limits (measurements less than those given in **Table 1**).

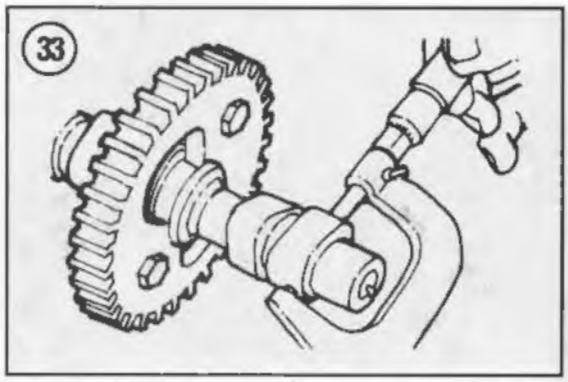
3. Check the camshaft bearing journals (B, **Figure 32**) for wear and scoring.

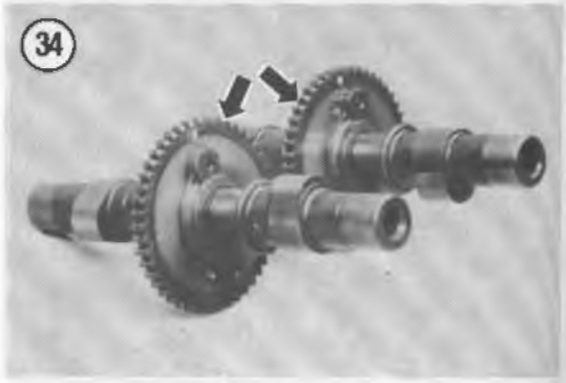
4. Even though the camshaft bearing journal surface appears satisfactory, with no visible signs of wear, the camshaft bearing journals must be measured with a micrometer. Replace the shaft(s) if worn beyond the service limits (measurements less than those given in **Table 1**).

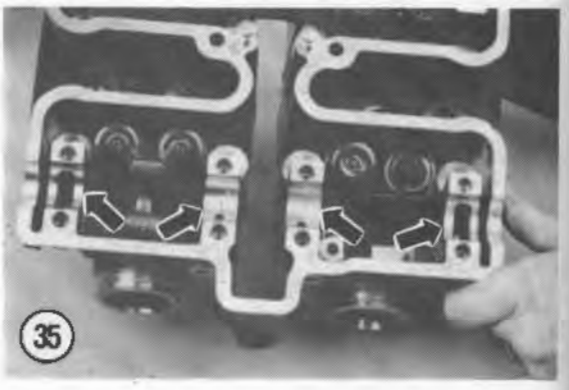
5. Place the camshaft on a set of V-blocks and check its runout with a dial indicator. Replace the camshaft if runout exceeds specifications in **Table 1**. Repeat for the opposite camshaft.

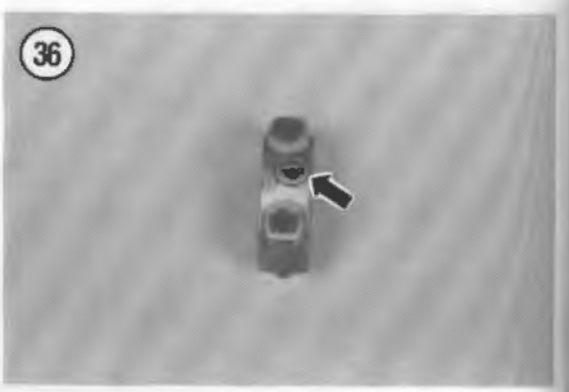
6. Inspect the camshaft sprockets (**Figure 34**) for wear; replace if necessary.

7. Check the camshaft bearing journals in the cylinder head (**Figure 35**) and camshaft caps (**Figure 36**) for wear and scoring. They should not be scored or excessively worn. If necessary, replace the cylinder head and camshaft caps as a matched pair.









Camshaft Bearing Clearance Measurement

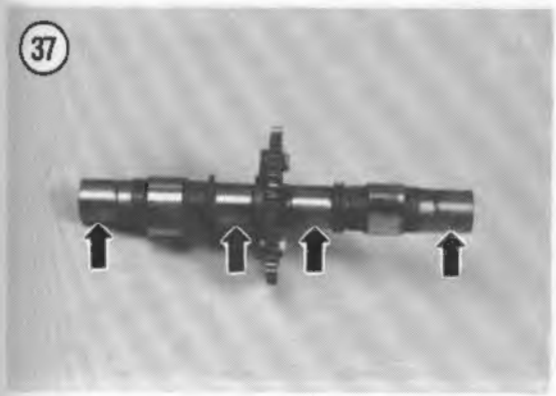
This procedure requires the use of a Plastigage set. The camshaft must be installed into the head. Before installation, wipe all oil residue from each cam bearing journal and bearing surface in the head and all camshaft caps.

1. Install the camshafts into the cylinder head.
2. Install all locating dowels into their camshaft caps.
3. Wipe all oil from the cam bearing journals before using the Plastigage material.
4. Place a strip of Plastigage material on top of each cam bearing journal (**Figure 37**), parallel to the cam.
5. Place the camshaft cap into position.
6. Install all camshaft cap bolts. Install finger-tight at first, then tighten in a crisscross pattern (**Figure 38**) to the final torque specification listed in **Table 2**.

CAUTION

Do not rotate the camshaft with the Plastigage material in place.

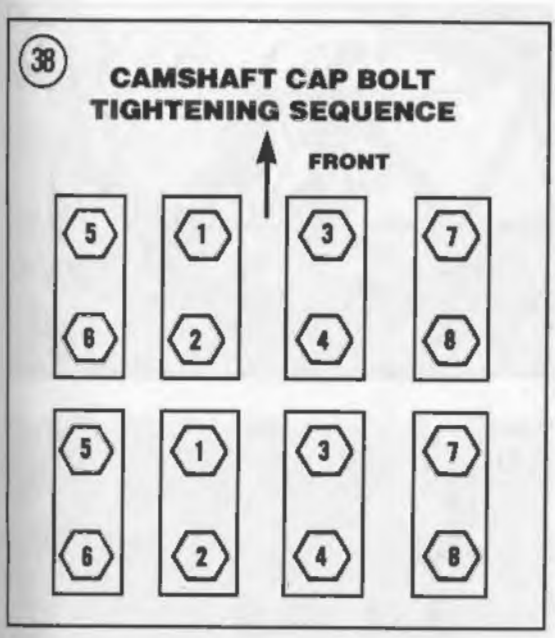
7. Gradually remove the camshaft cap bolts in a crisscross pattern. Remove the camshaft caps carefully.
8. Measure the width of the flattened Plastigage according to manufacturer's instructions (**Figure 39**).



9. If the clearance exceeds the wear limits in **Table 1**, measure the camshaft bearing journals with a micrometer and compare to the limits in **Table 1**. If the camshaft bearing journal is less than dimension specified, replace the cam. If the cam is within specifications, the cylinder head and camshaft caps must be replaced as a matched set.

CAUTION

Remove all particles of Plastigage from all camshaft bearing journals and the camshaft holder. Be sure to clean the camshaft holder groove. This material must not be left in the engine as it can plug up an oil control orifice and cause severe engine damage.

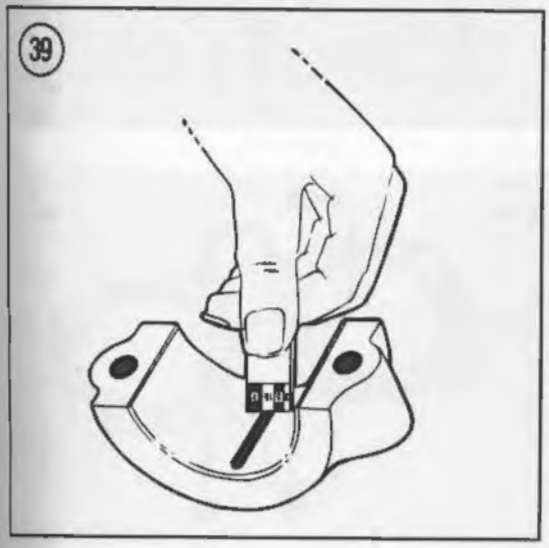


Cylinder Head Inspection

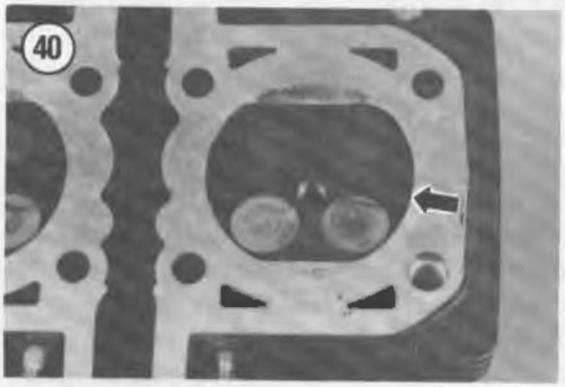
1. Remove all traces of gasket from cylinder head and cylinder mating surfaces. Do not scratch the gasket surface.
2. Without removing valves, remove all carbon deposits from the combustion chambers (**Figure 40**) with a wire brush or wooden scraper. Take care not to damage the head, valves or spark plug threads.

CAUTION

If the combustion chambers are cleaned while the valves are removed, make sure to keep the scraper or wire brush away from the valve seats to prevent damaging the seat surfaces. A damaged or even slightly scratched valve seat will cause poor valve seating.



3. Examine the spark plug threads in the cylinder head for damage. If damage is minor or if the threads are dirty or clogged with carbon, use a spark plug



thread tap to clean the threads following the manufacturer's instructions. If thread damage is severe, refer further service to a Kawasaki dealer or machine shop.

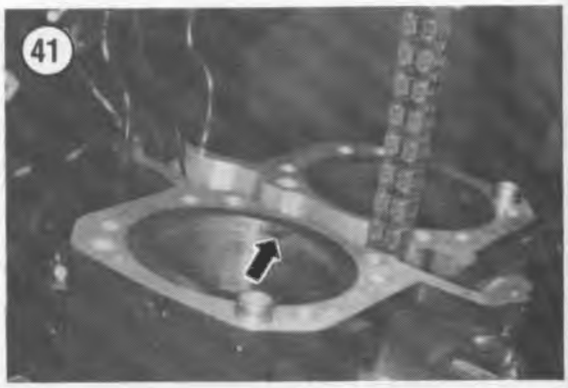
4. After all carbon is removed from combustion chambers, and valve ports and the spark plug thread holes are repaired, clean the entire head in solvent and blow dry with compressed air.

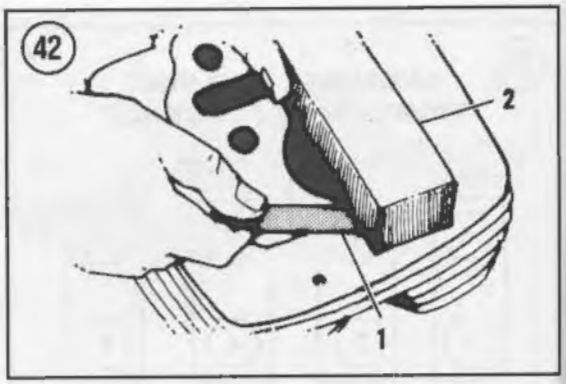
5. Clean away all carbon on the piston crowns. Do not remove the carbon ridge at the top of the cylinder bore (**Figure 41**).

6. Check for cracks in the combustion chamber and exhaust ports. A cracked head must be replaced.

7. After the head has been thoroughly cleaned, place a straightedge across the gasket surface at several points (**Figure 42**). Measure warp by inserting a feeler gauge between the straightedge and cylinder head at each location. Maximum allowable warpage is listed in **Table 1**. If warpage exceeds this limit, the cylinder head must be replaced.

8. Check the valves and valve guides as described under *Valves and Valve Components* in this chapter.





Oil Pipes Cleaning/Inspection

1. Examine the cylinder head pipes (**Figure 43**) and main oil pipes (**Figure 44**) for damage. Check the brazed joints for cracking or other apparent damage. Check the cylinder oil pipe O-rings (**Figure 45**) for wear. If the O-ring surfaces are not perfectly smooth, replace them.

2. Flush the oil pipes with solvent and allow to dry.

Cylinder Head Installation

1. If removed, install the rear chain guide (**Figure 46**).

2. Clean the cylinder head (**Figure 47**) and cylinder mating surfaces of all gasket residue.

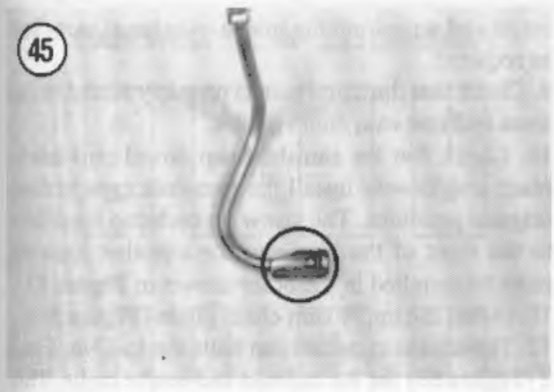
NOTE

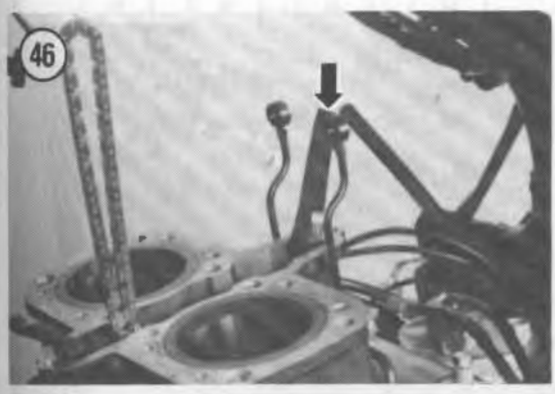
*The cylinder head gasket is marked with the word UP on one side. This side must face up (**Figure 48**).*

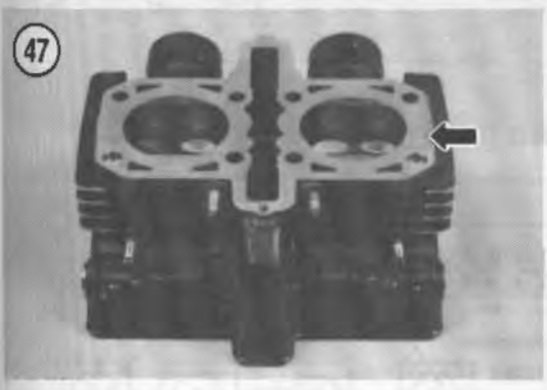
3. Install a new cylinder head gasket (A, **Figure 31**) and the 2 dowel pins (B, **Figure 31**).

4. Install the cylinder head (**Figure 30**).

5. Install the bolts securing the cylinder head. Tighten the 10 mm bolts in 2-3 stages in a crisscross







pattern (**Figure 49**) to the torque specifications listed in **Table 2**.

6. Tighten the front (**Figure 27**) and rear (**Figure 28**) cylinder head 6 mm bolts to the torque specifications listed in **Table 2**.

7. Install the main oil pipe and banjo bolts, using new copper washers. Tighten the banjo bolts to the specifications listed in **Table 2**.

Camshaft Installation

1. The intake and exhaust sprockets are identical. If the sprockets were removed from the camshafts, install them as follows:
   a. Install the sprockets onto their camshafts so that the sides marked with an IN and EX face to the left.
   b. There are 4 holes drilled into each sprocket. On the intake camshaft, use the sprocket bolt holes marked IN. On the exhaust camshaft, use the sprocket bolt holes marked EX.
   c. Tighten the sprocket bolts to the specifications in **Table 2**.
2. Coat all camshaft lobes and bearing journals with molybdenum disulfide grease or assembly oil.
3. Also coat the bearing surfaces in the cylinder head and camshaft bearing caps.
4. Lift up on the cam chain and slide the 2 camshafts through and seat them in the cylinder head. Engage the cam chain with the cam sprockets. Remove the wire from the cam chain.
5. Remove the 2 caps on the alternator cover (**Figure 50**).
6. Using a socket on the crankshaft bolt (A, **Figure 51**), turn the crankshaft clockwise until the "C" TDC