

The Preventive Maintenance Series

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Differential Tips

Performing a major overhaul on a differential can require a lot of tools including homemade items. I made the following notes while doing a major overhaul and there are a lot of opinions on this subject due to the complexity, the following are just mine. Follow the shop manual for items not covered below.

Side Sleeve Removal: Obtain a donor side sleeve, a donor 1/2" drive shallow socket, a heavy washer to cover the hole in the sleeve and weld the washer and socket in the center of the hole. This is a good way to remove and install the sleeves without breaking the lugs. Use WD40 on both sides of the sleeve at the threads as you loosen it and you may need to screw it back and forth a couple of times during removal. I keep a thread file handy to run the threads on the side sleeves if they don't screw in easily; it works very well (16 TPI). Most thread files have eight sizes and work for all kinds of other applications. Use a small wire brush to clean the inside threads on the case.

Pinion Sleeve: The tool that Clarks' sells for adjusting the pinion sleeve works fine but I had to weld an extension on the handle to be able to use it on sleeves that wanted to stay in place. The Powerglide pinion adjusting sleeve seal is installed with the lips facing the transmission (press it in with the sleeve off) and it must protrude half its length towards the transmission or it will obstruct the oil at the pinion bearings.

Manual Differential Pinion Shaft Internal splines: Be sure to clean this area and inspect the splines for wear – I have replaced these after total failure, so determine how much life remains on yours. If you have an early model that is bad, be sure that the replacement shaft has the correct speedometer drive gear for your application.

Bearings: Removing pinion shaft bearings and shimming operations will require a 20+ ton shop press, clamshell and drivers/installing rings. The 1966 shop manual revises the method of removing side sleeve and pinion sleeve races for all years, so check their method before proceeding (in 66 they no longer recommended drilling holes for punches). Side bearing removal will require a puller or careful use of a punch.

Ring Gear Attachment Tip: When re-attaching the ring gear to the differential housing, I run a 3/8 drill bit carefully through all the holes in the housing first because the HD lock washers will swedge metal into the holes. I use two 3/8 fine thread (1 1/2") bolts to start the ring gear and pull it on slightly so that the attaching bolts will line up.

Differential Release Bearing Shaft/Stator Shaft: There is a difference between 60-62 stator shafts (Powerglide) and 63-69 units. If you replace a worn shaft be sure you match the shaft you are replacing and be sure you match the oil passage in the case with the shaft when installing it. A small leak from this area is caused by a combination of a worn converter bushing, a worn stator shaft and a worn converter hub. New shafts are not available but you can install a new bushing and a new National seal 9845.

Pressing in Release Bearing Shafts/Stator Shafts: On both manual and Powerglide, I use a spare late side bearing sleeve as a support against the differential when pressing in the shaft and race. It is a perfect size to provide support and prevent case damage if pressing is difficult. Just be sure your press blocks have a hole for the shaft beyond the thickness of the side sleeve support.

Inch Pound Torque Wrench (Beam Type) and Fabricated Tool For Pre-Loading Bearings:

I welded a nut on the end of a donor 4-speed main shaft to assist in determining the proper bearing preload on manual differentials and I welded a bolt and shock washer on to a donor governor drive gear for checking automatic differentials. **Differential cases expand with heat and all four bearings will loosen in service, so applying the proper preload is critical for the life of the differential.** After years of reading manuals over and over while setting up differentials, I have come to the conclusion that 6-8 inch pounds preload on the side bearings and 6-8 inch pounds on the pinion bearings works just fine. First establish a .010 lash as a starting point, load the side bearings to 6-8 (with the pinion bearings at zero) and then add 6-8 more to the pinion bearings for a total of 12-16 inch pounds.

Ring and Pinion Contact Pattern: This is equal in importance next to the bearing pre-load and very critical for wear/noise. The Corvair shop manual has so many errors in it that you must read carefully and recognize that the pictures of patterns in the manual are from other Chevrolet differentials (they are backwards) and are quite confusing. They also refer to contact patterns on the pinion gear which is in error. If you are starting from scratch in your shimming, use a .015 shim as a starting point and change only in .003 increments. You can change patterns both with shims and with lash adjustments, so take the time to practice. A tube of Prussian Blue (Permatex) marking paste and a small brush are my favorites for checking patterns.

Ring and Pinion Lash: This is the least critical of the adjustments but to determine what the lash is you will need a dial indicator and the hardware to use it. If your bearing preload is correct and you have achieved a good contact pattern after starting with .010, any reasonable lash above .003 I think would be acceptable. Again the critical items are preload and pattern.