


Rebuilding your Transmission

Petroworks


Everything starts with simply draining the oil. Check the oil as it comes out for metal shavings or flakes. Large metal chunks could be a bad thing depending on where they came from. If the shifter locator pin has broken off in the past it will eventually end up down here in the bottom of the case. If it got wedged in the gearing on the way down, then you may have more to replace than you planned on.


Next it's time to go inside to check out the condition of the components. To do that you can start at the back and remove all the bolts holding the tail housing to the main section. Don't forget to remove the reverse shift rim bolt. You can see the arrow pointing at it in the photo on the left. When you remove it you will notice that it looks pretty unique... Don't lose it, we will talk more about this later.


Separate the tail shaft housing (extension case) from the main section and turn it up on end. Here you see the tail shaft seal. You should take this time to replace it and then clean out the case. Then set it aside for later.


Next we go to the front of the transmission and remove the clutch release bearing. Now you can see the 8 bolts that hold the input shaft bearing retainer in place. You will also note that even when the bolts have been removed, it is very difficult to remove the retainer.


There are three small bolt holes that look unused, these will help. Use 3 conventional 6mm bolts to 'pop' the retainer from its home.


Here is the input shaft seal. It is the other seal that needs to be replaced during a rebuild. Replace it and then set it aside and turn your attention back to the case.


Removing the upper case reveals the main shaft assembly. This can now be lifted easily from the case and set aside for now.


Back at the lower case, you can easily remove the reverse gear shaft and idler gear. Set it aside. Next we turn our attention to the countershaft.


Using a bearing puller, remove the countershaft rear bearing. This is the first of three bearings you will replace on the countershaft.


Being careful not to damage the gear teeth, remove the countershaft 5th gear and the countershaft reverse gear. They both just slide off of the countershaft.


Now we go to the opposite end of the countershaft and remove the c-clip from the end of the countershaft, and the large c-clip that surrounds the countershaft front bearing.

The factory service manual says to press out the countershaft using a hydraulic press. I accomplished the same thing using a brass drift and a small sledge hammer. Do not use the hammer by itself, you WILL damage the countershaft and you run the risk of cracking the case if you miss...


You can see the progress at the other end as the other bearing slides out. Be careful as the bearings leave the casting, do not damage the gear as it enters the race.


Using the bearing puller again, remove the bearing without damaging the gear behind it.


You can then pull the countershaft up and out of the lower case. Then remove the remaining bearing with the bearing puller and then reverse what you just did. Install new bearings and reassemble the countershaft and reinstall it in the lower case. Set the whole assembly aside and turn your attention to the main shaft again.


When you first look at the main shaft, it may appear very daunting. But as long as you have a large workbench where you can lay everything out in order (and you have your Factory Service Manual handy) it's not really tough. This is actually two shafts. The main shaft has the input shaft at one end. You can see it being carefully removed in the photo to the right. The high-speed synchronizer ring may be loose on the end of the input shaft when you separate the shafts, be sure to keep the parts in order. We will come back to this later.


On the end of the main shaft (where the input shaft had been) you will find a needle bearing. This is unlike the larger bearings you have already replaced because there are no ball bearings in it. This kind of bearing is for close quarters, looking more like a sleeve, it uses long cylindrical bearings that ride on a larger surface. Set this aside, keeping the components in a line to insure the right order of assembly.


Remove the circlip, and pull the third gear, synchonizer low speed hub and needle bearing off all at once. You can keep them together to make it easier, but remember to replace the needle bearing with a new one from the rebuild kit. Set it face down on the workbench in its place in the order.


Starting at the other end of the main shaft, carefully remove each bearing, and its set of gears and put them in line on the table.


There are circlips along the way that retain each gear set, so don't force anything until you have checked for one of these suckers.


Your rebuild kit should include all of the main bearings as well as the needle bearings, so remember to swap in the new components as you go.


As you (carefully) pull the main shaft assembly apart, you will notice three (3) ball bearings in the mix. Don't lose these. Also, don't try to remove a component if there is a ball holding the component in place. Carefully remove the ball and place it in the assembly order.


Once the shaft has been disassembled, go back through the parts you have removed and make sure you replace all of the bearings with new components that look identical.


Then reassemble the shaft in the reverse order that you took it apart. This is where keeping everything in order makes the difference.

For a reminder of the order, take a look at **this**. The main bearings will need to be pressed back into place, so be careful not to lose track of the ball bearings shown above.


The needle bearings should slide easily with no obstructions. And don't forget the circlips as you go.


Remember the input shaft we set aside earlier? You will need to replace the bearing on the end of the input shaft. Use a bearing puller for removal and then press the new bearing into its place. Then slide the input shaft back onto the main shaft over the new needle bearing.


As you carefully place the main/input shaft back into place, be sure to notice the circlips on the main bearings. These ride in a slot that will keep the bearing race from moving after assembly. Make sure everything rotates smoothly.


Bolt the upper case back into place and torque to factory specs. Put the idle gear/ reverse gear shaft back into place.


Bolt the extension case back into place and don't forget the reverse shift rim bolt that we pointed out earlier. Then we concentrate on the shift tower.


The shifter locating bolt is a commonly replaced item, as it is very prone to wear. There are two different sizes based on the model year of your transmission. You can see an example of each shifter to the right. The shifter on the left of the photo is a newer model, as it has the wider slot to accept a larger locating pin. On the right, you can see an older model that has also been outfitted with a new poly shifter 'sheet'. These replacement shifter sheets are available from many of the aftermarket distributors. Planning ahead, we got this one from North Coast Offroad during the ZookiMelt last year.


Here you can see the shifter tower after a cleanup and lube. A new locating bolt has been installed and because this is an older model shifter tower, we used the shifter handle with the new shifter sheet described above.

If your shift tower needs to be replaced, maybe the threads for the locating bolt are stripped out - or you have an older model and would like to take advantage of the larger diameter locating bolt of the newer model, you can get a complete tower kit from Hawk Strictly Suzuki.


Here we finally close up the case by replacing the input shaft housing.


Finally a new clutch release bearing (aka - the throwout bearing) tops off the input shaft. Remember to replace the pilot bearing in your flywheel also, or you may experience a situation where the vehicle still wants to move with the clutch depressed. Sometimes it's the little things that get you!

Important things to note here...

- Every rebuild kit is not created equal, make sure you are getting all of the seals and bearings to do the job right the first time.
- If you experience problems shifting smoothly from one gear to another while the drivetrain is in motion, the synchronizer rings may be worn out. These are not usually sold as a part of a rebuild kit. You may have to ask your distributor for them separately.
- And last but not least, everyone is not mechanically inclined. So if you think you may need help with this, get help first. Nobody likes having to fish through a box of transmission parts from an unfinished job.