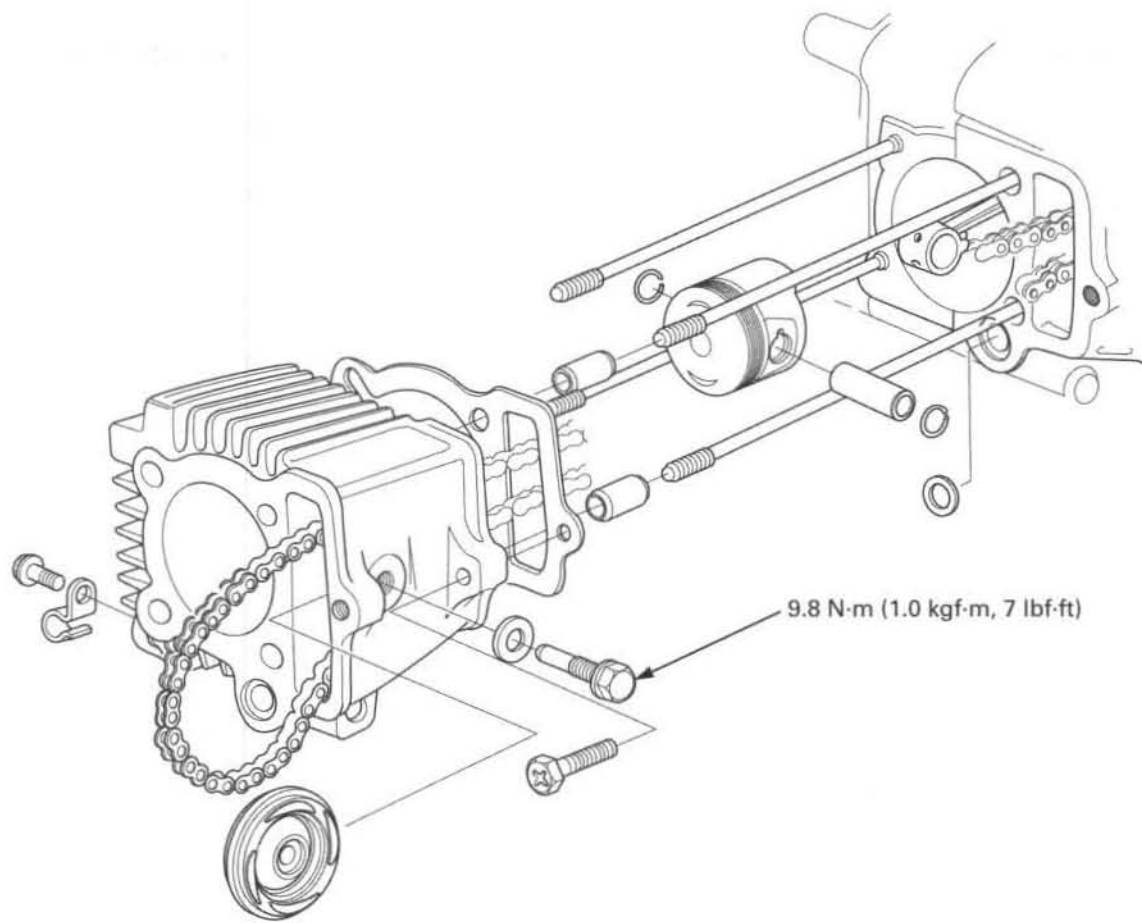


8. CYLINDER/PISTON

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COMPONENT LOCATION



SERVICE INFORMATION

GENERAL

- The cylinder and piston service can be done with the engine installed in the frame.
- Camshaft lubrication oil is fed to the cylinder head through an orifice in the cylinder head, cylinder and crankcase. Be sure that this orifice is not clogged and that the O-rings and dowel pins are in place before installing the cylinder.

SPECIFICATIONS

Unit: mm (in)

ITEM		STANDARD	SERVICE LIMIT	
Cylinder	I.D.	39.005 – 39.015 (1.5356 – 1.5360)	39.05 (1.537)	
	Out of round	–	0.10 (0.004)	
	Taper	–	0.10 (0.004)	
	Warpage	–	0.05 (0.002)	
Piston, piston rings	Piston mark direction	"IN" mark facing toward the intake side	–	
	Piston O.D.	38.975 – 38.995 (1.5344 – 1.5352)	38.90 (1.531)	
	Piston O.D. measurement point	8 mm (0.3 in) from bottom of skirt	–	
	Piston pin bore I.D.	13.002 – 13.008 (0.5119 – 0.5121)	13.06 (0.514)	
	Piston pin O.D.	12.994 – 13.000 (0.5116 – 0.5118)	12.98 (0.511)	
	Piston-to-piston pin clearance		0.002 – 0.014 (0.0001 – 0.0006)	0.08 (0.003)
	Piston ring-to-ring groove clearance	Top/Second	0.015 – 0.050 (0.0006 – 0.0020)	0.12 (0.005)
	Piston ring end gap	Top	0.05 – 0.15 (0.002 – 0.006)	0.5 (0.02)
		Second	0.05 – 0.20 (0.002 – 0.008)	0.5 (0.02)
Oil (side rail)		0.3 – 0.9 (0.01 – 0.04)	1.1 (0.04)	
Cylinder-to-piston clearance		0.010 – 0.040 (0.0004 – 0.0016)	0.15 (0.006)	
Connecting rod small end I.D.		13.016 – 13.034 (0.5124 – 0.5131)	13.08 (0.515)	
Connecting rod-to-piston pin clearance		0.016 – 0.040 (0.0006 – 0.0016)	0.12 (0.005)	

TORQUE VALUE

Cam chain guide roller pin bolt 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

TROUBLESHOOTING

- If the performance is poor at low speeds, check for white smoke in the crankcase breather hose. If the hose is smoky, check for a seized piston ring.

Cylinder compression is too low, or engine is hard to start

- Blown cylinder head gasket
- Worn, stuck or broken piston ring
- Worn or damaged cylinder or piston

Cylinder compression is too high, or engine overheats or knocks

- Carbon deposits on the cylinder head and/or piston crown

Piston sounds

- Worn cylinder, piston and/or piston ring
- Worn piston pin hole and piston pin
- Worn connecting rod small end

Excessive smoke

- Worn, stuck or broken piston ring

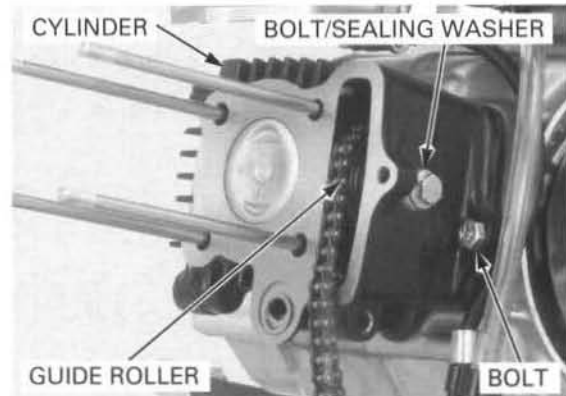
CYLINDER/PISTON

CYLINDER REMOVAL

Remove the cylinder head (page 7-7).

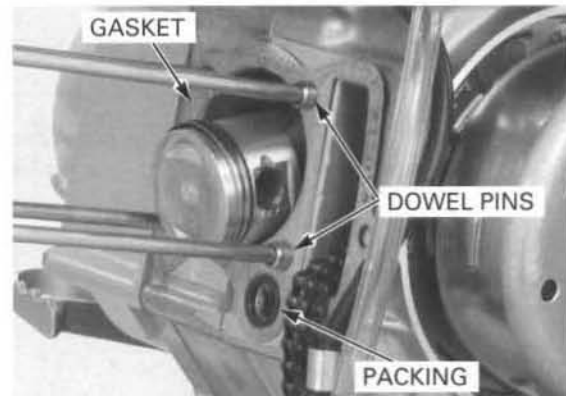
Remove the cam chain guide roller pin bolt, sealing washer and guide roller.

Remove the mounting bolt and cylinder.



Remove the following:

- Rubber packing
- Gasket
- Dowel pins

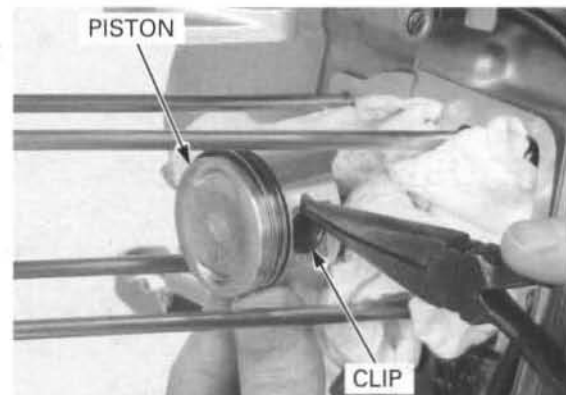


PISTON REMOVAL

Do not let the piston pin clips fall into the crankcase.

Remove the piston pin clip with pliers.

Press the piston pin out of the piston and remove the piston.



Do not damage the piston rings during removal.

Remove the piston rings.



CYLINDER/PISTON INSPECTION

Inspect the cylinder bore for wear or damage. Measure the cylinder I.D. in X and Y axis at three levels. Take the maximum reading to determine the cylinder wear.

SERVICE LIMIT: 39.05 mm (1.537 in)

Calculate the piston-to-cylinder clearance. Take a maximum reading to determine the clearance. Refer to page 8-6 for measurement of the piston O.D.

SERVICE LIMIT: 0.15 mm (0.006 in)

Calculate the taper and out of round at three levels in X and Y axis. Take the maximum reading to determine them.

SERVICE LIMITS:

Taper: 0.10 mm (0.004 in)

Out of round: 0.10 mm (0.004 in)

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

The following oversize pistons are available:

0.25 mm (0.010 in)

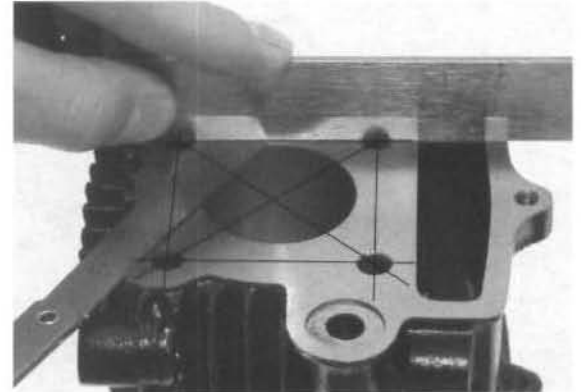
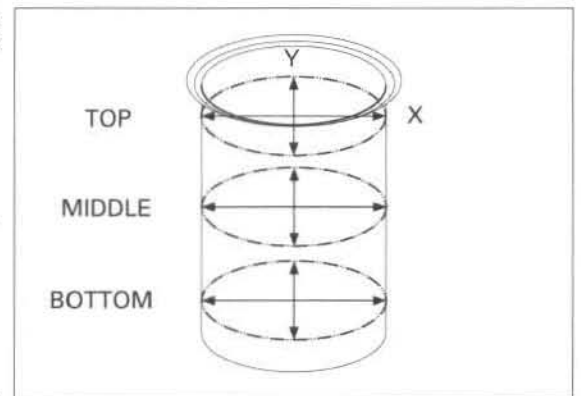
0.50 mm (0.020 in)

The piston to cylinder clearance for the oversize piston must be: 0.010 – 0.040 mm (0.0004 – 0.0016 in).

Inspect the top of the cylinder for warpage.

SERVICE LIMIT: 0.05 mm (0.002 in)

Remove any carbon deposits from the piston ring grooves, using an old piston ring as shown.



CYLINDER/PISTON

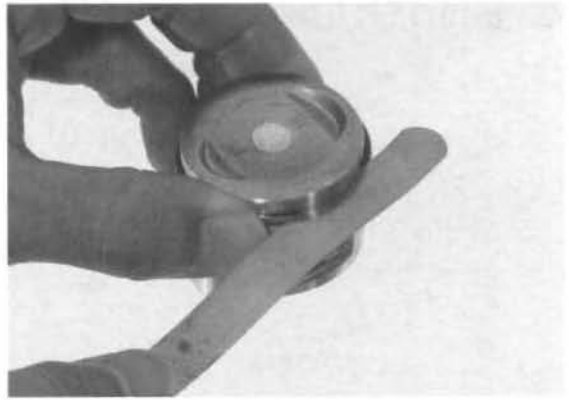
Temporarily install the piston rings to their proper position with the mark facing up.

Measure the piston ring-to-ring groove clearance with the rings pushed into the grooves.

SERVICE LIMITS:

Top: 0.12 mm (0.005 in)

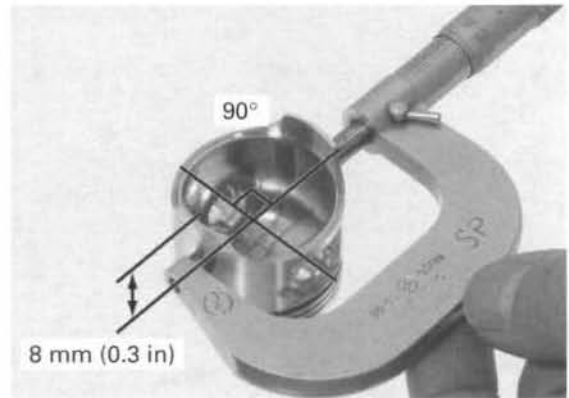
Second: 0.12 mm (0.005 in)



Inspect the piston for wear or damage.

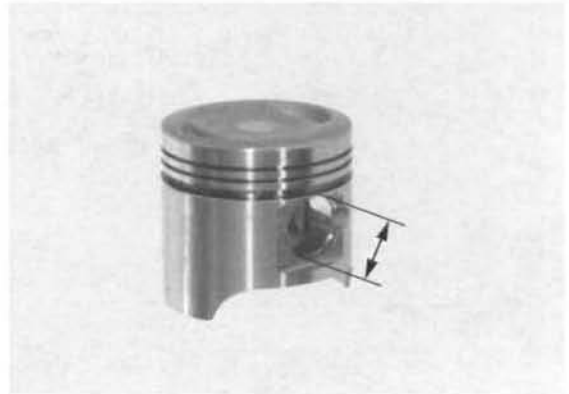
Measure the diameter of the piston at 8 mm (0.3 in) from the bottom of skirt and 90 degrees to the piston pin hole.

SERVICE LIMIT: 38.90 mm (1.531 in)



Measure the piston pin bore.

SERVICE LIMIT: 13.06 mm (0.514 in)

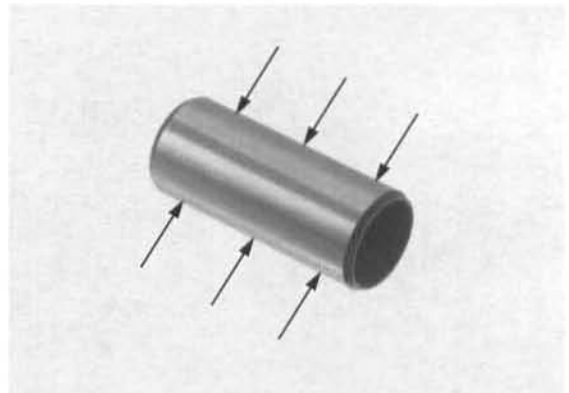


Measure the O.D. of the piston pin.

SERVICE LIMIT: 12.98 mm (0.511 in)

Calculate the piston-to-piston pin clearance.

SERVICE LIMIT: 0.08 mm (0.003 in)

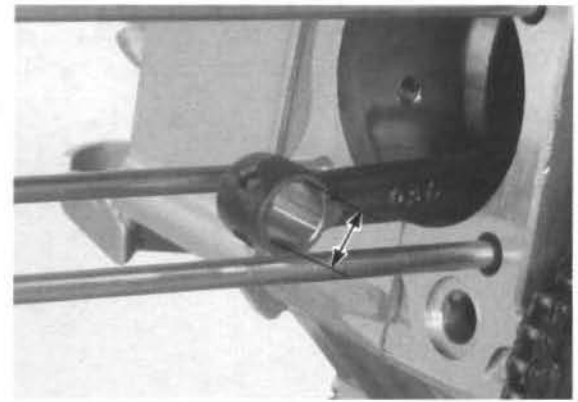


Measure the connecting rod small end I.D.

SERVICE LIMIT: 13.08 mm (0.515 in)

Calculate the connecting rod-to-piston pin clearance.

SERVICE LIMIT: 0.12 mm (0.005 in)



Push the rings into the cylinder with the top of the piston to be sure they are squarely in the cylinder.

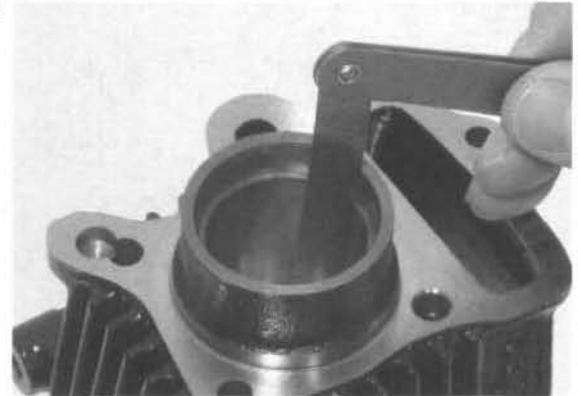
Insert the piston ring squarely into the bottom of the cylinder and measure the ring end gap.

SERVICE LIMITS:

Top: 0.5 mm (0.02 in)

Second: 0.5 mm (0.02 in)

Oil (side rail): 1.1 mm (0.04 in)



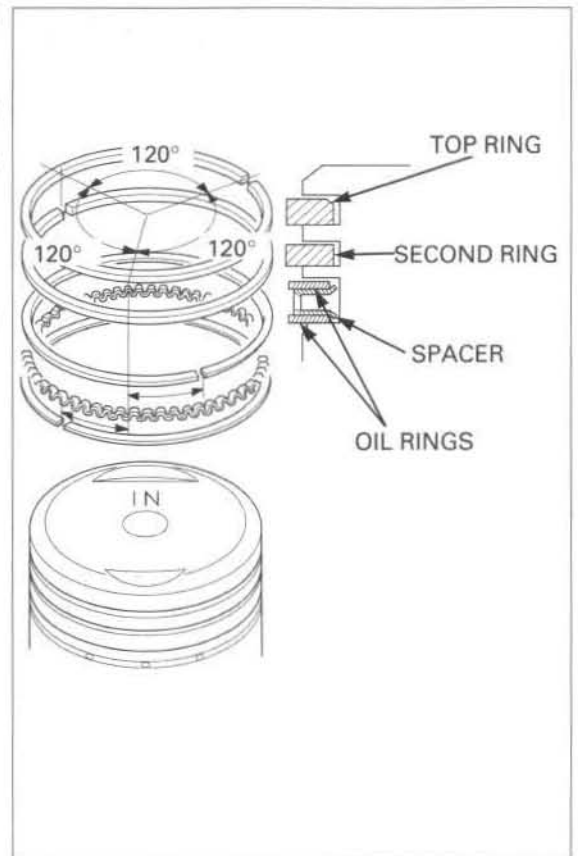
PISTON RING INSTALLATION

Clean the piston ring grooves thoroughly and install the piston rings.

- Apply oil to the piston rings.
- Avoid piston and piston ring damage during installation.
- Install the piston rings with their marking facing up.
- Do not confuse the top and second rings.

Space the piston ring end gaps 120 degrees apart. Do not align the gaps in the oil rings (side rails).

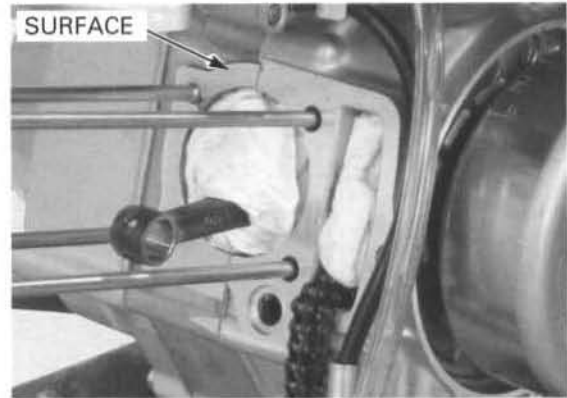
After installation, the rings should rotate freely in the ring grooves.



CYLINDER/PISTON

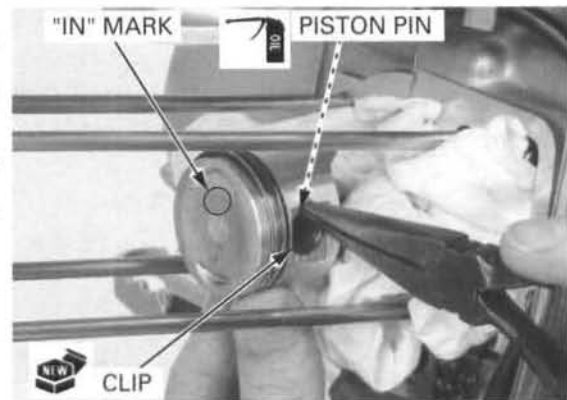
PISTON INSTALLATION

Clean off any gasket materials from the crankcase surface.



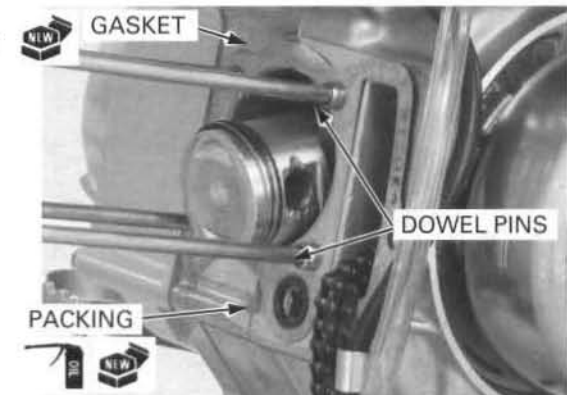
Apply oil to the piston pin outer surface.
Install the piston with its "IN" mark facing the intake side.
Install the piston pin and secure it with new piston pin clips.

- Do not align the piston pin clips end gap with the piston cut-out.
- Do not let the piston pin clips fall into the crankcase.



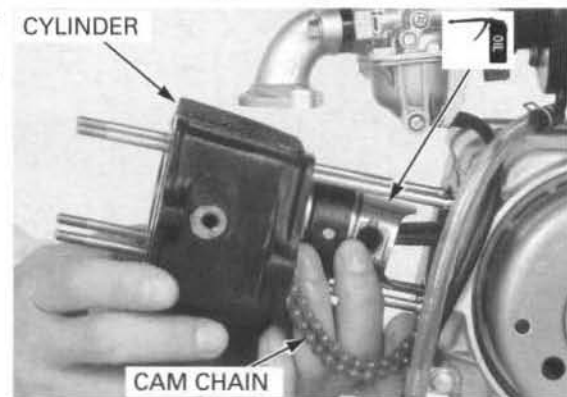
CYLINDER INSTALLATION

Apply engine oil to a rubber packing.
Install the dowel pins, new gasket and new rubber packing.



Coat the cylinder bore, piston outer surface and piston ring grooves with clean engine oil.
Route the cam chain through the cylinder and install the cylinder while compressing the piston rings.

- Avoid piston ring damage during installation.
- Do not let the cam chain fall into the crankcase.



Apply engine oil to the guide roller inner surface.
 Install the cam chain guide roller, new sealing washer and pin bolt.
 Tighten the cam chain guide roller pin bolt to the specified torque.

TORQUE: 9.8 N·m (1.0 kgf·m, 7 lbf·ft)

Install the cylinder mounting bolt but do not tighten it yet.

Install the cylinder head (page 7-16).

Tighten the cylinder mounting bolt after installing the cylinder head.

