

Introduction

We hope that your engine to transmission conversion goes very well, and that the installation of your Novak adapter works as smoothly as it is designed to. This kit is for adapting most GM standard shift bellhousings to the Tremec 150, three speed transmission used in CJ5 and CJ7 from 1976 through 1979. We strongly recommend that you read these instructions no matter how much experience you have had with this kind of work.



JEEP POWERTRAIN SUPERIORITY

About the T150 Transmission

The Borg-Warner T150 transmission was the three-speed transmission found in 1976 to 1979 Jeeps. It is a good transmission when well maintained and has often been adapted to V8 and V6 power.

Rated at medium-duty, the T150 is stronger than its compact size may suggest. The T150 is frequently retained in CJ Jeeps when married to mild GM V6 and V8 power. It is regarded as the second strongest of all the Jeep three-speeds, second to the Jeep T15.



T150 Specs
at a Glance

Make: Borg Warner
Length: 9.25"
Height: 14"
Weight: 85 lbs.
Case: Cast iron
Top Cover: Cast iron
Gearing: 2.99, 1.75, 1, R3.17

Features

The T150 is a top loaded, top shifting transmission. The T150 is fully synchronized in the second and third gears. All gears are helically cut.

Identification

The T150 transmission is 9" long and features a cast iron top cover that is retained by eight bolts and a main case of cast iron.

The Jeep T150 has a 1-3/8" x 6 spline output shaft for mounting the transfer case input gear. The transmission has a 7-1/2" input shaft (stick-out length) with 1-1/16" x 10 splines and a neoprene front seal and cast iron bearing retainer. The pilot tip is ~17mm.

The T150 features a conventional "H" shift pattern, with reverse being towards the driver and up.

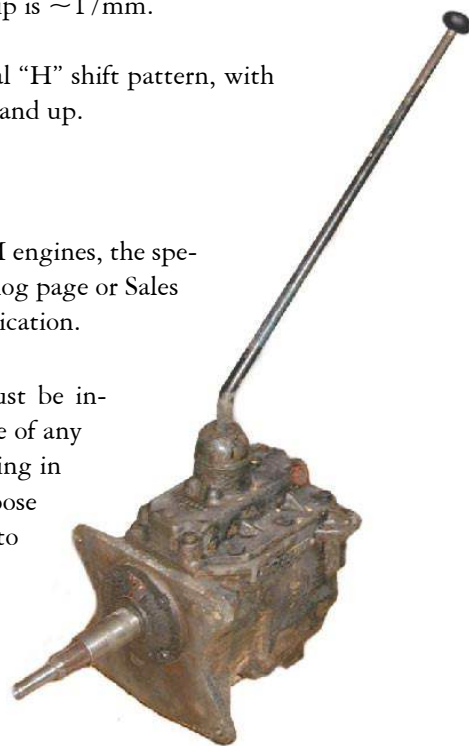
Preparation

Installing the Pilot Bushing

Because our adapter is compatible with both Gen. I-II and Gen. III+ GM engines, the specially machined pilot bushing is sold separately. The Novak website catalog page or Sales Technician will have prompted you to select the proper one for your application.

Before installing the transmission to the engine, the pilot bushing must be installed in the GM crankshaft. Ensure that the crank bore is clean and free of any particles, residue or burrs. It is advisable to soak the porous bronze bushing in clean motor oil at least overnight prior to installation. You may also choose to place the bushing in the freezer to shrink it very slightly, just prior to installation, to very lightly warm the crank flange with any safe method as you deem appropriate.

A wood drift such as a dowel or other driver can be used to install the pilot bushing. Never hammer directly on the bushing as it is quite soft, and it will surely be damaged by such a technique. Carefully and squarely drive the bushing into the crank flange bore until seated.



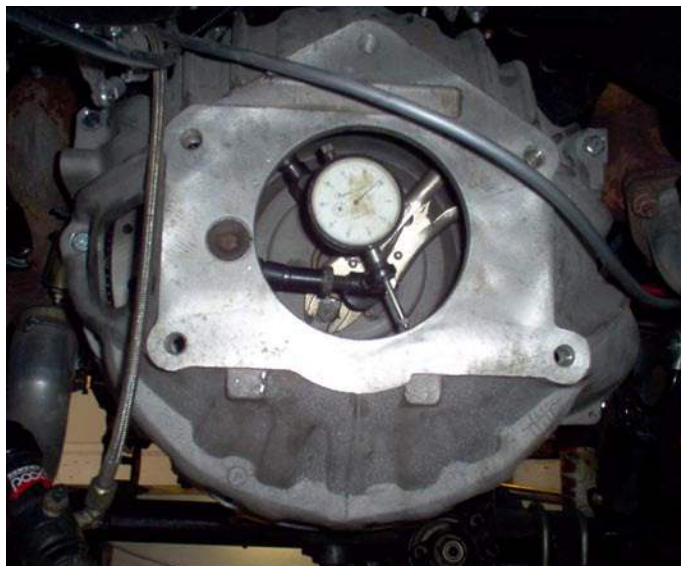
Do not use any kind of grease in the pilot bushing, as this will plug the pores that lubricate the transmission pilot tip from the oil soaked into the bushing.

Bellhousing Alignment

A misaligned block to bellhousing is more common than even professional mechanics know, and this situation can ruin your transmission and cause other damage.

On any engine using a standard shift transmission, with or without an adapter, it is important to check the bellhousing locating bore location relative to the crankshaft. The potential for transmission failure or premature wear is so great, due to misalignment at this point, that no engine should be assembled without being checked. The checking procedure is quite simple. Correcting misalignment is not so simple but must be done to insure normal service from the transmission. A dial indicator is required, as well as a suitable means to mount this instrument on the engine crankshaft.

A dial indicator is a device that has an arm or contact point, suitably connected to a pointer, that moves in front of a dial with markings on its face. These markings usually represent .001" each. The purpose of a dial indicator is to measure in thousandths of an inch that can be read directly on the dial of the indicator.



To check a bellhousing, mount it on the engine it's going to be used with, make sure there are no burrs or dirt on the block or bellhousing. All bellhousing to block bolts should be in and tight. Mount the dial indicator on the crankshaft of the engine using a suitable magnetic base attachment or mechanical clamping means. The contact point of the indicator should be touching the bore of the bellhousing. The indicator must be mounted rigidly enough so it does not move on its mounting to prevent false readings. Rotate the engine by hand with the spark plugs removed and observe the reading on the dial. Keep adjusting the dial assembly until the needle moves the least amount per rotation. When you have achieved the least amount of needle movement throughout the 360 degree sweep of the indicator, this is your runout. You can then determine the direction it is offset by the movement of the needle.

1. Install dial indicator base to the flywheel using a magnetic base, or use the crank bolts.
2. Remove the spark plugs from the engine. Have an assistant rotate the engine crank with a wrench.
3. Read the runout and mark the "high" and "low".
4. If runout exceeds .005" to .007", then you must install offset dowel pins, of the appropriate value and install them in the direction to correct the offset.
5. Check your work again with the indicator.



The total number of thousandths misalignment of the bore relative to the crankshaft is read directly on the dial. Total runout should not exceed .007", with .010" being maximum. The greater the misalignment, the sooner transmission problems and failure will occur. A symptom of misalignment is unusual wear of the pilot bushing. We have checked stock Chevy bellhousings on engines that were out more than 1/32" (.032"). Some Ford ones are reportedly worse. Anything over .010" runout must be corrected before the engine and bellhousing are put in service or you can count on pilot bushing, transmis-



sion, and clutch problems, followed by transmission failure. The simplest way to correct misalignment is to try another bellhousing or bell housings. Machining the bellhousing is the best cure but offset dowel pins are simpler. Shims between the block and bellhousing will also work if you have the patience to use this method. Offset dowel pins are sometimes available from speed shops, parts houses and other specialty suppliers.

Clutch System

Clutch Release

Many individuals will choose to retain their mechanical clutch release linkage as found on these 1976-1979 Jeep CJ's. As such, the installer will need to fabricate a simple plate to bolt to the GM engine as an anchor for the bellcrank pivot. Nothing need be elaborate here, just geometrically straight and strong.



This Chevy release arm is 6.5" long with a ratio of 2.17:1. This will provide proper geometry for the Jeep mechanical release linkage. It is listed at Novak part #RAGM.



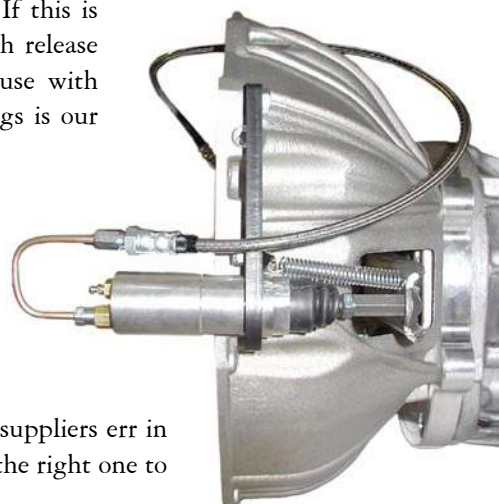
Use the pressure plate that is matched to your engine's flywheel. Choose a disc from a Jeep or Ford application that will provide a 10 x 1-1/16" spline, as is compatible with the T150 input shaft.

Note that the Jeep pressure plate will fit most Chevy flywheels that are drilled for a 10-1/2" clutch, allowing you to specify the Jeep clutch assembly to your parts retailer.

Some installers will opt to convert to hydraulic release, using a Jeep CJ master cylinder assembly. If this is the case, a very easy clutch release system that we offer for use with most Chevrolet bell housings is our #HCR kit, shown.

Throwout Bearings

One of the most significant mistakes made in the setup of factory and conversion clutch-



es is the wrong choice of release bearing, and the assumption that the clutch kit actually comes with the right length of throwout bearing. Many clutch kit suppliers err in the bearing they supply and it is the installer's responsibility to verify or choose the right one to ensure optimal clutch release system geometry.

Use the proper clutch release bearing for the clutch being used, to achieve ~1/8" air gap between the bearing face and pressure plate fingers with the clutch pedal at rest. There are six different length release bearings for GM clutches. Which bearing to use depends entirely on the pressure plate being used. See the chart below. A very detailed discussion of the procedure to determine this is at the Novak website Knowledge Base, under Clutches, Linkages & Bell housings.

Clutch Assembly

Use the Jeep clutch disc in the GM clutch as this will match the 1-1/16 10-tooth spline on the input gear of the transmission. The Jeep pressure plate will fit a Chevy flywheel drilled for 10-1/2" clutch.

GM Clutch Release Bearings

This chart shows the length of the bearing in inches. Most auto parts stores only stock a couple of these release bearings and they may not be the best ones for your swap. More on this topic is on the Novak website Knowledge Base under the topic of Clutches.

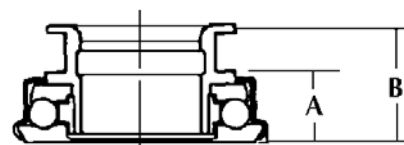
-A- length	-B- overall length	Part number
3/4	1-17/64	N 4068
15/16	1-5/8	N 1741
1	1-41/64	N 2001
1-1/16	1-11/16	N 1466
1-1/4	1-7/8	N 1086

Adaptation

Preparation

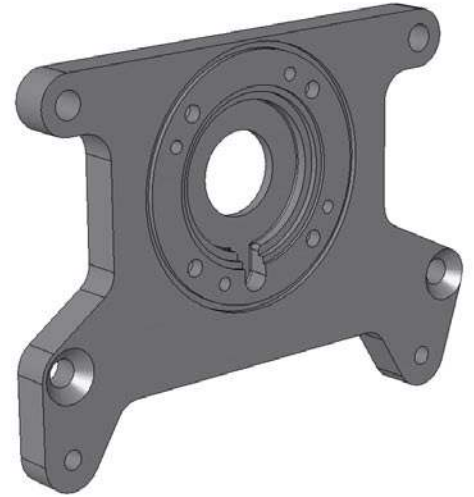
Wipe the face of the transmission case clean and carefully inspect it to make sure there are no pieces of old gasket, dirt, burrs or anything else that would prevent proper sealing of the adapter to the transmission.

Because the two upper holes in the T150 are very near to the same



Our adapter is made from 356 aluminum, heat treated to T6 condition. It is actually stronger than cast iron. In spite of this, the adapter, like anything else, is not indestructible. Misalignment, improper assembly, improper mounting, or incorrect driveshaft lengths, and miscalculated driveshaft geometry on shackle reversal setups are some of the things that may cause adapter failure. 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 workmanship.

location as the holes in a GM bellhousing, the only way to join them together is by elongating these holes in the transmission to match. Use a round file by hand, or a rotary file in a drill motor and elongate the two upper mounting bolt holes in the cast iron T150 case so they match the two upper holes in the Novak adapter. You will want to do this before mounting the adapter with sealer to avoid having to remove any filings that may get between the two.



Assembly

Clean your transmission and assembly area and then remove the front bearing retainer from the T150 and store it away, as it will not be used with the new assembly. Clean off the old gasket from the front face of the T150 with a razor and solvent if necessary. Use a smooth file on the face of the transmission to make sure there are no burrs, particularly along the top edge where the shift housing meets the face of the case. Install the seal o-ring ring provided with your kit in the groove on the face of the adapter, making sure it is not twisted. We have preinstalled the oil seal in your adapter. Apply some oil or assembly lube to the lip of the oil seal and on the input gear oil seal journal next to the front bearing. Then, slide the adapter down the input shaft, making sure the seal ring does not come out of its groove. Follow by installing the four 1/4", Allen socket head cap screws in the adapter and into the four threaded holes that formerly held the OEM retainer. Tighten evenly to approx. 25 ft. lbs. We recommend that you tighten to torque in three successive stages.

If not already assembled from Novak, apply gasket sealant between the retainer and front relief of the adapter. Apply gasket or thread sealant to the threads of the two bolts provided and install the bolts through the retainer. Tighten to approx. 25 ft. lbs.

If you are installing this kit against a Chevy bellhousing with a 5-1/8" bore, you should have ordered our #BR4 sizing ring, which we'll have pressed onto your retainer. Do not install this kit onto a 5-1/8" bellhousing bore without this precision locating ring or damage to your transmission will occur.



When using a large bore GM bellhousing, such as those found on GM trucks from 1968-1991 with the SM465 transmission, you will require the above precision sizing ring. This is available under Novak #BR4.

Fastening The Assembly

The top two bolt holes of the transmission and adapter are fastened by the supplied 1/2-13 bolts, passing through the transmission ears you elongated earlier, through the adapter and into the bellhousing threads. Final torque will be to 60 ft. lbs.

The lower two bolt holes of the GM bellhousing match the countersunk holes in the rear face of the adapter, for which we have supplied two flat head socket head Allen bolts. We recommend the use of a serviceable thread locking compound such as Permatex Loctite 243 Blue on these threads. Use sparingly at about 2-3 drops per threaded hole. Final torque will be to 60 ft. lbs.

The lowest two bolt holes of the adapter are threaded to accept the provided 7/16-14 countersunk bolts and backed by nuts and washers. Final torque will be to 60 ft. lbs.

Disclaimer & Liability Limitations

The information contained in these instructions is for guidance only, and does not guarantee or constitute a warranty of fitness, applicability or compatibility with the customer's particular project. Suitability of parts or information for an application is fully the responsibility of the reader or buyer.

These components and instructions applying to them are for Jeeps being used for off-road use only. It is the responsibility of

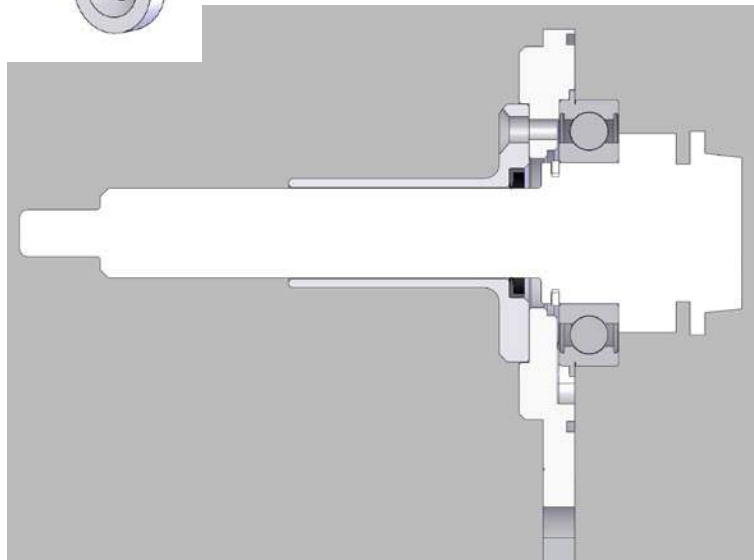
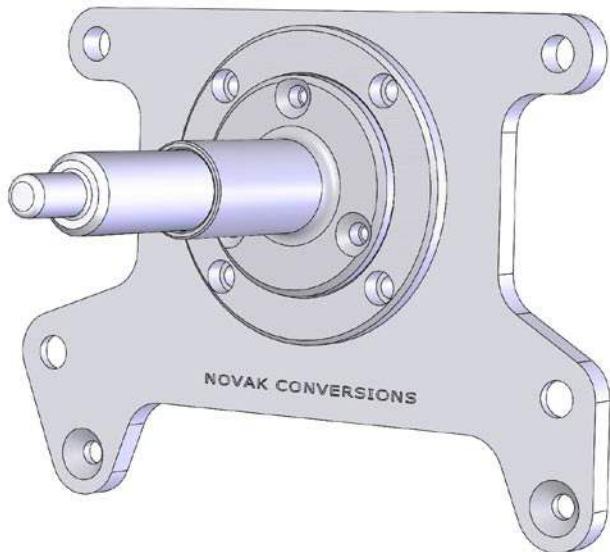
the installer to be qualified to safely and correctly perform this or any other work on a vehicle.

These instructions and the products and procedure described herein are offered only in accordance with the Novak policies and liability limitations found at: <http://www.novak-adapt.com/about/policies.htm>

Conclusion

We strongly suggest that you keep these instructions for future reference. For questions concerning your conversion, contact us. We'll be pleased to answer your questions.

There is no final word to our instruction packages. We update them as often as we receive relevant questions they don't already cover and we invite our customers to offer any suggestions, images or questions they may have that can make the process easier for any to follow. Note our contact information below.



Air pollution laws vary from state to state. Changing an engine or transmission in your vehicle may



change its pollution status. It is the customer's responsibility to determine that their vehicle conforms to whatever state and federal regulations that may apply to their vehicle. Neither Novak, Inc. nor its directors are responsible for any changes made to your vehicle.

Novak Kit #G150 includes:

- (1) Adapter, billet, G150, Jeep T150 transmissions to GM bellhousings
- (1) Retainer, front input bearing, GM style
- (1) Seal, oil, input bearing retainer, Jeep T150 transmission
- (1) O-ring, TH350 & TH700R4 tailhousing
- (4) Bolt, 5/16-18 x 7/8, hex socket, standard head
- (2) Bolt, 1/2-13 x 2, hex socket, flat head
- (2) Bolt, 1/2-13 x 2-1/2, hex head, grade 5, zinc plated
- (2) Bolt, 7/16-14 x 1-1/2, hex head, grade 5, zinc plated
- (2) Bolt, 7/16-14 x 1-1/2, hex socket, flat head
- (1) Threadlocker, Loctite 243 blue, .5 ml capsule, oil resistant, 10 min. cure
- (1) Instructions



American Made

©Novak, Inc.

www.novak-adapt.com

support@novak-adapt.com

877.602.1500