Rebuild a Puch E50 Engine

http://www.mopedarmy.com/wiki/Rebuild_a_Puch_E50_Engine

Introduction

I just rebuilt a Puch E50 and took some pictures along the way. Hope that this helps some folks out there. Probably more for those that have never done it before and are thinking whether or not they want to tackle this. I may have done some things out of order or differently than some others would, but it all comes out the same. I am not proclaiming to be an expert on this in any way. There are many, many people that are more knowledgeable about this than I. However, I *am* proclaiming that I am the only one that has taken pictures of the whole process. Don't use this info by itself to rebuild your engine. Do use it in conjunction with a repair manual. Doing this is fun. Take it slow.

The steps I took will be followed by the picture of the step described.

Top End Disassembly

Before you remove the engine, drain the ATF out of it. Take the intake and exhaust off and disconnect the wires from the wiring block. Remove the three bolts and it should pretty much just fall on the ground. Catch it. You will need to find the master link for the drive chain and disassemble it in order to get the chain off the sprocket.

Once you have the engine out clear out a work space and get your supplies. In the picture below, I have a Top Racing crank and a Polini kit for this build along with bearings, new seals and gaskets.

See Puch bearings for specific bearing information.

Loosen the four head nuts.

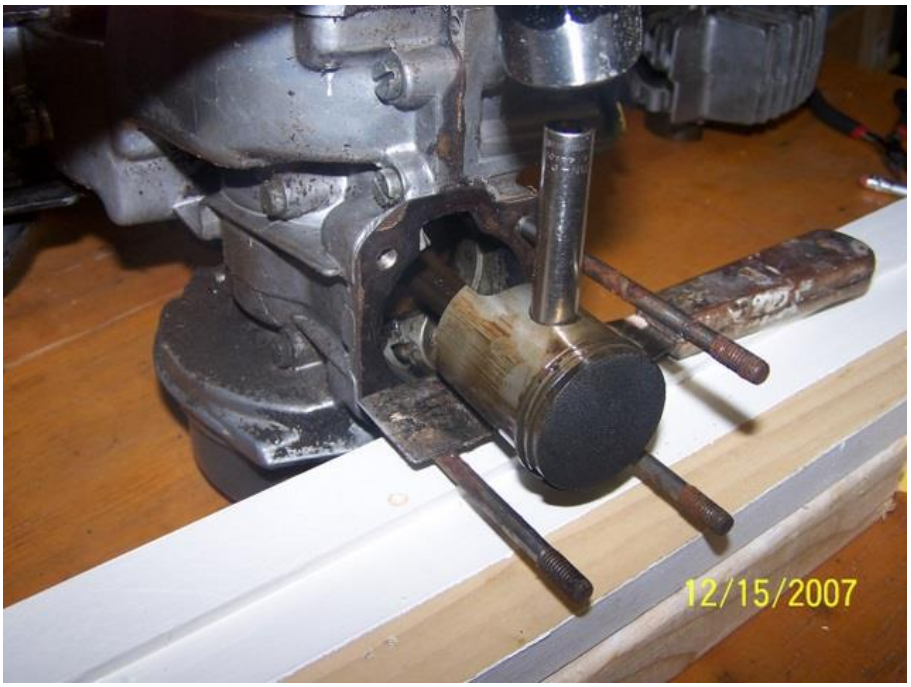
Sometimes the whole stud will come out with it. No problem. Mine are a bit rusty.

Take the head off. Throw the nuts and washers in a cup so you don't lose them.

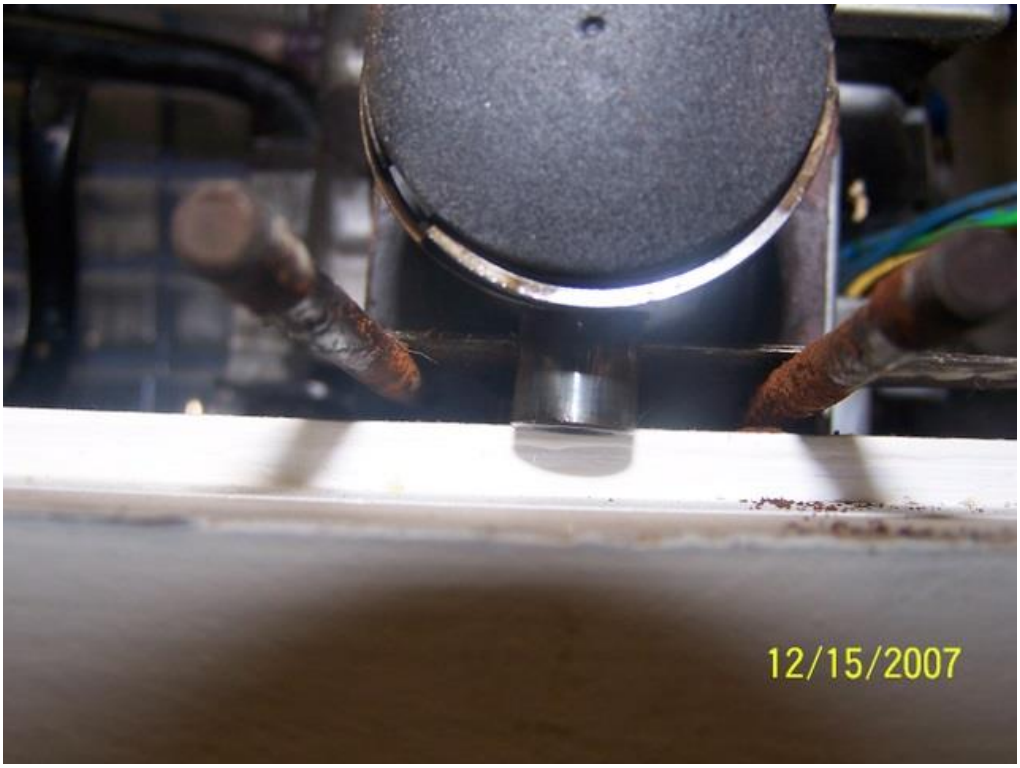
Slide the head off of the studs, leaving the cylinder exposed. It might take just a little wiggling but as long as it's not seized, it should slide right off.

Remove the little retaining clip that is holding the piston on the wrist pin. Use a small pair of pliers for this. Do it on both sides of the piston.

To remove the wrist pin, lay the engine on its side and put a putty knife under the piston and on top of the studs. I also place a board under the studs so that there won't be any stress on them. The board will take the brunt of the force applied. Make sure that you leave the bottom wrist pin hole open since you will be pounding out the wrist pin through it. I then take a socket that fits in to the wrist pin hole and tap it out with a hammer. Easy on the hammer. You don't want to be stressing the crankshaft by knocking it side to side.



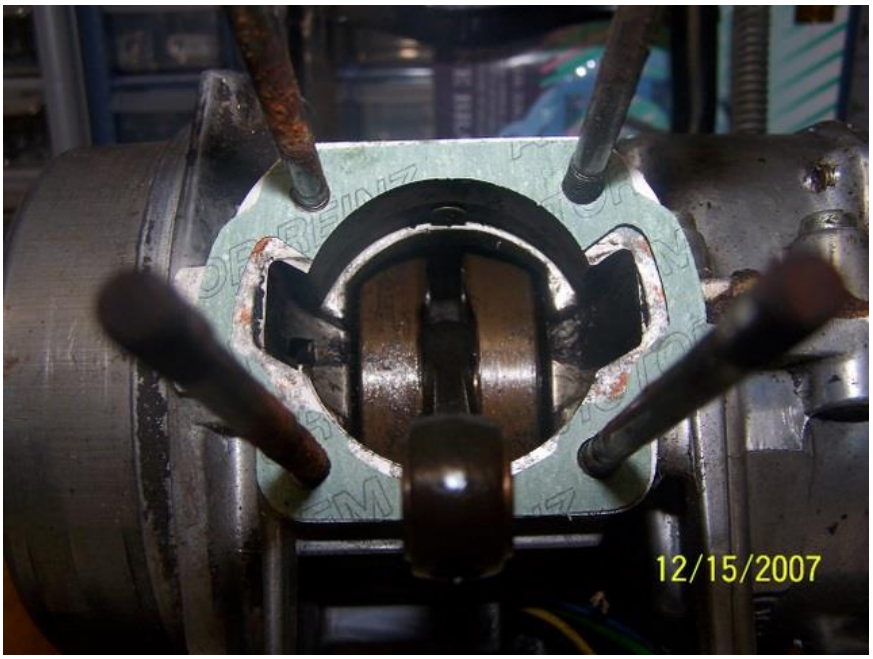
Another shot of that.



Once you get that wrist pin out, you can then pull the piston off. It'll look like this.

Case Matching Part 1 (optional)

At this point, since I was going to be putting a Polini kit on this engine I made my markings so that I can case match the kit to the engine block. This will result in better airflow and allow the kit to reach its full potential. I placed the base gasket that came with the Polini kit on.



Then I marked where the ports need to be opened with a Sharpie so that I know what material to remove from the engine case.

Here is what it looks like with the base gasket removed. Anything marked in black needs to be removed so that air flow can be improved with the performance kit. You can install a kit without case matching but if you really want to see some improvements do the case match.

Flywheel Removal

You could have done this earlier but I removed the kickstand now. Just three bolts on the bottom.

To remove the flywheel you can do it before you remove the engine with a piston stop of some sort (easier) or do it this way. I place two screwdrivers in a vertical position on the case opening. Take another screwdriver and put it through the hole on the end of the crank and turn the flywheel counter clockwise until the horizontal screwdriver rests against the vertical ones. Loosen the flywheel nut with a 14mm ratchet. The reason that you need to place the two screwdrivers vertical is because if you just rest the horizontal one against the engine case there can be enough flex in the screwdriver that can allow for a full revolution of the crankshaft when pressure is applied.

Then use the flywheel puller tool to remove the flywheel. Some people swear that you can hit it with a rubber mallet and it will come loose but I'm a big believer in getting the right tool for the job.

Once you pull off the flywheel make sure that you find the little woodruff key. It's the little half-circle piece of metal that makes sure that your flywheel lines up correctly on the crankshaft.

Remove the three screws that hold the stator plate in place.

Wiggle it a bit and pull it off. The wires will still be attached.

There is a little rubber grommet that the wires go through. This is so that water does not get in to your flywheel area. Slide this off the ends of the wires so that you can pull wires through that hole in the engine case. You should be able to fully remove the stator plate from the engine now.

Sprocket and Clutch Removal

Remove the little circlip from the drive sprocket. I use circlip piers for this and it is money well spent for this tool.

Once that circlip is removed you should be able to pull the sprocket off of the end of the shaft. There will be another circlip behind it. Remove it.

I then loosened up all of the screws holding the two halves together. There are 13 of them.

Then I removed the clutch cover by removing the four screws there.

This is what it looks like with the cover removed.

Separating the Case Halves

Now it's time to separate the case halves. To work them loose, I give a few whacks with a rubber mallet.

Lift off the case half and this is what you get. Not much there, is there?

Bearing and Seal Replacement

Pull out the shaft with the big gear. I'm going to show how to replace this bearing but this one rarely goes bad. At the least though, replace the seal with a fresh one. Pull off the old seal and the ring. Then remove the circlip as pictured below.

To remove this bearing, I used a three jaw puller as pictured.

To install a new bearing heat up the new bearing in an oven at 300 degrees for ten minutes or so. This will cause it to expand, making it easier to install. I hung mine in front of my heater that I had going at the time.

Drop the bearing on to the shaft. It is to rest against the circlip that is closest to the big gear on the shaft. If it doesn't drop right down then take a Puch seat post and pound it down. You want to pound on the inner race of the bearing and not the outer race.

Reinstall the outer circlip.

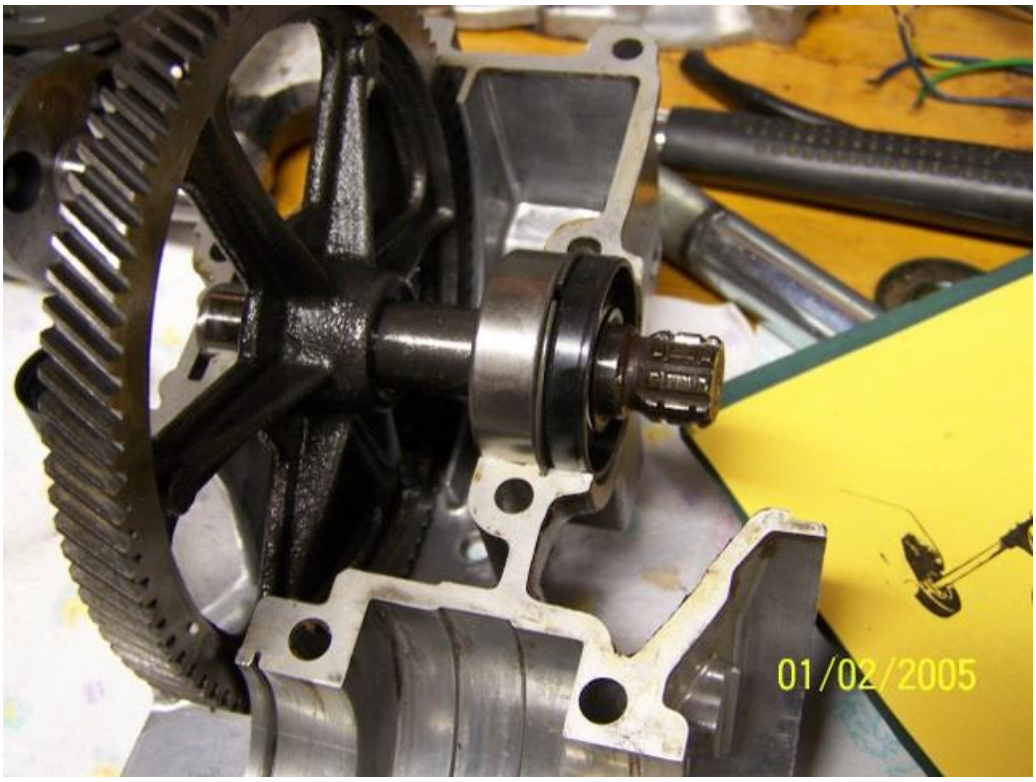
Put that steel ring back next.

NOTE·····Determine for yourself the oil seal orientation·····

Lube up the seal and install it with the lips facing out.

Here is that assembly loosely in the case.

Note: Most e50 primary shafts have a bearing on the short side also, as illustrated in the widely available '80/'81 Puch manual.



Grab the crankshaft and let's work on that one now. Remove the large retaining ring from the
clutch.

Remove the clutch starting plate.

Remove the clutch nut. Removing the clutch would be easier with a piston stop before the engine is off the bike. If you do it goofy like me, then put the circular part of the crank closest to the clutch in a vice and proceed my way. Remember, if you're smart, you'll remove the clutch using a piston stop. Anyway, carry on.

Clutch not removed.

Use a clutch puller to remove the clutch. This is a purchased specialty tool but you can make one also.

After you break the clutch loose, remove it. This is a three shoe clutch. In a stock Puch engine, you will more than likely find a two shoe clutch so yours may look a little different.

Remove the circlip in the clutch drum. There is a washer underneath it that can slide off too.

Pull the clutch drum off the shaft. There is a washer underneath it.

Remove the other circlip on the shaft. Also, remove the bushing.

This bearing is a bit trickier since you can't get a three jaw puller on it. Since you are replacing it, it is OK to mangle it. You can try to heat it up and hope to loosen it up or you can try the two screwdriver method to pop it up a bit. Sometimes this will raise it up enough to use a puller.

A ball joint fork (for cars) works well for this. Both methods will destroy your seal though so plan to replace them. In the picture I didn't have the upper circular part in the vice. Make sure you do that so that the forces on your crank don't deform it.

The other side works the same. Just remember what order things are coming off.

Put the bearing on the flywheel side as directed before. Pound it on with a seat post if you need to. Lube up a seal and slip it on with the lips facing out.

On the clutch side of the shaft, place a seal with the lip facing out and then install a circlip. The circlips locate the bearing on the shaft.

Note: Later model e50s have a larger ID seal that sits on a raised journal next to the lobe. The lip of the journal locates the inner side of the bearing, and there is no inner circlip, as illustrated in the widely available '80/'81 manual.

Next, install the bearing with the retaining ring towards the outside of the shaft. Pound it down until it makes contact with the circlip. Install the other circlip on top. POSSIBLE CORRECTION: OIL SEAL PLACEMENT
DISCUSSION :http://www.mopedarmy.com/forums/discuss/7/112975/112975/

Place the larger washer on top of the circlip.

Place the bushing.

Fit the clutch drum.

Place the smaller washer.

Install the circlip.

Install the clutch assembly.

Put on the washer and nut and tighten it up.

Put the starting plate back and reinstall the retaining ring.

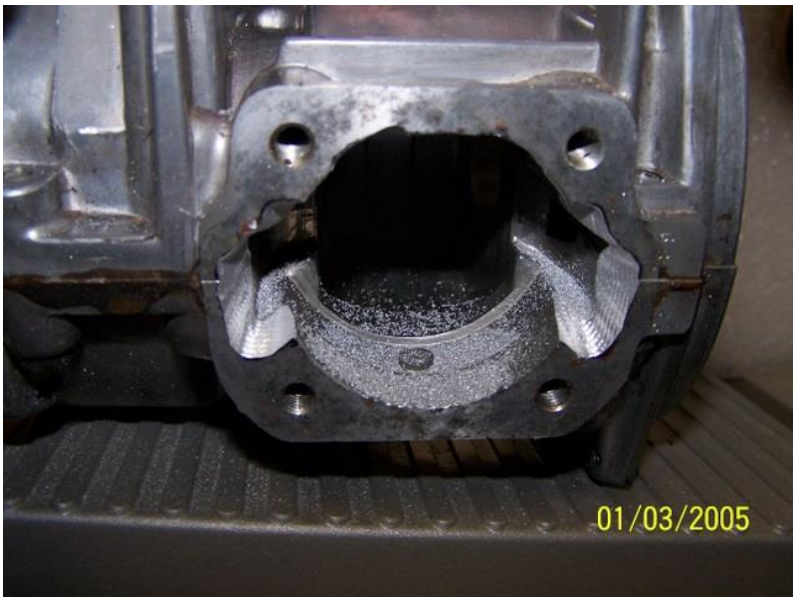
Case Matching Part 2 (optional)

At this point you are ready to start reassembling the engine. Since I am putting on a kit, I am going to show how I matched the case to the new kit. If you're not adding a new kit, skip this part. Remember how I made those marks with the marker before. Now I am going to grind that material away. The tool most commonly used for this is a Dremel. Work slowly and deliberately so that you don't take away too much material. I used a Rotozip and a carbide grout removal bit for mine. Take both case halves and put them together and tighten just the two front screws to hold it together while you do this. The case halves should be empty as you don't want this little metal dust getting all in to your nice new bearings. In fact, keep your new parts well away from where you are doing the grinding.

Here I am grinding one side of the case.

One side totally done.

Both sides done. At this point, you can take a finer griding device and smooth it out a bit as this surface is a bit rough. You can even follow it up with some polishing if you'd like. I don't go very deep in to the cases. Just enough to smooth out the transition a bit.



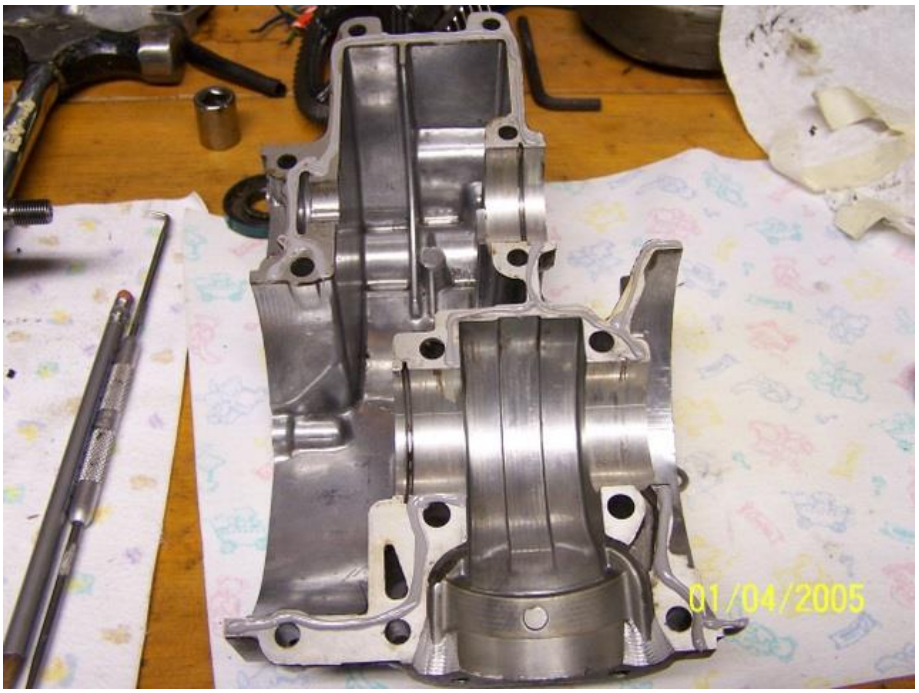
Clean-up

Disassemble and blow out the case halves with compressed air to get rid of the shavings. This might be a good time to clean your cases. I usually use a bucket with some gas and a solvent resistant brush that is used for parts cleaning. Takes some time but is well worth it.

Reassembly

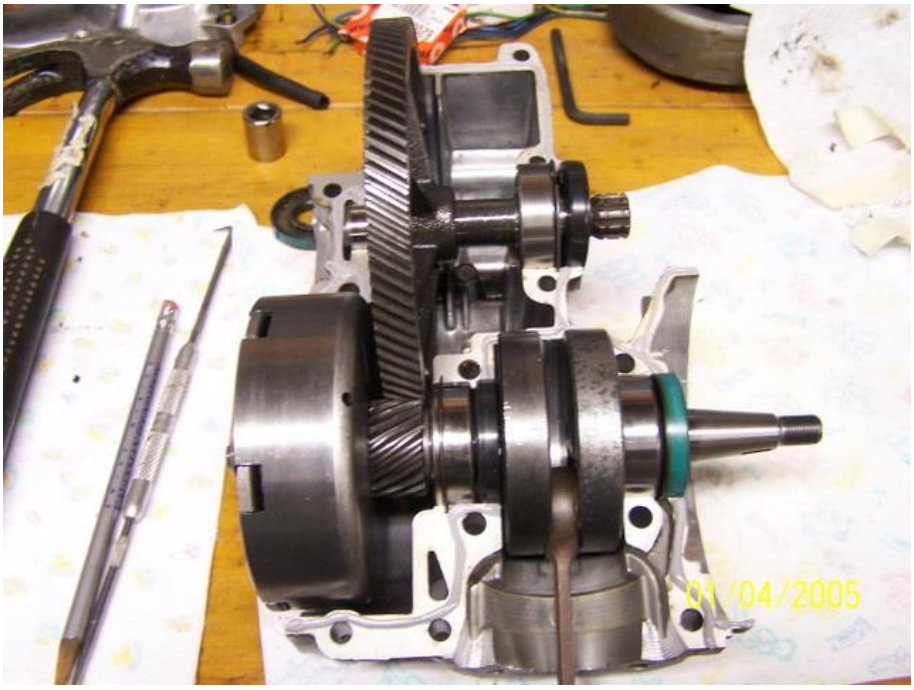
To seal the where the case halves join I use a product called Yamabond, available at almost all motorcycle shops. It just squeezes out of the tube.

This is all the areas where I put Yamabond. You want a nice tight seal otherwise your engine won't perform as desired.



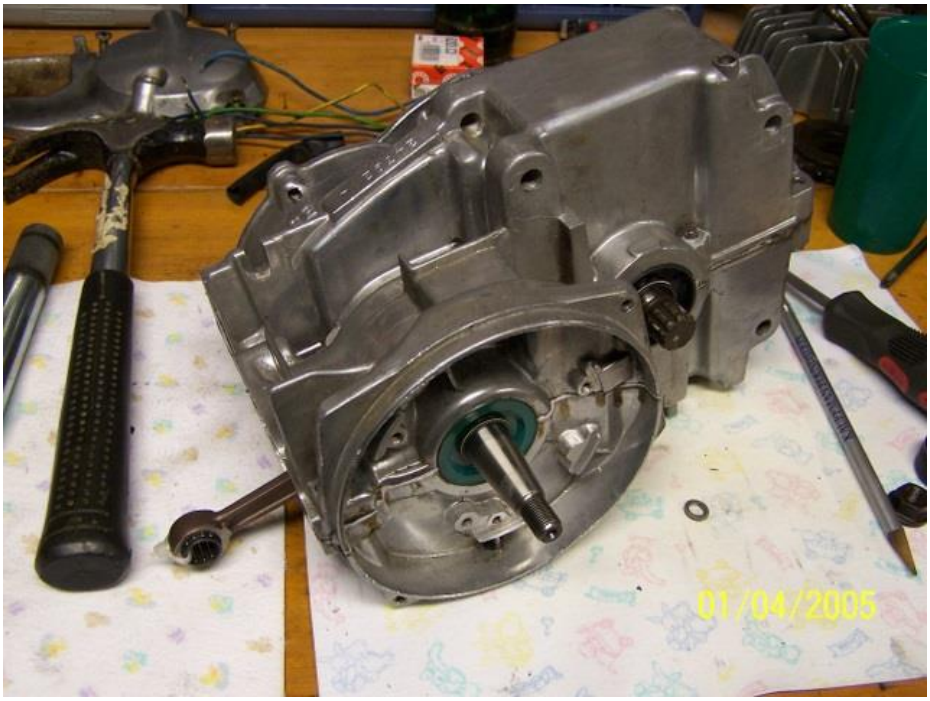
Drop in the crankshaft assembly.

Drop in the drive gear assembly. Put some oil on the part of the case where the non-bearing end of the drive shaft sits. This will help lube it up a bit.

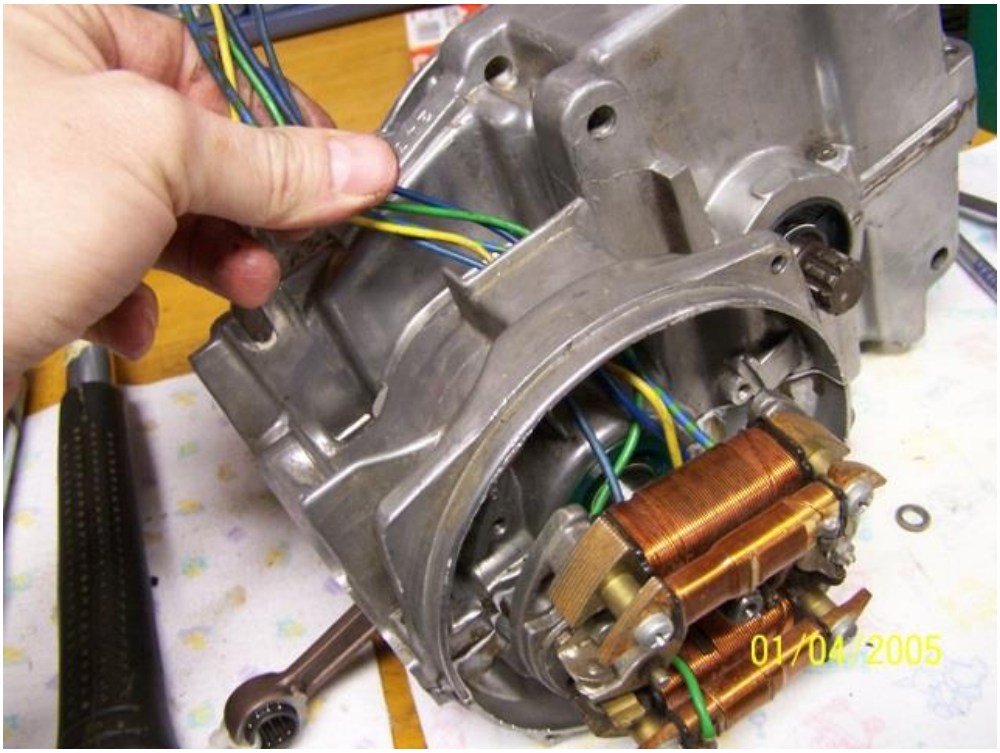


Make sure the seals are where you need them to be and pop the other case half on and start screwing. Work in a criss-cross fashion when tightening down the screws.

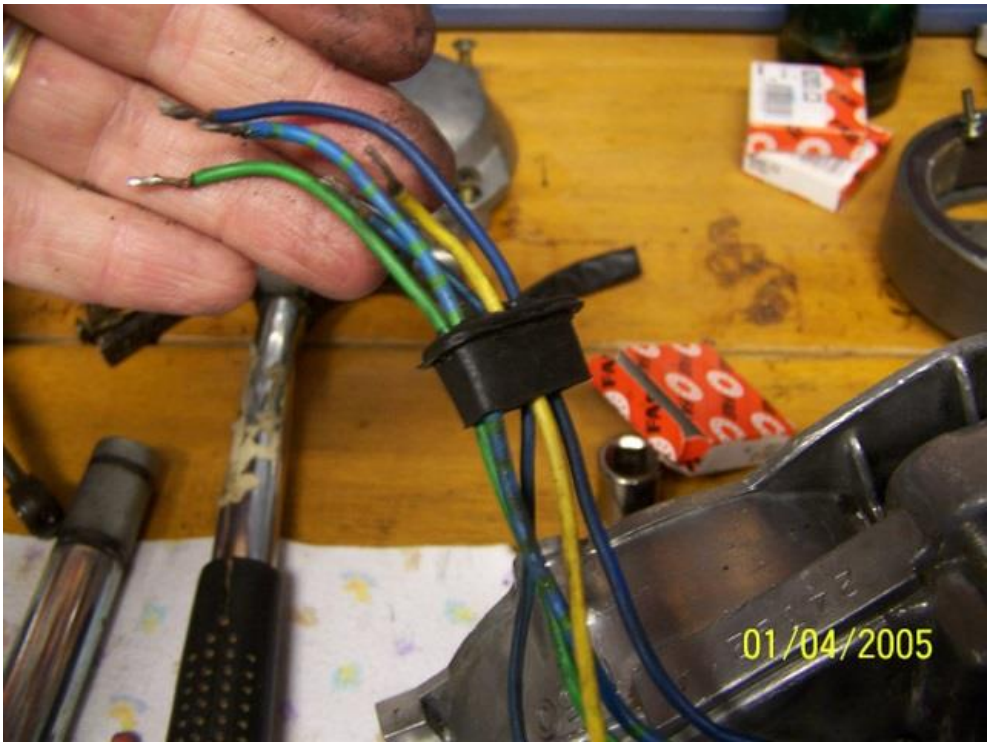
Here is the engine with both halves together.



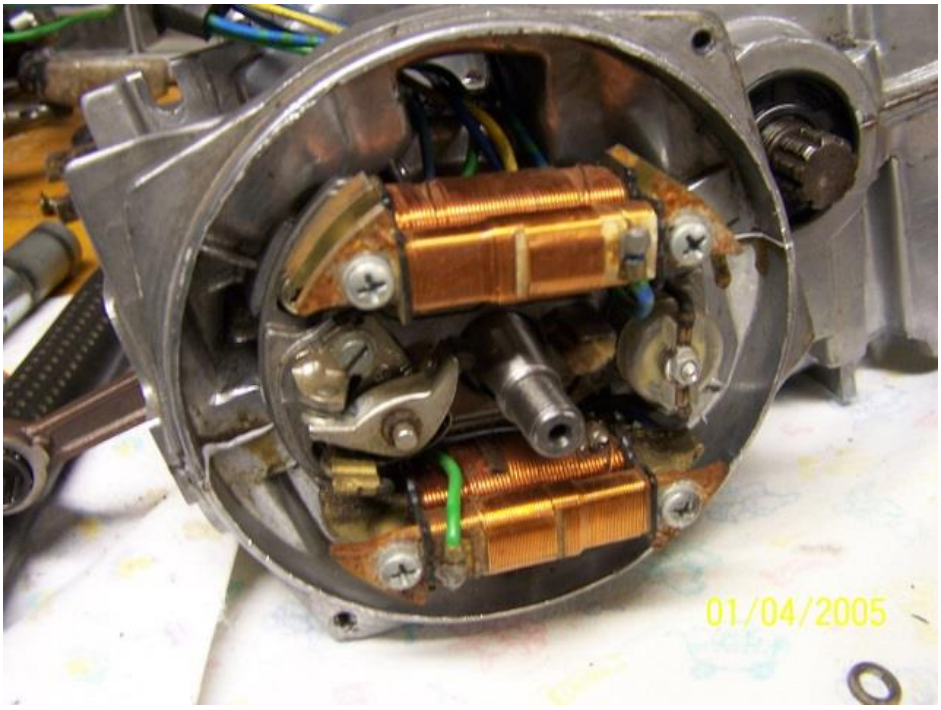
Pull the wires from the stator plate through the hole on top of the engine.



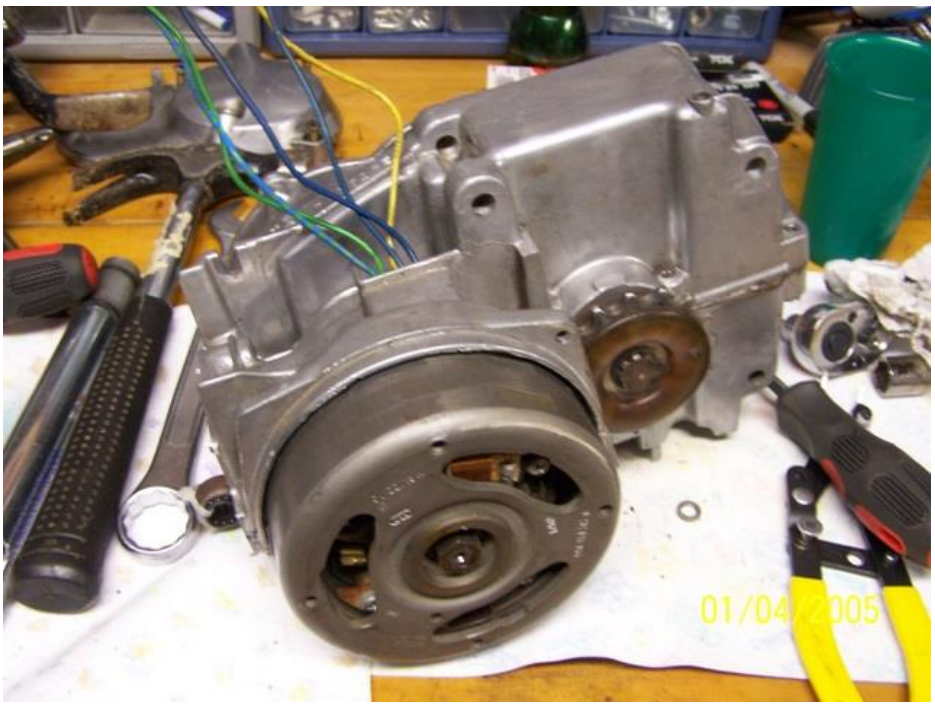
Feed the wires through that rubber grommet and slide it down the wires until it is firmly in the hole.



Screw the stator plate back on with the three screws. You can read how to set the timing from other sources once it is back on the moped.



Install the flywheel (don't forget to put that little semi-circle (woodruff key) piece back in before you install it!) and you're ready to install your piston, cylinder and head and you'll be back in business. Anytime you do a rebuild, it's a good idea to go a little heavier with the gas/oil mix to help break it in. Vary your speed and don't go full out right away. Let things settle in a bit.



If you're having trouble reattaching the kickstand spring, watch this.