

Model A Ford Carrier Bearing Preload Tool

By Tom Endy

Bearing preload requirements:

There are four tapered roller bearings used in the Model A Ford differential. All four are the same part number (A4221). Two are used with the pinion section and two are used with the carrier section. The word preload is used to describe the amount of side pressure that is applied to the bearing against the mating race. The preload pressure can be manually set for both the pinion and the carrier. The amount of preload has been determined by knowledgeable persons over the years to be 20-inch pounds as read with a dial indicator torque wrench when rotating the pinion or the carrier assembly on its two bearings.

Pinion bearing preload adjustment:

During rebuild of the differential the preload of the pinion gear bearing set is established by adjustment of the two large nuts attached to the pinion gear sleeve. The adjustment of the bottom nut will establish the preload, tightening the top nut will lock it in place. The amount of preload can be read from a dial indicator torque wrench attached to a 1-1/16 inch, six point, 1/2 drive, socket placed over the end of the drive shaft spline. By turning the drive shaft with the torque wrench the value is read directly from the dial. The desired torque value is 20-inch pounds and is achieved by readjusting the bottom pinion nut.

Carrier bearing preload adjustment:

Measuring the preload setting on the carrier bearings has been mostly a case of feel. The ring gear is turned with a finger reached through the opening in the banjo for the pinion gear assembly. By turning the ring gear with a finger, it is the experience of the re-builder that determines when the proper preload has been achieved. The actual preload adjustment is established by the total thickness of banjo gaskets used on both sides of the banjo during the assembly.

A more precise method:

An article written by Dr. Jack Richard in the January/February 1995 publication of *The Restorer* offered a method of measuring the carrier bearing preload by using a pull string and a fish scale. Dr. Richard

mathematically calculated the desired torque value of 20-inch pounds into a weight value read out on the fish scale. The task is to wrap a number of turns of string around the carrier and pass it out through the banjo opening for the pinion gear assembly. A fish scale is attached to the end of the string. As the string is smoothly pulled the value is read out on the fish scale. At the 1998 MAFCA National at Reno, a demonstration was set up on a Model A Ford differential assembly. I had the opportunity to test this method and to turn the ring gear with my finger and compare it with my own acquired sense of feel. Using the string and fish scale method does require some amount of string pulling skill to be able to get an even reading on the fish scale.

The design of a carrier preload tool:

It occurred to me that there must be some way to check the carrier bearing preload by using the dial indicator torque wrench in the same manner as the pinion gear bearing preload is checked. The solution was so simple I'm surprised no one ever thought of it before. Thus was born the idea for a new tool.

The tool:

A Model A Ford differential spider yoke, part number A4211, was located and I had a friend bore a hole through the center with it mounted on a lathe. I felt it was important to have the hole perfectly perpendicular to the three gear shafts on the spider yoke. The hole was then tapped for a 3/8-16 thread. A three-foot length of threaded stock was obtained from a local hardware store. I rolled the one I selected on a flat surface to make certain it was perfectly straight. I also purchased three hex nuts. While my friend was standing in front of his lathe I had him make me an aluminum insert plug with a flange on it that would fit snugly into the opening of the axle housing where the axle protrudes out. A hole was drilled in the center of the plug to allow the threaded stock to slide through smoothly. The threaded stock was cut to a length of 31". One end was chamfered and a hex nut was run on about one inch and tack welded in place.

How to use the tool:

Bolt the two differential carrier halves together with the modified spider yoke inside and without the axles and spider gears installed. Proceed in the normal manner to determine by feel the number of banjo gaskets needed to get the bearing pre-load somewhere in the ballpark. When that is achieved insert the chamfered end of the threaded stock down through either axle housing. Screw the end of the stock into the threaded hole in the yoke until it bottoms. Slide the insert plug down over the protruding end of the stock and slip it into the end of the axle housing opening. The purpose of the plug is to align the stock in the center of the housing in line with the hole in the yoke. Screw two hex nuts onto the end of the stock and lock them together. Now it is an easy task to place the socket of a dial indicator torque wrench over the top nut and rotate it in the same manner as is done with the pinion gear bearing preload check. Add or subtract banjo gaskets until you reach the desired reading of 20-inch pounds. The first time I tried out the tool it worked perfectly.

