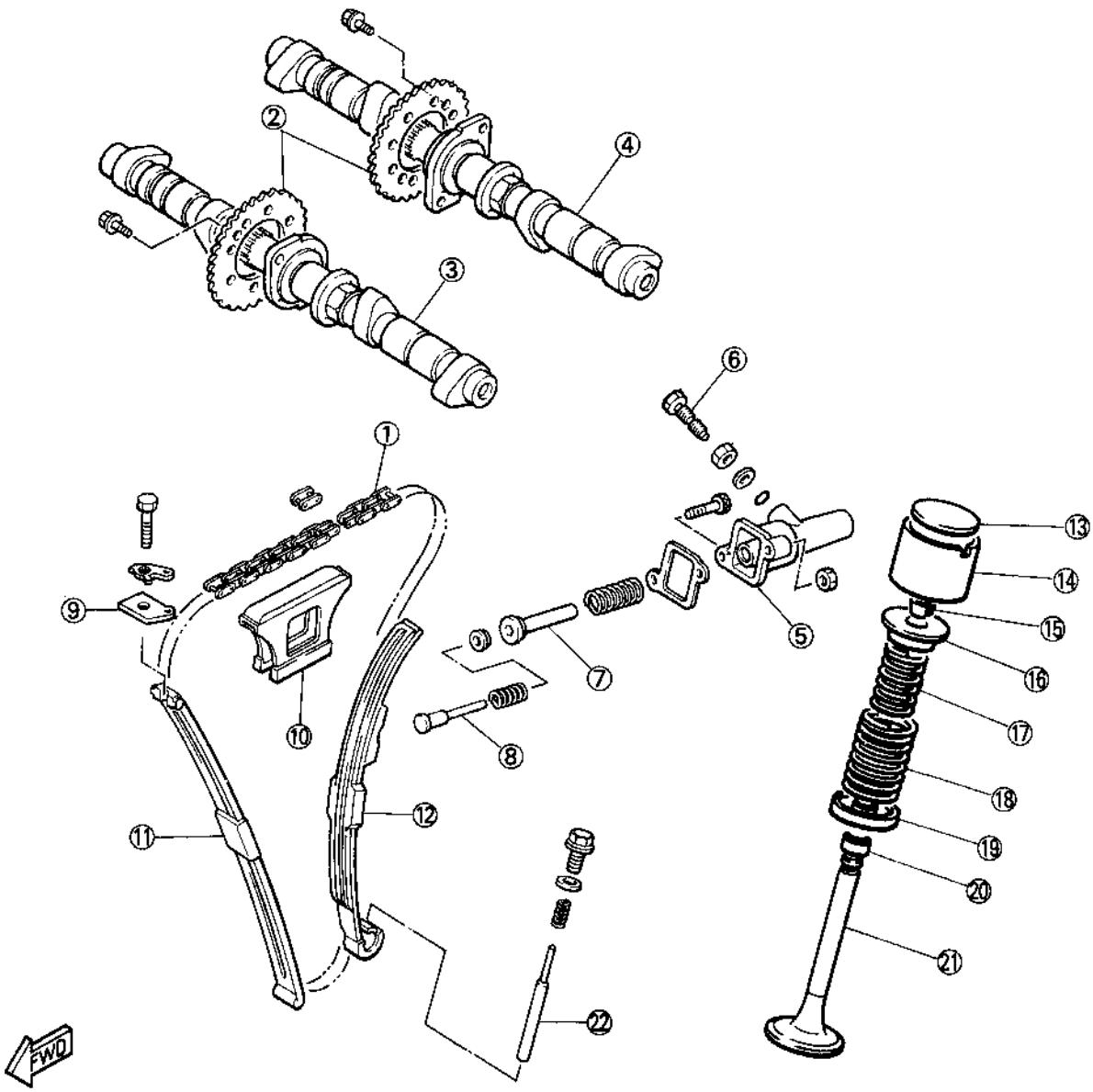


8.3 Camshafts, valves and cam chain tensioner - exploded view

1 *Cam chain*
2 *Cam sprockets*
3 *Exhaust camshaft*
4 *Intake camshaft*
5 *Chain tensioner body*
6 *Tensioner adjusting bolt*
7 *Large tensioner rod*
8 *Small tensioner rod*
9 *Chain guide stopper plate*
10 *Upper chain guide*
11 *Exhaust side chain guide*
12 *Intake side chain guide*
13 *Valve adjusting shim*
14 *Valve lifter*
15 *Valve keepers (collets)*
16 *Valve spring retainer*
17 *Inner spring*
18 *Outer spring*
19 *Spring seat*
20 *Stem oil seal*
21 *Valve*
22 *Intake side chain guide stopper*

3 Disassemble the tensioner **(see illustration)**. Check the tensioner parts for wear and damage and replace them as necessary.

Installation

Refer to illustration 8.5

4 Check the sealing washer on the adjusting bolt for cracks or hardening. It's a good idea to replace this washer whenever the tensioner cap is removed.

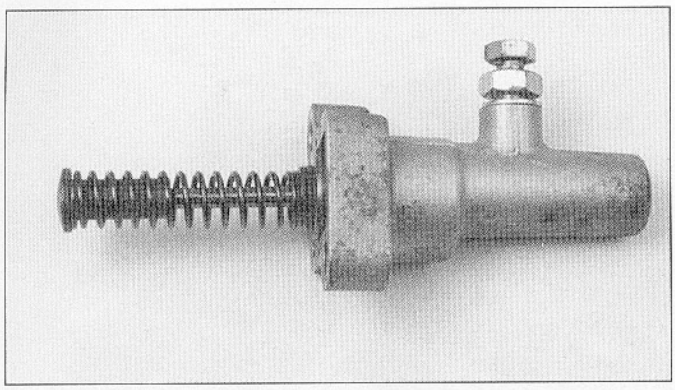
5 Press the chain tensioner rods into the tensioner housing and lightly tighten the adjusting bolt to hold them there **(see illustration)**.

6 Install the tensioner on the cylinder block, using a new gasket.

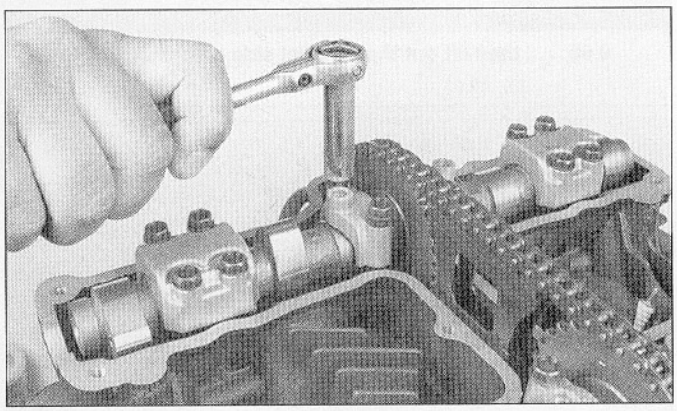
7 Tighten the mounting bolts to the torque listed in this Chapter's Specifications.

8 Loosen the tensioner adjusting bolt so the rods can extend.

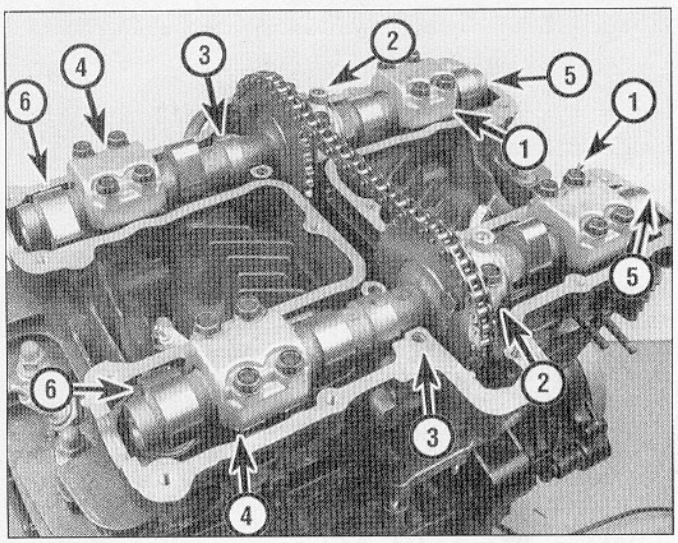
9 Refer to Chapter 1 and adjust the cam chain tension.



8.5 Push the tensioner rod to the bottom of the housing and snug the adjusting bolt until the tensioner is installed

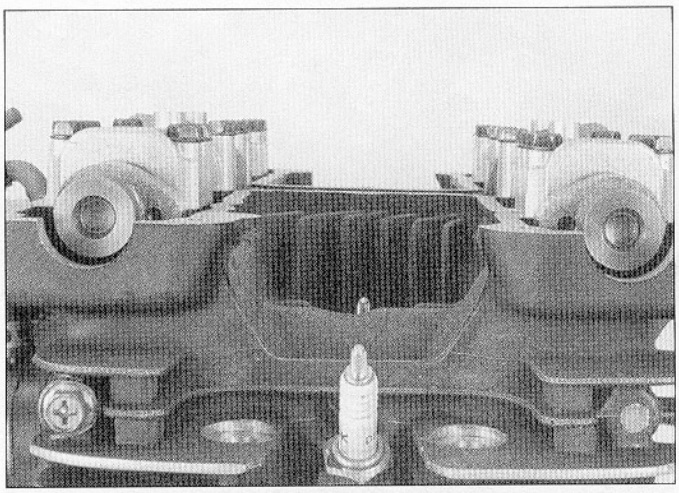


9.5a Remove the no. 3 cam bearing caps. . .

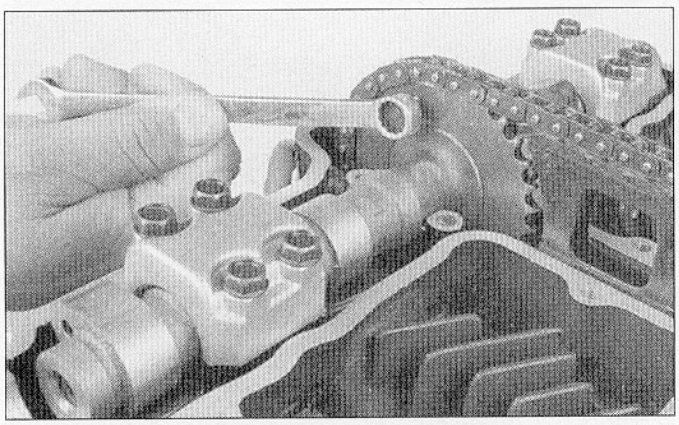


9.5c The camshaft bearing caps are numbered from left to right sides of the engine; with no. 1 cylinder at TDC compression, the no. 1 cam lobes point directly away from each other and the no. 4 cam lobes point directly at each other

1 *No. 1 cam bearing caps*
2 *No. 2 cam bearing caps*
3 *No. 3 cam bearing cap locations (caps removed)*
4 *No. 4 cam bearing caps*
5 *No. 1 cam lobes (no. 1 cylinder at TDC compression)*
6 *No. 4 cam lobes (no. 1 cylinder at TDC compression)*



9.3 When the no. 1 cylinder is at TDC on the compression stroke, the cam lobes of no. 4 cylinder should be pointing directly at each other as shown, and the cam lobes of no. 1 cylinder should be pointing directly away from each other



9.5b . . . then remove the cam sprocket bolts and slip the sprockets off the camshafts

9 Camshafts and lifters - removal, inspection and installation

Note: *This procedure can be performed with the engine in the frame.*

Camshafts

Removal

Refer to illustrations 9.3, 9.5a, 9.5b, 9.5c, 9.6a, 9.6b, 9.7 and 9.10

1 Set the bike on its centerstand (if equipped) or support it securely upright.

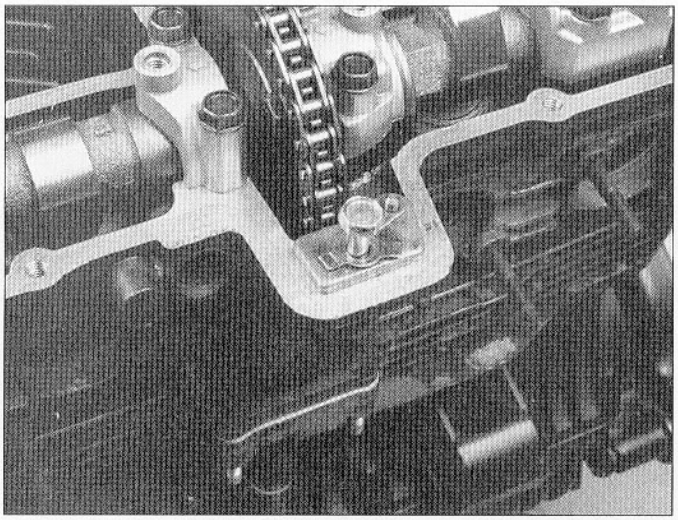
2 Remove the valve cover (see Section 7).

3 Turn the engine to position no. 1 cylinder at TDC compression (see Chapter 1 - *Valve clearances - check and adjustment)*. To ease reassembly, make alignment marks on the sprockets, chain and camshafts with a felt pen. The no. 4 cam lobes will face each other when no. 1 cylinder is at TDC **(see illustration)**.

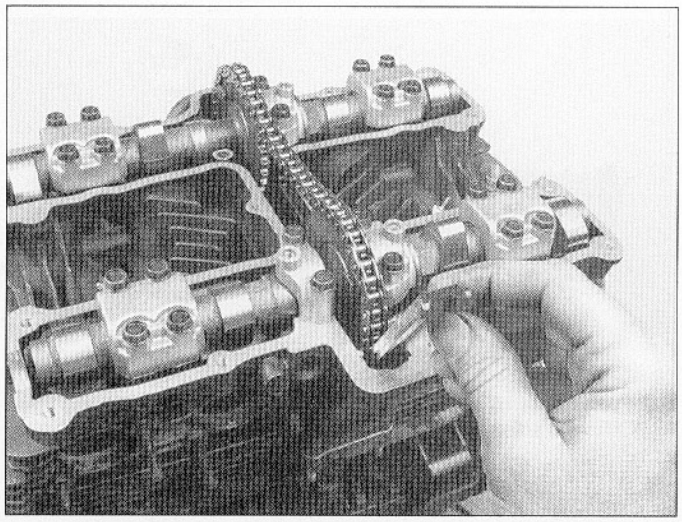
4 Remove the camshaft chain tensioner (see Section 8).

5 Loosen the cap bolts for the no. 3 camshaft bearing caps evenly and remove the no. 3 bearing caps **(see illustration). Note:** *Don't drop the cap bolts or dowels into the engine or major disassembly may be required to get them out. Hold the camshafts from turning with an open end wrench on the camshaft hex and remove the sprocket bolts* **(see illustrations)**. Dismount the sprockets from the camshafts.

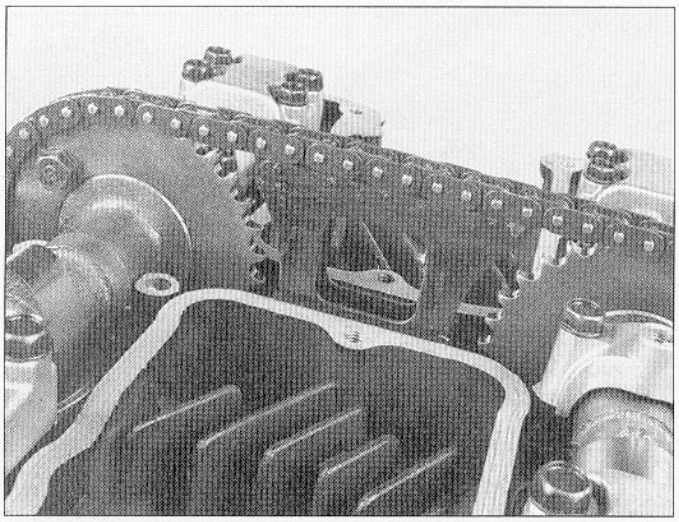
2



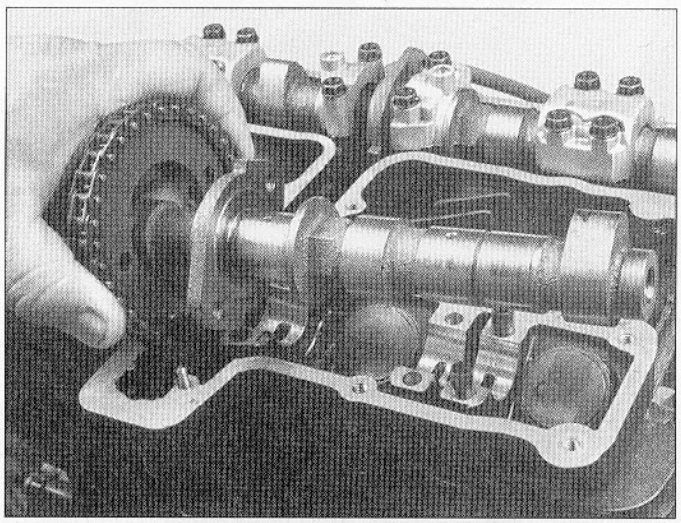
9.6a Bend back the lockwasher tab and remove the bolt . . .



9.6b . . . then lift out the exhaust side cam chain guide



9.7 Remove the upper chain guide



9.10 Slip the sprockets off the camshafts, then take the camshafts out

6 Remove the chain guide stopper and lift out the exhaust side chain guide **(see illustrations)**.

7 Pinch the side of the upper cam chain guide and remove from the cylinder head **(see illustration)**.

8 Loosen the camshaft bearing cap bolts for the intake and exhaust camshafts, a little at a time, until all of the bolts are loose. **Caution**: *If the bearing cap bolts aren't loosened evenly, the camshaft may bind. Note that each bearing cap is labeled with a number and the letter I for intake or E for exhaust.*

9 Remove the bolts and lift off the remaining bearing caps and their dowel pins.

10 Slip the camshafts out of the chain, then remove them **(see illustration)**.

11 Remove the camshaft sprockets. Keep the chain taut. Label the sprockets so they can be returned to their original camshafts.

12 While the camshafts are out, don't allow the chain to go slack - the chain may fall and bind between the crankshaft and case, which could damage these components. Install a piece of wire onto the chain to prevent it from dropping down into the crankcase. Also, cover the top of the cylinder head with a rag to prevent foreign objects from falling into the engine.

Inspection

Refer to illustrations 9.13, 9.14a, 9.14b, 9.14c, 9.19a and 9.19b

Note: *Before replacing camshafts or the cylinder head and bearing caps because of damage, check with local machine shops specializing in motorcycle engine work. In the case of the camshafts, it may be possible for cam lobes to be welded, reground and hardened, at a cost far lower than that of a new camshaft. If the bearing surfaces in the cylinder head are damaged, it may be possible for them to be bored out to accept bearing inserts. Due to the cost of a new cylinder head it is recommended that all options be explored before condemning it as trash!*

13 Inspect the cam bearing surfaces of the head and the bearing caps. Look for score marks, deep scratches and evidence of spalling (a pitted appearance) **see illustrations)**.

14 Check the camshaft bearing surfaces and lobes for heat discoloration (blue appearance), score marks, chipped areas, flat spots and spalling **(see illustrations)**. Measure the height of each lobe with a micrometer **(see illustration)** and compare the results to the minimum lobe height listed in this chapter's Specifications. If damage is noted or wear is excessive, the camshaft must be replaced.

15 Next, check the camshaft bearing oil clearances. Clean the