Engine Top End

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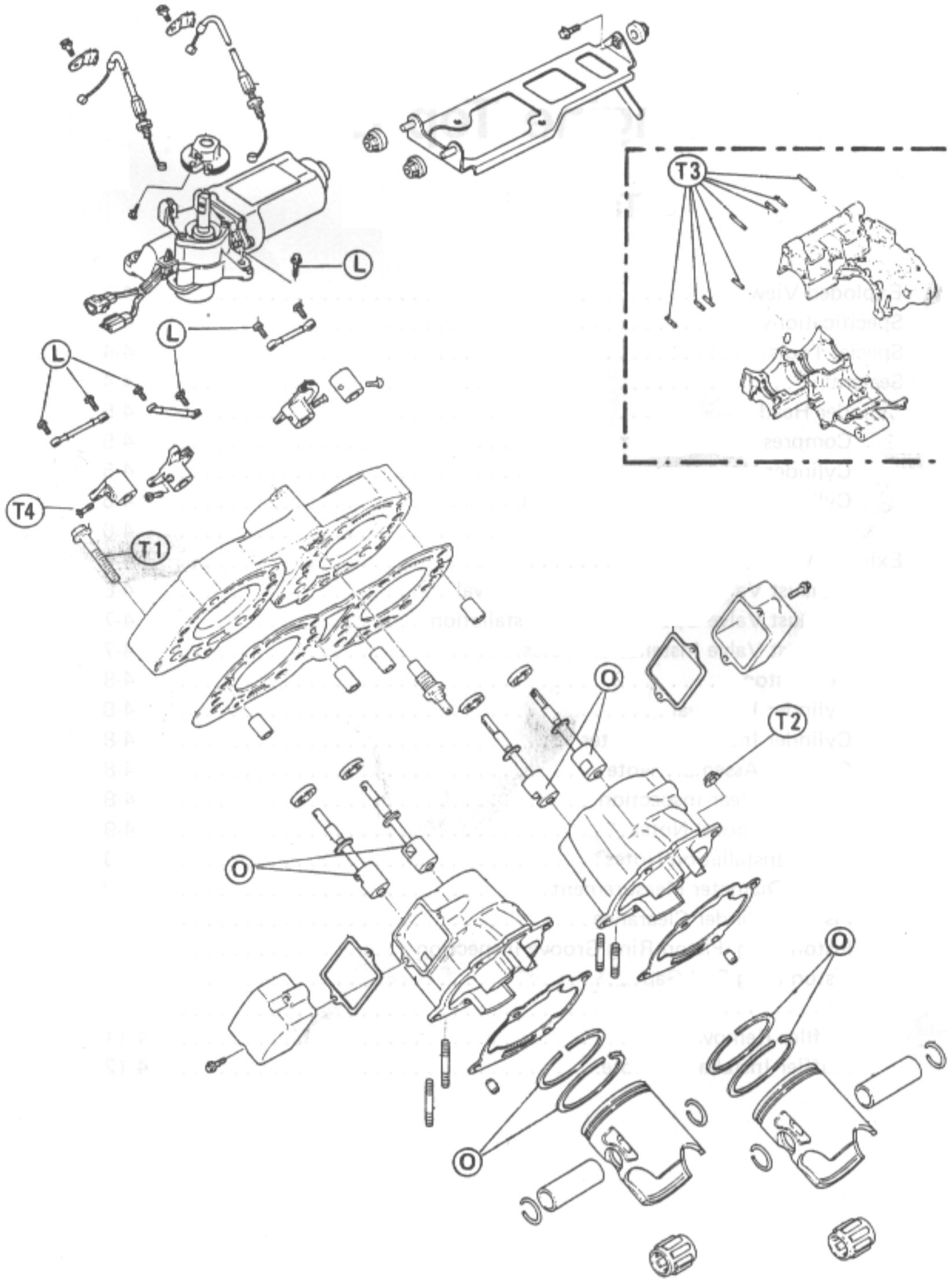
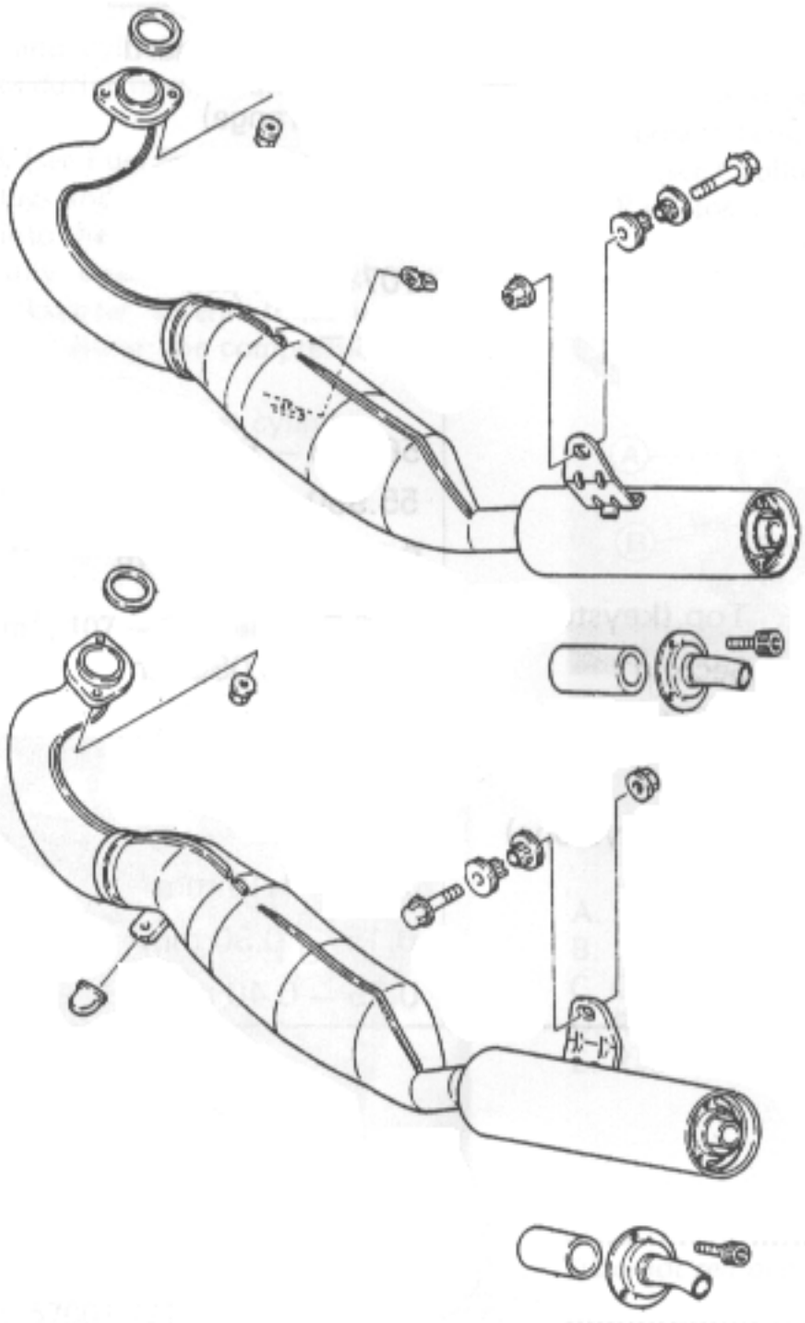
Exploded View





L : Apply non-permanent locking agent.
O : Apply 2-stroke engine oil.
T1: 25 N-m (2.5 kg-m, 19.0 ft-lb)
T2: 22 N-m (2.2 kg-m, 16.0 ft-lb)
T3: 9.8 N-m (1.0 kg-m, 87 in-lb)
T4: 2.9 N-m (0.3 kg-m, 26 in-lb)

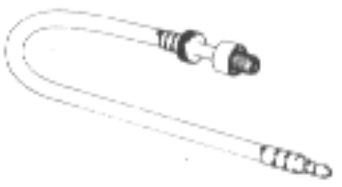
Specifications

Item		Standard	Service Limit
Cylinder Compression:		(usable range) 735 – 1,130 kPa (7.5 – 11.5 kg/cm², 107 – 164 psi)	– – –
Cylinder head warp		– – –	0.05 mm
Cylinder Block, Piston:			
Cylinder inside diameter		56.015 – 56.030 mm	56.09 mm
Piston diameter		55.960 – 55.975 mm	55.81 mm
Piston/cylinder clearance		0.040 – 0.070 mm	– – –
Piston ring/groove clearance	Top (keystone)	– – –	– – –
	Second	0.040 – 0.080 mm	0.18 mm
Piston ring groove width	Top (keystone)	– – –	– – –
	Second	1.230 – 1.250 mm	1.330 mm
Piston ring thickness	Top (keystone)	– – –	– – –
	Second	1.17 – 1.19 mm	1.10 mm
Piston ring end gap	Top	0.15 – 0.30 mm	0.60 mm
	Second	0.25 – 0.40 mm	0.7 mm

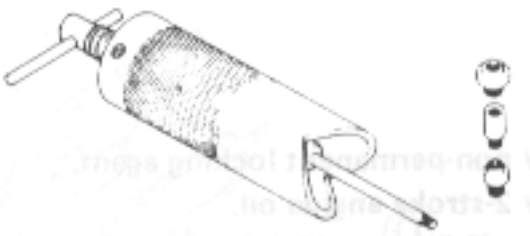
Special Tools

Compression Gauge: 57001-221

Adapter: 57001-1159



Piston Pin Puller Assembly: 57001-910



Sealant

Kawasaki Bond (Silicone Sealant): 56019-120

Cylinder Head

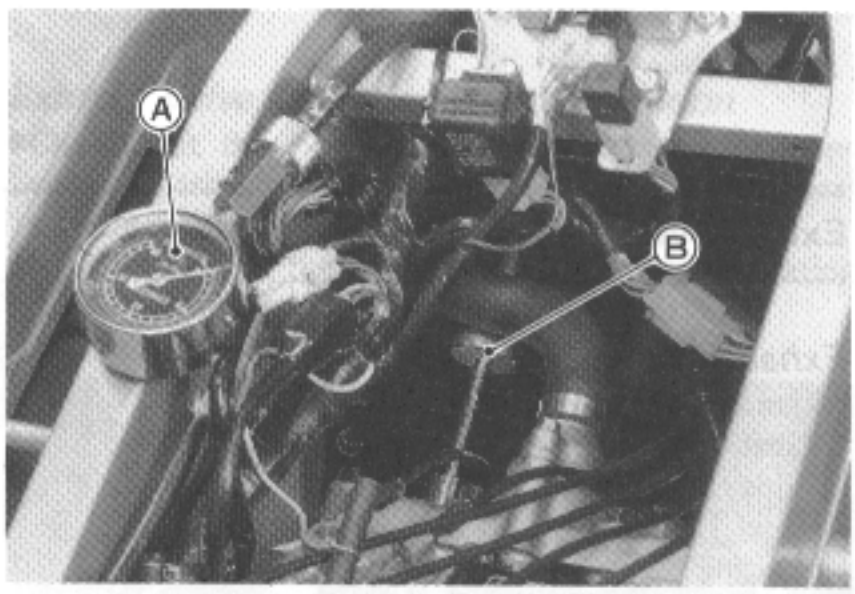
Compression Measurement

- Throughly warm up the engine so that engine oil between the piston and cylinder wall will help seal compression at it does during normal running.
- Stop the engine.
- Remove the fuel tank (see 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 – 1,139 kPa

(7.5 – 11.5 kg/cm^2, 107 – 164 psi)



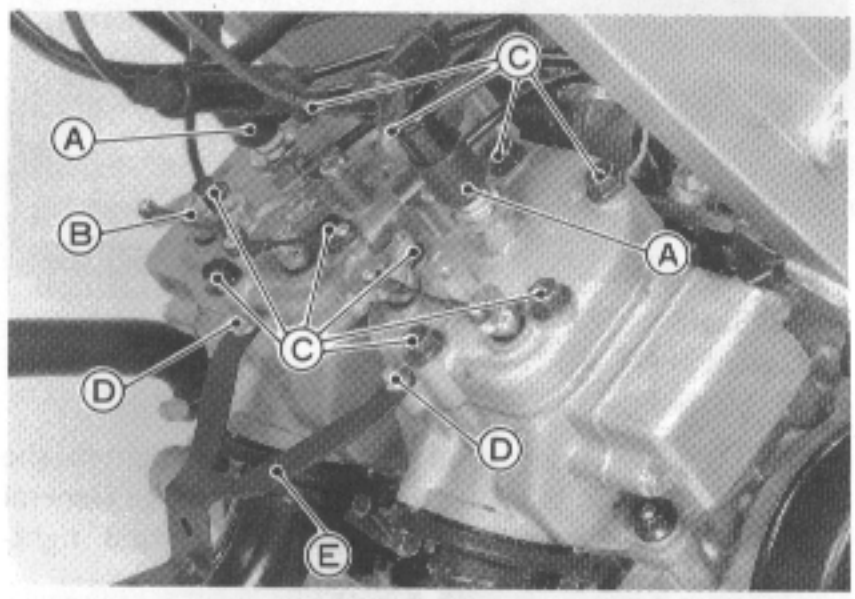
A. Compression Gauge: 57001-221
B. Adapter: 57001-1159

★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 following.
  - Seat
  - Side Cover
  - Fuel Tank
  - Fairings
  - Coolant
  - Thermostat (see Cooling System chapter)
  - Coolant Temperature Sensor (see Cooling System chapter)
  - Radiator



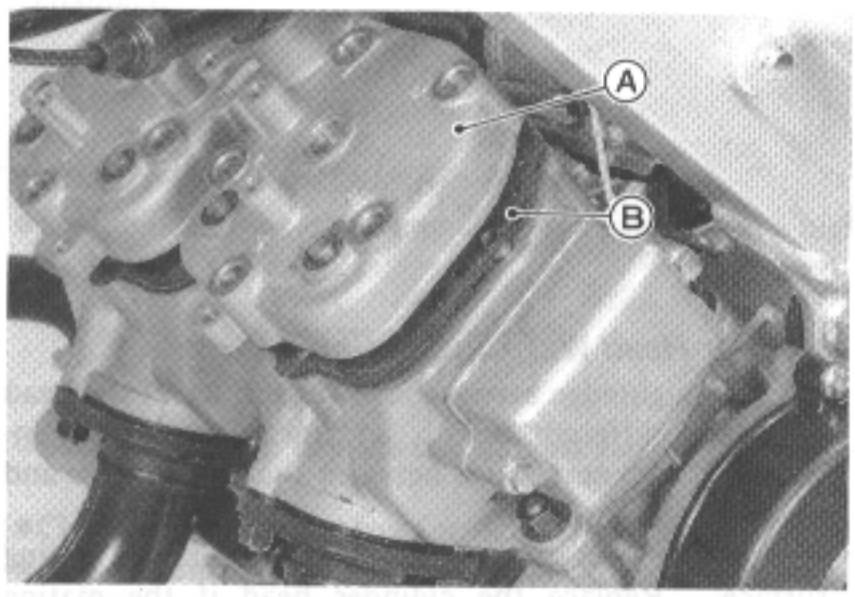
A. Spark Plug
B. Exhaust Valve Operating Unit
C. Cylinder Head Mounting Bolts
D. Radiator for Bracket Mounting Bolts
E. Radiator for Bracket

NOTE

○*Do not remove the exhaust valve operating motor.*

CAUTION

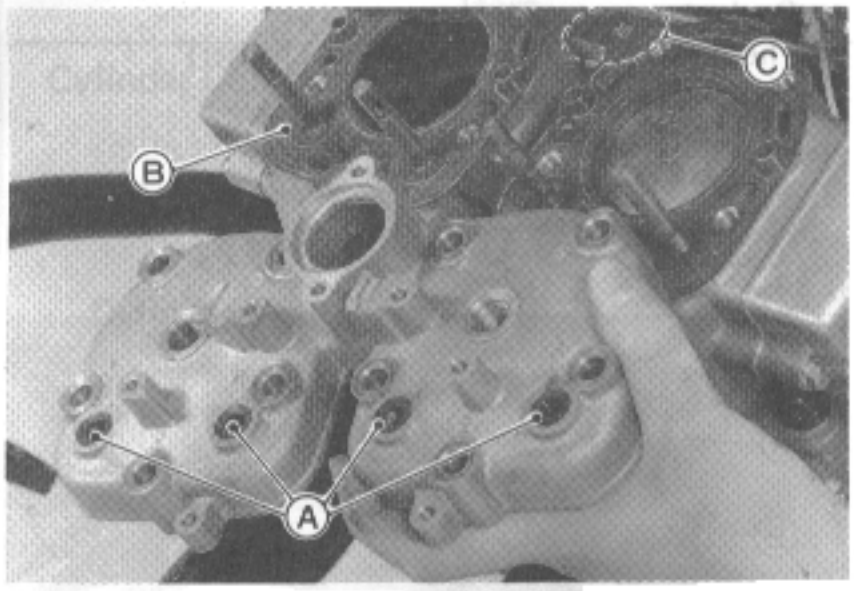
○**Take care not to damage the exhaust valves.**



A. Cylinder Head B. Gasket

Cylinder Head Installation Notes

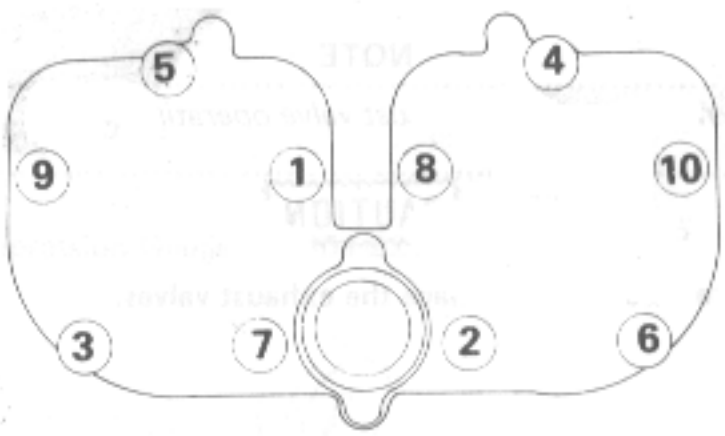
- Check the oil seals for damage. Replace them if necessary.
- Replace the gasket with a new one and install it as shown.



A. Oil Seals
B. Gasket
C. UP Mark

- Install the cylinder head as shown and tighten the cylinder head bolts to the specified torque (see General Information chapter), following the specified tightening sequence.

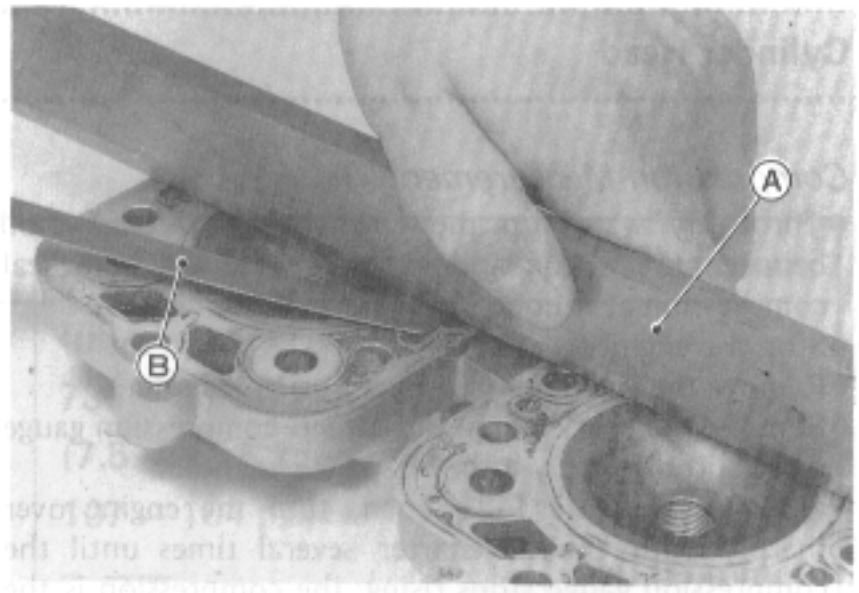
○Tighten the first to about one half of the specified torque, and then tighten them to the specified torque. Finally, retighten them to the specified torque again to check that they are tightened securely. Be sure to follow the specified tightening sequence.



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

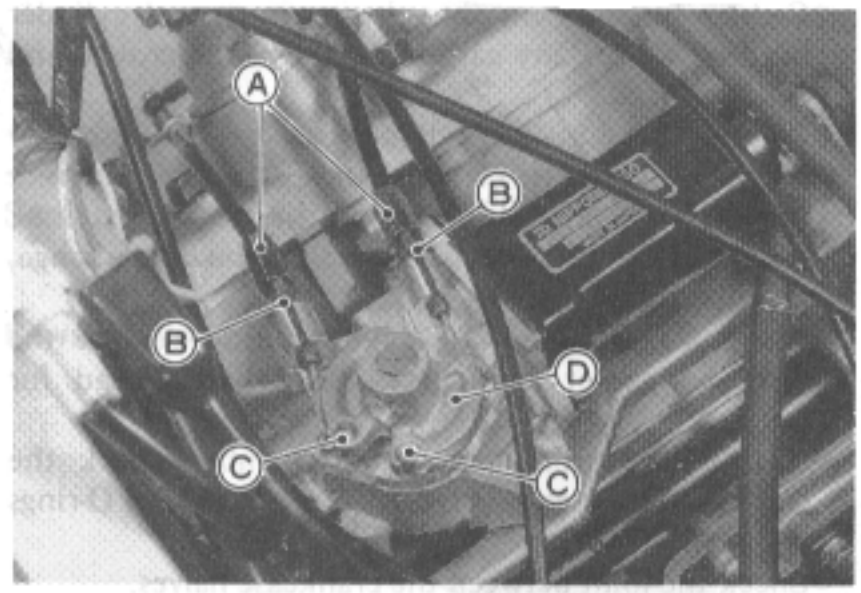
Cylinder Head Warp

Service Limit:	**0.05 mm**

Exhaust Valve (KIPS)

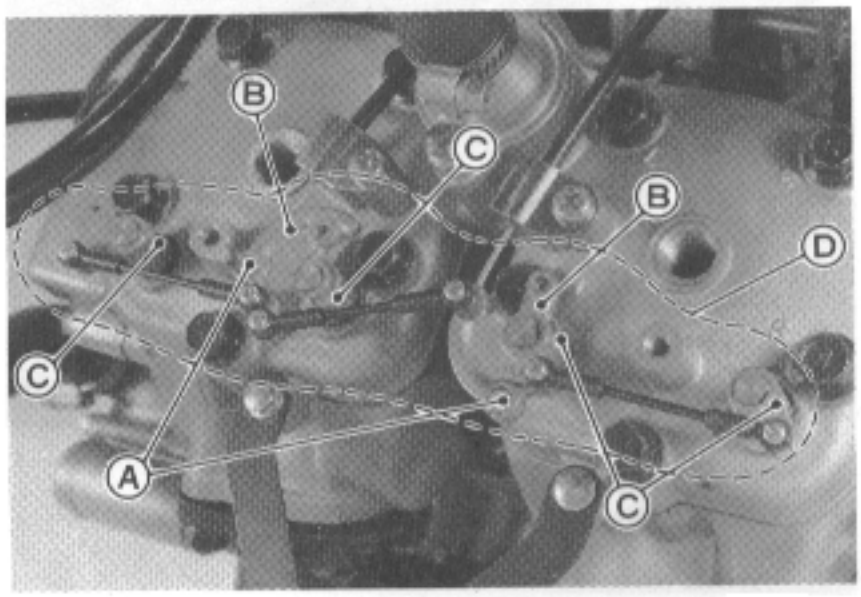
Exhaust Valve Operating Unit Removal

- Remove the following.
  - Seat
  - Side Covers
  - Fuel Tank
  - Fairings
  - Radiator (see Cooling System chapter)
  - Spark Plug
- Loosen the locknuts and screw in both adjusters. Then slip out the tips from the pulley and screw out the adjusters from the bracket.



A. Locknuts
B. Adjusters
C. Cable Upper Ends
D. Pulley

●Slip out the tips from the pullies. Then unscrew the mounting screws and remove the operating unit off the exhaust valves.

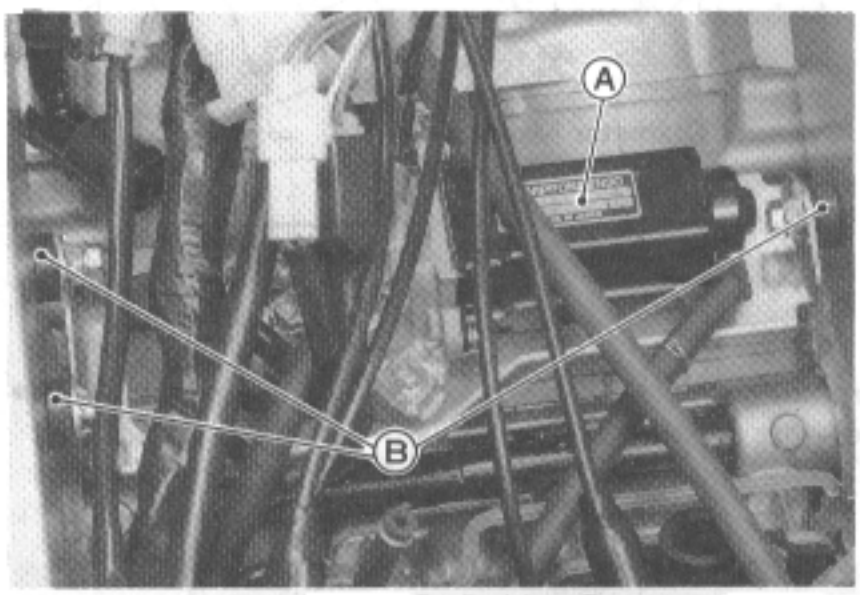


A. Cable Lower Ends
B. Pulley
C. Mounting Screws
D. Operating Unit

●Remove the operating motor.

Exhaust Valve Operating Unit Installation

●Check that the exhaust valve operating motor stops correct position (see CDI Unit/Exhaust Valve Operation Inspection in the Electrical System chapter).
★Visually inspect the rubber dampers on the operating motor mounts, and replace them if necessary.



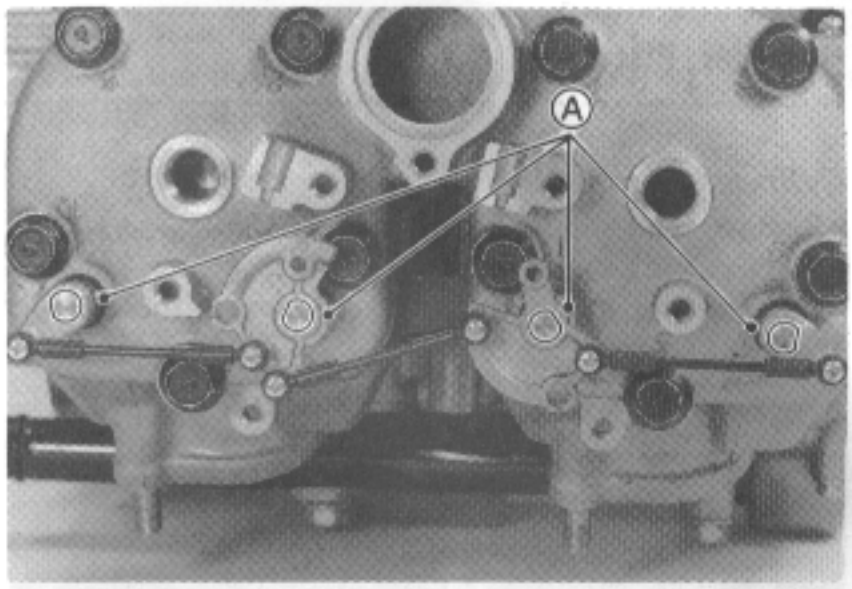
A. Operating Motor
B. Rubber Dampers

●Tighten the exhaust valve operating unit screws to the specified torque (see General Information chapter).

CAUTION

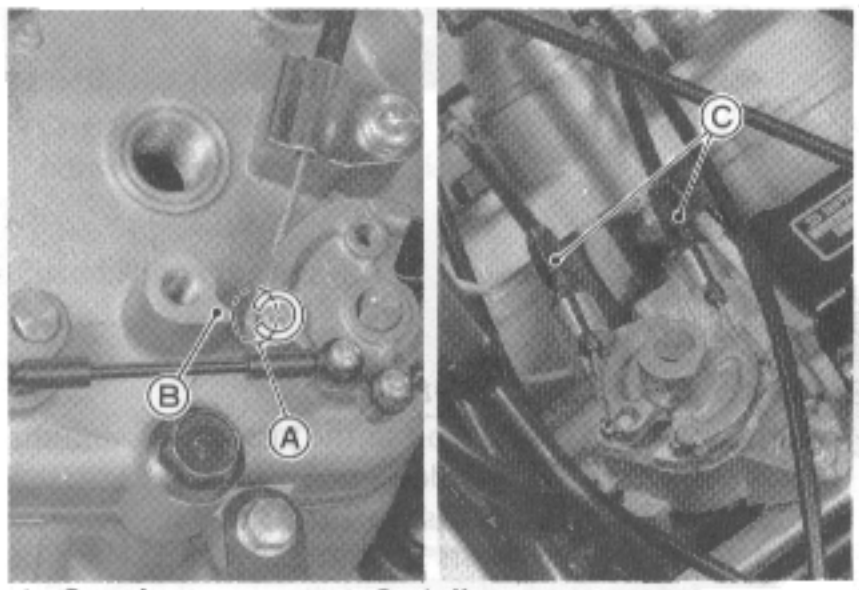
○Take care not to over tighten the exhaust valve operating unit screws to prevent the exhaust valve damage.

●Install the operating unit as shown.



A. Exhaust Valve Operating Unit Screws

●Install the cable lower ends. Fully screw in the adjusters and install the cable upper ends. Then align the opening on the pulley with the cylinder head projection as shown.



A. Opening
B. Projection
C. Adjusters

●With the pulley held, turn out the both adjusters evenly until the cables have no free play.
●Screw in both adjuster 2 times to make proper cable free play.
●Check the exhaust valve operation (see Electrical chapter).

Exhaust Valve Installation Notes

●Scrape out any carbon and clean the valves with a high flash point solvent.

CAUTION

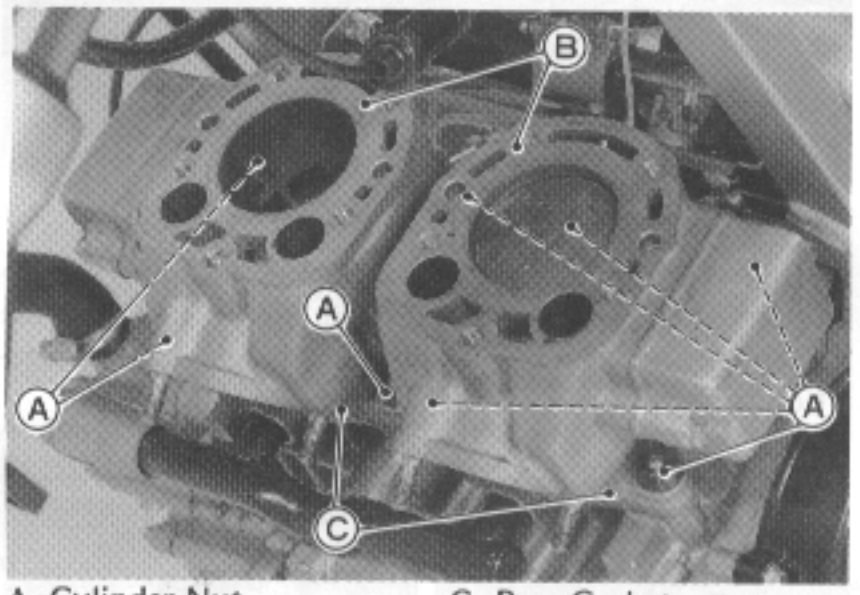
○Take care not to damage the exhaust valves.

●Check the exhaust valves for signs of damage.
★Replace the exhaust valves with new ones if necessary.
●Apply a 2-stroke engine oil at the lower ends of the exhaust valves.

Cylinder, Piston

Cylinder Removal

- Remove the cylinder head and muffler.
- Remove the exhaust valves.
- Unscrew the mounting bolts and remove the cylinder and gasket.

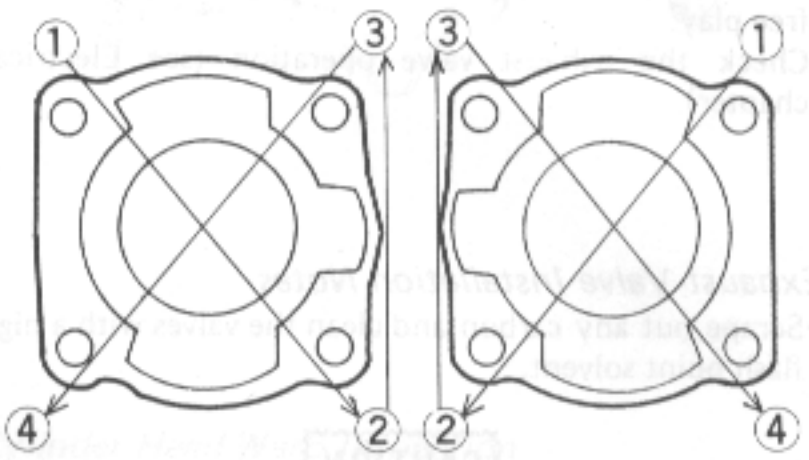


A. Cylinder Nut
B. Cylinder
C. Base Gasket

Cylinder Installation Notes

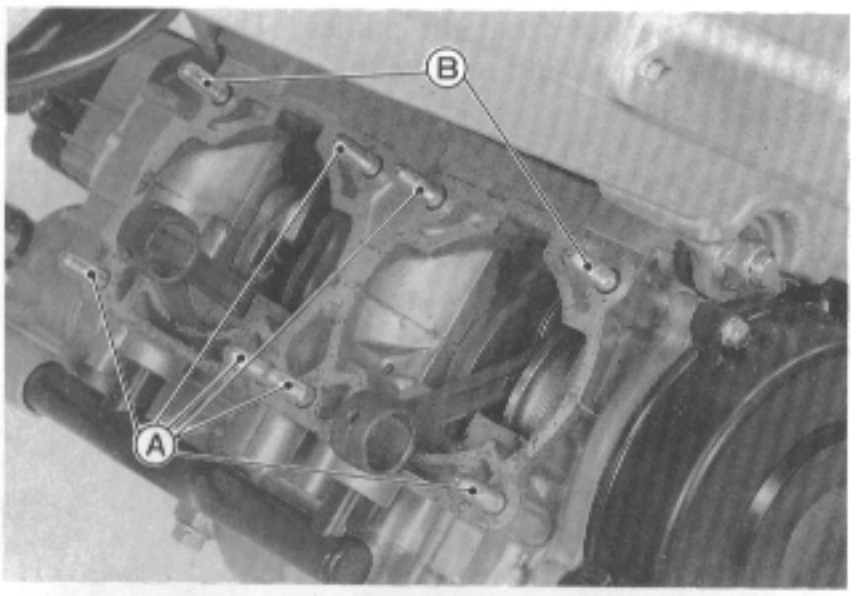
- Apply a little two-stroke oil to the piston rings and the inside surface of the cylinder.
- Install the new cylinder base gasket.
- Tighten the cylinder nuts to the specified torque (see General Information chapter), following the specified tightening sequence.

○Tighten them first to about one half of the specified torque. After cylinder head bolt tightening, tighten the nuts to the specified torque. Be sure to follow the specified tightening sequence.



Cylinder Assembly Note

- Screw the cylinder studs in the correct locations and specified torque (see General Information chapter).



A. 25 mm Length B. 30 mm Length

Cylinder Wear Inspection

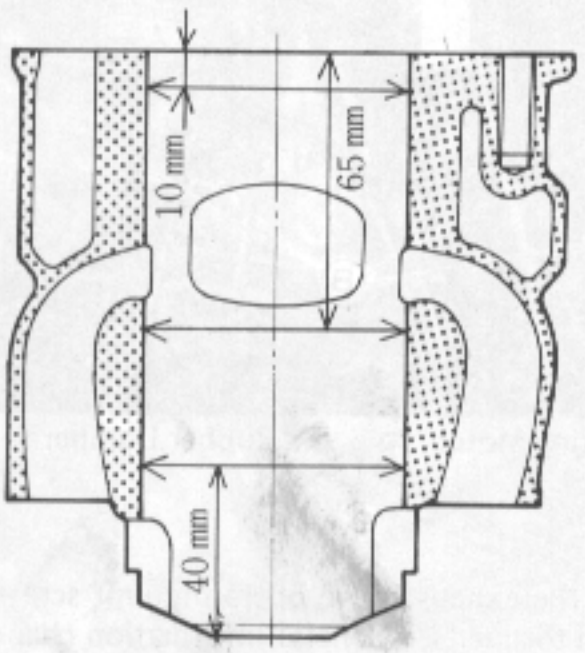
- Inspect the inside of the cylinder for scratches and abnormal wear.

★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

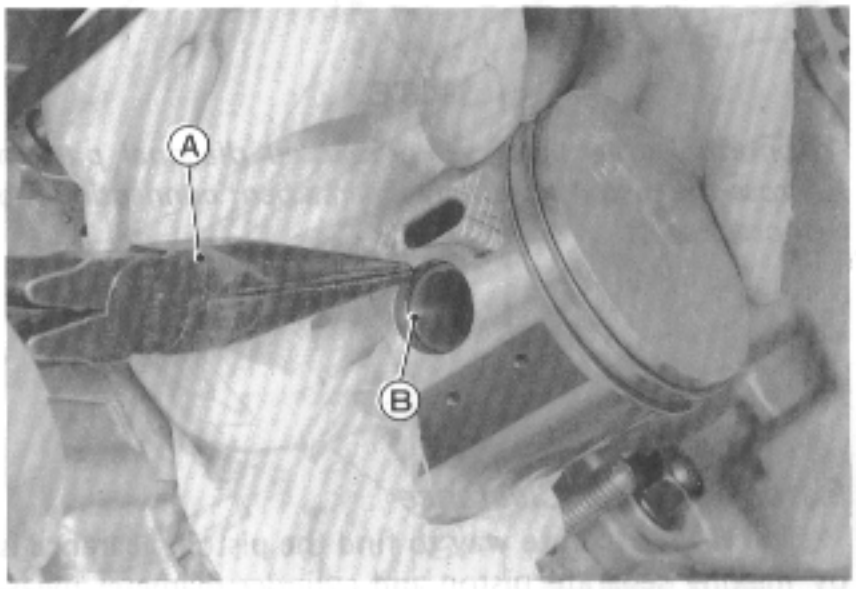


Cylinder Inside Diameter

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 measurement**

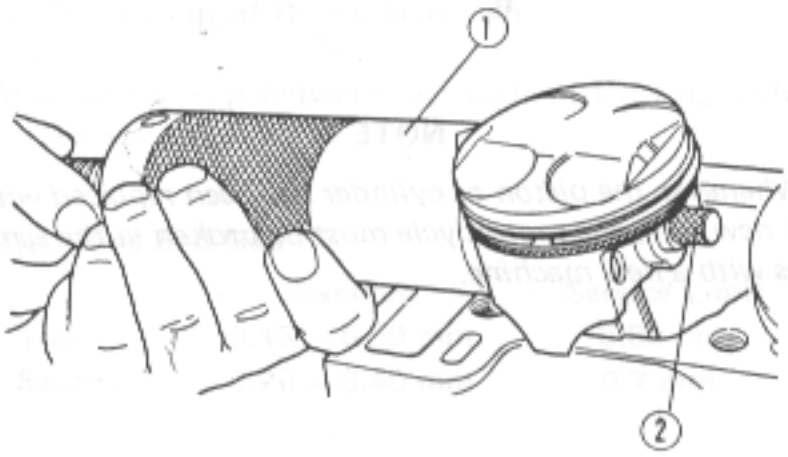
Piston Removal Notes

- Remove the piston pin snap ring.



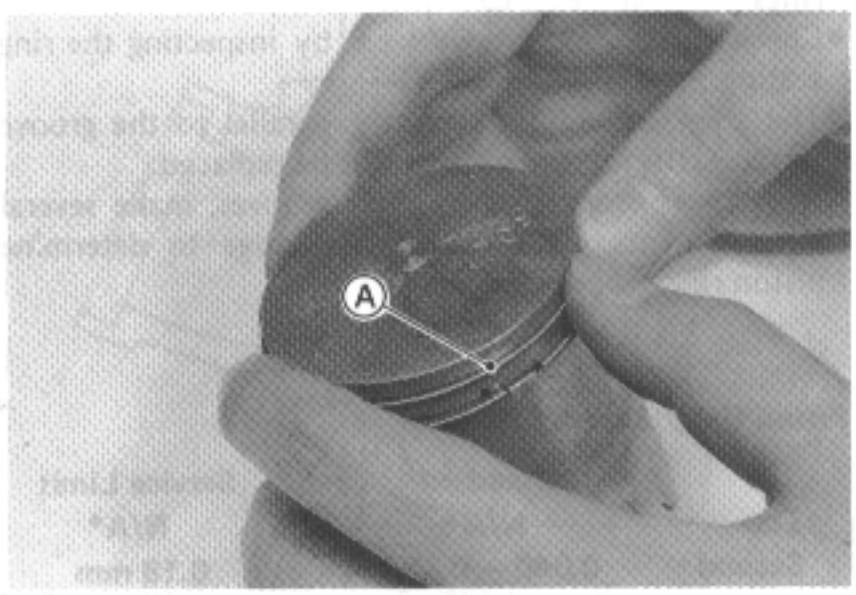
A. Pliers B. Snap Ring

- 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.



1. Piston Pin Puller Assembly: 57001-910
2. Adapter

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

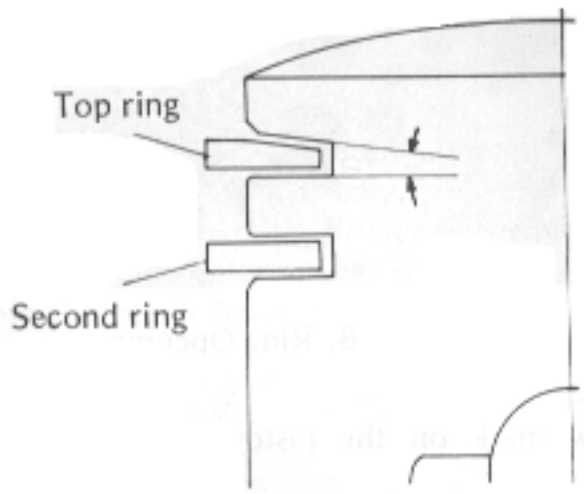


A. Piston Ring

Piston Installation Notes

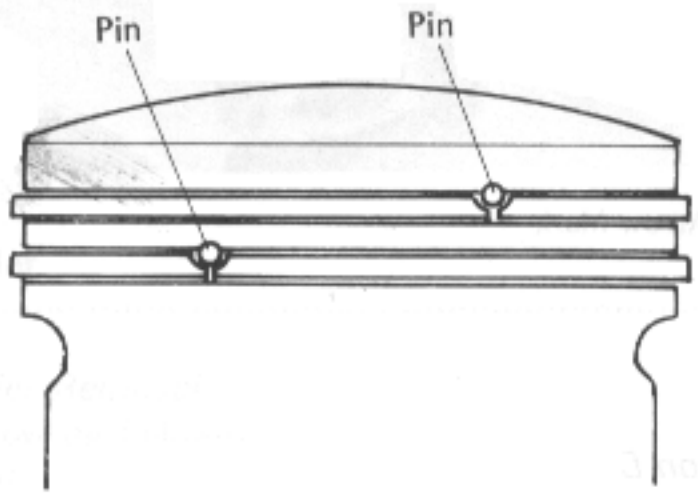
- Install the piston rings so that the correct side faces upwards as shown

Piston Ring



- 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



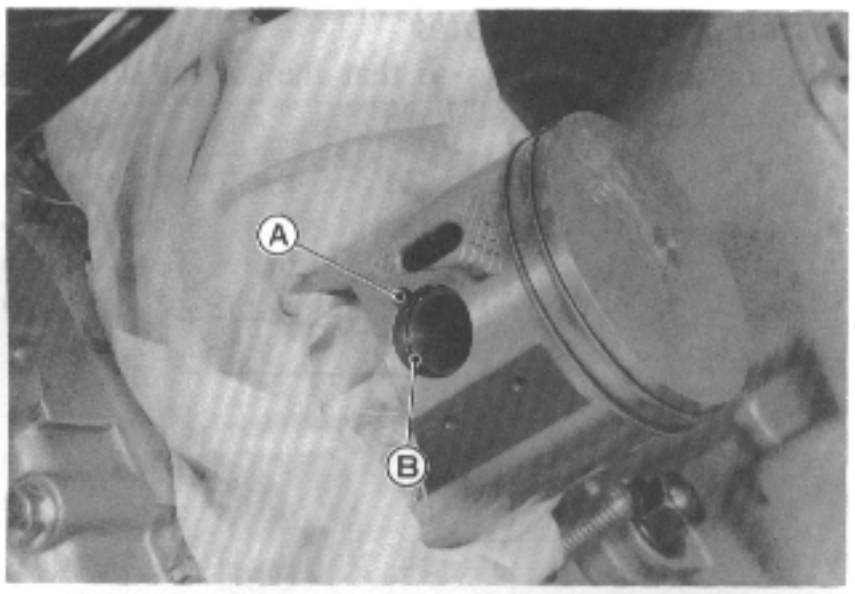
CAUTION

○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

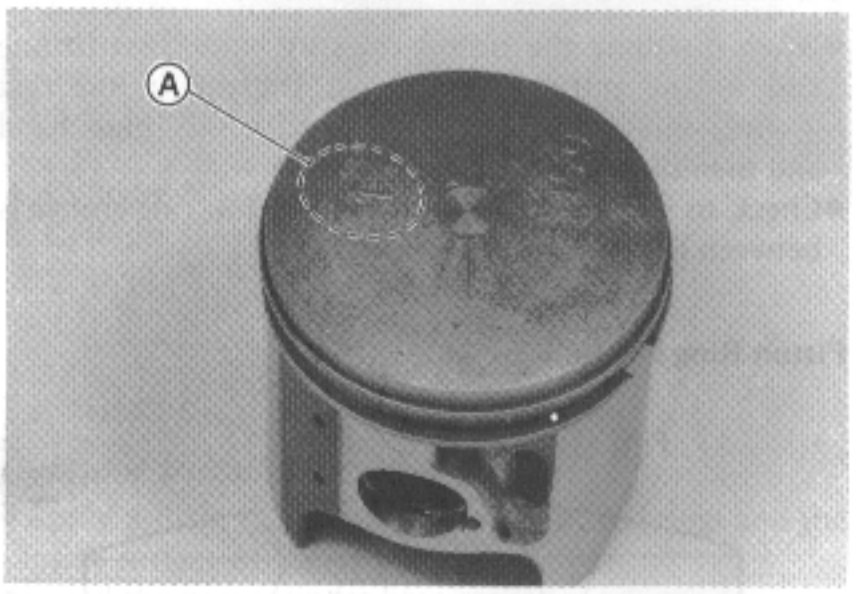
○Do not reuse snap rings, since removal weakens and deforms them. They could fall out and score the cylinder wall.

- Fit a new piston pin snap ring into the side of the piston so that the ring opening does no coincide with the slits of the piston pin hole.



A. Slit B. Ring Opening

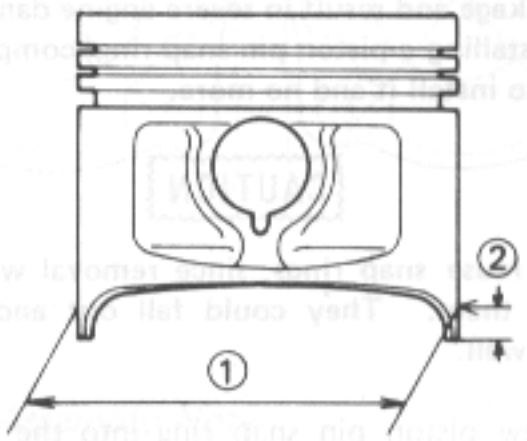
- The arrow mark on the piston must point toward front.



A. Arrow Mark

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.



1. Piston Diameter 2. 10 mm

Piston Diameter

Standard:	**55.960 – 55.975 mm**
Service Limit:	**55.81 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

0.040 – 0.070 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

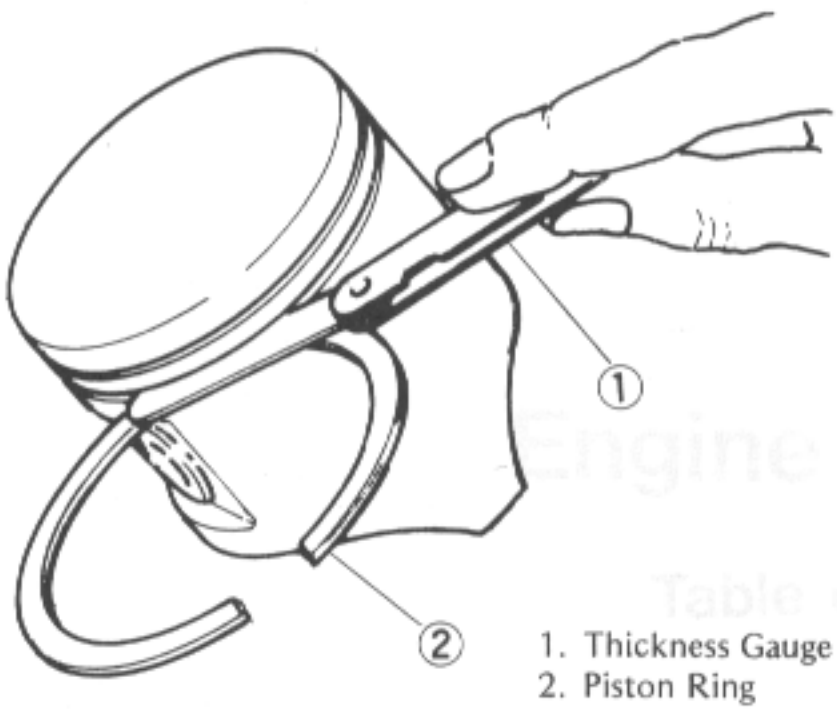
- Visually inspect the piston rings and the piston ring grooves.
- ★If the rings are worn unevenly or damaged, they must be replaced.
- ★If the piston ring grooves are worn unevenly or damaged, the piston must be replaced and fitted with new rings.
- Check for uneven groove wear by inspecting the ring 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	**0.040 – 0.080 mm**	**0.18 mm**

***Tapered Ring**

Groove Clearance Measurement



1. Thickness Gauge
2. Piston Ring

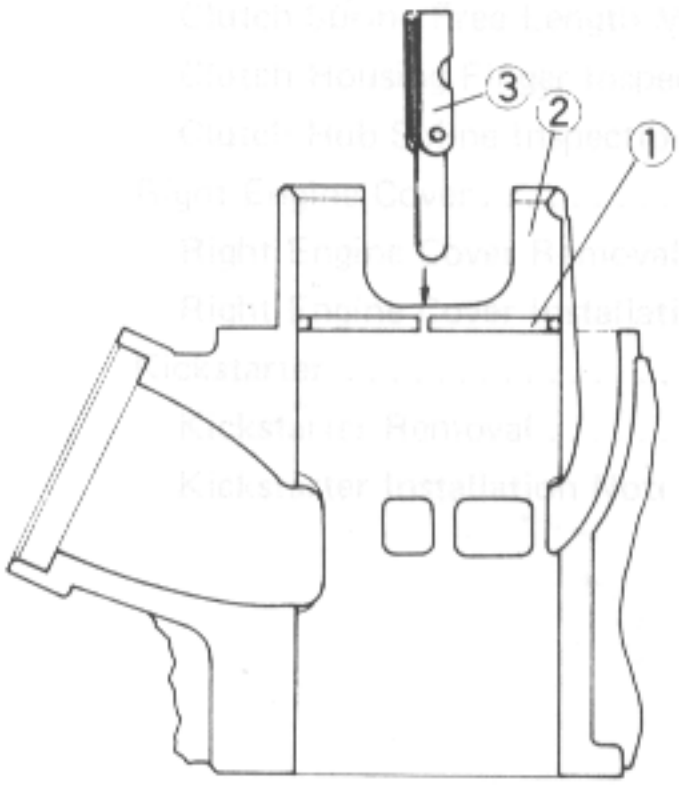
Piston Ring End Gap

- 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 – 0.30 mm	0.60 mm
Second	0.25 – 0.40 mm	0.7 mm

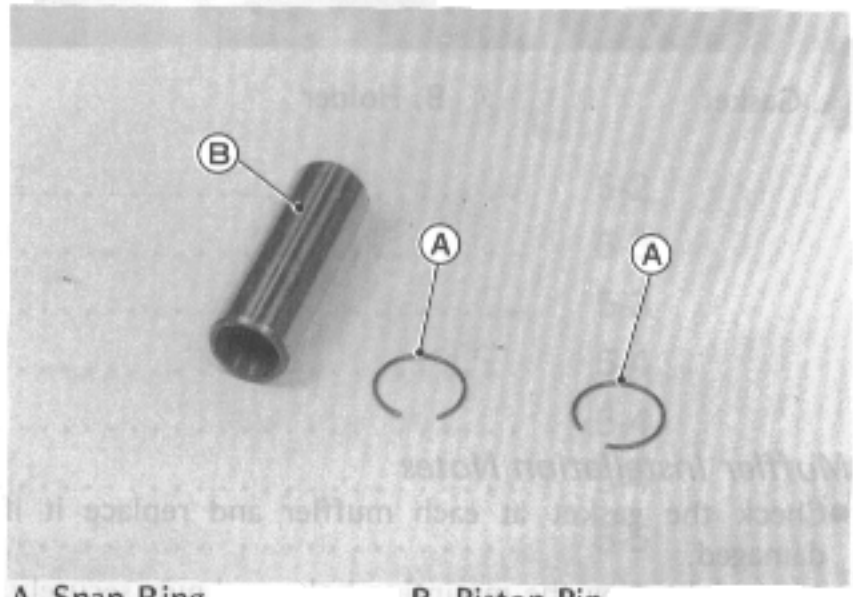
End Gap Measurement



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

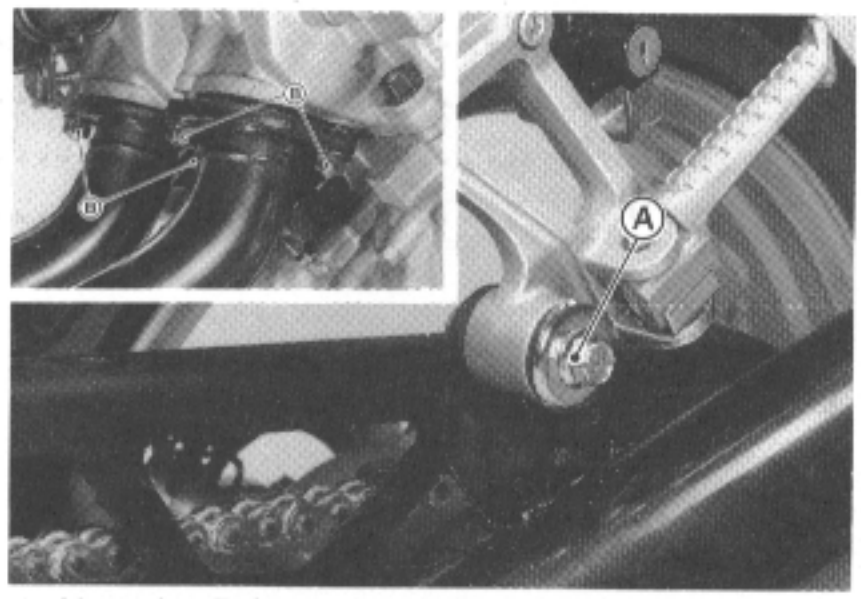


A. Snap Ring B. Piston Pin

Muffler

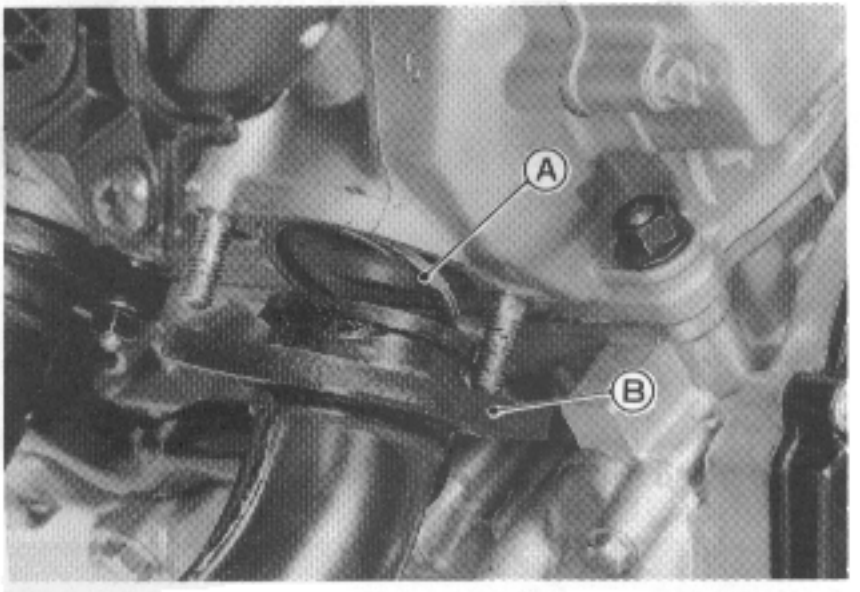
Muffler Removal

- Remove the following.
  - Seat
  - Side Covers
  - Fuel Tank
  - Fairings



A. Mounting Bolt B. Mounting Nut

- Remove the muffler and gasket.



A. Gasket B. Holder

Muffler Installation Notes

- Check the gasket at each muffler and replace it if damaged.
- After tightening the mounting bolts and nuts securely, thoroughly warm up the engine, wait until the engine cools down and tighten all mounting bolts and nuts.