

Introduction

We hope the installation of your Novak adapter assembly goes smoothly and that you achieve the desired improvements with your Jeep®. This kit adapts the GM HydraMatic 4L60-E transmission to the Jeep® Dana Model 300 transfer case, found in 1980-1986 Jeep CJ Universals.

Regardless of your experience level, we strongly advise you to read these instructions thoroughly and save them for future reference. These instructions include requirements, tips, and tricks from years of performing these conversions and customer feedback. Use this information to your advantage.

About the 4L60-E Transmission

The 4L60-E, introduced in 1992 for GM trucks and 1993 for rear-wheel-drive cars, is the electronically controlled evolution of the 700R4 (aka 4L60) from 1982. Unlike its predecessor, which used the vehicle ECM for the lock-up torque converter, the 4L60-E is entirely electronically shifted, enhancing performance by allowing the ECM/PCM to map shift points based on data from the Vehicle Speed Sensor (VSS), including speed, throttle position, temperature, gear position, and engine load. This results in improved reliability and durability, with the 4L60-E factory-rated for trucks up to 8600 lbs., making it suitable for robust Jeep conversions. Additionally, it can be affordably rebuilt with stronger components, and shift improver kits and various torque converters are available for off-road customization.

Identification

The early 4L60-E (1992-1996) is a medium-duty automatic overdrive transmission with a 23.4" die-cast aluminum case, similar to the 700R4, but with a square oil pan. In 1996, GM redesigned it, shortening the length to 21.5" and adding a 360-degree removable bellhousing for powertrain stiffness. The rear case face also changed from a four-bolt to a hex pattern. This shorter design allows for easier adaptation into short-wheelbase Jeeps. Note that some trucks retained the earlier four-bolt design through 1997. The transmission weighs 146 pounds dry (162 wet) and requires 8.4 (9.64" torque converter) or 11.4 (11.81" torque converter) quarts of Dextron III fluid.

Compatibility

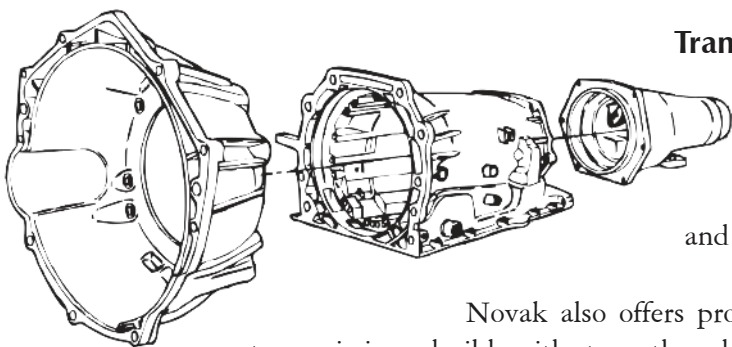
The 4L60-E is compatible with all 90-degree Chevrolet Small and Big Block engines, including the Chevy V6. Controlled by the PCM and its wiring, it is simplest to pair it with its original engine. Earlier engines can be used with a GM Controller (#12497316), and carbureted engines require a Throttle Position Sensor. The 4L60-E is common in GM rear-wheel-drive applications such as the C/K Truck, Sonoma, Jimmy, Tahoe, Yukon, Astro, Safari, Suburban, Bravada, Firebird, Camaro, and Corvette. It adapts well to Jeep transfer cases, including the Dana 300 and New Process 231, with our 3" adapter assembly, making it the shortest automatic overdrive transmission conversion available.



JEEP® POWERTRAIN SUPERIORITY



Conversion Procedure



Transmission Output Shaft Installation

You can have your new Novak transmission output shaft installed by a specialist, requiring disassembly of the transmission. This typically takes four hours. If you choose to install it yourself, use a factory service manual and appropriate specialty tools.

Novak also offers professional installation of the output shaft, as well as full transmission rebuilds with strength and performance upgrades, ensuring optimal performance and durability.

If you prefer to install the Novak 4L60-E output shaft yourself, do so with the assistance of a factory service manual. A few specialty tools may be required.

Adapter Installation

1. **Remove the Original Tailhousing:** Remove the original Hydramatic tailhousing or adapter from the transmission if still present.
2. **Install the Reluctor Ring:** If not already installed, place the steel reluctor ring onto the transmission output shaft, ensuring the teeth are positioned under the hole in the adapter. Its' press or clamp fit is sufficient unless removed with a puller.
3. **Prepare the Adapter:** Lube the transfer case input shaft with bearing grease to prolong spline wear. Test fit the adapter to the transmission flange; it should fit snugly with minimal side-play. Remove the adapter and install the square-section o-ring onto the adapter's locator step. RTV is optional but the o-ring will suffice for sealing.
4. **Install the Adapter:** Bolt the adapter to the transmission using the six supplied 10 x 1.5mm studs, leaving about 1" protruding. Use thread locking compound, such as Loctite™ Blue, on the transmission flange threads. Attach the adapter with the six supplied lock-washers and nuts, tightening to 40 foot-pounds in three sequential stages.



The new style 4L60E was released in 1996, featuring a hex pattern rear face and removeable bellhousing. Be careful to verify this feature as some confusion can occur between GM's earlier 4L60E with the four-bolt pattern. Some truck 4L60E's did not update until the 1998 model year.

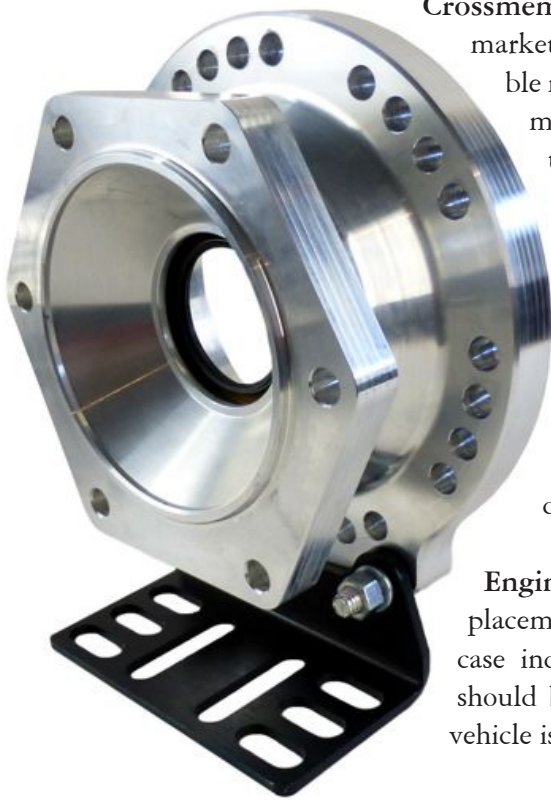
Transfer Case Installation

1. **Prepare the Adapter:** Install the six-holed gasket on the face of the adapter to prevent contaminants. Apply a very light coat of RTV, ensuring none squishes into the inner cavity of the adapter/transmission to avoid damage.
2. **Assemble the Transfer Case:** Attach the transfer case to the adapter using the original bolts. Sequentially cross tighten these six bolts in stages to 35 ft. lbs. If your four-cylinder transfer case has a missing stud, you can install a stud or bolt in that location.

Mounting the Drivetrain Assembly

Rear Mount Installation: Use the rear mount from a Muncie truck four-speed, as the factory mounts from some YJ, TJ, and XJ Jeeps can be restrictive and difficult to work with. The adapter is drilled to accept the regular two-bolt rear mount used on many GM applications. Suitable mounts include the Novak #RMU (urethane) or Borg Warner part #31-2268.





Crossmember Installation: The crossmember can be the factory unit, an after-market, or a custom “flat-style” skid plate. Drill the crossmember for the flexible mount mentioned above to cleanly mount the 4L60-E. Avoid rigid crossmember installations to prevent breakage of the transmission, adapter, or transfer case, as this will void the adapter’s warranty. A metal spacer can be used under the rear mount to achieve the proper transmission height, especially when using a factory skid member.

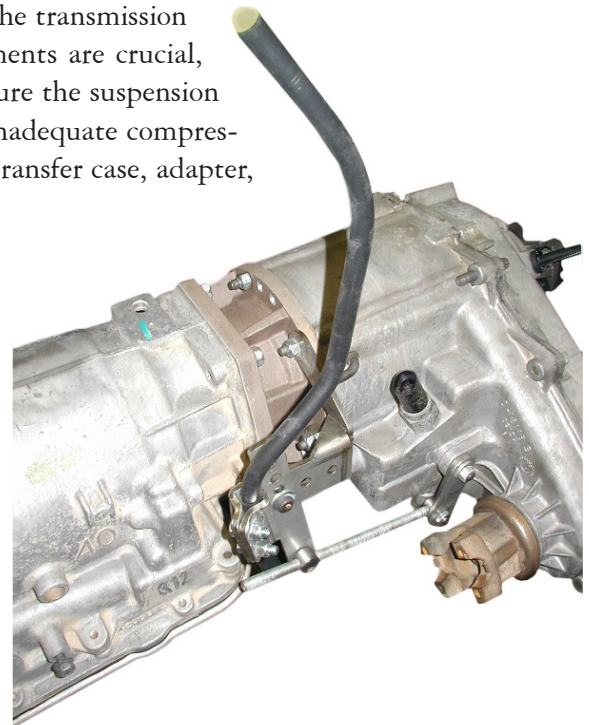
Driveshafts

Modification Requirements: Driveshaft lengths often need to be changed for the swap, as factory transmission and adapter combinations to the 231 vary. Driveshaft modifications are usually inexpensive when performed by driveline, RV, or tractor implement specialists. New driveshafts are an option but seldom required for a successful conversion.

Engine and Transmission Placement: Avoid letting driveshafts dictate the placement of the powertrain. Position the engine, transmission, and transfer case independently to avoid detrimental decisions. Driveshaft modifications should be performed after the engine and transmission are mounted and the vehicle is on its wheels.

Measuring for Modifications: Measure the length to modify the driveshafts after mounting the transmission and engine and with the Jeep on its wheels. Accurate measurements are crucial, especially if a shackle reversal has been or will be performed. Ensure the suspension geometry accounts for the front driveshaft. Incorrect lengths or inadequate compression slip can cause the driveshaft to damage the axle, driveshaft, transfer case, adapter, or transmission.

Novak’s #SK2X shifter assembly, shown with our #4L61 kit installed.



Transmission and Transfer Case Linkages

NP 231 Shifter: Modification may not be necessary for the NP 231 shifter. Though if the transfer case no longer aligns with the factory shifting mechanisms, consider using our #SK2X or #SK2XC shifter kits.

Transmission Shift Control Unit: The transmission shift control unit can be cable-operated with detent positions for all functions and should include a lockout to prevent accidental engagement of reverse. Several console-type shifters from B&M, such as the Z Gate, Star, and Sportshifter, are suitable options. Hurst Performance offers similar shifters. Direct linkage stick shifters like the Lokar are excellent, especially when replacing a manual transmission and adapting the transmission tunnel. These shifters often provide a preferable look and feel.

Factory Linkage: When replacing an automatic transmission, the factory linkage can generally be retained and adapted, though it may lack two positions, limiting full functionality.

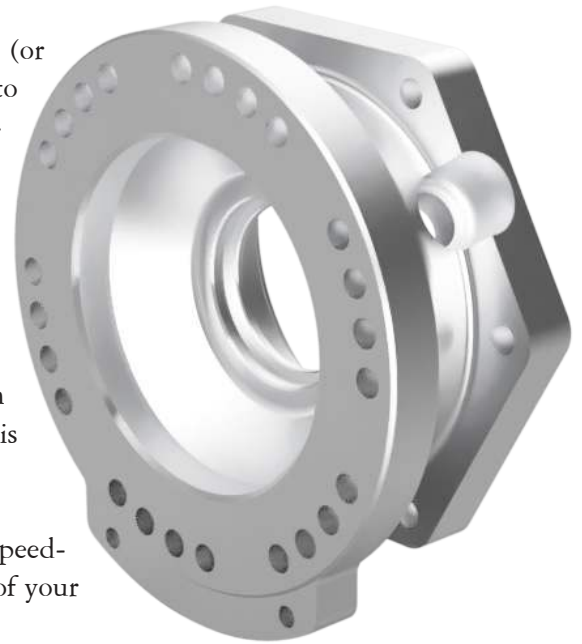


Vehicle Speed Sensors and Speedometers

VSS Assembly: The included VSS assembly will supply your ECM (or aftermarket standalone computer) with the necessary information to run the transmission. The ECM can then operate newer GM and aftermarket speed indicator gauges.

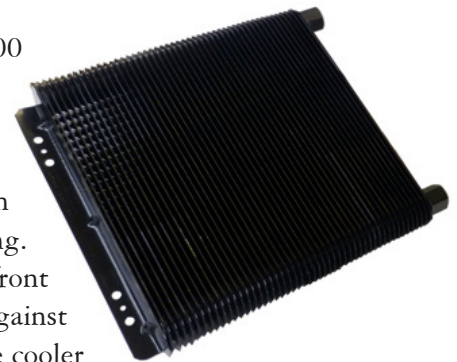
VSS Pickup Installation: Tighten the supplied VSS pickup into the threaded port on the adapter. Ensure the pickup o-ring is secure and torque it to 15 ft. lbs. Avoid overtightening to prevent breaking the pickup. Tightening it against its spotface will set the correct distance from the reluctor ring. Verify clearance by installing the adapter on the NP231 and checking with feeler gauges. The typical clearance is .015" - .040".

Stock Speedometer: To keep things simple, you may retain the speedometer function of the NP231 output assembly, facilitating the use of your existing Jeep mechanical gauges.



Transmission Cooling

For every ten degrees cooler you keep the transmission, you can add 25,000 miles to its service life. Therefore, using a transmission oil cooler is advisable for any automatic transmission. However, avoid mounting a cooler in front of the Jeep radiator, as it reduces the grille opening area and can cause airflow turbulence, leading to engine cooling loss. A transmission cooler can be mounted in the engine compartment and still provide satisfactory cooling. Suitable locations include the passenger side firewall or the backside of the front fender. Ensure the cooler is mounted to allow airflow through it, not flat against the firewall or fenderwell. Some choose to use a supplemental frame rail style cooler successfully. Using a transmission temperature gauge is also a good idea. These gauges 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.

Warranty

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.

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