

REBUILD OF 49-54 PASSENGER CAR AND 53-62 CORVETTE STEERING BOX AND COLUMN DISASSEMBLY, CLEANING AND INSPECTING

Tom Parsons

This is a rebuild procedure I learned to do long ago without any particular special tools or a scale (as illustrated in the service manual). The adjustments and preload on the bearings and sector roller are all done by “feel” and I’ll explain how it is done and to “feel”.

For a holding fixture, I use an engine stand with an old rail road tie plate drilled and tapped for attaching the steering box. A good vice would work just fine, but with the column mounted to a stand in this manner, it is mobile around and the box can be rotated to multiple positions during the rebuild.



After an initial cleaning with some industrial strength degreaser and a power washer, the first thing to do is remove the sector shaft/roller by removing the four bolts on the side cover.



The sector needs to be positioned so that the sector roller is in the straight up position because there is a notch in the steering box which the roller must pass through.

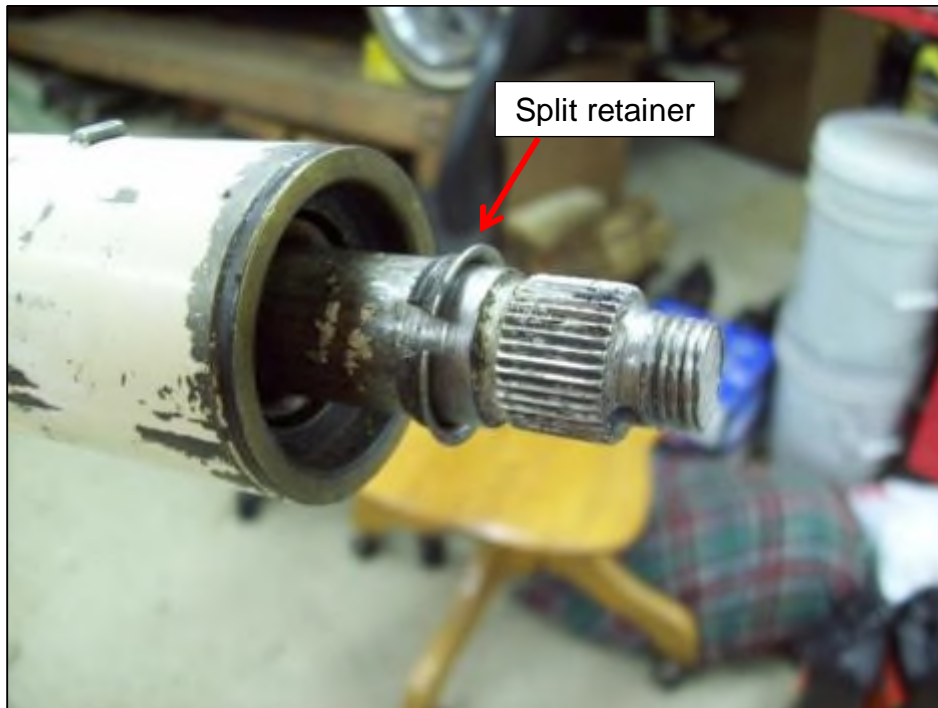


Once the sector and side cover are removed as a unit, loosen and remove the lock nut from the adjusting screw. Then screw the adjuster out of the side cover.

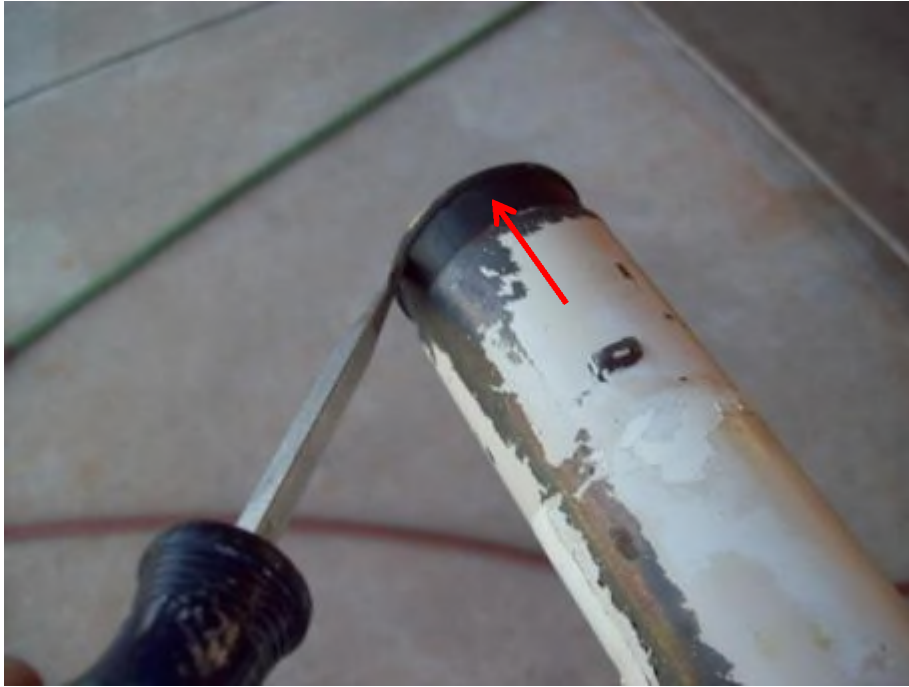


Loosen the big lock nut on the end of the steering box then unscrew the end cap from the end of the box. This will allow the worm gear and steering shaft to slide out as a unit.

At the upper end of the steering shaft is a bearing and horn contact unit, along with a split retainer which puts preload pressure on the upper bearing when the spring and steering wheel are installed. **DON'T LET THE SPLIT RETAINER FALL TO THE FLOOR AND GET LOST!**



Once the steering shaft is removed from the column, the upper bearing/horn contact can be gently persuaded out using a screwdriver and hammer. The upper bearing is completely covered with a hard rubber like material, so go slow and be very gentle when tapping it out because **this rubber material insulates the brass horn contact from the outer column.**



This is the upper bearing/horn contact after removal. The bearing is in pretty good shape, but the terminal has been broken off of the end of the wire, so the bearing will be replaced with a new one, which is still available from some vendors. The old bearing CAN BE saved by soldering on a new terminal.



After the side cover, sector and steering shaft are removed, thorough cleaning of the interior of the box and parts are done so that they can be closely inspected for wear, damaged bearings, mating surfaces and overall condition (also, it's no fun working on a nasty, greasy steering box).

After cleaning, the roller bearing (49-52 pass cars will have bushings here) in the steering box is driven out (**prior to driving out the bearing, the old seal on the end can be pried out with a big screwdriver**).

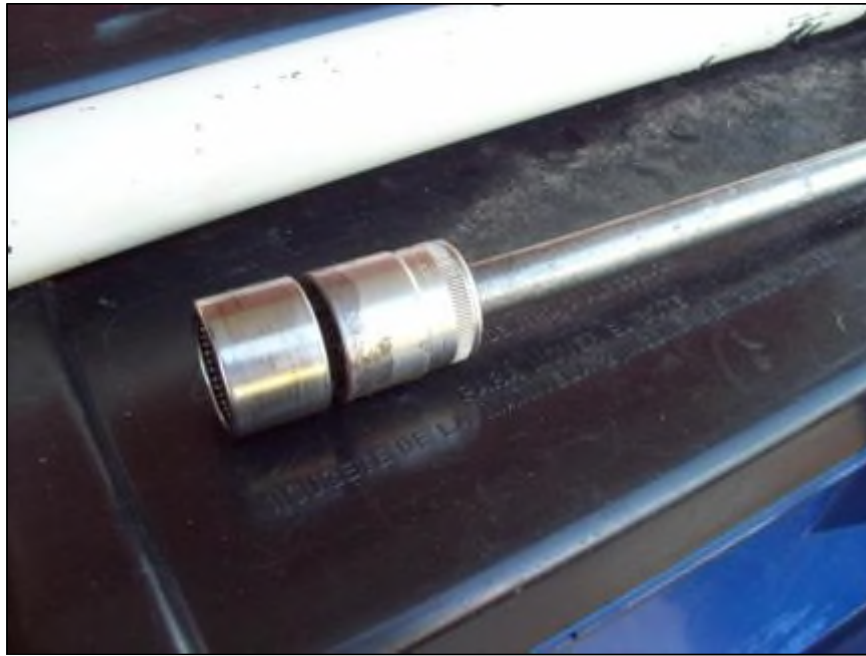
This is very simple and easy, but again, be gentle. Use a socket that will just barely pass through the bore for the bearing and gently tap it out.



Here's the bearing partially driven out.



And the removed bearing along with the socket that was used to drive it out.



Once everything is removed, all parts can be closely inspected.

With this particular steering box, amazingly, all the bearings, races, worm gear, sector roller and sector surfaces were in excellent shape. As a result, everything was thoroughly cleaned (I use a lot of brake cleaner on parts like this then blow dry with compressed air).

Below are the critical areas to inspect.

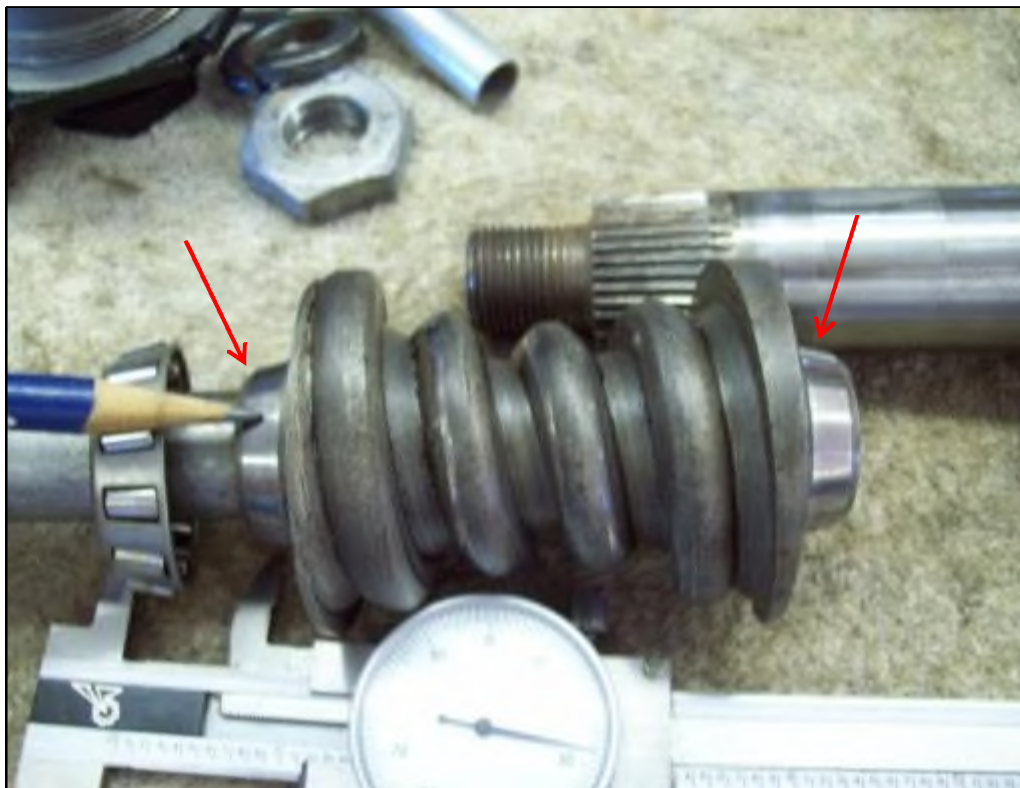
Naturally, look very closely at the bearing rollers and races for abnormal wear and pitting.



There is a race for the roller bearing up inside the box, look closely at that race. If any of the outer bearing races have to be removed from the box or end cap, a suitable puller will have to be used to remove them. The same goes for the roller bearing inside the side cover.



Each end of the worm gear is an inner bearing race. If these race surfaces are damaged or excessively worn, you get to buy an expensive new rebuild kit (the worm IS NOT available separately).





Also, look VERY closely at the contact surfaces of the worm gear and the sector roller for wear, chips or pits. If there is any detectable wear, it's going to be a personal decision as to whether or not the parts are re-useable.



Check the interior surface where the sector roller bearing is pressed in to assure it is in good condition.



Also, closely inspect the surface of the sector shaft where it rides in the roller bearings (bushings in the case of 49-52 pass cars). This one is in excellent condition.



Once all the parts have been inspected, the box is blasted to remove all residual dirt, grease and rust that were not removed during the cleaning with degreaser and power washing. The openings of the side cover and end cap were masked off to prevent blasting media from damaging the bearings or races.



After blasting, the box, column, side cover and end cap were thoroughly blown out, flushed several times with brake cleaner and blown dry to assure no debris or blasting media were remaining inside the box, inside the steering column tube or in the bearing areas.

Once everything was clean enough to eat off of, the end cap and side cover were installed and the entire box was painted with a rust preventative satin black enamel paint (your choice of paint).



TIME FOR ASSEMBLY.

Since all the bearings and races of this steering box were in good condition, the only part to install in the box itself is the caged roller bearing.

I positioned the bearing in the bore then started it in the bore with a block of wood and hammer.



After the bearing is started in the bore, it is finished driven in with a socket that is slightly larger than the bearing. **This larger socket will drive the bearing into the bore the correct depth.**



The new seal is now installed. I like to put a VERY light coat of sealant on the outer edge of the new seal. I use the Permatex in the large can with a brush in the lid.



I use a block of wood and hammer to install the new seal.



AFTER the seal is installed, I thoroughly pack the bearing with grease. By doing this after the seal is installed, it permits wiping off the grease and leaving a small amount of grease in the gap between the bearing cage and seal. Also, the bore where the seal fits is not contaminated with grease if the seal is installed first.



I like to insert the sector shaft backward in the bearing and rotate it several times to assure the bearings are fully coated with grease, plus check to assure the sector shaft rotates freely in the bearings. I do the same with the side cover before it is permanently installed.



The upper bearing is simple to install by tapping it into the upper end of the column. The Column tube has a ridge down below the end of the tube which helps to position the bearing. Be sure to insert the horn wire through the hole for the wire.



Slip the upper worm gear bearing on the steering shaft and thoroughly grease it then slip the steering shaft into the box.



Grease the lower worm gear bearing, place it into the end cap and screw the end cap into the box.



Don't forget to place the split retainer on the end of the steering shaft and shove it down into the upper bearing. When the spring and steering wheel are installed later, the spring pressure will push this retainer into the bearing and (supposedly) apply the correct amount of preload to the upper bearing.



Now, this is when and where the **FIRST** adjustment is done; **preloading the worm gear bearings.** I place a small pair of vice grips on the splined end of the steering shaft which allows “feeling” the preload of the worm gear bearings. This is done by “experienced feel”, not by a service manual procedure.





The end cap is progressively tightened to apply pressure to the worm bearings, **while at the same time the steering shaft is rotated with the vice grips until the slack is removed from the bearings, but yet NO BINDING occurs with the bearings.** Continue to loosen and tighten the cap while at the same time rotating the steering shaft to assure all bearing slack is removed and just the right amount of preload is applied to the bearings. AGAIN, this is a “feel” thing. You just have to know what a proper bearing preload feels like. Keep in mind, these worm bearings are not under the same kind of load that occurs with front wheel bearings.





Once the worm bearings are adjusted, tighten the lock nut on the end cap. I use a punch and hammer to tighten the lock nut. **Once the lock nut is firmly tightened, rotate the steering shaft again a few times to assure it all feels the same.**



The steering worm and shaft and upper bearing are now installed and adjusted. This portion is now complete. Sector shaft and adjustment is all that remains.



THOROUGHLY pack the ball bearings of the sector roller (on BOTH sides) with grease.



Slide the adjuster, WITH THE SHIM, into the end of the sector shaft.



Then screw the adjuster into the side cover-----screw it in almost all the way, and partly screw on the lock nut.



New side cover gasket.

I like to put a light coat of gasket sealer on both sides of the gasket, slip it over the sector and position it on the side cover.





Heavily grease the sector roller. Then slip the assembled sector shaft/side cover into the side of the steering box, with the roller pointing up.

REMEMBER, earlier I said to screw the adjuster almost all the way into the side cover. The purpose of this is so that when the sector is slipped into the steering box, the roller won't be jammed against the worm gear.

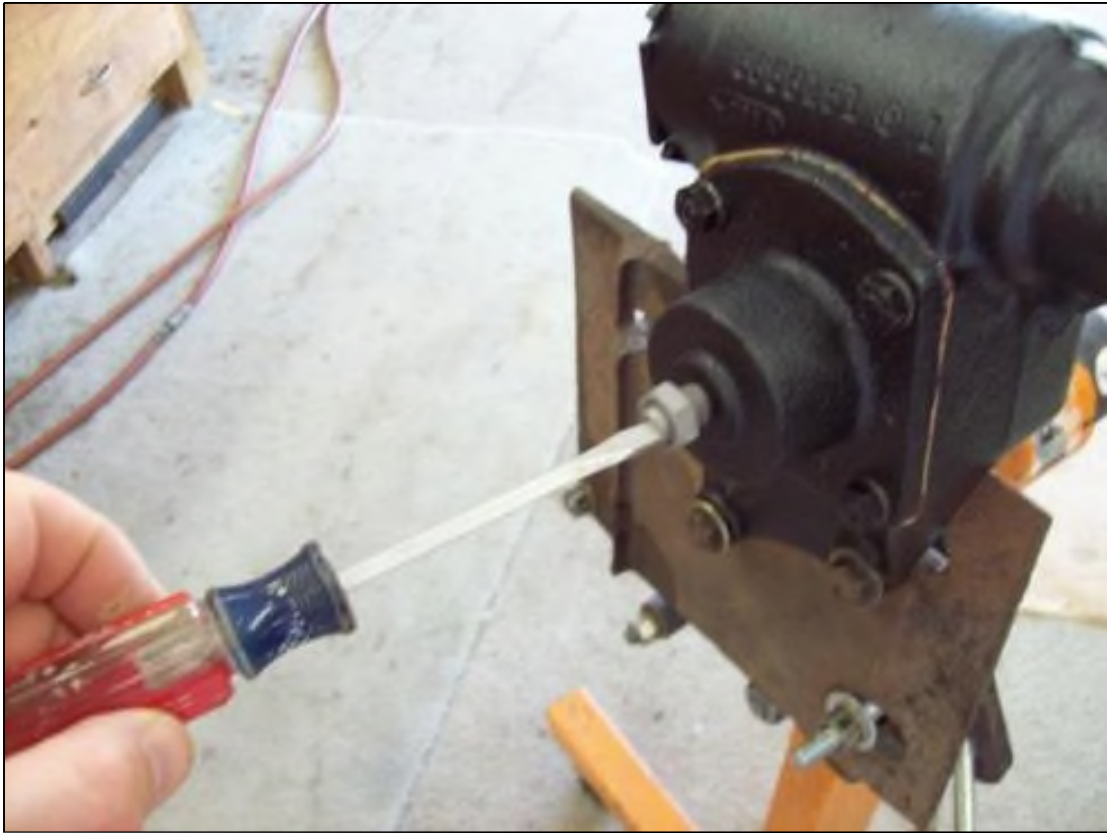




Once the sector is all the way into the steering box, install and tighten the 4 bolts/washers.



Now screw in the adjuster until you can feel the roller just barely touch the worm, and back off a little.



The vice grips are still clamped onto the upper end of the steering shaft.

Start turning the steering shaft back and forth from lock to lock. A full turning cycle should be ABOUT 4 ¼ turns.

From either lock, turn the shaft back to what should be the center point (about 2 1/8 turns). Screw in the sector adjuster in until you can just barely feel the roller contacting the worm again.

This is where the second adjustment is done-----AGAIN, by “feel”.

When the sector and steering worm gear are in the center position (straight ahead when driving), and as you rotate the vice grips back and forth past center, and as the sector roller is EVER SO SLIGHTLY adjusted into the worm, you will begin to feel a resistance as the worm/roller go through the center high point.

Now for the fine adjustment.

Back off of the sector adjuster-----again, as the steering shaft is being rotated back and forth through center.

As the sector roller is screwed into the worm, and then backed away, and as the steering shaft is rotated back and forth, you will alternately feel an increasing and decreasing resistance that occurs between the roller and worm. This resistance can be measured with a pulling scale as described in the service manual. I do the adjustment by “feeling” the resistance as the worm/roller pass through center. As the steering shaft is turned (by gently turning it with the vice grips) in one direction TOWARD center, take notice where the resistance is felt, and continue turning through center until the resistance just goes away. Turn the shaft back in the other direction and take notice of where the resistance just begins. Keep turning the sector adjusting screw until the resistance through center has just barely gone away (this is why I prefer to clamp a SMALL vice grip on the

splines of the shaft, it provides a “precise feel”). Now, turn the sector adjusting screw back in a tiny amount. You will now again be able to just BARELY feel a resistance. **STOP**. Turn the shaft back about a full turn and then turn it back until you feel it passing through the resistance of high center and continue turning past center for about a full turn. **Repeat this about 3-4 times so that you get a GOOD feel of exactly where center is.** Once you get a good feel for where high center is, turn the sector adjusting screw so that when you turn the steering shaft, you will feel a SLIGHT resistance between 1 and 2 inches of turning of the shaft. If you have a scale to use as instructed in the service manual, then that is fine. But most people don’t have one, nor do they have access to one. So, this is the way I was taught by a factory trained Chevy mechanic to adjust the steering box. And if you do it this way, then use a scale to check your adjustment, you’ll probably discover that you are VERY close to the values called for in the service manual.

Once the final adjustment is completed, tighten the lock nut on the adjusting screw-----and re-check the turning resistance to assure it did change when the adjusting lock nut was tightened.



When all is said and done, there SHOULD be a line scribed on the very end of the steering shaft which SHOULD be pointing straight up. This scribed line is for indexing the steering wheel for straight ahead driving. Well, sometimes, the scribed mark is not in the correct indexed position, or, in the case of this column, some previous person had cut off or ground off the very end of the threaded part of the steering shaft. So, I first marked it with a permanent black marker then made 3 punch marks to indicate straight up center.



After everything was completely finished, I slipped the pitman arm onto the splines of the pitman shaft, loosely installed the lock washer and nut and turned the pitman arm back and forth from lock to lock to verify that the center mark on the end of the steering shaft was at straight up center when the pitman arm was at the center of its travel. It was.



Now it's finished and ready for the customer to pick up.





Pump the box full of chassis grease, **NOT 80-90wt gear oil.**

Back in the late 50s, there was a **GM Service Bulletin** which directed the change to chassis grease in these early steering boxes.

GM 500 100 REV. 1-54
PRINTED IN U.S.A.





SERVICE BULLETIN

<p>ZONE #61 Wichita, Kansas</p> <p>SUBJECT CORVETTE STEERING GEAR LUBE LEAKING FROM THE DIRECTIONAL SIGNAL HOUSING.</p>	<p>DATE December 8, 1959</p> <p>BULLETIN NO. 83</p>
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In the event the steering gear lube should work up the mast jacket and leak from directional signal housing, remove the steering wheel, bearing and seat assembly at the top of the mast jacket. Place a felt collar #3721433 available in Service Parts Stock, over the shaft between the shaft and the mast jacket down to a position just above the steering gear housing. To further prevent the recurrence of oil leakage, drain housing and refill with a lubricant of non-pouring consistency, such as chassis lubricant.

Very truly yours
B.H. Berryhill
 B.H. Berryhill
 Zone Service Manager

BHB:JWP:wn

Tom Parsons

<http://www.chevytalk.org/fusionbb/showtopic.php?tid/225413/>