

Environmental Precautions

General

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

Emissions to Air

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

Exhaust Fumes

Running car engines is an essential part of workshop activities and exhaust fumes need to be ventilated to atmosphere. However, the amount of time engines are running and the position of the vehicle should be carefully considered at all times, to reduce the release of poisonous gases and minimise the inconvenience to people living nearby.

Solvents

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

Refrigerant

Discharge and replacement of these materials from air conditioning units should only be carried out using the correct equipment.

Engines:

Always adhere to the following.

- Don't leave engines running unnecessarily;
- Minimise testing times and check where the exhaust fumes are being blown.

Materials:

- Keep lids on containers of solvents;
- Only use the minimum quantity;
- Consider alternative materials;
- Minimise over-spray when painting.

Gases:

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

Discharges to Water

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

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

Checklist

Always adhere to the following disposal and spillage prevention instructions.

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

Spill Kits

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

Land Contamination

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

Checklist

Always adhere to the following.

- Don't pour or spill anything onto the soil or bare ground;
- Don't store waste materials on bare ground, see 'Spillage prevention' list.

Flexible Pipes and Hoses

General

When removing and installing flexible hydraulic pipes and hoses, ensure that the following practices are observed to ensure component serviceability.

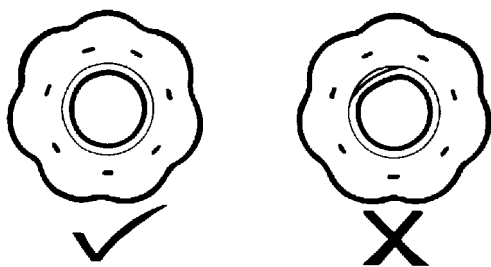
- Clean end fittings and the area surrounding them as thoroughly as possible.
- Obtain appropriate plugs or caps before detaching hose end fittings, so that the ports can be immediately covered to prevent the ingress of dirt.

Clean hose externally and blow through with airline. Examine carefully for cracks, separation of plies, security of end fittings and external damage. Reject any faulty hoses.

- When refitting a hose, ensure that no unnecessary bends are introduced, and that hose is not twisted before or during tightening of union nuts.
- Fit a cap to seal a hydraulic union and a plug to its socket after removal to prevent ingress of dirt.
- Absolute cleanliness must be observed with hydraulic components at all times.

After any work on hydraulic systems, carefully inspect for leaks underneath the vehicle while a second operator applies maximum brake pressure to the brakes (engine running) and operates the steering.

Fuel System Hoses



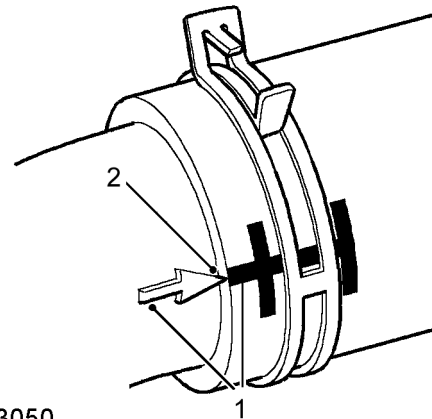
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All fuel hoses are made up of two laminations, an armoured rubber outer sleeve and an inner viton core. If any of the fuel system hoses have been disconnected, it is imperative that the internal bore is inspected to ensure that the viton lining has not become separated from the armoured outer sleeve. A new hose must be fitted if separation is evident.

Cooling System Hoses

The following precautions MUST be followed to ensure that integrity of cooling hoses and their connections to system components are maintained.

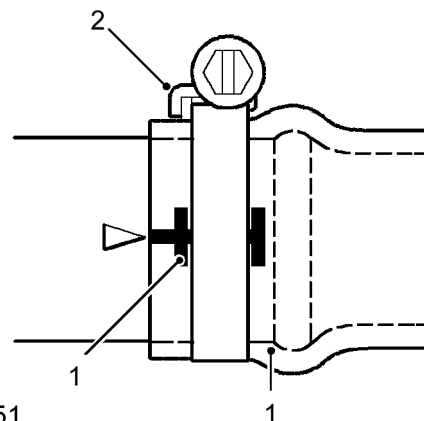
Hose Orientation and Connection



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Correct orientation of cooling hoses is important in ensuring that the hose does not become fatigued or damaged through contact with adjacent components. Where 'timing' marks (1) are provided on the hose and corresponding connection, these must be used to ensure correct orientation. Hoses must be pushed fully onto their connection points. Usually, a moulded form (2) on the stub pipe provides a positive indicator.

Hose Clip



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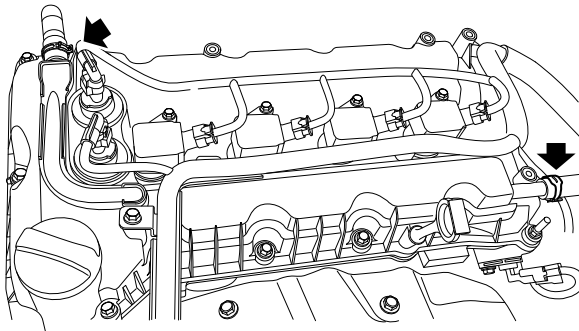
Markings (1) are usually provided on the hose to indicate the correct clip position. If no markings are provided, position the clip directly behind the retaining lip at the end of the stub as shown. Worm drive clips should be oriented with the crimped side of the drive housing (2) facing towards the end of the hose, or the hose may become pinched between the clip and the stub pipe retaining lip. Worm drive clips should be tightened to 3 Nm unless otherwise stated. Ensure that hose clips do not foul adjacent components.

Heat Protection

Always ensure that heatshields and protective sheathing are in good condition. Replace if damage is evident. Particular care must be taken when routing hoses close to hot engine components, such as the exhaust manifold and the Exhaust Gas Recirculation (EGR) pipe. Hoses will relax and deflect slightly

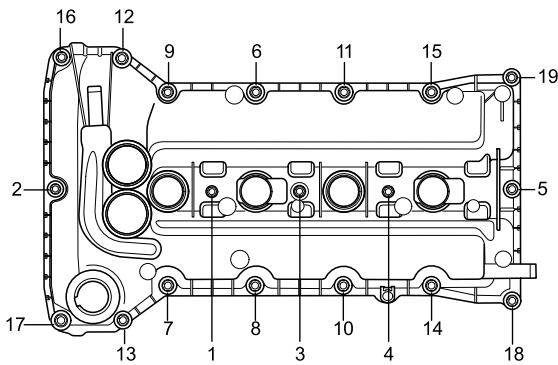
I.5DVCT - Cylinder Block and Piston

Cylinder Block:	
Material	Cast Iron, HT250
Type of Cylinder Liner	No cylinder liner, honing process of spiral bevel gear motion
Cylinder Liner Diameter	74.985-75.000mm
Cylinder Block Size Correction:	
Connecting Rod:	
Model	Fractured Connecting Rod, Material C70S6
Distance Between Centres	143.7 ± 0.05mm
Piston Pin Model	Full-floating type
Fitted Connecting Rod	Clearance
Length	44.8-45mm
Connecting Rod Bearing Shell:	
Clearance	0.020-0.071mm
Axial Endplay	0.100-0.246mm
Piston:	
Model	Aluminum alloy, graphite finish, NANO anti-friction coated skirt surface, offset to piston pin during thermal expansion
Piston Diameter:	74.941-74.959mm
Tolerance in Piston Pin Bore	0.005-0.013mm
Max. Ovality	0.002mm
Piston Ring:	
Model:	2 compression rings, 1 oil ring
Top Compression Ring	Half-barrel faced excircle, PVD treated surface
Second Compression Ring	Nose shaped, phosphate coated surface
Oil Ring	Three-piece oil ring, PVD treated blade
Tolerance Between Piston Ring and Ring Groove:	
Top Compression Ring	0.040-0.080mm
Second Compression Ring	0.030-0.070mm
Oil Ring	0.03-0.16mm
Piston Ring Assembly Clearance in Bore (measured at 20mm from cylinder liner bore):	
Top Compression Ring	0.20-0.30mm
Second Compression Ring	0.40-0.60mm
Oil Ring	0.20-0.70mm
Width of Piston Ring:	
Top Compression Ring	0.970-0.990mm
Second Compression Ring	0.970-0.990mm



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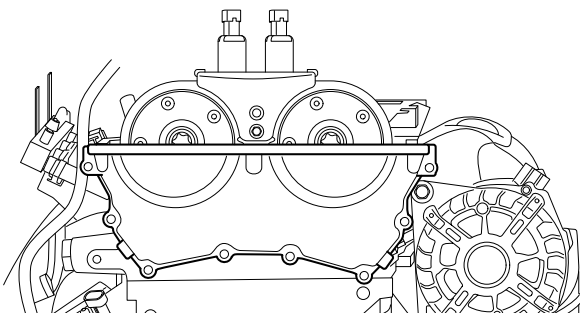
7. Remove the full load and part load breather pipe.
8. Loosen and remove 19 bolts securing the camshaft cover and confirm the position of each bolt.



9. Remove the camshaft cover, pay attention to the protection of check valve diaphragm and keep it clean.
10. Remove the jack.

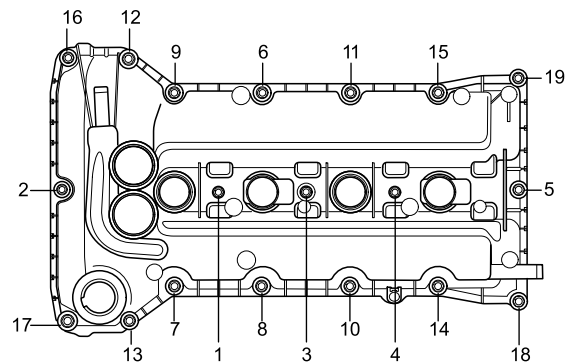
Refit

1. Check the upper surface of the cylinder head, take care not to damage it. Clean the upper surface of the cylinder head and remove the oil.
2. Apply silica gel (Dia.: 4mm) to the seam of the timing chain upper cover plate and the camshaft cover.



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3. Position the camshaft cover on the cylinder head.
4. Fit the bolt and tighten to **7-10Nm** in sequence shown in the figure below.



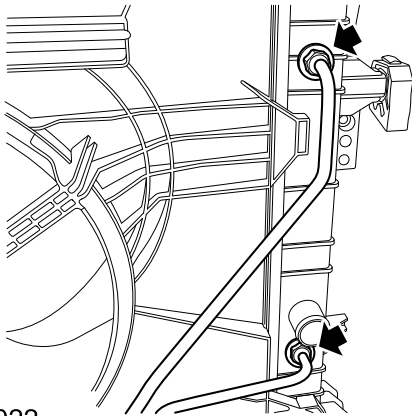
5. Fit the ignition coil and the ignition coil bracket, and tighten the retaining bolts to **8-12Nm**.

 **Ignition Coil Refit**

6. Fill the engine oil.

 **Lubricating Fluid Refill**

7. Fit the dipstick.
8. Connect the battery negative.

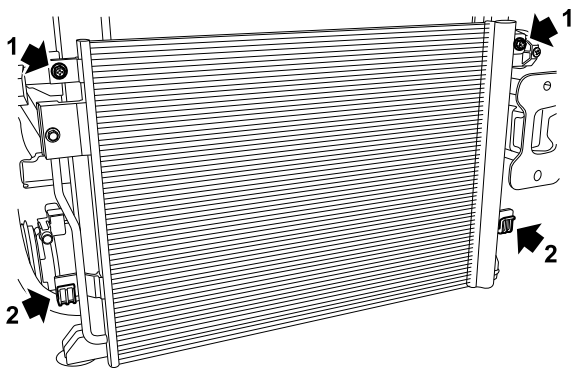


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7. Remove the front-end module.

Front-end Module Remove

8. Remove 2 bolts (1) fixing the condenser to the radiator.
9. Unscrew the clip (2) fixing the condenser to the radiator.



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10. Remove the radiator.
11. Remove the radiator upper shock pad.

Radiator Upper Shock Pad Remove

12. Remove the radiator lower shock pad.

Radiator Lower Shock Pad Remove

Refit

1. Fit the radiator lower shock pad.

Radiator Lower Shock Pad Refit

2. Fit the radiator upper shock pad.

Radiator Upper Shock Pad Refit

3. Fit the clip fixing the condenser to the radiator.
4. Fit 2 bolts fixing the condenser to the radiator, tighten to **5-7Nm**, and check the torque.
5. Fit the front-end module.

Front-end Module Refit

6. Fit the automatic transmission oil cooler/inlet/outlet pipes fixed to the radiator.

7. Fit the clamp fixing the radiator water outlet pipe to the radiator.
8. Fit the clamp fixing the radiator water inlet pipe to the radiator.
9. Fit the clamp fixing the engine overflow pipe to the radiator.
10. Fit the cooling fan.

Cooling Fan Refit

11. Fill the coolant.

Coolant Refill

Tank - Fuel

Remove

1. Disconnect battery earth lead.

Warning: Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO2, gas or powder close

2. Depressurise fuel system.

Fuel System - Depressurise

Warning: Fuel vapour is highly flammable and in confined spaces is also explosive and toxic. Always have a fire extinguisher containing foam, CO2, gas or powder close

3. Drain the fuel system.

Drain and Refill

Caution: Before disconnecting any part of the fuel system, it is imperative that all dust, dirt and debris is removed from around components to prevent ingress of foreign matter into fuel system.

4. Remove carbon canister.

Carbon Canister Remove

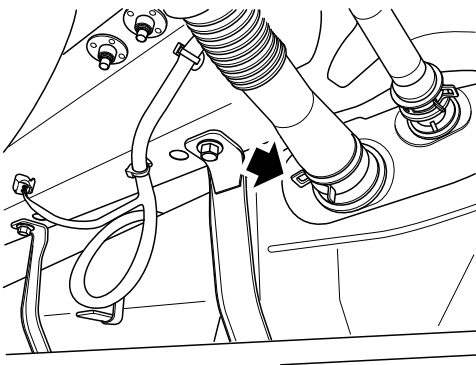
5. Remove fuel filter.

Fuel Filter Remove

6. Remove fuel tank heat shield.

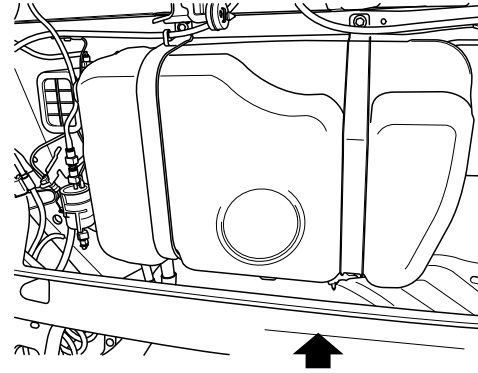
Fuel Tank Heat shield

7. Remove clips securing fuel filler and breather pipes to tank, remove pipes.

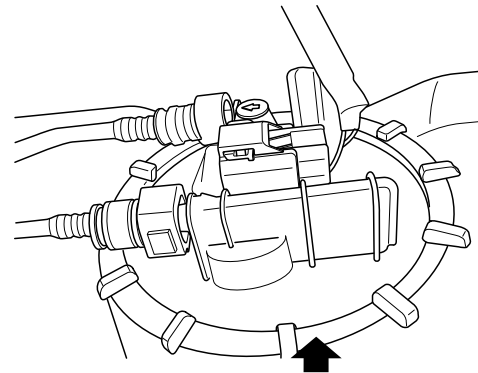


Warning: The spilling of fuel is unavoidable during this operation. Ensure that all necessary precautions are taken to prevent fire and explosion.

8. Use a suitable jacking device to support fuel tank.
9. Release 4 bolts securing retaining straps to body, remove straps.



10. Lower fuel tank to access top of tank.
11. Disconnect feed and return pipes to fuel pump.
12. Disconnect the connector of fuel pump.



13. Remove tank, use **T18007** remove the lock ring of fuel pump.

Refit

1. Position the new pump seal to fuel tank, fit the fuel pump, do not damage the pump seal.
2. Use **T18007** fit lock ring of fuel pump to fuel tank, and tighten to **75–85Nm**.
3. With assistance position fuel tank on jacking equipment, position to vehicle.
4. Connect the connector to fuel pump. Connect fuel feed and return pipes to fuel pump.
5. Raise fuel tank, align straps.

Caution: Take care not to trap any pipes or cables when fitting fuel tank.

6. Raise the fuel tank assembly to under-floor, Fit strap bolts and tighten to **22–28Nm**.
7. Reconnect fuel filler pipes to fuel tank, secure clips.
8. Refit fuel filter.

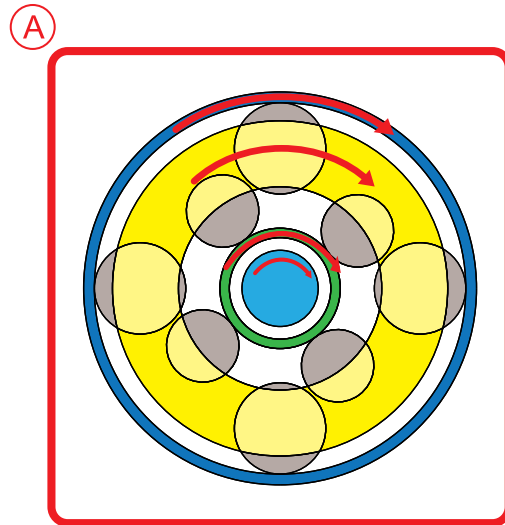
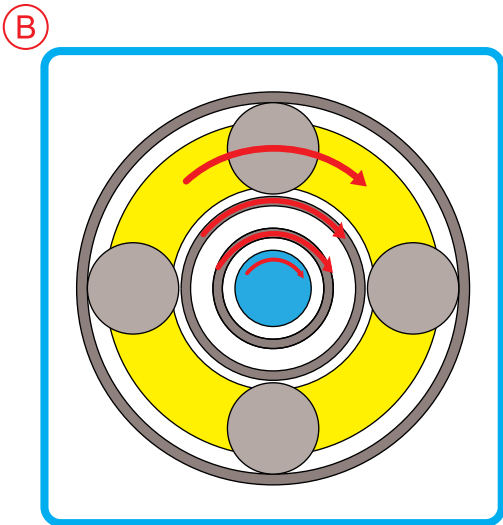
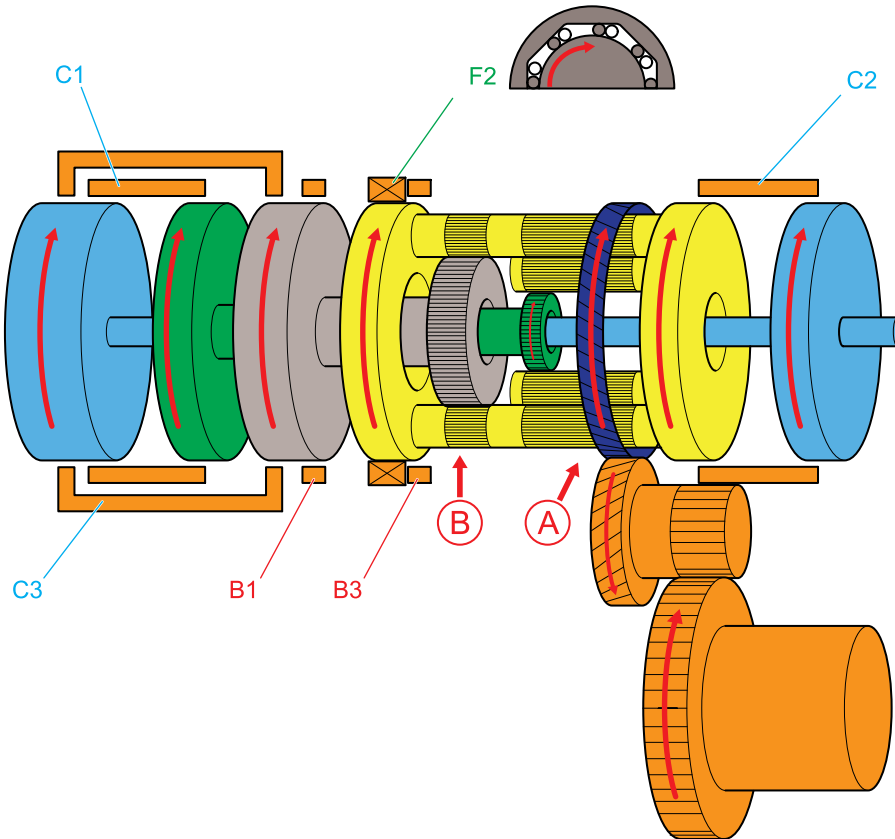
Fuel Filter Refit

9. Refit charcoal canister.

Carbon Canister Refit

D - 3rd Gear

Gear		Solenoid Valve					Clutch			Brake		One-way Clutch
		SLC1	SLC2	SLB1	SLU	SI	C1	C2	C3	B1	B3	F2
		N/O	N/O	N/C	N/C	N/C						
D	3rd	□	□	×	⊙	×	○	○	×	×	×	×

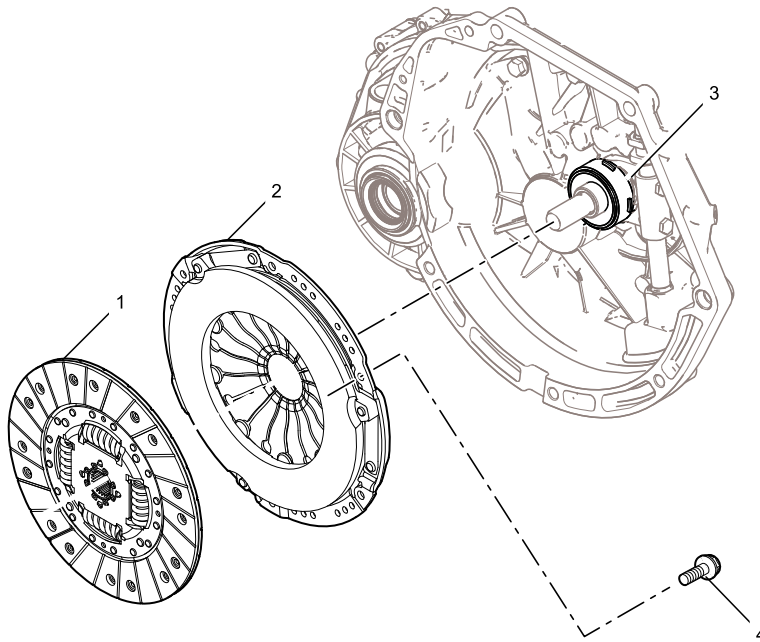


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Description and Operation

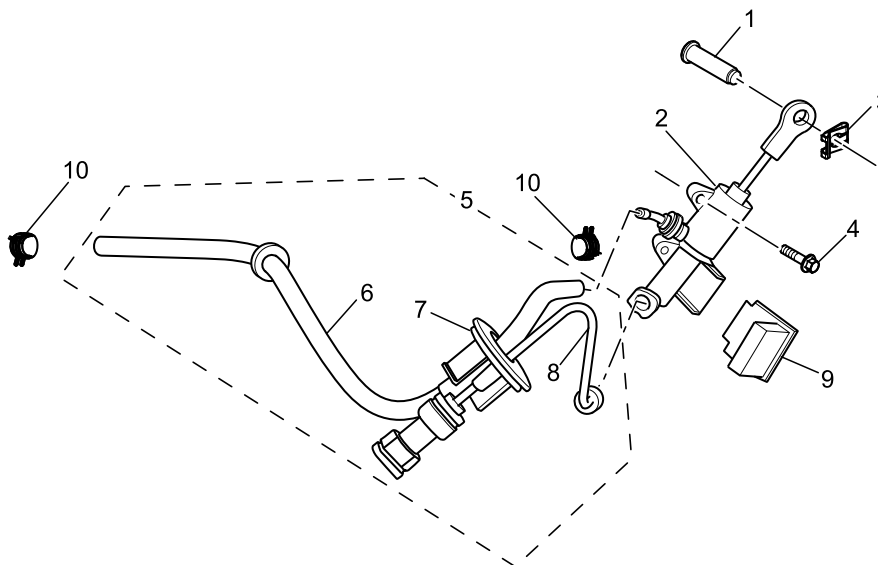
System Layout

Clutch Mechanical System (5MT)



- | | |
|--------------------------|---------------------------|
| 1. Clutch Friction Plate | 3. Screw |
| 2. Clutch Cover | 4. Clutch Release Bearing |

Clutch Master Cylinder and Pipeline Assembly (5MT)



- | | |
|---|---|
| 1. Pin - Clutch Master Cylinder Push Rod | 6. Clutch Master Cylinder Low-pressure Hose |
| 2. Clutch Master Cylinder | 7. Sleeve - Clutch Master Cylinder Pipeline |
| 3. Clip - Clutch Master Cylinder Push Rod Pin | 8. Clutch Master Cylinder Hard Pipe |
| 4. Bolt - Clutch Master Cylinder | 9. Clutch Sensor |
| 5. Clutch Master Cylinder Pipeline Assembly | 10. Clip - Clutch Hose |

Operation**Overview**

Manual A/C controller operates according to the followings inputs:

- Blower speed
- Evaporator temperature value
- A/C pressure value

The manual A/C controller controls the followings after manual settings on the panel:

- Blower speed
- Internal/external circulation damper motor position

Blower Speed Control

When the request of blower speed change is shown on the A/C control panel, the A/C controller controls the speed of the blower motor by increasing or decreasing the voltage at the blower motor ground end with the blower speed control resistor.

Intake Control

When the request of intake air source change is shown on the A/C control panel, the A/C controller enables the internal/external circulation actuator to change the damper angle.

Temperature Control

Adjust the temperature damper cable manually and change the angle of the damper.

Mode Control

Adjust the mode damper cable manually and drive the angle of the damper.

Compressor Control

When refrigeration request is shown on the A/C control panel, the A/C controller will receive the switch signal and then transmit to the engine control module via the bus; the engine control module will engage the compressor clutch, meanwhile the engine accessory belt drives the compressor to operate, thereby driving the refrigerant to circulate.

During the operation of compressor, the engine control module may cut off the supply of clutch in the following situations:

- The engine control module receives feedback from the pressure switch, and the value is higher or lower than certain threshold;
- The engine control module receives the temperature value from the A/C evaporator temperature sensor, and the value is lower than certain threshold;
- The engine control module receives the request of acceleration.

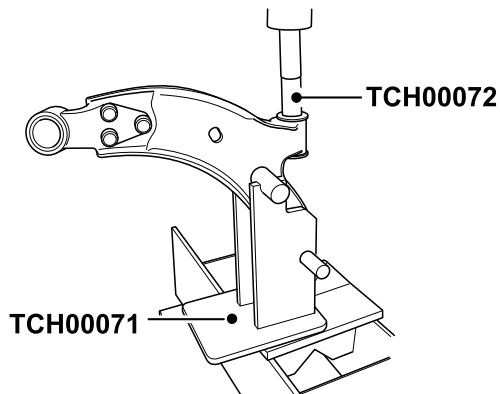
Front Lower Arm Front Bush

Remove

1. Remove front lower arm.

Front Lower Arm Remove

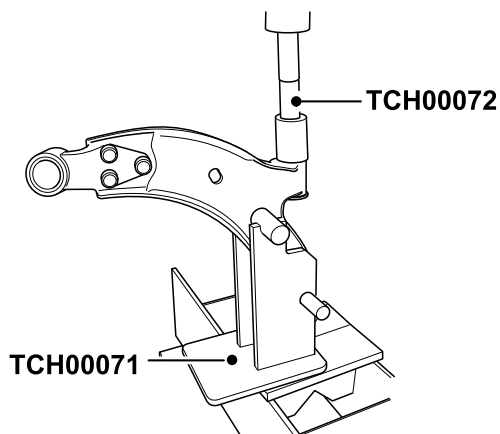
2. Position lower arm on suitable press.
3. Using **TCH00071** and **TCH00072** press bush from lower arm.



4. Discard bush.

Refit

1. Position new bush to arm on suitable press.
2. Using **TCH00071** and **TCH00072** press bush into lower arm.



3. Refit front lower arm.

Front Lower Arm Refit

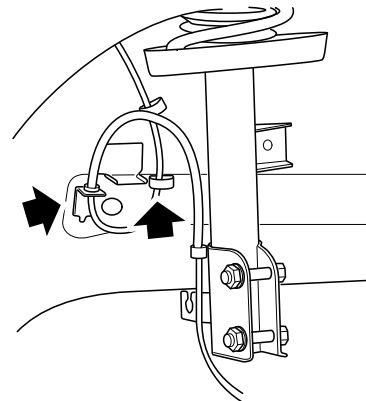
Front Damper

Remove

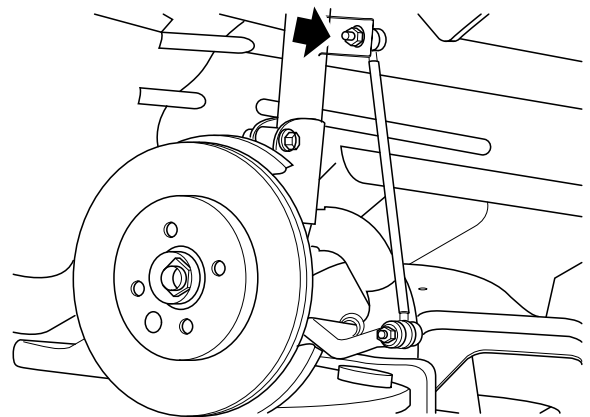
1. Raise vehicle on lift.
2. Remove road wheel.

Wheel Remove

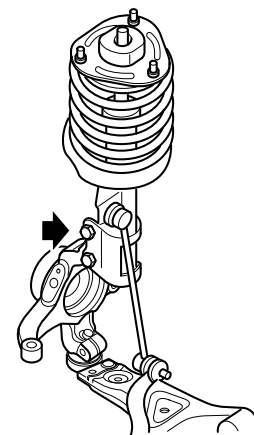
3. Release **ABS** sensor harness and brake hose from damper. Release harness and brake hose from clip.



4. Use an open ended spanner on the flats machined on the anti-roll bar link to prevent ball stud from rotating, remove nut, release anti roll bar link from damper.



5. Remove bolts securing damper to hub.

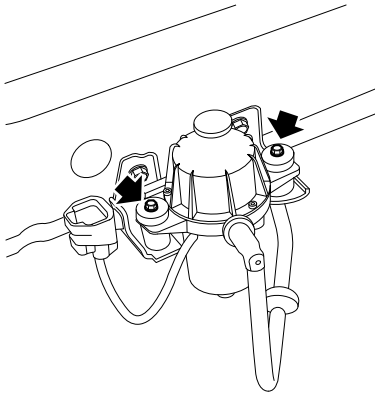


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6. Release hub from damper.

Electronic Vacuum Pump**Remove**

1. Disconnect the battery negative.
2. Disconnect the harness connector of the electronic vacuum pump.
3. Disconnect the electronic vacuum pump from the vacuum brake hose.
4. Remove 2 bolts fixing the electronic vacuum pump to the bracket.



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5. Remove the electronic vacuum pump.

Refit

1. Fix the electronic vacuum pump to the bracket, tighten 2 bolts fixing the electronic vacuum pump to the bracket to **7-10Nm**.
2. Connect the vacuum hose assembly to the electronic vacuum pump.

Caution: Keep the dust and foreign matter from vacuum hose. If having trouble to fix vacuum hose, please using grease special for fixing vacuum hose to lubricate, other liquid or grease is prohibited.

3. Connect the harness connector of the electronic vacuum pump.
4. Connect the battery negative.

Service Procedures

Front Seat

Remove

1. If the seat is adjustable, raise the seat fully.
2. Fully move the seat backward.
3. Using a suitable lever, remove fixing trim covers.
4. Remove 2 bolts fixing front of seat to body, discard.
5. Fully move the seat forward.
6. Using a suitable lever, remove fixing trim covers.
7. Remove 2 bolts fixing front of seat to body, discard.
8. Disconnect all electrical connectors.
9. Remove seat from vehicle.

Refit

1. Place the front seat in the body front seat mounting position.
2. Connect all electrical connectors.

Warning: Always ensure SRS wiring is routed correctly. Be careful to avoid trapping or pinching the SRS wiring. Do not leave the connectors hanging loose or allow SRS components to hang from their harnesses. Look for possible points of chafing.

3. Fix the seat to the vehicle body, fit 2 new rear bolts and tighten them to **40–50Nm**.
4. Refit fixing trim covers.
5. Fully move the seat backward.
6. Fit 2 new front retaining bolts and tighten them to **40–50Nm**.
7. Refit fixing trim covers.

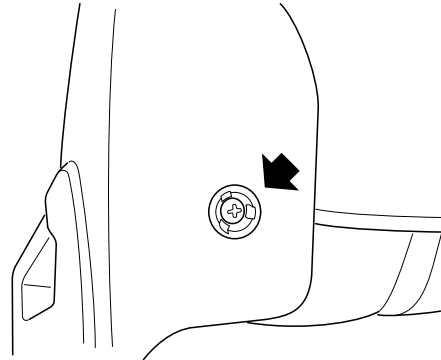
Front Seat Squab

Remove

1. Remove the front seat.

 **Front Seat Remove**

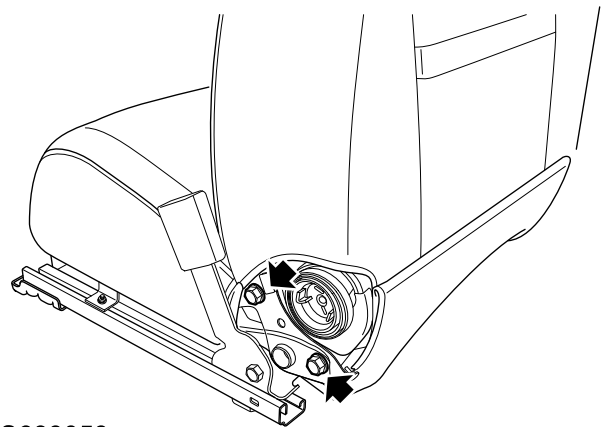
2. Release the interior trim panel fixing screw, remove the inner seat trim panel.



3. Remove outer seat trim panel.

 **Driver's Seat Exterior Trim Panel Remove**

4. Loosen the cables and J-clamps fixing the backrest upholstery to the seat frame.
5. Remove the 4 bolts connecting the cushion assembly with the squab assembly.



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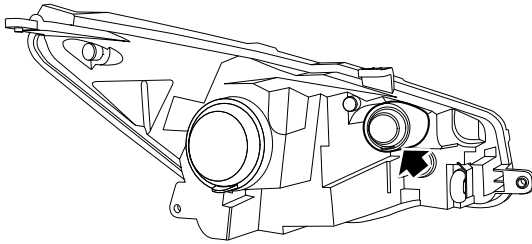
6. Carefully separate squab from cushion, release block connector from seat frame and thread airbag harness through cushion.
7. Remove seat squab.

Refit

1. Locate the cushion assembly and squab assembly, refit 4 bolts and tighten to **40–50Nm**, thread airbag wiring through seat cushion. Always ensure SRS wiring is routed correctly. Be careful to avoid trapping or pinching the SRS wiring. Do not leave the connectors hanging loose or allow SRS components to hang from their harnesses. Look for possible points of chafing.

Front Position Lamp**Remove**

1. Disconnect the battery negative.
2. Turn the front position lamp bulb cover counterclockwise to an appropriate position, and remove the bulb cover.



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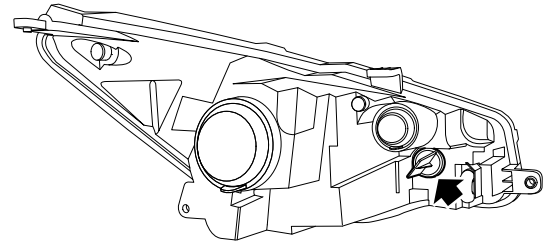
3. Turn the front position lamp holder counterclockwise and remove the holder.
4. Remove the bulb from the lamp holder and discard it.

Refit

1. Fit the new bulb into the lamp holder.
2. Fit the bulb holder to the headlamp assembly.
3. Fit the front position lamp bulb cover.
4. Connect the battery negative.

Front Direction Indicator Lamp**Remove**

1. Disconnect the battery negative.
2. Turn the front direction indicator lamp bulb cover counterclockwise to an appropriate position, and remove the bulb cover.



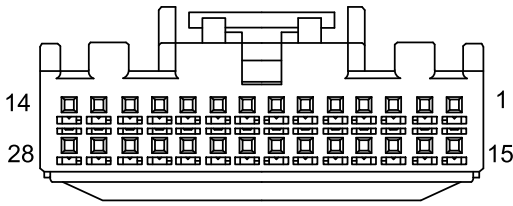
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3. Turn the front direction indicator lamp holder counterclockwise and remove the holder.
4. Remove the bulb from the lamp holder and discard it.

Refit

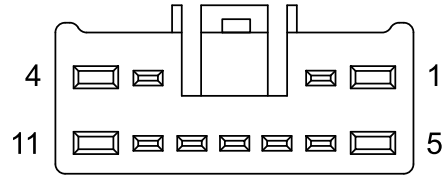
1. Fit the new bulb into the lamp holder.
2. Fit the bulb holder to the headlamp assembly.
3. Fit the front direction indicator lamp bulb cover.
4. Connect the battery negative.

BCM Harness Connector BY025



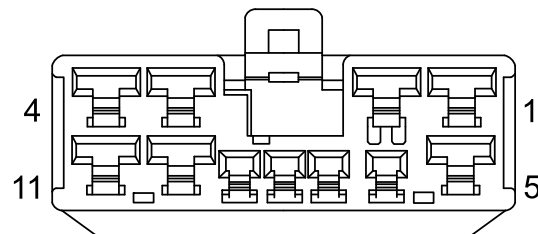
Pin No.	Description
1	-
2	High Beam Relay Coil
3	Horn Relay Coil
4	Drive the Driver Window Down
5	Starter Motor Relay Coil
6	-
7	-
8	Safety Lock Relay Coil
9	-
10	-
11	-
12	Door Lock Status Indicator
13	Front Compartment Cover Switch Status Signal
14	Wiper Intermittent Time Selection Signal
15	Front Wiper Speed Relay
16	Rear Wiper Relay Coil
17	Width Lamp Relay Coil
18	Front Wiper Enable Relay Coil
19	Wiper Analog Ground
20	-
21	-
22	-
23	-
24	-
25	Daytime Running Lamp Relay
26	-
27	Internal Central Lock Switch
28	-

BCM Harness Connector BY027



Pin No.	Description
1	Right Direction Indicator Lamp Output
2	Rear Fog Lamp Output
3	Luggage Compartment Motor
4	Washer Relay
5	Power Supply
6	-
7	Window Up/Down Function Enable
8 - 10	-
11	Power Supply

BCM Harness Connector BY084



Pin No.	Description
1	Power Supply
2	Low Beam Output
3	Door Lock Output
4	Power Supply
5	Ground I
6	Left Direction Indicator Lamp Output
7	Front Reading Lamp Output
8	-
9	Warning Request Signal

Front Floor

