

ENGINE COOLING SYSTEM

2-5

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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 fan, a water pump, a thermostat, and an engine coolant temperature sensor.
- The reserve tank is designed to eliminate the need for replenishing coolant.
- On models without an air conditioner, the ECM or ECM/TCM sends an ON or OFF switch signal to the radiator fan in response to signals from the engine coolant temperature sensor. On models with an air conditioner, the ECM or ECM/TCM sends ON or OFF (and LO or HI: Turbo model) switch signals to the radiator main fan and sub fan in response to signals from the engine coolant temperature sensor, vehicle speed sensor 2 and A/C switch.

2. Cooling Lines

This cooling system operates in three steps depending on the temperature of the engine coolant flowing through the cooling circuit.

- 1st step ... With thermostat closed

At the engine coolant temperature of below 76°C (169°F), the thermostat remains closed and the engine coolant flows through the bypass and heater circuits.

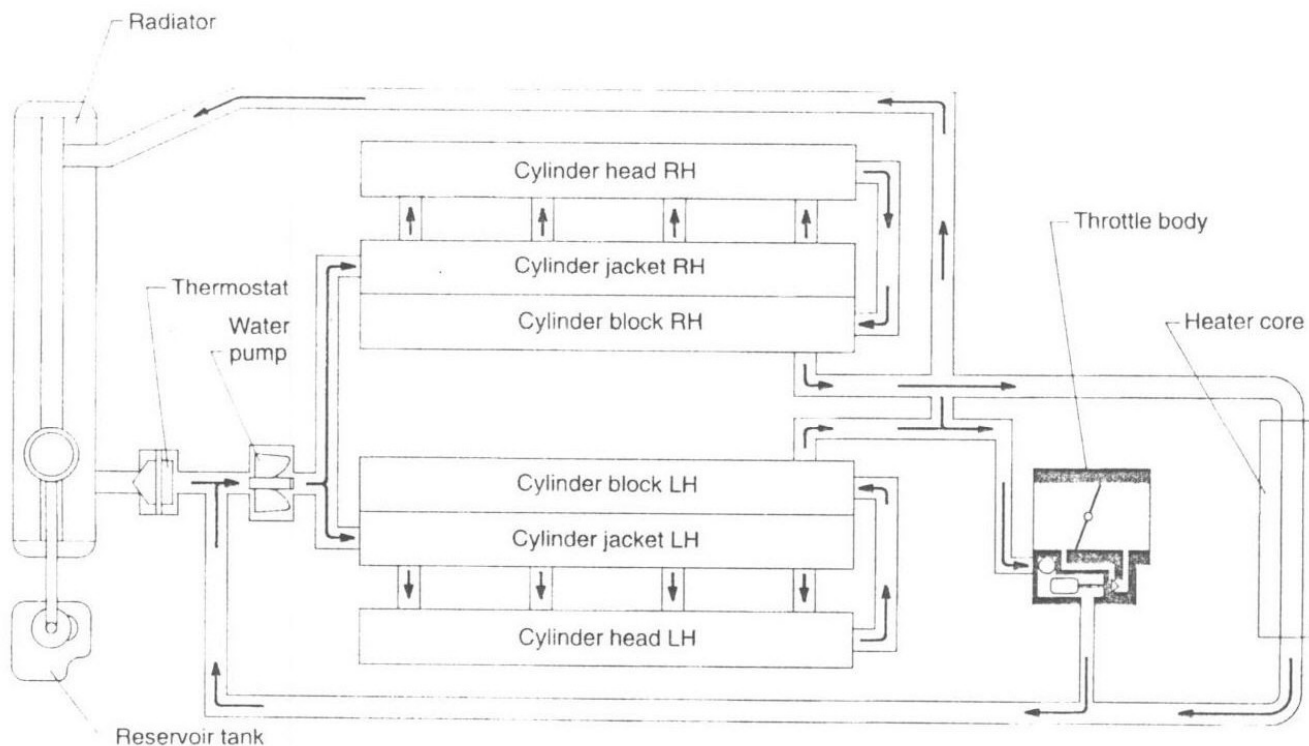
This permits the engine to warm up quickly.

- 2nd step ... With thermostat opened

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

- 3rd step ... With radiator fan operating

When the engine coolant temperature rises above 95°C (203°F), the ECM or ECM/TCM sends ON signal to the radiator fan in response to signal from the engine coolant temperature sensor and the radiator fan rotates.

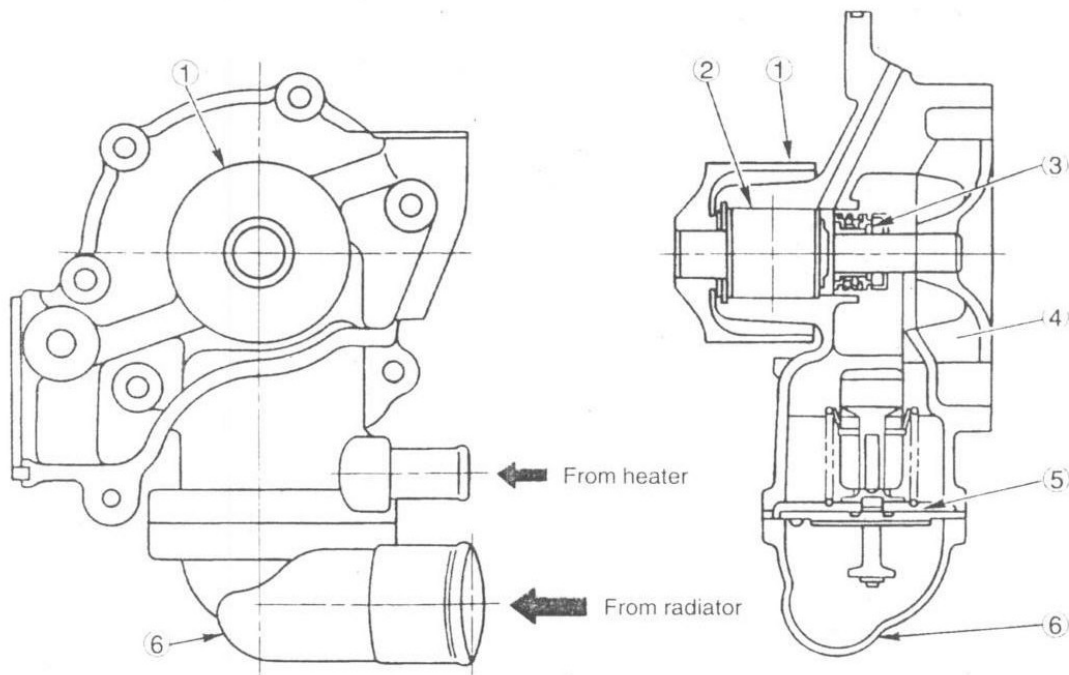


3. Water Pump

A: MECHANISM

The water pump is located on the left front portion of the cylinder block and is driven by the timing belt. The thermostat is built into the engine coolant inlet located on the lower side of the water pump. When the impeller rotates, engine coolant is drawing into the water 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 is delivered to the engine's engine coolant passage.

B: NON-TURBO MODEL



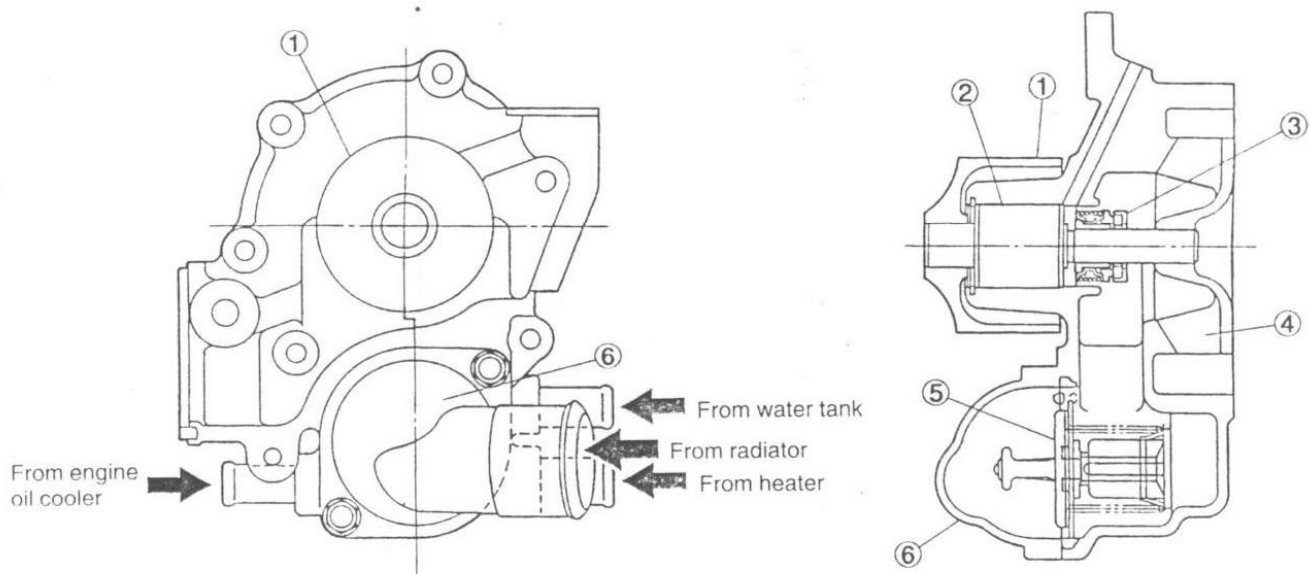
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- 1 Pulley
- 2 Ball bearing

- 3 Mechanical seal
- 4 Impeller

- 5 Thermostat
- 6 Thermostat case

C: TURBO MODEL



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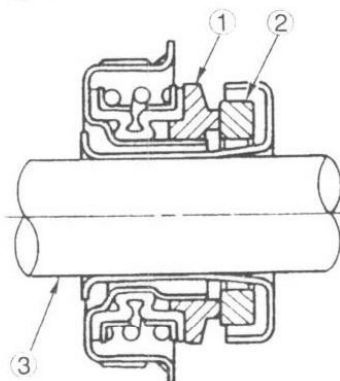
- ① Pulley
- ② Ball bearing

- ③ Mechanical seal
- ④ Impeller

- ⑤ Thermostat
- ⑥ Thermostat case

4. Mechanical Seal

The mechanical seal has its seat pressed into the water pump shaft to form the seal and water pump as a single unit. With this design, the water pump cannot be disassembled.

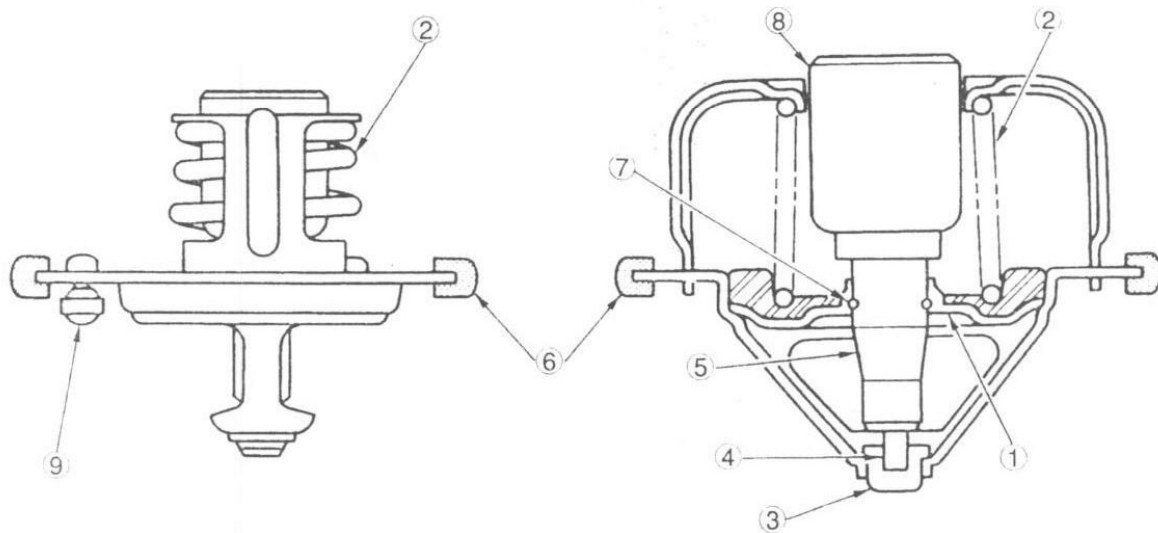


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- ① Carbon seal
- ② Ceramics seat
- ③ Water pump shaft

5. Thermostat

The thermostat is powered to open the valve by a totally-enclosed wax pellet which expands with increased temperature. It provides the sure open-close operation of the valve and features high durability.



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- 1 Valve
- 2 Spring
- 3 Stopper

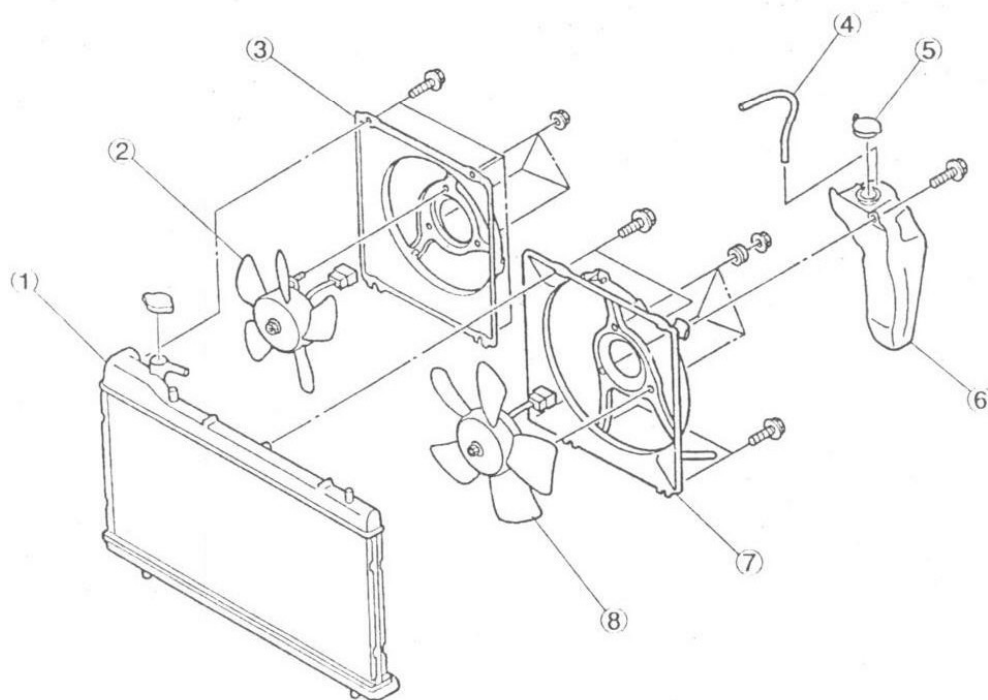
- 4 Piston
- 5 Guide
- 6 Gum packing

- 7 Stop ring
- 8 Wax element
- 9 Jiggle valve

6. Radiator Fan

A: DESCRIPTION

- The radiator fan is made of plastic. That is installed to the electric motor, and is located onto radiator straight by shroud.
- The vehicle without air conditioning has the radiator main fan only. Thus, the vehicle with air conditioning has the radiator sub fan, too.



- 1 Radiator
- 2 Radiator sub fan & motor
- 3 Radiator sub fan shroud
- 4 Over flow hose

- 5 Reservoir tank cap
- 6 Reservoir tank
- 7 Radiator main fan shroud
- 8 Radiator main fan & motor

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B: FUNCTION**1. WITHOUT A/C MODEL**

The ON-OFF (and Hi-Low: Turbo model) control of the radiator fan is governed by the ECM or ECM/TCM which receives signals sent from the engine coolant temperature sensor.

Non-turbo model

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

Turbo model

Vehicle speed	Engine coolant temperature		
	Less than 92°C (Less than 198°F)	Between 92 and 95°C (Between 198 and 203°F)	More than 96°C (More than 205°F)
	Operation of radiator main fan	Operation of radiator main fan	Operation of radiator main fan
Less than 19 km/h (Less than 12 MPH)	OFF	OFF	Low
Between 20 and 69 km/h (Between 12 and 43 MPH)	OFF	OFF	Hi
Between 70 and 105 km/h (Between 43 and 65 MPH)	OFF	OFF	Hi
More than 106 km/h (More than 66 MPH)	OFF	OFF	Hi

2. WITH A/C MODEL

On models which are equipped with an air conditioning system, the ECM or ECM/TCM receives signals sent from the engine coolant temperature sensor, vehicle speed sensor 2 and A/C switch. These signals simultaneously turn ON or OFF (and Hi or Low: Turbo model) the radiator main fan and radiator sub fan.

Non-turbo model

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

Turbo model

Vehicle speed	A/C compressor	Engine coolant temperature					
		Less than 92°C (Less than 198°F)		Between 92 and 95°C (Between 198 and 203°F)		More than 96°C (More than 205°F)	
		Operation of radiator fan		Operation of radiator fan		Operation of radiator fan	
		Main	Sub	Main	Sub	Main	Sub
Less than 19 km/h (Less than 12 MPH)	OFF	OFF	OFF	OFF	OFF	Low	Low
	ON	Low	Low	Hi	Hi	Hi	Hi
Between 20 and 69 km/h (Between 12 and 43 MPH)	OFF	OFF	OFF	OFF	OFF	Hi	Hi
	ON	Hi	Hi	Hi	Hi	Hi	Hi
Between 70 and 105 km/h (Between 43 and 65 MPH)	OFF	OFF	OFF	OFF	OFF	Hi	Hi
	ON	Low	Low	Low	Low	Hi	Hi
More than 106 km/h (More than 66 MPH)	OFF	OFF	OFF	OFF	OFF	Hi	Hi
	ON	OFF	OFF	Low	OFF	Hi	Hi