The Novak Guide to

Adapting the GM 6L80-E Transmission to Jeep Transfer Cases

Introduction

We hope that the installation of your new Novak adapter assembly goes smoothly and that you acheive the improved results with your Jeep® that you intend. This kit is for adapting the GM HydraMatic 6L80-E transmission to the Jeep® New Process 208, 231, 241, 242, 249 and dana 300 transfer cases.

Despite whatever your experience with this type of work may be, we strongly advise you to read these instructions well and save them for future reference and parts numbers. Contained in these instructions are the requirements, tips, hints and tricks of years of performing these conversions, both in our own facility and information we've gained from discussing this swap with our customers. Put this information to good use.

About the 6L80-E Transmission

The GM Hydramatic 6L80 transmission heralds a significant change in the design of automatic transmissions at General Motors. All previous GM automatic transmissions were virtually all based on hydraulic controls, and received increasing electrical elements as they modernized. The 6L80 was, from the ground up, developed as an electric over hydraulic transmission with microprocessor control.

The 6L80 began manufacture in 2005 for release in 2006 model year GM vehicles, persisting until at least 2016 in both 6L80 and 6L90 versions. The 6L80 denotes that the transmission is a 6-Speed, Longitudinally mounted, and for 8000 lbs. vehicle weights. It's RPO code is "MYC" and it is domestically manufactured in GM's Ypsilanti, Michigan plant. Newer to the transmission world is its use of direct clutch-to-clutch shifting and the total lack of bands. Because of this, the 6L80 - despite having two or three more gears than its predecessors, is unexpectedly short in length.

Length: 23.5"
Weight: 210-229 lbs.
Gearing: 4.02, 2.36, 1.53, 1.15, 0.85, 0.67, R3.06
Input Torque Rating: 440 ft. lbs.
GVW / GVCW: 8,600 / 14,000

Maximum engine input torque for the 6L80 is 440 ft. lbs. and the maximum output torque is 664 ft. lbs. The case is a cast aluminum alloy.

The 6L80 features a generously deep first gear for an automatic, making for favorably powerful starts from a standing stop. The transmission lacks a direct-drive, but features two overdrive gears. The gearing spread is a very capable 6.04.

Recommended fluid is Dexron VI and it typically accepts a 10 quart thru 12.6 quart fill depending on its application. It features a dry weight of ~195 lbs. and can weigh up to ~230 lbs. full.

The torque converter is a fluid turbine drive and - like those on its predecessor transmissions, the TH350C, 700R4, 4L60, and 4L80E - features a lock-up pressure plate for direct mechanically coupled driving from the engine crank. As with earlier Hydramatics, the 6L80 will accept either the 258mm or 300mm torque converters.

Engine Compatibility:

The 6L80 is a modular transmission, featuring removable bellhousings and tailhousings for interchangeability with the GM 90 Degree engines and other potential engines in the future.

While the 6L80 is generally mechanically compatible with Chevrolet and GM Gen. III+ engines, due to its advanced control strategy, the 6L80 is functionally compatible only with Generation IV GM engines and their matched Engine Control Modules.

Electronic challenges exist when mixing and matching the 6L80 as they must be matched to their particular engine. In a similar vein, GM Gen. IV engines do not always take kindly to other transmissions such as manuals (essentially no longer available from GM), and most automatics that predate the 6L80. Special engine computer programming strategies may be required.

Jeep Compatibility:

The 6L80 is doubtless a very successful OEM transmission, and a terrific conversion transmission in the right Jeeps and situations. However, it is a long transmission and is not compatible with short-wheelbase Jeeps such as the CJ5.

Transfer Case Compatibility:

2wd transmissions feature conical shaped tail housings and an output yoke, which are replaced with a typically shorter 4wd style output shaft of varying lengths and spline counts, depending on the application. The HydraMatic can be adapted to the popular Jeep transfer cases including:

Dana 300, 1980-1986

New Process Jeep 208, 219 & 229

New Process Jeep 231, 242 & 249

Conversion Procedure

Transfer Case Input Shaft Installation

The input shaft of your transfer case will need to be replaced with a 32 spline shaft to match the 6L80 output, or 29 spline shaft to match the 6L90. This shaft is supplied with your kit.

The input shaft installation is a 1-3 hour bench job and usually includes either a simple gasket and seal replacement or preferably a full rebuild of a tired transfer case. Bearings and pre-load are involved with a D300 job. It is not requisite that you rebuild your transfer case to successfully complete the conversion. However, it is certainly worth consideration especially if your transfer case leaks or has many years of service. Our superior quality gaskets & seals kits and our all-inclusive master rebuild kits are highly recommended for this purpose. Included with our rebuild kits are detailed instructions for rebuilding your transfer case and installing a new input gear.

Transmission shaft identification and modification.

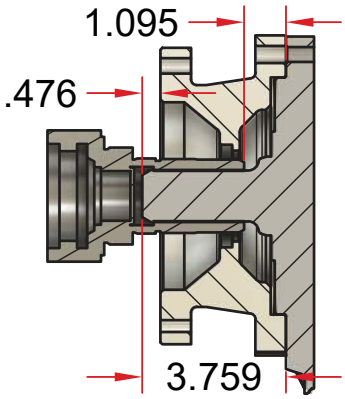
Once your new transfer case input gear has been installed, measure the length of your transmission output shaft. 4wd shafts are short and may not require trimming. 2wd shafts are longer and will need to be trimmed. While most shafts can be made to work, we cannot verify every variation. Do some measuring and make sure the splines and shaft don't bottom out. 2wd transmissions will need our 6LRS kit to seal the rear of the transmission.

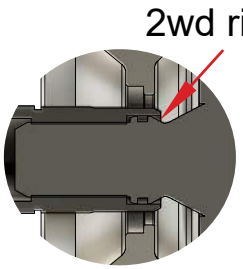
2wd shaft with o-ring ridge

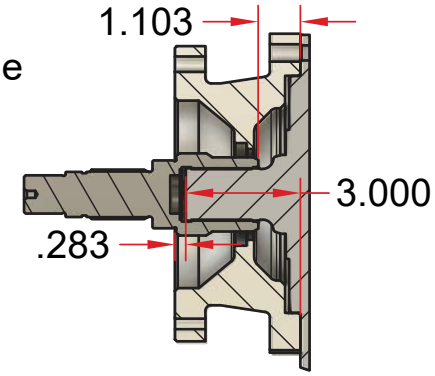
For 6L81 and 6l91 kits, the 6L ouput shaft should measure between 3.5"-3.8" long when measured from the tip of the shaft to the rear mounting face of the transmission. The splines must start at ~1.1" from the rear mounting face of the transmission. Some 2wd shafts have a o-ring ridge that interferes with the transfer case input shaft. Trimming of the transfer case shaft may be required in this situation

For 6L83 kits, the 6L ouput shaft should measure 2.8"-3.0" long when measured from the tip of the shaft to the rear mounting face of the transmission. This requires cutting of the 6L shaft. Also the splines must start at 1.1" from the rear mounting face of the transmission. Some 2wd shafts have a oring ridge that interferes with the transfer case input shaft. Trimming of the transfer case shaft may be required in this situation

Common 4wd shaft







In some cases the shaft splines do not extend deep enough on the shaft to allow for trimming and a spacer must be used instead. Our 163 spacer goes between the adapter and transfer case to allow for longer shaft lengths to be used.

Final assembly:

First, lube the transfer case input shaft before installing adapter. Assemble the adapter to the transmission as follows. Use a blue thread locking compound and screw the six 10 x 1.5mm studs supplied with the kit into the back of the transmission case so they protrude 1.5". Install the six lockwashers and nuts and tighten 1/4 turn at a time until the adapter pulls up evenly to the transmission case. Tighten to 40 foot-pounds. It is a good idea to cross-tighten the nuts to torque in three sequential stages.

At this point, the six-holed gasket installs on the face of the adapter to prevent ingress of contaminants. Assemble the transfer case to the adapter using the original bolts. Sequentially cross tighten these six bolts in stages to 35 ft. lbs

Mounting the Drivetrain Assembly

The rear mount from the some YJ, TJ and XJ Jeeps could be used with some modifications, but we find this factory mount to be restrictive and difficult to work with. As such the adapter is drilled to use the rear mount from a Muncie truck fourspeed. The adapter is drilled to accept the regular two-bolt rear mount used on a wide variety of GM applications. This is a Novak #RMU (urethane) or a Borg Warner part #31-2268 and will mount on the adapter using bolts, nuts and lockwashers.

Customers often ask if they must use a specially fabricated crossmember to accomodate a conversion. No. The crossmember itself can be the factory unit, or an aftermarket or custom "flat-style" skid plate. By drilling the crossmember for the above mentioned flexible mount, the 6L80 can be very cleanly mounted. Note that installation to a rigid crossmember risks breakage of the transmission, adapter or transfer case. Your adapter's warranty will be voided in this scenario. Note that a metal spacer can be used under the rear mount to acheive the proper transmission height, especially applicable when using a factory skid member

About Your Novak Adapter

The Novak #6LXX adapter kits are built to high standards of design, materials and build. The adapter housing is billet 6061 aluminum and is gusseted for remarkable strength. Our adapter shaft is machined of a triple-alloy gear steel, specially hardened and precision ground for strength and longevity.

Novak warranties 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.

Driveshafts

Most factory transmission and adapter combinations length will vary. As such, it is often that driveshaft lengths will need to be changed to accommodate the swap. Also, consider that there multiple ways to install a conversion engine (often used with this transmission) and the following will be of note:

- It is seldom a good idea to allow the driveshafts to make the decisions as to where the powertrain will be placed. Some of our customers, fearful at the perceived expense of new or modified driveshafts, attempt to let the existing driveshafts dictate engine, transmission and transfer case location, sometimes to the detriment of the project. Driveshaft modifications are usually inexpensive when performed by driveline, RV or tractor implement specialists. New driveshafts are an option but seldom a requirement in regards to the actual successful conversion. Jeeps that require extensive travel or specialty-built driveshafts have this option available through several fabricators across the nation.

- Finish mounting the transmission and engine and have the weight of the Jeep on the wheels when measuring the length to modify the driveshafts. Any changes in driveshaft length must be determined after the engine and transmission have been mounted. The Jeep must be sitting on the ground with its full weight on the wheels to make the best determination. If a shackle reversal has been or will be performed on the Jeep, it is crucial that you calculate the suspension geometry's effects on the front driveshaft. Shafts that are too long or do not have enough compression slip will cause the driveshaft to ram your transfer case, causing damage to your axle, driveshaft, transfer case, adapter or transmission. Our experience has shown that some stock Jeep drive shafts are not quite the correct length from the factory to begin with. This can be corrected if the driveshafts are modified.

Transmission Cooling:

For every ten degrees cooler you can keep the transmission, you can add 25,000 miles to its service life. Therefore, use of a transmission oil cooler is advisable for any automatic transmission. We do not advise mounting a cooler in front of the Jeep radiator, however, as the grille opening area is reduced by an amount relative to cooler size. A front mounted cooler can also cause air flow turbulence with resultant loss of engine cooling. A transmission cooler can be mounted in the engine compartment and still provide satisfactory cooling. The passenger side firewall or backside of the front fender (in the engine compartment) are suitable locations for transmission coolers. If so located, the cooler should be mounted as to allow airflow through it. In other words, don't mount it flat on the firewall or fenderwell. Some choose successfully to use a supplemental frame rail style cooler as well. Use of a transmission temperature gauge is also a good idea. These are widely available and generally inexpensive.

Some Conclusions

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 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 the 4wd retailer or technician you bought the kit from, or if you bought your conversion kit directly from us, contact us and we'll be happy to assist.

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