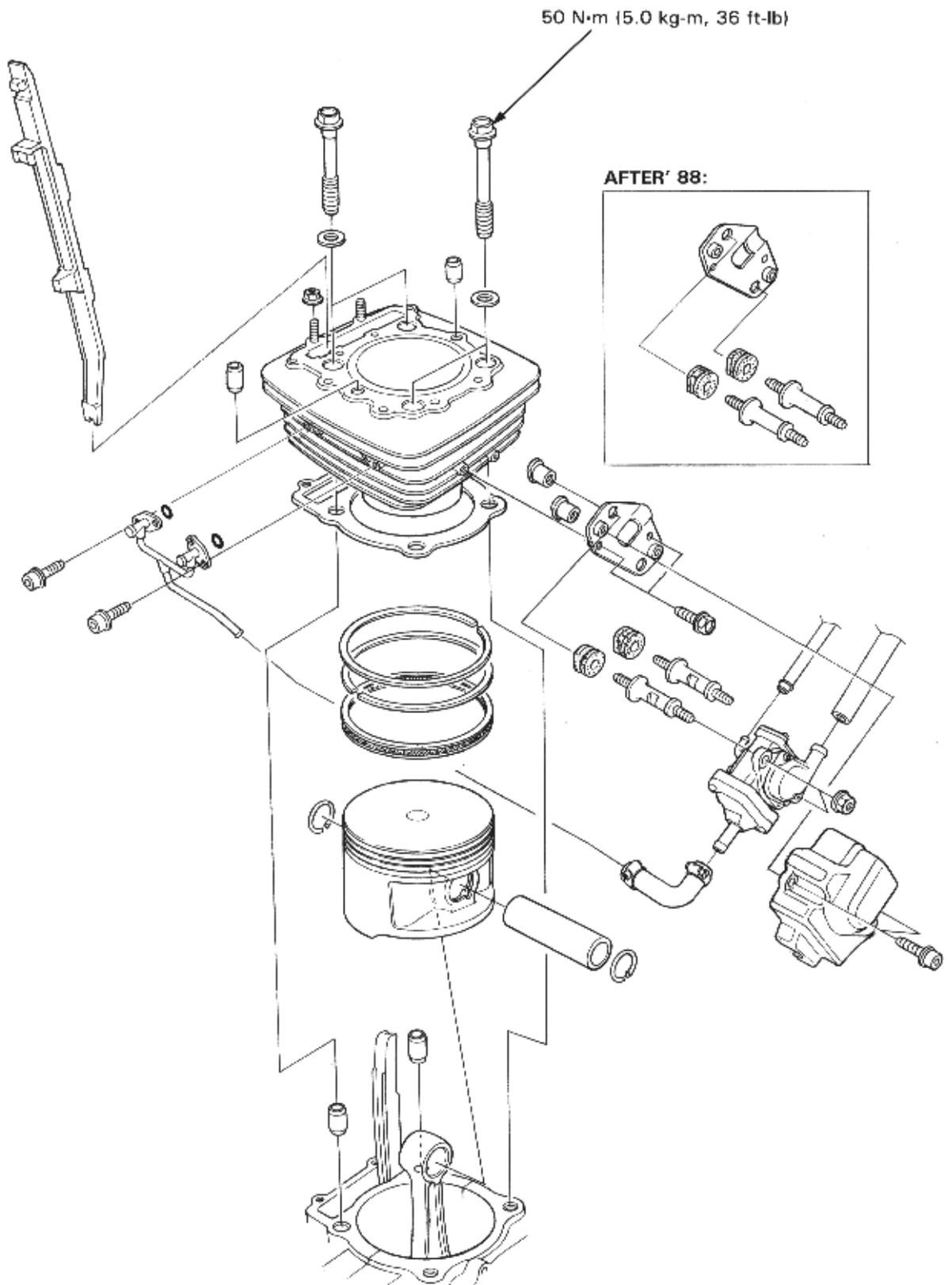


CYLINDER/PISTON



7. CYLINDER/PISTON

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SERVICE INFORMATION

GENERAL

- This section covers service of the cylinder and piston. These procedures can be performed with the engine in the frame.
- If the connecting rod small end I.D. exceeds the service limit, see section 10 for the crankshaft removal.

SPECIFICATIONS

ITEM		STANDARD	SERVICE LIMIT
Cylinder	I.D.	100.000–100.010 mm (3.9354–3.9374 in)	100.12 mm (3.942 in)
	Taper	—	0.05 mm (0.002 in)
	Out of round	—	0.05 mm (0.002 in)
	Warpage across top	—	0.10 mm (0.004 in)
Piston	O.D. at skirt	99.960–99.980 mm (3.9370–3.9362 in)	99.85 mm (3.931 in)
	Piston pin bore	24.002–24.008 mm (0.9450–0.9452 in)	24.03 mm (0.946 in)
	Piston pin-to-piston clearance	0.002–0.014 mm (0.0001–0.0006 in)	0.07 mm (0.003 in)
Piston ring end gap	Top	0.20–0.40 mm (0.008–0.016 in)	0.50 mm (0.020 in)
	Second	0.35–0.55 mm (0.014–0.022 in)	0.65 mm (0.026 in)
	Oil (side Rail)	0.2–0.9 mm (0.01–0.04 in)	—
Piston ring-to-groove clearance	Top	0.030–0.065 mm (0.0012–0.0026 in)	0.12 mm (0.005 in)
	Second	0.015–0.045 mm (0.0006–0.0018 in)	0.12 mm (0.005 in)
Cylinder-to-piston clearance		0.02–0.05 mm (0.0008–0.0020 in)	0.10 mm (0.004 in)
Piston pin O.D.		23.989–23.995 mm (0.9444–0.9447 in)	23.96 mm (0.943 in)
Connecting rod small end I.D.		24.020–24.041 mm (0.9457–0.9465 in)	24.07 mm (0.948 in)

TORQUE VALUES

Cylinder bolt 10 mm bolt:	50 N·m (5.0 kg-m, 36 ft-lb)	Apply oil to the threads
6 mm SH bolt:	10 N·m (1.0 kg-m, 7 ft-lb)	

TROUBLESHOOTING

Low or Unstable Compression

- Worn cylinder or piston rings
- Faulty decompressor cam

Excessive Smoke

- Worn cylinder, piston or piston rings
- Improper installation of piston rings
- Scored or scratched piston or cylinder wall

Overheating

- Excessive carbon build-up on piston head or combustion chamber

Knocking or Abnormal Noise

- Worn piston and cylinder
- Excessive carbon build-up on piston head or combustion chamber

NOTE

- If the piston, rings or cylinder show excessive wear, check for dirt passing the air filter due to improper installation or sealing.

CYLINDER/PISTON

CYLINDER REMOVAL

Remove the cylinder head (Section 6).
Remove the cam chain guide.

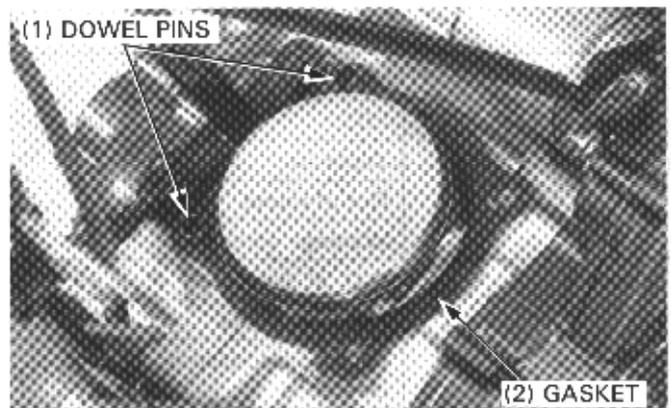
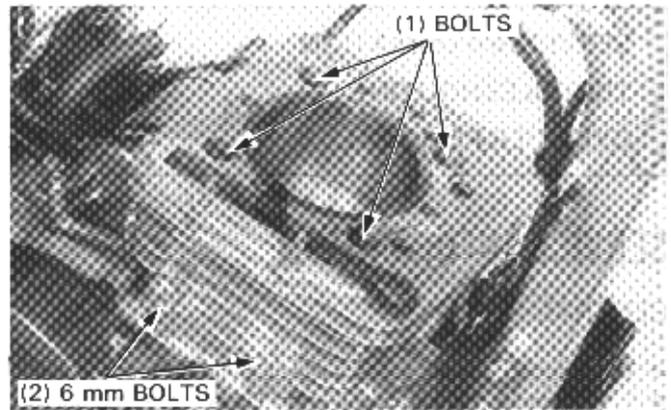
Remove the two 6 mm small head bolts on the right side of the cylinder.

Remove the four cylinder mounting bolts, then remove the cylinder.

NOTE

- Loosen the bolts in a crisscross pattern in two or more steps.

Remove the dowel pins and cylinder gasket.



CYLINDER INSPECTION

Inspect the cylinder wall for scratches and wear.

Measure and record the cylinder I.D. at three levels in both an X and Y axis. Take the maximum reading to determine the cylinder wear.

SERVICE LIMIT: 100.12 mm (3.942 in)

Calculate the piston-to-cylinder clearance. Take the maximum reading to determine the clearance.

SERVICE LIMIT: 0.10 mm (0.004 in)

Calculate the cylinder for taper at three levels in an X and Y axis. Take the maximum reading to determine the taper.

SERVICE LIMIT: 0.05 mm (0.002 in)

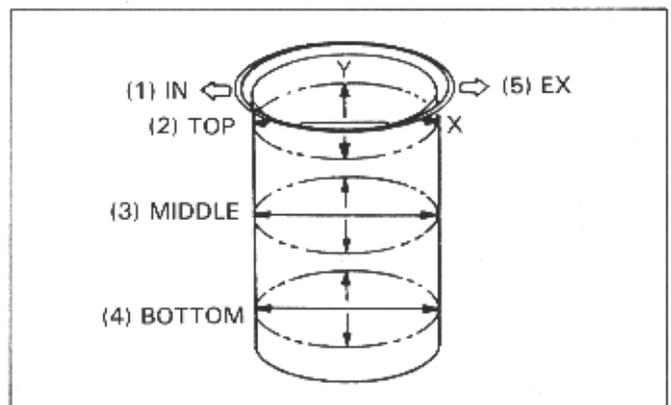
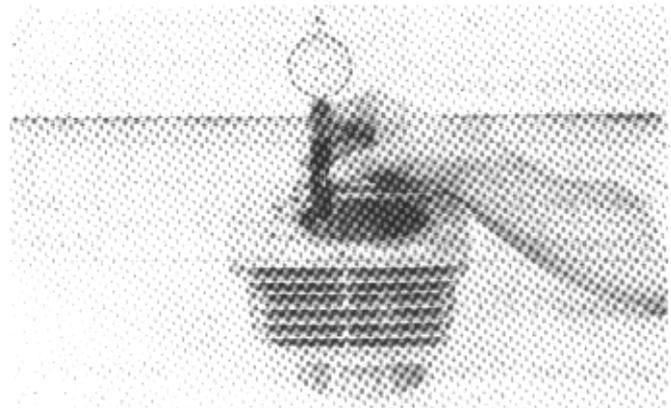
Calculate the cylinder for out-of-round at three levels in an X and Y axis. Take the maximum reading to determine the out-of-round.

SERVICE LIMIT: 0.05 mm (0.002 in)

The cylinder must be rebored and oversize piston fitted if the cylinder limits are exceeded.

**The following oversize piston are available:
100.25 mm (3.947 in) and 100.50 mm (3.957 in)**

The cylinder must be rebored so that the clearance to an oversize piston is 0.02 – 0.05 mm (0.0008 – 0.0020 in)

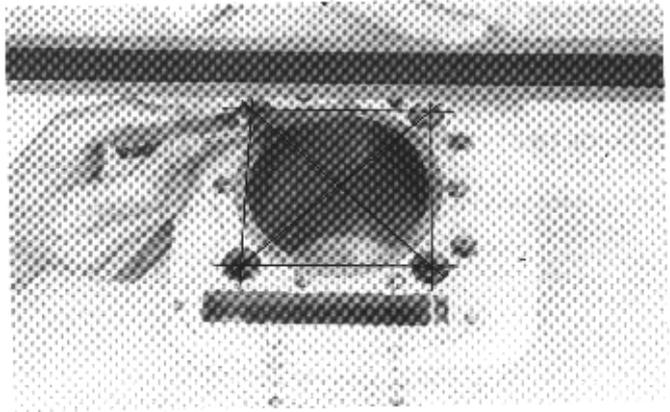


Clean the cylinder gasket surface.
Inspect the cylinder for transverse warpage across the top.

NOTE

- Measure the warpage using a straight edge and feeler gauge in the directions as shown.

SERVICE LIMIT: 0.10 mm (0.004 in)

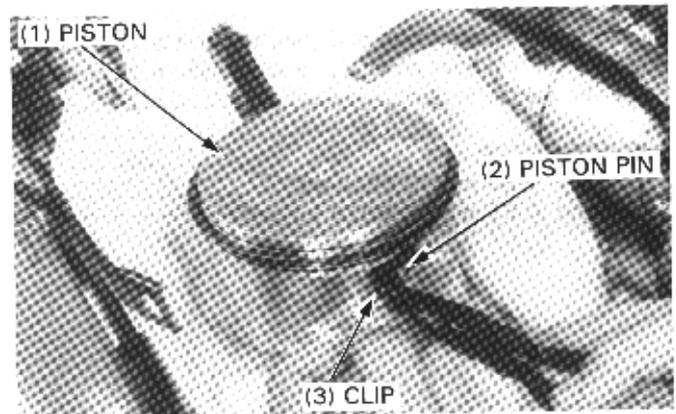
**PISTON REMOVAL**

Place a shop towel into the crankcase opening and remove the piston clips and discard them.

NOTE

- Do not let the clips fall into the crankcase.

Push the piston pin out and remove the piston.

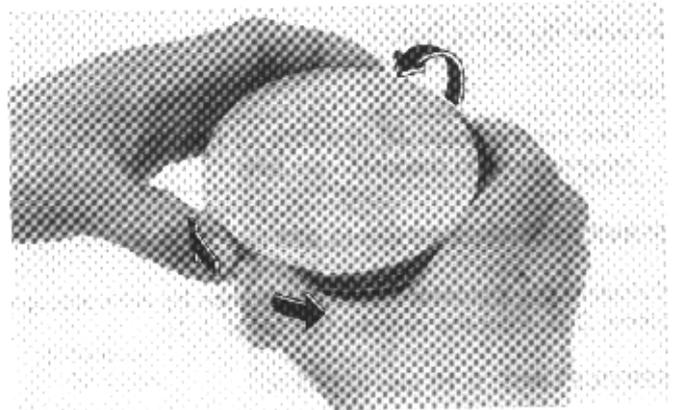
**PISTON/PISTON RING INSPECTION**

Remove the piston rings from the piston.

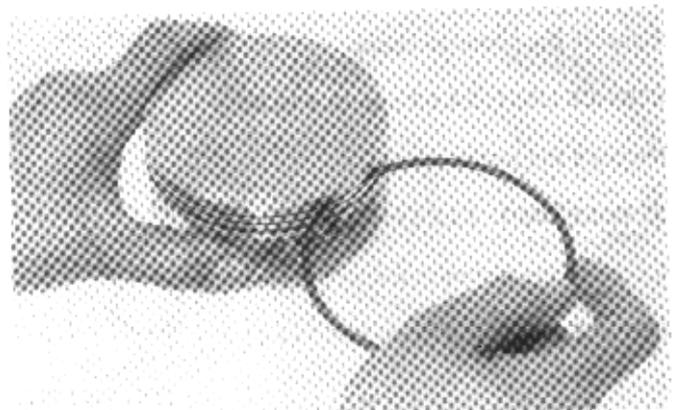
NOTE

- Do not damage the piston rings when removing them.

Inspect the piston for cracks or other damage and the ring grooves for excessive wear or carbon build-up.



Insert the outside surface of the ring into the proper ring groove and roll it around in the groove to make sure that the ring has a free fit around the piston's circumference and clean the ring grooves.

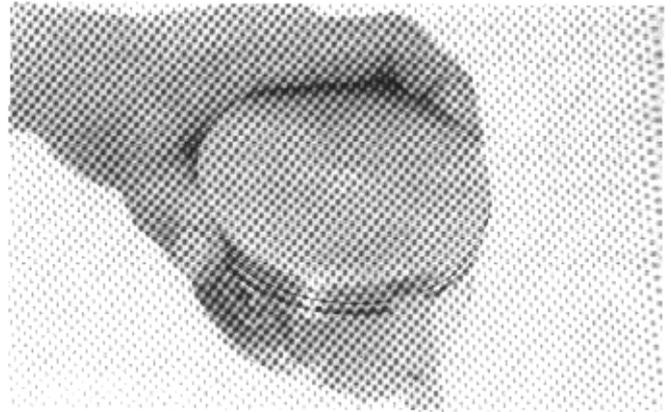


CYLINDER/PISTON

Install the piston rings into the piston ring grooves (page 7-5). Measure the piston ring-to-groove clearance, pushing the piston rings into the ring grooves.

SERVICE LIMIT: Top/Second: 0.12 mm (0.005 in)

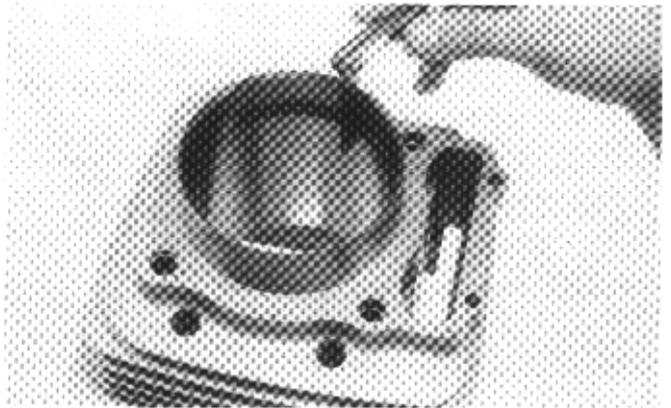
After measurement, remove the piston ring from the piston.



Measure each piston ring end gap; using a piston, push the ring into the cylinder squarely to the position as shown and make the measurement.

SERVICE LIMITS:

Top: 0.50 mm (0.0020 in)
Second: 0.65 mm (0.0026 in)



Measure the piston O.D.

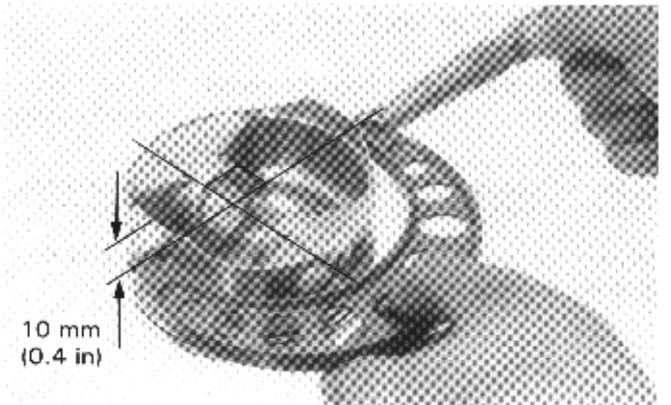
NOTE

- Take measurement 10 mm (0.4 in) from the bottom, and perpendicular to the piston pin hole.

SERVICE LIMIT: 99.85 mm (3.931 in)

Calculate the piston-to-cylinder clearance by subtracting the piston O.D. from the cylinder I.D. (page 7-2)

SERVICE LIMIT: 0.10 mm (0.004 in)



Measure the piston pin bore.

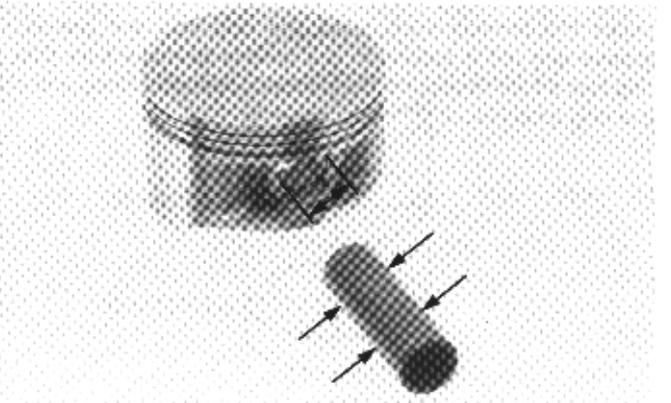
SERVICE LIMIT: 24.03 mm (0.946 in)

Measure the piston pin O.D.

SERVICE LIMIT: 23.96 mm (0.943 in)

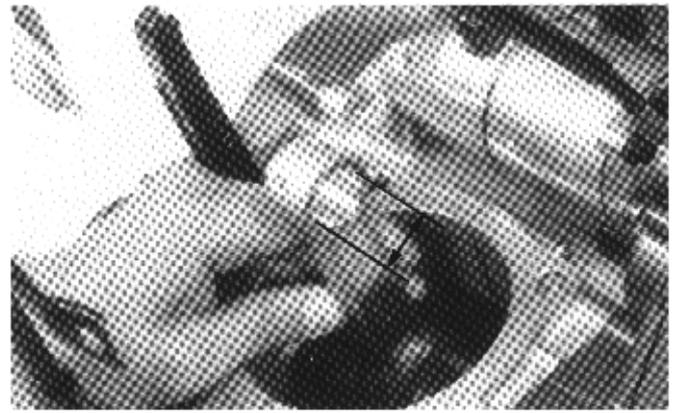
Calculate the piston-to-piston pin clearance.

SERVICE LIMIT: 0.07 mm (0.003 in)



Measure the I.D. of the connecting rod small end.

SERVICE LIMIT: 24.07 mm (0.948 in)



PISTON RING INSTALLATION

Apply clean engine oil to the piston rings. Install the piston rings into the piston ring grooves with the marks facing up.

NOTE

- Be careful not to damage the piston and piston rings during assembly.

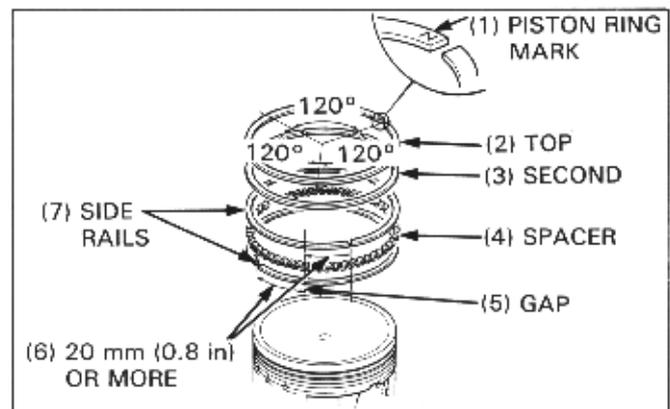
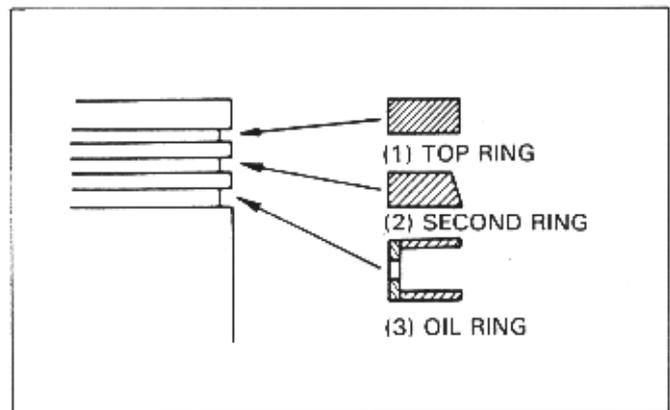
Stagger the ring end gaps 120 degrees from each other as shown.

Do not align the oil ring (side rail) gaps.

NOTE

- To install the oil ring, install the spacer first, then install the side rails.

After installing the rings, check that they rotate freely without sticking.



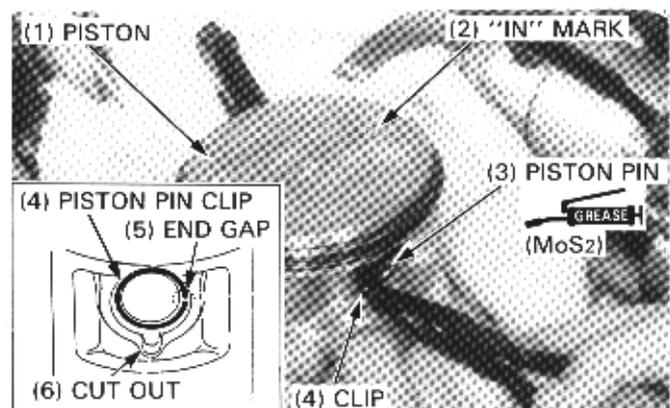
PISTON INSTALLATION

Cover the crankcase opening with a shop towel. Apply MoS₂ paste (page 2-14) to the sliding surfaces of the piston pin and connecting rod small end. Insert the piston pin through the piston and connecting rod, and secure them with new piston pin clips.

NOTE

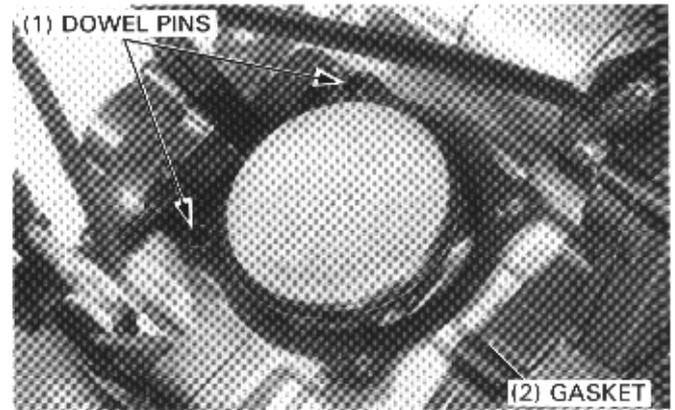
- Install the piston with the mark "IN" facing the intake side.
- After installing the piston pin clips, make sure that they are seated properly and the end gaps are not aligned with the cut-out in the piston.
- Be careful not to let the clips fall into the crankcase.

Clean any gasket material from the cylinder base surface.



CYLINDER INSTALLATION

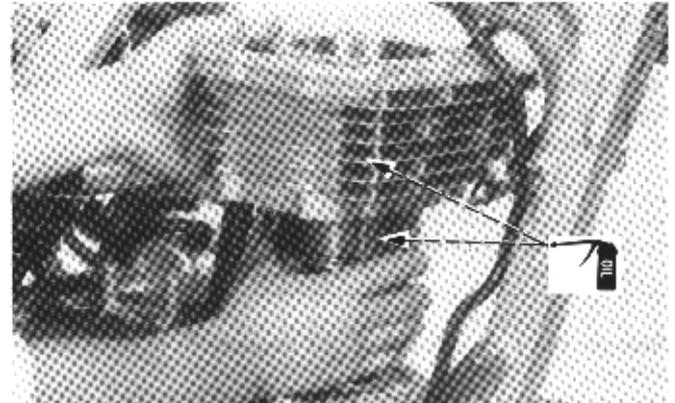
Install the dowel pins and a new gasket.



Coat the outer surface of the piston and inner surface of the cylinder with clean engine oil. Position the piston at the T.D.C. (Top dead center on compression stroke), and install it into the cylinder while compressing the piston rings with your fingers.

NOTE

- Be careful not to damage the piston rings during assembly.
- When the cylinder is halfway over the piston, route the cam chain through the cylinder.



Apply oil to the cylinder bolts (10 mm) and washers, and tighten the bolts in a crisscross pattern in two or more steps.

TORQUE: 50 N·m (5.0 kg·m, 36 ft·lb)

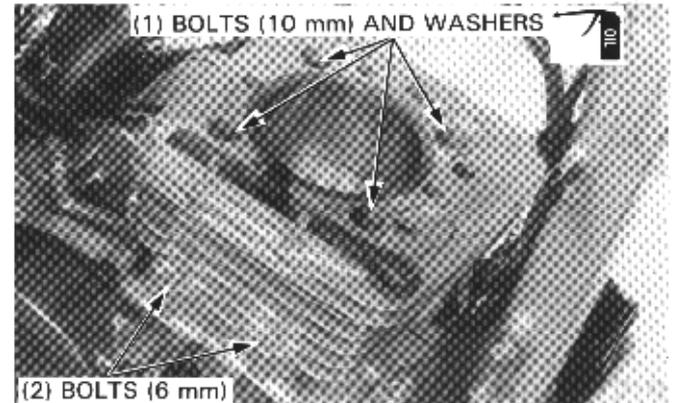
Tighten the cylinder bolts (6 mm).

TORQUE: 10 N·m (1.0 kg·m, 7 ft·lb)

Install the cam chain guide.

NOTE

- Fit the cam chain guide tab in the cylinder cut-out and push the guide until it bottoms in the crankcase guide hole.



Install the cylinder head (page 6-16).