TECHNICAL TIPS #24
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1340 CRANKCASE REPLACEMENT

We visited several dealerships to better understand why crankcase replacement time allowed in the job code manual was being criticized for being too short. We learned a lot and thought that a description of the procedure we use would benefit all of you. It's a lengthy Tech Tip, we know, but reading through it could make the whole job much quicker and easier.

When replacing a set of 1340 crankcases, there are a number of things to consider. First, remember that your efficiency decreases as the length and frequency of pauses or interruptions increase. Second, rebuilding or updating the engine should be performed at the direction of the customer and at his expense. Third, the parts you know you will need should be pulled and ready. You may need additional parts, but you won't finish even the basic job without these.

Remember, 1340 engine cases now come with the left main races installed. The remainder of the bearing set is in the box with the cases.

Nomenclature	Quantity	Part Number
Pinion bearing,white	1	24626-87
Pinion bearing,green	1	24628-87
Pinion bearing,red	1	24641-87
Pinion bearing,blue	1	24643-87
Cylinder studs	8	16837-85A
Engine gasket kit	1	17035-83B
Oil pump circlip	1	11002
Pinion bearing circlip	1	11177
Primary O-ring	1	11147
Primary gasket	1	varies w/model
Stator screws	4	varies w/model
Timing cover rivets	2	8699
Hose clamps/fuel	varies w/model	10014
Hose clamps/oil	varies w/model	10080

The following procedures are a guide and don't include every detail.

ENGINE REMOVAL

First, disconnect the battery. On FXR models, you can avoid draining and storing the fuel tank by tipping it forward to gain access to the top motor mount area. Prop it up with a block of wood or the like, but be careful of the front edge of the tank contacting the front fork, especially if the

front end is allowed to turn at all. Other models may require fuel tank removal.

Whenever possible, remove the entire exhaust system as a unit. Shorty duals are good candidates for this time saver. FLT's, FXRD and CHP's vehicles exhaust systems must be disassembled some before removal.

On FXR's, you can remove the top motor mount as a unit with coil still attached. Don't disturb the stabilizer link's adjustment either.

Remove the vehicles footboards only as needed. On FLT's, the engine will clear the rear brake pedal during removal. When removing the rear brake pedal from FXR's, disconnect the assembly from the frame and the master cylinder actuating rod instead of struggling with the press fit clevis pin at the pedal itself.

Operations like removing the primary cover are best done with air tools. They save lots of time and effort, and you cannot work on a job of this nature efficiently without them. With the primary cover off, you can remove the compensator nut and primary chain adjuster nut. Many times, normal wear of the primary chain will allow you to remove the compensator assembly and sprocket without pulling the clutch hub. This is especially time saving on 84 1/2-89 models. If clutch hub/basket removal is required, see the service manual for the most efficient method. Noting the position of each sprocket shaft spacer as it is removed will avoid confusion during reassembly and will prevent having to re-align the primary chain altogether. Removing the inner primary on 89 and later models is a waste of time. It's not even required on earlier models, except to pressure test the left case area.

Since we're trying to consolidate operations on each side of the vehicle as we go, now's a good time to remove the four engine to primary bolts. On rubber mount models, you can prop the inner primary in position or support the transmission with a jack prior to removing the engine. This will make getting the engine/primary assemblies realigned later much easier.

Once you've disconnected the carb from the manifold, along with all the engine mounting bolts, hoses and wires, you should remove the engine as a whole from the chassis. A 3/8th's bolt and hose clamp will allow you to plug the oil feed hose off neatly, and will eliminate the need to drain the engine oil. On FX models, the oil filter mount can be swung out of the way once the filter itself is removed. On rubber mount models, do not disturb the setting of the front stabilizer link, just swing it out of the way. The front motor mount plate may stay in place to ease engine re-installation as long as it is checked for bulge and the center mounting bolt is loosened and retorqued. Unplug the sensor from the module, but don't remove the sensor from the gearcase cover.

On FXRT/FXRP models, the fairing must be unbolted from the lower right mounting bracket and propped up a tad to clear the front rocker box during engine removal.

BENCH WORK-ENGINE TEARDOWN

Once you've got the engine up on your bench, bolt it to a conventional engine stand using only two bolts, on the left side, front and rear. This will hold the motor plenty still and still let you split the cases later on. The engine stand should be fastened to the bench. Bolting it down works good, but takes a lot of time. C-clamping the stand to the bench is much faster and will hold everything in place well enough to properly remove and install the cylinder head bolts. Once the head bolts have been removed properly (1/8th turn at a time in a cross pattern), unfasten the stand from the bench and place a catch tray underneath it. This will save your bench and the surrounding floor from the oil left in the flywheel compartment when you split the cases, as well as the clean-up time.

Now pull the rotor off and remove the stator (discard the old fasteners). If you flip the rotor over and slip it back on the sprocket shaft, you'll have a quick and easy way to rotate the engine by hand while it's on the bench.

Moving to the top end, let's remove the rocker box assemblies, keeping the lower's, shafts, and rocker arms intact. To prevent the lowers from warping, make sure both valves are in the closed position on the lower you are removing and that you unfasten the bolts in increments and in a cross pattern. An air rachet will allow you to unload the initial clamp load manually, and then spin the fastener out quickly and easily.

Now for the pushrods. If you can still make out the color of the stripes on them, then labeling them is unnecessary, just keep tract of top from bottom. If your particular engine has been fitted with adjustable pushrods, it's not necessary to collapse them for disassembly, just keep them with their original cylinders. The short pushrod will always go in the intake position, and proper re-installation of the rocker box lowers during engine reassembly will bleed down the lifter just as a OEM pushrod would do, saving you the trouble of a complete pushrod re-adjustment.

When you remove the heads, you should scrape the gasket surfaces and blow any loose carbon from the combustion chambers. Further de-carbonization is unnecessary. Now pull the cylinders. No rags under the pistons are needed, just take care that the piston skirt isn't damaged by striking the cylinder studs. Examine the cylinder walls and piston rings and scrape the cylinder's base gasket surface. If rings need replacement (PHD video 125, 1340 Crankcase I, provides some guidance on this subject), remove the pistons now, otherwise just protect the entire piston in place. A shop rag wrapped around the piston and secured with a stout rubber band works

great, just make sure the rag doesn't hang below the piston's skirt, or checking the flywheels for true will be difficult. Don't bore or hone cylinders needlessly (see PHD 125), but if honing is required, don't forget that it is a separate operation, and extra time is allowed for it under a separate labor code.

Once the gearcase cover, pinion gear and oil pump drive gear are pulled, you can take off the oil pump as a unit by removing the oil pump driven gear snap ring and tapping the oil pump body gently to loosen it. You should always replace the two oil pump body gaskets during re-assembly, but the oil pump shaft seal can be re-used if you don't submerge it in solvent. Unless there are signs of contamination, complete oil pump body disassembly is not required, just wipe the gasket surfaces dry.

When you're ready to remove the case bolts, remember that the replacement engine cases come with a new set of case bolts, so don't worry about driving the old ones out. Don't worry about gasket surfaces on the old cases, either. You can split them with gasket scrapers or the modified stabilizer link tool, a la crankcase video. Once they're split, you can unbolt the left case from the engine stand and press out the crank. Leave the old pinion bearing on the shaft for now to protect the pinion shaft's bearing surface.

Place the crank in a flywheel stand (HD-34813 for example) with the sprocket shaft pointing up and remove the old inner left main roller bearing. A knife edge bearing separator and a two bolt cross puller seems to do the best job. You can use the bearing separator with a two jaw puller, but it's not as safe or fast.

BENCH WORK-ENGINE REASSEMBLY

Once the left bearing is off, and you've dressed up any small nicks the bearing separator may have left on the sprocket shaft area, you can flip the crank over in the stand. Remove the old pinion bearing and inspect the bearing surface underneath. If it is servicable, now's the time to measure it and select the proper size replacement bearing based on the replacement crankcase's class code and the pinion shaft diameter. The chart is in the service manual.

Checking the flywheels for true is up next. This operation has it's own set of labor codes, so be sure to select the correct code to receive proper credit for the operations performed. The wheels can be checked for true with the pistons attached, but if they prove to be out of true, remove the pistons from the rods before administering any blows.

With the flywheels true, replace the crank in the flywheel stand with the sprocket shaft up. If you decide to warm the new left main bearings to ease installation, as shown in the video, nows the time. While the bearings are warming, you should transfer any needed fittings from the old crankcases to the new, as well as installing the new cylinder studs.

Once the new left main bearings are warm enough, slide the

inner over the sprocket shaft (don't put it on backwards) and seat it with the bearing installation tool. Follow with the bearing inner spacer, left case, outer left main and snug everything down with the bearing tool.

If you have one of those "cylinder-style" engine stands shown in the video, put it to use now. Make sure the pinion bearing snap ring is fully installed in it's groove and join case halves together with the proper sealant, tightening the case bolts as per service bulletin M-1011, to the first torque stage.

Now make with the oil pump. If you hold the new pump gaskets in place with a dab of Hylomar, you will avoid gasket shift and the resulting oil pump bind that comes with it. Slide the pump drive shaft into the pump driven gear as you install the pump and then insert the driven gear key in it's slot and on with the snap ring. During the oil pump bolt tightening process, it's a good idea to rotate the oil pump driven gear by hand from time to time to check for any binding that might be occurring (since you had to pull the pinion gear to get the pinion bearing off anyhow, you can slide off the oil pump drive gear too, which makes this checking for bind procedure possible).

When installing the pinion shaft nut, don't forget the Loctite. Once the gearcase cover is on, you can verify that breather gear and cam end plays exist. Remember that camshaft end play specifications have been opened up. With the engine in this position, you can install the tappet blocks and lifters without the lifters constantly wanting to fall into the gearcase, but hold off torquing them to their final torque until you replace the engine in the conventional stand (you can do that now).

Install pistons and rings if needed, (protect those new studs) then cylinders and heads. When tightening head bolts, please use that all important torque-turn method detailed in the service manual. Now you can apply final torque to the case bolts using the proper sequence.

When you install the first lower rocker box, the lifters will take a little while to bleed down. This will delay your rotating the engine into position to install the other rocker box. While you're waiting for that oil to ooze out of the lifters is a good time to install the stator (with new Torx fasteners, of course). Some Hylomar on the plug lead will prevent seepage later on, and some blue Loctite on the lead wire clamp screws will prevent any oil transfer around them. If the pushrods still aren't ready to spin freely, there's time to install the left main bearing seal and spacer. That new seal installation tool, Kent-Moore number HD-39361, works with the left main bearing installation tool to press the seal into place evenly. This even pressing, along with a thin film of sealant applied to the o.d. of the seal itself assures an oil tight seal at this location.

Waiting for the lifters to bleed down under the second rocker box is the time to install the 11147 engine to primary o-ring in it's counterbore in the left case. Since it's

impossible to observe this o-ring at all times during engine installation, we recommend a film of Hylomar be placed in the left case counterbore. Not only does the Hylomar hold the o-ring firmly in place during installation, but it aids in sealing this critical area later on.

With all lifters now bled down, the pushrod ball to rocker arm socket engagement can be checked by rotating the engine by hand and observing same (unless you've already put the rocker box tops on). Now is a good time to recall the contents of Service bulletin M-984. If the engine you're working on has the "lip-less" rocker box lowers described in the bulletin, you can prevent leakage here by using the prescribed sealant and a cork gasket in the lower position. The cork gasket is available under PN 17355-84, and it stays in place in that type of rocker box far better than it's neoprene counterpart.

Once the intake manifold has been re-installed, the engine is ready to go back into the chassis. During engine installation, don't forget to install all the sprocket spacers in their correct positions before you install the sprocket shaft extension.

To assure correct engine to primary alignment, please observe the fastener tightening sequence outlined in the service manual.

Efficient crankcase replacement requires careful thought and a fair degree of skill. We hope that this material will help you improve your efficiency.