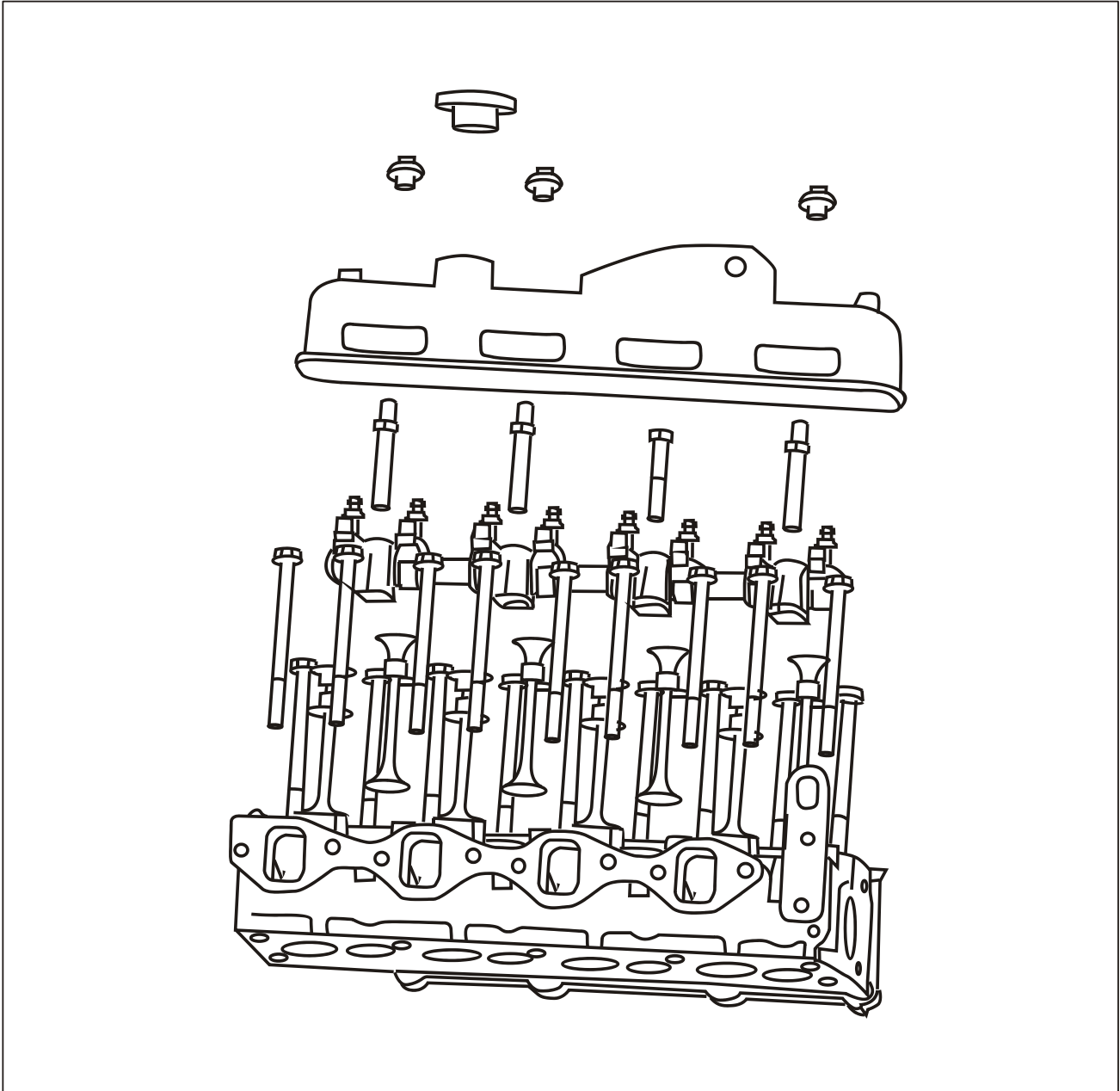


The 4DA1-2B2 engine is a turbocharged and intercooled diesel engine that is independently developed by Anhui Jianghuai Automobile Co., Ltd. on the basis of adoption of domestically and internationally advanced design ideas with the technical support of the internationally

famous engine design company AVL and that has reached the domestic leading level. This engine model features compact construction, low noise and vibration, high power and torque, and has high cost performance with its emission level reaching National III Standard.



When disassembling, be sure to put valve train parts together and mark them with identification numbers so that the parts can be returned to their respective original positions during reinstallation.

- 2 -

Diagnosis and Testing

Inspection and Repair

If excessive wear or damage is found during inspection, make necessary adjustments and repairs and replace parts.

Check gasket and mating surface of cylinder head for leakage, corrosion and blowby. In the case of gasket failure, determine the causes:

- Incorrect assembly
 - Cylinder head looseness or warpage
 - Insufficient tightening torque of cylinder head bolts
 - Cylinder block surface warpage
1. Check cylinder head bolt threads for damage or stretch and cylinder head for damage caused by incorrect use of tools.

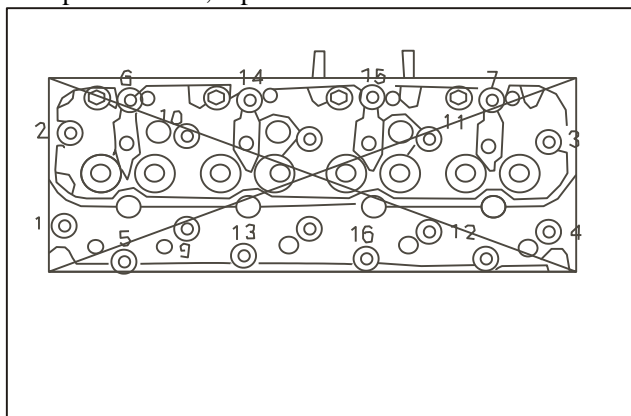
Caution: Suspected bolts must be replaced.

2. Check cylinder head (especially between valve cliffs and at exhaust port) for cracks.
3. Check cylinder head cover for corrosion and interior of cylinder head for sand inclusion and porosity.

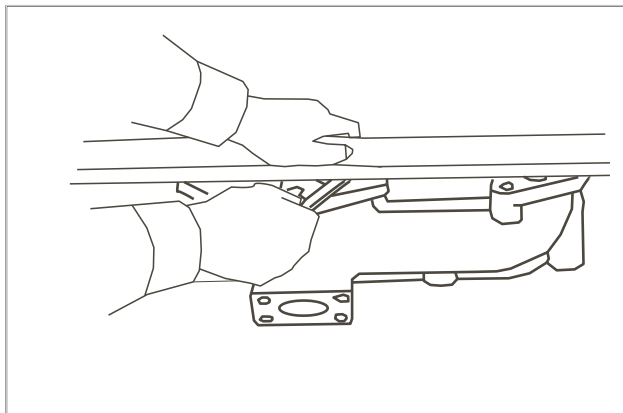
Caution: Do not repair weld any important surface on cylinder head. If damaged, replace.

4. Stringent requirements are specified for flatness of lower plane of cylinder head and mating surfaces of intake and exhaust manifolds.

These surfaces can be repaired by means of grinding. If “unevenness” of a surface is out of the specified range, grind the surface until the technical requirement is met. If much more out of specifications, replace.



the specified limit and the standard value, regrind the surface.



If the measured value exceeds the specified limit, the manifold must be replaced.

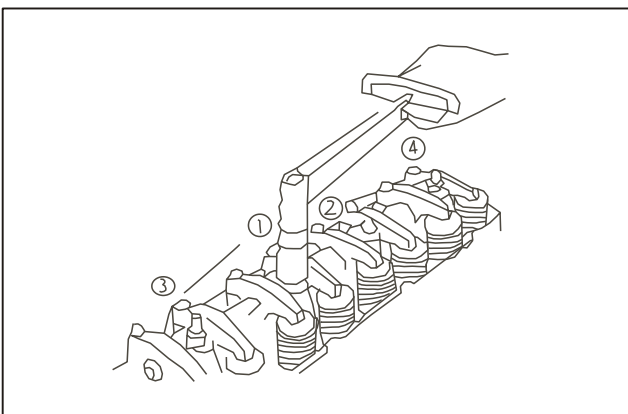
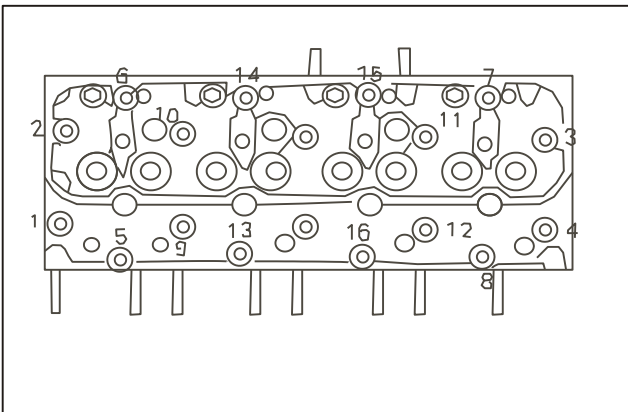
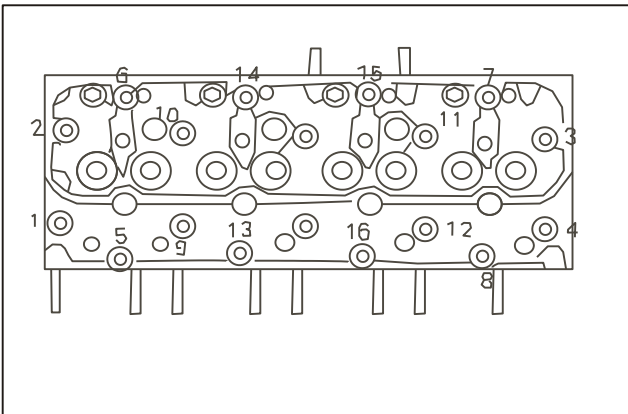
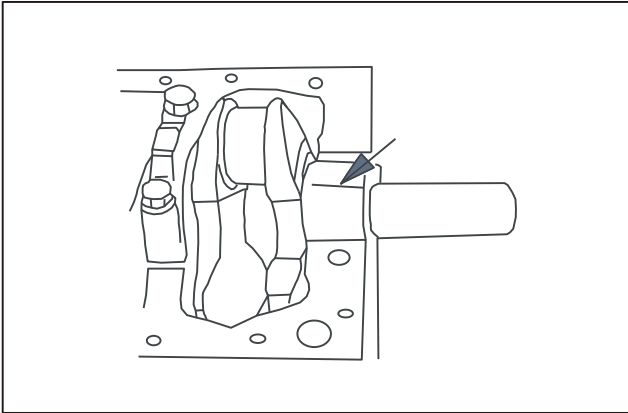
	Standard	Limit
Warpage of exhaust manifold	0.05 mm or less	0.20 mm

	Standard	Limit
Warpage of lower plane of cylinder head	0.05 mm or less	0.20 mm
Height of cylinder head	92 mm	91.55 mm

5. Mating surface of bowl plug of water jacket
6. Use a straightedge and a feeler gauge to measure warpage of exhaust manifold to cylinder head mating surface. If the measured value is between

Removal and Installation (Continued)

Crankshaft



12. Oil pan assembly

- Coat arch area and groove of No. 5 bearing cap and arch area of timing gear chamber with recommended fluid sealant or its equivalent as illustrated.
- Put rear lip of gasket in groove of No. 5 bearing cap.
- Ensure rear lip snugly fits in the groove.
- Install oil pan onto cylinder block.
- Tighten oil pan bolts to the specified torque.
Torque of oil pan bolt: 23.5 ± 3.5 N.m

13. Cylinder head

Cylinder head assembly

- Install dowel pin on cylinder block.
- Install cylinder head gasket with the mark on its top up.
- Clean lower surface of cylinder head and upper surface of cylinder block.
- Install cylinder head gently.
- Coat threads and mating surfaces of cylinder head bolts with engine oil.
- Tighten cylinder head bolts to the specified torque in three steps by sequence number as shown in the figure.

Torque of cylinder head bolt:

First step: 65 N.m

Second step: 85 N.m

Third step: 105 ± 5 N.m

Push rod

Coat push rod with engine oil and insert it into cylinder head.

Rocker shaft assembly

- Loosen all adjusting screws.
- Place rocker shaft with large oil hole ($\phi 4$) facing the front of the engine.
- Tighten rocker shaft support bolts to the specified torque in the order shown in the figure. Torque of rocker shaft support bolt: 55 ± 5 N.m
- Adjust valve clearance.

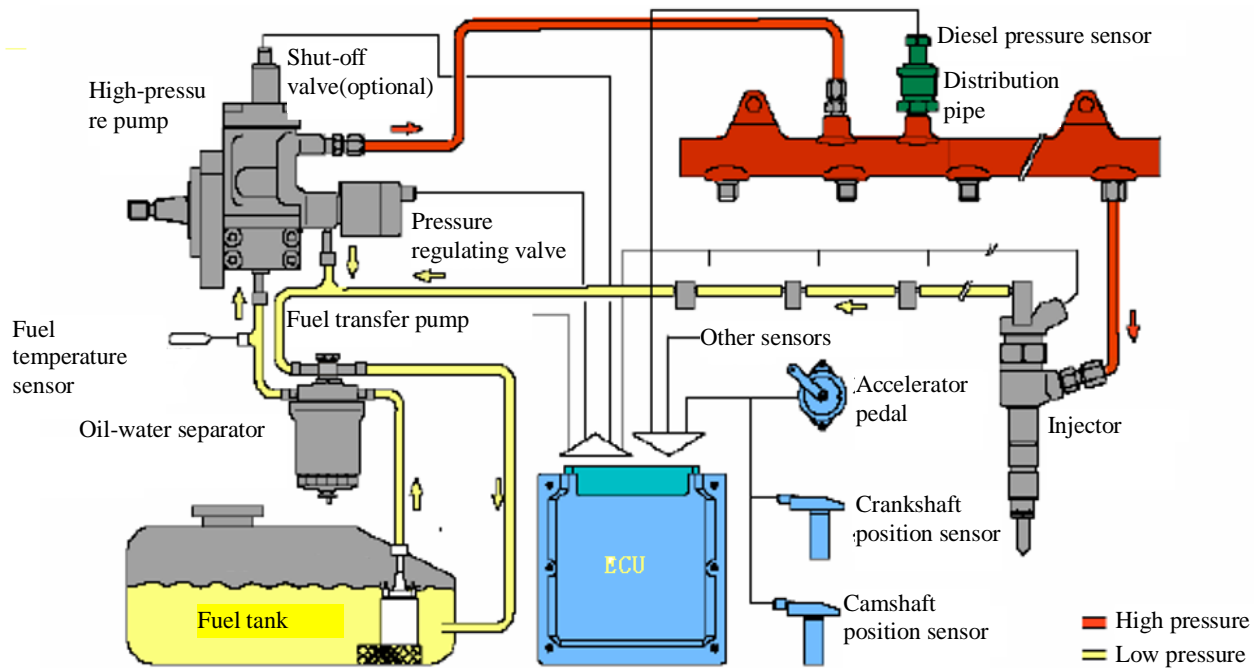
Trouble Diagnosis of Cooling System

Trouble	Cause	Remedy
Engine overheating	Coolant level too low Radiator cap pressure valve spring force reduced Fan belt slack or broken Fan belt slipping Thermostat malfunction (valve can not open) Water pump malfunction Water passage clogging due to oxide accumulation Injection timing incorrect Radiator core clogged Gas leaking into water jacket due to cylinder head gasket breakage	Refill coolant, check for leakage, and repair as needed. Replace filler cap assembly. Adjust or replace fan belt. Replace fan belt. Replace thermostat assembly. Replace water pump assembly. Clean radiator and water passage. Adjust injection timing properly. Clean exterior of radiator. Check cylinder head and replace gasket.
Engine undercooling	Thermostat malfunction (valve can not close completely)	Replace thermostat.
Coolant refill is required frequently.	Radiator leaky Radiator hose connector loose or hose damaged Radiator cap valve spring force reduced Water pump leaky Heater hose connector loose or hose damaged Cylinder head gasket leaky Cracks on cylinder head or cylinder block	Repair or replace. Tighten clip or replace hose. Repair or replace filler cap assembly. Replace water pump assembly. Tighten or replace hose. Check cylinder head and replace gasket. Replace cylinder head or cylinder block.
Noise from cooling system	Water pump shaft malfunction Fan fastener loose or bended Fan out of balance Fan belt malfunction	Replace water pump assembly. Tighten or replace fan assembly. Replace fan assembly. Replace fan belt.

Description and Operation

Diesel Common Rail Fuel Supply System Diagram

Diesel common rail injection system



The pressurization process and injection process on the common rail diesel injection system are complete separate from each other, which is different from former conventional high-pressure pump diesel injection systems. Electronically controlled injectors replace conventional mechanical ones. Fuel pressure in the fuel rail is generated by a high-pressure radial plunger pump. The pressure is irrelevant to engine speed and can be set freely within a certain range. The fuel pressure in the common rail is controlled by the fuel metering valve and can be regulated continuously according to engine

work needs. The pulse signal applied by the electronic control unit to the injector solenoid valve controls the fuel injection process. Fuel injection quantity depends on fuel pressure in fuel rail, opening duration of solenoid valve, and fluid flow characteristic of nozzle. Fuel injection pressure is one of the key indicators for diesel engines because it is associated with engine power, fuel consumption, emission, etc. The common rail diesel injection system has increased fuel injection pressure to 1,800bar.

Diagnosis and Testing

9. No. 3 cylinder injector malfunction: P0203, P0267, P0268, P0269, P1204, P1205, P1210, P1211, P1239, P123A, P1238

Trouble Description:








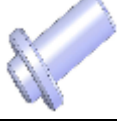




The engine control unit controls opening circuit of each fuel injector directly. The engine control unit uses a device known as “driver” to provide each injector control circuit with a pulse width modulation (PWM) current thus controlling ontime of each fuel injector. The driver has a feedback circuit. The engine control unit determines if a control circuit is open or shorted by monitoring the feedback circuit. If the engine control unit detects a malfunction in an injector control circuit, it will set a DTC for the circuit.

Diagnosis Help:

Since a malfunction in a wire connector will trigger a DTC, you must test the connectors related to this diagnostic procedure for short-circuit terminal or poor contact of wire. Shake the harnesses and connector related to the test while observing state parameters of corresponding fuel injector with a diagnostic tool. If there is an intermittent malfunction in a harness or connector being tested, the reading of the diagnostic tool will display corresponding malfunction. A compression test will help locate the intermittent malfunction.

SN	Operating procedure	Test result	Follow-up procedure
1	Turn off ignition switch and check if fuel injector connector is in good condition.	Y	Next step
		N	Service or replace.
2	Disconnect fuel injector plug and ignite to see if any malfunction exists.	Y	Check lines.
		N	Next step
3	Clear the malfunction, turn off ignition key, and then reconnect fuel injector and turn on ignition switch to see if any malfunction still exists.	Y	Replace fuel injector and perform matching.
		N	Next step
4	Repeat above steps for all fuel injectors to see if other injectors work well.	Y	Contact Technical Support.
		N	Repair or replace.

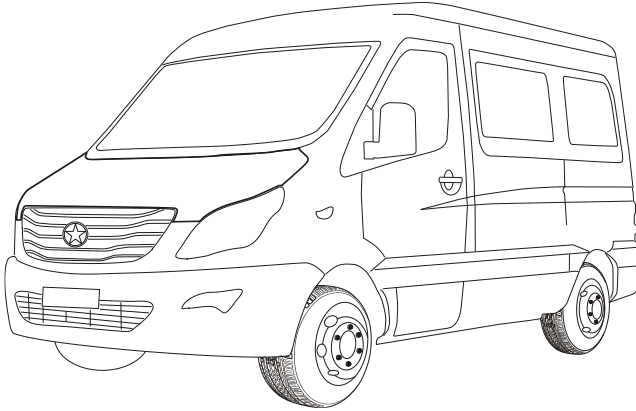
Special Tools for Sunray

Tool number	Tool name	Outline drawing	Purpose/application
JAC-T8B003	Clutch guide		Centering clutch discs (transmission)
JAC-T8B004	Input shaft bearing installer		Installing input shaft bearings (transmission)
JAC-T8B005	Output shaft bearing installer		Installing output shaft bearings (transmission)
JAC-T8B006	Countershaft front bearing installer		Installing countershaft front bearing (transmission)
JAC-T8B007	Input shaft protective sleeve		Protecting front gear of input shaft (transmission)
JAC-T8B008	Output shaft protective sleeve		Protecting front gear of output shaft (transmission)
JAC-T8B009	Transmission bearing remover kit		Removing bearings on transmission (transmission)
JAC-T8B010	Input shaft oil seal installer		Installing input shaft oil seals (transmission)
JAC-T8B011	Transmission rear end cover oil seal remover		Removing rear end cover oil seal (transmission)
JAC-T8B012	Rear end cover oil seal installer		Installing rear end cover oil seal (transmission)
JAC-T8D001	Steering linkage drawing die		Disconnecting front end control arm ball joint of wheel from steering knuckle (chassis)
JAC-T8D002	Interior trim crow plates		Prying door trims

BR Brake System

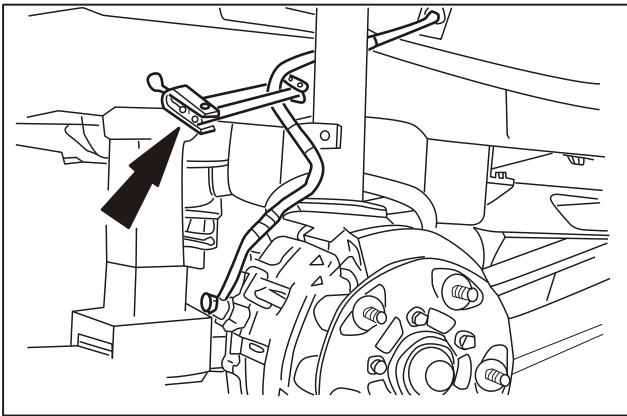
Removal/Installation

Brake caliper assembly



Removal

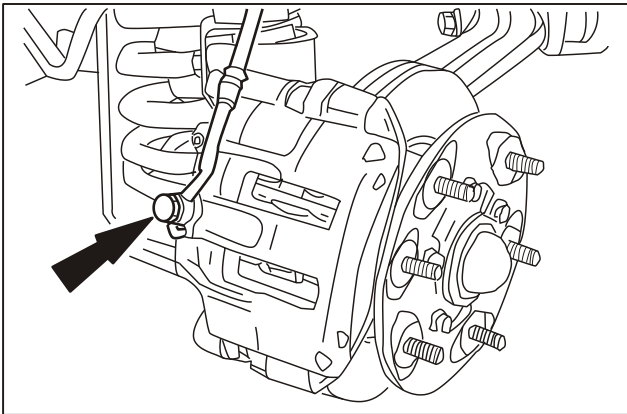
1. Have the vehicle lifted and remove the front wheel.



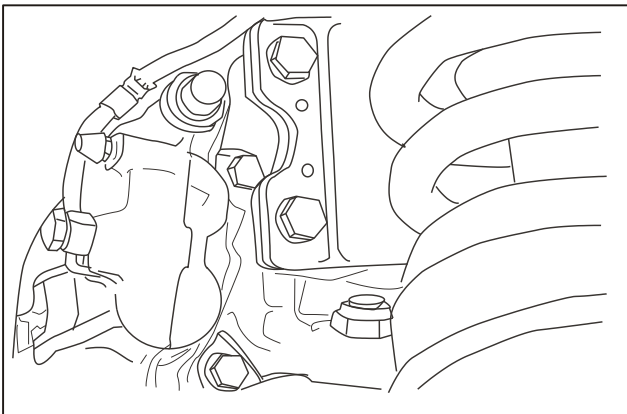
Note:

Clamp the brake hose with SST in order to avoid damage of brake hose.

2. Clamp the brake hose.



3. Remove the brake hose from the caliper.
Put on the seal plug to avoid excessive leak of brake fluid or contamination of dust.

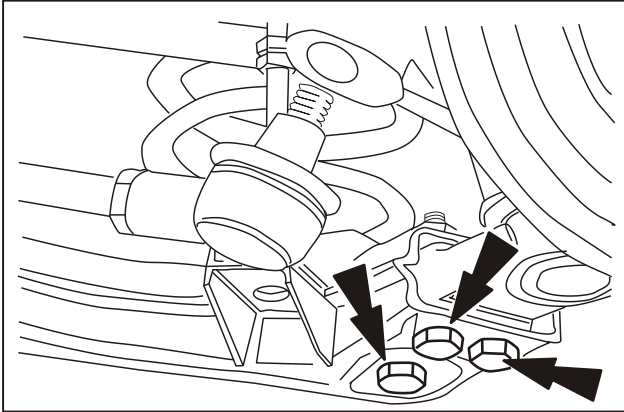


Note:

Loosen the upper mounting bolt of caliper until the brake caliper can be removed.

4. Remove the brake caliper assembly.

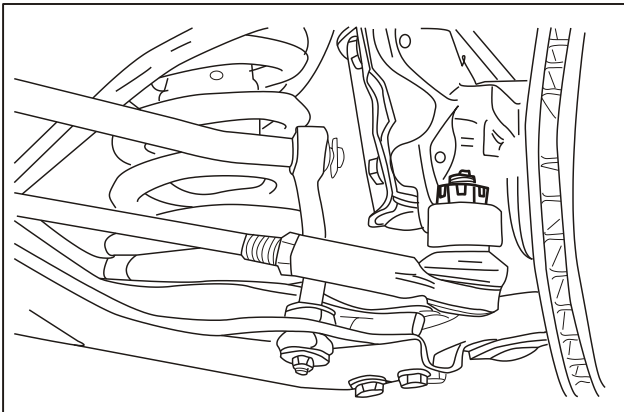
Removal and Installation of Lower Swing Arm (Continued)



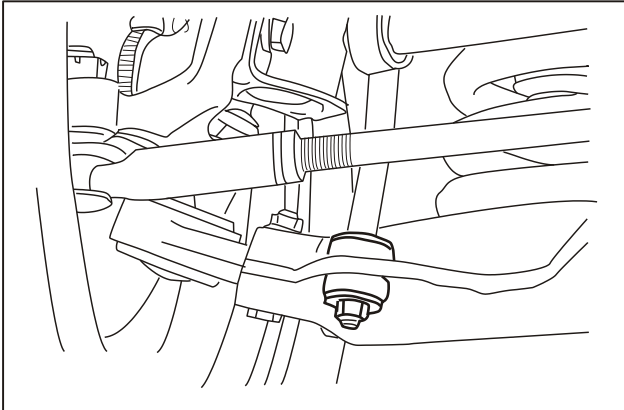
Caution:

When install the ball joint into the lower swing arm, the mounting of the front axle is not allowed to exceed the specified value to avoid damage of the lower swing arm ball joint dust cover.

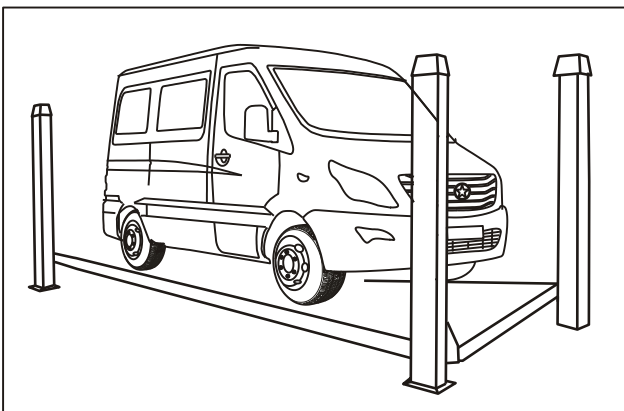
4. Reinstall the ball joint into the lower swing arm.



5. Reinstall the steering tie rod end onto the steering knuckle.

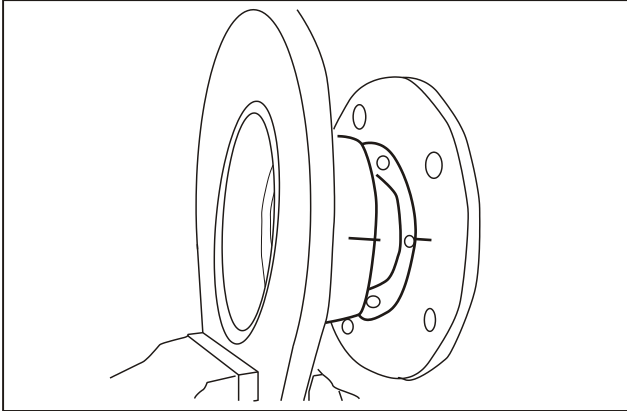


6. Reconnect the front anti-roll bar link with the lower swing arm.



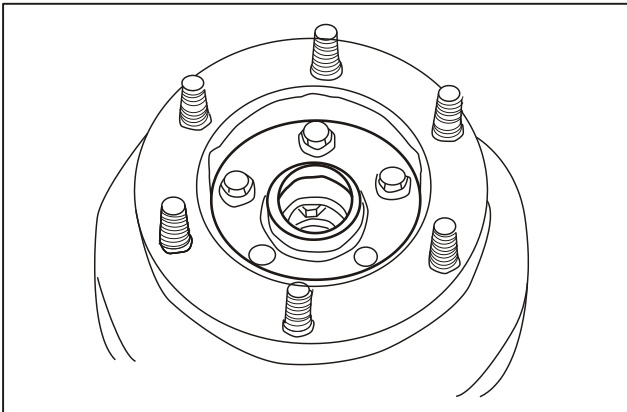
7. Install wheels and lower the vehicle.
8. Tighten mounting nuts of the lower swing arm.
 - Tighten nuts and bolts between the lower swing arm and the cross rail.
 - Tighten nuts and bolts between the lower swing arm and the front suspension

Replacement of front flange assembly (with flange assembly already removed)

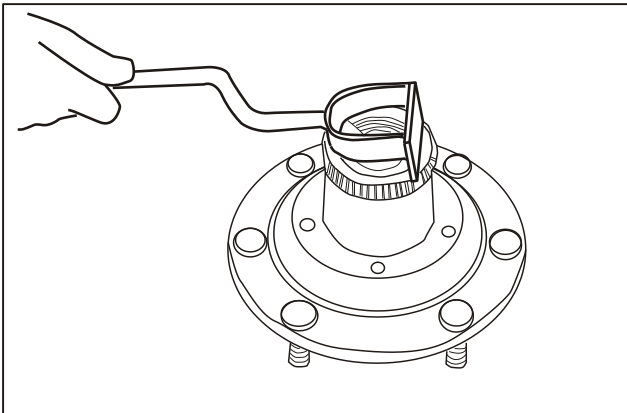


Removal

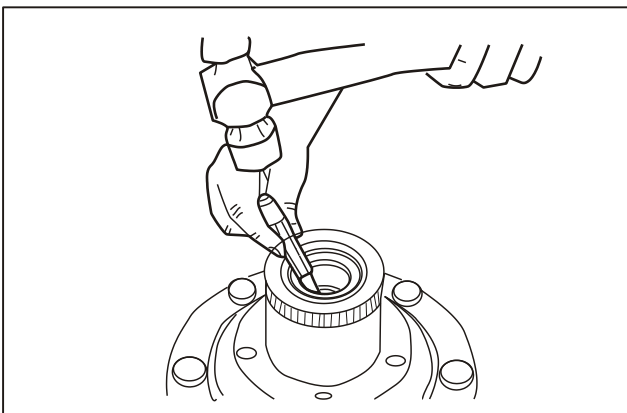
1. Mark properly on flange and brake disc to facilitate positioning during reinstallation.



2. Remove flange from brake disc.



3. Remove oil seal.
4. Remove inner and outer races of conical bearing.



Caution:

Don't make burr on flange to ensure bearing race can be fitted in place.

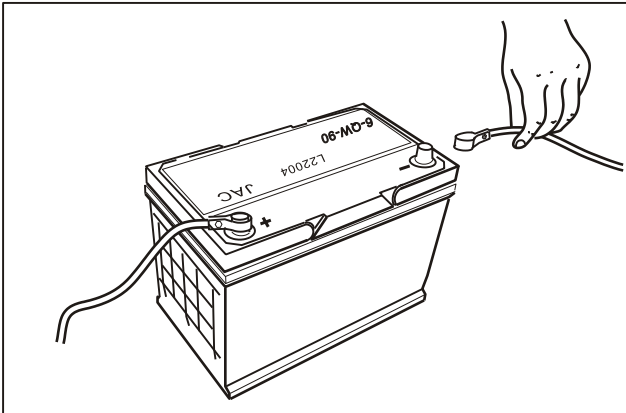
Note:

Tap the bearing race alternately and diagonally and don't make the sleeve tilted.

5. Remove inner and outer races of bearing.
6. Clean mating face between wheel hub and brake disc.

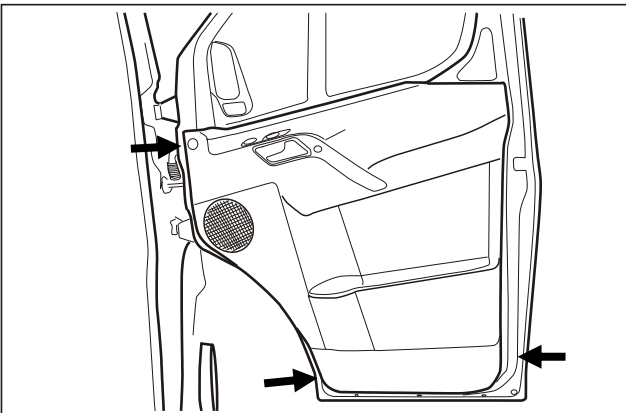
Removal/Installation

Right front door lock body

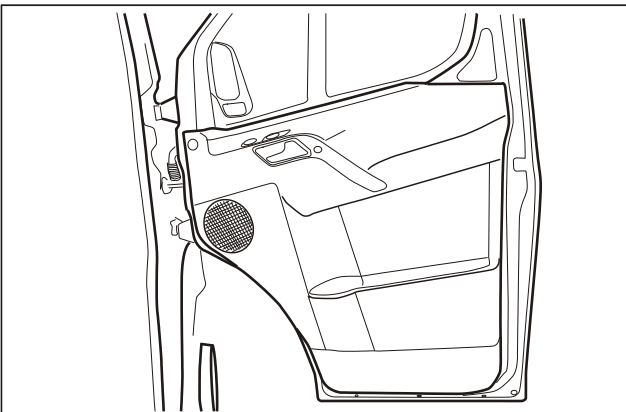


Removal

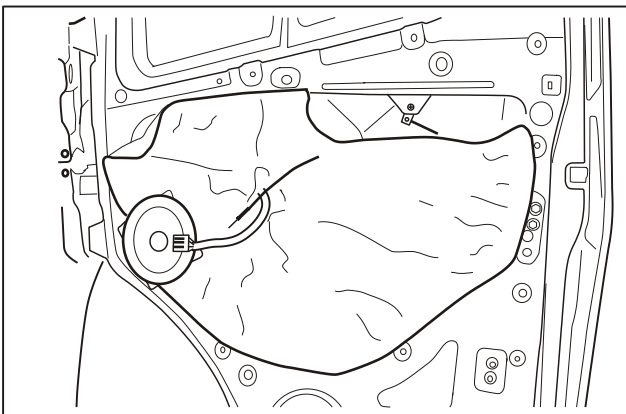
1. Disconnect the negative cable of battery.



2. Remove mounting screws for door.



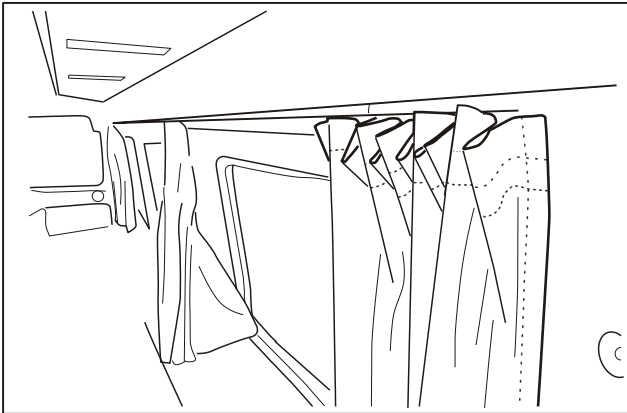
3. Remove door trim panel.



4. Peel off the waterproof membrane.

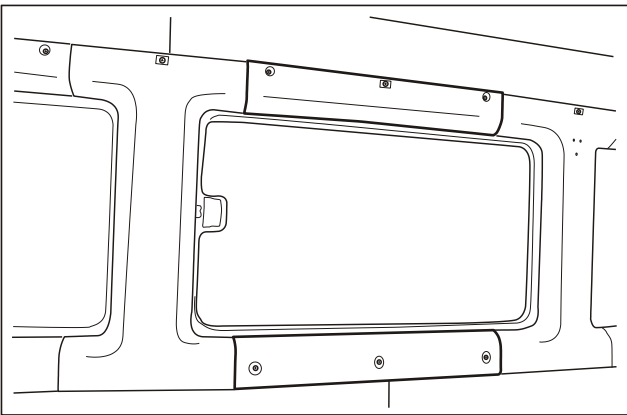
Removal/Installation

Left trim panels 1, 2, 3 and 4 and right trim panels 1, 2 and 3

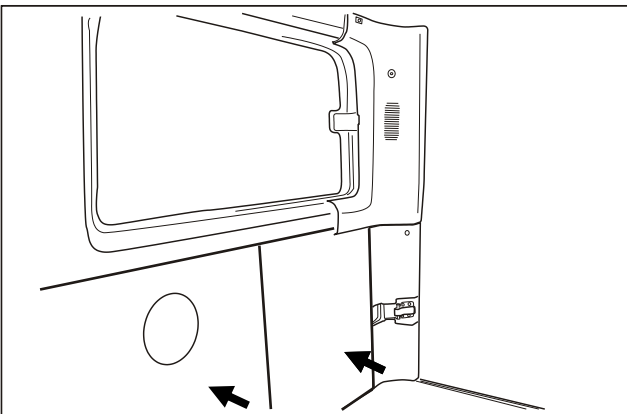


Removal

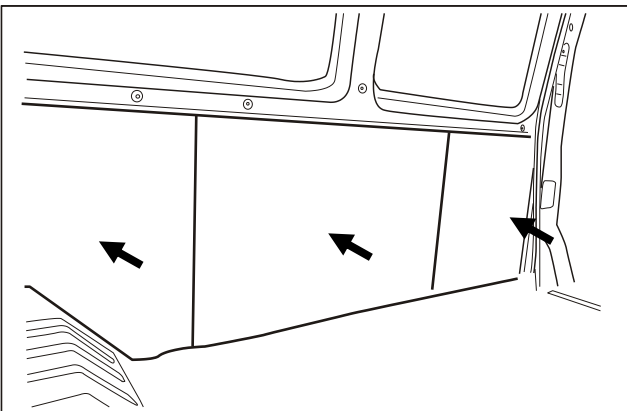
1. Remove curtains.



2. Remove upper and lower trim panels for right B-pillar, C-pillar, side pillar and D-pillar.



3. Remove right trim panels 1, 2 and 3.



4. Remove upper and lower trim panels for left B-pillar, C-pillar, side pillar and D-pillar. Remove left trim panels 1, 2, 3 and 4.

SC Battery and Charging System

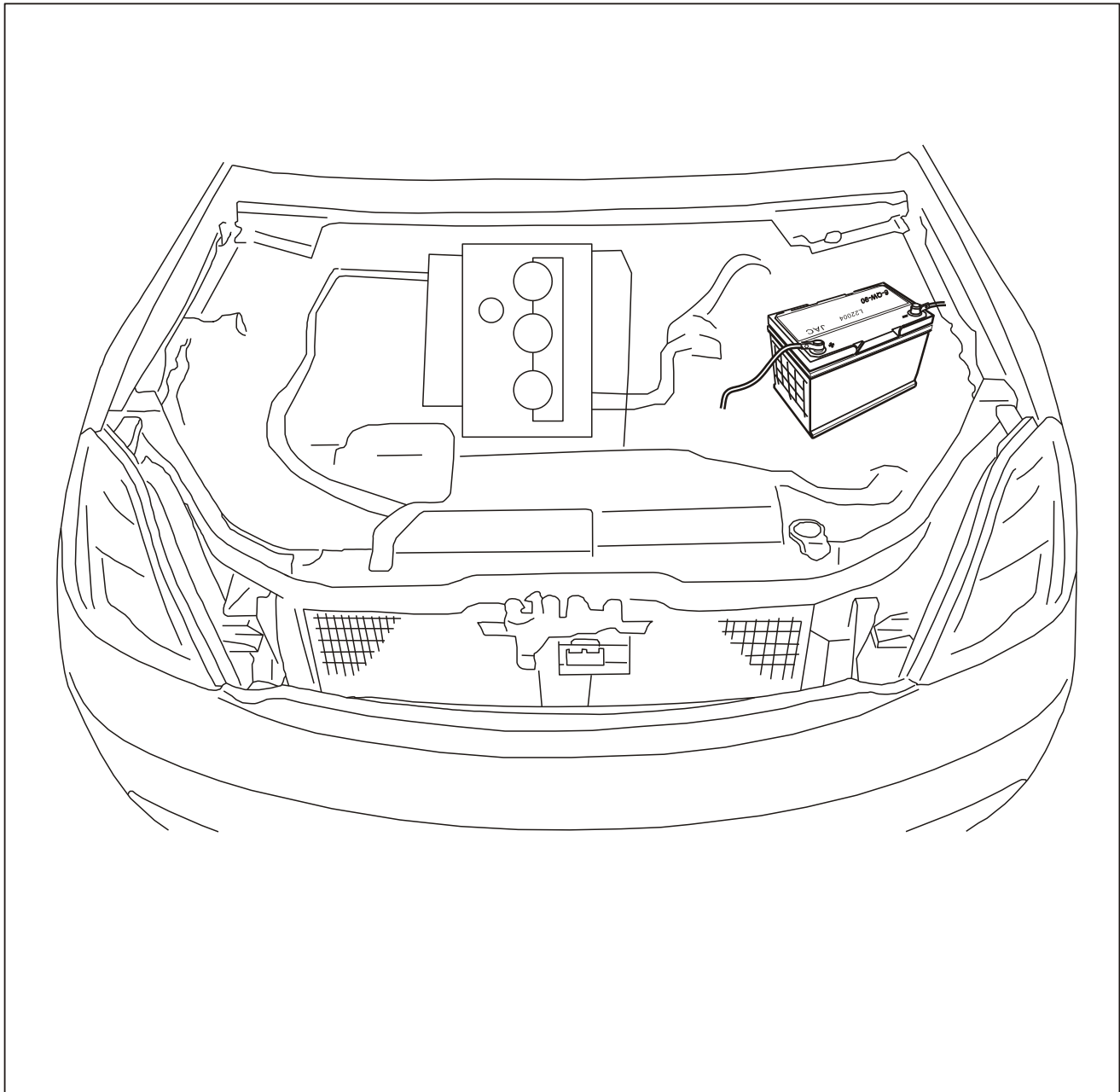
Instruction and Operation

Battery

Maintenance-free battery is adopted by Sunray series with characteristics in low electrolyte consumption. In the service life of the battery, there is no need to replenish with distilled water. Moreover, other characteristics of the battery are shock resistance, high temperature resistance and low self discharge. Therefore, the service life of this battery is twice as long as that of general batteries.

Mounting Position of Battery

The battery is mounted on the right side of the engine compartment.



LT Lighting System

Diagnosis and Testing

Fault diagnosis

13. Hazard warning lamp failed but with normal operation of turn signal lamps

Step	Operation	Yes	No
1	Is the fuse intact?	Go to Step 3.	Go to Step 2.
2	Replace the damaged fuse. Is the hazard warning lamp normal?		Go to Step 3.
3	Remove the hazard warning switch and check if it is normal.	Go to Step 4.	
4	Check if the voltage of hazard warning lamp switch is normal?	Go to Step 6.	Go to Step 5.
5	Check the instrument panel harness from fuse to hazard warning lamp switch.		
6	Check the ground wire of hazard warning lamp switch. Is it normal?	Go to Step 8.	Go to Step 7.
7	Check the ground wire of instrument panel harness.		
8	Check the lead from instrument panel harness to hazard warning lamp switch.		

Instruction and Operation

Functional operation



1. “TO-FACE” mode
Air is adjusted when passing through system and vented out through upper air vent. This mode is applied to most of places using A/C.



2. “TO-FACE/FEET” mode
Air is adjusted and vented out through upper air vent and floor air vent. The air from floor air vent is hotter than that from upper air vent. However, when the temperature knob is rotated counterclockwise to the end (hottest) or clockwise to the end (coldest), air temperature from two different positions are the same.



3. “TO-FEET” mode
Air is vented out through the bottom air vent.



4. “TO-FEET” plus “DEFROST” mode
Air is vented out through the bottom air vent and a little air is vented out through defroster air vent and air vent of side window defroster.