

COOLING SYSTEM

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CHECK & CHANGE OF ENGINE COOLANT

PRECAUTIONS

WARNING:

- If the coolant gets to the vehicle body, immediately flush away the coolant using water.
- Never open the radiator cap when the engine is still hot. Failure to observe this caution will cause you to get scalded.
- The inside of the radiator is under a pressurized condition when the cooling water is hot. Therefore, if the radiator cap should be removed, the cooling water will blow off, possibly causing injuries such as scald.

CAUTION:

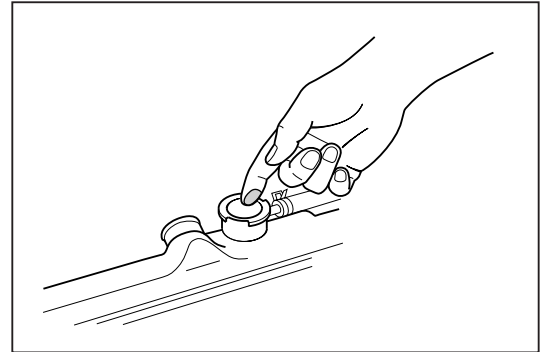
- Here, the coolant refers to the mixture of water and antifreeze of a reliable brand that has been mixed in accordance with the instructions of the antifreeze manufacturer.

MCO00002-00000

CHECK OF ENGINE COOLANT QUALITY

There should be no excessive deposits of rust or water scales around the radiator cap or the radiator filler hole. Also, the coolant should be free of oil.

Change the coolant if it is excessively dirty.



MCO00003-00001

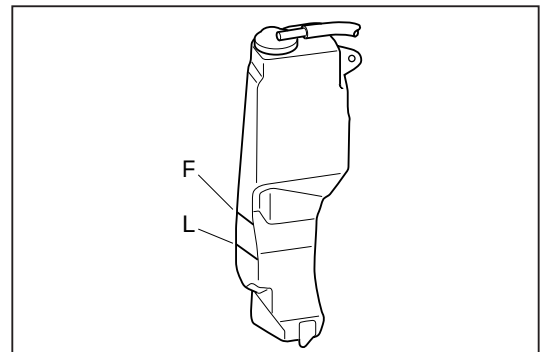
CHECK OF ENGINE COOLANT LEVEL

Check to see if the coolant level is between the L and F lines of the reserve tank.

If the coolant level is near the low level or below the low level, add the coolant up to the full level.

NOTE:

- If no coolant is present in the reserve tank or the coolant level is very low, check for water leakage, using a radiator cap tester. (Refer to the page CO-10.)

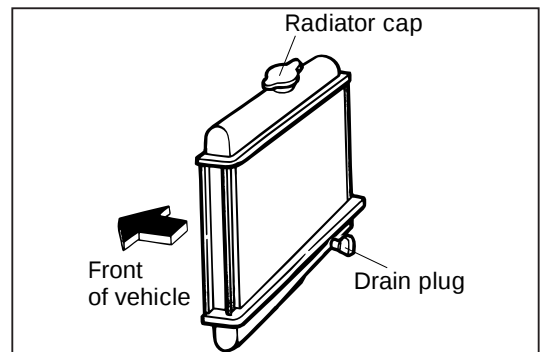


MCO00004-00002

CHANGE OF ENGINE COOLANT

1. Drain the coolant as follows:

- (1) Remove the radiator cap.
- (2) Drain the coolant by loosening the radiator drain plug.
- (3) Close the radiator drain plug.



MCO00005-00003

2. Fill the system with water.

CAUTION:

- As regards water to be used as cooling water, use soft water which does not contain salts of minerals, calcium, magnesium, and so forth.

3. Start the engine, and stop it.
4. Repeat the steps 1 through 3 two to three times.
5. Drain the water by removing the drain plug.

6. Fill the radiator and reserve tank with antifreeze solution in accordance with the instructions of the manufacturer of the antifreeze solution.

CAUTION:

- Use a reliable brand of ethylene-glycol base antifreeze solution.

Coolant Capacity: (W/heater, W/O reserve tank)

MT: 3.0 ℓ

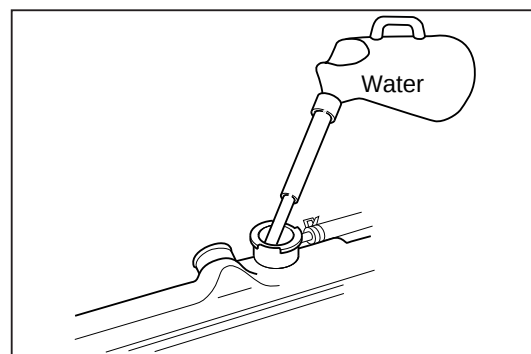
AT: 2.9 ℓ

Reserve Tank Capacity:

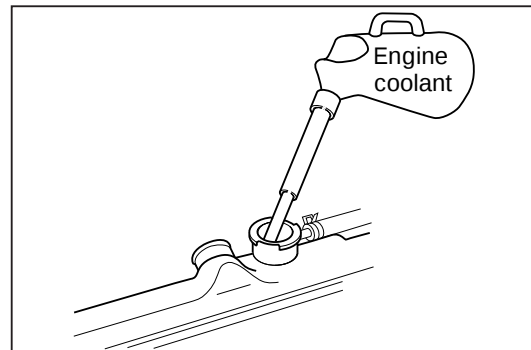
F: 0.45 ℓ

L: 0.25 ℓ

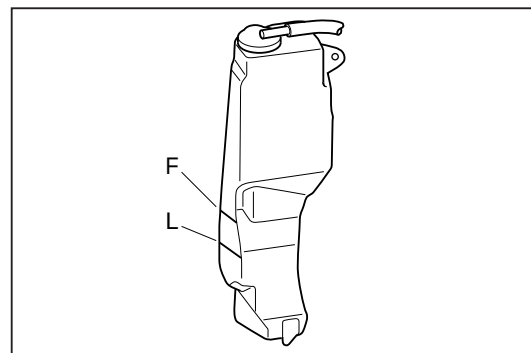
7. Start the engine. Check the coolant level. Add water, as required.
8. Tighten the radiator cap.
9. Warm the engine, until the radiator fan motor starts to rotate. Afterwards, allow the coolant to cool down to the atmospheric temperature. Recheck the coolant level at the reserve tank and the radiator. Add coolant to the full level, as required.



MCO00006-00004

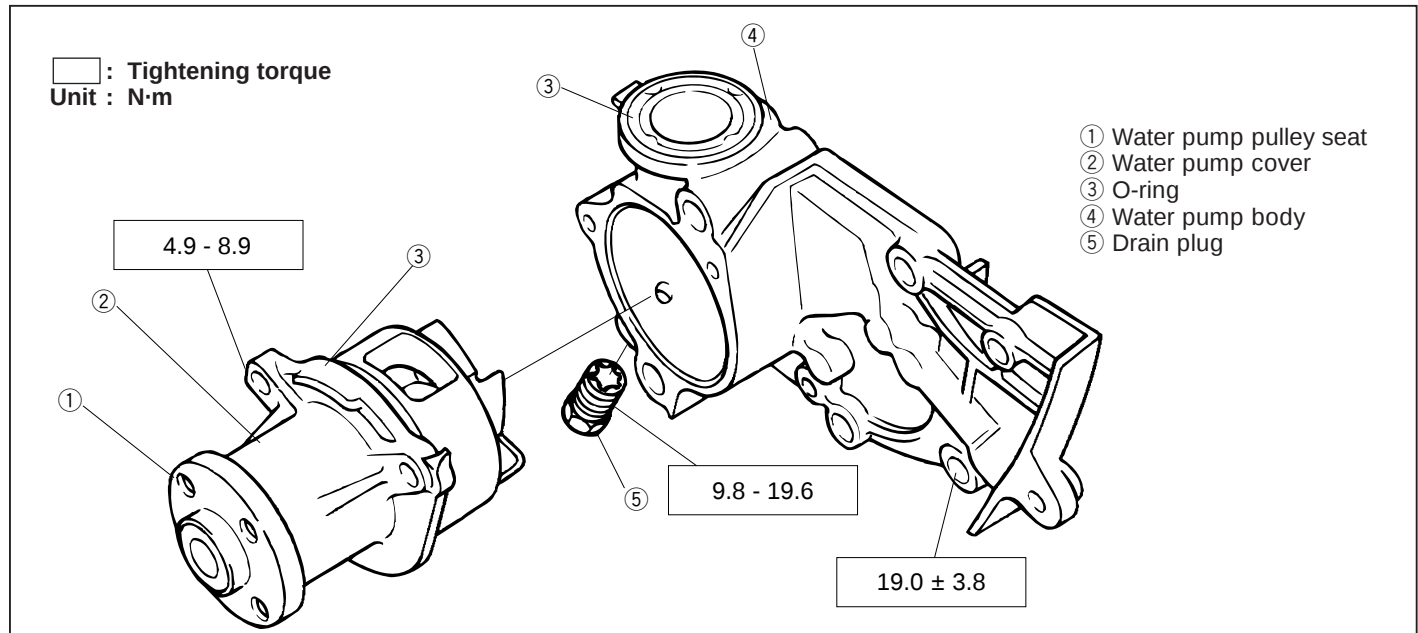


MCO00007-00005



MCO00008-00006

WATER PUMP COMPONENTS

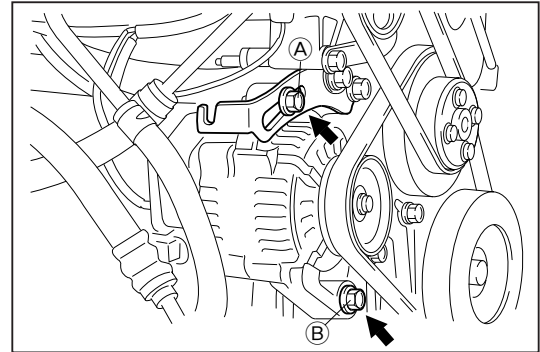


MCO00009-00007

Cases where only water pump cover is replaced:

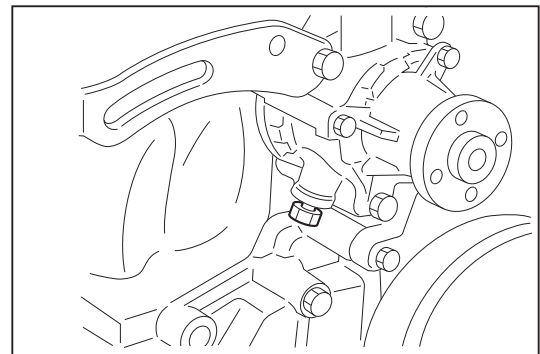
REMOVAL

1. Remove the water pump pulley.
2. Remove the V-belt.
3. Remove the alternator adjusting bar attaching bolt.



MCO00010-00008

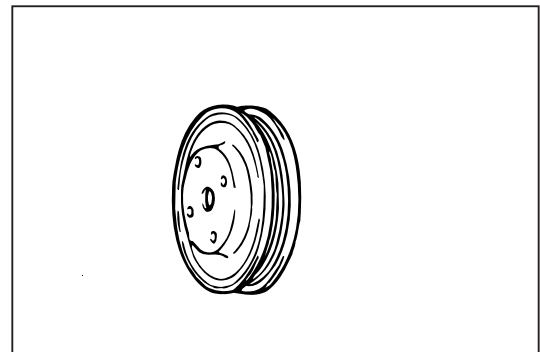
4. Drain the coolant by loosening the water pump drain plug.
5. Remove the water pump cover attaching bolt.
6. Remove the water pump cover.



MCO00011-00009

INSPECTION

1. Check the water pump pulley for damage or deformation. Replace the water pump pulley if it exhibits damage or deformation.

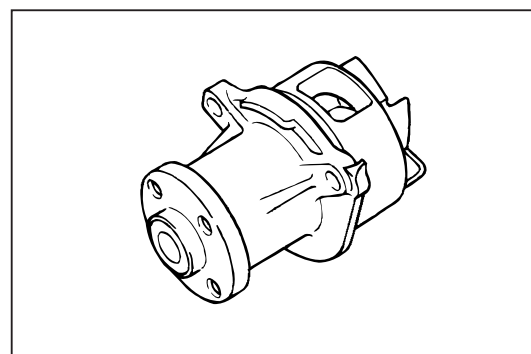


MCO00012-00010

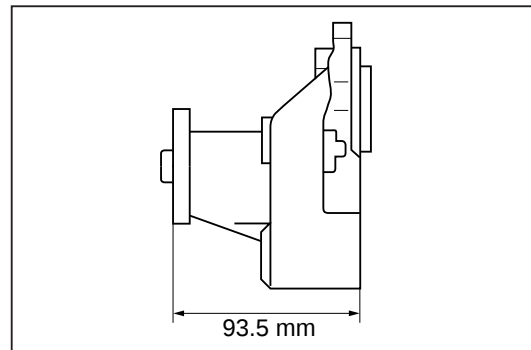
2. Visually inspect the water pump rotor for damage or deformation.
Replace the water pump cover if the water pump rotor exhibits damage or deformation.
3. Ensure that the water pump rotates smoothly by hand.
Replace the water pump cover if it will not rotate smoothly.
4. Visually inspect the O-ring for damage.
Replace the O-ring if it exhibits damage.
5. Visually inspect the water pump pulley seat for damage or deformation.
Replace the water pump pulley seat if it exhibits damage or deformation.

Replacement of water pump pulley seat

1. Remove the water pump pulley seat, using a press in combination with the SST 09238-87201-000 or a suitable bar.
2. Press-fit a new water pump pulley seat at the position indicated in the right figure, using a press.



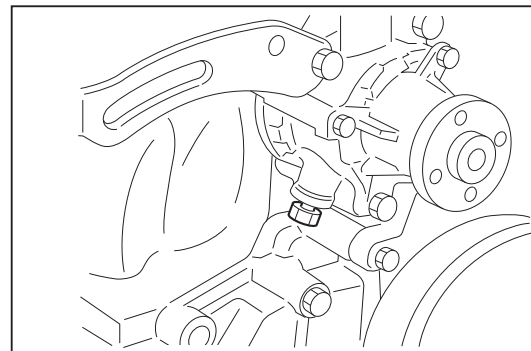
MCO00013-00011



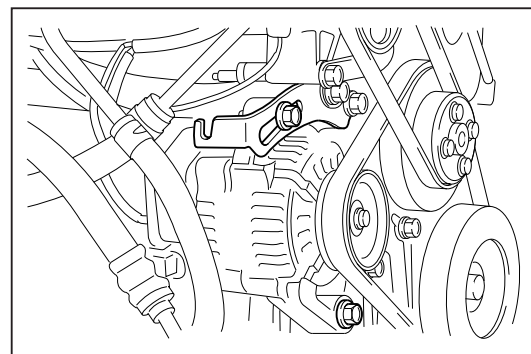
MCO00014-00012

INSTALLATION

1. Install the water pump cover to the water pump body.
Tightening Torque: 4.9 - 8.9 N·m
2. Install the water pump drain plug to the water pump.
Tightening Torque: 9.8 - 19.6 N·m
3. Install the water pump pulley and V-belt. (Refer to the EM section.)
4. Adjust the V-belt tension. (Refer to the CH section.)
5. Fill engine coolant.
6. Start the engine. Ensure that no water leakage is present.



MCO00015-00013

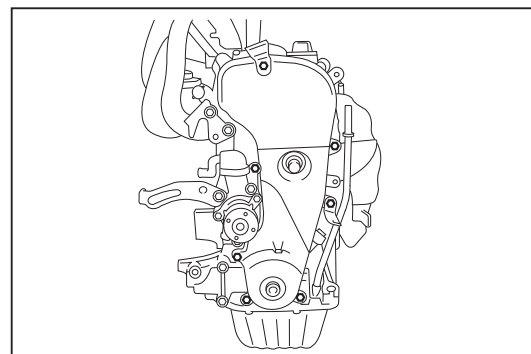


MCO00016-00014

Cases where water pump body is replaced:

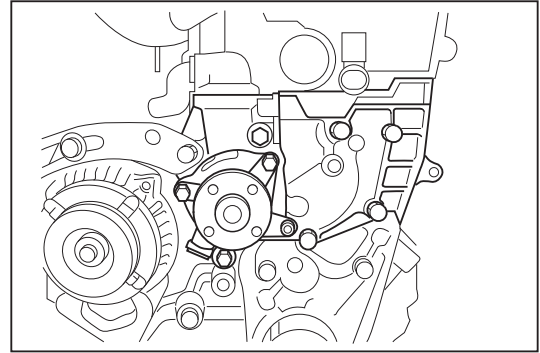
REMOVAL

1. Remove the water pump pulley.
2. Remove the V-belt.
3. Remove the crankshaft pulley.
4. Remove the timing belt cover.
5. Remove the timing belt tensioner.
6. Remove the timing belt.
(For the above operations 1. through 6., refer to the EM section.)

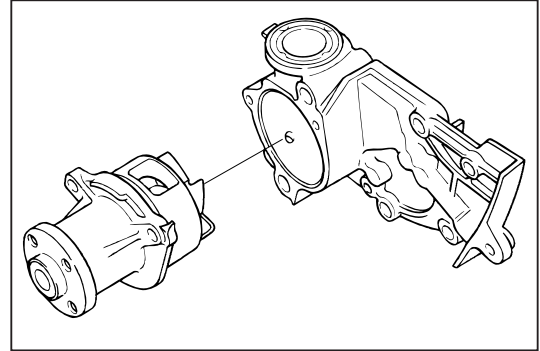


MCO00017-00015

7. Drain the coolant by loosening the drain plug (water pump).
 8. Remove the alternator adjusting bar attaching bolt.
 9. Remove the water pump assembly from the cylinder block.
 10. Remove the water pump gasket.
-
11. Separate the water pump body and water pump cover.



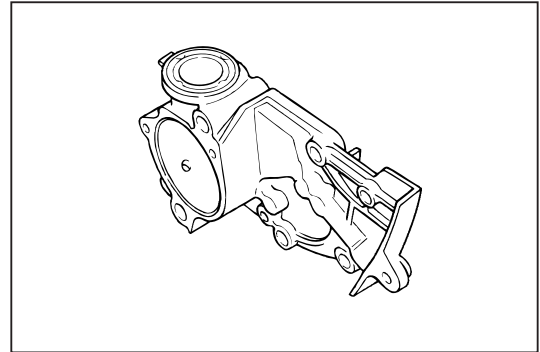
MCO00018-00016



MCO00019-00017

INSPECTION

1. Visually inspect the water pump body for damage or deformation.
Replace the water pump body if it exhibits damage or deformation.
2. Check the water pump body section of the cylinder block for damage or wear.
Replace the cylinder block if the water pump body section exhibits damage or wear. (Refer to the EM section.)



MCO00020-00018

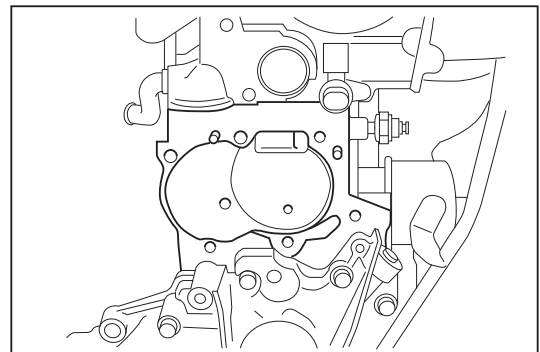
INSTALLATION

1. Clean the water pump attaching surface of the cylinder block, using a gasket scraper or the like.
2. Install the gasket to the cylinder block.
3. Install the water pump cover to the water pump body.
4. Install the water pump assembly to the cylinder block.

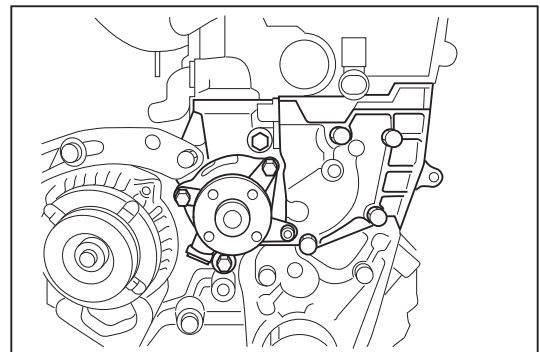
Tightening Torque: 19.0 ± 3.8 Nm
(Except alternator adjusting bar attaching bolt.)
(Alternator adjusting bar attaching bolt: 29.0 ± 5.8 N·m)

NOTE:

- After tightening the bolts, ensure that the water pump rotates smoothly by hand.

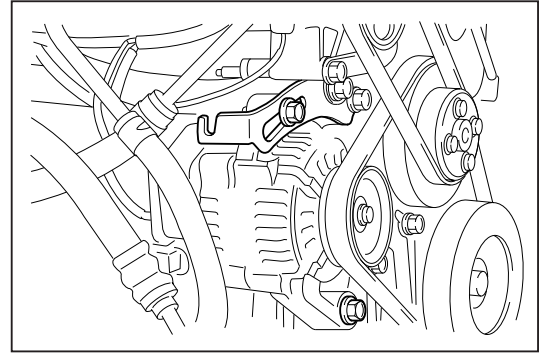


MCO00021-00019



MCO00022-00020

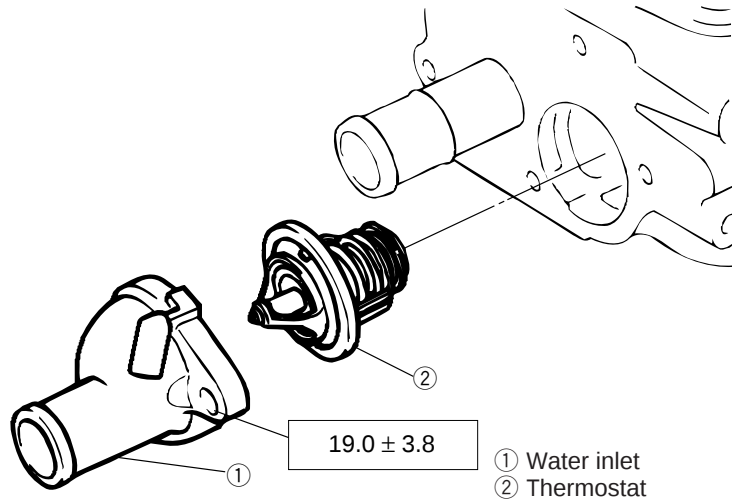
5. Install the timing belt and adjust the timing belt tension.
6. Install the timing belt cover.
7. Install the water pump pulley and V-belt.
(For the above operations 5. through 7., refer to the EM section.)
8. Fill engine coolant.
9. Start the engine. Ensure that no water leakage is present.



MCO00023-00021

THERMOSTAT COMPONENTS

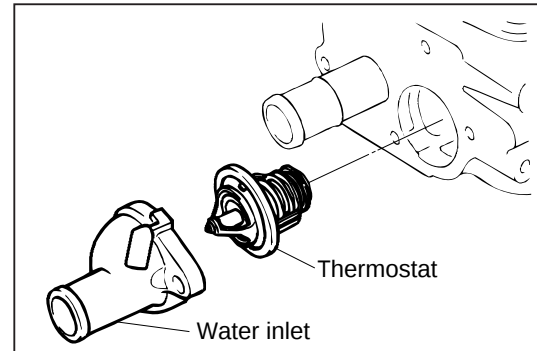
□ : Tightening torque
Unit : N·m



MCO00024-00022

REMOVAL

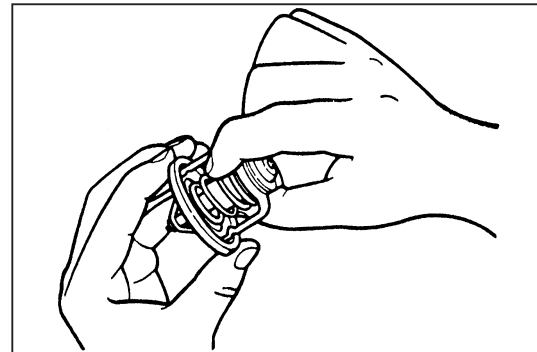
1. Drain the engine coolant. (Refer to page CO-2.)
2. Disconnect the radiator hose No. 2 from the water inlet.
3. Remove the water inlet from the cylinder head.
4. Remove the thermostat from the water inlet.



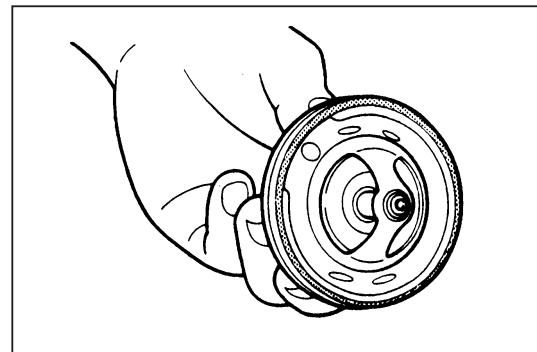
MCO00025-00023

INSPECTION

1. Ensure that the thermostat valve is closed at room temperature of 20°C and the spring has no play.
Replace the thermostat if the valve is open or the spring has a play.
2. Check the rubber grommet of the thermostat for damage or crack.
Replace the thermostat if the rubber grommet exhibits damage or crack.



MCO00026-00024



MCO00027-00025

3. Check of thermostat valve opening temperature

- (1) Immerse the thermostat in water, as indicated in the right figure. Heat the water gradually. Ensure that the temperature at which the valve begins to open conforms to the specified value.

Specified Valve Opening Temperature: 84°C

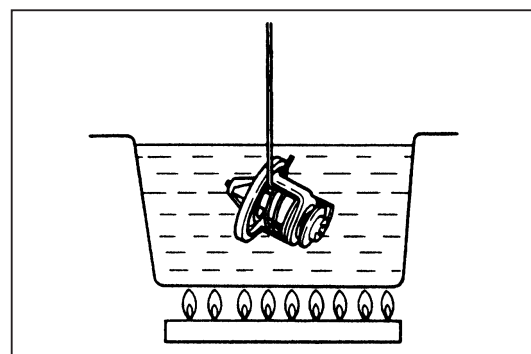
If the temperature fails to conform to the specification, replace the thermostat with a new one.

- (2) Under the condition described in the step (1), heat the water to 100°C. At this time, ensure that the valve lift is the specified value or more.

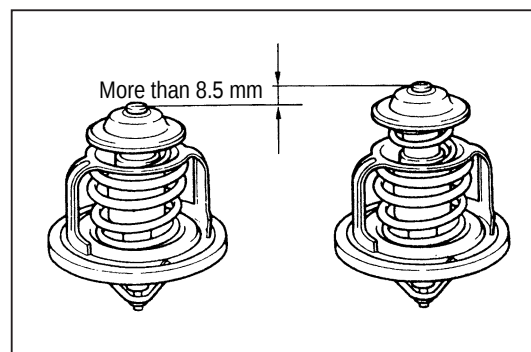
Specified Value: More than 8.5 mm

CAUTION:

- Be very careful not to get scalded, for the heated thermostat will be very hot.



MCO00028-00026



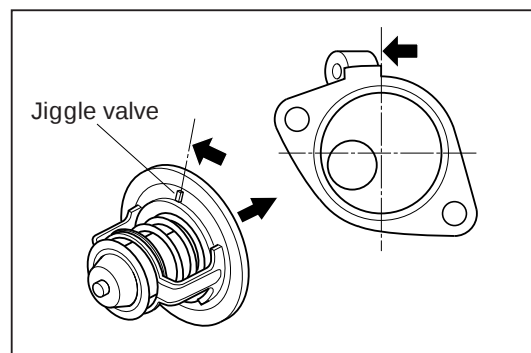
MCO00029-00027

INSTALLATION

1. Install the thermostat to the water inlet.

NOTE:

- Be sure to assemble the thermostat at the position indicated in the right figure.

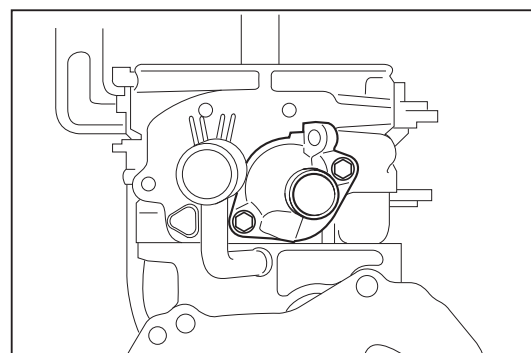


MCO00030-00028

2. Install the water inlet to the cylinder head.

Tightening Torque: $19.0 \pm 3.8 \text{ N}\cdot\text{m}$

3. Connect the radiator hose No. 2 to the water inlet.
4. Fill the engine coolant. (Refer to page CO-3)
5. Start the engine. Ensure that no water leakage is present.

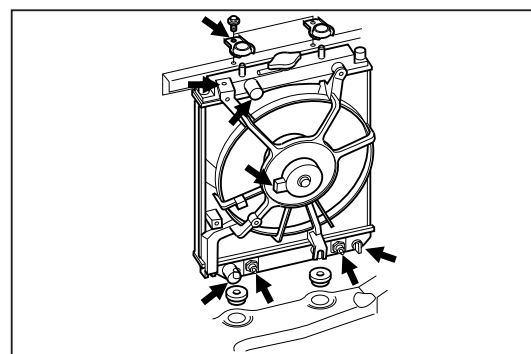


MCO00031-00029

RADIATOR

Removal

1. Separate the radiator and air conditioner condenser.
2. Disconnect the connector of the radiator fan motor.
3. Drain the engine coolant.
4. Remove the engine coolant reservoir tank from the radiator.
5. Disconnect the automatic transmission oil cooler tube from the radiator.
6. Disconnect the radiator inlet and outlet hoses from the radiator.
7. Remove the radiator upper support bracket.
8. Remove the radiator from the vehicle.
9. Remove the radiator lower support from the front frame.



MCO00032-00030

Installation

1. Install the radiator lower support to the front frame.
2. Install the radiator to the vehicle.
3. Install the radiator upper support bracket.
Tightening Torque: 12.5 ± 2.5 N·m
4. Connect the radiator inlet and outlet hoses to the radiator.
5. Connect the automatic transmission oil cooler tube to the radiator.
Tightening Torque: 17.7 ± 3.5 N·m
6. Install the engine coolant reservoir tank to the radiator.
Tightening Torque: 8.0 ± 1.6 N·m
7. Fill the engine coolant.
8. Connect the connector of the radiator fan motor.
9. Install the air conditioner condenser to the radiator.

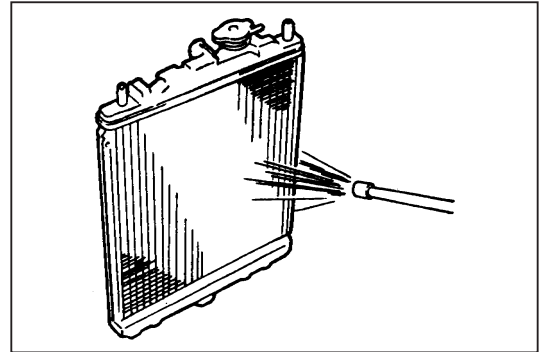
MCO00033-00000

CLEANING OF RADIATOR

Using water or steam cleaner, remove mud and dirt from the radiator core.

CAUTION:

- When using a high-pressure type cleaner, be very careful not to deform the radiator core fins.
- Keep a distance of more than 40 - 50 cm between the radiator core and the cleaner nozzle when the cleaner nozzle pressure is 2.9 - 4.9 MPa.
- Also, the injection angle of pressurized water should be right angles to the radiator.
- Failure to observe this caution will cause the radiator fins to be deformed.



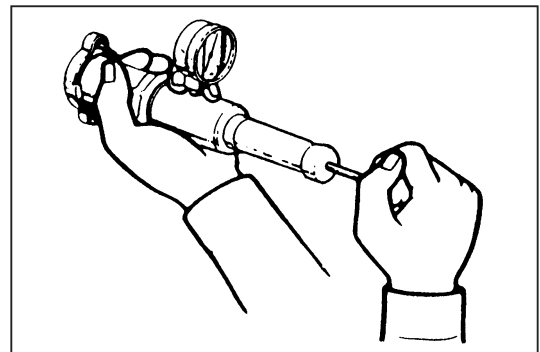
MCO00034-00031

INSPECTION OF RADIATOR

1. Check of radiator cap
 - (1) Check the radiator cap by means of a radiator cap tester to see if the relief valve opens at a pressure of 108 ± 15 kPa.
If the radiator cap fails to conform to the specification, replace the radiator cap.

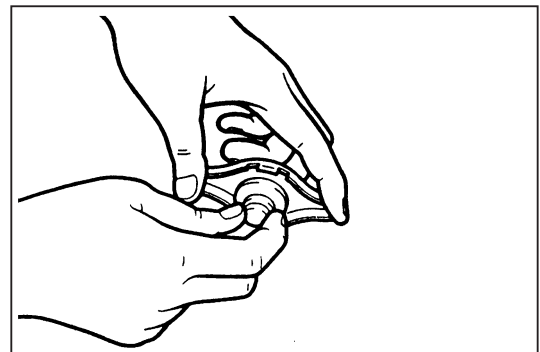
CAUTION:

- Never open the radiator cap when the engine is still hot.
- Failure to observe this caution will cause you to get scalded.



MCO00035-00032

- (2) Check the seal packing of the radiator cap for damage.
Replace the radiator cap with a new one, if any damage exists.
- (3) Lift the valve at the vacuum side with your fingers.
Ensure that the valve is functioning properly.
Replace the radiator cap with a new one, if the valve fails to function.



MCO00036-00033

2. Check of cooling system for leakage

- (1) Fill the radiator with coolant. Attach a radiator cap tester.
- (2) Warm up the engine.
- (3) Apply a pressure of 122.7 kPa to the cooling system by means of a radiator tester.

If the pressure drops, check the hoses, radiator, water pump and heater for evidence of leakage.

If no external leakage is found, check the heater core, cylinder block, cylinder head, oil cooler and throttle body for evidence of leakage.

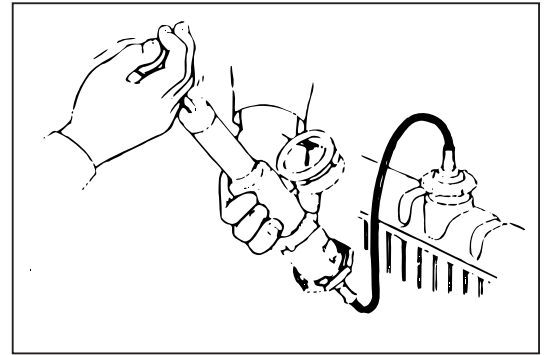
Check the hoses for deterioration, cracks, bulge or damage.

Replace the defective part(s) if necessary.

- (4) Remove the radiator cap tester from the radiator.

WARNING:

- Never open the radiator cap and/or drain cap when the coolant is still hot. Failure to observe this caution will cause you to get scalded.



MCO00037-00034

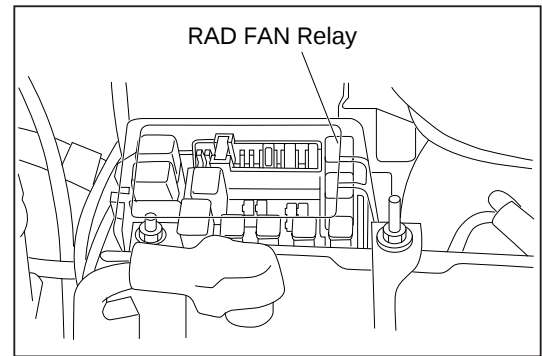
ELECTRIC COOLING FAN

IN-VEHICLE INSPECTION

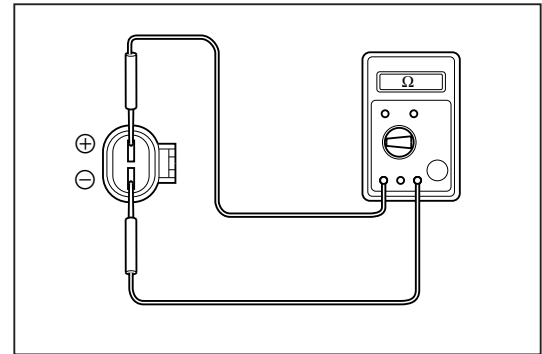
1. If the fan motor is rotating when the coolant temperature is below 80°C and the ignition switch is at the off position, check the RAD FAN relay and the wiring harness for short.
 - (1) Disconnect the RAD FAN relay from the relay Box (R/B).
 - (2) If the fan motor stops, check the RAD FAN relay.
 - (3) If the fan motor is rotating, check the wiring harness for short.
2. Turn on the ignition key switch. Ensure that the fan is not rotating when the coolant is cold (below 80°C). If the fan motor is rotating, check the EFI ECU.
3. Warm the engine, until the radiator coolant temperature rises above 80°C. Ensure that the fan motor is rotating. If the fan motor is not rotating, check the RAD FAN relay, wiring harness, radiator fan motor fuse, radiator fan motor, water temperature sensor and EFI ECU.
4. Disconnect the connector of the radiator fan motor.
5. Check resistance between the terminals of the radiator fan motor.

Specified Value: Approx. 1.0 Ω

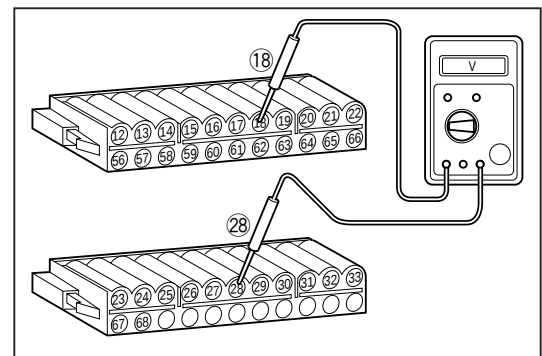
6. While referring to the EF section, check that the output from the EFI ECU is normal, using the SST (09842-97201-000).
 - (1) Connect a volt meter between the terminals 18 and 28 of the SST.
 - (2) Turn on the ignition switch. Ensure that the measured value is approximately the battery voltage.
 - (3) Turn off the ignition switch.



MCO00038-00035



MCO00039-00036



MCO00040-00037

- (4) Disconnect the water temperature sensor connector.
- (5) Turn on the ignition switch. At this time, ensure that the fan rotates and the voltmeter registers approximately 0.05 V.

If the fan motor will not rotate, replace the fan motor.

If the voltmeter will not register the specified value, check the water temperature sensor. If the water temperature sensor is normal, replace the EFI ECU.

(For the check of the water temperature sensor, refer to the EF section.)

NOTE:

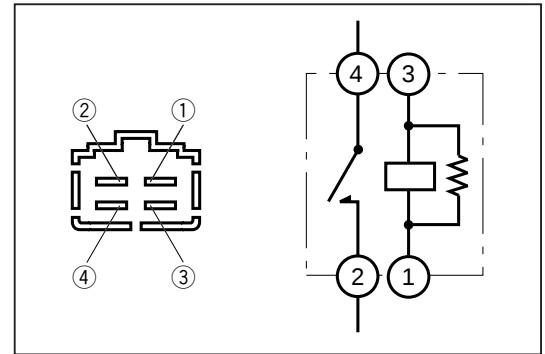
- When the ignition switch is turned ON with the water temperature sensor connector disconnected, the diagnosis code No. 42 will be detected. Be sure to erase this code after completion of the check.

- (6) Turn off the ignition switch.

MCO00041-00000

RADIATOR FAN MOTOR RELAY

The radiator fan motor relay employs the same relay as the starter motor relay. Therefore, for the unit inspection, refer to the ST section.



MCO00042-00038

SPECIFICATIONS

Coolant capacity (w/heater, excluding reserve tank)	MT	3.0 ℓ
	AT	2.9 ℓ
Reserve tank capacity	Full	0.45 ℓ
	Low	0.25 ℓ
Thermostat	Valve opening temperature	84°C
	Valve lift	8.5 mm or more at 90°C
Radiator cap	Relief valve opening pressure	108 ± 15 kPa (1.1 ± 0.15 kg/cm ²)

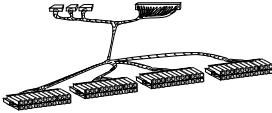
MCO00043-00000

TIGHTENING TORQUE

Components	N·m	kgf·m
Water pump cover × Water pump body	4.9 - 8.9	0.5 - 0.7
Water pump body × Cylinder block (except alternator adjusting bar attaching bolt)	19.0 ± 3.8	1.95 ± 0.39
Water pump drain bolt × Water pump	9.8 - 19.6	1.0 - 2.0
Adsuting bar × Cylinder block	29.0 ± 5.8	3.0 ± 0.6
Water inlet × Cylinder head	19.0 ± 3.8	1.95 ± 0.39
Fan motor × Fan shroud	2.55 ± 0.78	0.26 ± 0.08
Fan motor × Fan	6.17 ± 1.27	0.63 ± 0.13
Fan shuroud × Radiator	8.0 ± 1.6	0.8 ± 0.16
Coolant reserve tank × Fan motor	8.0 ± 1.6	0.8 ± 0.16
Oil cooler tube × Radiator (A/T)	17.7 ± 3.5	1.8 ± 0.4

MCO00044-00000

SST

Shape	Part No.	Part name	Remarks
	09842-97201-000	EFI computer check sub-harness	
	09238-87201-000	Remover	

MCO00045-00039