Installing The Camshaft

Place the block, upside down, on the workbench and conduct a thorough inspection. Inspect all oil ports to insure the absence of any obstructions. Replace the oil galley plugs, the short steel plug is used in the front while the rear plug is longer and made of brass. Use a sealer on the threads when replacing the plugs.
Inspect the front cam bearing to insure that the oil groove is facing forward to allow oil to lubricate the timing chain assembly. Also insure that the oil port in the bearing aligns with that of the block.
Chase all threaded holes such as those to receive the oil pan and bell housing bolts. (most are 8 x 1 mm.) The latter will be used to support the block on the engine stand and are very critical. Any threads showing excessive wear should be renewed with the use of helicoil inserts. I am recommending this step now because it is much easier to control the metal shavings while the block is still bare and free of sticky lubricants.

Now you are ready to install the cam shaft. Inspect the cam to insure that the circlip is in position on the rear of the shaft. This is very critical since it limits the end play of the cam against the rear bearing. Familiarize yourself with the middle and rear bearing. The rear bearing is one piece while the centre bearing consist of two halves aligned with dowel pins. There are two holes on the outside of each bearing. One penetrates all the way through the bearing, this is the oil port, while the other hole is only about1/4" deep which is used to lock the bearing into position. The bearings will be secured with locating bolts with a dowel nose inserted from the outside of the block. These bolts are also distinct in that they have holes drilled through their heads which allows them to be secured with safety wire once they are in position.

Thoroughly clean the bearing seats in the block and insert the rear bearing. Only minimal pressure should be required, lubricant on the outer surface may also help. The most common problem is misalignment. A long 1" x 1" piece of wood will help to push the bearing into place. Although most new bearings come with a small chamfer on the outer edge, if this is not the case, use a file to round the leading edge of the bearing. When properly positioned, you should be able to see all the way to the centre of the bearing from the oil galley. Minor adjustments can be made with a small drift pin inserted into the locating hole and gently rotating the bearing. If the locating bolt penetrates until the head seats against the block and you still see daylight through the oil port, the bearing is properly positioned. Remove the locating bolt, cover its threads with sealant and install.

The installation of the centre bearing is the same principle as the rear bearing except that it is installed while positioned on the camshaft. The two halves can be reversed in respect to each other. Simply be sure that the locator hole is a single hole as with the rear bearing as opposed to two half holes.

Apply assembly grease (white lube) to all three bearing surfaces and the cam races. While inserting the cam, take care not to damage the front bearing while passing the camshaft through the opening. Position the centre bearing around the cam, check the oil port and locator hole one more time, now move the entire assembly into position. Only minimal pressure should be required. A piece of wood placed between the centre bearing and the distributor drive sprocket serves to assist pushing the bearing into place. Do not apply excessive force because the bearings are made of soft metal and are easily damaged. Use the small drift to align the positioning hole and insert the locating bolt. Since you will not be able to see daylight through the oil port, use soft wire inserted in the oil port and rotate the cam shaft; you should touch the cam and feel its rotation. This will insure that the oil passage is open into the bearing. The cam should rotate with only the resistance produced by the assembly lubricant.

Install the thrust plate on the front of the block to secure the cam. The final step is the replacement of the core plug at the rear of the cam bearing opening. This is very critical because oil will simply pump out of the rear of the engine and into the bell housing. Apply sealant around the edge of the plug and put it into position, using a blunt dowel (about 1/2" diam.) on the centre of the plug, strike it with a hammer to put a dimple in the centre. This should expand the outer diameter to seat firmly into position.

The camshaft is now in position and we are ready to put the block on the engine stand to facilitate the installation of the crankshaft. Make a mental note to lubricate the cam lobes prior to closing the bottom of the engine. New cams often come with a tube of special cam lubricant to minimize damage to the lobes during initial start up. A thorough coating of lithium grease on each lobe will provide adequate protection. I would not apply the lubricant at this time because there is a likelihood that foreign particles will stick to the lobes during the upcoming procedures. Leave the lobes dry for the time being.