

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 Borg-Warner T14 and T15 three speed transmissions and the T18 four speed transmission as used in the CJ5 from 1972 through 1975. It is also compatible with the Borg-Warner T98 four speed transmission used in CJ's from 1955 through 1972. We strongly recommend that you read these instructions no matter how much experience you have had with this kind of work.

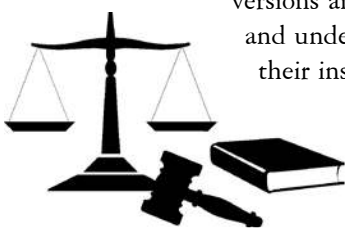


Note to the Customer and/or Installer

This document and the use of any Novak products assumes safe and adequate working knowledge of the automotive systems involved. Vehicular repair, upgrade and conversion work can be among the most difficult of automotive mechanical and electrical tasks and it is upon the customer to ascertain whether they are working within their expertise or whether they should acquire assistance. Because Novak has no control over the customer's project procedures, Novak instructions and recommendations do not constitute a warranty of fitness, applicability or compatibility with the customer's particular project. Novak cannot determine the skill level of the customer and/or the installer of Novak products, nor can Novak publish all of the information on fundamentals that an installer should know before attempting these advanced procedures. While every attempt at informational accuracy has been made, these instructions and any recommendations therein are for guidance only. This guide is not intended to replace the service manual specific to your vehicle. It is not possible to document the wiring, routing and specific system details of every vehicle and the installer should obtain and use both their vehicle's manual and the engine or transmission donor vehicle's manual in conjunction with these instructions.

Your Legal Requirements

Novak products and procedures are intended and recommended for off-road use only and installation on a vehicle for use on public roads could violate laws within your jurisdiction. Additionally, installation of Novak products may adversely affect the warranty coverage on your vehicle.



This guide is not meant to explain, interpret nor notify the installer any laws concerning vehicle changes, engine conversions and the emissions systems surrounding them. It is the installer's responsibility to know and understand their local, state and national legal requirements and regulations and to make their installation conform to emission and vehicle safety demands of the jurisdictions in which the vehicle may operate. Novak does not recommend nor condone the disabling or modification of the vehicle or any system within it that could render it out of conformance with any laws in which the vehicle may be licensed or operate. Neither Novak Conversions nor its directors, principles nor employees are responsible for any changes made to your vehicle.

If you are performing a powertrain conversion and if your vehicle requires a referee inspection, you may wish to establish a rapport with them and discuss your plans and seek advice and approval from them prior to commencing your modifications.

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>, which may supersede and prevail over these policies.

About the T14 Transmission

The Borg-Warner T14 is a lighter-duty, three-speed transmission, introduced in the 1967 CJ5 and C101, and was offered in Jeeps up through 1975. The T14 was found only behind the Buick V6 engine until 1972, when it was provided as the base transmission for the AMC 232 and 258 I6 engines.

About the T15 Transmission

The Borg-Warner T15 is a medium-to-heavy-duty, three-speed transmission, introduced in the 1971 Jeeps. It was offered in Jeeps up through 1975. The T15 was primarily found behind the AMC V8 engines as the base transmission, but was also found behind the AMC 232 and 258 I6 as an upgrade option over the T14. The upgrade to the T15 transmission was the Jeep T18 four speed.

About the T18 Transmission

The Borg-Warner T18 is a heavy-duty, truck style four-speed transmission introduced in 1965 and was produced through 1991. It was designed for and used in 1/2, 3/4 and 1+ ton Ford, Jeep and IH trucks. The T18 is the improved successor to the T98 transmission. The existing factory T18 cast iron front adapter plate (about 7/8" thick) will be used in conjunction with this Novak adapter kit. Jeep T18's using this adapter assembly will have an 8-1/4" transmission input shaft stickout length (measured from the pilot tip of the shaft to the front face of the T18's factory adapter plate).

About the T98 Transmission

The Borg-Warner T98 transmission is a heavy-duty, truck style four-speed transmission, introduced in 1948 and persisted until 1964 in Ford trucks. It was installed into Jeeps starting in 1955. The Jeep T98 was a desirable, but rare option for Jeeps through 1972, as it was a special order item for civilian versions, being more common in military Jeeps like the M38A1. For simplicity's sake, the T98 will be referred to as the T18 for the remainder of this set of instructions.

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.

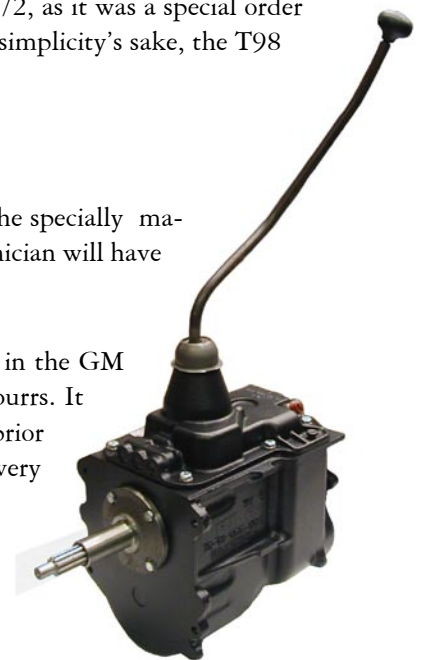
Before installing the transmission to the engine, the pilot bushing must be installed in the GM crankshaft. Ensure that the crank bore is clean and free of any particles, residue or burrs. It is advisable to soak the porous bronze bushing in clean motor oil at least overnight prior to installation. You 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.



Jeep T14 & T15 Transmissions



Jeep T98 & T18

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.

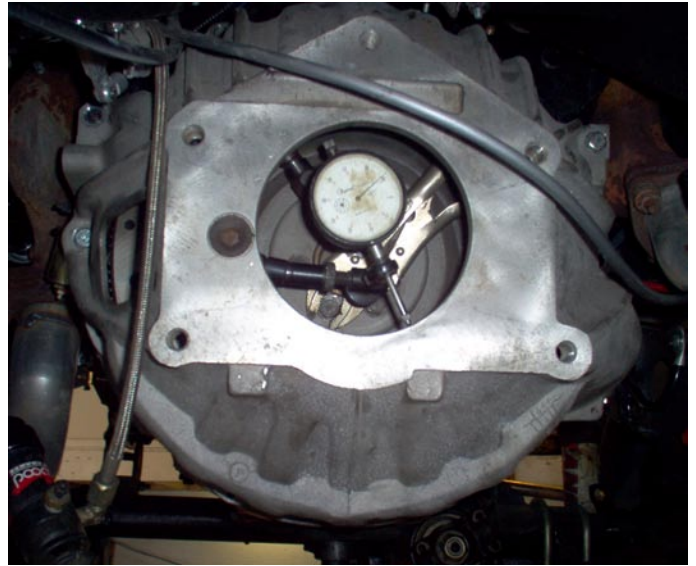
A dial indicator is a device that has an arm or contact point, suitably connected to a pointer, that moves in front of a dial with markings on its face. These markings usually represent .001" each. The purpose of a dial indicator is to measure in thousandths of an inch that can be read directly on the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

Alignment Procedure:

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, transmission, and clutch problems, followed by transmission failure. The simplest way to correct misalignment is to try another bellhousing or bellhousings. 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 1972-1975 Jeeps. 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.



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 1-3/16" spline for the T14 or 10 x 1-1/16" spline, as is compatible with the T15 and T18 input shafts.

Note that the 10-1/2" and 11" Jeep pressure plates will fit most Chevy flywheels that are drilled for a 10-1/2" or 11" clutch, allowing you to specify the Jeep clutch assembly to your parts retailer.

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 & Bellhousings.

Clutch Assembly

All standard shift parts for the engine being installed should be the same as if it were being used with a GM transmission. Note that the Jeep clutch will fit a Chevy flywheel that is drilled for the same diameter. This means a 10-1/2" Jeep pressure plate will fit a Chevy flywheel drilled for 10-1/2" clutch and the 11" Jeep pressure plate will fit an 11" drilled Chevy flywheel. The clutch disc will be Jeep or Chevy to match the 1-3/16" (T14) or 1-1/8" (T15, T18) input gear splines.

Adaptation Preparation

Clean off the old gasket from the front face of the transmission with a razor and solvent if necessary. Use a smooth file on the face of the transmission to make sure there are no burrs. Wipe the face of the transmission case clean and carefully inspect it to make sure there

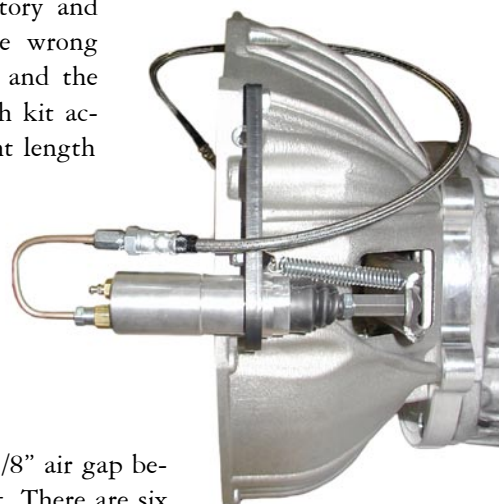
Some installers will opt to convert to hydraulic release, using a Jeep master cylinder assembly. If this is the case, a very easy clutch release system that we offer for use with most Chevrolet bellhousings is our #HCR kit, shown.

Throwout Bearings

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



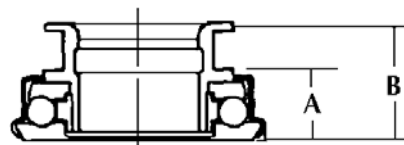
This Chevy release arm is 6.5" long with a ratio of 2.17:1. This will provide proper geometry for the Jeep mechanical release linkage. It is listed at Novak part #RAGM.



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



are no pieces of old gasket, dirt, burrs or anything else that would prevent proper sealing of the adapter to the transmission. Additionally, clean all of the supplied bolts and washers with brake cleaner or a similar solvent so as to remove any factory applied anti-corrosive oils.

Assembly

Clean your transmission and assembly area and then remove the front bearing retainer from the transmission for modification. Hacksaw off the finished turned area where the Jeep clutch release bearing used to ride. This should leave the retainer only about 1-1/2" long. Reinstall the retainer on the transmission with the factory bolts and washers. The adapter can now be installed on the transmission using the four supplied 7/16-14 x 1-1/2" socket head bolts and four 7/16" lock washers. Tighten evenly to approx. 76 ft. lbs. We recommend that you tighten to torque in three successive stages.

Now, install the GM style front retainer supplied with the kit on the adapter. There are three 5/16-18 x 1" socket head bolts that will be used to secure the retainer to the adapter. Apply gasket or thread sealant to the threads of the three bolts provided and install the bolts through the retainer. Tighten evenly to approx. 17 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 will press onto the bellhousing locator of the adapter.

Do not install this kit on a 5-1/8" bellhousing bore without this precision locating ring or damage to your transmission will occur.

Fastening The Assembly

Four 1/2-13 x 1-1/2" bolts and four 1/2" lock washers are supplied to attach the adapter to a GM bellhousing. 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. Tighten evenly to approx. 75 ft. lbs. The stock Jeep rear transmission mount and cross member are normally used for securing the rear of the transmission.

Wiring

Wiring changes are minimal if the oil and temp senders from the Jeep are used in the Chevy engine. The alternator is wired the same for GM or Jeep. The starter is also similar. The battery cable (+) positive wire goes to the large terminal on the Chevy starter and the wire from the "start" position of the ignition switch goes to the small terminal on the Chevy solenoid. The leftover wire on the Jeep solenoid is not used but should be taped or insulated with shrink tubing so it does not short out. Alternatively, one can use mechanical gauges to simplify wiring changes.



IMPORTANT CONSIDERATIONS FOR FOUR-SPEEDS:

Do not shorten the bearing retainer more than necessary as some four-speed retainers have special oil scraper grooves machined in them. If these are removed there will be no way to keep the gear oil in the transmission or off the clutch.

When using this kit with a four-speed, it must be used in conjunction with the 7/8" thick factory transmission adapter plate that was between the Jeep bellhousing and the four-speed. Attach the factory plate to the Novak adapter first as prescribed above, then install the assembly on the transmission with the factory bolts and washers.



Our adapter is made from 6061 aluminum, ~~6061~~ 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.

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 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. If you have a question you feel this information should have covered and didn't, please let us know about it. You are also welcome to submit your suggestions, ideas and images that you think we should include here which may help future conversion installers. Note our contact information below.

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Part No.	Description	Qty.
CST-15	Adapter, casting, 15 for T14,T15, T18, T98 transmissions to GM bellhousings	1
Retainer	Retainer, front input bearing, GM	1
92210A581	Bolt, 5/16-18 x 1	3
BT-SHS-716-14x1.250	Bolt, 7/16-14 x 1-1/4, hex socket, standard head	4
BT-HEX-12-13x1.500-G5Z	Bolt, 1/2-13 x 1-1/2, hex head, grade 5, zinc plated	4
WA-SL-716	Washer, lock, split, 7/16, zinc plated	4
WA-SL-12-Z	Washer, lock, split, 1/2, zinc plated	4