Yamaha YDS3 Engine Rebuild

Strip and rebuild of a 1965 YDS3 engine.

Within this presentation, you will find details on how to correctly strip down a YDS3 engine. This is also valid for all of the vertically split crankcase Yamaha models such as the YDS2, YDS3, YM1 and YDS5.

Removing the engine from the frame

1. First step as always is to drain the oil from the bike whilst in the frame. Run the engine for 10 to 15 minutes if possible to warm the oil. The oil is drained by loosening the 17mm drain bolt on the sump and also the 17mm drain bolt on the clutch casing.
2. Whilst the oil is draining, remove the tank and seat if not already done. Next is to fully loosen the carburettor rubber clamps and remove the rubbers themselves.
3. Next, slacken the carburettors at the manifold by using an 8mm socket on 250 and 305 models, do not use a screwdriver as this chews the finish on the clamp bolts. Unscrew the carb tops and remove the slides from the bodies. I wrap these in bubble-wrap or similar and tape to the top tube out of the road, this prevents the needles becoming bent or damaged.
4. Unscrew the exhaust nuts from the cylinder barrels and also the 2 nuts on the silencers. The silencers (mufflers) can remain on the bike on low pipe models, high pipe models must be removed.
5. Next job is to remove the right hand engine cover to gain access to the engine sprocket. This is held on by 5 No 3 Phillips screws.
6. Flatten the lock washer on the front sprocket with a suitable drift. I use an air impact gun to remove the sprocket nut (32mm). You can also apply the rear brake and undo the nut against the chain tension. It is a standard thread. After removing the nut and the lock washer, split the chain and remove the sprocket.
7. Next is to remove the electrical wiring to the generator assembly. There are 5 wires to remove as well as the green neutral light connection. The stator assembly is held on by 2 long screws. The points cam is also removed by undoing the 12 mm bolt and pulling the cam out.
8. Undo the tachometer cable from the top rear of the engine and place along the frame top tube out of the way.
9. Remove the oil pump cover and disconnect the main oil feed to the pump. Pull this through the rubber grommet and plug the line with a 6mm bolt or screw. Place at a higher level than the level in the tank. Also undo the oil pump actuating cable and stow along the top tube of the frame.
10. I always remove the cylinder heads and barrels to make lifting the engine easier. Remember to disconnect the oil feed pipes to the cylinder inlets, these have an 8mm head.
11. Remove the 4 engine bolts and the left hand footrest, you are now ready to lift out the engine.

Stripdown of the engine

First job is to remove the sump pan by turning the engine over on itself. This is held on by 8 6mm No 3 Phillips headed screws. The shifter cam assembly is then taken off by removing the 4 screws in the corners of the assembly. This can then be gently levered out after the linkage is removed. This is done by removing the 2 circlips and then the special washers and springs. Note the way these come off. These were not present on this engine as can be seen. A nut had been forced on one side and the wrong circlip forced on the other. Be careful as after the cam assembly has been removed, the end of the shifter shaft sits proud of the base of the engine. Support the rear of the engine with a bit of 2 by 2 wood.



The bottom of the oil pan was found to contain bits of clutch plate and 4 broken gear teeth as well as a fair bit of sludge. This does not look good for this engine!



The rotor is removed by installing an extractor bolt into the threaded portion of the rotor. This was not required on this engine due to it already being a loose fit on its shaft. This will require replacement due to damage to it from being loose.



Remove the tacho drive gearbox by taking out the 4 Phillips screws and then gently prizing it from the casing. Also remove the breather bolt from the back of the crankcase if fitted. Next remove all 8 clutch casing screws, noting the 2 longer screws that go though the location dowels. Gently tap the cover to break the seal. Be careful when pulling the 2 plastic oil lines through the hole in the crankcase, these can be very fragile.



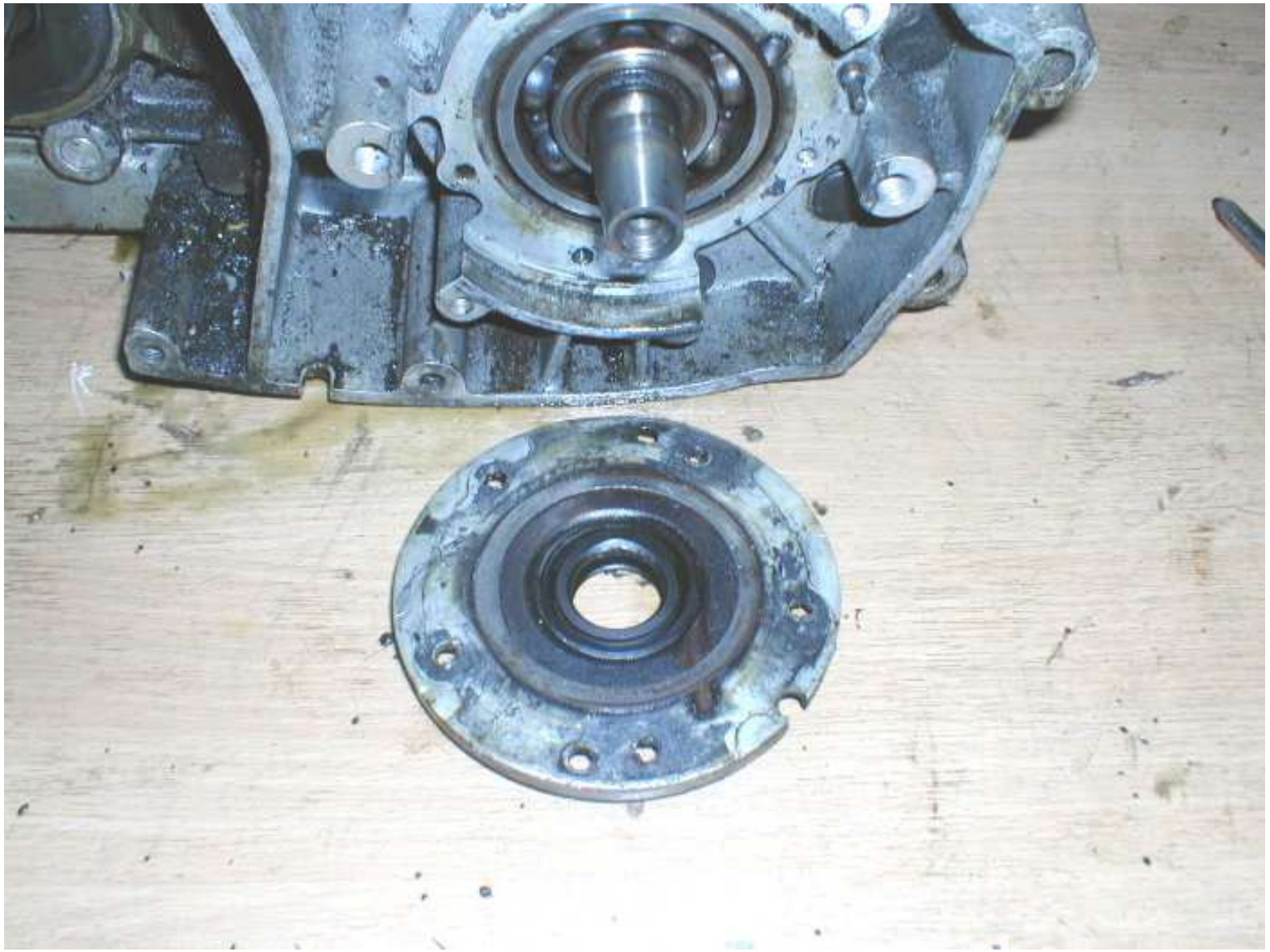
It was noted on this engine that the crankseal was sitting proud of the case. I have seen this a couple of times on engine that have been rebuilt incorrectly in the past. This is usually due to oiling the seal before hand. Remove the nut on the clutch and bend back the lock tab on the big primary gear. I remove the nuts with an impact gun but you can lock the gears by putting in a rag and turning against that. This causes no damage. The sizes are 26 and 29mm. Remove the clutch noting the location of the shims. Remove the primary gear after removing the clutch. Pull out the spacer that the crankseal fits over and prise out the old seal.



Next, remove the 5 screws that hold on the right hand crankseal. Gently prise off the seal plate noting the thin shim inside. Note the oil at the bottom of the plate, a sure sign the seal has been leaking. This lets you also see the condition of the main bearing when removed.



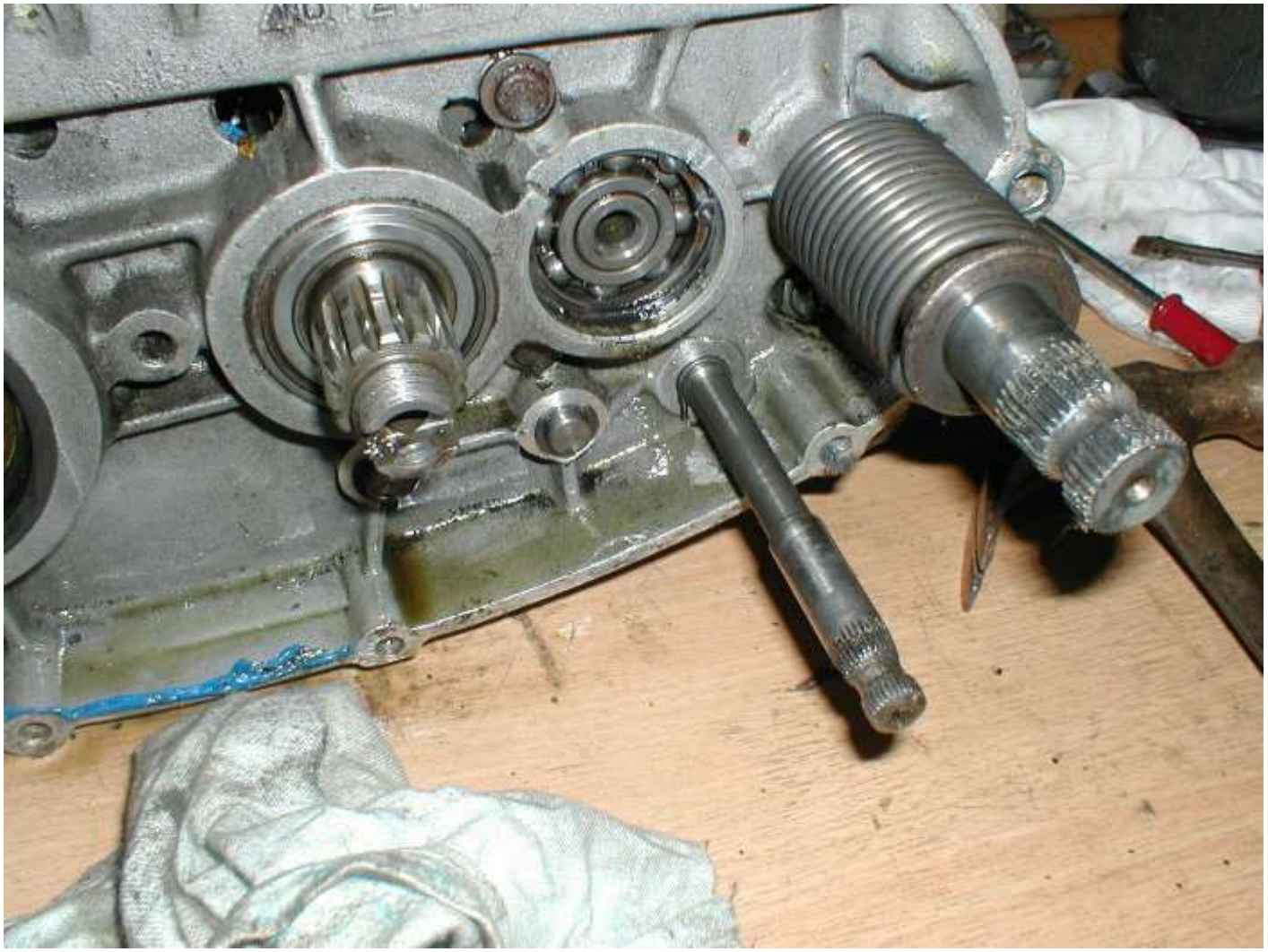
A picture showing the removed seal plate and the thin shim that sits inside the plate. The main bearing was found to be partially seized and had been spinning on the crankshaft. The crank seal was also found to be damaged.



A picture of after removing the left hand crank seal. You can see the oily brown deposits staining the metal surfaces. This crank bearing was scrap as well.



Staying on the left side, the oil catch trap is removed from the end of the gearbox lay shaft. This is gently prised out. The circlip holding the gear change shaft is also prised out at this point. The 2 small E clips are also removed from the ends of the selector shafts. The shafts are then gently tapped flush with their holes so that the 2 E clips on the inside of the casing can be removed. The 2 shafts are then slid out and the selector forks removed noting their position on the shafts.



I replace the E clips onto the shaft to save loosing them and also placing the selectors on in the same way that they came off. These selectors were found to be scrap, the engine has been run low on oil at some time and burnt the faces of all 3.





Next job is to remove all the casing screws on the left hand side of the engine so the cases can be split. Remember to remove the 3 rubber covers from the front 3 screw holes. There are 12 screws to remove. Attach the case splitting tool and tighten the 2 mounting bolts evenly. Gently apply pressure to the main screw until the cases start to move. Align the conrods so they do not catch as you turn the splitting tool. Gently tap the gearbox mainshaft to loosen it in the bearing. Repeat this process for the right hand side to pop the crankshaft from the crankcase.



After the casings have been split and the crankshaft removed, pull out the gearbox shaft noting the location of any shims that have been installed. These will be needed to be put back in the same place on re-assembly. I mark them with different coloured zip ties. This gear shaft was found to be scrap due to corrosion and also the broken teeth on the kick start gear. Most gears had corrosion marks on them.



To remove the kick shaft, prise up the spacer on the outside of the shaft. Next, unhook the spring from the shaft and release the spring tension. The spring then pulls off and the circlip and washer are removed before the shaft is pulled out. This casing was found to be cracked in 3 places, this will be repaired by welding the cracks and fitting an insert into it which is then machined to size.



The crankshaft also has shims either end. The generator side has one like this, the clutch side has one similar to this and also a large shim (4mm thick) that sits over the small one.



All that is left is to clean all the removed parts and also remove all bearings from the crank case and gearbox. The left hand main bearing is retained by a circlip on either side. These are removed and then the bearing is drifted out. The 2 main shaft bearings in the left hand crankcase have a circlip and shim in the middle of them. Drift the circlip to the side and then drift either bearing out to free the shim. I strongly recommend to replace all bearings and seals while the engine is apart since a leaky seal when the engine has been rebuilt is nothing but a nuisance!

A good acid based cleaner brings up the finish of the crank cases quite well. A stiff brush is used to clean between the fins at the front. I use a sharp scalpel blade to remove traces of old gasket and then fine steel wool to finish. Vapour blasting is a good refinish for older sandcast casings.