Bell Housing Restoration

by Tom Endy

Model A Ford bell housings are often found with a worn out pedal shaft, clutch release shaft, housing bushings, and with worn out bushings in the pedals. Bell housings are also usually covered with grease, crud, and rust. There are people who claim they can replace a pedal shaft while the bell housing is still installed in the car. That may be true, but I would never attempt it. The many I have done have all been on the work bench. Before beginning a restoration examine the bell housing for obvious damage. If damage is found discard it and find another. There are still many around and they are very inexpensive at swap meets.



A complete bell housing ready for disassembly.

The first effort after the bell housing is on the work bench with pedals removed and separated from the transmission is to completely disassemble it. Depending on the condition of the bell housing the task can be easy or very difficult.

Remove the throw-out bearing inspection plate. Remove the long pin that captures the heads of the two bolts associated with the front radius rod. The pin also captures the felt block used to contain oil drips and to lubricate the radius ball. The long pin is removed by removing the small cotter pin and pulling it out.

Remove the yoke on the clutch release shaft that pushes on the throw-out bearing. This is done by using a suitable punch to drive out the locking pin. The pin is driven out from the bottom of the yoke. Once the pin is out work the yoke over toward the side of the shaft opposite the operating lever. This is where you might have difficulty. If the shaft is rusted and full of crud you will have to clean it sufficiently to get the yoke to slide on the shaft. Remove the entire shaft by pulling on the operating lever. You may have to use a punch to drive the shaft out and free it from the yoke.

Beware, there is an early and late version of the clutch release shaft, operating lever, and yoke. The early ones use a 3\16" locking pin and have a woodruff key in both the operating lever and the yoke that corresponds to slots cut into both places on the release shaft. The later ones did not use the woodruff key method and had a 5\16" locking pin. Reproduction shafts and locking pins of both versions are available from Bratton's. There is a Ford service bulletin that addresses the change.



Clutch release shafts. The shaft at the top of the photo is the early type using woodruff keys to lock the lever arm and yoke into place and using 3\16" locking pins. Note the wear on the left end of the shaft and about an inch in from the right end. The shaft at the bottom of the photo is the later type using 5\16" locking pins. This shaft has only a slight amount of wear on it.

The operating lever will also have to be removed from the end of the old clutch release shaft by driving out the locking pin and driving or pressing the lever off.

Once the clutch release shaft assembly has been removed from the bell housing remove the two bushings. A stepped tool for removing and inserting bushings is the most desirable method. The tool is inserted into the bushing and driven out with a hammer. If one is not available an alternate method is to split each bushing with a hack saw blade. Hammer or grind a common nail to a chisel point and tap it down along side the split. Grip the protruding bushing with a pair of long nose pliers and curl it out. The pedal bushings in the two pedals are the same part number as the two in the bell housing and can be removed in the same manner.



Bushing removal and installation tool. The tool can be used for removal and installation of bushings in both the bell housing and the two pedals



The bushing tool can be used to drive the old bushings out and to drive the new bushings into place.

The last task in the disassembly process is to remove the pedal shaft, and this is not always easy. The pin that locks the shaft into place in the bell housing also comes in two versions. The earlier ones have a domed head, were driven in from the top, and had the end inside the bell housing mushroomed over. The later version had a soft tapered pin also driven in from the top. The tapered pins are fairly easy to get out. Both have to be driven out from the inside with a suitable punch. Before you can drive out the early ones with the dome shaped head you have to grind the mushroom off the end of the pin inside the bell housing. I use a small pneumatic grinder to do the job

When the pin has been removed the pedal shaft can be driven out from the inside with a long punch held at an angle, *Sometimes*! Some pedal shafts are in there very tight and are difficult to get out. For the difficult ones I use a tool I made up that bolts to the transmission mounting holes. A large bolt is then turned and it forces the shaft out. An alternate method is to saw the shaft off close to the outside of the bell housing and drive out the remaining length toward the inside with a punch.



Crude but effective tool used to push out a stubborn pedal shaft. The tool is bolted at the bottom to the four transmission mounting holes in the bell housing. The large bolt is turned with a wrench to push the shaft out.



Worn pedal shaft after removal from a bell housing. Note the locking pin hole on the left end still has a portion of the pin in place. This stubborn pin had to be drilled out from each end, then sheared by driving out the pedal shaft.

With the bell housing completely disassembled a massive clean up project is the next task. After de-greasing, I bead blast them inside and out and paint the exterior with Ford green paint.



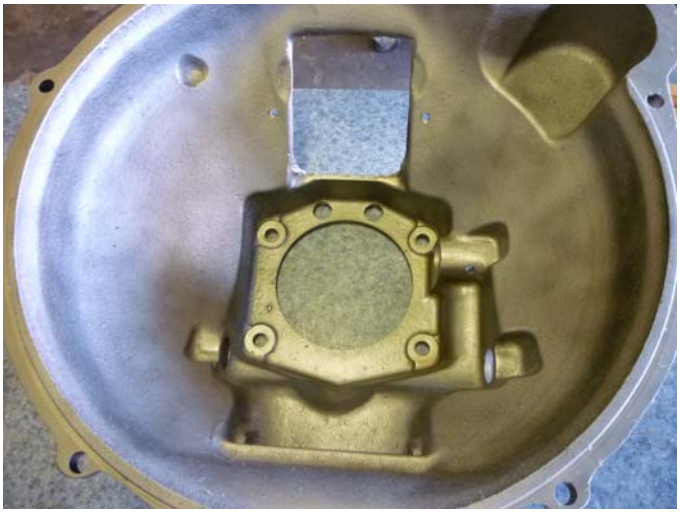
The inside of a bell housing can be extremely cruddy. This one will have to be de-greased before it can be bead blasted.



Disassembled bell housing ready for bead blasting and painting.



The outside of the bell housing after it was de-greased and bead blasted.

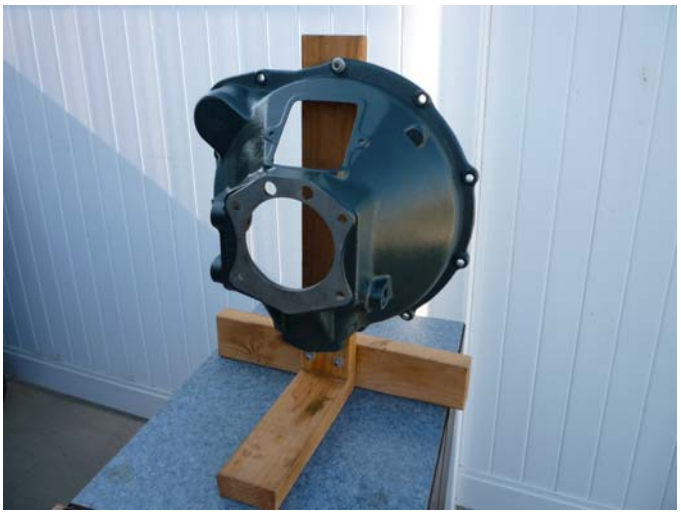


The inside of the bell housing after it was degreased and bead blasted.



The machined surfaces are masked off and the outside of the bell housing is painted Ford green. The inside of the bell housing is left unpainted and sprayed with WD-40 to prevent rusting. The unpainted machined surfaces are also coated with WD-40.





A simple wooden stand makes the assembly process easy. It can also be used for disassembly.

Once the bell housing has been cleaned and painted the re-assembly procedure is begun by installing the two bushings in the bell housing. This is where you will need some type of insertion tool. One can be made on a lathe from some round stock. The tool should have a small collar on it that grips the edge of the bushing so it can be driven in without mushrooming the end.



New bushings are driven in with a bushing tool.

The two bushing may need to be reamed to fit the new clutch release shaft. You will need a reamer long enough to be able to ream the two bushings so they will line up with each other. Honing is not a good idea in this case as you may be able to fit the shaft from either end, but they may not line up with each other and you will not be able to get the shaft through both bushings.



Bushing reamer. This tool is long enough to ream both bell housing bushings in line. It is also used to ream the pedal bushings.



This bushing reamer is long enough to fit through both bushings at the same time to ensure they will line up with each other.

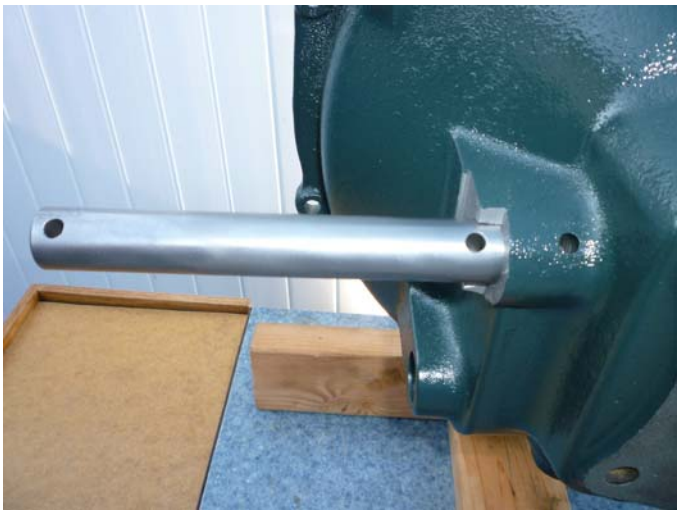
Once it has been determined that the release shaft fits correctly in the two bushings, Install the operating lever to the end of the release shaft. This can be accomplished by either driving the pin in with a hammer and punch, or by using a shop press.

The yoke is then installed onto the release shaft as it is slid into the bell housing. Be certain to orient the yoke in the correct position to properly engage the throw-out bearing. With yoke in a vertical position the operating lever should be pointing to the rear. The yoke locking pin is driven in from the top.



Yoke oriented correctly on new clutch release shaft. Radius rod bolt heads and felt installed correctly and retained by the long pin.

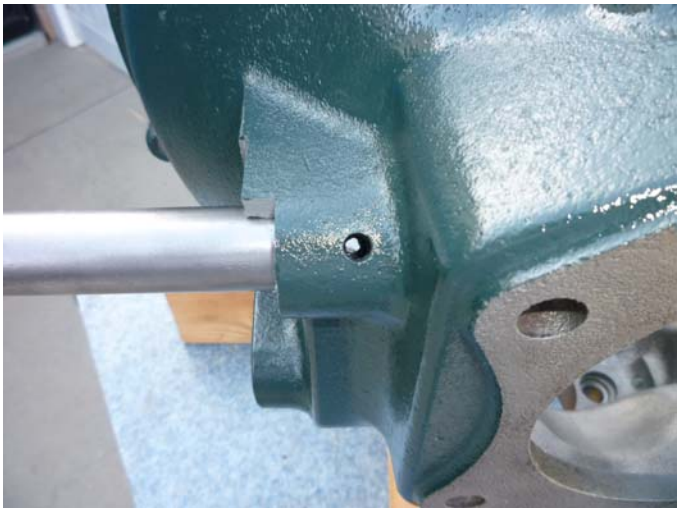
When installing the new pedal shaft there are three things to take into consideration. (1) Be certain to install the correct end of the shaft into the bell housing. The end with the locking pin hole about an inch from the end of the shaft goes into the bell housing. (2) Be certain to line up the hole in the shaft accurately with the hole in the bell housing. (3) Do not pound on the end of the pedal shaft with a hammer as it will mushroom the shaft. Use a block of wood against the end of the shaft. Drive the shaft in until the two holes line up.



The end of the pedal shaft with the pin hole about an inch from the end of the shaft goes into the bell housing. The other end of the shaft has the hole close to the end of the shaft. Accurately line up the hole in the shaft with the hole in the bell housing before driving it in.



Use a block of wood so as not to mushroom the end of the shaft with the hammer.



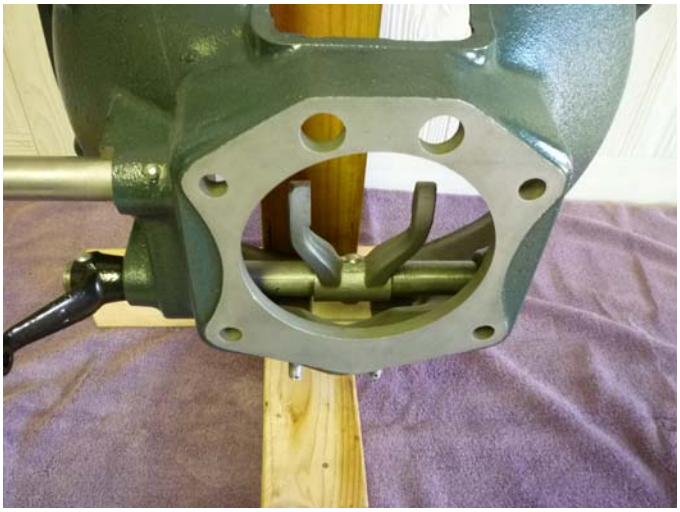
Drive the pedal shaft in until the two holes line up.



A tapered pin is driven into the bell housing hole to lock the pedal shaft in place.



Drive the pin in until it is flush with the housing.



New pedal and clutch release shafts installed. Note operating lever points to the rear when the yoke is standing vertical.



Complete restored bell housing bead blasted and painted Ford green. New clutch release shaft, bushings, and pedal shaft have been installed. The bell housing is ready for installation in the car once the transmission has been attached.

Incidental to bell housing restoration are two articles written some years ago. They are included here as an addendum to this article. The first addresses the Ford service bulletin that describes the changes made to the clutch release shaft. The second describes a procedure to align the brake and clutch pedals on a newly restored bell housing.

Did They Get It Wrong?

by Tom Endy

The clutch release shaft:

During the early production years of the Model A Ford, the clutch release shaft (p\n A7510-B) in the bell housing of the single disk clutch had two woodruff key slots machined into it, one to accommodate the clutch release arm (p\n A7511-B) and the other to accommodate the clutch release fork (p\n A7515-B). The arm and the fork each had a mating slot to lock it to the woodruff key. Each part was then held in place by a 3/16" diameter locking pin through a corresponding hole in the shaft.

In the later production years, as the depression deepened, Ford looked for ways to take cost out of the manufacturing process. Engineers looked at all aspects of the car to determine what parts could be made cheaper without affecting the integrity of the part. When they reviewed the clutch release assembly it was decided that the two woodruff keys in the shaft, and the slots in the arm and the fork could be eliminated. This would eliminate a considerable amount of machining. To compensate for the lack of the woodruff key the locking pins and corresponding holes in the shaft were increased in size from 3/16" to 5/16". New part numbers were created; the new shaft became A7510-C, the new arm A7511-C, and the new fork A-7515-C.

The service bulletin:

A service bulletin was released in June 1929 (page 351) to accommodate repairs to cars with the earlier part numbers. This is where I think they may have gotten it wrong. The service bulletin is quoted in full here.

"**When replacing an old design clutch release shaft with a new one it will be necessary to increase the size of the hole in the old design arm to accommodate the new pin. It will also be necessary to install a new fork as there is not sufficient stock at that point to permit increasing the diameter of the pin hole in the old fork."**

If you examine the old fork you will notice that there is ample material to accommodate a larger hole to allow use of the larger diameter pin. However, there is not ample material to allow the arm to be drilled out to accommodate the larger pin.

If the pin hole in the arm is enlarged the outer circumference of the new hole is almost to the edge of the arm and would certainly be prone to a crack at that point.

Perhaps the engineer writing the service bulletin got the two parts confused and reversed the instructions for the two parts. I would think after 80 plus years someone would have caught it by now. Maybe this is the reason why you hear about clutch release arms breaking occasionally.

I certainly would never drill out an old A7511-B release arm to accommodate a 5/16" locking pin, as it would be an invitation to failure of the arm.



The above photo shows two A7511-B arms. The arm on the left has the original 3/16" hole. The arm on the right has been drilled out to 5/16". Note how close to the edge the new hole is.



The above photo shows two A7515-B forks with the original 3/16" holes. Note there is ample material to drill the holes out to 5/16".

Even The Pedals!

by Tom Endy

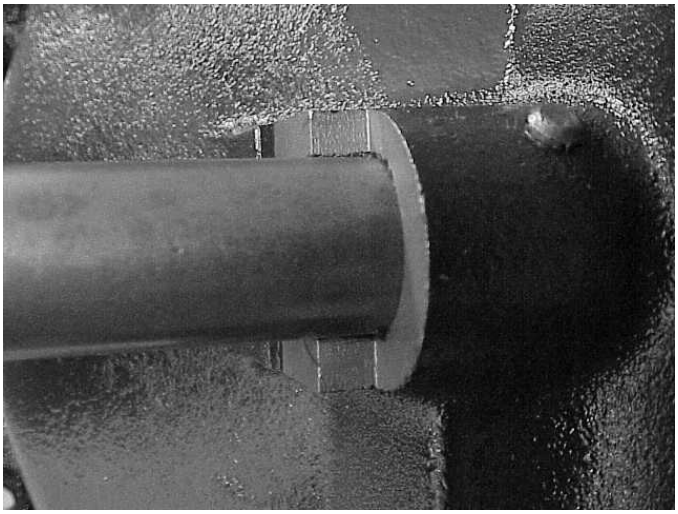
It is quite common to find the brake pedal and the clutch pedal on a Model A Ford do not return to the upright position so they are even with one another. One pedal may sit lower than the other. This is caused by wear on the bell housing brake pedal stops, the clutch and brake pedal stops, and the clutch pedal collar stops.

There is a very easy way to correct the problem and it is best accomplished when a complete restoration of the bell housing is being done. The restoration should include a new pedal shaft, a new clutch release shaft, new bushings in the bell housing, and new bushings in both pedals.

To even the pedals up you should begin with a new clutch pedal collar, p/n 7507-C, that has no wear on it. Slide the brake pedal onto the pedal shaft and pull it up against the stop on the bell housing so it is in the full upright position. This will be the reference point for adjusting the clutch pedal to be even with it.

Slide the clutch pedal onto the pedal shaft and install the clutch pedal collar and insert the locking pin. Pull the clutch pedal up to the full upright position with the pedal stops against the collar stops. The clutch pedal will probably be sitting lower than the brake pedal if you installed a new clutch pedal collar.

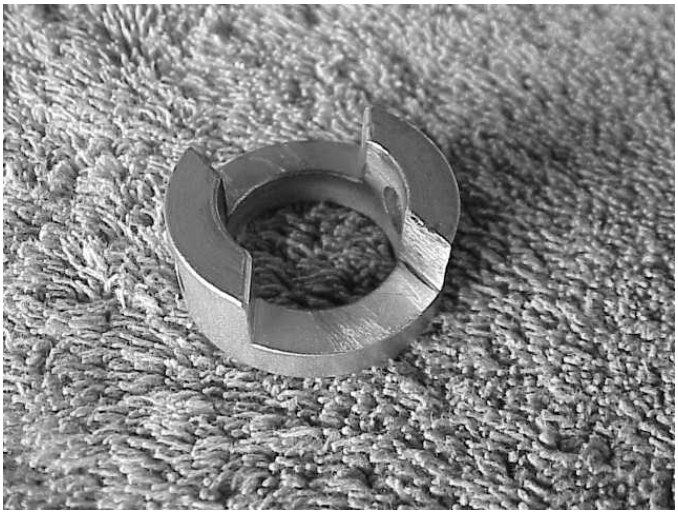
Carefully note where the clutch pedal stops are sitting against the collar stops. With a marking pen mark the location of the two collar stops that are in contact with the pedal stops. There are four stops on the collar, but you are only interested in the two you marked. Place the collar in a vice and carefully file material off both marked stops. Try to do it evenly. It is a trial and error fit process. As you remove material from the two collar stop positions the clutch pedal will start to move up even with the brake pedal. When the process is complete both pedals will be even regardless of the orientation of the clutch pedal collar. It can install on the pedal shaft two ways, but it won't make any difference in the pedal height.



Bell housing brake pedal stops



Brake pedal stops



Clutch pedal collar with stops, p/n A7507-C