

Introduction

This guide will assist the installer in setting up Novak adjustable clutch release bearings.

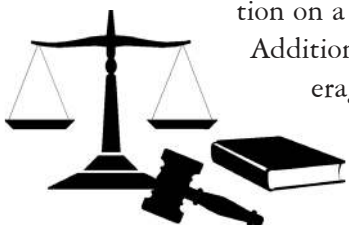
Note to the Installer

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 can be dangerous to the installer or others.

It is upon the customer to ascertain whether they are working safely and 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, principals nor employees are responsible for any changes made to your vehicle.

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About This Conversion

The length of clutch release bearing has the most significant effect on the operation of a clutch of any other factor, and for decades, too many clutch projects have been plagued with set-up problems due to improper bearing lengths.

The problem: pressure plates come in a variety of hat heights, yet it is common for the release bearing that comes with many of today's clutch kits to be the wrong length for the hat height of the release fingers. This frequently causes tremendous trouble for installers who often end up resorting to compensating with inadequate and even problematic fixes elsewhere in the linkage.

Now, Novak has reinvented the throwout bearing for GM and many AMC Jeep applications. Though other attempts have been made in the past at creating adjustable throwout bearings, they've usually been with sub-standard results.

Features

We set out to design and have achieved the following:

- Almost infinitely adjustable - 0.025" increments - for the finest calibration possible
- Very robust construction
- Fine-threaded, telescoping design
- Stainless steel lock pins
- Grooved sleeve bore design retains grease for smooth action and long service life on the transmission bearing retainer
- Adjusts to longer lengths than the longest GM & AMC bearings ever offered
- Zinc plated carrier assembly
- Replaceable bearing on the reusable carrier assembly

There is no longer a need to predict which length of bearing will best work with your combination of parts, or to purchase and return several models to investigate.

Installation

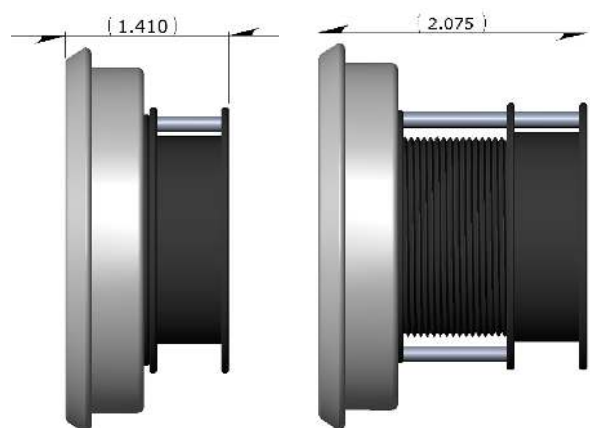
The installer will need to test fit and adjust the bearing to best fit their application by lengthening the bearing until 1/8" to 1/16" of air gap is achieved between the release bearing face and the throwout fingers.

Once the correct length is determined, we recommend the use of a small bench press to press the lock pins into the housing. Alternatively, they may tap into place with a small hammer. Following their installation, a cutoff wheel or hacksaw can be used to trim them to length. This is all explained in detail below.

General Motors Version

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.

This assembly works on nearly all GM applications that used an external release arm, from 1955-1991 and with an



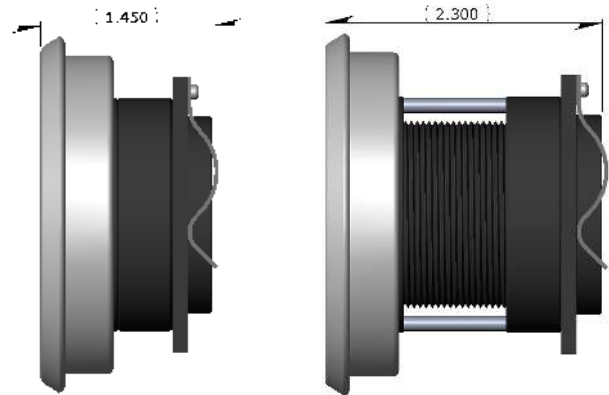
~1-3/8" transmission input bearing retainer sleeve.

This bearing replaces the following part numbers: N4008, 614083, N4068, 614038, N4109, 614109, N3068, N4172, 614018, N1488, CC1705C, N1451, G1697C, 1377C, N1466, G1625C, N1086, 614037, 1697C

AMC / Jeep Version

In contrast to the many GM bearings once available, 1976-1986 Jeeps only had two lengths of throwout bearings available during this era, making for inflexible setup options, until now.

This bearing replaces the following Jeep part numbers: 5361610, 614115, C-1447-C, 3236561, 3241263



Measurement Procedures

Install the flywheel, clutch disc, pressure plate and clutch housing on the engine. Be advised that there can be *no* oil or grease on your hands, the flywheel or pressure plate friction surfaces, or on the clutch disc. If there is, the clutch will grab (chatter) when being engaged.

In all of the below examples, we are using 1/8" as an air gap number. However, if you wish you really fine tune your clutch and reduce the amount of free travel at the pedal, you can approach something closer to 1/16", but don't push your luck. The clutch still needs some break-in and wear-down allowance.

Measurement Option I: Straight Edge and Math

This option is great if you don't want to mock install your transmission and you have access to a nice, long straight edge.

With the clutch disc and pressure plate installed, place the edge of a long straight edge squarely against two opposing diaphragm fingers such that one edge of it sits directly behind the block face. Now take a short scale and measure from the block's flat, machined face to the straight-edge. Record this measurement.

You will notice that we use the terms "fork", "arm" and "lever" interchangeably through this article. The clutch release fork or clutch release arm are one and the same.

Now, with the bellhousing on the transmission, place the edge of a long straight edge squarely against the front face of the bellhousing. Take a short scale and measure from the bellhousing's flat, machined face to the land (the area where the throwout bearing rear edge stops) of the transmission's front bearing retainer.

Now, subtract the sum of the diaphragm fingers-to-block measurement and the air gap desired from the bellhousing-to-bearing-retainer-land measurement. This is the suggested overall length of your throwout bearing.

Assemble your bellhousing and transmission assembly to the engine and verify your work.

Let's use the following numbers as examples:

1. Bearing retainer land to bellhousing face measurement: 5.82"

2. Diaphragm fingers to block face measurement: 3.75"

3. Air gap desired: 0.12"

Result:

$5.82'' - 3.75'' - 0.12'' = 1.95''$ overall length bearing retainer required.

Measurement Option II: Through the Window

This option is great if you have a large enough window to fit a scale, and a clear side view through that window.

With the clutch disc and pressure plate installed, temporarily install the transmission onto the bellhousing using at least the upper two bolts, finger tightened, safe and supported. Get a small flashlight, a telescoping magnet and a steel, 6" scale. Snap the scale onto the magnet and feed it into the bellhousing's release fork window. Butt the scale against the land or shoulder of the transmission's front bearing retainer. Feed the other side of the scale between the diaphragm fingers (or next to Borg & Beck finger). Peer into the window and read the measurement.



Choose a bearing that has the overall length of the measurement you made, considering that you want to subtract an air gap allowance of about 1/16" to 1/8" of air gap.

Disassemble your mock-up, and reassemble. Verify your bearing's air gap visually and by a slight amount of free play when operating the fork.



Measurement Option III: External Style Fork Travel

This option still requires a mock-up of the bellhousing assembly, but is superior to Option II above when there is no adequate window to sight your measurement through, and if you have a short bearing retainer to test with.

Measure your clutch arm and record its leverage ratio, i.e., pivot to release bearing centerline and pivot to pushrod dimple centerline. If your release arm inner section measures 2.3" and your release arm outer section measures 3.6", then you would divide the outer number by the inner number to obtain the arm's ratio, e.g., $3.6'' / 2.3'' = 1.56:1$ ratio.

With the clutch disc and pressure plate installed and ready, insert the release fork in its proper orientation into the bellhousing with its tail through the bellhousing window and its retention spring (if applicable) onto the bellhousing pivot. Temporarily clip the short release bearing (or the Novak adjustable release bearing fully collapsed) onto the fork and then insert the transmission bearing retainer snout securely into the bellhousing bore. Install the bellhousing to the engine block.

Find a datum point to which you can fix a scale. Move the release fork back and forth to obtain a linear travel measurement of the outer edge of the fork. Now, do your math. Divide that number by the leverage ratio of your release fork. Now subtract your air gap allowance. The result is how much longer of a bearing you want

Let's use the following numbers as examples:

1. Fork travel: 0.6"
2. Leverage ratio: 1.56
3. Air gap allowance: 0.125"
4. Disc wear / finger rise allowance: .125"
5. Test bearing overall length: 2.35"

Result:

$$(0.6" / 1.56) - 0.125" - 0.125" + 2.35" = 2.48" \text{ overall length bearing required.}$$

over the one you just tested with.

Option IV: Internal Style Fork Travel

This method is best for fully enclosed bellhousings that use an internal cross-arm (with the pivot on the opposite side of the push-point) instead of the traditional external release arm, such as with the Jeep AX15 to 4.0L style bellhousing.

You do not typically need to measure the ratio of a cross-style release arm as they are usually symmetric or that the push and pivot points at least evenly spaced from centerline.

Temporarily clip the short release bearing (or the Novak adjustable release bearing fully collapsed) onto the release arm. With the clutch disc and pressure plate installed and ready, and the transmission bolted to its bellhousing, insert the re-



lease fork in its proper orientation (if not fully symmetrical)

into the bellhousing, over the transmission bearing retainer snout and then snap on the retention spring (if applicable) onto the bellhousing pivot (see adjacent image). Install the bellhousing to the engine block.



Reach your finger into the slave cylinder port and pull the clutch arm fully back. Insert your scale into the port against the push-point of the arm without yet moving the arm. Read the scale and record your measurement against the datum point of the machined face of the port. Now, push the scale frontwards until the bearing stops against the pressure plate fingers. Record your measurement.

Take your two measurements above to determine your free-travel. Divide that measurement by a divisor of 2. Now subtract your air-gap allowance. The result is how

Let's use the following numbers as examples:

1. Fork travel: 1.2"
2. Leverage ratio: 2
3. Air gap allowance: 0.125"
4. Disc wear / finger rise allowance: .125"
5. Test bearing overall length: 2.35"

Result:

$$(1.2" / 2) - 0.125" - 0.125" + 2.35" = 2.7" \text{ overall length bearing required.}$$

much longer of a bearing you want over the one you just tested with.

Assembly Procedure

Now that you've done all your math, you are ready to set the Novak adjustable bearing to the height you've calculated.

Set Your Bearing Height

When setting your bearing at any height longer than its base height, we recommend you set the thread reveal equally for maximum strength.

The Novak adjustable bearing will extend to the height of the tallest bearings ever offered by manufacturers. We do not recommend you extend your release bearing to the point where you have any less than four (4) threads engaged on the inner sleeve. If your particular assembly requires a bearing longer than this, you truly have one *very* unique combination and you may wish to return your Novak bearing unused for credit.

Test Your Assembly

If you want to assemble and spin test your assembly, you can temporarily wrap the center section threads in black vinyl tape to prevent the bearing from spinning apart under a few cycles of the clutch.

Threadlocker

Once confident in your height, place a few drops of threadlocking compound on the threads, and follow up by installing the stainless steel roll pins.

GM Version Pins

In GM style applications, one pin will extend through the fork groove as a rotational stop against the fork. The other pin is to be severed at the rear edge of the front of the groove.

AMC Version Pins

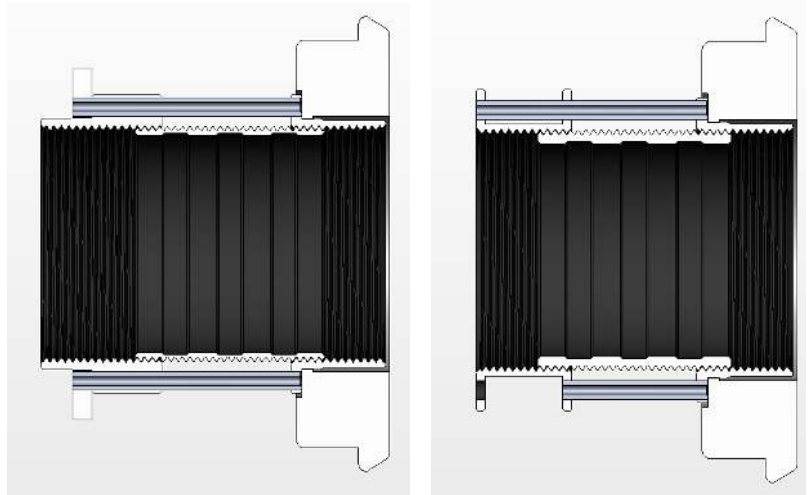
In AMC style applications, both pins will extend through the rear of the plate and be severed there.

Lock Pin Installation

Align the holes by sight to the closest setting to your measurements. Using a small bench press, carefully press both of the stainless steel pins into the holes until they reach the bottom of the front wall of the bearing housing. Do not press the pin so far as to put pressure against the bearing's rear shield. This

Because it's difficult to remove the lock pins (drilling, being the only method) after this bearing has been fully set up, we recommend that you fully set up your bellhousing, clutch and transmission with the Novak bearing installed *without* the pins installed and test it briefly. Spinning the engine and pressure plate against the bearing may cause it to spin without these pins, which could wreak havoc. Instead, have assistants push the vehicle while you operate the clutch to feel its release point, which will free or brake the vehicle upon disengagement and engagement, respectively.

Once you are satisfied that the clutch system operates adequately and to your liking, you can disassemble your system and set the pins for final use.

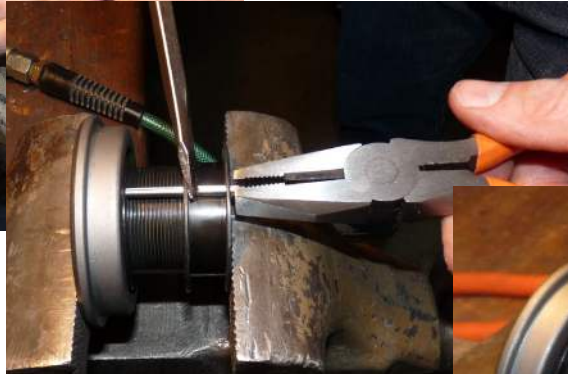


Cross sections of the AMC style bearing, left and GM style bearing, right
Telescope the sleeves evenly so that the thread engagement is the same front and back, as shown.



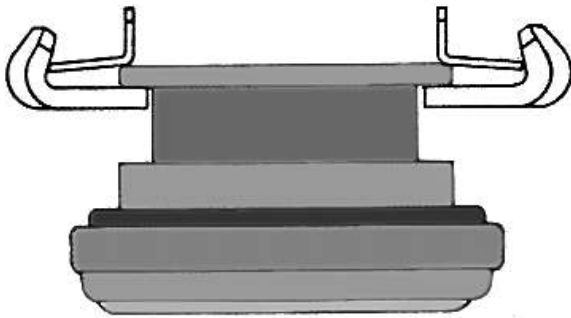
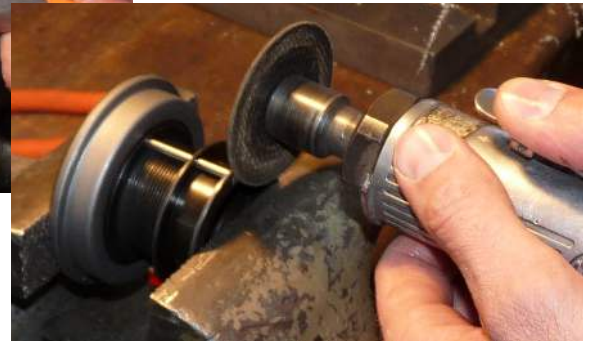


On this GM version shown, cut one pin essentially flush to the groove wall and pull out its remainder. Then flip it in the vice and cut the other pin essentially flush to the back of the bearing.

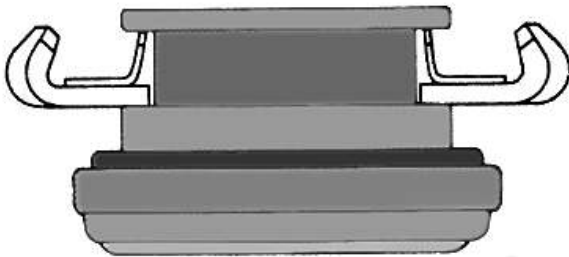


is a tricky process as the bearing and pin will get squirrely and try to rotate as you press the pin. Hold the bearing firmly and set the pin as vertical as possible.

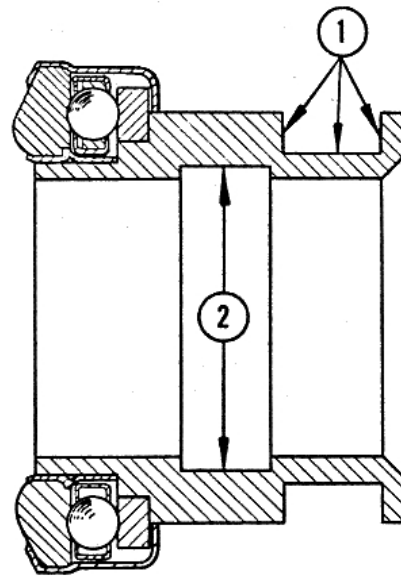
Alternatively, you may try using a small hammer to tap in the pin.



Above is the incorrect method for installing a GM release fork onto its throwout bearing and will cause malfunction and / or component breakage.



Above is the correct method for installation a GM release fork onto its throwout bearing.

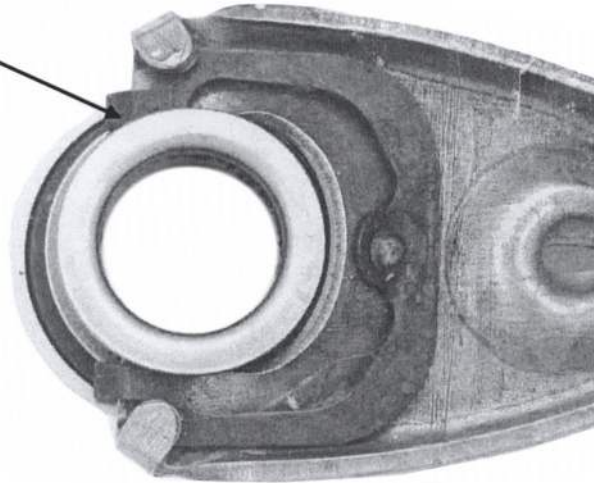


Before final assembly, use a good bearing grease as following:

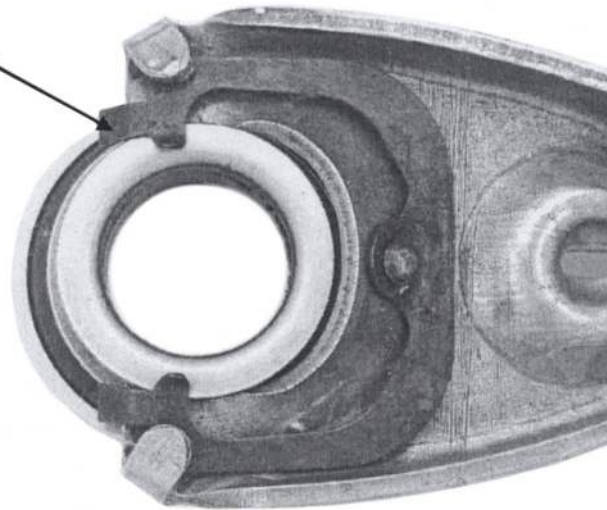
Coat groove #1 with grease.

Pack the #2 groove (or grooves, if multiple) with grease.

Right
Retainer clip fingers
under lip of the flange



Wrong
Retainer clip fingers
over lip of the flange



Cut Excess Pin Height

Once the pins are pressed in, hold your bearing in a vice (avoid excessive clamping pressure) and use a cut-off wheel to sever the pins as explained above for your style of bearing. If you choose another cutting method, be advised that the pins are stainless steel and may work harden if the cutting tool dwells too long. On GM bearings, use a screwdriver to pry the one severed pin rearward enough that you can grab and pull it with pliers.

Final Assembly

Assemble your clutch system according to the principles outlined in these instructions, and the requirements set forth for your particular vehicle and clutch linkage.

A properly set-up bearing and linkage system, and good driving techniques will allow your Novak bearing assembly to offer many miles of use. If you need to replace the bearing down the road, ask Novak or your bearing supplier for a #614038AA bearing, which can be pressed onto the Novak adjustable housing.

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.



Part No.	#TB1, GM Version, Part Description	Qty.
614038AA	Bearing, clutch release, throwout	1
1232	Sleeve, threaded, clutch release bearing plate, GM version, Novak adjustable	1
1231	Sleeve, threaded, clutch release coupling, Novak adjustable, GM version	1
122	Sleeve, threaded, clutch release bearing, Novak adjustable	1
92373A187	Pin, roll, 1/8" x 1-1/2", 18-8 stainless, Novak adjustable throwout bearing	2

Part No.	#TB2, AMC Version, Part Description	Qty.
614038AA	Bearing, clutch release, throwout	1
1229	Sleeve, threaded, clutch release bearing plate, AMC version, Novak adjustable	1
1230	Sleeve, threaded, clutch release coupling, Novak adjustable, AMC version	1
122	Sleeve, threaded, clutch release bearing, Novak adjustable	1
92373A187	Pin, roll, 1/8" x 1-1/2", 18-8 stainless, Novak adjustable throwout bearing	2

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