TECH TIP

Type 40 Ford Optima Battery Conversion
By Dave Gunnarson

There is currently no accurate reproduction Type 40 Ford Script battery as used in most late 1934 through 1936 Ford vehicles. The same Type 40 case, with reversed terminals was used in 1937 through 1939.

I was provided an original, but defunct, Type 40 battery and decided to see if a modern 6-volt Optima battery could be fitted while at the same time retaining as much of the original external visual appearance as possible. The following pictures and descriptions are the way I did the work.



Type 40 Ford Script battery



6-Volt Optima battery

Battery Case Preparation

The original battery was washed and rinsed to remove all acid and acid residue.



The original battery with Ford Script caps removed

Then the "tar" sealing material between the cells was removed.



Tar being removed between cell covers

To allow access to the underside of the top cell covers, the short ends of the cell covers was cut away.



Cutting the cell tops for access

With this material removed, it was possible to insert a hacksaw blade underneath the cell caps to cut the lead post connections to the cells. After taking a long time to cut only one post this way, a power saw was used to reduce the effort involved and to make the cuts much more quickly.



Hacksaw cutting the battery connections



Sawzall makes quick work cutting connections



Top ready for removal

Once all six cell connections were severed, the top cover, now loose, was removed and the two Ford Script lead cell connectors were salvaged for later re-installation. After doing all this work, I realized It may be possible to simply turn the battery upside down once all the tar has been removed and extract the top and all three cells at one time and separate the parts once they are outside of the case.



The old battery with the top removed and cells intact

The lead plate cells were removed and properly recycled. The now empty case has two cell dividers which were completely removed by a combination of cutting the breaking the walls apart.



The empty battery case with cell dividers intact



Battery case with internal dividers removed



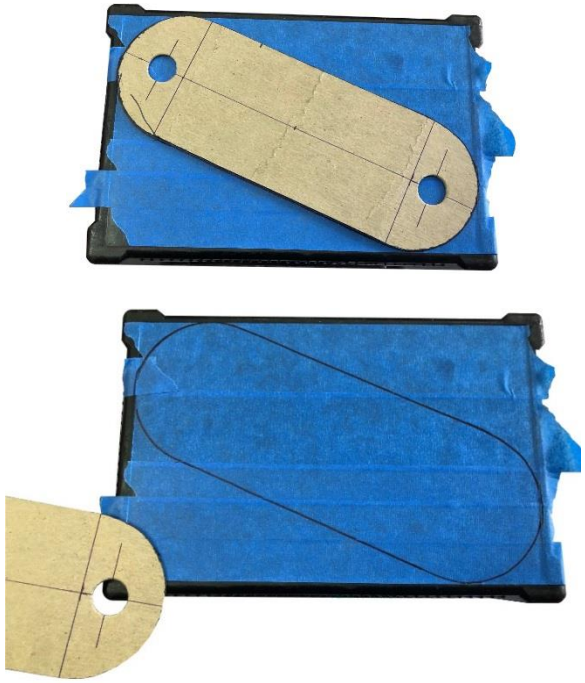
Three 2-volt cells from the original battery

Since the Optima battery is taller than the original battery, insertion of the Optima battery through the bottom of the original battery was required. To allow the battery to be inserted from the bottom, a hole the same size and shape as the top of the battery needed to be cut in the bottom of the battery case.



The original battery case upside down

A thin cardboard template of the Optima battery was created and the bottom of the battery was covered in blue masking tape. The outline of the cutout was traced on the bottom with the edges of the cutout positioned to accommodate the thickness of the battery case walls.



Outline transferred to battery case bottom

A portable jig saw is used to cut the hole.



Cutting the opening in the original battery case bottom



Cutting plastic parts



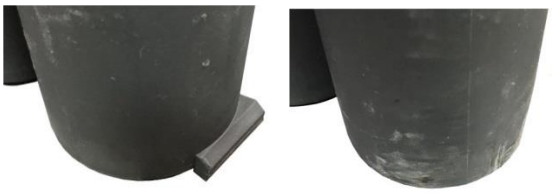


Drilling 1-3/8" hole in battery cover

1. Creation of a new top

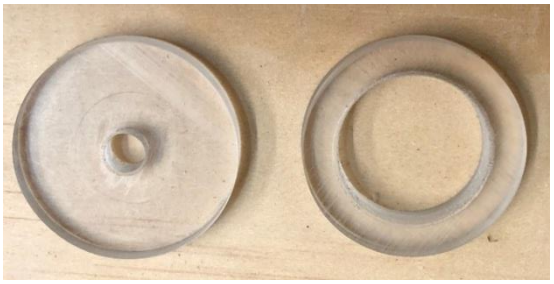
A new battery top is needed to replace the original top. A sheet of 1/16" thick plexiglass was cut into three x" x y" cell tops and one x x y" cover. A 1 3/8" diameter hole was cut in the center of each cell cover.

A cardboard template is used to layout all the components and to position the Optima battery at the best location to keep the new terminals as close to the original as possible. Since the Optima battery terminals are wider than those of the original battery it was necessary to remove a small section of the red plastic top where it touches the sides to maximize the rotation. It was also necessary to remove the two "feet" from the bottom of the Optima battery.

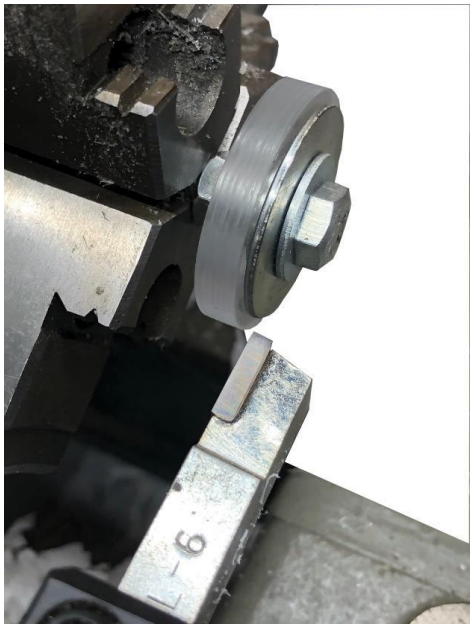


Before and after battery foot removed

Three discs were made from ¼" thick plexiglass by using a 1 ½" diameter hole saw. These discs were turned on a lathe to a final diameter of 1 3/8" diameter and the center of the discs were drilled to 59/64" diameter. These are used to create new cell screw cap holes. Since the original cell screw cap holes extend about 3/16" above the top surface of the cell caps, they were sized to fit in the holes drilled in the cell covers reducing their height by 1/16".



The rough cut disc (left) and machined part (right)

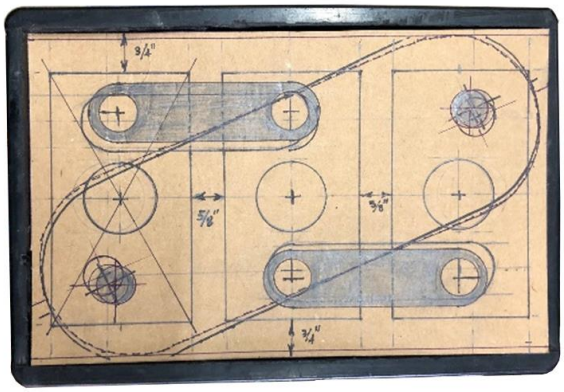


Reducing the disc diameter

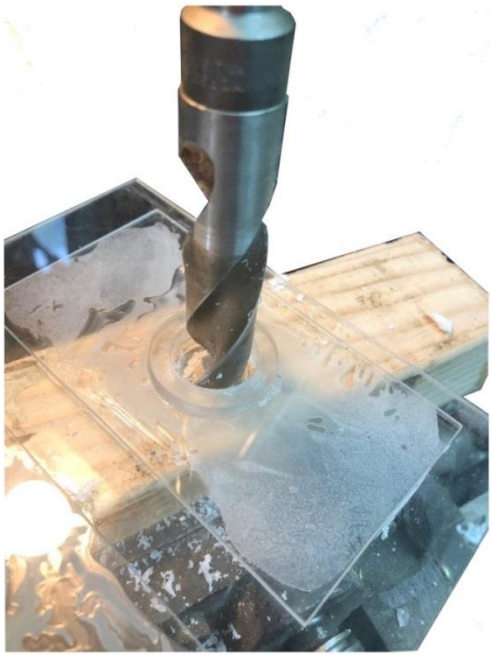


Drilling the 59/64" pilot hole for the cell screw cap.

The three cell tops and cell screw caps were glued to the new top cover with epoxy. Then the hole in each cell top was extended through the cover and the holes were threaded with a 1"-12 tap by hand. This allows re-use of the original three Ford script cell caps.



Top side cardboard template showing position of the new top pieces. Note there are two battery outlines, one represents the location the battery and the terminal posts without the modification of having some of the top removed.



Drilling the top holes through top (hold downs removed for clarity)



Hand threading cap holes

The cover was then fitted to the battery top opening. The battery was loosely fitted into position and the location of the positive and negative terminals marked and drilled. Four ¾" diameter holes were also drilled in the top to allow re-installation of the lead cell connectors which are now ornamental.



Test fit of all top components

Once all components were satisfactorily fitted, the caps and lead connectors were taken off and the plastic top was sprayed in semi-gloss paint. It was necessary to glue some plastic strips along the inside edges 1/8" down from the top to provide support for the cover plate.



Edge supports for battery top cover

2. Preparing the battery bottom

A 6 7/8" x 10 3/8" piece of ½" plywood is used to raise the battery case up to the proper lever of the Optima battery. A piece of 1/8" thick aluminum plate, with the same dimensions as the plywood, is used to support the battery. The plywood is cut out to the same shape as the battery bottom of the Optima battery so it sits on the aluminum plate. This results in the overall height of the battery only 1/8" higher than the standard Optima battery, or 8 ¼" overall height to the top of the terminals. With the aluminum plate and plywood in place

painted flat black, two ¼" diameter holes were drilled through the bottom of the case, the plywood, and the aluminum plate. The aluminum plate holes were countersunk and two 1-1/2" long ¼"-20 flat-head machine screws held all the parts together. This arrangement allows the battery to be removed from the bottom of the case.



Plywood Spacer



Bottom plywood spacer and aluminum plate



Capture nut epoxied inside the bottom of the battery case

3. Final Assembly

The battery was installed in the case with the bottom plywood and aluminum base. The cover was then placed into position and the 1/16" deep depression between the was filled with roofing tar. The lead connectors were also fixed in place with roofing tar and then the battery caps were screwed in place to complete the assembly.

The oval portion on both sides of the battery was painted gold using a small brush and Tester's Metallic Gold paint. It took three coats to provide a reasonable facsimile to the original gold color.



Painting Ford oval background



The finished battery ready for installation

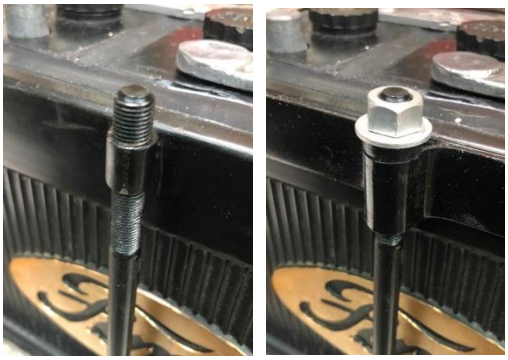
One consequence of raising the battery case 5/8" (1/8" for the aluminum plate and ½" for the plywood) is that the threaded two hold down arms attached to the battery tray are no longer tall enough to fit the battery hold down frame washers and nuts.

Two threaded coupling nuts were machined along with two 5/8" long 5/16"-24 threaded rods. By chance, the top of the hold down arms ended right at the top of the battery hold down frame so the coupling nut extended past the top of the frame. Two special spacer washers were machined to fit between the top of the hold down frame and washer.



Hold down arm extensions and washers





Original hold down arm(top), with extension installed and final fit up with the battery hold dawn frame and lead-coated nut and washer



Finished battery in battery tray

I'm happy with the end result. The application is for a 1935 Model 51 1 ½ ton truck which has the battery mounted under the plywood floor. The extra 5/8" height of the battery assembly just fits. I understand that the clearance for cars and maybe the pickup truck might be different and require some modifications to the way the battery is held in the frame or modification to the floorboard access cover plate so plan accordingly if you follow the same steps as I've outlined.

I'm very happy with the end result and have confidence that the battery will hopefully function and last a long time.