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 Aisin Warner AX15 five-speed transmission as found in 1988-1999 Jeeps.

NOVAK CONVERSIONS
JEEP® POWERTRAIN SUPERIORITY

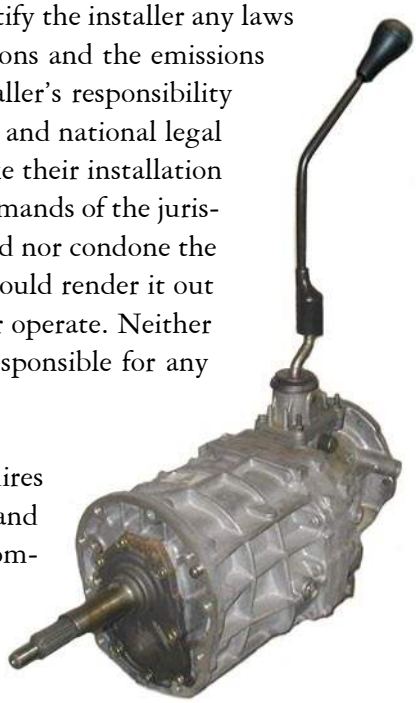
Note to the Installer

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 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.

Additional Instructions

This instruction set is intended to be used in conjunction with *The Novak Guide to Clutches, Linkages & Bellhousings*, found on the Novak website at: http://www.novak-adapt.com/knowledge/clutches_etc.htm . This document is invaluable and is the greatest compilation of clutch set-up and troubleshooting knowledge available.

About the AX15 Transmission

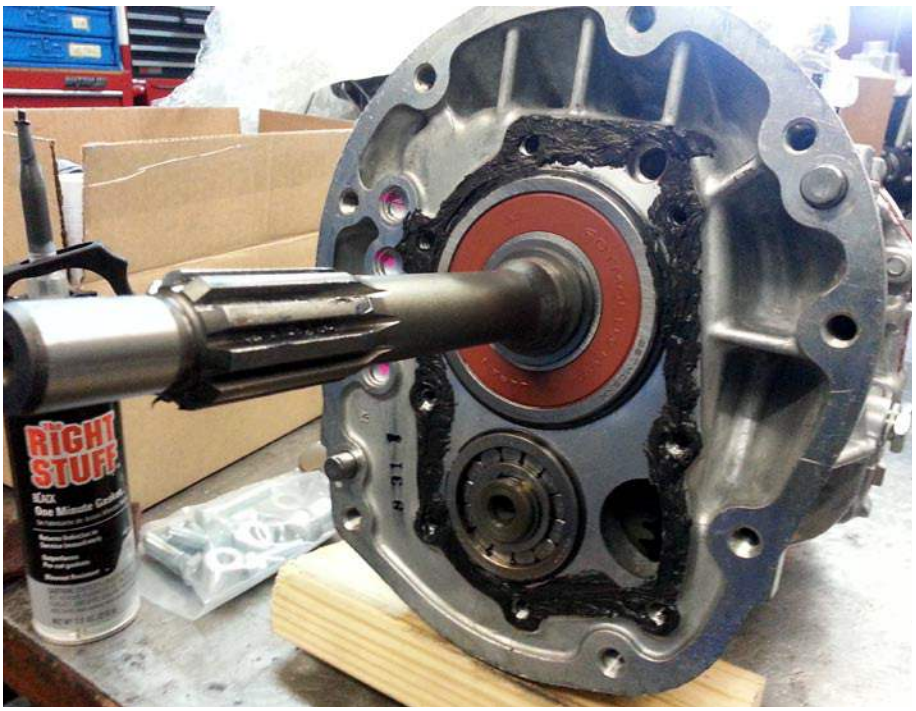
The Aisin Warner AX15 transmission is a medium-duty, standard shift, five-speed transmission introduced in the 1988 (mid-year) YJ Wrangler and XJ / MJ Cherokee / Comanche Jeeps, and found in 1988-1999 Jeep XJ, YJ & TJ models. Its only year in the ZJ Grand Cherokee was 1993, and only with the six-cylinder.

The AX15 is a medium-duty transmission found behind the AMC 258 and the Mopar 4.0L (242 ci) I6 engine. The AX15 is also found in Dakota trucks and is closely related to the Toyota R154 as found in the Supra Turbo and Four Runner, though the case rear halves and gear ratios vary. It is also related to or referred to as the AN5, AR5, MA5 in GM and Isuzu applications.

Adaptation

Preparation

Transmission removal is facilitated by removal of the shifter assembly from the transmission. This shifter assembly is held down vertically by two bolts and two studs, and can be accessed through the shifter hole in the floor, or from under the Jeep with the cross member removed and the drivetrain lowered.



Remove the 4.0L bellhousing from transmission from within the bellhousing after the 4.0 engine has been pulled. We do recommend a good washing of the transmission. It is particularly vital that the front face be clean so that no particles can present a risk of falling into the transmission, nor that the bellhousing/adapter assembly will be installed unparallel.

A GM-dimensioned bearing retainer is provided with each adapter kit so that you can use any of the common GM thowout bearings. As such, your factory bearing retainer is no longer required.

Factory Bearing Retainer Removal

There are two styles of bearing retainer

for the AX15. Models up through 1993 did not use a throw out bearing sleeve since they were made for use with the (problematic) internal hydraulic release bearing. 1994 and later versions retainers (image, adjacent) use a conventional throw out bearing sleeve. Novak's GMAX adapter assembly made from 2016-onward works with either style, and requires removal of the factory bearing retainer to replace with the Novak adapter, which has integral bearing retainer features.

Remove the eight bolts that fasten the factory retainer to the front face of the AX15. Use a soft mallet to carefully tap around the retainer to break its hold. Do not pry the retainer as it will mar the transmission surface.

Carefully use a razor or other scraper tool to remove any previous silicone skin on the transmission face, followed with cleaning the retainer machined surface with solvent and a rag.

Apply a small bead of silicone RTV such as The Right Stuff™ or other suitable product for sealing gearboxes. Do not allow excess sealant to enter the transmission holes, bearings, etc. as it could travel into oiling passages and starve bearings and journals.

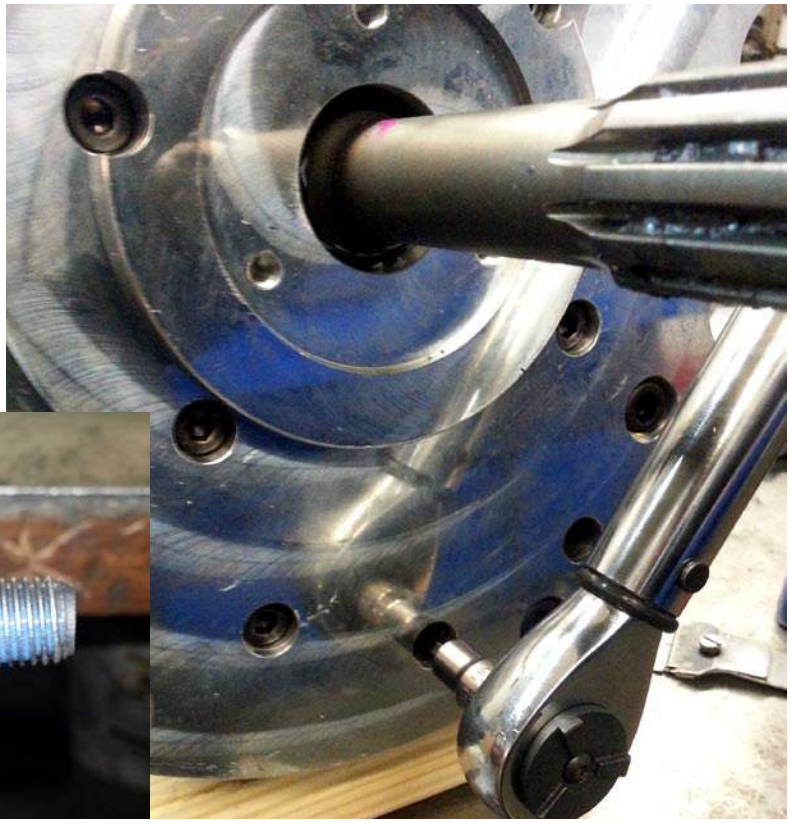
Keep the adapter and trans faces parallel as you tap into place.

Do not use the bolts to pull the adapter up to the trans, as trans or adapter breakage or thread stripping could occur.

Use a blue or otherwise servicable thread locking compound on the threads.

Assemble the Adapter to the AX15

As these transmissions uses dowel pin alignment, and that this alignment is crucial to the life of your transmission, you will notice that the dowel pins will fit tight into the adapter itself. Make sure there are no nicks or burrs that would prevent it from installing easily.



Slide the adapter on carefully keeping it parallel to the front face of the transmission. If the plate gets tilted, it will prevent it from sliding on. You may wish to use a soft face mallet and gently tap each side in alternate succession.

Retainer Bolts

Thread the eight supplied socket head (Allen™) retainer bolts into the inner holes, and tighten evenly and in three successive, cross-pattern steps to 18 ft. lbs. A scant drop of serviceable thread locker per bolt is recommended.

Our adapter is made from a billet of 6061 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.

Adapter to Transmission Bolts

The adapter is attached to the transmission with supplied metric socket head bolts with a unique 25 thread pitch. Do not substitute them for standard 10mm bolts, as thread damage will occur. We recommend that you torque them to 35ft. lbs. in a 10 ft. lb. increment, and then a 5 ft. lb. increment in a crossing pattern. The design of the adapter and the goals we held for its strength precluded us from using a deeper counter bore for conventional lock washers. Therefore a light amount of thread locking compound such as Locktite™ Blue must be used.

Release Bearing Sleeve Installation

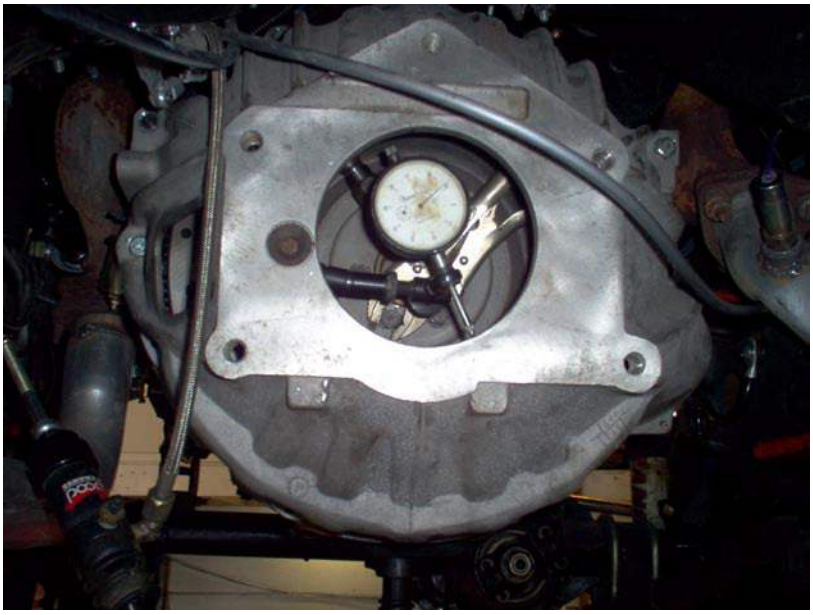
Included with your adapter is a billet steel sleeve for a GM release bearing. It is attached with three provided countersunk socket head bolts in any available radial orientation. Tighten the bolts evenly to 12 ft. lbs., and again, we recommend using thread locking compound, as previously.

Bellhousing Considerations

The #GMAX15 adapter will work with most conventional GM bellhousings. Post-'67 truck bellhousings require our optional #BR4 sizing ring adapter for the later bellhousing's 5-1/8" bore. Do not attempt to use a smaller bore adapter with a large bore bellhousing, as mislocation and transmission damage will almost invariably occur.

Drill Out Bellhousing Threads

Prepare the bellhousing by drilling or reaming out the four threaded holes on the rear face. This can be done with a drill, reamer or rotary file. Use the bolts to gauge that you have enough clearance for them to pass through. The bellhousing will bolt to the adapter from within. We have provided four ½"-13 bolts for this purpose, but note that some bellhousings have thicker or thinner bosses. You may have to use some of your original bolts or supply new ones if your bellhousing is unique. Make sure you are getting the maximum engagement into the adapter threads, without pushing against the face of the transmission itself. We do recommend that you use flat washers against these bolts to spread the load over a wider area. You may use lock washers or a thread locking compound to lock these four bellhousing bolts. Torque them to 55 ft. lbs. in two successive and incremental steps, following a crossing pattern.



Installing the Pilot Bushing

Before installing the transmission to the engine, the special pilot bushing you purchased from us (separately) must be installed in the GM crankshaft. We have provided the special pilot bushing according to the year of transmissions you have. You should test fit it to the transmission input shaft pilot tip to be sure it is correct.

A piece of broomstick makes a good drift punch 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. If the tolerances are tight between the crank and bushing, you may wish to set the pilot bushing in the freezer for an hour and then very lightly warm the end of the crank with a torch before assembly. This facilitates some installations and provides for a secure fit.

Bellhousing Alignment

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 a real

Conveniently, the AX15 has a 1-1/8", 10 spline input shaft. GM clutch disks commonly have the proper disk hub to accommodate this. Use a pressure plate that is matched to your engine and its flywheel. Nearly all GM trucks through the decades use this spline configuration with their manual transmissions.

possibility, 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.

Novak's HCR, hydraulic clutch retrofit

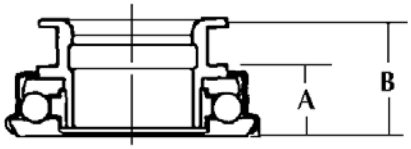
A dial indicator (right) is a device that has an arm or contact point, suitably connected to a pointer, that moves in front of a dial with markings on its face. These markings usually represent .001" each. The purpose of a dial indicator is to measure in thousandths of an inch that can be read directly 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 acheived the least amount of needle movement through he 360 degree sweep of the indicator, this is your run out. You can then determine the direction it is offset by the movement of the needle.

The total number of thousandths misalignment of the bore relative to the crankshaft is read directly on the dial. Total run out 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"). Anything over .010" run out 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 available from speed shops locally or online.

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. This chart lists five bearings by the critical "A" measurement; groove to face dimension as referred to in this article.

-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



Clutch System

Clutch Release

Most installers will opt to run their hydraulic release, using the existing Jeep master cylinder assembly. If this is the case, a very easy clutch release slave, bracket and arm system we offer for use with most modern (1970-1991) Chevrolet bellhousings is our #HCRC kit, shown below.

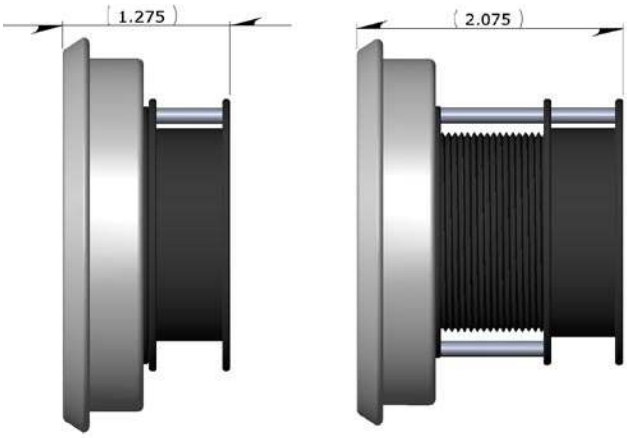
Use the proper clutch release bearing for the clutch being used. There are six different length release bearings for GM clutches. Which bearing to use depends entirely on the pressure plate being used. See the accompanying chart. Or, consider Novak's adjustable clutch release assembly, shown.

If the motor you are using will be developing a good deal of torque, you may wish to drain the transmission and replace its fluid with a synthetic ATF lubricant for extended wear.

Novak's Adjustable Release Bearing

General Motors originally specified and the market once offered a handful of different length bearing options. However, many of these have become unavailable, difficult to find or excessively expensive.

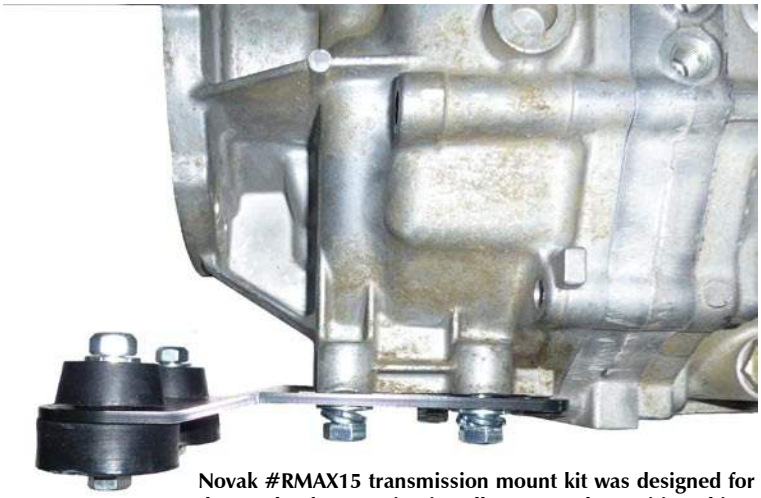
Novak's #TB1 assembly works on nearly all GM applications that used an external release arm, from 1955-1991, which makes it perfect for setting up your GMAX15 conversion.



Drivetrain Positioning

Our experience shows that the AX15 and the 231 transfer case will move forward as much as 3" with Chevrolet V6/V8 conversions. This is quite advantageous to lifted Jeeps whose owners are seeking better driveshaft angles. The crossmember may be left in the original location, with the only modifications being to the transmission mount. Two holes may need to be drilled into the crossmember for relocation. On our TJ conversion projects, we've shifted the transmission forward on its mount, using a simple bracket.

Any change in positioning may necessitate modifications to the transmission shifter. The example, below, has been lengthened by welding in an extension rod and subsequently bent for the proper angle. Make sure you remove the plastic ball bushing on the end, as well as the shifter stick. A vice and soft face mallet will facilitate the removal of the stick, as it is attached by a notched, press-fit.



Novak #RMAX15 transmission mount kit was designed for the needs of conversion installers. It can be positioned in a variety of orientation and spacing options.

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.

Novak Kit #GMAX15 includes:

- **Adapter plate**
- **Release bearing sleeve**
- **Seal, oil, input, Jeep #5252053**
- **Bolts (8), 8mm, socket head**
- **Bolts (9), M10-25, socket head**
- **Bolts (4) 1/2"-13**
- **Lockwashers, split**
- **Instructions**

American Made

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