CAUTION!! DO NOT Weld on this tie rod or draglink!

U-Turn™ Steering System

Installation and adjustment instructions

U-Turn™ steering systems for Jeep TJ vehicles are a crossover steering design that eliminates the steering toe change commonly associated with a "Inverted Y style" steering system. Along with improving the design, the U-Turn also incorporates heavy-duty tie rod and drag link assemblies. These assemblies are seamless Chromoly and are assembled and heat treated for ultimate durability. DO NOT under any condition weld on these tubes or if welding is necessary for a trail repair, replace the repaired unit before it is used for highway transportation.

U-Turn™ is designed to utilize a stock pitman arm. Failure to use a stock pitman arm may result in unfavorable steering conditions.

Please note: The U-Turn™ is an upgrade and it should not be expected to fix pre-existing conditions. It may mask a pre-existing condition by improving the drivability but the condition would still exist and most likely will reappear at a later time.

Component List:

3x Right Tie Rod End
1x Left Tie Rod End
1x Right Hand Steering Hub (3 holes total)
1x Left Hand Steering Hub (2 holes total)
1x U-Turn™ Drag Link
1x U-Turn™ Tie Rod

Component Kit #1
1x Adjuster Sleeve (zinc plated unit)
3x Right Hand Jam Nuts
2x Left Hand Jam Nuts

Component Kit #2
2x Aluminum Bushing
2x ½-20x2.5 Grade 8 Bolts
2x ½-20 top lock nut
4x Hardened flat washer
2x 1/8 x 1 Cotter Pin

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Tools Needed:

- ½" drive torque wrench capable of 90 ft-lbs
- 13mm 12pt socket that fits torque wrench
- ½" ratchet
- ¾" socket
- ¾" combination wrench
- Pliers
- Side cutters
- 1 – 2 lb hammer
- pickle fork (optional, need to separate tapered tie rod connections)
- Lock-Tite
- 15mm wrench
- 18mm wrench

NOTE: If you plan to set the toe as described later in this document, you will also need 2 48" long lightweight aluminum angle or channel, two 14-16" bungee cords and 2 tape measures, 6ft minimum

Pre-assemble tie rod and draglink

Install grease zerks and boots. Tie rod ends can be greased at this time, or once in the vehicle.

Tie Rod shown assembled. Note position of cotter pin.

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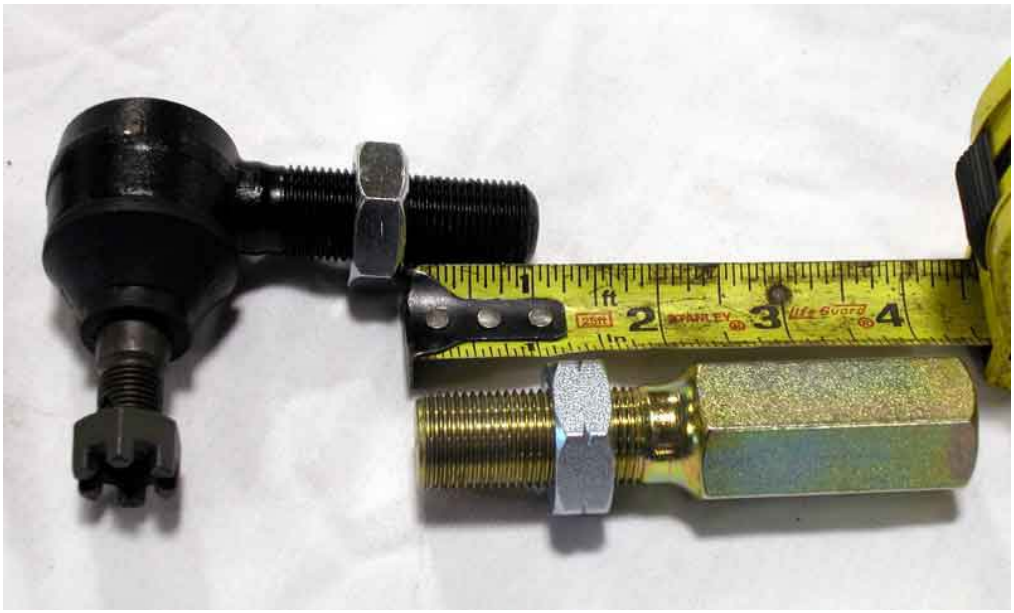
Locate the 4 tie rod ends and the bag with the yellow zinc adjuster sleeve and jam nuts. There should be 3 right hand Jam nuts and 2 left hand. The Left hand nuts are marked with a tick on each of the 6 flat intersections AS SHOWN.

Jam Nuts, not marking on left hand thread jam nuts

Install one left hand jam nut on the adjuster sleeve. The threads on the sleeve are rolled, and it may be necessary to tap on the side of the nut to allow it to spin on freely. Lube is welcome. Adjust nut so that there is approximately 1" of thread from the face of the jam nut to the end of the threaded shaft.

Install one right hand jam nut on one right hand tie rod end, adjust also so that there is 1" of thread from the face of the jam nut to the end of the threaded shaft.



Pre-adjust jam nuts on.the tie rod and adjuster.

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Install the tie rod end into the adjuster sleeve until the jam nut makes contact. See Assembled photo below.

Install the adjuster sleeve assembly in the non-bent end of the draglink, this threaded insert should be either marked with an "L" for left, or the face of the insert will have a marking groove cut in it, compare to the opposite end to identify the groove. Insert adjuster sleeve until jam nut makes contact.

Drag Link assembled

Locate another right hand jam nut and right hand tie rod end. Install jam nut and position so that there remains about 3/8" between the edge of jam nut and the stopping point of the threads (yes, this one is measured towards the tie rod body, not to the end of the threaded shaft)


Draglink showing proper starting point for right hand tie rod end

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Insert this into the bent end of the drag link until the jam nut makes contact.

The drag link is now assembled and should be adjusted very close to the final setting necessary.

Locate and install the two remaining jam nuts on the two remaining tie rod ends. Install appropriate tie rod end on the appropriate end of the tie rod. Adjust tie rod ends so that the remaining thread is equal and set to a distance of 48" from center to center.

These parts are now ready for final installation.

Jeep Preparations:

On Jeeps with aftermarket wheels, or OEM wheels with wheel spacers, it may be possible to install steering without removal of the tires, however, it is imperative that all fasteners are installed and tightened properly, and if the wheel causes access interference to the ½-20 nuts for proper torque, please remove the wheels and torque properly. Loosen lug nuts. Raise the front of the Jeep by the axle, placing two jack stands under the axle at each end. Remove tire and wheel assembly.

Removal of OEM components

Remove cotter pins from OEM tie rod castle nuts on both ends of draglink, and on the left tie rod end. The OEM steering can easily be removed as an assembly. Loosen and remove respective castle nuts. It will be necessary to remove the steering stabilizer at the axle end as well. The tie rod ends are all tapered and will require a pickle fork to remove. However there is also the big hammer method. Once the nuts are loosened, use the large hammer and hit squarely perpendicular to the tapered tie rod shank. This impact will cause the joint to pop out. If you try this method, leave the castle nuts finger tight on the shank, as when it pops this will prevent it from falling out as well as possibly prevent damage to the threads from a misguided hammer. It is best to hit the mount in a manner that has the least amount of give, or basically, hit the pitman arm on the side of the tie rod taper, but hit in a manner directly towards the pitman shaft. This will result in the most impact and least amount of "give" in the arm. SEE PHOTO

Hammer showing the proper position to break the taper free.

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Install Hubs

Next locate the black hub assemblies. The 3-hole unit goes on the passenger side, and then the 2-hole unit on the driver side.

Remove the forward and top wheel bearing retaining bolts on each side; these will require a 13mm 12point socket. Locate the ½-20 grade 8 x 2.5" long bolt with the cross drilled hole in the threaded end. This bolt should have a top lock nut, 2 washers and an aluminum bushing. Remove the nut and the first washer. This should leave the Bolt, a flat washer, and the bushing on the bolt, in that order.

Place the hub assembly so that the non-tapered hole is positioned over the OEM drag link attachment point. Insert the bolt/washer/bushing assembly from the bottom. Place the washer and the nut on the top. Place a few drops of Lock-Tite (recommended only if you wish to torque these bolts once, if you wish to check the torque during vehicle maintenance, do not lock-tite!) on the 2 wheel bearing retaining bolts and install. Start the threads and tighten a couple of turns to ensure that they are started properly.

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Note the bushing stopping point.

Push the ½-20 bolt and bushing assembly up into the taper, there should be approximately 1/8" of the bushing remaining below the stock steering knuckle. This is the allowance for crush, the bushing will swedge into the taper providing a very tight, rigid placement of the bolt in the tapered hole. When tightening this nut, hold the bolt to prevent it from rotating, turning only the nut. Once the bushing is seated, tighten the wheel bearing bolts.

Torque fasteners

Torque the Wheel bearing bolts first, 70ft-lbs
Torque the ½-20 locknut, 90ft-lbs
Install cotter pin in the ½-20 bolt. This pin is only to prevent the nut from turning completely off should it happen to loosen that much.

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Install drag link

Straighten the steering wheel and adjust the right front wheel so it is pointing straight forward. This should put things in almost the right spot to just insert the tapered tie rod ends in the hub and pitman arm. Before installing the drag link, it is wise to rotate (carefully using a pliers) the tapered shaft so that the hole for the cotter pin is aligned parallel to the axle. This will aid in installing the cotter pin later. Install the draglink and start the castle nuts on the tie rod ends to secure. **Ensure that the drag link is rotated properly, in the best position the bend in the drag link will be positioned parallel to the ground. This allows for maximum misalignment on the tie rod ends, failure to do so may result in early wear on tie rod ends.** Snug the jam nut at bend end of the drag link to stabilize. Look over the installed draglink, if it looks like the FOLLOWING PHOTO, then tighten the castle nuts and insert the cotter pins.

Finished assembly, note the position of the draglink.

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Install tie rod

Adjust both front wheels so that they are pointing straight forward. With the tie rod adjusted to 48" from center to center of the joints, the tie rod should fall perfectly into position. The tie rod can be installed so that the right or left hand threaded tie rod can be on either end, however, for adjustment purposes during the rest of this manual it is recommended to place the Right Hand thread joint on the passenger side. Again, adjust the tie rod tapered shafts so that the cotter pin holes are parallel to the axle. Insert and install castle nuts to retain. Look over the installed tie rod, if it looks like the ABOVE PHOTO, then tighten the castle nuts and insert the cotter pins.

Adjust toe

At this point, it is recommended to see a professional installer to do the final adjustments on the steering, only the toe and steering wheel centering specs should need to be adjusted if the vehicle had the proper caster setting before the install (Provided you didn't do a full suspension install, control arm adjust or anything else to adjust the rotation of the axle, then there should be no reason to adjust more than just the toe and center the steering wheel.)

Toe Adjustment

In our testing, we have found that there is less toe-in required for this steering than the stock steering. This is due to the fact that as you drive the stock steering will actually push the toe 'out' due to the suspension compressing from wind force and therefore changing the toe on the inverted Y. This does not happen with U-Turn, the setting to adjust it to sitting still is where it will be at all times.

The process listed here is to allow the operator to adjust the toe to a proper, driveable setting. This is a very reliable and relatively easy way to adjust it.

Items you will need to adjust toe:

2x 48" long aluminum 1x1 angle or square tubing (need to be straight and light and long that your tires are big in diameter!)
2x short (12-16") bungee cords
2x tape measures, 6 ft minimum.

The aluminum angles will be attached to the outside of the tires, centering the aluminum angle on the center of the tire, with the aluminum angle parallel to the ground. Wrap the bungee cord around the aluminum angle, adjusting it so that the hooks are at a point where they can be attached to the openings in the wheels. It may be necessary to adjust the bungee hooks open farther with a pliers. Adjust the tension of the bungee so that the aluminum angle does not slide or fall from position with the weight of the tape measures on it. Repeat process on opposite wheel.

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Note adjustment of the aluminum angle.

This will allow a very true line to measure from wheel to wheel.

Place the tape measure attaching clip on the front side of the tire aluminum edge on the passenger side. Stretch the tape across to the driver side and drape over the aluminum angle. Lock the tape in place to that the weight of the tape measure provides tension on the tape itself. Do the same for the rear.

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Note position of the tape measures, ensure that both are attached the same.

Now, with both tape measures set, and after double checking that the attaching points are the same for both tapes, then if you look at the driver side, and take a reading at the same edge of the aluminum. Rotating the tie rod up towards the front of the jeep will adjust the toe in, and rotating the tie rod down will adjust the toe out. When both tape measures are identical, then the toe is set to Zero. At this point adjust the tie rod so that the front tape measure reads 1/16" less than the zero point, or this should equate to a 1/8" difference front to rear, between the tape measures. This should be the starting point. Tighten the jam nuts, they both should get rotated up to tighten. Place a 1 ¼" wrench, or large crescent on the tube insert, and a 1 1/8" wrench or crescent on the jam nut to tighten. Ensure that once tight the tie rod is allowed to rotate a bit on the tie rod ends.

Turn the wheel to the left, and watch the drag link for clearance at the track bar/sway bar bracket, if it clears thru the arc of movement, then tighten the jam nut on the bend end. If not, rotate the drag link up or down to gain proper clearance, then tighten jam nut.

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Adjusting toe-in.

Center steering wheel.

After the toe setting, readjust the wheel if necessary to bring the tires as straight ahead as possible. Plan on adjusting it after the test drive. Inspect the steering wheel. If it is at or near the centered positron then tighten the jam nuts on the adjuster sleeve. If it is not, then rotating the adjuster down should rotate the wheel to the left and up should rotate the wheel to the right. Once it is close, tighten the jam nuts and test drive. Pay attention to the position of the wheel and which way it needs to be adjusted. Easy way of keeping track of the wheel position, while driving straight ahead, count how many little bumps on the back of the wheel from center it is.

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Service and Maintainence

Grease the tie rod ends with a quality wheel bearing or chassis grease. Grease at each oil change interval or more often as dictated by terrain, extremely wet or dusty environments should be greased more often.

Driving.

The toe setting plays a big factor in how it drives.

Excessive toe in: A steering adjusted with too much toe in will be quick over center, twitchy, almost impossible to keep going straight on rough roads.

Excessive toe out: A steering adjusted with too much toe out will be slow to respond to steering input and may also deliver an over steer condition once it does respond.

Our findings,
35-37" tires toe set at zero to + 1/32 (1/16 toe in)
31-33" tires toe set at +1/32 to +1/16 (1/16 to 1/8 toe in)

Settings may be affected by tire pressure and other variables; each vehicle should be adjusted to the best drivability.

500 Mile check and then every 3000 miles after that

Remove the cotter pins and recheck the torque on the ½-20 grade 8 bolts. Reinstall cotter pins.
Check torque on the 12point 13mm wheel bearing bolts. ***Only if not lock-tited! ***
Check jam nuts to ensure they remain tight.
Grease joints with quality wheel bearing or chassis grease ifnecessary.

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Steering Stabilizer Bracket

The U-Turn™ contains a steering stabilizer bracket that gets U-Bolted to the drag link near the adjuster at the pitman arm. This bracket is designed to utilize most aftermarket and OEM steering stabilizers.

Steering Stabilizer Bracket
Shown with preferred 5/8 mounting stud

ORO recommends the use of one of the following,

- Rancho RS5407
- Gabriel 6804SE
- Monroe SC2928
  (note, the Monroe one comes with a ½" stud that has a taper on it to attach to the bracket. It does work, just doesn't look as nice, see image)

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Steering Stabilizer Bracket with Monroe stud
Shown with stud supplied with Monroe stabilizer

The bracket has the ½" and 5/8" holes for the studs offset. The recommended steering stabilizers should have approximately 8" of travel and depending on adjustment, it may be necessary to orient the bracket to offset the stud closer to the pitman arm as shown. Mounting the bracket inversely may cause interference with the drag link adjuster before the stud is in the proper placement to prevent the stabilizer from bottoming.

Steering Stabilizer Bracket installed
Note, the bracket is rotated to allow best fit, each individual application will need to be inspected for clearance between other components during installation.

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Steering Stabilizer Bracket Installation

To install, assemble the stud to the bracket once it is determined where that placement should be.

Place bracket next to the drag link in the area nearest to the pitman arm and insert U-bolts and snug the nuts enough to hold bracket in place as shown.

Center the steering wheel on the Jeep.

Adjust the stabilizer so that the unit is centered in its travel, measure and make note of the shaft length extended to allow for easy checking.

Install the stabilizer to the axle using the OEM mounting hardware, in the OEM position.

Attach the stabilizer to the stud on the bracket; try to prevent adjusting the length of the stabilizer, measure the length to ensure proper placement.

The stabilizer bracket may need to be rotated on the draglink to allow proper clearance for track bar or other items that may interfere.

Inspect by turning steering lock to lock and cycling suspension as much as possible to ensure that the stabilizer and/or bracket hardware will not come in contact with any part of the suspension during normal operation. Failure to do so could result in serious injury.