

COOLING SYSTEM

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COOLING SYSTEM

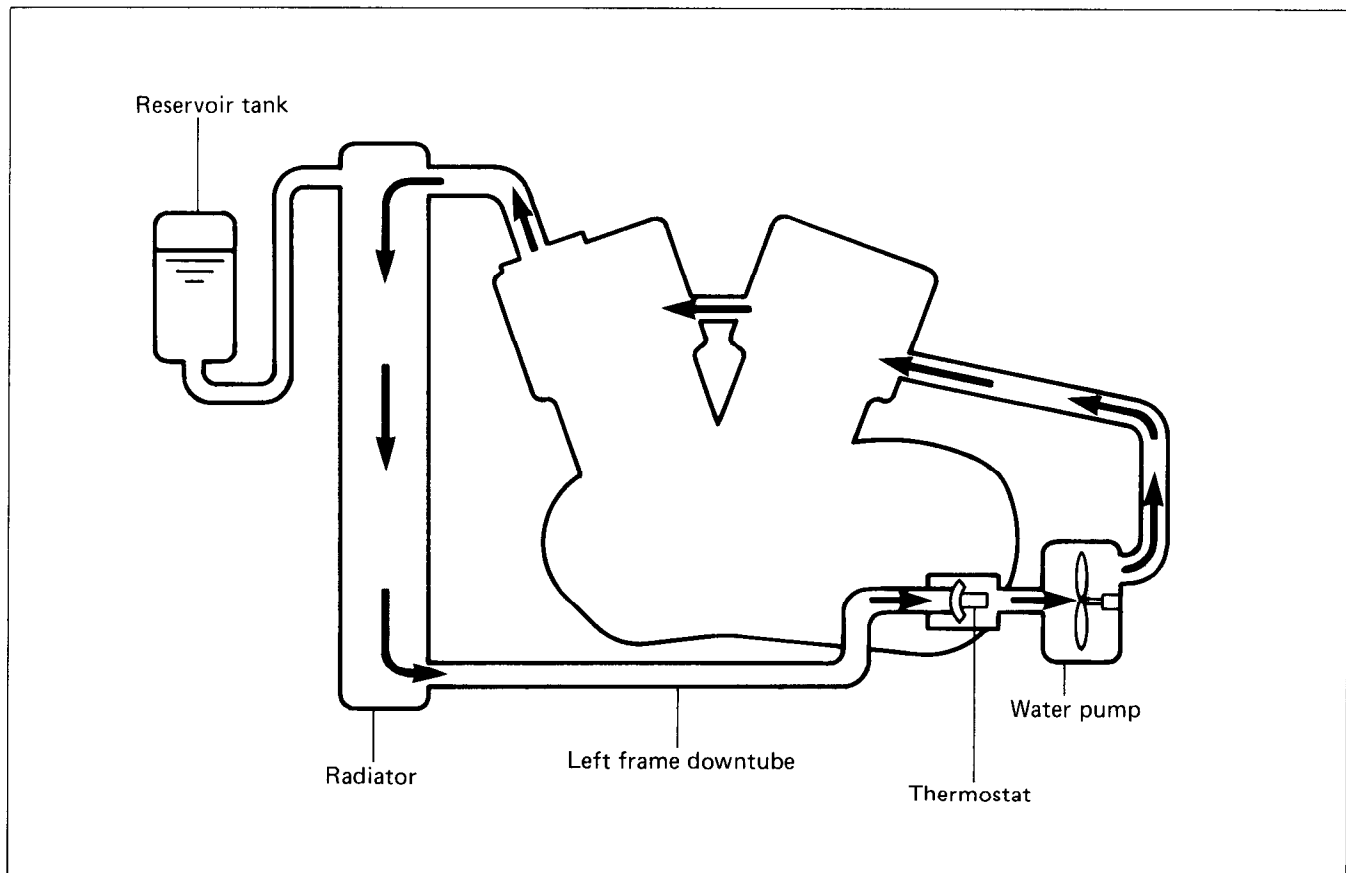
DESCRIPTION

The engine is cooled by coolant set in forced recirculation through jackets formed in the cylinder and head, and through the radiator. For the water pump, a high-capacity centrifugal pump is used. The radiator is a tube-and-fin type made of aluminum material, which is characterized by lightness in weight and good head dissipation.

The thermostat is of wax pellet type, complete with a valve as the means of temperature-dependent control over the flow of coolant through the radiator. The valve is actuated by the temperature-sensitive wax contained in the pellet.

Referring to the following illustration, the thermostat is in the closed condition, so that water recirculates through the route comprising pump, engine, by-pass holes of the thermostat and radiator in the regulated condition.

As the coolant temperature rises to 75°C and the thermostat valve unseats, the normal coolant flow is established. At about 90°C of coolant temperature, the thermostat becomes completely open and most of heat is released to the atmosphere through the radiator core.



COOLING SOLUTION

At the time of manufacture, the cooling system is filled with a 50 : 50 solution of distilled water and anti-freeze/summer coolant. This 50 : 50 mixture will provide excellent heat protection, and will protect the cooling system from freezing at temperatures above -31°C (-24°F).

If the motorcycle is to be exposed to temperatures below -31°C (-24°F), this mixing ratio should be increased up to 55% or 60% according to the Fig. 2.

NOTE:

The characteristics of different anti-freezes vary. Read the label to know the protection you will have.

CAUTION:

Do not put in more than 60% anti-freeze or less than 50%. Do not mix different brands of anti-freeze.

50%	Water	850 ml (1.8/1.5 US/Imp. pt)
	Coolant	850 ml (1.8/1.5 US/Imp. pt)

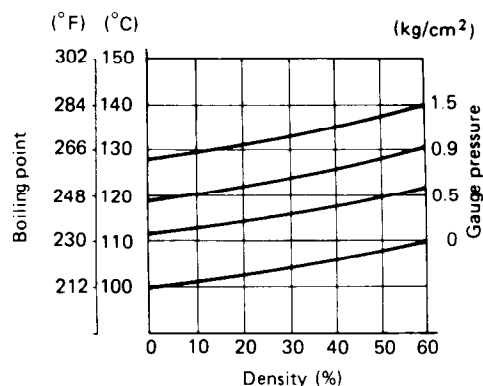


Fig. 1 Coolant density-boiling point curve.

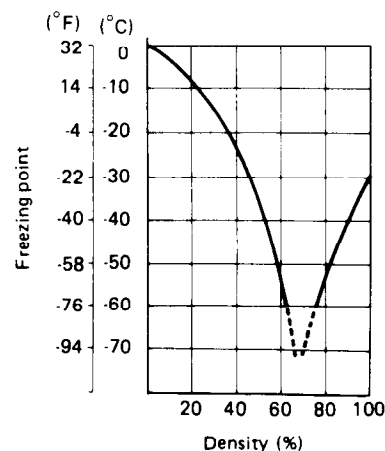
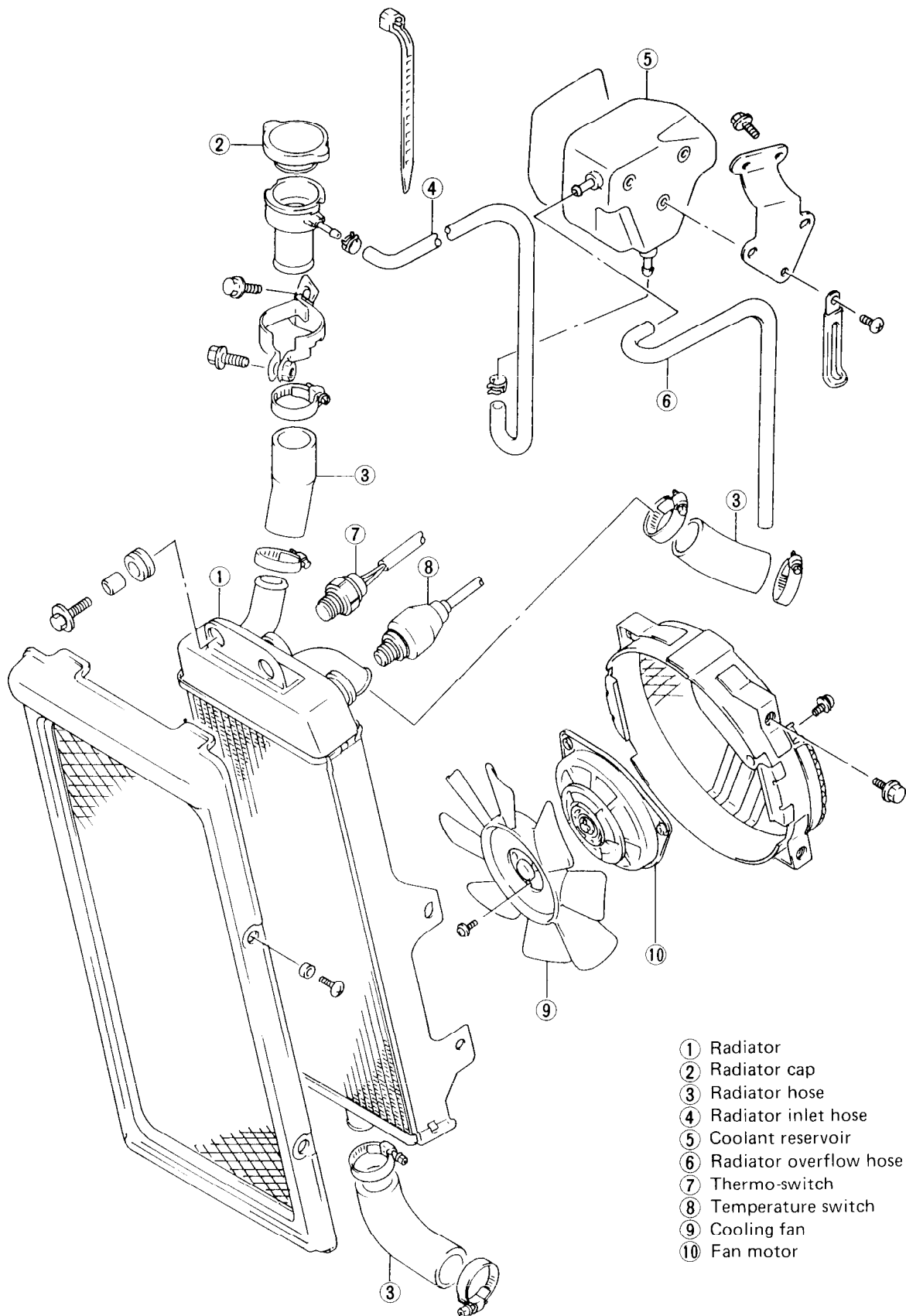


Fig. 2 Coolant density-freezing point curve.

RADIATOR AND WATER HOSES



INSPECTION

Before removing the radiator and draining the cooling solution, inspect the following items.

1. Test the cooling system for tightness by using the radiator tester as follows: Remove the radiator cap, and connect the tester to the filler. Give a pressure of about 1.2 kg/cm^2 (17 psi, 120 kPa) and see if the system holds this pressure for 10 seconds. If the pressure should fall during this 10-second interval, it means that there is a leaking point in the system. In such a case, inspect the entire system and replace the leaking component or part.
2. Test the radiator cap for relieving pressure by using the radiator tester in the following manner: Fit the cap to the tester, as shown, and build up pressure slowly by operating the tester. Make sure that the pressure build-up stops at $1.1 \pm 0.15 \text{ kg/cm}^2$ ($15.6 \pm 2.1 \text{ psi}$, $110 \pm 15 \text{ kPa}$) and that, with the tester held standstill, the cap is capable of that pressure for at least 10 seconds. Replace the cap if it is found not to satisfy either of these two requirements.

**Radiator cap valve release pressure : $1.1 \pm 0.15 \text{ kg/cm}^2$
($15.6 \pm 2.1 \text{ psi}$, $110 \pm 15 \text{ kPa}$)**

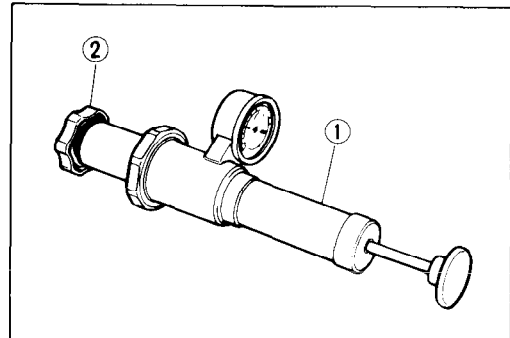
3. Road dirt or trash stuck to the fins must be removed. Use of compressed air is recommended for this cleaning. Fins bent down or dented can be repaired by straightening them with the blade of a small screwdriver.
4. Any water hose found in a cracked condition or flattened must be replaced. Any leakage from the connecting section should be corrected by proper tightening.

REMOVAL

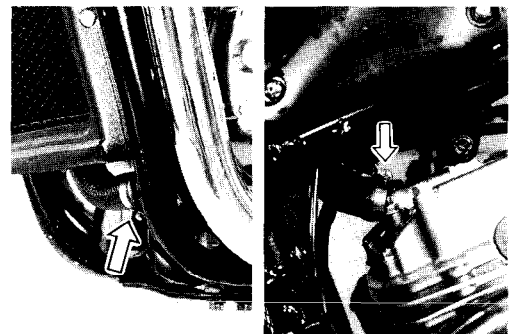
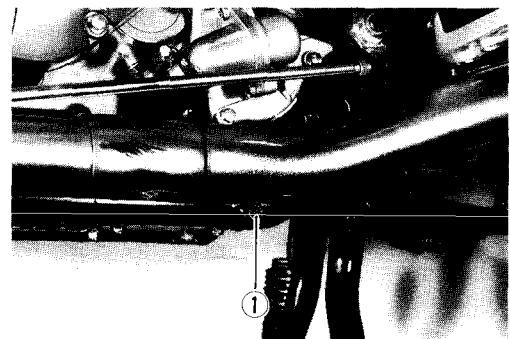
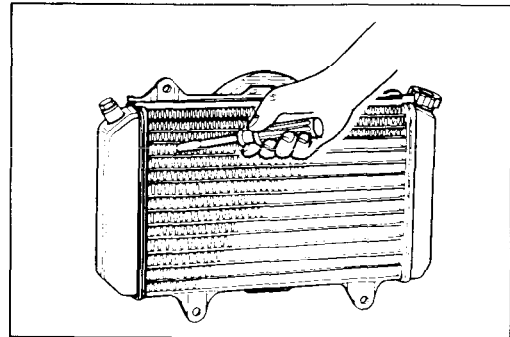
1. Drain the cooling solution by removing the drain plug ①.
2. Remove the radiator hoses, radiator and reservoir tank.

INSTALLATION

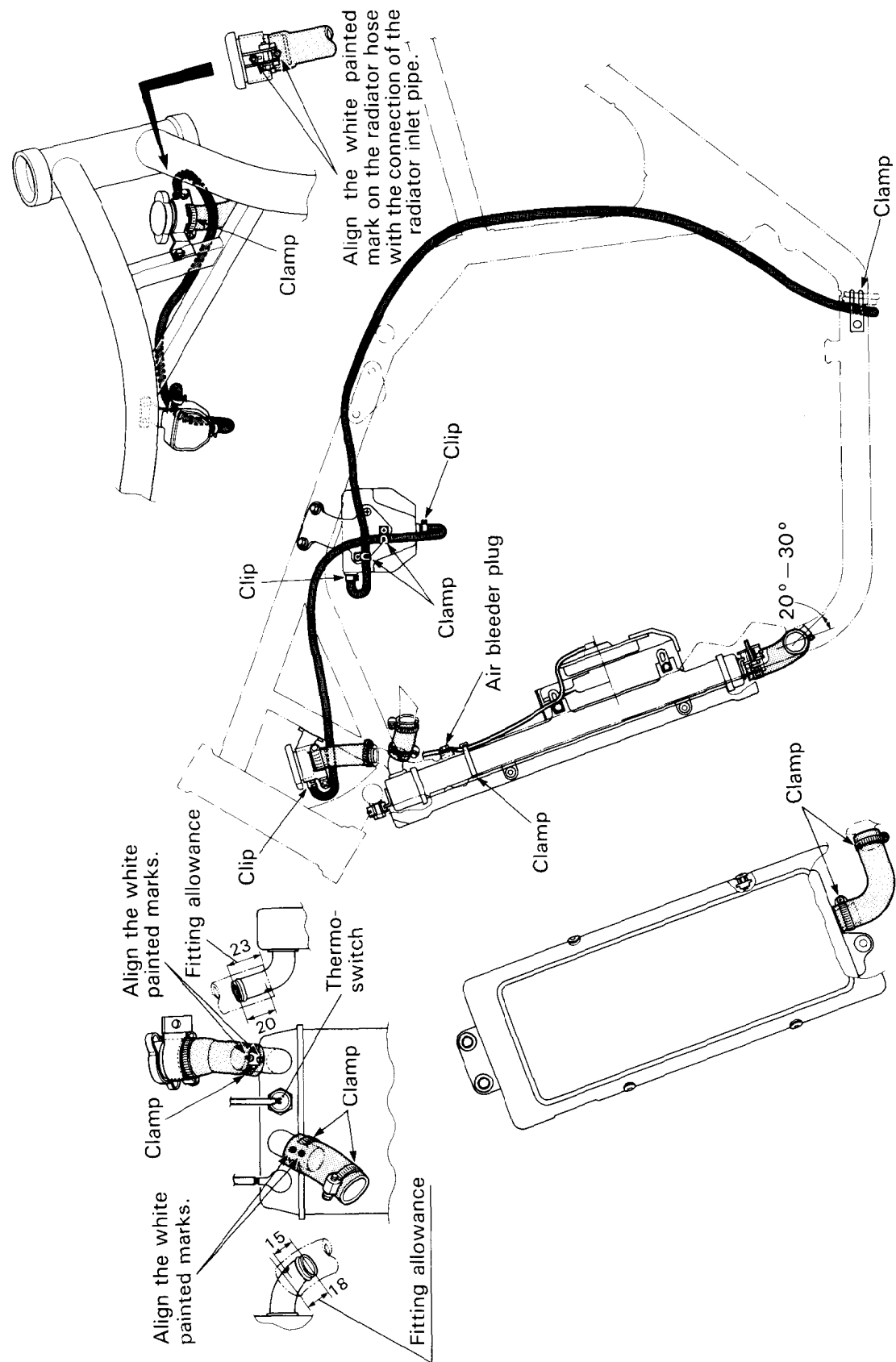
The radiator is to be installed in the reverse order of the removal procedure. After installing the radiator, be sure to add coolant: refer to page 2-10 for refilling information.



① Radiator cap tester ② Radiator cap



REASSEMBLY INFORMATION



Tightening torque

ITEM	N·m	kg-m	lb-ft
Air bleeder plug	10-12	1.0-1.2	7.0-8.5
Thermo-switch	9-14	0.9-1.4	6.5-10.0

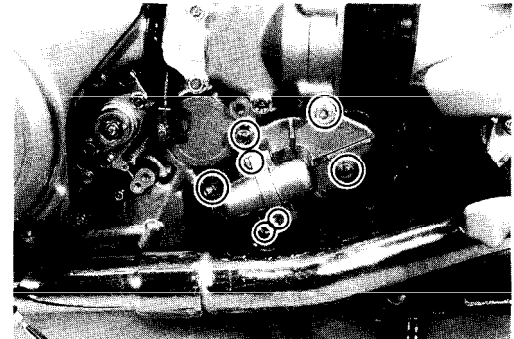
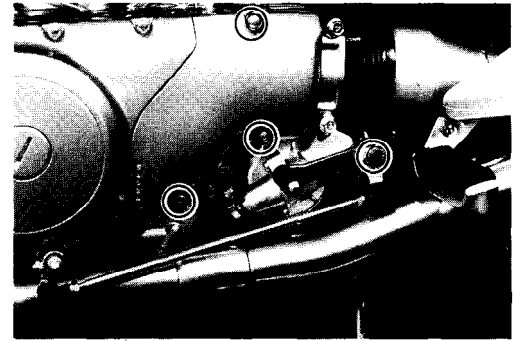
THERMOSTAT

REMOVAL

1. Drain the coolant.
2. Remove the secondary case cover.
3. Remove the gearshift lever by removing the snap ring.

09900-06107 : Snap ring pliers

4. Disconnect the radiator hose and remove the water pump cover assembly.
5. Disassemble the cover assembly. The thermostat will then be free.



INSPECTION

Inspect the thermostat pellet for signs of cracking.

Test the thermostat at the bench for control action, in the following manner.

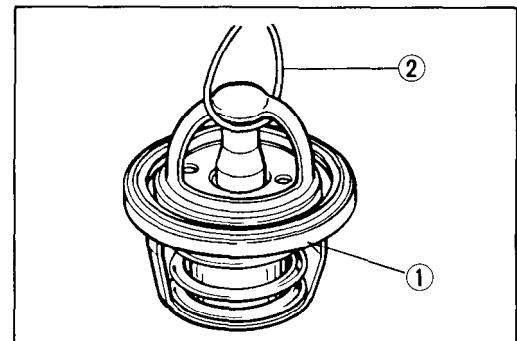
- Pass a string between flange, as shown in the illustration.
- Immerse the thermostat in the water contained in a beaker, as shown in the illustration. Note that the immersed thermostat is in suspension. Heat the water by placing the beaker on a stove and observe the rising temperature on a thermometer.
- Read the thermometer just when the thermostat drops to the bottom of the pan. This reading, which is the temperature level at which the thermostat valve begins to open, should be anywhere between 73.5°C (164.3°F) and 76.5°C (169.7°F).

**Thermostat valve opening temperature : $75.0 \pm 1.5^{\circ}\text{C}$
($167 \pm 2.7^{\circ}\text{F}$)**

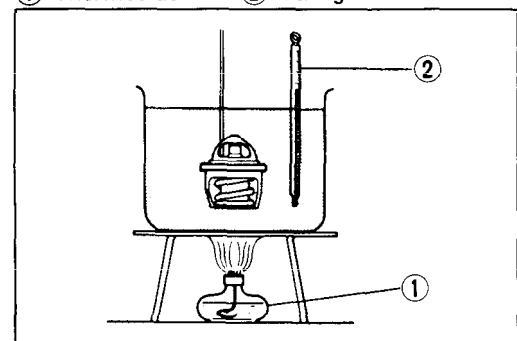
- Keep on heating the water to raise its temperature to and beyond 90°C (194°F).
- Just when the water reaches 90°C (194°F), the thermostat valve should have lifted by at least 6.0 mm (0.24 in).

**Thermostat valve lift : Over 6.0 mm at 90°C
(Over 0.24 in at 194°F)**

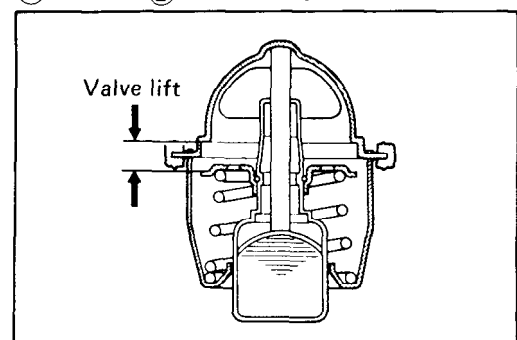
- A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.



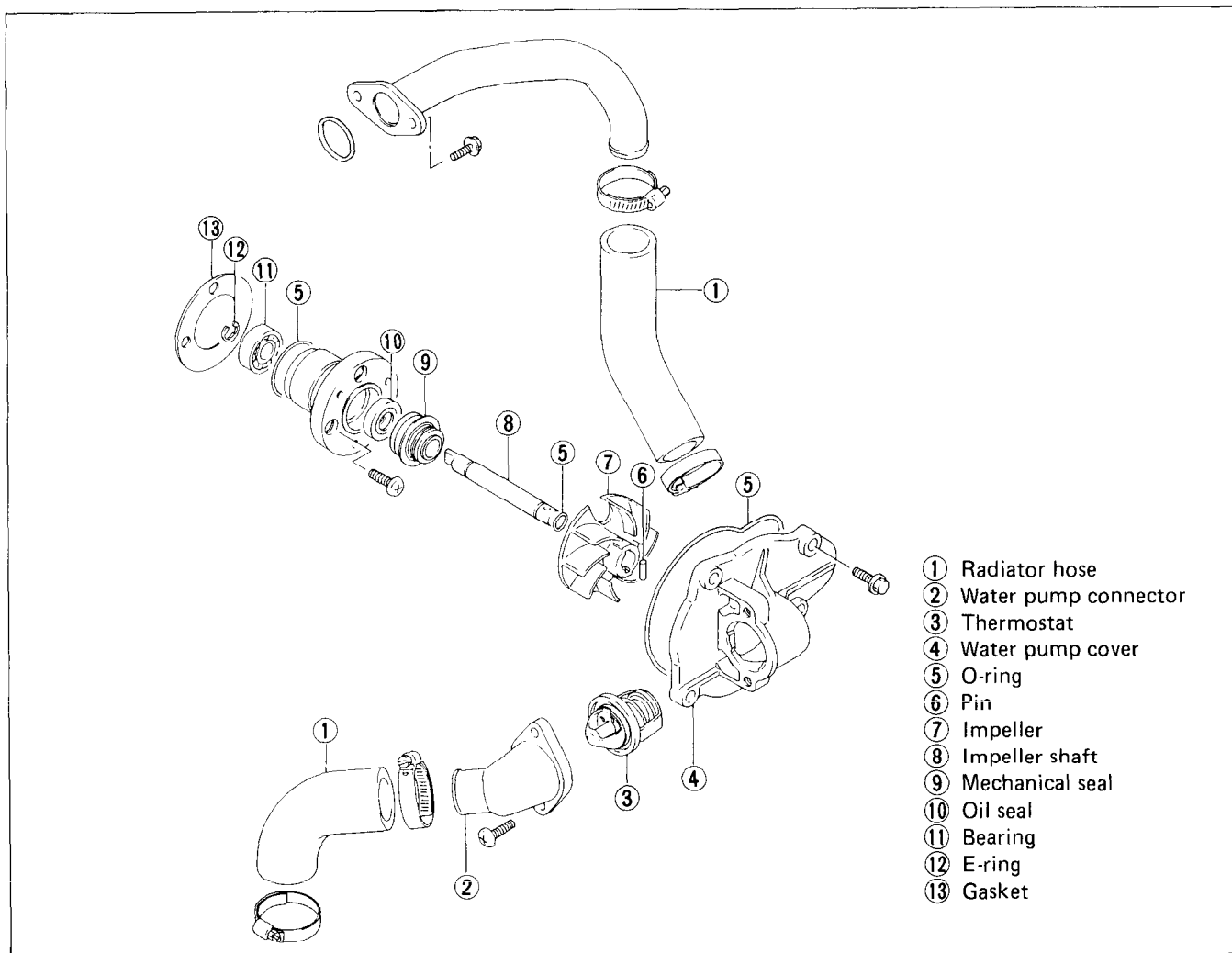
① Thermostat ② String



① Stove ② Thermometer

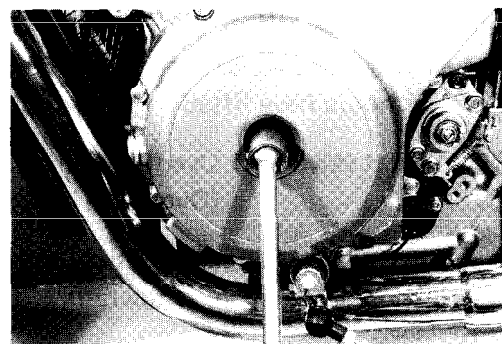
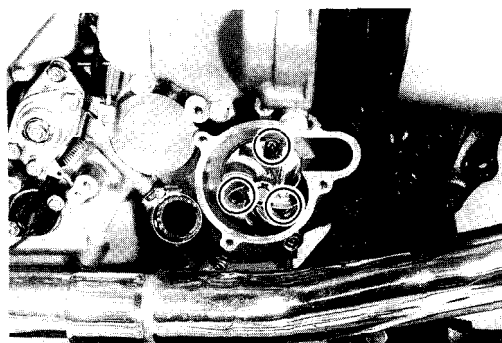


WATER PUMP

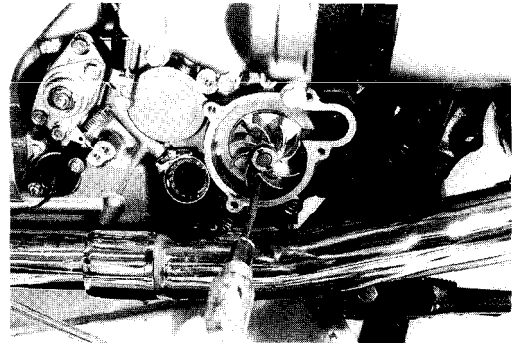


REMOVAL

1. Refer to page 5-6 for the water pump removal procedures.
2. Remove the water pump cover.
3. Remove the magneto cover plug, then set the three openings of the impeller to the three screws by rotating the generator rotor.
4. Remove the three screws securing water pump assembly.
5. Set one of the openings to an unused female screw by rotating the generator rotor.



6. Drive out the water pump assembly by threading a removed screw into the female screw.

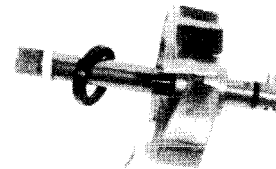
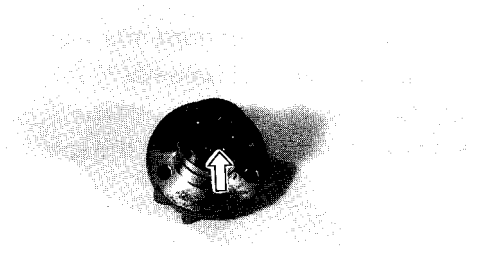


INSPECTION AND DISASSEMBLY

WATER PUMP BEARING

Turn the impeller and check the bearing play. If abnormal noise occurs or any sign of stickiness is noted, replace the bearing with a new one.

- Remove the E-ring.
- Pull out the impeller shaft.
- Remove the impeller from the impeller shaft.



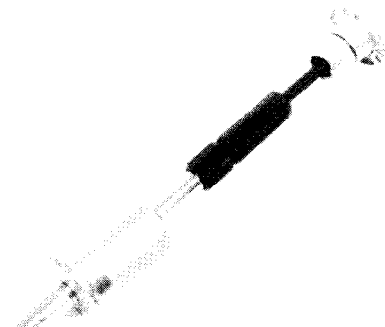
- Remove the water pump bearing by using the special tools.

09930-30102 : Sliding shaft

09921-20200 : Bearing remover

CAUTION:

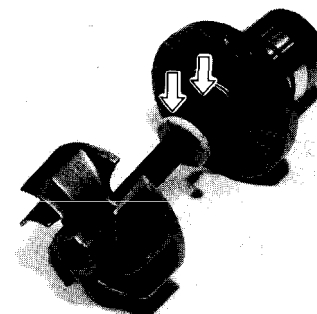
The removed bearing should be replaced with a new one.



MECHANICAL SEAL

Visually inspect the mechanical seal for damage, with particular attention given to the sealing face. Replace the mechanical seal that shows indications of leakage. Also replace the oil seal if necessary.

- Gouge out the mechanical seal with care to prevent damage to the stuffing box.



- Gouge out the oil seal.

CAUTION:

The removed mechanical seal or oil seal should be replaced with a new one.

REASSEMBLY

Reassemble and remount the water pump in the reverse order of removal and disassembly. Pay attention to the following points:

- Install the bearing using the special tool.

- Apply grease to the oil seal lip before installing.

(For U.S.A. model)

99000-25030 : SUZUKI SUPER GREASE "A"

(For the other models)

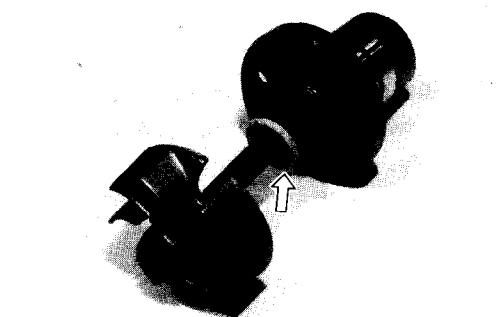
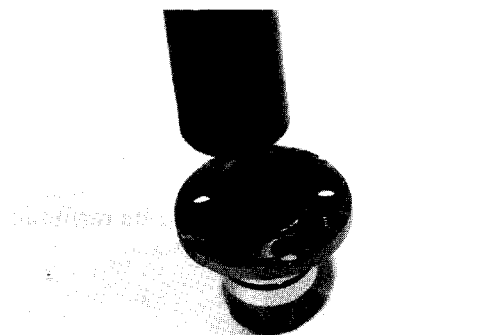
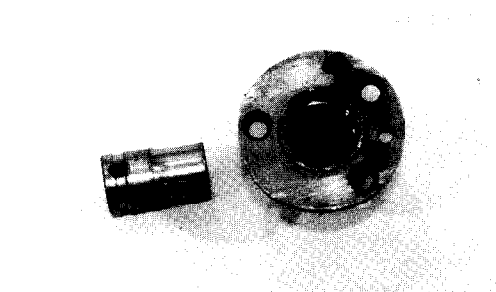
99000-25010 : SUZUKI SUPER GREASE "A"

- Press the oil seal into the stuffing box using a suitable size sleeve etc.
- Press the mechanical seal into the stuffing box using a suitable size sleeve etc.

- Replace O-rings with new ones when reassembling the water pump.

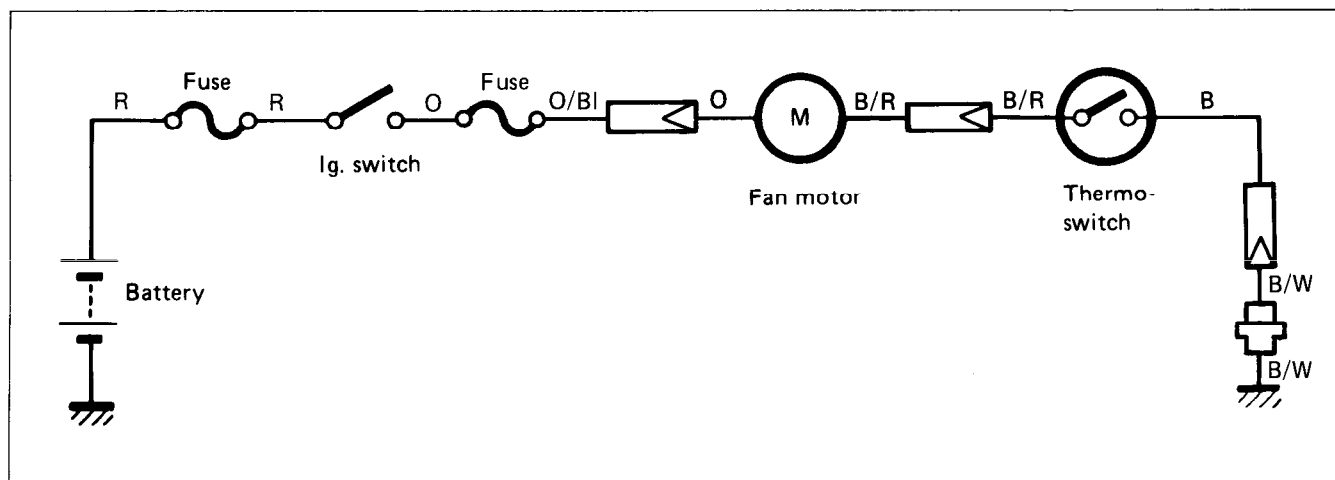
NOTE:

Seat ring of the mechanical seal must be assembled with marked face of the ring toward the impeller.



THERMO-SWITCH

The cooling fan, being located behind the radiator, is secured to the radiator by three bolts. The fan drive motor is automatically controlled by the thermo-switch. This switch remains open when the temperature of coolant is low, but it closes at about 105°C (221°F) of rising water temperature to set the fan in motion.



INSPECTION

THERMO-SWITCH

- Disconnect the thermo-switch lead wires and remove the thermo-switch from the radiator.
- The thermo-switch must be checked for its temperature-initiated closing action at the specification value of 105°C (221°F) by testing it at the bench as shown in the figure. Connect the switch to a circuit tester and raise the temperature of the oil in the pan, and read the column thermometer when the switch closes.

Thermo-switch specification

OFF → ON	Approx. 105°C (221°F)
ON → OFF	Approx. 100°C (212°F)

NOTE:

Do not forget the O-ring.

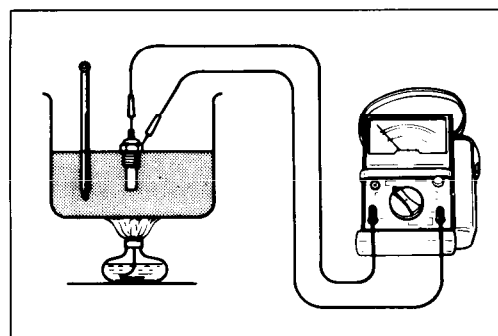
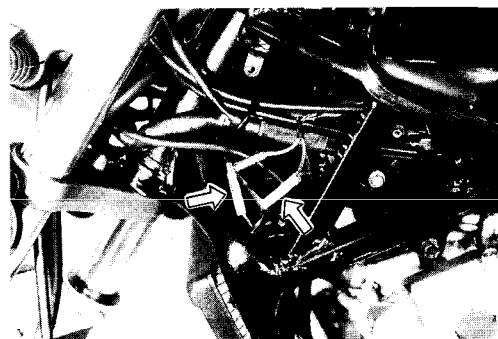
Tightening torque

Thermo-switch : 9.0 – 14 N·m

(0.9 – 1.4 kg-m, 6.5 – 10.0 lb-ft)

CAUTION:

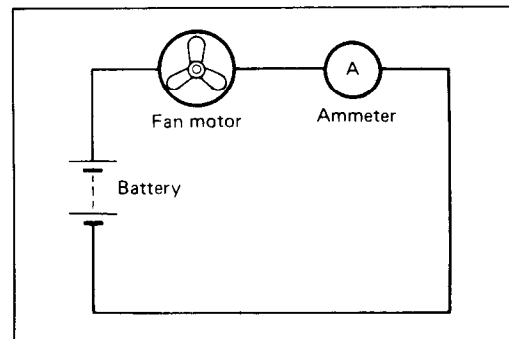
Take special care when handling the thermo-switch. It may cause damage if thermo-switch gets a sharp impact.



FAN MOTOR

Test the cooling fan drive motor for load current with a voltmeter and an ammeter connected as shown in the illustration. The voltmeter is for making sure that the battery applies 12 volts to the motor. With the motor with electric motor fan running at full speed, the ammeter should be indicating not more than 5 amperes.

If the fan motor does not turn, replace the motor assembly with a new one.



TEMPERATURE SWITCH

REMOVAL

- Remove the temperature switch after disconnecting the lead wires in the headlight housing.

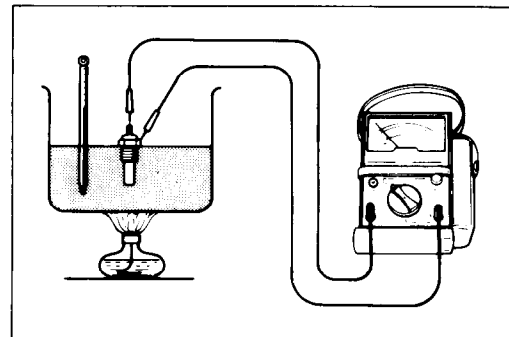
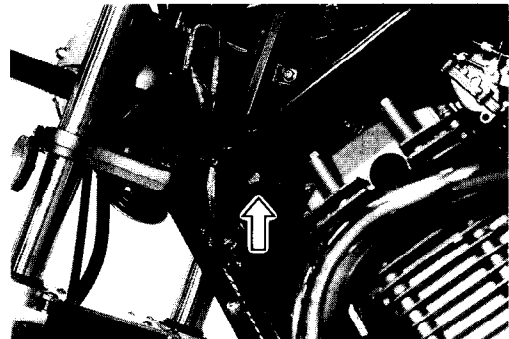
INSPECTION

The temperature switch must be checked for its temperature-initiated closing action at the specification value of 117°C (243°F) by testing it at the bench as shown in the illustration. Connect the switch to the pocket tester and raise the temperature of the oil in the pan, and read the column thermometer when the switch closes.

09900-25002 : Pocket tester

Temperature switch specification

OFF → ON	Approx. 117°C (243°F)
ON → OFF	Approx. 110°C (230°F)



REASSEMBLY

NOTE:

Do not forget the O-ring.

Tightening torque

Temperature switch : 10 – 15 N·m
(1.0 – 1.5 kg-m, 7.0 – 11.0 lb-ft)

CAUTION:

Take special care when handling the temperature switch. It may cause damage if temperature switch gets a sharp impact.

- Fill the specified coolant (See page 2-10).