Cooling System

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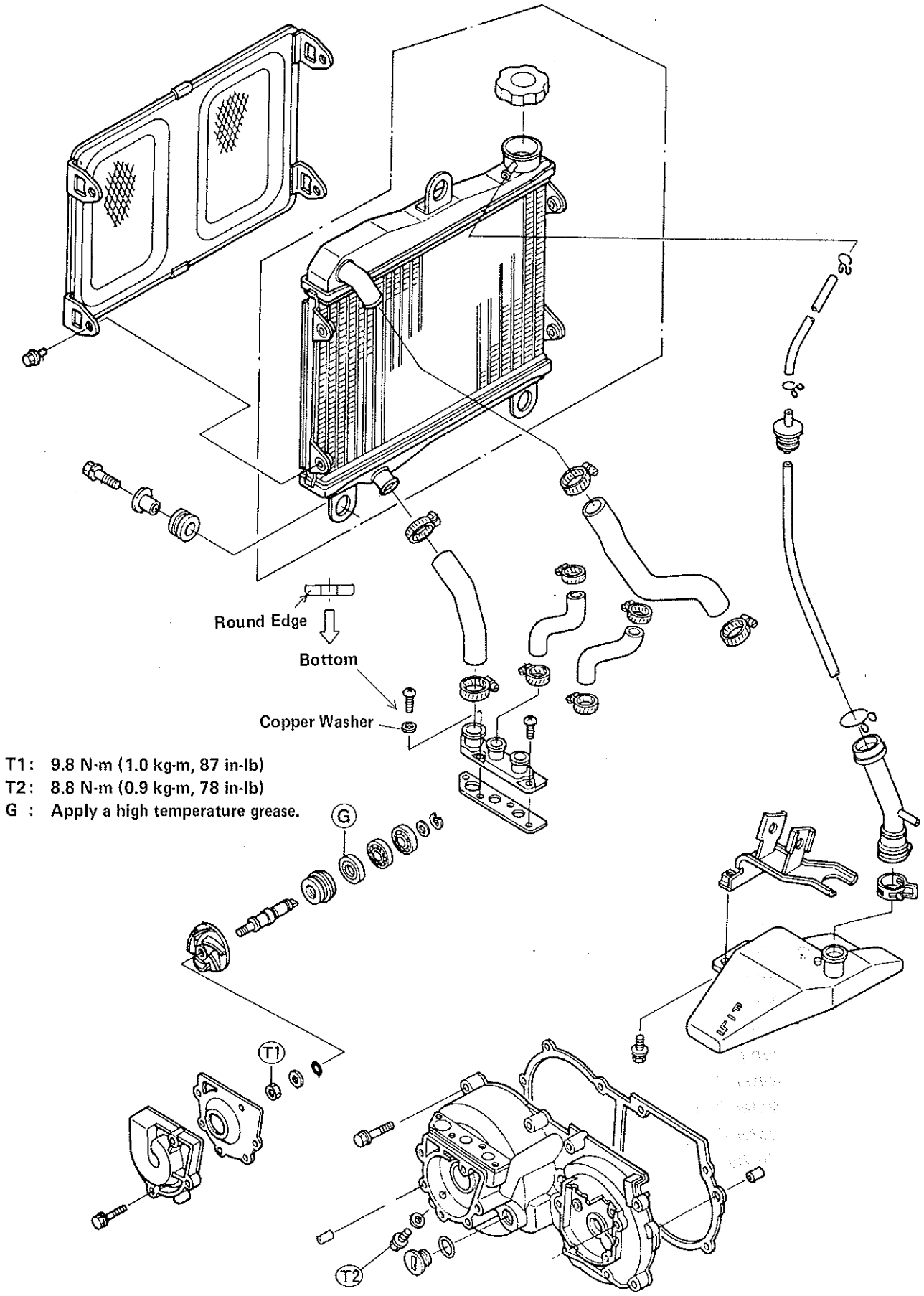
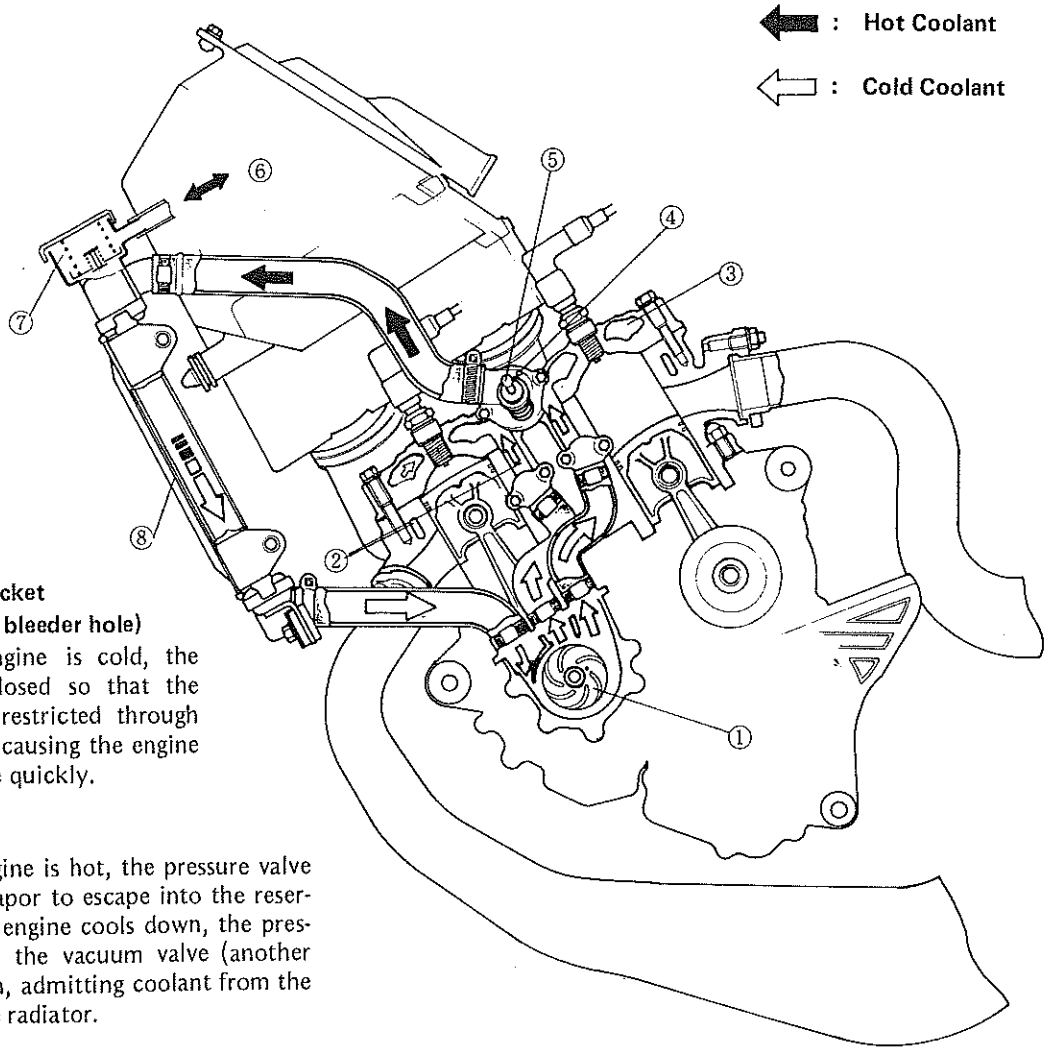
Exploded Views



Specifications

Item	Standard
Coolant Provided when Shipping:	
Type	Permanent type of antifreeze for aluminum engine and radiator
Color	Green
Mixed ratio	Soft water 57%, coolant 43%
Freezing point	–30°C (–22°F)
Total amount	1.8 L (reservoir tank full level)
Radiator Cap:	
Relief pressure	73.5 – 103 kPa (0.75 – 1.05 kg/cm², 11 – 15 psi)
Thermostat:	
Valve opening temperature	63.5 – 66.5°C (146 – 152°F)
Valve full open lift	not less than 6 mm @80°C (176°F)

Cooling System



1. **Water Pump**
2. **Cylinder Jacket**
3. **Cylinder Head Jacket**
4. **Bypass Hole (Air bleeder hole)**
   When the engine is cold, the thermostat is closed so that the coolant flow is restricted through the bypass hole, causing the engine to warm up more quickly.
5. **Thermostat**
6. **To reservoir tank**
   When the engine is hot, the pressure valve allows air and vapor to escape into the reservoir. When the engine cools down, the pressure drop draws the vacuum valve (another small valve) open, admitting coolant from the reservoir into the radiator.
7. **Radiator Cap**
8. **Radiator**

Coolant

Coolant Level Inspection

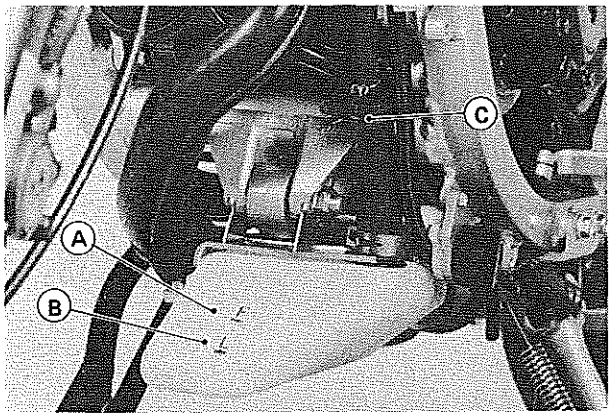
•Situate the motorcycle so that it is perpendicular to the ground.

•Check the level through the coolant level gauge on the reservoir tank. The coolant level should be between the FULL and the LOW marks.

NOTE

○*Check the level when the engine is cold (room or ambient temperature).*

★If the coolant level is low, pull off the reservoir tank cap and add coolant through the filler opening to the FULL mark. (In the photograph, the fairing has been removed for clarity.)



A. FULL mark
B. LOW Mark
C. Tank Cap

CAUTION

○For refilling, add the specified mixture of coolant and soft water. Adding water alone dilutes the coolant and degrades its anticorrosion properties. The diluted coolant can attack the aluminum engine parts. In an emergency, soft water can be added. But the diluted coolant must be returned to the correct mixture ratio within a few days.

○If coolant must be added often, or the reservoir tank has run completely dry; there is probably leakage in the cooling system. Check the system for leaks (see Visual Leak Inspection, and Pressure Testing).

Coolant Inspection

•Visually inspect the coolant in the reservoir tank.

○If whitish cotton-like wafts are observed, aluminum parts in the cooling system are corroded. If the coolant is brown, iron or steel parts are rusting. In either case, flush the cooling system.

○If the coolant gives off an abnormal smell when changing, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.

Coolant Draining

The coolant should be changed periodically to ensure long engine life.

CAUTION

○Use coolant containing corrosion inhibitors made specifically for aluminum engines and radiators in accordance with the instructions of the manufactures (see Coolant Filling section).

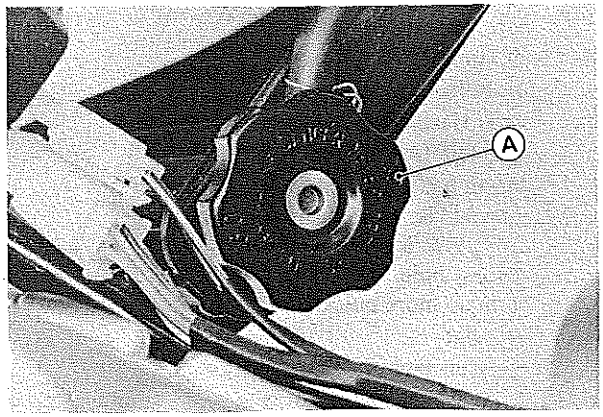
WARNING

○To avoid burns, do not remove the radiator cap or try to change the coolant when the engine is still hot. Wait until it cools down.

○Coolant on tires will make them slippery and can cause an accident and injury. Immediately wipe up or wash away any coolant that spills on the frame, engine or other painted parts.

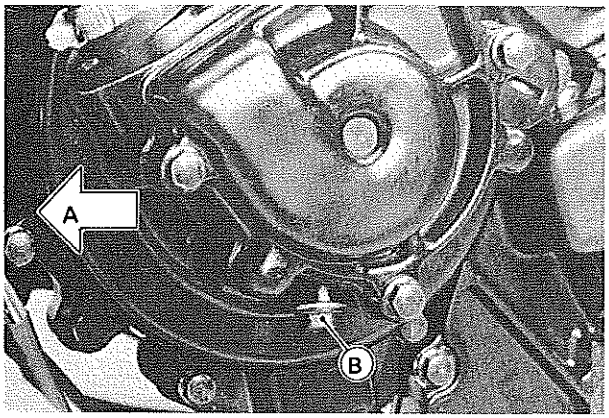
○Since coolant is harmful to the human body, do not use for drinking.

•Remove the radiator cap in two steps. First turn the cap counterclockwise to the first stop and wait there for a few seconds to allow any pressure to escape. Then push down and remove the cap.



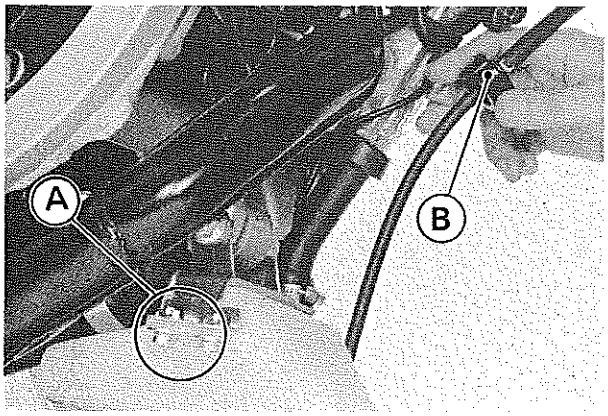
A. Radiator Cap

•Drain the coolant from the radiator and engine by removing the drain plug at the bottom of the water pump body (left side).



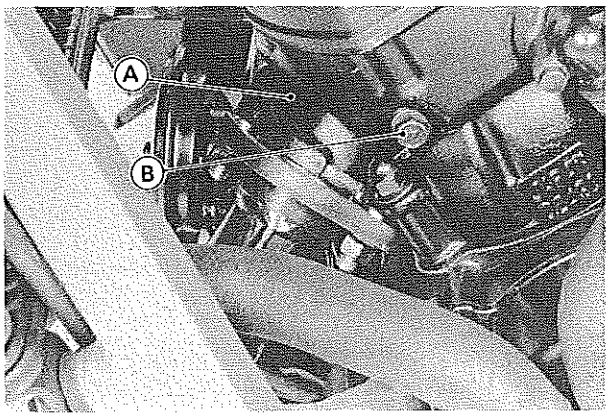
A. Front B. Drain Plug

- Remove the lower fairing.
- Pull the reservoir tank cap out.
- Unscrew the bolts, remove the reservoir tank and pour the coolant into a container.



A. Mounting Bolts B. Tank Cap

- Remove the drain plug at the bottom of the front cylinder.



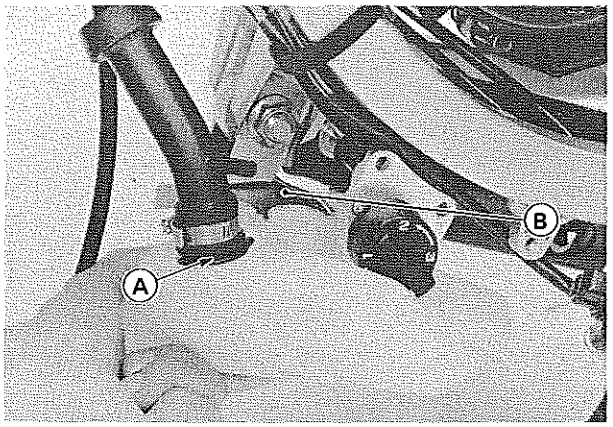
A. Front Cylinder B. Drain Plug

- Inspect the old coolant for color, smell (mentioned above).

Coolant Filling

- Install the drain plugs. Always replace the gaskets with new ones, if they are damaged.
- Tighten the drain plugs to the specification (see Exploded Views).
- Install the reservoir tank.

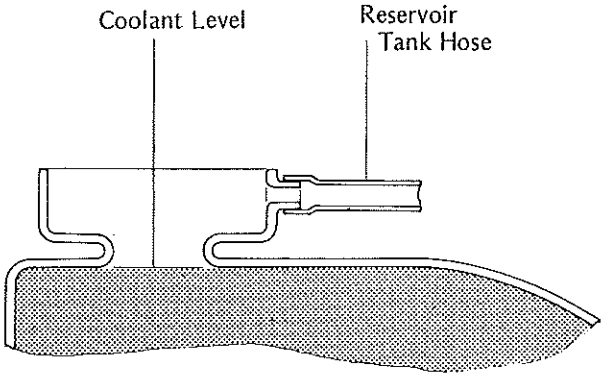
○After fitting the hose groove into the mounting bracket, tighten the mounting bolts.



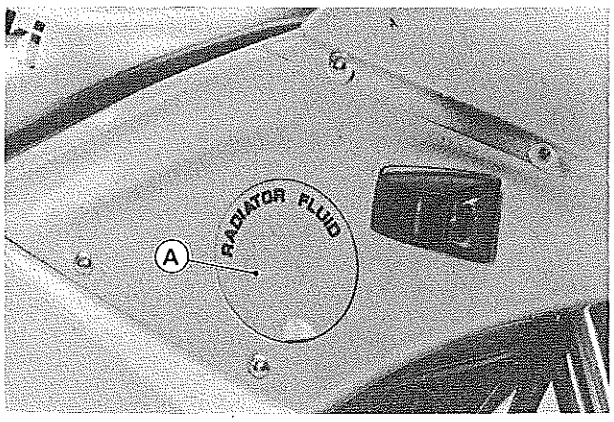
A. Hose Groove B. Mounting Bracket

- Fill the radiator up to the bottom of the radiator filler neck with coolant, and install the cap by turning it clockwise about ¼ turn while pushing it down.

Radiator Filler Neck



○A suitable coolant filler can be put into the fairing right side by removing the lid.



A. Lid

NOTE

○*Pour in the coolant slowly so that the air in the engine and radiator can escape.*
○*The radiator cap must be installed in two steps. First turn the cap clockwise to the first stop. Then push down on it and turn it the rest of the way.*

●Fill the reservoir tank up to the FULL mark with coolant, install the cap, and then bleed the system.

CAUTION

○**Soft or distilled water must be used with the antifreeze (see below for antifreeze) in the cooling system.**
○**If hard water is used in the system, it causes scales accumulation in the water passages, and considerably reduces the efficiency of the cooling system.**

NOTE

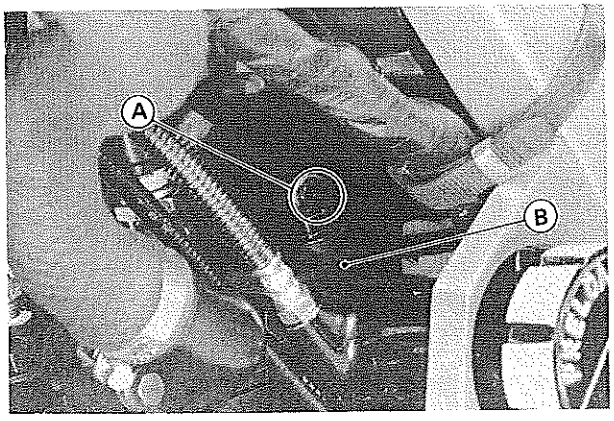
○*Choose a suitable mixture ratio by referring to the coolant manufacturer's directions.*

The coolant provided when shipping

Type	:	**Permanent type antifreeze for aluminum engine and radiator**
Color	:	**green**
Mixed ratio	:	**soft water 57%, coolant 43%**
Freezing point	:	**−30° (−22°F)**
Total amount	:	**1.8 L (up to "Full" mark)**

Air Bleeding

Before putting the motorcycle into operation, any air trapped in cooling system must be removed as follows.
●Remove the radiator cap.
●Loosen the air bleeder bolt on the top of the rear cylinder head.

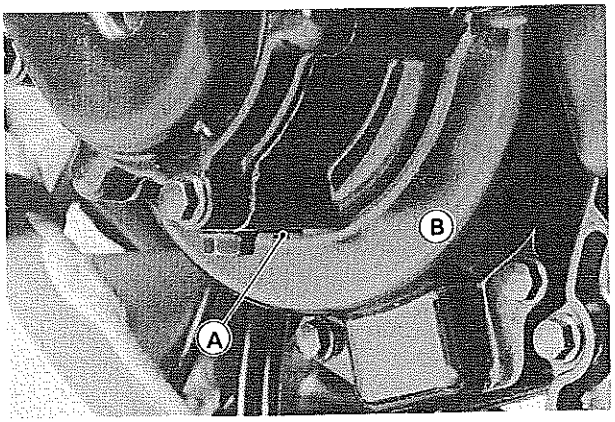


A. Air Bleeder Bolt B. Rear Cylinder Head

●Pour the coolant into the radiator until the coolant begins to flow out the air bleeder bolt hole (that is, all the remaining air forced out).
●Tighten the air bleeder bolt.
●Fill the radiator up to the radiator filler neck with coolant.
●Check the cooling system for leaks.
●Start the engine, warm it up thoroughly, and then stop it.
●Check the coolant level in the reservoir tank after the engine cools down.
★If the coolant level is low, add coolant up to the Full mark through the reservoir tank opening.

Visual Leak Inspection

Any time the system slowly loses water, insepct for leaks.
●Check the water pump body drainage outlet passage for coolant leaks.
★If the mechanical seal is damaged, the coolant leaks through the seal and drains through the passage. Disassemble the water pump and check the mechanical seal (see Mechanical Seal Inspection).
★If there are no apparent leaks, pressure test the system.



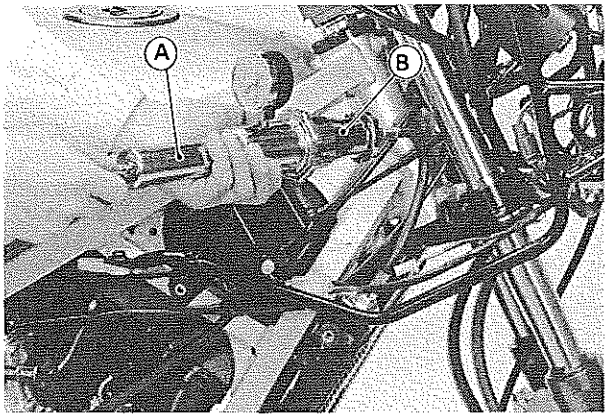
A. Drainage Outlet Passage B. Left Engine Cover

Cooling System Pressure Testing

CAUTION

○**During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure: 103 kPa (1.05 kg/cm², 15 psi).**

●Remove the radiator cap, and install a cooling system pressure tester on the radiator filler neck.
●Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.
●Build up pressure in the system carefully until the pressure reaches 103 kPa (1.05 kg/cm², 15 psi).
●Watch the gauge for at least 6 seconds. If the pressure holds steady, the system is all right.



A. Pressure Tester B. Adapter

- Remove the pressure tester, replenish the coolant, and install the radiator cap.

*If the pressure drops and no external source is found, check for internal leaks. Droplets in the engine oil indicate internal leakage. Check the cylinder head gasket, the water pump mechanical seal and oil seal.

Cooling System Flushing

Over a period of time, the cooling system accumulates rust, scale, and lime in the water jacket and radiator. When this accumulation is suspected or observed, flush the cooling system. If this accumulation is not removed, it will clog up the water passage and considerably reduce the efficiency of the cooling system.

- Drain the cooling system.
- Fill the cooling system with fresh water mixed with a flushing compound.

CAUTION

○**Do not use a flushing compound which is harmful to the aluminum engine and radiator. Carefully follow the instructions supplied by the manufacturer of the cleaning product.**

- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system.
- Fill the system with fresh water.
- Warm up the engine and drain the system.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant, and bleed the air from the system.

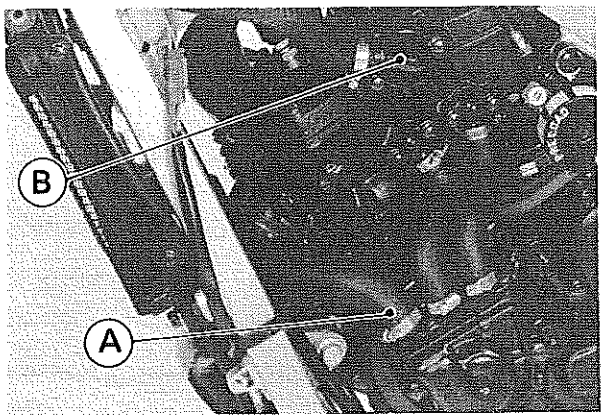
Disassembly and Assembly Precautions

- Prior to disassembly of cooling system parts (radiator, thermostat, pump, sensor, etc), wait until coolant cools down and drain coolant.
- After assembling and filling the system with coolant, bleed the air from the system.

Radiator

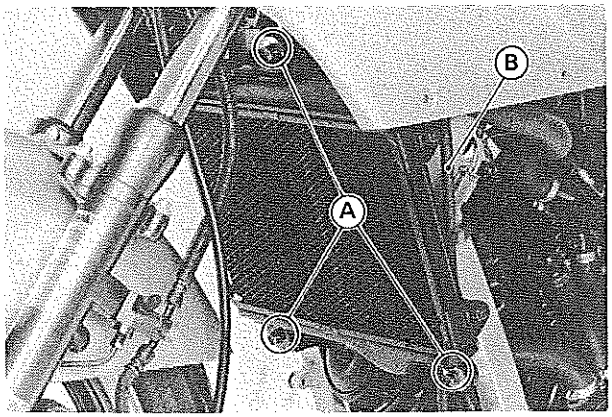
Radiator Removal

- Remove the fairings (see Fairing Removal in Frame).
- Separate the radiator hose from the cylinder head by removing the thermostat cover.
- Remove the hose clamp and radiator hose from the left engine cover.



A. Hose Clamp and Radiator Hose
B. Thermostat Cover

- Remove the reservoir tank hose end at the radiator.
- Remove the radiator mounting bolts (3).
- Remove the radiator taking care not to damage the radiator core.



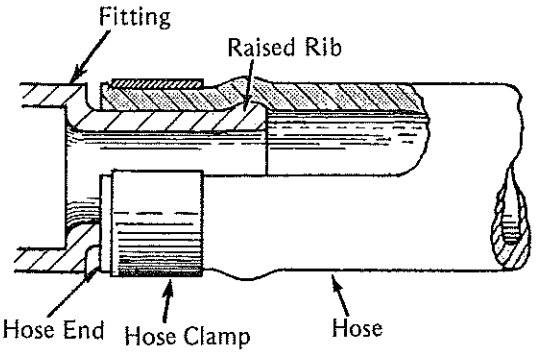
A. Radiator Mounting Bolts B. Reservoir Tank Hose

Radiator Hose, Reservoir Tank Hose Installation Note

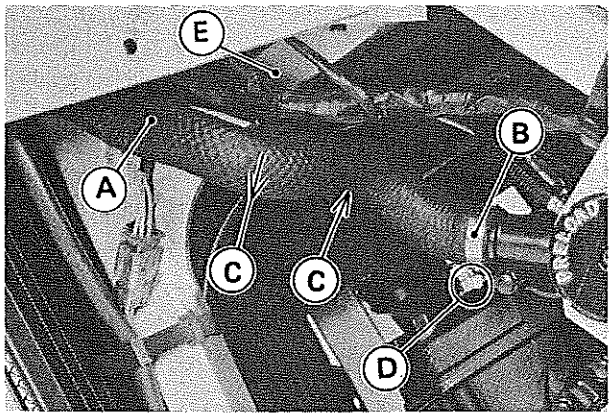
- Install the radiator hoses being careful to follow bending direction. (see Exploded Views). Avoid sharp bending, kinking, flattening, or twisting.

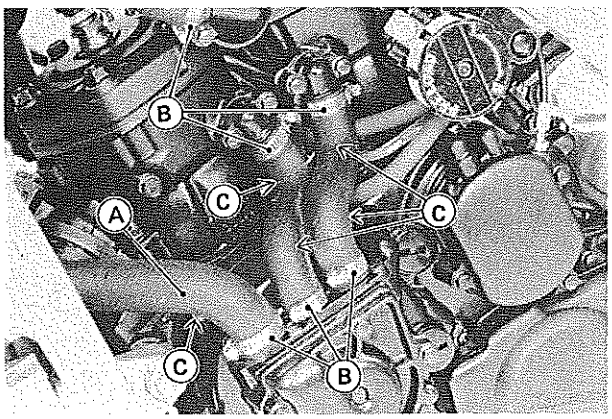
- Insert the hoses onto fittings completely.
- Install the clamps as near as possible to the end of the hose to clear the fitting raised rib. This will prevent the hoses from working loose.

Hose and Clamp Installation



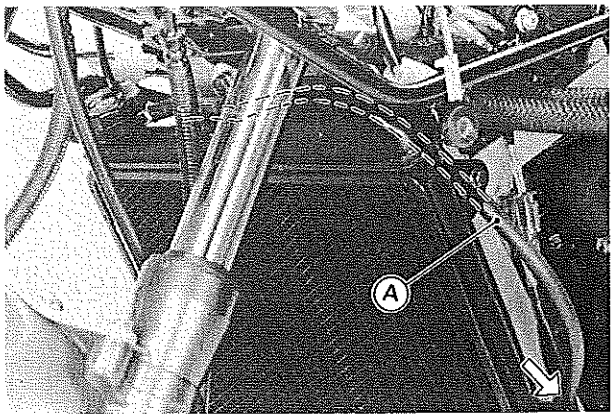
- Tighten the hose clamp securely.
- Install the hose clamp at the thermostat cover so that the clamp screw is below the hose for spark plug removal convenience.
- Keep the upper radiator hose about **10 mm** away from the frame.





A. Radiator Hose
B. Clamp
C. Bend
D. Hose Clamp Screw
E. Frame

- Route the reservoir tank hose as shown.



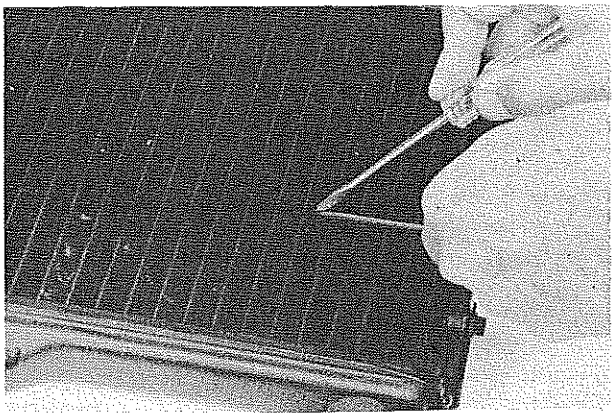
A. Reservoir Tank Hose

Radiator Hose, Reservoir Tank Hose Inspection

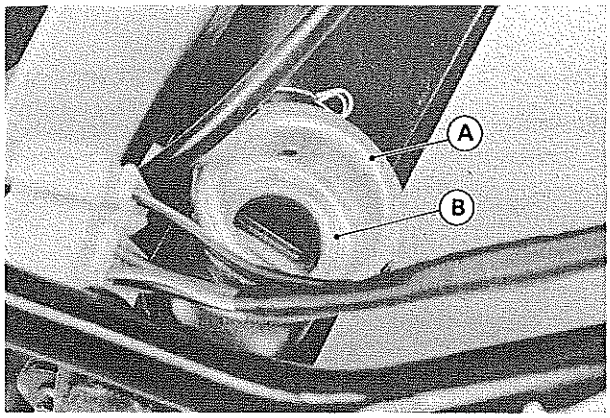
- In accordance with the Periodic Maintenance Chart, visually inspect the hoses for signs of deterioration. Squeeze the hose. A hose should not be hard and brittle, nor should it be soft or swollen.
- Replace any damaged hose.
- Retighten the hose clamps.

Radiator Inspection

- Check the radiator core.
- ★If there are obstructions to air flow, remove them.
- ★If the corrugated fins are deformed, carefully straighten them with the blade of a thin screw driver.



- ★If the air passages of the radiator core are blocked more than 20% by unremovable obstructions or irreparably deformed fins, replace the radiator with a new one.
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats in the filler neck. They must be smooth and clean for the radiator cap to function properly.

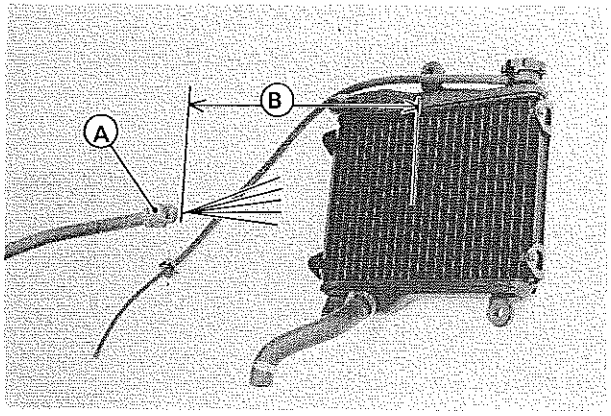


A. Top Sealing Seat B. Bottom Sealing Seat

Radiator Cleaning Note

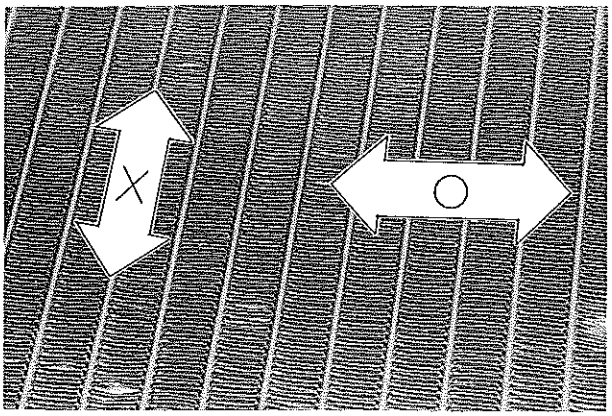
When cleaning the radiator with a steam cleaner, be careful of the followings to prevent radiator damage.

- Keep the steam gun more than **50 cm** away from the radiator core.



A. Steam Gun B. More than 50 cm

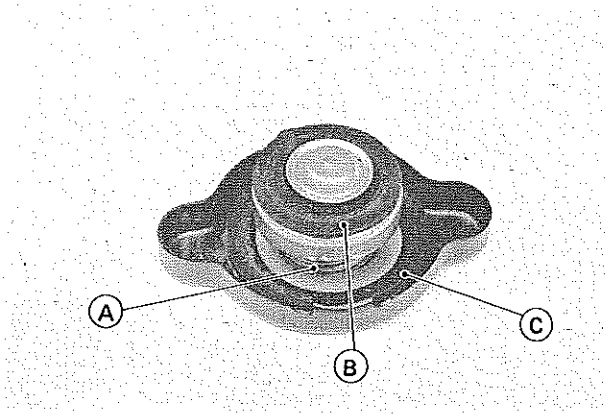
- Run the gun horizontally following the core fin direction holding it perpendicular to the core surface.



Radiator Cap Inspection

- Check the condition of the valve spring, and the top and bottom valve seals of the radiator cap.

★If any one of them shows visible damage, replace the cap.



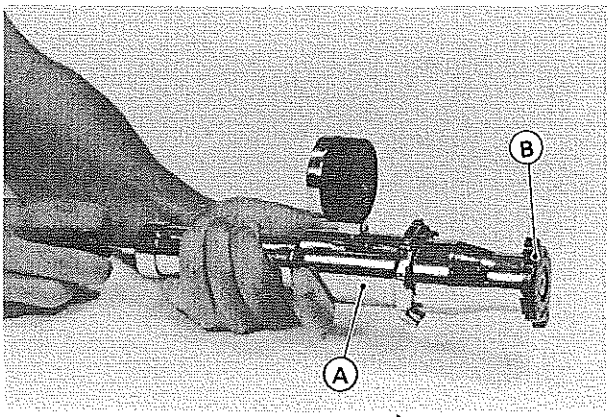
A. Valve Spring C. Top Seal
B. Bottom Seal

- Wet the cap sealing surfaces with water or coolant to prevent pressure leaks. Install the cap on a cooling pressure tester.
- Watching the gauge, pump the tester to build up the pressure. The cap must retain the pressure for at least 6 seconds. Also the cap must open at the pressure shown in the table.

Radiator Cap Relief Pressure

73.5 – 103 kPa
(0.75 – 1.05 kg/cm^2, 11 – 15 psi)

★If the cap cannot hold the specified pressure, or if it holds too much pressure, replace it with a new one.

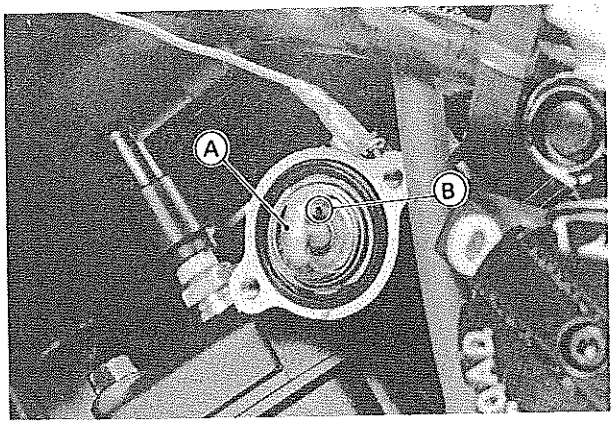


A. Pressure Tester B. Radiator Cap

Thermostat

Thermostat Installation Note

- Install the thermostat so that the air bleeder hole is on top with the engine installed in the frame.

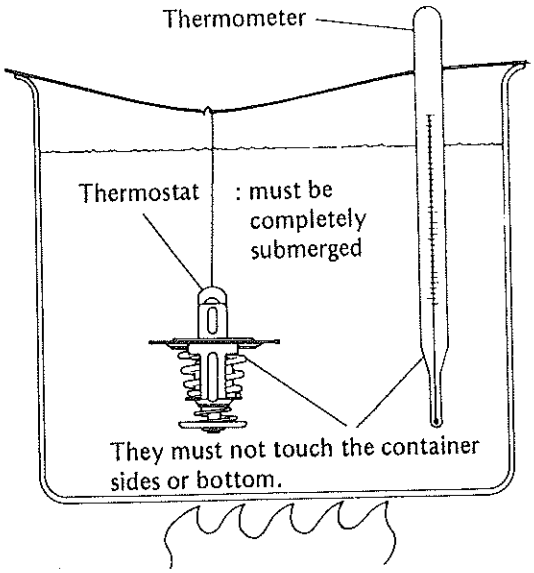


A. Thermostat B. Air Bleeder Hole

Thermostat Inspection

- Remove the thermostat, and inspect the thermostat valve at room temperature.
- ★If the valve is open, replace the valve with a new one.
- To check valve opening temperature, suspend the thermostat and an accurate thermometer in a container of water.
- Place the container over a source of heat and gradually raise the temperature of the water while stirring the water gently.

Valve Opening Temperature Measurement



- Watch the valve. As soon as the valve starts to open, note the temperature.
- ★If it is out of the service limit range, replace the thermostat.

Thermostat Valve Opening Temperature

63.5 – 66.5°C (146 – 152°F)

Water Temperature Sensor

Removal Caution

CAUTION

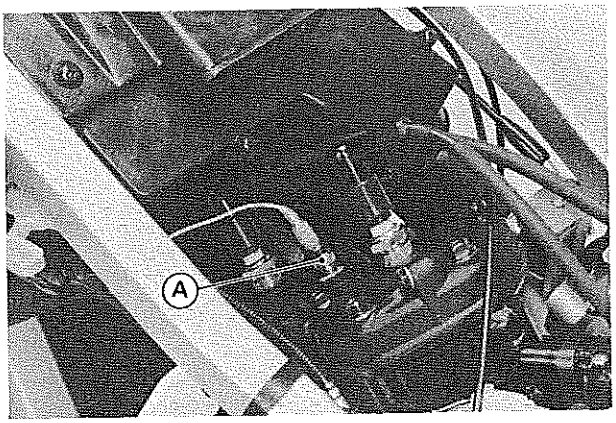
- **The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to these parts can damage them.**

Installation Note

- Apply a liquid gasket compound to the threads before mounting the sensor.
- Tighten the sensor to the specified torque (see Exploded Views).

Inspection

Refer to the Electrical System chapter.

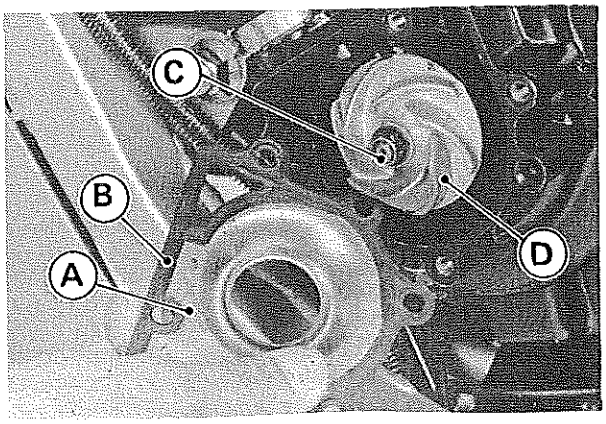


A. Water Temperature Sensor

Water Pump, Mechanical Seal

Pump Cover Removal

- Remove the pump housing.



A. Pump Housing
B. Rubber Coating
C. Nut
D. Impeller

Pump Housing Inspection

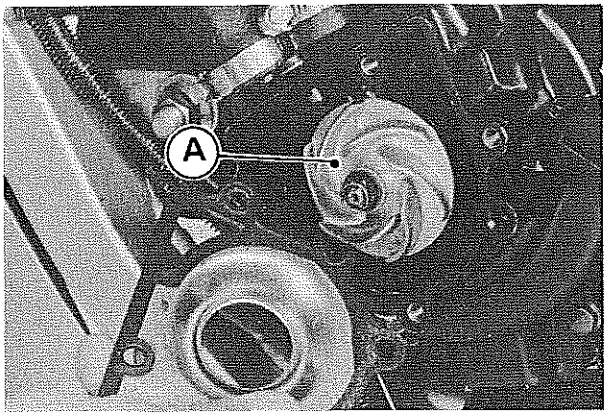
●Visually inspect the rubber coating on the pump housing.

★If the coating has any signs of separation, or other damage, replace the pump housing.

Pump Impeller Inspection

●Visually check the impeller.

★If the surface is corroded, or if the blades are damaged, replace the water pump impeller and O-ring.



A. Impeller

Pump Impeller Removal/Installation Note

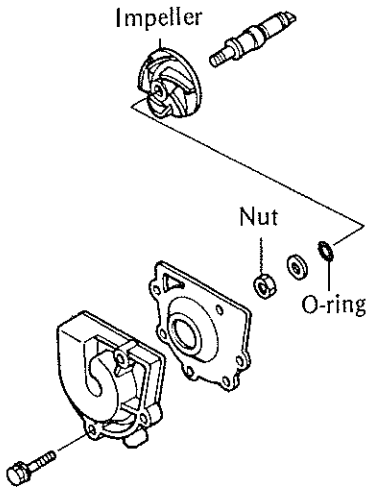
CAUTION

○**The impeller has an O-ring. Turn the impeller clockwise during installation, and counterclockwise during removal. This is to prevent impeller O-ring damage by the shaft threads.**

●Remove the impeller by taking off the nut.

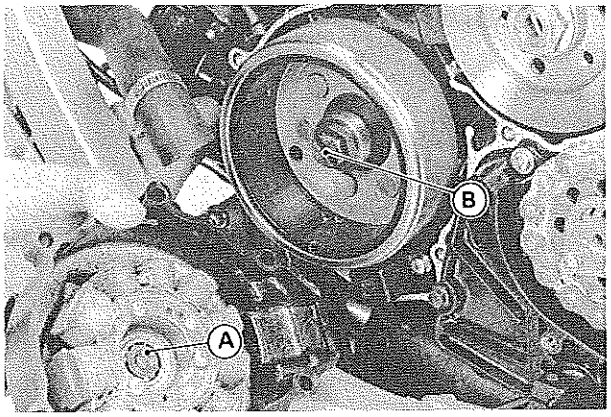
●Tighten the nut to the specified torque.

Water Pump Impeller



Water Pump Installation Note

●When installing the water pump, note the position of the magneto bolt slot and turn the water pump shaft so that the projection fits into the slot.



A. Water Pump Shaft Projection
B. Magneto Bolt Slot

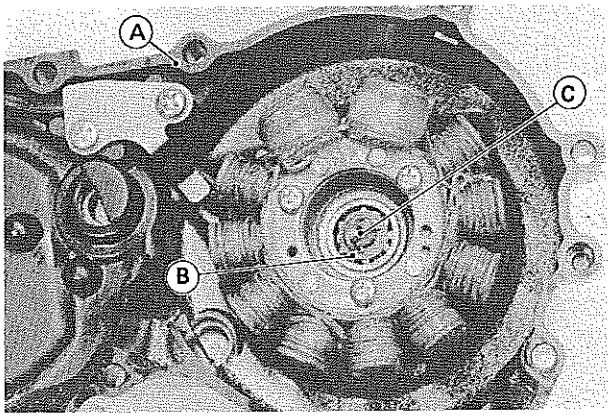
Water Pump Disassembly

NOTE

○***Do not remove the impeller, only the left engine cover for water pump disassembly.***

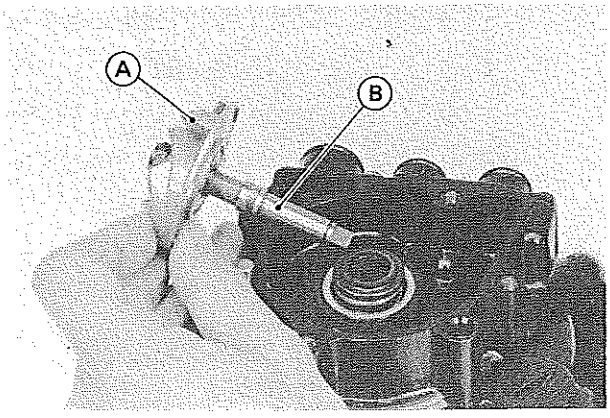
●Remove the left engine cover (see Left Engine Cover Removal in Electrical System).

●Remove the circlip and the washer.



A. Left Engine Cover
B. Circlip and Washer
C. Water Pump Shaft

●Remove the water pump shaft and impeller by tapping the shaft lightly.

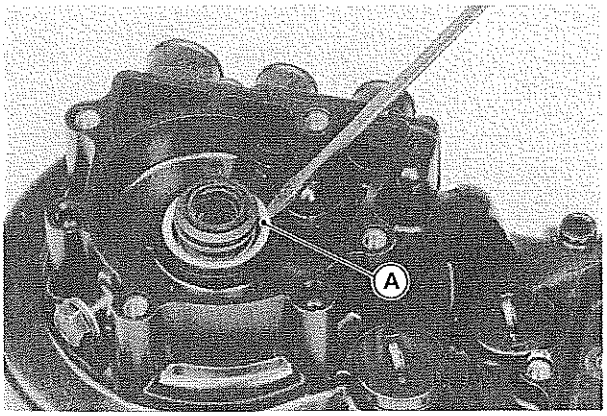


A. Water Pump Impeller
B. Shaft

CAUTION

○**Be careful not to damage the sealing surface of the mechanical seal.**

●Pull the mechanical seal out of the left engine cover with a sharp hook, after prying the flange off.
●Pull out the oil seal with a sharp hook.



A. Flange

CAUTION

○**Replace the mechanical seal and the oil seal with new ones.**

Water Pump Assembly Note

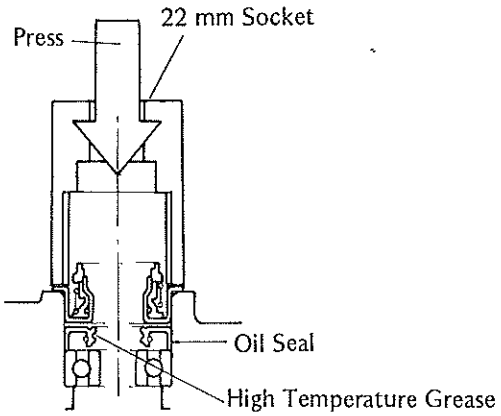
●Apply high temperature grease and install the oil seal as shown.

NOTE

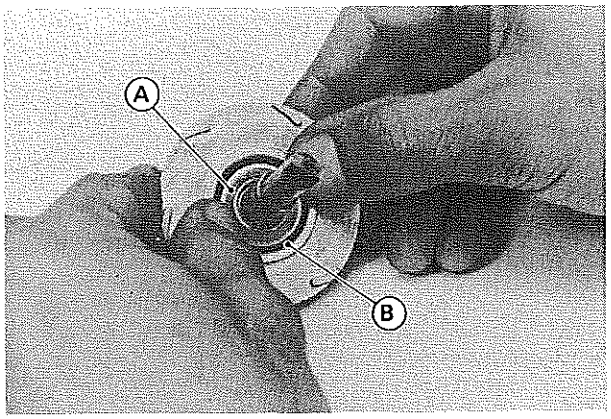
○*Since the replacement mechanical seal has an adhesive coated body, do not apply a liquid gasket to the exterior surface of the body.*

●Press the seal body into the hole by using a 22 mm socket until it stops at the bottom surface of the engine cover.

Mechanical Seal Assembly



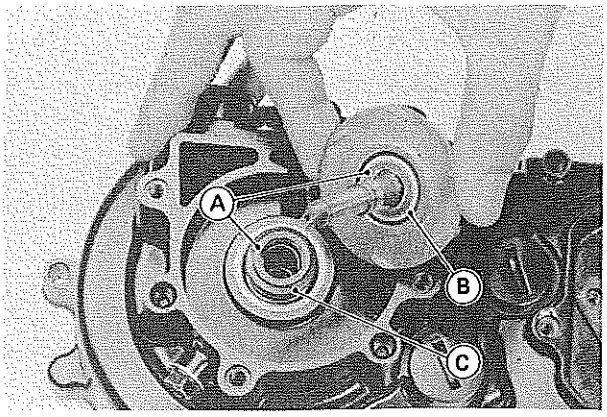
●Clean the sliding surface of the mechanical seal with a high flash-point solvent, and apply a little coolant to the sliding surface to give the mechanical seal initial lubrication.
●After applying coolant to the surfaces of the rubber seal and sealing seat, install the seal and seat into the impeller with finger pressure until they bottom out.



A. Sealing Seat
B. Rubber Seal

Mechanical Seal Inspection

●Visually inspect the mechanical seal.
★If any one of the parts is damaged, replace the mechanical seal as a unit.
○The sealing seat and rubber seal may be removed easily by hand



A. Impeller Sealing Seat Surface
B. Rubber Seal
C. Mechanical Seal Diaphragm