

Rebuilding the Lada 1600 engine (I)

Engine disassembly

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PRELIMINARY CONSIDERATIONS

1.- Engine cleanup:

It is very advisable to wash the engine before removing a single bolt from it. Working on a clean engine is much easier and nicer than doing one with a ten-year history of oil leaks with has accumulated a one-inch thick layer of muddy grime. If you're wiser than I was, you'll be taking the engine to a service station before removing it from the car. After almost one year lying in my shop's floor I mounted the lil' engine on my stand and sprayed on a yellow-coloured degreaser product which, according to the seller, worked wonders... That was some badly wasted money, because I soon found out that the best way to go was by using Diesel fuel (or kerosene), a hard brush, then washing it off using a garden hose... If you're wealthy and happen to have a pressure washer, well, use it!

2.- Workspace:

Start by setting up a clean and uncluttered workspace, big enough to accomodate the many different parts you'll be removing. The reason I say this is because if you're doing the work at home, it's better to tell the wife/girlfriend/mother/woman of the house (preferably with a considerably long notice) that you'll be "redecorating" before you start fighting with her over setting up an improvised greasy workshop in her precious space (name it garage, studio, laundry room, whatever)

3.- Tools and equipment:

Although is not mandatory, all mechanical work will be easier if done with the engine safely mounted on an adequate engine turnover stand. If you don't have one of these (well, how many engines can the average home mechanic rebuild each year?), if there aren't any shop equipment rental facilities close to where you live (much like in my case) and if you have access to welding equipment and some metal stock you could consider fabricating one up for yourself. After looking a couple of pictures on the internet I suddenly thought: "Hey, I can build that!", so I took some 100 mm (4") scrap I-beam I had lying around my warehouse/workshop and had my cousin's shop welding guy cut/join the parts together. A big chunk of 10 mm (7/16") thick plate, a couple pieces of 2" and 1 ½" steel water pipe, some 25 mm wide x 3 mm thick (1" x 5/32") flat stock, four pieces of drilled-through 20 mm steel rod, some bolts, two old rear wheel bearings and two steer casters, plus a can of black spray paint complete my creation... All for under 20 US dollars:



If you can't rent/fab a stand don't worry at all, just find yourself a piece of square wooden board (1x1 meter is enough) so you won't damage the floor. The only major drawback is that, doing it this way, you'll need an assistant to hold up the block while you try to work loose that stubborn bolt/nut which is always siezed. Of course, the assistant is also handy for other chores, such as handing the tools, receive/sort/wash/dry/store the parts as they are removed, bringing up the snacks, coffee, tea, water, beer, etc...☺

Find yourself several containers which can be used to hold up all of the many bolts, nuts, washers, studs, etc. Also, get a container or drip pan with a capacity of at least 5 litres to hold the drained engine oil. Any big vat or pan, plastic or metal (a washing up bowl is perfect), can be used to dip and wash all the parts. There's room for creativity when it comes to store the parts that will be reused like valve components, good bearings, pistons, etc. Pistons and connecting rods can be marked with paint according to their position in the engine and stored in a cardboard box, while small parts like the aforementioned valve gear bits can be stuffed in transparent plastic bags with markings such as "No. 1 – EXHAUST ; No. 2 – INTAKE, and so on. Remember that valves, pistons, connecting rods, journals and of course cylinders are counted from the engine's front to back.

LIST OF TOOLS

There's no need for any special tools in this stage of the process. This is what I used:

- 3/8" and 1/2" drive ratchets
- 3/4" drive T-bar (or cheater bar), plus a 3/4" x 1/2" adapter
- 3/8" x 6", 1/2" x 4" and 1/2" x 6" drive extensions
- 10mm, 13mm, 14mm, 17mm and 19mm sockets
- 3/4" drive 1 1/2" or 38 mm socket (for removing the crankshaft pulley)
- 10mm, 13mm, 17mm and 19mm combination spanners
- 13mm x 11mm obstruction spanner
- 12mm Allen key or socket
- A couple flat screwdrivers
- Ball pien hammer
- Flat cold chisel
- A length of chain for removing the oil filter (think an oil filter spanner would also work here). As an alternative method, the oil filter can also be stabbed with a screwdriver which is then used as a lever.

PROCEDURE

Before starting place a bucket or drip pan under the sump and, using the 12mm Allen key/socket remove the drain plug. Allow several minutes for the oil to drain completely. The drain plug might require considerable effort to remove:



Start work by removing the air filter cover using a 10mm socket. Take out the filter element to expose the nuts that hold the air filter to the carburetor lid. Loosen these nuts using the same 10mm socket and finally remove the air filter:





My air filter might look a little different from yours, mainly because I had to weld an adapter plate on it in order to make it fit the Weber 34 DCHE carb:



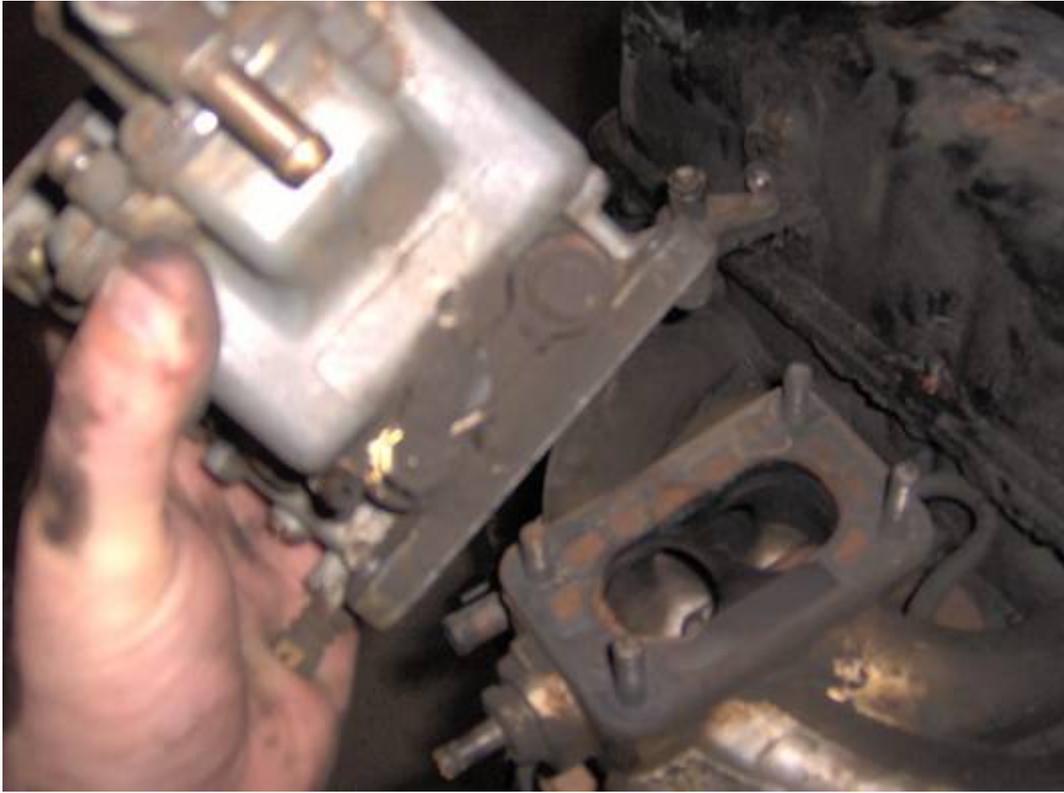
Use the 13mm combination spanner to remove the four 8mm nuts that hold the carburetor to the intake manifold:



Two of these nuts are a little difficult to get to; this is where the obstruction spanner comes in handy:



Use a flat screwdriver to loosen all of the clamps and remove the fuel supply and crankcase ventilation system hoses. Also, use the screwdriver to pry the throttle linkage off from the valve cover/carburetor and remove the latter:

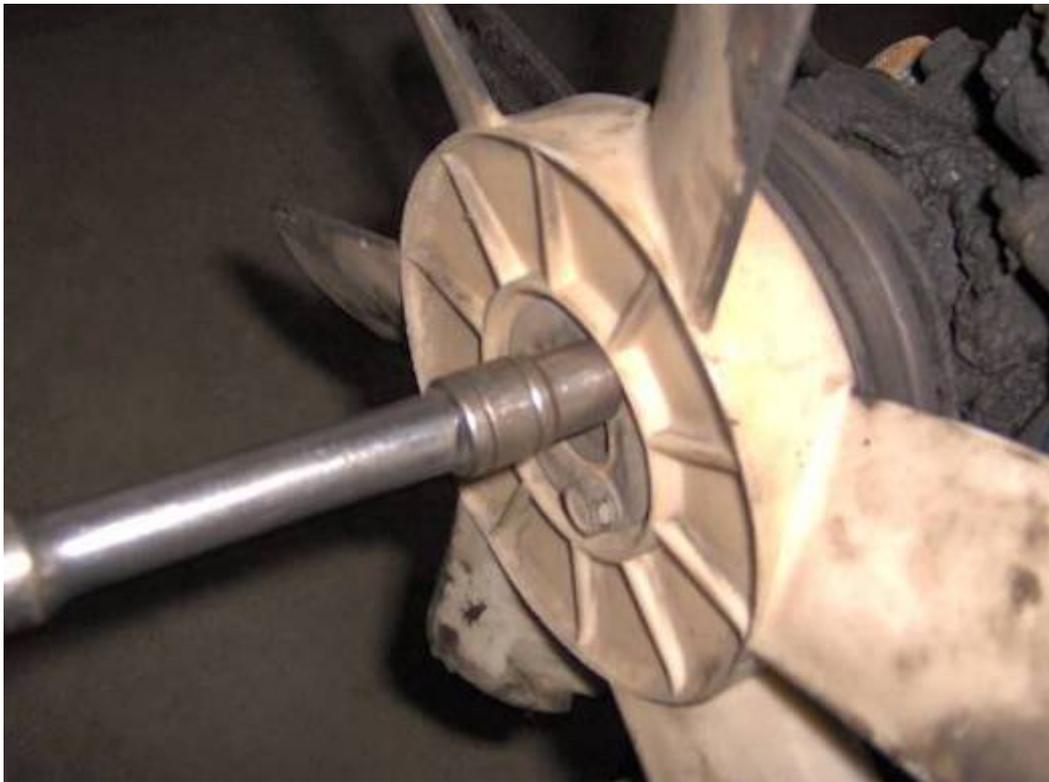


Use the 13mm spanner to loosen the distributor clamping plate nut, remove the clamping plate and then withdraw the distributor from the engine block:





Loosen the bolts that hold the fan and its drive pulley to the water pump hub with a 13mm socket and remove the fan/pulley. As you can see, my engine has no fan shroud:



Use the 13mm socket again to remove the pump-to-block bolts. With the aid of a screwdriver, loosen the clamps of the coolant hose going to the inlet manifold and pull on the hose to remove it from both the manifold and pump.



My country is so darn hot all year round that I had to part ways with the heater since year one. This is why my heater supply and return pipes are looped:



All those years made the loop hose weld into the tubing, so I took my blade and simply cut it in half...



The water pump can now be withdrawn from the engine block along with the heater matrix supply pipe:



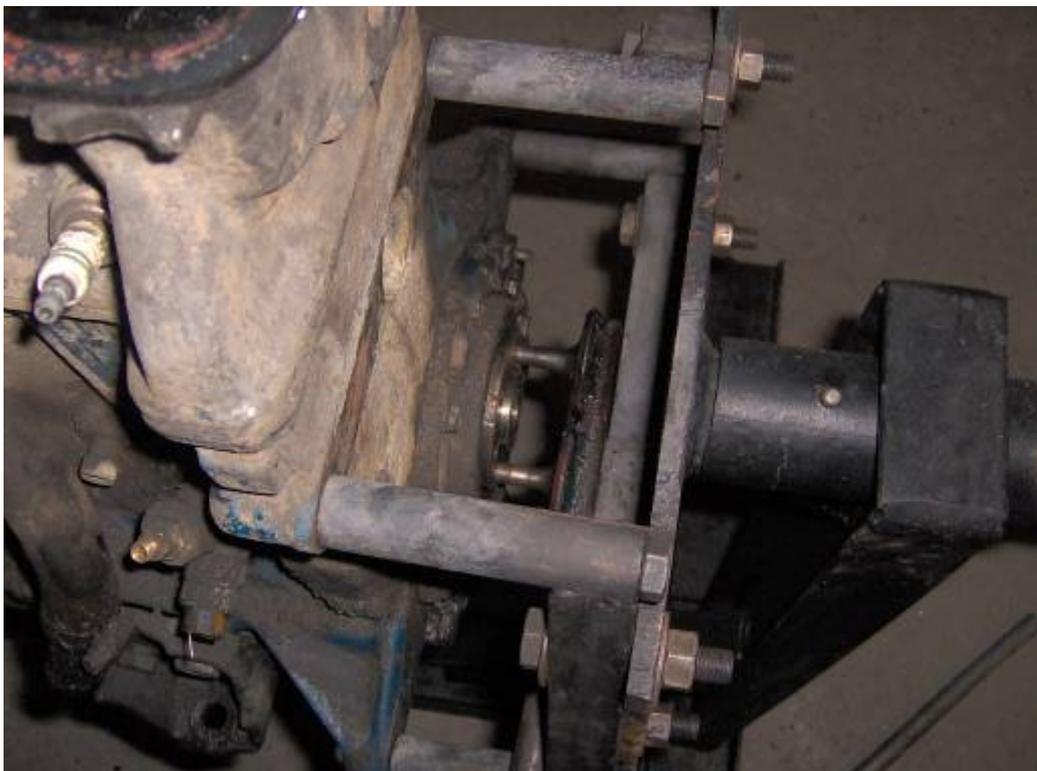
Undo and remove the valve cover nuts with a 10mm socket. Try not to loose any of the special washers when removing the valve cover:



I used this home-made tool, built out of a couple burnt valves and a piece of steel rod...



...To lock the crankshaft's rear end...



...While cracking the crankshaft pulley nut with the 1 1/2" / 38 mm socket and a big cheater bar. That damn nut was so tight I actually had to stand with both feet on the stand (how redundant!) to prevent it from tipping over...



...Once the nut is removed, out comes the pulley...



While taking the pulley off I found out I didn't remove the rear crankshaft seal holder before bolting the engine to the stand, so used a 10mm socket on the 3/8" ratchet and a flat screwdriver to pry on the holder:



Use the same 10mm socket (and a 13mm one) to remove the nuts and bolts of the timing chain cover:



At this point also found the oil filter was still there, so I used this ghetto fab filter spanner to take it off:



The fuel pump was in the way too, so took it off with the help of a 13mm socket:



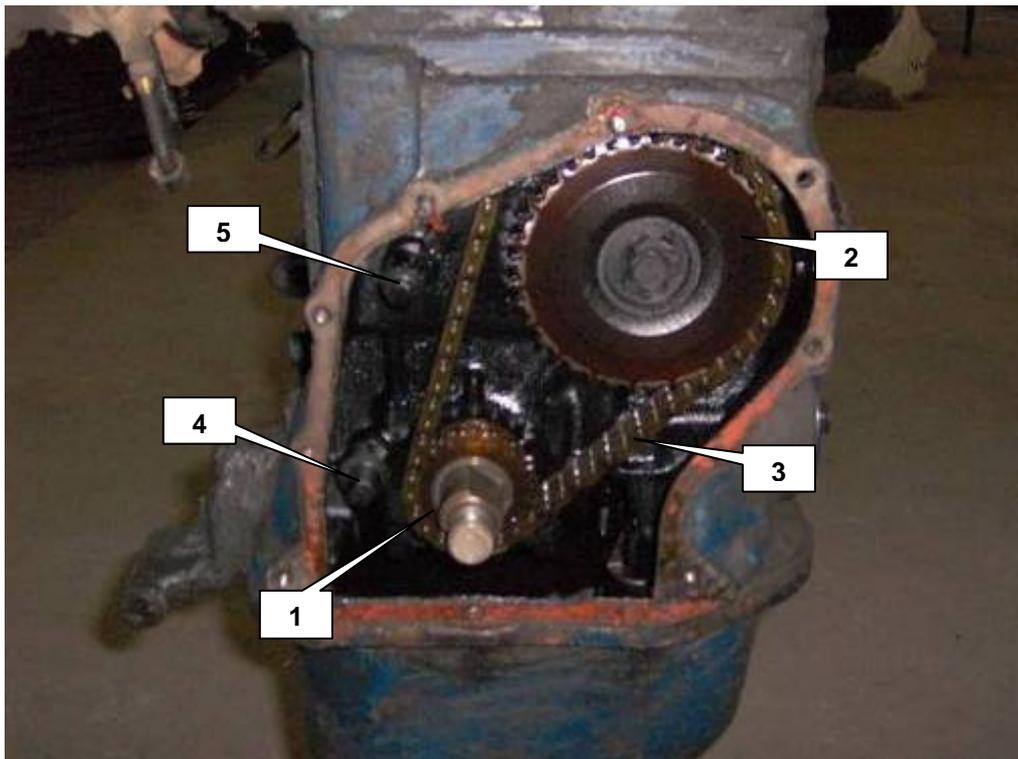
...Out with the pump...



Use a screwdriver to pry loose and finally remove the timing chain cover. Look at all that nasty sealant my old mechanic used:



A quick look inside reveals: the crankshaft (1) and oil pump/distributor drive (2) sprockets, the timing chain itself (3), the chain limiting pin (4) and the tensioner shoe fastening bolt (5):



Different manufactures use different tensioner nut dimensions. So far I've seen having 12mm, 13mm and 9/16" heads. Mine had a 13mm nut:



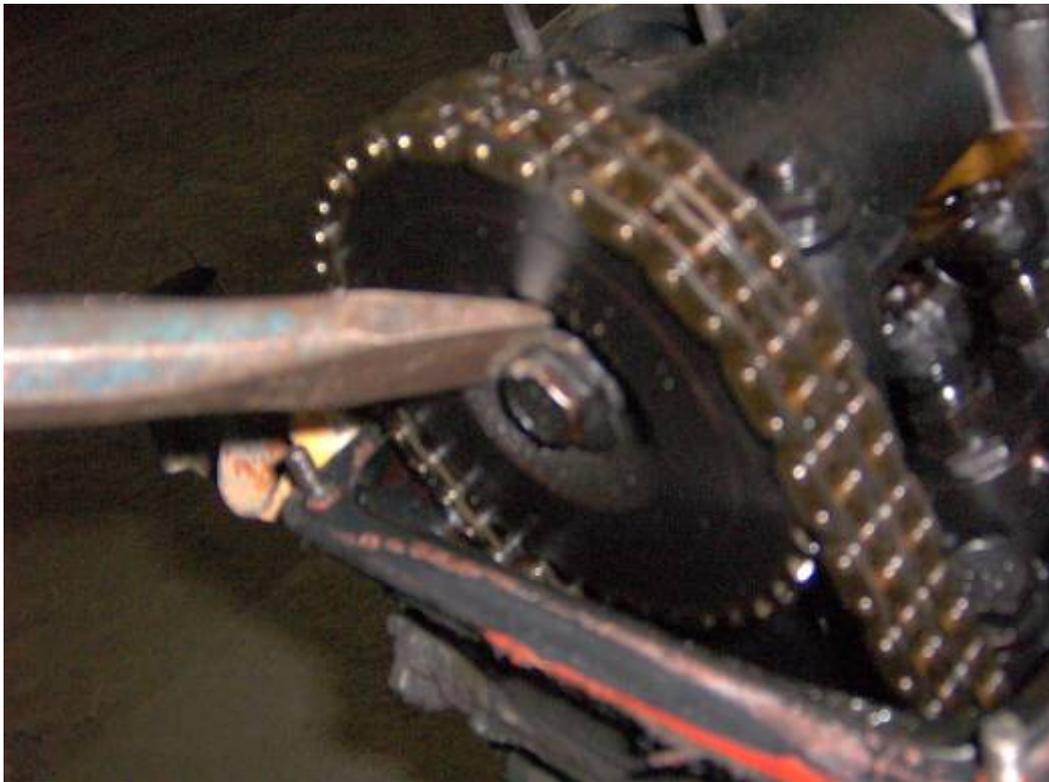
Use the 10mm socket to remove the tensioner fastening nuts before pulling it off the block:



Use the 13mm long socket to remove the crankcase ventilation system cover complete with the oil dipstick and vent hoses. That big hose is supposed to go to the air filter, but this engine had so much blow-by that it kept fouling the carb with oil so I opted by letting it discharge to open air:



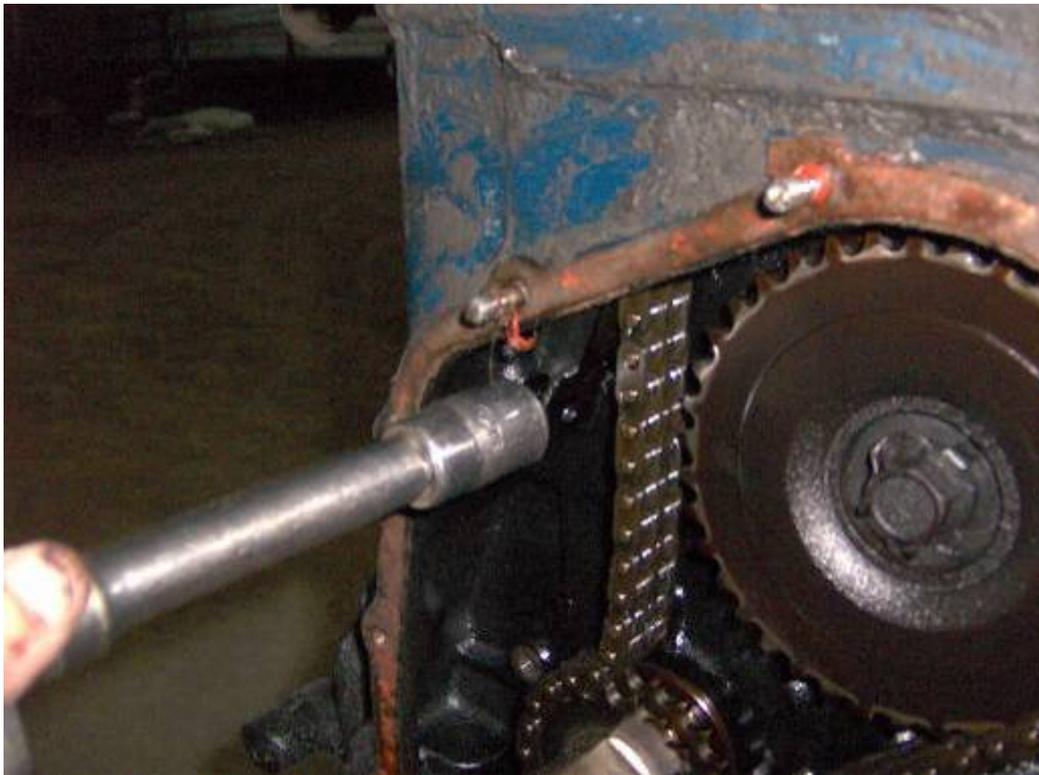
Both the camshaft and oil pump drive sprockets have these special lock washers to keep their bolts from coming loose. Use a cold chisel and tap with a hammer to unfold the washers and expose the bolts:



Take off the chain limiting pin with the aid of a 10mm wrench (spanner, if you haul from England, Scotland, Wales, Ireland, Oz or anywhere in Europe ☺):



Undo the tensioner shoe fastening bolt with a 17mm socket and remove the shoe:

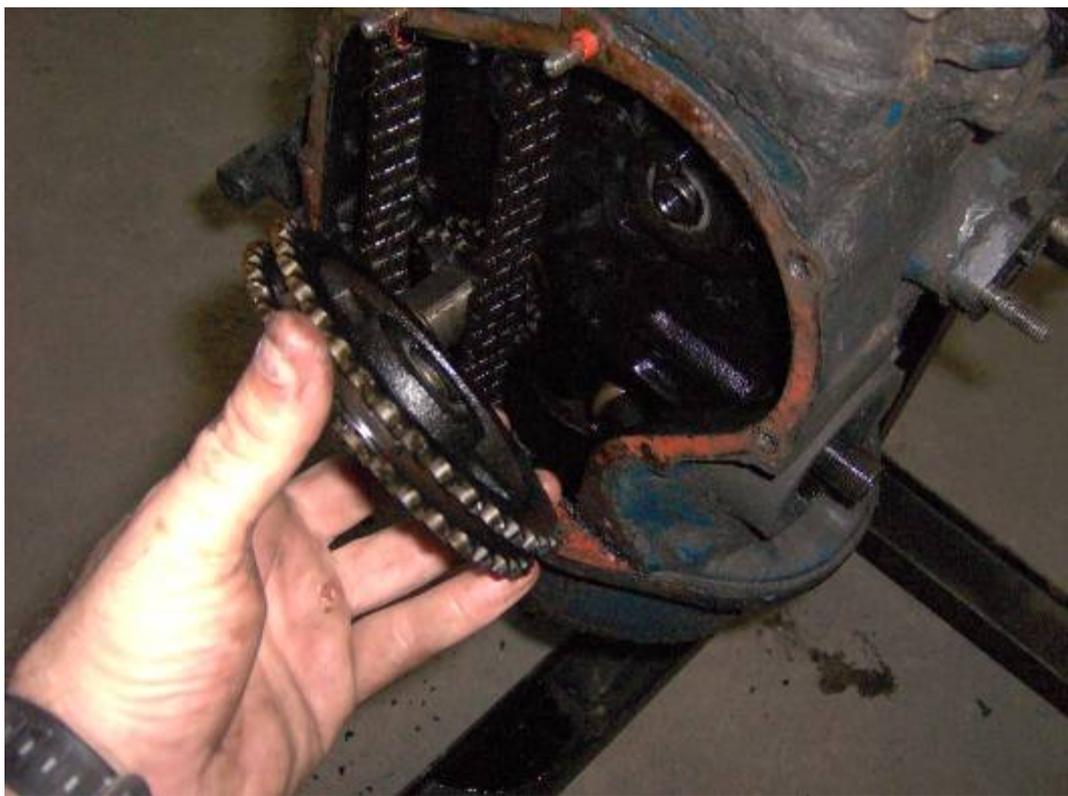


Use a screwdriver to lock the chain and use the 17mm socket to loosen both the camshaft and oil pump drive sprocket bolts, but don't drive them out all the way:





Now remove the bolt and take out the pump drive sprocket:



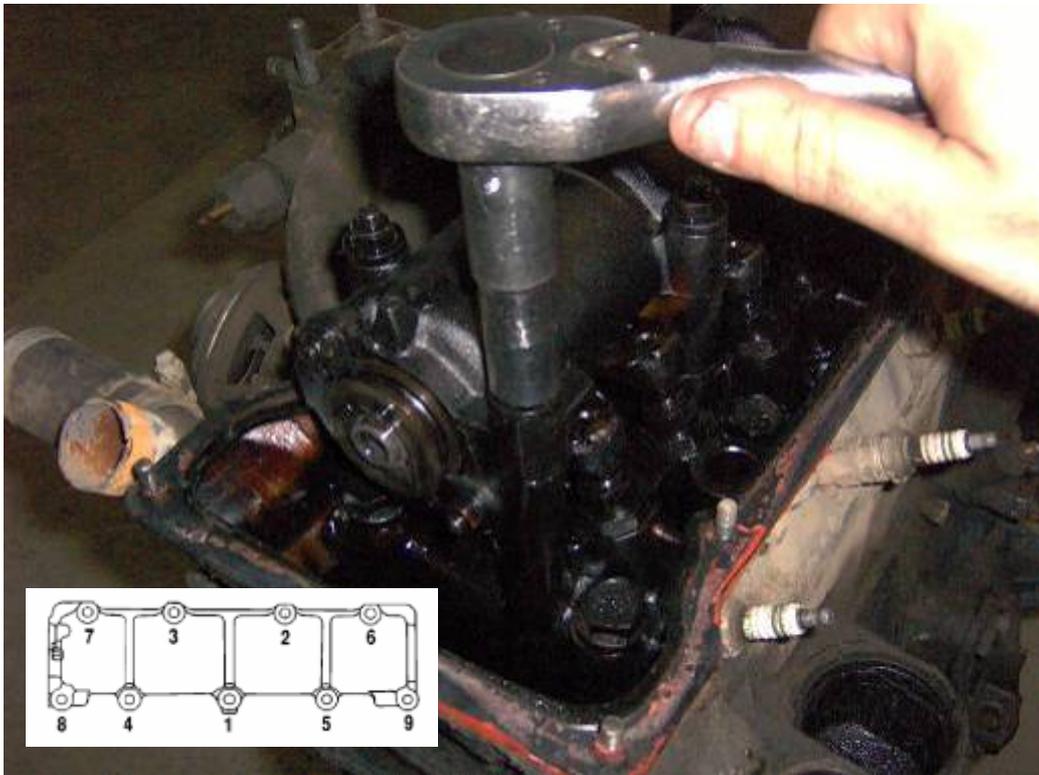
...Followed by the crankshaft sprocket...



...And finally remove the camshaft sprocket to withdraw the timing chain from the engine block:



The nuts holding the camshaft bearing assembly are then removed with a 13mm socket; preferably by inverting the tightening order shown in the box:



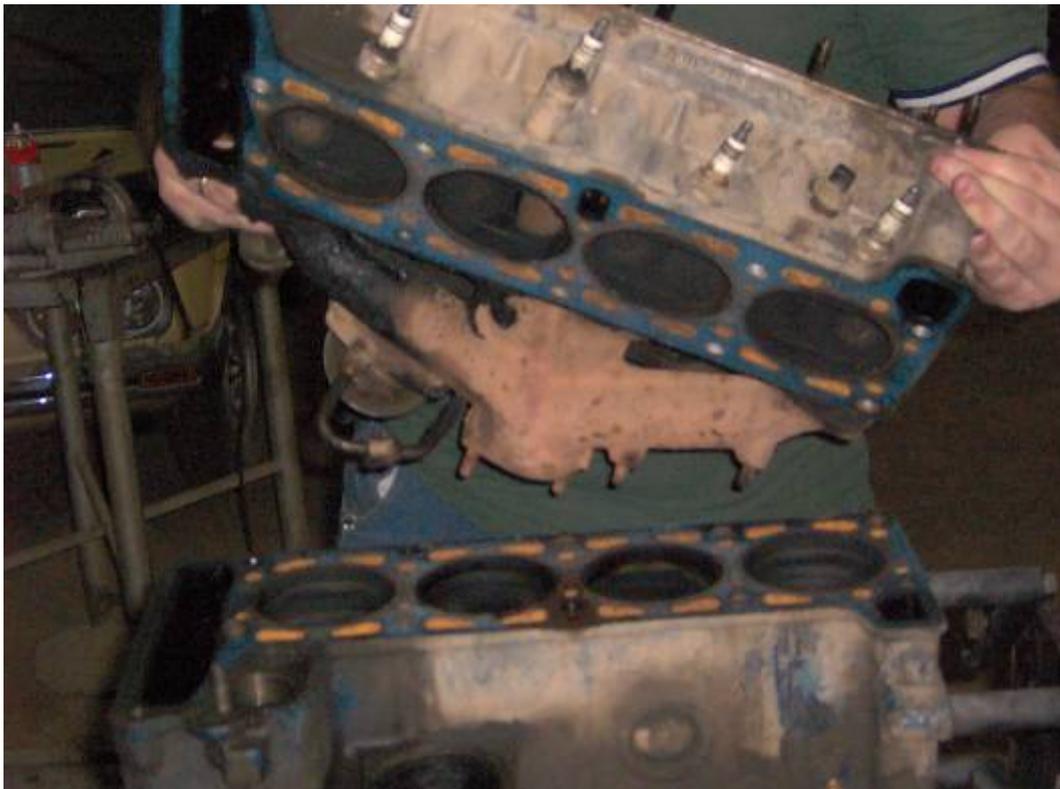
After which the bearing assembly can simply be lifted out, exposing the valve rockers:



The cylinder head bolts can be very tough to remove, so use a 19mm socket along with an extension and a big cheater bar to persuade them:



I could have removed the intake and exhaust manifolds, but to tell you the truth they give better grip when removing the head:



Damn! no wonder why No. 2 cylinder had no compression ☺...



We're pretty much done with the upper side, so now we turn the engine upside down to remove the oil sump nuts with the aid of a 10mm socket:



Pry on the sump a little...



And out comes the sump or oil pan like they say in some places:

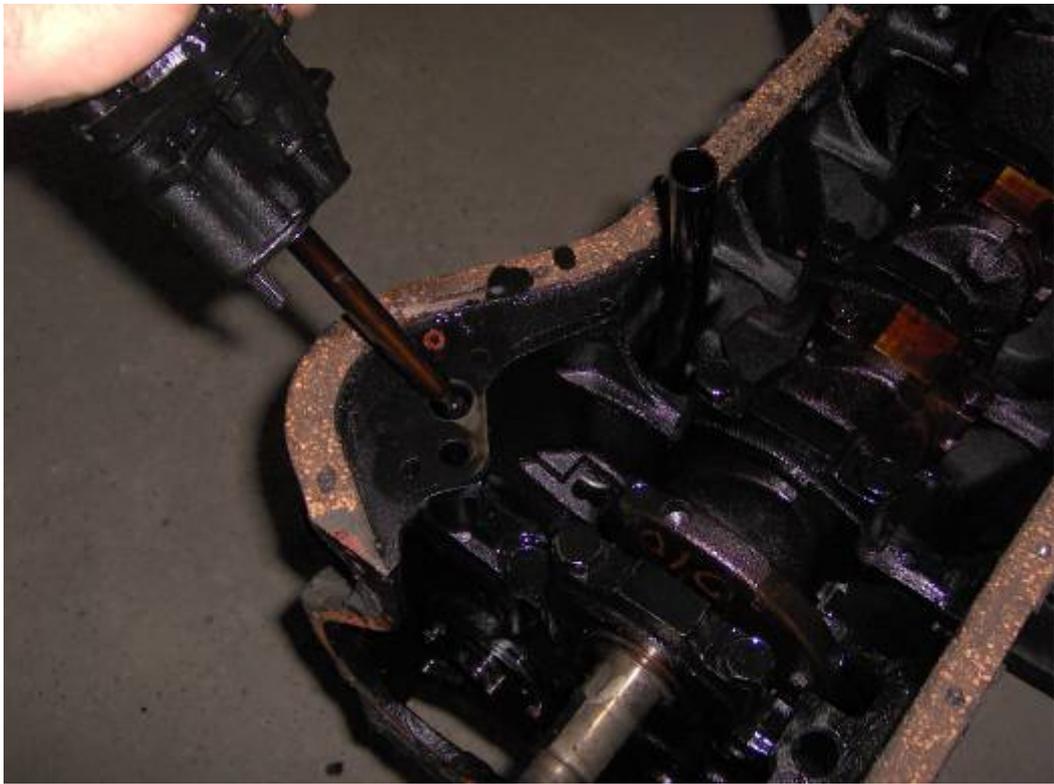


Oh, once the block is inverted, the distributor drive gear should fall by itself...



Use the 13mm socket to loosen the oil pump bolts and finally remove the pump:





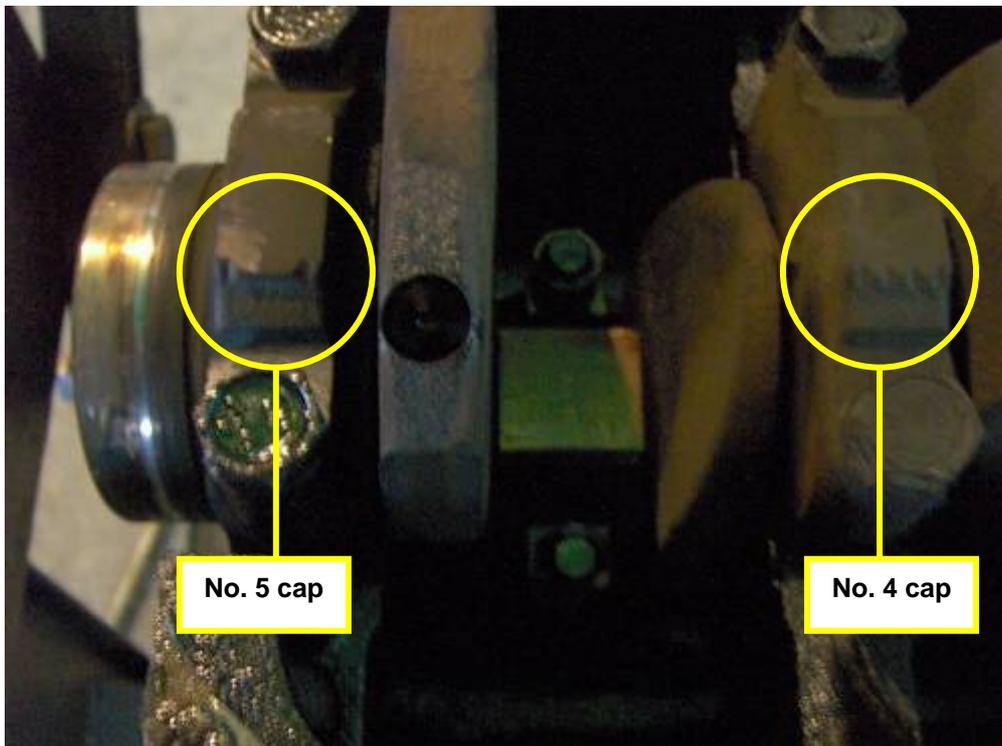
In this position the crankcase vent system return tube is easily removed:



A quick spray of carb cleaner to get things tidy before I show you something...



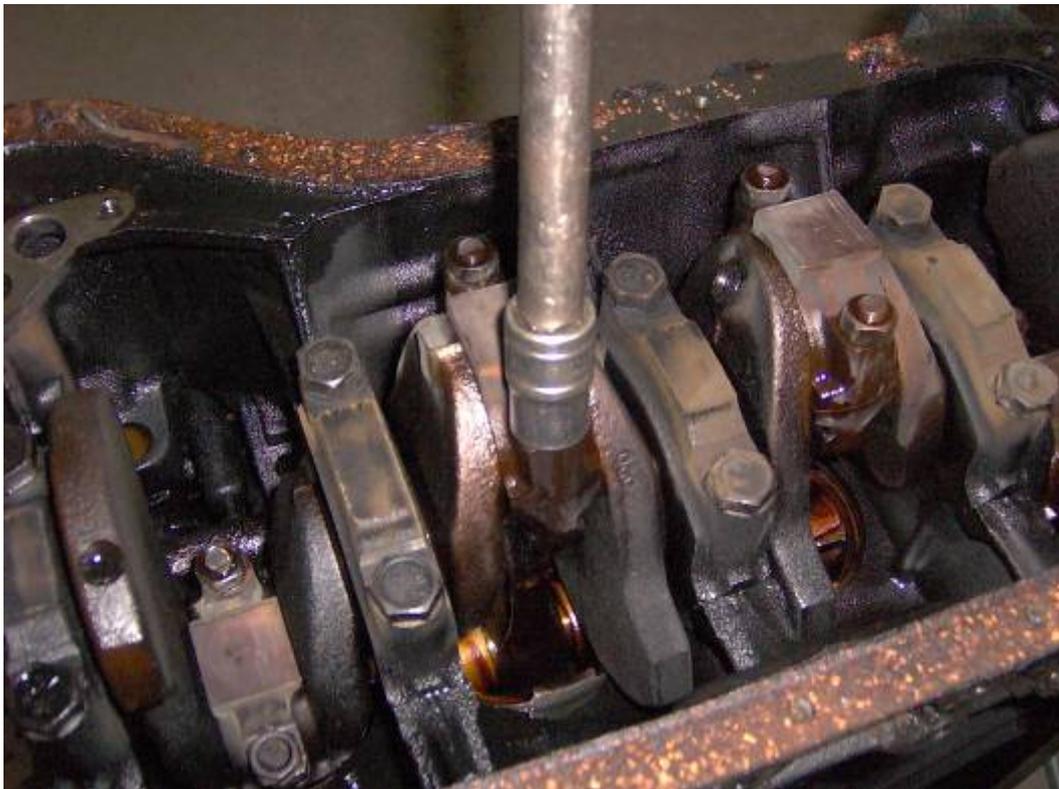
Here it is... The main bearing caps are marked with these notches according to their position, so don't mix them up! No. 1, 2, 3 and 4 caps are marked with 1, 2, 3, and 4 notches while No. 5 cap is marked with two notches, spaced some 10mm one from each other:



Connecting rods are also marked, but in this case matching numbers are used:



A 14mm or 9/16" socket is required to remove the connecting rod cap nuts:





To avoid gouging the journals, I put a piece of 8 mm (3/8") ID hose on each connecting rod bolt before removing the crankshaft:



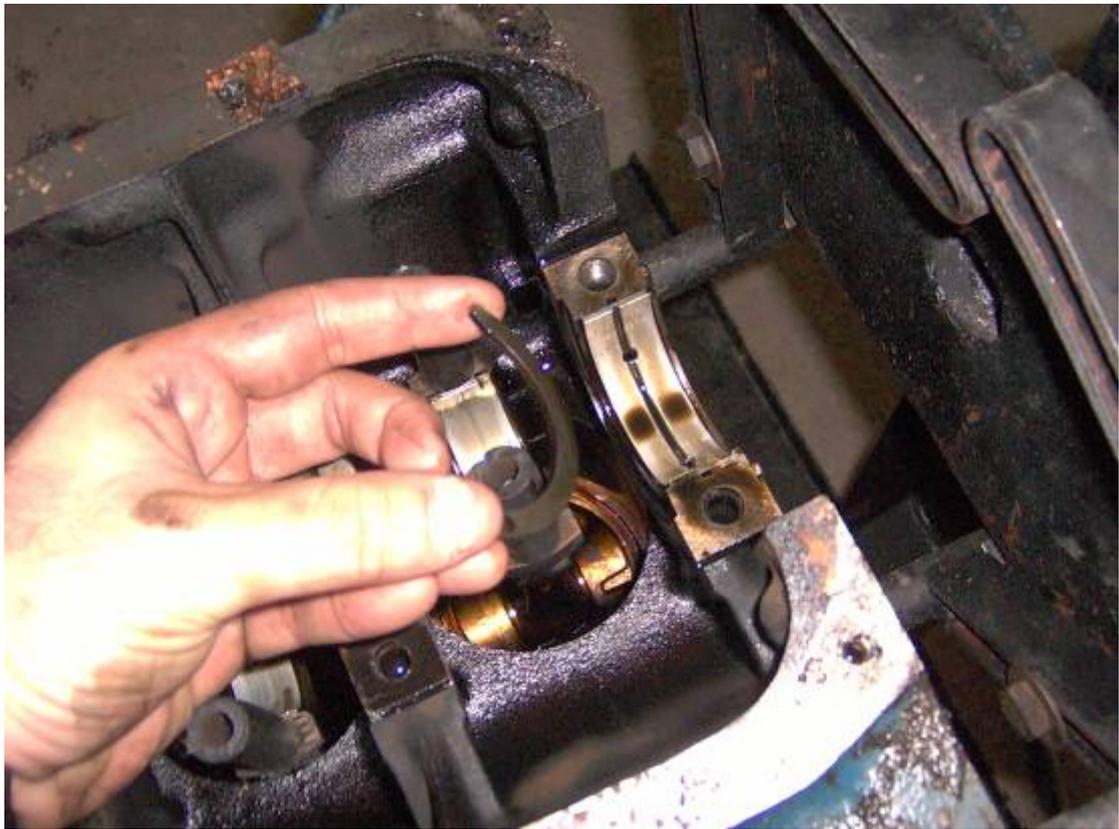
Use a 17mm socket to loosen the main bearing cap bolts and remove all of the caps:



The crankshaft can now be lifted from the block...



...Followed by the thrust half-rings which limit the crankshaft endplay. There's one on each side of the No. 5 main journal:



The piston-connecting rod group can now be pulled out from the block (engine inverted in picture)...



I didn't take any pictures of the process, but No. 1 piston was one hell of a bummer to remove... The oil control rings were broken in bits and those bits kept the piston from being withdrawn easily, so I pulled the piston up (engine inverted, remember?) until the piston hit the journal casting in order to pick the bits up with the aid of a magnetic parts retriever and a small screwdriver. Even after I did this I couldn't help but scratch the cylinder a little bit, no biggie since I'm having the block bored and honed... With the pistons out its time to remove the shell bearings from the main journals and the disassembly procedure is almost finished...



A while ago my oil pressure transmitter broke, all parts stores asked an arm and a leg for a new one so I bought a mechanical gauge for less than half the cost of a lone electric transmitter. That's why the mushroom-shaped thingy isn't shown in the pics...

Anyway, the transmitter needs to be removed before taking the block to the rebuilder, so use a 13/16" spark plug socket on the low oil pressure warning light switch and a 17mm socket to remove the tee fitting, which is held to the block by a banjo bolt (very similar to those used on brake systems). The low oil pressure switch is shown in the following picture right under that brass compression fitting:



Use a 13mm socket to loosen the two bolts that hold the oil pump drive shaft thrust plate to the engine block, remove the thrust plate and finally withdraw the shaft from the block to finish the disassembly operations. Of course the main engine subassemblies still need to be torn down, but that will be addressed in the next chapter.

FINAL NOTE:

All the procedures described in this article, with some logical exceptions such as fuel/ignition systems, valvetrain, electronics, among others, can be applied to any of the 1700 engines: Carb'd, SPFI (TBI) or MPFI.

Alejandro Gabatel, July 2006.-