

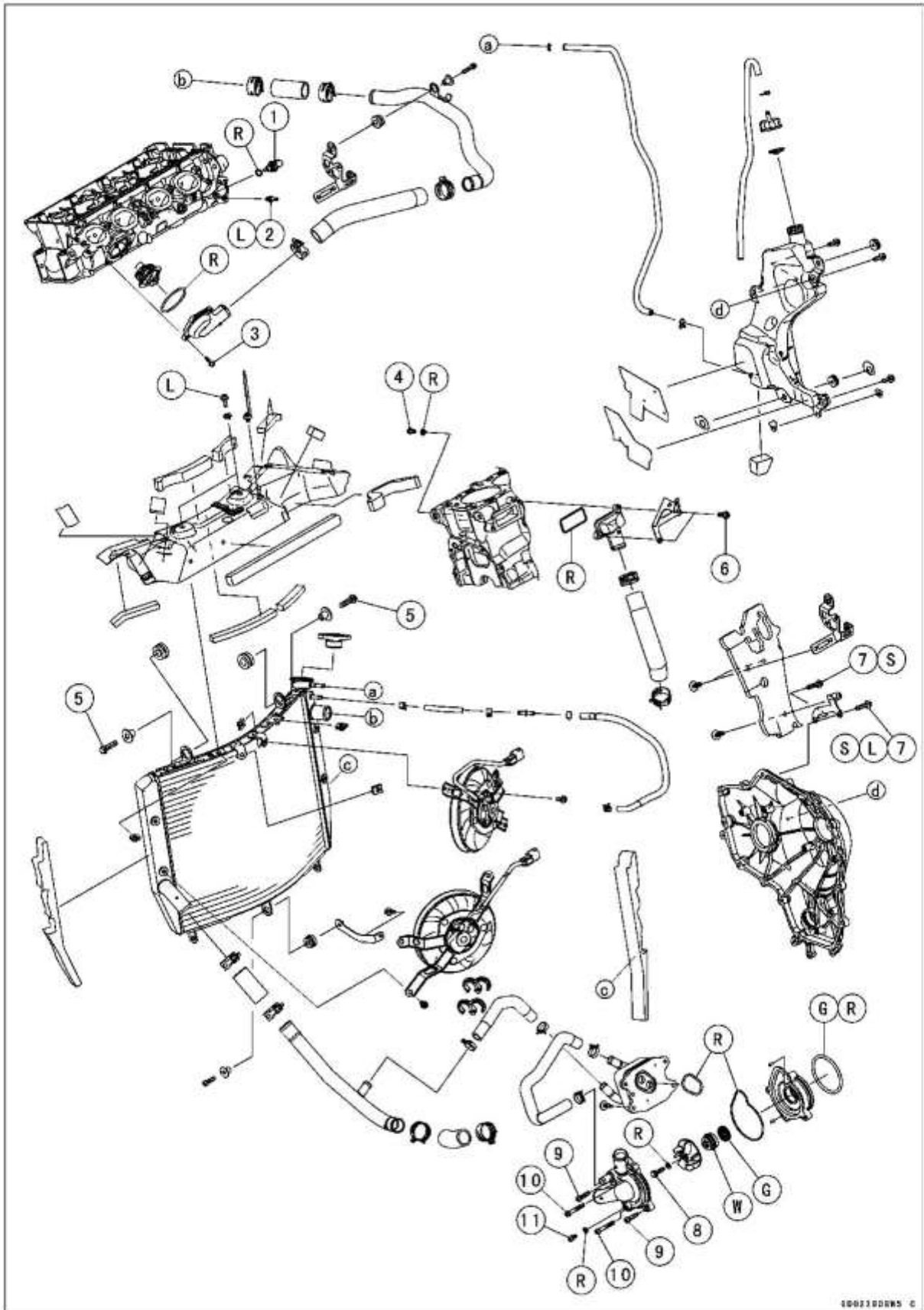
Cooling System

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4-2 COOLING SYSTEM

Exploded View



Exploded View

No.	Fastener	Torque			Remarks
		N·m	kgf·m	ft·lb	
1	Water Temperature Sensor	12	1.2	106 in·lb	
2	Water Hose Fitting	10	1.0	89 in·lb	L
3	Thermostat Housing Bolts	6.0	0.61	53 in·lb	
4	Coolant Drain Bolt (Cylinder)	10	1.0	89 in·lb	
5	Upper Radiator Mounting Bolts	15	1.5	11	
6	Water Hose Fitting Cover Bolts	10	1.0	89 in·lb	
7	Clutch Cover Bolts	12	1.2	106 in·lb	L (1), S
8	Water Pump Impeller Bolt	10	1.0	89 in·lb	
9	Water Pump Cover Bolts (L = 25 mm)	10	1.0	89 in·lb	
10	Water Pump Cover Bolts (L = 40 mm)	10	1.0	89 in·lb	
11	Coolant Drain Bolt	10	1.0	89 in·lb	

G: Apply grease.

L: Apply a non-permanent locking agent.

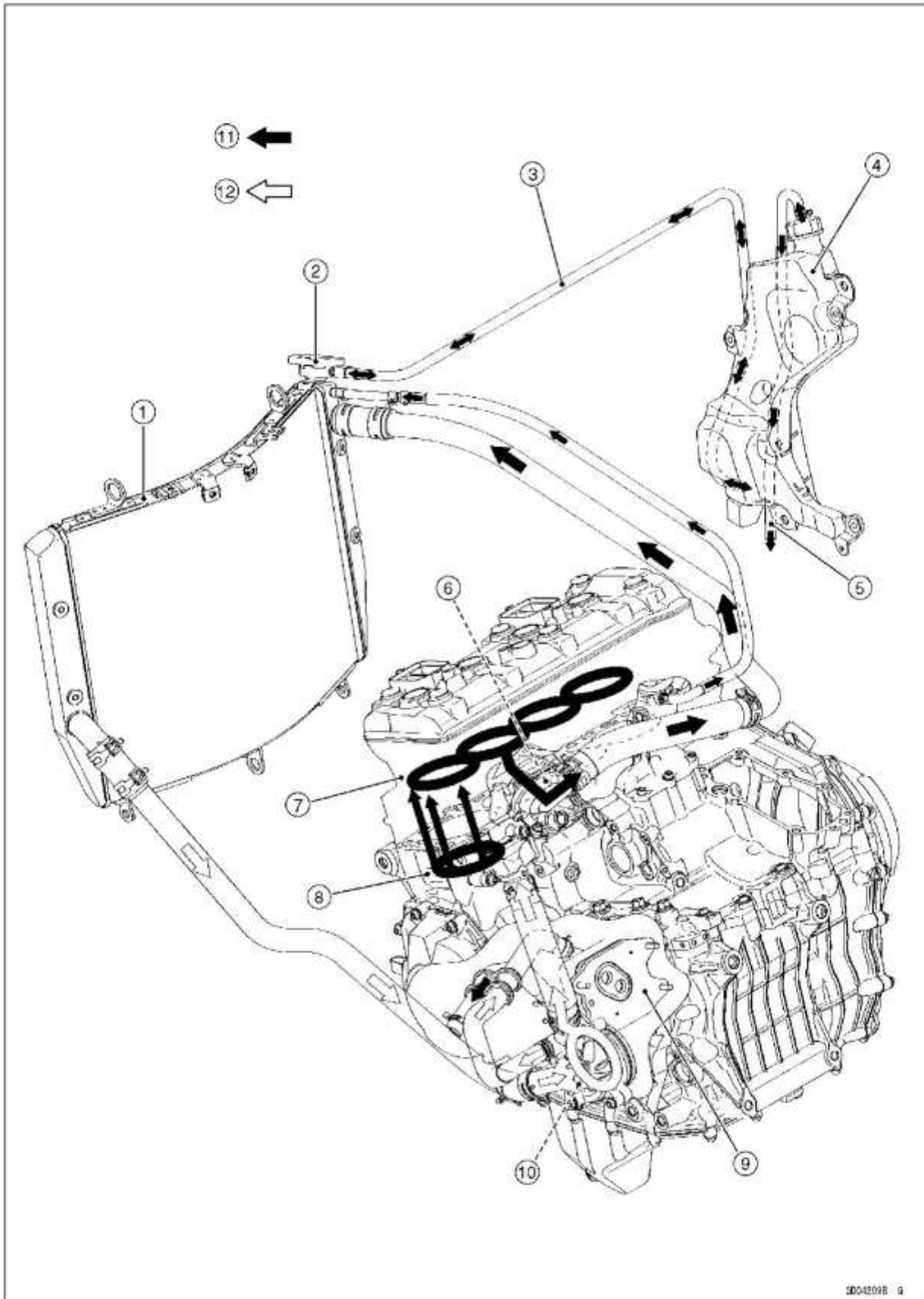
R: Replacement Parts

S: Follow the specified tightening sequence.

W: Apply water.

4-4 COOLING SYSTEM

Coolant Flow Chart



Coolant Flow Chart

1. Radiator
2. Radiator Cap
3. Radiator Overflow Hose
4. Reserve Tank
5. Reserve Tank Overflow Hose
6. Thermostat
7. Cylinder Head Water Jacket
8. Cylinder Water Jacket
9. Oil Cooler
10. Water Pump
11. Hot Coolant
12. Cold Coolant

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Coolant Flow Chart

Permanent type antifreeze is used as a coolant to protect the cooling system from rust and corrosion. When the engine starts, the water pump turns and the coolant circulates.

The thermostat is a wax pellet type which opens or closes with coolant temperature changes. The thermostat continuously changes its valve opening to keep the coolant temperature at the proper level. When coolant temperature is less than 55°C (131°F), the thermostat closes so that the coolant flow is restricted through the air bleeder hole, causing the engine to warm up more quickly. When coolant temperature is more than 58 ~ 62°C (136 ~ 144°F), the thermostat opens and the coolant flows.

When the coolant temperature goes up beyond 100°C (212°F), the radiator fan relay conducts to operate the radiator fan. The radiator fan draws air through the radiator core when there is not sufficient air flow such as at low speeds. This increases up the cooling action of the radiator. When the coolant temperature is below 97.5°C (208°F), the fan relay opens and the radiator fan stops.

In this way, this system controls the engine temperature within narrow limits where the engine operates most efficiently even if the engine load varies.

The system is pressurized by the radiator cap to suppress boiling and the resultant air bubbles which can cause engine overheating. As the engine warms up, the coolant in the radiator and the water jacket expands. The excess coolant flows through the radiator cap and hose to the reserve tank to be stored there temporarily. Conversely, as the engine cools down, the coolant in the radiator and the water jacket contracts, and the stored coolant flows back to the radiator from the reserve tank.

The radiator cap has two valves. One is a pressure valve which holds the pressure in the system when the engine is running. When the pressure exceeds 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi), the pressure valve opens and releases the pressure to the reserve tank. As soon as pressure escapes, the valve closes, and keeps the pressure at 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi). When the engine cools down, another small valve (vacuum valve) in the cap opens. As the coolant cools, the coolant contracts to form a vacuum in the system. The vacuum valve opens and allows the coolant from the reserve tank to enter the radiator.

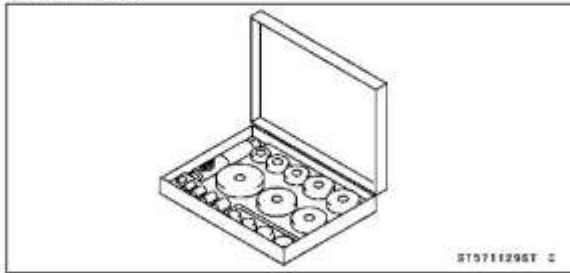
Specifications

Item	Standard
Coolant Provided when Shipping Type (Recommended) Color Mixed Ratio Freezing Point Total Amount	Permanent type of antifreeze (soft water and ethylene glycol plus corrosion and rust inhibitor chemicals for aluminum engines and radiators) Green Soft water 50%, coolant 50% -35°C (-31°F) 2.9 L (3.1 US qt) (Reserve tank full level, including radiator and engine)
Radiator Cap Relief Pressure	107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm ² , 15.6 ~ 19.9 psi)
Thermostat Valve Opening Temperature Valve Full Opening Lift	58 ~ 62°C (136 ~ 144°F) 8 mm (0.31 in.) or more @75°C (167°F)

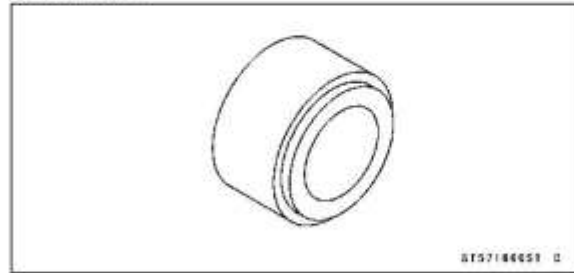
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Special Tools

Bearing Driver Set:
57001-1129



Oil Seal Driver $\phi 37.5$:
57001-1660



Coolant

Coolant Deterioration Inspection

- Visually inspect the coolant in the reserve tank [A].
- ★ 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, check for a cooling system leak. It may be caused by exhaust gas leaking into the cooling system.



Coolant Level Inspection

- Refer to the Coolant Level Inspection (see [Coolant Level Inspection\(2-26\)](#)).

Coolant Draining

- Refer to the Coolant Change (see [Coolant Change\(2-28\)](#)).

Coolant Filling

- Refer to the Coolant Change (see [Coolant Change\(2-28\)](#)).

Pressure Testing

- Inspect the radiator filler neck (see [Radiator Filler Neck Inspection\(4-19\)](#)).
- Install a cooling system pressure tester [A] on the filler neck.

NOTE

○ *Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.*

- Build up pressure in the system carefully until the pressure reaches 137.3 kPa (1.40 kgf/cm², 19.9 psi).



NOTICE

During pressure testing, do not exceed the pressure for which the system is designed. The maximum pressure is 137.3 kPa (1.40 kgf/cm², 19.9 psi).

- Watch the gauge for at least 6 seconds.
- ★ If the pressure holds steady, the system is all right.
- ★ 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 and the water pump.
- Remove the pressure tester, replenish the coolant, and install the radiator cap.
- Install the right lower fairing (see [Lower Fairing Installation\(15-16\)](#)).

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Coolant

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 coolant passage and considerably reduce the efficiency of the cooling system.

- Drain the cooling system (see [Coolant Change\(2-28\)](#)).
- Fill the cooling system with fresh water mixed with a flushing compound.

NOTICE

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.

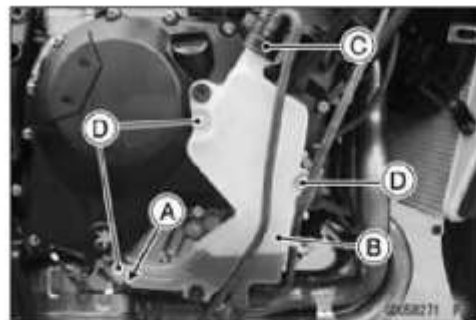
- Warm up the engine, and run it at normal operating temperature for about ten minutes.
- Stop the engine, and drain the cooling system after cooling the engine.
- Fill the system with fresh water.
- Warm up the engine, and drain the cooling system after cooling the engine.
- Repeat the previous two steps once more.
- Fill the system with a permanent type coolant and bleed the air from the system (see [Coolant Change\(2-28\)](#)).

Coolant Reserve Tank Removal

- Remove the right lower fairing (see [Lower Fairing Removal\(15-14\)](#)).
- Disconnect the water hose [A].



- Remove the clamp [A] from the coolant reserve tank [B].
- Remove:
 - Coolant Reserve Tank Cap [C]
 - Bolts [D]
 - Coolant Reserve Tank
- Pour the coolant into a container.



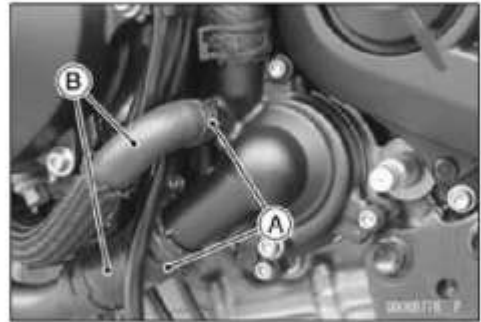
Coolant Reserve Tank Installation

- Installation is the reverse of removal.
- Run the hoses correctly (see [Cable, Wire, and Hose Routing section \(18-2\)](#)).
- Fill the coolant reserve tank with the coolant (see [Coolant Change\(2-28\)](#)).

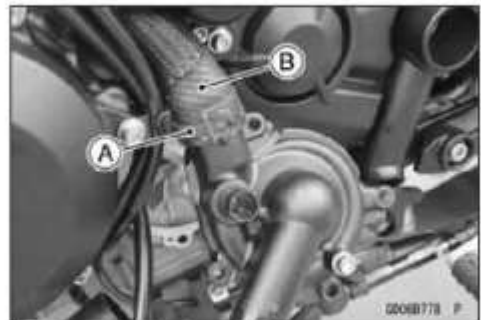
Water Pump

Water Pump Removal

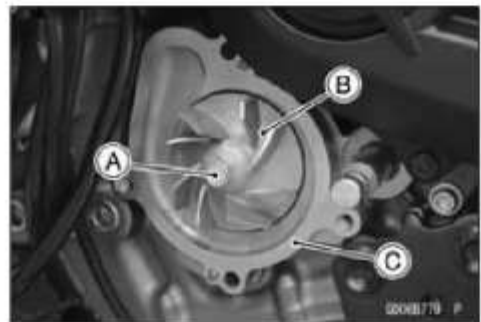
- Situate the motorcycle so that it is perpendicular to the ground to prevent from dropping out the oil pump parts.
- Drain:
Coolant (see [Coolant Change\(2-28\)](#))
Engine Oil (see [Engine Oil Change\(2-40\)](#))
- Remove:
Left Lower Fairing (see [Lower Fairing Removal\(15-14\)](#))
Shift Lever (see [Shift Pedal Removal\(9-48\)](#))
- Slide the clamps [A], and disconnect the water hoses [B].
- Remove the water pump cover bolts [A].



- Slide the clamp [A], and disconnect the water hose [B].



- Remove:
Water Pump Impeller Bolt [A] and Washer
Water Pump Impeller [B]
Water Pump Housing [C]



Water Pump Installation

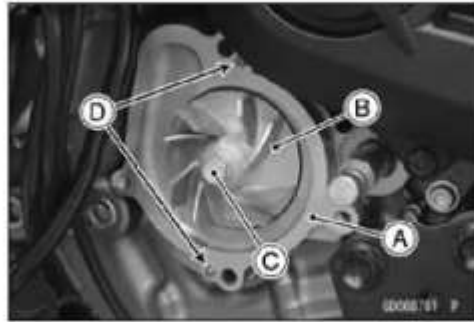
- Check that the oil pump is installed correctly.
- Replace the O-ring [A] with a new one.
- Apply grease to the O-ring, and install it.



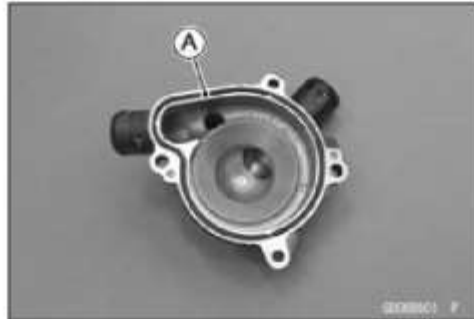
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Water Pump

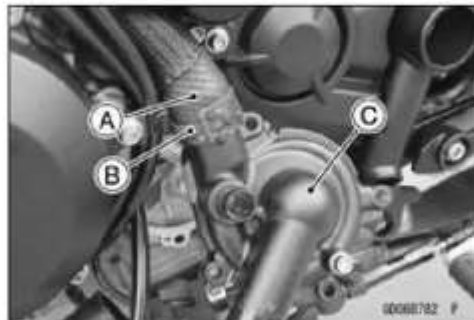
- Install:
 - Water Pump Housing [A]
 - Water Pump Impeller [B]
- Replace the washer with a new one, and install it.
- Tighten:
 - Torque - Water Pump Impeller Bolt [C]: 10 N·m (1.0 kgf·m, 89 in·lb)**
- Be sure to install the dowel pins [D].



- Replace the O-ring [A] with a new one, and install it.



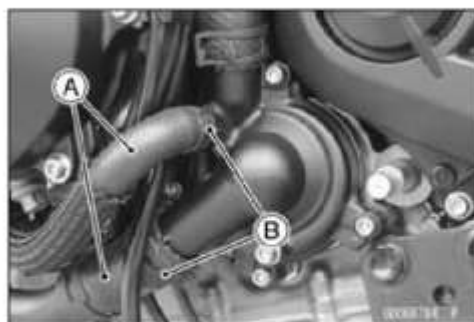
- Install the water hose [A] and clamp [B] to the water pump cover [C] (see Cable, Wire, and Hose Routing section (18-2)).



- Install:
 - Water Pump Cover [A]
 - Water Pump Cover Bolts (L = 25 mm) [B]
 - Water Pump Cover Bolts (L = 40 mm) [C]
- Tighten:
 - Torque - Water Pump Cover Bolts: 10 N·m (1.0 kgf·m, 89 in·lb)**



- Install the water hoses [A] and clamps [B] (see Cable, Wire, and Hose Routing section (18-2)).
- Install the removed parts.



Water Pump

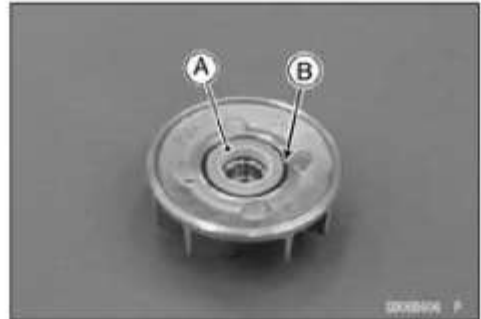
Water Pump Inspection

- Check the drainage outlet passage [A] at the bottom of the water pump housing for coolant leaks.
- If a coolant leak or ooze is found, start the engine and check if the coolant leaks continuously.
- When coolant does not continuously leak, it is normal.
- ★ If the mechanical seal is damaged, the coolant continuously leaks through the drainage outlet passage. Replace the mechanical seal unit.
- ★ If the oil seal is damaged, engine oil leaks through the drainage outlet passage. Replace the oil seal.



Water Pump Impeller Disassembly/Assembly

- Remove the water pump impeller (see [Water Pump Removal\(4-11\)](#)).
- The sealing seat [A] and rubber seal [B] may be removed easily by hand.
- Apply water or coolant around the surfaces of the rubber seal and sealing seat.
- Install the rubber seal and sealing seat into the impeller by pressing them by hand until the seat stops at the bottom of the hole.
- Install the water pump impeller (see [Water Pump Installation\(4-11\)](#)).



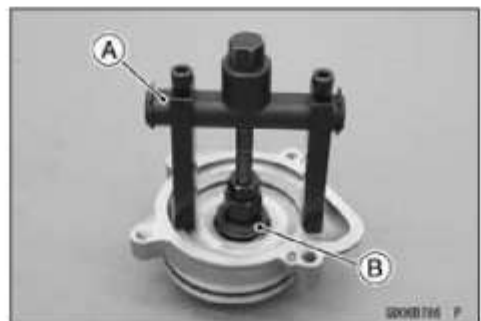
Water Pump Impeller Inspection

- Remove the water pump cover (see [Water Pump Removal\(4-11\)](#)).
- Visually inspect the water pump impeller [A].
- ★ If the surface is corroded or if the blades are damaged, replace the water pump impeller.



Water Pump Housing Disassembly

- Remove the water pump housing (see [Water Pump Removal\(4-11\)](#)).
- Using suitable tool [A], remove the mechanical seal [B] and oil seal from the water pump body.



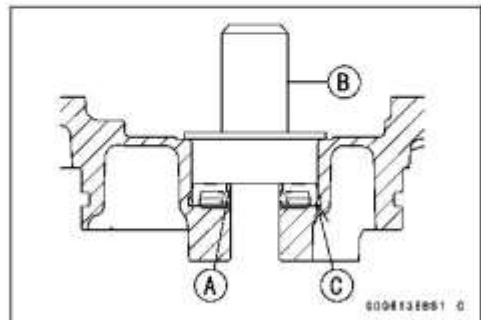
Water Pump Housing Assembly

NOTICE

Do not reuse the mechanical seal and oil seal.

- Apply grease to the oil seal lips [A].
- Press the new oil seal into the housing with a bearing driver [B] until it stops at the bottom surface [C] of the housing.

Special Tool - Bearing Driver Set: 57001-1129



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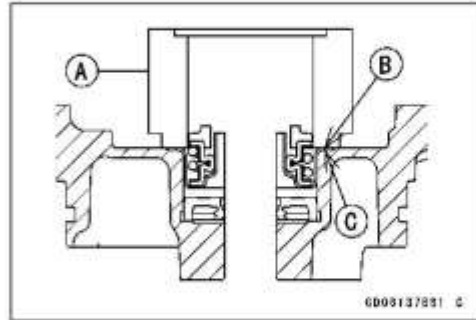
Water Pump

NOTICE

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

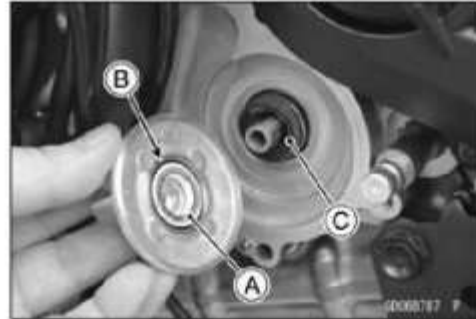
- Press the new mechanical seal into the housing with the oil seal driver [A] until its flange [B] touches the surface [C] of the housing.

Special Tool - Oil Seal Driver $\phi 37.5$: 57001-1660



Mechanical Seal Inspection

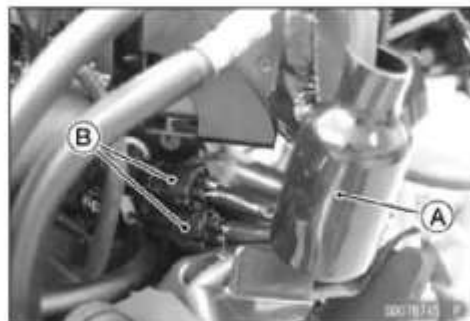
- Remove the water pump impeller (see [Water Pump Removal\(4-11\)](#)).
- Visually inspect the mechanical seal.
- ★ If any one of the parts is damaged, replace the mechanical seal as a unit.
 - Impeller Sealing Seat Surface [A]
 - Rubber Seal [B]
 - Mechanical Seal [C]



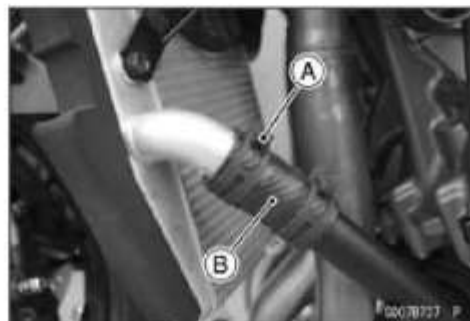
Radiator

Radiator and Radiator Fan Removal

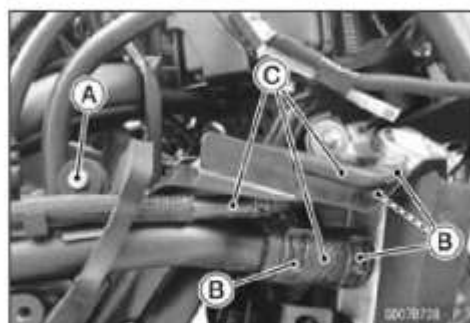
- Drain the coolant (see [Coolant Change\(2-28\)](#)).
- Remove:
 - Right Lower Fairing (see [Lower Fairing Removal\(15-14\)](#))
 - Rear Intake Duct (see [Intake Duct Removal\(15-23\)](#))
- Slide the dust cover [A], and disconnect the radiator fan motor lead connectors [B].



- Slide the clamp [A], and disconnect the water hose [B].



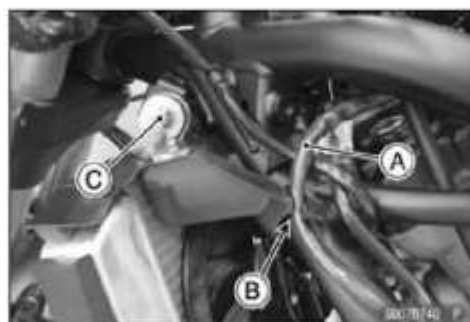
- Remove the water pipe bolt [A].
- Slide the clamps [B], and disconnect the water hoses [C].



- Remove the lower radiator mounting bolt [A].



- Clear the regulator/rectifier lead (to alternator) lead [A] from the slit [B].
- Remove the upper radiator mounting bolt [C] (both sides).



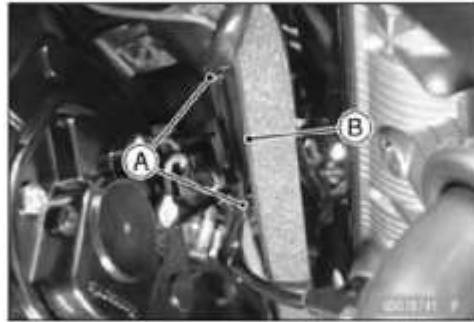
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Radiator

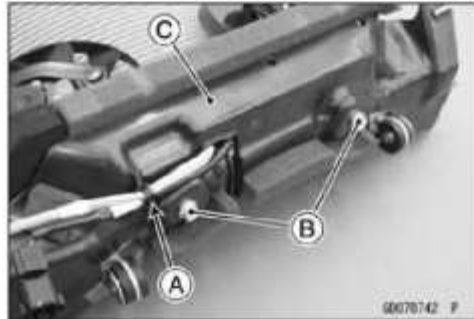
- Clear the camshaft position sensor lead clamps [A] from the radiator cover [B], and remove the radiator.

NOTICE

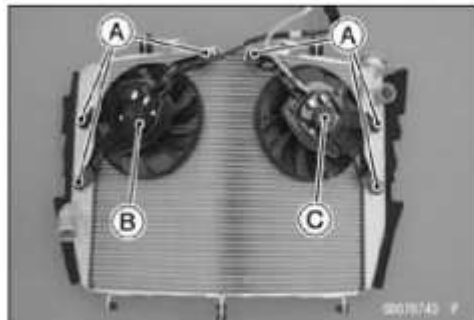
Do not touch the radiator core. This could damage the radiator fins, resulting in loss of cooling efficiency.



- Open the band [A].
- Remove:
 - Radiator Cover Bolts [B]
 - Collars
 - Radiator Cover [C]



- Remove:
 - Radiator Fan Bolts [A]
 - Left Radiator Fan [B]
 - Right Radiator Fan [C]

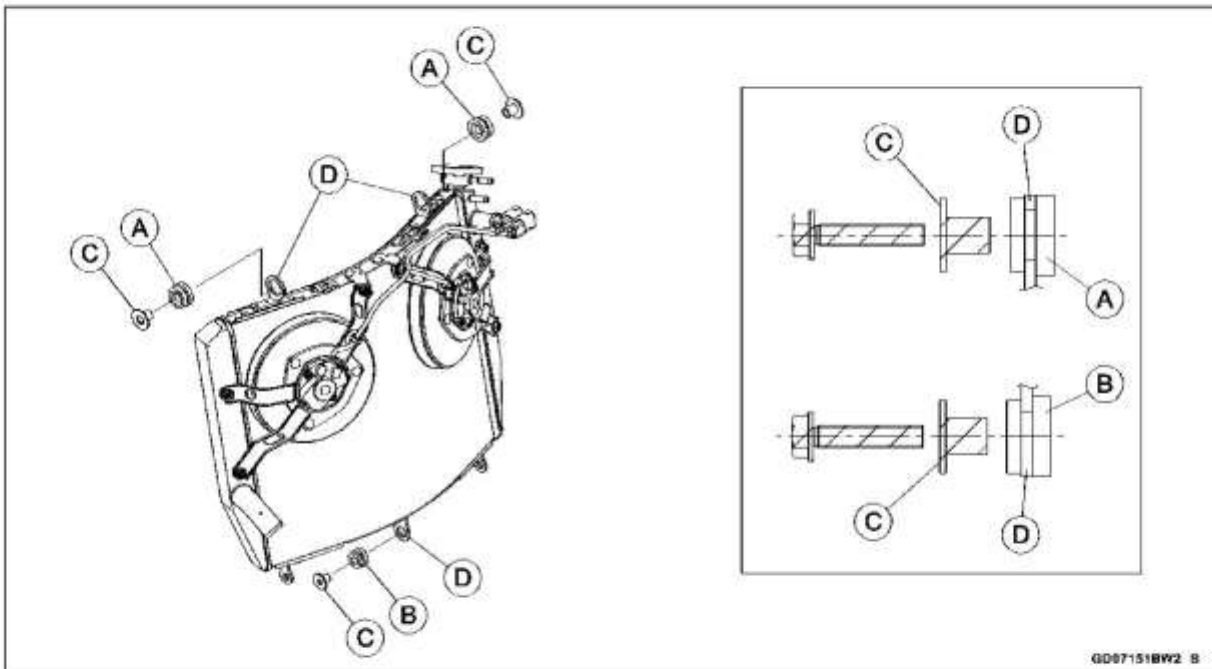


Radiator and Radiator Fan Installation

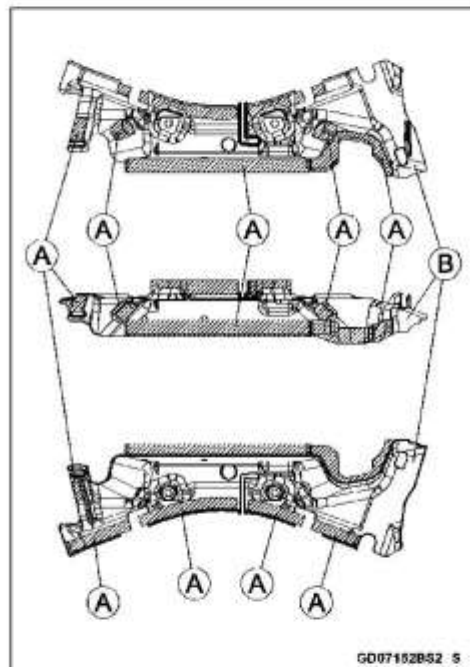
- Installation is the reverse of removal.
- Apply a non-permanent locking agent to the threads of the radiator cover bolts.

Radiator

- Install the rubber dampers [A], [B] and collars [C] as shown.
- Make sure that the dampers have been fitted in the brackets [D].
- Face the large diameter side of the damper to the collar.



- Check that the pads [A] are in place on the radiator cover [B].
- ★ If the pads are damaged or deteriorated, replace them.
- Apply a non-permanent locking agent to the threads of the radiator cover bolts.
- Install the collars and tighten the radiator cover bolts.



- Tighten the upper and lower radiator mounting bolts.
Torque - Upper Radiator Mounting Bolts: 15 N·m (1.5 kgf·m, 11 ft·lb)

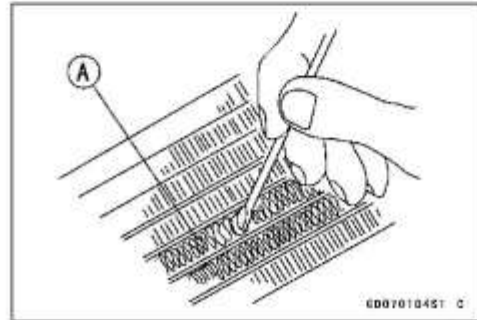
4-18 COOLING SYSTEM

Radiator

- Run the radiator fan motor leads and regulator/rectifier lead (to alternator) correctly (see Cable, Wire, and Hose Routing section (18-2)).
- Install the water hoses and clamps (see Cable, Wire, and Hose Routing section (18-2)).
- Tighten the water pipe bolt.
- Install the removed parts.

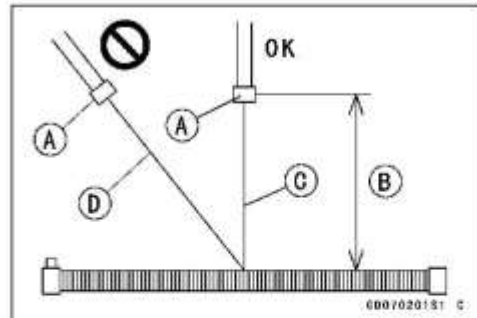
Radiator Inspection

- Remove the radiator (see Radiator and Radiator Fan Removal(4-15)).
- Check the radiator core.
- ★ If there are obstructions to air flow, remove them.
- ★ If the corrugated fins [A] are deformed, carefully straighten them.
- ★ 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.



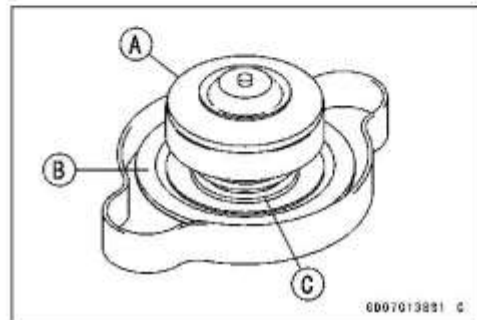
NOTICE

When cleaning the radiator with steam cleaner, be careful of the following to prevent radiator damage: Keep the steam gun [A] away more than 0.5 m (1.6 ft) [B] from the radiator core. Hold the steam gun perpendicular [C] (not oblique [D]) to the core surface. Run the steam gun, following the core fin direction.



Radiator Cap Inspection

- Remove:
 - Right Lower Fairing (see Lower Fairing Removal(15-14))
 - Radiator Cap
- Check the condition of the bottom [A] and top [B] valve seals and valve spring [C].
- ★ If any one of them shows visible damage, replace the cap with a new one.

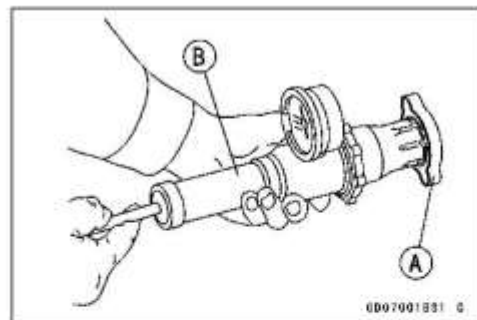


- Install the cap [A] on a cooling system pressure tester [B].

NOTE

○ Wet the cap sealing surfaces with water or coolant to prevent pressure leaks.

- Watching the pressure gauge, pump the pressure tester to build up the pressure until the relief valve opens: the gauge needle flicks downward. Stop pumping and measure leak time at once. The relief valve must open within the specified range in the table below and the gauge hand must remain within the same range at least 6 seconds.



Radiator Cap Relief Pressure

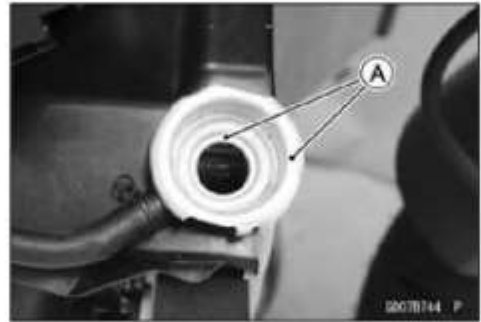
Standard: 107.9 ~ 137.3 kPa (1.10 ~ 1.40 kgf/cm², 15.6 ~ 19.9 psi)

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

Radiator

Radiator Filler Neck Inspection

- Remove:
 - Right Lower Fairing (see Lower Fairing Removal(15-14))
 - Radiator Cap
- Check the radiator filler neck for signs of damage.
- Check the condition of the top and bottom sealing seats [A] in the filler neck. They must be smooth and clean for the radiator cap to function properly.

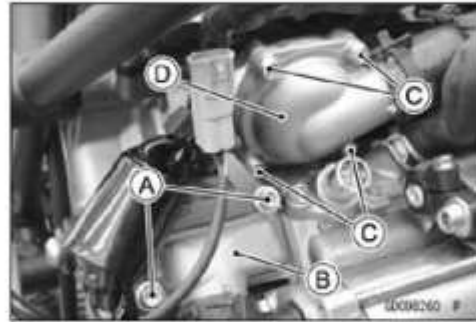


4-20 COOLING SYSTEM

Thermostat

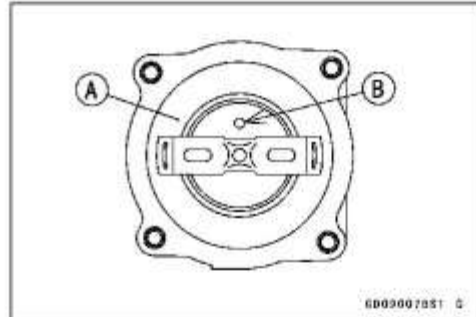
Thermostat Removal

- Drain:
Coolant (see [Coolant Change\(2-28\)](#))
- Remove:
Air Cleaner Housing (see [Air Cleaner Housing Removal\(3-66\)](#))
Water Hose Fitting Cover Bolts [A]
Water Hose Fitting Cover [B]
Thermostat Housing Bolts [C]
Thermostat Housing Cover [D]



Thermostat Installation

- Install the thermostat [A] in the housing so that the air bleeder hole [B] is on top.

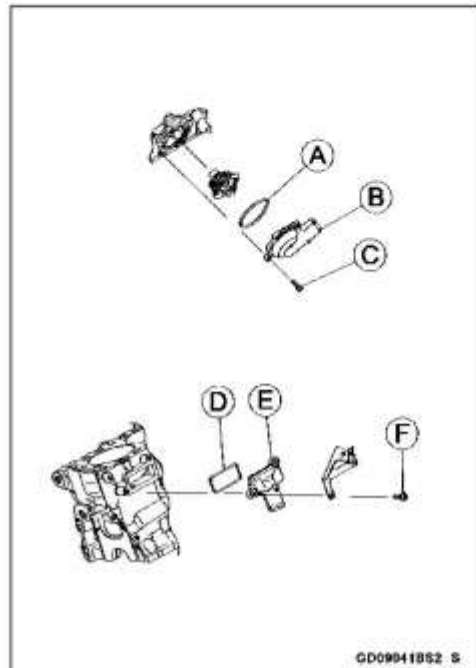


- Replace the thermostat housing cover O-ring [A] with a new one, and install it.
- Install the thermostat housing cover [B].

NOTE

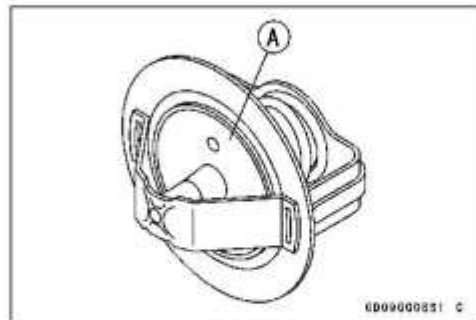
○Note that the thermostat does not move at the place when installing the thermostat housing cover.

- Tighten:
Torque - Thermostat Housing Bolts [C]: 6.0 N·m (0.61 kgf·m, 53 in·lb)
- Run the hoses correctly (see [Cable, Wire, and Hose Routing section \(18-2\)](#)).
- Replace the water hose fitting cover O-ring [D] with a new one, and install it.
- Install the water hose fitting cover [E].
- Tighten:
Torque - Water Hose Fitting Cover Bolts [F]: 10 N·m (1.0 kgf·m, 89 in·lb)
- Fill the radiator with coolant (see [Coolant Change\(2-28\)](#)).
- Install the removed parts.



Thermostat Inspection

- Remove the thermostat (see [Thermostat Removal\(4-20\)](#)).
- Inspect the thermostat valve [A] at room temperature.
- ★ If the valve is open, replace the thermostat with a new one.



Thermostat

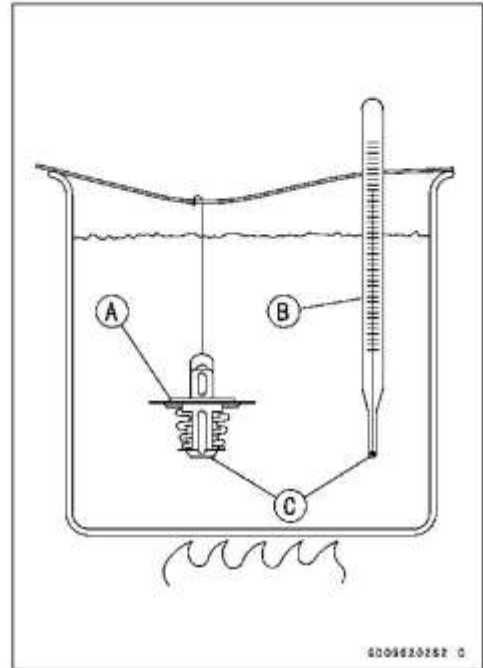
- To check valve opening temperature, suspend the thermostat [A] in a container of water and raise the temperature of the water.
- The thermostat must be completely submerged and must not touch the container sides or bottom. Suspend an accurate thermometer [B] in the water so that the heat sensitive portions [C] are located in almost the same depth. It must not touch the container, either.
- ★ If the measurement is out of the specified range, replace the thermostat with a new one.

Thermostat Valve Opening Temperature

Standard: 58 ~ 62°C (136 ~ 144°F)

Thermostat Valve Full Opening Lift

Standard: 8 mm (0.31 in.) or more @75°C (167°F)



4-22 COOLING SYSTEM

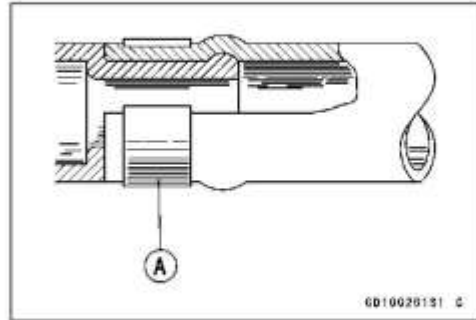
Hose and Pipes

Hose Installation

- Install the hoses and pipes, being careful to follow bending direction. Avoid sharp bending, kinking, flattening or twisting.
- Run the hoses (see Cable, Wire, and Hose Routing section (18-2)).
- Install the clamp [A] as near as possible to the hose end to clear the raised rib of the fitting. This will prevent the hoses from working loose.
- The clamps should be positioned correctly to prevent the clamps from contacting the other parts.

Hose Inspection

- Refer to the Cooling System Inspection (see Cooling System Inspection(2-27)).



Water Temperature Sensor

NOTICE

The water temperature sensor should never be allowed to fall on a hard surface. Such a shock to the water temperature sensor can damage it.

Water Temperature Sensor Removal/Installation

- Refer to the Water Temperature Sensor Removal/Installation (see Water Temperature Sensor Removal/Installation(17-41)).

Water Temperature Sensor Inspection

- Refer to the Water Temperature Sensor Inspection (see Water Temperature Sensor Inspection(16-119)).