

COOLING SYSTEM

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COOLING SYSTEM

The completely sealed cooling system consists of a corrugated fin type radiator with sealed filler cap, expansion tank with pressure cap, centrifugal water pump, wax pellet type thermostat, and a four-blade fan.

The radiator and the expansion tank are connected by hose. When engine is overheated, the coolant in the radiator flows out and led into the expansion tank through the hose. The coolant is then returned to the radiator by negative pressure which builds up in the cooling system when the engine cools down. The coolant should be changed every two years or every 48,000 km (32,000 miles).

3-A. COOLANT CIRCUIT

The water pump, which is driven by a belt from the crankshaft, delivers the coolant from the radiator through the inlet pipe to the water jackets on the cylinder block and the cylinder head.

When the engine is cold, the thermostat is closed and the coolant in the water jacket does not circulate back into the radiator but is delivered back to the inlet pipe after passing through the hot spot on the inlet manifold to preheat the air and fuel mixture. As the coolant circulates only between the water jackets and the inlet pipe, this enables the engine to warm up quickly.

Once the engine is warmed up, this opens the thermostat and the coolant is then circulated through the hot spot only to the inlet pipe but also to the radiator through the thermostat. The coolant in the radiator is cooled by the fan and the air stream caused by the travel of the vehicle and is then circulated to the water jackets.

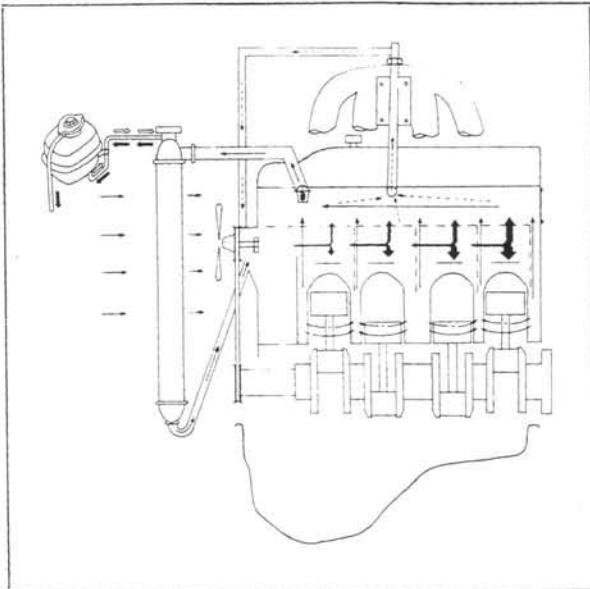


Fig. 3-1 Coolant circuit

3-B. MAZDA GENUINE LONG LIFE COOLANT

MAZDA genuine long life coolant is used in the cooling system of the MAZDA 616. The MAZDA genuine long life coolant was developed for the aluminum engine of MAZDA vehicles. Antifreeze solution and anti-

corrosive solution are included in this coolant. The table below shows the mixing rate of water and MAZDA genuine long life coolant.

Freezing point	Mixture ratio %		Specific gravity of mixture at 20°C (68°F)
	Coolant	Water	
- 20°C (- 4°F)	35	65	1.051
- 45°C (- 49°F)	55	45	1.078

Note:

(a) Always use soft water (demineralized water) in the cooling system.

(b) If the MAZDA genuine long life coolant is not available, add MAZDA genuine antifreeze solution or anticorrosive according to the season.

The percentage of the MAZDA genuine antifreeze solution required to protect the cooling system is shown in the following table.

Freezing point (Centigrade)	Mixture percentage (Volume)		Specific gravity of mixture at 20°C (68°F)
	Antifreeze solution	Water	
- 6.3	15	85	1.022
- 9.3	20	80	1.029
-12.6	25	75	1.037
-16.2	30	70	1.044
-20.5	35	65	1.051
-25.2	40	60	1.058
-31.2	45	55	1.066
-37.6	50	50	1.073
-45.2	55	45	1.080

3-C. CLEANING OF COOLING SYSTEM

The cooling system should be flushed every 48,000 km (32,000 miles) or every two years.

The flushing procedures are as follows:

1. Open the drain cocks and drain the coolant.
2. Close the drain cocks and supply clean soft water (demineralized water).

Note: If necessary, use cleaning solution to loosen the rust and scale, according to the instructions given by the maker of the cleaning solution.

3. Run the engine for about one hour keeping the normal operating temperature.
4. Drain the coolant completely and flush clean water through the cooling system in the direction opposite to the normal coolant flow. This action causes the water to get behind the corrosive deposits and force them out.
5. Fill with a mixture of MAZDA genuine long life coolant and soft water (demineralized water).

3-D. RADIATOR

The radiator is of a corrugated fin type with a sealed filler cap.

The capacity of the radiator is 2.6 liters (0.7 U.S. gallons, 0.6 Imp. gallons).

Examine the radiator carefully for leakage. If any leakage should be discovered, however small it may

be, repair completely by soldering, etc. Clean the exterior of the radiator core by blowing out with compressed air.

3-D-1. Expansion Tank Pressure Cap

The pressure cap is provided on the expansion tank. The expansion tank and the radiator are connected by the hose.

The pressure in the cooling system increases the boiling point of the coolant and prevents overheating and reduces overflow losses.

When the pressure in the cooling system exceeds 0.9 kg/cm² (12.8 lb/in²), the pressure valve opens.

A vacuum release valve is employed to prevent undesirable build-up when the system cools down.



Fig. 3-2 Expansion tank pressure cap

Note: To remove the radiator cap when the coolant temperature is high or boiling, depress the push button on the expansion tank cap to release the pressure and then remove the radiator cap.

3-E. THERMOSTAT

The thermostat is of a wax pellet type with the jiggle pin. The cooling system is designed to provide adequate cooling. However, the thermostat is necessary to provide quick warming up and to prevent over cooling.

To test the thermostat, place it in water with a thermometer and heat up the water gradually and check the temperature when the thermostat starts to open and when it opens fully. And also measure the lift height when the thermostat is fully opened.

If the reading shows a large difference from the standard specification, replace with a new thermostat.

The specification of the thermostat is shown in the following table.

Starts to open	82°C (180°F)
Fully opens	95°C (203°F)
Valve lift height	8mm (0.32 in)

3-F. WATER PUMP

The water pump employs a centrifugal impeller. In the pump body, the shaft is supported with two bearings. The impeller is fitted to the rear end of the shaft. The seal assembly made of carbon and rubber prevents water leakage.

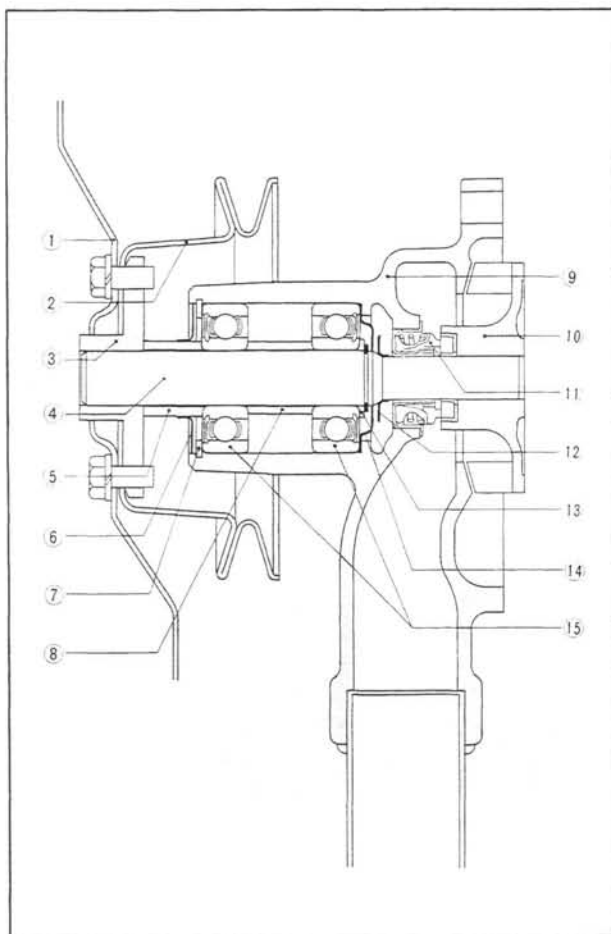


Fig. 3-3 Water pump

- | | |
|--------------------|---------------------|
| 1. Fan | 9. Body |
| 2. Pulley | 10. Impeller |
| 3. Pulley boss | 11. Seal assembly |
| 4. Shaft | 12. Baffle plate |
| 5. Spacer | 13. Washer |
| 6. Dust seal plate | 14. Dust seal plate |
| 7. Snap ring | 15. Bearing |
| 8. Spacer | |

3-F-1. Checking of Water Pump

Check the water pump for leaks and excessive end play or looseness of the shaft and bearings. If there is evidence of excessive play when the fan blades are manually moved up and down, it shows that the bearings are rough.



Fig. 3-4 Bearing and shaft assembly

If water leaks from the hole located on the pump body, it indicates defective seal necessitating overhaul of the pump and check of the seal and seat surfaces. If defective, replace it.

3-F-2. Disassembling of Water Pump

1. Remove the impeller from the shaft with a suitable puller.
2. Using the puller (49 0187 270), remove the pulley boss from the shaft.

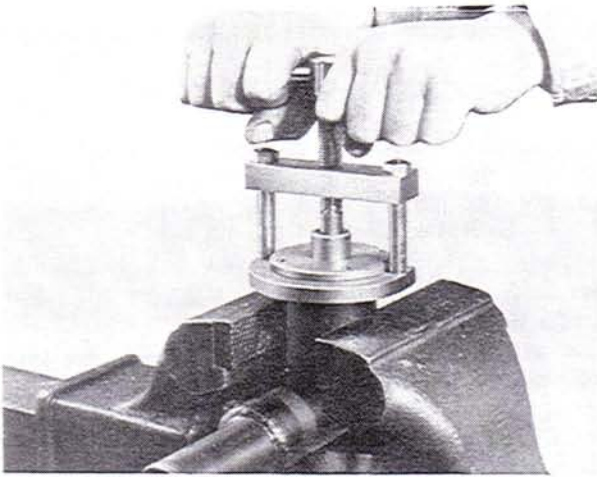


Fig. 3-5 Removing of pulley boss

3. Remove the spacer and dust seal plate assembly.
4. Remove the snap ring with a suitable plier.
5. Support the pump body and apply pressure to the rear end of the shaft to press the shaft, spacer and bearings assembly out through the front of the pump.
6. Remove the seal assembly from the body.
7. Remove the bearings and spacer from the shaft with a suitable puller.

3-F-3. Assembling of Water Pump

1. Install the stop ring into the groove on the shaft.
2. Place the dust seal plate on the shaft.
3. Drive the baffle plate onto the taper of the shaft.
4. Install the shaft into the body.
5. Install the washer and press in the bearing with the sealed side rearward.
6. Place the spacer on the bearing and fill grease.
7. Install the bearing with the sealed side forward until the snap ring can be installed.
8. Install the snap ring.

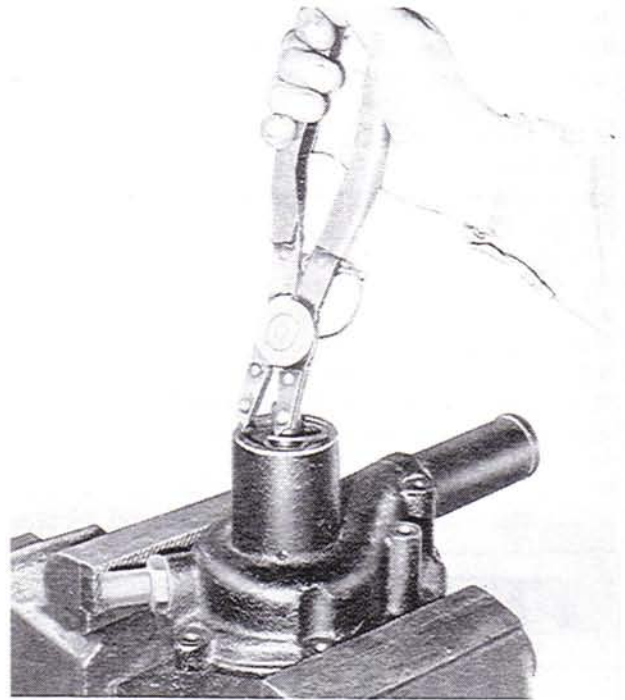


Fig. 3-6 Installing of snap ring

9. Position the spacer and dust seal plate on the bearing and press the pulley boss onto the shaft until it is flush with the front end of the shaft.
10. Install the seal assembly into the body.

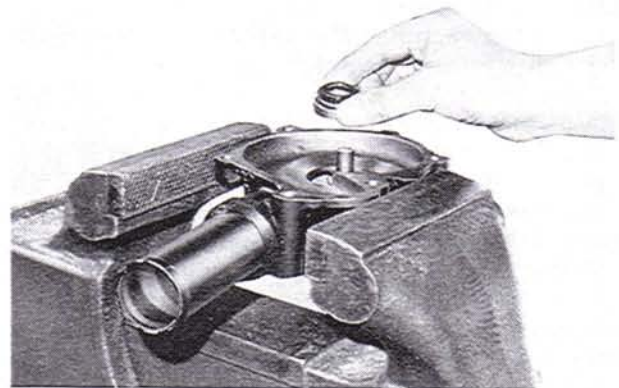


Fig. 3-7 Installing of seal assembly

11. Press the impeller onto the shaft until it is flush with the end of the shaft.

SPECIAL TOOL

49 0187 270

Water pump boss puller