

Introduction

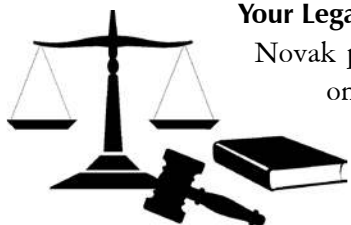
This guide will instruct the installer in assembling the TH400 transmission to the Jeep New Process transfer cases, The adapter kit is designed for compatibility with the Jeep NP207, NP231, NP242, NP249 & NP241OR "RockTrac" transfer cases.

Note to the 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



Advanced computer modeling methods were integral to the design of our #141 adapter assembly. We were able to push the bounds of product and process well beyond the status quo.

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 This Conversion

Our TH400 to NP / NVG conversion makes for an absolutely strong and capable assembly both on-road and off-road, and it remains one of our most requested automatic transmission to transfer case combinations.

The Adapter

The Novak TH400 to Jeep NP / NVG transfer cases adapter is very compact at only 1.4" in length. This adapter assembly is the shortest Turbo 400 adapter in the industry, providing a combined transmission and adapter length of only 25.9" (equivalent to a 18.9" manual transmission / bellhousing combination).

The adapter itself is machined from a high-grade billet aluminum alloy, featuring a thick flange and a heavy cross-section.

TH400 Versions

These kits are for all years and versions of the popular HydraMatic 400, including Chevy, Buick and other GM, AMC Jeep, etc. and work with 2wd & 4wd versions.

Transmission Output Shaft Replacement

This #141 kit comes with a new output shaft to be installed in your TH400

21 vs. 23 splines

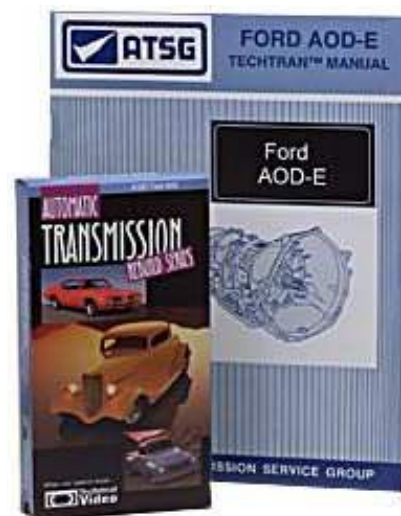
We're often asked about whether the 21 spline style connection is strong enough, vis a vis the 23 spline version. In most situations, 21 splines will be adequate.

Input gear This is due to the fact that we don't use friction welding on our shafts, and that much of the punishing torque multiplication takes place within the transfer case low range, which occurs after the input portion of the transfer case.

However, we have seen limited instances where 21 spline shafts have failed where 23 would not have. As such, our parts warranty extends only to our 23 spline version shaft.

If you are certain that you must have maximum strength, then you may purchase from us a 23 spline input gear for your NP2xx in conjunction with the 23 spline version of our kit. However, this may not be money best spent in some situations.

transmission that was originally a 2wd or 4wd version - either works equally well. The Novak output shaft is of a premium alloy steel, precision splined and specially hardened for strength and against wear, providing a superior interchange. This shaft connects the transmission output directly into the existing 21 or 23 spline NP / NVG input gear for the strongest connection. Transfer case disassembly is not typically required. However, please note our 21 vs. 23 spline discussion below and its warranty caveat.



Recommended reading for a do-it-yourselfer wishing to learn more about the TH400 is Ron Sessions book titled "How to Work With and Modify the Turbo Hydra-Matic 400 Transmission", published by MBI, ISBN 0-87938-267-8.

Technical Video has rebuild videos and manuals that will guide you through the process of installing your output shaft, and reconditioning and updating your transmission.

www.technicalvideos.com



directly into the factory Jeep NP/NVG input gear, and transfer case disassembly is not required.

Assembly Procedure

Transfer Case Fasteners Removal

If you've not already done so, remove any bolts and studs that remain in the transfer case. These are very tightly threaded and thread-locked from the factory. These can be removed with double nuts and wrenches, or with locking pliers.

Clean All Mating Surfaces

Clean all adapter mating surfaces on the rear face of the transmission as well as the transfer case input, being careful not to contaminate either of their internals with any particles. It may be necessary to razor off old gasket material and sealants. Follow up with a solvent, rag and compressed air as needed.

Clean and flush the transfer case input shaft spline bore using solvent and compressed air. You may use a small wire brush to clean the splines and any rust on them.

Clean and inspect all transmission and transfer case face threads. It may be necessary to run a threading tap for clean-up. In the event of severely damaged threads, thread repair inserts might be required. For individuals expecting severe duty from their TH400 / New Process combo, it may be a good idea to use thread inserts in the six bolt holes of the transmission's aluminum flange, as the leverage forces of the transfer case on the transmission could, over time, cause the fasteners to loosen.

Installation requires disassembly of the transmission for which we recommend the services of a transmission professional, though good work is within reach of the home mechanic. The basic installation is 3-4 hour bench job and may include simple gasket and seal replacements. Some choose this as the time for a more thorough master rebuild and update if necessary.

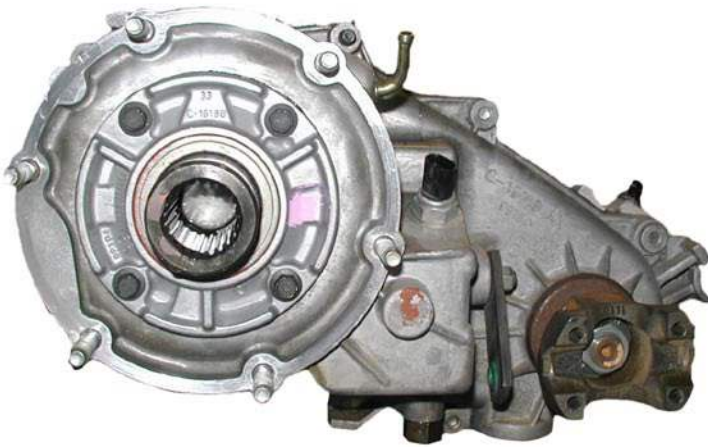
Transfer Case Input Shaft

The included Turbo 400 output shaft splines in di-



Two of our preferred gasket sealants include Permatex® The Right Stuff RTV silicone and Permatex® Aviation Form-A-Gasket in the brush-top bottle. Years of experience building many hundreds of gearboxes, leak-down testing them and hard operation prove them to be superior.





ate with a flat file or other means.

Spline Shaft Test Fitment

Before the assembling your TH400, test fit the supplied Novak output shaft into the transfer case input gear. The splines should slide together easily and just have a discernible amount of rotational allowance. Note that these are involute splines and are self-centering upon transmission of power.

If the shafts don't fit together, check your spline count. If you did not have the spline count you were expecting, it is possible to exchange your transmission output shaft with Novak, or you can order the appropriate input gear. Just call us and we'll help.

Adapter Fasteners

The fasteners for this adapter assembly have been provided. The adapter to transmission fasteners consist of six socket head bolts, 3/8-16 x 1-3/4" long. The adapter to transfer case fasteners consist of six socket head bolts, 3/8-16 x 1-1/4" long.



Adapter Test Fitment

Trial fit the adapter to the rear of the TH400 transmission case, leaving the provided gasket off to make certain the adapter mates up easily and squarely. Make sure they fit firmly together by hand and with minimal resistance. At this test fitting stage or final assembly, never use the adapter bolts and force to bring the assembly together.

Then, test fit the adapter against the front face of the transfer case. It should locate squarely onto the centering input bearing retainer and slide flatly against the transfer case input face. If it does not, check for any nicks or burrs and rectify as appropriate.



We've provided a vial of Permatex® Loctite Blue 243 thread locking compound. A drop or two per bolt is recommended to prevent the bolts from loosening under strenuous service.

Because of this adapter's short length, it is necessary to insert the 5 o'clock (as looking from the rear face of the adapter) transfer case socket head bolt, as shown prior to mounting the adapter to the transmission.

Adapter Installation

Your adapter has been pre-assembled at our facility with its internal oil seal pressed into a seal spacer so that this adapter will be compatible with both short and long transfer case input gears.

You will notice that the provided transmission output flange gasket will only fit properly one way. Put a thin coat of gasket sealant on each side of this gasket and install the transmission rear gasket around the adapter's locating shoulder, making sure it lays flat.

Fit the adapter to the transmission flange and thread in the bolts until



finger tight. Use your socket key or wrench to tighten the bolts in a crossing pattern in three successive stages until you've achieved 38 ft. lbs. of torque.

Splines Lubrication

The transmission output shaft splines and transfer case input shaft splines should be pre-lubricated prior to assembly for start-up usage. Use an assembly lubricant only. Do not use grease or

any other substance that will not properly dissolve into the transmission fluid. Upon filling and operating the TH400, the splines will then be continuously exposed to ATF and well lubricated.

Transfer Case to Adapter Clocking & Installation

The six bolt holes in the face of the transfer case are phased to prevent installation in all but one orientation. A gasket that corresponds to this face has been provided, and is used primarily for a barrier between the adapter and transfer case face, more to keep contaminants out

than keeping oil in, as the transmission output seal and transfer case input seals should sequester their fluids.

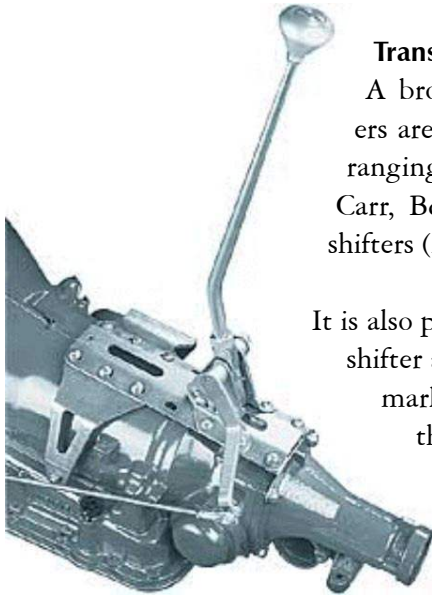
Install the adapter clocked to your preferences. Consider ground clearance, its shifter linkage, tunnel clearance, driveshaft clearance, etc.

Tighten the six transfer case bolts evenly by hand and then follow up with an even and sequential cross-tightening of the six transfer case bolts to a final torque of 38 ft. lbs.



AMC Jeep style transmissions from 1976-1979 featured a tilted transmission case casting, and for this we make an optional variation of our #141 kit. This adapter configuration is unique on the market in that it levels the adapter's base foot for square mounting on the rear isolator mount and crossmember. This is useful in that the adapter allows installation without clocking your transfer case down, or having your transmission mount sit crooked. Customers should choose this version only for AMC TH400s of the above era. Earlier Jeep units featured "universal" cases that were level as conventional. These earlier cases are identified by their use of a factory 400 transmission to Buick or AMC engine block adapter.





Transmission Shifter

A broad variety of transmission shifters are compatible with this conversion, ranging from console shifters (i.e.; Art Carr, B&M, etc.), to direct-mount stick shifters (i.e.; Gennie, Lokar, etc.).

It is also possible to use the factory console shifter and cable when using an after-market, fully adjustable shift arm on the TH400. Contact Novak for details.

Transfer Case Shifter

This transmission conversion will allow for the retention of the factory shifters, or allow you to upgrade to the Novak #SK2X shifter assembly for a simpler conversion and a clean shifting, direct linkage system, primarily for YJ installations.



Similarly, our #SK2XC transfer case shifter is highly recommended for XJ and TJ TH400 conversions.

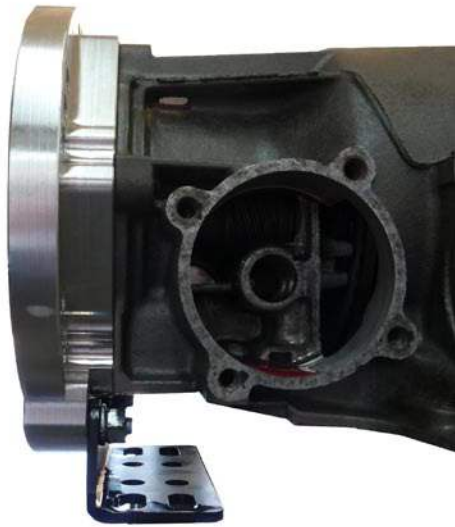


Driveshafts

Use of the factory diameter driveshaft and yoke is recommended. Our adapter design has maximized clearance between the transmission pan and yoke, but it is necessary that you install your GM engine offset 1-1/4" to the driver's side. If you are installing against a factory AMC engine with an AMC TH400 or a GM TH400 using our #437-AMC adapter kit, your factory engine should already have this proper offset.

The length of the Hydramatic 400 makes its placement into an 80" wheelbase Jeep (CJ5) prohibitive, but is an excellent fit into CJ7s, Utility Series Trucks and Wagons, as well as all of the Full Size Jeeps.

Driveshaft length changes are often required, as this geartrain combination is typically longer than factory Jeep combinations. However, some GM engine installations will allow for the transfer case to remain in its OEM location.



strong structural components of the vehicle's powertrain. As such, they are often the best place to support the important rear mount unit.

Included with our adapter kit is a steel base which is a highly configurable mounting foot, and it is ready to accept our industry standard urethane isolator mount. This is our preferred rear mount unit. Our #134 adapters are designed for it, and its usage is essential to protect powertrain components from the flex and jar typical of any automobile, but especially Jeeps. The urethane isolator may be mounted in either up or down orientations to best suit your particular crossmember / skidpan situation.

Some factory transmission mounts featured a torque-arm isolator with an offset, ostensibly to cut down on the kick-back from drivetrain twist. This stronger, centered style rear mount is typically just as effective when used in conjunction with good engine mounts, which have the largest effect on capturing rotation. If your exhaust used a hanger off this point, you or your exhaust professional will need to fabricate a suitable hanger, which can be anchored to this rear mount assembly if needed.

Vertical spacing using spacers or washers may be required to achieve the ~ 4 deg. of downward powertrain tilt recommended. Consider this and

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.

Transmission Rear Mount

This transfer case adapter's design is based on Novak's Universal Series adapters that feature a modular mounting and support system. Novak adapters are not just adaptation components, but



This Jeep featured a hard-mounted adapter, though with isolators at each end of the transmission support crossmember, which offers inferior powertrain flex and unacceptable frame flex. To counteract the latter, the installer welded a tubular crossmember behind the transfer case, which makes future servicing highly problematic.

Best stick with a more conventional skidpan and rear mount isolator, which offers better characteristics, geartrain shielding and frame strength.

A Warning on Hard Mounting

Under no circumstance should you “hard-mount” any part of your powertrain and doing so will void any warranty offered on this kit. Hard-mounting involves mounting the engine or transmission solidly to the frame horns, or to the crossmember / skidplate. This rigidity may be permissible in a race car that only sees smooth track, but is in no way appropriate for a regular street vehicle, let alone a 4wd vehicle. The powertrain requires the give, flex and shock-absorption afforded it by urethane, rubber or similar isolators.

As concerns the rear mount: even if you install a crossmember that is itself mounted to the frame on flexible isolators (also not a good idea as the crossmember is intended to be a structural and solid component of the frame), this is not enough since the amount of moment force required to flex that kind of crossmember is significantly higher and will unnecessarily strain the transmission case, rear mount base and the adapter. This can cause cracked cases, chronically loosening bolts, excessive driveline shock, broken parts, etc.

Transmission Cooling

For every 10 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 this automatic transmission. Use of a transmission temperature gauge is also a good idea. These are widely available and generally inexpensive.



With the increase in popularity of the newer, hotter burning, fuel-injected engines, it is increasingly recommended to run a stand-alone, dedicated transmission fluid cooler and in front of the engine radiator wherever possible, in lieu of one integrated into a radiator.

Engines & Engine Mounting

A TH400 installation is often done in conjunction with an engine conversion into the Jeep. These engines include the Chevrolet Small Block V6 & V8, from Generations I, II, & III, 1955-20012+.

Novak's MM Series engine mounts, featuring excellent vibration dampening, superior strength and impressive adjustability - adjustable even after the engine is installed. The design and strength and affordability of our mounts are second to none.

In any scenario, it is critical that the engine be installed (as the Jeep engines usually are) with an offset of 1" to 1-1/2" to the driver's side. Other engine mounts on the market - especially the bolt-in versions - do not take this into account and make other placement decisions for the installer that do not take the full powertrain into account. Novak offers what we have found to be the most intelligent engine mounting system for Jeeps available, allowing the installer to make an easy and satisfying decision as to powertrain placement with the TH400 and the Dana 300 both considered.



Axles

Use of factory axles is completely acceptable with this conversion. Axle upgrades are not necessary to the conversion itself, but they may be chosen for reasons external to this transmission upgrade.

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.



We've had many customers request it, and we've made available our New Process 231, 242, etc. Master Rebuild, kits plus several other components for them. We welcome you to call us or see our website for details.

Full dissassembly of these transfer cases is not required for this conversion, but many individuals wanting an entirely fresh and optimized powertrain find this a good time to do so.

Part No.	Description	Qty.
BIL-141	Adapter, billet, 134 & 141, TH400 transmission to the Jeep Dana 300 & NP transfer cases	1
OS-141	Shaft, output, TH400 transmission to Dana & NP transfer cases, 23 spline	1
3922	Gasket, TH400 rear face	1
8623943	Bushing, output shaft, TH400. Wide version, 1964-1974	1
BT-SHS-38-16x1.750	Bolt, 3/8-16 x 1-3/4, hex socket, standard head	6
BT-SHS-38-16x1.250	Bolt, 3/8-16 x 1-1/4, hex socket, standard head	6
7347-HP132	Gasket, six bolt front face transfer cases	1
471869	Seal, oil, Dana 300 and New Process input shafts and Novak Universal series adapters	1
SS231	Spacer, seal, Novak universal series adapters to NP / NVG transfer cases	1
F-UB3	Bracket, mount, transmission rear, automatic transmissions to Jeeps	1
NT-HEX-38-16x0.328-G5Z	Nut, 3/8-16, hex, grade 5, zinc plated	2
WA-SL-38	Washer, lock, split, 3/8, zinc plated	2
SD-38-16x1.750-Z	Stud, 3/8-16 x 1-3/4, fully threaded, zinc plated steel	2
91458A114	Threadlocker, Loctite 243 blue, .5 ml capsule, oil resistant, 10 min. cure	1



©Novak, Inc.
www.novak-adapt.com
support@novak-adapt.com
877.602.1500

