

## "HOW TO DISMANTLE AND REBUILD THE DELOREAN STEERING RACK"

By Mike Clemens

First, I'll make the assumption you have removed your steering rack and you have it on your bench. The manual covers removal from the car, if you need help there.

Step #1---Remove the tie rod ends from both sides then remove the jam nuts. Remove the driver's side boot and drain the oil from the steering rack by standing up vertically. Remove the passenger side boot. Now you are looking at the bare tie rods attached to the "steering bar" that slides back and forth in the "steering tube".

Step #2---Looking at either tie rod, you will notice that opposite the threaded end is a large "nut" that connects the tie rod to the steering bar.



THIS IS A KEY ITEM!!! That large nut is really two (2) jam nuts that are friction locked on the steering bar, just like the tie rod ends are held in place by a jam nut. They are backed up by the use of a "pin" inserted into a hole that is drilled between the two nuts and peened into place.

To remove the "pins", this is what I did---I first drilled a pilot hole in the center of each pin with a 1/16" drill bit. Then I enlarged that hole using a 5/64" drill bit, and then I went to a 7/64" bit. In both cases, as soon as the 7/64" bit started to grab in the pin, it came right out with the bit when the drill was removed. Note, when you drill the pilot hole go all the way through the pin, the hole is deeper than the pin and there is a small air space in there so you will know when you have gone far enough.

Now, you have both pins out. NEXT CRITICAL STEP!!!! Do not, I repeat--DO NOT grab the nearest wrench and try to loosen the jam nut with the whole assembly held in a vice. One nut on each end has flats on it and a large crescent will work, but if you torque on the steering bar, you will put serious stress on the pinion and possibly destroy something inside the steering tube. The correct and proper way is to put a wrench on the nut with the flats on it and put a pipe wrench on the round jam nut (or put the round nut in a vice). Twist in opposite directions and they will come apart. Now carefully remove the outer nut and tie rod. Look into the end of the steering bar and you will see a small white plastic rider with a small spring next behind it. Remove these and then remove the inner jam nut. Opposite side is removed the same way. Note---the larger jam nut with the flats on it goes on the driver's side when you put it all back together.

Step #3---Now, you have in front of you, the steering tube with the steering bar inside. You cannot just slide the bar out of the tube at this point. Proceed as follows: remove the two bolts from the oil refill cover (not the cover the steering column attaches to). Under the cover will be several thin metal shims (mine had two-these are used to pretension the rack down on the pinion), a small metal spring, and a white plastic rider.



Remove these carefully.

Next, remove the two bolts holding the pinion plate, remove the plate (careful no to damage the rubber bushing in the center, and the shims (mine had three),



then, withdraw the pinion with the upper bearing attached.



Be very careful to keep pressure on the top of the bearing since it is re-buildable and those 14 little balls will go everywhere if they fall out. The lower bearing will not come out since the steering bar is still over top of it. (This type of bearing is called an angular contact ball race, designed to take both radial and axial loads in one direction, hence why you have a pair of opposing races (thanks Martin). Now, holding the steering bar housing level, push the steering bar from the driver's side towards the passenger side and remove it completely. Then using a small magnet, remove the small race inside the pinion housing, then using the magnet again, remove the 14 ball bearings, and lastly remove the larger race.

Step #4-- Next remove the bushing from the passenger end. (Note: I do not know if this is rubber or plastic since mine was missing) You can see that by pressing downward and outward on the two "ears", the bushing will slide out. Of note, this is the part that cost me \$0.78 to make since it is not available through vendors.

Now, study the bearings and you will see it is made up of an upper cover, a lower retainer, and 14 ball bearings in between.



Step #5---Clean all parts and replace any that are bad. Note: The pinion, the bearings, and the steering rod are made of hardened steel, so they very seldom are bad. There is just not enough force or pressure on them to override the hardness of the

steel, but check them just to be sure. The part I had to replace in my rack was the bushing in the passenger side of the steering tube that the steering bar rides back and forth in. (Martin says this is a common failure item). Mine was totally gone except for a piece about the size of half a small finger nail. That piece was a type of hard black plastic.

To make a new one, I determined I need a fairly indestructible material that was in the shape of a cylinder (outer diameter-- 1 and 3/16", inner diameter--7/8", and a length of 1 and 1/4") I decided to use water line PVC. This stuff will outlast almost anything, its water proof, and heat and cold have almost no effect on it, unless you burn it with fire or operate your car in the Antarctic, during the winter season. :-)



Starting with the two outside pieces in the picture, I took a 3/4" PVC union (outside diameter 1 and 5/16") and cut it to the 1 and 1/4" length. I then sanded the inner bore of this to be smooth so a piece of 3/4" PVC thin-wall pipe would just start to slide in. I used thin-wall because it had an inner diameter of 7/8" and fit perfectly over the steering rod.

Next, I used standard PVC dope and slid the PVC pipe all the way into the union. I then cut the protruding end of the tube, even with the union. Now I had a bushing that slid right over the steering rod, but was just a bit big to slide into the steering tube. 15 minutes of sanding with my belt sander brought it down to the right size and it slid right in (finished product is the center piece in the picture). Once inserted, in the steering tube I added a bit of 5 minute epoxy to each of the "ear" openings to keep my new "bushing" in place.



## REASSEMBLY OF YOUR REFURBISHED STEERING RACK

This is just the reverse of disassembly, with a couple notes. The hardest part is getting the bearings and pinion back into the pinion housing, but the following trick worked for me.

Step #1---Carefully put both the bearings back together, large side down on flat surface, small side on top, and one ball bearing slid in at a time. This is hard, but with patience and a small curved pick, you can get all 14 of them inserted. (You can also use a small dab of grease to hold them in place)



Next, holding the pinion upside down from how it is installed on the car, slide the top bearing over the fluted shaft part of the pinion and hold it in place. I used a wrap of electrical tape on the shaft of the pinion after I had slid the bearing on to hold it in place and then removed the tape after I had installed the pinion and bearings in the housing.





Then, slide the lower bearing on the pinion and let gravity hold it in place.



Now, still holding the pinion upside down, slide the bearings

and pinion into the steering tube housing.



A bit of 90W gear oil coating the outside of the bearings and the inside of the pinion housing will help with installation.



Once you have it fully inserted, turn the steering tube right side up and remove the pinion and upper bearing being careful not to pull up on the lower bearing, spilling the balls all over the inside of the pinion housing. Now, carefully slide the

steering bar into the steering tube housing from the passenger side. Once you positioned the bar to where it will engage the pinion, slide the pinion and upper bearing back into the housing. Reinstall the shims and the pinion cover (coat the bushing on the cover with 90W), making sure to replace the two paper thin gaskets on each side.



Step #2---Install the plastic retainer and the spring and the oil refill cover, but just snug the bolts down, don't torque them to specs. You will see why later.

Step #3---Line up the steering bar jam nuts with the hole centered over the hole in the steering bar and tighten. Drive a pin in the hole, cut off the top and smooth with a small Dremel tool or file. I just used a nail of the approximate diameter for each pin.

Step #4---After complete assembly, make sure the bar runs smoothly back and forth. If it does, remove the oil refill cover, the spring and the plastic retainer. Now add 0.3 of a pint of 90W gear oil into the filler hole (amount the manual calls for). Reinsert the plastic retainer, the spring, two new paper thin gaskets, the shims and the cover. Now you can torque the bolts to specs. Check to make sure rack slides back and forth freely and there are no leaks around the boots. If all works as advertised, you're ready to reinstall the rack.

The following picture is all the parts in the steering rack, minus the tie rod ends/jam nuts and the rubber boots.



One rebuilt and refurbished Delorean Steering rack awaiting new boots and tie rod end covers is shown below.



