

RODEO

ENGINE

ENGINE COOLING (Y22SE 2.2L)

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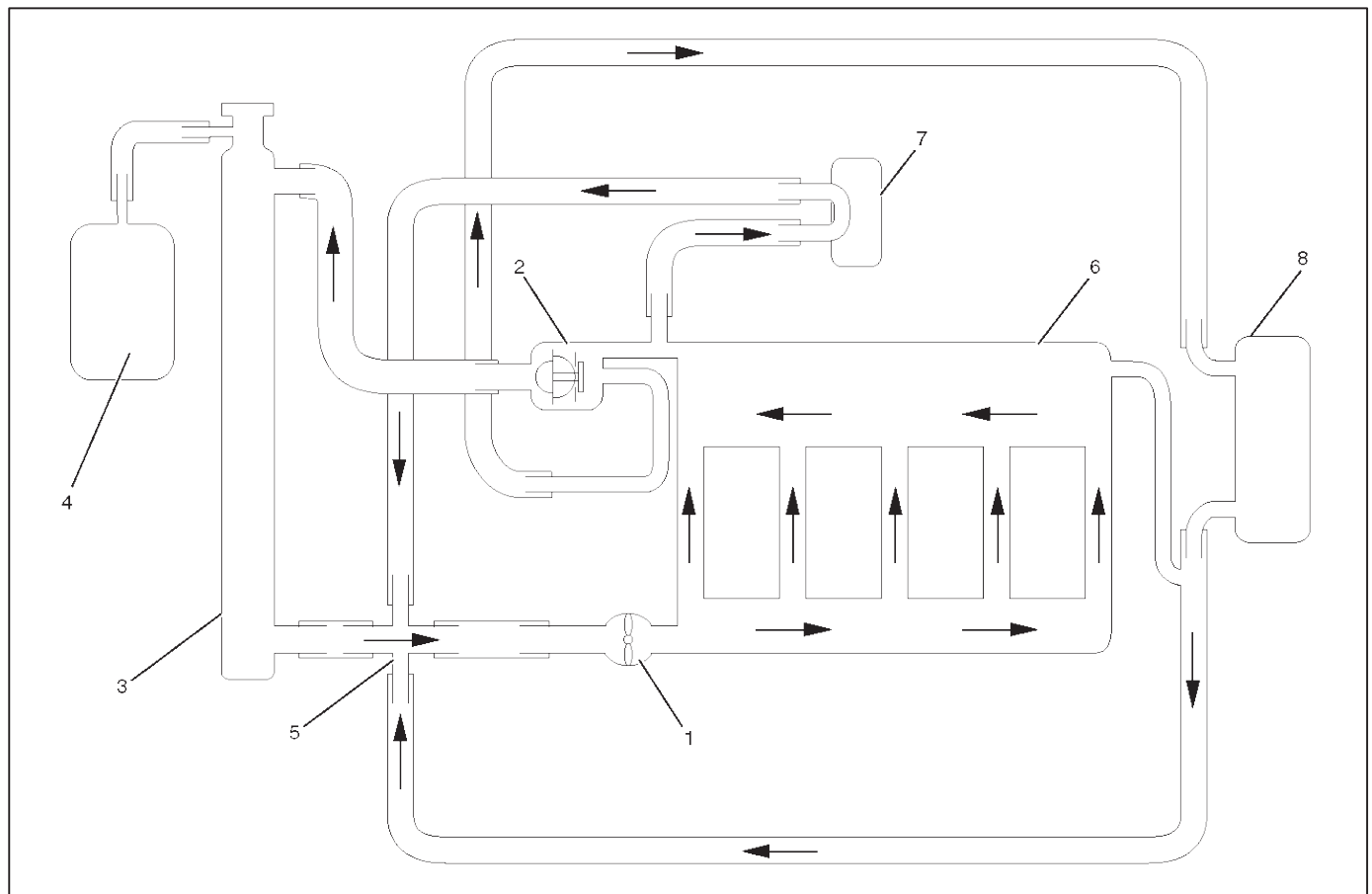
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Service Precaution

WARNING: THIS VEHICLE HAS A SUPPLEMENTAL RESTRAINT SYSTEM (SRS). REFER TO THE SRS COMPONENT AND WIRING LOCATION VIEW IN ORDER TO DETERMINE WHETHER YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING. WHEN YOU ARE PERFORMING SERVICE ON OR NEAR THE SRS COMPONENTS OR THE SRS WIRING, REFER TO THE SRS SERVICE INFORMATION. FAILURE TO FOLLOW WARNINGS COULD RESULT IN POSSIBLE AIR BAG DEPLOYMENT, PERSONAL INJURY, OR OTHERWISE UNNEEDED SRS SYSTEM REPAIRS.

CAUTION: Always use the correct fastener in the proper location. When you replace a fastener, use **ONLY** the exact part number for that application. ISUZU will call out those fasteners that require a replacement after removal. ISUZU will also call out the fasteners that require thread lockers or thread sealant. **UNLESS OTHERWISE SPECIFIED**, do not use supplemental coatings (Paints, greases, or other corrosion inhibitors) on threaded fasteners or fastener joint interfaces. Generally, such coatings adversely affect the fastener torque and the joint clamping force, and may damage the fastener. When you install fasteners, use the correct tightening sequence and specifications. Following these instructions can help you avoid damage to parts and systems.

General Description



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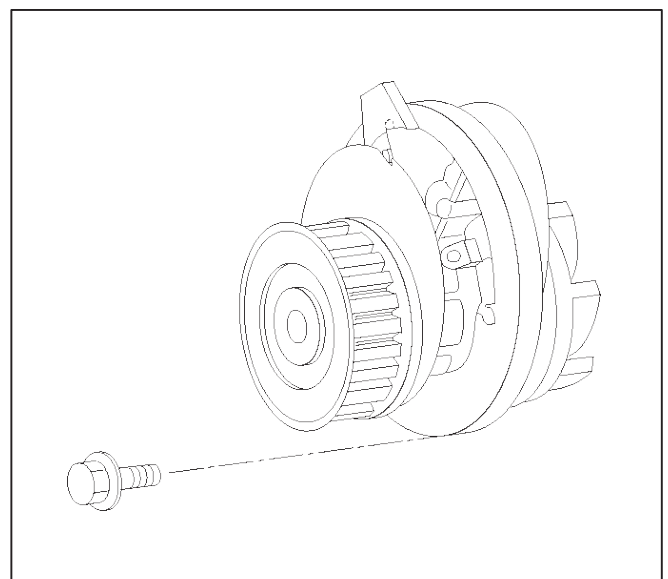
Legend

- | | |
|--------------------|-----------------------------|
| (1) Water Pump | (5) Coolant Distributor |
| (2) Thermostat | (6) Cylinder Block and Head |
| (3) Radiator | (7) Throttle Body |
| (4) Reservoir Tank | (8) Heater |

The Cooling System is a pressurized type, where the water pump, which is cambelt driven, forces the circulation of the coolant through the cylinder block and head. The thermostat regulates the flow of coolant between the radiator and the bypass circuit. The heater is part of the bypass circuit. The throttle body pre-heat is a separate circuit which is not regulated by the thermostat. An oil cooler may be fitted as part of this circuit.

Water Pump

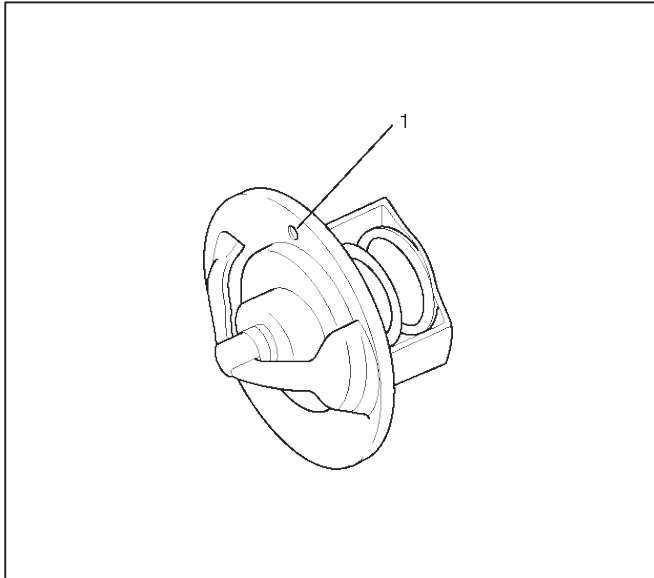
The water pump is centrifugal type and is driven by timing belt.



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Thermostat

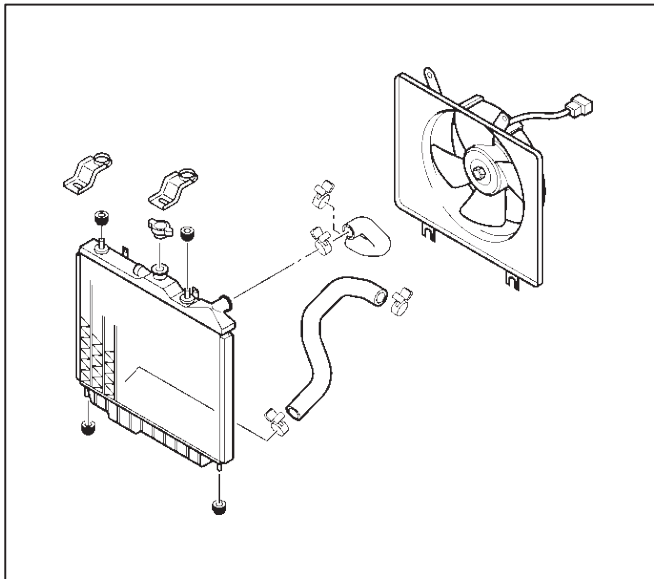
The thermostat is a bypass type and is a wax pellet type with a air hole (1).



031RW003

Radiator

The radiator is a flow type with corrugated fins.



110RX005

Antifreeze Solution

- Relation between Mixing ratio and Freezing temperature of the engine coolant varies with the ratio of antifreeze solution in water. Proper mixing ratio can be determined by referring to the chart. Supplemental inhibitors or additives claiming to increase cooling capability that have not been specifically approved by Isuzu are not recommended for addition to the cooling system.

- Calculating mixing ratio

Mixing ratio

$$= \frac{\text{Antifreeze solution (Lit/gal.)}}{\text{Antifreeze solution (Lit/gal.)} + \text{Water (Lit/gal.)}}$$

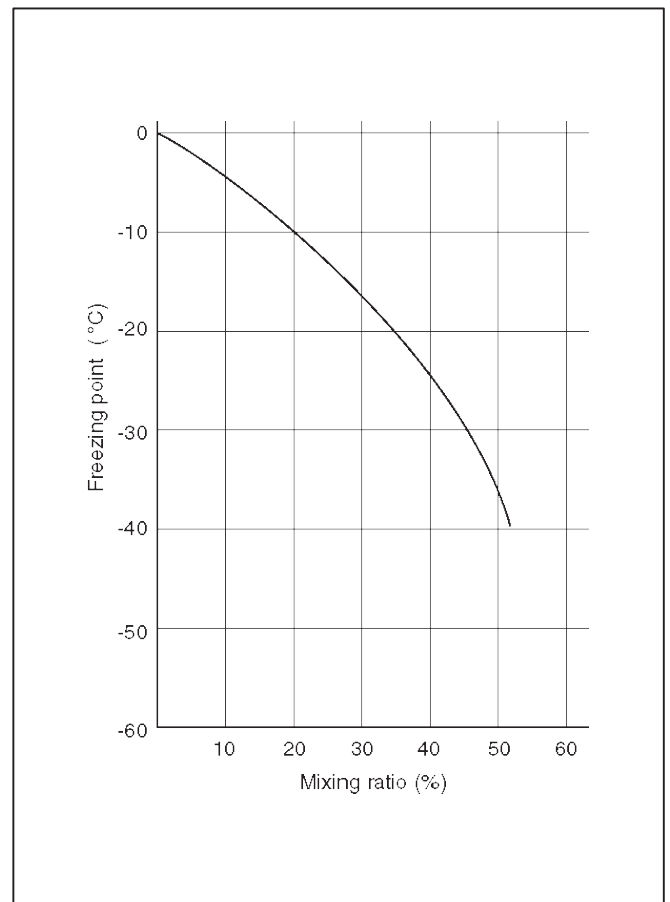
F06RW005

NOTE: Antifreeze solution + Water = Total cooling system capacity.

- **Total Cooling System Capacity**

6.9 Lit (7.3 US quarts) for M/T

7.0 Lit (7.4 US quarts) for A/T



111RW002

- Mixing ratio

Check the specific gravity of engine coolant in the cooling system temperature ranges from 0°C to 50°C using a suction type hydrometer, then determine the density of the engine coolant by referring to the table.

Diagnosis

Engine Cooling Trouble

Condition	Possible cause	Correction
Engine overheating	Low Engine Coolant level	Replenish
	Thermo mater unit faulty	Replace
	Faulty thermostat	Replace
	Faulty Engine Coolant temperature sensor	Repair or replace
	Clogged radiator	Clean or replace
	Faulty radiator cap	Replace
	Low engine oil level or use of improper engine oil	Replenish or change oil
	Clogged exhaust system	Clean exhaust system or replace faulty parts
	Faulty Throttle Position sensor	Replace throttle valve assembly
	Open or shorted Throttle Position sensor circuit	Repair or replace
	Damaged cylinder head gasket	Replace
Engine overcooling	Faulty thermostat	Replace
Engine slow to warm-up	Faulty thermostat	Replace
	Thermo unit faulty	Replace

Draining and Refilling Cooling System

Before draining the cooling system, inspect the system and perform any necessary service to ensure that it is clean, does not leak and is in proper working order. The engine coolant (EC) level should be between the "MIN" and "MAX" lines of reserve tank when the engine is cold. If low, check for leakage and add EC up to the "MAX" line. There should not be any excessive deposit of rust or scales around the radiator cap or radiator filler hole, and the EC should also be free from oil.

Replace the EC if excessively dirty.

1. Completely drain the cooling system by opening the drain plug at the bottom of the radiator.

2. Remove the radiator cap.

WARNING: TO AVOID THE DANGER OF BEING BURNED, DO NOT REMOVE THE CAP WHILE THE ENGINE AND RADIATOR ARE STILL HOT. SCALDING FLUID AND STEAM CAN BE BLOWN OUT UNDER PRESSURE.

3. Disconnect all hoses from the EC reserve tank.

Scrub and clean the inside of the reserve tank with soap and water. Flush it well with clean water, then drain it. Install the reserve tank and hoses.

4. Refill the cooling system with the EC using a solution that is at least 50 percent antifreeze but no more than 70 percent antifreeze.

5. Fill the radiator to the base of the filler neck.

Fill the EC reserve tank to "MAX" line when the engine is cold.

6. Block the drive wheels and firmly apply the parking brake. Shift an automatic transmission to "P" (Park) or a manual transmission to neutral.

7. Remove the radiator cap. Start the engine and warm it up at 2,500 ~ 3,000 rpm for about 30 minutes.

8. When the air comes out from the radiator filler neck and the EC level has gone down, replenish with the EC. Repeat this procedure until the EC level does not go down. Then stop the engine and install the radiator cap. Let the engine cool down.

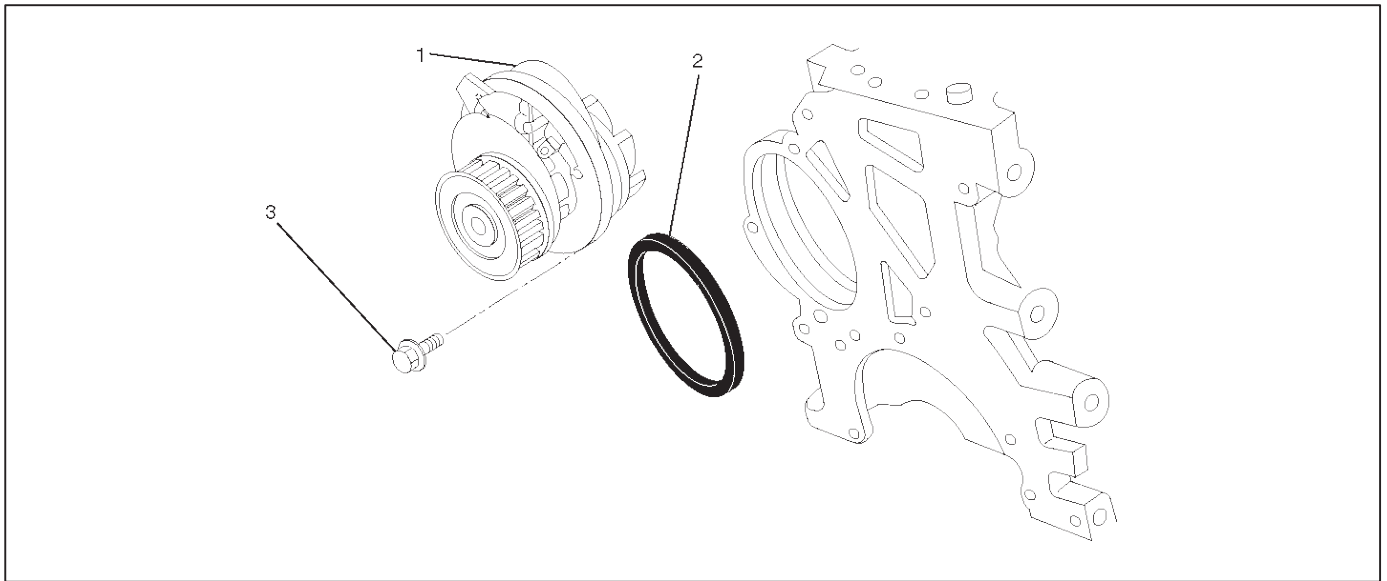
9. After the engine has cooled, replenish with EC up to the "MAX" line of the reserve tank.

10. Start the engine. With the engine running at 3,000 rpm, make sure there is no running water sound from the heater core (behind the center console).

11. If the running water sound is heard, repeat steps 8 to 10.

Water Pump

Water Pump and Associated Parts



030RW004

Legend

(1) Water Pump Assembly

(2) O Ring

(3) Bolt

Removal

1. Disconnect battery ground cable.
2. Drain coolant.
3. Radiator hose (on inlet pipe side).
4. Remove timing belt, refer to "Timing Belt" in this manual.
5. Remove the bolts (3) and water pump assembly.

Inspection

Make necessary repair and parts replacement if extreme wear or damage is found during inspection. Should any of the following problems occur, the entire water pump assembly must be replaced:

- Crack in the water pump body
- EC leakage from the seal unit
- Play or abnormal noise in the bearing
- Cracks or corrosion in the impeller

Installation

1. Before installing water pump, coat sealing surface with silicon grease.
2. Install water pump assembly and tighten bolts to the specified torque.

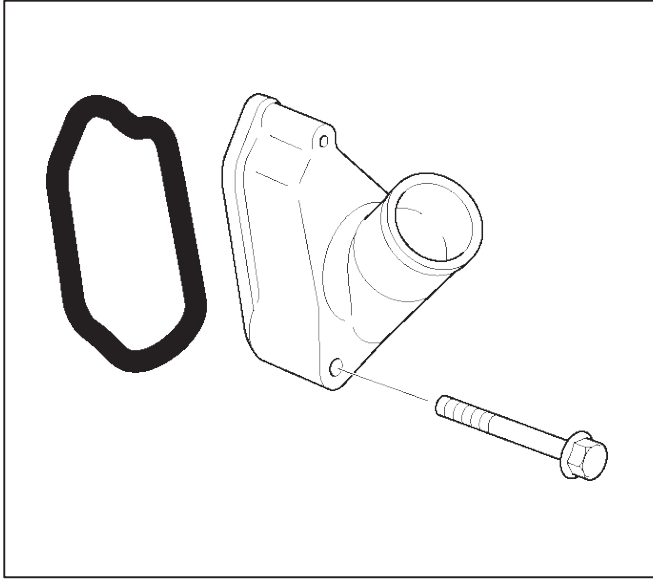
Torque: 25 N·m (18 lb ft)

3. Timing belt
 - Install timing belt, refer to timing belt installation step in "Timing Belt" in this manual.
4. Connect radiator hose and replenish EC.
5. Connect battery ground cable.

Thermostat

Removal

1. Disconnect battery ground cable.
2. Drain engine coolant from the radiator and engine.
3. Disconnect radiator hose from the inlet pipe.
4. Remove thermostat housing.



031RW012

Installation

1. Before installing thermostat, coat sealing surface with silicon grease.
2. Install gasket.
3. Install thermostat housing and tighten bolts to the specified torque.

Torque: 15 N·m (11 lb ft)

4. Installation rubber hose.
5. Replenish engine coolant (EC).
6. Start engine and check for EC leakage.

Inspection

Suspend the thermostat in a water-filled container using thin wire. Place a thermometer next to the thermostat.

Do not directly heat the thermostat.

Gradually increase the water temperature. Stir the water so that the entire water is same temperature.

Confirm the temperature when the valve first begins to open.

Valve opening temperature 92°C (197.6°F)

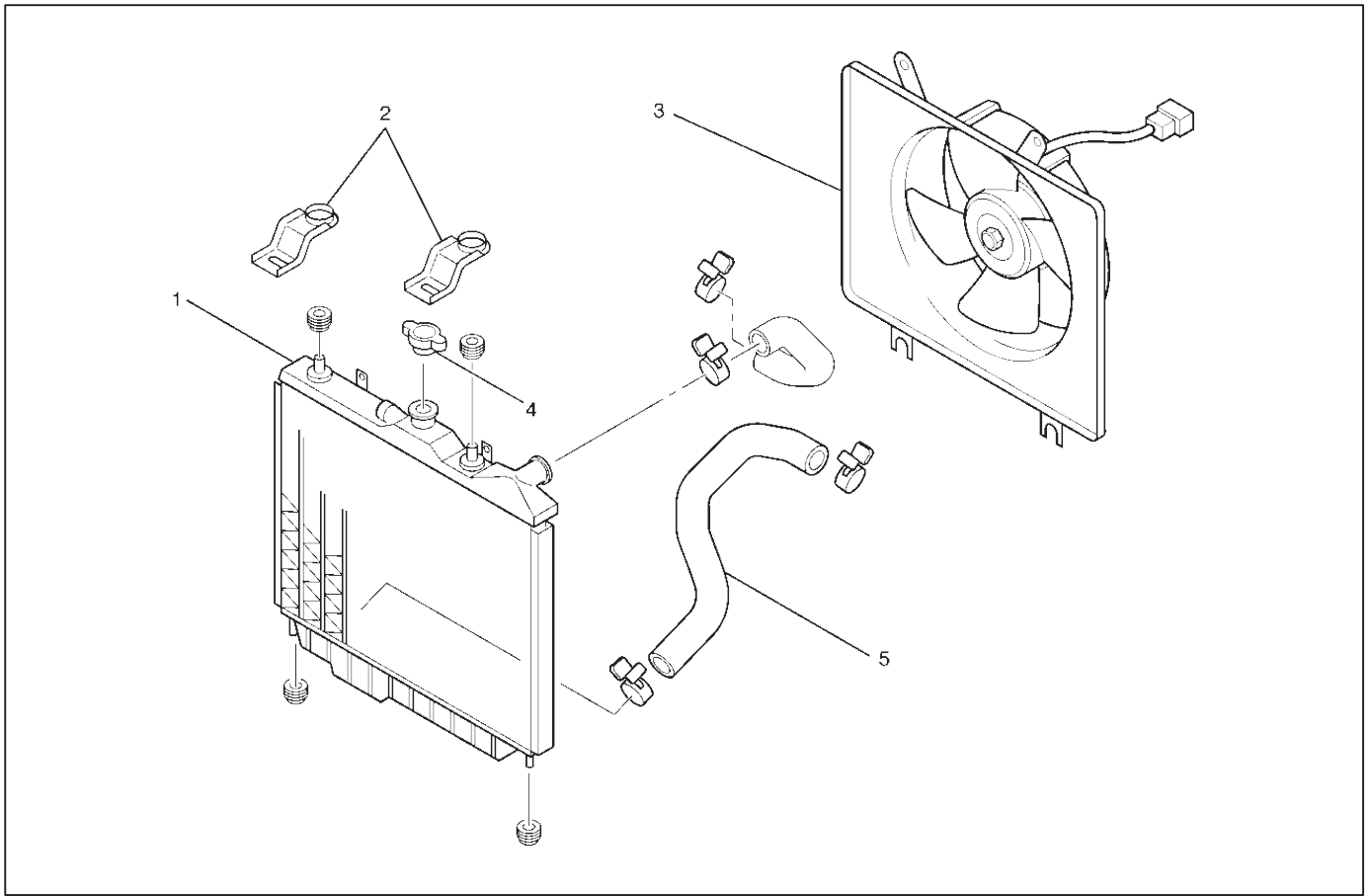
Confirm the temperature when the valve is fully opened.

Valve full open temperature 107°C (224.6°F)

Make necessary repair and parts replacement if extreme wear or damage is found during inspection.

Radiator

Radiator and Associated Parts

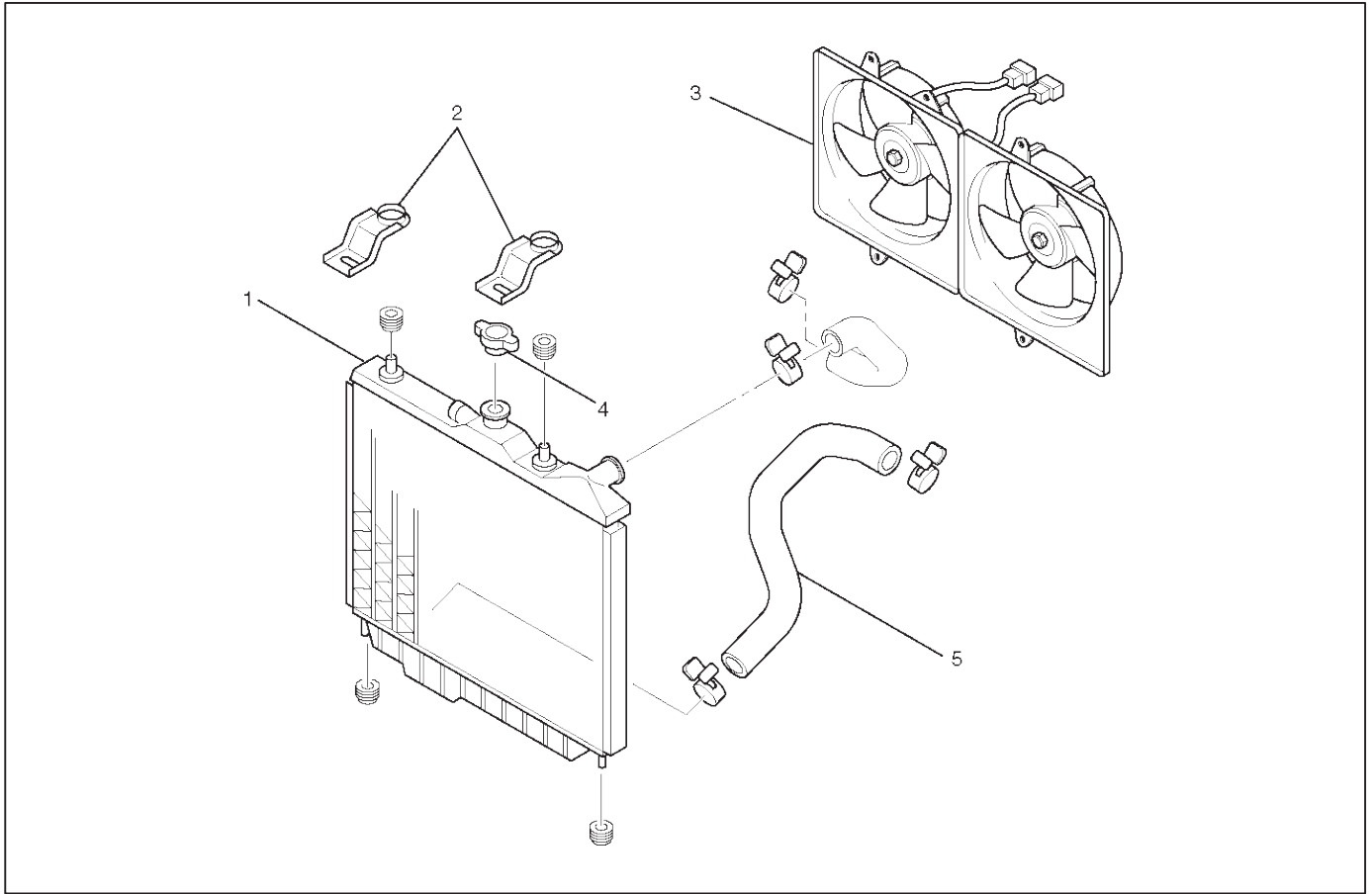


110RX004

Legend for Manual Transmission (M/T)

- (1) Radiator
- (2) Bracket

- (3) Cooling Fan Assembly
- (4) Radiator Cap
- (5) Radiator Hose



110R100004

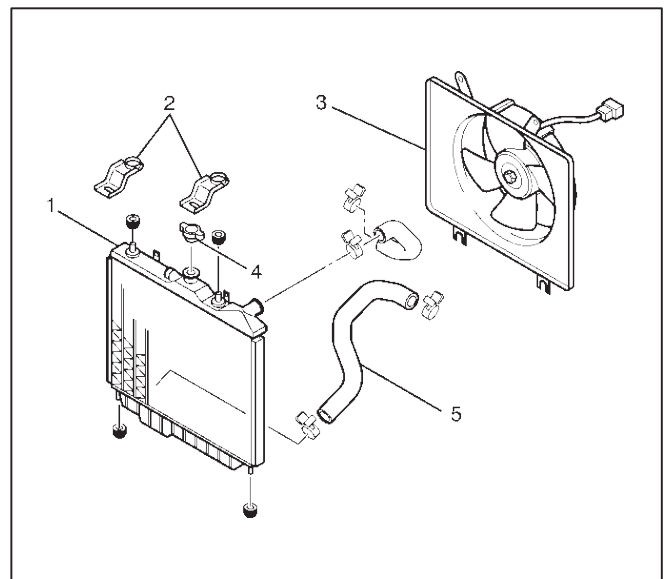
Legend for Automatic Transmission (A/T)

- (1) Radiator
- (2) Bracket

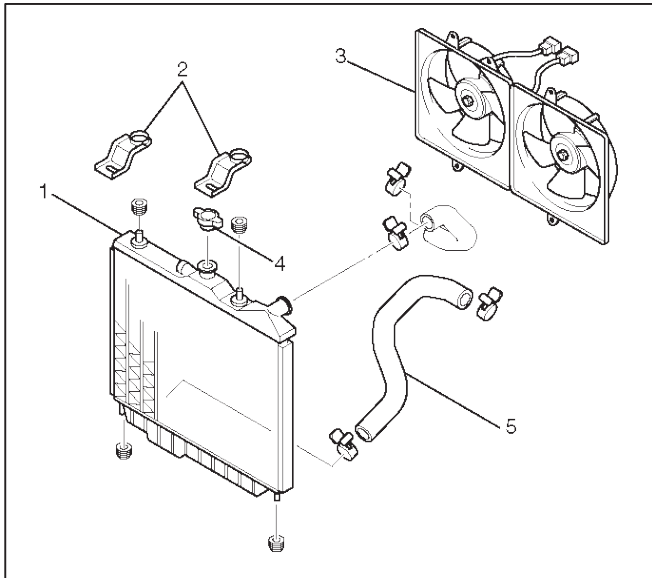
- (3) Cooling Fan Assembly
- (4) Radiator Cap
- (5) Radiator Hose

Removal

1. Disconnect battery ground cable.
2. Disconnect cooling fan motor connector. (For M/T one connector, for A/T two connectors)
3. Loosen a drain plug to drain EC. (Engine coolant)
4. Disconnect radiator inlet hose and outlet hose from the engine.
5. Remove fan assembly, bolts on upper sides and the bottom.
6. Disconnect the reservoir tank hose from radiator.
7. Remove bracket(2).



110RX003



110R10005

8. Lift out the radiator assembly with hose.

9. Remove rubber cushions on both upper sides and the bottom.

Inspection

Radiator Cap

Measure the valve opening pressure of the pressurizing valve with a radiator filler cap tester.

Replace the cap if the valve opening pressure is outside the standard range.

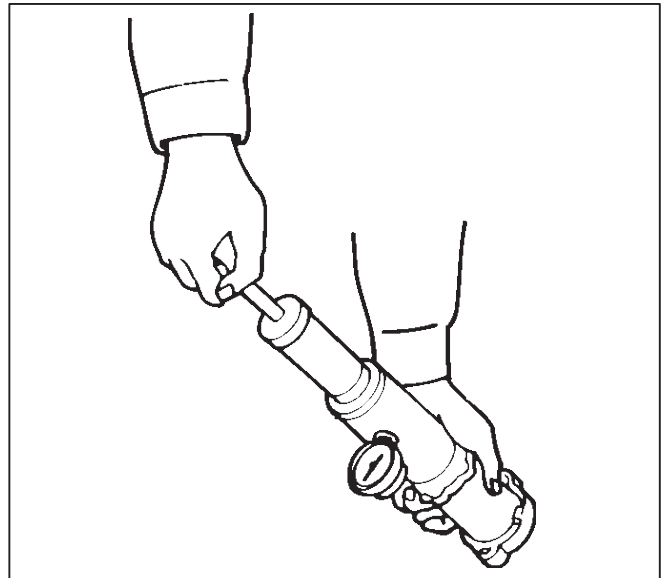
**Valve opening pressure kPa (psi) 93.3 ~ 122.7
(13.5 ~17.8)**

Cap tester: J-24460-01

Adapter: J-33984-A

Check the condition of the vacuum valve in the center of the valve seat side of the cap. If considerable rust or dirt is found, or if the valve seat cannot be moved by hand, clean or replace the cap.

**Valve opening vacuum kPa (psi) 1.96 ~ 4.91
(0.28 ~ 0.71)**



110RS006

Radiator Core

1. A bent fin may result in reduced ventilation and overheating may occur. All bent fins must be straightened. Pay close attention to the base of the fin when it is being straightened.

2. Remove all dust, bugs and other foreign material.

Flushing the Radiator

Thoroughly wash the inside of the radiator and the engine coolant passages with cold water and mild detergent. Remove all sign of scale and rust.

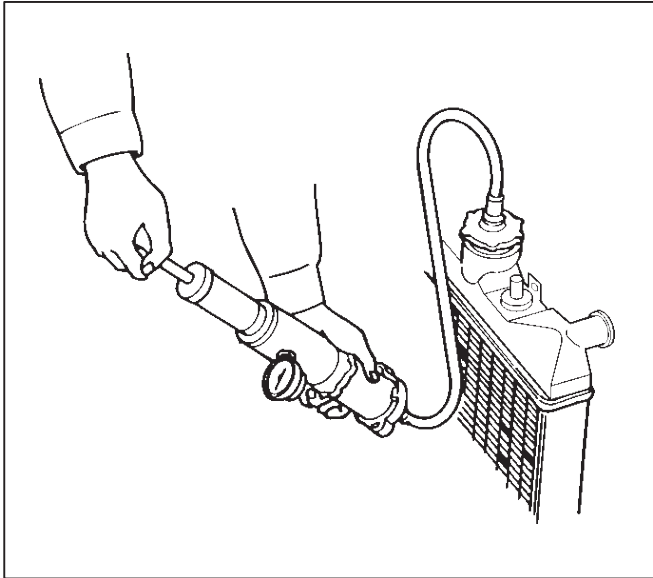
Cooling System Leakage Check

Use a radiator cap tester to force air into the radiator through the filler neck at the specified pressure of 147 kPa (21.3 psi) with a cap tester:

- Leakage from the radiator
- Leakage from the coolant pump
- Leakage from the water hoses
- Check the rubber hoses for swelling.

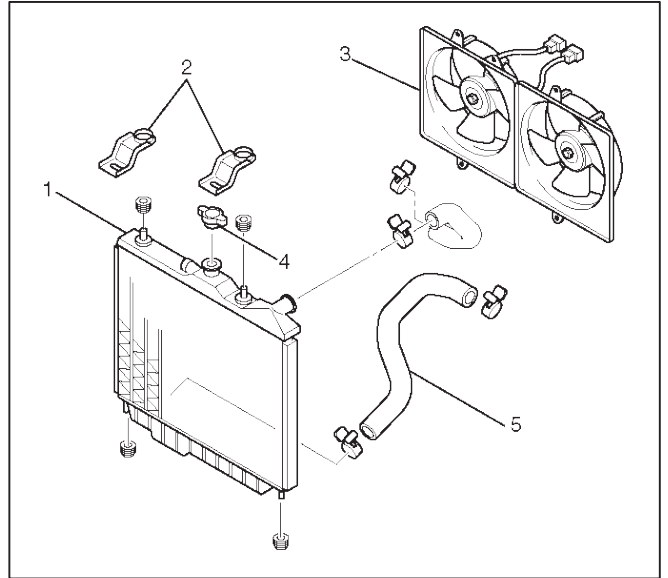
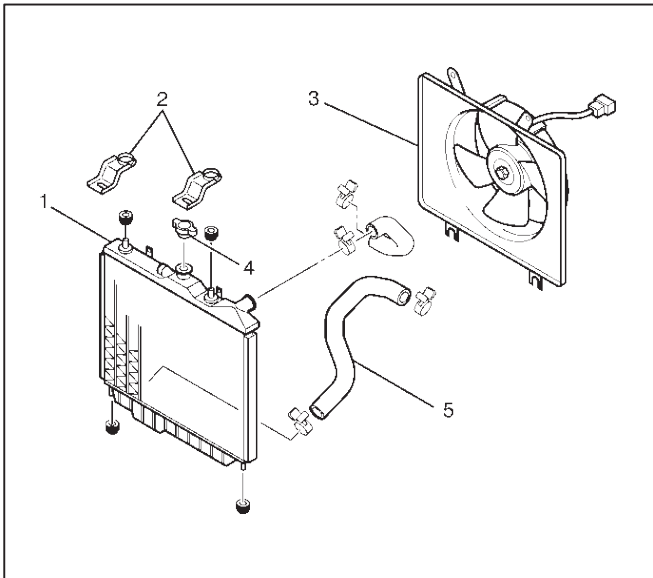
Cap tester: J-24460-01

Adapter: J-33984-A



Installation

1. Install rubber cushions on both sides of radiator bottom.
2. Install radiator assembly with hose, taking care not to damage the radiator core.
3. Install bracket and support the radiator upper tank with the bracket and secure the radiator.
4. Connect reserve tank hose.
5. Install fan assembly (3).
6. Connect radiator inlet hose and outlet hose to the engine.



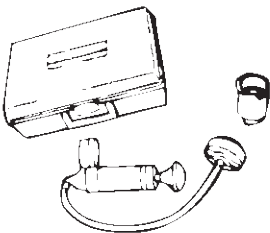
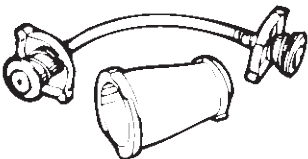
7. Connect battery ground cable.
8. Pour engine coolant up to filler neck of radiator, and up to MAX mark of reservoir tank.
Important operation (in case of 100% engine coolant change) procedure for filling with engine coolant.
 - Remove radiator cap.
 - Fill with engine coolant (EC) to the radiator filler neck.
 - Fill with EC to the "MAX" line on the reservoir.
 - Start the engine with the radiator cap removed and bring to operating temperature by running engine at 2,500 ~ 3,000 rpm for 30 minutes.
 - By EC temperature gauge reading make sure that the thermostat is open.
 - If air bubbles come up to the radiator filler neck, replenish with EC. Repeat until the EC level does not drop any further. Install the radiator cap and stop the engine.
 - Replenish EC to the "MAX" line on the reservoir and leave as it is until the engine gets cool.
 - After the engine gets cool, start the engine and make sure there is no water running noise heard from the heater core while the engine runs at 3000 rpm.
 - Should water running noise be heard, repeat the same procedure from the beginning.

Main Data and Specifications

General Specifications

Transmission Type	Manual Transmission	Automatic Transmission
Cooling system	Engine Coolant forced circulation	
Radiator	(1 tube in row) Tube type corrugated	
Heat radiation capacity	62.8 kw (54000 Kcal/h)	73.8 kw (63500 Kcal/h)
Heat radiation area	7.6773m ² (11900 in ²)	9.9817m ² (15472 in ²)
Radiator front area	0.2639m ² (409 in ²)	0.2639m ² (409 in ²)
Radiator dry weight (with fan)	55.4 N (5.65 kg)	88.3 N (9.0 kg)
Radiator cap valve opening pressure	108 kpa (15.7 psi)	
Engine coolant capacity	1.8 Lit (1.9 US quarts)	1.9 Lit (2.0 US quarts)
Engine coolant pump	Centrifugal type	
Thermostat	Bypass type	
Engine coolant total capacity	6.9 Lit (7.3 US quarts)	7.0 Lit (7.4 US quarts)

Special Tool

ILLUSTRATION	TOOL NO. TOOL NAME
 901RW072	J-24460-01 Tester; radiator cap
 901RW073	J-33984-A Adapter; radiator cap