

COOLING SYSTEM

CONTENTS

COOLING SYSTEM	5- 1
DESCRIPTION	5- 1
CONSTRUCTION	5- 2
COOLING SOLUTION	5- 4
COOLING SYSTEM REMOVAL AND DISASSEMBLY	5- 5
RADIATOR	5- 5
COOLING FAN	5- 6
WATER THERMO-SWITCH AND COOLING FAN	
THERMO-SWITCH	5- 6
THERMOSTAT	5- 7
WATER PUMP	5- 7
RADIATOR	5- 9
INSPECTION	5- 9
REMOVAL	5- 9
INSTALLATION	5- 9
WATER THERMO-SWITCH	5-10
REMOVAL	5-10
INSPECTION	5-10
REASSEMBLY	5-10
COOLING FAN	5-10
REMOVAL	5-10
INSPECTION	5-10
COOLING FAN THERMO-SWITCH	5-11
REMOVAL	5-11
INSPECTION	5-11
REASSEMBLY	5-11
THERMOSTAT	5-12
REMOVAL	5-12
INSPECTION	5-12
REASSEMBLY	5-12
WATER PUMP	5-13
REMOVAL AND DISASSEMBLY	5-13
INSPECTION	5-13
REASSEMBLY	5-13

COOLING SYSTEM

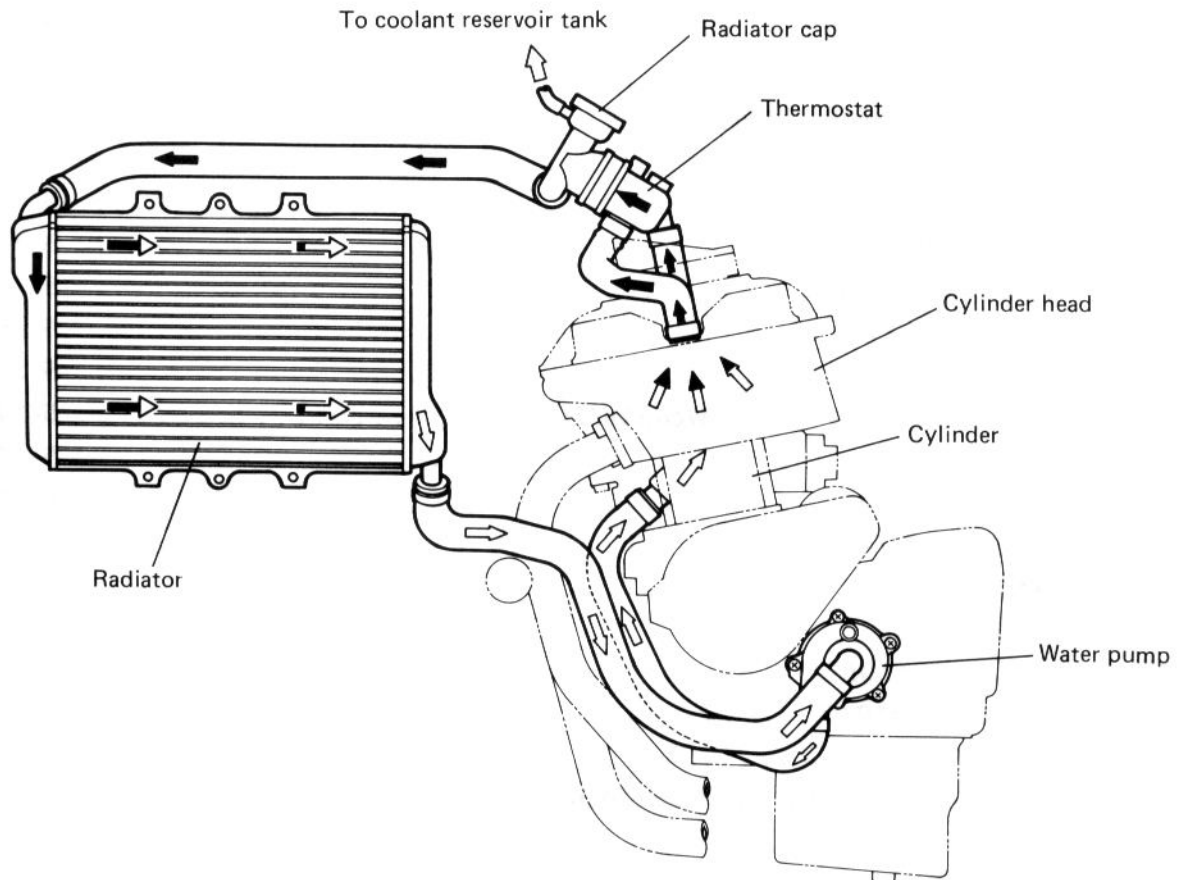
DESCRIPTION

The engine is cooled by coolant set in forced recirculation through jackets formed in the cylinder and cylinder 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 heat 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 coolant recirculates through the route comprising pump, engine, by-pass hole of the thermostat and radiator in the regulated condition.

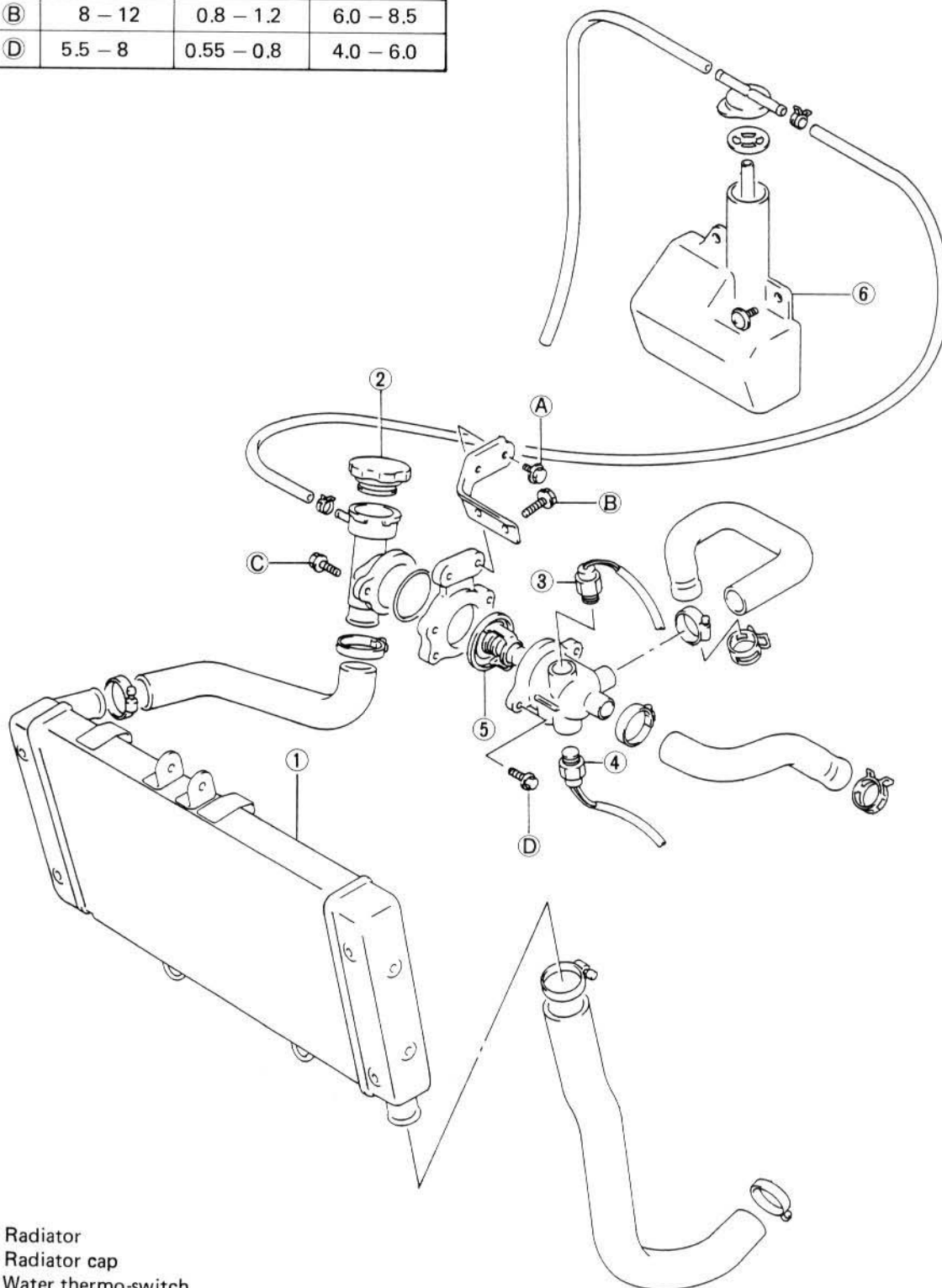
As the coolant temperature rises to 76.5°C and the thermostat valve unseats, the normal coolant flow is established. At about 90°C of coolant temperature, the thermostat becomes completely open and most of heat is released to the atmosphere through the radiator core.



CONSTRUCTION

Tightening torque

ITEM	N·m	kg·m	lb·ft
(A) (B)	8 - 12	0.8 - 1.2	6.0 - 8.5
(C) (D)	5.5 - 8	0.55 - 0.8	4.0 - 6.0



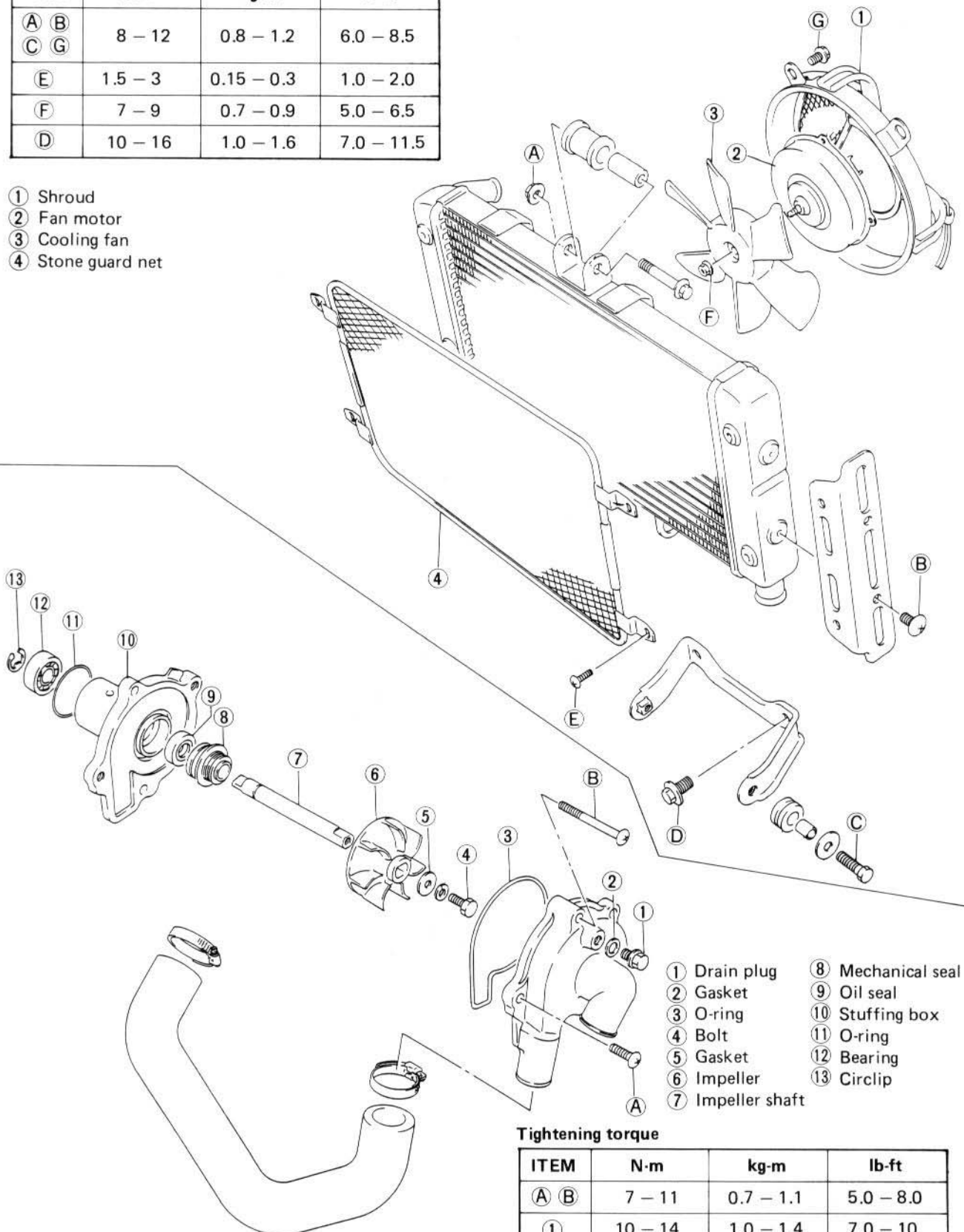
- ① Radiator
- ② Radiator cap
- ③ Water thermo-switch
- ④ Cooling fan thermo-switch
- ⑤ Thermostat
- ⑥ Coolant reservoir

5-3 COOLING SYSTEM

Tightening torque

ITEM	N·m	kg·m	lb·ft
(A) (B) (C) (G)	8 - 12	0.8 - 1.2	6.0 - 8.5
(E)	1.5 - 3	0.15 - 0.3	1.0 - 2.0
(F)	7 - 9	0.7 - 0.9	5.0 - 6.5
(D)	10 - 16	1.0 - 1.6	7.0 - 11.5

- ① Shroud
- ② Fan motor
- ③ Cooling fan
- ④ Stone guard net



- ① Drain plug
- ② Gasket
- ③ O-ring
- ④ Bolt
- ⑤ Gasket
- ⑥ Impeller
- ⑦ Impeller shaft
- ⑧ Mechanical seal
- ⑨ Oil seal
- ⑩ Stuffing box
- ⑪ O-ring
- ⑫ Bearing
- ⑬ Circlip

Tightening torque

ITEM	N·m	kg·m	lb·ft
(A) (B)	7 - 11	0.7 - 1.1	5.0 - 8.0
(1)	10 - 14	1.0 - 1.4	7.0 - 10
(4)	7 - 9	0.7 - 0.9	5.0 - 6.5

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	950 ml (2.0/1.7 US/Imp. pt)
	Coolant	950 ml (2.0/1.7 US/Imp. pt)

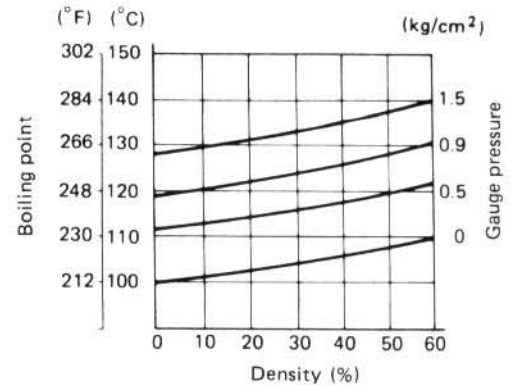


Fig. 1 Coolant density-boiling point curve.

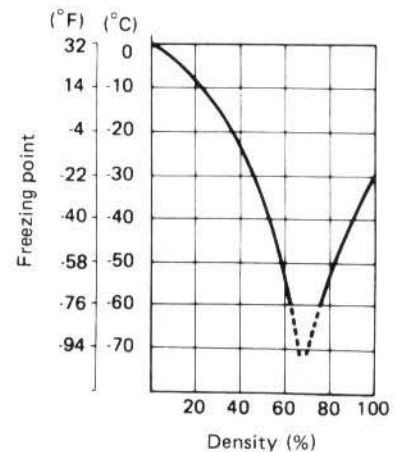
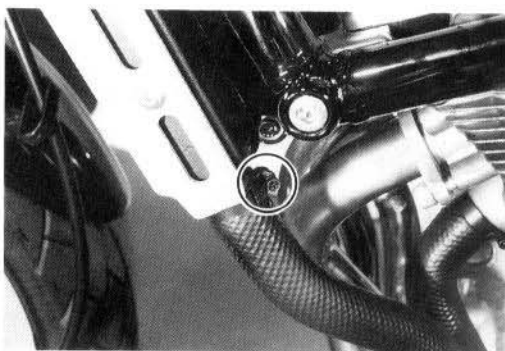
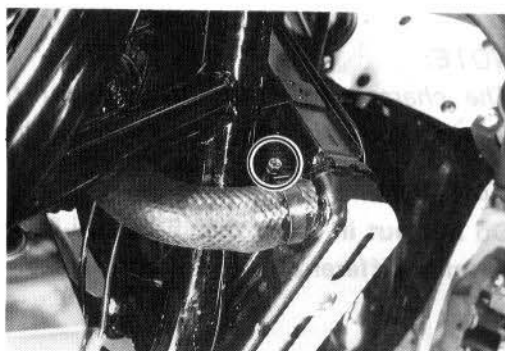
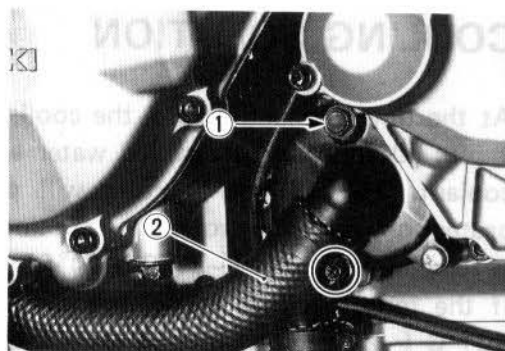


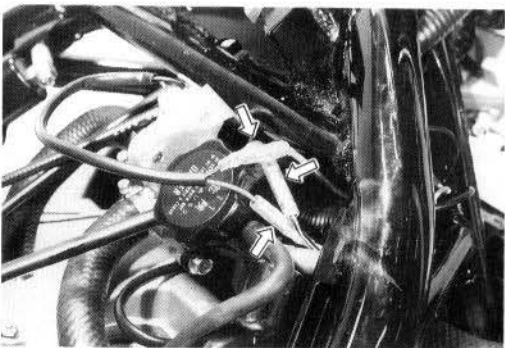
Fig. 2 Coolant density-freezing point curve.

COOLING SYSTEM REMOVAL AND DISASSEMBLY

- Remove the front seat. (Refer to page 1-12.)
- Remove the left and right air cleaner side cover. (Refer to page 1-12.)
- Remove the fuel tank. (Refer to page 4-2.)
- Drain the coolant by removing the drain plug ① and disconnect the water hose ② by loosening the clamp screw.
- Loosen the clamp screws and disconnect water hoses from the radiator.

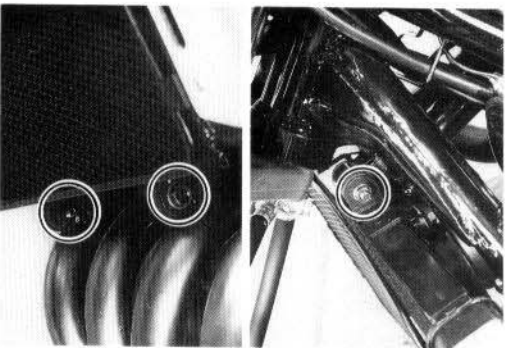


- Disconnect the water thermo-switch lead wires and cooling fan thermo-switch lead wires.



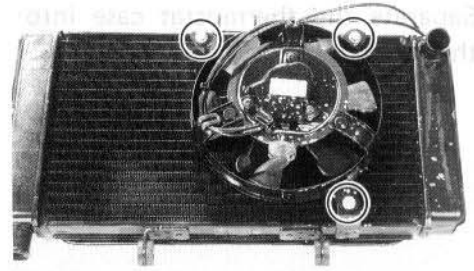
RADIATOR

- Remove the radiator by removing the mounting bolts.

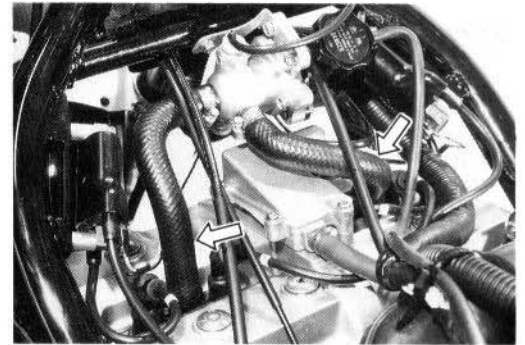


COOLING FAN

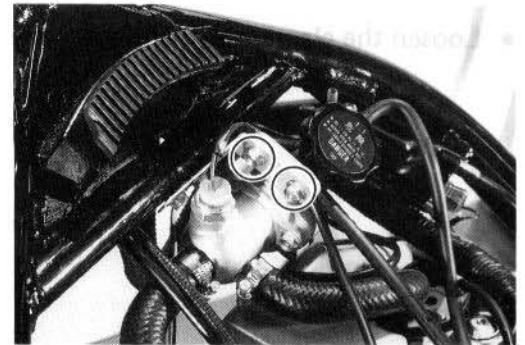
- Remove the cooling fan.



- Loosen the clamp screws and disconnect water hoses from the cylinder head.

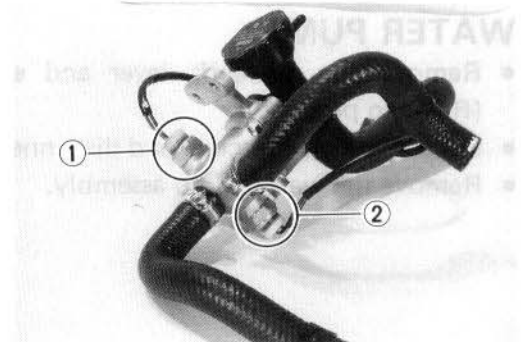


- Remove the thermostat case along with the water hoses.

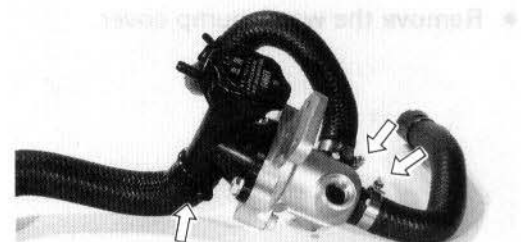


WATER THERMO-SWITCH AND COOLING FAN THERMO-SWITCH

- Remove the water thermo-switch ① and cooling fan thermo-switch ②.



- Loosen the clamp screws and disconnect the water hoses.

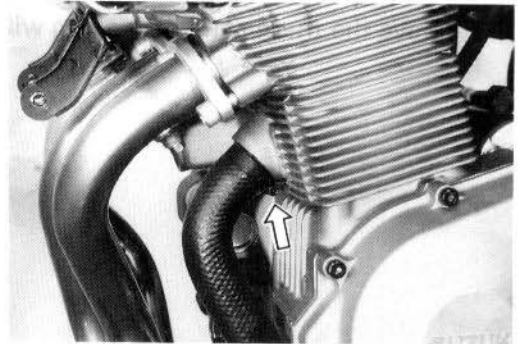


THERMOSTAT

- Separate the thermostat case into halves and remove the thermostat.

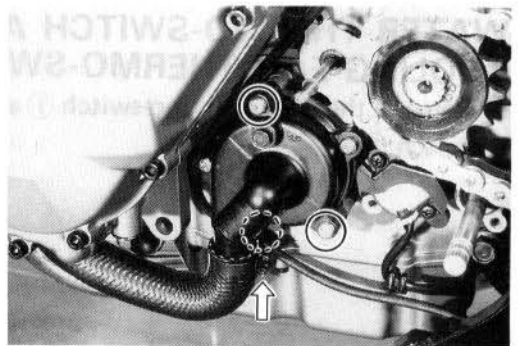


- Loosen the clamp screw and disconnect the water hose.

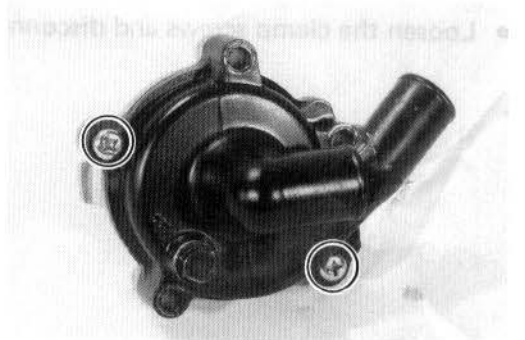


WATER PUMP

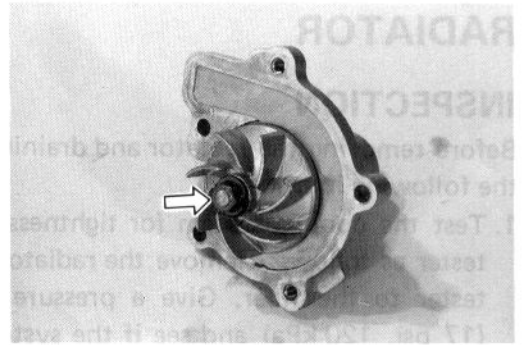
- Remove the gearshift lever and engine sprocket cover. (Refer to page 3-6.)
- Loosen the clamp screw and disconnect the water hose.
- Remove the water pump assembly.



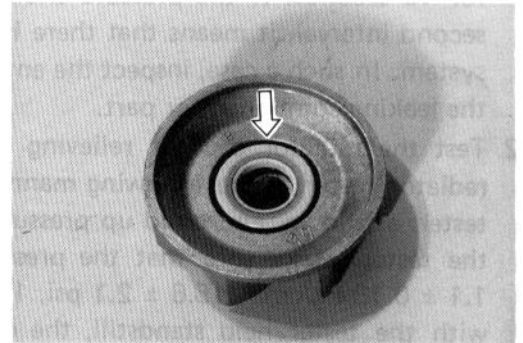
- Remove the water pump cover.



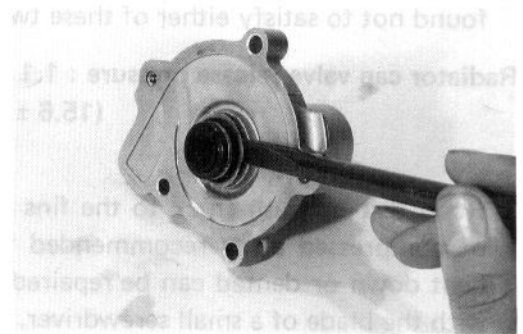
- Remove the impeller securing bolt by holding the impeller shaft with a water pump pliers.



- Remove the mechanical seal ring.



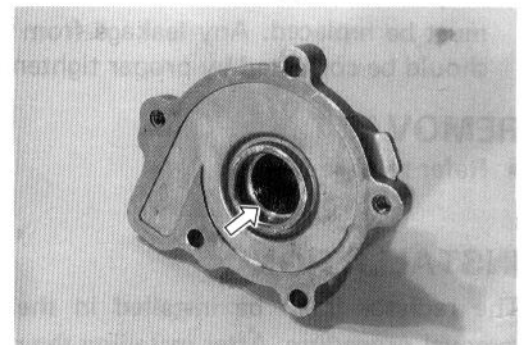
- Remove the circlip from the impeller shaft.
- Remove the impeller shaft.
- Remove the mechanical seal.



- Remove the oil seal.

CAUTION:

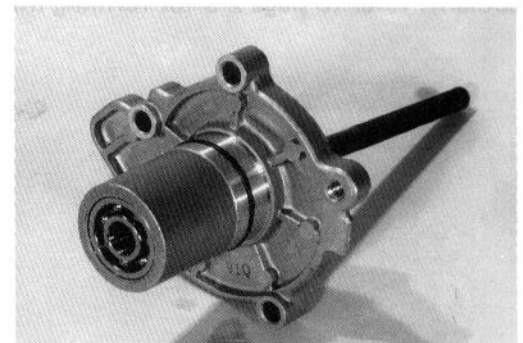
The removed mechanical seal or oil seal should be replaced with a new one.



- Drive out the bearing using a suitable bar.

CAUTION:

The removed bearing should be replaced with a new one.



RADIATOR

INSPECTION

Before removing the radiator and draining the coolant, 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 : $1.1 \pm 0.15 \text{ kg/cm}^2$
($15.6 \pm 2.1 \text{ psi}$, $110 \pm 15 \text{ kPa}$)**

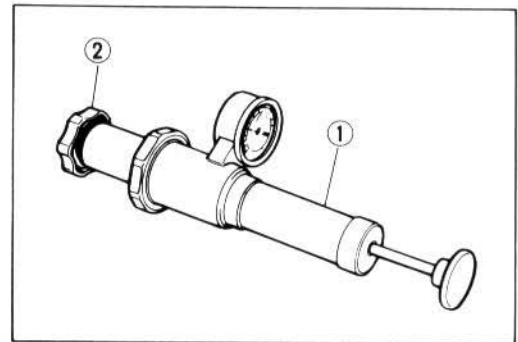
3. Road dirt or trash stuck to the fins must be removed. Use of compressed air is recommended for this cleaning. Fins bent down or dented can be repaired by straightening them with the blade of a small screwdriver.
4. Any water hose found in a cracked condition or flattened must be replaced. Any leakage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

REMOVAL

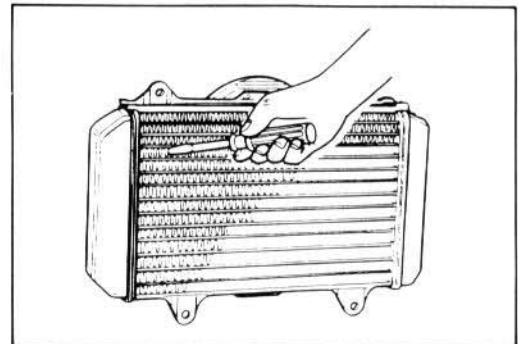
- Refer to page 5-5.

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 2-9 for refilling information.



① Radiator cap tester ② Radiator cap



WATER THERMO-SWITCH

REMOVAL

- Refer to page 5-6.

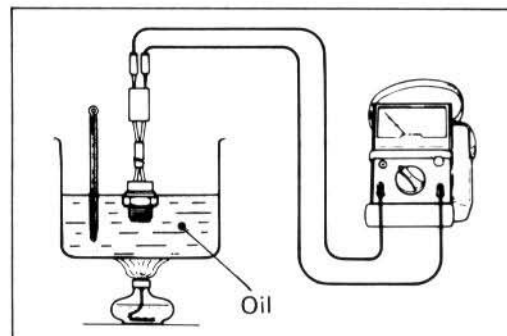
INSPECTION

The water thermo-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

Water thermo-switch specification

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



REASSEMBLY

NOTE:

Do not forget the new O-ring.

Tightening torque

Water 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 water thermo-switch. It may cause damage if water thermo-switch gets a sharp impact. Replace the O-ring with a new one.

- Fill the specified coolant (See page 2-9).

COOLING FAN

REMOVAL

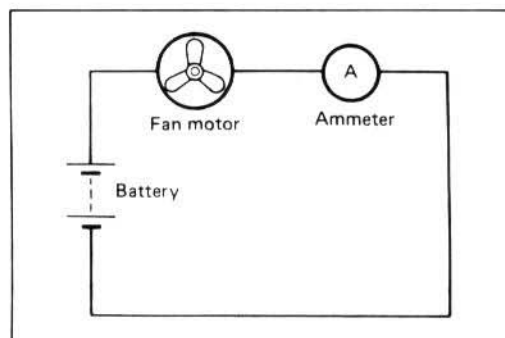
- Refer to page 5-6.

INSPECTION

Test the cooling fan drive motor for load current with an ammeter connected as shown in the illustration.

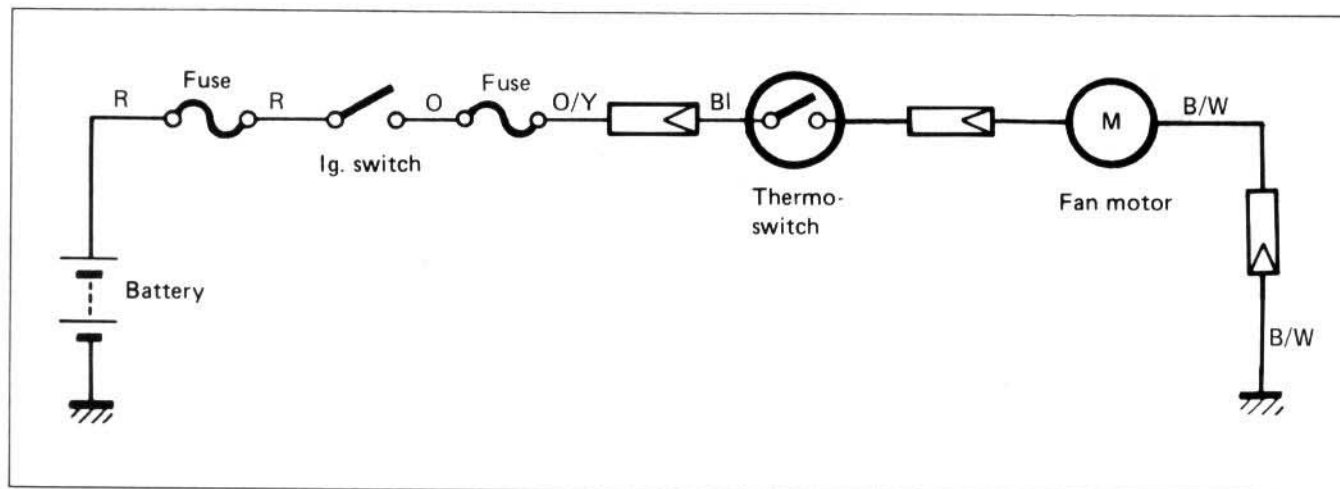
The voltmeter is for making sure that the battery applies 12 volts to the motor. With the motor with electric motor fan running at full speed, the ammeter should be indicating not more than 5 amperes.

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



COOLING FAN 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 95°C (203°F) of rising water temperature to set the fan in motion.



REMOVAL

- Refer to page 5-6.

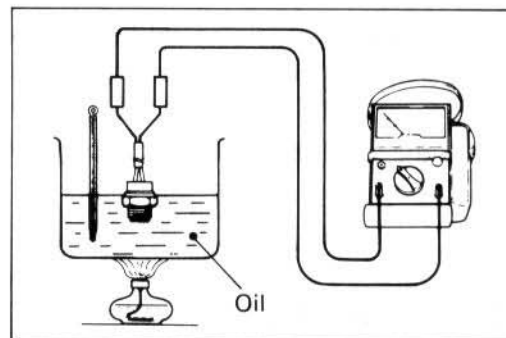
INSPECTION

- The thermo-switch must be checked for its temperature-initiated closing action at the specification value of 95°C (203°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.

09900-25002 : Pocket tester

Thermo-switch specification

OFF → ON	Approx. 95°C (203°F)
ON → OFF	Approx. 88°C (190.4°F)



REASSEMBLY

NOTE:

Do not forget the new 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.

Replace the O-ring with a new one.

THERMOSTAT

REMOVAL

- Refer to page 5-7.

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 74.5°C (166.1°F) and 78.5°C (173.3°F).

**Thermostat valve opening temperature : 74.5 – 78.5°C
(166.1 – 173.3°F)**

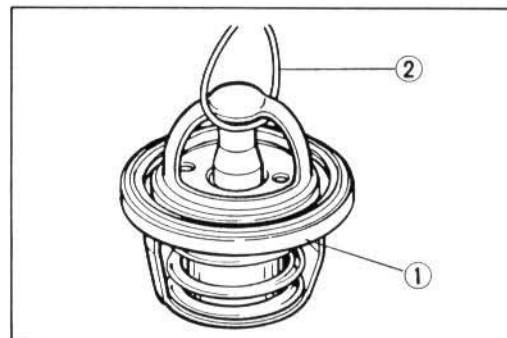
- Keep on heating the water to raise its temperature to and beyond 90°C (194°F).
- Just when the water reaches 90°C (194°F), the thermostat valve should have lifted by at least 7.0 mm (0.28 in).

**Thermostat valve lift : Over 7.0 mm at 90°C
(Over 0.28 in at 194°F)**

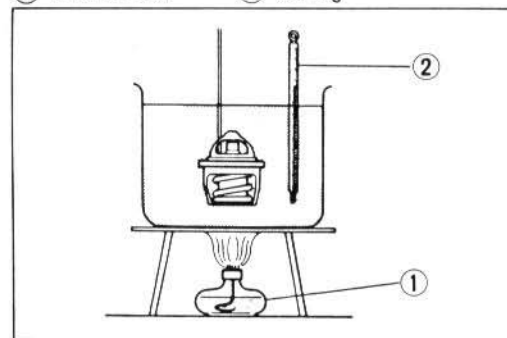
- A thermostat failing to satisfy either of the two requirements (start-to-open temperature and valve lift) must be replaced.

REASSEMBLY

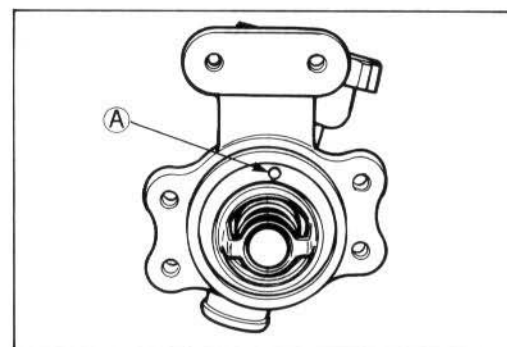
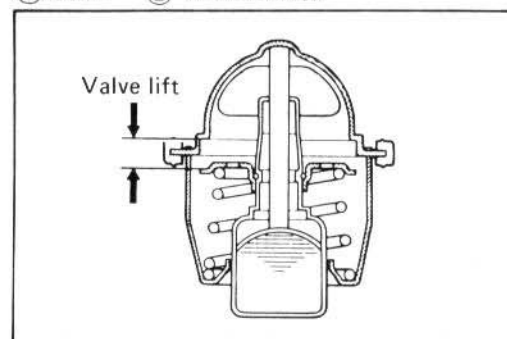
- The air bleeder hole (A) of the thermostat faces upside.



① Thermostat ② String



① Stove ② Thermometer



WATER PUMP

REMOVAL AND DISASSEMBLY

- Refer to page 5-7 for the water pump removal and disassembly procedures.

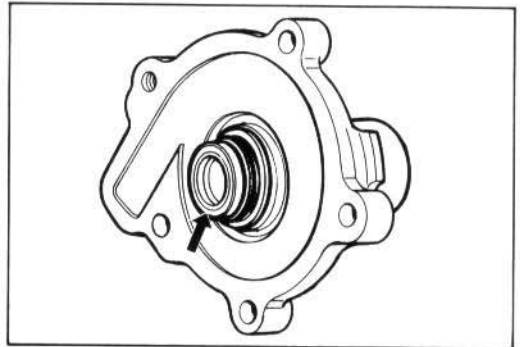
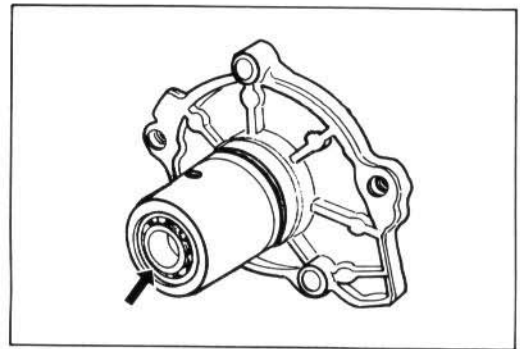
INSPECTION

WATER PUMP BEARING

Turn the inner race and check the bearing play. If abnormal noise occurs or any sign of stickiness is noted, replace the bearing 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.

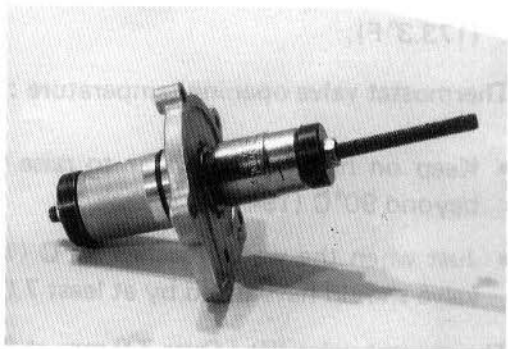


REASSEMBLY

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

- Press the new bearing into the stuffing box with the special tool and a suitable size sleeve etc.

09924-84521: Bearing installer



- 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 new oil seal into the stuffing box with the special tool and a suitable size sleeve etc.

09924-84521: Bearing installer

- Press the new mechanical seal into the stuffing box with a suitable size sleeve etc.

NOTE:

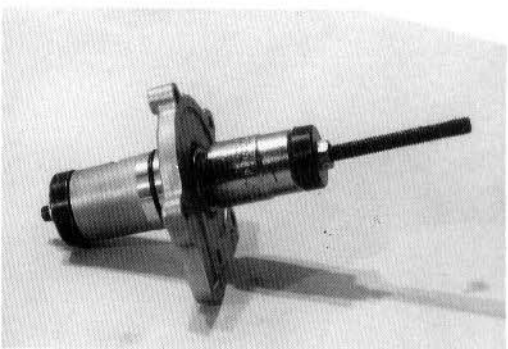
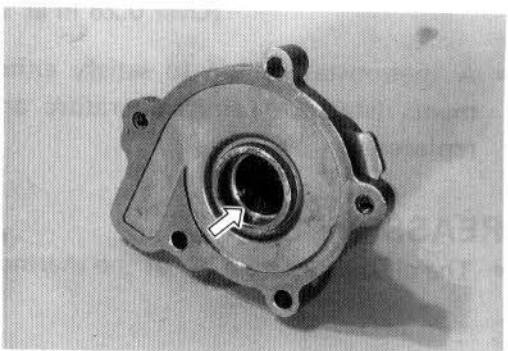
When installing the mechanical seal, apply SUZUKI BOND NO. 1207B to its outer surface.

(For U.S.A. model)

99104-31140: SUZUKI BOND NO. 1207B

(For the other models)

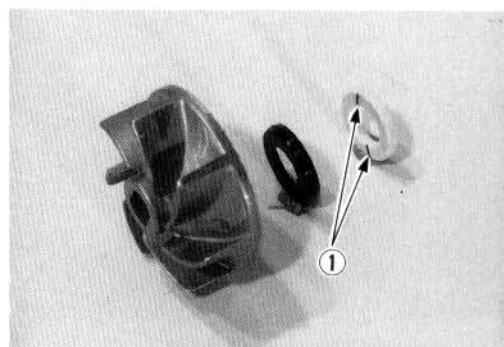
99000-31140: SUZUKI BOND NO. 1207B



- Replace the O-ring and water seal with new ones when re-assembling the water pump.

NOTE:

The mechanical seal ring must be assembled with marked face ① of the ring toward the impeller.



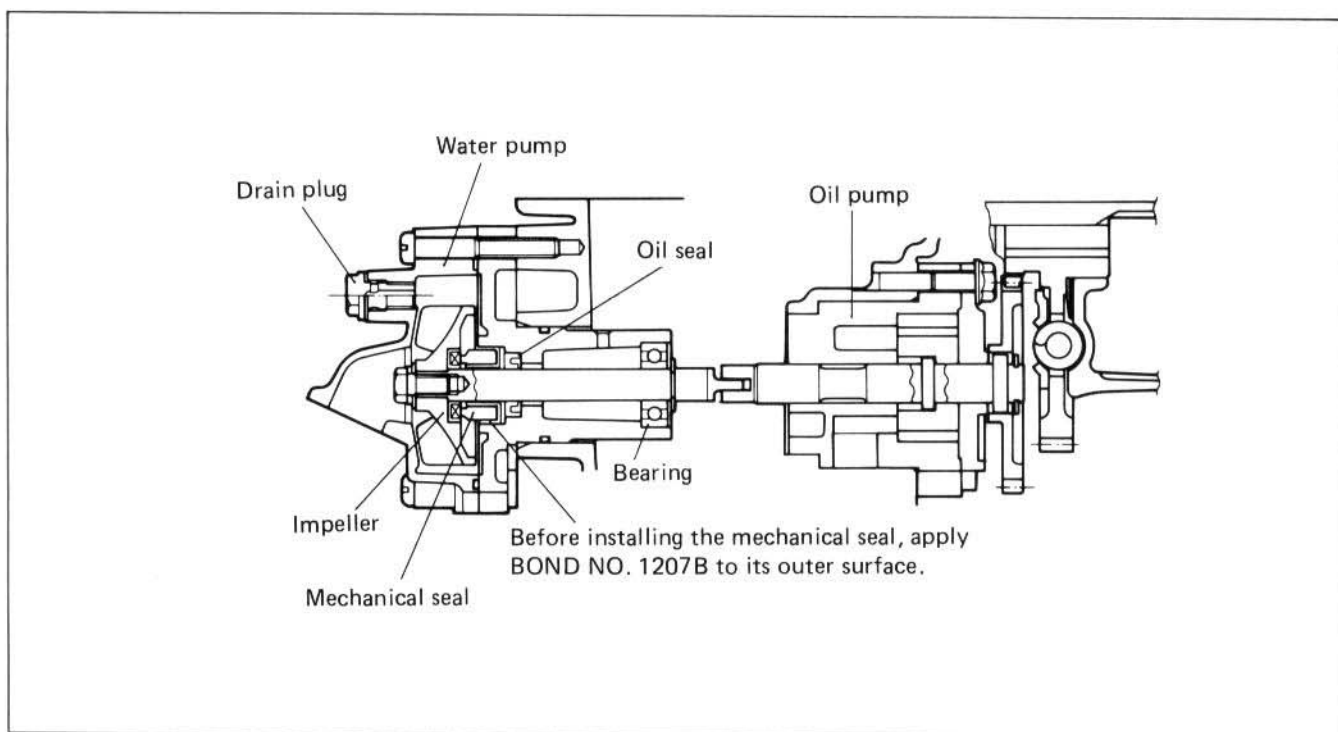
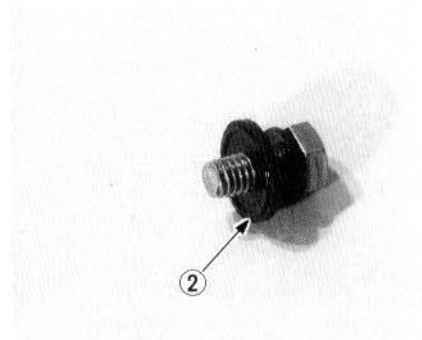
- Tighten the impeller securing bolt to the specified torque.

Tightening torque: 7 – 9 N·m

(0.7 – 0.9 kg-m, 5.0 – 6.5 lb-ft)

NOTE:

The seal lip side ② faces impeller.



Refer to page 8-17 for the radiator hose routing.