

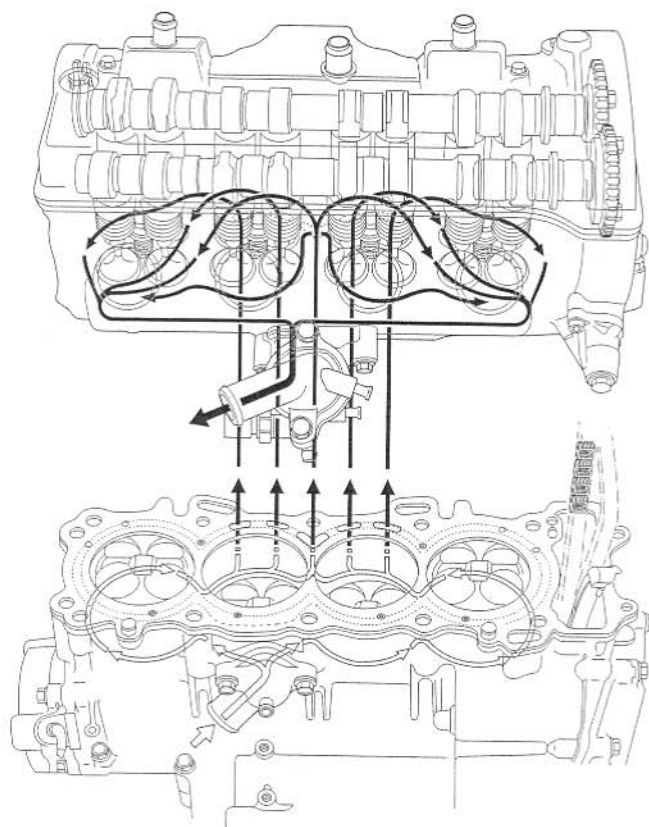
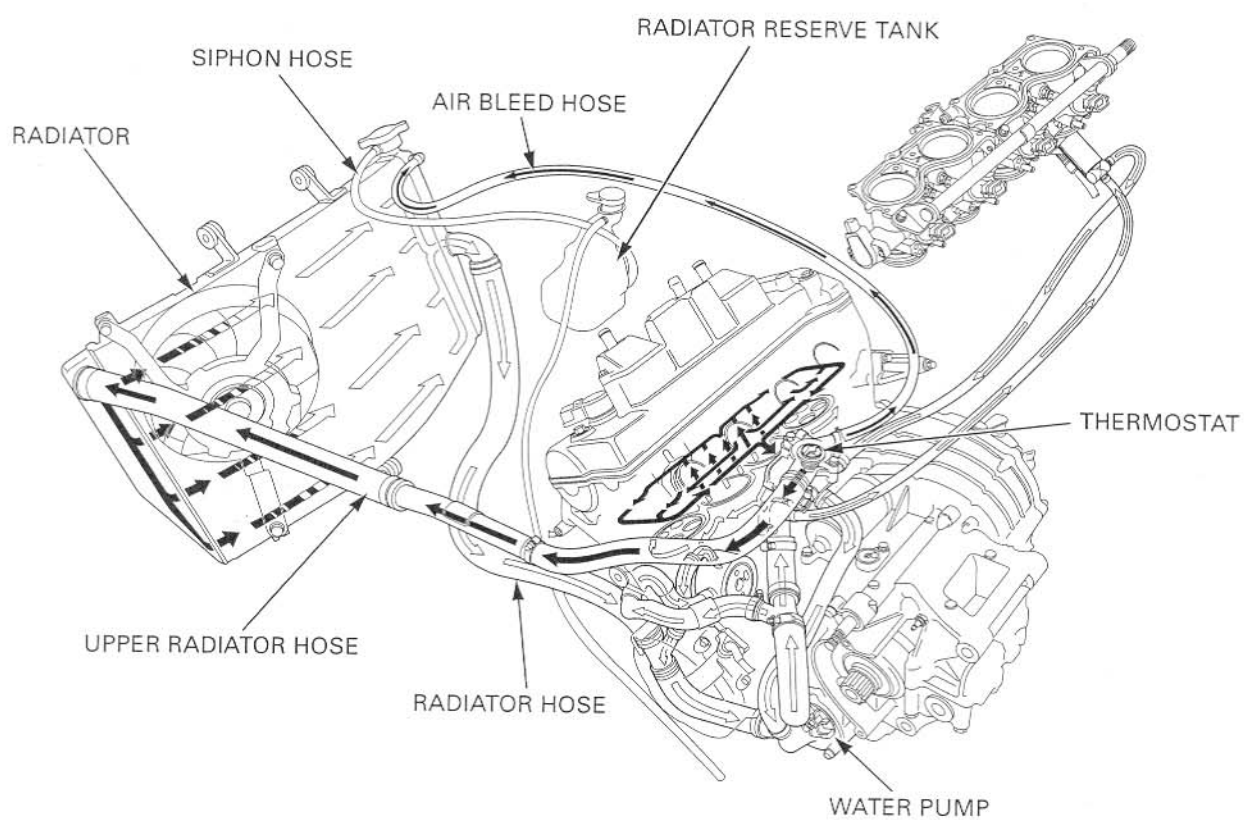
## 7. COOLING SYSTEM

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## COOLING SYSTEM

### SYSTEM FLOW PATTERN



## SERVICE INFORMATION

### GENERAL

#### ⚠ WARNING

Removing the radiator cap while the engine is hot can allow the coolant to spray out, seriously scalding you. Always let the engine and radiator cool down before removing the radiator cap.

#### NOTICE

Using coolant with silicate inhibitors may cause premature wear of water pump seals or blockage of radiator passages. Using tap water may cause engine damage.

- Add cooling system at the reserve tank. Do not remove the radiator cap except to refill or drain the system.
- All cooling system services can be done with the engine installed in the frame.
- Avoid spilling coolant on painted surfaces.
- After servicing the system, check for leaks with a cooling system tester.
- Refer to the fan control relay inspection (page 7-18) and ECT sensor inspection (page 20-16).

### SPECIFICATIONS

ITEM		SPECIFICATIONS
Coolant capacity	Radiator and engine	3.2 liter (3.4 US qt, 2.8 Imp qt)
	Reserve tank	0.30 liter (0.32 US qt, 0.26 Imp qt)
Radiator cap relief pressure		108 – 137 kPa (1.1 – 1.4 kgf/cm <sup>2</sup> , 16 – 20 psi)
Thermostat	Begin to open	80 – 84 °C (176 – 183 °F)
	Valve lift	8 mm (0.3 in) minimum at 90 °C (194 °F)
Recommended antifreeze		Pro Honda HP Coolant or an equivalent high quality ethylene glycol antifreeze containing corrosion protection inhibitors
Standard coolant concentration		1:1 mixture of antifreeze and soft water

### TORQUE VALUES

Water pump assembly flange bolt	12 N·m (1.2 kgf·m, 9 lbf·ft)	CT bolt
Thermostat housing cover flange bolt	13 N·m (1.3 kgf·m, 10 lbf·ft)	CT bolt
ECT (Engine Coolant Temperature) sensor	23 N·m (2.3 kgf·m, 17 lbf·ft)	
Cooling fan nut	2.9 N·m (0.3 kgf·m, 2.2 lbf·ft)	Apply a locking agent to the threads
Fan motor nut	4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)	
Fan motor shroud mounting bolt	7.8 N·m (0.8 kgf·m, 5.8 lbf·ft)	

## COOLING SYSTEM

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### TROUBLESHOOTING

#### Engine temperature too high

- Faulty temperature gauge or ECT sensor
- Thermostat stuck closed
- Faulty radiator cap
- Insufficient coolant
- Passage blocked in radiator, hoses or water jacket
- Air in system
- Faulty cooling fan motor
- Faulty fan control relay
- Faulty water pump

#### Engine temperature too low

- Faulty temperature gauge or ECT sensor
- Thermostat stuck open
- Faulty cooling fan control relay

#### Coolant leak

- Faulty water pump mechanical seal
- Deteriorated O-rings
- Faulty radiator cap
- Damaged or deteriorated cylinder head gasket
- Loose hose connection or clamp
- Damaged or deteriorated hose

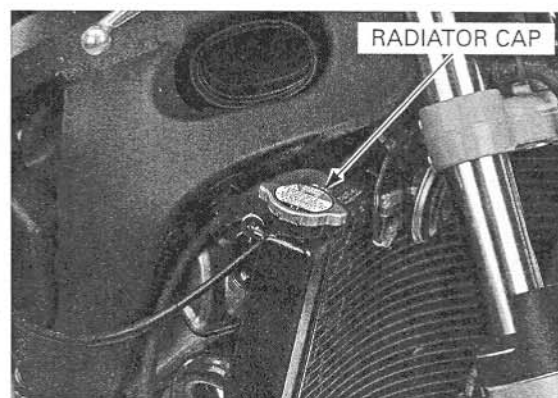
## SYSTEM TESTING

### COOLANT (HYDROMETER TEST)

Remove the following:

- Lower cowls (page 3-6)
- Middle cowls (page 3-7)
- Upper cowl (page 3-9)

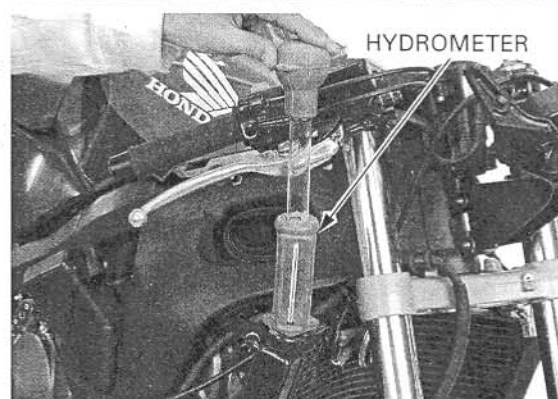
Remove the radiator cap.



Test the coolant gravity using a hydrometer (see below for "Coolant gravity chart").

For maximum corrosion protection, a 1:1 solution of ethylene glycol and distilled water is recommended (page 7-3).

Look for contamination and replace the coolant if necessary.



COOLANT GRAVITY CHART

		Coolant temperature °C (°F)										
		0 (32)	5 (41)	10 (50)	15 (59)	20 (68)	25 (77)	30 (86)	35 (95)	40 (104)	45 (113)	50 (122)
Coolant ratio%	5	1.009	1.009	1.008	1.008	1.007	1.006	1.005	1.003	1.001	0.999	0.997
	10	1.018	1.017	1.017	1.016	1.015	1.014	1.013	1.011	1.009	1.007	1.005
	15	1.028	1.027	1.026	1.025	1.024	1.022	1.020	1.018	1.016	1.014	1.012
	20	1.036	1.035	1.034	1.033	1.031	1.029	1.027	1.025	1.023	1.021	1.019
	25	1.045	1.044	1.043	1.042	1.040	1.038	1.036	1.034	1.031	1.028	1.025
	30	1.053	1.052	1.051	1.047	1.046	1.045	1.043	1.041	1.038	1.035	1.032
	35	1.063	1.062	1.060	1.058	1.056	1.054	1.052	1.049	1.046	1.043	1.040
	40	1.072	1.070	1.068	1.066	1.064	1.062	1.059	1.056	1.053	1.050	1.047
	45	1.080	1.078	1.076	1.074	1.072	1.069	1.066	1.063	1.060	1.057	1.054
	50	1.086	1.084	1.082	1.080	1.077	1.074	1.071	1.068	1.065	1.062	1.059
	55	1.095	1.093	1.091	1.088	1.085	1.082	1.079	1.076	1.073	1.070	1.067
	60	1.100	1.098	1.095	1.092	1.089	1.086	1.083	1.080	1.077	1.074	1.071

## COOLING SYSTEM

### RADIATOR CAP/SYSTEM PRESSURE INSPECTION

Remove the radiator cap (page 7-5).

*Before installing the cap in the tester, wet the sealing surfaces.*

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 6 seconds.

#### RADIATOR CAP RELIEF PRESSURE:

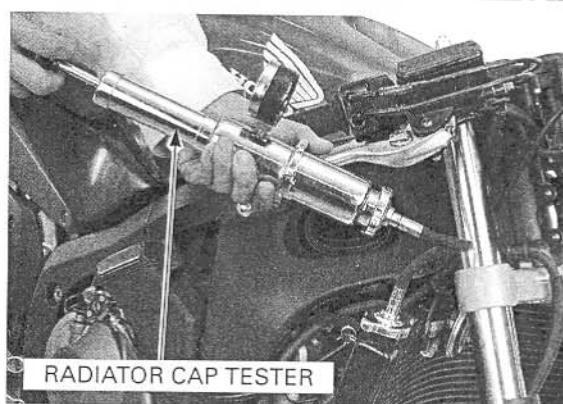
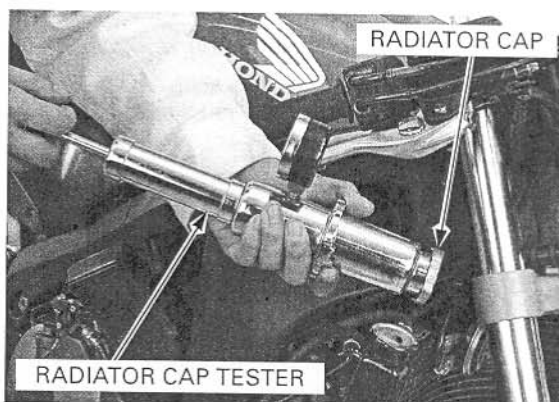
108 – 137 kPa (1.1 – 1.4 kgf/cm<sup>2</sup>, 16 – 20 psi)

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

#### NOTICE

*Excessive pressure can damage the cooling system components. Do not exceed 137 kPa (1.4 kgf/cm<sup>2</sup>, 20 psi).*

Repair or replace components if the system will not hold specified pressure for at least 6 seconds.



## COOLANT REPLACEMENT

### PREPARATION

- The effectiveness of coolant decreases with the accumulation of rust or if there is a change in the mixing proportion during usage. Therefore, for best performance change the coolant regularly as specified in the maintenance schedule.
- Mix only distilled, low mineral water with the antifreeze.

#### RECOMMENDED ANTIFREEZE:

Pro Honda HP Coolant or an equivalent high quality ethylene glycol antifreeze containing corrosion protection inhibitors

#### RECOMMENDED MIXTURE:

1:1 (Distilled water and antifreeze)

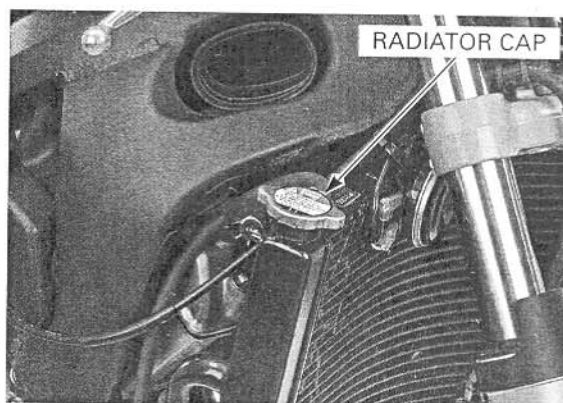
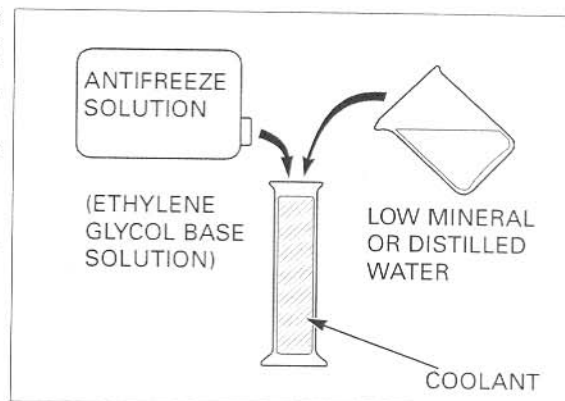
### REPLACEMENT/AIR BLEEDING

Remove the following:

- Lower cowls (page 3-6)
- Middle cowls (page 3-7)
- Upper cowl (page 3-9)

Remove the radiator cap.

*When filling the system or reserve tank with a coolant (checking coolant level), place the motorcycle in a vertical position on a flat, level surface.*



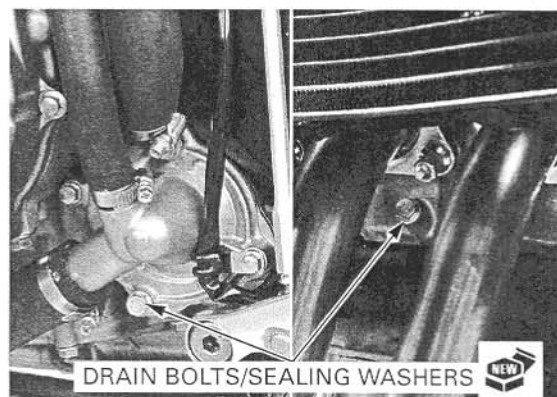
## COOLING SYSTEM

Remove the drain bolt on the water pump cover and drain the system coolant.

Remove the cylinder drain bolt and drain the coolant from the cylinder.

Reinstall the drain bolts with new sealing washers. Tighten the cylinder drain bolt securely. Tighten the water pump drain bolt to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

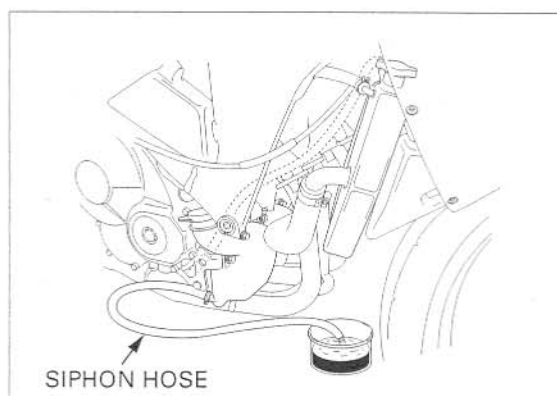


Disconnect the siphon hose from the radiator.

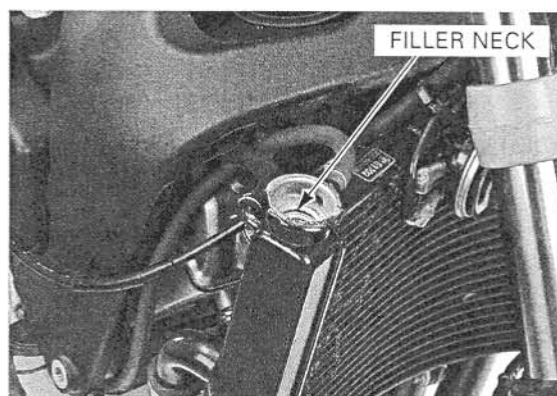
Drain the reserve tank coolant.

Empty the coolant and rinse the inside of the reserve tank with water.

Connect the radiator siphon hose.



Fill the system with the recommended coolant through the filler opening up to filler neck.



Remove the radiator reserve tank cap and fill the reserve tank to the upper level line.

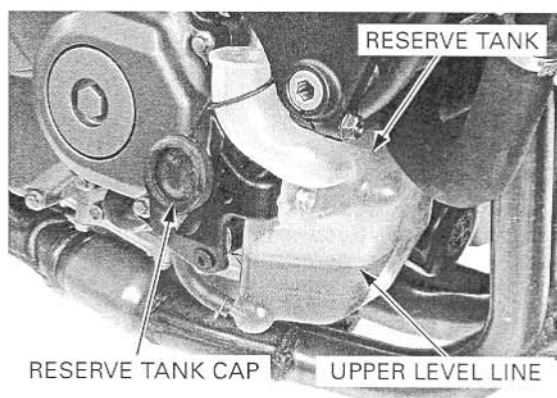
Bleed air from the system as follows:

1. Shift the transmission into neutral. Start the engine and let it idle for 2 – 3 minutes.
2. Snap the throttle three to four times to bleed air from the system.
3. Stop the engine and add coolant up to the proper level if necessary. Reinstall the radiator cap.
4. Check the level of coolant in the reserve tank and fill to the upper level if it is low.

Install the radiator reserve tank cap.

Install the following:

- Upper cowl (page 3-12)
- Middle cowls (page 3-8)
- Lower cowls (page 3-6)





## COOLING SYSTEM

### THERMOSTAT

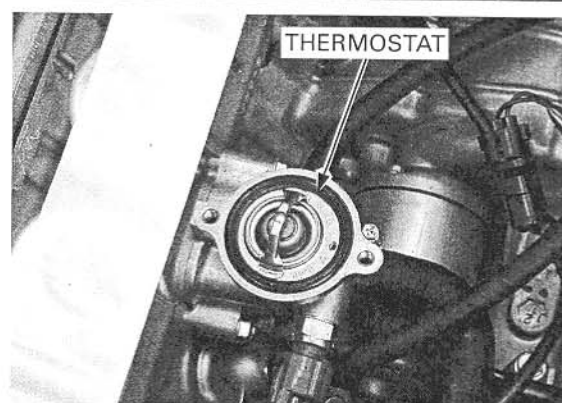
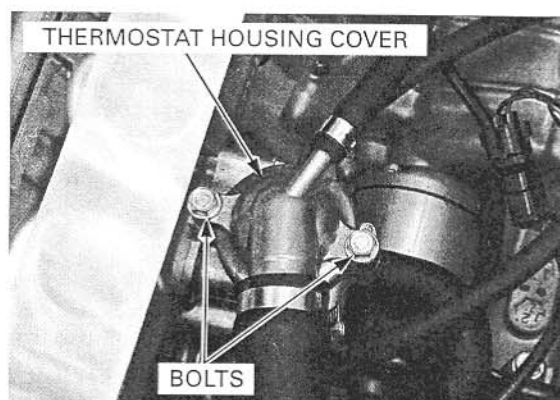
#### REMOVAL

Drain the coolant (page 7-6).

Remove the throttle body (page 6-72).

Remove the bolts and thermostat housing cover.

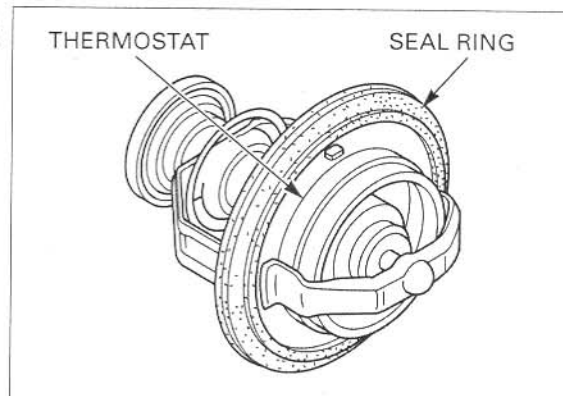
Remove the thermostat from the housing.



#### INSPECTION

Wear insulated gloves and adequate eye protection. Keep flammable materials away from the electric heating element.

Visually inspect the thermostat for damage. Check for damage of the seal ring.



*Do not let the thermostat or thermometer touch the pan, or you will get false reading.*

Heat the water with an electric heating element to operating temperature for 5 minutes. Suspend the thermostat in heated water to check its operation.

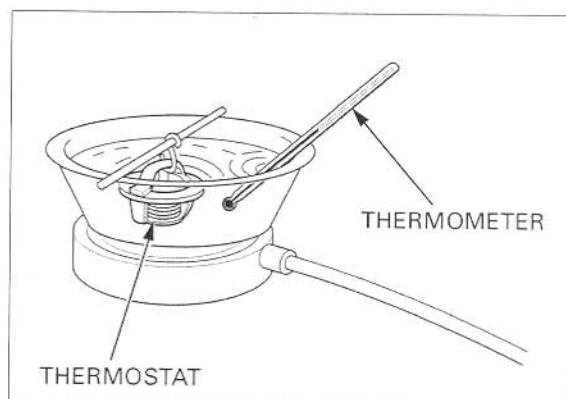
Replace the thermostat if the valve stays open at room temperature, or if it responds at temperatures other than those specified.

#### THERMOSTAT BEGIN TO OPEN:

80 – 84 °C (176 – 183 °F)

#### VALVE LIFT:

8 mm (0.3 in) minimum at 90 °C (194 °F)



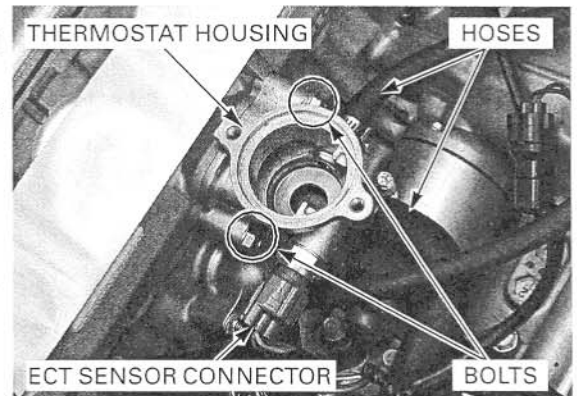


### THERMOSTAT HOUSING REMOVAL

Disconnect the ECT sensor connector.  
Disconnect the fast idle wax unit water hose and bypass hose from the thermostat housing.

Remove the bolts and thermostat housing from the cylinder head.

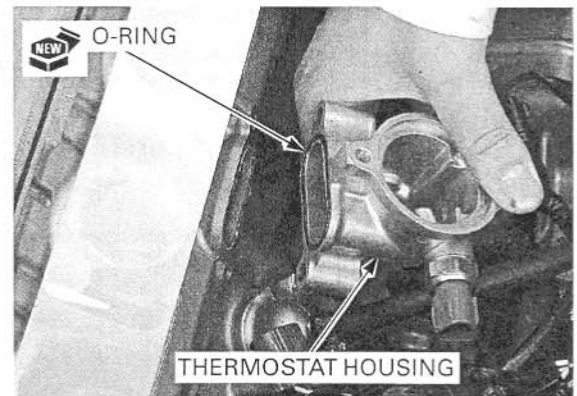
Remove the O-ring from the housing.



### THERMOSTAT HOUSING INSTALLATION

Install a new O-ring into the groove of the thermostat housing.

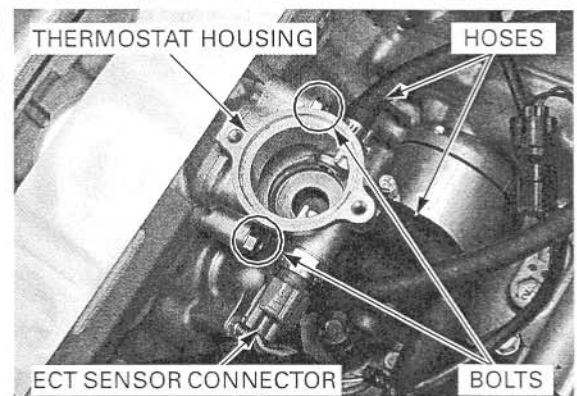
Install the thermostat housing onto the cylinder head.



Install and tighten the thermostat housing mounting bolts securely.

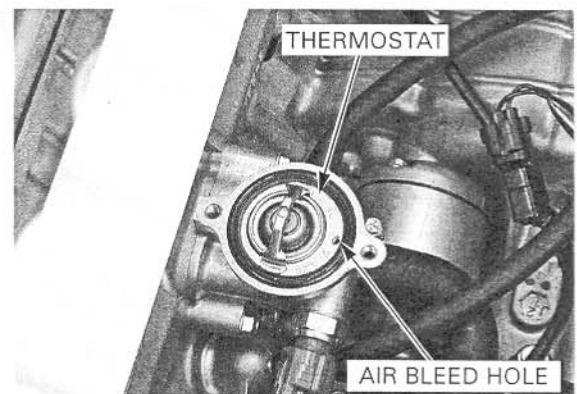
Connect the fast idle wax unit water hose and bypass hose.

Connect the ECT sensor connector.



### THERMOSTAT INSTALLATION

Install the thermostat into the housing with its air bleed hole facing rearward.

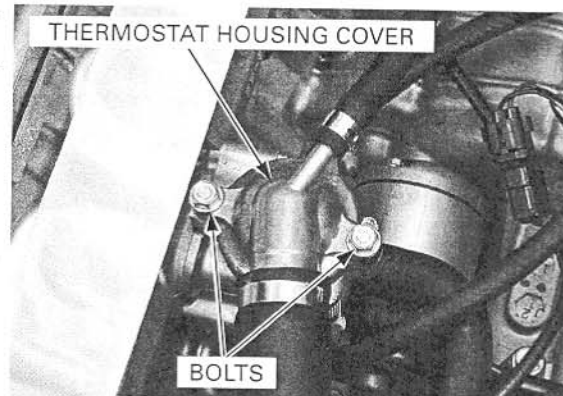


## COOLING SYSTEM

Install the thermostat housing cover onto the housing.  
Install and tighten the housing cover bolts to the specified torque.

**TORQUE: 13 N·m (1.3 kgf·m, 10 lbf·ft)**

Fill the system with the recommended coolant and bleed any air (page 7-6).



## RADIATOR

### REMOVAL

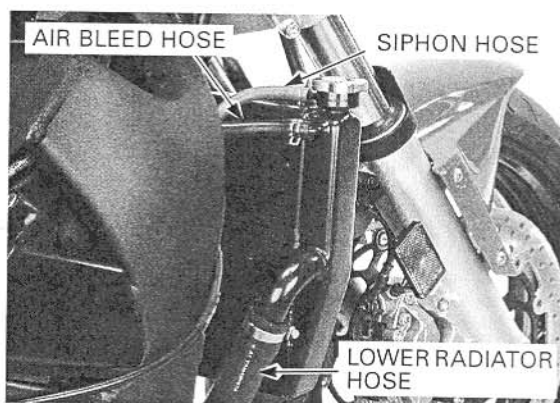
Remove the following:

- Lower cowls (page 3-6)
- Middle cowls (page 3-7)
- Upper cowl (page 3-9)

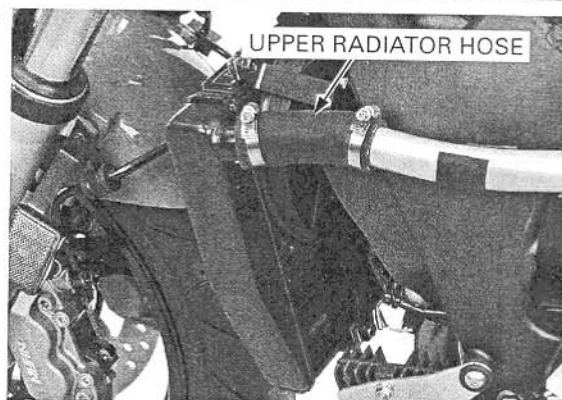
Drain the coolant (page 7-6).

Disconnect the siphon hose and air bleed hose from the radiator.

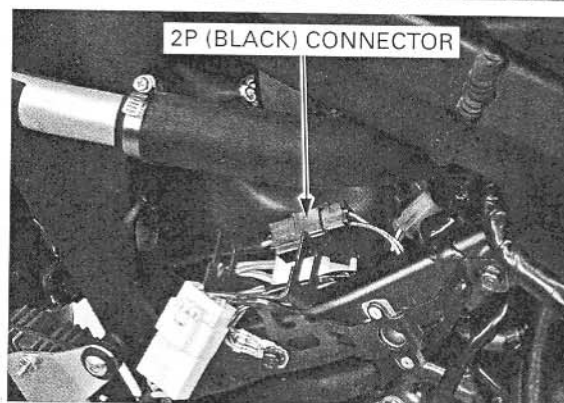
Loosen the hose clamp screw and disconnect the lower radiator hose.



Loosen the hose clamp screw and disconnect the upper radiator hose.

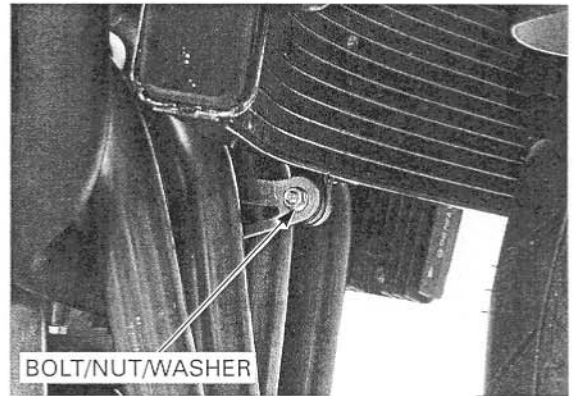


Disconnect the fan motor 2P (Black) connector.



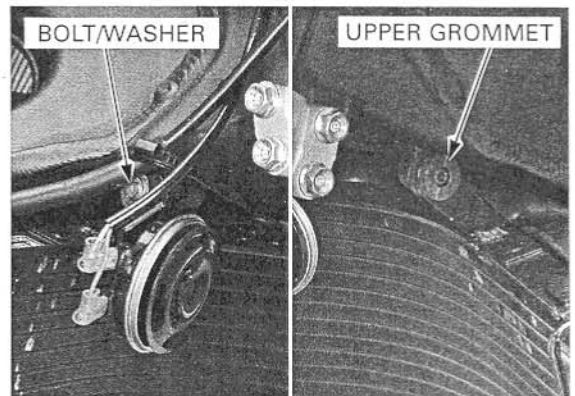
## COOLING SYSTEM

Remove the radiator lower mounting bolt/nut and washer.



Remove the wire band.

Remove the radiator upper mounting bolt, washer and horn mounting stay.

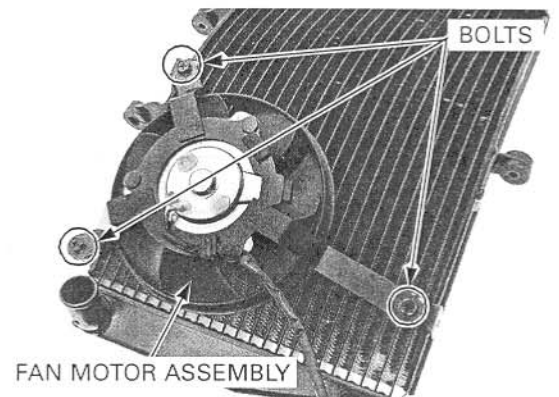


*Be careful not to damage the radiator fins.*

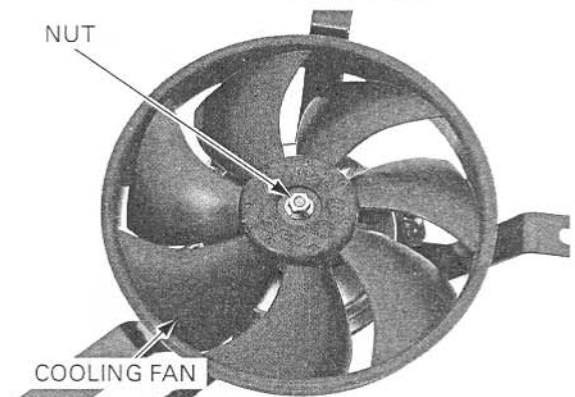
Release the radiator upper grommet from the frame boss by moving the radiator to the left, then remove the radiator assembly.

### DISASSEMBLY

Remove the three bolts and cooling fan motor assembly from the radiator.



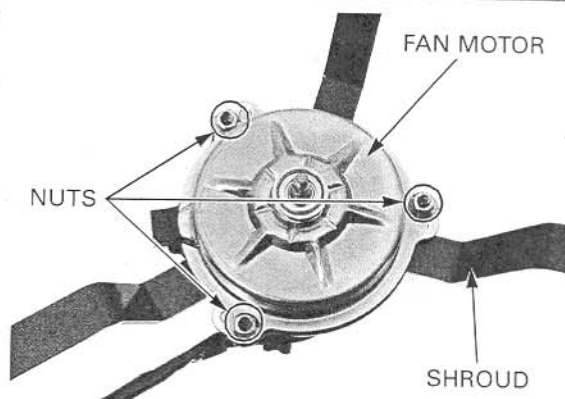
Remove the nut and cooling fan.



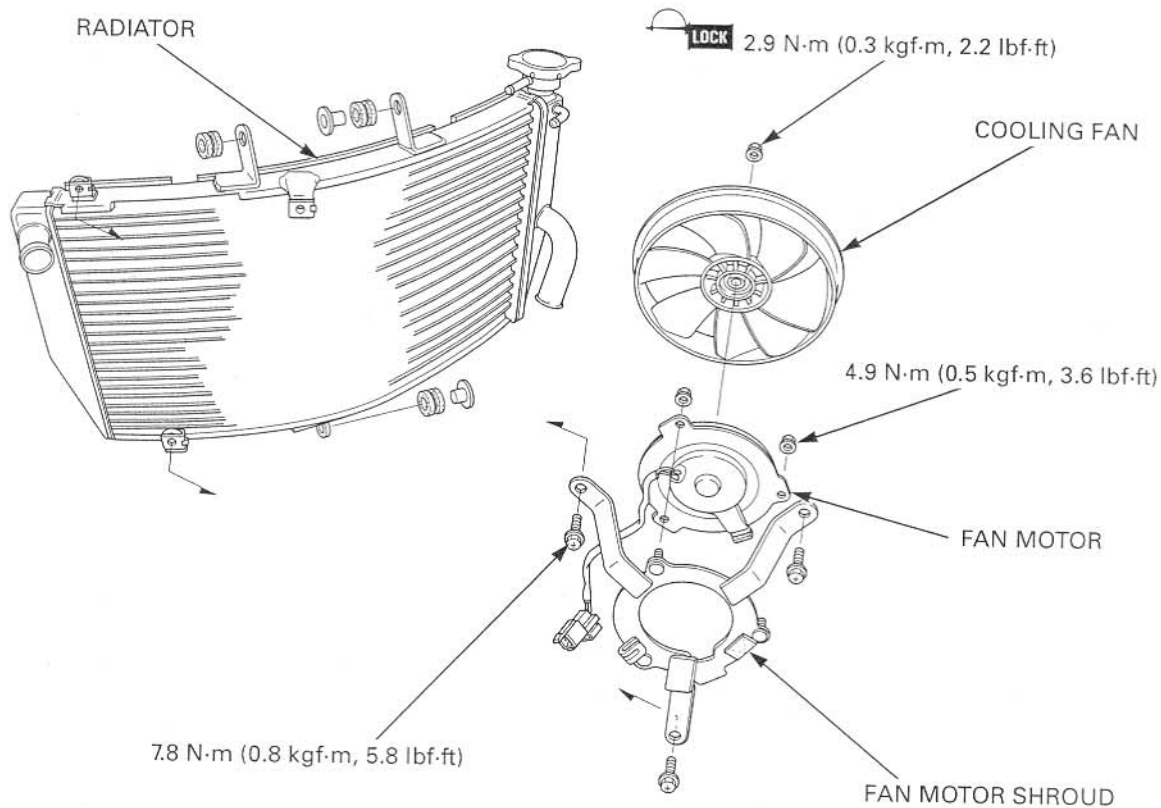
## COOLING SYSTEM

Remove the nuts and fan motor from the fan motor shroud.

Refer to the fan control relay information (page 7-18).



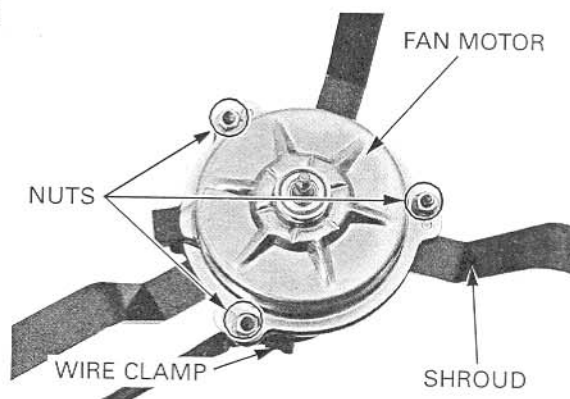
### ASSEMBLY



Install the fan motor onto the fan motor shroud and tighten the nuts to the specified torque.

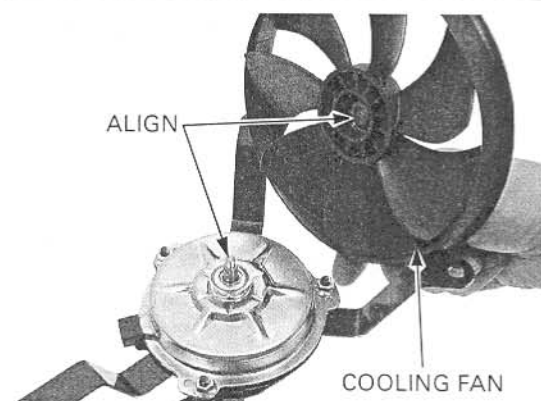
**TORQUE: 4.9 N·m (0.5 kgf·m, 3.6 lbf·ft)**

Install the fan motor wire onto the wire clamp.



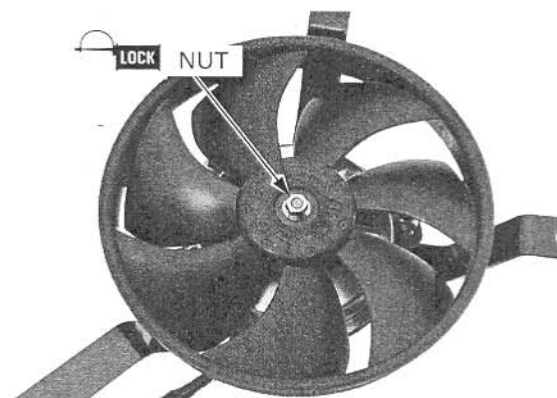
## COOLING SYSTEM

Install the cooling fan onto the fan motor shaft by aligning the flat surfaces.



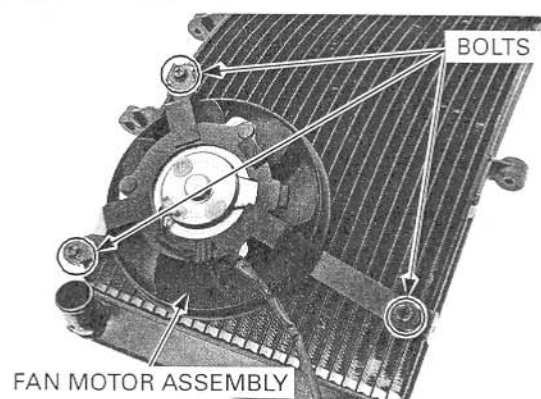
Apply a locking agent to the cooling fan nut threads. Install and tighten the nut to the specified torque.

**TORQUE: 2.9 N·m (0.3 kgf·m, 2.2 lbf·ft)**



Install the fan motor assembly onto the radiator. Install and tighten the three bolts to the specified torque.

**TORQUE: 7.8 N·m (0.8 kgf·m, 5.8 lbf·ft)**



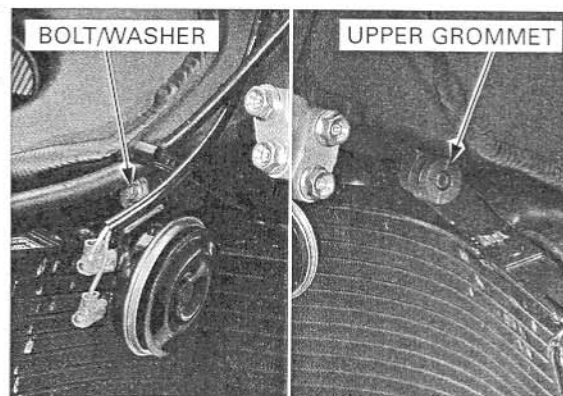
### INSTALLATION

*Be careful not to damage the radiator fins.*

Install the radiator assembly, aligning its upper grommet with the frame boss.

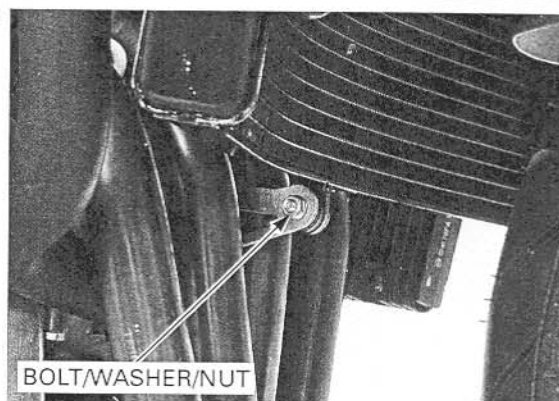
Install the washer, horn mounting stay and upper mounting bolt, then tighten the bolt.

Install the wire band.

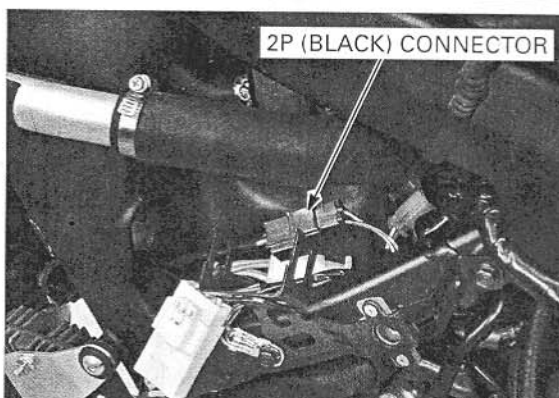


## COOLING SYSTEM

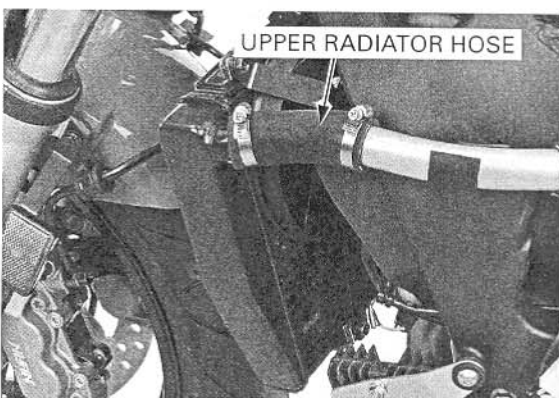
Install the radiator lower mounting bolt, washer, nut and tighten the nut securely.



Connect the fan motor 2P (Black) connector.



Connect the upper radiator hose and tighten the hose clamp screw.



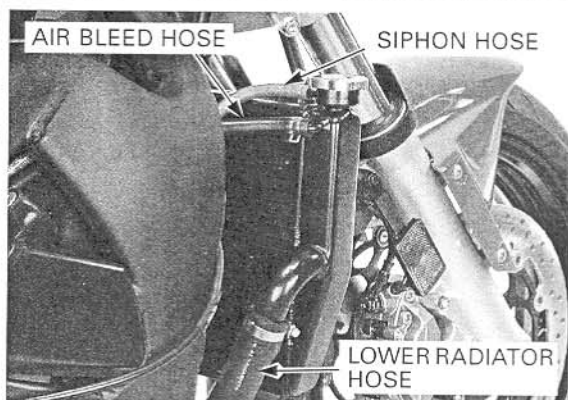
Connect the radiator hose and tighten the hose clamp screw.

Connect the siphon hose and air bleed hose to the radiator.

Fill the system with the recommended coolant (page 7-6).

Install the following:

- Upper cowl (page 3-12)
- Middle cowls (page 3-8)
- Lower cowls (page 3-6)





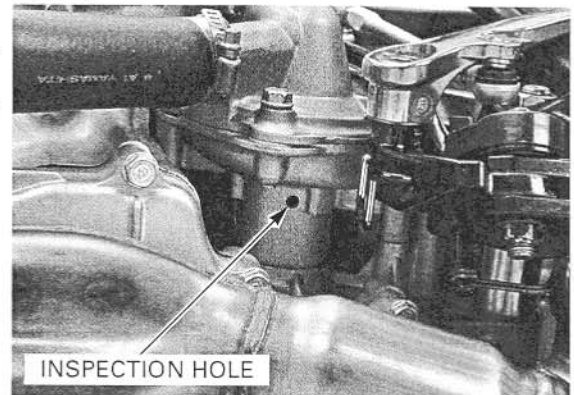
## WATER PUMP

### MECHANICAL SEAL INSPECTION

Remove the lower cowls (page 3-6).

Inspect the inspection hole for signs of coolant leakage.

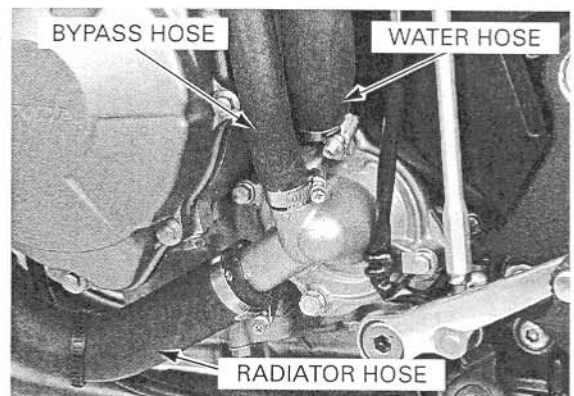
If there is leakage, the mechanical seal is defective and replace the water pump as an assembly.



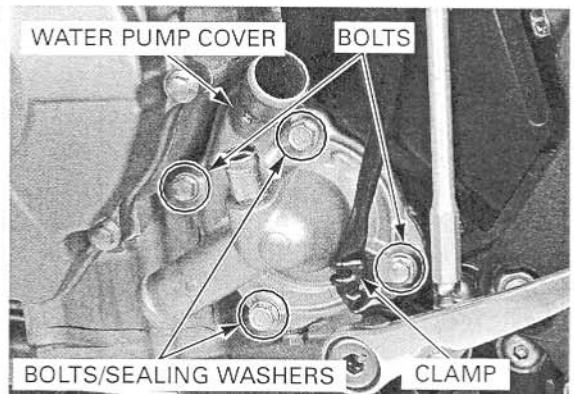
### REMOVAL

Drain the coolant (page 7-6).

Disconnect the radiator hose, bypass hose and water hose from the water pump cover.



Remove the two SH bolts and clamp, two flange bolts with two sealing washers and water pump cover.

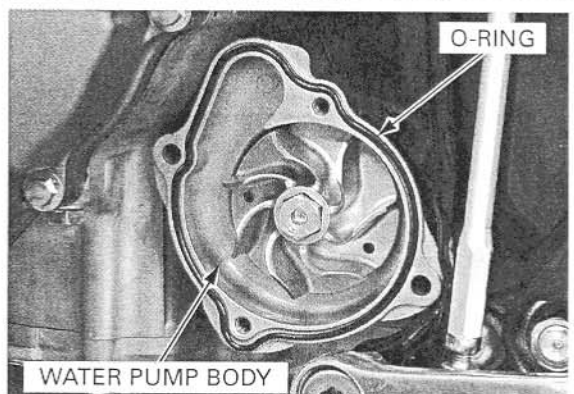


Remove the O-ring from the water pump body.

Remove the water pump body from the crankcase.

NOTE:

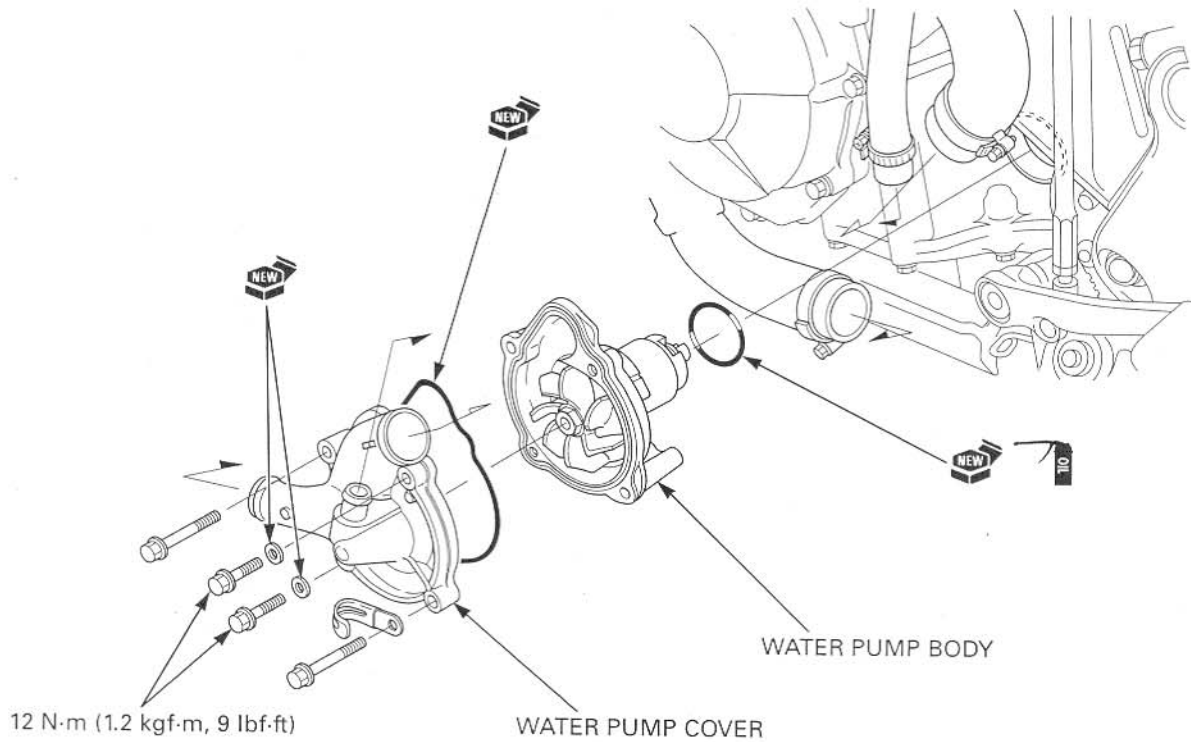
Do not disassemble the water pump body.



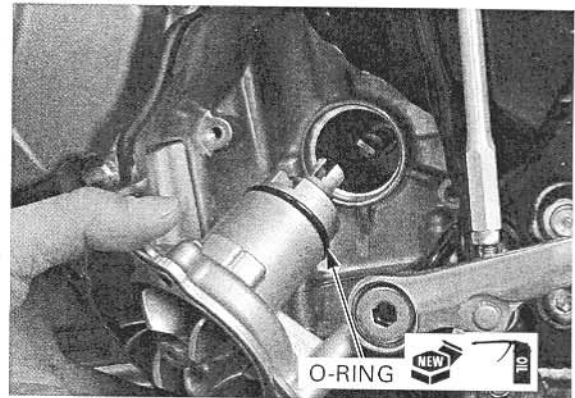


## COOLING SYSTEM

### INSTALLATION

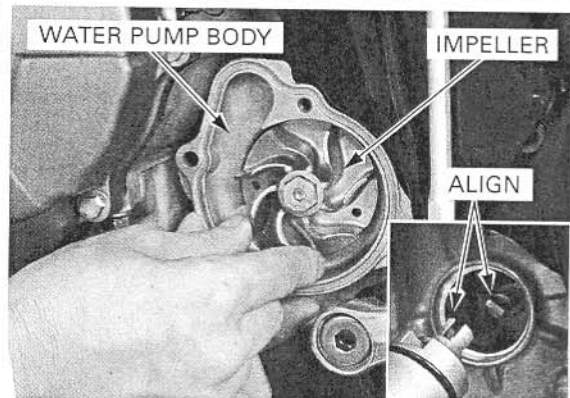


Apply engine oil to a new O-ring and install it onto the stepped portion of the water pump body.

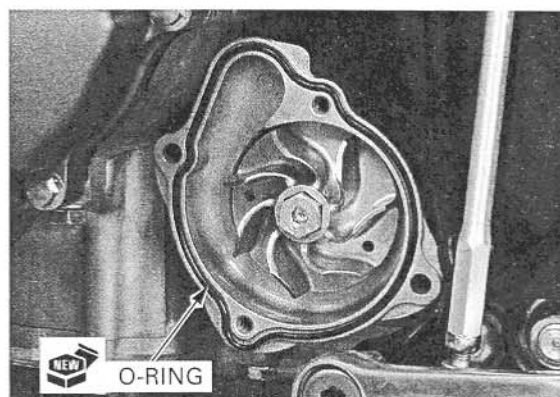


Install the water pump body into the crankcase while aligning the water pump shaft groove with the oil pump shaft end by turning the water pump impeller.

Align the mounting bolt holes in the water pump and crankcase and make sure the water pump is securely installed.



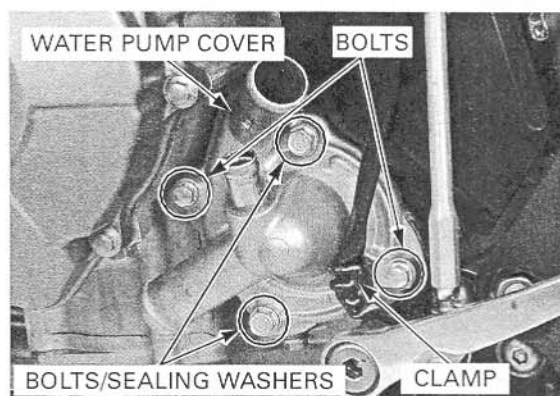
Install a new O-ring into the groove in the water pump body.



Install the water pump cover, new two sealing washers with two flange bolts and two SH bolts, clamp. Tighten the flange bolts to the specified torque.

**TORQUE: 12 N·m (1.2 kgf·m, 9 lbf·ft)**

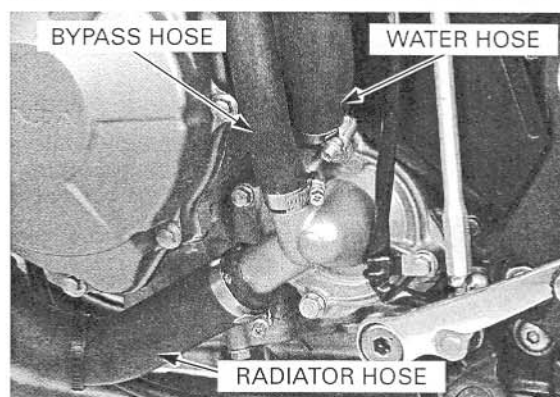
Tighten the two SH bolts securely.



Connect the radiator hose, water hose and bypass hose, then tighten the clamp screws.

Fill the system with the recommended coolant (page 7-6).

Install the lower cowls (page 3-6).



## RADIATOR RESERVE TANK

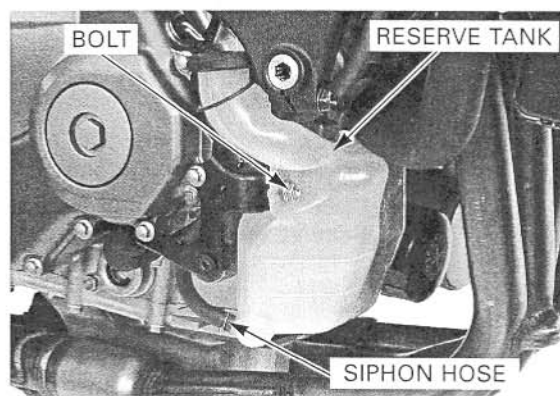
### REMOVAL

Remove the following:

- Lower cowls (page 3-6)
- Middle cowls (page 3-7)

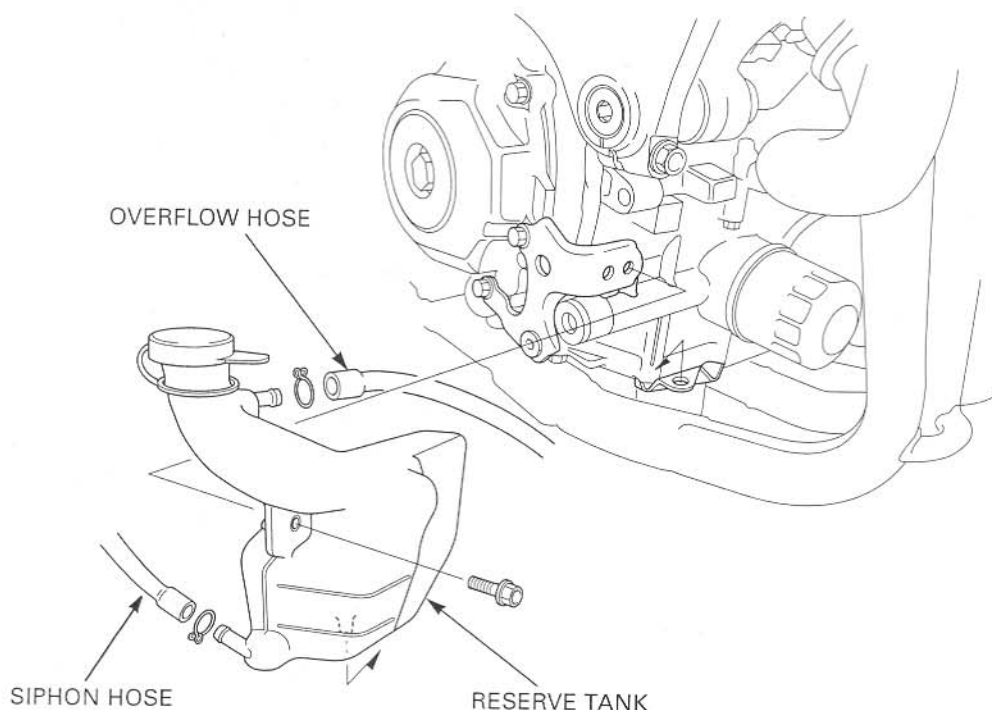
Disconnect the siphon hose and drain the coolant from the reserve tank.

Remove the bolt and radiator reserve tank.



## COOLING SYSTEM

### INSTALLATION



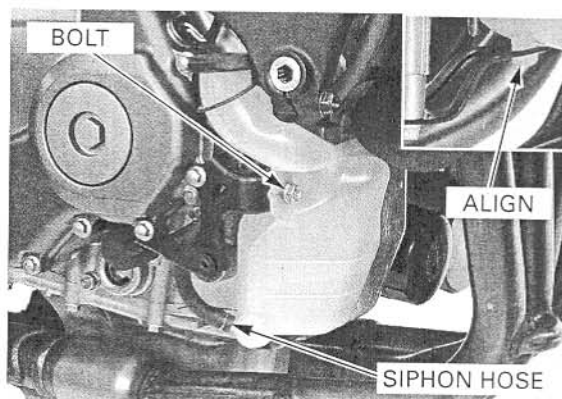
Connect the siphon hose to the reserve tank.

Install the reserve tank while aligning the boss of reserve tank with the mounting stay hole. Install and tighten the bolt securely.

Fill the system with the recommended coolant (page 7-6).

Install the following:

- Middle cowls (page 3-8)
- Lower cowls (page 3-6)



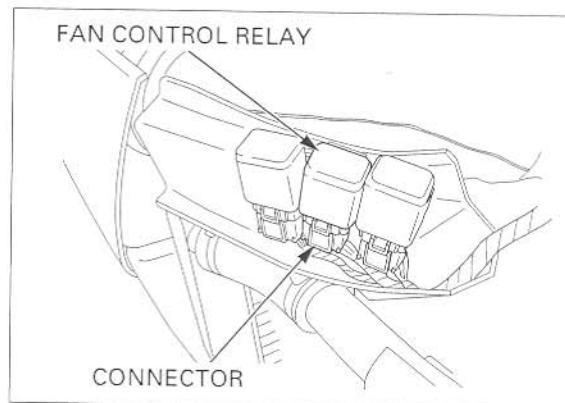
## FAN CONTROL RELAY

### INSPECTION

Remove the following:

- Lower cowls (page 3-6)
- Middle cowls (page 3-7)

Disconnect the fan control relay connector. Remove the fan control relay.



## COOLING SYSTEM

Connect the ohmmeter to the fan control relay connector terminals.

**CONNECTION: Blue/orange – Black/blue**

Connect the 12V battery to the following fan control relay connector terminals.

**CONNECTION: Green/blue – Black/white**

There should be continuity only when 12V battery is connected.

If there is no continuity only when the 12V battery is connected, replace the fan control relay.

