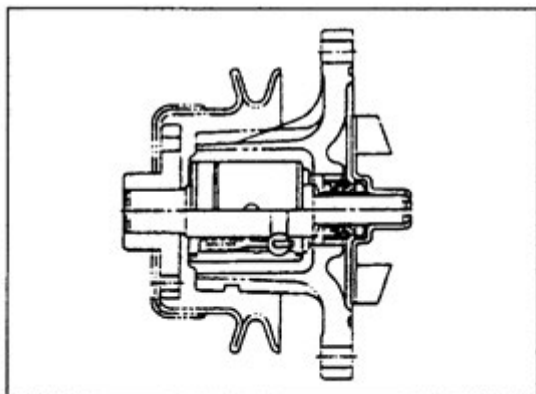


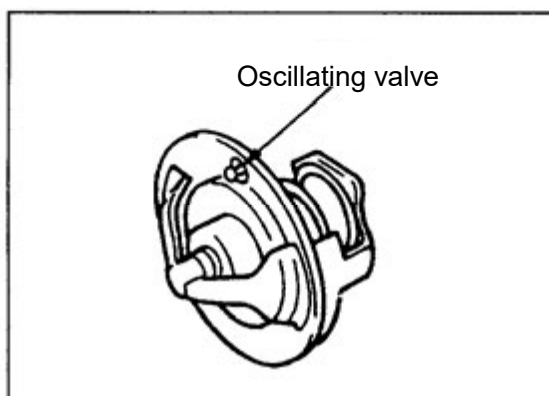


4 Engine cooling system

4.1 General



The engine cooling system is a pressure type coolant forced circulation version. It has a radiator cover and its differential pressure and boiling point are 98 ~ 196kpa and 120°C respectively. The system consists of a water pump, thermostat, fan, radiator and other components. Circulating coolant is used to cool down the oil in oil filter and turbocharger.

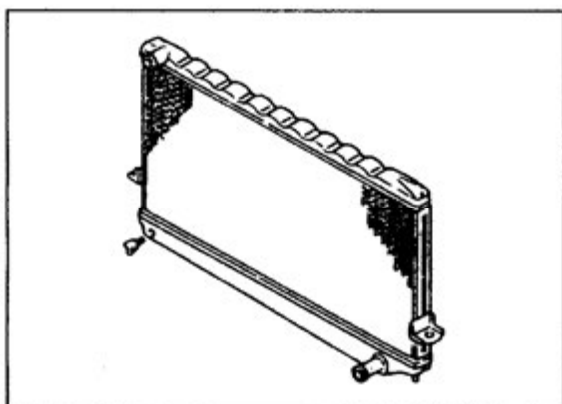


Water pump

It is a vane centrifugal pump driven by V drive belt.

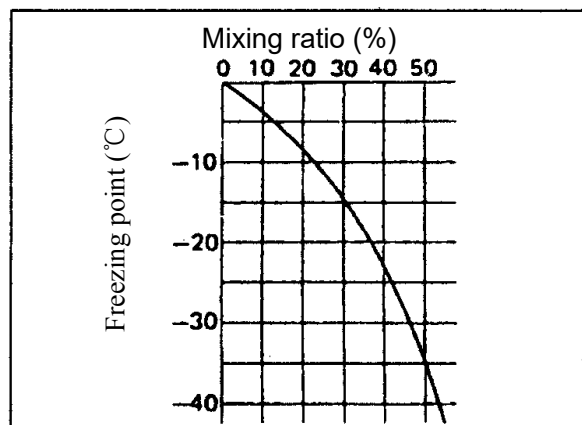
Thermostat

The thermostat belongs to wax type with an oscillating valve installed on the original valve. It is installed on the thermostat body.



Radiator

It is a tube type radiator with corrugated fins. In order to increase the boiling point, a cap with a valve is installed on the cylinder head thermostat body. This valve opens at the pressure 0.90—1.20kg/cm².



Anti-freezer

- The relationship between mixing ratio and freezing point

The freezing point temperature of engine coolant changes with the ratio of anti-freezer in water.

Correct mixing ratio can be determined according to the graph. Do not add the attached anti-rust agent or additive with enhancing cooling ability to the cooling system without approval of JAC Automotive Co., Ltd.

- Mixing ratio calculation

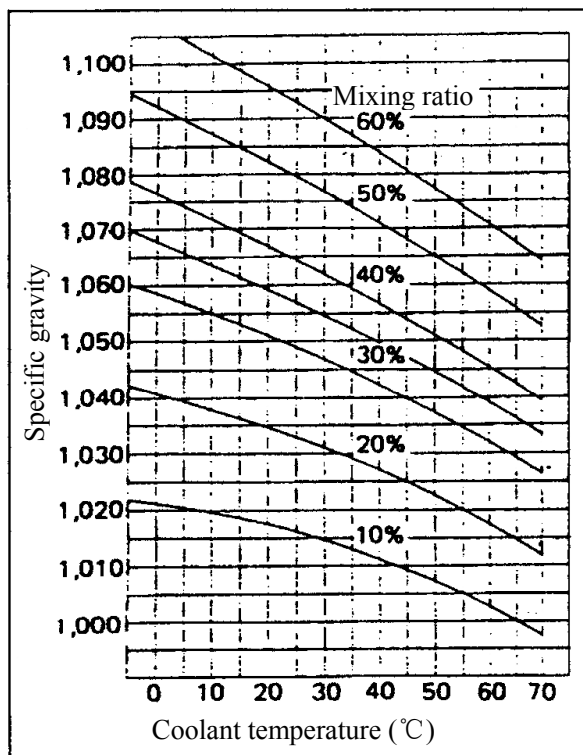
$$\text{Maxing ratio} = \frac{\text{Anti-freezer (L/qt)}}{\text{Anti-freezer (L/qt)} + \text{water (L/qt)}}$$

Note: Anti-freezer + water = 10L

Total volume of the cooling system

E.g., total volume of the cooling system is 10L

Mixing ratio%	Anti-freezer L/qt (En) / qt (Ame))	Water L/qt (En) / qt(Ame))
0	0 (0)	10(8.80 / 10.57)
5	0.5(0.44 / 0.53)	9.5(8.36 / 10.04)
10	1.0(0.88 / 1.06)	9.0(7.92 / 9.51)
15	1.5(1.32 / 1.59)	8.5(7.48 / 8.98)
20	2.0(1.76 / 2.11)	8.0(7.04 / 8.45)
25	2.5(2.20 / 2.64)	7.5(6.60 / 7.93)
30	3.0(2.64 / 3.17)	7.0(6.16 / 7.40)
35	3.5(3.08 / 3.70)	6.5(5.72 / 6.87)
40	4.0(3.52 / 4.23)	6.0(5.28 / 6.34)
45	4.5(3.96 / 4.76)	5.5(4.84 / 5.81)
50	5.0(4.40 / 5.28)	5.0(4.40 / 5.28)

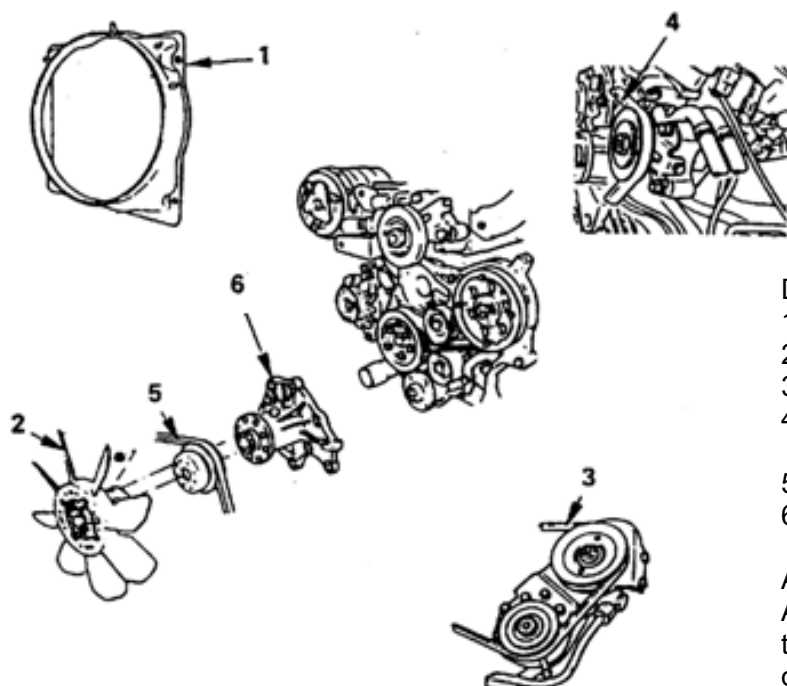


- Mixing ratio

Measure the specific gravity of engine cooling system coolant in 0°C to 50°C temperatures with a draft hydrometer, and then determine the coolant mixing ration according to the graph.



4.2 Water pump



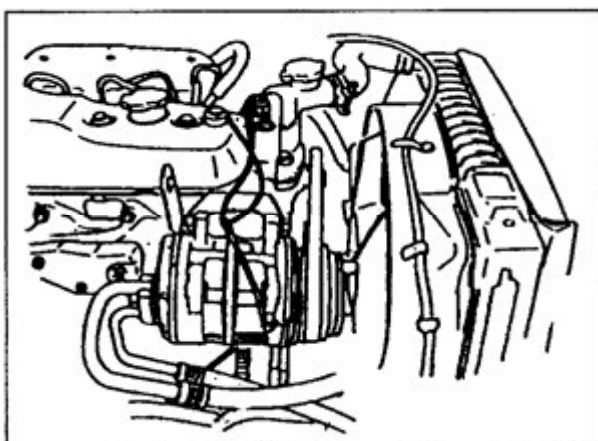
Disassembly sequence

1. Fan cowl
2. Fan assembly
3. Power steering pump drive belt
4. Air conditioning compressor drive belt
5. Alternator drive belt
6. Water pump assembly

Assembly sequence

As assembling, go on according to the reverse sequence of disassembly.

4.2.1 On-vehicle repair

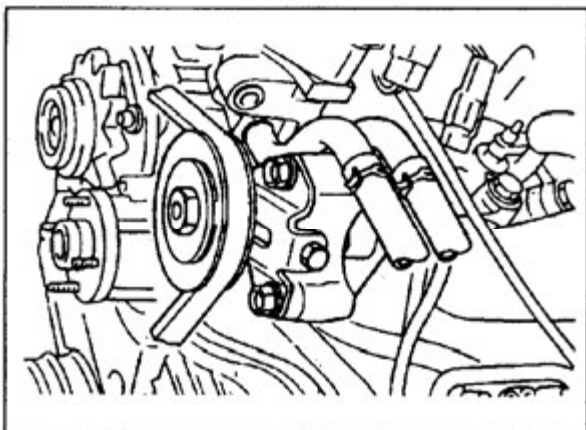


Disassembly

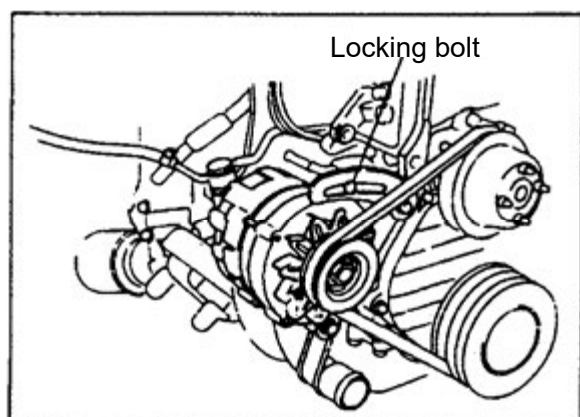
Preparation:

- Remove battery ground cables.
- Discharge the coolant.

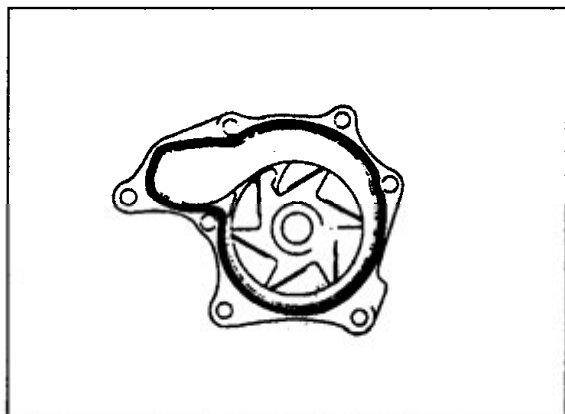
1. Fan cowl
 - Remove storage tank hose and fan cowl.
2. Fan assembly
 - Unscrew the locking nut(s) and take out the fan assembly.
3. Power steering pump drive belt
 - Loosen idler locking nut(s) and adjusting bolt(s), and then remove the drive belt.



4. Air conditioning compressor
 - Loosen ac compressor idler locking nut(s) and adjusting bolt(s).
Dismount the drive belt.



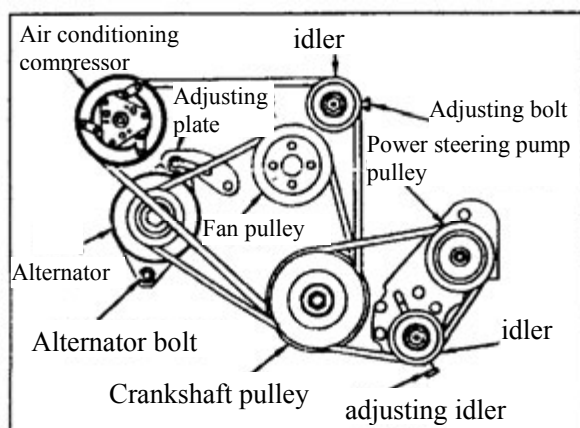
5. Alternator drive belt
 - Unscrew alternator fixing bolt(s) and adjusting plate locking bolt(s), then remove the drive belt.



Assembly

6. Water pump assembly
 - Detach the O-ring.
 - Put the O-ring into the water pump groove.
-  • Install water pump assembly and tighten the bolt(s) to the specified torque.

Water pump fixing bolt torque	N·m
25	



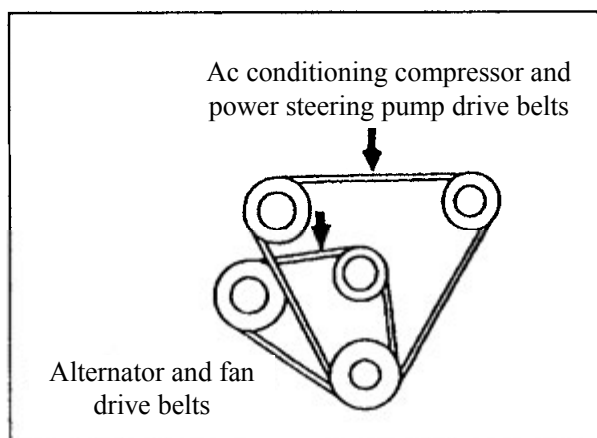
Inspection

If during inspection it is found that the water pump is severely worn or damaged, repair the water pump and replace the worn-out parts. The whole water pump assembly has to be replaced in case of one of the following problems.

- There is a crack on the water pump body.
- The coolant leaks from the water seal.
- The ball bearing is loose or produces unusual noise.
- Water pump impeller cracked or experienced corrosion.

5. Alternator drive belt
4. Air conditioning compressor drive belt
3. Power steering pump drive belt

- Install and adjust those drive belts. Inspect whether the drive belts are intact. Replace them if necessary. Check the belt tension, if necessary adjust the tension.
- Apply a force of 100N to those belts and check the deflection of each belt.



- Standard deflection

mm

	Initial tension
Alternator drive belt	8—10
Air conditioning compressor drive belt	
Power steering pump drive belt	

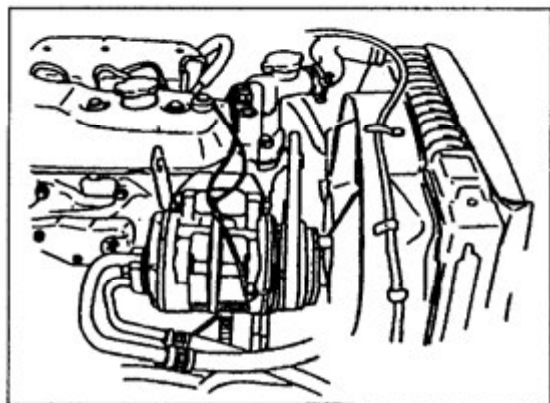


	Generator fixing bolt torque	N·m
	40	
	Adjusting plate fixing bolt torque	N·m
	25	
	Ac compressor idler locking nut torque	N·m
	27	
	Power steering pump idler locking nut torque	N·m
	27	

2. Fan assembly

- Fix the fan pulley and fan assembly onto the water pump, and tighten them to the specified torque.

Fan pulley nut torque	N·m
12.5	

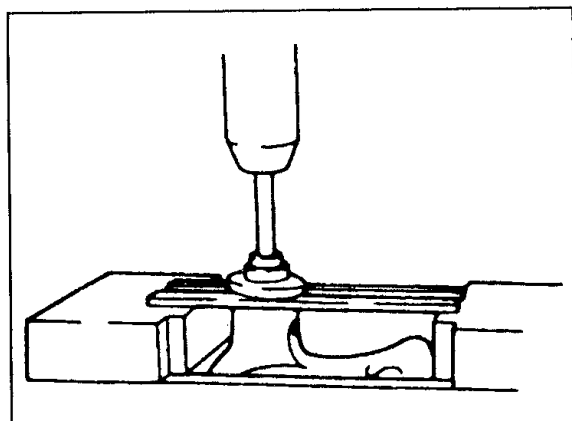
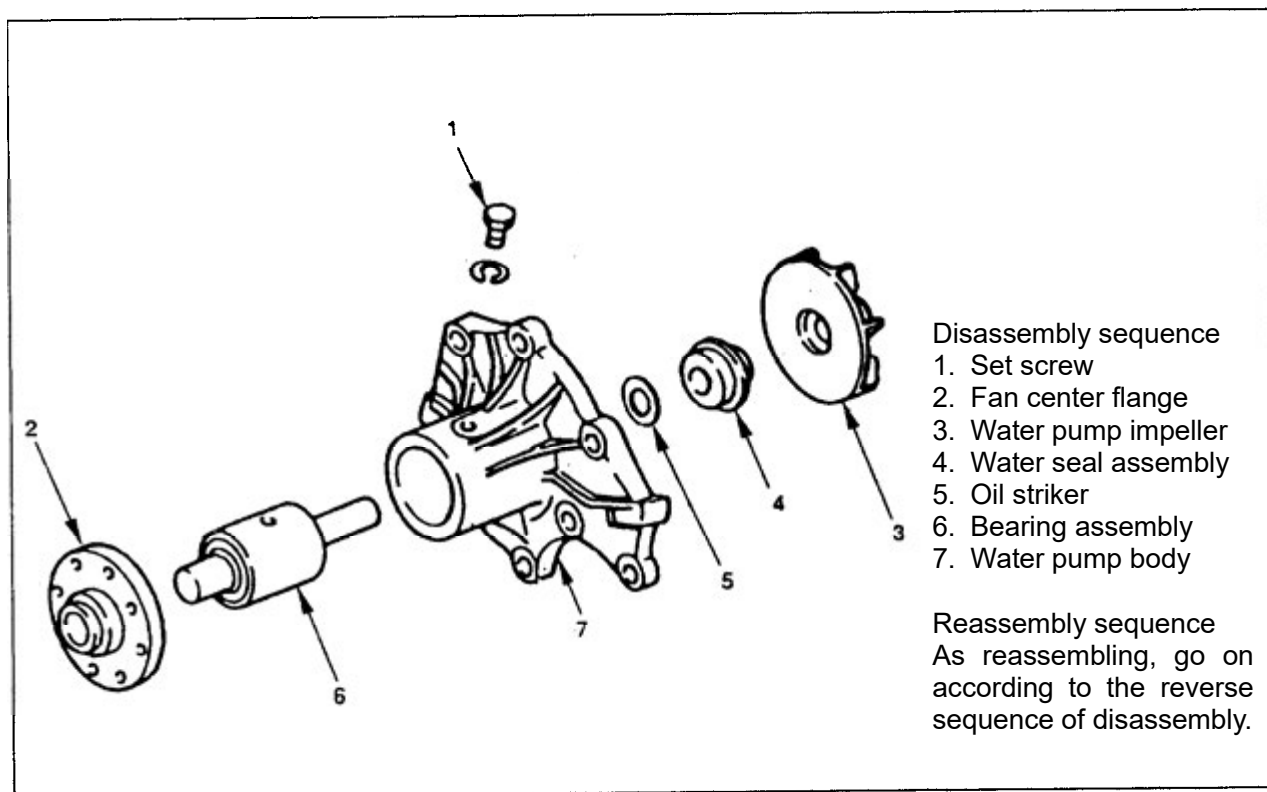


1. Fan cowl

- Install the fan cowl and storage tank hose.
- Connect battery ground cables.
- Fill in coolant.
- Start the engine and check whether there is any leakage of the coolant.

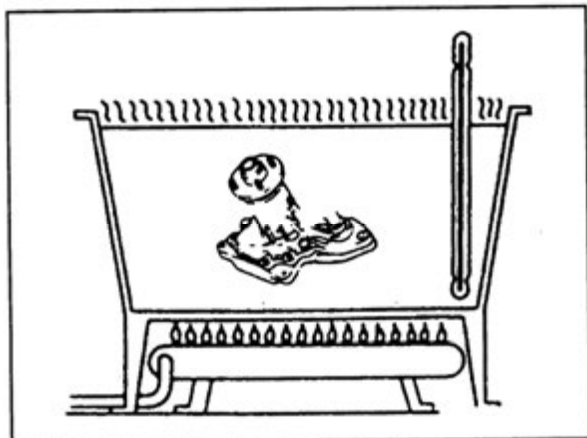


4.2.2 Single-piece repair

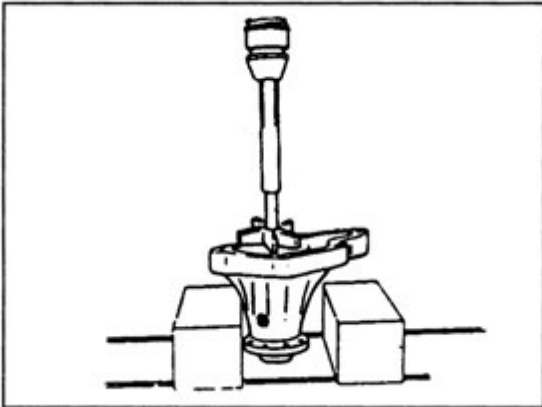


Disassembly

1. Set screw
2. Fan center flange
 - Push down the fan center flange with a bench press and compression bar.



3. Water pump impeller
4. Water seal assembly
5. Oil striker
6. Bearing assembly
 - 1) Heat up water pump body in hot water (80-90°C / 176-194°F).

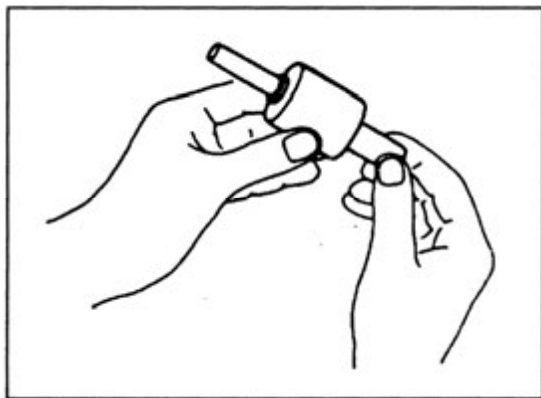


- 2) Push down the water pump impeller, water seal assembly and bearing assembly with a bench press and compression bar.

Note:

Do not attempt to disassemble the water pump impeller with a hammer, or it will destroy the impeller.

7. Water pump body

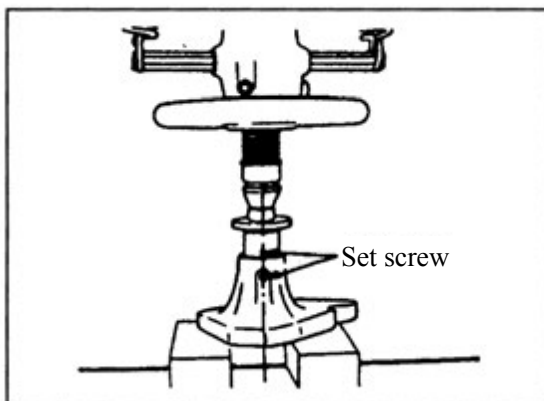


Inspection and repair

- If during inspection it is found that the water pump is severely worn or damaged, adjust and repair it and replace the worn-out parts.

Bearing assembly

- Check if there is any noise, stuck and other unusual phenomena in the bearing assembly.



Reassembly

7. Water pump body



6. Bearing assembly

1. Set screw

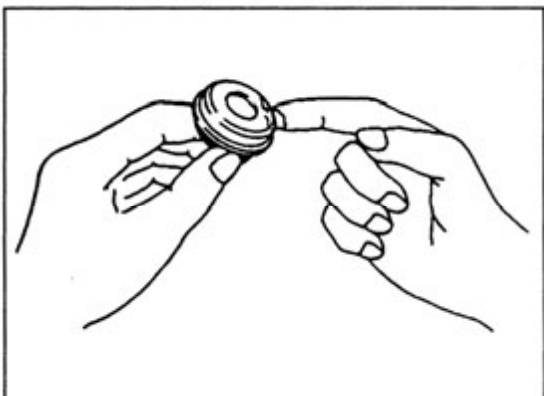
- 1) Align bearing set screw(s) with water pump body set screw(s).
- 2) Press the bearing assembly into the water pump body.
- 3) Fix the bearing with set screw(s).

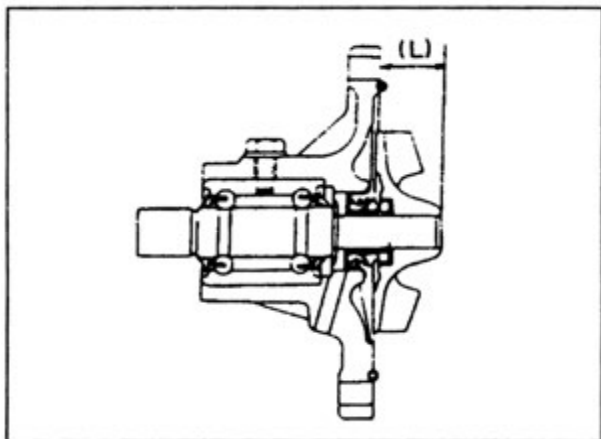
5. Oil striker



4 Water seal assembly

- 1) Coating a thin layer of liquid sealant on the water seal assembly outer edge.
- 2) Install the water seal assembly.

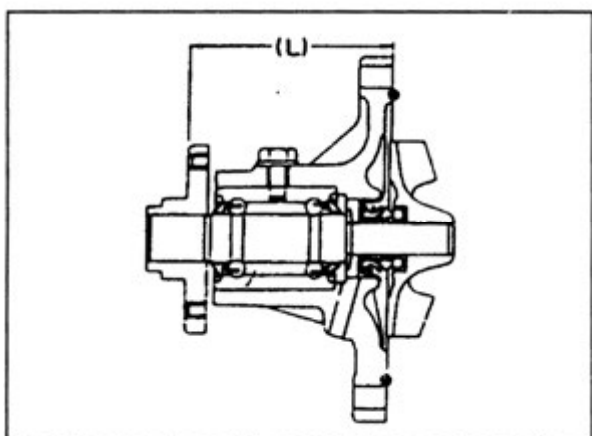




3. Water pump impeller

- 1) Install the water pump impeller with a bench press.
- 2) Measure the distance between water pump impeller protrusion and water pump body end face. The water pump impeller protrusion size has to be ensured.

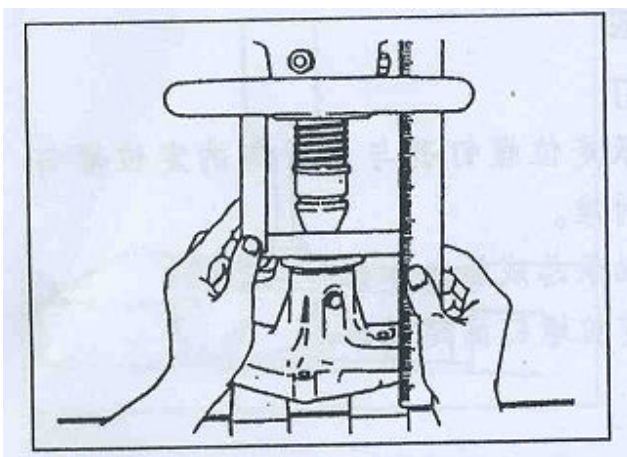
Impeller protrusion size (L)	mm
24.6	



2. Fan center flange

Measure the distance between fan fitting surface and rear fan cover.

Fan center distance	mm
Standard value	
79.2—79.8	

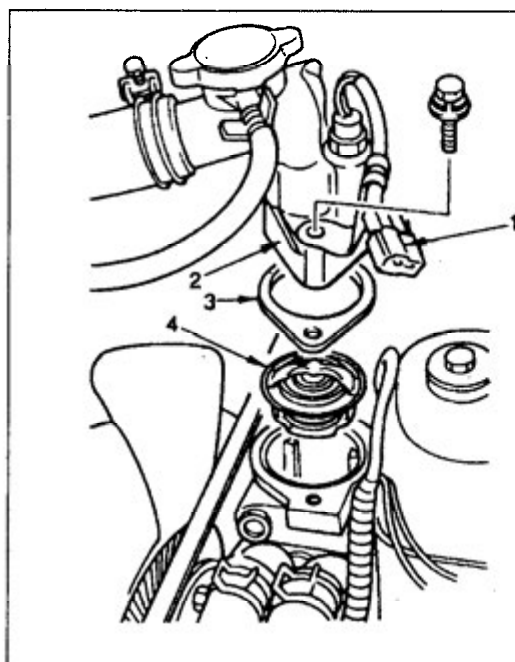


Notes:

1. Never disassemble and install the fan center flange and water pump impeller for the second time while mounting those units onto the water pump shaft with a bench press. Otherwise replace the whole water pump assembly. Disassembling and installing those units for the second time will lead to the water pump broken during engine operation with serious overheating.
2. If the force applied to fan center flange and water pump impeller is less than 1960N (200kg / 44lb), replace the water pump assembly.
3. Do not use hammers or similar tools to knock the bearing into water pump body, or it will destroy the bearing.



4.3 Thermostat



Disassembly sequence

1. Switch wire bundle
2. Water outlet pipe
3. Gasket
4. Thermostat

Assembly sequence

As assembling, go on according to the reverse sequence of disassembly.

Disassembly



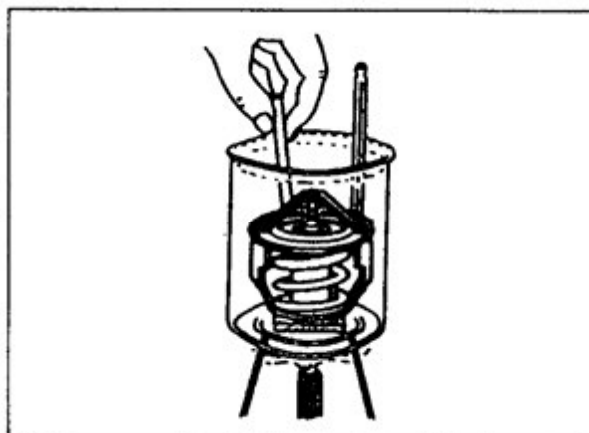
Preparation:

- Remove battery ground cables.
- Drain off the coolant in the radiator and generator .

1. Switch wire bundle
2. Water outlet pipe

Unscrew the fixing bolt(s). Remove both the water outlet pipe and radiator hose.

3. Gasket
4. Thermostat



Inspection

Put the thermostat assembly into water.

Place a wooden block under the water container.

Do not heat up the thermostat directly.

Increase water temperature gradually with continuous stirring so as to keep the water temperature in the container be equalized.

Confirm the main valve opens at the specified temperature.

Valve opening temperature °C

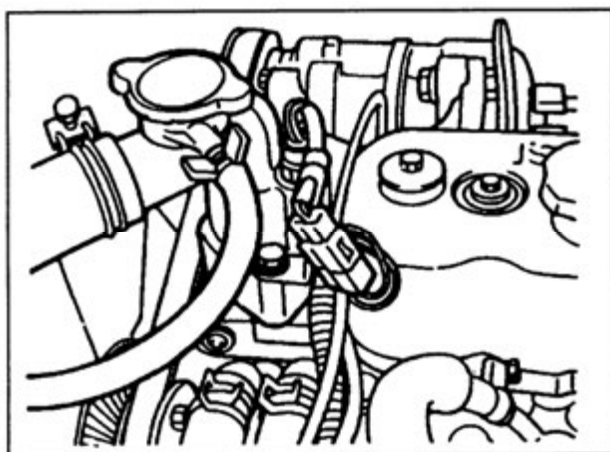
82

Confirm the secondary valve fully opens at the specified temperature.

Valve fully opening temperature °C

95

If during inspection it is found that the thermostat is severely worn or damaged, repair it and replace the worn parts.



Assembly

4. Thermostat
3. Gasket
2. Water outlet pipe
 - Connect water outlet pipe and tighten the bolt(s) to the specified torque.

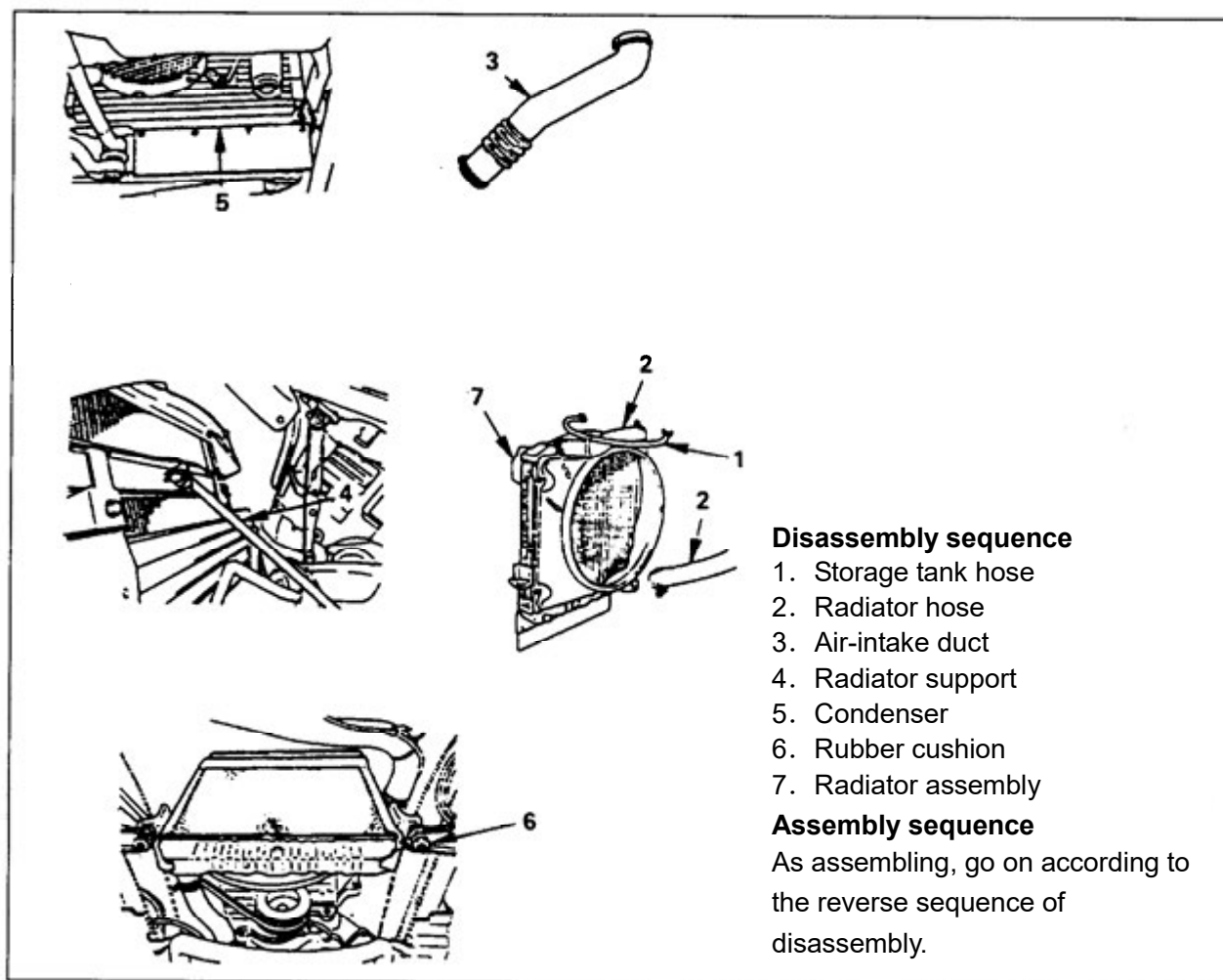
N·m

19

1. Switch wire bundle
 - Install the switch wire bundle.
 - Connect battery ground cables.
 - Fill in coolant.
 - Start the engine and check whether there is any leakage of the coolant.



4.4. Radiator



Disassembly

Preparation:

- Remove battery ground cables.
- Loosen drain plug and discharge the coolant.

1. Storage tank hose
 - Remove the lower hose from the radiator.
2. Radiator hose
 - Remove the upper and lower hoses from the engine.
3. Air-intake duct
4. Radiator support

5. Condenser

- Remove the condenser from the radiator and bind it to the vehicle front with wires temporarily.

6. Rubber cushion

- Remove the rubber cushions on both bottom sides.

7. Radiator assembly

- Remove upwards the radiator assembly with hose(s). Notes
Take care to avoid the fan blades scratching the radiator core.



Inspection

Radiator cap

- Measure the pressure valve opening pressure with a radiator cap tester.

If the opening pressure exceeds standard values, replace the radiator cap.

Check opening pressure of the vacuum valve installed in the radiator cap valve seat center.

Valve opening pressure	N·m
88. 2—117. 6	

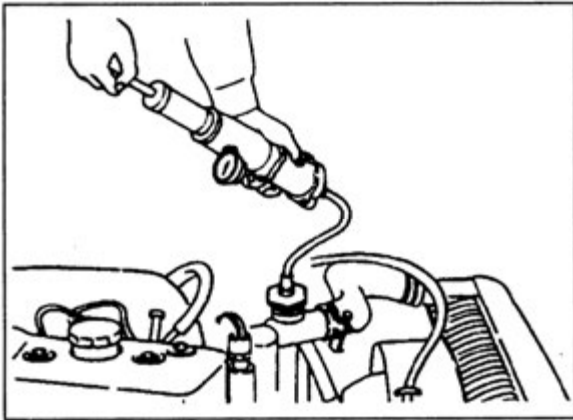
If the vacuum valve can't move smoothly due to rust or dust, clean or replace the radiator cap.

Radiator core

- Fin distortion will deteriorate the thermolysis effect and cause the cooling system to be overheated. Flatten the fin and take care to avoid damaging the fin bottom part.
- Clean off the dust and other foreign bodies.

Wash the radiator

- Wash radiator inside and coolant passage with water and neutral detergent. Clean the scale and incrustant completely.



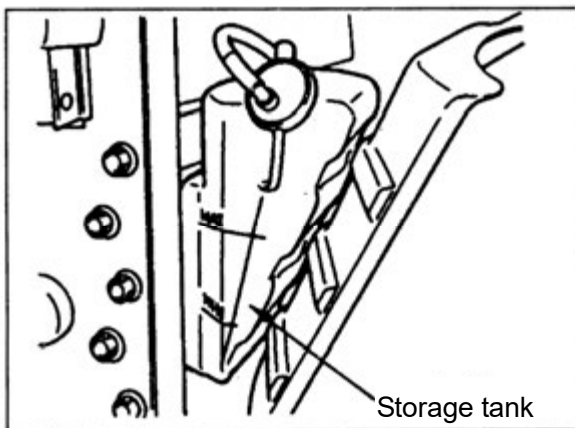
Check whether there is any coolant leakage.

- Feed the compressed air with pressure of 196.9kPa (28.4psi) through the filler neck into the radiator by a radiator cap tester, then check if there is any leakage in the cooling system.



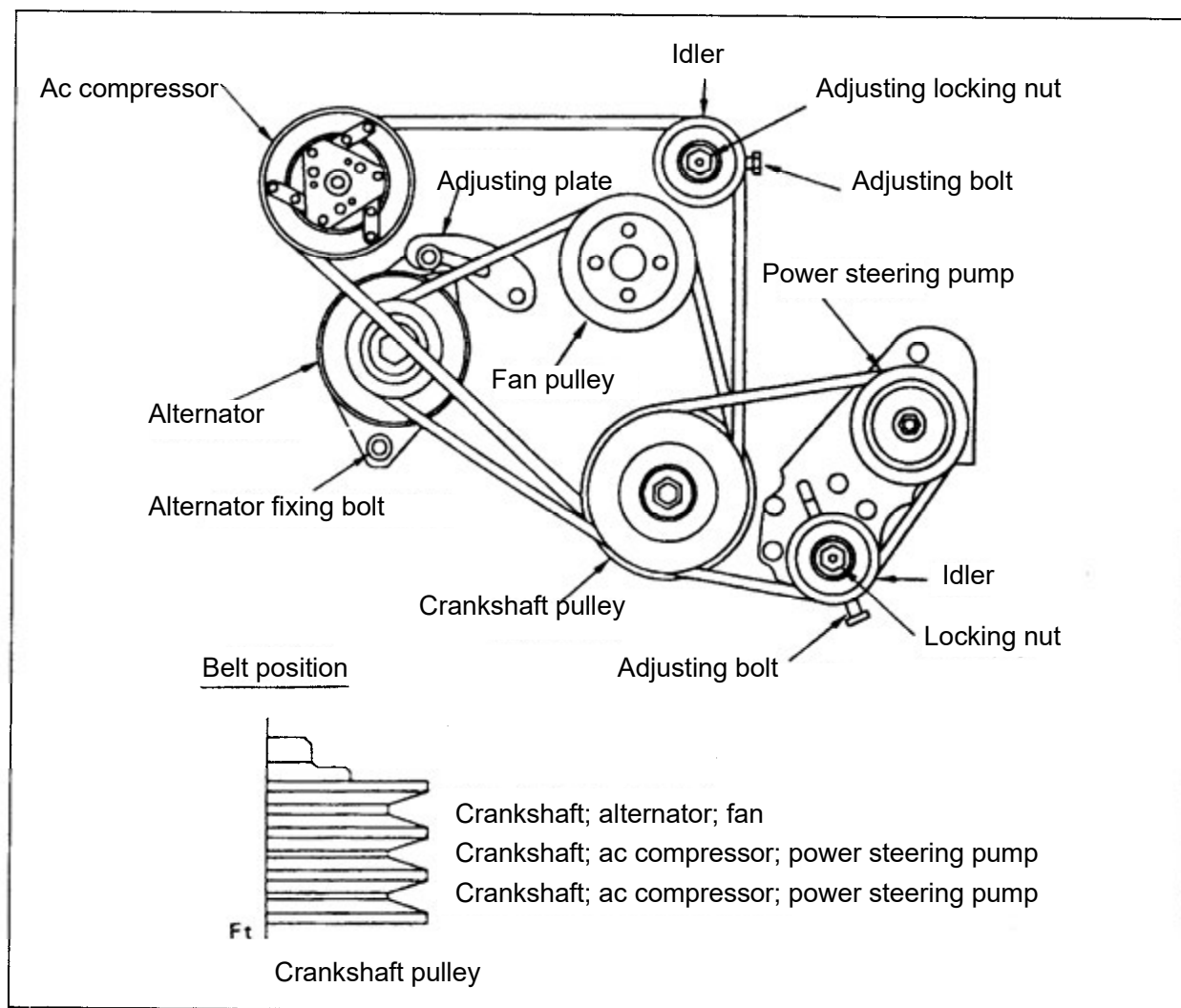
Assembly

7. Radiator assembly
 - Install the radiator.
6. Rubber cushion
 - Mount the rubber cushions to the both bottom sides of the radiator.
 - Install the radiator assembly with hose(s). Take care to avoid the fan blades scratching the radiator core.
5. Condenser
4. Radiator support
3. Air-intake duct
 - Connect the air-intake duct and fix the clip(s).
2. Radiator hose
 - Connect the inlet hose and outlet hose to the engine.
 - Connect battery ground cables.
 - Fill in coolant.
 - Fill in coolant until it goes up to the radiator filler neck and MAX mark of the storage tank.
1. Storage tank hose
 - Start the engine and warm it up. Inspect the coolant level.





4.5 Drive belt adjustment



Inspection

Inspect whether the drive belts are intact. Replace them if necessary. Check the belt tension, if necessary adjust the tension.

- Check belt tension.
- Apply a force of 100N to those drive belts and check the deflection of each belt.
- Standard deflection



	mm
	Belt tension while adjusting
Alternator and fan pulley drive belts Air conditioning compressor drive belt Power steering pump drive belt	8—10



Belt tension adjustment

1. Fan pulley drive belt

- Loosen generator bracket locking bolt. Adjust belt tension with adjusting bolts on the adjusting plate. Tighten the bolt to the specified torque.

Generator fixing bolt torque	N·m
37.5	
Adjusting plate fixing bolt torque	N·m
25	

2. Power steering pump and ac compressor pulley belts

- Loosen power steering pump locking nut and adjust belt tension with the adjusting bolt.

Tighten locking nut to the specified torque.

Locking nut torque	N·m
27	