

Rebuilding the Merak/Bora Steering Rack

This guide is intended to help the user through the process of a partial to a complete rebuild of the Merak/Bora steering rack. Current data suggests that only the Merak had the steering rack pressed on tie rod collars and extensions. However, there is insufficient data to confirm if all Meraks had this arrangement.

A. Lifting and Securing the Front End

The rear wheels should be blocked and the rear brake emergency brake should be engaged for safe measure. The front wheel lug nuts should be loosened sufficiently so as to allow for removal upon lifting the front end but sufficient enough to still safely support the front end of the car prior to lifting. Engage the lift jack under the front lift point.



Once the car has been lifted, wheels off the ground, install support jacks to the left and right front support cups located on the under chassis directly behind the front fender.

B. Undoing the Inspection Panel

This panel is one piece that goes over the piping that is located in the center of the under chassis. The screws that secure the panel can be rusted making removal very difficult and stripping the screw head is something to be avoided. If the screws are uncooperative, pry the inspection panel back at several screw locations. Saturate with penetrating oil in this area and leave overnight. The slots to the screws should be thoroughly cleaned with a detail file. The screwdriver head needs to be a direct fit into the slot of the screw head so as to eliminate any play between the two. Vise-Grip type pliers can be attached to the screwdriver shaft to provide additional torque while applying upward force against the screw head in removing any bound screws. Once all screws have been removed, place in a container marked panel screws. Upon reassembly, anti seize may be used for ease of removal in the future. Depending on the model, the panel can either slide to the rear or to the front of the steering rack



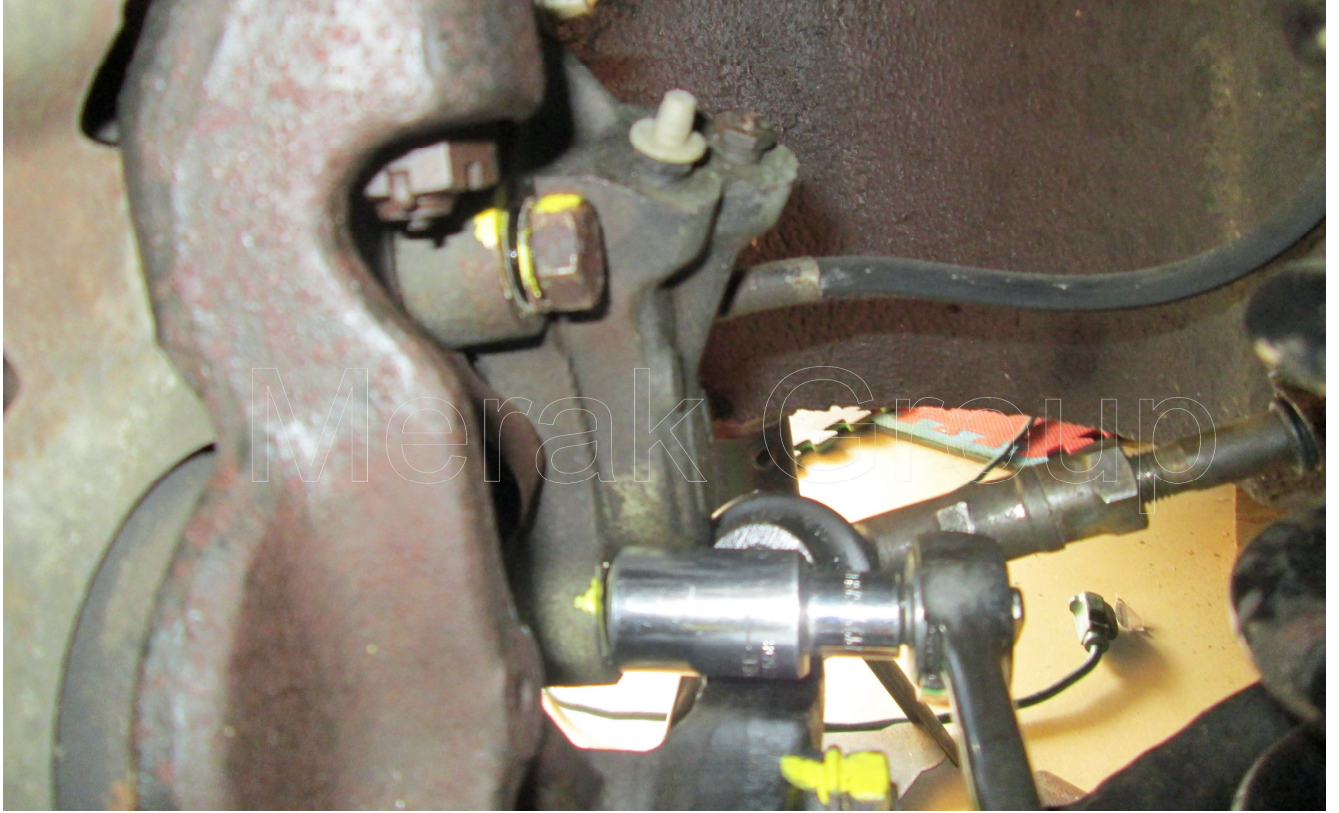
C.Removing the Brake Calipers

When your car is on jack stands, you will find there is insufficient room to properly position the tie rod separator. Secondly, the caliper and break line will be in the way of the tie rod separator as well.

The following photo show you why.



Remove the 2 caliper securing bolts, depress the caliper pistons slightly using some leverage – screw drivers work well, use a rubber mallet to loosen the caliper and lastly secure the caliper so as to not stress the brake line.



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D. Removing the Tie Rod Ends

Remove the cotter pin securing the castle nut and remove the castle nut.



A 5 lb. sledgehammer will work best with 4 or 5 deliberate hard strikes to loosen and separate the tie rod end.





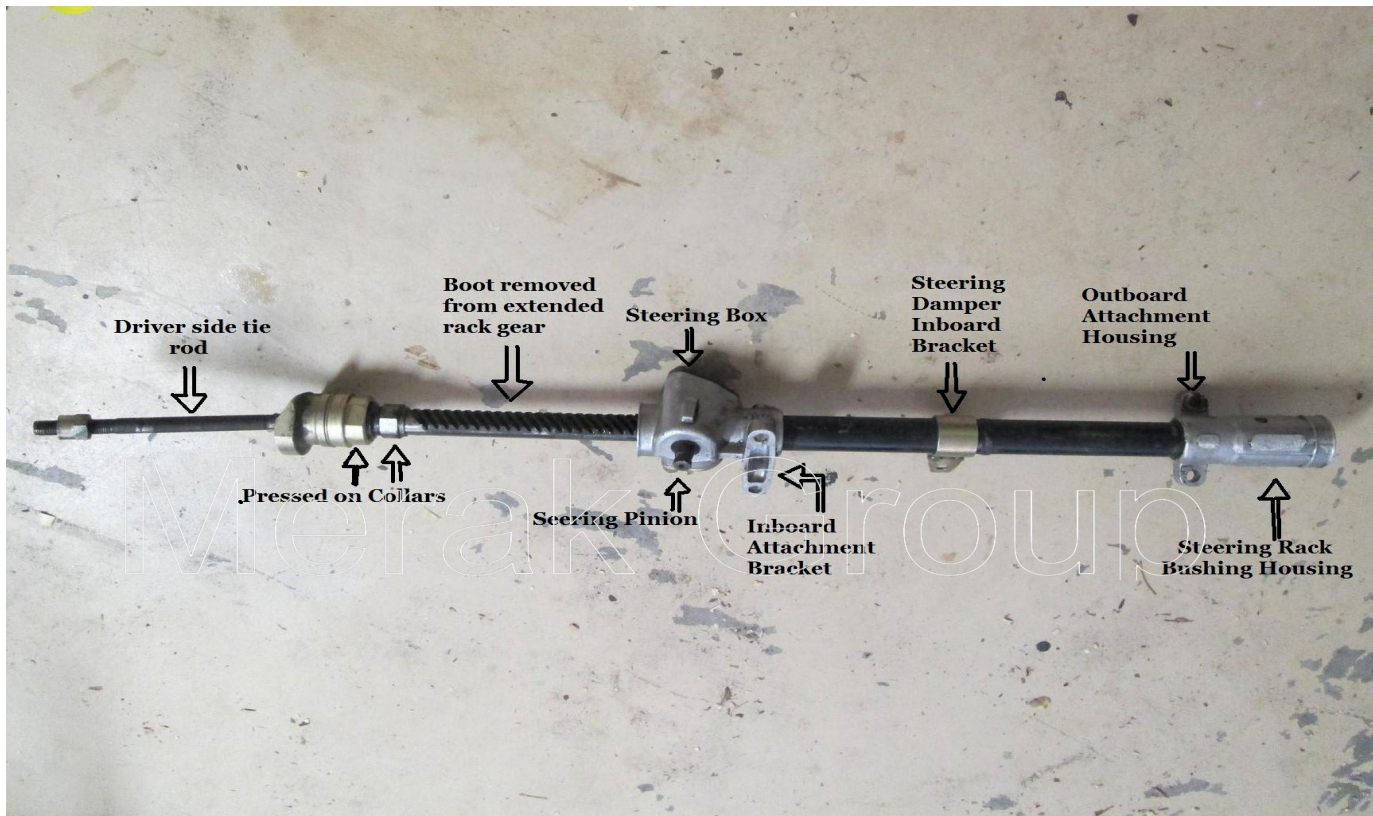
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The next step was to break loose the locking nut [#6] between the tie rod end [#5] and the tie rod [#7]. Leverage is leverage.

E. Removing the Steering Damper

The steering damper is attached to the steering rack. One end of the steering damper is attached to the aluminum housing – outboard side/driver side. The other end of the steering damper is attached to an inboard adjustable bracket.

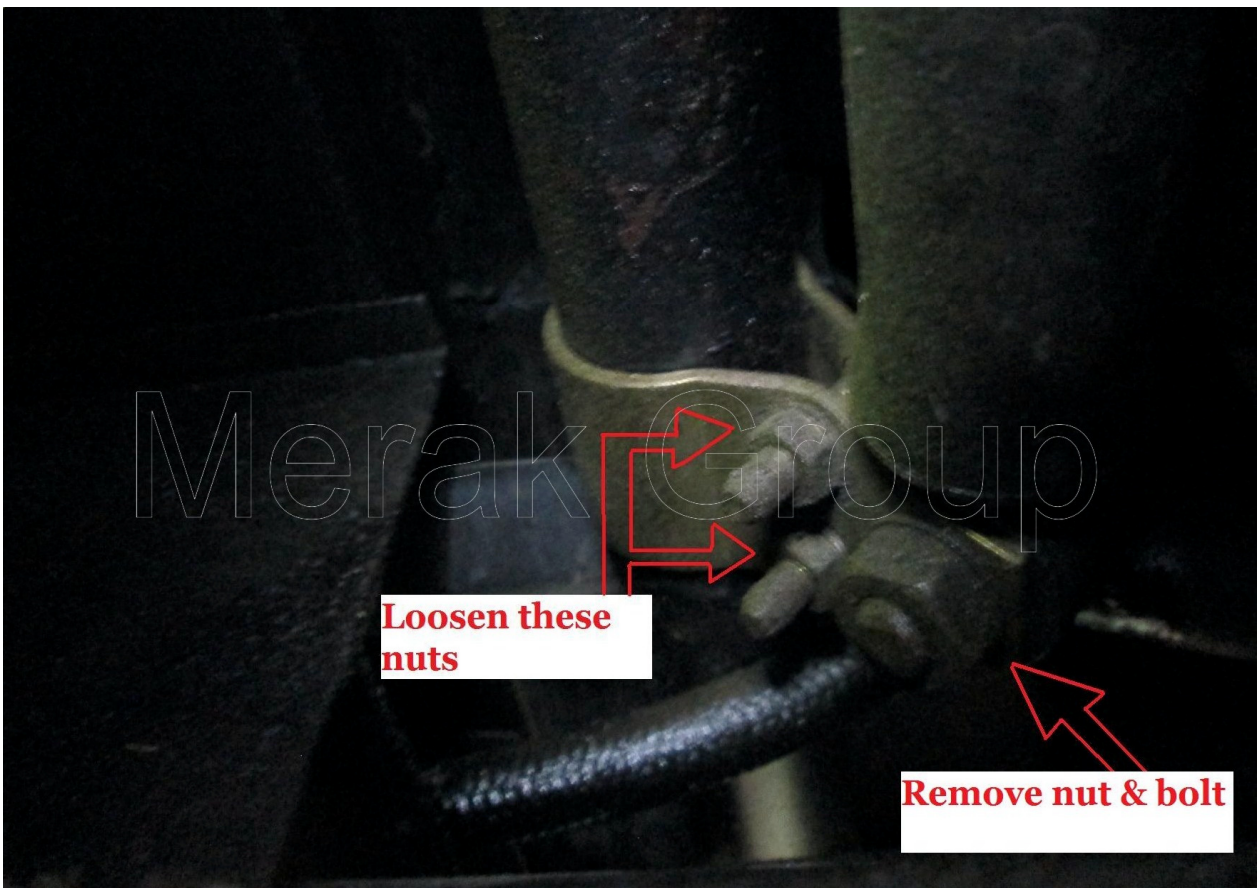
The photos below show the attachment point of the damper on the inboard side, generally speaking it is located in the central part of the steering rack.



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**Loosen these
nuts**

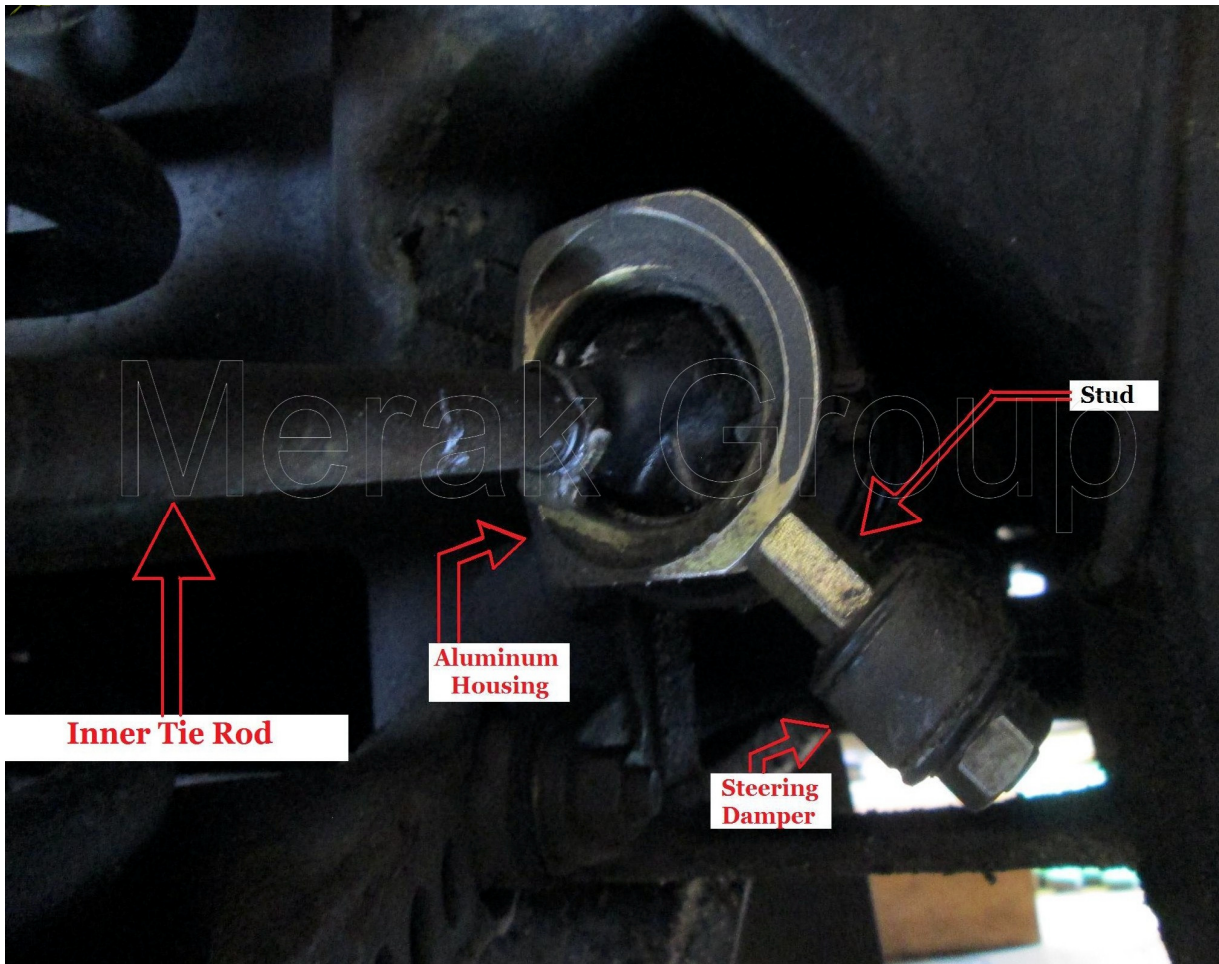
Remove nut & bolt











Remove the retaining steering damper nut making sure to stabilize the stud. Breaking the stud would cause a major problem. When in doubt, always use a penetrating oil just to be safe. Then detach and remove steering damper.



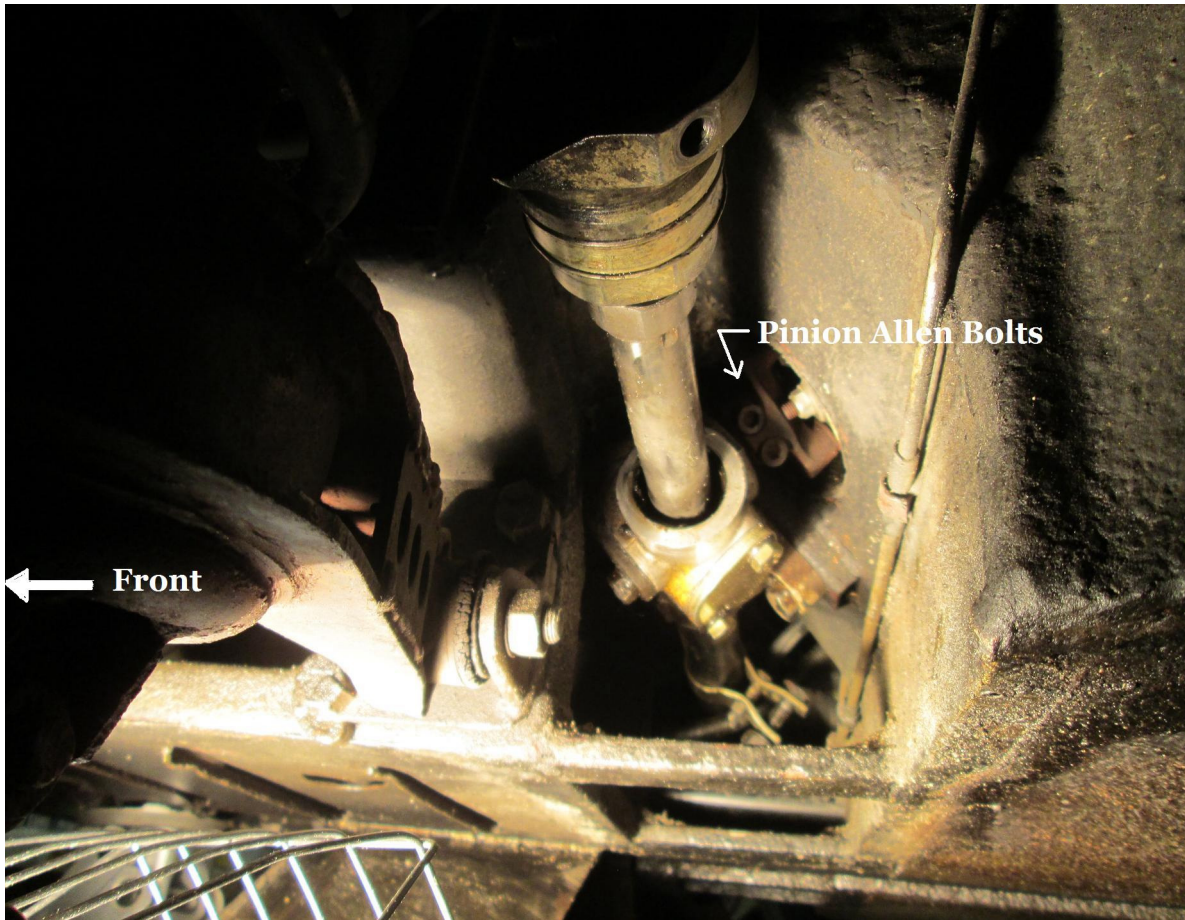
Next remove the stud from the housing. Removing the stud makes it easier to remove the steering rack assembly as well as not breaking the steering damper stud.



Remove in the following manner so as to avoid damaging the steering damper stud. Next, remove the stud for safe keeping.

At some point remove the two accordion dust boots either now or later.

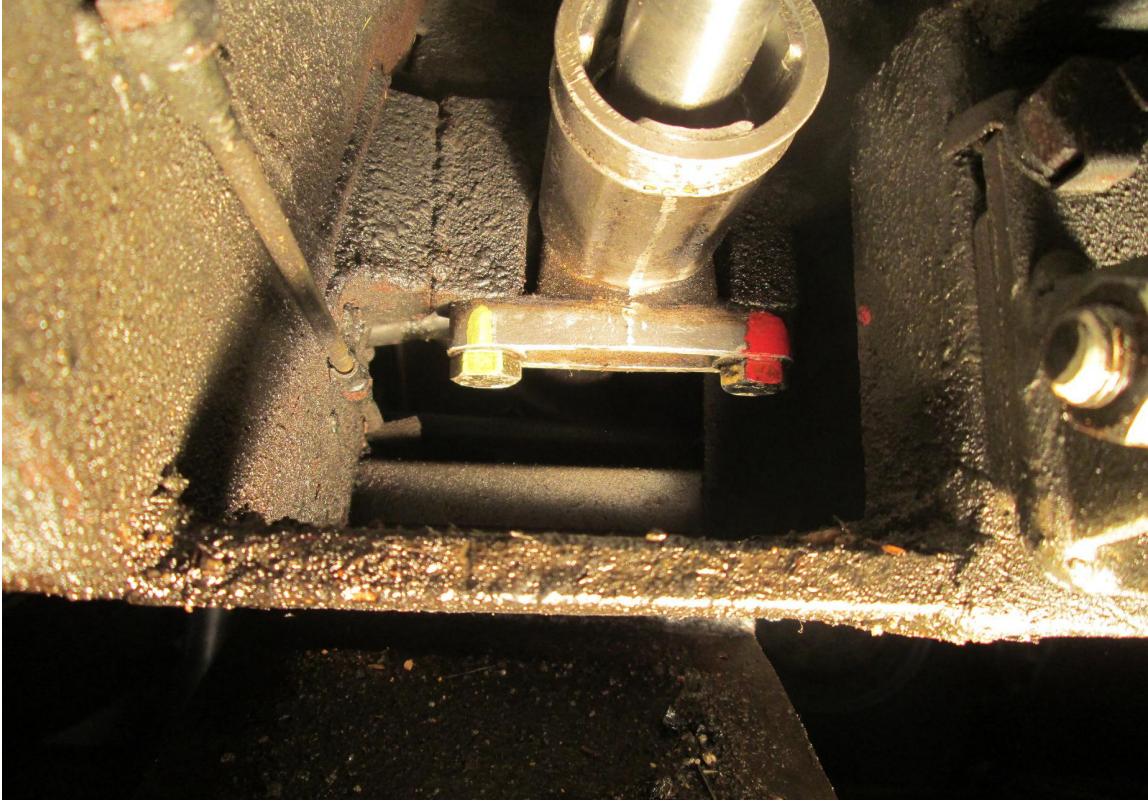
F. Removing The Steering Rack



Remove All Securing Bolts

The steering rack is bolted to the car via four 17 mm bolts torqued at 60 foot/pounds. It is a good idea to mark all four bolt/brackets with four distinct paint colors as a precautionary measure.

Passenger Side – Access directly from beneath the car.



Driver Side Bottom Bolt – Access directly from beneath the car.

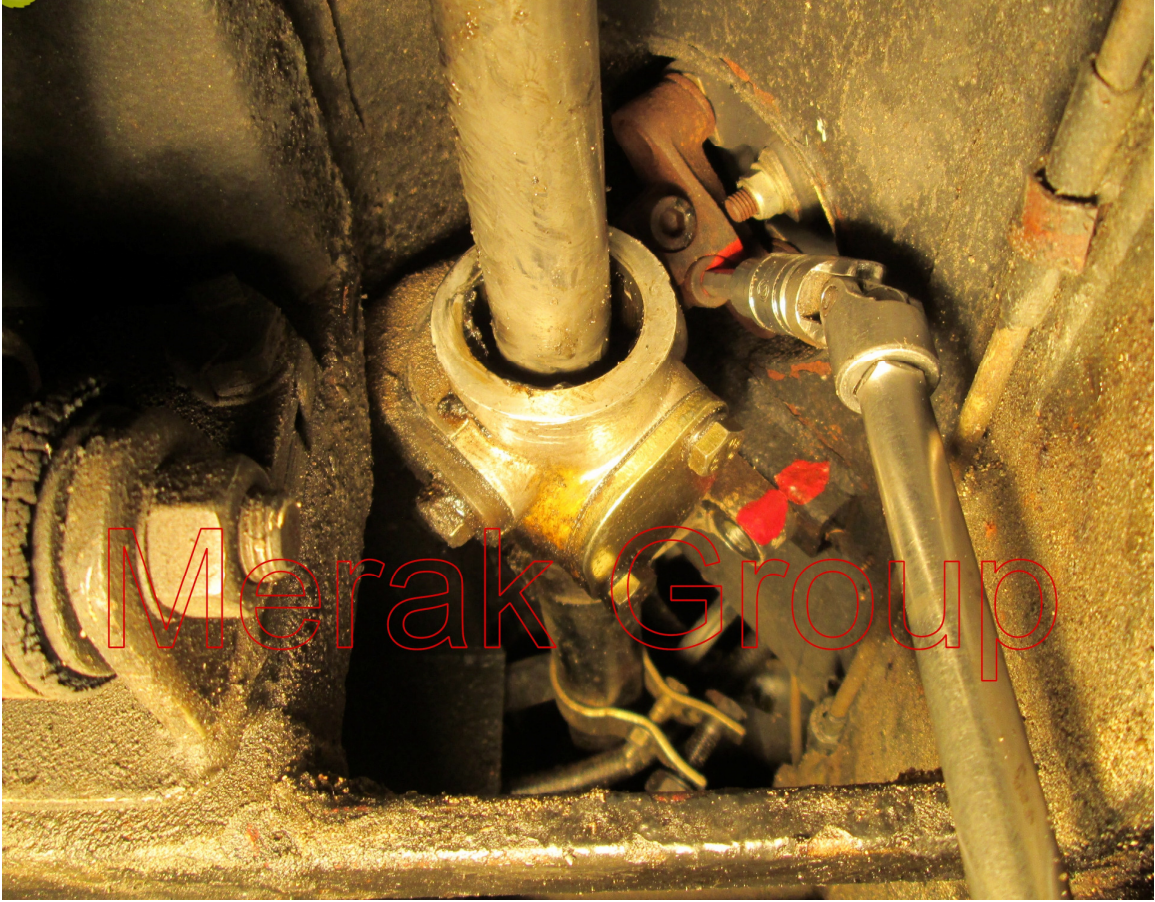


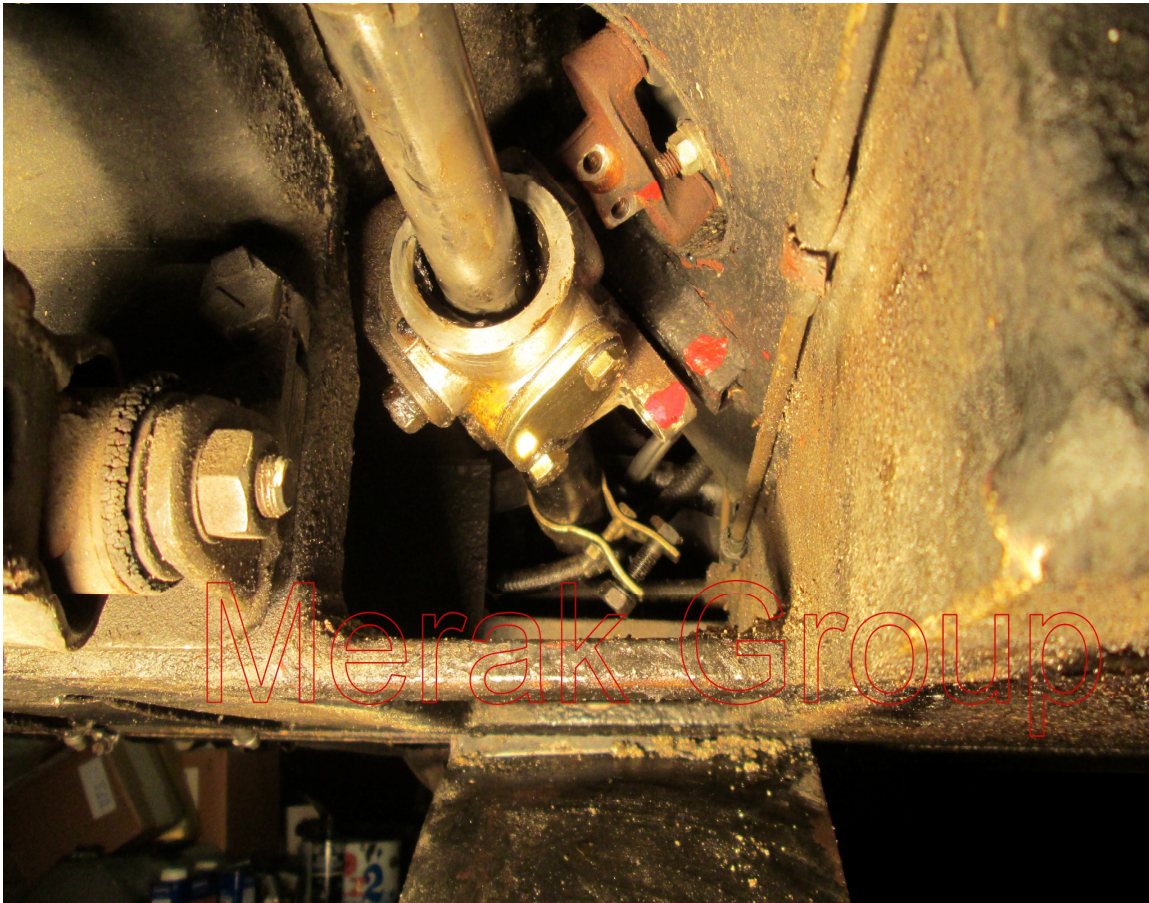
Driver Side Top Bolt – Access directly through access hole of the under chassis from beneath the car.



The steering pinion [Steering Box Input Shaft #8] has a splined end that fits into the steering coupler that is part of the steering shaft assembly. The steering pinion is secured by two 6 mm Allen bolts torqued to approx 20 foot/pounds. To access the two Allen bolts, the steering wheel must be turned all the way to the driver side.

Prior to removing the Allen bolts, it is a good idea to mark the steering pinion and the coupler with a paint stripe for perfect alignment upon reassembly.





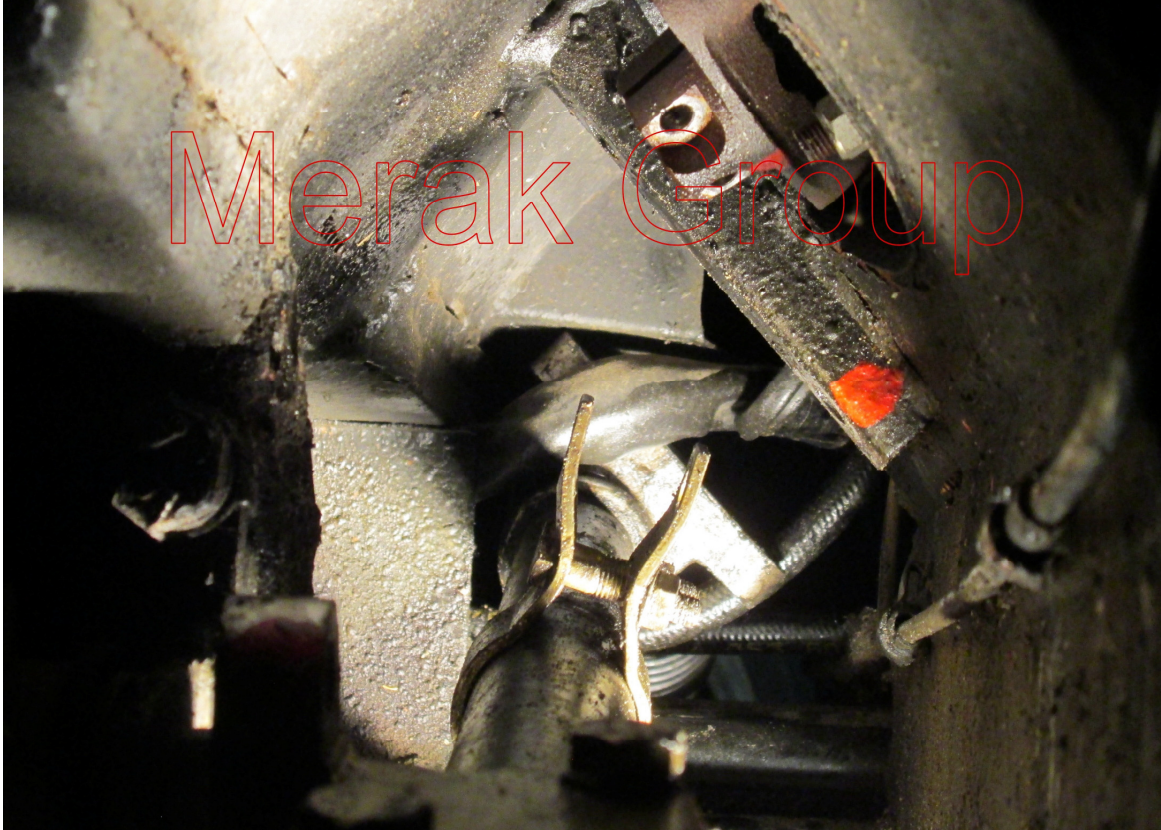
The last step in detaching the steering pinion from the coupler is to pry the two apart with a broad head screwdriver. You will note that the driver side accordion dust boot has been removed exposing the rack gear. In the last photo you can see the depression slot on the rack steering gear #14 and the pressed on collar that has been staked into the slot.

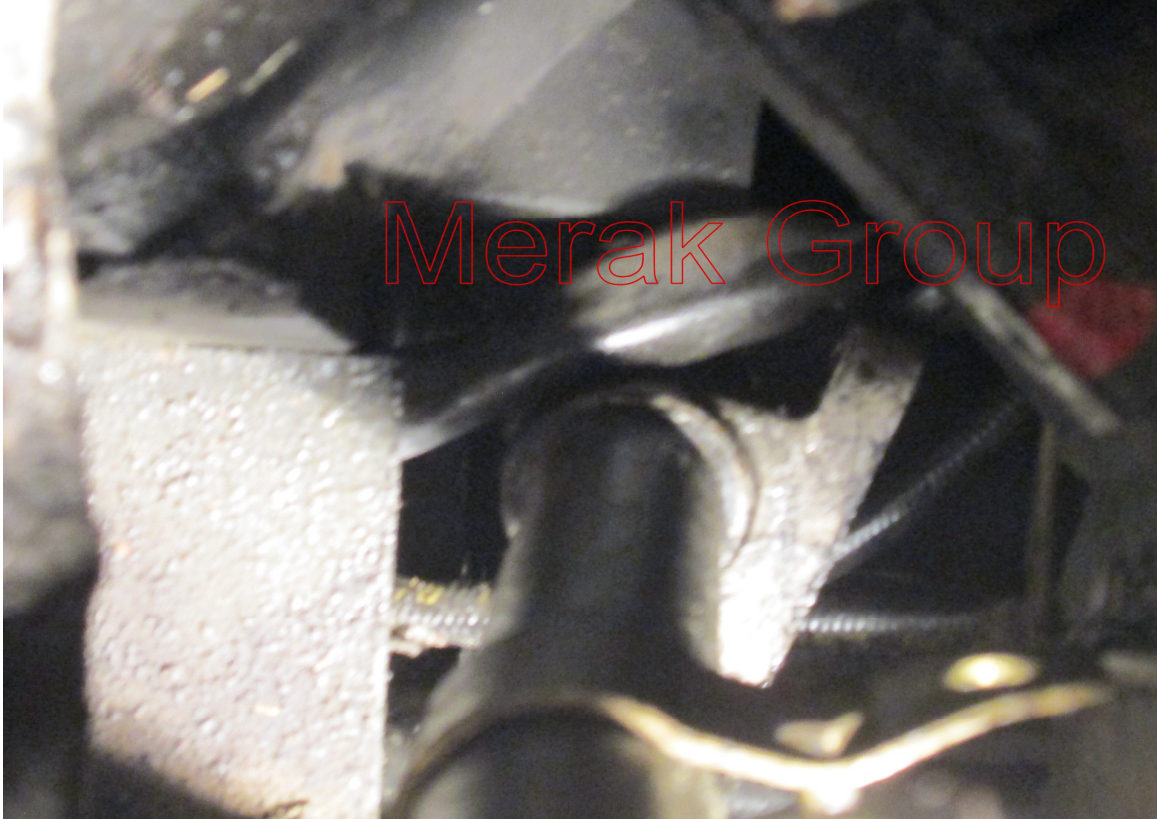




At this point the steering rack should be fully detached and ready for removal. The last step for removing the rack is to maneuver the inboard securing bracket/steering rack bushing housing past the two A/C lines and the electrical harness.

The securing bracket is oriented at the top of the steering rack. As you slide the steering rack out the driver side of the car, The electrical harness has enough slack to pull it sufficiently toward the driver side so as to create a space between it and the two A/C lines. This space should be sufficient enough to allow the securing bracket to fit between the two. The objective here is to pull the steering rack just enough that the top oriented bracket passes over the two A/C lines, but is stopped by the top oriented electrical harness. Rotate the bracket 180 degrees toward the rear of the car so that the bracket moves from a top position to a bottom position past the A/C lines. With the bracket now on the bottom and past the A/C lines there will be no hindrance from the top oriented electrical harness. The whole rack is now easily removed. The photos below indicate a clockwise rotation of the steering rack





Steering Rack Removed

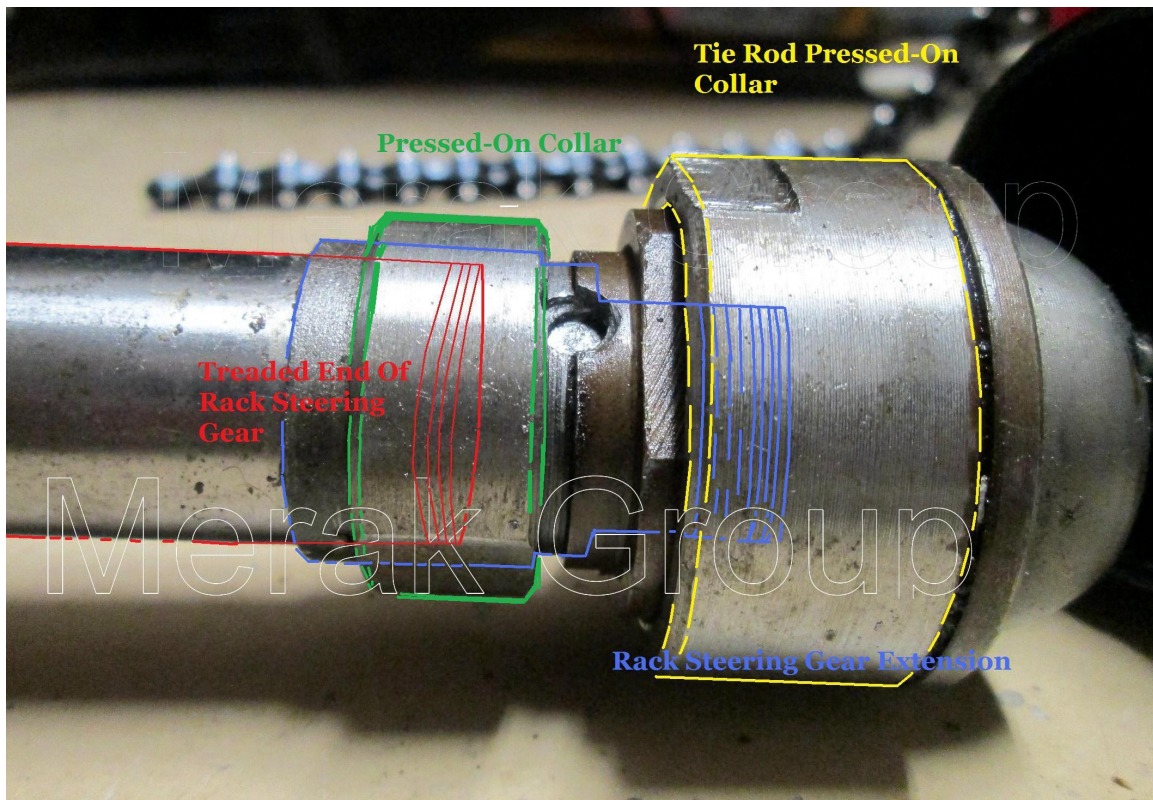


G. Removing the Passenger Side Tie Rod From The Steering Rack Gear

At the time of this writing it is unknown when the rack steering gear extension was used in the Merak production run. The rack steering gear extension received a pressed on collar that must be removed by sawing it off. The second collar is pressed onto the inboard end of the tie rod. Secondly, the tie rod pressed-on collar acts as a stopping guide once the rack gear reaches full turning radius.

Both collars can only be removed by being cut off. When replacing the rack steering gear bushing the passenger side tie rod must be removed prior to installing the bushing that acts as a support to the rack gear on the passenger side of the steering rack. The original passenger side tie rod is to be scrapped. Once the new bushing is pressed in, the new correct length tie rod can be installed and staked into the provided indentation on the rack steering rack gear end.

Below is a photo showing how the extension and two pressed-on collars orient to each other.



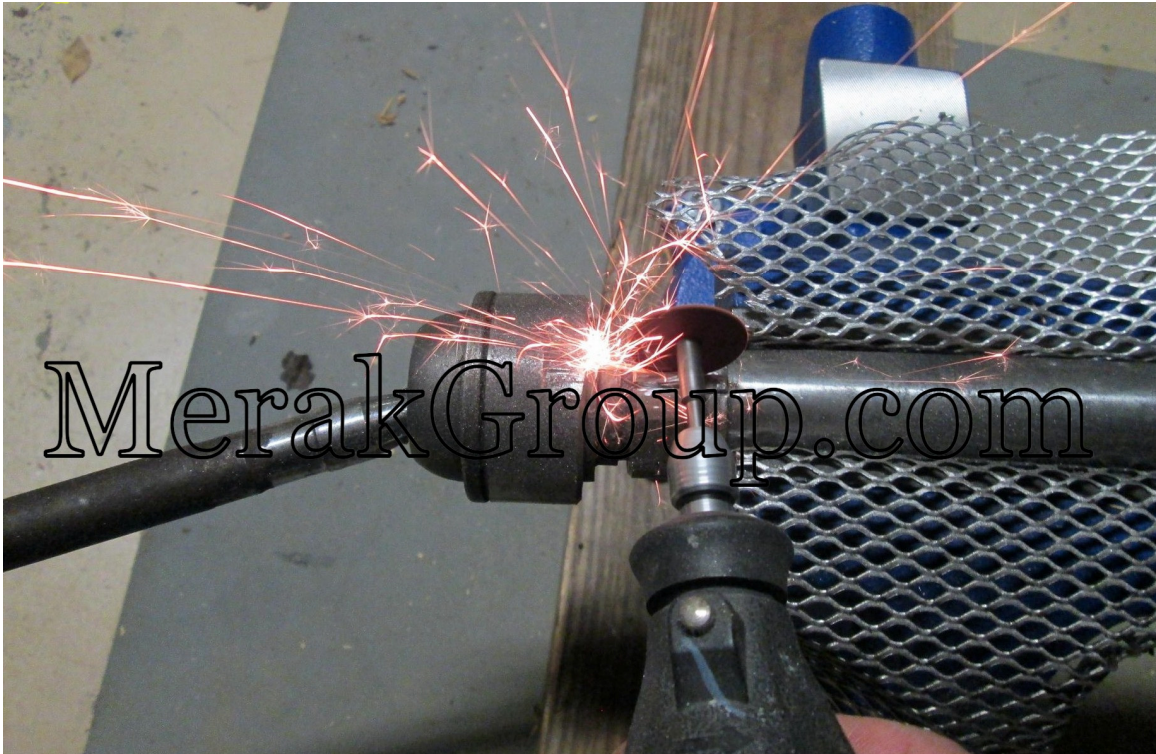


The first step is to separate the tie rod from the rack steering gear in the following manner. Cut the threaded extension off thereby detaching the tie rod and extension as one whole unit as indicated by the red arrow. The black arrow indicates the passenger side threaded end of the rack steering gear.



The next step is to cut through the extension pressed-on collar as shown in the next photo. The pressed on collar will not separate from what is left of the extension piece. There should be two cuts made across the width of the collar spaced apart by 180 degrees. Great care should be exercised when using a Dremel Tool as great injury may occur to the user. The rotation of the blade must always away from the operator. If the Dremel tool was to jump, it would jump away from the operator. Heavy duty leather gloves should be used as a precautionary measure. Lastly, eye protection goggles are also mandatory as the high speed cutting blades will break during the cutting procedure potentially causing the lose of an eye or both if eye protection is not worn.

During the cutting process, each cut across the collar should be done twice so as to be able to remove a sliver creating a space as in the above photo making the threaded part of the rack steering gear visible. This is important to not damage the threaded end.



In order to split open the extension/pressed-on collar assembly, a cut needs to be made across the face of the remaining assembly between the two prior cuts in order to weaken the structure as shown in the following photo. The two halves can then be easily pryed apart with a flat head screwdriver.



The end result of removing the extension should look as the following photo with minimal intrusion onto the threaded part of the rack steering gear.



H. Removing the Driver Side Tie Rod From The Steering Rack Gear

The removal of the driver side tie rod is the same as the passenger side. This step can be omitted if the tie rod is in good condition and only the rack steering gear bushing is being replaced.



I. Installing the Steering Rack Bushing

The rack steering gear must be fully retracted into the rack steering gear housing [#18 in the exploded view diagram]. This is accomplished by turning the steering pinion as shown in the next photo.



The following tool is called a **Blind Hole Puller** that is typically available for rent at your neighborhood auto parts store. This slide hammer has a screw on expandable three pronged attachment that can be fitted through the existing worn out bushing then expanded to the point where the three prongs lock against the back inboard portion of the bushing. Three or four slides of the hammer will easily dislodge and remove the old bushing.



OEM Steering Rack Bushing







The following shows the new aluminum bronze bushing that has been pressed into the passenger side aluminum housing end of the steering rack.

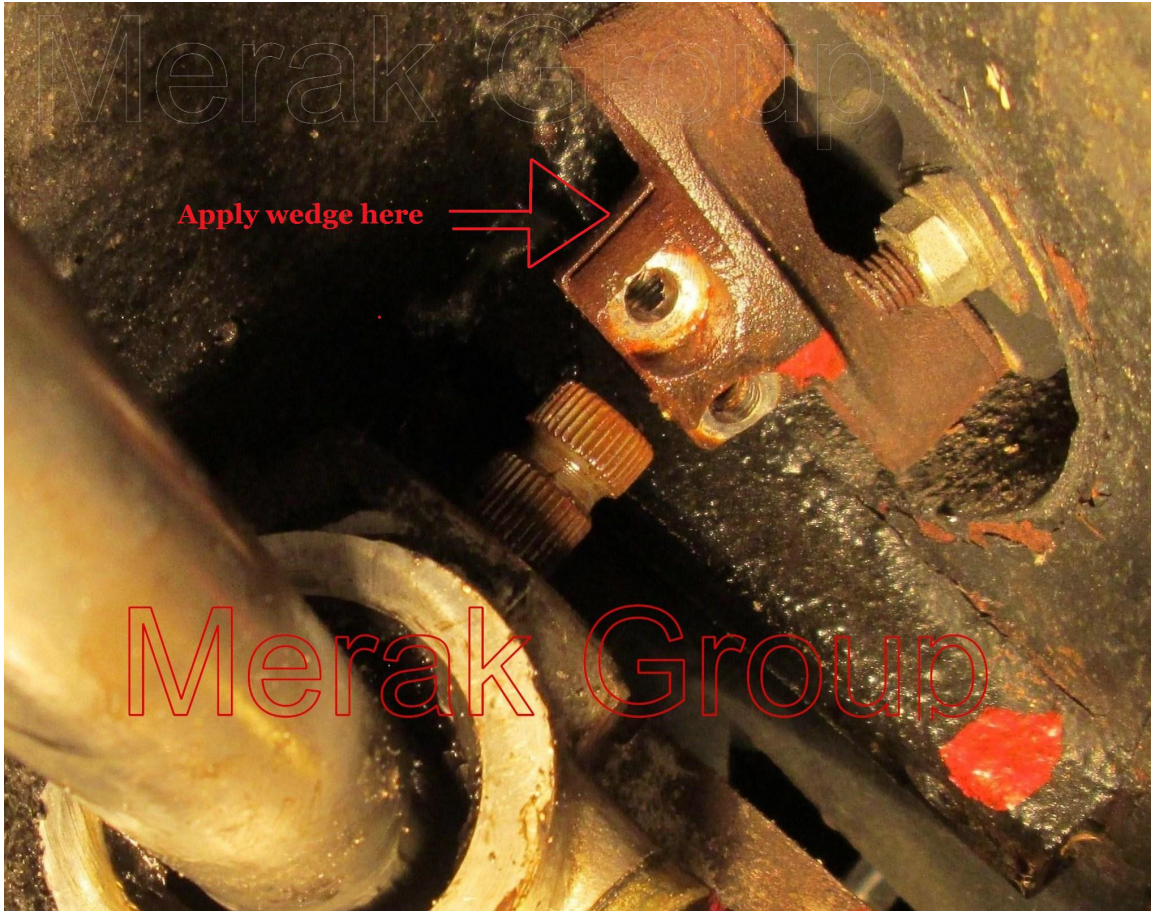


J. Installing The Steering Rack

Below is a photo of the fully restored Merak steering rack.



The driver side accordion dust boot can be easily maneuvered in place over the driver side assembly. Pack this area with plenty of grease to protect the tie rod assembly. The passenger side dust boot should be installed as one of the finishing steps once the steering rack is bolted in. Pack this area with plenty of grease to protect the tie rod assembly as well. The last step in preparing the steering rack is to apply a flat head screwdriver into the indicated space as a wedge to open up the steering pinion coupler ever so slightly.



It is best to use a dowel or a similar sized screwdriver to align the rack to the securing bracket bolt holes. Hand thread each bolt pair partially, alternating from one side to the other making sure that the alignment is correct. This may take several tries as the rack can become unwieldy at this point of the installation. At the same time care should be taken to make sure that the steering pinion/coupler/paint stripe also are in correct alignment.

Slowly alternate tightening the securing bolts so that they are snug. The focus is now on the steering pinion and the coupler. With the steering pinion coupler having been opened up the steering pinion should easily fit into the coupler. A flat head screwdriver can be used as a lever to apply any needed pressure to force the coupler onto the steering rack pinion. Take care to line up the pinion shaft indentations with the Allen bolt holes. Confirm that alignment is correct by use of a dowel or appropriate sized Philips head screwdriver prior to threading in the Allen bolts. The Allen bolts thread in very tightly. As long as they are lined up to the coupler surface at a 90 degree angle they will thread in perfectly



Install the steering damper stud and steering damper making sure the inboard bracket and the mounting stud are in correct angular alignment.



Remove the retaining clip and repack with grease.



Install the new tie rod small dust boot, and replace the retaining clip over the outer edge of the small tie rod dust boot.



Install the passenger side tie rod accordion dust boot.

Lastly, install the tie rod ends, brake calipers, and line up both wheels in a straightforward fashion adjusting the tie rod ends as needed prior to attaching the tie rod ends to the wheel assembly. Install the castle nuts and pins, tighten the locking nuts on the tie rods, and have a front-end alignment done at a reputable tire store.

Ciao,
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