

CENNTRO

Repair Manual

LOGISTAR 200



Foreword

This Repair Manual provides the operation essentials of diagnosis, disassembly, decomposition, inspection, adjustment, assembly and installation of CENNTRO LOGISTAR 200 (LS200) series battery electric vehicle. It is kindly to suggest making full use of this Repair Manual to carry out correct and effective maintenance.

All materials, illustrations and product descriptions included in this Manual are in line with the situation at the time of publication of this Manual. We strive to ensure that the illustrations, technical information, data and text descriptions in this Manual are complete and correct before printing. We reserve the right to change this Manual at any time without prior notice in order to implement the policy of continuous development and improvement of products of Cenntro.

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1 General information

1.1 General information

1.1.1 Special tool ordering information

The special tools shown in this Maintenance Manual can be purchased through CENNTRO.

1.1.2 Diagnosis worksheet

The purpose of designing the diagnosis worksheet is to improve the communication between customers and technicians during maintenance. Comparing to the traditional maintenance work order, the diagnosis worksheet is filled by the customer, so it can provide more information to the technician.

1.1.3 Vehicle identification number

The vehicle VIN is the legal identification of the vehicle.

Vehicle nameplate

- (1) Model
- (2) Maximum design total mass
- (3) Manufacturing date

1.1.4 Lift and raise the vehicle

Caution: In order to avoid vehicle damage, serious personal injury and even death, when removing the main components from the vehicle and supporting the vehicle with the lifting hook, use the lifting platform to support the vehicle from the opposite end of the removed parts.

Caution: In order to avoid vehicle damage, serious personal injury and even death, when lifting the vehicle with a jack, be sure to support the vehicle with a lifting platform.

Special precautions: Before starting any vehicle lifting or raising procedure, perform the following steps:

Remove or fix all items in the vehicle to avoid movement or any other motions during lifting or raising procedures.

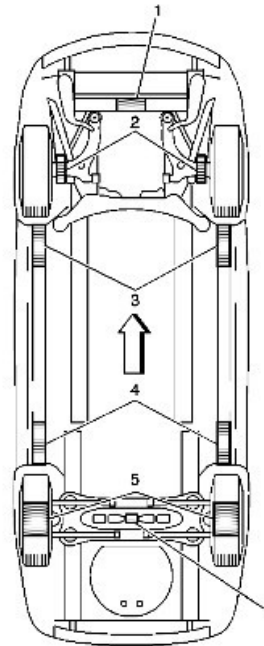
The rated weight of the lifting device or raising equipment must reach or exceed the weight of the vehicle and its contents.

The rated weight of the lifting device or raising equipment must meet the operating standards specified by the lifting device or raising equipment manufacturer.

Perform the vehicle lifting and raising procedures on a clean, solid, dry and level surface.

Perform the vehicle lifting and raising procedures only at the specified lifting points. Do not allow the lifting device or raising equipment to contact any other parts in the vehicle.

Failure to follow the above steps may result in damage to the lifting device or raising equipment, the vehicle or items in the vehicle.



Contact point of vehicle lifting and floor raising

- (1) Front floor - raising position
- (2) Front suspension - contact lifting position
- (3) Front vehicle body - contact lifting position
- (4) Rear vehicle body - contact lifting position
- (5) Rear suspension - contact lifting position
- (6) Rear floor - raising position

1) Vehicle lifting - frame-contact lifting jack

- (1) Front lifting pad

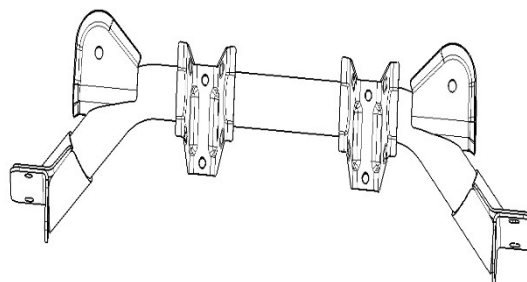
When lifting the vehicle with frame-contact lifting jack, place the front lifting pad on the front slag welding flange of the inner door sill plate.

- (2) Rear lifting pad

When lifting the vehicle with frame-contact lifting jack, place the rear lifting pad on the rear slag welding flange of the inner door sill plate.

Vehicle lifting - suspension-contact lifting jack

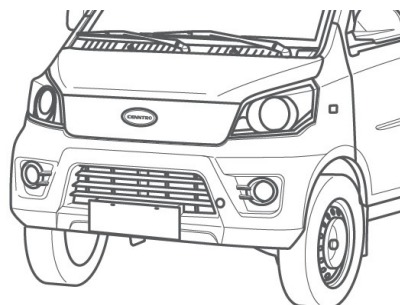
When lifting the vehicle with suspension-contact lifting jack, place the lifting point of the front strut at the lower center of the front axle weldment. Only under the rear axle can the rear strut lifting point be used to lift the rear of the vehicle.



Raise the vehicle with a bottom jack.

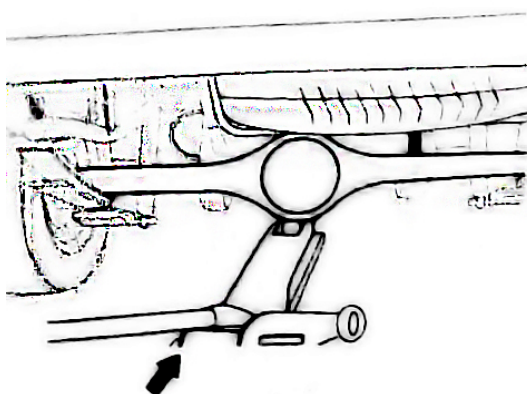
3) Under the front axle weldment

When lifting the front of the vehicle with the bottom jack, place the bottom jack lifting pad at the lower center of the front axle weldment.



4) Under the rear suspension center

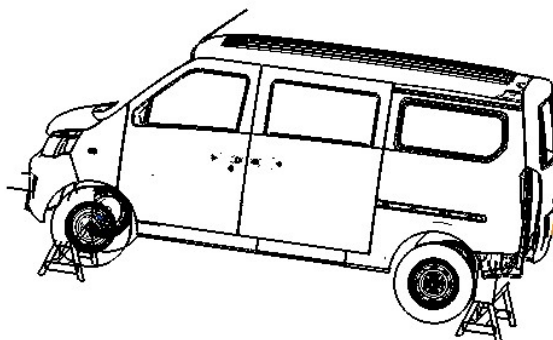
Place the bottom jack lifting pad in the center of the rear axle housing and lift the rear of the vehicle.



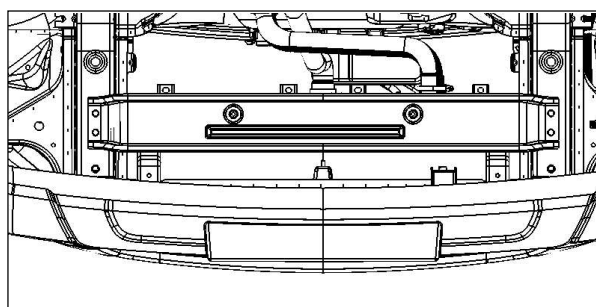
Support the vehicle with a jack.

Precautions: Only place the jack under a firm and stable vehicle structure.

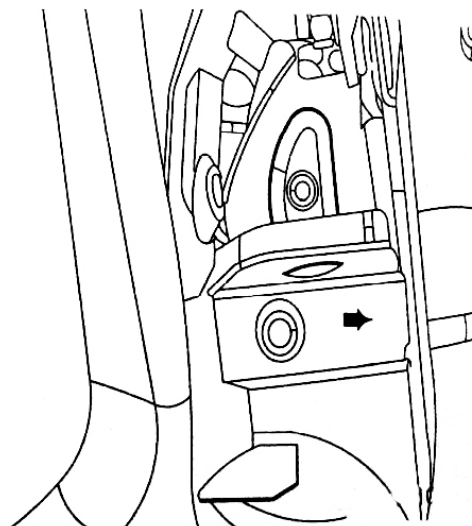
Support the vehicle with a bracket.



The front end of the bracket is used to support the locating hole of the body front longitudinal beam.



The rear end of the bracket is used to support the body rear longitudinal beam.



1.2 Maintenance and lubrication

1.2.1 Fluid capacity

Items	Specification	Capacity
Rear axle gear oil	GL-5 85W/90	1.7±0.05L
Coolant	FD-2, 50% aqueous solution	5.85±0.5L
Brake fluid	DOT-3	0.6±0.1L
Air conditioning system refrigerant	R1234YF	700±10g

Windshield glass cleaning fluid	If the ambient temperature is lower than 0°C, antifreeze detergent must be used	1.5±0.1L
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1.2.2 Tire inflation pressure specification

Items	Specification / parameters		
	LS200 Van	LS200 Pick-up	LS200 Cargo Box
Specification	185/65 R15LT	185/65 R15LT	185/65 R15LT
Front tire pressure under full load/kPa	400	550	550
Rear tire pressure under full load/kPa	490	600	600

1.2.3 Inspection and maintenance by the user

The following contents include the inspection and maintenance required to maintain the safety, reliability and emission control performance of the vehicle, as well as the recommended filling fluid for vehicle.

Before use

- Check brake fluid level
- Check windshield cleaning liquid level
- Check tire inflation

Try steering and braking when the vehicle speed does not exceed 30 km/h.

If any problem is found, eliminate it, and make the vehicle restore to normal conditions before use.

1) At least once half a year.

Inspection of protection device system

Confirm that the safety belt warning lamp and all safety belt systems work normally. Check whether the components of the safety belt system are loose or damaged. Repair loose or damaged components of the safety belt system. Repair the torn or worn safety belt.

Inspection of wiper blade

Check whether the wiper blade is worn or broken. Lubrication of the sealing strip: the silicone grease on the sealing strip helps to extend the service life of the sealing strip, make it more sealed,

and will not stick or make a squeak. Apply silicone grease with a clean rag.

Check the drive axle and check the fluid level. Add the fluid if necessary.

Lubrication of door hinge

First, remove the deposits in and around the hinge pin, and then fill the hinge pin with an appropriate amount of specified lubricating grease.

2) At least once a year.

Maintenance of key lock cylinder

Lubricate the lock cylinder with the recommended lubricating oil.

Lubricate all the following parts:

- Charging port cover
- Rear cabin hinge
- Rear cabin latch and lock
- Seat hardware

Underbody flushing

At least every spring, flush the underbody with clean water to remove the corrosive materials from the underbody.

3) Regular maintenance and inspection

The following inspection and maintenance shall be carried out at least twice a year.

Check the front and rear suspension systems

Check the steering system for signs of damage, looseness or missing parts, wear or insufficient lubrication. Repair the vehicle if necessary.

Clean and inspect the drive axle shield seal for damage, tear or leakage. Repair the vehicle if necessary.

- Braking system inspection

Special precautions: low brake fluid level indicates that the brake pad of the disc brake is severely worn.

- Check the whole system
- Check brake lines and hoses. Repair the components if necessary.

2 Mechanical steering system

2.1 Mechanical steering system

2.1.1 Specification

2.1.1.1 Fastener fastening specification

Application	Specification
Mechanical steering gear mounting bolt	49-69 N•m
Steering tie rod adjustment lock nut	39-49 N•m
Connecting nut between tie rod and steering knuckle	23-33 N•m

2.1.1.2 Lubricant specification

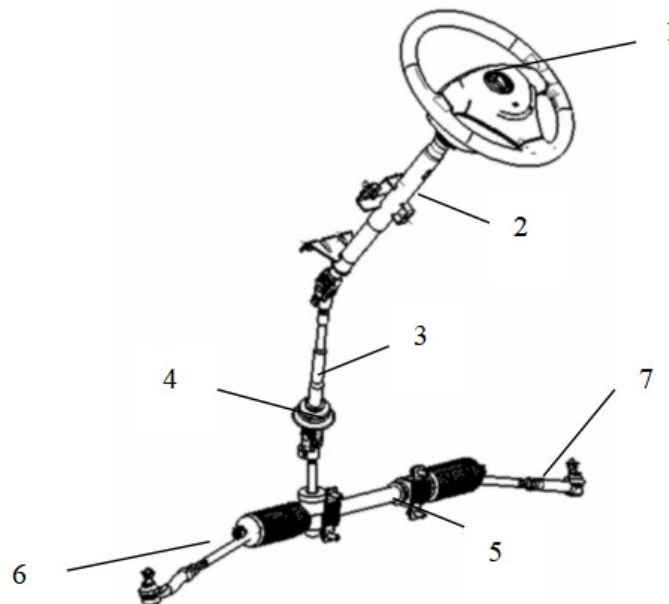
Application	Specification
Locking adhesive	Locking agent suitable for screw plug connection
Lubricating grease	Lithium lubricating grease (ZL-2 GB7324-2010)

2.1.1.3 Specification of mechanical steering gear

Application	Specification
Steering gear type	Pinion and rack type mechanical steering gear
Rack travel	140±0.3mm
Steering gear bearing	6003

2.1.2 Appearance identification

2.1.2.1 Steering system positioning diagram

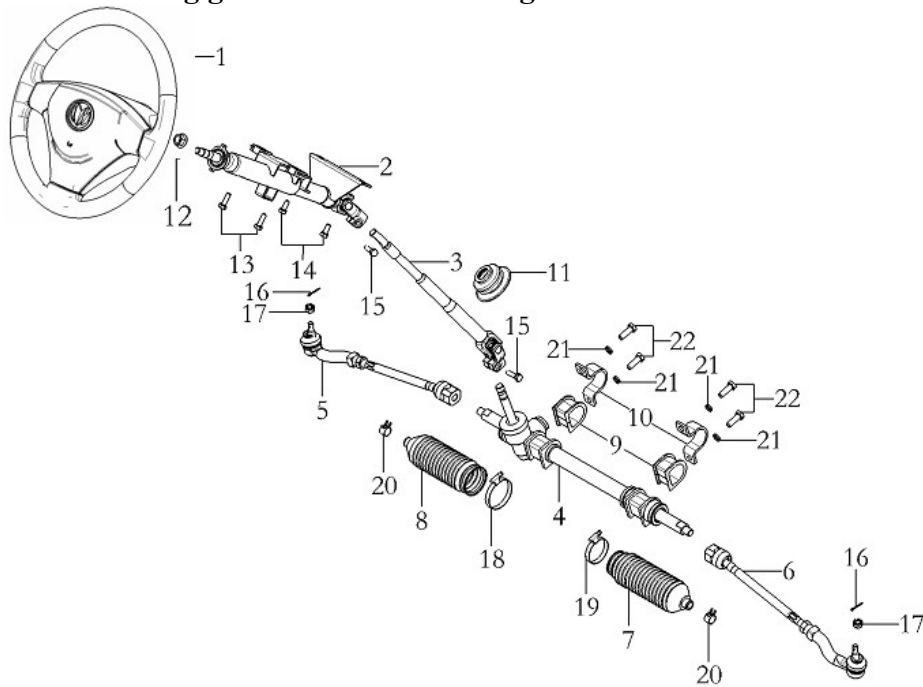


Icons:

1	Steering	2	Steering	3	Lower steering	4	Lower steering
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	wheel assembly		column		transmission shaft assembly		shaft dust cover
5	Steering gear assembly	6	Left tie rod assembly	7	Right tie rod assembly		

2.1.2.2 Mechanical steering gear - sectional drawing



Icons:

1	Steering wheel assembly	2	Steering column assembly	3	Lower steering transmission shaft assembly
4	Steering gear assembly	5	Steering gear left tie rod assembly	6	Steering gear right tie rod assembly
7	Steering gear right tie rod dust cover	8	Steering gear left tie rod dust cover	9	Steering gear mounting bushing
10	Steering gear mounting bracket	11	Lower steering shaft sheath	12	Hexagon nut and conical elastic washer assemblies
13	Hexagon bolt and spring washer assemblies	14	Hexagon bolt and spring washer assemblies	15	Hexagon bolt and spring washer

					assemblies
16	Split pin	17	Hexagon slotted nut	18	Single-lug stepless clamp
19	Single-lug stepless clamp	20	Clamp	21	Spring washer
22	Hexagon bolt - fine thread				

2.1.3 Diagnosis information and procedures

2.1.3.1 Mechanical steering system detection

When conducting road test before diagnosis, pay attention to the following systems during diagnosis:

- Suspension system
- Tires and wheels
- Check whether the tire pressure is appropriate and whether there is uneven wear;
- Check whether the universal joint link between the steering column and the steering gear is

loose or worn;

Check the following components for looseness or damage:

- Front suspension;
- Rear suspension;
- Steering gear;
- Steering tie rod;
- Steering column;

Check the tires for the following conditions:

- Whether the tire is not round
- Whether the tire is unbalanced;
- Whether the wheel is bent or deformed;
- Whether the wheel bearing is loose or worn;

2.1.3.2 Rattling noise in the steering system

Status	Measures
--------	----------

Steering gear is loose	Tighten the steering gear nut to the specified torque.
One or both ends of the steering tie rod are loose	Repair or replace the steering tie rod joint seat assembly if necessary.
Steering universal joint assembly is loose	Repair or replace the steering universal joint assembly if necessary.

2.1.3.3 Abnormal noise of mechanical steering gear

Status	Measures
Steering gear is loose	1. Tighten the steering gear nut to the specified torque.
One or both ends of the steering tie rod are loose	Repair or replace the steering tie rod joint seat assembly if necessary.
Steering universal joint is loose	Repair or replace the steering universal joint if necessary.

2.1.3.4 The free stroke of the steering wheel is too large or the steering is too loose

Problem	Measures
Joint between steering column and steering gear is loose	1. Check the steering universal joint between steering column and steering gear. 2. Replace the steering universal joint between steering column and steering gear if necessary.
Steering gear bracket is loose	1. Check the steering gear bracket. 2. Tighten the mechanical steering gear mounting bolt to the specified torque.
Ball joint of steering tie rod joint seat is loose	1. Check the ball joint of steering tie rod joint seat assembly. 2. Replace the steering tie rod joint seat assembly if necessary.
Wheel bearing is worn	1. Check the wheel bearing. 2. Replace the hub and bearing assembly.

2.1.3.5 Poor return of steering wheel

Problem	Measures
Steering tie rod ball joint pin is stuck	1. Check the steering tie rod ball joint pin. 2. Replace the steering tie rod joint seat assembly if necessary.
Incorrect front wheel alignment	1. Check the front wheel alignment parameters. 2. Check and adjust the front wheel alignment if necessary.
Steering gear is loose	1. Tighten the steering gear mounting nut to the specified torque.
Steering intermediate shaft clamp bolt torque is too large	Tighten the steering transmission shaft clamp bolt to the specified torque.
Steering column is stuck	1. Check the steering column adjustment mechanism. 2. Check the steering column bracket. 3. Repair or replace the steering column bracket if necessary.
Improper tire pressure	Inflate to the specified air pressure.

2.1.3.6 The steering is too loose or the intermediate clearance of the steering mechanism is too large

Problem	Measures
Joint between steering column and steering gear is loose or worn	1. Check whether the fastening torque of the steering universal joint between steering column and steering gear is correct. 2. Replace the steering universal joint between steering column and steering gear if

	necessary.
Steering gear mounting bracket is loose	<ol style="list-style-type: none"> 1. Check the steering gear mounting bracket. 2. Tighten the steering gear mounting nut to the specified torque.
Ball joint of steering tie rod joint seat is loose	<ol style="list-style-type: none"> 1. Check the steering tie rod joint seat assembly. 2. Replace the steering tie rod joint seat assembly if necessary.
Wheel bearing is worn	<ol style="list-style-type: none"> 1. Check the wheel bearing. 2. Replace the hub and bearing assembly.

2.1.3.7 Steering mechanism swings or is unstable

Problem	Measures
Incorrect front wheel alignment	<ol style="list-style-type: none"> 1. Check the front wheel alignment. 2. Check and adjust the front wheel alignment if necessary.
Front suspension damping spring is broken/loose	<ol style="list-style-type: none"> 1. Check the broken/loose spring. 2. Replace the broken/loose spring.
Stabilizer bar is loose	<ol style="list-style-type: none"> 1. Check whether the stabilizer bar mounting bolt is loose. 2. Tighten the stabilizer bar nut to the specified torque.
Shock absorber is worn	<ol style="list-style-type: none"> 1. Check whether the shock absorber is damaged or faulty. 2. Replace the shock absorber if necessary.
Uneven tire wear/incorrect alignment	<ol style="list-style-type: none"> 1. Check and repair the tire. 2. Replace the tire if necessary. 3. Check the front wheel alignment. 4. Check and adjust the front wheel alignment if necessary.

2.1.3.8 Steering deviation when braking

Problem	Measures
Camber angle is incorrect	Refer to "Wheel positioning".
Control arm is loose	<ol style="list-style-type: none"> 1. Check the control arm. 2. Replace the control arm if necessary.
Brake disc is warped	Replace the brake disc if necessary.
Spring is broken/loose	<ol style="list-style-type: none"> 1. Check the broken/loose spring. 2. Replace the broken/loose spring.
Wheel bearing is worn	<ol style="list-style-type: none"> 1. Check the wheel bearing. 2. Replace the hub and bearing assembly.
Unequal left and right brake forces	<ol style="list-style-type: none"> 1. Adjust the brake clearance. 2. Replace the left and right brake pads and adjust the brake clearance if necessary.
The steering gear is loose	<ol style="list-style-type: none"> 1. Check whether the steering gear is installed correctly. 2. Tighten the steering gear mounting nut to the specified torque.
Ball joint of steering tie rod joint seat is loose	<ol style="list-style-type: none"> 1. Check the steering tie rod joint seat ball joint assembly. 2. Replace the steering tie rod joint seat assembly.
The steering universal joint is loose	<ol style="list-style-type: none"> 1. Check the steering universal joint. 2. Replace the steering universal joint if necessary.

2.1.4 Maintenance Guide

2.1.4.1 Inspection/adjustment of straight forward position

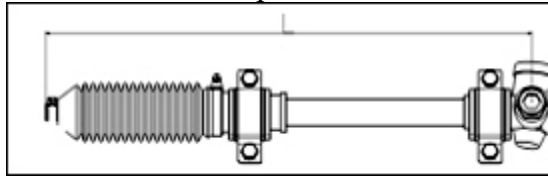
Important precautions: After any operation (removal, installation, disassembly or assembly) of

the steering gear or steering column assembly, the straight forward position of the steering mechanism must be checked.

Detection

The straight forward position can be obtained by checking the dimension "L" $=500.5 \pm 2$ mm.

The steering wheel must be in a horizontal position.



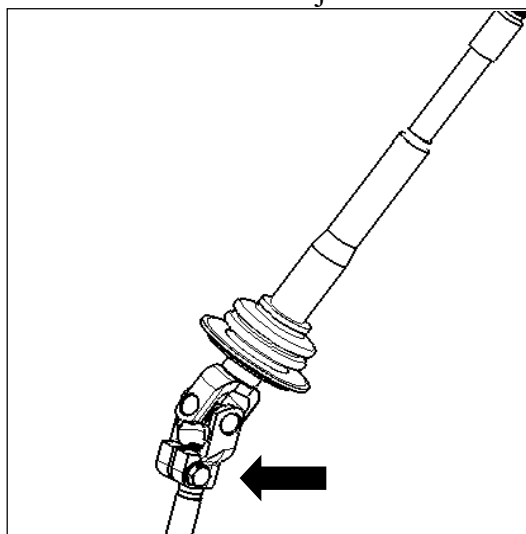
Adjust

Take off the steering wheel, adjust the steering column switch so that the adjustment pin is on the horizontal line, align the steering wheel, insert and press it, turn the steering wheel several times until hearing a sound of "tick", make the adjustment pin pop up, insert it into the steering wheel groove, turn the steering wheel back and forth, its free travel should be within $\pm 5^\circ$, and tighten it according to the specified torque.

2.1.4.2 Replacement of the mechanical steering gear

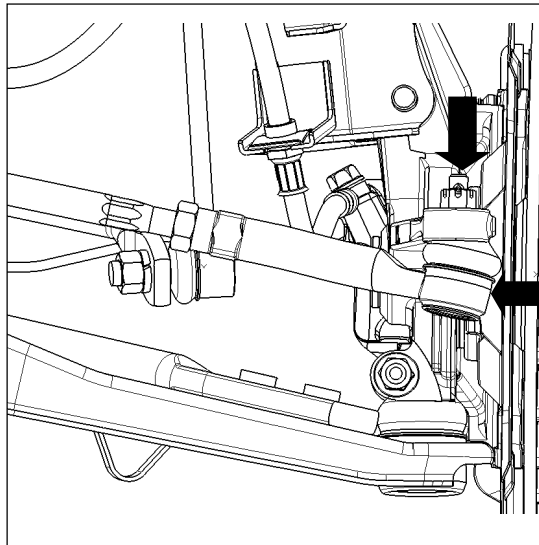
Required tool: NLM1-S0000009 ball joint puller

1. Jack up the vehicle and remove the front wheel.
2. Remove the steering transmission shaft lower joint bolt.



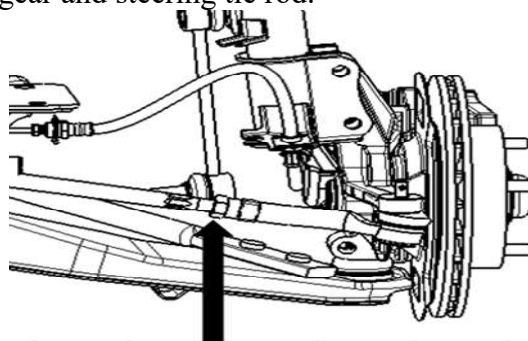
3. Remove the split pin and lock nut at the left/right steering tie rod joint seat assembly. Use the special tool NLM1-S0000009 to press out the steering tie rod joint seat from the steering

knuckle.

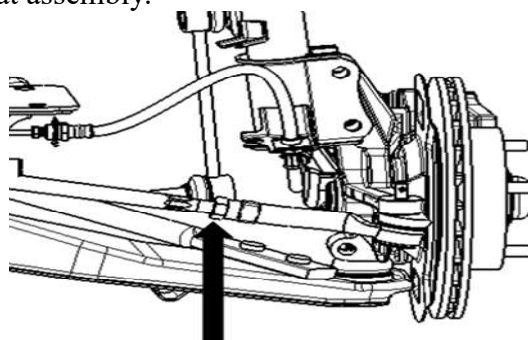


4. Remove four mounting bolts of the steering gear.

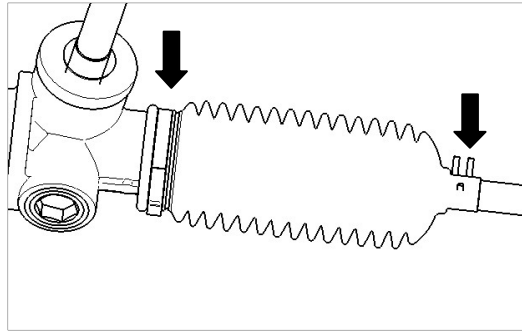
5. Remove the steering gear and steering tie rod.



6. In order to make proper adjustment after installation, the lock nut of the steering tie rod should be marked first. Then remove the lock nut of the steering tie rod and joint seat assembly, and remove the left/right joint seat assembly.

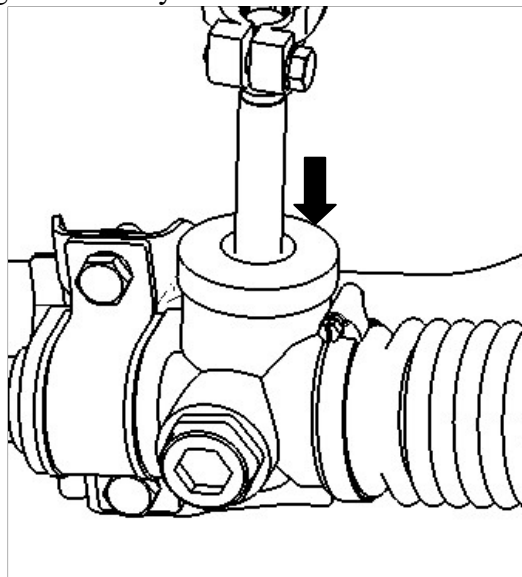


7. Remove the single-lug stepless clamps and clips on the left/right corrugated covers, and take off the left/right corrugated covers.



8. Remove the corrugated cover from the steering tie rod, pry off the locking pad, and loosen the steering tie rod housing. Then remove the left/right tie rod assembly from the rack.

9. Take off the steering gear assembly.



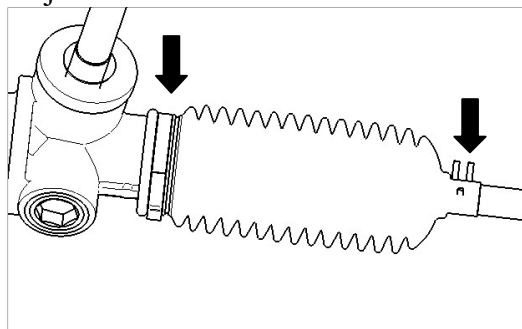
Installation steps

1. Install a new steering tie rod locking pad and steering tie rod onto the steering rack. The open groove part of the locking pad should be aligned with the platform wrench part of the rack.

2. Tighten the lock nut of ball joint tie rod according to the specified torque.

Tighten

Tighten the lock nut of ball joint tie rod to 80-100N•m.



3. Rivet the locking pad towards the wrench platform on the steering tie rod side.

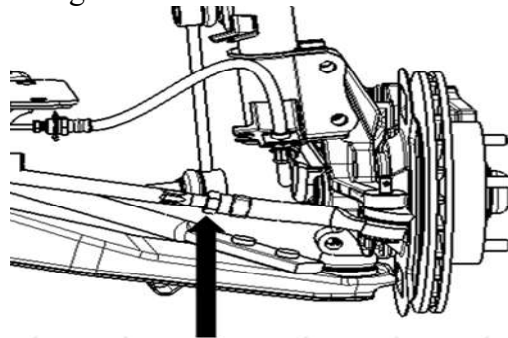
4. Apply semi-dry sealant on the installation part of the steering tie rod corrugated cover.

5. Correctly position the corrugated cover at the groove of the steering gear housing and the steering tie rod, and clamp it with a new single-lug stepless clamp according to the specified tightening force; install the self-tightening clamp.

6. Install the steering tie rod lock nut and the steering tie rod left/right joint seat assembly onto the steering tie rod. Position the lock nut at the mark made during disassembly and tighten it to the specified torque.

Tighten

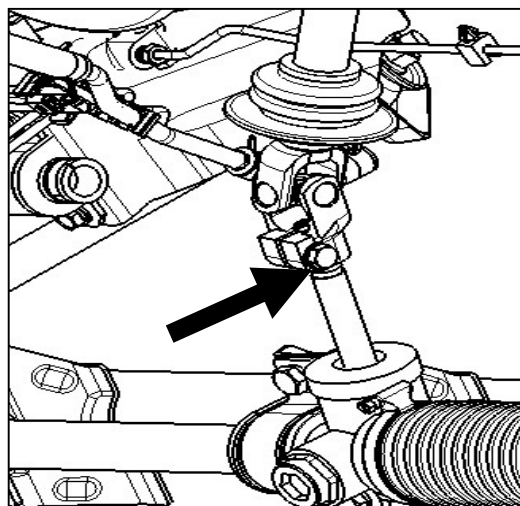
Tighten the lock nut of steering tie rod to 39-49N•m.



7. Connect the steering gear of the steering gear with the steering transmission shaft. Tighten the connecting bolts between the steering transmission shaft and steering gear.

Tighten

Tighten the connecting bolts between the steering transmission shaft and steering gear to 15-19N•m.



8. Tighten the steering gear mounting nut according to the specified torque.

Tighten

Tighten the steering gear mounting nut to 49-69N•m.

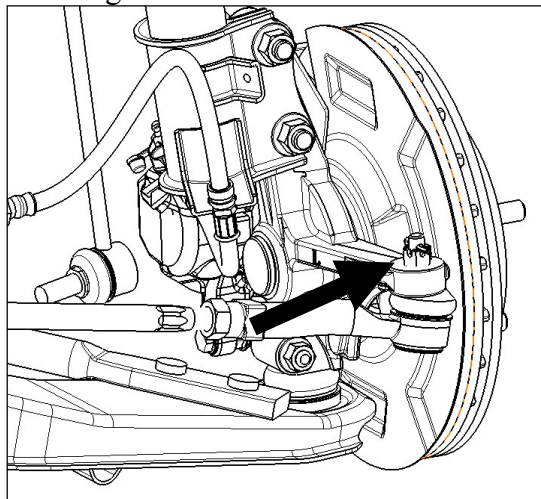
9. Install the ball joint pin of the steering tie rod joint seat with the steering knuckle. Tighten the slotted nut of the ball joint pin of the steering tie rod joint seat according to the specified torque, and install the split pin (the split pin is a non-reusable part).

Tighten

Tighten the slotted nut of the left/right steering tie rod joint seat to 23-33N•m.

10. Carry out the inspection and adjustment of straight forward position.

11. Install the wheel. Check the front wheel alignment and make appropriate adjustments as required. Refer to “Wheel positioning”.



2.1.4.3 Replacement of the steering ball joint tie rod assembly.

Removal steps

1. Remove the steering gear and steering tie rod. Refer to “Replacement of the mechanical steering gear”.

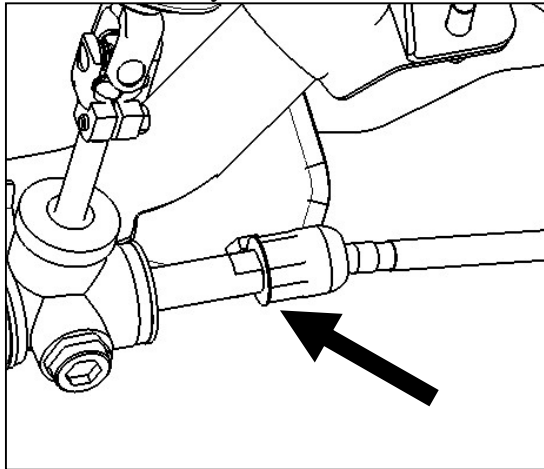
2. Remove the steering tie rod joint seat assembly. Refer to “Replacement of the steering tie rod joint seat assembly”.

3. Remove the steering gear corrugated cover. Refer to “Replacement of the steering gear corrugated cover”.

4. Pry off the locking pad and loosen the steering tie rod housing. Then remove the lower ball

joint tie rod assembly from the rack.

5. Take off the ball joint tie rod assembly.

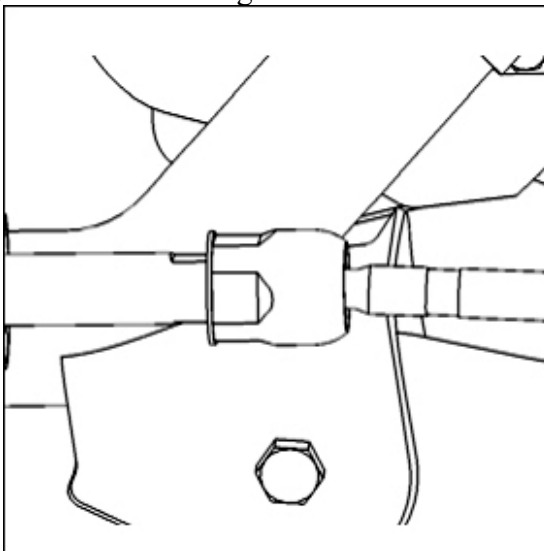


Installation steps

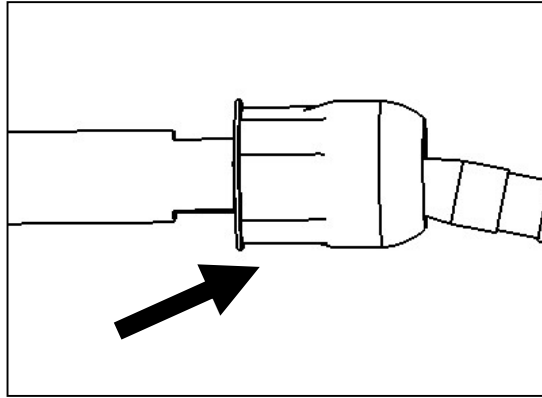
1. Install a new steering tie rod locking pad and steering tie rod onto the steering rack. The open groove part of the locking pad should be aligned with the platform wrench part of the rack.
2. Tighten the nut of ball joint tie rod housing according to the specified torque.

Tighten

Tighten the nut of ball joint tie rod housing to 80-100N•m.



3. Rivet the locking pad towards the wrench platform on the steering tie rod side.



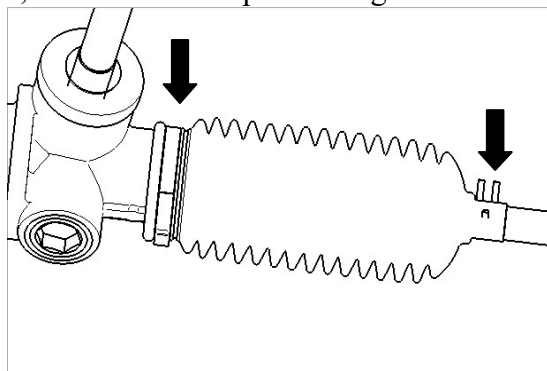
4. Apply semi-dry sealant on the steering ball joint tie rod.

5. Install the corrugated cover, correctly position the corrugated cover at the steering gear housing and steering tie rod groove, and fix the dust cover on the steering gear and steering tie rod with new clamps and self-tightening springs. Refer to “Replacement of the steering gear corrugated cover”.

6. Install the steering tie rod joint seat assembly. Refer to “Replacement of the steering tie rod joint seat assembly”.

7. Install the steering gear and steering tie rod. Refer to “Replacement of the steering gear”.

8. When adjusting toe-in, refer to “Wheel positioning”.



2.1.4.4 Replacement of the steering tie rod joint seat assembly

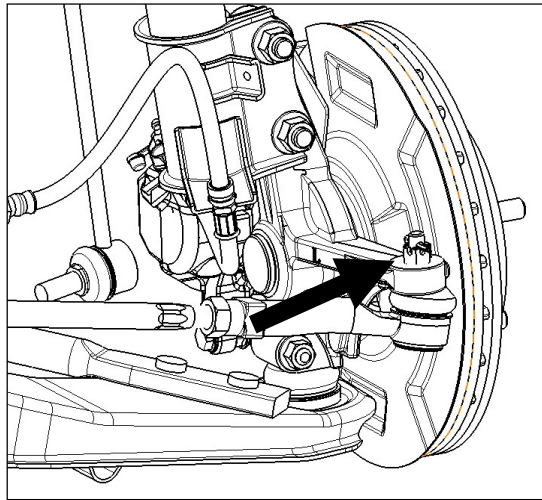
Important precautions: even if the dust cover of the ball joint pin of the steering tie rod joint seat is slightly damaged, the joint seat assembly should be replaced with a new one.

Removal steps

Required tool: NLM1-S0000009 ball joint puller

1. Remove the split pin and ball joint pin slotted nut of the steering tie rod joint seat, and press the end of the steering tie rod joint seat out of the steering knuckle with the special tool of

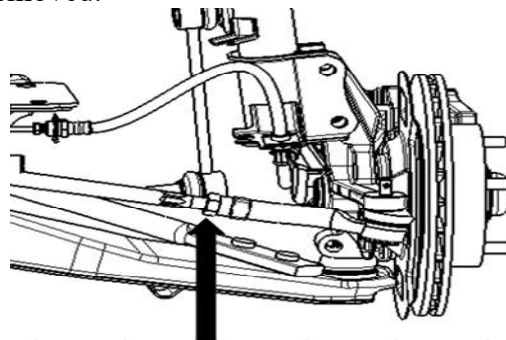
NLM1-S0000009.



2. Loosen the lock nut of the steering tie rod and remove the steering tie rod joint seat assembly from the steering tie rod without removing the corrugated cover.

Caution:

In order to make proper adjustment after installation, marks should be made at the lock nut where the steering tie rod is removed.



Installation steps

1. Install the lock nut of the steering tie rod and steering tie rod joint seat assembly, and position the lock nut at the mark made during removal.

2. Use a new lock nut to install the steering tie rod joint seat assembly on the steering knuckle.

Tighten

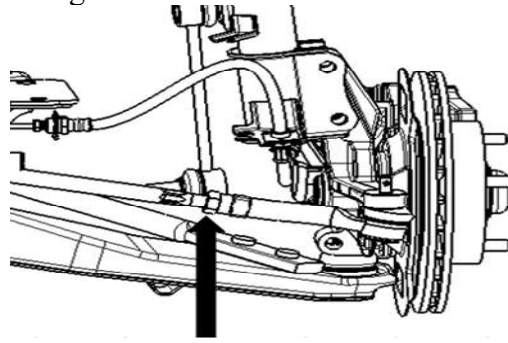
Tighten the slotted nut of the ball joint pin of the steering tie rod joint seat to 23-33N•m.

3. When adjusting toe-in, refer to “Toe-in adjustment” in the “Wheel positioning”.

4. Tighten the lock nut of steering tie rod according to the specified torque.

Tighten

Tighten the lock nut of steering tie rod to 39-49N•m.



2.1.4.5 Replacement of the steering gear corrugated cover

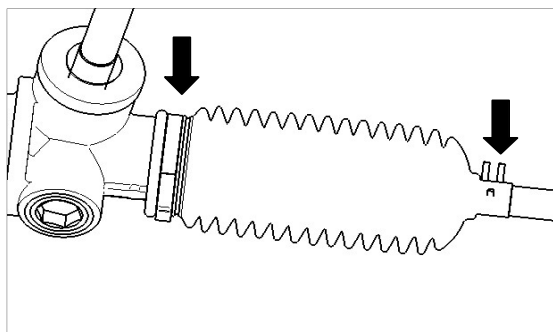
Inspection procedure

Check whether each corrugated cover is damaged. The damaged corrugated cover will immerse dust and water, which may cause the steering rack and steering gear to be worn, rusted and noisy, resulting in the operation failure of the steering system.

Replace the components even if minor damage is found. When jacking inspection is carried out at the specified time interval and the vehicle is lifted for other purposes, the corrugated cover shall be visually inspected for any damage.

Removal steps

1. Remove the steering tie rod joint seat assembly. Refer to “Replacement of the steering tie rod joint seat assembly”.
2. Loosen the clamp and self-tightening spring, and remove the corrugated cover (arrow in the figure).

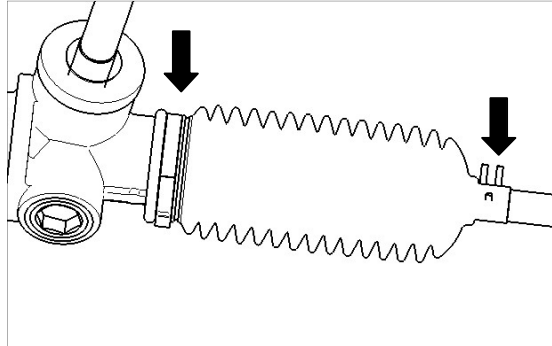


Installation steps

1. Apply semi-dry sealant on the installation part of the steering tie rod corrugated cover.
2. Correctly position the corrugated cover at the steering gear housing and steering tie rod groove, and fix the corrugated cover on the steering gear and steering tie rod with new clamps and

self-tightening springs.

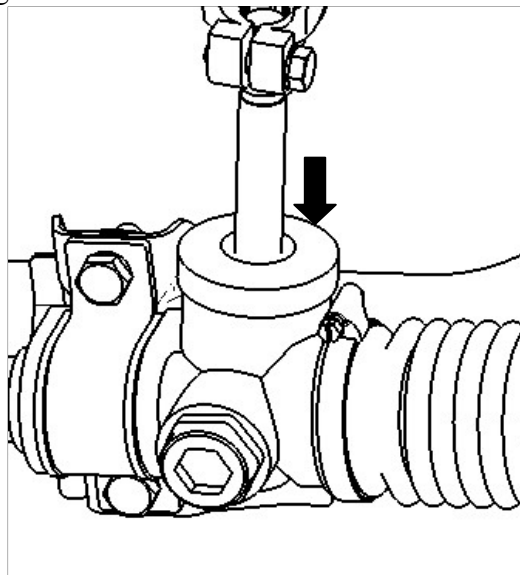
3. Install the steering tie rod joint seat assembly. Refer to “Replacement of the steering tie rod joint seat assembly”.



2.1.4.6 Replacement of the steering gear oil seal

Removal steps

1. When removing the steering gear assembly, refer to “Replacement of the mechanical steering gear”.
2. Remove the dust cover.
3. Remove the steering gear oil seal.



Installation steps

1. Install a new steering gear oil seal.
2. Install the dust cover.
3. When installing the steering gear assembly, refer to “Replacement of the mechanical steering gear”.

2.1.5 Description and operation

2.1.5.1 Safety regulations for mechanical steering system

- If there is a risk of electrical short circuit during operation, disconnect the grounding lead and cover the negative connector of the battery.

- Do not conduct heat treatment on the parts of the steering system, otherwise, the possible change in material properties will negatively affect the operation safety of the vehicle.

- When operating the steering system (steering gear, steering tie rod, steering column, etc.), the steering mechanism must be in the "straight forward" position during removal and installation.

- After an accident, in addition to checking the four-wheel alignment (in any case, the four-wheel alignment should be checked), the following parts should also be visually checked for bending or cracks.

- Steering system and steering tie rod. In addition, check the steering system by turning the steering wheel for a complete cycle.

- Chassis and all relevant components such as spring strut, steering knuckle, control arm, rear axle, stabilizer bar and other fasteners.

2.1.5.2 Description of mechanical steering system

The rotation of the steering wheel will have the following effects:

1. The movement of the steering wheel is transmitted to the steering gear.
2. The movement of the steering gear is transmitted through the rack and pinion.
3. The rack moves under the action of linear force.
4. The linear force is transmitted to the inner and outer steering tie rods and to the steering knuckle.
5. The steering knuckle transmits the force to the wheel.

2.1.5.3 Suggestions for replacement of the seal/fastener

- The lock nut and split pin must be replaced with new ones after removal;
- The steering gear oil seal must be replaced with a new one after removal.

2.2 Steering wheel and steering column

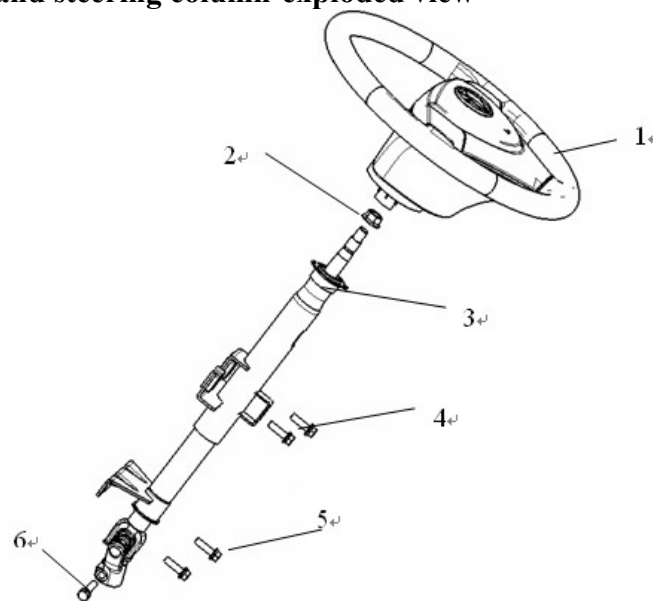
2.2.1 Specification

2.2.1.1 Fastener fastening specification

Application	Specification
Steering wheel lock nut	33-49N•m
Steering column mounting bolt	16-26N•m
Steering transmission shaft upper connecting bolt	15-19N•m
Steering transmission shaft lower connecting bolt	15-19N•m

2.2.2 Appearance identification

2.2.2.1 Steering wheel and steering column-exploded view



Icon

1	Steering wheel assembly	2	Lock nut	3	Steering column assembly
4	Mounting bolt	5	Mounting bolt	6	Lower transmission shaft mounting bolt

2.2.3 Diagnosis information and procedures

2.2.3.1 The lock system cannot unlock

Problem	Measures
The lock cylinder may be damaged	Inspect this component Replace the component if necessary. Refer to “Replacement of the ignition lock cylinder”.
The ignition switch is worn or damaged	Check the ignition switch. Replace the ignition switch if necessary.

2.2.3.2 The lock system cannot lock

Problem	Measures
The following components may be damaged: lock cylinder, steering column	Inspect the component Replace the component if necessary. Refer to “Replacement of the ignition lock cylinder” or “Replacement of the steering column assembly”.

2.2.3.3 The key cannot be removed at the closed and locked positions

Problem	Measures
The ignition lock cylinder is not set correctly	Adjust the lock cylinder as required Replace the component if necessary. Refer to “Replacement of the ignition lock cylinder”.
The lock cylinder is damaged	Replace the lock cylinder if necessary. Refer to “Replacement of the ignition lock cylinder”.

2.2.3.4 Greater locking force is required between the closed and locked positions

Problem	Measures
The lock cylinder is worn or damaged	Replace the lock cylinder if necessary. Refer to “Replacement of the ignition lock cylinder”.

2.2.3.5 Larger specified force

Problem	Measures
The following components may be damaged: lock cylinder ignition switch	Inspect the component Replace the component if necessary. Refer to “Replacement of the ignition lock cylinder”. Replace the ignition switch if necessary.

2.2.3.6 Steering shaft detection

Check whether the plastic pin of the steering shaft is cut off. Some symptoms if it is cut are as follows:

- There is a clicking sound when the steering shaft is slightly impacted from the side.
- Large clearance can be felt when turning the steering wheel.
- If the steering shaft is cut off due to a slight collision and other parts are not seriously

damaged, the vehicle can still turn safely, but it is recommended to replace the steering shaft.

2.2.3.7 Steering column is loose

Problem	Measures
Steering column mounting bolt is loose	Tighten the steering column mounting bolt to the specified torque. Refer to “Fastener fastening specification”.
The steering column assembly support is loose or damaged	1. Check the steering column support assembly. Refer to “Replacement of the steering column assembly”. 2. Repair or replace the steering column support assembly if necessary. Refer to “Replacement of the steering column assembly”.

2.2.3.8 Steering wheel is loose

Problem	Measures
Steering wheel mounting nut is loose	1. Check the installation of the steering wheel. Refer to “Replacement of the steering wheel”.

	2. Tighten the steering wheel mounting nut again. Refer to “Replacement of the steering wheel”.
Steering wheel is damaged	1. Check the steering wheel. Refer to “Replacement of the steering wheel”. 2. Replace the steering wheel. Refer to “Replacement of the steering wheel”.
Steering intermediate shaft is worn or damaged	Check the steering intermediate shaft. Refer to “Replacement of the steering intermediate shaft”. Replace the steering intermediate shaft. Refer to “Replacement of the steering intermediate shaft”.

2.2.4 Maintenance Guide

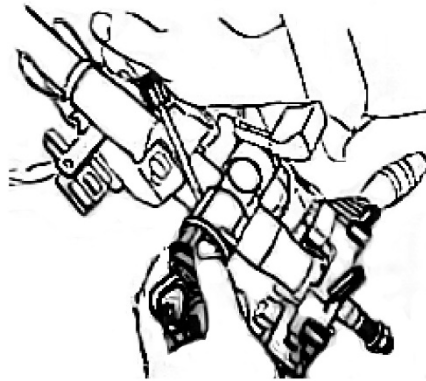
2.2.4.1 Refer to “Replacement of the ignition lock cylinder”

Removal steps

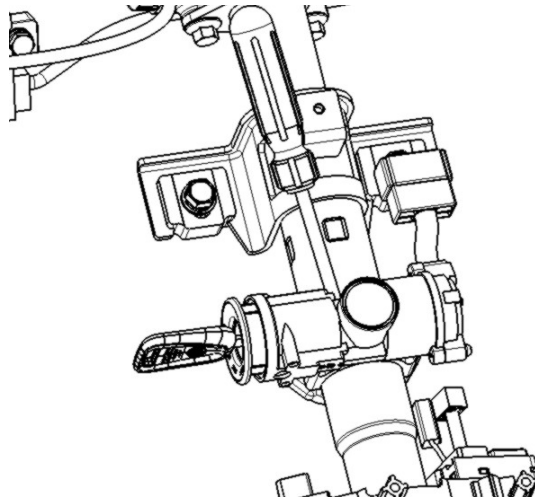
Required tool

NLM1-S0000007 interior trim staple pry board

1. Remove the battery negative wire.
2. Remove the steering wheel. Refer to “Replacement of the steering wheel”.
3. Loosen the mounting screws of the upper/lower trim cover assembly and remove the upper/lower trim cover assembly of the steering column.



4. Disconnect the harness plug of combination switch and ignition switch.
5. Turn the key to ACC position, insert a screwdriver or other tool into the unlocking hole on the ignition lock, and pull out the ignition lock cylinder outward.



Installation steps:

1. Align the lug of the ignition lock cylinder with the groove of the lock cylinder base, and then insert the ignition lock cylinder into the lock cylinder base. When you hear a click, it indicates it is in place.

2. Connect the combination switch plug connector.

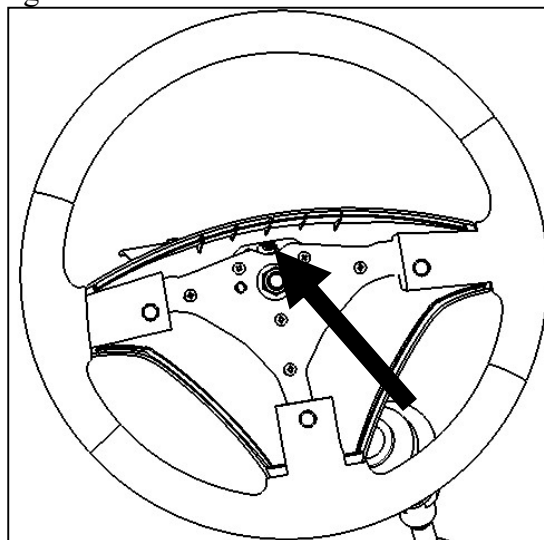
3. Install the steering column upper/lower trim cover assembly and tighten the screws.

Tighten

Tighten the upper and lower trim cover assembly to 6-12N•m.

4. Install the steering wheel. Refer to “Replacement of the steering wheel”.

5. Connect the battery negative wire.



2.2.4.2 Replacement of the steering wheel

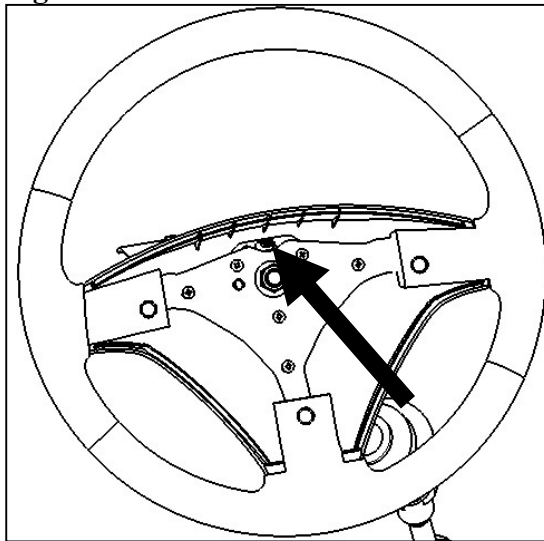
Precautions:

When removing the steering wheel, lock the steering column in the "straight forward position" to avoid damaging the contact device and steering wheel during reinstallation.

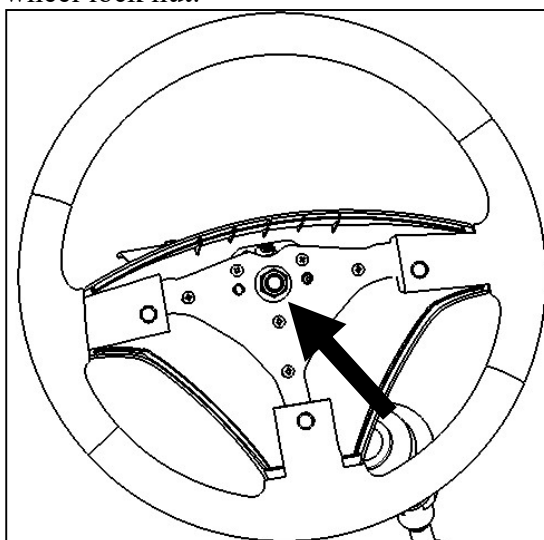
Do not knock the end of the steering shaft when removing the steering wheel. If being knocked, the plastic shear lock pin that maintains the length of the steering column will become loose, and the specific cushioning performance of the steering column will be damaged.

Required tool: NLM1-S0000014

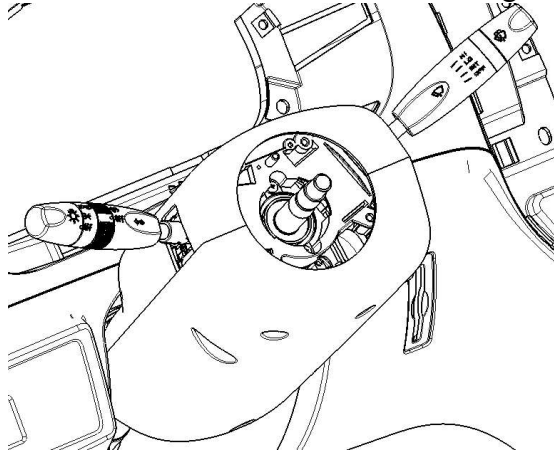
Removal steps of steering wheel die



1. Remove the steering wheel upper cover assembly.
2. Remove the harness plug of the horn from the groove of the steering wheel. Release the harness plug of the horn and take it out.
3. Remove the steering wheel lock nut.



4. Make the alignment marks of steering wheel and steering shaft.
5. Use the special tool NLM1-S0000014 to remove the steering wheel.



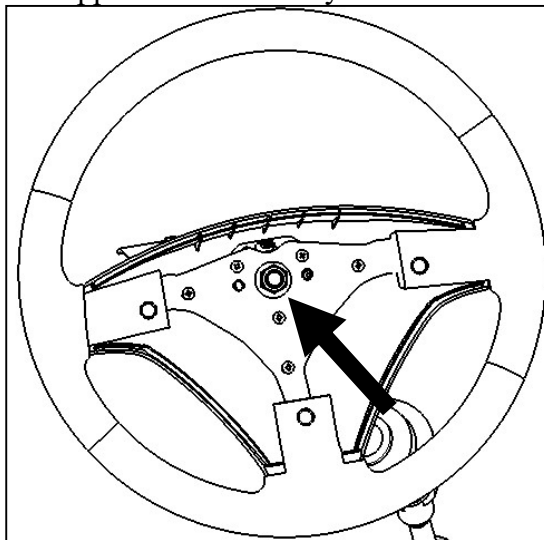
Installation steps

1. Install the steering wheel into the steering shaft and pay attention to the alignment marks.
2. Connect the horn harness connector. Tighten the steering wheel lock nut according to the specified torque.

Tighten

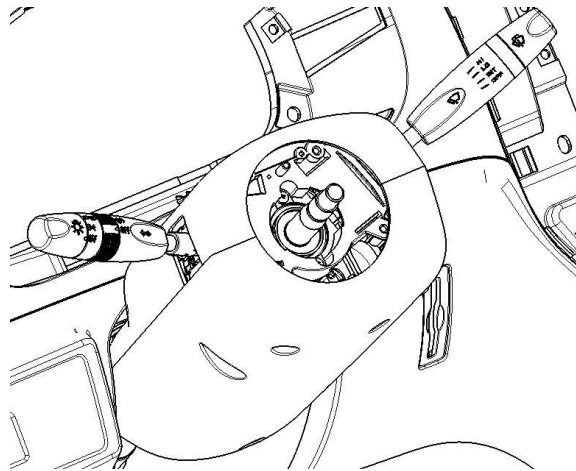
Tighten the steering wheel lock nut to 33-49N•m.

3. Install the steering wheel upper cover assembly.



2.2.4.3 Replacement of the steering column lock

1. Remove the battery negative wire.
2. Remove the steering wheel. Refer to “Replacement of the steering wheel”.
3. Remove the upper/lower trim cover assembly from the steering column.

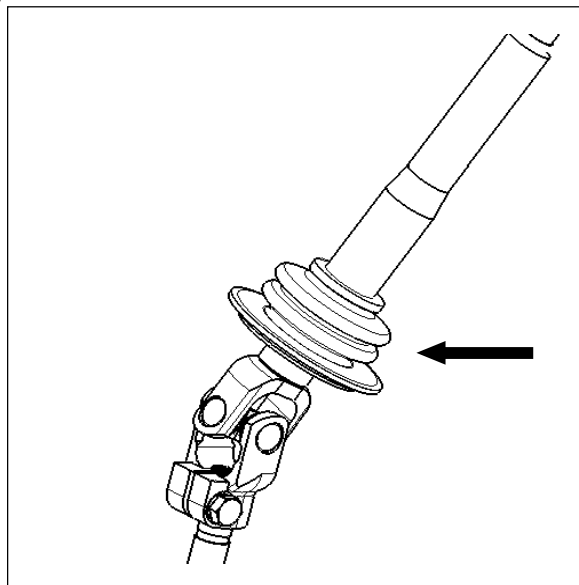


4. Remove the steering column assembly. Refer to “Replacement of the steering column”.

5. Remove the anti-theft bolt of the steering column lock with an electric drill or punch.

Caution: Use the punch or electric drill carefully to avoid damaging the steering column lock body.

6. Turn the ignition key to the "ACC" or "ON" position and remove the steering column lock assembly from the steering column.



Installation steps

1. Align the rectangular hole of the steering shaft with the center of the inner hole of the steering column.

2. Turn the ignition key to the LOCK position and pull it out.

3. Align the locking sleeve with the rectangular hole 换图 steering shaft, and rotate the shaft

to ensure that the steering shaft is locked.

4. Install a new steering column lock and tighten two new safety bolts until the hexagon head is sheared off.

5. Turn the ignition key to the "ACC" or "ON" position and check whether the steering shaft can rotate smoothly. Then check the operation of the anti-theft lock.

6. When installing the steering column, refer to "Replacement of the steering column" for details.

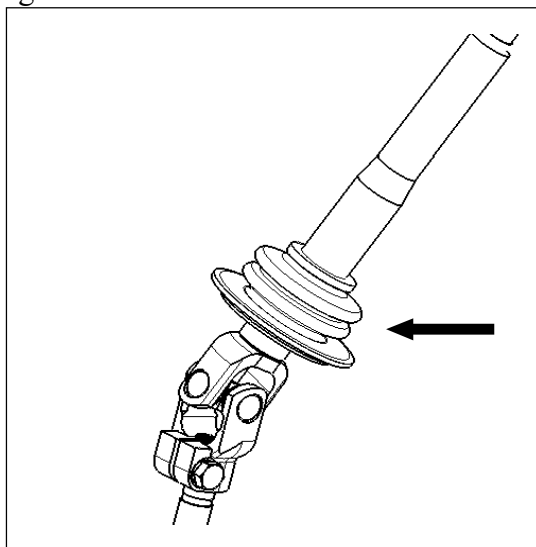
Tighten

Tighten the steering column mounting bolt to 16-26N•m.

7. Remove the steering wheel. Refer to "Replacement of the steering wheel".

8. Remove the upper/lower trim cover assembly from the steering column.

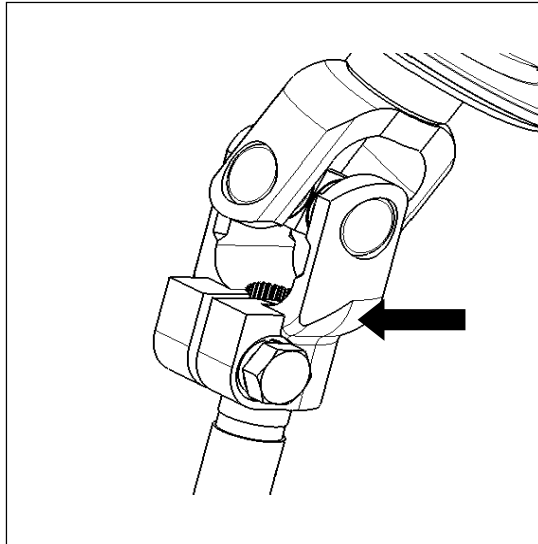
9. Connect the battery negative wire.



2.2.4.4 Replacement of the steering transmission shaft

Removal steps

1. Remove the connecting bolts on the steering transmission shaft and remove the dust cover.



2. Remove the lower connecting bolt of the steering transmission shaft.
3. Take off the steering transmission shaft assembly.

Installation steps

1. Tighten the lower joint bolt of steering transmission shaft according to the specified torque.

Tighten

Tighten the lower joint bolt of steering transmission shaft to 15-19N•m.

2. Apply lubricating grease to the lip of the steering transmission shaft dust cover, and then install the dust cover onto the front partition plate.

3. Align the flat part of the steering transmission shaft with the notch of the steering column joint, and then sleeve the steering column joint into the transmission shaft. Tighten the upper joint bolt of steering transmission shaft according to the specified torque.

Tighten

Tighten the upper joint bolt of steering transmission shaft to 15-19N•m.

2.2.5 Description and operation

2.2.5.1 Description of steering wheel and steering column

1. The steering column absorbs energy. When a frontal collision occurs, the steering column contracts to reduce the probability of hurting the driver.

2. The combination switch is located on the steering column and can control the following

components:


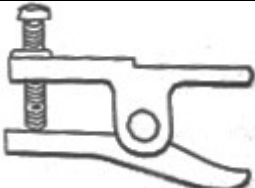

- Vehicle exterior lighting and turn signal lamp.
- Windshield wiper and cleaner.

The disassembly and reinstallation of the steering column is relatively simple: use the specified screws, bolts and nuts to ensure energy absorption. The steering column shall be handled with special care after being removed from the vehicle.

The plastic maintains the rigidity of the steering column and may be cut or loosened under the following conditions:

1. The steering wheel puller used is not the recommended puller.
2. The end of the steering shaft is severely impacted.
3. An object leans against the steering column.
4. The steering shaft falls off.

2.2.6 Special tools and equipment

Icon	Tool No./Description
	<p>NLM1-S0000007 Interior trim staple pry board</p>
	<p>NLM1-S0000009 Ball joint puller</p>
	<p>NLM1-S0000014 Steering wheel die</p>

3 Electric power steering system

3.1 General information

On the basis of the original mechanical steering system, the vehicle electric power steering (EPS) system adds torque sensor, EPS controller and power assist motor and other devices. The basic working principle is that the EPS controller, according to the torque signal of the steering wheel and speed signal, drives the motor to generate appropriate power according to the predetermined value, assists the driver in steering control, and obtains good steering sense.

3.1.1 Key components of EPS system

Torque sensor

The function of the torque sensor is to measure the torque and direction of the driver acting on the steering wheel. Its measuring system is relatively complex and costly, so the low-cost torque sensor with reliable performance is one of the key factors determining whether EPS can occupy the market. There are two main types of torque sensors: contact type and non-contact type. There are three types of commonly used contact sensors: swing arm type, double row planetary gear type and torsion bar type. At present, EPS system generally adopts torsion bar potentiometer type sensor.

Motor

The function of the motor is to output the appropriate power assist torque according to the command of the EPS controller. It is the power source of the EPS system. Permanent magnet DC motor is mostly used. The motor has a great impact on the performance of EPS system, so it requires high performance of the motor, not only low speed, large torque, small fluctuation, small moment of inertia, small size, light weight, but also high performance and easy control.

Power assist motor speed reduction mechanism

The speed reduction mechanism of power assist motor of EPS system is connected with the output shaft of motor, which has the function of raising and lowering speed and increasing torque. Worm gear and worm machinery are usually used. In order to suppress noise and improve durability, some gears of the speed reduction mechanism are made of resin material or made to special tooth shape.

EPS controller

EPS controller is the core component of EPS system, which is generally divided into control circuit and drive circuit. The control circuit determines the driving state of the motor according to the input signals of the above sensors and the motor voltage and current signals detected by itself, and sends corresponding control signals to the drive circuit; the drive circuit can drive the motor according to the control signal. It also has self-diagnosis and fault protection functions.

Self diagnosis function

When the vehicle is powered on, the "EPS" indicator lamp on the instrument panel is always on (indicating that the vehicle is equipped with EPS system); during the starting process, the EPS controller performs self-test on the relevant components of the system. When there is no fault in the system, the "EPS" indicator lamp will go out automatically; when there is a fault in the system, the "EPS" indicator lamp will be always on, and the EPS controller automatically turns off the power supply of the EPS system and converts it to the mechanical steering system. Fault diagnosis is carried out by grounding the fault diagnosis switch terminal (battery negative pole or body grounding). The "EPS" lamp flashes according to the corresponding fault code, and the fault code table is used to find out the cause of the fault. (Refer to the fault code table for details)

The self-diagnosis items are as follows:

Torque sensor

Vehicle speed sensor

Power supply

Motor

EPS controller

Caution:

When the ignition switch is turned to ON, the EPS controller outputs DTC22 fault code.

Advantages of EPS system:

1) Energy conservation and environmental protection: its energy consumption is only 20% of that of the hydraulic power steering system, and there is no direct environmental pollution caused by hydraulic oil leakage.

2) High-performance: It has the advantages of obtaining the best road feel, high speed driving

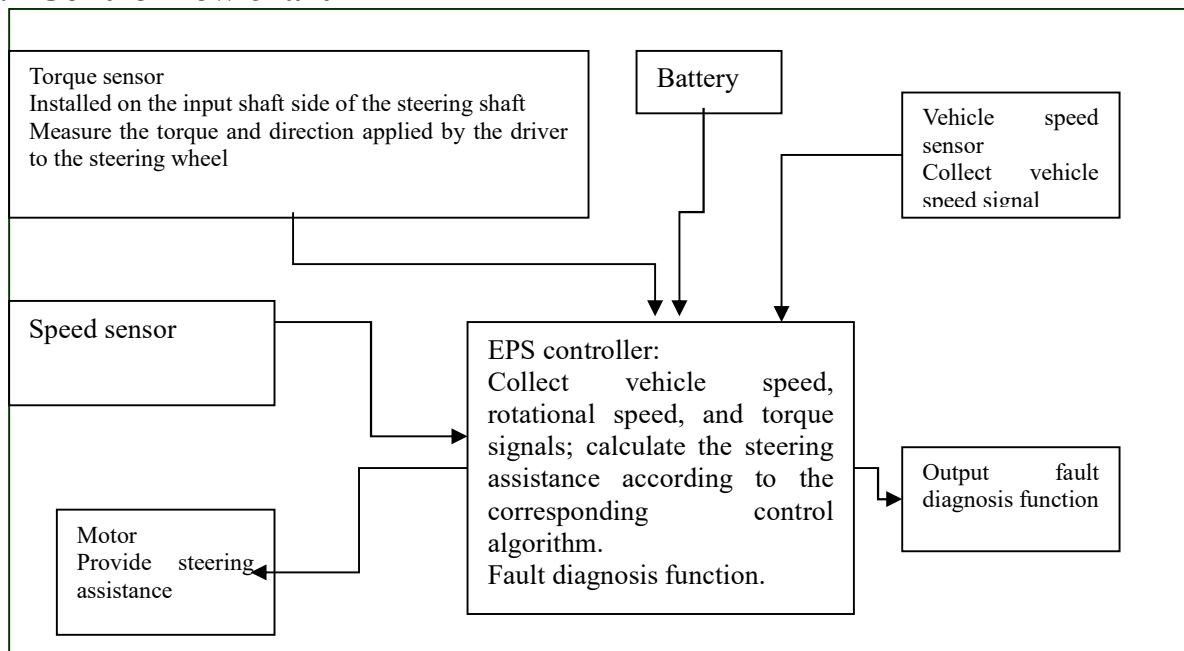
stability, low speed steering portability and strong anti-interference under various conditions of driving (road surface and speed).

3) High controllability: for different vehicle types and use requirements, the performance requirements can be met as long as the software is changed without changing the hardware.

4) Light weight: about 20% lighter than that of hydraulic power steering, with good assembly performance and easy vehicle layout.

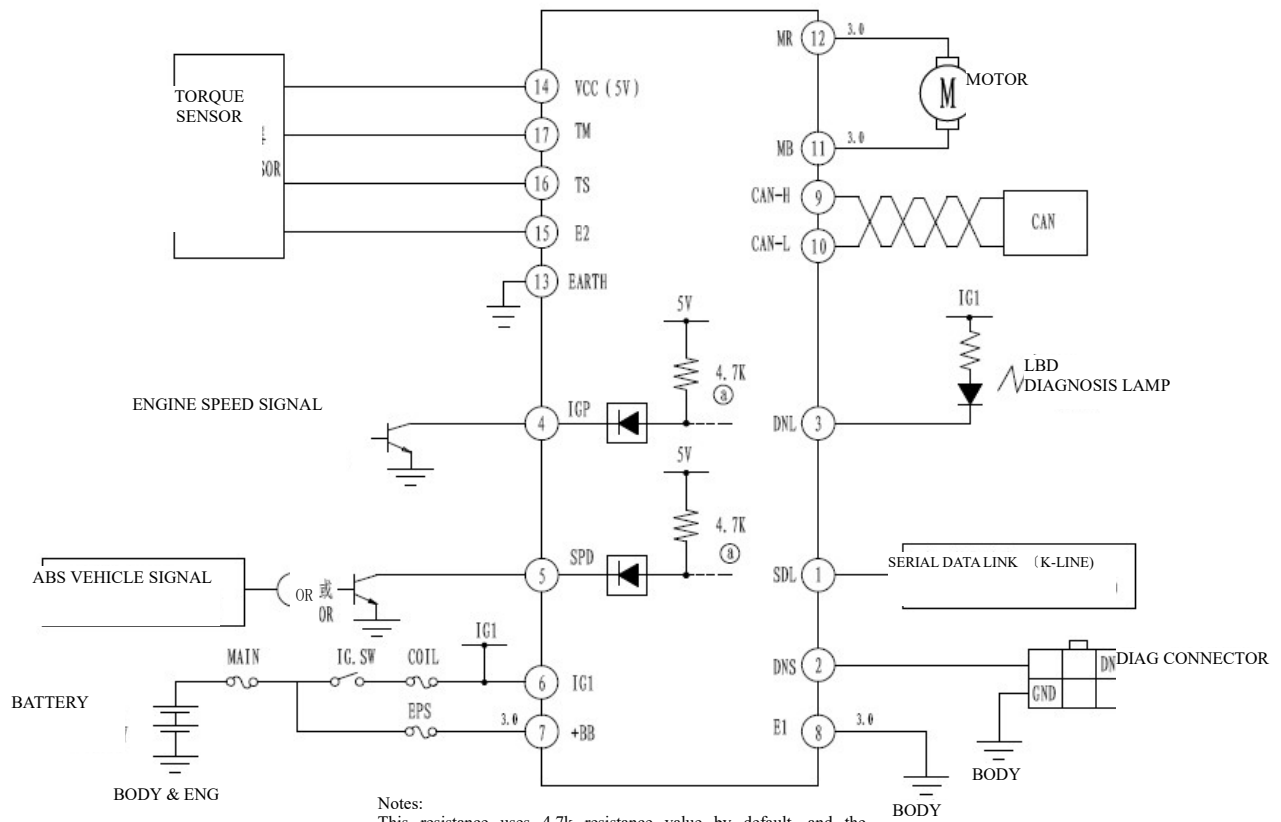
5) Wide application range: electric power steering system can be applied to all kinds of vehicles, especially environment-friendly hybrid electric vehicles, and EPS system is the best choice.

3.1.2 Control flow chart

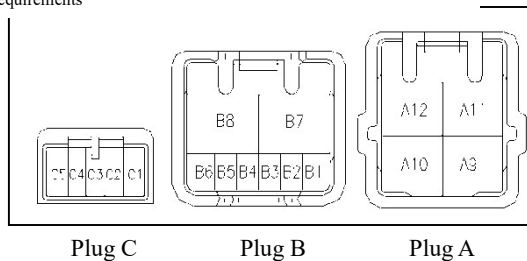


3.1.3 Electrical circuit schematic diagram

MAXIMUM WORKING CURRENT 35A



Notes:
This resistance uses 4.7k resistance value by default, and the resistance value can be matched and selected according to customer requirements



3.1.4 Connecting terminal definition

(See the circuit schematic diagram above for the location of each terminal)

S/N	Name	Terminal connection	Signal access	Signal status
B1	K-Line	Vehicle communication diagnostic instrument (K-line diagnostic instrument)	Serial communication	Positive pole of continuous power supply (battery) with voltage of 12VDC
B2	DNS	Fault diagnosis switch	Input	Float in the air under normal conditions and become effective when connecting to the negative pole of the power supply
B3	DNL	Fault lamp	Output	Level signal with voltage of 12VDC, effective at low level
B4				
B5	VS	Vehicle speed signal	Input	Square wave signal with peak value of 12V

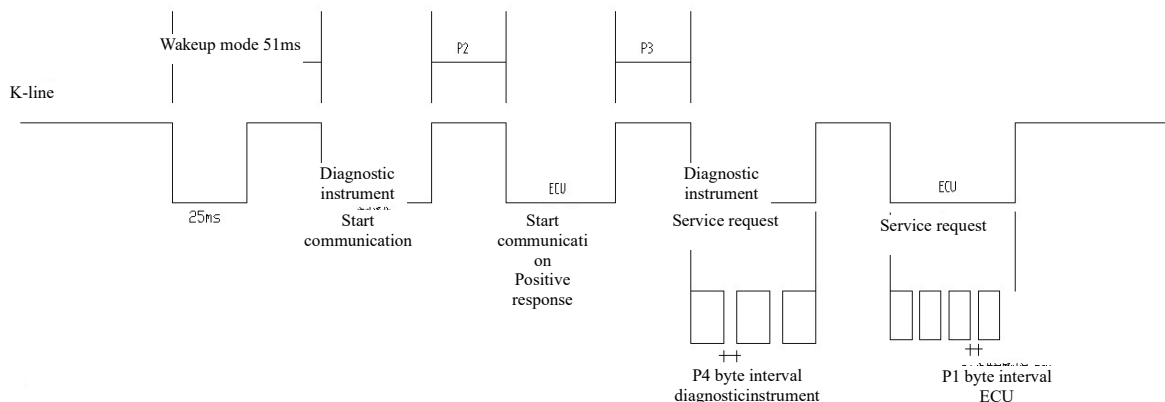
B6	IG	Ignition signal	Input	Level signal with voltage of 12VDC, effective at high level
B7	+BB	Power supply (+BB)	Input	Positive pole of continuous power supply (battery) with voltage of 12VDC
B8	E1	Grounding	Input	Negative pole of continuous power supply (battery) with voltage of 12VDC
A9	CAN-H	CAN-H		When hard wire connection is adopted, this end is suspended
A10	CAN-L	CAN-L		When hard wire connection is adopted, this end is suspended
A11	MB	Motor output	Output	Pulse signal with peak value of 12V and variable pulse width
A12	MR	Motor output	Output	Pulse signal with peak value of 12V and variable pulse width
C1	NONE	Unused end/suspended		
C2	VCC	5V sensor voltage	Output	Positive pole of power supply with voltage of 5VDC
C3	E2	Sensor grounding	Output	Negative pole of power supply with voltage of 5VDC
C4	TS	Torque sensor (secondary signal)	Input	Analog voltage signal with voltage of 0VDC-5VDC
C5	TM	Torque sensor (main signal)	Input	Analog voltage signal with voltage of 0VDC-5VDC

3.1.5 K-line communication

Quick initialization

At the beginning of diagnosis, the diagnostic instrument sends a wake-up mode (WUP) signal to the ECU through the K-line. The signal starts at a low level of 25ms after a period of idle time. After the wake-up signal, and then the first falling edge, the diagnostic instrument sends the first bit to start the communication service.

The diagnostic instrument must initialize communication with a baud rate of 10400.



Timing parameters

Timing parameters P1, P2, P3, P4

Numerical value	Description
-----------------	-------------

P1	Byte interval time of ECU response
P2	The interval between the diagnostic instrument request and ECU response or two ECU responses
P3	The interval between the end of ECU response and the start of new diagnostic instrument request
P4	Byte interval time requested by diagnostic instrument

Normal timing parameter setting

Timing parameters	Lower limit value (ms)			Upper limit value (ms)		
	Minimum	Default	Scale division	Default	Maximum	Scale division
P1	0	0	-	20	20	-
P2	0	25	0.5	50	1000	25
P3	0	55	0.5	5000	5000	250
P4	0	5	0.5	20	20	-

DTC status description of diagnostic instrument

The codes of the electric power steering system fault diagnostic instrument are described in the following table:

ECU fault code	Fault codes displayed on the diagnostic instrument	Diagnosis content
11	C1111	Torque sensor (main signal)
15	C1115	Torque sensor (secondary signal)
13	C1113	Main and auxiliary torque sensors and ???
14	C1114	Torque sensor voltage
21	C1121	Vehicle speed
23	C1123	
22		
41	C1141	Motor
52	C1152	Relay
54	C1154	
55	C1155	Controller internal fault

3.2 Fault diagnosis

3.2.1 Display of diagnostic trouble code (DTC)

Display of vehicle diagnostic instrument

Read the fault code through the vehicle diagnostic instrument, and refer to "Code Description of Electric Power Steering System Fault Diagnostic Instrument".

3.2.2 Clear diagnostic trouble code (DTC)

Restart the EPS system after power failure; or under power-on condition, the fault diagnosis

switch is grounded five times within 10 seconds, and the fault lamp turns on, indicating that the fault code is cleared.

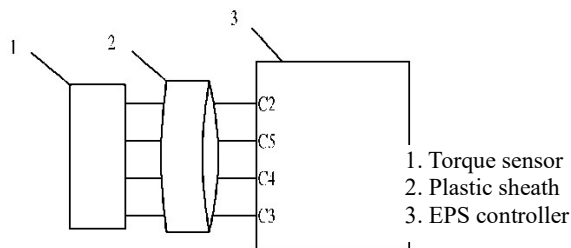
3.2.3 Precautions in fault diagnosis

- Do not connect the positive terminal of the power supply (battery) to the B2 terminal.
- Record the fault code.

3.2.4 Diagnosis flow chart

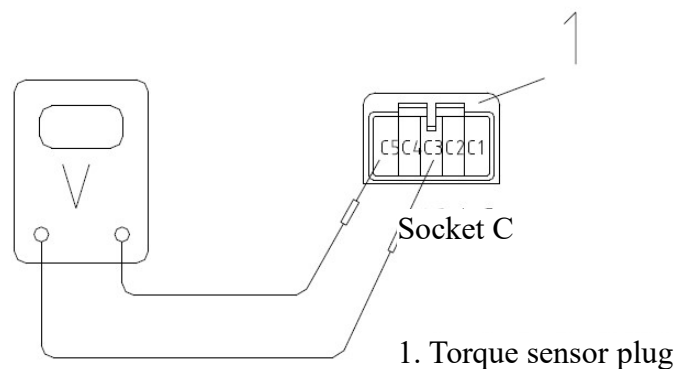
Main signal circuit of DTC11 (or C1111) torque sensor

(Main circuit is disconnected or short-circuited)



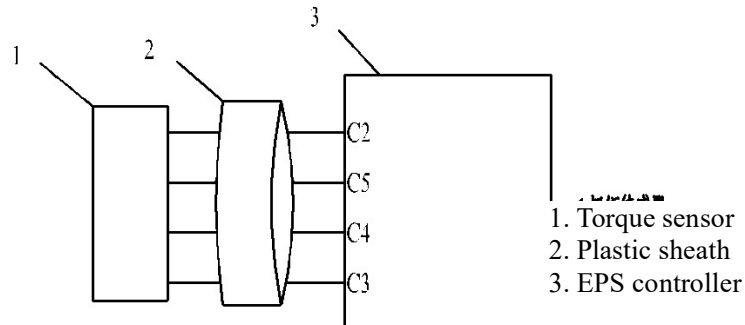
Steps	Operation	Yes	No
1	1) Remove the EPS controller cover. 2) Turn on the ignition switch, fix the steering wheel at the position where the vehicle is straight ahead, and check the voltage between "C5" and "C3" in the torque sensor plug. 3) Is it about 2.5V?	Go to step 2.	<ul style="list-style-type: none"> ● The "C5" or "C3" line is disconnected. ● Poor connection of "C5" or "C3". If all the above conditions are OK, replace with a good EPS controller and recheck.
2	4) When the steering wheel turns to the left limit, check whether the voltage between the torque sensor plug "C5" and "C3" is greater than 3.5V? 5) When the steering wheel turns to the right limit, check whether the voltage between the torque sensor plug "C5" and "C3" is less than 1.5V?	<ul style="list-style-type: none"> ● ● Replace with a good EPS controller and recheck. 	Torque sensor is faulty.

Applicable to step 2



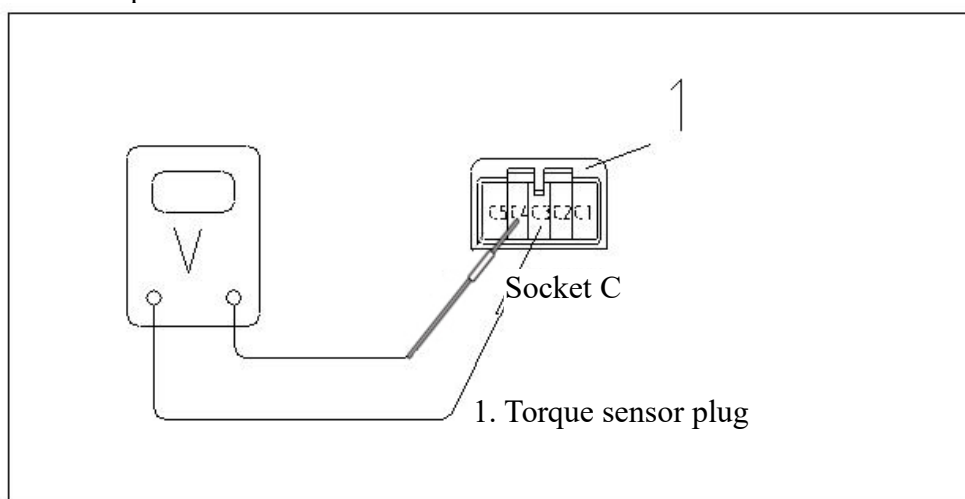
Secondary signal circuit of DTC15 (or C1115) torque sensor

(Secondary signal circuit is disconnected or short-circuited)



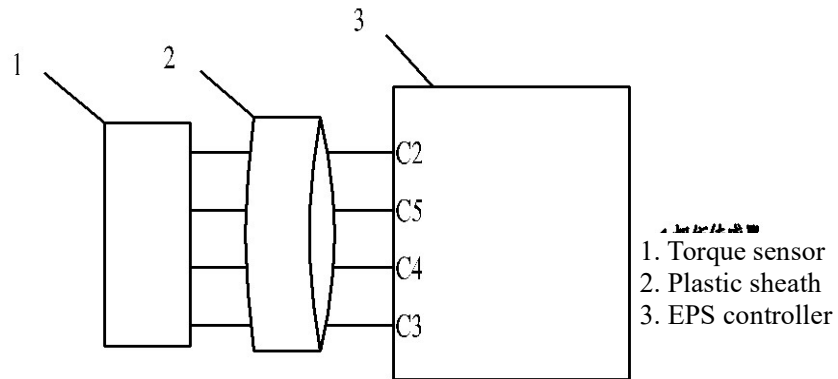
Steps	Operation	Yes	No
1	1) Turn off the ignition switch and remove the EPS controller cover. 2) Turn on the power but do not start the vehicle. 3) Check whether the voltage between the torque sensor plug "C4" and "C3" is about 2.5V? (The steering wheel is fixed at the position where the vehicle is straight ahead)	Go to step 2.	The "C4" or "C3" line is disconnected. Poor connection of "C4" or "C3". If all the above conditions are OK, replace with a good EPS controller and recheck.
2	4) When the steering wheel turns to the left limit, check whether the voltage between the torque sensor plug "C4" and "C3" is less than 1.5V? 5) When the steering wheel turns to the right limit, check whether the voltage between the torque sensor plug "C4" and "C3" is greater than 3.5V?	Replace with a good EPS controller and recheck.	Torque sensor fault

Applicable to step 2



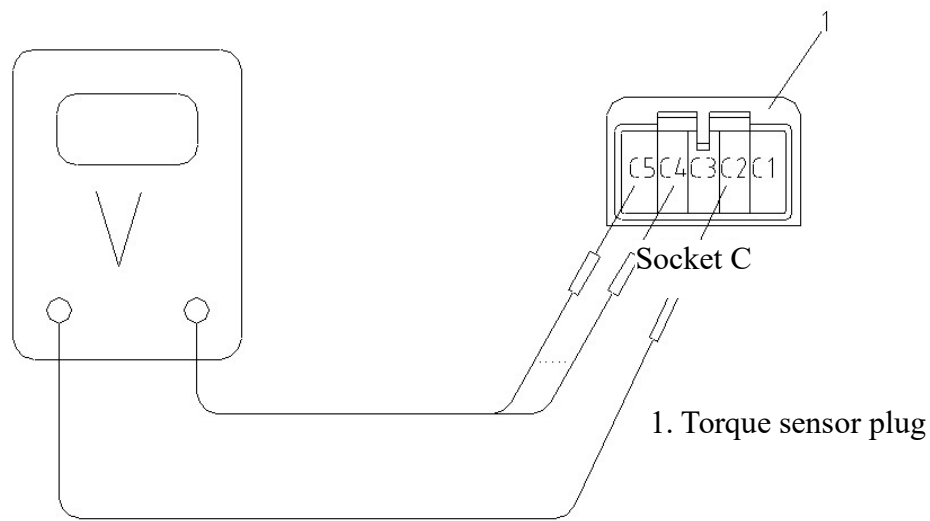
DTC13 (or C1113) torque sensor

(Primary and secondary signals and out-of-tolerance of torque sensor)



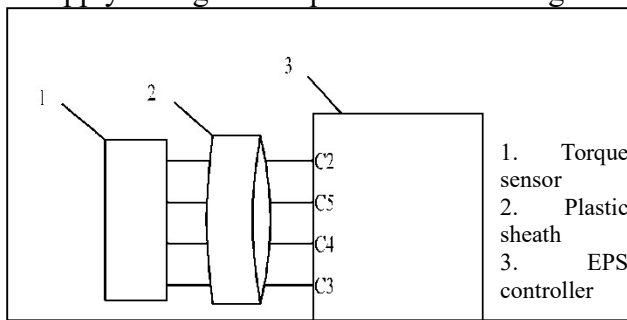
Steps	Operation	Yes	No	
1	1) Turn off the ignition switch and remove the EPS controller cover. 2) Turn on the power but do not start the vehicle. 3) Check the voltage between the terminals of the plug on the torque sensor side according to the following conditions.	<ul style="list-style-type: none"> • "C3" circuit is poor. • Poor connection of terminal "C5" or "C3". If all the above conditions are OK, replace with a good EPS controller and recheck.	Torque sensor fault	
	Between torque sensor plug terminals "C4" and "C3"			About 2.5V (the steering wheel is placed at the return position)
				Greater than 3.5V (the steering wheel turns to the right)
				Less than 1.5V (the steering wheel turns to the left)
	Between torque sensor plug terminals "C5" and "C3"			About 2.5V (the steering wheel is placed at the return position)
				Less than 1.5V (the steering wheel turns to the right)
	Greater than 3.5V (the steering wheel turns to the left)			

Applicable to step 1



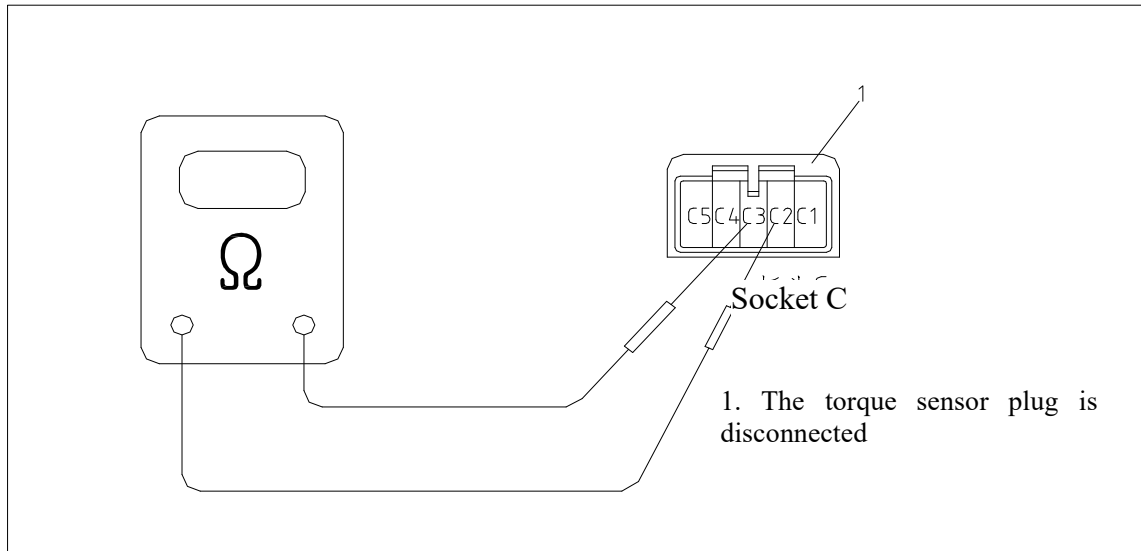
DTC14 (or C1114) torque sensor

(The supply voltage of torque sensor is too high or too low)



Steps	Operation	Yes	No
1	1) Turn off the ignition switch and remove the EPS controller cover. 2) Turn on the power but do not start the vehicle. 3) Check whether the voltage between the torque sensor plugs "C2" and "C3" is about 5V?	Go to step 2.	Torque sensor fault
2	4) Turn off the ignition and disconnect the torque sensor plug. 5) Check whether the resistance between "C2" and "C3" is about 1.09k Ω.	Replace with a good EPS controller and recheck.	Torque sensor fault

Applicable to step 2

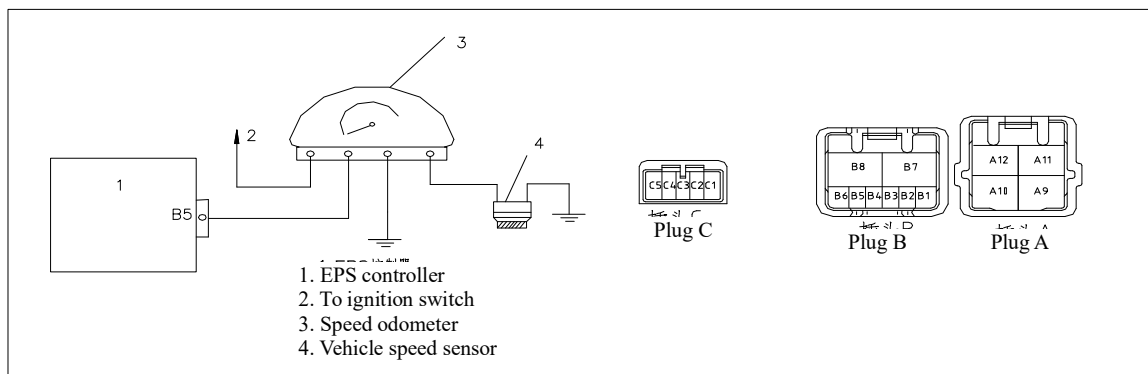


DTC21 (or C1123) VS line

(After ignition, disconnect the vehicle speed signal within 5 minutes, increase the speed to 4000 r/min, keep it for 30 seconds, check whether there is power assistance and whether the EPS controller gives an alarm, then recover the vehicle speed signal, increase the vehicle speed to more than 5 km/h, check whether there is power assistance and whether the EPS controller gives an alarm.)

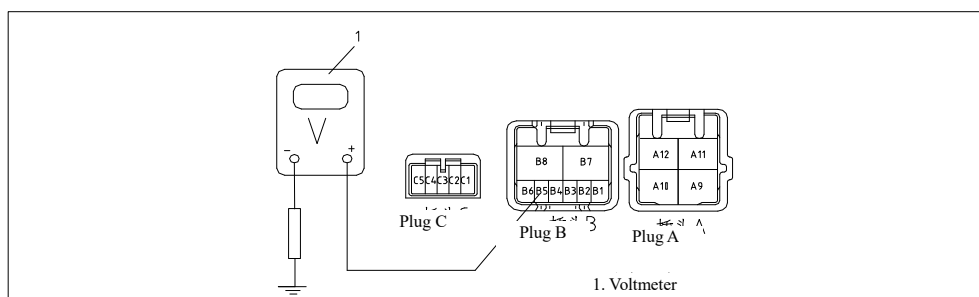
DTC23 (or C1123) VS line

(After ignition, disconnect the vehicle speed signal, increase the speed to 2500 r/min for three consecutive times, hold for 30s each time, then check whether there is power assistance and whether the EPS controller gives an alarm, then recover the vehicle speed signal, increase the vehicle speed to above 5 km/h, and check whether there is power assistance and whether the EPS controller gives an alarm.)



Steps	Operation	Yes	No
1	Is this DTC23 (or C1123)?	Go to step 3.	Go to step 2.
2	1)Refer to the "Clear DTC" section to clear DTC. 2)Start the vehicle, shift to the gear 1 ("L" for A/T vehicles), and start the vehicle at least 4000 rpm for about 1 minute. 3)Refer to the "DTC indication" section and check DTC at idling. 4)Is this DTC21 (or C1121)?	Go to step 3.	Open circuit fault.
3	Does the speedometer show the vehicle speed?	Go to step 2.	The speedometer, VS or its harness is poor.
4	1)When the ignition switch is OFF, remove the EPS controller and connect the plug to the EPS controller. 2)Connect a voltmeter between the "B5" terminal of the controller plug and the body grounding. 3)Lift the front of the vehicle and lock the front right tire. 4)Turn the front left tire quickly when the ignition switch is on. Is the voltage between 0-1V and 4-6 V when the tire is rotating?	Open circuit fault	Go to step 3.
5	Does the voltage display 0-1V?	Voltage display 0-1V "B5" is poorly connected or the "V" line to the ground is short-circuited. If the wire and connection are normal, replace with a good speedometer and recheck.	Voltage display 4-6V The "V" line is open circuit or the "V" line in the instrument cluster is poorly connected. If the wire and connection are normal, replace with a good speedometer and recheck.

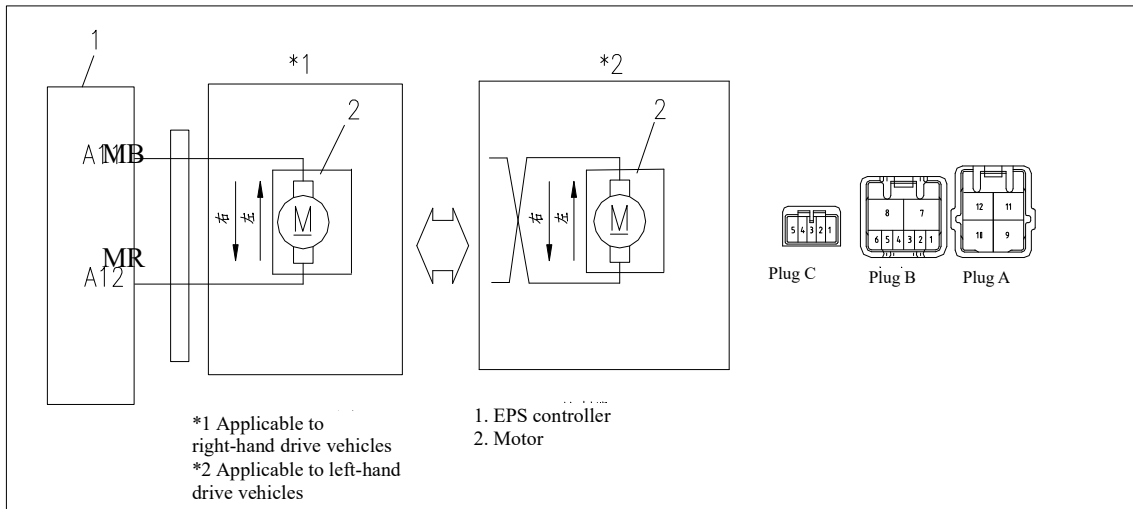
Applicable to step 4



DTC41 (or C1141) motor

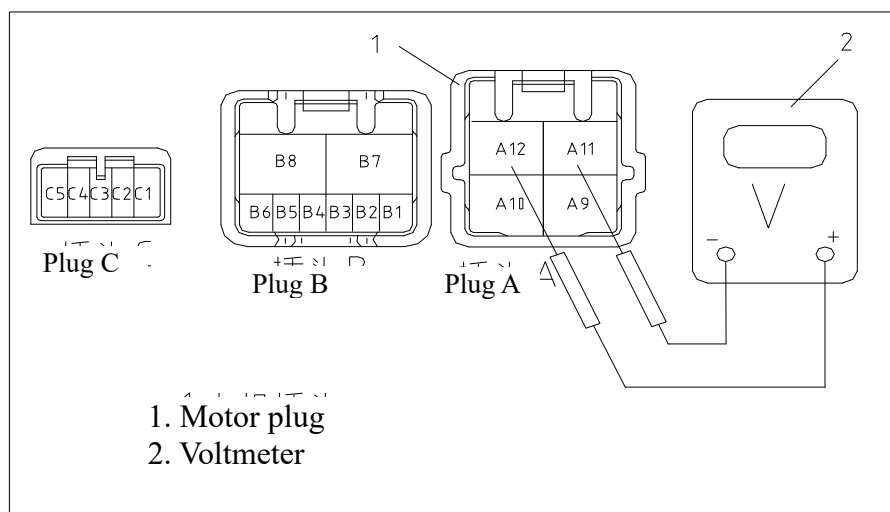
(The target current of EPS controller differs greatly from the actual motor current, and the

motor is in open circuit)

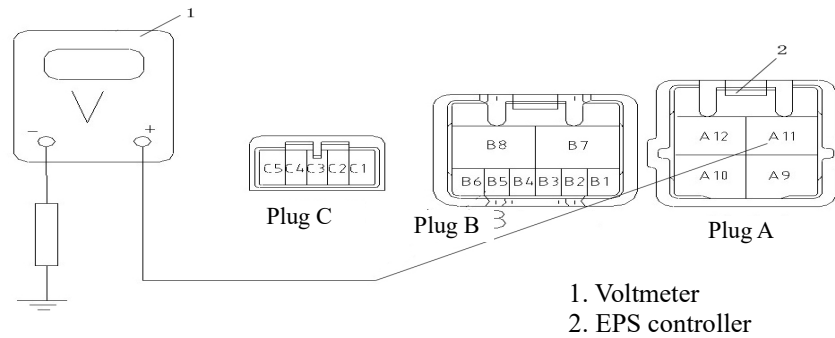


Steps	Operation	Yes	No
1	1) Remove the steering column shield. 2) Disconnect the motor plug when the ignition switch is OFF. 3) Check the continuity between motor terminals "A11" and "A12". 4) Is it continuous?	Go to step 2.	Motor fault
2	1) Check the resistance between the "A11" terminal of the motor plug and the body grounding. 2) Is it infinite?	<ul style="list-style-type: none"> ● The "MR" or "MB" line is disconnected. ● "MR" or "MB" line is short-circuited to the ground ● Poor contact of plug. If the above phenomena are normal, replace with a good EPS controller and recheck.	Motor fault

Applicable to step 1

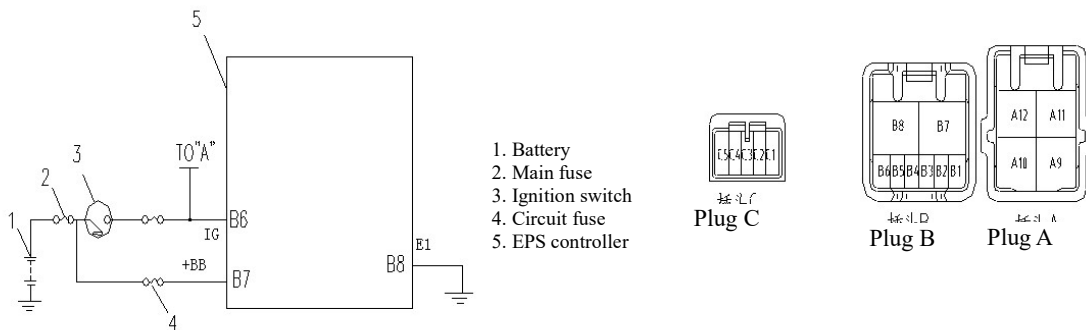


Applicable to step 2



Power circuit of DTC54 (or C1154) EPS controller

(The power supply voltage drops or the relay contacts poorly)



Steps	Operation	Yes	No
1	1)When the ignition switch is OFF, remove the EPS controller and connect the EPS controller plug. 2)With the ignition switch on, check the voltage between the terminal "B7" of the EPS controller and the ground. 3)Is it 10-15V?	<ul style="list-style-type: none"> ● "B7" terminal has poor contact. If the above phenomena are normal, replace with a good EPS controller and recheck.	Battery fault.

Power circuit of DTC52 (or C1152) EPS controller

(The contact of controller relay is stuck, replace the controller)

DTC55 (or C1155) EPS controller internal fault

(Internal fault of the controller, replace the controller)

Inspection of EPS controller and its circuit

EPS controller and its circuit can be checked by measuring the voltage and resistance of the EPS controller plug.

Caution:

The EPS controller cannot perform self-test. It is strictly forbidden to connect a voltmeter or

ohmmeter to the controller when the controller plug is disconnected from the controller.

Voltage check

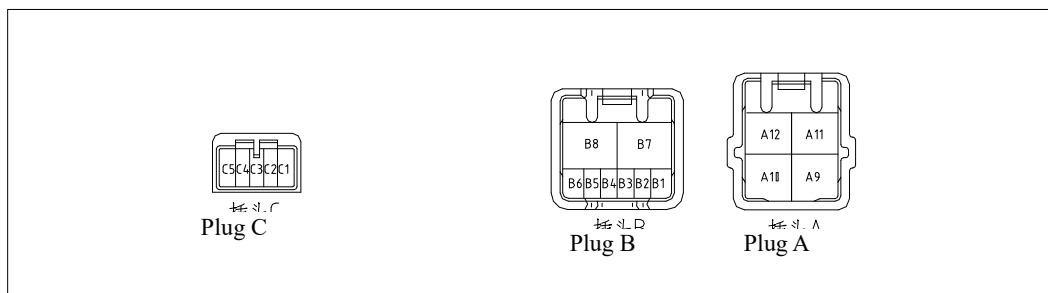
- 1)When the ignition switch is OFF, remove the EPS controller from the vehicle body.
- 2)Connect the EPS controller plug to the EPS controller.
- 3)When the ignition switch is ON, check the voltage of each terminal of EPS controller plug.

Circuit continuity inspection

When the ignition switch is OFF, remove the EPS controller from the vehicle body and check the circuit continuity.

Caution:

The voltage of each terminal is affected by the battery voltage, so when the ignition switch is on, confirm that the battery voltage is 10V or higher.



Terminal No.	Circuit	Normal voltage	Phenomena
B1	K_line communication		The vehicle diagnostic instrument can communicate and display the fault code in ECU.
B2	Fault diagnosis switch	5V	Ignition switch ON
B3	"EPS" lamp	0-2V	"EPS" indicator lamp on
		10-14V	"EPS" indicator lamp does not light up
B4			
B5	VS vehicle speed signal	Indicator repeated deflection 0-1V and 4-6 V	When the ignition switch is on, the front left tire rotates very fast when the front wheel is locked
B6	Ignition switch signal	10-14V	
B7	EPS controller power supply supporting circuit	10-14V	
B8	Grounding	—	—
A9	Blank	—	—
A10	Blank	—	—

A11	Motor output	5-7V	The steering wheel is fixed in the position where the vehicle is straight forward
A12	Motor output	5-7V	The steering wheel is fixed in the position where the vehicle is straight forward
C1	Blank		
C2	Torque sensor power supply	About 5V	With the ignition switch on, check the voltage between terminals C2 and C3
C3	Torque sensor (GND)	0V	—
C4	Torque sensor (secondary signal) (Sub)	About 2.5V	When the steering wheel is fixed in the position where the vehicle is straight forward, check the voltage between terminals C4 and C3
C5	Torque sensor main signal (Main)	About 2.5V	When the steering wheel is fixed in the position where the vehicle is straight forward, check the voltage between terminals C5 and C3

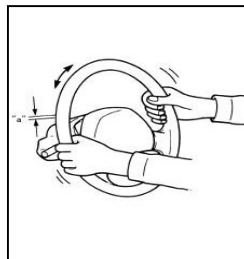
3.3 On-board maintenance

3.3.1 Inspection of free clearance of steering wheel

Check whether the steering wheel is loose or squeaks by moving it in the axial and transverse directions.

If defects are found, repair or replace them.

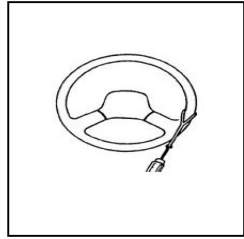
Check the steering wheel when the vehicle is stopped and the vehicle is fixed on the ground facing forward.



Range of free clearance of steering wheel "a": 0-30mm (0-1.2in.)

If the movement of the steering wheel is not within the specified free clearance, check as per the following example, and replace it if any defect is found.

- Check whether the steering tie rod ball joint is worn.
- Check whether the lower ball joint is worn.
- Check whether the steering shaft ball joint is worn.
- Check whether the steering pinion or gear rack is worn or broken.
- Whether other parts are loose.



3.3.2 Inspection of steering force

1) The vehicle is parked on a level road, and the steering wheel is placed in a straight forward position.

2) Check whether the tire inflation pressure meets the specified requirements (refer to the tire indication).

3) Start.

4) Measure the steering force by hooking the spring scale on the steering wheel in the tangential direction.

Steering force: not more than 35N (3.5kg), that is, when the force arm is 20cm, the steering torque does not exceed about 7N•m.

3.3.3 Removal and installation of EPS controller

Removal

1) Disconnect the negative battery wire.

2) Remove the steering column shield.

3) Disconnect the controller plug.

4) Loosen the EPS controller screws.

5) Remove the EPS controller.

Installation

Install in the reverse order of the removal procedure.

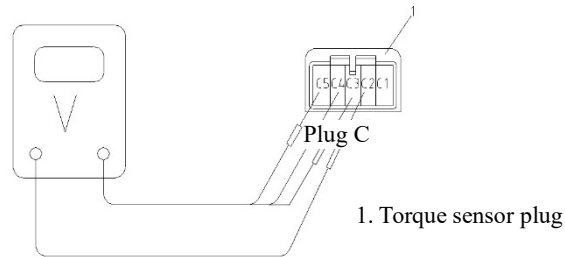
3.3.4 Torque sensor

On-board inspection

1) Remove the steering column dust cover.

2) Turn on the power but do not start the vehicle.

3) Check the voltage between the terminals of the plug on the torque sensor side.



Between torque sensor plug terminals "C4" and "C3"	About 2.5V (the steering wheel is placed at the return position)
	Greater than 3.5V (the steering wheel turns to the right)
	Less than 1.5V (the steering wheel turns to the left)
Between torque sensor plug terminals "C5" and "C3"	About 2.5V (the steering wheel is placed at the return position)
	Less than 1.5V (the steering wheel turns to the right)
	Greater than 3.5V (the steering wheel turns to the left)
Between torque sensor plug terminals "C2" and "C3"	About 5V

If the inspection results do not meet the requirements, replace the steering column.

- 4) Connect the torque sensor plug.
- 5) Install the steering column dust cover.

3.3.5 Motor

On-board maintenance

- 1) Remove the steering column dust cover.
- 2) Disconnect the motor plug when the ignition switch is OFF.
- 3) Check whether there is continuity between the terminals of the motor plug.

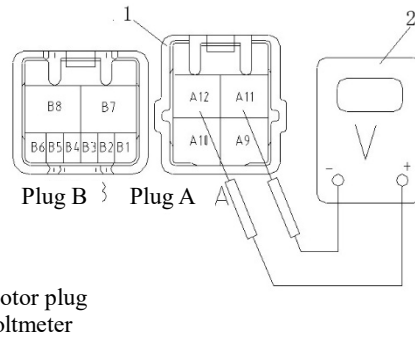
"A11" and "A12" (for motor)	Connected
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If the inspection results do not meet the requirements, replace the steering column.

- 4) In each of the following states, check the resistance between the terminals of the motor plug.

Between "A11" and ground	Infinite
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If the inspection results do not meet the requirements, replace the steering column.



5) Connect the motor plug.

6) Install the steering column dust cover.

3.4 Analysis and elimination of EPS common faults

3.4.1 Abnormal sound

Possible causes

1. The steering column interferes with the installation of the whole vehicle;
2. The steering motor makes abnormal noise.

Troubleshooting

1. Check the installation position of steering column;
2. Replace the motor. The tightening torque of the motor screw is 20N•m-30N•m.

Precautions

In order to ensure that the motor shaft is coaxial with the worm and that the motor is in good working condition, screw the screw in place by hand before tightening the motor screw. Turn the steering wheel with the right hand, hold the motor with the left hand, and feel whether the motor swings. If it does not swing, tighten the screw; if it swings, adjust the motor position by hand until it does not swing, and tighten the screw; if the adjustment is not good, replace the motor and repeat the above operation.

3.4.2 Runaway

Possible causes

Sensor main signal offset.

Troubleshooting

Connect one end of the multimeter to the main line of the sensor plug (white wire) and one end

to ground. Check whether the main circuit voltage of the sensor is $2.5 \pm 0.04V$, and adjust the main signal voltage of the sensor to restore the main signal voltage to $2.5 \pm 0.04V$.

Suggestions

Before readjusting the sensor main signal, remove the sensor and turn the sliding block by an angle.

Precautions

- 1) When adjusting the sensor main signal, the steering wheel cannot be stressed.
- 2) When tightening the sensor, the tightening torque is $6N \cdot m - 7N \cdot m$.
- 3) After tightening the sensor, the waist groove should be injection molded to prevent loosening.

3.4.3 Steering stuck

Possible causes

1. The motor does not work properly, resulting in a short time decrease in power due to heat generation;
2. Steering column failure.

Troubleshooting

1. Replace the motor.
2. Change the steering column.

3.4.4 Sometimes there is power assistance, sometimes there is no power assistance

Possible causes

1. The power signal does not match the controller;
2. Controller failure.

Troubleshooting

Replace the controller.

3.4.5 Heavy steering

Possible causes

1. The steering wheel is not installed correctly (twisted);

2. Poor performance of vehicle speed sensor;
3. Poor performance of torque sensor;
4. Poor performance of motor;
5. Steering column fault;
6. Controller failure.

Troubleshooting

1. Install the steering wheel correctly;
2. Check the speedometer;
3. Check the torque sensor;
4. Replace the motor;
5. Change the steering column;
6. Replace the controller.

3.4.6 Power assistance failure

Troubleshooting

1. Connect the fault diagnosis switch (terminal B2) to the ground, and the "EPS" indicator lamp will flash, and the EPS controller will output the fault code; or the fault code is read with the vehicle diagnostic instrument.

2. If there is no fault code, replace the controller.

Fault code	Cause	Troubleshooting
41(C1141)	Motor failure	Replace the motor
11(C1111);13(C1113);15(C1115);14(C1114)	Sensor failure	Replace the sensor.
52(C1152);54(C1154);55(C1155)	Controller failure	Replace the controller
21(C1121);23(C1123)	No vehicle speed input signal	Check the vehicle speed signal line for signal and make it contact well

4 Suspension system

4.1 Wheel positioning

4.1.1 Specification

4.1.1.1 Wheel alignment parameters (no load)

Name	Scope
Camber angle	0.25°-1.75°
Kingpin caster angle	2.3°-3.3°
Toe-in	0°-0.3°
Kingpin inclination angle	8.5°-9.5°
Maximum rotation angle of steering wheel	732.6°
Front wheel rotation angle	Outer wheel 33.7°±2° Inner wheel 37.6°±2°

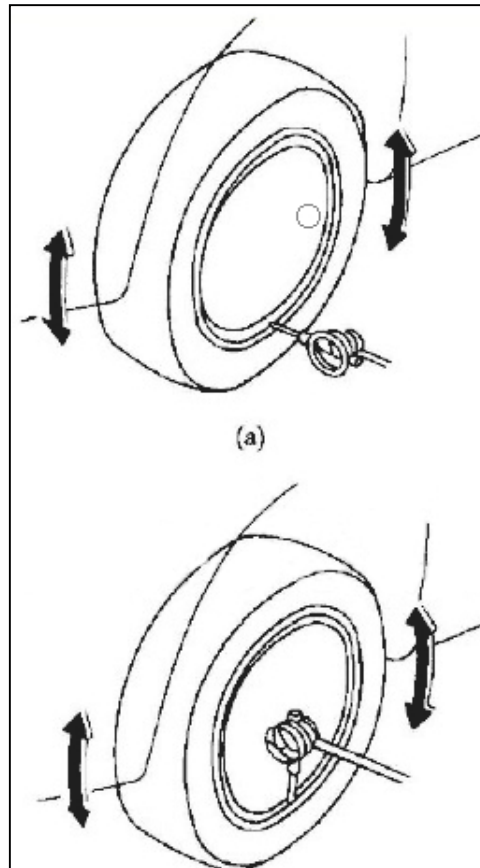
- Curb mass (seat unloaded)

4.1.2 Wheel alignment check and adjustment

Precautions:

Before checking the wheel alignment, check:

1. The wear of all wheels and tires. If the amount of wear on the left and right tires is uneven, or there is severe wear or eccentric wear, replace them with new tires.
2. Check the tire pressure. Refer to "Tire inflation pressure specification" for the specified pressure;
3. Whether the wheel rim is deformed;
4. Check the radial and lateral runout of the tire: radial runout<3mm, lateral runout<3mm;
5. Check the suspension system components for deformation and damage, and replace them with new ones if any.
6. Check whether the fasteners between the components of the suspension system are loose, if any, tighten them again according to the relevant technical requirements;
7. Check the steering tie rod end. If looseness is found, it must be corrected before adjustment;
8. Check whether the measuring equipment is in good conditions and operate according to the instructions provided by the manufacturer.

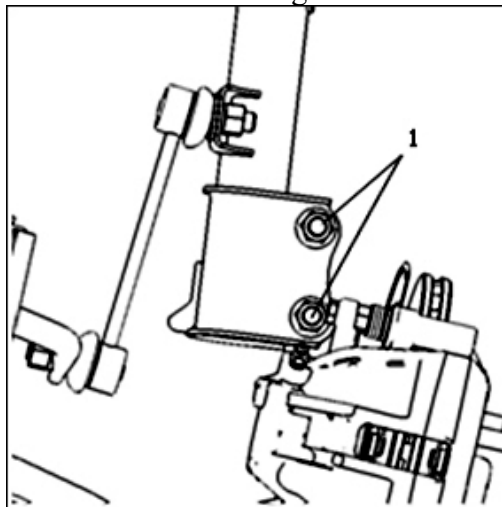


4.1.2.1 Camber

Important precautions: camber is not adjustable; the inspection value is 0.25° - 1.75° . If the measured value is too different from the standard value, check the front suspension system and replace relevant components of the front suspension system as appropriate.

Measurement

Measure the camber angle on the four-wheel aligner.



4.1.2.2 Kingpin inclination

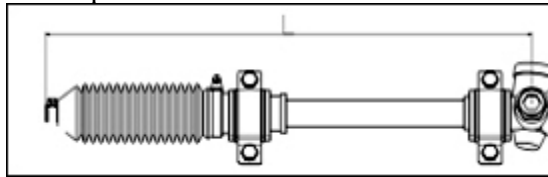
Important precautions: kingpin inclination is not adjustable; the inspection value is 8.5° - 9.5° .

4.1.2.3 Toe-in

The toe-in must be within the range of 0° - 0.3° .

Detection

Set the reference dimension of straight forward position $L=500.5 \pm 2\text{mm}$. Refer to "Inspection and adjustment of straight forward position".

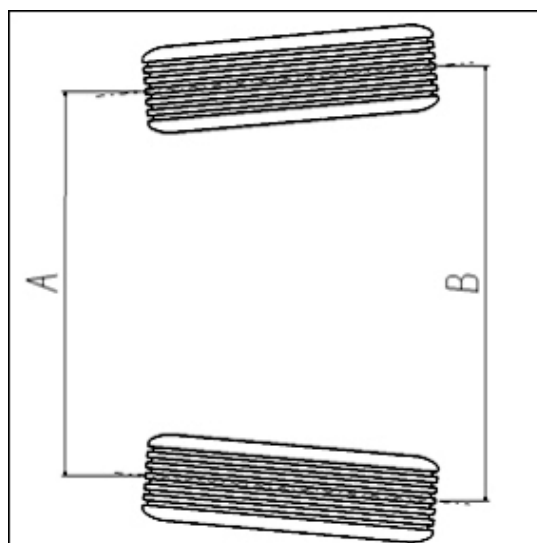


Precautions: the steering wheel must be within $\pm 5^{\circ}$ of the center position, and the lower clamping flange bolt of the steering shaft must be horizontal. Fix the steering wheel in the straight forward position with the steering wheel limiter available on the market.

If the deviation between the position of the steering wheel and the center position of the steering wheel exceeds ± 5 degrees, the steering wheel must be aligned to the front direction, see "Positioning of the steering wheel in the center position".

Measurement

After the vehicle is in the straight forward position, measure the distance "B" and "A" between the front and rear tread centers of the front wheels with a toe-in tester or four-wheel aligner. Toe-in value (B-A).



Precautions: When measuring the toe-in, the vehicle cannot reverse.

Adjust

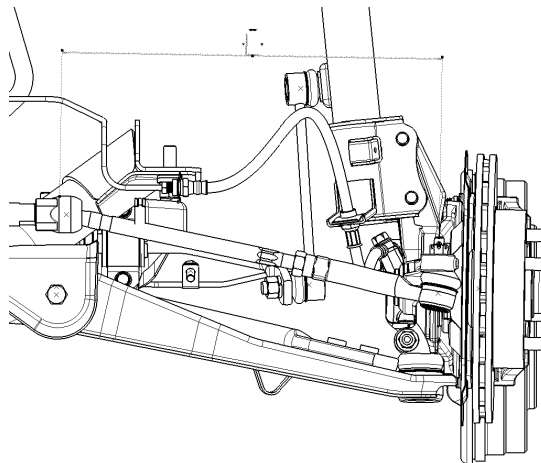
1. Loosen the left/right lock nuts and apply lubricating grease to the small end of the steering tie rod and rack dust cover to prevent the dust cover from twisting during toe-in adjustment. Adjust the toe-in value by turning the adjusting nut of the ball joint tie rod assembly.

2. Adjust according to the set toe-in parameters, rotate the left and right tie rods with the same torque, and pay attention to ensure that the distance "L" from the ball pins on the left and right sides to the root of the tie rod is equal.

3. After adjustment, tighten the lock nut of steering tie rod according to the specified torque.

Tighten

Tighten the lock nut of steering tie rod to 39-49N•m.



4.1.2.4 Inspection and adjustment of maximum steering angle

When replacing the tie rod or tie rod joint seat assembly, check the toe-in of the wheel first, and then check the steering angle with an angle tester or four-wheel aligner. If the steering angle is incorrect, check whether the length "L" of the left and right steering tie rods is correct.

Inside of steering angle: 37.6°

Outside: 33.7°

Special precautions: If the length of the steering tie rod is changed to adjust the steering angle, the toe-in of the wheel must be rechecked.

4.1.2.5 Inspection and adjustment of side slip

Use a wheel side slip test bench to detect front wheel side slip. Wheel slide slip range: - 5 - +5/K. If the wheel side slip exceeds the above range, the wheel toe-in or front wheel alignment may be incorrect.

4.1.3 Maintenance Guide

4.1.3.1 Positioning of steering wheel in the center position (without airbag)

1. Make sure that the wheels are in the straight forward position. Refer to “Inspection and adjustment of straight forward position”.

2. When installing the steering wheel assembly, ensure that the steering wheel is in the center position.

3. Tighten the steering wheel lock nut.

Tighten

Tighten the steering wheel lock nut to 33-49N•m.

4. Install the steering wheel upper cover assembly.



4.1.4 Suspension system inspection

4.1.4.1 Inspection of wheel rim, wheel nut and wheel hub bearing

1. Check each wheel rim for dent, deformation and crack, especially for crack on the four bolt holes. The wheel rim with cracks or serious damage and deformation must be replaced.

2. Check whether the wheel nuts are tight. If necessary, tighten them again according to the specified tightening torque.

Tighten

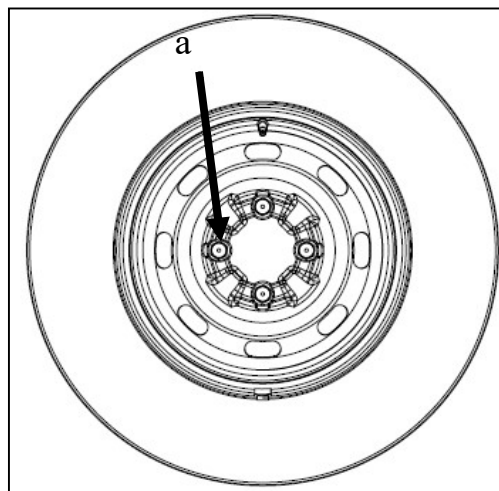
Vehicle wheel nut, 90-110N•m;

Wheel nut (aluminum wheel), 100-120N•m.

3. Check the wear of the wheel bearing.

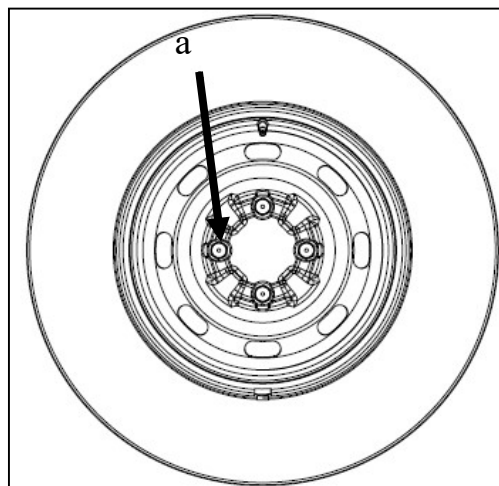
Front wheel: support the front axle with a jack to make the wheel off the ground, remove the wheel trim cover and the front hub inner cover, and then use a dial indicator on the hub to measure the thrust clearance of the hub bearing.

Thrust clearance limit value "a": 0.1mm. When the measured value exceeds the limit value, replace the hub assembly.

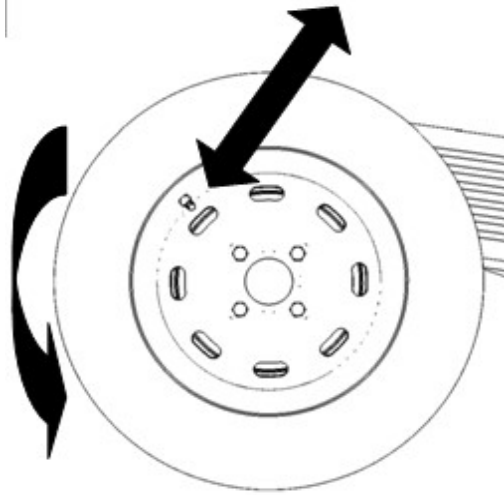


Rear wheel: support the rear axle with a jack to make the wheel off the ground, remove the wheel trim cover, and then use a dial indicator on the rear axle half shaft to measure the thrust clearance of the hub bearing.

Thrust clearance limit value "a": 0.8mm. When the measured value exceeds the limit value, replace the bearing.



4. Rotate the wheel, check the wheel bearing for noise and smooth rotation, and replace the wheel hub assembly if any defect is found.



4.1.4.2 Front/rear shock absorber failure check

Check the ride comfort of the vehicle. For example, whether there is abnormal vibration when the vehicle is driving, and whether there is an abnormal "thump" sound in the cab when driving on uneven roads.

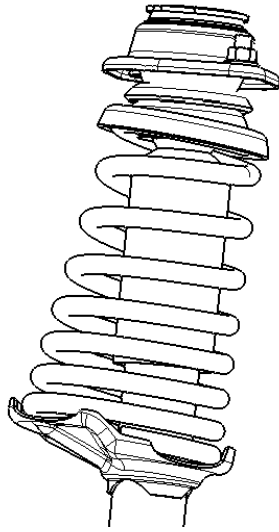
After stopping, press down one end of the vehicle forcefully. For example, if the vehicle swings three or four times, it indicates that the shock absorption performance of the shock absorber is already weak. Check the shock absorber for signs of oil leakage. When removing the shock absorber, check whether the piston rod is stuck or there is no resistance to push and pull the piston rod. When some of the above items occur, the shock absorber must be replaced.

Important precautions: The shock absorber can only be replaced as a whole, and cannot be disassembled for maintenance.

4.1.4.3 Inspection of suspension system rubber parts

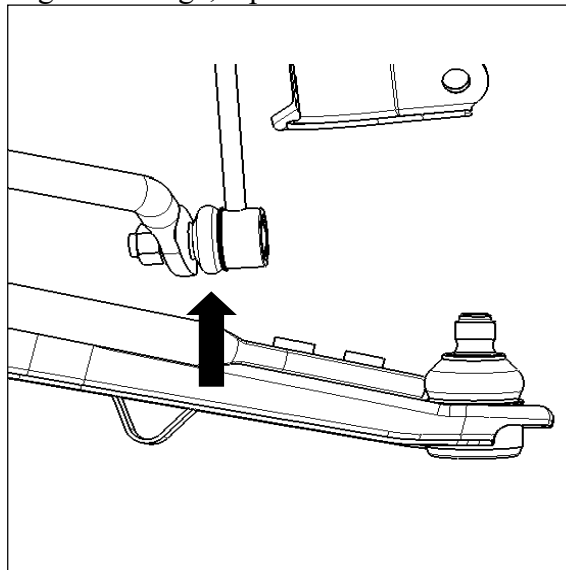
Check the buffer block and dust cover on the piston rod of the shock absorber, the buffer block of the upper fulcrum assembly (front suspension support), the rubber bushing on the support rod, the lower swing arm bushing, the lateral stabilizer shaft sleeve and bushing, the leaf spring bushing, the rear suspension buffer rubber, etc., and replace them immediately in case of damage or cracking.

This type of buffer rubber is not oil resistant and is not allowed to contact any oil. During removal or installation, only soapy water is allowed for lubrication.



4.1.4.4 Inspection of ball pin, leaf spring and coil spring of suspension system

1. During the routine inspection, pay attention to whether the dust cover on the left and right swing arms and ball pin assembly, and the ball pin assembly of the lateral stabilizer bar is damaged or leaked. If there is any damage or leakage, replace the dust cover filled with grease.

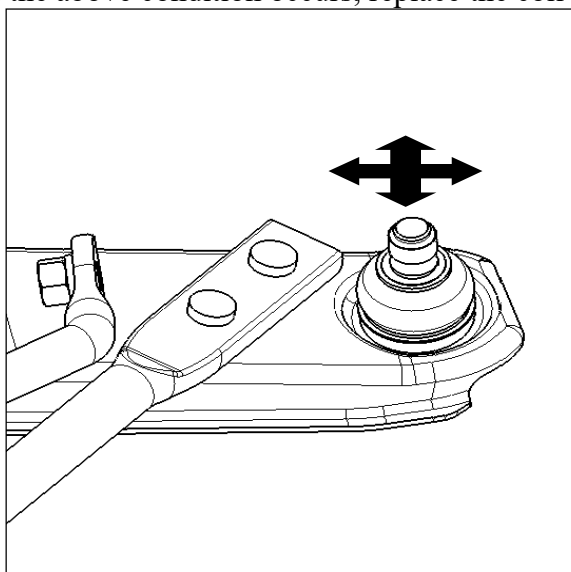


In addition, check whether the swing and rotation of the ball pin are smooth or loose.

Under normal temperature, rotating torque of swing arm ball pin: 1-3N•m. Rotating torque of lateral stabilizer bar ball pin: 0.7-4N•m.

2. When the tire pressure is normal and the vehicle is unloaded, observe the vehicle. If the vehicle is not at the same height from left to right, pay attention to checking whether the front suspension coil spring is at the same length from left to right, or whether the rear suspension leaf

spring has a broken reed. If the above condition occurs, replace the coil spring or spring reed.



4.2 Front suspension

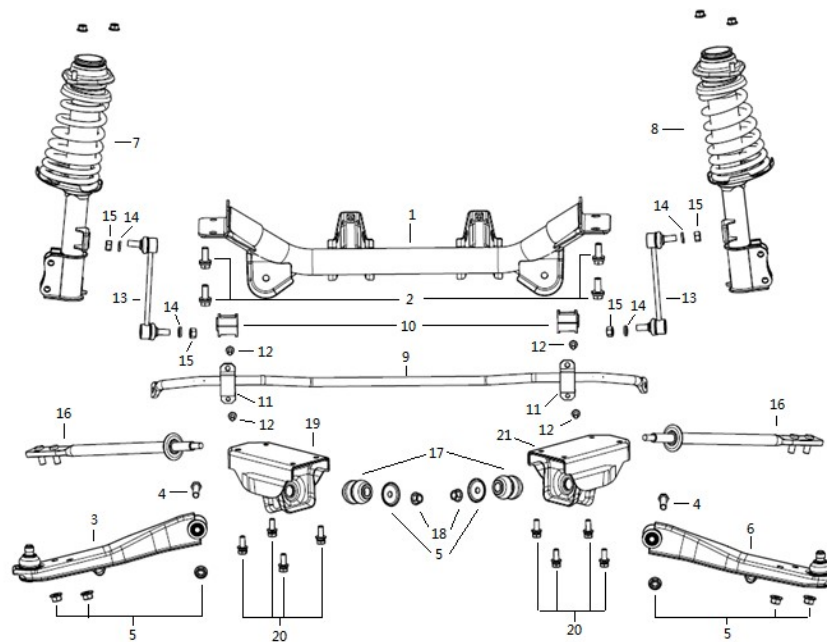
4.2.1 Specification

4.2.1.1 Fastener fastening specification

Application	Metric system
Steering tie rod lock nut	39-49N•m
Wheel nut (steel wheel)	90-110N•m
Wheel nut (aluminum wheel)	100-120N•m
Upper nut of front suspension mount assembly	40-50N•m
Nut at the connection between steering knuckle and front shock absorber	95-115N•m
Connecting nut between thrust rod and front suspension lower arm	90-120N•m
Connecting nut between swing arm ball pin and steering knuckle	69-85N•m
Connecting nut between front suspension lower arm and round girder	90-120N•m
Connecting nut between front lateral stabilizer bar ball pin assembly and support bar weldment	52-68N•m
Bolt assembly at stabilizer bar pressure block	16-26N•m
Fastening bolts between steering knuckle and brake caliper	74-91N•m

4.2.2 Appearance identification

4.2.2.1 Exploded view



1	Round girder assembly	2	Hexagon bolt, spring washer and flat washer assemblies	3	Front suspension left lower swing arm assembly
4	Hexagon fine thread bolt	5	All metal hexagon flange fine thread lock nut	6	Front suspension right lower swing arm assembly
7	Left front sliding column assembly	8	Right front sliding column assembly	9	Front lateral stabilizer bar assembly
10	Front lateral stabilizer bar bracket bushing	11	Front lateral stabilizer bar fixing bracket	12	Hexagon bolt, spring washer and flat washer assemblies
13	Front lateral stabilizer bar connecting rod assembly	14	Heavy duty spring washer	15	Type 1 fine thread hexagon nut
16	Front thrust rod assembly	17	Thrust rod rubber bushing	18	Thrust rod gasket

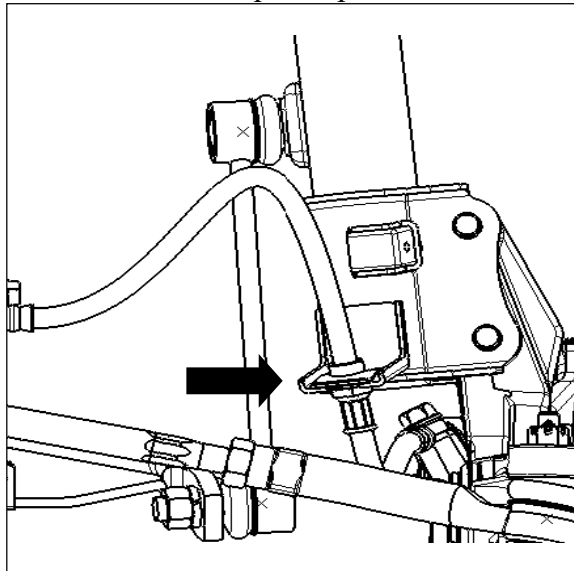
19	Left mounting bracket assembly of thrust rod	20	Hexagon bolt, spring washer and flat washer assemblies	21	Right mounting bracket assembly of thrust rod
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4.2.3 Maintenance Guide

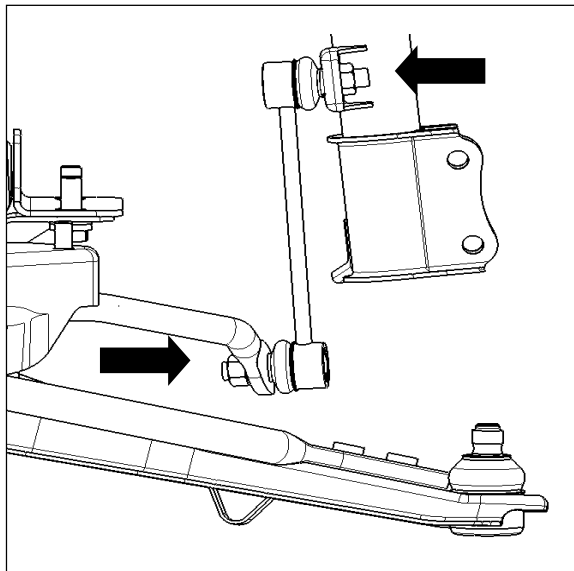
4.2.3.1 Replacement of the front shock absorber and coil spring assembly

Removal steps

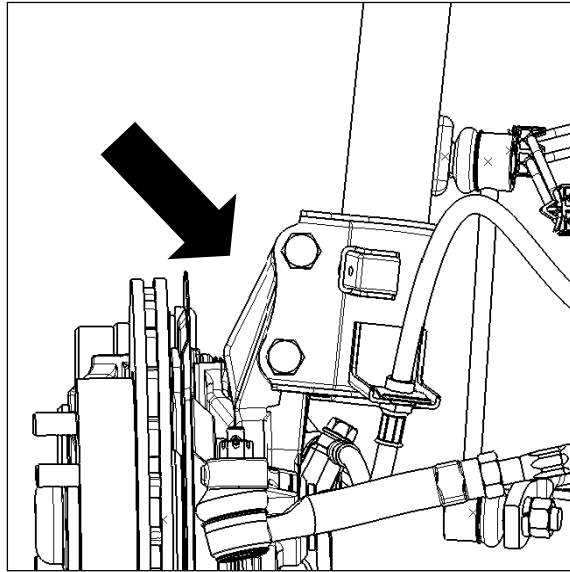
1. Refer to "Wheel assembly replacement" when removing the front wheel assembly.
2. Remove the brake hose connector circlip to separate the brake hose from the shock absorber.



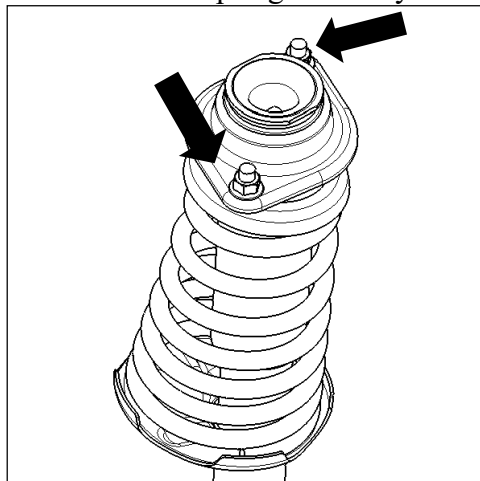
3. Remove the connection between the lateral stabilizer bar ball pin assembly and the shock absorber.



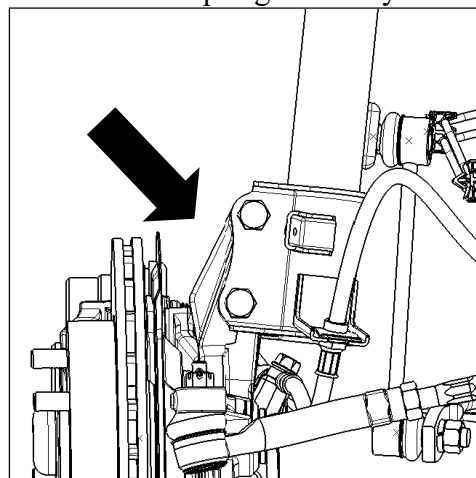
4. Remove the connecting bolts between the front suspension and steering knuckle.



5. Remove the two self-locking nuts on the front suspension mount assembly, paying attention to protecting the front shock absorber and coil spring assembly from falling.



6. Remove the front suspension and coil spring assembly.



Installation steps

1. Install the front suspension mount assembly nuts. Pay attention to protect the front shock

absorber and coil spring assembly from falling.

Precautions: When two lock nuts of the front suspension mount assembly are removed and reinstalled, new lock nuts must be used.

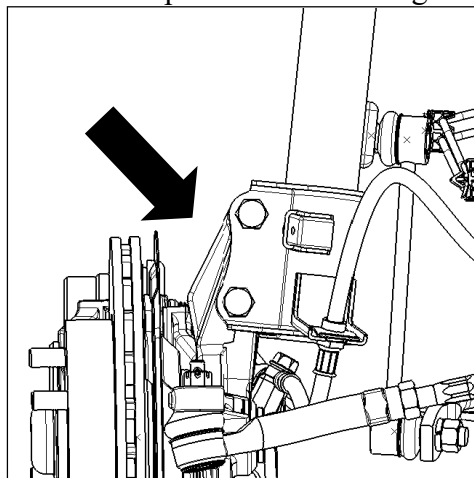
Tightening torque:

Nut of front suspension mount assembly: 40-50N•m.

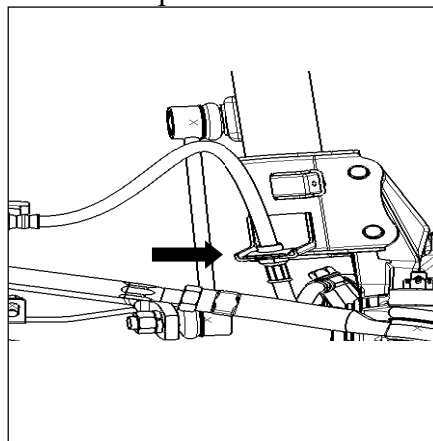
2. Install the connecting bolts between the front suspension and steering knuckle.

Tightening torque:

Connecting bolts between the front suspension and steering knuckle: 95-115N•m.



3. Install the brake hose connector circlip.

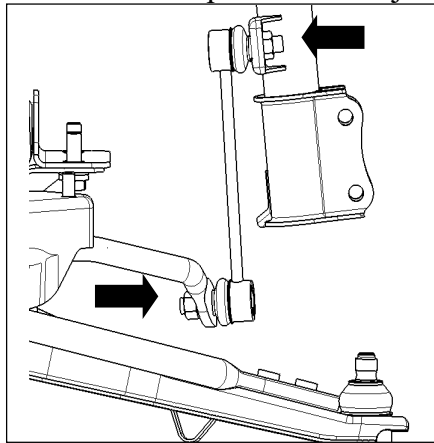


4. Install the connection between the lateral stabilizer bar ball pin assembly and the shock absorber.

Tighten

Tighten the lateral stabilizer bar ball pin assembly and shock absorber fastening nut: 52-68N•M.

5. Check the wheel alignment. Refer to "Inspection and adjustment of wheel alignment".

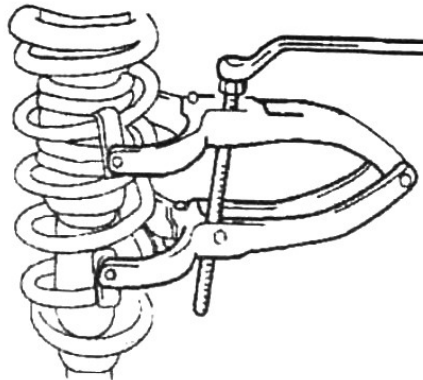


4.2.3.2 Replacement of the front shock absorber assembly

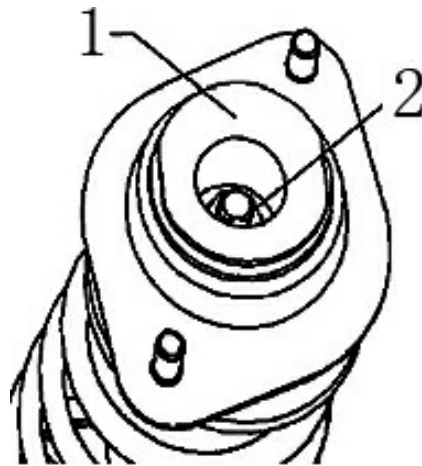
Required tool: NLM1-S0000011 spring compressor

Removal steps

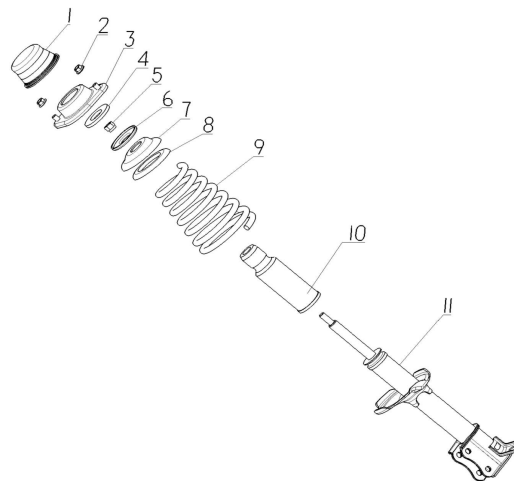
1. Remove the front wheel assembly. Refer to "Wheel assembly replacement".
2. Remove the front shock absorber and coil spring assembly. Refer to "Replacement of the front shock absorber and coil spring assembly".
3. Press the coil spring with the spring compressor until there is no action force between the coil spring and the spring seat.



4. Remove the dust cap stuck on the front suspension mount, clamp the upper opening of the stopper hub 1 with a 58mm wrench, and loosen the nut 2 at the top of the shock absorber piston rod.

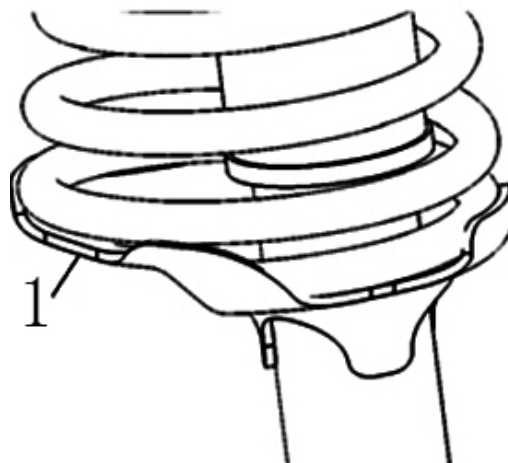


5. Remove the parts (2-11) in turn and check them. If they are in bad conditions, replace them with new ones.



Installation steps

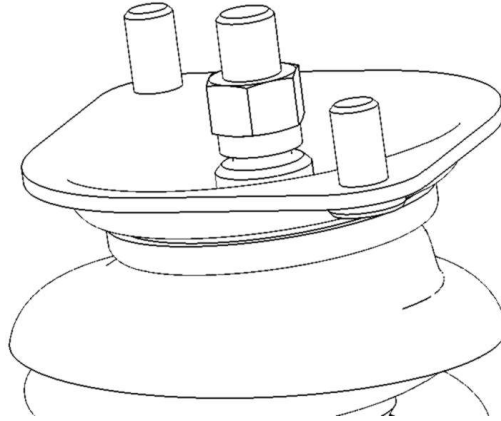
1. Install the front shock absorber and related components (1-11). Refer to the figure above. During assembly, proceed in the reverse order of disassembly.



Precautions: The lower end of the coil spring fits with the stepped part 1 of the lower seat of

the front spring. The arrow mark on the upper seat assembly of the front spring should face the center of the steering knuckle bracket notch at the bottom of the front shock absorber assembly.

The plain bearing must be installed in place.



2. Tighten the nut at the top of the shock absorber piston rod and install the dust cap on the front suspension mount.

Tighten

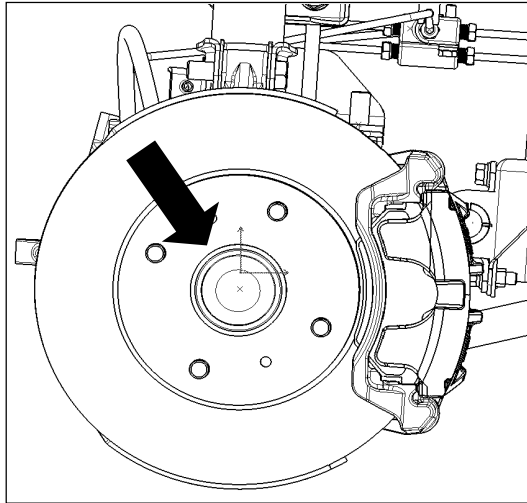
Tighten the nut at the top of the shock absorber piston rod to 50-70N•m.

3. Install the front shock absorber and coil spring assembly. Refer to “Replacement of the front shock absorber and coil spring assembly”.

4. Install the wheels and check the wheel alignment. Refer to "Inspection and adjustment of wheel alignment".

4.2.3.3 Replacement of the coil spring

Refer to “Replacement of the front shock absorber assembly”.



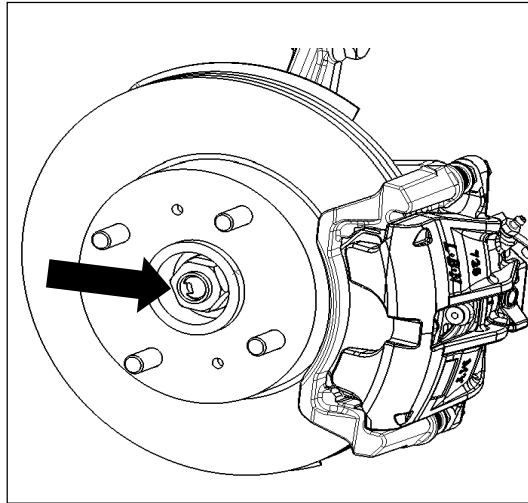
4.2.3.4 Replacement of the front hub assembly

Important precautions: the maintenance and service durability of the front hub bearing are considered in the design. The hub and bearing are designed as a whole, so the bearing does not need maintenance. No additional lubricating grease is required. If there is a problem with the bearing, the hub and bearing should be replaced at the same time, and the bearing cannot be disassembled and repaired separately.

Required tool: NLM1-S0000010 half shaft puller

Removal steps

1. Raise the vehicle. Refer to “Lift and raise the vehicle”.
2. Remove the front wheel.
3. Remove the front wheel hub inner cover. As shown in the figure, tap three places around the inner cover of the front hub with a screwdriver, and be careful not to damage the edge of the inner cover.

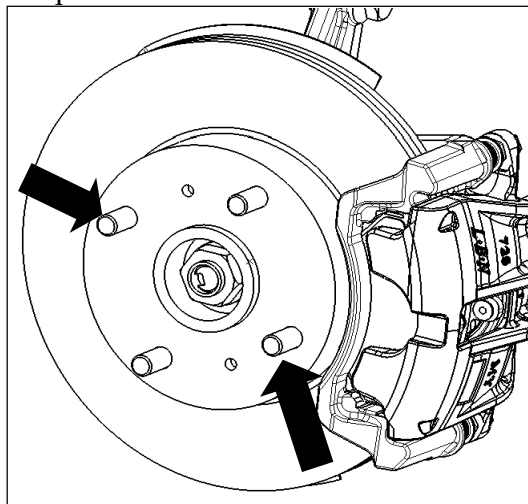


4. First chisel the lock position of the lock nut, then loosen and remove the lock nut.

Special precautions: Do not reuse the lock nut after it is removed.

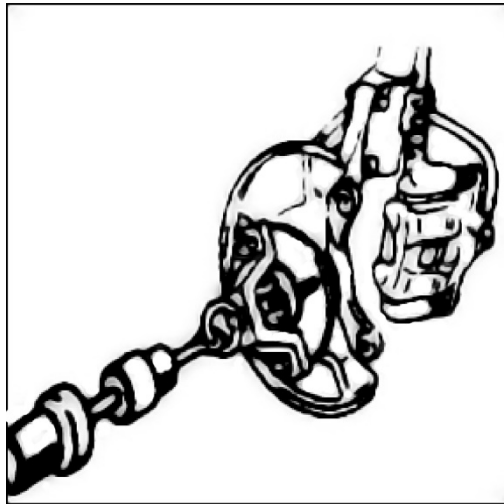
5. Loosen two bolts that fix the brake caliper assembly, and lift the brake caliper assembly with a hook to prevent the brake pipe from being pulled out.

Special precautions: Do not pull out the brake hose on the brake caliper.



6. Screw two M8 bolts into the M8 screw holes on the brake disc, jack up the brake disc and take down the brake disc.

7. Use the special tool NLM1-S0000010 to remove the hub.

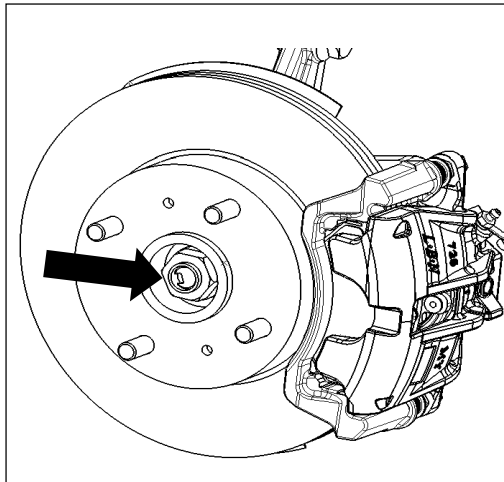


Installation steps

1. Assemble the front hub assembly to the steering knuckle assembly and tighten it with a new lock nut according to the specified torque.

Tighten

The tightening torque of hub lock nut is 150-200N•m.

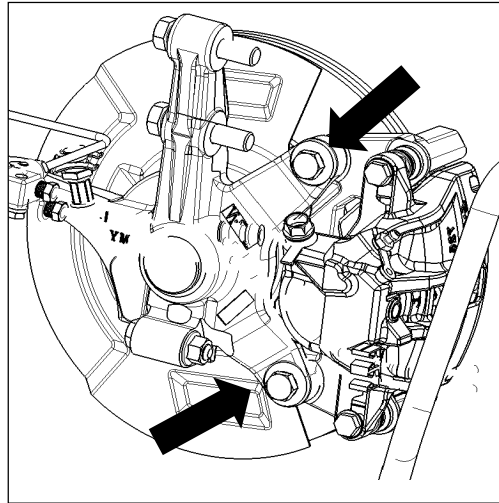


2. Install the brake disc.

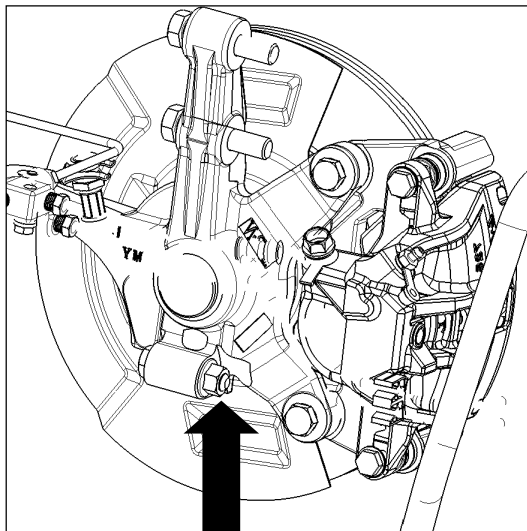
3. Install the brake caliper assembly. Tighten the fastening bolts connecting the brake caliper and steering knuckle to the specified torque.

Tighten

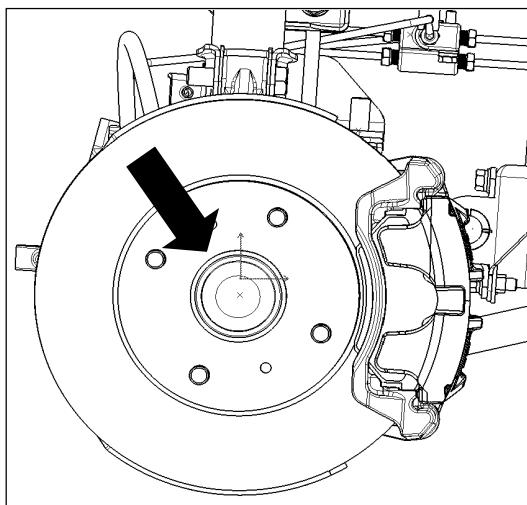
The tightening torque of steering knuckle and brake caliper fastening bolt is 74-91N•m.



4. Insert the lock nut into the groove directly facing the groove of the steering knuckle shaft pin for locking purpose. Be careful not to crack the lock nut at the notch.



- 5. Install the front wheel hub inner cover.
- 6. Install the front wheel and lower the vehicle.

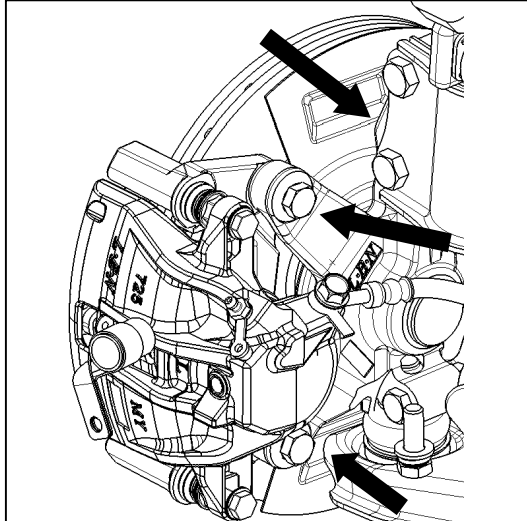


4.2.3.5 Replacement of the steering knuckle

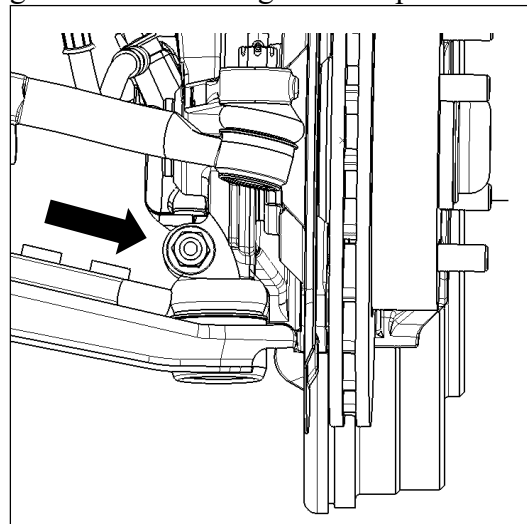
Required tool: NLM1-S0000009 ball joint puller

Removal steps

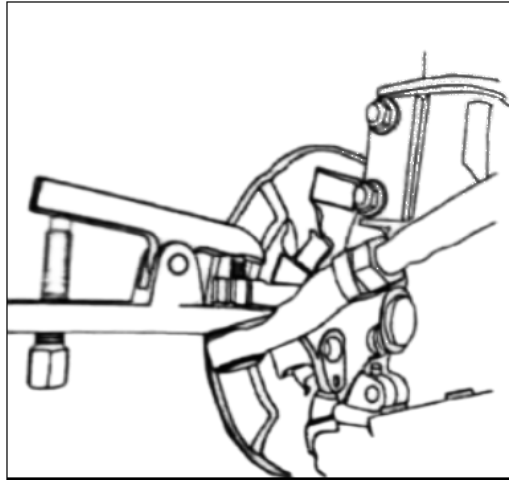
1. Raise the vehicle. Refer to “Lift and raise the vehicle”.
2. Remove the front wheel.
3. Remove two connecting bolts between the steering knuckle and the front shock absorber.



4. Remove the connecting nut between swing arm ball pin and steering knuckle.



5. Remove two connecting nuts between the swing arm and support rod weldment.
6. Press down the swing arm and disconnect the swing arm from the steering knuckle.
7. Remove the split pin and nut connecting the tie rod assembly and the steering knuckle.
8. Use the special tool NLM1-S0000009 to press out the end of the steering tie rod from the steering knuckle.

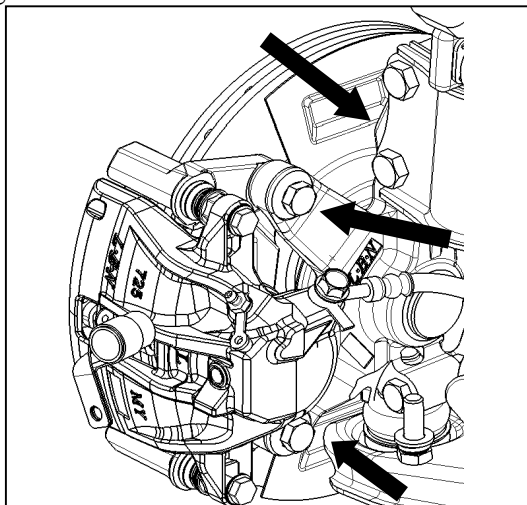


9. Loosen two bolts that fix the steering knuckle and brake caliper assembly, and lift the brake caliper assembly with a hook to prevent the brake pipe from being pulled out.

10. Remove the front hub assembly. Refer to "Replacement of the front hub assembly".

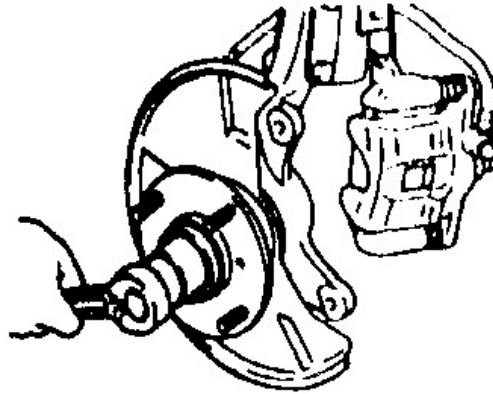
11. Remove the dust shield.

12. Take out the steering knuckle.



Installation steps

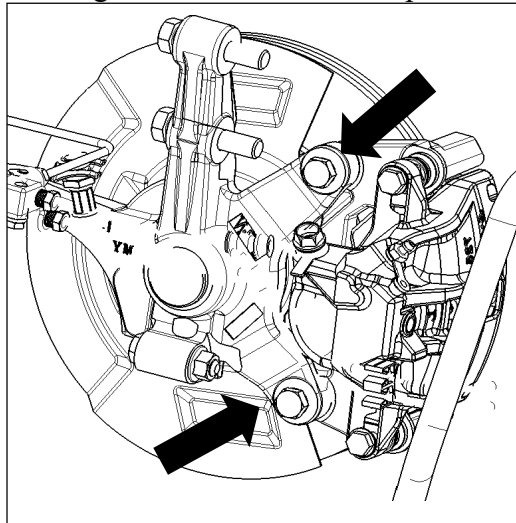
1. Install the dust shield and front wheel hub assembly. Refer to "Replacement of the front wheel hub assembly" for the installation of front wheel hub assembly.



2. Install two bolts connecting the steering knuckle and the brake caliper assembly. Tighten two bolts connecting the steering knuckle and the brake caliper assembly according to the specified torque.

Tighten

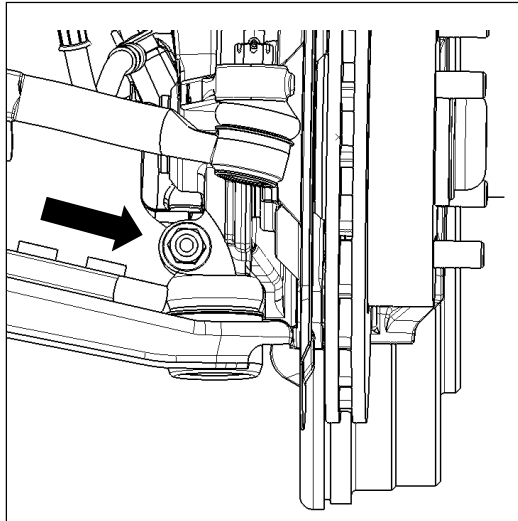
The tightening torque of steering knuckle and brake caliper fastening bolt is 74-91N•m.



3. Install the ball joint pin of the steering tie rod joint seat with the steering knuckle. Tighten the slotted nut of the ball joint pin of the steering tie rod joint ball socket according to the specified torque, and install the split pin.

Tighten

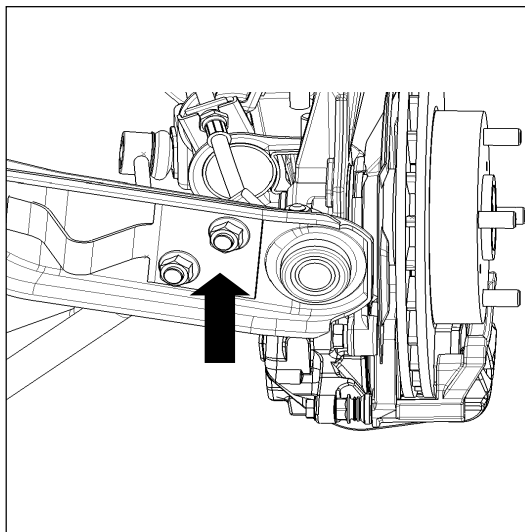
The tightening torque of the slotted nut of the ball joint pin of the steering tie rod joint seat is 23-33N•m.



4. Tighten two connecting nuts of the swing arm and support rod weldment according to the specified torque, and tighten the connecting bolts of the swing arm ball pin and steering knuckle at the same time.

Tighten

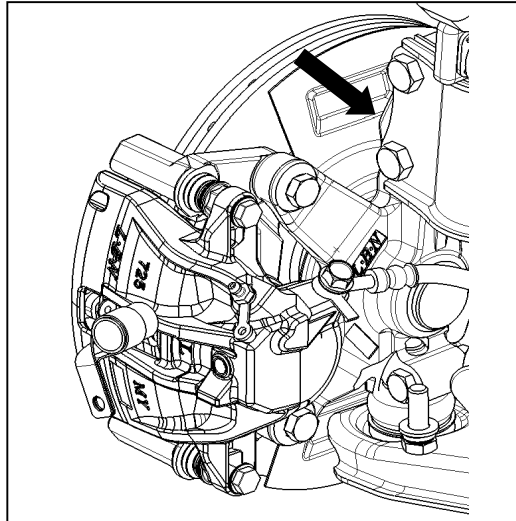
Connecting nut of swing arm ball pin and steering knuckle is 69-85N•m. Connecting nut of swing arm and support rod weldment is 90-120N•m.



5. Tighten two connecting nuts between the steering knuckle and the front shock absorber according to the specified torque.

Tighten

Tighten the steering knuckle and front shock absorber connecting nut at 95-115N • m.

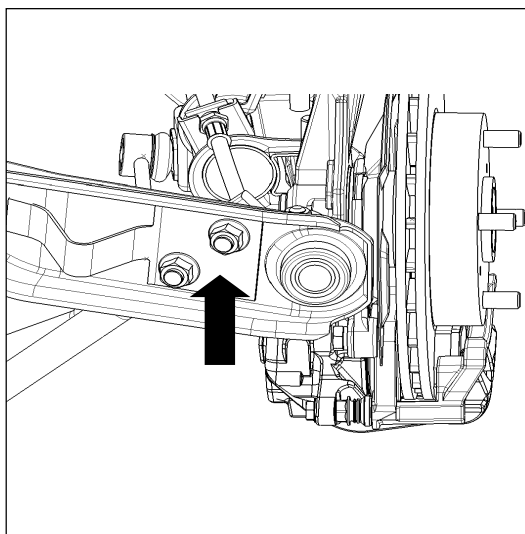


6. Install the front wheel and lower the vehicle.

4.2.3.6 Replacement of the left/right swing arm and ball pin assembly

Removal steps

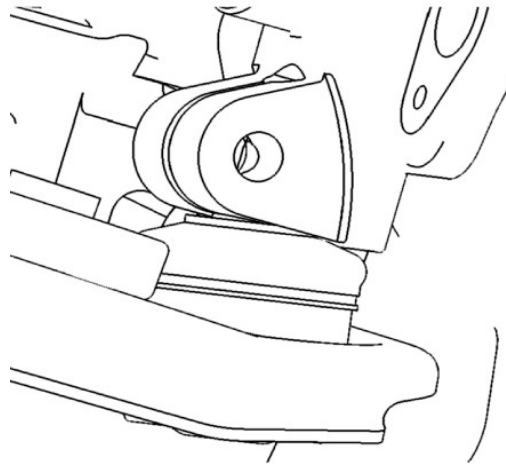
1. Raise and firmly support the vehicle. Refer to "Lift and raise the vehicle" in "General information".
2. Remove the front wheel. Refer to "Wheel replacement" in "Tire and wheel".
3. Remove the nut connecting the support rod weldment and the swing arm.
4. Remove the bolts and nuts connecting the swing arm and steering knuckle.
5. Remove the bolts and nuts connecting the swing arm and the front axle weldment.
6. Take off the swing arm.



Installation steps

1. Install the bolts and nuts connecting the swing arm and the front axle weldment.

2. Install the swing arm ball pin on the steering knuckle and align the ball pin groove with the steering knuckle bolt hole.



3. Install the nut connecting the support rod weldment and the swing arm.

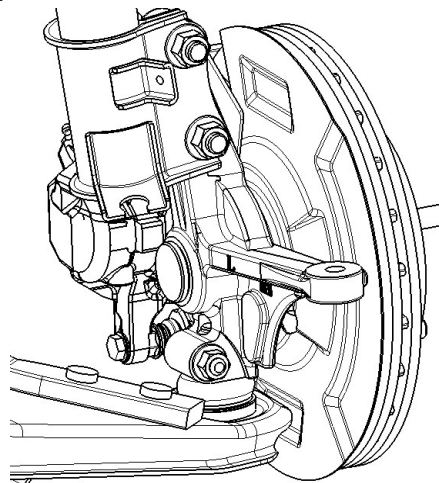
4. Install the bolts and nuts connecting the swing arm and steering knuckle.

Tighten

Tighten the nut at the connection between the swing arm and the steering knuckle to 69-85N•m.

5. Lower down the vehicle. Under the no-load condition, tighten the nut at the connection between the swing arm and the front suspension beam weldment to the specified torque.

6. Install the front wheel.



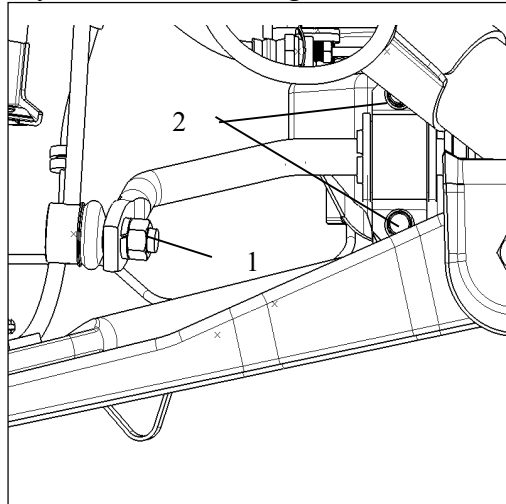
4.2.3.7 Replacement of lateral stabilizer bar

Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General

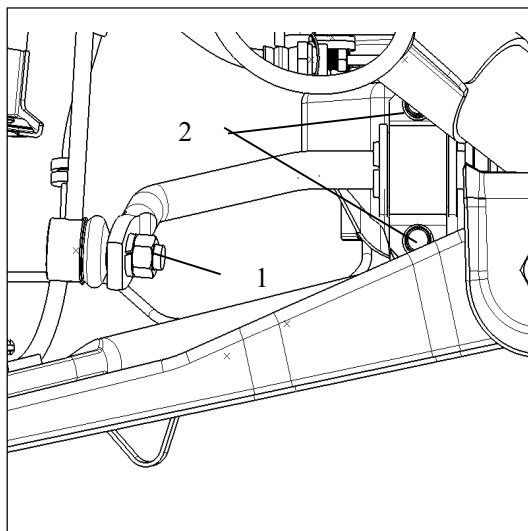
information".

2. Remove the lower mounting nut 1 of the lateral stabilizer bar ball pin assembly.
3. Remove the bolt assembly 2 at the left and right stabilizer bar pressure blocks.



Installation steps

1. Special precautions: 1 and 2 fasteners are tightened at the specified torque when the whole vehicle is on the ground with no load. Install the lateral stabilizer bar ball pin assembly and lateral stabilizer bar connecting nut 1.



2. Install the stabilizer bar bearing and stabilizer bar pressure block, and pre-tighten the stabilizer bar pressure block mounting nut.

Important precautions: The stabilizer bar bearing should be installed at the white mark on the stabilizer bar.

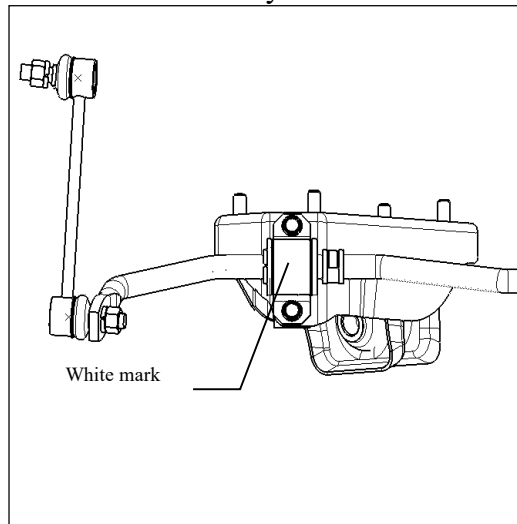
3. Lower down the vehicle.

Under no-load condition, tighten the following bolts to the specified torque:

Tighten

Tighten the connecting nut of lateral stabilizer bar ball pin assembly and lateral stabilizer bar to 52-68N•m.

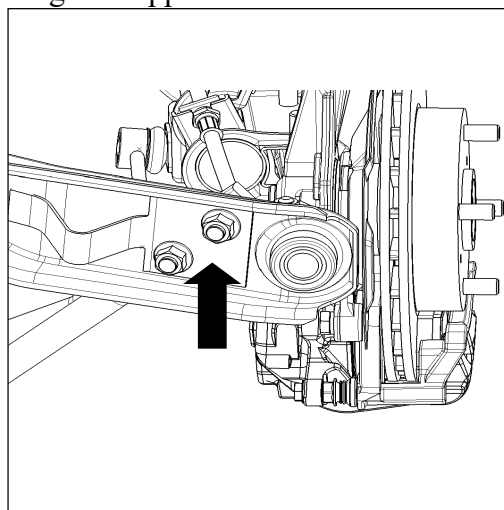
Tighten the mounting nut of the bolt assembly at the stabilizer bar pressure block to 16-26N•m.



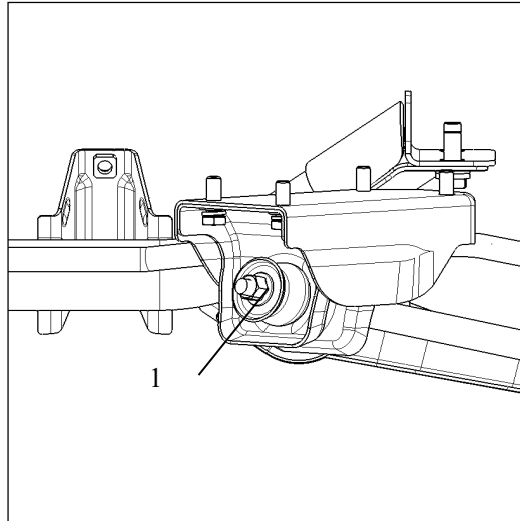
4.2.3.8 Replacement of the left/right support rod weldment

Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Remove the nut connecting the support rod weldment and the swing arm.



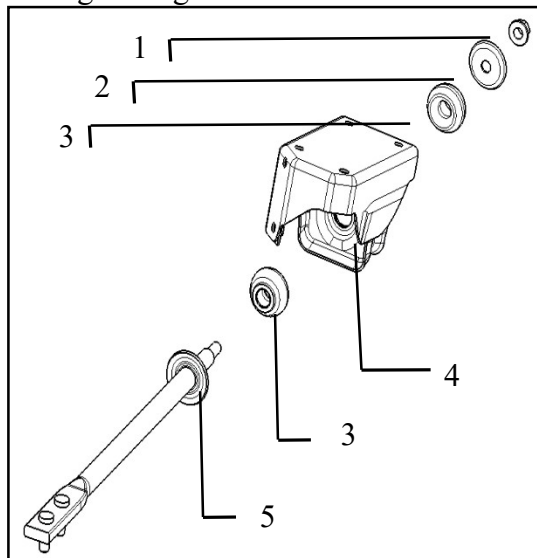
3. Remove the connecting nut 1 between the support rod weldment and the support rod bracket weldment.



Installation steps

1. Install the connecting nut 1 between the support rod weldment and the support rod bracket weldment.

Special precautions: Install the support rod bushing 3, cushion plate 5 (part 5), and cushion plate 2 (part 2) correctly without tightening the nut 1.



2. Install the nut connecting the support rod weldment and the swing arm.

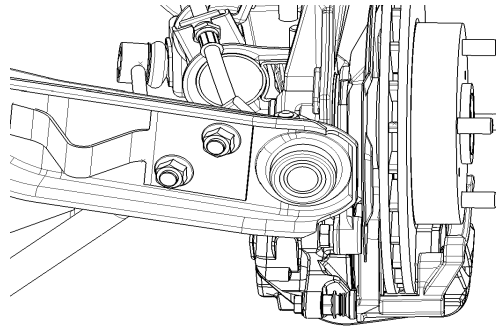
Tighten

Tighten the connecting nut of support rod weldment and swing arm to 90-120N•m.

3. Lower down the vehicle. Tighten the following nuts to the specified torque under the no-load state of the entire vehicle:

Tighten the connecting nut between the support rod weldment and the support rod bracket

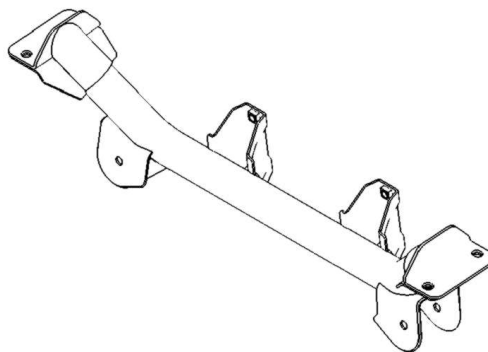
weldment to 49-69N • m.



4.2.3.9 Replacement of the front axle weldment

Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Remove the wheel. Refer to "Wheel replacement" in "Tire and wheel".
3. Remove the swing arm and ball pin assembly. Refer to “Replacement of the left/right swing arm and ball pin assembly”.
4. Remove the steering gear mounting bracket bolts, and remove the washer and steering gear mounting bracket.
5. Remove the bolts connecting the front axle weldment and the front beam. Pay attention to supporting the front axle weldment to avoid falling.
6. Remove the front axle weldment.



Installation steps

1. Hold the front axle weldment and install the connecting bolts between the front axle weldment and the front beam.

Tighten

Tighten the connecting bolts between the front axle weldment and the front beam to 78-98N•m.

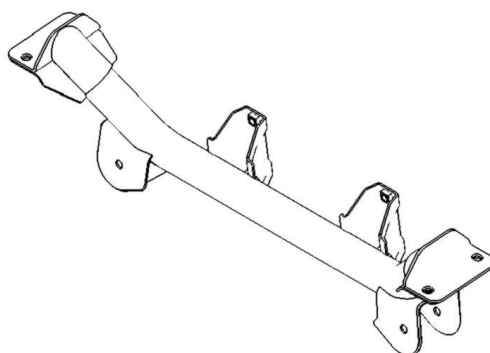
2. Install the steering gear mounting bracket and washer, and tighten the steering gear mounting bracket bolts according to the specified torque.

Tighten

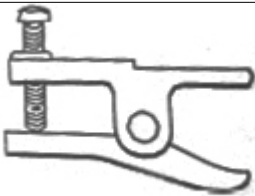
Tighten the steering gear mounting bracket bolt to 49-69N•m.


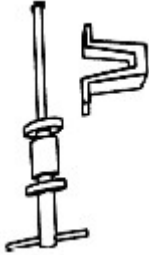
3. Remove the swing arm and ball pin assembly. Refer to “Replacement of the left/right swing arm and ball pin assembly”.

4. Install the wheel and lower the vehicle.



4.2.4 Special tools

Icon	Tool No./Description
	<p>NLM1-S000009 Steering tie rod end extractor</p>

	<p>NLM1-S000011 Spring compressor used to remove and assemble the suspension shock absorber strut</p>
	<p>NLM1-S000010 Half shaft puller</p>

4.3 Rear suspension (leaf spring non-independent suspension)

4.3.1 Specification

4.3.1.1 Fastener fastening specification

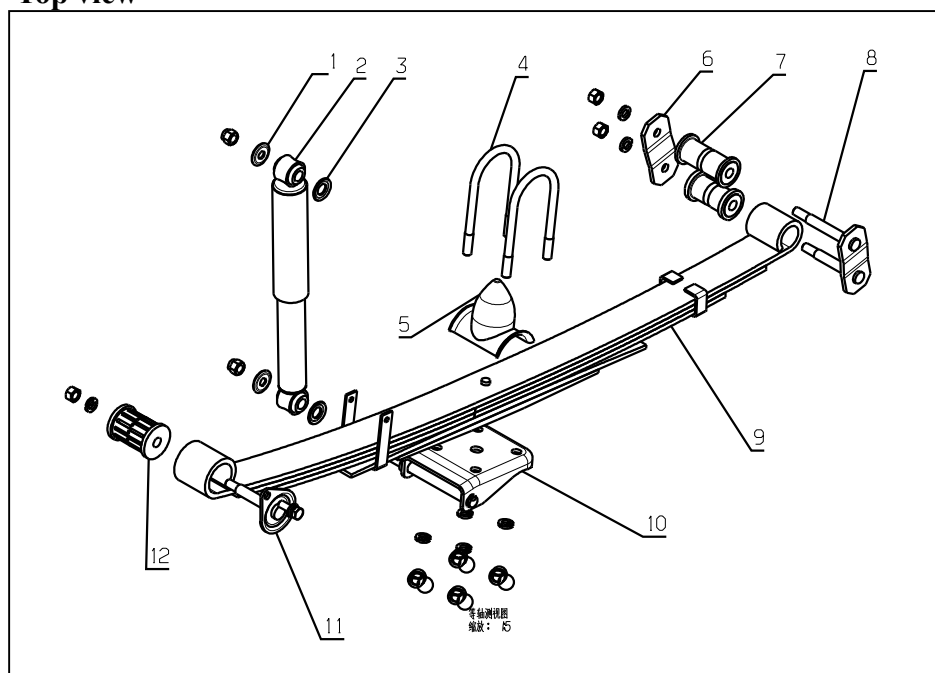
Application	Torque
Rear leaf spring lifting lug fastening nut*	29-42N•m
Tightening torque of front lifting lug bushing of leaf spring*	49-69N•m
Rear shock absorber fastening nut and vehicle body*	50-70N•m
Rear shock absorber fastening nut and lower leaf spring mount*	50-70N•m
Tightening torque of front lifting lug of leaf spring and front mounting bracket assembly of vehicle body leaf spring	29-39N•m
Tightening torque of rear leaf spring central bolt	22-28N•m
Leaf spring lower mount and "U" bolt	56-70N•m

*Indicates tightening when the vehicle is on the ground and empty.

4.3.2 Appearance identification

4.3.2.1 Exploded view of rear suspension system

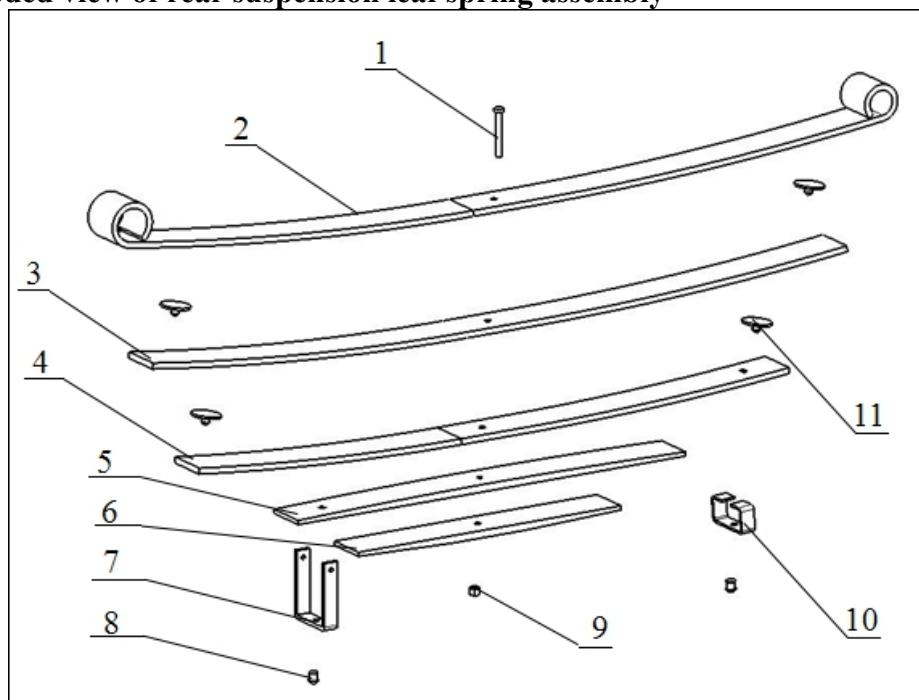
Top view



1	Shock absorber washer (small hole)	2	Shock absorber	3	Shock absorber washer (big hole)
4	U bolt	5	Rear suspension upper	6	Leaf spring rear lifting

			limit block assembly		lug baffle
7	Leaf spring rear lifting lug bushing	8	Leaf spring rear lifting lug	9	Leaf spring assembly
10	Leaf spring lower mount assembly	11	Leaf spring front lifting lug assembly	12	Leaf spring front lifting lug bushing

4.3.2.2 Exploded view of rear suspension leaf spring assembly



Icon

1	Center bolt	2	First piece of leaf spring	3	Second piece of leaf spring
4	Third piece of leaf spring	5	Fourth piece of leaf spring	6	Fifth piece of leaf spring
7	U-shaped clamp	8	Rivet	9	Nut
10	Clamp	11	Leaf spring gasket		

4.3.3 Maintenance Guide

4.3.3.1 General description

- Check the rubber parts and replace them if they are damaged, cracked, or aged.
- Check the parts such as support plate and front pin assembly, the inner side plate weldment of

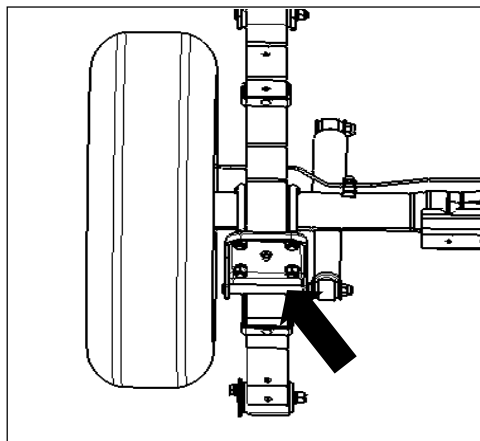
the lifting lug, the outer side plate of the lifting lug, and the left/right leaf spring clamp plate assembly, U-bolts and threaded fasteners, and replace them if they are worn, cracked, or damaged.

- Check the rear shock absorber assembly, and replace it if there is any oil leakage, abnormal noise, failure, or sticking.
- Check the leaf spring assembly, and if the spring plate has cracks, immediately replace the spring plate. If the clamps and U-clamps are damaged, replace them.
- During assembly, graphite lithium based grease should be applied between each leaf spring blade.
- During assembly, the grouping symbols for the two leaf spring assemblies of the same vehicle must be the same.

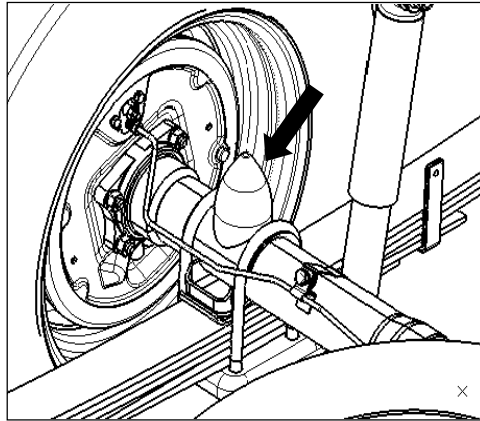
4.3.3.2 Replacement of the leaf spring assembly

Removal steps

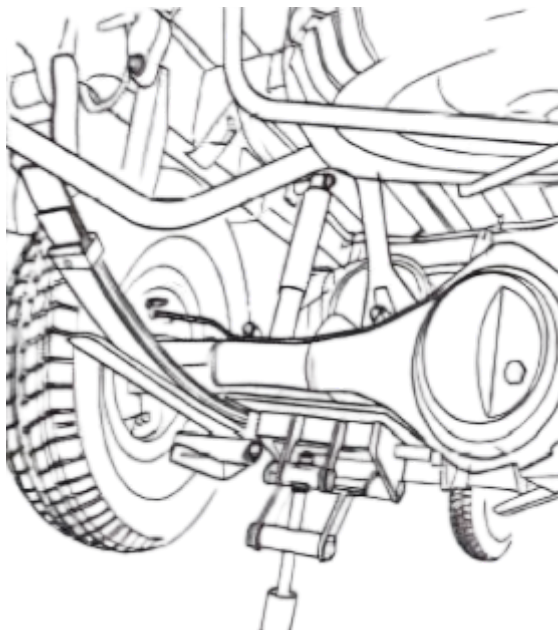
1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Support the rear axle assembly properly.
3. Remove the U-bolt.



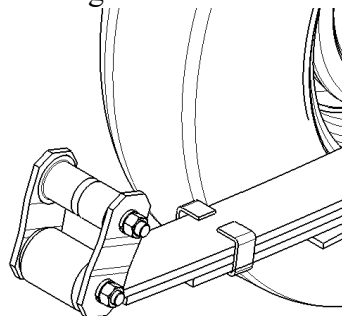
4. Remove the buffer rubber assembly.



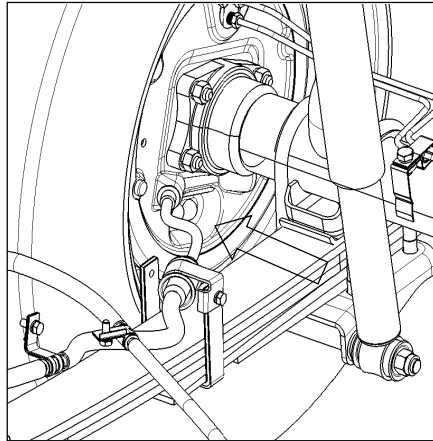
5. Raise the rear axle support equipment to separate the leaf spring from the rear axle assembly.



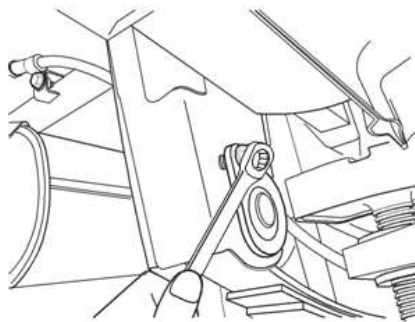
6. Remove the lifting lug outer plate fixing nut.



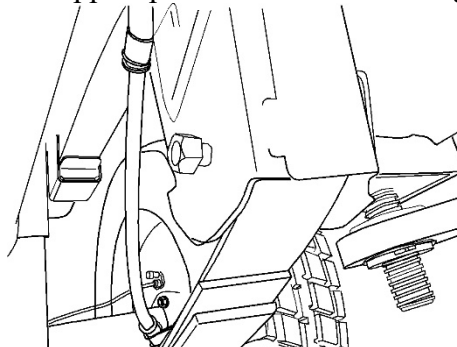
7. Remove the fastening bolts from the brake hose fixing bracket.



8. Remove fixing bolts from the support plate and the front lifting lug of the leaf spring.

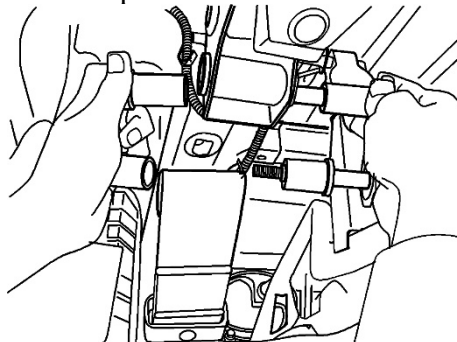


9. Remove lock nuts from the support plate and the front lifting lug of the leaf spring.



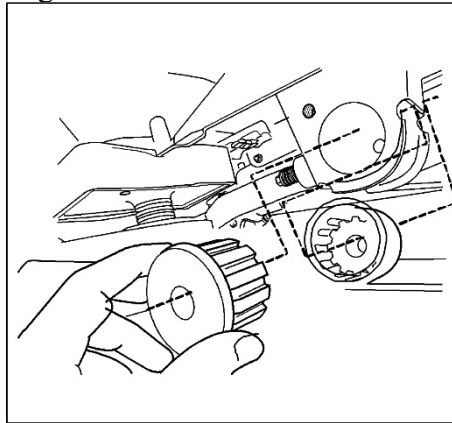
10. Properly support the leaf spring assembly

11. Extract the lifting lug inner side panel weldment.



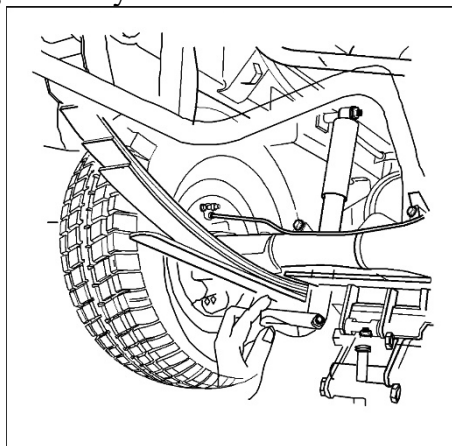
12. Extract the support plate and the front lifting lug of the leaf spring, and take out the front

lifting lug bushing of the leaf spring.



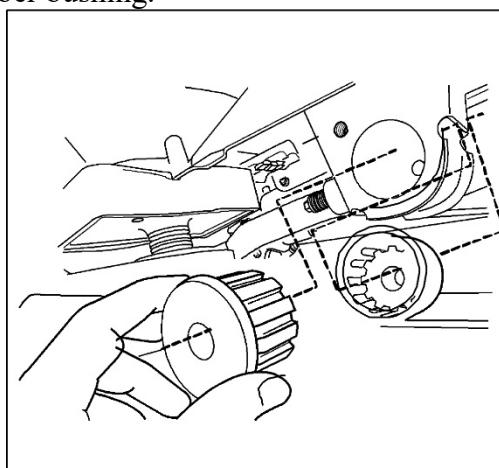
13. Turn the support plate connected to the lower end of the rear shock absorber aside.

14. Remove the leaf spring assembly.



Installation steps

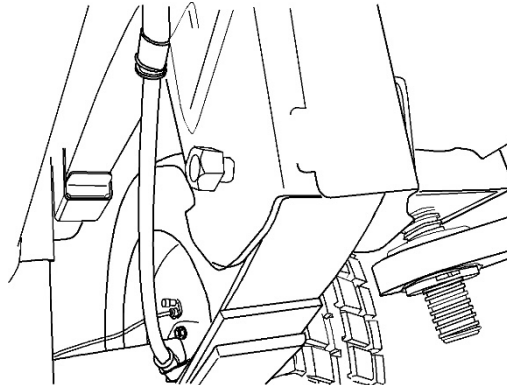
1. Replace the spline rubber bushing.



2. Install lock nuts from the support plate and the front lifting lug of the leaf spring.

Tighten

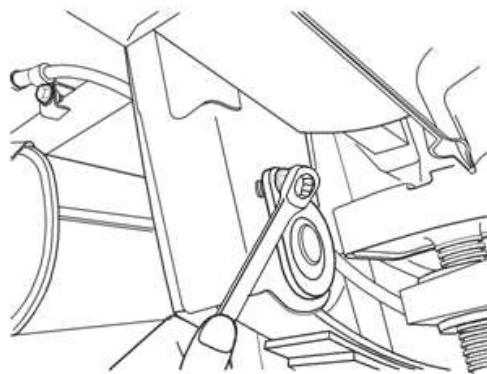
Tighten the fixing nuts of the support plate and the front lifting lug of the leaf spring to 49-69N•m.



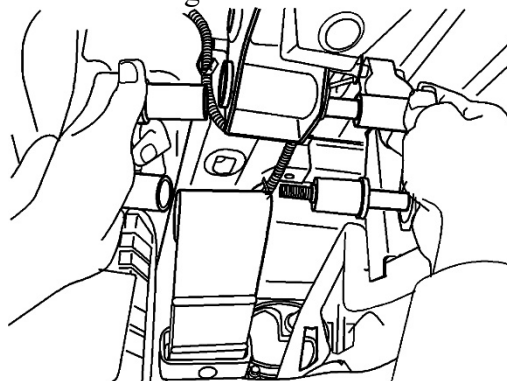
3. Install fixing bolts from the support plate and the front lifting lug of the leaf spring.

Tighten

Tighten the fixing bolts of the support plate and the front lifting lug of the leaf spring to 29-39N•m.



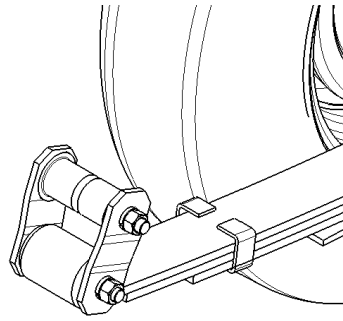
4. Replace the lifting lug rubber bushing.



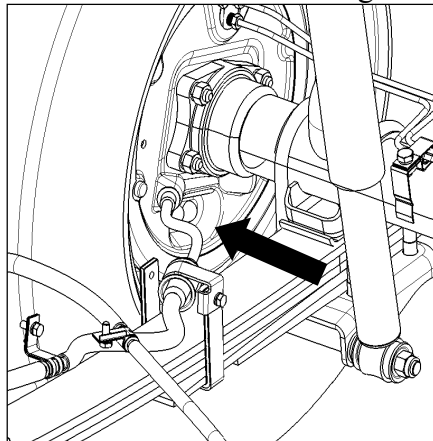
5. Install the lifting lug outer plate fixing nut

Tighten

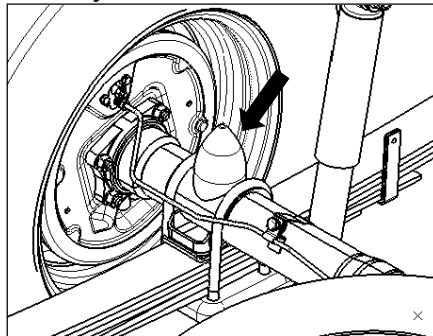
Tighten the fixing nuts on the outer side plate of the lifting lug to 49-69N•m.



6. Remove the fastening bolts from the brake hose fixing bracket.



7. Install the buffer rubber assembly.



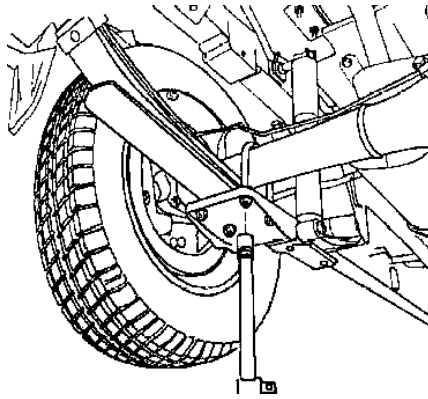
8. Install the U-bolt.

Tighten

Tighten the U-bolt to 56-70N•m.

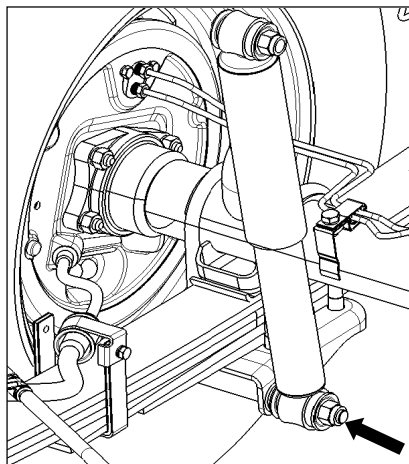
9. Remove the support equipment.

10. Lower down the vehicle.

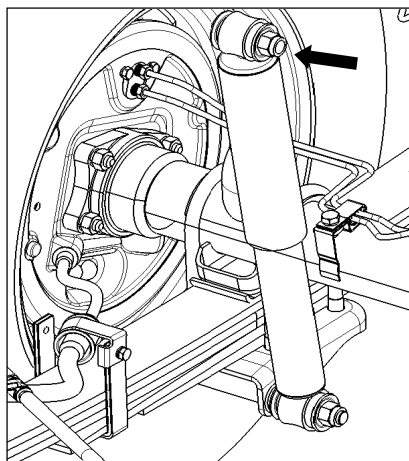


4.3.3.3 Replacement of the rear shock absorber

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Support the rear axle assembly properly.
3. Remove the connecting bolts between the lower end of the rear shock absorber and the support plate.



4. Remove fixing bolts from the upper end of the rear shock absorber.
5. Remove the rear shock absorber.

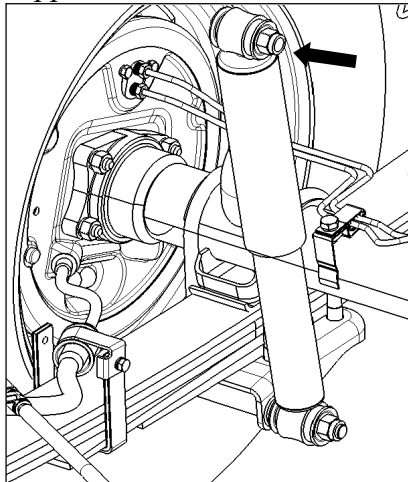


Installation steps

1. Remove fixing bolts from the upper end of the rear shock absorber.

Tighten

Tighten the fixing bolts at the upper end of the rear shock absorber to 50-70N•m.

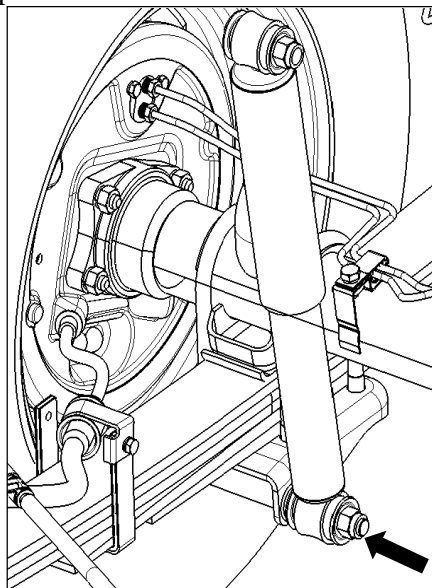


2. Install the connecting bolts between the lower end of the rear shock absorber and the support plate.

Tighten

Tighten the connecting bolts between the lower end of the rear shock absorber and the support plate to 50-70N•m.

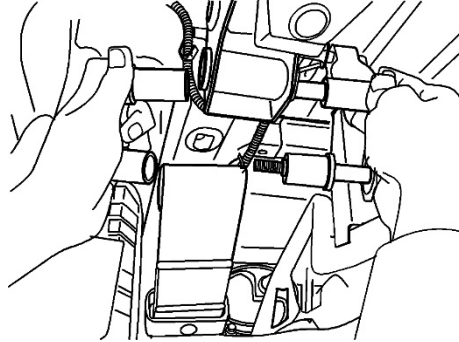
3. Remove the support equipment and lower down the vehicle.



4.3.3.4 Replacement of the lifting lug rubber bushing

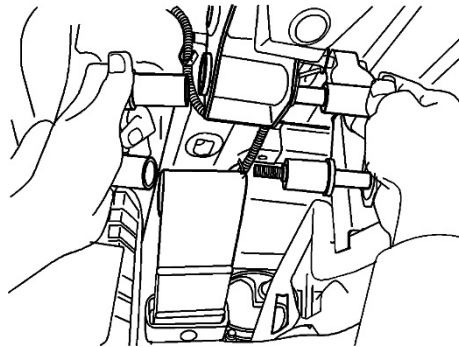
Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Support the rear axle assembly properly.
3. Remove the lifting lug rubber bushing. Refer to “Replacement of the leaf spring assembly”.



Installation steps

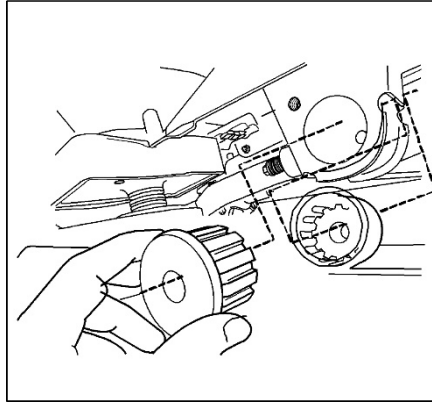
1. Install a new lifting lug rubber bushing. Refer to “Replacement of the leaf spring assembly”.
2. Remove the support equipment.
3. Lower down the vehicle.



4.3.3.5 Replacement of the spline bushing

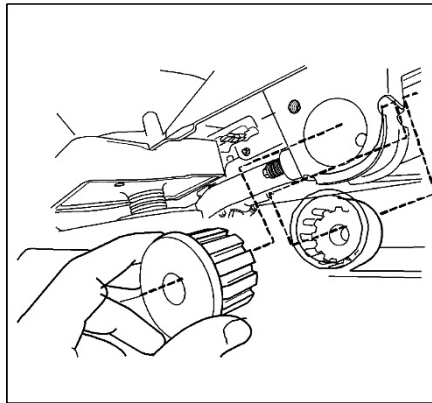
Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Support the rear axle assembly properly.
3. Remove the spline rubber bushing. Refer to “Replacement of the leaf spring assembly”.



Installation steps

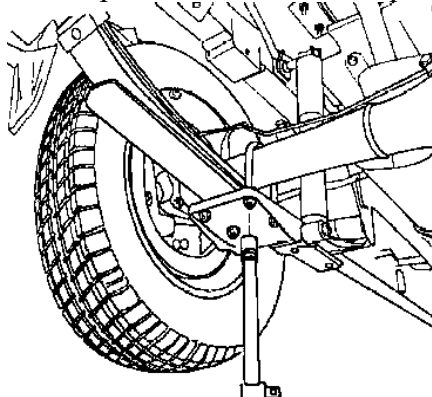
1. Install the spline rubber bushing. Refer to “Replacement of the leaf spring assembly”.
2. Remove the support equipment.
3. Lower down the vehicle.



4.3.3.6 Replacement of the U-bolt

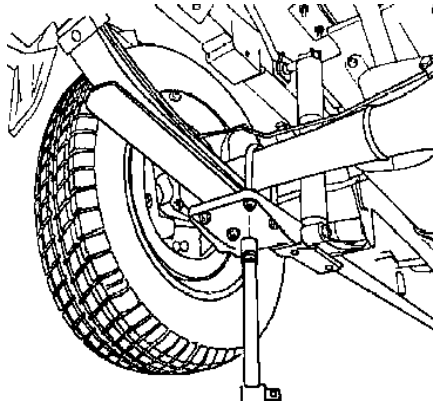
Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Support the rear axle assembly properly.
3. Remove the U-bolt. Refer to “Replacement of the leaf spring assembly”.



Installation steps

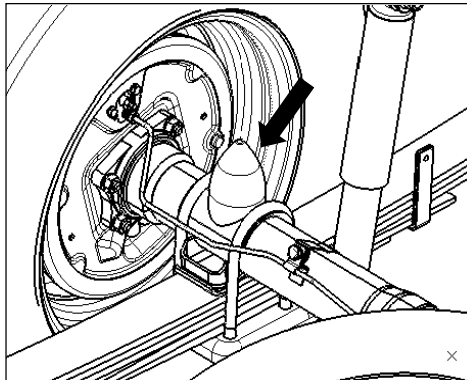
1. Install the U-bolt. Refer to “Replacement of the leaf spring assembly”.
2. Remove the support equipment.
3. Lower down the vehicle.

**4.3.3.7 Replacement of the buffer rubber cushion****Removal steps**

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Support the rear axle assembly properly.
3. Remove the buffer rubber cushion. Refer to “Replacement of the leaf spring assembly”.

Installation steps

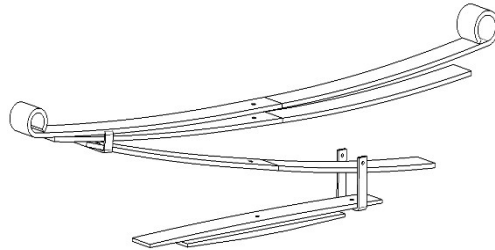
1. Install the buffer rubber cushion. Refer to “Replacement of the leaf spring assembly”.
2. Remove the support equipment.
3. Lower down the vehicle.

**4.3.3.8 Replacement of the intermediate leaf spring****Removal steps**

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.

2. Remove the leaf spring assembly. Refer to “Replacement of the leaf spring assembly”.

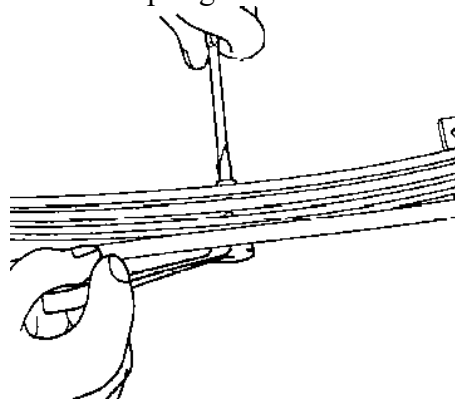
3. Remove the center bolt of the leaf spring assembly.



4. Disassemble the leaf spring assembly.

Installation steps

1. Replacement the intermediate leaf spring.



2. Install the center bolt of the leaf spring assembly.

Tighten

Tighten the center bolt of the leaf spring assembly to 22-28N•m.

3. Install the leaf spring assembly. Refer to “Replacement of the leaf spring assembly”.

4. Lower down the vehicle.

4.3.4 Description and operation

4.3.4.1 General description

The rear suspension uses variable stiffness springs, an integral rear axle, and a rear stabilizer bar. Rear wheel alignment is not adjustable.

4.3.4.2 Description of rear shock absorber

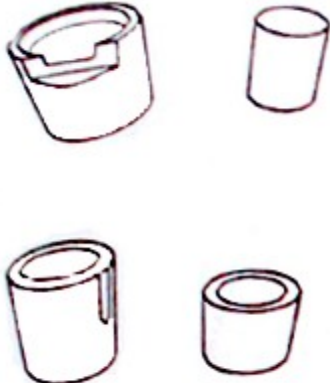
Type: cylindrical hydraulic two-way action (25 series), with the maximum length: 459.3mm

Minimum length: 285^{+3} mm

Damping force value: under the conditions of room temperature 20 ± 2 degrees, stroke 57 ± 1 mm.

Speed	0.05	0.1	0.3	0.6	1.0
Rated restoring resistance (N)	(120)	(436)	628 ± 103	(958)	(1420)
Rated compression resistance (N)	(90)	(270)	420 ± 107	(635)	(872)

4.3.5 Special tools

Icon	Tool No./Description
	NLM1-S0000016 Swing arm bushing removal sleeve

4.4 Tires and wheels

4.4.1 Specification

Tire size and inflation pressure

Items	Parameters		
	LS200 Van	LS200 Pick-up	LS200 Cargo Box
Specification	185/65 R15LT	185/65 R15LT	185/65 R15LT
Front tire pressure under full load/kPa	400	550	550
Rear tire pressure under full load/kPa	490	600	600

4.4.2 Diagnosis information and procedures

4.4.2.1 Tire diagnosis

There are many reasons for irregular or early tire wear.

- ◆ Incorrect inflation pressure can cause irregular or early tire wear.
- ◆ Irregular rotation can cause irregular or early tire wear.

- ◆ Poor driving habits can cause irregular or early tire wear.
- ◆ Improper wheel alignment can cause irregular or early tire wear.

Detection procedure

1. Check the wear of the front wheel tires. Check the wear of the rear wheel tires.

2. check the wheel alignment in case of any of the following conditions:

- ◆ The wear of the front tires varies from left to right.
- ◆ The lateral ground wear of the front tire is uneven.
- ◆ Feather wear occurs on one side of the tread pattern or tread block.

3. The tires must be rotated in case of any of following conditions:

- ◆ The wear degree of the front and rear tires is different.
- ◆ The lateral ground wear of the tire is uneven.
- ◆ The wear of the front tires varies from left to right.
- ◆ The wear of the rear tires varies from left to right.
- ◆ There are deep recesses and rubdown.

4.4.2.2 Runaway fault and diagnosis process

"Runaway" means that on a level road surface, even when the steering wheel is not under force, the vehicle will drive away from the straight line.

The reasons for runaway usually include:

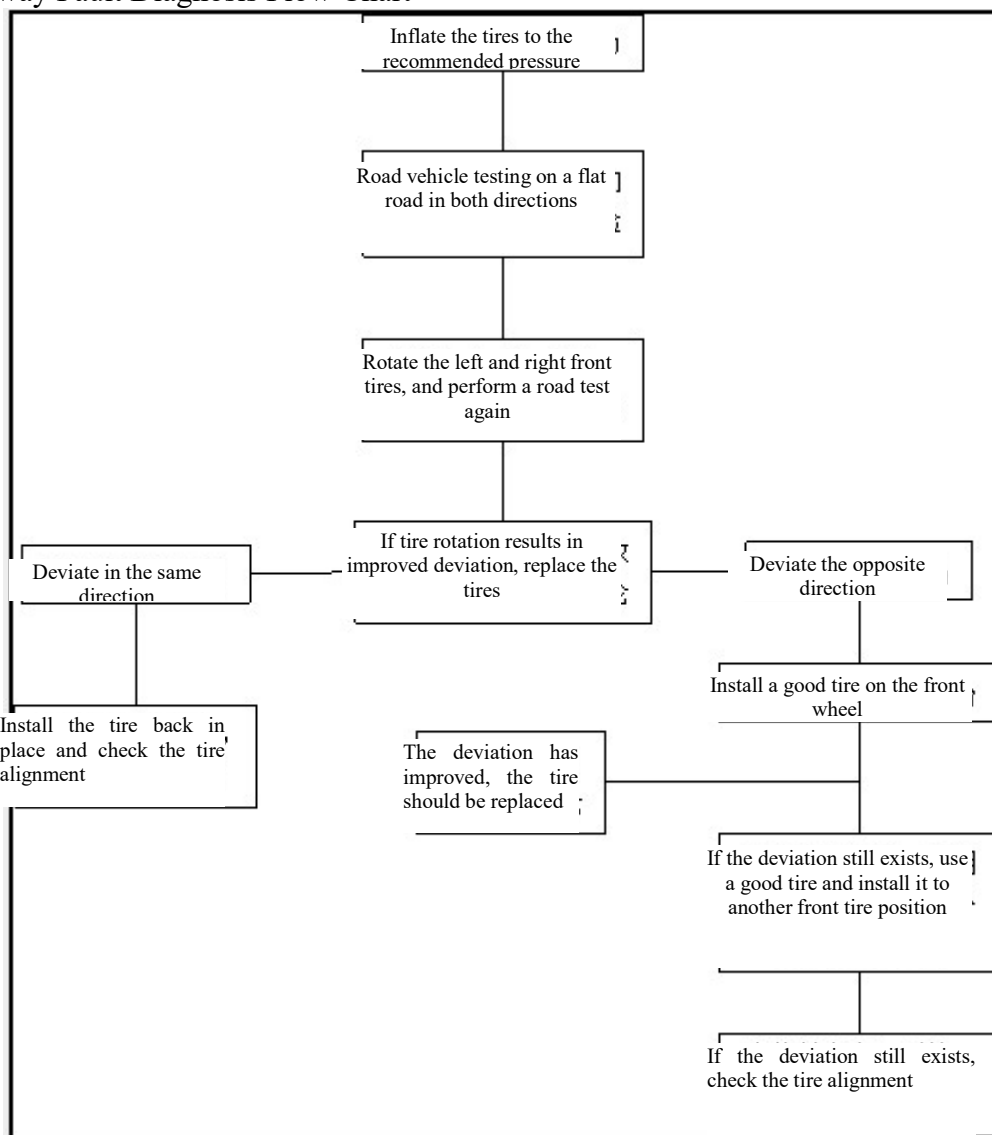
- ◆ Incorrect radial tire alignment.
- ◆ Uneven brake adjustment.
- ◆ Construction of tire.

The way that the tires are manufactured can cause runaway in the direction of the vehicle. In this example, we take a tire installed with the belt ply. Eccentricity of the belt ply can generate heavy lateral forces that cause the vehicle to sway on straight roads. If one side of the tire has a larger diameter than the other, the tire will easily swing to one side. This will increase the lateral force that causes the vehicle to run away. The steps in the following table (Runaway Fault Diagnosis Flow Chart) should be used to check the runaway.

1. The procedure for diagnosing runaway is different from that is shown in the correct tire rotation map found in the User Manual and Maintenance Guide. If you move a medium to high mileage tire (or a tire with a different specification from other tires) to the other side of the vehicle, be sure to check for driving discomfort.

2. The rear tires do not cause misalignment.

Runaway Fault Diagnosis Flow Chart



Important precautions: The above inspection should be conducted on the premise that the braking is intact and the braking force is adjusted evenly.

4.4.2.3 Fault maintenance checklist

Fault symptom	Cause of fault	Troubleshooting
Wheel running	◆ Tire is not matched.	◆ Replace

deviation	◆ Improper tire pressure	◆ Adjust the tire pressure to the specified value
	◆ The front spring is damaged or plastically deformed and becomes shorter	◆ Replace the spring
	◆ Radial tire uniformity (referred to as lateral runout) exceeds the limit value	◆ Replace the tire
	◆ A certain wheel runs with brake functioning	◆ Repair the brake
	◆ Front or rear suspension components are loose, bent, or easily damaged	◆ Tighten or replace suspension components
Abnormal tire wear	◆ The front spring is damaged or plastically deformed and becomes shorter	◆ Replace the spring
	◆ Tire dynamic imbalance exceeds the limit value	◆ Adjust
	◆ Front wheel side slip is out of tolerance	◆ Check and adjust the toe-in
	◆ Front shock absorber is faulty	◆ Replace
	◆ Vehicle overload	◆ -
	◆ No tire rotation	◆ Carry out tire rotation
	◆ Wheel bearing is loose due to excessive wear	◆ Replace
	◆ Insufficient or high tire pressure	◆ Adjust the tire pressure to the specified value
	◆ Wheel swing (radial or axial)	◆ Replace
Wheel bounce	◆ Bulging or damage of the tire	◆ Replace the tire
	◆ Radial tire uniformity (referred to as the change in radial stiffness) exceeds the limit value	
	◆ Wheel or tire radial runout exceeds the limit value	
	◆ Front shock absorber mismatch or failure	◆ Replace the front shock absorber
Front wheel shimmy and abnormal vibration	◆ Tire or wheel imbalance exceeds the limit value	◆ Balance wheels or change tires and/or wheels
	◆ Front wheel bearing is damaged or excessively worn	◆ Replace the front wheel bearing
	◆ Left and right lower swing arm ball joints or swing arm shaft sleeves are worn	◆ Replace the lower swing arm
	◆ Wheel or tire radial runout exceeds the limit value	◆ Repair or replace wheels and/or tires
	◆ Bulging or damage of the tire	◆ Replace the tire
	◆ Radial tire uniformity (referred to as the change in radial stiffness) exceeds the limit value	◆ Change tires or wheels
	◆ Insufficient tire inflation	◆ Inflate the tire to the specified pressure
Steering swing or poor steering stability	◆ Tire mismatch or uneven inflation pressure	◆ Replace the tire or inflate the tire to the specified pressure
	◆ The lower swing arm ball joint arm or steering tie rod ball joint pin is loose	◆ Replace the suspension ball joint arm or steering tie rod ball joint pin
	◆ Front shock absorber or mounting parts has fault	◆ Replace the front shock absorber or repair the mounting parts

◆ Front stabilizer bar is loose	◆ Tighten or repair the stabilizer bar or bushing
◆ The spring is damaged or plastically deformed and becomes shorter	◆ Replace the spring
◆ The stabilizer bar connecting ball joint is loose	◆ Replace the stabilizer bar connecting ball joint
◆ The left and right springs are not in the same group	◆ Replace the spring
◆ The spring is damaged or plastically deformed and becomes shorter	◆ Replace the spring
◆ Vehicle overload	◆ -
◆ Driving speed is too high when turning	◆ Reduce the turning speed

4.4.3 Maintenance Guide

4.4.3.1 Replacement of the aluminum hub cover

Removal steps

1. Remove the hub cover with a screwdriver.

Installation steps

2. Ensure that the alignment pins of the hub cap align with the small holes in the wheel. Press the hub cap into the wheel by hand.

4.4.3.2 Replacement of the steel wheel trim cover

Removal steps

1. Use a screwdriver to pry out the wheel trim cover.

Installation steps

2. Ensure that the notch in the trim cover is aligned with the tire valve. Press the wheel trim cover into the wheel by hand.

4.4.3.3 Repair of aluminum/steel wheel porosity

Repair procedure

1. Raise and correctly support the vehicle. Refer to "Lift and raise the vehicle" in "General information".
2. Remove the tire and wheel assembly. Refer to "Tire replacement" and "Wheel replacement" in this chapter.
3. Follow the following procedure to determine the leakage area:
 - ◆ Inflate the tires to 200 kPa.

- ◆ Immerse the tires and wheels in water.
- 4. Mark the leakage area.
- 5. Remove the tire from the wheel.
- 6. Grind the inside surface of the leakage area with 80 grit sandpaper.
- 7. Clean the area with a common cleaner such as 3M # 08984 or similar equipment.
- 8. Apply a layer of adhesive sealant 1/8 inch thick to the leakage area.
- 9. Dry for 12 hours.
- 10. Install the tire on the wheel.
- 11. Pressurize to the specified tire pressure.

Caution: To avoid serious personal injury, do not stand on the tire during inflation. When the bead undercut exceeds the safety limit, the bead may detach. If the tire bead is not in place, its inflation pressure must not exceed 200 kPa (29 psi). If the air pressure of 200 kPa (29 psi) does not allow the bead to be in place, deflate the tire, relubricate the bead, and reinflate. Excessive inflation can detach the tire bead and cause serious personal injury. After installation, inflate the tire to the specified pressure to fully place the bead.

- 12. Check for leakage.
- 13. Adjust the tire pressure to meet the specified requirements. Refer to the "Tire inflation pressure table" in this chapter.
- 14. Balance the tire and wheel assembly. Refer to "Tire and wheel balancing" in "General information".
- 15. Install the tire and wheel assembly. Refer to "Tire and wheel replacement".
- 16. Lower down the vehicle.

4.4.3.4 Tire and wheel replacement

Removal steps

Due to corrosion or the tight fit of the wheel center positioning hole with the wheel hub or brake disc, it may be difficult to remove the wheel. Follow the following procedure to safely remove the wheel:

- 1. Raise and correctly support the vehicle. Refer to "Lift and raise the vehicle" in "General

information".

2. Tighten all wheel nuts on the wheels, then loosen each nut by two turns.

3. Lower down the vehicle to the floor.

4. Swing the vehicle with excessive force from left to right to loosen the wheels. In addition, it can also move the vehicle several meters in the front and rear directions, and quickly and forcefully press the brake pedal to release the wheels.

5. Turn off the power supply. Raise and correctly support the vehicle. Refer to "Lift and raise the vehicle" in "General information".

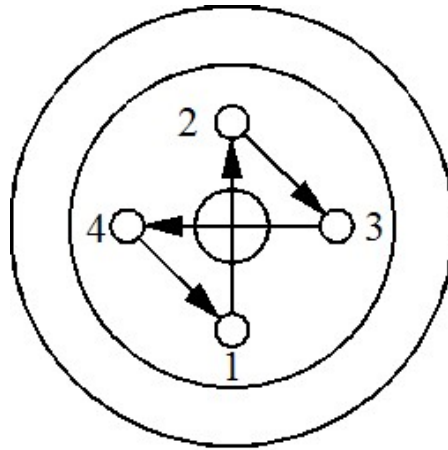
Caution: If there is oil infiltration on the vertical surface between the wheels and the brake disc or drum, this will loosen the wheels of the vehicle during driving, resulting in loss of control of the vehicle and causing injury accidents. When loosening a tight wheel, never apply heat, which will shorten the life of the wheel, stud, or hub and bearing assembly. The wheel nuts must be tightened sequentially to the correct torque to prevent bending of the wheel or brake disc or drum.

6. Remove the wheel nuts and the wheel. At no time should aluminum wheels be allowed to stand upright, placing the back of the wheels on a soft, clean surface.

Precautions: When removing a wheel or tire, do not use excessive force, such as hammering, but gently tap the tire sidewall with your hand or rubber hammer.

Caution: Before installing a wheel, use a scraper and wire brush to remove accumulated corrosion on the wheel mounting surface and the mounting surface of the brake drum or brake disc. Improper metal to metal contact on the mounting surface during wheel installation can cause wheel nuts to loosen. This will cause the wheels to fall off during vehicle travel, causing the vehicle to lose control, and possibly causing personal injury.

To prevent bending of the wheels, brake discs, or brake drums, the wheel nuts must be tightened to the correct torque in the sequence shown (1 to 4). Excessive tightening of nuts on steel wheels can damage the wheel mounting holes and cause cracks. Do not use lubricant or penetrant on wheel studs, nuts, or mounting surfaces.



4.4.3.5 Replacement of the tire

Install or remove tires using a tire changer. Follow the equipment manufacturer's instructions and do not use manual tools or tire prys to replace tires, as these tools can damage the tire bead or rim. Clean the rim bead seat with a wire brush or coarse steel wool to remove the following substances:

- ◆ Lubricating oil
- ◆ Old rubber
- ◆ Slight rust spots

Caution: To avoid serious personal injury, do not stand on the tire during inflation. When the bead undercut exceeds the safety limit, the bead may detach. If the tire bead is not in place, its inflation pressure must not exceed 220 kPa. If the air pressure of 220 kPa does not allow the bead to be in place, deflate the tire, relubricate the bead, and reinflate. Excessive inflation can detach the tire bead and cause serious personal injury. After installation, inflate the tire to the specified pressure to fully place the bead.

Important precautions: Do not lubricate the tire bead with silicone containing lubricating oil. Before installing or removing tires, clean the tire bead area and thoroughly lubricate the area with 50% lubricating oil and 50% water.

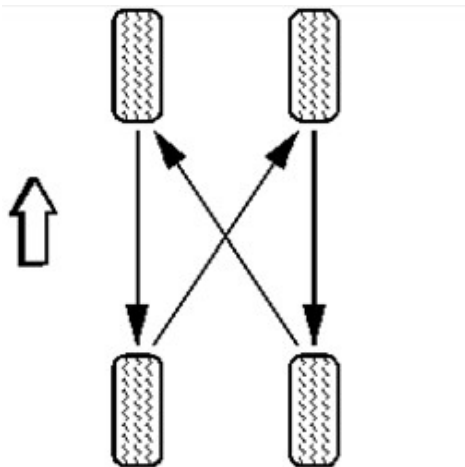
Install the valve core and inflate it to the pressure specified in "Tire inflation pressure specification" in "General information". Verify that the tire is secured to both sides of the rim flange.

4.4.3.6 Wheel rotation

Regularly rotate the wheels to balance tire wear. In addition to regular rotation, whenever uneven tire wear is found, the wheels should also be rotated.

Radial tires wear faster in the shoulder area, especially at the front end. Radial tires at non drive axle locations may generate irregular wear and increase tire noise, which requires regular wheel rotation to resolve.

Precautions: After rotation, check whether the wheel nuts have reached the specified tightening torque, and then set the tire pressure.



4.4.3.7 Tire wear limit

When the tread groove depth of a tire is 1.6mm (0.063 in.), the indicated tread pattern is 12mm (0.47 in.) wide. The tire tread has 6 indicator patterns in the same direction. When more than 3 indicator patterns are exposed from the groove, the tire should be replaced.

4.4.3.8 Lateral swing of the tire

"Swing" means that the front and rear of the vehicle oscillate to the left and right, which is caused by the uneven steel belt ply in the tire. This swing is most noticeable at low speeds of 8-48 km/h (5-30 mph).

A road test on a vehicle can identify faulty tires:

1. If there is a problem with the rear tire, the rear of the vehicle will swing left and right, and the driver in the seat will feel as if someone is pushing on one side of the vehicle.
2. If there is a problem with the front tire, the rocker arm is more obvious. The front rocker

arm moves forward and backward, causing the driver to feel the vehicle's axle load swing.

The diagnosis of swing can be carried out using the replacement method of the wheel assembly:

1. Find out if the vehicle is swinging at the front or rear.
2. Install good tires and wheels onto the vehicle.

4.4.3.9 Tire vibration (radial runout)

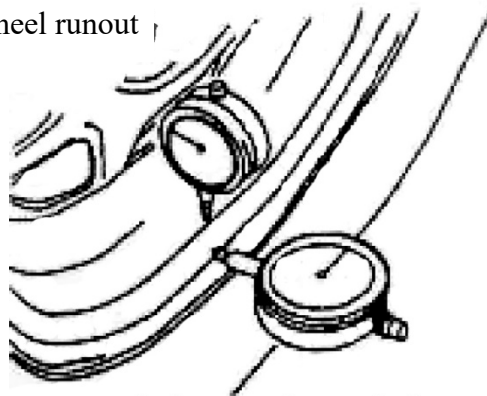
Important precautions: After changing a tire, be sure to re measure the wheel runout and perform a balance test.

Most of the vibration that occur when the vehicle is traveling on highways is caused by wheel imbalance. If there is still vibration after dynamic balancing, the cause may be:

- ◆ Tire runout
- ◆ Wheel runout
- ◆ Tire stiffness changes.

The wheel runout should not exceed the limits shown in the illustration.

Wheel runout γ



Limit: 2.5 mm radially
2.5mm for the side

Measuring the free runout of tires and/or wheels will only reveal some issues. The tire problem detection device (TPD) must be used to check the three causes of instrument vibration, such as load runout. If there is no tire problem detection device, you can only replace it with a good tire assembly, which takes a long time.

4.4.4 Description and operation

4.4.4.1 General description

The following factors have a significant impact on tire life:

- ◆ Correct tire pressure
- ◆ Wheel positioning

The following driving habits can increase tire wear:

- ◆ Heavy turning
- ◆ Accelerate too fast
- ◆ Heavy braking

4.4.4.2 Instructions to tire repair

Repairing tires from the outside is strictly prohibited. The tire should be removed from the wheel, inspected for damage, and repaired on the inside. Information can also be obtained from the tire manufacturer.

4.4.4.3 Instructions to tire repair inflation

The recommended pressures for all models are carefully calculated to provide the following characteristics:

- ◆ Comfortable ride
- ◆ Good steering response
- ◆ Maximum tread wear
- ◆ Improve tire life

To reduce tire damage, check the tire pressure monthly or before driving a long distance. To achieve optimal testing results, the following conditions must be observed:

- ◆ Tires due to cold tires (What does that mean?)
- ◆ Park the vehicle for three hours or more and set the tire pressure to the specified pressure.

Refer to the "Tire inflation pressure table" in this chapter.

After inflating the tire, please install the valve cover to prevent water and dust from entering. Improper tire pressure will affect driving conditions.

- ◆ Exceeding the recommended tire inflation pressure can have the following effects:

- Hard driving
- Tire wear or tire body damage
- Rapid tread wear at the center of the tire
- ◆ Below the recommended tire inflation pressure can have the following effects:
 - Tire noise during steering
 - Hard steering
 - Rapid and uneven wear of tread edges
 - Rim wear and breakage
 - Broken tire cord
 - High tire temperature
 - Reduced handling performance
 - Soft driving
- ◆ Unequal tire pressures on the same axle can have the following effects:
 - Uneven braking
 - Steering deviation
 - Reduced handling performance

Deviation due to torque action

4.4.4.4 Tire description

All tires have a tire performance standard (TPC) specification number on the sidewall near the tire size. This specification number indicates that the following performance of the tire meets the corresponding standards:

- ◆ Traction force
- ◆ Durability
- ◆ Dimensions
- ◆ Noise
- ◆ Operation
- ◆ Rolling resistance

Typically, each tire size is assigned a specific TPC specification number.

Caution: Do not mix different types of tires, such as radial tires, diagonal tires, and diagonal strap tires, on the same vehicle. Otherwise, vehicle handling performance may be seriously affected and serious casualties may result.

When selecting a replacement tire, select a tire with the same TPC specification number. This will ensure consistency with the size, load range, and structure of the tires on the original vehicle. Tires of any other tire size or construction type can significantly affect the following driving conditions:

- ◆ Ride
- ◆ Operation
- ◆ Speedometer or odometer calibration
- ◆ Vehicle ground clearance
- ◆ Clearance between tire and body and chassis (this restriction does not apply to spare tires equipped on the vehicle)

The tire must be replaced under any of the following conditions:

- ◆ The tire is worn to the following conditions: the tread thickness is below 1.6 mm (0.063 in.) or the cord or fabric is visible (for ease of detection, the tire has a built-in tread wear indicator that is visible between the tread grooves when the tread is below 1.6 mm (0.063 inch.)). Replace the tires when indicators appear in three different locations or in more than two adjacent tread grooves.

- ◆ The tread or sidewall is cracked, cut, or worn deep enough to expose the cord or fabric.
- ◆ The tire is bulging, expanding or cracking. A slight dent in the sidewall is normal and does not affect handling performance.

- ◆ The tire is punctured, cut, or otherwise damaged, which cannot be repaired due to size and location.

4.4.4.5 Precautions for tire repair

Precautions: When replacing a tire, do not use a tire that is smaller in size or has a lower speed rating than the original tire. The speed rating is only applicable to tires with full pressure. An underinflated tire cannot reach its speed rating value.

4.4.4.6 Instructions for changing wheels

Special precautions: Using non generic original wheels may result in:

- ◆ Damaging wheel bearings, wheel fasteners, and wheels
- ◆ Tire damage caused by changes in clearance with adjacent vehicle components
- ◆ Vehicle steering instability caused by changing tire radius
- ◆ Vehicle damage caused by changing ground clearance
- ◆ The speedometer and odometer readings are not accurate

Precautions: The replacement wheel must match the load capacity, diameter, rim width, wheel offset distance, and installation configuration of the original wheel. Improper wheel size or type will affect the life of wheels and bearings, brake cooling, speedometer/odometer calibration, vehicle ground clearance, and clearance between tire and body and chassis.

Replace the wheel under the following conditions:

- ◆ The wheel is bent or dented.
- ◆ The wheel radial runout is excessive.
- ◆ Air leakage at wheel welds.
- ◆ The wheel bolt hole is too long.
- ◆ The wheel nuts cannot be tightened.
- ◆ The wheels are severely rusted.
- ◆ Excessive wheel runout can cause unacceptable vibration.

4.4.4.7 Instructions to steel tire repair

Repairing wheels by welding, heating, or shot peening is not allowed. Wheel or tire leaks are not allowed to be repaired by inserting an inner tube. If a steel wheel is found damaged, replace it with a wheel that meets the quality of the original one.

4.4.4.8 Instructions to aluminum tire repair

Special precautions: Do not use tire replacement equipment to scratch or damage the transparent coating on aluminum wheels. Scratches on the clear coat can cause corrosion of aluminum wheels and peeling of the clear coat from the wheels. Remove and install the tire from the outer bead seat. Equipment without a platform for placing wheels can cause visual damage

when the wheels are tightened. The bottom flange stripper of some devices can also cause visual damage.

5 Braking system

5.1 Hydraulic braking system

5.1.1 Specification

5.1.1.1 Specification of braking system

Application	Specification
Diameter of brake master cylinder	22.22mm
Outer diameter of brake disc	256mm
Inner diameter of brake disc	156mm
Thickness of brake disc	18±0.1mm
Runout limit of brake disc	0.1mm
Thickness of brake pad	16mm
Thickness of friction block	10mm
Diameter of front wheel brake cylinder	54mm
Brake shoe size (width × Thick)	40×5mm
Inner diameter of rear wheel brake cylinder	23.81mm

5.1.1.2 Fastener fastening specification

Application	Specification
Master cylinder - front/rear wheel brake pipe joint nut	13-19N•m
Brake master cylinder mounting nut	20-26N•m
Brake hose caliper bolt	25-35N•m
Pedal bracket mounting nut	20-26N•m
Brake bracket nut	11-17N•m
Brake pedal lever pivot nut	14.7-21.6N•m
Rear brake backing plate mounting bolt	49-69N•m
Rear brake wheel cylinder oil pipe joint	13-19N•m
Front brake hose connecting nut	13-19N•m
Front brake positioning rod bolt	30-35N•m
Front brake bleed screw	8-13N•m
Connecting bolt between brake caliper assembly and steering knuckle	74-91N•m
Front brake support bracket bolt	74-91N•m

The main components such as the left and right brakes, brake shoes, friction pads, and brake drums of the same vehicle should use the same batch of products from the same manufacturer.

5.1.2 Schematic diagram and wiring diagram

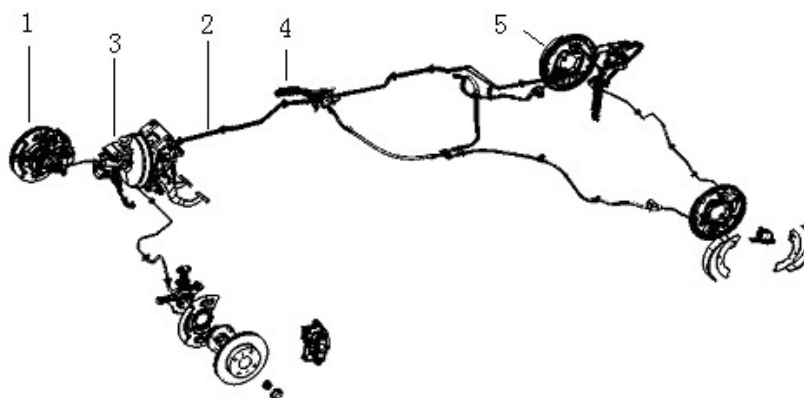
5.1.2.1 Wiring diagram of brake warning system

-Refer to 5.1.3.1 for brake fluid sensor and parking brake switch wiring diagram

-Refer to 5.1.3.1 for brake switch wiring diagram

5.1.3 Appearance identification

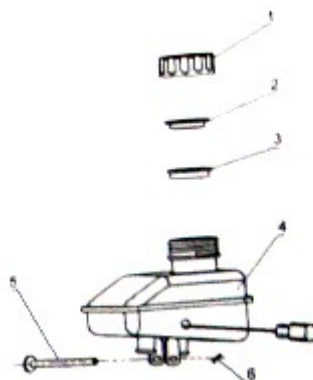
5.1.3.1 Exploded view of hydraulic braking system



1	Disc brake	2	Brake oil pipe	3	Brake master cylinder
4	Parking brake	5	Drum brake		

(1) Disc brake (2) Brake oil pipe (3) Brake master cylinder (4) Parking brake (5) Drum brake

5.1.3.2 Exploded view of brake fluid reservoir



1	External lid of reservoir	2	Internal lid of reservoir	3	Sealing ring	4	Thermal assembly of reservoir	5	Pin bearing	6	Lock pin
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5.1.4 Diagnosis information and procedures

5.1.4.1 Inspection of hydraulic brake diagnostic system

Steps	Operation	Normal results	Abnormal results
1	Check the brake fluid level in the	The brake fluid level is normal	The brake fluid level is too low

	reservoir		
2	Step the brake pedal to the end	The brake pedal moves smoothly towards the bottom floor	The movement of the brake pedal is unstable (hard or unstable pedal movement)
		Brake pedal stops and resists pressure	The brake pedal is too soft (too close to the floor)
3	Release the brake pedal	The brake pedal returns to its original position	The brake pedal does not return to its original position
4	Hydraulic brake system test	Immediate braking effect when braking is applied	After stepping on the brake, the braking effect lags behind
		The brake operates smoothly and normally without jamming - the brake pedal does not shake	When lightly stepping on the brake pedal, the brake operates rough
		When stepping on the brake pedal, the steering wheel and brake pedal do not vibrate (shake)	When stepping on the brake pedal, the steering wheel or brake pedal vibrates
		The vehicle will stop without having to apply significant brake pedal force	The brake pedal is laborious or difficult to brake
		The vehicle does not run away when braking	The vehicle runs away to one side when braking
		The front and rear brakes operate simultaneously	Uneven operation of the front or rear brakes
		No excessive noise during brake operation	Brake noise
The brake does not drag when the brake pedal is released	The brake drags when the brake pedal is released		
-To verify the correct test results, if possible, compare the test results with that of the same type of vehicle/system being operated. -Refer to the relevant fault diagnosis table for the operation results.			

5.1.4.2 External factors affecting braking performance

Tire

Tires with different indirect contact surfaces and adhesion to the road surface can lead to different braking effects. The following conditions may have an adverse impact on braking performance:

- Different tire inflation
- Different tire specifications
- Different tire tread patterns

Vehicle load

Heavily loaded vehicles require greater braking force. On vehicles with uneven load, the wheel with the largest load requires greater braking force than other wheels.

Wheel positioning

Incorrect wheel alignment, especially excessive camber and kingpin caster will lead to

runaway to one side when braking.

5.1.4.3 Brake system test

Test braking on a road surface that meets the following conditions

- Dry
- Clean
- Moderately flat

Do not test braking on the following road surfaces because the tires do not adhere evenly to the road surface:

- Damp
- Slippery
- Covered with loose soil. If the road arches, it will bias the weight towards one side of the wheel, which can have a negative impact on the test. If the road surface is uneven, the wheels may bounce, which can also have a negative impact on the test.

At different vehicle speeds, use the brake pedal force of the spot brake and the emergency brake to test braking. Do not lock the brakes and drag the tires. Due to sudden braking, the braking distance when the wheels rotate is shorter than when the wheels lock. Therefore, the locked brakes and dragged tires cannot reflect braking efficiency.

Unless at extremely high deceleration, it is necessary to balance the braking system to avoid locking the wheels. When braking hard, the brake pedal feels hard.

5.1.4.4 Inspection of vacuum booster

Ignition switch off state: step on the brake pedal and keep its position unchanged, then turn on the ignition switch to start the vehicle. If the pedal height does not change at this time, the booster will not work. If the booster is in good condition, the pedal should further sink after starting the vehicle.

Starting state: Step on the brake pedal and keep its position unchanged, then turn off the ignition switch. If the pedal height changes within 30 seconds (with a rising force), the booster is not functioning properly, possibly due to air leakage. If the booster is in good condition, the pedal height will not change within 30 seconds.

5.1.4.5 Brake pedal travel

Too low brake pedal travel is mostly the result of air action within the system. Exhaust the air from the system until all air has been exhausted. Refer to "Exhaust the air in the hydraulic brake system". Less common causes for excessive brake pedal travel include the following:

- Excessive wear of friction lining
- Hydraulic system leakage

Regularly and frequently measure the brake pedal travel, which is the distance the pedal travels towards the floor from a fully released position.

5.1.4.6 Brake fluid leakage

Start the vehicle with gear in N. Step on the brake pedal and keep the pedal force constant. If the pedal slowly drops with constant force, the hydraulic brake system may be leaking. Perform the following visual inspections to confirm any leakage:

Check the brake master cylinder fluid level. Normal friction lining wear can cause a slight drop in the fluid level in the reservoir. If the fluid level in the reservoir drops abnormally, the brake warning lamp will light up, indicating leakage in the system. There may be internal or external leakage inside the hydraulic system.

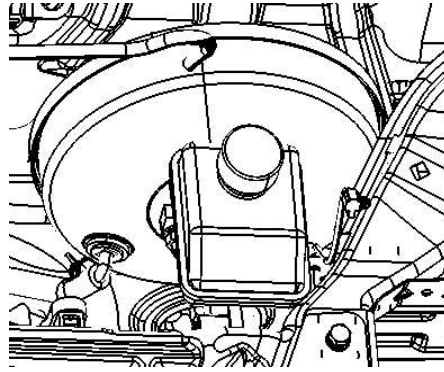
Check whether the brake pipe and brake hose connections is leaking. If there is leakage, check the torque of the fastener or replace the oil pipe or hose.

Check whether the components that connect the brakes are damaged. If necessary, reinstall or replace the components that connect the brakes. Check the caliper and wheel cylinder for leakage. If there is leakage, reinstall or replace these components if necessary.

5.1.5 Maintenance Guide

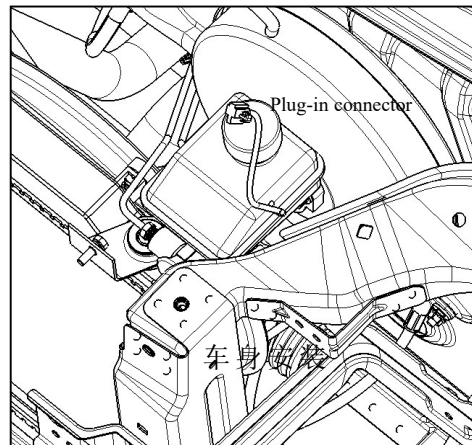
5.1.5.1 Fill the brake fluid reservoir

Caution: Do not overfill the brake fluid. Overfilling brake fluid can cause brake fluid to overflow onto exhaust components during the operation of the brake system. Brake fluid is flammable and can cause fire and injury if it comes into contact with exhaust system components.



The brake master cylinder reservoir is directly connected to the brake master cylinder with a pin shaft. The reservoir is located on the left side of the vehicle. The brake master cylinder reservoir should ensure sufficient brake fluid, so under normal conditions, the reservoir does not require maintenance. When the brake fluid level is too low, the fluid level sensor in the reservoir will give a timely alarm.

1. Before opening the reservoir cap, clean it to prevent dust from entering the reservoir.
2. Open the screw cap.
3. The filling amount of the reservoir must not exceed the maximum filling level.
4. Install the screw cap.

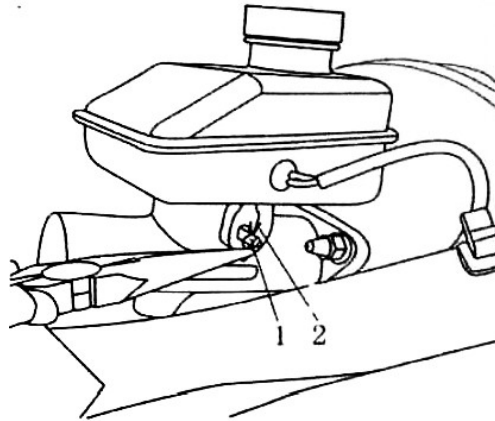


5.1.5.2 Replacement of the brake fluid reservoir

Removal steps

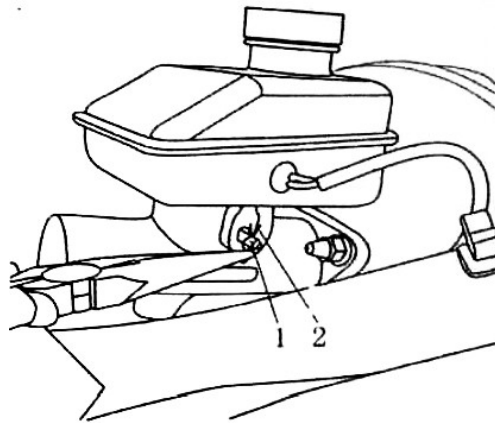
1. Remove the liquid level sensor wiring plug
2. Clamp out the pin lock with pliers, take out the pin shaft, and then pull out the brake fluid reservoir upwards.

Important precautions: Pay attention to the overflowed brake fluid.

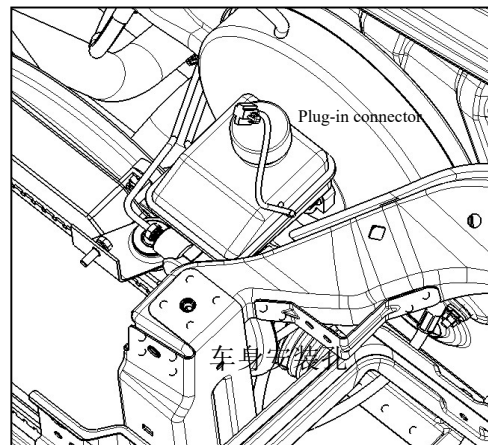


Installation steps

1. Insert the reservoir into the brake master cylinder mounting hole.
2. Insert the pin shaft and fix it with a lock pin;



3. Connect the brake fluid warning lamp harness connector and fix the harness in the vehicle body mounting hole.
4. Bleed the brake system and check for leakage. Refer to "Exhaust the air in the hydraulic brake system".

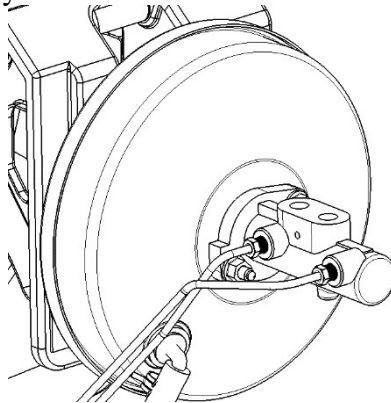


5.1.5.3 Replacement of the brake master cylinder

Removal steps

1. When removing the brake fluid reservoir, please refer to "Replacement of the brake fluid reservoir".
2. Loosen the master cylinder front/rear wheel oil pipe connecting nut to disconnect the brake pipe from the brake master cylinder.

Important precautions: Pay attention to the overflowed brake fluid.



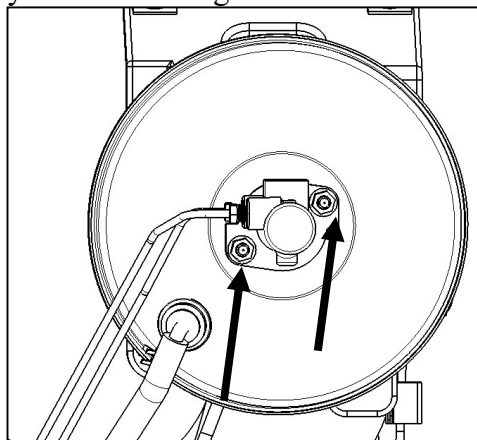
3. Remove two fixing nuts from the brake master cylinder.
4. Remove the brake master cylinder.

Installation steps

- 1 Install the brake master cylinder nuts.

Tighten

Tighten the brake master cylinder mounting nut to 20-26N•m.

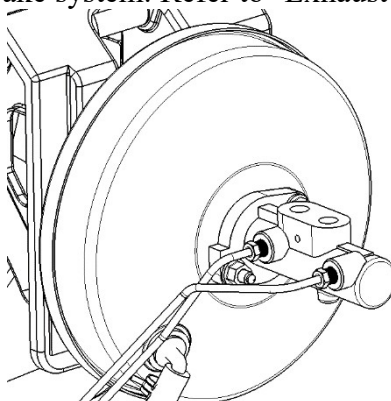


- 2 Install the master cylinder front/rear wheel oil pipe connecting nut.

Tighten

Tighten the master cylinder front/rear wheel oil pipe connecting nut to 13-19N•m.

3 Exhaust the air in the brake system. Refer to "Exhaust the air in the hydraulic brake system".

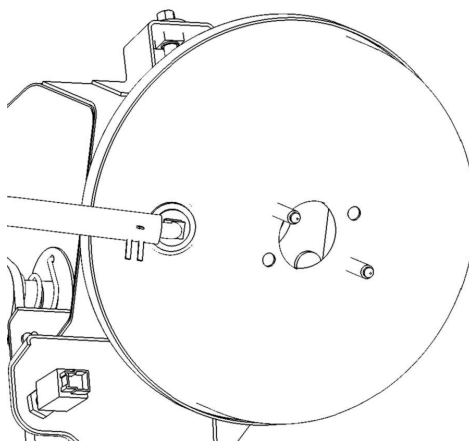


5.1.5.4 Replacement of the vacuum brake booster

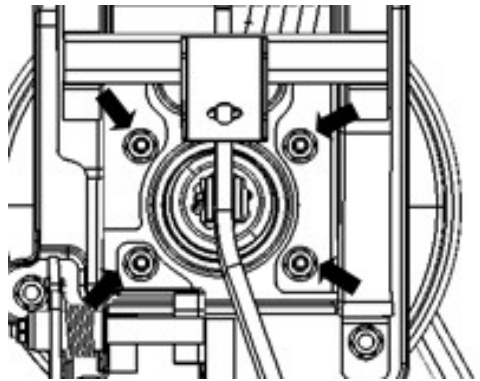
Special precautions: If a vacuum booster failure is found, it should be replaced with a new vacuum booster. The vacuum booster assembly cannot be disassembled for maintenance.

Removal steps

1. When removing the brake fluid reservoir, please refer to "Replacement of the brake fluid reservoir".
2. When removing the brake master cylinder, please refer to "Replacement of the brake master cylinder".
3. Loosen the vacuum hose with pliers.



4. Remove the split pin and pin shaft connecting the brake pedal assembly to the vacuum booster.
5. Remove four mounting nuts of the vacuum booster and take the vacuum booster out of the front engine cabin.

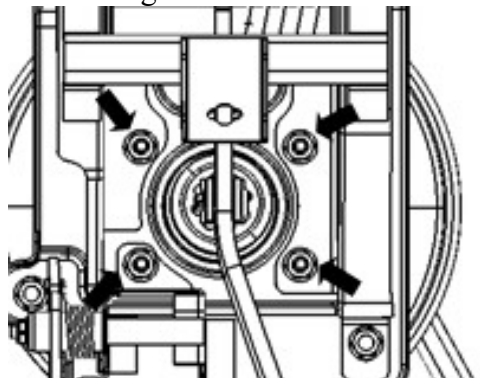


Installation steps

1. Install the vacuum booster to the brake bracket and tighten the vacuum booster mounting nuts.

Tighten

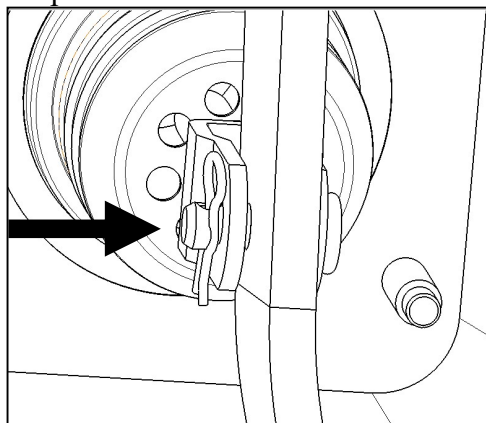
Tighten the vacuum booster mounting nut to 11-17N•m.



2. Install the split pin and pin shaft connecting the brake pedal assembly to the vacuum booster.
Connect the vacuum hose clamp.

Tighten

Tighten the brake pedal lever pivot nut to 14.7-21.6N•m.



3. When installing the brake master cylinder, please refer to "Replacement of the brake master

cylinder".

4. When installing the brake fluid reservoir, please refer to "Replacement of the brake fluid reservoir".

5.1.5.5 Replacement of the vacuum booster hose

Removal steps

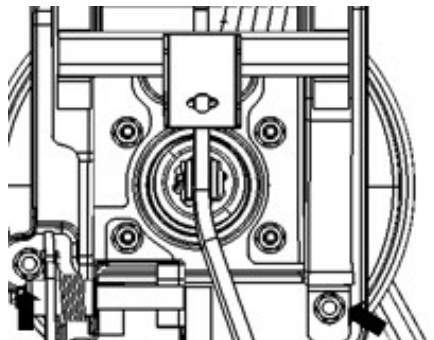
1. Use slip-joint pliers to remove the vacuum hose from the vacuum booster.
2. Disconnect the vacuum hose from the hard pipe.

Installation steps

1. Connect the vacuum hose to the hard pipe.

Important precautions: The vacuum hose connection should be inserted at least 18.5mm to ensure sealing.

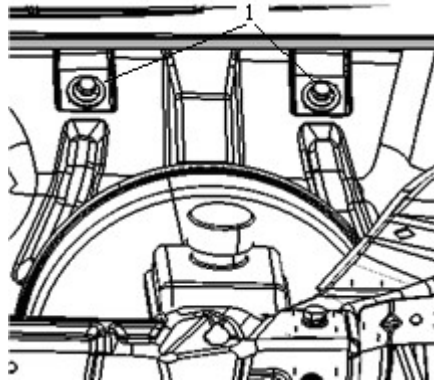
2. Connect the vacuum hose to the vacuum booster.



5.1.5.6 Replacement of the brake bracket assembly

Removal steps

1. Remove the brake lamp switch. Refer to "Replacement of the brake lamp switch".
2. Remove the split pin and pin shaft connecting the brake pedal assembly to the vacuum booster. Refer to "Replacement of the vacuum booster".
3. Remove the bracket mounting nut.



Installation steps

1. First fix the brake bracket to the installation position, and then tighten the brake bracket mounting nuts.

Tighten

1. Tighten the brake bracket nut to 11-17N•m.

2. Install the split pin and pin shaft connecting the brake pedal assembly to the vacuum booster.

Refer to "Replacement of the vacuum booster".

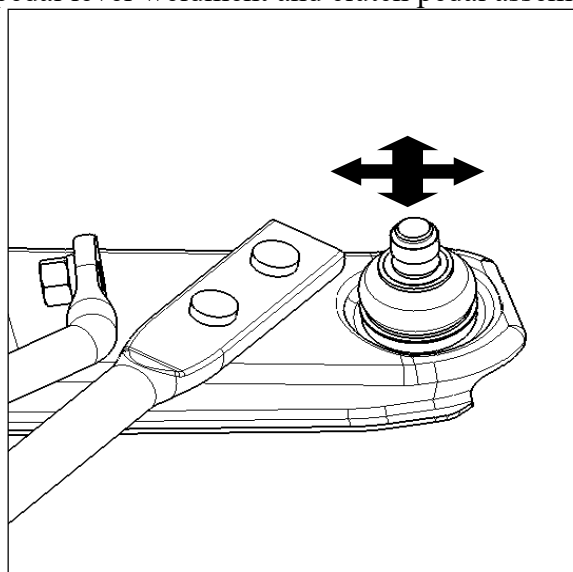
5.1.5.7 Replacement of the brake pedal

Removal steps

1. Remove the brake bracket assembly. Refer to "Replacement of the brake bracket assembly".

2. Use a slotted screwdriver to release the brake pedal lever torsion spring. Remove the brake pedal shaft and the shaft hex nut.

3. Take out the brake pedal lever weldment and clutch pedal assembly respectively.



Installation steps

1. Install the brake pedal lever weldment

Tighten

Tighten the pedal mounting nut to 20-26N•m.

Installation steps

1. Tighten the proportional valve mounting nuts.
2. Use a support wrench to connect the hard brake pipe joint to the proportional valve.

Tighten

Tighten the oil pipe joint nut at AA to 13-19N•m.

3. Lower down the vehicle.
4. Exhaust the air in the brake. Refer to "Exhaust the air in the hydraulic brake system".

5.1.5.8 Inspection and replacement of the brake pipe

Check the hard brake pipe:

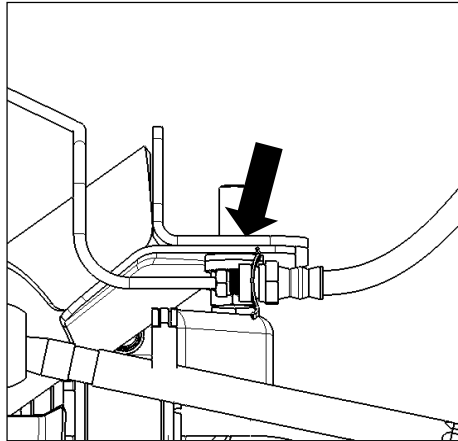
The hydraulic brake hose transmits hydraulic pressure from the steel brake pipes on the vehicle body to the brake caliper and brake shoes.

Caution: When replacing brake pipes, be sure to use dual wall steel brake pipes. It is recommended not to use any other type of pipe, as this may result in brake system failure. Carefully position and retain the replaced brake pipes. When replacing brake pipes, be sure to use the correct fasteners and replace the brake pipes in their original locations. Improper arrangement and installation of brake pipes will damage the brake pipes and lead to brake system failure.

Inspection of hose:

- Road accident damage
- Fracture
- Casing wear
- Leakage
- Air hole
- Correct wiring and assembly

If any signs of failure are found on the brake hose, replace the brake hose.



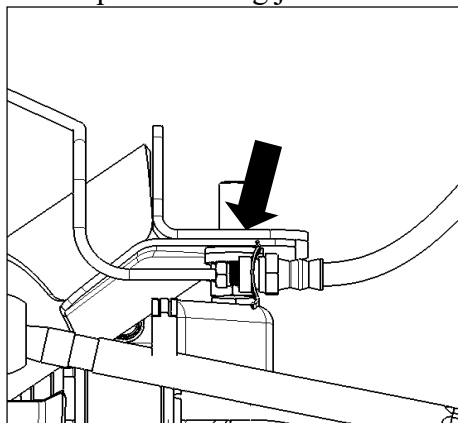
5.1.5.9 Replacement of the brake hose - front

Removal steps

Caution: Do not move the vehicle until a stable brake pedal (stroke) is obtained. Air in the brake system can cause brake failure and personal injury.

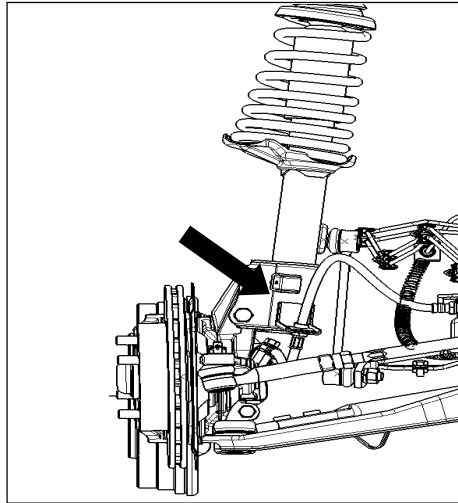
Special precautions: Do not let components hang on the hose, as this may cause damage to the brake hose.

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle”.
2. Remove dust and foreign objects on the brake hoses and pipe joints.
3. Use a wrench to remove the brake hose joint.
4. Remove the fixing card from the hose mounting bracket.
5. Remove the hose and brake caliper mounting joint from the bracket.



Installation steps

1. Install the brake hose onto the fixing card. The hose should not have any kinks.
2. Install the fixing card onto the hose joint of the bracket.

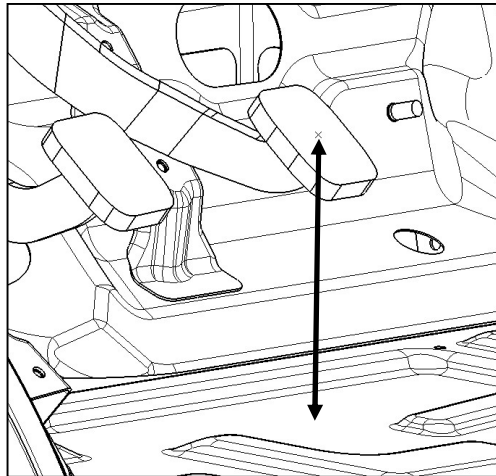


3. Connect the brake hose:

- Secure the hose joint with a support wrench.
- Don't bend the pipeline.

Tighten

Tighten the brake hose joint nut to 13-19 N • m.



4. Ensure that the hoses are not in any contact with the suspension system. Check the operation of the hoses on both sides. If the hose comes into contact with the suspension system, remove the hose and correct it.

5. Lower down the vehicle.

Exhaust the air in the brake. Refer to "Exhaust the air in the hydraulic brake system".

5.1.5.10 Replacement of the brake hose - rear

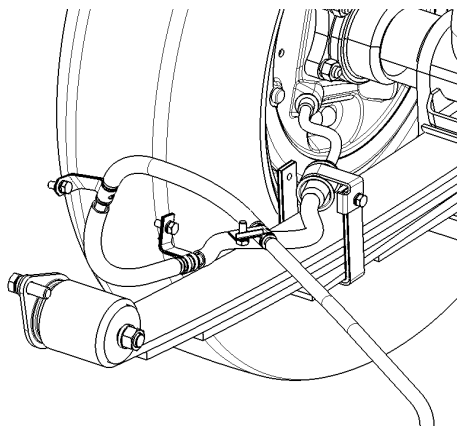
Removal steps

Caution: Do not move the vehicle until a stable brake pedal (stroke) is obtained. Air in the

brake system can cause brake failure and personal injury.

Special precautions: The brake hose at any location should not be crimped to prevent parts from losing brake fluid.

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle”.
2. Remove dust and foreign objects on the brake pipes and pipe joints.
3. Using a support wrench on the hose joint, remove the brake hose. Do not bend the brake hose bracket.
4. Remove the brake hose from the bracket.



Installation steps

1. Install the brake hose onto the bracket. The hose should not have any kinks.
2. Fasten the hard brake pipe to the brake hose with your fingers.
3. Fasten the hard brake pipe to the brake hose:
 - Tighten the hose joint with a support wrench.
 - Don't bend the bracket or pipeline.

Tighten

Tighten the brake hard pipe joint nut to 13-19N•m.

4. Lower down the vehicle.
5. Exhaust the air in the brake. Refer to "Exhaust the air in the hydraulic brake system".

5.1.5.11 Inspection of the free stroke of brake pedal

When stopping, step on the brake pedal two to three times to remove the residual vacuum in the brake booster, and then press on the brake pedal again until you feel significant resistance

(pushing the booster air). At this time, the pedal stroke is the free stroke, with a standard value of 6-10mm. The free stroke of the brake pedal cannot be adjusted.

Note: The total stroke of the brake pedal is 148 mm.

5.1.5.12 Exhaust the air in the hydraulic brake system

Caution: Do not move the vehicle until a stable brake pedal (stroke) is obtained. Air in the brake system can cause brake failure and personal injury.

Caution: Only use DOT3 or higher grade brake fluid in a clean, sealed tank. Do not use brake fluid in open containers that may be contaminated with water. Incorrect or contaminated brake fluid can damage components or lose braking performance, which can lead to personal injury.

Caution: Do not overfill the brake fluid. Overfilling brake fluid can cause brake fluid to overflow during brake system operation. Brake fluid is flammable and can cause fire and injury if it comes into contact with exhaust system components.

Important precautions: If any brake component is repaired or replaced, allowing air to enter the brake system, the entire exhaust procedure must be performed.

Important precautions: Avoid splashing brake fluid on any vehicle paint surface, wires, cables, or electrical connectors. Brake fluid can damage paint and electrical connections. If brake fluid splashes on the vehicle, flush the spilled components to reduce damage.

Special precautions: The purpose of the exhaust operation is to exhaust air when it enters the hydraulic braking system.

If air enters due to a low brake fluid level or a broken hard brake pipe on the brake master cylinder, exhaust the air in the hydraulic system of all four brakes. If the brake hose or hard brake pipe on a wheel is disconnected, only exhaust the air from the wheel caliper. If the hard brake pipe or hose is disconnected at any connection between the brake master cylinder and the brake pipe, only the brake system associated with the disconnected pipe or hose needs to be exhausted.

5.1.5.13 Procedure of exhausting the air in the braking system

Important precautions: This procedure requires an assistant to step on the brake pedal during the air exhaust procedure.

Important precautions: Make sure that the brake fluid level does not drop to the bottom of the

brake fluid reservoir. Check and fill the brake fluid reservoir according to the amount of brake fluid drained. If the brake fluid level has dropped to the bottom of the brake fluid reservoir, restart the air exhaust procedure from the first step.

1. Check and, if necessary, fill the brake master cylinder reservoir to a suitable level.

Important precautions: Wipe off the overflowed brake fluid with a rag.

2. Raise the vehicle and support it properly.

3. Install the transparent plastic exhaust hose to the rear right exhaust valve.

4. Immerse the other end of the transparent plastic exhaust hose into a clean container partially filled with clean brake fluid.

5. Open the exhaust valve.

6. Press the brake pedal to approximately 75% of the full range and hold.

7. Close the exhaust valve.

8. Release the brake pedal.

9. Repeat steps 4 to 8 until no bubbles appear in the brake fluid.

Tighten the exhaust valve to 8-13N•m.

Important precautions: Make sure that the exhaust valve is not leaking.

10. Remove the transparent plastic exhaust hose from the exhaust valve.

11. Repeat steps 3-11 for the left rear brake, left front caliper, and right front caliper until no bubble appears.

12. Lower down the vehicle.

13. Remove the brake fluid reservoir cap.

14. Check the brake fluid level in the reservoir. If necessary, fill the reservoir to the correct level.

15. Install the brake fluid reservoir cap.

16. Turn the ignition start switch to the START position and turn off the power. Step on the brake pedal with moderate force and maintain the pedal position. Pay attention to pedal travel and foot feel.

17. If the pedal feels firm and stable and the pedal travel is not excessive, start the vehicle.

Recheck the pedal travel during operation.

18. If the pedal still feels firm and stable and the pedal travel is not excessive, perform a road test of the vehicle. Try normal braking several times at medium speed to ensure that the braking system functions properly.

19. If the pedal feels soft or has excessive travel at the beginning, repeat the manual exhaust procedure, starting with Step 1.

Caution: You must step on the brake pedal firmly before moving the wheels. An accident can occur if the pedal is not firm before moving the vehicle.

20. Road test of the vehicle. Try normal braking several times at medium speed to ensure that the braking system functions properly.

5.1.5.14 Flush the hydraulic braking system

Operation procedure:

Important precautions: Use a suitable container and/or rag to absorb brake fluid and prevent it from contacting any painted surface.

1. Clean the brake fluid reservoir cap and adjacent areas.
2. Remove the brake fluid reservoir cap.
3. Drain the remaining brake fluid in the brake fluid reservoir.
4. Fill the reservoir with clean DOT3 grade brake fluid to a suitable level.
5. Install the brake fluid reservoir cap.
6. Raise the vehicle and support it properly.
7. Flush the brakes in the following order:

Right rear – left rear – left front – right front

8. Install the transparent plastic exhaust hose to the rear right brake drum exhaust valve.
9. Immerse the other end of the hose into a clean container partially filled with clean brake fluid.
10. Slowly open the exhaust valve and allow the brake fluid to flow out.
11. Step on the brake pedal repeatedly until clean, bubbleless brake fluid flows out of the plastic exhaust hose.

12. Close the exhaust valve when clean brake fluid begins to flow.

Tighten

Tighten the front caliper exhaust valve to 8-13N•m.

13. If necessary, replace all of the following rubber parts:

- Brake hose assembly.
- Brake master cylinder sealing rubber.
- Brake caliper and drum seals.

14. Check the brake fluid level in the reservoir and, if necessary, fill the reservoir to the correct level.

15. Install the brake fluid reservoir cap.

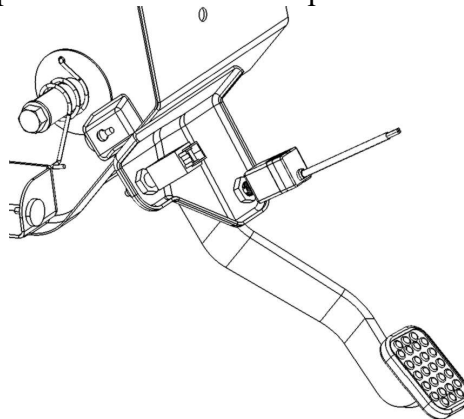
16. Exhaust the air in the whole hydraulic brake system. Refer to "Exhaust the air in the hydraulic brake system".

17. Lower down the vehicle.

5.1.5.15 Replacement of the brake lamp switch

Removal steps

1. Disconnect the brake lamp line connector
2. Remove the brake lamp switch from the brake pedal bracket.



Installation steps

1. Install the brake lamp switch on the brake pedal bracket.
2. Connect the brake lamp line connector.

3. Adjust the brake lamp switch.

5.1.6 Description and operation

5.1.6.1 Description of the brake master cylinder

Important precautions:

- Do not use compressed air with lubricating oil on brake parts. Otherwise, it will damage the rubber parts.
- After removing or disconnecting any hydraulic component, exhaust the air in all or part of the brake system.

The specified torque values apply to dry, non lubricated fasteners.

Perform maintenance on a clean, mineral oil free workbench. The brake master cylinder is used for diagonal split brake system. In this system, the front and rear diagonal rear brakes are actuated by primary pistons, while the other pair of front and rear brakes are actuated by secondary pistons.

The brake fluid reservoir is also equipped with a liquid level sensor. At the same time, it is equipped with a load sensing proportional valve to provide front and rear brake balance during emergency braking.

5.1.6.2 Description of load sensing proportional valve

Important precautions: Do not wash the proportional valve in any cleaning liquid. Internal parts shall be lubricated with special grease.

The proportional valve is located on the rear brake connection pipeline. Brake fluid can damage paint and electrical connections. If brake fluid splashes on the vehicle, flush the spilled components to reduce damage.

The following conditions can cause brake fluid to vaporize:

- Improper brake fluid
- The brake fluid contains mineral oil or water.

The rubber parts in the brake hydraulic system will also age. If the rubber parts age, the following parts will expand:

- Sealing ring of the brake master cylinder

- Caliper sealing ring

If aging occurs, remove all useful hydraulic components. Refer to "Hydraulic brakes" and "Disc brake". Wash all parts with alcohol. Dry the parts with compressed air that does not contain lubricating grease, preventing alcohol from entering the system. Replace all rubber parts in the system, including hoses and unused hydraulic components.

Fill the brake system with new brake fluid. Refer to "Fill the brake master cylinder reservoir".

Flush the brake system. Refer to "Flush the hydraulic braking system". Exhaust the air in the brake system. Refer to "Exhaust the air in the hydraulic brake system".

5.1.6.3 Description of vacuum booster

Important precautions:

- Lubricate the rubber parts with silicone grease for assembly purposes.
- Do not use compressed air with lubricating oil on brake parts. Otherwise, it will damage the rubber parts.
- After removing or disconnecting any hydraulic brake component, exhaust the air in all or part of the brake system.
- The torque values specified in detail are applicable to dry, grease free fasteners.
- Perform maintenance on a clean, mineral oil free workbench.

5.1.6.4 Description of brake system fault indicator circuit

The brake system malfunction indicator on the instrument panel lights up under the following conditions:

- Turn on the ignition switch;
- The parking brake works;
- The brake fluid level of the brake master cylinder is too low; when the ignition switch is turned on or the parking brake is applied, this indicator lights up to check whether the indicator is normal.

When the brake fluid level in the brake master cylinder is too low, the brake fluid level indicator sensor will turn off. The combination instrument performs relevant functions through sensors and circuits. At this time, the brake system fault indicator lights up.

5.2 Disc brake

5.2.1 Specification

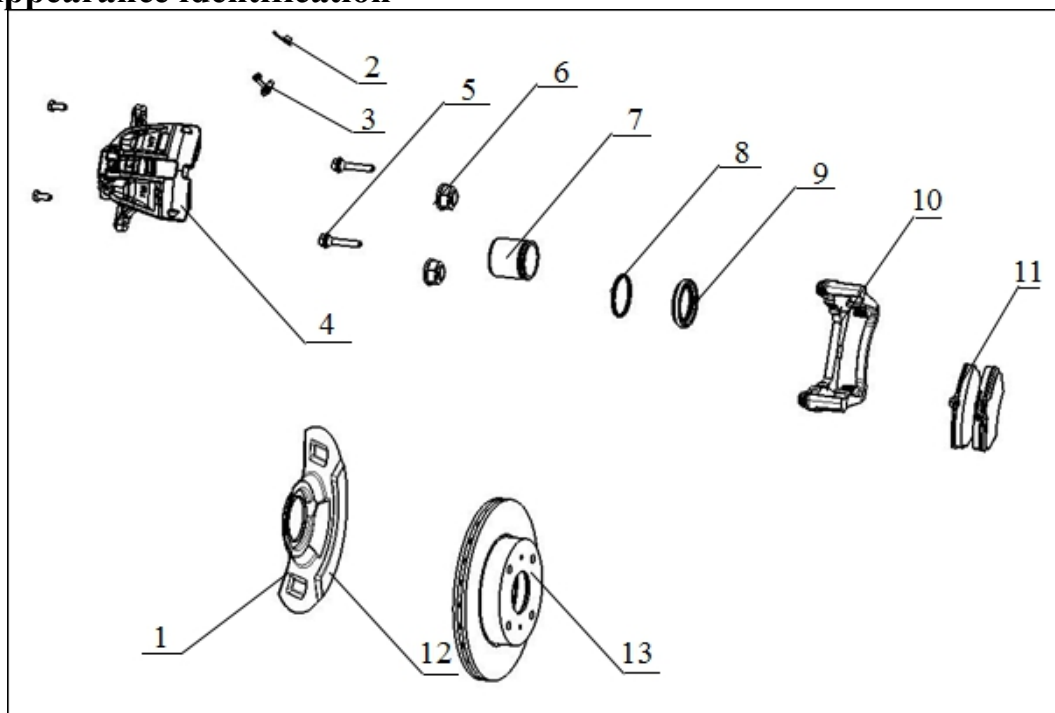
5.2.1.1 Specifications of disc brake components

Application	Specification
Diameter of front wheel brake cylinder	54mm
Outer diameter of brake disc	256mm
Inner diameter of brake disc	156mm
Thickness of brake disc	18±0.1mm
Runout limit of brake disc	0.1mm
Thickness of friction block	10mm
Diameter of front wheel brake cylinder	54mm

5.2.1.2 Fastener fastening specification

Application	Specification
Caliper bolt (positioning rod)	30-35N•m
Caliper bracket bolt	74-91N•m
Brake hose bolt connected to caliper	25-35N•m

5.2.2 Appearance identification



Icons:

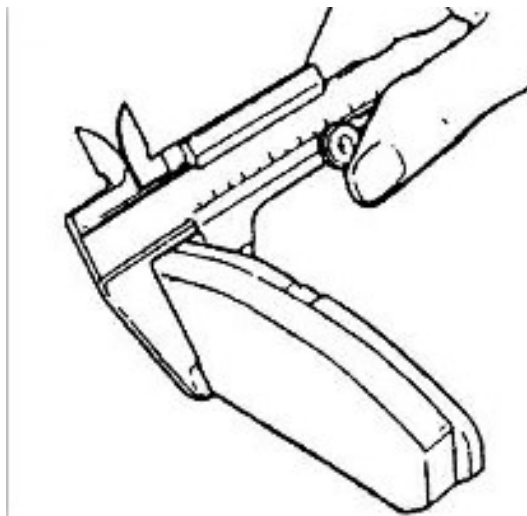
1	Left/right brake caliper assembly	2	Dust cover	3	Air exhaust screw	4	Left/right brake caliper body
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5	Positioning rod	6	Locating pin dust cover	7	Front wheel brake piston	8	Rectangular sealing ring
9	Dust cover of front wheel brake piston	10	Bracket	11	Brake pad	12	Dust shield
13	Brake disc						

5.2.3 Diagnosis information and procedures

5.2.3.1 Inspection of brake disc thickness deviation

Measure the thickness of the brake disc at four or more points on the brake disc to check the thickness deviation of the brake disc. Check each measurement at the same distance from the edge of the brake disc. Brake disc with a thickness change greater than 0.01 mm can cause pedal jitter and/or front end vibration when braking. Process or replace brake discs that do not meet the above specifications.



5.2.3.2 Brake disc lateral runout check

Important precautions: When removing the brake disc, clean the rust or foreign matters on the joint surface of the brake disc. Failure to do so may result in increased lateral runout and brake jitter. Check the lateral runout of the wheels to obtain a more accurate total indicated runout reading under actual braking conditions. Remove the wheels and maintain the caliper position to obtain an accurate reading.

Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.

2. Make the marks on wheels and hubs.

3. Remove the wheel. Refer to "Tire and wheel replacement".

4. Clean the brake disc surface.

5. Install and tighten the wheel nuts to secure the brake disc.

6. Fix the micrometer on the steering knuckle. Make sure that the contact point of the micrometer contacts the brake disc surface approximately 10 mm from the outer edge.

7. Set the micrometer to zero.

8. Rotate the wheel one revolution. Check the runout of the index on the dial indicator. If the runout exceeds 0.1mm, process or replace the brake disc. If the total indicator runout exceeds 0.1 mm, adjust or replace the brake disc.

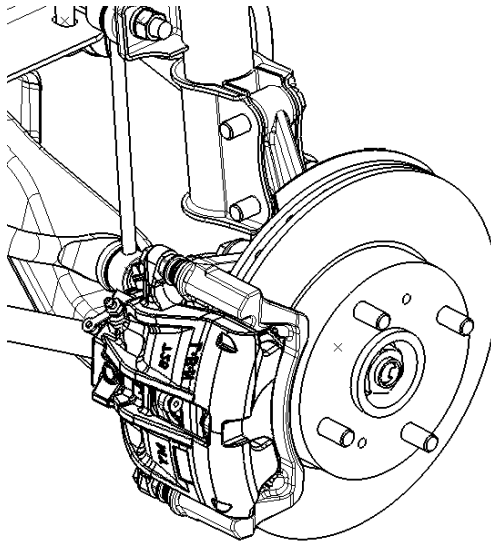
Important precautions: Sometimes, excessive lateral runout of the brake disc can be improved by rotating the brake disc on the wheel hub and changing one or two bolt positions from the original position. If the lateral runout cannot be improved by rotating the brake disc, check the wheel hub for excessive lateral runout or looseness. If the lateral runout of the hub is excessive, replace the hub. If the lateral runout meets the requirements, the brake disc can be replaced as needed.

Installation steps

1. Remove the nut fixing the brake disc.

2. Install the tire and wheel assembly according to the original markings on the wheel and hub, refer to "Tire and wheel replacement".

3. Lower down the vehicle.



5.2.4 Maintenance Guide

5.2.4.1 Inspection of the brake lining

Inspection procedure

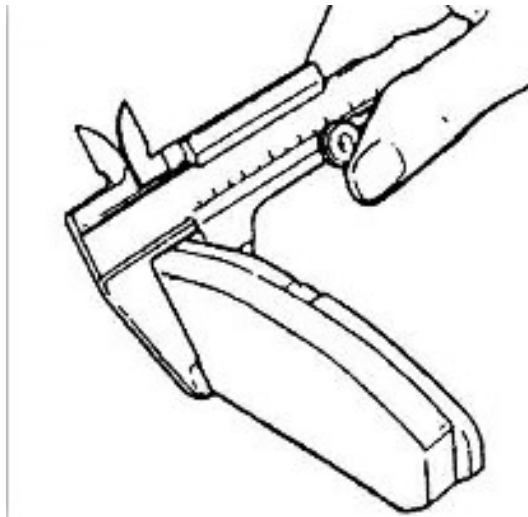
Check the brake lining every 7500km.

As long as the wheels are removed (tire rotation, etc.), it is necessary to inspect the brake lining once.

Look at both ends of the caliper and inspect both ends of the outer lining. The most worn areas typically occur at these locations.

Check the thickness of the inner brake lining to ensure that the brake lining has not worn prematurely. Observe the inner brake lining through the inspection hole on the top of the caliper. Refer to "Replacement of the brake lining".

When the brake lining is worn and the thickness (lining+steel backing of the brake block) is less than 7.5mm, replace it with a new brake lining. Refer to "Replacement of the brake lining".

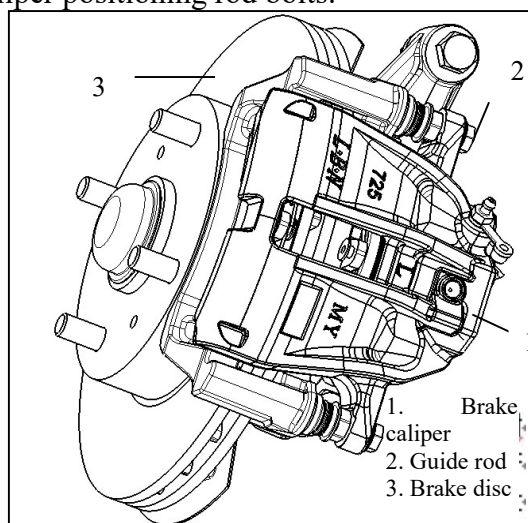


5.2.4.2 Replacement of the brake lining

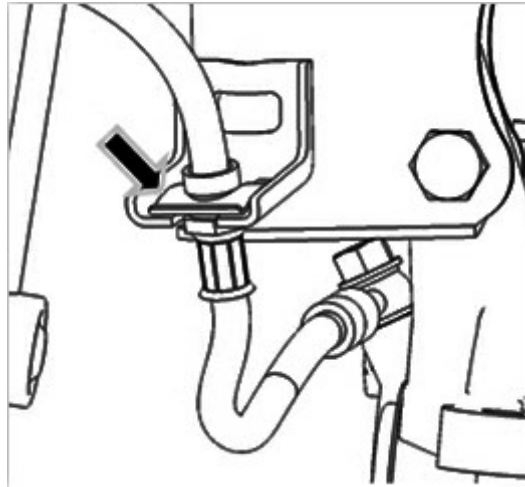
Removal steps

Important precautions: For all vehicles, the brake friction lining recommended by the original manufacturer should be used to maintain a balanced braking performance of the front and rear brakes. If the material properties of the front and rear brake linings installed differ from the recommended parts for this vehicle, the original braking performance of the vehicle will be changed.

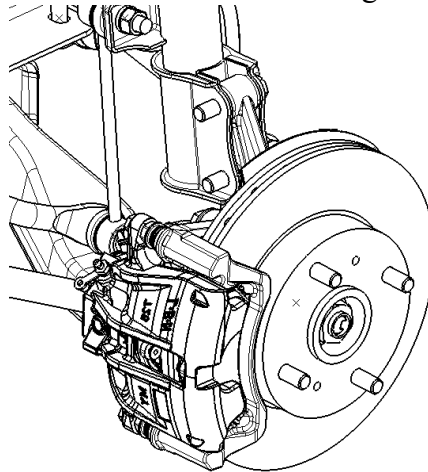
1. Raise the vehicle and support it properly. Refer to "Lift and raise the vehicle" in "General information".
2. Mark the position of the wheel relative to the hub.
3. Remove the tire and wheel. Refer to "Tire and wheel replacement".
4. Remove the brake caliper positioning rod bolts.



5. Remove the U-shaped circlip fixing the brake hose and remove the hose from the support bracket.



6. Pull the caliper outwards and remove the brake lining from the caliper bracket.



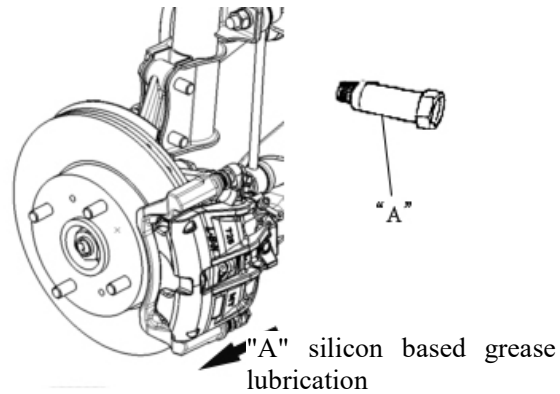
Installation steps

Important precautions: Before installing a new brake lining, wipe the outer surface of the caliper shield clean.

When installing a new brake lining, be careful not to allow foreign matter to enter the bottom of the caliper cylinder bore.

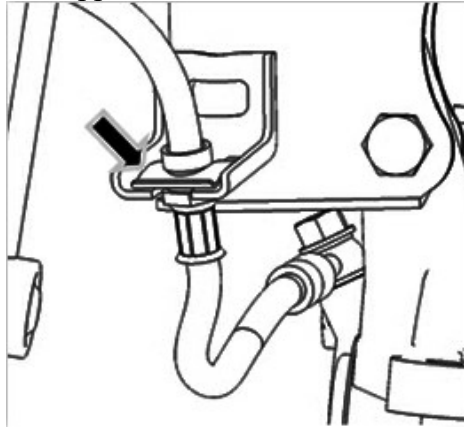
Special precautions: The inner and outer brake linings must be replaced in pairs. Failure to do so may cause overheating or damage to the brake lining, brake disc, or caliper.

1. Install the brake lining on the caliper bracket.



2. Lubricate the caliper positioning rod and dust cover with silicon based grease. Do not lubricate the bolt threads.

3. Place the brake hose on the support bracket and fix it with a U-shaped circlip.



4. Clamp the caliper against the brake lining and install it onto the caliper bracket. Install the caliper positioning rod bolts.

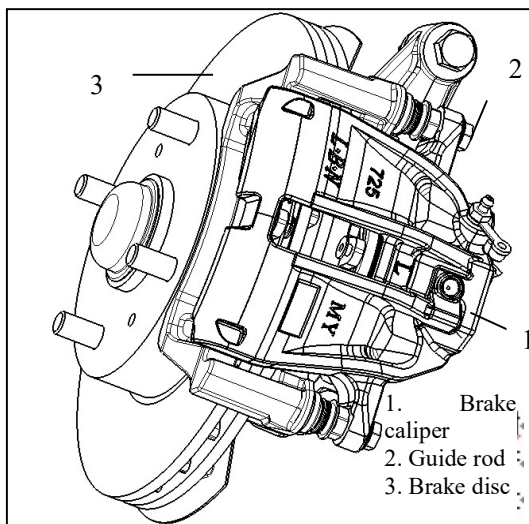
Tighten

Tighten the positioning rod bolt to 30-35N•m.

5. Align the original markings on the wheel and hub and install the tire and wheel assembly. Refer to "Tire and wheel replacement".

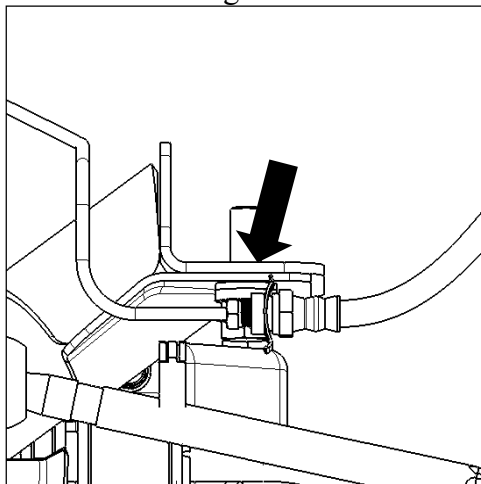
6. Lower down the vehicle.

7. Step on the brake pedal three times firmly to properly position the lining.



5.2.4.3 Running-in of lining and brake disc

- After replacing the brake lining, the new brake surface needs to be run in.
- After refinishing or replacing the brake disc, run in the new brake surface.
- At a speed of 48 km/h, brake 20 times and run in the new brake surface.
- Step on the brake pedal with medium to high force. The brakes must not overheat.



5.2.4.4 Replacement of the brake caliper assembly

Removal steps

Caution: Do not move the vehicle until a stable brake pedal (stroke) is obtained. Moving the vehicle without obtaining a stable brake pedal can cause personal injury.

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Mark the position of the wheel relative to the hub.

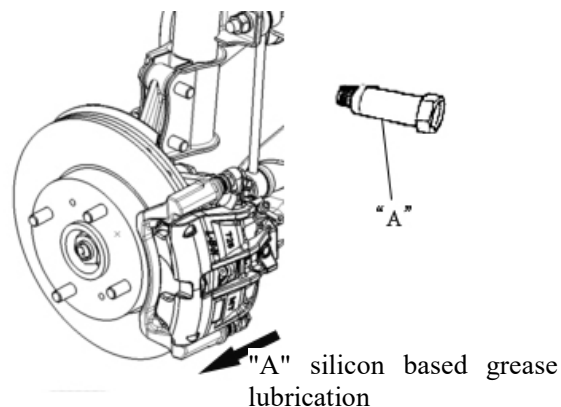
3. Remove the tire and wheel. Refer to "Tire and wheel replacement".
4. Remove the brake lining. Refer to "Replacement of the brake lining".
5. Plug the openings in the brake caliper housing and brake pipelines to prevent brake fluid loss and pollution.
6. Remove the brake hose connecting nut.
7. Remove the caliper housing from the brake disc and caliper bracket.

Important precautions: Do not use flexible hoses to hang the caliper. Otherwise, the hose may be damaged.

8. Inspect the locating pin shield for the following conditions:
 - Cut -Tear -Aging
 - In case of any damage, replace the locating pin shield. Refer to "Replacement of the brake caliper bracket".
9. Check the piston shield for the following conditions:
 - Cut -Tear -Aging
 - In case of any damage, replace the piston shield.

Installation steps

1. Lubricate the caliper positioning rod. Use the silicon-based lubricating oil. Do not lubricate the bolt threads.
2. Lubricate two positioning rod shields on the caliper bracket. Use the silicon-based lubricating oil.



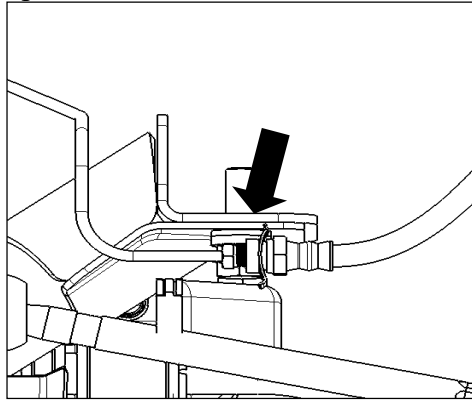
3. Install the caliper housing on the brake disc and caliper bracket, making sure that the shaft sleeve is fixed.

4. Install the brake hose connecting nut.

Tighten

Tighten the brake hose connecting nut to 25-35N•m.

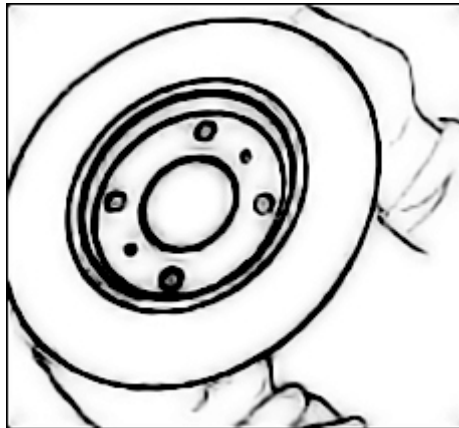
5. Exhaust the air in the caliper. Refer to “Exhaust the air in the hydraulic brake system”.



6. Inspect whether the hydraulic brake system has brake leakage. Refer to “Brake fluid leakage”.
7. Install the brake lining. Refer to "Replacement of the brake lining".
8. Install the tire and wheel assembly. Refer to "Tire and wheel replacement".
9. Lower down the vehicle.

5.2.4.5 Replacement of the brake disc**Removal steps**

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.
2. Mark the position of the wheel relative to the hub.
3. Remove the tire and wheel. Refer to "Tire and wheel replacement".
4. Remove the brake caliper bracket. Refer to "Replacement of the brake caliper bracket".
5. Remove the brake disc.

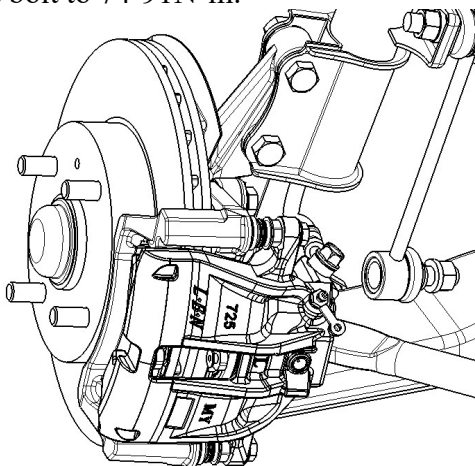


Installation steps

1. Position a new brake disc.
2. Install the brake caliper bracket and caliper. Refer to "Replacement of the brake caliper bracket" and "Replacement of the brake caliper".

Tighten

Tighten the caliper bracket bolt to 74-91N•m.



1. Install the tire and wheel. Refer to "Tire and wheel replacement".
2. Lower down the vehicle.

5.2.5 Description and operation

5.2.5.1 Description of disc brake

Important precautions:

- Replace all components in the caliper repair tool.
- Lubricate all rubber parts with clean brake fluid to facilitate assembly.
- Do not use compressed air with lubricating oil on brake. Otherwise, it will damage the rubber

parts.

- Whenever the hydraulic components are removed, exhaust the air in the entire brake system.
- Brake linings can only be replaced in sets according to the shaft (front axle or rear axle).
- The specified torque values apply to dry, non lubricated fasteners.
- Perform maintenance on a clean workbench. The caliper of this vehicle has a single cylinder liner.

Install the caliper on the bracket with two mounting bolts. When braking is applied, the fluid pressure at the rear of the caliper piston increases. The pressure acts equally on the bottom of the piston and the bottom of the piston cylinder liner. The pressure acting on the piston is transmitted to the lining, which forces the lining against the inner surface of the brake disc.

- The pressure acting on the bottom of the piston cylinder liner forces the caliper to slide on the mounting bolts. Slide the caliper towards the center of the vehicle. Due to the integrated sliding of the caliper, the outer section of the caliper exerts pressure on the back of the outer lining. This pressure then causes the lining to press against the outer surface of the brake disc. As the pipeline pressure builds, the pressure that the lining presses against the surface of the brake disc increases. This force stops the vehicle. When the brake pedal is released, the pipeline pressure is released. The sealing ring and groove slightly retract the piston. The retraction of the piston reduces the drag force generated by the inner and outer linings on the brake disc. The outward movement of the piston and the automatic inward movement of the caliper compensate for the wear of the lining. As the lining wears, brake fluid fills the enlarged area behind the piston from the master cylinder reservoir.

5.3 Drum brake (rear)

5.3.1 Specification

5.3.1.1 Specifications of parts

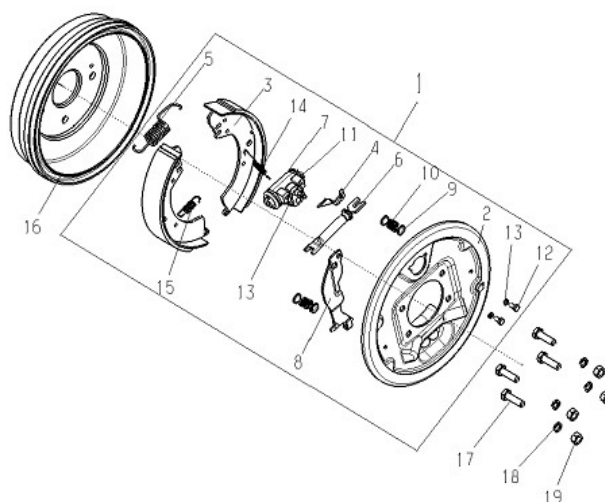
Application	Specification
Inner diameter of brake cylinder	23.81mm
Inner diameter of brake drum	240mm
Gap adjustment method	Automatic adjustment
Brake shoe size (width × Thick)	40×5mm

5.3.1.2 Fastener fastening specification

Application	Specification
Rear brake base plate bolt	46-69N•m
Brake pipe bolt connected to the wheel cylinder	13-19N•m

5.3.2 Appearance identification

5.3.2.1 Drum brake (rear) - exploded view



Icons:

1	Rear brake assembly	2	Rear brake base plate assembly	3	Brake shoe assembly
4	Left transfer plate	5	Upper return spring	6	Left clearance automatic mechanism assembly
7	Brake wheel cylinder assembly	8	Left parking brake lever	9	Compression spring seat
10	Compression spring	11	Wheel cylinder washer	12	Bolt M6×12
13	Spring washer	14	Support plate spring	15	Lower return spring
16	Rear brake drum	17	Hexagon bolt - fine thread	18	Spring washer
19	Type 1 hexagon nut				

5.3.3 Maintenance Guide

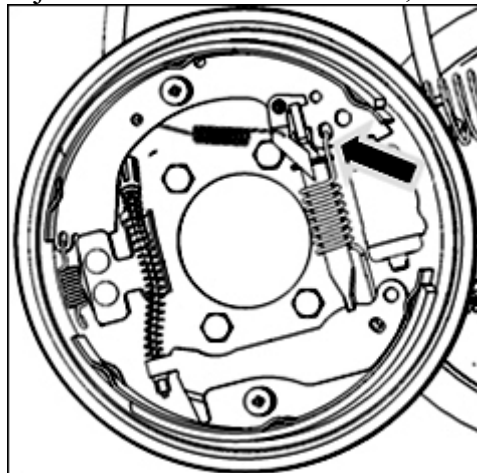
5.3.3.1 Inspection of the brake shoe

Inspection of brake friction lining

- Inspect the brake friction lining every 7500km.
- When removing wheels (tire rotation, etc.), always check the brake friction lining.
- If the brake shoe lining is deformed or falls off, it must be replaced.
- Remove the rubber plug from the observation hole of the brake friction lining.
- Check that the thickness of the brake friction lining is not less than 1mm.
- Whenever the thickness of the brake friction lining is worn to within 1mm, the brake friction lining should be replaced. If a brake shoe needs to be replaced, the left and right brake shoes must be replaced in pairs at the same time.

- The brake shoe lining must not be contaminated with any oil, as this will seriously affect braking performance.

- When the spring fails or partially fails, it must be replaced.
- The split ring must be replaced after removal.
- When the automatic gap adjustment device cannot work, it must be replaced.



5.3.3.2 Replacement of brake shoe

Removal steps

The brake friction lining material (or equivalent) for replacement should use the product recommended by the original manufacturer. Use the friction lining recommended by the original

manufacturer to provide safety assurance for the braking distance and the entire braking process control. Installing front or rear brake linings that are not recommended by the original manufacturer will change the original braking balance of the vehicle.

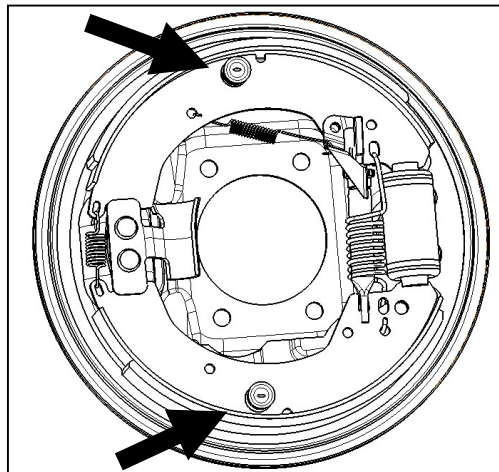
1. Raise the vehicle and support it. Refer to "Lift and raise the vehicle" in "General information".

2. Mark the position of the wheel relative to the hub and remove the wheel. Refer to "Wheel replacement" in "Tire and wheel".

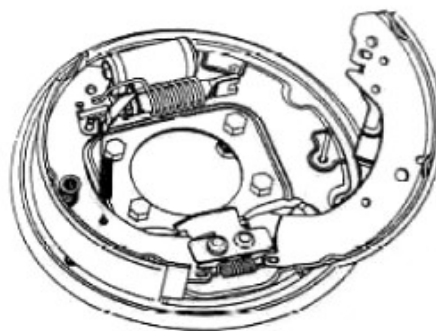
3. Remove the brake drum. Refer to "Replacement of brake drum".

4. Remove one end of the return spring from the brake shoe hole.

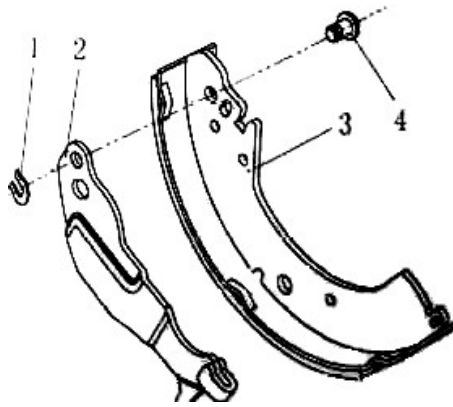
5. Press down the brake shoe backrest spring with pliers and rotate it for 90 degrees before taking it out.



6. Take out the small spring of the rear brake shoe and the hand brake cable, and take out the entire brake slave shoe and hand brake lever.



7. Take out the open retainer ring with pliers, and take out the hand brake lever and rear brake slave shoe from the pin shaft.



8. Knock the pin out of the brake lead shoe and take out the tension spring from the brake shoe hole.

9. Take out the rear brake lead shoe.

Installation steps

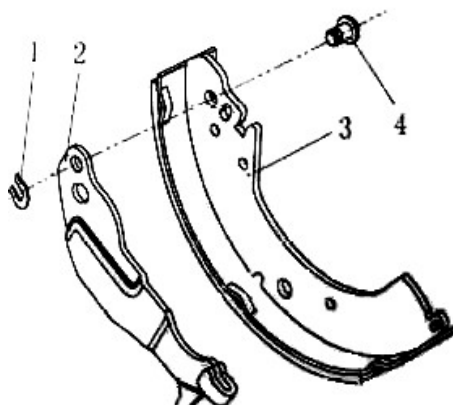
Important precautions: All components on the brake floor should be coated with waterproof putty during installation.

1. Clean the brake base plate surface.

2. Before installation, carefully check to ensure that each component is free of any defects that affect its use.

3. Install the split collar on the brake slave shoe and hand brake lever.

4. Use pliers to press down the backrest spring of the brake lead shoe and brake slave shoe and rotate them to a certain angle to confirm that the spring seat has been installed in place.

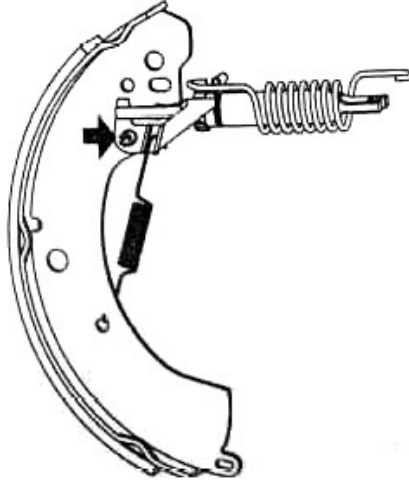


5. Install the tension spring and connect the brake lead shoe and self-adjusting mechanism with a pin shaft.

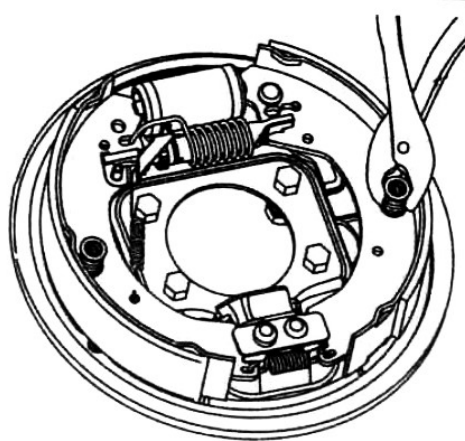
6. Connect the brake slave shoe to the brake adjustment bolt. Install the brake shoe into the

piston groove of the brake wheel cylinder.

7. Install the hand brake cable and brake shoe small spring.



8. Install the brake shoe return spring.



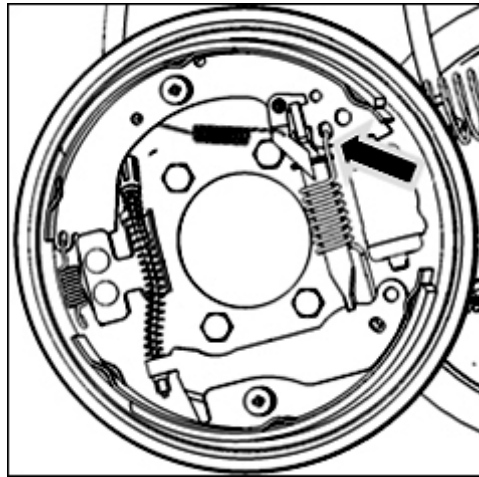
9. Install the rear brake drum according to the marked wheel position relative to the hub. Refer to "Replacement of brake drum".

10. Adjust the rear brake clearance. Refer to "Adjustment of rear brake clearance".

11. Check whether the hand brake stroke is greater than 9 teeth, otherwise, it is necessary to adjust the hand brake stroke. Refer to "Adjustment of hand brake stroke".

12. Install the tire and wheel. Refer to "Removal and installation of the tire and wheel".

13. Lower down the vehicle.



5.3.3.3 Replacement of hand brake lever and clearance adjustment device

Refer to "Replacement of brake friction lining".

5.3.3.4 Running-in of lining and brake drum

After replacing the brake lining, run in the new brake surface.

Brake 20 times from a speed of 48 km/h to run in the new brake surface.

Step on the brake pedal with moderate to strong force. Do not overheat the brake.

Special precautions: Avoid emergency braking within the 200km driving range after replacing the new brake lining.

5.3.3.5 Replacement of drum brake (rear)

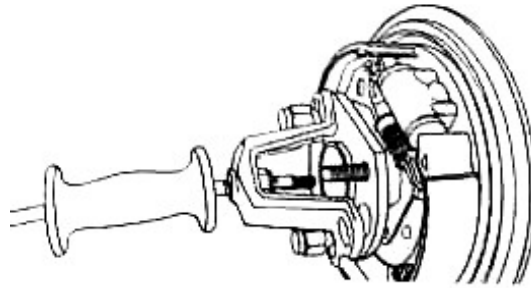
Removal steps

Required tool

NLM1-S0000010 Half shaft puller

1. Fill the brake fluid to the "MAX" mark on the reservoir.
2. Raise the vehicle and support it properly. Refer to "Lift and raise the vehicle" in "General information".
3. Mark the position of the wheel relative to the hub and remove the wheel. Refer to "Wheel replacement" in "Tire and wheel".
4. Remove the brake drum. Refer to "Replacement of brake drum".
5. Release the parking brake cable from the brake. Refer to "Replacement of parking brake left/right cable".

6. Remove the hard brake pipe connector from the rear brake.
7. Remove four bolts connecting the rear brake base plate and the rear axle housing.
8. Use the special tool NLM1-S0000010 to pull out the half shaft. Refer to "Replacement of half shaft assembly".
9. Remove the rear brake.



Installation steps

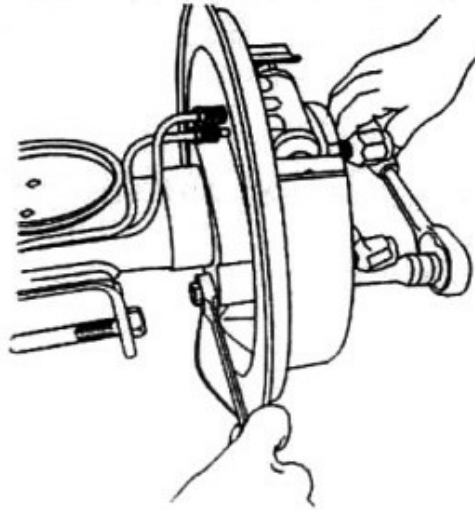
Required tool

1. Clean and inspect the rear brake surface.
2. Pass the half shaft through the brake base plate and install the half shaft assembly. Refer to "Replacement of half shaft assembly".
3. Install the brake base plate and rear axle assembly mounting nuts.

Tighten

Tighten the nut to 49-69N•m.

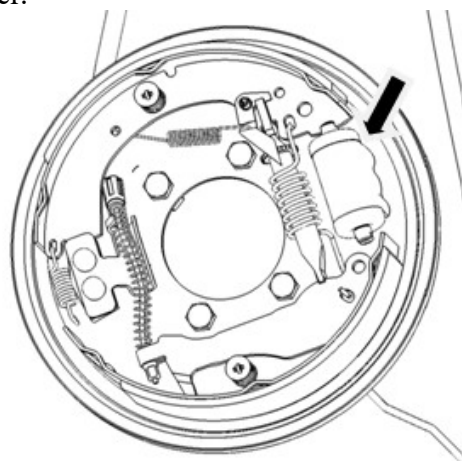
4. Install the parking brake cable. Refer to "Replacement of parking brake cable".



5.3.3.6 Replacement of drum brake wheel cylinder

Removal steps

1. Fill the brake fluid to the "MAX" mark.
2. Mark the position of the wheel relative to the hub and remove the wheel. Refer to "Removal and installation of the tire and wheel".
3. Remove the brake drum. Refer to "Replacement of brake drum".
4. Use the spring pliers to remove the return spring.
5. Remove the brake pipe of the wheel cylinder and plug the oil outlet of the pipe.
6. Remove the wheel cylinder mounting bolts.
7. Remove the wheel cylinder.



Installation steps

1. Install the wheel cylinder on the brake base plate.

Tighten

Tighten the wheel cylinder bolt to 9N•m.

2. Install the brake arm to the wheel cylinder.

Tighten

Tighten the brake pipe bolt to 13-19N•m.

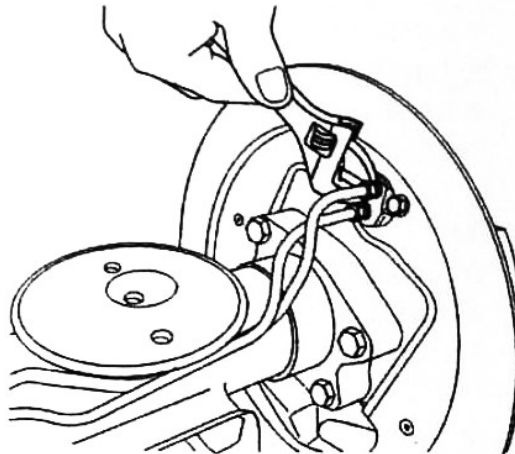
3. Install the return spring.

4. Install the brake drum. Refer to "Replacement of brake drum".

5. Exhaust the air in the brake system and inspect. Refer to "Exhaust the air in the hydraulic brake system".

6. Adjust the brake friction lining clearance. Perform 10-15 times of braking and adjust the brake to ensure correct clearance. Refer to "Adjustment of rear brake clearance".

7. Install the wheel. Refer to "Wheel replacement" in "Tire and wheel".



5.3.3.7 Replacement of drum brake wheel cylinder rubber ring

Important precautions:

1. Any leakage of brake fluid will seriously affect braking performance and must be repaired immediately;

2. The brake cylinder and its components must not be soaked with any brake fluid and other fluids or debris that are different from the type of brake fluid used in the vehicle.

Removal steps

1. Remove the brake wheel cylinder. Refer to "Replacement of brake wheel cylinder"

2. Remove the exhaust screw (left side only).

3. Remove the dust cover.
4. Extract the wheel cylinder piston from the cylinder block.
5. Remove the rubber ring from the piston.

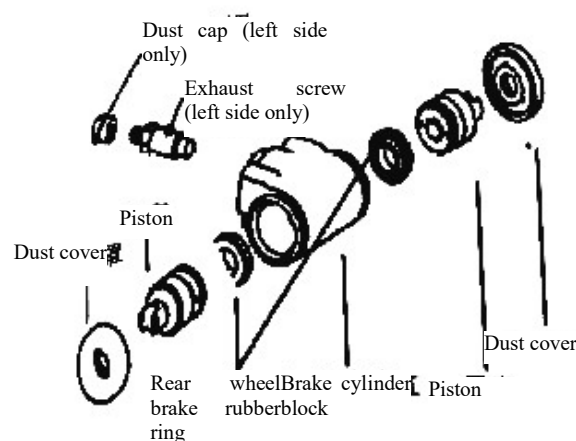
Inspection:

1. Measure the gap between the piston and the cylinder block. If the gap exceeds the limit value, it will lead to poor sealing of the wheel cylinder, causing leakage, and must be replaced (limit value $\leq 1.5\text{mm}$)

2. Slight wear marks are allowed on the piston and cylinder block, but obvious scratches will increase the wear of the brake cylinder rubber ring or cause direct scratches, resulting in wheel cylinder leakage, and must be replaced timely;

3. Check whether the dust cover is intact and replace it if there is any crack;

4. Once removed, the brake cylinder rubber ring must be replaced.



Installation steps

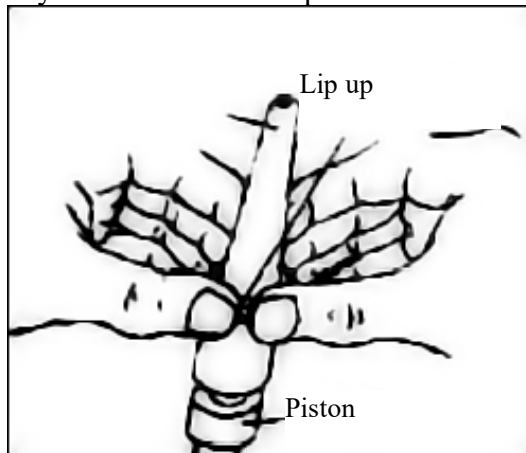
Important precautions: When assembling the rear wheel brake cylinder rubber ring, use a conical special tool for installation. Apply brake fluid to the contact surface between the special tool and the piston, and slowly and evenly slide the rubber ring onto the piston.

Required tool

NLM1-S0000018 Rear wheel cylinder rubber ring installer

1. Lubricate the piston with clean brake fluid.
2. Install the rear wheel brake cylinder rubber ring and piston.
3. Install the dust cover and exhaust screw (left side only).

4. Install the brake wheel cylinder. Refer to “Replacement of brake wheel cylinder”



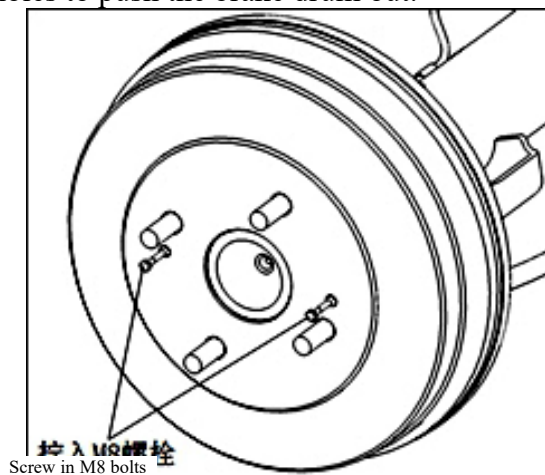
5.3.3.8 Replacement of the brake drum

Removal steps

1. Raise the vehicle and support it properly. Refer to “Lift and raise the vehicle” in “General information”.

2. Mark the position of the wheel relative to the hub and remove the wheel. Refer to "Wheel replacement" in "Tire and wheel".

3. Remove the rear brake drum. If the rear brake drum is difficult to remove, screw M8 bolts into the brake drum screw holes to push the brake drum out.

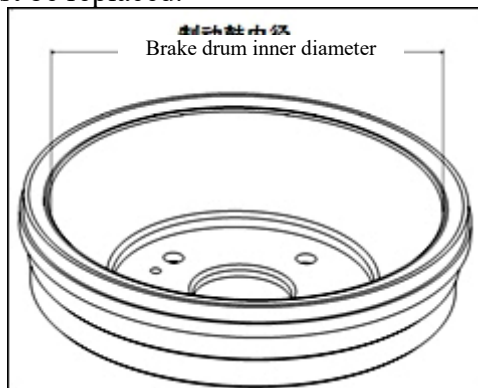


Inspection

1. Cleaning: After removing the brake drum, it must be clean and free of debris, and the working surface of the brake drum must not leave any oil stains.

2. Inner diameter: the standard value is 240mm, and the limit value is 242mm. If the limit value is exceeded, the brake drum must be replaced.

3. Other defects: If the brake drum has cracks or defects, it must be replaced timely. If the brake drum has severe scratches or scratches, it will exacerbate the wear of the brake lining and cannot be used anymore. It must be replaced.



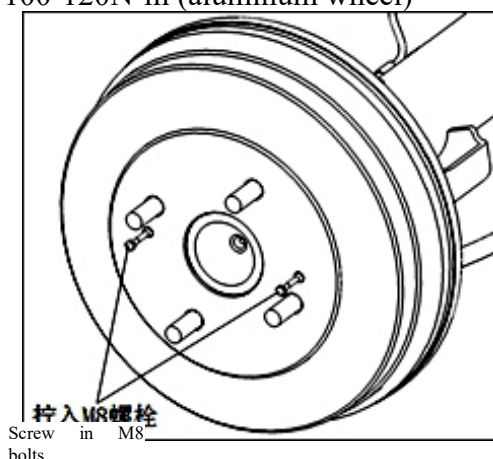
Installation steps

1. Remove dirt and oil stains from the brake drum;
2. Install the brake drum (place the M8 screw holes on the larger sides of the half shaft flange so that the brake drum can be pushed out when the M8 bolts are screwed in);
3. Install the rear wheel.

Tighten

Tighten the wheel nut to 90-110N•m (steel wheel)

Tighten the wheel nut to 100-120N•m (aluminum wheel)



5.3.3.9 Adjustment of rear brake clearance

Adjustment during assembly

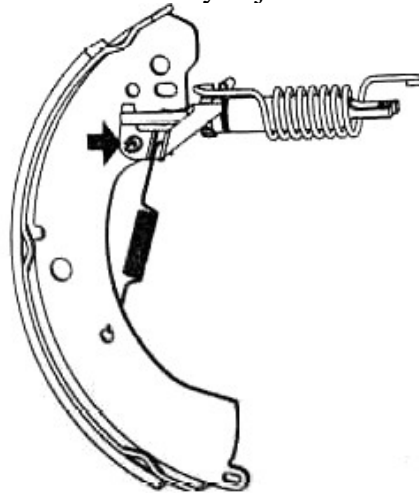
1. Lift the adjustment paddle to disengage it from the adjustment solenoid, and then rotate the adjustment solenoid upward (the outer diameter becomes smaller) or downward (the outer diameter

becomes larger) until there is slight contact between the brake drum and the brake shoe during assembly. Then, rotate the adjustment solenoid upward for 1-2 turns.

2. Install the rear brake drum.

Adjustment during general use of the vehicle

When disassembling and assembling the rear brake, its clearance has been adjusted to be greater (for assembly purposes), and the rear brake clearance must be readjusted: After starting, step on the brake pedal multiple times to automatically adjust the brake clearance to the design state.



5.3.4 Description and operation

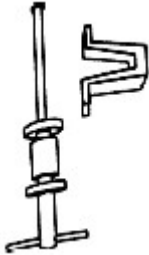
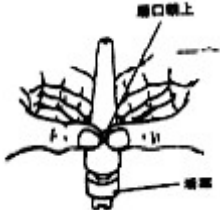
5.3.4.1 Description of drum brake system

Important precautions:

- Lubricate the rubber parts with clean brake fluid to facilitate assembly.
- Do not use compressed air with lubricating oil on the brake, as this will damage the rubber parts.
- Whenever removing any hydraulic brake system component, exhaust the air in the entire brake system.
- The specified torque values apply to dry, non lubricated fasteners.
- Perform maintenance on a clean workbench. The rear brake used in this vehicle has a wheel cylinder. Use four mounting bolts to install the rear brake on the rear axle. When braking is applied, the hydraulic pressure behind the wheel cylinder piston increases. The pressure acts equally on the bottom of the piston and the bottom of the piston cylinder. The pressure acting on the piston is

transmitted to both brake friction linings. This pressure forces the friction lining to contact the inner surface of the brake drum. As the pipeline pressure builds, the pressure that the lining presses against the surface of the brake drum increases. This force stops the vehicle. When the brake pedal is released, the pipeline pressure is released and the upper return spring retracts the brake lining and piston. The outer movement of the lining gap adjustment rod can automatically compensate for lining wear.

5.3.5 Special tools

Legend	Tool No./Description
	NLM1-S000010 Half shaft puller
	NLM1-S000018 Rear wheel cylinder rubber ring installer

5.4 Parking brake

5.4.1 Specification

5.4.1.1 Fastener fastening specification

Application	Specification
Parking brake lever mounting bolt	16-26N•m
Parking brake switch installation	3N•m
Seat lower frame weldment bolt	16-26N•m

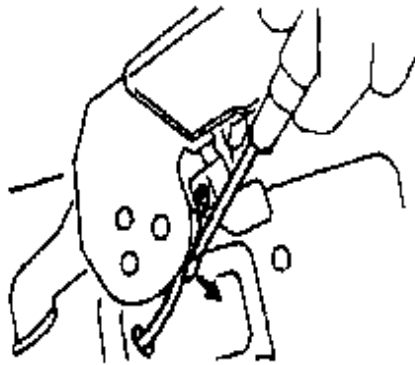
5.4.2 Maintenance Guide

5.4.2.1 Replacement of parking brake control mechanism and parking brake warning lamp switch

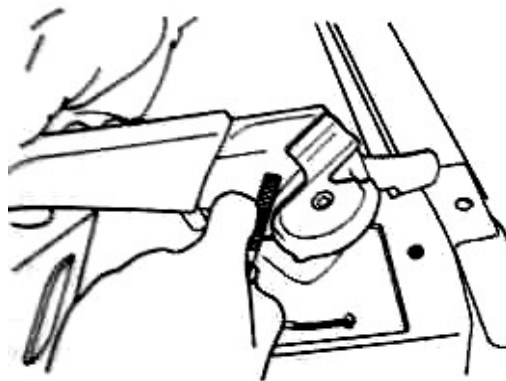
Removal steps

1. Remove the shift handle and auxiliary instrument panel. Refer to "Replacement of auxiliary

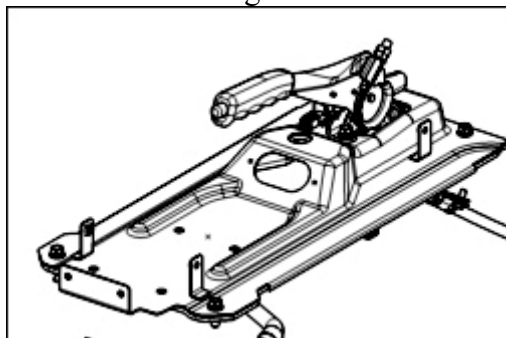
instrument panel".



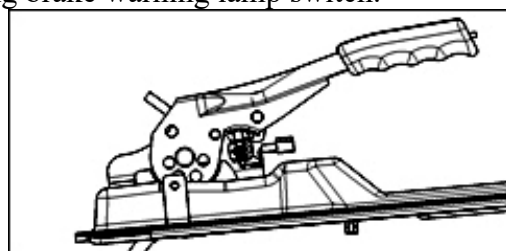
2. Pull off the bottom curved tongue of the hand brake control mechanism, remove the hand brake adjusting nut and lock nut, and take out the front section of the hand brake cable.



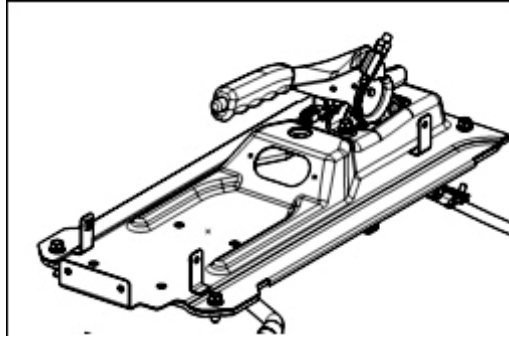
3. Loosen the seat frame weldment mounting bolts.



4. Pull up on the lower seat frame weldment and disconnect the parking warning lamp harness connector. Remove the parking brake warning lamp switch.



5. Remove the parking brake control mechanism mounting bolts.



Installation steps

1. Install the hand brake control mechanism assembly onto the lower seat frame weldment, and tighten the mounting nuts.

Tighten

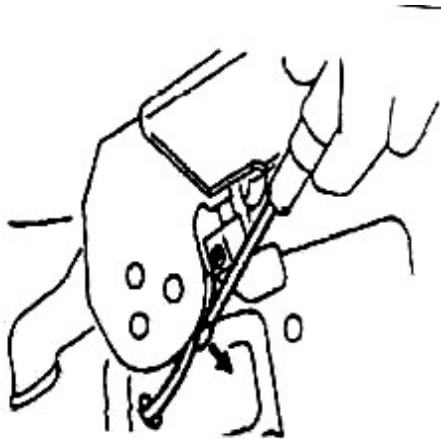
Tighten the mounting nut of the hand brake control mechanism assembly to 16-26N•m.

2. Connect the parking warning lamp switch plug. Tighten the parking warning lamp switch mounting screws.

Tighten

Tighten the brake switch screws to 3N•m.

3. Install the front section of the parking brake front cable and bend the curved tongue over the cable to prevent it from coming out.



4. Install the parking brake adjustment nut.

5. Install the seat lower frame weldment and tighten the seat lower frame weldment bolts.

Tighten

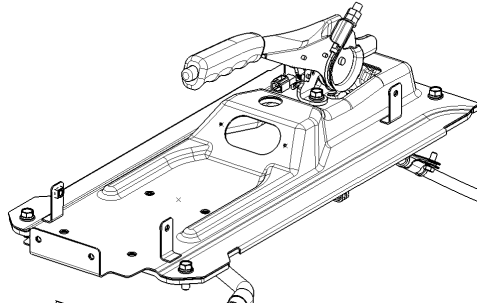
Tighten the mounting bolts of the lower seat frame weldment to 16-26N•m.

6. Adjust the tightness and travel of the parking brake cable. Refer to "Inspection/Adjustment

of the parking brake control mechanism".

7. Adjust the position of the parking brake lamp switch so that the parking brake lamp will display when the handle is turned one tooth.

8. Install the auxiliary instrument panel and shift handle.



5.4.2.2 Inspection/Adjustment of the parking brake control mechanism

1. Inspection of the parking brake control mechanism

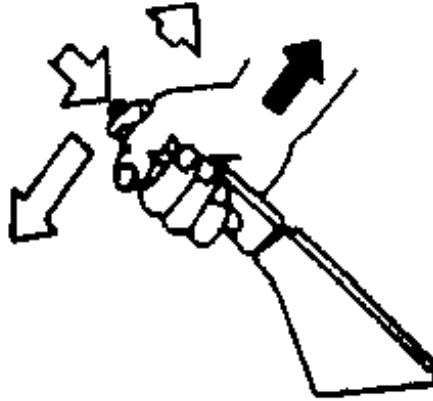
(1) When the handle is pulled up, it should be able to reliably stop at any number of teeth. Press the button on the front end of the handle, and it should be able to smoothly lower the handle.

(2) When the handle is pulled to the first tooth, the parking brake lamp must display. When the handle is lowered, the parking brake lamp must go out, otherwise it is necessary to adjust or replace the parking brake lamp switch.

(3) Pull up the handle with a force of 400N, and its stroke is between 6-10 teeth. If it exceeds, it must be adjusted.

(4) After lowering the handle, the rear wheels should be free of drag, otherwise readjustment is necessary.

(5) The parking brake handle must be replaced as a whole, and it is not allowed to replace internal components after disassembly for continued use.



2. Adjustment of the parking brake control mechanism

(1) The parking brake (handle) stroke adjustment should be performed after the handle and cable are installed and the rear brake clearance is appropriate.

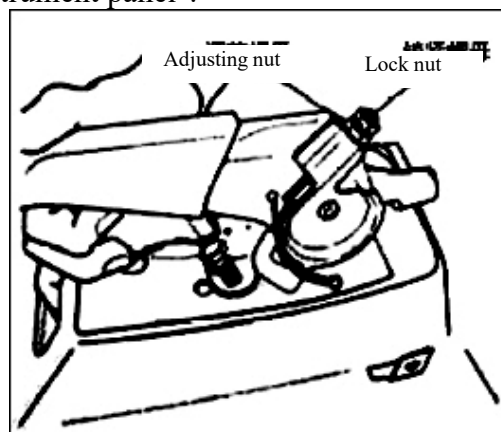
(2) When removing the auxiliary instrument panel, refer to "Replacement of auxiliary instrument panel".

(3) Lower the parking brake handle and loosen the lock nut.

(4) Screw in (out) the adjusting nut until the travel of the parking brake handle meets the requirements: Pull up the handle with a force of 400N, and the travel is between 6-10 teeth.

(5) After adjustment, the rear wheels should be rotated without dragging, otherwise, it is necessary to readjust or check and replace relevant components.

(6) Tighten the lock nut and install the auxiliary instrument panel and shift handle. Refer to "Replacement of auxiliary instrument panel".



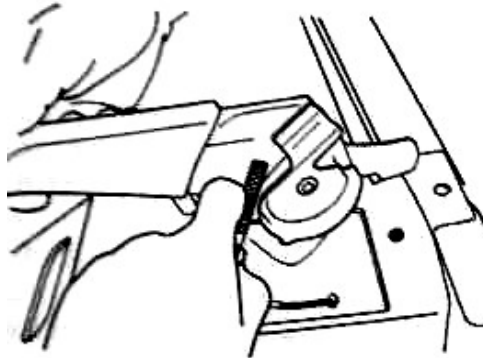
5.4.2.3 Replacement of parking brake front cable

Removal steps

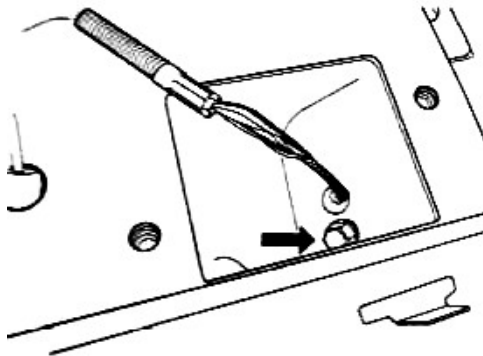
1. Remove the auxiliary instrument panel and shift handle. Refer to "Replacement of auxiliary

instrument panel".

2. Remove the adjusting nut and lock nut. And pull down the front cable.

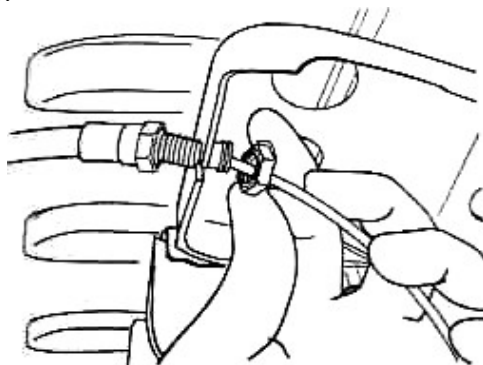


3. Loosen the front fixing nut of the front cable.



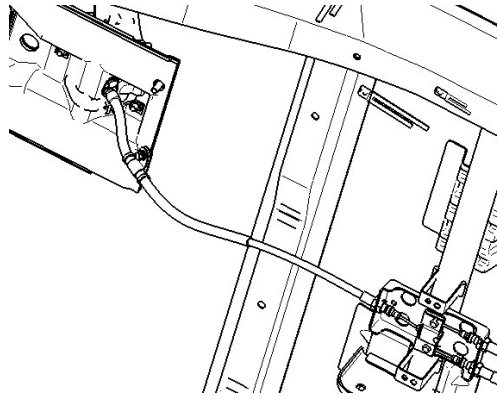
4. Loosen the front cable clamp fixing bolt and the front cable rear end nut.

5. Take out the front cable.

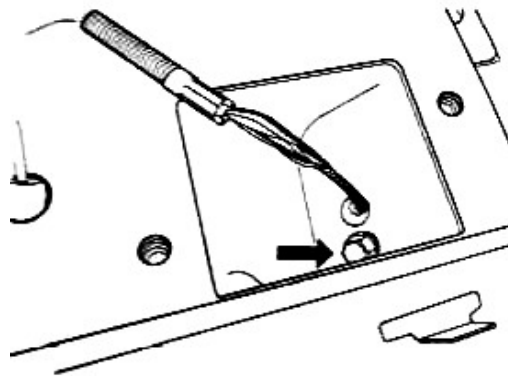


Installation steps

1. Install the front cable rear end nut and the front cable pipe clamp fixing bolt.



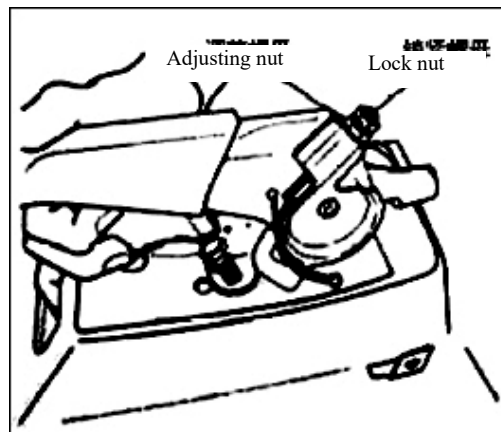
2. Pass the front cable through the mounting hole of the lower seat frame weldment, and tighten the front fixing nut of the front cable.



3. Bend the bent tongue over the cable to prevent it from coming out, and install the adjusting nut and lock nut.

4. Install the parking brake control mechanism assembly. Refer to "Replacement of parking brake control mechanism and parking brake warning lamp switch".

5. Adjust the stroke of the hand brake cable. Refer to "Inspection/Adjustment of the parking brake control mechanism".



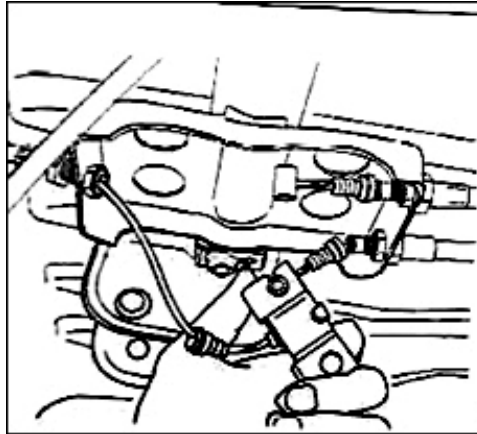
5.4.2.4 Replacement of parking brake left rear cable

Important precautions: Lay the hand brake cable flat, and the movement of the hand brake core wire in the sleeve should be free of stagnation; the surface of the cable should be free of cracks and uneven bending; the return spring at the rear end of the rear cable should have no permanent deformation;

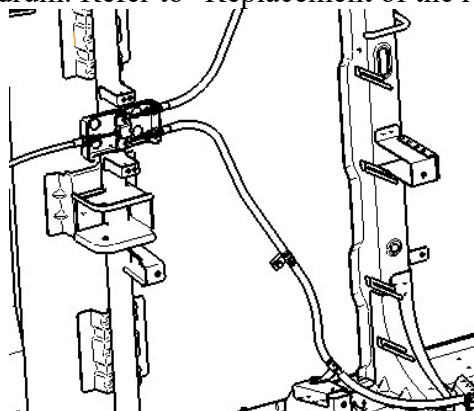
Each part of the stay wire in the cable should be free of obvious wear.

Removal steps

1. Loosen the left rear cable adjusting nut and lock nut.
2. Take out the left rear cable from the main brake cable bracket.



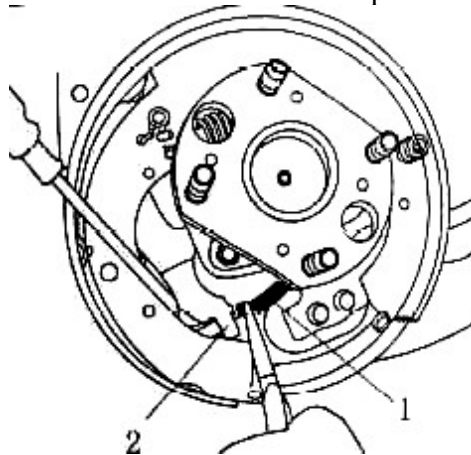
3. Remove the left rear cable fixing clip.
4. Remove the rear brake drum. Refer to "Replacement of the rear brake drum".



5. Remove the connecting part between the rear end of the left rear cable and the parking brake lever.

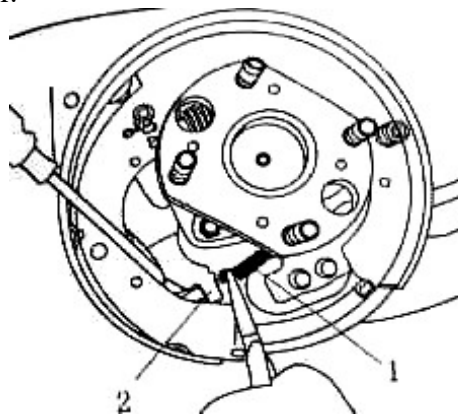
6. Pull the left rear cable and press the cable retainer into the mounting hole with a screwdriver.

7. Take out the left rear cable from the rear brake base plate.

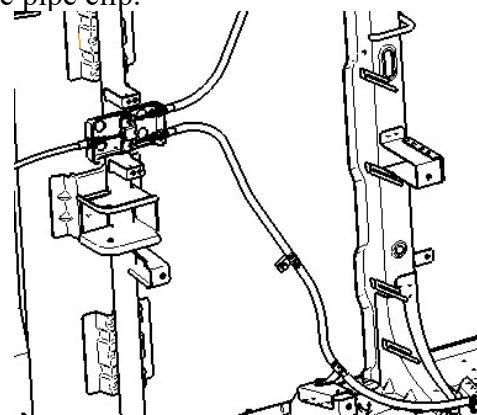


Installation steps

1. Pass the left rear cable through the brake base plate and connect the rear end of the left rear cable to the parking brake lever.

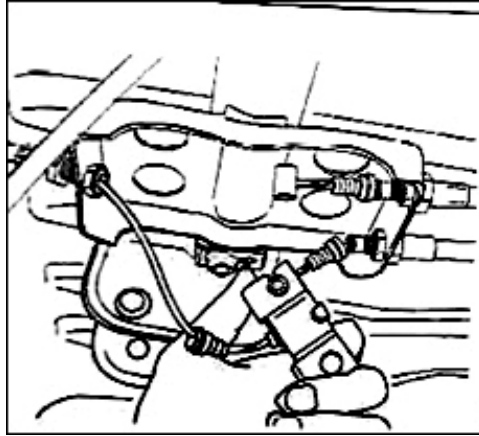


2. Install the rear left cable pipe clip.



3. Install the front end of the left rear cable onto the brake cable bracket.
4. Adjust the length of the left rear cable, tighten the adjusting nut and lock nut.
5. Adjust the travel of the parking brake handle, refer to "Inspection/Adjustment of the parking brake control mechanism".

6. Install the rear brake drum and wheel. Refer to "Replacement of the rear brake drum".



5.4.2.5 Replacement of parking brake right rear cable

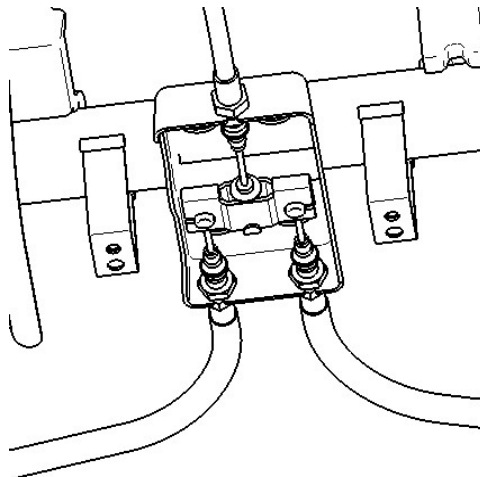
Important precautions:

Lay the hand brake cable flat, and the movement of the hand brake core wire in the sleeve should be free of stagnation;

The surface of the cable should be free of cracks and uneven bending; the return spring at the rear end of the rear cable should have no permanent deformation; each part of the stay wire in the cable should be free of obvious wear.

Removal steps

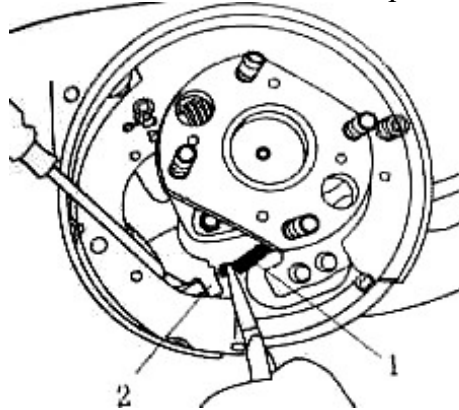
1. Loosen the right rear cable adjusting nut and lock nut.
2. Remove the front end of the rear cable from the balancer.



3. Remove the right rear cable fixing clip.
4. Remove the rear brake drum. Refer to "Replacement of the rear brake drum".
5. Pull the right rear cable and press the cable retainer into the mounting hole with a

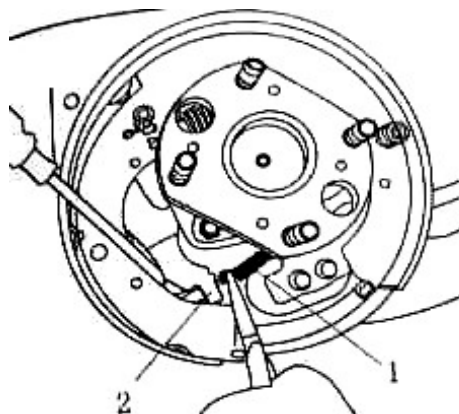
screwdriver.

6. Take out the right rear cable from the rear brake base plate.



Installation steps

1. Pass the right rear cable through the brake base plate and connect the rear end of the right rear cable to the parking brake lever.
2. Install the right rear cable fixing clip.
3. Install the front end of the rear right cable to the balancer.
4. Adjust the length of the right rear cable, tighten the adjusting nut and lock nut.
5. Adjust the travel of the parking brake handle, refer to "Inspection/Adjustment of the parking brake control mechanism".
6. When installing the rear brake drum and wheel, refer to "Replacement of the rear brake drum".



6 Vehicle body and accessories

6.1 Lighting system

6.1.1 Specification

6.1.1.1 Fastener fastening specification

Application function name	Specification
Bolt/screw - headlamp	6-12N•m
Bolt/screw - tail lamp	6-12N•m

6.1.1.2 Use of bulbs

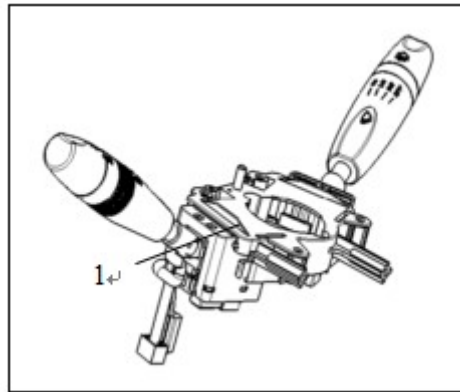
Lamp type	Specification
Headlamp (high beam and low beam)	H4 12V60W H4 12V55W
Headlamp (front turn signal lamp)	12VPY21W amber bulb
Headlamp (position lamp)	12VW5W
Rear combination lamp (turn signal lamp)	12VPY21W amber bulb
Rear combination lamp (fog lamp)	12VP21W
Rear combination lamp (reversing lamp)	12VP21W
Rear combination lamp (brake/position lamp)	12VP21/05W
Side turn signal lamp	12VW5W
High brake lamp	12VW5W (5 pcs.)
Front interior lamp	12VC5W
Rear interior lamp	12VC5W
License plate lamp	12VW5W

6.1.2 Maintenance Guide

6.1.2.1 Combination switch (steering, lighting, rear fog lamp)

Removal steps

1. Remove the steering wheel and steering column upper and lower trim covers (refer to "Steering system").
2. Disconnect the combination switch plug-in.



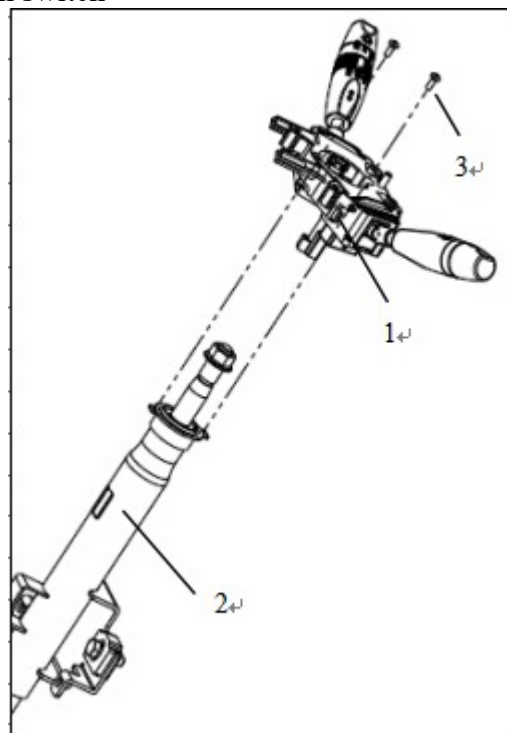
Icons:

1	Combination switch
---	--------------------

3. Remove the combination switch fixing screw with a cross screwdriver.
4. Pull out the combination switch.

Installation steps

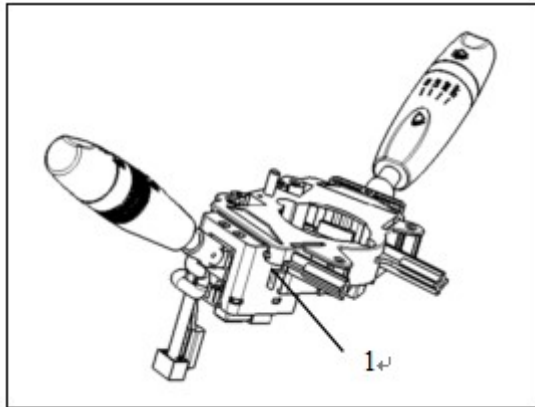
1. Install the combination switch



Icons:

1	Combination switch	2	Steering column	3	Cross recessed pan head screw
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2. Tighten the combination switch fixing screw with a cross screwdriver.
3. Plug in the combination switch plug-in.
4. Install the steering wheel and steering column upper and lower trim covers (refer to "Steering system").



Icons:

1	Combination switch
---	-----------------------

6.1.2.2 Replacement of hazard warning lamp switch

Removal steps

1. Remove the central control panel body of the instrument panel assembly (refer to "Replacement of the instrument panel").
2. Unplug the hazard warning lamp switch plug-in.
3. Unplug the hazard warning lamp switch.



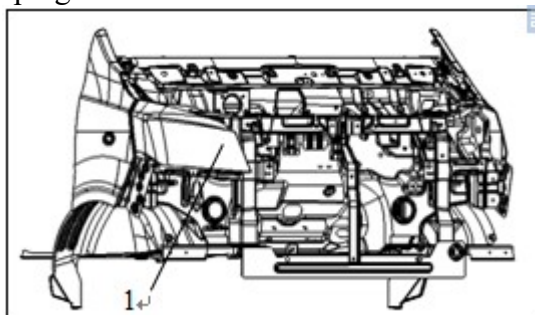
Installation steps

1. Install the hazard warning lamp switch into the central control panel body.
2. Plug in the hazard warning lamp switch plug-in.
3. Install the central control panel body onto the instrument panel assembly.

6.1.2.3 Replacement of headlamp

Removal steps

1. Remove the front bumper. Refer to "Replacement of front bumper" in "Exterior trim".
2. Remove fixing bolts from the headlamp.
3. Take the headlamp out of its fixed position.
4. Remove the electrical plug-in.

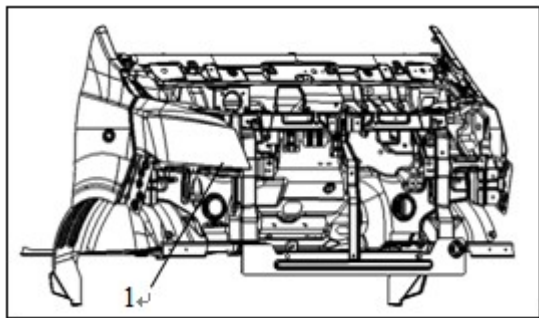


Icons:

1	Front combination lamp
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Installation steps

1. Connect the headlamp assembly electrical plug-in.
2. Install the headlamp assembly and fixing bolts.
3. Install the front bumper. Refer to "Replacement of front bumper" in "Exterior trim".



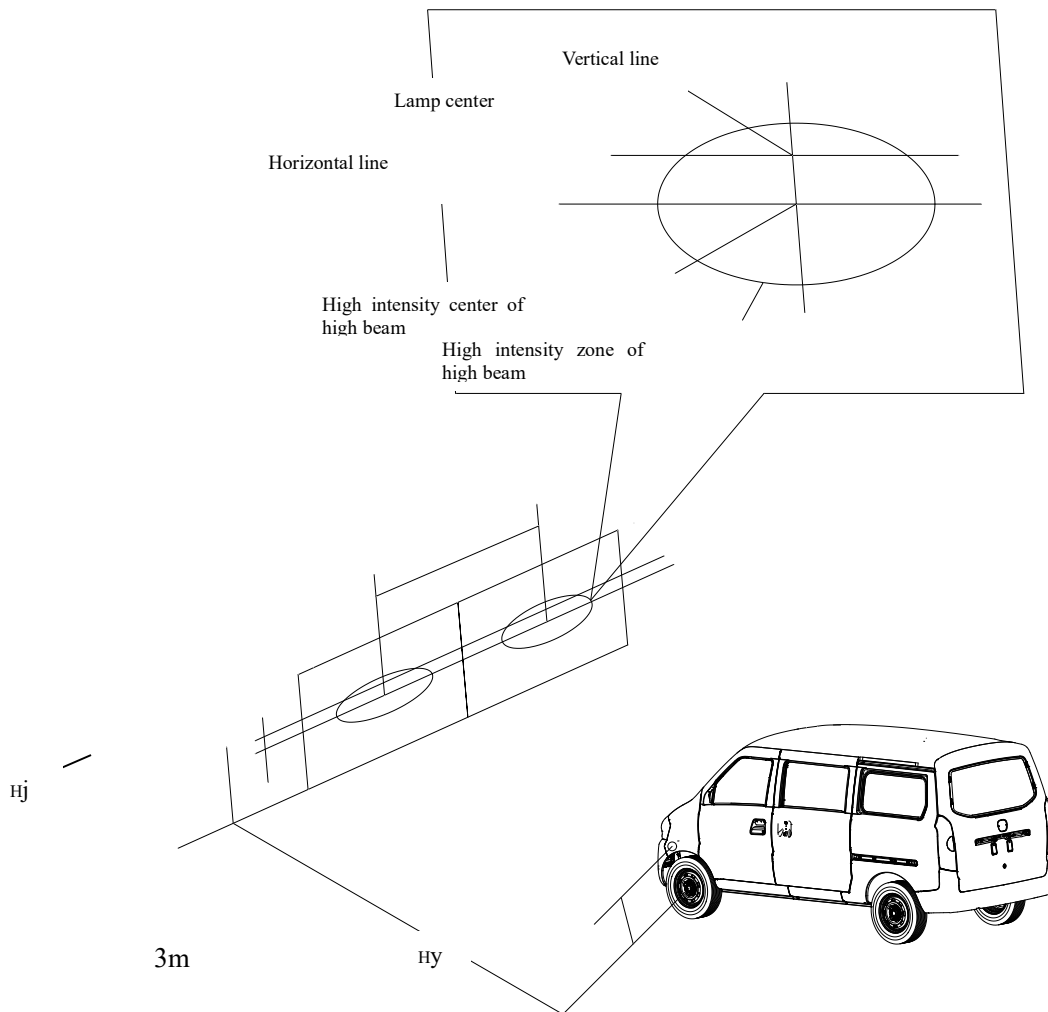
Icons:

1	Front combination lamp
---	------------------------------

Tighten

Tighten the headlamp screw to 6-12N•m.

6.1.2.4 Adjustment of headlamp beam



Adjustment of headlamp beam should be carried out under the following conditions:

1. The vehicle is unloaded.
2. Check the tire pressure.
3. The floor is flat.
4. The center height of the headlamp low beam is $H_i=902\text{mm}$, and the center height of the headlamp high beam is $H_y=808\text{mm}$.
5. The height of the corner or midpoint of the cut-off line of the low beam of the headlamp shall be $0.7-0.9$ (H_j : the height of the reference center of the headlamp is 9.2mm). The cut-off line of the optical axis shall be clear, and the horizontal position shall not deviate more than 170mm to

the left and 350mm to the right.

6. The height of the corner or midpoint of the cut-off line of the high beam of the headlamp should be 0.9-1.0 Hy (Hy: center height is 808mm). The cut-off line of the high beam optical axis should be clear, and the horizontal direction position headlamp requires that the left lamp should not deviate more than 170 mm to the left and 350mm to the right, and the right lamp should not deviate more than 350 mm to the left or right.

7. Place an adjustment plate 3m in front of the vehicle. While adjusting one headlamp, cover the other.

8. If the effective space cannot be obtained, the measurement distance can be reduced accordingly.

9. For vehicles without headlamp height adjustment, the vertical adjustment screw and the horizontal adjustment screw shown in the figure can be used.

6.1.2.5 Replacement of headlamp (high beam/low beam) bulb

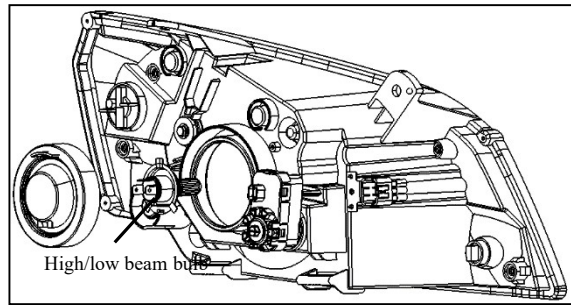
Removal steps

1. Open the front cabin cover.
2. Remove the corresponding electrical plug-ins.
3. Open the rubber cover, screw out the tapping screw, and take out the defective bulb.

Important precautions: When removing and placing the headlamp bulb, please hold the bulb holder with your hand.

Installation steps

1. Install a new bulb, tighten the tapping screw, and close the rubber cover.
2. Connect the corresponding electrical plug-ins.
3. Close the front cabin cover.



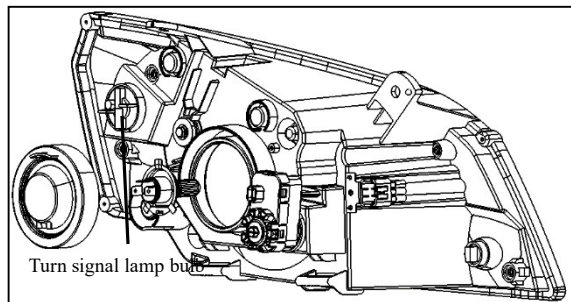
6.1.2.6 Replacement of headlamp - turn signal lamp bulb

Removal steps

1. Open the front cabin cover.
2. Rotate the bulb holder counterclockwise and take out the defective bulb.

Installation steps

1. Install a new bulb and rotate the bulb holder clockwise.
2. Close the front cabin cover.



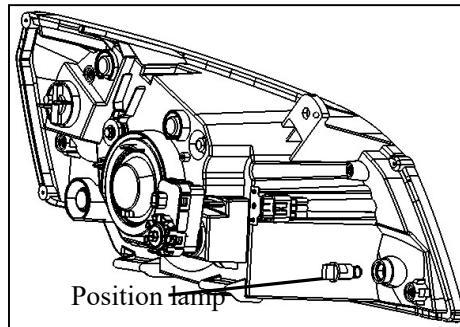
6.1.2.7 Replacement of headlamp-position lamp bulb

Removal steps

1. Open the front cabin cover.
2. Rotate the bulb holder counterclockwise and take out the defective bulb.

Installation steps

1. Install a new bulb and rotate the bulb holder clockwise.
2. Connect the corresponding headlamp assembly. Refer to "Replacement of headlamp".
3. Close the front cabin cover.



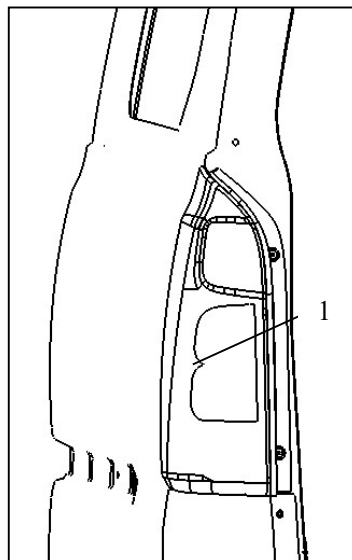
6.1.2.8 Replacement of tail lamp

Removal steps

1. Open the tailgate.
2. Remove fixing bolts from the tail lamp.
3. Remove the plug-in.
4. Remove the rear tail lamp.

Installation steps

1. Connect the tail lamp to the harness.
2. Insert the tail lamp into the body positioning hole and fix it with screws. Tighten the tail lamp bolt to 6-12N•m.
3. Close the tailgate.



Icons:

1	Tail lamp
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Replacement of tail lamp bulb - brake/position lamp, turn signal lamp, reversing lamp,

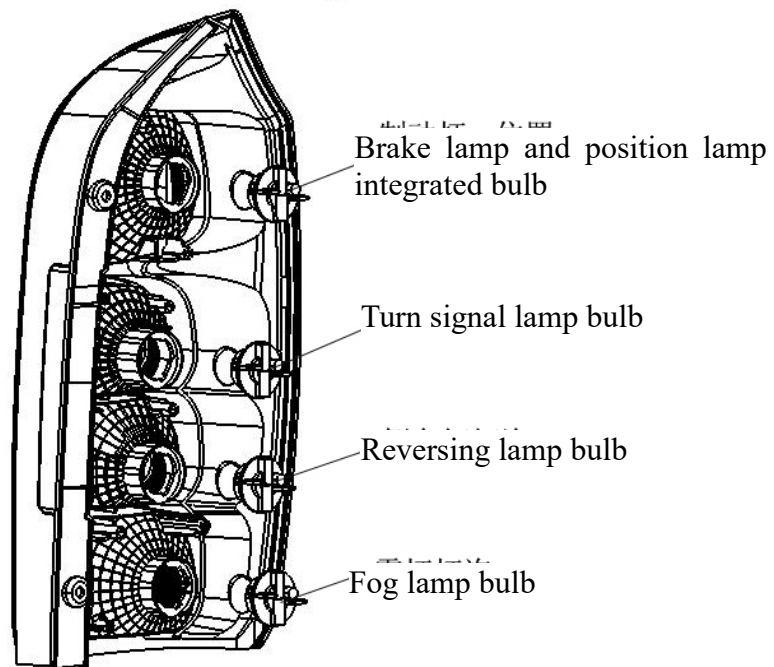
and rear fog lamp

Removal steps

1. Open the tailgate.
2. Remove the tail lamp assembly.
3. Rotate the bulb holder counterclockwise and remove the bulb from the holder.

Installation steps

1. Install the bulb to the tail lamp holder.
2. Install the tail lamp assembly to the rear body.
3. Close the tailgate.



6.1.2.9 Replacement of license plate lamp and bulb

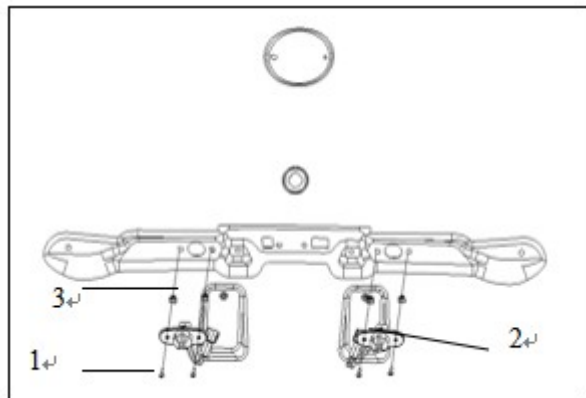
Removal steps

1. Remove the license plate lamp.
2. Remove the electrical plug-in.
3. Replace the defective bulb with a new one.

Installation steps

1. Connect the license lamp assembly electrical plug-in.
2. Install the license plate lamp.

3. Tighten the license plate lamp fixing screws.



Icons:

1	Cross recessed pan head tapping screw - type F	2	License plate lamp	3	Plastic buckle
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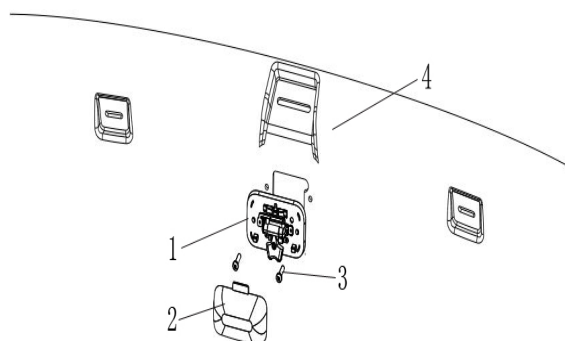
6.1.2.10 Replacement of the ceiling lamp

Removal step 1 (at the front beam)

1. Pry off the ceiling lamp cover.
2. Remove the ceiling lamp fastening screws, remove the corresponding plug-ins, and remove the ceiling lamp.

Installation step 1 (at the front beam)

1. Plug in the corresponding plug-ins.
2. Position the ceiling lamp at the corresponding position on the roof and tighten the ceiling lamp screws.
3. Install the ceiling lamp cover trim.



Icons:

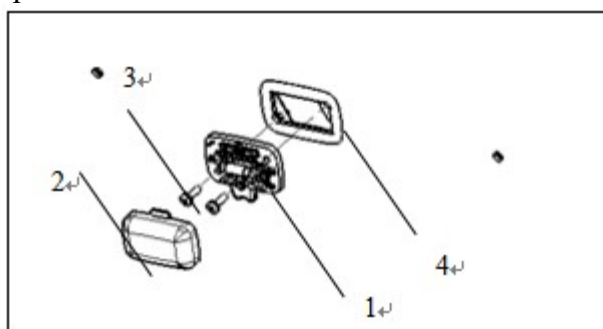
1	Front ceiling lamp	2	Front ceiling lamp cover	3	Cross recessed pan head screw	4	Formed ceiling
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Removal step 2 (at the middle beam)

1. Pry off the ceiling lamp cover trim.
2. Remove the ceiling lamp fastening screws, remove the corresponding plug-ins, and remove the ceiling lamp.

Installation step 2 (at the middle beam)

1. Plug in the corresponding plug-ins.
2. Position the ceiling lamp at the corresponding position on the roof and tighten the ceiling lamp screws.
3. Install the ceiling lamp cover trim.



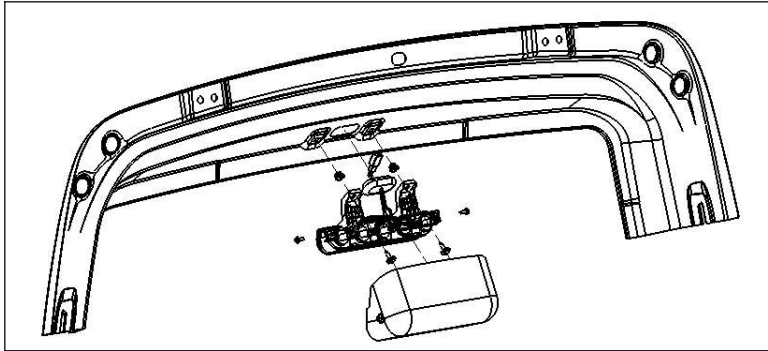
Icons:

1	Rear ceiling lamp	2	Rear ceiling lamp cover	3	Cross recessed pan head screw	4	Formed ceiling
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6.1.2.11 Replacement of high brake lamp

Removal steps

1. Use a screwdriver to take out the screws on both sides of the high brake lamp housing.
2. Push out the high brake lamp housing downward.
3. Remove the high brake lamp fixing screws.
4. Disconnect the harness connection plug.
5. Take off the high brake lamp.



Icons:

1	Cross recessed large round head tapping screw	2	High brake lamp cover	3	Cross recessed pan head self tapping screw and large washer assemblies
4	High brake lamp body	5	Plastic nut		

Installation steps

1. Connect the harness connection plug.
2. Place the lamp into the mounting hole and fasten the brake lamp with the screws.
3. Fix the high brake lamp housing to the lamp body with screws.

6.2 Wiper/cleaner system

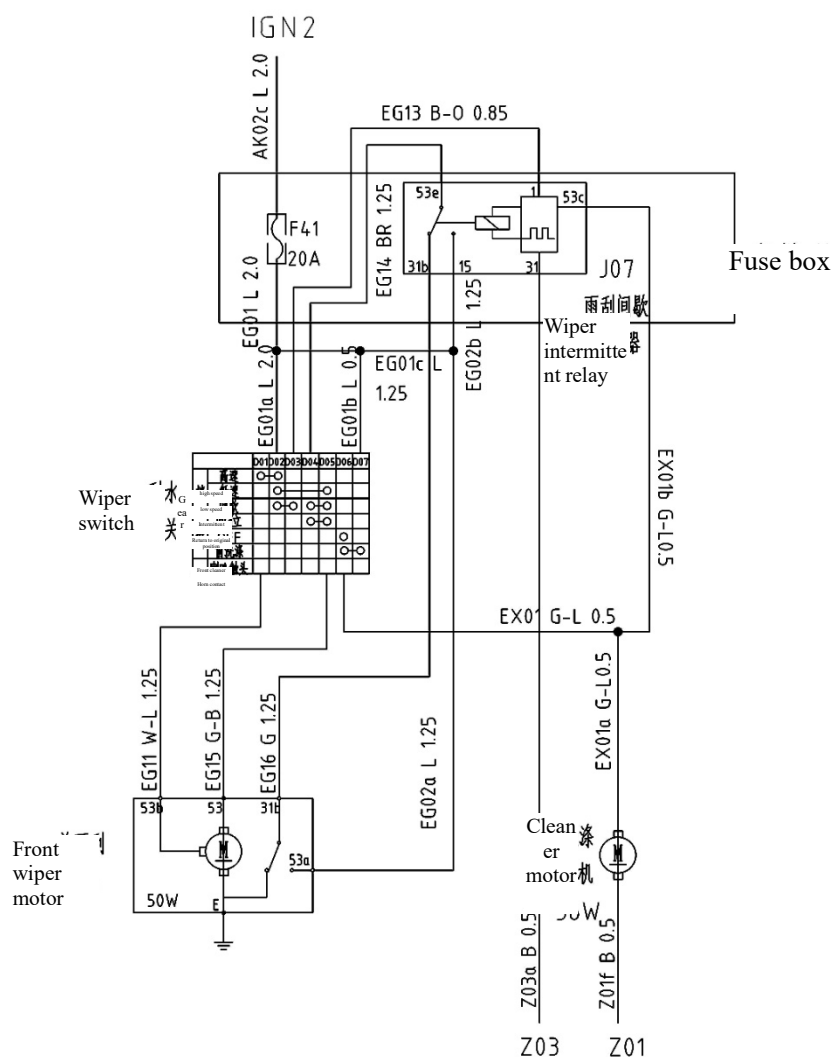
6.2.1 Specification

6.2.1.1 Fastener fastening specification

Application	Specification
Wiper arm assembly to shaft nut	16-26N•m
Wiper transmission system module to vehicle nut	6-12N•m
Wiper motor assembly mounting bolt	6-12N•m

6.2.2 Schematic diagram and wiring diagram

6.2.2.1 Schematic circuit

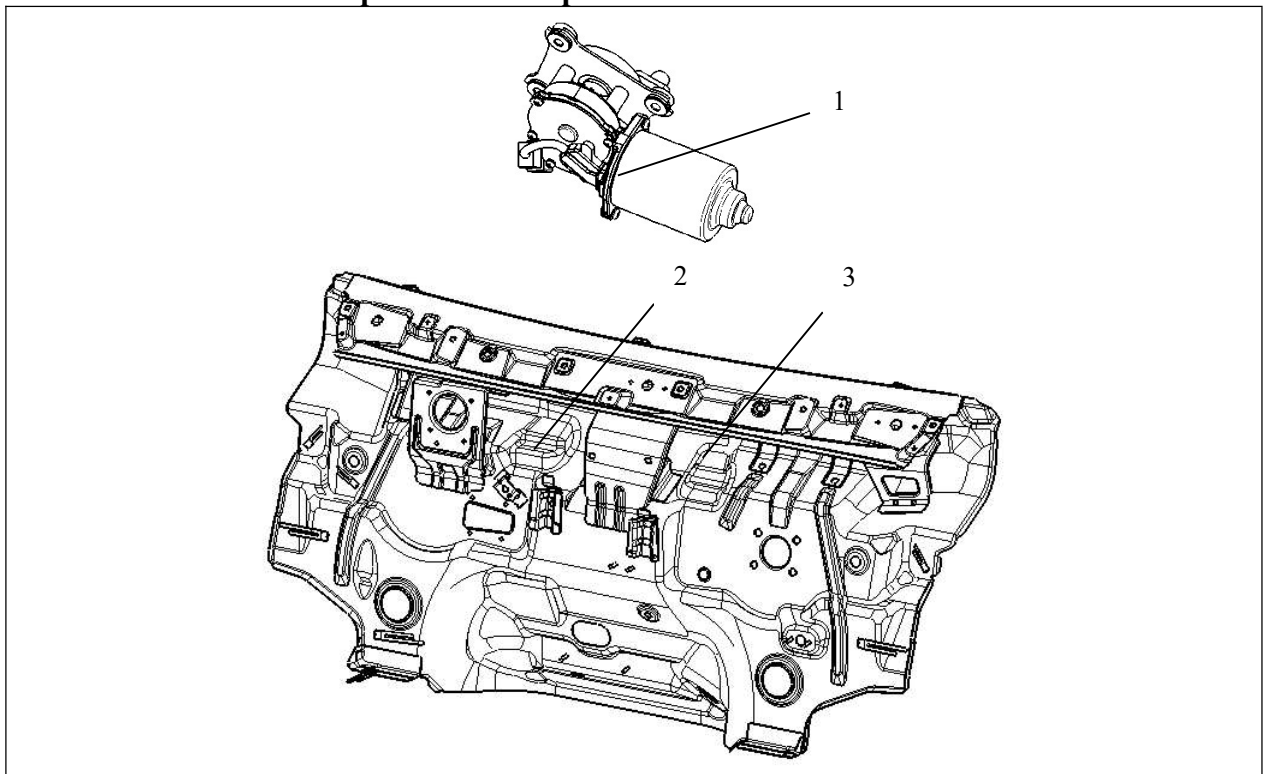


6.2.3 Component positioning

6.2.3.1 Wiper/cleaner system components

Name	Location	Positioning view	Connector end view
Fuse box	In the instrument panel, on the right side of the steering column	"Fuse and relay box component view" in "Wiring system"	
Windshield glass cleaner pump	In the windshield cleaner solvent tank, on the left side of front cabin	"Front windshield wiper motor component view"	
Windshield wiper motor	Under the front cover, at the right front of the instrument panel		
Front windshield wiper/cleaner switch	On the right side of steering column	"Steering wheel and steering column - exploded view" in "Steering wheel and steering column"	

6.2.3.2 Front windshield wiper motor component view

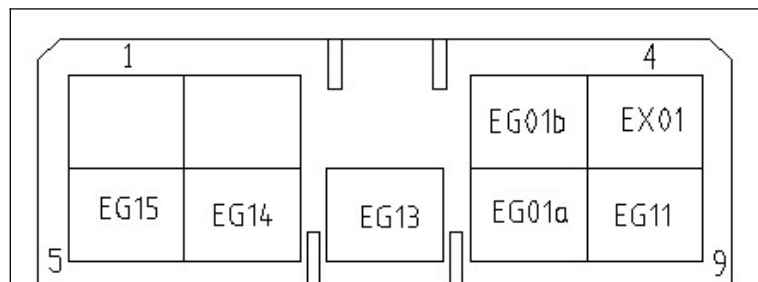


Icon

1	Wiper motor with bracket assembly	2	Wiper motor mounting plate	3	Front wall plate assembly
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6.2.3.3 Wiper/cleaner system connector end view

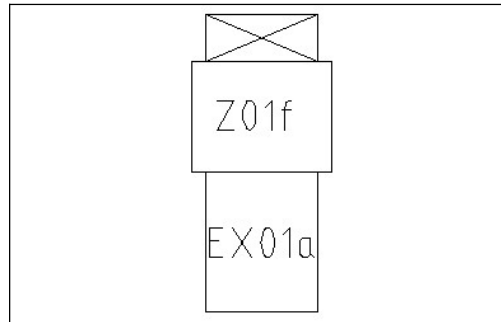
Wiper switch



Harness No.	Wire color	Function
EG01b	Blue	Front cleaner power supply
EX01	Green blue	Front cleaner motor power supply
EG15	Green black	Low speed
EG14	Brown	Return
EG13	Black orange	Intermittent
EG01a	Blue	Front wiper power supply

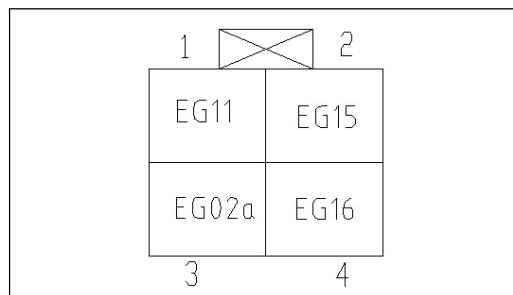
EG11	White blue	High speed
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Front cleaner



Harness No.	Wire color	Function
Z01f	Black	Grounding
EX01a	Green blue	Power supply

Wiper motor



Harness No.	Wire color	Function
EG11	White blue	High speed
EG15	Green black	Low speed
EG02a	Blue	Power supply
EG16	Green	Return

Wiper intermittent relay

Harness No.	Wire color	Function
EX01b	Green blue	Cleaner powered on
EG14	Brown	Switch - Return
EG16	Green	Wiper motor - Return
EG02b	Blue	Power supply
EG13	Black orange	Intermittent switch - relay power supply
Z03a	black	Grounding

6.2.4 Diagnosis information and procedures

6.2.4.1 Inspection of the wiper/cleaner system

Steps	Measures	Normal results	Abnormal results
1	Turn the ignition switch to ON. Turn the cleaner switch to ON.	The wipers operate at low speed. As long as the cleaner switch is held in the ON position, the cleaner sprays water onto the windshield. When the switch is turned off, the cleaner stops working. The wipers return to the stop position after 2-4 wipes.	<ul style="list-style-type: none"> ● Cleaner does not work
2	Place the wiper switch in the intermittent (INT) (pulse mode) position.	After the wiper has completely swept once, pause for 1-2 seconds before proceeding to the next sweep.	<ul style="list-style-type: none"> ● The wiper delay mode does not work ● Wiper defogging, delay, and low speed modes do not work
3	Place the wiper switch in the intermittent (INT) position Hold the wiper switch on for 1-2 seconds.	As long as the cleaner switch is held in the ON position, the cleaner sprays water onto the windshield. The wiper operates at a low speed while spraying water, and continues to sweep 2-4 times after releasing the cleaner switch. The wipers then resume pulse operation.	<ul style="list-style-type: none"> ● Cleaner does not work ● The wiper intermittent mode does not work ● The wiper intermittent and low speed modes do not work
4	Place the wiper switch in the low speed (LO) position.	The wipers continue to operate at low speed.	<ul style="list-style-type: none"> ● The wiper intermittent and low speed modes do not work
5	Place the wiper switch in the high speed (HI) position.	The wipers continue to operate at high speed.	<ul style="list-style-type: none"> ● The wiper high and low speed modes do not work
6	Place the wiper switch in the turned off (OFF) position.	The wipers return to the paused position at low speed.	<ul style="list-style-type: none"> ● Windshield wiper does not stop ● Wipers are always turned on
7	Place the wiper	The wipers pause for approximately 8	<ul style="list-style-type: none"> ● The wiper intermittent mode

	switch in the ON position.	seconds.	does not work ● The wiper intermittent and low speed modes do not work
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6.2.4.2 Diagnostic procedures for wiper/cleaner system

Steps	The wipers and cleaners do not operate regardless of the position of the wiper switch.	Yes	No
1	Check the F41 fuse. Is the fuse damaged?	Go to step 3	Go to step 2
2	Remove the wiper switch and inspect it; confirm that it is OK. Use a digital multimeter to measure the voltage from the wire harness connector to the wiper switch pins EG01b and EG01a. Check whether the voltage is normal.	Go to step 5	Go to step 4
3	Replace the damaged fuse.	Go to step 2	—
4	Please check the instrument panel wire harness from the fuse (F41) to the wiper switch. Repair it if necessary.	Go to step 5	—
5	Confirm that the wiper switch and wire harness connectors are in good contact; Separate the wire harness from the wiper motor, detect the instrument panel wire harness from the wiper switch and fuse (F41) to the wiper motor according to the schematic diagram, and repair it if necessary.	Go to step 6	—
6	Check the wiper motor and repair it if necessary; confirm that there is no problem with the wiper motor and that the connector to the wiper motor is in good contact.	Go to step 7	—
7	Please check the grounding wire of the wiper motor at the instrument panel wire harness and repair it if necessary.	Go to step 8	—
8	Is the system intact?	—	—
Steps	Only high gear does not work	Yes	No
1	Please separate the wire harness from the wiper motor. Use a digital multimeter to measure the voltage of EG11 at the wire harness side. Is the voltage normal?	Go to step 2	Go to step 3
2	Check the internal structure of the wiper motor and replace or repair it if necessary.	—	—
3	Remove the wiper switch and inspect it; confirm that it is OK. Check the instrument panel wire harness from the wiper switch to the wiper motor EG11; repair the instrument panel wire harness if necessary.	—	—
Steps	Only low gear does not work	Yes	No
1	Please separate the wire harness from the wiper motor. Use a digital multimeter to measure the voltage of EG15 at the wire harness side. Is the voltage normal?	Go to step 2	Go to step 3
2	Check the internal structure of the wiper motor and replace or repair it if necessary.	—	—
3	Remove the wiper switch and inspect it; If necessary, replace or repair the wiper switch and confirm that it is OK.	Go to step 4	—
4	Check the instrument panel wire harness from the wiper switch to the wiper motor EG15; repair the instrument panel wire harness if necessary.	—	—
Steps	Only intermittent gear does not work	Yes	No
1	Remove the wiper intermittent relay, turn the ignition to the "ON" position, and turn the wiper switch to the intermittent position. Use a digital multimeter to measure the voltage of EG13 on the relay. Is the voltage normal?	Go to step 4	Go to step 2
2	Remove the wiper switch and inspect it; confirm that it is OK, otherwise replace or repair it if necessary.	Go to step 3	—

3	Please check the instrument panel wire harness from the wiper switch to the wiper relay EG13 and repair it if necessary.	—	Go to step 7
4	Please check the grounding wire at the relay (Z03a). Is the grounding wire well grounded?	Go to step 6	Go to step 5
5	Please repair the grounding wire and make sure it is well grounded.	—	—
6	Please replace the relay. Is the system in good condition?	—	—
7	Please check the instrument panel harness from the wiper switch to the relay EG14 to confirm that it is OK.	Go to step 8	Go to step 10
8	Remove the new wiper relay and use a digital multimeter to measure the voltage at relay pin EG02b. Is the voltage normal?	Go to step 10	—
9	Please check the instrument panel wire harness and repair it if necessary to confirm that it is OK.	Go to step 10	—
10	Please check the instrument panel wire harness from the relay to the wiper motor EG16 and repair the instrument panel wire harness if necessary to confirm that it is OK. The system is intact.	—	—
Steps	Wipers do not work when turned on	Yes	No
1	Check F41 Is the 20A fuse intact?	Go to step 3	Go to step 2
2	Replace the damaged fuse.	Go to step 3	—
3	Remove the wiper switch and use a digital multimeter to measure whether the EG01a voltage on the switch is normal?	Go to step 5	Go to step 4
4	Please check the instrument panel wire harness from the fuse (F41) to the wiper switch and repair if necessary.	Go to step 5	Go to step 6
5	Check the internal structure of the wiper switch and replace or repair it if necessary. Confirm that it is OK. Is the system intact?	—	Go to step 10
6	Please separate the connector from the wiper motor, turn the ignition switch to the "ON" position, turn the wiper switch to the high gear, and use a digital multimeter to measure the voltage of EG11 at the connector (wire harness side). Is the voltage normal?	Go to step 7	Go to step 10
7	Please check the instrument panel harness from the wiper switch to the relay (EG13) to confirm that it is OK.	Go to step 8	Go to step 9
8	Please use a digital multimeter to confirm whether the grounding wire (Z03a) is well grounded.	—	—
9	Remove the wiper motor and replace or repair it. The system is in good condition.	—	Go to step 10
10	Check the instrument panel wire harness from the wiper switch to the wiper motor according to the circuit diagram; Repair it if necessary and confirm that it is OK. Is the system intact?	—	—
Steps	The wiper blade does not stop in its original position	Yes	No
1	Remove the wiper switch and check the structure of the wiper switch. Replace or repair it if necessary. Confirm that it is OK.	Go to step 2	—
2	Disconnect the wiper motor connector; use a digital multimeter to measure the voltage at the wire harness side connector EG02a. Is the voltage normal?	Go to step 4	Go to step 3
3	Check the wire harness from the (No. 41) fuse to the wiper motor instrument panel according to the circuit diagram; confirm that it is OK.	Go to step 4	—
4	Remove the wiper motor and inspect the structure; repair it if necessary and confirm that it is OK. The system is intact.	—	—
Steps	Cleaner does not work	Yes	No
1	Remove the wiper/ cleaner switch; turn the ignition switch to the "ON" position; use a digital multimeter to measure the voltage of EG01b at the switch home position. Is the voltage normal?	Go to step 3	Go to step 2

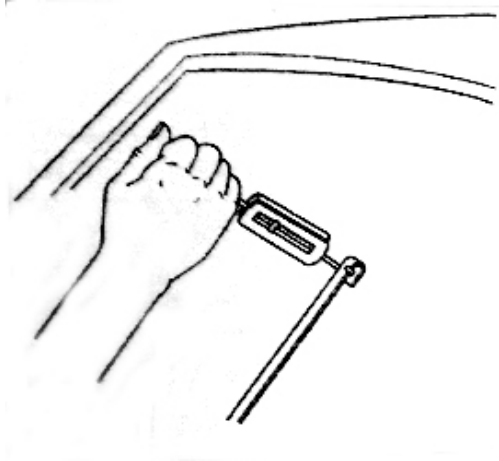
2	Please check the instrument panel wire harness from the fuse (F41) to the wiper/cleaner switch and repair it if necessary and confirm that it is OK.	Go to step 3	—
3	Please check the structure of the wiper switch. Replace or repair it if necessary. Confirm that it is OK. Is the system intact?	—	Go to step 4
4	Turn the ignition switch to the "ON" position and install the wiper/cleaner switch; separate the cleaner motor connector and turn the wiper/cleaner switch to the "cleaner operating" position. Use a digital multimeter to measure the voltage at the wire harness side pin EX01a at the cleaner motor connection. Is the voltage normal?	Go to step 7	Go to step 5
5	Turn the ignition switch to the "On" position and the wiper/cleaner switch to the "Cleaner operation" position. Use a digital multimeter to measure the voltage at the wire harness side pin EX01 at the cleaner motor connection. Is the voltage normal?	Go to step 6	—
6	Check and repair the wire harness from the wiper/cleaner switch EX01 to the cleaner motor EX01a according to the wiring diagram. Is the system intact?	Go to step 7	—
7	Please replace the cleaner motor. The system is intact.	—	—

6.2.4.3 Inspection of wiper arm end pressure and blade rubber strip

Inspection of wiper arm end pressure

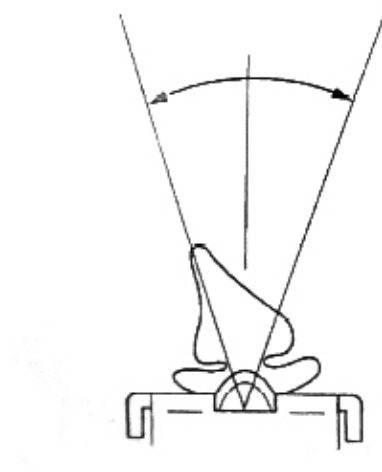
1. Run the wiper and blade to the intermediate position.
2. Remove the wiper blade from the wiper arm. Refer to "Replacement of wiper arm blade, spring blade, and rubber strip".
3. Connect a spring scale to one end of the wiper arm and measure the force required to lift the wiper arm perpendicular to the windshield to its normal operating position height (the height when the blade is connected).

Left wiper arm end pressure is 6.0-7.2N, right wiper arm end pressure is 4.5-5.5N.
4. If the measured value is not within specifications, replace the wiper arm. Refer to "Replacement of the wiper arm".
5. Install the wiper blade on the wiper arm. Refer to "Replacement of wiper arm blade, spring blade, and rubber strip".



Adjust and inspect the blade rubber strip.

1. Remove the wiper blade from the wiper arm. Refer to "Replacement of wiper arm blade, spring blade, and rubber strip".
2. Check the length of the wiper arm blade rubber strip.
3. If the rubber part in contact with the glass is not within $\pm 15^\circ$ of the blade centerline, replace the wiper blade rubber strip. Refer to "Replacement of the wiper blade rubber strip".
4. Install the wiper blade on the wiper arm. Refer to "Replacement of wiper arm blade, spring blade, and rubber strip".



6.2.5 Maintenance Guide

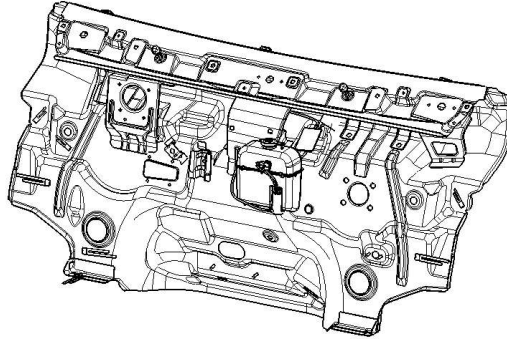
6.2.5.1 Replacement of water bottle and pipe assembly, nozzle

Removal steps

1. Open the front cabin cover.
2. Disconnect the electrical connector from the cleaner pump.
3. Remove the nozzle from the upper mounting plate trim and disconnect the hose from the

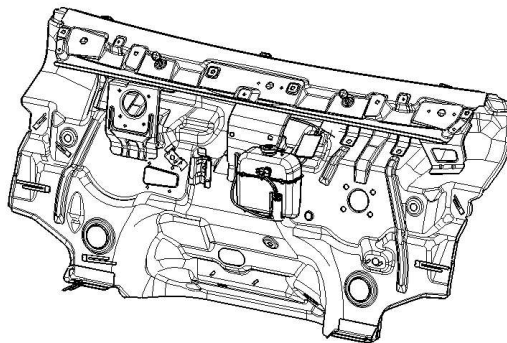
nozzle.

4. Remove the adhesive that secures the hose from the vehicle body.
5. Remove the water bottle and pipe assembly from the vehicle body.



Installation steps

1. Install the water bottle and pipe assembly on the mounting bracket of the vehicle body.
2. Lay the hose under the front bulkhead of the vehicle body, clamp the pipe clamp, and stick a new plastic foam adhesive.
3. Pass the hose through the nozzle mounting hole of the upper mounting plate trim and connect the nozzle.
4. Install the nozzle on the upper mounting plate trim assembly.
5. Connect the electrical connector on the cleaner pump.
6. Close the front cabin cover.

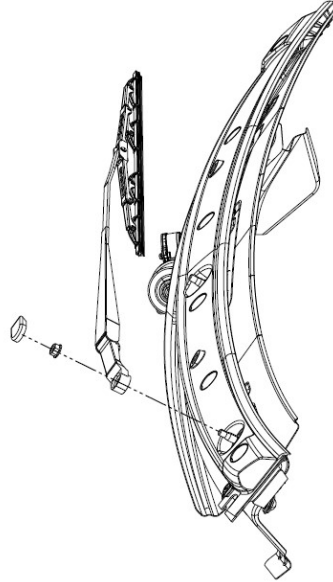


6.2.5.2 Replacement of the wiper arm assembly

Removal steps

1. Turn the ignition switch to ON.
2. Place the wiper switch in the intermittent (INT) position.
3. When the wiper arm is in the stop position, turn off the ignition switch.

4. Remove the waterproof cover.
5. Remove the nut from the wiper arm.
6. Remove the wiper arm assembly from the wiper variable speed drive shaft by shaking it.



Installation steps

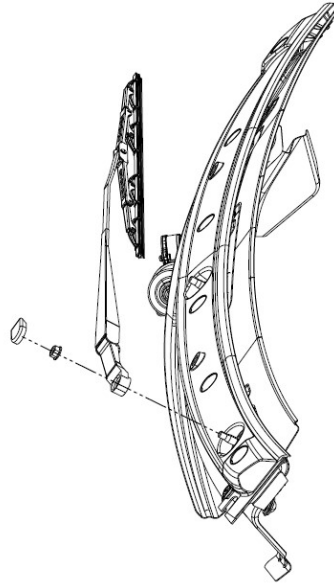
1. Install the wiper arm assembly onto the wiper variable speed drive shaft, and turn the ignition switch to the ON position.
2. Place the wiper switch in the intermittent (INT) position. Windshield wiper motor should operate.
3. When the wiper drive system is at a stop, turn off the ignition switch. Install the wiper arm on the wiper variable speed drive shaft while keeping the wiper brush covering the white line on the black edge below the front gear.

4. Install the nut onto the wiper variable speed drive shaft and wiper arm.

Tighten:

Tighten the nut to 16-26N•m.

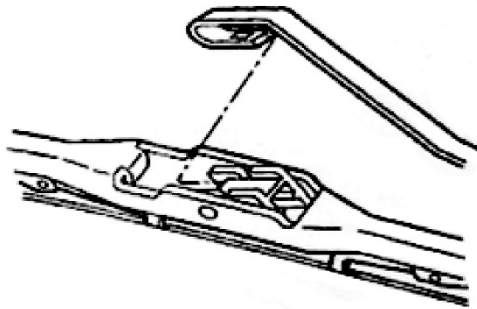
5. Put a waterproof cover on the nut.
6. Operate the wiper arm and check for proper operation.



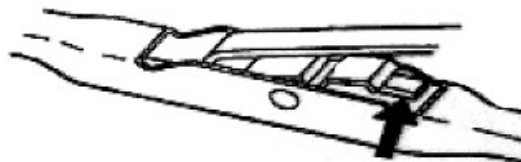
6.2.5.3 Replacement of wiper arm blade, spring blade, and rubber strip

Removal steps

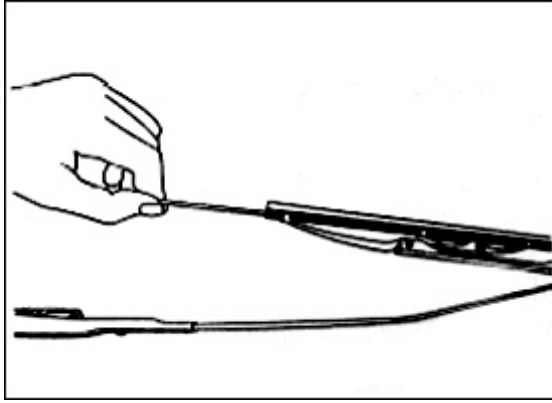
1. Push in the bottom of the wiper arm blade clip and remove the wiper blade from the inside of the wiper arm.



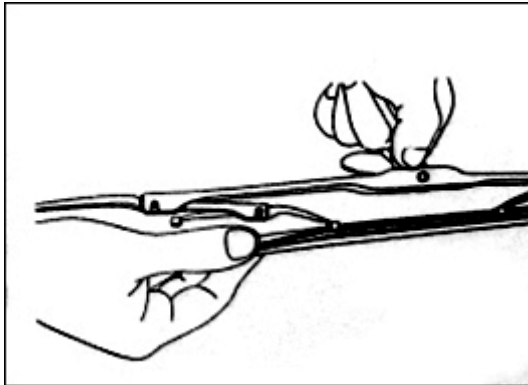
2. Take out the wiper arm through the wiper arm blade opening.



3. Remove the spring blade from the lower end of the blade.

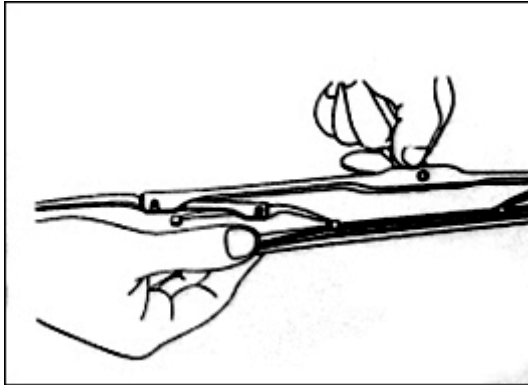


4. Take the rubber strip out of the blade frame.

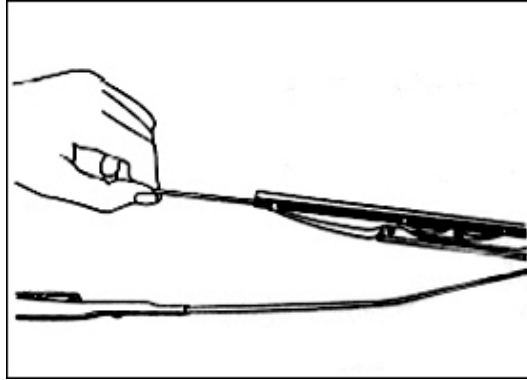


Installation steps

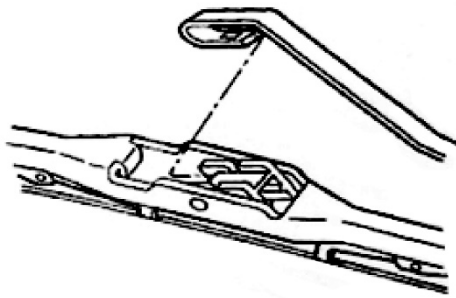
1. Install the rubber strip into the blade frame.



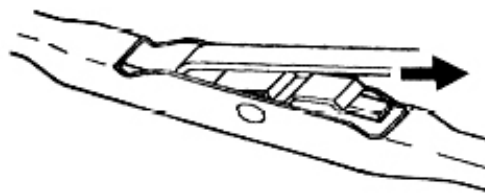
2. Install the spring blade into the lower end of the blade.



3. Install the wiper arm through the wiper arm blade opening.
4. Place the wiper arm blade hook groove on the inside of the wiper arm hook.



5. Pull the wiper arm blade hook groove into the wiper arm hook until the groove locks the hook.
6. Operate the wiper and check for proper operation.



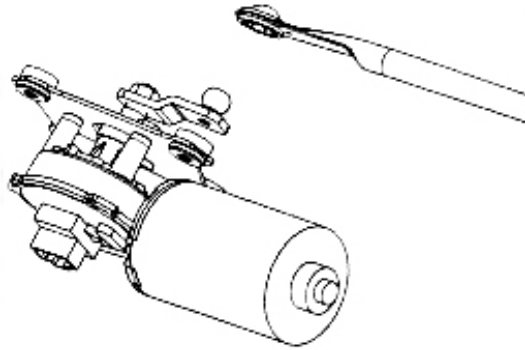
6.2.5.4 Replacement of the wiper motor

(complete with rocker arm and transmission)

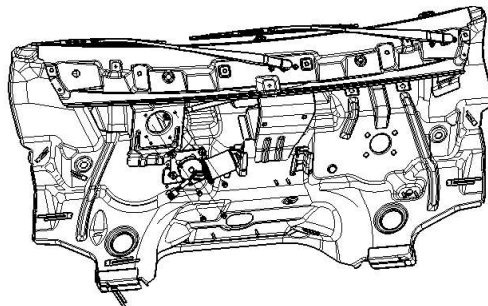
Removal steps

1. Remove the wiper arm from the wiper drive shaft. Refer to "Replacement of the wiper arm assembly".

2. Remove the upper mounting plate trim assembly from the vehicle. Refer to "Replacement of upper mounting plate trim component" in "Vehicle body front end".
3. Remove the fixing nuts from the wiper connecting rod assembly.
4. Remove the wiper connecting rod connector from the wiper motor and bracket assembly.



5. Remove the wiper connecting rod assembly from the vehicle body.
6. Remove the mounting bolts from the wiper motor with bracket assembly.
7. Disconnect the main harness from the wiper motor harness.
8. Remove the wiper motor with bracket assembly.



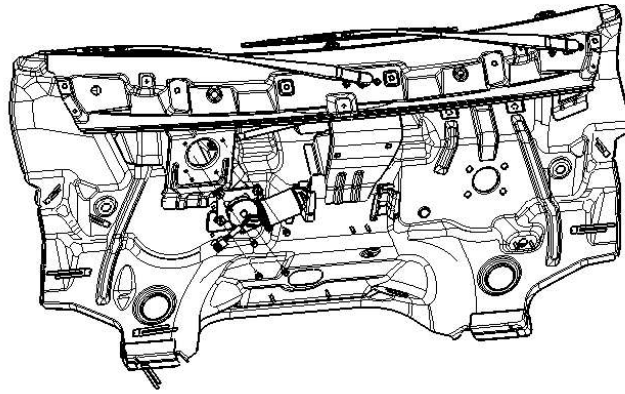
Installation steps

1. Install the wiper motor and bracket assembly to the vehicle body.

Tighten:

Tighten the bolt to 6-12N•m.

2. Connect the main harness and the wiper motor harness.
3. Install the wiper connecting rod assembly to the vehicle body.
4. Connect the wiper motor and bracket assembly to the wiper connecting rod joint.

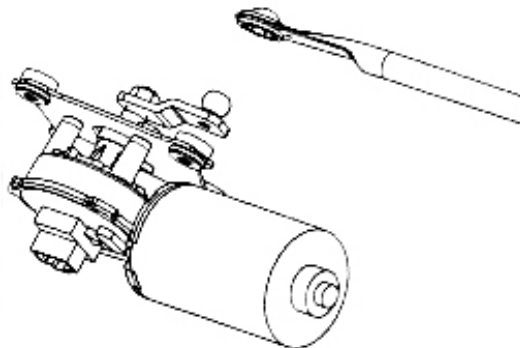


5. Pass the wiper connecting rod assembly through the vehicle body mounting hole and fasten with nuts.

6. Install the upper mounting plate trim assembly on the vehicle body. Refer to "Replacement of upper mounting plate trim component" in "Vehicle body front end".

7. Install the wiper arm into the wiper drive shaft. Refer to "Replacement of the wiper arm assembly".

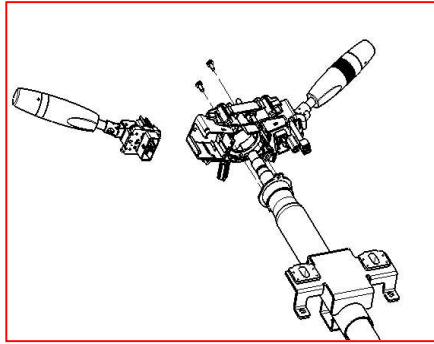
Operate the wiper and check for proper operation.



6.2.5.5 Replacement of the wiper switch

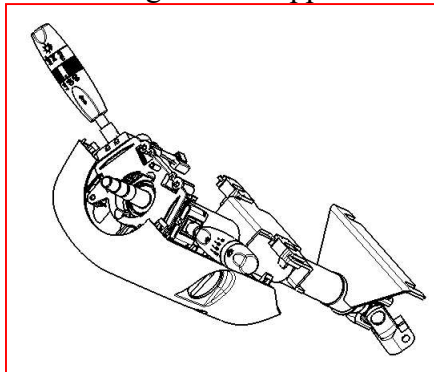
Removal steps

1. Remove the steering wheel and steering column upper and lower trim covers.
2. Disconnect the wiper switch plug-ins
3. Pull out the wiper switch.



Installation steps

1. Install the wiper switch.
2. Plug in the wiper switch connector.
3. Install the steering wheel and steering column upper and lower trim covers.



6.2.5.6 Repair for rod shake

On some vehicles, the windshield wipers may shake and/or scrub unevenly. There are various reasons for this situation to occur. To complete the repair, all items listed below should be tested and repaired as appropriate.

Clean the windshield

Clean the wiper blade rubber strip

Perform a wiper arm pressure test

Check the adjustment of the wiper blade rubber strip

6.2.5.7 Windshield cleaning

Clean the windshield with windshield cleaning agent or equivalent. The cleaning agent should not damage the painted surface or scratch the glass. If the entire glass is free of water droplets or laid horizontally on the entire glass surface, it indicates that the glass has been cleaned.

6.2.5.8 Blade cleaning

Lift each blade assembly from the windshield and clean the blade rubber strip with a cloth soaked in cleaning fluid. Then clean the blade assembly with water.

6.3 Exterior trims

6.3.1 Diagnosis information and procedures

6.3.1.1 Inspection after collision

If a severe collision moves the bumper away from its original position, the following components may need to be replaced:

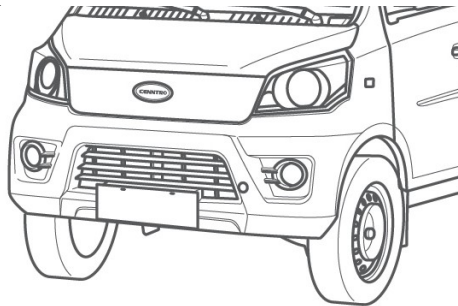
Bumper, fog lamp components.

6.3.2 Maintenance Guide

6.3.2.1 Replacement of front bumper brand

Removal steps

1. Use a plastic flat bladed tool to lift or remove the brand plate (front) from the upper surface of the front bumper grille.
2. Remove the front brand plate.



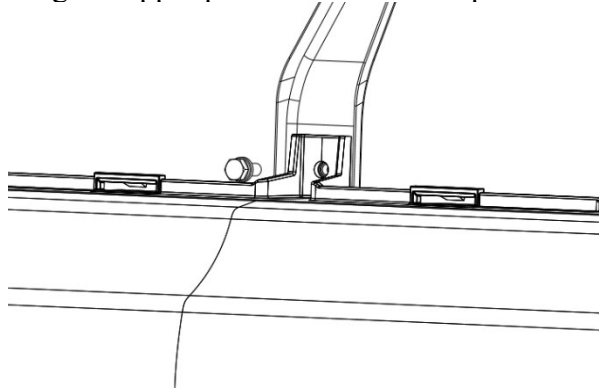
Installation steps

1. Clean the area where the brand will be installed. Use a clean non-woven cloth and naphtha or a 50:50 mixture of isopropyl alcohol and water by volume to clean the area.
2. Allow the area to dry thoroughly.
3. Peel off the lining on the back of the brand plate and attach the brand plate to the front bumper grille through the hole.

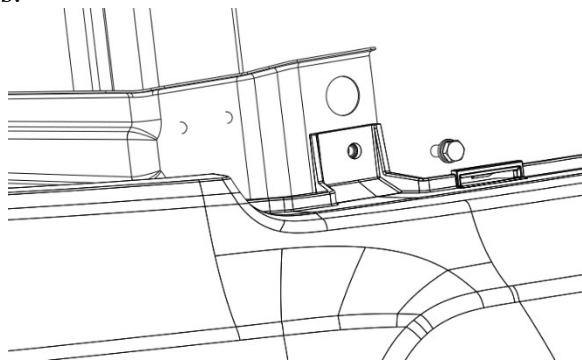
6.3.2.2 Replacement of front bumper

Removal steps

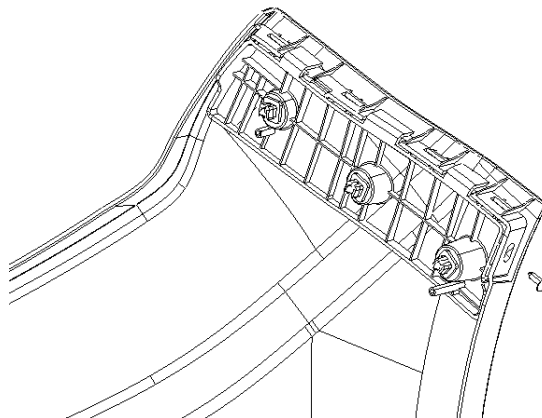
1. Open the front cabin cover plate.
2. Remove the upper grille.
3. Remove the bolts fixing the upper part of the front bumper to the center column.



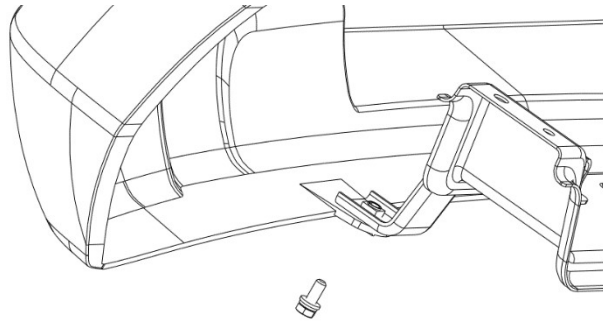
4. Remove two bolts fixing the upper part of the front bumper to the lower mounting beams of the left and right headlamps.



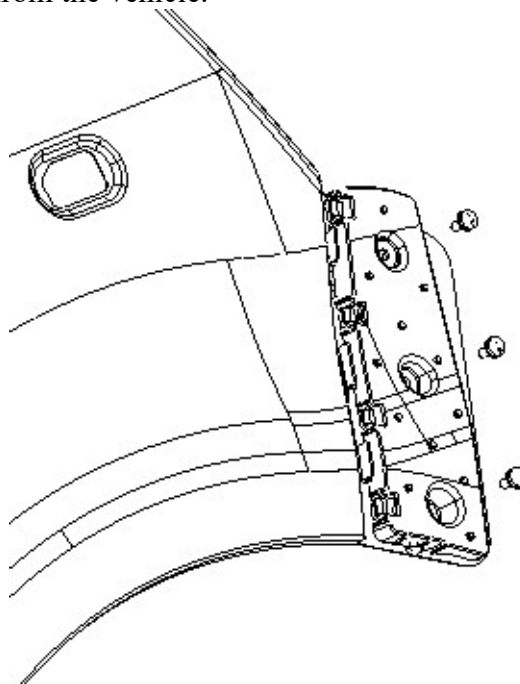
5. Remove the fixing screws on both sides of the front bumper and the left and right brackets.



6. Remove two bolts fixing the lower part of the bumper to the radiator bracket.



7. Pry off the fixing claws on both sides of the front bumper and the left and right brackets, and remove the front bumper from the vehicle.



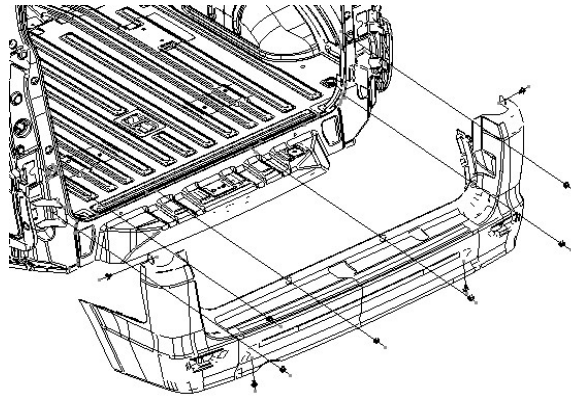
Installation steps

The installation procedure is the reverse process of the disassembly procedure.

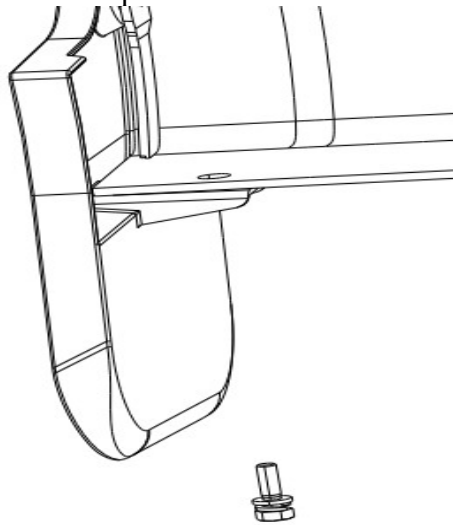
6.3.2.3 Replacement of rear bumper

Removal steps

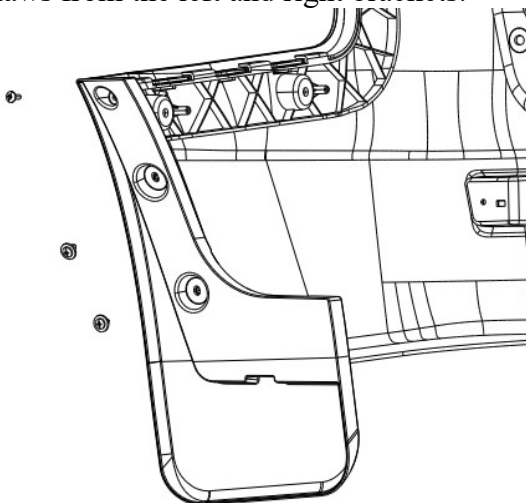
1. Remove the tail lamp. Refer to "Replacement of the tail lamp" in "Lighting system".
2. Remove 10 fixing bolts from the rear bumper.



3. Remove 2 fixing bolts on the rear bumper fixed to the rear wheel housing fender.

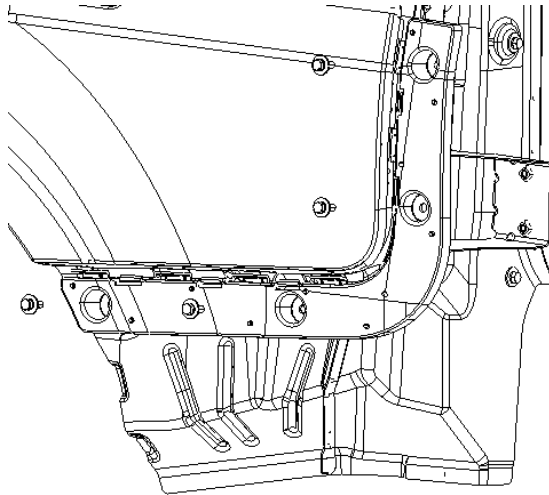


4. Remove 6 bolts on the rear bumper fixed to the rear wheel housing fender , and pry off the fixing claws from the left and right brackets.



5. Move the rear bumper to the rear and disengage from the rear fixture.

6. Remove 8 bolts fixing the rear bumper bracket and remove the left and right brackets from the rear side wall outer plate.



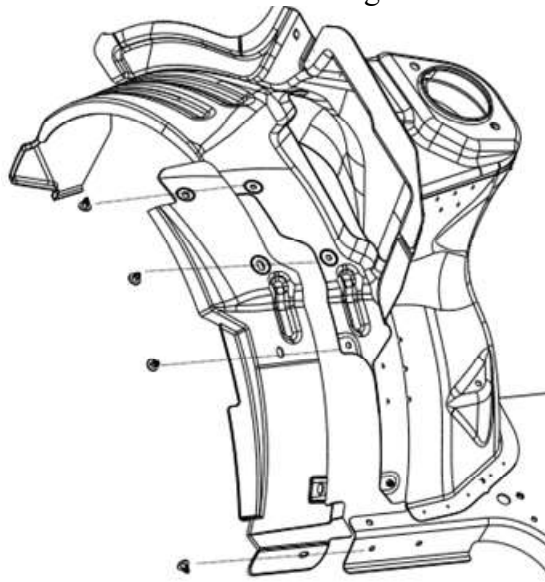
Installation steps

The installation procedure is the reverse process of the disassembly procedure.

6.3.2.4 Replacement of the front fender of the front wheel housing

Removal steps

1. Use a plastic flat bladed tool to remove 5 snap fasteners from the front fender of the front wheel housing.
2. Pull off the front fender of the front wheel housing



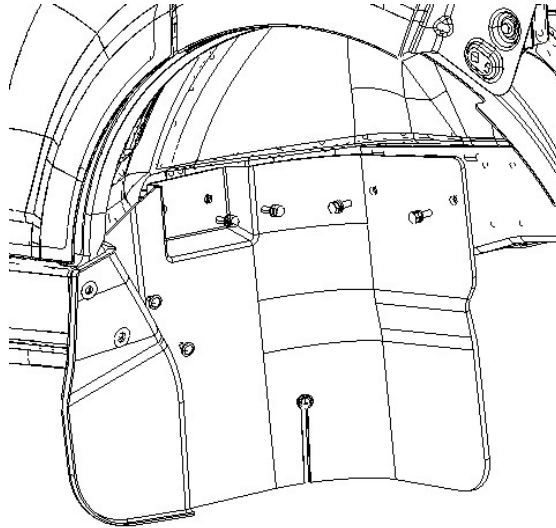
Installation steps

The installation procedure is the reverse process of the disassembly procedure.

6.3.2.5 Replacement of the rear fender of the front wheel housing

Removal steps

1. Use a plastic flat bladed tool to remove 2 snap fasteners from the rear fender of the front wheel housing.
2. Remove 4 fixing bolts from the rear fender of the front wheel housing.
3. Pull off the rear fender.



Installation steps

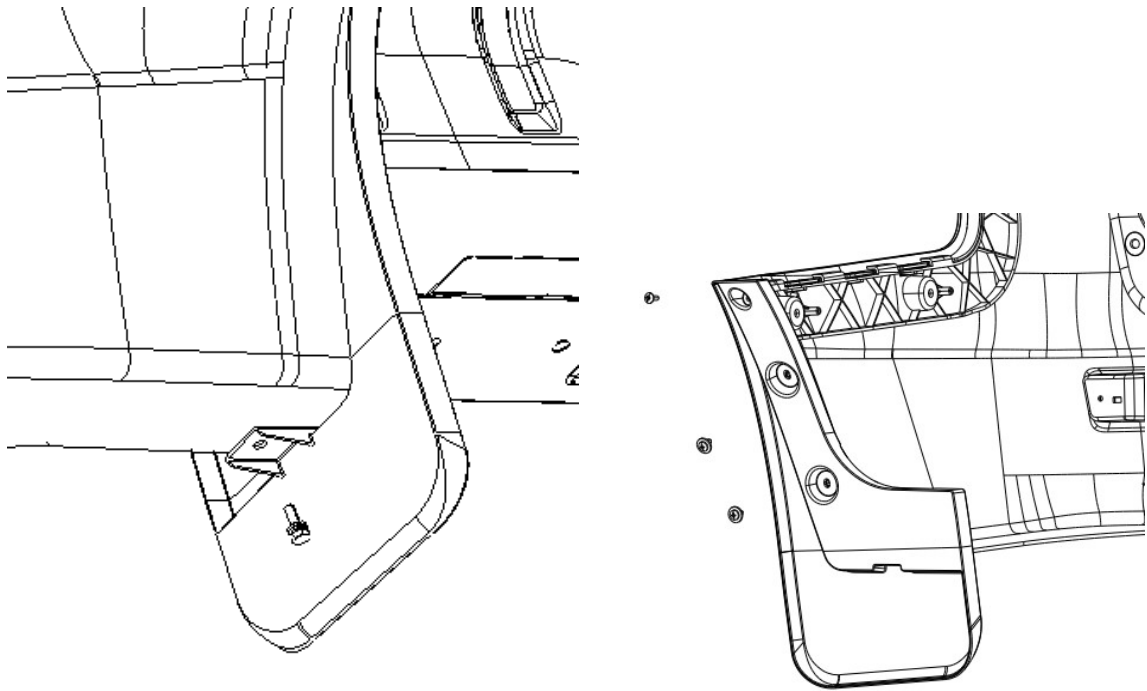
The installation procedure is the reverse process of the disassembly procedure.

6.3.2.6 Replacement of the fender of the rear wheel housing

Requirement: After installing the rear bumper, install the bolts.

Removal steps

1. Remove 1 bolt fixing the rear fender to the bottom of the rear bumper.
2. Remove 3 bolt fixing the rear fender to the side of the rear bumper.
3. Pull off the rear fender.



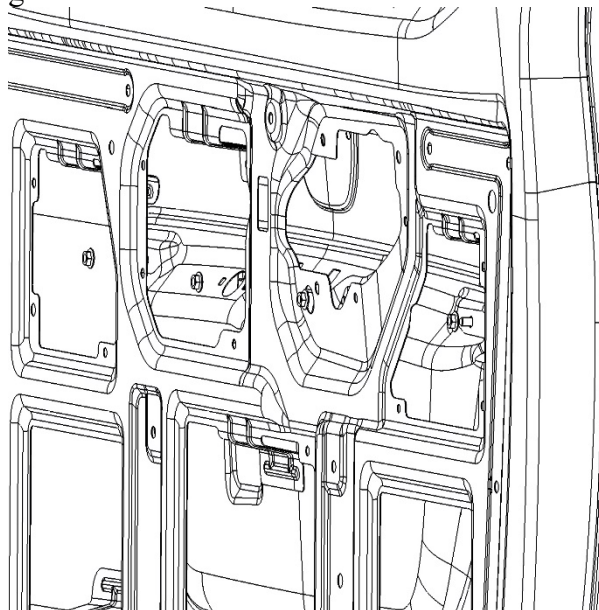
Installation steps

The installation procedure is the reverse process of the disassembly procedure.

6.3.2.7 Replacement of license plate and lighting device trim

Removal steps


1. Use the special tool NLM1-S0000007 to remove the lighting device trim.
2. Remove fixing nuts from the lighting device trim.
3. Remove the lighting device trim.



Installation steps

The installation procedure is the reverse process of the disassembly procedure.

6.3.3 Special tools

Icon	Tool No./Description
	NLM1-S0000007 Interior trim staple pry board

6.4 Fix the window

6.4.1 Maintenance Guide

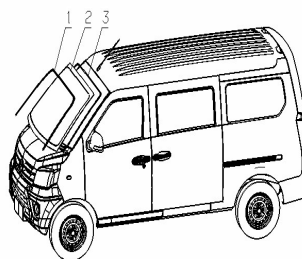
6.4.1.1 Replacement of the front windshield

Install the front windshield with a special vehicle windshield adhesive (that is, directly attach the front windshield to the vehicle body sheet metal using a single component polyurethane adhesive sealant and a universal primer).

To replace the front windshield, it is necessary to use adhesive with strong adhesion, and the following correct operation methods must be followed.

Special precautions: Generally, use adhesive (single component polyurethane adhesive sealant) and two primers (some also use only one universal primer) to replace the windshield. Regardless of which manufacturer's primer and adhesive is used, it is important to refer to the user manual provided. Failure to follow this procedure or misuse of other adhesives will impair the original adhesive properties. Therefore, before working, it is necessary to carefully read the manual and instructions provided by the adhesive manufacturer, and follow the correct steps and methods during the entire repair process.

In addition, paint the scratched or other damaged surfaces and repair the damaged parts to prevent further deterioration of the corrosion level.



The adhesive used has a bonding strength that meets the following requirements:

- Shear strength: 40kg/m² (569b/in²) or more
- Adhesive materials required for disassembly and assembly of the front windshield: adhesive, glass primer, and body primer.

Tools:

Awl, steel wire, primer brushes (two), knife, rubber suction cup, sealant gun (with adhesive injected), putty scraper (to remove adhesive).

Removal steps

1. Apply adhesive tape to the window. This protects the paint surface and ceiling lining.

Caution: When processing any type of glass, use approved safety goggles and gloves to avoid any injury.

2. Add both inside and outside sides and all around the windshield.

3. When removing the nozzle, refer to "Replacement of water bottle and pipe assembly, nozzle".

4. when removing the wiper arm assembly, refer to "Replacement of the wiper arm assembly".

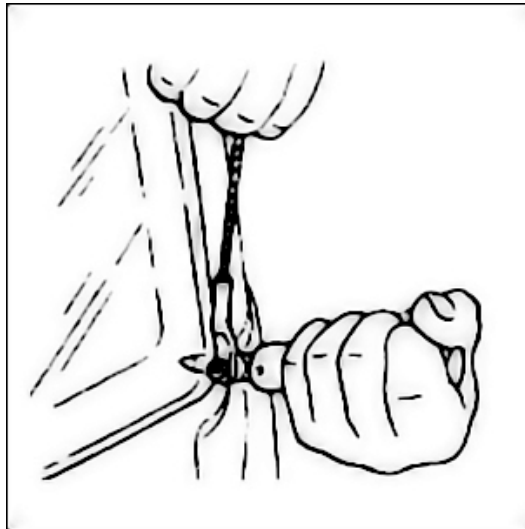
5. When removing the upper mounting trim panel assembly, refer to "Replacement of upper mounting trim panel assembly".

6. Cover the vehicle surface around the glass with adhesive tape to avoid damage.

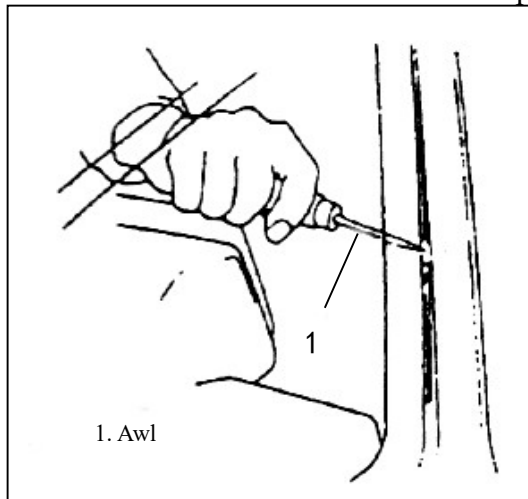
7. When removing the interior rearview mirror, refer to "Replacement of the interior rearview mirror".

8. When removing the sun visor and front column trim, remove the front windshield trim from the front column (right/left). Refer to "Sun visor replacement (comfort)".

9. Cut off all adhesive around the glass with a knife. If using a steel wire to scrape it off, follow steps 11-12.



10. Drill through the adhesive with an awl and let the steel wire pass through.

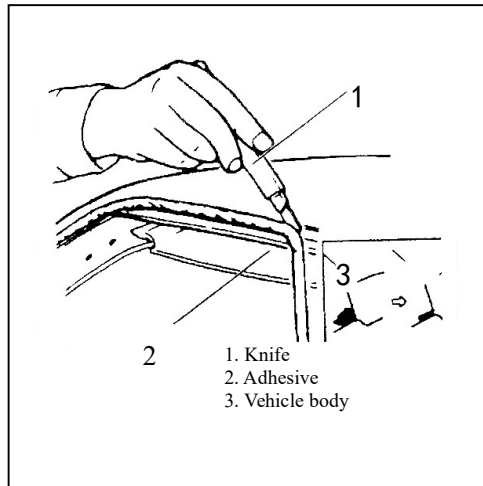


11. Remove the adhesive around the glass with steel wires.

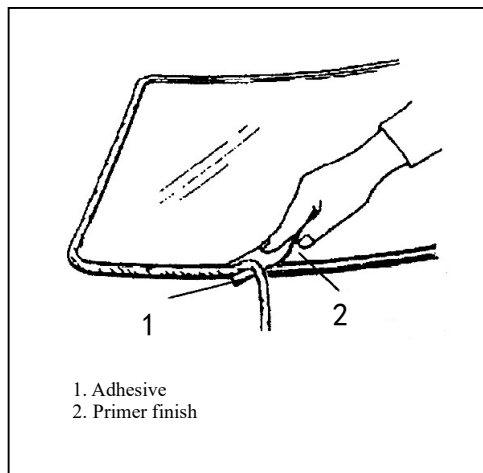
Special precautions: Use steel wires as close to the glass as possible to prevent damage to the vehicle body.

12. Use a small knife to smoothly scrape off the remaining adhesive on the vehicle body side, and the insertion depth of the knife is 1-2m.

Special precautions: Before using the knife, clean the knife with alcohol, or use a similar method to remove oil stains from the knife.

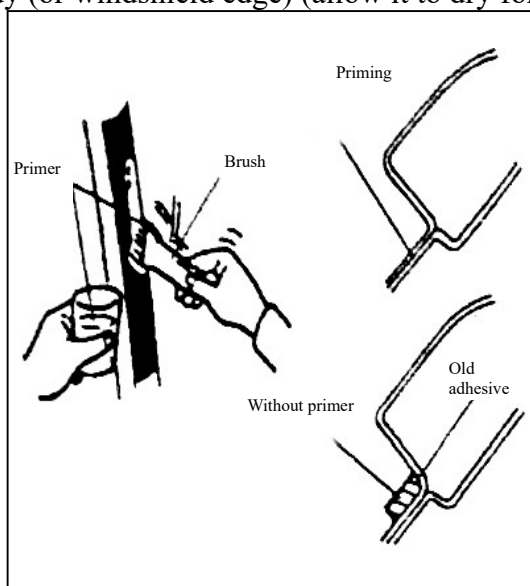


13. When reusing the windshield, completely remove the front windshield trim and adhesive from the glass.

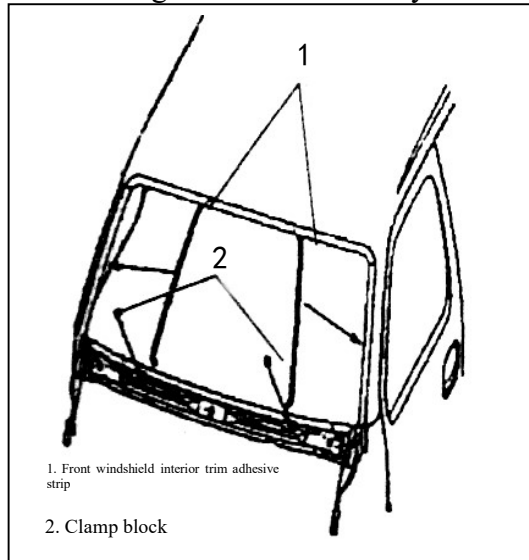


Installation steps

1. Where the windshield is bonded, use a cleaning agent to clean the adhesive surface remaining on the vehicle body (or windshield edge) (allow it to dry for more than 10 minutes).



2. Thoroughly clean the old adhesive contact surfaces, body paint, or exposed metal. Carefully apply the glass primer to the vehicle body paint or exposed metal surfaces. Do not apply the glass primer to the adhesive surfaces remaining on the vehicle body.



Special precautions: Be sure to refer to the instructions provided by the glass primer manufacturer for correct operation and dry according to the specified time.

The glass primer must not contact the old adhesive surface on which the vehicle body and glass are bonded.

3. Check the replaced front windshield and replace it with a new one if it is damaged.
4. Insert the glass into the new front windshield outer rubber strip.
5. Clean the adhesive on the glass surface with a clean cloth, and if using cleaning liquid, let it dry for more than 10 minutes.
6. Install the front windshield inner adhesive strip onto the front column and upper frame of the front windshield. Install the clamp block.
7. Using a new brush, apply a sufficient amount of glass primer along the glass bonding edge.

Special precautions: Be sure to refer to the instructions provided by the manufacturer for correct operation and dry according to the specified time.

Do not touch the glass primer layer. The scope of application of glass primer is as follows:
width "a" is about 20mm (0.78in)

"b" is approximately 20 mm (0.78 in)

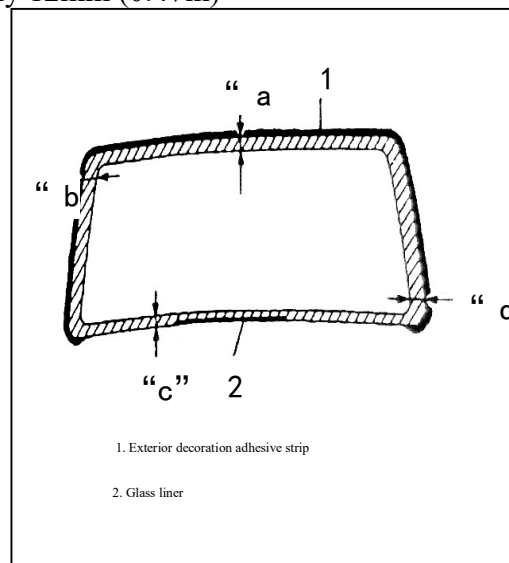
"c" is approximately 20mm (0.78 in)

"d" is approximately 20 mm (0.78 in)

Starting from the bottom side of the glass, be careful not to damage the glass primer. The adhesive height on the lower side should be higher than the other three sides: upper, right, and left sides.

Width "e": approximately 8mm (0.31 in)

Height "f": approximately 12mm (0.47in)



After applying adhesive, use a rubber suction cup to grasp the glass.

Complete steps 8-9 within 10 minutes to ensure that the adhesive has sufficient viscosity.

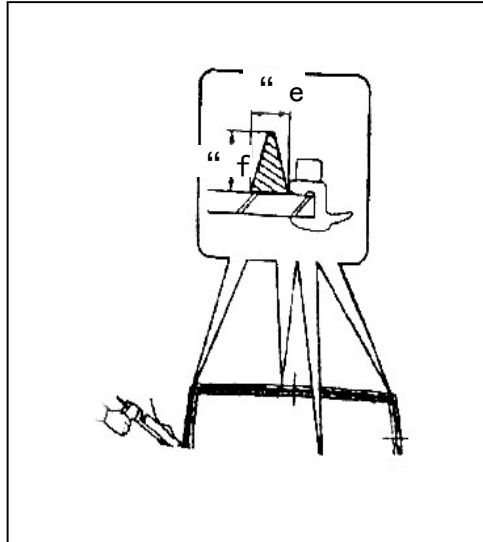
Refer to the instructions provided by the adhesive manufacturer for processing methods and drying time.

8. Press the glass into the vehicle body using a rubber suction cup, and firmly bond the glass by tapping the glass surface and the adhesive trim strips around it.

9. Use adhesive tape to attach the front windshield to the vehicle body and fix the glass until the adhesive cures.

10. Clean any excess adhesive from the vehicle body.

11. Spray with gentle water flow: conduct a water tightness test on the windshield.



Special precautions: Do not spray the newly applied adhesive directly with high-pressure water flow.

12. Check the windshield for leakage.

13. If the leakage is found, use a plastic scraper to apply more adhesive to the leak point.

14. Retest the front window for leakage.

15. Maintain the vehicle at a room temperature of 21° C (70°F) and a relative temperature of at least 30%.

Caution: It takes approximately 24 hours for the repair material to fully cure. Before doing so, do not disturb the repaired area. If the adhesive is not sufficiently cured, unprotected occupants can be thrown out of the vehicle, resulting in personal injury.

16. If water still leaks, remove the glass and reinstall it as described above.

Special precautions: When drying, do not use compressed air to directly dry the adhesive coating area.

Do not use a far infrared lamp or similar method to dry. Sudden closing of the door before the adhesive is completely dry can cause the glass to loosen or fall off. Therefore, before the adhesive is completely dried, whether the door is open or closed, it is important to ensure that all doors are opened and carefully operated. Each adhesive has its own specific drying time. Before bonding, it is necessary to refer to the manufacturer's instructions to understand the drying time of the adhesive, and be sure to observe precautions in advance.

Do not start the vehicle until the adhesive is fully adhered to ensure that the adhesive is sufficiently firm.

17. Remove the protective covering or adhesive tape from the vehicle.

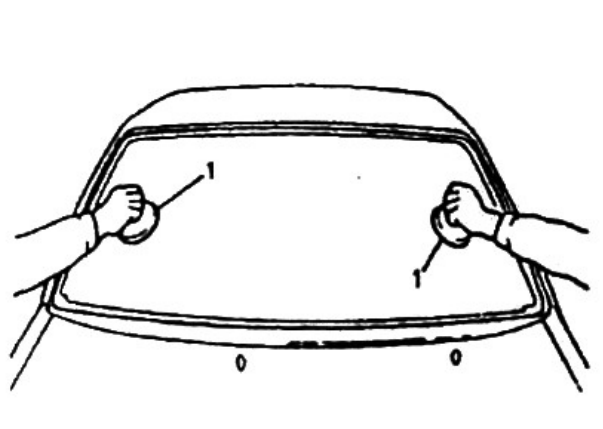
18. When installing the sun visor and front column trim, install the front windshield trim onto the front column (right/left). Refer to "Sun visor replacement (comfort)".

19. When installing the interior rearview mirror, refer to "Replacement of the interior rearview mirror".

20. When installing the upper mounting trim panel assembly, refer to "Replacement of upper mounting trim panel assembly".

21. when installing the wiper arm assembly, refer to "Replacement of the wiper arm assembly".

22. When installing the nozzle, refer to "Replacement of water bottle and pipe assembly, nozzle".



6.4.1.2 Window cleaning

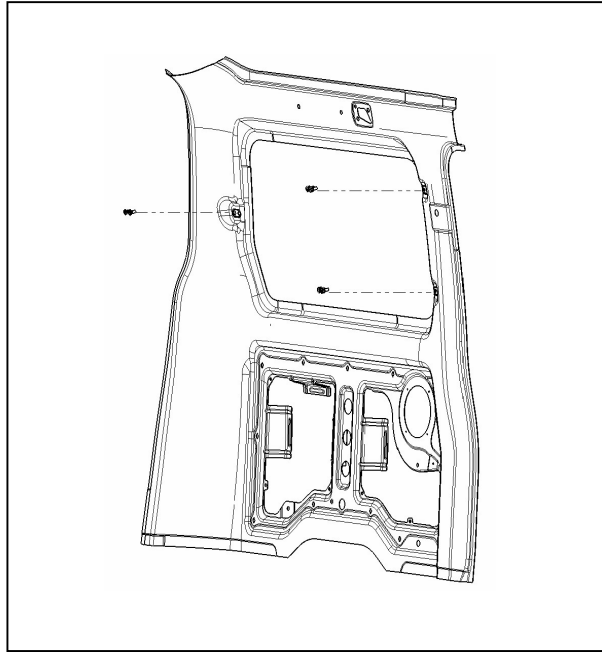
Clean the windows regularly. Use a universal glass cleaning additive or equivalent to remove common soot droplets and dust film.

Non abrasive filters can be used on the outside of the windshield. To clean the wiper blades, perform the following procedure:


1. Clean the wiper blade with glass cleaning agent or equivalent things.

- Glass cleaning agent.
- A solvent of half water and half methanol can be used.

2. Clean the blade with water.



6.4.2 Special tools

Icon	Tool No./Description
	<p>NLM1-S0000008 Hot air gun</p>

6.5 Vehicle body front end

6.5.1 Specification

6.5.1.1 Fastener fastening torque

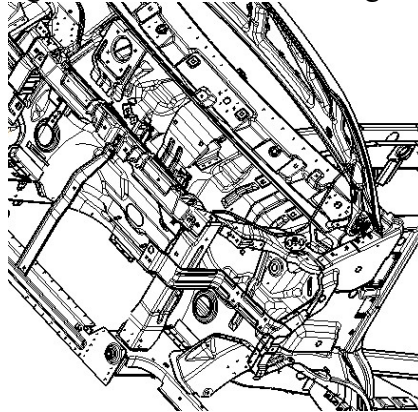
Application	Specification
Front fender to front wheel housing upper outer panel bolt	6-12N•m
Front fender to side wall outer plate middle bolt	6-12N•m
Front fender to front end fixing bolt	6-12N•m
Water tank upper cross beam	17-28N•m
Front cabin cover hinge to front cabin cover bolt	6-12N•m
Front impact bar bracket fixing nut	6-12N•m
Front fender to front wheel housing upper outer panel bolt	6-12N•m
Front fender to side wall outer plate middle bolt	6-12N•m

6.5.2 Replacement of front cabin cover hinge

Caution: When removing or installing the front cabin cover support device, additional support must be used to avoid possible vehicle damage or personal injury.

Removal steps

1. Remove the front cabin cover. Refer to "Replacement of front cabin cover".
2. Remove the bolts connecting the front cabin cover hinge to the vehicle body.



Installation steps

1. With the help of an assistant, position the front cabin cover in the vehicle body position.
2. With the help of an assistant, install the front cabin cover bolts.
3. Check the fit of the front cabin cover with the vehicle body, and adjust the front cabin cover as necessary. Refer to "Adjustment of the front cabin cover".
4. Tighten the front cabin cover hinge bolts

Tighten

Tighten the front cabin cover hinge to 6-12N•m.

5. Remove the protective lining.
6. Close the front cabin cover.

6.6 Door

6.6.1 Specification

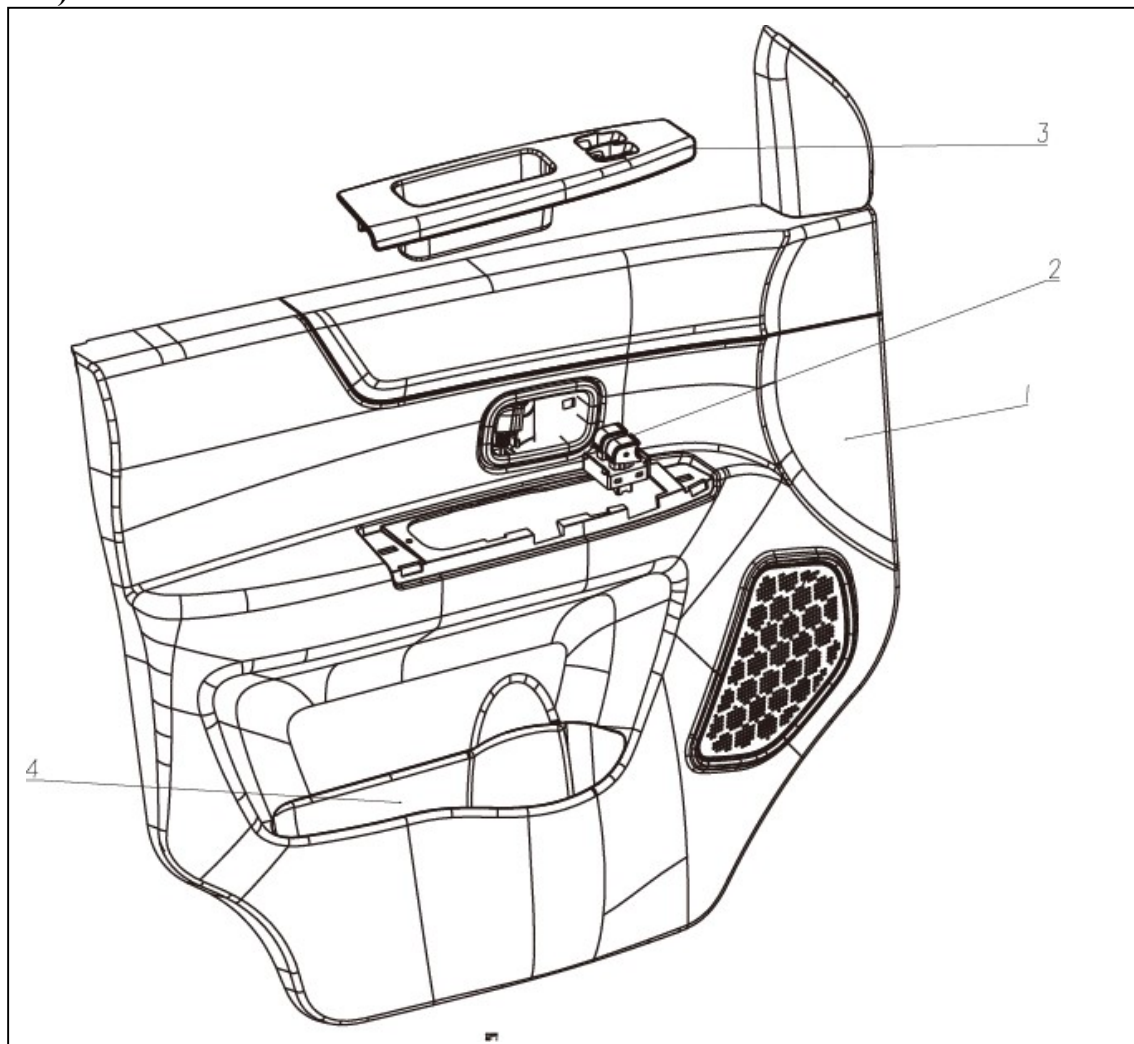
6.6.1.1 Fastener fastening torque

Application	Specification
Door lock bolt	5-7N•m
Stopper bolt	8N•mMAX
Window rear guide rail screw	6-12N•m
Window guide rail screw	6-12N•m

Front door inner handle screw	3-5N•m
Latch screw	9-17N•m
Outer handle screw	4-5N•m
Window switch base screw	1.5-2.0N•m
Trim panel screw	1.5±0.3N•m
Front door horn screw	2±0.5N•m
Exterior rearview mirror screw	1.5-2.0N•m
Window lifter guide rail	6-12N•m

6.6.2 Component location

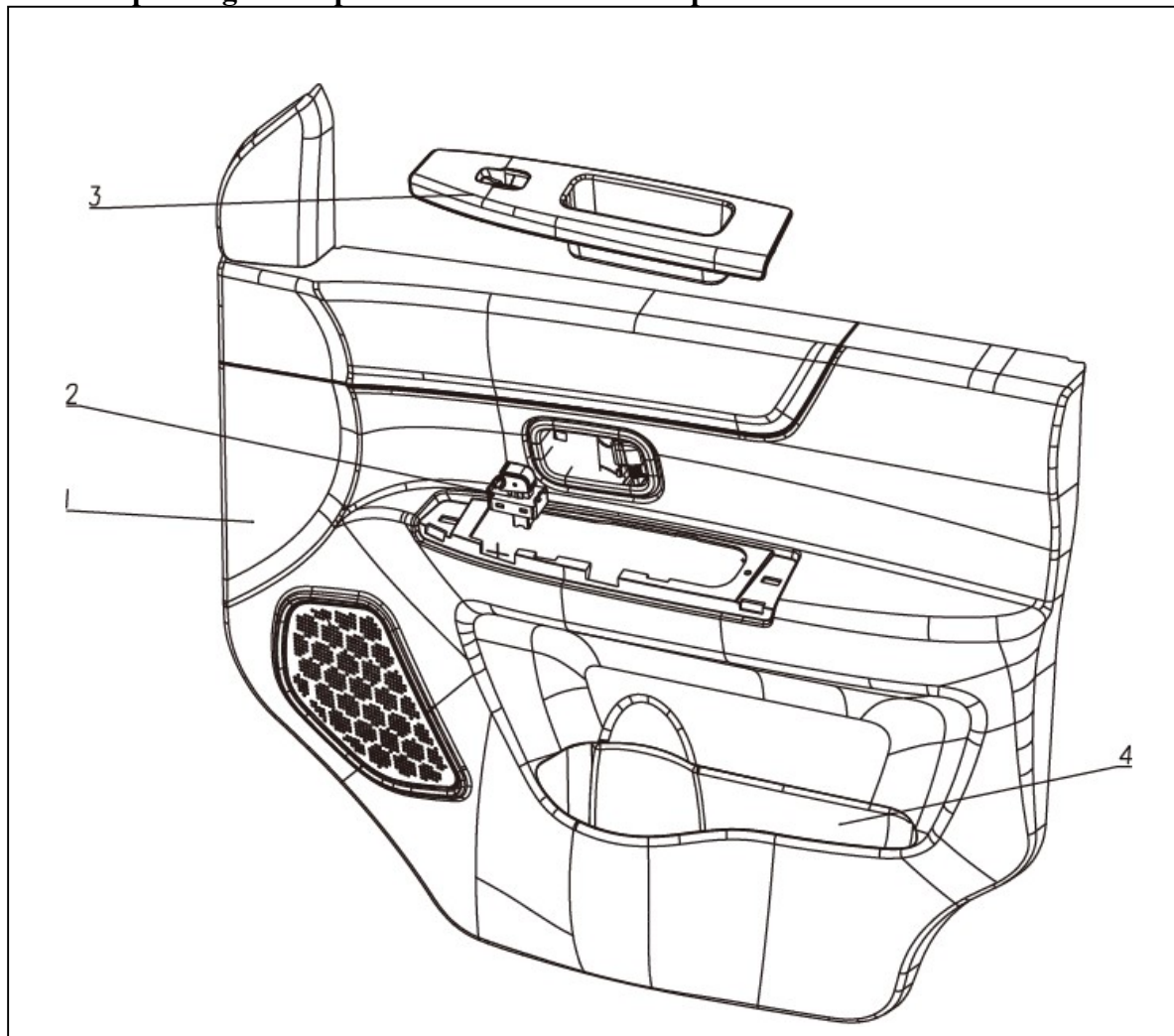
6.6.2.1 Driver side power window switch component view (Only the front window is power window)



Icon

1. Left front door inner guard
2. Driver side power window switch
3. Left front door armrest
4. Left front door glove box assembly

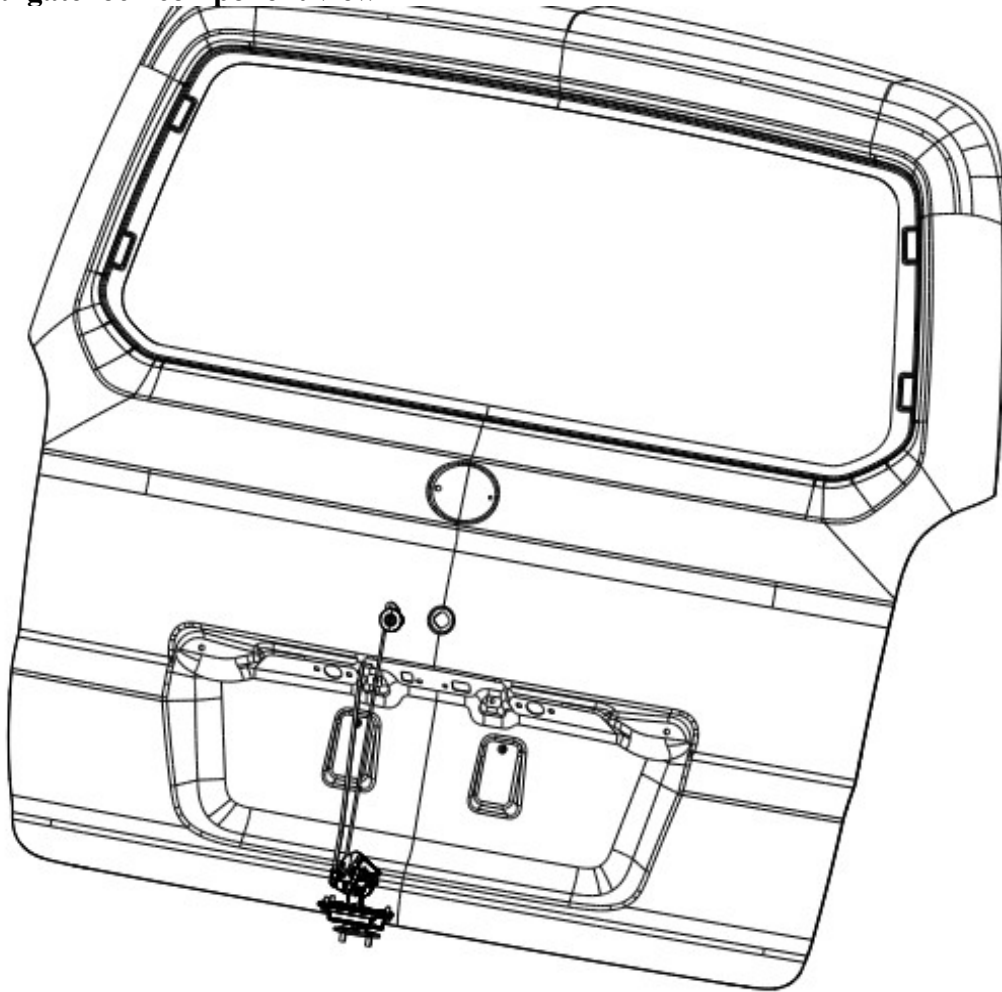
6.6.2.2 Front passenger side power window switch component view



Icon

1	Right front door interior trim panel	2	Front passenger side power window switch	3	Right front door armrest	4	Right front door glove box
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6.6.2.3 Tailgate lock component view

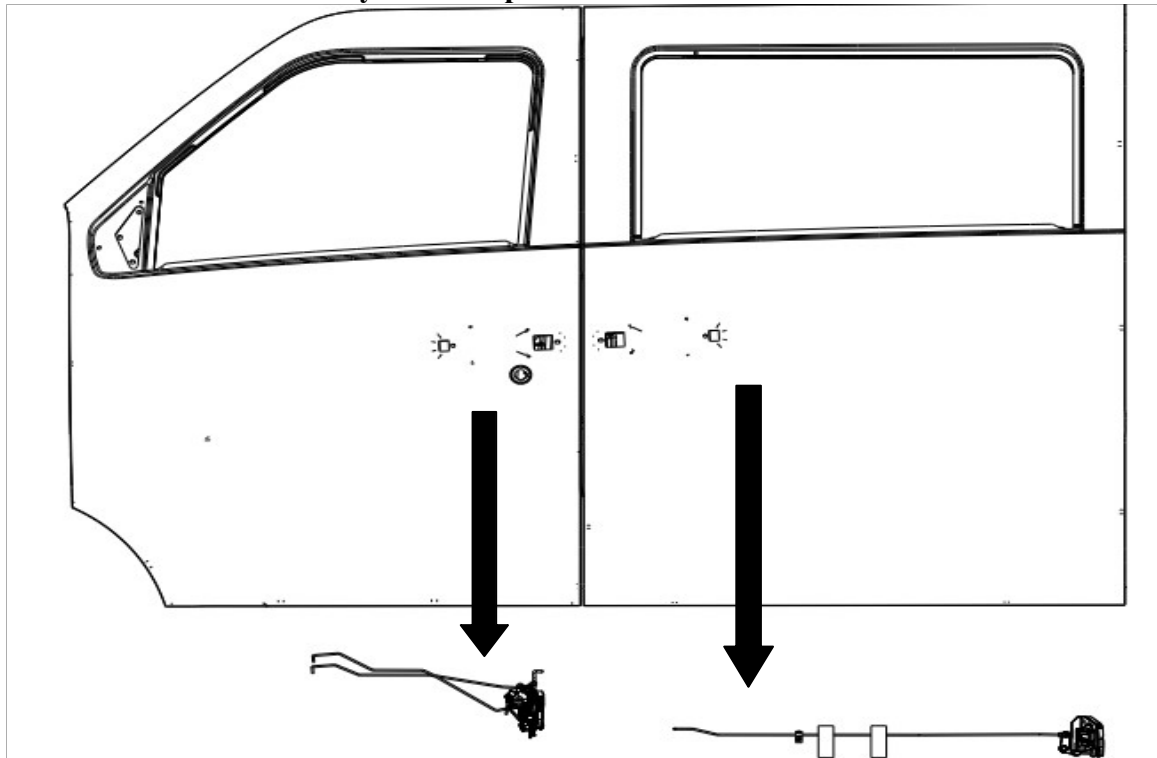


Icons:

1	Back door lock assembly
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(1) Back door lock assembly

6.6.2.4 Mechanical door lock system component view



Icons:

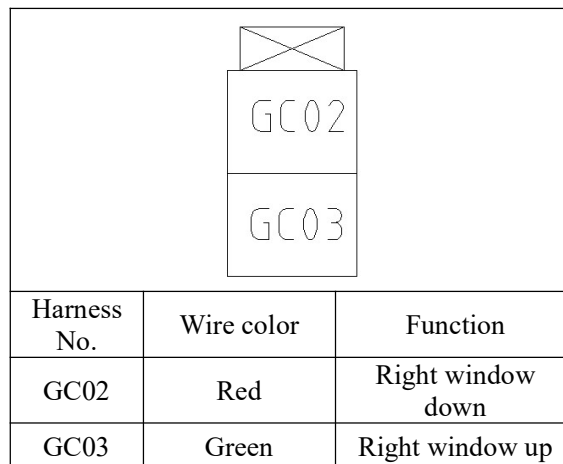
1	Front door lock assembly	2	Rear side sliding door lock assembly
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6.6.2.5 Door system connector end view

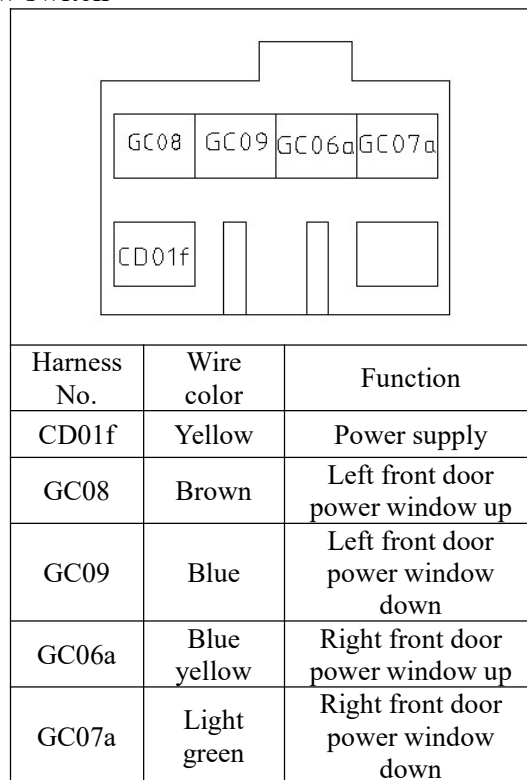
Left lifter motor

Harness No.	Wire color	Function
GC04	White	Left window down
GC05	Red	Left window up

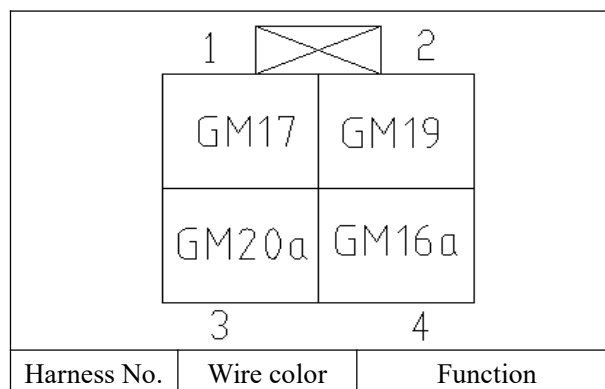
Right lifter motor



Left front power window switch

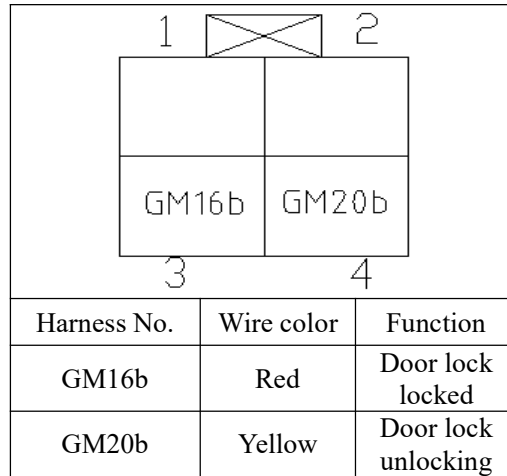


Left front door lock

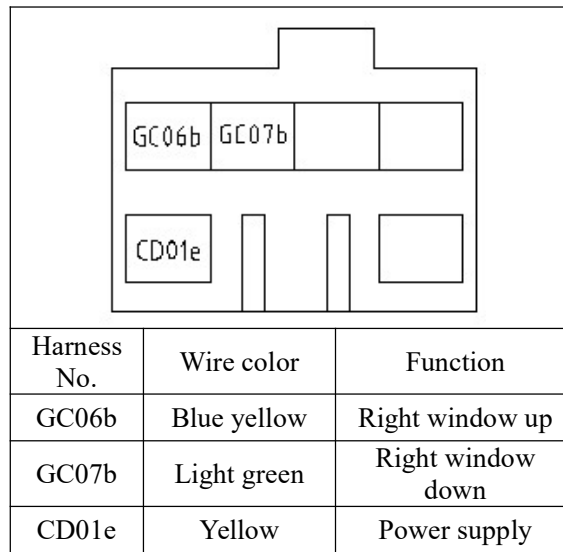


GM20a	Yellow	Door lock unlocking
GM16a	Red	Door lock locked
GM17	Orange black	Door lock switch
GM19	White red	Power

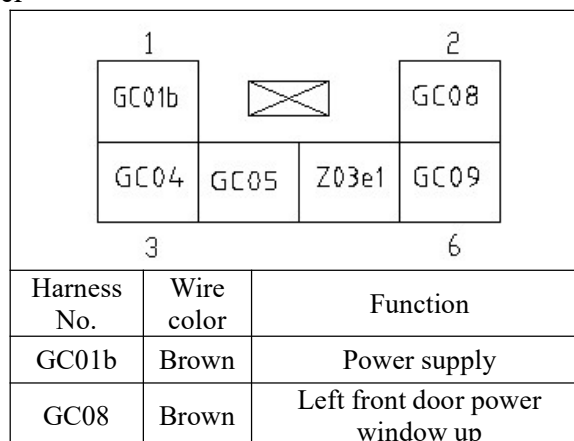
Right front door lock



Right front power window switch




Left front window lifter



GC04	White	Left front window lifter motor down
GC05	Red	Left front window lifter motor up
Z03e1	black	Grounding
GC09	Blue	Left front door power window down

Right front window lifter

1		2	
GC01a		GC06	
GC02	GC03	Z04f1	GC07
3		6	
Harness No.	Wire color	Function	
GC01a	White red	Power supply	
GC06	Blue yellow	Right front door power window up	
GC02	Red	Right front window lifter motor down	
GC03	Green	Right front window lifter motor up	
Z04f1	black	Grounding	
GC07	Light green	Right front door power window down	

6.6.3 Diagnosis information and procedures

6.6.3.1 Door window lifter does not work

All

Steps	Measures	Yes	No
1	1. Turn the ignition switch to ON. 2. Check whether the circuit wire is disconnected.	To 7	To 2
2	1. Turn the ignition switch to the locked position. 2. Disconnect the front left window switch. 3. Turn the ignition switch to ON. 4. Using a test lamp to light the space between the main harness and the left front door harness connector CD01f and ground. Does the lamp illuminate?	To 3	To 5
3	Using a test lamp to light the space between the main harness and the right front door harness connector CD01e and ground. Does the lamp illuminate?	To 4	To 6
4	Repair the poor connection at the switch or replace the left window switch.	-	-
5	Repair the poor connection or open circuit between fuse box F42 and the left front door harness connector CD01f.	-	-
6	Repair the poor connection or open circuit between fuse box F42 and right front door harness connector CD01e.	-	-
7	Repair the grounding short-circuit in the fuse of circuit F42. Is the repair	-	To 2

	completed?		
--	------------	--	--

Left side

Steps	Measures	Yes	No
1	Check whether the circuit fuse is disconnected. Is the circuit disconnected?	To 11	To 2
2	1. Disconnect the left window lifter motor 2. Inspect for poor connection of the harness from the left door window switch to the window motor and repair the harness as necessary. 3. Turn the ignition switch to the ON position and check whether the voltage of the left door switch CD01f is normal?	To 3	To 4
3	1. Disconnect the front left window lifter motor and controller connector. 2. Turn the ignition switch to ON. 3. Press the up and down buttons of the window switch respectively, while using a digital multimeter. Check whether the harness voltage of left front window controller GC08 and GC09 is normal.	To 6	To 5
4	Check the harness from the fuse box to the main harness connector CD01f, and repair the harness if necessary.	-	-
5	Replace the switch	-	-
6	1. Disconnect the left door controller plug-in. 2. Turn the ignition switch to ON. 3. Use a digital multimeter at the same time. Check whether the harness voltage of left front window controller GC01b is normal.	To 7	To 8
7	1. Disconnect the left front window lifter motor connector 2. Turn the ignition switch to ON. 3. Press the up and down buttons of the window switch respectively, while using a digital multimeter. Check whether the harness voltage of left front window controller GC05 and GC04 is normal.	To 10	To 9
8	Check the harness from the fuse box to the controller connector GC01b, and repair the harness if necessary.	-	-
9	Replace the left front window lifter. Is the repair completed?	-	-
10	Replace the left front window lifter motor. Is the repair completed?	-	-
11	Replace F42 fuse. Is the repair completed? Replace F24 fuse. Is the repair completed?	-	To 2

6.6.3.2 Diagnostic procedure for the central door lock system (central door lock inoperative)

Steps	Measures	Yes	No
1	Check whether the fuse is intact?	Go to step 2	Go to step 3
2	Replace the damaged fuse.	Go to step 3	-
3	Please separate the connector between the central door lock control box and the main harness, and use a digital multimeter to measure the voltage at pin GM10 of the main harness. Is the voltage normal?	Go to step 7	Go to step 4
4	Please check and repair the main wire harness of the central control door lock pin GM10 from the fuse to confirm that it is OK.	Go to step 5	-
5	Remove the central door lock module, turn the ignition device to the "ON" position, and use a digital multimeter to measure the voltage at pin AK03c. Is the voltage normal?	Go to step 8	Go to step 6
6	Please check and repair the main harness from the ignition switch to the central locking pin AK03c according to the electrical circuit diagrams. Confirm that it is OK.	Go to step 8	-
7	Replace with a new central door lock module. Is the system normal?	-	Go to step 8

8	Use a digital multimeter to measure the grounding wire (pin Z04e) of the central door lock module. Is it well grounded?	Go to step 10	Go to step 9
9	Please repair the grounding wire and make sure it is well grounded.	Go to step 16	-
10	Please disconnect the central door lock motor connector and the switch connectors at each door; use a digital multimeter to test and check the main harness from pins GM16 and GM20 to each door motor according to the circuit diagram; repair the wire harness as necessary. Confirm the wire harness is OK. Is the system normal?	-	Go to step 11
11	Please check the internal structure of the central door lock switch and the central motors at each door, and replace or repair them if necessary. The system is intact.	-	-

6.6.3.3 Inspection of power window system

Steps	Measures	Normal results	Abnormal results
1	Turn the ignition switch to ON.	-	-
2	Operate the left front door window from the switch on the left window control panel.	Operate quietly and smoothly without jamming.	Power window does not work.
3	Operate the right front door window from the switch on the left window control panel.	The front right window operates quietly and smoothly without jamming.	Power window does not work.
4	Operate the right front window from the switch on the right inner door handle.	The front right window operates quietly and smoothly without jamming.	Power window does not work.

6.6.3.4 Inspection of power door lock system

Steps	Measures	Normal results	Abnormal results
1	Lock and unlock according to the remote key in the User Manual	All doors are locked and unlocked according to the User Manual.	The door lock does not work according to the User Manual.

Operation guide for central door lock

1. Anti-theft setting

When IGN-SW is OFF and all doors closed, press the lock button once to lock the doors, the turn signal lamps flash once, the anti-theft horn sounds once, and the vehicle enters the anti-theft alert state.

2. Anti-theft setting deactivated

1) The vehicle is in an alert state. Press the unlock button once to unlock the doors. The turn signal lamps flash twice, the anti-theft horn sounds twice, and the anti-theft setting is deactivated.

2) If the remote control is lost or fails, use the emergency key to first open the driver side door, and then continuously turn IGN-SW ON ←→ OFF back and forth for 6 times within 15 seconds. The sixth time, the emergency key stays in the IGN-SW ON position for more than 2 seconds to

release the anti-theft setting.

3. Anti-theft alert

1) In the anti-theft alert state, when the door or IGN-SW is ON, the turn signal lamps flash for 25-30 seconds, and the anti-theft horn alarms synchronously.

2) Secondary anti-theft setting

A. When IGN-SW is OFF, if the door has not been opened within 25 seconds after remote unlocking, the turn signal lamps flash once, the anti-theft horn sounds once, and the door automatically locks, entering the anti-theft alert state again;

B. If there is a trigger signal within 25 seconds after remote unlocking, such as IGN-SW ON, the door has been opened, and this function fails.

3) Door open indicator lamp

In the anti-theft release state, if one of the doors or IGN-SW ON is not closed properly when pressing the lock key, the horn alarm will sound three times and the turn signal lamps will flash three times, indicating that the arming is unsuccessful.

4) Manual unlocking and locking

Control the unlocking and locking of the central door lock by controlling the manual handle of the door lock motor on the driver side (left front door).

4. Remote control learning

When the remote control is damaged or lost, the original remote control can be deleted from the host computer memory through a relearning operation, and then a new remote control can be relearned.

Learning method:

① Press and hold the host learning button (>0.5 seconds)

Use the emergency key to continuously turn IGN-SW ON \longleftrightarrow OFF back and forth for 3 times within 6 seconds. The third time, the emergency key stays in the IGN-SW ON position for more than 2 seconds, the horn sounds once, and the turn signal lamps remain on for a long time, indicating that the host machine enters the learning state;

② Press any key on the remote control, and the turn signal lamps flash for three times before

turning off, indicating that the remote control has successfully learned, and the system automatically exits the learning mode; after the system enters the learning state, if there is no operation within 15 seconds, it will automatically exit and the original remote control will remain unchanged.

③ The system only allows learning one remote control.

5. Precautions

A. Please use the remote control to open and close the central door lock. In the alert state, opening the door with a key will trigger an alarm;

B. Before the vehicle is powered off, and when you get off, please take away the remote control. After getting off and closing the door, timely press the remote control lock button to lock the door;

C. Do not string the two remote controls together to avoid accidental losses and trouble;

D. Do not press the remote control button arbitrarily;

E. If water enters the remote control, immediately remove the battery, dry the remote control with a low gear hot air blower, and wipe the battery dry;

F. If the remote control buttons do not respond and the LED does not prompt, the remote control battery may be low. Please replace the battery timely. The battery model is CR2032, and the number is one.

6.6.4 Maintenance Guide

6.6.4.1 Replacement of the front door

Removal steps

1. Remove the exterior rearview mirror. Refer to "Replacement of the exterior rearview mirror".

2. Remove the door interior trim. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

3. Remove the front door window sill outer sealing strip. Refer to "Replacement of the front door window sill outer sealing strip".

4. Remove the front door speaker. Refer to "Replacement of the front door speaker" in "Entertainment system".

5. Remove the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".
6. Remove the window glass. Refer to "Replacement of the front door window".
7. Remove the door window sealing strip. Refer to "Replacement of the front door window sealing strip".
8. Remove the window glass guide rail. Refer to "Replacement of the front door window glass guide rail".
9. Remove the window glass lifter. Refer to "Replacement of the front door (power) glass lifter".
10. Remove the inner handle. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".
11. Remove the lock block. Refer to "Replacement of the front door lock block".
12. Remove the outer handle. Refer to "Replacement of the front door outer handle".
13. Remove the front door lock cylinder. Refer to "Replacement of the front door lock cylinder".
14. Remove the stopper.
15. Remove the harness.
16. Remove the hinge.

Installation steps

1. Install the hinge.
2. Install the harness.
3. Install the stopper.
4. Install the outer handle. Refer to "Replacement of the front door outer handle".
5. Install the front door lock cylinder. Refer to "Replacement of the front door lock cylinder".
6. Install the lock block. Refer to "Replacement of the front door lock block".
7. Install the inner handle. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".
8. Install the window glass lifter. Refer to "Replacement of the front door (power) glass lifter".

9. Install the window glass guide rail. Refer to "Replacement of the front door window glass guide rail".

10. Install the door frame sealing strip. Refer to "Replacement of the front door window sealing strip".

11. Install the window. Refer to "Replacement of the front door window".

12. Install the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

13. Install the front door speaker. Refer to "Replacement of the front door speaker" in "Entertainment system".

14. Install the door interior trim panel. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

15. Install the front door window sill outer sealing strip. Refer to "Replacement of the front door window sill outer sealing strip".

16. Install the exterior rearview mirror. Refer to "Replacement of the exterior rearview mirror".

6.6.4.2 Replacement of the rear side sliding door

Removal steps

1. Remove the glass lifter handle.

2. Remove the inner handle. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".

3. Remove the door interior trim panel. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".

4. Remove the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

5. Remove the window sill outer sealing strip. Refer to "Replacement of the rear side sliding door window sill outer sealing strip".

6. Remove the glass guide rail. Refer to "Replacement of the rear side sliding door window glass guide rail".

7. Remove the window. Refer to "Replacement of the rear side sliding door window".

8. Remove the door window sealing strip. Refer to “Replacement of the rear side sliding door window sealing strip”.

9. Remove the window lifter (manual). Refer to "Replacement of the rear side sliding door (manual) window lifter".

10. Remove the lock tie rod. Refer to "Replacement of the rear side sliding door lock tie rod".

11. Remove the inner tie rod. Refer to "Replacement of the rear side sliding door inner tie rod".

12. Remove the outer tie rod. Refer to "Replacement of the rear side sliding door outer tie rod".

13. Remove the lock block. Refer to "Replacement of the rear side sliding door lock block".

14. Remove the outer handle. Refer to "Replacement of the rear side sliding door outer handle".

15. Remove the rear side sliding door positioning buckle (door latch switch).

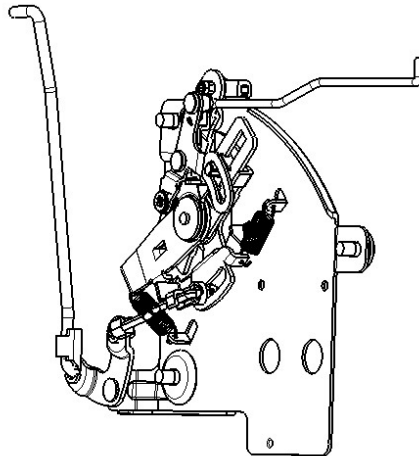
16. Remove the rear side sliding door upper buffer adhesive.

17. Remove the middle slide rail stop block of the rear side sliding door. Refer to "Replacement of the rear side sliding door middle slide rail".

18. Remove the rear side sliding door upper sheave. Refer to "Replacement of the rear side sliding door upper sheave bracket".

19. Remove the rear side sliding door middle sheave. Refer to "Replacement of the rear side sliding door middle sheave bracket".

20. Remove the rear side sliding door lower sheave. Refer to "Replacement of the rear side sliding door lower sheave bracket".



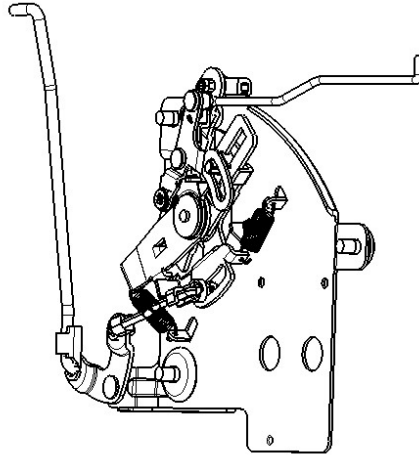
Installation steps

1. Install the rear side sliding door lower sheave. Refer to "Replacement of the rear side sliding door lower sheave bracket".
2. Install the rear side sliding door middle sheave. Refer to "Replacement of the rear side sliding door middle sheave bracket".
3. Install the rear side sliding door upper sheave. Refer to "Replacement of the rear side sliding door upper sheave bracket".
4. Install the rear side sliding door to the frame.
5. Install the rear side sliding door upper buffer adhesive.
6. Install the middle slide rail stop block of the rear side sliding door. Refer to "Replacement of the rear side sliding door middle slide rail".
7. Install the rear side sliding door positioning buckle (door latch switch).
8. Install the outer handle. Refer to "Replacement of the rear side sliding door outer handle".
9. Install the lock block. Refer to "Replacement of the rear side sliding door lock block".
10. Install the outer tie rod. Refer to "Replacement of the rear side sliding door outer tie rod".
11. Install the inner tie rod. Refer to "Replacement of the rear side sliding door inner tie rod".
12. Install the lock tie rod. Refer to "Replacement of the rear side sliding door lock tie rod".
13. Install the window lifter (manual). Refer to "Replacement of the rear side sliding door (manual) window lifter".
14. Install the window sealing strip. Refer to "Replacement of the rear side sliding door window sealing strip".
15. Install the window. Refer to "Replacement of the rear side sliding door window".
16. Install the glass guide rail. Refer to "Replacement of the rear side sliding door glass guide rail".
17. Install the window sill outer sealing strip. Refer to "Replacement of the rear side sliding door window sill outer sealing strip".
18. Install the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

19. Install the door interior trim panel. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".

20. Install the inner handle. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".

21. Install the glass lifter handle.



6.6.4.3 Replacement of the front door lock block

Removal steps

1. Remove the door interior trim panel and glove box. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

2. Remove the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

3. Remove the window glass rear guide rail. Refer to "Replacement of the front door window glass guide rail".

4. Release the outer handle tie rod. Refer to "Replacement of the front door outer handle tie rod adjustment nut".

5. Release the inner handle tie rod. Refer to "Replacement of the front door inner tie rod".

6. Release the lock tie rod. Refer to "Replacement of the front door lock tie rod".

7. Release the lock cylinder tie rod. Refer to "Replacement of the front door lock cylinder tie rod".

8. Remove the door lock block screws (1, 2, 3). 9. Disconnect the electrical connection from

the lock block (only if there is a central locking actuator).

10. Remove the connecting bolts between the lock block and the central locking actuator.

Installation steps

1. Install the connecting bolts between the lock block and the central locking actuator.
2. Connect the electrical connection from the lock block (only if there is a central locking actuator).
3. Install the lock block screws and tighten the screws to 5-7N•m.
4. Install the lock cylinder tie rod. Refer to "Replacement of the front door lock cylinder tie rod".
5. Install the lock tie rod. Refer to "Replacement of the front door lock tie rod".
6. Install the inner tie rod. Refer to "Replacement of the front door inner tie rod".
7. Install the outer handle tie rod. Refer to "Replacement of the front door outer handle tie rod adjustment nut".
8. Install the window glass rear guide rail. Refer to "Replacement of the front door window glass guide rail".
9. Install the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".
10. Install the door interior trim panel and glove box. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

6.6.4.4 Replacement of the rear side sliding door lock block

Removal steps

1. Remove the window glass lifter handle (manual). Refer to "Replacement of the rear side sliding door (manual) window lifter".
2. Remove the inner handle. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".
3. Remove the door interior trim panel. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".
4. Remove the water retaining film. Refer to "Replacement of the rear side sliding door water

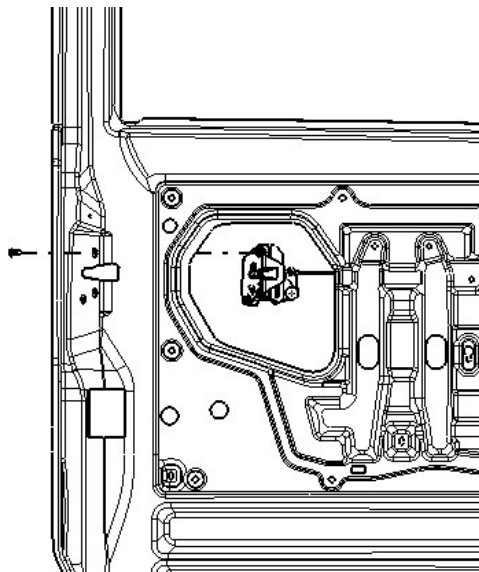
retaining film" in "Interior trim".

5. Remove the window sill outer sealing strip. Refer to “Replacement of the rear side sliding door window sill outer sealing strip”.

6. Remove the glass rear guide rail. Refer to "Replacement of the rear side sliding door window glass guide rail".

7. Loosen the tie rod connecting the lock block from the steering mechanism of the rear side sliding door lock.

8. Remove the door lock block screws.



Installation steps

1. Install the door lock block screws. Tighten the lock block screws to 5-7N•m.

2. Connect the steering mechanism of the rear side sliding door lock with the lock block tie rod.

3. Install the glass rear guide rail. Refer to "Replacement of the rear side sliding door window glass guide rail".

4. Install the window sill outer sealing strip. Refer to “Replacement of the rear side sliding door window sill outer sealing strip”.

5. Install the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

6. Install the door interior trim panel. Refer to "Replacement of the rear side door trim panel

(comfort)" in "Interior trim".

7. Install the inner handle. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".

8. Install the glass lifter (manual). Refer to "Replacement of the rear side sliding door (manual) window lifter".

6.6.4.5 Adjustment of door latch

Adjust the lock block upward or downward and inward or outward.

1. Loosen the latch screw.
2. Move the latch upward or downward and inward or outward as needed.
3. Tighten the door lock latch screw to 9-17N•m.

Adjust the latch forward or backward

1. Apply molding clay or vehicle body caulking compound to the door lock opening (remove the clay or caulking compound after adjustment).

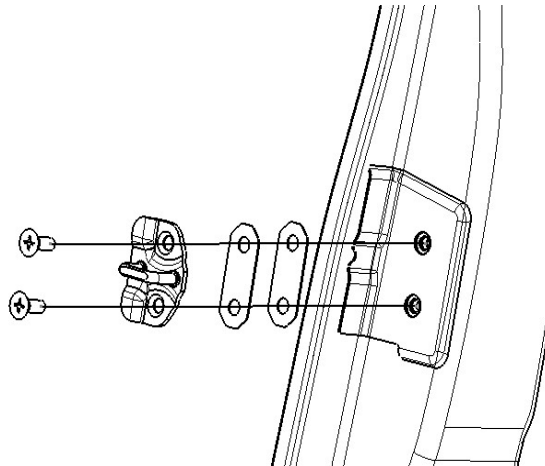
2. Close the door from a sufficient distance so that the latch can press the caulking compound.
3. Open the door and check that the latch indentation is in the middle of the door lock opening.
4. If adjustment is necessary, perform the following procedure:

- Remove the latch.
- Add or remove washers as needed.
- Install the latch.
- Tighten the door lock latch screw to 9-17N•m.

6.6.4.6 Replacement of the door latch

Removal steps

1. Mark the location of the existing latch.
2. Remove the screws.
3. Remove the door lock latch.
4. Depending on the equipment conditions, remove the washer.



Installation steps

1. Install the removed washer.
2. Install the door lock latch to the marked position.
3. Install the screws.

Tighten

Tighten the screw to 9-17N•m.

4. Check that the latch engages with the lock block. If adjustment is necessary, see "Adjustment of the door latch".

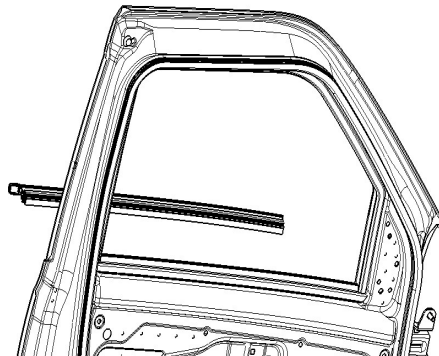
6.6.4.7 Replacement of the front door window sill outer sealing strip

Removal steps

1. Remove the window sill outer sealing strip.

Installation steps

1. Install the window sill outer sealing strip onto the door flange and press it into place.



6.6.4.9 Replacement of the front door window sill inner sealing strip

Removal steps

1. Remove the front door interior trim panel. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

2. Pull the window sill inner sealing strip straight from the front door interior trim panel flange and remove the window sill inner sealing strip.

Installation steps

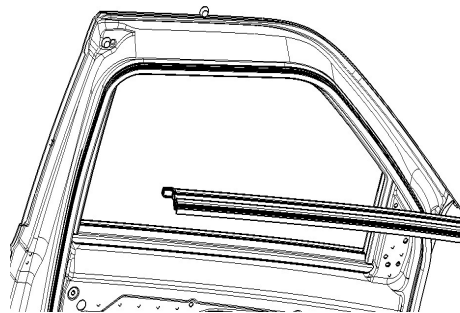
1. Fully buckle the locking position of the sealing strip inside the window sill onto the positioning hole of the front door interior trim panel, with both ends flush with both ends of the interior trim panel. Turn the locking position 90° and tighten the sealing strip inside the window sill.

2. Install the front door interior trim panel. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

Special precautions:

- Ensure that the front end of the window sill inner sealing strip is inserted between the door window sealing strip and the door inner panel.

- Ensure that the rear end of the window sill inner sealing strip is flush with the rear foot of the door window sealing strip, but does not interfere with the track of the window. Install the entire window sill inner sealing strip firmly in place.



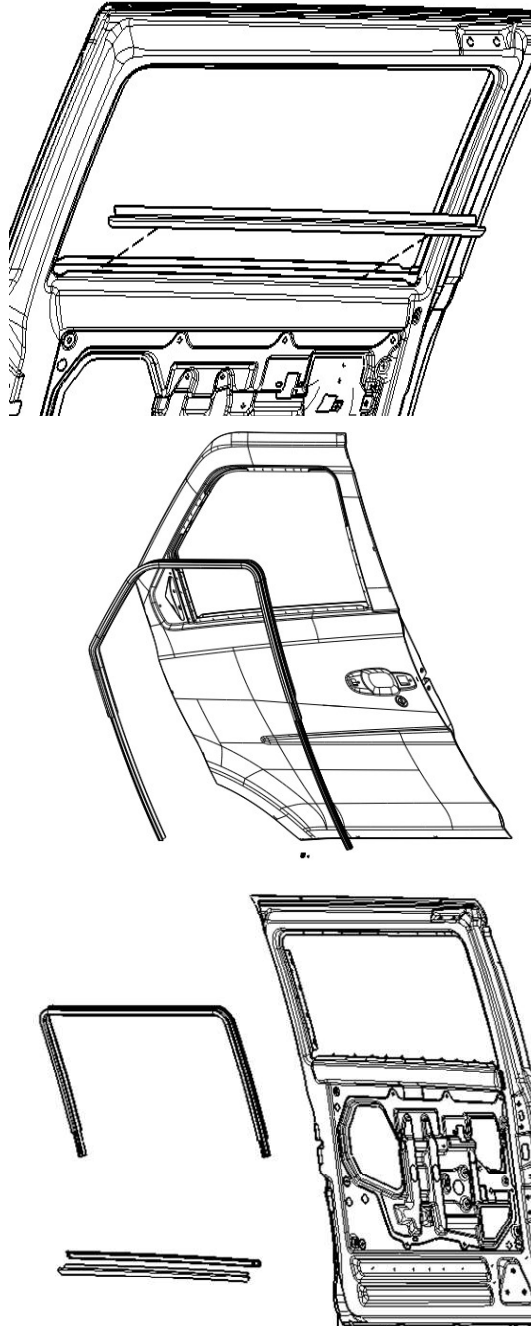
6.6.4.10 Replacement of the front door window sealing strip

Removal steps

1. Remove the front door interior trim panel. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

2. Remove the front door water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

3. Remove the front door window sill outer sealing strip. Refer to “Replacement of the front door window sill outer sealing strip”.
4. Remove the front window. Refer to "Replacement of the front door window".
5. Carefully pull the door window sealing strip out of the door.



Installation steps

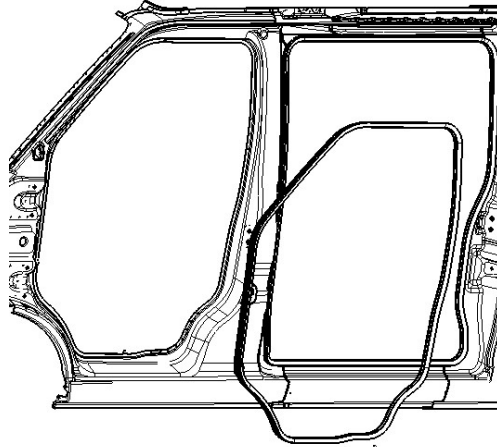
1. Install the door and window sealing strip from the top corner in two directions.
2. Firmly install the door window sealing strip to the door.

3. Install the door window. Refer to "Replacement of the front door window".

4. Install the window sill outer sealing strip. Refer to "Replacement of the front door window sill outer sealing strip".

5. Install the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

6. Install the front door interior trim panel. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".



6.6.4.11 Replacement of the rear side sliding door window sealing strip

Removal steps

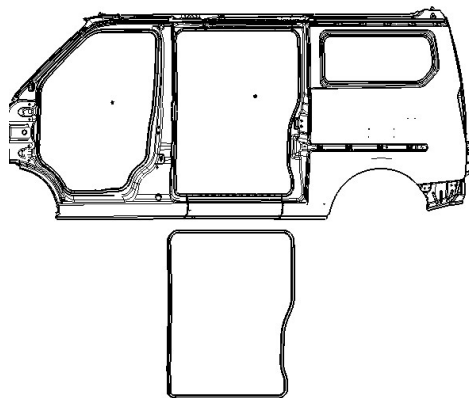
1. Place the window in the fully lowered position.

2. Remove the rear door interior trim panel. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".

3. Remove the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

4. Remove the window. Refer to "Replacement of the rear side sliding door window".

5. Pull the door window sealing strip out of the door.



Installation steps

1. Install the door and window sealing strip from the top corner in two directions.
2. Firmly install the door window sealing strip to the door.
3. Install the window. Refer to "Replacement of the rear side sliding door window".
4. Close the window.
5. Check the glass to ensure that it is positioned correctly on the door window sealing strip.
6. Install the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".
7. Install the interior trim panel. Refer to "Replacement of the rear side door trim panel (comfort)" in "Interior trim".

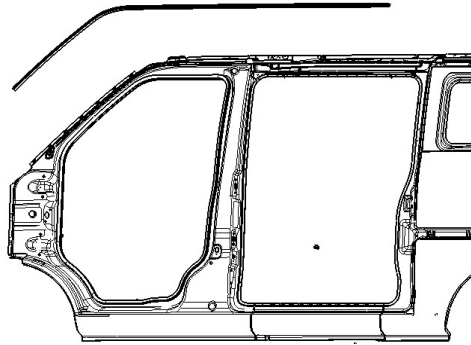
6.6.4.12 Replacement of the front door frame sealing strip

Removal steps

1. Open the front door.
2. Remove the door sill trim panel.
3. Pull the front door frame sealing strip out of the welded flange and complete the removal.

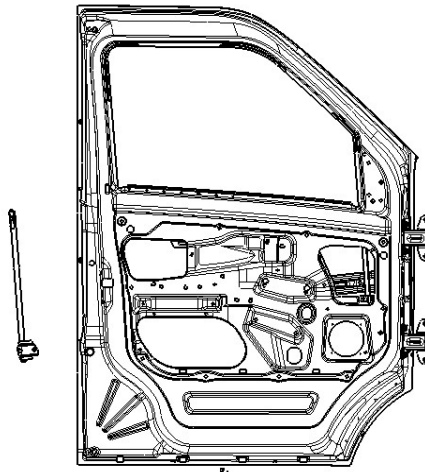
Special precautions: Completely mark the position of the gap.

According to the installation instructions, the door frame sealing strip cannot be reused.



Installation steps

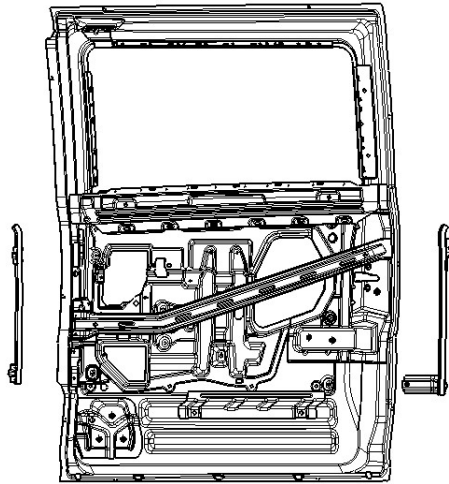
1. Install the door frame sealing strip onto the flange of the vehicle body.
2. Install the side door sill trim panel.
3. Close the front door.



6.6.4.13 Replacement of the rear side sliding door frame sealing strip

Removal steps

1. Open the rear side sliding door.
2. Pull the rear side sliding door frame sealing strip out of the welded flange and complete the removal.



Installation steps

1. Install the sealing strip onto the weld flange.
2. Check whether the appearance of the door frame sealing strip is flat and smooth.
3. Close the rear side sliding door.

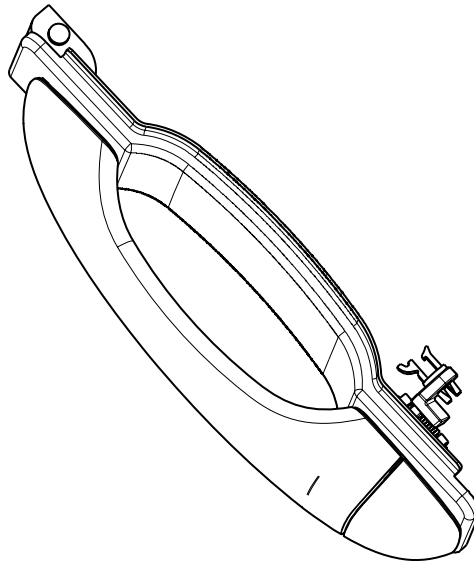
6.6.4.14 Replacement of left and right water channel sealing strips

Removal steps

1. Open the front door and rear side sliding door.
2. Pull the left and right water channel sealing strips out of the welded flange and complete the removal.

Installation steps

1. Install the sealing strip onto the weld flange.
2. Check whether the appearance of the left and right water channel sealing strips is flat and smooth.
3. Close the front door and rear side sliding door.



6.6.4.15 Replacement of the front door window glass guide rail

Removal steps

1. Remove the door window sealing strip. Refer to “Replacement of the front door window sealing strip”.
2. Loosen and remove the fixing bolts.
3. Remove the window glass rear guide rail from the door.

Installation steps

1. Install the window glass rear guide rail and fixing bolt.

Tighten

Tighten the guide rail bolt to 6-12N•m.

2. Install the door window sealing strip. Refer to “Replacement of the front door window sealing strip”.

6.6.4.16 Replacement of the rear side sliding door window glass guide rail

Removal steps

1. Remove the door window sealing strip. Refer to “Replacement of the rear side sliding door window sealing strip”.
2. Remove the front and rear guide rails of the window glass by loosening and removing 4 fastening bolts.

Installation steps

1. Install the front and rear guide rails of the window glass and fasten with fastening bolts.

Tighten

Tighten the guide rail bolt to 6-12N•m.

2. Install the door window sealing strip. Refer to “Replacement of the rear side sliding door window sealing strip”.

6.6.4.17 Replacement of the front door outer handle

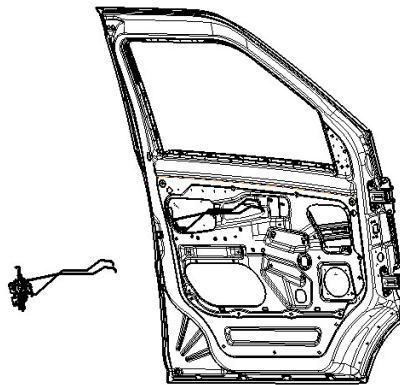
Removal steps

1. Remove the front door accessories. Refer to "Replacement of front door window sealing strip", "Replacement of front door window sill outer sealing strip", "Replacement of front door window glass guide rail", "Replacement of front door (power) glass lifter", "Replacement of front door window glass guide rail", "Interior trim", "Replacement of front door lock block", "Replacement of front door lock cylinder" etc.

2. When removing the outer handle tie rod, refer to "Replacement of the front door outer handle tie rod adjustment nut".

3. Remove the fixing screws of the outer handle on the inner door panel.

4. Remove the front door outer handle.

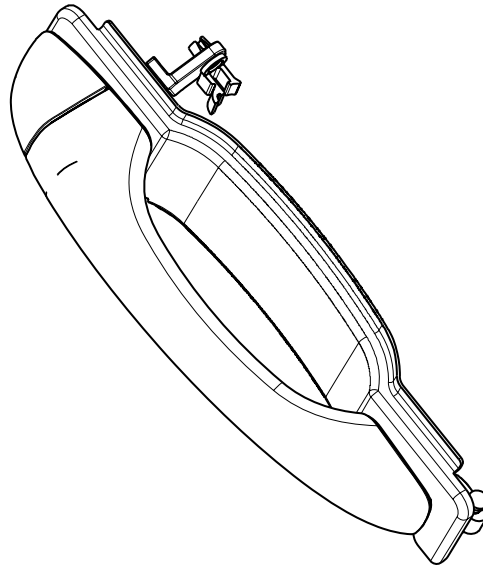


Installation steps

1. Install the front door outer handle.

2. Install the fixing screws of the outer handle on the inner door panel.

3. When installing the outer handle tie rod, refer to "Replacement of the front door outer handle tie rod adjustment nut".



6.6.4.18 Replacement of the rear side sliding door outer handle

Removal steps

1. Remove the sliding door accessories. Refer to "Replacement of rear side sliding door window sealing strip", "Replacement of rear side sliding door window sill outer sealing strip", "Replacement of rear side sliding door window glass guide rail", "Interior trim", "Replacement of rear side sliding door lock tie rod", "Replacement of rear side sliding door inner tie rod", "Replacement of rear side sliding door lock block", etc.

2. When removing the outer handle tie rod, refer to "Replacement of the rear side sliding door outer tie rod".

3. Remove fixing screws from the exterior handle on the inner door panel.

4. Remove the outer handle.

Installation steps

1. Install the outer handle.

2. Install fixing screws for the upper handle of the inner door panel.

3. When installing the outer handle tie rod, refer to "Replacement of the rear side sliding door outer tie rod".

6.6.4.19 Replacement of the front door lock tie rod

Removal steps

1. Remove the water retaining film. Refer to "Replacement of front door water retaining film"

in "Interior trim".

2. Remove the lock tie rod from the lock.

Installation steps

1. Install the lock tie rod onto the lock.
2. Install the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

6.6.4.20 Replacement of the front door inner tie rod

Removal steps

1. Remove the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

2. Remove the inner tie rod from the lock.
3. Disengage the inner tie rod from the fixing clamp.
4. Remove the inner handle together with the inner tie rod.
5. Remove the inner tie rod from the inner handle.

Installation steps

1. Install the inner tie rod and inner handle.
2. Fix the inner tie rod with the fixing clamp.
3. Install the inner tie rod onto the lock.
4. Install the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

6.6.4.21 Replacement of the front door outer handle tie rod adjustment nut

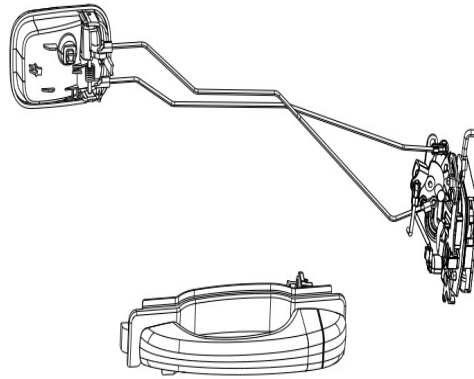
Removal steps

1. Remove the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

2. Lift the window glass to the full up position.
3. Remove the tie rod from the outer handle.
4. Remove the tie rod together with the adjusting nut.
5. Remove the adjusting nut from the tie rod.

Installation steps

1. Install the adjusting nut to the tie rod.
2. Lift the window glass to the full up position.
3. Insert the tie rod with the adjusting nut into the base of the lock.
4. Install the tie rod to the handle.
5. Install the water retaining film. Refer to "Replacement of the front door water retaining film".



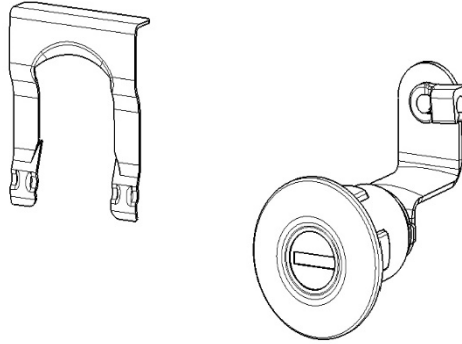
6.6.4.22 Replacement of the front door lock cylinder tie rod

Removal steps

1. When removing the lock, refer to "Replacement of the front door lock block".
2. Separate the tie rod from the lock block.
3. When removing the lock cylinder assembly, refer to "Replacement of the front door lock cylinder".
4. Remove the tie rod assembly from the lock cylinder.

Installation steps

1. Install the tie rod onto the lock cylinder assembly.
2. When installing the lock cylinder assembly, refer to "Replacement of the front door lock cylinder".
3. Attach the tie rod to the lock block.
4. When installing the lock, refer to "Replacement of the front door lock block".



6.6.4.23 Replacement procedure for the front door lock cylinder

Removal steps

1. When removing the lock, refer to "Replacement of the front door lock block".
2. Remove the lock cylinder circlip.
3. Remove the lock cylinder from the lock hole.

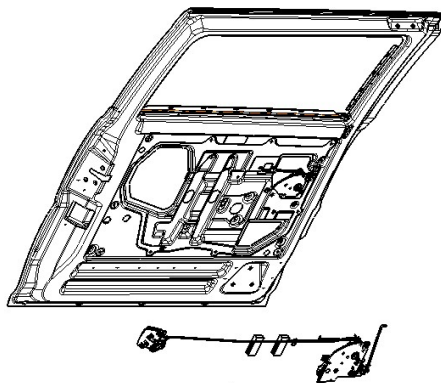
Installation steps

1. Install the lock cylinder to the lock hole.
2. Install the lock cylinder circlip.
3. When installing the lock, refer to "Replacement of the front door lock block".

6.6.4.24 Replacement of the rear side sliding door lock tie rod

Removal steps

1. Remove the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".
2. Remove the lock tie rod from the rear side sliding door lock steering mechanism.



Installation steps

1. Install the lock tie rod onto the rear side sliding door lock steering mechanism.
2. Install the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

6.6.4.25 Replacement of the rear side sliding door inner tie rod

Removal steps

1. Remove the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".
2. Remove the inner tie rod from the lock block.
3. Remove the inner tie rod from the fixing clamp.
4. Remove the inner tie rod from the rear side sliding door lock steering mechanism.

Installation steps

1. Install the inner tie rod onto the rear side sliding door lock steering mechanism.
2. Install the inner tie rod onto the fixing clamp.
3. Install the inner tie rod onto the lock block.
4. Install the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

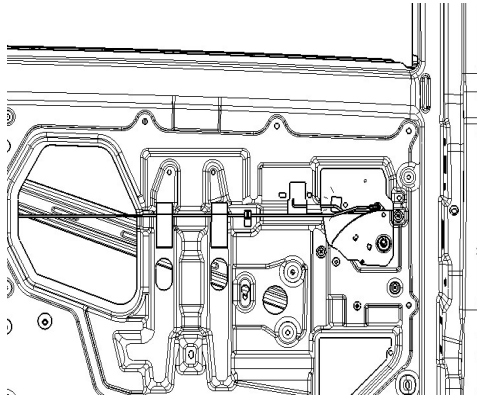
6.6.4.26 Replacement of the rear side sliding door outer tie rod

Removal steps

1. Remove the rear side sliding door lock steering mechanism. Refer "Replacement of the rear side sliding door lock steering mechanism".
2. Remove the outer tie rod from the outer handle.
3. Remove the outer tie rod from the rear side sliding door steering crank assembly.

Installation steps

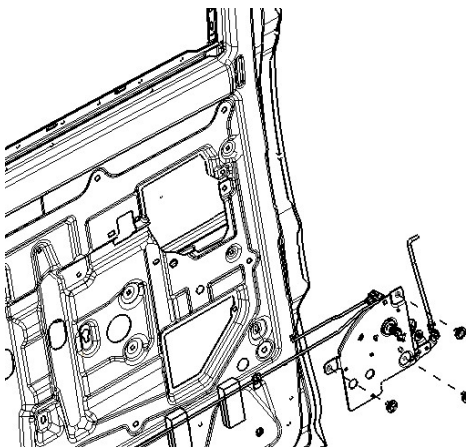
1. Install the outer tie rod on the rear side sliding door steering crank assembly.
2. Install the outer tie rod to the outer handle.
3. Install the rear side sliding door lock steering mechanism. Refer "Replacement of the rear side sliding door lock steering mechanism".



6.6.4.27 Replacement of the rear side sliding door lock steering mechanism

Removal steps

1. Remove the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".
2. Remove the rear side sliding door lock tie rod. Refer to "Replacement of the rear side sliding door lock tie rod".
3. Remove the rear side sliding door inner tie rod. Refer to "Replacement of the rear side sliding door inner tie rod".
4. Remove the connecting rod between the rear side sliding door steering crank assembly and the rear side sliding door lock steering mechanism.
5. Remove the fixing bolts of the rear side sliding door lock steering mechanism.
6. Remove the rear side sliding door lock steering mechanism from the rear side sliding door inner panel.



Installation steps

1. Install the fixing bolts of the rear side sliding door lock steering mechanism.

Tighten

Tighten the bolt to 7-9N•m.

2. Install the connecting rod between the rear side sliding door steering crank assembly and the rear side sliding door lock steering mechanism.

3. Install the rear side sliding door inner tie rod. Refer to "Replacement of the rear side sliding door inner tie rod".

4. Install the rear side sliding door lock tie rod. Refer to "Replacement of the rear side sliding door lock tie rod".

5. Install the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

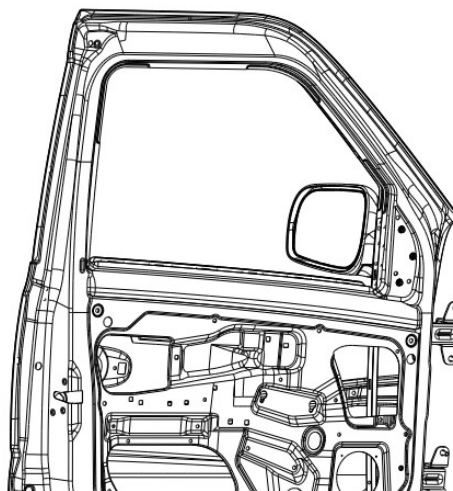
6.6.4.28 Replacement of the manual exterior rearview mirror assembly

Removal steps

1. Remove the front door triangular trim panel. Refer to "Replacement of front door interior trim panel component" in "Interior trim".

2. Remove the exterior rearview mirror fastening nuts.

3. Remove the exterior rearview mirror.



Installation steps

1. Position the exterior rearview mirror above the door.

2. Tighten the nut.

Tighten

Tighten the exterior rearview mirror nut to 6-12N•m.

3. Install the front door triangular trim panel. Refer to "Replacement of front door interior trim panel component" in "Interior trim".

6.6.4.29 Replacement of the front door window glass

Removal steps

1. Remove the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

2. Place the window at the location where the fixing screws of the window glass are removed, and remove the fixing screws of the window glass on the window lifter track.

Special precautions: In order to avoid glass slipping, an assistant is required to help carry the glass.

3. Loosen the front and rear guide rail bolts of the window glass to disengage the guide rail from the fixed position.

4. Take out the window glass from the inside of the door.

Installation steps

1. Place the window glass between the inner and outer door panels from the inside of the door.

2. Position the window lifter guide rail at the location where the window glass fixing screws are installed.

3. Align the window glass fixing screw through hole with the window lifter guide rail mounting hole, and tighten the screw.

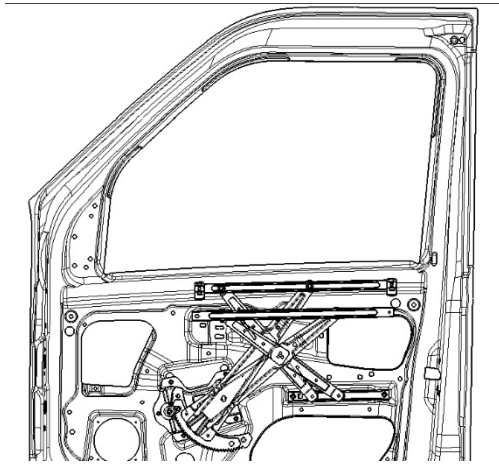
Tighten

Tighten the window lifter track screws to 6-12N•m.

4. Raise the window glass to the top.

5. Install the bolts on the front and rear guide rails of the window glass, and place the door and window sealing strips in the guide rails.

6. Lower the window glass to the bottom, adjust the gap between the front and rear guide rails of the glass, ensure that the glass rises and falls smoothly without swinging left and right, and then tighten the front and rear guide rail bolts.



Tighten

Tighten the front and rear guide rail bolts to 6-12N•m.

7. Install the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

8. Install the door interior trim panel. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".

6.6.4.30 Replacement of the rear side sliding door window

Removal steps

1. Remove the water retaining film. Refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

2. Place the window at the location where the screws of the window glass are removed, and remove the fixing screws of the window glass on the window lifter track.

Special precautions: In order to avoid glass slipping, an assistant is required to help carry the glass.

3. Loosen the front and rear guide rail bolts of the door glass to disengage the guide rail from the fixed position.

4. Take out the window glass from the outside of the door.

Installation steps

1. Place the window glass between the inner and outer door panels from the outside of the door.

2. Position the window lifter guide rail at the location where the window glass fixing screws

are installed.

3. Align the window glass fixing screw through hole with the window lifter guide rail mounting hole, and tighten the screw.

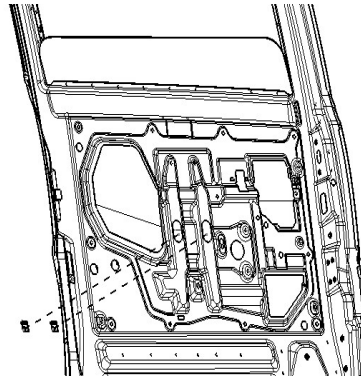
Tighten

Tighten the window lifter track screws to 6-12N•m.

4. Raise the window glass to the top.

5. Install the bolts on the front and rear guide rails of the window glass, and place the door and window sealing strips in the guide rails.

6. Lower the window glass to the bottom, adjust the gap between the front and rear guide rails of the glass, ensure that the glass rises and falls smoothly without swinging left and right, and then tighten the front and rear guide rail bolts.



Tighten

Tighten the front and rear guide rail nuts to 6-12N•m.

7. When installing the water retaining film, refer to "Replacement of the rear side sliding door water retaining film" in "Interior trim".

8. Install the door interior trim panel. Refer to "Replacement of the rear side door interior trim panel (comfort)" in "Interior trim".

6.6.4.31 Replacement of the front door (power) glass lifter

Removal steps

1. Remove the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".

2. Remove the front door window glass. Refer to "Replacement of the front door window".

3. Remove fixing bolts from the glass lifter.
4. Disconnect the electrical connector.
5. Remove the lifter from the door.

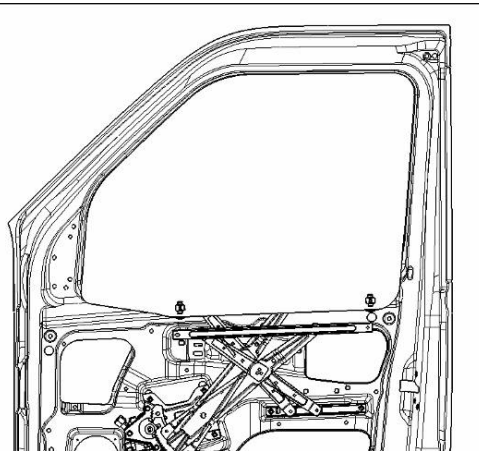
Installation steps

1. Install the glass lifter on the door.
2. Connect the glass lifter motor to the door electrical harness.
3. Install the fixing bolts of the glass lifter.

Tighten

Tighten the bolt to 6-12N•m.

4. Install the front door window glass. Refer to "Replacement of the front door window".
5. Install the water retaining film. Refer to "Replacement of front door water retaining film" in "Interior trim".
6. Install the door interior trim panel. Refer to "Replacement of front door interior trim panel component (comfort)" in "Interior trim".



6.6.4.34 Replacement of front door actuator

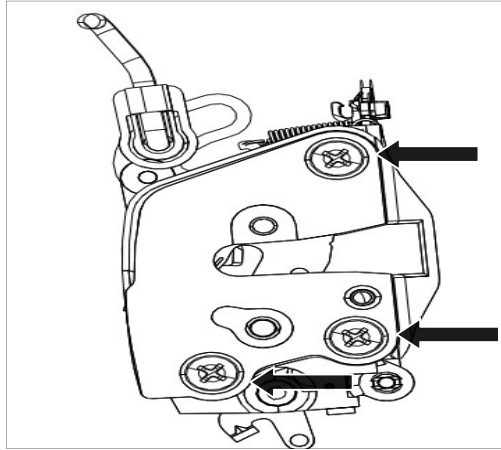
Removal steps

1. Remove the door interior trim panel and door lock assembly.
2. Disconnect the wire plug.
3. Remove the actuator of the front door lock assembly.

Installation steps

1. Install the actuator of the front door lock onto the door lock assembly.

2. Check and adjust the actuator.
3. Connect the wire plug.
4. Install the door lock assembly and door trim panel.



6.6.4.35 Replacement of the rear side sliding door upper sheave bracket

Removal steps

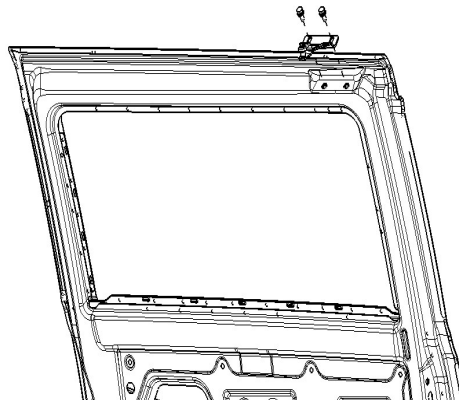
1. Remove the mounting bolts of the rear side sliding door upper sheave bracket.
2. Remove the rear side sliding door upper sheave bracket from the door.

Installation steps

1. Install the rear side sliding door upper sheave bracket on the door.
2. Tighten the bolts of the rear side sliding door upper sheave bracket.

Tighten

Tighten the bolt to 17-28N•m.

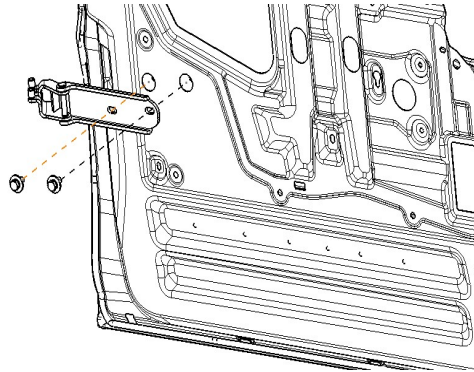


6.6.4.36 Replacement of the rear side sliding door middle sheave bracket

Removal steps

1. Remove the mounting bolts of the rear side sliding door middle sheave bracket.

2. Remove the rear side sliding door middle sheave bracket from the door.
3. Remove the middle slide rail stop block of the rear side sliding door. Refer to "Replacement of the rear side sliding door middle slide rail".
4. Remove the rear side sliding door middle slide rail bracket from the rear side sliding door middle slide rail.

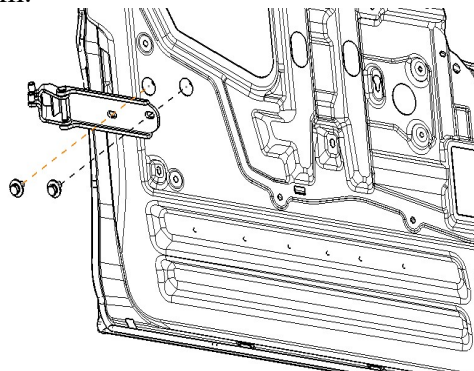


Installation steps

1. Place the rear side sliding door middle slide rail bracket into the rear side sliding door middle slide rail.
2. Install the middle slide rail stop block of the rear side sliding door. Refer to "Replacement of the rear side sliding door middle guide rail".
3. Install the rear side sliding door middle sheave bracket on the door.
4. Tighten the bolts of the rear side sliding door middle sheave bracket.

Tighten

Tighten the bolt to 17-28N•m.



6.6.4.37 Replacement of the rear side sliding door lower sheave bracket

Removal steps

1. Remove the mounting bolts of the rear side sliding door lower sheave bracket.

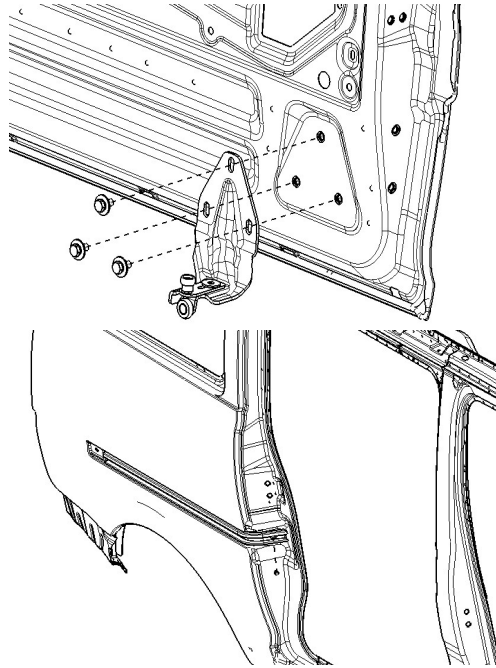
2. Remove the rear side sliding door lower sheave bracket from the door.

Installation steps

1. Install the rear side sliding door lower sheave bracket on the door.
2. Tighten the bolts of the rear side sliding door lower sheave bracket.

Tighten

Tighten the bolt to 17-28N•m.



6.6.4.38 Replacement of the rear side sliding door middle slide rail

Removal steps

1. Remove the rear side sliding door. Refer to "Replacement of the rear side sliding door".
2. Remove the rear side sliding door middle slide rail screws.
3. Remove the rear side sliding door middle slide rail from the vehicle body.

Installation steps


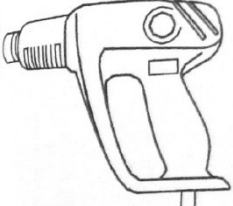
1. Install the rear side sliding door middle slide rail on the vehicle body.
2. Tighten the rear side sliding door middle slide rail screws.

Tighten

Tighten the screw to 5-8N•m.

3. Install the rear side sliding door. Refer to "Replacement of the rear side sliding door".

Special tools

Icon	Part No./Description
	NLM1-S000007 Interior trim staple pry board
	NLM1-S000008 Hot air gun

6.7 Horn

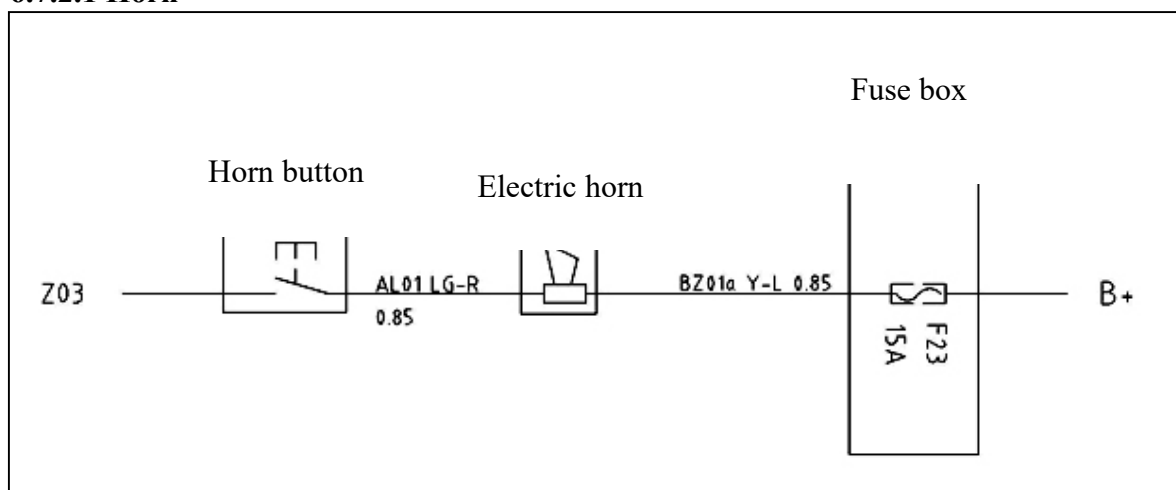
6.7.1 Specification

6.7.1.1 Fastener fastening torque

Application	Specification
Horn assembly mounting bolts	16-26N•m

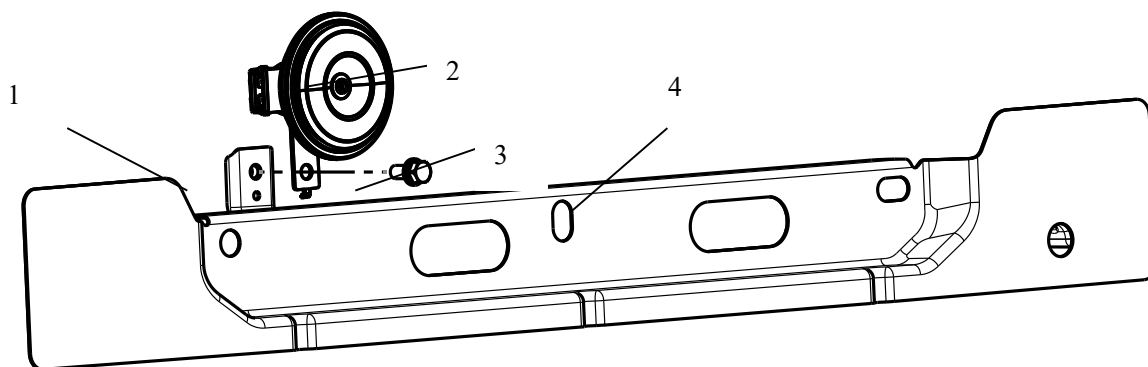
6.7.2 Schematic diagram and wiring diagram

6.7.2.1 Horn



**6.7.3
Com
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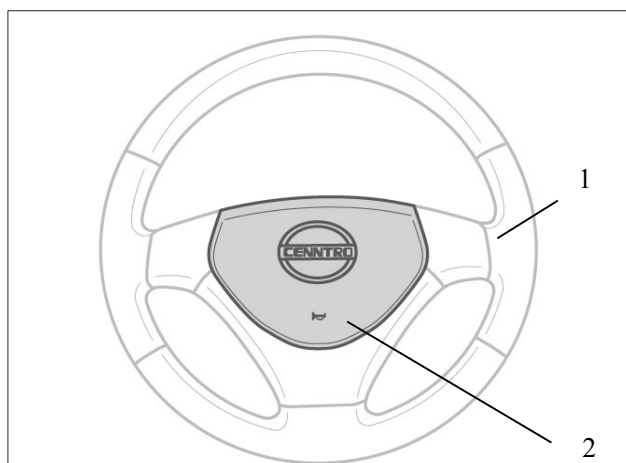
6.7.3.1 Horn



Icons:

1	Horn mounting bracket	2	Horn
3	Hexagon bolt, spring washer and flat washer assemblies	4	Front anti-collision beam inner plate

6.7.3.2 Horn button



Icons:

1	Steering wheel	2	Horn button
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6.7.3.3 Horn connector end view

Electric horn 1

AL01		
Harness No.	Wire color	Function
AL01	Light green red	Horn switch

Electric horn 2

BZ01a		
Harness No.	Wire color	Function
BZ01a	Yellow blue	Power supply

6.7.4 Diagnosis information and procedures

6.7.4.1 Horn system inspection

Steps	Measures	Normal results	Abnormal results
1	Press and release the horn button	The horn emits a sound when the horn button is pressed. When the horn button is released, the horn stops sounding.	<ul style="list-style-type: none"> ● The horn does not work properly ● The horn sounds

			abnormal.

6.7.4.2 Horn does not work

Steps	Measures	Yes	No
1	Check whether the horn fuse is blown?	Go to step 3	Go to step 2
2	1. Pull out the horn assembly plug-in. 2. Use a test lamp to lap the horn assembly plug-in between terminal 1 and terminal 2. 3. Observe the test lamp while pressing the horn button. Is the test lamp illuminated?	Go to step 4	Go to step 5
3	Replace the horn fuse.	Go to "Horn system inspection"	—
4	Replace the horn assembly.	Go to "Horn system inspection"	—
5	1. Remove the horn switch wire from the steering wheel. 2. Use a test lamp to lap between connectors 1 and 2 of the horn button. Does the horn sound?	Go to step 6	Go to step 7
6	Replace the horn button.	Go to "Horn system inspection"	—
7	Check whether the grounding is not good: Connect a test lamp to terminal 1 of the horn button and ground. Is the test lamp illuminated?	Go to step 8	Go to step 9
8	Repair the wire that has a poor grounding.	Go to "Horn system inspection"	—
9	Repair the poor connections between the circuits	Go to "Horn system inspection"	—

6.7.4.3 Abnormal horn sound

- Operate the horn to confirm the owner's concerns (see "Horn system inspection").
- If the abnormal sound of the horn is obvious, perform the following routine inspection:
 - Check whether the terminal has poor contact; repair any poor connections that are found.
 - Check the grounding connection. If there is an obvious poor connection, correct the poor grounding.
 - Ensure that the horn assembly does not come into contact with any other object; if there is any contact, reposition other objects or bend the horn assembly bracket if necessary.
- Operate the horn to determine if the condition still exists. If the condition persists, perform the following specific tests:
 - Determine the type of sound quality produced by the speaker.
 - 1) The tone is low.
 - 2) The tone is sharp and weak.

- If the tone is significantly low, it indicates that the current is too high and the horn assembly must be replaced. Refer to "Horn replacement".

- If the tone is significantly sharp and weak, the horn may contain adhering foreign matter. Remove the horn assembly and check for foreign matter. Refer to "Horn replacement".

- Remove any adhering foreign matter and reinstall the horn assembly.

- If no adhering foreign matter is found, or if the material cannot be removed, replace the horn assembly.

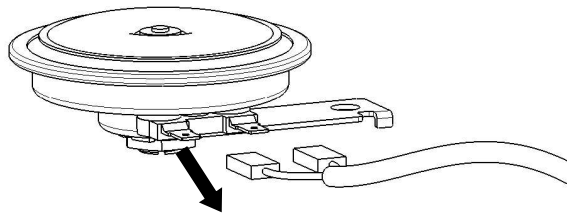
● Operate the horn to confirm that the concerned items have been repaired. Refer to "Horn system inspection".

6.7.5 Maintenance Guide

6.7.5.1 Horn replacement

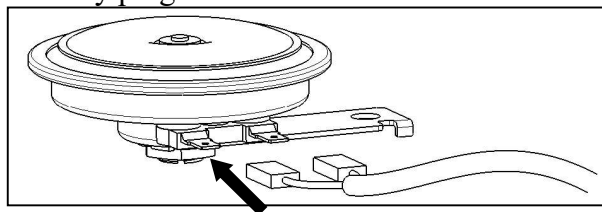
Removal steps

1. Remove the fixing bolts from the horn assembly under the front bumper.
2. Disconnect the horn assembly plug-in.
3. Remove the horn assembly.



Installation steps

1. Fasten and install the horn assembly with bolts.
2. Connect the horn assembly plug-in.

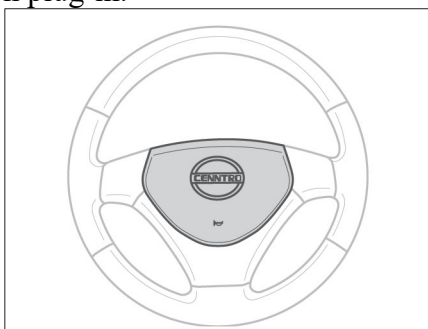


6.7.5.2 Replacement of the horn button

Removal steps

1. Remove the horn button.

2. Disconnect the horn button plug-in.



Installation steps

1. Connect the horn button plug-in.
2. Put on the cover for the steering wheel horn button.

6.8 Rear of vehicle body

6.8.1 Specification

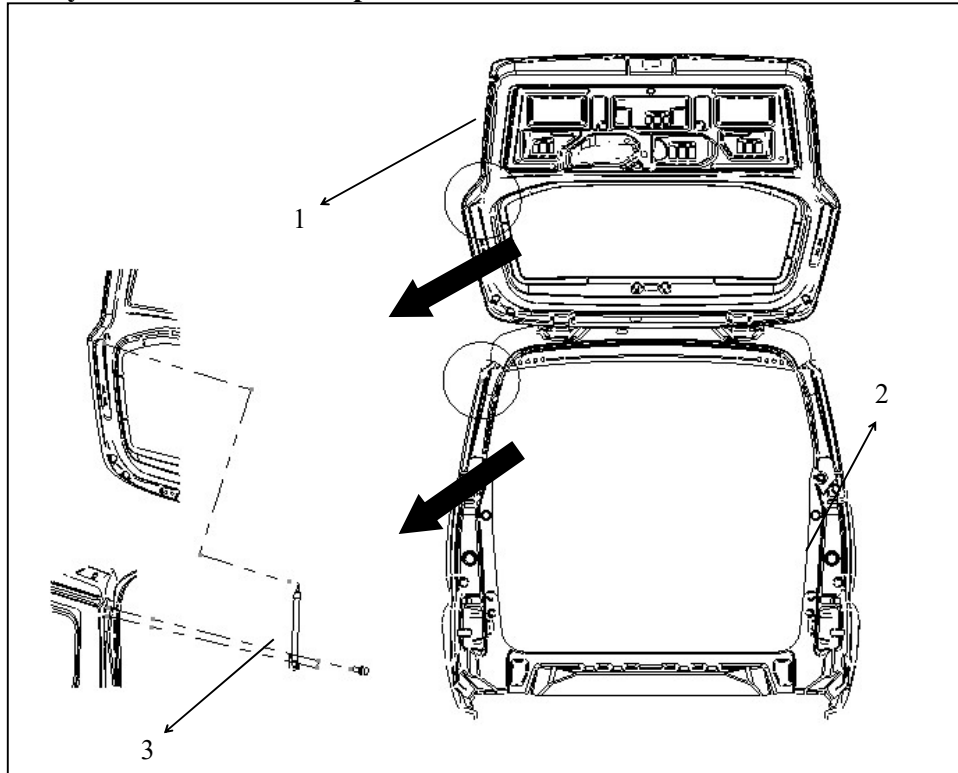
6.8.1.1 Fastener fastening torque

Application	Specification
Door lock bolt of back door	6-12N•m
Back door hinge connecting vehicle body bolts	17-28N•m
Back door lock latch screw	9-17N•m
Back door guide block mounting bracket bolts	6-12N•m
Back door support upper end bolt	6-12N•m
Back door support ball headed bolt	17-28N•m
Back door hinge mounting nut	17-28N•m
Rear handle assembly - back door nut	2.5-5.5N•m
Lock cylinder assembly - back door nut	2.5-5.5N•m

Precautions: For information about the back door actuator, see "6.6 Door".

6.8.2 Component location

6.8.2.1 Rear body and back door component view



Icons:

1	Back door	2	Rear body	3	Back door brace and tailgate bracket
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6.8.3 Maintenance Guide

6.8.3.1 Back door adjustment

Specification

Back door to roof: the clearance is $6\pm 1.5\text{mm}$, and the flush tolerance is $0\pm 2\text{mm}$.

Back door (side) to rear bumper: the clearance is $6\pm 1.5\text{mm}$.

Back door (lower part) and rear bumper: the clearance is subject to the principle of non-interference.

Adjustment procedure

1. Open the back door.

Adjust upper alignment

2. Loosen the bolts on the back door hinge (body side). Tighten the bolts sufficiently to maintain the adjusted position of the rear liftgate.

3. Align the back door. Move the back door hinge (body side) forward and backward on each side to adjust the back door position.

4. Close the back door.

5. Check the alignment.

6. Open the back door. Adjust until the upper alignment of the back door meets specifications.

Adjust lower alignment

1. Loosen the bolts on the back door latch. Tighten the bolts sufficiently to maintain the adjusted position of the back door.

2. Adjust the latch position to secure the back door.

3. Close the back door.

4. Check the alignment.

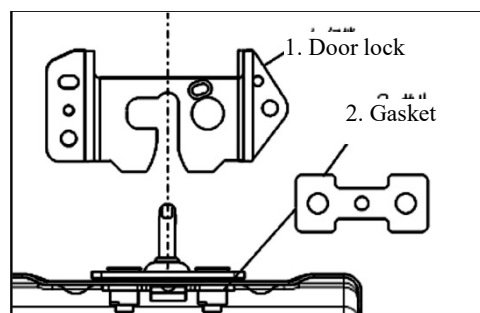
5. Open the back door. Adjust until the lower alignment of the back door meets specifications.

6. Adjust the back door side bumper as required to ensure clearance on both sides.

7. Tighten the bolts on the back door hinge (body side). Refer to "Replacement of the back door".

8. Tighten the bolts on the back door latch. Refer to "Replacement of the back door latch".

9. Close the back door.



6.8.3.2 Replacement of the back door

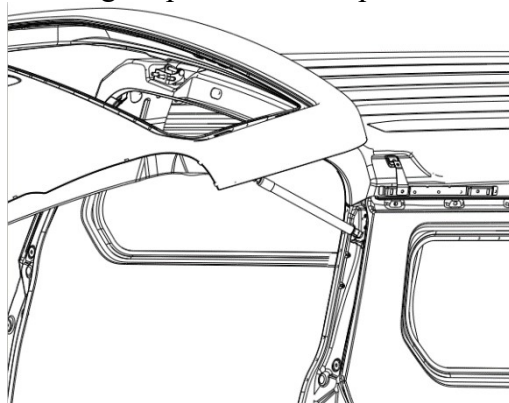
Removal steps

1. Open the back door.

2. Place the protective covers on adjacent body panels.

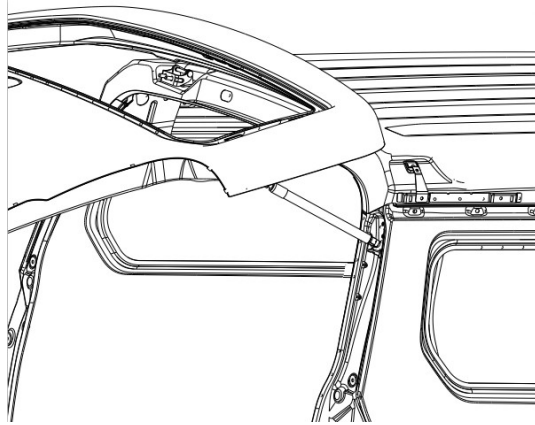
Caution: When removing or installing the back door brace, alternative support should be provided to avoid the possibility of causing damage to the vehicle or causing personal injury or death.

3. Pull the end of the wire protection hose out of the back door hole.
4. Remove the back door trim panel assembly.
5. Disconnect the rear harness clipped to the back door. Refer to "Replacement of the back door harness".
6. Remove the back door brace from the back door. Refer to "Replacement of the back door brace".
7. With the help of an assistant, remove the back door hinge. Refer to "Replacement of the back door hinge".
8. With the help of an assistant, remove the back door assembly.
9. Remove the back door lock cylinder assembly and handle assembly. Refer to "Replacement of the back door lock cylinder assembly" and "Replacement of the back door handle assembly".
10. Remove the back door handle assembly. Refer to "Replacement of the back door handle assembly".
11. Remove the adjustable buffer block from the back door. Refer to "Replacement of the adjustable buffer block of the back door".
12. Remove the ball bolt/screw of the back door brace (back door side). Refer to "Replacement of the ball bolt of the back door brace".
13. Remove the back door sealing strip. Refer to "Replacement of the back door sealing strip".



Installation steps

1. Install the back door sealing strip onto the back door. Refer to "Replacement of the back door frame sealing strip".
2. Install the back door brace ball bolt/screw onto the back door. Refer to "Replacement of the ball bolt of the back door brace".
3. Install the adjustable buffer block on the back door. Refer to "Replacement of the adjustable buffer block of the back door".
4. Install the back door handle assembly. Refer to "Replacement of the back door handle assembly".
5. Install the back door latch onto the back door. Refer to "Replacement of the back door latch".
6. Install the back door lock cylinder assembly and handle assembly onto the back door. Refer to "Replacement of the back door lock cylinder assembly" and "Replacement of the back door handle assembly".
7. Install the back door lock cylinder tie rod and handle tie rod. Refer to "Replacement of the back door lock cylinder tie rod" and "Replacement of the back door handle tie rod".
8. Install the back door hinge onto the back door. Refer to "Replacement of the back door hinge".
9. With the help of an assistant, install the back door onto the back door frame. Refer to "Replacement of the back door hinge".
10. Connect the back door brace to the back door brace ball bolt (back door side). Refer to "Replacement of the back door brace".
11. Connect the rear harness clipped to the back door. Refer to "Replacement of the back door harness".
12. Install the back door trim panel assembly onto the back door.
13. Push the end of the harness hose into the hole in the back door.
14. Remove the protective covers from adjacent body panels.
15. Close the back door.



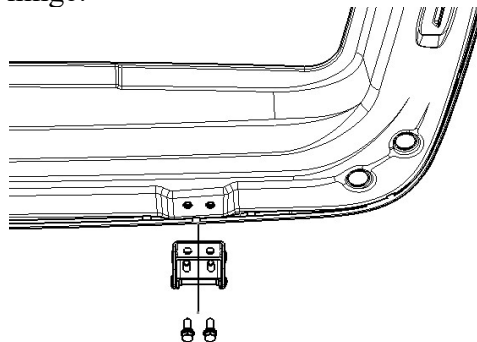
6.8.3.3 Replacement of the back door hinge

Removal steps

1. Open the back door.

Caution: When removing or installing the back door brace, alternative support should be provided to avoid the possibility of causing damage to the vehicle or causing personal injury or death.

2. Use a paint pen to mark the position of the back door hinge on the roof panel of the vehicle.
3. Remove the back door sealing strip. Refer to "Replacement of the back door sealing strip".
4. Remove the roof cover inner. Refer to "Replacement of the roof cover inner" in "Interior trim".
5. With the help of an assistant, remove the back door hinge (body side) nuts.
6. Remove the back door. Refer to "Replacement of the back door".
7. Remove the back door hinge (door side) bolts.
8. Remove the back door hinge.



Installation steps

1. Place the back door hinge (door side) at the marked position on the back door.

2. Fasten the back door hinge bolts to the back door hinge.

Tighten

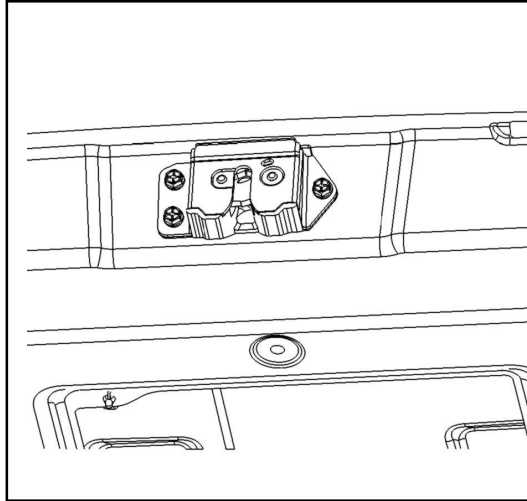
Tighten the back door hinge bolts to 17-28N•m.

3. Apply sealant to the mounting area of the body hinge.
4. With the help of an assistant, align the back door hinge with the back door frame hinge mounting hole (vehicle body side).
5. Push the back door hinge pin through the mounting hole and tighten the hinge with nuts.

Tighten

Tighten the back door hinge nuts to 17-28N•m.

6. Install the rear liftgate. Refer to "Replacement of the back door".
7. Install the roof cover inner. Refer to "Replacement of the roof cover inner" in "Interior trim".
8. Install the back door opening sealing strip. Refer to "Replacement of the back door frame sealing strip".
9. Close the back door.



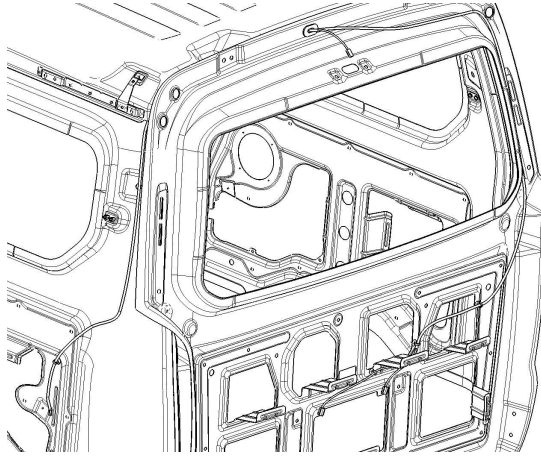
6.8.3.4 Replacement of the back door lock

Removal steps

1. Open the back door.
2. Remove the back door trim panel assembly.
3. Remove the bolts from the back door lock.
4. Pull out the lock block and release the back door lock cylinder tie rod and handle tie rod.

Refer to "Replacement of the back door lock cylinder tie rod" and "Replacement of the back door handle tie rod".

5. Remove the lock block.



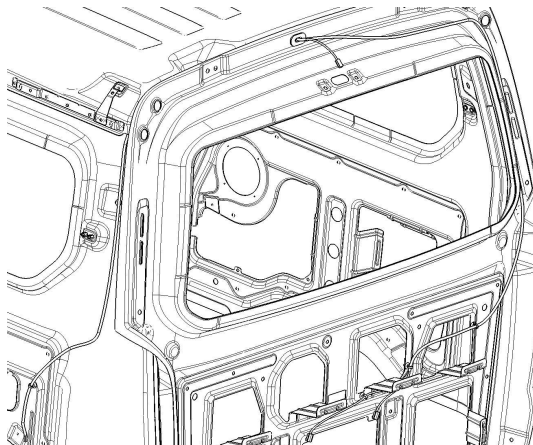
Installation steps

1. Grip the back door lock cylinder tie rod and handle tie rod onto the lock block. Refer to "Replacement of the back door lock cylinder tie rod" and "Replacement of the back door handle tie rod".
2. Pull the lock block and lock lever onto the back door panel and align them with the position of the hole.
3. Fasten the bolts to the back door lock block.

Tighten

Tighten the back door lock bolts to 6-12N•m.

4. Install the back door trim panel assembly.
5. Close the back door.



6.8.3.5 Replacement of the back door harness

Removal steps

1. Disconnect the harness connector between the chassis harness and the back door harness of the rear body.
2. Cut the fixing strap of the back door harness.
3. Pull out the back door harness from the vehicle body side.
4. Disconnect the connection between the back door harness and the high brake lamp.
5. Disconnect the connection between the back door harness and the license plate lamp, and disconnect the harness fixing buckle.
6. Pull out the back door harness from the back door side.

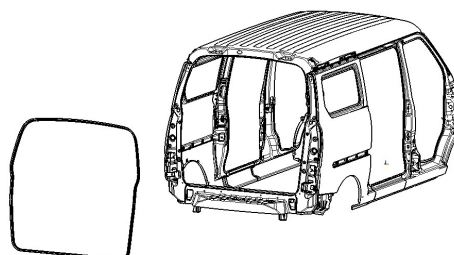
Installation steps

1. Place the back door harness routing in the back door, as shown in the figure.
2. Insert the wire harness fixing buckle into the back door hole.
3. Thread the back door harness into the rear side wall mounting hole of the vehicle body.
4. Connect the harness connector between the chassis harness and the back door harness of the rear body.
5. Connect the plug of the back door harness to the high brake lamp
6. Connect the plug of back door harness to the license plate lamp.

6.8.3.6 Replacement of the back door latch

Removal steps

1. Open the back door.
2. Use a paint pen to mark the position of the back door latch on the rear sill plate.
3. Remove the bolts from the back door latch.
4. Remove the back door latch.



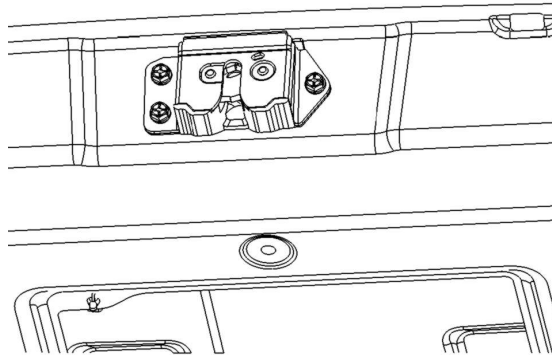
Installation steps

1. Place the back door latch at the marked position on the rear sill plate.
2. Install the back door latch bolt onto the rear sill plate.
3. Fix the bolts partially. Allow the adjustment of the back door latch.
4. Close the back door so that the lock block matches the back door latch.
5. Fasten the bolt to the latch.

Tighten

Tighten the back door latch bolts to 9-17N•m.

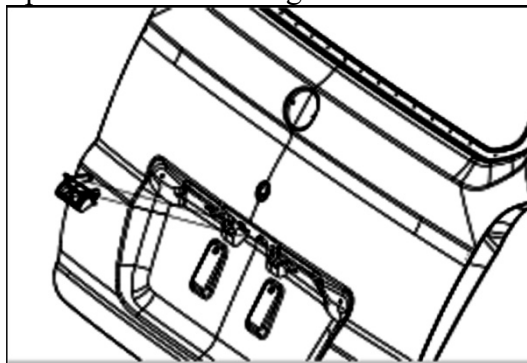
6. Close the back door.



6.8.3.7 Replacement of the back door sealing strip

Removal steps

1. Open the back door.
2. Grasp the back door sealing strip and carefully pull it up.
3. Remove the sealing strip from the weld flange.



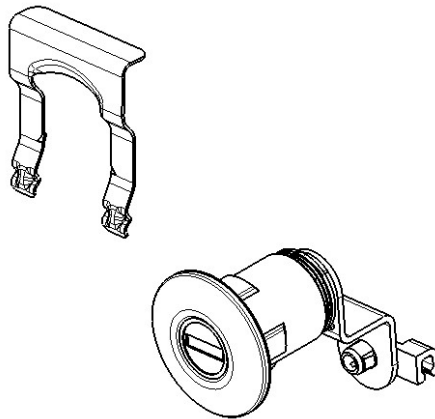
Installation steps

1. Install the back door sealing strip onto the weld flange.
2. Align the two corner marks on the back door sealing strip with the two upper corners of the tailgate frame.
3. Insert the back door sealing strip into the welded flange.
 - Start at the joint and spread around.
 - Use a rubber hammer to ensure that the back door sealing strip fully fits onto the welded flange.
4. Close the back door.

6.8.3.8 Replacement of back door lock cylinder assembly

Removal steps

1. Open the back door.
2. Remove the back door trim panel assembly.
3. Remove the back door lock cylinder tie rod from the lock cylinder. Refer to "Replacement of the back door lock cylinder tie rod".
4. Remove the circlip on the lock cylinder, and then remove the lock cylinder assembly.



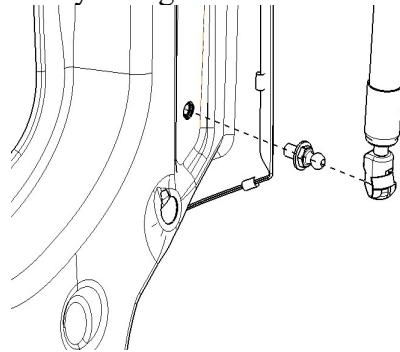
Installation steps

1. Fix the lock cylinder to the back door outer panel with a circlip.
2. Connect the back door lock cylinder tie rod to the lock cylinder. Refer to "Replacement of the back door lock cylinder tie rod".
3. Install the back door trim panel assembly.
4. Close the back door.

6.8.3.9 Replacement of the back door outer buckle

Removal steps

1. Open the back door.
2. Remove the back door trim panel assembly.
3. Remove the back door handle tie rod. Refer to "Replacement of the back door handle tie rod".
4. Remove the handle assembly fixing nuts and remove the handle assembly.



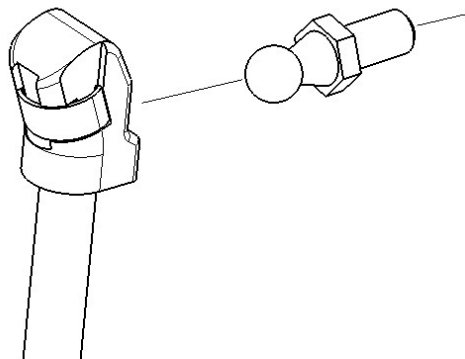
Installation steps

1. Connect the handle to the back door handle assembly with nuts, and then tighten the nuts.

Tighten

Tighten the handle assembly nuts to 2.5-5.5N•m.

2. Install the back door handle tie rod. Refer to "Replacement of the back door handle tie rod".
3. Install the back door trim panel assembly.
4. Close the back door.



6.8.3.10 Replacement of the back door brace

Removal steps

1. Open the back door.

Caution: When removing or installing the back door brace, alternative support should be provided to avoid the possibility of causing damage to the vehicle or causing personal injury or death.

2. Remove the back door brace bracket bolts.
3. Use a small and flat tool to lift the locking clip on the ball bolt of the brace.
4. Loosen the brace from the ball bolts and remove it.

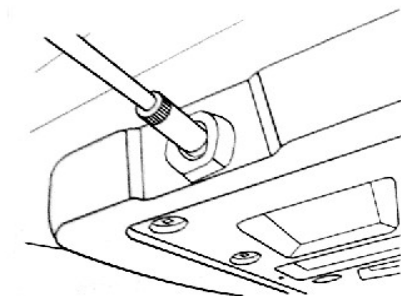
Installation steps

1. Place the back door brace onto the brace ball bolt.
2. Insert the gas spring body bracket ball bolt.
3. Install the back door brace bracket bolts.
4. Close the back door.

6.8.3.11 Replacement of the adjustable buffer block of the back door

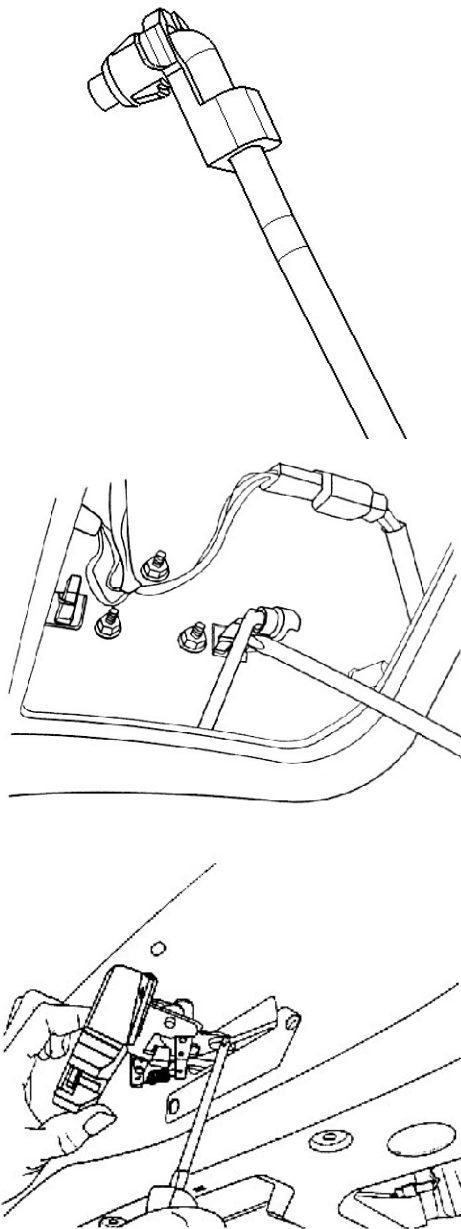
Removal steps

1. Open the back door.
2. Remove the buffer block bolts from the adjustable buffer block of the back door.
3. Remove the adjustable buffer block from the back door.



Installation steps

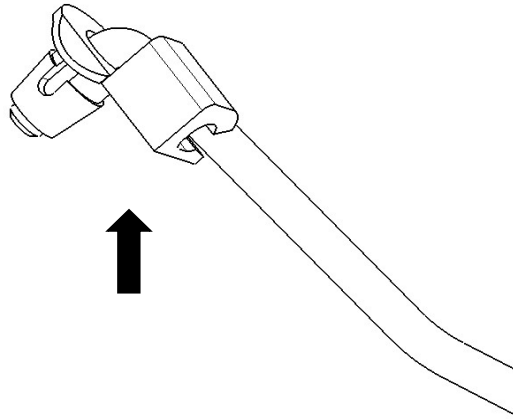
1. Install the adjustable buffer block on the back door.
2. Fasten the adjustable buffer block on the back door with the buffer block bolt.
3. Close the back door.



6.8.3.12 Replacement of the back door lock cylinder tie rod

Removal steps

1. Open the back door.
2. Remove the back door trim panel assembly.
3. Remove the back door lock from the back door panel and pull it out. Refer to "Replacement of the back door lock".
4. Loosen the clip on the lock cylinder tie rod on the lock block side.
5. Turn the clip and pull the tie rod out of the clip.



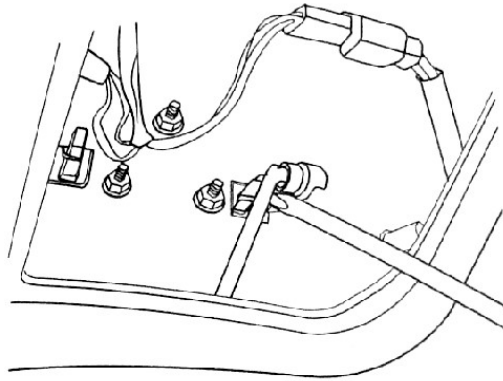
6. Unscrew the tie rod from the lock cylinder clip.
7. Remove the tie rod from the lock cylinder.

Installation steps

1. Push the tie rod through the clamping hole of the lock cylinder.
2. Rotate the tie rod to position it in the clip.



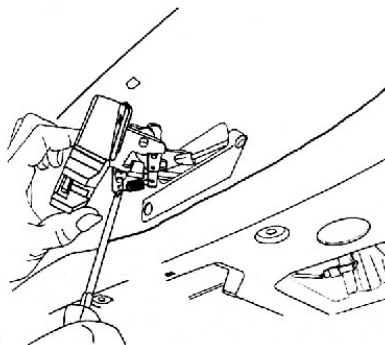
3. Push the other end of the tie rod through the hole in the back door lock clip.
4. Turn the clip and bite the tie rod.
5. Install the back door lock onto the rear liftgate panel. Refer to "Replacement of the back door lock".
6. Install the back door trim panel assembly onto the back door.
7. Close the back door.



6.8.3.13 Replacement of the back door handle tie rod

Removal steps


1. Open the back door.
2. Disconnect the back door trim panel assembly.
3. Remove the back door lock from the back door panel and pull it out. Refer to "Replacement of the back door lock".
4. Loosen the clip on the handle tie rod on the lock block side.
5. Turn the clip and pull the tie rod out of the clip.
6. Unscrew the tie rod from the lock cylinder clip.
7. Remove the tie rod from the handle.



Installation steps

1. Push the tie rod through the clamping hole of the handle.
2. Rotate the tie rod to position it in the clip.
3. Push the other end of the tie rod through the hole in the back door clip.
4. Turn the clip and bite the tie rod.
5. Install the back door lock onto the back door panel. Refer to "Replacement of the back door lock".
6. Install the back door trim panel assembly onto the back door.
7. Close the back door.

Special tools

Icon	Tool No./Description
	NLM1-S0000007 Interior trim staple pry board

6.9 Instrument panel, combination instrument and auxiliary instrument panel

6.9.1 Specification

6.9.1.1 Fastener fastening torque

Application	Specification
Connecting bolt between cross beam and front wall plate (Q1460820)	16-26N•m
Mounting bolts for instrument panel beam and vehicle body (Q1460820)	16-26N•m
Instrument panel body fixing and CD support bracket mounting bolts (Q1400616)	6-12N•m

6.9.4 Diagnosis information and procedures

6.9.4.1 Diagnostic system check of instrument panel

Circuit description

The instrument panel diagnostic system check is an efficient and orderly method for identifying faults related to the instrument panel. Ensure that this check is the starting point for

diagnosing any instrument panel faults. The above principles can guide you to the next logical step of diagnosing a fault. This instrument panel is a highly reliable component. This instrument panel is unlikely to be the cause of the fault. Most system faults are caused by the following conditions:

- Line fault
- Connector fault
- Component fault

Using the table correctly can ensure that the following results are obtained:

- Shorten the diagnosis time.
- Avoid unnecessary parts replacement.

Diagnostic help

Intermittent faults in electronic systems are difficult to be detected and accurately diagnosed. Conduct instrument panel testing for different fault conditions in different vehicle conditions. Based on the above considerations, a complete test drive must be conducted in order to reproduce a fault condition. If system faults are not repeated during the driving test, a good fault description may be useful in finding intermittent fault conditions. The following faulty components cause most intermittent faults.

- Improper matching of plugs.
- Loose terminals.
- Worn wires.
- Poor wire to terminal connection.
- The terminals are too dirty or corroded.
- Damaged connector.
- Use a J35616-A to check the terminals
- Probe terminals.
- Check terminals.
- An adapter can be used to ensure that the following results are obtained:
 - The terminals are not damaged.
 - Indicate whether the contact tension is sufficient.

- Check all fuses associated with the instrument panel (see schematic diagram). If the fuses are open circuited, check whether the circuits that are powered by these fuses are shorted to ground.
- Ensure that all relevant grounding electrodes are clean and tight.
- For the removal and replacement procedures of the instrument panel, refer to "Replacement of instrument panel combination instrument".

Check for broken wires (or partial broken wires) in the insulation, which may cause the following results:

- System fault.
- After the system was disconnected, its continuity/voltage check was normal.

Harness No.	Wire color	Function
FZ17a	Purple	Battery power
Z03c	Black	Grounding
BT02d	Green	Right turn signal lamp
BT01f	Purple	Left turn signal lamp
Z03b	Black	Light indication grounding
FZ27	Pink blue	Safety belt alarm
BW01b	Pink yellow	Rear fog lamp
BY03c	Blue yellow	High beam lamp
CD01b	Yellow	Instrument power supply
VL09a	White red	Tachometer signal input
VL57a1	Red yellow	Vehicle speed and mileage signal
FZ05	Brownish red	Water temperature gauge signal
BX03f	Light green	Small lamp signal
FZ10	Purplish red	Parking brake indication
BJ03f	Red black	Low beam lamp
CD02f	White	Do opened
FA02	Red yellow	Battery charging

- These circuits are sporadic or recessive when loaded. If possible, the circuit can be checked

by monitoring the voltage drop with the operating system (with load).

Check whether electronic devices purchased in the aftermarket that may affect the integrity of other systems are installed correctly.

6.9.4.2 Diagnosis of combination instrument

Steps	Measures	Numerical value	Yes	No
1	Turn the ignition switch to ON. Use a digital multimeter to perform a back probe between the following combination instrument power circuit wire (number FZ17a) and ground. Is the voltage equal to the specified value?	12V	Go to step 2	Go to step 3
2	Use a test lamp to perform a back probe between B+ and each of the following circuits. Combination instrument pin PIN17 is grounded Is the test lamp on for this circuit?	—	Go to step 5	Go to step 4
3	Repair the following conditions in the power circuit of the faulty combination instrument: poor connection, faulty fuse, and check the system. Is the repair completed?	—	The system is normal	—
4	Repair the following conditions in the grounding circuit of the faulty combination instrument: poor connection, faulty fuse, and check the system. Is the repair completed?	—	The system is normal	—
5	Check the brake warning lamp. Is the brake warning indicator lamp always on?	—	Refer to "Brake warning indicator lamp always on"	Go to step 6
6	Set the parking brake. Does the brake warning indicator illuminate when the parking brake is set?	—	Go to step 7	Refer to "Brake warning indicator lamp does not work"
7	Check the brake fluid. Does the brake warning indicator lamp light up when the brake fluid is insufficient?	—	Go to step 10	Refer to "Brake warning indicator lamp does not work"
8	Check the brake warning indicator lamp. Does the indicator lamp not work?	—	Refer to "Brake warning indicator lamp does not work"	Go to step 9
9	Turn the ignition switch to ON or start the vehicle. Check the charging indicator lamp for the following conditions: Always on, flashing Does the charging indicator lamp have any of the above conditions?	—	Refer to "Battery charging indicator lamp does not work"	Go to step 10
10	Turn the ignition switch to ON or start the vehicle. Check the charging indicator lamp for the following conditions: Does not work Does the charging indicator lamp have any of the above conditions?	—	Refer to "Battery charging indicator lamp does not work"	Go to step 22
11	Turn the ignition switch to ON or start the vehicle. Check the high beam lamp for the following conditions: Does not work, always on	—	Refer to "High beam lamp always on/does not work"	Go to step 14

	Does the high beam lamp have any of the above conditions?			
12	Turn the ignition switch to ON or start the vehicle. Check the speedometer/odometer. Does the speedometer/odometer operate incorrectly or unstably?	—	Refer to "Speedometer and/or odometer readings are not accurate"	Go to step 21
13	Turn the ignition switch to ON or start the vehicle. Check the speedometer/odometer. Does the speedometer/odometer not work?	—	Refer to "Speedometer and/or odometer does not work"	Go to step 22
14	Turn the ignition switch to ON or start the vehicle. Check the tachometer. Does the tachometer operate incorrectly or unstably?	—	Refer to "Tachometer readings are not accurate"	Go to step 23
15	Turn the ignition switch to ON or start the vehicle. Check the tachometer. Does the tachometer not work?	—	Refer to "Tachometer does not work"	Go to step 24
16	Turn the ignition switch to ON or start the vehicle. Check the left turn signal indicator lamp. Does the left turn signal indicator lamp not work?	—	Refer to "Left turn signal indicator lamp does not work"	Go to step 25
17	Turn the ignition switch to ON or start the vehicle. Check the right turn signal indicator lamp. Does the right turn signal indicator lamp not work?	—	Refer to "Right turn signal indicator lamp does not work"	Go to step 26
18	Perform all operating steps in the inspection of combination instrument diagnostic system. Is the inspection completed?	—	The system is normal	—

6.9.4.3 Brake indicator lamp is always on/does not work

Steps	Measures	Numerical value	Yes	No
1	Turn the ignition switch to ON. Is the brake indicator lamp always on?	—	Go to step 2	Go to step 7
2	Check whether the parking brake is applied.	—	Go to step 3	Go to step 6
3	Check whether the brake indicator lamp remains on during driving without using the parking brake.	—	Go to step 4	Go to "System inspection"
4	Use a digital multimeter to check the voltage at the FZ10 terminal of the combination instrument harness.	0 V	Go to "Brake system check brake fluid control switch and parking brake switch"	Go to step 5
5	Replace the combination instrument. Refer to "Replacement of instrument panel combination instrument". Is the repair completed?	—	Go to "System inspection"	—
6	Check whether the brake fluid level is too low.	—	Go to step 3	Go to step 4
7	Use a digital multimeter to check the voltage at the FZ10 terminal of the combination instrument harness.	12V	Go to step 8	Go to step 5
8	Use a digital multimeter to check for an open circuit between the combination instrument harness FZ10, the parking brake switch, and the brake fluid level alarm switch.	—	Go to step 9	Go to "Brake system check brake fluid control switch and parking brake switch"

9	Repair the open circuit between the combination instrument harness FZ10 and the switch. Is the repair completed?	—	Go to “System inspection”	—
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6.9.4.4 Speedometer/or odometer display inoperative/inaccurate

Steps	Measures	Numerical value	Yes	No
1	Have you performed the "Inspection of combination instrument diagnostic system"?	—	Go to step 2	Go to “System inspection”
2	Check the vehicle speed with the X431. Did you measure the speed?	—	Go to step 4	Go to step 3
3	Replace the vehicle speed sensor. Has the problem been solved?	—	The system is normal	Go to step 2
4	Use a digital multimeter to test the circuit between the combination instrument wire (number VL57a1) and the vehicle speed sensor. Is the circuit disconnected?	—	Go to step 5	Go to step 6
5	Repair the open circuit. Has the problem been solved?	—	The system is normal	Go to step 6
6	Replace the combination instrument. Refer to “Replacement of the combination instrument”. Is the repair completed?	—	Go to “System inspection”	—

6.9.4.5 The tachometer is not accurate

Steps	Measures	Numerical value	Yes	No
1	Have you performed the "Inspection of combination instrument diagnostic system"?	—	Go to step 2	Go to “System inspection”
2	Install one X431. Turn the ignition switch to Start. Start the vehicle. Select special functions from the main menu. Is the tachometer indicator lamp identical to the ECM output?	—		
3	Replace the combination instrument. Refer to “Replacement of the combination instrument (IRC)”. Check the system. Is the repair completed?	—	Go to “System inspection”	—

6.9.4.6 The tachometer does not work

Steps	Measures	Numerical value	Yes	No
1	Have you performed the "Inspection of combination instrument diagnostic system"?	—	Go to step 2	Go to “System inspection”
2	Install one X431. Turn the ignition switch to Start. Start the vehicle. Select special functions from the main menu. Does the control module have tachometer output?	—		
3	Use a digital multimeter to test the circuit between the combination instrument VL09a and the control module. Is the circuit open?	—	Go to step 4	Go to step 5
4	Repair the open-circuited harness. Is the repair completed?	—	Go to “System inspection”	—
5	Replace the combination instrument. Refer to “Replacement of the combination instrument”. Is the repair completed?	—	Go to “System inspection”	—

6.9.4.7 Battery charging indicator lamp does not work

Steps	Measures	Numerical	Yes	No
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		value		
1	Have you performed the "Inspection of combination instrument diagnostic system"?	—	Go to step 2	Go to "System inspection"
2	Turn the ignition switch to ON. Does the battery charging indicator lamp light up after the command is given?	—	Go to step 3	Go to step 4
3	Turn the ignition switch to the Start position and allow the vehicle to start. Does the battery charging indicator lamp light up after the command is given?	—	Go to "System inspection"	Go to step 8
4	Use a digital multimeter to check the voltage at the harness end of the combination instrument wire (number FA02).	0 V	Go to step 5	Go to step 6
5	Replace the combination instrument. Refer to "Replacement of the combination instrument" Is the repair completed?	—	Go to "System inspection"	—
6	Use a digital multimeter to check the circuit between the harness end of the combination instrument wire (number FA02) and the drive motor connector. Is it disconnected?	—	Go to step 7	—
7	Repair the open circuit. Is the repair completed?	—	Go to "System inspection"	—
8	Use a digital multimeter to check the voltage at the drive motor connector.	12V	Go to step 5	—

6.9.4.8 Left and right turn signal indicator lamps do not work

Steps	Measures	Numerical value	Yes	No
1	Turn on the turn signal switch in order to turn on the left and right turn signal lamps. Use a digital multimeter to check the voltage at the connector of the combination instrument (wire numbers BT02d, BT01f).	12V	Go to step 2	Go to step 5
2	Remove the combination instrument. Check the connector of the combination instrument and the left and right turn signal indicator lamps for open circuit or loose connection. Do the combination instrument connector and the left and right turn signal indicator lamps work normally?	—	Go to step 3	Go to step 4
3	Replace the combination instrument. Refer to "Replacement of the combination instrument" Is the repair completed?	—	Go to "System inspection"	—
4	Repair the combination instrument connector or replace the left and right turn signal indicator lamps. Is the repair completed?	—	Go to "System inspection"	—
5	Repair the open circuit between the connector of the combination instrument and the turn signal switch. Is the repair completed?	—	Go to "System inspection"	—

6.9.4.9 Combination instrument background light does not work

Steps	Measures	Numerical value	Yes	No
1	Have you performed the "Inspection of combination instrument diagnostic system"?	—	Go to step 2	Go to "System inspection"
2	Turn the ignition switch to Start. Pull the lamp switch to the parking position. Is the background light on?	—	Go to step 3	Go to step 4

3	Move the dimmer control to observe whether the background light changes as the dimmer control is adjusted.	—	The system is normal	Go to step 8
4	Use a digital multimeter to check if there is voltage in the harness at the combination instrument connector wire (number BX03f).	—	Go to step 7	Go to step 5
5	Use a digital multimeter to check if the dimmer control has voltage output.	—	Go to step 6	Go to "Switch for interior lighting system inspection"
6	Repair the open circuit between the harness at the combination instrument connector wire (number BX03f) and the dimmer control. Is the repair completed?	—	Go to "System inspection"	—
7	Replace the combination instrument. Refer to "Replacement of the combination instrument". Is the repair completed?	—	Go to "System inspection"	—
8	Connect a test bulb between the harness at the combination instrument connector wire (number BX03f) and the dimmer control. Does the test bulb flash with the moving dimmer control?	—	Go to step 7	Go to "Inspection of interior lighting system of the switch"

6.9.4.10 High beam lamp is always on/does not work

Steps	Measures	Numerical value	Yes	No
1	Turn the ignition switch to Start. Pull the lamp switch to the low beam position and pull the switch from the low beam position to the high beam position. Is the high beam lamp on?	—	Go to "System inspection"	Go to step 2
2	Use a digital multimeter to check the voltage at the harness end of the combination instrument connector wire (number BY03c).	12V	Go to step 4	Go to step 3
3	Repair the open circuit between the low beam switch and the harness at the combination instrument connector wire (number BY03c). Is the repair completed?	—	Go to "System inspection"	—
4	Replace the combination instrument. Refer to "Replacement of the combination instrument". Is the repair completed?	—	Go to "System inspection"	—

6.9.4.11 Inspection of cigarette lighter system

Steps	Measures	Normal results	Abnormal results
1	Press the cigarette lighter into the cigarette lighter holder until you hear a click.	When the cathode is energized, the cigarette lighter will jump to the edge of the cigarette lighter holder	The cigarette lighter does not work
2	Turn on the cigarette lighter switch	Cigarette lighter light is on	Cigarette lighter light goes out

6.9.4.12 The cigarette lighter does not work

Steps	Measures	Yes	No
1	Check fuse F51 Is the fuse blown?	Go to step 3	Go to step 2

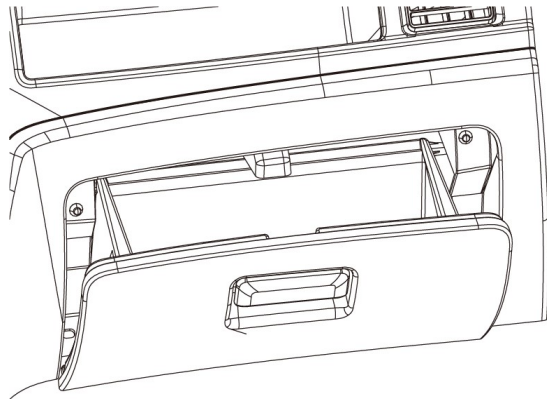
2	Connect the positive and negative ends of the cigarette lighter with a test lamp to see if there is electricity. Is the test lamp on?	Go to step 4	Go to step 5
3	Replace the fuse	—	Go to “System inspection”
4	Replace the cigarette lighter	—	Go to “System inspection”
5	Repair poor connections	—	Go to “System inspection”

6.9.5 Maintenance Guide

6.9.5.1 Replacement of glove box

Removal steps

Open the glove box lock and disengage the bottom slot of the glove box from the instrument panel positioning shaft.



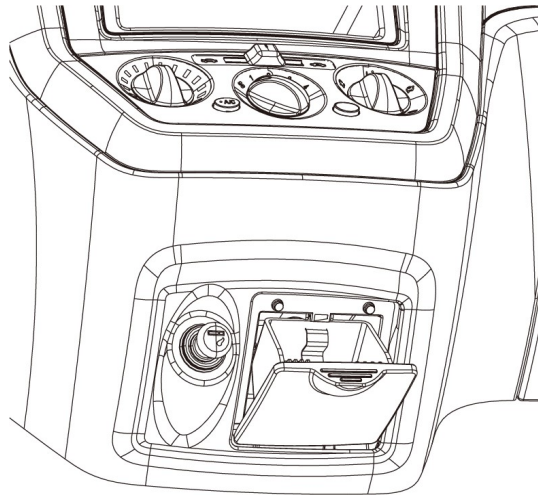
Installation steps

Position the shaft guide surface along the instrument panel and clip the glove box bottom slot into the shaft.

6.9.5.2 Replacement of ashtray (standard version)

Removal steps

1. Open the ashtray and press the ashtray retaining circlip.
2. Disengage the bottom slot of the ashtray from the instrument panel positioning lug.



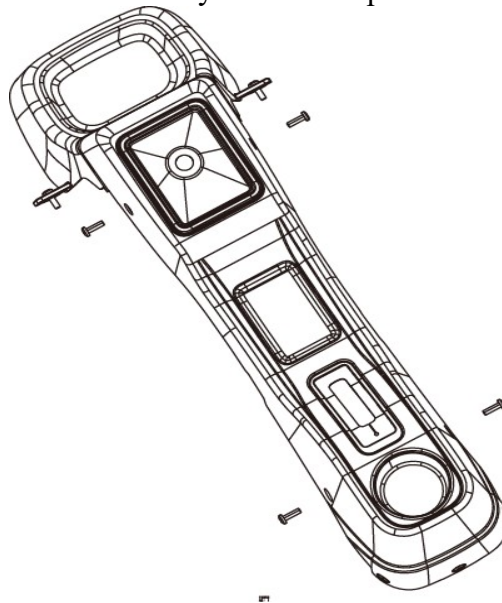
Installation steps

1. Clip the bottom slot of the ashtray into the instrument panel positioning lug.
2. Press the ashtray retaining circlip and push the ashtray into the instrument panel.

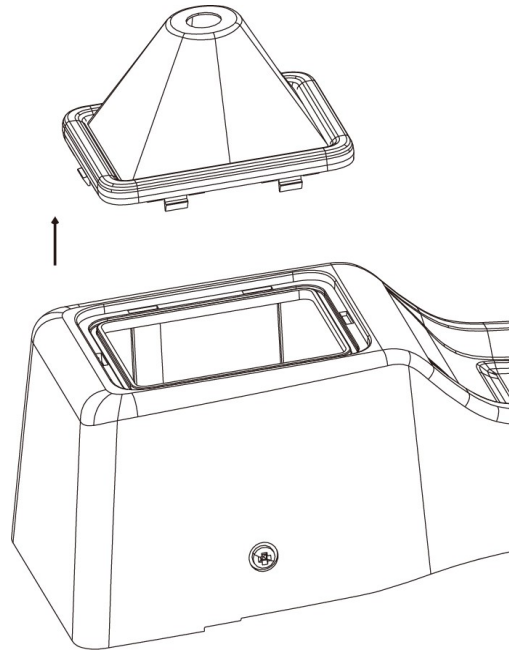
6.9.5.3 Replacement of auxiliary instrument panel

Removal steps

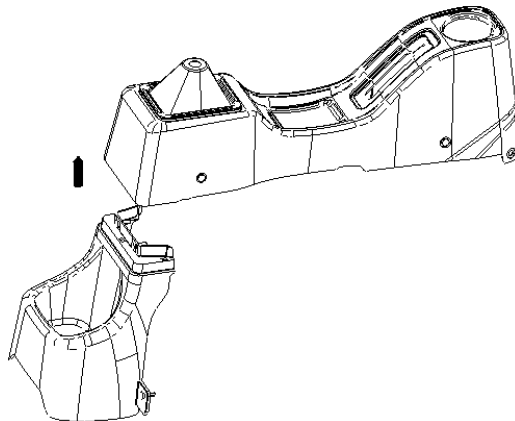
1. Open the seat buckle, turn the driver's seat and passenger's seat back, and remove 4 mounting screws from the side of the auxiliary instrument panel.



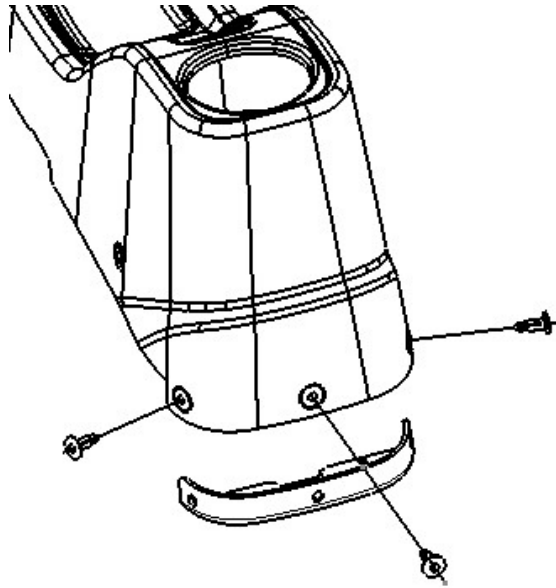
2. Rotate and unscrew the shift handle, then use a flat-bladed tool to pry up 4clips of the shift lever shield, pull the shift lever up, and pull the shift lever shield off the center console opening (trim panel).



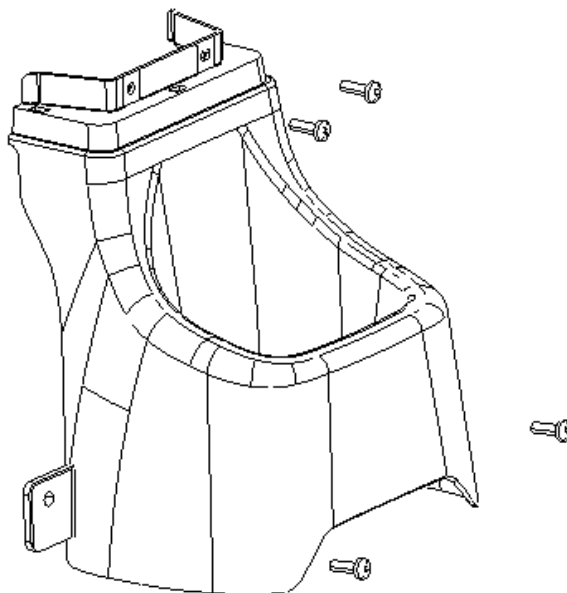
3. Pull the auxiliary instrument panel body up along the shift lever, and separate the auxiliary instrument panel glove box.



4. Remove 3 snap fasteners connecting the auxiliary instrument body and the rear trim panel of the auxiliary instrument panel, and pull out the rear trim panel of the auxiliary instrument panel downward.

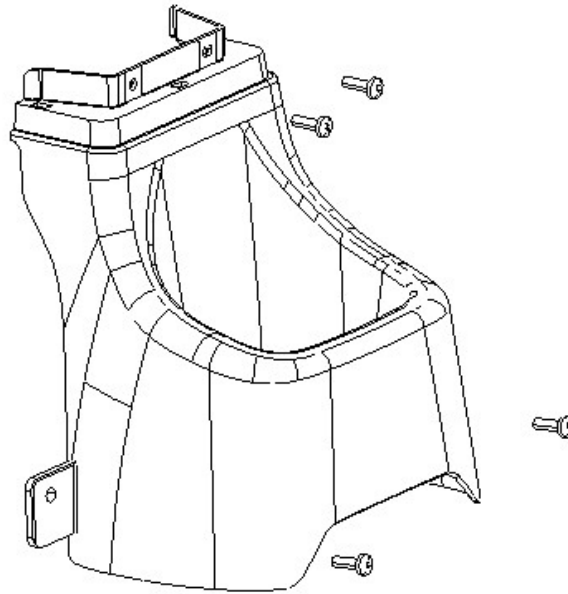


5. Remove 4 mounting screws of the auxiliary instrument panel glove tray and pull them out.



Installation steps

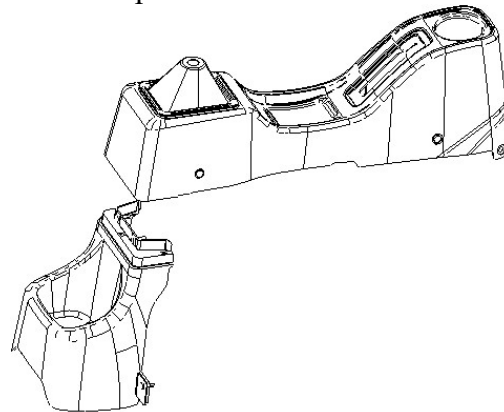
1. Align the auxiliary instrument panel glove tray with the shield and parking brake handle mounting plate, and tighten with screws.
2. Install the rear trim panel of the auxiliary instrument panel onto the main body of the auxiliary instrument panel.



3. Install the auxiliary instrument panel onto the underseat frame assembly along the shift lever and handbrake glove.

4. Put on the shift lever shield.

5. Tighten the auxiliary instrument panel screws.



6.9.5.4 Replacement of the instrument panel

Removal steps

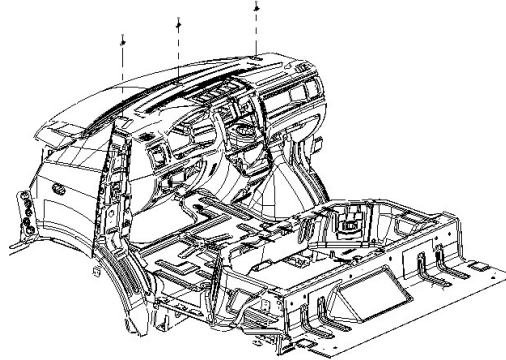
1. Remove the key and disconnect the negative pole of the battery.

2. Remove the instrument panel mounting trim covers (three plugs), pry off the instrument panel bolt mounting trim cover respectively on the left, middle, and right sides, and remove the instrument panel bolts.

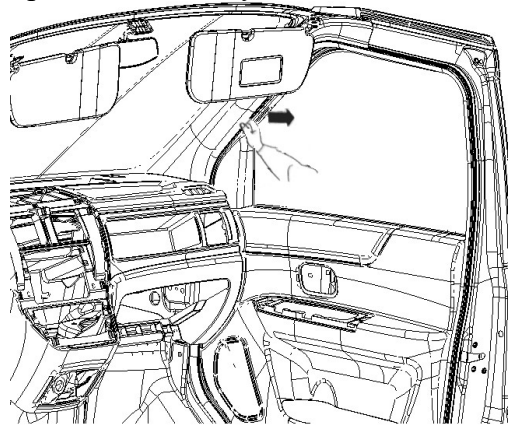
3. Remove the central control panel and the central control top cover. Refer to “Replacement of the central control panel and the central control top cover”.

4. Remove the glove box, refer to "Replacement of the glove box".

5. Remove the combination instrument and its cover. Refer to "Replacement of the combination instrument and its cover".



6. Remove A-column trim panel and directly remove A-column trim panel from A-column.



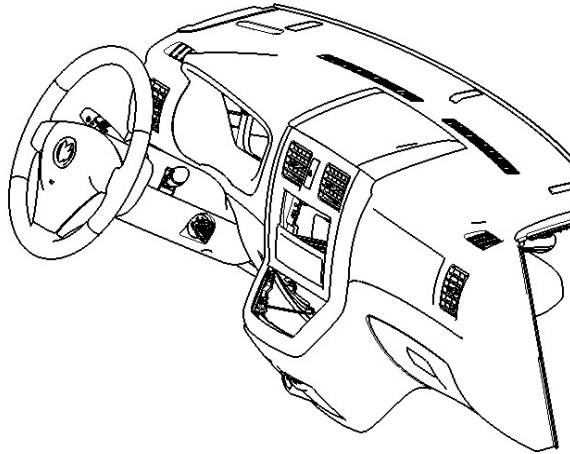
7. Remove the multimedia screen. Refer to "Replacement of the multimedia device".

8. Remove the steering wheel. Refer to "Replacement of the steering wheel".

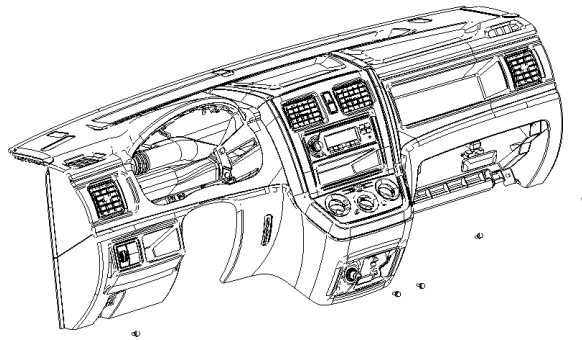
9. Remove the steering column shield. Refer to "Replacement of the steering column shield".

10. Remove the cigarette lighter. Refer to "Replacement of the cigarette lighter".

11. Engine cabin cover opening mechanism. Refer to "Replacement of the engine cabin cover opening mechanism".



12. Remove the bolts that fasten the instrument panel and remove the instrument panel assembly.



Installation steps

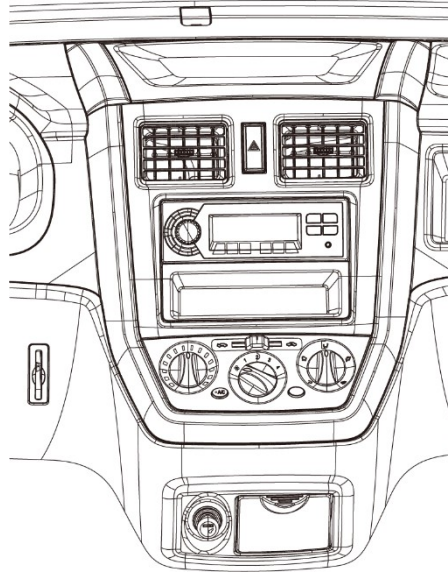
1. Position the instrument panel assembly on the instrument panel bracket assembly and install 11 instrument panel bolts.
2. When installing the engine cabin cover opening mechanism, refer to "Replacement of the engine cabin cover opening mechanism".
3. Install the cigarette lighter. Refer to "Replacement of the cigarette lighter".
4. Install the multimedia screen. Refer to "Replacement of the multimedia device".
5. Install A-column trim panel.
6. Install the combination instrument and its cover. Refer to "Replacement of the combination instrument and its cover".
7. Install the glove box. Refer to "Replacement of the glove box".
8. Install the central control panel and the central control top cover. Refer to "Replacement of the central control panel and the central control top cover".

9. Install the instrument panel mounting trim cover.
10. Connect the negative pole of battery.

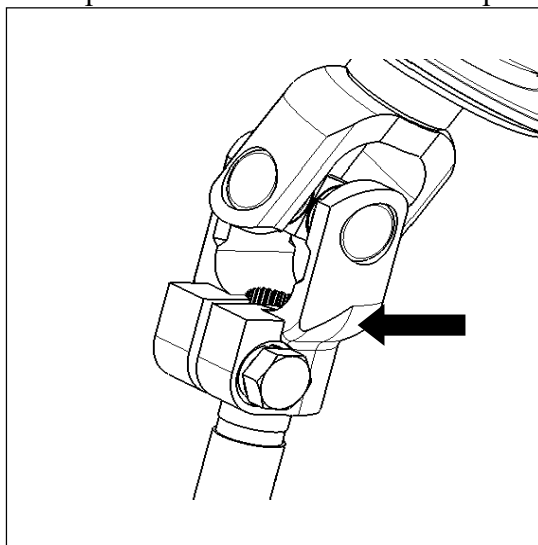
6.9.5.5 Replacement of the central control panel and the central control top cover

Removal steps

1. Disconnect the negative pole of battery.
2. Use a screwdriver to pry off the central control panel and the central control top cover.

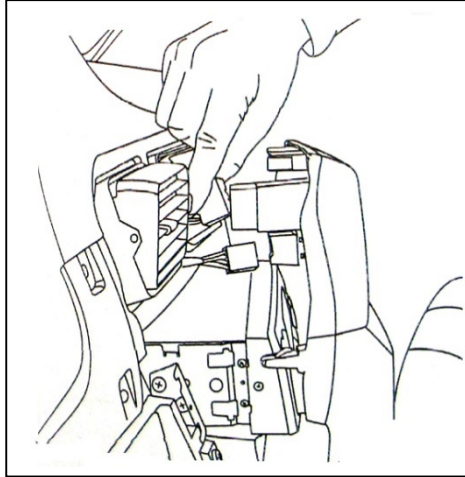


3. Disconnect the emergency switch power plug.
4. Remove the central control panel and the central control top cover.



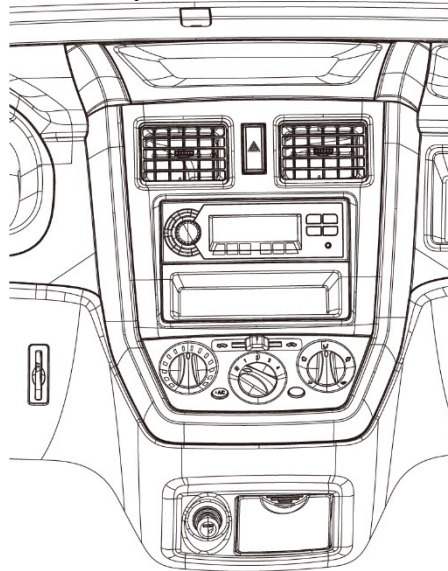
Installation steps

1. Connect the emergency switch power plug.



2. Install the central control panel and the central control top cover on the instrument panel. Align the protrusions on the back of the central control panel and the central control top cover with the spring clips to the installation space of the instrument panel, and push in until the spring clips on the protrusions snap into the space.

3. Connect the negative pole of battery.



6.9.5.6 Replacement of the instrument panel air outlet grille assembly

Removal steps

1. Disconnect the negative pole of battery.
2. Remove the instrument panel assembly. Refer to "Replacement of the instrument panel".
3. Remove the air outlet grille from the instrument panel face blowing duct.

Installation steps

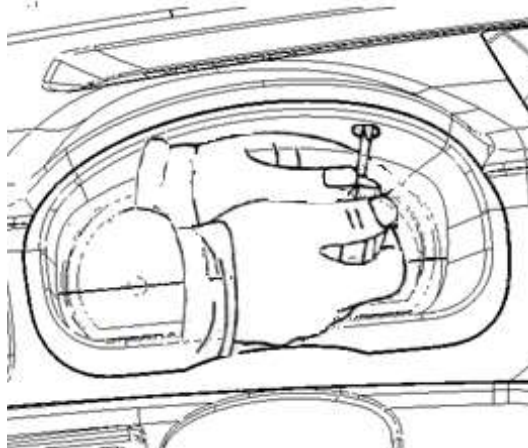
1. Install the air outlet grille assembly onto the instrument panel face blowing duct.
2. Install the instrument panel. Refer to "Replacement of the instrument panel".
3. Connect the negative pole of battery.



6.9.5.7 Replacement of the combination instrument and its cover

Removal steps

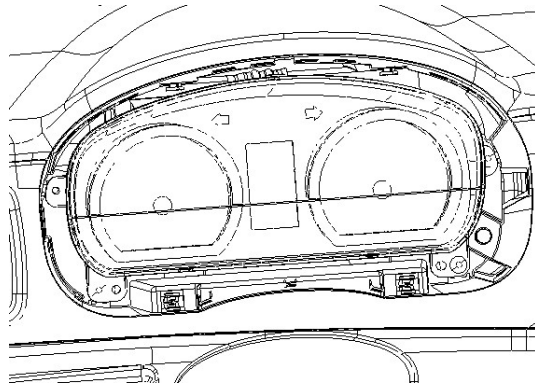
1. Disconnect the negative pole of battery.
2. Remove the 2 snap fasteners of the combination instrument cover and remove the combination instrument cover.



3. Remove the screws that fasten the combination instrument.
4. Remove the combination instrument and disconnect its plug.

Installation steps

1. Connect the combination instrument plug.
2. Align the combination instrument, install the combination instrument screws, and tighten the combination instrument.



3. Align the protrusions on the back of the combination instrument cover with the spring clips to the installation space of the instrument panel, and push in until the spring clips on the protrusions snap into the space.

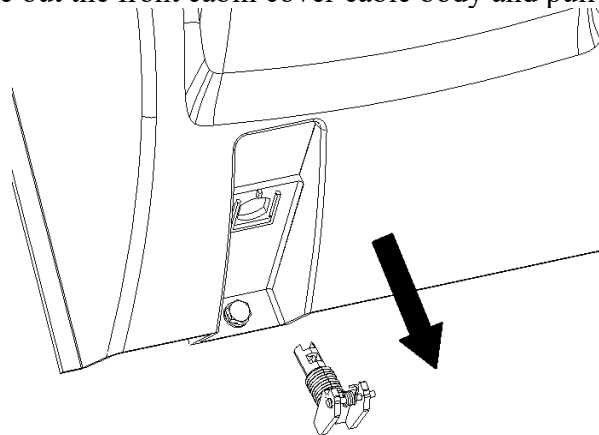
4. Install the combination instrument cover snap fasteners and fasten the combination instrument cover.

5. Connect the negative pole of battery.

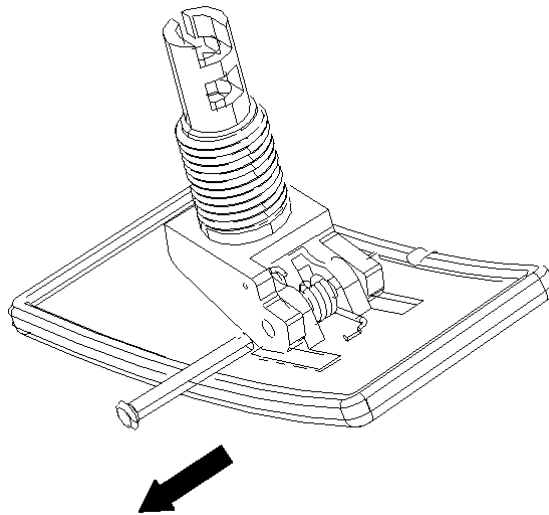
6.9.5.8 Replacement of the engine cabin cover opening mechanism

Removal steps

1. Loosen the plastic nut fastening the engine cabin opening mechanism from the inside of the instrument panel, then take out the front cabin cover cable body and pull out the cover handle panel.

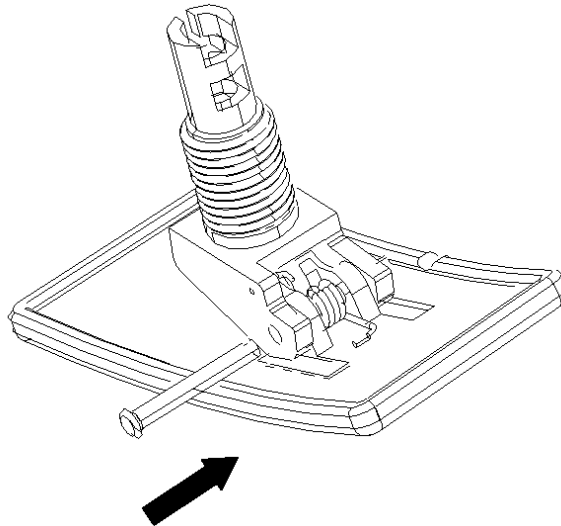


2. Take out the cover handle shaft and remove the cover handle base.

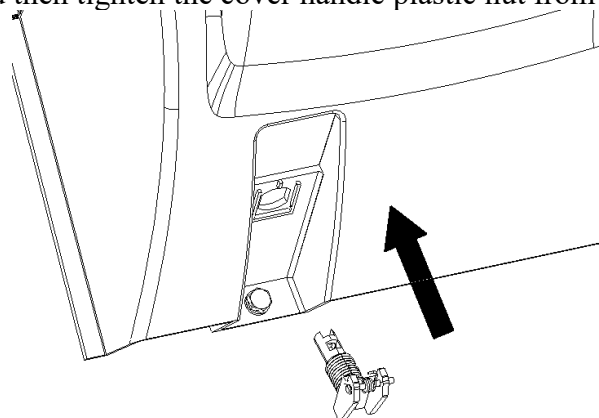


Installation steps

1. Assemble the cover handle base, cover handle panel, and spring cover handle shaft.



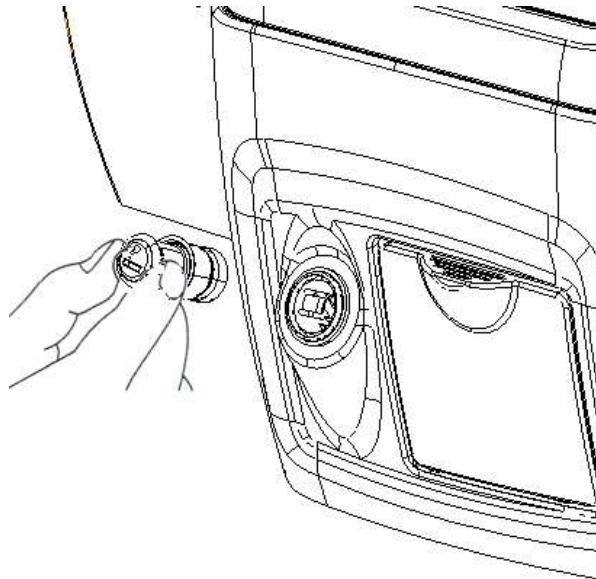
2. Push the cover handle into the instrument panel, insert the front cabin cover cable body into the cover handle base, and then tighten the cover handle plastic nut from the inside.



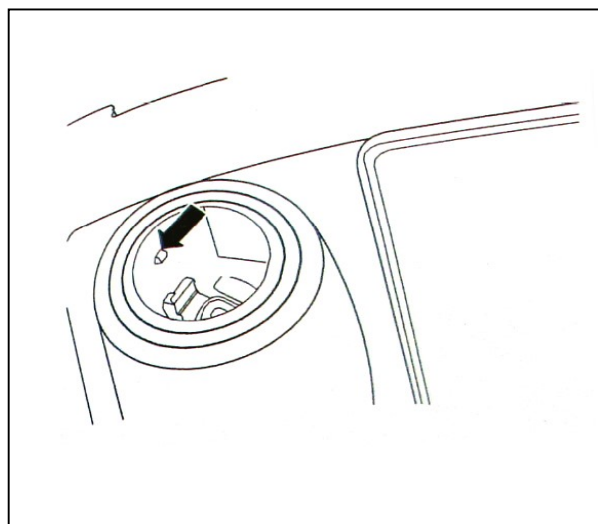
6.9.5.9 Replacement of the cigarette lighter assembly

Removal steps

1. Disconnect the plug of the cigarette lighter from inside the instrument panel and pull out the cigarette lighter head.



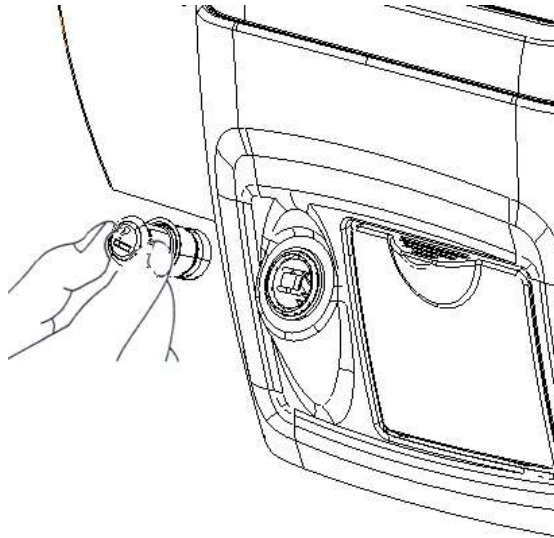
2. Press down the inner protrusion of the cigarette lighter and take out the cigarette lighter holder.



Installation steps

1. Insert the cigarette lighter holder into the instrument panel mounting hole and connect the cigarette lighter connector from inside the instrument panel.

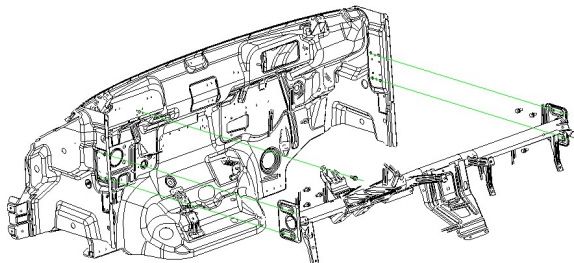
a) Insert the cigarette lighter head.



6.9.5.10 Replacement of the instrument panel cross beam

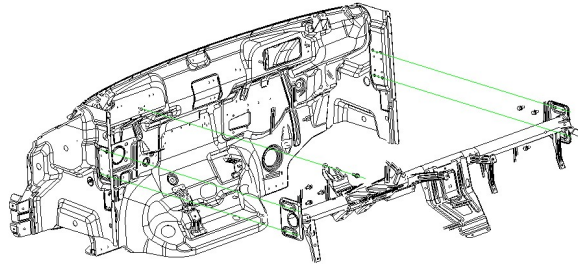
Removal steps

1. Disconnect the negative pole of battery.
2. When removing the instrument panel assembly, refer to "Replacement of instrument panel".
3. Remove the steering column, refer to "Replacement of the steering column".
4. Remove the instrument panel cross beam.



Installation steps

1. Install the instrument panel bracket assembly and tighten the instrument panel bracket assembly bolts.
2. When installing the steering column, refer to "Replacement of the steering column".
3. When installing the instrument panel assembly, refer to "Replacement of instrument panel".
4. Connect the negative pole of battery.



6.9.6 Description and operation

6.9.6.1 Description of the combination instrument circuit

Parking brake indicator lamp

When the hand brake is applied, this lamp will remain illuminated.

Rear fog lamp indicator lamp

When turning on the rear fog lamp, this indicator lamp will light up.

Position lamp indicator lamp

When the light control switch is turned to the position lamp position, this indicator lamp will light up.

Door status indicator lamp

This lamp will light up when any door is not closed.

Battery charging indicator lamp

If this lamp lights up during driving, the battery is not charging. The generator should be inspected.

High beam indicator lamp

When turning on the high beam lamp, this indicator lamp will light up. This signal is generated by the headlamp switch.

Low beam indicator lamp

When the low beam lamp is turned on, this indicator lamp will light up. This signal is generated by the headlamp switch.

Left/right turn indicator lamp

When the left turn signal lamp or the right turn signal lamp is turned on, the corresponding turn signal indicator lamp also flashes together; When the hazard warning lamp is turned on, the left and right turn indicator lamps will flash simultaneously.

LCD screen

Ten boxes at the fifth row on the LCD screen of the combination instrument indicates the water temperature. When the water temperature is displayed in the full box on the LCD screen, it indicates that the water temperature is too high, reminding the user of it.

6.10 Seat

6.10.1 Specification

6.10.1.1 Fastener fastening torque

Application	Specification
Rear side of seat and lower seat frame	37-75N•m

6.10.2 Diagnosis information

6.10.2.1 Mechanical diagnosis of the seat adjuster

Table of mechanical diagnosis of the seat fore and aft adjuster

Possible problems	Possible causes	Revise
The adjuster cannot self-lock	<ul style="list-style-type: none"> • Seat adjuster handle twisted or bent • The locking return spring of the adjuster has failed • The lock is bonded to the adjuster 	<ul style="list-style-type: none"> • Repair the handle to ensure both sides can be released and locked at the same time or replace the handle • Install a new adjuster. • Apply special lubricating oil to the lock pivot shaft. If the lock sticks, eliminate the cause of the adhesion or replace the adjuster.
Difficulty in moving the seat forward and backward	<ul style="list-style-type: none"> • The new adjuster has not been run in (20 runs are required). • The adjuster is not properly lubricated. • The adjuster is not smooth due to bent or damaged rails. 	<ul style="list-style-type: none"> • Move the seat repeatedly between the forwardmost and rearmost positions to make the track slide smoothly. • Lubricate the adjuster track with a special automotive lubricant or equivalent. • Replace the adjuster.
Adjuster track one front one rear	The seat system is installed with one track in front and one track in rear	<ol style="list-style-type: none"> 1. Move the seat forward as much as possible. 2. Loosen the adjuster to floor bolts. 3. Lock the seat in the foremost position and tighten the adjuster to floor bolts

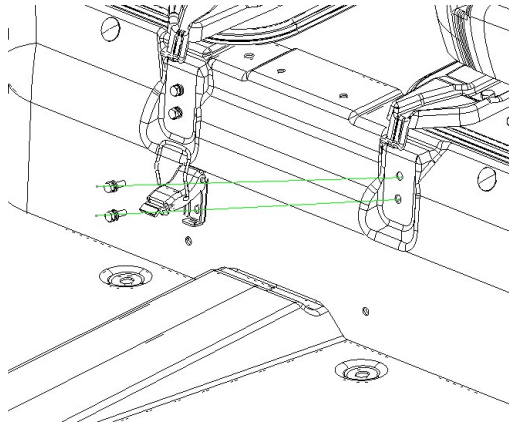
6.10.3 Maintenance Guide

6.10.3.1 Replacement of the seat latch assembly

Removal steps

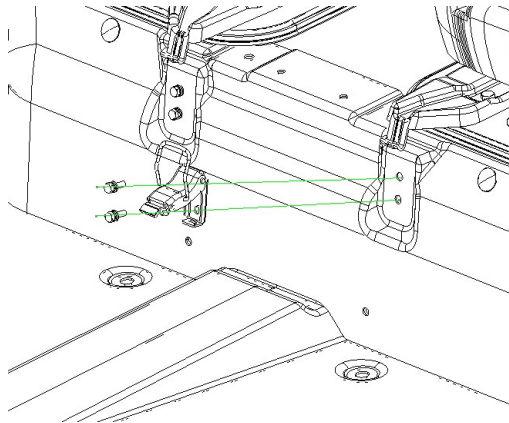
1. Pull up the seat latch handle to release the hook and loop from the seat hook.

2. Remove the lock fastener.



Installation steps

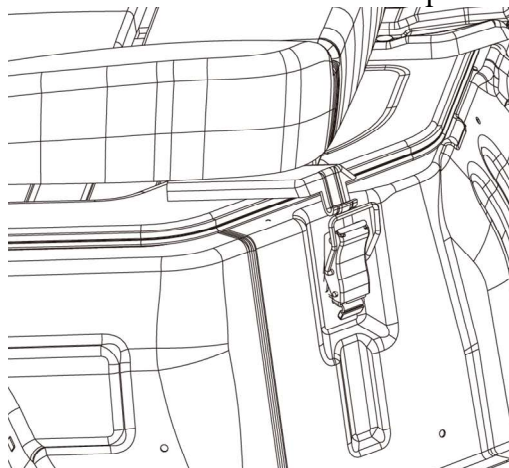
1. Fix the seat latch with bolts, with a tightening torque of 6-12N•m;
2. Fasten the seat latch.



6.10.3.2 Replace the seat

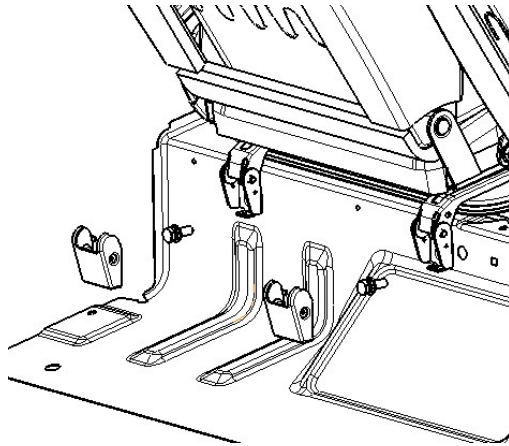
Removal steps

1. Pull up the seat latch handle to release the hook and loop from the seat hook.



2. Remove the cover from the seat frame and remove the two bolts fastening the rear side of the seat.

3. Remove the seat from the seat frame weldment.

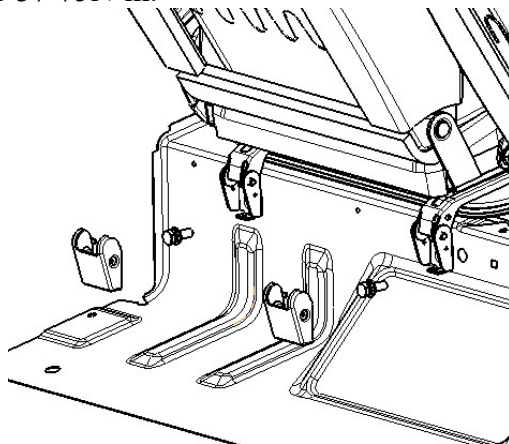


Installation steps

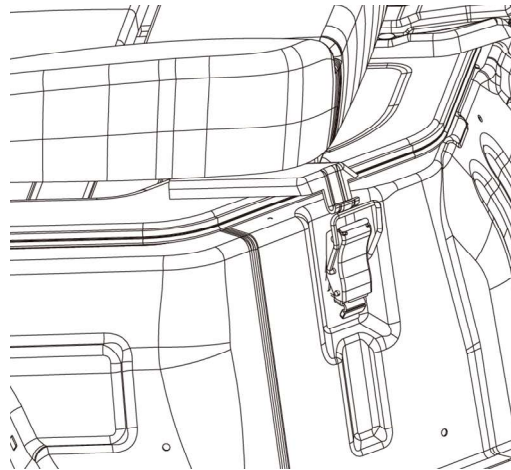
1. Place the seat on the seat frame weldment in the vehicle, install the bolts between the rear side of the seat and the lower seat frame, and fasten the cover.

Tightening torque:

Tighten the bolt torque to 37-75N•m.



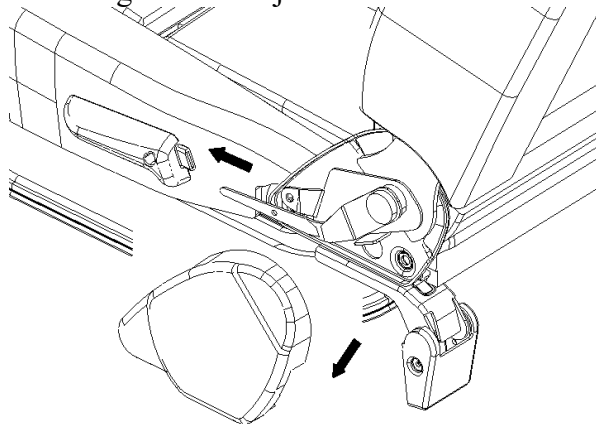
2. Hook the seat latch hook and loop onto the seat cushion hook. Press down the seat latch handle.



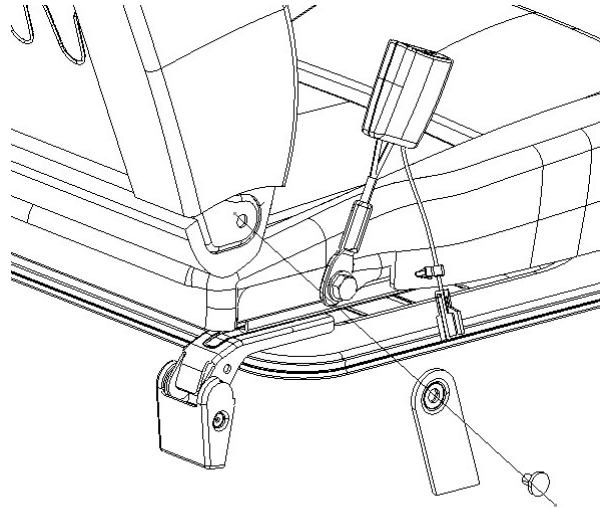
6.10.3.3 Replace the seat backrest

Removal steps

1. When removing the seat assembly from the seat frame, refer to " Replace the seat".
2. Remove the adjuster handle and cover plate.
3. Remove the bolts connecting the seat adjuster and the seat frame.

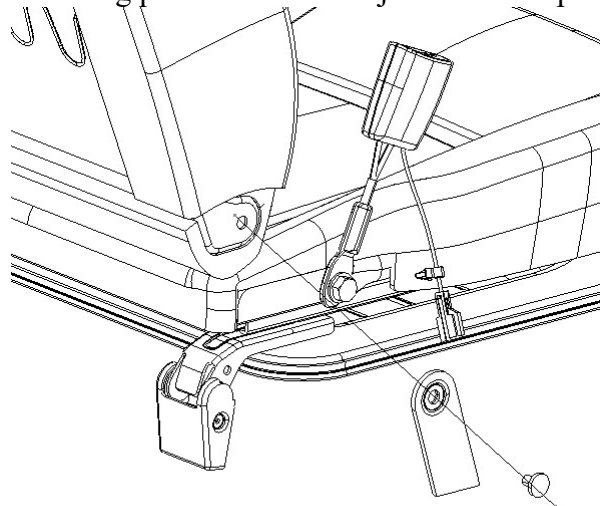


4. Remove the seat turning parts and seat adjustment foot plates of the other side seat backrest frame and seat frame.
5. Remove the seat backrest from the seat.

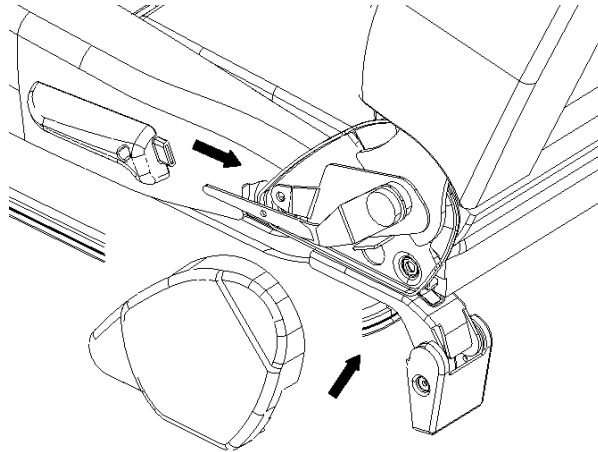


Installation steps

1. Place the seat backrest in the position where it is connected to the seat cushion, and tighten the seat adjuster and the seat turning parts of the seat adjustment foot plate.



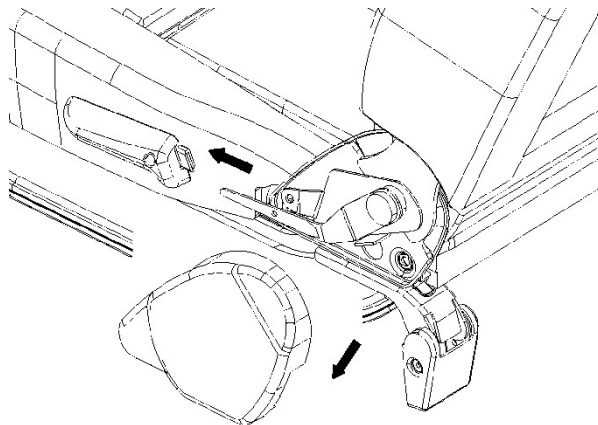
2. Fasten the adjuster of the other seat backrest frame and cushion frame.
3. Install the adjuster trim cover. Refer to “Replacement of the seat backrest adjuster”.



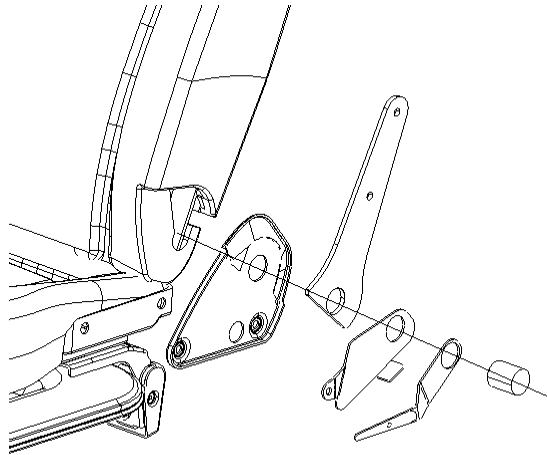
6.10.3.4 Replacement of the seat backrest adjuster

Removal steps

1. When removing the seat from the seat frame, refer to " Replace the seat".
2. Remove the adjuster trim cover mounting screws from the seat backrest and remove the adjuster trim cover;

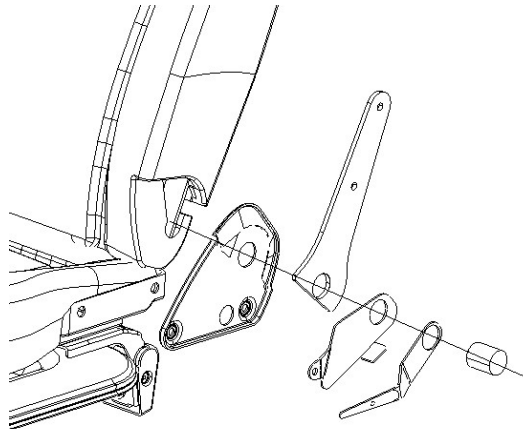


3. When removing the seat backrest, refer to "Replacement of the seat backrest".
4. Remove the bolts fastening the seat backrest adjuster from the seat backrest frame and remove the seat backrest adjuster.

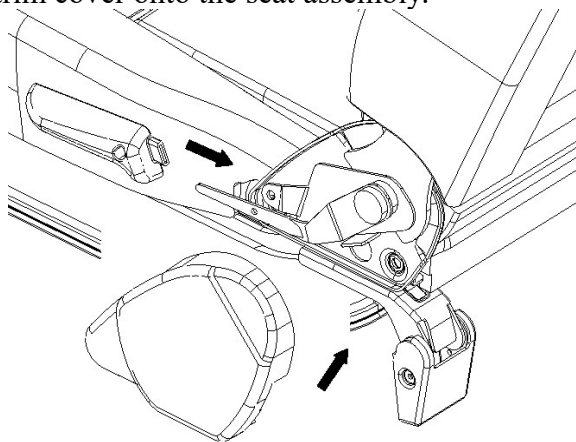


Installation steps

1. Fasten the seat adjuster to the seat frame.



2. When installing the seat backrest, refer to "Replacement of the seat backrest".
3. Install the adjuster trim cover onto the seat assembly.



6.10.3.5 Replacement of the seat headrest

Removal steps

1. Press the button on the headrest guide to release the locking spring.
2. Remove the headrest from the seat backrest.

Installation steps

1. Place the headrest on the seat backrest.
2. Press the headrest down to the bottom.
3. Lift the headrest to make sure it stops at the stop.
4. Return the headrest to its original position.

6.11 Interior trims

6.11.1 Maintenance Guide

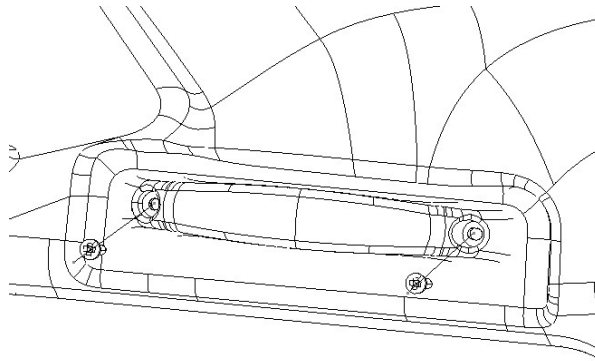
6.11.1.1 Replacement of the auxiliary handle

Removal steps

Loosen the screws of the auxiliary handle and remove the handle.

Installation steps

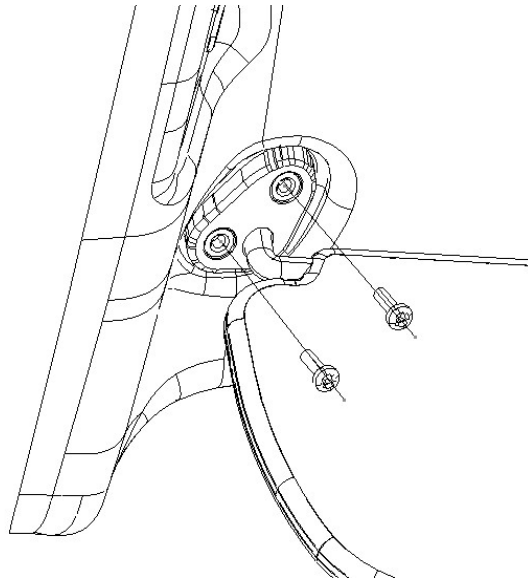
Position the auxiliary handle and install the screws that secure the auxiliary handle.



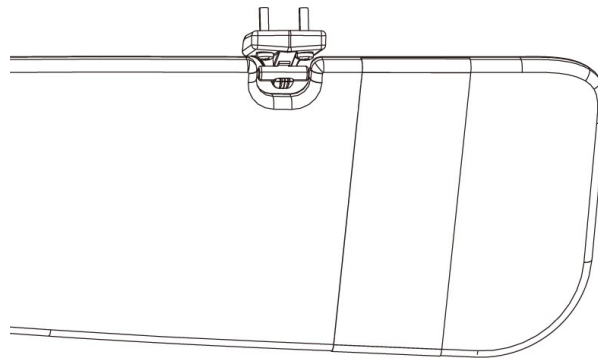
6.11.1.2 Replacement of the left sun visor

Removal steps

1. Remove the screws that mount the outer bracket of the sun visor.

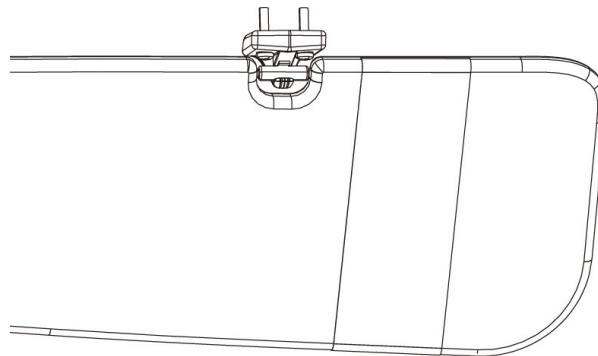


2. Remove the inner pin of the sun visor from the sun visor mount and remove the left sun visor.

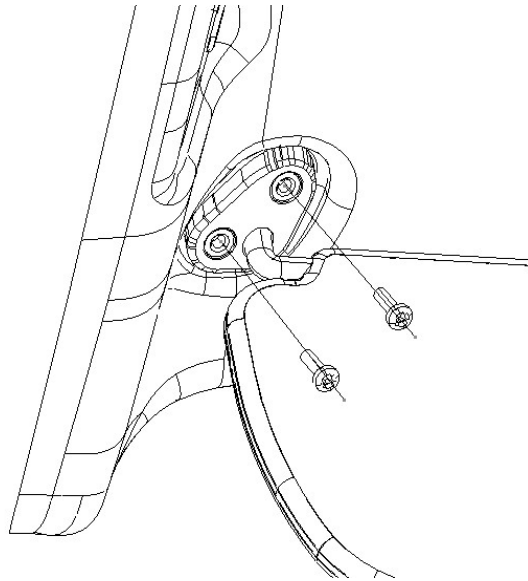


Installation steps

1. Install the inner pin shaft of the sun visor onto the sun visor mount.



2. Install the screws for the upper sun visor outer bracket.



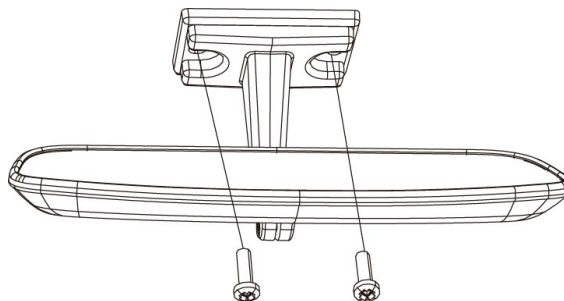
6.11.1.3 Replacement of the right sun visor

Refer to "Replacement of the left sun visor" for removal and installation methods.

6.11.1.4 Replacement of the interior rearview mirror

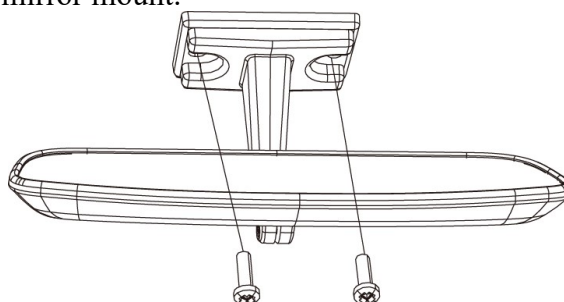
Removal steps

Remove the screws from the interior rearview mirror mount and pull out the interior rearview mirror.



Installation steps

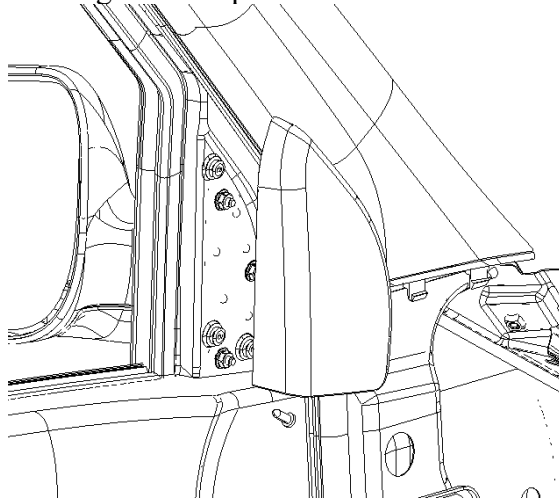
Align the interior rearview mirror to the corresponding position and install the screws that fasten the interior rearview mirror mount.



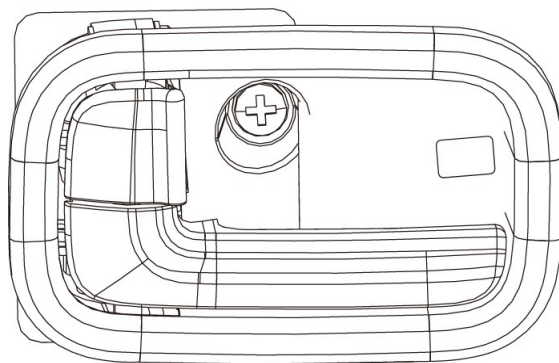
6.11.1.5 Replacement of front door interior trim panel assembly

Removal steps

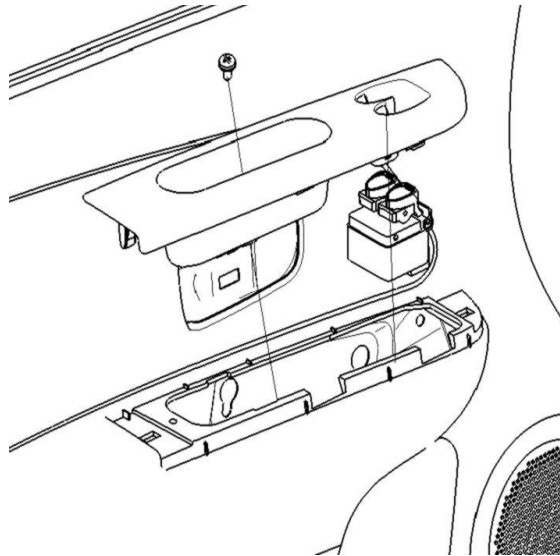
1. Remove the front door triangular trim panel.



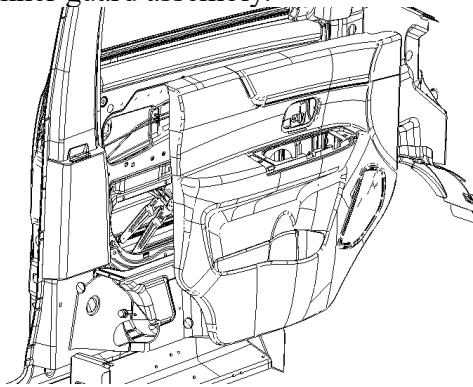
2. Remove the front door inner handle.



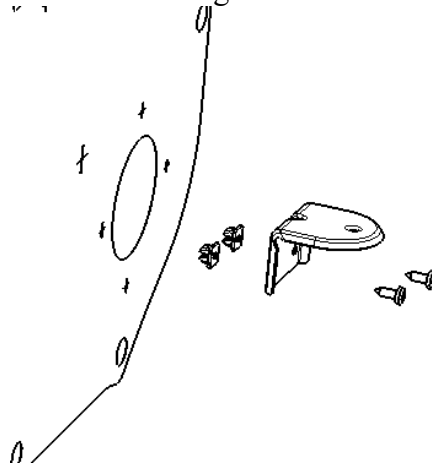
3. Remove the front door armrest screws, take out the front door armrest, press out the electric lifter button, and disconnect the harness of the electric lifter button.



4. Remove the front door inner guard assembly.

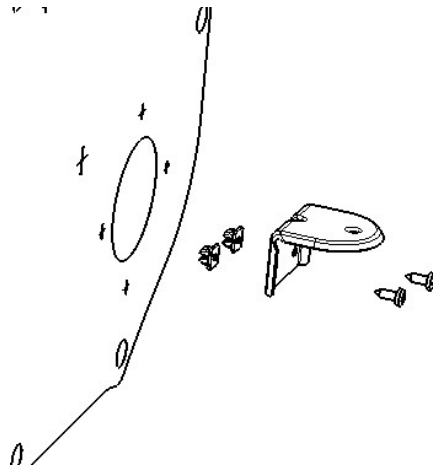


5. Remove the front door armrest mounting bracket.

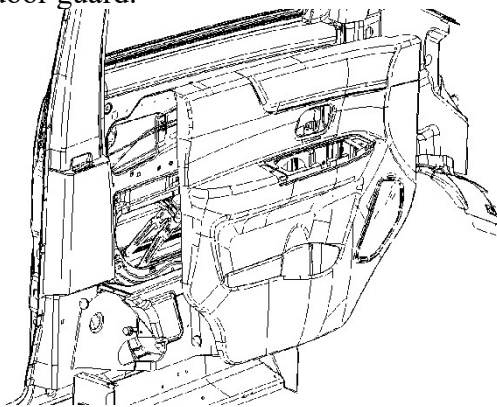


Installation steps

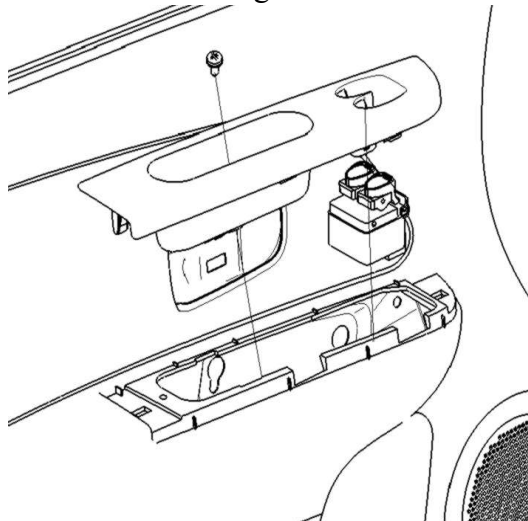
1. Install the front door armrest mounting bracket.



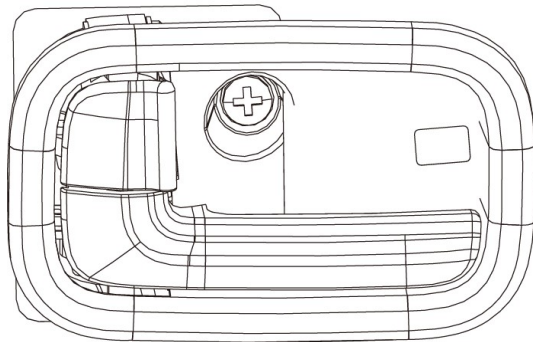
2. Install the upper front door guard.



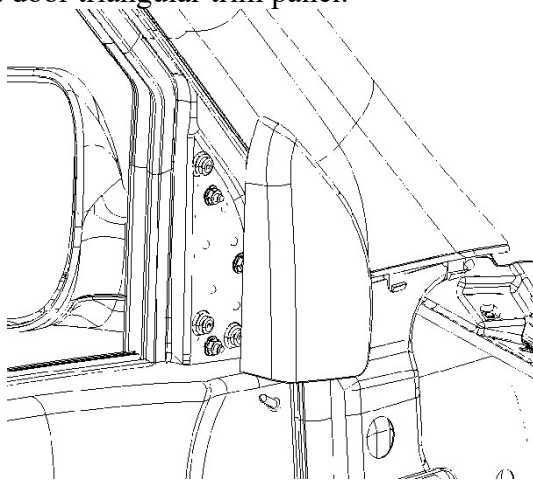
3. Install the electric lifter button onto the front door armrest, connect the wiring harness, and install the front door armrest onto the front door guard.



4. Install the upper front door inner handle and tighten with screws.



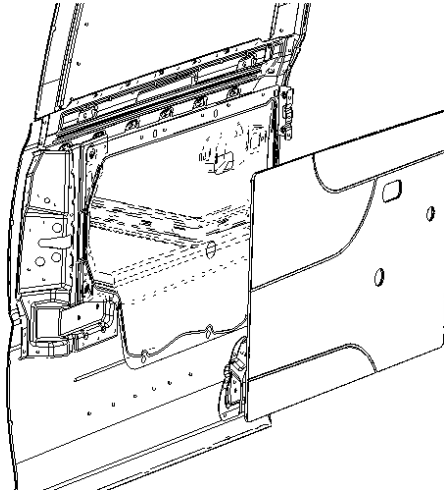
5. Install the upper front door triangular trim panel.



6.11.1.6 Replacement of sliding door interior trim panel assembly

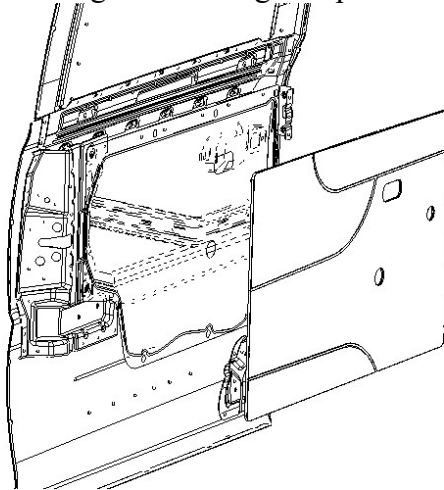
Removal steps

1. Use a screwdriver to pry out the circlip of the sliding door opening handle and remove the sliding door opening handle.
2. Remove the fastening screws from the sliding door lock switch trim panel and remove the sliding door lock switch assembly.
3. Use a screwdriver to pry the snap on the sliding door inner guard plate out of the vehicle body mounting hole and remove the sliding door inner guard plate.



Installation steps

1. Position the snap on the sliding door inner guard plate at the corresponding position, and press the snap to install the upper sliding door inner guard plate.

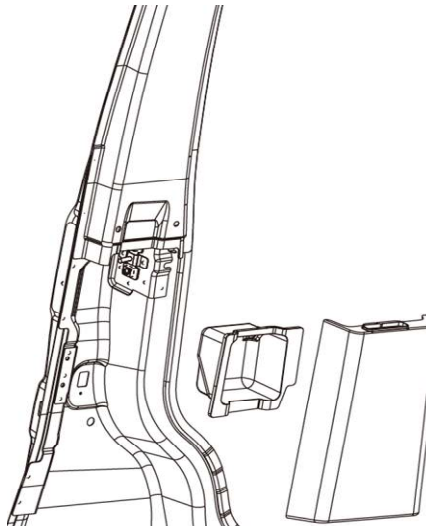


2. Install the lock switch trim panel and tighten the lock switch trim panel screws.
3. Install the sliding door opening handle.

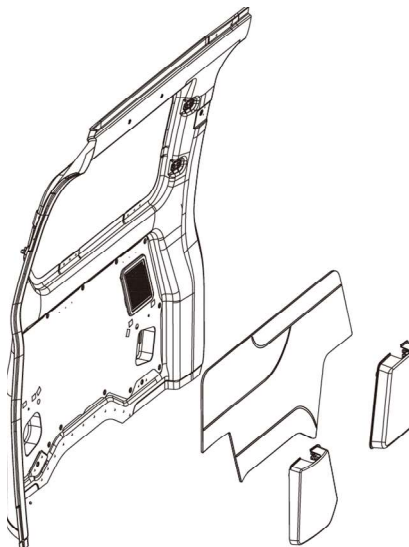
6.11.1.7 Replacement of rear side wall interior trim panel assembly

Removal steps

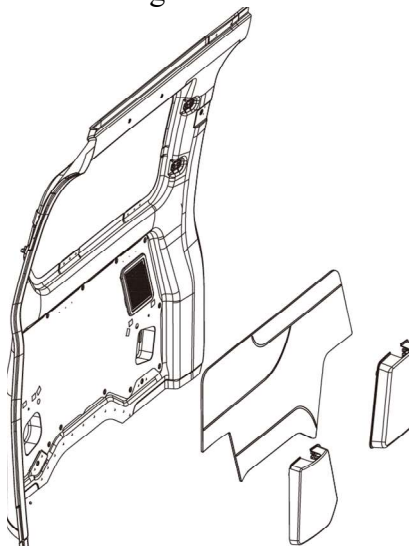
1. Remove the safety belt trim panel, refer to "Replacement of rear safety belt trim panel".
2. Use a screwdriver to pry the snap on the front safety belt trim cover assembly out of the vehicle body mounting hole and remove the front safety belt trim cover.
3. Remove the front safety belt retractor shield assembly.



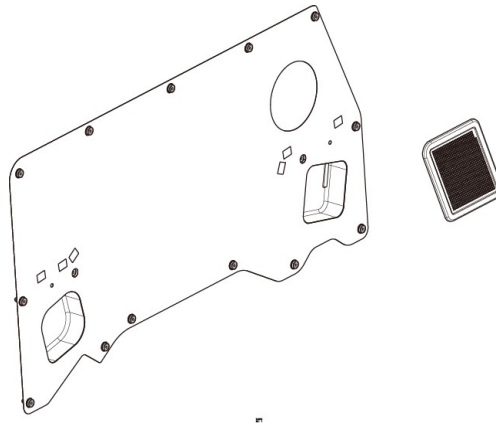
4. Use a screwdriver to pry out the clips on the middle safety belt trim cover assembly and the rear safety belt trim cover assembly from the vehicle body, and remove the middle safety belt trim cover and the rear safety belt trim cover.



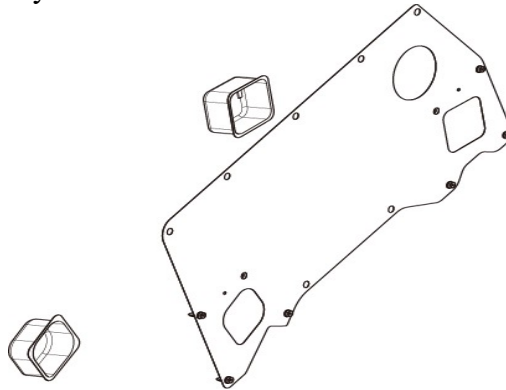
5. Pry out the clips on the rear side wall guard and remove the rear side wall guard.



6. Remove the speaker cover from the rear side wall guard.

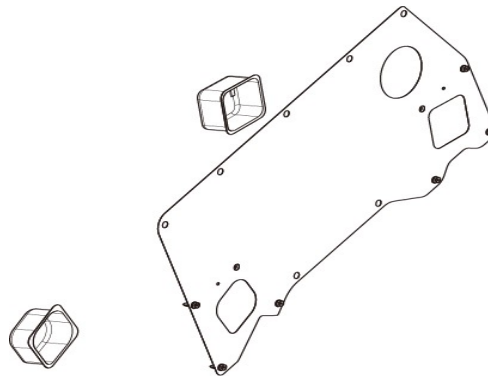


7. Remove the middle safety belt retractor shield and the rear safety belt retractor shield.

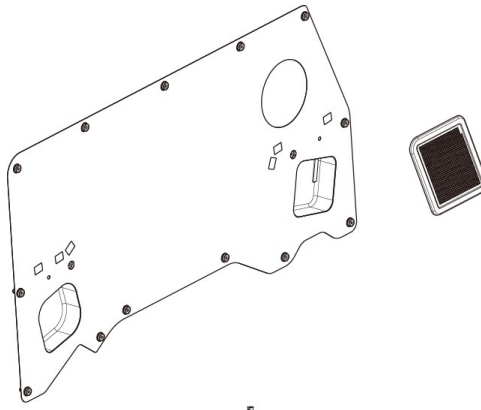


Installation steps

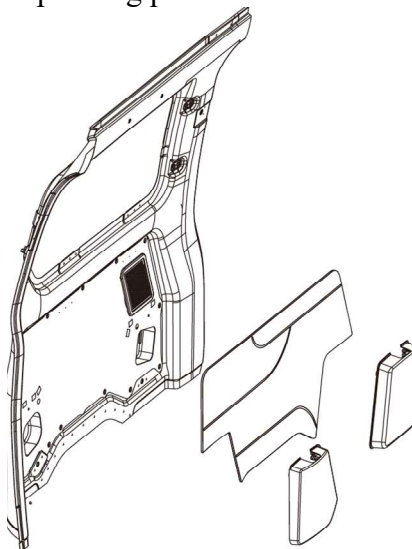
1. Install the middle safety belt retractor shield and the rear safety belt retractor shield to the rear side wall inner panel.



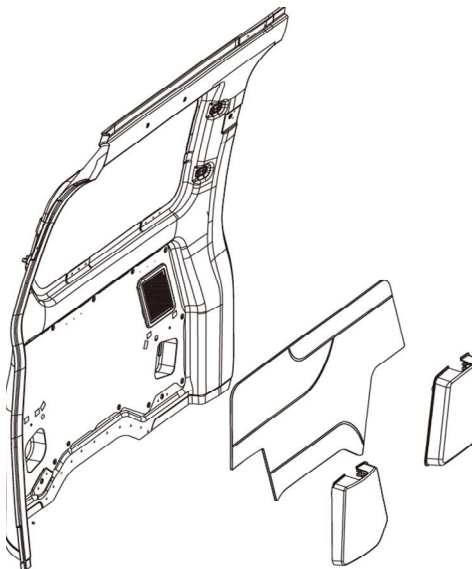
2. Install the speaker cover to the rear side wall inner panel.



3. Install the clips onto the rear side wall inner panel accordingly, and then press the side wall inner panel assembly onto the corresponding position of the door inner panel.



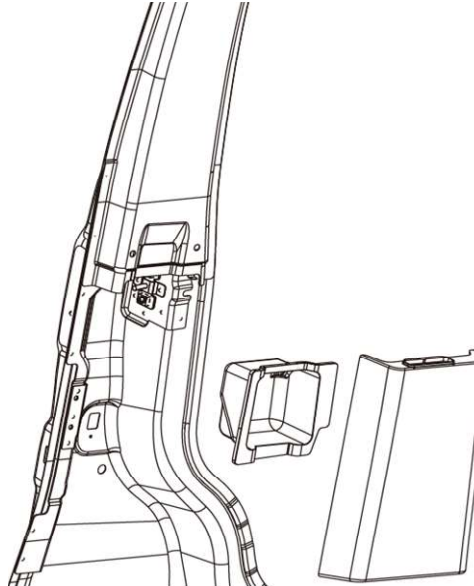
4. Install the middle safety belt trim cover assembly and the rear safety belt trim cover assembly.



5. Install the upper front safety belt retractor shield assembly.

6. Install the upper front safety belt trim cover assembly.

7. When installing the safety belt trim panel, refer to "Replacement of rear safety belt trim panel".



6.11.1.8 Replacement of the front door water retaining film

Removal steps

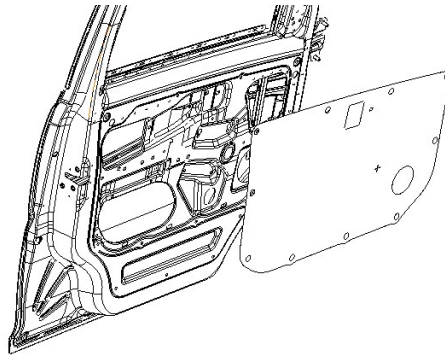
1. When removing the front door interior trim device, refer to the removal steps in "Replacement of the front door interior trim device (low configuration)" or "Replacement of the front door interior trim panel assembly (high configuration)".

2. Remove the front door waterproof film.

Installation steps

1. Affix the front door waterproof film to the vehicle body accordingly.

2. When installing the front door interior trim assembly, refer to the installation steps in "Replacement of the front door interior trim device (low configuration)" or "Replacement of the front door interior trim panel assembly (high configuration)".



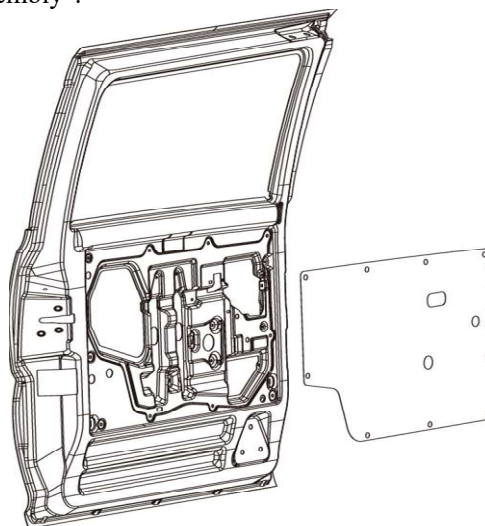
6.11.1.9 Replacement of the sliding door water retaining film

Removal steps

1. When removing the sliding door interior trim device, refer to the removal steps in "Replacement of sliding door interior trim panel assembly".
2. Remove the sliding door waterproof film.

Installation steps

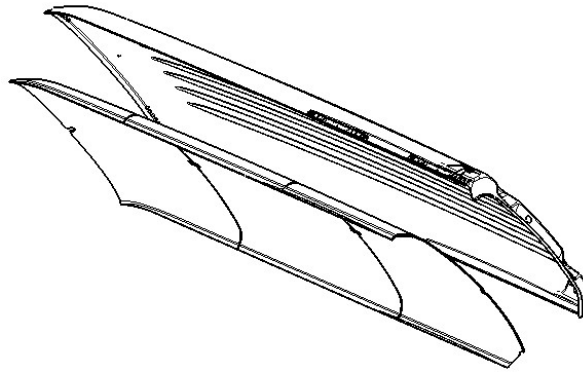
1. Affix the sliding door waterproof film to the vehicle body accordingly.
2. When installing the sliding door interior trim assembly, refer to the installation steps in "Replacement of sliding door interior trim panel assembly".



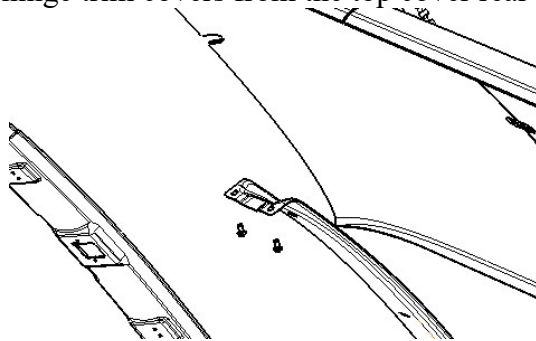
6.11.1.10 Replacement of the top cover inner cover

Removal steps

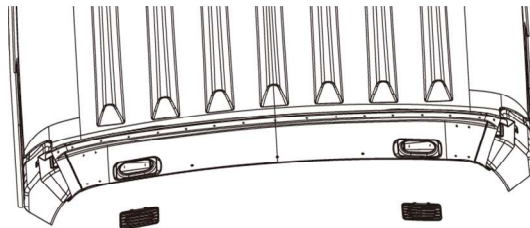
1. Remove the overhead air conditioner.



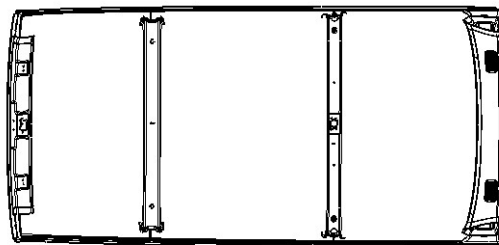
2. Remove 2 back door hinge trim covers from the top cover rear cross beam.



3. Remove the bolts from the top cover front cross beam, top cover middle cross beam, top cover middle front cross beam, and top cover rear cross beam. Remove the top cover front cross beam, top cover middle cross beam, top cover middle front cross beam and top cover rear cross beam.



4. Remove the front insulation layer, the middle insulation layer, and the rear insulation layer of the top cover from the outer panel of the top cover.



Installation steps

1. Apply the front insulation layer, the middle insulation layer, and the rear insulation layer of


the top cover to the corresponding positions on the outer plate of the top cover.

2. Install the top cover front cross beam, top cover middle cross beam, top cover middle front cross beam, and top cover rear cross beam, and tighten them with bolts.

3. Install 2 back door hinge trim covers onto the rear cross beam of the top cover.

4. When installing the overhead air conditioner, see "Replacement of overhead air conditioner assembly - auxiliary".

6.11.2 Special tools and equipment

Icon	Tool No./Description
	NLM1-S000007 Interior trim staple pry board

6.12 Central door lock controller assembly

6.12.1 Specification

6.12.1.1 Fastener fastening specification

Application	Specification
Remote door lock receiver mounting screws	6-12N•m

6.12.2 Component positioning diagram

6.12.2.1 Position of the central centralized door remote control module

////

Icons:

3

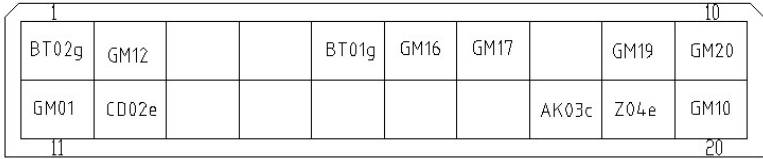
1	Instrument panel tube beam	2	Main harness assembly	3	Central door lock controller	4	Central door lock controller connector
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6.12.2.2 Central door lock controller plug-in

Central door lock control box

2

4

									
Harness No.	Wire color	Function							
BT02g	Green	Right turn signal lamp output							

GM12	Red green	Warning horn
BT01g	Purple	Left turn signal lamp output
GM16	Red	Central control lock locked
GM17	Orange black	Central door lock controller unlock sw
GM19	White red	Central door lock controller S_GND
GM20	Yellow	Central control lock unlocking
GM01	Blue black	Receiving antenna - ANT
CD02e	White	Door lamp switch -DOOR SW
AK03c	Red black	Ignition switch-IGN-SW
Z04e	black	Grounding
GM10	Blue	Power supply positive pole - B+

6.12.3 Description and operation

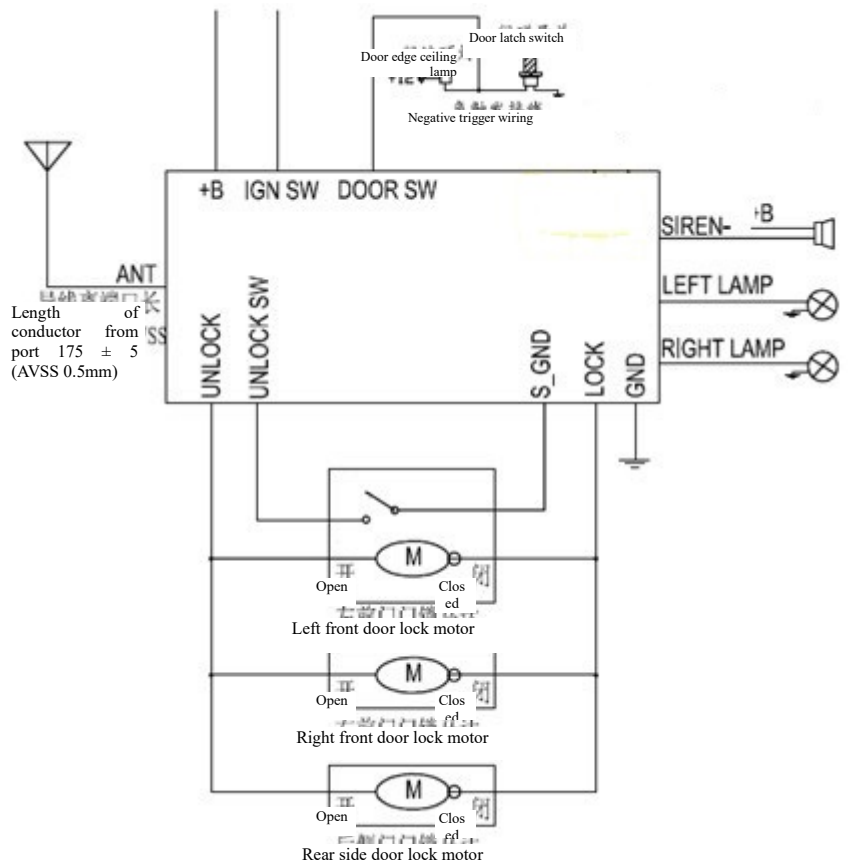
6.12.3.1 Description of system function

The following fault modes are set when the vehicle body wiring is normal and there is no radio interference with the normal operation of the product:

List of door lock remote control assembly faults

Phenomena	Cause	Countermeasures
1. Remote control distance becomes closer	Insufficient battery power	If you need to approach the vehicle in order for the transmitter to function, replace the battery
2. Remote control failure	1) Transmitter battery equipment	Replace battery
	2) Transmitter failure.	Replace the receiver and learn the code again
	3) Receiver failure.	Replace the receiver and learn the code again
3. Central control failure	Receiver damaged	Replace the receiver and learn the code again
4. Horn does not sound	1) Horn short circuit to ground	Check the wiring and turn on the horn
	2) Horn damaged	Replace the horn

1. Working principle diagram



2. Anti-theft setting

When IGN-SW is OFF and all doors closed, press the lock button once to lock the doors, the turn signal lamps flash once, the anti-theft horn sounds once, and the vehicle enters the anti-theft alert state.

3. Anti-theft setting deactivated

1) The vehicle is in an alert state. Press the unlock button once to unlock the doors. The turn signal lamps flash twice, the anti-theft horn sounds twice, and the anti-theft setting is deactivated.

2) If the remote control is lost or fails, use the emergency key to first open the driver side door, and then continuously turn IGN-SW ON \longleftrightarrow OFF back and forth for 6 times within 15 seconds. The sixth time, the emergency key stays in the IGN-SW ON position for more than 2 seconds to release the anti-theft setting.

4. Anti-theft alert

1) In the anti-theft alert state, when the door or IGN-SW is ON, the turn signal lamps flash for 25-30s, and the anti-theft horn alarms synchronously.

2) Secondary anti-theft setting

A. When IGN-SW is OFF, if the door has not been opened within 25 seconds after remote unlocking, the turn signal lamps flash once, the anti-theft horn sounds once, and the door automatically locks, entering the anti-theft alert state again;

B. If there is a trigger signal within 25 seconds after remote unlocking, such as IGN-SW ON, the door has been opened, and this function fails.

3) Door open indicator lamp

In the anti-theft release state, if one of the doors or IGN-SW ON is not closed properly when pressing the lock key, the horn alarm will sound three times and the turn signal lamps will flash three times, indicating that the arming is unsuccessful.

4) Manual unlocking and locking

Control the unlocking and locking of the central door lock by controlling the manual handle of the door lock motor on the driver side (left front door).

5) Remote control learning

When the remote control is damaged or lost, the original remote control can be deleted from the host computer memory through a relearning operation, and then a new remote control can be relearned. Learning method:

① Press and hold the main engine learning button (>0.5S), and use the emergency key to continuously turn IGN-SW ON \longleftrightarrow OFF back and forth for 3 times within 6 seconds. The third time, the emergency key stays in the IGN-SW ON position for more than 2 seconds, the horn sounds once, and the turn signal lamps remain on for a long time, indicating that the host machine enters the learning state;

② Press any key on the remote control, and the turn signal lamps flash for three times before turning off, indicating that the remote control has successfully learned, and the system exits the learning mode; after the system enters the learning state, if there is no operation within 15 seconds, it will automatically exit and the original remote control will remain unchanged.

③ The system only allows learning one remote control.

5. Precautions

A. Please use the remote control to open and close the central door lock. In the alert state,

opening the door with a key will trigger an alarm;

B. Before the vehicle is powered off, and when you gets off, please take away the remote control. After getting off and closing the door, timely press the remote control lock button to lock the door;

C. Do not string the two remote controls together to avoid accidental losses and trouble;

D. Do not press the remote control button arbitrarily;

E. If water enters the remote control, immediately remove the battery, dry the remote control with a low gear hot air blower, and wipe the battery dry;

F. If the remote control buttons do not respond and the LED does not prompt, the remote control battery may be low. Please replace the battery timely. The battery model is CR2032, and the number is one.

6.12.4 Maintenance Guide

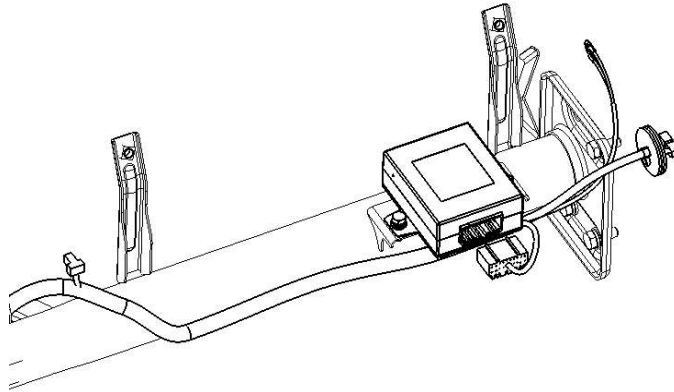
6.12.4.1 Replacement of the central door lock controller

Removal steps

1. Remove and replace the instrument panel assembly.
2. Unplug the harness plug-in of the door lock remote control assembly.
3. Remove the mounting bolts installed on the central door lock controller bracket.

Installation steps

1. Install the central door lock controller assembly onto the central door lock controller bracket with 2 bolts.
2. Plug in the harness connector
3. Install the instrument panel assembly.



6.12.4.2 Replacement of the remote transmitter battery

Removal steps

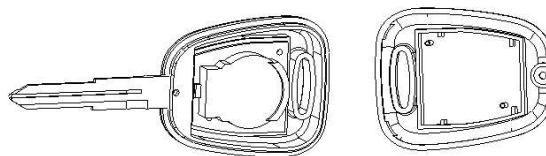
1. Remove the screw from the remote key.
2. Remove the remote key cover.
3. Remove the 3V old button battery.

Installation steps

1. Install a new 3V button battery.

Important precautions: The positive pole "+" of the battery faces upward.

Clip the remote key cover into the transmitter base along the periphery, and then tighten the screws.



/ 7 Safety protection device

7.1 Safety belt

7.1.1 Specification

7.1.1.1 Fastener fastening torque

Application	Specification
Safety belt guide ring bolt	40-50N•m
Safety belt retractor bolt	40-50N•m
Safety belt buckle bolt	40-50N•m
Safety belt fixing bolt	40-50N•m

7.1.2 Diagnosis information and procedures

7.1.2.1 Operation and function check

Safety belt inspection

Caution: To avoid personal injury caused by a crash without repairing the safety protection system:

1. Replace the safety belt system that is worn during a crash, except for minor crashes.
2. Each safety belt system should be inspected, and if there is any doubt about the condition of system components, the safety belt system should be replaced.

Perform the following inspection procedure for the driver seat: refer to "Description of safety belt system".

Inspect the shoulder belt guide ring to determine the following:

1. The shoulder belt guide ring can rotate freely.
2. The safety belt webbing can be smoothly placed into the guide ring slot.
3. The safety belt webbing is not sticking.
4. Make sure the safety belt buckle is facing inward and its length is proper.
5. Ensure that the safety belt retractor is securely fastened.
6. Ensure that the safety belt fixing bolts are securely fastened.
7. Fully stretch the safety belt webbing to ensure it does not twist or tear.
8. Check the safety belt retractor to ensure it retracts freely.
9. Insert the safety belt locking tab into the buckle lock.
10. Pull the safety belt latch and buckle quickly to ensure that the safety belt latch and buckle remain locked during the pull.
11. Press the button on the buckle lock.
12. Ensure that the safety belt latch can easily pop out of the buckle lock.
13. Make sure the button returns to its original position.

Repeat the inspection procedure for the safety belt (Steps 2 through 10).

Caution: Perform the following tests in an area free of vehicles and pedestrians. This test is prohibited to be carried out on public roads. Spacious and open parking spots are more suitable. Failure to do so may result in vehicle damage or other personal injury.

1. Fasten the safety belt. If the retractor being tested is not a component of the driver's safety belt, an additional assistant is required.
2. Slowly accelerate the vehicle to 16 km/h (10 mph) and step on the brake.
3. Ensure that the safety belt is locked when the brake is stepped on.
4. If the safety belt is not locked, follow the steps below.
 - 4.1. Remove the safety belt retractor assembly.
 - 4.2. Slowly tilt the safety belt retractor.
 - 4.3. Ensure that the webbing of the safety belt can be pulled out of the retractor when the inclination is not greater than 15 degrees, and cannot be pulled out of the retractor when the inclination is greater than or equal to 45 degrees.
 - 4.4. If the safety belt retractor cannot be locked as described above, replace the safety belt assembly.

Refer to "Replacement of the safety belt".

7.1.2.2 Precautions for use of safety belt

Do not bleach or dye the safety belt webbing. Use only mild soap, water soluble substances, and soft bristle brushes or cloth when cleaning the safety belt webbing.

Remove objects from the safety belt that can cause scratch and damage. Avoid bending or damaging the safety belt buckle lock or locking tab.

Replace the safety belt webbing that has any form of cuts and damage.

Use special safety belt fixing bolts and screws.

- Tighten bolts and screws to ensure correct torque, refer to "Fastener tightening specification".

- When installing the safety belt fixing bolt, ensure that the bolt threads are aligned by hand.

Some safety belts and retractors must be serviced using a complete set of special repair parts.

Ensure that the replacement parts section and the vehicle seat position are correct. The safety belt cannot be replaced from a different seat.

Only replace the safety belt with an instruction caution plate

Some safety belts have energy control systems, which are folds where the webbing of the safety belt is stitched together. If any of the seams are separated, the safety belt should be replaced.

7.1.3 Maintenance Guide

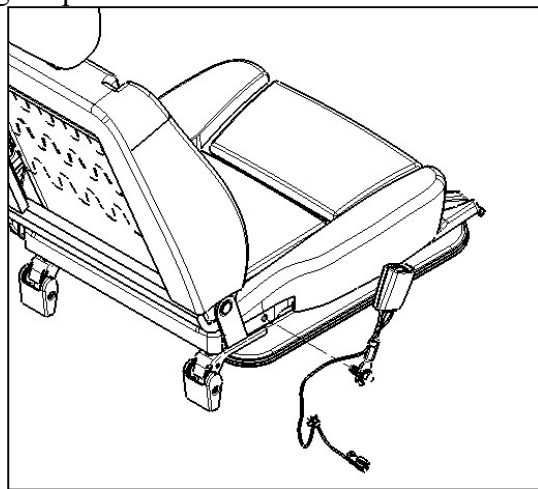
7.1.3.1 Replacement of the safety belt buckle

Removal steps

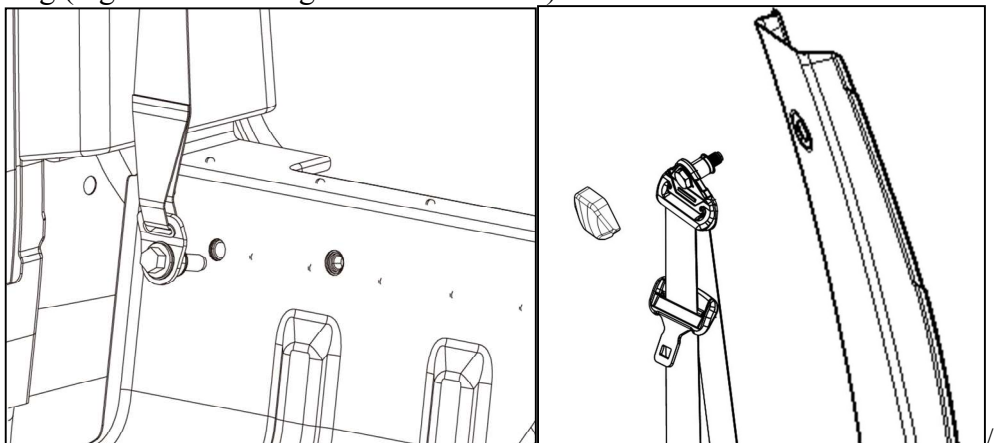
1. Remove the bolt from the seat side safety belt buckle.
2. Remove the safety belt unfastened alarm buckle assembly from the seat.

Installation steps

1. Install the unfastened safety belt alarm buckle assembly onto the seat. Install the safety belt buckle bolt with a tightening torque of 40-50N•m.



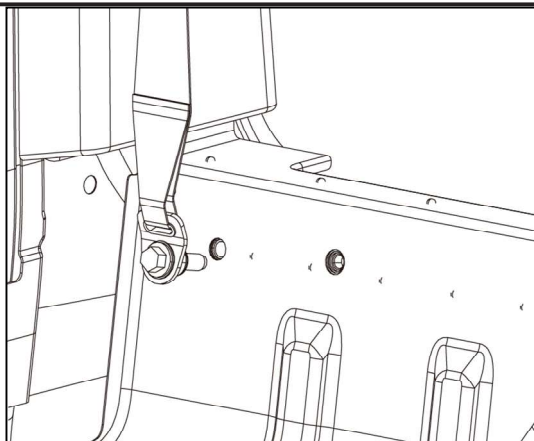
2. Remove the upper trim cover of the safety belt and remove the fastening bolt of the safety belt guide ring (together with the guide roller washer).



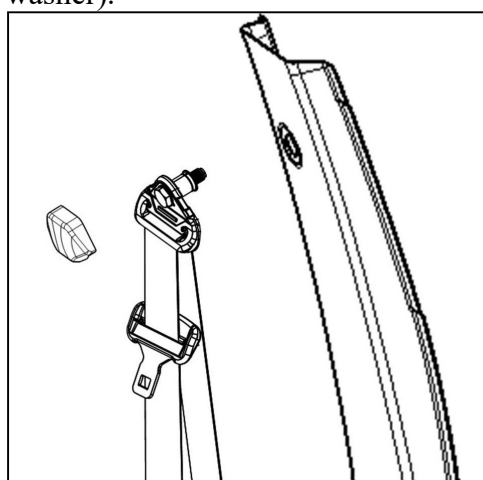
7.1.3.2 Replacement of the safety belt

Removal steps

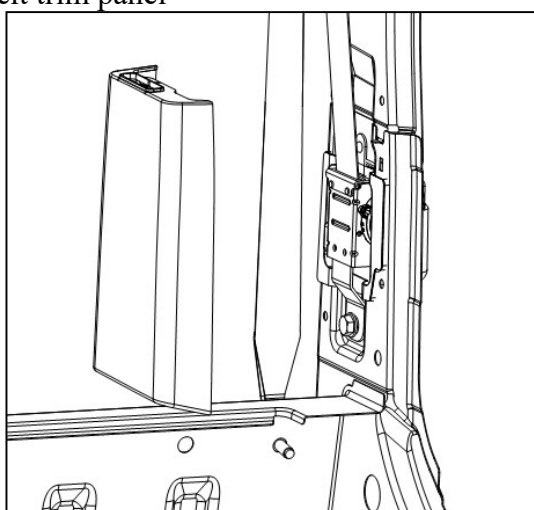
1. Remove the safety belt fixing bolt trim cover, and remove the bolts connecting the lower part of the safety belt and the middle floor (together with the guide roller washer).



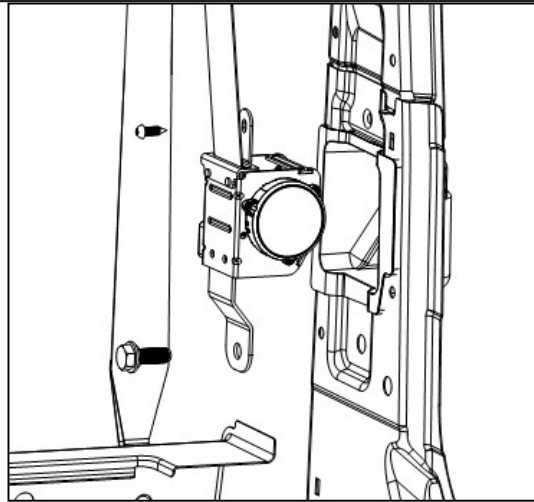
2. Remove the upper trim cover of the mounting belt and remove the guide ring fastening bolts (together with the guide roller washer).



3. Remove the safety belt trim panel



4. Remove the fixing bolts and screws of the safety belt retractor and remove the safety belt retractor.



Installation steps

1. Install the safety belt retractor into the safety belt retractor shield assembly.
2. Install the screws and bolts on the safety belt retractor and tighten them.
3. Install the safety belt trim panel after the safety belt webbing is not twisted.
4. Install the fastening bolt of the guide ring on the upper belt (together with the guide roller washer), and install the upper safety belt trim cover.
5. Install the bolt connecting the lower part of the safety belt to the middle floor (together with the guide roller washer), and fasten the safety belt fixing bolt trim cover.

7.1.4 Description and operation

7.1.4.1 Instructions on safety belt system

Caution: Except for minor collisions, the safety belt, retractor, and all hardware used should be replaced. At the same time, if local damage is caused by a collision, the protective device system should be replaced, and the fixing points should be carefully repaired. If you have any doubts, replace the safety belt system. Any visible or non visible damage can cause personal injury or death in an accident.

Protection device system

Caution: To avoid personal injury caused by a crash without repairing the safety protection system:

Replace the safety belt system that is worn during a crash, except for minor collisions.

Each safety belt system should be inspected, and if there is any doubt about the condition of system components, the safety belt system should be replaced.

The safety belt is the most important safety protection device for passengers. The safety belt may significantly reduce the impact force on passengers in the passenger compartment under the following conditions:

Front impact

Rear impact

Side impact

Roll

Sudden change in vehicle speed

Sudden change in vehicle driving direction

The vehicle climbs a steep slope

The vehicle slides

All safety belts have emergency locking devices. Under normal operation and driving conditions, the retractor remains unlocked to ensure that everyone's upper body can move normally.

The position of the safety belt webbing is locked by a sensitive element that can lock the gear on the reel of the retractor when the following conditions occur:

The safety belt retracts rapidly from the retractor

The safety belt has an automatic locking function. When the safety belt webbing is fully opened from the retractor, the locking function is activated, which prevents the webbing from pulling out of the retractor.

This locking function is automatically cancelled when the webbing can be fully retracted into the retractor. When the locking function is cancelled, the sideband is not locked and can be pulled out of the retractor.

This vehicle adopts a three-point emergency locking retractor type safety belt (hereinafter referred to as the three-point type). For specific information, refer to the "Description of the three-point safety belt system".

7.1.4.2 Instructions on three-point safety belt system

The retractor of this vehicle's seat has dual mode features of emergency locking and automatic locking. The seat is equipped with a three-point safety belt.

Safety belt system of the seat includes the following components:

The retractor side safety belts for the driver and passenger seats are located in the B-column inner panel.

The safety belt buckles for the driver and passenger seats, located between the two seats, are connected to the seat.

Instructions for using safety belts:

Use of the three-point safety belt system: Pull the webbing out of the retractor, let the shoulder belt pass through the shoulder, and the lap belt cross the pelvis. Then insert the locking tongue into the buckle. When a "click" sound is heard, it indicates that the safety belt has been fastened.

Adjust the safety belt: Adjust the seat and sitting posture to a comfortable level, place the waist belt as low as possible above the hips, and the diagonal belt on the shoulder of the three-point safety belt can be freely adjusted. Pull the shoulder safety belt upward through the tongue to keep the safety belt in a natural tension state.

Release the safety belt: Hold the lock tongue with one hand, and press the red button of the lock buckle with the other hand. The lock tongue will automatically pop out; Allow the retractor to fully retract the webbing, and ensure that the webbing is not pleated when the retractor is retracting the webbing.

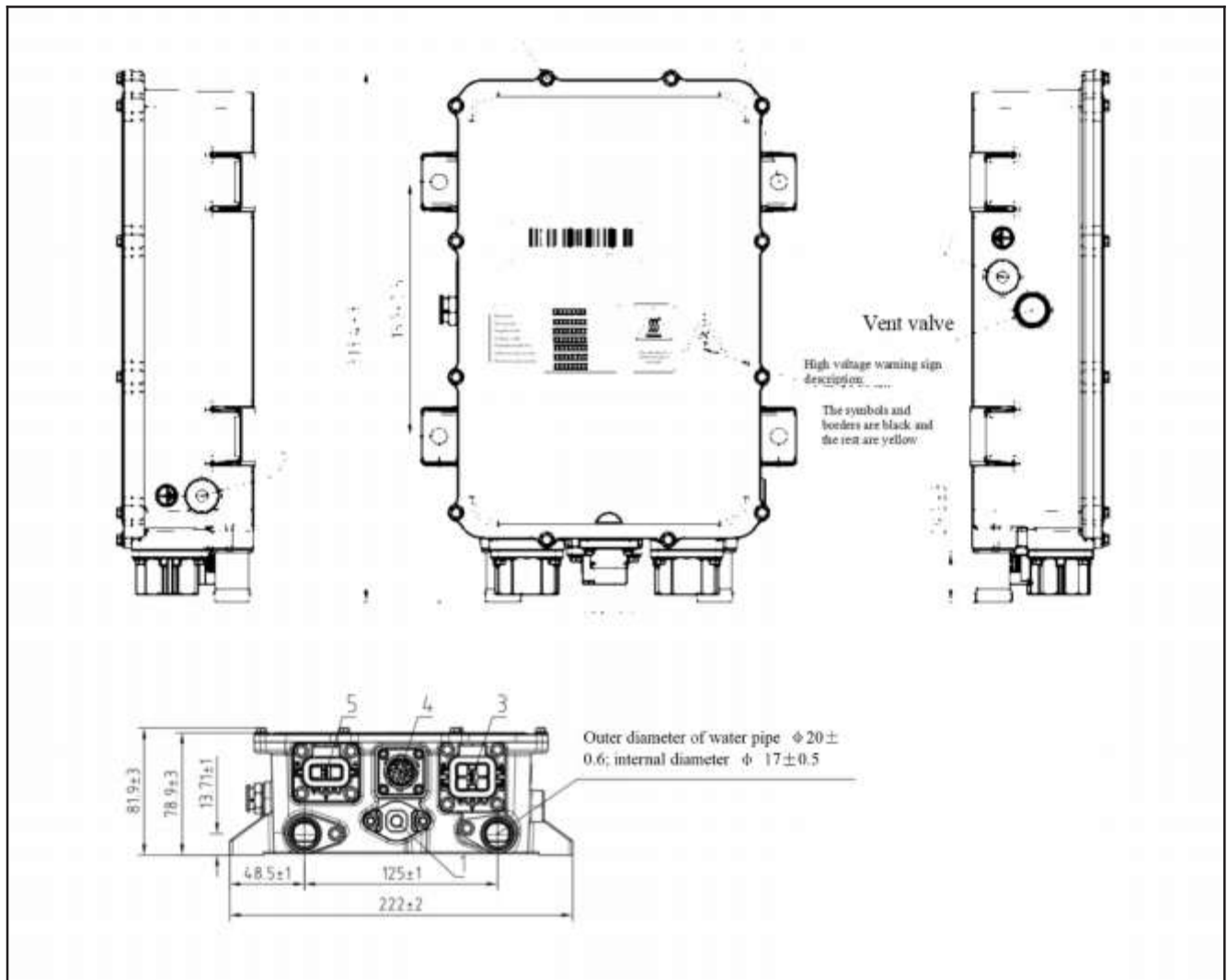
8 Electrical Equipment

8.1 D+C parts fault repair

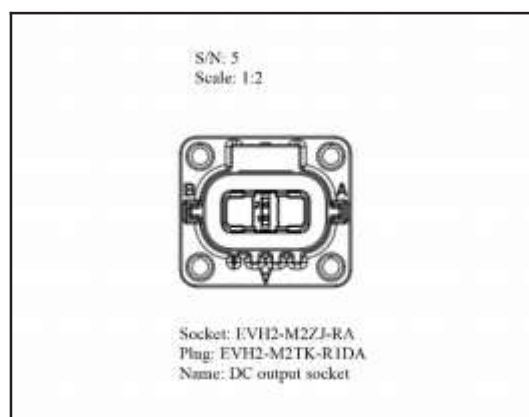
In the whole vehicle, the main function of the D+C assembly is to convert the high voltage of the high-voltage battery pack into low voltage, and part of it is output to the small lead-acid battery through the fuse to provide 14V DC power; provide slow charging for on-board power battery, i.e., convert AC 220V power supply into DC high-voltage power supply so as to charge the power battery.

8.1.1 Basic technical data of D+C

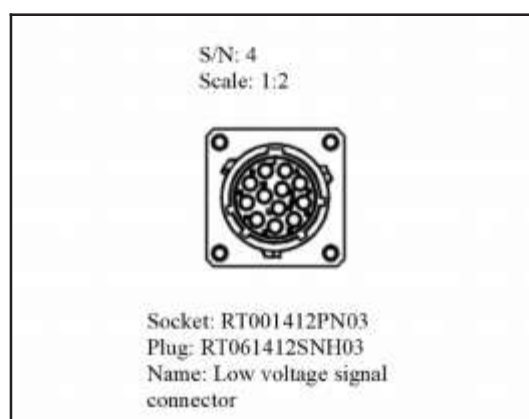
Appearance



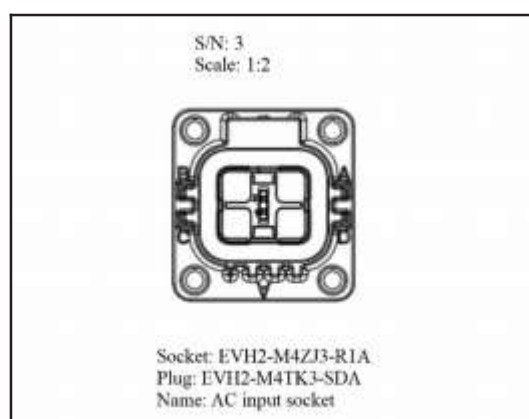
Terminal	Pin definition	Description
A	BAT-	Negative pole
B	BAT+	Positive pole





Terminal	Pin definition	Description
A	CAN_H	.
B	CAN_L	.
C	DC_EN	.
D	CP	.
E	CC	.
F	CC_OUT	.
G	OBC_EN_BMS	.
H	Bat12+	.
J	Bat12-	.



Terminal	Pin definition	Description
A	AC_L	Live wire
B	AC_N	Neutral wire
C	PE	Protective grounding wire
D	/	/



Harness routing of relevant parts

Socket	Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① , ② , ③ , etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector,which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness; refer to the high-voltage battery line fault maintenance section for the harness routing of the high-voltage power relay coil involved in D+C.</p>
a	1	
	2	<p>① Refer to high voltage harness connector D+C, wire No.:GY1/GY2;</p> <p>② Refer to BMS positive pole of high-voltage harness connector, wire No.:GY1;</p> <p>③ Refer to BMS negative pole of high-voltage harness connector, wire No.:GY2;</p>
b	1	Empty, not used;
	2	 <p>① Refer to D+C fault signal of electric control harness connector, wire No.:DH4;</p> <p>② Refer to VCU large sheath of electric control harness connector, wire No.:DH4;</p>
	3	Empty, not used;


c	c	Low voltage output positive pole, connected to battery positive pole;
d	d	Low voltage output negative pole, connected to battery negative pole;

Basic performance parameters

D+C	
D+C input voltage	330 DC
Rated output power	1.2 kW
Peak output power	1.4 kW (6min)
Efficiency	≥ 88%
Charger	
AC input voltage	90~264 VAC (45-65Hz)
High voltage output voltage	250~420 VDC
AC input current	16A Max
High voltage output current	10A±3% Max
Output power	3.1kW Max
Efficiency	≥ 93%

8.1.2 Working principle and troubleshooting process for reference

The schematic diagram of D+C working principle is shown. After the key switch is turned to “START”, the main contactor inside the high-voltage battery is closed, the instrument “Ready” is on, the VCU pulls pin a down to a low level, and the D+C high- voltage relay is closed (Note: the D+C high-voltage relay is integrated in the high-voltage battery). D+C detects the high-voltage input, and then starts the operation automatically. For details of the working principle of D+C in the whole vehicle, please refer to the schematic diagram of the whole vehicle.

Note 1: ① in case of D+C fault, the D+C fault signal line will be pulled down from high level to low level. When the VCU receives the low level signal, it will send a message to the instrument through the CAN bus, and the instrument fault light "  " will be lit and displayed in red; ② It is also possible to indirectly judge whether D+C is faulty through some electrical equipment (such as low headlamp brightness, low horn sound, unable to charge slowly, etc.),

and then measure the battery voltage with a multimeter. If the voltage is less than 11.6V or even lower, it can basically judge that D+C is faulty, and then refer to the above steps for maintenance.

Note 2: as the aviation plugs and harness of vehicle may be damaged or loosened due to aging or vibration during driving, which may affect D+C not to work, the problem can be solved by fastening, repairing the loose connectors or replacing relevant parts.

Note 3: refer to the routing of relevant pin harness in the basic technical data of D+C, query the definition of pin of harness connector by drawing number, connector name and wire number, and then check whether the high-voltage harness has high-voltage output and harness continuity according to the definition and wire number.

Note 4: D+C high-voltage relay and high-voltage power supply fuse are integrated in the high-voltage battery. The coil harness of the high-voltage relay can be repaired according to the fault maintenance of the high-voltage battery line. The hardware of the high-voltage relay and high-voltage power supply fuse needs to be repaired according to the battery system.

Note 5: ① when D+C starts working, the "POWER" light and "RUN" light are on. If only the "POWER" light is on or the "RUN" light is flashing, it indicates that the charger is not working normally.

Note 6: as the connectors and harness of vehicle may be damaged or loosened due to aging or vibration during driving, which may affect D+C not to work, the problem can be solved by fastening, repairing the loose connectors or replacing relevant parts.

Note7: refer to relevant pin harness routing in basic technical data of charger, query the definition of pin of harness connector by drawing number, connector name and wire number, and then check whether the high-voltage harness has high-voltage output and harness continuity according to the definition and wire number.

8.1.3 Common precautions for D+C

Ensure that all connectors are firmly contacted.

Ensure that the AC supply voltage is consistent with the allowable input voltage of the charger. In case of any doubt, please contact the retailer or consult the local power supply bureau.

For the sake of safety and electromagnetic compatibility, the charger is equipped with a three-hole plug, which is suitable for sockets with grounding wires.

If the extension line is used for AC power supply, it shall be ensured that the extension line can withstand the maximum input current of the charger.

In order to prevent damage to the charging line, do not place objects on the line or at places that are easy to be stepped on. If the wire is worn or damaged, please replace it immediately.

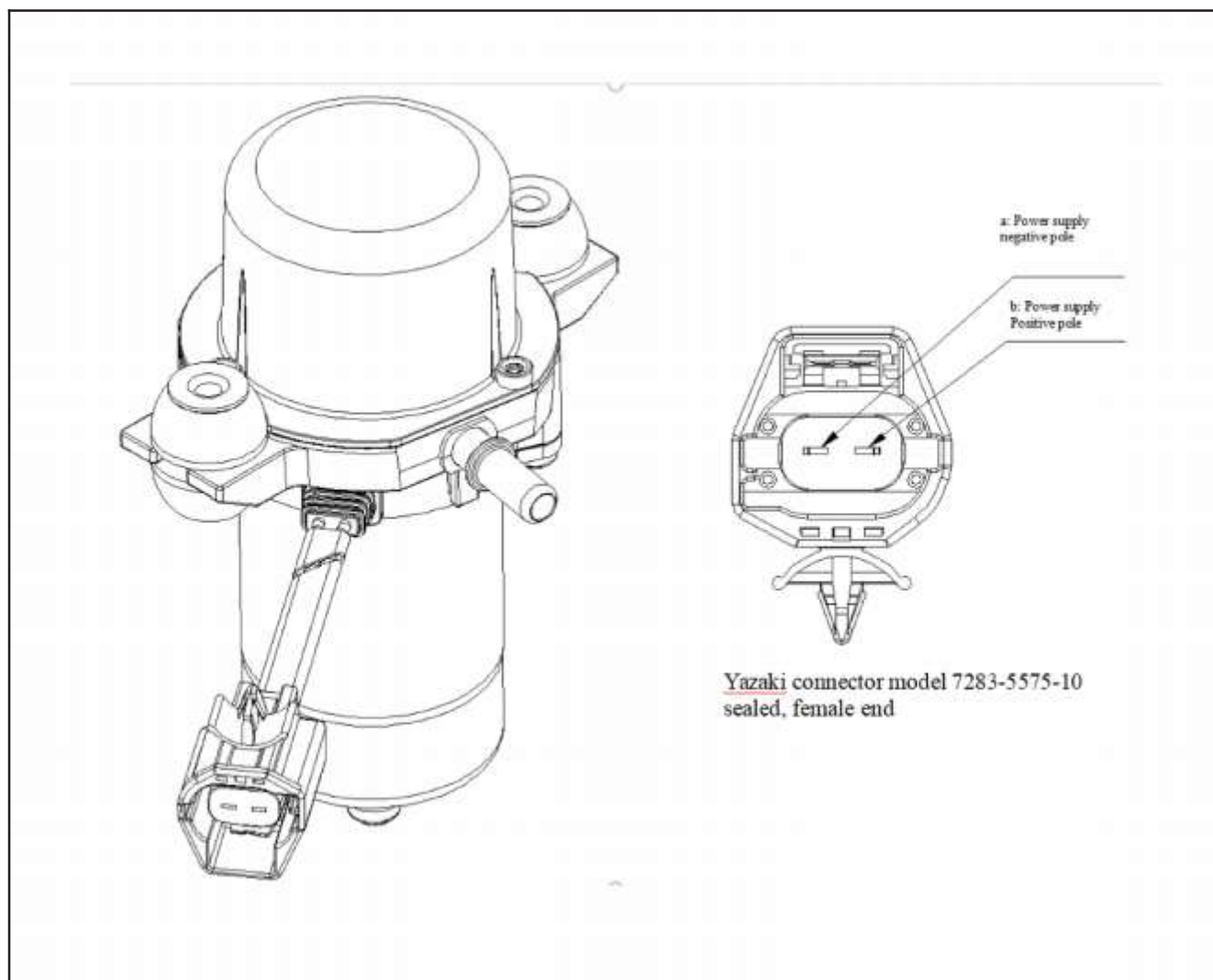
8.2 Fault repair of vacuum pump parts

vacuum booster is the prevailing brake assist mode on passenger cars at present. For traditional gasoline vehicles, when the engine is started, a certain vacuum will be formed at the intake manifold, so that the vacuum provided by the engine can be used to assist braking. For electric vehicles, since there is no engine, other ways are needed to provide vacuum. Electric vacuum pump is the most common vacuum pumping device used in electric vehicles. Due to the increasingly high requirements of people on the vehicle and the characteristics of the electric vehicle itself, such electric vacuum pump should not only have the characteristics of small volume and light weight, but also have the advantages of fast pumping speed, low vibration, low noise and long service life.



In addition, the vacuum booster needs a continuous and sufficient vacuum degree to ensure that the driver can step on the brake pedal at any time for assistance. If the electric vacuum pump installed on the electric vehicle keeps working to ensure the vacuum, its working life will be greatly shortened. Therefore, there is also a need for an energy storage device - vacuum tank, which is matched with vacuum booster systems such as vacuum pump and vacuum booster. On the whole vacuum booster pipeline, in order to ensure that the pipeline failure has the minimum impact on the booster, a one-way valve shall be installed at the nearest place of the booster; meanwhile, since the pipeline is connected with the atmosphere when the vacuum pump is not working, a one-way valve shall be installed between the vacuum pump and the vacuum tank to prevent the vacuum degree in the vacuum tank from decreasing or disappearing.

8.2.1 Basic technical data of vacuum pump

Appearance



Harness routing of relevant parts

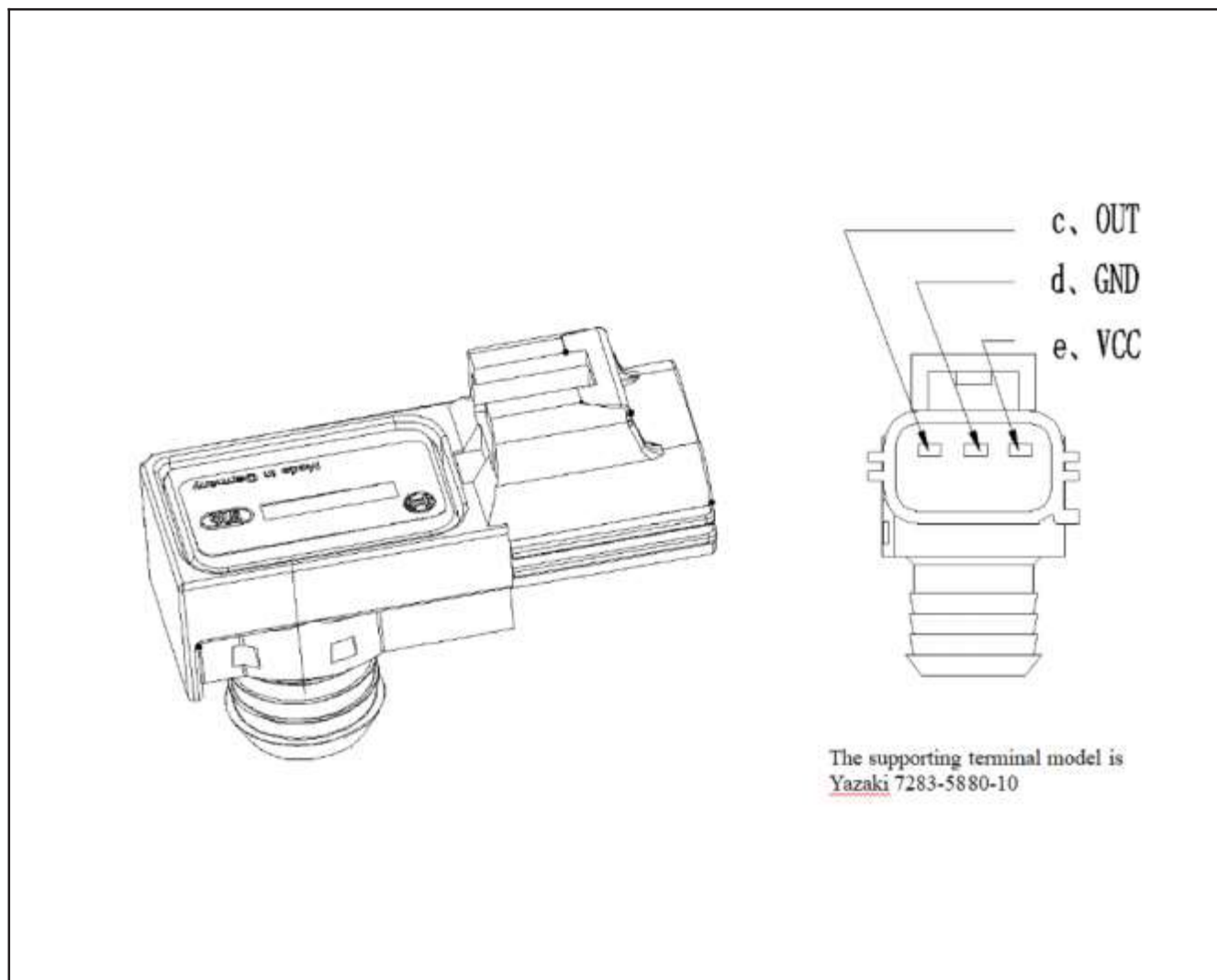
Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① ,② ,③ ,etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector, which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness;refer to the fuse box circuit fault maintenance section for the harness routing of the power relay coil involved in the vacuum pump.</p>
a	 <p>① Refer to main harness connector vacuum pump power supply, wire No.: Z02e;</p> <p>② Refer to grounding point 2 on the main harness, wire No.: Z02; Note: Z02e is crimped on Z02, and the two are conductive;</p>
b	 <p>① Refer to main harness connector vacuum pump power supply, wire No.: AF18;</p> <p>② Refer to the electrical box assembly above the main harness, wire No.: AF18;</p> <p>Note: AF18 is connected to the vacuum pump relay, and AF17 is connected to the 20A fuse via the relay;</p>

Basic performance parameters

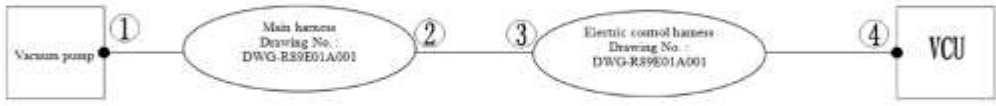
Model	UP30
Operating voltage range	10~16VDC
Maximumvacuum	$ P \geq 90\text{kPa}$; (test volume: 4L, standard atmospheric pressure, $23.5 \pm 5 \text{ }^\circ\text{C}$, voltage: $13.5 \pm 1\%$ VDC, the following parameters are measured under this condition)
Working temperature	-40~120 $^\circ\text{C}$
Storage temperature	-40~125 $^\circ\text{C}$
Cycle life	>900000workingcycles(15years)
Total on time	>1200 h
Noise	≤ 77 dB

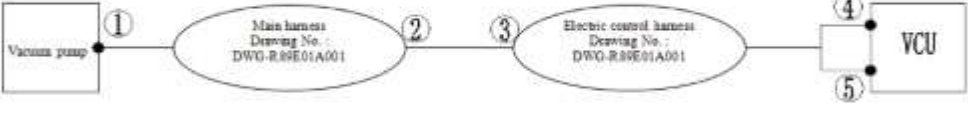
8.2.2 Basic technical data of vacuum pump sensor

Appearance



Harness routing of relevant parts

Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① ,② ,③ ,etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector, which can be found in the harness drawing; •The wire number can be found on the drawing through the connector name to test the continuity of the harness;
c	 <p>① Refer to main harness connector of vacuum pump sensor,wire No.:DD1;</p> <p>② Refer to main harness connector electric control harness 2,wire No.:DD1;</p> <p>③ Refer to electric control harness connector electric control harness 2,wire No.:DD1;</p> <p>④ Refer to VCU large sheath of electric control harness connector,wire No.: DD1;</p>

d	 <p>The diagram illustrates the electrical connection between four components: a Vacuum pump, a Main harness, an Electric control harness, and a VCU. The Vacuum pump is connected to the Main harness at point 1. The Main harness is connected to the Electric control harness at point 2. The Electric control harness is connected to the VCU at point 4. The VCU is also connected to the Electric control harness at point 5. The Main harness and Electric control harness are both labeled with Drawing No. DWG-R89E01A001.</p>
e	<p>① Refer to main harness connector vacuum pump sensor, wire No.: ZK37/ ZK38;</p> <p>② Refer to main harness connector electric control harness 2, wire No.:XC3/ XD3;</p> <p>③ Refer to electric control harness connector electric control harness 2, wire No.: XC3/XD3;</p> <p>④ Refer to VCU small sheath of electric control harness connector,wire No.: XC3/XD3;</p> <p>Note:ZK37 is crimped on XC3,and the two are conductive; ZK38 is crimped on XD3,and the two are conductive;</p>

Basic performance parameters

Projects	Parameters
Supplyvoltage (Vcc)	5.0±0.25 V DC
Overvoltage protection	16V(<1h)
Inputcurrent	10mAMax
Working pressure range	100~0kPa(relative pressure)
Ratedoutput voltage	90%~10%Vcc
Safepressure	200 kPa (absolute pressure)
Impactpressure	300 kPa (absolute pressure)
Operating temperaturerange	-40~130°C
Responsetime	<5ms

8.2.3 Table of working thresholds of vacuum booster system

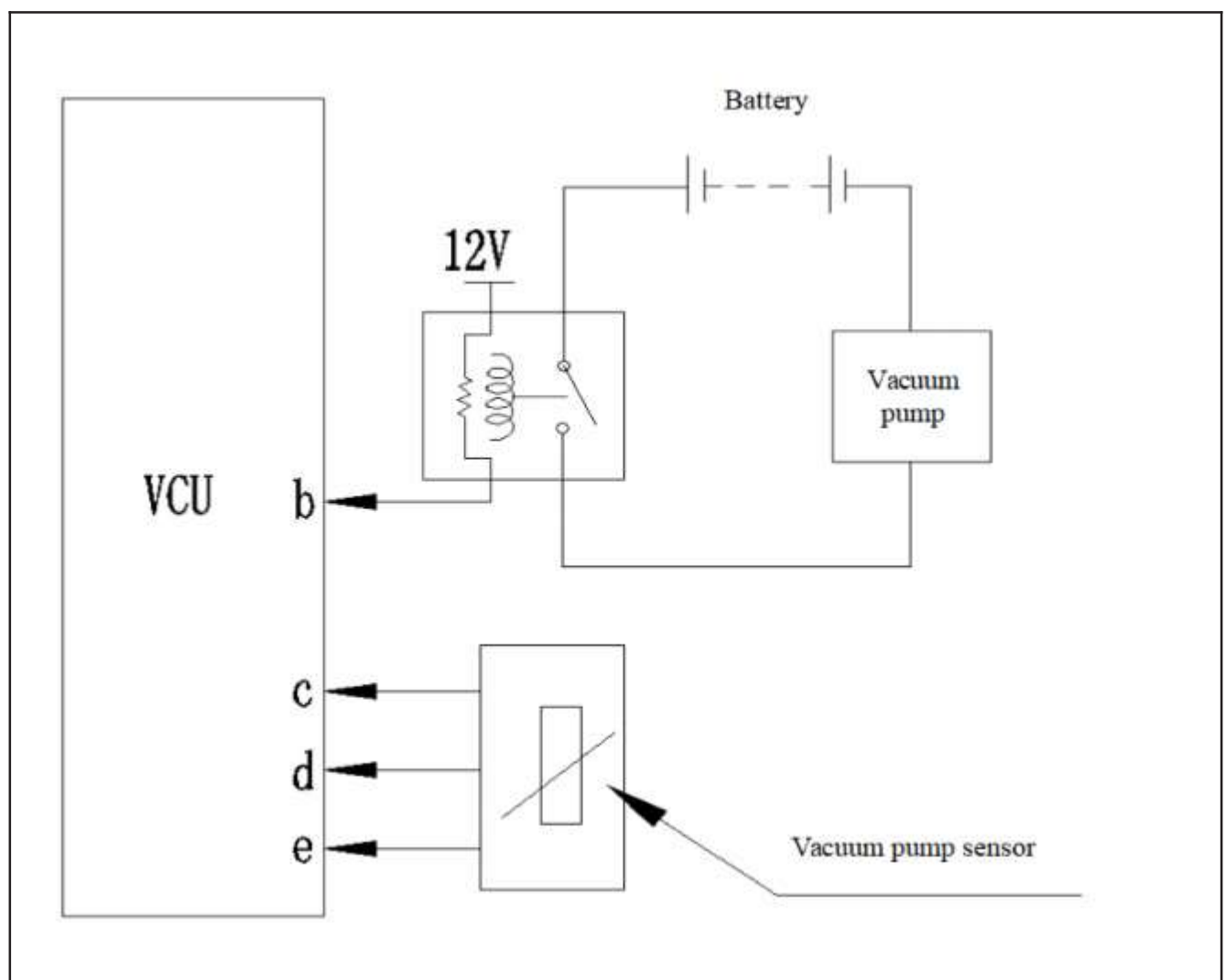
The pressure sensor is currently set with three thresholds:

S/N	Vacuumpressure	Workingstate of vacuum pump
1	$30 \leq P \leq 50\text{kPa}$	The control pin of the vacuum pump relay (see pin B in the following schematic diagram) is pulled low, and the vacuum pump is working;
2	$ P \geq 75\text{kPa}$	The control pin of the vacuum pump relay is pulled high, and the vacuum pump stops working;
3	$ P \leq 30\text{kPa}$	The control pin of the vacuum pump relay (see pin B in the following schematic diagram) is pulled low, and the vacuum pump is working; at this time, the vacuum pressure is insufficient to give an alarm and send a fault message;

8.2.4 Working principle and troubleshooting process for reference





When the key is in the second gear, the VCU collects the pressure of the vacuum tank through the vacuum pump sensor, then judges according to the vacuum pressure threshold, and controls whether the coil b pin of the vacuum pump relay is pulled low.



When end b is pulled low, the vacuum pump relay is closed and the vacuum pump is working, otherwise the vacuum pump is closed. The following figure is the working diagram of the vacuum pump. See the schematic diagram of the whole vehicle for its specific working principle.





The vacuum brake system is used to assist the driver in braking. In case of any problem, the brake pedal will be heavy, that is, the brake is not assisted. The fault problems and their reference solutions are introduced as follows:

Notes:

- ※ “” There are three possible conditions when the lamp is on: 1. When the hand brake is pulled up 2. The vacuum is insufficient 3. The brake fluid is insufficient;
- ※ “” refers to the fault of the whole vehicle, including level I fault and level II fault. The lamp will be on for many faults;
- ※ “|” If those two lights are on at the same time, it is not sure whether it is the fault of the vacuum pump system. It is suggested to read it by the computer, or judge it by indirect methods such as the sound, vibration and brake pressing of the vacuum pump are more laborious than normal;

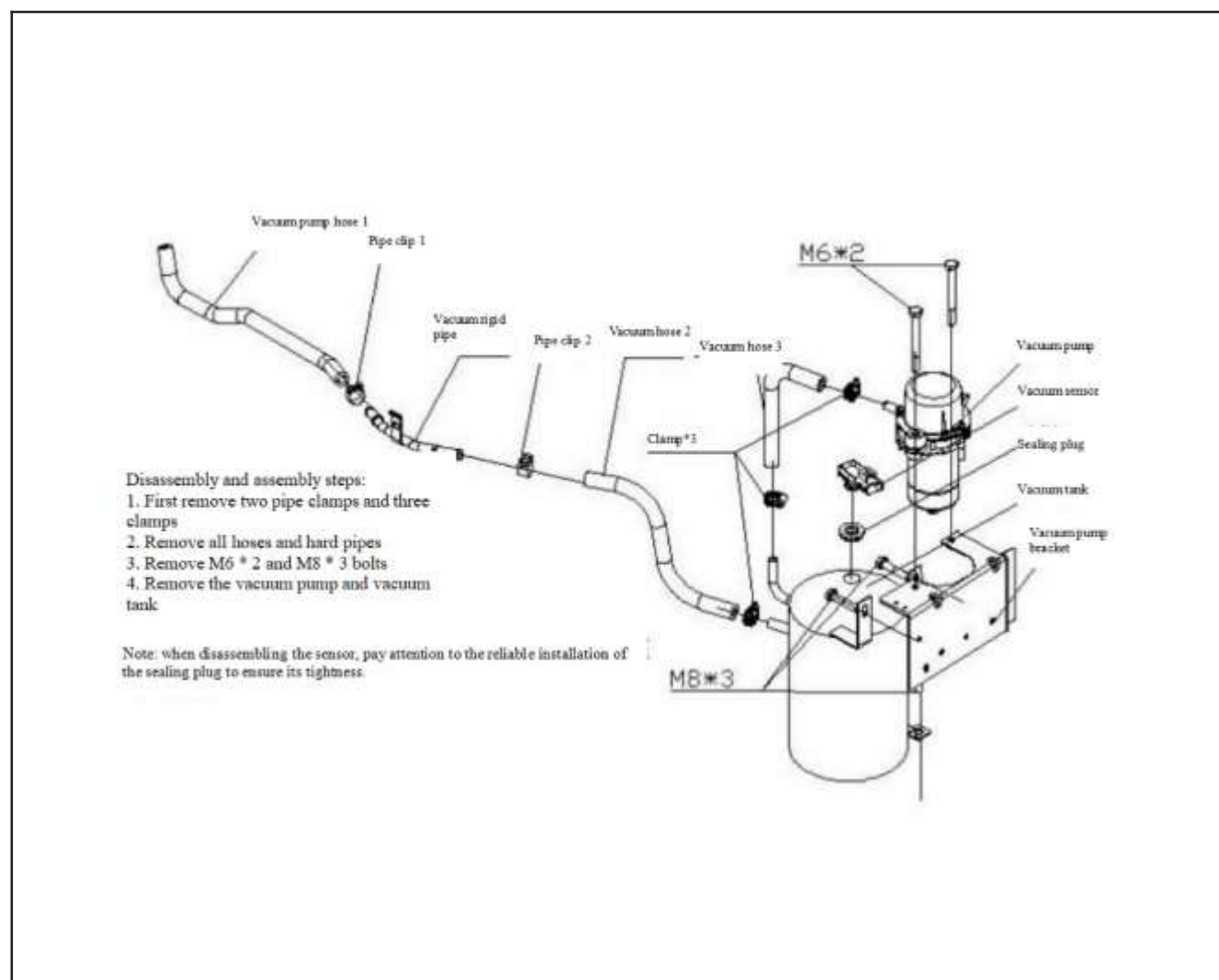
Situation 1: when the vehicle is not used for a long time, the fault lights “|” on the instrument panel light up and go out automatically after a few seconds of operation. This situation is normal, because the vacuum pressure is insufficient at the beginning, and the fault lights light up. After a few seconds of operation, the vacuum pressure meets the normal conditions and the fault lights go out;


Situation 2: when the key is turned to the second gear, the instrument panel fault lights “|” are on, and the vacuum pump is not working (whether the vacuum pump works can be judged by the sound and vibration of the vacuum pump). The following can be checked in sequence:

- ① Check whether the connectors of vacuum pump, vacuum pressure sensor and harness are in good contact;
- ② According to the harness routing in the basic technical data of the vacuum pump, check whether the upper fuse of the vacuum pump power supply is burnt out;
- ③ If there are no problems in the above 1 and 2 items, it can be considered to test the continuity of the harness according to the relevant pin harness routing in the basic technical data of the vacuum pump/vacuum pump sensor;
- ④ If there are no problems in Items 1, 2 and 3 above, consider replacing the vacuum

pump, vacuum sensor and other components;

⑤ Replace the vacuum pump and sensor and refer to the following figure for disassembly and assembly;



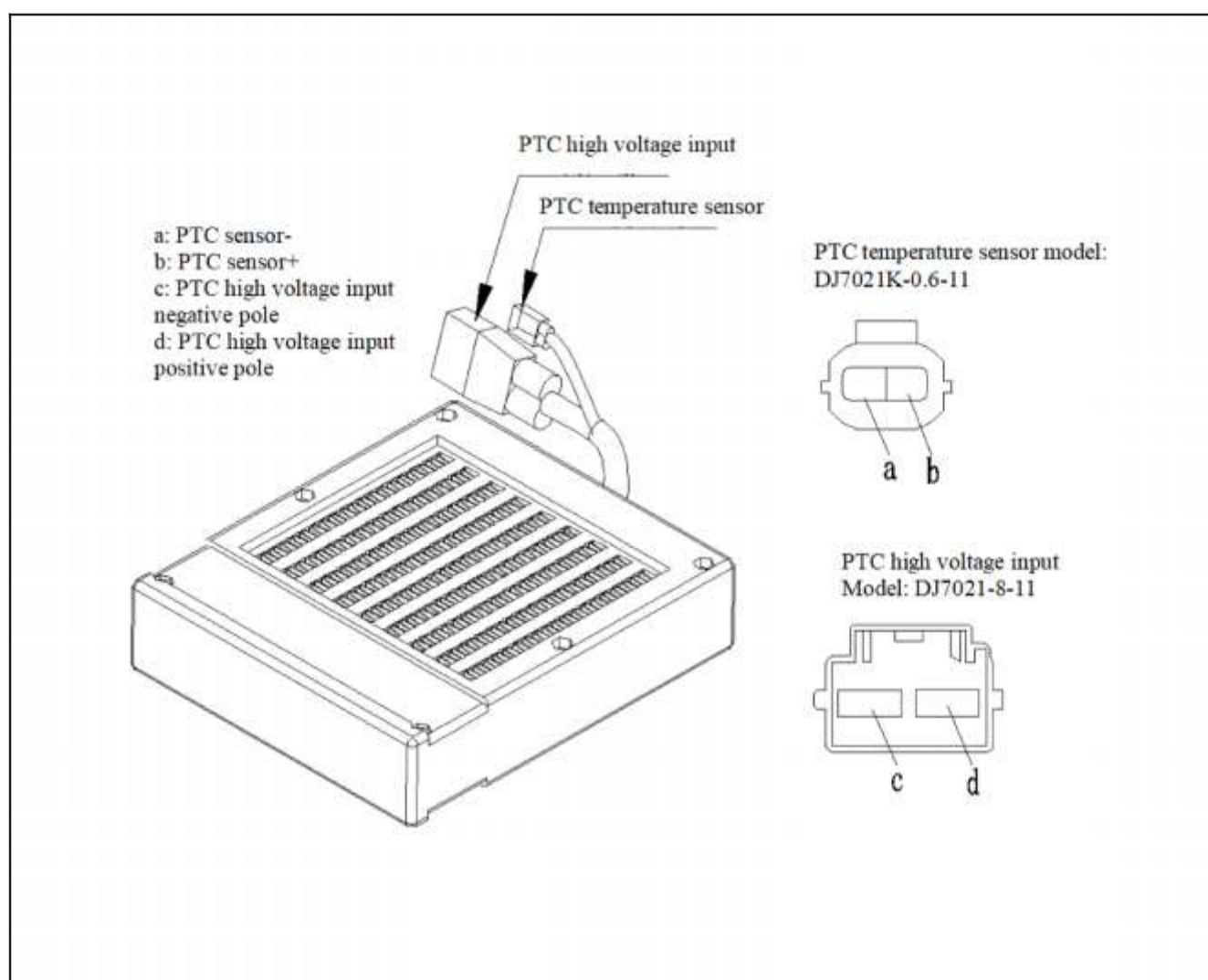
Situation 3: when the key is turned to the second gear, the instrument panel fault light “” is on, and the vacuum pump is always in working state or relatively dense working cycle, which indicates that there is air leakage in the vacuum pipeline. Check whether the fixed clips of each pipeline are fastened, whether the hoses are damaged, and whether there is air leakage in the vacuum tank.

8.3 PTC parts fault repair

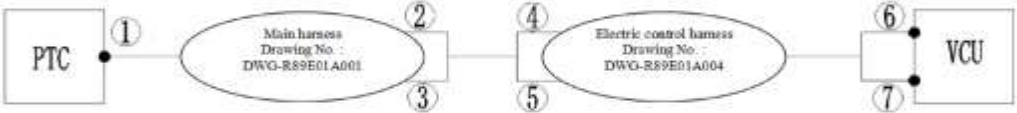
In the whole vehicle, the PTC heating plate is a core device component of the heating system of the electric vehicle. During the operation of the PTC heating plate, the temperature of the passenger compartment can be increased. The function of PTC heating plate is the same as that of traditional gasoline vehicle heating core, except that the water circulation system is removed on the original basis and electric heating is directly used.

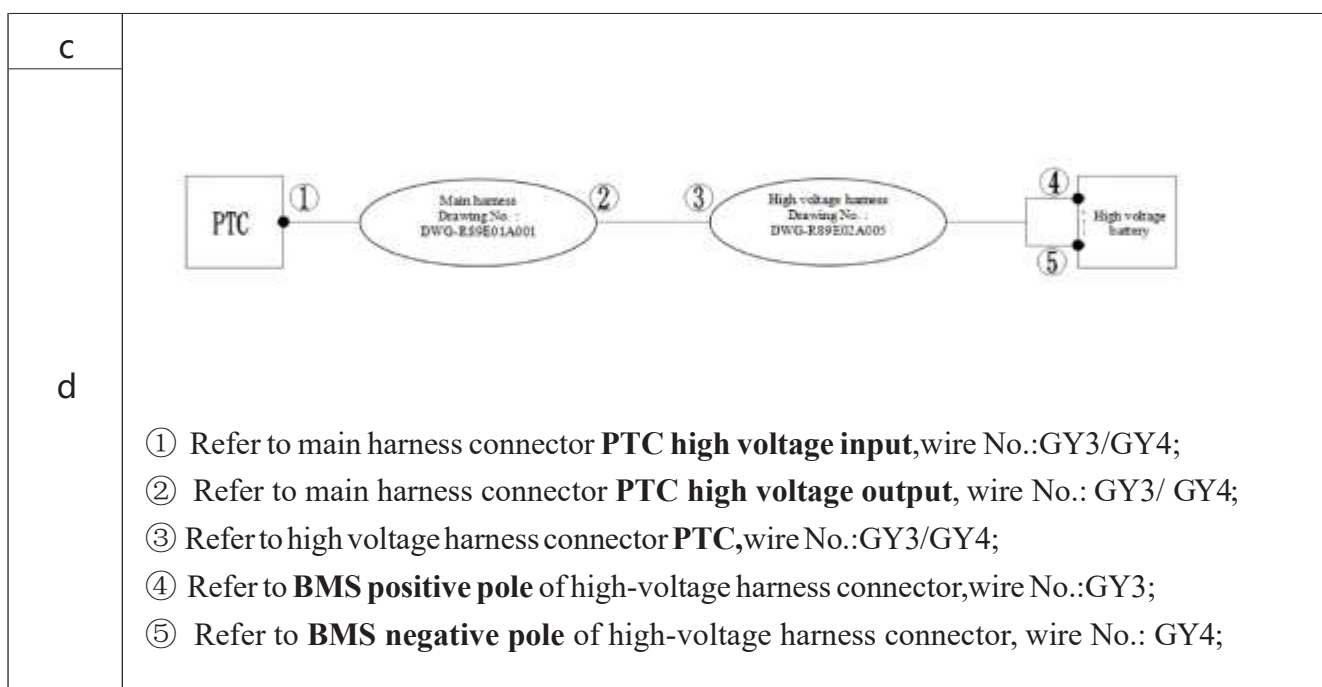
8.3.1 Basic technical data of PTC

Appearance



Harness routing of relevant parts

Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① ,② ,③ ,etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector, which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness;refer to the high-voltage battery line fault maintenance section for the harness routing of the high-voltage power relay coil involved in PTC.</p>
a	
b	<p>① Refer to main harness connector PTC temperature sensor, wire No.:DG1/ ZK36;</p> <p>② Refer to main harness connector electric control harness 2, wire No.:DG1;</p> <p>③ Refer to main harness connector electric control harness 1, wire No.:VL40c;</p> <p>④ Refer to electric control harness connector electric control harness 2, wire No.:DG1;</p> <p>⑤ Refer to electric control harness connector electric control harness 1, wire No.:XE4;</p> <p>⑥ Refer to VCU large sheath of electric control harness connector, wire No.: DG1;</p> <p>⑦ Refer to VCU small sheath of electric control harness connector, wire No.: XE4;</p> <p>Note:ZK36/VL40c/XE4 are crimped or butted,and they are conductive;</p>

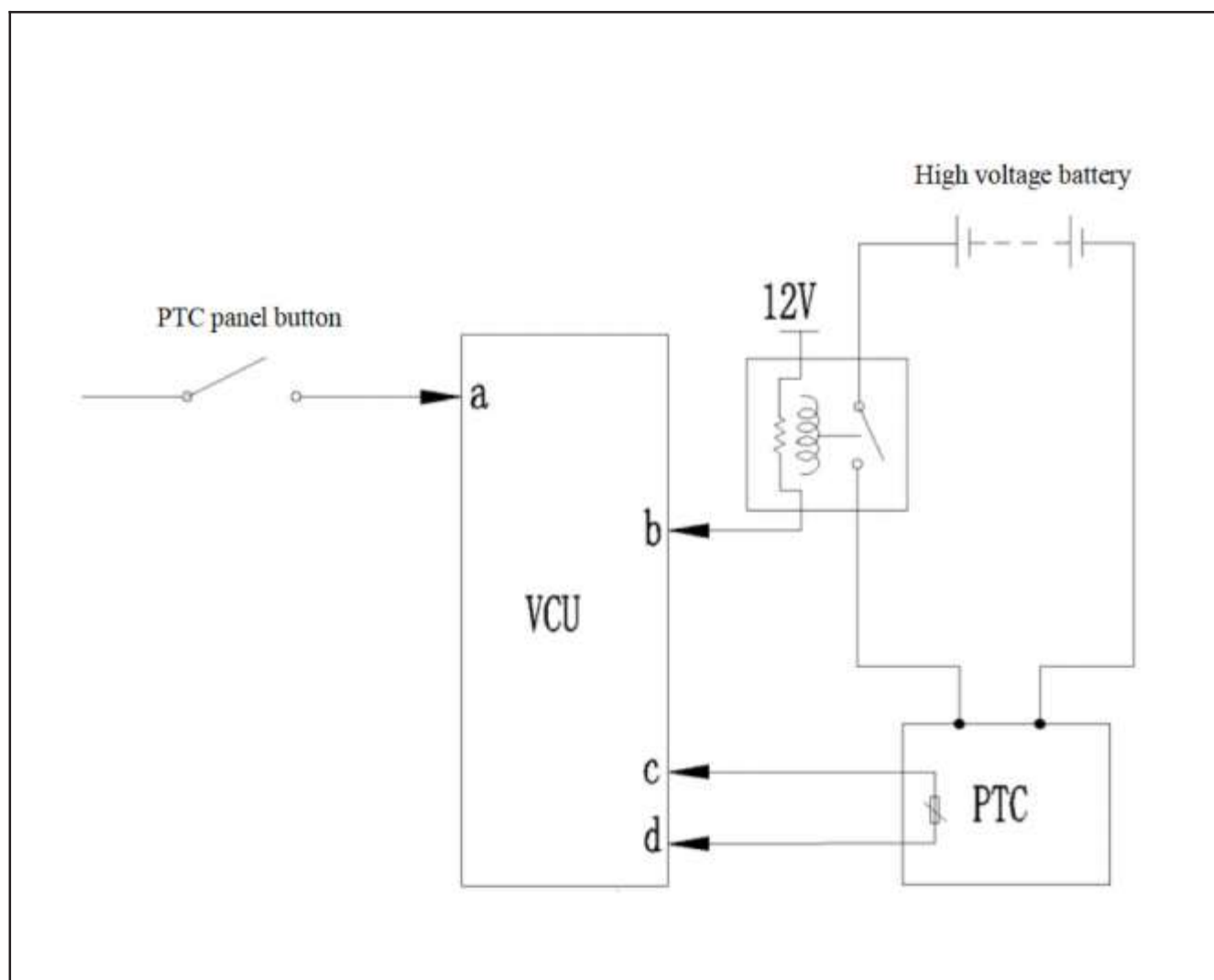


Basic technical parameters

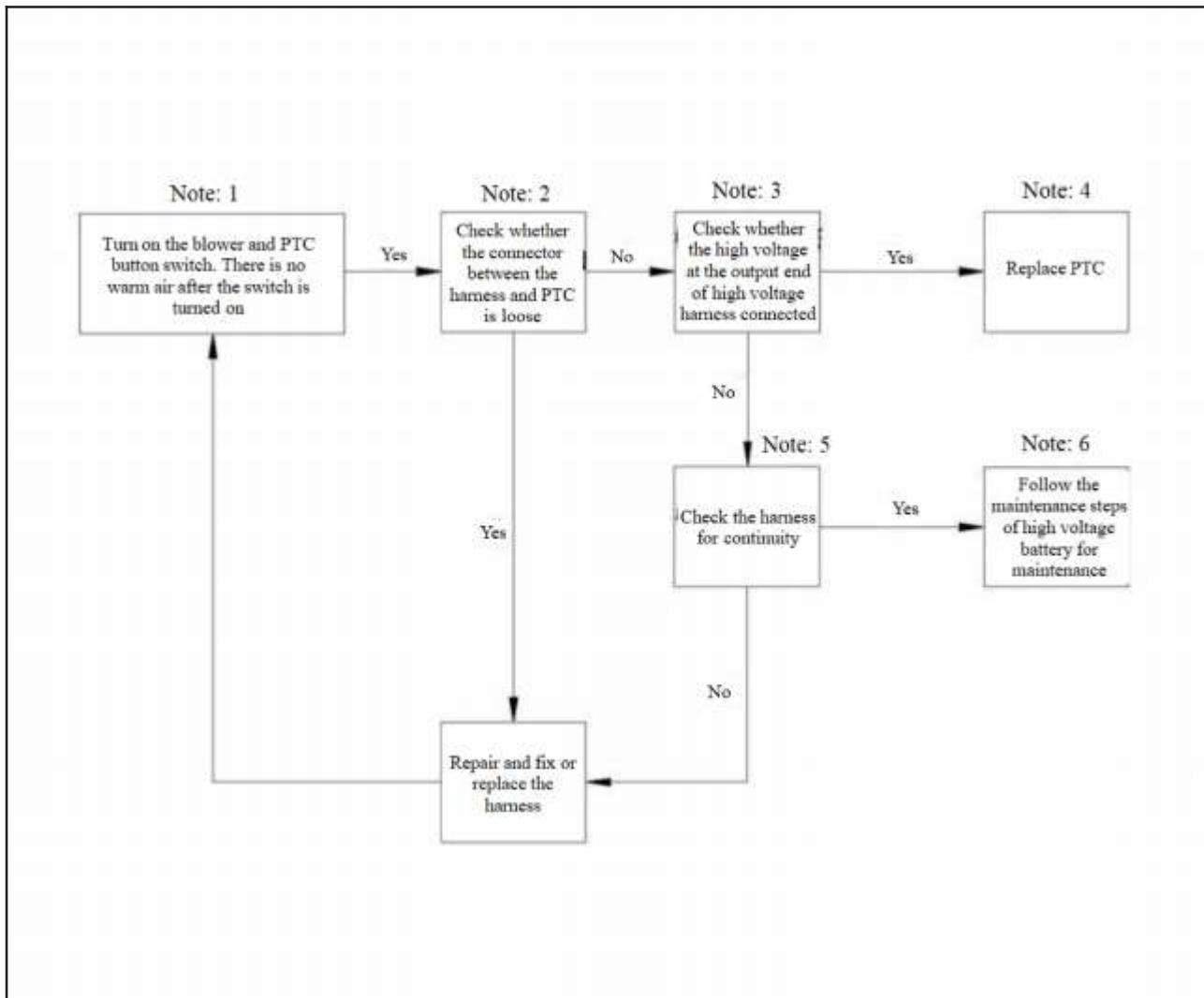
Projects	Parameters
Operatingvoltage	250~380V
Ratedvoltage	324V
Ratedpower	3kW
Overtemperature protection	When the warm core temperature of the PTC heating plate is greater than 130 °C, the PTC heating plate enters the overtemperature protection. When the temperature is less than or equal to 130 °C ,the PTC heating plate enters the working state.

8.3.2 Working principle and troubleshooting process for reference

For reference



The above figure shows the schematic diagram of PTC working principle. When VCU pin a is at low level, it is the warm air on condition; when VCU pin a is at high level, it is the warm air off condition. When the warm air condition is on, VCU controls the closing of PTC high-voltage relay by querying the resistance value range between c and d (Note: PTC high-voltage relay is integrated in the high-voltage battery). When the resistance value reaches or is greater than $2.23\text{k}\Omega$, the warm air relay is closed. When the resistance value is less than $0.972\text{k}\Omega$, the warm air relay is disconnected to keep the PTC surface temperature between $70\text{-}100\text{ }^\circ\text{C}$. For details of the working principle of PTC in the whole vehicle, please refer to the schematic diagram of the whole vehicle. See Table 1 in the following appendix for the corresponding relationship between PTC resistance and temperature.

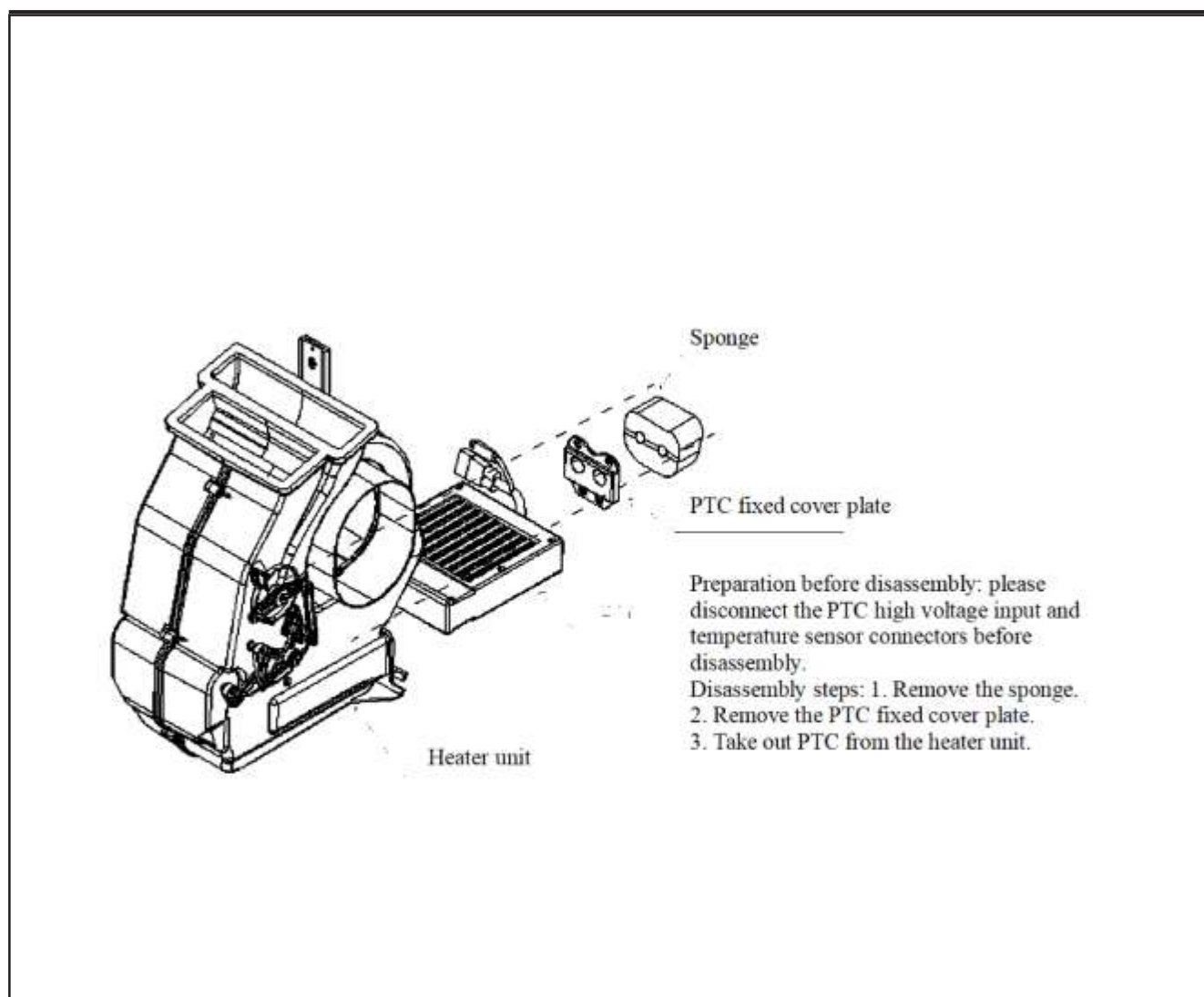


Note 1: Pay attention to the opening sequence of PTC. First switch the warm air door, then start the blower, and finally press the PTC button.

Note 2: As the aviation plugs and harness of vehicle may be damaged or loosened due to aging or vibration during driving, which may affect PTC not to work, the problem can be solved by fastening, repairing the loose connectors or replacing relevant parts.

Note 3/Note 5: Refer to the routing of relevant pin harness in the basic technical data of PTC, query the definition of pin of harness connector by drawing number, connector name and wire number, and then check whether the high-voltage harness has high-voltage output and harness continuity according to the definition and wire number.

Note 4: Before disassembly, please disconnect the PTC high-voltage input and temperature sensor connector. For disassembly and assembly of the heating unit, please refer to the maintenance manual of the traditional vehicle. For replacement of PTC, please refer to the following installation explosion diagram.



Note 5: PTC high-voltage relay and high-voltage power supply fuse are integrated in the high-voltage battery. The coil harness of the high-voltage relay can be repaired according to the fault maintenance of the high-voltage battery line. The hardware of the high-voltage relay and high-voltage power supply fuse needs to be repaired according to the battery system maintenance.

8.3.3 Corresponding relationship between PTC resistance and temperature

Table 1

Temp erature (°C)	Resistance value (kΩ)	Temp erature (°C)	Resistance value (kΩ)	Temp erature (°C)	Resistance value (kΩ)
-20	69.3831	36	6.7018	92	1.1997
-19	66.0422	37	6.4699	93	1.1681
-18	62.8831	38	6.2473	94	1.1374
-17	59.8948	39	6.0335	95	1.1077
-16	57.0670	40	5.8281	96	1.0789
-15	54.3902	41	5.6307	97	1.0509
-14	51.8555	42	5.4409	98	1.0238
-13	49.4545	43	5.2586	99	0.9975
-12	47.1793	44	5.0832	100	0.9720
-11	45.0226	45	4.9146	101	0.9473
-10	42.9775	46	4.7524	102	0.9233
-9	41.0377	47	4.5963	103	0.9000
-8	39.1972	48	4.4462	104	0.8773
-7	37.4502	49	4.3017	105	0.8554
-6	35.7915	50	4.1626	106	0.8341
-5	34.2161	51	4.0286	107	0.8134
-4	32.7194	52	3.8997	108	0.7933
-3	31.2969	53	3.7755	109	0.7738
-2	29.9447	54	3.6558	110	0.7548
-1	28.6588	55	3.5405	111	0.7364
0	27.4357	56	3.4294	112	0.7186
1	26.2718	57	3.3224	113	0.7012
2	25.1641	58	3.2191	114	0.6843
3	24.1094	59	3.1196	115	0.6679
4	23.1050	60	3.0236	116	0.6519
5	22.1482	61	2.9311	117	0.6364
6	21.2365	62	2.8418	118	0.6214
7	20.3675	63	2.7556	119	0.6067
8	19.5389	64	2.6725	120	0.5925
9	18.7488	65	2.5923	121	0.5786
10	17.9950	66	2.5148	122	0.5652
11	17.2758	67	2.4400	123	0.5520

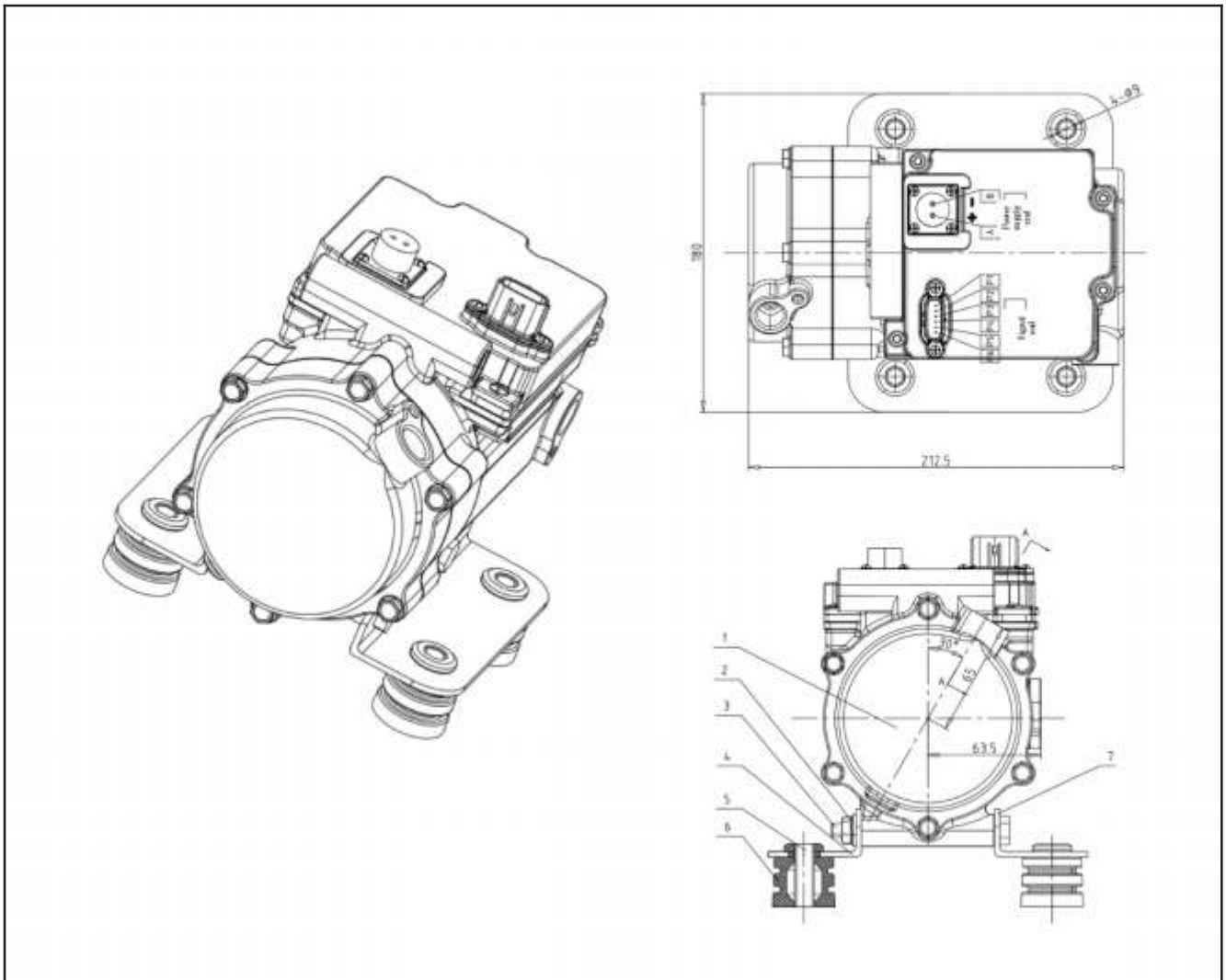
Temperature (°C)	Resistance value (kΩ)	Temperature (°C)	Resistance value (kΩ)	Temperature (°C)	Resistance value (kΩ)
12	16.5893	68	2.3678	124	0.5393
13	15.9339	69	2.2981	125	0.5269
14	15.3080	70	2.2307	126	0.5148
15	14.7102	71	2.1656	127	0.5031
16	14.1390	72	2.1027	128	0.4916
17	13.5931	73	2.0420	129	0.4805
18	13.0712	74	1.9832	130	0.4697
19	12.5722	75	1.9265	131	0.4592
20	12.0950	76	1.8716	132	0.4489
21	11.6385	77	1.8185	133	0.4389
22	11.2016	78	1.7671	134	0.4292
23	10.7835	79	1.7175	135	0.4197
24	10.3833	80	1.6694	136	0.4105
25	10.0000	81	1.6230	137	0.4015
26	9.6329	82	1.5780	138	0.3927
27	9.2812	83	1.5344	139	0.3842
28	8.9442	84	1.4923	140	0.3759
29	8.6213	85	1.4515	141	0.3677
30	8.3116	86	1.4120	142	0.3599
31	8.0147	87	1.3738	143	0.3522
32	7.7300	88	1.3367	144	0.3447
33	7.4568	89	1.3008	145	0.3373
34	7.1947	90	1.2661	146	0.3302
35	6.9432	91	1.2324	147	0.3233

8.4 Compressor parts fault repair

In the whole vehicle, the compressor is a driven fluid machine that promotes low-pressure gas to high-pressure gas. It is the heart of the refrigeration system. It sucks low-temperature and low-pressure refrigerant gas from the intake pipe, drives the piston to compress it through the operation of the motor, and then discharges high-temperature and high-pressure refrigerant gas to the exhaust pipe to provide power for the refrigeration cycle, so as to realize the refrigeration cycle of compression → condensation (heat release) → expansion → evaporation (heat absorption).

8.4.1 Basic technical data of compressor

Appearance


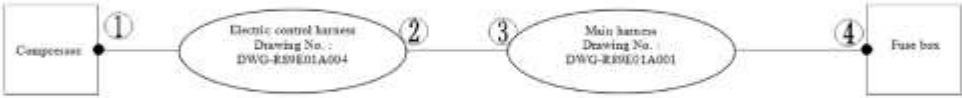



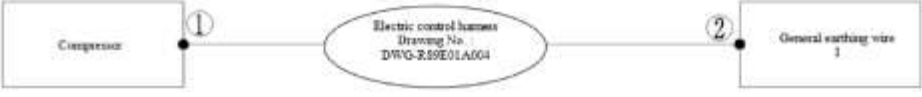
Compressor pin definition

A: High voltage positive input	B: High voltage negative input	P3: not used	P4: not used
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P1:12VDC positive input	P2:12VDC negative input	P5:CANH	P6:CANL
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Harness routing of relevant parts

Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> • The "pin" in the left box means the hardware lead of electrical parts; • The lower ① ,② ,③ ,etc. respectively represent a connector on the harness; • The "bold" is the function name of the connector, which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness; refer to the high-voltage battery line fault maintenance section for the harness routing of the high-voltage power relay coil involved in compressor.</p>
A	
B	<p>① Refer to high voltage harness connector compressor, wire No.:GY5/GY6;</p> <p>② Refer to BMS positive pole of high-voltage harness connector, wire No.:GY5;</p> <p>③ Refer to BMS negative pole of high-voltage harness connector, wire No.: GY6;</p>
P1	 <p>① Refer to electric control harness connector compressor, wire No.:ZK2;</p> <p>② Refer to electric control harness connector electric control harness 1, wire No.:ZK4;</p> <p>③ Refer to main harness connector electric control harness 1, wire No.:ZK4;</p> <p>④ Refer to the electrical box assembly above the main harness, wire No.:ZK4; upper fuse 10A;</p> <p>Note:ZK2 is crimped on ZK4,and the two are conductive;</p>

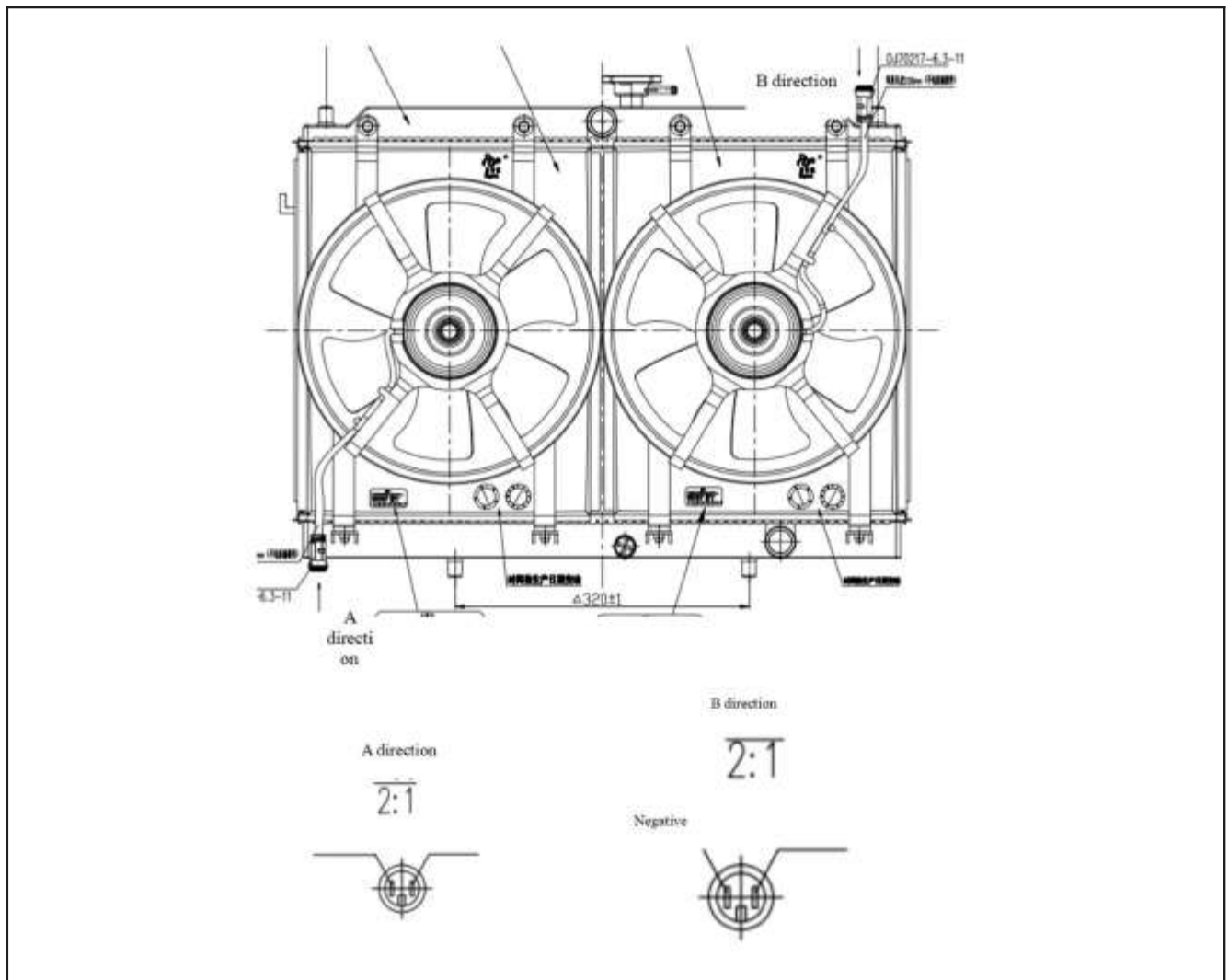
P5	
P6	<p>① Refer to electric control harness connector compressor, wire No.: ZK15/ ZK16;</p> <p>② Refer to VCU large sheath of electric control harness connector, wire No.: DA4/DB4;</p> <p>Note: ZK15 is crimped on DA4, and the two are conductive;</p> <p>ZK16 is crimped on DB4, and the two are conductive;</p>
P2	 <p>① Refer to electric control harness connector compressor, wire No.: ZK17;</p> <p>② Refer to electric control harness connector general earthing wire 1, wire No.: ZK17;</p>

Basic performance parameters

Projects	Parameters
Operating voltage range	195~405VDC
Rated input voltage	300VDC
Rated input power	2400W
Displacement	27cc/rev
Weight	7.2kg



8.4.2 Basic technical data of condenser fan

Appearance



Harness routing of relevant parts

Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① ,② ,③ ,etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector,which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness;refer to the fuse box circuit fault maintenance section for the harness routing of the power relay coil involved in the condenser fan.</p>
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<p>a</p>	 <p>① Refer to main harness connector condenser fan, wire No.: AF16; ② Refer to the electrical box assembly above the main harness, wire No.: AF16; Note: AF16 is connected to the condenser fan relay, and AF15 is connected to the 30A fuse via the relay;</p>
<p>b</p>	 <p>① Refer to main harness connector condenser fan, wire No.: Z01g; ② Refer to main harness connector grounding point 1, wire No.: Z01; Note: Z01g is crimped on Z01, and the two are conductive;</p>

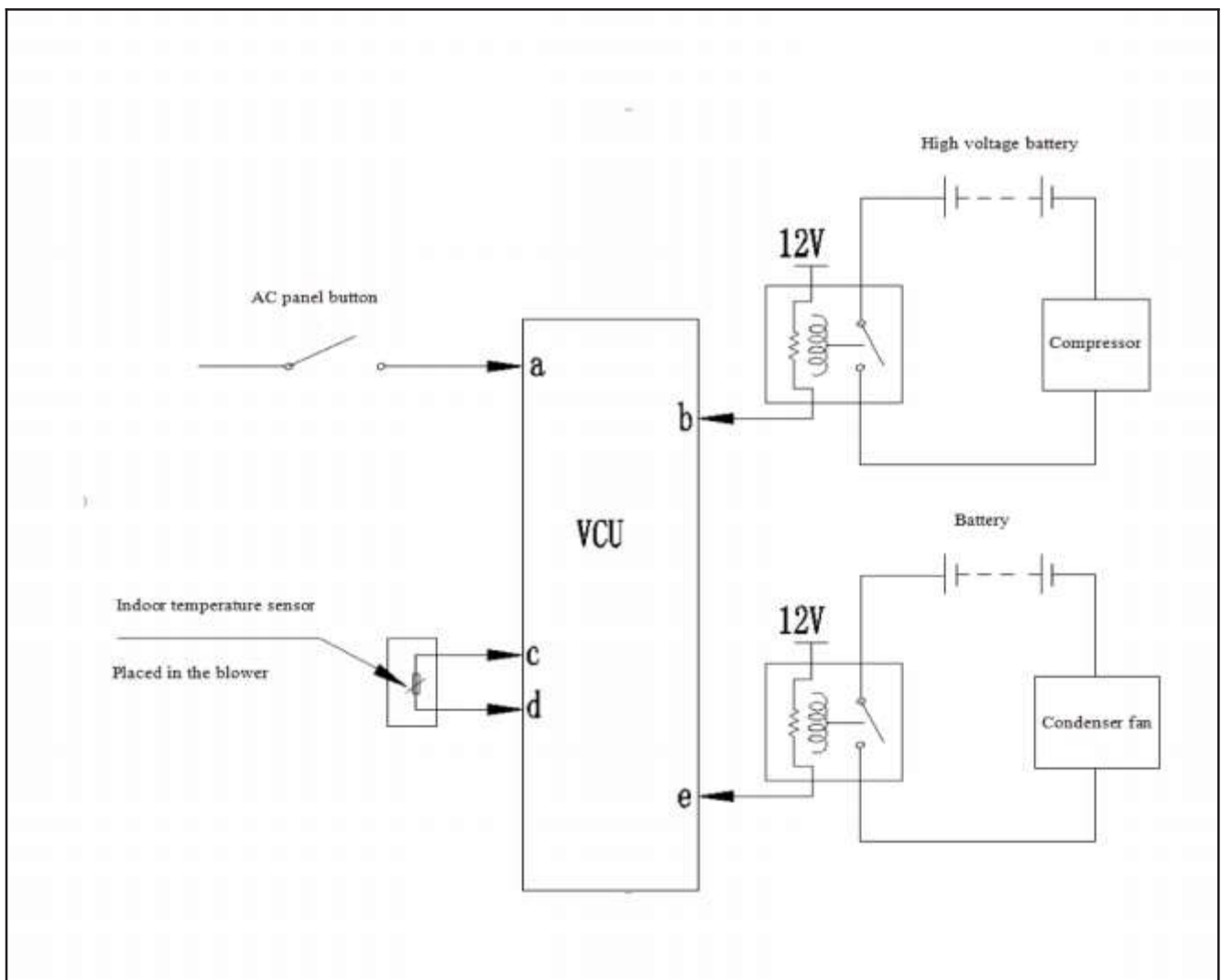
Basic technical parameters

Projects	Parameters
Nominal voltage	13.5V
Operating voltage range	9~15V
Rated current	<11.5A
Rated rotation speed	2300±200

8.4.3 Working principle and troubleshooting process for reference

When the AC button on the air conditioner panel is pressed, the VCU receives the AC on signal through the hard wire (whether the air conditioner is turned on depends on the SOC of the battery), first pull in the high-voltage relay of the air conditioner, and then pull in the fan relay of the condenser. After a delay of 10s, the VCU sends the AC on signal to the compressor controller through CAN. The compressor adjusts the corresponding rotation speed according to the collected evaporator temperature information by the temperature sensor. After receiving the signal that the compressor has been turned off fed back by the compressor controller through CAN (if the air conditioning off signal is not fed back within 5s, the high-voltage relay of the air conditioner will be actively disconnected), delay for 2s (delay for the disconnection of the high-voltage relay of the air conditioner), disconnect the high-voltage relay of the air conditioner, and then delay for 60s (delay for the disconnection of the condenser fan), and disconnect the relay of the condenser fan.

The following figure is the schematic diagram of the cold air system. Please refer to the schematic diagram of the whole vehicle for the detailed principle of cold air system in the whole vehicle.



The compressor is an important part of the air conditioning cold air system. If the compressor does not work, the most obvious condition is that there is no cold air after it is started. The precondition for the compressor to work is the high-voltage power on of the whole vehicle. After the power on and the instrument “Ready” is on, the following process can be referred to for judgment:

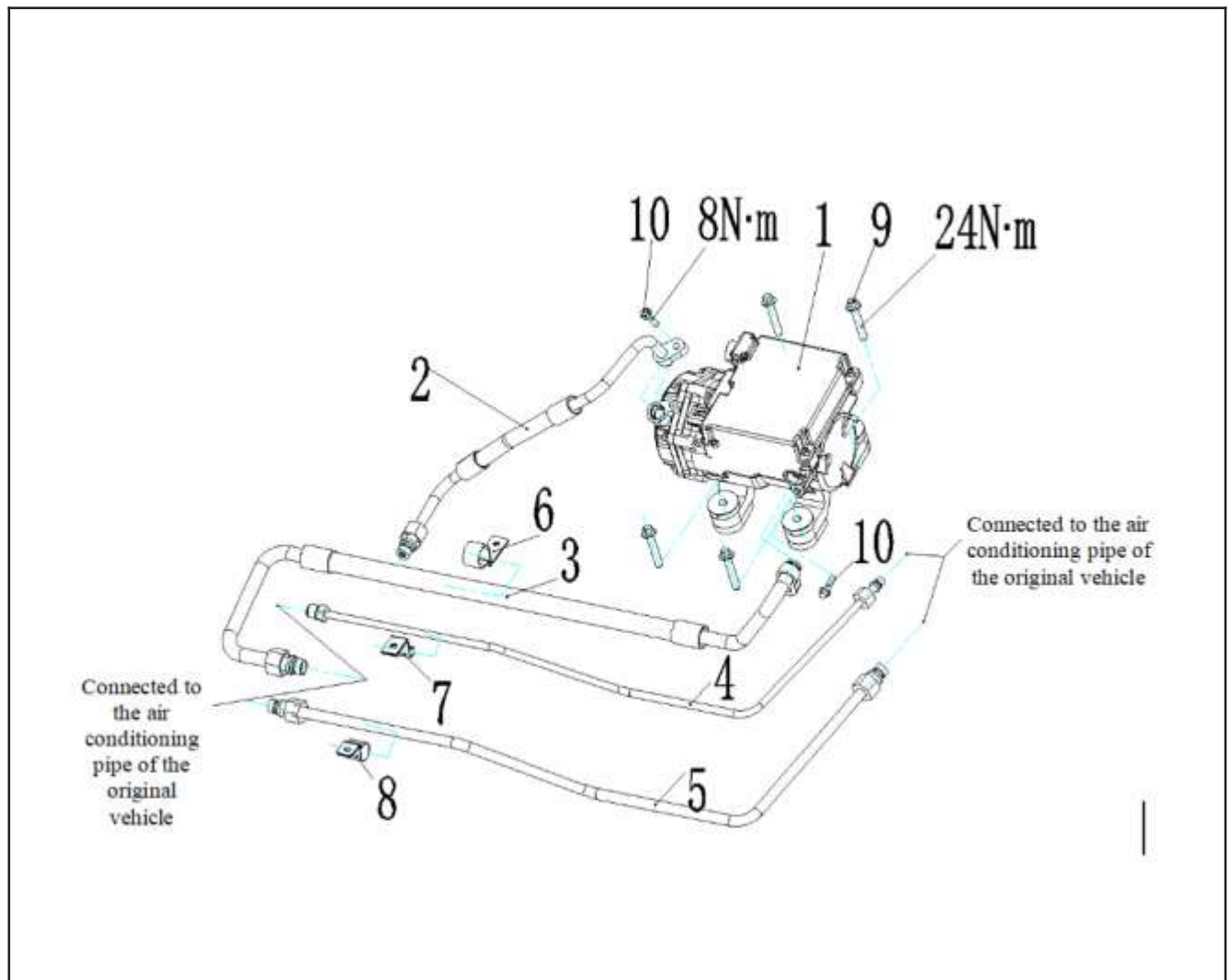
① Check whether the connectors between compressor/condenser fan and harness are in good contact;

② Check whether relevant fuses of the compressor/condenser fan are burnt out (the high-voltage power fuse of the compressor is integrated in the high-voltage battery. Please carry out maintenance as per the high-voltage battery maintenance items of the electric control section. The fuse of the condenser fan is installed in the main harness fuse box. Please refer to the harness routing in the basic technical data to check the upper fuse of the condenser fan).

③ If there are no problems in the above 1 and 2 items, it can be considered to test the continuity of the harness according to the relevant pin harness routing in the basic technical data of the compressor/condenser fan;

④ If there are no problems in Items 1, 2 and 3 above, consider replacing the compressor, condenser fan and other components;

⑤ Replace the compressor and refer to the following figure for disassembly and assembly



List of M70EV parts

S/N	PartNo.	Part name	Quantity	Remarks
1	R89E02A009	Electric compressor assembly	1	
2	R78E03A020	Compressor exhaust pipe assembly	1	
3	R78E03A021	Compressor suction pipe assembly	1	
4	R78E03A022	High pressure liquid pipe assembly	1	
5	R78E03A023	Low pressure hard pipe assembly of overhead air conditioner	1	
6		Compressor suction pipe clip	1	
7		High pressure liquid pipe clip	1	
8		Low pressure hard pipe clip of overhead air conditioner	1	
9	Q1840845	Hexagon flange bolt	4	
10	Q1840625	Hexagon flange bolt	2	

Disassembly steps:

- ① Before disassembly, the refrigerant must be recovered to ensure that the internal pressure of the air conditioning system is consistent with the atmospheric pressure.
- ② Remove the connecting bolts between 6, 7 and 8 pipe clips and the vehicle body;
- ③ Remove the connecting ports between 3, 4 and 5 and the air conditioning pipeline of the original vehicle, remove 4 and 5, and seal the two ends of the pipeline with plugs to avoid entering sundries.
- ④ Remove bolts 10 (two bolts) and remove 2 and 3;, and seal the two ends of the pipeline with plugs to avoid entering sundries.
- ⑤ Remove bolts 9 (four bolts) and remove.

Installation steps:

Contrary to the disassembly steps, the refrigerant filling amount is 425g±15g for the single steam system and 700g±15g for double steam system respectively.

※ Note: the compressor must be placed upward to prevent the refrigerant oil from flowing out. The compressor and inlet and outlet holes shall be sealed with plugs.

8.4.4 Common faults and treatment methods

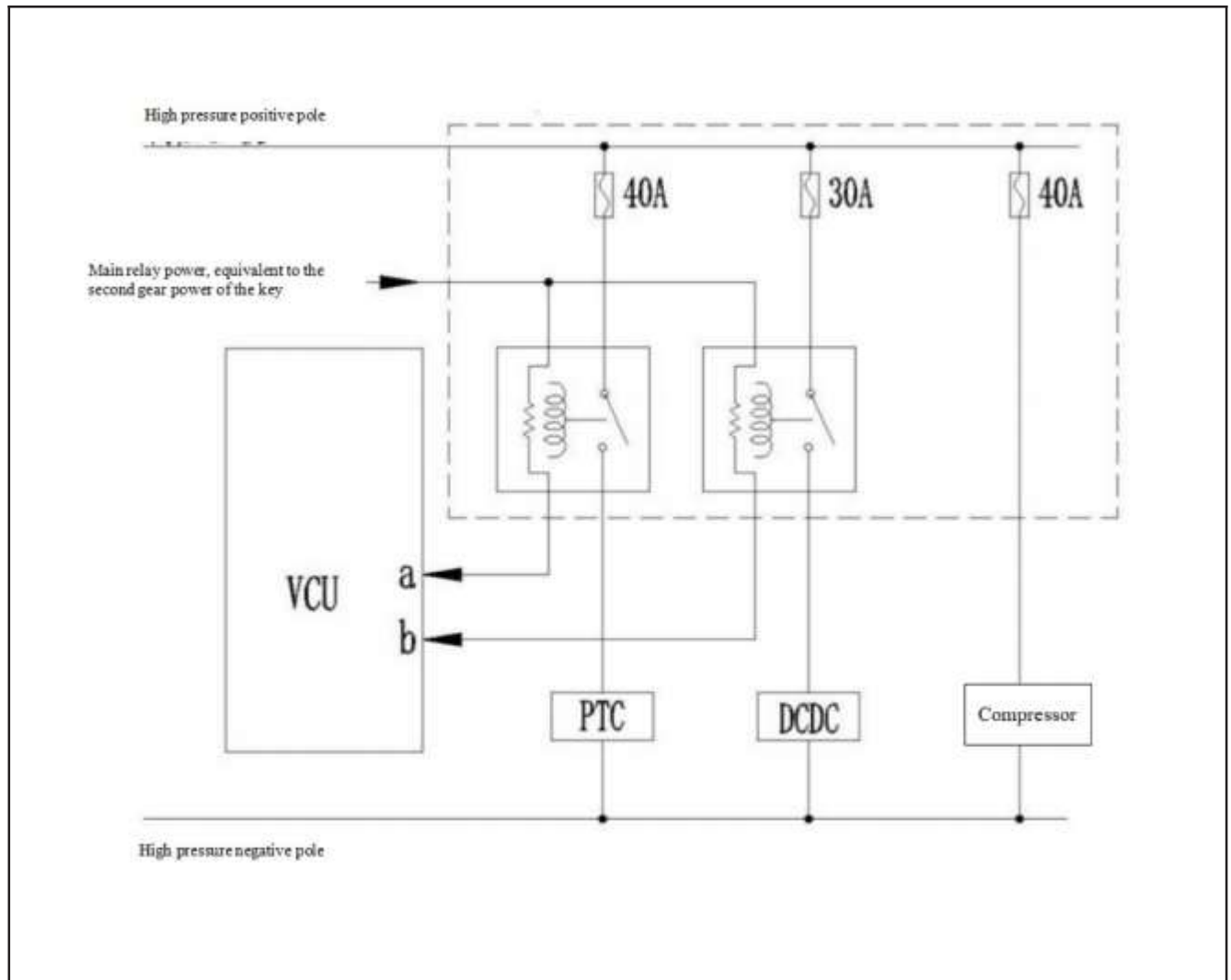
S/N	Faults	Treatment methods
1	The air conditioning pressure is high, and the temperature of the compressor exhaust chamber is too high.	① Excessive refrigerant filling or air in the system: refill the refrigerant and fill it in strict accordance with the filling process and filling amount. ② Condenser does not work: replace with new one harness; ③ There is dust on the condenser surface and the heat exchange effect is poor: clean the condenser surface. ④ Impurities in the system: clean the system
2	The compressor has no reaction	Please confirm whether the circuit voltage is normal.
3	The compressor cannot reach the set rotation speed	Please confirm whether the voltage is low or the load is heavy.
4	Compressor stops during operation	Confirm whether the power supply is over-voltage, under voltage, over temperature and over-current.
5	The compressor cannot be started, and repeat the start	Confirm whether the load (high and low air pressure difference of the system) is too large.
6	High air pressure is not high The low-pressure air pressure is negative	Clean the system with cleaning equipment, replace the liquid receiver dryer, clean or replace the expansion valve, replace the capillary, vacuum, and add refrigerant according to the specified filling method and amount.

7	High pressure is normal, while low pressure is low	Clean and tidy the evaporator surface, and repair the temperature controller, blower, air volume switch and variable speed resistor. When replacing the evaporator, the system must be filled with 30-50cc refrigerant oil.
8	Turn on the air conditioner and the sound changes before and after	First, check whether the installation position meets the standard; secondly, judge whether the refrigerant filling amount and process meet the standard; finally, check the sound of moving parts in the air conditioning system. Determine whether the working sound of the compressor is normal. If the motor and internal parts are running and rubbing, the working sound is normal.
9	Leakage	Arrange professionals to judge the leakage position. If it is determined that the electric compressor leaks, the electric compressor assembly must be replaced. The refrigeration performance of the air conditioning system meets the refrigeration standard. There is oil on the surface of the compressor. If the leakage is not detected by a leak detector, it is determined to be normal. The compressor has no fault and does not need to be replaced.
10	Internal seizure of compressor	The air-conditioning system must be cleaned with a special air-conditioning cleaner for vehicles and other faults that cause compressor failure must be removed. The receiver dryer shall be replaced before the compressor is replaced

8.5 High voltage battery harness fault repair

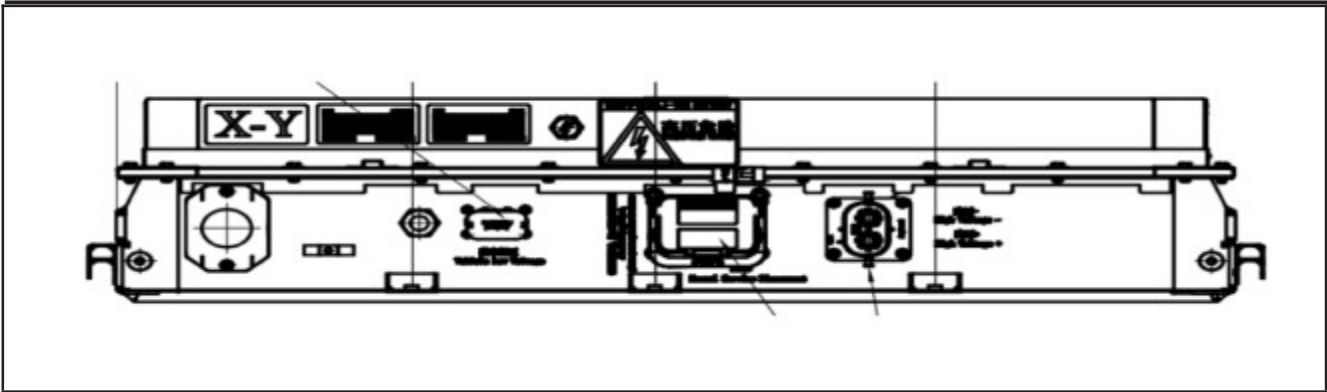
8.5.1 Schematic diagram

Schematic diagram of the principle of high-voltage relay involving electrical components (compressor, D+C and PTC)



8.5.2 High voltage battery aviation plug pin harness routing

Appearance


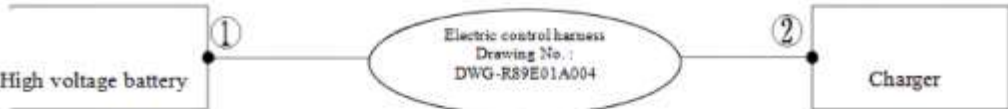


Aviation plug pin harness routing

Aviationplug	Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① , ② , ③ , etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector,which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness;</p>
4-coreaviationplugpositive	A	Refer to charger parts maintenance
	B	Refer to PTC parts maintenance
	C	Refer to DC/DC parts maintenance
	D	Refer to AC compressor parts maintenance
4-coreaviationplugNegative	A	Refer to charger parts maintenance
	B	Refer to PTC parts maintenance
	C	Refer to DC/DC parts maintenance
	D	Refer to AC compressor parts maintenance

8-core aviation plug	A	
	B	① Refer to electric control harness connector BMS , wire No.:DB4/DA4; ② Refer to VCU large sheath of electric control harness connector, wire No.: DB4/DA4;
	C	Refer to charger parts maintenance
	D	Refer to charger parts maintenance
	E	
	F	① Refer to electric control harness connector BMS , wire No.: ZK22/ ZK21; ② Refer to electric control harness connector OBD , wire No.: ZK22/ ZK21;

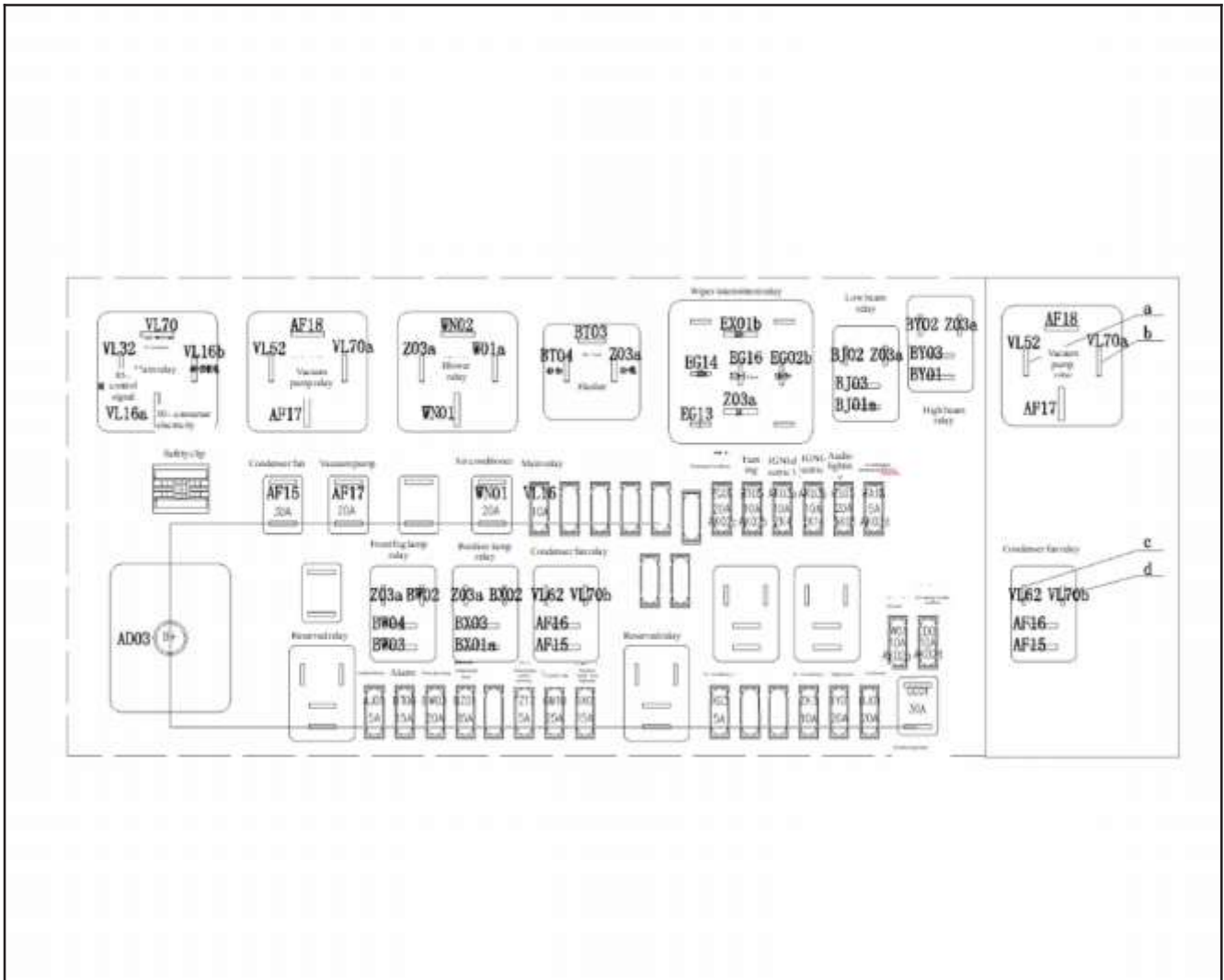
12-core aviation plug	A	
	B	<p>① Refer to electric control harness connector BMS, wire No.: ZK3/ZK4/ ZK1;</p> <p>② Refer to electric control harness connector electric control harness 1, wire No.: ZK3/ZK4/ZK1;</p>
	E	<p>③ Refer to main harness connector electric control harness 1, wire No.: ZK3/ZK4/VL70d</p> <p>④ Refer to the electrical box assembly above the main harness, wire No.: ZK3/ZK4/VL70;</p> <p>Note: ZK1/ VL70d/ VL70 are butted or crimped and conductive and connected to VL16 through relay with upper 10A fuse; ZK3/ZK4 are respectively connected with upper 10A fuse;</p>
	C	Refer to charger parts maintenance
	D	<p>① Refer to electric control harness connector BMS, wire No.: ZK20;</p> <p>② Refer to electric control harness connector general earthing wire 1, wire No.: ZK20;</p>

	F	
	G	
	H	<p>① Refer to electric control harness connector BMS, wire No.:DM1/DM2/ DL2; ② Refer to VCU large sheath of electric control harness connector, wire No.: DM1/DM2/DL2;</p>
	K	 <p>① Refer to electric control harness connector BMS, wire No.:ZK5; ② Refer to electric control harness connector charger, wire No.:ZK5;</p>

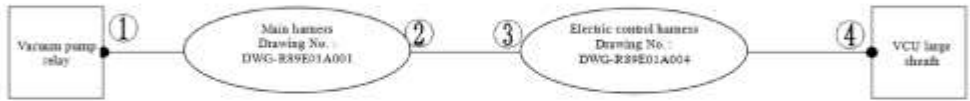
8.6 Schematic diagram of main harness electrical box and routing of vacuum pump and condenser fan coil

8.6.1 Routing of condenser fan coil and vacuum pump coil involved in main harness fuse box

Appearance



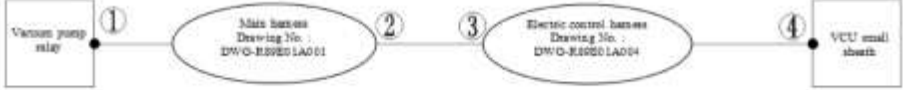
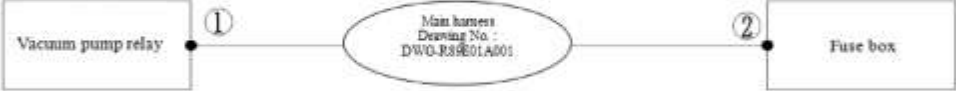
Routing of vacuum pump relay coil/condenser fan relay coil pin harness

Pin	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① ,② ,③ ,etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector, which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness;</p>
a	 <p>① Refer to vacuum pump relay above the main harness electrical box assembly, wire No.:VL52;</p> <p>② Refer to main harness connector electric control harness 2,wire No.:VL52;</p> <p>③ Refer to electric control harness connector electric control harness 2,wire No.:DL4;</p> <p>④ Refer to VCU large sheath of electric control harness connector,wire No.: DL4;</p> <p>Note:VL52/DL4 are butted connectors,and the two are conductive;</p>



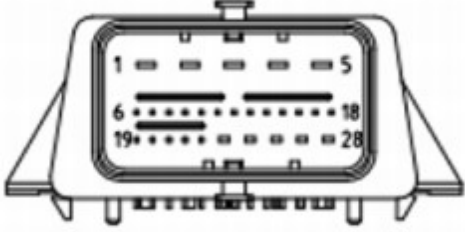
b

- ① Refer to vacuum pump relay above the main harness **electrical box assembly**, wire No.:VL70a;
- ② Refer to main relay above the main harness **electrical box assembly**, wire No.:VL70;
Note:VL70a/VL70 are butted connectors,and the two are conductive;

<p>c</p>	 <p>① Refer to condenser fan relay above the main harness electrical box assembly, wire No.:VL62;</p> <p>② Refer to main harness connector electric control harness 1,wire No.:VL62;</p> <p>③ Refer to electric control harness connector electric control harness 1,wire No.:XA2;</p> <p>④ Refer to VCU small sheath of electric control harness connector,wire No.: XA2;</p> <p>Note:VL62/XA2 are butted connectors,and the two are conductive;</p>
<p>d</p>	 <p>① Refer to condenser fan relay above the main harness electrical box assembly, wire No.:VL70b;</p> <p>② Refer to main relay above the main harness electrical box assembly, wire No.:VL70;</p> <p>Note:VL70b/VL70 are butted connectors,and the two are conductive;</p>

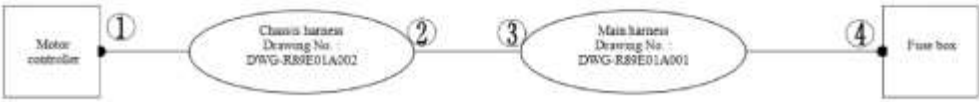

8.7 Motor controller harness fault repair

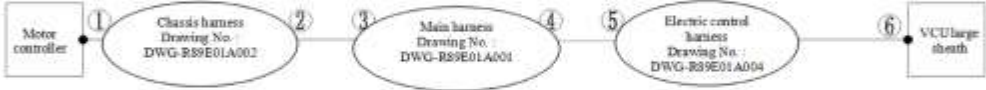
Motor controller socket terminal pin definition

28pin low voltage signal terminal definition			
		Terminal manufacturer	Socket model
			047745-0100
		MOLEX	Matching plug model
			064318-1011
Terminal S/N	Function	Terminal S/N	Function
01	Frame earthing wire	15	Sinusoidal winding SIN+
02	Blind plugging	16	Blind plugging
03	Signal earthing wire	17	Blind plugging
04	Battery power supply (negative), 8~18V	18	Hard wire wake-up signal KL15
05	Battery power supply (positive), 8~18V	19	Temperature detection + temperature sensor (type: PT100)
06	Motor CAN_L (with terminal resistance by default)	20	Temperature detection-temperature sensor (type: PT100)
07	Motor CAN_H (with terminal resistance by default)	21	Blind plugging
08	Debugging CAN_L	22	Blind plugging

28pin low voltage signal terminal definition			
09	Debugging CAN_H	23	Signal earthing wire
10	Spin excitation EXC+	24	Blind plugging
11	Spin excitation EXC-	25	Blind plugging
12	Cosine winding COS-	26	Blind plugging
13	Cosine winding COS+	27	Signal earthing wire
14	Sinusoidal winding SIN-	28	Blind plugging

Routing of pin harness corresponding to the connector

<p>Pin</p>	<p>Description of harness routing of relevant parts:</p> <ul style="list-style-type: none"> •The "pin" in the left box means the hardware lead of electrical parts; •The lower ① ,② ,③ ,etc. respectively represent a connector on the harness; •The "bold" is the function name of the connector, which can be found in the harness drawing; <p>The wire number can be found on the drawing through the connector name to test the continuity of the harness;</p>
<p>a</p>	 <p>① Refer to ground plate harness connector motor controller, wire No.:ZK8;</p> <p>② Refer to ground plate harness connector main harness 1, wire No.:ZK8;</p> <p>③ Refer to main harness connector chassis harness, wire No.:VL70c;</p> <p>④ Refer to main harness electrical box assembly, wire No.:VL70;</p> <p>Note:ZK8/ VL70c/ VL70 are butted and crimped,and they are conductive;VL70 is connected to VL16a through the main relay,and VL16a is connected to upper 10A fuse;</p>
<p>b</p>	 <p>① Refer to ground plate harness connector motor controller, wire No.:ZK30;</p> <p>② Refer to ground plate harness connector vehicle body grounding, wire No.: ZK30;</p>

c	
d	<p>① Refer to ground plate harness connector motor controller, wire No.: DA3/ DA2;</p> <p>② Refer to ground plate harness connector main harness 1, wire No.: DA3/ DA2;</p> <p>③ Refer to main harness connector chassis harness, wire No.: DA3/DA2;</p> <p>④ Refer to main harness connector electric control harness 1, wire No.: DA3/ DA2;</p> <p>⑤ Refer to electric control harness connector electric control harness 1, wire No.: DA3/DA2;</p> <p>⑥ Refer to VCU large sheath of main harness connector, wire No.: DA3/DA2;</p>

9 Electrical Control System

9.1 Vehicle controller detection tool

9.1.1 Introduction to hardware

a. The whole vehicle fault diagnosis hardware adopts the USBCAN series CAN interface card (hereinafter referred to as CAN card) developed by Zhiyuan Electronics Co., Ltd., and the model is USBCAN series. With this interface card, the PC can be connected to CAN network through the USB bus to read the fault information in the CAN network.

The product is as follows:

b. Wiring description: select one of the CAN interfaces and respectively connect CAN_ H and CAN_ L to OBD public end interfaces PIN14 and PIN6.



9.1.2 CAN Test software

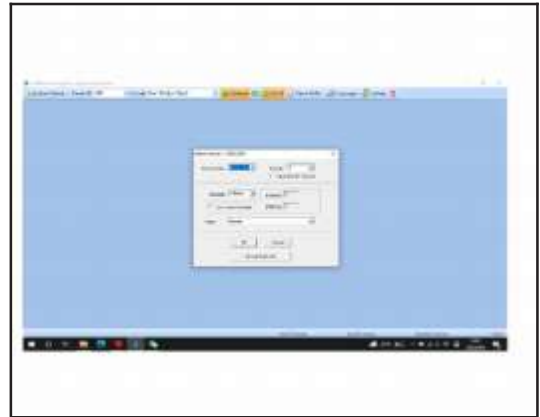
CAN Test software provided along with CAN card. After the software is installed, the message data in the network can be collected by using the software. When there is a fault, the fault message information of the whole vehicle can be collected through the CAN Test software to analyze the fault. The operation steps are as follows:

a. Double click the CAN Test software to enter the following page and click "select equipment". If you use CAN1, select USBCAN1; if you use CAN2, select USBCAN2;



b. When selecting USBCAN1, directly click "OK and start CAN". When selecting USBCAN2, it is better to tick "open all CAN channels at the same time", and then click "OK and start CAN".

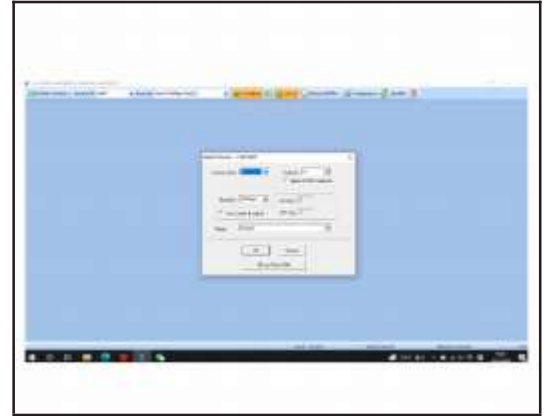
c. Click "start" as shown in the figure: click "stop" to read the message data. Click "save" to save the data for future analysis.



9.2 Vehicle controller fault diagnosis software

9.2.1 Operation of fault diagnosis instrument

a. After the professional maintenance personnel connect the CAN card equipment, run the diagnostic software to pop up the following interface. After clicking "connect" and "start", observe whether the data is connected normally. If the data does not change, unplug the USB of the CAN card equipment and reconnect it.



b. After the data is connected, the fault diagnosed by the VCU is shown on the left side of the interface. The middle of the interface is the fault diagnosis information of the motor controller and battery BMS. If the motor or battery has fault, please refer to the maintenance operation methods of the motor and battery for troubleshooting; the right part of the interface is the information status of battery charging. For specific troubleshooting of the above components, please refer to the "maintenance list of common faults of electric control system" in the following table.



9.2.2 Vehicle fault information record

After the vehicle has fault, relevant information shall be recorded immediately according to the following table, and the original message data for a period of vehicle failure state shall be saved with CANtest software to facilitate data statistics and analysis.

CENNTRO LS200 Battery Electric Vehicle Mass Production After-Sales Maintenance Record							
Remarks	Fault analysis and countermeasures (Parts manufacturer)	Fault analysis and countermeasures (After-sales Service Department)	Original data of the whole vehicle (file name intercepted and saved by CANtest)	Faults (or attached figure)	Time points of failure (specific to minutes)	Battery box No.	License plate/VIN number
							S/N
							1
							2
							3
							4

9.3 Maintenance list of common faults of electric control system

S/N	Component	Fault name/ phenomenon	Possible causes	Corrective measures
1	Vehicle controller	EPS fault	There is no power steering on the left and right sides, the connector is in poor contact, and the connector has such faults as film withdrawal, sleeve withdrawal, virtual connection and virtual welding.	Use a multimeter to check whether there is rated voltage and current flowing in the interface. After finding out the cause, make sure that the connector leads are in good contact.
			There is no steering power on the left and right sides, and the torque sensor exceeds the rated travel.	Replace steering column assembly
			In the left and right directions, the steering in one direction is heavy, and the power in the other direction is normal. There may or may not be EPS fault reported, which belongs to EPS control module fault.	Replace EPS control module

S/N	Component	Fault name/ phenomenon	Possible causes	Corrective measures
1	Vehicle controller	EPS fault	Steering assist is intermittent, and no EPS fault is reported. The connector is loose, the grounding is poor or the EPS control module is faulty.	If the harness is normal, replace the EPS control module.
2		D+C fault	The fuse at the output end of D+C is blown, and the output current and voltage of D+C are too high, and the fuse heat is too high due to long-time operation.	Replace the D+C and the blown fuse when the high voltage of the D+C input terminal is normal.
			After D+C is used for a period of time, the output voltage is lower than 12V, thus the internal aging of D+C.	Remove the faulty D+C and replace it with a new D+C. does not work, replace D+C.
			D+C has no voltage output, 1. D+C has no high voltage input. 2. D+C internal fault	Check the engagement of D+C high-voltage relay after high voltage is applied. If not, check the line and VCU status. If D+C high-voltage relay is closed and D+C still does not work, replace D+C.

S/N	Component	Fault name/ phenomenon	Possible causes	Corrective measures
2	Vehicle controller	D+C fault	<p>The fuse at the input end of D+C is blown.</p> <p>1. The internal fault of D+C causes the input current to be greater than the maximum allowable range, resulting in the fuse being blown.</p> <p>2. When D+C is started, the pulse current is greater than the range that the fuse can withstand.</p>	<p>Replace the fuse when it is determined that the steady-state working current of D+C is normal. If the steady-state working current of D+C is abnormal, replace D+C.</p>
3		Vacuum booster fault	<p>The vacuum pump works for a long time:</p> <p>1. There is air leakage in the vacuum pipeline and the vacuum tank.</p> <p>2. The aging of the vacuum tube itself causes that the vacuum cannot be pumped to the specified lower limit.</p>	<p>Replace the vacuum pump when it is confirmed that there is no air leakage in the vacuum pipeline and the vacuum tank.</p>

S/N	Component	Fault name/ phenomenon	Possible causes	Corrective measures
3		Vacuum booster fault	The vacuum pump does not work: the connector of the vacuum pump has such faults as film withdrawal, sleeve withdrawal, virtual connection and virtual welding.	Check the input voltage of the vacuum pump connector and ensure that the control harness of the whole vehicle is in good contact with the vacuum pump and VCU.
4	Vehicle controller	Accelerator pedal fault	The accelerator pedal fails in both ways: 1. Accelerator pedal connector has such faults as film withdrawal, sleeve withdrawal, virtual connection and virtual welding. 2. The accelerator pedal is faulty after being pressed for many times.	Check whether the input power supply of the accelerator pedal is normal and whether the output signal connector is connected. If it is normal, replace the accelerator pedal.

S/N	Component	Fault name/ phenomenon	Possible causes	Corrective measures
4	Vehicle controller	Accelerator pedal fault	The accelerator pedal fails in one way: 1. Accelerator pedal connector has such faults as film withdrawal, sleeve withdrawal, virtual connection and virtual welding. 2. The accelerator pedal is faulty after being pressed for many times.	Replace the accelerator pedal when the accelerator pedal connector and VCU connector are in normal contact.
			The accelerator pedal fails in two way.	Replace the accelerator pedal when the accelerator pedal connector and VCU connector are in normal contact.
5	Vehicle controller	Gear failure	The lever connector has such faults as film withdrawal, sleeve withdrawal, virtual connection and virtual welding.	Replace the gear lever when the gear lever connector and VCU connector are in normal contact.
			Internal fault of gear lever after several shifts.	Remove the original faulty gear lever and replace it with a new one.
6	Vehicle controller	BMS dropped	Poor contact or disconnection of battery 8PIN or 12PIN aviation plug	Check whether there is open circuit or poor contact in the aviation plug connector.
			BMS internal fault	Replace battery pack

S/N	Component	Fault name/ phenomenon	Possible causes	Corrective measures
6	Vehicle controller	BMS dropped	BMS low voltage power supply is insufficient.	Check battery voltage status, determine D+C working status, and replace D+C.
7		AC air conditioner cannot be turned on	Read the indoor and outdoor temperature through the detection software, and the temperature sensor is abnormal if there is a significant difference from the actual value.	Compare the indoor and outdoor temperature read by the detection software with the actual value to determine the faulty temperature sensor and replace it.
			Poor contact of electrical harness	Remove the AC connector and use a multimeter to check the connection of internal terminals.
			The air pressure in the refrigeration pipeline is insufficient, and the pressure switch cuts off the operation of the air conditioner, which is caused by insufficient Freon pressure.	Check whether there is air leakage in the refrigeration pipeline. If it is normal, add Freon.

S/N	Component	Fault name/ phenomenon	Possible causes	Corrective measures
7	Vehicle controller	AC air conditioner cannot be turned on	AC has no high voltage input	If the AC has no high voltage input under normal operation of the vehicle, the battery shall be replaced or the internal fuse of the battery shall be replaced by professional personnel.
			AC has high voltage input, but it cannot work normally.	Replace the compressor if there is no problem with the connector and harness.
8		PTC warm air cannot be turned on	Read the PTC temperature through the detection software and observe whether it is normal.	Determine whether the temperature sensor is normal.
			Poor contact of electrical harness	Remove the PTC connector and use a multimeter to check the connection of internal terminals.

S/N	Component	Faultname/ phenomenon	Possiblecauses	Correctivemeasures
8	Vehicle controller	PTC warm air cannot be turned on	PTC high voltage relay is not closed.	Check the engagement of PTC high-voltagerelay after high voltage is applied. If not, check the line and VCU status. If PTC high-voltage relay is closed and PTC still does not work, replacePTC.
9	Battery system	Battery pack failure		Replacebattery
10		Motorcontrollerfault		Replace the motor controller
11		Battery temperature is toohigh	The battery pack temperature is higher than 55 °C after long- time driving.	Stop driving immediately so that the temperature of the battery pack can be naturally cooled and reduced to the normal temperature range.
12	Charging system	Charger communication fault		Replacecharger
13	Charging system	Poor connection of chargingplug	key-on, the meter does not show that the charging cable is connected.	Check the connection state between the charging plug and the vehicle and 220V AC port, and fasten the connection.

S/N	Component	Faultname/ phenomenon	Possiblecauses	Correctivemeasures
14		The charging plug is connected but cannot be charged.	The vehicle runs for a long time, and the battery temperature exceeds the allowable charging temperature range (0-45 °C) and cannot be charged.	Stop the vehicle, restore the battery pack temperature to within the allowable charging temperature range of 0-45 °C , and then resumecharging.
			The 220V AC voltage is unstable, resulting in the charger module unable to operatenormally.	The professional personnel of the power supply bureau shall replace and repair the power supply line, and our personnel shall cooperate.

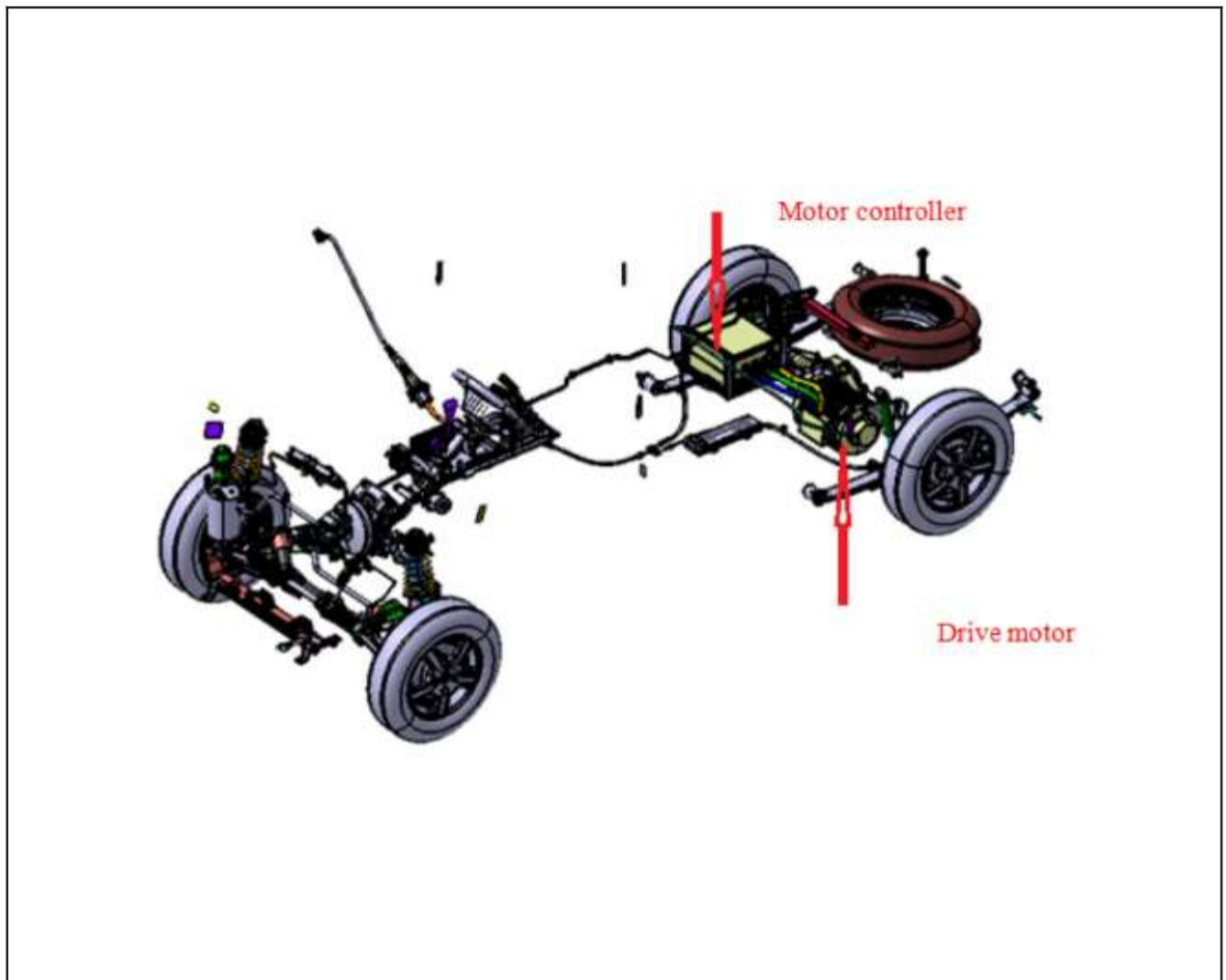
10 Drive Motor System

The driving motor of LS200 battery electric vehicle is permanent magnet synchronous motor, and the cooling mode of permanent magnet synchronous motor is water cooling; the cooling mode of the motor controller is also water cooling, the control circuit uses TMS320F2407 as the main control chip, the power element uses IGBT as the power conversion element, and the motor voltage variable frequency vector control method is adopted to realize the closed-loop control of the motor torque.

Basic working principle of drive motor system:

The DC high voltage of the motor controller is provided by the on-board power battery. The DC high voltage power is inverted by the motor controller into three-phase AC with adjustable voltage amplitude and frequency to drive the AC motor; at the same time, the current rotor position signal is detected and the phase current of the motor is sampled in real time and sent to the motor control unit. The motor control unit communicates with the vehicle controller through the CAN bus, obtains the current torque command, operation mode and rotation direction from the vehicle controller, and obtains the current and motor position signals according to the feedback, controls the motor driver to generate the required three-phase AC, drives the motor to run, and thus drives the vehicle to run.

The driving mode of LS200 battery electric vehicle is rear drive. The installation position of the motor system on the whole vehicle is shown in the figure below. The permanent magnet synchronous motor replaces the generator of the traditional vehicle. The energy provided by the battery is inverted by the motor controller to drive the motor as the driving force of the whole vehicle.



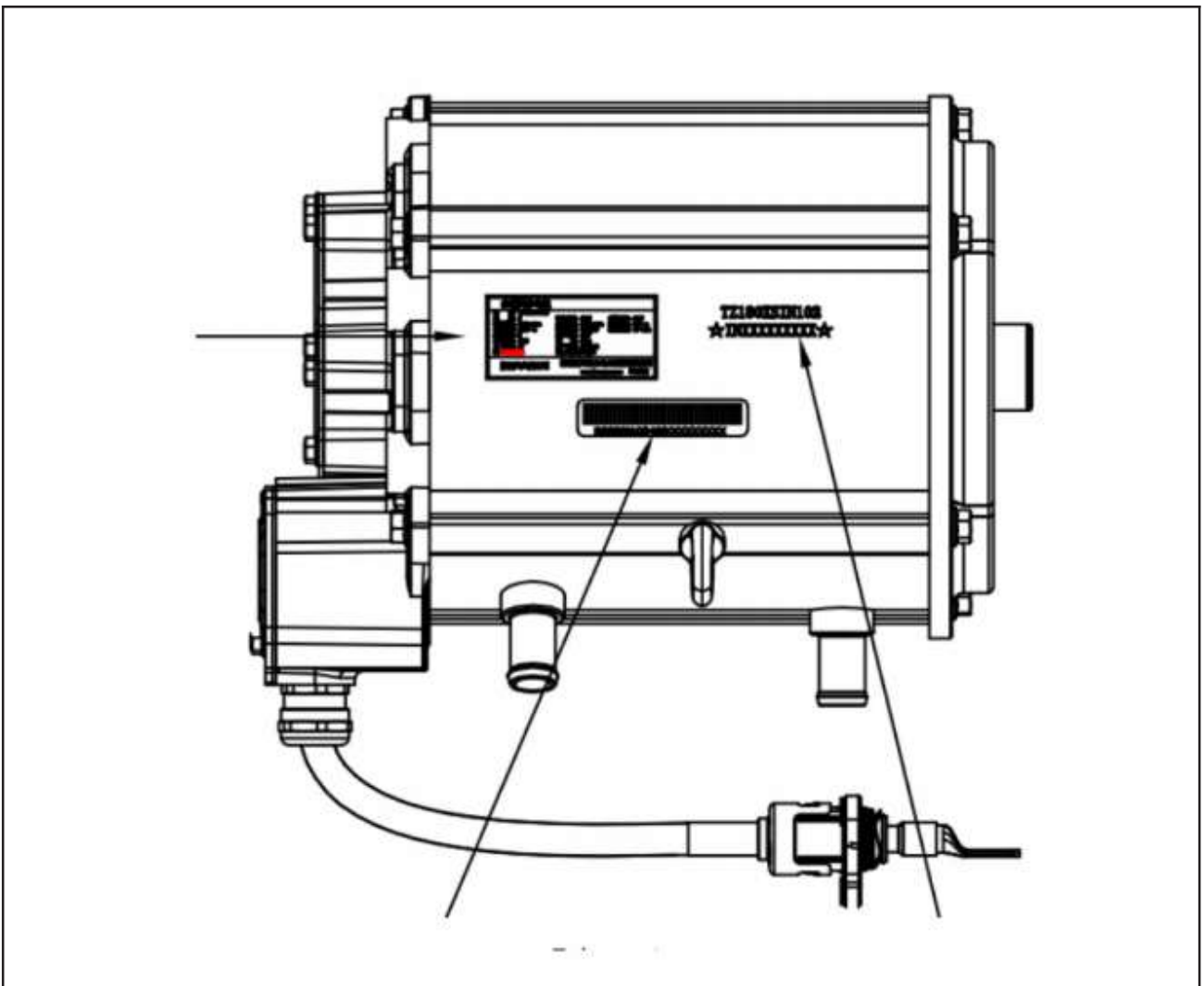
10.1 Introduction to AC induction motor

10.1.1 Main technical parameters of drive motor

Projects	Parameters
Model	TZ180XS1N102
Size/mm	250x250x309
Weight/kg	37
Stator resistance/ mΩ	17@20°C
Ratedvoltage/V	DC336V
Ratedpower/kW	30
Peakpower/kW	60
Ratedtorque/N•m	90
Peaktorque/N•m	220
Ratedrotation speed/rpm	3183

Maximum rotation speed/rpm	9000
Maximum motor efficiency/%	≥ 94
Working environment temperature $^{\circ}\text{C}$	-30~+80
Cooling mode	Watercooling
Protection level	IP67
Insulation grade	Grade H

10.1.2 Drive motor appearance



The appearance of the drive motor is shown in the above figure. When disassembling the motor, first pull out the three-phase wire and the rotary transformer line; the three-phase wire aviation plug has sequence color mistake-proofing. Ensure the correct phase sequence during assembly, otherwise the motor will not work normally.

10.1.3 Disassembly and assembly of power motor

Disassembly steps:

1. Unplug the three-phase wire and rotary transformer line of the motor;
2. Remove hexagon flange bolts (1, 3 and 4);
3. Remove the motor fixing bracket (5);
4. Support the motor (7) with a hydraulic truck;
5. Remove the flange bolt (6);
6. Separate the motor from the rear axle (2).

Remarks

- ✘ It is necessary to ensure that the motor and the rear axle are fitted manually. It is forbidden to use bolts to pull the motor and the rear axle together;
- ✘ When tightening bolts, the torque of bolts shall be strictly controlled to prevent thread damage. At the same time, it shall not be disassembled for many times, which will also cause thread damage;
- ✘ Unplug the aviation plug and harness before disassembly. It is forbidden to break the rotary transformer line or wear the aviation plug during disassembly.

10.1.4 Inspection of permanent magnet synchronous drive motor

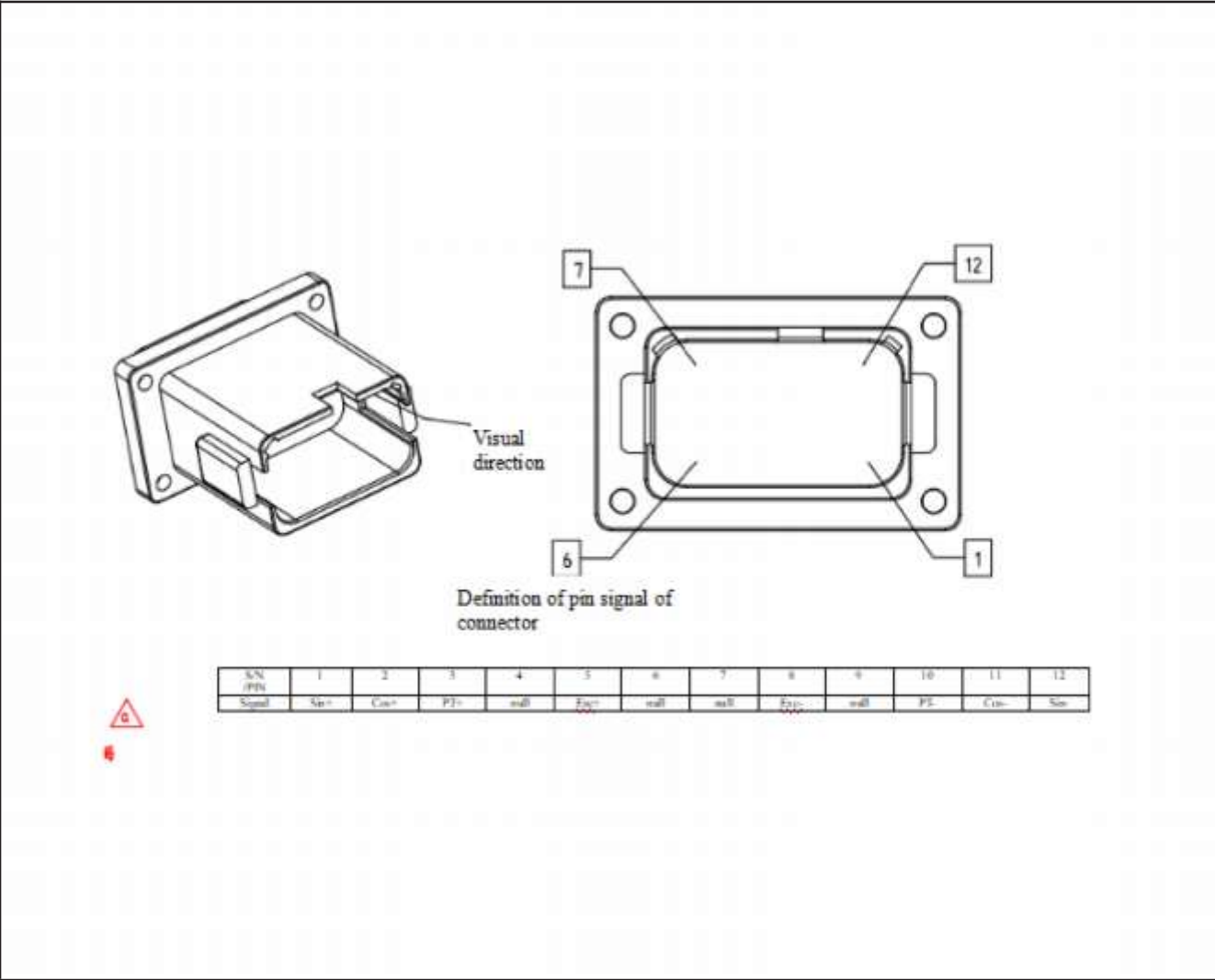
Visual inspection

Check whether the motor nameplate, factory number and three-phase wire aviation plug are complete. Visually check the appearance for obvious scratches or scoring, check whether the fixing screws of the motor housing are loose, whether the insulation layer of the three-phase wire is intact, and whether the harnesses of the motor rotary transformer and the temperature sensor are intact.

Bearing inspection

Gently rotate the bearing of the motor by hand to see whether the bearing rotates smoothly and whether there is obvious abnormal sound or other obvious abnormalities.

Rotary transformer and temperature sensor connector



Among them, the rotary transformer Sin groups are connected with each other, and the resistance is $42\pm 5 \Omega$; the Cos groups are connected with each other, and the resistance value is $42\pm 5 \Omega$; the excitation source EXC groups are connected with each other, and the resistance value is 19 ± 2 . These three groups of windings are not conductive to each other. If two groups of windings are conductive, the rotary transformer is faulty, which may cause the motor to not operate or operate abnormally. The resistance value between the temperature sensors varies depending on the temperature of the motor winding, as

shown in the following figure:

Temperature (°C)	0	1	2	3	4	5	6	7	3	9
	Resistance value (Ω)									
-40	84.27	83.87	83.48	83.08	82.69	82.29	81.89	81.50	81.10	80.70
-30	88.22	87.83	87.43	87.04	86.64	86.25	85.85	85.46	85.06	84.67
-20	92.16	91.77	91.37	90.98	90.59	90.19	89.80	89.40	89.01	88.62
-10	96.09	95.69	95.30	94.91	94.52	94.12	93.73	93.34	92.95	92.55
0	100.00	99.61	99.22	98.83	98.44	98.04	97.65	97.26	96.87	96.48
0	100.00	100.39	100.78	101.17	101.56	101.95	102.34	102.73	103.12	103.51
10	103.90	104.29	104.68	105.07	105.46	105.85	106.24	106.63	107.02	107.40
20	107.79	108.18	108.57	108.96	109.35	109.73	110.12	110.51	110.90	111.29
30	111.67	112.06	112.45	112.83	113.22	113.61	114.00	114.38	114.77	115.15
40	115.54	115.93	116.31	116.70	117.03	117.47	117.86	118.24	118.63	119.01
50	119.40	119.78	120.17	120.55	120.94	121.32	121.71	122.09	122.47	122.86
60	123.24	123.63	124.01	124.39	124.78	125.16	125.54	125.93	126.31	126.69
70	127.08	127.46	127.84	128.22	128.61	128.99	129.37	129.75	130.13	130.52
80	130.90	131.28	131.66	132.04	132.42	132.80	133.18	133.57	133.95	134.33
90	134.71	135.09	135.47	135.85	136.23	136.61	136.99	137.37	137.75	138.13
100	138.51	138.88	139.26	139.64	140.02	140.40	140.78	141.16	141.54	141.91
110	142.29	142.67	143.05	143.43	143.80	144.18	144.56	144.94	145.31	145.69
120	146.07	146.44	146.82	147.20	147.57	147.95	148.33	148.70	149.08	149.46
130	149.83	150.21	150.58	150.96	151.33	151.71	152.08	152.46	152.83	153.21
140	153.58	153.96	154.33	154.71	155.08	155.46	155.83	156.20	156.58	156.95
150	157.33	157.70	158.07	158.45	158.82	159.19	159.56	159.94	160.31	160.68

10.1.5 Summary of permanent magnet synchronous motor faults

S/N	Faults	Possible causes	Solutions
1	Abnormal noise of motor	The front or rear bearing is damaged; friction between stator and rotor	Replace the motor
2	Unqualified insulation resistance (less than 20 megohm)	Water ingress or grounding of motor winding	Dry the motor and check whether the insulation resistance is greater than 20 megohm. If it still fails, replace the motor.
3	Abnormal motor power output	The rotary transformer connector is in poor contact or the rotary transformer is damaged.	Check whether the rotary transformer connector and 12PIN connector are in poor contact, and check whether there is short circuit and open circuit. Check whether the phase sequence of the three-phase wire is correct. If there is no problem with the rotary transformer connector and phase sequence, replace the motor.
4	Motor leakage or abnormal current output	The motor winding is burnt out or the winding turns are damaged	Replace the motor
5	Spline deformation	Spline deformation	Repair with a diamond file until it can match the rear axle

As for the permanent magnet synchronous motor, it is not allowed to open the motor for maintenance of internal windings and other parts without special tools used to measure the rotation angle. If it is judged that the motor is faulty, the motor needs to be replaced.

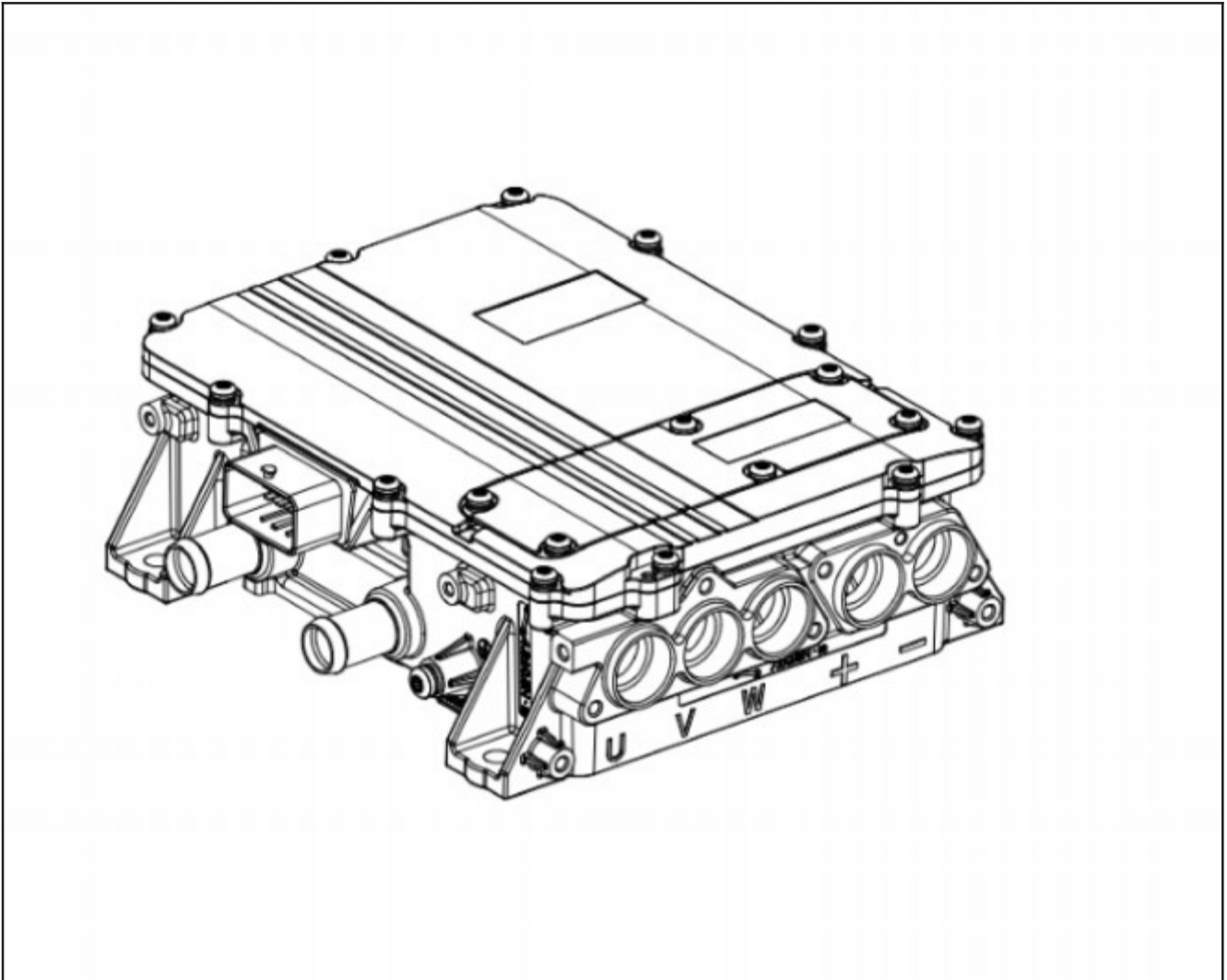
10.2 Introduction to IEVD030-40Z11HA-XN motor controller

10.2.1 Main parameters of motor controller

Projects	Parameters
Peak capacity	100kVA
Rated capacity	58kVA
Rated voltage	336VDC
Continuous current	110A
Operating voltage range	250~420VDC
Peak output current	200A@60s
Maximum efficiency	98.5%
Frequency	0~700Hz
Weight	5.2kg
Cooling mode	Water cooling
Busbar capacitance	300uf
IGBT	650V@200A

10.2.2 Appearance identification of motor controller

Motor controller appearance and connector definition



The U, V and W phase sequence of the motor controller must be consistent with the motor phase sequence, otherwise the motor will not work normally; the positive and negative busbar aviation plugs are connected to the battery. Remember to keep consistent with the positive and negative of the battery, otherwise there may be danger; the monitoring panel connector is used for the external keyboard, which can monitor and determine the problem in case of failure. The rotary transformer connector is connected with the motor end; the control line connector is connected with the harness. The terminal shall not be damaged during plug-in. If it is damaged, the controller may not work normally.

Disassembly steps:

- 1.Remove the aviation plug of the three-phase wire of the motor;
- 2.Unplug the 28PIN connector
- 3.Remove hexagon flange bolt(1)
- 4.Remove the motor controller assembly (3)

Remarks:

- ※ When tightening bolts, the torque of bolts shall be strictly controlled to prevent thread damage. At the same time, it shall not be disassembled for many times, which will also cause thread damage;
- ※ Unplug the aviation plug and harness before disassembly. It is forbidden to break the rotary transformer line or wear the aviation plug during disassembly.

10.2.3 Motor controller inspection

Visual inspection

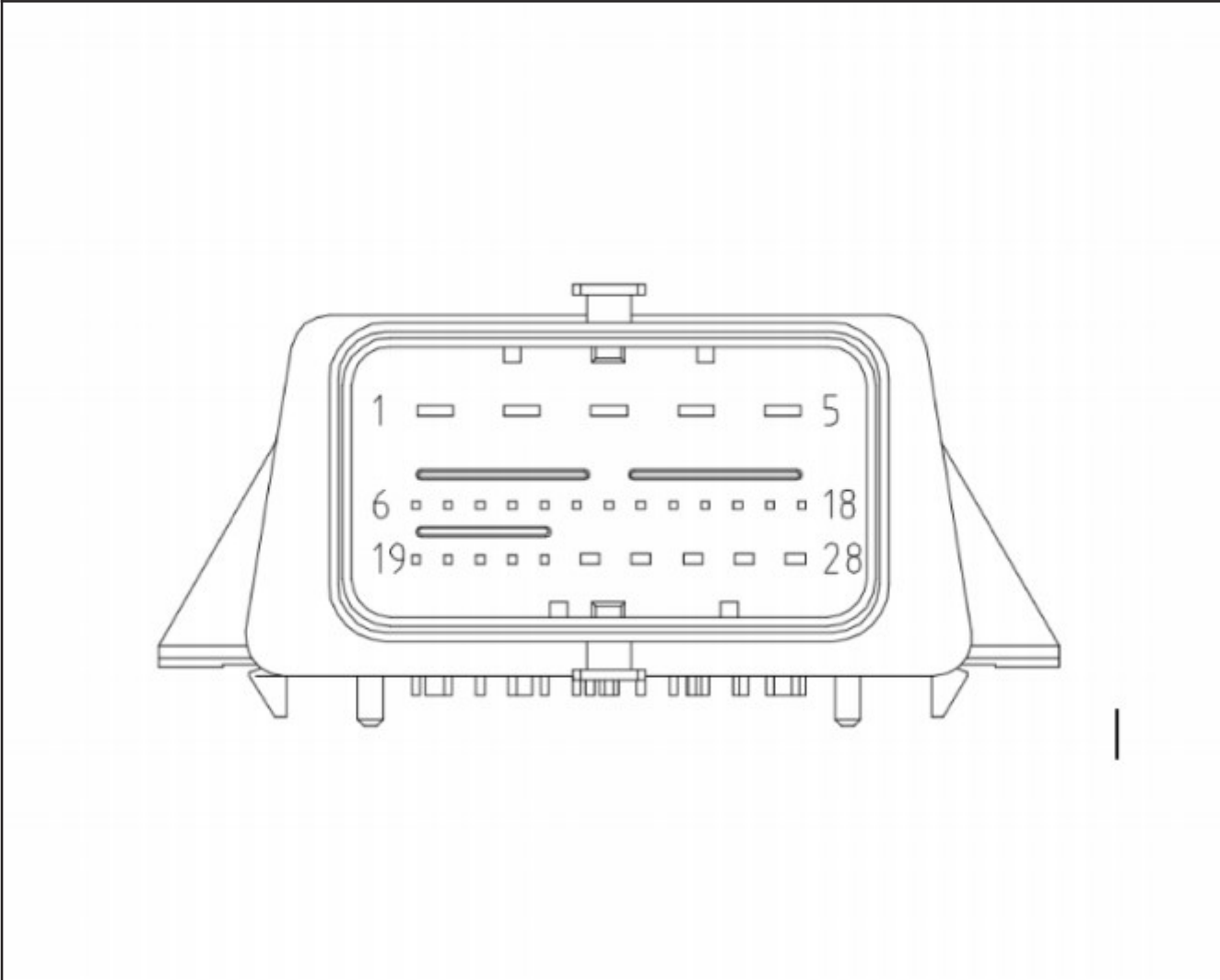
Check whether the motor controller nameplate, aviation plug and fan are complete. Visually check the appearance for obvious scratches or scoring, and check whether the 28Pin is short circuited or broken.

Precautions for maintenance of motor controller

Warning:

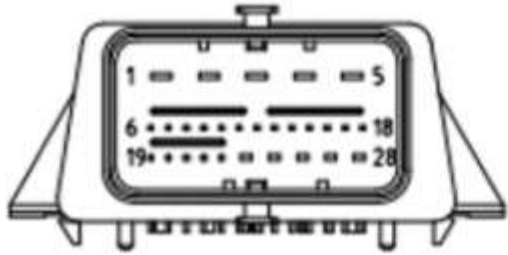
- ※ Do not open the controller end cover under any circumstances!
- ※ All connectors shall not be plugged in and out with electricity!
- ※ The three-phase wire aviation plug has sequence color mistake-proofing, and the phase sequence must be consistent; the positive and negative busbars shall not be misplaced in key positions. It is strictly prohibited to plug and unplug them when they are not aligned with the key positions to prevent the connectors from being worn or even damaged!
- ※ Do not touch any input/output terminal of the controller after power on, otherwise there is danger of electric shock!
- ※ Make sure that the controller is powered off for more than five minutes before maintenance. Otherwise, the residual capacitance on the capacitor will harm the human body!

Control line 28PIN connector



Pin definition diagram

28pin low voltage signal terminal definition



Terminal manufacturer	Socket model
	047745-0100
MOLEX	Matching plug model
	064318-1011

Terminal	Function	Terminal	Function
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Terminal S/N	Function	Terminal S/N	Function
01	Frame earthing wire	15	Sinusoidal winding SIN+
02	Blind plugging	16	Blind plugging
03	Signal earthing wire	17	Blind plugging
04	Battery power supply (negative), 8~18V	18	Hard wire wake-up signal KL15
05	Battery power supply (positive), 8~18V	19	Temperature detection + temperature sensor (type: PT100)

06	Motor CAN_L (with terminal resistance by default)	20	Temperature detection-temperature sensor (type: PT100)
07	Motor CAN_H (with terminal resistance by default)	21	Blind plugging
08	Debugging CAN_L	22	Blind plugging
09	Debugging CAN_H	23	Signal earthing wire
10	Spin excitation EXC+	24	Blind plugging
11	Spin excitation EXC-	25	Blind plugging
12	Cosine winding COS-	26	Blind plugging
13	Cosine winding COS+	27	Signal earthing wire
14	Sinusoidal winding SIN-	28	Blind plugging

10.2.4 Summary of motor controller faults

Fault level	Fault description
Motor system level I fault (sub low level, general fault): the controller requests the vehicle controller to make the vehicle to limp	Overload of motor
	Fast current limiting fault
	Motor overspeed
	Excessive speed deviation
	Encoder not connected
	Motor overheating warning
	Controller overheating warning
Motor system level II fault (sub high level, serious fault): the controller requests the whole vehicle controller to stop the operation of the whole vehicle	Overvoltage
	Undervoltage
	Overcurrent
	Output phase loss
	Motor overheating
	Controller overheating
	CAN communication failure

10.3 Common faults and troubleshooting of drive motor system

Fault description	Corrective measures
<p>The main contactor of the battery is closed, but the motor controller has no voltage feedback, the “READY” light of the whole vehicle is not on, and there are no other fault lights on the instrument panel.</p>	<p>Check whether the battery manual switch is closed.</p>
	<p>Check whether the positive and negative power lines of the battery from the battery to the motor controller is open circuited or in poor contact.</p>
	<p>Check whether the CAN line of the motor controller is correct, whether there is open circuit or whether the CAN high-low connection is reversed.</p>
<p>Use a multimeter to measure whether there is voltage on the positive and negative busbars of the controller, but there is no high-voltage feedback. The “READY” light of the whole vehicle is not on, and there are no other fault lights on the instrument panel.</p>	<p>Check whether the 23-core connector of the motor controller control line is connected with the vehicle connector, check whether the definition of the 23-core connector is correct, check whether the CAN line is open circuited, and measure whether the resistance value between CANH and CANL in the 4-core connector at the motor controller end and wire harness end is 120 Ω.</p>

<p>Power on the ON gear for the first time, and the gear position of the instrument is displayed normally. After pressing “START”, the instrument indicates nothing.</p>	<p>Disconnect the controller 23PIN aviation plug and operate again to see if the phenomenon is eliminated. If it is eliminated, the CAN network of the controller is short circuited. Measure the resistance value of the CAN network and conduct troubleshooting one by one.</p>
<p>The “READY” light of the whole vehicle is on, there are no other faults, and the vehicle does not move when the accelerator is pressed.</p>	<p>Check whether there is open circuit or poor contact of the rotary transformer. Measure whether the resistance value of the rotary transformer is correct.</p>
<p>While the vehicle is running, the instrument frequently displays the sign of motor overheating.</p>	<p>Check whether the temperature line is in poor contact, whether the fan works and whether the fan is blocked.</p>
<p>The “READY” light of the whole vehicle is on, there are no other faults, and the vehicle shakes when starting.</p>	<p>Check whether there is short circuit and poor contact of the rotary transformer, and measure whether the resistance between the three groups of windings of the rotary transformer is correct.</p>

11 Battery System

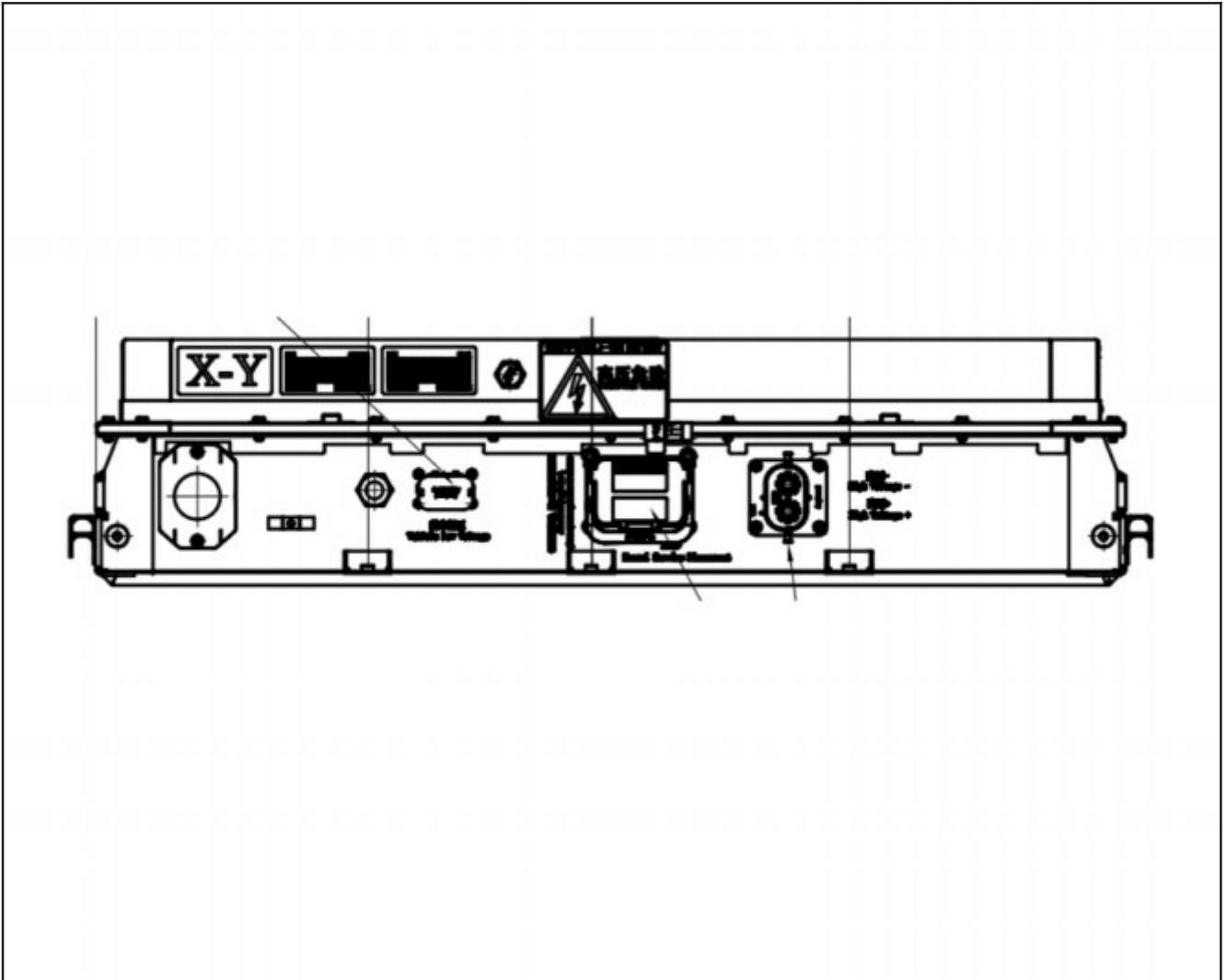
11.1 Specifications and parameters

11.1.1 Basic parameters of battery system

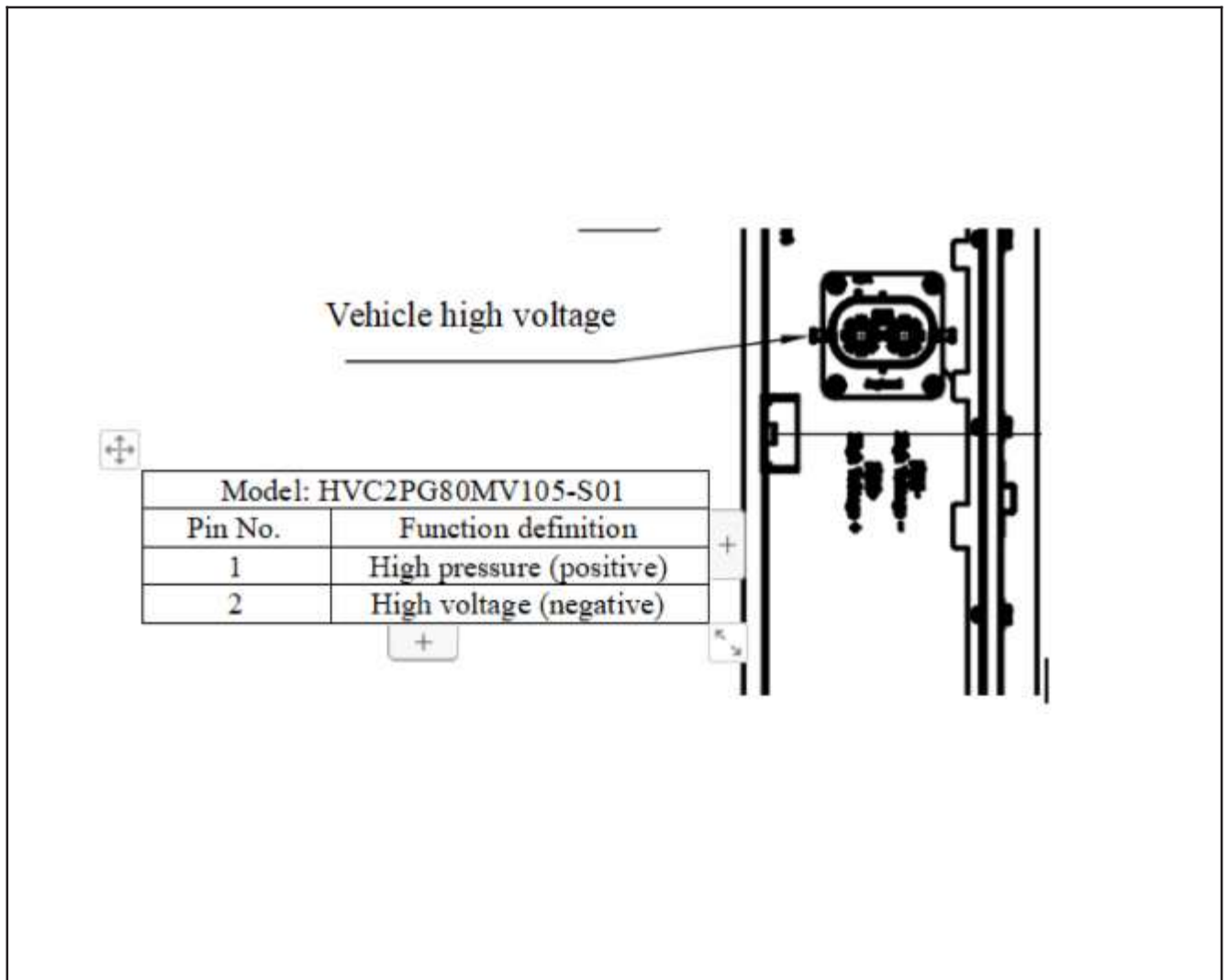
Item	parameters
BMS working power supply	12 V
BMS working power supply	12 V
BMS static power consumption	Electrostatic current $\leq 1\text{mA}$ with the deviation of 0.05 mA
BMS dynamic power consumption	Power consumption without relay $\leq 6\text{W}$ with the deviation of $\pm 1\text{ W}$
Operating temperature range	$-30^{\circ}\text{C} \sim 60^{\circ}\text{C}$ with the deviation of $\pm 2^{\circ}\text{C}$
Cell voltage detection	$0\text{-}5\text{ V}$ with the deviation of $\pm 5\text{mv}$
Temperature check	$-45^{\circ}\text{C} \sim 125^{\circ}\text{C}$ with the deviation of $\pm 5^{\circ}\text{C}$, sampling period $\leq 300\text{ms}$
Current detection	$\pm 350\text{A}$, $\leq 1\%$ FSR
Balancing function	Passive $\leq 100\text{ mA}$
CAN communication function	One internal CAN, CAN1 supports internal communication and diagnosis Two independent external CAN, CAN2 supports normal CAN communication. CAN3 supports CAN communication with off-board charger.
SOC estimation	$0\sim 100\%$, $\leq 5\%$
SOH	$0\sim 100\%$, $\leq 8\%$
BMS protection level	The module is dust-proof, moisture-proof and IP67, and the waterproof is guaranteed by the battery box.
Battery type	Lithium iron phosphate
Nominal voltage	334.88 V
Operating voltage range	$260\sim 379.6\text{V}$
Rated capacity	125 Ah
Rated energy	41.86 kWh
Quick charging	125 A

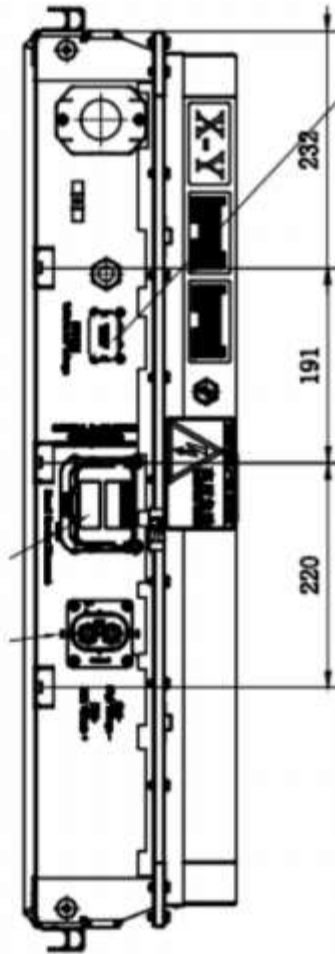
Item	parameters
Maximum discharge current	125A
Working temperature	-30~60°C
Weight	308±9kg

11.1.2 Battery system pin definition



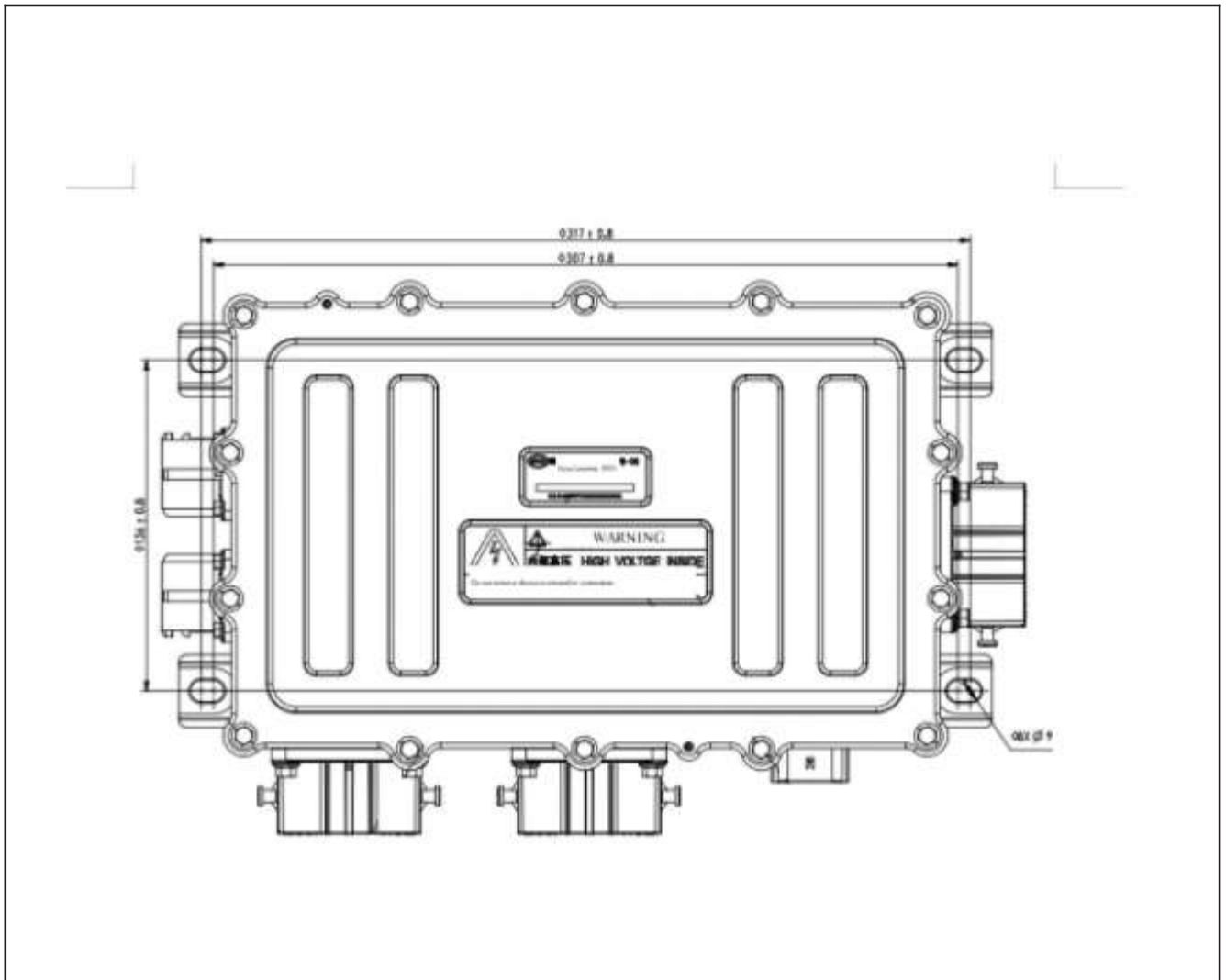
Interface function definition





Vehicle low voltage

Model: MPS02-BSMA0320	
Pin No.	Function definition
1~4	Blind plugging
5	Charging CANH
6	Charging CANL
7	CC2
8	Blind plugging
9	Vehicle CANH
10	Vehicle CANL
11	Quick charging 12V (A+)
12	CC OUT (reserved)
13	AC wake
14	BMS internal CANH
15	BMS internal CANL
16	IGN1+ electricity 1 (ON power)
17	B+ electricity 2 (normal power)
18	BMS grounding
19~20	Blind plugging
21	T1+ (NTC1)
22	T1+ (NTC2)
23~25	Blind plugging
26	Fast charging relay high side drive
27	T-
28~32	Blind plugging



Definition of high voltage box socket:

High voltage connector pin definition				
Item No.:	Connector model	Interface name	Pin No.	Definition
3	REG-2ZPNT1H0.3-A	High voltage input	A	Battery -
			B	Battery +
7	REG-2ZPAT1H0.3-A	Electronic control output	A	MCU+
			B	MCU-
12	REG-2ZPBT1H0.3-A	DC quick charging	A	DC charging-
			B	DC charging+
14	REM-Z3 BH-2.5-A	Accessory high voltage (negative)	1	D+C negative pole
			2	PTC-
			3	AC-
15	REM-Z3 AH-2.5-A	Accessory high voltage (positive)	1	D+C positive pole
			2	PTC+
			3	AC+



11.2 Repair of battery system

11.2.1 Fault diagnosis and treatment

S/N	Status	Possible causes	Treatment methods
1	Unable to charge	Charging line connection fault	Check whether the charging line is disconnected
		Charger fault	Check whether the charger function is normal
		Battery pack alarm	View the alarm on display screen
2	Unable to ischarge	Vehicle fault	Check whether the whole vehicle is faulty
		Connection fault between battery and vehicle body	Check the connecting wire
		Battery pack alarm	View the alarm on display screen
3	Limp	Vehicle alarm	Check whether the whole vehicle triggers an alarm
		Low battery pack alarm	Check whether the vehicle displays low battery
		Other battery pack alarms	View the alarm on display screen

11.3 Maintenance

11.3.1 Maintenance

- ① During storage, it is recommended to put it in a ventilated, moisture-proof, anti- corrosion and dust-proof environment;
- ② After long-time parking, full charge and discharge shall be conducted every 3 months (Full charge to SOC100% and discharge to SOC50%).

Note:

※ it is not allowed to stop before the charging is completed as displayed on the screen (i.e. charging until the gun stops working). After the charging is completed, discharge and store in the optimal SOC interval (50%) to ensure the battery performance.

11.3.2 Maintenance record

Maintenance time	Maintenance item	Maintained by	Remarks

11.3.3 List of professional maintenance equipment and tools

List of special tools for maintenance of battery, motor and electric control systems

S/N	Name	Model	Function	Remarks
1	Computer	Ordinary laptop	Install inspection software	
2	Vehicle fault diagnosis software	Special for LS200 battery electric vehicle	Most faults can be read directly from software	
3	Vehicle fault diagnosis hardware	ZLGCAN card (USBCAN-II+)	Hardware used to connect the computer to the vehicle	Install CANtest software

List of special equipment for power battery maintenance (Dingyan)

S/N	Name	Model	Function	Remarks
1	Communication screen	BMS dedicated display screen	Display battery pack system information and fault alarm information	
2	Computer	Ordinary laptop	Install inspection software	
3	Connecting wire and communication fixture	Common communication line and green link CR104	Communication connection between battery management system and computer	
4	Multimeter	VICTOR vc9805A	Measure battery voltage etc.	
5	DC power supply	Ordinary low voltage DC power supply	Provide low voltage power supply	
6	DC charger	German Digatron BNT series	Charge the battery	

7	DC load machine	German Digatron BNT series	discharge the battery	
8	Screw sleeve combination, screwdriver combination, glue gun	Ordinary	Disassemble and assemble battery pack	
9	Battery maintenance instrument	Independent research and development by Dingyan (FB- L01)	Battery balancing	
10	Soldering iron, wire stripping pliers, insulating gloves	Ordinary	Disassemble and assemble battery pack harness	



CENNTRO

The logo features the word "CENNTRO" in a bold, blue, sans-serif font, centered within a white diamond shape. This diamond is set against a black background that has a white border. Below this, there is a grey background with a white border that also forms a diamond shape, mirroring the one above.

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