

# 11. COOLING SYSTEM

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## COOLING SYSTEM

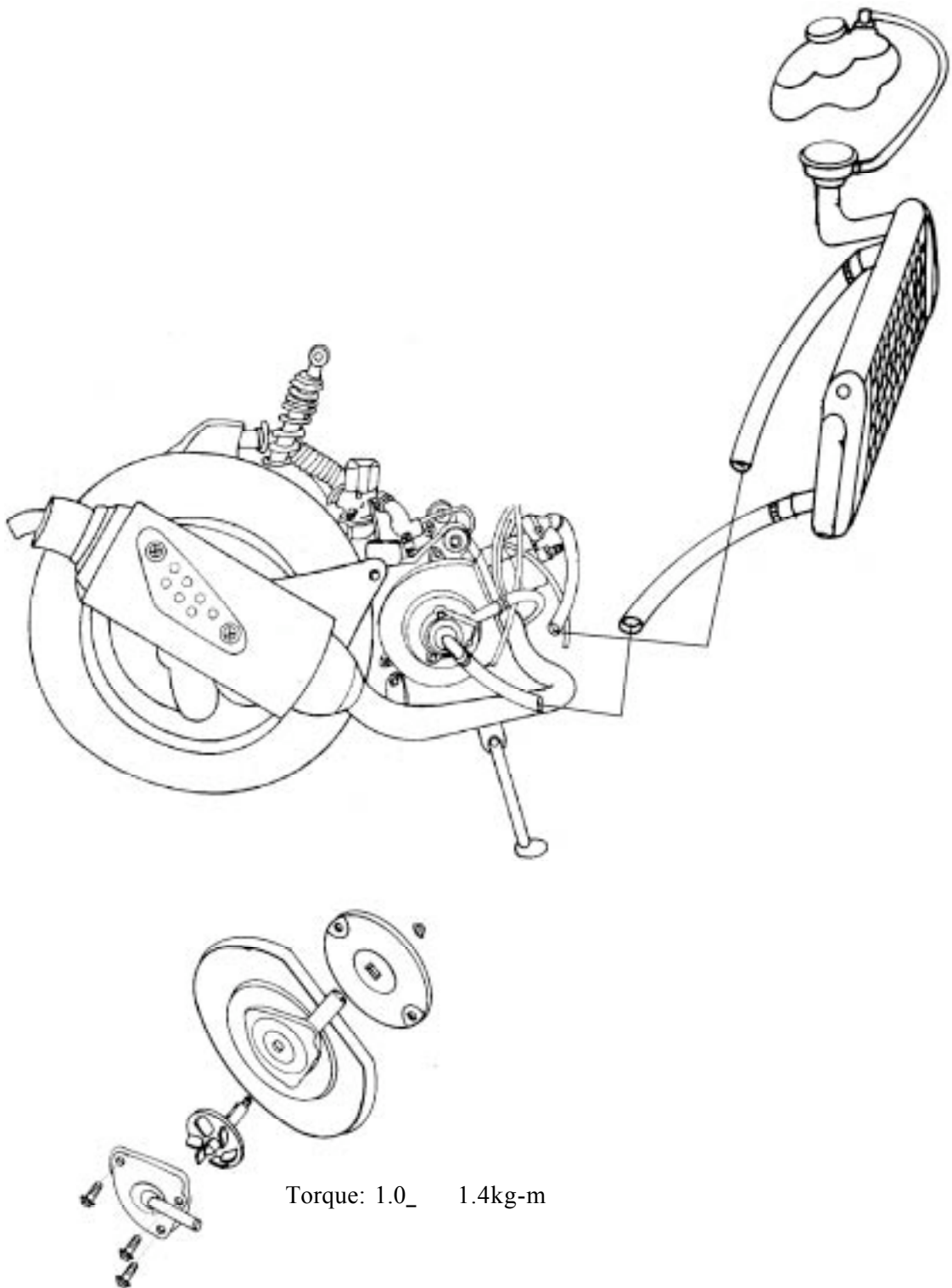
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### SCHEMATIC DRAWING



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## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- The water pump must be serviced after removing the engine. Other cooling system service can be done with the engine installed in the frame.
- The engine must be cool before servicing the cooling system.  
When the coolant temperature is over 100°C , never remove the radiator cap to release the pressure because the boiling coolant may cause danger.
- Avoid spilling coolant on painted surfaces because the coolant will corrode the painted surfaces.  
Wash off any spilled coolant with fresh water as soon as possible.
- After servicing the system, check for leaks with a cooling system tester.

### SPECIAL TOOL

Mechanical seal driver

### TORQUE VALUES

Water pump impeller	1.0_	1.4kg-m
Water pump cover bolt	0.8_	1.2kg-m

## TROUBLESHOOTING

### Engine temperature too high

- Faulty temperature gauge or thermosensor
- Faulty radiator cap
- Faulty thermostat
- Insufficient coolant
- Passages blocked in hoses or water jacket
- Clogged radiator fins
- Passages blocked in radiator
- Faulty water pump

### Temperature gauge pointer does not register the correct coolant temperature

- Faulty temperature gauge or thermosensor
- Faulty thermostat

### Coolant leaks

- Faulty pump mechanical (water) seal
- Deteriorated O-rings
- Damaged or deteriorated water hoses

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## SPECIFICATIONS

Radiator cap relief pressure		0.9±0.15kg/cm	
Thermostat temperature	Begins to open	80±2°C	
	Full-open	90°C	
	Valve lift	3.5_ 4.5mm	
Coolant capacity		Total system 1165cc	Radiator: 825cc Reserve tank: 340cc

## COOLANT GRAVITY

Temp. °C Coolant concentration	0	5	10	15	20	25	30	35	40	45	50
5%	1.009	1.009	1.008	1.008	1.007	1.006	1.005	1.003	1.001	0.009	0.997
10%	1.018	1.107	1.017	1.016	1.015	1.014	0.013	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	1.051	1.051	1.049	1.047	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	1.056	1.063	1.062	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

## COOLANT MIXTURE (WITH ANTI-RUST AND ANTI-FREEZING EFFECTS)

Freezing Point	Mixing Rate	KYMCO SIGMA Coolant Concentrate	Distilled Water
-9°C	20%		
-15°C	30%	360cc	825cc
-25°C	40%		
-37°C	50%		
-44.5°C	55%		

### Cautions for Using Coolant:

- Use coolant of specified mixing rate. (The mixing rate of 360cc KYMCO SIGMA coolant concentrate + 825cc distilled water is 30%.)
- Do not mix coolant concentrate of different brands.
- Do not drink the coolant which is poisonous.
- The freezing point of coolant mixture shall be 5°C lower than the freezing point of the riding area.

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## COOLING SYSTEM TESTING

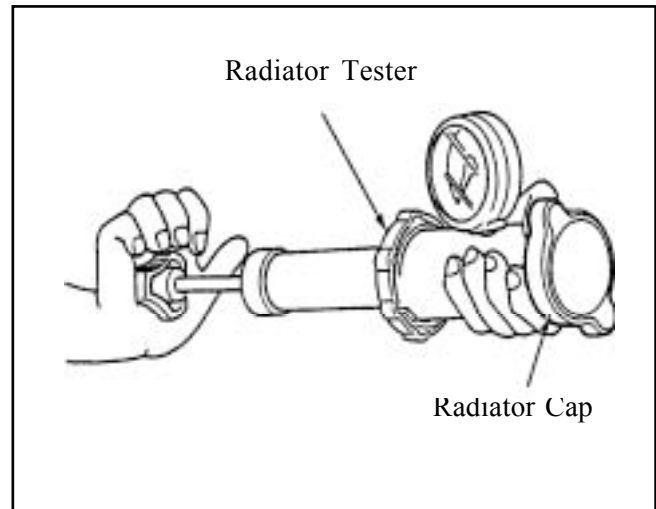
### RADIATOR CAP INSPECTION

Install the radiator cap onto the radiator tester and apply specified pressure to it. It must hold specified pressure for at least six seconds.

- \* Apply water to the cap sealing surface before testing.

#### Radiator Cap Relief Pressure:

$0.9 \pm 0.15 \text{ kg/cm}_2$



Install the radiator tester onto the radiator and apply specified pressure to it. It must hold specified pressure for at least six seconds.

Check the water hoses and connectors for leaks.

- \* The test pressure should not exceed  $1.05 \text{ kg/cm}_2$ . Excessive pressure can damage the radiator and its hose connectors.



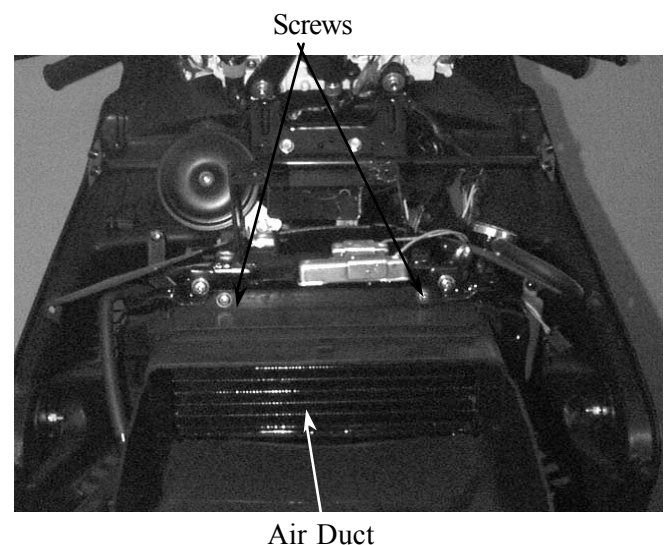
## RADIATOR

### RADIATOR INSPECTION

Remove the front upper cover. (⇒2-5)

Remove the front lower cover. (⇒2-5)

Remove the two screws and the air duct.



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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.  
Carefully straighten any bent fins.



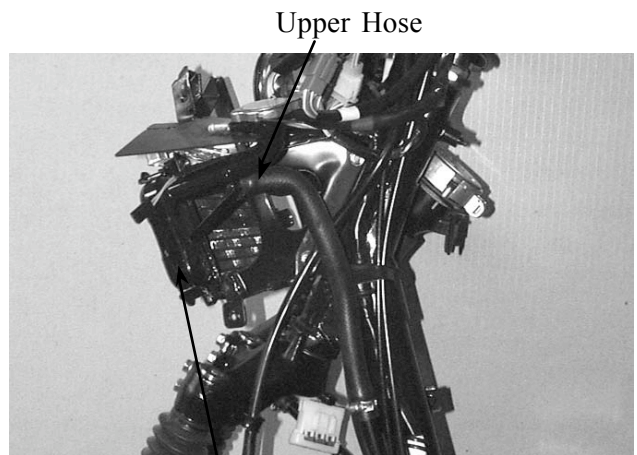
## RADIATOR REMOVAL

Drain the coolant. (⇒3-9)  
Remove the overflow tube clamp and disconnect the overflow tube.



Overflow Tube

Loosen the hose band and disconnect the upper hose from the radiator.

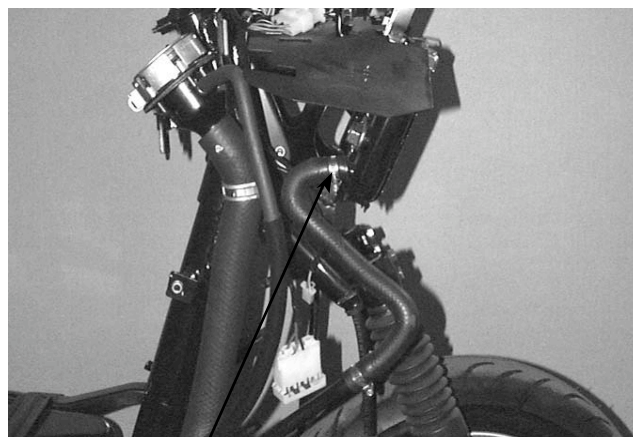


Radiator

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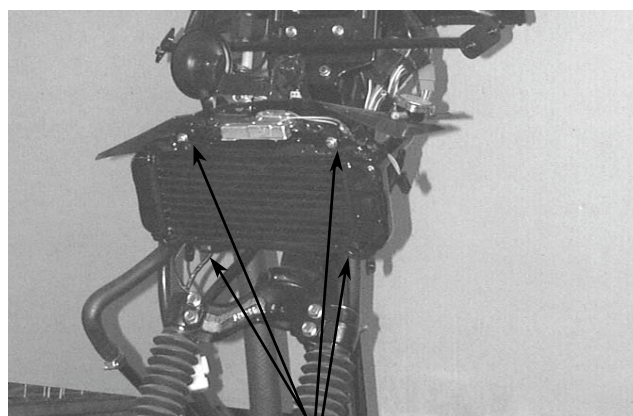
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Loosen the hose band and disconnect the lower hose from the radiator.



Lower Hose

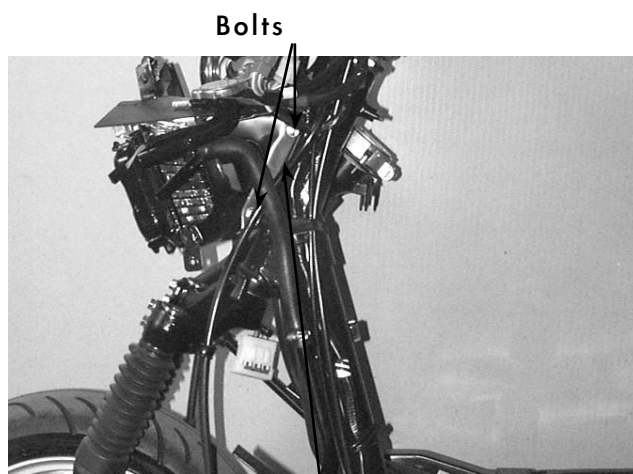
Remove the four screws and the radiator.



Screws

## **RADIATOR BRACKET REMOVAL/INSTALLATION**

Remove the two bolts to remove the radiator bracket.  
The installation sequence is the reverse of removal.



Radiator Bracket

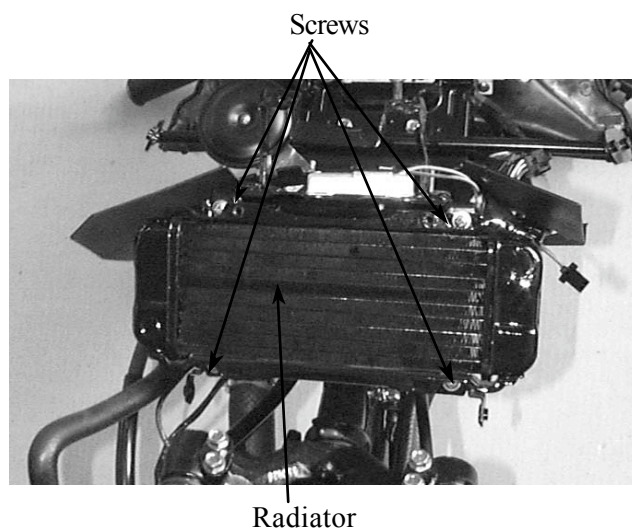


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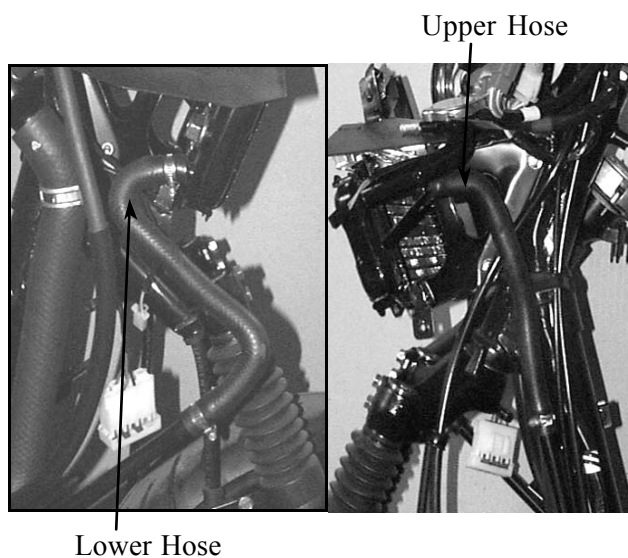
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## RADIATOR INSTALLATION

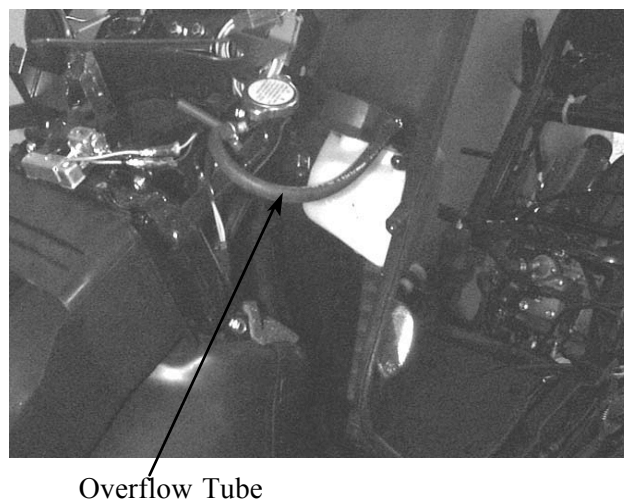
Install the radiator on the radiator bracket with the four screws.



Connect the upper and lower hoses and secure them with hose bands.



Install the heat screen.  
Connect the overflow tube and secure with the tube clamp.



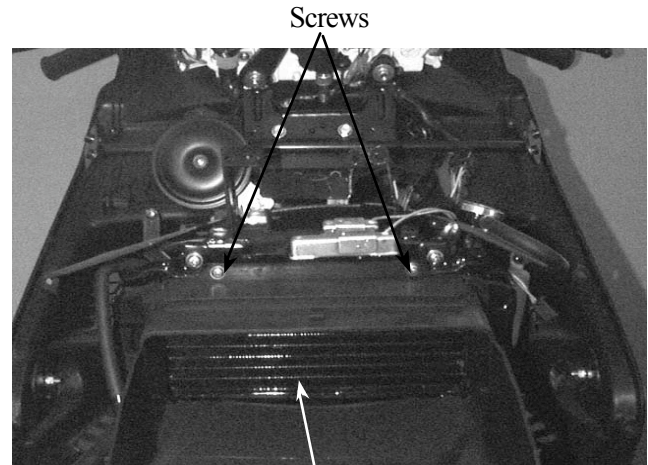


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Set the two tabs under the air duct into the grooves on the radiator lower part and then secure the radiator with the two screws.

Fill the radiator with coolant. (⇒3-12)  
After installation, check for coolant leaks.

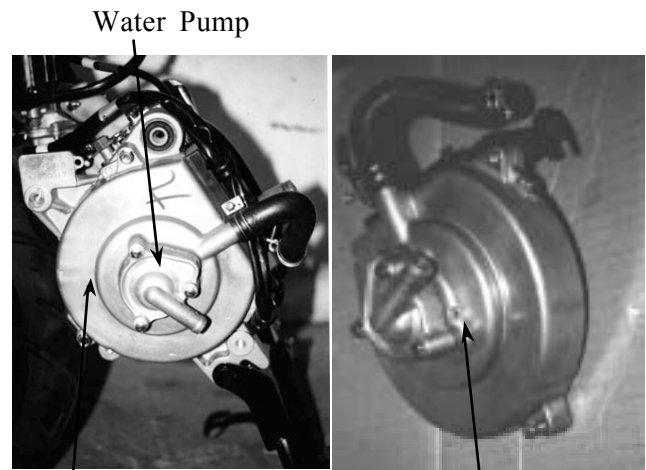


Air Duct

## WATER PUMP

### MECHANICAL SEAL (WATER SEAL) INSPECTION

Inspect the telltale hole for signs of mechanical seal coolant leakage.  
If the mechanical seal is leaking, remove the right crankcase cover and replace the mechanical seal.

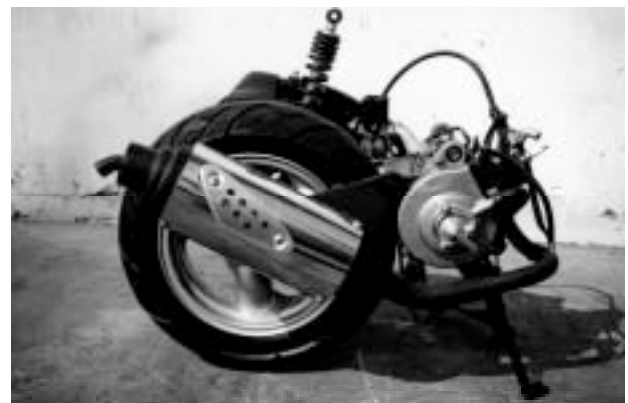


Right Crankcase Cover

Telltale Hole

### WATER PUMP/IMPELLER REMOVAL

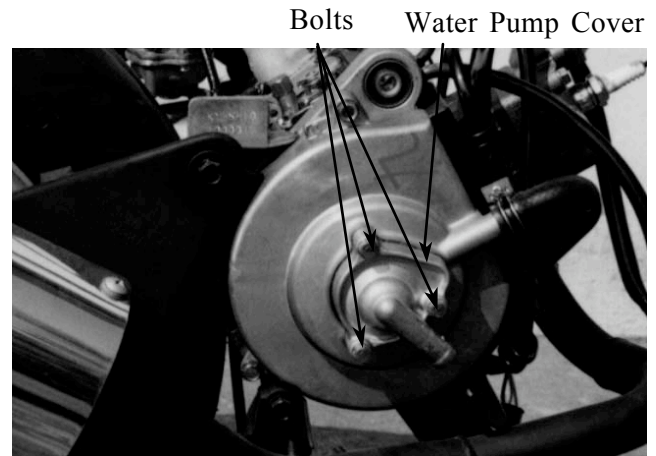
Remove the engine from the frame. (⇒5-2)



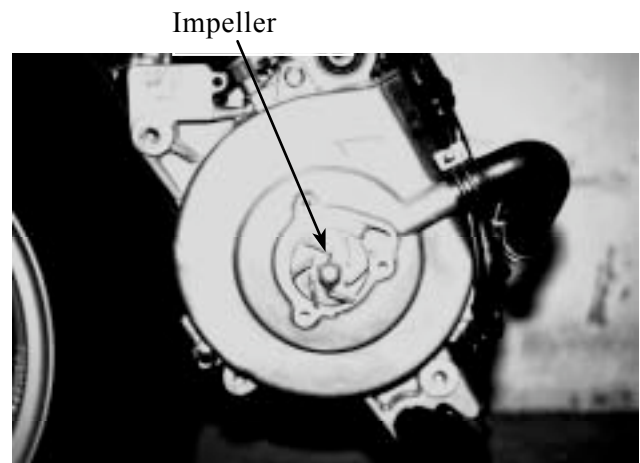
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Remove the three bolts and the water pump cover, gasket and 1 dowel pins.

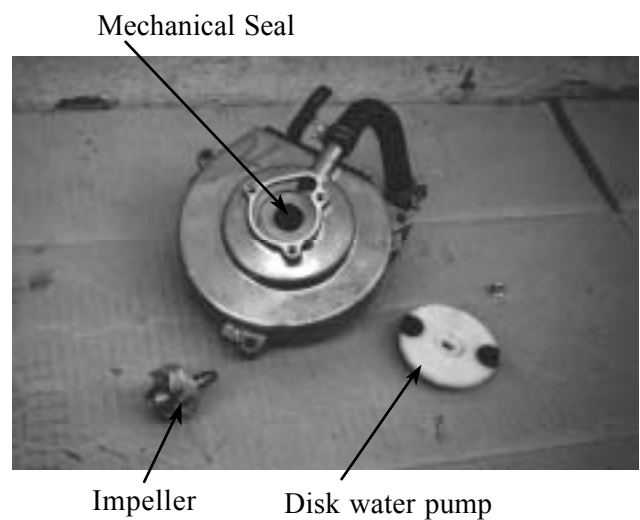


Remove the three bolts attaching the right crankcase cover and the cover.  
Remove the water pump impeller.



Inspect the mechanical (water) seal and inner bearing for wear or damage.

\* The mechanical seal and inner bearing must be replaced as a set.

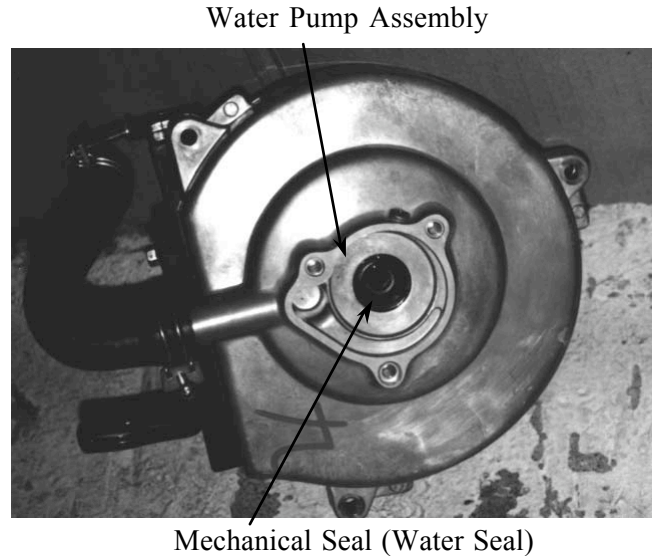


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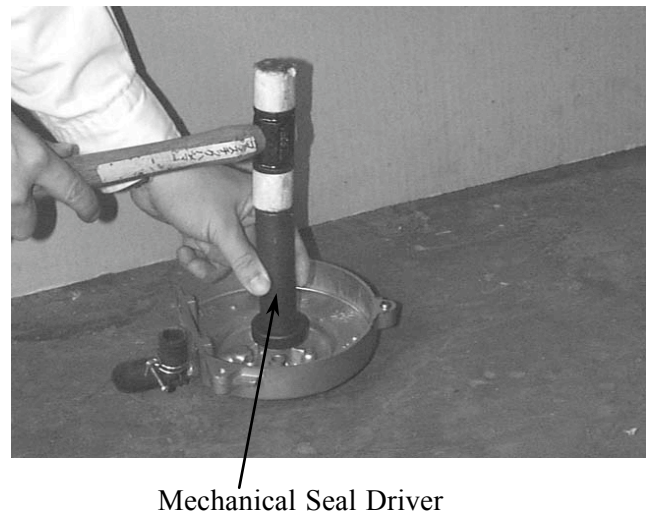
## MECHANICAL SEAL REPLACEMENT

Drive the mechanical seal out of the water pump assembly from the outer.



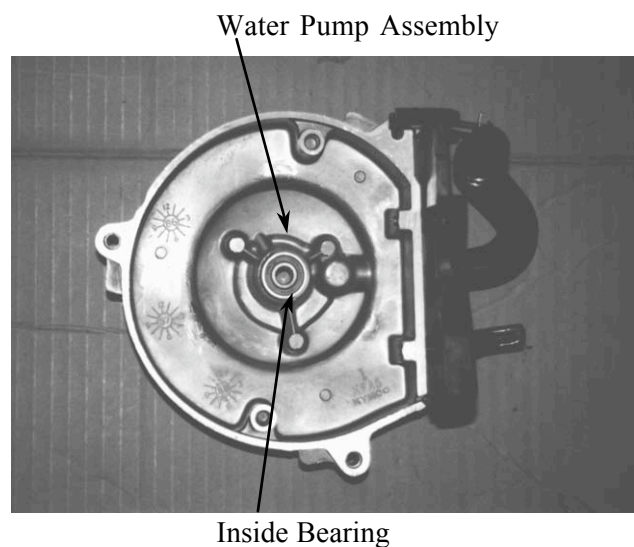
Drive in a new mechanical seal using a mechanical seal driver.

- \* Apply sealant to the right crankcase cover fitting surface of a new mechanical seal and then drive in the mechanical seal.



## WATER PUMP SHAFT INSTALLATION

Drive a new water pump shaft inside bearing into the water pump assembly from the inside.



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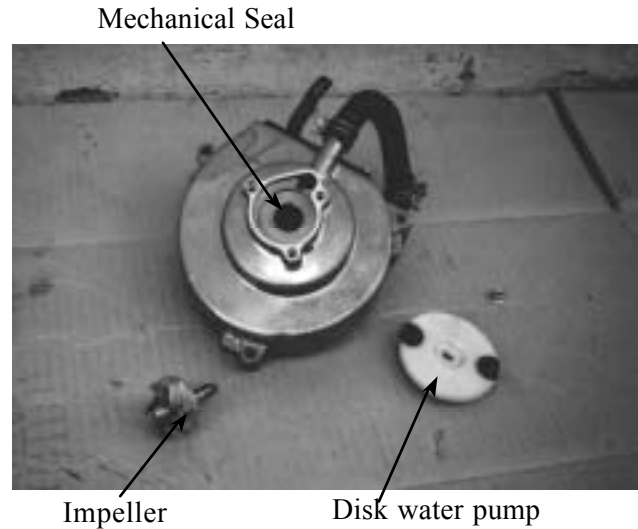
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## WATER PUMP/IMPELLER INSTALLATION

When the mechanical seal is replaced, a new shaft inside must be installed to the impeller.

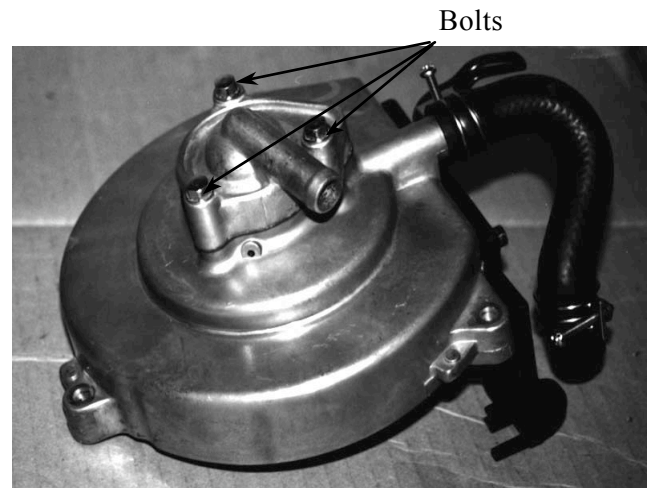
Install the impeller onto the water pump assembly.

**Torque:** 1.0\_ 1.4kg-m



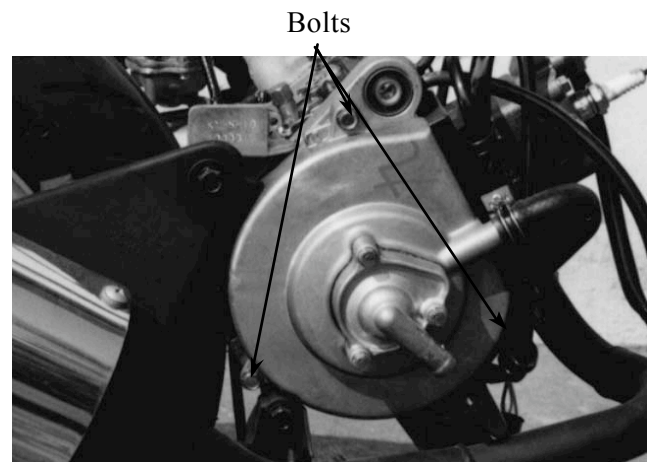
Install the one dowel pins and a new gasket.  
Install the water pump cover and tighten the 3 bolts.

**Torque:** 0.8\_ 1.2kg-m



Install the right crankcase cover over the crankcase

Tighten the three right crankcase cover bolts.



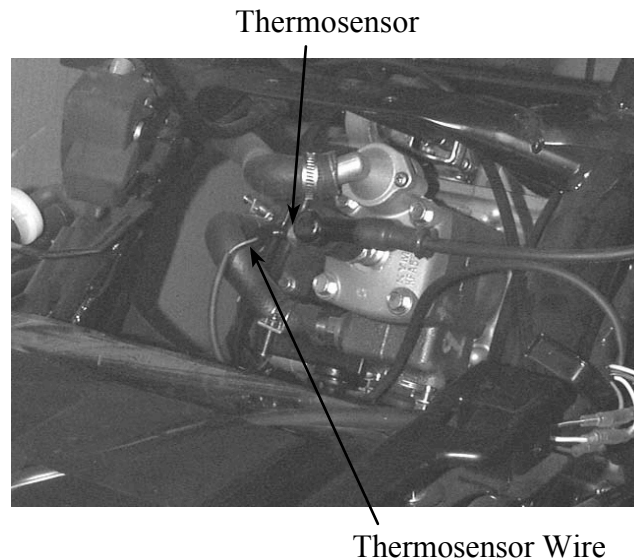


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## THERMOSENSOR

### THERMOSENSOR REMOVAL

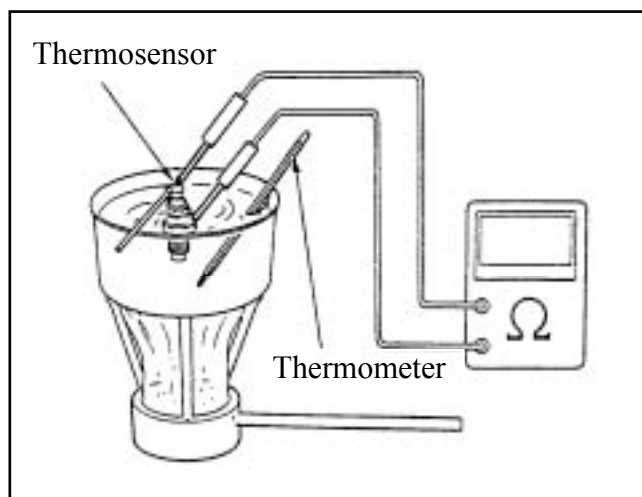
Remove the seat, met-in box and center cover.  
Drain the coolant.  
Disconnect the thermosensor wire.  
Remove the thermosensor.



### THERMOSENSOR INSPECTION

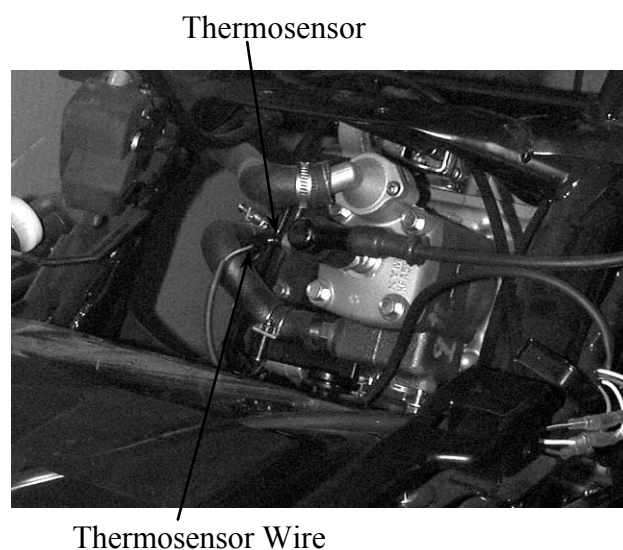
Suspend the thermosensor in a pan of water over a burner and measure the resistance through the sensor as the water heats up.

Temperature(°C )	50	80	100	120
Resistance(Ω)	154	52	27	16



### THERMOSENSOR INSTALLATION

Apply 3-BOND No. 1212 sealant or equivalent to the cylinder head threads and install it into the thermostat housing.  
Connect the thermosensor wire.  
Fill the radiator with coolant. (⇒3-12)  
Install the center cover, met-in box and seat. (⇒2-3)



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### THERMOSTAT

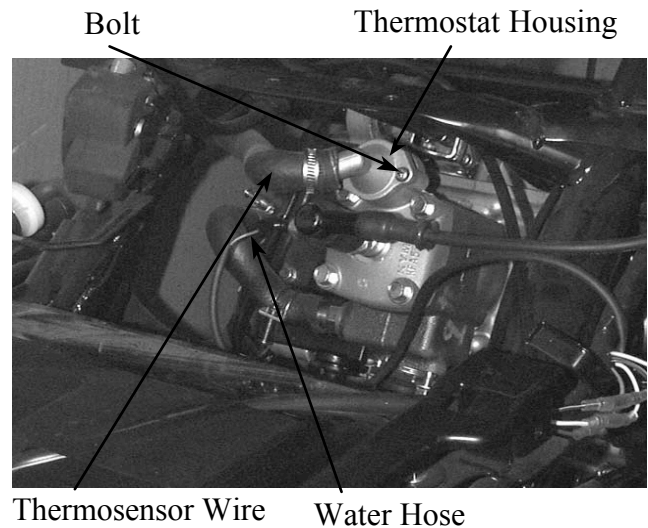
#### THERMOSTAT REMOVAL

Remove the seat, met-in box and center cover.

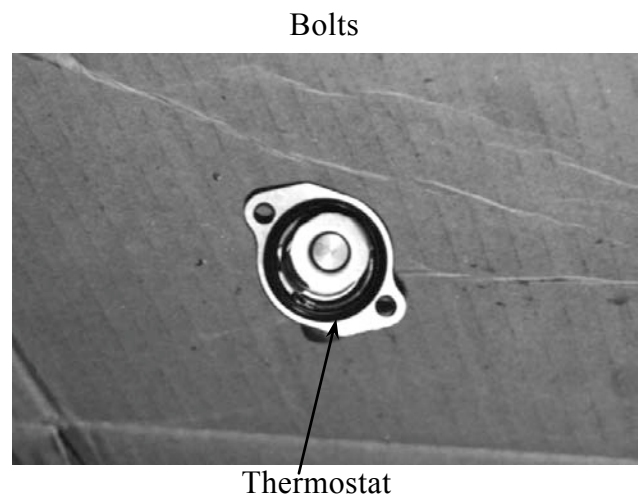
Drain the coolant.

Disconnect the water hose from the thermostat housing.

Remove the mounting bolt and the thermostat housing from the cylinder head.



Remove the thermostat from the thermostat housing.

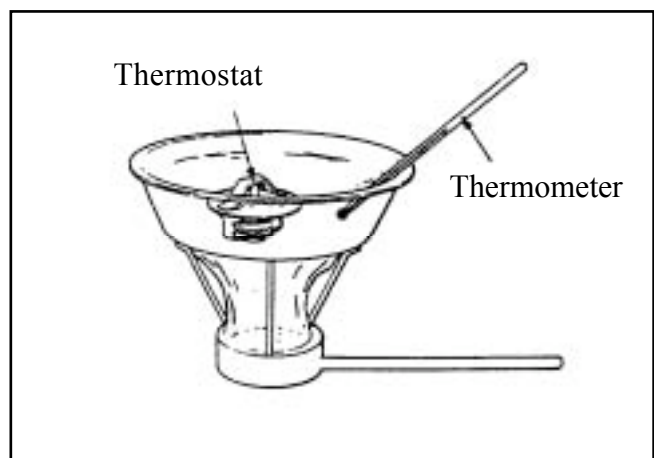


#### THERMOSTAT INSPECTION

Suspend the thermostat in a pan of water over a burner and gradually raise the water temperature to check its operation.

##### Technical Data

Begins to open	$80 \pm 2^{\circ}\text{C}$
Full-open	$90^{\circ}\text{C}$
Valve lift	3.5_ 4.5mm



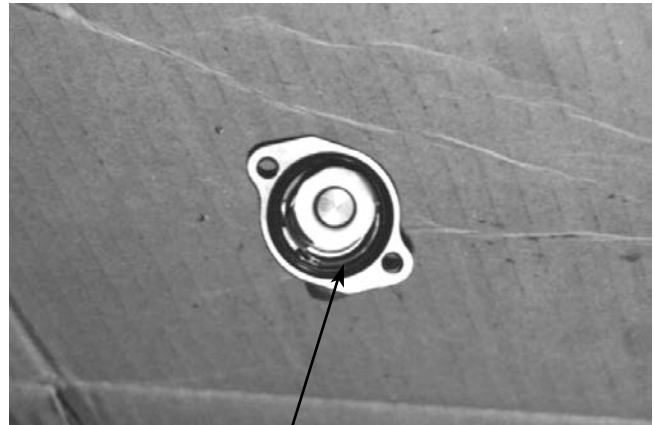


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- Do not let the thermostat touch the pan as it will give a false reading.
- Replace the thermostat if the valve stays open at room temperature.
- Test the thermostat after it is opened for about 5 minutes and holds the temperature at 70°C .



Thermostat Housing

## THERMOSTAT INSTALLATION

The installation sequence is the reverse of removal.

Fill the cooling system with the specified coolant. (⇒3-12)

Thermostat Housing

