

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 T98 transmission used in the Kaiser Jeep M715 / M725 trucks. We strongly recommend that you read these instructions no matter how much experience you have had with this kind of work.



JEOP® POWERTRAIN SUPERIORITY

About the T98 Transmission

The T98 transmission is a heavy-duty, top loading, truck style four-speed. The Borg-Warner T98 transmission was 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. It was more common in military versions of the CJ like the M38A1.



Borg Warner T98 Specs at a Glance:

Make: Borg Warner
Length: 11.87"
Height: 17.5"
Weight: 145 lbs
Case: Cast Iron
Top Cover: Cast Iron
PTO Port: Passenger's Side
Gearing: 6.40, 3.09,
1.69, 1.00

The Borg Warner T98 was distinctively the first compound-low, four-speed manual transmission to be offered in Jeeps. This transmission was standard in the Kaiser Jeep M715 and M725 military trucks. It was also found in IH, Reo/White, other trucks and industrial applications.

The T98 is a good, tough transmission, and all consumable parts are available as well as most hard parts.

Features

The T98 is ~11-7/8" long. It has a deep first gear of 6.39:1 and is direct-drive in fourth gear. It's reverse ratio is 7.82:1. The T98 is fully synchronized in the second through fourth gears. All gears are helically cut except first and reverse, which are spur gears.

Identification

The T98 transmission is ~11.9" long and features a cast iron top cover that is retained by six bolts. The T98 case is of cast iron. The case itself is unusually narrow for a heavy-duty gearbox. The case and top cover are both cast iron, with the top cover being retained by six bolts. T98's that are

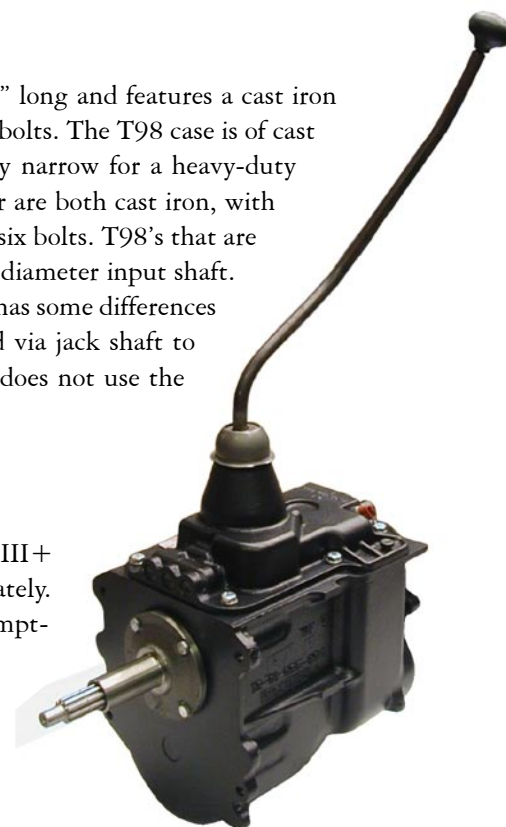
found behind the OHC 226 I6 engine featured a 10-spline 1-1/8" diameter input shaft. The M715 uses a Borg Warner T98 four-speed transmission which has some differences from its civilian counterpart, which include its divorced, mounted via jack shaft to its transfer case, and it has a 1" shorter input gear, and finally it does not use the adapter plate found on civilian models.

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.

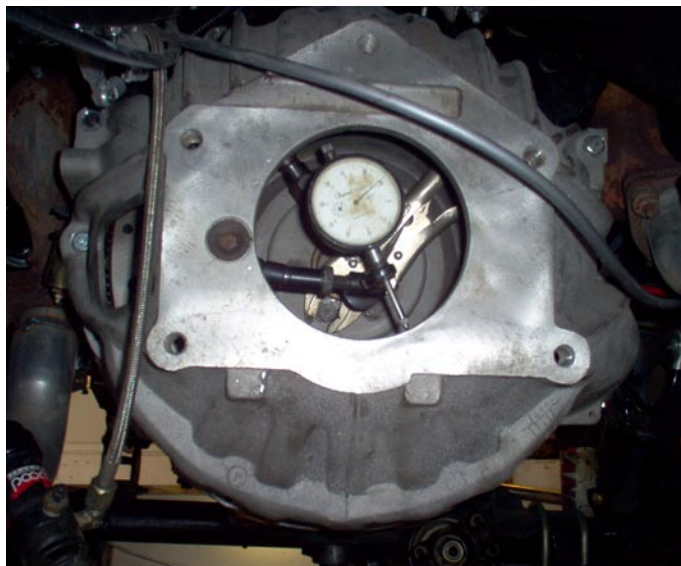
A wood drift such as a dowel or other driver can be used to install the pilot bushing. Never hammer directly on the bushing as it is quite soft, and it will surely be damaged by such a technique. Carefully and squarely drive the bushing into the crank flange bore until seated.

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. If you wish to further charge the bushing with oil, you can soak it in a light motor oil for a day or more.

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.



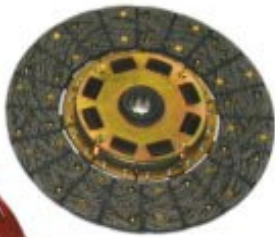
A dial indicator is a device that has an arm or contact point, suitably connected to a pointer, that moves in front of a dial with markings on its face. These markings usually represent .001" each. The purpose of a dial indicator is to measure in thousandths of an inch that can be read directly on the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





Use the pressure plate that is matched to your engine's fly-wheel and corresponding GM style 1-1/8" x 10 spline disc.

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



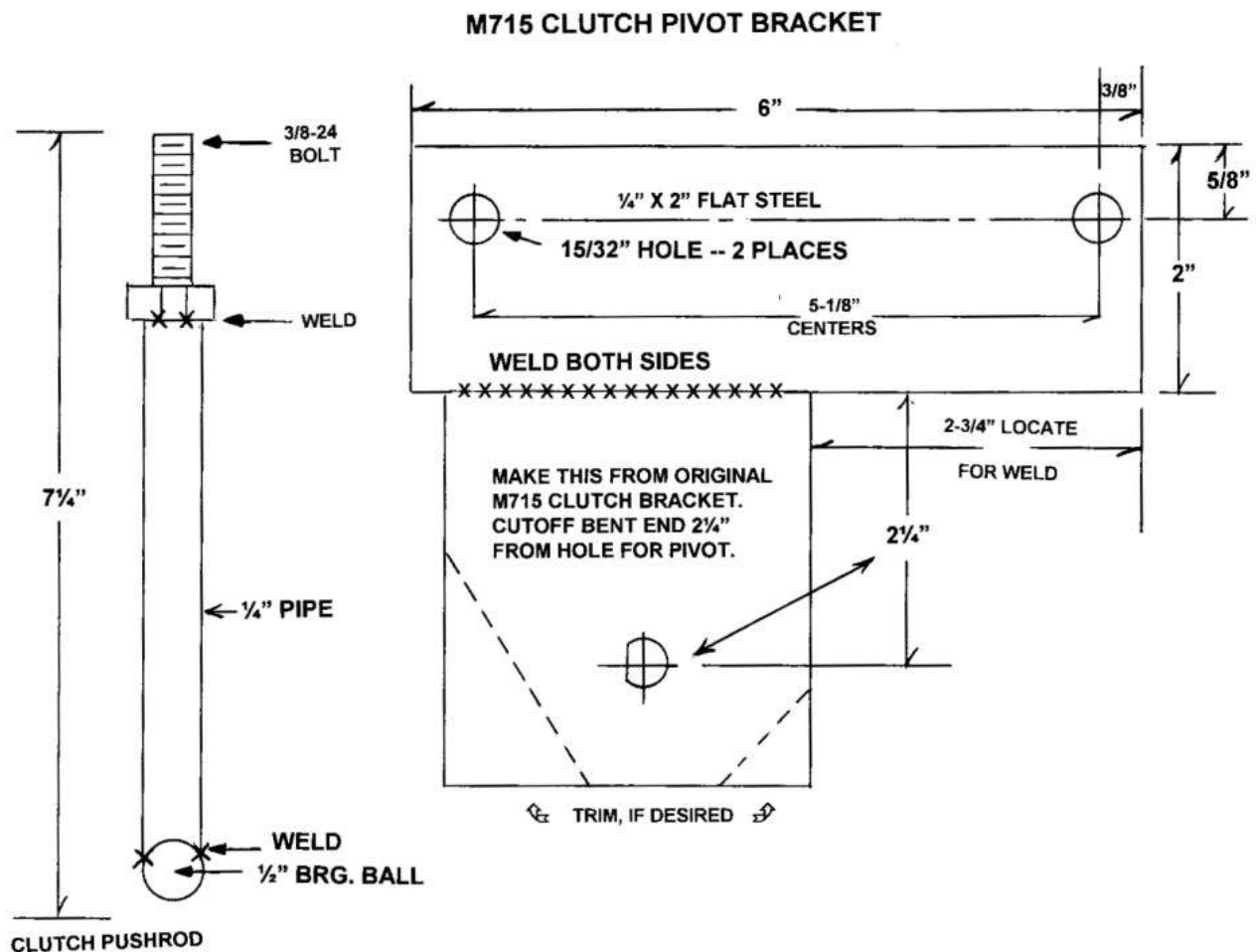
This Chevy release arm is 6.5" long with a ratio of 2.17:1. This will provide proper geometry for the Jeep mechanical release linkage. It is listed at Novak part #RAGM.

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 trucks. As such, the installer



The bracket shown can be made to support the inner end of the clutch cross shaft. Cut a piece of 1/4x2" flat steel 6" long. Drill two 15/32" holes to match the holes in the side of the Chevy engine (5-1/8" centers). Cut the bent part of the Jeep clutch bracket off 2 1/4" in front of the pivot stud hole. This will be turned 90 degrees and welded to the 1/4x2" piece to end up with a piece shaped like the enclosed sketch. If the engine block you are using does not have both 1/2-13 holes, a couple of tabs will have to be added to the plate to mount in the two bellhousing bolts above and below the bellhousing dowel pin.

Shorten the cross shaft (tube) 1 1/2". Draw a line on the tube lengthwise before cutting. This will allow the two halves to be re-aligned so as to keep the original relationship of the arms. Clamp the two halves in a piece of angle iron when welding together. Note that the holes in these arms, as well as the pin on the upper pushrod end are often quite worn. We welded up the worn hole and redrilled it. We also replaced the worn end on the pushrod with a self-aligning rod end bearing (see catalog).

The cross shaft and new mounting plate can now be installed. Bolt the rod end bearing of the pushrod to the cross shaft arm.

Make a new lower pushrod from a piece of 1/4" pipe. Weld a 1/2" diameter bearing ball to one end and a 3/8-24 bolt to the other end. This should end up 7 1/4" long.

Screw a 3/8-24 nut and self-aligning rod end bearing on the threads.

Attach a light spring to the hole in the end of the release fork. Connect the other end to a wire loop around the cross shaft. This will keep the ball end of the pushrod from falling out of the release fork. Use Chevy #3892632 fork only (see catalog #RAGM).

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

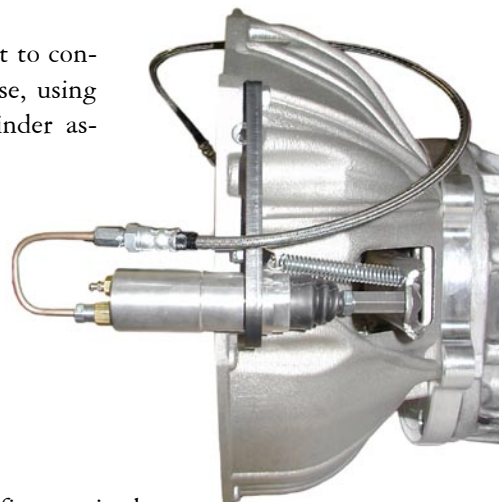
You can use a fully GM style clutch kit with this transmission, since it has a GM style, 1-1/8" x 10 spline input shaft.



Alternative to hunting for diminishing options in GM release bearings, consider Novak's adjustable release bearing, which surpasses the entire range of the above-listed bearings.

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 as shown above. We have found the following modifications to the clutch linkage work very well on this conversion.

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 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 choose the right one to ensure optimal clutch release system geometry.

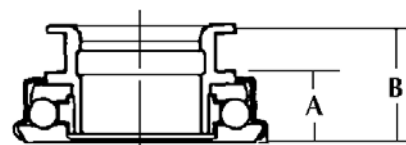
Use the proper clutch release bearing for the clutch being used, to achieve ~1/8" air gap between the bearing face and pressure plate

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

If adapting to nearly all GM Gen III+ engines, it is strongly advised to use the aftermarket flywheel with extended depth and drilled for a classic Chevy 11" clutch. This is discussed in greater detail on the Novak website or your Novak Sales Tech.



Adaptation Preparation

The GM bearing retainer is supplied bolted to the adapter it is used on—it does not go on the T98 transmission and has the purposes of being the mount for the throwout bearing and precision centering locator for the bellhousing.

Our adapter kit 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.

The factory T98 front bearing retainer must be shortened enough to clear the GM retainer bolted to the front of the adapter. 1" will be enough, but NOT more than 1¼". There are special internal grooves in this retainer for oil control and if shortened too much it may leak oil. It is suggested that 1" wide masking tape be wrapped around the end of the retainer as guide for sawing. A hand hacksaw can be used to make the cut, followed by a deburring of the fresh edge.

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 re-seating of the retainer and seating of the new adapter to the transmission.

Assembly

Assemble the C715 adapter in the following manner: First obtain the proper length ½-13 bolts for the particular Chevy bellhousing being used. Because of variations in Chevy bellhousing design, bolts are not supplied in the kit for this purpose. (Some designs use bolt and nuts on lower holes, while others use tapped holes in the housing—proper length ½" diameter bolts should be used for the particular Chevy bellhousing being used.

Fastening The Assembly

Bolt the 1¾" thick adapter to the Chevy bellhousing after lightly coating the release bearing area with grease. Next, bolt the 7/8" thick adapter to the 1¾" thick adapter with the bolts supplied.

If the engine and transmission are going to be installed as a unit, the transmission can now be bolted to the 7/8" thick adapter using ½-13 bolts. After bumping the firewall per the motormount information (see motormount instructions), the engine and transmission can be installed in the truck. The transmission will mount on its original mount at the rear.

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.

Other Conversion Considerations

Throttle

The M715 uses a cable for throttle control. A simple bracket can be made using part of the original Jeep bracket that will mount on the rear carburetor stud. The "ball" from the Jeep carburetor will bolt to the Chevy carburetor making this assembly very simple.

Other GM engines, including Throttle by Wire, will each have their particular methods.

Electrical

For many, the most difficult part of any 24 volt equipped military vehicle conversion will be the wiring. There are two basic approaches—keep it 24 volt or convert to 12 volts. To keep it 24 volt, a bracket to adapt the military generator to the Chevy engine will have to be fabricated. The pulley won't be the right width or diameter for the Chevy belt but a Chevy thin single crank pulley could probably be adapted. The Chevy starter will operate on 24 volts but it's a little rough on the drive pinion when it engages. Use a separate 12 volt solenoid and control button to operate the starter. An alternative would be to use two 12 volt batteries in series for 24 volts and tap off of one for 12 volts to the starter. Regular coil type 12 volt GM ignition systems require 7.2 volts to operate. This is obtained by the use of a resistor or special resistance type coil wire. The resistors are available in any parts store, they are usually referred to as ballast resistors. The 1975 and later "electronic" distributors take the full 12 volts.

Converting to 12 volts for the entire vehicle will allow the use of lower priced, more readily available electrical system parts. When this type of electrical conversion is done on a military vehicle it is usually simpler to completely remove the military



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.

wiring, switches, etc. and completely rewire. Our “Basic 12 volt wiring diagram” is suitable for use in completely rewiring the vehicle.

Trying to convert the military system to 12 volts is probably the hardest to do, particularly if you are unfamiliar with DC automotive wiring systems.

Gearing

The front axle on the M715 is a Spicer model 60, and rear is a model 70. Ratios available, other than original, are 4.88, 4.56, 4.10, and 3.73. Ratios higher (smaller number) than 4.56 will require a change of differential carrier in addition to the ring and pinion change.

With the stock 36” diameter military tire and 5.89 gear ratio, the engine will be turning 3,000 RPM at 55 MPH.

Firewall Clearance

Chevy Small Block installation clears best with a point type distributor. If a GM HEI. distributor is used, it may be necessary to indent the firewall for distributor cap clearance. Alternatively, aftermarket HEI distributors are a great option.

It will be necessary to dent the firewall for clearance at the passenger side cylinder head and exhaust manifold. This will be at the “corner” of the firewall where the toe board meets the indented area that the 6 cylinder engine sat in. It doesn’t take much—don’t get carried away!

On the drivers side at approximately the same area, there is a stiffener that sticks straight forward about a ½”. Bend about 2” of this flat against the firewall to provide for manifold clearance.

M715 Motor Mounts and Installation Notes

We formerly sold engine mounts which allowed the Chevy Small Block V8 to be bolted to the existing frame brackets in an M715. However, we found that our more modern MMX Series mounts offer greater freedom of placement and configuration around factory frame and body variances.

This engine installation will be centered in the frame. The center of the crank should be 15” from each side of the frame. The mounts have enough telescoping to allow side to side shift to center the engine. The four mounting plate to frame bracket bolts can now be tightened. Tighten the nuts on the 4” long bolts and run the jam nuts on these using two wrenches.



Install the engine in the M715. We have found it easier to have the transmission in the vehicle and adapters assembled to the engine. If the clutch was assembled with an alignment shaft, the two will slip together with no problem. If they do not—do not try to pull together with the bolts—something will surely be damaged or break!

Exhaust

We advise using the block-hugger style headers or if you must use manifolds, consider the old Chevy “rams horn” type with the outlets that point straight down. These will give maximum clearance at all areas and they have excellent flow (low back-pressure) characteristics. These rams horn manifolds will fit any Chevy small block cylinder head through 1979. In 1980 some small block heads use an offset bolt hole on the right front port only. Rams horn manifolds can be used with these heads also by using a spacer/adaptor kit available from most engine rebuilding shops. There is a series of rams horn manifolds that have a rearward turn to the exhaust pipe flange. This type will work fine on the passenger side but will require a tight turn of the head pipe to clear the clutch linkage on the drivers side.

The late style rear outlet manifolds could be used also if the following modifications are made: On the passenger side remove the heat shield from the toe board and dent the toe board for exhaust pipe flange clearance. On the drivers side the outlet

will be very close to the clutch cross shaft and bracket. It may possibly get hot enough to cause problems with the plastic bushings in the cross shaft. If you use the late style manifolds, keep an eye on this. If these bushings melt the clutch linkage will get sloppy.

Run the head pipes down and turn them out close behind the spring hangers where they will turn 90 degrees back to a muffler hung under each side of the body. From the mufflers, short tail pipes will turn out in front of each rear wheel.



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.



American Made

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 #C715 includes:

Adapter #15
Adapter #T18
Retainer,
Bolts (3), 5/16"-18 x 1"
Bolts (4), 7/16"-14 x 1-1/4"
Washers, lock (4), 7/16"
Instructions

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The Novak Guide to Electrical Conversions in Jeeps

A good electrical system depends on clean sound connections, free of grease, dirt or corrosion. The condition of connections to ground is just as important as the hot wire connection because the current must return to the battery via the ground connection. It is good practice to use a grounding strap between the body and frame, as well as the engine to frame, as both the body and engine are on rubber mounts. The battery should be grounded directly to the engine.

Use #14 stranded copper wire (fine strand) with vinyl insulation for general hookup of lights, accessories, primary ignition, etc. Use #8 stranded copper wire (fine strand) for connecting the alternator or generator regulator to the ammeter and from the ammeter to the battery. If a generator is being used, connect the A (armature) terminal on the generator to the A terminal on the regulator with #8 stranded copper wire also. Terminal ends should be used wherever possible and all connections should be properly soldered.

Wiring should be taped into looms using vinyl electrical tape or plastic looms can be used from late GM cars. This is corrugated plastic tubing split lengthwise that allows fast, neat wiring with the wires readily accessible without having to untape.

On the diagram, the broken lines from the boxes marked alternator and generator designate the charging circuit connections to the main system depending on which is being used. An alternator is recommended, and if used, should be used with the proper alternator regulator. Wiring diagram of alternator regulator is for Delco system with voltage regulator separate from alternator.

The ignition switch on the diagram is the four terminal type that incorporates a start switch. These are common replacement type sold in auto parts stores. Headlight switch is also the common replacement type. IGR ignition resistor is standard replacement type that delivers about 7.5 volts to the coil.

The 6 volt gas gages on older Jeeps can be used with the 12 volt system by obtaining a 12 to 6 volt dropping resistor and connecting the hot wire to the gas gage dash unit at the 6 volt terminal of the dropping resistor. The 6 volt gas gage dash unit and tank unit will be damaged if connected directly to the 12 volt system.

The ammeter is a current measuring device and will work on any direct current voltage. An ammeter that was originally used on 6 volts will work perfectly well on 12 volts. The current rating of the ammeter should be compatible with alternator output. That is, if using a 60 amp alternator, use a 60 amp ammeter. A 30 amp ammeter can be used with the 37 amp Delcotron alternator or a 30 or 40 amp generator.

If electric oil and temperature gages are being used, they should be connected per the diagram, surrounded by the broken line. Mechanical oil and temperature gages are preferred for accuracy and reliability.

Converting from 6 to 12 Volts

This is the most common electrical "swap" and is usually done in conjunction with an engine swap as all conversion engines require 12 volts for starting.

There are several dual relays and other switching tricks that have been used with two 6 volt batteries to get the necessary 12 volts for cranking but these are more trouble than they are worth and the second battery is a problem to mount and maintain.

By converting the entire Jeep to 12 volt, a simple system that uses easy to obtain lamps and other parts is achieved. One of the most common questions we are asked is – "is 6 volt wiring large enough to handle 12 volts?" Quite simply, it's twice as large as it has to be. When you double the voltage, the amperage is cut in half, so 6 volt wiring is more than adequate but – most vehicles that had 6 volt systems used the old style rubber and fabric insulation that is probably so brittle that it will break instead of bend. Also, most of these older vehicles will have had their wiring modified by any number of previous owners and can be a real mess to sort out. Evaluate the particular vehicle and consider a complete rewire job using new wire and standard parts store switches and controls, rather than trying to patch an old system. Take the time to do it right and the electrical system will be trouble free for many years.

To actually convert from 6 to 12 volts start by changing all the bulbs and sealed beam headlights. Mount the 12 volt battery using a negative ground to the engine. Because the engine and body are mounted on rubber (theoretically at least) a braided jumper cable (sometimes called a grounding strap) should be used between the engine and frame, and between the frame and body to insure a good ground. The positive battery cable should go to the starter solenoid (or relay, if not part of the starter, such as on Ford engines).

For charging the battery we advise using an alternator rather than a generator due to the higher output at low RPM and lower maintenance requirements. If you have a choice, use the internal regulator type alternator for the utmost in simplicity of wiring.

Most 12 volt system coils and point type distributors operate on about 7.5 volts. In factory installations this is obtained by a special resistance wire to the coil or a ballast resistor. Don't consider anything but the ballast resistor to get 7.5 volts – the resistance wire method is not reliable over a period of time as its resistance increases with age.

The Jeep should now start, run, and charge on 12 volts. This leaves us with the gages and accessories. Most older Jeeps used mechanical oil and temperature gages and these require no power.

This leaves the gas gage and ammeter. First the ammeter (actually we advise using a voltmeter rather than an ammeter as you will never be surprised by a dead battery and they are simpler to hook up). This gage, as its name implies, measures amps which is the term for current flow. Because of this, it will work on any direct current voltage. The ammeter must, however, be capable of measuring the total amp output of the alternator. A 30 amp ammeter will work with a 37 amp alternator, such as found on some GM engines. Most GM alternators put out 50 to 60 amps and this will burn out a 30 amp ammeter. You will have to buy a 60 amp ammeter to use with the high output alternators. Once again, we suggest a voltmeter instead, for reasons already stated.

Finally we get to the gas gage. This is a two part unit, the dash gage and the tank unit. These will only work properly on the voltage for which they were designed. If you put 12 volts into a 6 volt gage, it will burn out one, or sometimes both units. This can be solved by a voltage dropping resistor. These are commonly sold in auto parts stores under the trade name Volt-a-drop. If you can't find one of these, use another ignition ballast resistor and run the gage on 7.5 volts. It won't be completely accurate but it will work. Don't use the same resistor you use for the ignition as it could affect the ignition by "robbing" voltage from it. The best solution for the gas gage is to buy a new 12 volt Stewart Warner® dash unit and matching tank unit.

What about the accessories? Perhaps a heater or electric wipers? Once again, the Volt-a-drop solves the problem but this time you will need the larger size for the greater amperage draw required by these types of accessories.

Refer to the wiring diagram for connection of the previously discussed components.

Should you have the occasion to use a 6 volt starter on 12 volts, it will work quite well. It will spin almost twice as fast and draw half the amps it would on 6 volts. About the only problem you will have is with a little shorter life of the Bendix drive as it hits the flywheel twice as hard and fast as it does on 6 volts.

Converting from 24 Volts to 12 Volts

This conversion is usually done to simplify a military electrical system and make lamp and component replacement less expensive with easier to obtain parts.

Even though we are doubling the amperage by cutting the voltage in half, the military wiring will work on 12 volts. The biggest problem you will have here will be with old dried out, hard insulation and "tying into" the wiring because of the odd military waterproof connectors.

We have tried using a 12 volt system with two 12 volt batteries, wired in series for 24 volts so they both charged, and tapped off one to get 12 volts for starting. It worked but the dual batteries were a pain and when you need a regulator or generator in 24 volt, be prepared for some expense.

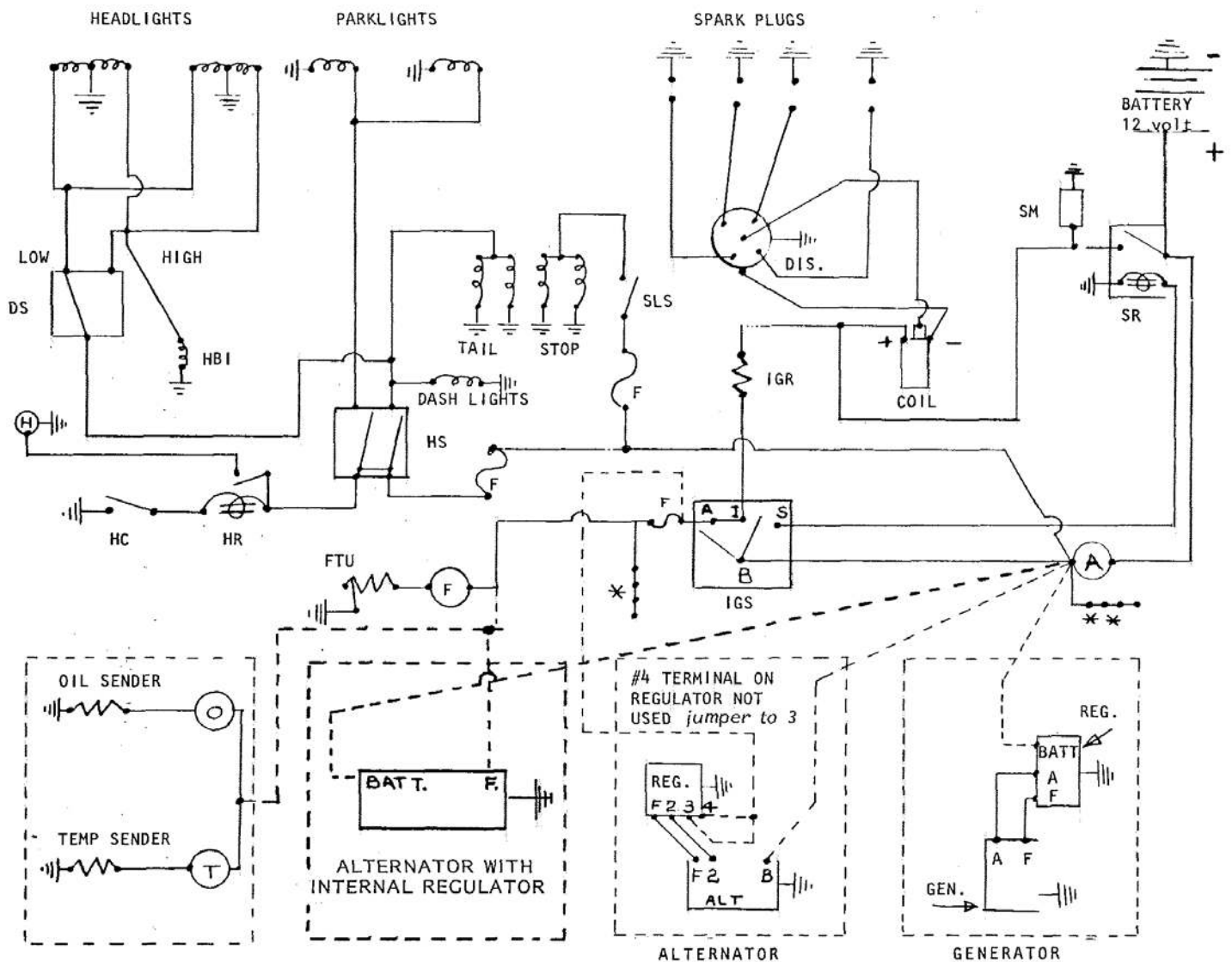
As in the 6 to 12 volt swap, we advise the use of an internal regulator type alternator. If using a GM engine, this will bolt up with stock brackets. Otherwise, a special bracket will have to be made for the engine and a wide pulley made up for the alternator to match the early style wide belt, or in some cases, dual narrow belts.

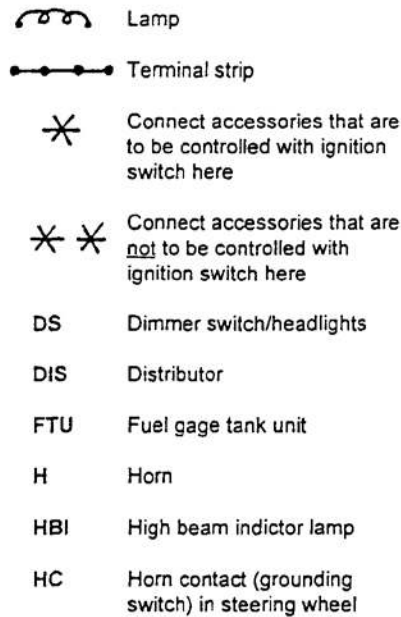
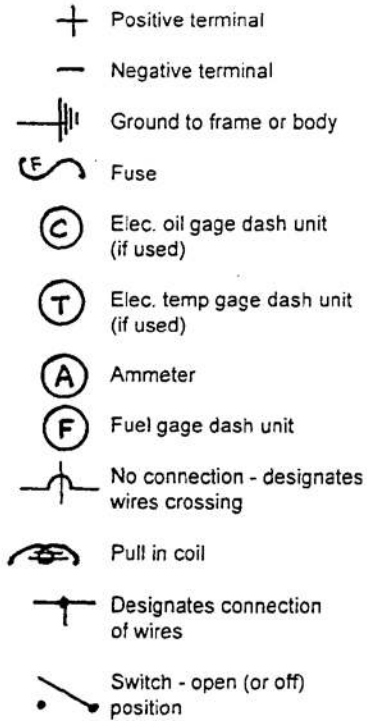
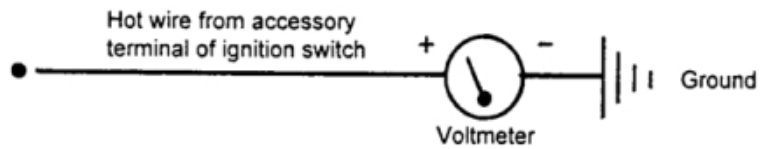
If doing an engine conversion, the engine being used will have a 12 volt starter, relay, etc. If simply converting a stock M38A1 to 12 volt, you will have to get the 12 volt civilian starter, distributor, and ignition coil.

Gages are a little more of a problem on 24 to 12 volt swaps. The military "charging indicator" is a combination volt and ammeter. The charging indicator will be useless on 12 volt. The fuel gage will be operating on half its normal voltage which will make it about 80% incorrect. Once again, we advise using a voltmeter and a new dash and tank unit for the gas gage.

All bulbs and the sealed beam headlights should be replaced with 12 volt units. The 12 volt headlights won't be compatible with the military connectors but these can be cut off and standard three-prong headlight plugs used instead. Check your wiring to see that you don't "cross" wires and get the high and low beam wires mixed. You could have one high and one low beam, or both low beam hooked to the high beam wires. The high beam indicator should (obviously) indicate high beam and the civilian connectors wired as such.

This diagram and information is based on the use of GM parts





HR	Horn relay
HS	Headlight/park. light switch
IGR	Ignition resistor
SLS	Stoplight switch
SM	Starter motor
SR	Starter relay

IGS	Ignition/start switch
B	Battery wire
S	To start solenoid
I	Ignition wire
A	To ignition switch controlled terminal strip for accessories