

COOLING SYSTEM

CONTENTS

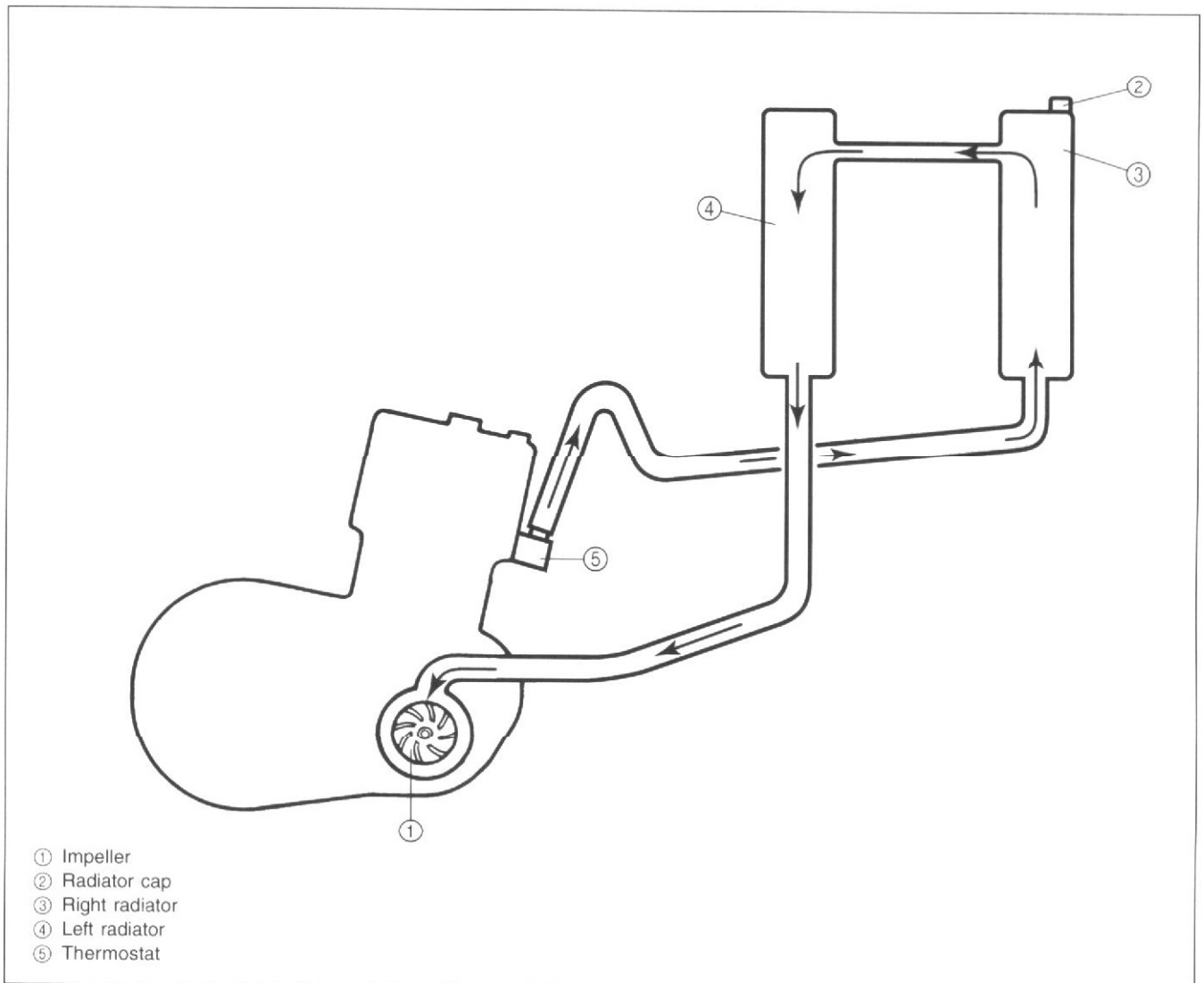
COOLING SYSTEM	5- 2
DESCRIPTION	5- 2
CONSTRUCTION	5- 3
ENGINE COOLANT	5- 4
RADIATOR AND COOLING FAN	5- 5
INSPECTION	5- 5
REMOVAL	5- 6
REMountING	5- 7
COOLING FAN THERMOSWITCH	5- 8
REMOVAL	5- 8
INSPECTION	5- 9
INSTALLATION	5- 9
ENGINE COOLANT TEMPERATURE THERMOSWITCH	5-10
REMOVAL	5-10
INSPECTION	5-10
INSTALLATION	5-10
THERMOSTAT	5-11
REMOVAL	5-11
INSPECTION	5-11
INSTALLATION	5-12
WATER PUMP	5-13
REMOVAL AND DISASSEMBLY	5-13
INSPECTION	5-14
REASSEMBLY	5-14

COOLING SYSTEM DESCRIPTION

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

A wax-pellet type thermostat is used to regulate the flow of engine coolant through the radiator. As the coolant temperature rises to about 75°C (167°F) the thermostat valve unseats and a normal coolant flow is established. At about 90°C (194°F) the thermostat becomes completely open and, as a result, heat is released to the atmosphere through the radiator core.

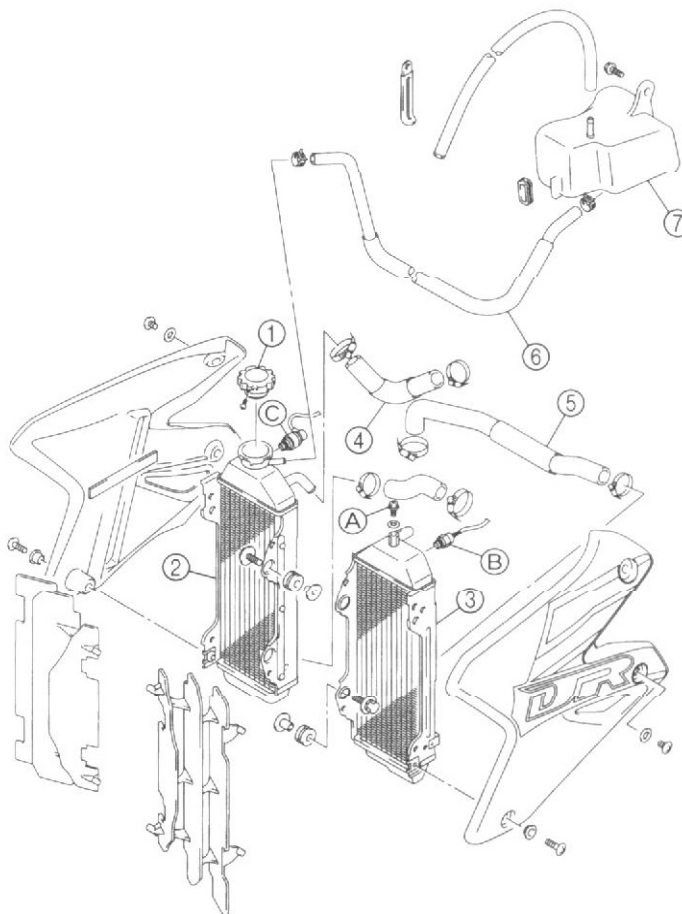
Referring to the following illustration, the thermostat is in the closed condition, so that engine coolant recirculates through the route comprising the water pump, engine, by-pass hole of the thermostat and radiator in the regulated condition.



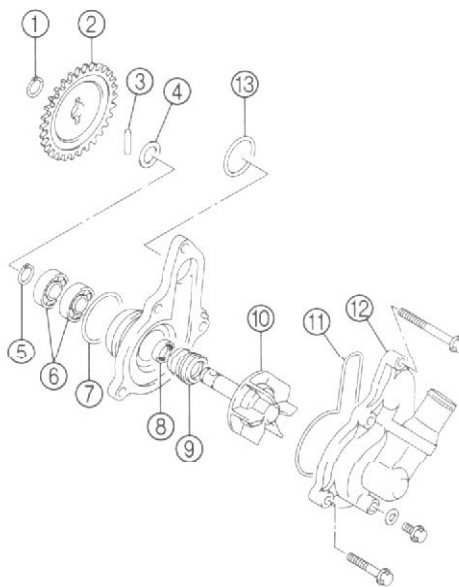
CONSTRUCTION

- ① Radiator cap
- ② Radiator (R)
- ③ Radiator (L)
- ④ Radiator inlet hose
- ⑤ Radiator outlet hose
- ⑥ Overflow hose
- ⑦ Overflow tank

- Ⓐ Air bleeder bolt
- Ⓑ Cooling fan thermostitch
- Ⓒ Engine coolant temperature thermostitch



ITEM	N·m	kgf·m	lb·ft
Ⓐ	5.5	0.55	4.0
Ⓑ	13	1.3	9.5
Ⓒ	13	1.3	9.5



- ① Circlip
- ② Water pump driven gear
- ③ Pin
- ④ Washer
- ⑤ Circlip
- ⑥ Bearing
- ⑦ O-ring
- ⑧ Oil seal
- ⑨ Mechanical seal
- ⑩ Impeller
- ⑪ O-ring
- ⑫ Water pump cover
- ⑬ O-ring

ENGINE COOLANT

At the time of manufacture, the cooling system is filled with a 50:50 mixture of distilled water and ethylene glycol antifreeze. This mixture will provide optimum corrosion and heat protection, and will protect the cooling system from freezing at above -31°C (-24°F).

If the motorcycle is to be exposed to temperatures below -31°C (-24°F), the percentage of antifreeze should be increased to 55% or 60%, according to figure 2.

- The characteristics of different antifreeze vary; therefore, be sure to use the specified antifreeze.

DATA Engine coolant: Mix antifreeze designed for aluminum radiators with distilled water only.

Water/antifreeze mixture ratio: 50:50 – 40:60

CAUTION

- * Mix a high quality ethylene glycol based antifreeze with distilled water only. Do not mix an alcohol based antifreeze or different brands of antifreeze.
- * The percentage of antifreeze in the coolant should be between 50 to 60%. If the percentage of antifreeze is above or below this range the coolant's frost protection and rust-inhibiting capabilities will be reduced. Always keep the antifreeze content above 50% even if the atmospheric temperature does not go below the freezing point.

DATA Engine coolant capacity: 1 250 ml (1.3 US qt, 1.1 Imp qt)

Antifreeze density	Freezing point
50%	-31°C (-24°F)
55%	-40°C (-40°F)
60%	-55°C (-67°F)

WARNING

- * Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- * The engine must be cool before servicing the cooling system.
- * Engine coolant may be harmful if swallowed or if it comes in contact with the skin or eyes. If engine coolant gets into the eyes or contacts the skin, flush the eyes or wash the skin thoroughly, with plenty of water. If engine coolant is swallowed, induce vomiting and call a physician immediately.

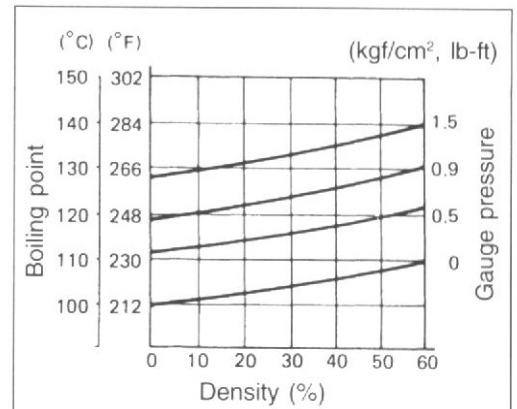


Fig. 1 Engine coolant density-boiling point

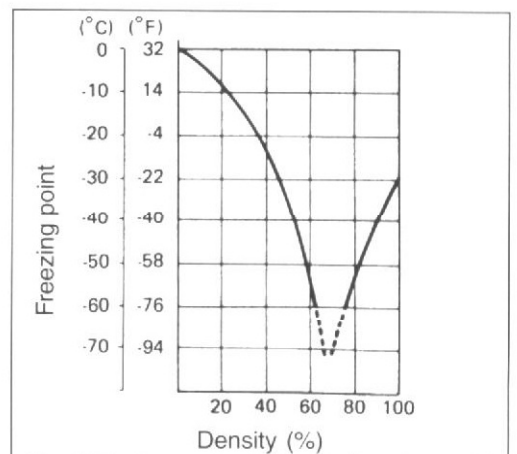


Fig. 2 Engine coolant density-freezing point

RADIATOR AND COOLING FAN INSPECTION

RADIATOR

Before removing the radiator and draining the engine coolant, check the following.

Check the cooling system for leaks with a radiator tester ①. Remove the radiator cap and connect the radiator tester to the filler. Pressurize the cooling system with 120 kPa (1.2 kgf/cm², 17 psi) of pressure, and then check if it holds the pressure for 10 seconds. If the cooling system does not hold the pressure for at least 10 seconds, check the entire cooling system for leaks. If a leak is found, replace the damaged part.

⚠ WARNING

- * Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- * When removing the radiator cap tester, put a rag on the filler to prevent the engine coolant from spraying out.

⚠ CAUTION

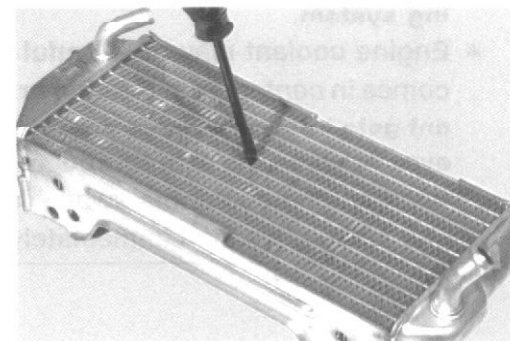
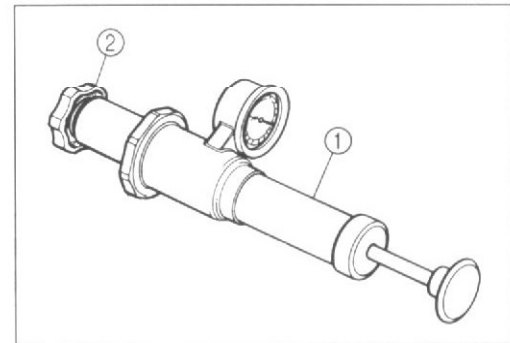
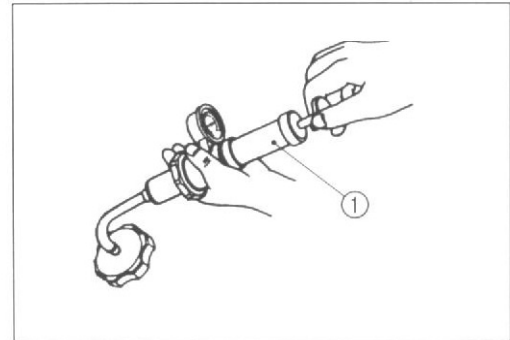
Do not exceed the radiator cap release pressure, or the radiator cap and subsequently the radiator, can be damaged.

Check the radiator cap ② using a radiator tester ①. Attach the radiator cap to the radiator tester as shown. Slowly apply pressure to the radiator cap; do not exceed 95 – 125 kPa (0.95 – 1.25 kgf/cm², 13.5 – 17.8 psi). If the radiator cap does not hold the pressure for at least 10 seconds, replace it with a new one.

DATA Radiator cap release pressure: 95 – 125 kPa
(0.95 – 1.25 kgf/cm², 13.5 – 17.8 psi)

Check the radiator for dirt and other foreign materials. If any are found, clean the radiator using compressed air. Also, repair any bent or dented fins using a small screwdriver.

Check all the water hoses for cracks, flat spots, or loose connections. Replace any damaged hoses and properly tighten any loose connections.



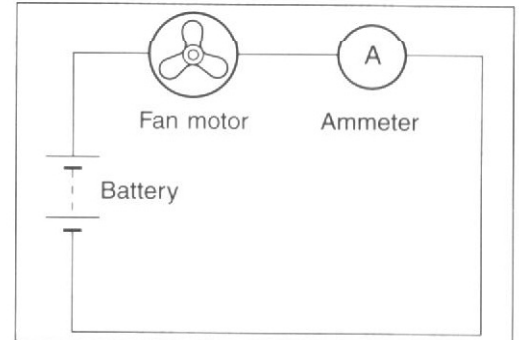
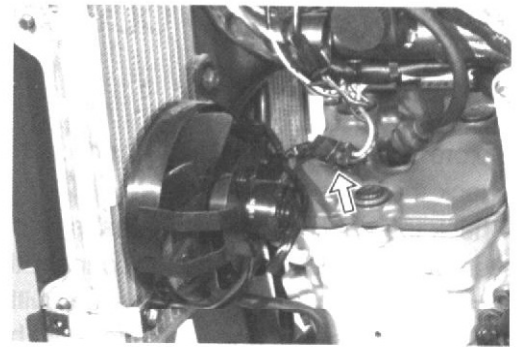
COOLING FAN

- Remove the fuel tank. (☞ 4-2)
- Disconnect the cooling fan motor coupler.

Test the cooling fan motor for load current using an ammeter connected as shown.

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.

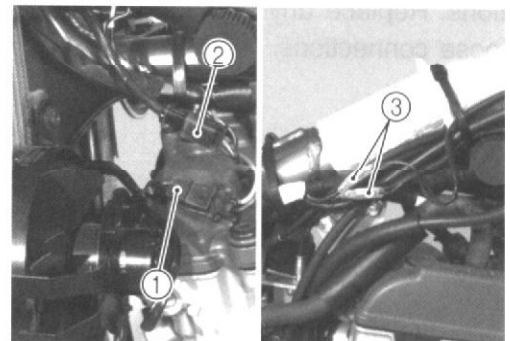
**REMOVAL**

- Remove the fuel tank. (☞ 4-2)
- Drain the engine coolant. (☞ 2-15)

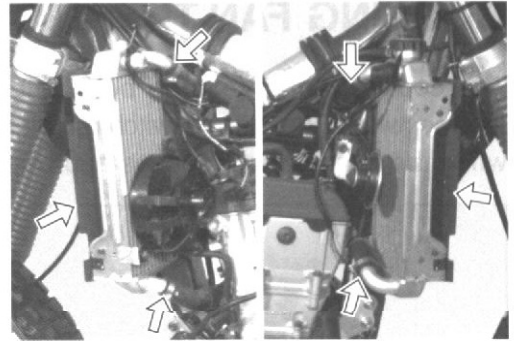
⚠ WARNING

- * Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- * The engine must be cool before servicing the cooling system.
- * Engine coolant may be harmful if swallowed or if it comes in contact with the skin or eyes. If engine coolant gets into the eyes or contacts the skin, flush the eyes or wash the skin thoroughly, with plenty of water. If engine coolant is swallowed, induce vomiting and call a physician immediately.

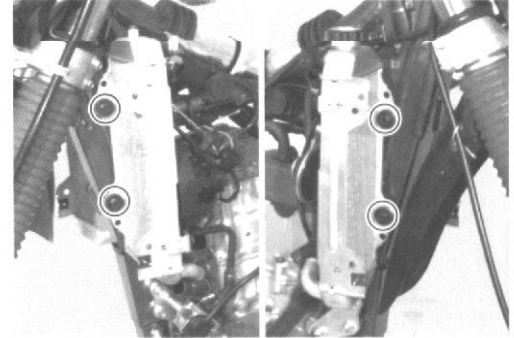
- Disconnect the cooling fan motor coupler ①, cooling fan thermostatic coupler ②, and engine coolant temperature thermostatic lead wires ③.



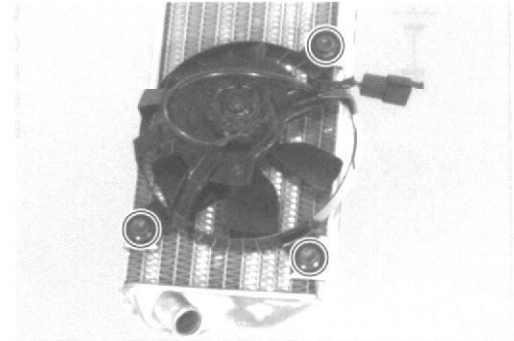
- Disconnect the radiator hoses and radiator covers.



- Remove the radiators.



- Remove the cooling fan.

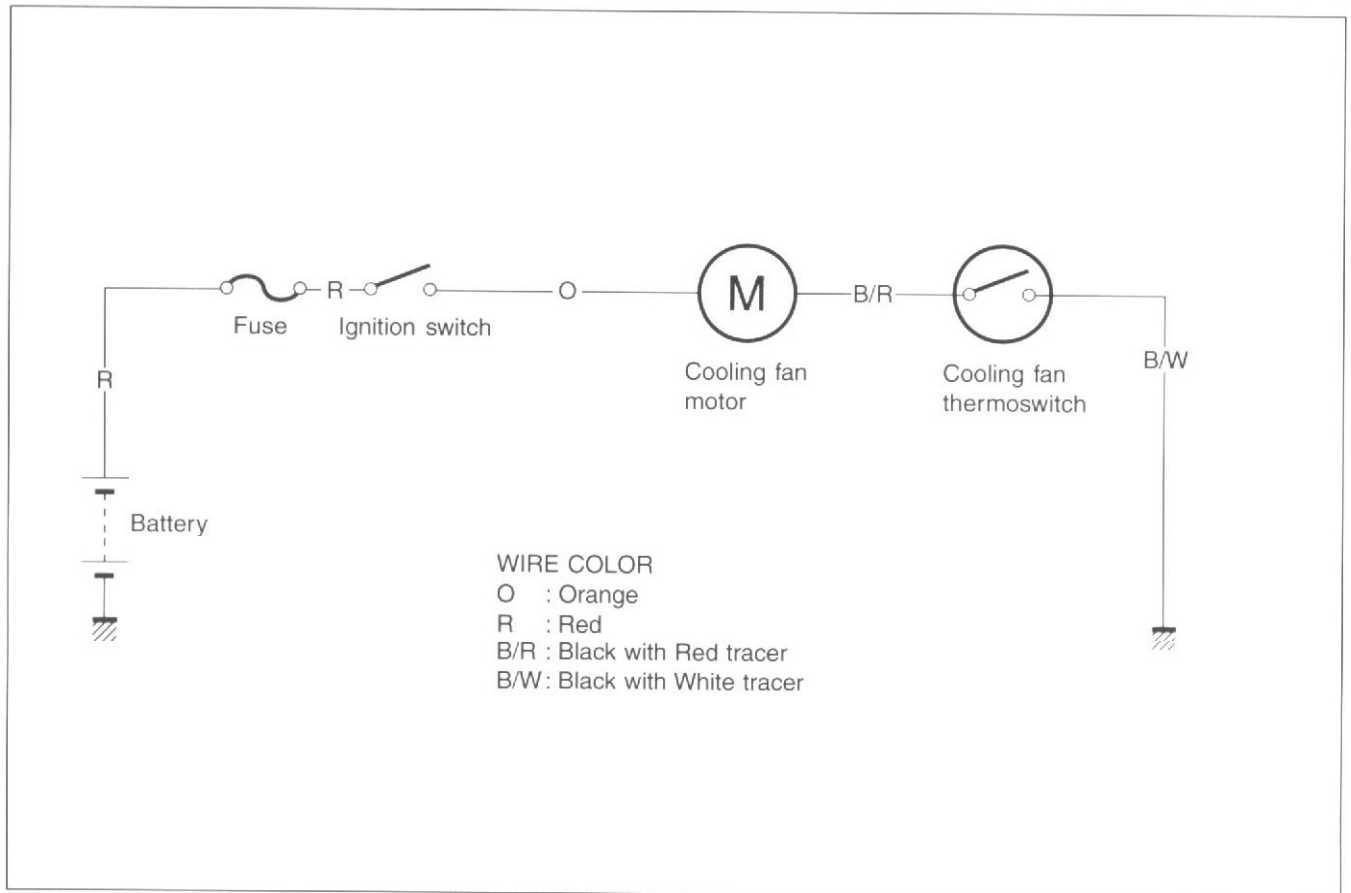


REMOUNTING

Remount the radiator in the reverse order of removal. After remounting the radiator, be sure to add engine coolant. (⚙️ 2-15)

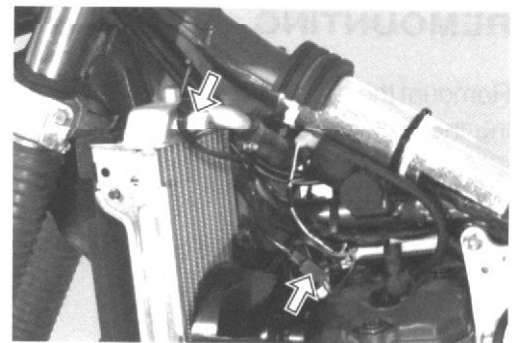
COOLING FAN THERMOSWITCH

The cooling fan is secured behind the radiator by three bolts and is automatically controlled by the thermoswitch. The thermoswitch remains open when the temperature of the engine coolant is low, but closes when the temperature reaches approximately 96°C (205°F) setting the cooling fan in motion.



REMOVAL

- Remove the fuel tank. (☞ 4-2)
- Disconnect the cooling fan thermoswitch coupler and remove the cooling fan thermoswitch.



INSPECTION

Check the operating temperature of the cooling fan thermostatic switch.

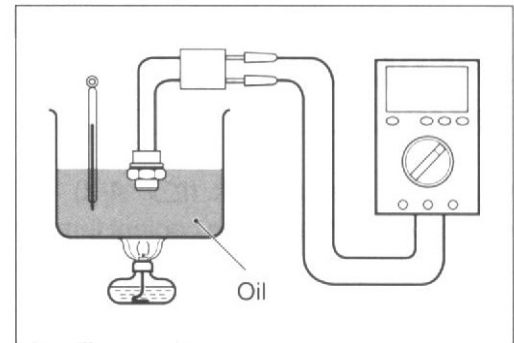
- Connect the multi circuit tester to the cooling fan thermostatic switch.
- Place the cooling fan thermostatic switch into a container of oil.
- Heat the oil and check the temperature on the thermometer when the cooling fan thermostatic switch is operated.

TOOL 09900-25008: Multi circuit tester set

DATA Cooling fan thermostatic switch specification:

OFF → ON: Approximately 96°C (205°F)

ON → OFF: Approximately 91°C (196°F)



INSTALLATION

Install the cooling fan thermostatic switch in the reverse order of removal. Pay attention to the following points:

- Apply SUZUKI SUPER GREASE "A" to the O-ring.

For USA

AH 99000-25030: SUZUKI SUPER GREASE "A"

For the other countries

AH 99000-25010: SUZUKI SUPER GREASE "A"

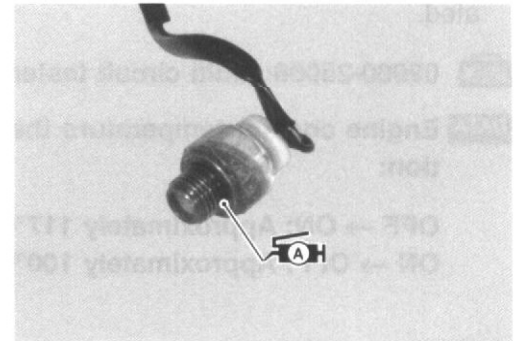
- Tighten the cooling fan thermostatic switch to the specified torque.

T Cooling fan thermostatic switch: 13 N·m (1.3 kgf·m, 9.5 lb·ft)

CAUTION

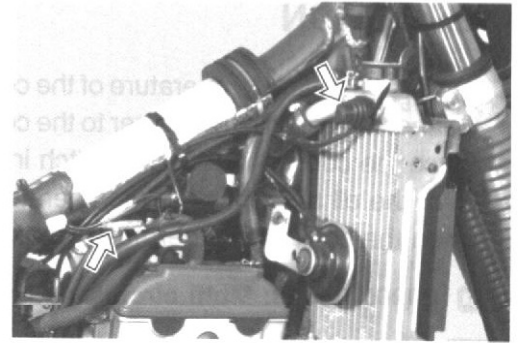
- * Take special care when handling the cooling fan thermostatic switch. Do not subject it to strong blows or allow it to be dropped.
- * Replace the removed O-ring with a new one.

- After installing the cooling fan thermostatic switch, be sure to add engine coolant. (☞ 2-15)



ENGINE COOLANT TEMPERATURE THERMOSWITCH REMOVAL

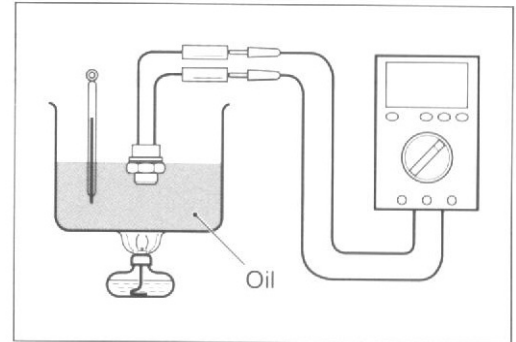
- Remove the fuel tank. (☞ 4-2)
- Disconnect the engine coolant temperature thermoswitch lead wires and remove the engine coolant temperature thermoswitch.



INSPECTION

Check the operating temperature of the engine coolant temperature thermoswitch.

- Connect the multi circuit tester to the engine coolant temperature thermoswitch.
- Place the engine coolant temperature thermoswitch into a container of oil.
- Heat the oil and check the temperature on the thermometer when the engine coolant temperature thermoswitch is operated.



TOOL 09900-25008: Multi circuit tester set

DATA Engine coolant temperature thermoswitch specification:

OFF → ON: Approximately 117°C (243°F)

ON → OFF: Approximately 100°C (212°F)

INSTALLATION

Install the engine coolant temperature thermoswitch in the reverse order of removal. Pay attention to the following points:

- Apply SUZUKI SUPER GREASE “A” to the O-ring.

For USA

AH 99000-25030: SUZUKI SUPER GREASE “A”

For the other countries

AH 99000-25010: SUZUKI SUPER GREASE “A”

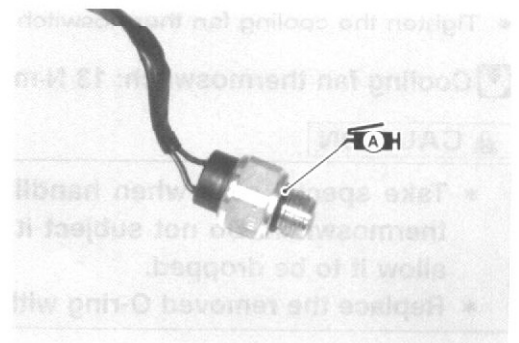
- Tighten the engine coolant temperature thermoswitch to the specified torque.

Engine coolant temperature thermoswitch:
13 N·m (1.3 kgf-m, 9.5 lb-ft)

CAUTION

Take special care when handling the engine coolant temperature thermoswitch. Do not subject it to strong blows or allow it to be dropped.

- After installing the engine coolant temperature thermoswitch, be sure to add engine coolant. (☞ 2-15)



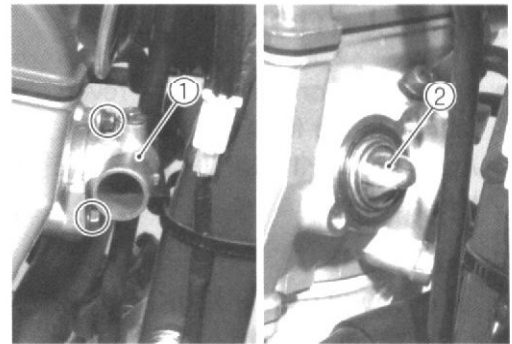
THERMOSTAT REMOVAL

- Drain the engine coolant. (☞ 2-15)
- Remove the right radiator. (☞ 5-6 and 5-7)

⚠ WARNING

- * Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- * The engine must be cool before servicing the cooling system.
- * Engine coolant may be harmful if swallowed or if it comes in contact with the skin or eyes. If engine coolant gets into the eyes or contacts the skin, flush the eyes or wash the skin thoroughly, with plenty of water. If engine coolant is swallowed, induce vomiting and call a physician immediately.

- Disconnect the thermostat case ① and remove the thermostat ②.

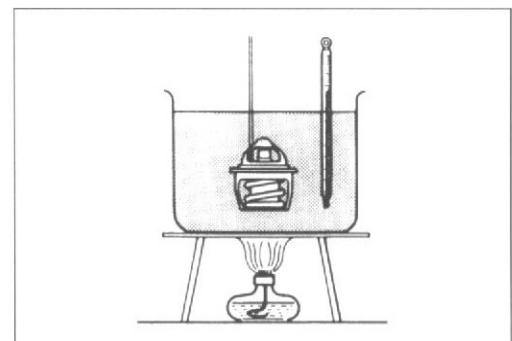
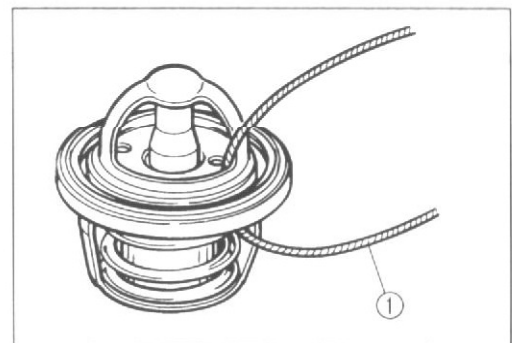


INSPECTION

Inspect the thermostat for cracks or damage. If any damages are found, replace the thermostat with a new one.

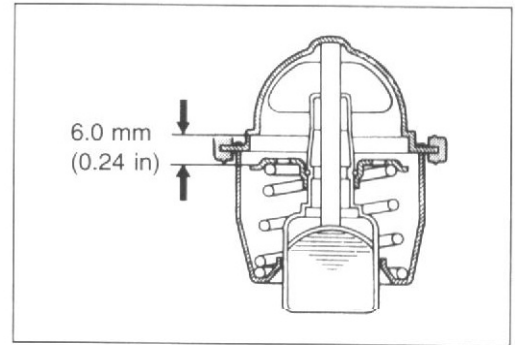
Check the opening temperature of the thermostat valve.

- Pass a string ① between the flange as shown.
- Immerse the thermostat into a container of water and keep it suspended as shown.



- Slowly heat the container and check the temperature on the thermometer when the thermostat valve begins to open.

DATA Thermostat valve opening temperature:
Approximately 75°C (167°F)



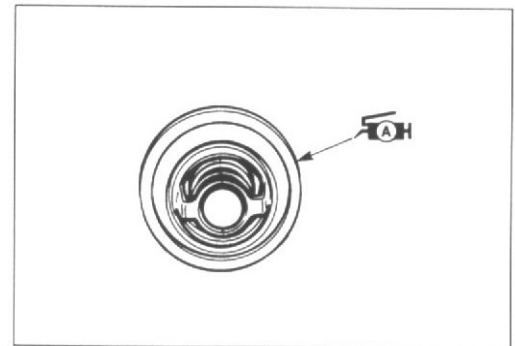
- Continue heating the container until the water temperature is above 90°C (194°F).
- When the water temperature reaches 90°C (194°F), the thermostat valve should have lifted at least 6.0 mm (0.24 in).

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

- If the thermostat is faulty in either of these two checks, replace it.

INSTALLATION

- Install the thermostat in the reverse order of removal. Pay attention to the following points.
- Apply SUZUKI SUPER GREASE "A" to the rubber seal on the thermostat.



For USA

SUZUKI SUPER GREASE "A"

For the other countries

SUZUKI SUPER GREASE "A"

- After installing the thermostat, be sure to add engine coolant.
 (☞ 2-15)

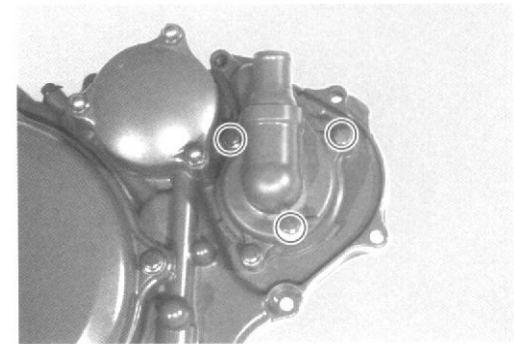
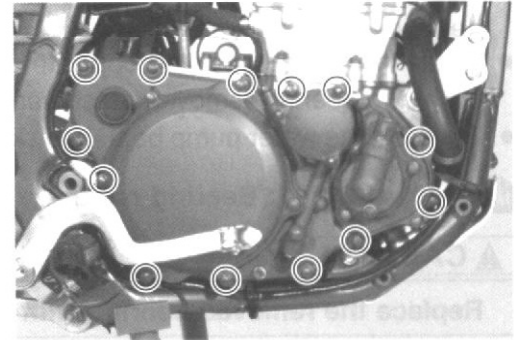
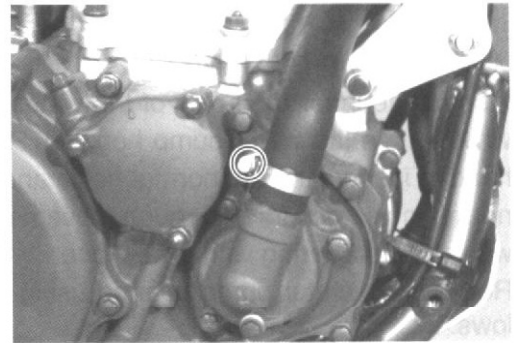
WATER PUMP REMOVAL AND DISASSEMBLY

- Drain the engine coolant. (☞ 2-15)
- Drain the engine oil. (☞ 2-11)

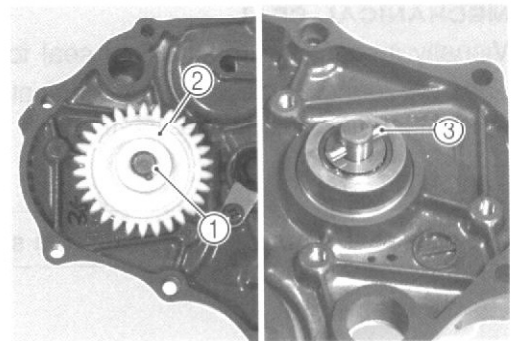
⚠ WARNING

- * Do not open the radiator cap when the engine is hot, as you may be injured by escaping hot liquid or vapor.
- * The engine must be cool before servicing the cooling system.
- * Engine coolant may be harmful if swallowed or if it comes in contact with the skin or eyes. If engine coolant gets into the eyes or contacts the skin, flush the eyes or wash the skin thoroughly, with plenty of water. If engine coolant is swallowed, induce vomiting and call a physician immediately.

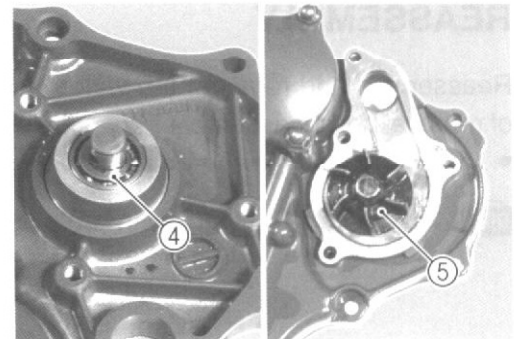
- Disconnect the radiator hose.
- Remove the right crankcase cover.
- Remove the water pump cover.



- Remove the circlip ①, water pump driven gear ② and pin ③.



- Remove the E-ring ④ and impeller ⑤.



INSPECTION

WATER PUMP BEARING

Inspect the inner race play of the water pump bearing by hand while it is in the water pump housing. Rotate the inner race by hand to inspect it for abnormal noise and smooth rotation. If abnormal noise occurs or if rough movement is noted, replace the water pump bearing with a new one.

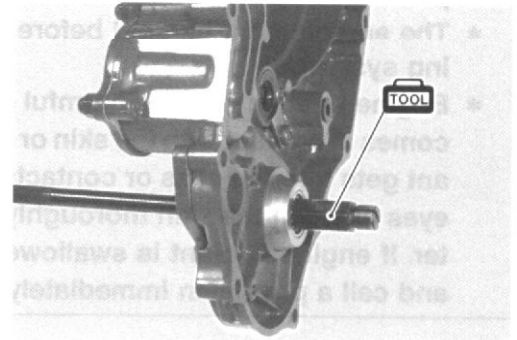
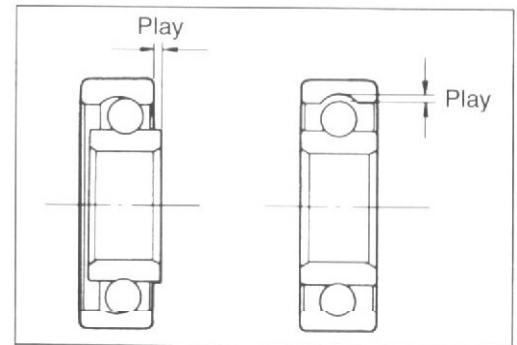
Remove the water pump bearing using the special tool, as follows:

- Insert the bearing remover attachment into the water pump bearing.
- Install the wedge from the opposite side and lock it into the slit of the bearing remover attachment.
- Drive out the water pump bearing by knocking the wedge bar.

 09941-50111: Bearing remover

CAUTION

Replace the removed bearing with a new one.



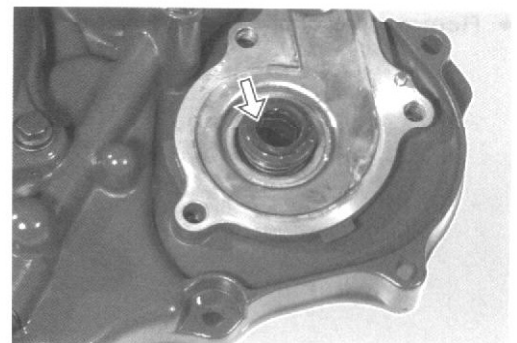
MECHANICAL SEAL

Visually inspect the mechanical seal for damage. If any damages are found, replace the mechanical seal with a new one.

- Remove the mechanical seal.

CAUTION

Replace the removed mechanical seal with a new one.

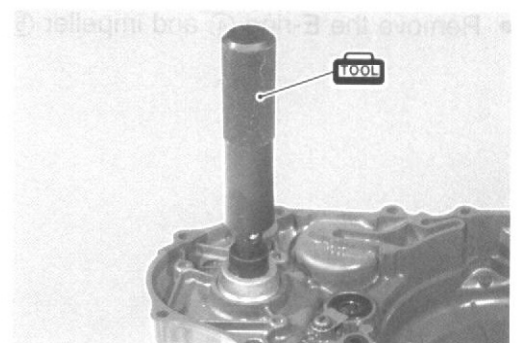


REASSEMBLY

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

- Install the water pump bearings using the special tool.

 09913-70210: Bearing installer set



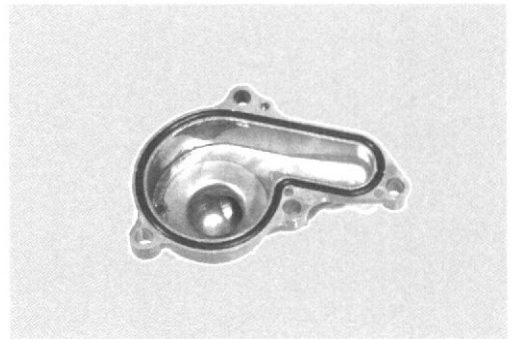
- Apply SUZUKI SUPER GREASE "A" to the new O-ring.

For USA

 H99000-25030: SUZUKI SUPER GREASE "A"

For the other countries

 H99000-25010: SUZUKI SUPER GREASE "A"



- When installing the water pump driven gear align the pin ① with the groove ②.
- After installing the water pump, be sure to add engine coolant. (☞ 2-15)

