Differential Rebuild 1932 V8 Ford June 2, 2019

by Tom Endy

This job came into the shop for the purpose of having the ring & Pinion gear ratio changed from what ever found to a 354:1 ratio. The owner supplied a new gear set. The unit came out of a 1932 Tudor with a V8 engine. The early 1932's are similar to a Model A rear axle assembly; however, there are several differences. This will be a complete overhaul with new bearings, races, seals, and gaskets.

The rear axle assembly has had all the bolts removed from the torque tube and both sides of the banjo. Note some of the differences from a Model A.

The torque tube and drive shaft is longer to accommodate a longer wheel base on the 1932 Fords. The U-joint housing is one piece. It was installed before the bell end of the torque tube was welded on, so there is no removing it, The two spring perches are much larger,

A show stopper:

Shown here is the speedo drive gear that slides onto the splined drive shaft at the front of the torque tube. Any that I have ever seen on a Model A just slide right off. This one does not, it is somehow jammed onto the drive shaft, probably rusted there as I did find water inside the banjo. A hammer and a chisel did not dislodge it. It will be a challenge getting it off.

Shown here is the U-joint housing that is one piece and does not come off. Note a grease fitting is located on the housing for greasing the U-joint, the speedo drive gear, and the front roller bearing. On a Model A the grease fitting is located on the transmission rear bearing retainer. The housing has only four mounting bolt holes, the Model A has six.

Note the circular attachment to the right of the U-joint housing, this is where the front of the radius rods bolt on.

Both axle housings have been removed and will have the seals knocked out. New ones will be installed. After they have been cleaned up both carrier bearing races will be removed and new ones installed. The large spring perches are clearly seen here.

Note the two-hole brackets welded to the side of the housings. This is where the rear of the radius rods attach instead of to the backing plate mounting bolt holes as in a Model A.

Shown here are the three grease seals that were removed from the unit. The one on the left came out of the front of the torque tube. It is the original that was installed at the factory. The two on the right came out of the two axle housings, they are also the originals that were installed at the factory, both came apart during the removal process. In all three cases the leather portion of the seals had deetiolated years ago, there was no sign of any remaining leather.

Stamped on all three seals was the letters J&K, I have no idea what this stands for. The original Model A seals had the letters CR stamped on them that stood for Chicago Rawhide. The seals used in the 1932 cars are the same as those used in the Model A.

Shown here is the unit with both axle housings removed and the torque tube and banjo ready to be lifted off. Because the speedo drive gear is frozen to the drive shaft it was not possible to pull the torque tube off as part of the disassembly process. The drive shaft and the pinion gear cannot be removed until the issue with the jammed speedo drive gear is resolved.

Shown here is a close up of the carrier assembly. It is ready for disassembly.

It was determined that the ring & pinion gear ratio was 433:1 (39\9), which was apparently common to the 1932's. Both were in very good condition. This is considered a low gear ratio The Model A did not use this ratio.

The Model A ring & pinion ratios were:

370:1 37\10 (ring & pinion tooth count) used only in the early 1928 cars.

378:1 34\9 This was the standard ratio used in most cars.

411:1 37\9 This was used in pick-up trucks, station wagons, and some town sedans. (low gearing)

354:1 (39\11) This was an early-on after market choice after the roads in the US were improved. (high gearing)

327:1 (36\11) This is a much later after market choice and is very high geared and is generally used in Model A's with high performance engines.

Shown here is the torque tube and banjo with the drive shaft and pinion gear still inside. The trick now is how to get the speedo dive gear off the drive shaft. Until that happens the assembly cannot come apart.

After about four hours of effort, which included multiple heating's of the speedo drive gear that was frozen to the drive shaft, a Dremel was used to cut away a portion of the gear, and after much coaxing I was able to drive the gear off the shaft.

The photo shows the destroyed speedo drive gear and a serviceable one that will be used as a replacement.

The front roller bearing and race were found to be in terrible condition. They both were very badly pitted.

The new 354:1 ring & pinion gear set supplied by the owner is shown here. There are 39 teeth on the ring gear and 11 teeth on the pinion gear.

Unfortunately, the gear set comes from a poor-quality supplier that does not understand the need for the sleeve on the pinion gear to be machined such that there are two different dimensions. The dimension closest to the pinion gear where the first bearing resides should be .0015” larger in diameter than where the second bearing resides. The first bearing should press on with an interference press fit, the second bearing should be a snug sliding fit to accommodate setting the pre-load. The pinion sleeve will have to be machined before it can be installed.

Shown here is the carrier after it has been cleaned up and bead blasted. It was found to be in excellent condition with little or no wear on the inside and the bearing hubs were not damaged due to the bearings spinning from being set up too tight. It is believed that this is the first time this rear axle assembly has been apart because the carrier bearings were found to be the originals with the Ford logo and the original part number on them.

The nine carrier bolts were bead blasted and wire wheeled. The spider gear assembly was also bead blasted. The new 354:1 ring & pinion gear set is shown here. The three new bearings shown here will have two installed on the carrier and one installed on the pinion gear after it has been machined.

Shown here is the carrier that has been assembled with the new 354:1 ring gear and the nine carrier bolts, which have been torqued to 35 ft. lbs. The two new bearings have been pressed on using a shop press. Inside the carrier assembly is the pre-load tool that has been temporarily installed in place of the spider gears to facilitate the carrier bearing pre-load adjustment.

Another show stopper:

Once the torque tube was removed after the removal of the frozen speedo drive gear it was discovered that the drive shaft was found to be a 1&3/4" diameter hollow tube welded over a smaller solid drive shaft. Apparently this is particular to the 1932 V8's. This prevents the two large nuts, lock and thrust washers, and the front pinion bearing from being slid off over the drive shaft and then the drive shaft with the pinion gear on it from being pushed out the side of the banjo.

In order to take this assembly apart the entire pinion assembly, including the double race, will have to be pulled from the banjo. However, because of the large diameter of the drive shaft my Model A pinion puller will not fit the shaft. Some other method will have to be improvised.

The improvised method:

The rear plate of the Model A pinion puller was used in conjunction with a commercial bearing puller. The bearing puller was placed in the recess in the area where the large tube is welded to the end of the drive shaft and used as a locked in place device on the drive shaft. The two bolts shown in a vertical position were run in to pull the pinion bearing assembly out. Once it was out it was an easy task to remove the pinion gear from the drive shaft and disassemble the pinion bearing assembly.

Once the pinion bearing assembly was removed from the end of the drive shaft it was cleaned up and bead blasted and is ready to accept the new pinion gear and bearing assembly.

Shown here is the front end of the drive shaft. A hollow tube is installed over the smaller diameter drive shaft and welded into place. The splined end will connect to a U-joint the same as a Model A.

Shown here is the 1932 V8 drive shaft. A hollow tube was welded over the driveshaft to give it stability. Both ends have been bead blasted to clean them up.

The drive shaft and torque tube are about three inches longer than a Model A to accommodate the longer wheel base on the 1932's.

Shown here is the banjo after it was de-greased and bead blasted. A new pinion gear bearing double race is being pressed into place.

Shown here is the ring & pinion gearset that was removed from the 1932 rear axle assembly after it was de-greased and bead blasted. The gear ratio is 433:1 (39 teeth on the ring gear, 9 on the pinion gear). The gear set is in excellent condition; however, it is of little value as the gear ratio is too low for today's modern roads.

The numbers seen here stamped on the side of the banjo (939) apparently stand for the number of teeth on the ring and the pinion gears. Nine on the pinion gear, thirty-nine on the ring gear, a 433:1 gear ratio.

Shown here is the torque tube after it was cleaned up and sanded down with an orbital sander. Note the U-joint housing on the right end, it is captured there by virtue of the manufacturing process. It cannot be removed. To the left is a bracket welded to the torque tube to attach the front of the two radius rods.

The torque tube is three inches longer than a Model A.

A close up of the bracket that the two radius rods bolt to.

Shown here is a new seal and a new roller bearing race installed in the front of the torque tube. The seal must be driven into place first before the race can be installed.

Another show stopper:

When it was time to install the new grease seals in the two axle housings it became apparent that both would not install. A closer inspection revealed that the outboard portion of both seals were still jammed into the two axle housings. The trick was to get them out. There was not much to grab onto with a screwdriver to drive them out. After much coaxing, the seal potions were driven down about 1\8". A combination screwdriver residing in my tool box became the tool to drive then out the rest of the way.

Shown here is the combination screwdriver that was used to drive out the remnant portions of the seals, seen at left. The portion of the combination screwdriver at the top, left was used to insert into the1\8” space that was created and both seal remnants were driven out.

New seals were then installed.

After both axle housings were cleaned up and sanded down with an orbital sander the new carrier bearing races were removed and new races were installed. Both removed races had the Ford logo and early part number on them, further indication that this rear axle housing had never been apart since delivered from the Ford factory.

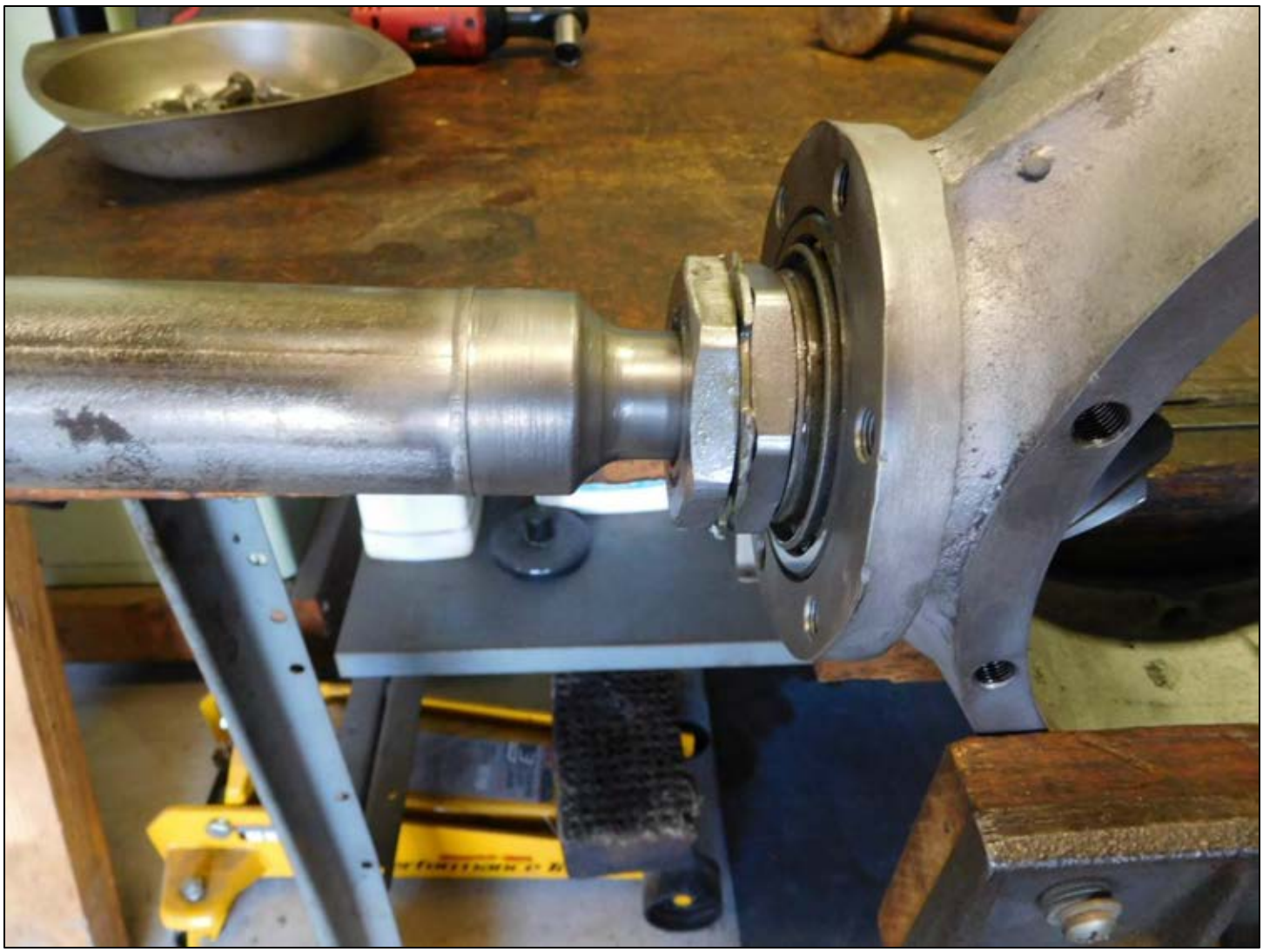
Shown here is the rear axle housings assembled with the carrier assembly inside. The carrier bearing pre-load was established at 18-inch pounds by using three .010 banjo gaskets.

The new 354:1 pinion gear shown here has had the sleeve machined so that the front bearing is not an interference press fit, but a sliding snug fit. During the machining process it was discovered that the gear did not run true when attached to the tool that allows it to be mounted on a lathe. The run-out was off by about .002”. Hopefully this will not affect the backlash adjustment.

This gearset came from one of the more notorious poor-quality suppliers. My recommendation is to purchase new ring & pinion gearsets from Bratton’s Antique Auto.

The photo shows the rear bearing being pressed onto the pinion gear using a shop press. The rear bearing should and does press on with an interference press fit.

The pinion gear with the rear bearing installed has been inserted into the banjo, the second bearing was then installed, along with the two large nuts, the thrust washer, and the locking washer. The drive shaft will be installed next and the 5\16" hex nut will be torqued to a nominal 100 ft. lbs. before the pinion bearing pre-load is established by the adjustment of the two large nuts.



The drive shaft has been inserted into the pinion gear sleeve.

The hex nut has been torqued to a nominal 100 ft. lbs., and a cotter pin inserted. Note the legs of the cotter pin are bent down along side of the nut and not across the end of the shaft. This is because there is little clearance between the end of the drive shaft and the rotating carrier.

Shown here is the pinion bearing pre-load being established. The rear nut is adjusted for the 20-inch pound pre-load, the front nut locks the second nut into place. Ford factory wrenched are shown being used here. They are long to provide leverage. The Ford service bulletins say to use a hammer on the handle portion of the wrench to insure they are extremely tight together.

Shown here is the pinion gear assembly and the drive shaft assembled into the banjo. The next step is to install the two axle housings and adjust the backlash between the pinon and ring gears. This will be done by distributing the quantity of banjo gaskets that were previously selected to establish the pre-load on the carrier bearings.

T

The two rear axle shafts were found to be in good serviceable condition and were cleaned up. Shown here they are ready for installation. They are the same as used in a Model A.

The backlash was set by installing two of the .010 gaskets on the right side of the banjo and one .010 on the left side. The two axle shafts and the spider gears were installed and the housings were then bolted together using Indian Head gasket sealer on the banjo gaskets. The unit was then moved from the vertical jig to the roll-around cradle. It is shown here ready for the torque tube to be installed over the drive shaft.

Indian Head gasket sealer was used on the banjo gaskets:

Shown here is Bryan installing the six bolts that secure the torque tube to the banjo flange. This is a trial an error effort to have each bolt sufficiently tight with the safety wire hole parallel to allow the safety wire to install in a perfect circle. This is made possible by having a large collection of original torque tube bolts.

The torque tube bolts have been securely tightened and safety wired in a hallmark perfect circle.

The rear axle assembly is complete, the next task is to mask off the machined surfaces and paint it.

Note that on a 1932 rear axle assembly the mounting to the speedo drive gear is off-set from the bottom center line of the torque tube to the right about 20 degrees.

Note that on a 1932 rear axle assembly the two spring perches are set back from the centerline of the axle housings by five inches.

The finished 1932 rear axle assembly, ready for installation back in the car:

Don’t forget to put oil in the banjo: