

1928 Differential Rebuild, May 2016

by Tom Endy

This 1928 rear axle assembly was removed from a 1929 roadster pick up for rebuild; the owner is a member of the Santa Anita A's. A complete disassembly took place while the owner was present.



Internal parts have been cleaned up and bead blasted: Ring & Pinion, both carrier halves, spider gear assembly, nine carrier bolts & nuts, 20 banjo bolts, 6 torque tube bolts, pinion nut assembly, drive shaft nut, speedo drive gear, with thrust washer, front roller bearing race, banjo drain & Fill plugs. Snap ring and thrust washer were missing. Four new bearings, two new axle housing races, and one double banjo race will be installed during the rebuild process, all made by Timken. Three new axle and drive shaft seals will be installed. New shackle bushings will be installed in both axle housings.



New parts are used in every rebuild consisting of four bearings (two carrier, and two pinion), two axle housing races, one double banjo race, three axle drive shaft\axle grease seals, two shackle bushings, a torque tube flange gasket, and a speedo housing gasket. A number of banjo gaskets are used in the assembly and are determined by pre-load requirements.



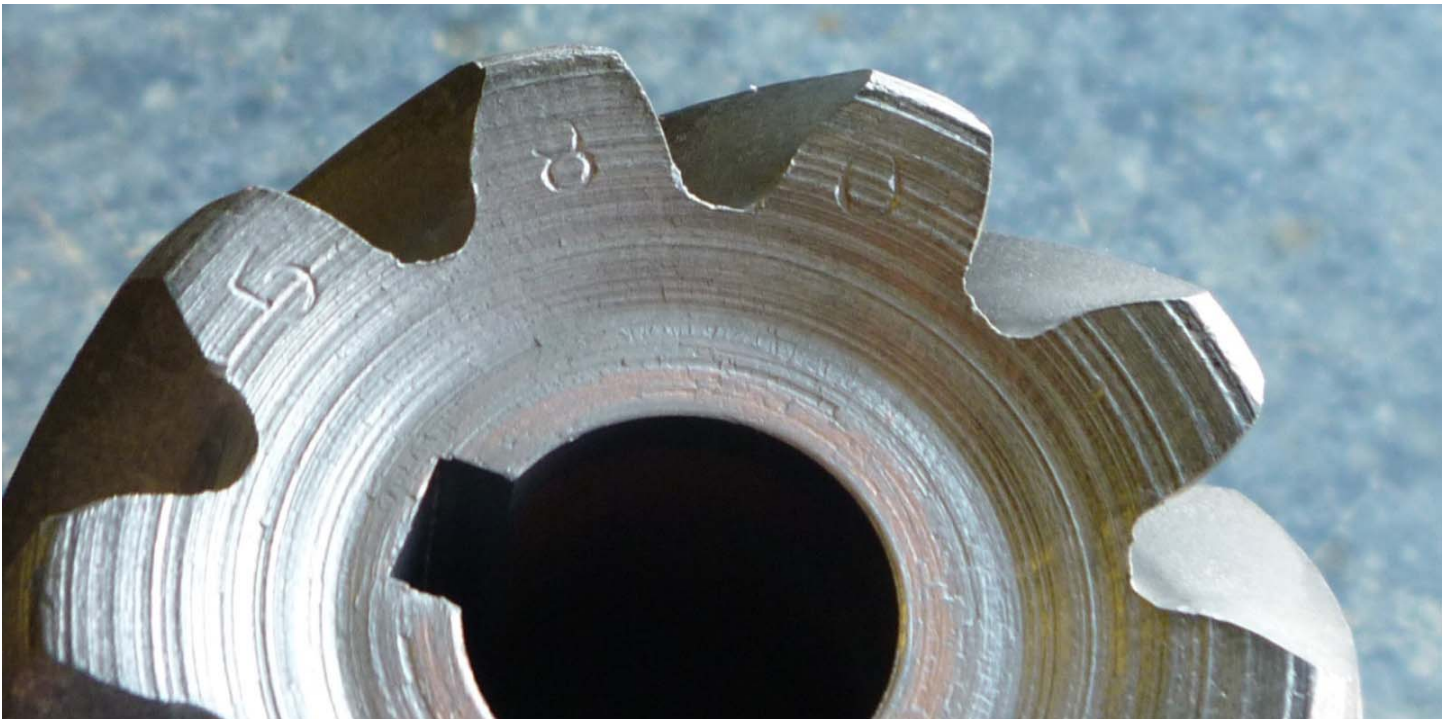
The original banjo was a 1928 without support gussets. These early banjos are prone to crack at the four bolt holes nearest the torque tube flange, which was the case with this banjo. It is prudent to replace these early banjos with a 29-30 banjo unless the car is being restored for blue ribbon judging.



Note the four cracks across the rails at each of the four bolt holes closest to the torque tube flange. The banjo has been replaced with a 1928-1930 banjo that has support gussets



The carrier assembly with the ring gear installed. Both bearings are installed and the pre-load tool is inside the carrier. The pinion gear has a new rear bearing installed. A replacement banjo has a new double race installed.



The 378 ring & pinion found in this rear axle assembly was an original, but did not have matching numbers. The ring gear number is 878; the pinion gear number is 580. It was common practice at the Ford factory to pull a numbered pinion gear from stock and write this number with a vibrator tool on the back side of a ring gear pulled from stock. After a few hundred miles the gears would have lapped themselves into a matched set.

Apparently sometime in the history of the car the ring or the pinion was replaced, for whatever reason, with a part from another car. Since this assembly came from a running car the gears should have lapped themselves into a matched set during the time it was driven and should be perfectly serviceable.



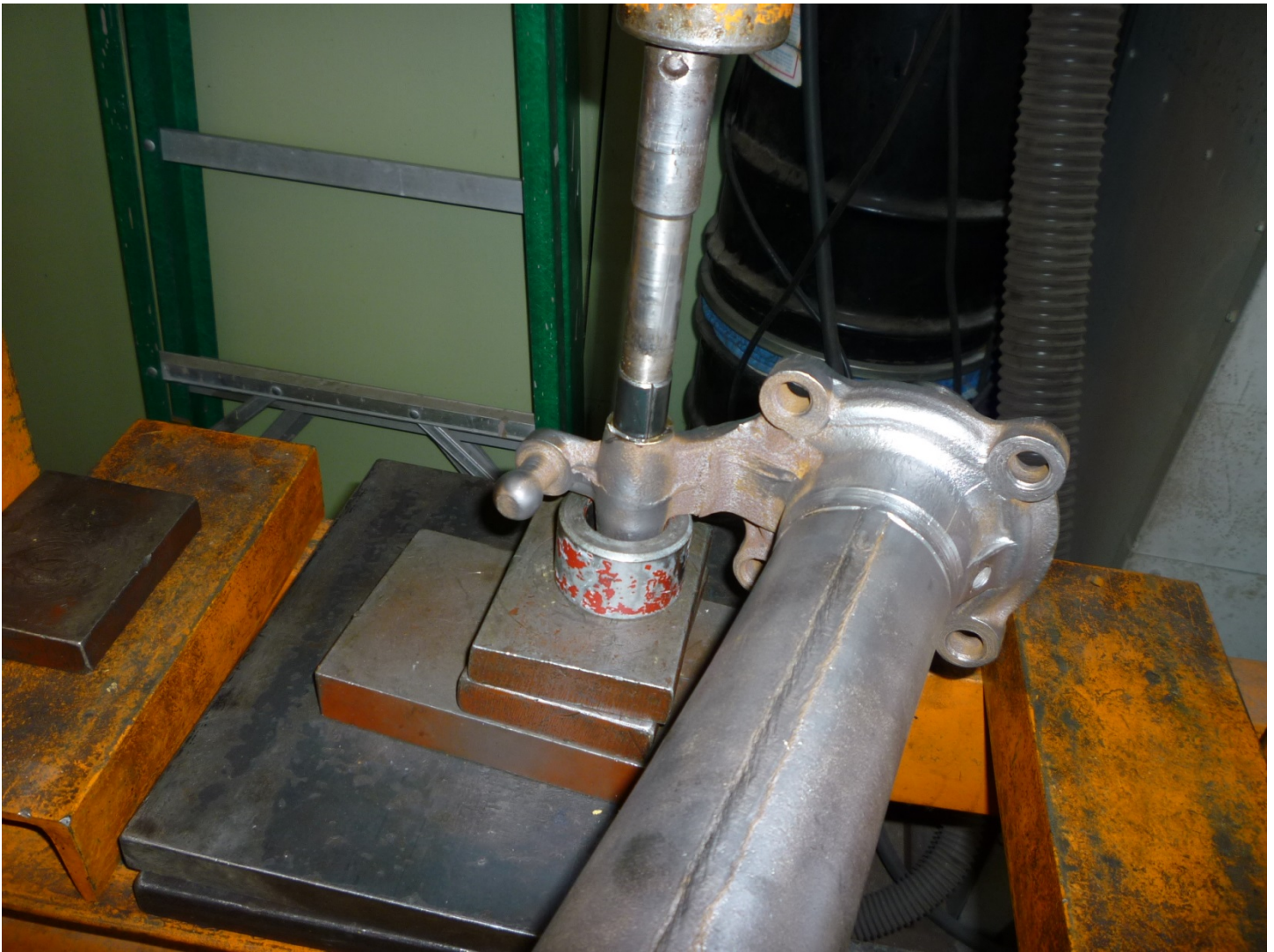
An axle housing bearing race is installed using a vintage K. R. Wilson press-in tool



A dental mirror is used to make sure the bearing race is fully seated against the stop in the axle housing all the way around.



A new axle housing grease seal is driven into place using an insertion tool and a hammer. The original Ford leather seals installed at the factory were found inside each axle housing and in the torque tube. The leather was totally deteriorated. Original seals will have the letters CR stamped on them. It stands for Chicago Rawhide.



A new axle housing shackle bushing is pressed into place using a shop press and an insertion tool.



The two axle housings have been de-greased, and wire wheeled to remove surface rust. Axle housing bearing races and grease seals have been installed in both axle housings. The ring gear has been installed on the carrier along with both bearings. The pre-load tool has been placed inside the two carrier halves. A new double bearing race has been installed in a 29-30 banjo. The housing pieces have been marked left and right for easy reference when doing the carrier pre-load adjustment, which will require numerous trial and error assembly efforts.



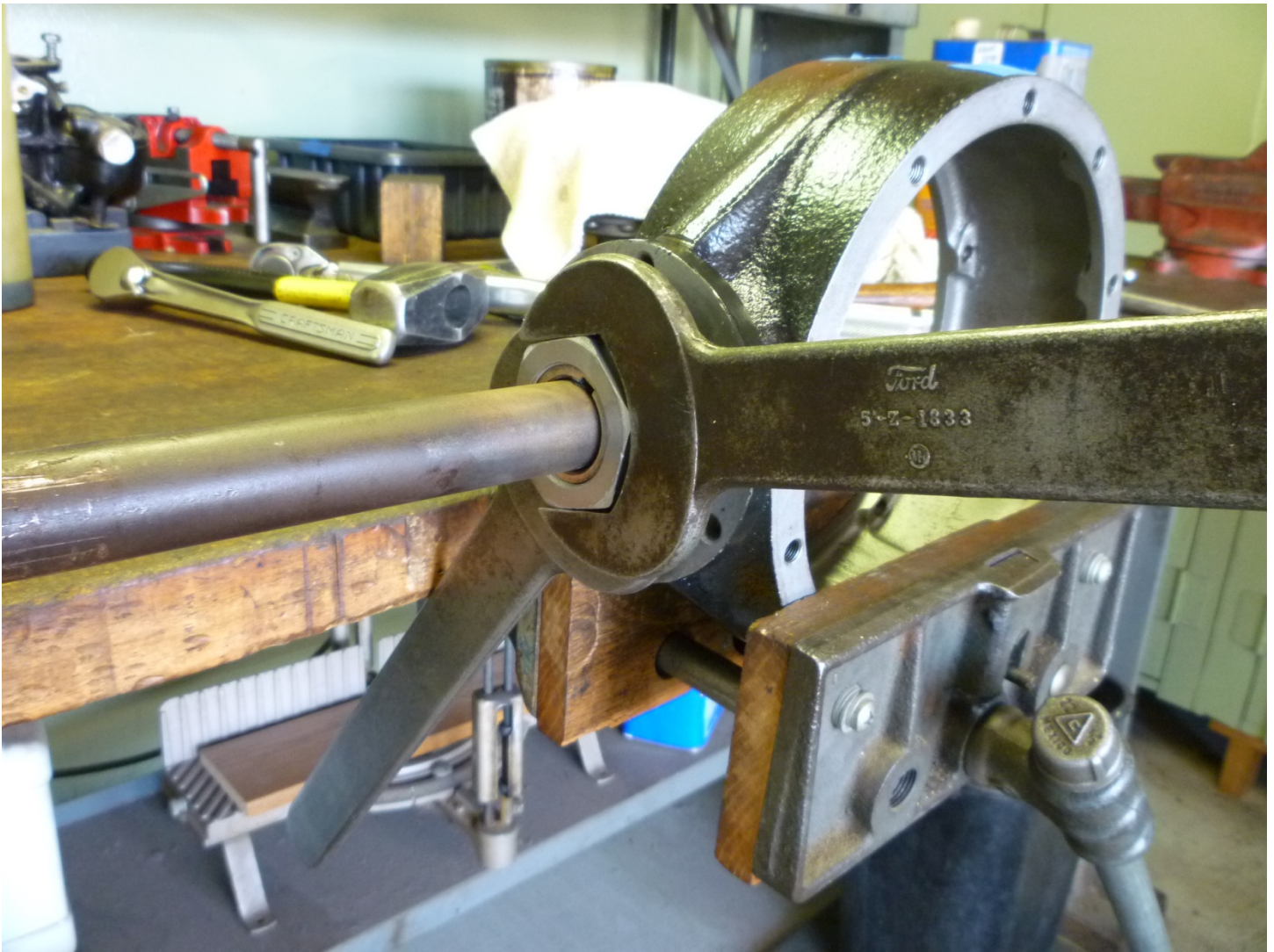
The banjo has been attached to the right axle housing and torqued to 35 ft. lbs. The carrier assembly is set in place in the banjo and several banjo gaskets are placed on the left side of the banjo and secured with 3/8-18 positioning studs. The left axle housing will be placed down over the studs and replaced with banjo bolts and torqued to 35 ft. lbs. This will be the first trial and error attempt to determine how many gaskets will be required to establish the proper pre-load.



After a number of trial and error attempts the pre-load was set and was determined to require three .010 banjo gaskets to establish pre-load which in this case came to 14-16 in. lbs. pre-load. The three gaskets will be installed on both the left and the right side of the banjo during final assembly. Their individual placement left and right will determine backlash.



The pinion assembly has been installed along with the drive shaft. The drive shaft is torqued to nominal 100 ft. lbs. The pre-load on the pinion bearings is established by adjusting the two large nuts on the pinion gear sleeve.



Ford factory wrenches are used on the two large nuts. The rear nut is tightened to establish pre-load, the front nut locks the first nut. The pre-load on this unit was set at 15 in. lbs.



The carrier has the spider gears and both axles installed. The nine bolts and nuts are torqued to 35 ft. lbs. and safety wired. This carrier is an early one with the nuts on the ring gear side and dome headed bolts locking in place on the other side. The later carriers are different with the rectangular head of the bolts resting on the ring gear.



The backlash has been set. It was determined that two of the .010 gaskets are installed on the right side of the banjo. A single .010 gasket is installed on the left side of the banjo. The three .010 gaskets were previously determined to set the carrier pre-load. The final assembly is taking place with gasket sealer applied to both sides of the three gaskets.

Indian Head gasket sealer works well on banjo gaskets. It does not affect the pre-load and it seals the banjo bolt threads.

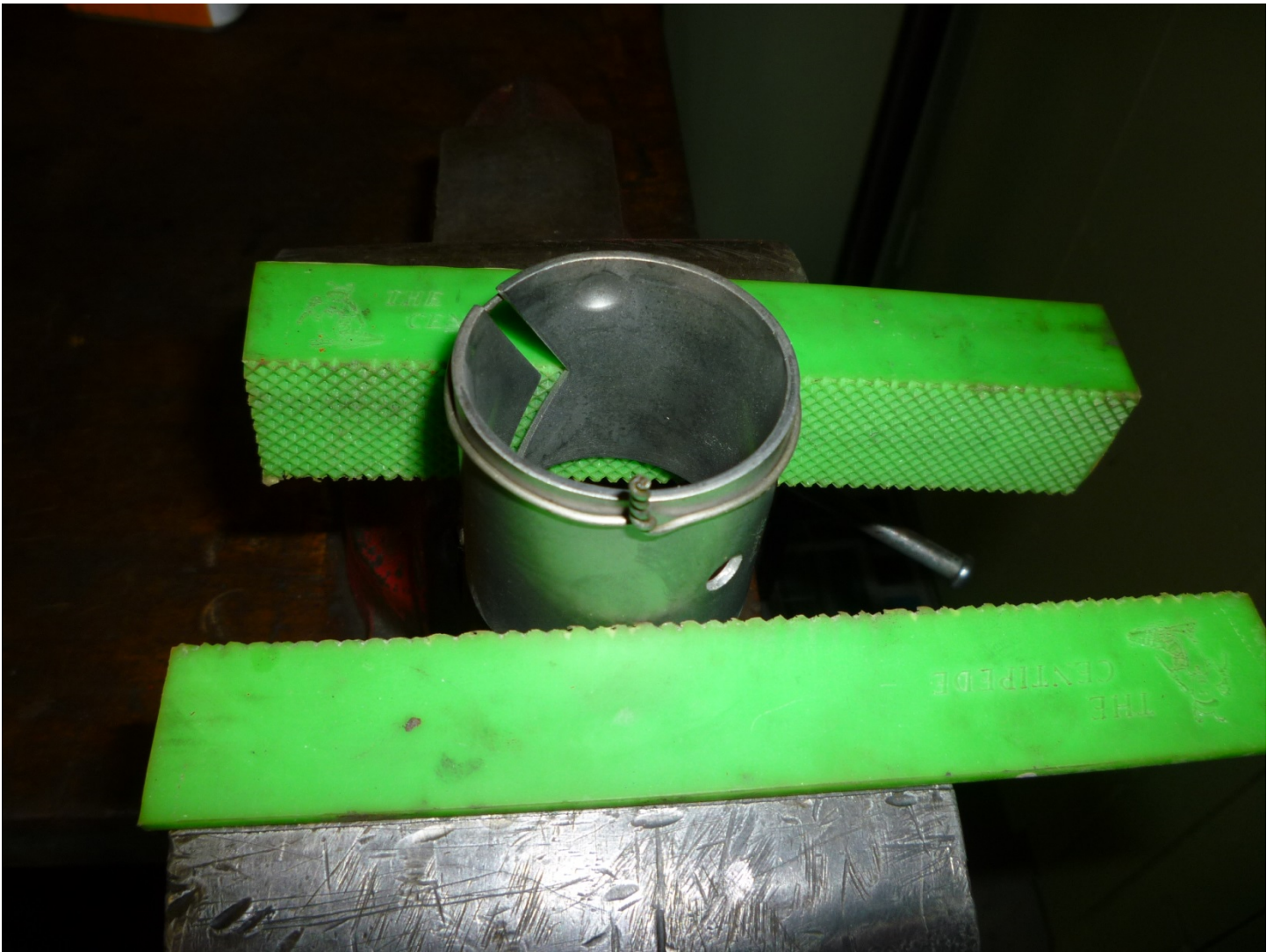




The torque tube has been cleaned up and wire wheeled to remove surface rust. The roller bearing race sleeve and the old grease seal have been removed.



A new grease seal is driven into place with an insertion tool. The seal must be installed first before the bearing race sleeve is installed.



The roller bearing race sleeve is prepared for installation by squeezing it in a vice and wrapping it with safety wire to slightly reduce the circumference.



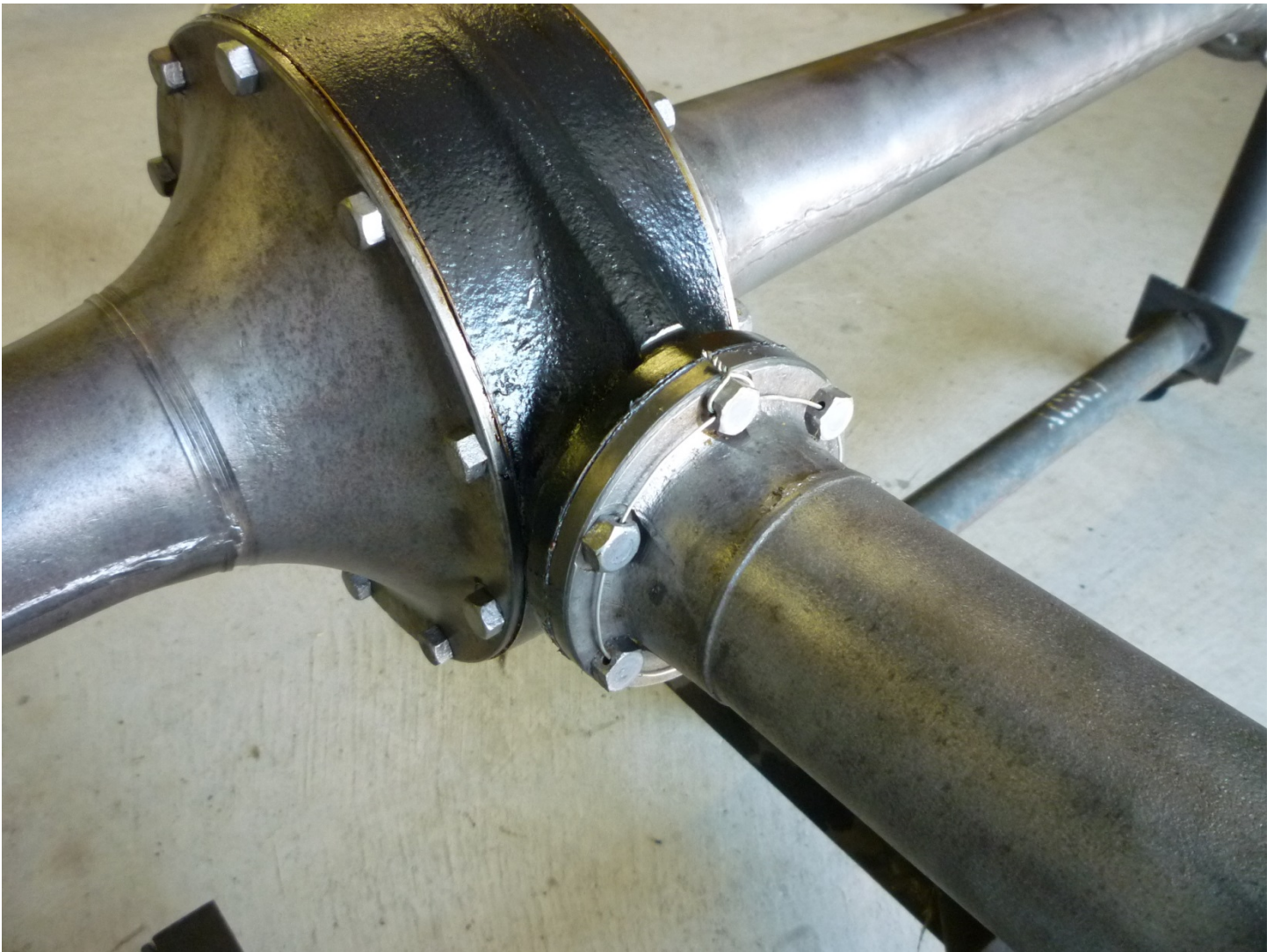
The roller bearing race sleeve is driven into place with the flat side of a 36mm socket. It is important that the race seat around the inner circumference of the torque tube with the dimple in the recess. The race must fit into place properly or the bearing and drive shaft will not be able to install. The safety wire will exit as the sleeve is seated.



The rear axle assembly has been removed from the vertical jig and placed in the roll around cradle and is ready to have the torque tube installed.



The assembly is complete and has been removed from the vertical assembly jig and placed in the roll around jig where the torque tube was installed. It will next be masked off and painted.



The torque tube bolts are torqued to 35 ft. lbs. and safety wired. The axle housings for a 1928 rear axle assembly have the weld seams on the side and should be oriented such that they face forward.



The fully assembled rear axle assembly has been masked off for painting. The bell end that attaches to the U-joint housing is masked. The area where the two rear backing plates bolt up to the axle housings is also masked. The ball perch for the shocks is masked. Paper toweling has been stuffed into the shackle bushings, and threaded stock has been inserted into the grease fittings for the rear wheel bearings. A length of threaded stock has been inserted into the bolt hole for the rear radius rods. This will allow the assembly to be lifted off the cradle at the front and rested on a jack stand so that both the top and the underside can be painted at the same time by pivoting the assembly at the rear of the stand.



The rear axle assembly is painted and ready for return to the customer. Note the tag attached: “no oil in banjo”. Best to leave it in place until the assembly has been oil serviced.

