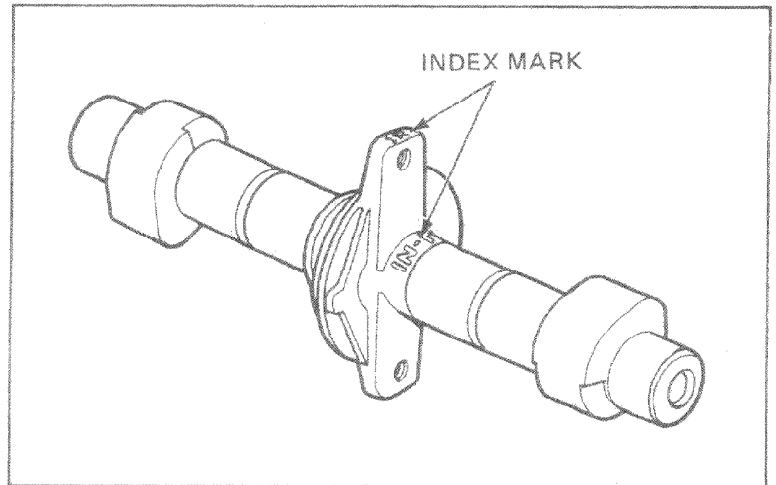




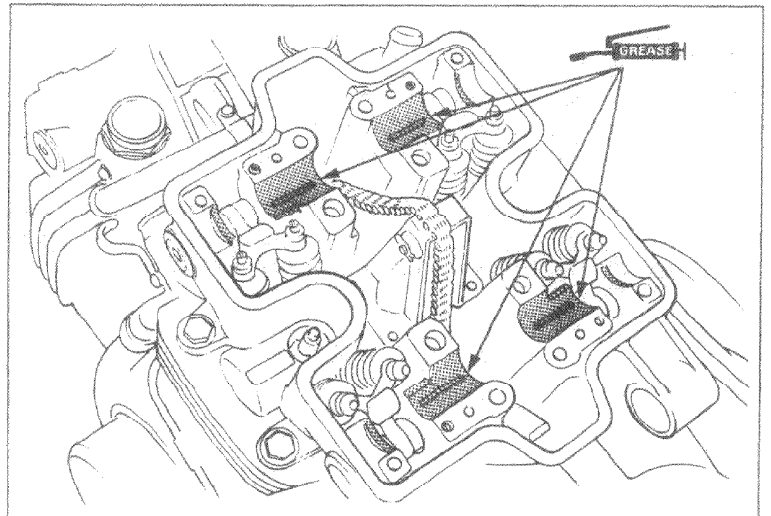
## CAMSHAFT INSTALLATION

### CAUTION

- Follow this procedure from beginning to end, even if you are only servicing one cylinder head.
- Check the camshaft marks so that you install each camshaft in its correct location.
- The marks on the camshaft mean:  
EX RR, ER: Rear cylinder exhaust  
IN RR, IR: Rear cylinder intake  
EX FR, EF: Front cylinder exhaust  
IN FR, IF: Front cylinder intake
- The camshaft sprockets are interchangeable.



Lubricate the cylinder head cam bearing surfaces with molybdenum disulfide grease.

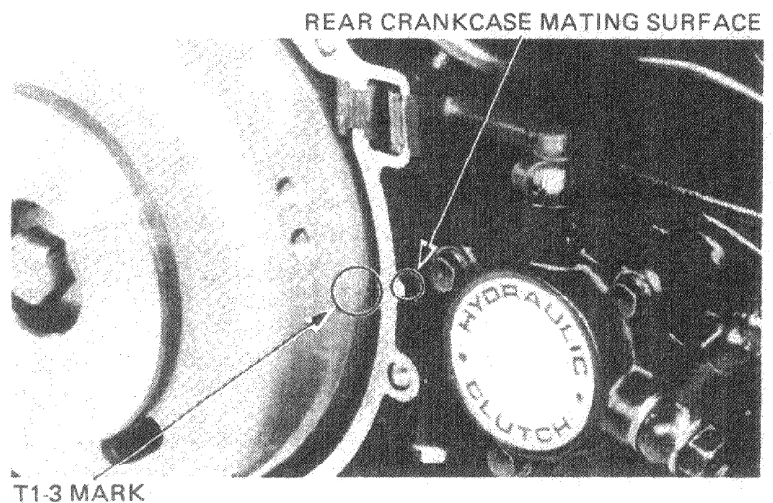


### ● Rear Cylinder Camshafts

Turn the crankshaft counterclockwise until the T1-3 mark on the flywheel rotor aligns with the rear crankcase mating surfaces.

### CAUTION

When turning the crankshaft, make sure the cam chains don't jam at the cam chain tensioners or at the crankshaft.





## CYLINDER HEAD/VALVE

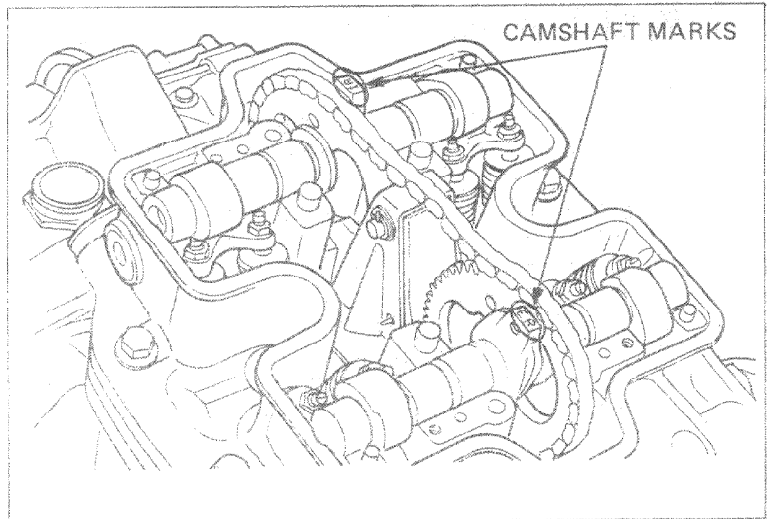
Install the intake and exhaust camshafts and sprockets through the rear cylinder cam chain as shown.

Turn the camshafts so the camshaft marks face up.

### NOTE

If the front cylinder camshafts were not removed, check that the front camshaft marks face up. If not, turn the crankshaft counter-clockwise 360 degrees (one turn).

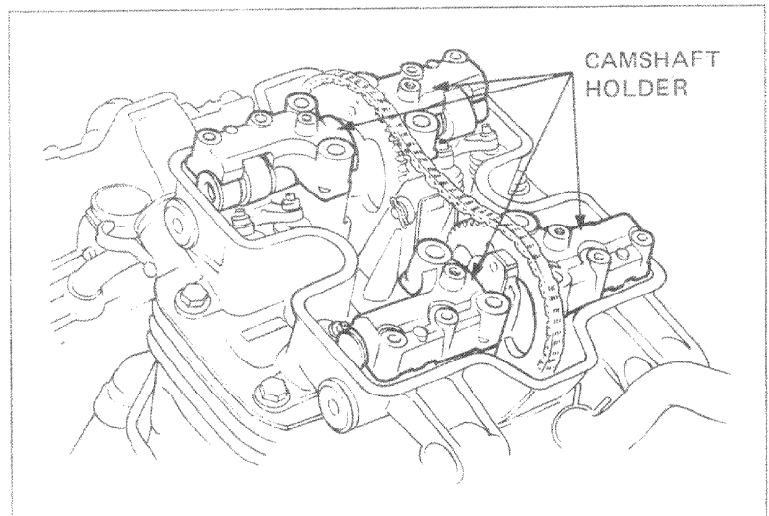
If a valve clearance adjuster keeps the camshaft from seating fully in the cylinder head, back the adjuster out all the way.



### CAUTION

*If you force a valve open while installing the camshaft holders, you may damage the holders or the camshaft bearing surfaces.*

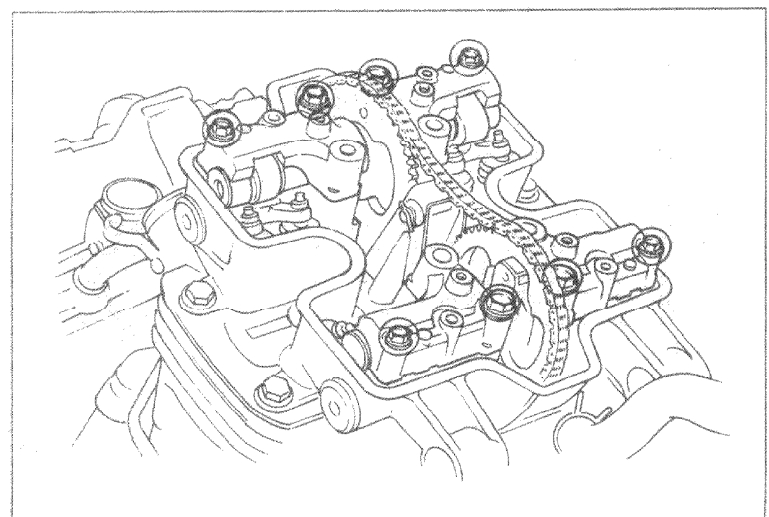
Place the camshaft holders in the same locations noted during removal. The groove in the bottom of the holder must align with the camshaft locating ridge.



Install the camshaft holder bolts, but do not tighten them yet.

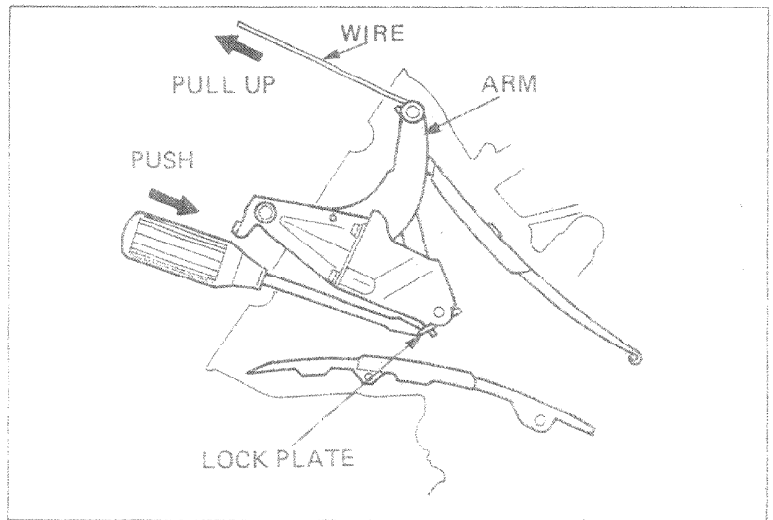
### NOTE

The camshaft holder bolts in each corner of the cylinder head are longer than the others.

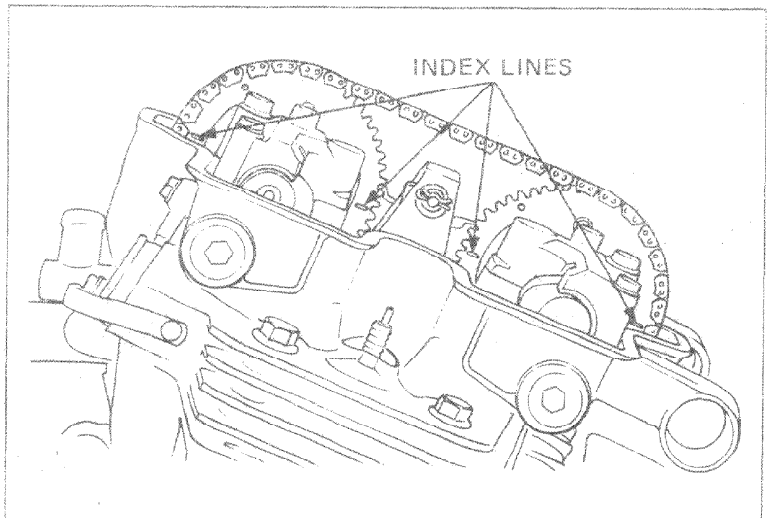




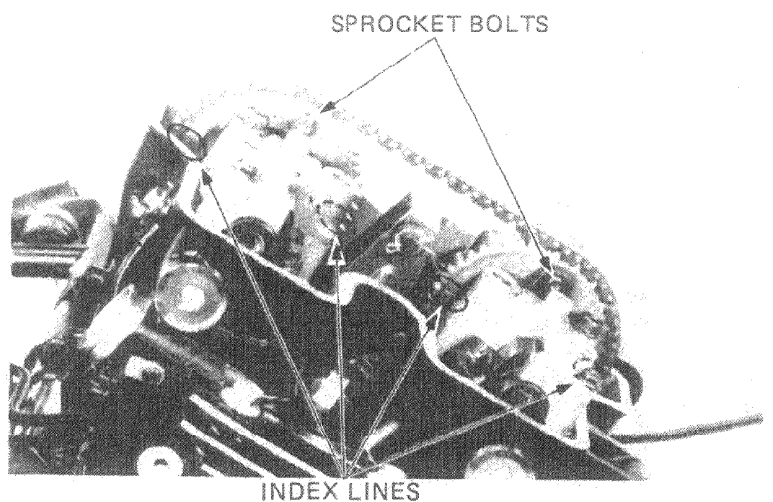
If the cylinders were not removed, lock the cam chain tensioner for minimum tension: push the lock plate down while pulling or prying the tension arm up; hold the arm pin up while you insert a pin or wire through the lock holes.



Check that the camshaft marks are still facing up, then align the sprocket index lines with the top of the rear cylinder head. Place the cam chain on the sprockets.



Slide the sprockets onto the camshaft flanges, and install the sprocket bolts in the exposed holes. Check that the sprocket index lines align at T1-3. Unlock the cam chain tensioner.





## CYLINDER HEAD/VALVE

### • Front Cylinder Camshafts

#### NOTE

Install the rear cylinder head camshafts before you install the front camshafts.

If the front cylinder camshaft sprockets were not indexed during removal and are not marked as shown follow the procedure below:

Clean the sprockets with contact cleaner and wipe dry.

On a piece of paper, draw two lines perpendicular to each other (90°). Use a protractor and draw two diagonal lines at a 45° angle. Center the sprocket on the lines with the original punch marks aligned on the horizontal line.

Make new index marks on the sprocket where the 45° diagonal lines cross the sprocket.

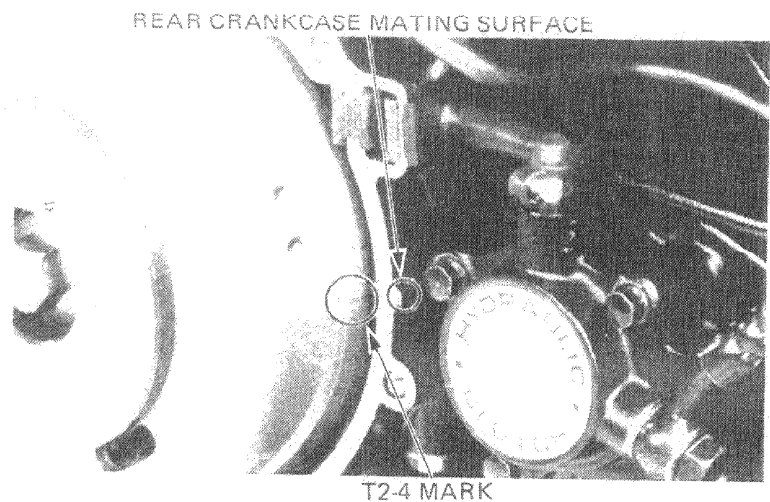
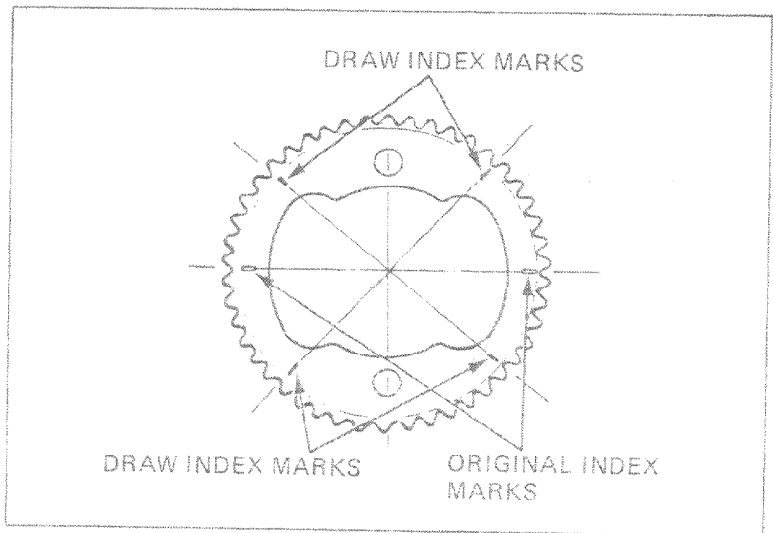
#### NOTE

It is not necessary to make new index marks for the rear cylinder's camshafts sprockets.

Rotate the crankshaft counterclockwise 90 degrees (1/4 turn), until the T2-4 mark aligns with the rear crankcase mating surfaces.

#### CAUTION

*When turning the crankshaft, make sure the cam chain doesn't jam at the cam chain tensioner or at the crankshaft.*



Install the intake and exhaust camshafts and sprockets through the front cylinder cam chain as shown.

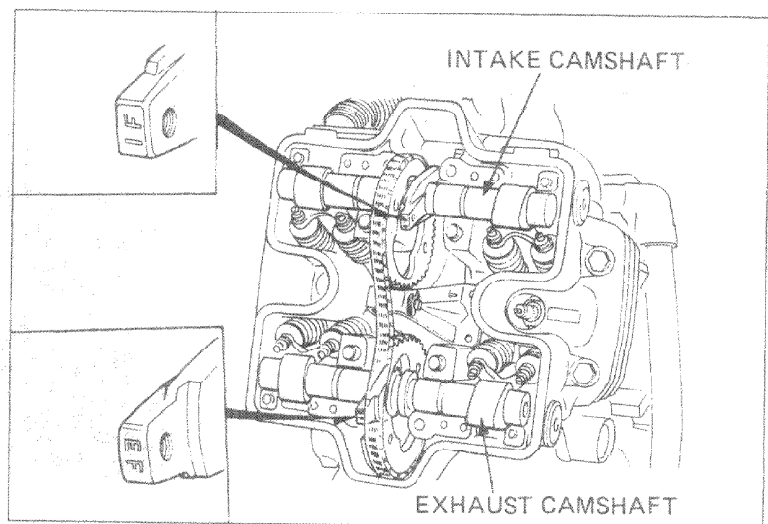
Turn the camshafts so the camshaft marks face up.

Rotate each front camshaft counterclockwise 45 degrees (1/8 turn) to seat the cam fully in the cylinder head.

If a valve adjuster keeps the camshaft from seating fully in the cylinder head, back out the adjuster all the way.

Install the front cylinder camshaft holders and bolts, as described for the rear cylinder head. Do not tighten bolts at this time.

Lock the cam chain tensioner for minimum tension.





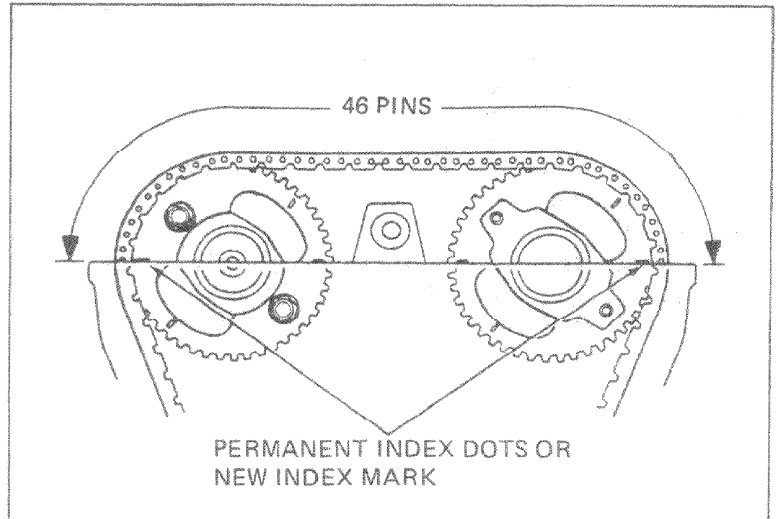
Align the permanent index dots or new index mark on the front cylinder cam sprockets with the top of the cylinder head (viewed from the left side of the engine).

**NOTE**

There should be a total of 46 pins between the index marks on the intake and exhaust cam sprockets as shown.

Slide the sprockets onto the camshaft flanges, and install the sprocket bolts in the exposed holes (rotate the crankshaft counterclockwise a little if necessary).

Check that the sprocket index dots align at T2-4. Unlock the cam chain tensioner.



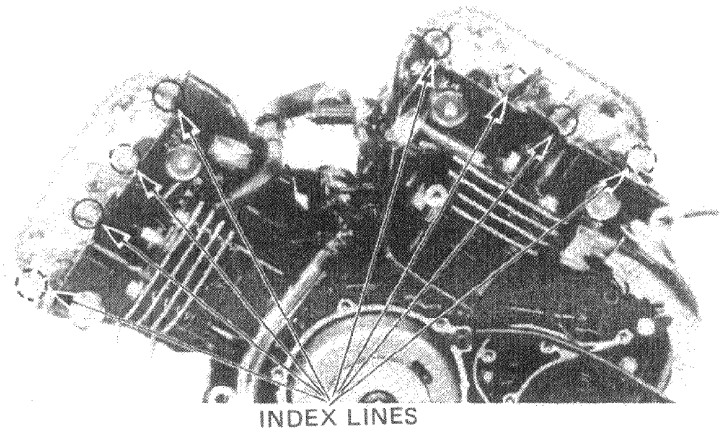
● **Valve Timing Inspection**

Check the front-to-rear cylinder camshaft timing as follows.

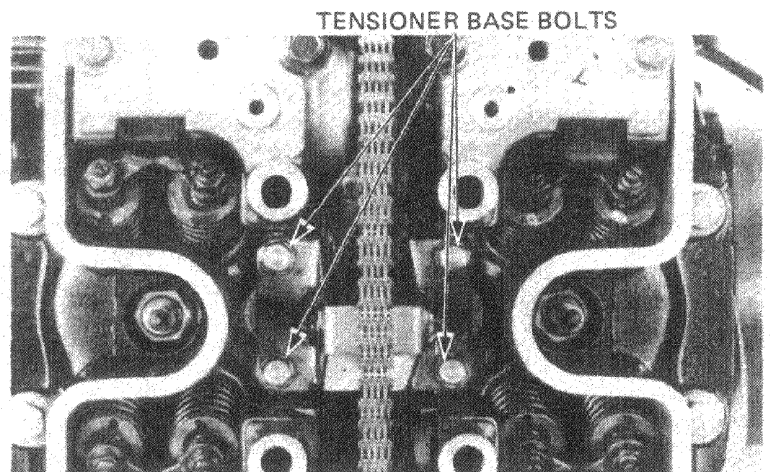
- When the T1-3 mark aligns with the rear crankcase mating surface, the index lines on all cam sprockets should align with the top of the cylinder heads.
- All camshaft marks will either face up or down.

Turn the crankshaft as required to install the remaining sprocket bolts at all four camshafts. Tighten the camshaft sprocket bolts to the specified torque.

**TORQUE: 18–20 N·m (1.8–2.0 kg·m, 13–14 ft·lb)**



Tighten the tensioner base bolts securely.





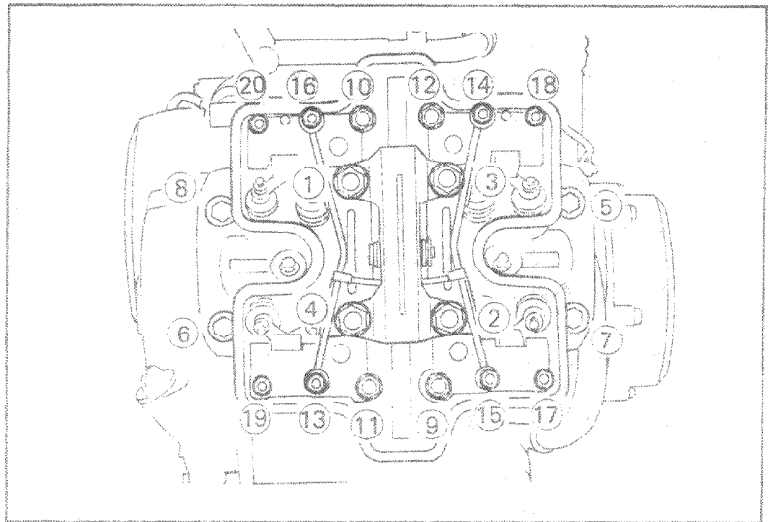
**CYLINDER HEAD/VALVE**

Turn the crankshaft counterclockwise until there is maximum cam chain free play, then install the oil pipes under the cam chain.

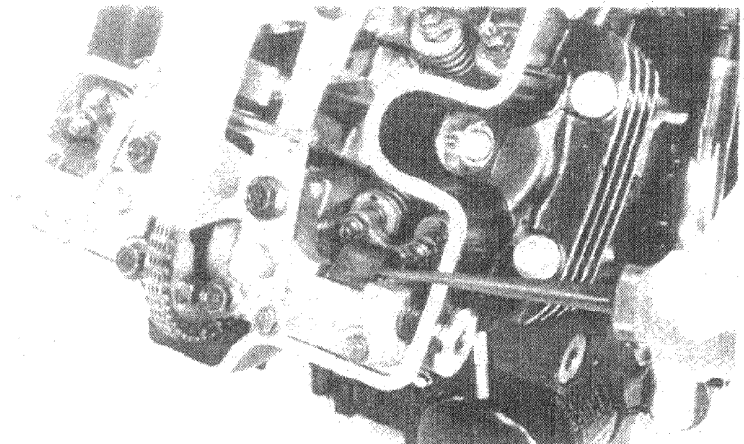
Install the cam chain guide on the oil pipe base plate. Tighten the cylinder head bolts in a criss cross pattern in 2-3 steps.

**TORQUE:**

- 9 mm: 38-42 N·m (3.8-4.2 kg·m, 27-30 ft·lb)
- 8 mm: 21-25 N·m (2.1-2.5 kg·m, 15-18 ft·lb)
- 6 mm: 10-14 N·m (1.0-1.4 kg·m, 7-10 ft·lb)



Lubricate the cam lobes with oil.



Adjust the valve clearance (page 3-8).  
Install the new cylinder head cover gasket.

**NOTE**

Clean the gasket before applying sealant.

Apply sealant to the cylinder head cover gasket.

Install the rear cylinder head cover with its tabs facing forward, and install the front cylinder head cover with its tabs facing down.

Tighten the cylinder head cover bolts.

**TORQUE:** 8-12 N·m (0.8-1.2 kg·m, 6-9 ft·lb)

Install the remaining parts in the reverse order of removal.

