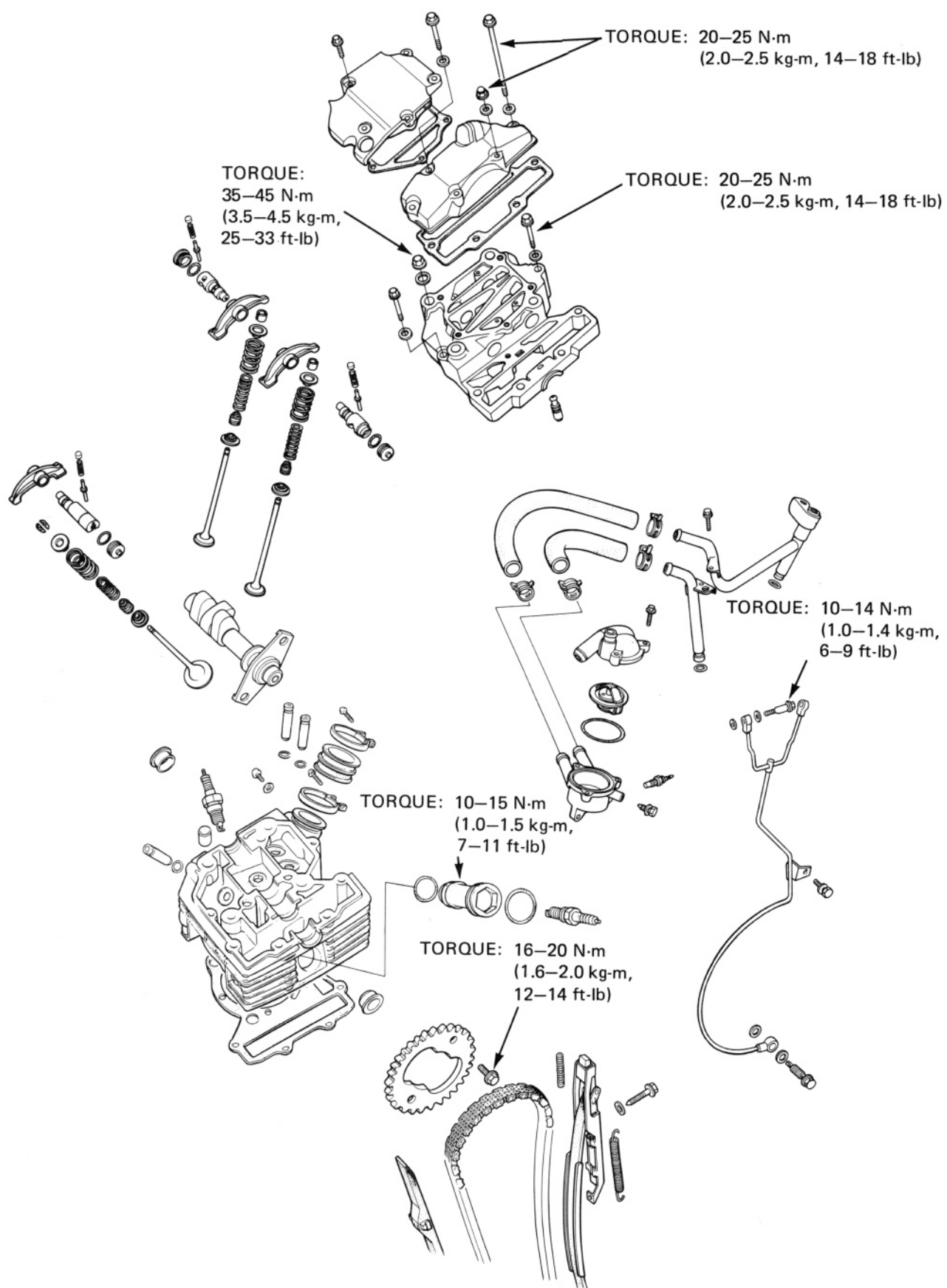


CYLINDER HEAD/VALVE



10. CYLINDER HEAD/VALVE

SERVICE INFORMATION	10-1	VALVE GUIDE REPLACEMENT	10-13
TROUBLESHOOTING	10-2	VALVE SEAT INSPECTION/ REFACING	10-14
CYLINDER HEAD COVER REMOVAL	10-3	CYLINDER HEAD ASSEMBLY	10-17
CAMSHAFT REMOVAL	10-4	CYLINDER HEAD INSTALLATION	10-18
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CYLINDER HEAD REMOVAL	10-10	CYLINDER HEAD COVER ASSEMBLY	10-21
CYLINDER HEAD DISASSEMBLY	10-10	CYLINDER HEAD COVER INSTALLATION	10-23

SERVICE INFORMATION

GENERAL

- The engine uses hydraulic tappets. After installing the cylinder head covers, fill the de-foaming chambers in the head covers with fresh engine oil as described in this section.
- To service the cylinder heads, the engine must be removed from the frame. See Section 5 for removal and installation of the engine.
- Camshaft lubricating oil is fed through an oil line. Be sure the hole in the oil line is not clogged.
- During assembly, apply molybdenum disulfide grease to the camshaft holders and rocker arm shafts to provide initial lubrication.
- The hydraulic tappets must be adjusted with shims whenever the following parts are replaced:
 - Cylinder head cover.
 - Cylinder head.
 - Valve, valve guide and valve seat refacing.
 - Camshaft.
 - Rocker arm and rocker arm shaft.

10

SPECIFICATIONS

Unit: mm (in)

Unit: mm (in)

ITEM				STANDARD	SERVICE LIMIT
Compression pressure				12 ± 2 kg/cm ² (171 ± 28 psi)	—
Camshaft	Cam lobe height	IN		36.497 (1.4369)	36.28 (1.4283)
		EX		36.497 (1.4369)	36.28 (1.4283)
	Runout			0.03 (0.0010)	0.05 (0.0020)
	Oil clearance	Both ends		0.020—0.062 (0.0008—0.0024)	0.07 (0.0027)
		Center		0.020—0.062 (0.0008—0.0024)	0.07 (0.0027)
Rocker arm	Rocker arm I.D.			13.750—13.768 (0.5413—0.5420)	13.80 (0.5433)
	Rocker arm shaft O.D.	IN		13.716—13.734 (0.5400—0.5406)	13.58 (0.5346)
		EX		13.716—13.737 (0.5400—0.5408)	13.58 (0.5346)
	Camshaft holder I.D.			20.000—20.021 (0.7874—0.7882)	20.07 (0.7902)
	Tappet assist spring free length			19.46 (0.7661)	18.68 (0.7354)
	Tappet compression stroke with kerosene			—	0.20 (0.0079)
Valves and valve guides	Valve stem O.D.	IN		6.570—6.595 (0.2587—0.2596)	6.55 (0.2579)
		EX		6.550—6.575 (0.2579—0.2589)	6.54 (0.2575)
	Valve guide I.D.			6.600—6.620 (0.2598—0.2606)	6.66 (0.2622)
	Stem-to-guide clearance	IN		0.005—0.050 (0.0002—0.0020)	0.11 (0.0043)
		EX		0.025—0.070 (0.0010—0.0028)	0.12 (0.0047)
	Valve seat width			0.9—1.1 (0.0354—0.0433)	1.50 (0.0591)
Valve springs	Free length	OUTER	IN	45.70 (1.7992)	43.90 (1.7283)
			EX	43.50 (1.7126)	41.80 (1.6457)
		INNER	IN	37.9 (1.4921)	36.40 (1.4331)
			EX	37.9 (1.4921)	36.40 (1.4331)
Cylinder head warpage				—	0.10 (0.0040)

CYLINDER HEAD/VALVE

TORQUE VALUES

Cylinder head cover	
10 mm cap nut	35–45 N·m (3.5–4.5 kg-m, 25–33 ft-lb)
8 mm bolt	20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)
Cam chain cover	
8 mm bolt/cap nut	20–25 N·m (2.0–2.5 kg-m, 14–18 ft-lb)
Oil pass pipe	10–14 N·m (1.0–1.4 kg-m, 6–9 ft-lb)
Spark plug sleeve	10–15 N·m (1.0–1.5 kg-m, 7–11 ft-lb)
	– Apply molybdenum disulfide grease to the threads.
Cam sprocket bolt	16–20 N·m (1.6–2.0 kg-m, 12–14 ft-lb)

TOOLS

Special

Valve Guide Reamer	07984–6570100
Valve Guide Driver	07942–6110000
Valve Guide Driver Attachment (IN)	07943–6570100
(EX)	07943–6890100
Hydraulic Tappet Bleeder	07973–ME90000
Spark Plug Sleeve Socket	07930–KA50100

Common

Valve Spring Compressor	07757–0010000 or 07957–3290001
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TROUBLESHOOTING

Engine top-end problems usually affect engine performance. These can be diagnosed by a compression test, or by tracing noises to the top-end with a sounding rod or stethoscope.

Low Compression

1. Valves

- hydraulic tappet locked.
(Engine will not start)
- Depress hydraulic tappet.
(Chatter noise)
 - insufficient air bleeding, noise will stop after about 10 minutes.
- Burned or bent valves.
- Broken or damaged valve springs.
- Incorrect valve timing.
- Valve stuck open.

2. Cylinder head

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

3. Cylinder and piston (Refer to Section 13)

Compression too high

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

Excessive Noise

1. Hydraulic tappet.

- Worn or damaged tappet.
- Clogged oil hole or oil passage to cylinder head.
- Weak or damaged assist spring.
- Worn or damaged assist shaft.
- Worn or damaged rocker arm or shaft.
- Worn or damaged rocker arm shaft mount hole in head cover.
- Air in oil passage caused by low oil level.
- Excessively worn valve seat.
- Worn rocker arm follower or valve stem end.

2. Sticking valve or broken valve spring.

3. Weak valve spring.

4. Worn or damaged camshaft.

5. Worn or damaged cam chain.

6. Worn or damaged cam chain tensioner.

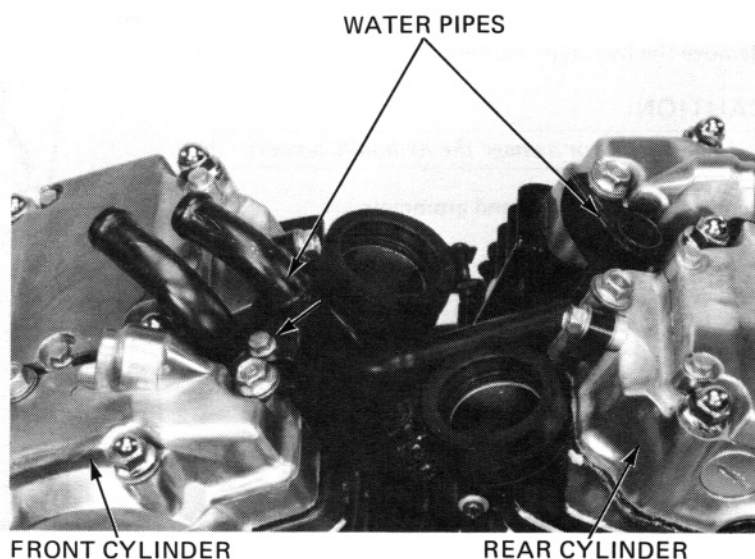
7. Worn cam sprocket.

CYLINDER HEAD COVER REMOVAL

Remove the engine from the frame (page 5-2).

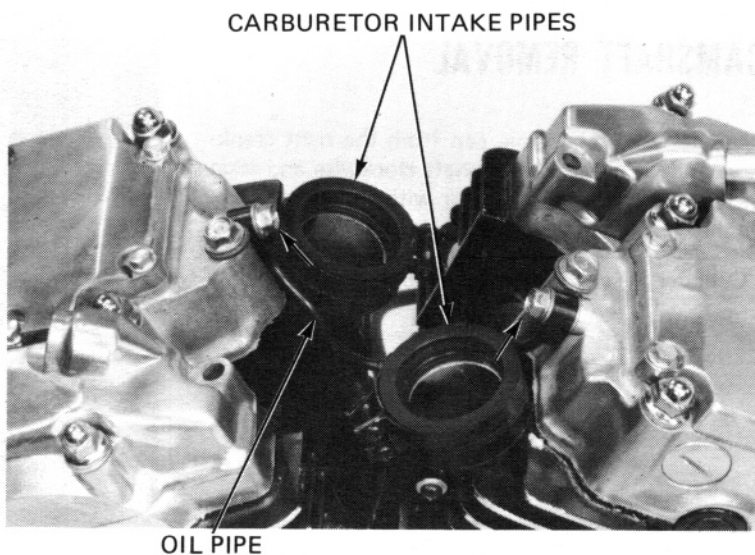
Remove the water pipes from the front and rear cylinder heads.

Remove the O-ring from the water pipes.



Remove the oil pipe from the front and rear cylinder heads.

Remove the carburetor intake pipes.



Loosen the rocker arm cover 6 mm mount bolts.

NOTE:

Carefully remove the rocker arm covers to keep the hydraulic tappet assist springs from falling into the cylinder head.

Remove the cylinder head covers and cam sprocket covers.

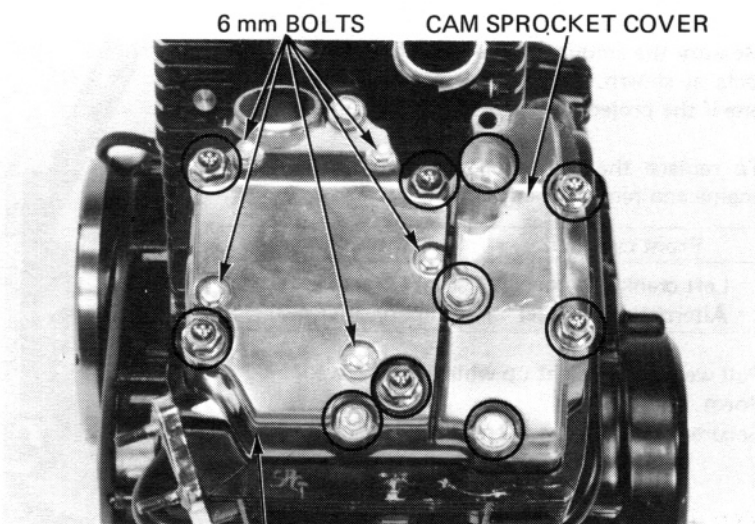
NOTE:

The hydraulic tappets may come out with the cylinder head cover. Be careful they do not fall out.

Loosen the 6 mm bolts in the criss-cross pattern in 2-3 steps, starting with the center bolt.

NOTE:

Tilt the engine about 40° to the right (left) when removing the front (rear) cylinder head cover.



Remove the cover gaskets.

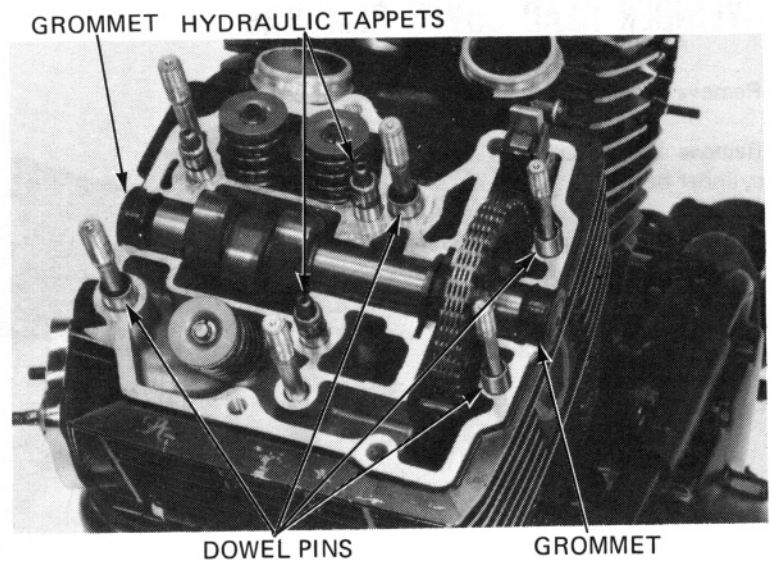
CYLINDER HEAD/VALVE

Remove the hydraulic tappets.

CAUTION:

Do not strike or damage the hydraulic tappets.

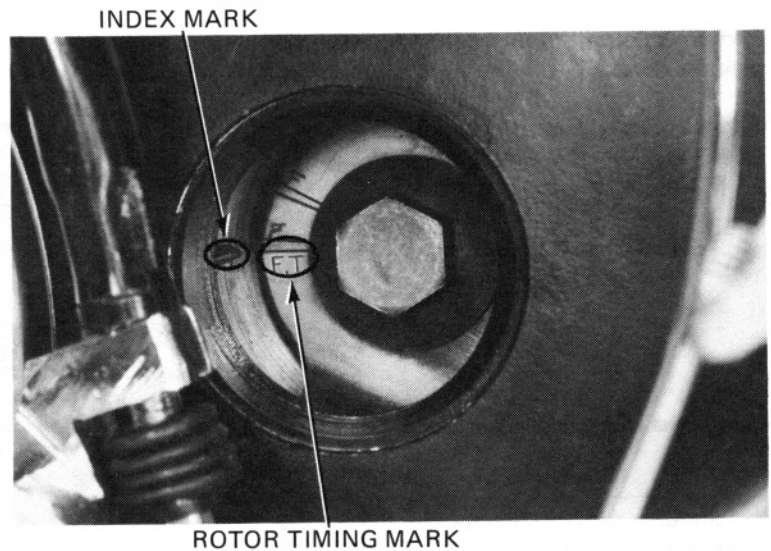
Remove the dowel pins and grommets.



CAMSHAFT REMOVAL

Remove the timing hole cap from the right crankcase cover. Turn the crankshaft clockwise and align the timing mark on the rotor with the index mark on the crankcase cover.

Cylinder	Rotor timing mark
Front	F.T.
Rear	R.T.



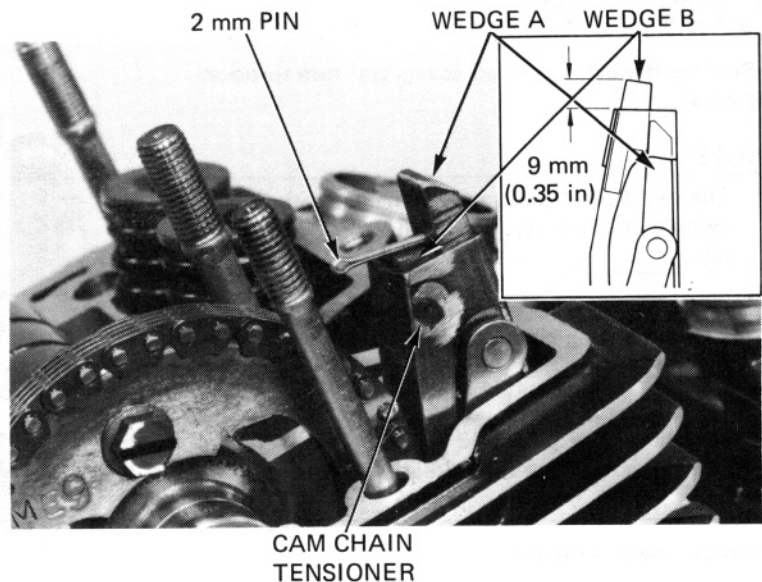
Measure the amount of the cam chain tensioner projects as shown. Replace the cam chain with a new one if the projection exceeds 9.0 mm (0.35 in.).

To replace the cam chain, drain the oil from the engine and remove the following parts:

Front cylinder	Rear cylinder
• Left crankcase cover	• Right crankcase cover
• Alternator flywheel	• Primary drive gear

Pull wedge A straight up while holding wedge B down.

Secure wedge A with a 2 mm pin as shown.



Remove the sleeve with fork tube holder attachment (07930-KA50100) from the spark plug hole on the cam chain side.

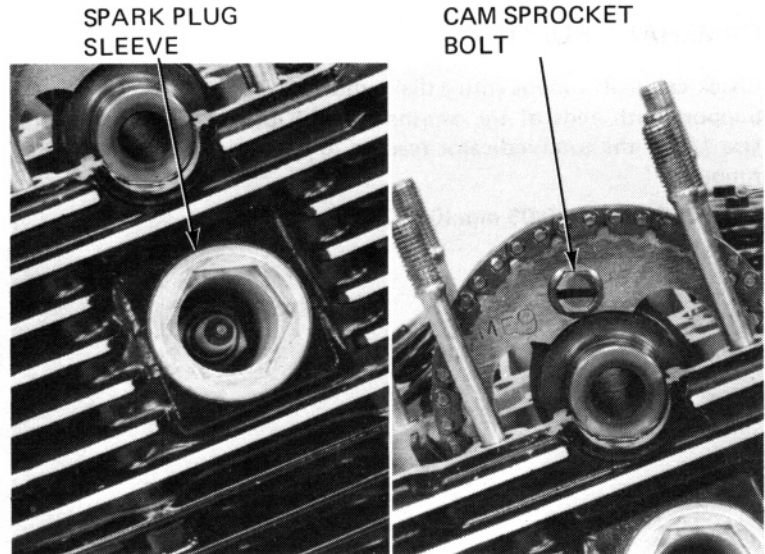
Remove the cam sprocket bolts.

Rotate the crankshaft clockwise one turn (360°) and remove the other cam sprocket bolts.

NOTE:

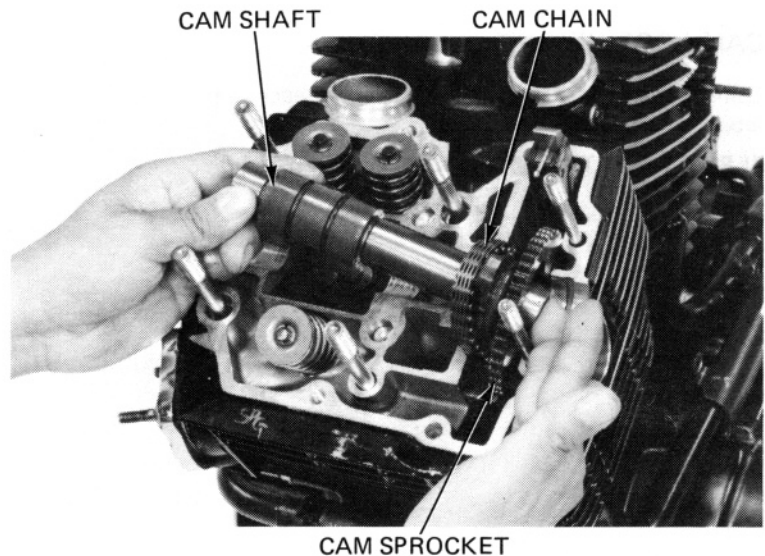
Be careful not to let the cam sprocket bolts fall into the crankcase.

Remove the cam sprocket from the camshaft flange with the cam chain. Rotate the crankshaft clockwise half a turn (180°) and remove the cam chain from the sprocket.



Hang the cam chain on the camshaft behind the camshaft flange and remove the cam sprocket while lifting the camshaft out.

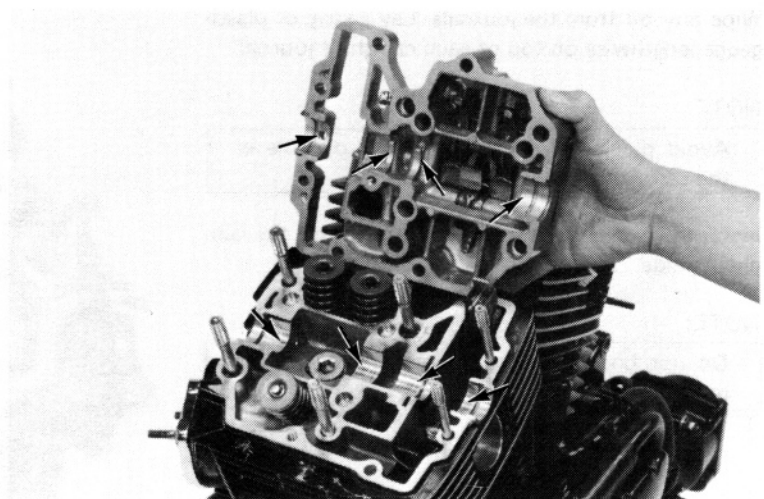
Attach a piece of wire to the cam chain to prevent it from being dropped into the crankcase.



INSPECTION

CAMSHAFT HOLDER/CYLINDER HEAD

Inspect the camshaft holder and cylinder head journal surfaces for scoring, scratches, or evidence of insufficient lubrication.

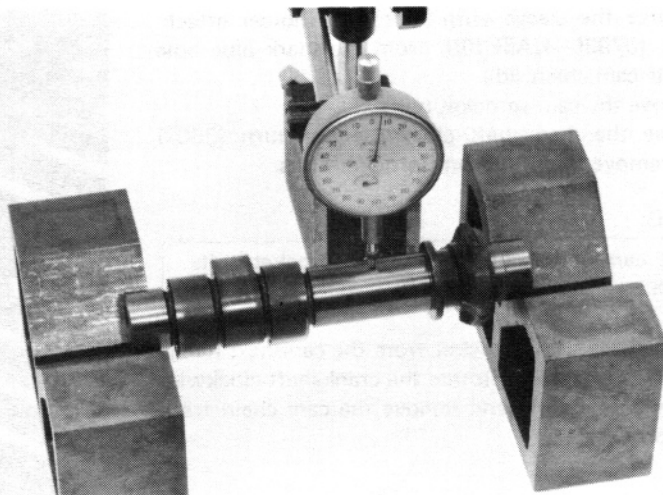


CYLINDER HEAD/VALVE

CAMSHAFT RUNOUT

Check camshaft runout with a dial indicator. Support both ends of the camshaft with V-blocks. Use 1/2 of the total indicator reading to determine runout.

SERVICE LIMIT: 0.05 mm (0.002 in)



CAM LOBE HEIGHT

Using a micrometer, measure the height of each cam lobe.

SERVICE LIMITS: IN/EX: 36.38 mm (1.4282 in)



Wipe any oil from the journals. Lay a strip of plastigauge lengthwise on top of each camshaft journal.

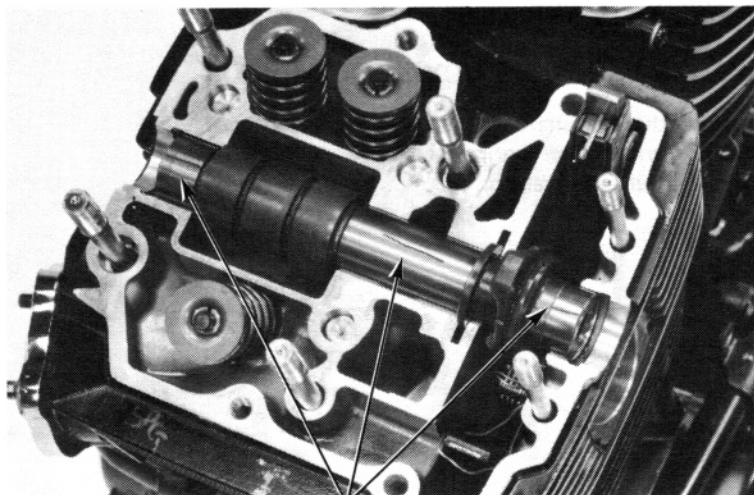
NOTE:

Avoid placing plastigauge over the oil hole in the cam holder.

Hook the cam chain suspension wire against the cam chain guide.

NOTE:

Do not hook the wire against the head cover mating surface.



PLASTIGAUGE

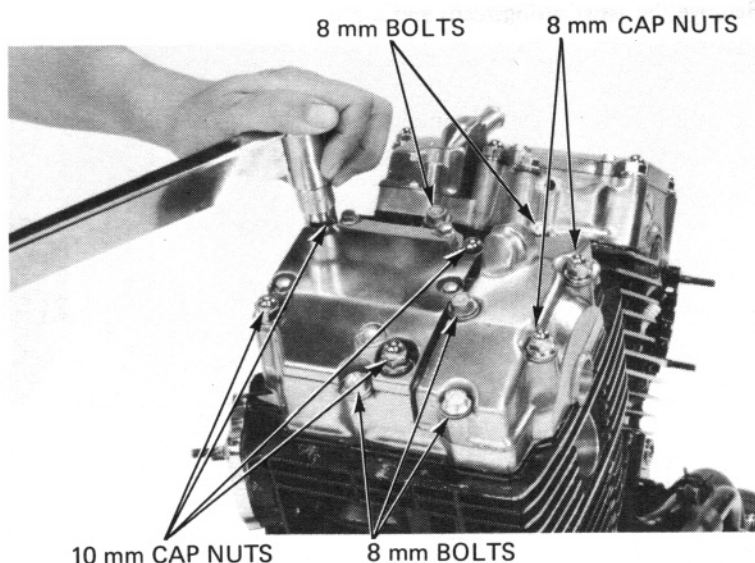
Install the cylinder head cover and tighten in a crisscross pattern in 2–3 steps. Also, install the cam chain cover.

NOTE:

Do not rotate the camshaft when using plati-gauge.

TORQUES:

8 mm bolt/nut: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)
10 mm cap/nut: 35–45 N·m
(3.5–4.5 kg·m, 25–33 ft·lb)



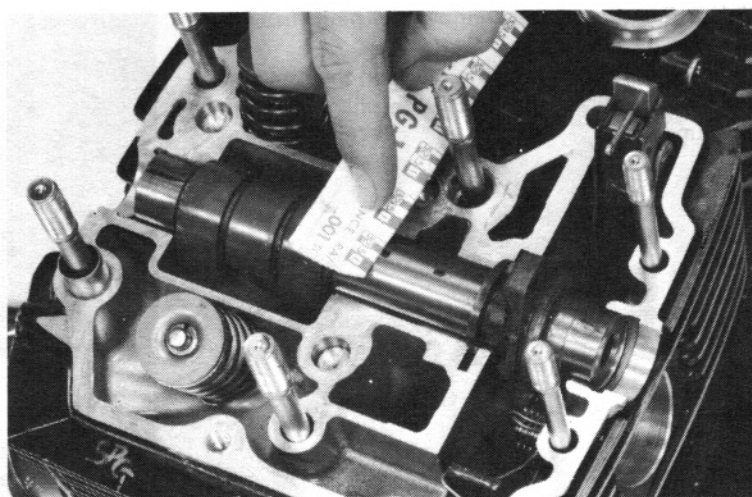
Remove the cylinder head cover and measure the width of each plastigauge. The widest thickness determines the oil clearance.

SERVICE LIMITS:

CENTER: 0.07 mm (0.0027 in)
BOTH ENDS: 0.07 mm (0.0027 in)

When the service limits are exceeded, replace the camshaft and recheck the oil clearance.

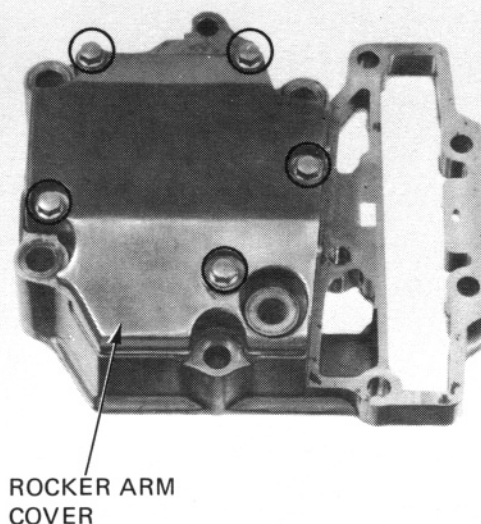
Replace the cylinder head and cover if the clearance still exceeds the service limits.

**CYLINDER HEAD COVER DISASSEMBLY**

Remove the rocker arm cover and cover gasket.

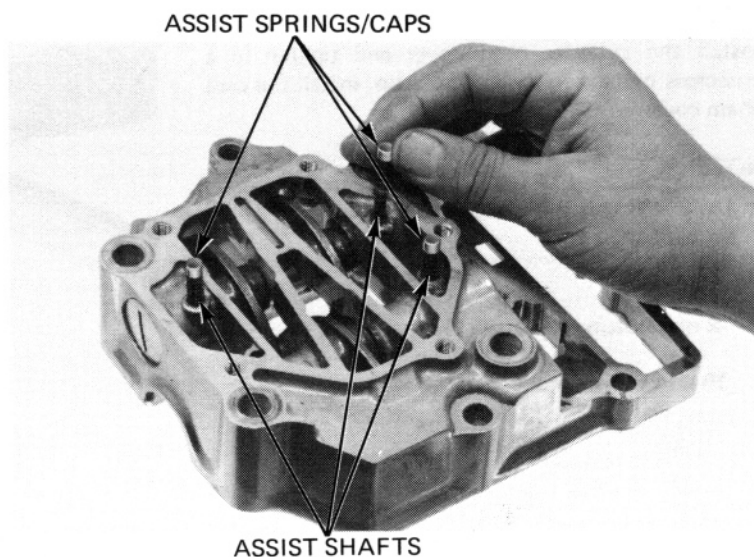
NOTE:

Remove the rocker arm covers carefully as the assist springs and caps will pop out.

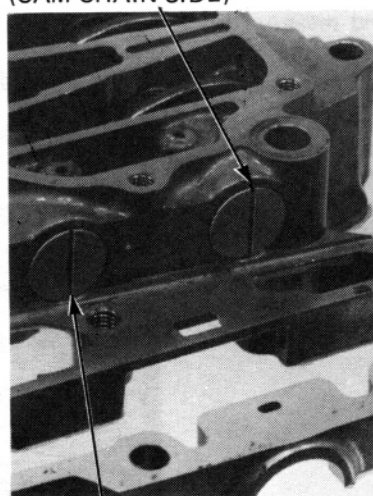


CYLINDER HEAD/VALVE

Remove the assist springs/caps and shafts.

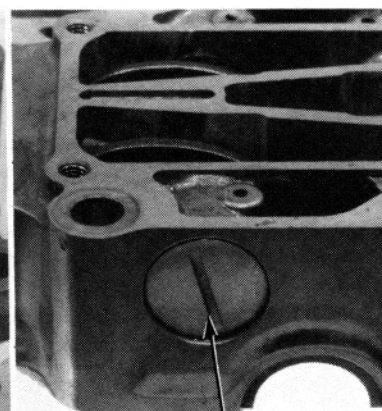


IN. ROCKER ARM SHAFT PLUG
(CAM CHAIN SIDE)



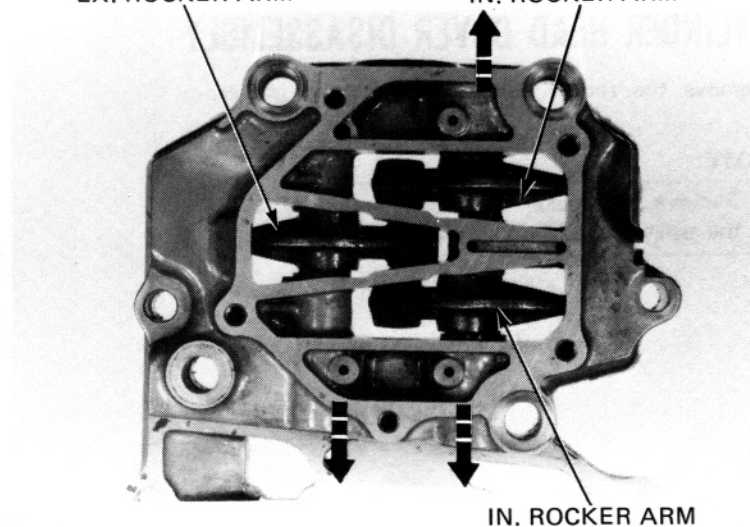
EX. ROCKER ARM SHAFT PLUG
(CAM CHAIN SIDE)

EX. ROCKER ARM



IN. ROCKER ARM
SHAFT PLUG

IN. ROCKER ARM



With a flat screwdriver, remove the plugs from the rocker arm shaft hole;

Thread 6 mm bolts into the plugs on the cam chain side. Then pull on the bolts with pliers to remove the plugs.

Remove the rocker arm shafts and rocker arms.

INSPECTION

ROCKER ARM SHAFT/
ROCKER ARM

Inspect the rocker arm shafts and rocker arms for wear or damage.

Check the rocker arms for clogged oil holes.

Measure the O.D. of each rocker arm shaft.

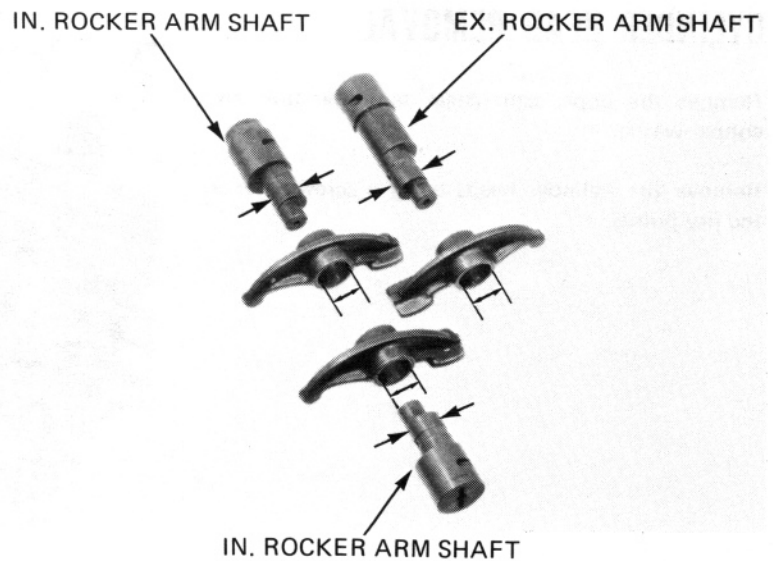
SERVICE LIMITS:

IN: 13.58 mm (0.5346 in)

EX: 13.58 mm (0.5346 in)

Measure the I.D. of each rocker arm.

SERVICE LIMIT: 13.80 mm (0.5433 in)



INSPECTION

ASSIST SPRING/SHAFT

Inspect the assist springs and shafts for wear or damage.

Measure the free length of each assist spring.

SERVICE LIMIT: 18.68 mm (0.7354 in)

HYDRAULIC TAPPET

Inspect the hydraulic tappet for wear or damage or for a clogged oil hole.

Measure the free length of each hydraulic tappet as follows:

Attach the Hydraulic Tappet Bleeder to the hydraulic tappet and compress and extend the hydraulic tappet slowly in a jar filled with kerosene.

NOTE:

Hold the hydraulic tappet upright while compressing and extending the hydraulic tappet.

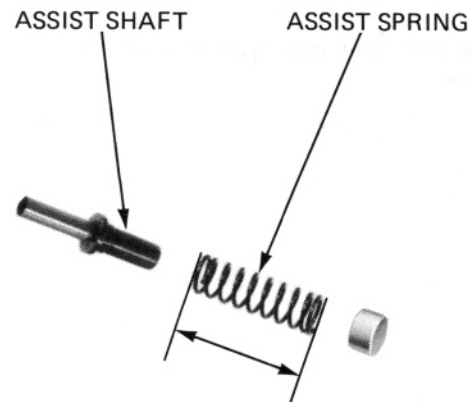
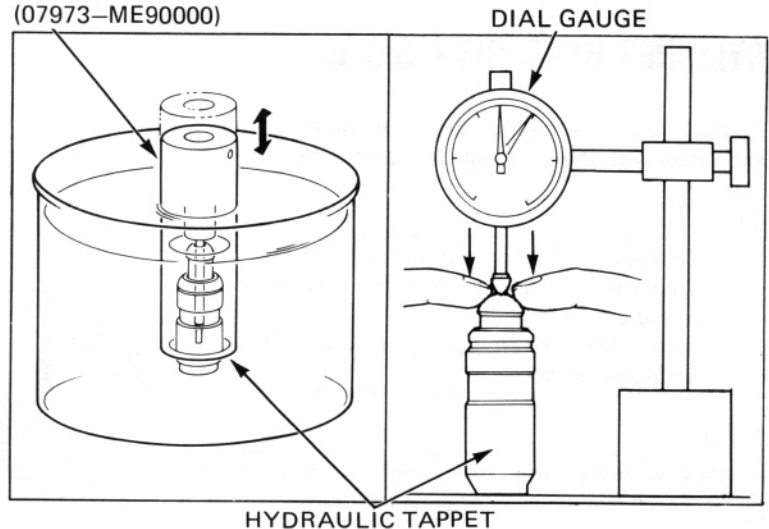
Continue operating the hydraulic tappet until there are no air bubbles from the hydraulic tappet and it does not make no further action.

Remove the hydraulic tappet and try to compress quickly the tappet by hand. Measure the compression stroke with the dial gauge on the flat place.

COMPRESSION STROKE: 0–0.2 mm

NOTE:

Keep the hydraulic tappet below the surface of kerosene while priming the hydraulic tappet.

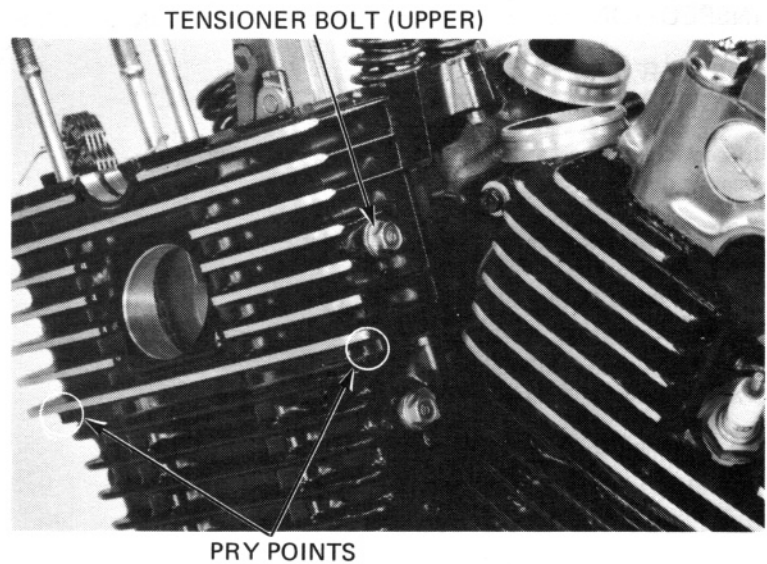
HYDRAULIC TAPPET BLEEDER
(07973–ME90000)

CYLINDER HEAD/VALVE

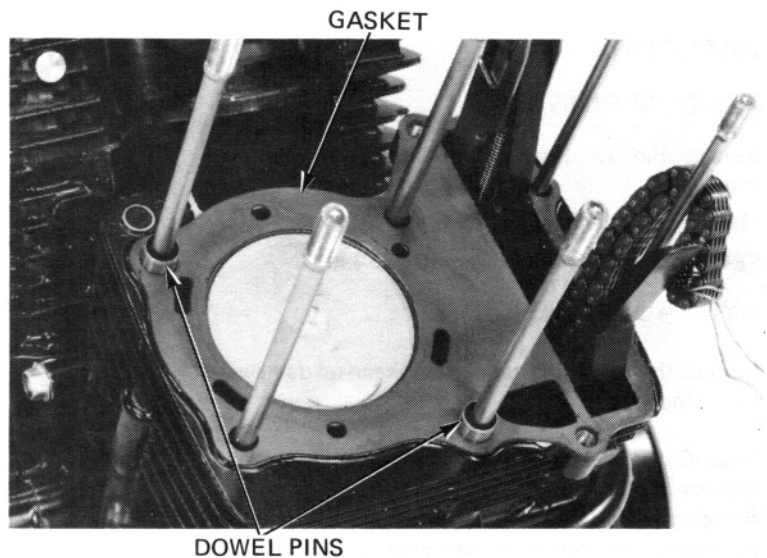
CYLINDER HEAD REMOVAL

Remove the upper cam chain tensioner bolt and copper washer.

Remove the cylinder heads using a screwdriver at the pry points.



Remove the front and rear cylinder head gaskets and dowel pins.



CYLINDER HEAD DISASSEMBLY

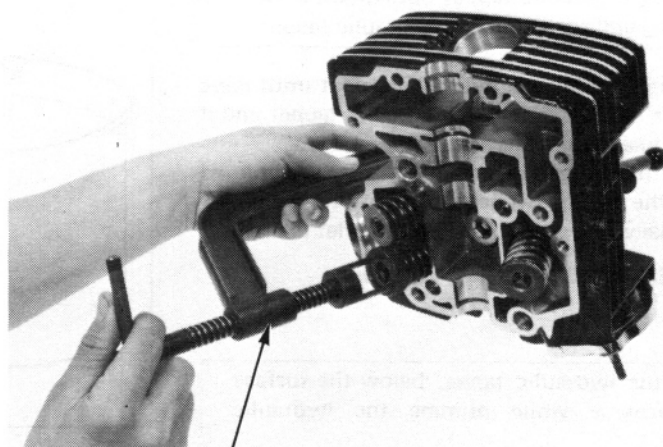
Remove the valve spring cotters, retainers, springs and valves with the Valve Spring Compressor.

CAUTION:

- To prevent loss of tension, do not compress the valve springs more than necessary to remove the cotters.
- Avoid damaging the sliding surfaces of the hydraulic tappets.

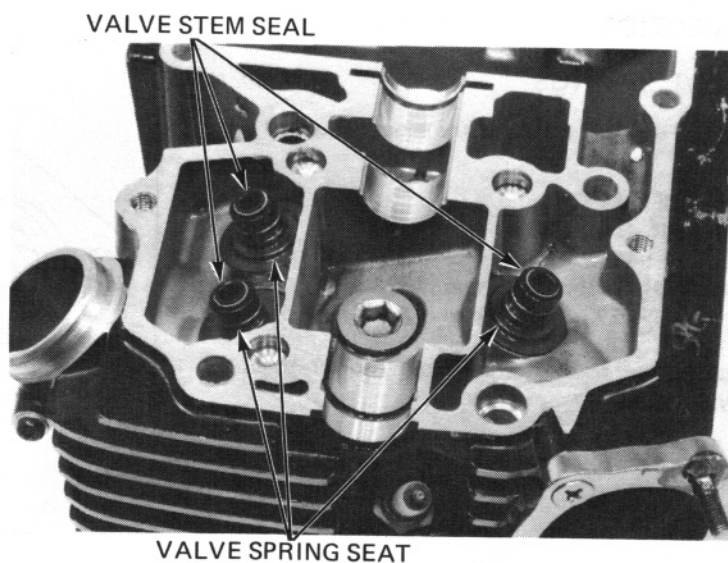
NOTE:

Mark all parts during disassembly so they can be placed back in their original locations.



07757-0010000 OR 07959-3290001

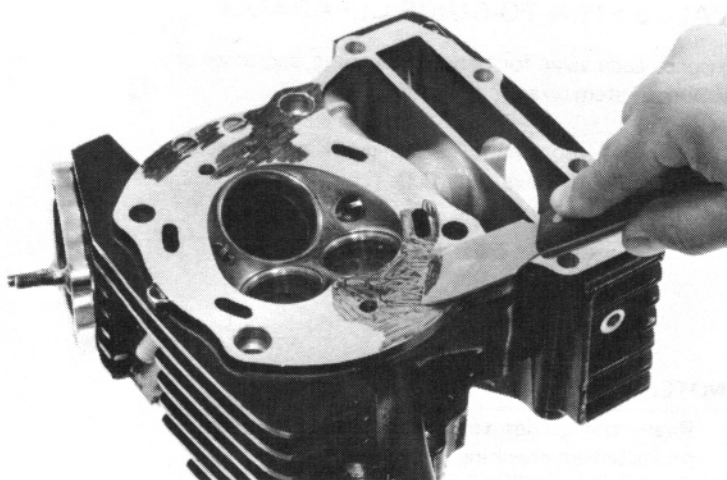
Remove the valve stem seals and valve spring seats.



Remove carbon deposits from the combustion chamber and clean off the head gasket surfaces.

NOTE:

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



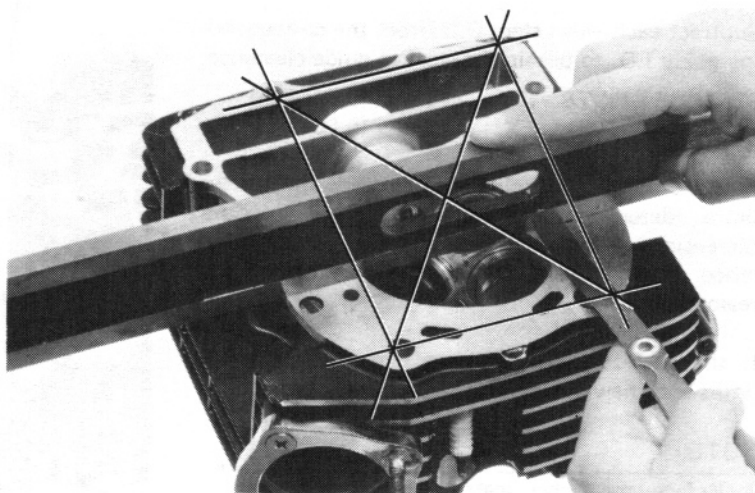
INSPECTION

CYLINDER HEAD

Check the spark plug hole and valve areas for cracks.

Check the cylinder head for warpage with a straight edge and feeler gauge.

SERVICE LIMIT: 0.10 mm (0.004 in)



CYLINDER HEAD/VALVE

INSPECTION

VALVE SPRINGS

Measure the free length of the inner and outer valve springs.

SERVICE LIMITS:

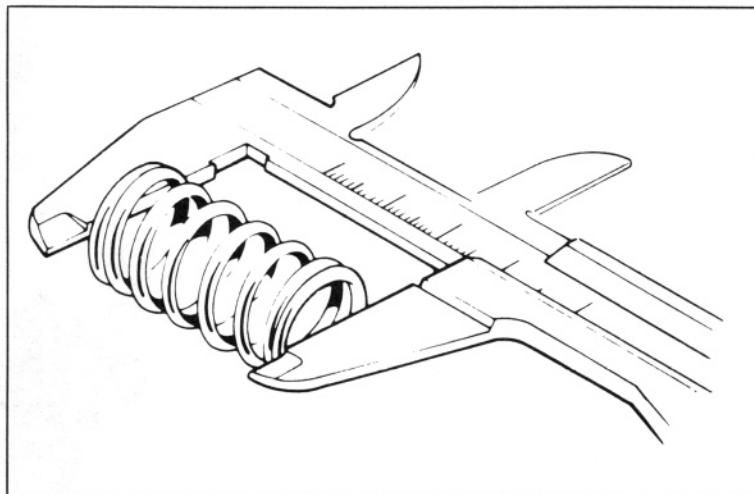
INNER (IN): 36.40 mm (1.4331 in)

(EX): 36.40 mm (1.4331 in)

OUTER (IN): 43.90 mm (1.7283 in)

(EX): 41.80 mm (1.6457 in)

Replace the springs if they are shorter than the service limits.



VALVE STEM-TO-GUIDE CLEARANCE

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

Check valve movement in the guide and measure and record each valve stem O.D.

SERVICE LIMITS: IN: 6.55 mm (0.2579 in)

EX: 6.54 mm (0.2575 in)

NOTE:

Ream the guides to remove any carbon deposits before checking clearances.

Measure and record each valve guide I.D.

SERVICE LIMIT: 6.66 mm (0.2622 in)

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

SERVICE LIMITS: IN: 0.11 mm (0.0043 in)

EX: 0.12 mm (0.0047 in)

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.

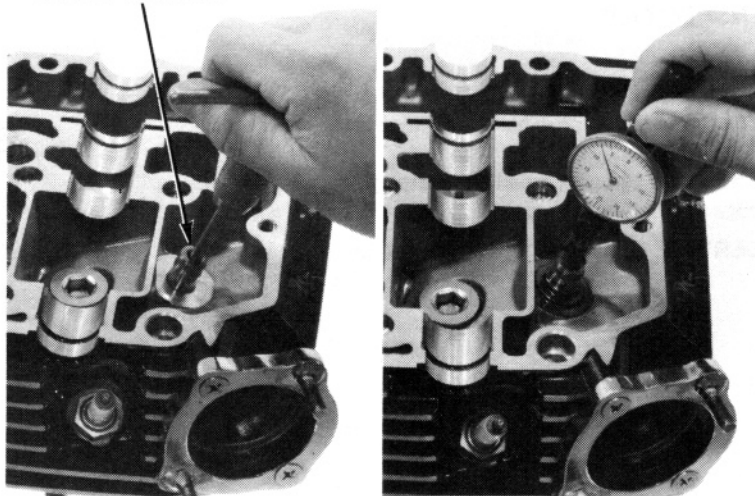
If the stem-to-guide clearance exceeds the service limits with new guides, also replace the valves.

NOTE:

Reface the valve seats whenever the valve guides are replaced.



VALVE GUIDE REAMER
07984-6570100



VALVE GUIDE REPLACEMENT

Heat the cylinder head to 100°C (212°F) with a hot plate or oven.

WARNING

To avoid burns, wear heavy gloves when handling the heated cylinder head.

CAUTION:

- *Do not use a torch to heat the cylinder head; it may cause warping.*

Support the cylinder head and drive out the old guides from the combustion chamber side of the cylinder head.

NOTE:

Avoid damaging the cylinder head.

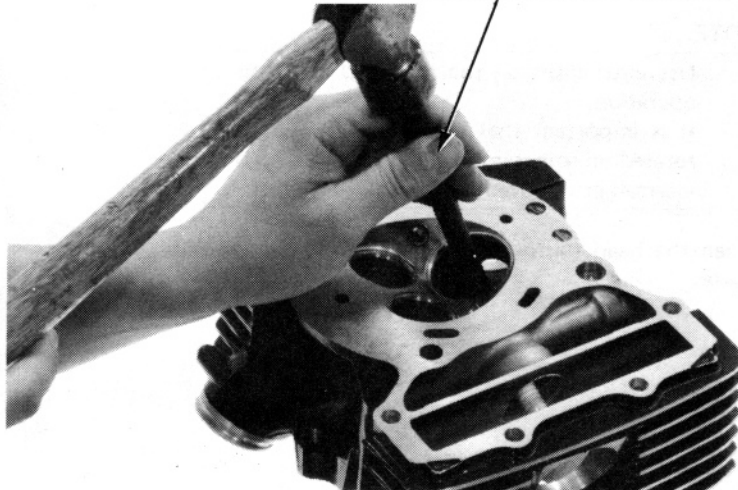
Drive new guides in from the rocker arm side of the cylinder head.

VALVE GUIDE PROJECTION ABOVE CYLINDER HEAD:

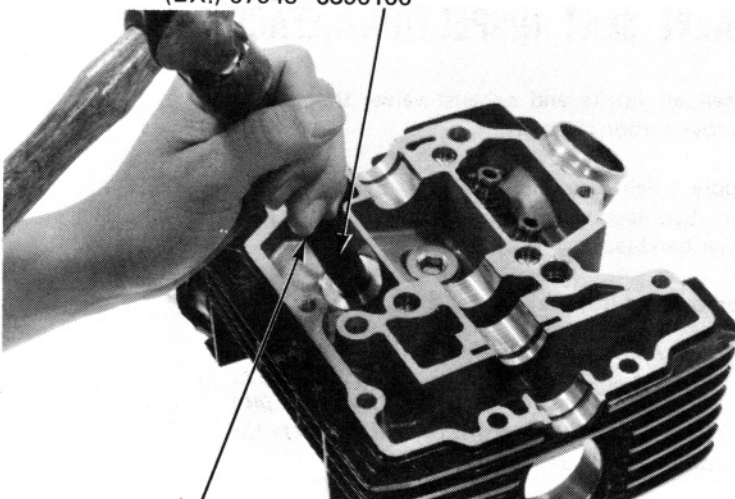
IN: 14.5 ± 0.1 mm (0.5709 ± 0.004 in)

EX: 15.5 ± 0.1 mm (0.6102 ± 0.004 in)

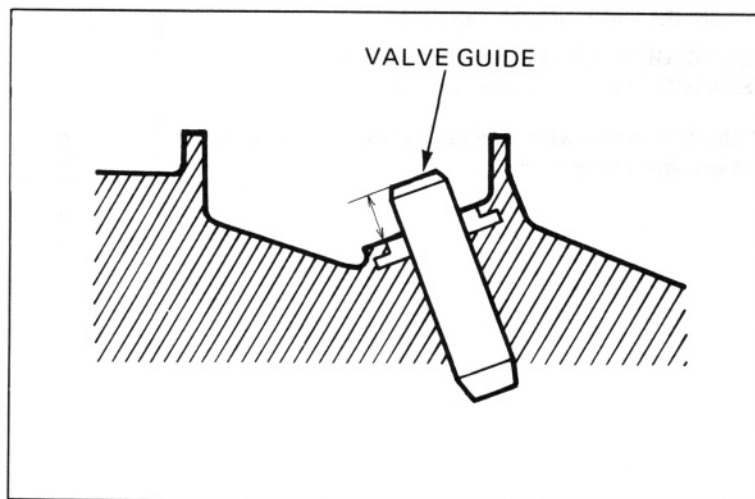
VALVE GUIDE REMOVER, 6.1 mm
07742-0010200 OR 07942-6110000



VALVE GUIDE DRIVER ATTACHMENT
(IN.) 07943-6570100
(EX.) 07943-6890100



VALVE GUIDE REMOVER
07942-6110000



CYLINDER HEAD/VALVE

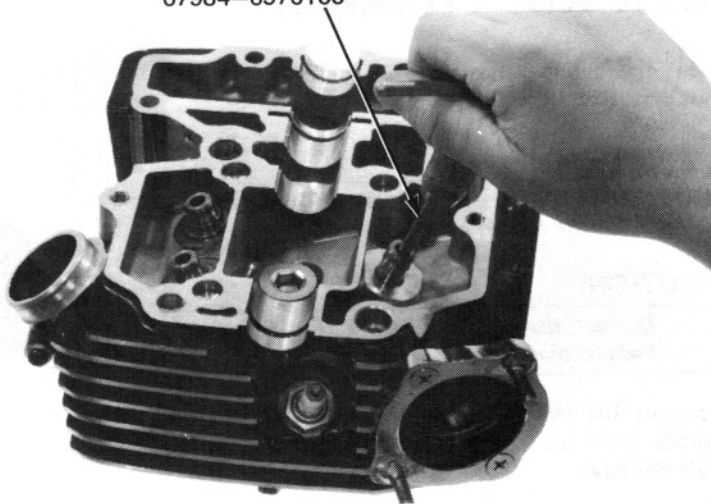
Ream the new valve guides after installation.

NOTE:

- Use cutting oil on the reamer during this operation.
- It is important that the reamer always be rotated in the same direction when it is inserted or removed.

Clean the head thoroughly after reaming the valve guides.

VALVE GUIDE REAMER
07984-6570100



VALVE SEAT INSPECTION/REFACING

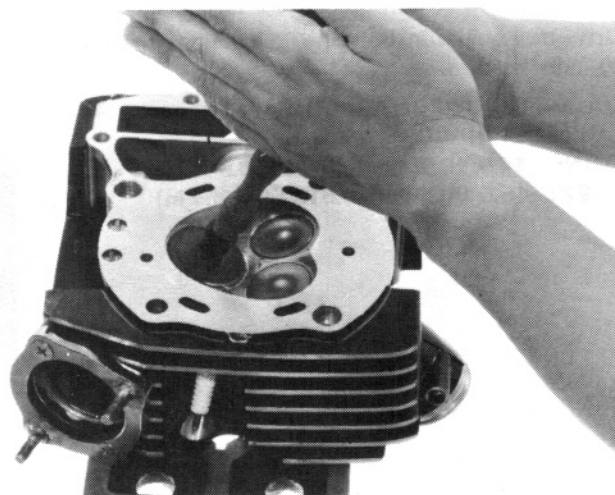
Clean all intake and exhaust valves thoroughly to remove carbon deposits.

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

Remove and inspect each valve.

CAUTION:

The valve cannot be ground. If the valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.

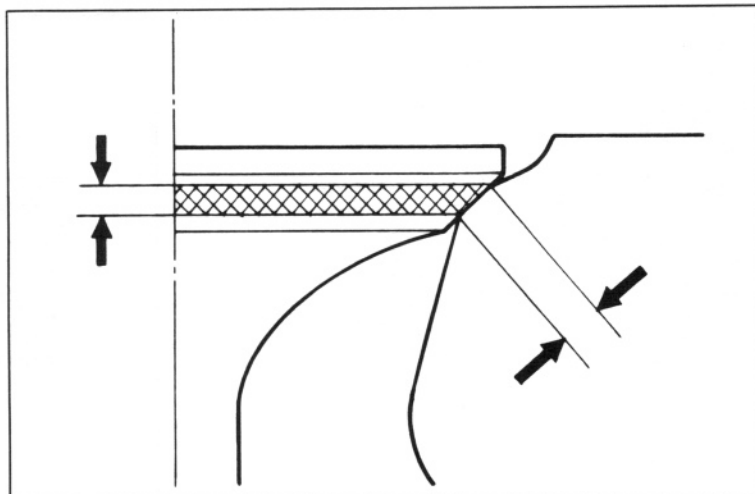


Inspect the width of each valve seat.

STANDARD: 1.1–1.3 mm (0.04–0.05 in)

SERVICE LIMIT: 2.0 mm (0.08 in)

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

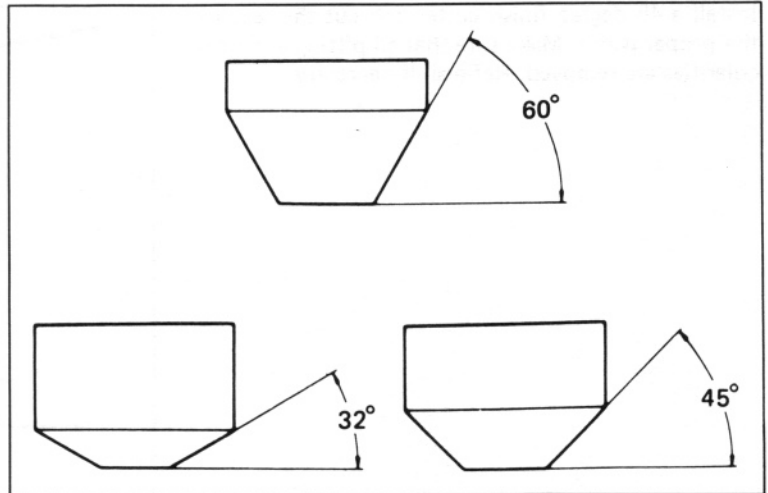


VALVE SEAT CUTTERS

Honda Valve Seat Cutters, grinder or equivalent valve seat refacing equipment are recommended to correct a worn valve seat.

NOTE:

- Follow the refacer manufacturer's operating instructions.



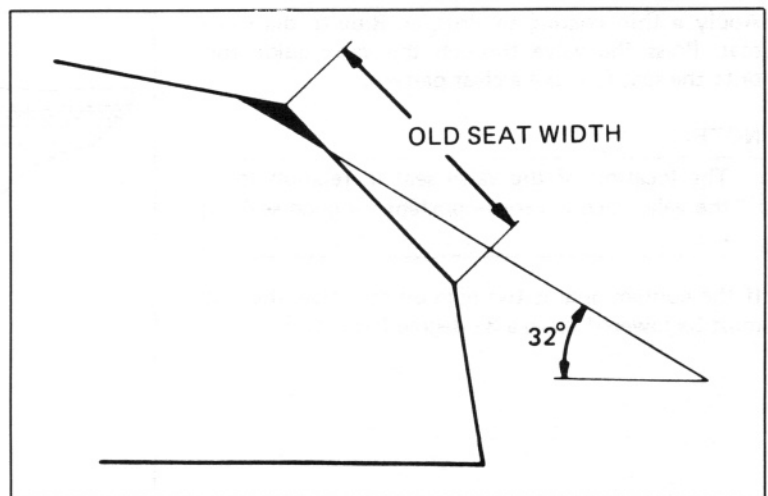
VALVE SEAT REFACING

Use a 45 degree cutter to remove any roughness or irregularities from the seat.

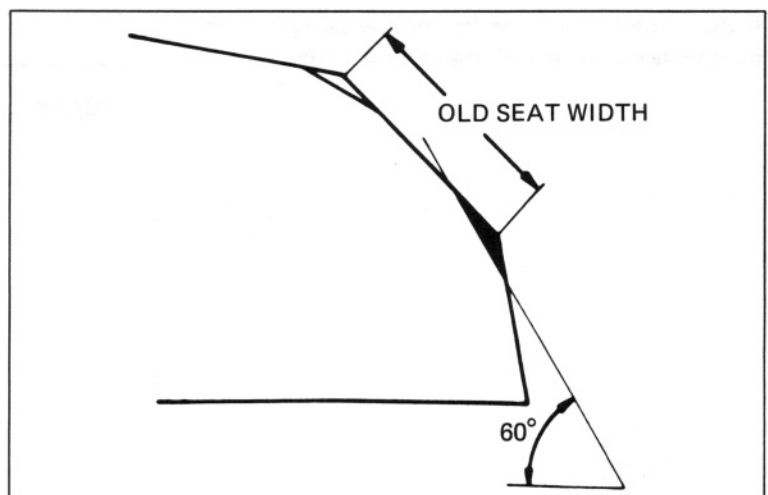
NOTE:

Reface the seat with a 45 degree cutter when a valve guide is replaced.

Use a 32 degree cutter to remove the top 1/4 of the existing valve seat material.

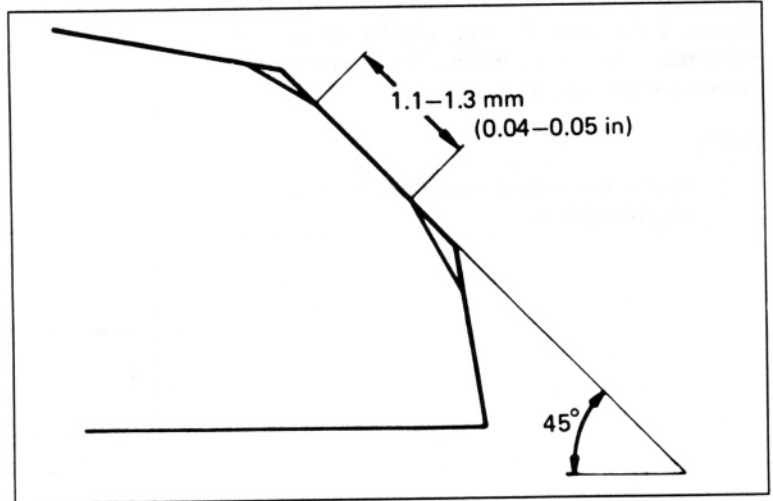


Use a 60 degree cutter to remove the bottom 1/4 of the old seat. Remove the cutter and inspect the area you have refaced.



CYLINDER HEAD/VALVE

Install a 45 degree finish cutter and cut the seat to the proper width. Make sure that all pitting and irregularities are removed. Refinish if necessary.

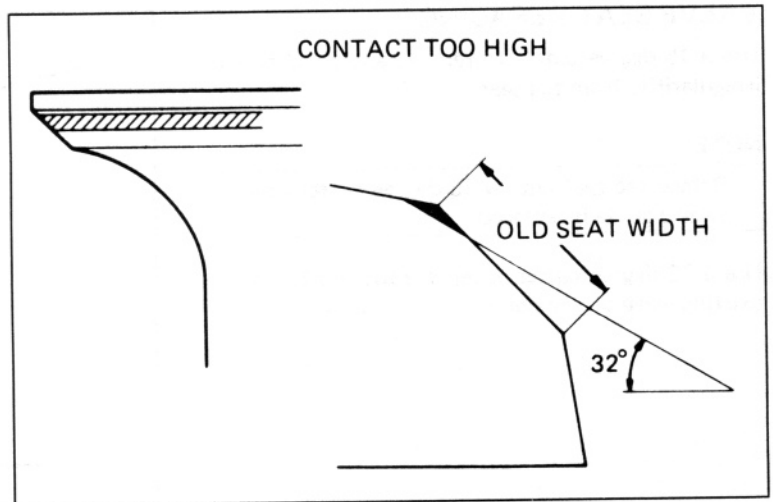


Apply a thin coating of Prussian Blue to the valve seat. Press the valve through the valve guide and onto the seat to make a clear pattern.

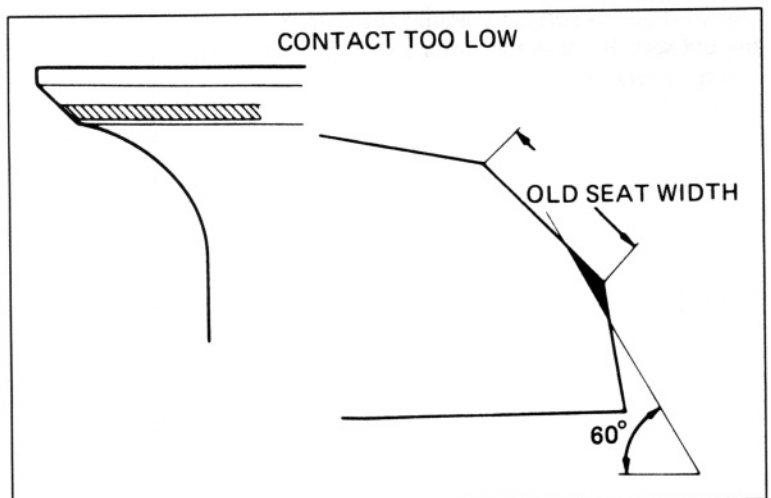
NOTE:

The location of the valve seat in relation to the valve face is very important for good sealing.

If the contact area is too high on the valve, the seat must be lowered using a 32 degree flat cutter.



If the contact area is too low on the valve, the seat must be raised using a 60 degree inner cutter.

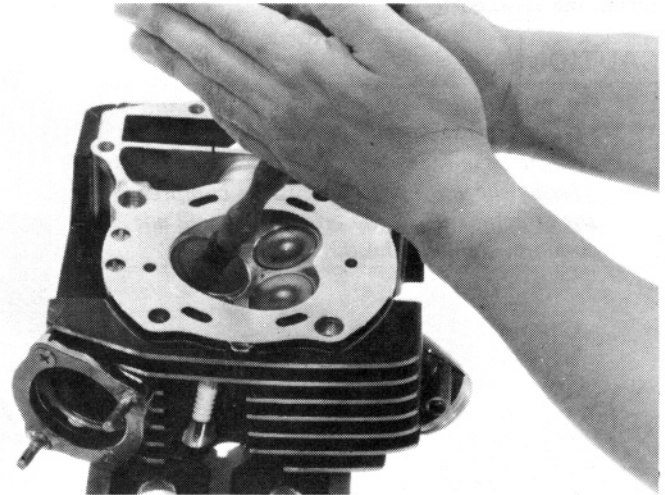


Refinish the seat to specifications, using a 45 degree finish cutter.

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

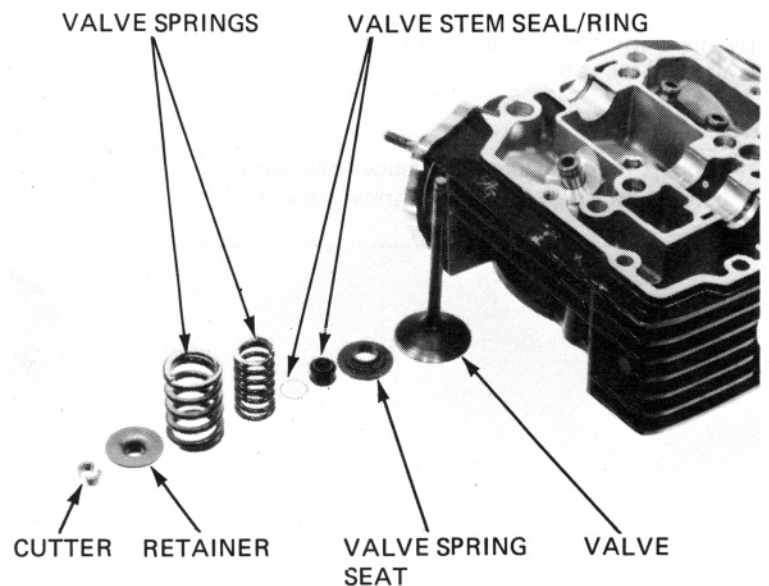
NOTE:

Do not allow lapping compound to enter the guides.



CYLINDER HEAD ASSEMBLY

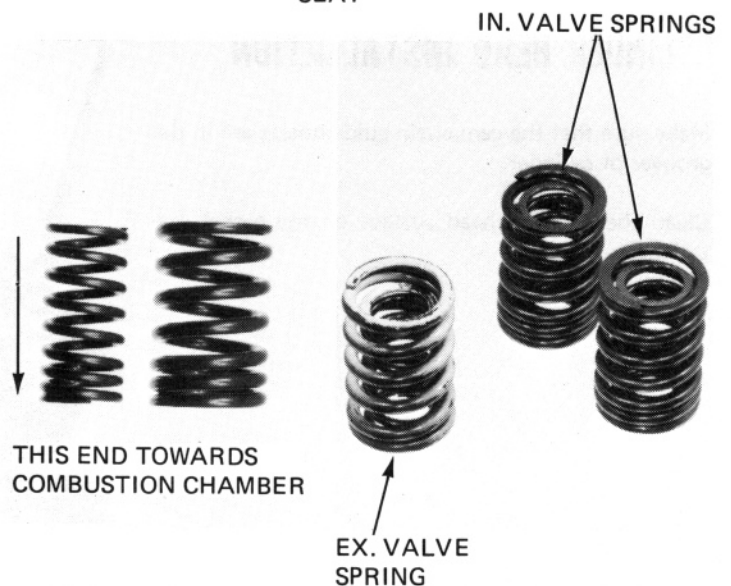
Install the valve spring seat and a new stem seal. Lubricate each valve stem with molybdenum disulfide grease and insert the valve into the valve guide. To avoid damage to the stem seal, turn the valve slowly when inserting.



Install the valve springs and retainers. The springs tightly wound coils should face in toward the combustion chamber.

NOTE:

Springs with green paint are exhaust valve springs.

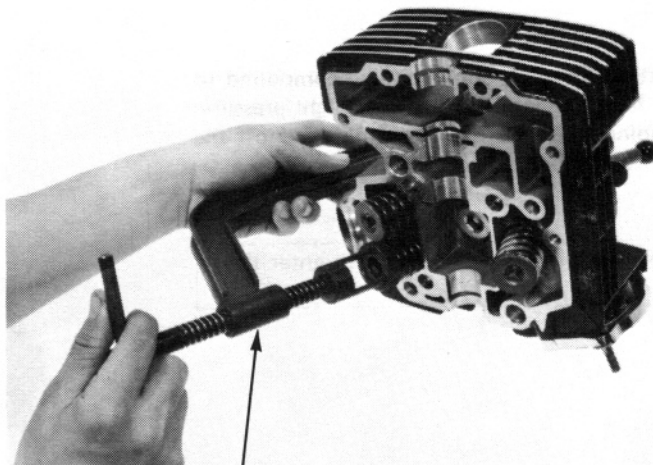


CYLINDER HEAD/VALVE

Install the valve cotters.

CAUTION:

- *To prevent loss of tension, do not compress the valve springs more than necessary to install the valve keepers.*
- *Thread the large retainer on the compressor attachment, so the compressor will not touch the cylinder head.*

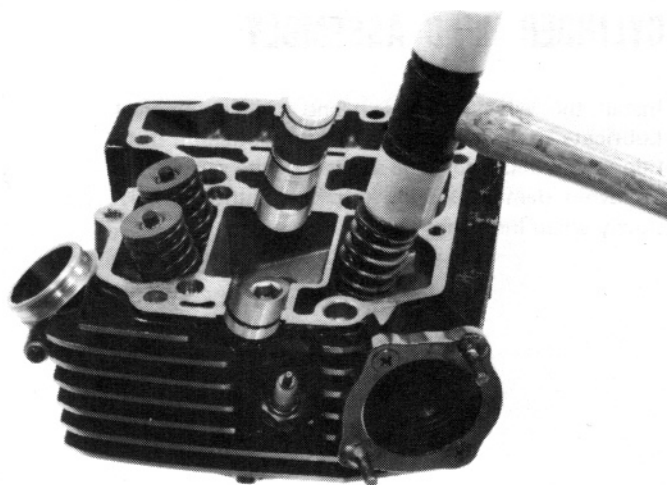


VALVE SPRING COMPRESSOR
07757-0010000 OR 07959-3290001

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

NOTE:

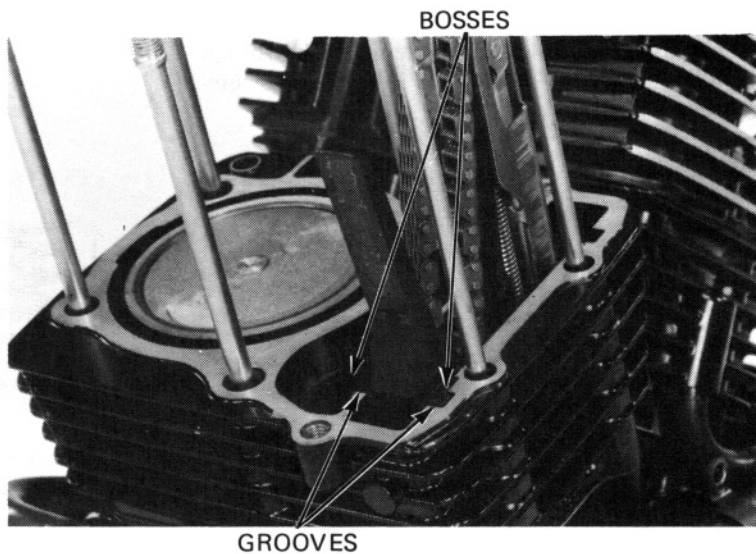
Support the cylinder head above the work bench surface to prevent possible valve damage.



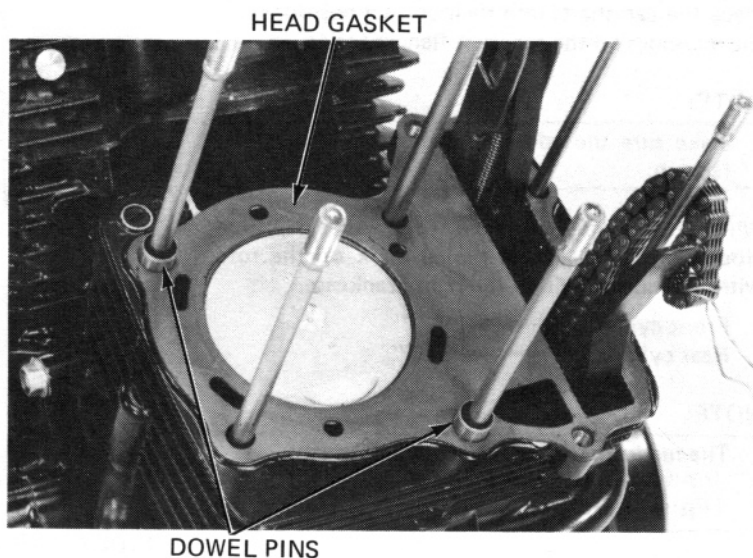
CYLINDER HEAD INSTALLATION

Make sure that the cam chain guide bosses are in the grooves of cylinder.

Clean the cylinder head surface of any gasket material.

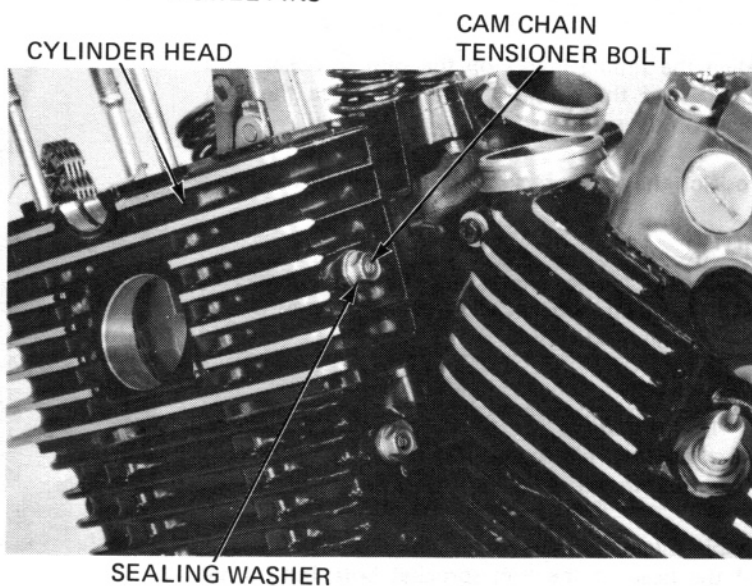


Install the dowel pins and a new head gasket.



Install the cylinder head.

Install the cam chain tensioner bolt and sealing washer.



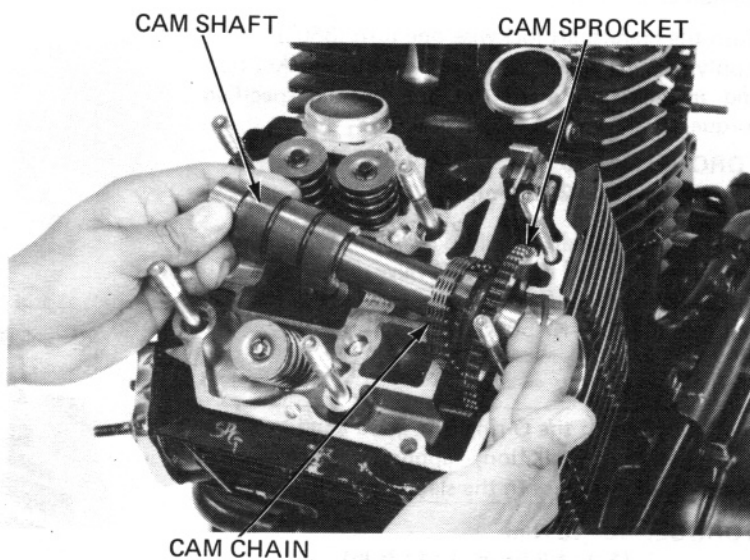
CAMSHAFT INSTALLATION

Lubricate the camshaft journal surface of the cylinder head with molybdenum disulfide grease.

Run the camshaft through the cam chain and install the cam sprocket on the shaft flange.

NOTE:

Install the cam sprocket with the timing mark (punch mark) facing the outside.



CYLINDER HEAD/VALVE

Place the camshafts into their correct positions with the markings on the sprocket flanges facing up.

NOTE:

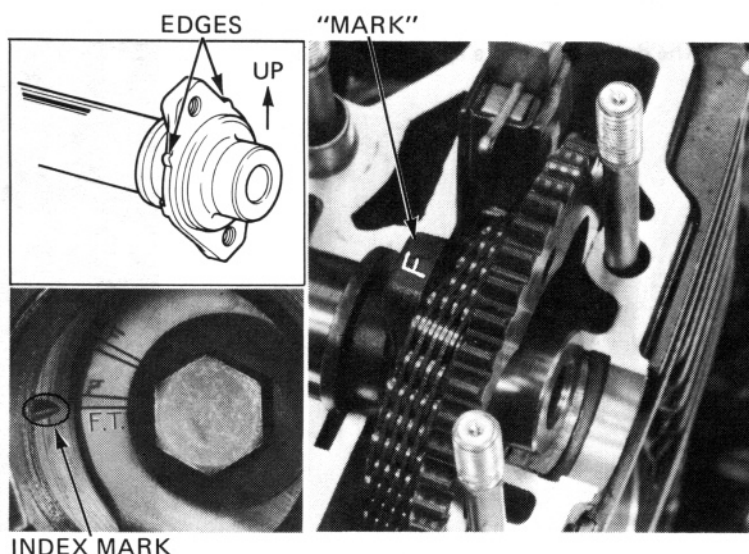
Make sure the edges on the sprocket flanges face up.

While lifting the cam chain, rotate the crankshaft clockwise and align the timing mark on the rotor with the index mark on the right crankcase.

Front cylinder → "F.T"
Rear cylinder → "R.T"

NOTE:

The marks on the camshaft flanges mean:
"F" → Front cylinder camshaft
"R" → Rear cylinder camshaft



Align the timing marks on the cam sprocket with the top of the cylinder head and place the cam chain on the sprocket.

Position the cam sprocket on the camshaft flange.

NOTE:

After installing, check that the timing marks on the cam sprocket align with the top of the cylinder head.

CAUTION:

After installing the front cylinder, turn the crankshaft clockwise 225° turn and then install the rear cylinder.

Apply a locking agent to the threads and underside of the head of the cam sprocket bolt, but do not tighten at this time.

Turn the crankshaft lockwise one turn (360°). Apply locking agent to the other cam sprocket bolt and install it. Tighten the bolt to the specified torque.

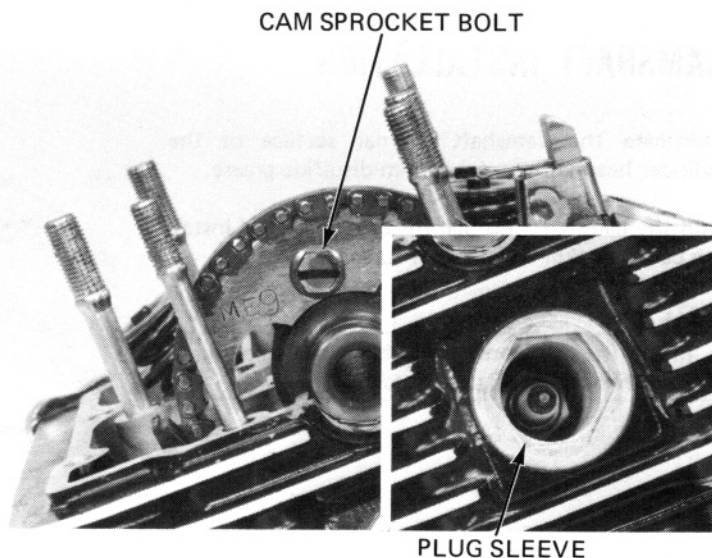
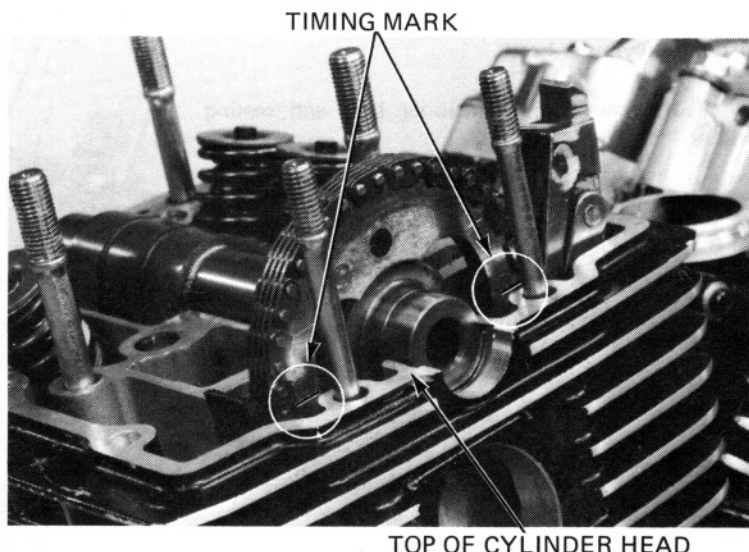
TORQUE: 16–20 N·m
(1.6–2.0 kg·m, 12–14 ft·lb)

Turn the crankshaft clockwise one turn and torque the remaining bolt to the same valve. Install and torque the spark plug sleeve with the special tool (07930–KA50100).

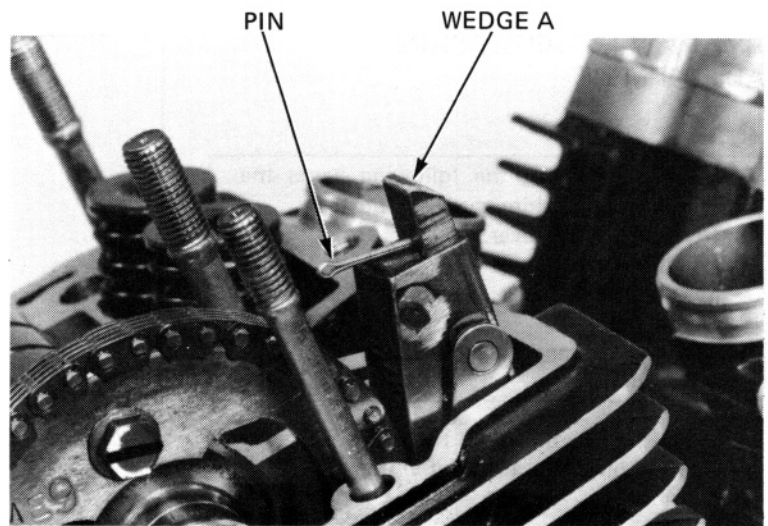
NOTE:

- Check that the O-ring is in good condition.
- Before installation, apply molybdenum disulfide grease to the sleeve threads.

TORQUE: 10–15 N·m
(1.0–1.5 kg·m, 7–11 ft·lb)



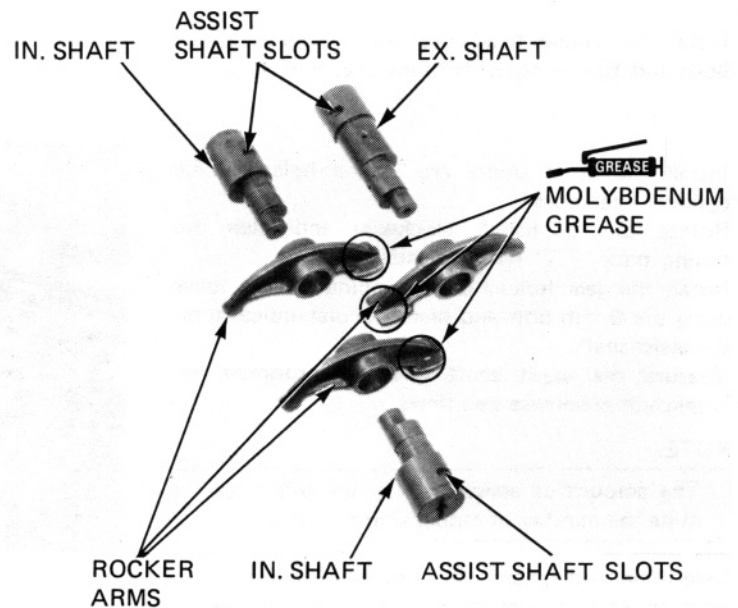
Remove the 2 mm pin holding wedge A.



CYLINDER HEAD COVER ASSEMBLY

Brush Molybdenum Disulfide grease on the slipper surfaces of the rocker arms and coat the contact surfaces of the rocker shafts with clean engine oil.

Install the rocker arms and shafts into the cylinder head cover, making sure that the assist shaft slots are facing up.



Rotate each rocker shaft so that the arms are moved in toward the center of the cover.

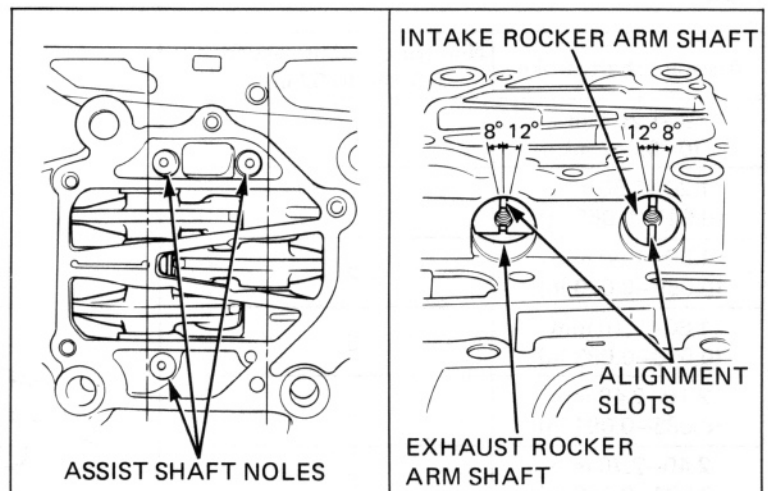
NOTE:

Put your finger on the rocker arms as you rotate the shaft to be sure which way they are moving.

Check that the alignment slots in the rocker shafts are within the limits shown.

NOTE:

Both intake rocker arm shafts should fall within the same limits.



CYLINDER HEAD/VALVE

HYDRAULIC TAPPET SHIM ADJUSTMENT

NOTE:

Whenever replacing the following parts, the hydraulic tappet shim must be adjusted.

- Cylinder head cover.
- Cylinder head.
- Valve stem, valve guide and valve seat refacing.
- Rocker arm and rocker arm shaft.
- Camshaft.

After bleeding the oil in the hydraulic tappets with the tappet bleeder, install the tappets into the cylinder head.

Install the cylinder head cover and tighten the 8 mm bolts and 10 mm cap nuts to the specified torque.

Install the assist shafts in the holes of the cylinder head cover.

Rotate the crankshaft clockwise and align the timing mark "F.T." with the index mark.

Install the gear holder on the cylinder head cover using the 6 mm bolt and place the dial indicator on the assist shaft.

Measure the assist shaft stroke by rotating the crankshaft clockwise two times.

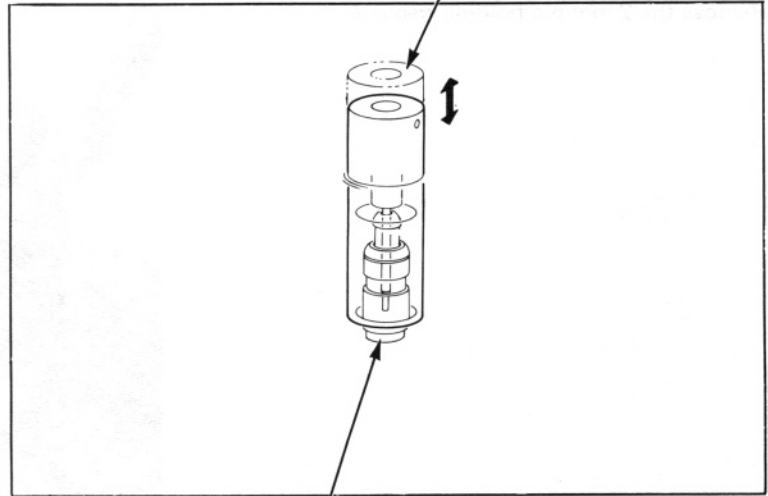
NOTE:

The amount of assist shaft stroke will determine the number of tappet shims needed.

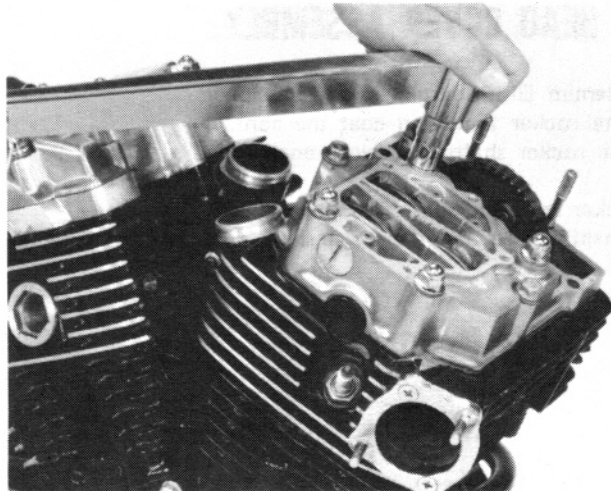
Determine and record the number of shims to be used to each tappet according to the following chart.

Assistant shaft stroke	Number of shims needed 0.5 mm (0.02 in)
0–1.20 mm (0–0.047 in)	0
1.20–1.50 mm (0.047–0.059 in)	1
1.50–1.80 mm (0.059–0.070 in)	2
1.80–2.10 mm (0.070–0.083 in)	3
2.10–2.40 mm (0.083–0.094 in)	4
2.40–2.70 mm (0.094–0.106 in)	5

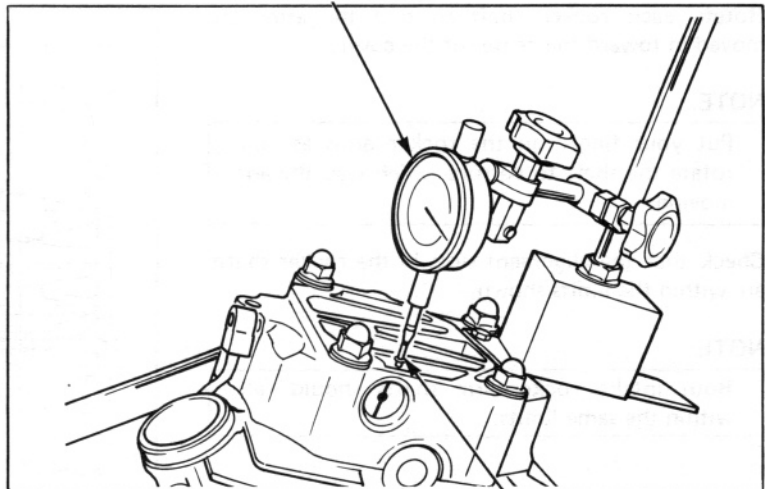
TAPPET BLEEDER
07973–ME90000



HYDRAULIC TAPPET



DIAL INDICATOR

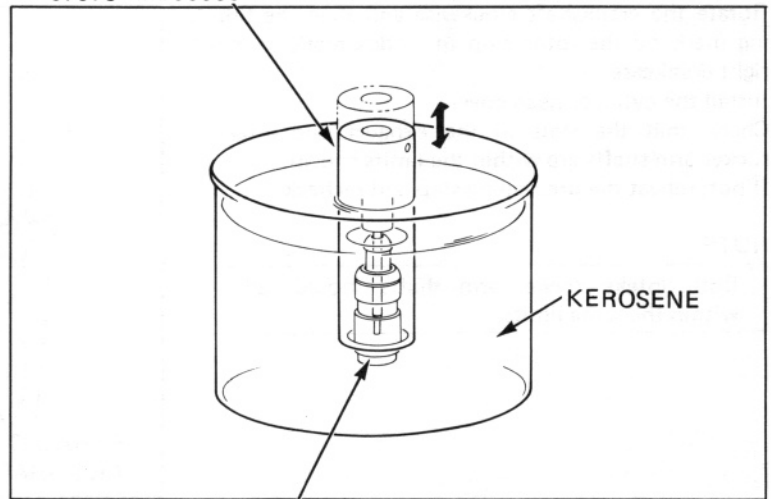


ASSIST SHAFT

CYLINDER HEAD COVER INSTALLATION

Place the tappet in a jar filled with kerosene. Place the tappet bleeder into the tappet. Hold the tappet upright and pump the tappet until air bubbles stop coming out. Remove the tool, and try to quickly compress the tappet by hand. You should not be able to compress it more than 0.2 mm (0.008 in). Remove the tappet from the fluid keeping it upright.

HYDRAULIC TAPPET BLEEDER
07973-ME90000



Install the shims into each hydraulic tappet hole of the cylinder head. Install the hydraulic tappets into the cylinder head.

CAUTION:

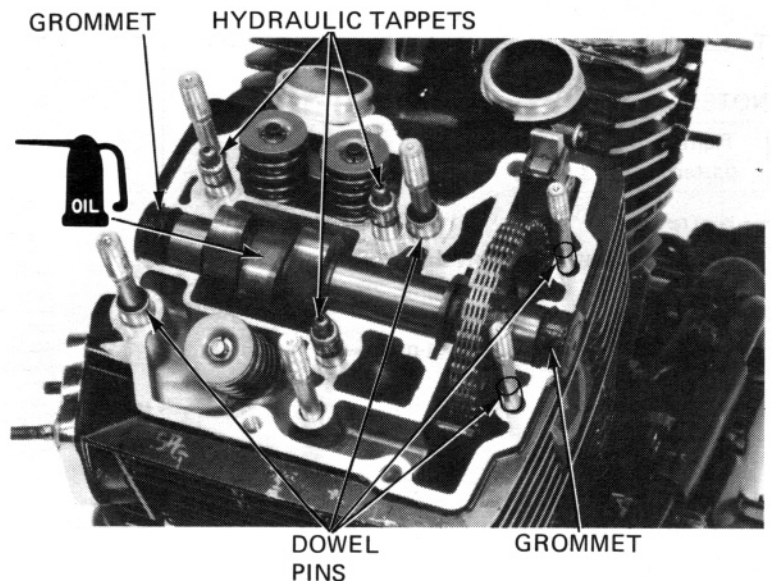
Do not tilt the hydraulic tappets, keep them as upright as possible.

Install the dowel pins and grommets.

NOTE:

Apply a liquid sealant to the oil seals where they contact the cylinder head.

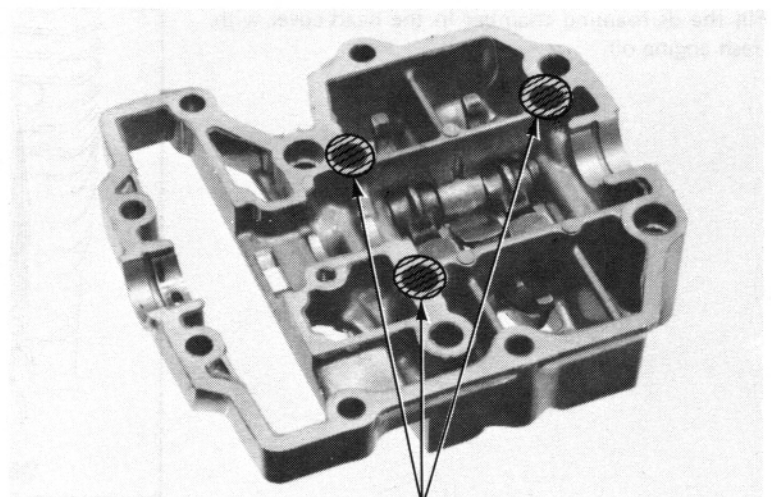
Pour fresh oil into the oil pockets in the cylinder head until the cams are submerged.



Apply a liquid sealant to the mating surfaces of the cylinder head cover.

NOTE:

Do not apply liquid sealant to the shadowed area. Failure to do so could cause a faulty hydraulic tappet.



DO NOT APPLY SEALANT
TO THESE AREAS

CYLINDER HEAD/VALVE

Rotate the crankshaft clockwise and align the timing mark on the rotor with the index mark on the right crankcase.

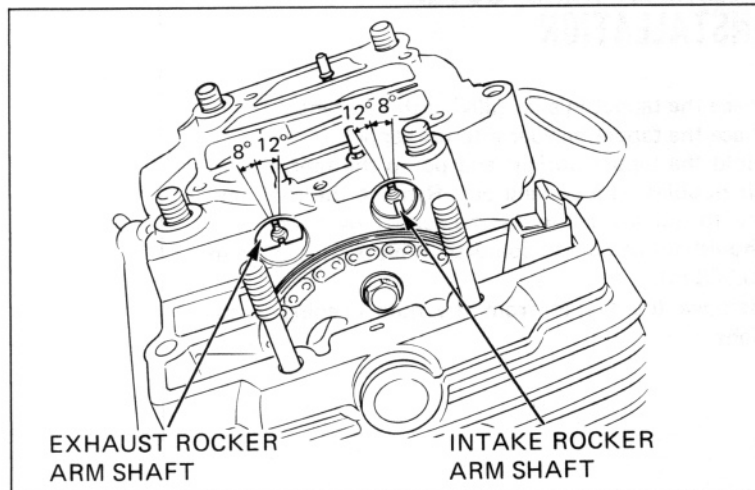
Install the cylinder head cover.

Check that the slots in the exhaust and intake rocker arm shafts are within the limits shown.

If not, repeat the preceding step and recheck.

NOTE:

Both intake rocker arm shafts should fall within the same limits.



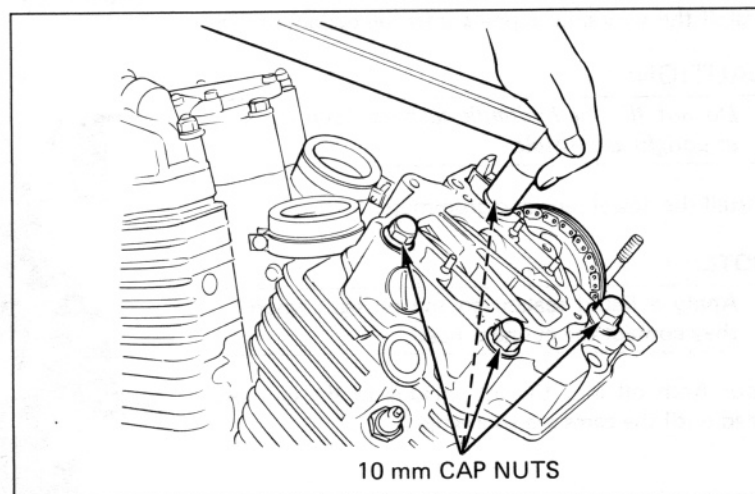
Torque the cylinder head cover bolts and cap nuts.

NOTE:

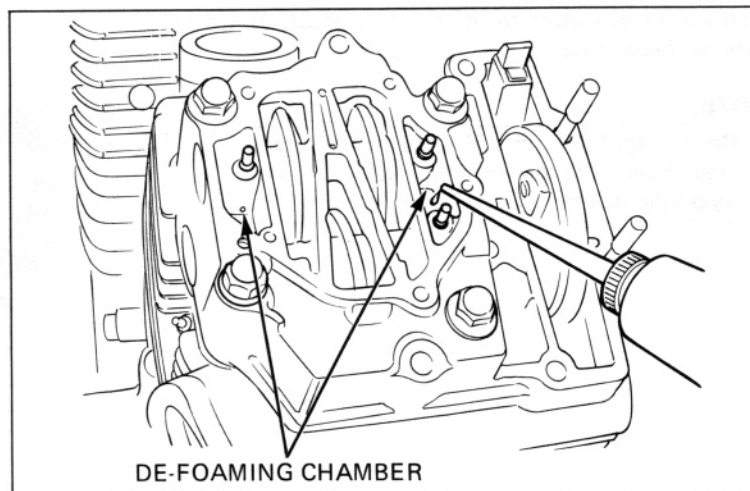
Tighten the bolts and cap nuts in a criss-cross pattern in 2–3 steps.

TORQUES:

10 mm cap nut: 35–45 N·m
(3.5–4.5 kg·m, 25–33 ft·lb)
8 mm bolt: 20–25 N·m
(2.0–2.5 kg·m, 14–18 ft·lb)



Fill the de-foaming chamber in the head cover with fresh engine oil.



Place a new O-ring on each rocker arm shaft plug and install the plugs.

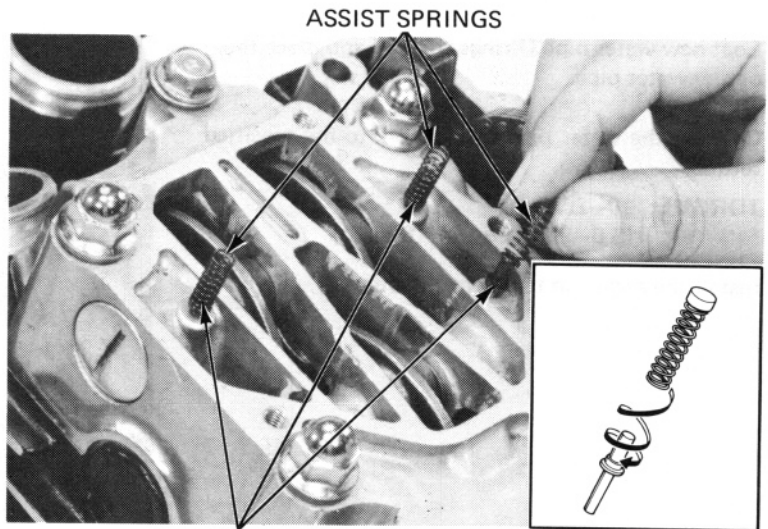


PLUG

Install assist spring onto assist shaft while twisting it so that assist spring end seats flange face tightly. Install the assist shafts and springs in the holes of the cylinder head cover as shown.

Rotate the crankshaft clockwise and align the timing mark (T.D.C.) on the rotor with the index mark on the right crankcase.

Make sure the rocker arm can be slid side way.



ASSIST SPRINGS

ASSIST SHAFTS

Install the cam sprocket cover with a new gasket. Torque the 8 mm bolts and cap nuts.

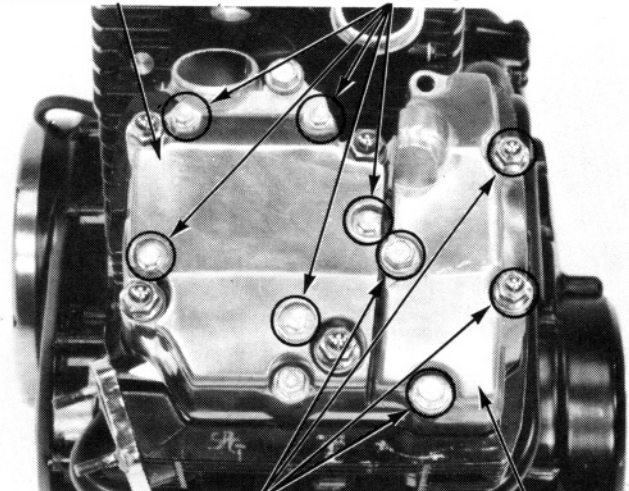
NOTE:

Tighten the bolts and cap nuts in a criss-cross pattern in 2–3 steps.

TORQUE: 20–25 N·m (2.0–2.5 kg·m, 14–18 ft·lb)

Place a new gasket on the cylinder head cover. Install the rocker arm cover and torque the 6 mm bolts in a crisscross pattern in 2–3 steps.

ROCKER ARM COVER 6 mm BOLTS

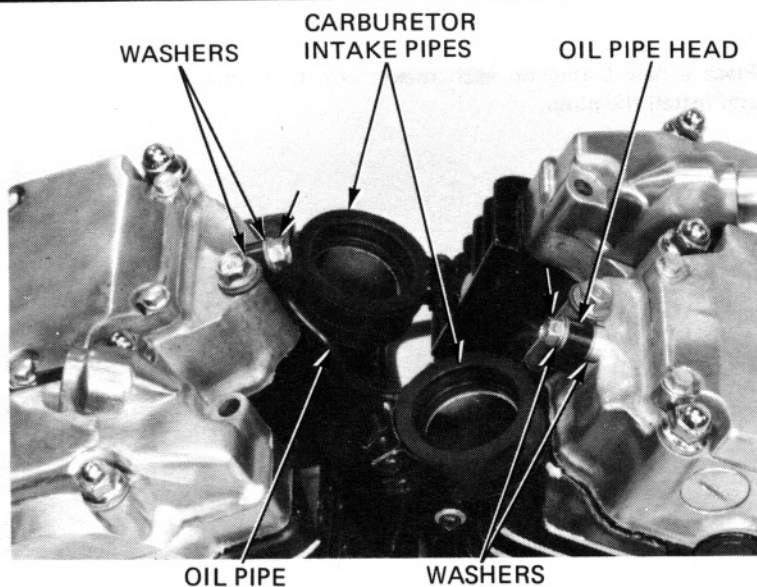
8 mm
BOLTS/CAP NUTSCAM SPROCKET
COVER

CYLINDER HEAD/VALVE

Install the carburetor intake pipes.

Connect the oil pipe to the cylinder head cover and tighten to the specified torque.

TORQUE: 10–14 N·m
(1.0–1.4 kg-m, 6–9 ft-lb)



Coat new water pipe O-rings with oil and place them on the water pipe.

Connect the water pipe and tighten to the specified torque.

TORQUE: 20–25 N·m
(2.0–2.5 kg-m, 14–18 ft-lb)

Install the engine in the frame (Section 5).

