COOLING SYSTEM

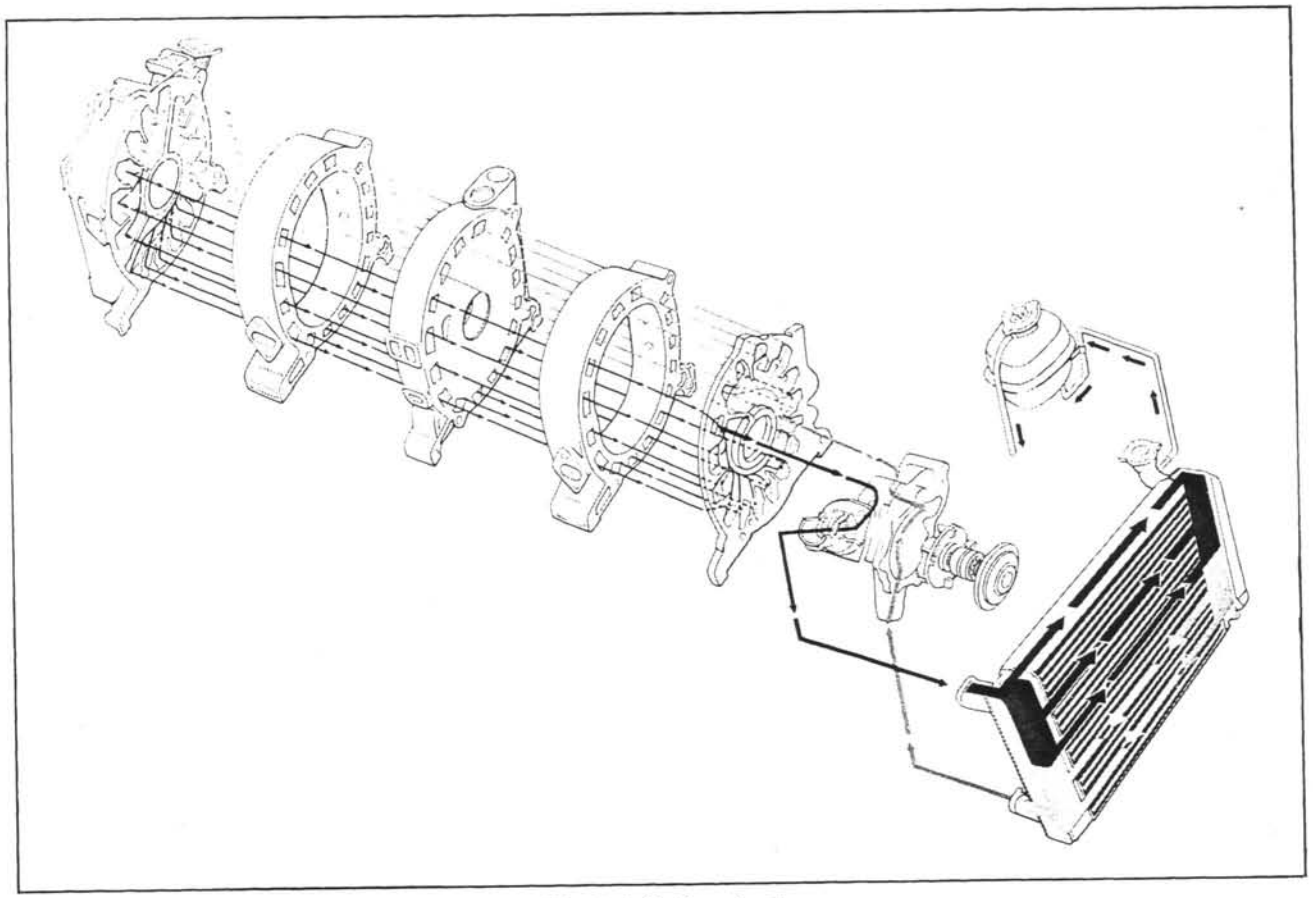


Fig. 3–1 Cooling circuit

COOLING SYSTEM

The completely sealed cooling system consists of a radiator with a sealed filler cap, an expansion chamber (sub-tank) with a pressure cap, centrifugal water pump a thermostat and a four-vane fan.
The radiator and the expansion chamber are connected by hose. When the engine is heated sufficiently, the coolant in the radiator flows out and is led into the expansion chamber 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 (30,000 miles).

3–A. COOLANT CIRCULATION

The water pump is driven by the eccentric shaft pulley over a V-belt and discharges the cooling water to the front housing. The water circulates from the front housing through the water passage provided in each housing and flows to the rear housing. From the rear housing, the water is returned to the front housing. At low engine temperature, the thermostat is closed to keep the water from entering the radiator. The water is then recirculated directly to the water pump and discharged to each housing. As the thermostat opens when the engine is warmed up, the water flows into the radiator. The cooled water flows from the radiator to the water pump through the connecting hose and cools the engine by circulation.

3–B. GENUINE LONG LIFE COOLANT

The genuine long life coolant is used in the cooling system of RX-2.
The genuine long life coolant was developed for the aluminum engine of RX-2. Antifreeze solution and anti-corrosive solution are included in this coolant.
The table below shows the mixing rate of water and genuine long life coolant. Follow the table when changing the 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: If the genuine long life coolant is not available, add genuine antifreeze solution or anticorrosive according to the season.

Freezing point (Centigrade)	mixture percentage (Volume)		Specifix 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. FLUSHING THE COOLING SYSTEM

When the genuine long life coolant is in use, the coolant should be changed every two years ro every 48, 000 km (30,000 miles). At the time of the coolant change, the cooling system should be cleaned as follows:

1. Open the drain cocks to drain the coolant.
2. Close the cocks. Fill with the clean soft water (demineralized water).
3. Operate the engine for about one hour.
4. Drain the water.
5. Fill in a mixture of water and genuine long life coolant.

Note: In case the accumulation of rust and other deposits are excessive, a detergent can be used. In this case the instructions of the detergent maker should be followed.

3–D. RADIATOR

The radiator is of the corrugated fin type with a sealed filler cap. A pressure cap is fixed to the expansion chamber.

Carefully inspect the radiator for water leakage. Any minor leakage must be completely eliminated by soldering or other means. A clogged radiator badly influences the cooling effect and should be cleaned with the compressed air.

3–D–1. Pressure Cap

The pressure cap is provided on the expansion chamber. The expansion chamber and the radiator are connected by hose. When the cooling water is pressurized, the boiling point rises and this prevents overheating and minimizes the loss of water. When the pressure in the cooling system exceeds 0.9 kg/cm² (12.8 lb/in²), the cap opens. When the coolant temperature falls, the vacuum release valve open at 0.1 kg/cm² (1.4 lb/in²) to prevent vacuum build up in the cooling system.

Fig. 3–2 Pressure cap

3–E. COOLING FAN

Torque limit type fan drive has been adopted to drive the cooling fan, with a view to reducing the loss of the horsepower at a high speed under full load and preventing noises due to the fan, and also this drive is so designed using silicon oil as the medium for transmitting the torque that even if that the fan the engine revolution increases, the revolution of the the fan does not exceed a certain limit.

3–E–1. Checking the Fan Revolution

In case troubles, such as oil leakage etc., should take place on the fan drive, the fan revolution decreases. If the engine is apt to overheat, check the revolution of the fan in the following manners.

1) Stick scotch tape on the fan drive shaft and fan as per Fig. 3–3.

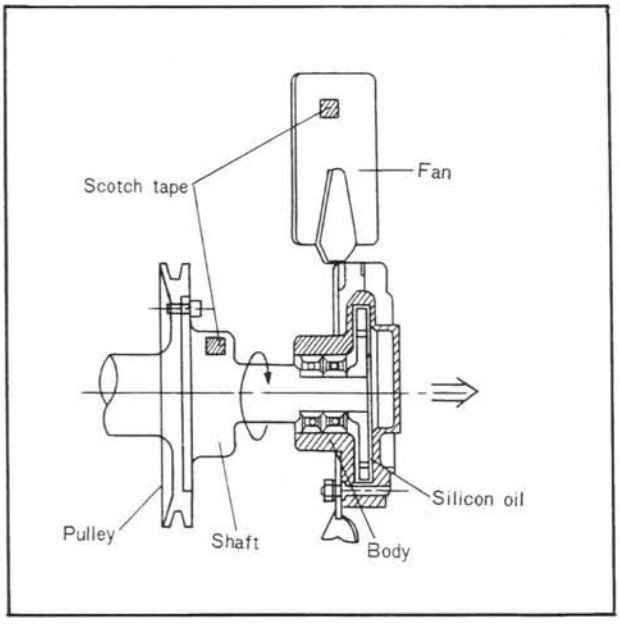


Fig. 3–3 Fan drive assembly

2) Keep the engine revolution at 2,000 rpm by using a photo electrical revolution counter.

3) Facing the revolution counter to the fan and read the revolution of the fan, and if it is less than the prescribed one, replace the fan drive ass'y and if it is more than the prescribed one, carry out the following check.

4) After warming-up the engine for 5 minites at more than 3,000 r p m , keep the engine at 5,000 r p m by using a tacho dwell tester, and check if the revolution of the engine at that time is within the prescribed one.

Prescribed Revolution	
Shaft	Fan
2,000 rpm.	1,500 ~ 1,800 rpm.
5,000 rpm.	Loss than 2,400 rpm.

3–F. THERMOSTAT

Thermostat is for adjusting the temperature of the cooling water circulation in the engine body.

The thermostat begins to open at 82°C (180°F) and fully opens at 95°C (203°F). The lift at this moment is 8 mm (0.31 in).

For inspection of the thermostat, place the thermostat together with a thermometer in water. Stir the water

while gradually heating. Measure the temperature under which the thermostat begins to open and the lift. If the measured value differs excessively from the standard value, install a new thermostat.
It is of wax type and bottom bypass type which is superior in the cooling efficiency. The bypass hole is provided at the lower part of the thermostat, as shown in Fig. 3–4, through which a large volume of cooling water flows when the thermostat is completely closed so that localized rise in temperature can be prevented.

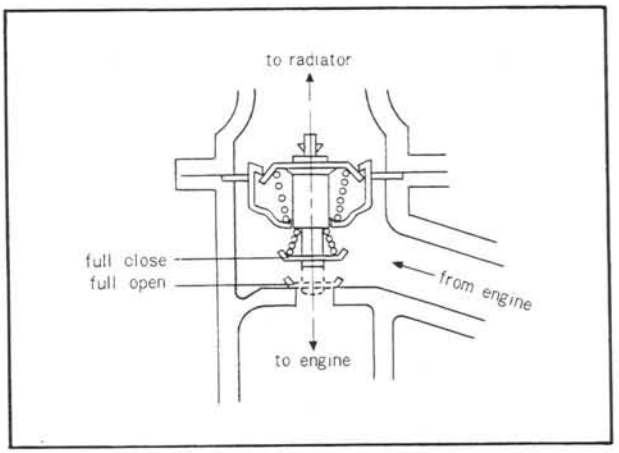


Fig. 3–4 Thermostat

On the other hand, when the thermostat is completely opened, the bypass hole is closed by the thermostat valve and all the quantity of cooling water is circulated into the radiator, which will enable the radiator to work effectively. However, in case the thermostat is taken off, the volume of cooling water flowing through the bypass hole is large due to a larger bypass hole and water circulating into the radiator will decrease by half which will result in the rise of the temperature of the cooling water. Accordingly, be sure not to take off the thermostat nor to use any other make instead of this type.

3–G. WATER PUMP

The water pump is of the centrifugal impeller type. The shaft is supported in the pump body by two bearings.
The impeller is fitted on the rear end of the pump shaft. The seal is made of stainless steel, carbon and rubber to prevent water leakage. Inspect the water pump for water leakage, check the end play and looseness of bearings. Move the impeller blades by hand. If the play is excessive, the bearing must be worn. If water leaks from the pump body opening, the seal is defective. Then it is necessary to overhaul the pump and inspect the seal and seat surfaces. If the seal is defective, it should be replaced.

3–G–1. Disassembling the Water Pump

1. Remove the bolts that attach the cover to the pump body, and separate the water pump assembly.
2. Remove the pulley boss with the **water pump puller** No. 1 (49 0813 145A), press the shaft slowly to extract the pulley boss from the shaft. And then remove the retaining ring with a suitable plier.

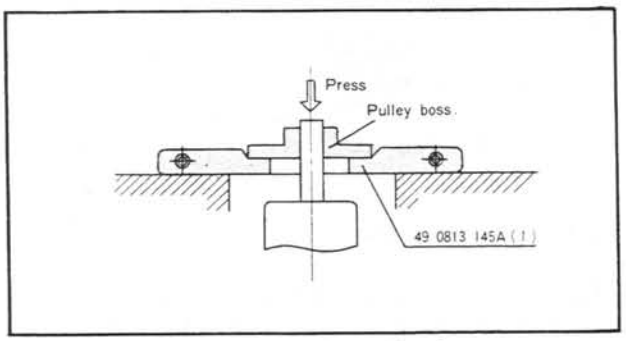
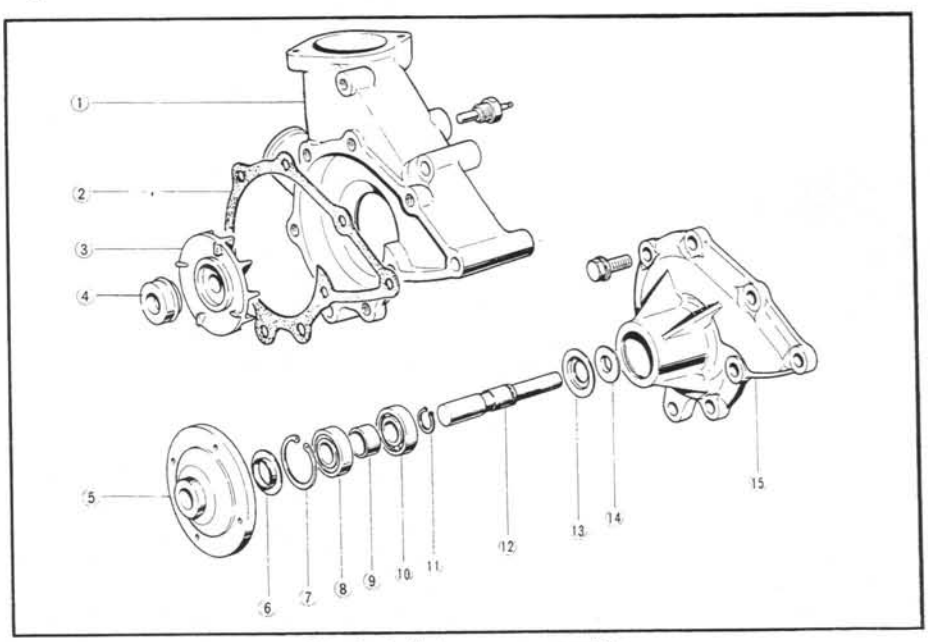


Fig. 3–5 Removing pulley boss

3. Support the front side of the water pump cover with the **water pump puller** No. 2 (49 0813 145A) and apply pressure to the rear end of the shaft to press the shaft and remove the impeller, and then push the bear-



1. Pump casing
2. Packing
3. Impeller
4. Water seal cpt.
5. Pulley boss
6. Dust seal plate
7. Retaining ring
8. Ball bearing
9. Spacer
10. Ball bearing
11. Stop ring
12. Shaft
13. Dust seal plate
14. Baffle plate
15. Pump cover

Fig. 3–6 Water pump assembly

ing assembly with shaft out through front of the cover.
4. Remove the water seal complete.
5. Remove the bearings and spacer from the shaft with a suitable puller.

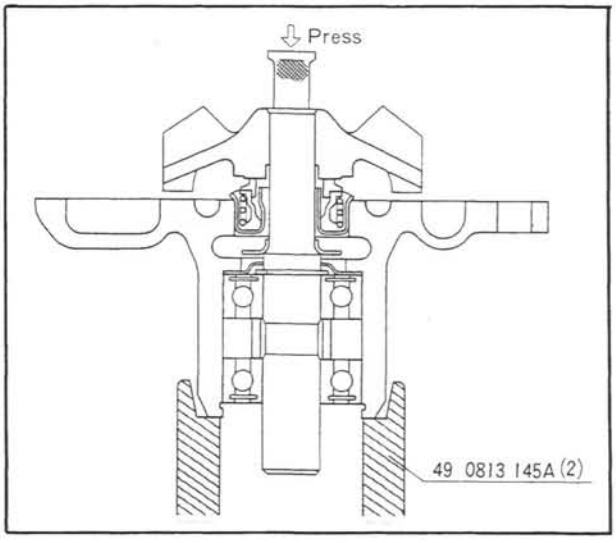


Fig. 3–7 Removing impeller

3–G–2. Assembling the Water Pump

When assembling the water pump, refer to Fig. 3–6 and proceed as follows:
1. Fit the stop ring into the groove of the shaft.
2. Place the dust seal plate on the stop ring and drive the baffle plate onto the tapper of the shaft.
3. Pressfit the bearing with the sealed side rearward.
4. Press the shaft and bearing into the cover using a suitable tool.
5. Insert the spacer into the shaft and approximately fill 1/3 the space between the two bearings with grease.
6. Pressfit the bearing with sealed side forward until the retaining ring can be inserted.
7. Install the snap ring into the groove of the cover to retain the bearings in position.
8. After fitting the dust seal plate to the pulley boss press the pulley boss onto the shaft until the boss comes in contact with the bearing.
9. Install the water seal complete into the cover.
10. Press the impeller assembly onto the shaft until it is flush with the end of the shaft.
11. Install the cover and gasket to the body.

SPECIAL TOOL

49 0813 145A	Water pump puller