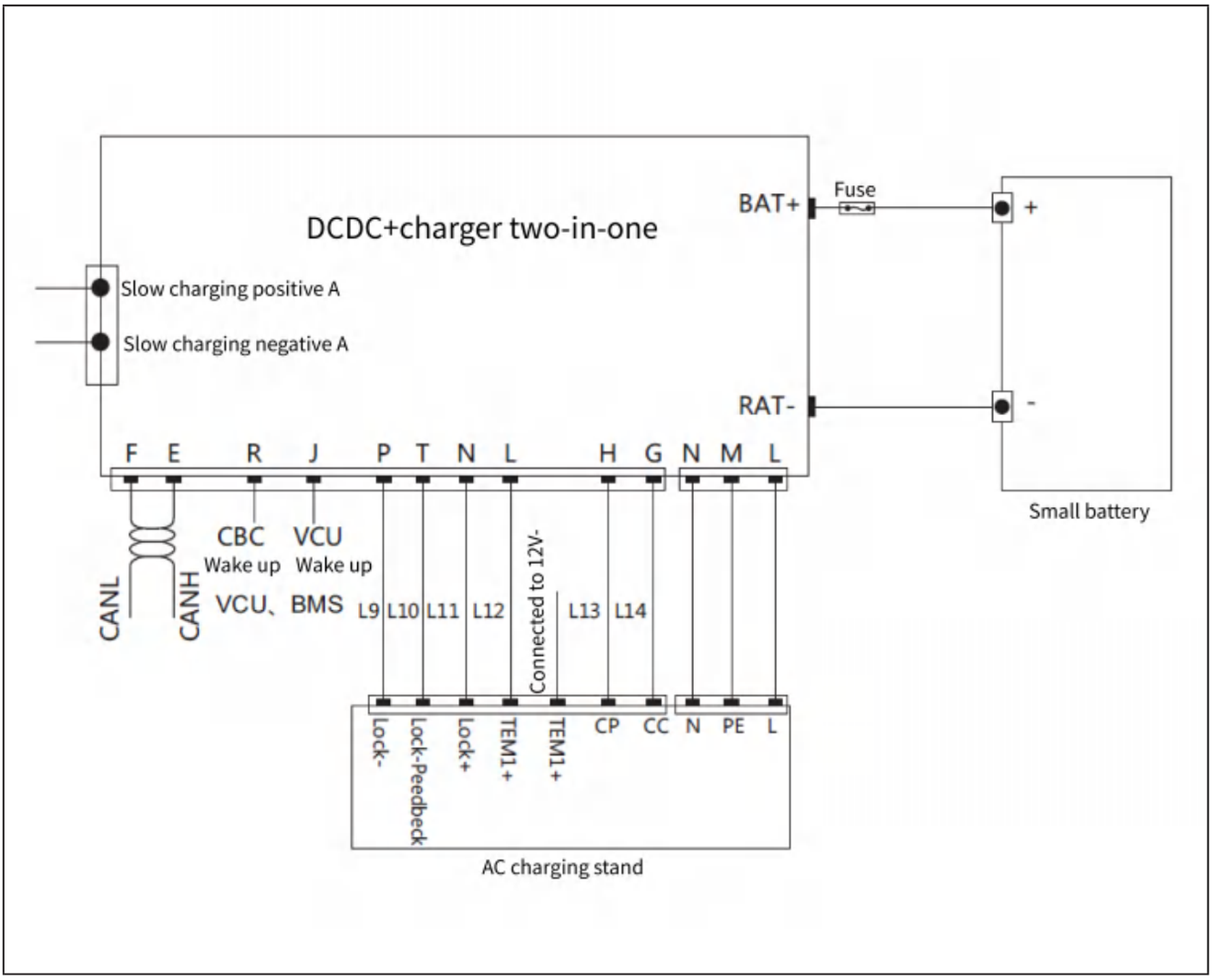
Withstand voltage

DCDC shall meet the dielectric strength between the terminal to the ground (shell) and the circuits without electrical connection to each other, and shall be able to withstand the voltage of 2000 VDC (or rated voltage of +1500 V).

Insulation resistance

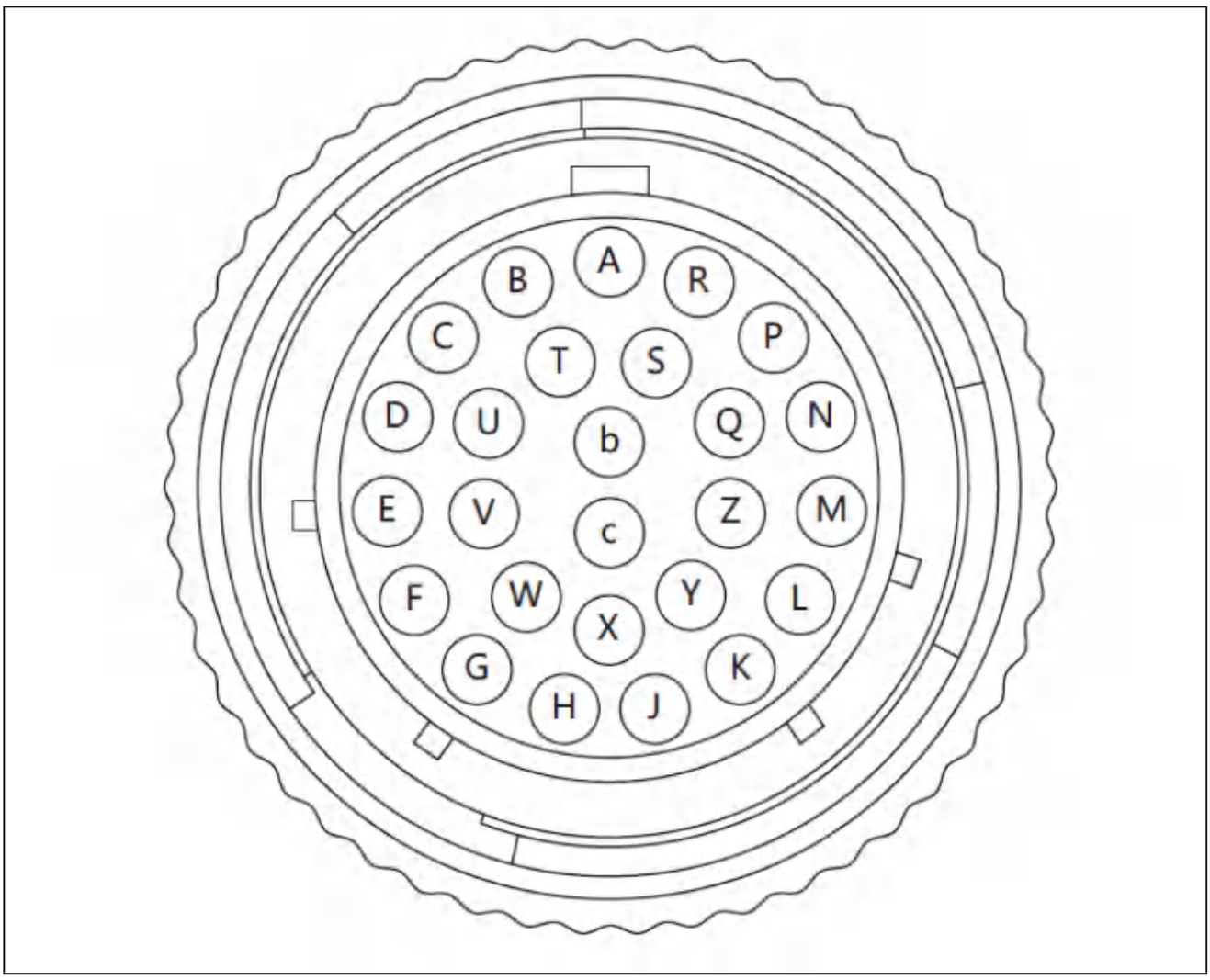
Measure with a special insulation meter, and the insulation resistance shall not be less than 500 MΩ.

7.1.3 Schematic diagram of charger+DCDC two-in-one



7.1.4 Definition of charger+DCDC two-in-one terminal

Low voltage signal plug-in



Base pin	Function description	Rated current	Minimum current	Maximum current	Peak current	Locked rotor current	Signal type
A	BAT+battery input positive	1.5 A	1 A	1.5 A	2 A	4 A	Power input
B	BAT+battery input positive	1.5 A	1 A	1.5 A	2 A	4 A	Power input
C	BAT-battery input negative	1.5 A	1 A	1.5 A	2 A	4 A	Power input
D	BAT-battery input negative	1.5 A	1 A	1.5 A	2 A	4 A	Power input
E	CANHCAN high	200 mA	-	-	-	-	Digit
F	CANLCAN low	200 mA	-	-	-	-	Digit
G	CP control confirmation	500 mA	-	-	-	-	Analog input

Base pin	Function description	Rated current	Minimum current	Maximum current	Peak current	Locked rotor current	Signal type
H	CC charging connection confirmation	500 mA	-	-	-	-	Analog input
J	WAKE_ UP_ DCDC wakes up DCDC	500 mA	100 mA	500 mA	-	-	Analog input
K	CC_ OUT gun insertion feedback signal	100 mA	50 mA	100 mA	200 mA	-	Analog output
L	NTC1 charging port temperature detection 1+	100 mA	-	-	-	-	Analog input
M	NTC1 charging port temperature detection 1-	100 mA	-	-	-	-	Analog input
N	DSC1 electronic lock positive	2 A	1 A	2.2 A	3 A	-	Analog output
P	DSC2 electronic lock negative	2 A	1 A	2.2 A	3 A	-	Analog output
R	OBC-EN wakes up VCU and BMS	500 mA	100 mA	500 mA	1 A	-	Analog output
S	CAN grounding	200 mA	-	-	-	-	Digit
T	lockdect	200 mA	50 mA	200 mA	-	-	Analog output
U	HUIL_IN	500 mA	100 mA	500 mA	-	-	-
V	HUIL_OUT	500 mA	100 mA	500 mA	-	-	-

7.1.5 Fault strategy

Charger

Fault code name	Fault type	Fault level	Fault judgment conditions	Recovery conditions
Output voltage fault	Output overvoltage	1	Protection point: output voltage is greater than 435 V	Recovery point: within 50 seconds: the output voltage is less than 420 V, otherwise restart is required.
	Output undervoltage	1	Protection point: output voltage is less than 215 V	Recovery point: within 50 seconds: the output voltage is greater than 225 V, otherwise restart is required.
Input voltage fault	Input undervoltage	1	Protection point: input voltage is less than 80 V, lasting for 2 seconds	Recovery point: input voltage is greater than 90 V
	Input overvoltage	1	Protection point: input voltage is greater than 273 V, lasting for 2 seconds	Recovery point: input voltage is less than 265 V
PFC voltage fault	Overvoltage fault	1	Protection point: PFC voltage is greater than 460 V, lasting for 100 MS	Unrecoverable, power on again to recover, and save historical faults at the same time
Output short circuit	-	1	Protection point: output voltage is less than 20 V and output current is more than 12 A, lasting for 200 MS	Unrecoverable fault, requiring power-on and restart for recovery, and saving historical fault
Output overcurrent	-	1	Protection point: greater than 24 A	Unrecoverable fault, requiring power-on and restart for recovery, and saving historical fault
Overtempera-ture fault	-	1	Protection point: When the temperature of the board is greater than 85 °C , the charger will be shut down. When the board temperature is greater than 75 °C , the charger will be derated.	Recovery point: When the temperature of the board is less than 70 °C , the output is restored.

DCDC

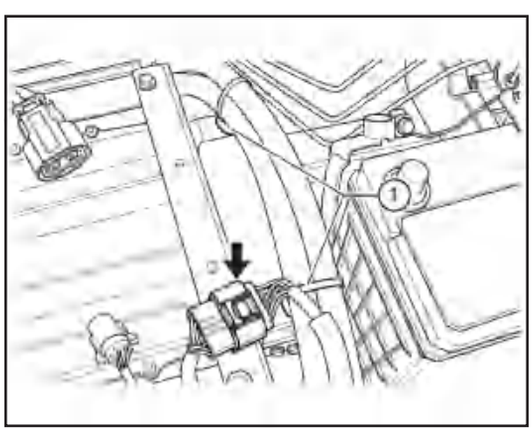
Fault code name	Fault type	Fault level	Fault judgment conditions	Recovery conditions
Output voltage fault	Output undervoltage	1	Output undervoltage protection point: 7.5 V	Output undervoltage recovery point: 2 s burping recovery
	Output overvoltage	1	Output undervoltage protection point: 17.5 V	Output undervoltage recovery point: 17 V
Input voltage fault	Input undervoltage	1	Input undervoltage protection point: 230 V	Input undervoltage recovery point: 240 V
	Input overvoltage	1	Input overvoltage protection point: 430 V	Input overvoltage recovery point: 420 V
Output overcurrent	-	1	Output overcurrent protection point: output current is greater than 185 A	Output overvoltage recovery point: 5s burping recovery
Temperature fault	-	1	Overtemperature protection point: 90 °C (194 °F)	Overtemperature recovery point: 80 °C (176 °F)
Communi-cation fault	Communi-cation timeout fault	1	Protection: message loss lasting for 10 s	Recovery: message received again

7.2 On-board maintenance

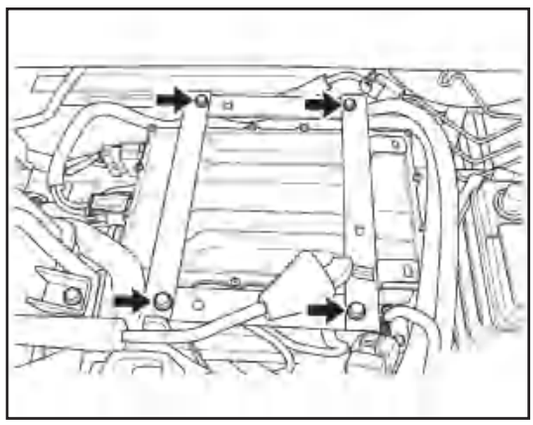
7.2.1 Charger+DCDC two-in-one

Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the high-voltage distribution box assembly
4. Remove the high-voltage distribution box mounting bracket
   ① Disengage the fixing clip of DC fast charging low-voltage harness plug-in (arrow).
   ② Disengage the DC fast charging high-voltage cable fixing clip from the mounting bracket (1).

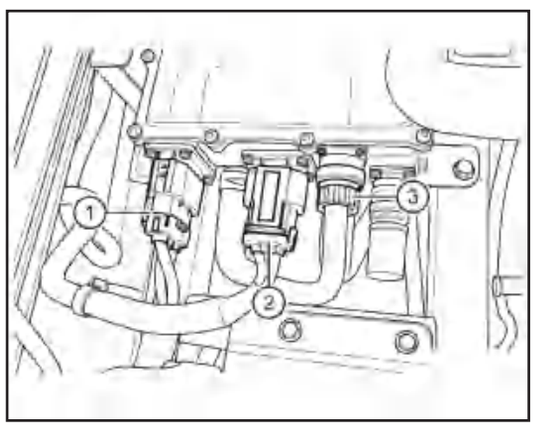


③ Remove fixing bolts (arrows) from the left and right mounting brackets. Take out the mounting brackets.



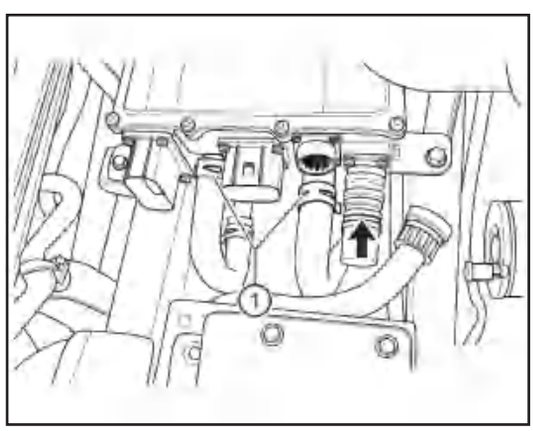
5. Remove charger+DCDC two-in-one assembly

① Disconnect the AC slow charging input plug-in (1), DCDC high voltage input plug-in (2) and low voltage signal plug-in (3).

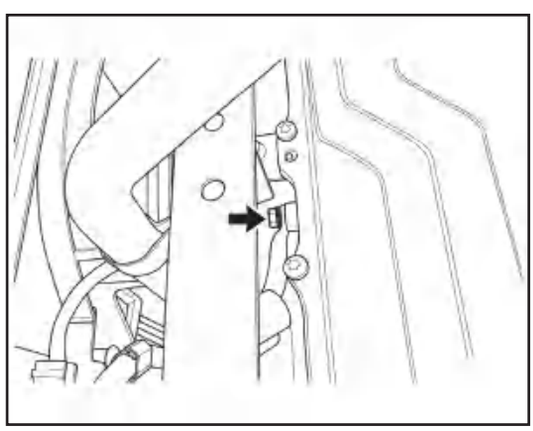


② Loosen the elastic clamp and pull out the water inlet and outlet pipe (1) from the two-in-one device.

③ Disconnect the two-in-one (DCDC) output connector (arrow).



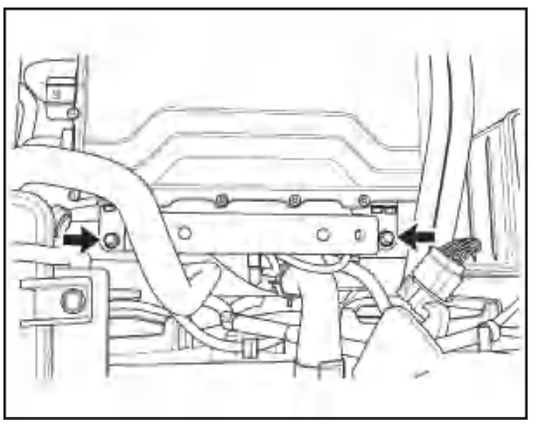
④ Remove the grounding wire bolt on the charger+DCDC two-in-one housing (arrow).



⑤ Remove the two fixing bolts (arrows) at the front of the charger+DCDC two-in-one assembly.

Tightening torque:

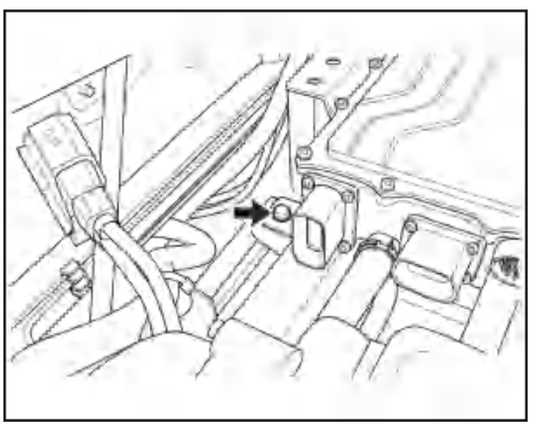
23±3 N·m (17.0±2.2 ft-lbs.)

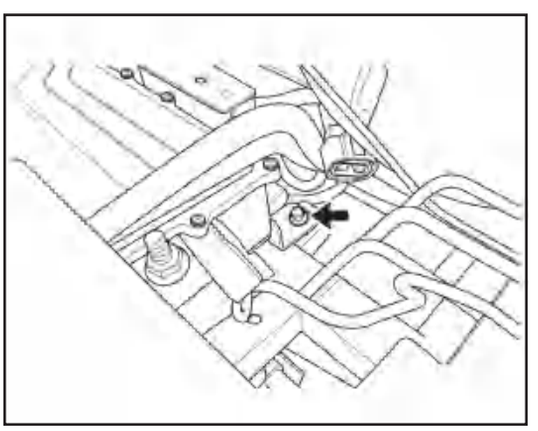


⑥ Remove the two fixing bolts (arrows) at the rear of the charger+DCDC two-in-one assembly.

Tightening torque :

23±3 N·m (17.0±2.2 ft-lbs.)





⑦ Carefully take out the charger+DCDC two-in-one assembly.

Installation

1. The sequence of installing the charger+DCDC two-in-one assembly is the reverse of the removal sequence.

Caution:
※ After the assembly is installed, add coolant.

7.2.2 AC/DC integrated charging socket

Technical parameters

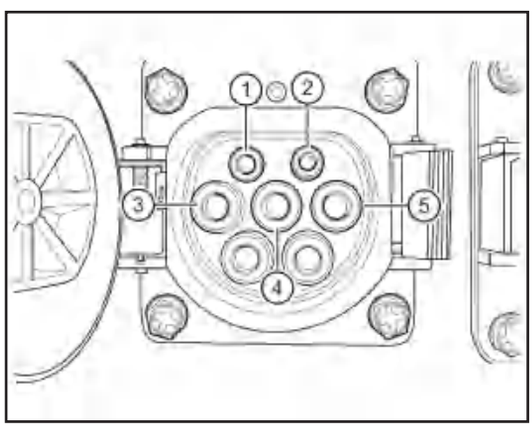
※ DC charging socket technical parameters

European standard 125A DC charging socket	
Rated current	125 A
Rated voltage	750 V
Protection grade	IP54

※ AC charging socket technical parameters

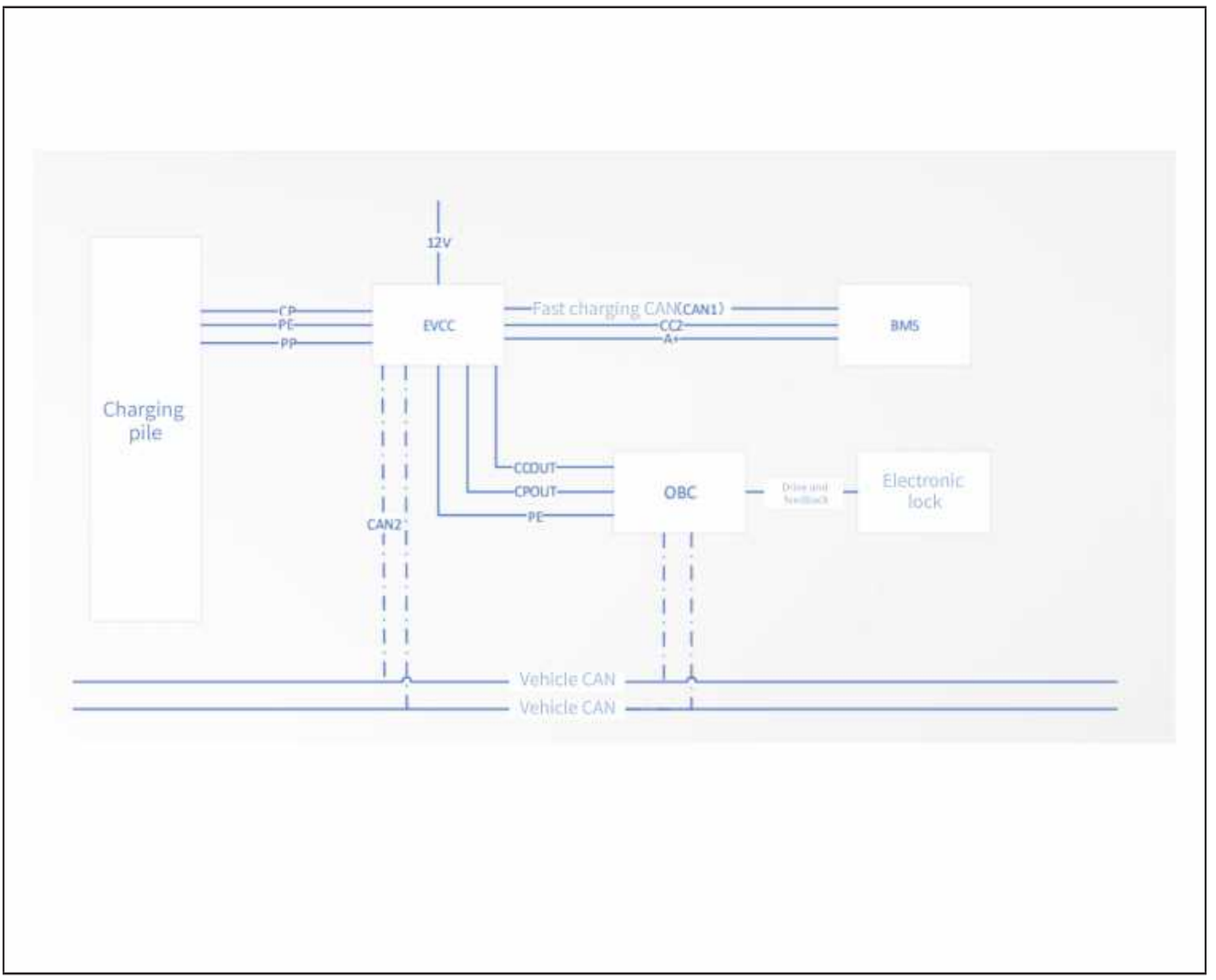
European standard 32A AC charging socket	
Rated current	32 A
Rated voltage	250/440 V
Protection grade	IP54

End hole definition



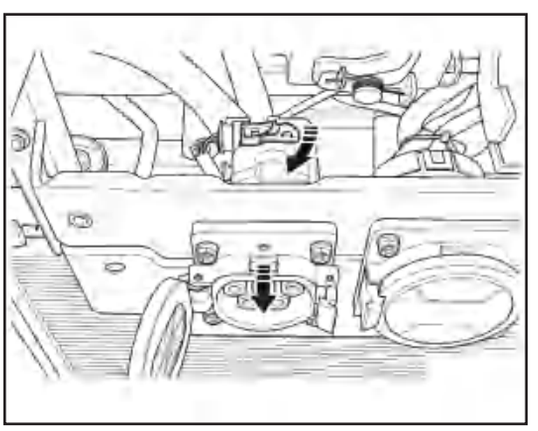
End hole No.	Definition
1	PP connection confirmation
2	CP control confirmation
3	L1 live wire
4	N null line
5	PE protective earthing
6	DC-DC negative
7	DC-DC positive

Charging schematic diagram

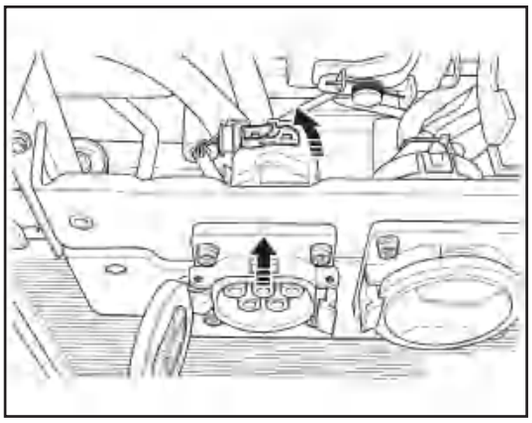


Electronic lock

※ Locking status of electronic lock



※ Unlocking status of electronic lock

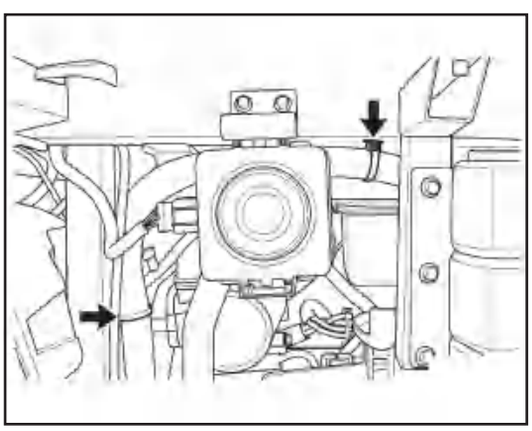


Caution:
※ When the electronic lock cannot be unlocked due to the failure of the electronic lock or charging system, the manual mechanical unlocking method can be used. Push the red dial block counterclockwise by hand to make it unlocked, and then pull out the charging gun.

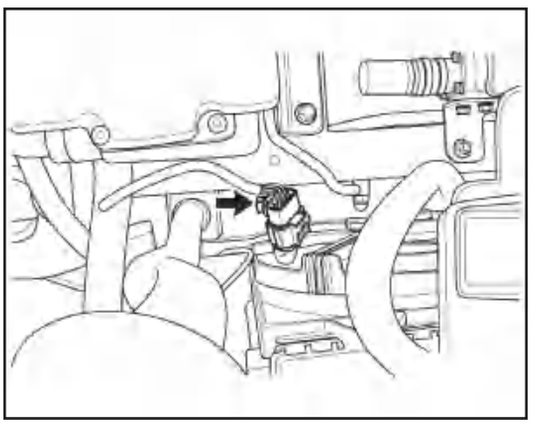
Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove AC charging socket assembly

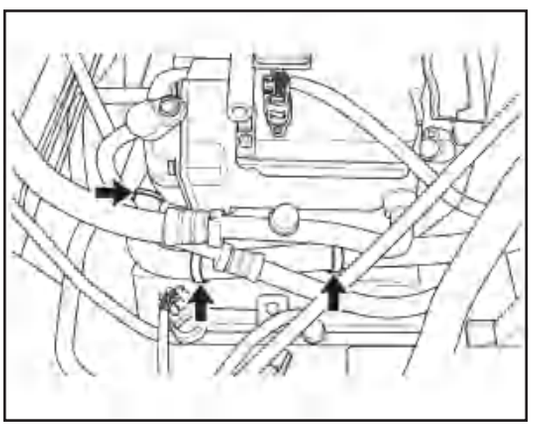
   ① Disengage the two fixing clips of the AC charging cable from the front frame (arrows).



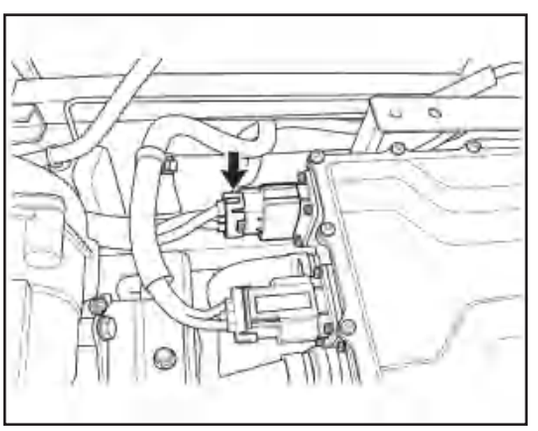
② Disconnect the AC charging low voltage signal connector (arrow).



③ Disengage the three fixing clips of the AC charging cable from the mounting frame (arrows).

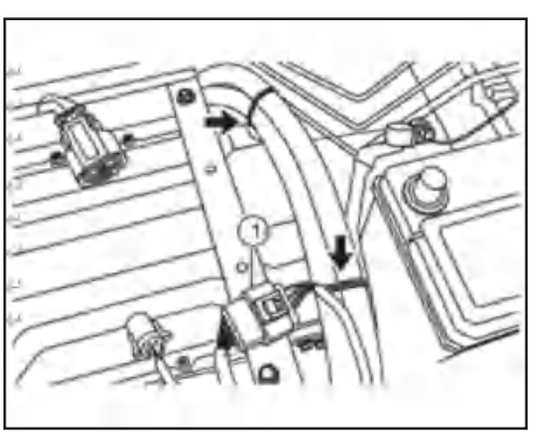


④ Disconnect the charger+DCDC two-in-one AC input plug-in (arrow).

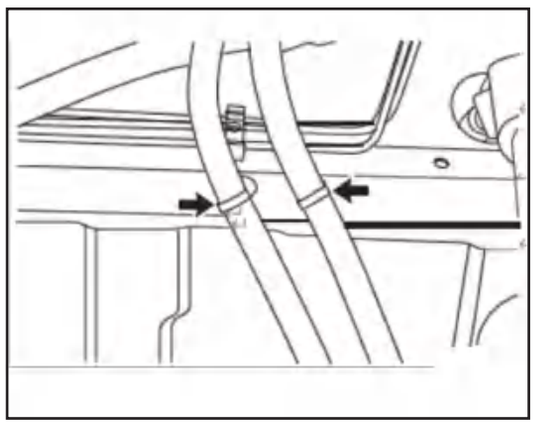


⑤ Disconnect the charging stand low voltage signal connector (1).

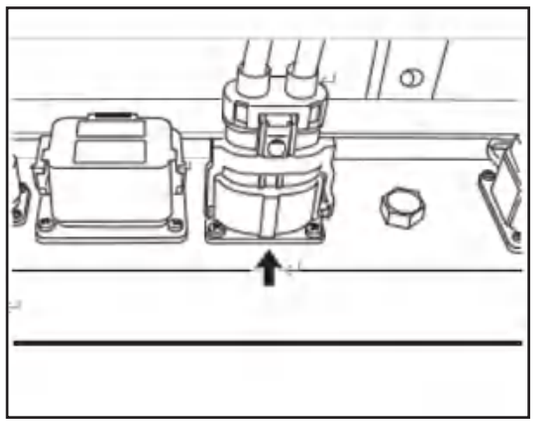
⑥ Disconnect the two fixing clips of the DC charging cable from the fixing bracket of the high-voltage distribution box (arrows).



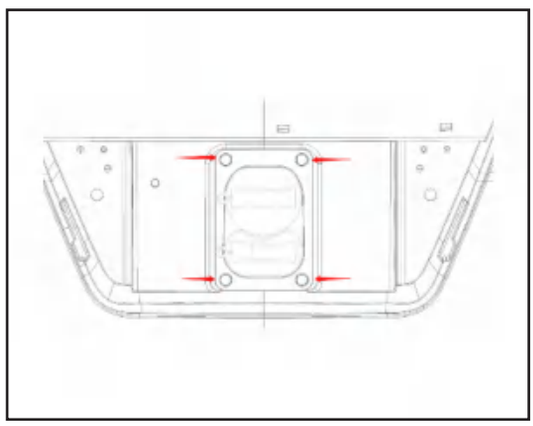
⑦ Disengage the two fixing clips of the DC charging cable from the body (arrows).



⑧ Disconnect the fast charging input plug-in on the power battery pack (arrow).



⑨ Remove 4 fixing bolts (arrows) from the AC/DC integrated charging socket, slowly pull out the AC charging socket with cable assembly from the front mounting hole.



Installation

1. The sequence of installing the AC and DC integrated charging socket is the reverse of the removal sequence.

7.2.3 Fixed cover plate bracket of charging stand

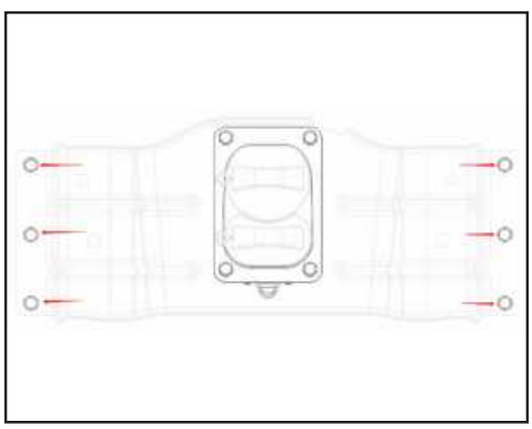
Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove AC/DC integrated charging stand
4. Remove fixed cover plate bracket assembly of charging stand

   ① Remove 6 fixing bolts (arrows) from the fixed cover plate bracket of charging stand. Take off fixed cover plate bracket assembly of charging stand.

   Tightening torque:

   9±1 N·m (6.6±0.7 ft-lbs.)



Installation

1. The sequence of installing the fixed cover plate bracket of charging stand is the reverse of the removal sequence.

Cooling system

8.1 Functional specifications

8.1.1 Coolant capacity

Items	Capacity
Cooling system	5.4± 0.1 L (1.43±0.03 us gal)

8.1.2 Precautions for coolant filling

※ After the coolant is filled, the liquid level shall be kept 0 – 3 mm below the MAX line.

※ The coolant shall not be mixed with that of different models.

※ Requirements for antifreeze: the freezing point is lower than -38 °C (-36 °F), and the volume ratio of ethylene glycol and pure water is 53:47.

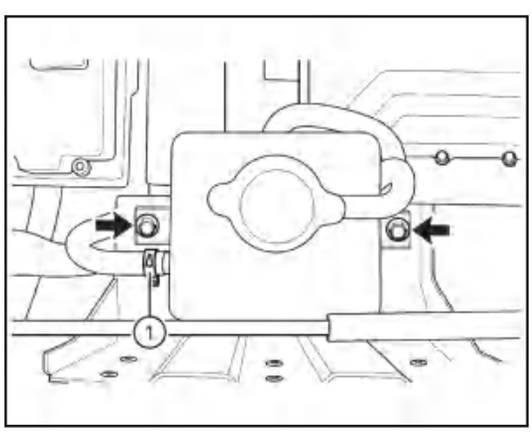
※ If the coolant splashes into the eyes during operation, wash it with clean water in time.

8.2 On-board maintenance

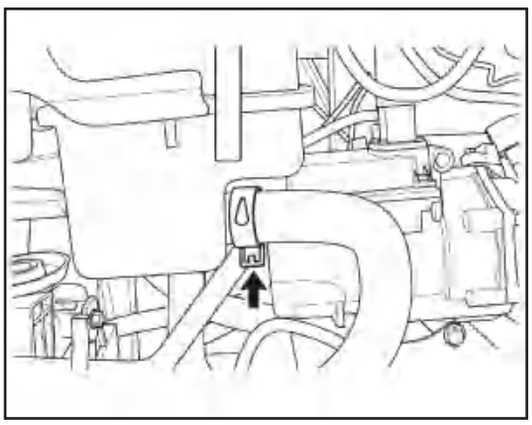
8.2.1 Expansion kettle

Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the expansion kettle assembly
   ① Loosen the elastic clamp (1) and disconnect the degassing hose from the expansion kettle.
   ② Remove 2 fixing bolts (arrows) from the expansion kettle.
   Tightening torque:
   7±1 N·m (5.2±0.7 ft-lbs.)



③Loosen the elastic clamp (arrow) and disconnect the water supply hose from the expansion kettle.



④ Take off the expansion kettle assembly.

Installation

1. The sequence of installing the charger+DCDC two-in-one assembly is the reverse of the removal sequence.

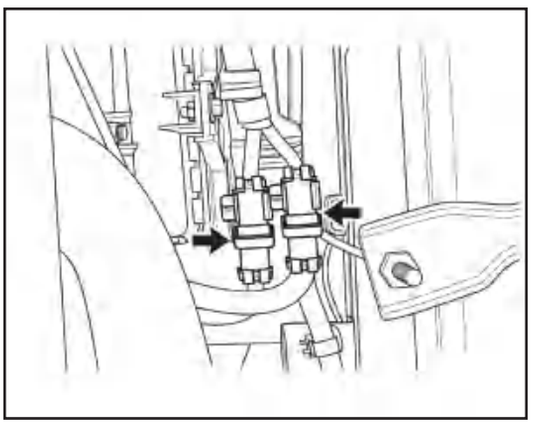
Caution:
※ Connect the I-shaped end of the radiator degassing pipe with the expansion tank (the I-shaped end of the water pipe faces directly above), and clamp it with a clamp tightly.
※ The small-diameter “soil” end is connected with the expansion tank (the “soil” end of the water pipe faces the horizontal left side) and is clamped with a clamp. The direction of the clamp is aligned with the “soil” sign.
※ After the assembly is installed, add coolant. Check whether the connecting pipeline is connected well without leakage.

8.2.2 Cooling fan

Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the expansion kettle assembly
4. Remove the cooling fan assembly

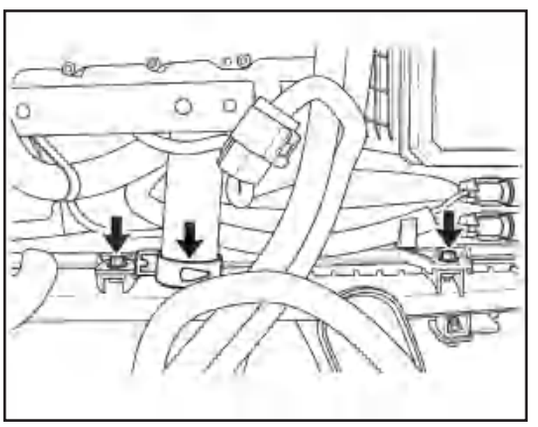
① Disconnect the cooling fan connector (arrow).



② Remove 2 fixing bolts (arrows) at the right and middle of the cooling fan, loosen the elastic clamp (1), and disconnect the connection between the upper water pipe and the radiator.

Tightening torque :

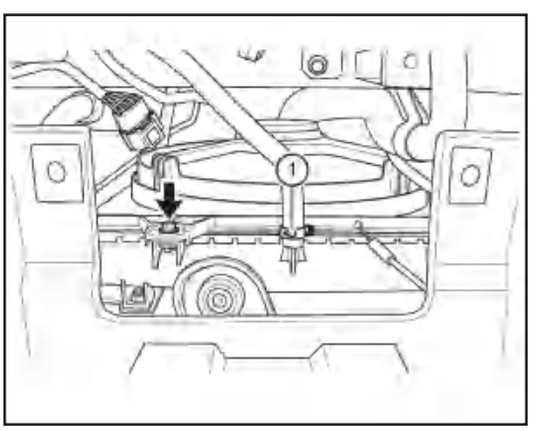
7±1 N·m (5.2±0.7 ft-lbs.)



③ Remove 1 fixing bolt (arrow) on the left side of the cooling fan, loosen the elastic clamp (1), and disconnect the connection between the degassing pipe and the radiator.

Tightening torque:

7±1 N·m (5.2±0.7 ft-lbs.)



④ Take off the cooling fan assembly.

Installation

1. The sequence of installing the cooling fan is the reverse of the removal sequence.

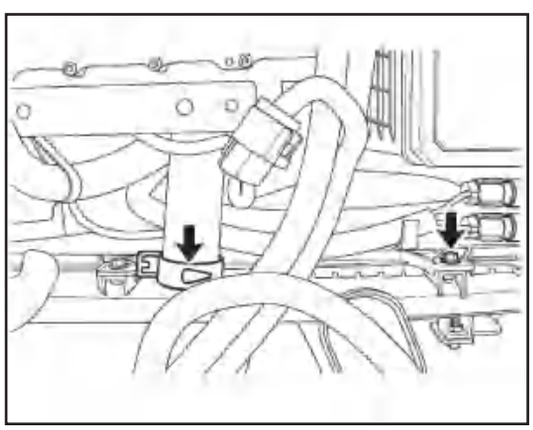
Caution:
※ Connect the "soil" end of the degassing pipe with the degassing port of the radiator (the "soil" end of the water pipe faces directly above) and clamp it tightly with a clamp. ※ Connect the I-shaped end of the water supply pipe with the water inlet of the radiator assembly (the I-shaped end of the water pipe faces directly above) and clamp it with a clamp tightly. ※ After the assembly is installed, add coolant. Check whether the connecting pipeline is connected well without leakage.

8.2.3 Radiator

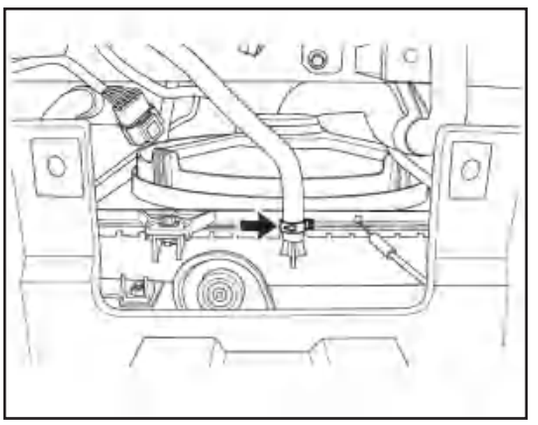
Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the expansion kettle assembly
4. Remove the cooling fan assembly
5. Remove the radiator assembly

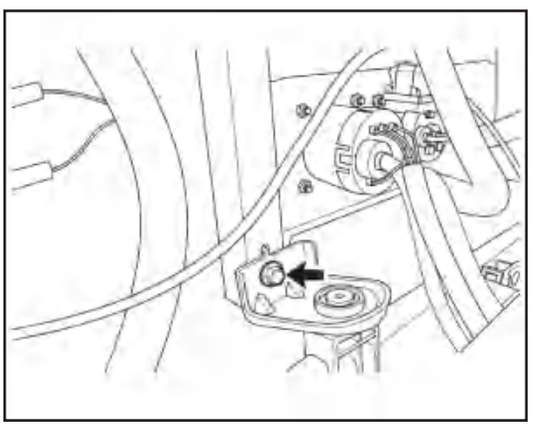
   ① Loosen the elastic clamp (arrow) and disconnect the upper water pipe from the radiator.

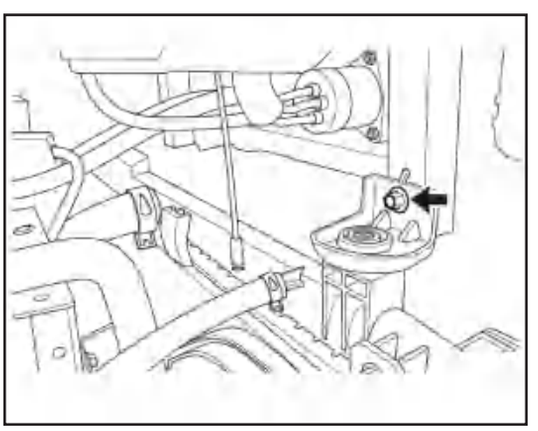


② Loosen the elastic clamp (arrow) and disconnect the degassing pipe from the radiator.

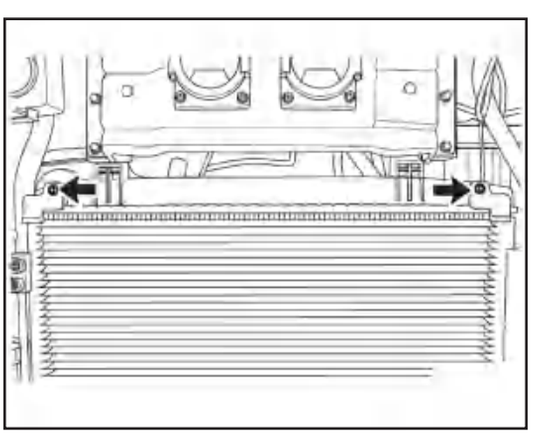


③ Remove 2 fixing bolts (arrows) connecting the left and right radiator mounting brackets and the front frame.

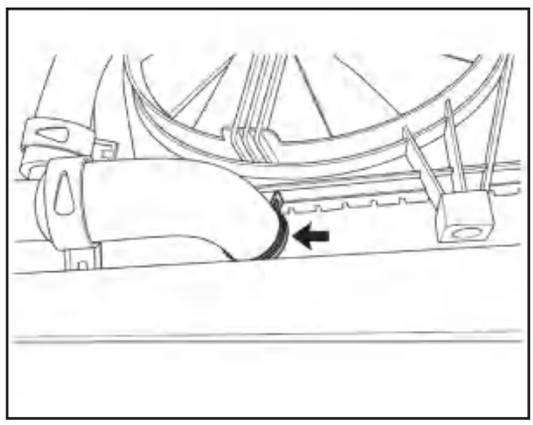




④ Remove 2 fixing bolts (arrows) at the left and right sides of the radiator and condenser.



⑤ Loosen the elastic clamp (arrow) and disconnect the lower water pipe from the radiator.



⑥ Take off the radiator assembly.

Installation

1. The sequence of installing the radiator is the reverse of the removal sequence.

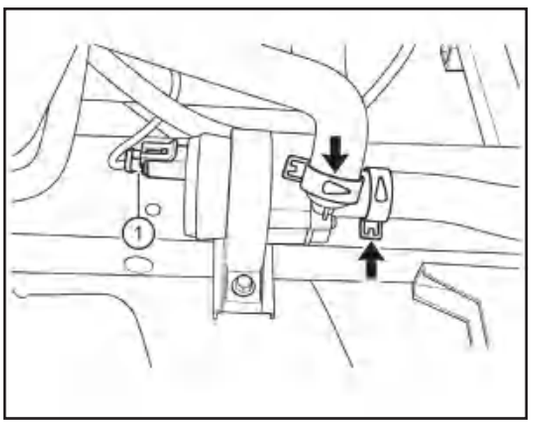
Caution:
※ Connect the "soil" end of the degassing pipe with the degassing port of the radiator (the "soil" end of the water pipe faces directly above) and clamp it tightly with a clamp. ※ Connect the I-shaped end of the water supply pipe with the water inlet of the radiator assembly (the I-shaped end of the water pipe faces directly above) and clamp it with a clamp tightly. ※ Connect the large-diameter "soil" end of the radiator water outlet pipe with the radiator water outlet (the "soil" end of the water pipe faces directly above) and clamp it with a clamp tightly. The clamp direction faces horizontally to the right and aligns with the radiator water outlet boss. ※ After the assembly is installed, add coolant. Check whether the connecting pipeline is connected well without leakage.

8.2.4 Electronic water pump

Removal

1. Turn the ignition switch to OFF
2. Disconnect the battery negative (-) terminal cable
3. Remove the electronic water pump assembly

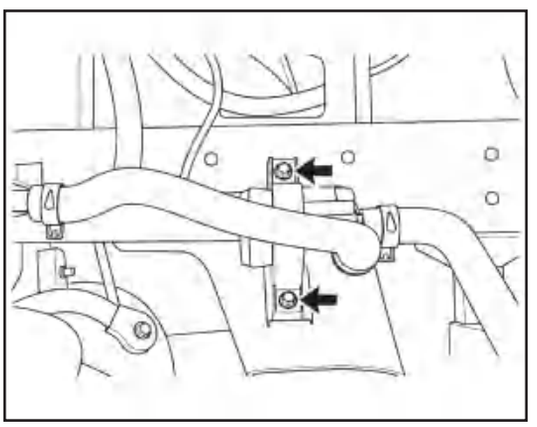
① Disconnect the electronic water pump connector (1). Loosen the elastic clamp (arrows) and disconnect the water inlet and outlet pipes from the electronic water pump.



② Remove 2 fixing bolts (arrows) from the electronic water pump.

Tightening torque :

7±1 N·m (5.2±0.7 ft-lbs.)



③ Take off the electronic water pump assembly.

Installation

1. The sequence of installing the electronic water pump is the reverse of the removal sequence.

Caution:
※ Connect the I-shaped end of the water inlet pipe with the water inlet of the electronic water pump (the I-shaped of the water pipe faces directly below) and fasten it with a clamp. The clamp is located in the middle of the I-shape and the opening direction faces the middle of the sign.
※ Connect the "soil" end of the water outlet pipe of the water pump with the water outlet of the water pump (the "soil" end of the water pipe faces directly below), and clamp it with a clamp.
※ After the assembly is installed, add coolant. Check whether the connecting pipeline is connected well without leakage.

Suspension system

9.1 Description

9.1.1 Front suspension

The front suspension of this vehicle is equipped with McPherson type independent suspension, which is not adjustable in height, cylindrical spiral spring, shock absorber, and with lateral stabilizer; the front suspension has the function of steering. The upper end of the suspension is connected with the body, and the lower end is connected with the front knuckle.

9.1.2 Rear suspension

The rear suspension of this vehicle adopts leaf spring non-independent suspension. The rear suspension is equipped with leaf spring and telescopic shock absorber, but there is no horizontal stabilizer, and the height is not adjustable. The rear suspension has drive function. The upper end of the suspension is connected with the body and the lower end is connected with the rear drive axle, which improves driving stability and safety.

9.1.3 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Connecting nut between front connecting rod assembly and front shock absorber assembly	60± 5	44.3±3.7
Connecting nut between front connecting rod assembly and front stabilizer rod assembly	60± 5	44.3±3.7
Connecting nut between front shock absorber assembly and front knuckle assembly	240± 20	177.1±14.8
Connecting nut of upper connecting plate of front shock absorber assembly	60± 5	44.3±3.7
Connecting nut between front control arm assembly ball joint and front knuckle assembly	85± 5	62.7±3.7
Connecting bolt between the forepart of the front control arm assembly and the front frame assembly	220± 20	162.4±14.8
Connecting bolt between the rear part of the front control arm assembly and the front frame assembly	220± 20	162.4±14.8
Connecting bolt between front stabilizer bar assembly fixing bracket and front frame	33± 3	24.4±2.2
Connecting nut between rear shock absorber assembly and body	75± 5	55.4±3.7

Description	Torque	
	N·m	ft-lbs.
Connecting nut between rear shock absorber assembly and lower plate of leaf spring	75± 5	55.4±3.7
U-bolt fixing nut	180± 15	132.8±11.1
Parking brake cable bracket fixing bolts	23± 2	17±1.5
Fixing bolt of front rolling lug of leaf spring	125± 10	92.3±7.4
Lifting lug outer plate fixing nut	125± 10	92.3±7.4

9.1.4 Tools

Common tools

Tool name	Tool picture
Pallet jack	
Spring compressor	

9.2 Diagnosis and test

9.2.1 Fault symptom table

Tips:
※ Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence. Repair or replace faulty parts or make adjustments as necessary.

Front suspension

Symptom	Suspicious parts
Deviation of vehicle	Front wheel tires (worn or improperly inflated)
	Front wheel alignment (error)
	Control arm ball pin assembly (loose)
	Steering tie rod (loose or worn)
	Front suspension parts (excessive wear or deformation)

Symptom	Suspicious parts
Sagging	Vehicle (overload)
	Front coil spring (too soft)
	Front shock absorber assembly (worn or damaged)
	Front wheel tires (improperly inflated)
	Front wheel alignment (error)
Decline	Front wheel tires (worn or improperly inflated)
	Front stabilizer bar assembly (bent or broken)
	Front shock absorber assembly (worn or damaged)
Wheel shimmy	Front wheel tires (worn or improperly inflated)
	Front wheel (unbalanced)
	Front shock absorber assembly (worn or damaged)
	Front wheel alignment (error)
	Front control arm assembly (loose)
	Steering gear (misadjusted or damaged)

Rear suspension

Symptom	Suspicious parts
Sagging	Vehicle (overload)
	Rear shock absorber assembly (worn or damaged)
	Rear suspension parts (excessive wear or deformation)
	Rear wheel tires (improperly inflated)
Decline	Rear wheel tires (worn or improperly inflated)
	Leaf spring (bent or broken)
	Rear shock absorber assembly (worn or deformed)
Abnormal tire wear	Rear wheel tires (improperly inflated)
	Rear wheel (unbalanced)
	Rear shock absorber assembly (worn or damaged)
	Rear suspension parts (excessive wear or deformation)

9.3 On-board maintenance

9.3.1 Front shock absorber assembly

Inspection

1. Inspect the front shock absorber assembly.

※ Park the vehicle at a stable place, bounce the vehicle up and down, and check whether the vehicle swings up and down when the body bounces. If it shakes up and

down continuously, the shock absorber assembly may be damaged and should be replaced.

2. Inspect the leakage of the front shock absorber assembly.

※ As the shock absorber assembly works frequently during vehicle operation, the shock absorber oil will form oil vapor due to temperature rise and adhere to the dust cover. This phenomenon is normal, and it is unnecessary to replace the shock absorber assembly.

※ The shock absorber itself is designed to have a very thin oil film on the surface of the piston rod. These oil films will be scraped off by the dust film on the shock absorber oil seal when the shock absorber is compressed. At the same time, a very small amount of oil will accumulate on the upper part of the oil seal. Because of its high permeability, the oil accumulated in the upper part of the oil seal slowly diffuses from the upper part of the shock absorber to the lower part, forming a thin oil film. If the following conditions occur:

① The oil film is between the dust cover and the spring seat.

② The circumferential oil stain shown is relatively uniform.

The above conditions are oil stains formed by volatilization, which can be judged as slight oil leakage, which is normal. It is not necessary to replace the shock absorber assembly.

※ If the following conditions occur:

① The circumferential oil stain is uneven.

② The oil trace reaches the lower connection position.

The above conditions indicate that the shock absorber assembly has oil leakage and should be replaced.

※ If it is impossible to accurately judge whether the shock absorber assembly leaks oil from the appearance. Wipe the oil dirt on the surface of the shock absorber in question and then conduct a road test. Drive the vehicle under normal road conditions for 5 to 10 minutes and check it. If oil stain is found on the surface of the shock absorber assembly, it indicates that there is oil leakage, and it should be replaced.

Removal

Warning:
※ Please wear necessary labor protection articles to avoid accidents. ※ When removing and installing chassis parts, ensure that the safety lock of the elevator is locked. ※ It is forbidden to weld or repair the load parts and guide parts of the suspension. ※ Be careful when removing and installing the coil spring to avoid personal injury caused by the spring popping out.

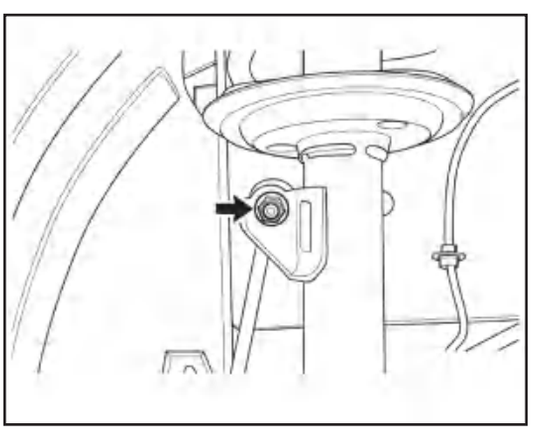
Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

1. Remove the left front wheel
2. Remove the left front shock absorber assembly

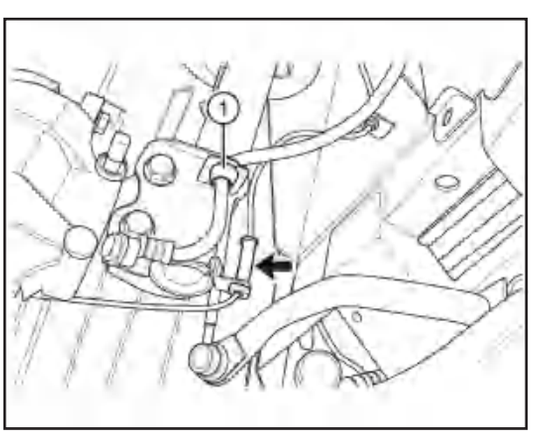
① Remove the connecting nut (arrow) between the left front connecting rod assembly and the left front shock absorber assembly.

Tightening torque:

60 ± 5 N·m (44.3±3.7 ft-lbs.)



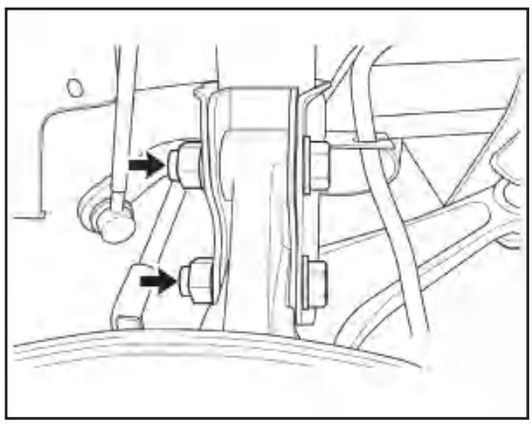
② Disconnect the left front wheel speed sensor harness (arrow) and the left front brake hose assembly (1) from the left front shock absorber assembly.



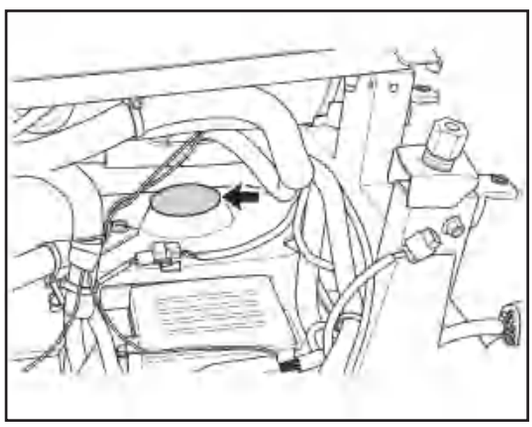
③ Remove 2 cross bolts (arrows) of the left front shock absorber assembly and the left front steering knuckle assembly.

Tightening torque:

240 ± 20 N·m (177.1±14.8 ft-lbs.)



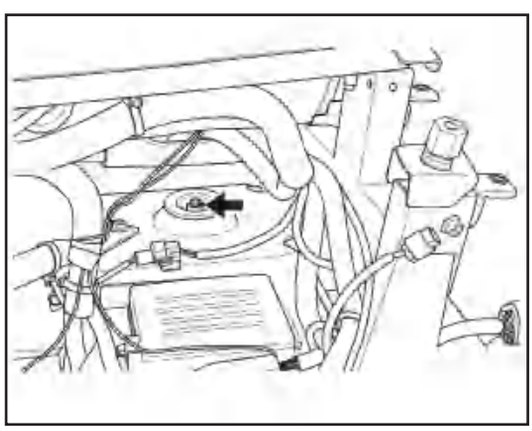
④ Remove the left front shock absorber dust cover (arrow).



⑤ Remove one fixing nut (arrow) of the connecting plate of the left front shock absorber assembly, and take down the connecting plate of the shock absorber.

Tightening torque:

60 ± 5 N·m (44.3±3.7 ft-lbs.)



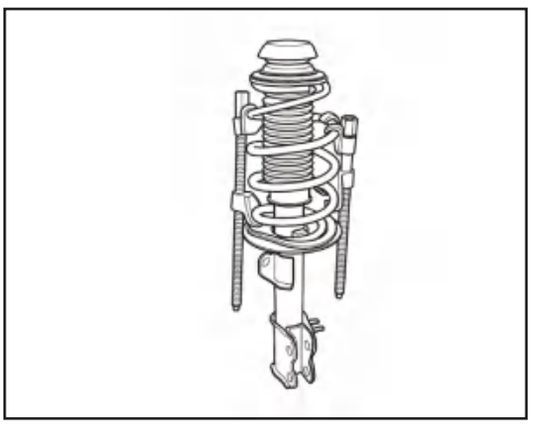
⑥ Take off the left front shock absorber assembly.

Removal

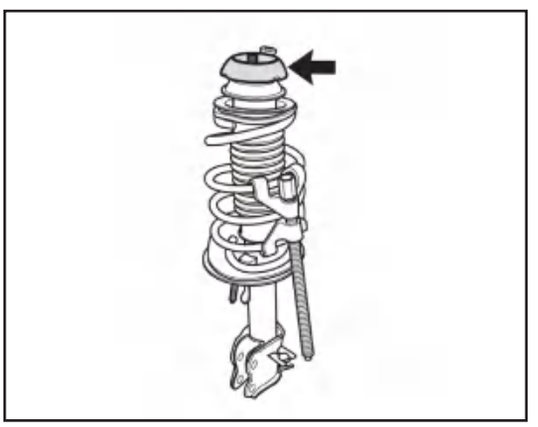
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Remove the left front shock absorber

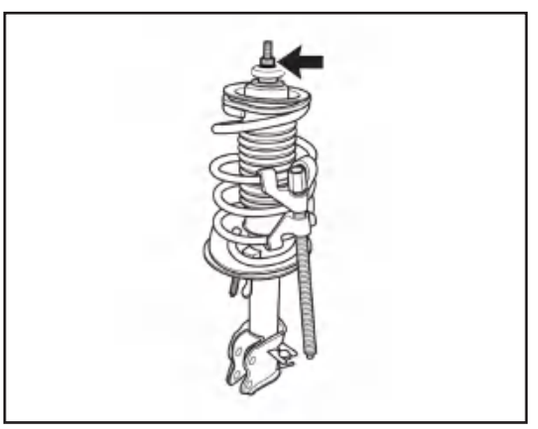
① Install the spring compressor onto the left front shock absorber, and tighten the end screw of the spring compressor to compress the front coil spring.



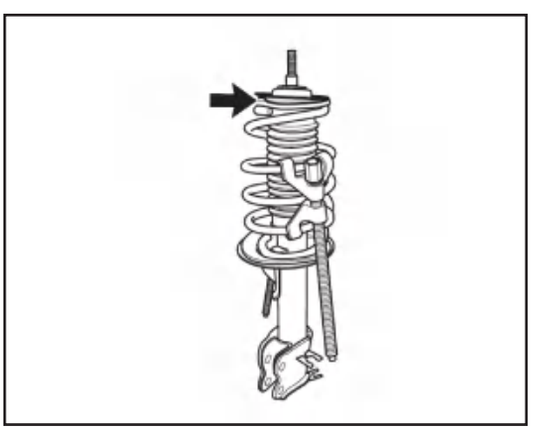
② Remove the cushion (arrow) from the shock absorber assembly.



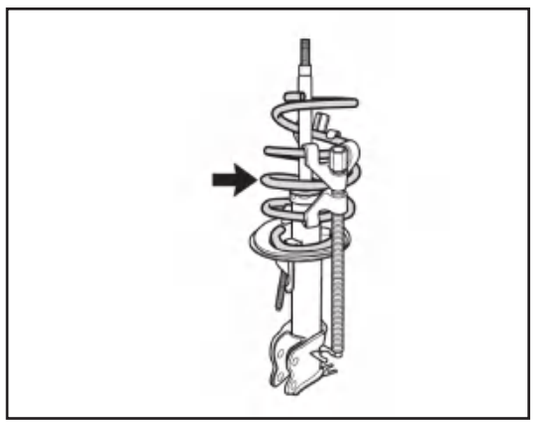
③ Remove the lock nut (arrow) of the shock absorber assembly.



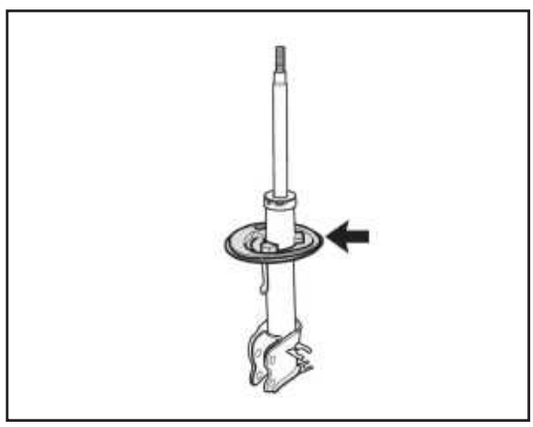
④ Remove the upper tray of the front coil spring (arrow) from the upper part of the left front shock absorber assembly.



⑤ Remove the front coil spring with spring compressor (arrow) from the left front shock absorber assembly.



⑥ Remove the front coil spring lower cushion (arrow) from the lower end of the left front shock absorber assembly.

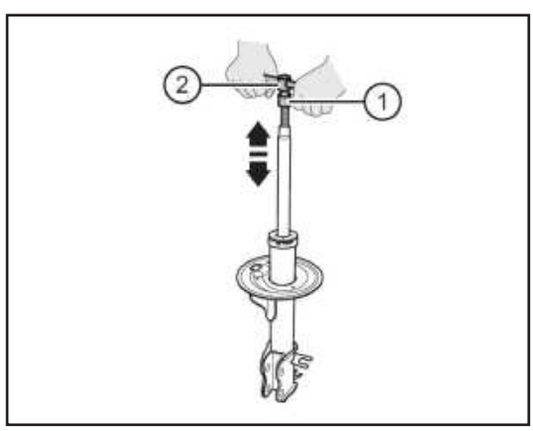


Inspection

1. Inspect the front shock absorber assembly

   Manual check:

   ① Install the lock nut (1) on the upper end of the front shock absorber assembly strut, and then install the T-wrench (2) or similar tool.



   ② Compress and extend the front shock absorber assembly strut several times by hand in the direction indicated by the arrow in the figure. Check and confirm that there is no abnormal resistance or sound during operation. If there is any abnormality, replace it with a new front shock absorber assembly.

2. Check other parts of the front shock absorber assembly

   ① Check whether the upper connecting plate assembly of the front shock absorber is damaged. Replace if necessary.

   ② Check whether the front coil spring is worn, cracked or deformed. Replace if necessary.

   ③ Check whether the upper tray of the front coil spring is broken or deformed. Replace if necessary.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the bolts to the specified torque.
※ After installation, check the wheel alignment and adjust the wheel alignment to the standard range if necessary.

9.3.2 Front control arm assembly

Removal

Warning:
※ Please wear necessary labor protection articles to avoid accidents.
※ When repairing chassis parts, please pay attention to whether the safety lock of the lift is locked.
※ It is forbidden to weld or repair the load parts and guide parts of the suspension.
※ Always replace self-locking nuts and rusted nuts when disassembling chassis parts to ensure safety.

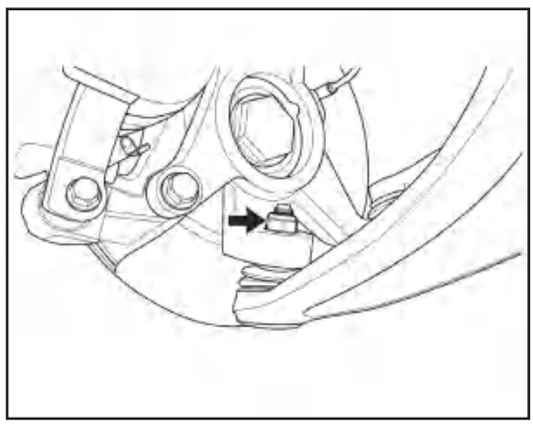
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Remove the left front wheel
2. Remove the left front control arm assembly

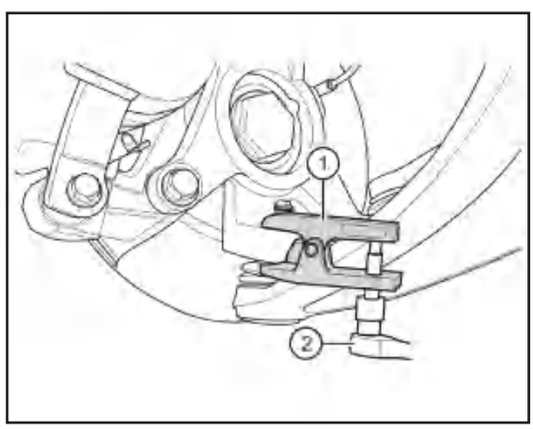
① Remove the connecting nut (arrow) between the ball pin of the left front control arm assembly and the left front steering knuckle assembly.

Tightening torque:

85 ± 5 N·m (62.7±3.7 ft-lbs.)



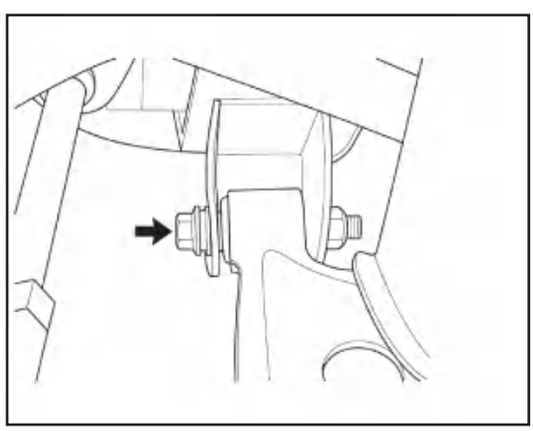
② Use the ball joint separating tool (1) and turn the wrench (2) to separate the ball pin of the front control arm from the steering knuckle.



③ Remove the connecting bolt (arrow) between the forepart of the left front control arm assembly and the frame assembly.

Tightening torque :

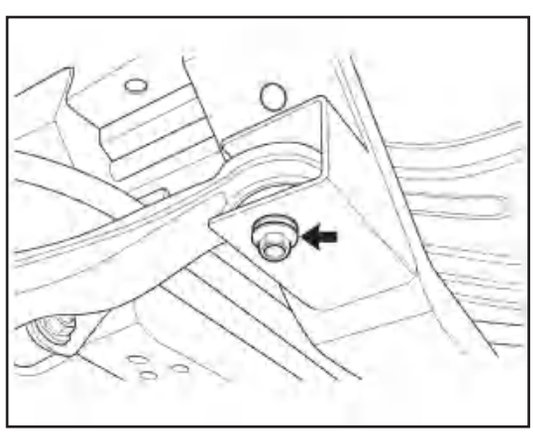
220 ± 20 N·m (162.4±14.8 ft-lbs.)



④ Remove the connecting bolt (arrow) between the rear part of the left front control arm assembly and the frame assembly.

Tightening torque:

220 ± 20 N·m (162.4±14.8 ft-lbs.)



⑤ Take off the left front control arm assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the connecting bolts and nuts to the specified torque.
※ After installation, make sure that the ball pin assembly operates freely without jamming.
※ After installation, check the wheel alignment. Adjust the wheel alignment to the standard range if necessary.

9.3.3 Front stabilizer bar assembly

Removal

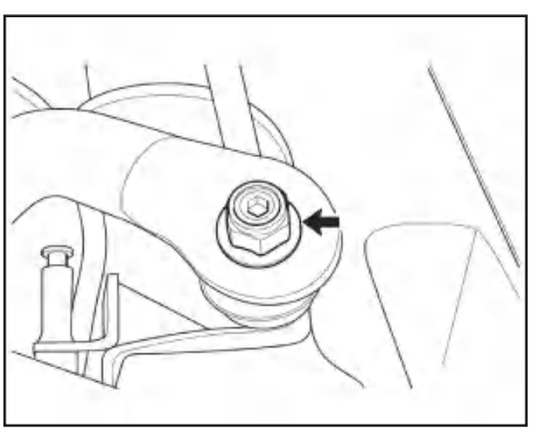
Caution:
※ Please wear necessary labor protection articles to avoid accidents.
※ When repairing chassis parts, please pay attention to whether the safety lock of the lift is locked.

1. Remove the front wheel
2. Remove the front stabilizer bar assembly

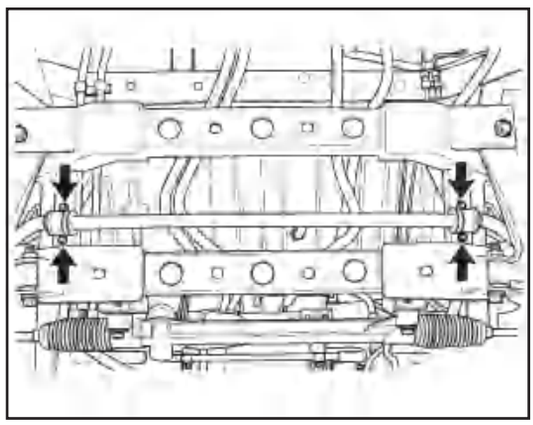
① Remove the fixing nut (arrow) connecting the stabilizer bar and connecting rod. The right fixing nut is removed in the same way as the left side.

Tightening torque:

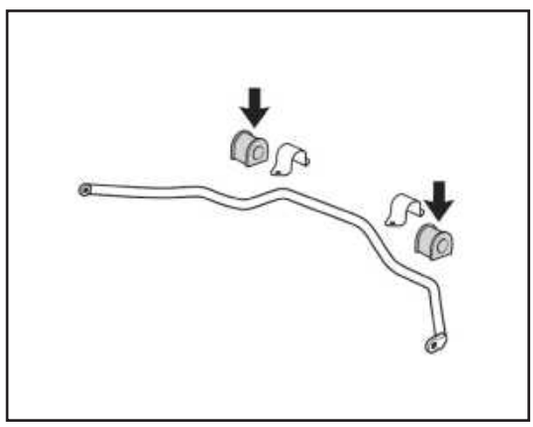
60 ± 5 N·m (44.3±3.7 ft-lbs.)



② Remove 4 fixing bolts (arrows) between the stabilizer bar assembly and the front frame, and remove the front stabilizer bar assembly.



③ Disengage the left and right rubber pads from the front stabilizer bar assembly.



Inspection

1. Check the front stabilizer bar assembly

① Check whether the fixing clip of the front stabilizer bar assembly is worn, cracked, deformed or damaged. Replace if necessary.

② Check whether the fixing clip of the rubber pad is worn, cracked, deformed or damaged. Replace if necessary.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the connecting bolts and nuts to the specified torque.

9.3.4 Front connecting rod assembly

Removal

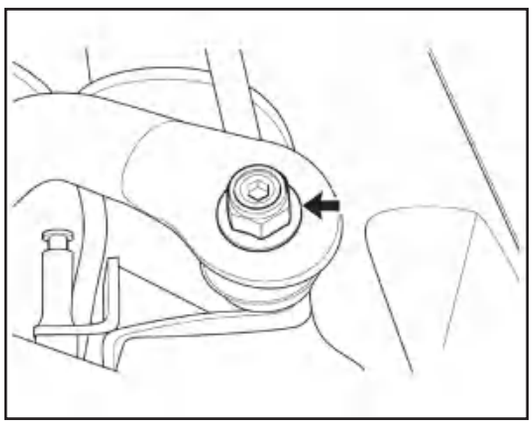
Caution:
※ Please wear necessary labor protection articles to avoid accidents. ※ When repairing chassis parts, please pay attention to whether the safety lock of the lift is locked.

1. Remove the front wheel
2. Remove the left front connecting rod assembly (the right side is removed in the same way as the left side)

① Fix the lower end of the left front connecting rod assembly with an Allen wrench, and remove the connecting nut (arrow) between the left front stabilizer rod assembly and the left front connecting rod assembly with a holding wrench.

Tightening torque:

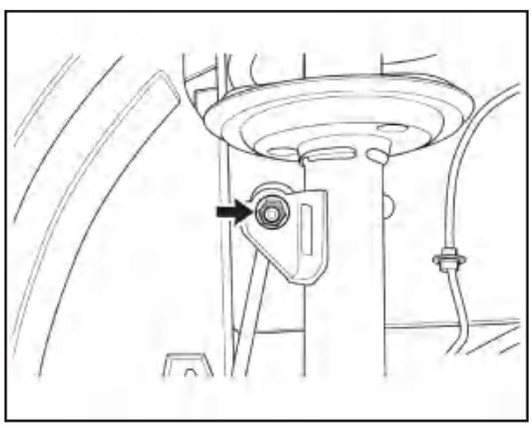
60 ± 5 N·m (44.3±3.7 ft-lbs.)



② Fix the upper end of the left front connecting rod assembly with an Allen wrench, and remove the connecting nut (arrow) between the left front connecting rod assembly and the left front shock absorber assembly with a holding wrench.

Tightening torque:

60 ± 5 N·m (44.3±3.7 ft-lbs.)



③ Take off the left front connecting rod assembly.

Inspection

1. Check the front connecting rod assembly

① Check the front connecting rod assembly bushing for wear, crack, deformation, damage or grease leakage. Replace if necessary.

② Check whether the end of the front connecting rod assembly rotates freely. Replace if necessary.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the connecting bolts and nuts to the specified torque. ※ After installation, ensure that the end of the front connecting rod assembly runs freely without jamming.

9.3.5 Front knuckle assembly

Removal

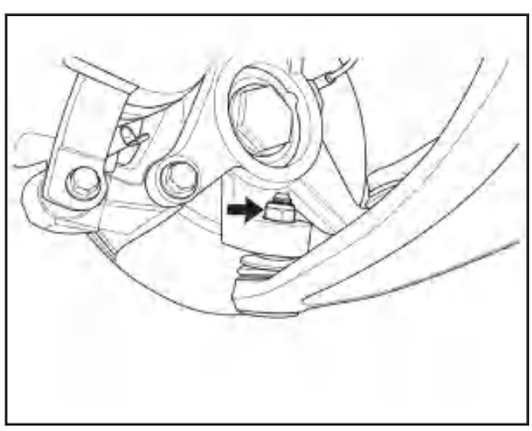
Caution:
※ Please wear necessary labor protection articles to avoid accidents. ※ When repairing chassis parts, please pay attention to whether the safety lock of the lift is locked. ※ It is forbidden to weld or repair the load parts and guide parts of the suspension. ※ Always replace self-locking nuts and rusted nuts when disassembling chassis parts to ensure safety.

1. Remove the front wheel
2. Raise the vehicle to a suitable position
3. Remove the left front steering knuckle assembly (the right side is removed in the same way as the left side)

   ① Remove the fixing nut of the left front control arm ball joint and separate the ball joint from the left front steering knuckle assembly.

   Tightening torque:

   85 ± 5 N·m (62.7±3.7 ft-lbs.)

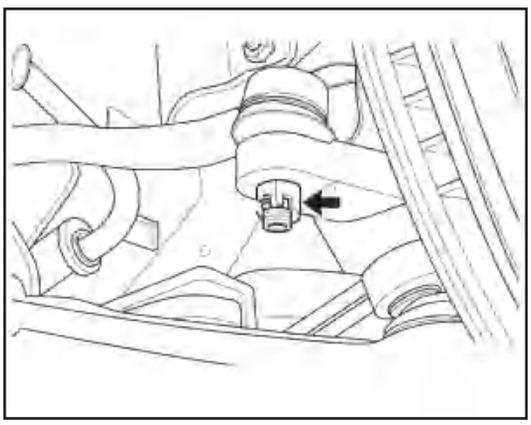


   ② Pull out the cotter pin from the ball pin of the steering gear tie rod.

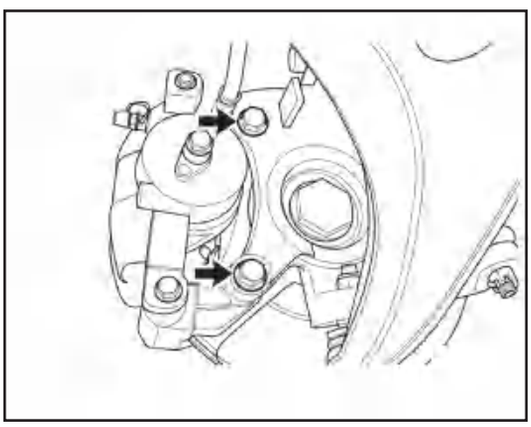
③ Remove the fixing nut (arrow) of the steering gear tie rod ball joint and separate it from the left front steering knuckle assembly.

Tightening torque:

55 ± 5 N·m (40.6±3.7 ft-lbs.)



④ Remove 2 fixing bolts of the brake caliper assembly and the left steering knuckle assembly, and move the brake caliper assembly to the proper position.

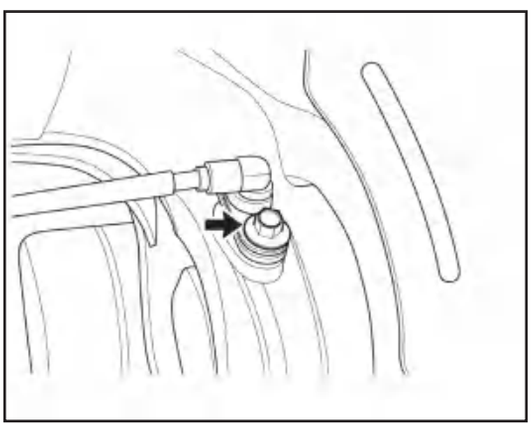


Warning:
※ Take care not to overstretch the front brake hose.

⑤ Remove 1 fixing bolt of the left front wheel speed sensor and take out the sensor.

Tightening torque:

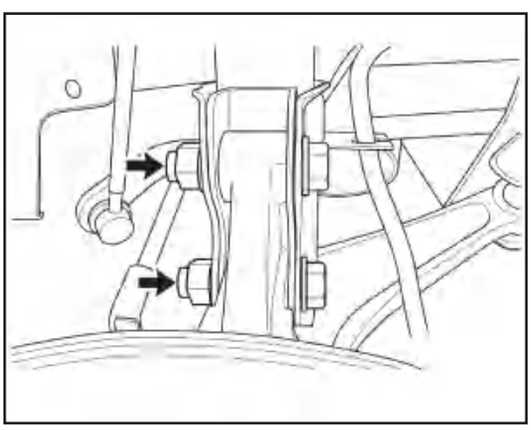
9 ± 1 N·m (6.6±0.7 ft-lbs.)



⑥ Remove the 2 fixing bolts of the left steering knuckle assembly and the left front shock absorber assembly.

Tightening torque:

240 ± 20 N·m (177.1±14.8 ft-lbs.)



⑦ Remove the left front knuckle assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the connecting bolts and nuts to the specified torque.
※ After installation, ensure that the end of the front connecting rod assembly runs freely without jamming.

9.3.6 Rear shock absorber assembly

Removal

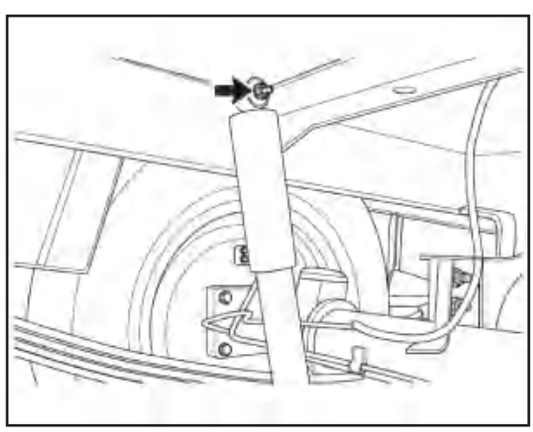
Caution:
※ Please wear necessary labor protection articles to avoid accidents.
※ When repairing chassis parts, please pay attention to whether the safety lock of the lift is locked.

1. Raise the vehicle to a suitable position
2. Remove the left rear shock absorber assembly (the right side is removed in the same way as the left side)

① Remove 1 connecting nut (arrow) between the upper part of the left rear shock absorber assembly and the body.

Tightening torque :

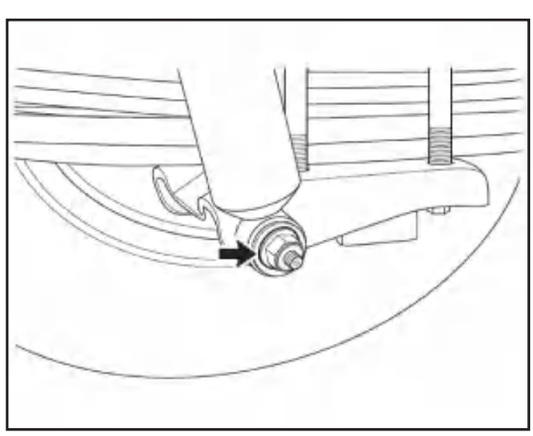
70 ± 5 N·m (51.7±3.7 ft-lbs.)



② Remove 1 connecting nut (arrow) between the lower part of the left rear shock absorber assembly and the lower left pressure plate assembly of the leaf spring.

Tightening torque :

70 ± 5 N·m (51.7±3.7 ft-lbs.)



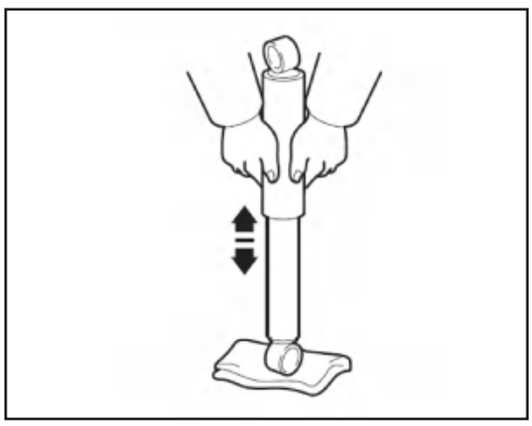
③ Remove the left rear shock absorber assembly and remove the inner and outer gaskets.

Inspection

1. Inspect the rear shock absorber assembly.

   Manual check:

   ① Compress and extend the rear shock absorber assembly several times by hand in the direction indicated by the arrow in the figure, check and confirm that there is no abnormal resistance or abnormal sound during the operation; if there is any abnormality, replace it with a new rear shock absorber assembly.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the connecting bolts and nuts to the specified torque.
※ After installation, bounce the vehicle up and down several times to stabilize the rear suspension.

9.3.7 Leaf spring assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

Caution:
※ Please wear necessary labor protection articles to avoid accidents.
※ When repairing chassis parts, please pay attention to whether the safety lock of the lift is locked.
※ It is forbidden to weld or repair the load parts and guide parts of the suspension.

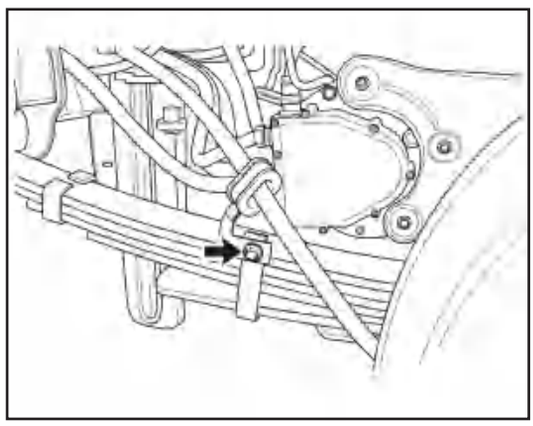
1. Remove the rear wheel
2. Raise the vehicle to a suitable position
3. Remove the leaf spring assembly

① Remove 2 fixing nuts of the left rear shock absorber assembly and take down the left rear shock absorber assembly.

② Remove 1 fixing bolt of the hand brake cable bracket.

Tightening torque:

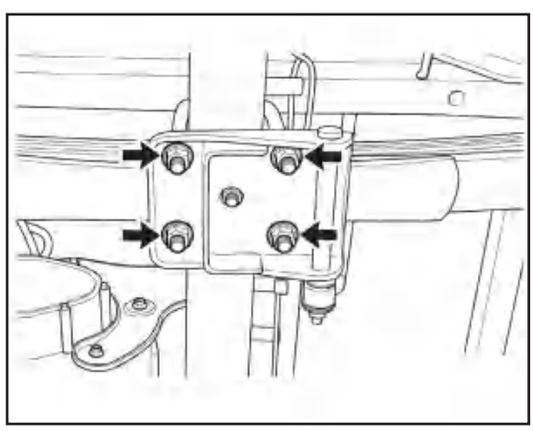
23 ± 2 N·m (17±1.5 ft-lbs.)



③ Remove 4 fixing nuts of the left leaf spring press plate assembly and remove the two U-bolts.

Tightening torque:

180 ± 15 N·m (132.8±11.1 ft-lbs.)

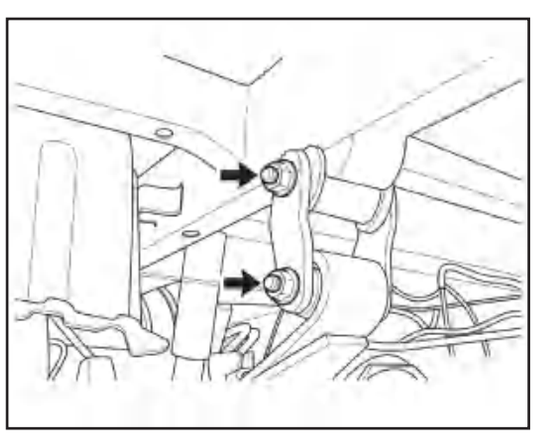


④ Place the transmission bracket under the leaf spring assembly for support.

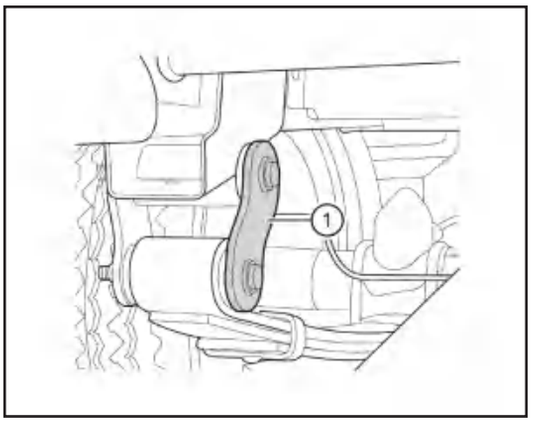
⑤ Remove 2 fixing nuts (arrows) of the outer side plate of the leaf spring lifting lug.

Tightening torque:

125 ± 10 N·m (92.3±7.4 ft-lbs.)



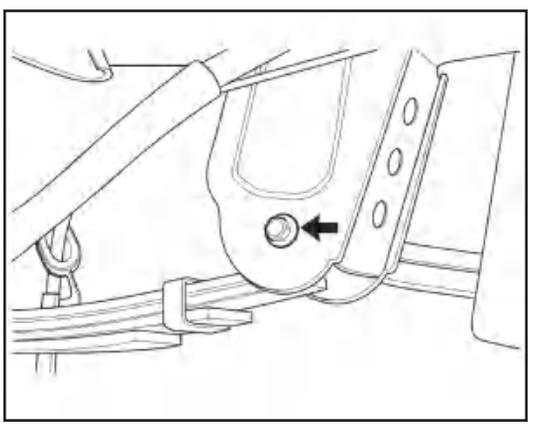
⑥ Remove the outer side plate (1) of the leaf spring lifting lug.



⑦ Remove 1 fixing bolt at the front lug of the leaf spring assembly.

Tightening torque:

125 ± 10 N·m (92.3±7.4 ft-lbs.)



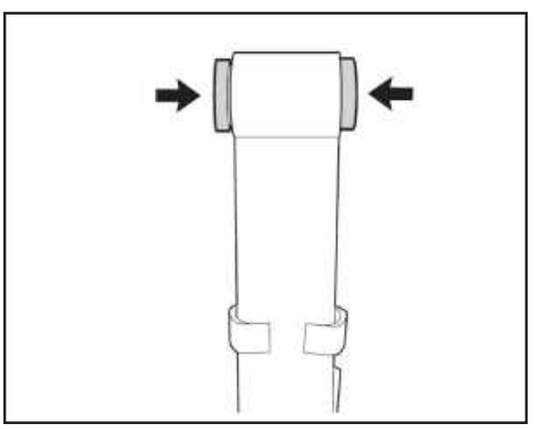
⑧ Carefully remove the leaf spring assembly.

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

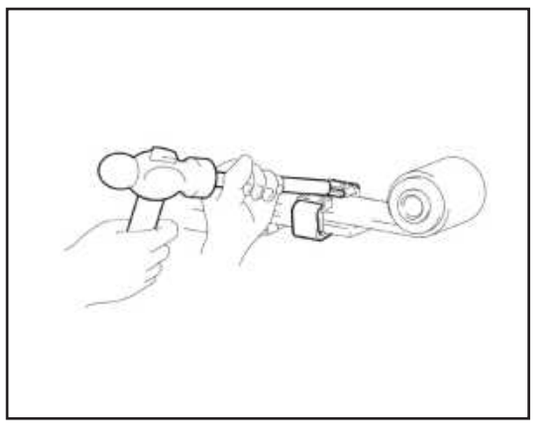
1. Remove the leaf spring assembly

① Use a screwdriver wrapped with protective tape to pry out the lower 2 rubber bushings (arrows).



② Fix the leaf spring assembly in the vice with aluminum plate.

③ Use a hammer and pry bar to pry out the spring clip from the leaf spring assembly .



Inspection

1. Check whether the leaf spring is worn, cracked and deformed due to excessive use; if there is any abnormality, replace the leaf spring.
2. Check whether U-bolts are worn or deformed; if there is any abnormality, replace the U-bolt.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the leaf spring bushing, apply a thin layer of grease on the contact surface. ※ Always tighten the connecting bolts and nuts to the specified torque. ※ After installation, bounce the vehicle up and down several times to stabilize the suspension.

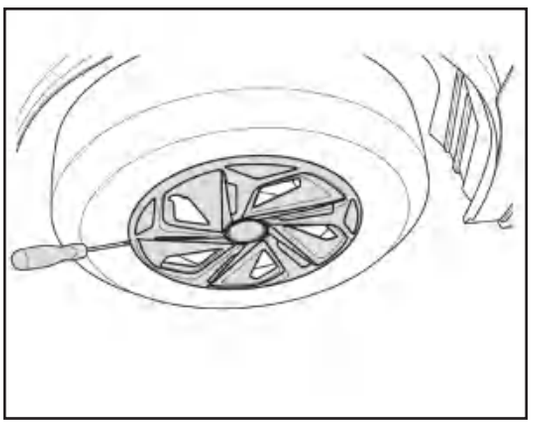
9.3.8 Wheel

Removal

Caution:
※ Please wear necessary labor protection articles to avoid accidents.

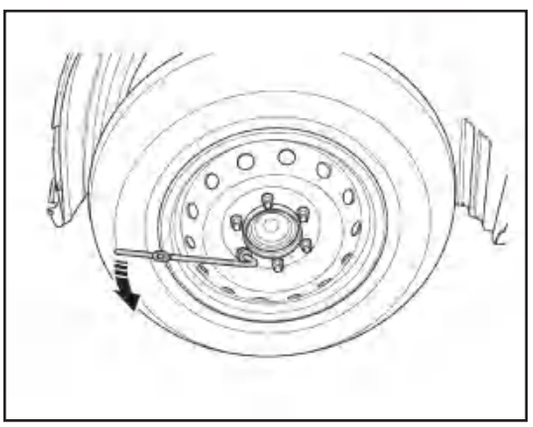
1. Park the vehicle on a smooth surface and apply the parking brake
2. Remove the whee

① Remove the wheel trim cover (arrow) with a screwdriver wrapped with protective tape.



② Firmly support and raise the vehicle to a suitable height.

③ Use a wheel wrench to loosen 6 wheel mounting bolts.



④ Lift the vehicle to the wheel off the ground, remove the mounting bolts and remove the wheel.

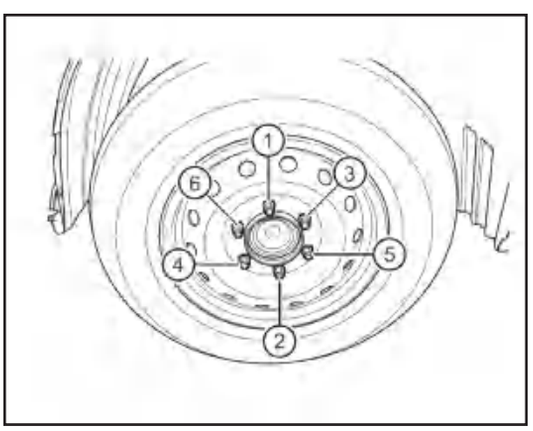
Installation

1. The installation sequence is the reverse of the removal sequence

① Anti-corrosion and anti-rust treatment shall be carried out on the contact surface of wheel and brake disc.

② Install the wheel and pre-tighten the wheel mounting bolts by hand.

③ Use a torque wrench to evenly tighten the wheel mounting bolts to the specified torque in the sequence shown in the figure.



9.3.9 Wheel positioning

Caution:
※ Make sure to carry out wheel alignment according to the operating instructions of the four-wheel alignmeter. ※ The four-wheel aligner should be maintained and repaired regularly.

Generally, check and perform wheel alignment after removing, installing or replacing the following parts:

1. Front control arm assembly.
2. Front knuckle.
3. Front shock absorber assembly.
4. Steering gear and steering tie rod.

Specification (four-wheel alignment parameter standard)

Items		Specified value
Front wheel	Front wheel camber angle	-0° 28′ ± 30′
	Kingpin caster angle	4° 56′ ± 30'
	Kingpin inclination angle	10° 28′ ± 30′
	Front wheel toe-in	0° 19′ ± 10′
Rear wheel	Rear wheel toe-in	0° ± 30′
	Rear wheel camber angle	0° ± 30′

Fault symptom table

Tip:
※ Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence, repair or replace faulty parts or make adjustments as necessary.

Symptom	Suspicious parts
Deviation of vehicle	Front wheel alignment (error)
	Rear wheel alignment (error)
Wheel shimmy	Front wheel alignment (error)
	Rear wheel alignment (error)
Abnormal tire wear	Tires (worn or improperly inflated)
	Front wheel alignment (error)
	Rear wheel alignment (error)

Inspection before wheel alignment

1. The vehicle shall be empty.
2. Support the vehicle with a lift and raise it to a suitable height.
3. Check whether the suspension parts, steering tie rod and ball pin are worn, deformed or damaged. Replace the faulty parts if necessary.
4. Check whether the shock absorber assembly works normally.
5. Check whether the tire pressure is within the specified range, and adjust the tire pressure to the specified pressure if necessary.

   Check whether the tire pressure is within the specified range, and adjust the tire pressure to the specified pressure if necessary.
6. Check the rim and tire.

   ① Visually inspect the rim and tire for scratches, wear or damage.

   ② Perform wheel dynamic balancing.

Front wheel camber angle

※ Incorrect front wheel camber will cause abnormal tire wear. If necessary, check and adjust the front wheel camber.

Under normal circumstances, it is not necessary to adjust the camber angle after the assembly of independent suspension and wheel knuckle; if the camber angle of the wheel is found to deviate from the tolerance range due to other reasons, it can be adjusted by connecting bolts of independent suspension and steering knuckle.

Specified value of front wheel camber angle:

Items	Specified value
Front wheel camber angle	-0° 28′ ± 30′

※ Inspection

① Before adjustment, check (visually) whether the driving system parts are deformed or damaged, and replace the deformed or damaged parts if necessary.

② Install the wheel aligner on the front wheel and check it according to the operating instructions of the wheel aligner.

Front wheel toe-in

※ Incorrect toe-in of the front wheel will cause wheel deviation and abnormal tire wear; check and adjust the front wheel toe-in if necessary.

If the front wheel toe-in is found to deviate from the tolerance range due to other reasons, the length of the steering tie rod can be adjusted to reach the specified value.

Specified value of front wheel toe-in:

Items	Specified value
Toe-in	0° 19′ ± 10′

※ Inspection

① Use the four-wheel aligner for inspection (refer to the specific operating instructions of the four-wheel aligner for inspection).

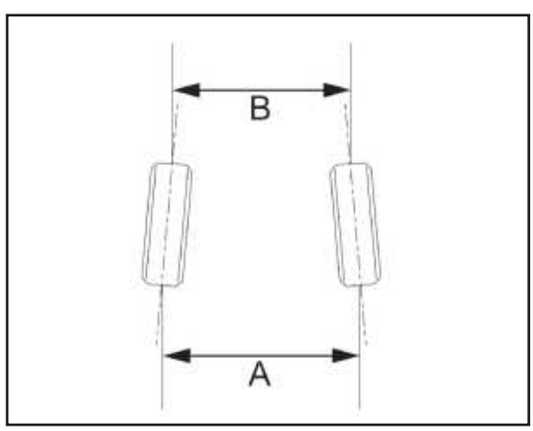
② Manual check:

1) Place the vehicle on a level road, check whether the front tire pressure is within the specified range, and adjust the front tire pressure to the specified value if necessary.

2) Mark the center of the front of the two front wheels, and measure the distance A between the two marks with a tape measure.

3) Push the vehicle to turn the wheel 180 degrees. When the mark turns to the rear of the wheel, measure the distance B between the two marks with a tape measure.

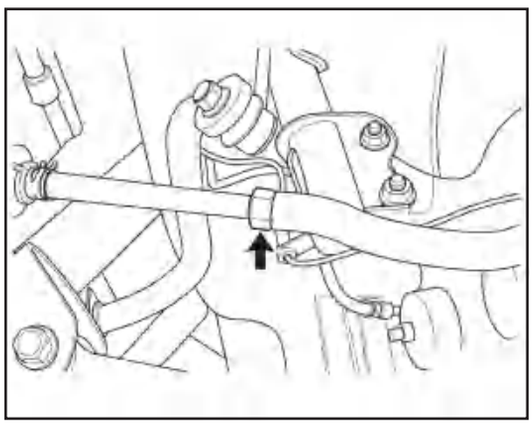
4) Calculation method: front wheel toe-in=A–B ≦ 1 mm



※ Adjustment

① According to the needs of the tester, prepare the wheel alignment for adjustment.

② Loosen the lock nut of the steering tie rod, and turn the tie rod as necessary to adjust its length until the front wheel toe-in reaches the specified value. If it is found that the left and right tie rods are seriously out of alignment (the thread difference is more than 3 threads), please recheck whether the steering wheel is centered.



Tightening torque: 55 ± 5 N·m (40.6±3.7 ft-lbs.)

③ Tighten the lock nut of the steering tie rod and check whether the lock nut is fastened in place.

④ After the front wheel toe-in adjustment is completed, check whether the steering wheel is horizontal; if necessary, loosen the steering wheel lock nut, adjust the steering wheel to the horizontal position, and then tighten the steering wheel lock nut to the specified torque.

Kingpin caster angle and kingpin inclination angle

※ Kingpin caster angle and kingpin inclination angle can only be checked with the four-wheel aligner.

Kingpin caster angle and kingpin inclination angle are guaranteed by the structural design and cannot be adjusted.

If the measured value is not within the standard range, check whether other parts connected to the steering knuckle are deformed or damaged; in addition, check whether the connecting part of the steering knuckle is deformed or damaged.

If it is deformed or damaged, replace the corresponding parts.

Specified value of kingpin caster angle and kingpin inclination angle:

Items	Specified value
Kingpin caster angle	4° 56′ ± 30′
Kingpin inclination angle	10° 28′ ± 30′

Braking system

10.1 General information

10.1.1 Description

The braking system of this vehicle adopts the following configurations: front wheel disc brake, rear wheel drum brake.

10.1.2 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Fixing screw plug of brake master cylinder assembly and brake hard pipe	18±2	13.3±1.5
Fixing nut of vacuum booster assembly and brake pedal assembly	23±2	17±1.5
Fixing nut of brake pedal assembly and body	23±2	17±1.5
Fixing nut of electronic accelerator pedal assembly	7 ± 1	5.2±0.7
Connecting screw plug of front brake hose assembly and front brake hard pipe	18±2	13.3±1.5
Connecting bolt of front brake hose assembly and front brake caliper assembly	27±2	19.9±1.5
Connecting screw plug of rear brake hose assembly and rear brake hard pipe assembly	18±2	13.3±1.5
Connecting bolt of rear brake hard pipe assembly and rear axle	9 ± 1	6.6±0.7
Vacuum pump assembly fixing bolt	10±1	7.4±0.7
Vacuum pump mounting bracket fixing bolt	10±1	7.4±0.7
Connecting bolt of vacuum tank and vehicle body	23±2	17±1.5
Fixing bolt of atmospheric pressure sensor	10±1	7.4±0.7

Front disc brake

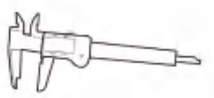
Description	Standard thickness (mm)	Effective thickness (mm)
Front brake friction plate	10	8

Rear drum brake

Description	Standard thickness (mm)	Effective thickness (mm)
Rear brake shoe	5	4

10.1.3 Tools

Special tools

G-type pliers	
Ruler	
Vernier caliper	

10.1.4 Technical parameters for maintenance

Brake fluid model: DOT4

10.2 Diagnosis and test

10.2.1 Fault symptom table

Tips:
※ Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence. Repair or replace faulty parts or make adjustments as necessary.

Symptom	Possible causes
The brake pedal position is low or the pedal is soft	Air in the braking system
	Braking system (leakage)
	Front brake piston seal (worn or damaged)
	Brake master cylinder assembly (fault)
	Vacuum booster push rod position (incorrect)
Abnormal noise on bumpy roads	The leaf spring is worn or deformed
	Brake assembly bolt connection is loose
	Abnormal noise caused by slight axial movement of brake caliper on bumpy road
	Loose steering/suspension parts or worn shock absorber

Symptom	Possible causes
The body deviates when braking	Front brake piston (stuck or frozen)
	Front brake friction plate (dirty, cracked or deformed)
	Front brake disc (uneven wear)
Brake noise	Front brake friction plate (broken, deformed, dirty or polished)
	Front disc brake guide bolt guide pin (worn)
	Front brake caliper assembly fixing bolts (loose)
	Front brake disc (scratch)
	Brake disc radial runout (excessive)
	Brake shoe limit spring (damaged)
	Brake shoe return tension spring (damaged or insufficient elasticity)

10.2.2 Inspection

Caution:
※ Use well-sealed DOT4 brake fluid or similar products. Do not use oily solution, otherwise the seal of the braking system may be damaged.
※ Brake fluid may damage the painted surface. If the brake fluid splashes onto the painted surface, wash it with water immediately.
※ During the maintenance, the grease or other foreign matters on the brake caliper assembly, brake friction plate, brake disc and the outer surface of the hub must be removed.
※ When operating the brake disc and brake caliper, be careful not to damage the brake disc and brake caliper, and avoid scratching or cutting the brake shoe and friction plate.

1. Check the condition of the tires and wheels. Damaged or worn wheels and tires may lead to deviation, jitter, vibration and conditions similar to emergency braking.
2. If there is noise when braking, check the suspension parts. Bounce the vehicle up and down several times to check for any loose, worn or damaged suspension or steering parts.
3. Check the brake fluid level and condition.

   ※ If the brake fluid level is too low, check the ABS control unit assembly, brake caliper, brake pipeline, brake master cylinder assembly, brake fluid reservoir and other parts for leakage.

※ If the brake fluid shows signs of dirt, drain a certain amount of brake fluid for inspection. Replace with new brake fluid if necessary.

10.3 On-board maintenance

10.3.1 Brake bleed

The brake must bleed after replacing the brake related parts.

Caution:
※ Wear safety glasses when bleeding the braking system. ※ Be careful when bleeding. Brake fluid may spray out of the bleeding screw due to high pressure.

Warning:
※ During the bleeding process, the brake pedal should not be pressed repeatedly at any time when the bleeding screw is open. Otherwise, it will increase the air in the system and conduct additional bleeding. ※ When bleeding the braking system, do not drain the brake fluid in the brake fluid reservoir.

Tips:
※ An assistant is required to bleed the braking system.

1. Fill the brake fluid reservoir with brake fluid to the proper level.
2. Loosen the bleeding screw cap, connect a transparent plastic hose to the bleeding screw, and immerse the end of the hose in the container.
3. Ask an assistant to repeatedly press the brake pedal three to four times to a lower position, hold the brake pedal, and then loosen the bleeding screw.
4. Whenever the brake pedal drops rapidly, tighten the bleeding screw and then release the brake pedal.
5. Repeat the above steps and bleed the brake pipes of each wheel in the same way until the air in the braking system is exhausted.

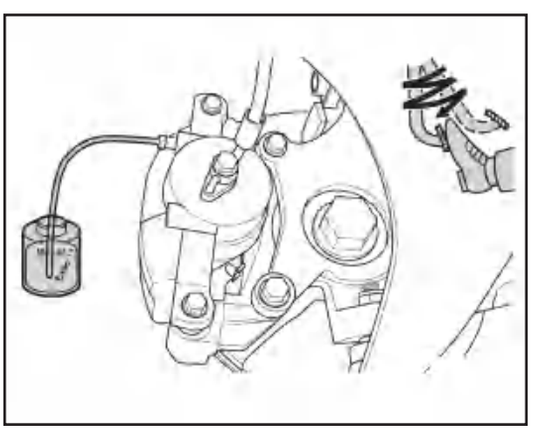
   Evacuation mark: there are strands of fresh brake fluid flowing into the transparent container without bubbles.

Tips:
※ During the bleeding process of braking system, ensure that the brake fluid level in the brake fluid reservoir is always close to the "MAX" level. Check the brake fluid level at any time during bleeding and add brake fluid if necessary.

6. Check and adjust the brake fluid level to the "MAX" mark.
7. Check the braking effect of the brake pedal. If the pedal braking effect is poor or the pedal is soft, there may still be air in the system. If necessary, bleed the braking system again.
8. Test the vehicle to confirm that the brake works normally and the pedal works good.

10.3.2 Change the brake fluid

1. Drain off the brake fluid
   ① Start the vehicle.
   ② Unscrew the filler cap of the brake fluid reservoir assembly. Loosen the bleeding screw cap, connect a transparent plastic hose to the bleeding screw, and immerse the end of the hose in the container.
   ③ Loosen the bleeding screw and press the brake pedal continuously until the brake fluid no longer flows out.



2. Add the brake fluid
   ① After confirming that the brake fluid is drained off, tighten the bleeding screw. Then add new brake fluid to the brake fluid reservoir to the appropriate level.
3. Bleeding
   ① After replaced with the new brake fluid, be sure to bleed the braking system to ensure that the braking system works normally.

10.3.3 Brake fluid reservoir assembly

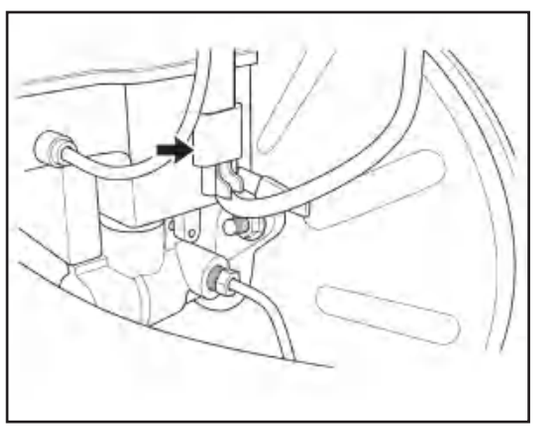
Removal

1. Drain off the brake fluid

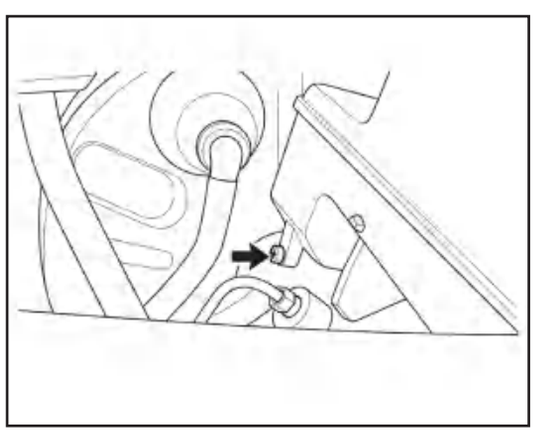
Tips:
※ The drained brake fluid shall be properly stored in containers and shall not be discarded at will.

2. Remove the brake fluid reservoir assembly

① Disconnect the liquid level warning harness plug-in (arrow).



② Remove the fixing screws (arrow) of the brake fluid reservoir assembly and the brake master cylinder assembly.



③ Remove the brake fluid reservoir assembly from the brake master cylinder assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Tips:
※ After installation, bleed the braking system and add brake fluid to the proper position.

10.3.4 Vacuum booster with brake master cylinder assembly

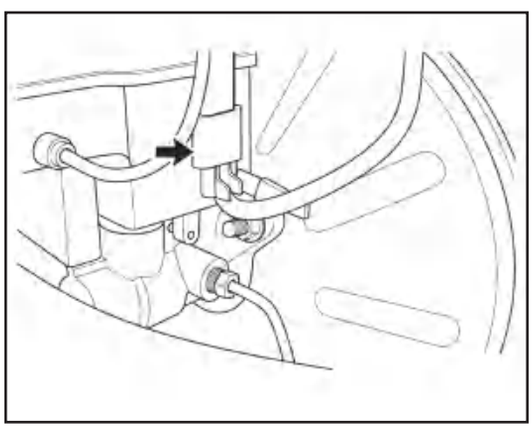
Removal

1. Drain off the brake fluid

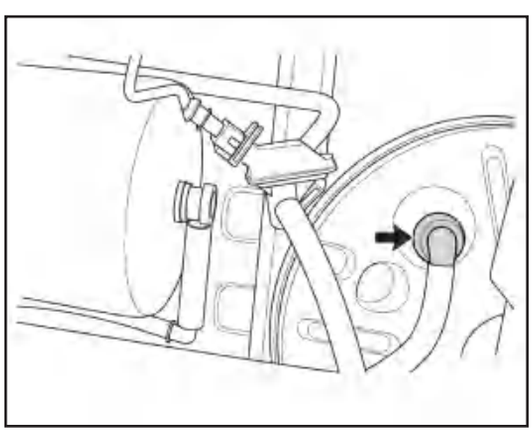
Tips:
※ The drained brake fluid shall be properly stored in containers and shall not be discarded at will.

2. Disconnect the negative battery cable
3. Remove the brake fluid reservoir assembly
4. Remove the front cabin beam assembly
5. Remove the vacuum booster with brake master cylinder assembly

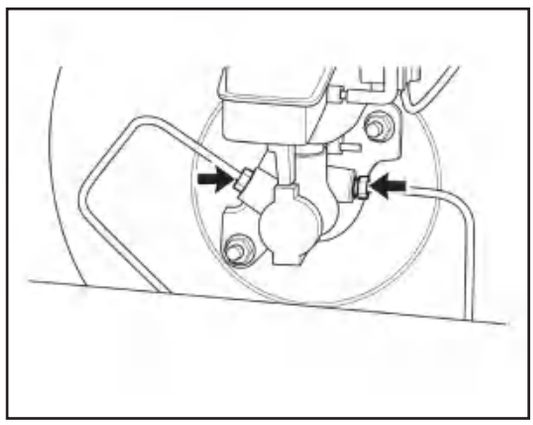
① Disconnect the liquid level warning harness plug-in (arrow).



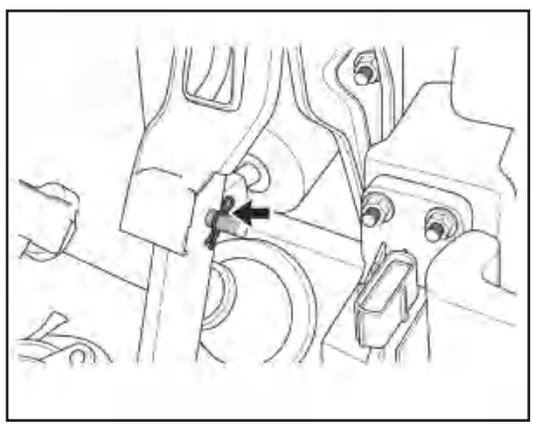
② Disconnect the vacuum pipe assembly from the vacuum booster assembly (arrow).



③ Remove 2 hard brake pipes connected to the brake master cylinder assembly.



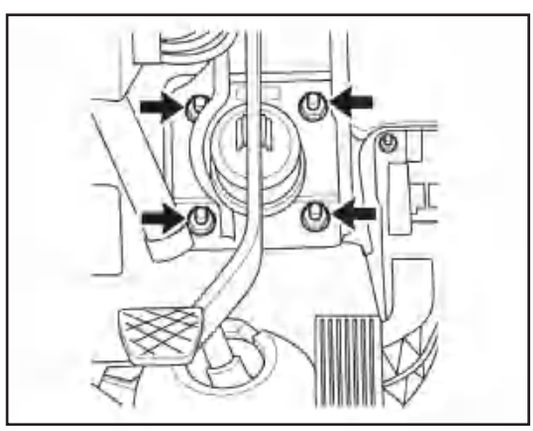
④ Remove the lock pin and pin shaft on the vacuum booster push rod and disconnect the brake pedal assembly.



⑤ Remove 4 fixing nuts (arrows) from the vacuum booster assembly and brake pedal assembly.

Tightening torque :

23 ± 2 N·m (17±1.5 ft-lbs.)



⑥ Remove the brake pedal.

⑦ Remove the vacuum booster with brake master cylinder assembly from the engine compartment.

Installation

1. The installation sequence is the reverse of the removal sequence.

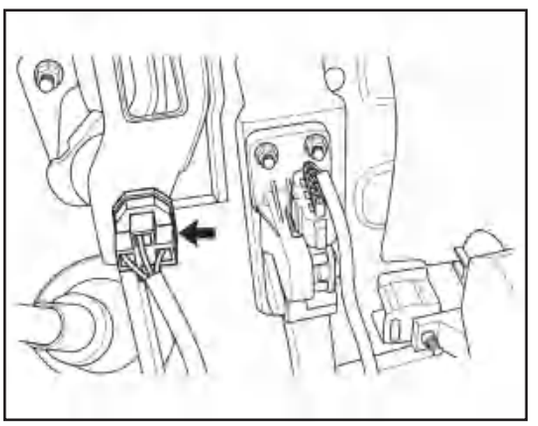
Caution:
※ Always tighten the fixing bolts and nuts to the specified torque during installation.
※ After installation, bleed the braking system and add brake fluid to the proper position.
※ After removing the vacuum booster with brake master cylinder assembly, check or adjust the brake switch assembly.

10.3.5 Brake pedal assembly

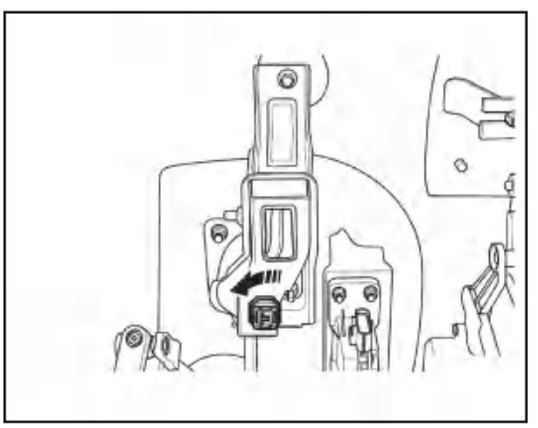
Removal

1. Remove the brake lamp switch assembly

   ① Disconnect the brake lamp switch assembly harness connector (arrow).

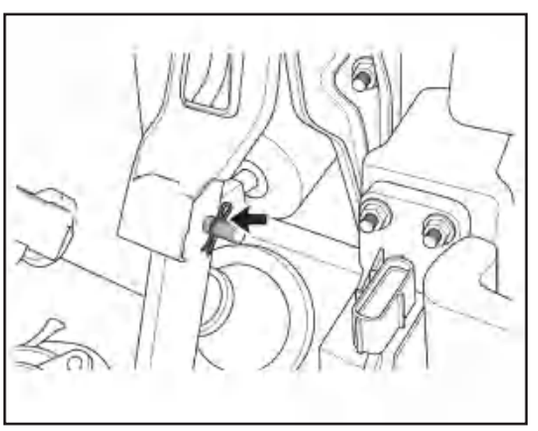


   ② Press the switch by hand and rotate it anticlockwise to make the switch body exactly correspond to the length direction of the pedal mounting hole. Pull the brake switch assembly outward along the pedal opening and remove the brake switch assembly.



2. Remove the brake pedal assembly

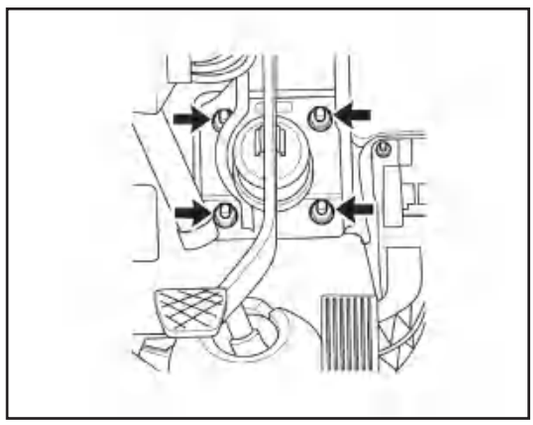
   ① Remove the lock pin and pin shaft on the vacuum booster push rod and disconnect the brake pedal assembly.



② Remove 4 fixing nuts (arrows) from the vacuum booster assembly and brake pedal assembly.

Tightening torque:

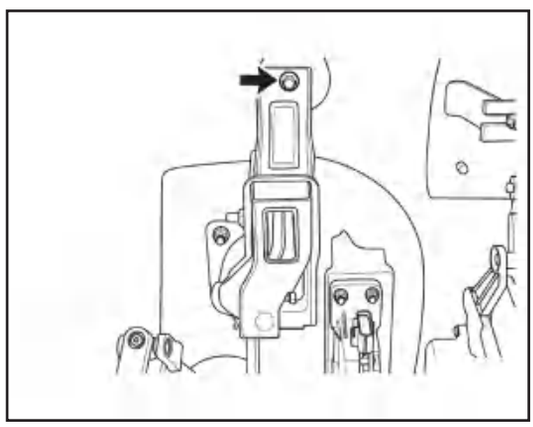
23 ± 2 N·m (17±1.5 ft-lbs.)



③ Remove 1 fixing nut (arrow) of the brake pedal assembly and the body.

Tightening torque :

23 ± 2 N·m (17±1.5 ft-lbs.)



④ Remove the brake pedal assembly from the cab.

Installation

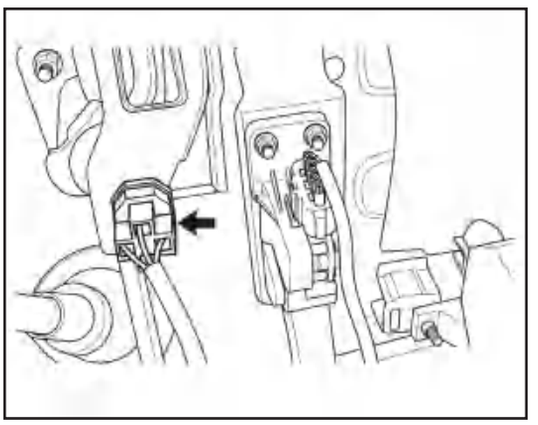
1. The sequence of installing the brake pedal assembly is the reverse of the removal sequence
2. Install the brake switch assembly

① Before the brake switch is loaded, the top rod must be fully pulled out. If the switch top rod cannot be pulled along the axis direction, it is the longest level of the top rod.

② Press the brake pedal to the bottom, the brake switch body corresponds exactly with the mounting hole of the pedal, and insert it into the mounting hole of the pedal, press the switch and rotate it clockwise to make the switch clip clip into the clip hole on the pedal. (Before assembly, the brake pedal and brake master cylinder have been installed).

③ Slowly release the brake pedal to make the brake pedal automatically return to the initial position under the action of the return spring, and at the same time, automatically adjust the brake switch top rod to the appropriate gear.

④ Connect the brake lamp switch assembly harness connector (arrow).



⑤ Installation completed.

Caution:
※ After installation, the brake pedal shall be fully contacted with the top rod of the brake switch (the top rod is compressed). ※ Always tighten the fixing nuts to the specified torque during installation. ※ After installation, check and confirm that the brake lamp works normally.

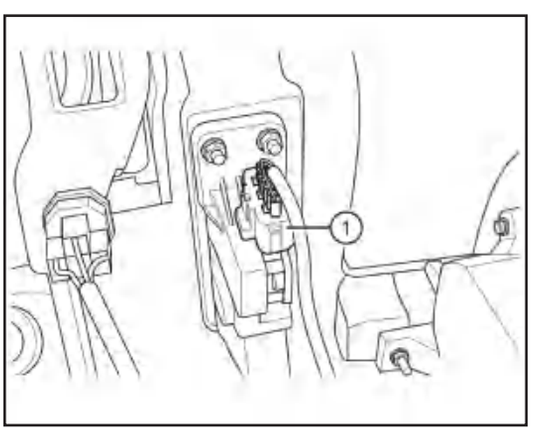
10.3.6 Electronic accelerator pedal assembly

Removal

Warning:
※ Please wear necessary labor protection articles during maintenance to avoid accidents.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the electronic accelerator pedal assembly

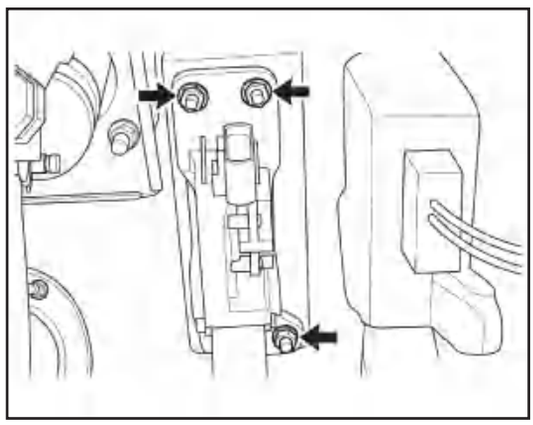
① Disconnect the electronic accelerator pedal assembly connector (1).



② Remove 3 fixing nuts (arrows) of the electronic accelerator pedal assembly.

Tightening torque:

7 ± 1 N·m (5.2±0.7 ft-lbs.)



③ Take off the electronic accelerator pedal assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing screw plug to the specified torque during installation.
※ Be sure to plug the connector in place during installation.

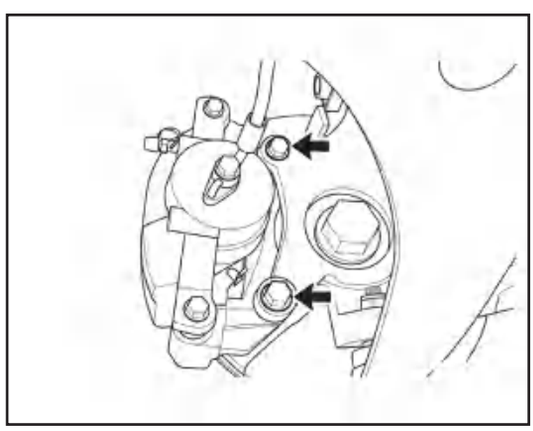
10.3.7 Front disc brake assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Remove the left front wheel
2. Remove the left front brake caliper assembly

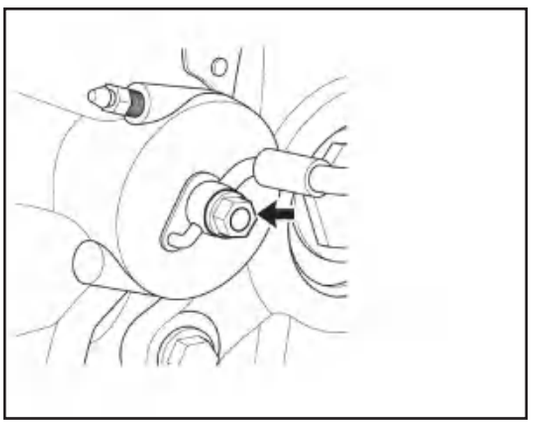
① Remove 2 connecting bolts (arrows) of the left front brake caliper assembly and the left front steering knuckle.



② Remove the connecting screw plug (arrow) of the left front brake caliper assembly and the left front brake hose assembly.

Tightening torque:

27 ± 2 N·m (19.9±1.5 ft-lbs.)

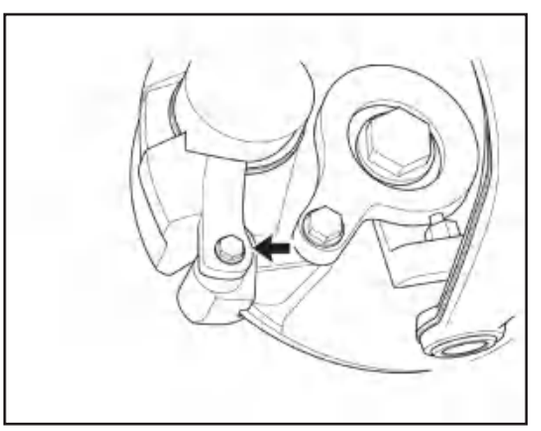


Caution:
※ The brake fluid is corrosive. When removing the brake hose, do not splash the brake fluid onto the clothes or skin.

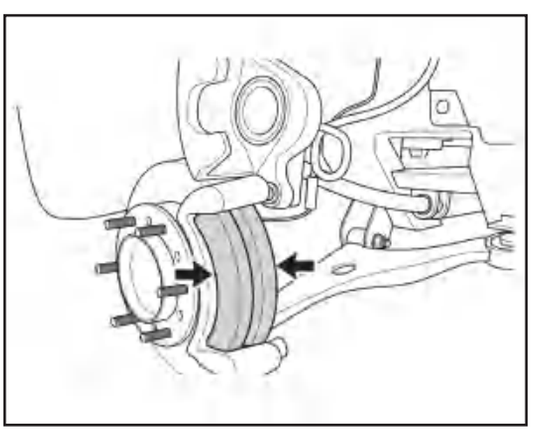
③ Remove the left front brake caliper assembly.

3. Remove the front friction plate (take the left side as an example)

① Remove 1 fixing bolt (arrow) of the guide pin of the brake caliper assembly.



② Lift the left front brake wheel cylinder up to the proper position and remove the front friction plate (arrow).



Warning:
※ The friction plate cannot be replaced individually.

Inspection

1. Check the brake caliper fixing bracket and brake caliper guide pin assembly:

※ Clean the contact surface of the brake caliper fixing bracket and the brake friction plate support gasket with brake cleaner. Check for deformation, crack, rust and foreign matters that are difficult to remove.

※ Check whether the rubber dust cover of the brake caliper guide pin is deformed, cracked, worn and has foreign matters that are difficult to remove.

※ Install the brake caliper guide pin and the brake caliper guide pin rubber dust cover on the brake caliper fixed bracket, and push the brake caliper guide pin assembly by hand, which shall be flexible and free from jamming, otherwise it shall be replaced.

2. Check the thickness of the brake friction plate

※ Measure the thickness of the brake shoe.

① Standard thickness: 10 mm

② Effective thickness: 8 mm

※ If the thickness of the brake friction plate is less than or equal to the minimum thickness, replace the brake friction plate.

Warning:
※ The brake friction plates need to be replaced in pairs.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Ensure that the contact surface of the friction plate and brake disc is free of oil and grease.
※ Before installing the brake friction plate, fully retract the brake caliper piston into the brake caliper bore.
※ After installing the brake friction plate and before moving the vehicle, press the brake pedal several times to fix the brake friction plate on the brake disc to ensure safety.
※ The brake friction plate shall be replaced in pairs, and cannot be replaced separately.
※ Do not reversely install the inner brake friction plate and the outer brake friction plate.

10.3.8 Front brake hose assembly

Removal

Warning:
※ Please wear necessary labor protection articles during maintenance to avoid accidents.
※ During removal and installation, try to avoid scratching the body paint.

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Remove the left front wheel
2. Drain off the brake fluid

Tips:
※ The drained brake fluid shall be properly stored in containers and shall not be discarded at will.

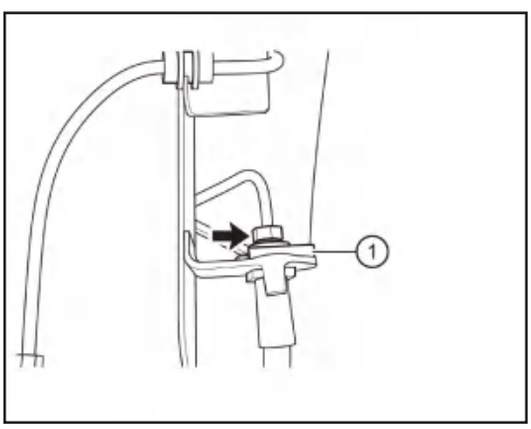
Caution:
※ If the brake fluid comes into contact with any painted surface, wash it immediately.

3. Remove the left front brake hose assembly

① Loosen the connecting screw plug (arrow) of the left front brake hose assembly and the left front brake hard pipe, and disconnect the fixing clip (1).

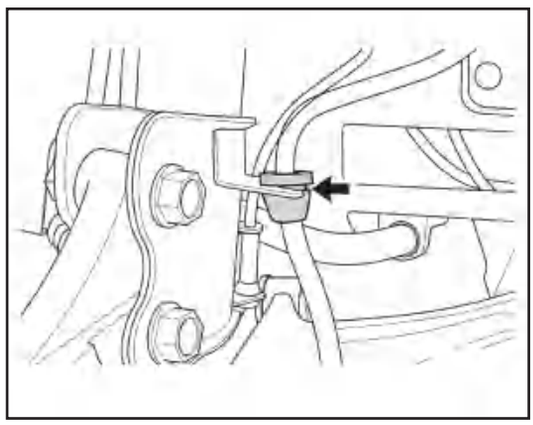
Tightening torque:

18 ± 2 N·m (13.3±1.5 ft-lbs.)



Caution:
※ Do not bend or damage the brake pipe.
※ Do not let foreign matters (such as dirt and dust) enter the brake pipe from the connection part.
※ After removing the brake pipe, seal it to prevent foreign matters from entering.

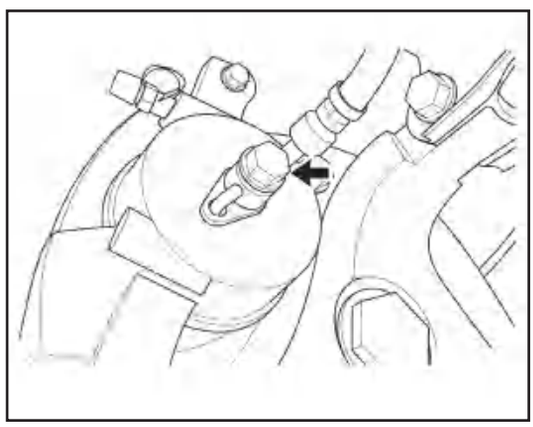
② Disconnect the fixing part of the left front brake hose assembly from the left front damper assembly (arrow).



③ Remove the connecting bolt (arrow) of the left front brake caliper assembly and the left front brake hose assembly.

Tightening torque:

27 ± 2 N·m (19.9±1.5 ft-lbs.)



Caution:
※ The brake fluid is corrosive. When removing the brake hose, do not splash the brake fluid onto the clothes or skin.

④ Remove the left front brake hose assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

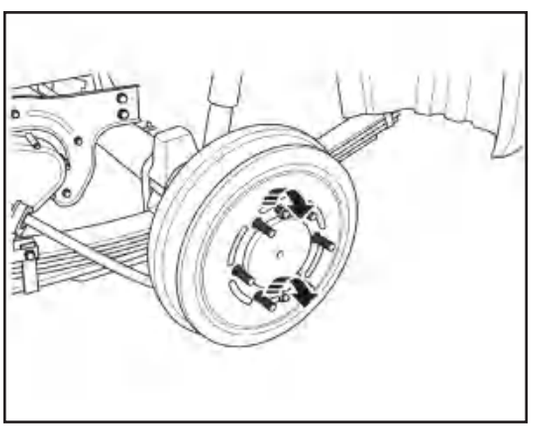
Caution:
※ Always tighten the fixing screw plug to the specified torque during installation. ※ Always check the braking system for leakage after installation. Repair or replace faulty parts as necessary. ※ Always bleed the braking system after installation. ※ Be sure to add brake fluid to the proper position after installation.

10.3.9 Rear drum brake assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Drain off the brake fluid
2. Remove the left rear wheel
3. Remove the left rear brake drum
   ① Install two suitable bolts on the left rear brake drum removal hole.
   ② Use a wrench to turn the bolt clockwise in the direction of the arrow until the brake drum is separated from the brake shoe. Remove the left rear brake drum.

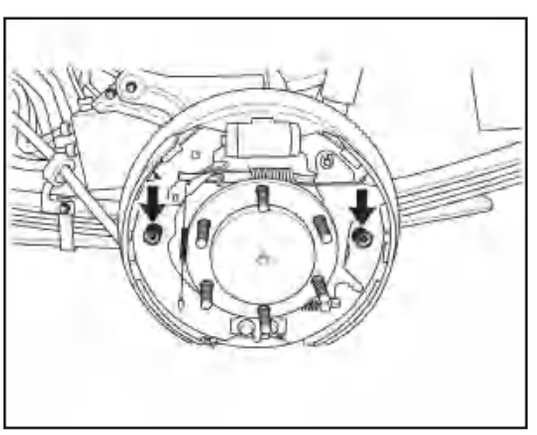


Warning:
※ If it is difficult to disassemble, adjust the hand brake cable to the proper position.

Removal

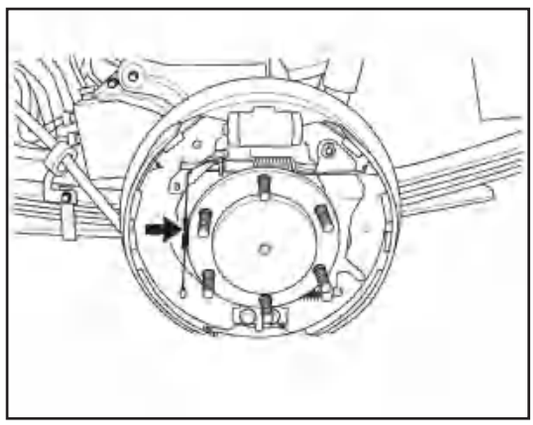
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Remove the brake shoe limit spring assembly
   ① As shown in the figure, press the brake shoe limit spring plate (arrow) with pointed-nose pliers, and turn the brake shoe limit pin clockwise or counterclockwise to remove the brake shoe limit spring assembly on both sides.



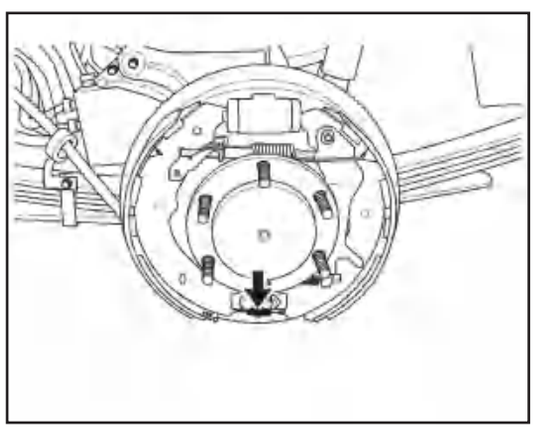
2. Remove the brake automatic clearance tension spring

① As shown in the figure, use pointed-nose pliers to carefully remove the brake automatic clearance tension spring (arrow).



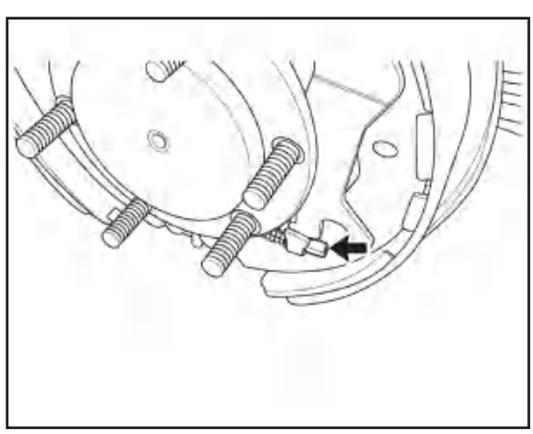
3. Remove the brake shoe return tension spring (lower side)

① As shown in the figure, carefully remove the brake shoe return tension spring (arrow) with pointed-nose pliers.

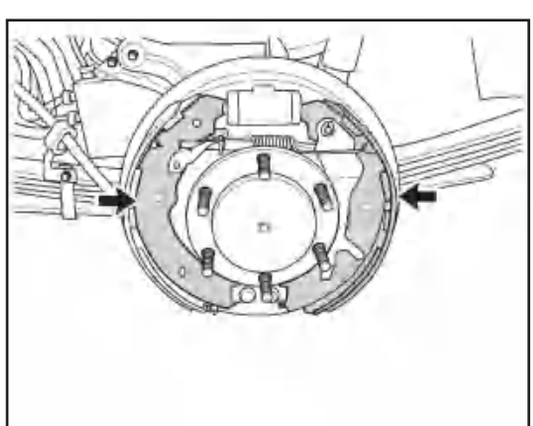


4. Remove the brake shoe

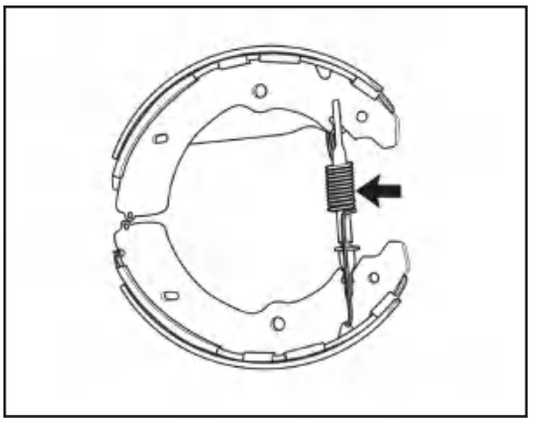
① As shown in the figure, use pointed-nose pliers to tighten the return spring (arrow) at the end of the parking brake rear cable and disconnect it from the brake shoe linkage lever.



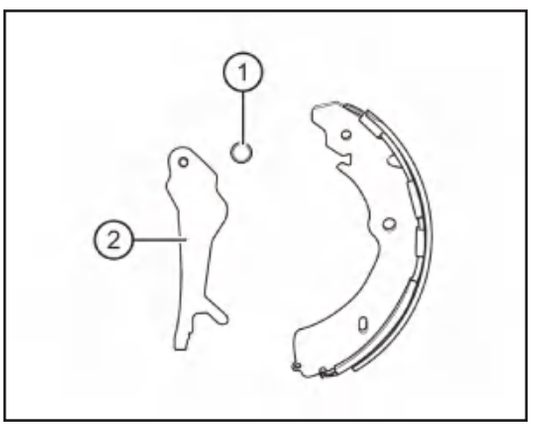
② As shown in the figure, disconnect the left and right brake shoes from the brake shoe adjustment device (arrow).



③ As shown in the figure, disconnect the brake shoe adjustment device from the brake shoe.

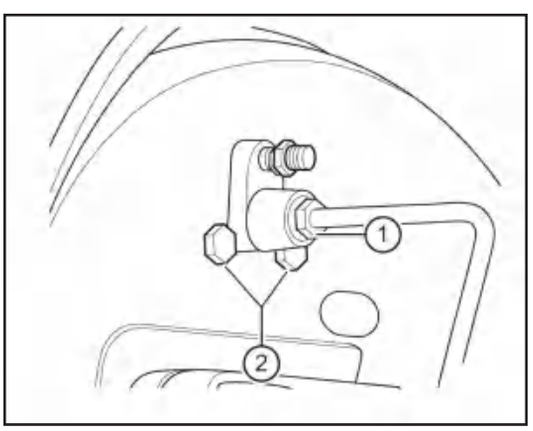


④ As shown in the figure, remove the brake shoe linkage rod from the right brake shoe.



5. Remove the rear brake wheel cylinder

① As shown in the figure, remove the connecting screw plug (1) of the rear wheel brake hard pipe and the connecting bolt (2) of the rear brake wheel cylinder and the rear brake backing plate.



② Remove the rear brake wheel cylinder.

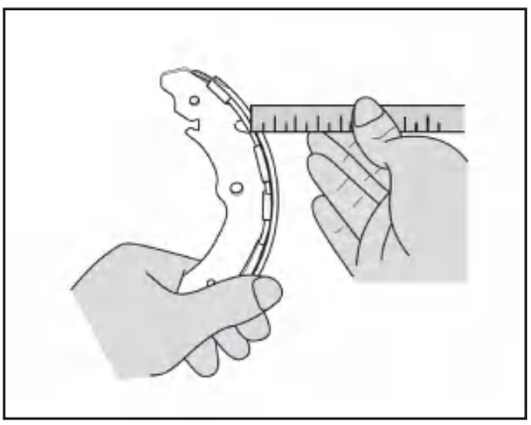
Inspection

1. Check the thickness of the brake shoe

① Measure the thickness of the brake shoe with a ruler.

Standard thickness: 5 mm

Effective thickness: 4 mm

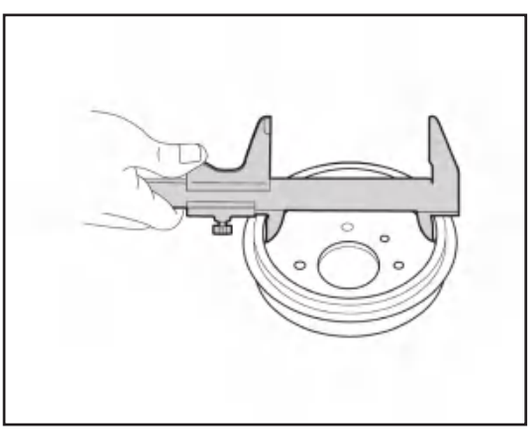


② If the brake shoe thickness is less than or equal to the minimum thickness, replace the brake shoe.

Warning:
※ The brake shoes should be replaced in pairs, not individually.

2. Check the inner diameter of brake drum

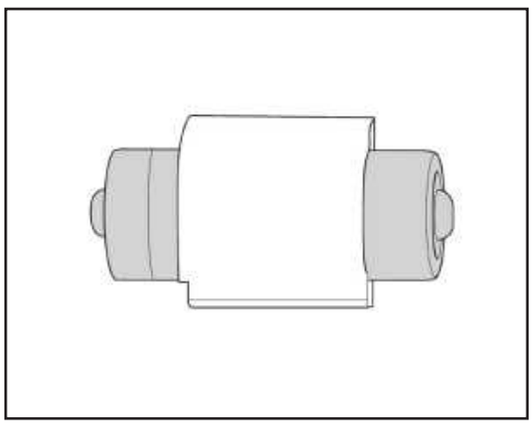
① Use a vernier caliper or equivalent tool to measure the inner diameter of the rear brake drum.



② If the inner diameter of the brake drum is less than the minimum inner diameter, replace the brake drum.

3. Check the rear brake wheel cylinder

① As shown in the figure, check the dust cover on both sides of the rear brake wheel cylinder for oil leakage.



② If there is oil leakage, replace the rear brake wheel cylinder.

4. Check other parts

① Check whether the brake shoe return tension spring (upper side) is broken, bent, damaged or has insufficient elasticity; replace it if necessary.

② Check whether the brake shoe push rod return tension spring is broken, bent, damaged or has insufficient elasticity; replace it if necessary.

③ Check whether the brake shoe adjusting device is stuck, rusted, damaged or slipping; replace it if necessary.

④ Check whether the return spring of the rear parking brake cable assembly is broken, bent, damaged or has insufficient elasticity; replace it if necessary.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing bolts and nuts to the specified torque during installation.
※ Always check the braking system for leakage after installation. Repair or replace faulty parts as necessary.
※ Always bleed the braking system after installation.
※ Be sure to add brake fluid to the proper position after installation.
※ Adjust the parking brake after replacing the parking brake shoes. After adjustment, check whether the parking brake works normally. Check the travel of the parking brake control mechanism. Release the parking brake control mechanism and check whether the rear wheels rotate freely. If the wheel is difficult to turn freely, it needs to be adjusted.

10.3.10 Rear brake hose

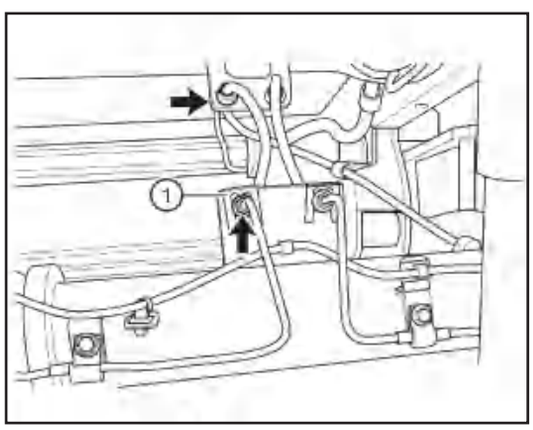
Removal

1. Turn off all electrical equipment and start button
2. Drain off the brake fluid

Tips:
※ The drained brake fluid shall be properly stored in containers and shall not be discarded at will.

Warning:
※ If the brake fluid comes into contact with any painted surface, wash it immediately.

3. Remove the rear brake hose assembly (take the left side as an example).



① Remove the retaining spring (1) securing the left rear brake hose assembly.

② Remove the fixing screw plug (arrow) connecting the two ends of the left rear brake hose assembly and the brake hard pipe.

Tightening torque :

18 ± 2 N•m (13.3±1.5 ft-lbs.)

③ Take off the left rear brake hose assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing screw plug to the specified torque during installation.
※ Always check the braking system for leakage after installation, and repair or replace faulty parts if necessary.
※ Always bleed the braking system after installation.
※ Be sure to add brake fluid to the proper position after installation.

10.3.11 Rear brake hard pipe

Removal

1. Turn off all electrical equipment and start button
2. Drain off the brake fluid

Tips:
※ The drained brake fluid shall be properly stored in containers and shall not be discarded at will.

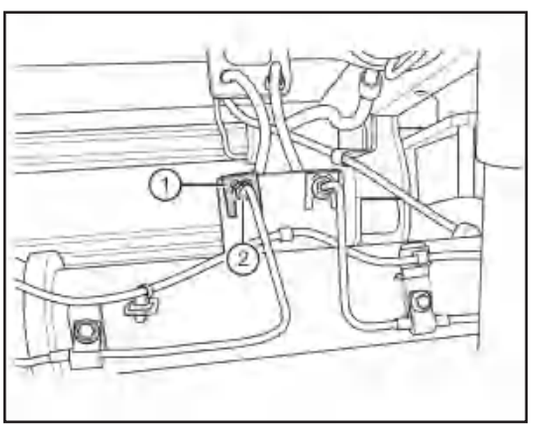
3. Remove the left rear brake hard pipe assembly

① Remove the retaining spring (1) securing the left rear brake hose assembly.

② Remove the connecting screw plug (2) of the left rear brake hard pipe assembly.

Tightening torque :

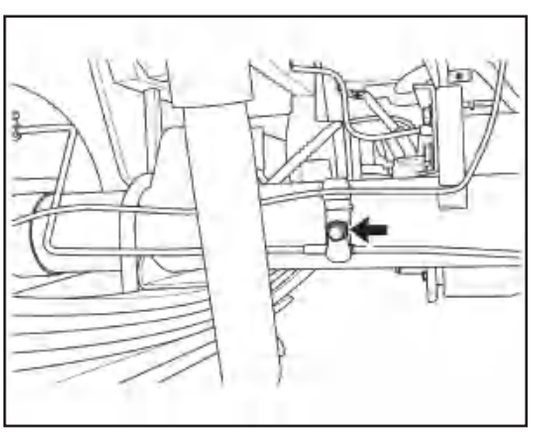
18 ± 2 N•m (13.3±1.5 ft-lbs.)

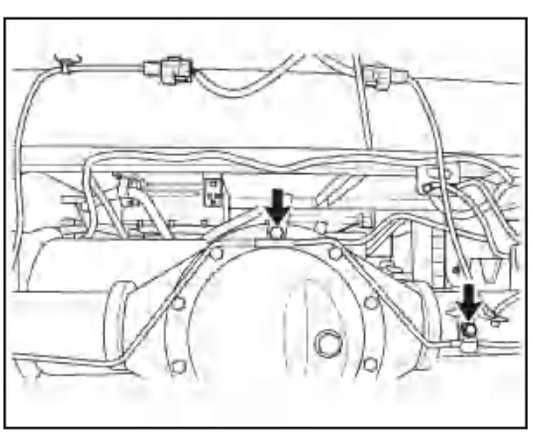


③ Remove 3 fixing bolts (arrows) connecting the left rear brake hard pipe assembly and the rear axle.

Tightening torque:

9 ± 1 N•m (6.6±0.7 ft-lbs.)

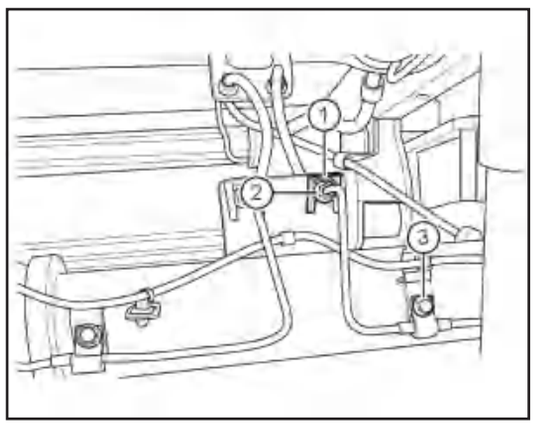




④ Disconnect the left rear brake hard pipe assembly from the left rear brake wheel cylinder.

⑤ Take off the left rear brake hose assembly.

4. Remove the right rear brake hard pipe assembly



① Remove the retaining spring (1) securing the right rear brake hose assembly.

② Remove the connecting screw plug (2) of the right rear brake hard pipe assembly.

③ Remove 1 fixing bolt (1) connecting the right rear brake hard pipe assembly and the rear axle.

Tightening torque: 18 ± 2 N•m (13.3±1.5 ft-lbs.)

Tightening torque: 9 ± 1 N•m (6.6±0.7 ft-lbs.)

④ Disconnect the right rear brake hard pipe assembly from the right rear brake wheel cylinder.

⑤ Take off the right rear brake hard pipe assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

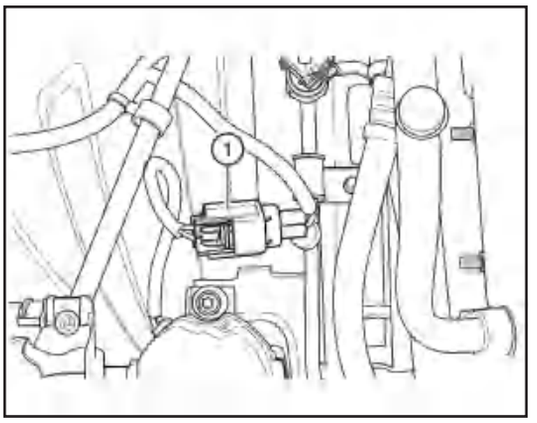
Caution:
※ Always tighten the fixing screw plug to the specified torque during installation.
※ Always check the braking system for leakage after installation, and repair or replace faulty parts if necessary.
※ Always bleed the braking system after installation.
※ Be sure to add brake fluid to the proper position after installation.

10.3.12 Vacuum pump

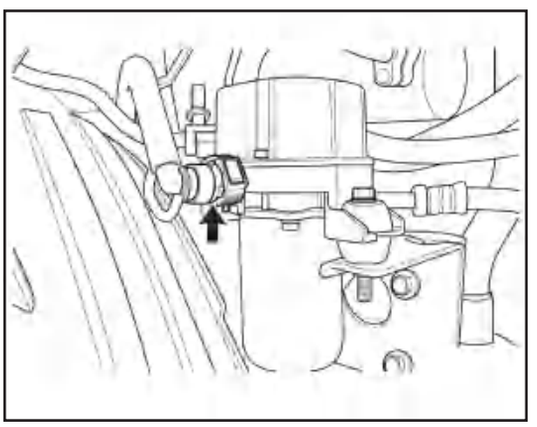
Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the vacuum pump assembly

① Disconnect the vacuum pump assembly connector (1).



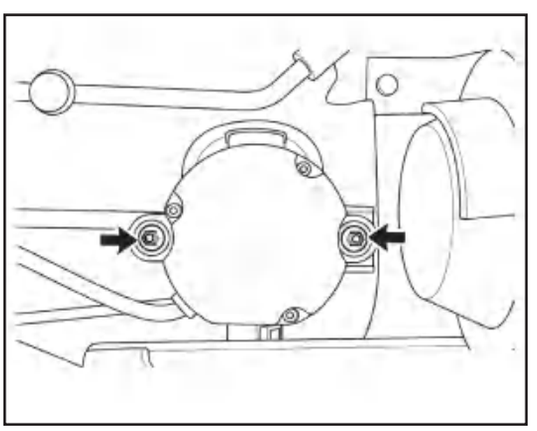
② Disconnect the vacuum pipe from the vacuum pump assembly (arrow).



③ Remove 2 fixing bolts (arrows) of the vacuum pump assembly.

Tightening torque:

10 ± 1 N•m (7.4±0.7 ft-lbs.)

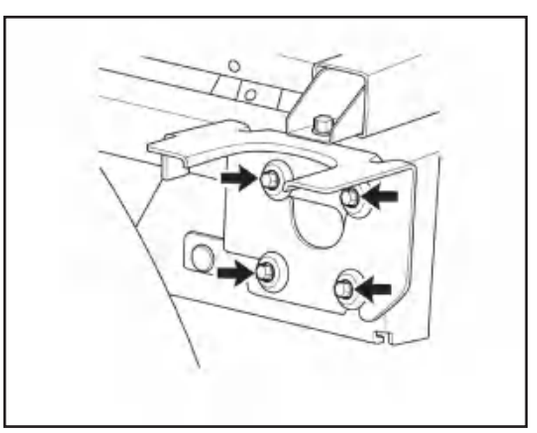


④ Take off the vacuum pump assembly.

⑤ Remove 4 fixing bolts (arrows) of the vacuum pump mounting bracket and remove the vacuum pump mounting bracket.

Tightening torque:

10 ± 1 N•m (7.4±0.7 ft-lbs.)



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing screw plug to the specified torque during installation.
※ Be sure to clip the vacuum pipe into place during installation.

10.3.13 Vacuum tank

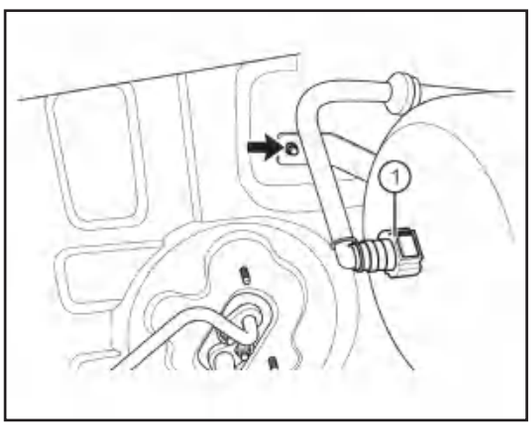
Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the front cabin beam assembly
4. Remove the vacuum tank assembly

① Disconnect the vacuum pipe (1) from the vacuum tank and remove 1 fixing nut (arrow) of the bracket.

Tightening torque :

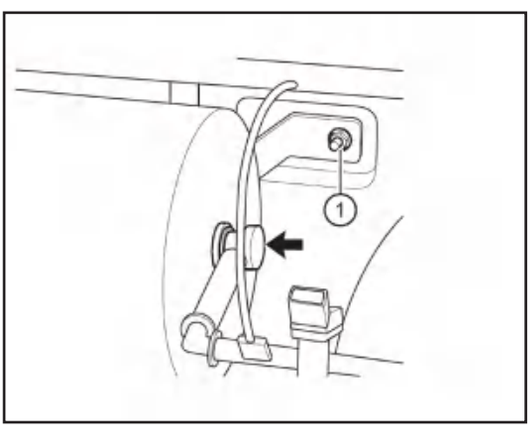
23 ± 2 N•m (17±1.5 ft-lbs.)



② Disconnect the connection of the vacuum tank check valve (arrow), and remove 1 fixing nut (1) on the right side.

Tightening torque:

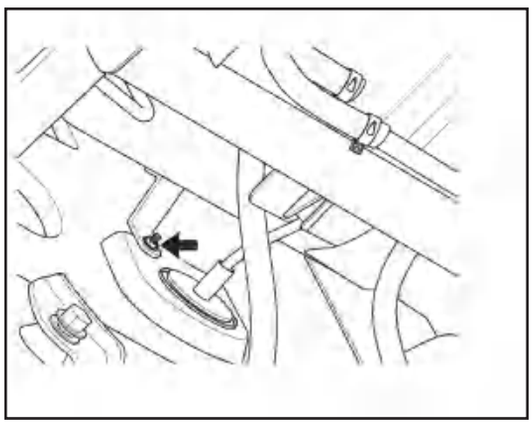
23 ± 2 N•m (17±1.5 ft-lbs.)



③ Remove 1 fixing nut (arrow) under the vacuum tank assembly.

Tightening torque:

23 ± 2 N•m (17±1.5 ft-lbs.)



④ Take off the vacuum tank assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

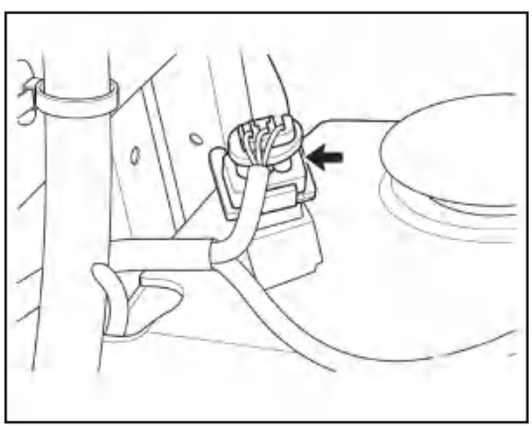
Caution:
※ Always tighten the fixing screw plug to the specified torque during installation.
※ Be sure to clip the vacuum pipe into place during installation.

10.3.14 Atmospheric pressure sensor

Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the atmospheric pressure sensor

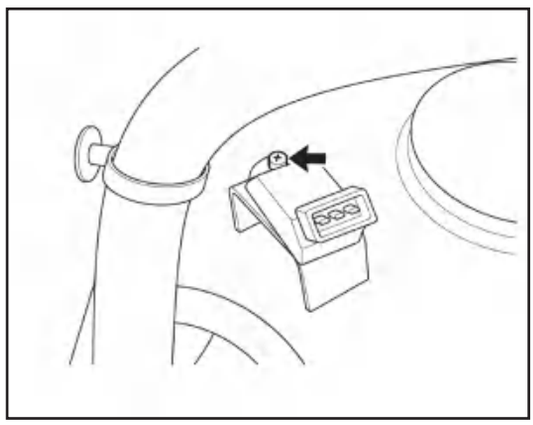
① Disconnect the atmospheric pressure sensor connector (arrow).



② Remove 1 fixing bolt (arrow) of atmospheric pressure sensor.

Tightening torque:

10 ± 1 N•m (7.4±0.7 ft-lbs.)



③ Take off the atmospheric pressure sensor.

Installation

1. The installation sequence is the reverse of the removal sequence.

ABS system

11.1 General information

11.1.1 System description

The brake control system equipped with this model is ABS (anti-lock braking system).

It mainly includes the following parts and functions: ABS control module assembly (hydraulic control module and electronic control module), wheel speed sensor (each wheel has a wheel speed sensor).

The main purpose of ABS is to prevent wheel lockup during emergency braking; the following effects are achieved when braking:

1. It can improve the driving stability of the vehicle.
2. It can improve the steering ability of the vehicle.
3. Maintain the optimum brake pressure.
4. It can effectively shorten the braking distance.

11.1.2 ABS working principle

ABS braking

※ During braking, if the ABS system detects the possibility of wheel locking, the braking system will enter the ABS braking mode. During the braking process, the ABS control module outputs the signal from each wheel speed sensor to each solenoid valve after analysis and processing, so as to adjust the oil pressure in each pipeline to prevent wheel lockup.

※ Some working characteristics in the ABS/ESP system may have the following phenomena, but they are actually normal.

① After the vehicle is powered on or the engine is started, there will be a brief buzzing sound. This is the sound of ABS self-test, which is a normal phenomenon.

② During normal operation of ABS, the motor, solenoid valve and return pump in the hydraulic unit will generate certain noise, which is a normal phenomenon.

③ During ABS operation, the brake pedal may vibrate slightly and the mechanical noise can be heard , which is normal.

④ The crash sound of suspension and vehicle body caused by emergency braking.

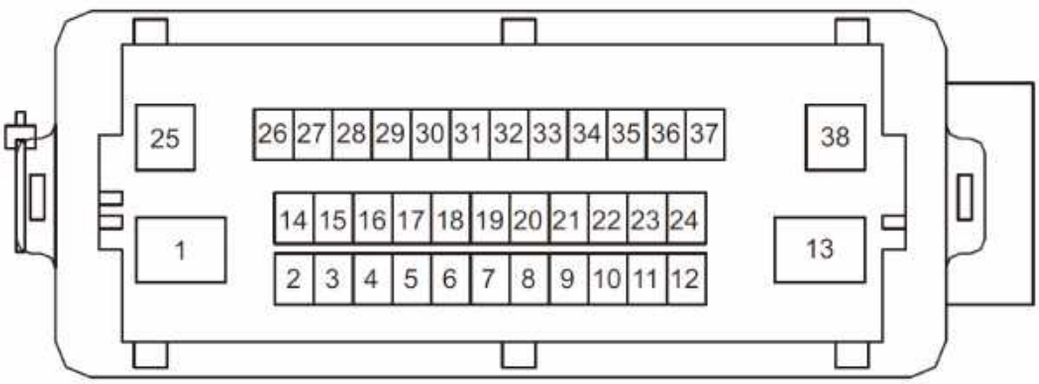
11.1.3 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Fixing bolt of ABS control module assembly damping element	4 ± 1	3±0.7
Fixing bolt of ABS control module assembly mounting bracket and body	23±2	17±1.5
Fixing bolt of front wheel speed sensor	9 ± 1	6.6±0.7
Fixing bolt of rear wheel speed sensor	9 ± 1	6.6±0.7
Connecting bolt of hard brake pipe and ABS control module assembly	18±2	13.3±1.5
Connecting screw plug of front brake hose and hard brake pipe	18±2	13.3±1.5
Connecting screw plug of rear brake hose and hard brake pipe	18±2	13.3±1.5

11.1.4 List of ABS control module assembly terminals

Plug-in terminal



Terminal No.	Terminal definition	Terminal No.	Terminal definition
1	Power terminal of motor(positive)	20	Signal terminal of wheel speed sensor (left rear)
2	–	21	–
3	–	22	Signal terminal of wheel speed sensor (left front)
4	–	23	-
5	–	24	-
6	Signal terminal of wheel speed sensor (right front)	25	Power terminal of valve relay
7	–	26	CAN_H
8	–	27	-
9	–	28	-
10	–	29	-

Terminal No.	Terminal definition	Terminal No.	Terminal definition
11	–	30	Brake lamp switch
12	–	31	Signal terminal of wheel speed sensor (right rear)
13	Ground terminal of motor	32	Power terminal of VCU (ignition power line)
14	CAN_L	33	Wheel speed sensor power terminal/ground (left rear)
15	–	34	Wheel speed sensor power terminal/ground (left front)
16	–	35	-
17	–	36	-
18	Wheel speed sensor power terminal/ground (right front)	37	-
19	Wheel speed sensor power terminal/ground (right rear)	38	VCU grounding wire

11.2 On-board maintenance

11.2.1 ABS control module assembly

Removal

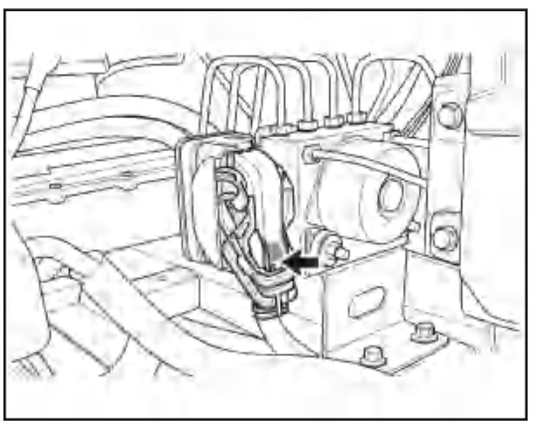
Caution:
※ When repairing the ABS system, first release the high-pressure brake fluid pressure in the accumulator to avoid personal injury caused by high-pressure brake fluid splashing. ※ Operation steps: first turn off the start button, and then repeatedly press and release the brake pedal until the brake pedal becomes hard. ※ In addition, do not turn on the start button until the ABS system is fully installed to prevent the hydraulic pump from running with power.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Drain off the brake fluid

Tips:
※ The drained brake fluid shall be properly stored in containers and shall not be discarded at will.

4. Remove the battery assembly
5. Remove the ABS control module assembly

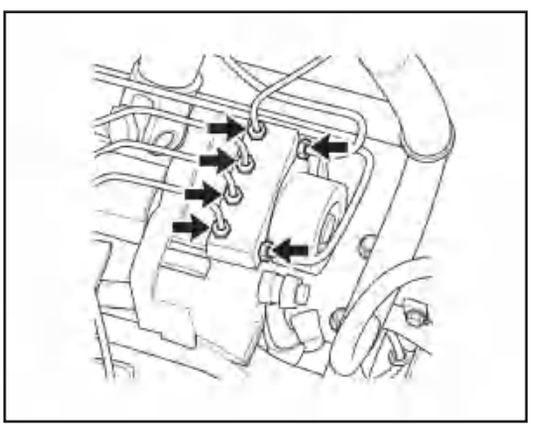
① Press the locking position of the ABS control module assembly connector, pull the connector locking bracket downward and disconnect the ABS control module assembly connector (arrow).



② Use a holding wrench to carefully disconnect the 6 brake hard pipe connecting bolts (arrows).

Tightening torque:

18 ± 2 N·m (13.3±1.5 ft-lbs.)

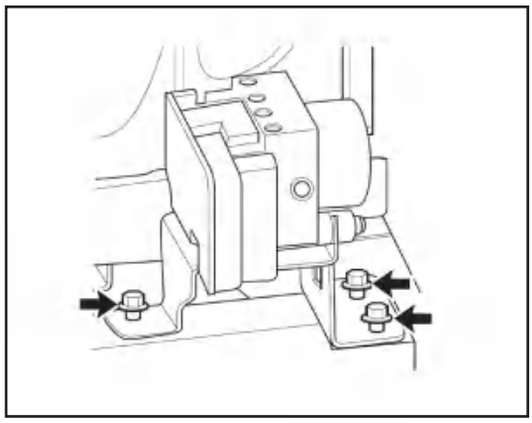


Warning:
※ When removing the brake pipe, prevent foreign matters from entering the threaded hole of the ABS control module assembly.
※ After disconnecting the brake pipeline, take sealing measures to prevent foreign matters from entering.

③ Remove 3 fixing bolts (arrows) of the ABS control module assembly mounting bracket and the body.

Tightening torque:

23 ± 2 N·m (17±1.5 ft-lbs.)



④ Remove the ABS control module assembly with mounting bracket.

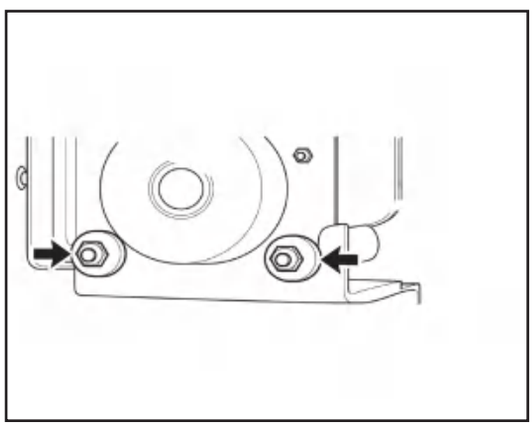
Removal

1. Remove the ABS control module assembly

① Remove 2 fixing bolts (arrows) of the damping element of the ABS control module assembly.

Tightening torque:

4 ± 1 N·m (3±0.7 ft-lbs.)



② Disconnect the ABS control module assembly from the mounting bracket.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ ABS control module assembly contains the hydraulic control module and the electronic control module. As a whole, they cannot be repaired or replaced separately.
※ Always tighten the fixing bolts to the specified torque during installation.
※ Always bleed the braking system after installation.
※ Use the diagnostic instrument to enter the brake control system, record and clear the fault code, and then drive the vehicle for a road test to confirm that the ABS system works normally and the brake pedal works good.

11.2.2 Front wheel speed sensor (take the left front wheel as an example)

Removal

Caution:
※ Do not make the wheel speed sensor contaminated with oil or other foreign matters, otherwise, the wheel speed signal generated by the wheel speed sensor may be inaccurate, or even make the system unable to work properly.

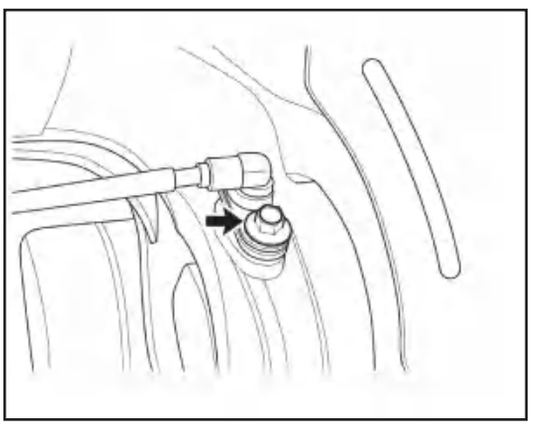
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Turn off all electrical equipment and start button
2. Disconnect the battery negative terminal cable
3. Remove the left front wheel
4. Remove the left front wheel speed sensor

① Remove the fixing bolts (arrow) of the left front wheel speed sensor and the left front steering knuckle assembly and carefully disconnect the left front wheel speed sensor.

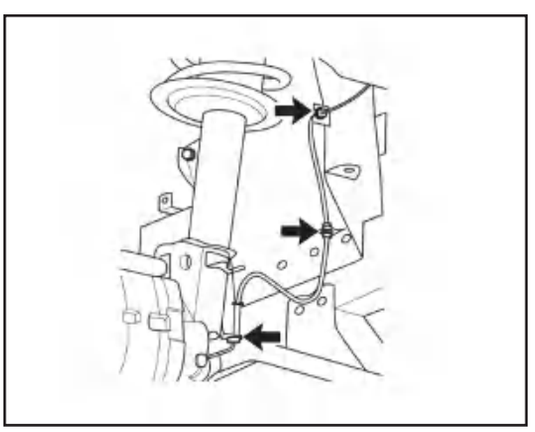
Tightening torque:

9 ± 1 N•m (6.6±0.7 ft-lbs.)



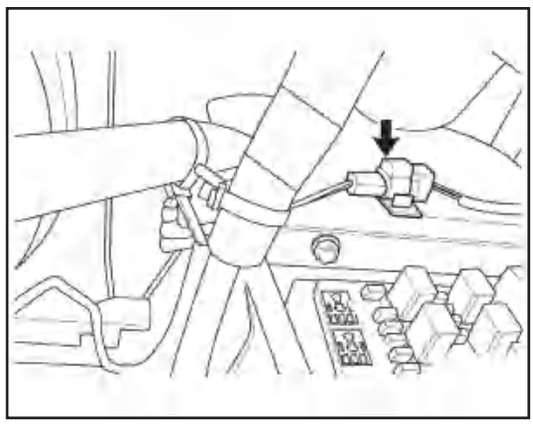
Caution:
※ Keep the sensor head and sensor mounting hole away from foreign objects.

② Disconnect the clamping part of the left front wheel speed sensor harness from the left front damper assembly and the fixing bracket (arrows).



Tips:
※ Observe the routing direction of the sensor harness to prevent incorrect installation.

③ Disconnect the left front wheel speed sensor harness connector (arrow).



④ Disengage the fixing clip and remove the left front wheel speed sensor.

Inspection

1. Check the left front wheel speed sensor
   ① Check the surface of the left front wheel speed sensor for cracks, dents or nicks.
   ② Check the left front wheel speed sensor connector or harness for scratches, cracks or damage.
   ③ If any of the above conditions occurs, replace it with a new left front wheel speed sensor.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing bolts to the specified torque during installation.

11.2.3 Rear wheel speed sensor (take the left rear wheel as an example)

Removal

Caution:
※ Do not make the wheel speed sensor contaminated with oil or other foreign matters, otherwise, the wheel speed signal generated by the wheel speed sensor may be inaccurate, or even make the system unable to work properly.

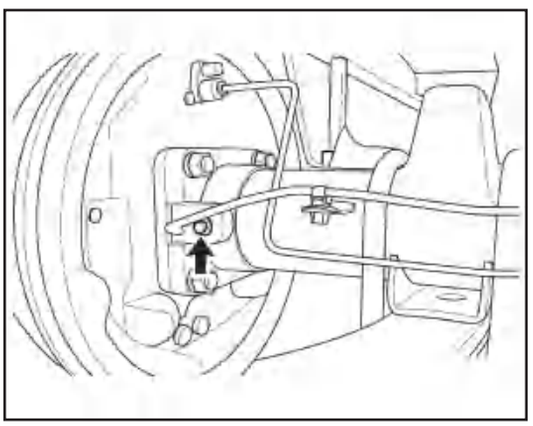
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Turn off all electrical equipment and start button
2. Disconnect the battery negative terminal cable
3. Remove the left rear wheel
4. Remove the left rear wheel speed sensor

① Remove the left rear wheel speed sensor fixing bolt (arrow).

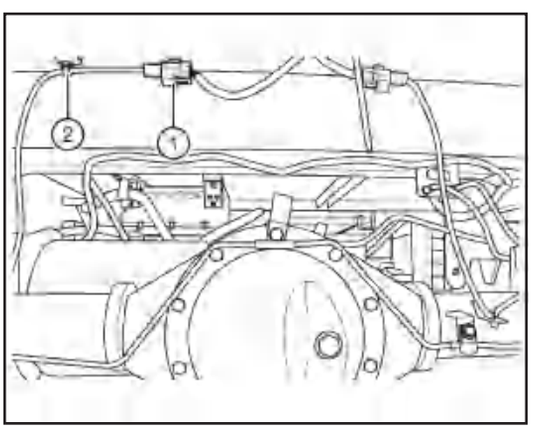
Tightening torque:

9 ± 1 N•m (6.6±0.7 ft-lbs.)

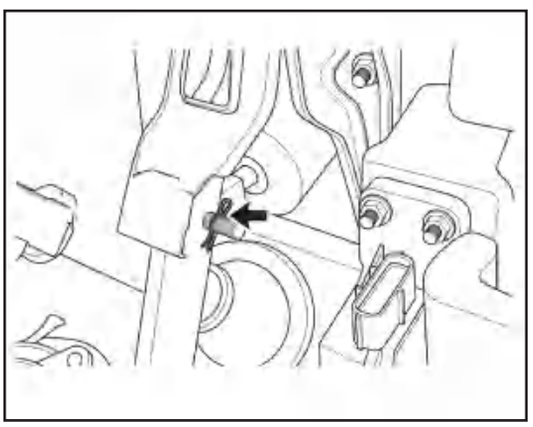


Caution:
※ Keep the sensor head and sensor mounting hole away from foreign objects.

② Disconnect the left rear wheel speed sensor connector (1) and 1 fixing clip (2) of the sensor harness.



③ Disconnect 3 fixing clips (arrows) of the left rear wheel speed sensor harness.



④ Take off the left rear wheel speed sensor.

Inspection

1. Check the left rear wheel speed sensor

   ① Check the surface of the left rear wheel speed sensor for cracks, dents or nicks.

   ② Check the left rear wheel speed sensor connector or harness for scratches, cracks or damage.

   ③ If any of the above conditions occurs, replace it with a new rear wheel speed sensor.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing bolts to the specified torque during installation.

Parking brake system

12.1 General information

12.1.1 Function introduction

The vehicle is equipped with a parking brake lever assembly, which is installed in the center of the cab and operated manually. Each rear wheel has a separate parking brake cable, which is respectively connected with the parking brake front cable assembly, parking brake lever and rear brake shoe assembly.

12.1.2 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Fixing bolts of parking brake control mechanism	23±2	17±1.5
Fixing nuts of parking brake rear cable	23±2	17±1.5
Fixing bolts of parking brake rear cable bracket and body	9 ± 1	6.6±0.7

12.2 Diagnosis and test

12.2.1 Fault symptom table

Tips:
※ Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence. Repair or replace faulty parts or make adjustments as necessary.

Symptom	Possible causes
Brake shoe and brake drum contact and wear under non-parking brake condition	The parking brake system is adjusted (adjusted incorrectly, the stroke is too small)
	Parking brake shoes (too large diameter)
	Front brake piston seal (worn or damaged)
	Brake shoe return tension spring (damaged)

Symptom	Possible causes
When parking, the parking brake cannot provide enough parking force	The parking brake system is adjusted (adjusted incorrectly, the stroke is too large)
	Brake shoe (after wear, the diameter is too small, resulting in excessive travel of the parking system)
	Brake shoe (wear exceeds limit)
	Rear brake drum (inner diameter wear exceeds the limit)
	Parking cable and balancer (poor connection)
	Parking cable and parking arm on parking brake (poor connection)
	Parking brake control mechanism (poor fixation)
When the parking brake is not applied, the brake warning lamp is on	Warning lamp circuit (fault)
When the parking brake is applied, the brake warning lamp is not on	Warning lamp circuit (fault)

12.2.2 Adjustment of parking brake system stroke

1. Inspection

   ① When the vehicle is on the flat ground and the hand brake control mechanism is fully released, there shall be no obvious blocking force on the trolley by one person.

   ② When the vehicle is empty/fully loaded, the hand brake control mechanism can be pulled to the bottom to make the vehicle park on a 20% ramp (up and down).

2. Adjust

   ① Remove the rubber plug on the parking brake base plate, and use a slotted screwdriver to move the adjusting bolt starwheel inside the brake toward the center of the brake drum until the adjusting bolt cannot rotate (the brake shoe is against the brake drum). Then turn the adjusting bolt back 4 teeth in the opposite direction and install the rubber plug.

12.3 On-board maintenance

12.3.1 Parking brake control mechanism

Removal

Caution:
※ When removing the parking brake control mechanism, be sure to wear labor protection articles to avoid accidents.

1. Turn off all electrical equipment and ignition switch
2. Remove the auxiliary dashboard assembly
3. Remove the parking brake switch assembly
4. Remove the parking brake control mechanism assembly

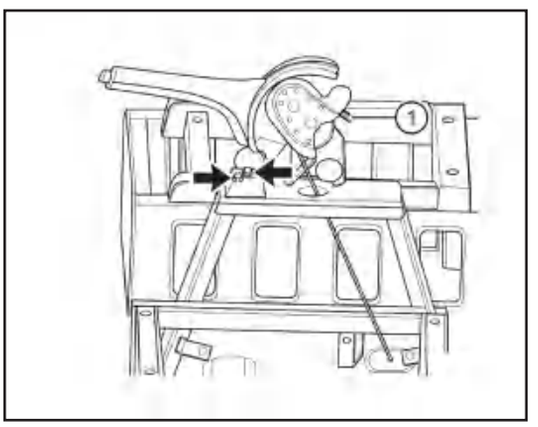
   ① Remove the parking brake cable adjusting nut (1) and remove the parking brake front cable from the parking brake control mechanism.

   ② Remove 2 fixing bolts (arrows) of the parking brake control mechanism and mounting bracket.

   Tightening torque:

   23 ± 2 N·m (17±1.5 ft-lbs.)

   ③ Remove the parking brake control mechanism.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installing the parking brake control mechanism assembly, always check the parking brake lever travel. If necessary, adjust the parking brake lever stroke to the proper position by adjusting the parking brake lever adjusting nut.

12.3.2 Parking brake rear cable

Removal

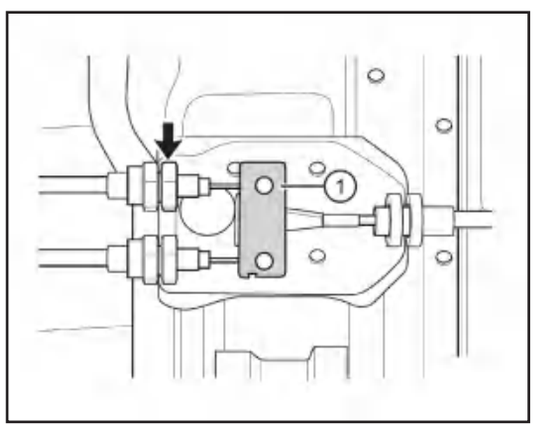
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Turn off all electrical equipment and ignition switch
2. Remove the power battery assembly
3. Remove the left rear parking brake cable

① Loosen the left rear cable fixing nut (arrow) and separate the left rear cable from the balance weight (1).

Tightening torque:

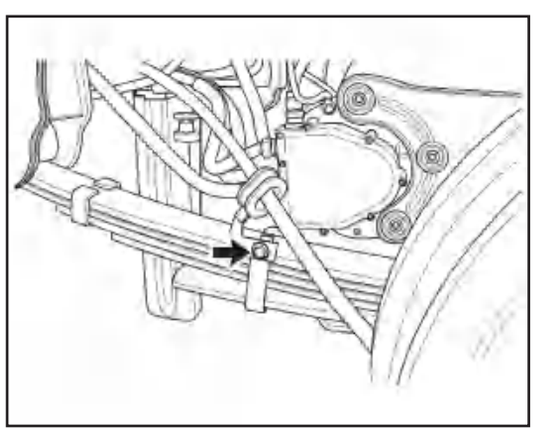
23 ± 2 N·m (17±1.5 ft-lbs.)

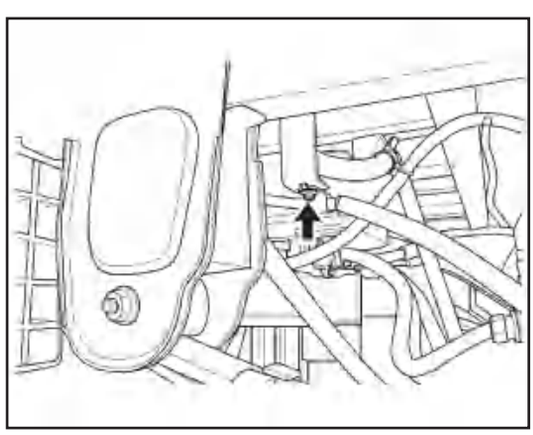


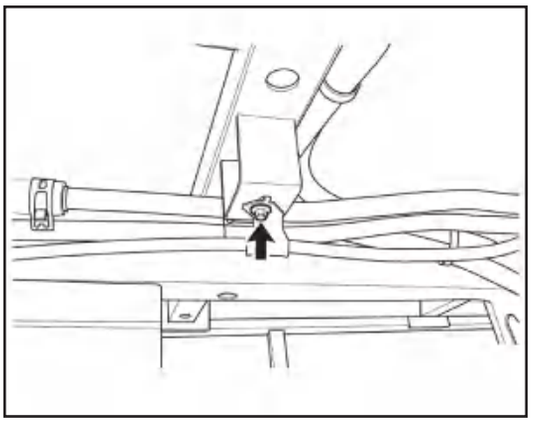
② Remove 3 fixing bolts (arrows) connecting the left rear cable and the body.

Tightening torque:

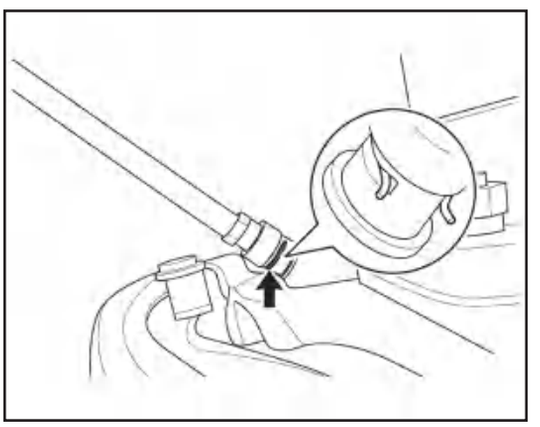
9 ± 1 N·m (6.6±0.7 ft-lbs.)



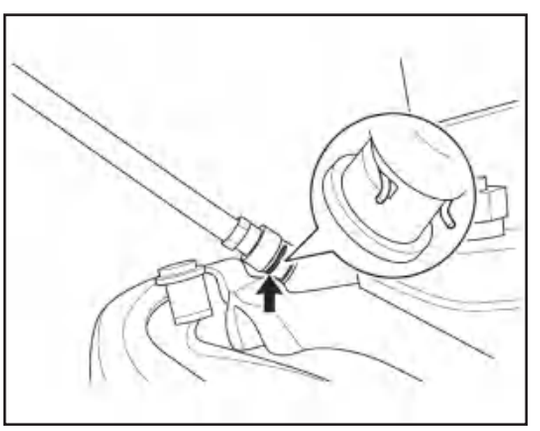




③ Remove 1 elastic clip of the left rear cable (arrow).



④ Use pointed-nose pliers to tighten the return spring (arrow) at the end of the parking brake rear cable and disconnect it from the brake shoe linkage lever.



⑤ Take off the left rear parking brake cable.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installing the parking brake cable, always check the parking brake lever travel. If necessary, adjust the parking brake lever stroke to the proper position by adjusting the parking brake lever adjusting nut.

Electric power steering system

13.1 General

13.1.1 Description

This vehicle adopts the electronic power steering system, which can reduce the working load of the driver when operating the steering wheel, and improve the operation convenience and driving safety.

13.1.2 Adjustment of toe-in and steering wheel angle

1. Before installing the four-wheel aligner, calibrate the steering wheel in advance to align the wheels.
2. When adjusting the four-wheel aligner, according to the toe-in value of the left and right front wheels measured by the instrument (front wheel toe-in: 10′ ±10′ unilateral), rotate the steering wheel to make the toe-in deviation of the left and right front wheels of the vehicle basically equal.
3. After the toe-in deviation of the front wheels is adjusted to basically equal, reposition the steering wheel, center the steering wheel, and install a level gauge.
4. According to the toe-in deviation measured by the instrument (toe-in of front wheel: 10 '± 10' unilateral), adjust the tie rods on both sides of the steering gear, and tighten the lock nuts of the pull rods after adjustment in place (tightening torque: 55 ± 5 N • m).
5. Tighten the steering wheel and complete the front wheel toe-in adjustment.

Warning:
※ If the difference between the left and right maximum steering wheel angles of the vehicle is found to be too large during the inspection, rework adjustment must be carried out, and the adjustment method is as follows.

6. Manually adjust the steering wheel to the central position, reposition and tighten the steering wheel.
7. Align the wheels and drive the vehicle onto the four-wheel aligner.
8. Install the level gauge.
9. According to the toe-in deviation measured by the instrument (toe-in of front wheel: 10 '± 10' unilateral), adjust the steering gear pull rod, adjust the front wheel toe-in in place, tighten the pull rod lock nut, and complete the steering wheel symmetry rework adjustment.

13.1.3 Pecification

Torque pecification

Description	Torque	
	N·m	ft-lbs.
Connecting nut of steering wheel and steering column	35± 3	25.8±2.2
Connecting nut of steering tie rod and steering knuckle	55± 5	40.6±3.7
Locking bolt of steering column lower fork joint and steering knuckle input shaft	55± 5	40.6±3.7
Connecting bolt of steering column and instrument beam	23± 2	17±1.5
Fixing nut of steering column sheath	7 ± 1	5.2±0.7
Fixing bolt of steering gear	125± 10	92.3±7.4

13.1.4 Tools

Special tools

Ball pin separator	

Common tools

Digital multimeter	

13.1.5 EPS controller pin definition

EPS terminal

Vehicle power: controller power connector

Pin	Definition
1	GND
2	BAT+

Vehicle signal: controller signal connector

Pin	Definition
1	–
2	CAN_H
3	CAN_L
4	IGN
5	–
6	–
7	–
8	–

13.2 On-board maintenance

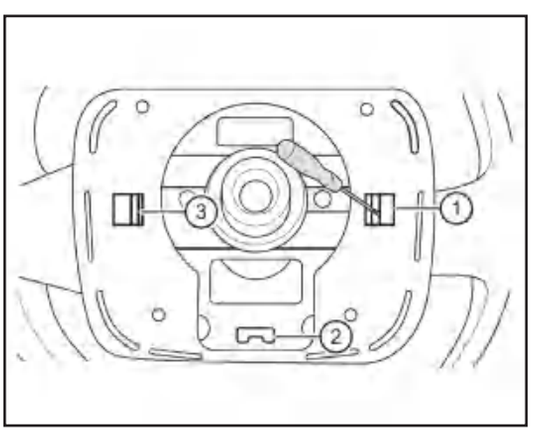
13.2.1 Steering wheel assembly

Removal

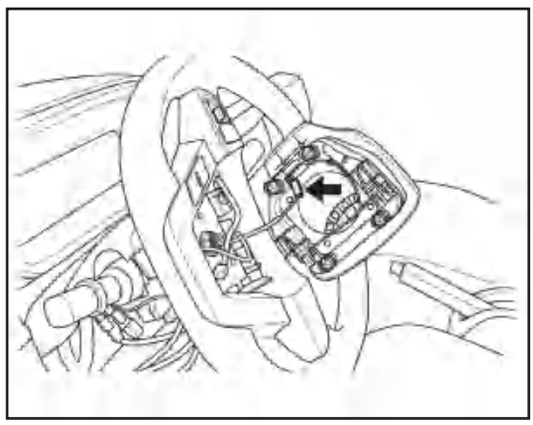
1. Set the steering wheel to the straight ahead position
2. Turn off all electrical equipment and start button
3. Disconnect the negative battery cable
4. Remove the horn cover

   ① Remove 1 fixing screw of the lower shield of the steering column and remove the lower shield of the steering column.

   ② Use a slotted screwdriver to remove the steering wheel removal hole in sequence: 3 o'clock, 6 o'clock and 9 o'clock directions, as shown in the figure, corresponding to (1), (2) and (3), and hold the clamp spring until the Ω spring comes out.



③ Pick up the horn cover, disconnect the horn cover harness (arrow), and remove the horn cover.

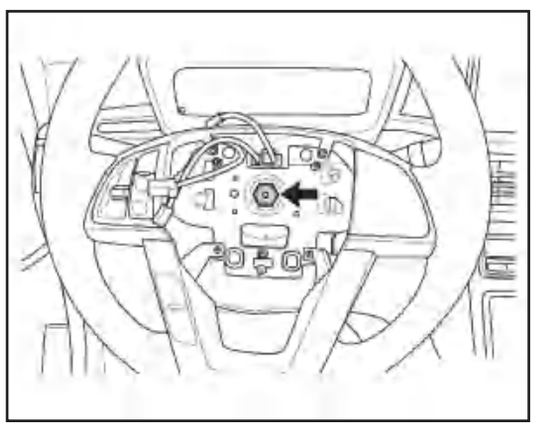


5. Remove the steering wheel assembly

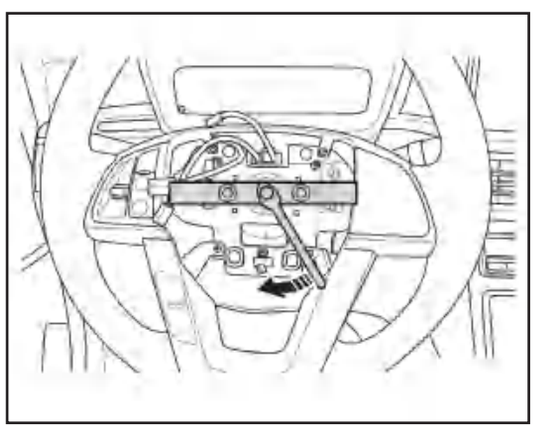
① Hold the steering wheel assembly by hand and remove 1 fixing nut (arrow) of the steering wheel assembly.

Tightening torque:

35 ± 3 N•m (25.8±2.2 ft-lbs.)



② Install the steering wheel remover, loosen the connection between the steering wheel assembly and the steering column assembly, and remove the steering wheel assembly.



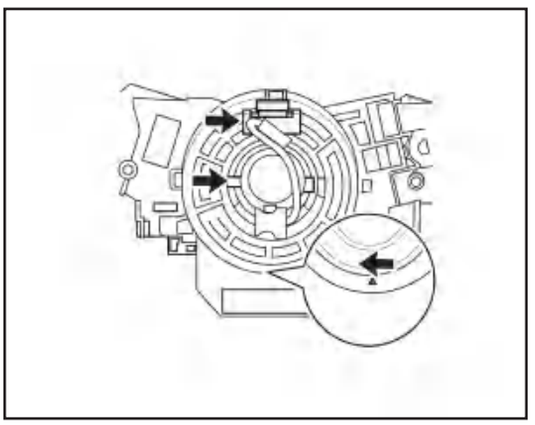
Inspection

1. Check whether the steering wheel assembly is damaged or deformed. If necessary, replace the steering wheel assembly.
2. Check whether the splines in the steering wheel assembly are damaged. If necessary, replace the steering wheel assembly.

Installation

Caution:
※ Before installing the steering wheel assembly, check and ensure that the front wheels are in the straight ahead position.

1. Adjust the clock spring coil to the correct position (arrow).



Tips:
※ When re-aligning the center, turn the inner ring of the spiral cable clockwise to the end, and then turn two or three turns in the opposite direction until the alignment mark ▲ is reached.

2. Pass the horn connector through the steering wheel assembly hole, and then connect the steering wheel shortcut key connector. Then align the assembly marks on the steering wheel assembly and steering column assembly for installation.
3. The other installation steps are the reverse of the removal steps.

Caution:
※ Tighten the steering wheel assembly fixing nuts to the specified torque. ※ Install the connectors in place.

13.2.2 Steering gear assembly

Removal

1. Place the front wheels in the straight ahead position
2. Turn off all electrical equipment and start button
3. Disconnect the negative battery cable
4. Remove the left front and right front wheels
5. Raise the vehicle to a suitable position

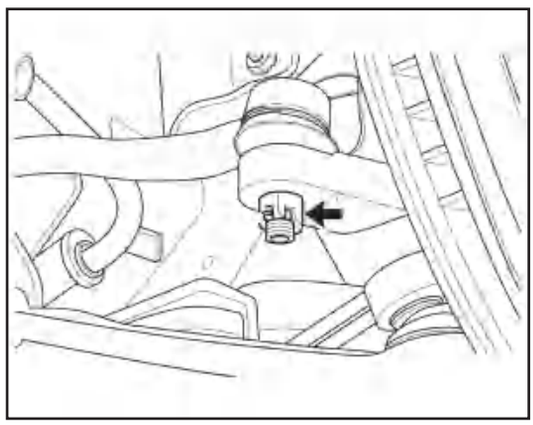
6. Remove the tie rod ball pin (the right side is removed in the same way as the left side)

① Pull out the cotter pin from the tie rod ball pin.

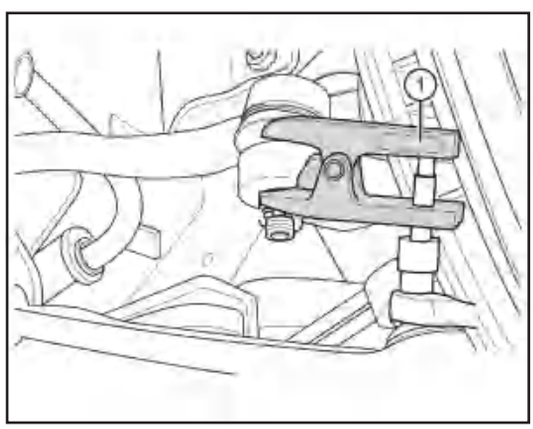
② Remove the lock nuts (arrows) of the left tie rod ball pin assembly and the left front steering knuckle assembly.

Tightening torque :

55 ± 5 N•m (40.6±3.7 ft-lbs.)



③ Install the ball pin separator (1) to separate the left tie rod ball pin from the left knuckle assembly.

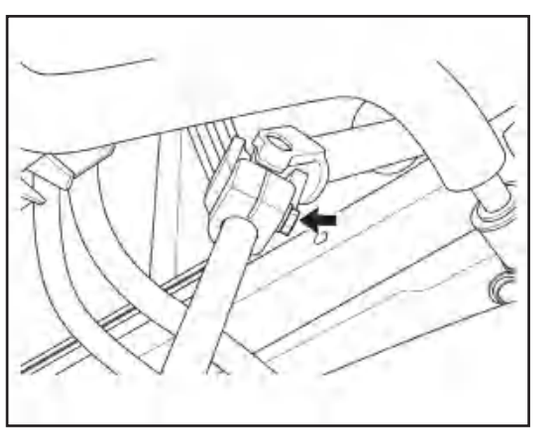


7. Remove the steering gear assembly

① Remove the lock nut (arrow) of the lower yoke of the steering column and the steering gear input shaft.

Tightening torque :

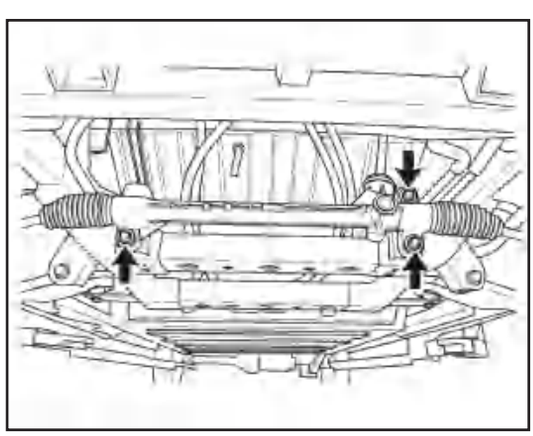
55 ± 5 N•m (40.6±3.7 ft-lbs.)



② Remove 3 fixing bolts (arrows) connecting the steering gear assembly and the frame.

Tightening torque :

125 ± 10 N•m (92.3±7.4 ft-lbs.)



③ Take off the steering gear assembly.

Inspection

1. Check whether the steering gear dust cover is damaged and whether the clamp is loose. If necessary, it must be replaced, otherwise it is easy to cause water and fine dust to enter and lead to premature damage of parts.
2. Check whether the steering gear is damaged. If necessary, replace the steering gear assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

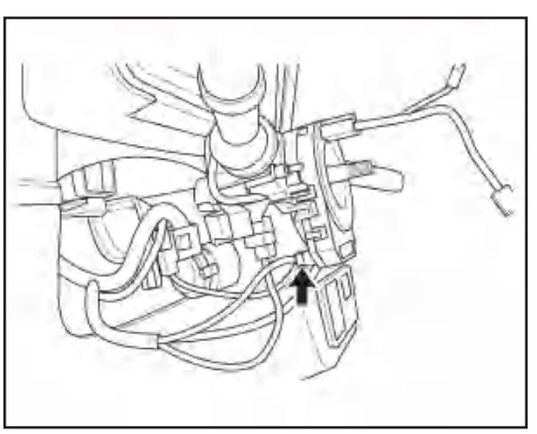
Caution:
※ When installing the lock nut of the lower yoke of the steering column and the steering gear input shaft, it must be assembled reliably.
※ After installing the tie rod ball pin, bend the cotter pin.
※ After the steering gear assembly is installed, toe-in adjustment is required.

13.2.3 Steering column with intermediate shaft assembly

Removal

1. Set the steering wheel to the straight ahead position
2. Turn off all electrical equipment and ignition switch
3. Disconnect the negative battery cable
4. Remove the horn cover assembly
5. Remove the steering wheel assembly
6. Remove the upper and lower shields of the steering column
7. Remove the spiral cable

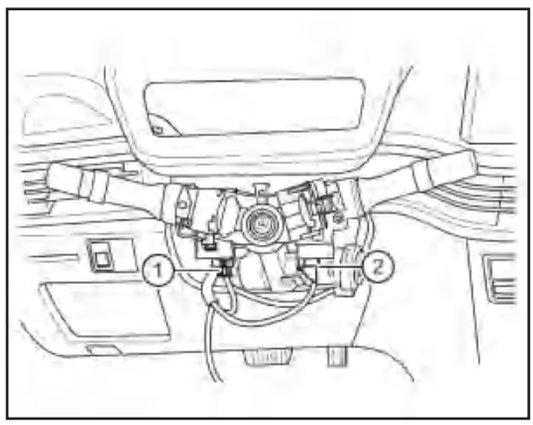
① Disconnect the spiral cable connector (arrow).



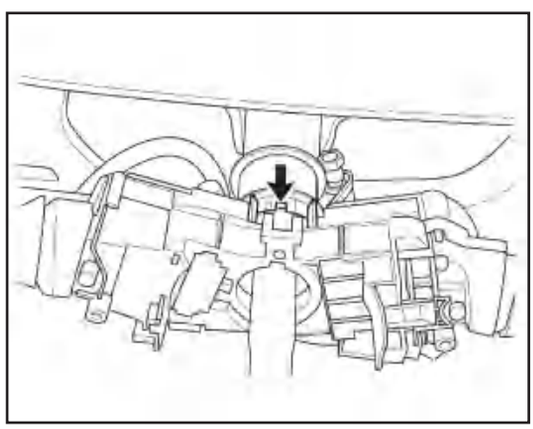
② Remove the spiral cable from the combination switch upper assembly.

8. Remove the combination switch assembly

① Disconnect the connector (1) of the headlamp switch and the connector (2) of the wiper switch.



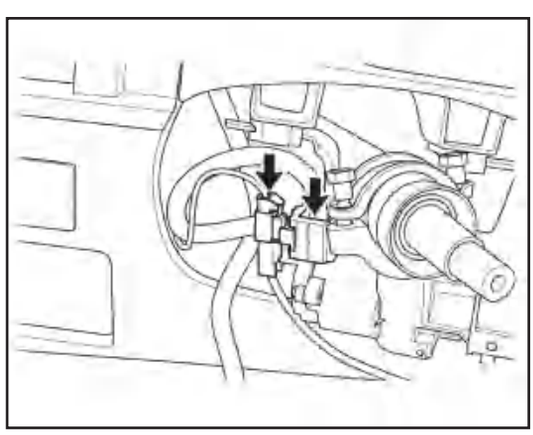
② Loosen the combination switch fixing clamp (arrow), pull the combination switch outward, disconnect the combination switch from the steering column, and remove the combination switch.



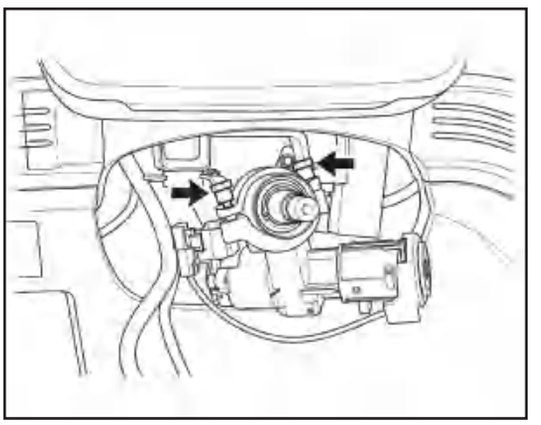
9. Remove the left lower guard assembly

10. Remove the steering column with intermediate shaft assembly

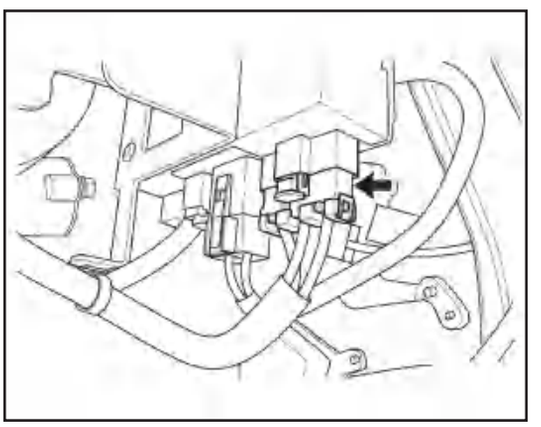
① Disconnect the ignition switch connector (arrows).



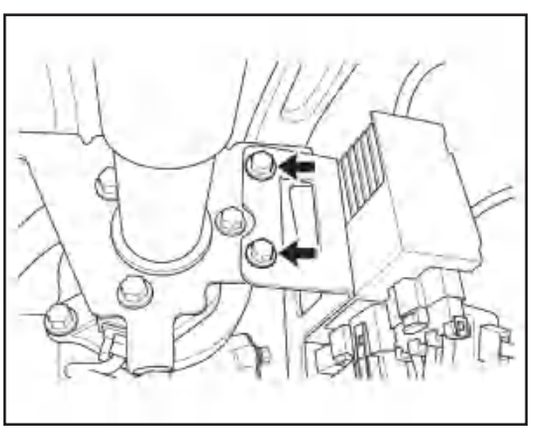
② Remove 2 anti-theft bolts (arrows) of the electronic steering column lock and remove the electronic steering column lock.



③ Disconnect the connector (arrow) on the EPS controller.



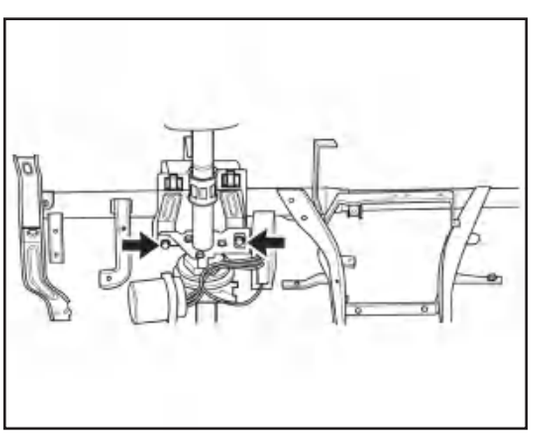
④ Remove 2 fixing bolts (arrows) of the EPS controller and remove the EPS controller.



⑤ Remove 2 fixing nuts (arrows) of the upper bracket of the steering column.

Tightening torque:

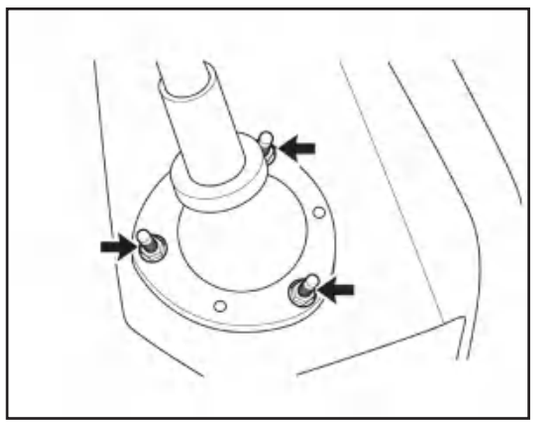
23 ± 2 N•m (17±1.5 ft-lbs.)



⑥ Remove 3 fixing nuts (arrows) of the steering sheath.

Tightening torque:

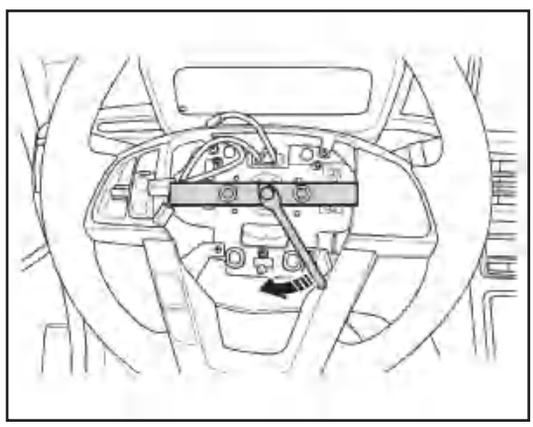
7 ± 1 N•m (5.2±0.7 ft-lbs.)



⑦ Remove the lower yoke locking bolt (arrow).

Tightening torque :

55 ± 5 N•m (40.6±3.7 ft-lbs.)



⑧ Remove the steering column with intermediate shaft assembly.

Caution:
※ When taking the steering column, the handle position is not allowed to be taken, but the column pipe position can be taken; the steering column shall not be bumped or hit during the process of taking, handling and assembling to prevent collapse of the steering column. ※ Do not touch the interior trim when taking out the steering column assembly with intermediate shaft to avoid scratching the interior trim.

Inspection

1. Check whether the steering column assembly is worn, cracked or deformed. Repair welding or correction is not allowed. If necessary, replace the steering column assembly.
2. Check whether the steering column bearing is loose, worn or stuck. If necessary, replace the steering column assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When taking the steering column, the handle position is not allowed to be taken, but the column pipe position can be taken; the steering column shall not be bumped or hit during the process of taking, handling and assembling to prevent collapse of the steering column. ※ Do not touch the interior trim when installing the steering column assembly with intermediate shaft to avoid scratching the interior trim.

Air conditioning system

14.1 General information

14.1.1 System description

KQ71 air conditioning system is a single steam system. When the air conditioner is working, it can realize the function adjustment of air conditioning, air supply mode, air volume, temperature, internal and external circulation ventilation, heating and cooling.

KQ71 air conditioning system is mainly composed of air inlet transition duct, HVAC assembly, air conditioning control panel assembly, compressor, compressor bracket, condenser, air conditioning pipeline and other parts, including pressure switch, O-ring and other accessories.

14.1.2 Precautions for installation and removal of air conditioning system

1. Recover the refrigerant in the air conditioning system before installation and removal.
2. After the air conditioning pipeline is removed, the pipe orifice should be blocked immediately to ensure the cleanliness of the inside of the pipe.
3. When cleaning the pipeline, do not use compressed air, but use nitrogen or refrigerant gas.
4. Correctly assemble and check the tightening torque of each connecting part as required.
5. Check all parts to ensure that there is no damage and that adjacent parts do not interfere with each other.
6. Carry out system sealing test to ensure that the air conditioning system meets the sealing requirements.

14.1.3 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Pipe clamp fixing bolt	9 ± 1	6.6±0.7
Compressor fixing bolt	23±2	17±1.5
Compressor line fixing bolt	9 ± 1	6.6±0.7
Condenser fixing bolt	7 ± 1	5.2±0.7
Condenser air conditioning pipeline fixing bolt	7 ± 1	5.2±0.7

Description	Torque	
	N·m	ft-lbs.
HVAC fixing bolt	7 ± 1	5.2±0.7

Refrigerant specification

Description	Filling volume
HFO-1234YF	450 ± 10 g (15.9±0.4 oz)

Refrigerant oil specification

Description	Model
Refrigerant oil	PAG56

14.1.4 Tool picture

Special tools

Tool name	Tool picture
Air leakage detector	
Refrigerant recovery/reuse equipment	

14.2 Diagnosis

14.2.1 On-board inspection

Caution:
※ Air conditioning refrigerant lines and hoses are used to transfer refrigerant between air conditioning system parts. The twisted or bent refrigerant lines and hoses will reduce the performance of the air-conditioning system and reduce the flow of refrigerant in the system.
※ There is high pressure in the refrigerant when the air conditioning compressor assembly is working. Make sure that all connecting parts of the air conditioning system are well sealed. Check the system pipeline at least once a year to ensure that it is in good condition and properly routed. The refrigerant lines and hoses cannot be repaired. If there is leakage or damage, they must be replaced.

1. Routine inspection
   ① Check whether there is oil or dust at the joints of the air conditioning pipeline. If this happens, there may be a leak.
   ② Check whether the condenser surface is dirty and whether the radiation fin is deformed.
   ③ Check whether there is harsh noise when the compressor assembly works normally.
   ④ Feel by hand that there should be obvious temperature difference between the inlet and exhaust pipes of the compressor assembly. Under normal conditions, the low pressure pipe is cooler and the high pressure pipe is hot. Compare the temperature of the condenser inlet pipe and outlet pipe by hand. Under normal conditions, the temperature of the inlet pipe is higher than that of the outlet pipe.
2. Check the refrigerant pressure with the pressure gauge set
   ① Connect the manifold pressure gauge assembly. After the following conditions are met, read the pressure indicated on the pressure gauge. Test conditions:
      ※ As for the internal and external circulation switch, it is set to the outside circulation position.
      ※ Turn the temperature control knob to the coldest.

※ The blower speed control switch is set to the highest gear.

※ Turn on the air conditioning switch.

14.2.2 Check refrigerant leakage

Warning:
※ Avoid inhaling the vapor or moisture of air-conditioning refrigerant and refrigerant oil. ※ Only use professional service equipment to discharge the refrigerant. In case of accidental discharge of the system, ventilate the workplace before maintenance.

Caution:
※ If the filling capacity of air conditioning refrigerant is empty or low, there may be leakage in the air conditioning system. Check all air conditioning pipelines, connectors and parts for residual oil. Residual oil is an indicator of the leak location of the air conditioning system.

1. After recharging the refrigerant, use the leakage detector to check whether the refrigerant gas leaks.
2. Perform the operation under the following conditions:
   ① Turn the start button to OFF.
   ② Ensure good ventilation.
   ③ Repeat the test 2 or 3 times.
   ④ Make sure that there is still refrigerant in the refrigeration system.
3. Use the air leakage detector to close to the air conditioning pipeline interface and check whether the air conditioning pipeline leaks. If the leak detector makes a noise, it indicates that there is a leak. If necessary, repair or replace the leaking air conditioning pipeline.
4. Use the same method to detect the condenser for leakage. Clean or replace the condenser assembly as necessary.

14.2.3 Fault symptom table

Tips:
※Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence. Repair or replace faulty parts or make adjustments as necessary.

Symptom	Suspicious parts
No warm air sent from the air conditioner	Blower speed control module (damaged)
	Blower motor (damaged)
	Mixing damper control mechanism (stuck or damaged)
	PTC (damage)
	Harness or connector (open circuit or short circuit)
No cooling air sent from the air conditioner	There is a leak in the system
	Refrigerant (overcharged)
	Air conditioning pressure switch (damaged)
	Evaporator temperature sensor (damaged)
	A/C switch (damaged)
	Electric compressor assembly fuse (damaged)
	Electric compressor assembly (damaged)
	Condenser assembly (blocked or damaged)
	Expansion valve (blocked or frosted)
	Evaporator core assembly (blocked or damaged)
	Harness or connector (open circuit or short circuit)
Intermittent cooling of the air conditioner	There is water in the system
Insufficient cooling of air conditioner	There is a leak in the system
	Refrigerant (insufficient)
	There is water in the refrigerant
	Condenser (dirty or blocked)
	Expansion valve (dirty or blocked)
	High and low pressure pipeline of air conditioner (dirty or blocked)
The system is too noisy	Compressor assembly mounting bolts (loose)
	Cooling fan blade (deformed)
	Refrigerant oil (too little)

14.2.4 Terminal definition of air conditioning panel assembly

Plug-in terminal

Terminal No.	Terminal definition	Terminal No.	Terminal definition
1	Control panel power supply+	14	Thermostat-
2	Control panel power supply-	15	Reserved
3	Backlight power supply-	16	Evaporator temperature sensor signal
4	Backlight power supply+	17	Signal ground
5	Blower power supply+	18	Reserved
6	Reserved	19	Reserved
7	A/C request signal	20	Reserved
8	Fan start relay control signal	21	Reserved
9	Double flash feedback	22	Reserved
10	Double flash output	23	Reserved
11	Reserved	24	Reserved
12	PTC request signal	25	Power supply ground
13	Thermostat+	26	Reserved

14.3 On-board maintenance

14.3.1 Recovery, vacuum extraction and filling of refrigerant

Recover/drain refrigerant

Warning:
※ The air conditioning system is under high pressure, so special care should be taken during maintenance.
※ The air conditioning system contains refrigerant under high pressure. The maintenance must be carried out by professional maintenance personnel. Otherwise, the wrong repair procedure may cause serious danger or fatal injury.
※ If the air conditioning system is accidentally depressurized, ventilate the working area before maintenance. Releasing a large amount of refrigerant in a closed workplace will reduce oxygen and may cause asphyxiation, thus causing serious or fatal injury.
※ Refrigerant in automobile air conditioning system shall not be directly discharged into the atmosphere to avoid environmental pollution.

Caution:
※ Special recycling equipment must be used for recycling.
※ Keep away from open flames.
※ Always dispose of the recovered refrigerant according to regulations.
※ Do not add other types of refrigerant to the refrigerant using HFO-1234YF. Incompatible refrigerants will damage the air conditioning system.

1. Open the front cabin cover and loosen the air conditioning high/low pressure pipe connector cover.
2. Connect the refrigerant recovery/reuse equipment to the high and low pressure pipe joints of the air conditioner.
   ① Connect the blue connector to the low pressure pipe connector of the air conditioner.
   ② Connect the red connector to the high pressure pipe connector of the air conditioner.
3. Open the high-pressure valve and low-pressure valve of the refrigerant recovery/reuse equipment.
4. Select the Recycle option on the device and make it work.
5. Check the low pressure value of the pressure gauge to ensure that the recovery is complete, and then shut down the equipment.
6. Disconnect the connection between the refrigerant recovery/reuse equipment and the air-conditioning pipeline connector.
7. Reinstall the cap on the refrigerant line connector.

Vacuumize

1. Open the front compartment cover and loosen the air conditioning high/low pressure pipe connector cover.
2. Connect the refrigerant recovery/reuse equipment to the high and low pressure pipe joints of the air conditioner.
   ① Connect the red connector to the high pressure pipe connector of the air conditioner.
   ② Connect the blue connector to the low pressure pipe connector of the air conditioner.

3. Open the high-pressure valve and low-pressure valve of the refrigerant recovery/reuse equipment.
4. Select the "vacuumize " option on the device, set the time to 15 minutes, and then select OK and make it work.
5. After the operation is completed, hold the pressure and wait for about 10 minutes to check whether the vacuum degree of the air conditioning system changes. If there are changes, the air conditioning system may have leakage, and the air conditioning system should be checked and repaired. If there is no change, fill the refrigerant.

14.3.2 Refill refrigerant

Caution:
※ A small amount of refrigerant oil will be removed from the air conditioning system when the refrigerant is recovered and drained. When filling the air conditioning system, be sure to replenish the refrigerant oil lost in the recovery process. ※ Do not overfill the refrigerant. Otherwise, the pressure of the compressor assembly will be too high, which will cause the noise of the compressor assembly and the fault of the air conditioning system.

1. Use a vacuum pump to vacuumize.
2. Add refrigerant oil after checking and confirming that there is no leakage in the air conditioning system.
3. After adding refrigerant oil, vacuum again for 3 minutes, and then add refrigerant.
4. Select the "Fill" option on the device, set the filling amount to the specified value, and then select OK and make it work.
5. Open the suction valve and close the exhaust valve, and then open the filling valve to allow the refrigerant to flow into the system.
6. When the delivery of refrigerant has stopped, close the filling valve.
7. If the filled refrigerant is not delivered in place, start the vehicle to make the air conditioning compressor assembly work.
8. Open the filling valve to deliver the remaining refrigerant to the air conditioning system.

Warning:
※ Do not open the exhaust (high pressure) valve at this time. Otherwise, personal injury or even death may occur.

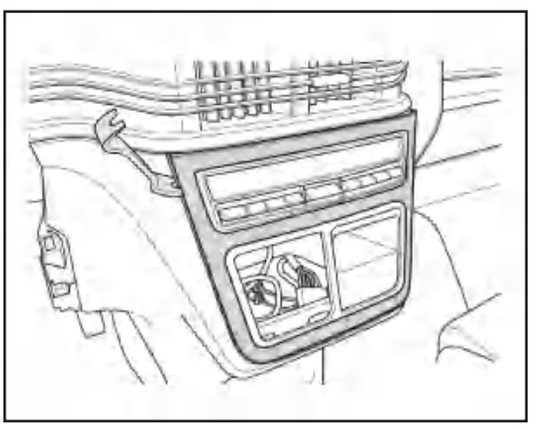
9. After filling, perform the air conditioning system pressure test.
10. After the test, remove the refrigerant filling connecting pipe.
11. Reinstall the cap on the air conditioning pipeline connector.

14.3.3 Air conditioning control panel assembly

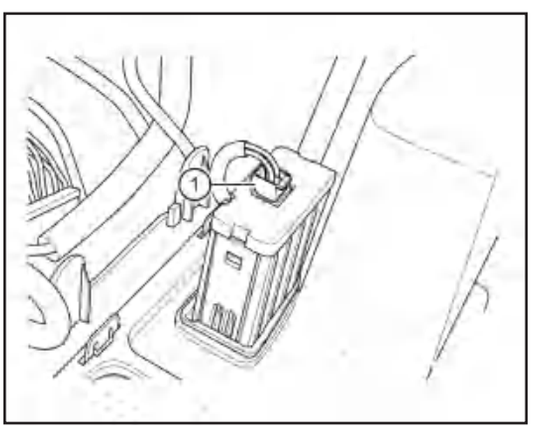
Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the air conditioning control panel assembly

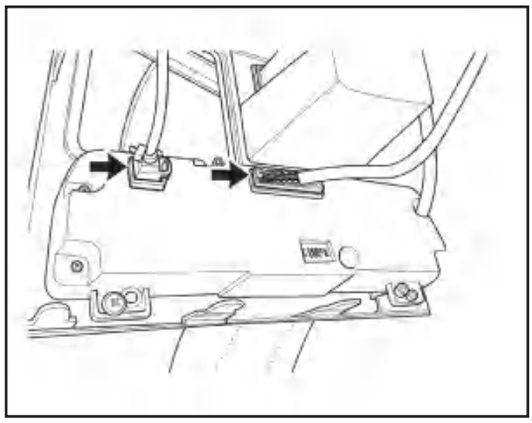
① Remove the central control panel with air conditioning control panel assembly using the interior trim pry.



② Disconnect the connector (1) on the central control panel.



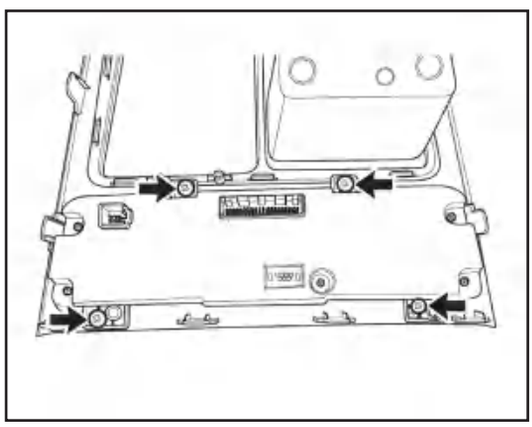
③ Disconnect 2 connectors (arrows) of the air conditioning control panel assembly.



④ Remove 4 fixing screws of the air conditioning control panel assembly and remove the air conditioning control panel assembly.

Tightening torque:

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



Installation

1. The installation sequence is the reverse of the removal sequence.

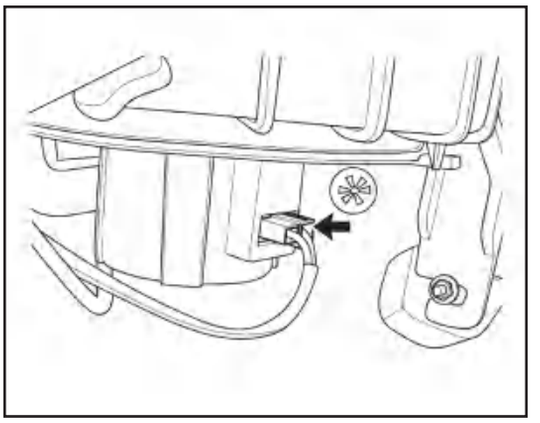
Caution:
※ Be sure to install the fixing clip on the central control panel assembly in place during installation.

14.3.4 Blower assembly

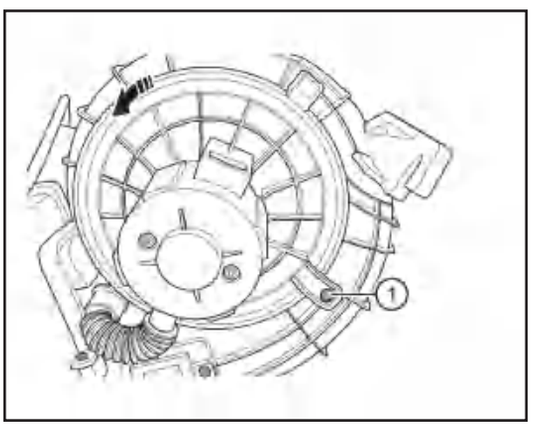
Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the blower assembly

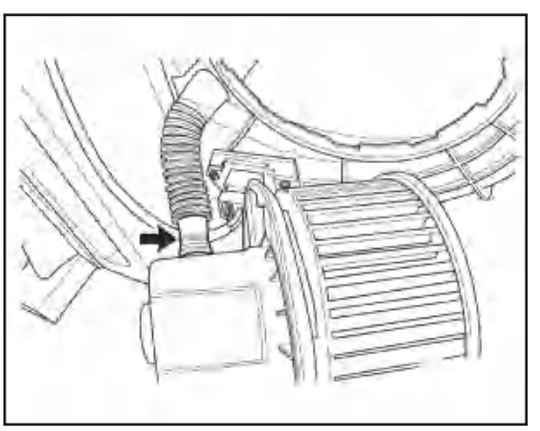
① Disconnect the blower assembly connector (arrow).



② Remove 1 fixing screw of the blower assembly, and rotate it anticlockwise from the spiral casing to remove the blower assembly.



③ Disconnect the hose and remove the blower assembly.



Inspection

1. Inspect the blower

   ① Connect the positive (+) lead and negative (-) lead of the battery to 2 terminals of the blower, and check whether the blower can run smoothly.

Installation

1. The installation sequence is the reverse of the removal sequence.

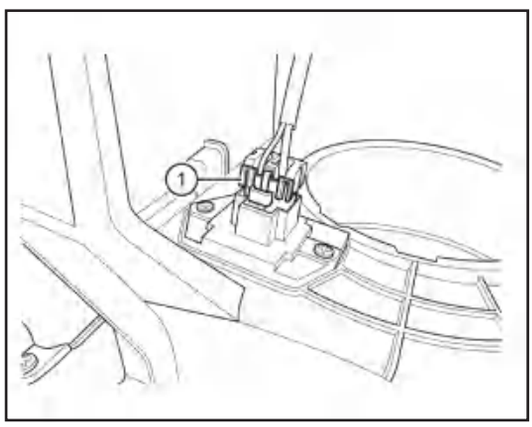
14.3.5 Blower speed control module

Removal

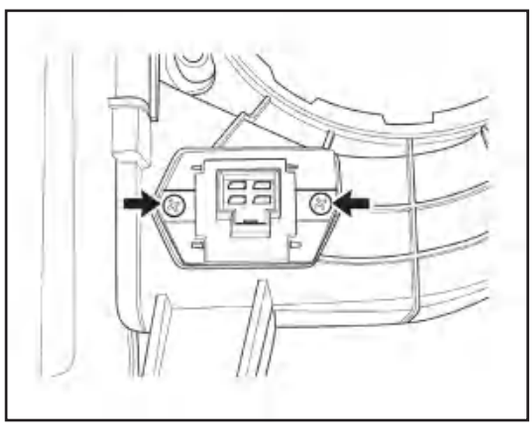
Caution:
※ During normal operation, the blower speed control module may be very hot. Turn off the blower and wait for a few minutes for the blower speed control module to cool before performing diagnosis or maintenance to prevent scalding.
※ Do not operate the blower assembly when removing the blower speed control module from the vehicle. Otherwise, the blower assembly may be damaged.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the blower speed control module

① Disconnect the blower speed control module connector (1).



② Remove 2 fixing screws (arrows) of the blower speed control module.



③ Remove the blower speed control module assembly.

Installation

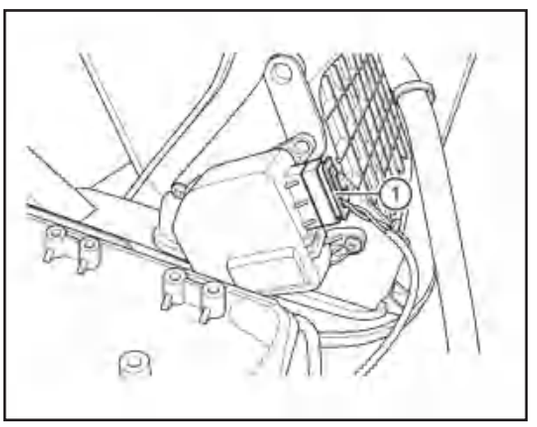
1. The installation sequence is the reverse of the removal sequence.

14.3.6 Internal and external circulation motor

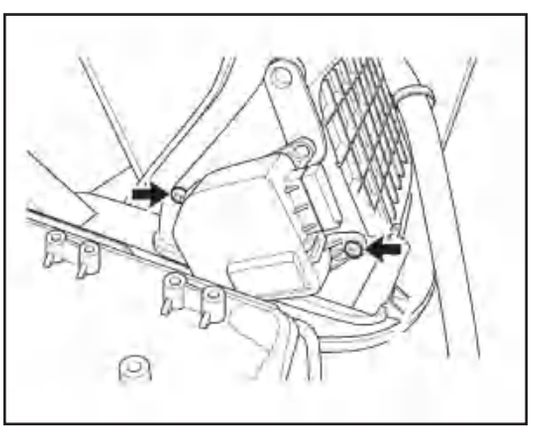
Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the glove box assembly
4. Remove the internal and external circulation damper motor

① Disconnect the connector of the internal and external circulation damper motor (1).



② Remove 2 fixing screws of the internal and external circulation damper motor.



③ Remove the internal and external circulation damper motor.

Installation

1. The installation sequence is the reverse of the removal sequence.

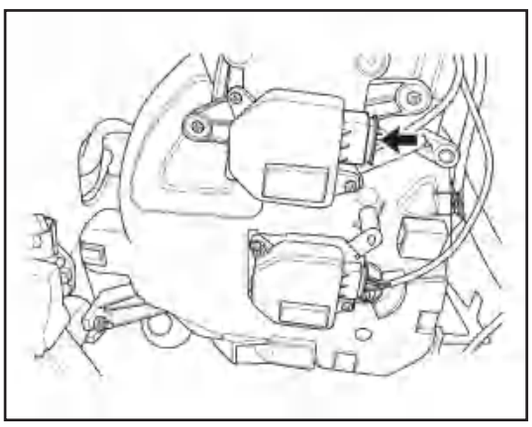
Caution:
※ During installation, apply a small amount of grease on the contact surface between the internal and external circulation damper motor paddle and the internal and external circulation damper assembly to ensure its smooth operation.

14.3.7 Mode servo motor

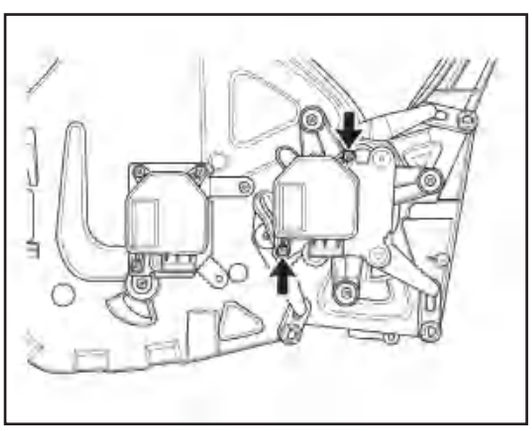
Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the left lower guard assembly of the dashboard
4. Remove the mode servo motor

① Disconnect the mode servo motor connector (arrow).



② Remove 2 fixing screws (arrows) of the mode servo motor.



③ Remove the mode servo motor.

Installation

1. The installation sequence is the reverse of the removal sequence.

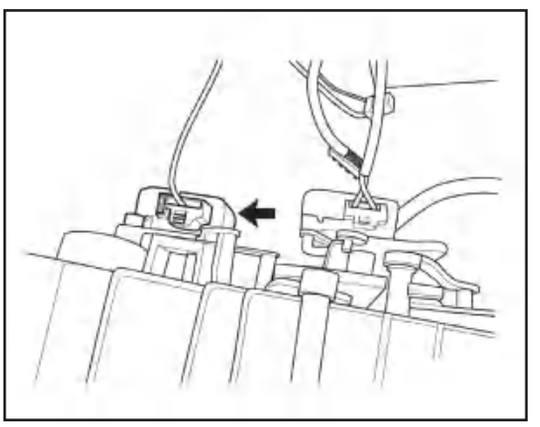
Caution:
※ During installation, apply a small amount of grease on the contact surface between the mode servo motor paddle and the mode servo assembly to ensure its smooth operation.

14.3.8 Heating and cooling servo motor

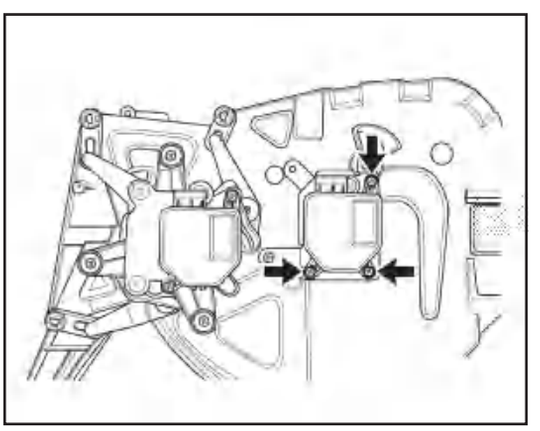
Removal

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the left lower guard assembly of the dashboard
4. Remove the heating and cooling servo motor

① Disconnect the heating and cooling servo motor connector (arrow).



② Remove 3 fixing screws (arrows) of the heating and cooling servo motor.



③ Remove the heating and cooling servo motor.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ During installation, apply a small amount of grease on the contact surface between the heating and cooling servo motor paddle and the heating and cooling servo motor assembly to ensure its smooth operation.

14.3.9 Air conditioning pipeline

Removal

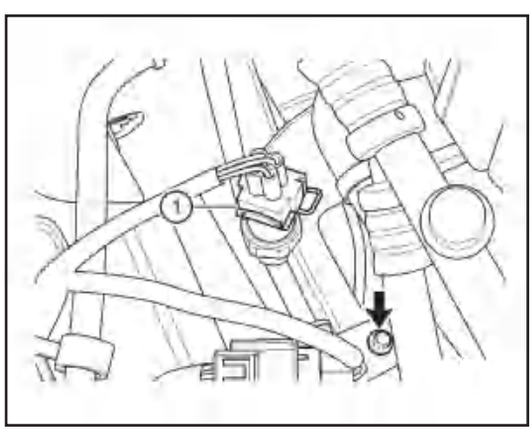
Caution:
※ Refrigerant must be recovered/filled using professional service equipment.
※ Be sure to keep the working site well ventilated.
※ Sealing measures shall be taken for the disconnected air conditioning pipeline and its butt joint to prevent foreign matters from entering.

1. Recover the refrigerant in the air conditioning system
2. Turn off all electrical equipment and start button
3. Disconnect the negative battery cable
4. Remove the front bumper assembly
5. Remove the air conditioning pipeline assembly

① Disconnect the air conditioning pressure switch connector (1) and remove 1 fixing bolt (arrow) between the air conditioning pipe and the body.

Tightening torque:

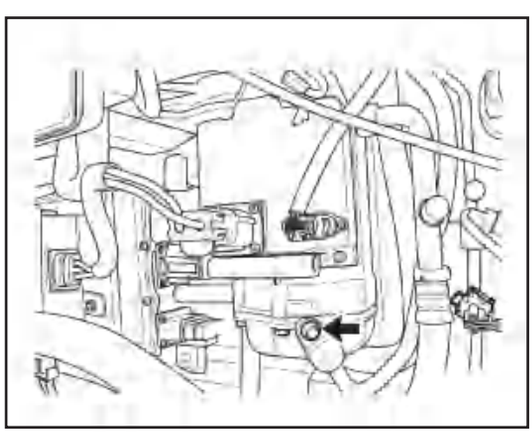
7 ± 1 N·m (5.2±0.7 ft-lbs.)

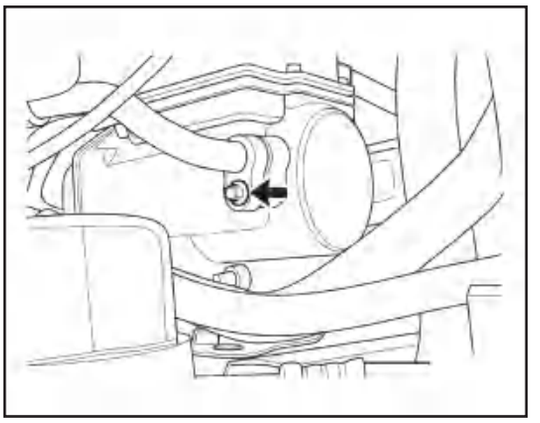


② Remove 2 fixing bolts (arrows) of the air conditioning pipeline and compressor assembly.

Tightening torque:

9 ± 1 N·m (6.6±0.7 ft-lbs.)

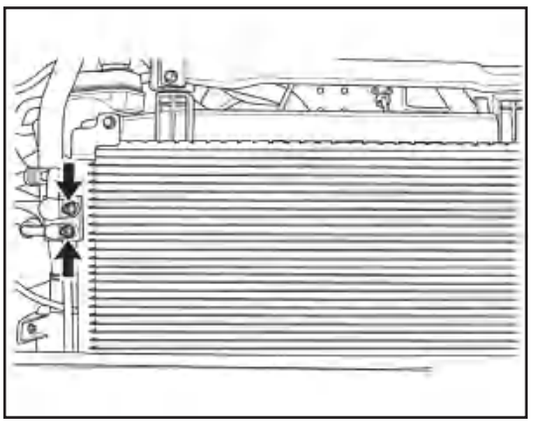




③ Remove 2 fixing bolts (arrows) of the air conditioning pipeline and the condenser.

Tightening torque:

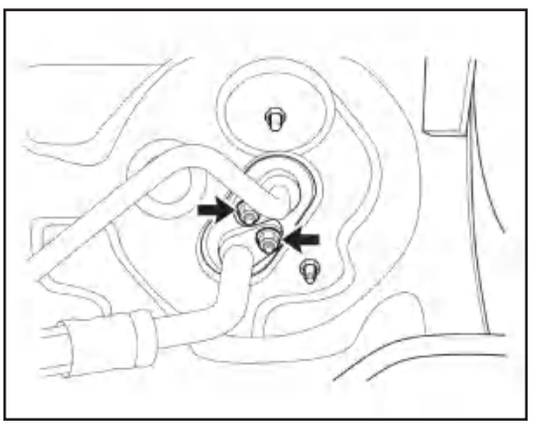
7 ± 1 N·m (5.2±0.7 ft-lbs.)



④ Remove 2 fixing bolts (arrows) of the air conditioning pipeline and the evaporator core.

Tightening torque:

7 ± 1 N·m (5.2±0.7 ft-lbs.)



⑤ Remove the air conditioning pipeline assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing bolts and nuts to the specified torque. ※ When installing the refrigerant pipeline, replace the O-ring seal of the refrigerant pipeline. Otherwise, refrigerant leakage may occur. ※ Lubricate the new rubber O-ring seal with clean refrigerant oil and install it on the refrigerant line connector. ※ Refill the air conditioning system and check for refrigerant leakage.

14.3.10 HVAC assembly

Removal

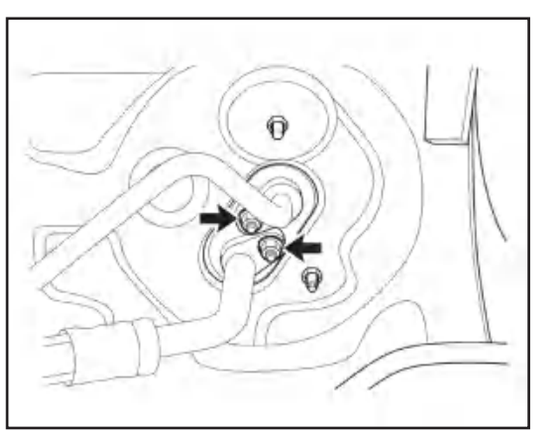
Caution:
※ Refrigerant must be recovered/filled using professional service equipment. ※ Take care not to damage the hose when removing and installing it. ※ Be sure to keep the working site well ventilated. ※ Sealing measures shall be taken for the disconnected air conditioning pipeline and its butt joint to prevent foreign matters from entering.

1. Recover the refrigerant in the air conditioning system
2. Turn off all electrical equipment and ignition switch
3. Disconnect the negative battery cable
4. Remove the horn cover assembly
5. Remove the steering wheel assembly
6. Remove the dashboard body assembly
7. Remove the dashboard beam assembly
8. Remove the HVAC assembly

   ① Remove 2 fixing bolts (arrows) of the high and low pressure pipeline of air conditioner and the evaporator core.

   Tightening torque :

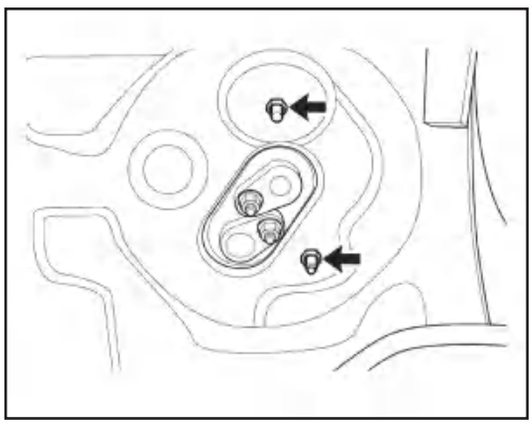
   7 ± 1 N·m (5.2±0.7 ft-lbs.)



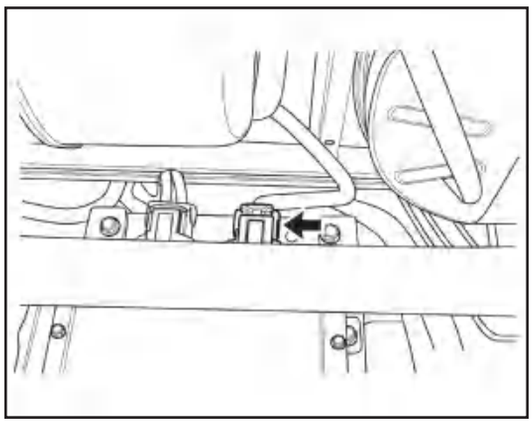
② Remove 2 fixing nuts (arrows) of the evaporator core and the body.

Tightening torque :

9 ± 1.5 N•m (6.6±1.1 ft-lbs.)



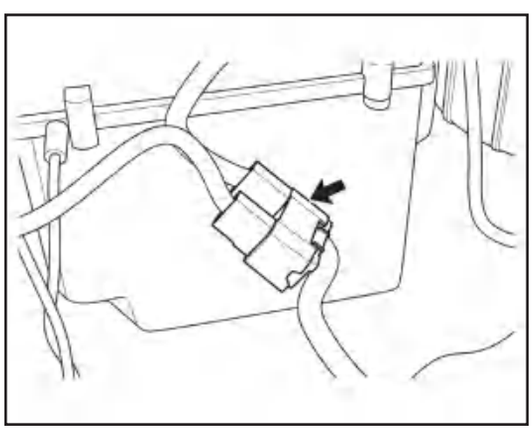
③ Disconnect the high-voltage plug-in (arrow) between PTC and high-voltage distribution box.



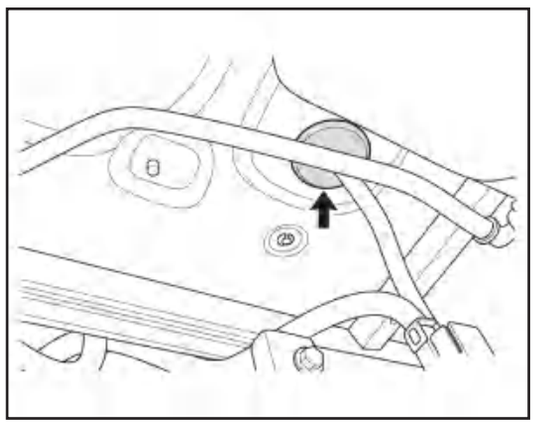
Warning:

※ It is necessary to ensure that the vehicle is powered off and the power battery maintenance switch is disconnected to avoid electric shock.

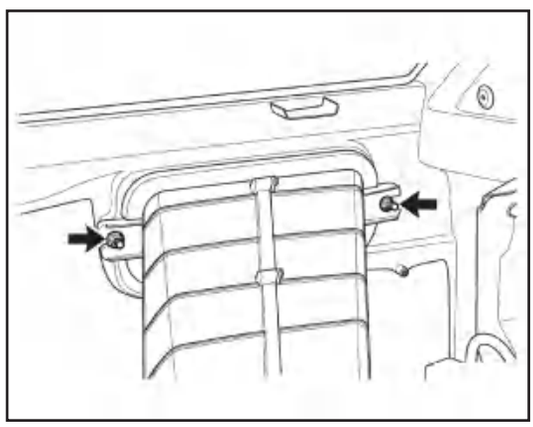
④ Disconnect the plug-in (arrow) of the air conditioning harness and the instrument harness.



⑤ Apply force to the cab and push out the sealing ring on the PTC harness.



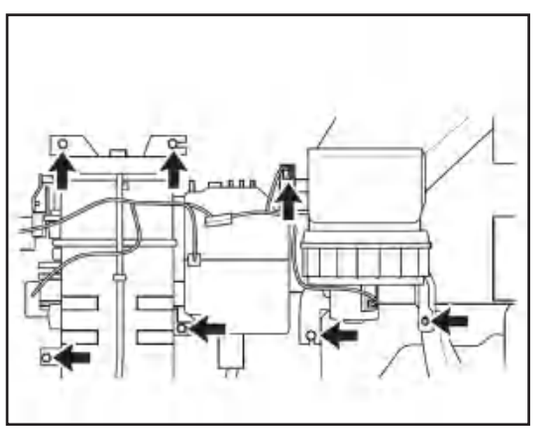
⑥ Remove 2 fixing nuts of the air inlet transition duct and take down the air inlet transition duct.



⑦ Remove 7 fixing nuts (arrows) of the HVAC assembly and the body.

Tightening torque :

7 ± 1 N•m (5.2±0.7 ft-lbs.)

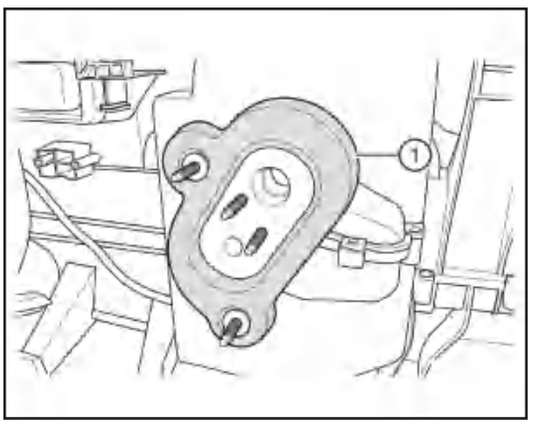


⑧ Disconnect the air conditioning drain pipe and remove the HVAC assembly from the vehicle body.

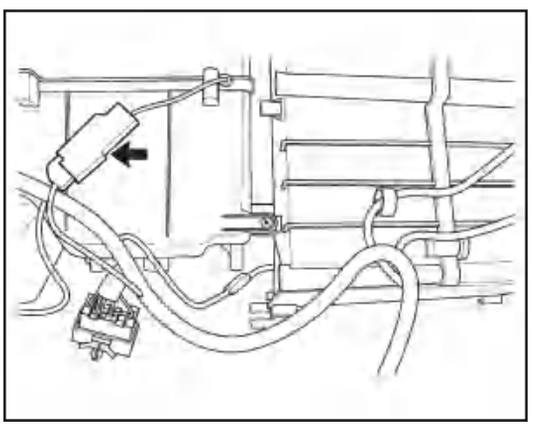
Removal

1. Remove the blower assembly
2. Remove the blower speed control module
3. Remove the internal and external circulation damper motor
4. Remove the mixing damper motor
5. Remove the mode damper motor
6. Remove the evaporator core assembly

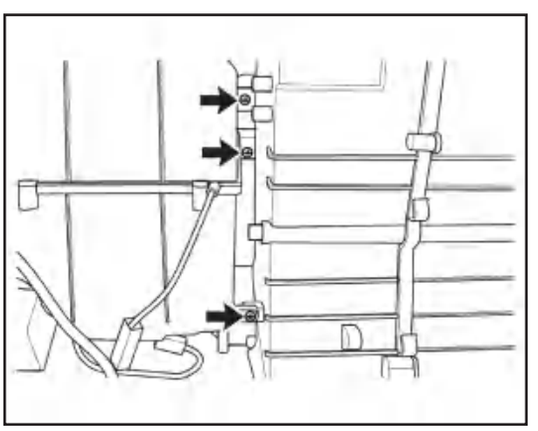
① Remove the evaporator core assembly sponge (1).



② Disconnect the evaporator tank temperature sensor (arrow).

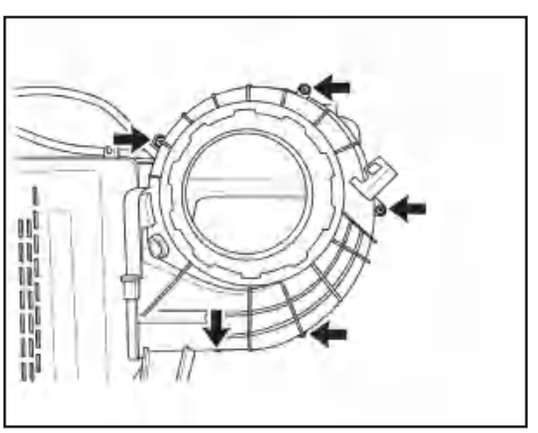


③ Remove 3 fixing screws (arrows) connected to the PTC housing and separate them from the evaporator core housing.

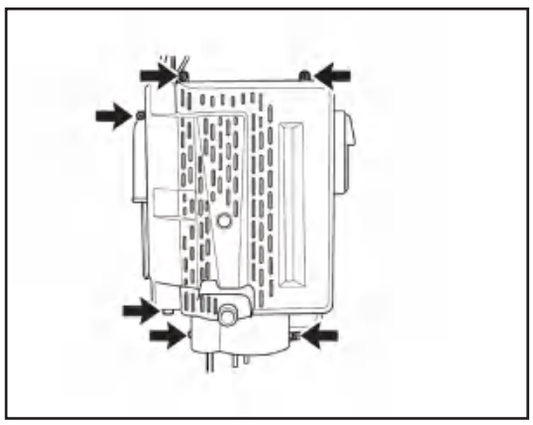


④ Remove 1 fixing screw of the blower assembly, and rotate it anticlockwise to remove the blower assembly.

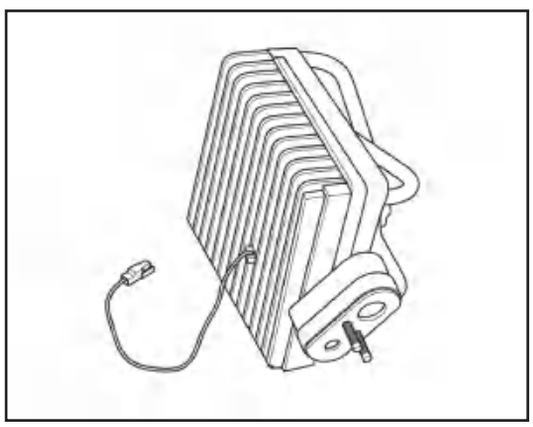
⑤ Remove 5 fixing screws (arrows) of the blower spiral casing and take down the blower spiral casing.



⑥ Remove 6 fixing screws (arrows) of the evaporator core housing.



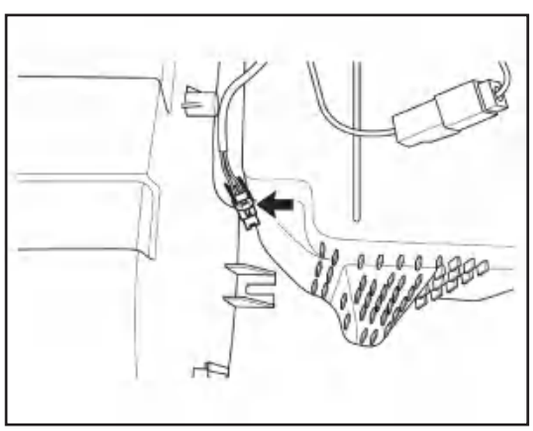
⑦ Remove the evaporator core assembly.



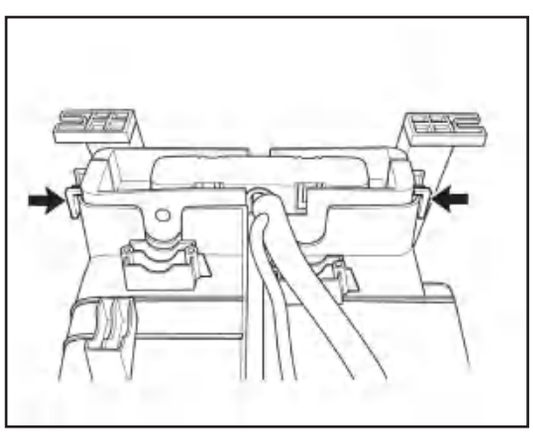
⑧ Remove the lower air conditioning harness.

7. Remove the PTC assembly

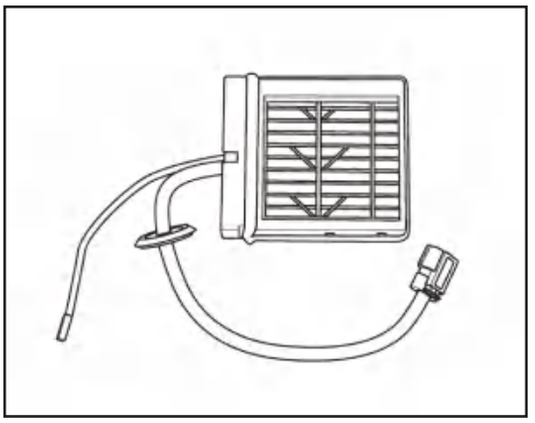
① Disconnect the temperature control switch connector (1).



② Pry off the self-locking structure at both ends of the PTC assembly (arrows).



③ Remove the PTC assembly from the box.



Inspection

1. Inspect the evaporator core assembly
   ① Check the evaporator core assembly for cracks, damage and leakage. If any problem is found, replace the evaporator core assembly.
   ② Check whether the radiation fin is bent.
2. Check the PTC assembly
   ① Check the PTC assembly for cracks and damage. If any problem is found, replace the PTC assembly.

Reassembly

1. The reassembly sequence is the reverse of the disassembly sequence.

Caution:
※ During installation, apply a small amount of grease on the contact surface of the internal and external circulation damper regulating mechanism to ensure its smooth operation.
※ During installation, apply a small amount of grease on the contact surface of the mixing damper regulating mechanism assembly to ensure its smooth operation.
※ After installation, be sure to check and confirm that the mixing damper mechanism assembly works normally.
※ When installing the refrigerant pipeline, replace the O-ring seal of the refrigerant pipeline. Otherwise, refrigerant leakage may occur.
※ After installation, always refill the refrigerant and check whether the refrigerant leaks.
※ Be sure to install the drip pipe in place after installation.

Installation

1. The installation sequence is the reverse of the removal sequence.

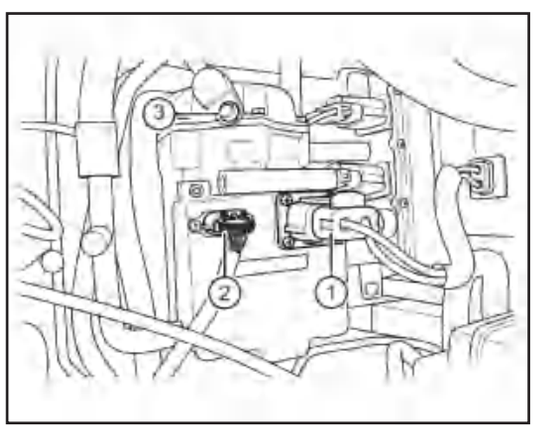
14.3.11 Electric compressor assembly

Removal

Caution:
※ Always observe safety precautions before performing this operation. Otherwise, serious personal injury or even death may occur. ※ It is necessary to ensure that the vehicle is powered off and the power battery maintenance switch is disconnected to avoid electric shock.

Warning:
※ Refrigerant must be recovered/filled using professional service equipment. ※ Be sure to keep the working site well ventilated. ※ Sealing measures shall be taken for the disconnected air conditioning pipeline and its butt joint to prevent foreign matters from entering.

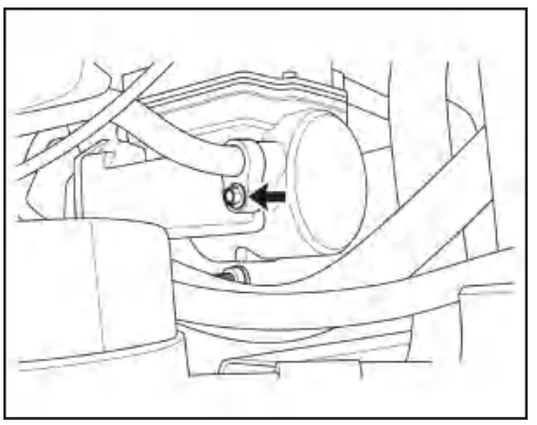
1. Recover the refrigerant in the air conditioning system
2. Turn off all electrical equipment and start button
3. Disconnect the negative battery cable
4. Remove the electric compressor assembly
   ① Disconnect the high voltage harness connector (1) of the electric compressor assembly.
   ② Disconnect the electric compressor assembly connector (2).
   ③ Remove 1 fixing bolt (3) of the compressor-condenser high-pressure pipeline.
   Tightening torque :
   9 ± 1 N•m (6.6±0.7 ft-lbs.)



④ Remove 1 fixing bolt (arrow) of the compressor-condenser high-pressure pipeline.

Tightening torque:

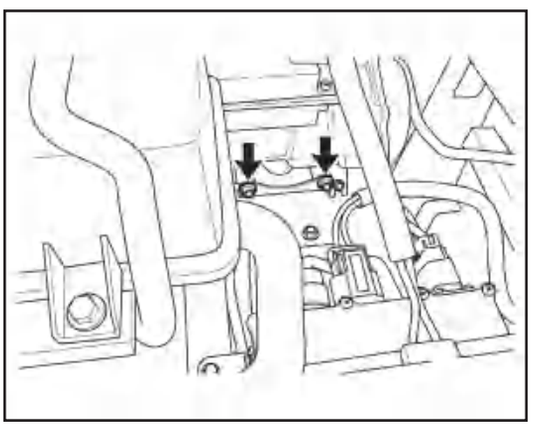
9 ± 1 N•m (6.6±0.7 ft-lbs.)



⑤ Remove 2 fixing bolts (arrows) of the electric compressor assembly and mounting bracket.

Tightening torque:

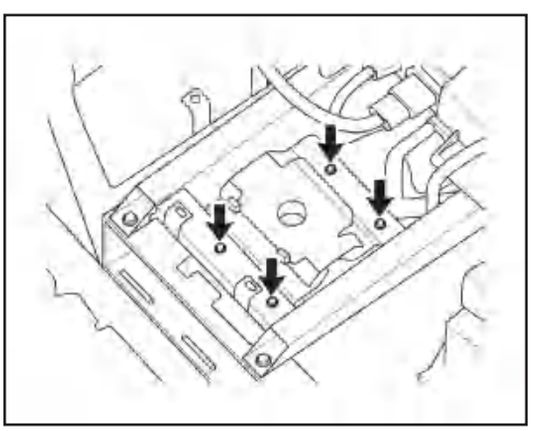
23 ± 2 N•m (17±1.5 ft-lbs.)



⑥ Remove the electric compressor assembly.

5. Remove the electric compressor assembly mounting bracket.

① Remove 4 fixing bolts (arrows) of the electric compressor mounting bracket and the frame.



② Remove the compressor assembly mounting bracket.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing bolts and nuts to the specified torque. ※ When installing the refrigerant pipeline, replace the O-ring seal of the refrigerant pipeline. Otherwise, refrigerant leakage may occur. ※ Lubricate the new rubber O-ring seal with clean refrigerant oil and install it on the refrigerant line connector. ※ Use only the recommended refrigerant oil for the vehicle air conditioning compressor assembly. ※ Refill the air conditioning system and check for refrigerant leakage.

14.3.12 Condenser assembly

Removal

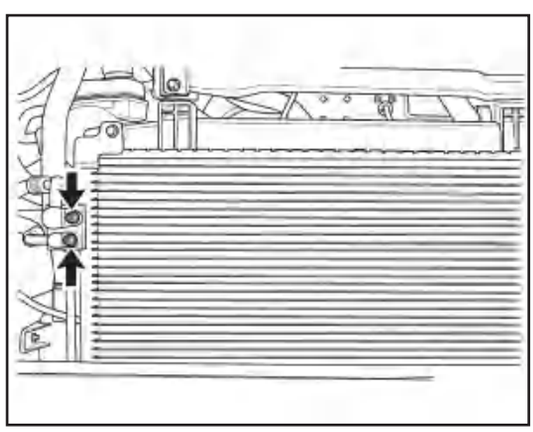
Warning:
※ Always observe safety precautions before performing this operation. Otherwise, serious personal injury or even death may occur. ※ Be sure to keep the working site well ventilated. ※ Sealing measures shall be taken for the disconnected air conditioning pipeline and its butt joint to prevent foreign matters from entering.

1. Recover the refrigerant in the air conditioning system
2. Turn off all electrical equipment and start button
3. Disconnect the negative battery cable
4. Remove the front bumper assembly
5. Remove the condenser assembly

   ① Remove 2 connecting nuts (arrows) of the condenser inlet and outlet pipes and the condenser assembly.

   Tightening torque:

   7 ± 1 N•m (5.2±0.7 ft-lbs.)

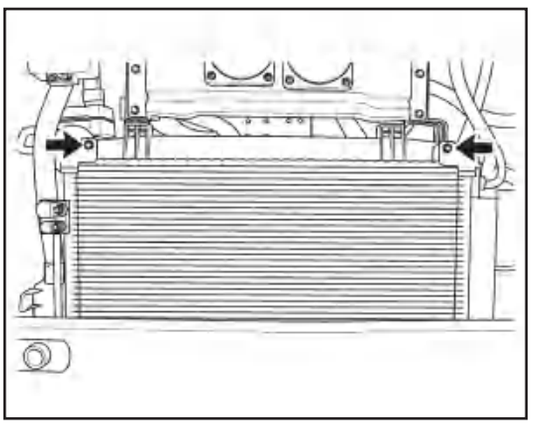


② Remove the condenser inlet and outlet pipelines from the condenser assembly.

③ Remove 2 fixing bolts (arrows) above the condenser assembly.

Tightening torque:

7 ± 1 N•m (5.2±0.7 ft-lbs.)



④ Remove the condenser assembly from the lower condenser mounting bracket.

Inspection

1. Check the condenser radiation fin

① If the condenser radiation fin is dirty, please clean it with water, then dry the radiation fin with compressed air.

Caution:
※ Do not damage the condenser radiation fin.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the fixing bolts and nuts to the specified torque.
※ When installing the refrigerant pipeline, replace the O-ring seal of the refrigerant pipeline. Otherwise, refrigerant leakage may occur.
※ Lubricate the new rubber O-ring seal with clean refrigerant oil and install it on the refrigerant line connector.
※ Only use the specified O-rings.
※ Refill the air conditioning system and check for refrigerant leakage.

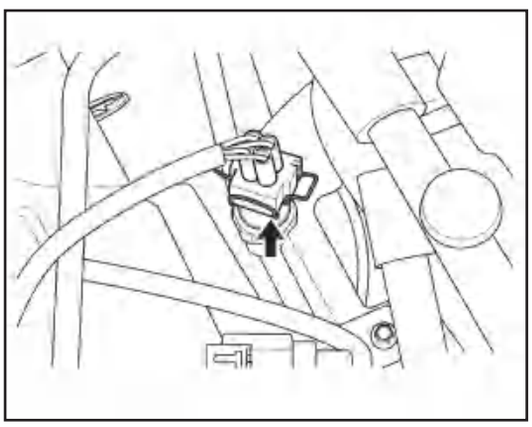
14.3.13 Air conditioning pressure switch

Removal

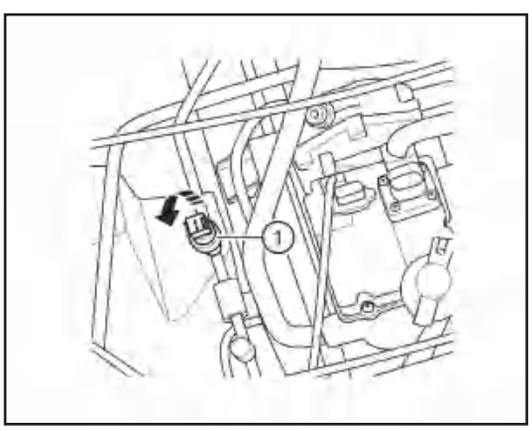
Warning:
※ Always observe safety precautions before performing this operation. Otherwise, serious personal injury or even death may occur.
※ Be sure to keep the working site well ventilated.

1. Recover the refrigerant in the air conditioning system
2. Turn off all electrical equipment and start button
3. Disconnect the negative battery cable
4. Remove the air conditioning pressure switch

① Disconnect the air conditioning pressure switch connector (arrow).



② Use a wrench to remove the air conditioning pressure switch (1) by turning it counterclockwise.



Installation

1. The installation sequence is the reverse of the removal sequence.

Exterior trim system

15.1 General

15.1.1 Description

The main parts of the exterior trims of this model include the front bumper assembly, the front bumper mounting bracket, the front wheel cover guard, the front wheel eyebrow, the fender flap assembly, the side skirt guard assembly, the door trim panel assembly, the rear bumper assembly, the rear bumper mounting bracket, the rear bumper bracket, the rear wheel eyebrow, the rear wheel cover guard, the front windshield lower trim panel assembly, etc.

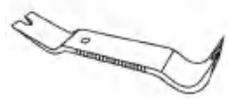
15.1.2 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Lower fixing bolt of front bumper assembly	5± 1	3.7±0.7
Front fixing bolt of front bumper assembly	5± 1	3.7±0.7
Upper fixing bolt of front bumper assembly	5± 1	3.7±0.7
Fixing bolt of front bumper upper connecting plate	5± 1	3.7±0.7
Fixing bolt of front bumper mounting bracket	5± 1	3.7±0.7
Fixing screw of front wheel cover guard	5± 1	3.7±0.7
Fixing bolt of A-column exterior trim panel	5± 1	3.7±0.7
Fixing bolt of rear spoiler assembly	7± 1	5.2±0.7
Upper fixing bolt of rear bumper assembly	5± 1	3.7±0.7
Lower fixing bolt of rear bumper assembly	5± 1	3.7±0.7
Fixing screw of rear bumper assembly	1.5± 0.5	1.1±0.4
Fixing bolt of rear bumper mounting bracket	5± 1	3.7±0.7
Fixing screw of side skirt guard assembly	1.5± 0.5	1.1±0.4
Fixing screw of rear wheel cover guard	2.0± 0.5	1.5±0.4
Fixing nut of exterior rearview mirror assembly	7± 1	5.2±0.7

15.1.3 Tools

Special tools

Name of special tools	Parts No.	Picture of special tools
Interior trim pry	CH-10008	

15.2 On-board maintenance

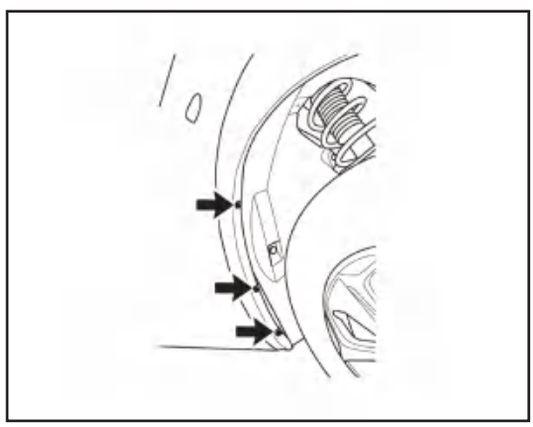
15.2.1 Front bumper assembly

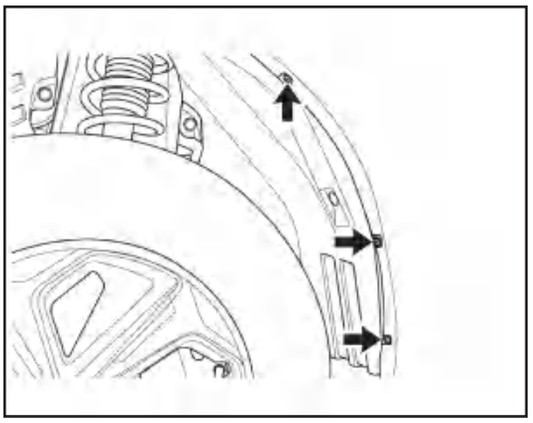
Removal

Caution:
※ When removing the front bumper assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the front bumper assembly, pay attention to apply the appropriate strength and be careful when operating.

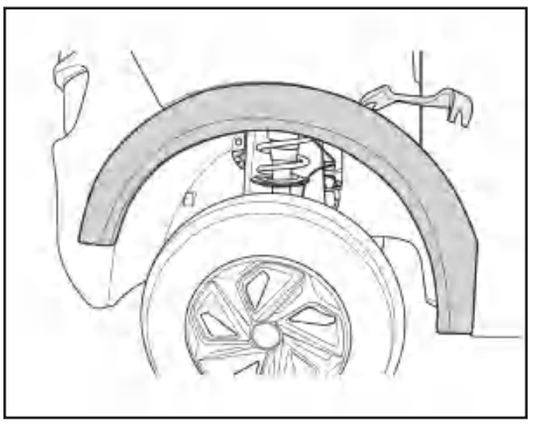
1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the front wheel eyebrow assembly (take the left side as an example)

   ① Remove 6 fixing screws (arrows) of the left front wheel eyebrow. (Take the left side as an example)





② Use the interior trim pry to pry off the fixing clip on the left front wheel eyebrow.



③ Remove the left front wheel eyebrow assembly.

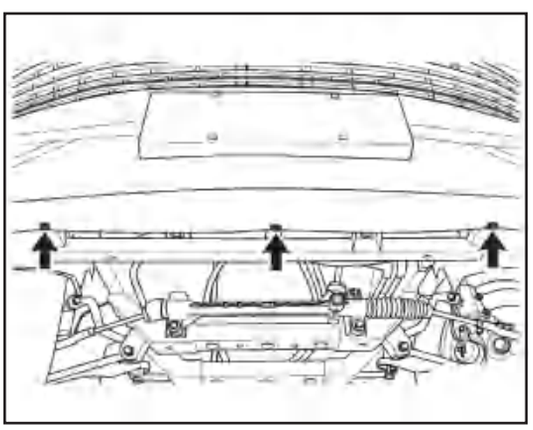
4. Remove the front bumper assembly

① Raise the vehicle to a suitable position.

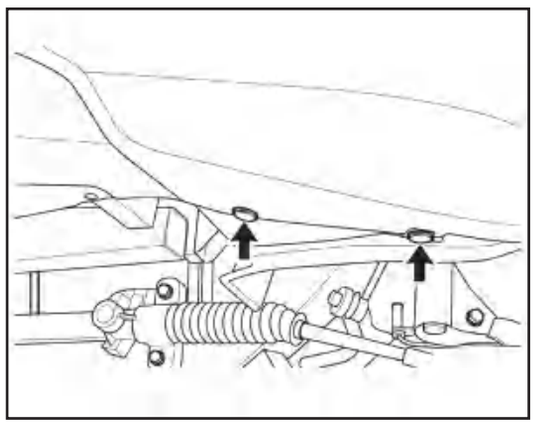
② Remove 3 fixing bolts (arrows) under the front bumper assembly.

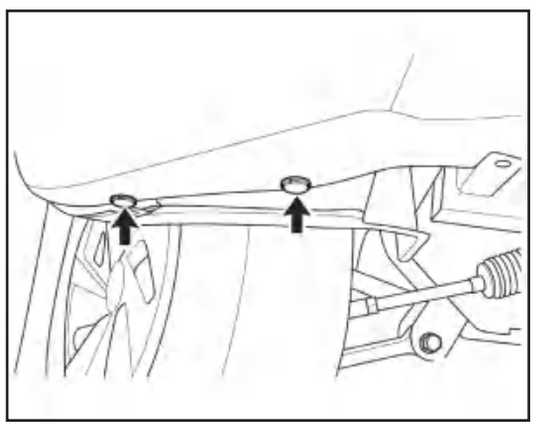
Tightening torque :

5 ± 1 N•m (3.7±0.7 ft-lbs.)



③ Remove 4 fixing snap fasteners (arrows) under the front bumper assembly.





④ Lower the vehicle to a suitable position.

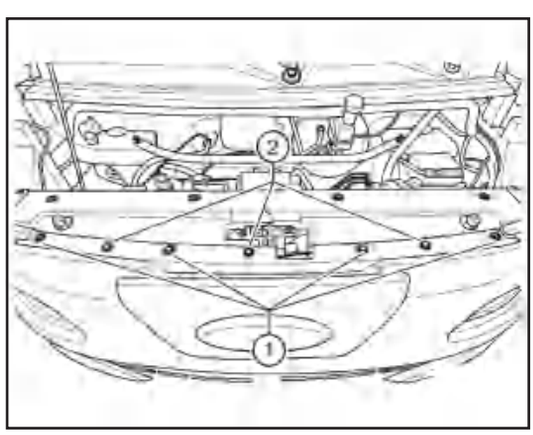
⑤ Open the front charging port cover and remove 2 fixing bolts in front of the front bumper assembly.

Tightening torque: 5 ± 1 N•m (3.7±0.7 ft-lbs.)

⑥ Remove 4 fixing bolts (1) above the front bumper assembly.

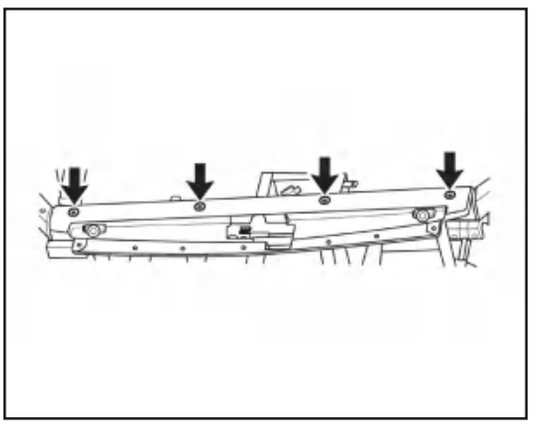
Tightening torque : 5 ± 1 N•m (3.7±0.7 ft-lbs.)

⑦ Remove 3 fixing clips (2) above the front bumper.



⑧ Remove the front bumper assembly.

⑨ Remove 4 fixing bolts (arrows) of the upper connecting plate of the front bumper and remove the upper connecting plate of the front bumper.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installing the front bumper assembly, it is necessary to check whether it is loose. If it is loose, remove it for inspection and reinstall it.
※ Finally, check the clearance and surface difference between the front bumper and the fender flap, headlamp and wheel eyebrow. If there is obvious clearance, disassemble, check and reinstall it.

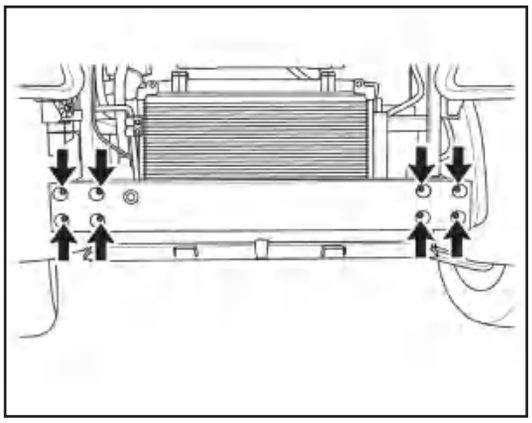
15.2.2 Front bumper anti-collision beam assembly

Removal

Caution:
※ When removing the front bumper anti-collision beam assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the front bumper anti-collision beam assembly, pay attention to apply the appropriate strength and be careful when operating.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the front bumper assembly
4. Remove the front bumper anti-collision beam assembly

① Remove 8 fixing nuts of the front bumper anti-collision beam assembly.



② Remove the front bumper anti-collision beam assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

15.2.3 Front bumper bracket

Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

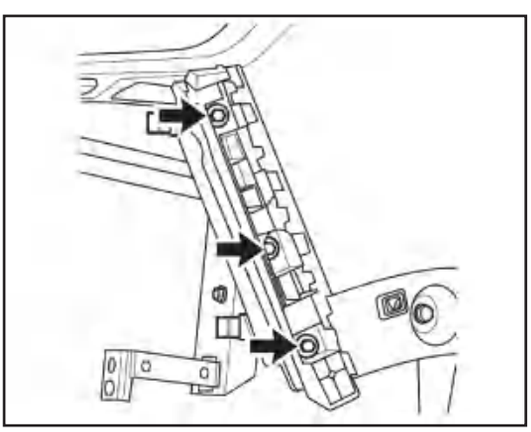
Caution:
※ When removing the front bumper mounting bracket, be sure to wear labor protection articles to avoid accidents. ※ When removing the front bumper mounting bracket, avoid scratching the body paint.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the front bumper assembly
4. Remove the left front bumper side bracket

① Remove 3 fixing bolts (arrows) of the front bumper side bracket.

Tightening torque :

5 ± 1 N•m (3.7±0.7 ft-lbs.)



② Remove the left front bumper side bracket.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the front bumper mounting bracket, be sure to wear labor protection articles to avoid accidents. ※ When installing the front bumper mounting bracket, avoid scratching the body paint.

15.2.4 Front wheel cover guard assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

Caution:
※ When removing the front wheel cover guard assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the front wheel cover guard assembly, avoid scratching the body paint.

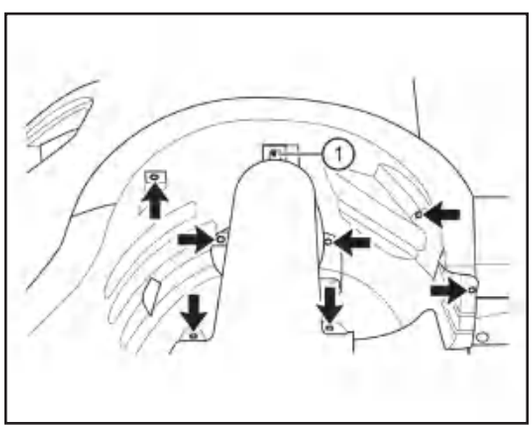
1. Remove the wheel
2. Remove the left front wheel eyebrow assembly
3. Remove the left front wheel cover guard

① Remove 7 plastic snap fasteners (arrows) of the front wheel cover guard.

② Remove 1 fixing screw (1) at the upper end of the front wheel cover guard.

Tightening torque :

5 ± 1 N•m (3.7±0.7 ft-lbs.)



③ Remove the front wheel cover guard.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the front wheel cover guard, be sure to wear labor protection articles to avoid accidents. ※ After installation, check whether the wheel cover guard is loose. If it is loose, disassemble, check and reinstall it.

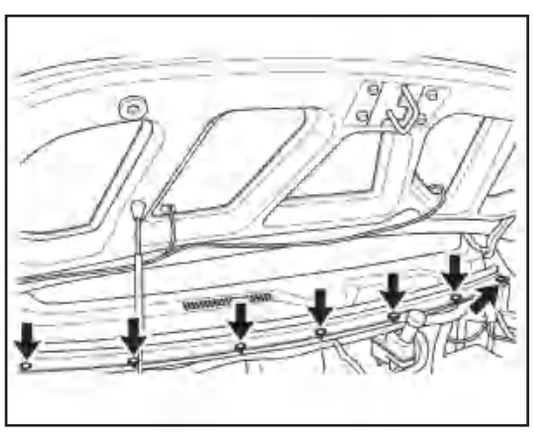
15.2.5 Front windshield lower trim panel assembly

Removal

Caution:
※ When removing the windshield lower trim panel assembly, be sure to wear labor protection articles to avoid accidents.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the front wiper arm assembly
4. Remove the front windshield lower trim panel assembly

① Remove 7 fixing clips (arrows) of the front windshield lower trim panel assembly.



② Remove the front windshield lower trim panel assembly.

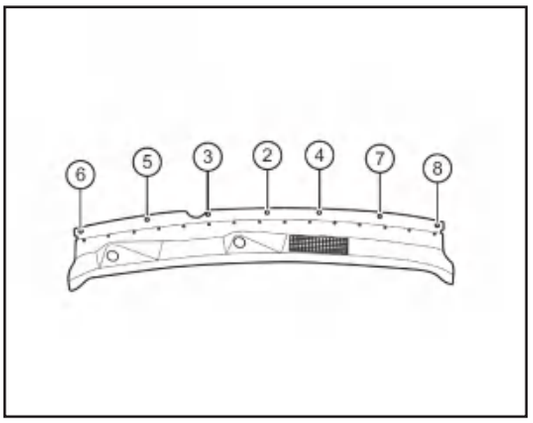
Installation

1. Install the front windshield lower trim panel assembly.

① When installing the front windshield lower trim panel assembly, first clip the 8 glass clips into the lower part of the front windshield; adjust the posture of the lower trim panel of the front windshield to make it fall on the gutter as a whole. At the same

time, the locating pin of the same position is aligned with the locating hole of the body and is clamped in.

② Assemble 7 fixing clips in place according to the assembly sequence of 2 – 8. (The assembly sequence can be adjusted according to the actual assembly situation)



Caution:
※ After assembly, carefully check whether all clips are installed in place. ※ After installation, check whether the lower trim panel of the front windshield matches with the surrounding parts and whether there is any abnormality and looseness; if so, adjust it.

15.2.6 A-column outer trim panel assembly

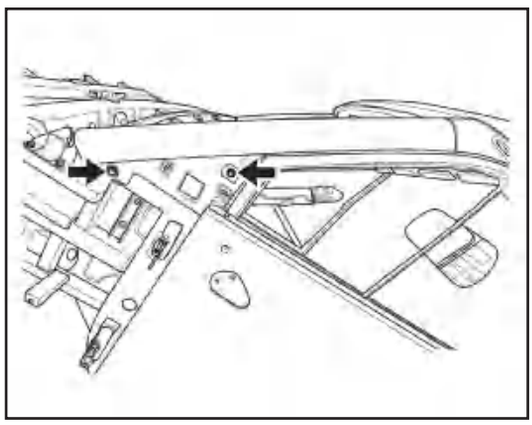
Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

Caution:
※ When removing A-column outer trim panel assembly, be sure to wear labor protection articles to avoid accidents.

1. Turn off all electrical equipment and start button
2. Remove the left fender flap assembly
3. Remove the left A-column outer trim panel assembly

① Remove 2 fixing bolts (arrows) of the A-column outer trim panel assembly.



② Use the interior trim pry to remove the fixing clip of the A-column outer trim panel assembly.

③ Remove the left A-column outer trim panel assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installation, check whether there is any abnormity in matching with the surrounding parts, and whether there is local gap or poor surface difference.

15.2.7 Fender flap assembly

Removal

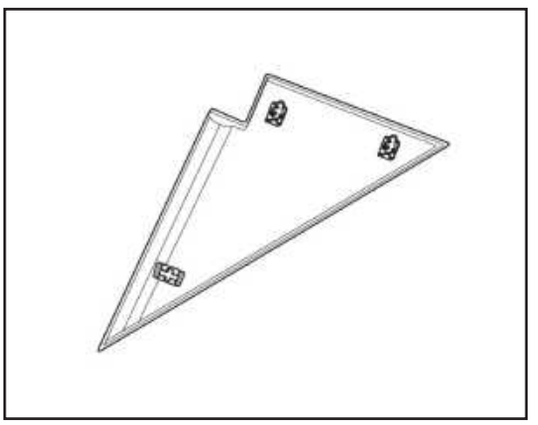
Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

Caution:
※ When removing the fender flap assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the fender flap assembly, avoid scratching the body paint.

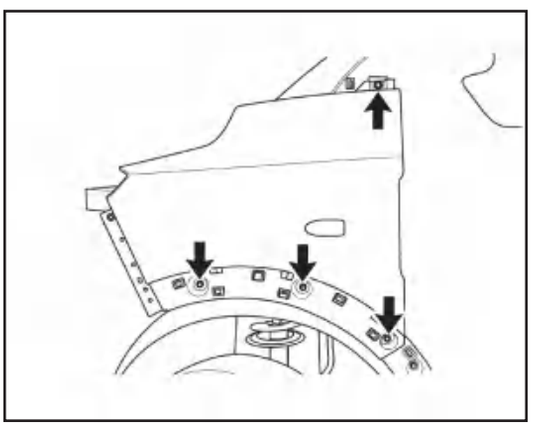
1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the left front wheel assembly
4. Remove the left front wheel eyebrow assembly
5. Remove the front bumper assembly

6. Remove the headlamp assembly
7. Remove the front windshield lower trim panel assembly
8. Remove the left fender flap assembly

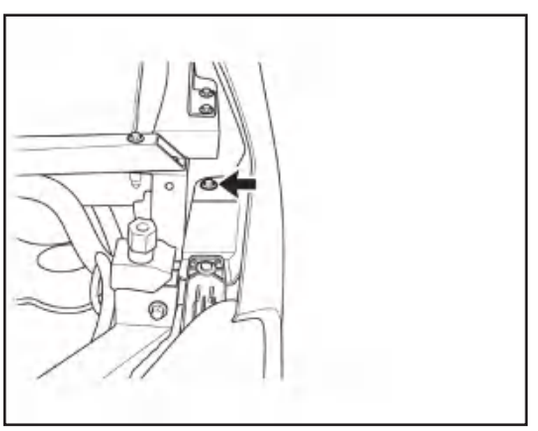
① Remove the left front triangle block assembly.

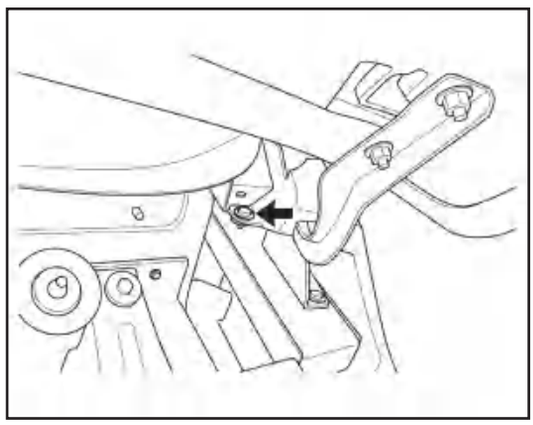


② Remove 4 fixing bolts (arrows) (arrows) connecting the fender flap assembly and the body.

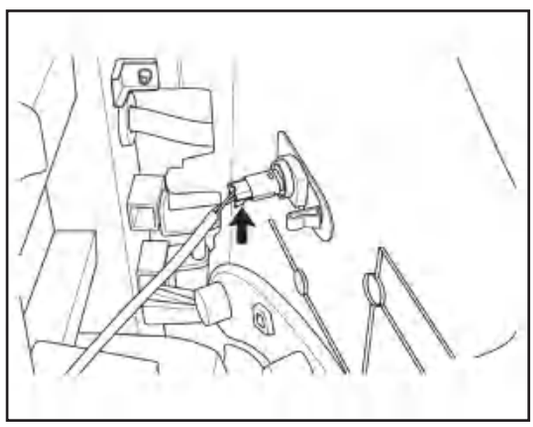


③ Remove 2 fixing bolts (arrows) (arrows) connecting the upper fender flap assembly and the body.





④ Disconnect the left front turn signal lamp connector (arrow).



⑤ Remove the left fender flap assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the front fender flap, be sure to wear labor protection articles to avoid accidents. ※ When installing the front fender flap, ensure that the front fender flap is installed correctly and the assembly clearance with the body is appropriate.

15.2.8 Hinge masking strip assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

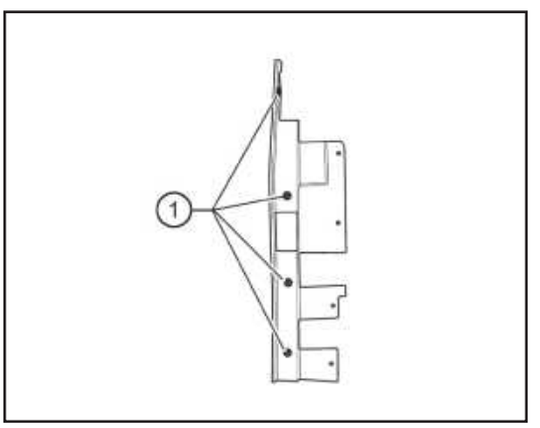
Caution:
※ When removing the hinge masking strip assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the hinge masking strip assembly, avoid scratching the body paint.

1. Remove the hinge masking strip assembly

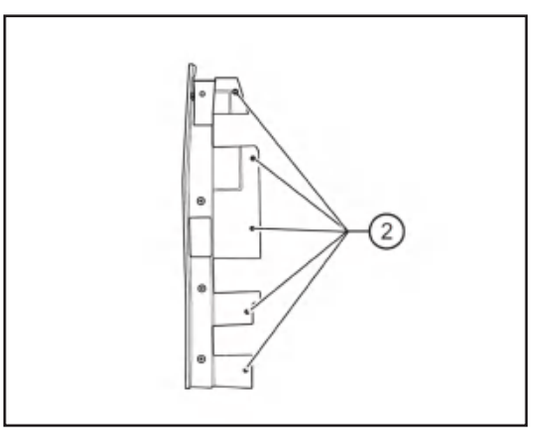
① Open the left front door and remove 4 fixing screws (1) of the left hinge masking strip assembly.

Tightening torque :

1.5 ± 0.5 N•m (1.1±0.4 ft-lbs.)



② Remove 5 fixing clips (2) of the left hinge masking strip assembly.



③ Remove the hinge masking strip assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

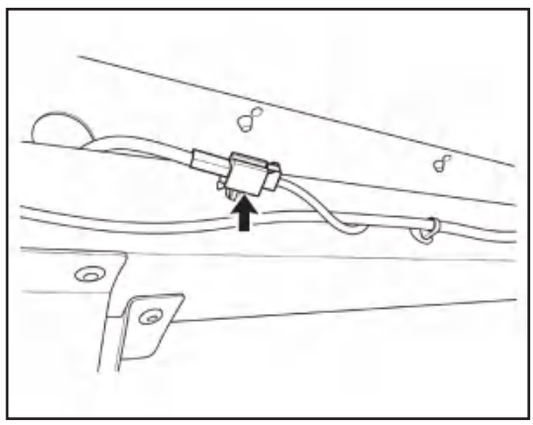
15.2.9 Rear spoiler assembly

Removal

Caution:
※ When removing the rear spoiler assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the rear spoiler assembly, avoid scratching the body.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the rear spoiler assembly

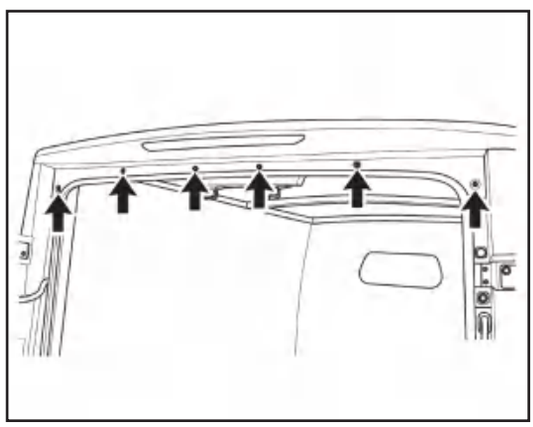
① Disconnect the harness connector (arrow) on the high brake lamp.



② Remove 6 fixing bolts (arrows) of the rear spoiler assembly.

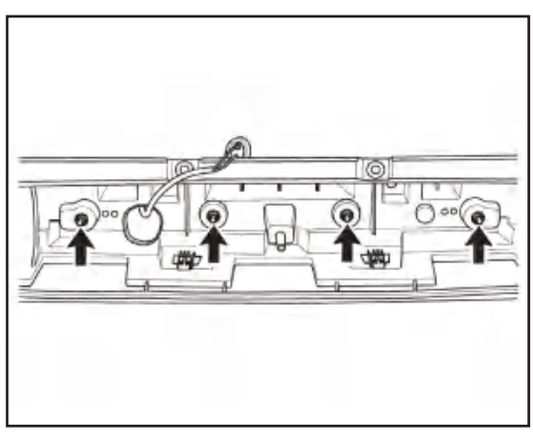
Tightening torque:

7 ± 1 N•m (5.2±0.7 ft-lbs.)



③ Pry off 6 fixing clips of the rear spoiler assembly and remove the rear spoiler assembly.

④ Remove 4 fixing nuts of the high brake lamp and the rear spoiler, and remove the high brake lamp.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the rear spoiler assembly, be sure to wear labor protection articles to avoid accidents. ※ After installation, check whether the spoiler matches with the surrounding parts and whether there is any abnormality and looseness.

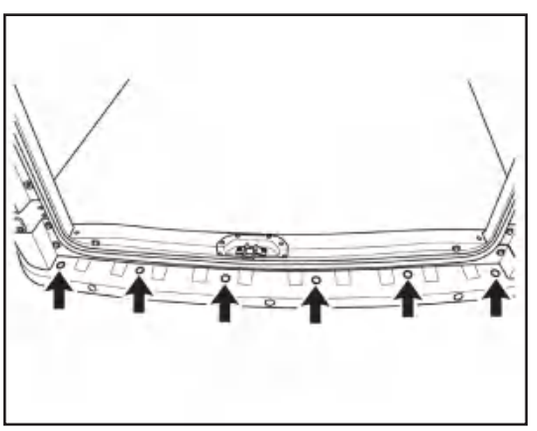
15.2.10 Rear bumper assembly

Removal

Caution:
※ When removing the rear bumper assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the rear bumper assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing the rear bumper assembly, avoid scratching the body.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the rear wheel eyebrow assembly
4. Remove the rear bumper assembly

   ① Remove 6 fixing snap fasteners (arrows) above the rear bumper assembly.

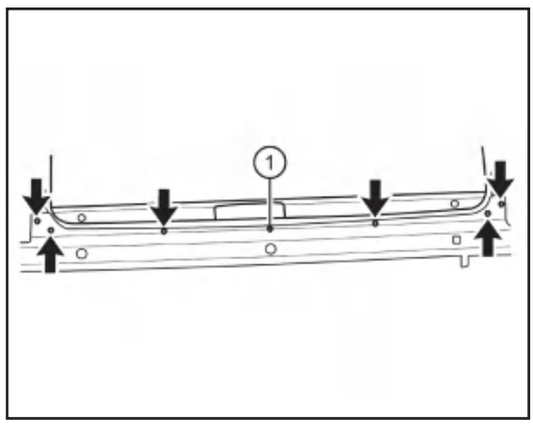


② Remove 1 fixing screw (1) and 6 fixing bolts (arrows) above the rear bumper assembly.

Tightening torque:

1.5 ± 0.5 N•m (1.1±0.4 ft-lbs.)

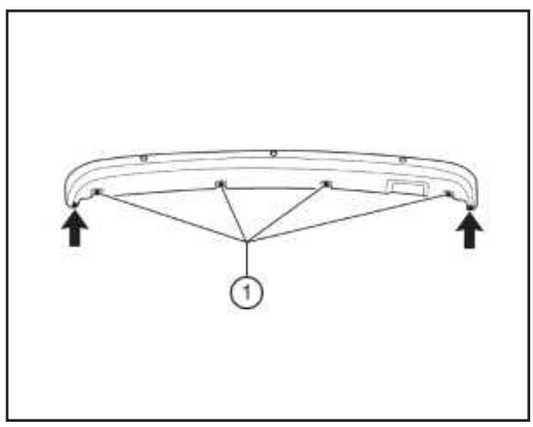
5 ± 1 N•m (3.7±0.7 ft-lbs.)



③ Remove 4 fixing bolts (1) and 2 fixing clips (arrows) below the rear bumper assembly.

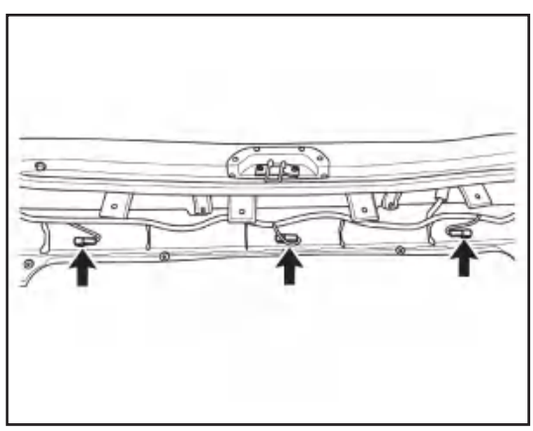
Tightening torque :

5 ± 1 N•m (3.7±0.7 ft-lbs.)



④ Separate the rear bumper from the body.

⑤ Disconnect 3 reversing radar probes from the rear bumper assembly (arrows).



⑥ Remove the rear bumper assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

① Grasp both sides of the rear bumper assembly, align the rear bumper mounting bracket, and check whether it is clamped in place.

Caution:
※ If there are screws or bolts loose, slippery, broken, and bumper cracks during installation, it needs to be removed and reinstalled. ※ After installation, check the difference and clearance between the rear bumper and the side skirt. If it does not meet the DTS requirements (clearance: 2 ± 1.0, surface difference: - 0.7 ± 0.7, bumper low), it needs to be removed and reassembled after inspection. If it still cannot be installed in place, it needs to be repaired offline.

15.2.11 Rear bumper mounting bracket

Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

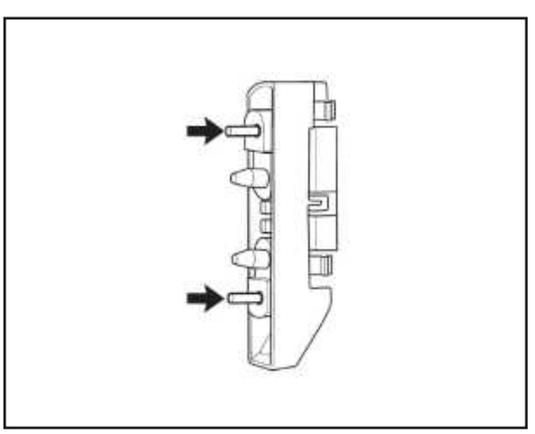
Caution:
※ When removing the rear bumper mounting bracket, be sure to wear labor protection articles to avoid accidents. ※ When removing the rear bumper mounting bracket, avoid scratching the body.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the rear bumper assembly
4. Remove the rear bumper left mounting bracket

① Remove 2 fixing bolts (arrows) of the left mounting bracket of the rear bumper.

Tightening torque:

5 ± 1 N•m (3.7±0.7 ft-lbs.)



② Remove the rear bumper left mounting bracket.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the rear bumper mounting bracket, be sure to wear labor protection articles to avoid accidents.
※ When installing the rear bumper mounting bracket, avoid scratching the body.

15.2.12 Side skirt guard assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

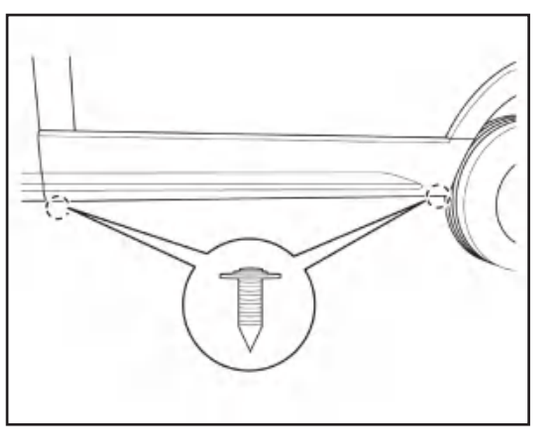
Caution:
※ When removing the side skirt guard assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the side skirt guard assembly, avoid scratching the body paint.

1. Remove the left side skirt guard assembly

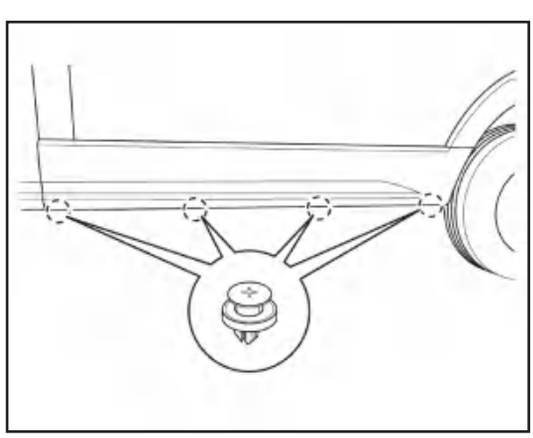
① Remove 2 fixing bolts of the left side skirt guard assembly.

Tightening torque :

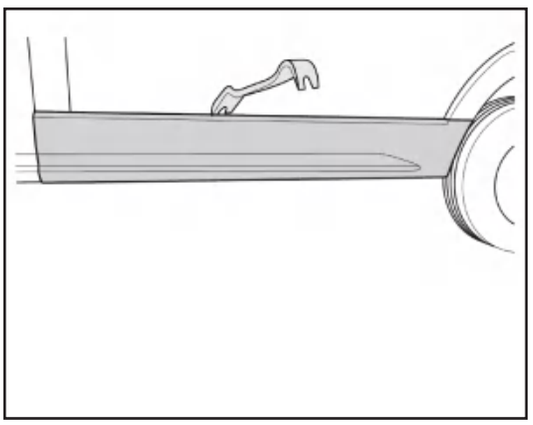
1.5 ± 0.5 N•m (1.1±0.4 ft-lbs.)



② Remove 4 snap fasteners of the left side skirt guard assembly.



③ Use the interior trim pry to pry off the fixing clip on the side skirt guard assembly.



④ Remove the side skirt guard assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After the installation, carefully check whether the plastic clips are all clamped in place.
※ After installation, check whether the rear door trim panel matches the surrounding parts and if there is any abnormity and local gap or poor surface difference.

15.2.13 Front door trim panel assembly

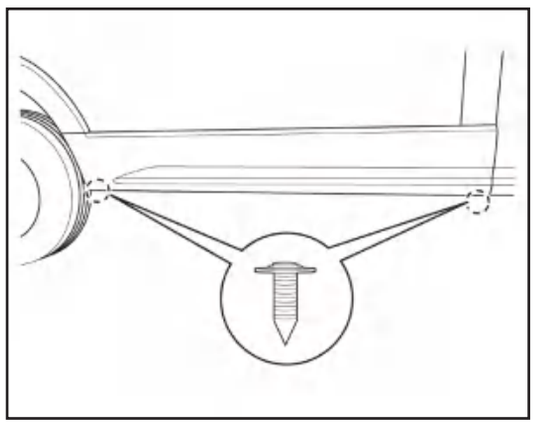
Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

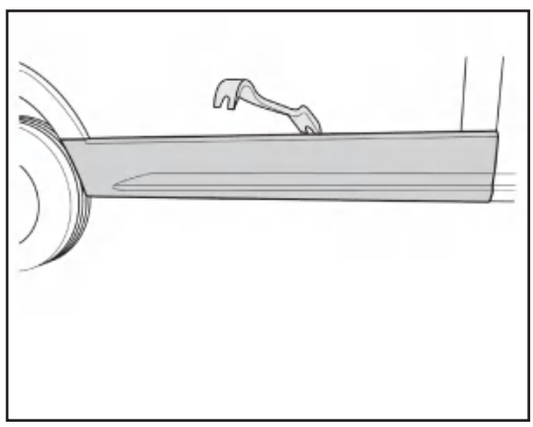
Caution:
※ When removing front door trim panel assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the front door trim panel assembly, avoid scratching the body paint.

1. Remove the left front wheel eyebrow guard
2. Remove the front door trim panel assembly

① Remove 2 fixing screws of the front door trim panel assembly.



② Use the interior trim pry to pry off the fixing clip on the front door trim panel assembly.



③ Remove the front door trim panel assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After the installation, carefully check whether the plastic clips are all clamped in place. ※ After installation, check whether the front door trim panel assembly matches with the surrounding parts and whether there is any abnormality.

15.2.14 Rear wheel eyebrow trim panel assembly

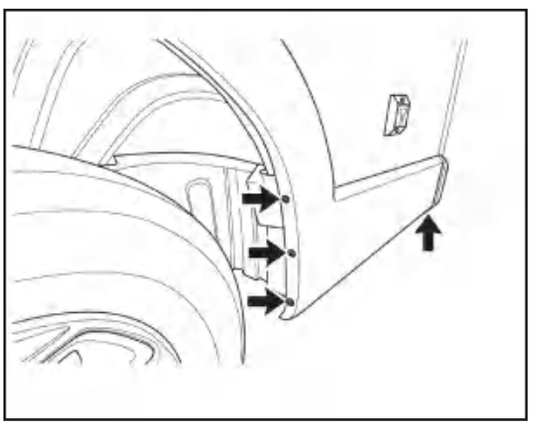
Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

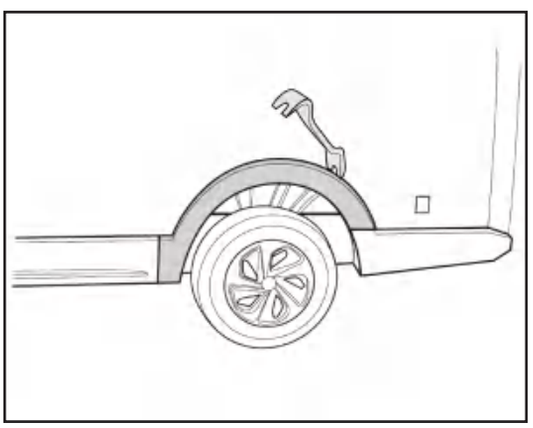
Caution:
※ When removing the rear wheel eyebrow trim panel assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the rear wheel eyebrow trim panel assembly, avoid scratching the body paint.

1. Remove the left rear wheel eyebrow trim panel assembly

① Remove 4 fixing screws (arrows) of the left rear wheel eyebrow trim panel assembly.



② Use the interior trim pry to pry off the fixing clip on the left rear wheel eyebrow trim panel assembly.



③ Remove the left rear wheel eyebrow trim panel assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After the installation, carefully check whether the plastic clips are all clamped in place. ※ After installation, check whether the rear wheel eyebrow trim panel matches with the surrounding parts and whether there is any abnormality.

15.2.15 Rear wheel cover guard assembly

Removal

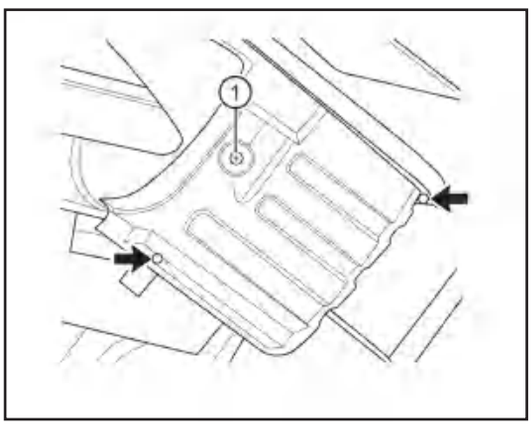
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

Caution:
※ When removing the left rear wheel cover guard assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the left rear wheel cover guard assembly, avoid scratching the body paint.

1. Remove the left rear wheel cover guard assembly

   ① Remove 2 fixing bolts (arrows) of the left rear wheel cover guard assembly.

   ② Remove one fixing snap fastener (1) of the left rear wheel cover guard assembly.



   ③ Remove the left rear wheel cover guard assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the left rear wheel cover guard, be sure to wear labor protection articles to avoid accidents.
※ When installing the left rear wheel cover guard, avoid scratching the body paint.

15.2.16 Exterior rearview mirror assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

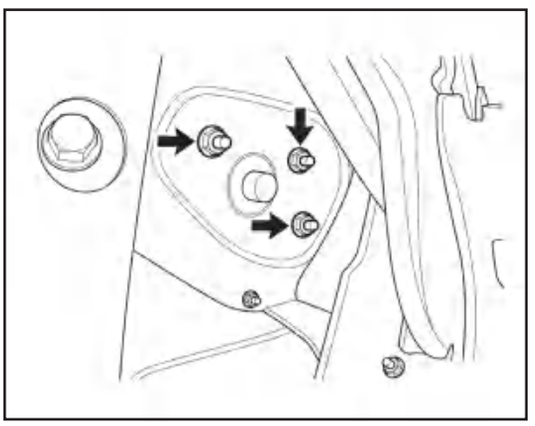
Caution:
※ When removing the exterior rearview mirror assembly, be sure to wear labor protection articles to avoid accidents.

1. Turn off all electrical equipment and start button
2. Remove the left front door interior trim guard assembly
3. Remove the left exterior rearview mirror assembly

① Remove 3 fixing nuts (arrows) of the left exterior rearview mirror assembly.

Tightening torque:

7 ± 1 N•m (5.2±0.7 ft-lbs.)



② Remove the left exterior rearview mirror assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the exterior rearview mirror assembly, always tighten the fixing nuts to the specified torque.

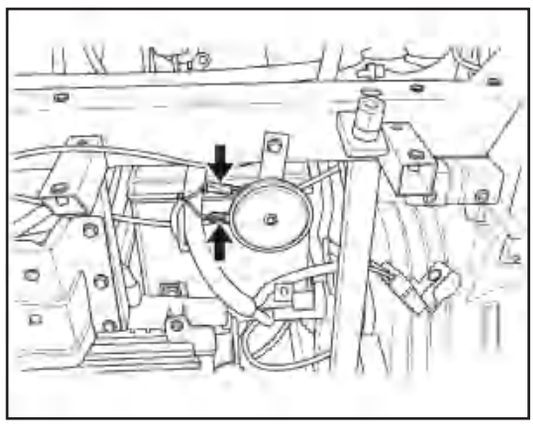
15.2.17 Horn

Removal

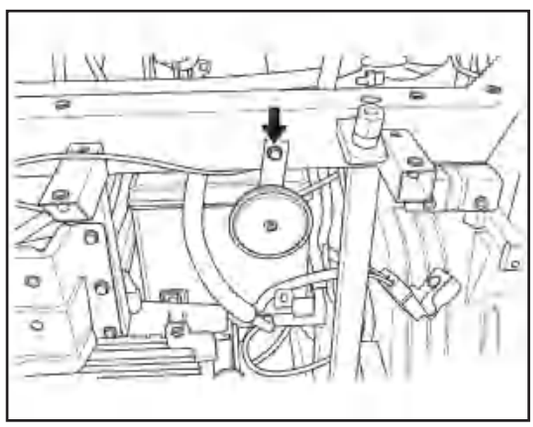
1. Turn the start button to OFF
2. Disconnect the negative battery cable
3. Remove the front bumper connecting plate assembly

4. Remove the horn

① Disconnect the horn harness connector (arrows).



② Remove 1 fixing bolt (arrow) of the horn bracket and remove the horn.



Inspection

1. Check the horn

① Apply battery voltage to the horn and check the operation of the horn.

Measurement conditions	Condition	Specified state
Battery positive(+) - terminal 1 Battery negative(–) - terminal 2	Always	Horn blowing

Tips:
※ If the result is not as specified, replace the horn.

2. Check the harness

① Use a digital multimeter to check the horn system harness for open circuit, short circuit or ground fault. Replace it if necessary.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Always tighten the bolts to the specified torque. ※ Install the connectors in place.

15.2.18 Front cabin cover assembly

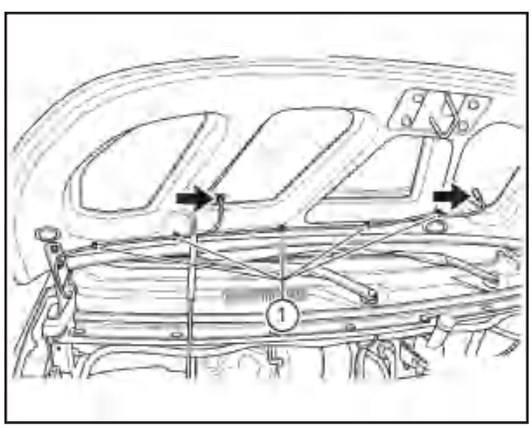
Removal

Caution:
※ When removing the front cabin cover assembly, be sure to wear labor protection articles to avoid accidents.

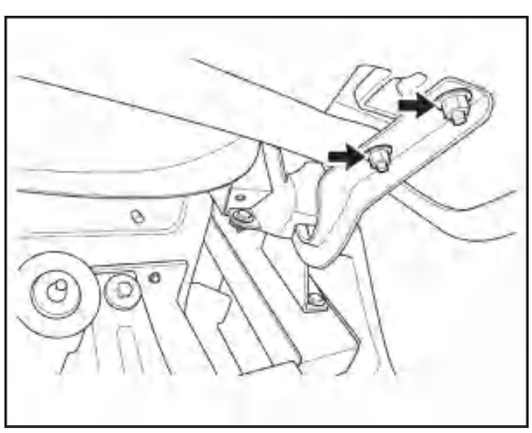
1. Remove the front cabin cover assembly

① Disconnect the connection between the washing pipeline and the front wiper nozzle (arrow).

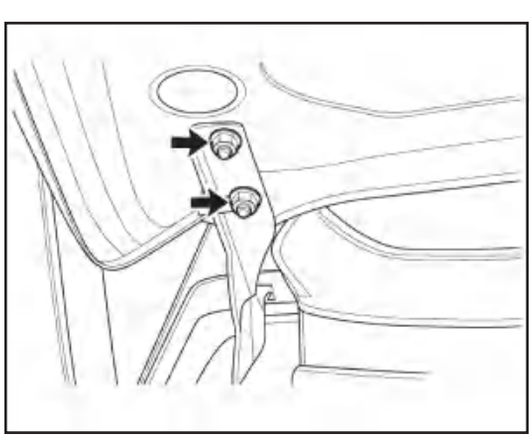
② Disconnect 5 fixing clips (1) between the washing pipeline and the front cabin cover assembly.



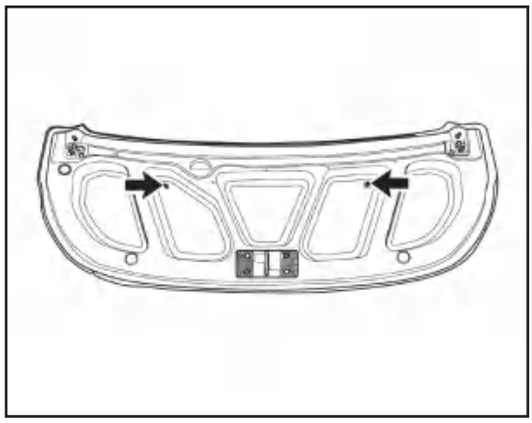
③ Remove 2 fixing nuts (arrows) between the front cabin cover assembly and the left hinge.



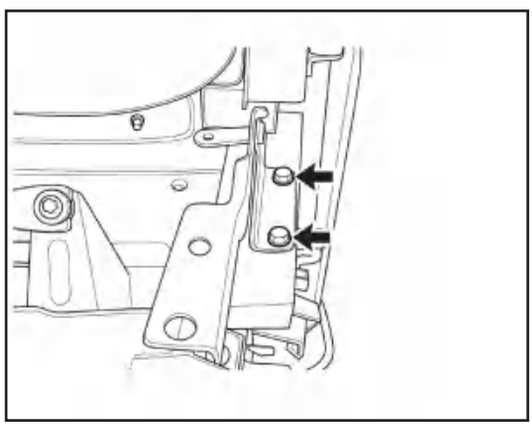
④ Remove 2 fixing nuts (arrows) between the front cabin cover assembly and the right hinge.



⑤ Carefully remove the front cabin cover assembly and remove 2 front wiper nozzles (arrows) from the cabin cover assembly.



⑥ Remove 2 fixing bolts (arrows) between the hinge assembly and the body. The removal method for the right side is the same as that for the left side.



⑦ Remove the hinge assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installing the front cabin cover assembly, check whether the fixing bolts are assembled in place.
※ After installing the front cabin cover assembly, check whether the clearance and alignment between the installation position and each part are within the specified range, and adjust it if necessary.

Interior trim system

16.1 General

16.1.1 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Fixing screw of B-column upper guard assembly	1.5± 0.5	1.1±0.4
Fixing screw of sun visor assembly	3± 1	2.2±0.7
Fixing screw of interior front ceiling lamp assembly	2±0.5	1.5±0.4
Fixing screw of auxiliary dashboard	1.5± 0.5	1.1±0.4
Fixing bolt of auxiliary dashboard	5± 1	3.7±0.7
Fixing bolt of dashboard	5± 1	3.7±0.7
Fixing screw of dashboard	1.5± 0.5	1.1±0.4
Fixing bolt of instrument beam	5± 1	3.7±0.7
Fixing bolt of front seat	50±5	36.9±3.7

16.1.2 Tools

Special tools

Name of special tools	Picture of special tools
Interior trim pry	

16.2 On-board maintenance

16.2.1 Front door sill pressing plate assembly

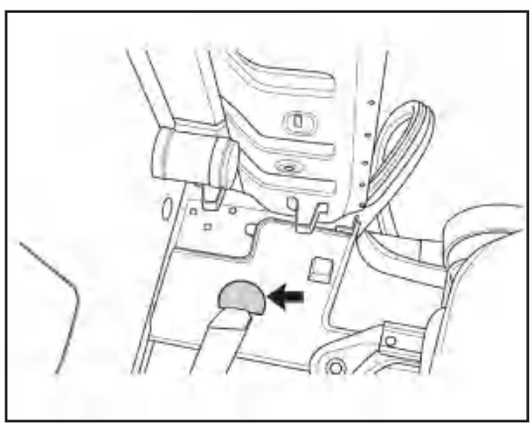
Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

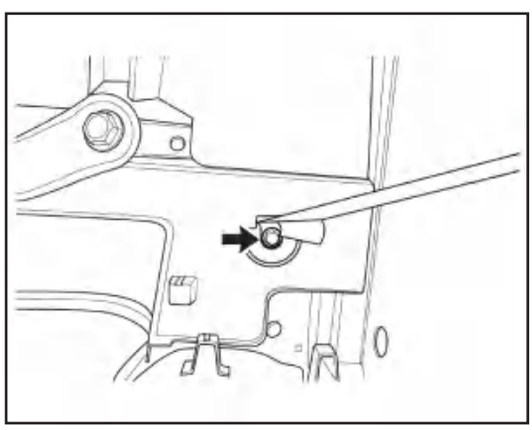
Caution:
※ When removing the left front door sill pressing plate assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the left front door sill pressing plate assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing the left front door sill pressing plate assembly, avoid scratching the interior trim.

1. Remove the left front door opening sealing strip
2. Remove A-column lower guard assembly
3. Remove B-column lower guard assembly
4. Remove the left front door sill pressing plate assembly

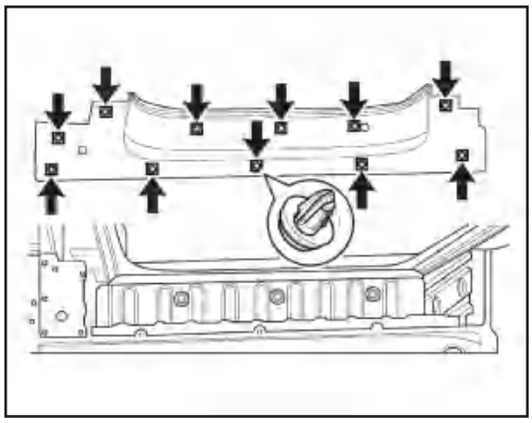
① Use the interior trim pry to pry off the front door sill plug (arrow).



② Remove 1 fixing bolt (arrow) of the safety belt and move the safety belt to the proper position.



③ Use the interior trim pry to pry off 11 fixing clips of the left front door sill pressing plate assembly.



④ Remove the left front door sill pressing plate assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the front door sill pressing plate assembly, replace the damaged clip and install the front door sill pressing plate assembly in place.
※ After installing the front door sill pressing plate assembly, install the front door sill pressing plate assembly in place with B-column lower guard assembly and A-column lower guard assembly.

16.2.2 Front door opening sealing strip

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the right side.

Caution:
※ When removing front door opening sealing strip, be sure to wear labor protection articles to avoid accidents.
※ When removing the front door opening sealing strip, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the front door opening sealing strip, avoid damaging it.

1. Remove the right front door opening sealing strip

① Remove the right front door opening sealing strip (1) by gently pulling around from one corner of the front door opening sealing strip.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the front door opening sealing strip, the front door opening sealing strip should have a certain clamping force in conjunction with the vehicle body and should not fall off easily. ※ When installing the front door opening sealing strip, use a rubber hammer to knock it evenly around to make it installed in place. The surface after installation should be free of any defects, such as hammering marks, deformation, warpage, etc. ※ After installing the front door opening sealing strip, it is not allowed to disassemble it at will unless necessary to avoid reducing the installation retention of the front door opening sealing strip.

16.2.3 A-column upper guard assembly

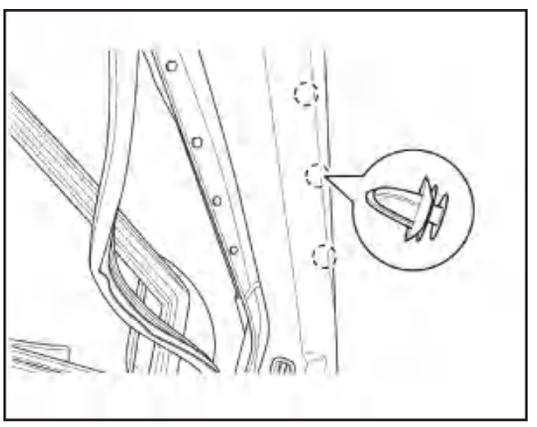
Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

Caution:
※ When removing A-column upper guard assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing A-column upper guard assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing A-column upper guard assembly, avoid scratching the interior trim.

1. Remove the left front door opening sealing strip
2. Remove the left A-column upper guard assembly (remove the passenger armrest first when removing the right side)

① Remove 3 fixing clips of the left A-column upper guard assembly with the interior trim pry.

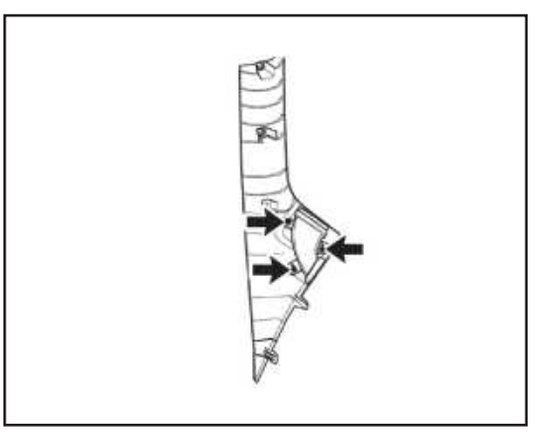


② Remove the left A-column upper guard assembly.

③ Remove 3 fixing screws (arrows) of the air outlet and take down the air outlet.

Tightening torque :

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing A-column upper guard assembly, replace the damaged clip and install A-column upper guard assembly in place. ※ After installing A-column upper guard assembly, make sure that A-column upper guard assembly is tightly installed with the front door opening sealing strip.

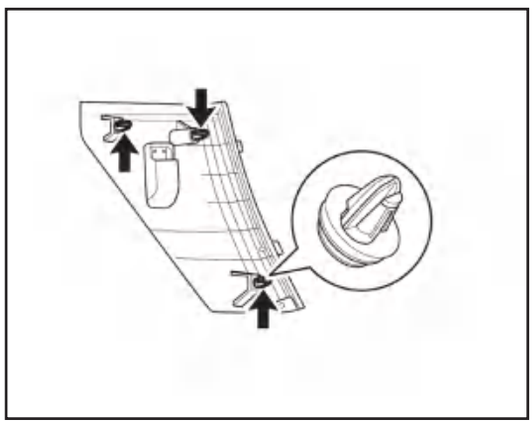
16.2.4 A-column lower guard assembly

Removal

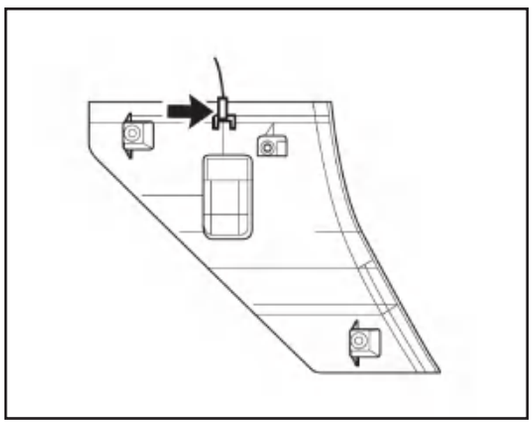
Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

Caution:
※ When removing A-column lower guard assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing A-column lower guard assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing A-column lower guard assembly, avoid scratching the interior trim.

1. Remove the left front door opening sealing strip
2. Remove the left A-column lower guard assembly
   ① Use the interior trim pry to pry off 3 fixing clips of A-column lower guard assembly.



② Disconnect the opening cable of the charging port cover from A-column lower guard assembly (arrow).



③ Remove the left A-column lower guard assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing A-column lower guard assembly, be sure to install the opening cable of the charging port cover in place. ※ When installing A-column lower guard assembly, replace the damaged clip and install A-column lower guard assembly in place. ※ After installing A-column lower guard assembly, make sure that A-column lower guard assembly is tightly installed with the front door opening sealing strip.

16.2.5 B-column lower guard assembly

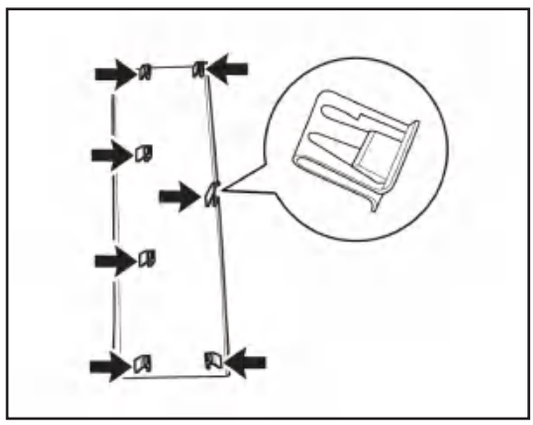
Removal

Tips:
※ The operation process on the right side is the same as that on the left side. ※ The following is the operation process on the left side.

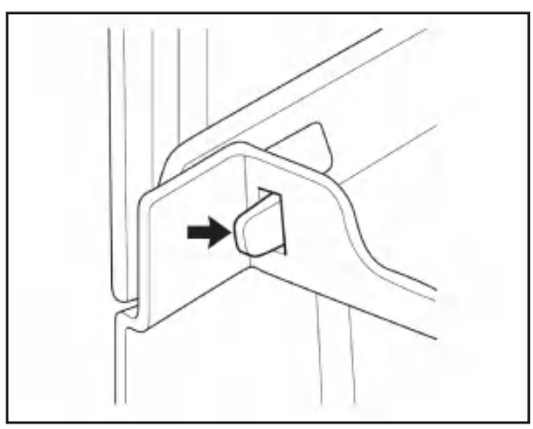
Caution:
※ When removing B-column lower guard assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing B-column lower guard assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing B-column lower guard assembly, avoid scratching the interior trim and body paint.

1. Remove the left front door opening sealing strip
2. Remove the left B-column lower guard assembly

① Pry off 7 spring clips (arrows) of B-column lower guard assembly with the interior trim pry.



② Disconnect the clamping part (arrow) between B-column lower guard assembly and the door sill pressing plate assembly.



③ Remove B-column lower guard assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing B-column lower guard assembly, replace the damaged clip and install B-column lower guard assembly in place.
※ After installing B-column lower guard assembly, make sure that B-column lower guard assembly is tightly installed with the front door opening sealing strip.
※ After installing B-column lower guard assembly, make sure that B-column lower guard assembly is tightly clamped with the front door sill pressing plate assembly.

16.2.6 B-column upper guard assembly

Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

Caution:
※ When removing B-column upper guard assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing B-column upper guard assembly, avoid scratching the interior trim.

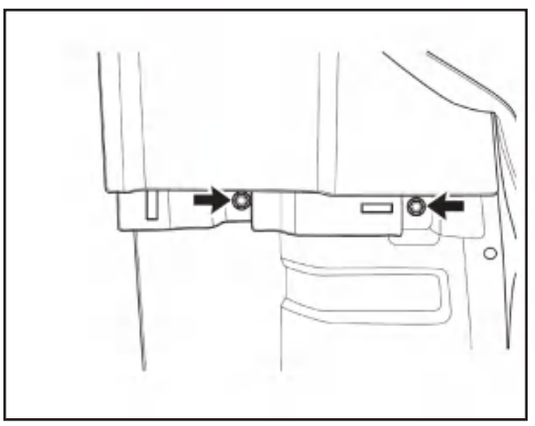
1. Remove the left front door opening sealing strip
2. Remove the left B-column lower guard assembly
3. Remove the left B-column upper guard assembly

① Open the safety belt plug and remove 1 fixing bolt of the safety belt.

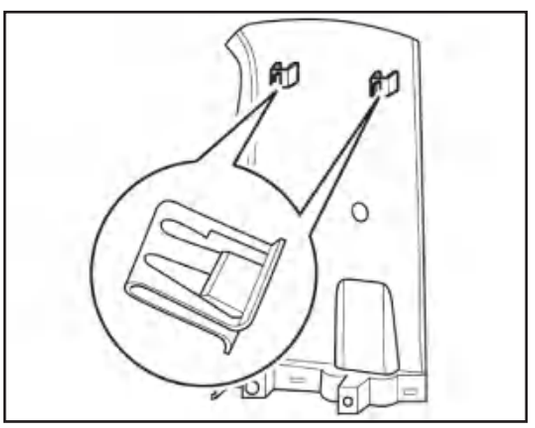
② Remove 2 fixing screws (arrows) under B-column upper guard assembly.

Tightening torque:

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



③ Use the interior trim pry to pry off 2 spring clips above B-column upper guard assembly.



④ Remove B-column upper guard assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installing B-column upper guard assembly, make sure that B-column upper guard assembly is tightly installed with the front door opening sealing strip.

16.2.7 Sun visor assembly

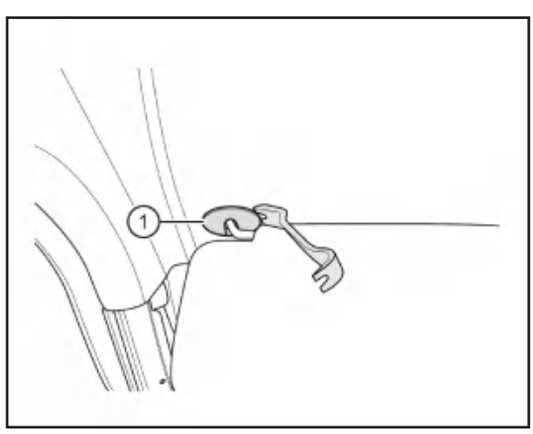
Removal

Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

Caution:
※ When removing sun visor assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the sun visor assembly, avoid damaging the body interior trim and ceiling.

1. Remove the left sun visor assembly

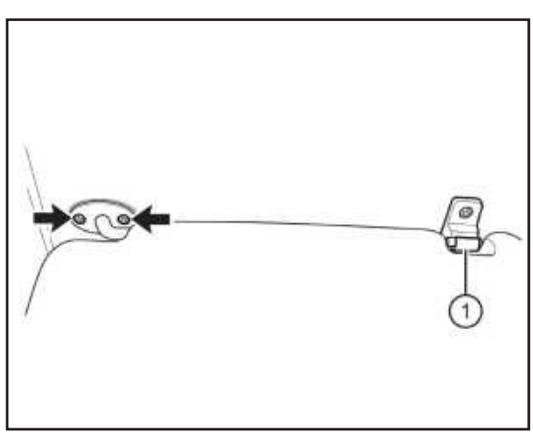
① Pry off the trim cover (1) of the sun visor holder with the interior trim pry.



② Disconnect the sun visor assembly from the holder (1); remove 2 fixing screws (arrows) on the left front sun visor with a cross screwdriver.

Tightening torque:

3 ± 1 N·m (2.2±0.7 ft-lbs.)



③ Remove the left sun visor assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

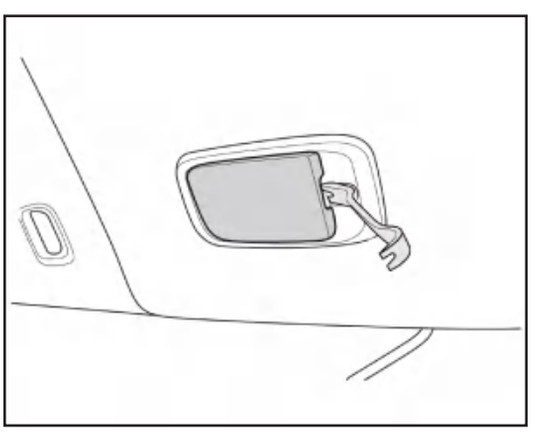
16.2.8 Ceiling assembly

Removal

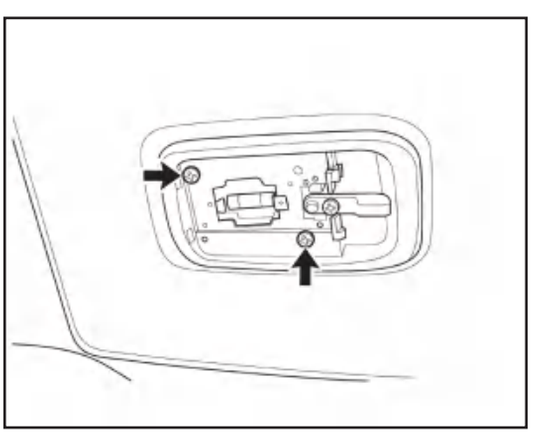
Caution:
※ When removing the ceiling assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the ceiling assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the ceiling assembly, avoid damaging the interior trim and body paint.

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

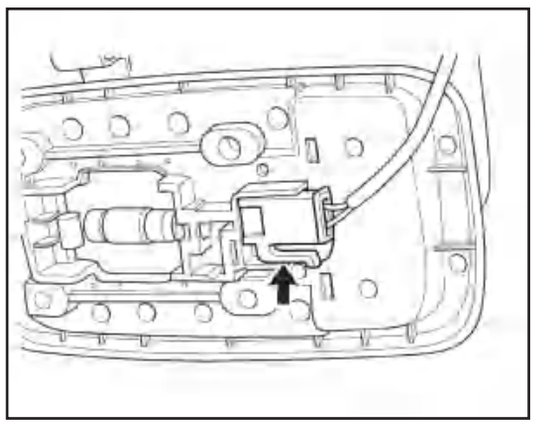
① Use the interior trim pry to pry off the front interior ceiling lamp cover.



② Remove 2 fixing screws (arrows) of the front interior ceiling lamp assembly.

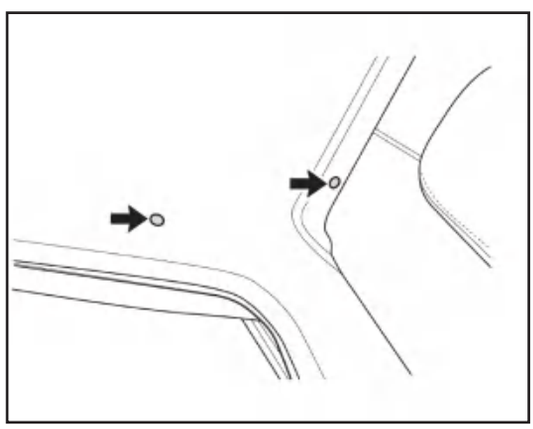


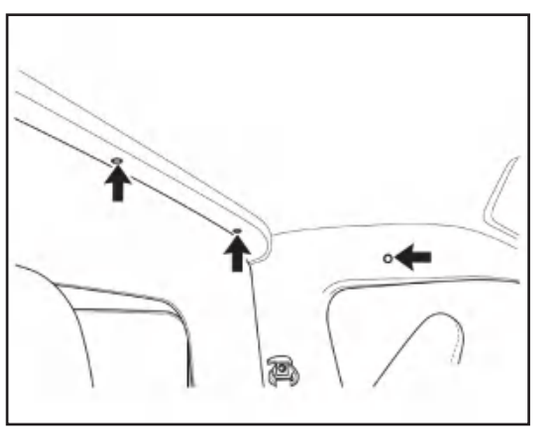
③ Disconnect the front interior ceiling lamp connector (arrow) and remove the front interior ceiling lamp assembly.



4. Remove the sun visor assembly
5. Remove the sun visor holder
6. Remove the passenger armrest assembly
7. Remove the front door opening sealing strip
8. Remove A-column upper guard assembly
9. Remove B-column lower guard assembly
10. Remove B-column upper guard assembly
11. Remove the ceiling assembly

① Remove 5 fixing clips (arrows) of the ceiling assembly.





② Remove the ceiling assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing ceiling assembly, replace the damaged clip and install ceiling assembly in place. ※ After installing the ceiling assembly, make sure that the ceiling assembly and the upper guard of the column are tightly installed. ※ After installing the ceiling assembly, make sure that the ceiling assembly and the door opening sealing strip are tightly installed.

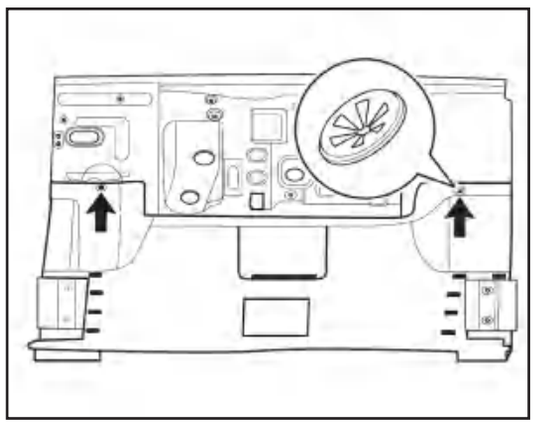
16.2.9 Front floor carpet assembly

Removal

Caution:
※ When removing the front floor carpet assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the front floor carpet assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing the front floor carpet assembly, avoid damaging the interior trim.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the auxiliary dashboard assembly
4. Remove the gear shift mechanism assembly
5. Remove the front seat assembly
6. Remove the front seat mounting bracket
7. Remove the front door opening sealing strip
8. Remove the front door sill pressing plate assembly
9. Remove A-column lower guard assembly
10. Remove B-column lower guard assembly
11. Remove the front floor carpet assembly

① Remove 2 clamping gaskets (arrows) in front of the front floor carpet assembly.



② Remove the front floor carpet assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After the installation of the front floor carpet assembly, confirm whether the carpet matches other systems smoothly without bulges, missing sheet metal and other defects, whether the auxiliary dashboard and door sill position fit the body, whether the seat mounting hole matches the body mounting hole, and whether the foot air outlet leaks. If necessary, remove the relevant parts and adjust the carpet in place.

16.2.10 Front baffle inner acoustic pad

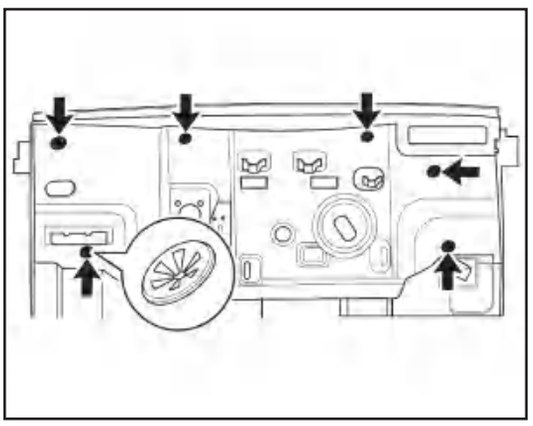
Removal

Caution:
※ When removing the front baffle inner acoustic pad, be sure to wear labor protection articles to avoid accidents. ※ When removing the front baffle inner acoustic pad, pay attention to apply the appropriate strength and be careful when operating.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the dashboard assembly
4. Remove the instrument beam assembly
5. Remove the HVAC assembly
6. Remove the electronic accelerator pedal

7. Remove the brake pedal bracket and vacuum booster assembly
8. Remove the steering column assembly
9. Remove B-column lower guard assembly
10. Remove the front baffle inner acoustic pad

① Remove 6 clamping gaskets (arrows) of the front baffle inner acoustic pad.



② Remove the front baffle inner acoustic pad.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When assembling the front baffle inner acoustic pad, it should be consistent with the gap between the front wall and the side wall of the body, and it should not affect the installation of the dashboard, wiring harness, etc. ※ After assembling the front baffle inner acoustic pad, it should be fitted with the body sheet metal without wrinkles, and the hole position should be aligned with its mating parts as far as possible.

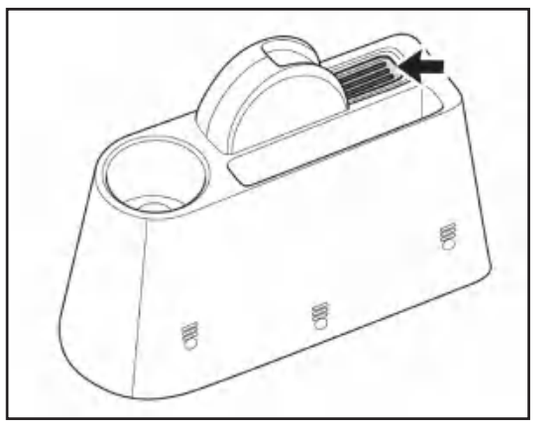
16.2.11 Auxiliary dashboard assembly

Removal

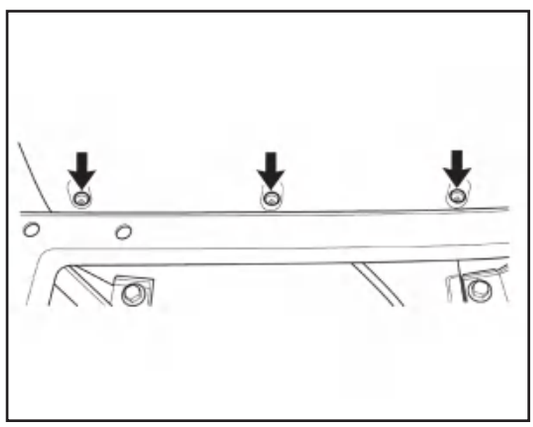
Warning:
※ When removing the auxiliary dashboard assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the auxiliary dashboard assembly, pay attention to apply the appropriate strength and be careful when operating.

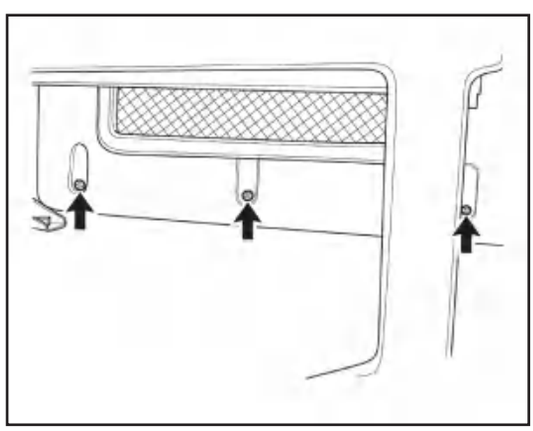
1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the auxiliary dashboard assembly

① Remove the hand brake cover plate (arrow) from the auxiliary dashboard assembly.



② Remove 6 fixing screws (arrows) on the left and right sides of the auxiliary dashboard assembly.



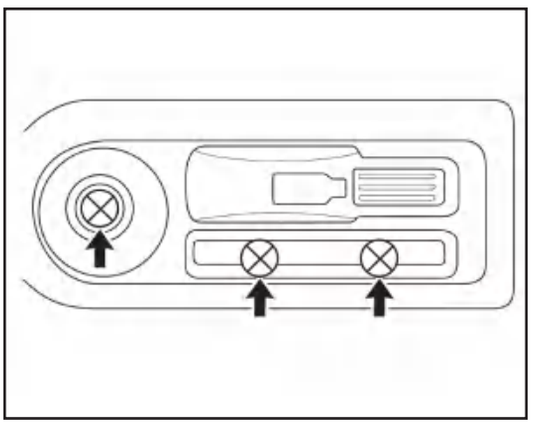


③ Take out the cup holder rubber pad and the storage box rubber pad.

④ Remove 3 fixing bolts (arrows) above the auxiliary dashboard assembly.

Tightening torque:

5 ± 1 N•m (3.7±0.7 ft-lbs.)



⑤ Remove the auxiliary dashboard assembly.

Installation

1. The reassembly sequence is the reverse of the disassembly sequence.

Caution:
※ Check whether the bolts fit the vehicle body, whether the fasteners are free of slippage or looseness, and whether the hand brake movement interferes, otherwise it is necessary to adjust the installation.

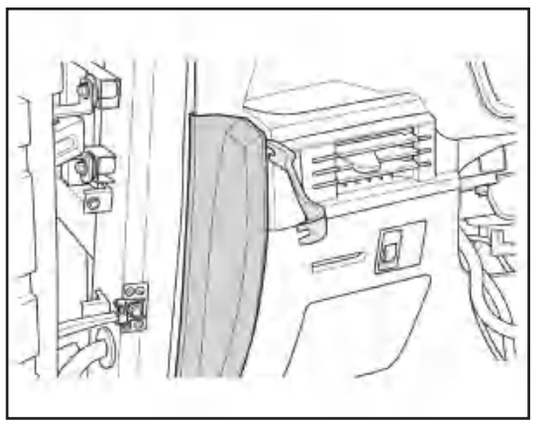
16.2.12 Dashboard assembly

Removal

Warning:
※ When removing the dashboard assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the dashboard assembly, avoid scratching the interior trim.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the front door opening sealing strip
4. Remove A-column upper guard assembly
5. Remove A-column lower guard assembly
6. Remove the dashboard end cover (take the left side as an example)

① Use the interior trim pry to pry off the clip on the left end cover assembly of the dashboard and remove the left end cover assembly of the dashboard.

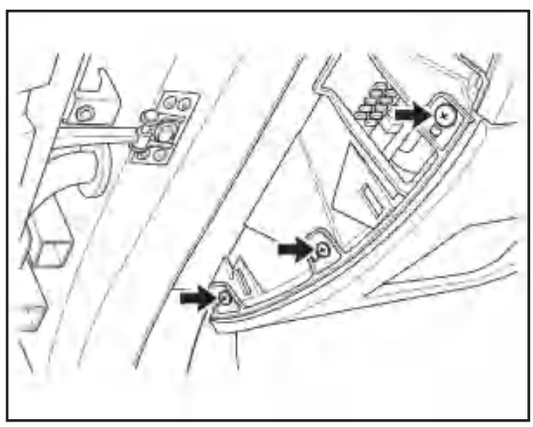


7. Remove the left lower guard assembly of the dashboard

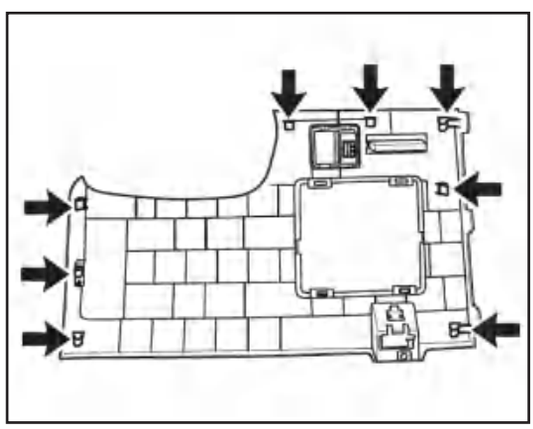
① Remove 3 fixing screws (arrows) of the left lower guard assembly of the dashboard.

Tightening torque :

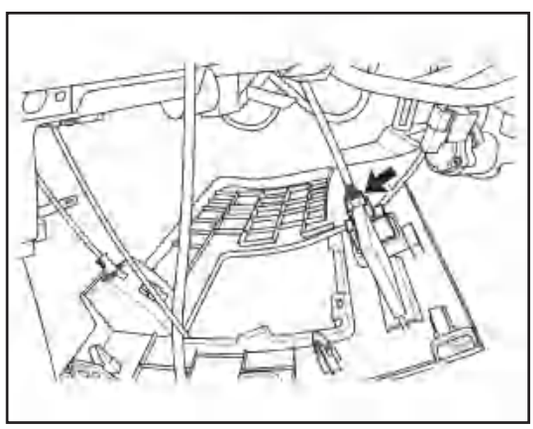
1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



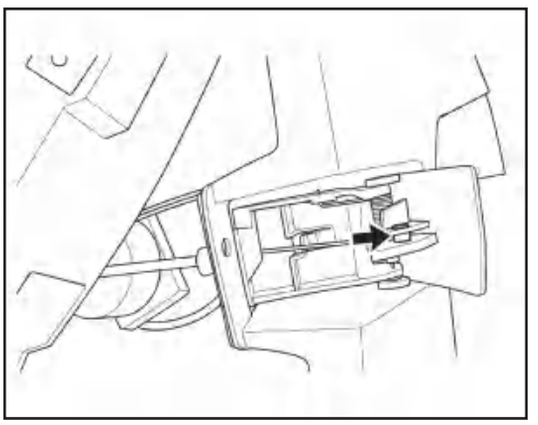
② Use the interior trim pry to pry off 8 fixing clips (arrows) of the left lower guard assembly of the dashboard.



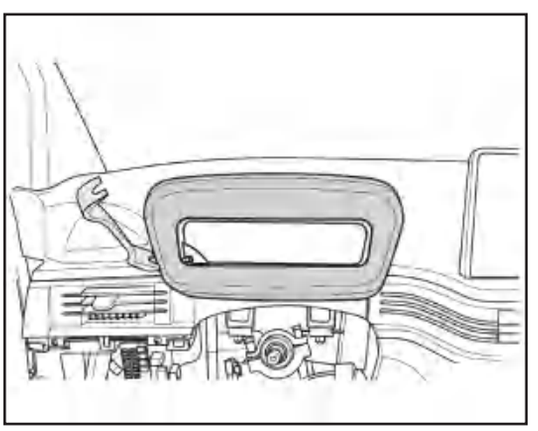
③ Disconnect the headlamp adjustment switch connector.



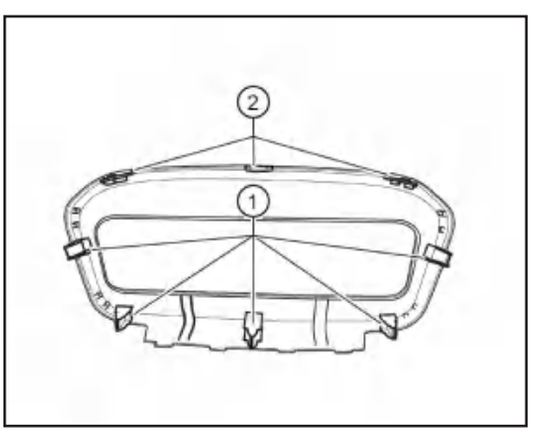
④ Disconnect the front cabin cover opening cable (arrow) and remove the left lower guard assembly of the dashboard.



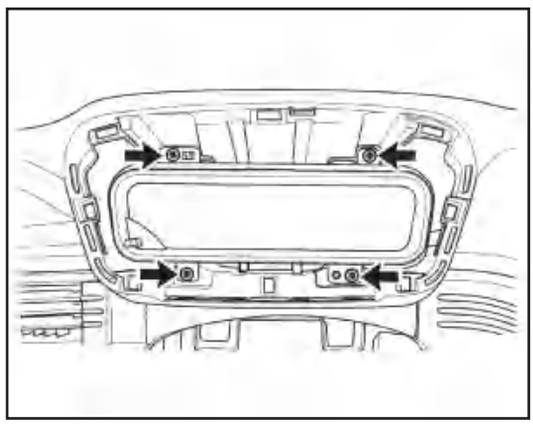
8. Remove the horn cover assembly
9. Remove the upper and lower shields of the steering column
10. Remove the steering wheel assembly
11. Remove the spiral cable
12. Remove the combination switch assembly
13. Remove the combination instrument assembly



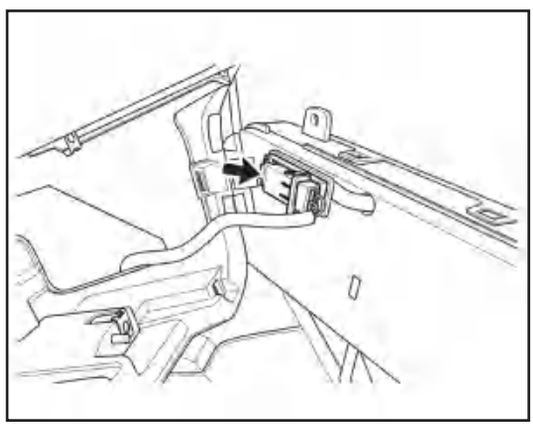
① Use the interior trim pry to pry off 5 fixing clips (1) and 3 unilateral clips (2) of the combination instrument cover.



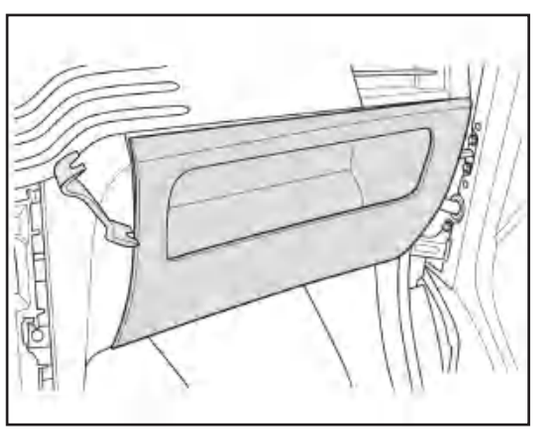
② Remove 4 fixing screws (arrows) of the combination instrument assembly.



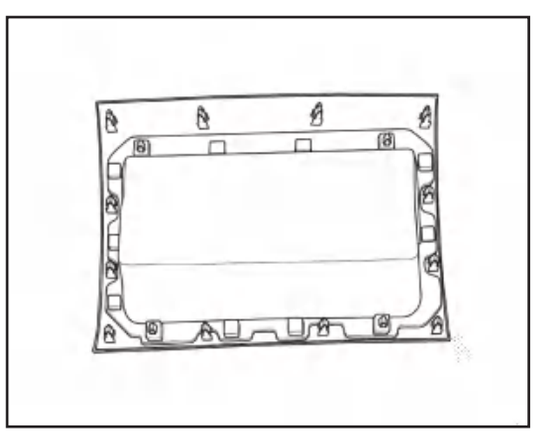
③ Disconnect the combination instrument assembly connector (arrow) and take down the combination instrument assembly.



14. Remove the air conditioning control panel assembly
15. Remove the large multimedia screen
16. Remove the glove box assembly



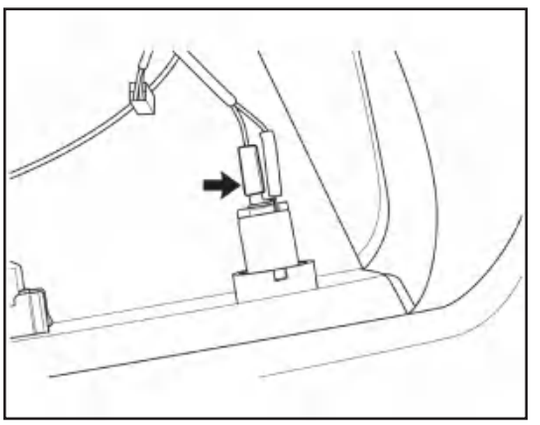
① Use the interior trim pry to pry off 16 fixing clips of the glove box assembly and the dashboard assembly.



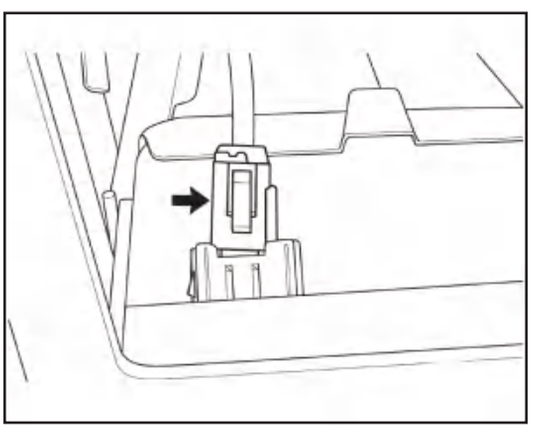
② Remove the glove box assembly.

17. Remove the lower middle panel assembly

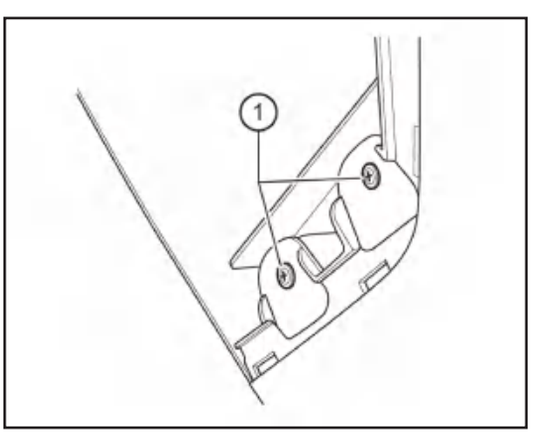
① Disconnect the standby power connector (arrow).



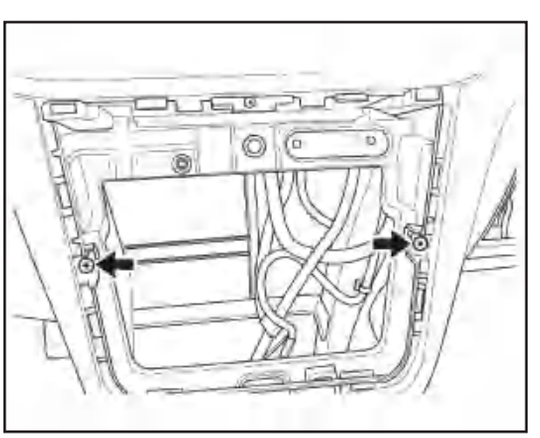
② Disconnect the USB port connector (arrow).



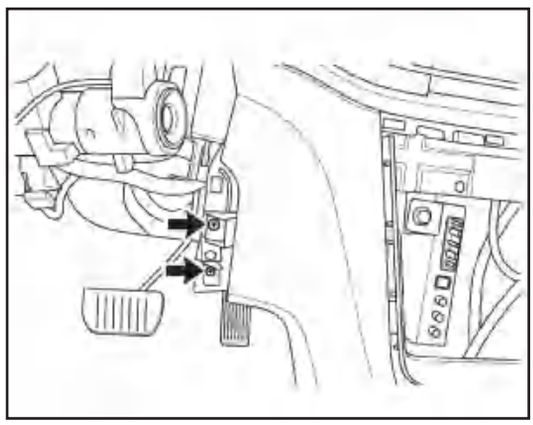
③ Remove 2 fixing screws on the left under the lower middle panel assembly (the removal on the right is the same as that on the left).

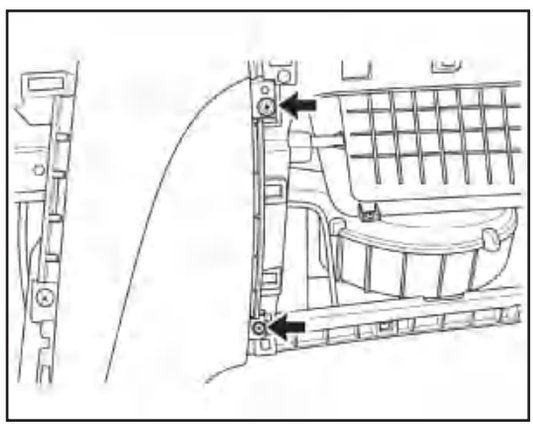


④ Remove 2 fixing screws (arrows) in the middle of the lower middle panel assembly.



⑤ Remove 4 fixing screws (arrows) on the left and right above the lower middle panel assembly.





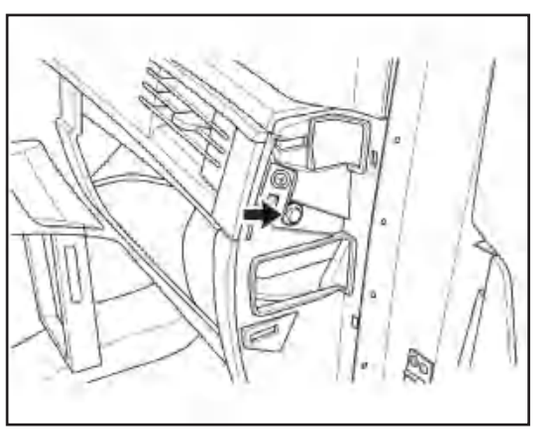
⑥ Remove the lower middle panel assembly.

18. Remove the dashboard assembly

① Remove 1 fixing bolt on the right side of the dashboard assembly (the left side is the same as the right side).

Tightening torque :

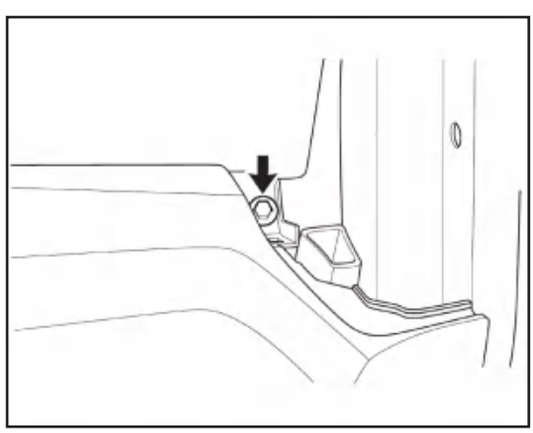
5 ± 1 N•m (3.7±0.7 ft-lbs.)



② Remove 1 fixing bolt above the right side of the dashboard assembly (the left side is the same as the right side).

Tightening torque :

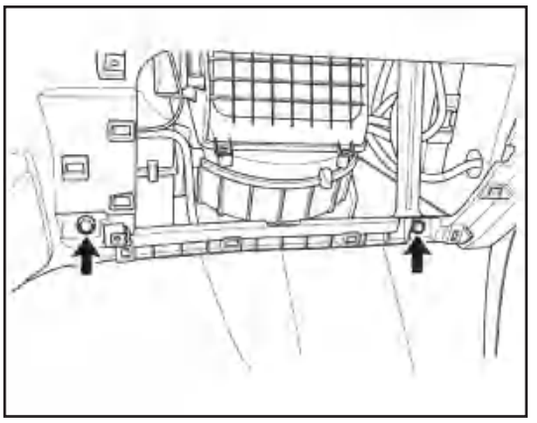
5 ± 1 N•m (3.7±0.7 ft-lbs.)



③ Remove 2 fixing bolts (arrows) connecting the lower right end of the dashboard assembly and the instrument beam.

Tightening torque:

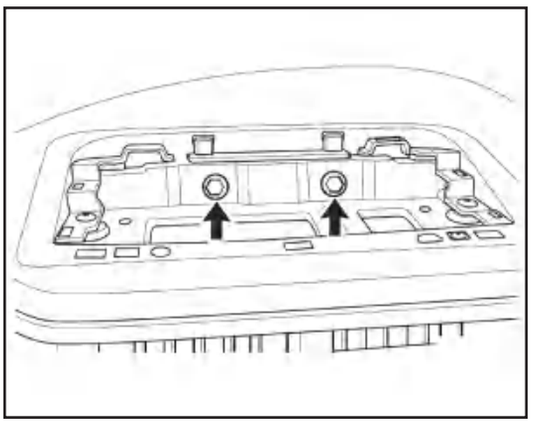
5 ± 1 N•m (3.7±0.7 ft-lbs.)



④ Remove 2 fixing bolts (arrows) connecting the upper middle of the dashboard assembly and the beam.

Tightening torque :

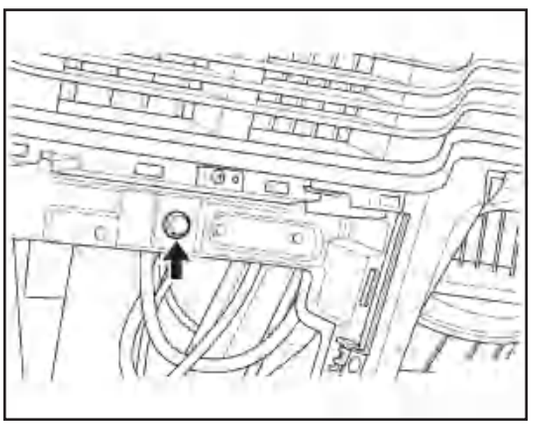
5 ± 1 N•m (3.7±0.7 ft-lbs.)



⑤ Remove 1 fixing bolts (arrows) connecting the lower middle of the dashboard assembly and the beam.

Tightening torque :

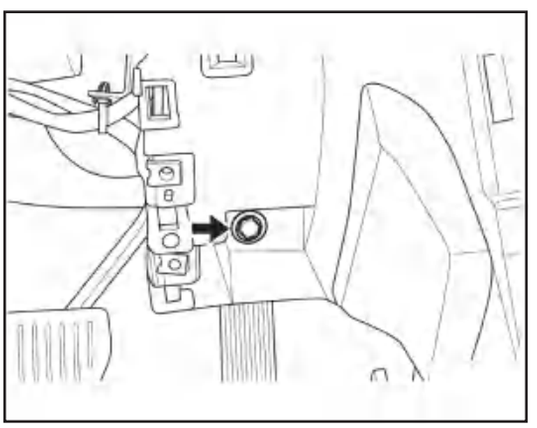
5 ± 1 N•m (3.7±0.7 ft-lbs.)



⑥ Remove 1 fixing bolts (arrows) connecting the lower left of the dashboard assembly and the beam.

Tightening torque:

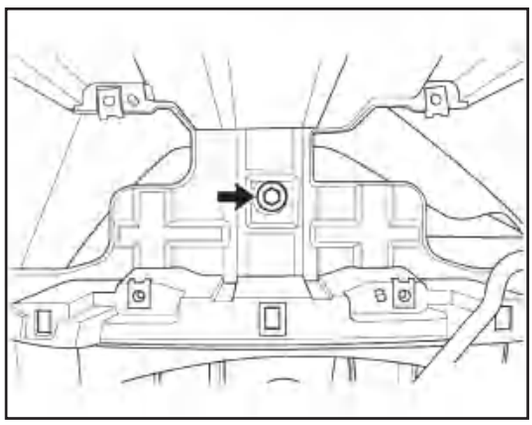
5 ± 1 N•m (3.7±0.7 ft-lbs.)



⑦ Remove 1 fixing bolts (arrows) connecting the upper left of the dashboard assembly and the beam.

Tightening torque :

5 ± 1 N•m (3.7±0.7 ft-lbs.)



⑧ Carefully remove the dashboard assembly from the instrument beam.

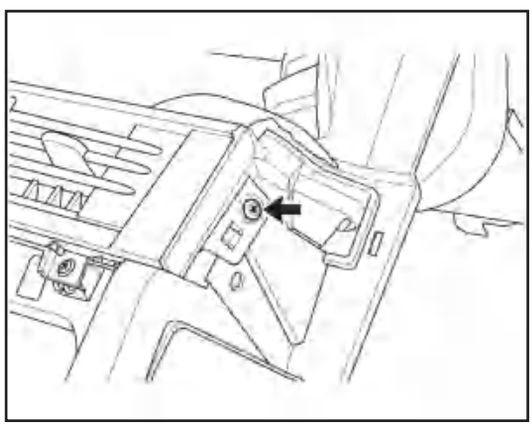
Removal

1. Remove the right air outlet assembly

① Remove 1 fixing screw (arrow) at the side of the right air outlet assembly.

Tightening torque:

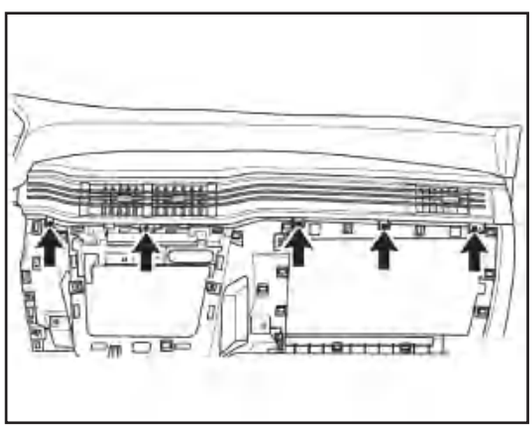
1.5 ±0.5 N•m (1.1±0.4 ft-lbs.)



② Remove 5 fixing screws (arrows) of the right air outlet assembly.

Tightening torque :

1.5 ±0.5 N•m (1.1±0.4 ft-lbs.)



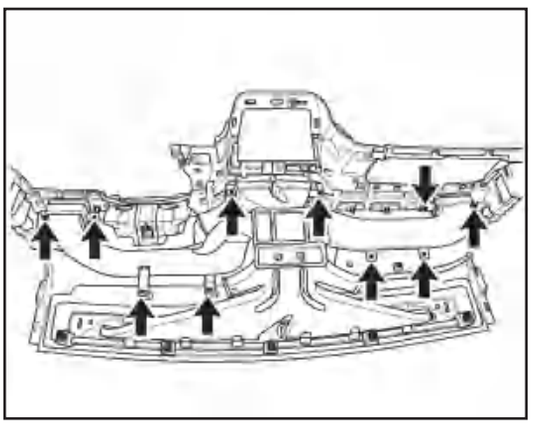
③ Use the interior trim pry to remove the right air outlet assembly.

2. Remove the central air duct

① Remove 10 fixing screws (arrows) of the central air duct.

Tightening torque：

1.5 ±0.5 N•m (1.1±0.4 ft-lbs.)



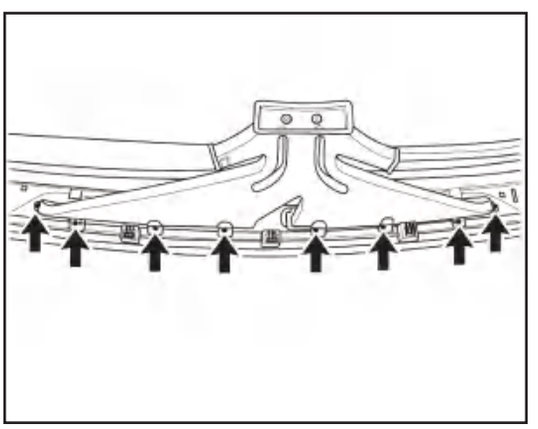
② Remove the central air duct.

3. Remove the central defrost air duct

① Remove 8 fixing screws (arrows) of the central defrost air duct.

Tightening torque：

1.5 ±0.5 N•m (1.1±0.4 ft-lbs.)



② Remove the central defrost air duct.

Assembly

1. The assembly sequence is the reverse of the disassembly sequence.

Installation

1. The reassembly sequence is the reverse of the disassembly sequence.

Caution:
※ Check for looseness, improper matching, missing installation and other abnormalities.

16.2.13 Dashboard beam assembly

Removal

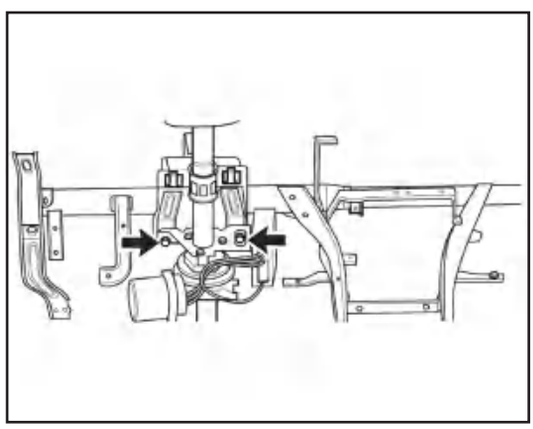
Warning:
※ When removing the dashboard beam assembly, be sure to wear labor protection articles to avoid accidents.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the dashboard assembly
4. Remove the front windshield lower trim panel assembly
5. Remove the electronic steering column

   ① Remove 2 fixing nuts (arrows) connecting the electric steering column and the instrument beam.

   Tightening torque：

   23 ± 2 N•m (17±1.5 ft-lbs.)



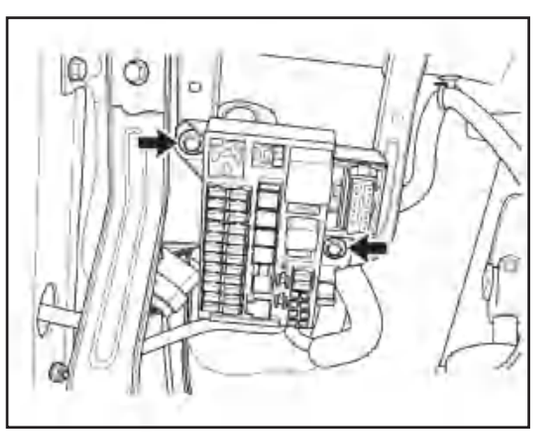
   ② Lower the electric steering column to the proper position.

6. Remove the instrument fuse box

   ① Remove 2 fixing bolts (arrows) of the instrument fuse box.

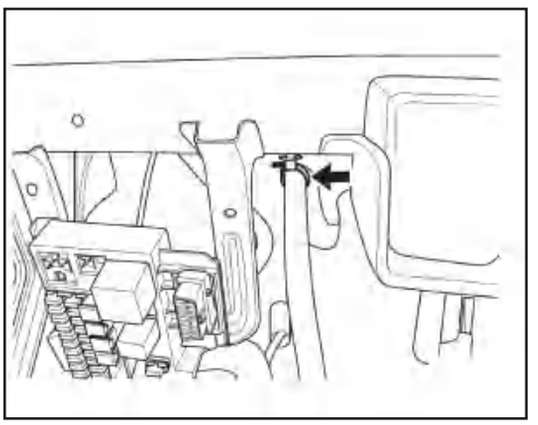
   Tightening torque：

   5 ± 1 N•m (3.7±0.7 ft-lbs.)

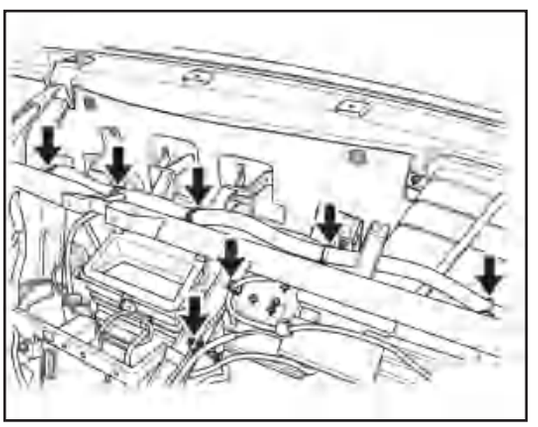


7. Remove the instrument beam assembly

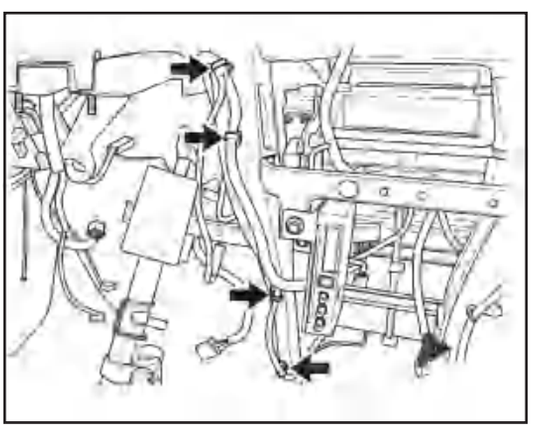
① Disconnect the fixing clip of instrument harness (arrow).

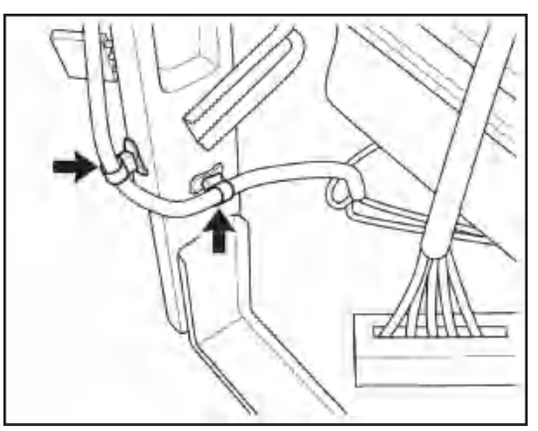


② Disconnect the fixing clip above the instrument harness (arrow).

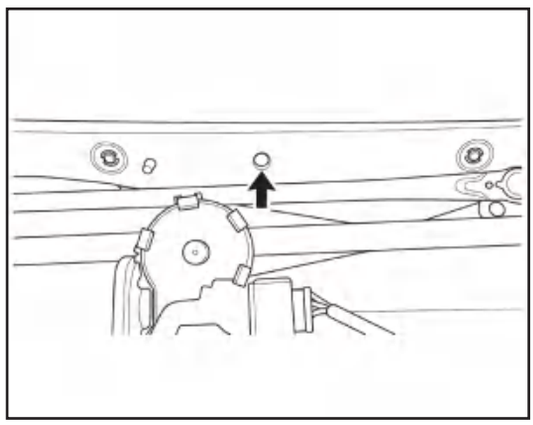


③ Disconnect the fixing clip (arrow) at the left end of the instrument harness and instrument beam assembly.

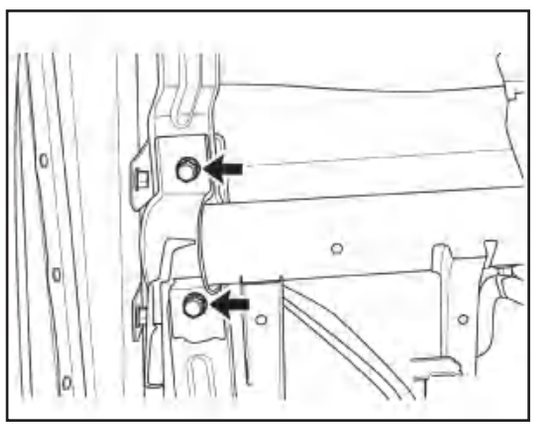




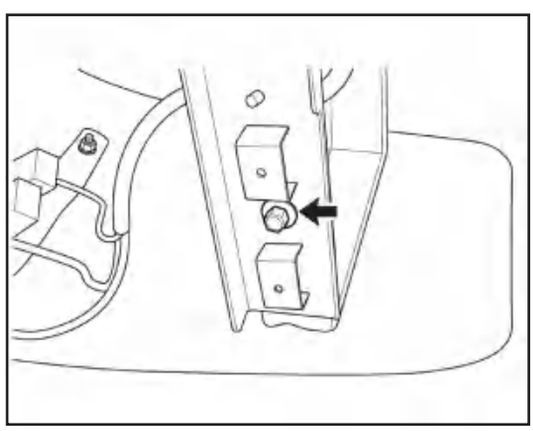
④ Remove 1 fixing bolt (arrow) under the lower trim panel of the front windshield outside the dashboard beam.



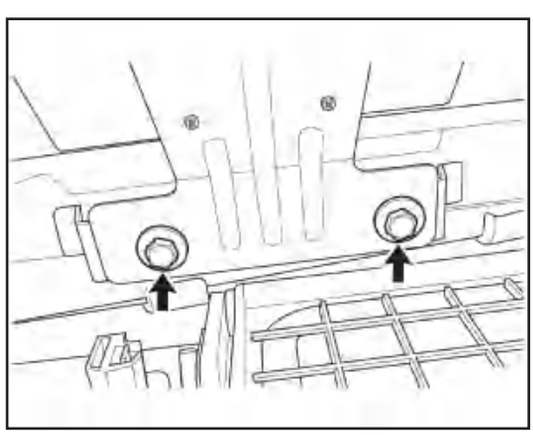
⑤ Remove 2 fixing bolts (arrows) of the instrument beam (the same on the right side).



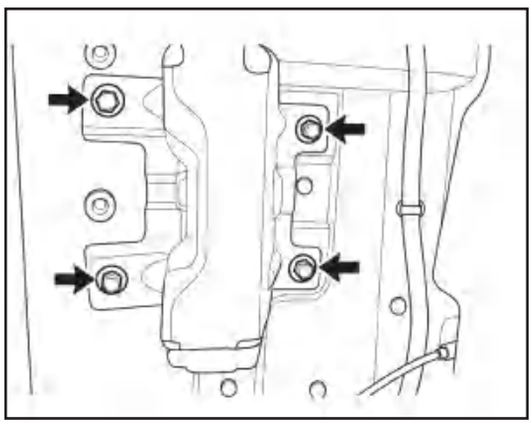
⑥ Remove 2 fixing bolts (arrows) below the instrument beam (the same on the right side).



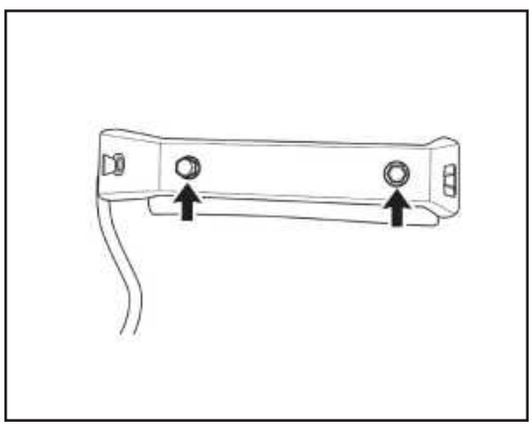
⑦ Remove 2 fixing bolts (arrows) of the combination antenna and move the combination antenna to the proper position. Remove the instrument beam assembly with care.



⑧ Remove 4 fixing bolts (arrows) of the mounting bracket of the instrument beam. The removal method for the right side is the same as that for the left side. Remove the instrument beam mounting bracket.



⑨ Remove 2 fixing bolts (arrows) of the central mounting bracket of the instrument beam. Remove the central mounting bracket of the instrument beam.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the instrument panel beam assembly, always tighten the fixing bolts to the specified torque. ※ When installing the instrument panel beam assembly, always clip the harness fixing clip in place.

16.2.14 Front seat assembly

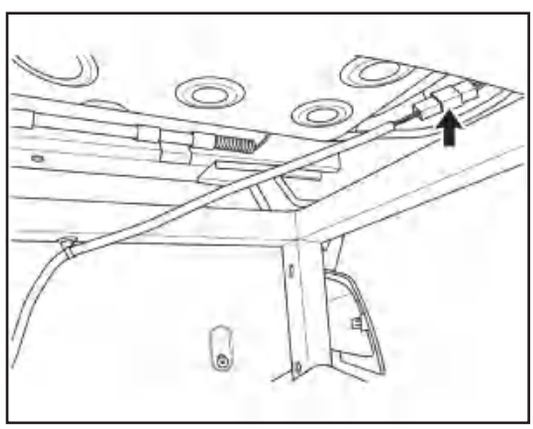
Removal

Tips:
※ The operation process of the front passenger seat assembly is the same as that of the driver seat assembly. ※ The following is the operation process of the driver seat assembly.

Caution:
※ When removing the driver seat assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the driver seat assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the driver seat assembly, avoid scratching the interior trim.

1. Turn off all electrical equipment and ignition switch
2. Remove the driver seat assembly

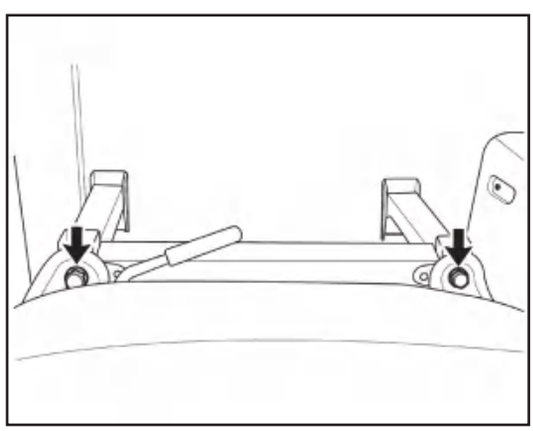
① Disconnect the driver safety belt buckle connector (arrow).



② Move the seat back to the proper position and remove 2 fixing bolts (arrows) in front of the seat assembly.

Tightening torque :

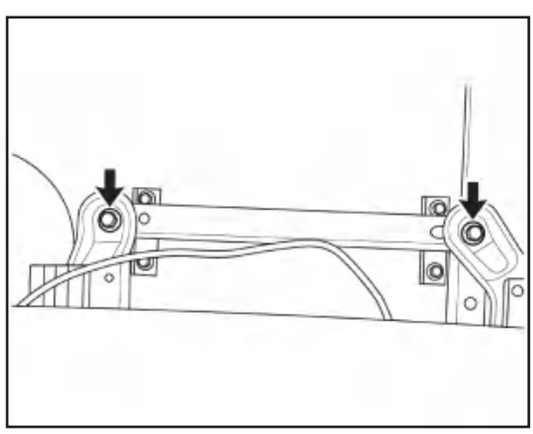
50 ± 5 N·m (36.9±3.7 ft-lbs.)



③ Move the seat forward to the proper position and remove 2 fixing bolts (arrows) behind the seat assembly.

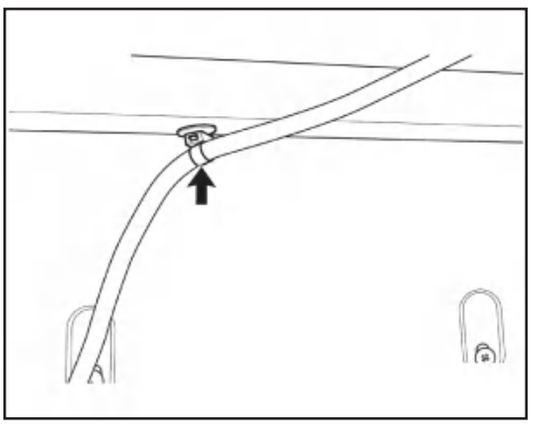
Tightening torque :

50 ± 5 N·m (36.9±3.7 ft-lbs.)

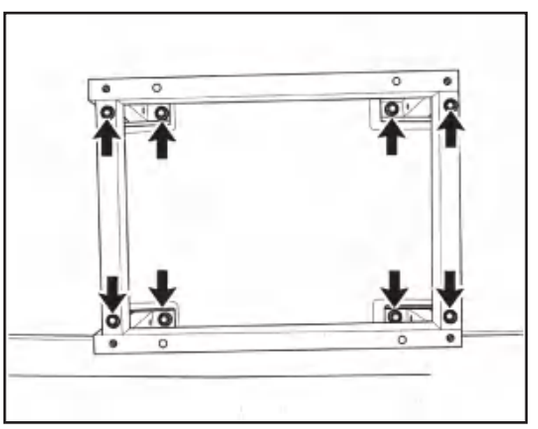


④ Remove the driver seat assembly.

⑤ Disconnect the wire harness fixing clip (1) fixed on the driver seat assembly.



⑥ Remove 8 fixing bolts of the driver seat mounting bracket.



⑦ Remove the driver seat mounting bracket.

Inspection

1. Turn on the power of the whole vehicle, and the safety belt warning lamp on the instrument should be in the "on" state; after the left front safety belt latch is connected with the left front safety belt buckle, the safety belt warning lamp should go out.
2. The seat should not make a sharp and harsh noise when moving forward and backward, and the front seat locking mechanism shall be safe and reliable.

Installation

1. The installation sequence is the reverse of the removal sequence.

16.2.15 Front door inner guard assembly

Removal

Tips:
※ The installation point of the right front door inner guard assembly is the same as that of the left front door inner guard assembly.
※ The following is the operation process of the left front door inner guard assembly.

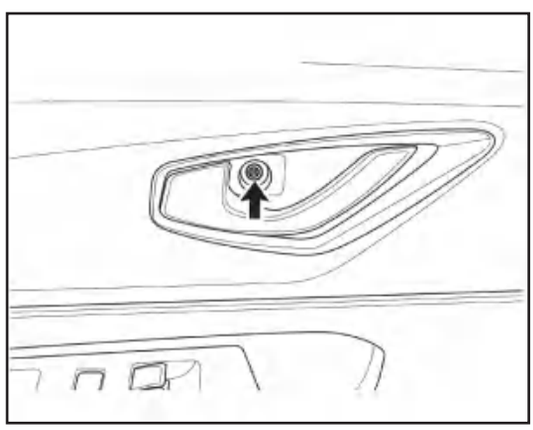
Caution:
※ When removing the left front door inner guard assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the left front door inner guard assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing the left front door inner guard assembly, avoid scratching the interior trim.

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

① Remove 1 fixing screw (arrow) from the upper part of the left front door inner guard assembly.

Tightening torque :

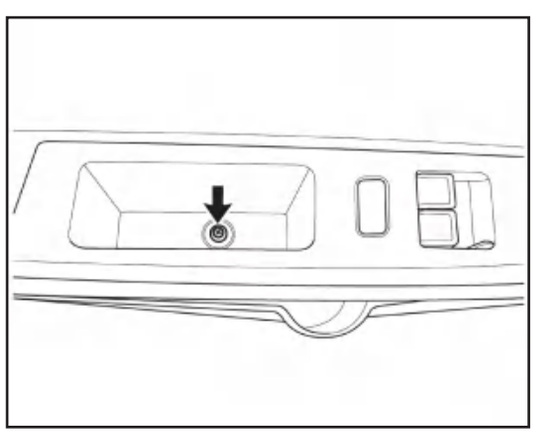
1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



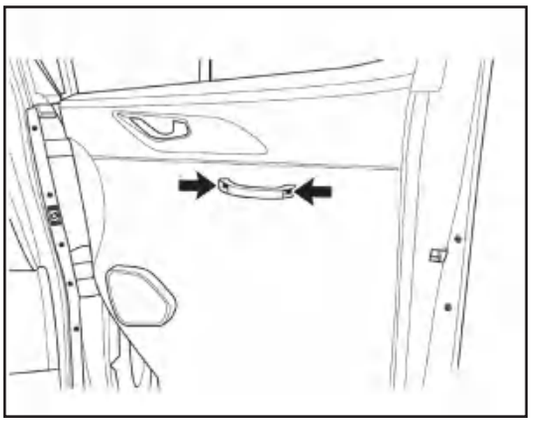
② Remove 1 fixing screw (arrow) at the left front door lifter switch assembly.

Tightening torque:

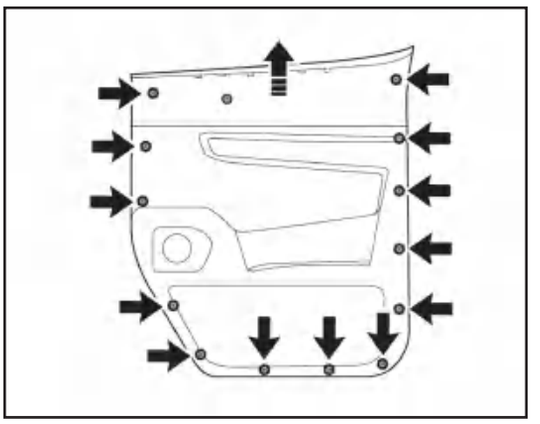
1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



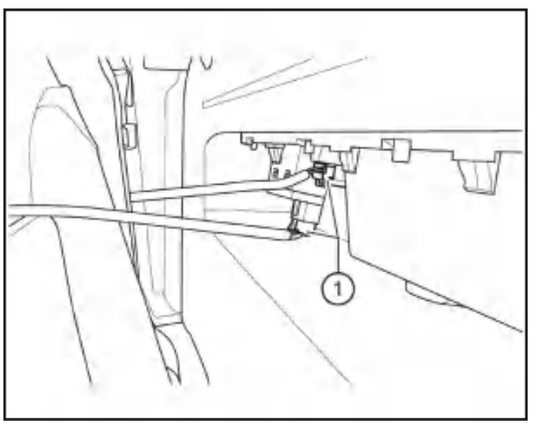
Warning:
※ For the inner guard assembly of the right front door, there is no lifter switch disassembly and assembly link. Instead, remove the U-shaped handrail; the U-shaped handrail is fixed with two cross-recessed pan head screws (arrows).



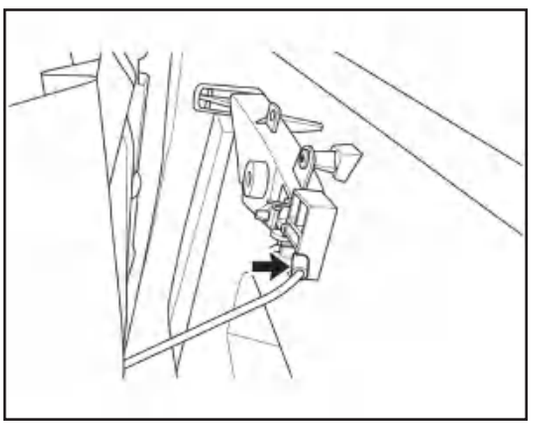
③ Use the interior trim pry to carefully pry off the waterproof clips (arrows) on the front door inner guard assembly. As shown in the figure, detach the front door inner guard assembly upwards in the direction of the arrow.



④ Disconnect 2 connectors (1) of the left front door lifter switch assembly.



⑤ Disconnect the left front door interior handle cable (arrow) from the left front door interior handle.

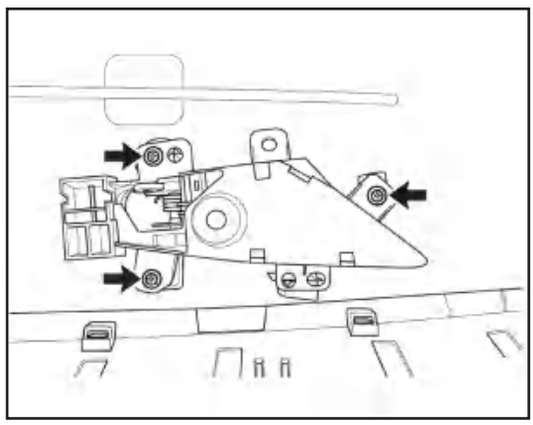


⑥ Remove the left front door inner guard assembly.

⑦ Remove 3 fixing screws (arrows) of the left front door interior handle and remove the left front door interior handle.

Tightening torque :

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)

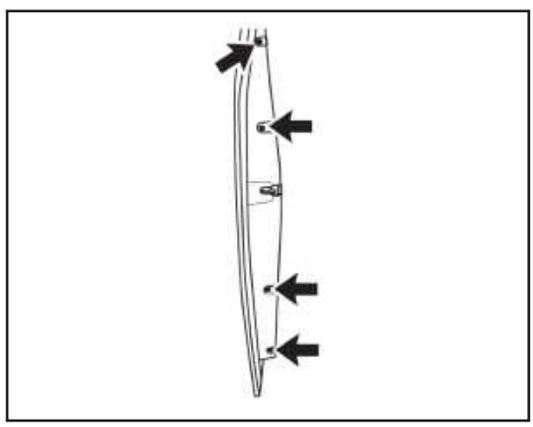


4. Remove the rear body assembly of the left front door inner guard (the right front and the left front are removed in the same way)

① Remove 4 fixing screws (arrows) on the side of the rear body assembly of the left front door inner guard.

Tightening torque :

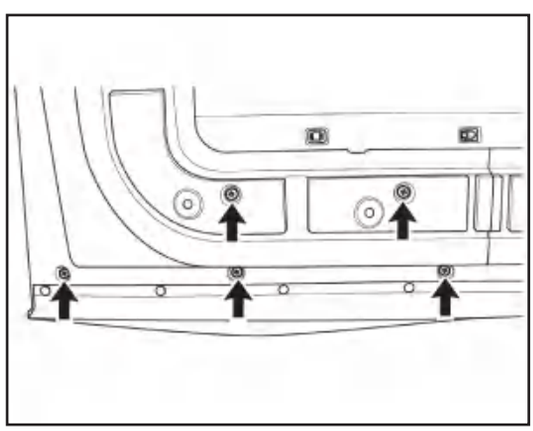
5 ± 1 N·m (3.7±0.7 ft-lbs.)



② Remove 5 fixing screws (arrows) below the rear body assembly of the left front door inner guard.

Tightening torque:

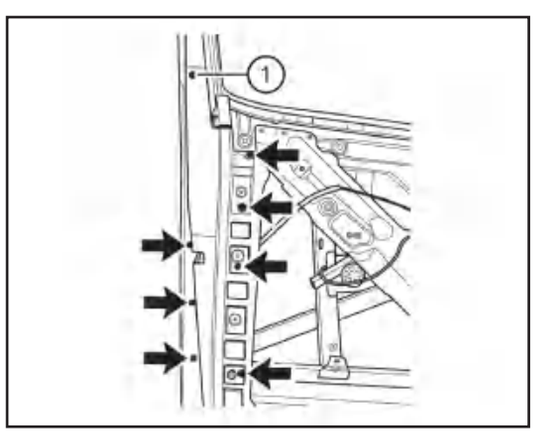
5 ± 1 N·m (3.7±0.7 ft-lbs.)



③ Remove 1 fixing screw (1) of the left front door outer water strip.

Tightening torque:

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



④ Remove 7 fixing screws (arrows) of the rear body assembly of the left front door inner guard.

Tightening torque :5 ± 1 N·m (3.7±0.7 ft-lbs.)

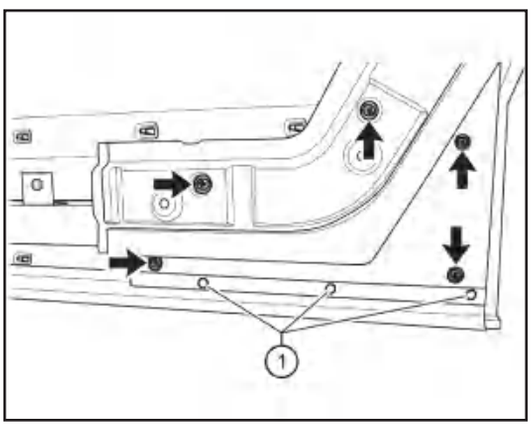
⑤ Remove 3 fixing clips of the rear body assembly of the left front door inner guard. Remove the rear body assembly.

5. Remove the front body assembly of the left front door inner guard (the right front and the left front are removed in the same way)

① Remove 5 fixing screws (arrows) below the front body assembly of the left front door inner guard.

Tightening torque：

5 ± 1 N·m (3.7±0.7 ft-lbs.)



② Remove 3 fixing clips (1) of the lower water strip.

③ Remove 2 fixing screws on the side of the front body assembly of the left front door inner guard.

④ Remove 11 fixing screws of the front body assembly of the left front door inner guard.

⑤ Remove the front body assembly of the left front door inner guard.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installation, it is necessary to confirm that the front and rear body assembly of the door guard, the door sheet metal frame and the outer door plate are well fastened.
※ After installation, it is necessary to confirm that the body assembly of door guard and the front and rear body assembly match well.

16.2.16 Back door guard assembly

Removal

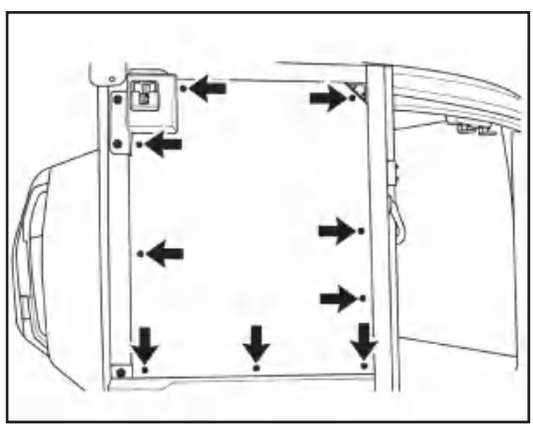
Caution:
※ When removing the back door guard assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the back door guard assembly, pay attention to apply the appropriate strength and be careful when operating.

1. Turn off all electrical equipment and ignition switch
2. Remove the back door left inner guard assembly

① Remove 9 fixing screws (arrows) of the back door left inner guard body assembly, and remove the back door left inner guard body assembly.

Tightening torque :

5 ± 1 N·m (3.7±0.7 ft-lbs.)



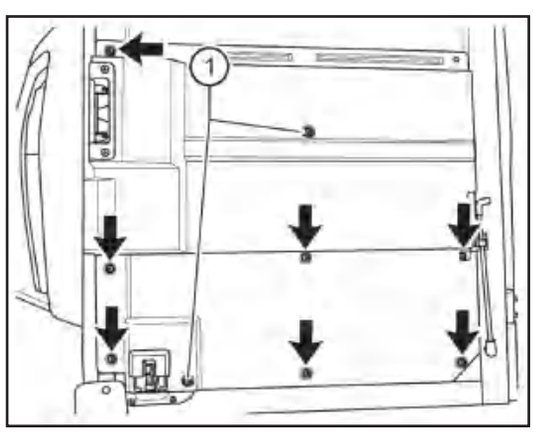
② Remove 2 tapping screws (1) of the left lower trim panel of the back door lock.

Tightening torque:

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)

③ Remove 7 cross-recess fixing screws (arrows) of the left lower trim panel of the back door lock.

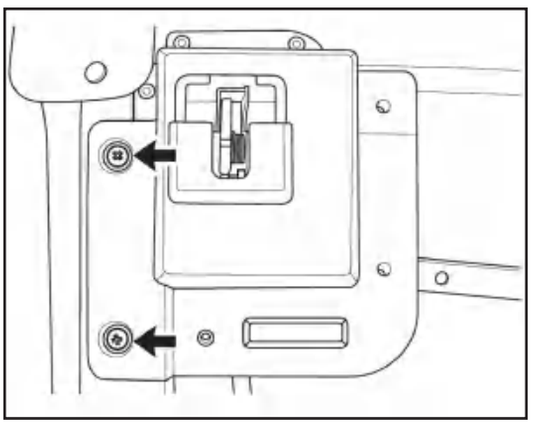
Tightening torque: 5 ± 1 N·m (3.7±0.7 ft-lbs.)



④ Remove 2 cross-recess fixing screws (arrows) of the left upper trim panel of the back door lock.

Tightening torque:

5 ± 1 N·m (3.7±0.7 ft-lbs.)

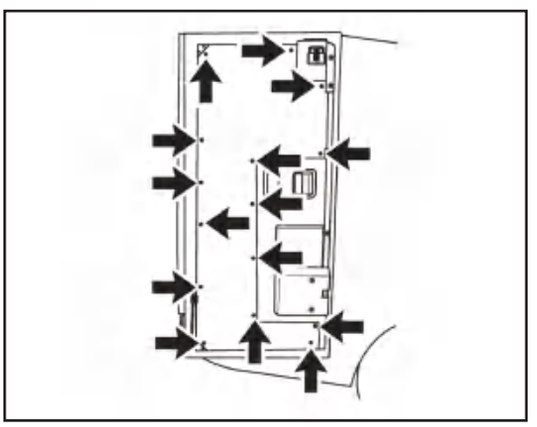


3. Remove the back door right inner guard assembly

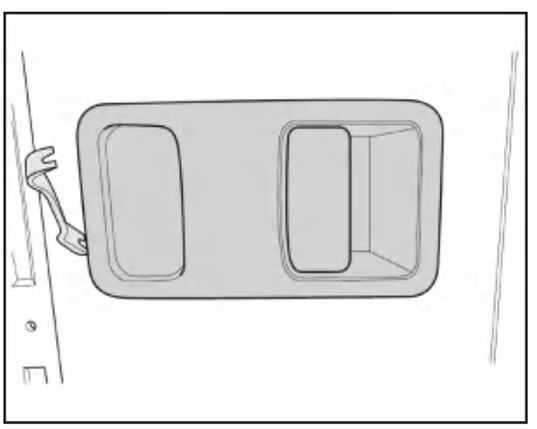
① Remove 15 cross-recessed fixing screws (arrows) of the back door right guard body assembly, and remove the back door right guard body assembly.

Tightening torque:

5 ± 1 N·m (3.7±0.7 ft-lbs.)



② Use the interior trim pry to pry off the back door interior handle cover.



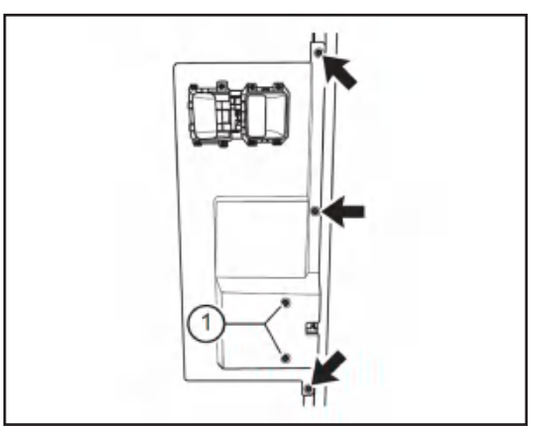
③ Remove 2 tapping screws (1) of the right lower trim panel of the back door lock.

Tightening torque :

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)

④ Remove 3 cross-recess fixing screws (arrows) of the right lower trim panel of the back door lock.

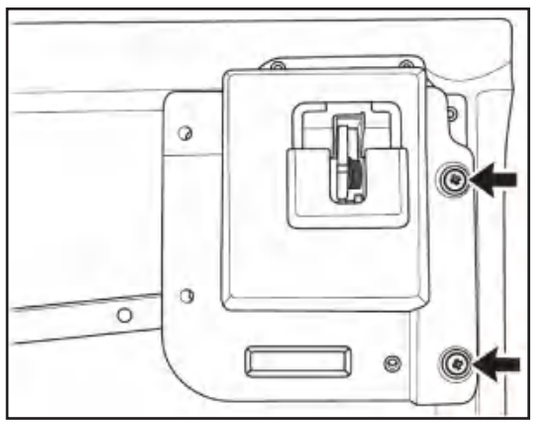
Tightening torque: 5 ± 1 N·m (3.7±0.7 ft-lbs.)



⑤ Remove 2 cross-recess fixing screws (arrows) of the right upper trim panel of the back door lock.

Tightening torque:

5 ± 1 N·m (3.7±0.7 ft-lbs.)



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installation, it is necessary to confirm that the left/right body assembly of the back door guard is flush with the metal ring of the pickup door and the fixing point is firm.

16.2.17 Latch shield assembly

Removal

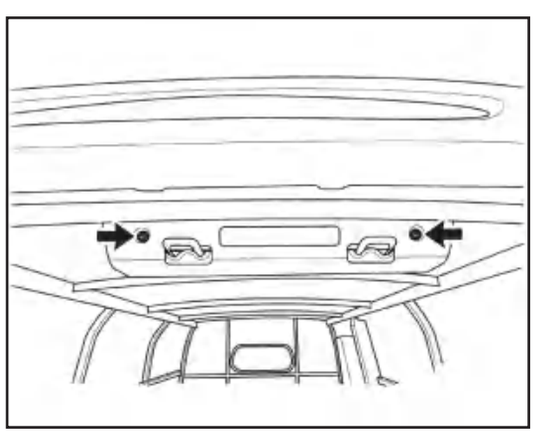
Caution:
※ When removing the latch shield assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the latch shield assembly, pay attention to apply the appropriate strength and be careful when operating.

1. Turn off all electrical equipment and ignition switch
2. Remove the latch shield assembly

① Remove 2 fixing screws (arrows) of the latch rear shield and remove the latch rear shield.

Tightening torque:

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)



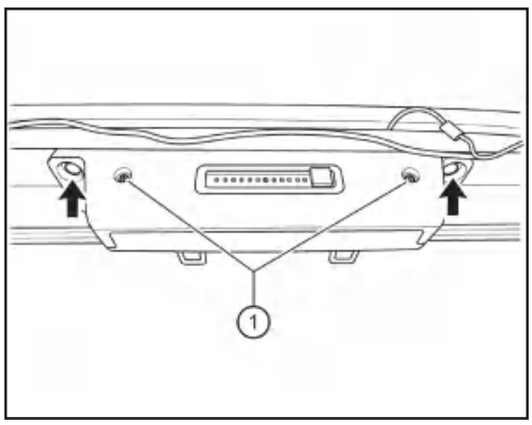
② Remove 2 fixing screws (1) of the latch front shield.

Tightening torque:

1.5 ± 0.5 N·m (1.1±0.4 ft-lbs.)

③ Remove 2 fixing clips (arrows) of the latch front shield.

④ Disconnect the cargo compartment lamp connector and remove the latch front shield.



Installation

1. The installation sequence is the reverse of the removal sequence.

16.2.18 Front safety belt assembly

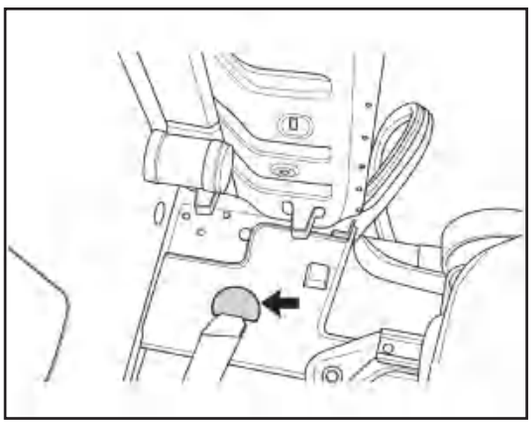
Removal

Tips:
※ The installation point of the right front safety belt assembly is the same as that of the left front safety belt assembly.
※ The following is the operation process of the left front safety belt assembly.

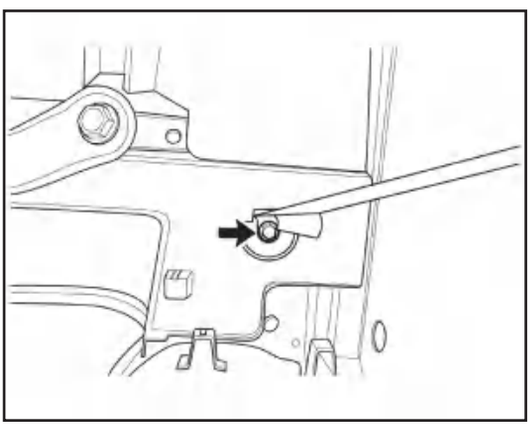
Caution:
※ When removing the left front safety belt assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the left front safety belt assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the left front safety belt assembly, avoid scratching the interior trim.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove B-column lower guard assembly
4. Remove the left front safety belt assembly

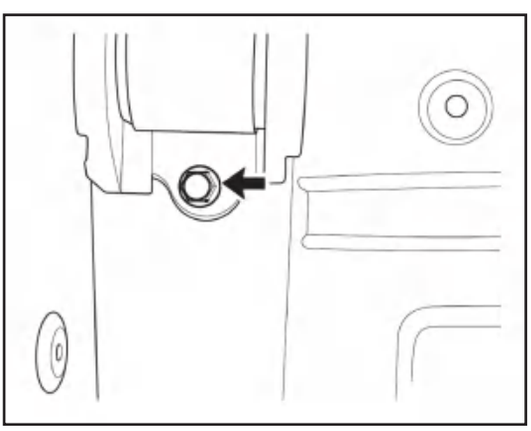
① Use the interior trim pry to pry off the front door sill plug (arrow).



② Remove 1 fixing bolt (arrow) of the left front safety belt and move the left front safety belt to the proper position.



③ Remove 1 fixing bolt (arrow) of the left front safety belt retractor.



④ Remove the left front safety belt assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Body control module (BCM)

17.1 General information

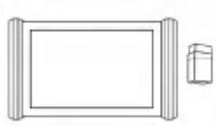
17.1.1 Specification

Torque specification

Description	Torque
Body control module fixing nut	7± 1 N•m (5.2±0.7 ft-lbs.)

17.1.2 Tool picture

Common tools

Tool name	Tool picture
X-431 diagnostic instrument	

17.1.3 BCM function

Turn signal lamp control

※ Turn signal lamp function

① The BCM will turn on the turn signal lamp when it meets the following two conditions:

1) IGN=ON ;

2) The left/right turn signal lamp switch is activated.

② The load flashing frequency of turn signal lamp is 75±5 times per minute, and the duty cycle is 50±5 %.

③ When the turn signal lamp is activated, the BCM sends a CAN signal ("LHTurnSignalSts" or "RHTurnSignalSts"), and the step is consistent with the working frequency of the turn signal lamp load; if the turn signal lamp input is deactivated, the left/right turn signal lamp should stop working immediately and stop sending the corresponding LHTurnSignalSts/RHTurnsignalSts.

④ If the corresponding turn signal lamp bulb is damaged, the BCM sends LHTurnSignalSts "or" RHTurnSignalSts, and the frequency is twice that of the normal operation of the bulb, but the load flashing frequency remains unchanged. If the turn signal lamp input is deactivated, the left/right turn signal lamp should stop working

immediately and stop sending the corresponding LHTurnSignalSts/RHTurnsignalSts.

⑤ Turn signal lamp has diagnostic function.

⑥ The BCM will turn off the turn signal lamp when it meets the following two conditions:

1) Turn the key from IGNON to ACC or OFF;

2) The left/right turn signal lamp switch is deactivated.

※ Lane change function

① Working conditions of lane change:

1) IGN=ON ;

2) The left/right turn signal lamp switch is activated for a short time (activation time T:50 ms<T<60 0ms).

② The load flashes 3 times during lane change operation, the frequency is 75±5 times per minute, and the duty cycle is 50±5 %.

③ When the lane change is activated, the BCM sends a CAN signal ("LHTurnSignalSts" or "RHTurnSignalSts"), and the step is consistent with the working frequency of the turn signal lamp load.

④ During the operation of left/right lane change: activate the left/right turn signal lamp switch again for a short time (T:50 ms<T<600 ms), and the left/right turn signal lamp will flash again for 3 times.

⑤ If the left/right turn signal lamp switch remains activated (T>600 ms), it will automatically switch to the left/right turn signal lamp operation logic.

⑥ If the corresponding turn signal lamp bulb is damaged, the BCM sends LHTurnSignalSts "or" RHTurnSignalSts, and the frequency is twice that of the normal operation of the bulb, but the load flashing frequency remains unchanged.

⑦ During the operation of left/right lane change, activate the right/left turn signal lamp switch and immediately operate according to the right/left turn signal lamp.

⑧ The BCM will turn off the turn signal lamp when it meets the following two conditions:

1) Turn the key to ACC or OFF;

2) The left/right turn signal lamp flashes 3 times.

※ Hazard lamp function

① Activation condition of hazard lamp:

1) Activate the hazard lamp switch and the hazard lamp will be lit.

2) When the hazard lamp is on, activate the hazard lamp switch again and the hazard lamp stops working.

Caution:
※ When the hazard lamp is activated: the corresponding bulb is intact, the BCM sends LHTurnsignalSts and RHTurnsignalSts, and the step is consistent with the working frequency of the turn signal lamp load; changing the key status will not affect the function of hazard lamps.

② When the hazard lamp is activated, the hazard indicator lamp flashes 75±5 times per minute and the duty cycle is 50±5 %.

③ The hazard lamp switch is a point-touch switch.

④ If any bulb is damaged, the frequency of the turn signal lamp CAN signal (LHTurnsignalSts and RHTurnsignalSts) and the flashing frequency of the hazard indicator lamp are twice as high as when the bulb is intact. However, the flashing frequency of hazard lamp load remains unchanged. When the hazard lamp is activated, the ICM illuminates the hazard indicator lamp and the turn indicator lamp.

⑤ When the ABM sends the collision signal, the hazard lamp function should be activated automatically. The flashing frequency of the left/right turn signal lamp and hazard indicator lamp is 75±5 times per minute, and the duty cycle is 50±5 %. The BCM sends LHTurnsignalSts and RHTurnsignalSts, and the step is consistent with the working frequency of the turn signal lamp load. Turn the key to OFF, then to ON, or press the hazard lamp button to cancel the hazard lamp function automatically activated due to collision.

※ Priority of turn signal lamp and hazard lamp

① When the turn signal lamp function and the hazard lamp function are effective at the same time, the BCM shall execute the latter input function; when the latter input is cancelled and the former input is still valid, the former function shall be executed.

Position lamp control

※ Activation condition of position lamp: small lamp input is activated (low beam lamp switch will activate position lamp in ON/ST gear, and low beam lamp will not activate position lamp in other ignition gears).

※ The position lamp will stop activating if any one of the following conditions is met: the small lamp input is deactivated; turn the key to OFF.

※ When IGN=OFF, activate the small lamp switch again, and the small lamp will be lit as the parking lamp until the small lamp switch is deactivated.

※ When the position lamp is activated, the BCM sends the CAN signal 'ParkTailLightSts' (value is' 1') to the ICM, which illuminates the corresponding indicator lamp. When IGN=OFF and the BCM receives the vehicle search signal from the PEPS, the turn signal lamp flashes for 8 seconds at (400 ms-On-400 ms-Off), the small lamp lights up for 8 seconds at the same time, and the tweeter and woofer are activated twice (the tweeter outputs 20 ms ON-280 ms OFF).

※ When the CAN network signal lights up the small lamp, the combination switch can turn off the small lamp. Switch takes priority over CAN network signal.

※ When IGN=OFF, the BCM sends "ParkLightOnWarning=1" to the CAN bus when it detects that the left front door is open and the small lamp is not turned off.

Low beam lamp control

※ Activation condition of low beam lamp: IGNON; low beam lamp input is activated.

※ The low beam lamp will stop activating if any one of the following conditions is met: the low beam lamp input is deactivated; turn the key to IGN-OFF or IGN-ACC.

Caution:
※ When the low beam lamp is activated, the BCM sends the CAN signal 'LowBeamSts' (value is '1').
※ When the CAN network signal illuminates the low beam lamp, the combination switch can turn off the low beam lamp. Switch takes priority over CAN network signal.

Follow Me Home function (FMH)

※ Function activation

① Follow-mehome is controlled by the BCM, and the low beam lamp, position lamp

and license plate lamp are turned on for convenience.

② FMH function activation condition: Flash switch is activated within 2 minutes after the key is turned to OFF.

③ Once the FMH function is activated, the low beam lamp, position lamp and license plate lamp will be lit. The BCM sends CAN signal 'LowBeamSts' (value is '1') and 'ParkTailLightSts' (value is '1') to the ICM. The ICM illuminates the corresponding indicator lamp. When the switch is activated, the BCM should send HighBeamSts=1, and the ICM illuminates the corresponding indicator lamp.

Caution:
※ When IGN=OFF and the switch is activated, HighBeamSts=1 should be sent, but the high beam lamp will not be on to increase the light-on time.

④ When the FMH function is activated: the default duration is 30 s. If the flash switch is activated again for a short time, the FMH function duration will be increased by 30s each time, with a maximum of 8 times (after the first 30 s, activate the switch again for 8 times, with a maximum of 240 s, i.e. 8*30=240 s).

⑤ Within 2 minutes after the key is turned to OFF, whether the FMH function is manually closed or automatically closed after timeout, it can be activated again. When the switch is activated, HighBeamSts=1 should be sent again.

⑥ When the FMH function is activated, the BCM will continuously send CAN signal ‘LowBeamSts’ ='1' and ‘ParkTailLightSts’ ='1'. Within 2 minutes after the FMH function is activated or the key is turned to OFF, when the Flasher switch is activated, the BCM will send the CAN signal ‘HighBeamSts’ ='1'.

※ Function invalidity

① When the FMH function is activated: if Flash is activated for a long time for 2S, the FMH function will be manually turned off - low beam lamp, small lamp and license plate lamp will go out immediately and the cumulative duration of FMH will be cleared to 0, sending LowBeamSts=0, ParkTailLightSts=0 and 'FollowMeTime'=0.

② After FMH function is manually turned off, the FMH function can be activated again within 2 minutes after the key is turned to OFF.

※ Function stop

① The FMH function will be stopped if any one of the following conditions is met:

1) After the set FMH working time is reached;

2) Turn the key to ACC or IGNON;

3) The FMH switch is deactivated.

② The BCM will turn off the low beam lamp and small lamp immediately and the cumulative duration of FMH will be cleared to 0.

③ At the same time, the BCM will send CAN signals ‘LowBeamSts= ‘0’ ’ , ‘ParkTailLightSts= ‘0’ ’ , ‘FollowMeTime’ = ‘0’ .

Lead me to the car (LMC)

※ LMC function activation conditions:

① IGN OFF ;

② FMH is in the same ignition cycle;

③ BCM receives remote unlocking signal;

④ The four doors are closed.

※ If any one of the following conditions is met, the LMC function will be deactivated:

① The BCM receives the remote locking signal (excluding secondary fortification);

② Any door is opened;

③ Turn the key to ACC or IGNON;

④ The 60s timing is completed. Once the LMC function is activated, the low beam lamp, position lamp and license plate lamp will be lit.

※ Once the LMC function is deactivated, the low beam lamp, small lamp and license plate lamp will be turned off without other inputs.

※ In the same ignition cycle, the change form of IGN is: ON ->ACC ->OFF.

※ The BCM receives the remote unlocking signal, and the LMC function is activated. The LMC function is delayed for 60 s based on the time of receiving the remote unlocking.

※ When LMC function is activated: FMH function cannot be activated.

※ Leadmetothecar function: When the remote control is unlocked, the headlamps will turn on. If any door is opened, the headlamps will turn off, and the Leadmetothecar function will end.

High beam lamp control

※ Operating conditions of high beam lamp:

① IGN ON ;

② The low beam lamp is activated;

③ The high beam switch is activated.

※ The high beam lamp will be deactivated if any one of the following conditions is met:

① The high beam lamp switch is deactivated;

② The low beam lamp is deactivated;

③ IGN-OFF or IGN-ACC.

Caution:
※ When the high beam lamp is activated, the BCM sends the CAN signal 'HighBeamSts' = '1', and the ICM illuminates the corresponding high beam lamp.

Flash function

※ Flash working conditions:

① IGN ON ;

② The Flash switch is activated.

※ The Flash function will be deactivated if any one of the following conditions is met:

① The Flash switch is deactivated;

② Turn the key to IGN-OFF or IGN-ACC.

Caution:
※ When the flash function is activated, the BCM sends the CAN signal 'HighBeamSts' = '1') to ICM, and ICM turns on the corresponding high beam indicator lamp. ※ When IGN-ACC is activated, the flash switch is activated, and the BCM cannot send the CAN signal 'HighBeamSts' = '1' to the ICM. ※ When the key is turned to IGN-OFF 2 minutes, the flash switch activates the FMH function, and the BCM sends the CAN signal 'HighBeamSts' = '1' to the CAN. ※ KQ71 low beam lamp and high beam lamp use the same load. When the flash function is activated, the BCM will activate the low beam lamp and high beam lamp simultaneously.

Rear fog lamp control

※ Working conditions of rear fog lamp:

① IGN ON ;

② Front fog lamp or low beam lamp load is activated;

③ The rear fog lamp switch is activated.

※ The rear fog lamp will be deactivated if any one of the following conditions is met:

① Activate the rear fog lamp switch again;

② Turn the key to IGN-OFF or ACC;

③ The front fog lamp or low beam lamp load is deactivated.

Caution:
※ When the rear fog lamp switch is activated, the BCM sends the CAN signal 'RearFogLightSts' = '1' to the ICM.

Daytime running lamp

※ Working condition of daytime running lamp:

① IGN=ON ;

② BCM receives CAN signal 'EngineSts=1' sent by EMS;

③ The high and low beam lamps are not activated.

Caution:
※ When the daytime running lamp is working, operating the Flash switch will not affect the daytime running lamp.

Emergency braking double trip warning function

※ If the following conditions are met, the hazard lamp will activate for at least 3S (the left/right turn signal lamp, indicator lamp and turn signal lamp CAN signal flash at 200 ms ON / 200 ms OFF):

① The vehicle acceleration exceeds - 6 m/s 2 (the BCM detects the vehicle speed signal sent by EMS_4_G every 10 ms, the average speed V1 is detected in the first 5 cycle 50 ms, and the average speed V2 is detected in the last 5 cycle 50 ms to obtain the acceleration);

② The vehicle speed exceeds 50 km/h (31 mph) before deceleration;

③ The key is in the ON position; CAN signal "BrakePedalSts"value= ‘1’ .

※ When the hazard lamp of this function is activated, the ICM will activate the hazard indicator lamp and the left and right turn indicator lamps to flash at 200 ms ON / 200 ms OFF.

※ If any one of the following conditions is met, the function will be stopped (the turn signal lamp and hazard indicator lamp will stop at the same time):

① The vehicle accelerator pedal is activated (the “GasPedalPosition>0” signal is activated);

② Turn the key gear to OFF.

※ When the hazard lamp of this function works, operate the hazard lamp switch, and this function will stop immediately.

※ During this operation, the BCM receives the collision signal (“CrashOutputSt ≠ 00) and the function stops immediately; the BCM receives the “GasPedalPosition” signal from EMS_1.

Reversing lamp function

※ In case of manual gear, the input BCM of the reversing lamp only judges the hand brake hardware signal; in case of automatic transmission, the input BCM of the reversing lamp only judges the CAN signal.

※ IGN-ON, the reversing lamp input is activated, the BCM will light up the reversing lamp and send the CAN signal “ReverseGearSwitch==1” to the CAN network.

※ If any one of the following conditions is met, the BCM will turn off the reversing lamp and send the CAN signal “ReverseGearSwitch==0” to the CAN network:

① Turn the key to OFF or ACC;

② The reversing lamp input is deactivated.

Lane change auxiliary lighting function

※ IGN-ON, when the BCM receives the CAN signal ‘EngineSts=1’ sent by the EMS and the high and low beam lamp switch is activated, when the turn signal lamp switch input is activated, the BCM will turn on the daytime running lamps, and then turn on the hazard warning lamps and turn off the daytime running lamps.

Caution:
※ When the high and low beam lamps are not activated, the turn signal lamp switch input is activated, and the daytime running lamps are continuously lit.

Battery power saving

※ In IGNON or IGNACC, battery power saving is always activated (no trigger is required).

※ Turn the key to OFF, and the battery power saving timer will start to count.

※ 10min after the key is turned to OFF, the power saving of the battery and the power supply of the key lamp and ceiling lamp will be cut off.

※ Within 10 minutes after the key is turned off, the battery power saving timer will reset to 10 minutes after any door or trunk is opened, the remote unlocking signal and the central control unlocking/locking are received.

Ceiling lamp control

※ The control strategy is feasible only when the ceiling lamp switch is in the DOOR position.

※ If any door or trunk is opened and remains open (IGN is in any gear), the ceiling lamp will light up for 3 minutes ±10 % (gradually on and off).

※ Within 3 minutes of the operation of the ceiling lamp: another door is opened, and the ceiling lamp timing is reset - continue to light up for 3 minutes and then gradually go out.

※ Within 3 minutes of the operation of the ceiling lamp: when the key is in the ON position and all doors are closed, the ceiling lamp will gradually go out immediately; when the key is in the OFF or ACC position, all doors will be closed, and the ceiling lamp will continue for 15 seconds and then gradually go out; if the key is turned to IGNON within 15 seconds, the ceiling lamp will go out gradually.

※ When IGN-ON, regardless of the door status, if the value of CAN signal 'CrashOutputSts' is not ‘00’, the BCM will light up the ceiling lamp for 30 minutes, without gradual lighting process, including gradual fading process.

※ Within 30 minutes after the ceiling lamp is turned on: if the key is turned to OFF, the ceiling lamp will gradually go out immediately.

Backlight control

※ Activation condition of backlight: small lamp input is activated (low beam lamp switch will activate position lamp in ON/ST gear, and low beam lamp will not activate position lamp in other ignition gears).

※ The backlight will stop activating if any one of the following conditions is met:

① The small lamp input is deactivated;

② Turn the key to OFF.

※ When IGN=OFF, activate the small lamp switch again, and the backlight will be lit until the small lamp switch is deactivated.

※ When the small lamp is activated, the BCM sends the CAN signal 'ParkTailLightSts' (value is '1') to the ICM, which illuminates the corresponding indicator lamp.

※ When IGN=OFF, the BCM sends "ParkLightOnWarning=1" to the CAN bus when it detects that the left front door is open and the small lamp is not turned off. The BCM can independently adjust the backlight brightness according to the signal on the CAN.

Keyhole lamp control

※ If the left door is open and IGN is in the OFF position, turn on the remote control hole lamp (if the door is always open, it will go out after three minutes). If the door is closed at this time, the key hole lamp will continue for T1 time. If IGN is in the ON position during T1, it will go out immediately.

※ If the left door is open and IGN is in OFF position, the remote control hole lamp is on. At this time, IGN is in ACC/ON position, and the key hole lamp is off immediately.

Fortification mode

※ Trigger condition of fortification mode:

① IGN=OFF ;

② The four doors and trunk are closed;

③ BCM receives remote locking signal.

※ When entering the fortification mode, BCM feedback:

① The anti-theft indicator lamp flashes at the frequency of 100ms on and 1900ms off;

② Turn signal lamp flashes once (lit for 500 ms) and sends corresponding

LHTurnsignalSts and RHTurnsignalSts;

③ Drive the tweeter and woofer for 20ms.

Fortification failure mode

※ Trigger condition of fortification failure mode:

① IGN=OFF ;

② Any of four doors and trunk is not closed;

③ BCM receives remote unlocking signal.

※ When entering the fortification failure mode, BCM light feedback: the turn signal lamp flashes twice (flashing time: 500ms, interval: 1.5 s), and sends the corresponding LHTurnsignalSts and RHTurnsignalSts.

※ The body will not be fortified.

Caution:
※ When entering the fortification failure mode, the trunk is not fully closed, which does not affect the central locking action. The BCM will lock the central control once.
※ If the trunk is closed and any door is not closed, the BCM will lock the central control first and then unlock the central control, with an interval of 500ms.
※ If the BCM receives the remote control locking signal, the central locking is in the lock protection state, and the turn signal lamp flashes twice (flashing time: 500ms, interval: 1.5s), the lock will not act and will not be fortified.

Secondary fortification mode

※ Trigger conditions of secondary fortification mode:

① The whole vehicle is in the fortification mode;

② BCM receives remote unlocking signal.

※ When entering the fortification mode, BCM feedback:

① The anti-theft indicator lamp will go out immediately;

② The turn signal lamp flashes twice at the frequency of 500ms on and 500ms off, and sends the corresponding LHTurnsignalSts and RHTurnsignalSts.

※ The automatic locking of the secondary fortification requires no intrusion. The BCM receives the remote unlocking signal, but the four doors and two covers have no action.

※ Automatic locking is only effective when the remote unlocking signal is received when

the vehicle is fortified.

※ The time from disarming to secondary fortification is: 30± 2 sec.

※ The BCM enters the fortification mode from the secondary fortification mode without any feedback.

※ The BCM receives the remote control signal. If any of the four doors and the trunk are opened, the BCM exits the anti-theft mode.

※ If there is no action on the four doors and trunk, the BCM will automatically lock and enter the fortified state after 30 seconds, and the anti-theft indicator lamp will flash at the frequency of 100 ms on and 1900 ms off.

Intrusion mode

※ Trigger conditions of intrusion mode: When the whole vehicle is in the fortified mode, the BCM will enter the warning state after the following conditions occur:

① The door is opened;

② Turn the key to non-OFF gear;

③ The trunk is opened illegally.

※ The BCM feedback phenomenon within 33 seconds after an warning cycle and entering the intrusion mode is as follows:

① The horn (tweeter and woofer sounds with the frequency of 500 ms ON and 500 ms OFF) works for 28±2 seconds and pauses for 5 seconds;

② The right turn signal lamp flashes for 28 seconds and pauses for 5 seconds at the frequency of 75 times/min (400 ms on, 400 ms off), and sends the corresponding LHTurnsignalSts and RHTurnsignalSts;

③ If the intrusion ends, the BCM will stop the warning after the current warning cycle ends. If the same warning source is triggered again after the warning ends, the BCM will continue the remaining warning cycle.

※ When the intrusion mode is triggered, the warning can be triggered for up to 8 cycles.

※ After the warning is triggered for 8 cycles, the trigger source is triggered again, and the tweeter, woofer and turn signal lamp cannot be activated.

※ The anti-theft indicator lamp flashes continuously at the frequency of 100 ms on, 200 ms off, 100ms on and 600 ms off (1Hz).

※ If the four doors and two covers are closed at the end of the warning, the BCM enters the fortification mode.

※ After triggering the warning for 8 cycles, if the trigger warning source reappears, the whole vehicle is in the intrusion mode, but the audible and visual warning stops.

※ When the same warning source is continuously triggered, a single trigger source can trigger up to 3 warning cycles; the warning will not be triggered again after 3 warning cycles.

※ After the whole vehicle is intruded, the remote control is successfully fortified, and the anti-theft indicator lamp flashes fast and slowly. At this time, the remote control is unlocked and the whole vehicle is disarmed, but the anti-theft indicator lamp still flashes fast. After entering the ON gear, the contact anti-theft indicator lamp flashes fast.

Disarming mode

※ The whole vehicle is in the fortification mode, and the BCM receives the remote unlocking signal; central control unlocking; the turn signal lamp flashes twice (500 ms on, 1 s off, 500 ms on) and sends the corresponding LHTurnsignalSts and RHTurnsignalSts at the same time.

※ The whole vehicle is in warning mode; BCM receives remote unlocking signal. Central control unlocking; the turn signal lamp flashes twice (500 ms on, 1 s off, 500 ms on) and sends the corresponding LHTurnsignalSts and RHTurnsignalSts at the same time; when the warning is disarmed: if the key is not in IGNON, the anti-theft indicator lamp still flashes continuously at the frequency of 100 ms on, 200 ms off, 100 ms on and 600 ms off (1 Hz); if the key is in IGNON, the anti-theft indicator lamp will stop flashing and stop audible and visual warning.

Driver door side mechanical unlocking/locking

※ Activation condition of mechanical unlocking and locking: the whole vehicle responds to mechanical unlocking and locking action.

※ When the mechanical unlocking and locking input signal is switched from unlocking to locking, the BCM will execute the mechanical locking response.

※ When the mechanical unlocking and locking input signal is switched from locking to

unlocking, the BCM will execute the mechanical unlocking response.

Caution:
※ The mechanical unlocking/locking of the driver's side door is still valid when the door is open.
※ The mechanical unlocking/locking of the driver's side door is invalid when the whole vehicle is in the fortified state.

Automatic unlocking/locking

※ Automatic unlocking activation conditions:

① The vehicle speed is 0 km/h;

② Detect key withdrawal.

※ Collision unlocking activation condition:

① IGN ON ;

② The BCM receives the CAN signal “CrashOutputSts ≠ 00”.

※ Activation conditions of high-speed locking:

① IGN ON ;

② The door speed is 30 km/h (19 mph) ;

③ The left front door lock is unlocked.

※ BCM turns off high-speed locking function by default; 2. After the first automatic locking, it is detected that the vehicle speed is lower than 30 km/h (19 mph), and at the same time, the manual unlocking and the door status change, and it will be locked again after returning to 30 km/h (19 mph). If there is no above operation, the locking action will not be performed after 30 km/h.

※ After the BCM receives the CAN signal “CrashOutputSts ≠ 00”, the BCM will unlock the central control twice with an interval of 1 second (independent of the door status).

※ After the BCM receives the CAN signal “CrashOutputSts ≠ 00”, the locking action is prohibited; turn the key to OFF and then to ON, and it is forbidden to lock and cancel.

※ If there are more than 10 central locking actions within 25 s, the central locking operation is prohibited for 30 s. Within 30s of protection, if the BCM receives the CAN signal "CrashOutputSts ≠ 00”, the BCM will execute the central control unlocking described in the collision unlocking.

※ The BCM receives unlocking or locking twice within 1 s, and the second time will be ignored.

※ BCM switch detects anti-jitter for 50 ms±10 %.

※ The BCM will not unlock or lock when it is powered on again after power failure.

※ The BCM receives the unlocking/locking response feedback time of T=200±50 ms (the time T can be modified according to the response time of the door lock).

※ Once any door status is changed, the BCM must immediately send the door status CAN signal to the CAN network.

Front wiper control

※ By turning the manual switch at different positions, the BCM activates different modes of front wiper: OFF mode, defrost wiper mode, intermittent/automatic wiper mode, low speed wiper mode and high speed wiper mode (the switch is valid and must work for at least one cycle). The front wiper has diagnostic function.

※ The wiper operates in the IGN-ON status. If it is in the IGN-ACC or IGN-OFF gear and the wiper is not in the stop position, the wiper will operate at low speed until it returns to the wiper stop position. At this time, the non-return status is detected again, and the wiper will no longer operate (only return once).

※ During operation, when it is detected that the front wiper return switch does not change for 5 seconds, it should be judged that the motor is locked and the output should be closed. At this time, the wiper can be restarted only when the ignition switch passes the OFF-ON cycle or the wiper switch is turned from OFF to another gear.

Spot wiper and low speed wiper mode

※ When IGN-ON, the wiper switch is in low speed mode or spot wiper mode, the BCM drives the wiper motor to operate at low speed. The wiper switch will operate at low speed as long as it is at 'low speed' and 'mist'.

※ When the low-speed wiper operates: when the wiper switch is switched to other operating modes, the wiper will immediately operate in other operating modes.

※ When the wiper switch is turned from low speed to OFF, the wiper will automatically work at low speed until it returns to the wiper stop position (whether IGNON or not).

High-speed wiper mode

※ When IGN-ON, the wiper switch is in high speed mode, the BCM drives the wiper motor to operate at high speed. As long as the wiper switch is at 'HighSpeed', it will perform high-speed action.

※ When the high-speed wiper operates: when the wiper switch is switched to other operating modes, the wiper will immediately operate in other operating modes.

※ When the wiper switch is turned from high speed to OFF and the wiper is not in the stop position, the wiper will automatically work at low speed until it returns to the wiper stop position (whether IGNON or not).

Intermittent wiper mode

※ The intermittent wiper mode can be activated when the vehicle is not equipped with rain sensor.

※ When the wiper switch is turned to "Interval/Automatic", the BCM activates the intermittent wiper mode to drive the wiper motor to work at different intervals.

※ The BCM has two different strategies when switching the intermittent time to other intermittent working time gear when the intermittent wiper is active:

① The new time interval is smaller than the original time interval:

1) If the wiper is in the suspended state when switching to the new intermittent gear, the wiper will immediately work at the new interval.

2) If the wiper is in motion when switching to a new intermittent gear, the wiper will work at a new interval at the next pause.

② The new time interval is greater than the original time interval:

1) If the wiper is in the suspended state when switching to the new intermittent gear, the wiper will complete the current cycle and work at the new interval at the next pause.

2) If the wiper is in motion when switching to a new intermittent gear, the wiper will work at a new interval at the next pause.

※ If the rain sensor is not configured in the IGN-ON gear and the wiper switch is set to the intermittent mode, the BCM will drive the wiper to work at low speed.

※ The wiper sensitivity switch has four gears:

Clearance gear	Time [s]	Resistance
Level 1	13± 0.2	330
Level 2	8± 0.2	220
Level 3	4± 0.2	150
Level 4	2± 0.2	68

※ The BCM detects the wiper stop signal and stops the wiper output after 20 ms.

※ When the key is turned from IGNON to OFF/ACC and the wiper is not in the stop position, the wiper will automatically work at low speed until it returns to the wiper stop position.

※ Turn the key to IGN-CRANK, and the front wiper will temporarily stop output. After Crank, the front wiper function will resume.

Wiper maintenance mode

※ When turning from ON to OFF, operate the wiper switch within 10 s and enter the wiper maintenance mode after 2 s. The wiper will stop at the vertical position after 700 ms to facilitate maintenance of the wiper.

※ After entering the wiper maintenance mode, IGNON, the wiper switch is not in the OFF position, and the wiper returns to the stop position.

Tips:
※ If the customer turns off the engine and does not turn off the wiper, even if the low gear is turned on for 2 s, the wiper maintenance mode cannot be entered. The wiper maintenance mode can only be entered after the switch is turned on again for 2 s.

Front cleaning control

※ Working conditions of front cleaning:

① IGN ON ;

② The activation of the front cleaning input remains more than 0.3 ± 0.1 sec.

※ The front cleaning work will be output when the front cleaning input is activated.

※ The cleaning will be stopped at IGN-CRANK and resume after Crank.

※ After the wiper is in the OFF position and the cleaning input is activated, the BCM drives the wiper motor to work at low speed. When the cleaning input is deactivated, the BCM continues to drive the wiper motor to work at low speed until three cycles are

completed.

※ The wiper works at low speed for 1 cycle after completing 3 cycles and 3±0.2 sec at low speed.

※ When the BCM performs the cleaning action (including 3 cycles and 3±0.2 sec), if the BCM receives the new cleaning request, it will immediately perform the new action.

※ The wiper is in low speed wiper mode or high speed wiper mode. When the cleaning switch is activated, when the wiper is in the low-speed wiper mode or high-speed wiper mode, the wiper will continue to operate in the low-speed wiper or high-speed wiper mode.

Key working conditions

※ The key status is ‘Crank+ON’, and some BCM functions stop being activated. If ‘Crank+ON’ exceeds 10 s, send KeySts=2(ON), and the functions resume.

※ After 'Crank+ON' exceeds 10s, the ACC and ON gears change, and the BCM sends the corresponding KeySts according to the actual position of the key.

Maritime transport mode

※ In maritime transport IGNON mode, the following functions will not be disabled:

① Light lamp, position lamp and turn signal lamp;

② Front and rear wiper and cleaning.

※ Maritime transport mode IGNOFF:

① BCM prohibits all functions;

② After IGNOFF for 3 minutes, the BCM will enter the maritime transport sleep mode and can only wake up through IGN gear.

Power window control

※ When the ignition is in the ON gear, the window can operate all functions.

※ Within 60s after the ignition leaves the ON gear, the window can perform the following functions:

① When the ignition switch leaves the ON gear, if the automatic function is being executed, stop immediately;

② Within 60 s of the delay, the window can only be manually performed;

③ Within 60 s of the delay, if two doors are opened, the BCM will ignore all window

switch inputs;

④ Within 60 s of the delay, if the BCM enters the fortification mode, the BCM will ignore all window switch inputs.

※ Window switches can be divided into window up and window down, both of which have mechanical self-recovery function.

※ If the window switch is operated for less than 50 ms, the window motor will not work.

※ If the window inhibit switch is effective, the BCM ignores the passenger side window switch signal and turns on the inhibit indicator. If the ignition switch leaves the ON gear and ignores all window switch inputs, the inhibit indicator lamp will be turned off.

※ During engine ignition, the window action is suspended; when the ignition is over, except for the automatic rise of the power window, other windows continue to operate.

※ When the BCM detects resistance (due to the window rising to the top, falling to the bottom or other obstacles), the window will stop moving.

※ If the window has not completed its operation (that is, it has not reached the top or fallen to the bottom) within 8 seconds, the window operation will stop.

※ Power window control priority.

LIMP HOME function

※ When the software fails, the small lamp, low beam lamp and indoor lamp will be automatically turned on. If any of the wiper MIST, low speed and high speed switches is effective, the wiper low speed function will be turned on at the same time.

17.1.4 BCM pin definition

Connector CN1 definition: plug-in model: 2137614-1 green			
Terminal No.	**Description**	**Terminal No.**	**Description**
1	Low beam lamp	2	Front fog lamp
3	SEN-grounding	4	Grounding
5	Luggage compartment open switch	6	Unlocking switch
7	PAS-SW reserved	8	RL door slightly opened
9	RR door slightly opened	10	Reverse gear switch
11	Rear fog lamp switch	12	Rear wiper switch 2
13	Front wiper switch 1	14	Front wiper switch 2

Connector CN1 definition: plug-in model: 2137614-1 green			
Terminal No.	Description	Terminal No.	Description
15	Rear wiper reset input	16	SEC indicator lamp
17	Position lamp	18	High beam lamp
19	Key unlocking switch	20	Key locking switch
21	Prohibit switch	22	Locking switch
23	Horn switch	24	FL door slightly opened
25	FR door slightly opened	26	Luggage compartment switch
27	Hazard warning lamp switch	28	Rear fog lamp switch
29	Rear wiper switch 1	30	Demist switch
31	Front cleaner switch	32	Front wiper reset input

Connector CN2 definition: plug-in model: 2137614-2 blue			
Terminal No.	Description	Terminal No.	Description
1	Hazard indicator lamp	2	LINBUS
3	SEN-RL	4	SEN-RR
5	AGND_wiper	6	AGND_ cruise
7	Low beam lamp switch	8	AGND_ light beam
9	SEN-FL reserved	10	RR Window_ Others_ SW
11	PAS indicator lamp reserved	12	RR Window_ Driver_ SW
13	AGND_ Window_ driver	14	SEN-RLM
15	SEN-RRM reserved	16	ACC
17	inhibit indicator lamp	18	CAN_H
19	CAN_L	20	SEN-PWR
21	Wiper intermittent switch	22	Cruise
23	High beam lamp_SW	24	Turn _SW
25	SEN-FR reserved	26	FR window_others_SW
27	RL Window_ Others_ SW	28	RL Window_ Driver_ SW
29	FR Window_ Driver_ SW	30	FL Window_ Driver_ SW
31	KEYIN	32	IGN1ON

Connector CN3 definition: plug-in model: 963357-1 (22PIN)			
Terminal No.	Description	Terminal No.	Description
1	Rear wiper output	2	GND
3	Front wiper high speed output	4	FL window down
5	BCM power supply 2	6	FL window up
7	Front wiper low speed output	8	BCM power supply 5
9	Key lamp	10	RL window down
11	Rear defrosting	12	RL window up
13	BCM power supply 3	14	BCM power supply 4
15	BCM power supply 7	16	FR window down
17	Grounding	18	FR window up
19	Unlocking switch	20	RR window down
21	Locking	22	RR window up

Connector CN4 definition: plug-in model: 963357-2(18PIN)			
Terminal No.	Description	Terminal No.	Description
1	BCM power supply	2	Grounding
3	Right turn lamp	4	Grounding
5	Left turn lamp	6	Rear cleaner output
7	Reverse indicator lamp	8	Front cleaner output
9	DRL	10	BCM power supply 1
11	BCM power supply 6	12	Luggage compartment
13	Reversing lamp	14	Right fog lamp
15	Battery power saver	16	BCM power supply 8
17	Ceiling lamp	18	Horn

17.1.5 BCM fault code

Fault code	Description	Failure type
B1000-16	Power supply voltage	Loop voltage below threshold
B1000-17		Loop voltage above threshold
B1001-18	Left turn signal lamp control circuit	Loop current below threshold
B1001-19		Loop current above threshold
B1002-18	Right turn signal lamp control circuit	Loop current below threshold
B1002-19		Loop current above threshold

Fault code	Description	Failure type
B100A-16	Interior lamp control circuit	Loop voltage below threshold
B100A-17		Loop voltage above threshold
B100C-18	Left front window up control circuit	Loop current too low
B100C-19		Loop current too high
B100C-71		Actuator adhesion
B100D-18	Left front window up control circuit	Loop current too low
B100D-19		Loop current too high
B100D-71		Actuator adhesion
B100E-18	Right front window up control circuit	Loop current too low
B100E-19		Loop current too high
B100E-71		Actuator adhesion
B100F-18	Right front window down control circuit	Loop current too low
B100F-19		Loop current too high
B100F-71		Actuator adhesion
B101B-18	Central lock unlocking control circuit	Loop current too low
B101B-19		Loop current too high
B101B-71		Actuator adhesion
B101C-18	Central lock locking control circuit	Loop current too low
B101C-19		Loop current too high
B101C-71		Actuator adhesion
U0073-88	Control module bus	Bus fault
U0100-87	Lost communication with EMS	Missing node information
U0101-87	Lost communication with TCM	Missing node information
U0129-87	Lost communication with BMS	Missing node information
U0131-87	Lost communication with EPS	Missing node information
U0155-87	Lost communication with ICM	Missing node information
U0167-87	Lost communication with IMMO	Missing node information
U1300-55	Software configuration	Software not configured

17.2 On-board maintenance

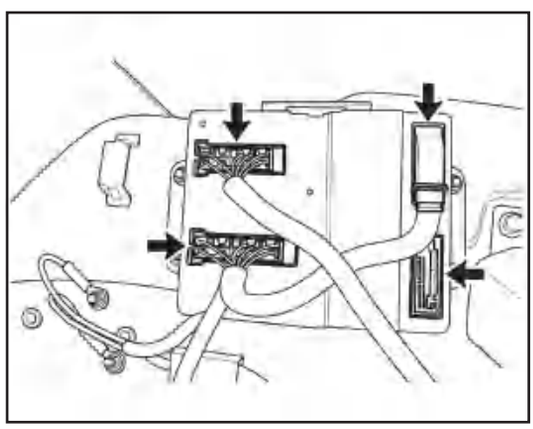
17.2.1 Body control module

Removal

Caution:
※ The original software configuration code needs to be read out before replacing the body control module , and written into the original configuration code after replacement.

1. When the vehicle is in OFF gear, disconnect the negative pole of battery
2. Remove the glove box assembly
3. Remove the body control module

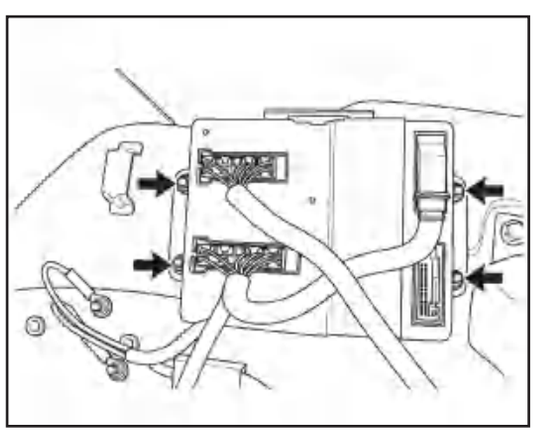
① Unplug the wire harness of 4 sockets of the body control module (arrow).



② Remove 4 fixing nuts (arrows) of the body control module bracket.

Tightening torque:

7.0 ± 1 N•m (5.2±0.7 ft-lbs.)



③ Remove the body control module.

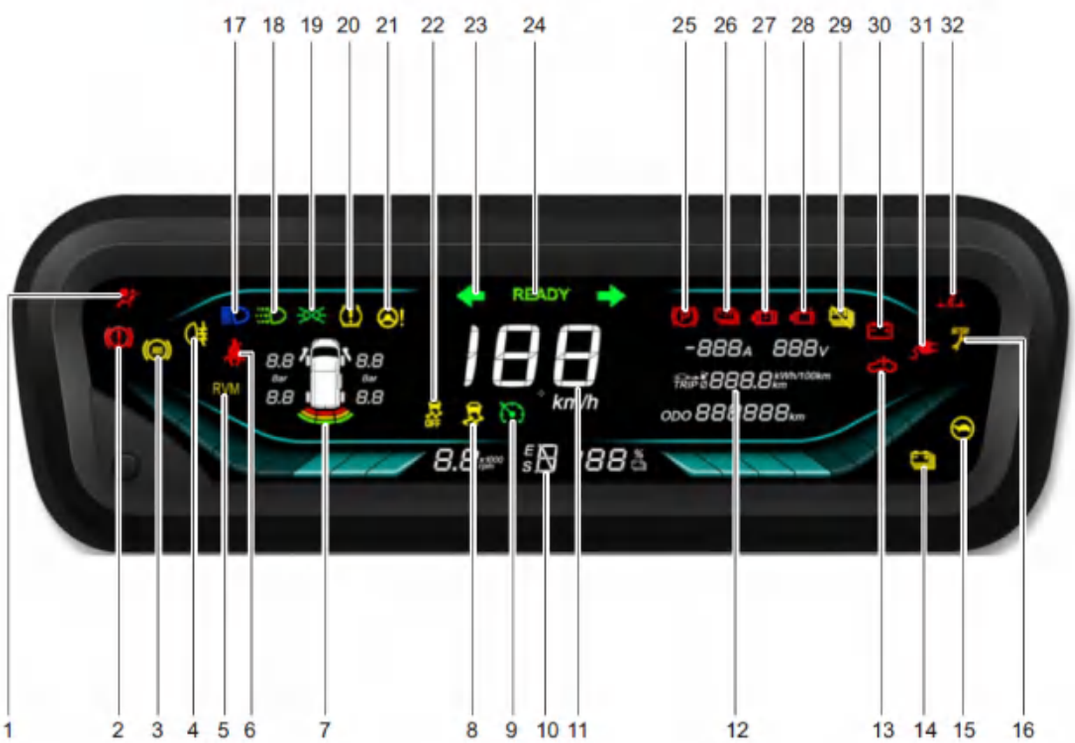
Installation

1. The assembly sequence is the reverse of the disassembly sequence.

Instrument control module (ICM)

18.1 General information

18.1.1 Description



1 - Airbag indicator lamp (reserved)	2-Low brake fluid level/brake fault lamp
3-ABS indicator lamp	4-Rear fog lamp indicator lamp
5-T-BOX fault lamp	6-Safety belt unfastened indicator lamp
7- Tire pressure and reversing radar indicator lamp	8-ESC working indicator lamp (reserved)
9-Cruise control indication (reserved)	10-Gear shift, speed, SOC screen display
11 - Speed display	12-LCD screen display
13-System fault	14-Low battery warning lamp
15 - Power limiting lamp	16-Maintenance indicator lamp
17-High beam lamp	18-Daytime running lamp
19-Position lamp	20-Tire pressure fault lamp
21-EPS fault lamp	22-ESC non working lamp (reserved)
23-Left/right turn signal lamp	24-Ready indicator lamp
25-Parking brake indicator lamp	26-Power battery fault indicator lamp

27-Motor fault lamp	28-Motor and electric control overheat indicator lamp
29-Power battery cut-off indicator lamp	30-12V battery fault lamp
31-Charging connection indicator lamp	32-Insulation fault lamp

18.1.2 Working principle

※ CANBUS communication is designed based on BOSCH CAN2.0.

※ The development of diagnostic function conforms to ISO14229 diagnostic standard, and has the following basic diagnostic functions: read fault code, clear fault code, read data flow and action test, and read software and hardware version information.

※ LCD screen: adopt negative display and segment code LCD screen.

※ LED warning symbols: including 30 warning indicators.

※ Speedometer, tachometer, power and other information are displayed on the LCD screen.

18.1.3 Instrument model and configuration information

Instrument function	H12-3820010EV	
	Function	Remarks
Vehicle speed	●	CAN
Rotation speed	●	CAN
Power	●	CAN
Subtotal/total mileage	●	
Driving mileage	●	CAN
Current	●	CAN
Voltage	●	CAN
Power consumption/100km	●	CAN
Gear information	●	CAN
Tire pressure display	●	CAN (online configuration)
Door opening display	●	CAN
Radar information	●	CAN (online configuration)
ECO	●	CAN
SPORT	●	CAN
Warning symbols:		
Left/right turn signal	●	CAN
Side lamp	●	CAN

Instrument function	H12-3820010EV	
	Function	Remarks
High beam lamp	●	CAN
Rear fog lamp	●	CAN
Driver safety belt unfastened	●	PIN
The power battery is low	●	CAN
Parking indication	●	PIN
Low brake fluid level fault	●	PIN/CAN
Airbag fault	●	PIN
Tire pressure warning	●	CAN (online configuration)
Electric drive system fault	●	CAN
Battery charge and discharge indication	●	CAN
ABS	●	CAN
EBD	●	CAN
Power reduction indication	●	CAN
Power battery cut off	●	CAN
Charging cable connection	●	CAN
Sports readiness	●	CAN
Motor and control unit overheat	●	CAN
EPS	●	CAN
Power battery fault	●	CAN
Insulation fault	●	CAN
Vehicle system fault	●	CAN
T-BOX fault	●	CAN
Battery maintenance	●	CAN
Instrument sends information:		
Vehicle speed output	●	PIN
Battery voltage	●	CAN
Hand brake status	●	CAN
Total mileage	●	CAN
Airbag status	●	CAN
Safety belt unfastened	●	CAN

18.1.4 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Fixing screw of combination instrument	4.5 ± 0.5	3.3±0.4

18.1.5 Power mode judgment priority

The instrument first judges whether the hardware input state of KL15 is ON. If it is ON, the instrument is always in D1 state regardless of the CANKeySts signal; if OFF, judge whether the instrument is in D2 or D3 status by the status of the NetworkCommand sent by the CANKeySts and NWM_BCM nodes.

18.1.6 Working power mode

Working power mode	Condition				Description of working power mode
	KL15	KL30	Network	KeySts	
D1	ON	ON/OFF	/	/	ICM works normally
D2	OFF	ON	SA	ACC	The work is as follows: 1. The decorative line of LCD screen is lit; 2. Door opening display, hazard warning lamp indicator, small lamp indicator, high beam indicator, small lamp. The sound of not closing and key not being pulled out, and the indication of hand brake status

Working power mode	Condition				Description of working power mode
	KL15	KL30	Network	KeySts	
D3	OFF	ON	SA/Sleep	OFF	The work is as follows: 1. Door opening display, hazard warning lamp indicator, small lamp indicator, high beam indicator, small lamp. The sound of not closing and key not being pulled out, and the indication of hand brake status; 2. After receiving the network sleep signal, ICM sleeps, turns off all outputs without any display, and the static current is less than 1mA.
D4	OFF	OFF	/	/	ICM does not work. Except for the total mileage and EEPROM configuration items and parameters, it can not be memorized.

18.1.7 Technical requirements

Operating environment and requirements

※ Working temperature (except LCD screen): -40 ~ +75 °C (-40~167 °F).

※ Working temperature of LCD screen: -30 ~ +75 °C (-22~167 °F).

Environmental requirements for electrical equipment

※ Operating voltage range: 9 ~ 16 V.

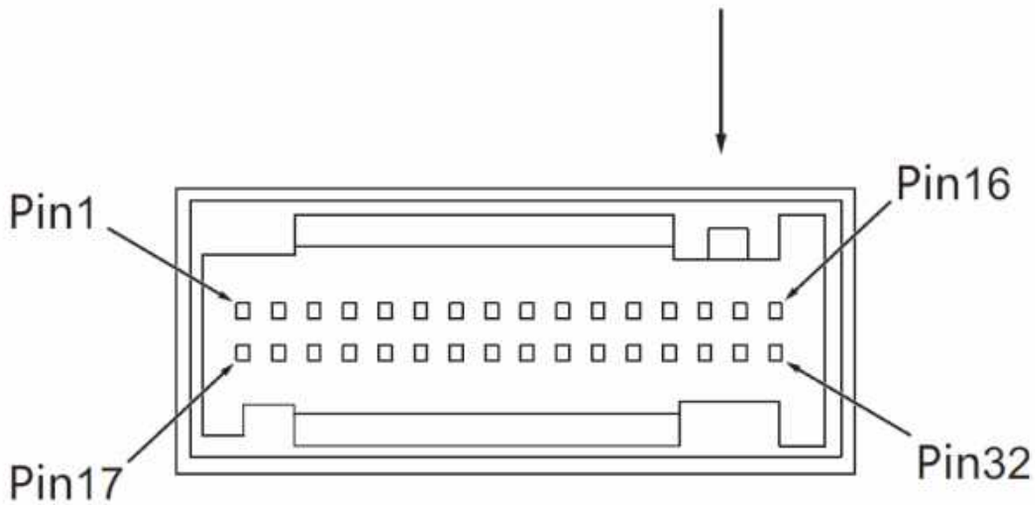
※ Test voltage: 13.5±0.2 V.

※ Nominal voltage: 12 V

※ Working voltage of CAN network: 6 ~ 16 V.

※ In D3 mode and the network enters Sleep mode, the static current is ≦ 1 mA.

18.1.8 Pin definition



Terminal No.	Description	Terminal No.	Description
1	-	17	-
2	-	18	Hand brake signal input
3	Power supply ground	19	Driver's safety belt signal input
4	-	20	-
5	-	21	-
6	-	22	-
7	Vehicle speed output	23	-
8	-	24	-
9	-	25	-
10	-	26	Low brake fluid level
11	Battery power supply	27	-
12	-	28	-
13	Ignition power supply	29	CAN-L

Terminal No.	Description	Terminal No.	Description
14	-	30	CAN-H
15	-	31	-
16	-	32	-

18.1.9 Requirements for adjustment button

Adjustment button function definition

※ Realize the switching of subtotal mileage, endurance mileage and power consumption interface of 100 kilometers; clear the subtotal mileage.

Requirements for operation time

※ Short press time t1: 0.3 s ≦ t1<2 s is short press operation;

※ Long press time t2: t2 ≧ 2 s is long press operation.

Functional requirements

※ The set function can be achieved when the adjustment button is operated;

※ The adjustment button can automatically and completely reset after the external force is removed.

18.1.10 Work instruction

※ The speedometer is a metric speedometer. The instrument calculates the current speed according to (D)/16:

VehicleSpeed	Pointer status
0000-0DCO	(D)/16
0D60-1FFF	220
/	0
/	0

※ When the actual speed is lower than 1 km/h, 0 km/h is displayed, and the speed transmission accuracy is 0.0625 km/h.

※ Indication error: The indication range of the instrument pointer shall meet the following requirements: (1+3 %) V2 ≦ V1 ≦ (1+3 %) V2+2.5 km/h. When the input value of vehicle speed is greater than 214 km/h(133 mph) , the pointer of the speedometer indicates at 220 km/h (136 mph) (failure mode, vehicle speed is out of range).

Actual speed		Indicated speed range (km/h)
km/h	mph	
0	0	0
20	12	20.6 ～ 23.1
40	25	41.2 ～ 43.7
60	37	61.8 ～ 64.3
80	50	82.4 ～ 84.9
100	62	103 ～ 105.5
120	74	123.6 ～ 126.1
140	87	144.2 ～ 146.7
160	99	164.8 ～ 167.3
180	112	185.4 ～ 187.9
200	124	206 ～ 208.5
214	133	220

PIN27 vehicle speed output

※ The instrument outputs the actual vehicle speed through Pin7 frequency. The output interface is OC port (the instrument provides pull-up resistance). The vehicle speed V=3600*f/PPK, f: pin7 output frequency, PPK: the default value is 3600. When the actual vehicle speed is less than 1 km/h, the output is 0Hz. When the actual vehicle speed is 220 km/h(136 mph) , the output is based on the actual vehicle speed of 220 km/h(136 mph) . When the vehicle speed hardware output is 0Hz, the output continues to be low.

※ Correspondence between vehicle speed output frequency and actual vehicle speed

Actual speed		Output frequency(Hz)
km/h	mph	
20	12	20
40	25	40
60	37	60
80	50	80
100	62	100
120	74	120
140	87	140
160	99	160
180	112	180

Speed display accuracy

Number of speed illumination segments	1	2	3	4	5	6	7	8	9	10
Illumination speed	50	1300	2300	3300	4300	5300	6300	7300	8300	9300
Extinguishing speed	10	1000	2000	3000	4000	5000	6000	7000	8000	9000

Power display

※ The meter calculates the current power according to (D)*0.01. When the received signal is invalid, the power will display -- %.

Number of power illumination segments	1	2	3	4	5	6	7	8	9	10
Illumination power value	0.02	0.12	0.22	0.32	0.42	0.52	0.62	0.72	0.82	0.92
Extinguishing power value	0	0.1	0.2	0.3	0.4	0.5	0.6	0.7	0.8	0.9

※ Battery power warning

① When the power is lower than 30 %, the instrument low power warning lamp will light up, and when the power is greater than 32 %, the low power warning lamp will be off.

※ Display requirements

① When the 469 signal is not received for 2.5 s, it is judged that the BMS node information is lost, the instrument power is not displayed, and the display is -- %. The low power indicator lamp does not light up. After receiving the continuous 469 signal again for 2.5 s, the power display is immediately updated to the current value.

Current

※ Working power mode

① The current indication works under D1 condition.

※ Work instruction

① The instrument calculates the present current value according to D*0.05-1600. If the calculation result is positive (for example, 110), it will display:+110 A; if the calculation result is negative, it will display: - 110 A.

※ Display requirements

① When the BMS signal is lost or invalid, the instrument current display: --- A;

② The current display is rounded off decimal display, and only integer is displayed. When 0<calculated value<1, 1 A is displayed; when the calculated current value is 0, 0A is displayed;

③ The instrument current display is updated every 1 s, and the displayed value is the calculated data value of the last frame within 1 s.

Voltage

※ Working power mode

① The voltage indication works under D1 condition.

※ Display requirements

① When the BMS signal is lost or invalid, the instrument voltage display:---V;

② The instrument voltage display is updated once every 1 s, and the displayed value is the average value of the signal within 1 s (10 times).

Gear display

※ Working power mode

① The gear display works under D1 condition.

※ Display requirements

① When the VCU signal is lost, the instrument gear will not be displayed;

② When the gear signal is invalid, reserved or others, the instrument gear will not be displayed.

Driving mileage

※ Working power mode

① The mileage display works under D1 condition.

※ Display requirements

① When the VCU signal is lost or the default value is set, the instrument mileage display:--- km;

② The mileage display discards the decimal part and only displays the integer part.

Power consumption/100 km

※ Working power mode

① The power consumption/100 km is displayed under D1 condition.

※ Display requirements

① When the VCU signal is lost or invalid, the instrument power consumption/100km display:--- kmH/100 km;

② The power consumption/100 km display discards the decimal part and only displays the integer part.

Mileage information

The mileage information of the combination instrument includes: total mileage and subtotal mileage.

※ Total mileage

① Signal source: the mileage signal comes from the integral of the instrument speed signal.

② Working conditions: total mileage is calculated and displayed under D1 conditions.

③ Algorithm: the mileage error shall be ≦ 2 % by integrating the vehicle speed (actual vehicle speed) with time.

④ Refresh time: the LCD display of total mileage is refreshed once every 1km, and the calculation cycle is 1s.

⑤ Display range: total initial mileage display: 0km; display range of total mileage: 0-999999 km. If the total mileage exceeds 999999km, keep this value unchanged.

⑥ Zero clearing mode: when and only when the total mileage does not exceed 256 km (159 miles) for the first time, press and hold the instrument adjustment lever button in D4 mode to make the instrument enter D2 condition and last for 20 s, the total mileage is cleared only once. Total mileage shall not be lost in D4 mode.

※ Subtotal mileage

① Signal source: the mileage signal comes from the integral of the instrument speed signal.

② Working conditions: subtotal mileage is calculated and displayed under D1

conditions.

③ Algorithm: the mileage error shall be ≦ 2 % by integrating the vehicle speed (actual vehicle speed) with time.

④ Refresh time: the LCD display of subtotal mileage is refreshed once every 0.06 mi, and the calculation cycle is 1 s.

⑤ Display range: initial mileage display: 000.0 km; display range of driving mileage: 0.0 ~ 999.9 km. If the driving mileage exceeds 999.9 km, return to zero and start accumulation again.

⑥ Zero clearing mode: under D1 condition, when the subtotal mileage is displayed, press and hold the adjustment button to clear the subtotal mileage. In D2/D3/D4 mode, the mileage is not saved. When the instrument+15 is powered off, the subtotal mileage should not be cleared. After the instrument+30 is powered on and+15 is powered off, the subtotal mileage of meter is cleared, and the initial power-on display is 000.0km.

Reversing radar

※ Working power mode

① The reversing radar works under D1 condition.

※ Display description

① When the distance L ≦ 60 cm (24 in.), 1 grid is displayed.

② When 65 cm (26 in.) ≦ L ≦ 90 cm (35 in.), 2 grids are displayed; when 95 cm (37 in.) ≦ L ≦ 150 cm (59 in.), 3 grids are displayed.

③ When 3E is accepted, the line is not displayed. When 3F is accepted, the three-segment line flashes. 0X20-3D is invalid data and will not be processed.

④ When the radarworks signal of the RADAR received by the instrument is 1, the prompt will be given according to the value of the xxxRadarSensorDistance signal. The following requirements must be met:

1) The instrument will display according to the distance value received from xxxRadarSensorDistance;

2) When the instrument receives the AudibleBeepRate signal value, it beeps according to the corresponding frequency value;

3) When the instrument does not receive the RADAR signal, the three-segment line of the reversing radar flashes at a frequency of 2Hz, and the fault code is stored.

Left/right turn signal

※ Working conditions

① The left/right turn indicator works under D1 condition, and the hazard warning lamp works under D1/D2/D3 condition.

※ Work instruction

① Correspondence between left/right turn indicator and BCM_ 1 signal is as follows:

LHTurnlightSts	RHTurnlightSts	Left turn signal	Right turn signal
0	0	OFF	OFF
0	1	OFF	ON
1	0	ON	OFF
1	1	ON	ON

② The BCM sends RHTurnlightSts and LHTurnlightSts signals in two cycles:

1) 400ms is "1" and 400ms is "0".

2) 200ms is "1" and 200ms is "0".

※ Beep parameters

Function	Beep parameters (Hz)	Warning mode	Trigger mode	Remarks
Left/right turn signal	744	400 ms on,400 ms off,	Beep if signal exists	/
Turn fault mode	744	200 ms on,200 ms off	Beep if signal exists	/

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Left/right turn signal	560mm	60-120	500 ms on,500 ms off 1 Hz	Receive the signal to light indicator lamp	/

※ Display and beep control

① When the BCM node is lost or the signal is the default value, the instrument steering does not indicate and there is no beep;

② When the high-priority beep warning occurs, the high-priority warning will interrupt the steering sound, and only when the high-priority signal ends, the steering beep will be carried out.

Side lamp

※ Working conditions

① The small lamp indication works under D1/D2/D3 conditions.

※ Work instruction

ParkTailLightSts	Small lamp indication
0	OFF
1	ON

① When the small lamp is turned on, the instrument backlight (LCD screen+watch plate) brightness is 30% of the maximum brightness.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Side lamp	560mm	60-120	/	Receive the signal to light indicator lamp	/

※ Display control: When the BCM node is lost, the small lamp indicator lamp will light up.

※ Self-inspection mode: no self-inspection, the signal will display normally when the instrument receives it.

Rear fog lamp

※ The rear fog lamp signal comes from the BCM.

※ The rear fog lamp indication works under D1 condition.

※ Work instruction

RearFogLightSts	Rear fog lamp indicator lamp
0	OFF
1	ON

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Rear fog lamp indicator lamp	587mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

High beam lamp indication

※ The high beam lamp signal comes from the BCM.

※ The high beam lamp indication works under D1/D2/D3 condition.

※ Work instruction

HighBeamSts	High beam lamp indication
0	OFF
1	ON

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
High beam lamp indication	470mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

Daytime running lamp

※ The DRL indication signal comes from the BCM.

※ The DRL indication works under D1 condition.

※ Work instruction

DRLSts	DRL indication
0	OFF
1	ON

① When the BCM node is lost or the DRL signal is the default value, the daytime running indicator lamp does not light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
DRL indication	560mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

Door opening display

※ Door opening indication signal comes from the BCM.

※ Door opening indication works under D1/D2/D3 conditions.

※ Work instruction strategy

① When any door is opened and the vehicle speed is less than 5 km/h (3 mph) , the door opening is displayed (permanently lit);

② When any door is opened and the vehicle speed is ≧ 5 km/h (3 mph) , the door opening indicator will flash at a frequency of 1 Hz, and three audible warnings will be triggered at the same time. The audible warning will not be triggered after the end of the audible warning, unless the door opening status is changed or the ignition is re-ignited; if the door is still not closed, the door opening status will continue to flash, and the audible warning will not be triggered at the same time;

③ If the door is closed during the audible warning, the beep will stop immediately and the door opening display will be closed; if the vehicle speed drops or is 0 during the warning process and the ignition is not turned off, the warning will continue to be kept until the buzzer ends after three beeps and the door opening indicator flashes;

④ After three beeps, as long as any door is not closed, if any door is reopened, the door opening beep will not be triggered, but the door indication will be triggered.

S/N	Input		Output	
	Door status	Vehicle speed	LCD indication	Beep
1	OFF	X	N/A	N/A
2	OPEN	<5 km/h (3 mph)	Flashing (corresponding door flashing)	N/A
3	OPEN	≧ 5 km/h (3 mph)	Flashing (corresponding door flashing)	Three beeps

12V battery charge and discharge indication

※ The charge and discharge fault signal comes from VCU.

※ The charge and discharge indication works under D1 condition.

※ Work instruction

BatteryElectricizeAndDiselectricizeFaults WarningLightSts	Charge and discharge fault display
0	OFF
1	ON

① When the VCU signal is lost or is invalid, the charge and discharge indicator lamp is off.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Charge and discharge fault display	630mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

Safety belt

※ The driver side safety belt indicator signal comes from the driver side safety belt buckle PIN19.

※ The driver side safety belt indication works under D1 condition.

※ Work instruction strategy

Pin19	Driver safety belt indication
Low level	ON
Hang in the air	OFF

① The instrument detects the airbag signal input through the PIN, but the indicator lamp on the instrument is the software control lamp.

※ Warning indicator lamp parameters

Function	Wavelength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Safety belt indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection mode: no self-inspection, the signal will display normally when the instrument receives it.

ABS

※ The ABS fault indication signal comes from ABS.

※ The ABS fault indication works under D1 condition.

※ Work instruction

ABSWLSts	ABS fault indication
0	OFF
1	ON

① When the ABS signal is lost, the ABS indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavelength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
ABS fault indication	587mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection mode: if the ABS configuration exists, the system self-inspection will light up for 3 s (the time is controlled by the ABS module); if ABS does not exist, the ABS indicator lamp will not be lit during the instrument self-inspection.

Hand brake

※ The hand brake indication signal comes from the automatic hand switch (PIN18).

※ The hand brake indication works under D1 condition.

※ Work instruction strategy

Pin18	Driver safety belt indication
Low level	ON
Hang in the air	OFF

① The instrument detects the hand brake signal input through the PIN, but the indicator lamp on the instrument is the software control lamp.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Hand brake instruction	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

Low brake fluid level indication

※ The brake fluid level indication signal comes from the brake fluid level sensor (PIN26).

※ Low brake fluid level indication works under D1 condition.

※ Work instruction strategy

Pin26	Brake fluid level indication
Low level	ON
Hang in the air	OFF

① Remarks: the instrument detects the hand brake signal input through the PIN, but the indicator lamp on the instrument is the software control lamp.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Brake fluid level indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

EBD fault

※ The EBD fault indication signal comes from ABS.

※ The EBD fault indication works under D1 condition.

※ Work instruction

EBDWLSts	Brake fault indication
0	OFF
1	ON

① When the ABS signal is lost, the EBD indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
EBD fault indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection method: the instrument self-inspection will light up for 3 s (after 3 s of self-inspection, any signal of low brake fluid level or EBD fault will warning and the warning lamp will light up).

EPS

※ The EPS fault indication signal comes from EPS_1.

※ The EPS fault indication works under D1 condition.

※ Work instruction

EPSFailSts	EPS fault indication
0	OFF
1	ON

① When the EPS signal is lost, the EPS indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
EPS fault indication	587mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection mode: self-inspection is carried out, and the signal will display normally when the instrument receives it.

Motor fault

※ The motor fault indication signal comes from VCU_1.

※ The motor fault indication works under D1 condition.

※ Work instruction

Motor_InvertorFaultWarningLightSts	Electric drive system fault indication
0	OFF
1	ON

① When the VCU signal is lost, the motor fault indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Motor fault indication	630mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

Power limit indication

※ The power limit fault indication signal comes from the VCU.

※ The power limit fault indication works under D1 condition.

※ Work instruction

SystemWarningLightSts	Power reduction fault indication
0	OFF
1	ON

① When the VCU signal is lost, the power limit indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Power limit fault indication	587mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection mode: self-inspection is carried out, and the signal will display normally when the instrument receives it.

Power battery cut off

※ The power battery cut off indication signal comes from BMS_1.

※ The power battery cut off indication works under D1 condition.

※ Work instruction

PowerBatteryDisconnectWarningLightSts	Power battery cut-off indication
0	OFF
1	ON

① Display description: When the BMS signal is lost, the power battery cut-off indicator

lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Power battery cut-off fault indication	587mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection mode: no self-inspection, the signal will display normally when the instrument receives it.

Power battery fault

※ The power battery fault indication signal comes from VCU_1.

※ The power battery fault indication works under D1 condition.

※ Work instruction

PowerBatteryFaultsWarningLightSts	Power battery fault indication
0	OFF
1	ON

① When the VCU signal is lost, the power battery fault indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Power battery fault indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

Insulation fault

※ The insulation fault indication signal comes from BMS.

※ The insulation fault indication works under D1 condition.

※ Work instruction

Hld_Bms_IsolSuperSts	Insulation fault indication
000	OFF
001	Always on
010	Always on
011	Always on

Hld_Bms_IsolSuperSts	Insulation fault indication
100	Flash

① When the BMS signal is lost, the insulation fault indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Insulation fault indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

※ The self-inspection lasts for 3 seconds and it is controlled by the system signal after the self-inspection is completed.

Charging cable connection

※ The charging cable connection indication signal comes from BMS_1.

※ The charging cable connection indication works under D1/D2/D3 condition.

※ Work instruction

ElectricizeWireConnectLightSts	Charging cable connection indication
00	OFF
01	
10	ON

① When charging, the charging line connection indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Charging cable connection indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

READY indication

※ READY indication signal comes from VCU.

※ READY indication works under D1 condition.

※ Work instruction

READYLightSts	READY indication
0	OFF
1	ON

① After each power-on, when READY is on, the instrument will trigger an audible prompt.

② When the VCU signal is lost, READY indicator lamp will not light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
READY indication	560mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection is carried out, and the signal will display normally when the instrument receives it.

Motor and control unit overheat warning

※ Motor and control unit overheat warning indication signal comes from VCU_ 1.

※ Motor and control unit overheat warning indication works under D1 condition.

※ Work instruction

Motor_ InvertorOvertemperatureWarning LightSts	Motor and control unit overheat warning indication
0	OFF
1	ON

① When the VCU signal is lost, the motor and control unit overheat indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Motor and control unit overheat indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

Vehicle system fault

※ The vehicle system fault indication signal comes from the VCU.

※ The vehicle system fault indication works under D1 condition.

※ Work instruction

SystemFaultsWarning LightSts	Vehicle system fault indication
0	OFF
1	ON

① When the VCU signal is lost, the vehicle system fault indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Vehicle system fault indication	630±7 mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

T-box fault

※ T-box fault indication signal comes from TBOX_1.

※ T-box fault indication works under D1 condition.

※ Work instruction

TBOX_4GSts	TBOX _GPSSts	TBOX _POWERSts	RVM fault indication
0	0	0	OFF
1	X	X	ON
0	1	X	ON
X	0	1	ON

① X represents any value.

② When the T-BOX signal is lost, the RVM indicator lamp will light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
T-BOX fault indication	587mm	60-120	/	Receive the signal to light indicator lamp	/

※ Self-inspection description: Instrument self-inspection for 3 s (shield RVM signal for 3 s). After 3 s self-inspection, if any signal status is 1, the RVM fault indicator lamp will always be on.

Battery maintenance

※ The battery maintenance indication signal comes from VCU_1.

※ The battery maintenance indication works under D1 condition.

※ Work instruction

MaintainLightSts	Battery maintenance indication
0	OFF
1	ON

① When the VCU signal is lost, the battery maintenance indicator lamp will not light up.

※ Warning indicator lamp parameters

Function	Wavel-ength	Light intensity	Warning lamp flashing frequency	Trigger mode	Remarks
Battery maintenance indication	587mm	60-120	/	Receive the signal to light indicator lamp	/

※ No self-inspection, the signal will display normally when the instrument receives it.

Tire pressure display

※ Tire pressure warning indication signal comes from the TPM_1.

※ The tire pressure warning indication works under D1 condition.

※ Work instruction strategy

① Tire pressure system fault working strategy:

TirePressureSystemFailSts	Tire pressure system fault indication
0	Warning lamp is not lit
1	The warning lamp will remain on after flashing for 75s (0.5s on, 0.5s off)

② Tire pressure warning lamp status working strategy:

TirePressureWarningLampSts	Tire pressure warning lamp status
00	Warning lamp is not lit
01	Warning lamp flashes (0.5s on, 0.5s off)

TirePressureWarningLampSts	Tire pressure warning lamp status
10	Warning lamp is always on
11	Warning lamp is not lit

③ TirePressureSystemFailSts has higher priority than TirePressureWarningLampSts tire pressure warning working strategy:

Tire Position Warning (left front, right front, left rear, right rear)	Display Status (left front, right front, left rear, right rear)	Note (left front, right front, left rear, right rear)
000	Tire lamp always on	Normal interface
010	Tire flashes (0.5s on, 0.5s off)	Warning interface (low tire pressure)
101	Tire flashes (0.5s on, 0.5s off)	Warning interface (tire temperature too high)
110	Tire flashes (0.5s on, 0.5s off)	Fault interface
001/100/111	/	Ignore

④ Warning interface: the tire displays and flashes at the frequency of 2 Hz, and the corresponding pressure value flashes.

⑤ Fault interface: the tire displays and flashes at the frequency of 2 Hz, and the corresponding pressure value flashes.

⑥ Failure display: tire pressure value displays '-.-' .

※ Tire pressure warning strategy

① In case of multiple warnings, the warning priority of the indicator lamp is the tire pressure system fault warning indicator lamp, that is, the treatment of TirePressureSystemFailSts takes precedence over the treatment of TirePressureWarningLampSts.

Self-inspection indication

The warning indicator lamp of the combination instrument has two self-inspection methods: instrument self-inspection and system self-inspection.

※ Instrument self-inspection mode:

① From D2/D3 to D1, the instrument self-inspection lasts for 3 s. When the READY lamp is not lit, and after the LED of the instrument driving instrument self-inspection is lit

for 3 s, the LED status is controlled by the corresponding system.

② From D2/D3 to D1, when READY lamp is on during the instrument self-inspection, the instrument self-inspection ends immediately, and the LED status is controlled by the corresponding system.

※ System self-inspection mode:

① From D2/D3 to D1, the system drives the LED to light up (the time varies with different systems), and the instrument controls the LED status according to the system signal.

18.1.11 Fault diagnosis and failure treatment

The instrument shall trigger the corresponding node failure strategy according to the KL15 power and KL30 power status. The general rules are as follows:

※ In D2 state, when the network is from sleep to wake-up, the instrument detects the KL30 node state 1.5 seconds after wake-up, and triggers the corresponding failure strategy;

※ From D2 to D1, state a is executed normally. After KL15 is powered on for 1.5s, the instrument detects the state of KL15 node and triggers the corresponding failure strategy; from D1 to D2, the instrument only detects the KL30 node status and triggers the corresponding failure strategy.

VCU failure treatment

※ DTC storage

① When the VCU signal is not received for 2.5 s, the instrument confirms that the VCU node is lost. The instrument lights up the electric drive system fault, power reduction indication, power battery fault, motor and control unit overheat indication, charge and discharge indication, and system fault warning indication. The instrument stores the corresponding DTC for the current fault.

② The VCU signal is re-detected for 2.5 s, the current fault stored DTC of the instrument is cleared, all fault lamps are indicated according to the current signal value, and the corresponding DTC is stored for the historical fault.

※ Vehicle speed treatment

① During the normal indication of the speedometer, if the VCU_1 signal is not received

for 2.5 s, the vehicle speed will be displayed as "0".

② If the VCU_1 signal is received again for 2.5 s, the speedometer pointer will quickly indicate the current vehicle speed position.

※ Endurance treatment

① If the VCU_1 signal is not received for 2.5 s, the current value of the endurance display will remain unchanged. If the VCU_1 signal is not received for 2.5 s, the instrument endurance display: --- km.

② If the VCU_1 signal is received again for 2.5 s, the current mileage will be displayed immediately.

※ Mileage treatment

① When the VCU_1 signal is not received for 2.5 s, the current value of subtotal mileage A and total mileage display will remain unchanged. When the VCU_1 signal is received again, the subtotal mileage/total mileage will continue to accumulate on the basis before the signal is lost.

MCU failure treatment

※ DTC storage

① When the signal from MCU is not received for 2.5 s, the instrument confirms that the MCU node is lost, and the current fault storage: U0140-87 loses communication with MCU.

② After the MCU signal is detected again for 2.5 s, the current fault storage DTC of the instrument is cleared, and the historical fault storage: U0140-87 loses communication with the MCU.

※ Rotation speed treatment

① In the process of normal speed indication, when the MCU_1 signal is not received, the current value of speed display remains unchanged. If the MCU_1 signal is not received for 2.5 s, the instrument speed display is 0.

② If the MCU_1 signal is received again for 2.5 s, the instrument rotation speed quickly indicates to the current rotation speed position.

ABS failure treatment

※ DTC storage

① When the ABS signal is not received for 2.5 s, the instrument confirms that the ABS node is lost, the instrument lights up the ABS and brake fault indicator lamp, and the current fault storage: U0140-87 loses communication with ABS.

② The ABS signal is re-detected for 2.5 s, the instrument current fault storage DTC will be cleared, the ABS and brake fault indicator lamp will indicate according to the current signal status, and the historical fault storage: U0140-87 loses communication with the BCM.

BMS failure treatment

※ DTC storage

① When the BMS signal is not received for 2.5 s, the instrument confirms that the BMS node is lost, the instrument lights up the power battery cut-off and insulation fault indicator lamp. The current fault storage: U0140-87 loses communication with the BCM.

② After the BCM signal is detected again for 2.5 s, the current fault storage DTC of the instrument is cleared, and the historical fault storage: U0140-87 loses communication with the BCM.

※ Voltage display treatment

① In the process of normal voltage indication, when the BMS_3 signal is not received, the current value of voltage display remains unchanged. If the BMS_3 signal is not received for 2.5 s, the instrument voltage display is ----V.

② If the BMS_3 signal is received again for 2.5 s, the instrument voltage quickly indicates to the current voltage position.

※ Current display treatment

① In the process of normal current indication, when the BMS_3 signal is not received, the current value of current display remains unchanged. If the BMS_3 signal is not received for 2.5 s, the instrument current display is ----A.

② If the BMS_3 signal is received again for 2.5 s, the instrument current quickly indicates to the present current position.

※ Battery power treatment

① In the process of normal battery power indication, when the BMS_3 signal is not received, the current value of battery power display remains unchanged. If the BMS_3 signal is not received for 2.5 s, the instrument battery power display is ----%.

② If the BMS_3 signal is received again for 2.5 s, the instrument battery power quickly indicates to the current battery power position.

T-BOX failure treatment

※ When the T-BOX signal is not received for 2.5 s, the instrument confirms that the T-BOX node is lost, the instrument lights up the T-BOX fault indicator lamp, and the current fault storage: U0140-87 loses communication with T-BOX.

※ After the T-BOX signal is detected again for 2.5 s, the current fault storage DTC of the instrument is cleared, T-BOX will indicate according to the signal status, and the historical fault storage: U0140-87 loses communication with the T-BOX.

BCM failure treatment

※ When the signal from BCM is not received for 2.5 s, the instrument confirms that the BCM node is lost, the instrument lights up the small lamp, and the current fault storage: U0140-87 loses communication with BCM.

※ After the BCM signal is detected again for 2.5 s, the current fault storage DTC of the instrument is cleared, small lamp will indicate according to the signal status, and the historical fault storage: U0140-87 loses communication with the BCM.

EPS failure treatment

※ When the EPS signal is not received for 2.5 seconds, the instrument confirms that the EPS node is lost, the instrument lights up the EPS fault indicator lamp, and the current fault storage: U0140-87 loses communication with EPS.

※ After the EPS signal is detected again for 2.5 s, the current fault storage DTC of the instrument is cleared, EPS fault lamp will indicate according to the signal status, and the historical fault storage: U0140-87 loses communication with the EPS.

Power supply failure treatment

※ KL30 open circuit

① In D1 mode, if KL30 is open circuited, the instrument needs to maintain normal

working status;

② KL30 open circuit lasts for 2.5 s, and the corresponding DTC (KL30 open circuit) is stored for the current fault of the instrument;

③ The KL30 power supply recovery time lasts for 2.5 s, the current fault of the instrument is cleared, and the KL30 open circuit DTC is stored for the historical fault.

※ KL15 and KL30 open circuit

① In D1 mode, KL15 and KL30 are open circuited at the same time, that is, the instrument directly enters D4 mode from D1 mode: the instrument does not work;

② The subtotal mileage and average fuel consumption are cleared.

Low voltage treatment

※ Low voltage (9 V)

① If the voltage of KL15 or KL30 is lower than 9V and lasts for more than 2.5 s, the current fault of the instrument will store the corresponding DTC (low voltage).

② If KL15 or KL30 voltage recovers to more than or equal to 9V and lasts for more than 2.5 s, the current fault of the instrument will be cleared, and the corresponding DTC will be stored for the historical fault.

※ Low voltage (6.5 V)

① In the process of drawing T1, T2 and T3 under KL15 and KL30 voltage, the instrument warning indicator and LCD display are turned off, but in this process, the stored information of the instrument will not be lost.

② When the voltage of KL15 and KL30 recovers to above 9 V, the warning indication and LCD display will resume, and the instrument cannot perform the self-test function.

18.2 On-board maintenance

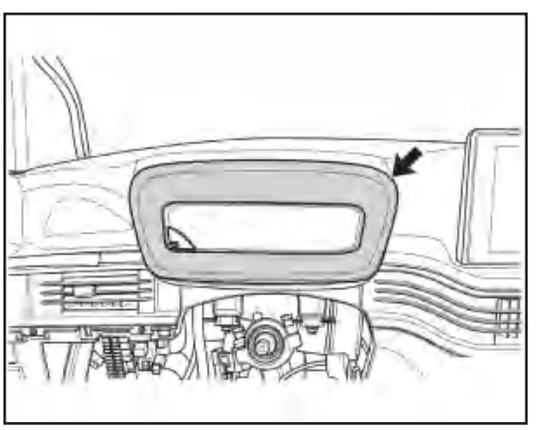
18.2.1 Combination instrument assembly

Removal

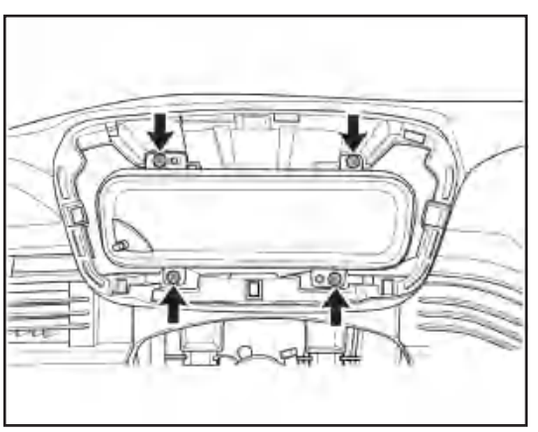
Caution:
※ When removing the combination instrument assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the combination instrument assembly, be careful to prevent damage to parts. ※ When removing the combination instrument assembly, avoid scratching the interior trim and body paint.

1. Turn the start button to OFF
2. Disconnect the negative battery cable
3. Remove the combination instrument

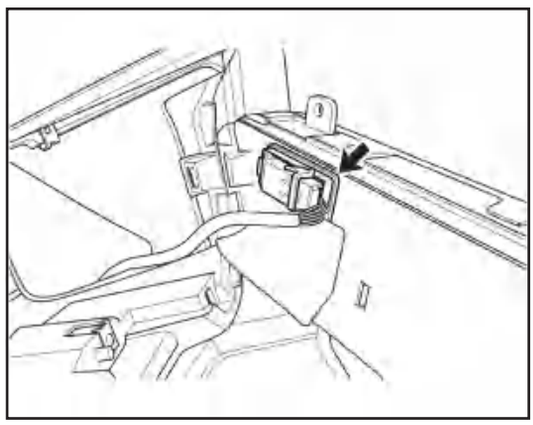
① Use the interior trim pry to carefully pry off the combination instrument shield (arrow).



② Remove 4 fixing screws (arrows) of the combination instrument assembly.



③ Disconnect the instrument harness connector plug (arrow).



④ Remove the combination instrument assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the combination instrument, be sure to install the connector in place.
※ When installing the combination instrument, be sure to fasten the fixing screws in place.
※ When installing the combination instrument, be careful to prevent damage to parts.

Reversing radar

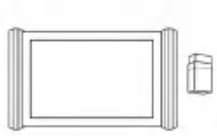
19.1 General information

19.1.1 Working principle

The reversing radar system uses the principle of ultrasonic reflection to measure distance. After the probe of reversing radar sends out ultrasonic wave and receives the obstacle echo, the controller calculates the obstacle distance according to the ultrasonic ranging principle, and sends the data to the display terminal for display and warning. So as to help the driver eliminate the defects of dead corners and blurred vision, and improve the safety of reversing driving.

19.1.2 Tools

Special tools

Diagnostic instrument	

19.1.3 Diagnosis and test

Fault symptom table

Tips:
※ Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence. Repair or replace faulty parts or make adjustments as necessary.

Symptom	Suspicious parts
The reversing radar system does not work (the buzzer in the combination instrument does not sound)	Reversing lamp switch
	Reversing radar sensor
	Radar control module assembly
	Combination instrument
	Harness and connector

19.2 On-board maintenance

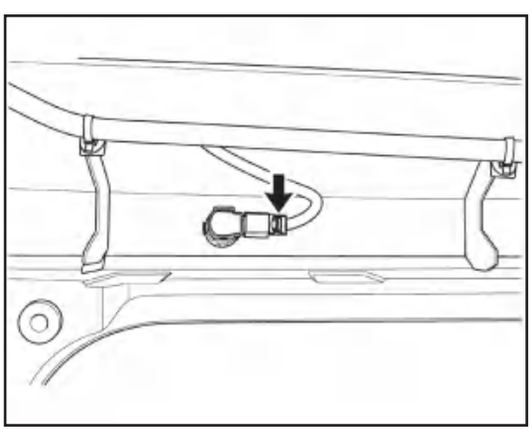
19.2.1 Reversing radar sensor

Removal

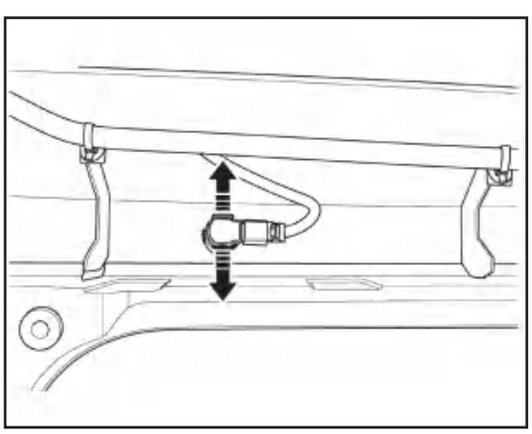
Warning:
※ When removing the reversing radar sensor, be sure to wear labor protection articles to avoid accidents.
※ When removing the reversing radar sensor, be careful to prevent damage to the reversing radar sensor.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the rear bumper assembly
4. Remove the reversing radar sensor

① Disconnect the reversing radar sensor connector (arrow).



② As shown in the figure, pull the locking part on the reversing radar sensor outward in the direction of the arrow.



③ Remove the reversing radar sensor from the rear bumper assembly slot.

Installation

Caution:
※ When installing the reversing radar sensor, be sure to install the connector in place. ※ After installing the reversing radar sensor, check whether the reversing radar system can work normally.

T-BOX system

20.1 General information

20.1.1 Pin definition

Terminal No.	Description	Terminal No.	Description
1	Slow charging activation	2	—
3	—	4	—
5	—	6	—
7	—	8	—
9	—	10	—
11	—	12	—
13	—	14	—
15	—	16	—
17	—	18	—
19	HSCAN_H	20	Power supply
21	IG	22	Fast charging activation
23	—	24	—
25	—	26	—
27	—	28	—
29	—	30	Grounding
31	—	32	—
33	—	34	—
35	—	36	—
37	—	38	—
39	HSCAN_L	40	Grounding

20.2 On-board maintenance

20.2.1 TBOX module

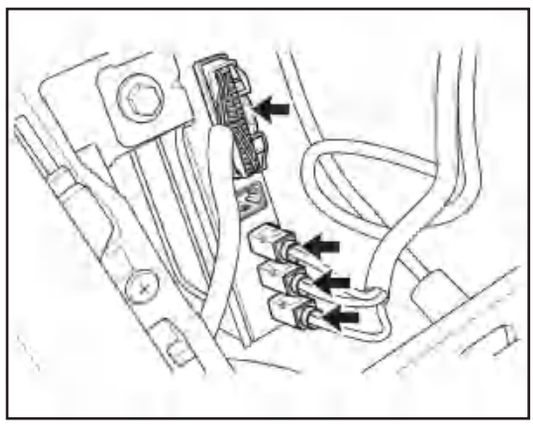
Removal

Caution:
※ When removing TBOX module, be sure to wear labor protection articles to avoid accidents.

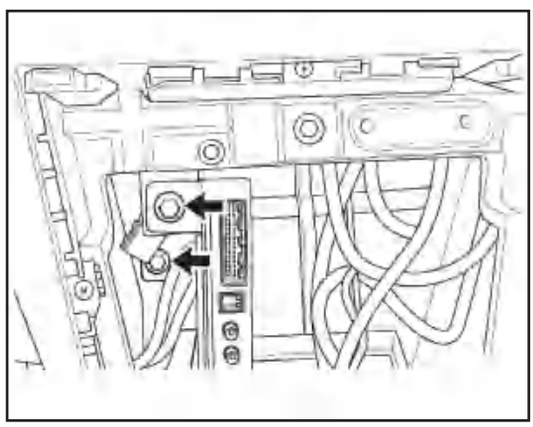
1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the central control panel assembly

4. Remove TBOX module

① Disconnect TBOX module connector (arrows).



② Remove 2 fixing bolts (arrows) of TBOX module.



③ Remove TBOX module assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

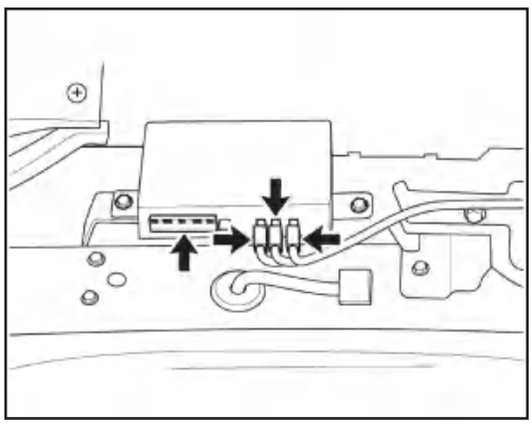
20.2.2 Wireless communication module

Removal

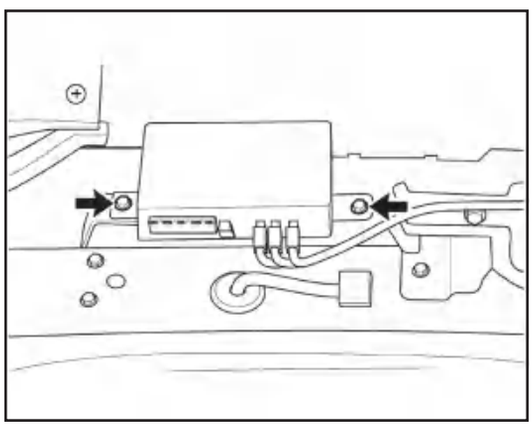
Caution:
※ When removing the wireless communication module, be sure to wear labor protection articles to avoid accidents.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the lower right storage box
4. Remove the wireless communication module

① Disconnect the wireless communication module connectors (arrows).



② Disconnect the wireless communication module connectors (arrows).



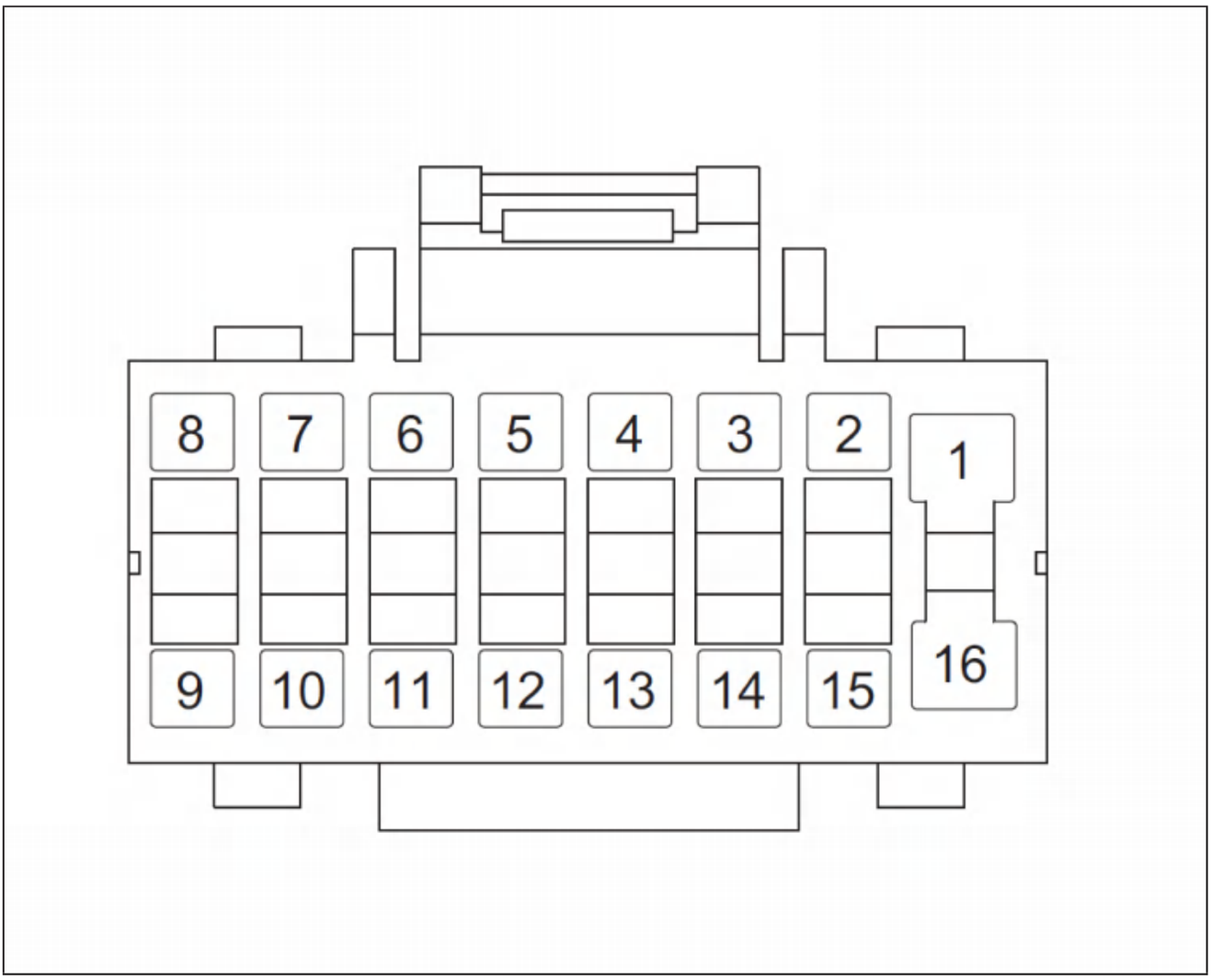
③ Remove the wireless communication module assembly.

Installation

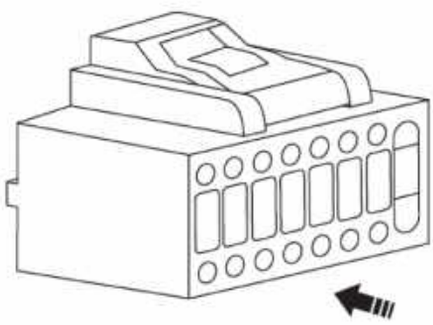
1. The installation sequence is the reverse of the removal sequence.

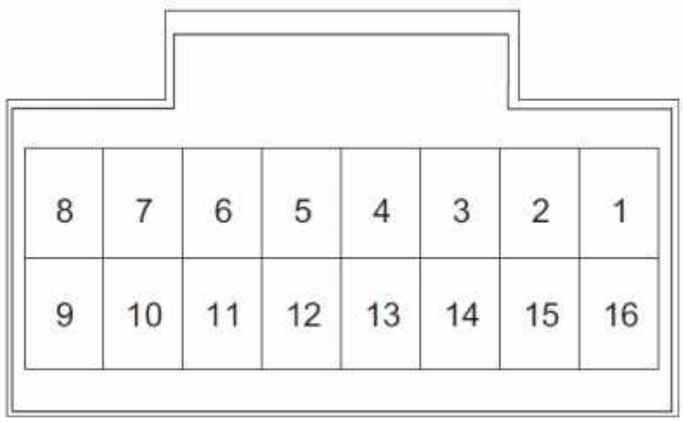
Multimedia entertainment system*

21.1 Pin definition

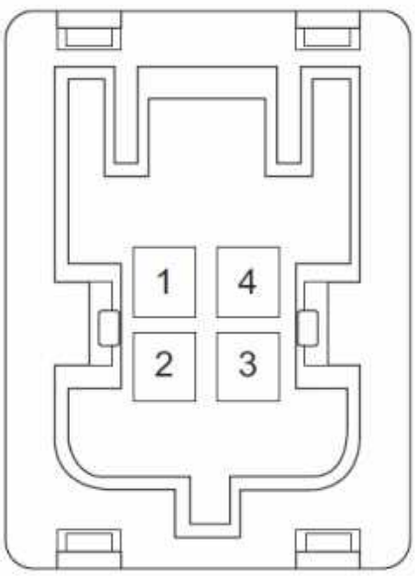


Terminal No.	Description	Terminal No.	Description
1	Power supply ground	2	Left front door speaker+
3	Left front door speaker-	4	Right front door speaker-
5	Right front door speaker+	6	Left rear door speaker+
7	Left rear door speaker-	8	Right rear door speaker+
9	Right rear door speaker-	10	Steering wheel key GND
11	Antenna working power output	12	Steering wheel key signal 1 (audio input)
13	Steering wheel key signal 2 (Telephone input)	14	Small lamp signal input
15	Trigger power ACC	16	Battery power supply





Terminal No.	Description	Terminal No.	Description
1	Reversing signal	2	NC
3	NC	4	NC
5	Camera video+	6	Camera video-
7	Camera power supply	8	Camera ground
9	NC	10	NC
11	NC	12	NC
13	NC	14	NC
15	NC	16	NC



Terminal No.	Description	Terminal No.	Description
1	USB-5 V	2	USB signal-
3	USB signal+	4	GND

21.2 On-board maintenance

21.2.1 Large multimedia screen*

Removal

Warning:
※ When removing the large multimedia screen, be sure to wear labor protection articles to avoid accidents.
※ When removing the large multimedia screen, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the large multimedia screen, avoid scratching the interior trim.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the large multimedia screen

① Remove 2 screws in front with a cross screwdriver.

② Remove 2 screws at rear with a cross screwdriver.

③ Unplug the large multimedia screen harness plug-in (arrow).

④ Remove the large multimedia screen.

Inspection

1. Check whether the large multimedia screen connector and terminal are deformed or damaged. Replace it if necessary.
2. Check whether the large multimedia screen casing is deformed or damaged. Replace it if necessary.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the large multimedia screen, be careful to prevent damage to parts.
※ When installing the large multimedia screen, always tighten the fixing screws to the specified torque.
※ When installing the large multimedia screen, be sure to install the connectors in place.
※ When installing the large multimedia screen, check whether the large multimedia screen can work normally.

Wiper system

22.1 General information

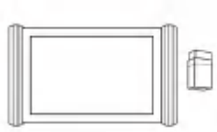
22.1.1 Specification

Torque specification

Description	Torque	
	N·m	ft-lbs.
Fixing nut of front wiper arm assembly	18± 2	13.3±1.5
Wiper motor and linkage assembly fixing bolt	9.0±1.5	6.6±1.1
Fixing bolt of cleaning fluid tank assembly	7±1	5.2±0.7

22.1.2 Tools

Common tools

Tool name	Tool picture
Diagnostic instrument	

22.1.3 Diagnosis and test

Fault symptom table

Tips:
※ Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence. Repair or replace faulty parts or make adjustments as necessary.

Symptom	Suspicious parts
The front wiper and cleaner systems do not work	Fuse
	Wiper switch assembly
	Cleaner pump
	BCM
	Harness or connector
The front wiper system does not work at the LO or HI position	Wiper switch assembly
	Front wiper motor assembly
	BCM
	Harness or connector

Symptom	Suspicious parts
Front wiper system does not work	Fuse
	Wiper switch assembly
	Front wiper motor assembly
	BCM
	Harness or connector
When the front wiper switch is closed, the front wiper arm and front wiper blade do not return to the initial position	Front wiper motor assembly
	BCM
	Harness or connector
Cleaner system does not work	Nozzle assembly
	Wiper switch assembly
	Cleaner pump
	BCM
	Harness or connector

22.2 On-board maintenance

22.2.1 Wiper switch assembly

Removal

Caution:
※ When removing the wiper switch assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the wiper switch assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing the wiper switch assembly, avoid scratching the interior trim and body paint.

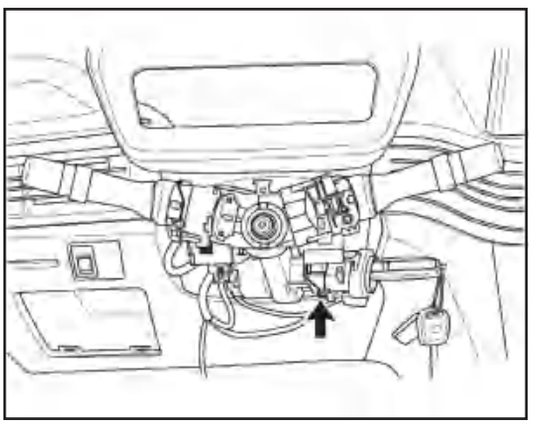
1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable

Warning:
※ After disconnecting the negative battery cable, wait for at least 90 seconds to prevent the airbag and safety belt tensioner from activating.

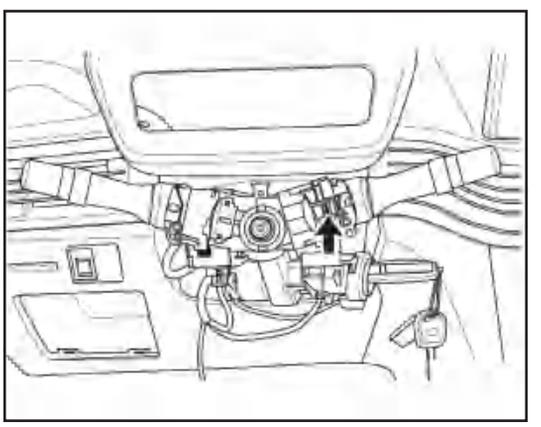
3. Remove the driver airbag assembly
4. Remove the steering wheel assembly

5. Remove the lower shield of the combination switch
6. Remove the upper shield of the combination switch
7. Remove the wiper switch assembly

① Disconnect the wiper switch connector (arrow).



② Disengage the fixing clip (arrow) of the wiper switch from the combination switch and take out the wiper switch.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When removing the wiper switch assembly, be careful to prevent damage to parts.
※ When installing the wiper switch assembly, be sure to install the connectors in place.
※ When installing the wiper switch assembly, check whether the switch can work normally.

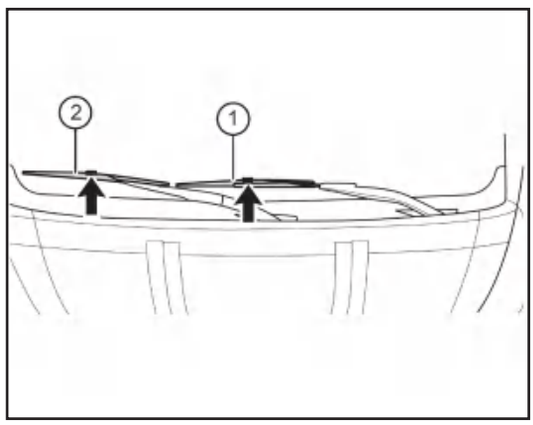
22.2.2 Front wiper blade assembly

Removal

Caution:
※ When removing the front wiper blade assembly, be sure to wear labor protection articles to avoid accidents.

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

① As shown in the figure, press the button in the direction shown by the arrow and pull it out slightly to remove the main front wiper blade (1) and the auxiliary front wiper blade (2).



Installation

1. The installation sequence is the reverse of the removal sequence.

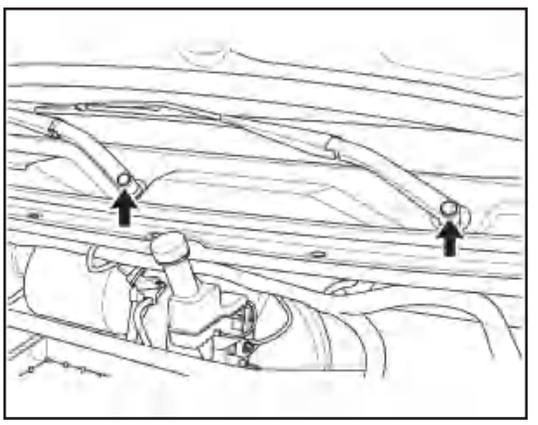
22.2.3 Front wiper arm assembly

Removal

Caution:
※ When removing the front wiper arm assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the front wiper arm assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the front wiper arm assembly, avoid scratching the front windshield assembly.

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

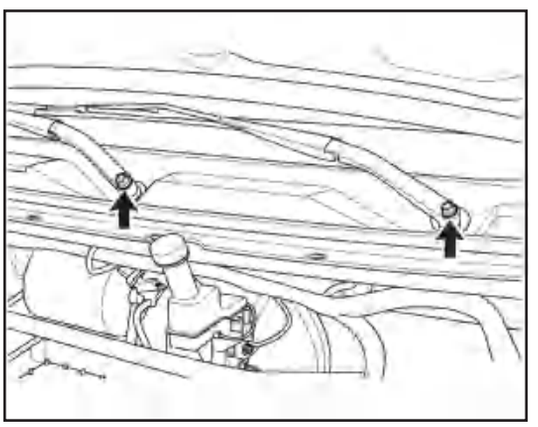
① Remove the front wiper arm trim cap (arrow) with a screwdriver wrapped with protective tape.



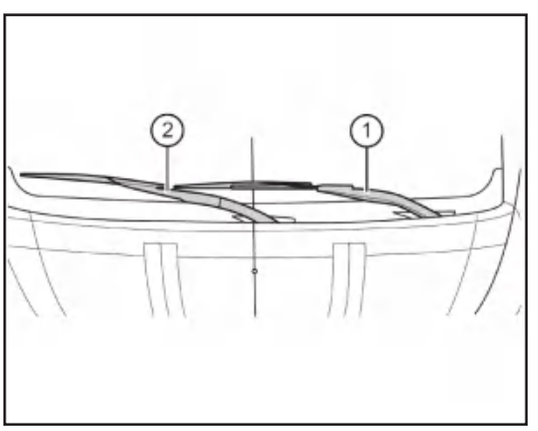
② Remove 2 fixing nuts (arrows) on the front wiper arm assembly.

Tightening torque:

18 ± 2 N•m (13.3±1.5 ft-lbs.)



③ Remove the front main wiper arm (1) and front auxiliary wiper arm (2).



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When removing the front wiper arm assembly, be careful to prevent damage to other parts. ※ When installing the front wiper arm assembly, always tighten the fixing nuts to the specified torque. ※ When installing the front wiper arm assembly, check whether the front wiper arm assembly can work normally. ※ During assembly, please pay attention to the locating point on the front windshield assembly and press the wiper arm blade on the identification point.

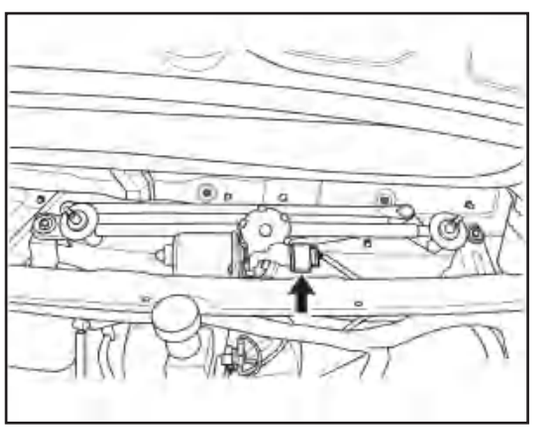
22.2.4 Front wiper motor and linkage assembly

Removal

Caution:
※ When removing the front wiper motor assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the front wiper motor assembly, pay attention to apply the appropriate strength and be careful when operating. ※ When removing the front wiper motor assembly, avoid scratching the body paint.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the front wiper arm assembly
4. Remove the front windshield lower trim panel assembly
5. Remove the wiper motor and linkage assembly

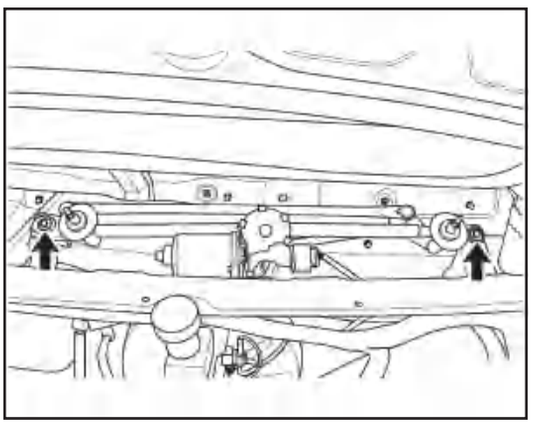
   ① Disconnect the connector (arrow) on the wiper motor and linkage assembly.



② Remove 2 fixing bolts (arrows) on the wiper motor and linkage assembly.

Tightening torque :

9.0 ± 1.5 N•m (6.6±1.1 ft-lbs)



③ Remove the wiper motor and linkage assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When removing the front wiper motor assembly, be careful to prevent damage to other parts. ※ Before installing the front wiper motor assembly, adjust and ensure that the wiper motor and wiper linkage are at the initial position, otherwise the wiper system will not work normally. ※ When installing the front wiper motor assembly, install the connector in place and tighten the fixing bolts to the specified torque. ※ After installing the front wiper motor assembly, check whether the wiper system can work normally.

22.2.5 Front nozzle assembly

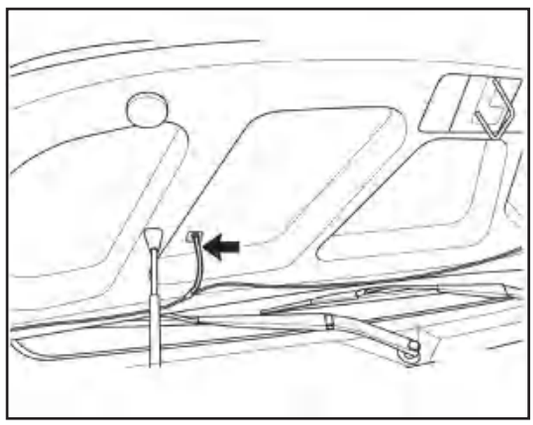
Removal

Caution:
※ When removing the front nozzle assembly, be sure to wear labor protection articles to avoid accidents.

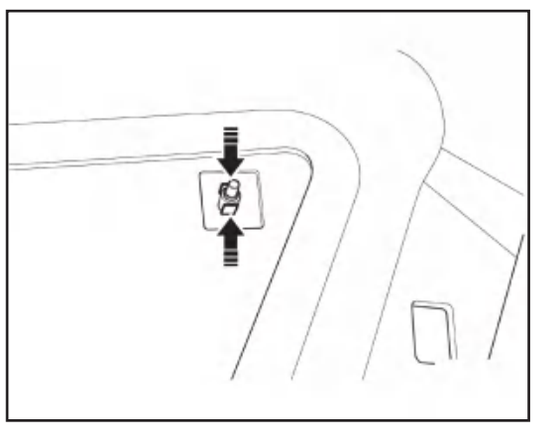
1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the front nozzle assembly

① Open the engine hood.

② Pull out the front washing pipeline (arrow).



③ Press the clip (arrow) at the front washing nozzle interface to remove the front washing nozzle.



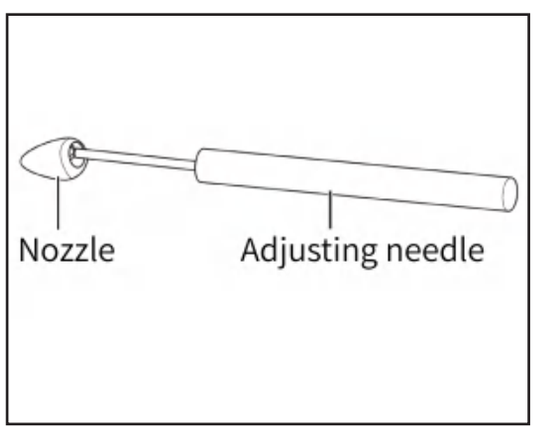
Inspection

1. Check the front nozzle assembly.

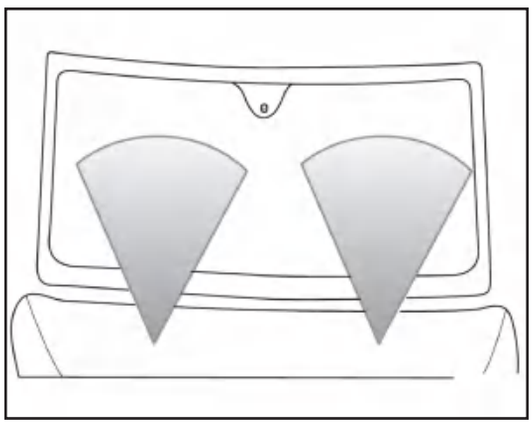
   ① Check whether the front nozzle is blocked, deformed or damaged. If necessary, replace the front nozzle.

Adjust nozzle angle

1. Use the adjusting needle to adjust the water spray angle. After inserting the adjusting needle into the ball head, pull up and down to adjust the water spray angle.



2. After adjustment, the water spray status is as shown in the figure.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When removing the front nozzle assembly, be careful to prevent damage to parts.
※ When installing the front nozzle assembly, install the cleaning pipeline connector in place.
※ After installing the front nozzle assembly, check whether the nozzle can work properly.

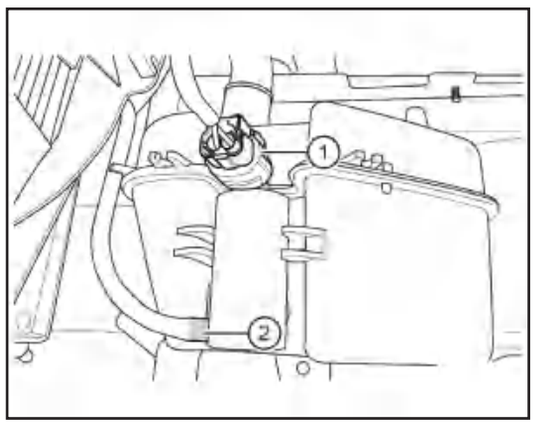
22.2.6 Cleaning pump assembly

Removal

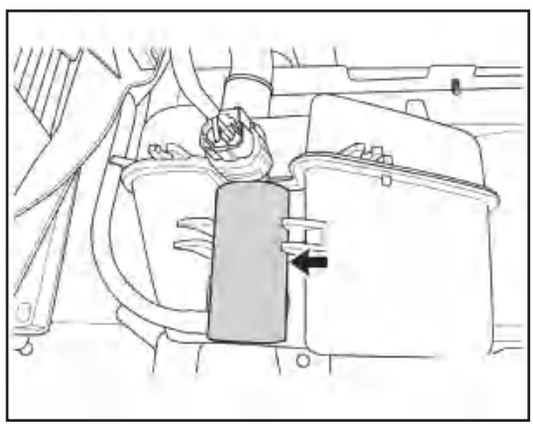
Caution:
※ When removing the cleaning pump assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the cleaning pump assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the cleaning pump assembly, avoid scratching the body paint.

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

① Disconnect the front cleaning pump connector (1) and the interface (2) between the front cleaning pipeline and the cleaning pump.



② Pull out the cleaning pump assembly (arrow).



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When removing the cleaning pump assembly, be careful to prevent damage to parts.
※ When installing the cleaning pump assembly, install the cleaning pipeline connector in place.
※ After installing the cleaning pump assembly, check whether the cleaner system can work normally.

22.2.7 Cleaning fluid tank assembly

Removal

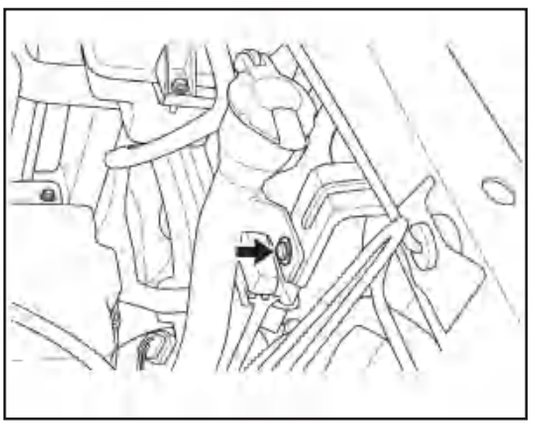
Caution:
※ When removing the cleaning fluid tank assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the cleaning fluid tank assembly, pay attention to apply the appropriate strength and be careful when operating.
※ When removing the cleaning fluid tank assembly, avoid scratching the body paint.

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

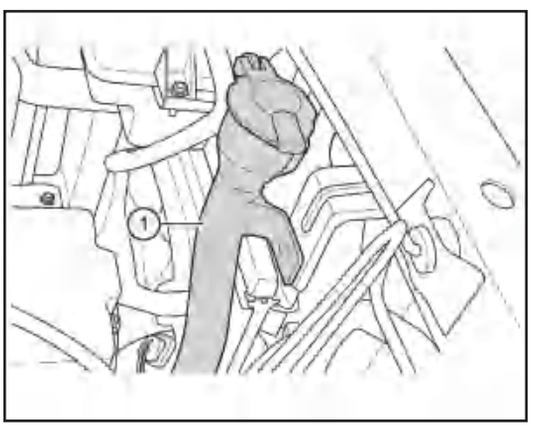
① Remove the fixing bolts (arrows) on the guide tube assembly.

Tightening torque :

7 ± 1 N•m (5.2±0.7 ft-lbs.)

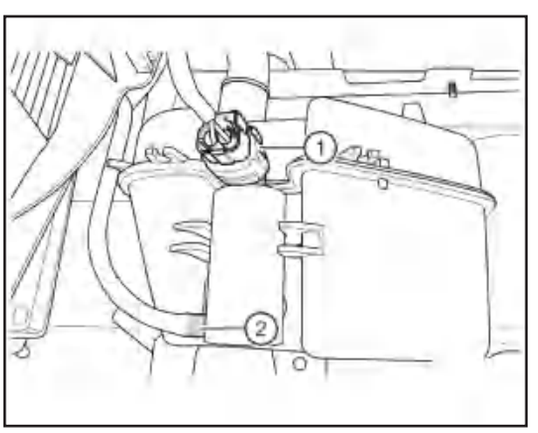


② Remove the guide tube assembly (1) from the cleaning fluid tank assembly.

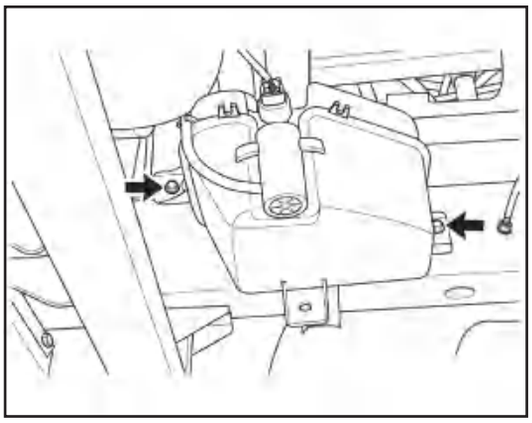


5. Remove the cleaning fluid tank assembly

① Disconnect the cleaning pump connector (1) and the interface (2) between the cleaning pipeline and the cleaning pump.



② Remove 2 fixing nuts (arrows) on the cleaning fluid tank assembly, and remove the cleaning fluid tank assembly.



Inspection

1. Check the cleaning fluid tank assembly.
   ① Check the cleaning fluid tank assembly for leakage, deformation or damage. If necessary, replace the cleaning fluid tank assembly.
   ② Check whether the inside and outside of the cleaning fluid tank is dirty. If necessary, remove the dirt or replace the cleaning fluid tank assembly.
   ③ Check whether the sealing ring is damaged. Replace the sealing ring if necessary.

Installation

1. The installation sequence is the reverse of the removal sequence.

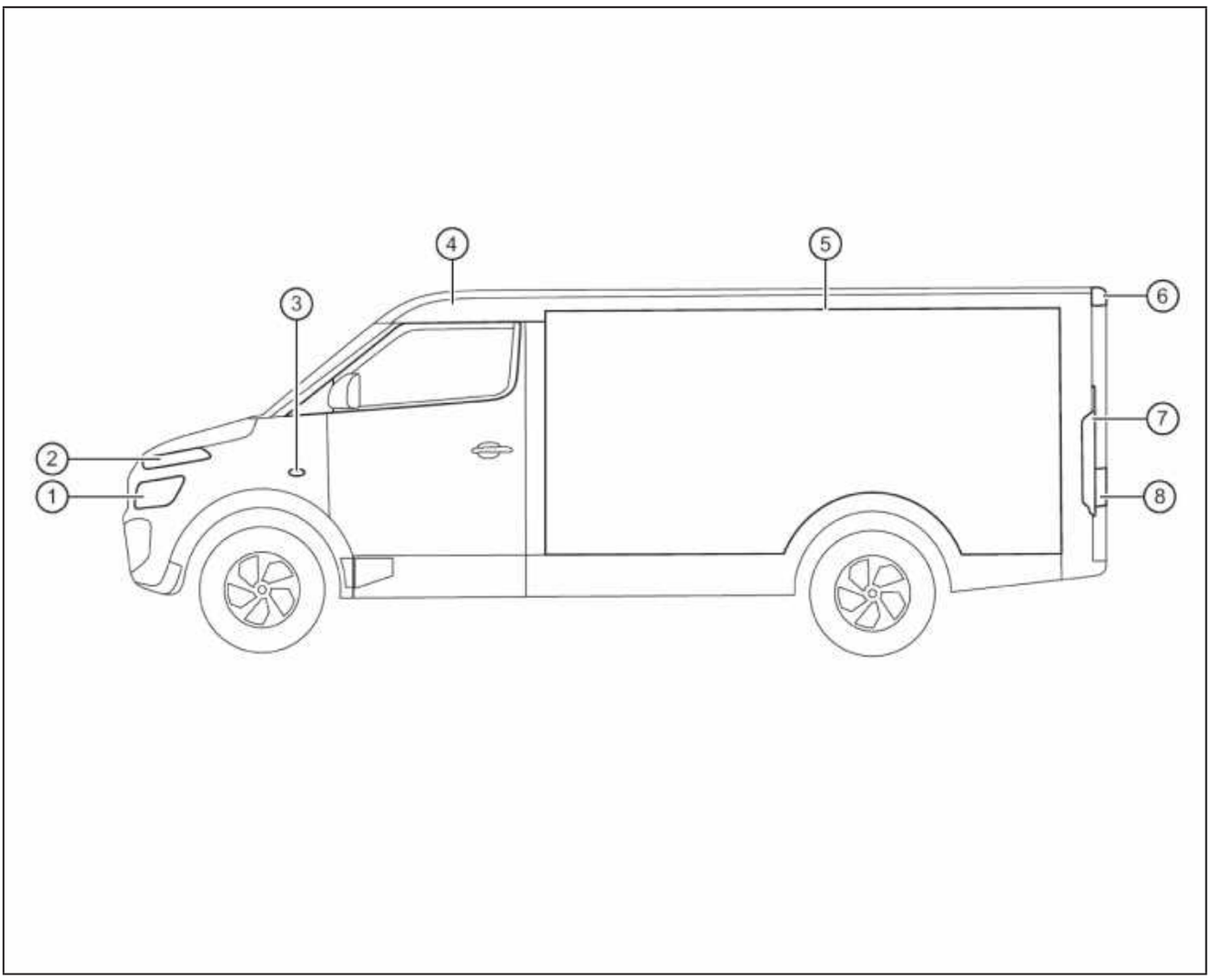
Caution:
※ When removing the cleaning fluid tank assembly, be careful to prevent damage to parts.
※ When installing the cleaning fluid tank assembly, tighten the fixing bolts to the specified torque.
※ When installing the cleaning fluid tank assembly, install the cleaning pipeline connector in place.

Lighting system

23.1 General information

23.1.1 Description

Lamp position diagram



1-Left headlamp assembly	2-Left front position lamp assembly
3-Left turn signal lamp assembly	4-Interior front ceiling lamp assembly
5-Interior rear ceiling lamp assembly	6-High brake lamp assembly
7 - Rear tail lamp assembly	8-License plate lamp assembly

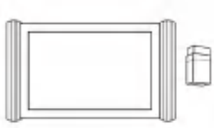
The lighting system of this vehicle is composed of vehicle lighting device and light signal device, which can be used for the normal operation of the vehicle and ensure the safety of driving at night or in fog.

23.1.2 Torque specification

Description	Torque	
	N·m	ft-lbs.
Headlamp assembly fixing bolt	5±1	3.7±0.7
Front position lamp assembly fixing bolt	5±1	3.7±0.7
Fixing screw of rear tail lamp assembly	3±1	2.2±0.7
Fixing nut of rear tail lamp assembly	3±1	2.2±0.7
Fixing nut of high brake lamp assembly	3±1	2.2±0.7
Fixing screw of interior front ceiling lamp	3±1	2.2±0.7

23.1.3 Tools

Special tools

Diagnostic instrument	

Common tools

Digital multimeter	

23.1.4 Turn signal lamp control

Turn signal lamp function

※ The BCM will turn on the turn signal lamp when it meets the following two conditions:

① IGN=ON ;

② The left/right turn signal lamp switch is activated.

※ The load flashing frequency of turn signal lamp is 75±5 times per minute, and the duty cycle is 50±5 %.

※ When the turn signal lamp is activated, the BCM sends a CAN signal ("LHTurnSignalSts" or "RHTurnSignalSts"), and the step is consistent with the working frequency of the turn signal lamp load; if the turn signal lamp input is deactivated, the left/right turn signal lamp should stop working immediately and stop sending the corresponding

LHTurnSignalSts/RHTurnsignalSts.

※ If the corresponding turn signal lamp bulb is damaged, the BCM sends LHTurnSignalSts "or" RHTurnSignalSts, and the frequency is twice that of the normal operation of the bulb, but the load flashing frequency remains unchanged. If the turn signal lamp input is deactivated, the left/right turn signal lamp should stop working immediately and stop sending the corresponding LHTurnSignalSts/RHTurnsignalSts.

※ Turn signal lamp has diagnostic function.

※ The BCM will turn off the turn signal lamp when it meets the following two conditions:

① Turn the key from IGNON to ACC or OFF ;

② The left/right turn signal lamp switch is deactivated.

Lane change function

※ Working conditions of lane change:

① IGN=ON ;

② The left/right turn signal lamp switch is activated for a short time (activation time T:50 ms<T<600 ms).

※ The load flashes 3 times during lane change operation, the frequency is 75±5 times per minute, and the duty cycle is 50±5 %.

※ When the lane change is activated, the BCM sends a CAN signal ("LHTurnSignalSts" or "RHTurnSignalSts"), and the step is consistent with the working frequency of the turn signal lamp load.

※ During the operation of left/right lane change: activate the left/right turn signal lamp switch again for a short time (T:50 ms<T<600 ms), and the left/right turn signal lamp will flash again for 3 times.

※ If the left/right turn signal lamp switch remains activated (T>600 ms), it will automatically switch to the left/right turn signal lamp operation logic.

※ If the corresponding turn signal lamp bulb is damaged, the BCM sends LHTurnSignalSts "or" RHTurnSignalSts, and the frequency is twice that of the normal operation of the bulb, but the load flashing frequency remains unchanged.

※ During the operation of left/right lane change, activate the right/left turn signal lamp switch and immediately operate according to the right/left turn signal lamp.

※ The BCM will turn off the turn signal lamp when it meets the following two conditions: 1. Turn the key to ACC or OFF; 2. The left/right turn signal lamp flashes 3 times.

Hazard lamp function

※ Activation condition of hazard lamp: activate the hazard lamp switch and the hazard lamp will be lit. When the hazard lamp is on, activate the hazard lamp switch again and the hazard lamp stops working.

※ When the hazard lamp is activated: the corresponding bulb is intact, the BCM sends LHTurnsignalSts and RHTurnsignalSts, and the step is consistent with the working frequency of the turn signal lamp load; changing the key status will not affect the function of hazard lamps.

※ When the hazard lamp is activated, the hazard indicator lamp flashes 75±5 times per minute and the duty cycle is 50±5 %.

※ The hazard lamp switch is a point-touch switch.

※ If any bulb is damaged, the frequency of the turn signal lamp CAN signal (LHTurnsignalSts and RHTurnsignalSts) and the flashing frequency of the hazard indicator lamp are twice as high as when the bulb is intact. However, the flashing frequency of hazard lamp load remains unchanged. When the hazard lamp is activated, the ICM illuminates the hazard indicator lamp and the turn indicator lamp.

※ When the ABM sends the collision signal, the hazard lamp function should be activated automatically. The flashing frequency of the left/right turn signal lamp and hazard indicator lamp is 75±5 times per minute, and the duty cycle is 50±5 %. The BCM sends LHTurnsignalSts and RHTurnsignalSts, and the step is consistent with the working frequency of the turn signal lamp load. Turn the key to OFF, then to ON, or press the hazard lamp button to cancel the hazard lamp function automatically activated due to collision.

Priority of turn signal lamp and hazard lamp

※ When the turn signal lamp function and the hazard lamp function are effective at the same time, the BCM shall execute the latter input function; when the latter input is cancelled and the former input is still valid, the former function shall be executed.

Position lamp control

※ Activation condition of position lamp: small lamp input is activated (low beam lamp switch will activate position lamp in ON/ST gear, and low beam lamp will not activate position lamp in other ignition gears).

※ The position lamp will stop activating if any one of the following conditions is met:

① The small lamp input is deactivated;

② Turn the key to OFF.

※ When IGN=OFF, activate the small lamp switch again, and the small lamp will be lit as the parking lamp until the small lamp switch is deactivated.

※ When the position lamp is activated, the BCM sends the CAN signal 'ParkTailLightSts' (value is' 1') to the ICM, which illuminates the corresponding indicator lamp.

※ When IGN=OFF and the BCM receives the vehicle search signal from the PEPS, the turn signal lamp flashes for 8 seconds at (400 ms-On-400 ms-Off), the small lamp lights up for 8 seconds at the same time, and the tweeter and woofer are activated twice (the tweeter outputs 20 ms ON-280 ms OFF).

※ When IGN=OFF, the BCM sends "ParkLightOnWarning=1" to the CAN bus when it detects that the left front door is open and the small lamp is not turned off.

※ The position lamp has diagnostic function.

23.1.5 Low beam lamp control

※ Activation condition of low beam lamp:

① IGN ON ;

② Low beam lamp input is activated.

※ The low beam lamp will stop activating if any one of the following conditions is met:

① The low beam lamp input is deactivated;

② Turn the key to IGN-OFF or IGN-ACC.

Caution:
※ When the low beam lamp is activated, the BCM sends the CAN signal 'LowBeamSts' (value is '1').
※ When the CAN network signal illuminates the low beam lamp, the combination switch can turn off the low beam lamp. Switch takes priority over CAN network signal.

23.1.6 Follow Me Home function (FMH)

Function activation

※ Follow-mehome is controlled by the BCM, and the low beam lamp, position lamp and license plate lamp are turned on for convenience.

※ FFMH function activation condition: Flash switch is activated within 2 minutes after the key is turned to OFF.

※ Once the FMH function is activated, the low beam lamp, position lamp and license plate lamp will be lit. The BCM sends CAN signal 'LowBeamSts' (value is '1') and 'ParkTailLightSts' (value is '1') to the ICM. The ICM illuminates the corresponding indicator lamp. When the switch is activated, the BCM should send HighBeamSts=1, and the ICM illuminates the corresponding indicator lamp.

※ When IGN=OFF and the switch is activated, HighBeamSts=1 should be sent, but the high beam lamp will not be on.

Increase the light-on time

※ When the FMH function is activated: the default duration is 30 s. If the flash switch is activated again for a short time, the FMH function duration will be increased by 30s each time, with a maximum of 8 times (after the first 30s, activate the switch again for 8 times, with a maximum of 240 s, i.e. 8*30=240 s).

※ Within 2 minutes after the key is turned to OFF, whether the FMH function is manually closed or automatically closed after timeout, it can be activated again. When the switch is activated, HighBeamSts=1 should be sent again.

※ When the FMH function is activated, the BCM will continuously send CAN signal ‘LowBeamSts’ ='1' and ‘ParkTailLightSts’ ='1'. Within 2 minutes after the FMH function is activated or the key is turned to OFF, when the Flasher switch is activated, the BCM will send the CAN signal ‘HighBeamSts’ ='1'.

Function invalidity

※ When the FMH function is activated: if Flash is activated for a long time for 2 s, the FMH function will be manually turned off - low beam lamp, small lamp and license plate lamp will go out immediately and the cumulative duration of FMH will be cleared to 0, sending LowBeamSts=0, ParkTailLightSts=0 and 'FollowMeTime'=0.

※ After FMH function is manually turned off, the FMH function can be activated again within 2 minutes after the key is turned to OFF.

Function stop

※ The FMH function will be stopped if any one of the following conditions is met:

① After the set FMH working time is reached;

② Turn the key to ACC or IGNON;

③ The FMH switch is deactivated.

※ The BCM will turn off the low beam lamp and small lamp immediately and the cumulative duration of FMH will be cleared to 0.

※ At the same time, the BCM will send CAN signals ‘LowBeamSts= ‘0’ ’ , ‘ParkTailLightSts= ‘0’ ’ , ‘FollowMeTime’ = ‘0’ .

23.1.7 High beam lamp control

※ Operating conditions of high beam lamp:

① IGN ON ;

② The low beam lamp is activated;

③ The high beam switch is activated.

※ The high beam lamp will be deactivated if any one of the following conditions is met:

① The high beam lamp switch is deactivated;

② The low beam lamp is deactivated;

③ IGN-OFF or IGN-ACC.

※ When the high beam lamp is activated, the BCM sends the CAN signal ‘HighBeamSts’ = ‘1’ , and the ICM illuminates the corresponding high beam lamp.

Flash function

※ Flash working conditions:

① IGN ON ;

② The Flash switch is activated.

※ The Flash function will be deactivated if any one of the following conditions is met:

① The Flash switch is deactivated;

② Turn the key to IGN-OFF or IGN-ACC.

※ When the flash function is activated, the BCM sends the CAN signal ‘HighBeamSts’ = ‘1’) to ICM, and ICM turns on the corresponding high beam indicator lamp. When IGN-ACC is activated, the flash switch is activated, and the BCM cannot send the CAN signal ‘HighBeamSts’ = ‘1’ to the ICM.

※ When the key is turned to IGN-OFF 2 minutes, the flash switch activates the FMH function, and the BCM sends the CAN signal ‘HighBeamSts’ = ‘1’ to the CAN.

※ KQ71 low beam lamp and high beam lamp use the same load. When the flash function is activated, the BCM will activate the low beam lamp and high beam lamp simultaneously.

23.1.8 Rear fog lamp control

※ Working conditions of rear fog lamp:

① IGN ON ;

② Front fog lamp or low beam lamp load is activated;

③ The rear fog lamp switch is activated.

※ The rear fog lamp will be deactivated if any one of the following conditions is met:

① Activate the rear fog lamp switch again;

② Turn the key to IGN-OFF or ACC;

③ The front fog lamp or low beam lamp load is deactivated.

※ When the rear fog lamp switch is activated, the BCM sends the CAN signal ‘RearFogLightSts’ = ‘1’ to the ICM.

23.1.9 Daytime running lamp

※ Working condition of daytime running lamp:

① IGN=ON ;

② BCM receives CAN signal ‘EngineSts=1’ sent by EMS;

③ The high and low beam lamps are not activated.

※ When the daytime running lamp is working, operating the Flash switch will not affect the daytime running lamp.

23.1.10 Emergency braking double trip warning function

※ If the following conditions are met, the hazard lamp will activate for at least 3 s (the left/right turn signal lamp, indicator lamp and turn signal lamp CAN signal flash at 200 ms ON/200 ms OFF):

① The vehicle acceleration exceeds - 6 m/s 2 (the BCM detects the vehicle speed signal sent by EMS_4_G every 10 ms, the average speed V1 is detected in the first 5cycle50ms, and the average speed V2 is detected in the last 5cycle50ms to obtain the acceleration);

② The vehicle speed exceeds 50 km/h (31 mph) before deceleration; the key is in the ON position;

③ CAN signal "BrakePedalSts"value= ‘1’ .

※ When the hazard lamp of this function is activated, the ICM will activate the hazard indicator lamp and the left and right turn indicator lamps to flash at 200 ms ON/200 ms OFF.

※ If any one of the following conditions is met, the function will be stopped (the turn signal lamp and hazard indicator lamp will stop at the same time):

① The vehicle accelerator pedal is activated (the “GasPedalPosition>0” signal is activated);

② Turn the key gear to OFF.

※ When the hazard lamp of this function works, operate the hazard lamp switch, and this function will stop immediately.

※ During this operation, the BCM receives the collision signal (“CrashOutputSt ≠ 00) and the function stops immediately.

※ The BCM receives the “GasPedalPosition” signal from EMS_1.

23.1.11 Reversing lamp function

※ In case of manual gear, the input BCM of the reversing lamp only judges the hand brake hardware signal; in case of automatic transmission, the input BCM of the reversing lamp only judges the CAN signal.

※ IGN-ON, the reversing lamp input is activated, the BCM will light up the reversing lamp and send the CAN signal “ReverseGearSwitch==1” to the CAN network.

※ If any one of the following conditions is met, the BCM will turn off the reversing lamp and send the CAN signal “ReverseGearSwitch==0” to the CAN network:

① Turn the key to OFF or ACC;

② The reversing lamp input is deactivated.

23.1.12 Backlight control

※ Activation condition of backlight: small lamp input is activated (low beam lamp switch will activate position lamp in ON/ST gear, and low beam lamp will not activate position lamp in other ignition gears).

※ The backlight will stop activating if any one of the following conditions is met:

① The small lamp input is deactivated;

② Turn the key to OFF.

※ When IGN=OFF, activate the small lamp switch again, and the backlight will be lit until the small lamp switch is deactivated.

※ When the small lamp is activated, the BCM sends the CAN signal ‘ParkTailLightSts’ (value is ‘1’) to the ICM, which illuminates the corresponding indicator lamp.

※ When IGN=OFF, the BCM sends "ParkLightOnWarning=1" to the CAN bus when it detects that the left front door is open and the small lamp is not turned off. The BCM can independently adjust the backlight brightness according to the signal on the CAN.

23.1.13 Keyhole lamp control

※ If the left door is open and IGN is in the OFF position, turn on the remote control hole lamp (if the door is always open, it will go out after three minutes). If the door is closed at this time, the key hole lamp will continue for T1 time. If IGN is in the ON position during T1, it will go out immediately.

※ If the left door is open and IGN is in OFF position, the remote control hole lamp is on. At this time, IGN is in ACC/ON position, and the key hole lamp is off immediately.

22.1.14 Diagnosis and test

Fault symptom table

Tips:
※ Use the following table to help diagnose the cause of the fault. Check each suspicious part in sequence. Repair or replace faulty parts or make adjustments as necessary.

Symptom	Suspicious parts
"Low beam lamp" is not lit (one side)	Fuse
	Headlamp bulb
	Harness or connector
"Low beam lamp" is not lit (both sides)	Fuse
	Headlamp bulb
	Combination lamp switch assembly
	Low beam lamp relay
	Harness or connector
	Body control module (BCM)
"High beam lamp" is not lit (one side)	Fuse
	Headlamp bulb
	Harness or connector
"High beam lamp" is not lit (both sides)	Fuse
	Headlamp bulb
	Combination lamp switch assembly
	High beam lamp relay
	Harness and connector
	Body control module (BCM)
"Position lamp" is not lit (one side)	Position lamp bulb
	Harness or connector
"Position lamp" is not lit (both sides)	Position lamp bulb (all)
	Harness or connector
	Combination lamp switch assembly
	Body control module (BCM)

Rear fog lamp

Symptom	Suspicious parts
Rear fog lamp is not lit	Rear fog lamp bulb
	Combination lamp switch
	Harness or connector
	Body control module (BCM)

Turn signal lamp and hazard warning lamp

Symptom	Suspicious parts
Hazard warning lamp and turn signal lamp are not lit	Bulb
	Combination lamp switch
	Harness or connector
	Body control module (BCM)
	Hazard warning lamp switch
Hazard warning lamp is not lit (the turn signal lamp is normal)	Hazard warning lamp switch
	Harness or connector
	Body control module (BCM)
Turn signal lamp is not lit (the hazard warning lamp is normal)	Combination lamp switch
	Harness or connector
	Body control module (BCM)

License plate lamp

Symptom	Suspicious parts
License plate lamp is not lit	Combination lamp switch assembly
	Harness or connector
	Body control module (BCM)

Brake lamp

Symptom	Suspicious parts
Brake lamp is not lit	Fuse
	Brake lamp bulb (all)
	Brake lamp switch
	Harness and connector
	Body control module (BCM)
Only one brake lamp is not lit	Brake lamp bulb
	Harness or connector

Front ceiling lamp

Symptom	Suspicious parts
Front ceiling lamp is not lit	Front ceiling lamp bulb
	Harness or connector
	Front ceiling lamp assembly
	Body control module (BCM)

Reversing lamp

Symptom	Suspicious parts
Reversing lamp is not lit	Transmission control module (TCU)
	Reversing lamp bulb
	Reversing lamp switch (MT)
	Body control module (BCM)
	Harness or connector
	Gear switch

23.2 On-board maintenance

23.2.1 Front headlamp assembly

Removal

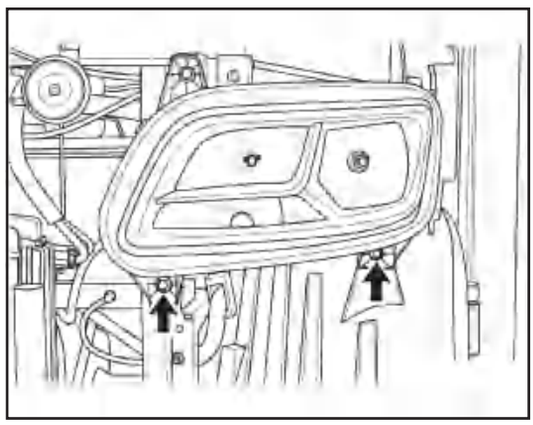
Tips:
※ The operation procedure of the right headlamp assembly is the same as that of the left headlamp assembly. The following is the operation procedure of removing the left headlamp assembly.

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

① Remove 2 fixing bolts (arrows) on the lower part of the headlamp assembly.

Tightening torque:

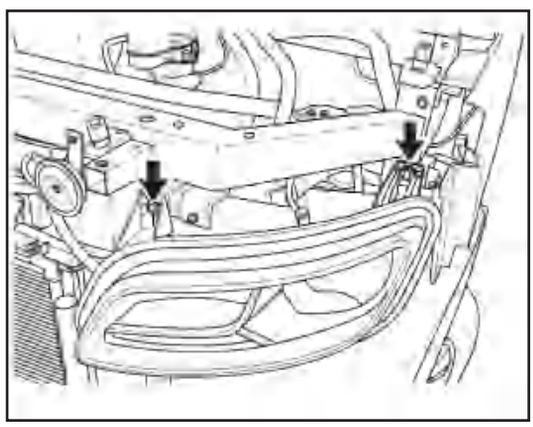
5.0± 1 N•m (3.7±0.7 ft-lbs.)



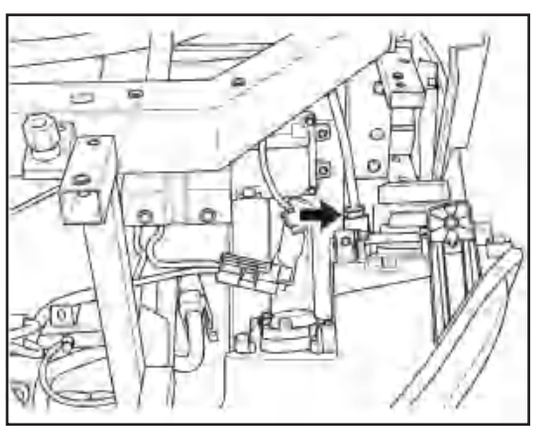
② Remove 2 fixing bolts (arrows) on the upper part of the headlamp assembly.

Tightening torque:

5.0± 1 N•m (3.7±0.7 ft-lbs.)



③ Disconnect the headlamp assembly harness connector (arrow) and remove the headlamp assembly.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the headlamp assembly, make sure that the assembly clearance between it and the engine hood, front fender and front bumper is appropriate. Adjust if necessary.

23.2.2 Front position lamp assembly

Removal

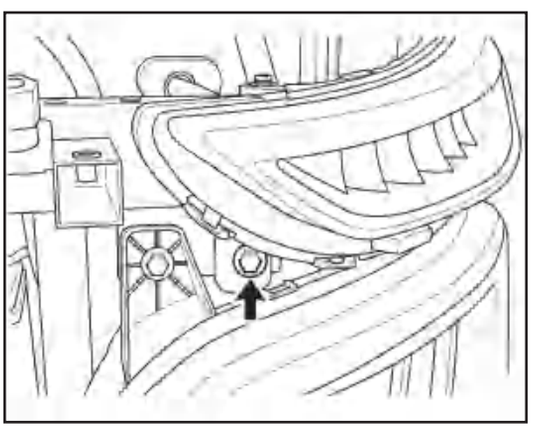
Tips:
※ The operation procedure of the right front position lamp assembly is the same as that of the left front position lamp assembly. The following is the operation procedure of removing the left front position lamp assembly.

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

① Remove 1 fixing bolt (arrow) on the lower part of the front position lamp assembly.

Tightening torque :

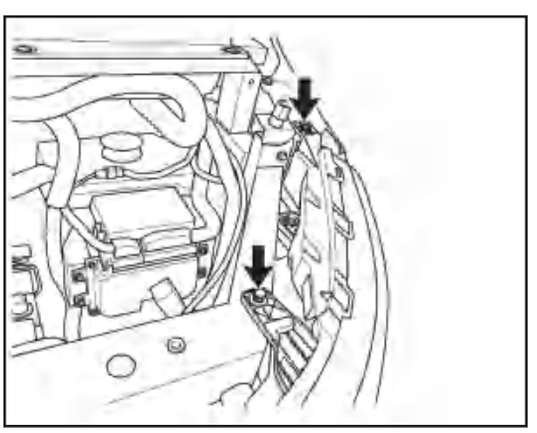
5.0± 1 N•m (3.7±0.7 ft-lbs.)



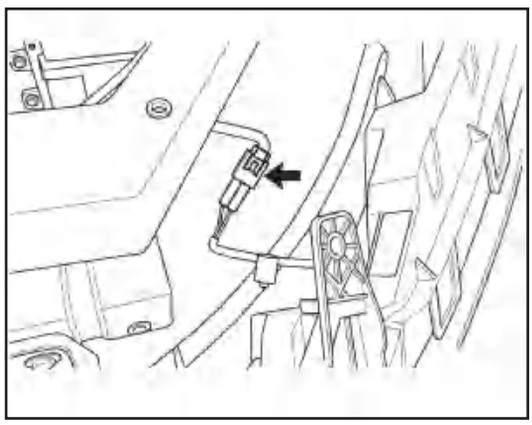
② Remove 2 fixing bolt (arrow) on the upper part of the front position lamp assembly.

Tightening torque :

5.0± 1 N•m (3.7±0.7 ft-lbs.)



③ Disconnect the front position lamp assembly harness connector (arrow) and remove the headlamp assembly.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the front position lamp assembly, make sure that the assembly clearance between it and the engine hood, front fender and front bumper is appropriate. Adjust if necessary.

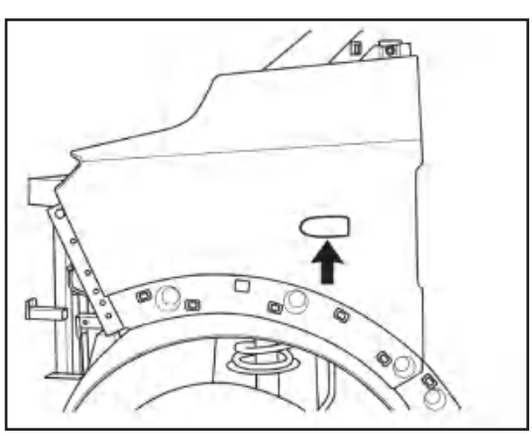
23.2.3 Side turn signal lamp assembly

Removal

Tips:
※ The operation procedure of the right front turn signal lamp is the same as that of the left front turn signal lamp. The following is the operation procedure of removing the left front turn signal lamp.

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the side turn signal lamp

① Stick kraft paper on the fender around the lamp, and use the interior trim pry to carefully pry off the side turn signal lamp.



② Disconnect the harness connector plug and remove the side turn signal lamp.

Installation

1. The installation sequence is the reverse of the removal sequence.

23.2.4 Rear tail lamp assembly

Removal

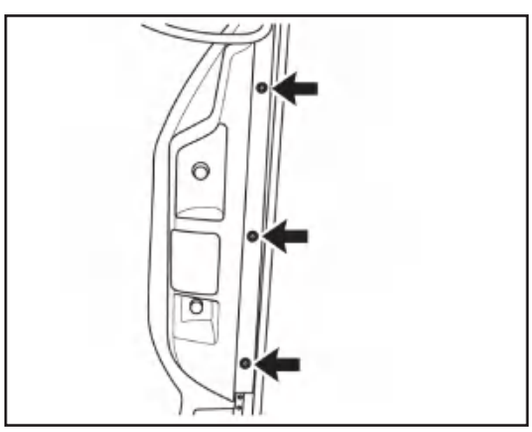
Tips:
※ The operation procedure of the right rear tail lamp assembly is the same as that of the left rear tail lamp assembly. The following is the operation procedure of removing the left rear tail lamp assembly.

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

① Remove 3 fixing screws (arrows) of the rear tail lamp assembly.

Tightening torque :

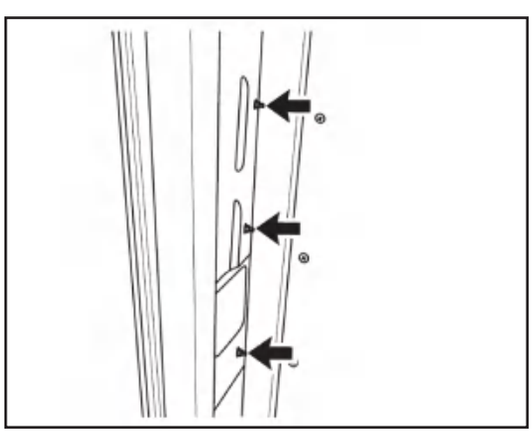
3.0± 1 N•m (2.2±0.7 ft-lbs.)



② Remove 3 fixing nuts (arrows) of the rear tail lamp assembly.

Tightening torque :

3.0± 1 N•m (2.2±0.7 ft-lbs.)



③ Disconnect the rear tail lamp harness connector plug and remove the rear tail lamp assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

23.2.5 High brake lamp assembly

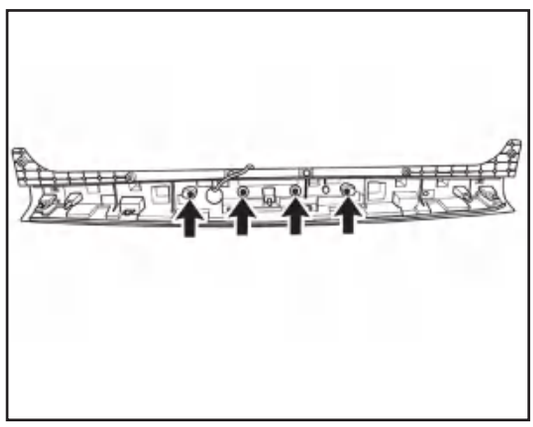
Removal

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

① Remove 4 fixing nuts of the high brake lamp assembly.

Tightening torque :

3.0± 1 N•m (2.2±0.7 ft-lbs.)



② Remove the high brake lamp assembly.

Installation

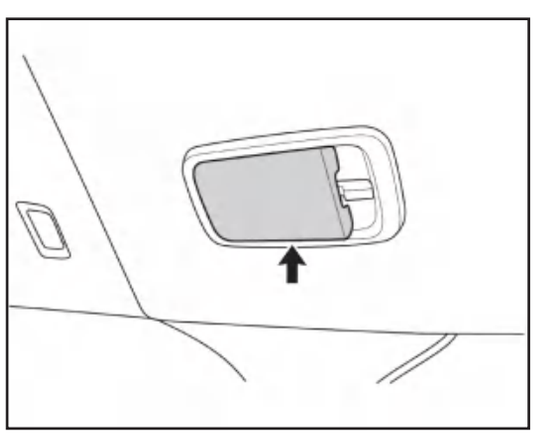
1. The installation sequence is the reverse of the removal sequence.

23.2.6 Interior front ceiling lamp assembly

Removal

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

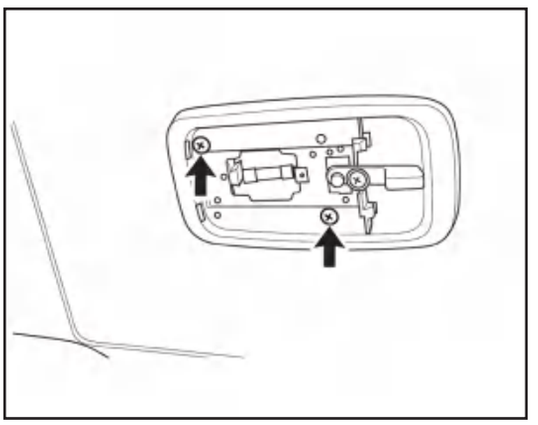
① Use the interior trim pry to carefully pry off the ceiling lamp cover (arrow).



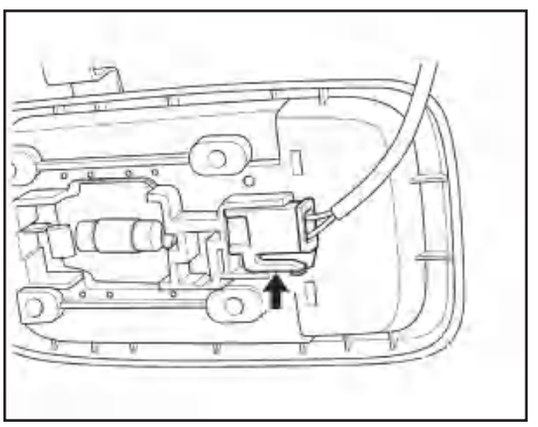
② Remove 2 fixing screws (arrows) of the interior front ceiling lamp assembly.

Tightening torque :

3.0± 1 N•m (2.2±0.7 ft-lbs.)



③ Use the interior trim pry to carefully pry off the interior front ceiling lamp assembly and disconnect the harness connector plug (arrow).



④ Remove the interior front ceiling lamp assembly.

Installation

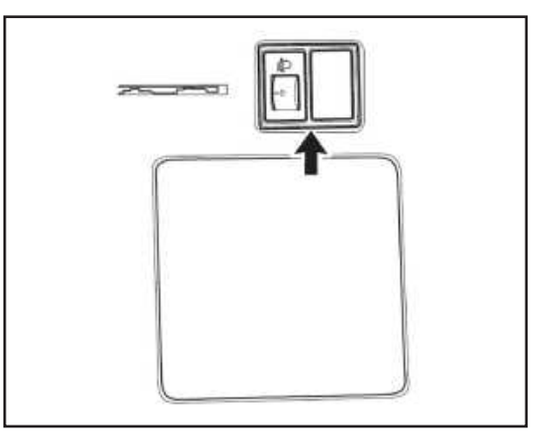
1. The installation sequence is the reverse of the removal sequence.

23.2.7 Headlamp adjustment switch assembly

Removal

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the storage box on the left lower guard
4. Remove the headlamp adjustment switch assembly

① Disconnect the harness connector of the headlamp adjustment switch assembly, reach out from the back of the storage box and push the switch out of the mounting hole.



② Remove the headlamp adjustment switch assembly.

Installation

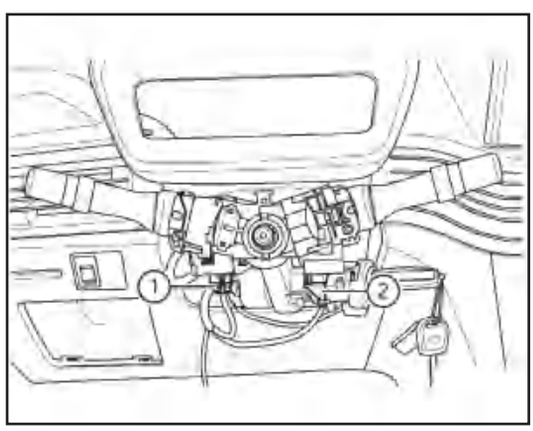
1. The installation sequence is the reverse of the removal sequence.

23.2.8 Combination switch assembly

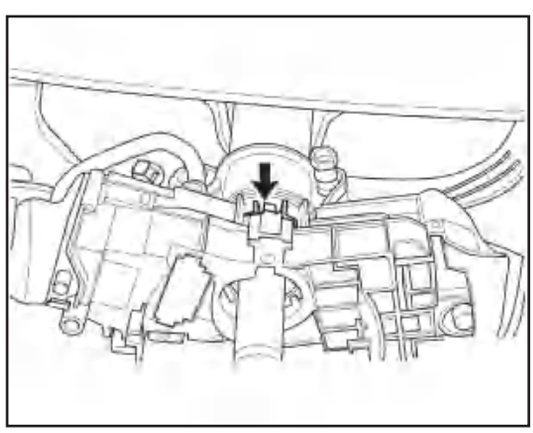
Removal

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the driver airbag
4. Remove the steering wheel
5. Remove the shield of the combination switch
6. Remove the clock spring assembly
7. Remove the combination switch assembly

① Disconnect the connector (1) of the combination lamp switch and the connector (2) of the wiper switch.



② Loosen the combination switch fixing clamp (arrow), pull the combination switch outward, disconnect the combination switch from the steering column, and remove the combination switch.



③ Loosen the fixing clip of the wiper switch and remove the combination lamp switch.

Installation

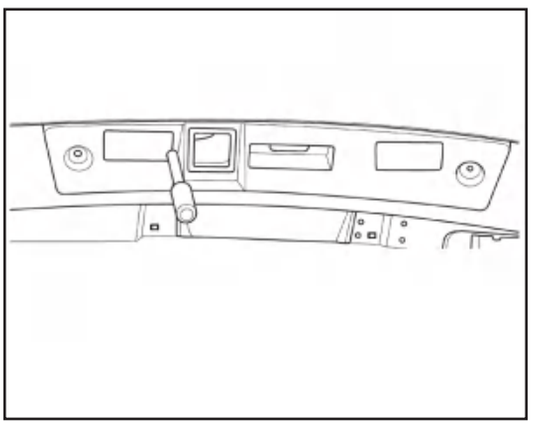
1. The installation sequence is the reverse of the removal sequence.

23.2.9 License plate lamp assembly

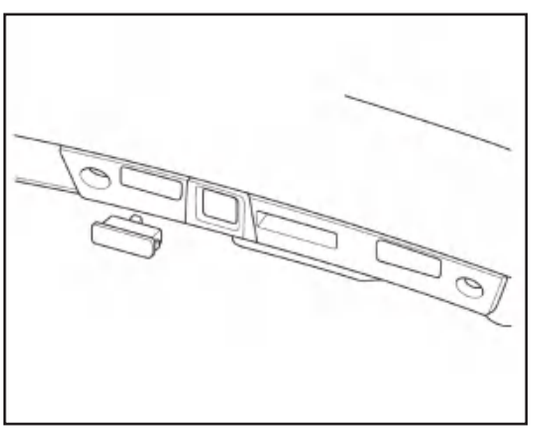
Removal

1. Turn off all electrical equipment and ignition switch
2. Disconnect the negative battery cable
3. Remove the license plate lamp assembly

① Pry off the license plate lamp (arrow) with a screwdriver wrapped with protective tape.



② Remove the license plate lamp and disconnect the license plate lamp connector.



Installation

1. The installation sequence is the reverse of the removal sequence.

Door lock system

24.1 On-board maintenance

24.1.1 Engine hood lock assembly

Removal

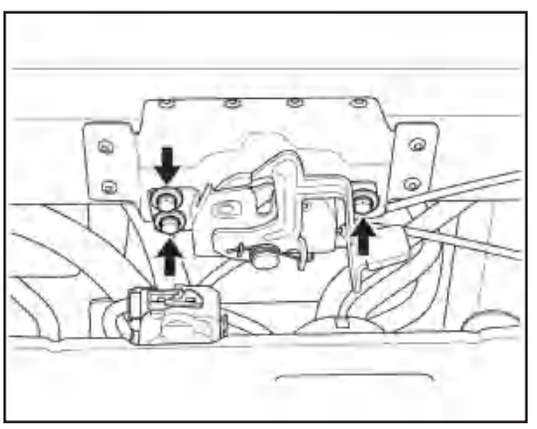
Caution:
※ When removing the engine hood lock assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the engine hood lock assembly, avoid damaging the body paint.

1. Remove the engine hood lock assembly

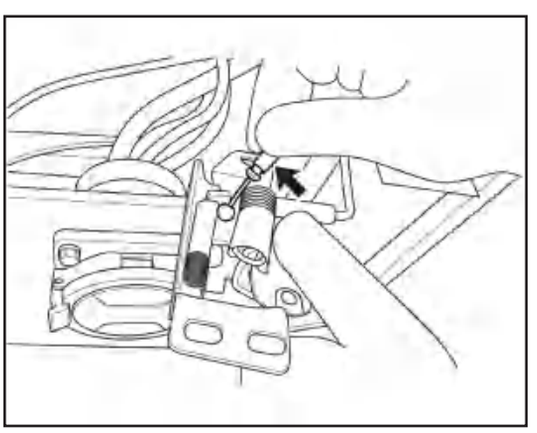
① Remove 3 fixing nuts (arrows) of the engine hood lock assembly.

Tightening torque:

9.0± 1 N•m (6.6±0.7 ft-lbs)



② Disconnect the engine hood cable assembly from the fixing slot and remove the engine hood lock assembly.



Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installing the engine hood lock assembly, check whether the engine hood can work normally.

24.1.2 Front door lock assembly

Removal

Caution:
※ When removing the front door lock assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the front door lock assembly, avoid scratching the interior trim and body paint.

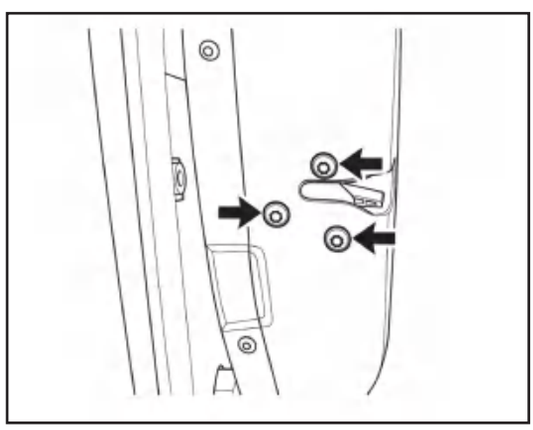
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the left front door inner guard assembly
4. Remove the left front door protective film assembly
5. Remove the left front door rear glass guide assembly
6. Remove the left front door lock assembly

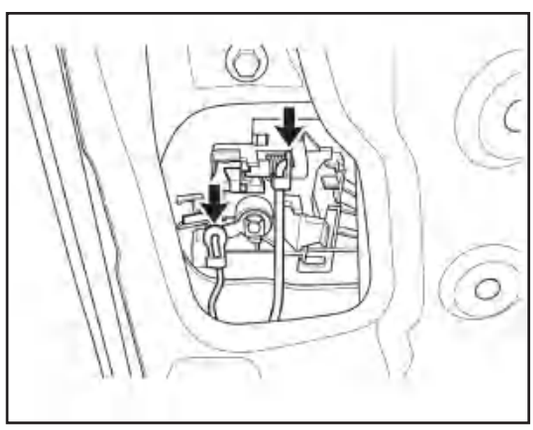
① Remove 3 fixing screws (arrows) of the front door lock assembly.

Tightening torque :

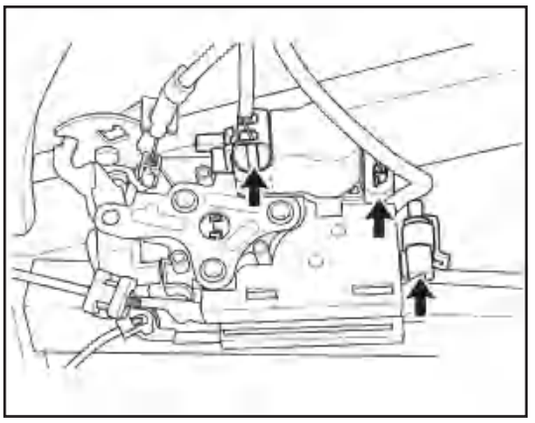
10 ± 1 N•m (7.4±0.7 ft-lbs.)



② Disconnect the clip (arrow) connecting the front door lock assembly and the front door lock cylinder push rod.



③ Disconnect the connector (arrow) of the front door lock assembly.



④ Disengage the front door inner handle cable clip.

⑤ Remove the left front door lock assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ When installing the front door lock assembly, check whether the connector is installed correctly.
※ When installing the front door lock assembly, install the clip and cable in place.
※ After installing the front door lock assembly, check whether the front door lock can work normally.

24.1.3 Front door latch assembly

Removal

Caution:
※ When removing the front door latch assembly, be sure to wear labor protection articles to avoid accidents.
※ When removing the front door latch assembly, avoid damaging the body paint.

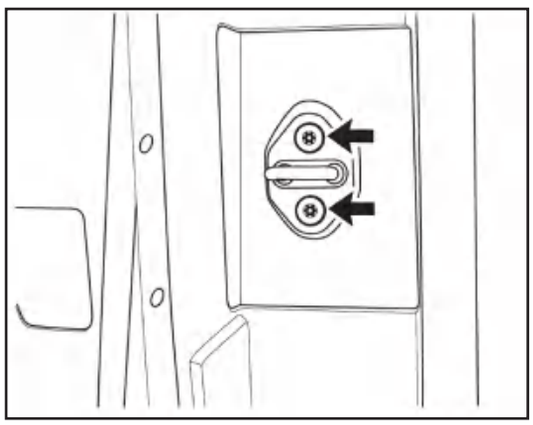
Tips:
※ The operation process on the right side is the same as that on the left side.
※ The following is the operation process on the left side.

1. Remove the left front door latch assembly

① Remove 2 fixing screws (arrows) of the front door latch assembly.

Tightening torque:

23 ± 2 N•m (17±1.5 ft-lbs.)



② Remove the left front door latch assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ Before installation, it is necessary to adjust the latch position to ensure that the latch column engages with the lock body at the center line of the fish mouth, and ensure that the door can be opened and closed normally.

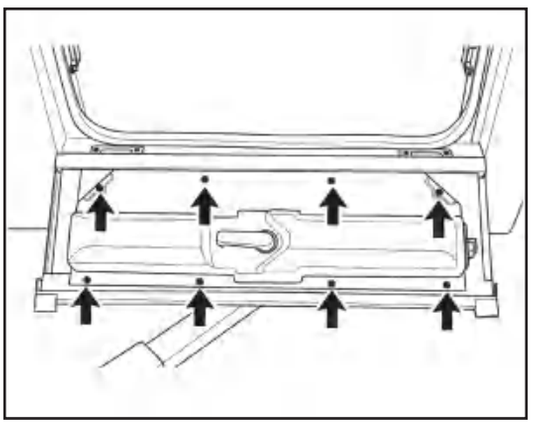
24.1.4 Pickup door lock assembly

Removal

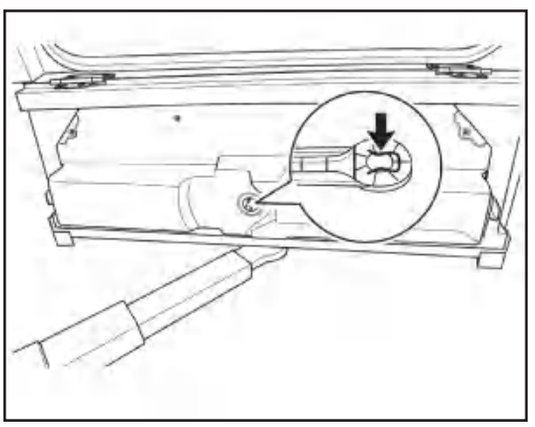
Caution:
※ When removing the pickup door lock assembly, be sure to wear labor protection articles to avoid accidents. ※ When removing the pickup door lock assembly, avoid scratching the interior trim and body paint.

1. Turn off all electrical equipment and start button
2. Disconnect the negative battery cable
3. Remove the pickup door lock assembly

① Remove 8 fixing screws (arrows) of the pickup door guard.

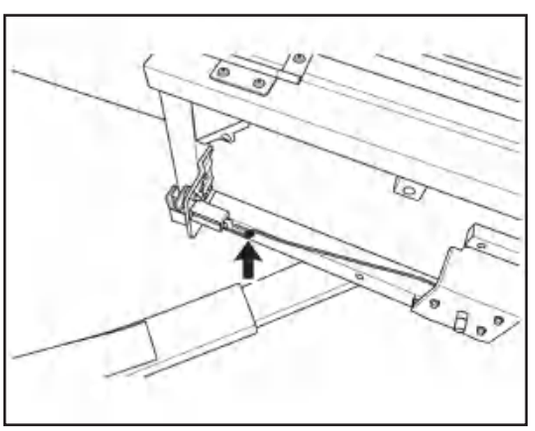


② Remove the lock pin (arrow) on the inner handle of the pickup door guard.

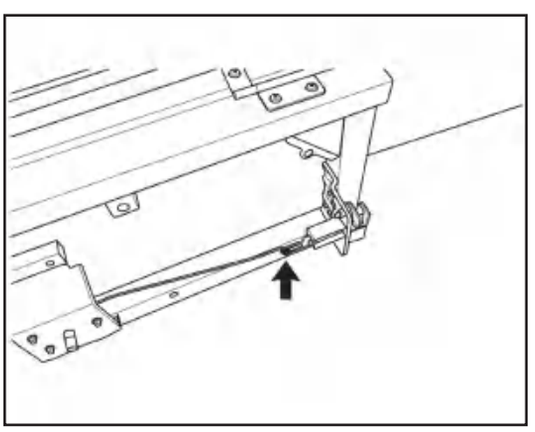


③ Remove the pickup door guard assembly.

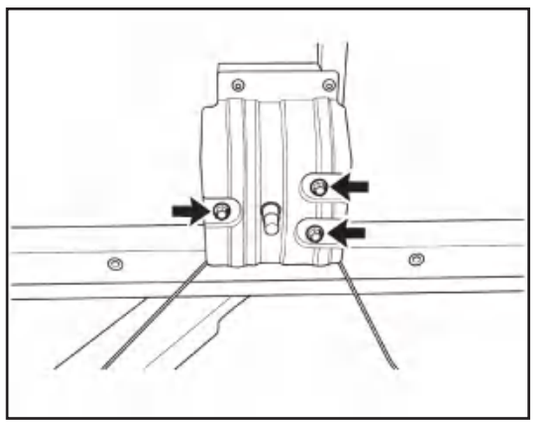
④ Remove the left tie rod of the pickup door lock (arrow).



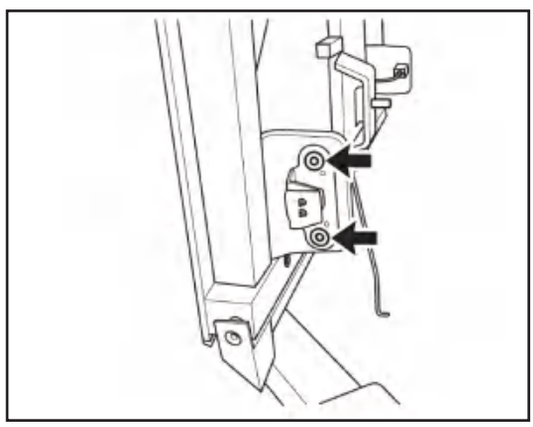
⑤ Remove the right tie rod of the pickup door lock (arrow).



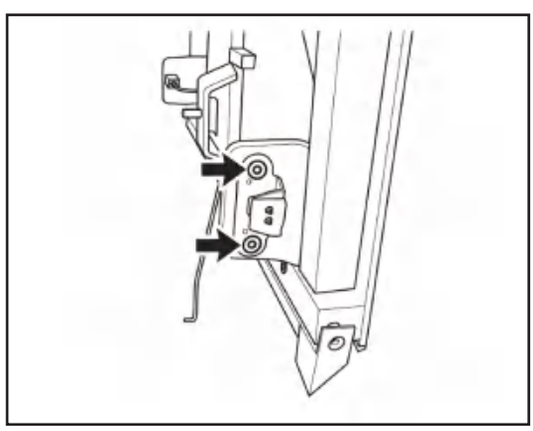
⑥ Remove 3 bolts (arrows) on the pickup door lock and remove the pickup door lock assembly.



⑦ Remove 2 fixing bolts (arrows) of the left latch of the pickup door lock.



⑧ Remove 2 fixing bolts (arrows) of the right latch of the pickup door lock.



⑨ Remove the pickup door lock latch assembly.

Installation

1. The installation sequence is the reverse of the removal sequence.

Caution:
※ After installing the pickup door lock assembly, check whether the front door lock can work normally.

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