



Dennis Lacy

Member

from Southern California

dumprat said: ↑

Anything new with this build?

Yes! I've began work on the steering gear and started the write-up last night. Not sure what kind of time I'll have today but I will get it posted by tomorrow.

DENNIS LACY, JUL 4, 2015

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Fogger

Member

from San Fernando, Calif

Dennis, Looking forward to the steering box rebuild. Saving the original parts, as you have, maintains the heritage of the early Fords. Great coverage and detailed explanation of the procedures. This info will benefit many members. Ron

FOGGER, JUL 4, 2015

SHARE POST#297



Dennis Lacy

Member

from Southern California

STEERING GEAR – PART 1

At this point in the project I am going to turn my attention towards over hauling the steering gear. I would like to have it completed and installed before I start down the path of fitting the engine because once it is in place it may not be possible to get the steering gear back in! With the “B” 4 cylinder engine the starter must be removed to allow sufficient room to get the gear in and out and with a flathead V8 the exhaust manifold or header must be removed.

Early (32-34) Ford Steering Gears

Over the decades early Ford steering gears have earned a bad reputation. They leak, they're sloppy, they're impossible to adjust and they require too much physical effort to turn the wheels. As I have become somewhat of a “specialist” when it comes to these gear boxes I have found that in most cases those accusations are the result of misunderstanding or lack of

knowledge on the users part. While these early gear boxes do have some limitations, with some studying, modernization and careful attention to detail they can be made to work quite well.

The typical '32-'34 Ford steering gear looks like this:



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The housing is made up of two pieces – the main (worm) housing and the side (sector) housing. There are probably half a dozen variations of worm housings (different manufacturer markings) but the housings across all three years are identical in

shape/dimension and interchange. The sector housing has two specific designs, one for '32 and the other for '33-'34.

Originally as '32 production got under way there were two dedicated sector housings, one for passenger cars and one for light commercial vehicles. The actual castings are the same, where they differ is the offset of the 3 mounting holes in the triangle shaped flange that attaches at the frame. This is necessary because the steering gear and column are mounted at a steeper angle in light commercial vehicles. Typically (but not always) the passenger car version will be stamped with the letter "A" on the mounting flange and the commercial version will be stamped with a "B". At some point during the '32 year the "B" sector housing was discontinued and instead the three mounting holes in the side of the frame rail were slotted so that the steering gear and column could be rotated up or down depending on if the vehicle was a commercial or passenger. The photo below shows the commercial "B" version on the left and the passenger "A" version on the right.



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The '33/'34 sector housing is very similar to a '32. The differences being that the '33/'34 is slightly shorter and the triangle shaped mounting flange is clocked opposite the '32. In '33/'34 there is only one sector housing. The mounting holes in the

frame were slotted so that the angle of the gear and column could be adjusted to fit passenger or commercial vehicles. In the photo below the '32 sector housing is on the left and the '33/'34 sector housing is on the right.



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The gear ratio for '32 to mid-'33 is 13:1. The gear ratio for late-'33 thru '34 is 15:1. As the ratio number increases, the physical effort required to steer the wheels decreases. The trade off is that as the ratio number increases, so does the turning distance lock-to-lock. Between 13:1 and 15:1 that distance is a half turn of the steering wheel. As luck would have it, the worm and sector gears (and all other internal parts) from '32 thru '34 are interchangeable. That means a '32 to mid-'33 steering gear can be upgraded to the 15:1 gear set and see a reduction in physical steering effort. The steering gear from my truck was still the original 13:1 ratio so I will be upgrading it to 15:1.

Up until about 5 years ago the only way to be able to upgrade a '32 to mid-'33 gear box to 15:1 ratio was to get lucky and find a good used set of original gears or get really lucky and find an NOS set. Reproduction gears had been available but

they were not made correctly and were next to impossible to work with. Luckily, the aftermarket finally came to the rescue and started offering high quality reproduction gear sets that set up and run every bit as nice as an NOS original set.

In the photo below is the original 13:1 worm gear (top) and new 15:1 worm gear (bottom.) You can notice the different shape.



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Although this is a reproduction gear, all original 15:1 worms are similarly marked with a “15”.



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In the photo below is the original 13:1 sector gear (left) and new 15:1 sector gear (right). Note that the triangle shaped gaps between teeth are wider on the 13:1. Although it is a reproduction, original 15:1 sector gears are similarly marked with a "15".



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Again, 13:1 (top) and 15:1 (bottom).



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Last edited: Jul 5, 2015

DENNIS LACY, JUL 4, 2015

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STEERING GEAR – PART 2

Dis-assembly



Dennis Lacy

Member

from Southern California

Here is an overall picture of the steering gear for my truck. Unless you have an open top car the gear must be removed as a whole assembly with the column, wheel and horn button. This is because the horn button has a rod that runs all the way down through the steering shaft and out the bottom of the gear to operate the original light switch. The button/rod must be removed to access the steering wheel nut. With any kind of close car the roof can get in the way of pulling the button/rod all the way out.



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At the bottom of the steering gear where the horn button rod protrudes there is a fork (that operates the light switch) and spring retained by a half circle clip. Push on the fork to compress the spring and remove the half circle clip, then the fork and spring will come off the end of the rod and the horn button/rod can be pulled up and out from the other end.



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When the fork, spring and clip are removed they will look like this.



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With the horn button/rod removed the steering wheel retaining nut can now be accessed and removed with a 15/16" wrench or socket.

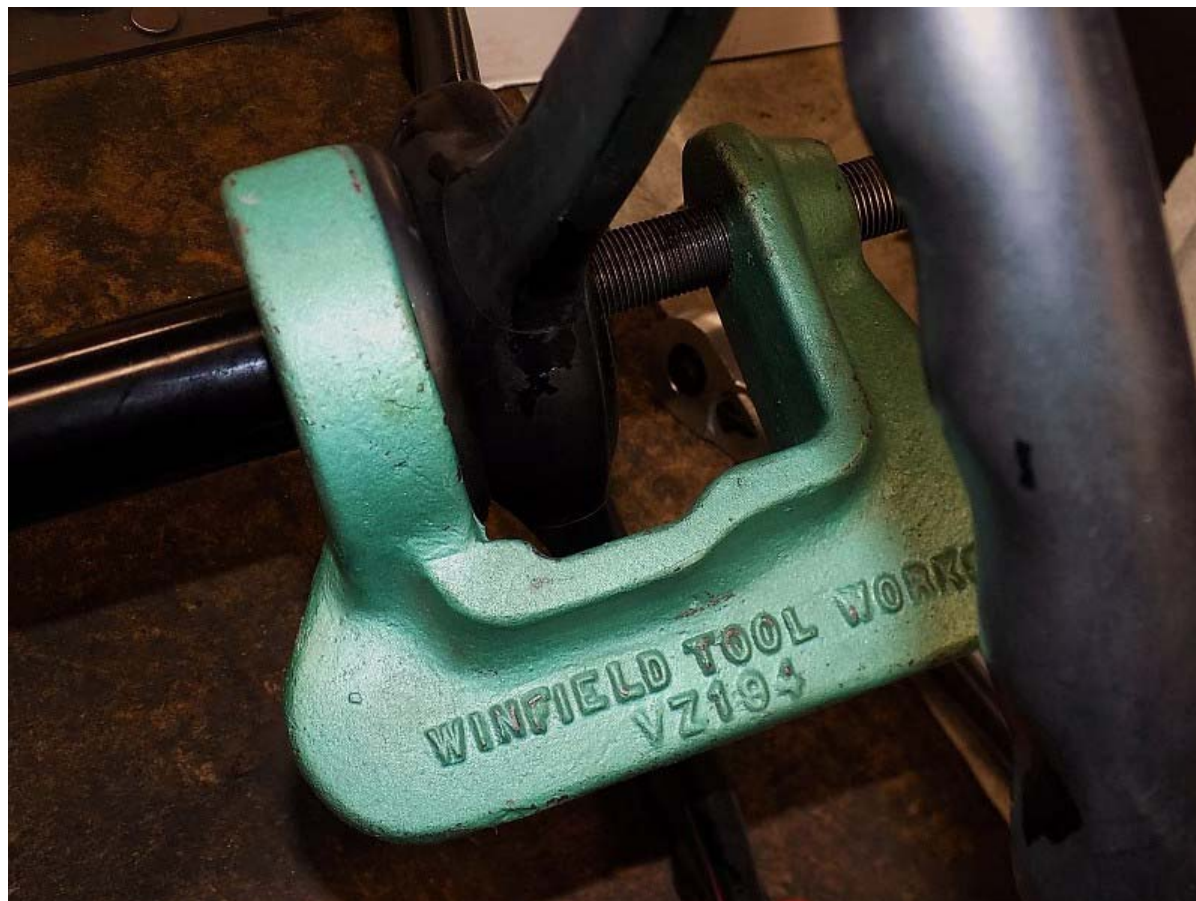


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This steering wheel removal tool is a copy of an original K.R. Wilson Ford tool by Winfield Tool Works. The base of the tool has a thick rubber pad so it will not damage the underside of the wheel. It also has a brass slug that presses on the end of the steering shaft and will not damage the shaft. This is one of those tools that you don't need very often but is super nice to have!

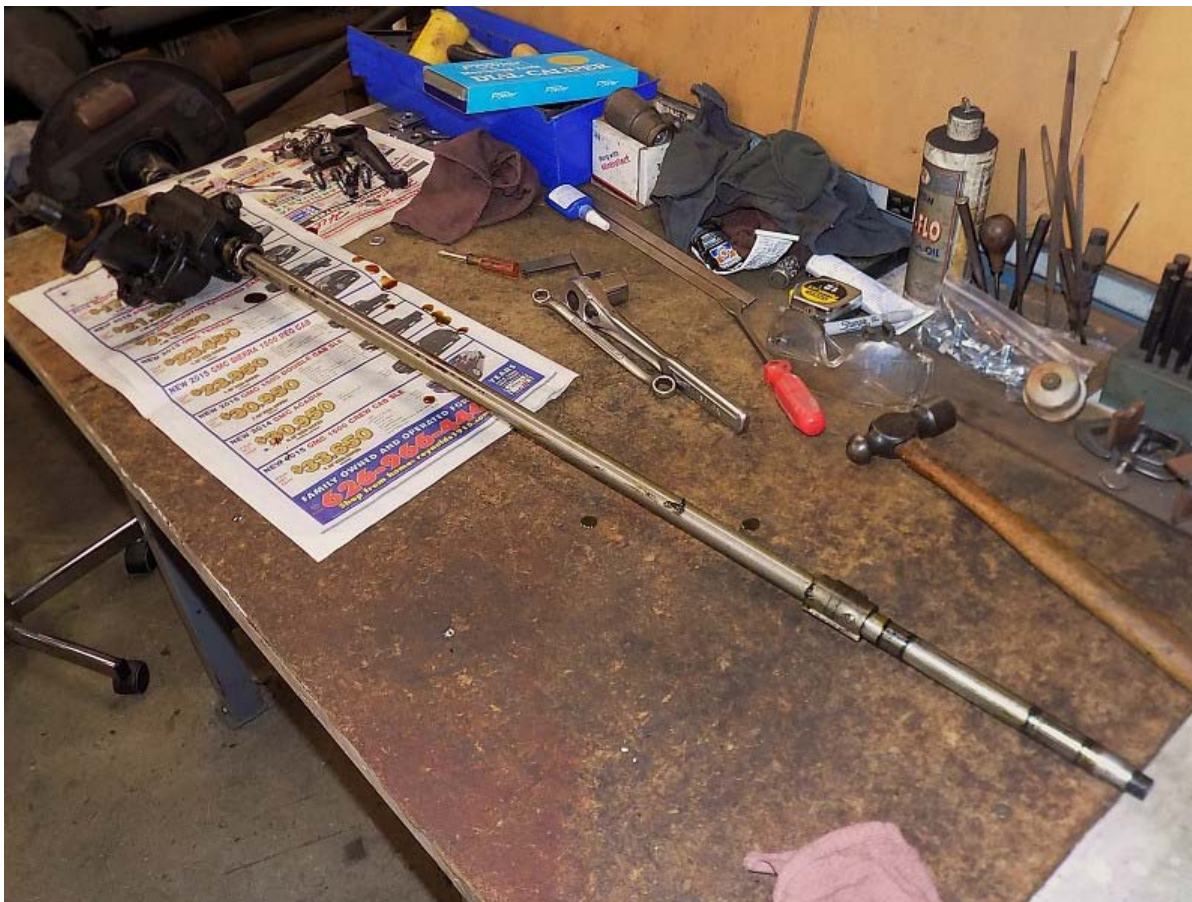


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With the steering wheel removed unlock the ignition switch, loosen the clamp at the base of the steering column tube and slide the tube up and off of the steering gear/shaft.



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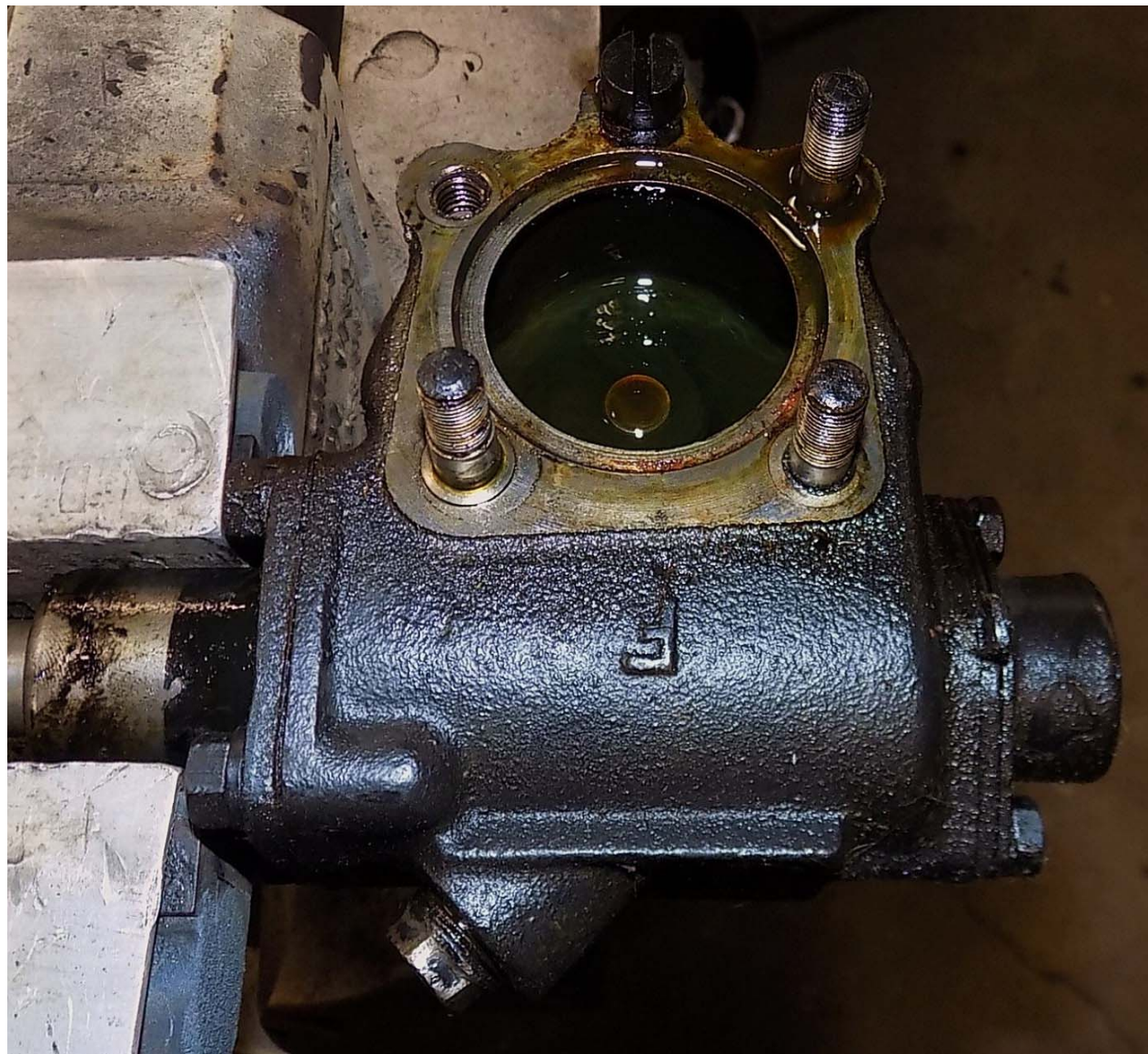
Towards the top of the steering shaft is the striker collar for the ignition switch lock. It is held in place with two special set screws. Typically the screws will be staked in place to prevent them from backing out. Use a quality screw driver that is a good fit in the screw slots and work them out. Sometimes they come out fairly easy, sometimes they put up a fight. Do your best to not destroy them. Once the set screws are out the collar can be driven off of the shaft. I use a special shaped drift shown in the second picture below.

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The gear housing is clamped into a bench vise on the upper bearing retainer with aluminum “soft jaws” to prevent tooth marks from the vise. Remove the 4 nuts holding the sector housing to the worm housing and remove the housing along with the sector gear.



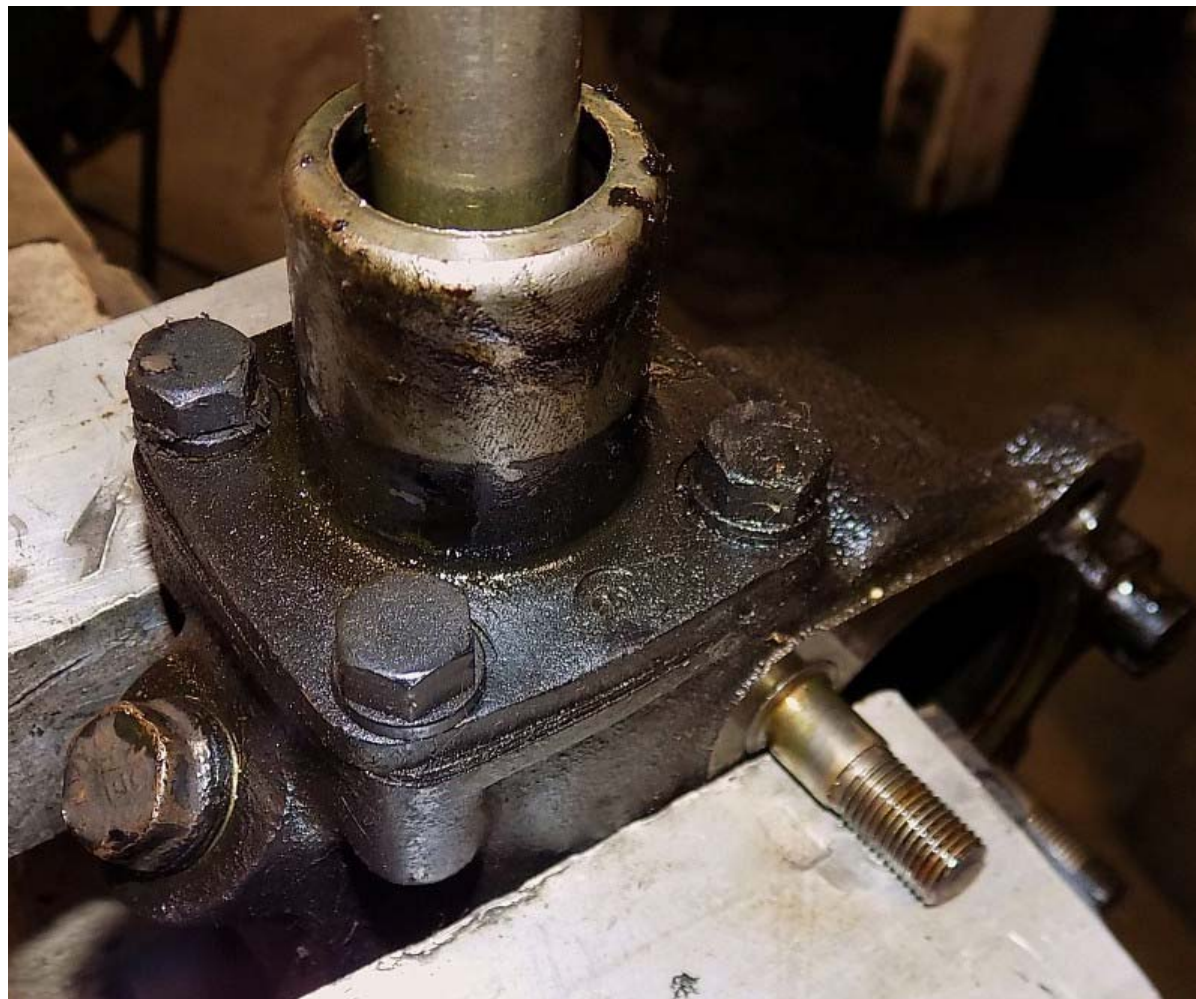
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Remove the two 1/4" bolts at the bottom of the worm housing and remove the light switch mounting cup and lower seal plate. Originally, 32's did not have the brass tube attached to the lower plate. Ford started this in '33 in an effort to reduce oil leaks. My steering gear had been retrofitted with the brass tube version in the past. This is somewhat common to find.



The gear housing is then clamped in the vise so that it's standing upright. Remove the four 5/16" bolts attaching the upper bearing retainer to the worm housing.



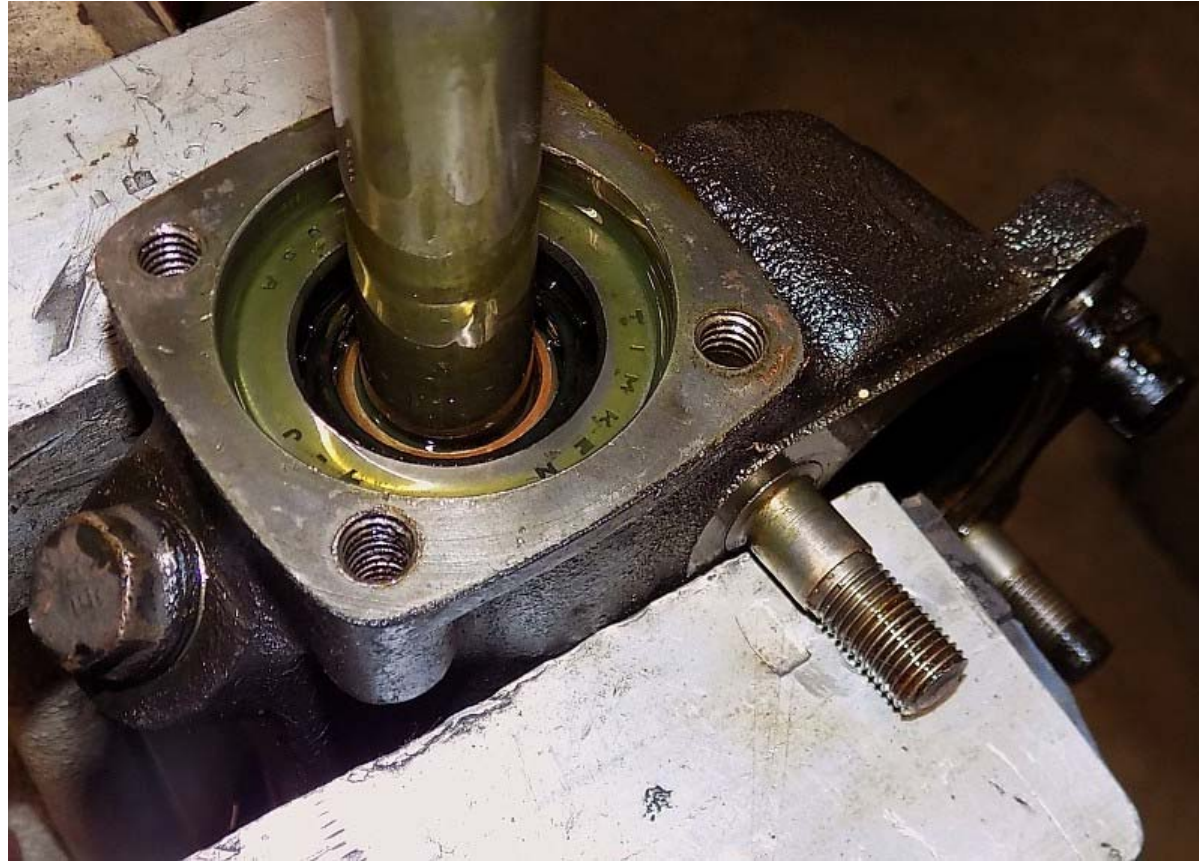
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After removing the bearing retainer underneath it there is a spring washer assembly that simply pulls out of the gear housing.

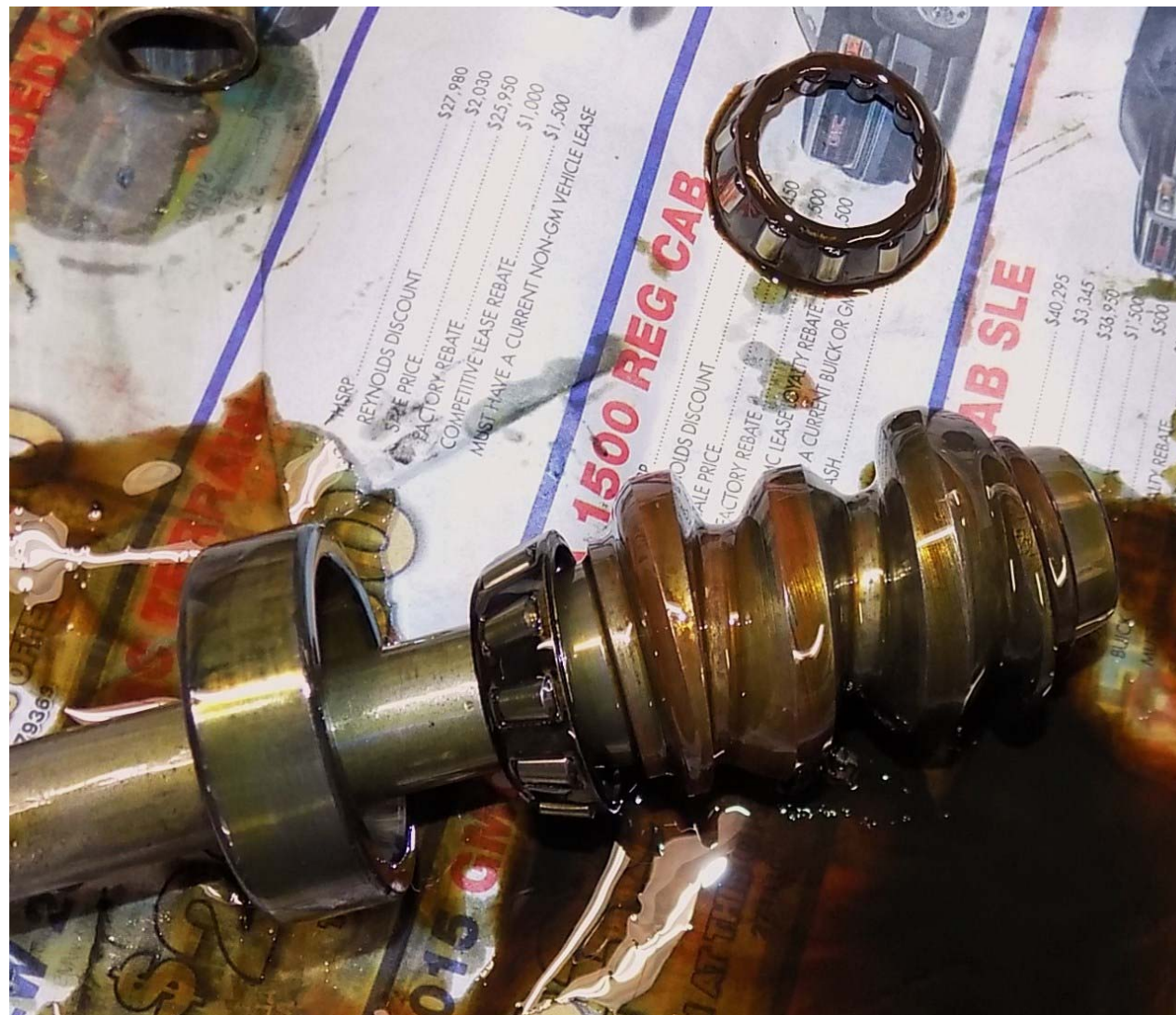


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With the spring washer removed the upper worm bearing cup will be exposed. At this point the shaft, gear and bearings can be removed from the worm housing simply by grabbing the shaft and pulling it up and out of the housing. There are tapered roller bearings at both ends of the gear.

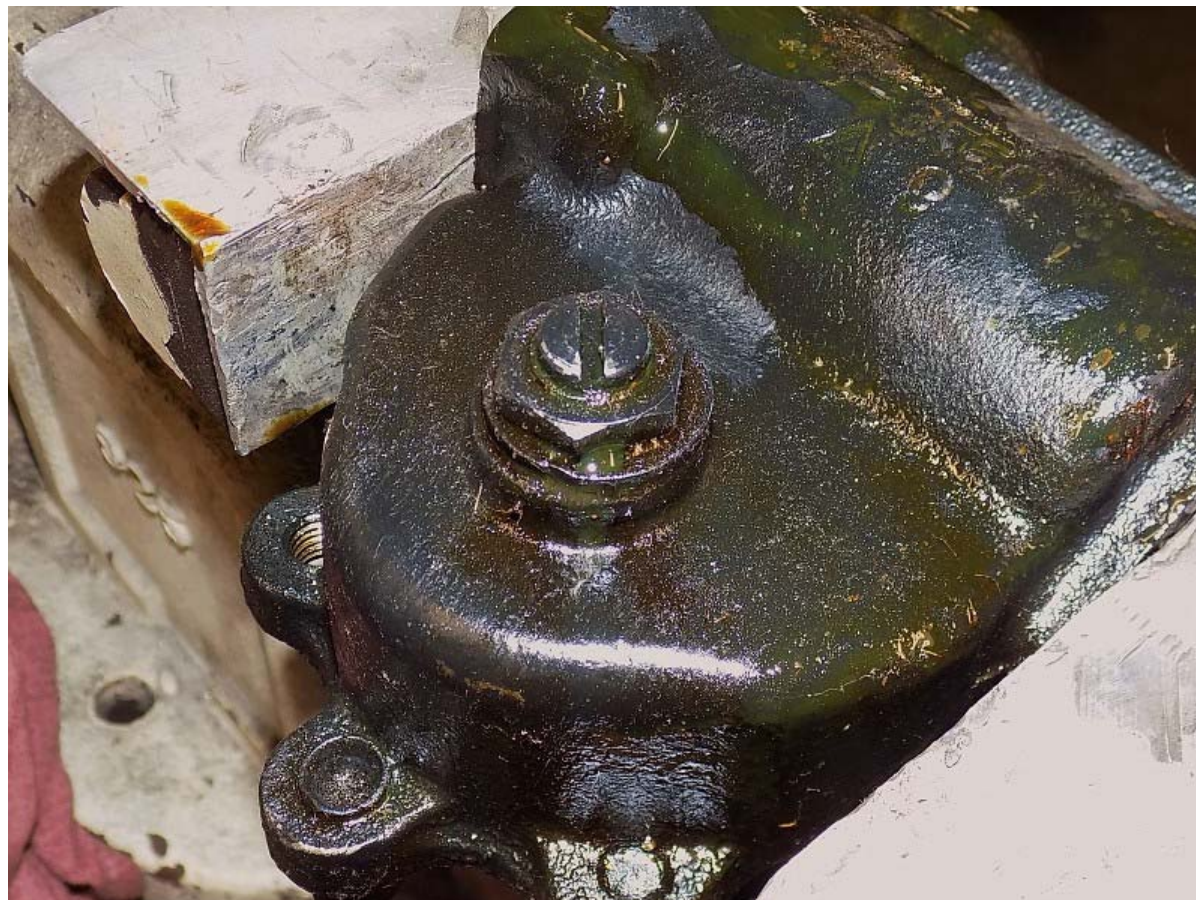


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On the side of the worm housing there is a stud with a slotted top, jamb nut and lock washer. This stud sets the thrust on the sector gear. Remove the jamb nut with a 3/4" wrench or socket and screw the stud out of the housing.



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At this point the steering gear is disassembled and the housings and parts should be cleaned and inspected for wear and damage.

DENNIS LACY, JUL 4, 2015

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**Dennis Lacy****Member**

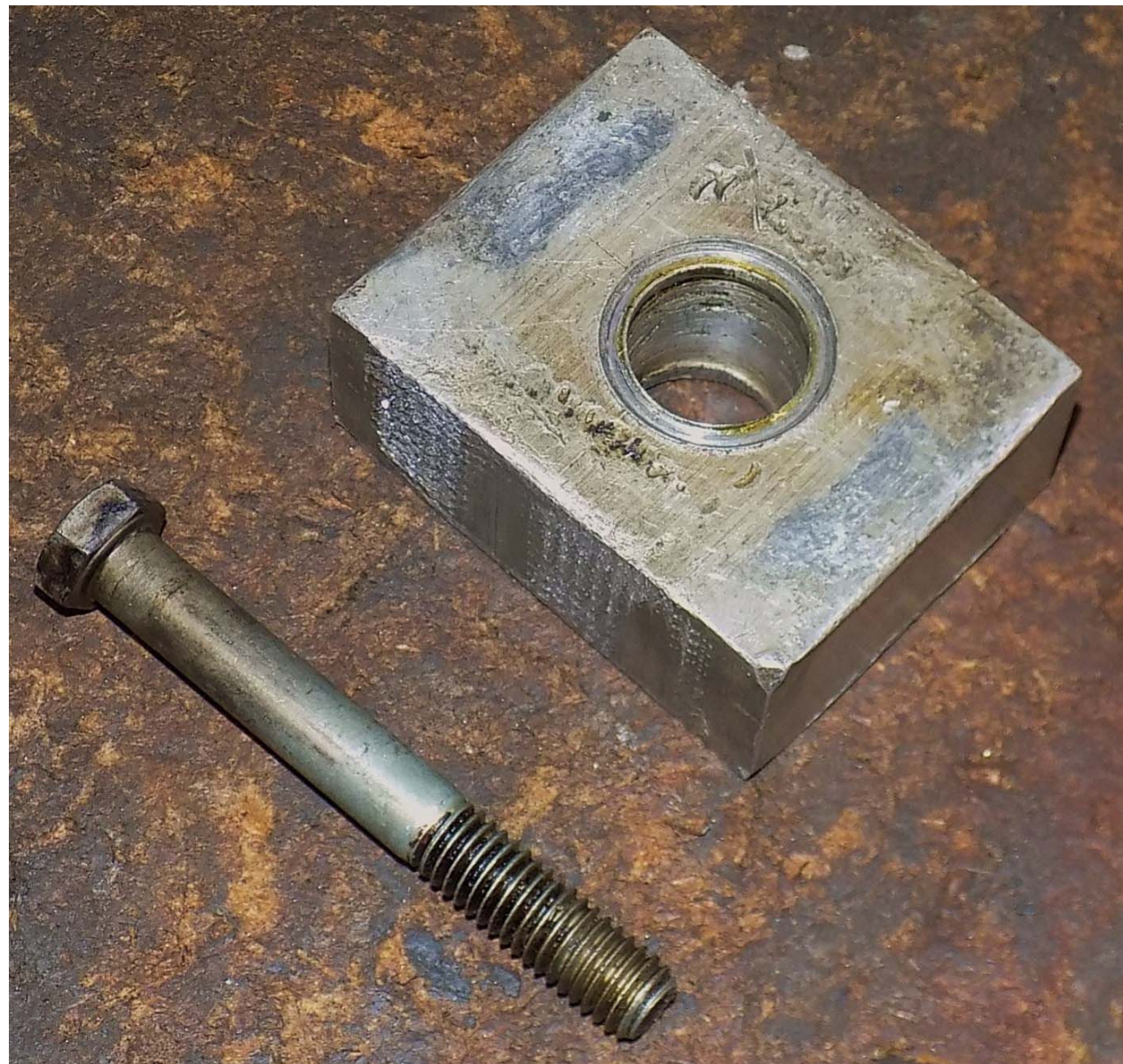
from Southern California

STEERING GEAR – PART 3

Worm Gear Removal and Replacement

As I mentioned before, the steering gear in my truck still has the original 13:1 ratio and I am going to upgrade to the late-'33 and '34 ratio of 15:1 using a new reproduction gear set. Doing so means removing the existing worm gear from the steering shaft and installing the new one. This is, absolutely, the most difficult part of the rebuild process if a person doesn't have experience and some custom made specialty tools for the job. It's real easy to damage parts if the process is approached incorrectly or forced. The last thing you want is to ruin a '32 steering shaft because they are impossible to come by.

Pictured below is a 1" thick aluminum block with a hole in the center the size of the steering shaft. There is also a 3/8" bolt with a half-round recess cut into the head.



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The aluminum block is slid down the shaft and up against the top of the worm gear. The block is then clamped in a bench vise, but not too tight as it will compress. The shaft needs to be free to slide in the block.

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The bolt is then inserted into the bottom of the steering shaft. Note that the head of the bolt bears against the end of the shaft but not the worm gear.



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I then use a large 2-jaw puller. The jaws hook around the aluminum block and the tip of the puller screw fits into the half-round recess in the head of the bolt. I use a long 1/2" drive breaker bar with a 3/4" impact socket to tighten the screw against the end of the shaft. It usually takes a lot of force to break the worm gear free so that the shaft starts to push out of it. Typically when it first breaks free there will be a loud "pop" and the effort needed will get slightly less. Sometimes the worm gear will not come loose. In that case I tighten the puller really tight and apply heat to the worm gear with an oxygen/acetylene torch. I don't have to heat the worm bright red, just a few seconds of even heat application and I will hear the loud "pop" as the worm lets go. I can then turn the torch off and remove the worm with the puller. Failing that, the worm gear can be carefully sliced through length-wise with a die grinder and cutoff wheel. I've only had to do that once or twice.



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With the worm removed there will be obvious burrs left behind on the shaft from the splines inside the gear. These burrs will need to be dressed off before the new worm can be installed.



To remove the burrs I put the steering shaft in our lathe and polish them away using an 80 grit sanding belt turned inside out.



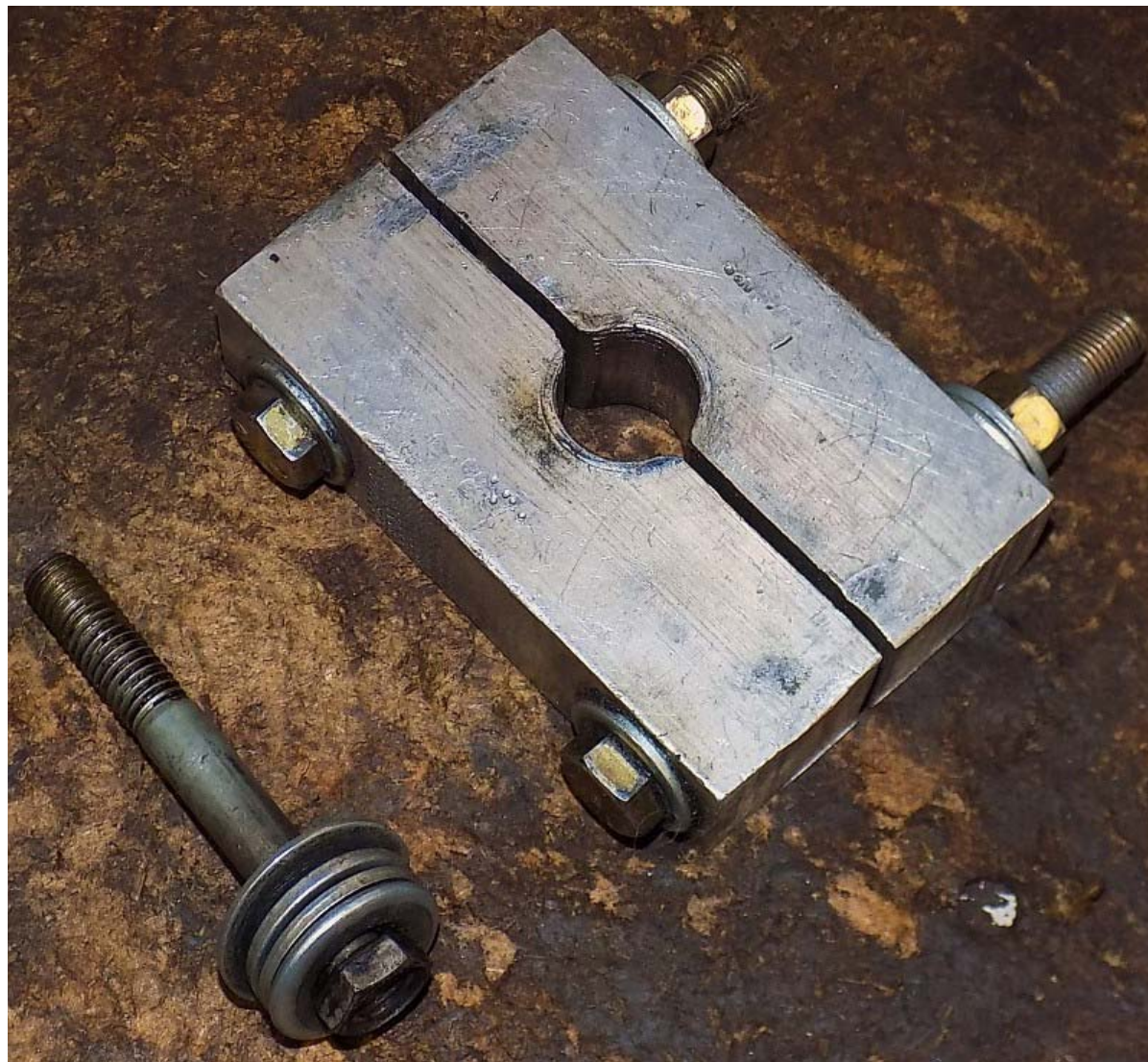
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The dressed shaft looks like this when I'm finished.



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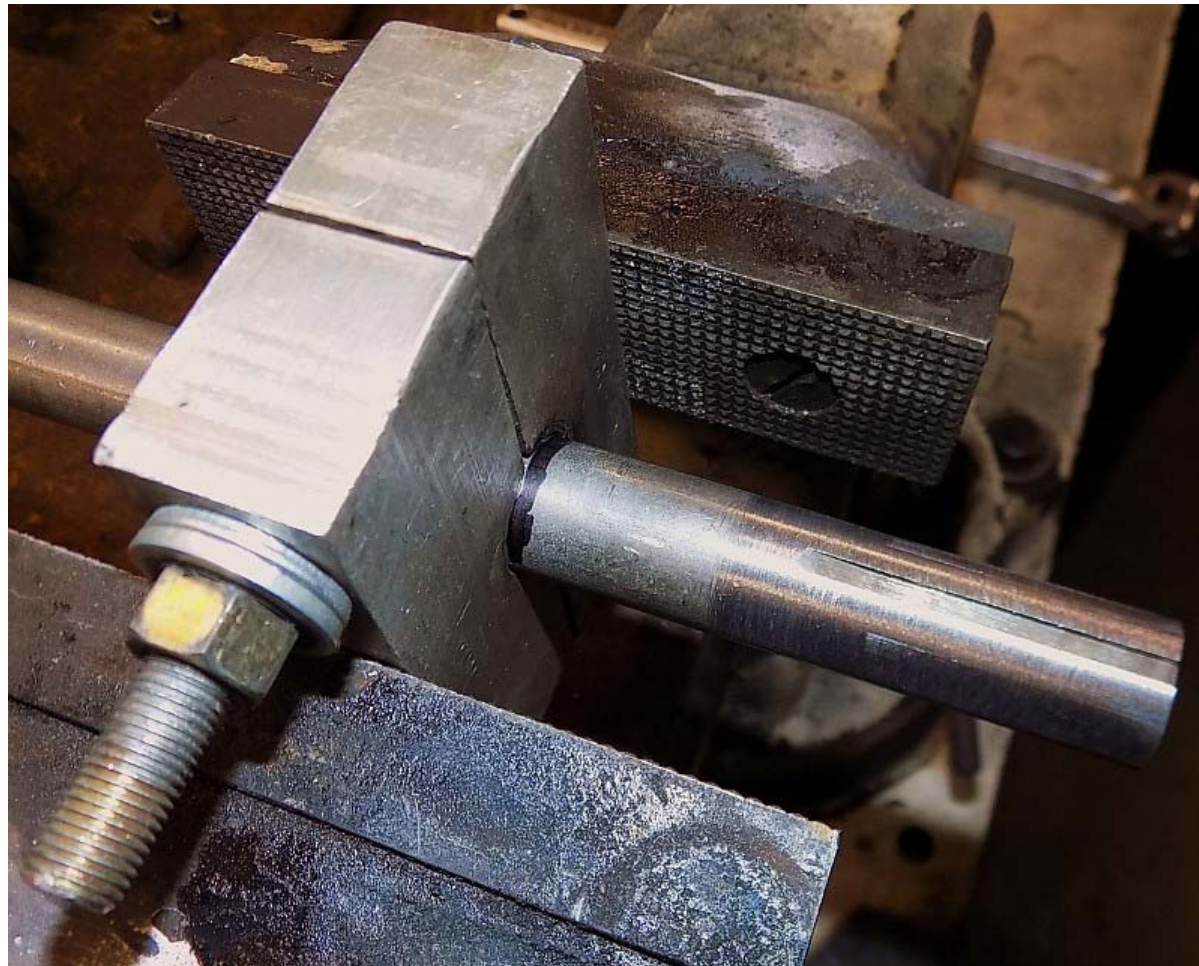
To install the new worm we have this home made aluminum block that clamps around the steering shaft. The same bolt from before is used, this time with several thick washers so that it pushes on the end of the worm gear.



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The worm gear is roughly 3" long. I put a mark at about 3 1/4" on the shaft then install the aluminum clamp just behind it. The black mark serves two purposes. 1) So I know where to position the clamp without it interfering with the worm gear. 2) So that if the shaft starts being pushed through the clamp I can tell right away. If that is happening then the worm is no longer being pressed onto the shaft.

The aluminum clamp is tightened as much as possible without breaking the bolts and it is then clamped tight in the bench vise, as tight as I can physically manage and then some. I don't want the shaft to move! A big bench vise come in handy because I have broken a smaller vise in half trying to tighten it enough to do this.



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I apply some black grease to the end of the shaft and the worm gear is started on the end of the shaft. There are splines inside the worm and they only are half the length of the gear. The splines go towards the end of the shaft. There is also a taller

spline that aligns with the key slot in the shaft. With the gear properly aligned I tap it onto the shaft as far as I can with a plastic mallet. The bolt with washers is then inserted into the worm/shaft and the same large 2-jaw puller is used to push the worm the rest of the way onto the shaft.



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When the worm is fully installed it will be flush with the end of the shaft.



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All done!



Again, I have to caution that without some experience and some specialty tools this operation can be absolutely frustrating for the average person to attempt. What the photos above don't show is that pushing the new gear on doesn't always go smoothly. Sometimes the new gear will get within a quarter inch or less of being fully installed and just stop. In those cases it is necessary to remove the gear and dress the shaft a little bit more until the new gear will push all of the way on. The gear needs to be tight on the shaft so it is crucial that a minimum amount of material be removed from the shaft. Having done so many of them now I have the process and feel down pretty good. Despite my experience, every once in a while I have one that just doesn't want to cooperate as has to come back apart multiple times before the gear will go all the way on.

DENNIS LACY, JUL 4, 2015

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TECHNICAL

1932 PICKUP REBUILD THREAD UPDATED 1/11/16

Discussion in 'Traditional Hot Rods' started by Dennis Lacy, Apr 5, 2015.

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Dennis Lacy

Member

from Southern California

STEERING GEAR – PART 4

Parts Preparation

With all of the parts washed free of grease or oil and the worm gear successfully replaced it's time to start preparing the rest of the parts.

TOP

The first order of business was to remove the two bushings from the sector housing and bead blast it. Almost always the bushings will be worn and need replacing. Check this by inserting the sector gear into the housing and try to wiggle it in the housing at both ends. If there's any perceivable slop, the bushings need replaced. Every once in a great while I will come across a sector with truly nice bushings that fit the new gear shaft perfectly, no bind yet no slop. In those cases I don't replace the bushings because there's no point.



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One of the original bushings that I removed is on the left while one of the new replacement bushings is on the right. New '32-'34 bushings are not available. All that is available is 78- part number bushings for '37 and later. The new bushings are the same outside and inside diameter, they are just 1/4" shorter. They work just fine.



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The new bushings are installed into the sector housing. The outer bushing is installed about 1/4" down into the hole because the housing is going to be machined for a push-in lip seal. There's no point in installing the bushing at the edge of the hole then machining part of it away. The inner bushing is installed as normal. Sometimes the bushings are a good tight fit in the housing, sometimes they are a little loose. In this case the outer bushing fit tight while the inner didn't so red Loctite was applied to the inner bushing before installing it. With the bushings installed I dropped off the sector housing and new gear at our machinist, Benders Automotive in Covina, CA, to have the bushings honed to fit the shaft on the gear.



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In the bottom of the main (worm) housing there is a cup for the lower worm bearing. Whether it is in good reusable condition or not I always remove it during the cleaning process. The cup sits on a stepped ledge which creates a cavity underneath it where grit and crap can build up. If the housing is being bead blasted it's also inevitable that glass beads will find their way in there. I find that it is impossible to get this cavity cleaned enough with the bearing cup in place that I feel comfortable with it.



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The top machined surface of the worm housing gets very lightly dressed with a mill file to ensure that it is reasonably flat and free of burrs. The idea here is to dress the surface without removing much material because it can alter the dimensions of the housing.



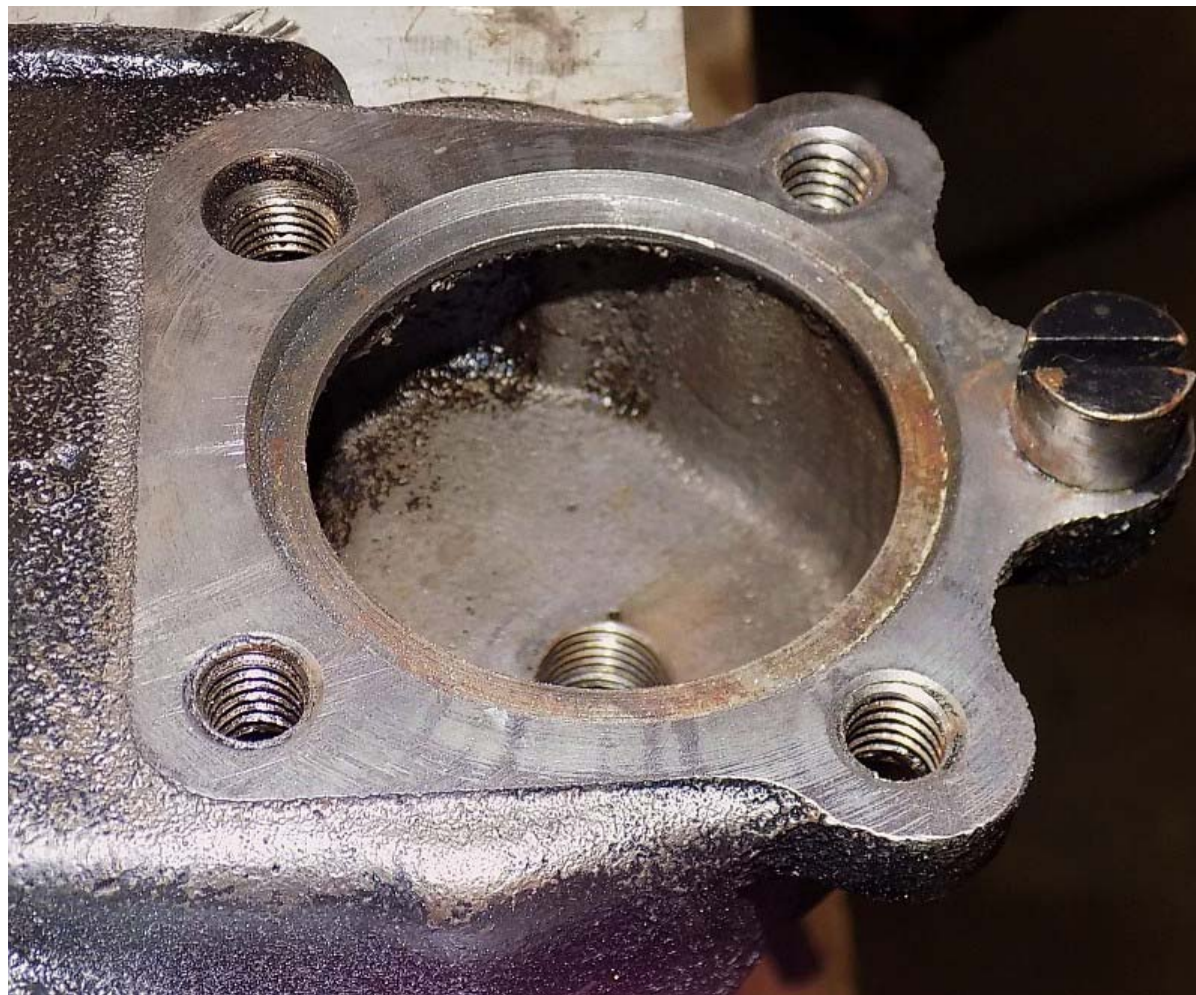
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The lower seal plate surface is dressed flat with a mill file. It is critical that this surface is flat to prevent oil leaks after the steering gear is completed.



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The surface where the sector housing attaches is also dressed with a mill file, ever so slightly, to ensure there are no burrs.



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The underside of the upper bearing retainer cap is ground flat on our large grinding disc. This part is especially susceptible to getting warped over time.



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This is as far as I have gotten. I am going to hold off bead blasting and prepping the rest of the parts until I get the honed sector housing back and get it machined for the modern seal. I don't want the rest of the parts sitting around in the