

OVERHAULING HONDA'S HALF-LITER

If your 500 Four is ailing inside, this is how to get at it.

What do you do when you have the "Gem" of the motorcycle market's engines? Well, Honda just made their 500 that much nicer, mechanically, than their previous showpiece 750. The bulk, weight and, of course, the displacement of the Honda 500 Four engine is a third less than the 750 but the half-liter is even nicer inside. It's a complicated engine if you're used to working on two-strokes but anyone with any overhead-valve engine experience should have few problems in getting into the overhead

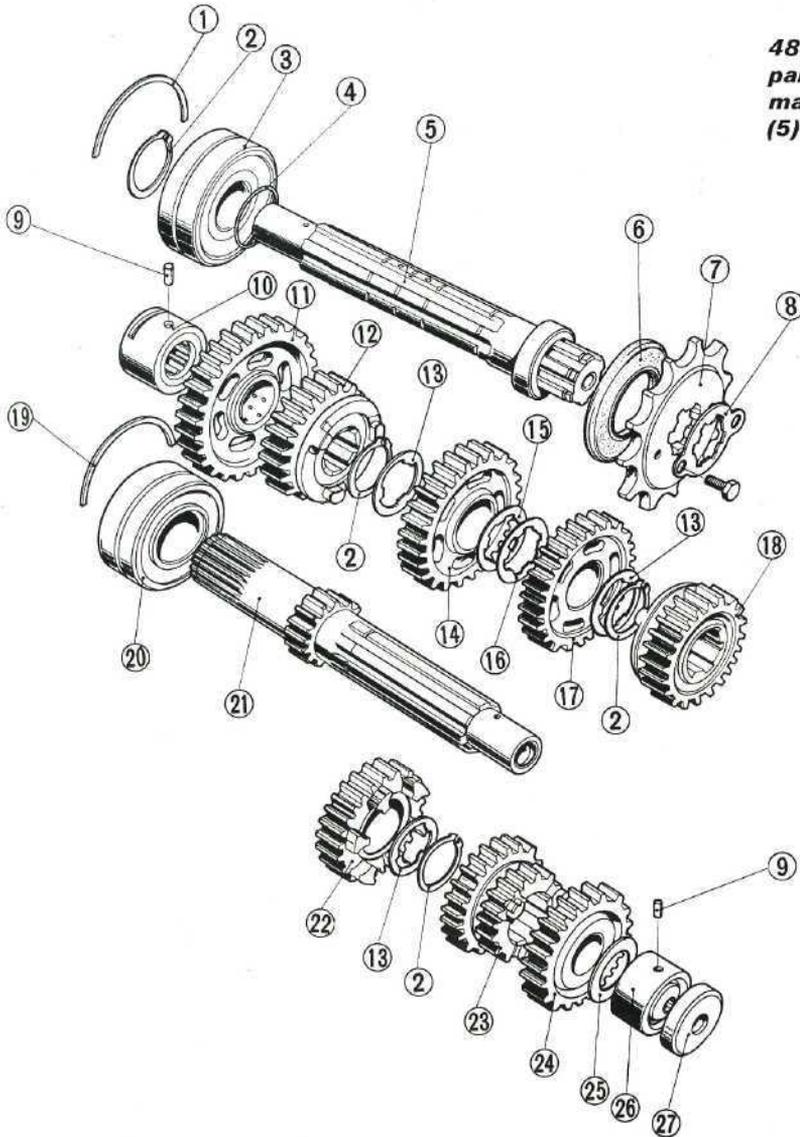
cam Honda. Don't even start the tear-down, though, without a copy of the factory's Honda CB 500 Shop Manual; your dealer can get one for you for less than \$10. There's a few fine detail parts that make these engines the jewel-like machines they are and the manual will show you just where they fit together.

When you're tearing an engine apart, and particularly one with as many pieces as a four-cylinder, it pays to have a few housewife-style cooking sheets padded with a layer of clean rags. Lay each of the parts on the cookie sheet in the order you took it off, with separate pans for the cylinder head, barrel and piston parts, and crankcase pieces to keep them in some kind of order for reassembly.

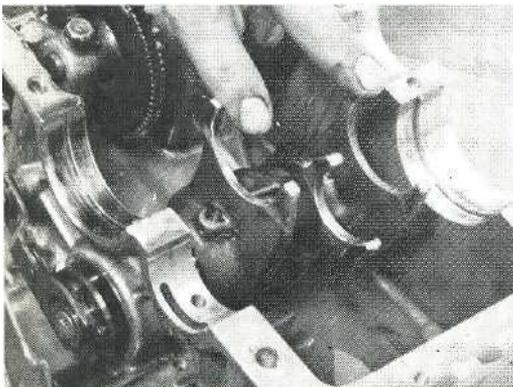
The outside of the engine should, of course, be completely clean and dry and you'll enjoy the work more if you wash off each of the parts as you go in gasoline.

Surprisingly, for an engine that seems so complex, you won't need any special tools to take it apart or to get it back together again. The 500 Four, like any other four-stroke, will require a valve spring compressor to gain access to the valves and you'll need both a torque wrench and a Phillips-bit impact wrench; the rest will come apart nicely with just an assortment of metric wrenches, a soft-headed hammer and screwdrivers. You will need special Honda pullers to get at the works of the AC generator or the transmission's

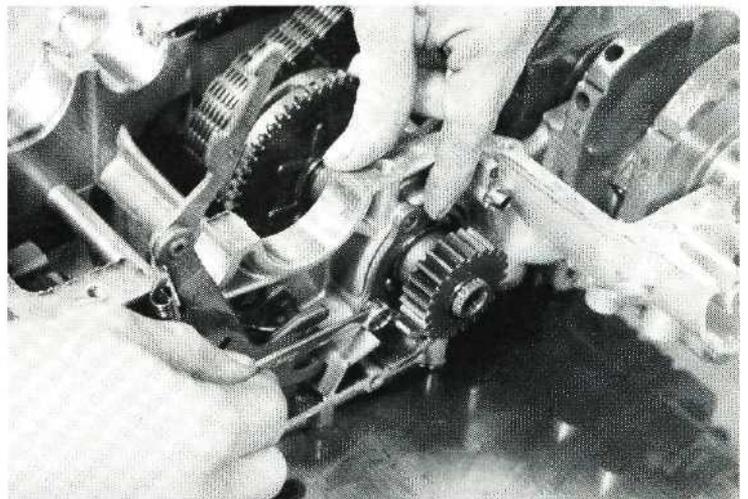
48. The assembly sequence and parts of the transmission's mainshaft (21) and countershaft (5).



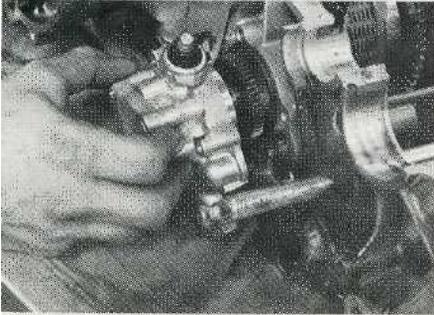
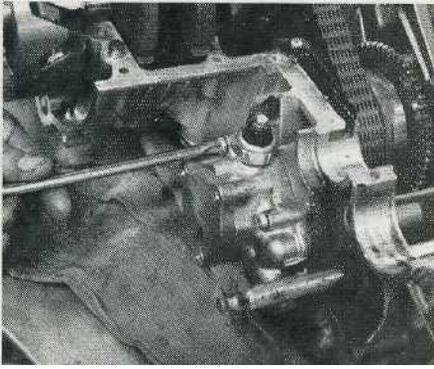
1. 57 mm bearing set ring
2. 25 mm snap ring
3. 5205 special ball bearing
4. 24.5 mm O-ring
5. Transmission counter shaft
6. 33x57x7 oil seal
7. Drive sprocket (17T)
8. Drive sprocket fixing plate
9. Gear shift fork pin
10. 20 mm needle bearing
11. Counter shaft low gear (40T)
12. Counter shaft fourth gear (29T)
13. 25 mm thrust washer
14. Counter shaft third gear (33T)
15. 25 mm lock washer
16. 25 mm thrust washer
17. Counter shaft second gear (36T)
18. Counter shaft top gear (27T)
19. 52 mm bearing set ring
20. 5205 HS ball bearing
21. Transmission main shaft (24T)
22. Main shaft fourth gear (28T)
23. Main shaft second, third gear (22T, 26T)
24. Main shaft top gear (30T)
25. 20 mm thrust washer
26. 22 mm needle bearing
27. 8x34x8 oil seal



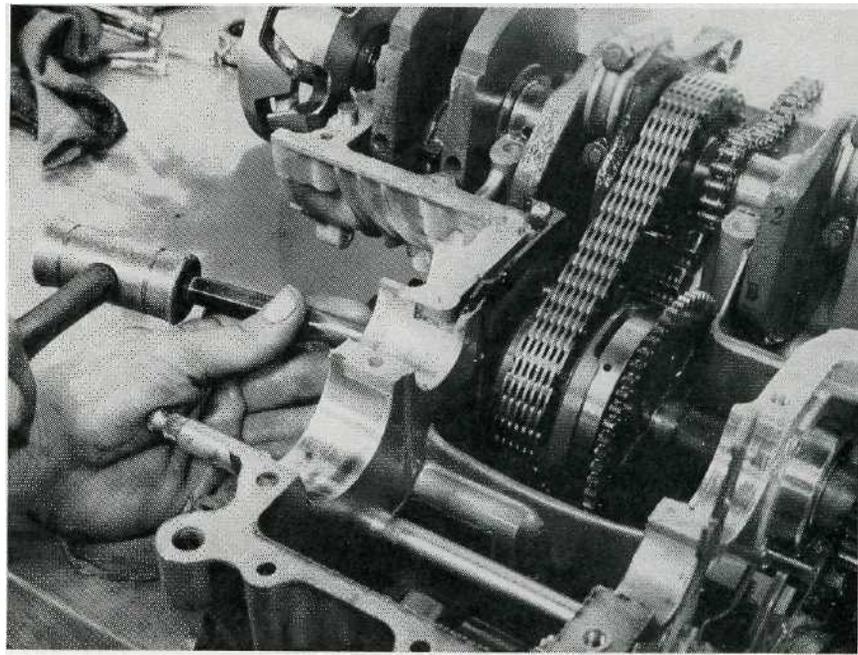
49. The edges of the transmission's shifting forks are one of the most likely wear points in the unit. If they're highly polished that's fine but, if they show any wear marks deeper than the thickness of a business card, that fork should be replaced.



50. Remove the bolts that retain the end of the primary shaft on the side opposite the oil pump—the shaft will come out this end later.

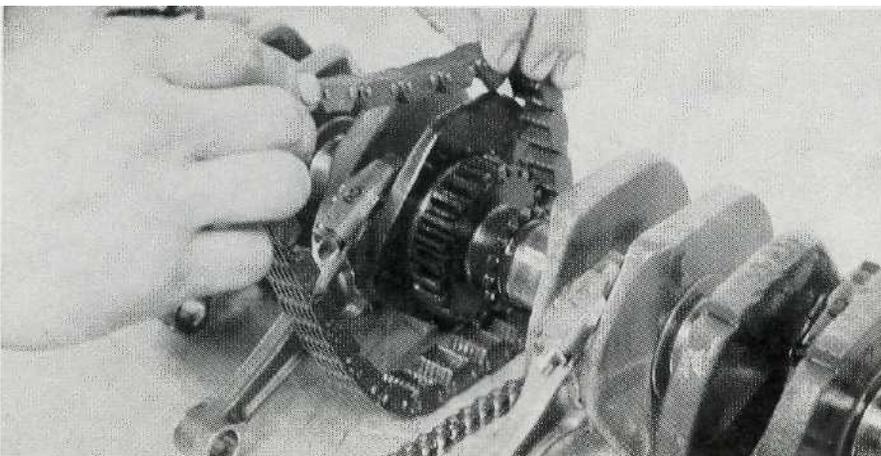
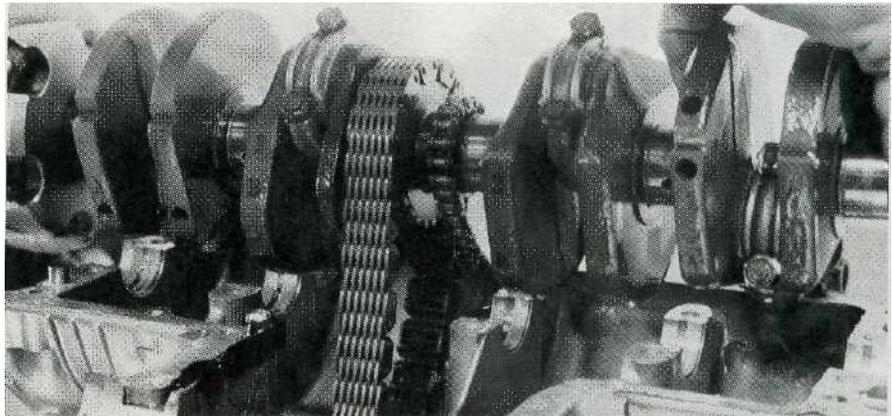


51 & 52. Remove the Phillips-head screws that retain the oil pump and lift the pump straight away from the side of the crankcase and the primary shaft inside.



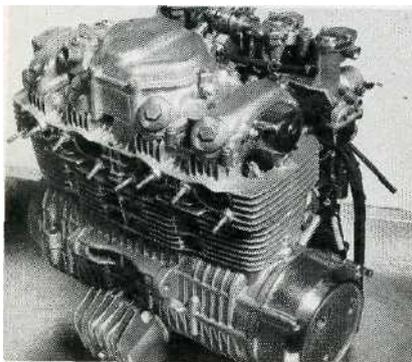
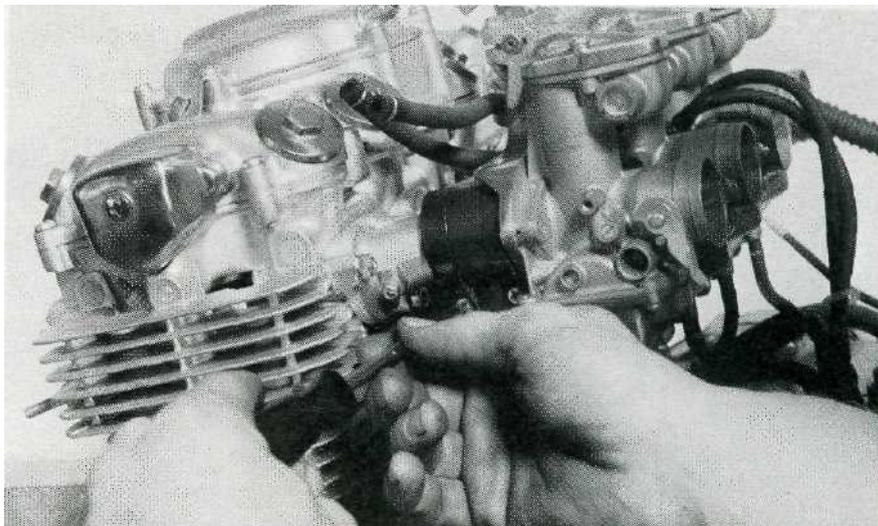
53. Tap out the primary shaft from the oil pump side. The crankshaft-driven primary sprocket and starter clutch will remain in the case as a single unit; they can be lifted away from the primary chain once the primary shaft is out.

54. Auto parts stores sell a special clearance gauge called a "Plasti Gauge" that is placed between the crankshaft bearings and the crankshaft. If there is more than .0031-inches clearance between any of the crankshaft bearings and their Journals in the case the bearing will have to be replaced and the crankshaft re-ground. The factory workshop manual describes the procedure for picking the proper bearings.

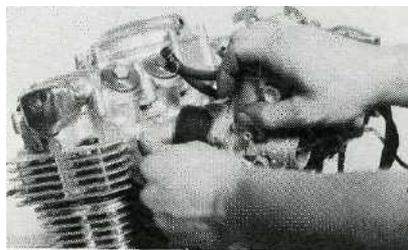


55. The primary chain can be wiggled about off the end of the crankshaft without removing the rods if you have to replace it. The big ends of the rods should be checked for wear too. If there is more than .0031-inches clearance between the bearing and crank, the bearing will have to be replaced and, most often, the crankshaft throw re-ground. The rod's big end bolts should be tightened to 14.46 to 15.91 foot pounds of torque. The "Plasti Gauge," again, is needed to get an accurate reading on the big end bearing's clearances.

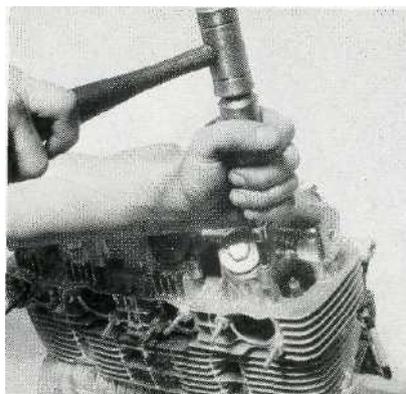
primary shaft, however, if either of these components is ailing. Your dealer is the best man to recut the valve seats, if they need it, so those tools won't be required either. You'd be best off, in fact, if you'd entrust a dealer with any valve replacement work; just hand him the head and a few small bills and he'll return the head to you in a few days ready to bolt back in place. Valve removal, valve seat recutting, valve grinding, valve spring tension-equalization and reassembling the valves, springs and keepers are things that can be done quicker and, in the long run cheaper, by a well-equipped Honda dealer's service department. The rest you can handle with a bit of help from the manual.



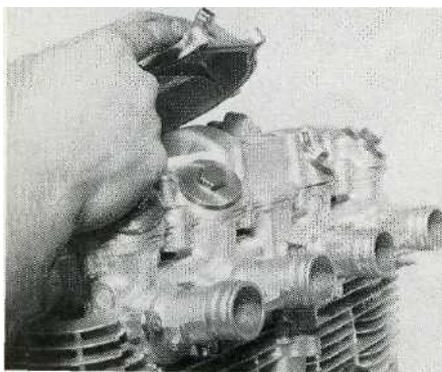
1. Disconnect the exhaust pipes, the fuel lines and the electrical connections to the engine. Remove the drive chain and the engine-mounting bolts and it can be lifted onto your workbench. One man can handle the 500, barely, but it's safer with two. You can disconnect the carburetors from the engine and just leave them in the frame still attached to their cables if you wish.



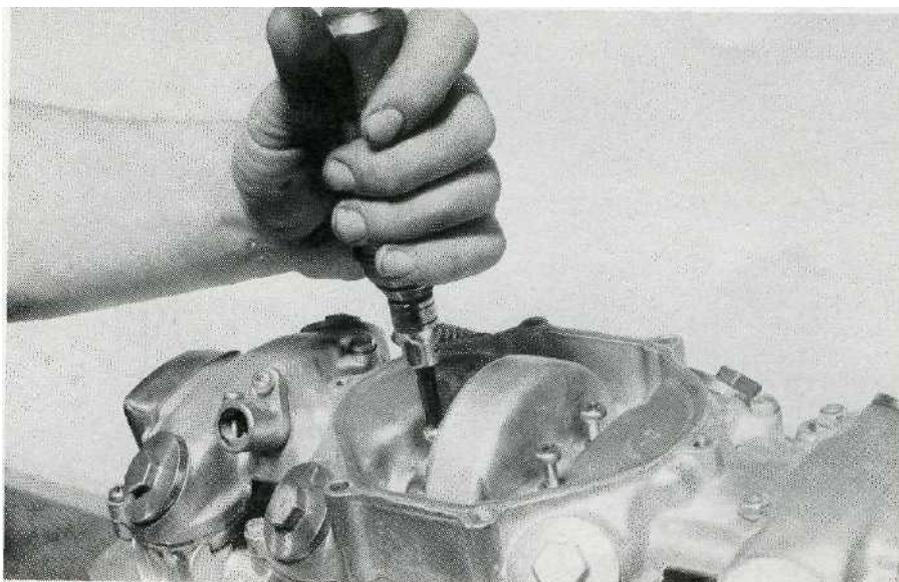
2 & 3. Loosen each of the four carburetor-to-cylinder head flexible hoses' clamping screws and carefully pry off the four carburetors as a single unit. A few drops of water will help to ease them back on later.

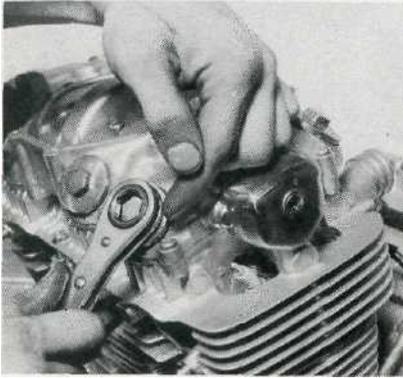


4. An impact driver is a must for most modern engines. Use it, here, to loosen the screws that retain the cylinder head cover. Turn each screw only a quarter-turn, at first, to equalize the tension so the cover won't warp. Work in a criss-cross pattern. Tighten the screws gradually, too, when the engine is reassembled.



5 & 6. There's a breather cover over the center of the cylinder head cover piece that has to be removed to gain access to the screws holding the cylinder head cover. Remove the breather and loosen the four remaining screws below it.





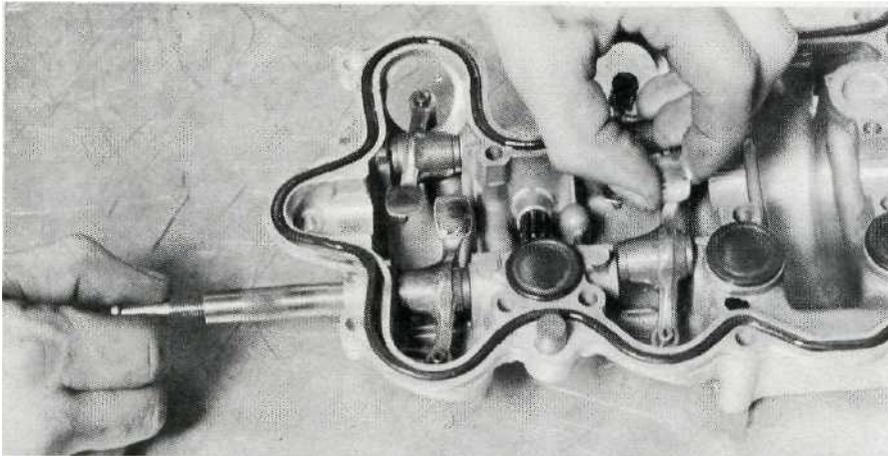
7. The eight individual tappet adjustment plugs are best removed before you lift the cylinder head cover so you'll have the entire engine for leverage. Remove all eight of them and place them in order on one of those padded cookie sheets. They can stay off until the engine is back in the chassis ready for the valves to be adjusted.



8. Use the impact screwdriver, again, to loosen and remove the screw that retains each of the side covers and remove them.

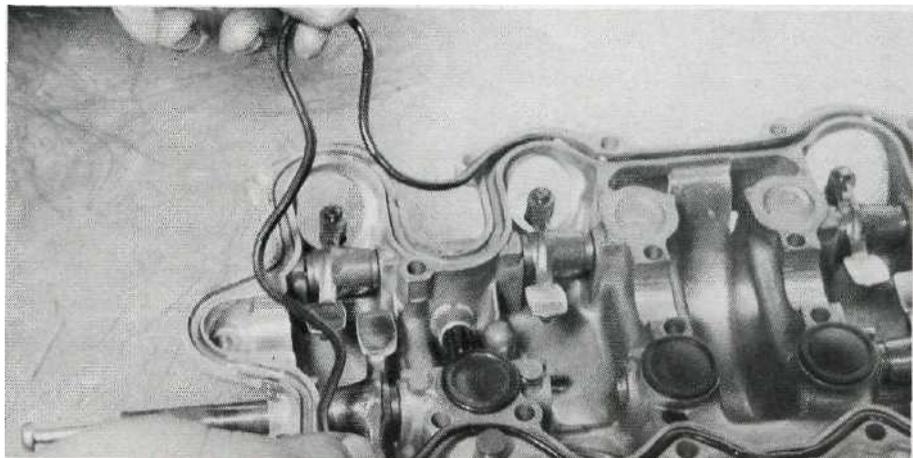


9. There are, in addition to all the Phillips-head screws, four bolts with copper washers beneath that retain the cylinder head cover. Remove them and the cover can be lifted away from the engine.

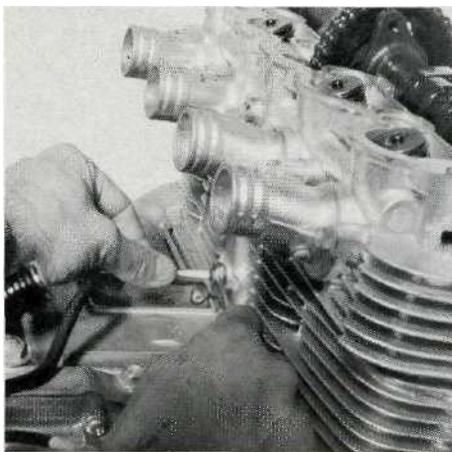


10. The cylinder head cover also contains the rocker arms and their shafts. Screw a long bolt into the end of each shaft (they're tapped to accept a 6mm bolt) and pull the four separate shafts from each end of the cylinder head cover. Inspect the rubbing faces of each of the rocker arms for any signs of the scrapes and pits that indicate excessive wear. Replace any worn rocker arms before reassembling the engine.

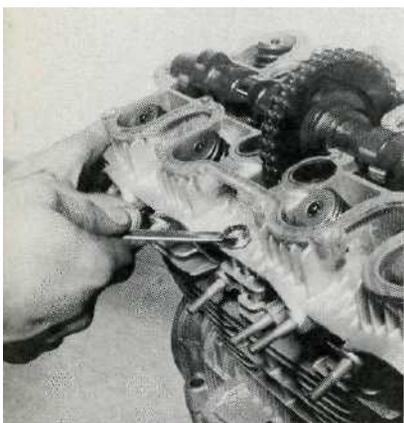
11. One of the jewel-like qualities of the Honda 500 is the gasket in the cylinder head cover. It's a specially-molded and shaped O-ring style neoprene seal that is oil-tight without the bother of gasket cement. Lift it gently from its groove in the cover. If there's any sign of cracking or wearing, replace the gasket.



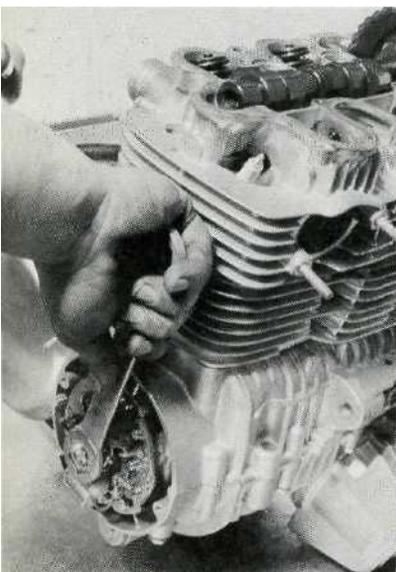
12. Loosen the cam chain tensioner's outer lock nut and inner slotted adjusting screw if you're only going to remove the cylinder head. If the barrel, too, will be removed you can unscrew both the nut and screw.



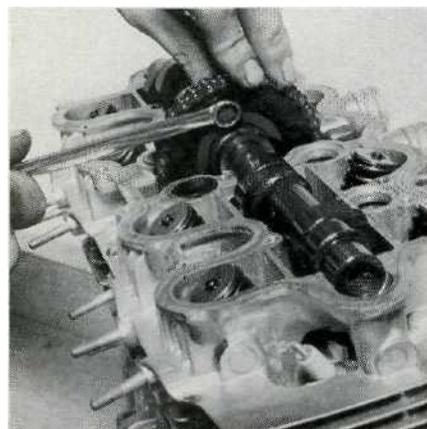
13. The bolt immediately above the cam chain tensioner is the one that actually holds the tensioner in the cylinder head. You must remove it to remove the cylinder head. Leave the actual tensioner in place for now (it can stay in place if you're only working on the head).



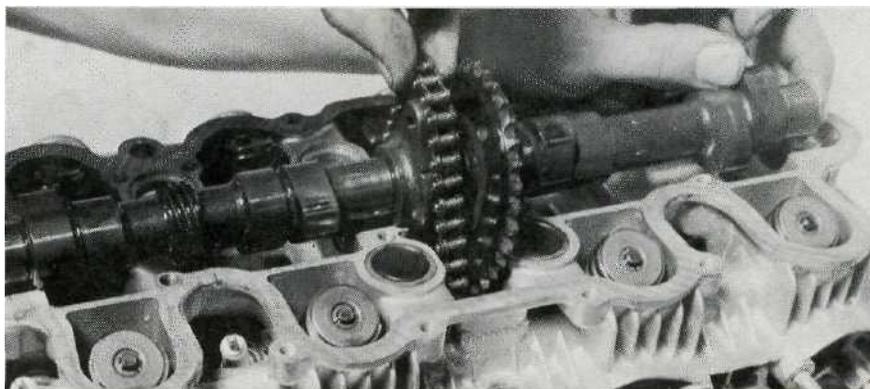
14. There are twelve nuts that hold the cylinder head but they cannot be removed until the camshaft is out of the way. The two 6mm bolts at the center of both front and back of the barrel are the ones you're likely to forget, though; they can be removed now.

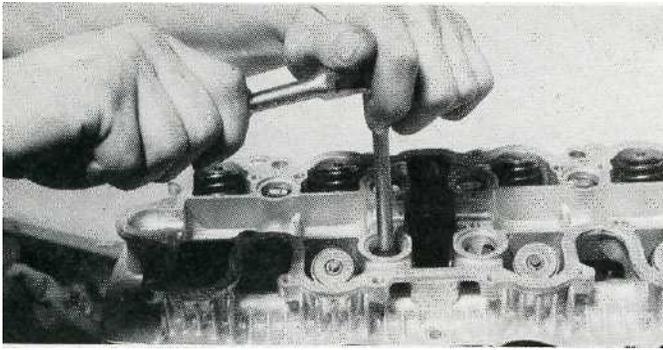


16 & 17. Remove both of the camshaft sprocket's retaining nuts. The hole in the sprocket is elongated to clear the tabs on the center of the camshaft. Pry the chain off the gear with your fingers first, then slide the cam through the chain and through the elongated holes in the sprocket. It's a good idea to tie a wire to the chain and another to the sprocket so they don't drop down into the crankcase.

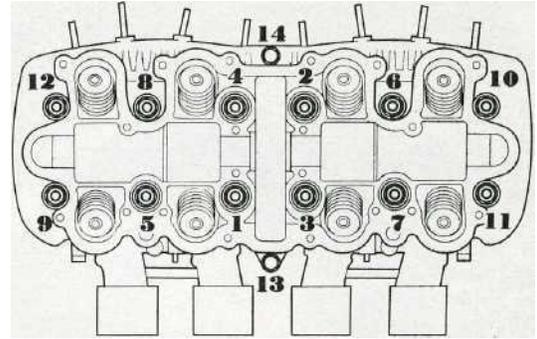


15. Remove the cover over the contact points so you can turn the engine over with a wrench on the central crankshaft nut (you could also use the kickstarter lever if you wish). Rotate the engine so you can easily reach the two bolts that attach the camshaft sprocket.

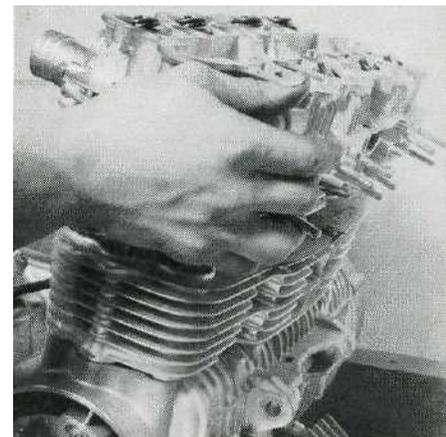
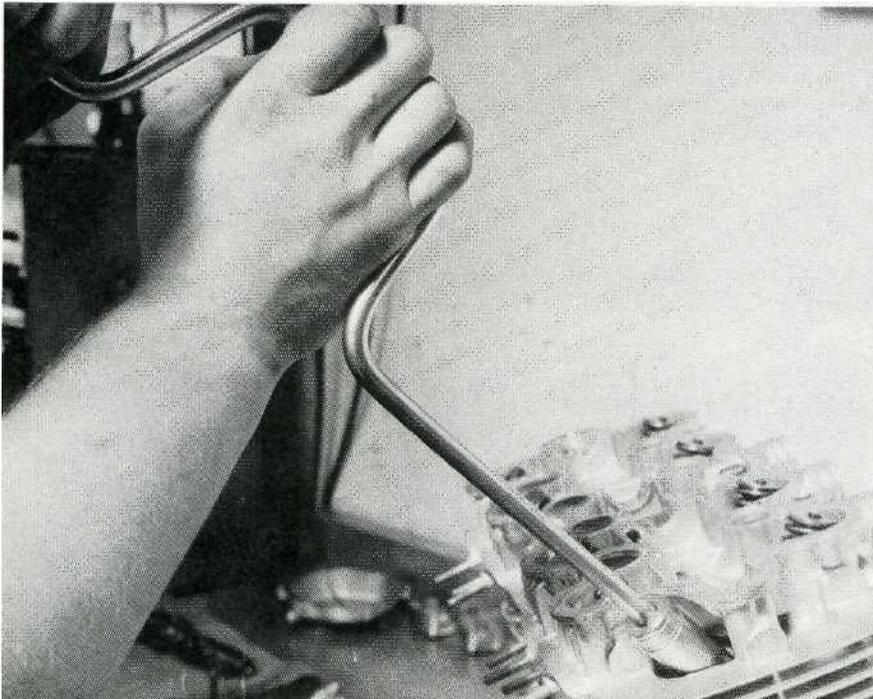




18. Inspect each of the camshaft bearings for wear or the pebbly-surfaces that indicate galling from lack of lubrication. If there's more than .004-inch clearance between the cam and the cylinder head bearings the head must be replaced. Remove the four small rubber caps over the four center cylinder head hold-down nuts.

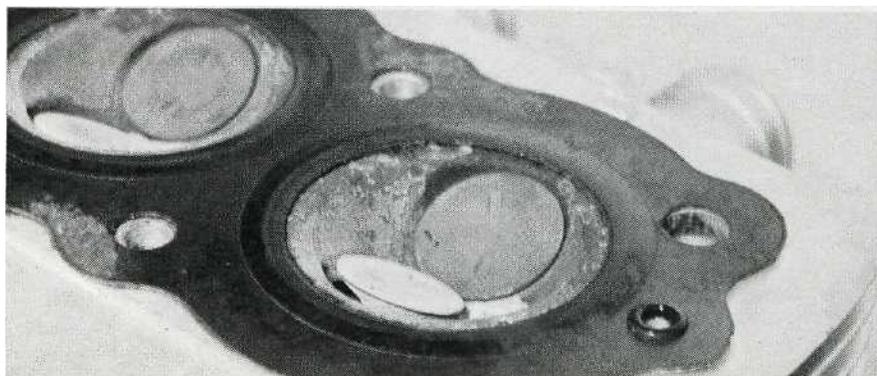


19. Loosen the 12 8mm cylinder hold-down nuts a quarter-turn at a time to evenly relieve the pressure on the head so it won't warp. When the engine is reassembled follow the same pattern, torquing each nut to between 14.46 and 16.63 foot-pounds with a torque wrench.



20 & 21. The cylinder head should be free to be lifted away by hand; if it's tight, replace the spark plugs and crank it over—the valves are all closed and the compression should be enough to break the head gasket's seal. Lift the head and gently pry away the head gasket.

22. You need a plethora of special tools to properly rework the cylinder head including a valve spring compressor, special seat-cutting tools and a spring tension-equalizer. If the valves need reworking or there's much carbon buildup in the exhausts take it into a Honda dealer.

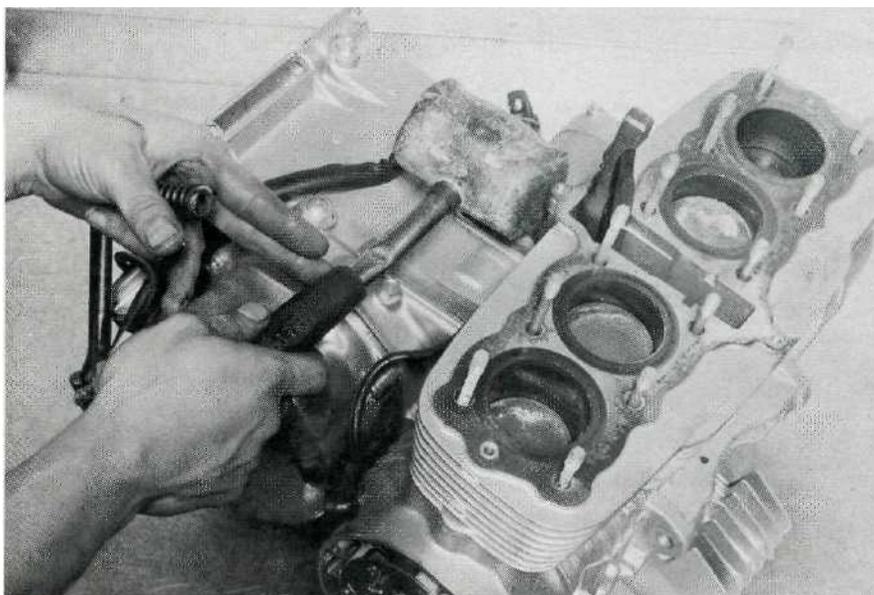




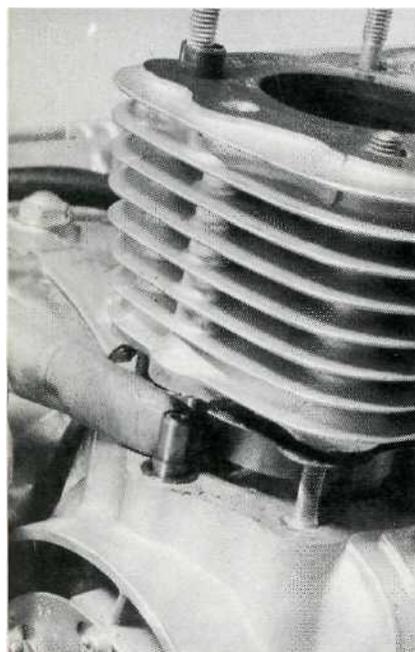
23. The adjusting screw and the top bolt that retain the cam chain tensioner were removed earlier. The tensioner must be rotated 90 degrees so its integral guide pins will clear the chain slot in the cylinders and it can be lifted from the cylinder barrel. The chain stays for now.



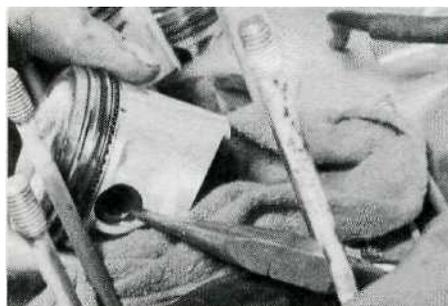
24. There are several rubber O-rings and aligning pins in both the cylinder head and barrel (another reason for having the factory workshop manual handy). Remove these oil passage O-rings from the cylinder barrel, for example, so you don't lose them. Remember to replace them!



25. You'll likely need to tap the sides of the barrel to break the base gasket seal. Use a rubber or fiber-headed hammer and tap only on the solid portions of the barrel, not the fins. A few light taps on all four sides should be enough to loosen the barrel.



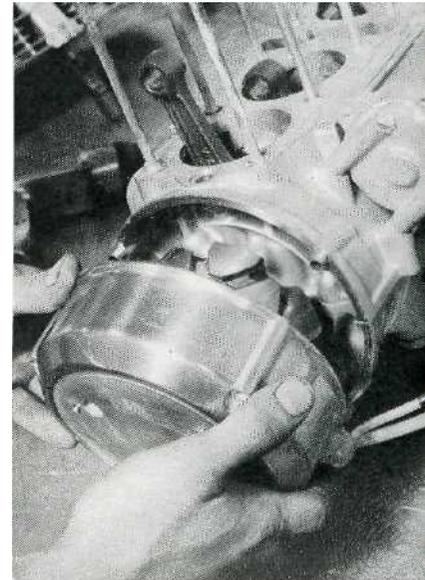
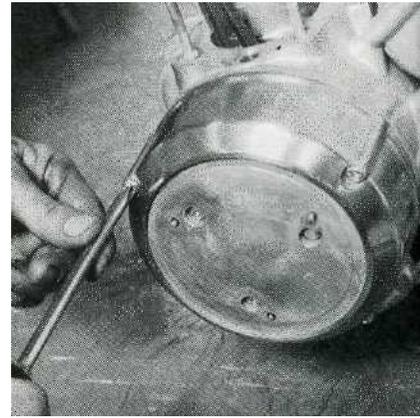
26. There are O-rings around the hollow oil passage dowel rings at the top of the crankcase too, set them aside for replacement later. The barrel is easy enough to lift but it's devilishly difficult to get FOUR sets of piston rings compressed when you replace it. Discount auto parts stores sell ring compressors for less than two-dollars that'll make it easier to reassemble the barrel over the pistons and rings.



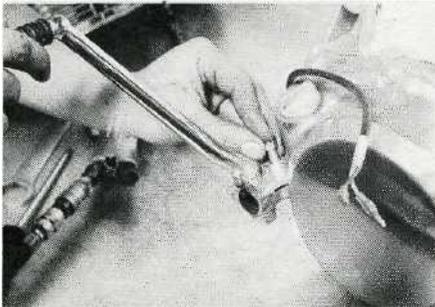
27 & 28. Stuff a rag around the base of each cylinder so you don't drop any parts down into the crankcase. Honda sells a special piston ring clip removal tool but you can do the job with an ice pick and a pair of needle-nose pliers. Pry the edge of the clip loose with the pick and lift it free with the needle-nose pliers.



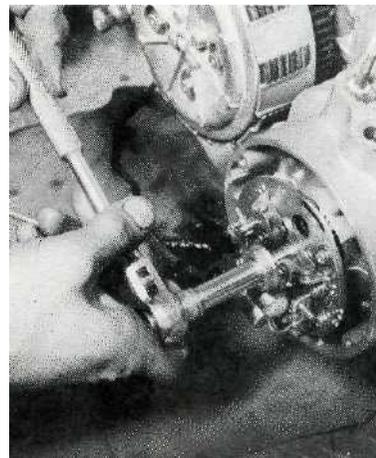
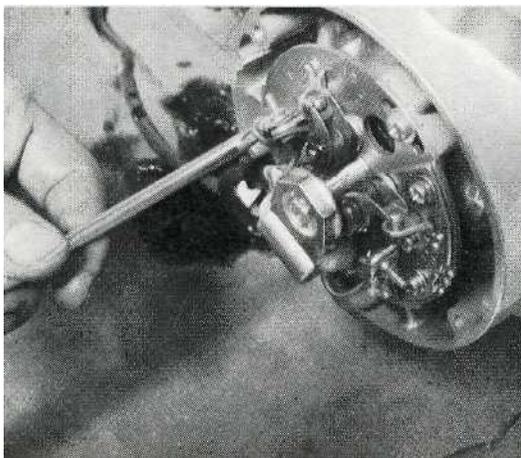
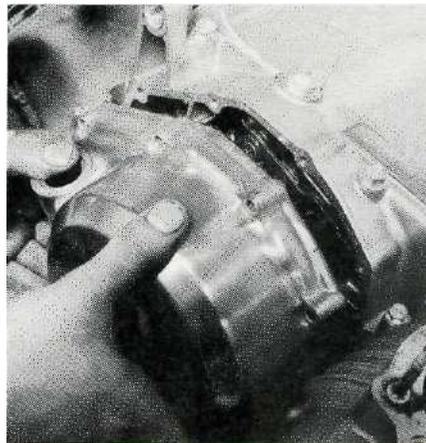
29. The piston pins should just slide out of the pistons. Remove the rings and check their end gap by inserting each of them in their respective cylinders. It should be less than .027-inches or the rings need replacing. If they're badly worn check their clearance top-to-bottom in the ring slots of the piston. The **MAXIMUM** clearance between the ring and the groove is .007-inches for the top ring and .005 for the bottom two. If the piston-to-bore clearance exceeds .010-inches you're due for a rebore. If the pistons are smaller than 2.198-inches anywhere around the ring area diameter they'll have to be replaced. When you replace the rings be sure to stagger their gaps one-third of the way around **AND** be sure that none of the gaps are in line with the piston pin **OR** the long edges of front and backs of the piston skirts. Use new pin clips even if you replace the old pistons or rings. The maximum allowable diameter on the piston pin hole in the piston is .593-inches, if it's larger replace the piston.



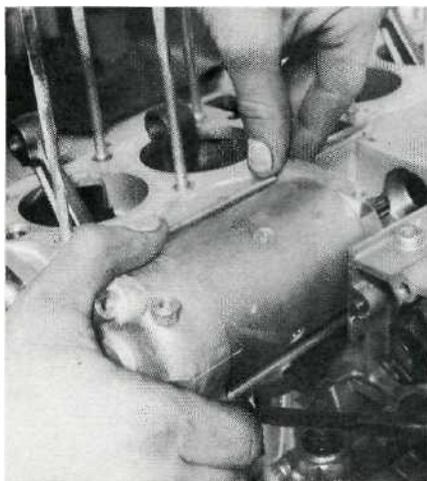
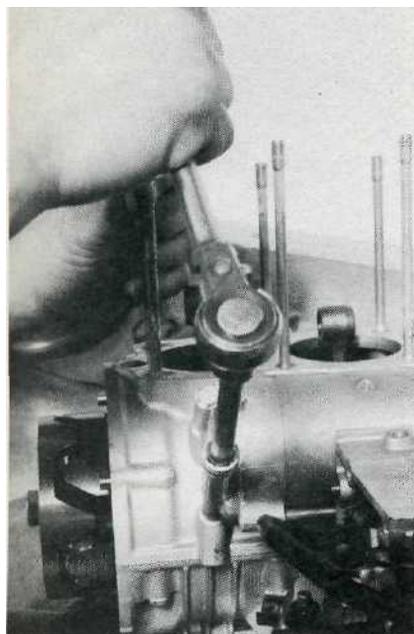
30 & 31. Remove the generator cover using an impact screwdriver to loosen the Phillips-headed screws. A puller (number 07011-21601 from Honda) is needed to pull the generator rotor if you're having troubles with it. You don't have to remove the rotor, however, to remove the crankshaft or to split the crankcases for access to the transmission.



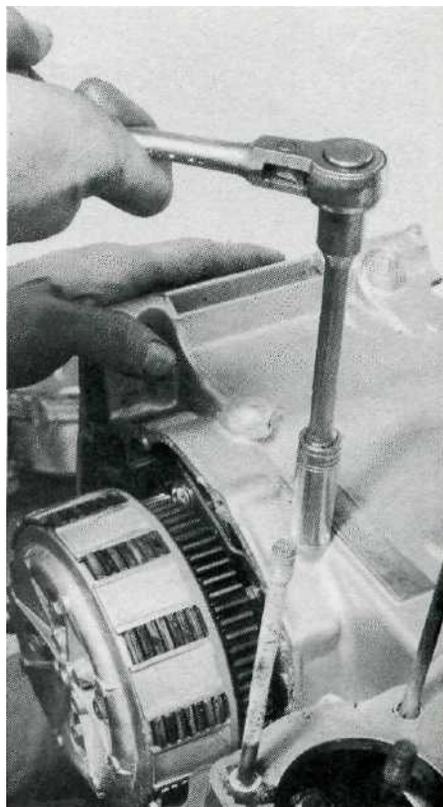
32 & 33. Remove the kickstarter lever and the clutch cover plate. The clutch itself can remain intact unless it, too, requires replacing or rebuilding.



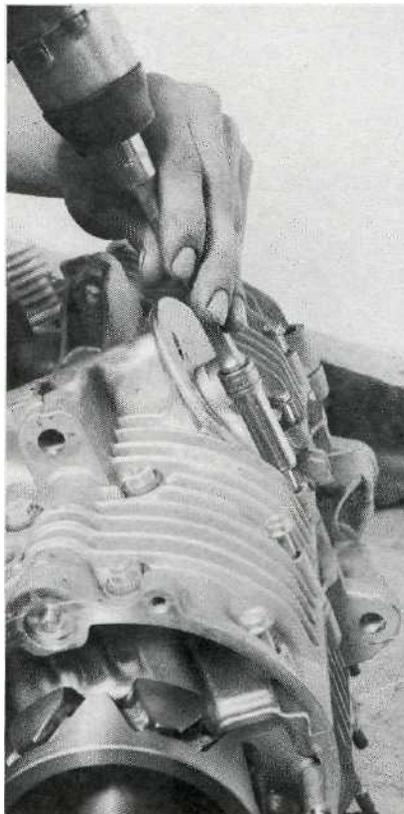
34 & 35. Remove the Phillips-head screws from the extreme outer edges of the contact point backing plate then loosen the nut on the end of the crankshaft that retains the contact point cam. Remove the nut, the spark advance mechanism and the complete contact point assembly.



36 & 37. Loosen the two bolts that hold the starter motor in place and pull the complete starter motor straight out of the side of the crankcase.

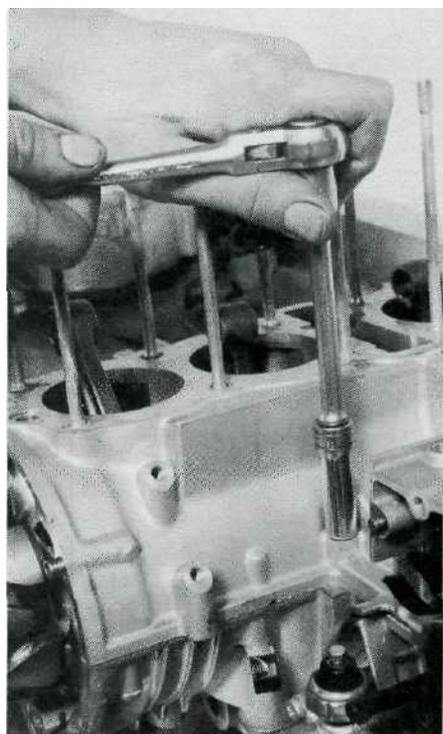


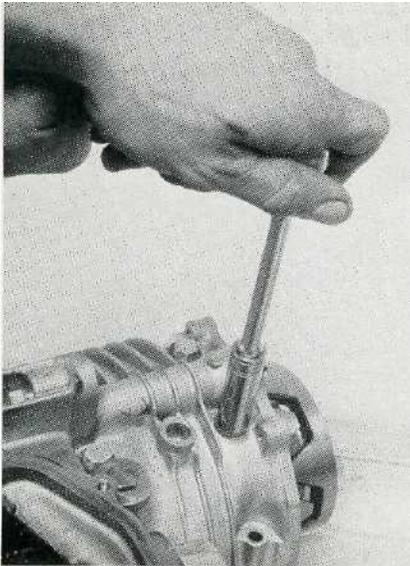
38 & 39. Loosen and remove all of the 6mm and 8mm bolts that hold the top of the transmission and crankcase together—there are about 16 more 6mm bolts and 13 more 8mm ones on the bottom but we'll get those later.



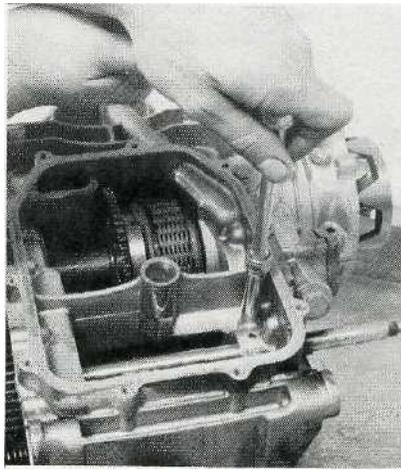
40. The crankcase can now be turned upside down to gain access to the bolts and parts on the bottom side. Remove the central bolt that retains the oil filter and lift both filter and element away.

41. You can now begin loosening the bolts that hold the crankcase halves together. Start with the two center bolts and work your way out towards both ends, turning each about a half-turn at a time to avoid warping the cases.

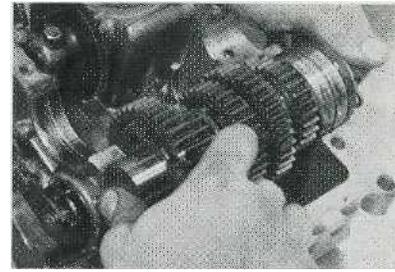




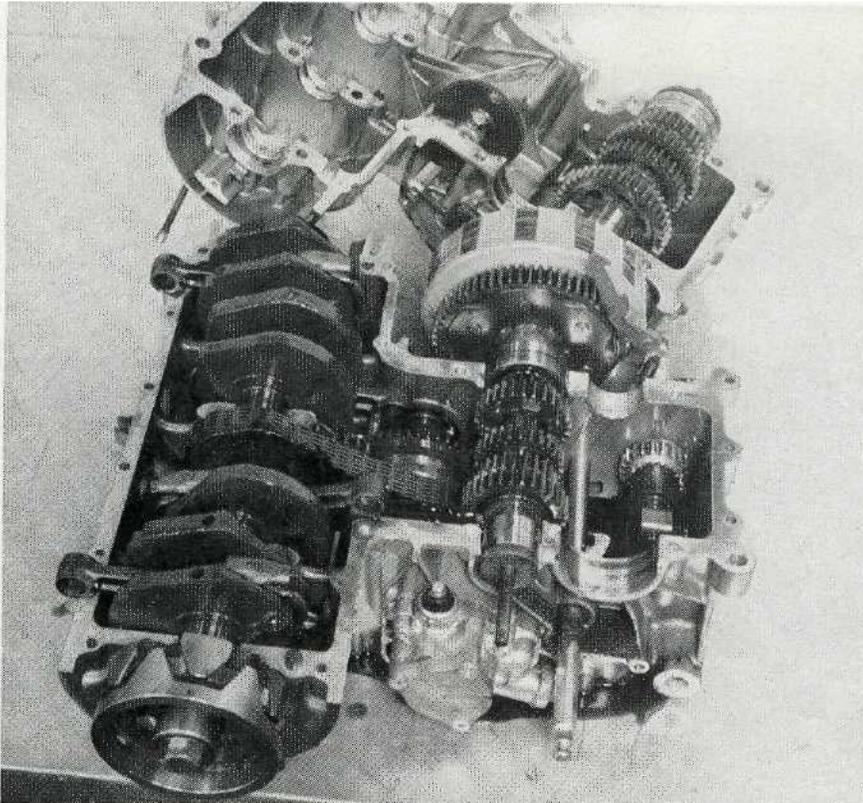
42. Watch the head of each bolt, as you remove it, for a number. There are two special 8mm bolts on the generator end marked "9"—each and every part of the engine, including the bolts, nuts and screws, should go back exactly as it was.



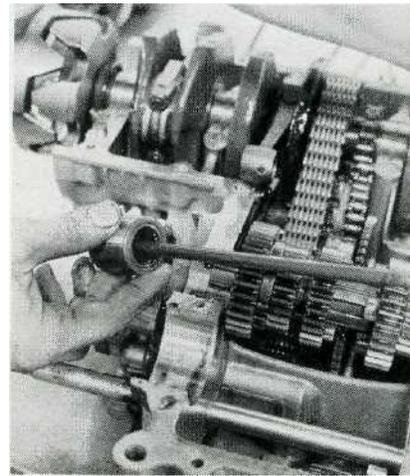
43. Remove the ten bolts that retain the finned oil pan and carefully tap the edges of the pan, if necessary, to free it. There's another 6mm bolt inside the transmission (shown) as well as three others along its back edge. When reassembling the cases, the 8mm bolts should be tightened with a torque wrench to between 16.63 and 18.08 foot pounds.



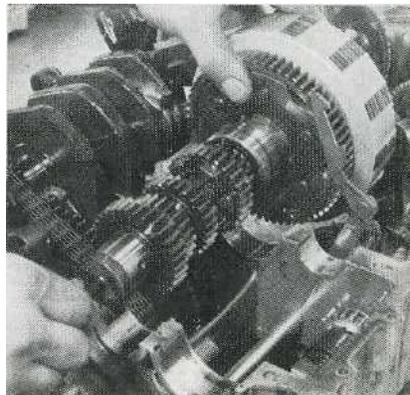
45. The countershaft will lift away from the top half of the crankcase. Take a close look at each and every gear for signs of excessive wear. The drawing illustrates the order of assembly of each of the gears, keepers and washers if you do have to replace any of the gears.



44. The crankcases should **now** be ready to be split apart. You may have to tap the edges with a soft-head hammer and pry, but oh-so-lightly, on some of the edges to get them apart. If they seem stubborn, look around for a bolt or nut you forgot—it doesn't take much effort to split the 500's cases. The bottom half is lifted away leaving the top half with the crankshaft and countershaft in the case and, the transmission mainshaft in the bottom half of the case.



46. Pull the clutch-actuating rod and the mainshaft's one bearing will lift out of the hollow mainshaft if you need to gain access to any of the transmission gears on the mainshaft.



47. The complete clutch and mainshaft can also be lifted gently from the crankcase top half (the clutch-actuating rod can remain inside).