

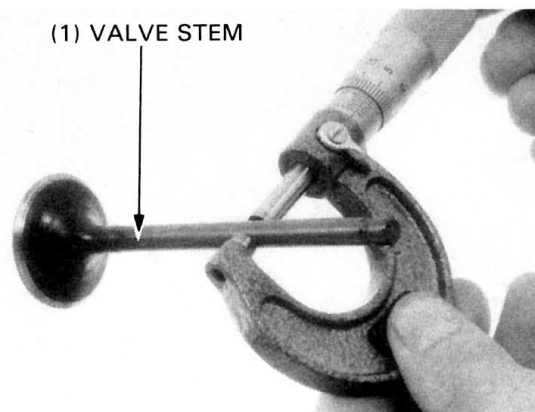
CYLINDER HEAD/VALVES

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: 5.47 mm (0.215 in)
EX: 6.55 mm (0.258 in)

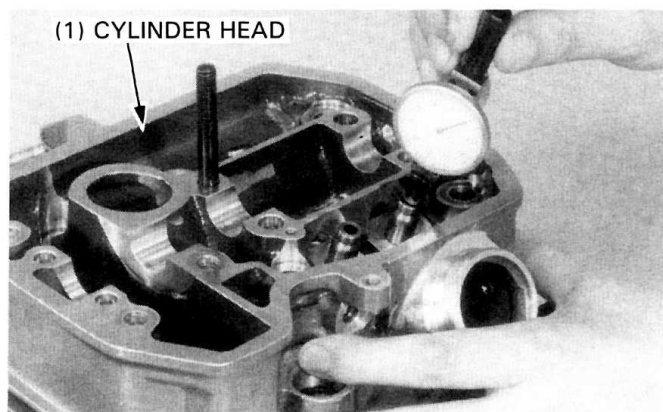


Measure and record each valve guide I.D.

NOTE

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

SERVICE LIMITS: IN: 5.53 mm (0.218 in)
EX: 6.66 mm (0.262 in)



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

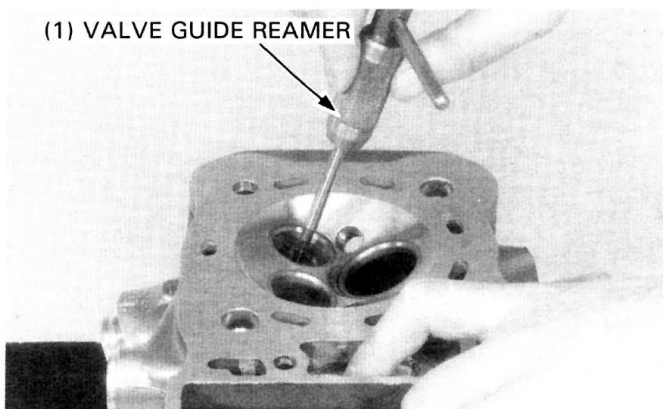
SERVICE LIMITS: IN: 0.07 mm (0.003 in)
EX: 0.11 mm (0.004 in)

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.

TOOLS:

Valve guide reamer

IN: 07984-2000001 or 07984-200000B U.S.A. only
EX: 07984-ZE20001 or 07984-ZE2000B



NOTE

- It is important that the reamer always be rotated in the same direction when it is inserted or removed.

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 REPLACEMENT

Chill the valve guides in the freezer section of a refrigerator for about an hour.

Heat the cylinder head to 212°F (100°C) with a hot plate or oven. Maximum allowable temperature is 300°F (150°C).

⚠ 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.

TOOLS:

Valve guide driver

(IN): 07742-0010100

(EX): 07742-0010200 or 07942-6570100 (U.S.A. only)

NOTE

- Avoid damaging the cylinder head.

Make note of the valve guide projection specifications (following), then drive in new guides from camshaft side of the cylinder head.

TOOLS:

Valve guide driver

5.5 mm (IN): 07742-0010100

6.6 mm (EX): 07742-0010200

Attachment

5.5 mm (IN): 07943-MF50100

6.6 mm (EX): 07943-MF50200

VALVE GUIDE PROJECTION HEIGHT:

IN: 19.4–19.6 mm (0.76–0.77 in)

EX: 17.9–18.1 mm (0.70–0.71 in)

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.

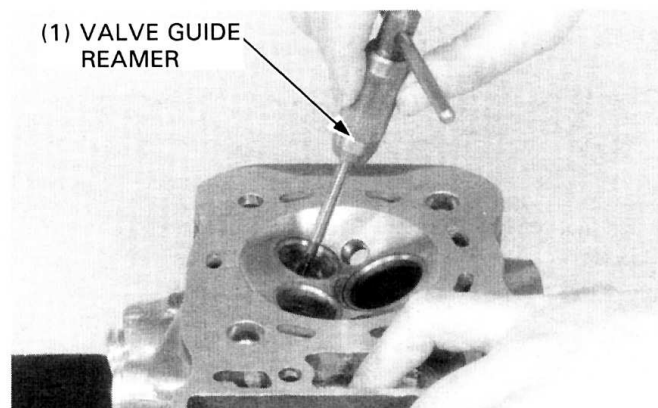
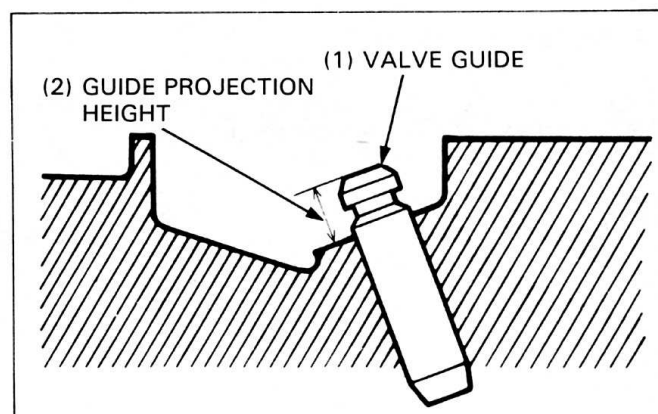
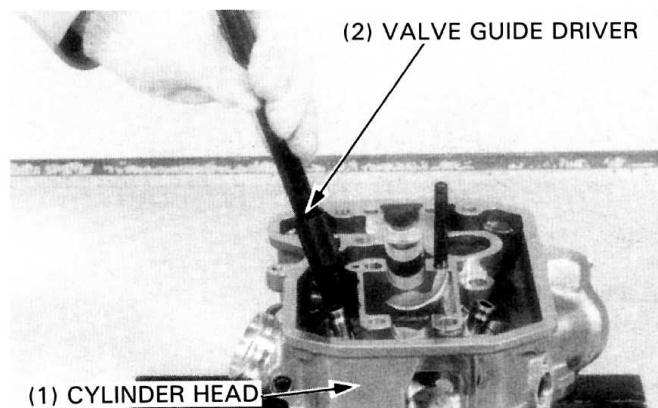
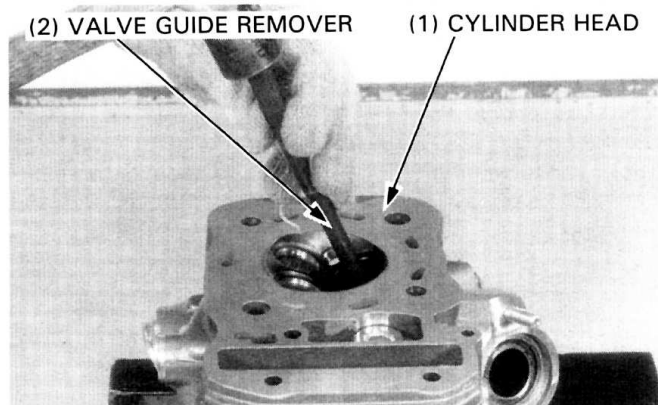
Clean the head thoroughly after reaming the valve guides.

TOOLS:

Valve guide reamer

IN: 07984-2000001 or 07984-200000B (U.S.A. only)

EX: 07984-ZE20001 or 07984-ZE2000B (U.S.A. only)

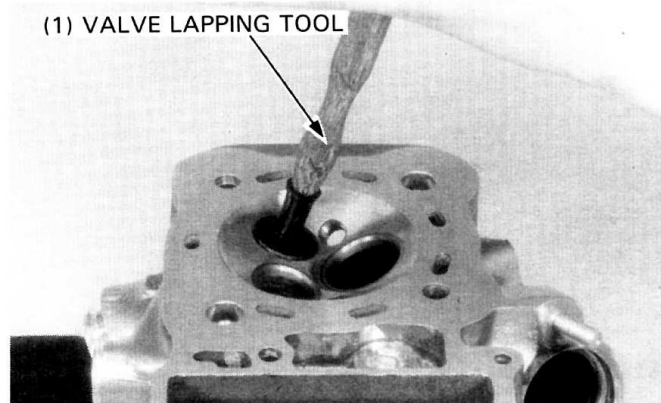


CYLINDER HEAD/VALVES

VALVE SEAT INSPECTION/REFACING

Clean the 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

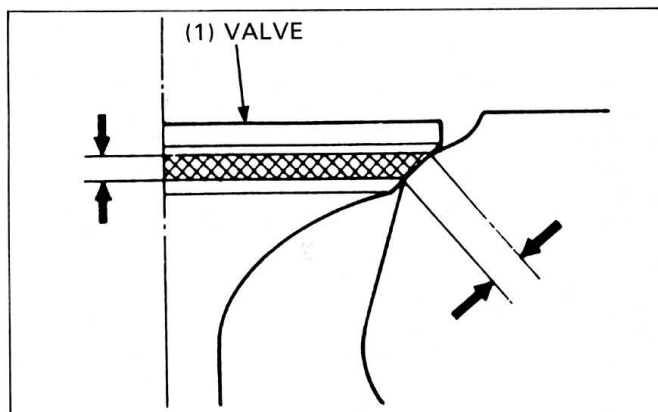
- *The valves cannot be ground. If a valve face is burned or badly worn or if it contacts the seat unevenly, replace the valve.*

Inspect the width of each valve seat.

STANDARD: 0.9–1.1 mm (0.035–0.043 in)

SERVICE LIMIT: 1.5 mm (0.06 in)

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

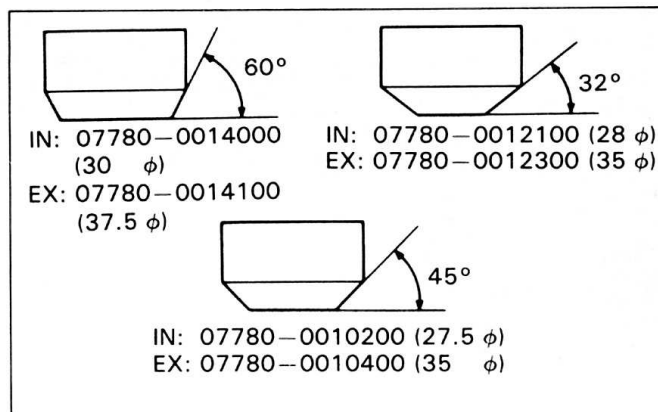


VALVE SEAT CUTTERS

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.

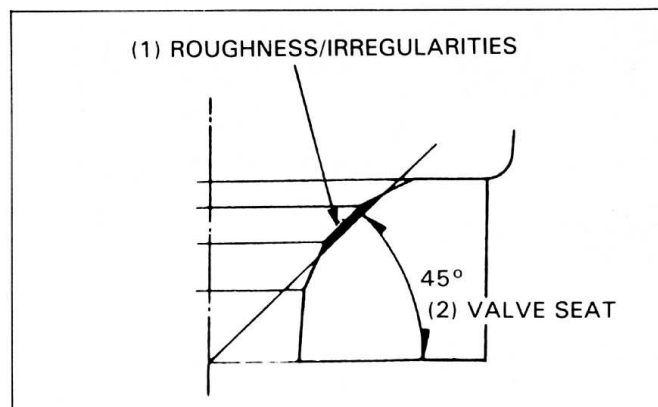


VALVE SEAT REFACING

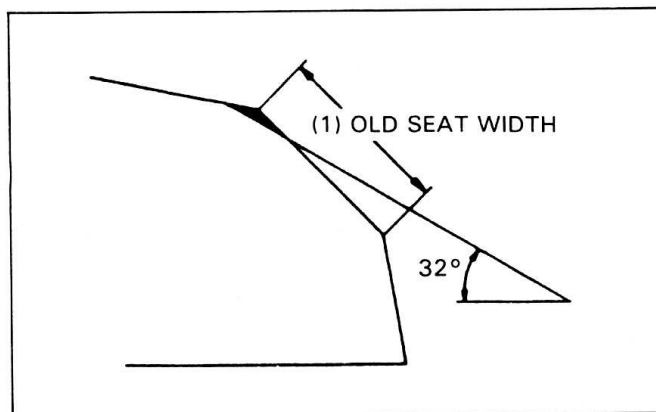
Use a 45 degree cutter to remove any roughness or irregularities from the seat.

NOTE

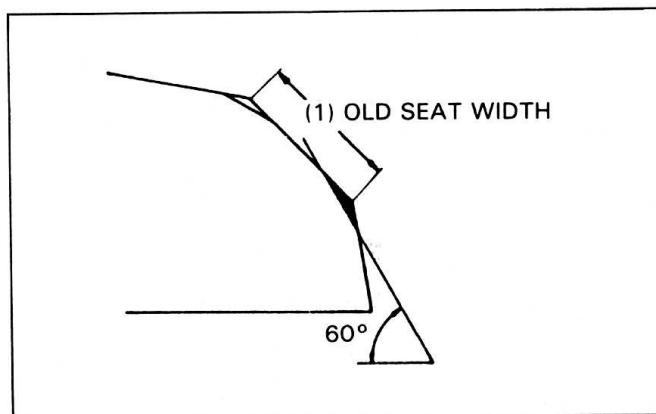
- Reface the seat with a 45 degree cutter when a valve guide is replaced.



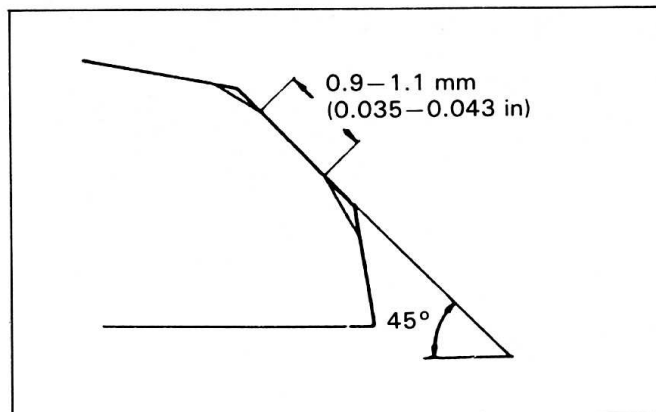
Use a 32 degree cutter to remove the top 1/4 of the existing valve seat material.



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.



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.

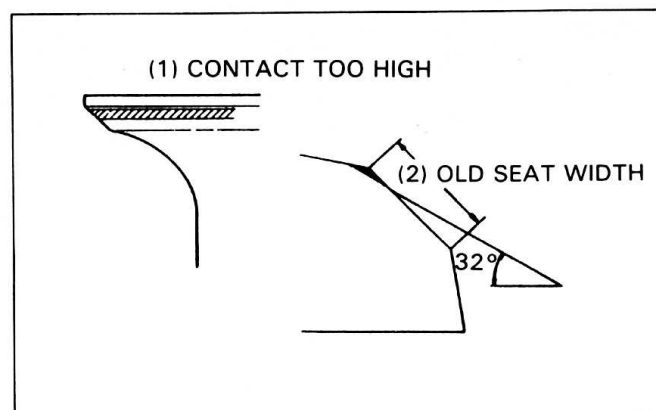


Apply a thin coating of Prussian Blue to the valve seat. Press the valve through the valve guide and onto the seat to make a clear pattern.

NOTE

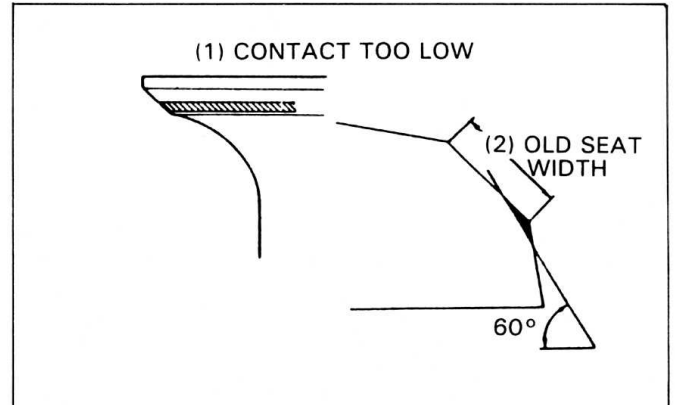
- The location of the valve seat in relation to the valve face is very important for good sealing.

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



CYLINDER HEAD/VALVES

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

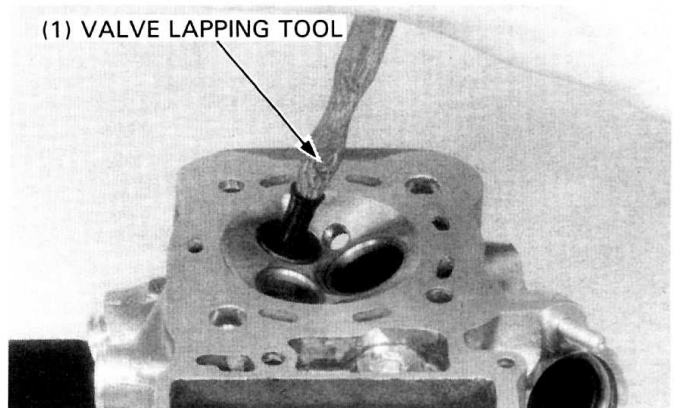


Refinish the seat to specifications, using a 45 degree finish cutter.

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

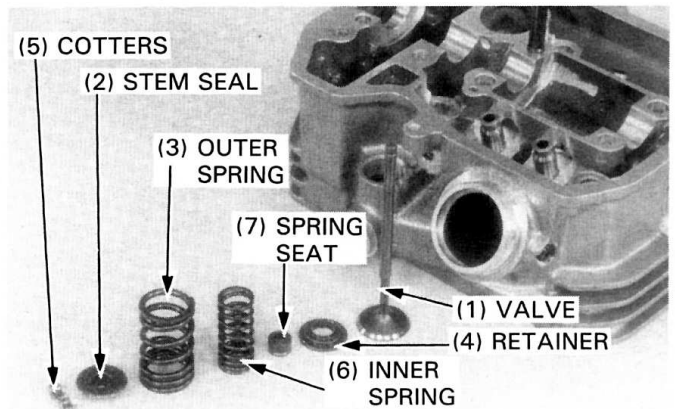
- Do not allow lapping compound to enter the guides.



CYLINDER HEAD ASSEMBLY

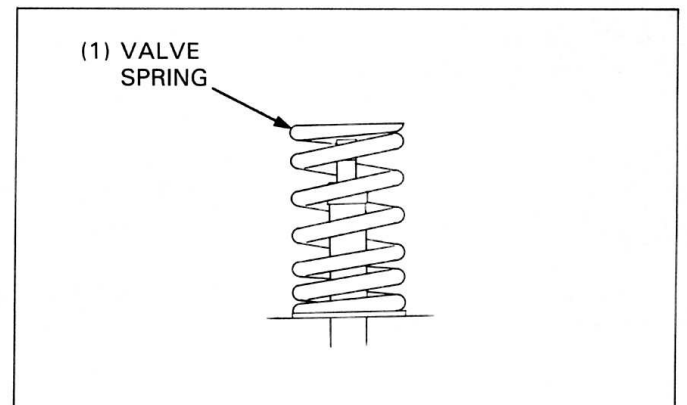
Install the valve spring seats and new stem seals. Lubricate each valve stem with MoS₂ paste grease and insert the valve into the valve guide. Turn the valve slowly while inserting to avoid damaging the seals.

Move the valves up and down to check for smooth operation.



Install the valve springs with the tightly wound coils facing the combustion chamber.

Install the spring retainers.



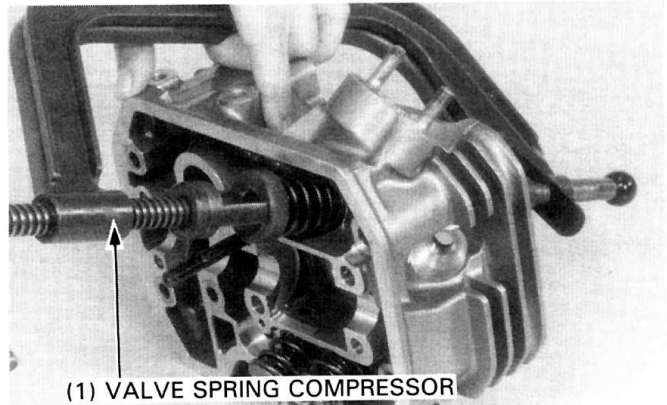
Compress the springs and install the valve cotters.

CAUTION

- *To prevent loss of tension, do not compress the valve springs more than necessary to install the valve cotters.*

TOOL:

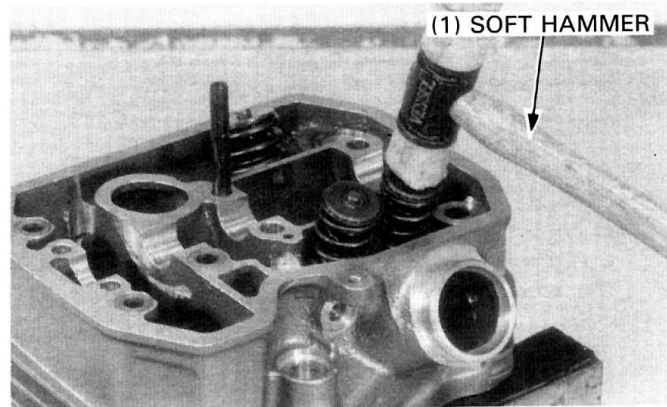
Valve spring compressor 07757-0010000 or
07957-3290001



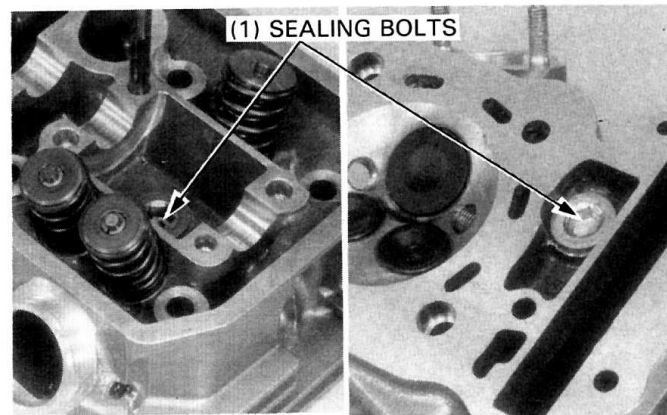
Tap the valve stems gently with a soft hammer to firmly seat the cotters.

NOTE

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



Apply locking agent to the threads of the sealing bolts and tighten them, if removed.



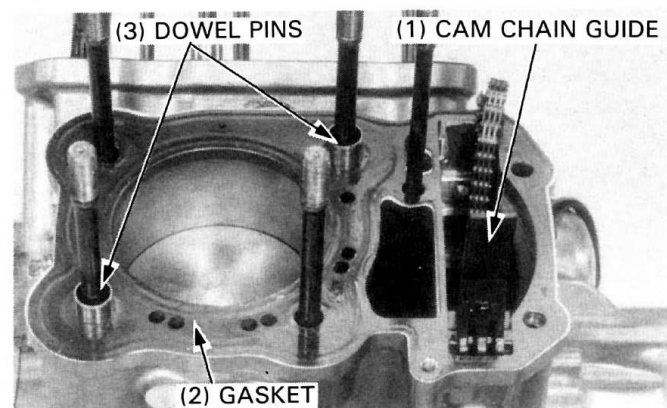
CYLINDER HEAD INSTALLATION

Install the cam chain guide into the cylinder.

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

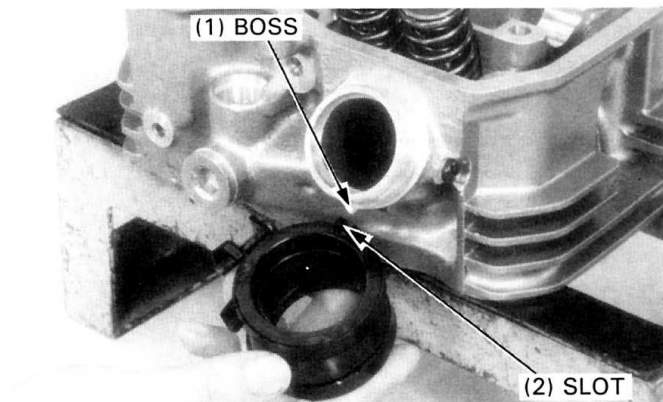
Clean the cylinder head surface of any gasket material.

Install the dowel pins and a new head gasket.



CYLINDER HEAD/VALVES

Install the carburetor insulator on the cylinder head, aligning the boss on the cylinder head with the slot in the insulator. Tighten the screw securely.



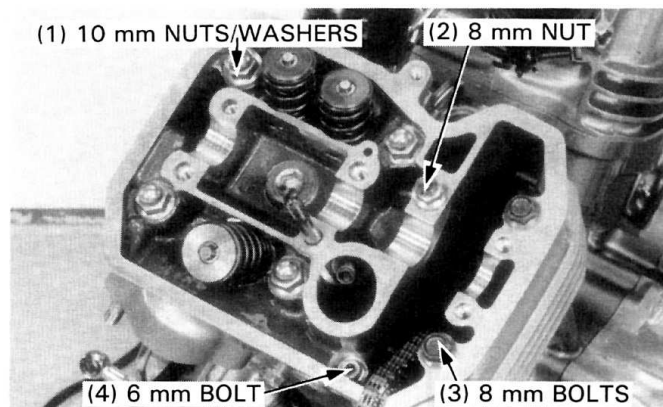
Install the cylinder head.
Reinstall the upper exhaust port stud securely.
Install the 10 mm nut/washer, 8 mm nut/washer, 8 mm bolt/washer and 6 mm bolt and tighten them in a crisscross pattern in 2 or 3 steps.

TORQUE:

- 10 mm nut: 48 N·m (4.8 kg-m, 35 ft-lb)
- 8 mm bolt: 23 N·m (2.3 kg-m, 17 ft-lb)
- 8 mm nut: 23 N·m (2.3 kg-m, 17 ft-lb)
- 6 mm bolt: 10 N·m (1.0 kg-m, 7.2 ft-lb)

Install the following:

- cam chain tensioner with washers and bolts.
- water pipes



TORQUE: Cam chain tensioner bolt:

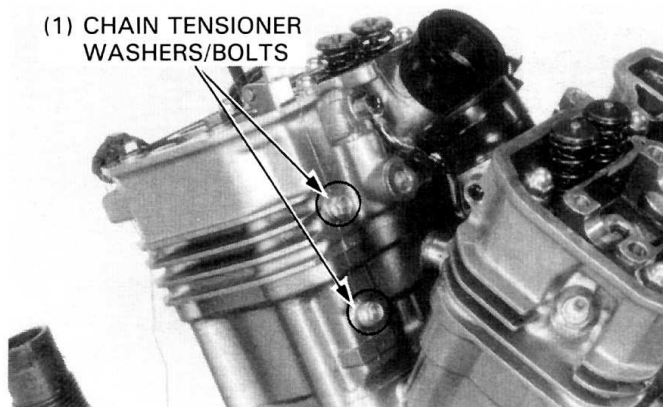
- 10 N·m (1.0 kg-m, 7.2 ft-lb)

Check the oil pass pipe bolts and oil pass pipe for clogging or bending.

Install the oil pass pipe, new sealing washers, oil pass pipe bolts and the pipe holder bolt.
Tighten the bolts.

TORQUE:

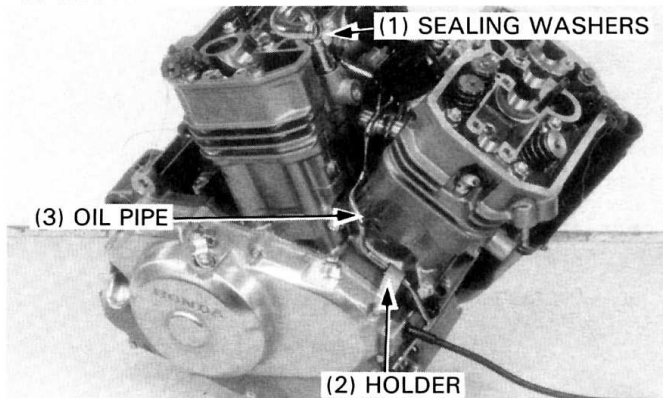
- Oil pass pipe bolt:
 - 7 mm: 10 N·m (1.0 kg-m, 7.2 ft-lb)
 - 8 mm: 23 N·m (2.3 kg-m, 17 ft-lb)



Install the following:

- camshaft (page 9-17)
- camshaft holders (page 9-18)

'88 SHOWN:

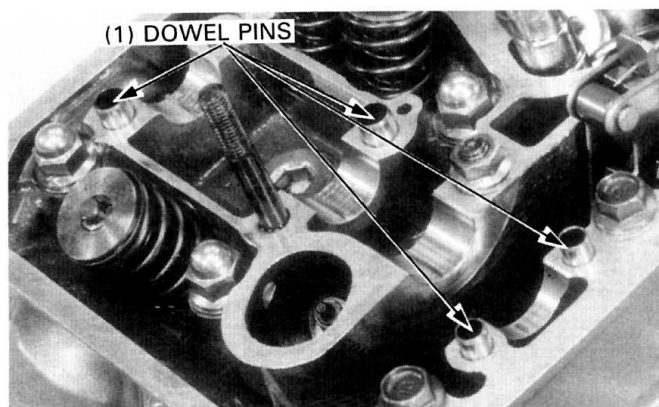


CYLINDER HEAD/VALVES

NOTE

- If the front and rear cylinder camshafts were removed, do not confuse them. Check the identification mark on the end of the shaft.

Install the dowel pins into the cylinder head.

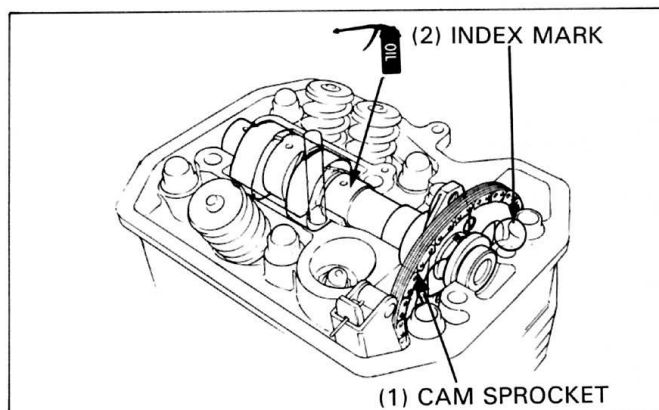


Install the camshaft in the cylinder head through the cam chain and install the cam sprocket on the camshaft.

With the cam lobes all facing down, align the timing marks (index lines) on the cam sprocket with the top of the cylinder head.

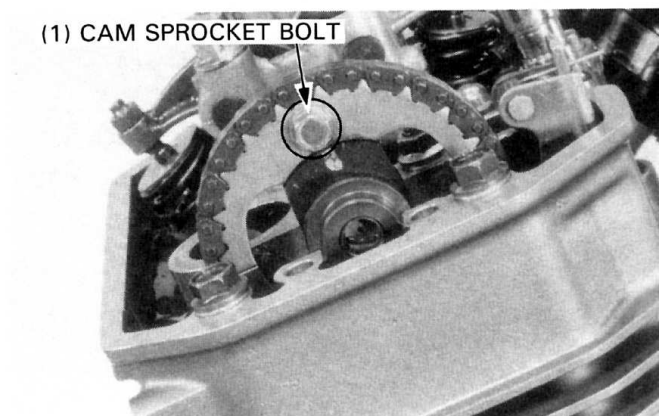
Place the cam chain on the sprocket.

Install the cam sprocket on the camshaft flange and recheck that the timing marks (index lines) align with the top of the cylinder head.



Align the cam sprocket bolt holes in the cam sprocket and camshaft, install and tighten the cam sprocket bolt.

TORQUE: 23 N·m (2.3 kg-m, 17 ft-lb)



Install the holder, oil plate, 8 mm bolts, 8 mm nut and 6 mm bolts.

TORQUE:

8 mm bolt: 23 N·m (2.3 kg-m, 17 ft-lb)

8 mm nut: 23 N·m (2.3 kg-m, 17 ft-lb)

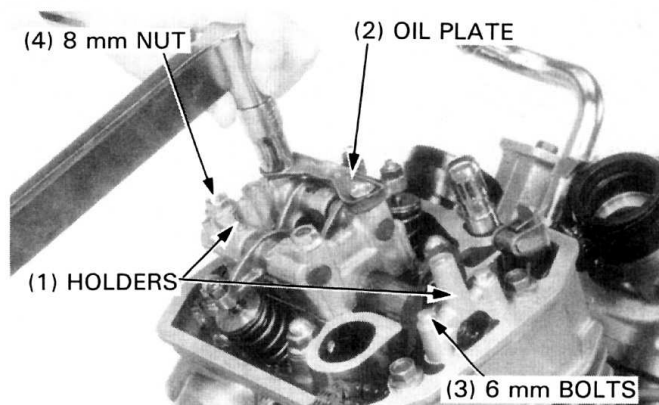
6 mm bolt: 10 N·m (1.0 kg-m, 7.2 ft-lb)

Turn the crankshaft counterclockwise 360° and install the other sprocket bolt.
Install the end holder.

CAUTION

- *Note the direction of the camshaft end holder, install the flat surface on the holder facing in.*

After installing the front cylinder camshaft, turn the crankshaft counterclockwise 232° (approximately 5/8 turn) and align the RT mark with the index on the timing hole, then install the rear cylinder camshaft using the same procedure as for the front cylinder.

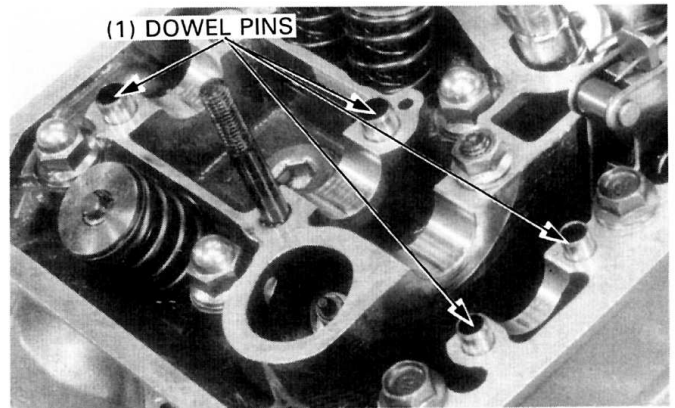


CYLINDER HEAD/VALVES

NOTE

- If the front and rear cylinder camshafts were removed, do not confuse them. Check the identification mark on the end of the shaft.

Install the dowel pins into the cylinder head.

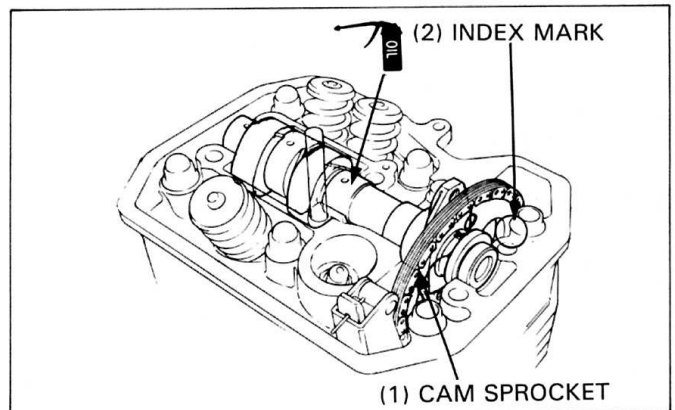


Install the camshaft in the cylinder head through the cam chain and install the cam sprocket on the camshaft.

With the cam lobes all facing down, align the timing marks (index lines) on the cam sprocket with the top of the cylinder head.

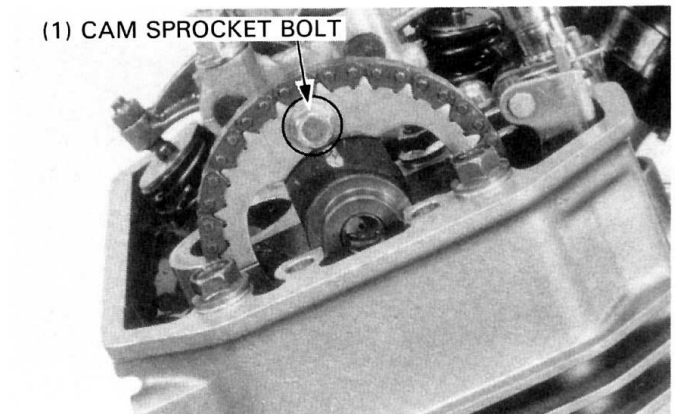
Place the cam chain on the sprocket.

Install the cam sprocket on the camshaft flange and recheck that the timing marks (index lines) align with the top of the cylinder head.



Align the cam sprocket bolt holes in the cam sprocket and camshaft, install and tighten the cam sprocket bolt.

TORQUE: 23 N·m (2.3 kg-m, 17 ft-lb)



Install the holder, oil plate, 8 mm bolts, 8 mm nut and 6 mm bolts.

TORQUE:

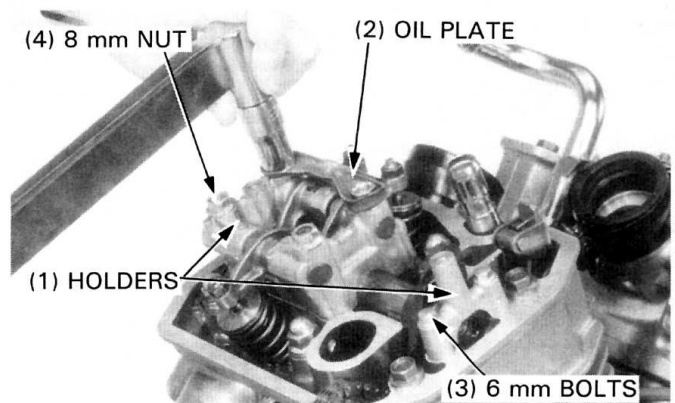
- 8 mm bolt: 23 N·m (2.3 kg-m, 17 ft-lb)
- 8 mm nut: 23 N·m (2.3 kg-m, 17 ft-lb)
- 6 mm bolt: 10 N·m (1.0 kg-m, 7.2 ft-lb)

Turn the crankshaft counterclockwise 360° and install the other sprocket bolt. Install the end holder.

CAUTION

- *Note the direction of the camshaft end holder, install the flat surface on the holder facing in.*

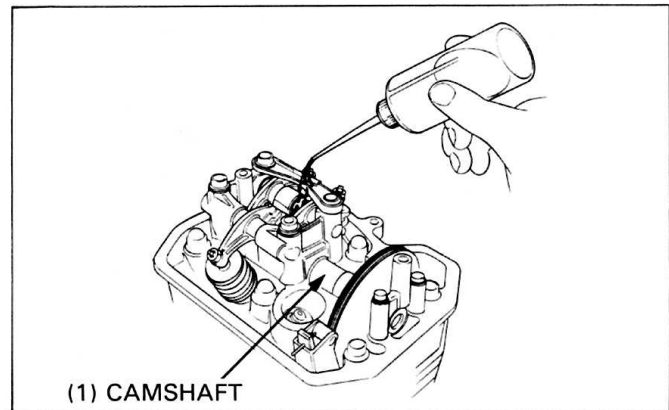
After installing the front cylinder camshaft, turn the crankshaft counterclockwise 232° (approximately 5/8 turn) and align the RT mark with the index on the timing hole, then install the rear cylinder camshaft using the same procedure as for the front cylinder.



Lubricate the cam lobes with fresh engine oil.

If the cylinder head was removed with the engine in the frame, install the following:

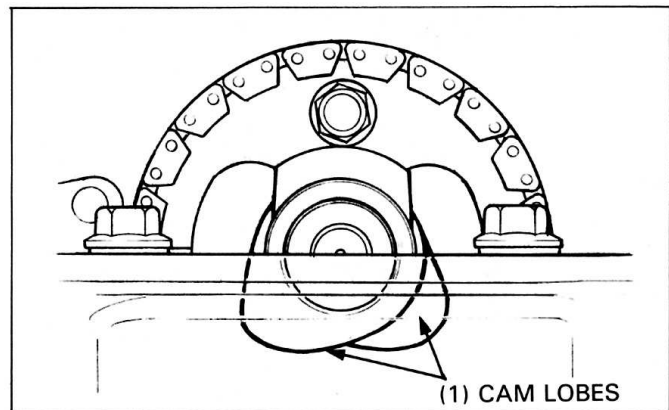
- radiator
- exhaust pipe



REAR CAMSHAFT ONLY

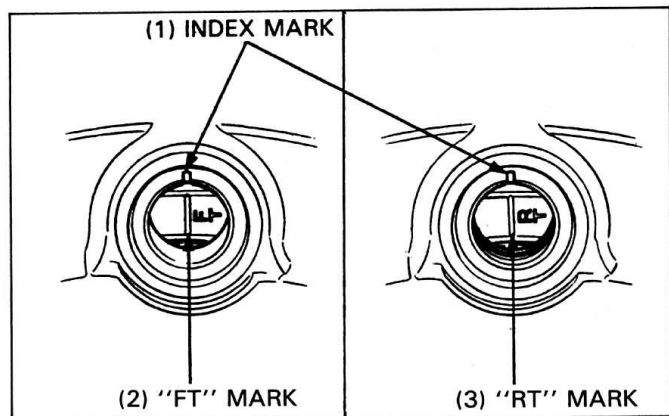
Turn the crankshaft counterclockwise and align the "FT" mark on the flywheel with the index mark on the timing hole. Make sure the FRONT cam lobes are all facing DOWN. If they are not, turn the crankshaft counterclockwise one revolution so that the FRONT cam lobes are all facing DOWN.

Continue turning the crankshaft counterclockwise (232°) until the "RT" mark on the flywheel aligns with the index mark on the timing hole (approximately $5/8$ turn).



Place the camshaft into correct position with the cam lobes all facing down.

Install the cam sprocket and camshaft holders using the same procedure as for the front cylinder (page 9-17).



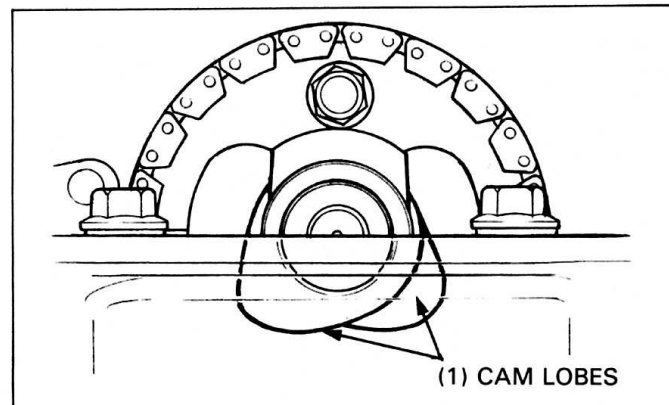
FRONT AND REAR CAMSHAFTS

Turn the crankshaft counterclockwise and align the "FT" mark on the flywheel with the index mark on the timing hole.

Install the front camshaft with all the cam lobes facing DOWN. Align the index marks on the cam sprocket with the top of the cylinder head.

Continue turning the crankshaft counterclockwise (232°) until the "RT" mark on the flywheel aligns with the index mark on the timing hole (approximately $5/8$ turn).

Install the rear camshaft with all the cam lobes facing DOWN. Align the index lines on the cam sprocket with the top of the cylinder head.

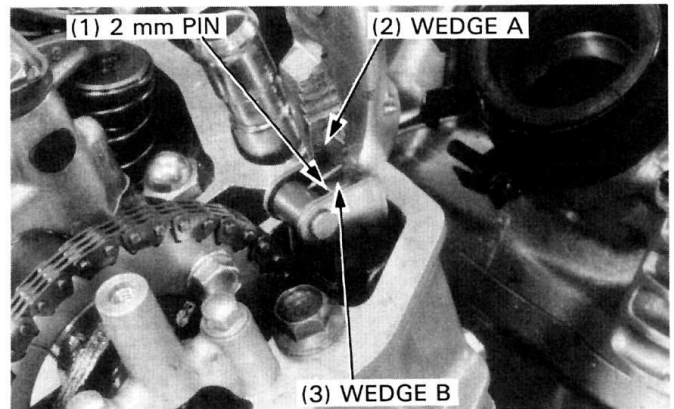


CYLINDER HEAD/VALVES

Remove the 2 mm pin holding cam chain tensioner wedge A.

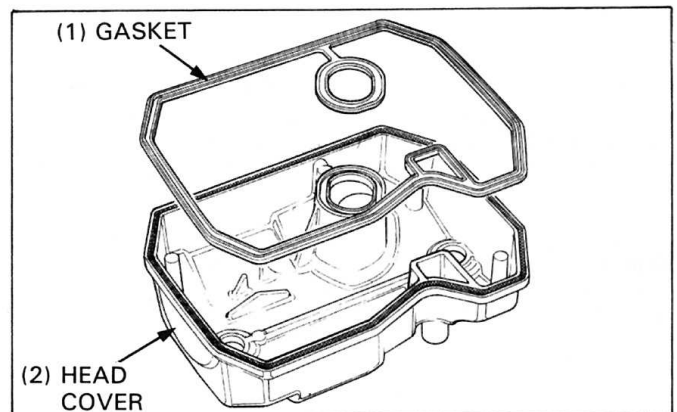
NOTE

- Be careful not to let the 2 mm pin fall into the crankcase.
- Do not forget to remove the 2 mm pin before installing the cylinder head cover.



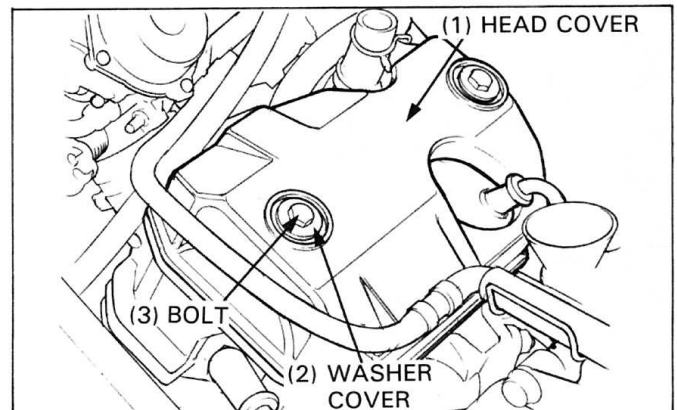
CYLINDER HEAD COVER INSTALLATION

Clean the gasket and apply contact cement to the gasket groove.



Install the cylinder head cover, rubber washer, washer cover and cylinder head cover bolts.
Tighten the cover bolts.

TORQUE: 10 N·m (1.0 kg-m, 7.2 ft-lb)



Connect the water hose to the water pipe and install the spark plug caps.

Install the following parts:

- carburetors (page 4-19)
- air cleaner case (page 4-4)
- fuel tank (page 4-3)

Fill the cooling system (page 5-3).