

# 5R1-PMP-ALIGN

Fits: 5R110W 2003up

Corrects/Prevents/Reduces

Severe Damage from Misaligned Pump



## Step 1: Hold it!

Please do not remove Converter Bushing yet. It has been reported that some pumps have had converter bushings that are bored to size "in place".

Only replace converter bushings that need it. If it's still in good shape and the size checks good, don't change it, **re-use it!**

If the pump bushing looks even "**just ok**", check it for size using the hub of the converter you are going to install with this pump. If the clearance is ok, re-use it.

**To Repeat:** Final front bushing fit & feel should always be double checked on the converter hub that it will run with.

### If Changing Converter Bushings:

Bushing must be **recessed below** gear pocket surface or you'll bind the Drive Gear against the pump plate. The bushing must always have some clearance between it and the pump gear. Position the lube groove as shown.



Time and heat are the usual culprits for warped pumps. Install an SK®5R110W & 5R110-Vent kit and you'll prevent some real headaches & re-work!

## Step 2: IMPORTANT!

DO NOT install the front pump seal yet. Install it **after** the pump alignment steps are completed. *Thanks for listening!*

If you **can't re-use** the original pump bushing, then index the *Lube Groove* of the new bushing into the Pump Body using the factory position as shown and recess the bushing as shown on left.



## Step 1:

### Test fit the tool:

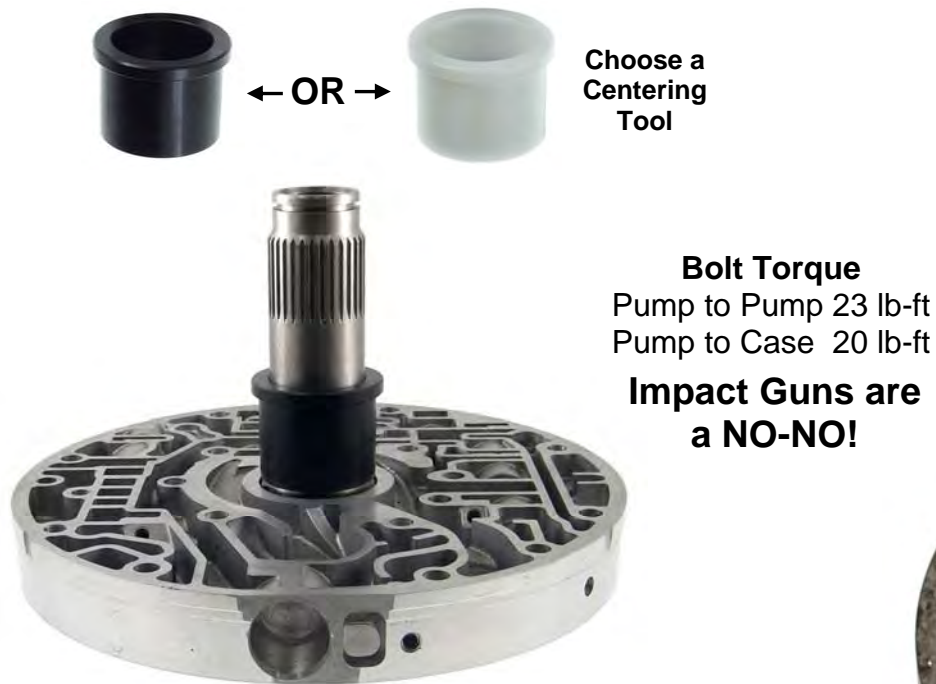
Choose the alignment tool that fits your stator tube the snuggest without forcing it. The white tool has a slightly larger inside diameter than the black, both tools have the same outside diameter under the shoulder.

### When Using The Tool:

**NEVER use FORCE** or you'll ruin the centering tool.

Do not use a damaged / abused centering tool!

Select the tool that fits the stator tube and set the other unused tool aside and out of the way.



We have found different pump half outside diameters up to .007" difference. One more reason a band alone on the OD for alignment does not always work.

## Step 2:

**Pre-lube** the pump pocket and gears with **Synthetic ATF**. Assembly gel is not recommended for pre-lubing pump assemblies. Read the extra data enclosed to help prevent the pump from failing during install or road test.

**Install the pump-half bolts** but leave them **loose!**

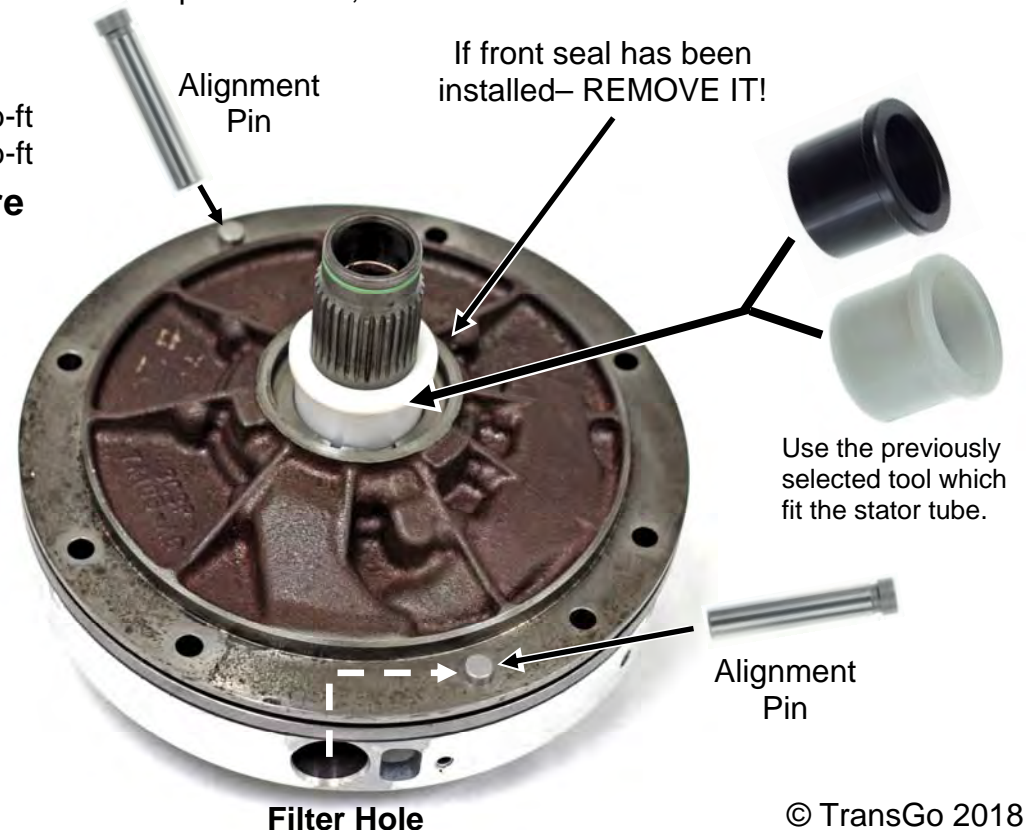
**Install the 2 guide pins.** This gets the pump halves close.

**Install outer band but leave it loose.**

### Using the centering tool:

The idea here is, the tool fits snug to the stator tube and the taper on the tools outside diameter centers the Pump Bushing to the tube as you push the tool down. **Do not use force!** When taper seats into the bushing. **Stop!** You're done!

The stator & bushing are now perfectly centered to each other. Now just snug the outer band to center the wear plate. Torque the bolts, remove the tools & install the front seal.

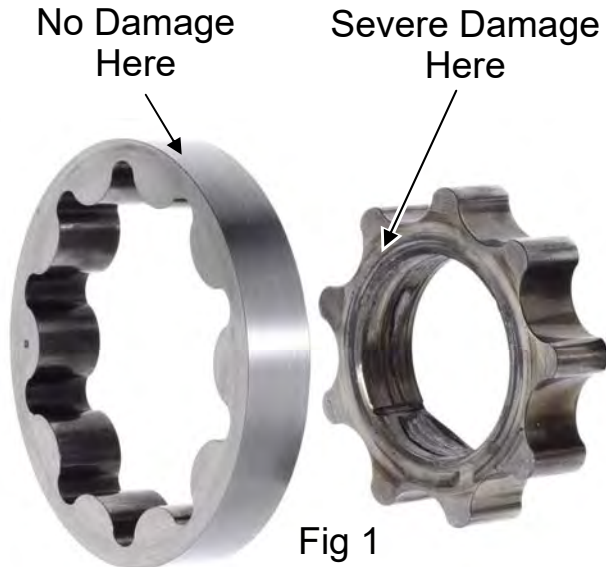


## 5R110 Additional Information

Take heed and give this information some serious consideration. There are more than a few ways to hurt, warp, weld or split the inner gear and generally bring the pump to an untimely death. This information will save the pump, your pocket book and your reputation!

### Cause of Failure: Electrical, Bushing, Oil Starved or Programming?

Knowing how to tell the difference is half the battle.



Electrical ground failure or a tight pump bushing clearance will weld the inner gear to the pump plate.



Lack of oil, restricted filter, dry start-up or aggressive TCM programming. Both gears are equally black & blued.

**Pump Bushing To Hub Clearance: If the pump bushing or the converter is changed the bushing to hub clearance must be checked.** Place the feeler gauge through the pump bushing bore then drop the pump body over the converter hub.

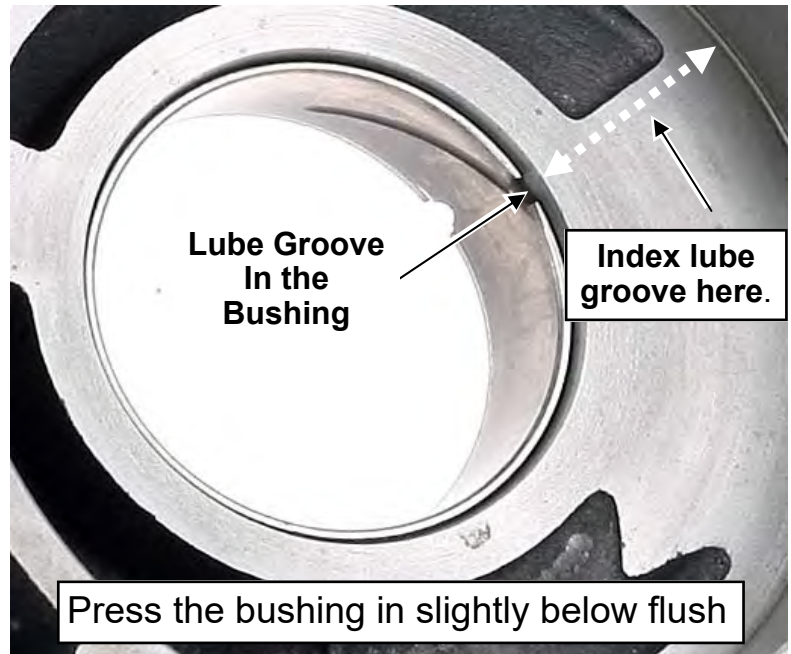
**Clearance, min .0025" max .0045".**



We have heard the reports of replacement bushings that will only provide .001" clearance to a properly sized hub. Running the bushing this tight will seize the bushing to the hub and spin the bushing in the pump body. The metal generated will get between the inner gear and pump plate welding them together, this will look like a ground failure, see fig 1. Tolerances and alignment are critical with this pump. See TransGo 5R1-PMP-Align.

**Pump Bushing: Reuse the OE bushing when possible.**

**Some 5R110 pumps have been found with an offset bushing bore. This required the factory to machine the bushing in place, another reason to leave the OE bushing alone. Always use a pump alignment tool that centers the bushing bore to the stator tube. See: TransGo 5R1-PMP-ALIGN.**



## Changing Converter, Pumps, Gears or Bushings?

**Perform quick test:** With the pump bushing and gears installed into the pump body, place the pump body onto the converter hub so the inner gear indexes to the hub.

Now rotate the body 360 degrees and feel for tight spots or binding. It should rotate smooth as glass all the way around. Binding or tight spots indicates a problem with the gear pocket, gears, convertor hub or pump bushing.



**Line Pressure and Pump Failure:** Aggressive computer programming can contribute to high line pressure and pump failure, see page 1 fig 2. Check with a pressure gauge during the road test. Stock Programming: Light-load cruising speed 150-170psi and very reactive to engine load. Hard throttle up-shifts 200-235psi. Full throttle starts can briefly spike to 280psi.

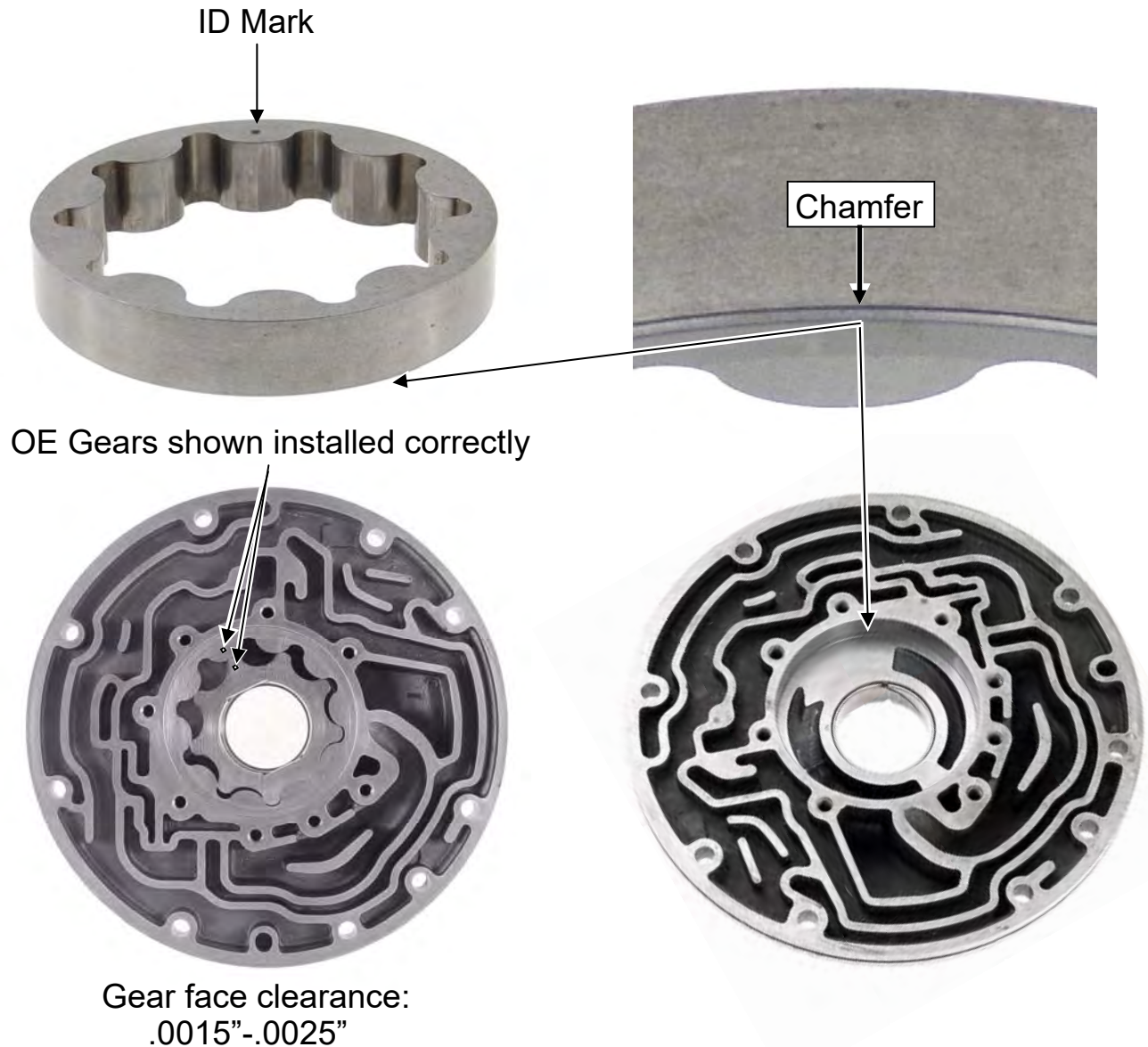
Constant high line pressure accelerates the wear on the inner pump gear, a little wear is ok. Check the inner gear fit on your converter hub. No binding or excessive rocking is acceptable.

There is no FIX that is going to save the pump when the PCM programming is **commanding 300psi** in the forward gears. Excessive stall time at the drag strip is also a pump killer. Listen to your customer and know when to pass on a job if it's going to eat your lunch.



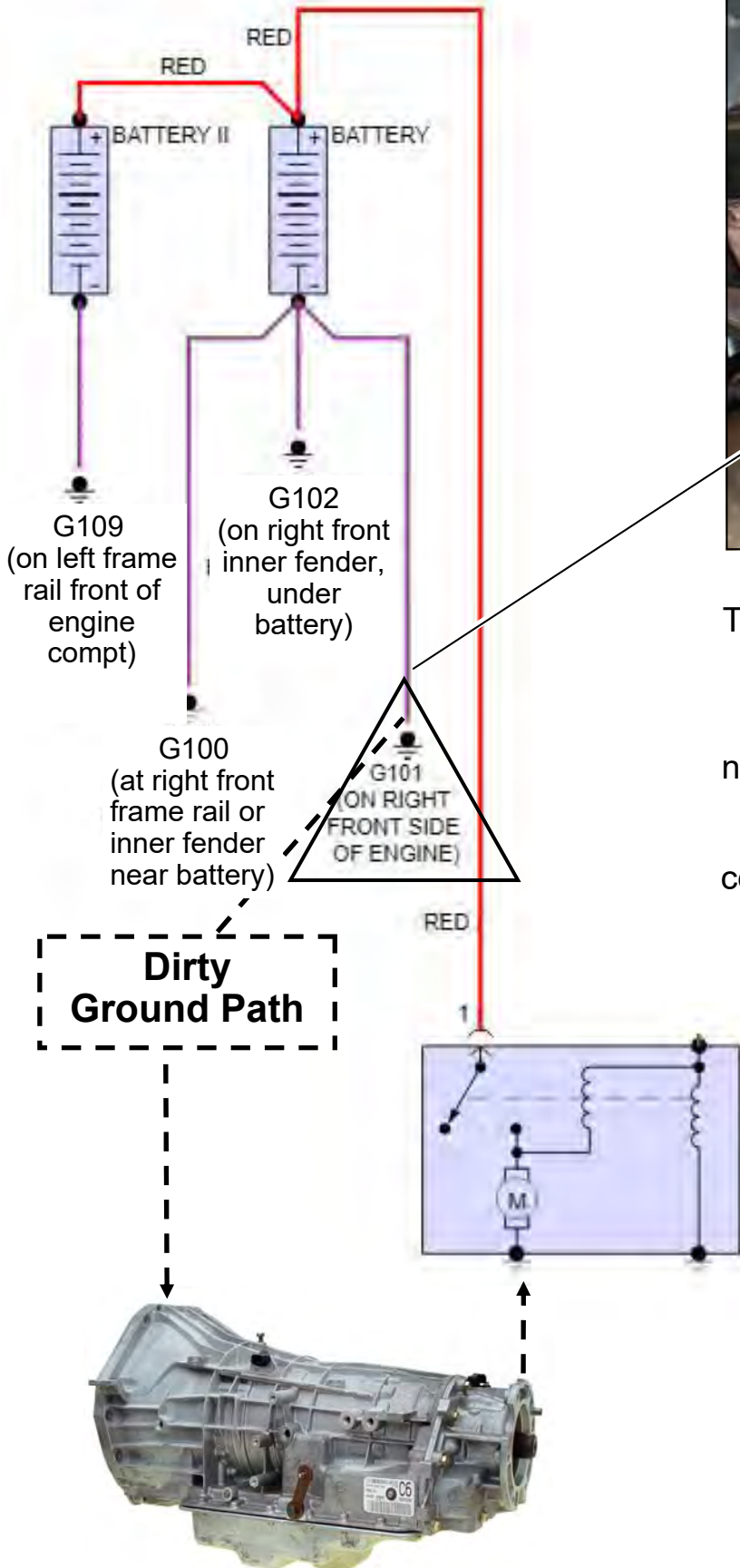
## Pump Gear ID Marks and Outer Gear Chamfer.

The **Original Equipment** pump gears have ID marks on the inner and outer gear. These ID marks **MUST be visible** when the gears are installed into the pump body. With original equipment gears this will ensure that the chamfered side of the outer gear is facing into the pump body. **Attention: If the outer gear ID mark is not visible when installed, the pump will seize on the road test or shortly after.**



**Never Install Pump Gears Dry.** The gear pocket & both gears should be thoroughly lubed "with ATF only" during assembly. Also, please take the time to pour 3 to 4 quarts of ATF into the converter before installing it. This can be difficult and time consuming however we feel it is necessary.

# Ground Issues:



## Diesel Engine

This is the main battery ground on the passenger side front of the engine, #G101. This connection is the most critical one. To clean it correctly, the nut, cable and the stud that screws into the block MUST be removed and cleaned, NO exceptions. If this connection is dirty the current will take an alternate path through the transmission and damage the pump.

## Ground Issues Cont:

Although these pictures are of a gas rig, diesels show up more with this issue. Often when removing the cab to replace the head gaskets the aux ground straps occur damage. They are hidden behind the motor. You **MUST** fix them if they are damaged or missing otherwise the current will find an alternate path to ground!

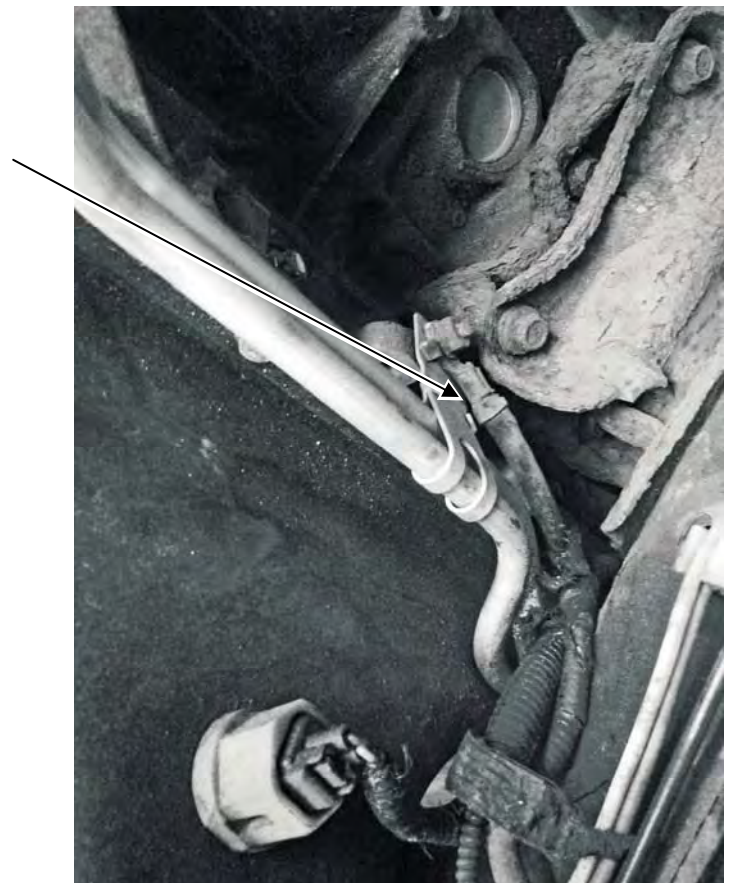
Diesels:

If corrosion is observed between the back of the engine block and the trans adapter housing, it may be easier to add a **heavy** ground cable from the adapter housing to the block rather than removing the adaptor housing to clean it.



Carefully peel back the plastic covering near the cable connector ends to make sure there is no hidden corrosion, seal it up if it's okay. If any corrosion is found, the cable must be replaced. Do **NOT** give this to your customer to fix. **You** need to fix it before starting the engine!

Bad grounds can **weld pumps** and mangle converter hubs and can cause an assortment of drivability complaints. Check for this issue **BEFORE** the job gets sold!



# 5R110W 5th Gear Ratio / Delayed Reverse Center Support Caused Complaints

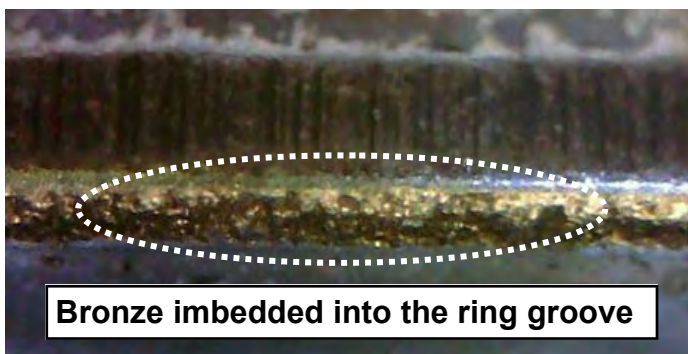
A common tech call that we receive is how poorly the direct drum air checks through the center support. Many of the center supports that we tested had bronze particles imbedded into the side of the ring grooves preventing the rings from sealing. The bronze material is coming from the drum bushings. Always replace the drum bushings. A wire wheel on a drill or a piece of green scotch-brite used with a small screwdriver on a lathe are effective tools to remove the bronze build up. Once the imbedded bronze was removed a majority of the “bad” supports would now air check with 35-45psi. If the drum still does not air check after a good cleaning with new Ford rings #3C3Z-7D025AA the support ring groove is cracked, scrap it.



The arrows are pointing to the outside of the ring grooves where the rings need to seal. This is the area where the bronze particles accumulate and imbed into the support.



This picture can be viewed in color @ [transgo.org](http://transgo.org).



Here are some examples at 400x magnification:



**In Line Cooler Filter:** Trucks built prior to 2008 have a external in-line cooler filter. See fig 1.

**Proper Cooler Flushing:** Remove and discard the filter cartridge and temporarily plug the filter feed hole. See fig 2. Most housings have a .204" feed hole. Use a 6mm tap to carefully add enough threads to install a 6mm bolt 2-3 threads, hand tighten the bolt so it will not fall out. Reinstall the filter bowl (leave cartridge out) and flush the system. After flushing remove the filter bowl and bolt, clean out the housing and install a new filter cartridge and bowl.



Fig 1

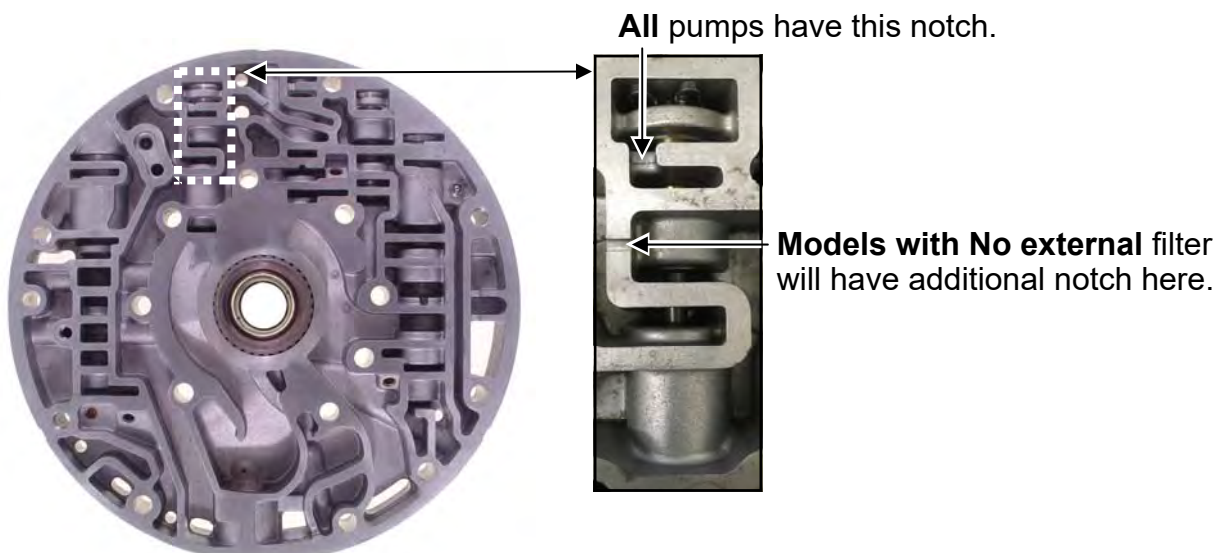
Tap the filter feed hole enough to install a 6mm bolt 2-3 threads.

(If the hole is a different size, use the appropriate size tap and bolt).



Fig 2

**Pump Interchange:** 2008 and later trucks no longer have the in-line cooler filter. These models use a different oil pump. In a pinch you can use a 2008 type pump (2 notch) on the external filter models by permanently plugging the external filter feed hole. The in line filter type pump (1 notch) should not be used in place of a 2 notch pump. If the 1 notch pump is installed on a truck with **NO external filter** you run the risk of starving the gear train for lube if the oil cooler becomes restricted or plugged.



# SUMMARY

## **Keep Alive Memory Reset:**

Reset the KAM BEFORE starting the engine after overhaul. Clearing the KAM will tell the computer to forget the old trans and start with an all new beginning. Forgetting this step will cause the transmission to run at a higher pressure at start up which is hard on the pump.

## **Clearances, Pre-Lube, Startup & Filling:**

Pump bushing and gear clearances are critical!. Pump clearances MUST be checked if **ANY** parts are changed. See pages 1 and 3.

**DO NOT** use assembly gel or grease as lube for this pump. The gear pocket & both gears should be thoroughly lubed with ATF before assembling. Pour 3 to 4 quarts of the approved ATF into the converter before installing it.

*This is a **High Volume Pump** and it will run out of oil very quickly.*

**Pre fill** the unit with 8 quarts of ATF. Start engine and let it run for 15 seconds then shut the engine off. Add 5 more quarts then re-start the engine and complete the filling procedure. This along with the converter prefill will have the oil level within 1-3 qts of full depending on oil pan capacity. The ATF thermostat will not open until 150-185 degrees.

## **Before Road Testing, perform final ground voltage check:**

Hook negative side of Voltmeter to negative side of battery post set to DC Volts. Use the positive lead and probe the frame, the trans, the engine & the body looking for voltage above 0.05 volts key-on engine-off and 0.10 volts while running. Readings up to 0.40-0.50 on gas & 0.90 volts on 2 battery diesels is ok **briefly** during cranking. Voltage **higher** than this **DURING CRANKING CAN KILL THE PUMP!**

**Re-check level after road test.**



**Mr. Shift**

*Thanks for listening!*