

# Differential Overhaul August 27, 2019

by Tom Endy

Another early 1932 rear axle assembly has arrived for overhaul and the installation of a 354:1 ring and pinion gear set. This one is out of a 1932 model B car with a four-cylinder engine. It is seen here ready for disassembly.



Let the fun begin!



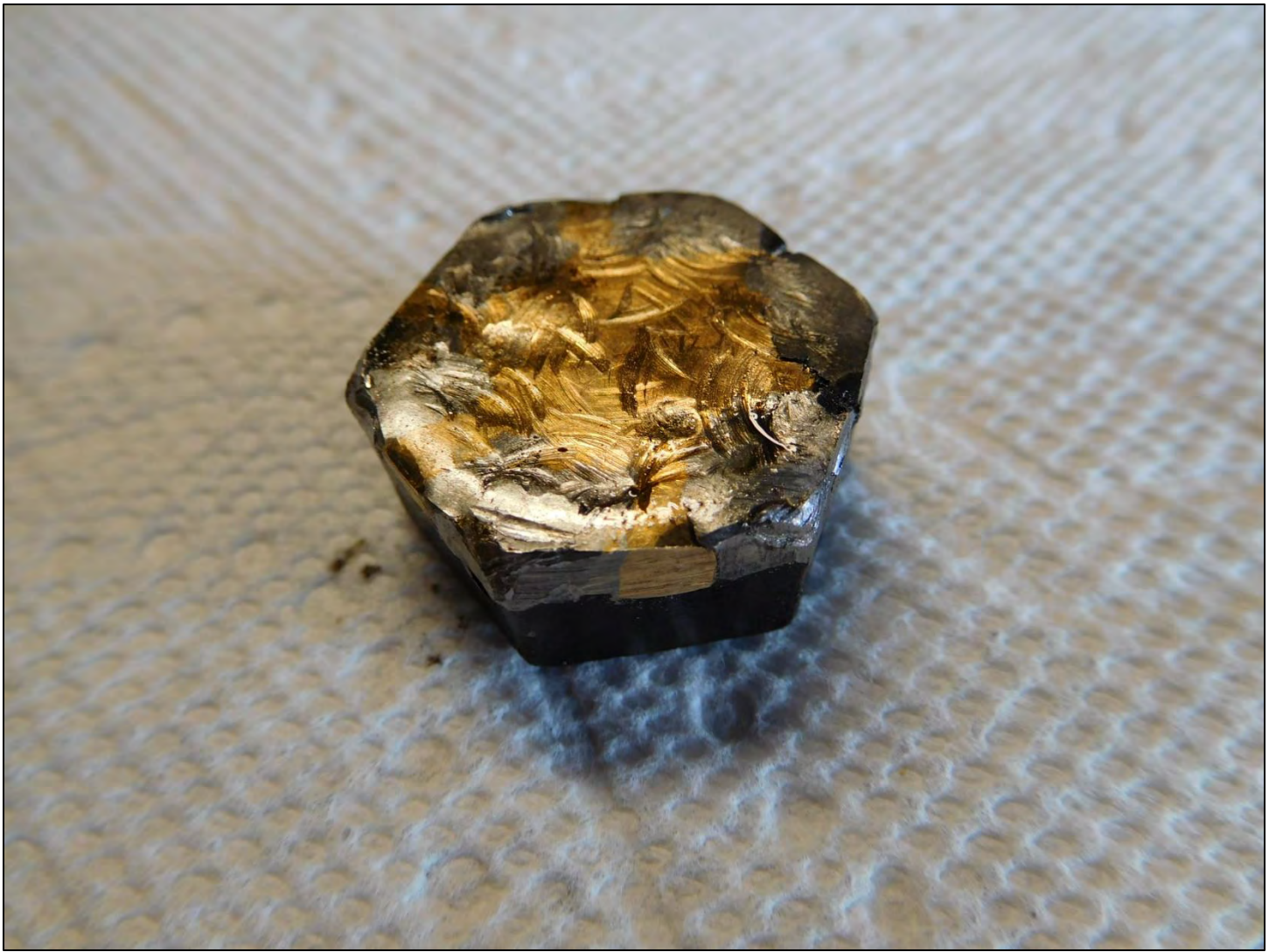
**The ring & pinion found inside was a 411:1 gear ratio; and it showed signs of extensive wear. The two pinion bearings and the double banjo race were in poor condition. The first obstacle discovered was that the nut on the end of the drive shaft had been braised onto the threaded end of the drive shaft and the threads had been cut off short. Shown here is the drive shaft clamped in a vice. Note the end of the drive shaft with the pinion gear assembly still attached. The two large pinion nuts had come loose and backed off and allowed the drive shaft to move back allowing the nut on the end of the drive shaft to come in contact with the rotating carrier. The nut was ground down and mushroomed such that a socket would not fit over it. The hex had to be ground down so that a socket could be hammered on. An impact wrench then spun it off.**



**The nut on the end of the drive shaft is seen here braised onto the end of the drive shaft.**



**Shown here is the inside of the nut after it was removed.**



**Shown here is the outside of the nut after it was removed. Note the braising. Witness marks can be seen where the back side of the nut came in contact with the rotating carrier.**



**Shown here is the threaded end of the drive shaft after the nut and the pinion gear assembly were removed. About half of the threads are missing, along with the hole for the cotter pin. The drive shaft has been compromised and will have to be replaced.**

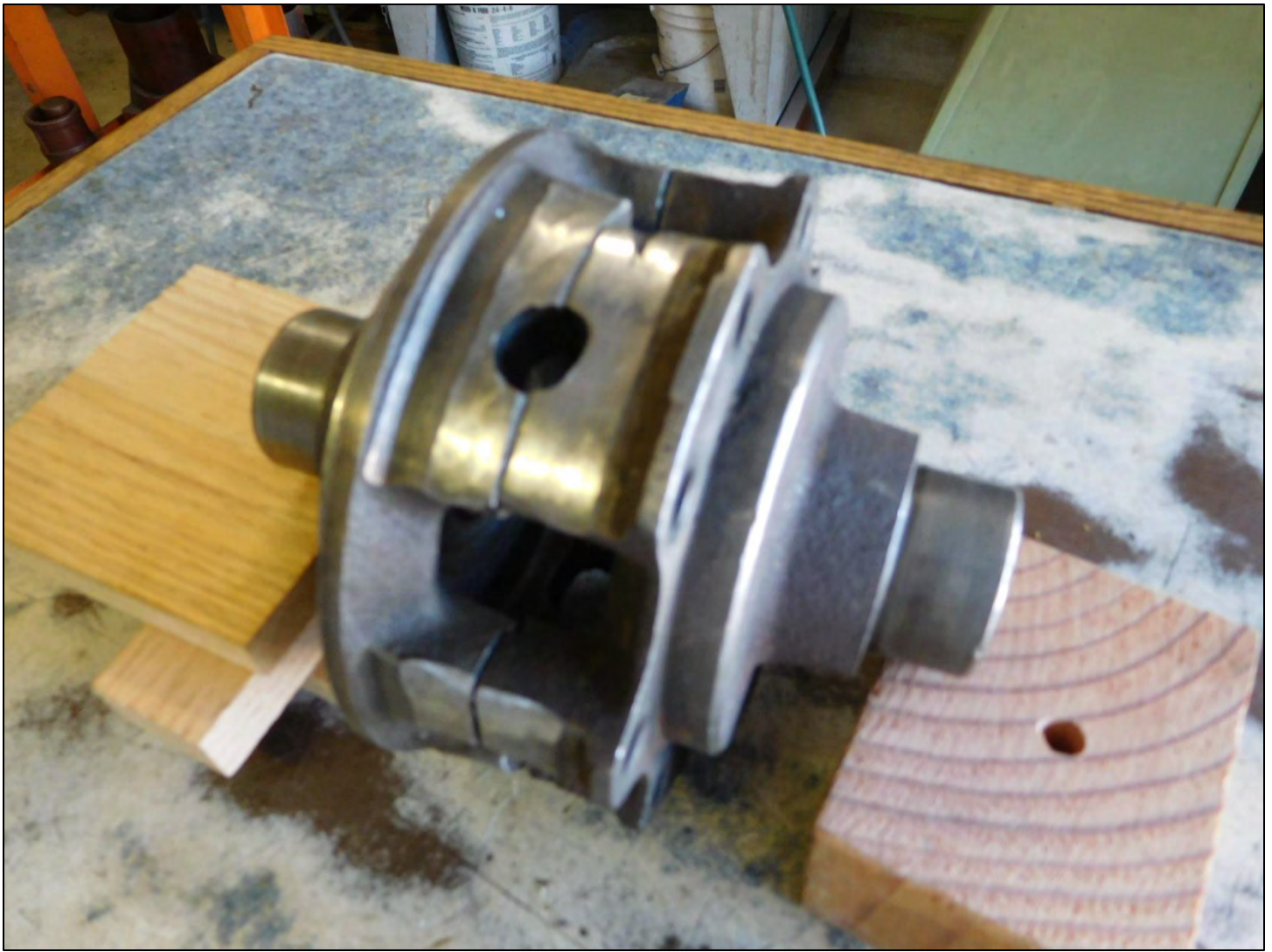


**The two removed axles are shown here. Both have the keys wallowed out and the threads distressed. Both will be replaced.**



**Shown here is the 411:1 ring & pinion that was removed, de-greased, and bead blasted. Note there is wear on the gear surfaces, however, the gear set is still serviceable.**





**Shown here is the carrier that was removed. The bearing mounts were spun and will be exchanged with one that has been knurled. Witness marks can also be seen where the rotating carrier contacted the nut on the end of the drive shaft.**



**The front roller bearing assembly was found devoid of any grease and was shot and will be replaced.**



**This is a close-up photo of one of the banjo mounting bolt holes. A previous mechanic must have discovered the threads striped and as a repair drilled and inserted a Heli-coil. In the process the housing cracked. This mounting hole is located at the bottom of the banjo and the crack is an invitation to an oil leak. The banjo will be replaced.**



**Shown here is the fill plug on the banjo. Someone cut two slots into the threads, probably as an attempt to remove a frozen plug. A definite oil leak. Another reason to discard the banjo.**



**Shown here is the new 354:1 ratio ring & pinion gear set that will be installed. The ring gear is shown installed on a replacement carrier that has had the bearing hubs knurled. New bearings have been pressed onto the hubs.**

**The pinion gear is seen here with a tool installed that will facilitate it being mounted onto a lathe so that the sleeve can be machined. The reason is that this reproduction pinion has not been machined correctly. The sleeve should allow the first bearing to press on with an interference press fit. The second bearing should have a sliding snug fit to accommodate setting the bearing pre-load. There should be a diameter difference of .0015. Most reproduction ring & pinions are not machined correctly, the sleeve is all one dimension, an interference press fit.**

**The ring & pinion gear set was manufactured in Italy.**



**Shown here is the first pinion bearing being pressed onto the sleeve. The sleeve had to be machined because the area for the second bearing was an incorrect diameter that would have been an interference fit that would have made setting the pinion bearing pre-load difficult.**



**Shown here is a new double race being pressed into the replacement banjo. The banjo should never be set with the bottom on the press platform as the force of the press would distort it. The manner shown above is how the race should be pressed in.**



**The torque tube has been cleaned up? The front end was put in the bead blaster to remove the rust and crud from the bell and the U-joint housing.**





**The U-joint housing design on a 1932 rear axle assembly was not one of Henry's better ideas. The housing is one piece and was installed before the bell was welded on. It cannot be removed and makes it difficult to clean and restore. The bead blasting cleaned it up and it will be painted in place.**



**A new grease seal was driven into place. It must be installed before the bearing race is installed. Shown here is the race being installed. It is driven into place using the back side of a 36 mm socket.**



**Shown here is the bearing race after it was installed in the front end of the torque tube. The race must be seated correctly with a notch in the race seated into a dimple in the torque tube. There should be no gap around the outside diameter of the race against the inner wall of the torque tube. An incorrectly seated race will prevent the installation of the roller bearing.**



**Shown here are the two axle housings after they were degreased and bead blasted. The decision was made to bead blast them due their rusted condition. New seals, bearing races, and shackle bushings are about to be installed.**

**1932 axle housings should not be reversed left to right because the spring perch on each housing would then be toward the front instead of the rear.**

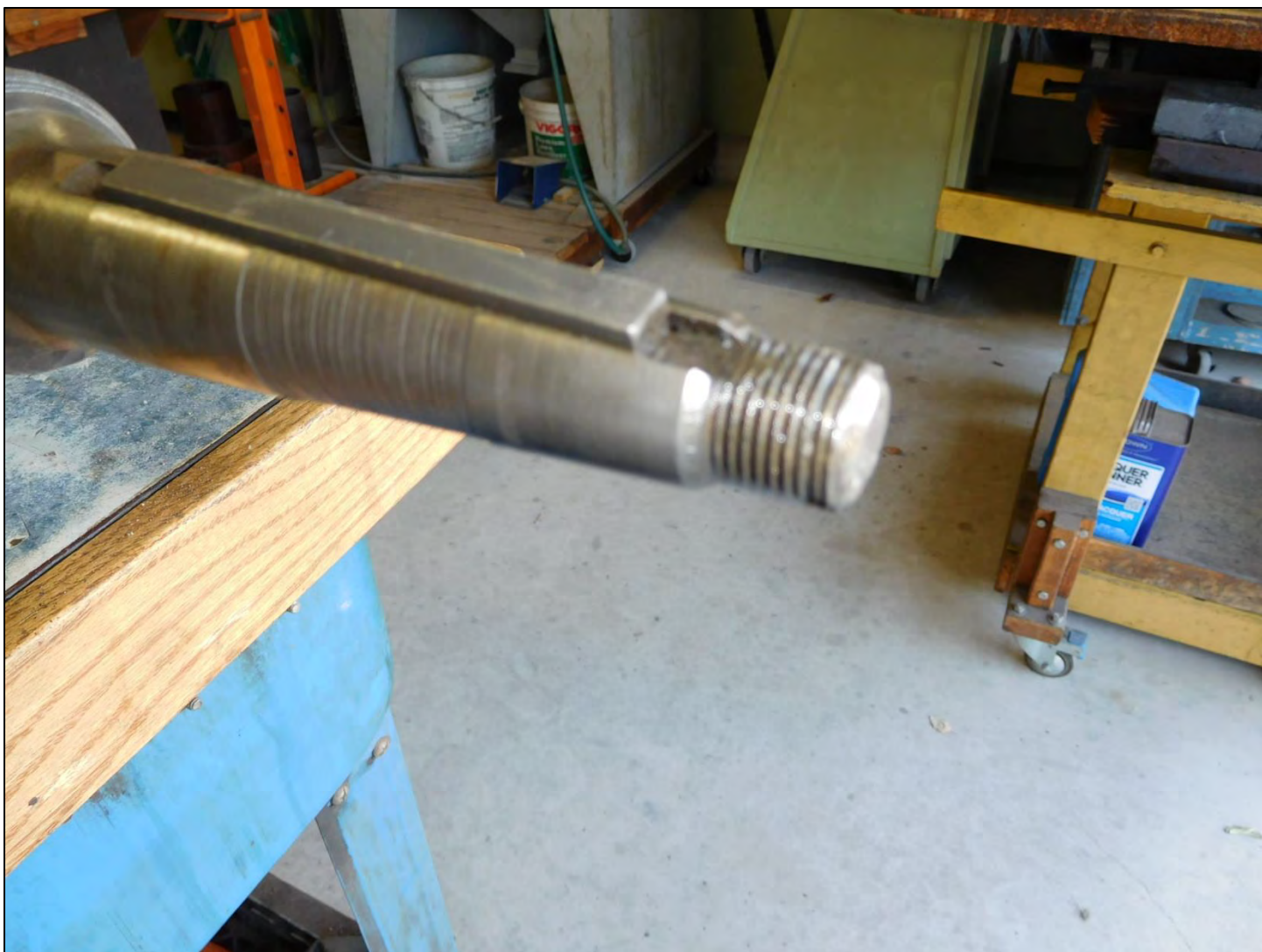


**Shown here are the axle housings assembled to the replacement banjo. The carrier assembly is inside and the carrier bearing pre-load has been set by installing the proper amount and thickness of banjo gaskets.**

**The project is at a standstill until a replacement early 1932 drive shaft can be located.**



**The replacement early 1932 driveshaft has arrived and is in excellent condition.**



**The threaded end of the drive shaft is in excellent condition.**



**The bearing race surface and spline of the drive shaft are in excellent condition.**





**The two replacement axles have been installed in the carrier assembly and it is being safety wired.**



**The pinion gear has been installed on the end of the replacement drive shaft and is shown installed in the banjo. The cotter pin has been installed and the legs have been bent down along the side of the nut.**



**The banjo with the right axle housing, drive shaft, and pinion assembly installed is ready to accept the carrier assembly with the axles installed.**



**Shown here is Bryan installing the carrier assembly into the right side of the banjo, this will put the ring gear on the left side.**

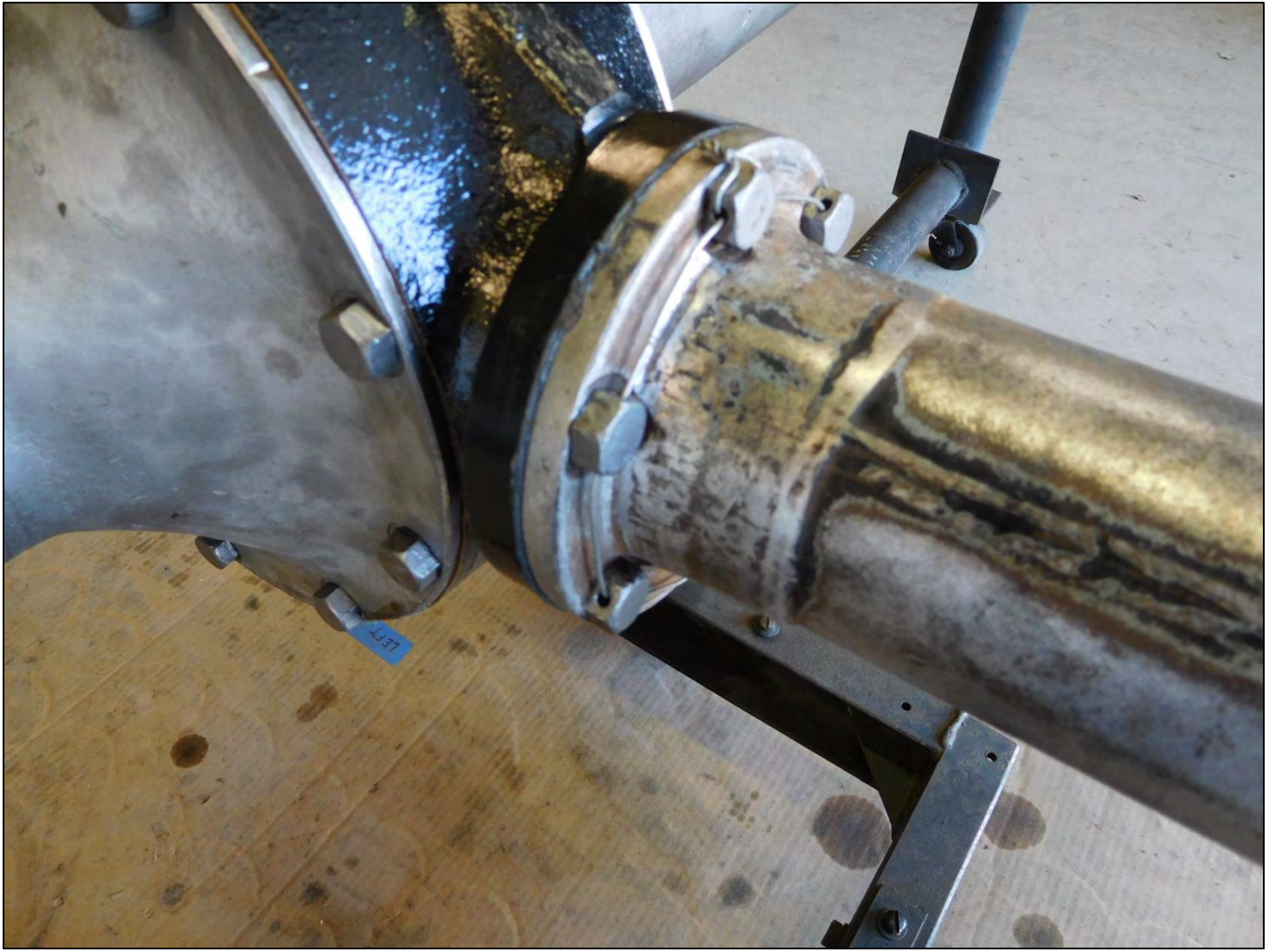
**The ring gear must be installed such that it is on the left. It is possible to install it on the right; however, you will then have one speed forward and three in reverse.**



**The rear axle assembly is fully assembled minus the torque tube. The backlash has been set by adjusting banjo gaskets right and left.**



**The assembled rear axle assembly has been moved to the roll around cradle and the torque tube has been installed.**



**The torque tube bolts have been torqued and safety wired.**



**New shackle bushings have been installed.**





**The finished product.**

**Don't forget to put oil in the banjo.**

