

Introduction

This guide will show the installation of the Novak #153 adaptation and clocking ring to the Dana 300 transfer case. This adapter is compatible with New Process-flanged transmissions, which popularly include the AX15, NV3550, AX5 and NSG370 and other manuals, as well as the AW4 and some other automatics.

This conversion relies on the use of the factory transmission output shafts and no replacement of these shafts is necessary.

These instructions apply to our #153 & #153F “Flipped” adapter, similarly.

Transfer Case Input Shaft Option

Transfer case input shaft replacement is not required when your transmission has a 23 spline output shaft and that this output shaft sticks out past the output flange by $\sim 1/2$ ” or more. This typically includes:

- AX15, 1988-1999
- AW4, 1991-1999

Transfer case input shaft replacement is necessary in the scenarios where the transmission has a 21 splines output shaft or that the output shaft has 23 splines and is flush with the output flange of the transmission.

21 spline versions typically include:

- AX4 & AX5 Transmissions
- AW4, typ. 1987-1990

For these transmissions, a 21 spline input shaft is available for the Dana 300 and was recommended at the time of purchase with your #153 adapter.

Flush 23 spline transmissions typically include:

- TF904/909
- TF999/32RH
- NV3550
- NSG370

For these transmissions, an extended depth 23 spline input shaft is available for the Dana 300 and was recommended at the time of purchase.

Conversion Procedure

First, you should trial fit the new input shaft to the transmission output shaft to verify proper spline fit. Pay particular attention to the spined shafts and how they mate up. There is a certain amount of variation in factory shafts due to wear and other factors. We have splined our shaft tight enough to mini-



mize both wear and the risks of breakage. Make sure your output shaft splines are clean and free of rust. You may need to polish or clean the factory splines. Do make sure they slide nicely together and by hand. If the shaft mating seems somewhat loose, remember that the involute form of splines cause the two shafts to self-center when transferring power.

Removing the Transfer Case Input Shaft

If applicable as described above, replace your Dana 300 input shaft. Removal and disassembly of the input retainer assembly is required. This is a simple process and is done as follows:

Having removed the transfer case from the transmission and the Jeep, drain its fluid and bench the transfer case.

Remove the two studs from the mounting face of the transfer case. Some transfer cases use six bolts instead of studs. Next, remove the six socket head bolts from the transfer case input bearing cap



using a 3/16" hex (Allen®) wrench. Gently tap the retainer with a soft mallet to break any adherence to the transfer case bore.

Carefully pry the front bearing cap assembly from the transfer case using screw drivers or pry bars. You will notice that there are two notches

Dana 300 4:1 Low Gears Caveat

4:1 gearsets will require an additional step over the factory Dana 300 gearset. The input shaft and gear assembly cannot be pulled out of the front of the case bore unless the intermediate gear has been removed. This will require that the transfer case bottom pan be removed, and the intermediate idler shaft be removed by being driven out *rearward*.

Once this step is completed, you will be able to remove your input gear assembly and proceed as directed.

for this purpose. It will remove as a unit consisting of the input gear, shaft, bearing, seal and retainer. Nothing should fall apart or out of the transfer case.

Disassemble the front retainer by removing the rear snap ring. Now remove the gear. These splines are not usually overly tight and removal should be easy.

With the gear removed, now remove the large retaining ring that holds the bearing in the retainer bore. Remove the shaft with its bearing. Press the bearing off the shaft. If the input bearing in the Dana 300 retainer is to be replaced, now is the time.

Input Seal Replacement

You will be replacing the unidirectional factory input seal on the Dana 300 with our provided bidirectional seal. This clever design will keep the transfer case and transmission fluids totally separate from each other, without having to resort to the use of a sealed bearing, which does not receive





the benefit of the cooling and flushing effects of the transfer case fluids.

Remove the factory seal with a seal puller. Clean the seal bore with a mild abrasive and solvent as necessary.

Install the new seal squarely and gently, being careful not to deform it as you press it in.

Installing the New Transfer Case Input Shaft

Set the old input shaft aside and get the new one. As with all splines, test fit the Dana 300 input gear splines to the shaft. Fit should be snug, but not exorbitantly tight.

Dana used shims on the shoulder of the input shaft to prevent the helical gear from thrusting up and down the input shaft while under substantial its forces. Your goal here is to totally minimize the gear's end play. As



a rule of thumb, install as many shims as possible and still be able to install the gear's retaining ring. It is easiest to set this up empirically, using calipers. You will measure the input shaft from the bearing shoulder to the rear of the retaining ring groove, as shown in the image. You should get 2.498" to 2.501". Now measure the stackup, including: the input bearing, input gear, snap ring and shims. Add or remove shims until you have achieved a number just .001" to .003" shy of this ~2.500" measurement. You can then proceed with the assembly of the input shaft assembly.



Install your shims on the input bearing journal. Press the input bearing on the input shaft. Then lube the seal and shaft on the seal journal. Press the shaft and bearing assembly into the retainer and install the retaining ring, which should just snap into the groove, assuredly but with a bit of drag if you've set up your shims correctly.

Dry Cavity vs. Wet Cavity Adaptations

Because this kit works with multiple transmissions, and because those transmissions have a shallow or deep seal placement, the installer will need to make a distinction here.



- If the New Process transfer case being replaced had a short (1.2" protruding) in-



put gear, or if the seal of the output housing sits 5/8" below the factory adapter face, your Dana 300 input shaft will reach that seal and create a dry cavity. In this scenario, you should pack the provided double lipped Dana 300 input seal with grease for its longevity.

- If the New Process transfer case being replaced had a long input gear (2.1" protruding), or if the seal of the output housing sits much more than 5/8" below the factory adapter face, your Dana 300 input shaft will not reach that seal and create a wet cavity. In this scenario, you do not need to pack the provided double lipped Dana 300 input seal with grease for its longevity, but you should use assembly lube for protection during the initial run-up.

tion during the initial run-up.

If your adaptation features a wet cavity, make sure any factory transfer case tailhousing weep holes are closed with epoxy or another adequate plugging method.



gear-to-shaft snap ring. The transfer case input assembly should now be completely assembled.

Transfer Case Face Preparation

Prepare the transfer case for assembly to the adapter by cleaning the transfer case surface with sandpaper and a small block of wood. Sand



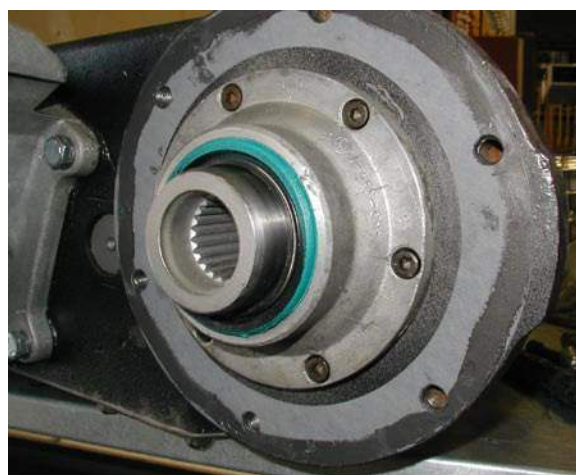
We've had many customers request it, and we've made available our Dana Model 300 Master Rebuild, kit #300MR, plus several other components for the 300. We welcome you to call us or see our website for details.

Full disassembly of the D300 is not required for this conversion, but many individuals wanting an entirely fresh and optimized powertrain find this a good time to do so.

the mounting face of the transfer case until it is absolutely clean of dirt and rust. This step is important to insure a proper seal between the adapter and transfer case. The Jeep factory adapter did not use a gasket at this location and the mounting face of the transfer case may have accumulated rust and dirt.

Input Shaft Assembly Installation

For an extra measure of sealing, you may wish to install a small bead of RTV or other sealant to the flange / journal of the input bearing retainer. Now insert the input shaft assembly into the input bore of the transfer case. Rotate the retainer until the bolt holes align. Lightly and squarely tap the retainer into place until it seats. Thread in the six socket head bolts into the transfer case. Do not use these bolts to seat the retainer. If there is any obstruction, eliminate it and retry.



Torque the bolts evenly and in three sequential stages to 7-8 ft. lbs.

Adapter Installation

The six bolt holes in the face of the transfer case are phased to prevent installation in all but one orientation. Align one of the provided gas-



A modified AX15 shifter



kets to these holes. Then, coat the mating face of the transfer case with RTV to obtain the best fluid seal possible. The transmission tailhousing and adapter form a wet cavity and RTV is important to pre-

vent leak-

age, but don't allow excess or stray RTV to enter the transmission. Now, stick the aligned gasket to the face.

Install the #153 adapter with the engraved arrow up. Install the provided socket head bolts and thread them into the transfer case. Tighten the bolts evenly and lightly, just until the RTV begins to squeeze out. Allow the RTV to cure for a couple of hours and then follow up with an even and sequential cross-tightening of the six bolts to a final torque of ~38 ft. lbs.

Transfer Case Installation

You can choose which clocking you believe will best fit your situation. We have drilled and tapped four different choices of pattern. Temporarily thread the provided studs into the adapter and test fit to your transmission.

When you've found your preferred clocking, remove the transfer case and thread the six studs into the adapter. We recommend the use of a drop of Loctite Blue on each stud going into the aluminum. Install the second provided gasket with RTV in a similar manner as done earlier. Install the assembly to your transmission. Slip the six lock washers onto the studs and thread on the nuts.

Allow the RTV to cure for a couple of hours and then follow up with an even and sequential cross-tightening of the six bolts to a final torque of ~38 ft. lbs.

Drivetrain Positioning

There is a wide array of situations in which our customers employ this conversion. However, the factory transmission mount under the OEM adapter will usually provide a good mounting location for a variety of installations. Use of a Jeep rear mount unit indicated for the AX15, NV3550 and AW4 and others will facilitate this.

Any change in positioning may necessitate modifications to the AX15, NV3550 and NSG370 shifters. The example, pictured, has been lengthened by welding in an extension rod and subsequently bent for the proper angle. Make sure you remove the plastic ball bushing on the end, as well as the shifter stick. A vice and soft face mallet will facilitate the removal of the stick, as it is attached by a notched press-fit.

The AW4 linkage, likewise, may require adjustment or modifications easily within the scope of the individual performing the swap.

Conclusion

While reading through these instructions, and especially while performing the transmission swap, it is often recognized that it is not the swap itself that provides the greatest difficulty, but in the ancillary things like linkages, mounts, clearances, and the like. Any good installation should consider all the points

About Your Novak Adapter

The Novak #153 adapter kit is built to high standards of design, materials and build. The adapter housing is machined from 6061-T6 aluminum for remarkable strength. Our adapter shaft (if ordered) is machined of a triple-alloy gear steel, specially hardened and precision ground for strength and longevity.

The design of this adapter is such that it precludes the need to buy a special transfer case front output yoke.

Novak warrants your adapter and shaft against defects of workmanship and materials for the life of the vehicle. This warranty is non-transferable and requires a copy of your invoice as documentation. These components are not warrantied against damage or defects resulting from improper installation, including misalignment, improper assembly, improper mounting, or incorrect driveshaft lengths, and miscalculated driveshaft geometry on shackle reversal setups. Because we have no control over how the parts are handled or installed, we are not liable for any problems or failures of this product unless it is a defect of design, materials or workmanship. Determination of this warranty is at the fair discretion of Novak, Inc.

Should you have any questions concerning this conversion or these components, we welcome you to contact us.

in this article and also allow for time, energy and funds for the dozens of variations in drivetrain conversions that cannot be anticipated.

We strongly suggest that you keep these instructions and the following, associated parts list for future reference. For questions concerning your conversion, contact us and we'll be happy to assist.



Novak Kit #153 includes:

- ☐ Adapter, #153 (1)
- ☐ Gasket, six bolt front transfer cases (2)
- ☐ Washer, split lock, 3/8 (6)
- ☐ Stud, 3/8-16 x 2", fully threaded (6)
- ☐ Bolt, 3/8-16 x 1, hex socket, standard (6)
- ☐ Nut, 3/8-16, hex, grade 5, zinc plated (6)
- ☐ Seal, oil, double lipped, bidirectional (1)
- ☐ Threadlocker, Loctite 242 blue, .5ml (1)
- ☐ Instructions

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