

## CHAPTER SIX

### COOLING SYSTEM

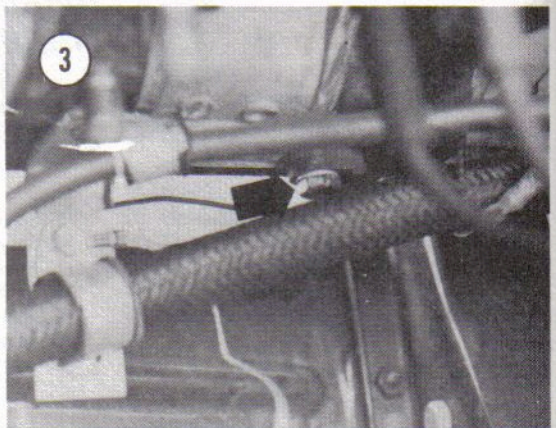
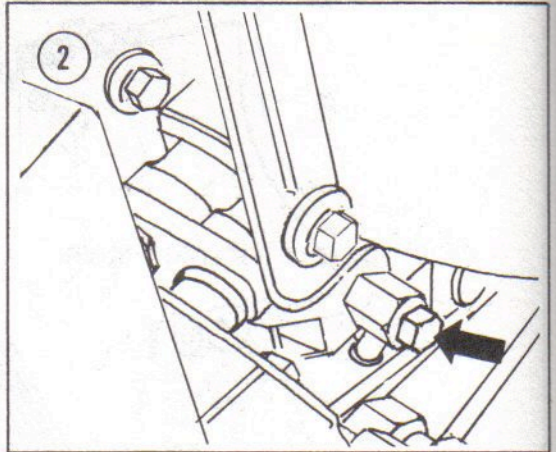
The RX-2 and RX-3 use a closed-type cooling system with a corrugated-fin radiator, expansion tank, centrifugal water pump, and bottom-bypass thermostat. A 4-blade fluid-driven fan cools the system. **Figure 1** shows the cooling system components.

Coolant flows from the water pump, through the engine front housing, along the left-hand side and top of the engine, through the rear housing, and along the right-hand side and bottom of the engine to the front housing.

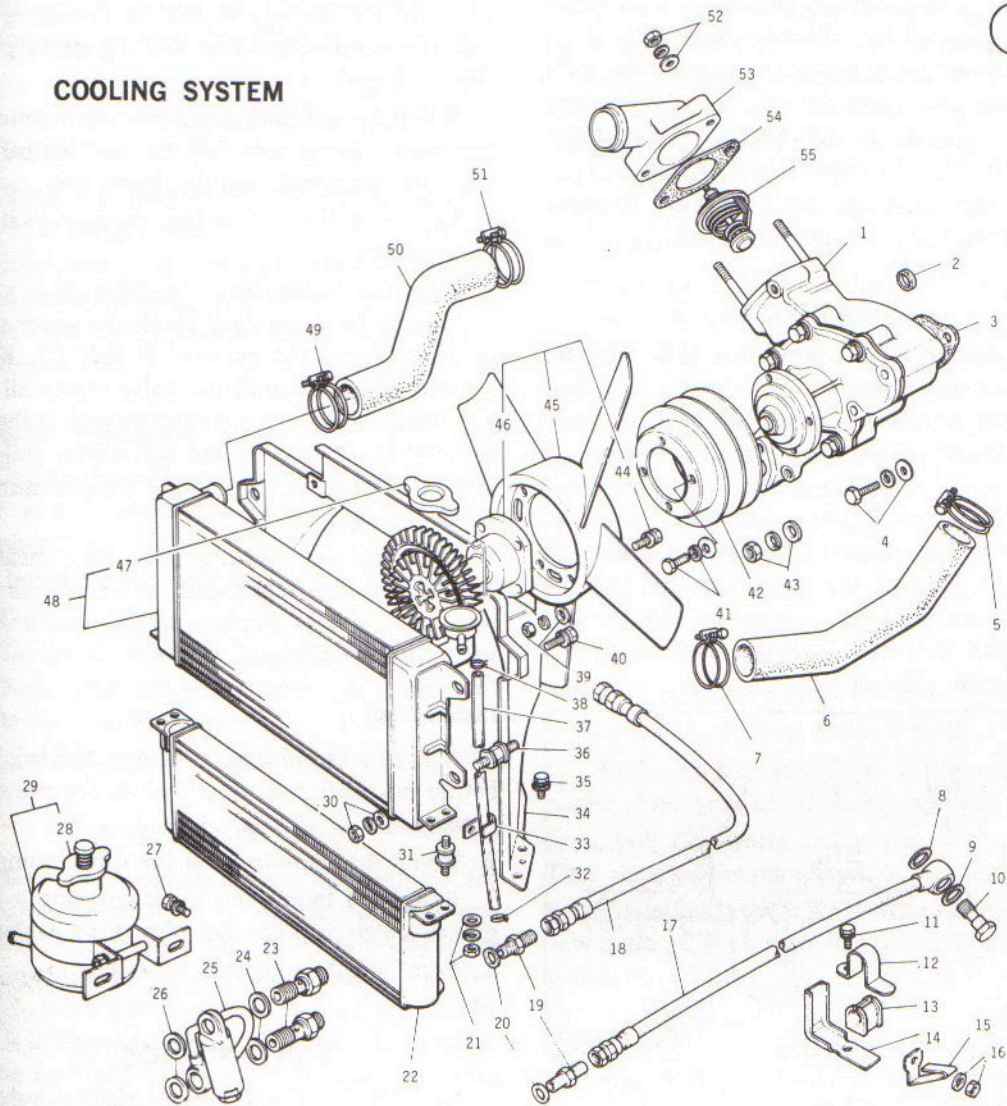
#### COOLING SYSTEM FLUSHING

The cooling system should be flushed and the coolant replaced at intervals specified in Chapter Two. Flush as follows.

1. Remove the expansion tank cap. Open the radiator and intermediate housing drain plugs (**Figures 2 and 3**) and drain the cooling system.
2. Reinstall the drain plugs.
3. Fill the cooling system with clean, mineral-free water. If desired, a chemical flushing agent may be used, following the manufacturer's instructions.
4. Warm the engine to normal operating temperature, then let it run for about an hour.
5. Drain the cooling system completely.



COOLING SYSTEM

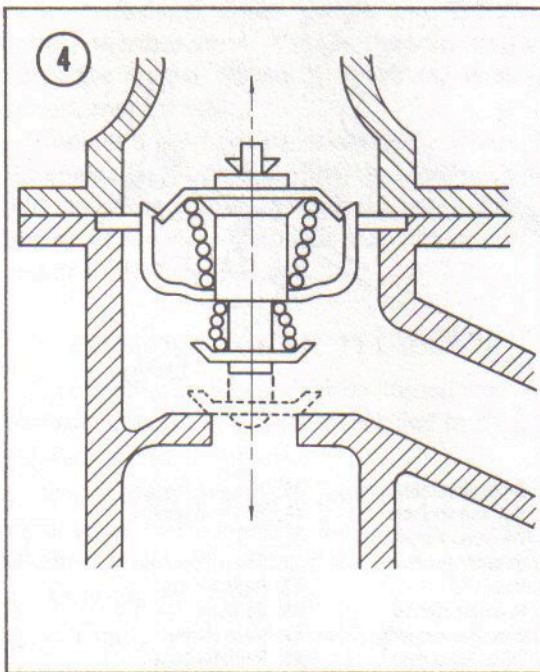


- |                     |                        |                            |                        |
|---------------------|------------------------|----------------------------|------------------------|
| 1. Water pump       | 15. Bracket            | 29. Expansion tank         | 43. Nut and washers    |
| 2. Gasket           | 16. Nut and washer     | 30. Nut and washers        | 44. Bolt and washer    |
| 3. Gasket           | 17. Oil cooler hose    | 31. Vibration mount        | 45. Fan                |
| 4. Bolt and washers | 18. Oil cooler hose    | 32. Hose clamp             | 46. Fan clutch         |
| 5. Hose clamp       | 19. Union joints       | 33. Hose clip              | 47. Radiator cap       |
| 6. Radiator hose    | 20. Gaskets            | 34. Radiator shroud        | 48. Radiator           |
| 7. Hose clamp       | 21. Nut and washers    | 35. Bolt and washers       | 49. Hose clamp         |
| 8. Gasket           | 22. Oil cooler         | 36. Vibration mount        | 50. Radiator hose      |
| 9. Gasket           | 23. Connectors         | 37. Hose to expansion tank | 51. Hose clamp         |
| 10. Oil hose bolt   | 24. Gaskets            | 38. Hose clamp             | 52. Nut and washers    |
| 11. Hose clamp bolt | 25. Bypass valve       | 39. Nut and washers        | 53. Thermostat housing |
| 12. Hose clamp      | 26. Gaskets            | 40. Bolt and washer        | 54. Gasket             |
| 13. Rubber bushing  | 27. Bolt and washer    | 41. Bolt and washers       | 55. Thermostat         |
| 14. Bracket         | 28. Expansion tank cap | 42. Fan pulley             |                        |

6. Fill the cooling system with a 50-50 mixture of ethylene glycol-based anti-freeze and water, even if you live in a climate which doesn't require this degree of freeze protection. The anti-freeze makes a good corrosion inhibitor. Total coolant capacity is 8.5 quarts. The radiator should be full, the expansion tank half full.
7. Run the engine and check for leaks. Recheck coolant level and top up if necessary.

### THERMOSTAT

The thermostat is mounted in a housing on top of the water pump (Figure 1). Opening and closing of the thermostat is controlled by a wax pellet which expands when heated and contracts when cooled. When the engine is cold, the thermostat opens the bypass passage and closes the passage to the radiator (Figure 4). Coolant recirculates through the engine, preventing hot spots. When the engine warms up, the thermostat closes the bypass passage and opens the outlet to the radiator.



The engine must not be run without a thermostat, or approximately half the coolant will bypass the radiator, causing overheating. A conventional thermostat must not be used for the same reason.

### Removal and Testing

1. Drain the cooling system by removing the radiator and intermediate housing drain plugs (Figure 2 and 3).
2. Referring to Figure 1, remove the thermostat housing retaining nuts. Lift the housing off the water pump and take out the thermostat.
3. Submerge the thermostat in water with a thermometer.
4. Heat the water until the thermostat valve just begins to open, then check the water temperature. It should be 180° F (82° C). Keep heating the water until the valve opens all the way, then check the temperature again. It should be 203° F (95° C). If the thermostat fails to open or opens at the wrong temperature, it should be replaced.
5. When the thermostat is fully open, measure the lift of the thermostat valve. It should be 0.31 in. (8mm). Replace the thermostat if the valve lift is insufficient.

### Installation

1. If a new thermostat is being installed, test before installation as described in the previous procedure.
2. Install the thermostat in the water pump.
3. Install the thermostat housing, using a new gasket coated on both sides with gasket sealer.
4. Install the thermostat housing nuts.

### FAN AND HUB

The RX-2 and RX-3 use a viscous-hub fan which slips at high speeds. This reduces the horsepower required to turn the fan, as well as reducing fan noise. If oil leaks from the fan hub, or if the engine overheats when other parts of the cooling system are in good condition, have the fan hub checked by a Mazda dealer. Correct fan speed is 1,500-2,000 rpm at 2,000 engine rpm, and 2,000-4,000 rpm at 4,000 engine rpm. Replace the hub if defective.

### Removal/Installation

1. Loosen and remove the fan belt.
2. Referring to Figure 1, unbolt the fan from the eccentric shaft pulley.

3. Separate the fan drive from the fan.
4. Installation is the reverse of these steps. Adjust fan belt tension as described in Chapter Two.

### RADIATOR

#### Inspection

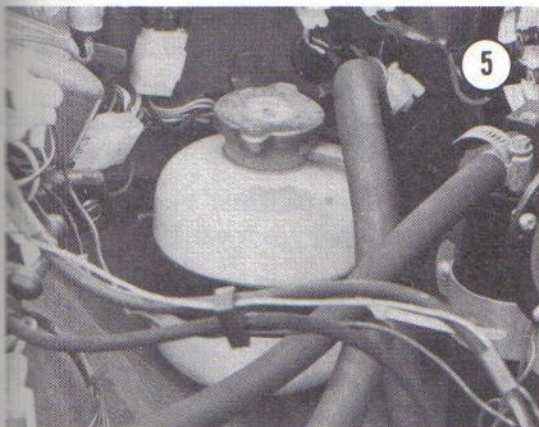
1. Check the radiator for coolant residue or rust, indicating a leak.
2. Check the cooling fins for damage, and the air passages for clogging. If 20 per cent or more of the core surface area is clogged, the radiator must be replaced.

#### Removal/Installation

1. Drain the cooling system by opening the radiator and intermediate housing drain plugs (Figures 2 and 3).
2. Unbolt the shroud from the radiator and lift it out. See Figure 1.
3. Disconnect the hoses from the radiator.
4. Detach the radiator from the oil cooler and car body, then lift it out.
5. Installation is the reverse of these steps.

### EXPANSION TANK

Check the expansion tank (**Figure 5**) for cracks or other damage. Replace if necessary. Check the cap with a cap tester, following tester manufacturer's instructions. A service station will do this if you don't have the equipment. The cap is designed to open at 12.8 psi (0.9 kg/cm<sup>2</sup>). If the cap fails to open or opens at the wrong pressure, replace it.



### WATER PUMP

A defective water pump may warn of impending failure by making noise. If the water pump is suspect, check it as described in this section. Water pump repair kits are available from Mazda dealers, and a machine shop can do the necessary press work.

#### Inspection

1. Check the water pump for leaks. If coolant has been leaking from the hole in the pump body, the seal is defective and should be replaced.
2. Loosen the fan belt. Shake the fan blades up and down, and pull the fan in and out. If there is excessive play, the water pump bearings are worn and should be replaced.

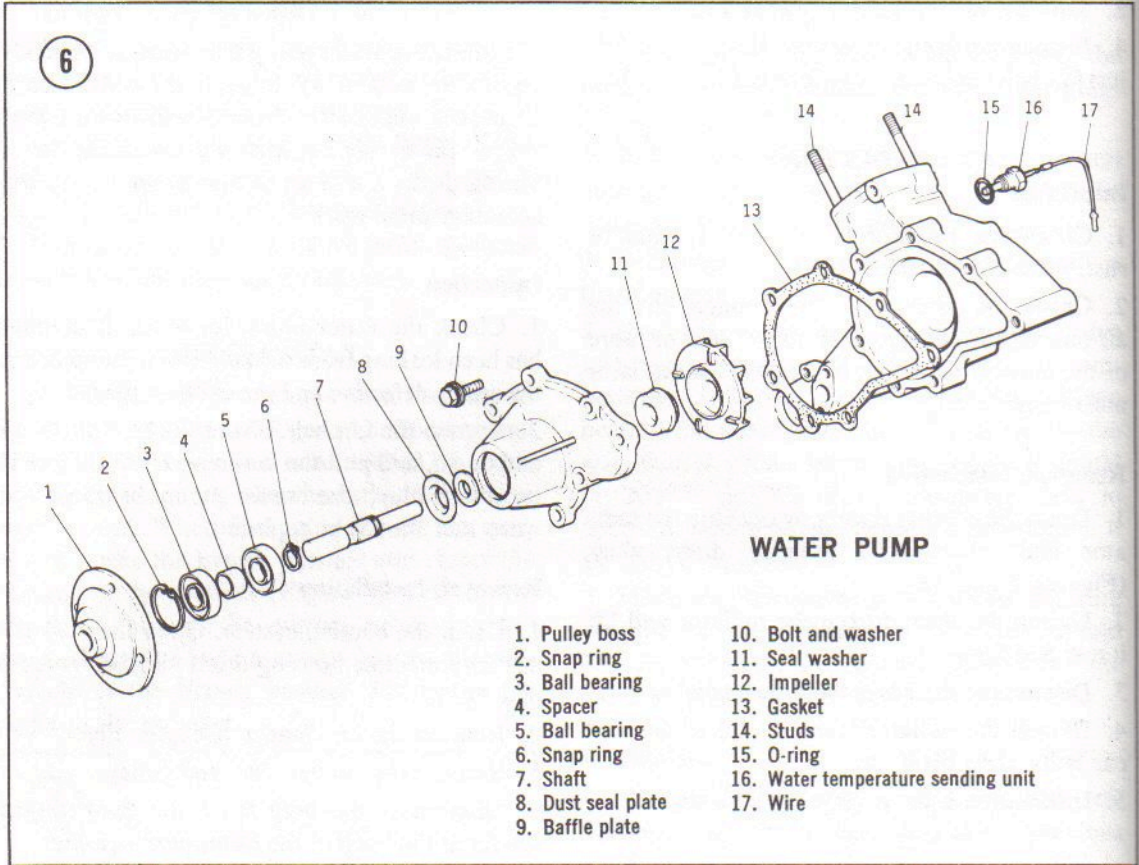
#### Removal/Installation

1. Drain the cooling system. Open the radiator and intermediate housing drain plugs (Figures 2 and 3).
2. Remove the air cleaner (Chapter Five).
3. Remove the fan belt, fan, and pulley.
4. Disconnect the wire from the temperature sender at the back of the water pump casing.
5. Unbolt the water pump from the engine. Then separate the pump casing and pump body.
6. Installation is the reverse of these steps. Use new gaskets, coated on both sides with gasket sealer.

#### Disassembly

**Figure 6** is an exploded view of the water pump. Refer to it as needed for the following procedures.

1. Press the water pump shaft out of the pulley boss and dust seal plate.
2. Remove the snap ring that secures the shaft and bearings.
3. Place the pump body in a press support tool. Press the shaft out of the impeller. Remove the impeller, then press the shaft and bearings out of the pump body.
4. Remove the seal (11, Figure 6) from the pump body.
5. Slide the baffle plate (9) and dust shield (8) off the shaft.



6. Remove the bearing stop ring (6).
7. Remove the bearings and spacer from the shaft. Use a gear puller if necessary.

### Assembly

1. Install the bearing stop ring (6, Figure 6) in the groove on the water pump shaft.
2. Install the dust shield and baffle plate over the rear end of the shaft.
3. Press the rear bearing onto the shaft. The sealed side of the bearing faces the rear.
4. Press the bearing and shaft into the pump body. Slide the spacer onto the shaft. Fill the space between the 2 bearings  $\frac{1}{3}$  full of grease.
5. Press the front bearing onto the shaft until the snap ring groove is exposed. The sealed side of the bearing faces the front. Install snap ring.
6. Slide the dust seal plate onto the shaft. Press the pulley flange on until it is flush with the front of the shaft.
7. Coat the seal with grease and install it in the rear side of the pump body.
8. Press the impeller on until it is flush with the rear end of the shaft.