

11. COOLING SYSTEM

COOLING SYSTEM

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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	9.8_	13.72N-m
Water pump cover bolt	7.84_	11.76N-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

Coolant leaks

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

Temperature gauge pointer does not register the correct coolant temperature

- Faulty temperature gauge or thermosensor
- Faulty thermostat

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SPECIFICATIONS

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.

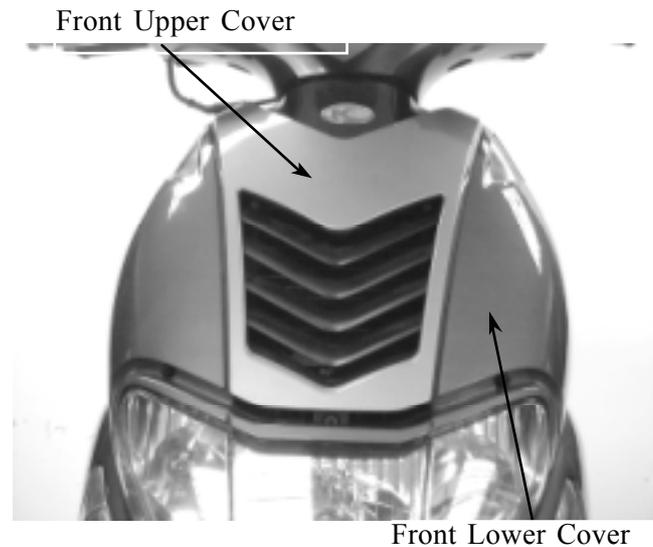
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RADIATOR

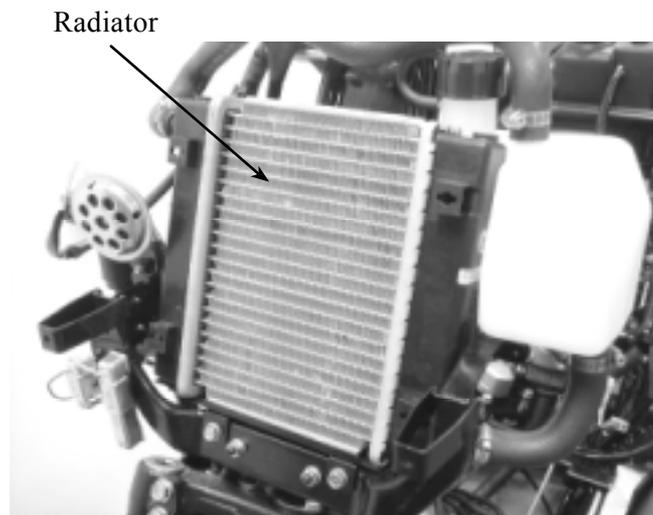
RADIATOR INSPECTION

Remove the front upper cover. (⇒2-3)

Remove the front lower cover. (⇒2-3)



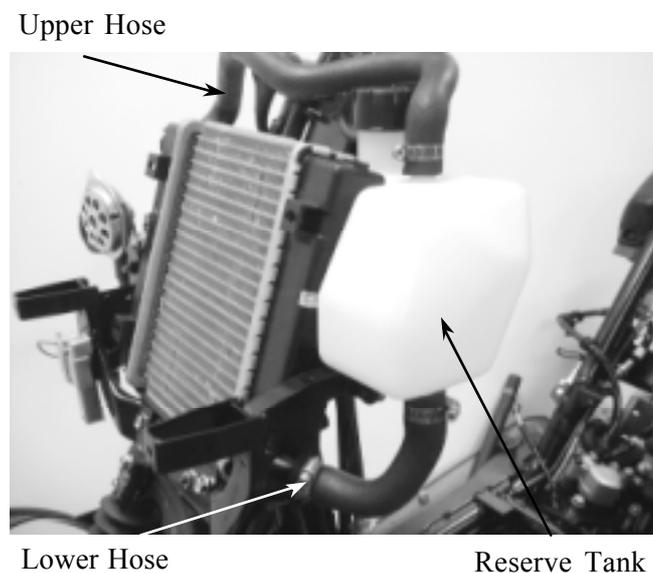
Inspect the radiator soldered joints and seams for leaks.
Blow dirt out from between core fins with compressed air. If insects, etc., are clogging the radiator, wash them off.
Carefully straighten any bent fins.



RADIATOR REMOVAL

Drain the coolant. (⇒3-10)

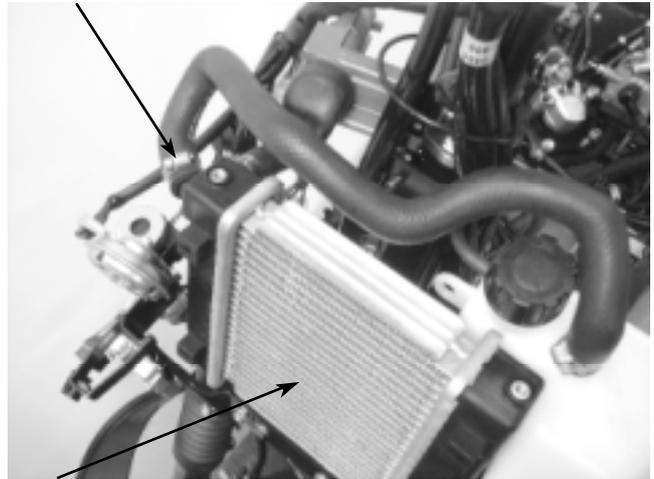
Loosen the hose band and disconnect the upper and lower hose from connect the radiator and reserve tank.



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

Upper Hose



Radiator

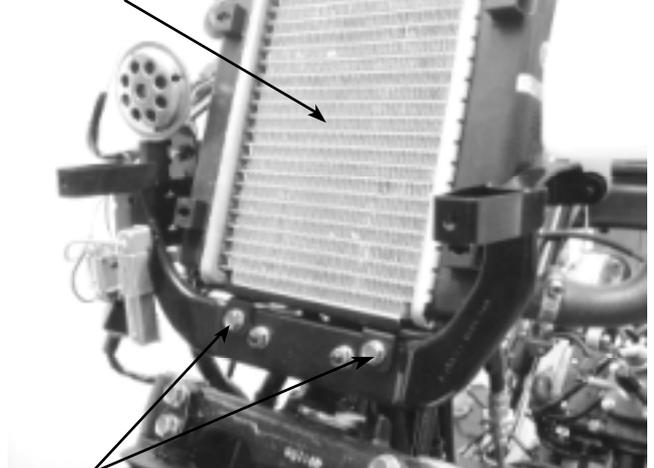
Loosen the hose band and disconnect the lower hose from the radiator.



Lower Hose

Remove the two bolts and the radiator.

Radiator

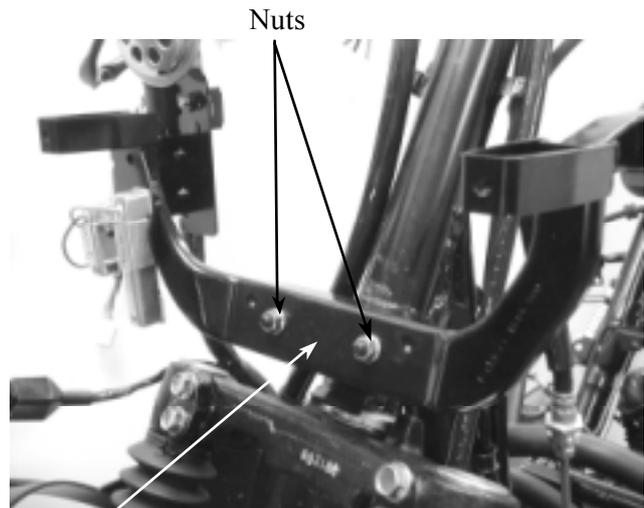


Bolts

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RADIATOR BRACKET REMOVAL/ INSTALLATION

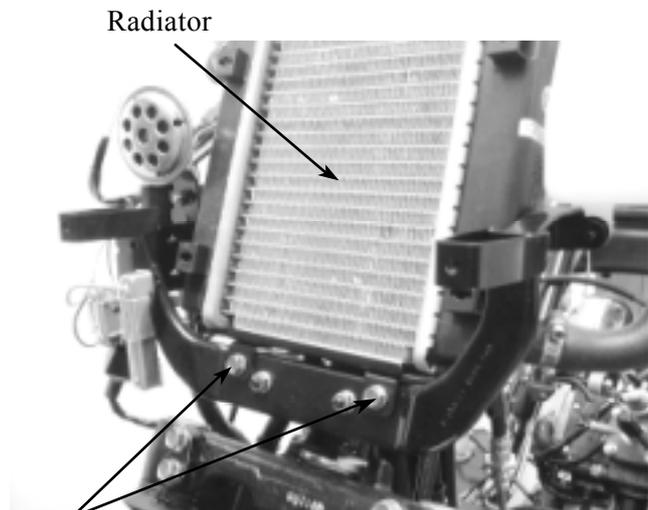
Remove the two nuts to remove the radiator bracket.
The installation sequence is the reverse of removal.



Radiator Bracket

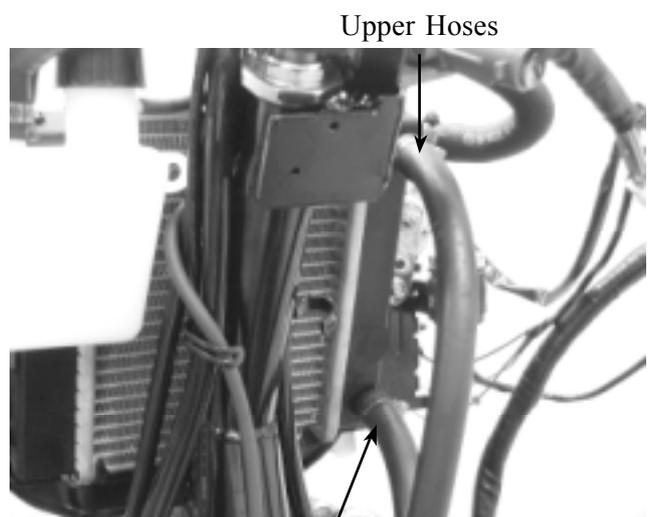
RADIATOR INSTALLATION

Install the radiator on the radiator bracket with the two bolts.



Bolts

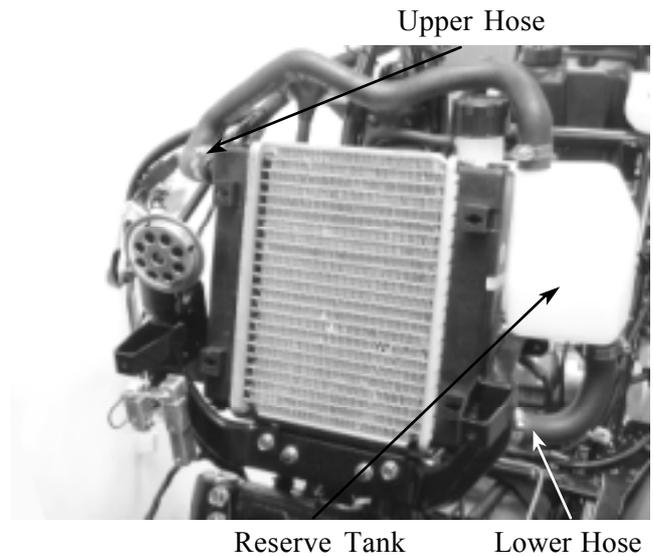
Connect the upper and lower hoses and secure them with hose bands.



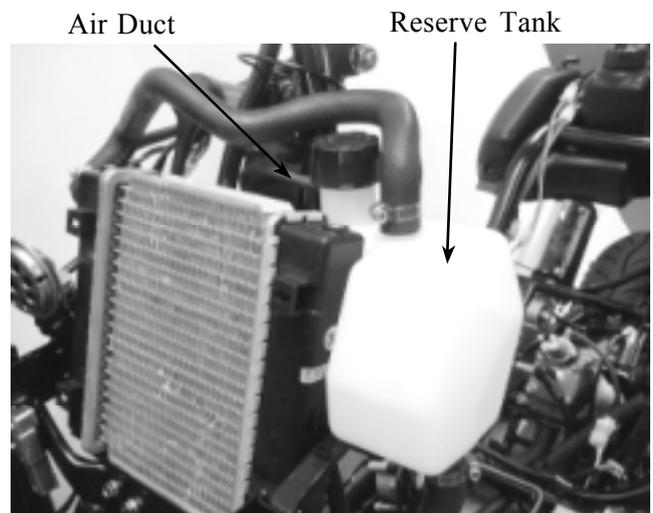
Lower Hoses

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Reinstall the upper and lower hoses, make sure the bands are secured.



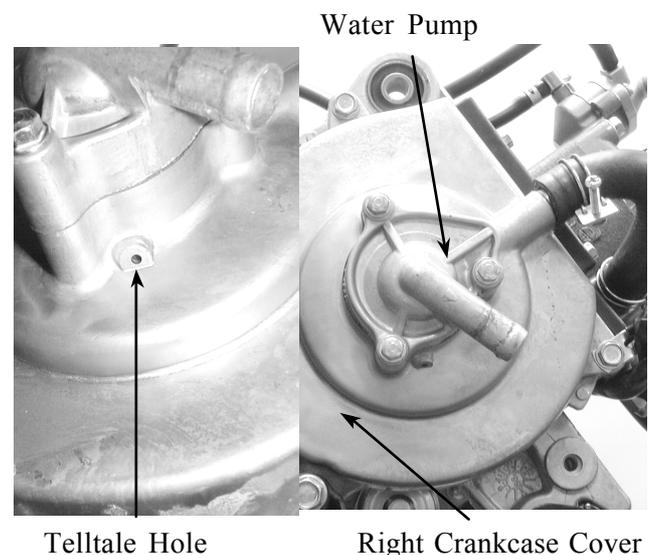
Fill the reserve tank with coolant. (⇒3-10)
 Check for coolant leaks.
 Install the front upper and lower cover.



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.



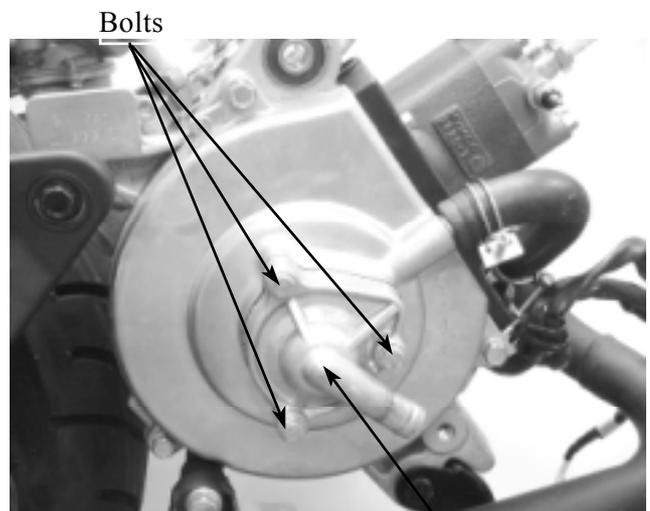
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WATER PUMP/IMPELLER REMOVAL

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



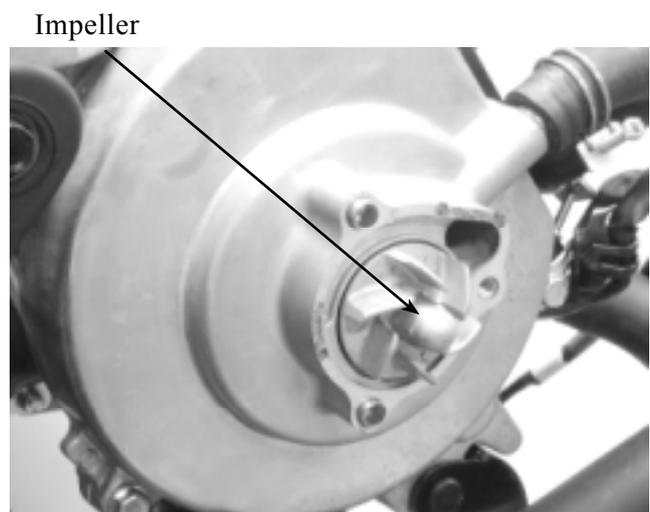
Remove the three bolts and the water pump cover, gasket and two dowel pins.



Water Pump Cover

Remove the water pump impeller.

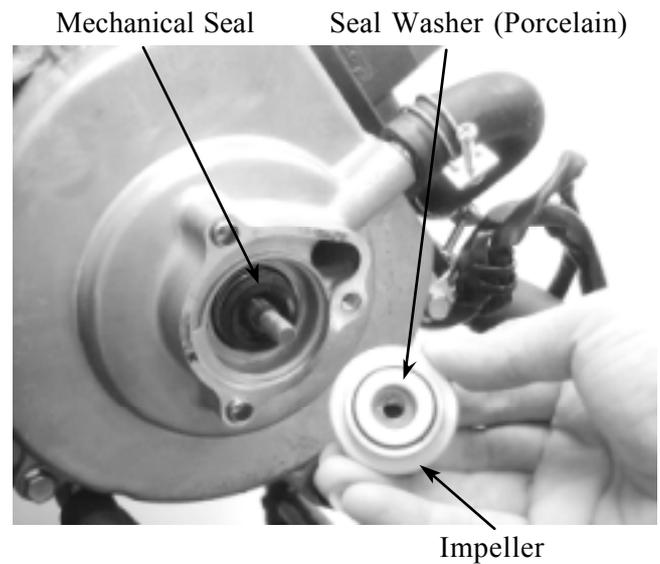
* The impeller has left hand threads.



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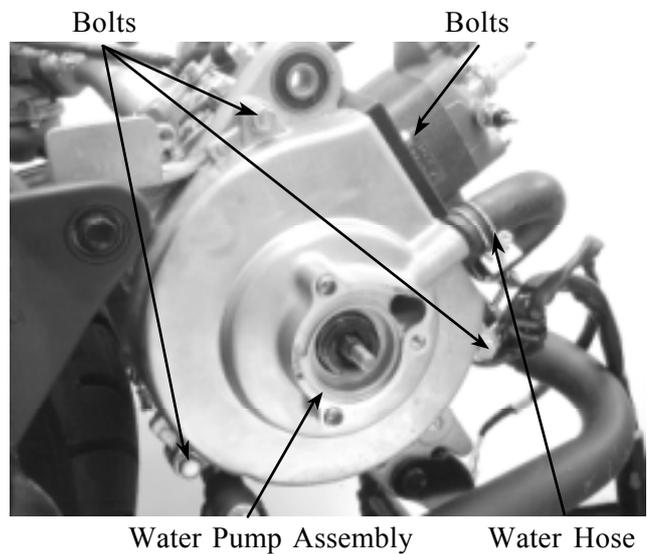
Inspect the mechanical (water) seal and seal washer for wear or damage.

* The mechanical seal and seal washer must be replaced as a set.

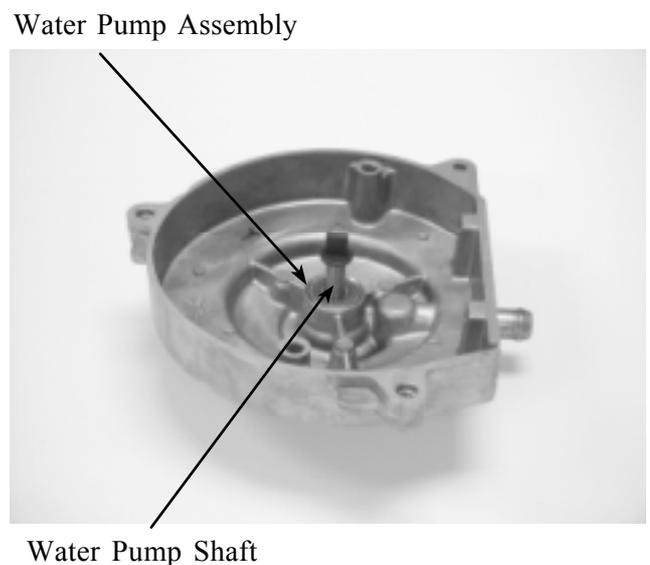


WATER PUMP SHAFT REMOVAL

Disconnect the water hose from the right crankcase cover.
Remove the two timing cap bolts and the timing cap.
Remove the three bolts attaching the water pump assembly.
Remove the water pump assembly and dowel pins.



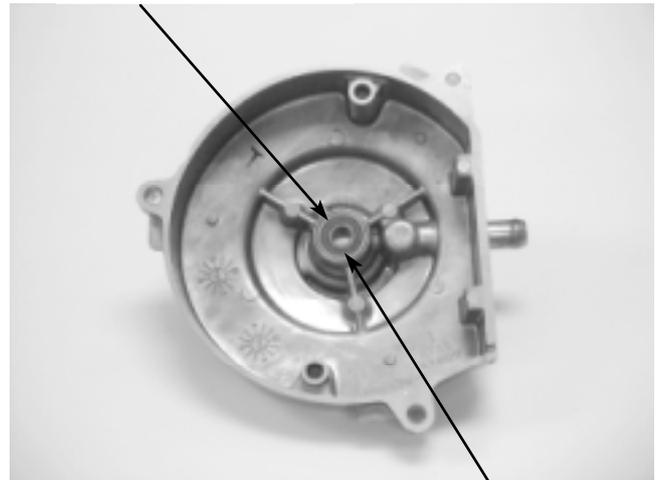
Remove the water pump shaft from the water pump assembly.



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**WATER PUMP BEARING/
MECHANICAL SEAL REMOVAL**
Remove the water pump shaft inside bearing.

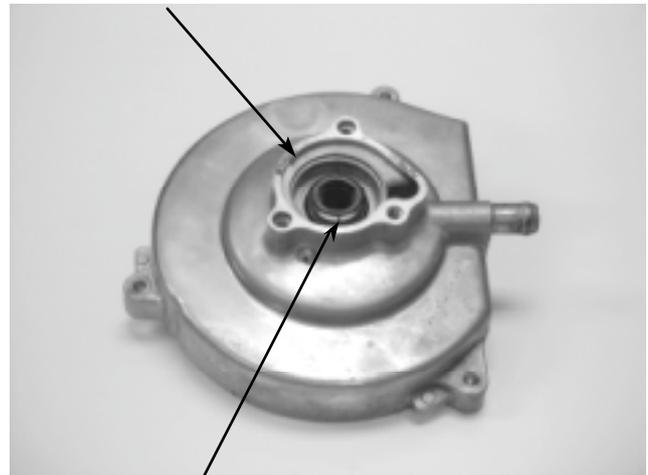
Water Pump Assembly



Inside Bearing

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

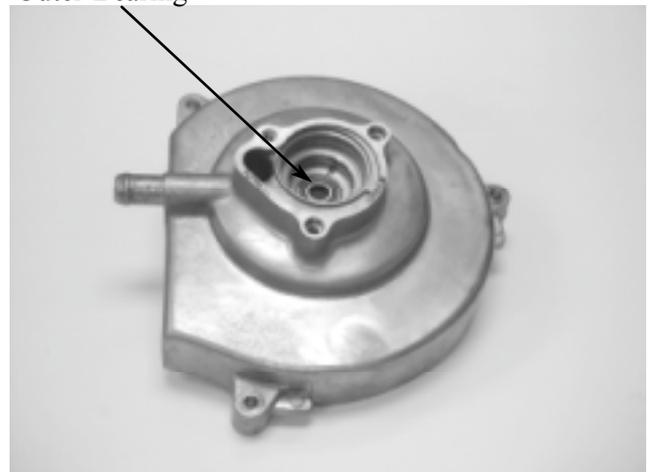
Water Pump Assembly



Mechanical Seal (Water Seal)

Remove the water pump shaft outer bearing.

Outer Bearing



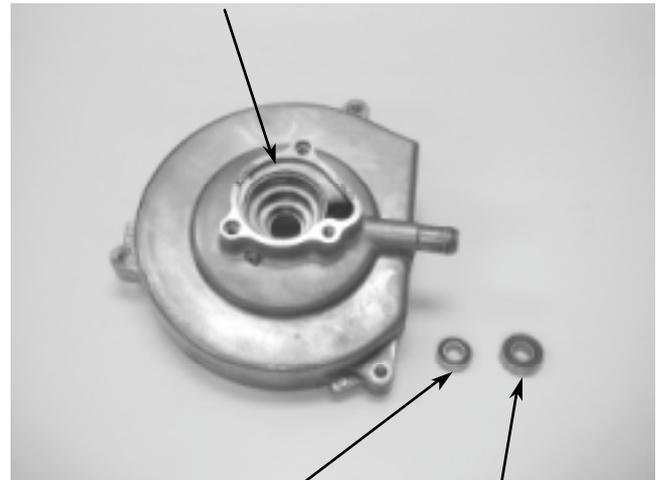
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WATER PUMP BEARING/ MECHANICAL SEAL INSTALLATION

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

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

Water Pump Assembly

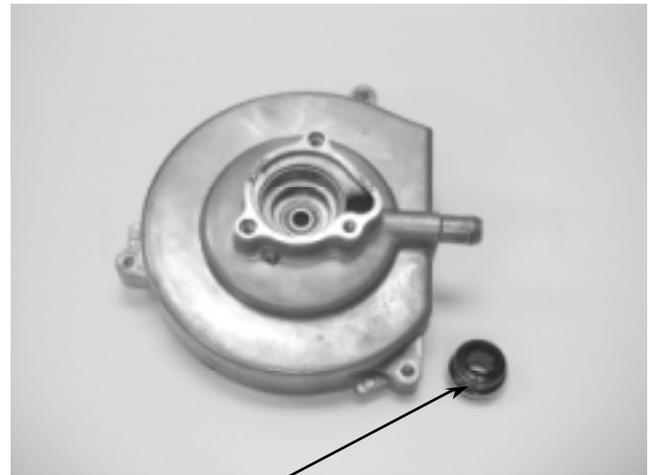


Outer Bearing

Inside Bearing

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

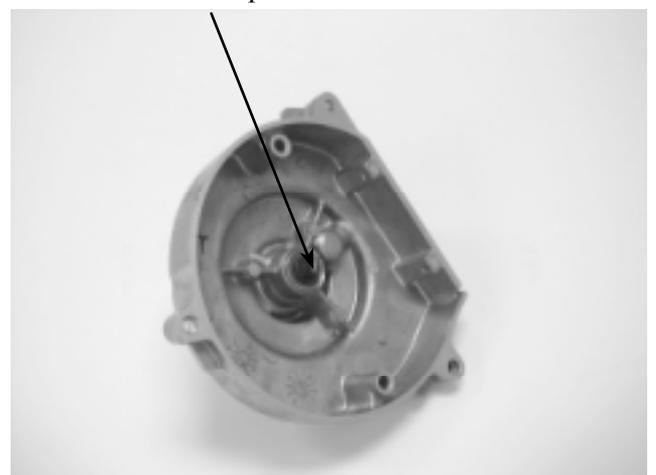
* Apply sealant to the right crankcase cover fitting surface of a new mechanical seal and then drive in the mechanical seal.



Mechanical Seal

Install the water pump shaft into the water pump assembly.

Water Pump Shaft



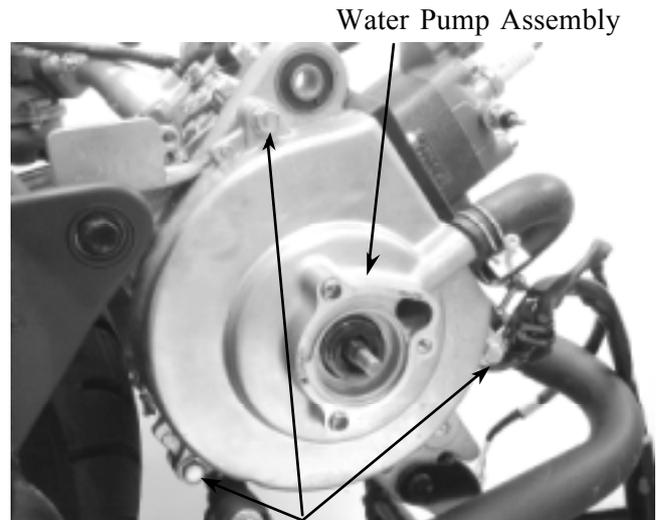
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Install the dowel pins and then install the water pump assembly to the right crankcase.

Tighten the three bolts to secure the water pump assembly.

Install the two timing cap bolts and the timing cap.

* When installing the water pump assembly, aligning the tab on the water pump shaft with the groove on the A.C. generator nut.



Bolts

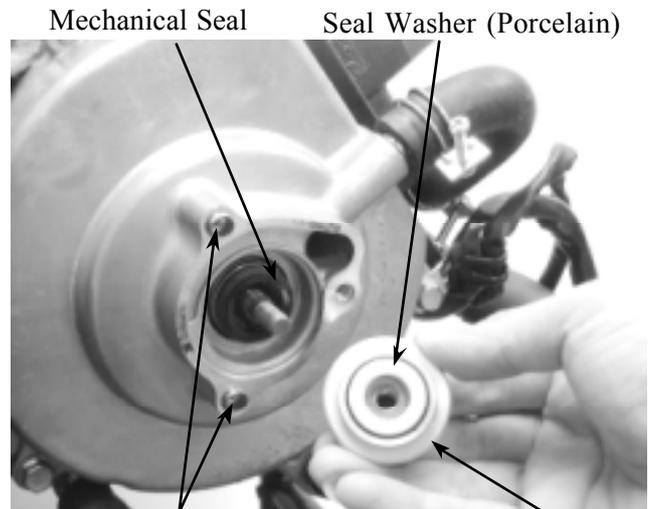
WATER PUMP/IMPELLER INSTALLATION

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

Install the impeller onto the water pump shaft.

Torque: 9.8_ 13.72N-m

* The impeller has left hand threads.



Mechanical Seal

Seal Washer (Porcelain)

Dowel Pins

Impeller

Install the two dowel pins and a new gasket.

Install the water pump cover and tighten the three bolts.

Torque: 7.84_ 11.76N-m



Water Pump Cover

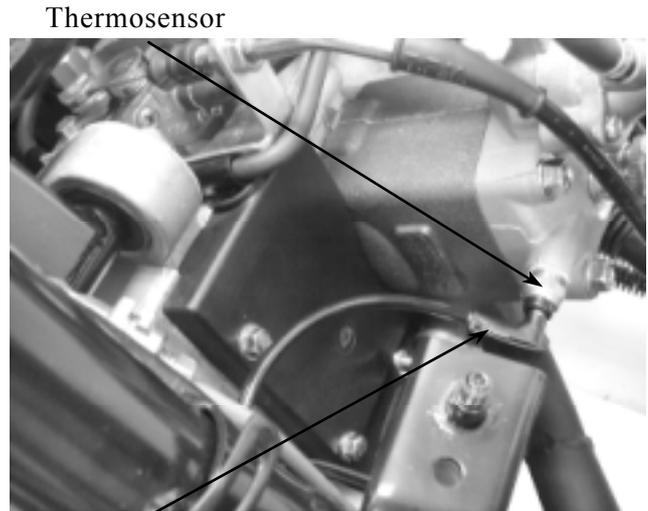
Bolts

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THERMOSENSOR

THERMOSENSOR REMOVAL

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

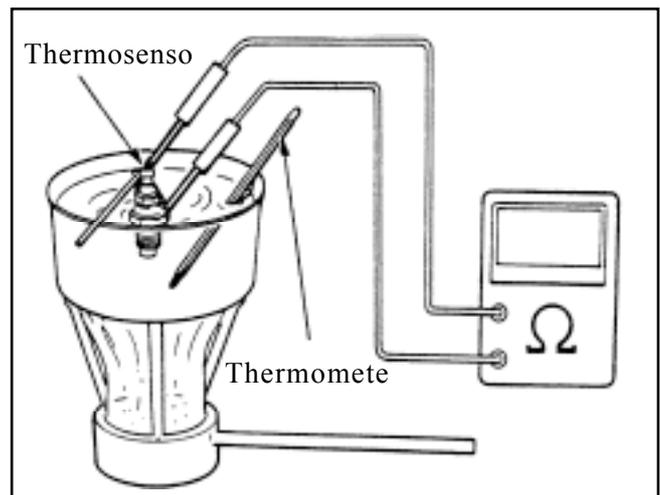


Thermosensor Wire

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 reserve tank with coolant. (⇒3-10)
 Install the frame body cover, met-in box and seat. (⇒2-3)

* Be sure to bleed air from the cooling system.

Thermosensor

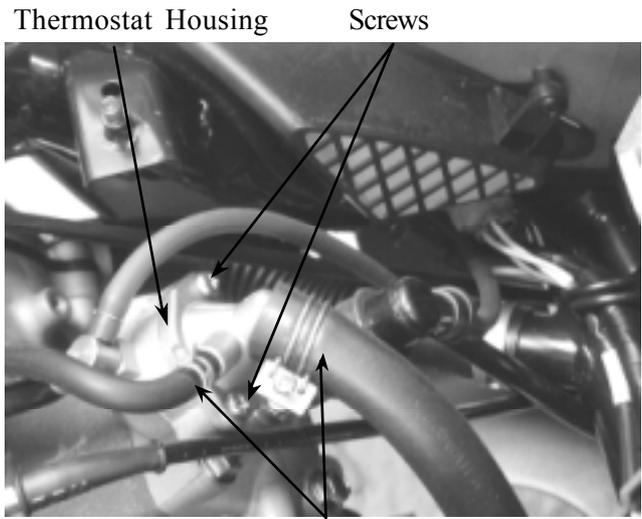


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THERMOSTAT

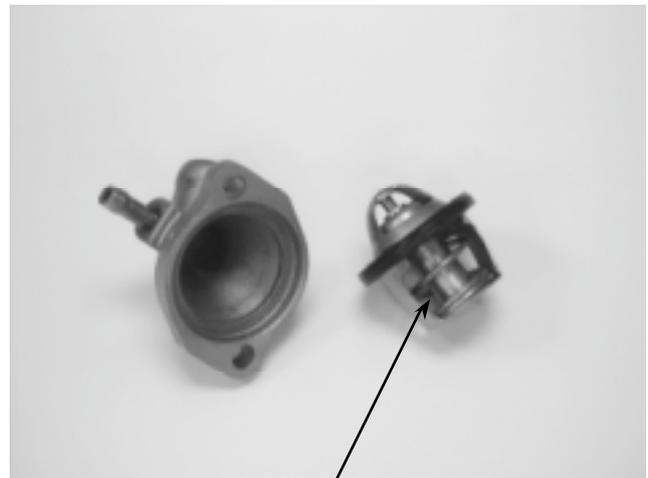
THERMOSTAT REMOVAL

Remove the seat, met-in box and frame body cover.
 Drain the coolant.
 Disconnect the water hose from the thermostat housing.



Water Hose

Remove the two screws and separate the thermostat housing cover .
 Remove the thermostat from the thermostat housing.



Thermostat

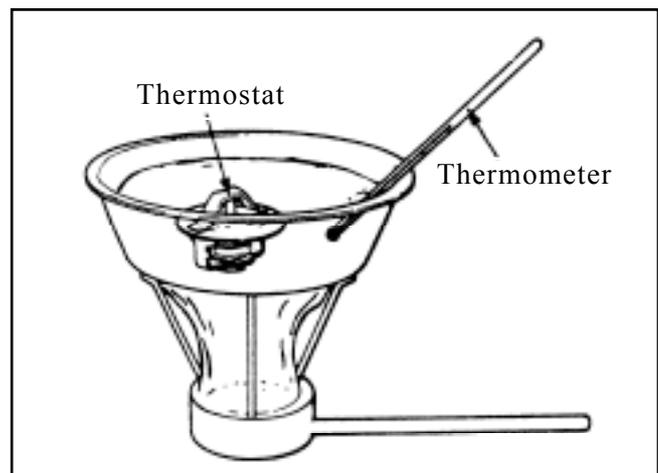
THERMOSTAT INSPECTION

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±2°C
Full-open	90°C
Valve lift	3.5_ 4.5mm

- * 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 .

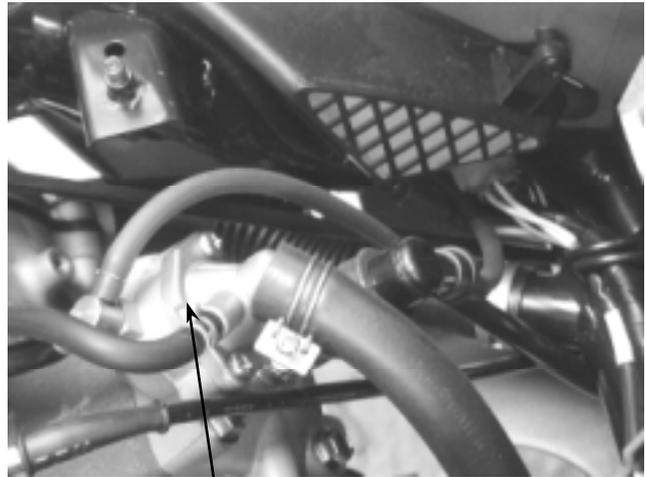


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THERMOSTAT INSTALLATION

The installation sequence is the reverse of removal.

Fill the cooling system with the specified coolant. (⇒3-10)



Thermostat Housing