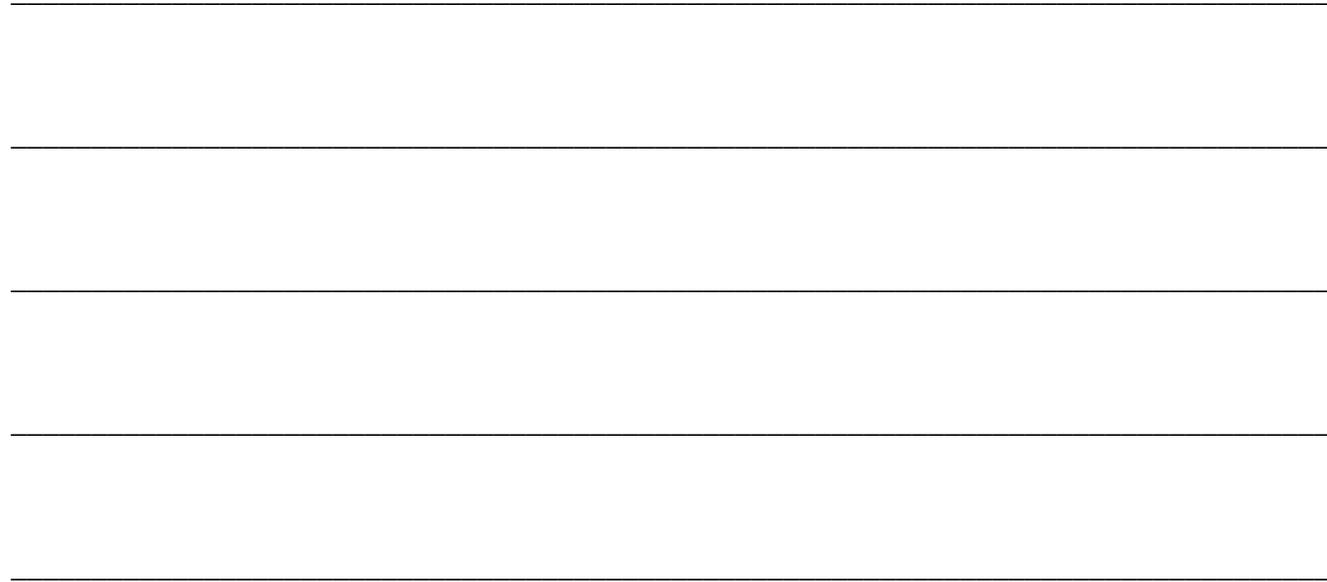


**9. CYLINDER/PISTON**

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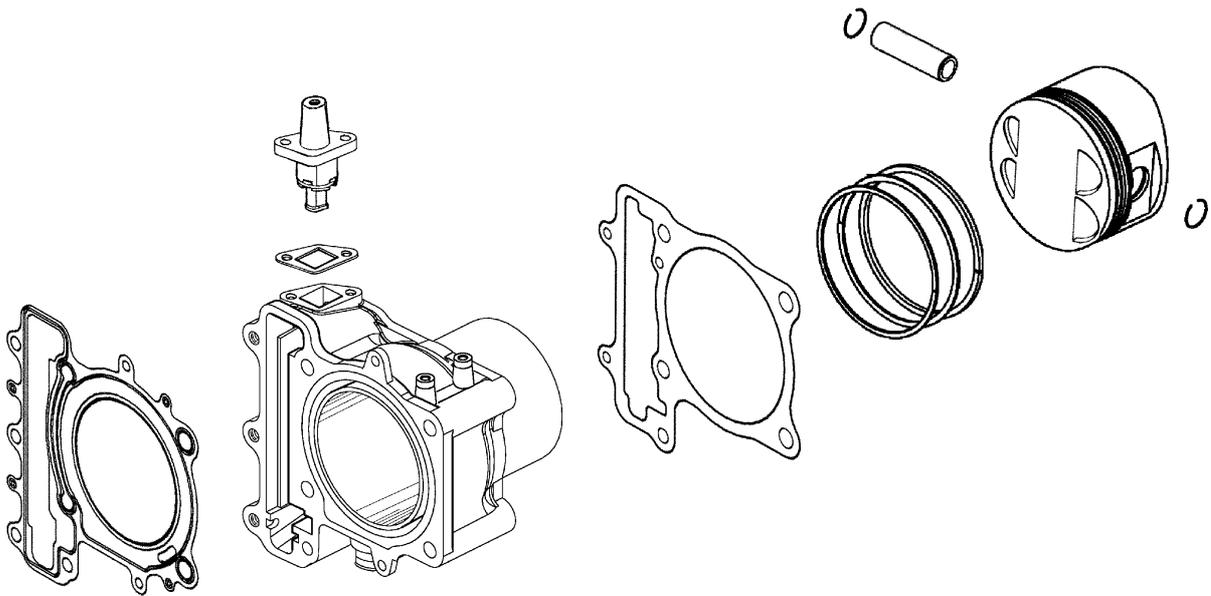
**CYLINDER/PISTON**

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**9. CYLINDER/PISTON**

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**SCHEMATIC DRAWING**

## 9. CYLINDER/PISTON

### SERVICE INFORMATION

#### GENERAL INSTRUCTIONS

- The cylinder and piston can be serviced with the engine installed in the frame.
- When installing the cylinder, use a new cylinder gasket and make sure that the dowel pins are correctly installed.
- After disassembly, clean the removed parts and dry them with compressed air before inspection.

#### SPECIFICATIONS

Unit: mm (in)

Item		Standard	Service Limit	
Cylinder	I.D.	92.005 (3.6802)~92.015 (3.6806)	92.1 (3.684)	
	Warpage	0.01 (0.0004)	0.05 (0.002)	
	Cylindricity	0.01 (0.0004)	0.1 (0.004)	
	True roundness	0.01 (0.0004)	0.1 (0.004)	
Piston, piston ring	Ring-to-groove clearance	top	0.03 (0.0012)~0.065 (0.0026)	0.08 (0.003)
		Second	0.015 (0.0006)~0.05 (0.002)	0.065 (0.0026)
	Ring end gap	top	0.15 (0.006)~0.3 (0.012)	0.5 (0.02)
		Second	0.03 (0.012)~0.45 (0.018)	0.65 (0.026)
		Oil side rail	0.2 (0.008)~0.7 (0.028)	1 (0.04)
	Piston O.D.		91.96 (3.6784)~91.98 (3.6793)	91.9 (3.676)
	Piston O.D. measuring position		10 mm from bottom of skirt	—
	Piston-to-cylinder clearance		0.01 (0.0004)~0.045 (0.0018)	0.1 (0.004)
Piston pin hole I.D.		22.002 (0.8801)~22.008 (0.8803)	22.04 (0.8826)	
Piston pin O.D		21.994 (0.8798)~22 (0.88)	21.96 (0.8784)	
Piston-to-piston pin clearance		0.002 (0.0001)~0.014 (0.0006)	0.02 (0.001)	
Connecting rod small end I.D. bore		22.016 (0.8806)~22.034 (0.8814)	22.06 (0.8824)	

### TROUBLESHOOTING

- When hard starting or poor performance at low speed occurs, check the crankcase breather for white smoke. If white smoke is found, it means that the piston rings are worn, stuck or broken.

#### Compression too low or uneven compression

- Worn or damaged cylinder and piston rings
- Worn, stuck or broken piston rings

#### Compression too high

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

#### Excessive smoke from exhaust muffler

- Worn or damaged piston rings
- Worn or damaged cylinder and piston

#### Abnormal noisy piston

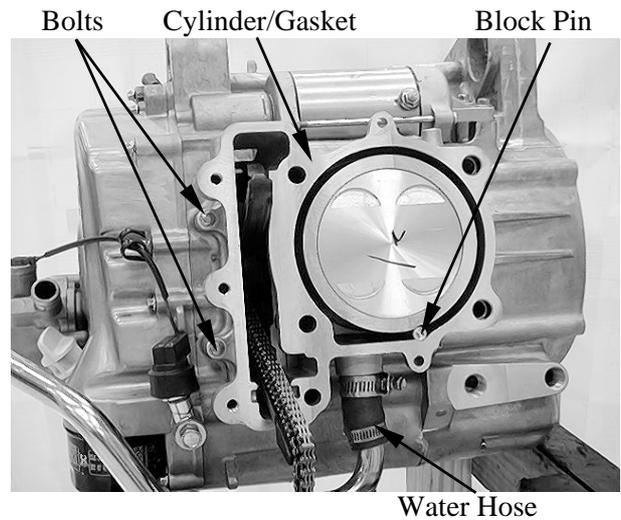
- Worn cylinder, piston and piston rings
- Worn piston pin hole and piston pin
- Incorrectly installed piston

## 9. CYLINDER/PISTON

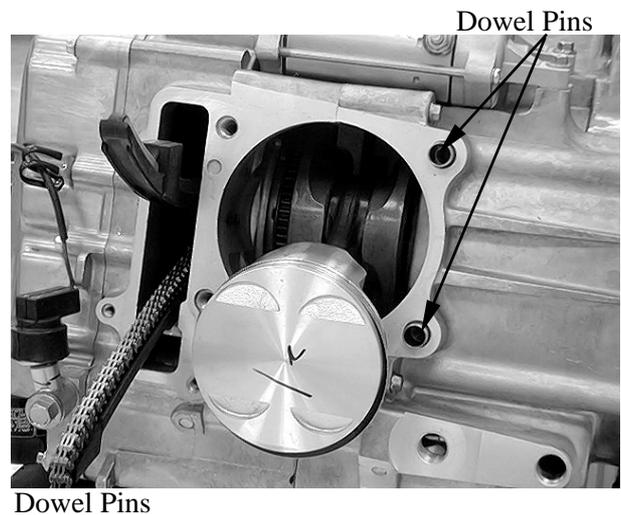
### CYLINDER/PISTON REMOVAL

Remove the cylinder head (page 8-11).

Take the block pin out.  
Remove the water hose from the cylinder.  
Remove the two cylinder bolts.  
Remove the cylinder and gasket.



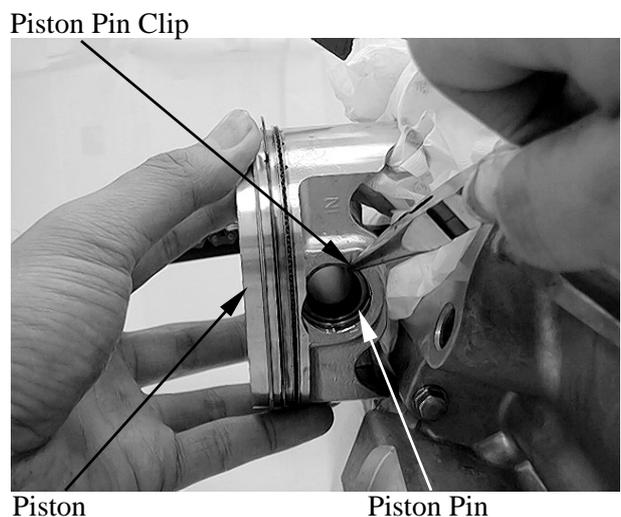
Remove the dowel pins



Remove the piston pin clip.

\* Place a clean shop towel in the crankcase to keep the piston pin clip from falling into the crankcase.

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

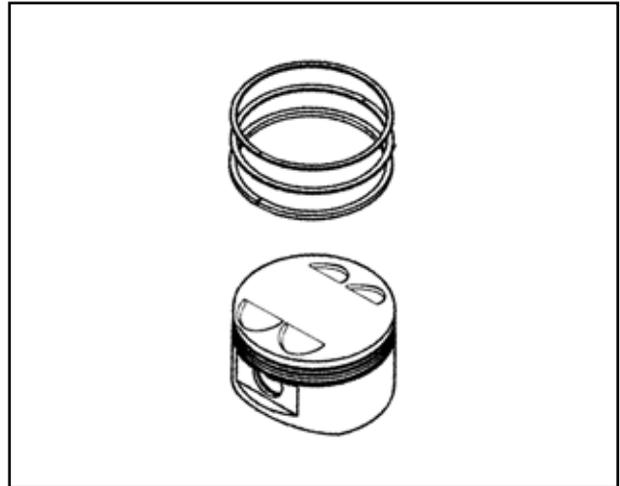


## 9. CYLINDER/PISTON

Spread each piston ring and remove it by lifting up at a point opposite the gap

\* Do not damage the piston ring by spreading the ends too far.

Clean carbon deposits from the piston ring grooves.



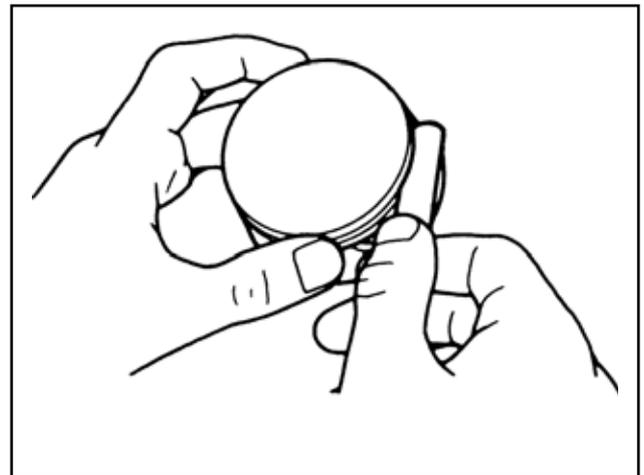
### INSPECTION

#### Piston ring

Inspect the piston rings for movement by rotating the rings. The rings should be able to move in their grooves without catching.

Push the ring until the outer surface of the piston ring is nearly flush with the piston and measure the ring-to-groove clearance.

**Service Limits: Top: 0.08 mm (0.003 in)**  
**2nd: 0.065 mm (0.0026 in)**



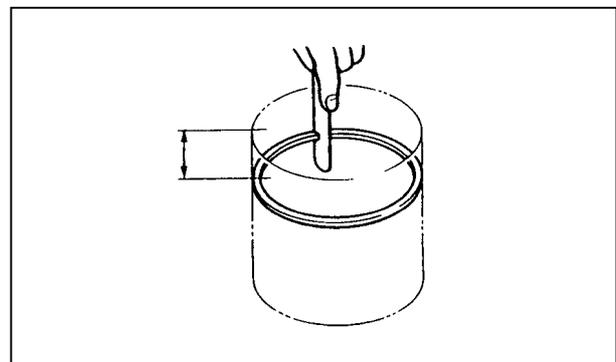
Insert each piston ring into the bottom of the cylinder squarely.

\* Use the piston head to push each piston ring into the cylinder.

Measure the piston ring end gap.

#### Service Limit:

**Top: 0.5 mm (0.02 in)**  
**2nd: 0.65 mm (0.026 in)**  
**Oil ring: 1 mm (0.04 in)**



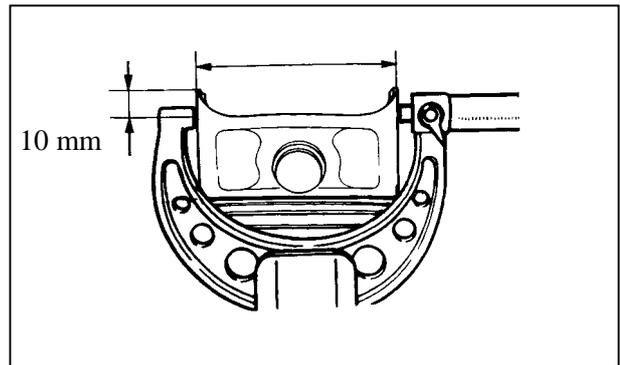
## 9. CYLINDER/PISTON

### Piston/Piston pin

Measure the piston O.D. at the point 10 mm from the bottom and 90° to the piston pin hole.

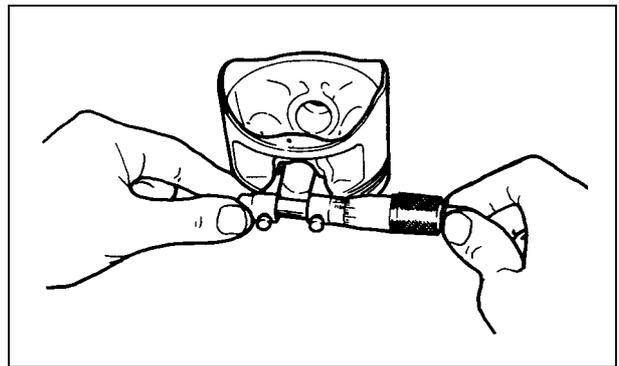
**Service Limit: 91.9 mm (3.676 in)**

Calculate the cylinder-to-piston clearance (cylinder I.D.: page 9-6)



Measure the piston pin hole. Take the maximum reading to determine the I.D..

**Service Limit: 22.04 mm (0.8826 in)**

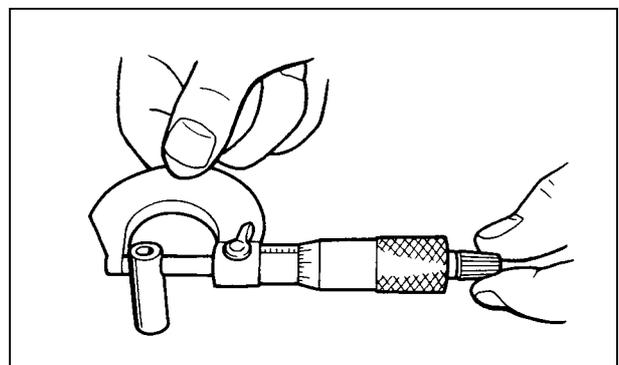


Measure the piston pin O.D. at piston and connecting rod sliding areas.

**Service Limit: 21.96 mm (0.8784 in)**

Measure the piston-to-piston pin clearance.

**Service Limit: 0.002 mm (0.0001 in)**



## 9. CYLINDER/PISTON

### Cylinder

Check the cylinder for warpage with a straight edge and feeler gauge in the directions shown.

**Service Limit: 0.05 mm (0.002 in)**



Check the cylinder wall for wear or damage. Measure and record the cylinder I.D. at three levels in an X and Y axis. Take the maximum reading to determine the cylinder wear.

**Service Limit: 92.1 mm (3.684 in)**

Calculate the piston-to-cylinder clearance. Take a maximum reading to determine the clearance. Refer to page 9-5 for measurement of the piston O.D..

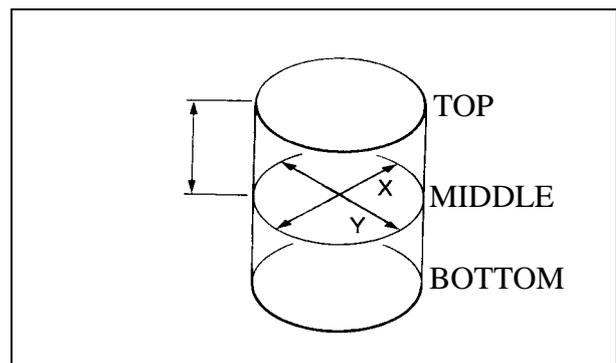
**Service Limit: 0.1 mm (0.004 in)**

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

**Service Limit:**

**Taper: 0.1 mm (0.004 in)**

**Out-of-round: 0.1 mm (0.004 in)**



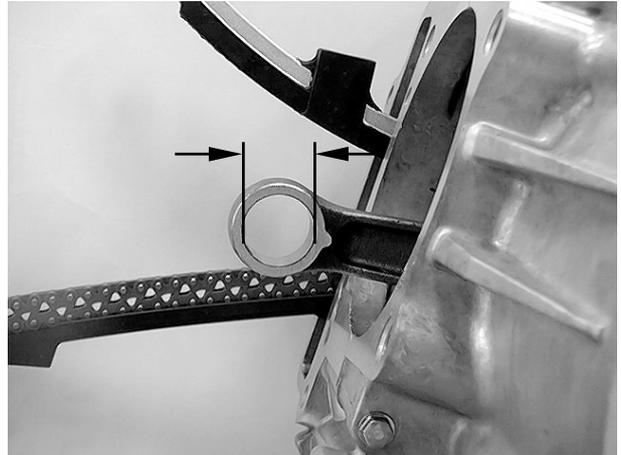
## 9. CYLINDER/PISTON

Measure the connecting rod small end I.D..

**Service Limit: 22.06 mm (0.8824 in)**

Calculate the connecting rod-to-piston pin clearance.

**Service Limit: 0.06 mm (0.002 in)**



### CYLINDER/PISTON INSTALLATION

#### PISTON RING INSTALLATION

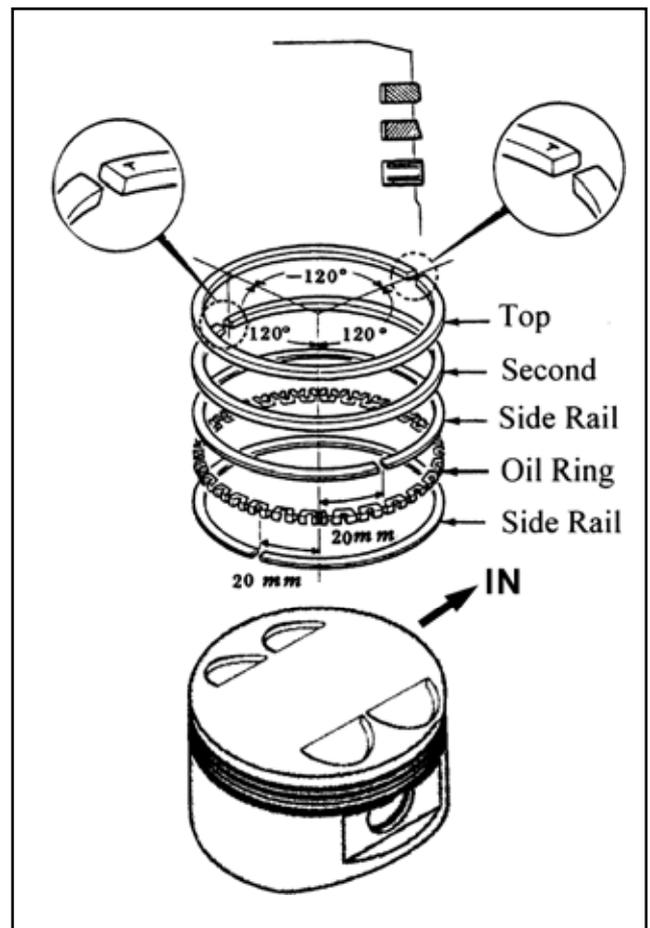
Carefully install the piston rings into the piston ring grooves with the markings facing up.

\* Be careful not to damage the piston and rings.

- ♦ Do not confuse the top and second rings.
- ♦ To install the oil ring, install the oil ring, then install the side rails.

Stagger the piston ring end gaps 120° degrees apart from each other.

Stagger the side rail end gaps as shown.

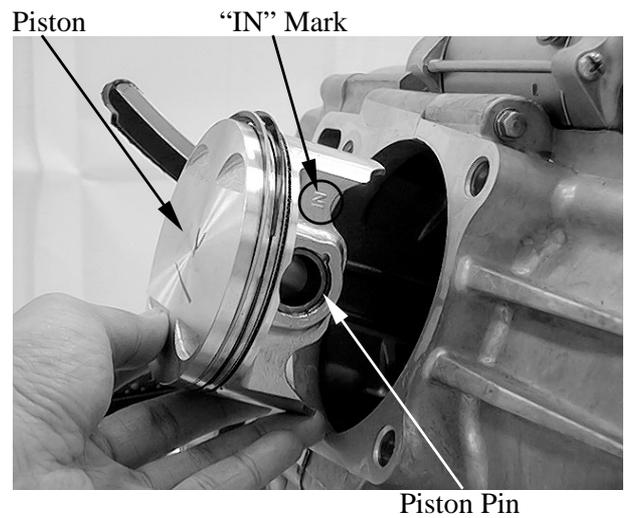


## 9. CYLINDER/PISTON

**CYLINDER/PISTON INSTALLATION**  
Clean any gasket material from the cylinder mating surfaces of the crankcase and oil passage.

Apply engine oil to the piston pin.  
Apply engine oil to the connecting rod small end and piston pin hole.

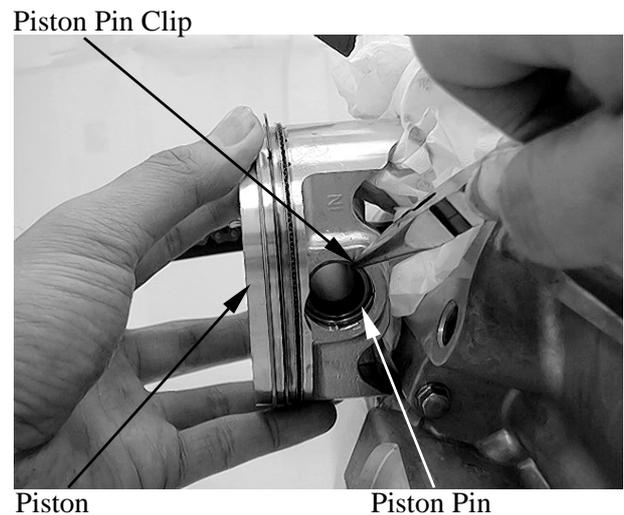
Install the piston with the “IN” mark face intake side and piston pin.



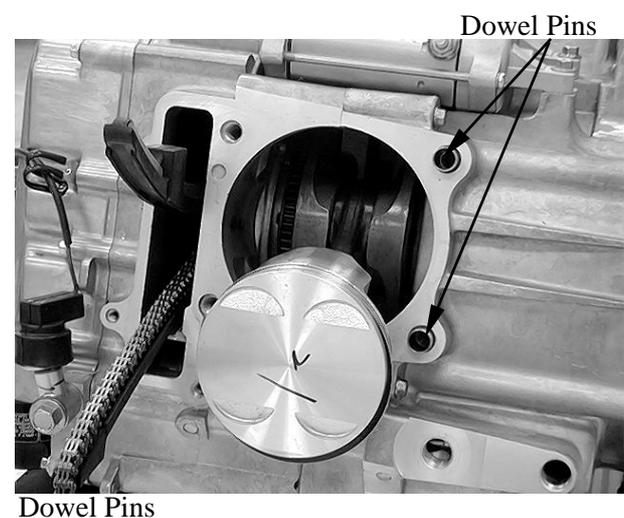
Place a clean shop towel over the crankcase prevent the clip from falling into the crankcase.

Install the new pin clip.

- \* ♦Make sure that the piston pin clips are seated securely.  
♦Do not align the piston pin clip end gap with the piston cut-out



Install the dowel pins.



## 9. CYLINDER/PISTON

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Install the gasket.

Apply engine oil to the cylinder wall, piston and piston ring outer surfaces.

Pass the cam chain through the cylinder and install the cylinder over the piston.

\* Be careful not to damage the piston rings and cylinder walls.

Install and tighten the two cylinder bolts to specified torque.

**Torque: 10 N•m (1 kgf•m, 7 lbf•ft)**

Install the block pin.

Connect the water hose.

