

COOLING

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1. General

- The engine cooling system consists of a down-flow radiator which features high heat-dissipation performance, an electric-motor-driven fan, a water pump, a thermostat, and an engine coolant temperature sensor.
- The reservoir tank is made of translucent resin and enables easy confirmation of the coolant level. Also, coolant should be added to the reservoir tank when replenishment is necessary.
- The ECM controls the operation of the radiator main fan and subfan depending on the signals from the engine coolant temperature sensor, vehicle speed sensor and A/C switch.

2. Cooling Circuits

The cooling system operates in three different phases depending on the temperature of the engine coolant.

- 1st phase (thermostat closed)

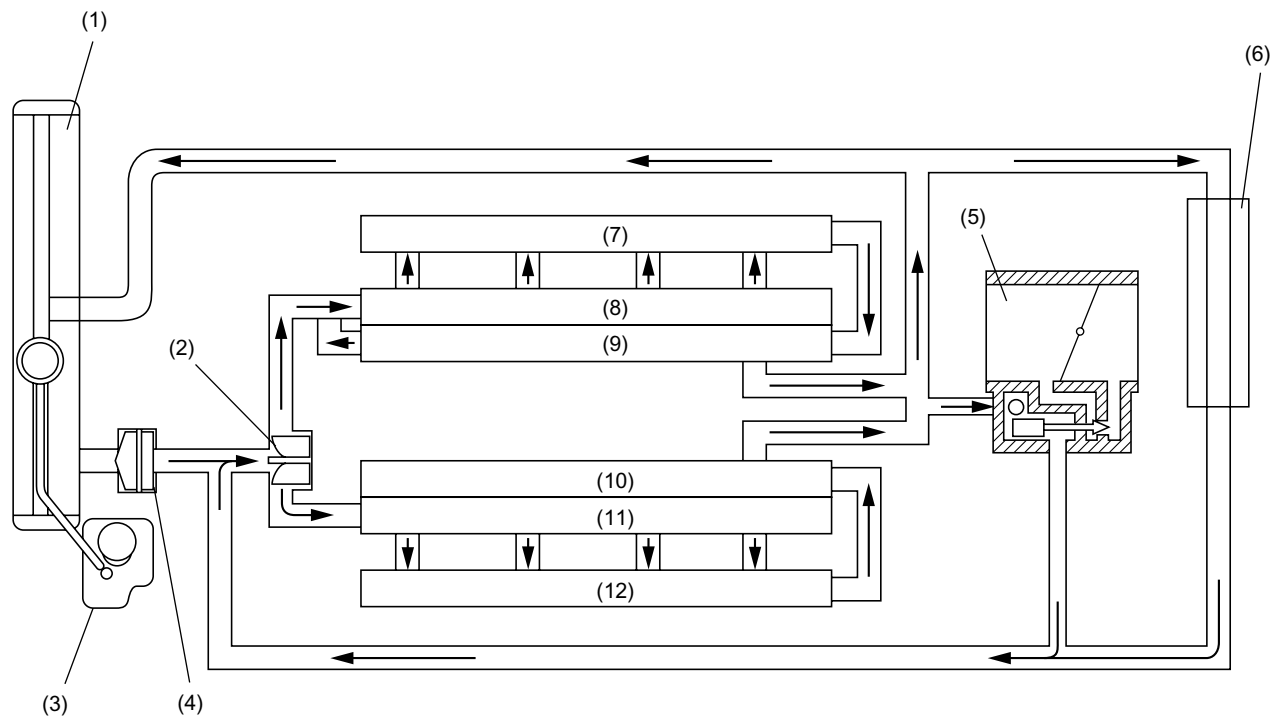
When the engine coolant temperature is below 76°C (169°F), the thermostat remains closed. The coolant flows through the heater circuit. This permits the engine to warm up quickly.

- 2nd phase (thermostat open)

When the engine coolant temperature is above 76 — 80°C (169 — 176°F), the thermostat opens. The coolant flows through the radiator where it is cooled.

- 3rd phase (thermostat open and radiator fan operating)

When the engine coolant temperature sensor sends a signal indicating a temperature above 95°C (203°F) to the ECM, it causes the radiator fan (or fans) to operate.



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- (1) Radiator
- (2) Water pump
- (3) Engine coolant reservoir tank
- (4) Thermostat
- (5) Throttle body
- (6) Heater core

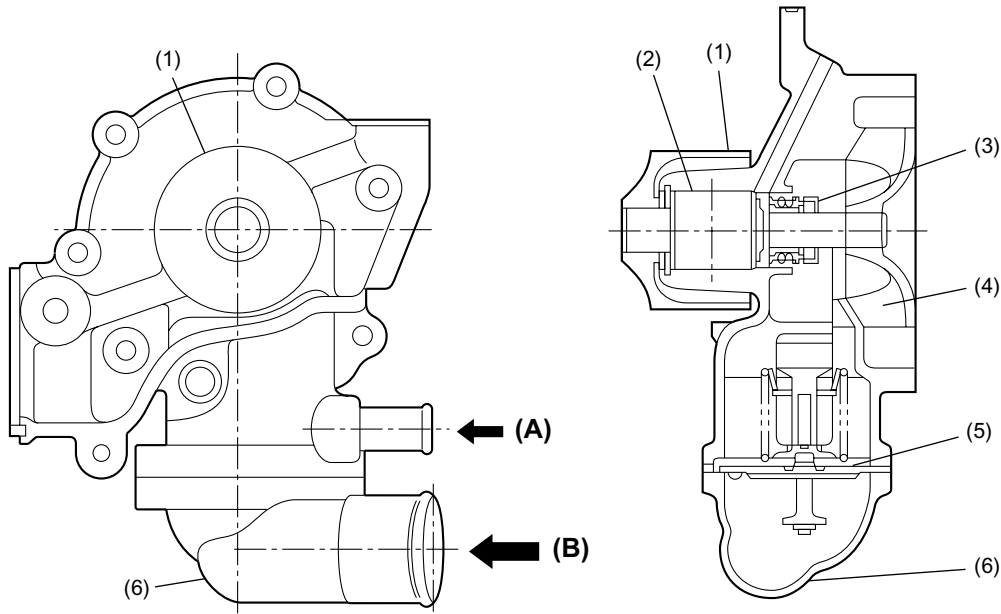
- (7) Cylinder head RH
- (8) Cylinder jacket RH
- (9) Cylinder block RH
- (10) Cylinder block LH
- (11) Cylinder jacket LH
- (12) Cylinder head LH

WATER PUMP

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3. Water Pump

The water pump is located in the front portion of the left bank cylinder block and is driven by the engine through the timing belt. The thermostat is fitted into the coolant inlet at the bottom of the water pump. When the pump impeller rotates, the coolant is drawn into the pump from the lower pipe (which is connected to the radiator hose) via the thermostat. It then flows along the perimeter of the impeller and then is discharged for circulation through a circuit depending on the coolant temperature.



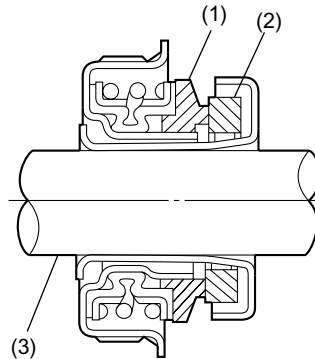
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- (A) From heater circuit
- (B) From radiator

- (1) Pulley
- (2) Ball bearing
- (3) Mechanical seal
- (4) Impeller
- (5) Thermostat
- (6) Thermostat cover

4. Mechanical Seal

The mechanical seal has its seat tightly fitted on the water pump shaft. Since it is a hermetic seal forming an integral part of the water pump, the water pump cannot be disassembled.



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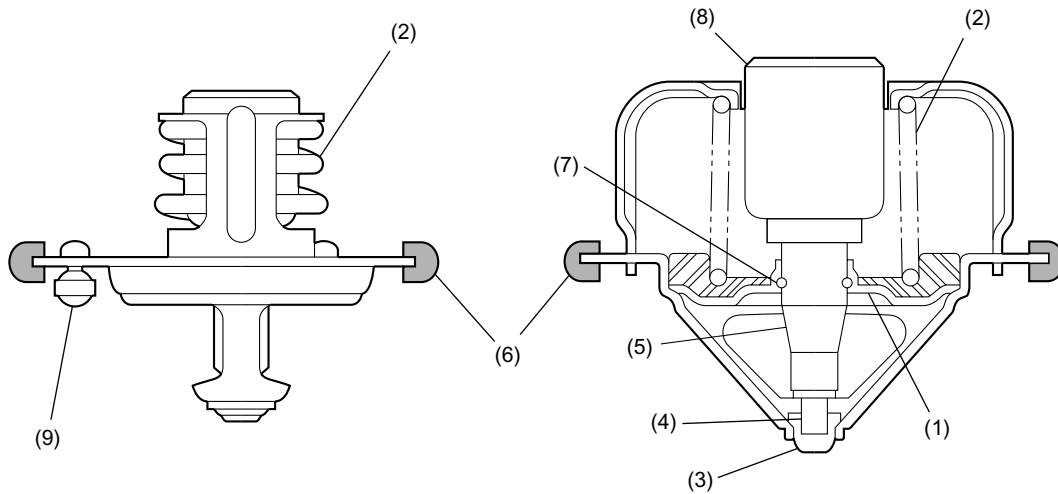
- (1) Carbon seal
- (2) Ceramics seat
- (3) Water pump shaft

THERMOSTAT

COOLING

5. Thermostat

The thermostat has a totally-enclosed wax pellet which expands as the coolant temperature increases. It opens and closes accurately at the preset temperatures and features high durability.



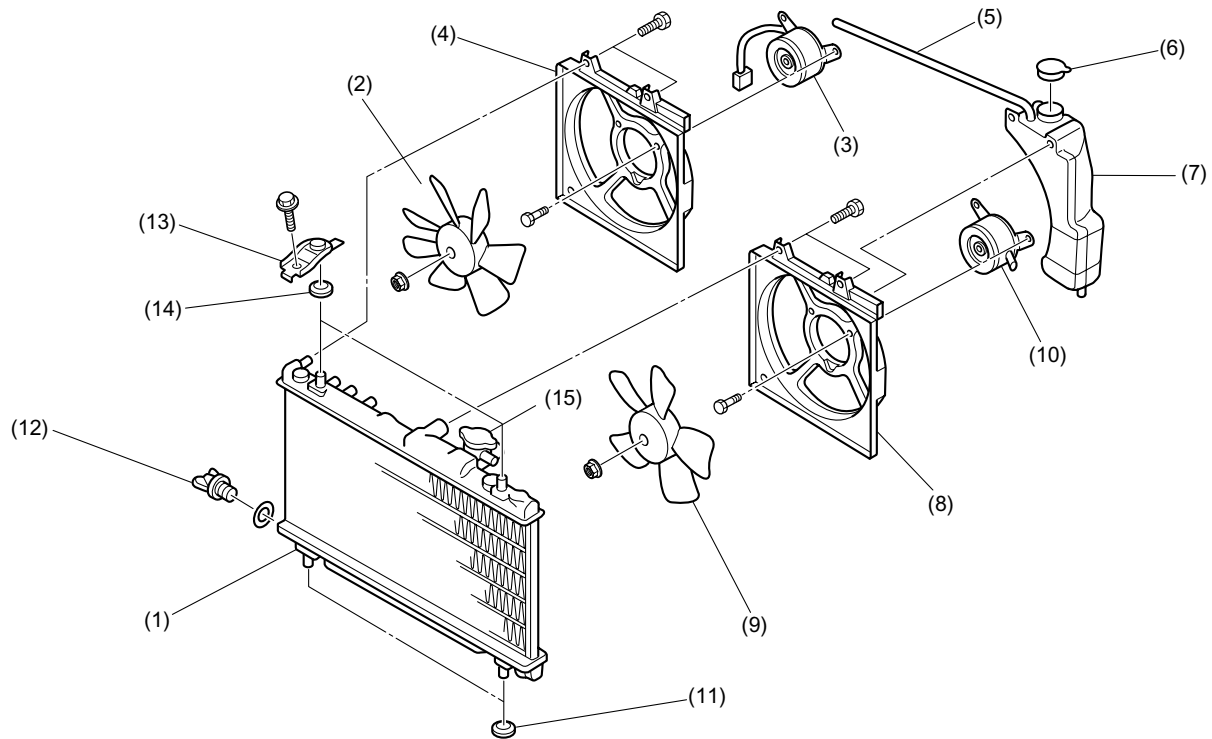
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- | | | |
|-------------|--------------------|------------------|
| (1) Valve | (4) Piston | (7) Stop ring |
| (2) Spring | (5) Guide | (8) Wax element |
| (3) Stopper | (6) Rubber packing | (9) Jiggle valve |

6. Radiator Fan

A: DESCRIPTION

Each radiator fan is made of plastic. It is driven by an electric motor which is retained on a shroud.



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|--|------------------------------|
| (1) Radiator | (9) Radiator main fan |
| (2) Radiator sub fan (models with A/C) | (10) Radiator main fan motor |
| (3) Radiator sub fan motor (models with A/C) | (11) Lower cushion |
| (4) Radiator subfan shroud (models with A/C) | (12) Drain plug |
| (5) Overflow hose | (13) Upper bracket |
| (6) Reservoir tank cap | (14) Upper cushion |
| (7) Reservoir tank | (15) Radiator cap |
| (8) Radiator main fan shroud | A/C: Air conditioning system |

RADIATOR FAN

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B: FUNCTION

1. MODELS WITHOUT A/C

The ON-OFF control of the radiator fan is performed by the ECM which receives signals from the engine coolant temperature sensor and the vehicle speed sensor.

Vehicle speed	Engine coolant temperature		
	Lower than 95°C (203°F)	Between 96 and 99°C (205 and 210°F)	Higher than 100°C (212°F)
	Operation of radiator fans	Operation of radiator fans	Operation of radiator fans
Lower than 19 km/h (12 MPH)	OFF	ON	ON
Between 20 and 69 km/h (12 and 43 MPH)	OFF	ON	ON
Between 70 and 89 km/h (43 and 55 MPH)	OFF	OFF	ON
Higher than 90 km/h (56 MPH)	OFF	OFF	ON

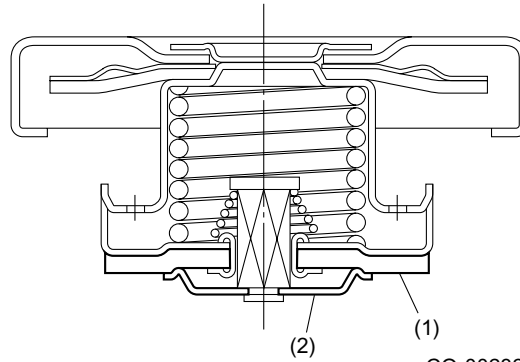
2. MODELS WITH A/C

The ON-OFF control of the radiator main fan and sub fan is performed by the ECM which receives signals from the engine coolant temperature sensor, vehicle speed sensor and the A/C switch.

Vehicle speed	A/C compressor load	Engine coolant temperature					
		Lower than 95°C (203°F)		Between 96 and 99°C (205 and 210°F)		Higher than 100°C (212°F)	
		Operation of radiator fans		Operation of radiator fans		Operation of radiator fans	
		Main fan	Subfan	Main fan	Subfan	Main fan	Subfan
Lower than 19 km/h (12 MPH)	OFF	OFF	OFF	ON	OFF	ON	ON
	ON	ON	ON	ON	ON	ON	ON
Between 20 and 69 km/h (12 and 43 MPH)	OFF	OFF	OFF	ON	OFF	ON	ON
	ON	ON	ON	ON	ON	ON	ON
Between 70 and 89 km/h (43 and 55 MPH)	OFF	OFF	OFF	OFF	OFF	ON	ON
	ON	ON	OFF	ON	ON	ON	ON
Higher than 90km/h (56 MPH)	OFF	OFF	OFF	OFF	OFF	ON	ON
	ON	OFF	OFF	ON	OFF	ON	ON

7. Radiator Cap

The radiator cap has a pressure valve and a vacuum valve. When the radiator inner pressure becomes higher than specified, the pressure valve opens to send coolant to the reservoir tank. Also, when the radiator inner pressure becomes lower than the atmospheric pressure during the cooling down phase, the vacuum valve opens to send back coolant from the reservoir tank to the radiator. These functions prevent damage to the radiator components.



- (1) Pressure valve
- (2) Vacuum valve

RADIATOR CAP

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