

Engine Top End

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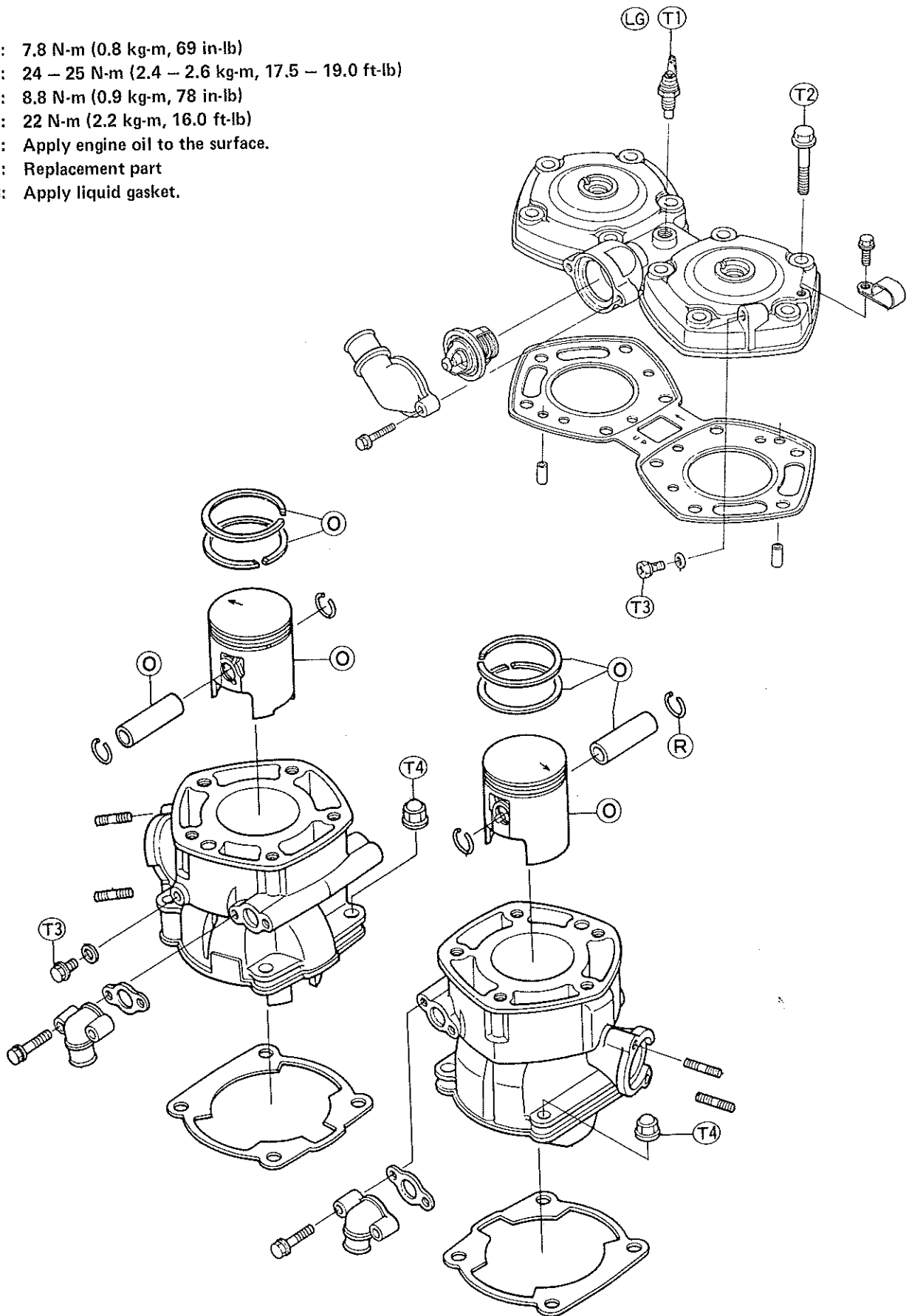
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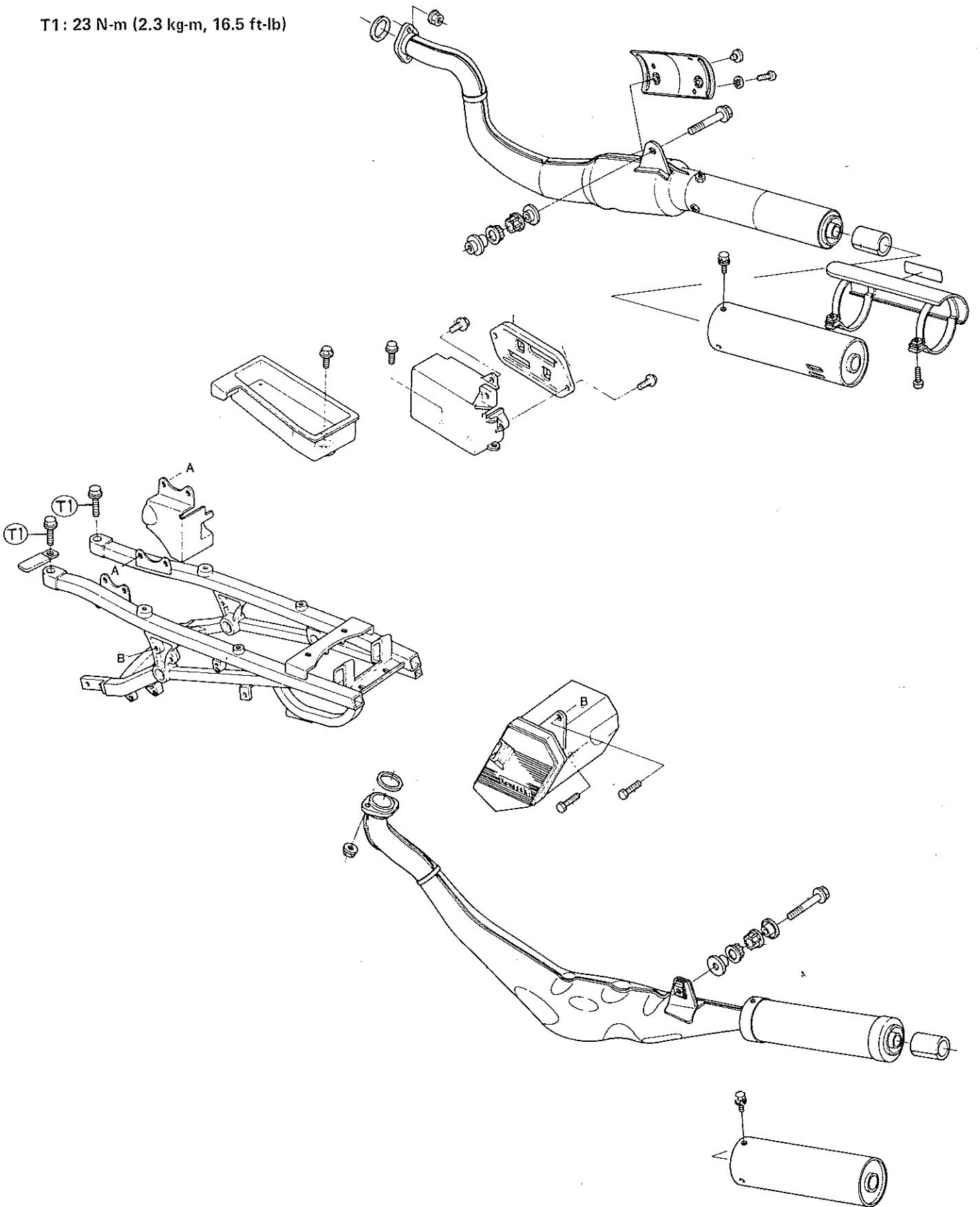
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Exploded View

- T1: 7.8 N-m (0.8 kg-m, 69 in-lb)
T2: 24 – 25 N-m (2.4 – 2.6 kg-m, 17.5 – 19.0 ft-lb)
T3: 8.8 N-m (0.9 kg-m, 78 in-lb)
T4: 22 N-m (2.2 kg-m, 16.0 ft-lb)
O : Apply engine oil to the surface.
R : Replacement part
LG: Apply liquid gasket.



T1: 23 N-m (2.3 kg-m, 16.5 ft-lb)



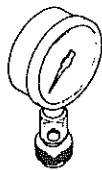
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Specifications

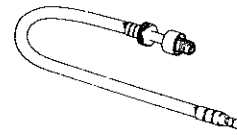
Item	Standard	Service Limit
Cylinder Compression:	(usable range) 735 – 1,130 kPa (7.5 – 11.5 kg/cm ²) (107 – 164 psi)	— — —
Cylinder head warp	— — —	0.05 mm
Cylinder Block, Piston:		
Cylinder inside diameter	56.015 – 56.030 mm	56.090 mm
Piston diameter	55.960 – 55.975 mm	55.80 mm
Piston/cylinder clearance	0.050 – 0.060 mm	— — —
Piston ring/groove clearance		
Top (keystone)	— — —	— — —
Second	0.03 – 0.07 mm	0.18 mm
Piston ring groove width		
Top (keystone)	— — —	— — —
Second	1.22 – 1.24 mm	1.33 mm
Piston ring thickness		
Top (keystone)	— — —	— — —
Second	1.17 – 1.19 mm	1.10 mm
Piston ring end gap		
Top	0.15 – 0.35 mm	0.65 mm
Second	0.15 – 0.35 mm	0.65 mm

Special Tools

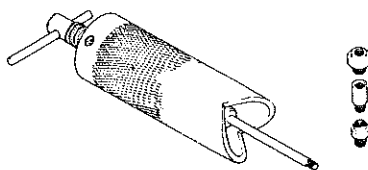
Compression Gauge: 57001-221



Adapter: 57001-1159



Piston Pin Puller Assembly: 57001-910



Adapter: 57001-913



NOTE

○The adapter (P/N 57001-913) is included in the piston pin puller assembly (P/N 57001-910).

Cylinder Head

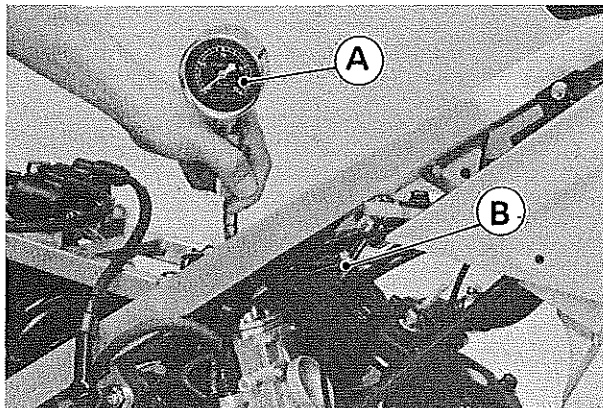
Carbon buildup inside the combustion chambers interferes with heat dissipation and increases the compression which may result in preignition, detonation, and overheating. Trouble can also arise from improper head mounting or mounting torque, which may cause compression leakage.

Compression Measurement

- Thoroughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression as it does during normal running.
- Stop the engine.
- Remove the fuel tank and the air cleaner housing (see Fuel Tank Removal, Air Cleaner Housing Removal in Fuel System chapter).
- Remove the spark plugs and attach compression gauge (special tool) firmly into the spark plug hole.
- With the throttle fully open, turn the engine over sharply with the kickstarter several times until the compression gauge stops rising; the compression is the highest reading obtainable.
- Repeat the measurement for the other cylinder.

Cylinder Compression (Usable Range)

735 – 1,130 kPa (7.5 – 11.5 kg/cm², 107 – 164 psi)



A. Compression Gauge: 57001-221
B. Adapter: 57001-1159

- ★ If the cylinder compression is higher than the usable range, check the following:
 - Carbon build-up on the piston crown and cylinder head—clean off any carbon on the piston crowns and cylinder head.

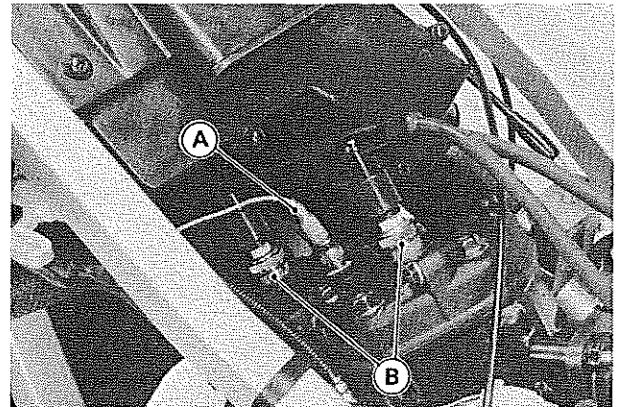
- Cylinder head gasket, cylinder base gaskets—use only the proper gaskets. The use of a gasket of incorrect thickness will change the compression.

★ If cylinder compression is lower than the usable range, check the following:

- Gas leakage around the cylinder head—replace the damaged gasket and check the cylinder head for warp.
- Gas leakage from the crank chamber—check the crankshaft oil seals, valve cover oil seals and O-rings, and reed valves.
- Check the joint between the crankcase halves.
- Piston/cylinder clearance, piston seizure.
- Piston rings, piston ring grooves wear.

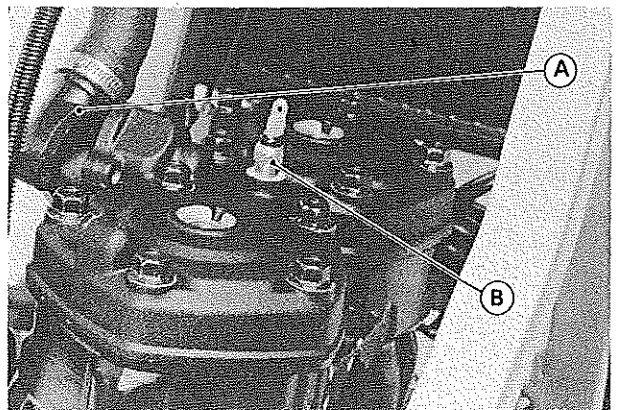
Cylinder Head Removal

- Remove the air cleaner (see Air Cleaner Housing Removal in Fuel System chapter).
- Drain the coolant (see Coolant Draining in Cooling System).
- Remove the spark plugs.
- Pull off the lead of the water temperature sensor.



A. Water Temperature Sensor Lead
B. Spark Plugs

- Remove the thermostat cap.

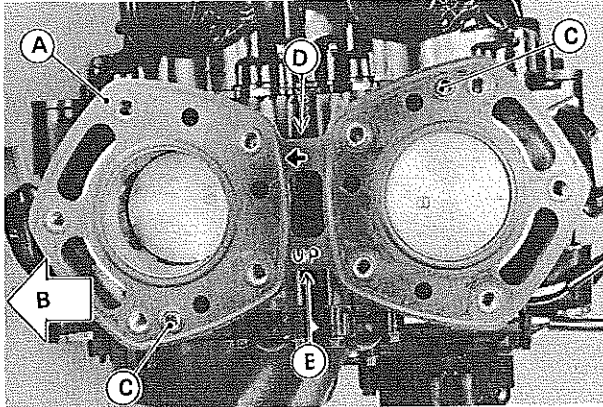


A. Thermostat Cap B. Water Temperature Sensor

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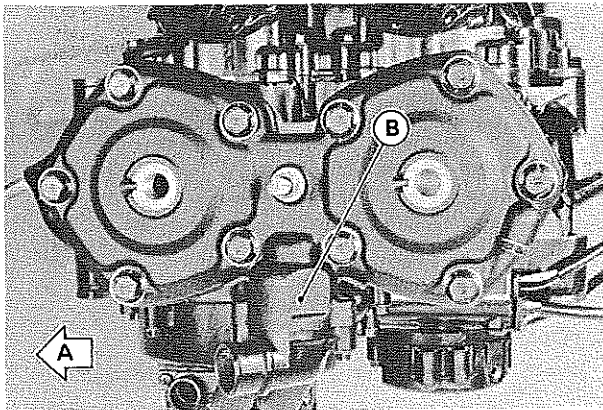
Cylinder Head Installation Notes

- See that the knock pins (2) are in place and install the new cylinder head gasket.
- The UP mark of the gasket must face upward and "Front" mark must face forward.



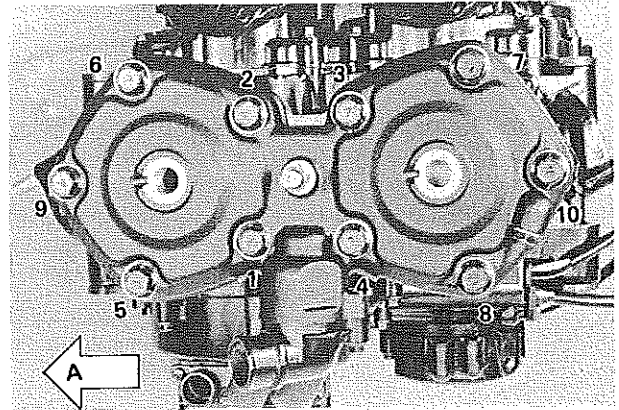
- A. New Cylinder Head Gasket
 B. Front
 C. Knock Pins
 D. "Front" Mark
 E. UP Mark

- Install the cylinder head so that the thermostat housing is on the engine left side as shown.



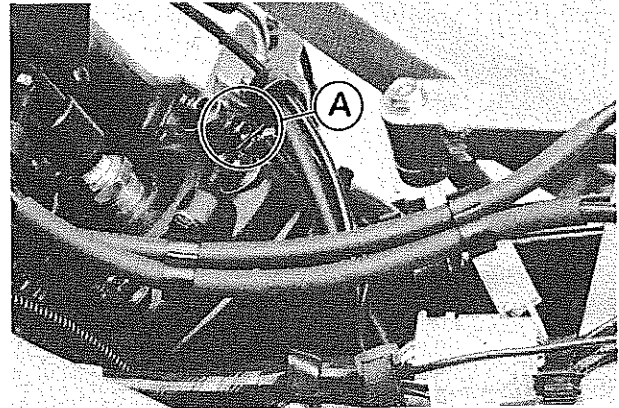
- A. Front
 B. Thermostat Housing

- Tighten the cylinder head bolts to the specified torque, following the specified tightening sequence.
- The sequence numbers are marked on the cylinder head.
- Tighten them first to about one half of the specified torque, and then tighten them to the specified torque in the order of index number.
- Finally, retighten them to the specified torque again in order to check that they are tightened securely.



A. Front

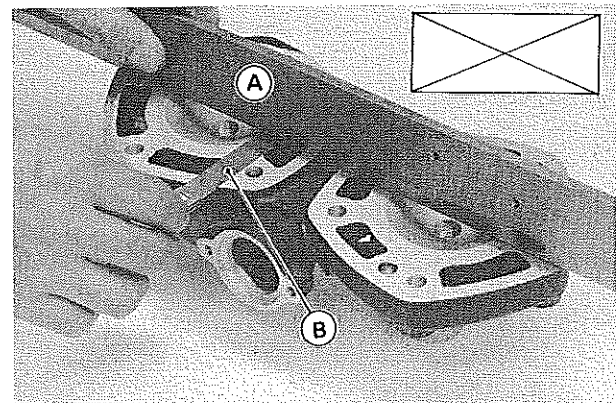
- Be sure to install the main harness ground lead.



A. Main Harness Ground Lead

Cylinder Head Warp Inspection

- Lay a straightedge across the lower surface of the head at several different points, and measure warp by inserting a thickness gauge between the straightedge and the head.
- ★ If warp exceeds the service limit, repair the mating surface. Replace the cylinder head if the mating surface is badly damaged.



- A. Straightedge
 B. Thickness Gauge

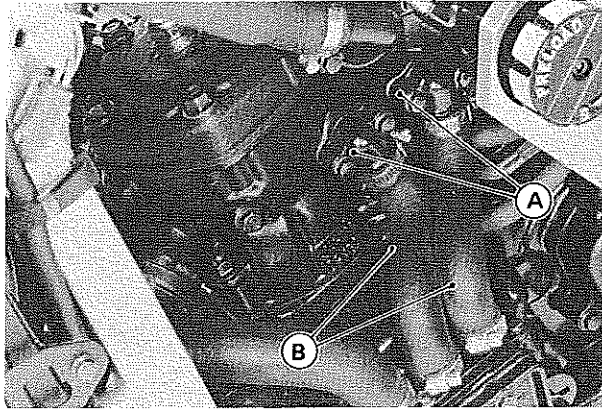
Cylinder Head Warp

Service Limit: 0.05 mm

Cylinder, Piston

Cylinder Removal

- Remove the front and rear mufflers.
- Remove the cylinder head.
- Separate the fittings and water hoses.



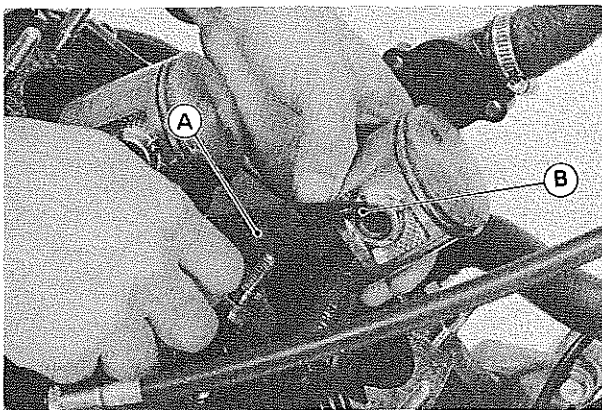
A. Fittings

B. Water Hoses

- Lift off the cylinders, and remove the cylinder base gaskets. If necessary, tap lightly around the base of the cylinders with a plastic mallet, taking care not to damage the cylinders.
- Before the cylinders are off the pistons, cover the cylinder base holes with sheets of cloths to prevent dirt or moisture from entering.

Piston Removal Notes

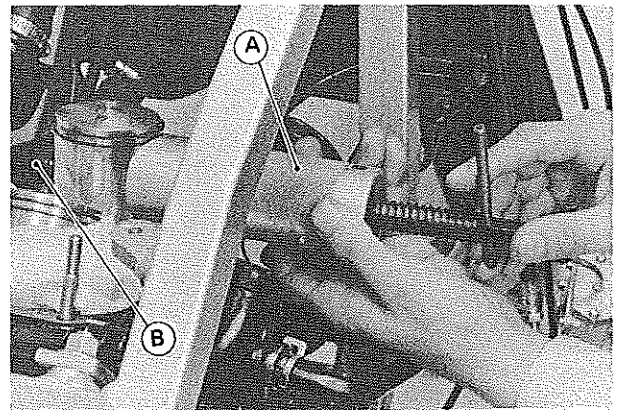
- Remove the piston pin snap ring.



A. Pliers

B. Snap Ring

- Remove the piston by pushing its pin out the side that the snap ring was removed. Use piston pin puller assembly (special tool), if the pin is tight.



A. Piston Pin Puller Assembly: 57001-910
B. Adapter: 57001-913

- Carefully spread the ring opening with your thumbs and then push up on the opposite side of the ring to remove it.

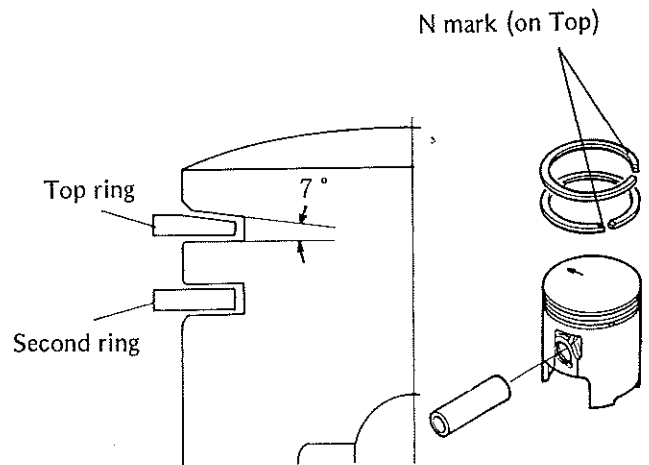


A. Piston Ring

Piston Installation Notes

- Do not mix up the second ring with the top ring.
- Install the piston rings so that the correct side faces upwards as shown.

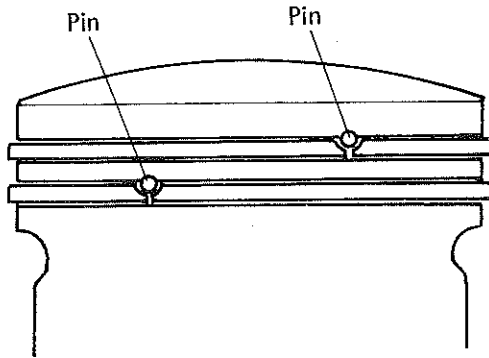
Piston Rings



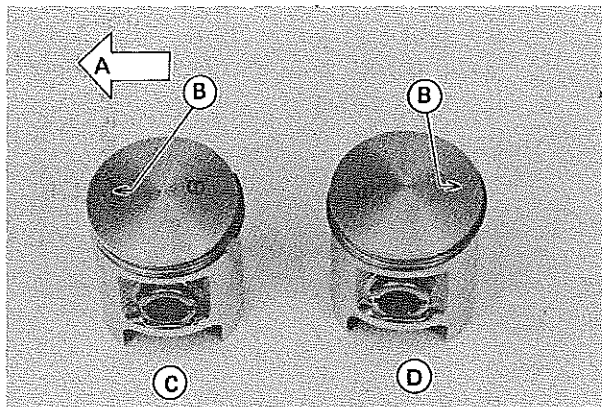
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- When installing the piston rings by hand, first fit one end of the piston ring against the pin in the ring groove, spread the ring opening with the other hand and then slip the ring into the groove.
- Check to see that the pin in each piston ring groove is between the ends of the piston ring.

Piston Ring Position



- Be careful not to mix up the front piston with the rear piston. They must be installed in the original cylinders respectively.
- The arrow on the Top of the front piston must point toward front and the arrow on the rear piston must point toward rear.



A. Front
B. Arrow
C. Front Piston
D. Rear Piston

CAUTION

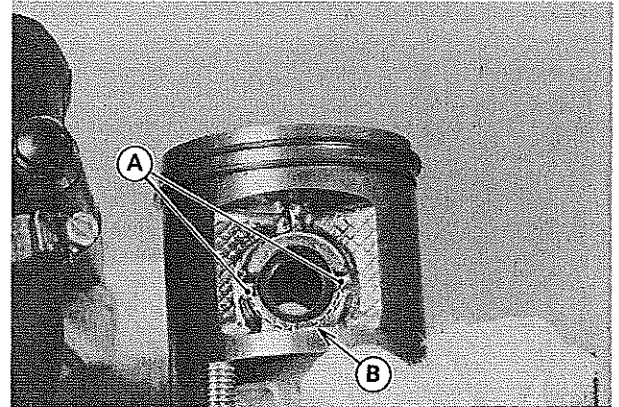
○Incorrect installation of the pistons could cause piston ring breakage and result in severe engine damage.

- When installing a piston pin snap ring, compress it only enough to install it and no more.

CAUTION

○Do not reuse snap rings, since removal weakens and deforms them. They could fall out and score the cylinder wall.

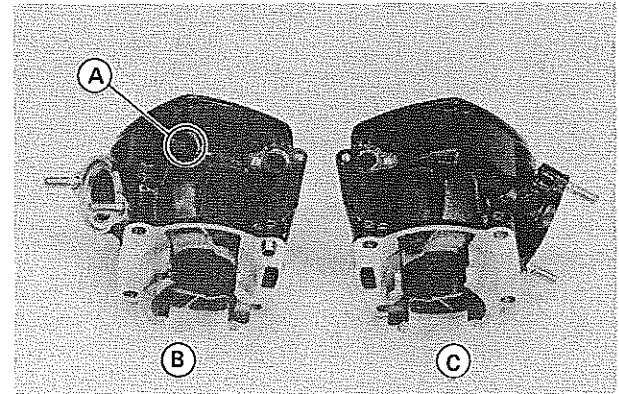
- Fit a new piston pin snap ring into the side of the piston so that the ring opening does not coincide with the slits of the piston pin hole.



A. Slit
B. Ring Opening

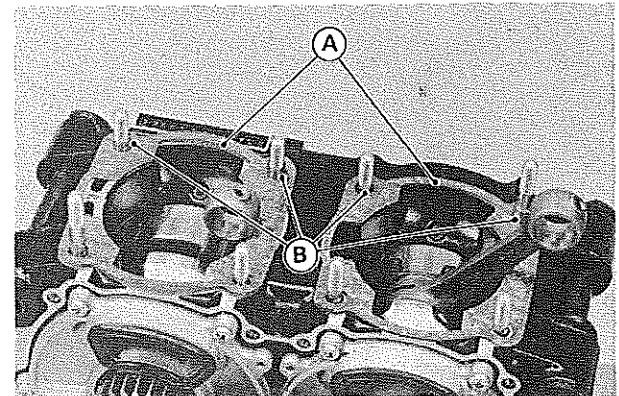
Cylinder Installation Note

○The front cylinder has a coolant drain plug. Be careful not to mix up the front cylinder with the rear cylinder.



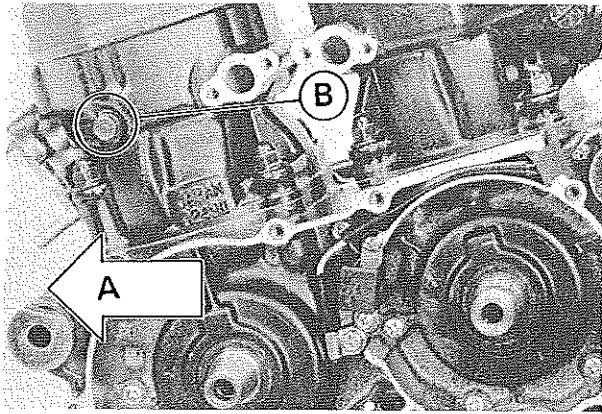
A. Drain Plug
B. Front Cylinder
C. Rear Cylinder

- Apply a little two-stroke oil to the piston rings and the inside surface of the cylinder.
- Install the new cylinder base gaskets. Check that the knock pins(2) are in place.

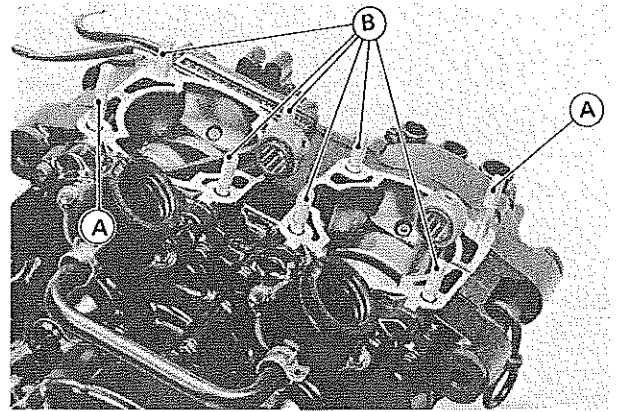


A. New Cylinder Base Gasket
B. Knock Pin

- Install the cylinders being careful of installation direction as shown.

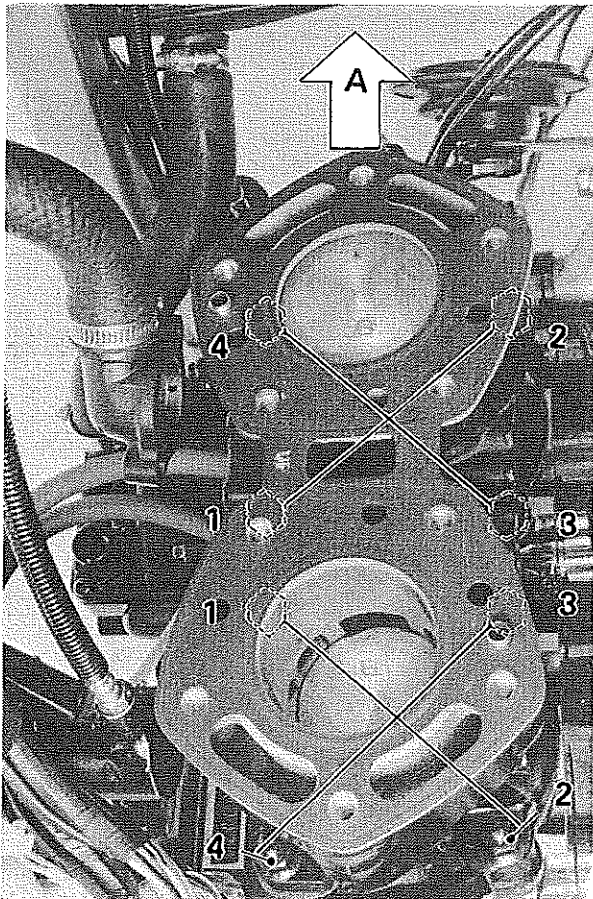


A. Front B. Coolant Drain Plug



A. Nominal Length: 45 mm
B. Nominal Length: 30 mm

- Tighten the cylinder nuts to the specified torque (see Exploded Views), following the specified tightening sequence.

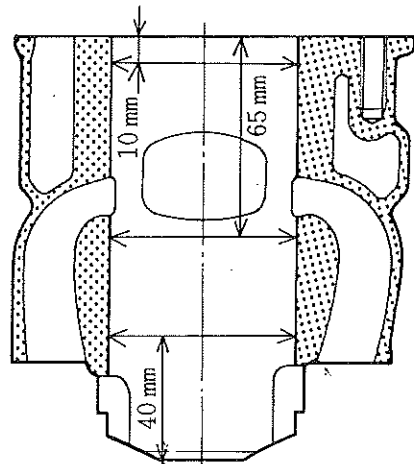


A. Front 1 - 4. Cylinder Nut

Cylinder Wear Inspection

- Inspect the inside of the cylinder for scratches and abnormal wear.
- ★ If the cylinder is damaged or badly worn, replace it with a new one.
- Since there is a difference in cylinder wear in different directions, take a side-to-side and a front-to-back measurement at each of the 3 locations (total of 6 measurements) shown in the figure.
- ★ If the cylinder inside diameter measurement exceeds the service limit, the cylinder must be replaced with a new one since the ELECTROFUSION cylinder cannot be bored or honed.

Cylinder Diameter Measurement



Cylinder Assembly Note

- Screw the cylinder studs in the correct locations as shown.

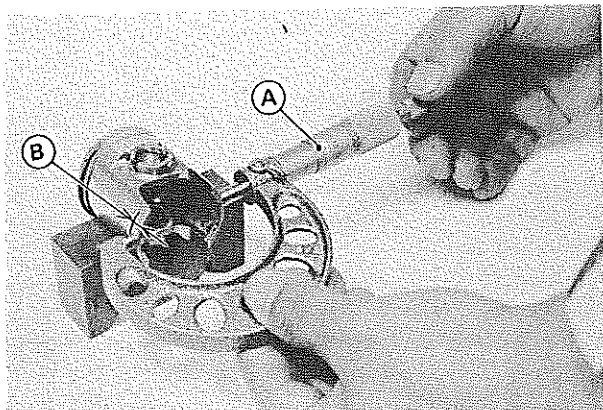
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Cylinder Inside Diameter

Standard: 56.015 – 56.030 mm and less than 0.01 mm difference between any two measurements
Service Limit: 56.09 mm, or more than 0.05 mm difference between any two measurements

Piston Diameter Measurement

- Measure the outside diameter of the piston 10 mm up from the bottom of the piston at a right angle to the direction of the piston pin.



A. Micrometer

B. 10 mm

Piston Diameter

Standard: 55.960 – 55.975 mm
Service Limit: 55.80 mm

NOTE

- Abnormal wear such as a marked diagonal pattern across the piston skirt may mean a bent connecting rod or crankshaft.

Piston/Cylinder Clearance

The most accurate way to find the piston clearance is by making separate piston and cylinder diameter measurements and then computing the difference between the two values. Measure the piston diameter as just described, and measure the cylinder diameter at the very bottom of the cylinder.

Piston/Cylinder Clearance

0.045 – 0.055 mm

NOTE

- Whenever the piston or cylinder has been replaced with a new one, the motorcycle must be broken in the same as with a new machine.

Piston Ring, Piston Ring Groove Inspection

- Visually inspect the piston rings and the piston ring grooves.

★ If the rings are worn unevenly or damaged, they must be replaced.

★ If the piston ring grooves are worn unevenly or damaged, the piston must be replaced and fitted with new rings.

● Check for uneven groove wear by inspecting the ring seating.

★ The rings should fit perfectly parallel to the groove surfaces. If not, the piston must be replaced.

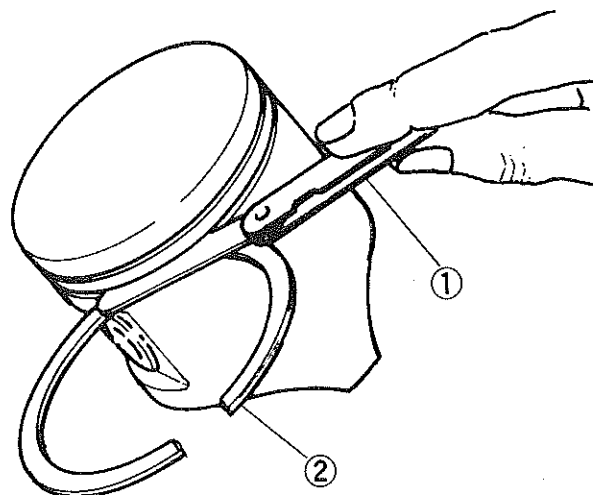
● With the piston rings in their grooves, make several measurements with a thickness gauge to determine piston ring/groove clearance.

Piston Ring Groove Clearance

	Standard	Service Limit
Top	N/A*	N/A*
Second	0.03 – 0.07 mm	0.18 mm

*Tapered Ring

Groove Clearance Measurement



1. Thickness Gauge: 57001-1081
2. Piston Ring

Piston Ring End Gap

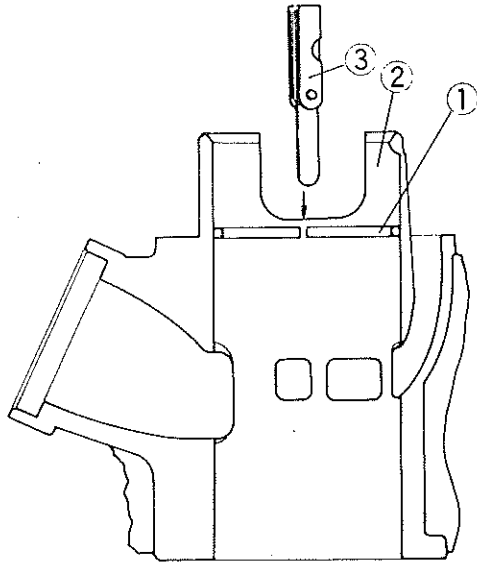
● Place the piston ring inside the cylinder, using the piston to locate the ring squarely in place. Set it close to the bottom of the cylinder, where cylinder wear is low.

● Measure the gap between the ends of the ring with a thickness gauge.

Piston Ring End Gap

	Standard	Service Limit
Top	0.15 – 0.35 mm	0.65 mm
Second	0.15 – 0.35 mm	0.65 mm

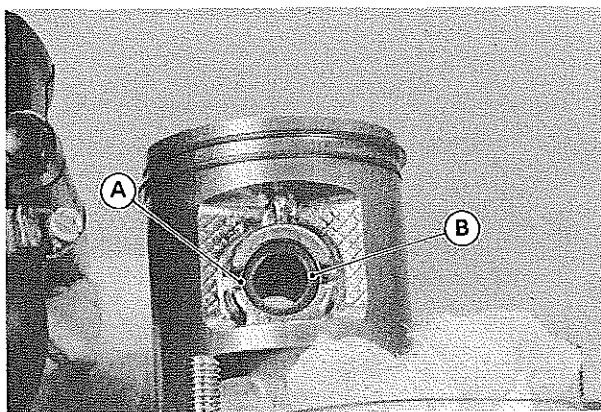
End Gap Measurement



1. Piston Ring 2. Cylinder Block 3. Thickness Gauge

*Piston, Piston Pin,
Connecting Rod Wear Inspection*

- Visually inspect the snap rings are fitted in place.
- ★ If the ring shows weakness or deformation, replace the ring. Also if the pin hole groove shows excessive wear, replace the piston.
- Visually inspect the piston pin hole and connecting rod small end hole.
- ★ If the piston pin hole shows uneven wear, replace the piston.
- ★ If the rod small end hole shows uneven wear, replace the rod, or crankshaft assembly.
- Visually inspect the outer surface of the piston pin.
- ★ If the pin shows color change or stepped wear, replace the pin and needle bearing.

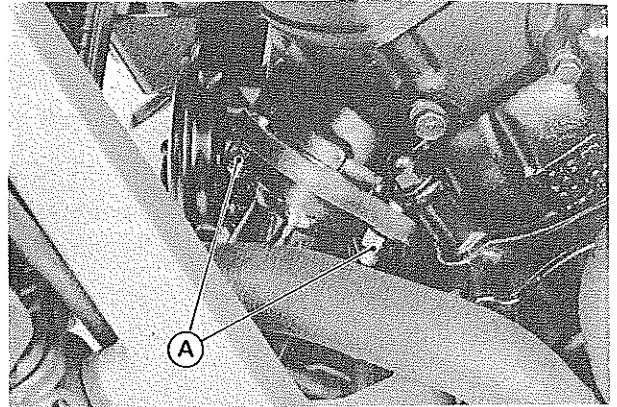


A. Snap Ring B. Piston Pin

Muffler

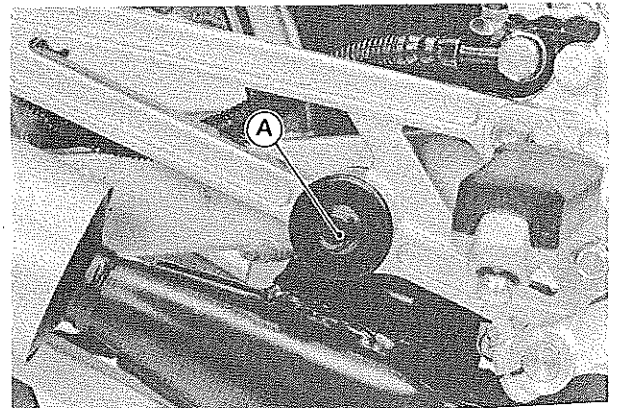
Front Muffler Removal

- Remove the lower fairing (see Fairing Removal in Frame chapter).
- Remove the exhaust flange holder nuts.



A. Nut

- Remove the front muffler mounting bolt.

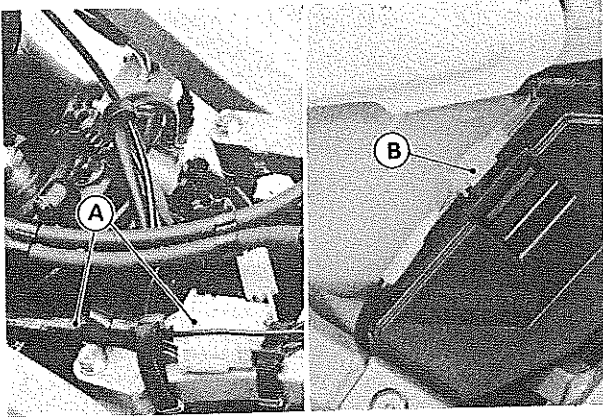


A. Bolt

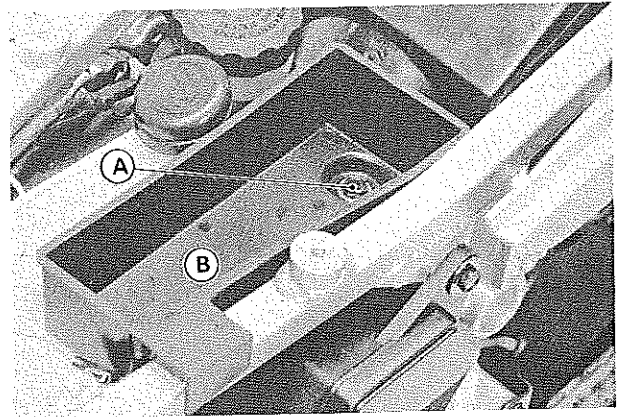
Rear Muffler Removal

- Remove the seat and the fuel tank (see Fuel Tank Removal in Fuel System chapter).
- Pull off the following connectors and the terminals.
 - Main harness and connectors
 - Rear brake switch connector
 - Ignition coil lead terminals and the ground terminal
 - Battery terminal and main harness ground terminal
 - Fuse connector
 - Turn signal relay terminals

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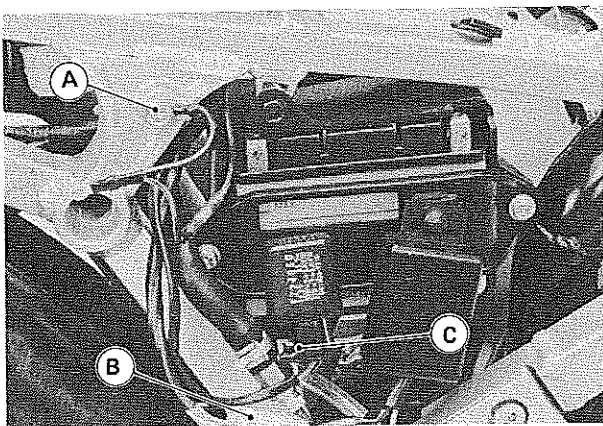


A. Main Harness and Connectors
B. Rear Brake Switch Connector

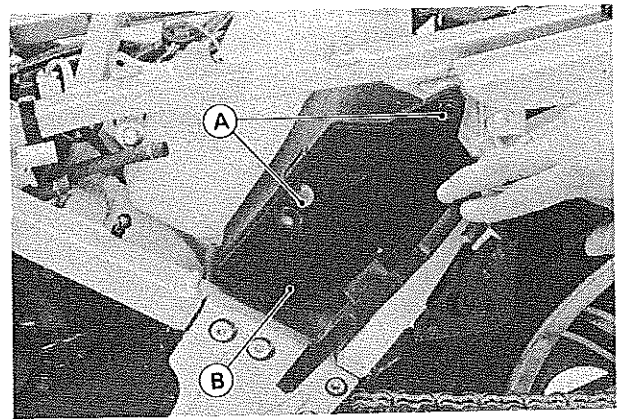


A. Bolt
B. Tool Case

● Remove the bolts and take out the storage case.



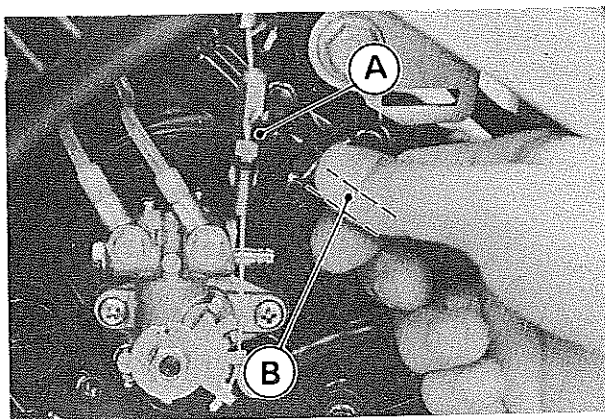
A. Main Harness Ground Terminal
B. Fuse Connector
C. Turn Signal Replay Terminals



A. Bolts
B. Storage Case

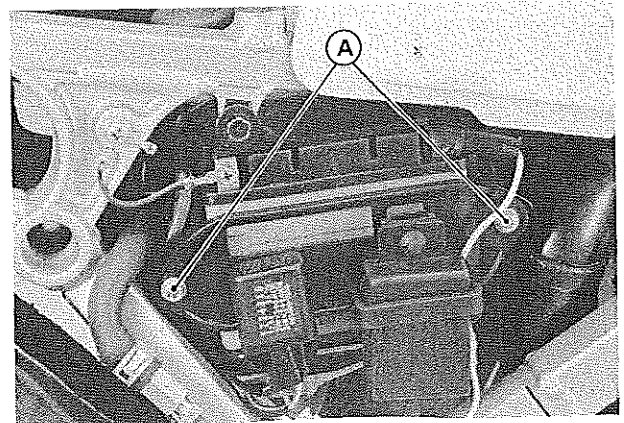
● Remove the oil pump cover and oil pump inlet hose. Screw one of the mounting bolts into the inlet hose to keep the oil from flowing out, and hold the end of the hose upwards.

● Remove the battery and then the battery case by taking off the screws and the bolts.

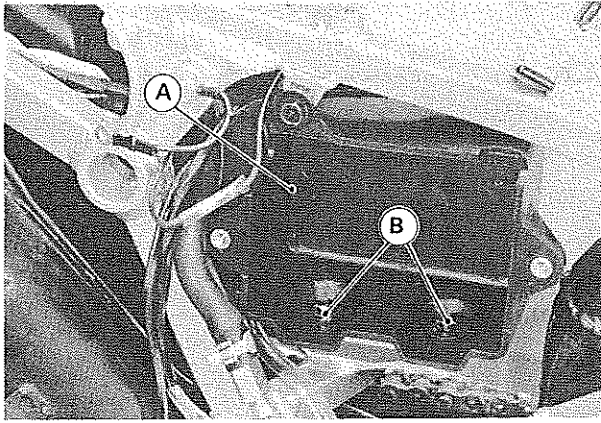


A. Mounting Bolt
B. Inlet Hose from the oil tank

● Remove the bolt and tool case.

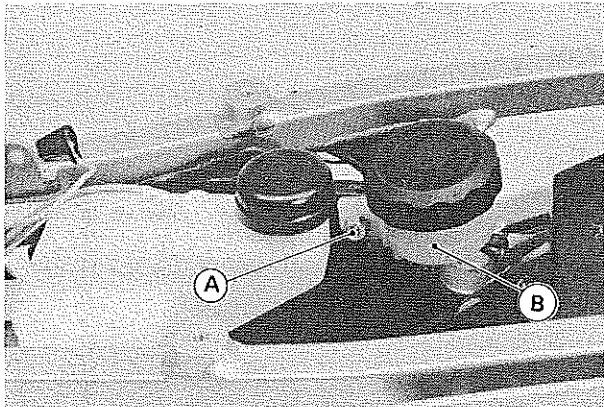


A. Screws



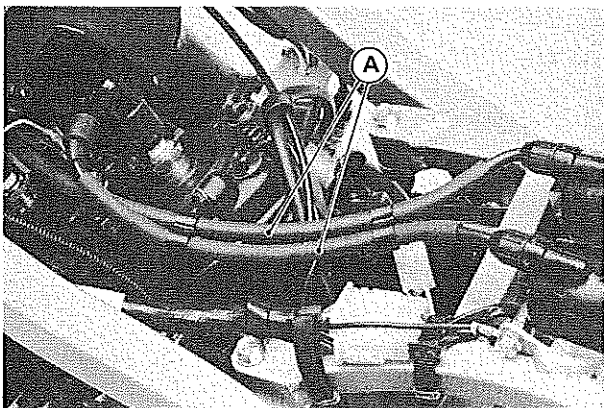
A. Battery Case B. Bolts

● Remove the rear brake reservoir tank mounting bolt.



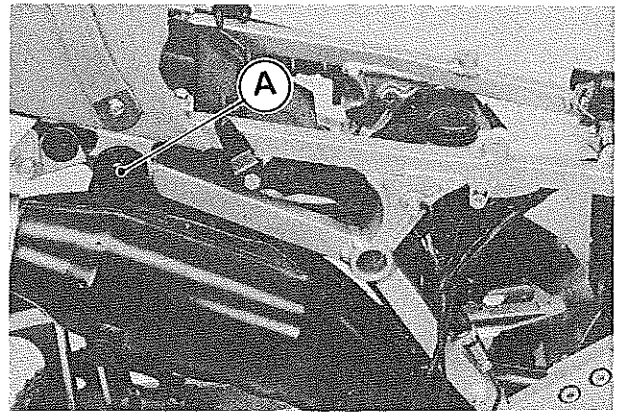
A. Bolt B. Brake Reservoir Tank

● Remove the spark plug leads from the plugs.



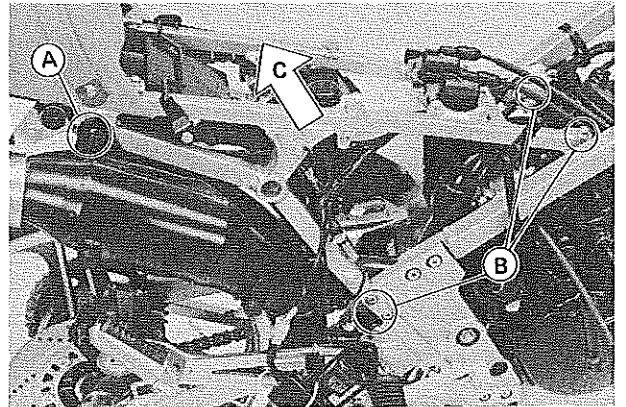
A. Spark Plug Lead

● Remove the rear muffler mounting bolt.



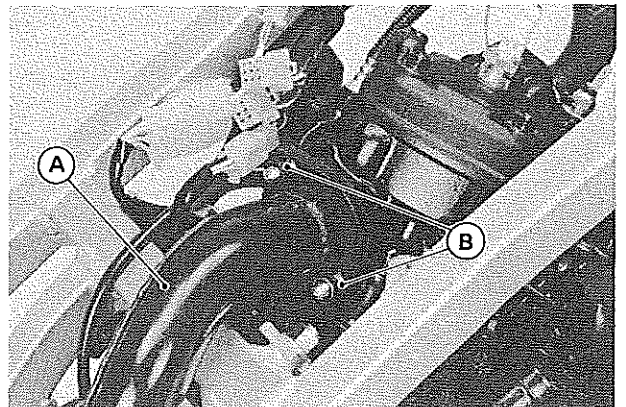
A. Rear Muffler Mounting Bolt

● Remove the rear frame with the oil tank and the ignition coils installed by taking off the following bolts.



A. Rear Muffler Mounting Bolt
B. Rear Frame Mounting Bolts
C. Frame Removal Direction

● Remove the exhaust flange nuts and rear muffler.

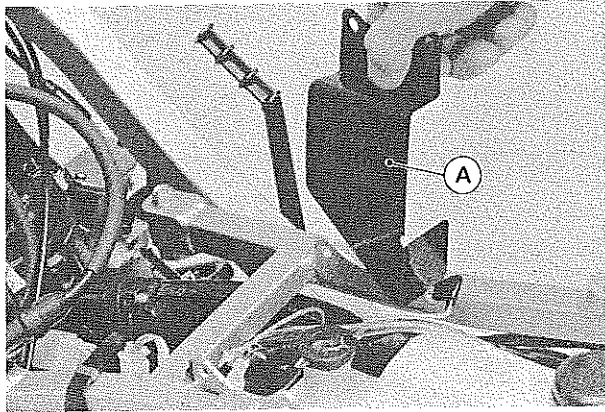


A. Rear Muffler B. Nut

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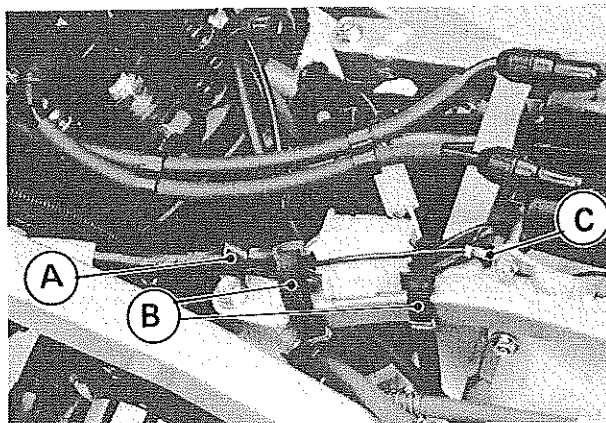
Muffler Installation Notes

- Check the gasket at each muffler, and replace it if damaged.
- Tighten the muffler mounting bolts and exhaust flange nuts in the order and method indicated below.
- First, tighten all the bolts and nuts to a snug fit.
- Next, tighten the exhaust flange nuts evenly to avoid exhaust leaks. After rear frame installation, tighten the rear exhaust flange nuts.
- Finally, tighten the mounting bolts securely.
- Be sure to install the ignition coil bracket.



A. Ignition Coil Bracket

- Hold the main harness on the rear frame with clamps to avoid its being burned by the rear muffler.
- Be sure to install the main harness ground terminal on the ignition coil mounting nut.



A. Clamps
B. Clamps

C. Ground Terminal

CAUTION

- After rear muffler installation, make sure the wires and the tubes do not touch the muffler.