

The
1928-1931
Model A Ford
Universal Joint Housing Caps—inner and outer
And
Transmission Main Shaft Bearing Retainer
Assemblies
By
Steve C. Plucker
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The following study concerns the 1928-1931 Model A Ford Universal joint housing caps—inner and outer assemblies (and related parts) along with its counter part, the Transmission main shaft bearing retainer.

All the information used in this study was taken directly from the Ford Service Bulletins, the Ford Service Letters, The Ford Parts Price Lists, and the Ford Part Releases which came from the Benson Ford Research Center and Archives in Dearborn, Michigan.

There were three (3) known styles of A-4513, Universal joint housing caps—inner; four (4) known styles of A-4520, Universal joint housing caps—outer assemblies (not to mention all the variations within); and five (5) known styles of A-7085, Transmission main shaft bearing retainers. When used in combination, there were five (5) major types of assemblies for which I have elected to use the Transmission main shaft bearing retainer as the basis for each one.

The initial purpose of the Universal joint housing cap assemblies were two-fold. First they were to guard the Universal Joint Assembly, A-7090, from becoming damaged and to contain the grease for it. The second item was to help stabilize in place the Brake Cross Shaft Assemblies, right and left, for the early service brake system. When the arms were discontinued the assembly was for guarding the Universal joint. All Universal joint housing caps—outer, upper and lower, were machined in pairs and were not serviced individually. They were painted “black”. The inner cap was “unfinished”.

The purpose of the Transmission main shaft bearing retainer was also two-fold. First it served as a retainer for the small rear Transmission main shaft ball bearing, A-7065, in the transmission. Second, it was also used to attach the Universal joint housing caps—inner and outer with six “unfinished” bolts, nuts and cotter keys. The Transmission main shaft bearing retainer was installed upon the completion of the transmission. The transmission was then installed onto the completed engine and clutch prior to the shipment to the various assembly plants to be installed into the chassis at time of assembly of the car or truck. The retainer was painted Ford Engine Green.

Most of the data is represented by the major changes that occurred on the part. These changes are described and will make it easier for the restorer to put the right combination onto whatever vehicle it is they are restoring at a certain point in time.

The dates contained in this study reflect the Ford Part Release dates. Just when the new and updated parts were sent to the final assembly line depends on just where the parts were sent and how much back stock of the previous assembly there was. More than likely the Rouge plant was the first to utilize the new parts and the assembly plants which were further away were later.

At the start of production in October, 1927, Type 1 assembly, had six (6) **equally** spaced bolt holes around the circumference of the assembled parts and was specified for the first 1000 units.

The Transmission main shaft bearing retainer was represented by part number A-7085 and A-7085-A (Fig. 1). The six (6) bolt hole flanges were $\frac{1}{4}$ inch in thickness and referred to as the **thin** type, it had a large center hole and raised “hump like” center areas on all four sides on the outside of the retainer. The grease zerk was on the middle right side of the retainer. These were stamped with the “Ford” script in various spots on the retainer. A good photo of its placement on the back of the transmission can be seen on page 236, Fig. 484 of the March, 1928 Ford Service Bulletin.



Fig. 1

The Universal joint housing cap—inner, represented by part numbers A-4513, A-4513-A, and AA-4513 had no side holes in the bell and the center hole measured 2-5/32 inch diameter.

The Universal joint housing cap—outer assembly, had no known individual part numbers at the time except as a complete assembly, A-4514-C. However to simplify things the upper half was known as A-4518 and the lower half was known as A-4514. There were two (2) known varieties of the “outer” assembly. Variety 1, (Fig. 2) has a safety lug with a raised, pronounced rib going up the center of the lug on the upper half. On the lower half there is a “T” type boss to position the safety lug which was to be welded on but was not. This variety has been confirmed on *A189*, owned by Mr. Charlie Bass, which was stamped on November 2, 1927. Variety 2, (Fig. 3) has the revised safety lug which was half round with no pronounced rib on the upper half. The lower half had a “D” shaped boss to position the safety lug which was to be welded on but was not. This variety has been confirmed on *A1031*, owned by Mr. Steve Ciccalone, which was stamped on December 1, 1927. It is not known when Variety 1 was discontinued or when Variety 2 began. The releases did not say.



Fig. 2



Fig 3

The safety lug, which was part number A-4519, was also called the Universal joint housing cap lug and was welded on to the upper half of the Universal joint housing caps. The word “safety” was used in reference to the lug in several releases.

Both halves had extension arms for the service brake equalizer brake system. Both varieties had 1/4 inch wide oil or grease grooves extending the length of the extended arms on the lower half only. The reinforcement ribs in the corners of the arms on Variety 2 were 1-1/16 inch in height, upper and lower, but were 1-3/16 inch in height on Variety 1 lower and unknown on the upper.

A good example of the lower part of Variety 1 can be found on page 222, Fig. 451 of the February, 1928 Ford Service Bulletin. If you have early copies of the Ford Parts Price List's, the pronounced “rib” can also be seen on the upper half of the outer housing, A-4520.

On November 10, 1927, it was designated by the engineering department under Release # 4447 that a new designed **unequal** spaced Transmission main shaft bearing retainer, A-7085-B, and Universal joint housing cap—inner, A-4513-B, was to be adopted for use after 1000 vehicles. By December 2, 1927, Release # 5440, new outer caps, A-4518 and A-4514, had been adopted. However the “1000 vehicle” designation did not materialize because on this date, it was designated by the release information that the new parts were to be used “after 3400 cars”. What Ford's reason was to change this designation is unknown at this time. But if one were going to use the 3400th engine as the cut off (providing Ford was correlating engines to cars), that would mean then as of December 21, 1927, when the 3401st engine was stamped and assembled at the Rouge, the “new” Type 2 assembly started in the production scheme. I say this because of the way the engine was assembled. When the engine was first assembled, it included the transmission and in order to hold the rear bearing in the transmission, the Transmission main shaft bearing retainer had to be on the transmission when sent to final assembly.

Several people in the hobby have asked several questions concerning the early housings...”Just where are these early housings?”. “Why aren't we seeing more of them?”. Great questions and very legitimate but I do not have an answer to the questions at this time. Do you?

It is quite interesting when studying all the part releases concerning the early development of the Model A. I acquired as much available data from the archives as possible to try and decipher the early stages of development of the Universal joint housing caps and Transmission main shaft bearing retainer that I possibly could. There was not that much information issued by the Ford Engineers to decipher just what was going on with the Type 1 assembly until Type 2 assembly started to take shape starting on November 10, 1927 with new parts. By December 19, 1927, all of the Type 2 assembly parts were in place to be used “after 3400 cars”.

As Type 2 assembly was being worked out, one of the changes that the Ford engineers decided to do different was to change the six (6) bolt hole spacing to an **unequal** spaced assembly. It is not immediately known just why Ford did this. Where the **equal** spaced holes were spaced 2-3/4 inches **equally** around Type 1 assembly, the **unequal** spaced holes, around Type 2 assembly, were spaced **unequally** from the top clockwise around the assembly, 3 inches, 2-1/2 inches, 2-3/4 inches, 2-3/4 inches, 2-1/2 inches, and 3 inches respectively. To achieve this change however, only the upper half bolt hole configuration was changed.

Type 2 assembly parts started being produced in November, 1927 but it was not until December 21, 1927, when the 3401st engine was assembled (providing the “3400 car” designation is correct), that Type 2 assembly parts went into production on the assembly line. This assembly had six (6) **unequal** spaced bolt holes around the circumference of the assembled parts and was specified for use “after 3400” vehicles.

The Transmission main shaft bearing retainer, represented by part number A-7085-B (Fig. 4), still had **thin** flanges, raised “hump like” center areas on all four sides of the retainer and still retained the large center hole. The only major change to this part was that the grease zerk was moved to the right 60 degrees to the bottom of the retainer where it remained throughout production. The “Ford” script is also on early styles of these retainers but was removed after late March, 1928 “for the convenience in exporting”!



Fig. 4

The Universal joint housing cap—inner, represented by part number A-4513-B, had no side holes in the bell and the center hole measured 2-5/32 inch diameter. On March 29, 1928, the hole was increased to 2-9/32 inch diameter, about a 1/8 of an inch increase.

The Universal joint housing cap—outer assembly, represented by part number A-4520 (Fig. 5), finally started to distinguish that the upper half of the assembly was A-4518 and the lower half was A-4514. The upper half, A-4518, still had the half round “D” shaped safety lug which was still being welded onto the part. The corner reinforcement ribs started out at 15/16 inches in height. However on December 30, 1927 they were reduced to 13/16 inches. The lower half, A-4514, also went through some changes. The “D” type boss, which was on Type 1, Variety 2, was removed. The reinforcement ribs changed in height from 1-1/16 inch to ¾ inch in mid December, 1927. Sometime between December, 1927 and February, 1928, the oil or grease grooves on the extended arms were changed from ¼ inch to 1/8 inch in width. However on February 13, 1928, the grooves were changed to 3/16 inch in width.



Fig. 5

Both the upper and lower outer housing caps, Type 1 and Type 2 assemblies, were held together with four (4) 3/8—24 S.A.E. x 1-1/16 inch hex bolts, A-20915; four (4) 3/8—S.A.E. (21/64 x 9/16) hex nuts, A-21741; and four (4) 3/8 (0.401-0.411 3/32 x 21/32) lock washers, A-22245 up through the October 1, 1928 Parts Price List. Starting with Type 3 assembly, only two (2) of each were used. However the hex bolt was represented by 3/8—24 U.S.S. x 1” hex head screw, A-20905. All were “unfinished” except for the nuts which changed to “Zinc Plated” after mid- 1930.

As Ford was revising the service braking system during early and mid 1928, it also meant revising the U-joint housing caps and Transmission main shaft bearing retainer. This led to Type 3 assembly and many changes to the parts involved.

Up to this point, most parts, if not all, were forgings or of Forged Design. But Ford must have had a better idea because about this time the Ford Motor Company started producing parts of the Malleable Iron Design.

In 1930, Mr. Murray Fahnestock, who was known and respected for his writings about Ford technical data, wrote a book called “Know the Ford”. One of the chapters in the book was titled “How Quality Steel Forms The Quality Car”. Mr. Fahnestock indicated that there was over 40 different kinds of steel used in the construction of the Model A Ford. Two of these were Drop Forgings and Castings.

Forgings, he indicated, was a process which the red-hot metal (not melted) was worked so that the “grain” of the metal was compacted and refined to increase the strength of the part which made it very strong. In other words, the forgings “preserves and intensifies the original fibrous structure of the rolled bar, thus increasing the strength and toughness of the steel”. Another advantage of forgings as compared to castings was that the forged parts were much more reliable and thus could be made lighter with the assurance of ample strength in the part itself. Another advantage of forgings over castings were that the forgings contained no “hidden blow-holes or seams which sometimes occur in castings, making castings far less reliable. The problem, however, was that forged parts were expensive to make as compared to the cheaper castings.

Apparently Ford discovered that the parts in question, the Transmission main shaft bearing retainer, A-7085; the Universal joint housing cap—outer assembly which included the Universal joint housing cap—outer upper, A-4518 and A-4517, and the Universal joint housing cap—outer lower, A-4514, could be made cheaper since the parts in question did not need that extra “strength” to do the job they were required to do.

So by converting the parts to a casting design, otherwise called the “Malleable Iron Design”, new parts were made by castings.

As Mr. Fahnstock related in his book, “Castings, which are formed by pouring molten metal into molds, have more weight than that of forged steel, lack its toughness, and may have flaws which cannot be detected on the surface. So their use should be limited to more or less bulky, compact parts”. Thus the reason why Ford switched from forgings to castings.

Most forged parts have raised part numbers, where the castings or Malleable Iron Designed parts, have the part numbers stamped into to part itself. **Note:** Please inspect these caps very carefully as some may be cracked or have flaws in them.

Sometimes a part had two sheets of release data. One was for the “forging size” and the other was for the “finish size”. In other words, once the part was forged, it possessed a certain size on all sides especially those sides which were to be bolted up to another part. The “forging size” part was then machined to its “finish size” which allowed the part to fit the assembly correctly.

All parts were in place early in the development of Type 3 assembly except for the Transmission main shaft bearing retainer. On October 9, 1928, the retainer was issued as a new part and adopted for the new assembly by its placement on the engine/transmission. Therefore, sometime after this date, the new braking system started to show up on the assembly line. However, NOT to confuse the issue, I have a question. Are there any known unrestored Model A's out there which were produced before mid-October, 1928 with the new style service braking system? I will leave it at that.

Type 3 assembly was introduced in mid-October/November, 1928 with the introduction of the new service braking system. It retained the **unequal** spacing of the six (6) bolt holes on the parts themselves and the Universal joint housing cap—inner, with the 2-9/32 inch hole and no holes in the bell, remained the same as with Type 2 assembly.

The Transmission main shaft bearing retainer, represented by part number A-7085-C (Fig. 6), was a casting. However when it was redesigned, the six (6) bolt hole flanges changed from **thin** to **thick** and the four sides of the retainer were changed to flat, not “hump like” as with the two early styles. It still retained the large center hole and the grease zerk on the bottom of the retainer.



Fig. 6

More than likely Ford changed the thickness of the six (6) bolt hole flanges on the Transmission main shaft bearing retainers due to the casting as they were not as strong as the forgings. At the start of production, the flanges were about $\frac{1}{4}$ inch in **thickness**. By October, 1928, Ford went to **thicker** flanges which made them about $\frac{5}{16}$ inch **thick**. An increase of $\frac{1}{16}$ inch in **thickness** (Fig. 7). This also changed the bolt lengths which were used to connect the Universal joint housing caps—inner and outer by $\frac{1}{16}$ th of an inch.



Fig. 7

From start of production up to the time Type 3 assembly was introduced, six (6) bolts, bolt number A-20931, which was a $\frac{3}{8}$ —24 S.A.E. x $\frac{1-5}{32}$ hex head bolt (W/cotter hole), was used because of the thin retainer. When the new Transmission main shaft bearing retainer, A-7085-C, was introduced with thicker flanges, a new bolt, A-20953, which was a $\frac{3}{8}$ —24 x $\frac{1-7}{32}$ hex head bolt (W/cotter hole), was introduced and used throughout production.

The Universal joint housing cap—outer assembly (Fig. 8) was represented by part number A-4520-B. Both the upper and lower parts had the extended arms removed, as they were not needed for the new braking system. During the redesigning, both parts, whether forged or casting, had the thickness of the web between the bolt boss and the rear corner changed making it the same thickness as the boss. The edge between the bolt boss and the rear corner was also changed from being curved to being straight (Fig. 9). But may be found both ways. The upper half had three known part numbers, A-4518-B, which was a forging; A-4517-B1, unknown (have not viewed this part but may be a forging); and A-4517-B2, which was a casting or Malleable Iron Design. All three retained the safety lug. However with the “castings”, the lugs appeared to be formed with the part itself and not welded on as with the forgings. The lower half also had three known part numbers, A-4514-B, which was a forging; A-4514-B1, a forging (have not viewed this part); and A-4514-B2, which was a casting.



Fig. 8



Fig. 9

The Universal joint housing caps—inner and outer flanges, remained the same thickness throughout production.

On March 15-18, 1929, Ford issued Release # 12326, which was yet another change in the Universal joint housing cap—inner and outer and Transmission main shaft bearing retainer assembly. This would be Type 4 assembly which the six (6) bolt holes surrounding the assembly were changed to **equal** spacing.

The Transmission main shaft bearing retainer was represented by part number A-7085-A (Fig. 10). Some have A-7085-A1 stamped on them. It was identical to A-7085-C except it now had **equal** spaced holes. It retained the large center hole, **thick** flanges and it's construction was the Malleable Iron Design.



Fig. 10

The Universal joint housing cap—inner, reverted back to the original part number of A-4513-A (Fig. 11). In actuality it was the same as the first style but the only difference was that there were two 3/8 inch holes punched into the side of the bell portion for extra lubrication of the Universal Joint Assembly, A-7090. The large hole in the bell portion was 2-9/32 inch diameter and remained as such throughout production. Some inner later caps have been seen without the two 3/8 inch holes. Some inner earlier caps have the two 3/8 inch holes drilled on the side which the service department may have done due to the explanation in the June, 1929 Service Bulletin.



Fig. 11

The Universal joint housing cap—outer assembly, took on a new part number of A-4520-C. Ford had decided to remove the extension or safety lug on the upper universal joint housing cap thus “obsoleting” or discontinuing A-4518-B, A-4517-B1 and A-4517-B2 upper cap completely as “the lug is no longer necessary”. The upper cap was replaced with the lower cap, A-4514-B2 (Fig.12) which made the assembly **equal** spaced. It was explained in the June, 1929 Ford Service Bulletin that “This change eliminates the necessity of **unequally** spacing the bolt holes in both this part and its corresponding gaskets (not to mention the Universal joint housing cap—inner and the Transmission main shaft bearing retainer) as the **unequal** spacing was used simply to insure that the housing cap being assembled with the extension lug toward the top”. With the safety lug becoming obsolete on March 15, 1929, some upper halves of A-4518-B’s, which had been forged, may have just the “D” boss and not the safety lug.



Fig. 12

Type 4 assembly lasted but a few short months when on June 22, 1929, Release # 13297, Ford redesigned the Transmission main shaft bearing retainer. A flange was added to the large center hole which reduced it’s size from 2-1/2 inches to 2-27/32 inches. It was finally reported in the September, 1929 Ford Service Bulletins about 100 days later and was done to “reduce any possibility of oil leakage through the rear transmission bearing”.

This leads up to the final assembly, Type 5. The parts used in this assembly were the same exact parts as what was used in Type 4 assembly except for the new Transmission main shaft bearing retainer, A-7085-A1 (Fig. 13). Just when this retainer went into actual production is anybody’s guess...any time from late June to September, 1929 and was continued in use through the production of the Model A Ford.



Fig. 13

U-joint housing caps/Transmission main shaft bearing retainer assembly	U-joint housing cap--inner	U-joint housing cap--outer Assembly Upper and lower	Transmission main shaft bearing retainer	Time of use (According to Ford Part Release dates)
Type 1 Equal spaced	Style 1 A-4513 A-4513-A AA-4513	Style 1 A-4514-C Upper: A-4518 Lower: A-4514	Style 1 A-7085 A-7085-A Thin flanged	Used October to mid-December, 1927—Used with the first 3400 units
Type 2 Unequal spaced	Style 2 A-4513-B	Style 2 A-4520 Upper: A-4518 Lower: A-4514	Style 2 A-7085-B Thin flanged	Used mid-December, 1927 through mid-October, 1928
Type 3 Unequal spaced	Style 2 A-4513-B	Style 3 A-4520-B Upper: A-4518-B, A-4517-B1, A-4517-B2 Lower: A-4514-B, A-4514-B1, A-4514-B2	Style 3 A-7085-C Thick flanged	Used mid-October, 1928 to mid-March, 1929
Type 4 Equal spaced	Style 3 A-4513-A	Style 4 A-4520-C Upper: A-4514-B2 Lower: A-4514-B2	Style 4 A-7085-A A-7085-A1 Thick flanged	Used mid-March, 1929 through late June, 1929
Type 5 Equal spaced	Style 3 A-4513-A	Style 4 A-4520-C Upper: A-4514-B2 Lower: A-4514-B2	Style 5 A-7085-A1 Thick flanged	Used late June, 1929 through production.

The above chart shows the different Universal joint housing caps—inner and outer and Transmission main shaft bearing retainer assemblies that were used in the different time periods throughout the Model A era according to the dates as they were “released” by the Ford Engineering Department. Just when the specific parts went into actual production and placed on vehicles is unknown. One must take into consideration the amount of lag time it took to gear up to make the new part plus the using up of all existing “old” parts. Some of the existing parts that were on the assembly lines may have very well been taken off and sent to dealers for repair purposes as I do not think Ford continued making the older parts as they became obsolete .

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