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## SERVICE INFORMATION

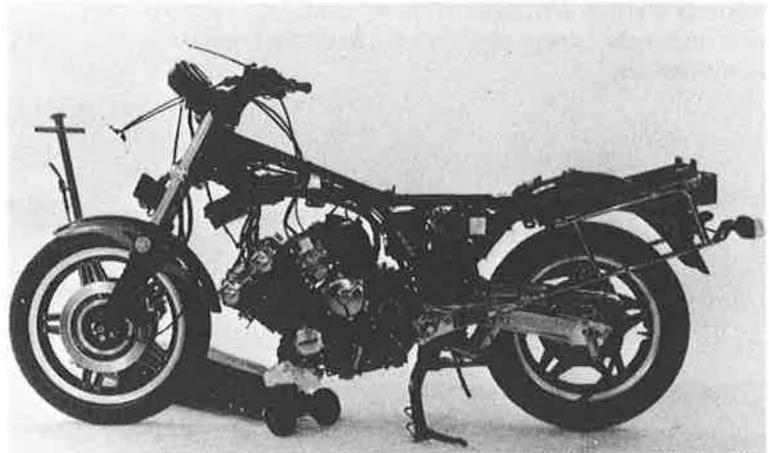
### GENERAL INSTRUCTION

- The following parts or components can be serviced with the engine installed in the frame:
  - Clutch
  - A.C. generator
  - Shift linkage
  - Starter motor
  - Camshaft
- The following parts or components can be serviced with the engine tilted forward in the frame:

### NOTE

The engine can be pivoted on the rear lower hanger bolt after removing the front engine hangers, upper engine hangers and three hanger bolts.

- Carburetor
- Cylinder head
- Cylinder
- Piston



## SPECIFICATIONS

Engine dry weight 108 kg (238 lb)  
 Oil capacity 5.5 lit (5.8 U.S. qt) at engine assembly  
 4.0 lit (4.2 U.S. qt) at draining

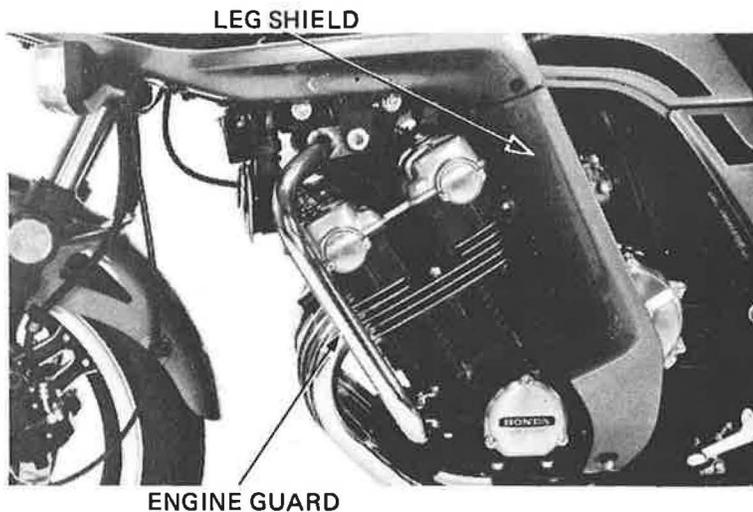
## TORQUE VALUES

8mm bolt 18–25 N·m (1.8–2.5 kg-m, 13–18 ft-lb)  
 10 mm bolt 30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)  
 14 mm bolt 90–100 N·m (9.0–10.0 kg-m, 65–72 ft-lb)  
 Rear axle nut 85–105 N·m (8.5–10.5 kg-m, 62–76 ft-lb)  
 Drive sprocket 50–54 N·m (5.0–5.4 kg-m, 36–39 ft-lb)  
 Spark plug 12–16 N·m (1.2–1.6 kg-m, 9–12 ft-lb)



## TILTING ENGINE

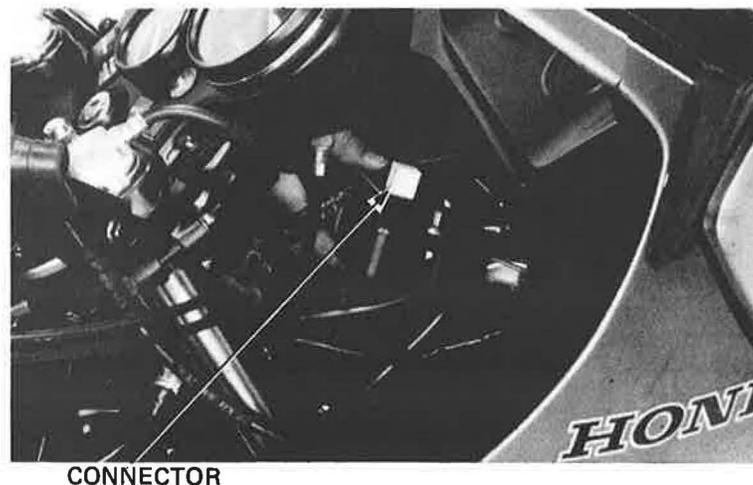
Remove the left and right leg shields and engine guard.



Remove the left and right horns by removing the wire connector covers and disconnecting the horn wire terminals.

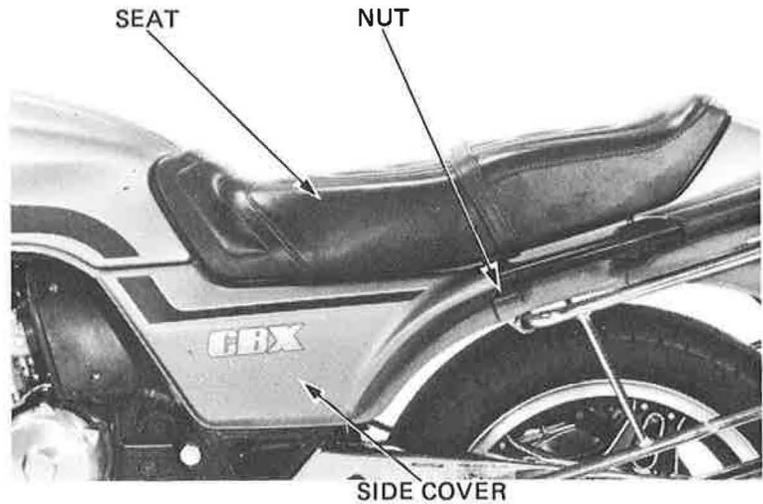


Disconnect the fairing wire connector and remove the fairing.  
 (Fairing Removal page 13-18)

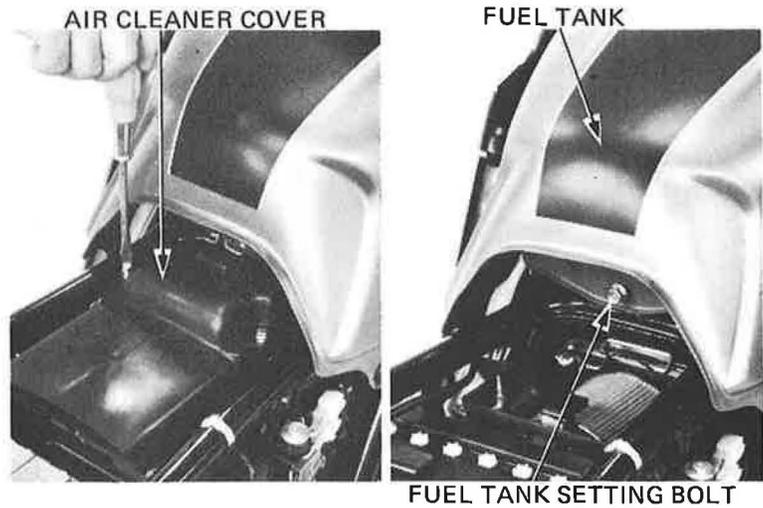




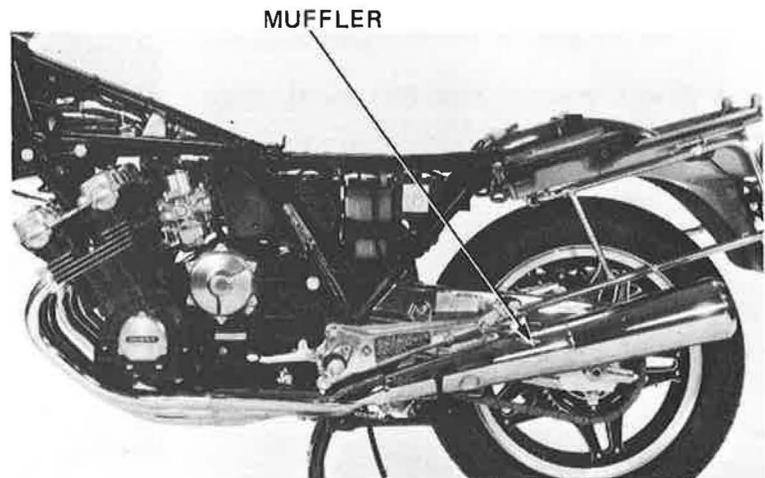
Remove the left and right side covers.  
Remove the seat mounting nuts.  
Pull the seat back and remove it.



Remove the air cleaner cover.  
Remove the fuel tank.



Remove the exhaust system.

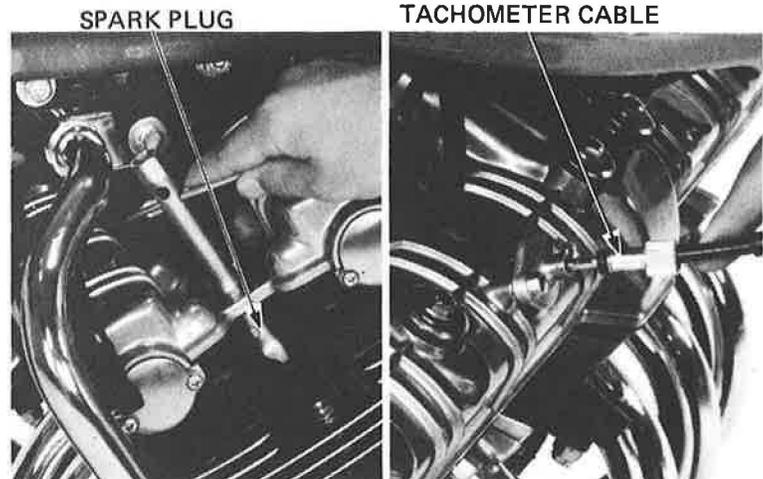




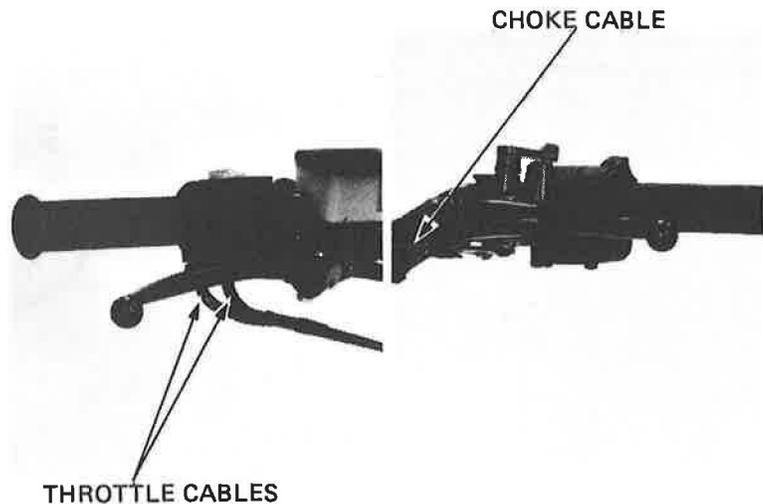
Remove the tachometer cable from the cylinder head cover.  
 Remove all spark plug caps and the No. 1 and 6 spark plugs.

**NOTE**

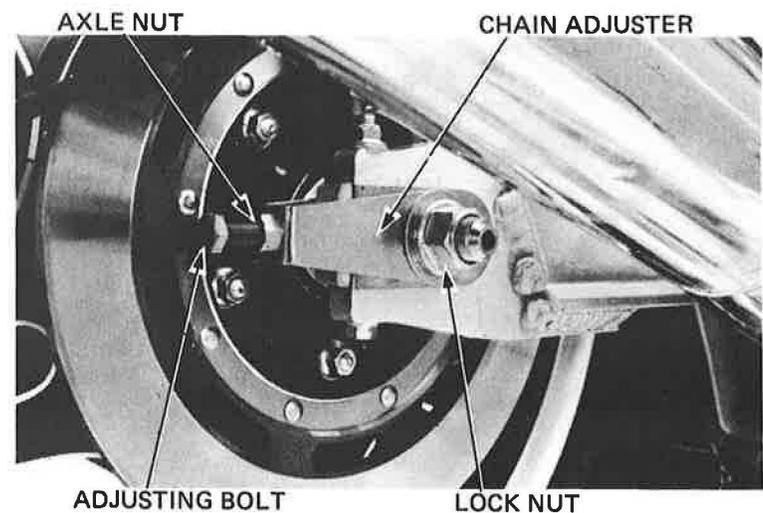
Do not allow anything to fall into the cylinders through the spark plug holes.



Remove the choke cable from the choke lever.  
 Remove the throttle cables from the right handlebar switch.



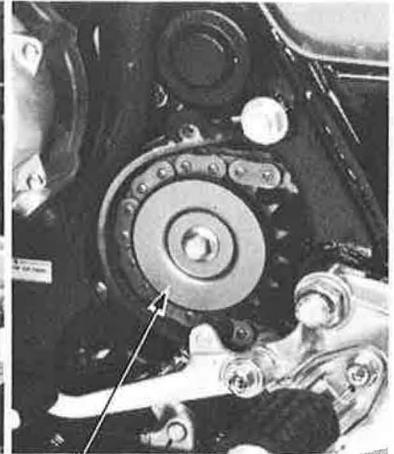
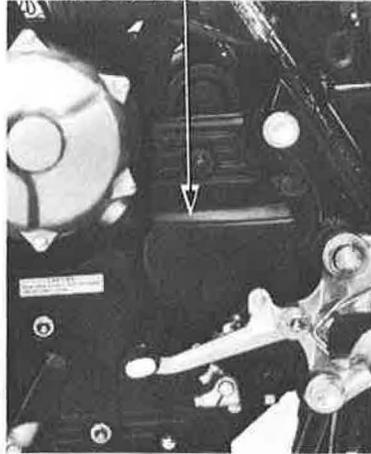
Loosen the rear axle nut and drive chain adjusting bolt.  
 Slide the chain adjusters down. Push the rear wheel forward.





Remove the drive sprocket cover.  
Remove the drive sprocket bolt and disengage the drive chain from the drive sprocket by removing the drive sprocket.  
Remove the gear change pedal.

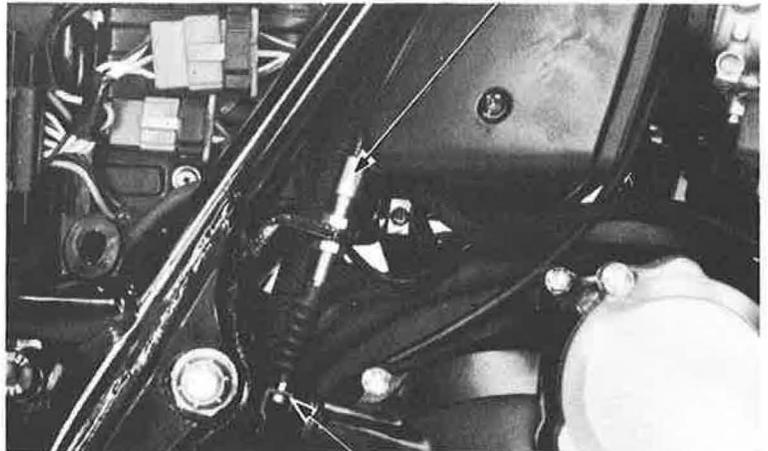
**DRIVE SPROCKET COVER**



**DRIVE SPROCKET**

Remove the clutch cable from the clutch arm.

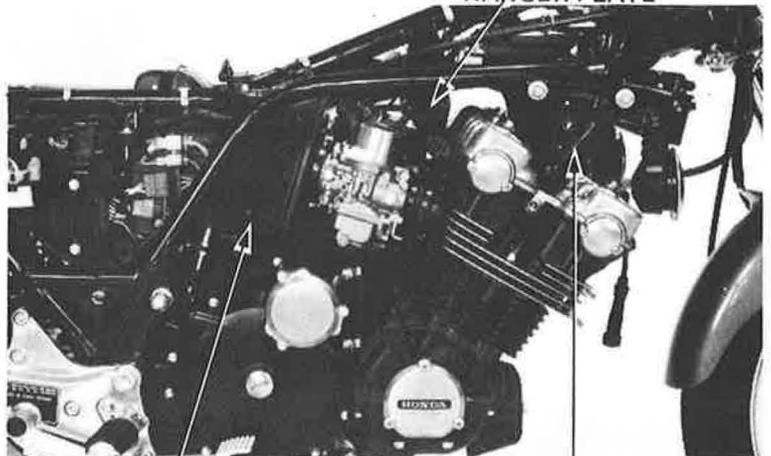
**CLUTCH CABLE**



**CLUTCH ARM**

Place a jack under the engine.  
Remove the left and right front engine hanger brackets and upper engine hanger plates.  
Loosen the air chamber connecting tube band screw.

**UPPER ENGINE HANGER PLATE**

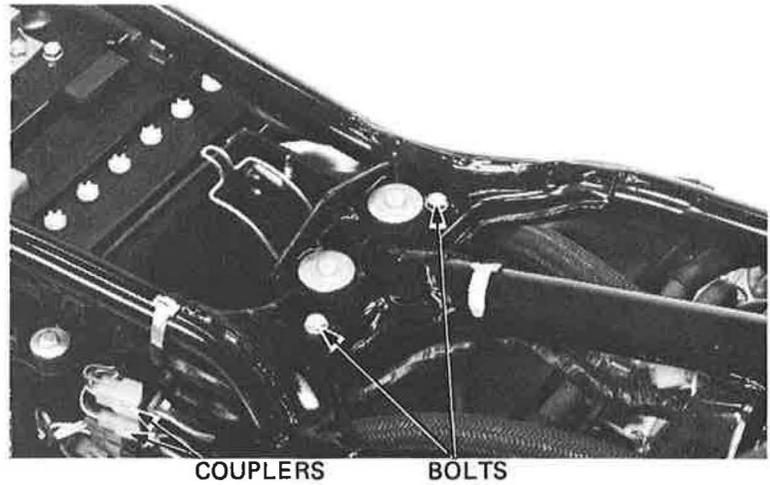


**AIR CLEANER CHAMBER**

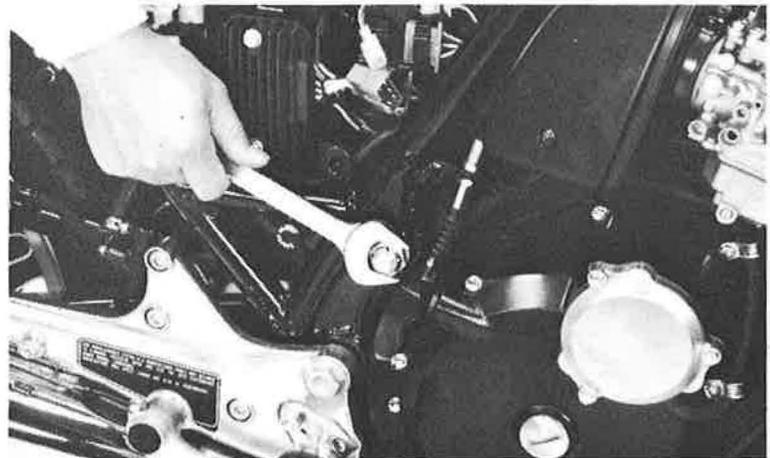
**FRONT ENGINE HANGER BRACKET**



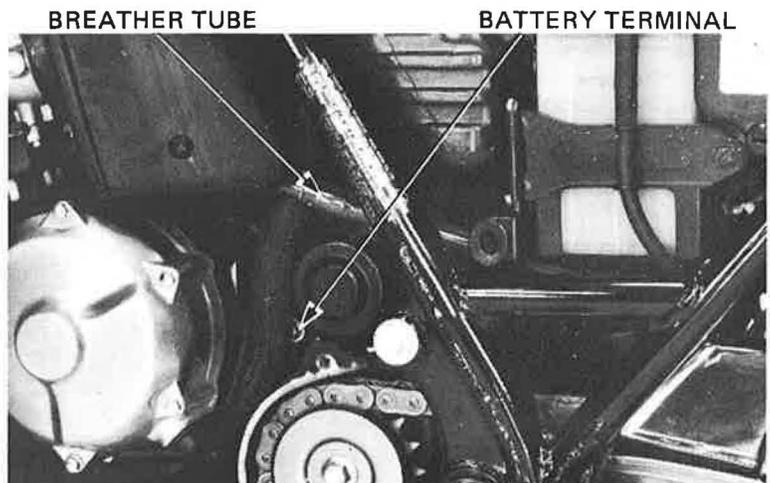
Remove the two bolts holding the air chamber.  
 Disconnect the three couplers.



Remove the rear upper engine hanger bolt.



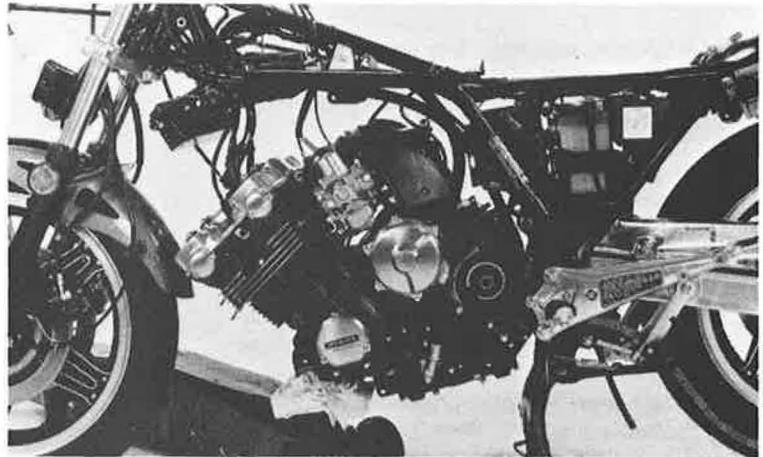
Remove the battery negative terminal at the starter motor.  
 Disconnect the breather tube.  
 Loosen the rear engine hanger bolt.  
 Tilt the engine forward on the rear lower hanger bolt by lowering the jack.





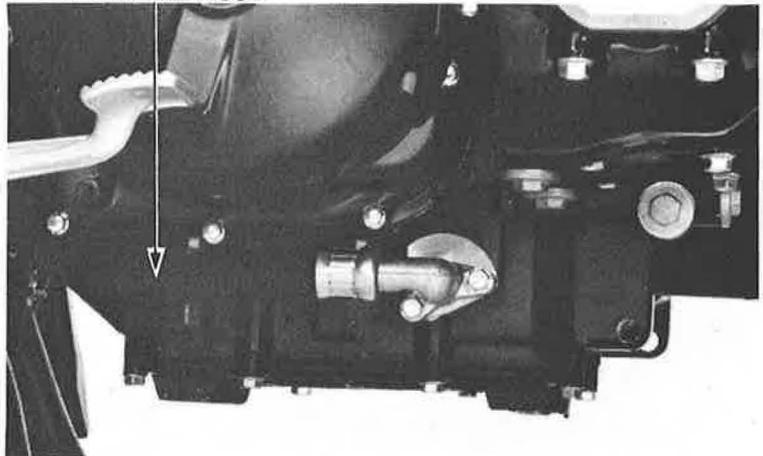
## ENGINE REMOVAL

Drain oil from the engine.  
Perform tilting engine procedures (page 5-2).  
Disconnect the throttle cables and choke cable from the carburetor.



Remove the right oil hose cover and remove the oil hose.  
Remove the brake pedal.

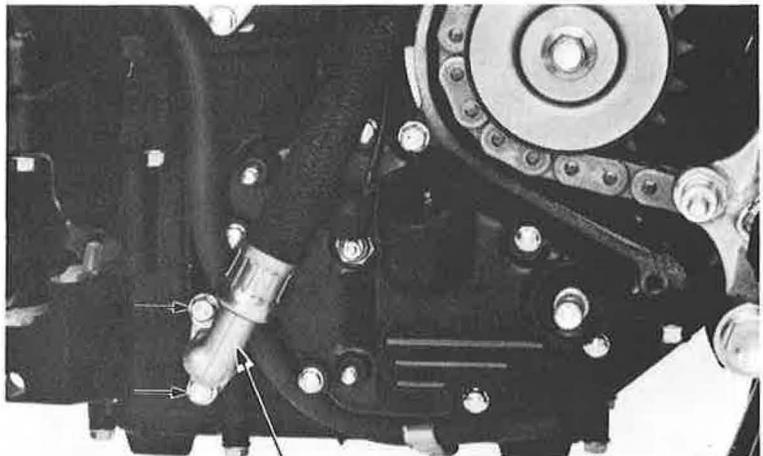
RIGHT OIL HOSE



Remove the left oil hose and remove the oil hose.  
Remove the rear engine mounting bolt.  
Lower the jack and remove the engine.

### NOTE

Jack height must be continuously adjusted during engine removal and installation to prevent damage to mounting bolt threads, wire harnesses and cables.



LEFT OIL HOSE



## ENGINE INSTALLATION

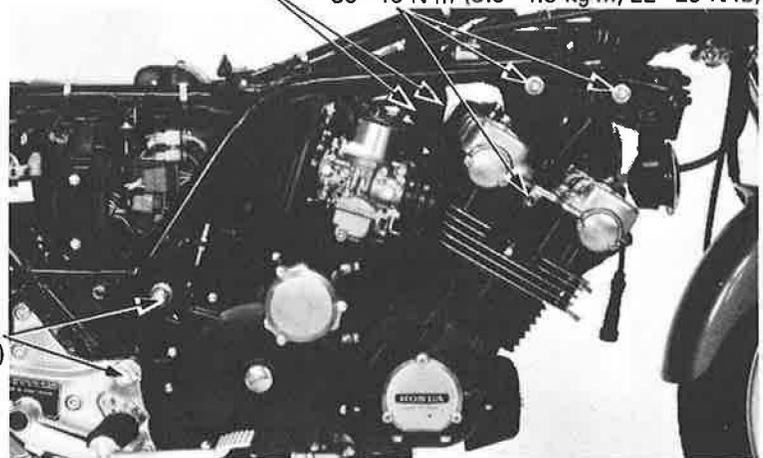
The installation sequence is essentially the reverse of removal.

### NOTE

- Do not damage parts during installation.
- Route the wires and cables properly (Page 1-8).
- Fill the crankcase to the proper level (Page 2-1).
- Perform the following inspection and adjustments: Throttle cable free play (Page 3-19).  
Clutch lever free play (Page 3-6).  
Drive chain tension (Page 3-15).  
Choke cable free play (Page 3-9).

18–25 N·m (1.8–2.5 Kg-m, 13–18 ft-lb)

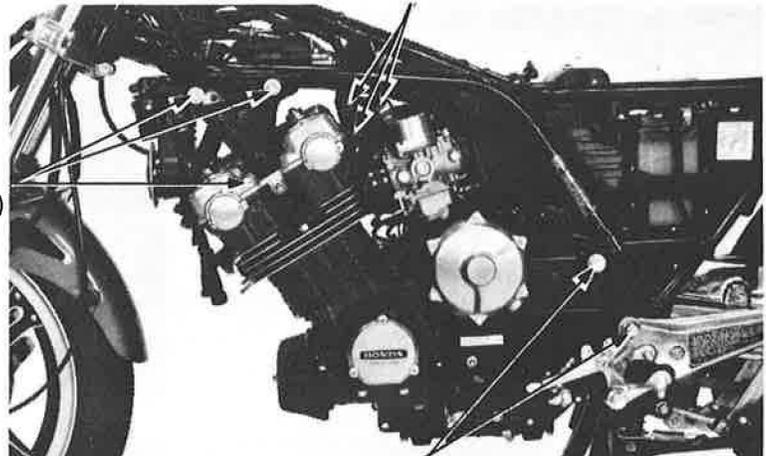
30–40 N·m (3.0–4.0 kg-m, 22–29 ft-lb)



90–100 N·m  
(9.0–10.0 kg-m, 65–72 ft-lb)

18–25 N·m

(1.8–2.5 kg-m, 13–18 ft-lb)



30–40 N·m  
(3.0–4.0 kg-m, 22–29 ft-lb)

Drive sprocket bolt:

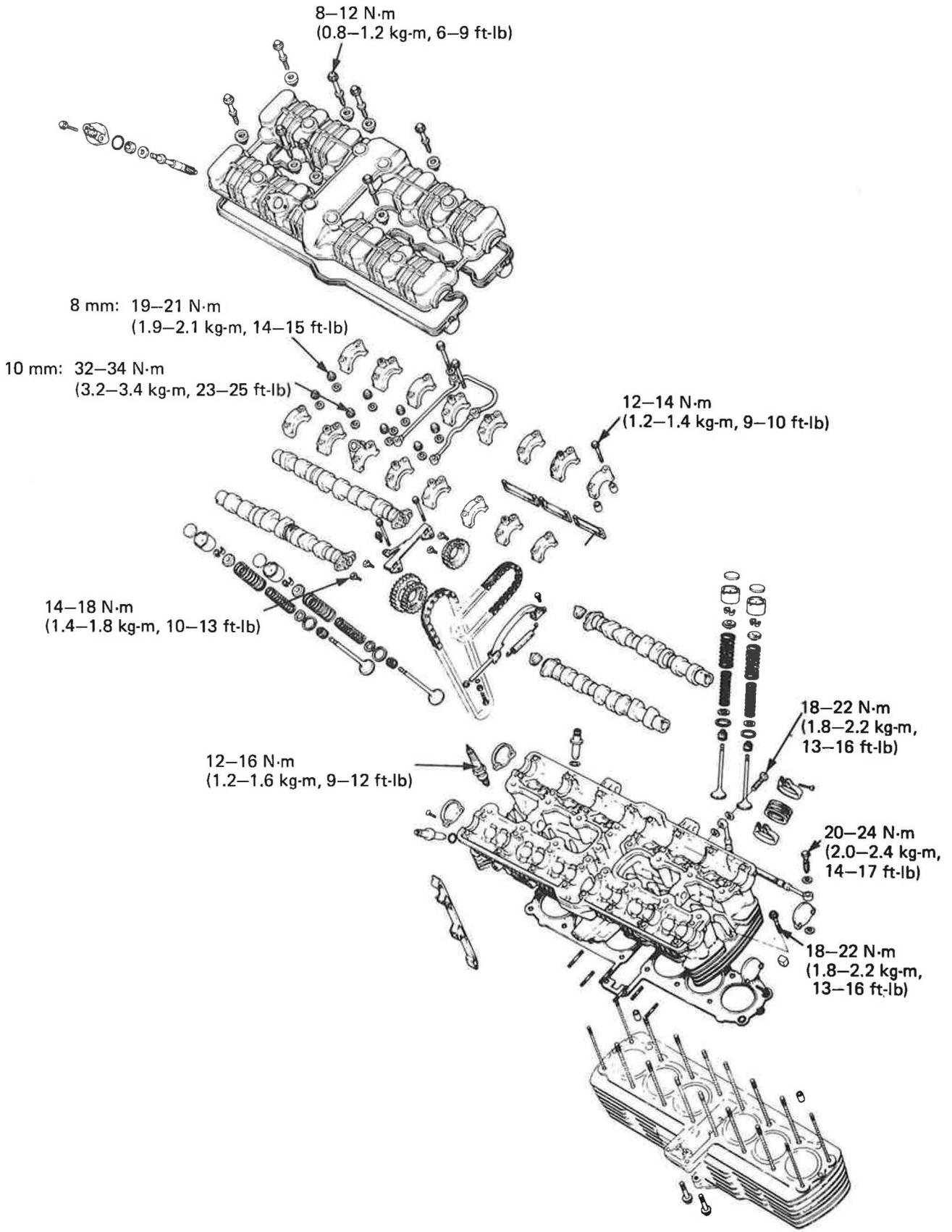
50–54 N·m (5.0–5.4 kg-m, 36–39 ft-lb)

90–100 N·m  
(9.0–10.0 kg-m, 65–72 ft-lb)



**HONDA**  
**CBX**

MEMO





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CAMSHAFT REMOVAL	6-3	CYLINDER HEAD ASSEMBLY	6-18
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## SERVICE INFORMATION

### GENERAL INSTRUCTIONS

- All cylinder head maintenance and inspection can be accomplished with the engine installed.
- Camshaft lubricating oil is fed through the oil hose. Be sure the holes in the oil hose bolt are not clogged.
- During assembly, apply molybdenum disulfide to the camshaft bearings to provide initial lubrication. Pour clean engine oil into the oil pockets in the cylinder head to lubricate the camshafts.
- To remove the cylinder head, the engine should be tilted. The camshafts and valve lifters can be serviced without engine tilting.
- Marks 1 thru 16 on the camshaft holders mean position of holders to be installed; 1 to 8 are for EXHAUST side and 9 to 16 for INTAKE side from left to right respectively. When installing, be sure the mark  faces forward.

### TOOLS

#### Special

Valve Guide Reamer	07984-2000000
Valve Lifter Hole Protector	07999-4220000

#### Common

Valve Guide Remover (5.5 mm)	07742-0010100
Valve Spring Compressor	07757-0010000

### TORQUE VALUES

Cylinder head cover		8-12 N·m (0.8-1.2 kg-m, 6-9 ft-lb)
Camshaft holder		12-16 N·m (1.2-1.6 kg-m, 9-12 ft-lb)
Cylinder head cap nut	10 mm	33-35 N·m (3.3-3.5 kg-m, 24-25 ft-lb)
	8 mm	19-21 N·m (1.9-2.1 kg-m, 14-15 ft-lb)
Cylinder head 6 mm bolt		19-21 N·m (1.9-2.1 kg-m, 14-15 ft-lb)
Cam sprocket		14-18 N·m (1.4-1.8 kg-m, 10-13 ft-lb)
Spark plug		12-16 N·m (1.2-1.6 kg-m, 9-12 ft-lb)
Oil hose	Upper	18-22 N·m (1.8-2.2 kg-m, 13-16 ft-lb)
	Lower	20-24 N·m (2.0-2.4 kg-m, 14-17 ft-lb)

### SPECIFICATIONS

			STANDARD	SERVICE LIMIT
Compression pressure			1177 ± 98 kPa (12 ± 1 kg/cm <sup>2</sup> , 171 ± 14 psi)	—
Camshaft	Cam height	IN.	37.000-37.160 mm (1.4567-1.4630 in)	36.9 mm (1.45 in)
		EX.	37.500-37.660 mm (1.4763-1.4826 in)	37.4 mm (1.47 in)
	Oil clearance	No. 1 and 9	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
		No. 2 and 10	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 3 and 11	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 4 and 12	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
		No. 5 and 13	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
		No. 6 and 14	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 7 and 15	0.063-0.105 mm (0.0025-0.0041 in)	0.14 mm (0.006 in)
		No. 8 and 16	0.040-0.082 mm (0.0016-0.0032 in)	0.12 mm (0.005 in)
Run out			—	0.03 mm (0.001 in)



			STANDARD	SERVICE LIMIT
Valve lifter	Valve lifter O.D.	Mark B	27.982–27.993 mm (1.1017–1.1021 in)	27.98 mm (1.102 in)
		Mark A	27.972–27.982 mm (1.1013–1.1017 in)	27.97 mm (1.101 in)
	Cylinder head I.D.	Mark A	28.000–28.011 mm (1.1024–1.1028 in)	28.02 mm (1.103 in)
		Mark B	28.011–28.021 mm (1.1028–1.1032 in)	28.03 mm (1.104 in)
Lifter to cylinder head clearance			—————	0.07 mm (0.003 in)
Valve spring	Free length	IN. Outer	43.9 mm (1.73 in)	42.5 mm (1.67 in)
		In. Inner	40.7 mm (1.60 in)	39.8 mm (1.57 in)
		Ex. Outer	43.9 mm (1.73 in)	42.5 mm (1.67 in)
		EX. Inner	40.7 mm (1.60 in)	39.8 mm (1.57 in)
	Preload/length	IN. Outer	12.6–14.6 kg/37.5 mm (27.78–32.19 lbs/1.48 in)	12.0 kg/37.5 mm (26.46 lbs/1.48 in)
		IN. Inner	6.39–7.81 kg/34.5 mm (14.087–17.218 lbs/1.36 in)	6.0 kg/34.5 mm (13.23 lbs/1.36 in)
		EX. Outer	12.6–14.6 kg/37.5 mm (27.78–32.19 lbs/1.48 in)	12.0 kg/37.5 mm (26.46 lbs/1.48 in)
EX. Inner	6.39–7.81 kg/34.5 mm (14.087–17.218 lbs/1.36 in)	6.0 kg/34.5 mm (13.23 lbs/1.36 in)		
Valve guide	Valve stem O.D.	IN	5.475–5.490 mm (0.2156–0.2161 in)	5.47 mm (0.215 in)
		EX.	5.455–5.470 mm (0.2148–0.2154 in)	5.45 mm (0.215 in)
	Valve guide I.D.	IN.	5.500–5.512 mm (0.2165–0.2170 in)	5.54 mm (0.218 in)
		EX.	5.500–5.512 mm (0.2165–0.2170 in)	5.54 mm (0.218 in)
	Stem-to-guide clearance	IN.	—————	0.07 mm (0.003 in)
		EX.	—————	0.09 mm (0.004 in)
Valve seat width		0.90–1.10 mm (0.035–0.043 in)	1.5 mm (0.06 in)	
Cylinder head	Warpage		—————	0.10 mm (0.004 in)
Cam chain	Length		169.70–169.92 mm (6.681–6.690 in)	170.7 mm (6.72 in)

## TROUBLESHOOTING

Engine top-end problems are usually performance-related and can be diagnosed by a compression test, or are engine noise which can be traced to the top end with a sounding rod or stethoscope.

### Low Compression or Uneven Compression

#### 1. Valves

- Incorrect valve adjustment
- Burned or bent valves
- Incorrect valve timing
- Broken valve spring

#### 2. Cylinder head

- Leaking or damaged head gasket
- Warped or cracked cylinder head

#### 3. Cylinder and piston (Refer to Section 7)

### Compression Too High

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

### Excessive Noise

1. Incorrect valve adjustment
2. Sticking valve or broken valve spring
3. Damaged or worn camshaft
4. Loose or worn cam chain
5. Worn or damaged cam chain tensioner
6. Worn cam sprocket teeth

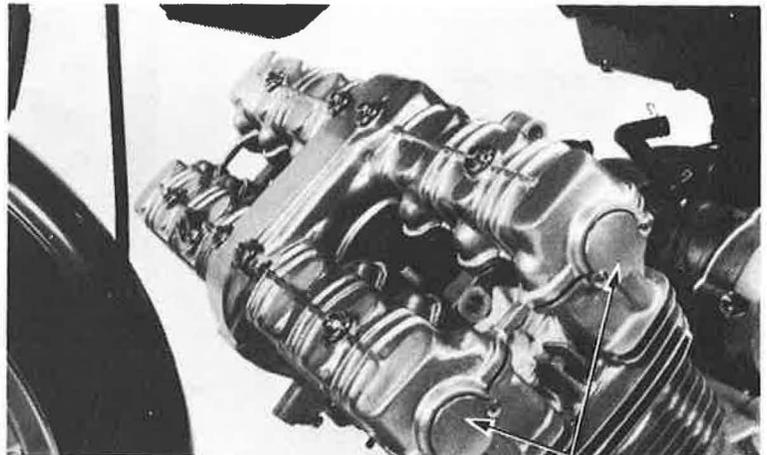


## CAMSHAFT REMOVAL

Remove the left and right leg shields (page 13-18).  
 Remove the fairing and engine guards (page 13-18).  
 Disconnect the tachometer cable and remove the tachometer drive gear.  
 Disconnect the spark plug caps.  
 Remove the No. 1 and 6 spark plugs.  
 Remove the front engine hanger brackets.  
 Remove the cylinder head side covers.

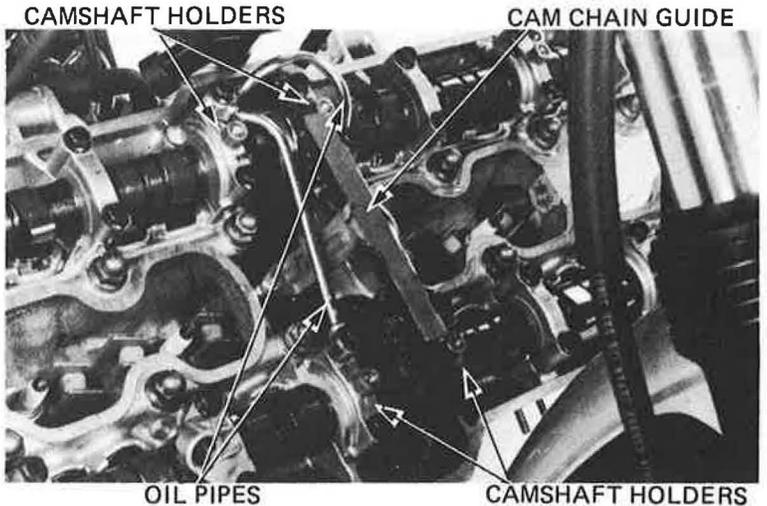
### CAUTION

*The tachometer driven gear must be removed to prevent No. 4 camshaft holder breakage when the camshafts are rotated. Camshaft holder breakage necessitates cylinder head assembly replacement.*

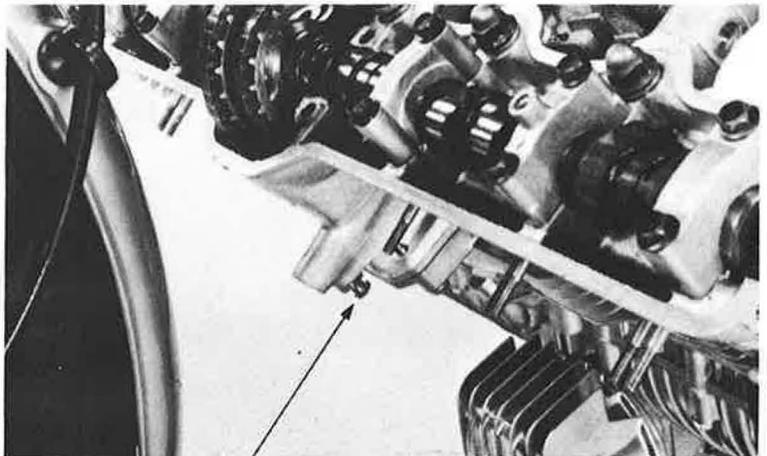


CYLINDER HEAD SIDE COVER

Remove the cylinder head cover bolts and the cylinder head cover.  
 Remove the oil pool plates.  
 Remove the oil pipes and cam chain guide.  
 Remove the No. 4, No. 5, No. 12 and No. 13 camshaft holders.  
 Remove the dowel pins.



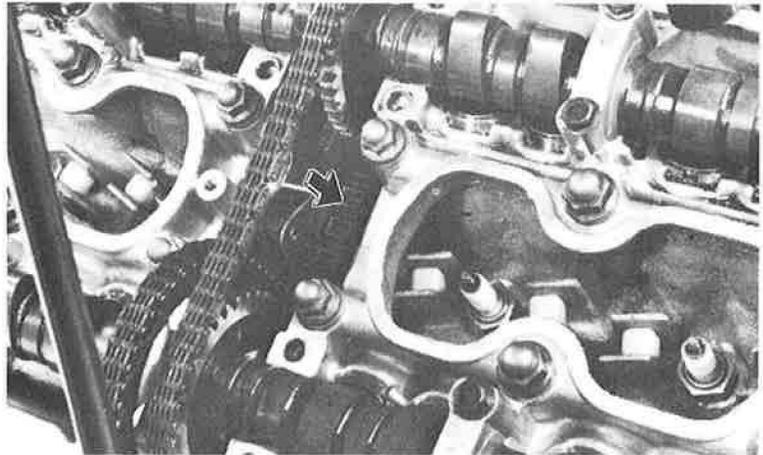
Loosen the front cam chain tensioner lock nut and bolt.



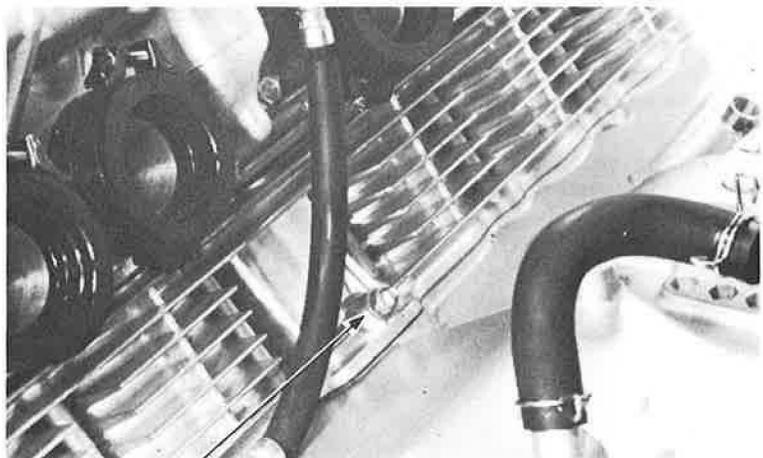
TENSIONER LOCK NUT AND BOLT



Press the cam chain tensioner down to reduce chain tension.  
Tighten the lock bolt and nut.

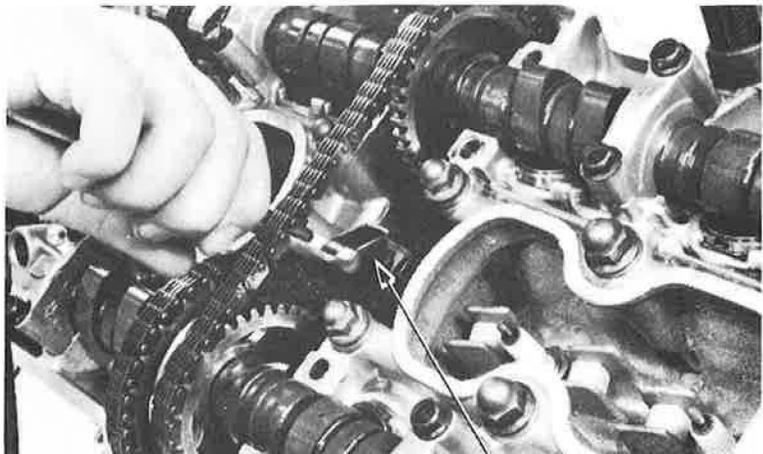


Loosen the rear cam chain tensioner lock nut.



LOCK NUT

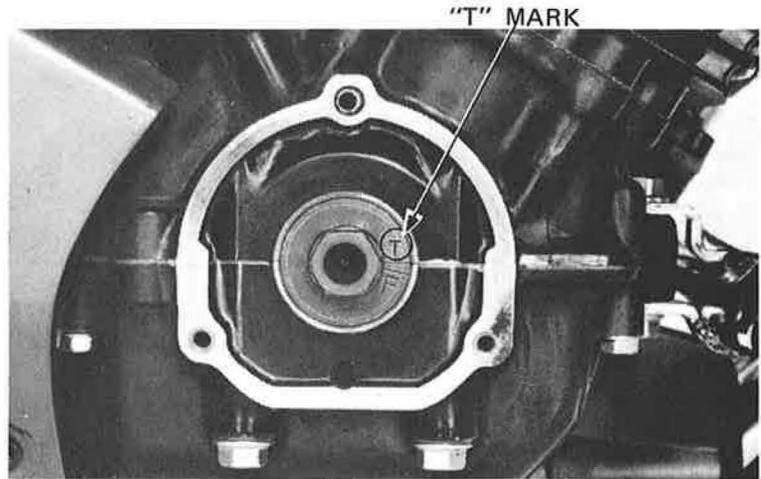
Pull the cam chain tensioner up to reduce chain tension and tighten the bolt and lock nut.



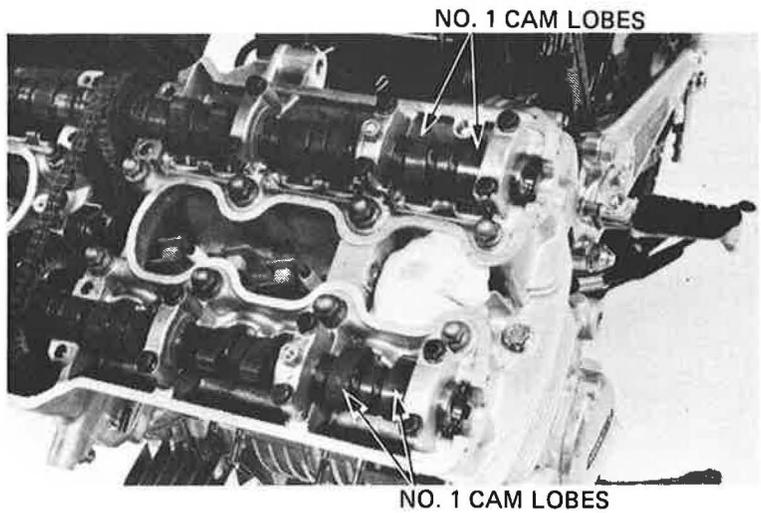
CAM CHAIN TENSIONER



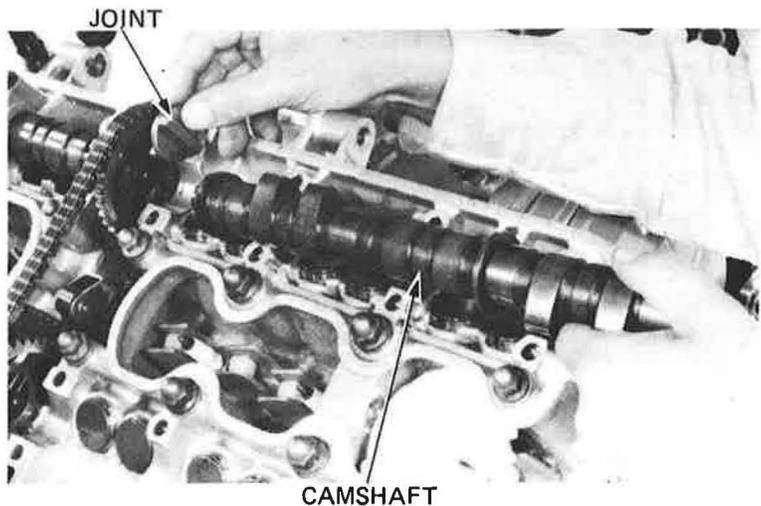
Remove the right crankshaft side cover.  
Turn the crankshaft clockwise until the "T" mark on the crankshaft end aligns with the forward crankcase mating surface.



Make sure the No. 1 cylinder intake and exhaust cam lobes face the spark plug.  
If they do not, turn the crankshaft 360 degrees clockwise and realign the "T" mark.  
Remove the No. 2 and 10 camshaft holders.  
Remove the No. 1, 9, 3 and 11 holders.  
Remove the dowel pins.



Remove the left camshafts and joints.



Turn the crankshaft 360 degrees clockwise and realign the "T" mark with the crankcase mating surfaces.

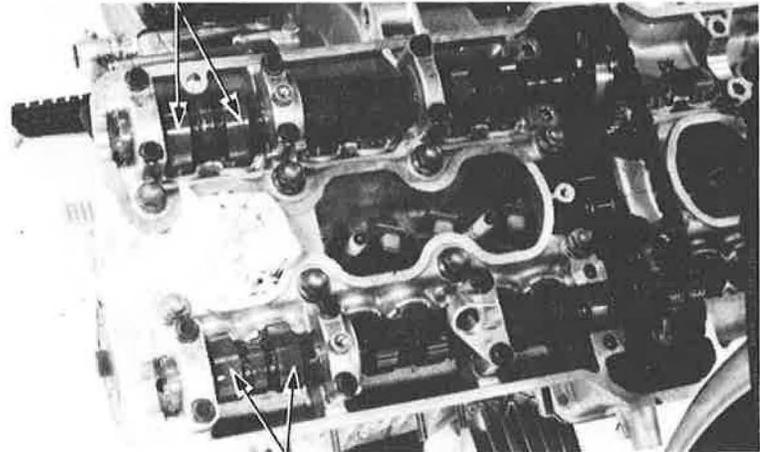
The No. 6 intake and exhaust cam lobes face the spark plug.

Remove the No. 15 camshaft holder.

Then remove the No. 16 and 14 camshaft holders.

Remove the dowel pins.

NO. 6 CAM LOBES

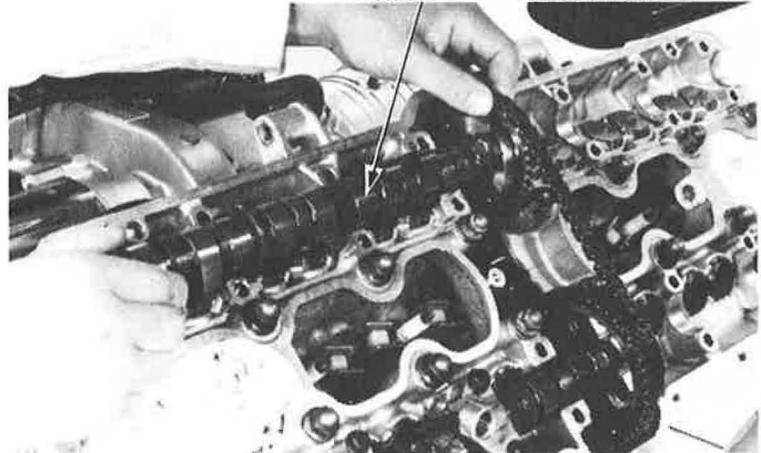


NO. 6 CAM LOBES

Remove the right intake camshaft with the cam sprocket.

Loosen the cam sprocket bolt.

RIGHT INTAKE CAMSHAFT



Turn the crankshaft clockwise until cam lift is minimal and the other cam sprocket bolt can be removed.

Remove the cam sprocket with the cam chain.

**NOTE**

Suspend the cam chain with a piece of wire to keep it from falling into the cylinder.

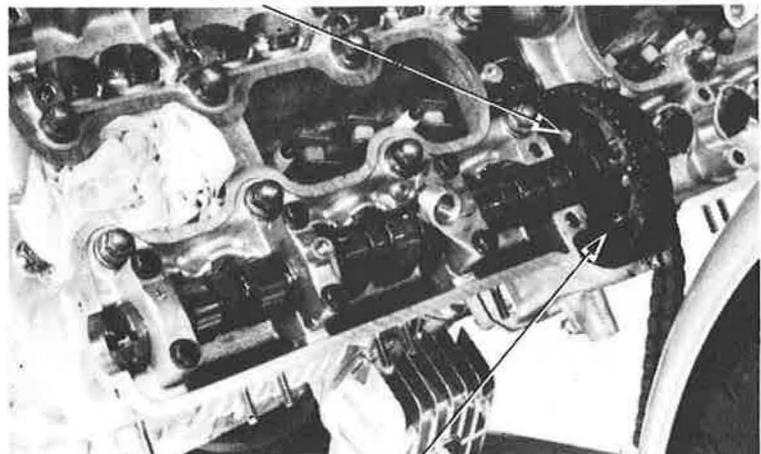
Remove the No. 7 camshaft holder, then remove the No. 8 and 6 camshaft holders.

Remove the right exhaust camshaft.

**NOTE**

After removing the camshaft, the valve clearance adjusting shims and valve lifters can be removed.

CAM SPROCKET BOLT

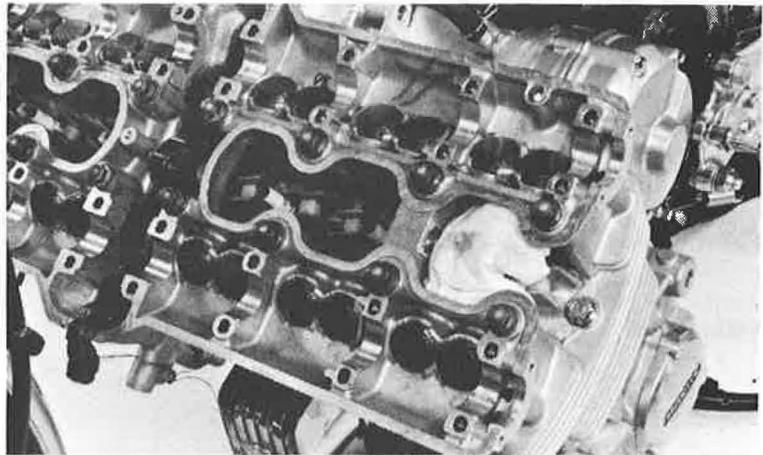


CAM SPROCKET



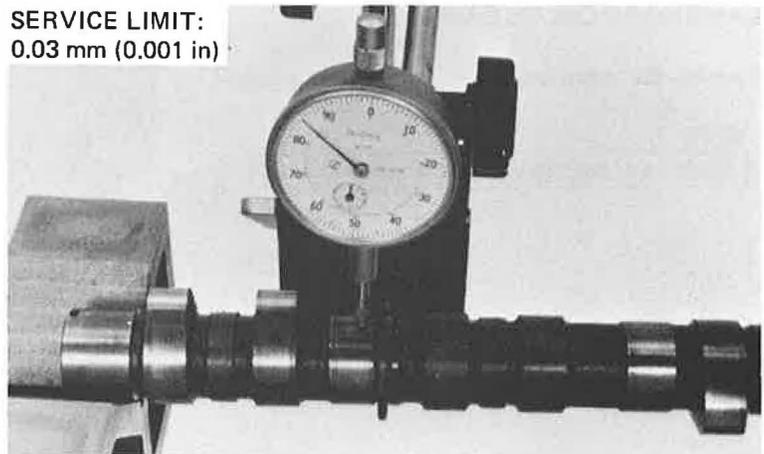
### CAM BEARING SURFACE INSPECTION

Inspect the cam bearing surfaces for scoring, scratches, or evidence of insufficient lubrication. Inspect the bearing surface of the camshaft holders.



### CAMSHAFT RUNOUT

Check the camshaft runout with a dial gauge. Support both ends of the camshaft with V-blocks.



### CAM LOBE INSPECTION

Measure the height of each cam lobe. Inspect the cam lobes for wear or damage.





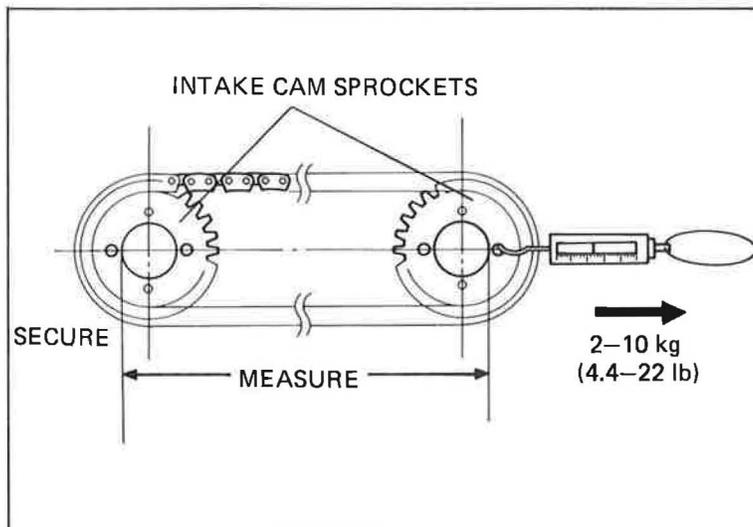
### CAM CHAIN LENGTH MEASUREMENT

Place the cam chain over the intake camshaft sprockets. Secure one sprocket and apply 2–10 kg (4.4–22 lb) of tension with a spring scale. Measure the distance between the points as shown.

**SERVICE LIMIT: 170.7 mm (6.72 in)**

### CAM CHAIN GUIDE INSPECTION

Inspect the cam chain guide for damage or local or excessive wear.

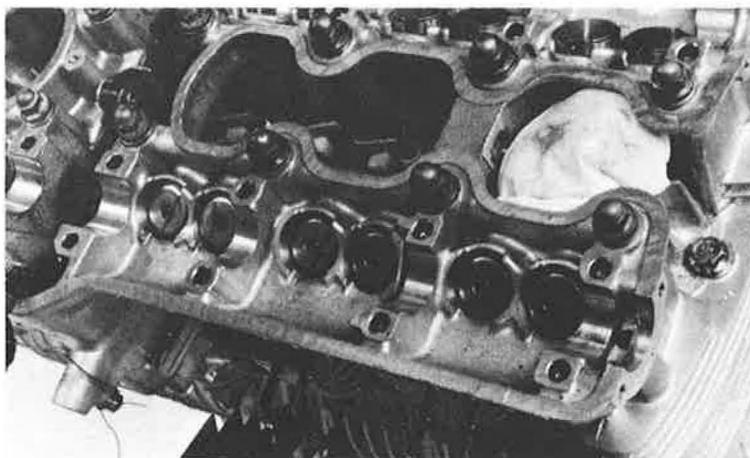


### CAMSHAFT OIL CLEARANCE

Remove the adjusting shims and the valve lifters.

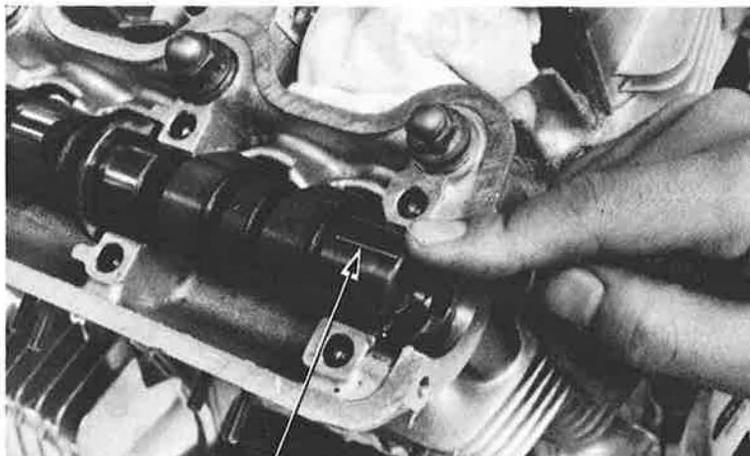
#### NOTE

Mark each part to ensure correct reassembly.



Wipe any oil from the journals.

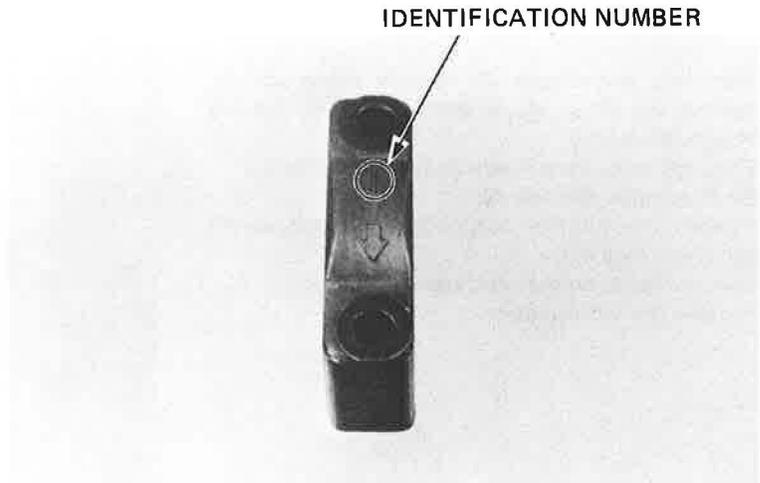
Lay a strip of plastigauge lengthwise on top of each camshaft journal.



PLASTIGAUGE



Determine the camshaft holder identification number before installing.



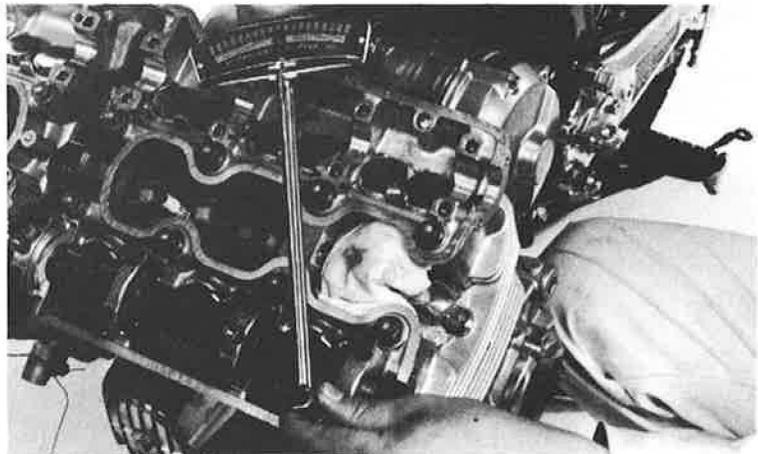
Install the camshaft holders and tighten to the specified torque in a crisscross pattern.

**NOTE**

Do not rotate the camshaft when using plastigauge.

**TORQUE:**

12–14 N·m (1.2–1.4 kg·m, 9–10 ft·lb)



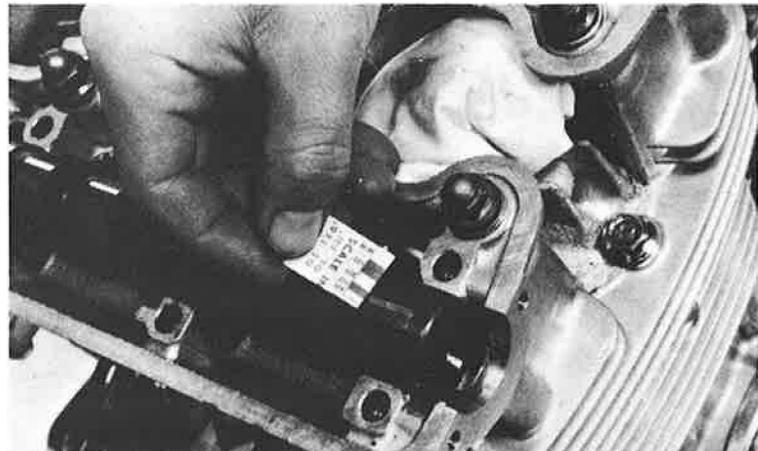
Remove the camshaft holders and measure the width of each Plastigauge. The widest thickness determines the oil clearance.

**SERVICE LIMITS:**

No. 1, 4, 5, 8, 9, 12, 13 and 16:  
0.12 mm (0.005 in)

No. 2, 3, 6, 7, 10, 11, 14 and 15:  
0.14 mm (0.006 in)

When the service limits are exceeded, replace the camshaft and recheck the oil clearance. Replace the cylinder head and camshaft holders if the clearance still exceeds service limits.





## CYLINDER HEAD REMOVAL

Place the motorcycle on its side stand for 2-3 minutes to allow oil to drain from the cylinder head to the sump.

Then, place the motorcycle on its center stand.

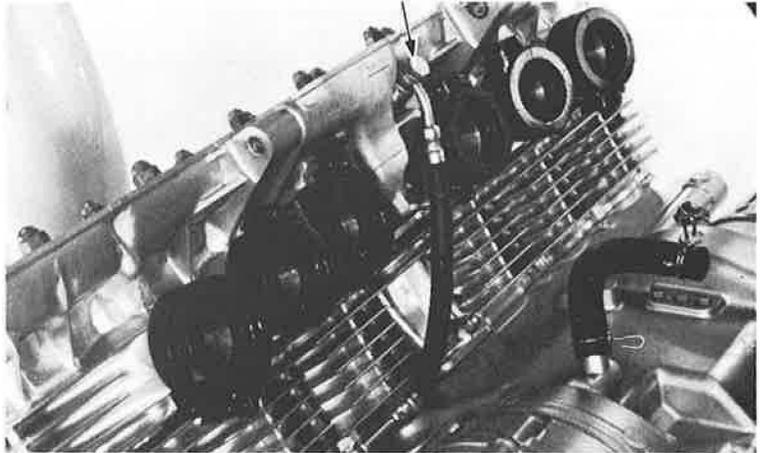
Tilt the engine (Section 5).

Remove the cylinder head cover and remove the camshaft (Page 6-3).

Remove the carburetor and exhaust system.

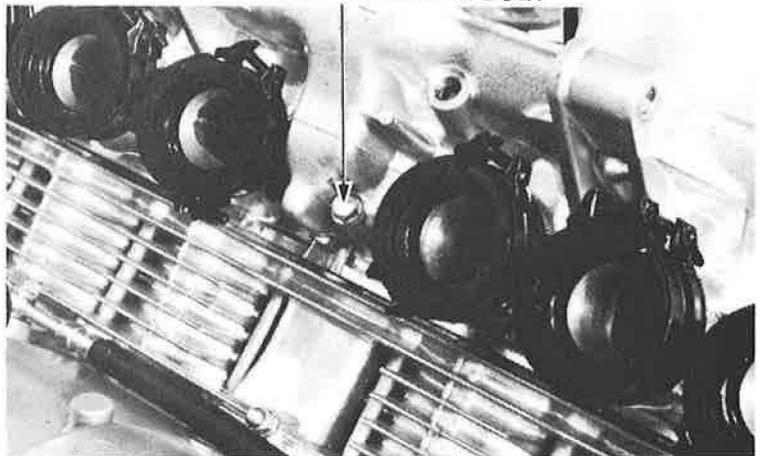
Remove the oil hose bolt.

OIL HOSE BOLT

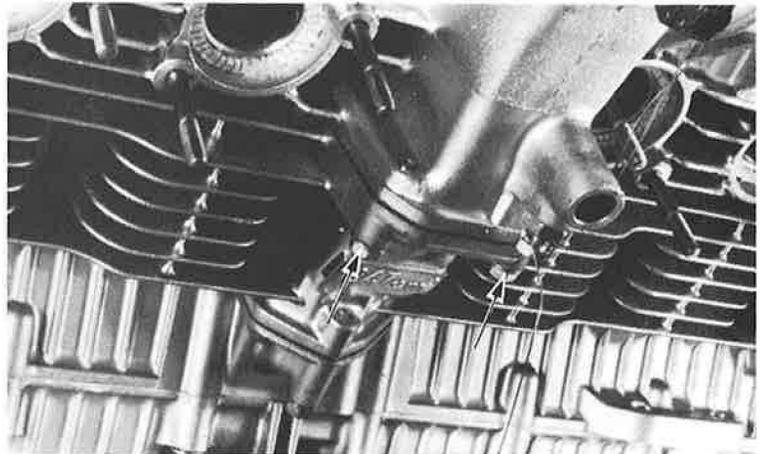


Remove the rear cam chain tensioner bolt.

CAM CHAIN TENSIONER BOLT



Remove the two cam chain housing bolts.



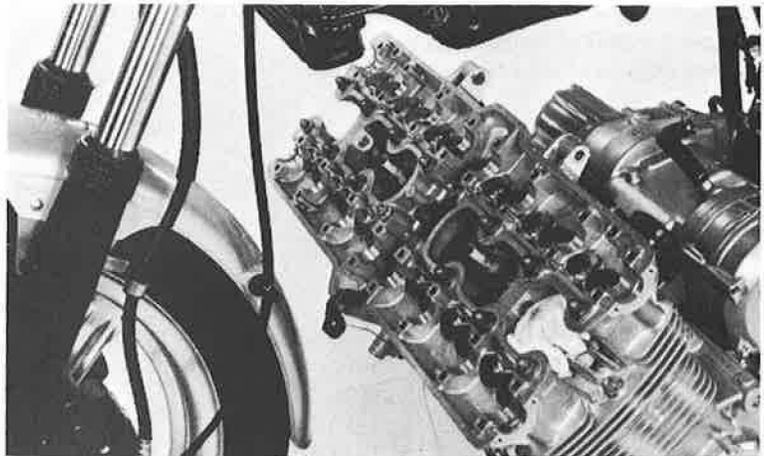


Remove the 16 cap nuts and two bolts.

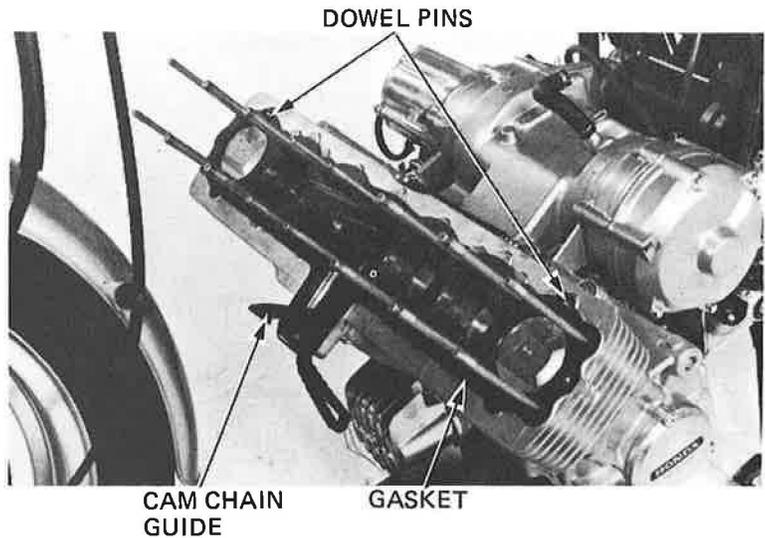
**NOTE**

Remove the nuts and bolts in 2-3 steps and in a crisscross pattern to prevent warpage.

Remove the cylinder head.



Remove the cylinder head gasket, dowel pins, and cam chain guide.

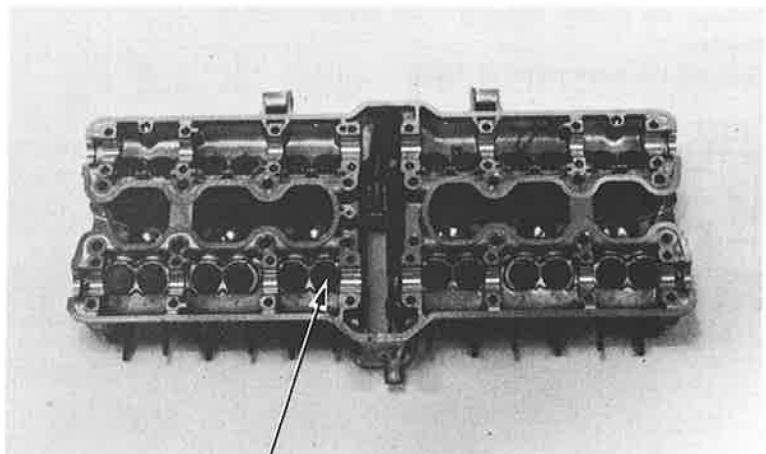


## CYLINDER HEAD DISASSEMBLY

Remove the carburetor insulators.  
Remove the valve shims.  
Remove the valve lifters.

**NOTE**

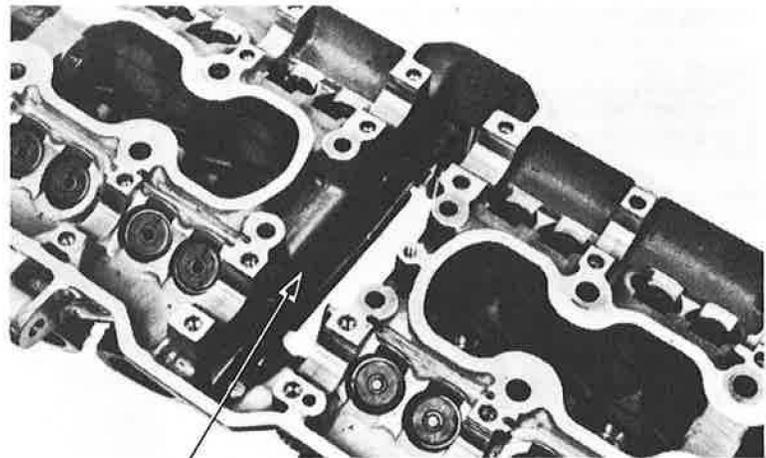
Mark all disassembled parts to ensure original assembly.



SHIM AND LIFTER



Loosen the cam chain tensioner lock nut and bolts.  
 Remove the bolt in the cylinder head.  
 Pull the chain tensioner back and remove.



CAM CHAIN TENSIONER

Remove the valve spring keepers, retainers, springs and valves.

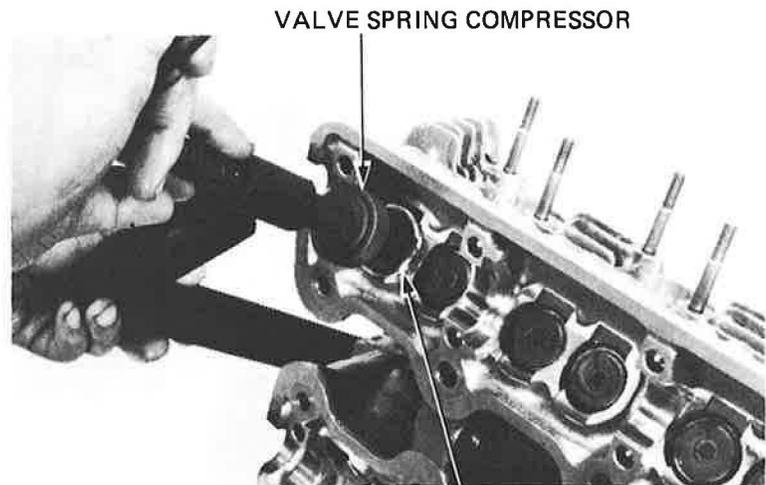
**CAUTION**

*To prevent loss of tension, do not compress the valve springs more than necessary to remove the keepers.*

**NOTE**

- Avoid damaging the lifter sliding surface.
- Mark all disassembled parts to ensure original assembly.

Remove the valve stem seals.



VALVE SPRING COMPRESSOR

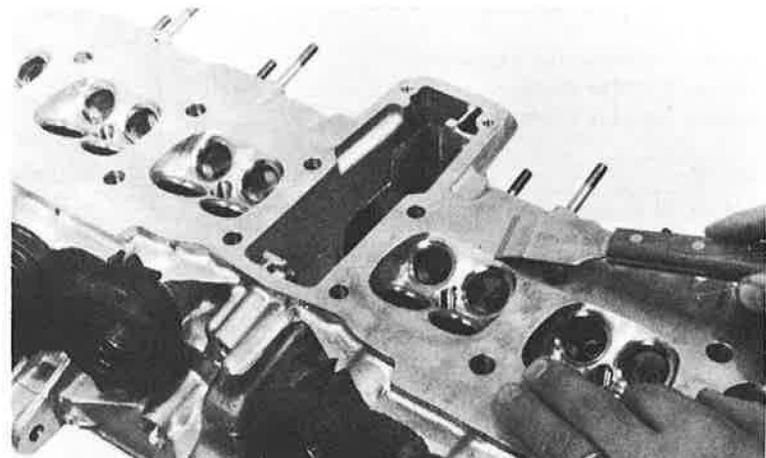
LIFTER HOLE  
 PROTECTOR  
 07999-4220000

Remove the carbon deposits from the combustion chamber.

Clean off the head gasket surfaces.

**NOTE**

- Avoid damaging the gasket surfaces.
- Gasket will come off easier if soaked in solvent.





**VALVE LIFTER O.D. MEASUREMENT**

Measure the valve lifter O.D.,

**STANDARD:**

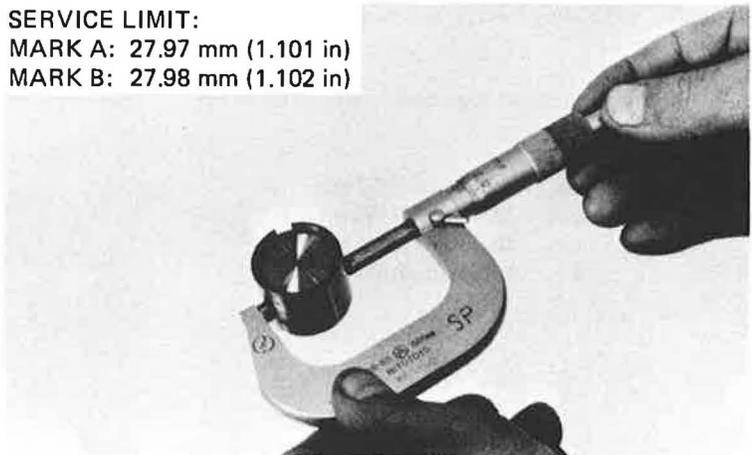
**MARK A: 27.972–27.982 mm (1.1013–1.1017 in)**

**MARK B: 27.982–27.993 mm (1.1017–1.1021 in)**

**SERVICE LIMIT:**

**MARK A: 27.97 mm (1.101 in)**

**MARK B: 27.98 mm (1.102 in)**



**CYLINDER HEAD I.D. MEASUREMENT**

Measure the cylinder head I.D.

**STANDARD:**

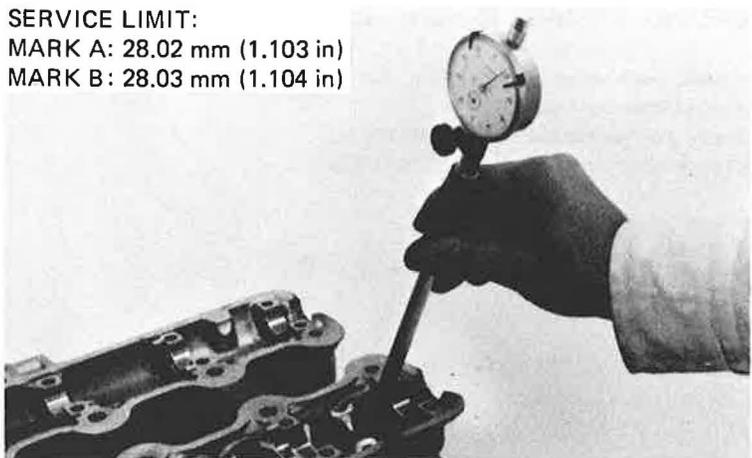
**MARK A: 28.000–28.011 mm (1.1024–1.1028 in)**

**MARK B: 28.011–28.021 mm (1.1028–1.1032 in)**

**SERVICE LIMIT:**

**MARK A: 28.02 mm (1.103 in)**

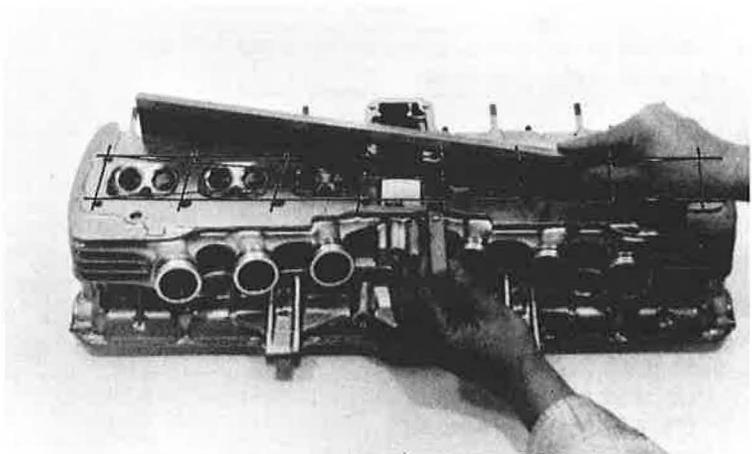
**MARK B: 28.03 mm (1.104 in)**



**CYLINDER HEAD INSPECTION**

Inspect the sliding surfaces for scoring, scratches, or evidence of insufficient lubrication.

Check the spark plug hole and valve areas for cracks. Check the cylinder head for warpage with a straight edge and a feeler gauge.



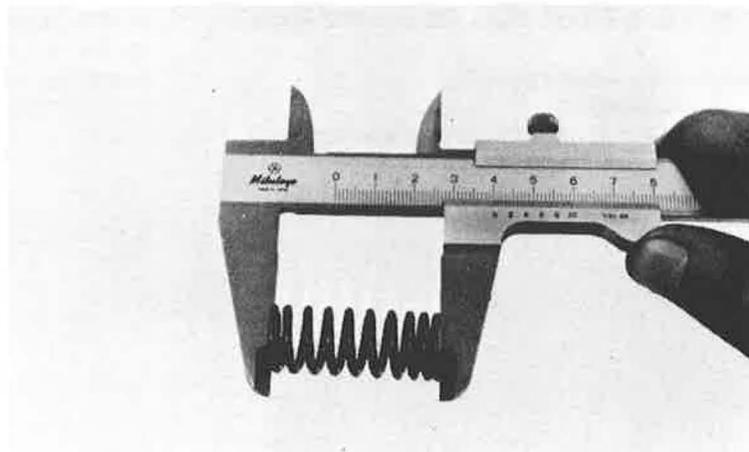


### VALVE SPRING FREE LENGTH INSPECTION

Measure the length of the inner and outer valve springs.

#### SERVICE LIMITS:

Inner:	IN.	39.8 mm (1.57 in)
	EX.	39.8 mm (1.57 in)
Outer:	IN.	42.5 mm (1.67 in)
	EX.	42.5 mm (1.67 in)



### VALVE STEM-TO-GUIDE CLEARANCE

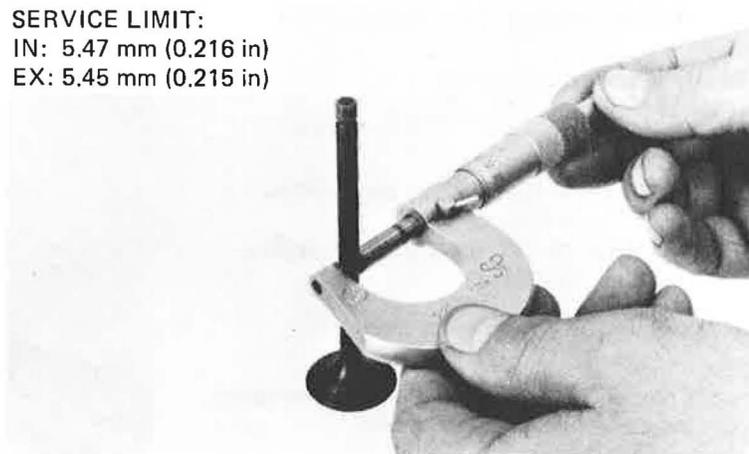
Inspect each valve for bending, burning, scratches or abnormal stem wear.

Check the valve movement in the guide.

Measure and record each valve stem O.D.

#### SERVICE LIMIT:

IN:	5.47 mm (0.216 in)
EX:	5.45 mm (0.215 in)



#### NOTE

Ream the guides to remove any carbon build-up before checking clearance.

Measure and record each valve guide I.D. using a ball gauge or inside micrometer.

#### SERVICE LIMITS:

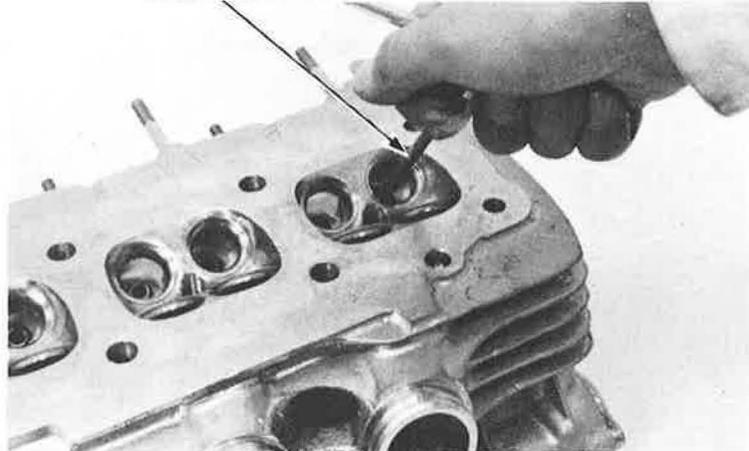
IN.	5.54 mm (0.215 in)
EX.	5.54 mm (0.215 in)

Subtract each valve stem O.D. from the corresponding guide I.D. to obtain the stem to guide clearance.

#### SERVICE LIMITS:

IN.	0.07 mm (0.003 in)
EX.	0.09 mm (0.004 in)

VALVE GUIDE REAMER (5.5mm)  
07984-2000000





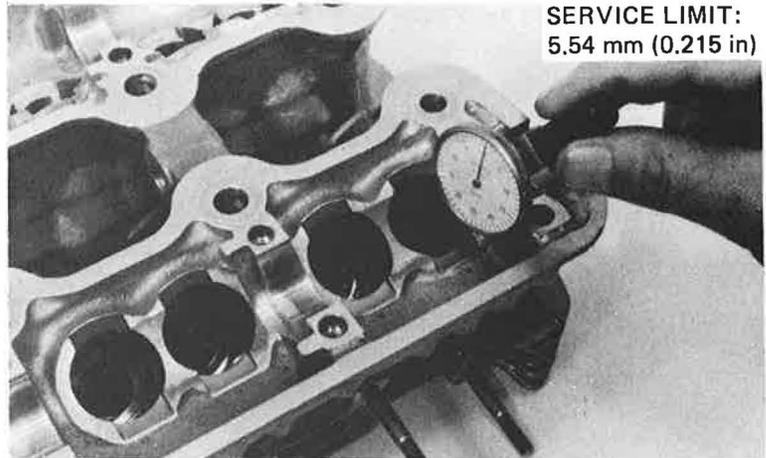
**NOTE:**

If the stem-to-guide clearance exceeds the service limits, determine if a new guide with standard dimensions would bring the clearance within tolerance. If so, replace any guides as necessary and ream to fit.

If stem-to guide clearance exceeds the service limits with new guide, replace the affected valves and guides.

**NOTE**

Reface the valve seats whenever the valve guides are replaced.



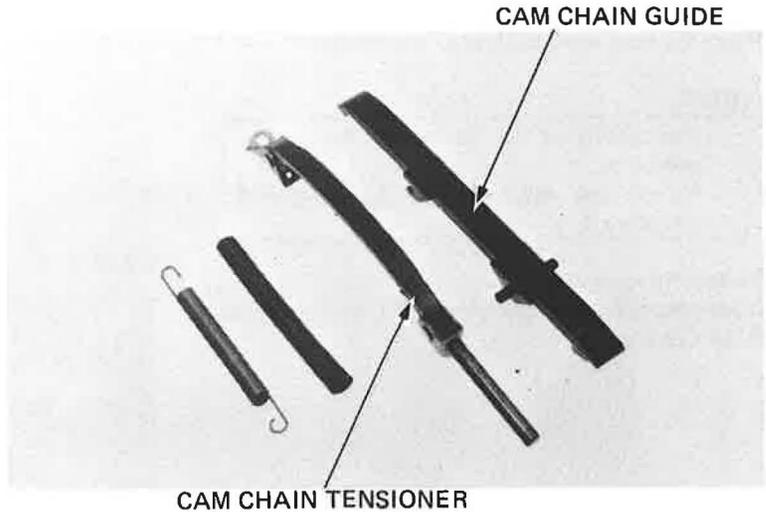
**SERVICE LIMIT:**  
5.54 mm (0.215 in)

**CAM CHAIN GUIDE AND CAM CHAIN TENSIONER INSPECTION**

Inspect the cam chain guide for damage or excessive wear.

Inspect the cam chain tensioner slipper for damage or excessive wear.

Inspect the tension spring for weakness.

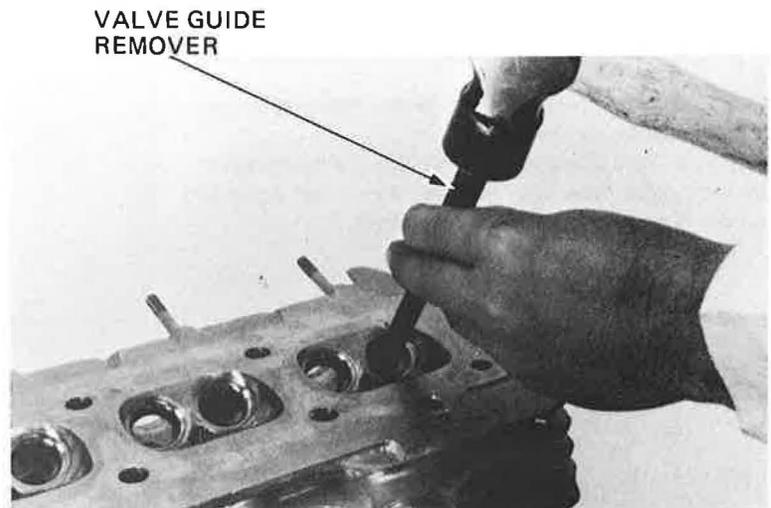


**VALVE GUIDE REPLACEMENT**

Support the cylinder head and drive out the guide from the valve port.

**NOTE**

When driving out the valve guide, do not damage the head.



Install a new oversize valve guide from the top of the head.

**NOTE**

For best results, heat the cylinder head to 150°C (300°F) before installing new oversize guides.

VALVE GUIDE  
REMOVER



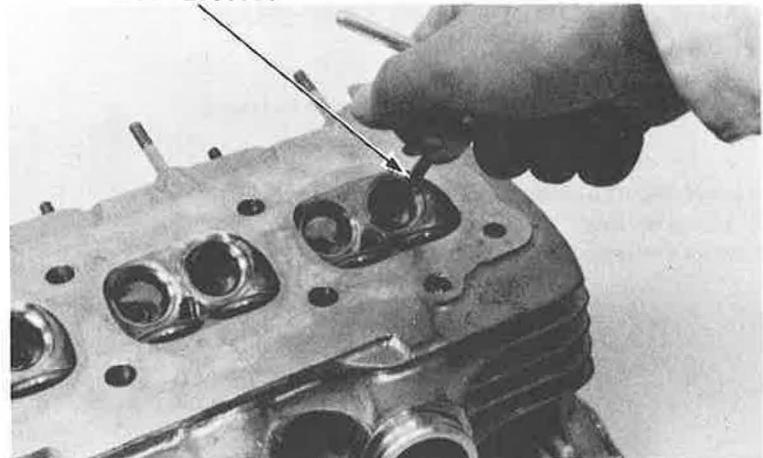
Ream the new valve guide after installation.

**NOTE**

- Use cutting oil on the reamer during this operation.
- Rotate the reamer when inserting and removing it.

Reface the valve seat.  
Clean the cylinder head thoroughly to remove any metal particles.

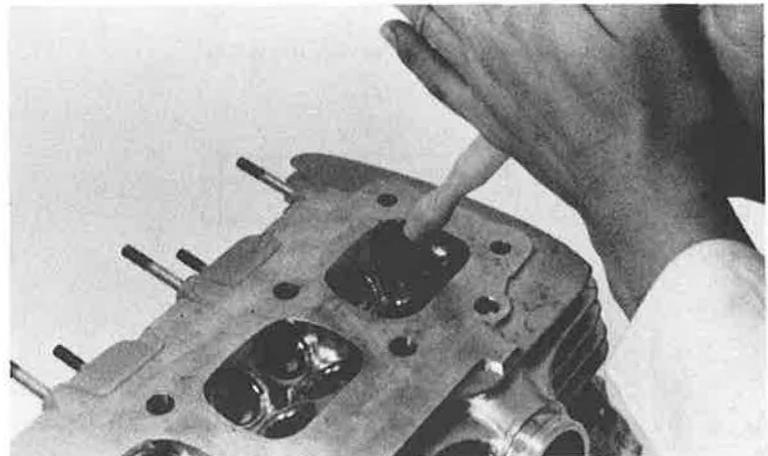
VALVE GUIDE REAMER (5.5 mm)  
07984-2000000



## VALVE SEAT INSPECTION/REFACING

Clean all intake and exhaust valves thoroughly to remove carbon deposits.

Apply a light coating of valve lapping compound to each valve face. Lap each valve and seat using a rubber hose or other hand-lapping tool.





Remove the valve and inspect the face.

**CAUTION**

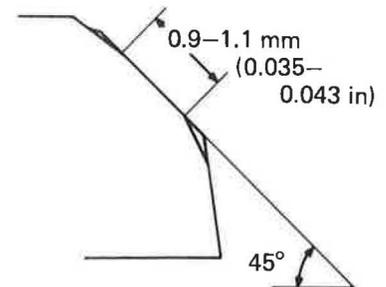
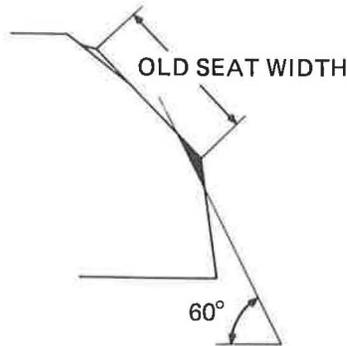
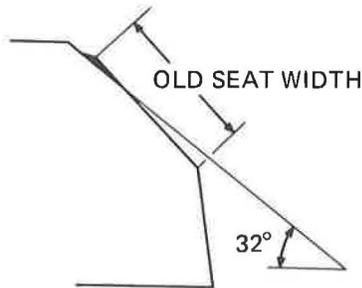
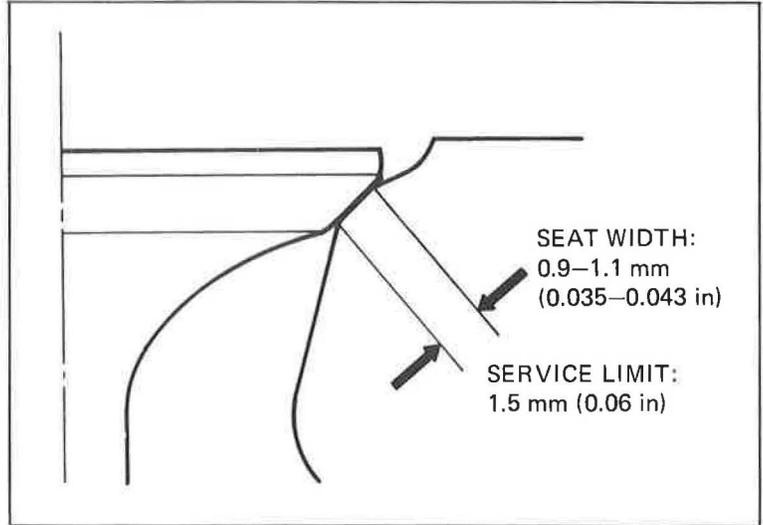
*The valves cannot be ground. If the valve face is rough, worn unevenly, or contacts the seat improperly, the valve must be replaced.*

Inspect the valve seat.

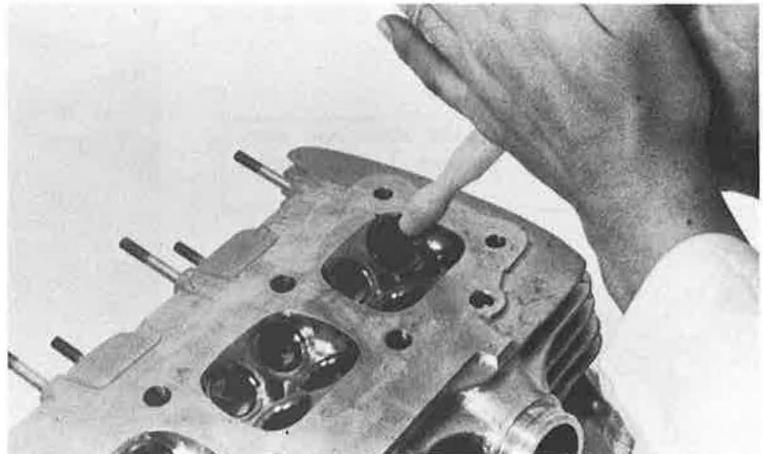
If the seat is too wide, too narrow, or has low spots, the seat must be ground.

**NOTE**

Follow the refacer manufacturer's operating instructions.



After cutting the seat, apply lapping compound to valve face, and lap the valve using light pressure. After lapping, wash any residual compound off the cylinder head and valve.





## CYLINDER HEAD ASSEMBLY

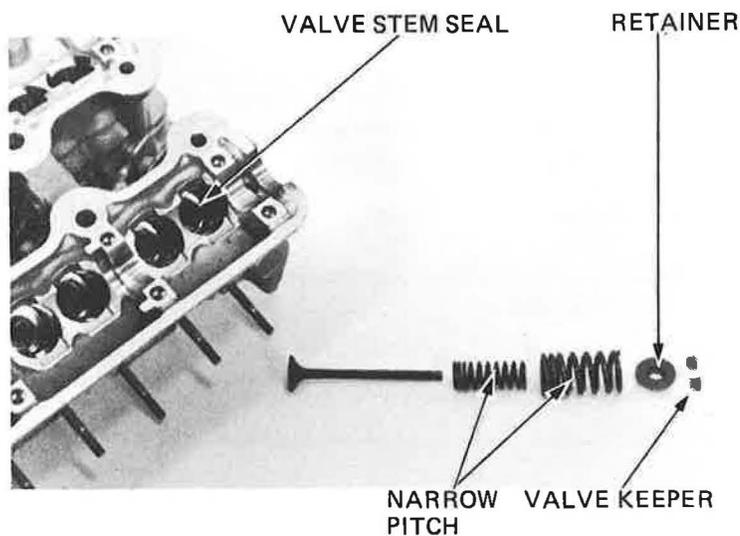
### NOTE

Install new valve stem seals when reassembling.

Lubricate each valve stem with molybdenum disulfide grease and insert the valve into the valve guide.

### NOTE

To avoid damage to the stem seal, turn the valve slowly when inserting.



Install the valve springs and retainers.

### NOTE

Install the valve springs with the tightly wound coils facing the cylinder head.

Install the valve keepers.

### CAUTION

*To prevent loss of tension, do not compress the valve spring more than necessary to install the valve keepers.*

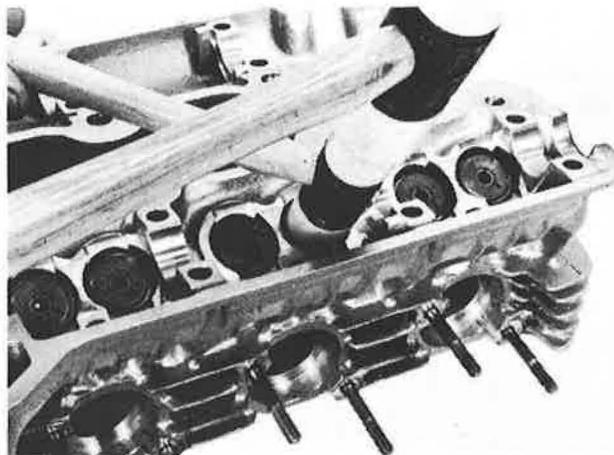


LIFTER HOLE  
 PROTECTOR  
 07999-4220000

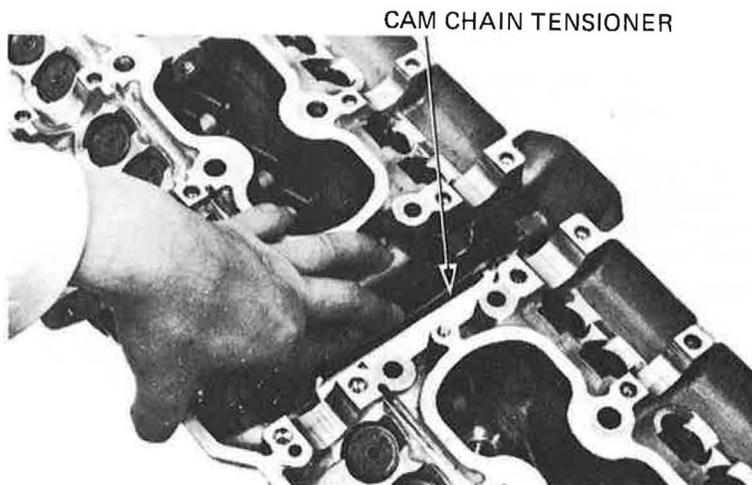
Tap the valve stems gently with a soft hammer to firmly seat the keepers.

### NOTE

Support the cylinder head above the work bench surface to prevent possible valve damage.



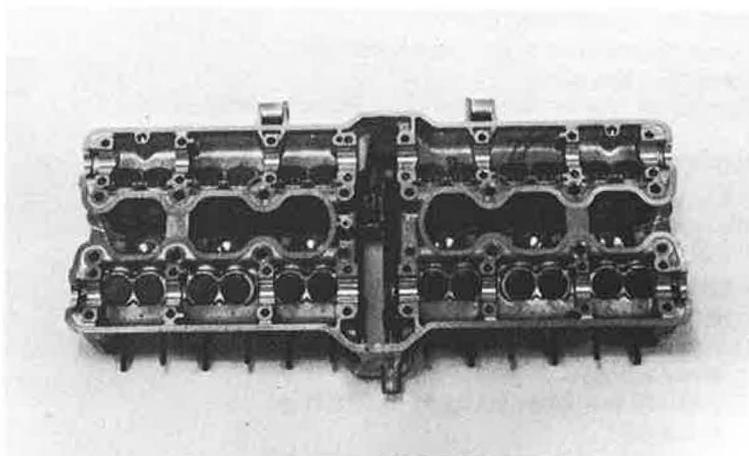
Install the cam chain tensioner.  
Push the chain tensioner and tighten the lock nut.



Install the valve lifters and adjustment shims.

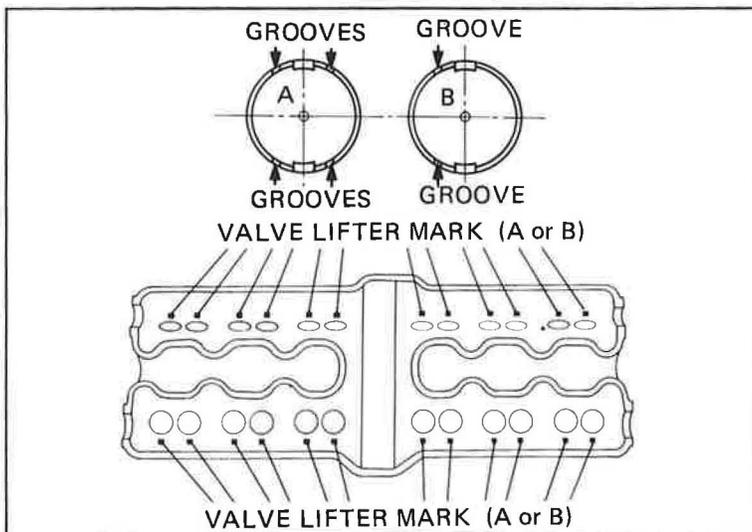
**NOTE**

Make sure that the valve lifters and shims are in their original position.



**NOTE**

Valve lifters are available in two sizes. When installing new valve lifters, use lifters with the letter code that corresponds the code stamped on the cylinder head. Use 'A' with 'A', 'B' with 'B'.





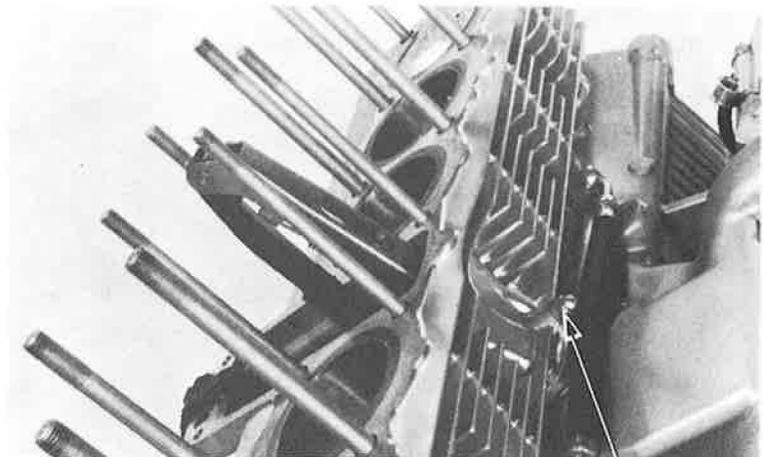
## CYLINDER HEAD INSTALLATION

Clean the cylinder head gasket surfaces of any gasket material.

Loosen the cam chain tensioner lock nut and pull the tensioner up.

Retighten the lock nut.

Install the dowel pins, a new gasket and cam chain guide.



LOCK NUT

Install the cylinder head assembly.

Tighten the cap nuts in the sequence shown.

Tighten the two bolts.

Tighten the two bolts at the cam chain housing.

### NOTE

Apply molybdenum disulfide grease to the threads of the cylinder bolts and washers.

### TORQUE VALUES:

**10 mm cap nut:**

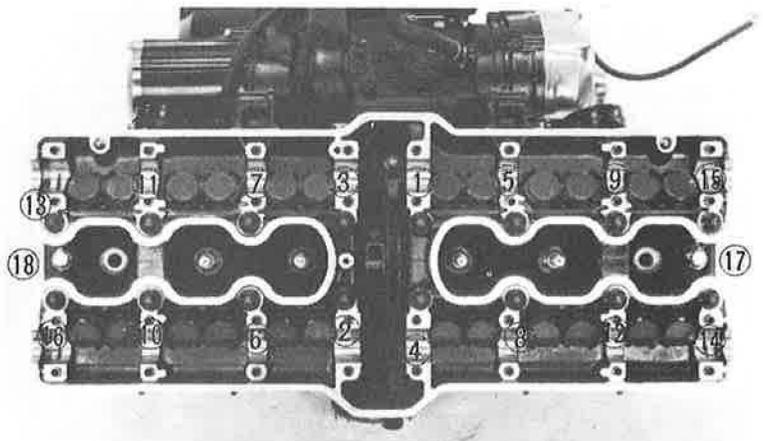
32–34 N·m (3.2–3.4 kg·m, 23–25 ft·lb)

**8 mm cap nut:**

19–21 N·m (1.9–2.1 kg·m, 14–15 ft·lb)

**8 mm bolt:**

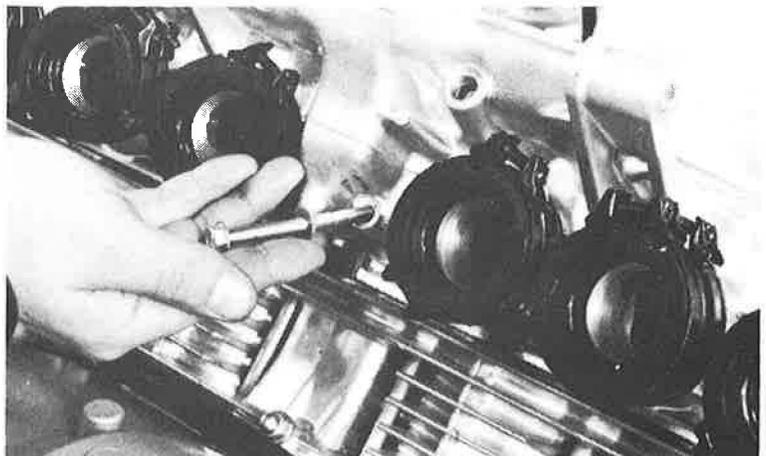
18–22 N·m (1.8–2.2 kg·m, 13–16 ft·lb)



Tighten the cam chain tensioner bolt.

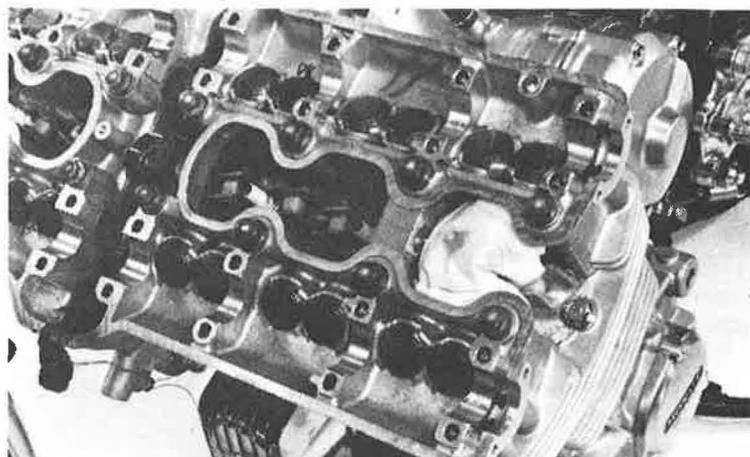
### TORQUE:

10–14 N·m (1.0–1.4 kg·m, 7–10 ft·lb)

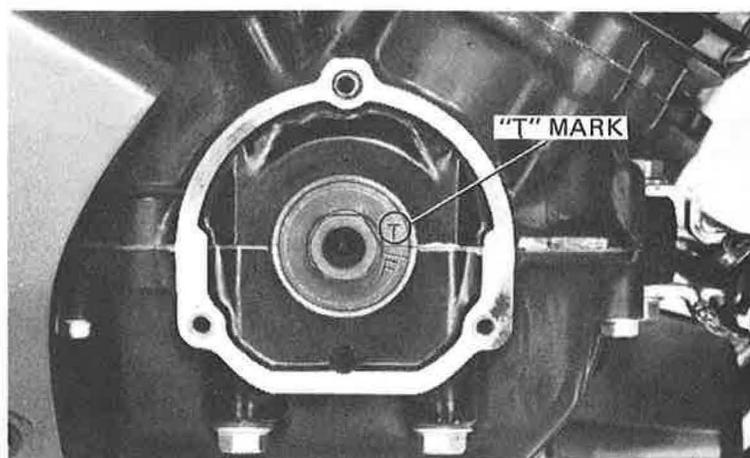


## CAMSHAFT INSTALLATION

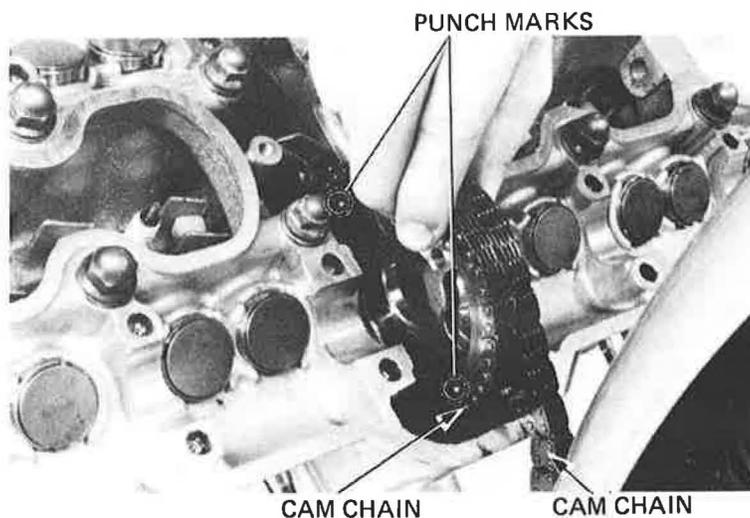
Lubricate the camshaft bearings with molybdenum disulfide grease.



Turn the crankshaft clockwise until the "T" mark is toward the front of the engine and is aligned with the crankcase mating surfaces as shown.



Place the cam chains over the exhaust camshaft sprocket, aligning the sprocket punch marks with the cylinder head surface. Install the right exhaust camshaft, positioning the cam lobes for the No. 6 cylinder toward the spark plug. Install a camshaft sprocket bolt, but do not tighten yet.



Loosely install the No. 6 and No. 8 camshaft holders. Install the No. 7 holder, positioning the camshaft so its flange fits into the slot in the No. 7 holder.

**NOTE**

Install camshaft holders with directional arrows pointing toward the front of the engine.

Tighten the camshaft holder bolts in a crisscross pattern.

**TORQUE:**

**12–16 N·m (1.2–1.6 k·m, 9–12 ft·lb)**

Turn the crankshaft clockwise 360° to obtain access for installing the other camshaft sprocket bolt. Install the sprocket bolt and tighten to the specified torque.

**TORQUE:**

**14–18 N·m (1.4–1.8 kg·m, 10–13 ft·lb)**

Turn the crankshaft another 360° and tighten the sprocket bolt which was installed earlier. Adjust the cam chain (page 3-14).

Position the crankshaft so the "T" mark is again aligned with the crankshaft mating surfaces as shown on page 6-21. Recheck the position of the exhaust camshaft sprocket; the punch marks must align with the cylinder head surface. Place the cam chain over the intake camshaft sprocket, aligning the sprocket punch marks with the cylinder head surface.

Install the right intake camshaft, positioning the cam lobes for the No. 6 cylinder toward the spark plugs. Install a camshaft sprocket bolt, but do not tighten yet.

**NOTE**

If the sprocket was not removed from the camshaft during disassembly, then reinstall as an assembled set.

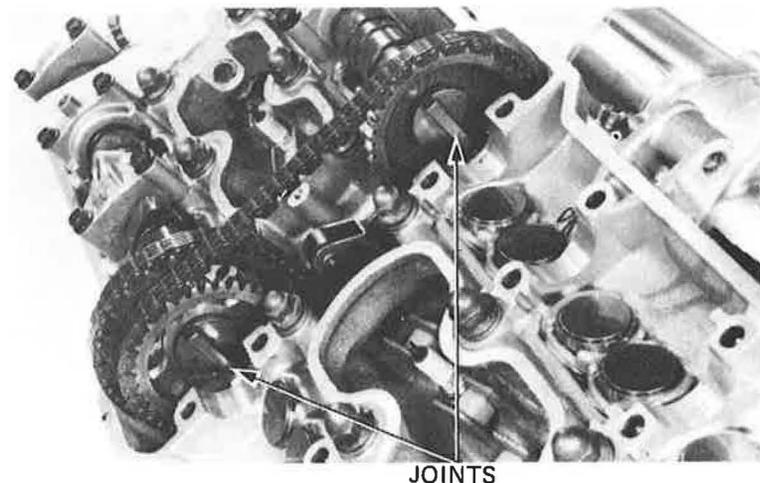
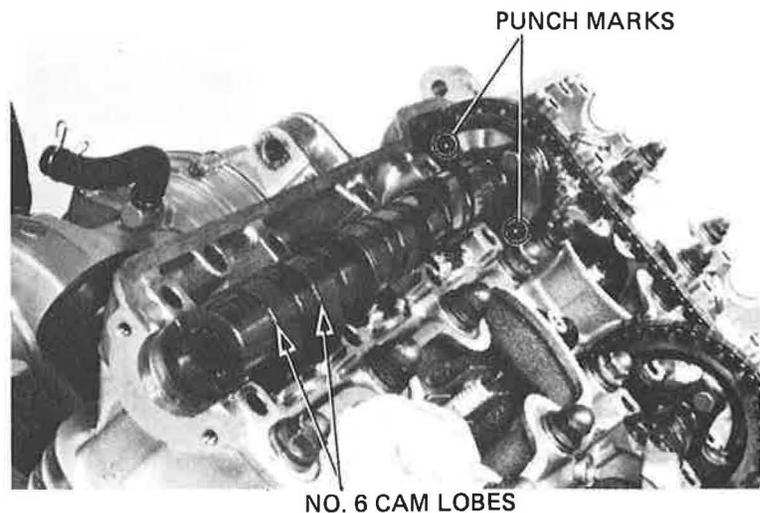
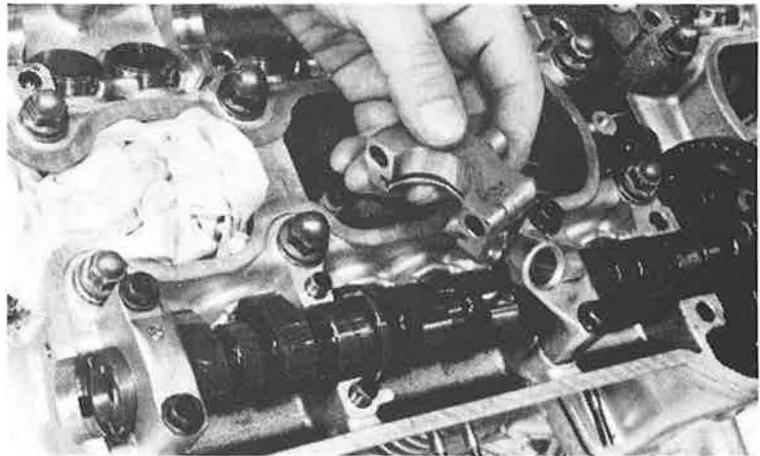
Loosely install the No. 14 and No. 16 camshaft holders. Install the No. 15 holder, positioning the camshaft so its flange fits into the slot in the No. 15 holder.

Tighten the camshaft holder bolts, then tighten the camshaft sprocket bolt, following the same procedure described for exhaust camshaft installation.

Turn the crankshaft clockwise 360° until the "T" mark is aligned with the crankcase mating surface. Make sure the cam lobes for the No. 6 cylinder are toward outside.

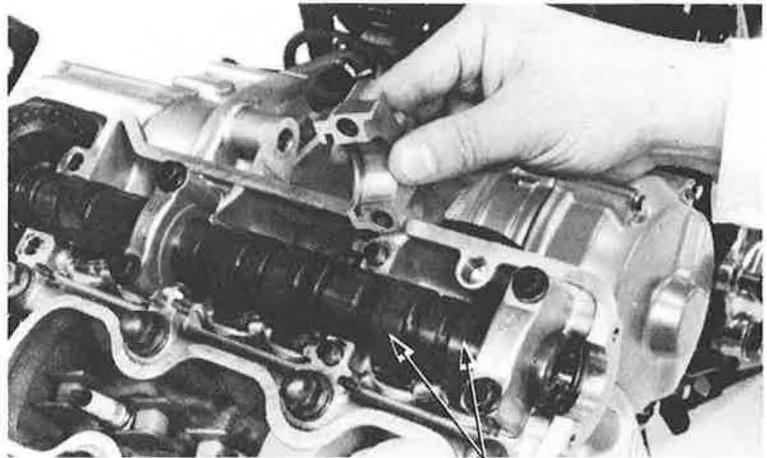
Install and tighten the camshaft sprocket bolt. Adjust the cam chain tensioner (page 3-14). Recheck the crankshaft and camshaft sprocket alignment.

Insert the camshaft joints into the camshaft ends.



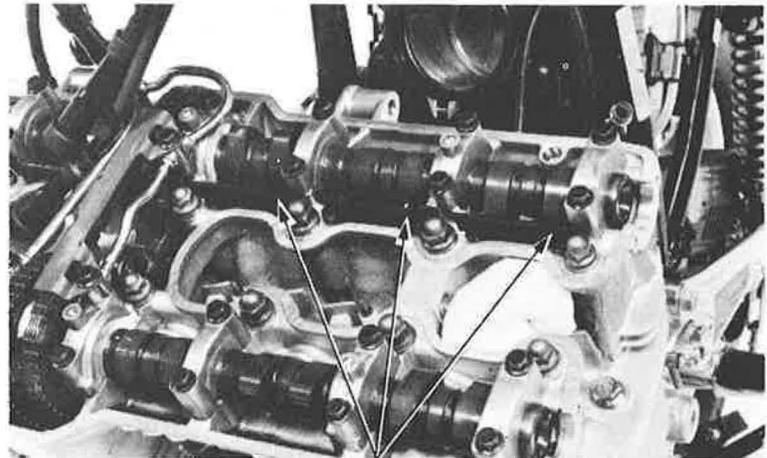


Connect the left camshafts to the joints with No. 1 cam lobes toward the spark plug.  
Install No. 1, No. 3 and No. 9 and 11 holders loosely.  
Install the No. 2 and No. 10 holders.  
Tighten the bolts to the specified torque in a criss-cross pattern.



NO. 1 CAM LOBES  
ALSO, NO. 1 EX. CAM LOBES  
TOWARD SPARK PLUG.

Install the oil pipes and cam chain guide with the No. 4, 5, 12 and 13 holders.  
Tighten in a crisscross pattern to the specified torque.



OIL POOL PLATES

Install the engine.  
Fill the oil pockets in the head with oil so that the cam lobes are submerged.

Adjust valve tappet clearance (Section 3).



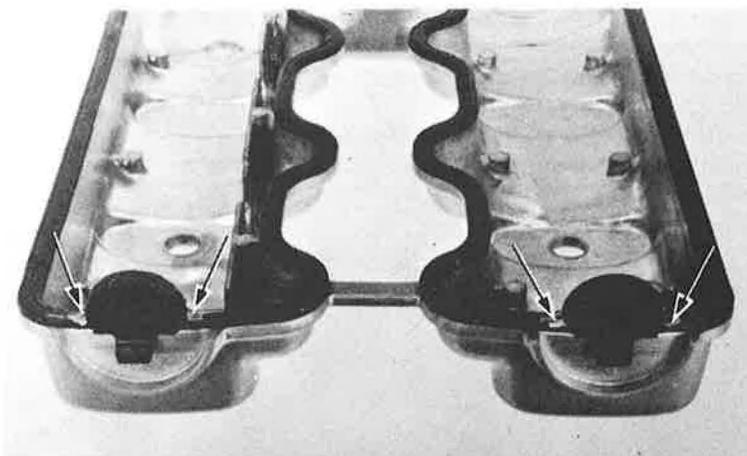


Inspect the cylinder head cover gasket for damage or deterioration.

Apply a sealant on the cylinder gasket as shown, adjacent to each side cover.

**NOTE**

Before applying sealant, clean the gasket.

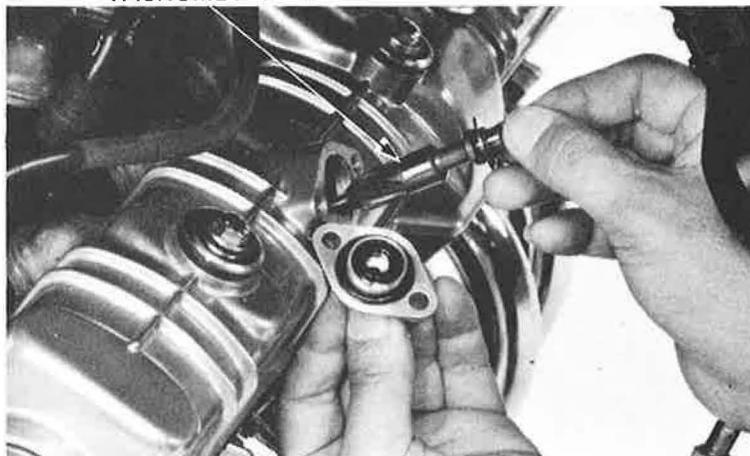


**GASKET**

Install the cylinder head cover and cylinder head side covers.

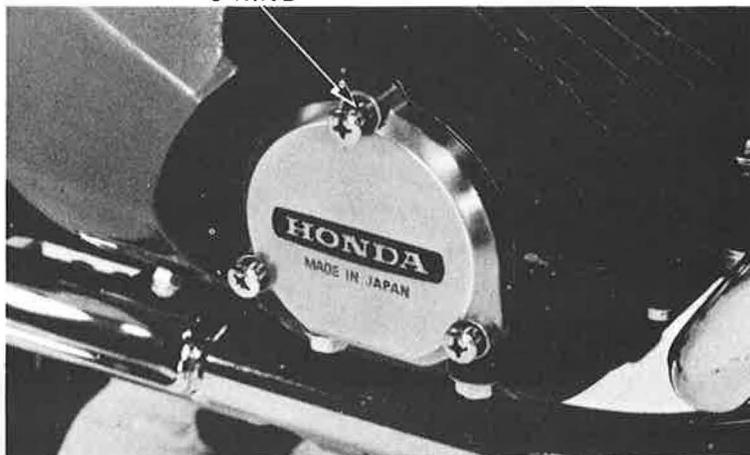
Insert the tachometer drive gear.  
 Install the tachometer gear cover.  
 Connect the tachometer cable.

**TACHOMETER DRIVE GEAR**



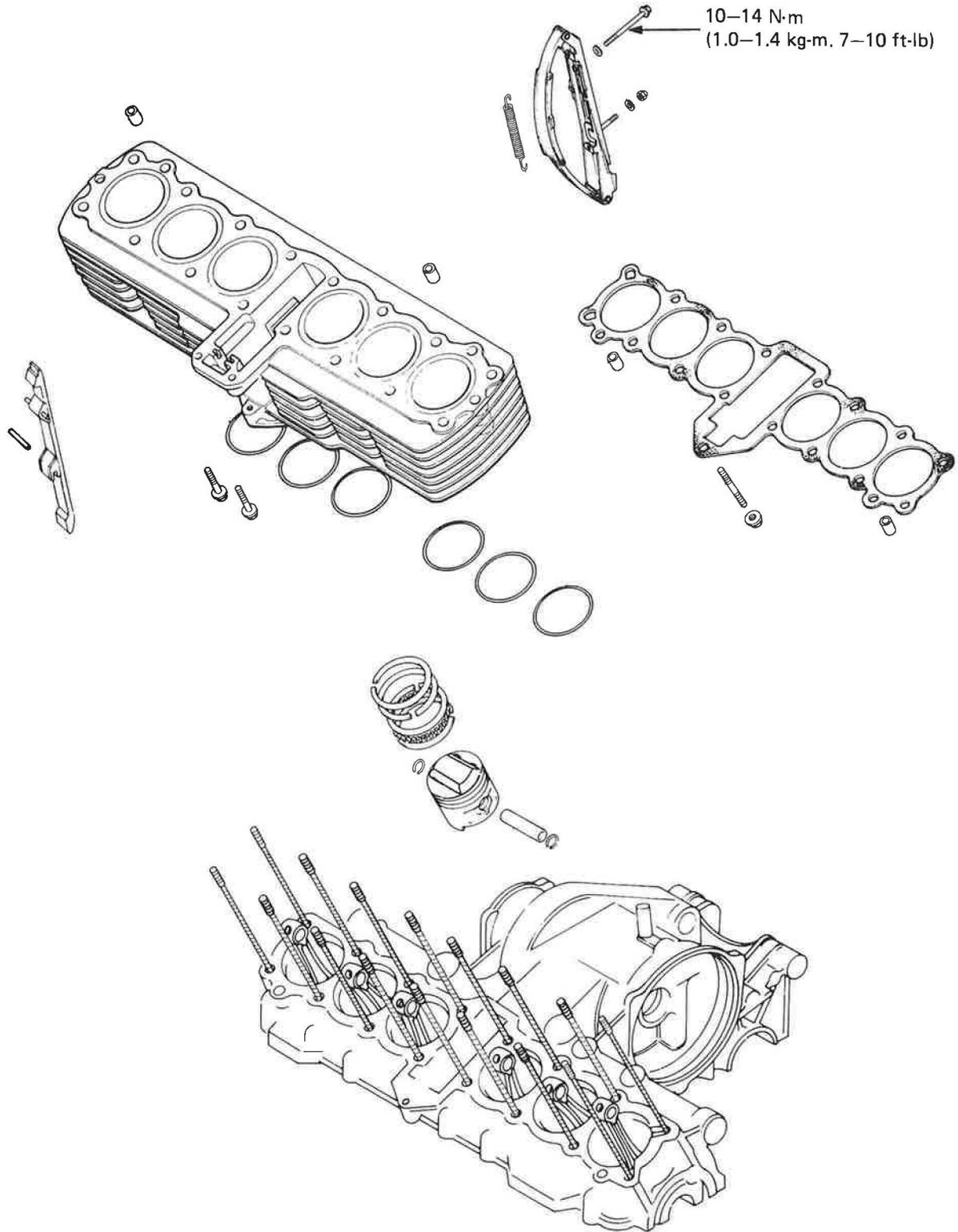
Install the right crankshaft side cover and gasket with bead printed surface toward the crankcase.  
 Install a new O-ring on the upper screw only.  
 Adjust the cam chain (page 3-14).

**O-RING**





MEMO





<b>SERVICE INFORMATION</b>	<b>7-1</b>	<b>PISTON REMOVAL</b>	<b>7-3</b>
<b>TROUBLESHOOTING</b>	<b>7-1</b>	<b>PISTON INSTALLATION</b>	<b>7-7</b>
<b>CYLINDER REMOVAL</b>	<b>7-2</b>	<b>CYLINDER INSTALLATION</b>	<b>7-7</b>

## SERVICE INFORMATION

### GENERAL INSTRUCTION

All cylinder/piston maintenance and inspection can be accomplished with the engine in the frame.

### TOOLS

#### Special

Piston Base (4 required) 07958-250000  
Piston Ring Compressor (4 required) 07954-4220000

### TORQUE VALUE

Cam chain tensioner rear bolt: 10-14 N·m (1.0-1.4 kg·m,  
7-10 ft·lb)

### SPECIFICATIONS

		STANDARD	SERVICE LIMIT	
Cylinder	I.D.	64.500-64.510 mm (2.5394-2.5398 in)	64.60 mm (2.543 in)	
	Warpage	—————	0.10 mm (0.004 in)	
Piston, piston rings and piston pin	Piston ring-to ring groove clearance	TOP	0.015-0.045 mm (0.0006-0.0018 in)	
		SECOND	0.015-0.045 mm (0.0006-0.0018 in)	
	Ring end gap	TOP	0.15-0.30 mm (0.006-0.012 in)	
		SECOND	0.15-0.30 mm (0.006-0.012 in)	
		OIL (SIDE RAIL)	0.30-0.90 mm (0.012-0.035 in)	
	Piston O.D.		64.47-64.49 mm (2.538-2.539 in)	64.40 mm (2.535 in)
	Piston pin bore		15.002-15.008 mm (0.5906-0.5909 in)	15.04 mm (0.592 in)
	Connecting rod small end I.D.		15.016-15.034 mm (0.5912-0.5919 in)	15.05 mm (0.592 in)
	Piston pin O.D.		14.994-15.000 mm (0.5903-0.5906 in)	14.98 mm (0.590 in)
	Piston-to-piston pin clearance		—————	0.04 mm (0.002 in)
Cylinder-to-piston clearance		—————	0.10 mm (0.004 in)	

## TROUBLESHOOTING

### Compression Too Low or Unstable

1. Worn cylinder or piston rings

### Excessive Smoke

1. Worn cylinder or piston
2. Improper installation of piston rings
3. Scored or scratched piston or cylinder

### Overheating

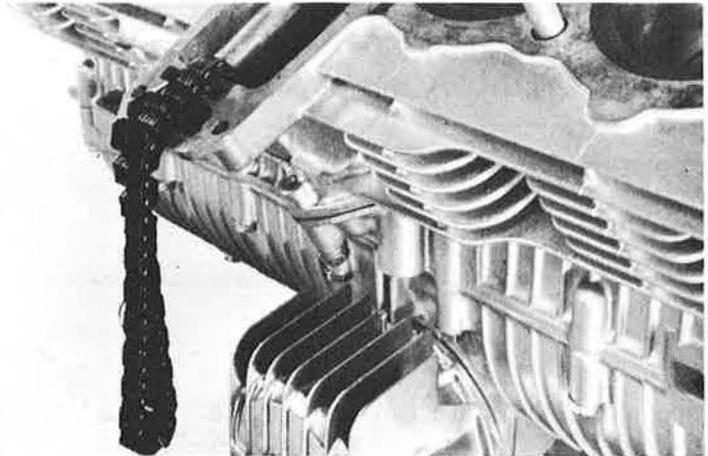
1. Excessive carbon build-up on the piston or combustion chamber.

### Knocking or Abnormal Noise

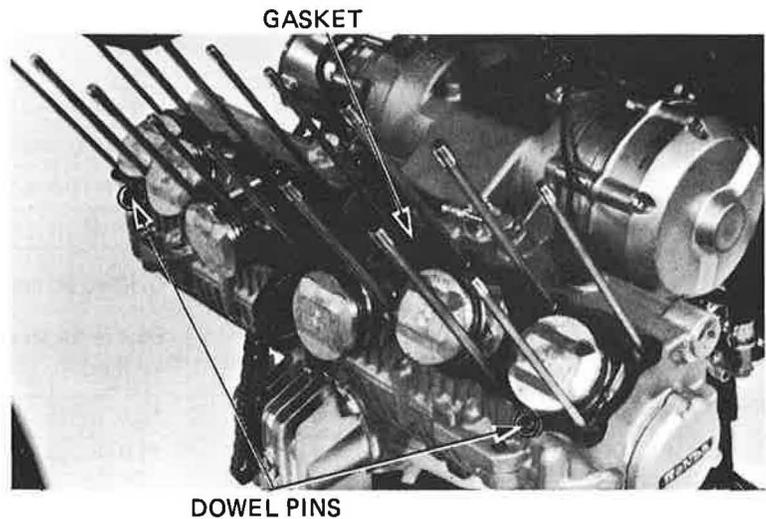
1. Worn piston and cylinder
2. Excessive carbon build-up

## CYLINDER REMOVAL

Remove the cylinder head (Section 6).  
 Place clean shop towels into the crankcase openings to keep objects from falling in.  
 Remove the nut at the lower front cylinder base.  
 Remove the cylinder.  
 Remove the cam chain tensioner.

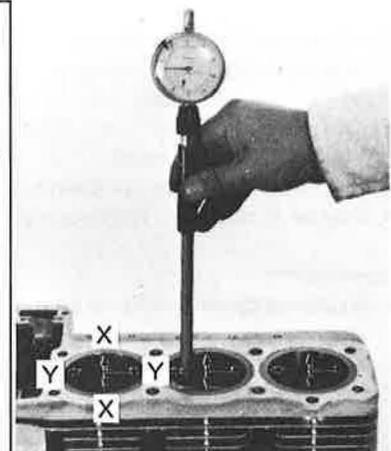
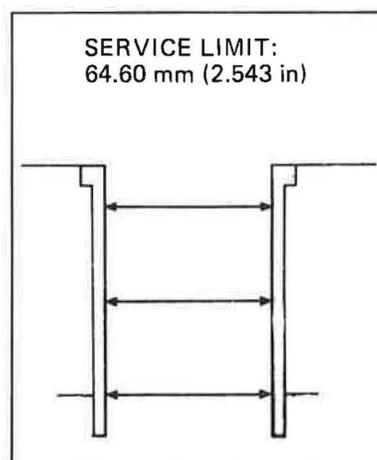


Remove the cylinder gasket and dowel pins.  
 Remove the cam chain guide pin.



## CYLINDER INSPECTION

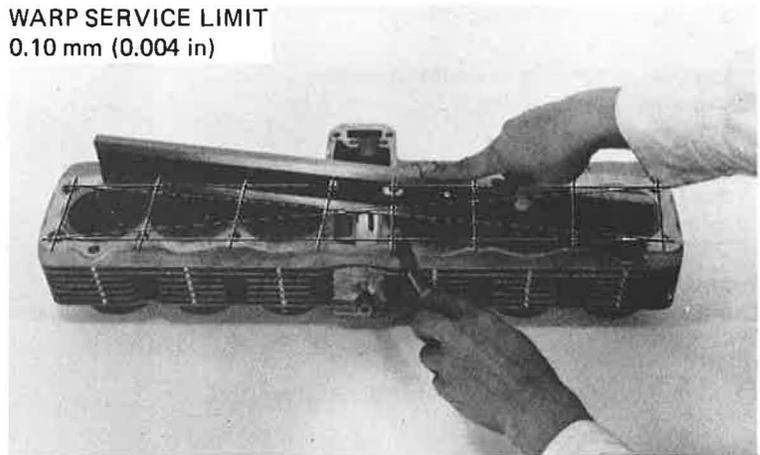
Inspect the cylinder bores for wear or damage.  
 Measure the cylinder I.D. at three levels in X and Y axis.





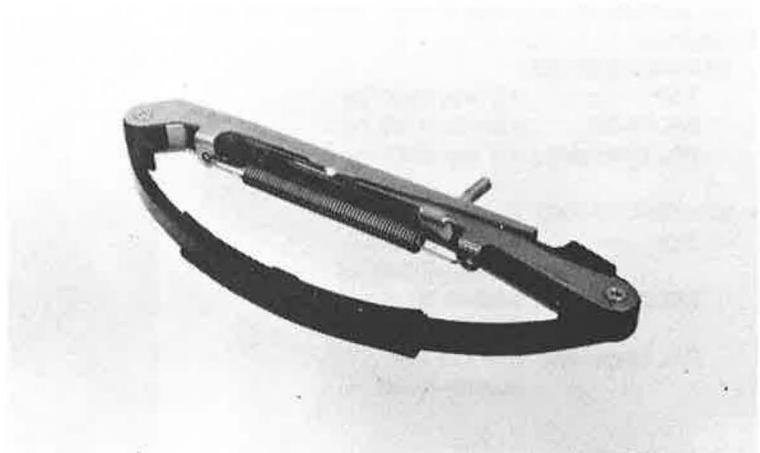
Inspect the top of the cylinders for warpage.  
Check in an X pattern as shown.

WARP SERVICE LIMIT  
0.10 mm (0.004 in)



### CAM CHAIN TENSIONER INSPECTION

Inspect the slipper of the cam chain tensioner for damage or excessive wear.  
Inspect the tension spring for weakness.



### PISTON REMOVAL

Remove and discard each piston pin clip with pliers.

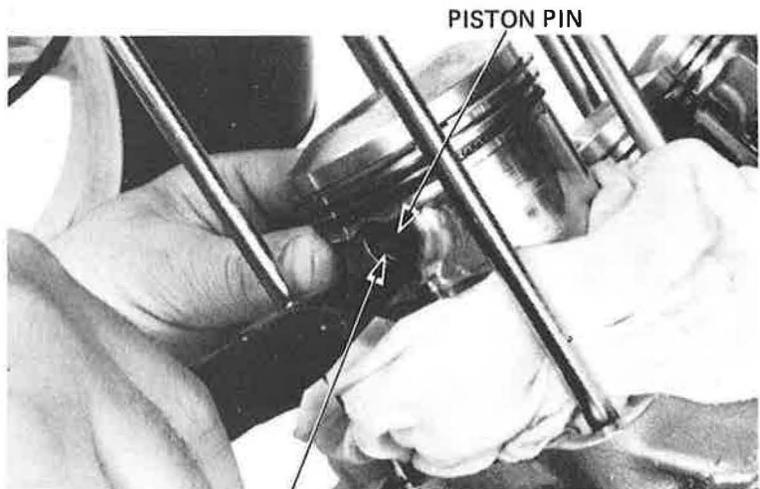
**NOTE**

- Do not allow clips to fall into the crankcase.
- Never re-use the clips.

Press the piston pin out of the piston.

**NOTE**

- Mark the pistons to indicate the cylinder positions.



PISTON PIN  
CLIP



## PISTON/PISTON RING INSPECTION

Inspect the piston ring-to-groove clearance.  
Remove the piston rings.

### NOTE

Mark the rings so that they can be returned to their original locations.

Inspect the pistons for damage and cracks.  
Check ring grooves for wear.



**SERVICE LIMIT:**  
**TOP: 0.09 mm (0.004 in)**  
**SECOND: 0.09 mm (0.004 in)**

Insert each piston ring into the cylinder and inspect the 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)**

### STANDARD END GAPS:

**TOP 0.15–0.30 mm (0.006–0.012 in)**  
**SECOND: 0.15–0.30 mm (0.006–0.012 in)**  
**OIL (Side rail): 0.3–0.9 mm (0.012–0.035 in)**



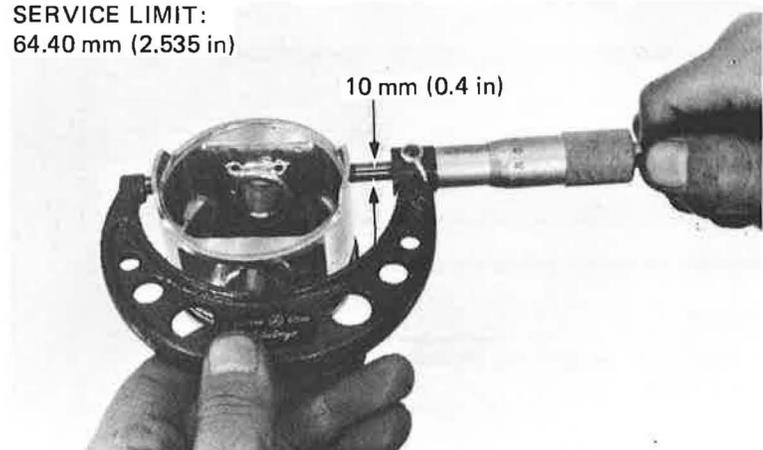
Measure the piston O.D. at the skirt 90° from the piston pin hole.

### NOTE

Measurements should be taken 10 mm (0.4 in) from the bottom.

Calculate the cylinder-to-piston clearance.  
**SERVICE LIMIT: 0.10 mm (0.004 in)**

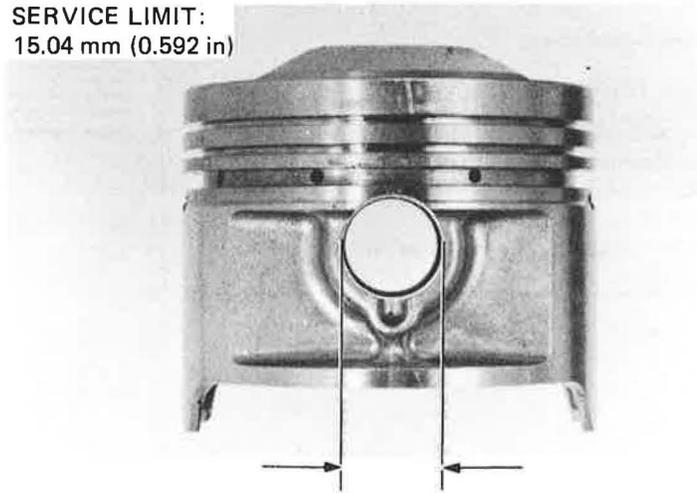
**SERVICE LIMIT:**  
**64.40 mm (2.535 in)**





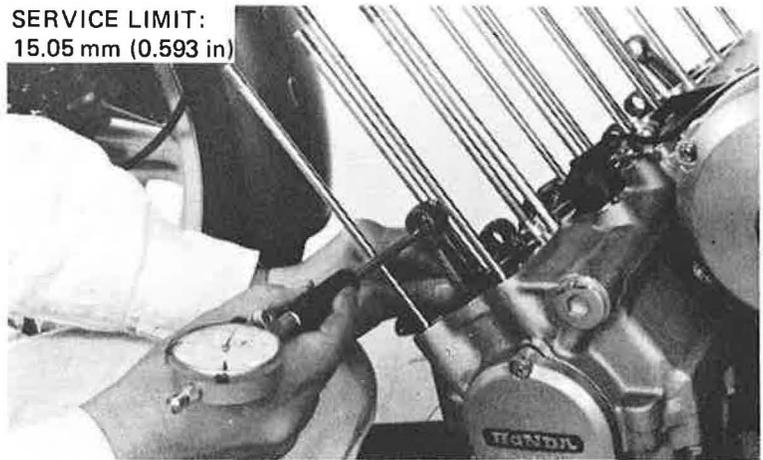
Measure the piston pin hole I.D..

**SERVICE LIMIT:**  
15.04 mm (0.592 in)



Measure the connecting rod small end I.D..  
(See Section 12 for replacement procedure)

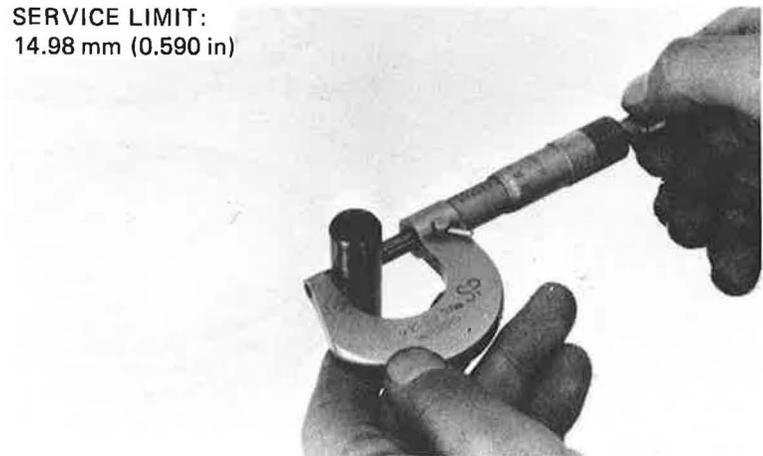
**SERVICE LIMIT:**  
15.05 mm (0.593 in)



Measure the piston pin O. D..

Determine the piston-to-piston pin clearance.  
**SERVICE LIMIT: 0.04 mm (0.002 in)**

**SERVICE LIMIT:**  
14.98 mm (0.590 in)



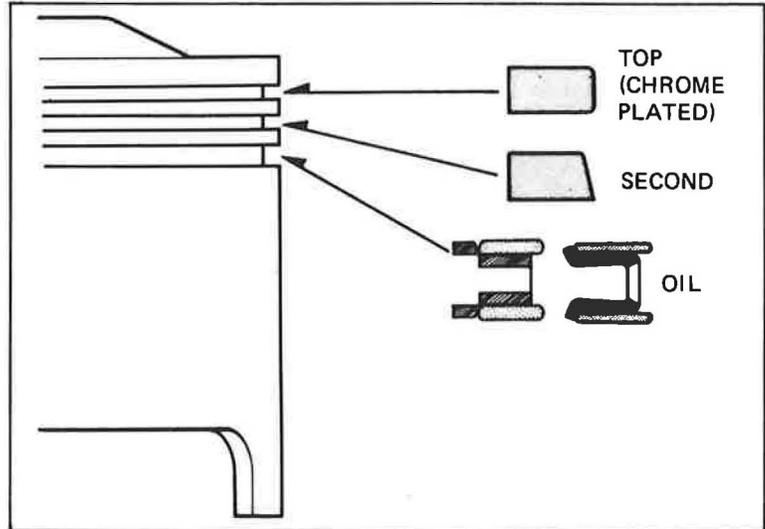


**PISTON RING INSTALLATION**

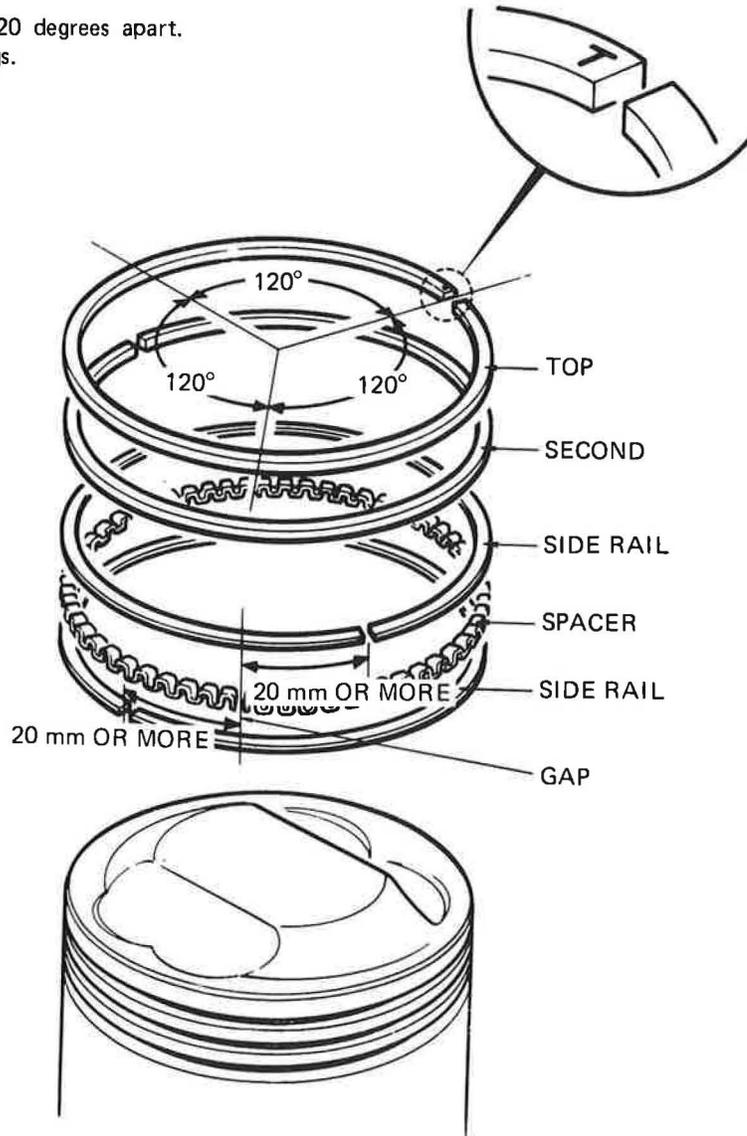
Install the piston rings.

**NOTE**

- Avoid piston and piston ring damage during installation.
- All rings should be installed with the markings facing up.
- After installation, the rings should rotate freely.



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





## PISTON INSTALLATION

Apply molybdenum disulfide grease to the connecting rod small ends.  
Install the pistons, piston pins and new clips.

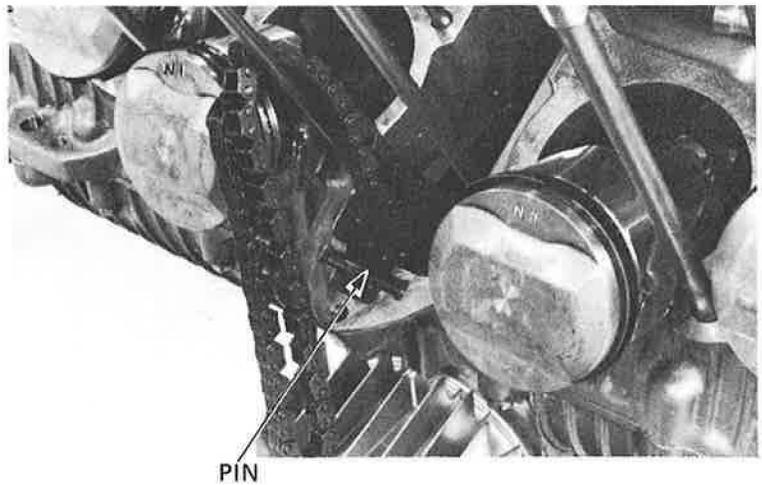
### NOTE

- Position the mark "IN" on the piston to the intake side.
- Install the pistons in their original positions.
- Do not allow clips to fall into the crankcase.
- Do not damage the piston by fitting the cylinder edge.

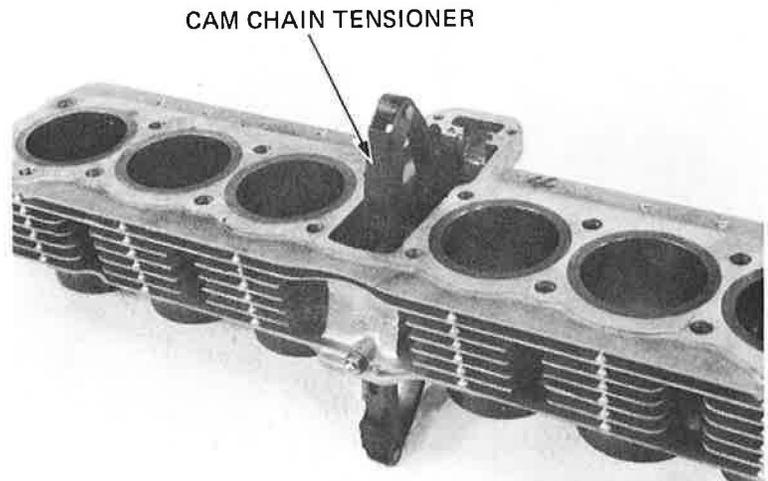


## CYLINDER INSTALLATION

Install the cam chain guide pin.

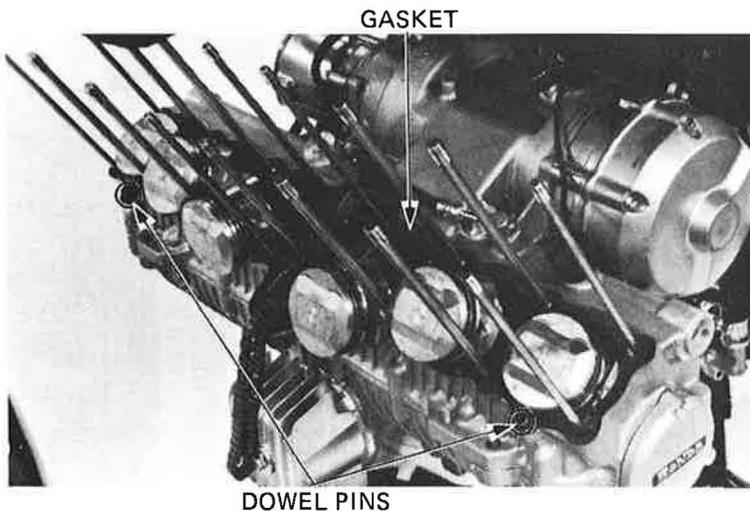


Install the cam chain tensioner.





Install the dowel pins and cylinder gasket.



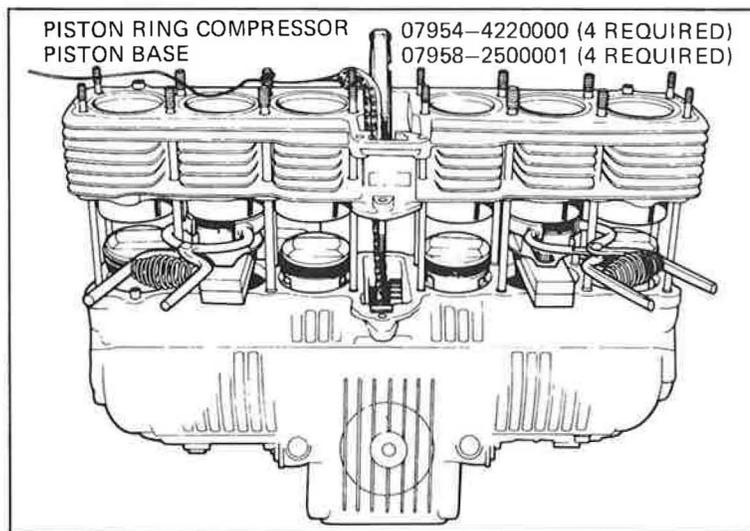
Install the cylinder.

**CAUTION**

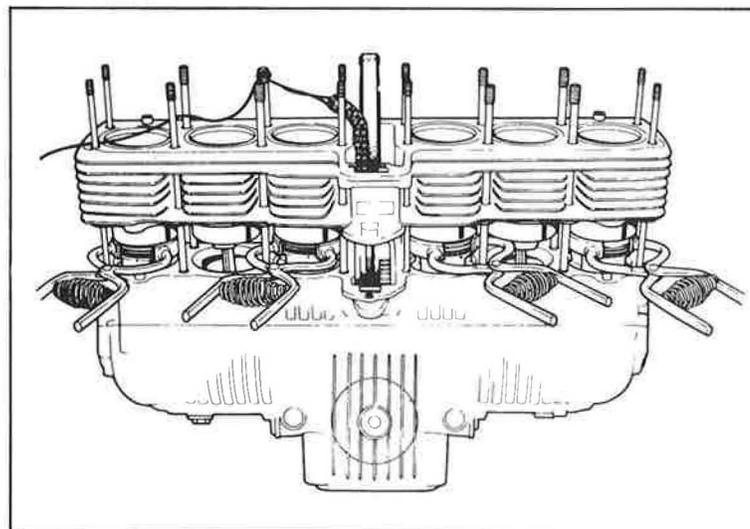
*Avoid damaging the pistons and piston rings when installing the cylinder.*

**NOTE**

Before using the special tools, position the No. 2 and No. 5 pistons at T. D. C. (Top Dead Center).



Tighten the cylinder base nut securely after installation.





MEMO

