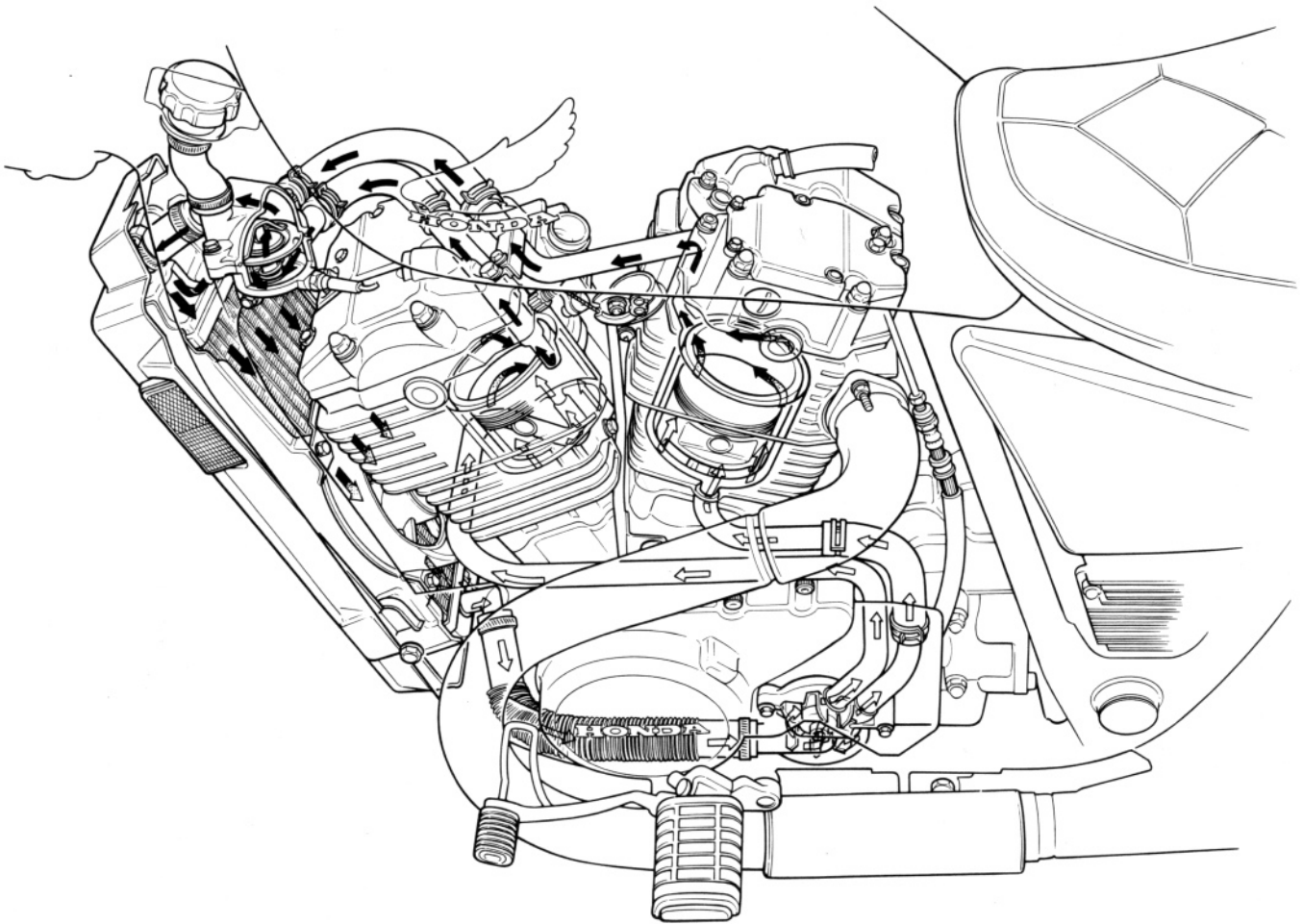


COOLING SYSTEM



6. COOLING SYSTEM

SERVICE INFORMATION	6-1	THERMOSTAT	6-4
TROUBLESHOOTING	6-1	RADIATOR/COOLING FAN	6-6
SYSTEM TESTING	6-2	WATER PUMP	6-10
COOLANT REPLACEMENT	6-3		

SERVICE INFORMATION

GENERAL

WARNING

Do not remove the radiator cap when the engine is hot. The coolant is under pressure and severe scalding could result. The engine must be cool before servicing the cooling system.

- Use only distilled water and ethylene glycol in the cooling system. A 50–50 mixture is recommended for maximum corrosion protection. Do not use alcohol-based antifreeze or an antifreeze with self sealing properties.
- Add coolant at the reserve tank. Do not remove the radiator cap except to refill or drain the system.
- Radiator, cooling fan and thermostat services can be made with the engine in the frame.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- Refer to Section 21 for fan motor thermostatic switch and temperature sensor inspections.

SPECIFICATIONS

Radiator cap relief pressure	0.75–1.05 kg/cm ² (10.7–14.9 psi)
Freezing point (Hydrometer test):	55% Distilled water + 45% ethylene glycol: –32°C (–25°F) 50% Distilled water + 50% ethylene glycol: –37°C (–34°F) 45% Distilled water + 55% ethylene glycol: –44.5°C (–48°F)
Coolant capacity: Radiator and engine Reserve tank Total system	1.7 liters (1.80 US qt) 0.4 liters (0.42 US qt) 2.1 liters (2.22 US qt)
Thermostat	Begins to open: 80° to 84°C (176° to 183°F) Valve lift: Minimum of 8 mm at 95°C (0.315 in at 203°F)
Boiling point (with 50–50 mixture):	Unpressurized: 107.7°C (226°F) Cap on, pressurized: 125.6°C (258°F)

TOOLS

Special

Cooling system tester

Commercially available

TROUBLESHOOTING

Engine temperature too high

1. Faulty temperature gauge or gauge sensor
2. Thermostat stuck closed
3. Faulty radiator cap
4. Insufficient coolant
5. Passages blocked in radiator, hoses, or water jacket
6. Fan blades bent
7. Faulty fan motor

Engine temperature too low

1. Faulty temperature gauge or gauge sensor
2. Thermostat stuck open

Coolant leaks

1. Faulty pump mechanical seal
2. Deteriorated O-rings
3. Loose or too tight hose clamps

COOLING SYSTEM

SYSTEM TESTING

COOLANT

Test the coolant mixture with an antifreeze tester. For maximum corrosion protection, a 50–50% solution of ethylene glycol and distilled water is recommended.



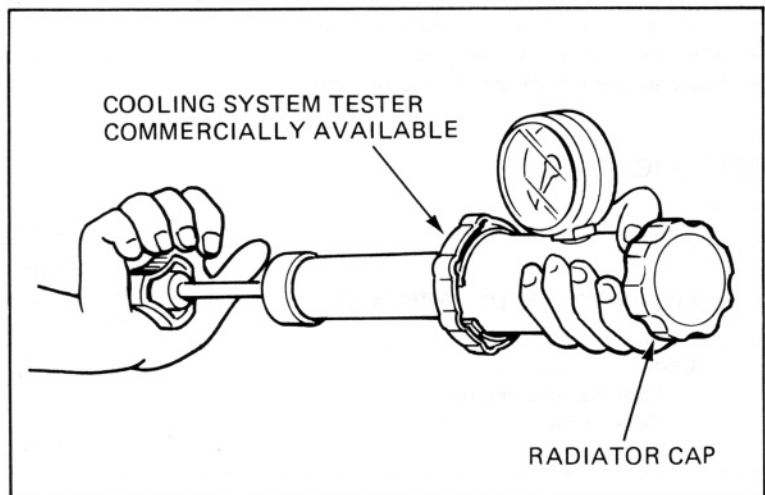
RADIATOR CAP INSPECTION

Pressure test the radiator cap. Replace the radiator cap if it does not hold pressure, or if relief pressure is too high or too low. It must hold specified pressure for at least six seconds.

NOTE:

Before installing the cap on the tester, apply water to sealing surfaces.

RADIATOR CAP RELIEF PRESSURE:
 $0.9 \pm 0.15 \text{ kg/cm}^2$ ($12.8 \pm 2.1 \text{ psi}$)

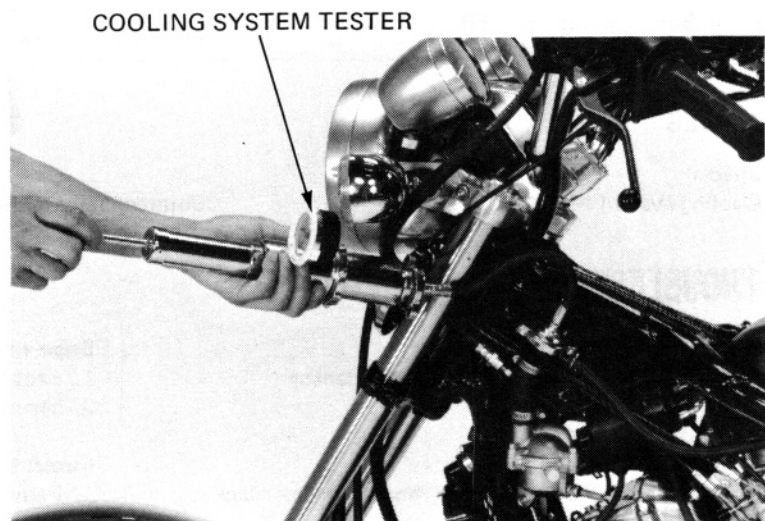


Pressurize the radiator, engine and hoses, and check for leaks.

CAUTION:

*Excessive pressure can damage the radiator.
Do not exceed 1.05 kg/cm^2 (14.9 psi)*

Repair or replace components if the system will not hold specified pressure for at least six seconds.



COOLANT REPLACEMENT

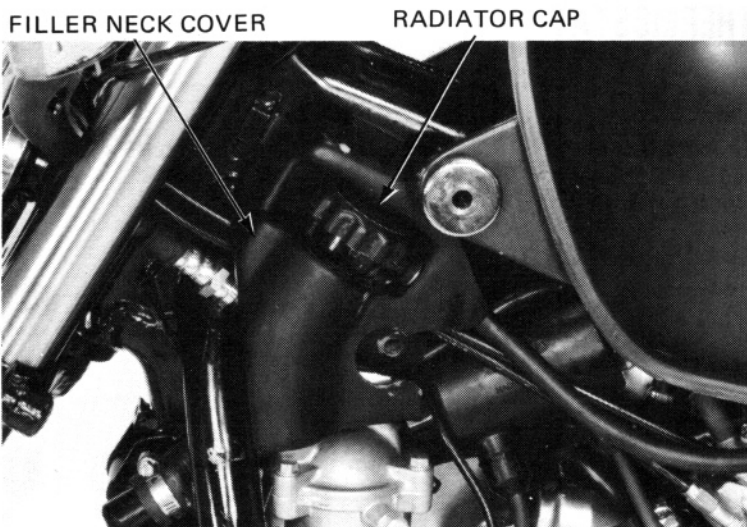
CAUTION:

The engine must be cool before servicing the cooling system, or severe scalding may result.

Remove the fuel tank front mounting bolts and raise the front of the fuel tank.

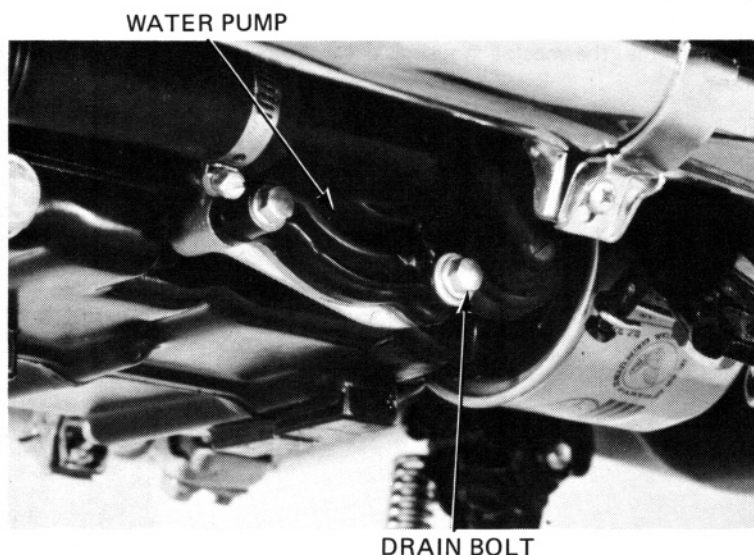
Remove the radiator filler neck cover.

Remove the radiator cap.



Remove the drain bolt located at the water pump and drain the system coolant.

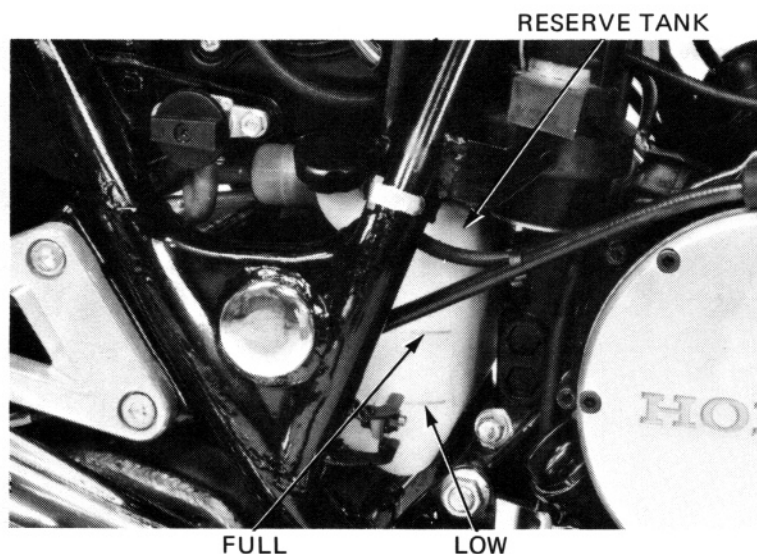
Replace the drain bolt.



Fill the system with a 50–50 mixture of distilled water and ethylene glycol.

Bleed air from the radiator.

- Start the engine and run until there are no air bubbles in the coolant, and the level stabilizes.
- Stop the engine and add coolant up to the proper level if necessary.
- Reinstall the radiator cap.
- Check the level of coolant in the reserve tank and fill to the correct level if it is low.



COOLING SYSTEM

THERMOSTAT

REMOVAL

Turn the fuel valve OFF.

Remove the seat and fuel tank.

Remove the coolant drain bolt, and drain the coolant (page 6-3).

Remove the radiator cover.

Disconnect the radiator upper hose at the radiator.

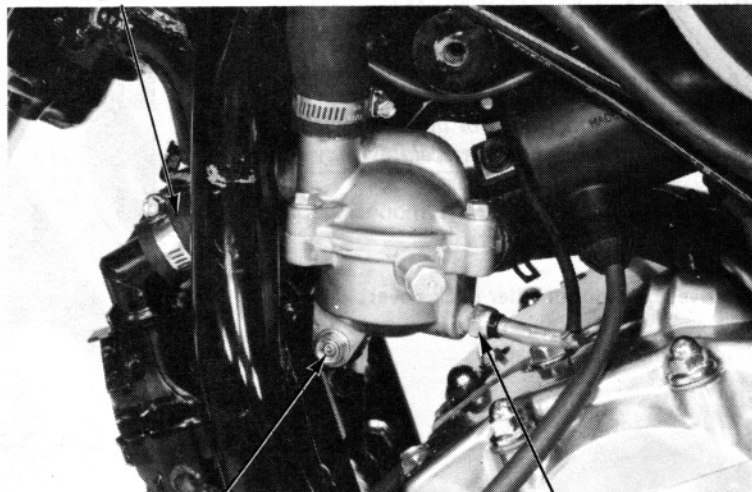
Disconnect the wire connector from the temperature sensor.

Remove the bolt attaching the thermostat housing to the frame.

Remove the thermostat housing cover bolts and cover.

Remove the thermostat from the housing.

RADIATOR HOSE



BOLTS

TEMPERATURE SENSOR

BOLTS



THERMOSTAT HOUSING COVER

THERMOSTAT



HOUSING

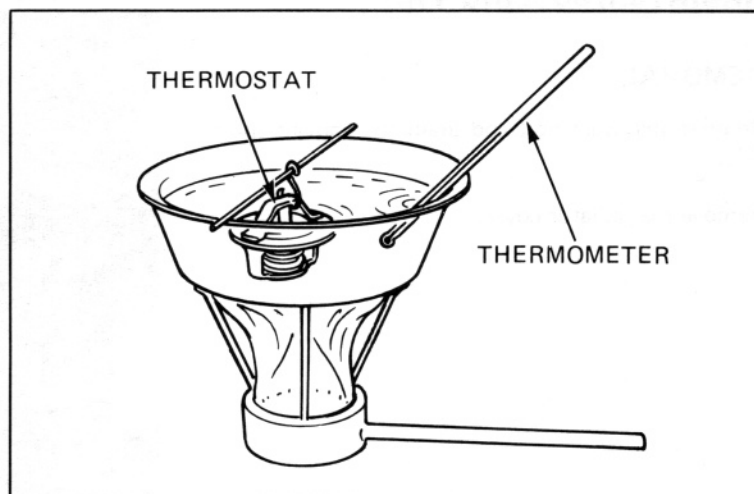
INSPECTION

Visually inspect the thermostat for damage. Suspend the thermostat in heated water to check its operation. Do not let the thermostat or thermometer touch the pan or false readings will result.

Replace the thermostat if the valve stays open at room temperature, or if it responds at temperatures other than those specified.

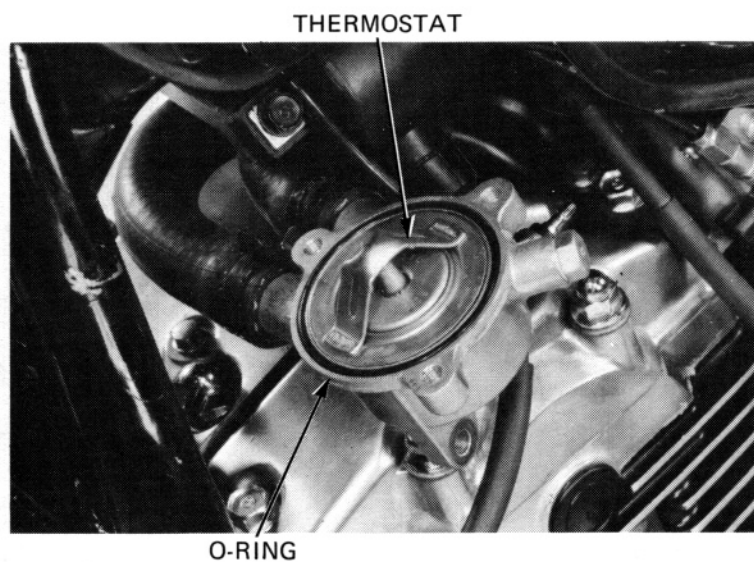
Technical Data

Starts to open	80° to 84°C (176° to 183°F)
Valve lift	8 mm minimum (0.31 in) when heated to 95°C (203°F) for five minutes.



INSTALLATION

Install a new O-ring on the thermostat housing and insert the thermostat into the housing.



Install the thermostat housing cover and tighten the bolts.

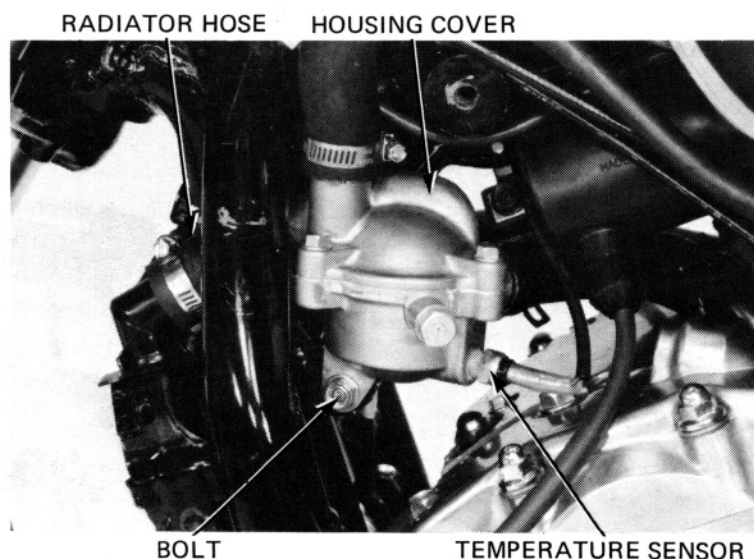
Connect the radiator upper hose to the radiator and tighten the hose band.

Secure the thermostat housing to the frame with the bolt.

Connect the wire lead to the temperature sensor.

Fill the cooling system (page 6-3).

Install the radiator filler neck cover, fuel tank, seat and radiator cover.



COOLING SYSTEM

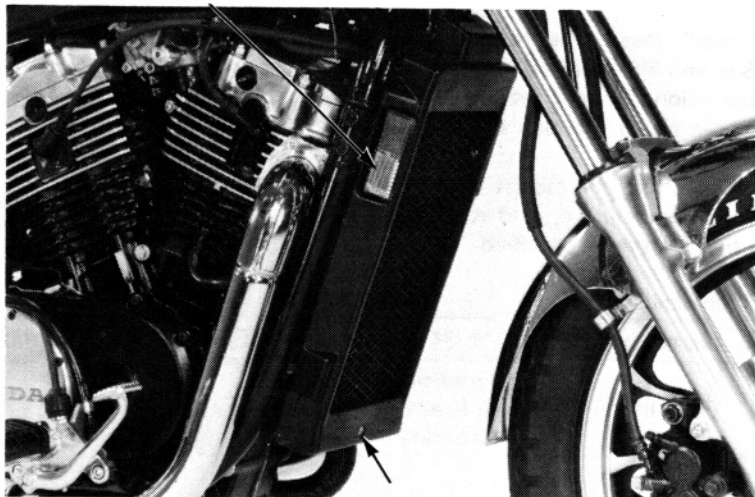
RADIATOR/COOLING FAN

REMOVAL

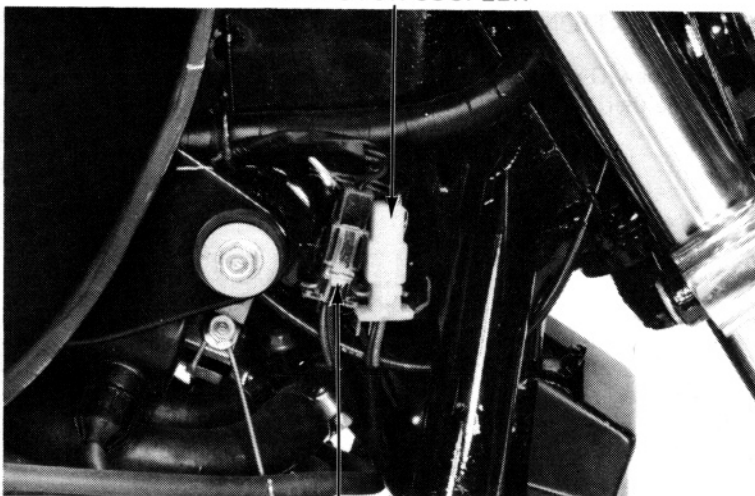
Remove the drain bolt and drain the coolant (page 6-3).

Remove the radiator cover.

RADIATOR COVER



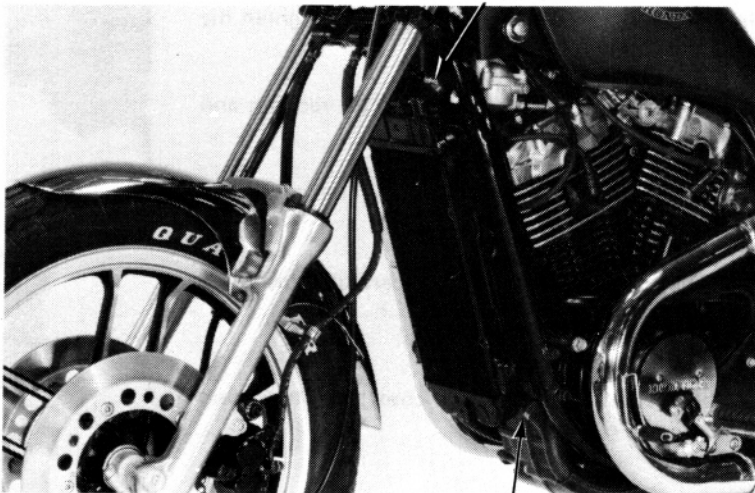
FAN MOTOR COUPLER



THERMOSTATIC SWITCH COUPLER

Loosen the upper and lower hose bands.

UPPER HOSE BAND



LOWER HOSE BAND

Remove the radiator mounting bolt.

Remove the radiator while pulling the upper and lower hoses off.

RADIATOR MOUNTING BOLT

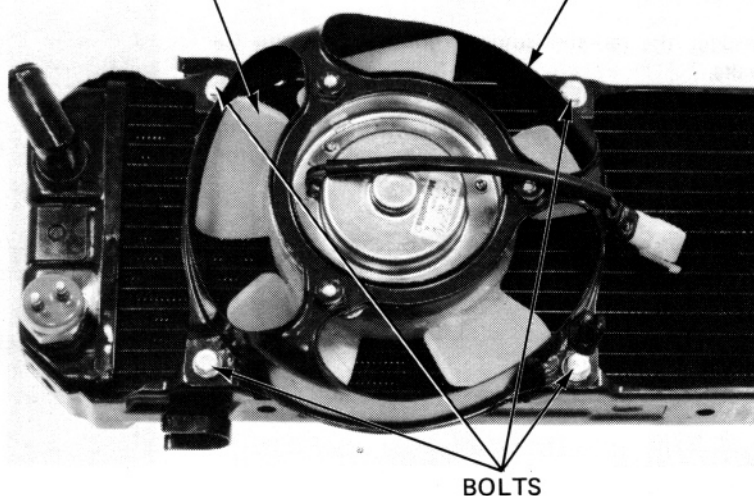


DISASSEMBLY

Remove the fan shroud with the fan by removing the four bolts.

FAN

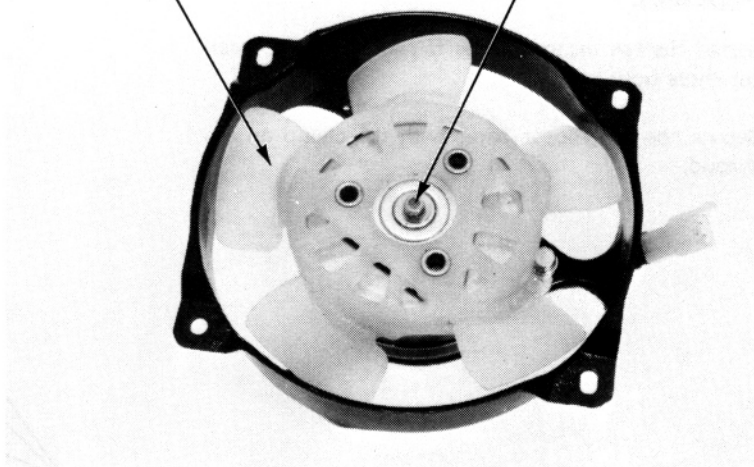
FAN SHROUD



Remove the fan attaching nut and pull the fan off the fan motor.

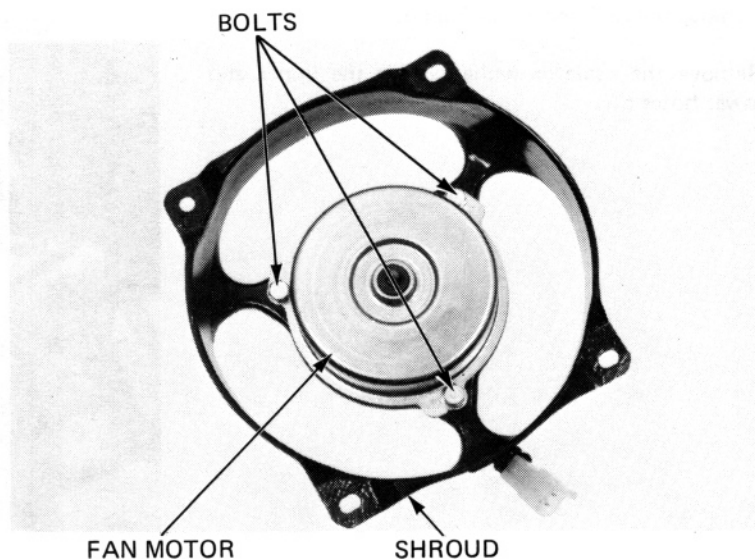
FAN

NUT



COOLING SYSTEM

Remove the three fan motor attaching bolts and remove the fan motor from the shroud.

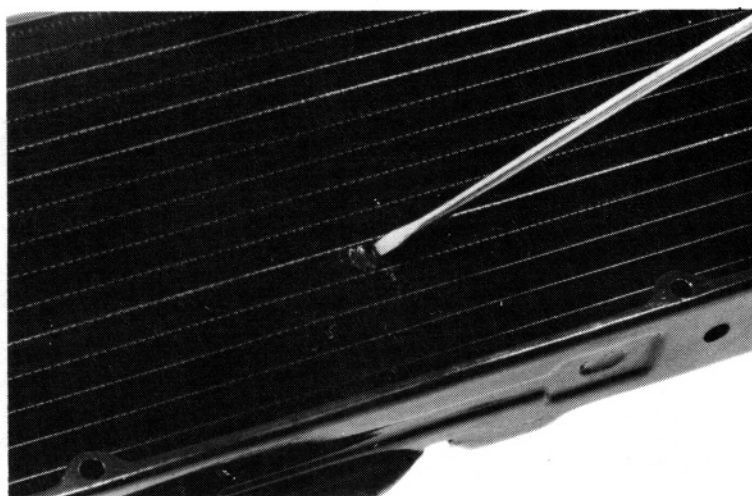


RADIATOR INSPECTION

Inspect the radiator soldered joints and seams for leaks.

Blow dirt out from between core fins with compressed air. If insects, etc., are clogging the radiator, wash them off with low pressure water.

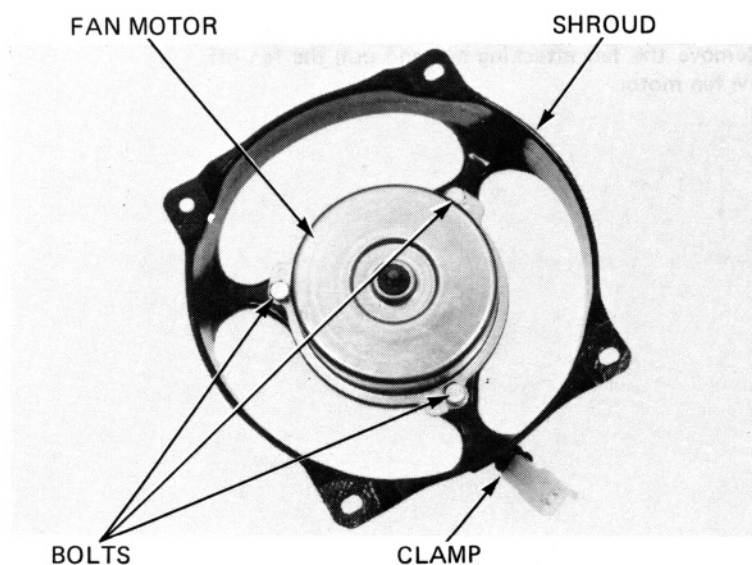
Carefully straighten any bent fins.



ASSEMBLY

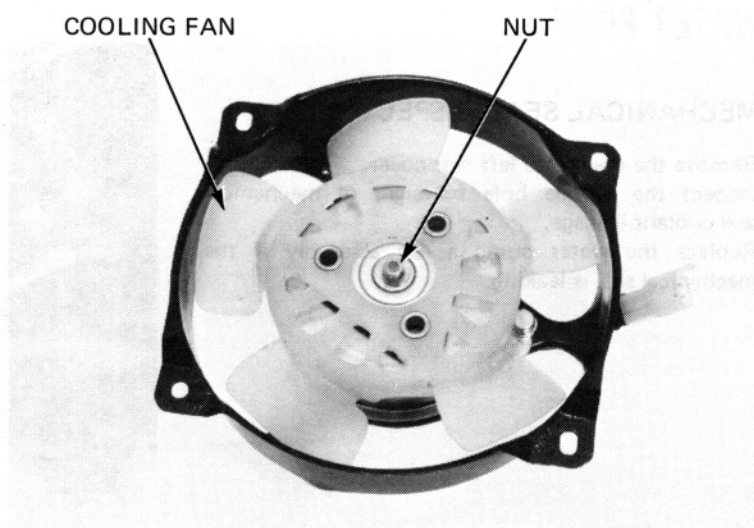
Install the fan motor on the fan shroud and tighten the three bolts.

Secure the fan motor wires with the clamp on the shroud.

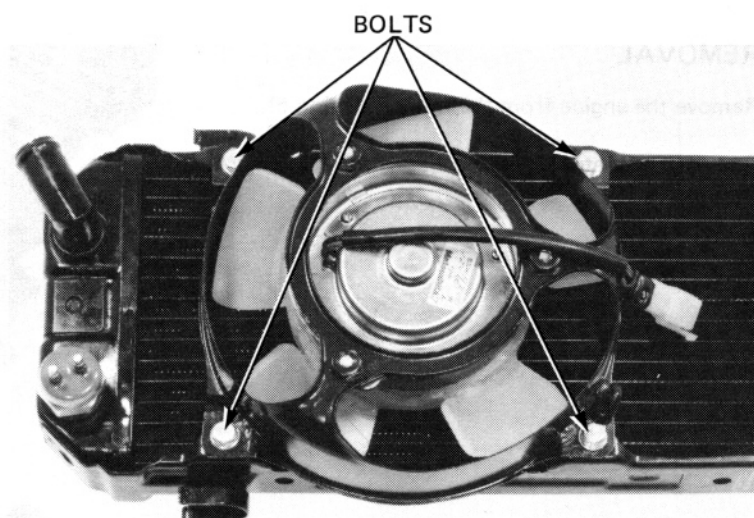


Place the fan over the motor shaft.

Apply a locking agent to the fan motor shaft threads, install and torque the plain washer, lock washer and nut.



Attach the fan shroud to the radiator with the four bolts.



INSTALLATION

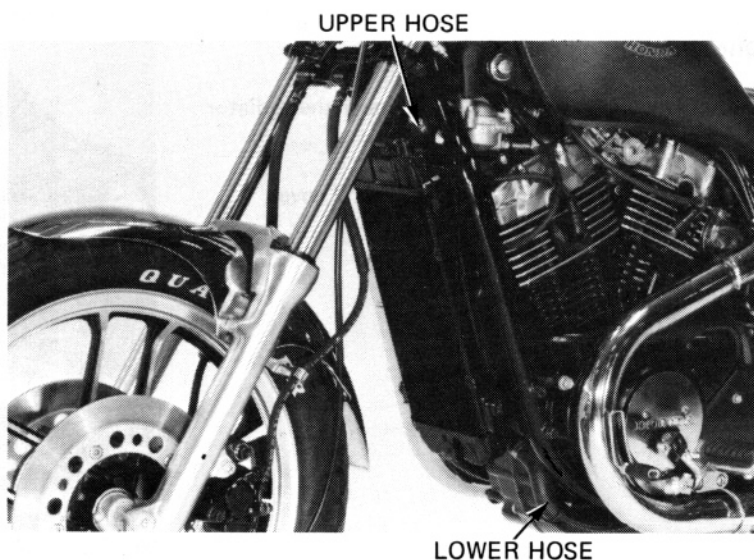
Install the radiator onto the frame and tighten the mounting bolts.

Connect the upper and lower hoses to the radiator and tighten the hose bands.

Connect the thermostatic switch and fan motor wire couplers to the wire harness.

Install the radiator cover.

Fill the cooling system (page 6-3).

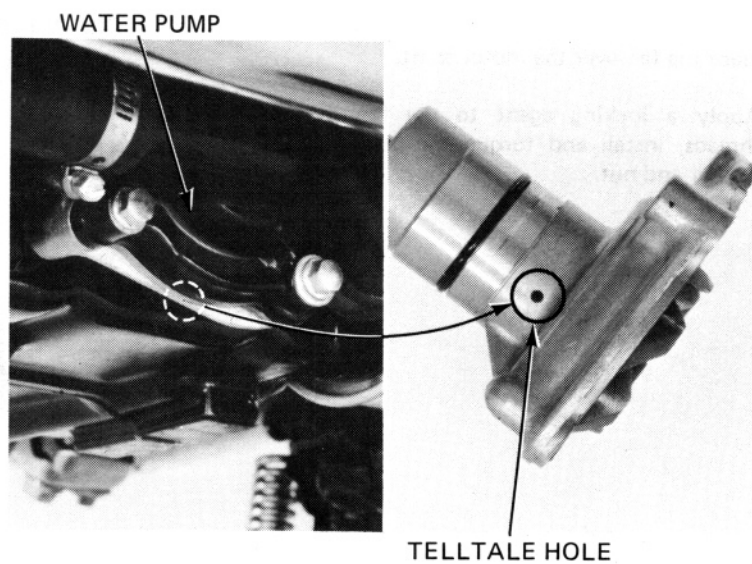


COOLING SYSTEM

WATER PUMP

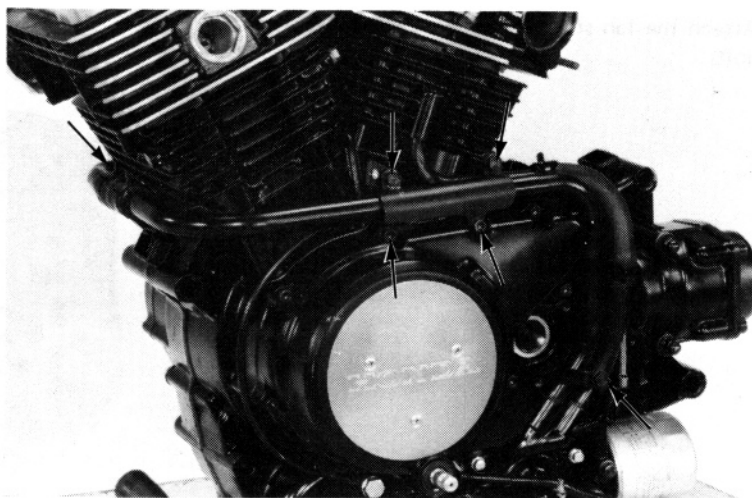
MECHANICAL SEAL INSPECTION

Remove the crankcase left rear cover.
Inspect the telltale hole for signs of mechanical seal coolant leakage.
Replace the water pump as an assembly if the mechanical seal is leaking.



REMOVAL

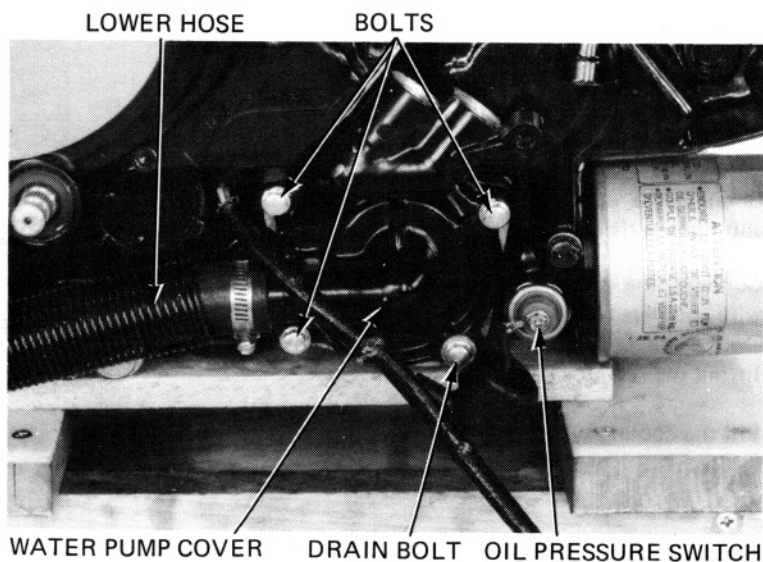
Remove the engine from the frame (Section 5).
Remove the water pipes and hoses from the engine.



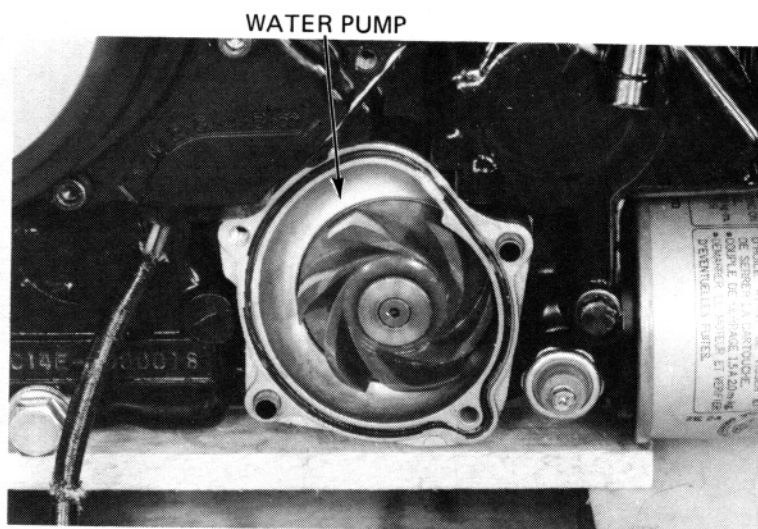
Disconnect the oil pressure switch wire.

Loosen the hose band and disconnect the radiator lower hose from the water pump.

Remove the water pump cover bolts and cover.

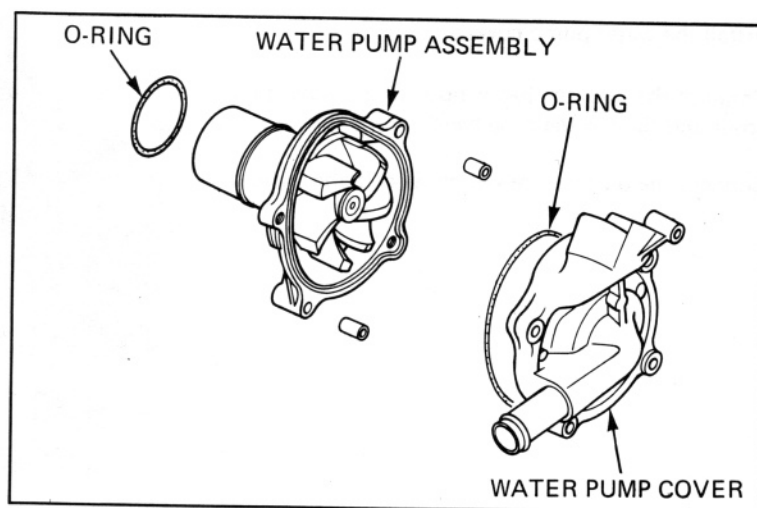


Pull the water pump off the crankcase.



INSPECTION

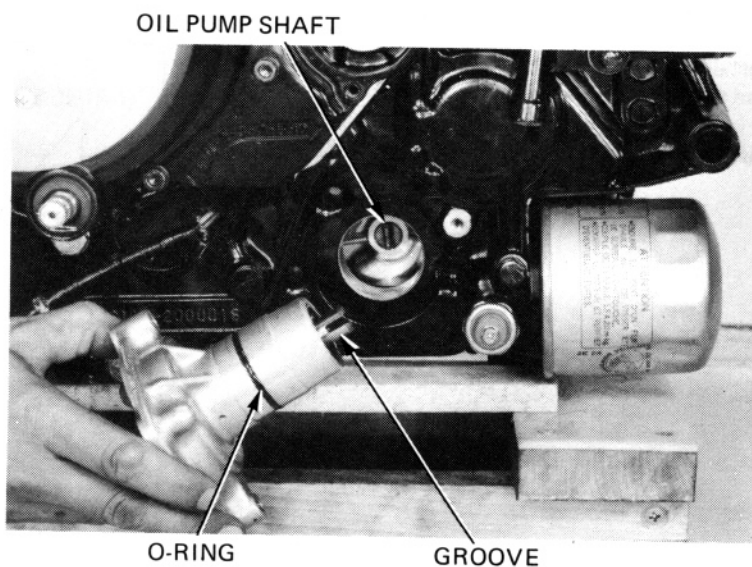
Check the water pump for mechanical seal leakage and bearing deterioration. Replace the water pump as an assembly if necessary.



INSTALLATION

Apply a coat of clean engine oil to a new O-ring and install it in the water pump shaft housing groove.

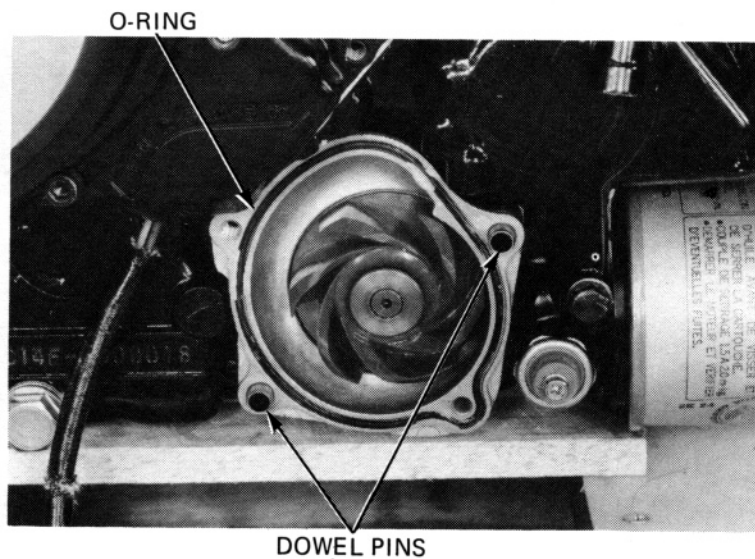
Align the water pump shaft groove with the oil pump shaft and insert the water pump into the crankcase.



COOLING SYSTEM

Apply a coat of engine oil to a new O-ring and install it around the impeller.

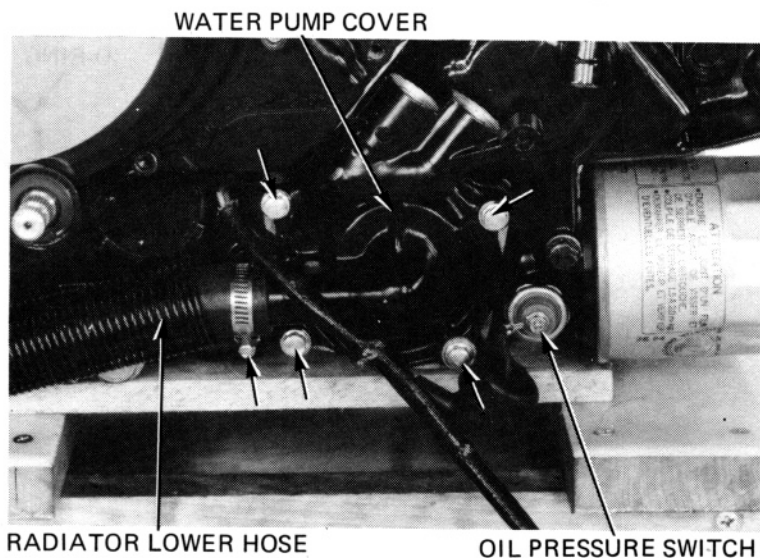
Install the two dowel pins.



Install the water pump cover.

Connect the radiator lower hose to the water pump cover and tighten the hose band.

Connect the oil pressure switch wire to the switch.



Install the water pipes and hoses with new O-rings and tighten the hose bands.

Install the engine into the frame (page 5-6).

