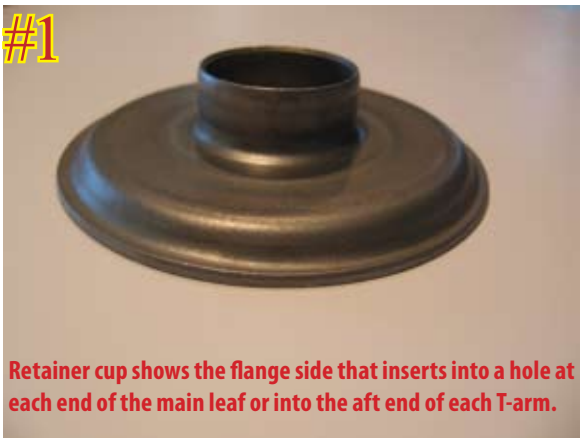
Replacing Retainer Cups in a C2/C3 Rear Leaf Spring

Restoring a rear leaf spring on a C2 and C3 can both improve the cosmetics of the rear suspension and restore ride height. The easy tasks in such a restoration are replacing the center bolt, repainting the spring leaves and replacing the inter-leaf polyethylene liners. However, it's more of a challenge to replace the retainer cups (Fig. 1) that are swaged into each end of the main leaf.



Retainer cup shows the flange side that inserts into a hole at each end of the main leaf or into the aft end of each T-arm.

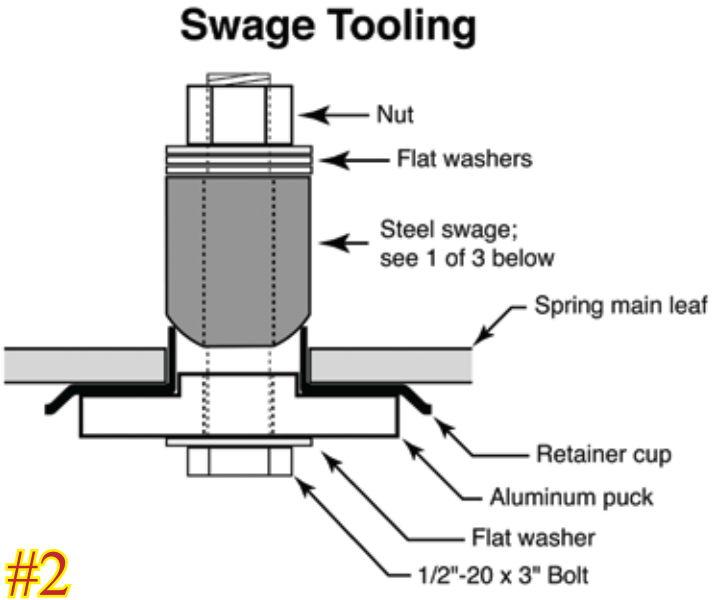
Identical retainer cups exist in the aft end of each trailing arm. Each one serves to constrain a large rubber bushing that is part of the link-bolt connection between the end of the leaf spring and the associated trailing arm. Since the original retainer cups were made from carbon steel that was neither painted nor plated, they tend to become rusty and pitted after long-term exposure to moisture and salted winter roads. Often the retainer cups are beyond restoration and must be replaced.

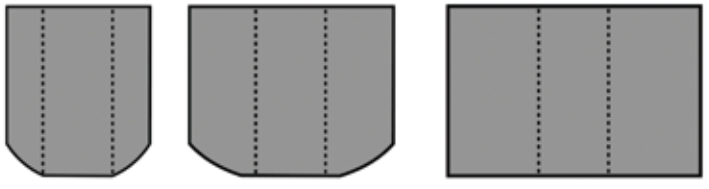
A second reason for replacing the retainer cups is that the currently available GM service part (GM # 3910701) is configured differently from the retainer cups originally used from 1963 through 1966 and sporadically during the first few months of the '67 model years. As a result, is it common to find a mid-year car with restored rear suspension that has the incorrect service replacement parts installed, and knowledgeable chassis judges will make a deduction. The cup replacement process described in this article was conceived and tested on a '65 that was having the incorrect service cups replaced with modified cups that approximate the original cups used during production.

Removal of the old retainer cups can be easily accomplished using a hammer and chisel or an air chisel. The challenging step in installing new retainer cups involves crimping or swaging over the flange of each retainer that inserts through the hole in the leaf spring end or in the trailing arms. Some people claim that the swaging can be done using a ball-peen hammer, but I can only guess that this technique requires the skill of an artist to recreate the factory look. We are going to describe a foolproof system for swaging the cups, which does however require the use of some custom-made tooling. A nice feature of this system is that it works equally well with the spring and T-arms installed in the car or out of the car and it does not require the use of a hydraulic press.

From the outset we want to emphasize that the most important consideration in this entire presentation is safety. The replacement of the retainer cups, which is typically done one side at a time, necessitates the removal of the large bolt that links the end of the leaf spring to the associated T-arm. When removing that link bolt a substantial force must be applied to the end of the spring to remove any tension on the link bolt and to maintain the spring in its deformed, nearly flat configuration. With the technique described here, the force to keep the spring in the deformed state is provided by the weight of the car.

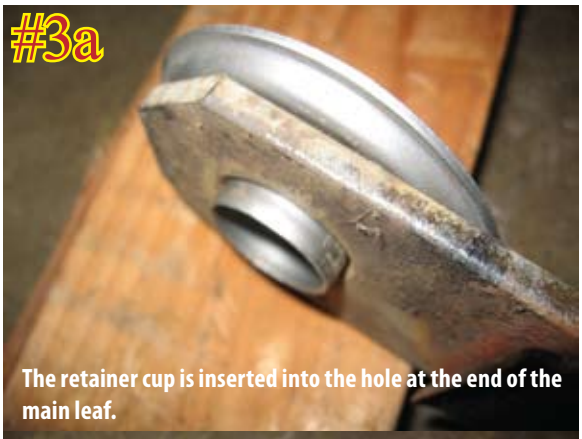
A sketch of the swage tooling is shown in Fig. 2. The creation of the two steel swaging tools at the lower left in the figure required the use of a radius cutter and a lathe. The upper part of the sketch shows the first steel





swage in position and ready to start the swaging process. The lower part of the figure shows the three separate swages that are used in turn.

The following figures show a retainer cup inserted into the end hole in the main leaf of a rear leaf spring before and after placement of the swage tooling.



The retainer cup is inserted into the hole at the end of the main leaf.

The swage tooling is in position to begin the process.

The technique involves the use of a floor jack and three jack stands to support and stabilize the car and the various rear suspension parts. The other essential items include: 1) a piece of 5/8"-thick plywood approximately 2' x 5,' 2) a twelve-inch piece of 4"x 4" fence post stock, 3) a twelve-inch long piece of 2"x 4" wall stud, and 4) one or two twelve-inch long 1"x 2" wood cleats. These wooden pieces are assembled as is shown in Fig 5.

In brief, the 4 x 4 piece is securely attached via nails, screws, or bolts to one end of the plywood. This piece serves as blocking and will be positioned against the inboard surface of the rear tire on the opposite side of the retainer cups to be replaced. The piece of 2 x 4 is attached via nails/screws/bolts to the plywood along with the cleats at a location approximately three feet from the first 2 x 4 block. The exact location of this second 2 x 4 blocking piece and cleats will be a function of the geometry and size of the jack stand that will be used to support the end of the leaf spring that is being worked on.

Begin by applying the parking brake and placing chocks securely in front and behind one or both tires on the driver's side of the car (not shown in Fig. 5). Next, use a floor jack under the side frame rail roughly at the center of the door to raise the passenger's side of the car. Continue jacking until the rear tire is approximately 8" to 10" off the ground; the reason for this extra height will become clear later. Now place one jack stand under the side frame rail just in front of the rear tire. Lower the floor jack slightly until the weight of the car is supported by the jack stand, but leave the floor jack in place. Remove the rear wheel.

Next, position the plywood with attached blocking as shown in Fig. 5. Then, place a jack stand (four-legged, not three) under the passenger's side end of the leaf spring with two legs of the jack stand on top of the 2 x 4 with the legs pushed up snug against the 1 x 2 cleat and the other two jack stand legs on the plywood. (See Fig. 6) This 2 x 4 block and cleats must be

Close-up of the retainer flange after the swaging is completed using the third (flat) swage tool.

securely attached using nails, screws, or bolts.

The top of the jack stand should be 2" to 3" inboard of the leaf spring retainer cup. The purpose of the 2 x 4 block is to angle the jack stand so that the force between the jack stand and the spring is close to perpendicular to the local tangent to the arch of the spring. The purpose of the cleat screwed to the top of the block is to prevent the jack stand from shifting in the direction of the driver's side. The second cleat secured to the plywood just to the left of the 2 x 4 block in Fig. 6 is for added security.

Next raise the floor jack until the jack stand under the frame rail is unloaded and remove that jack stand. Then carefully lower the floor jack until the weight of the car rests securely on the jack stand under the end of the leaf spring. For safety reasons after this is done, place additional jack stands under the front and rear ends of the passenger's side frame rail. You'll need to use shims to ensure that there is a minimal gap between the undersurface of the frame rail and the tops of the two jack stands. Note, however, that these two jack stands should not support any of the weight of the car. At this point the weight of the roughly half the car should be supported solely by the jack stand under the leaf spring.

Plywood and blocking system in position to allow removal and replacement of the retainer cups on the passenger's side. The sequence of steps leading up to the stage shown in this figure is explained in detail in the text.

Here we have to emphasize that it is the stability of that single jack stand under the end of the leaf spring that is critical to the safety of the entire process that follows. If you have any doubts whatsoever about the integrity or stability of that jack stand, those doubts should be addressed before proceeding.

Close-up photo showing the position of the jack stand under the end of the leaf spring. Note that the vertical axis of the jack stand is close to perpendicular to the arch of the spring. This photo shows the stage of the process after removal of the link bolt, with the new retainer cup in place and with the swaging tooling in place ready to perform the swaging step.

The floor jack can now be repositioned under the rear brake rotor (or brake drum) with a piece of wood placed between the jack plate and the rotor to prevent possible damage to the rotor. The floor jack should then be raised until the T-arm is raised slightly, but not to the extent that any tension is created in the link bolt. The lack of any tension in the link bolt is essential before attempting to remove the bolt. Loosening of the link bolt may require the application of a substantial force or torque, especially if it is rusty. It would be wise at this point to give a good tug on various parts of the suspension and body to reassure yourself that the spring and car are stably supported and that some inevitable shaking is not going to disrupt anything.

The link bolt can now be removed. If the bolt and nut have never been apart and if they are obviously rusty, it can be next to impossible to loosen the link bolt nut and this might be the time to use a reciprocating saw or high-speed cutoff tool to cut the bolt in half and replace these items with new hardware. Once the bolt has been removed, the retainer cup at the end of the leaf spring and the retainer cup at the aft end of the T-arm can be removed using a hammer and chisel or an air chisel to peel up the swaged flange that secures each retainer cup in place. Once the old retainer cups have been removed, the new retainer cups can be inserted and the swaging steps performed.

Photo showing the swaging tooling in place to perform step one of the swaging process for the retainer cup at the end of the leaf spring. The entire swaging process of all four retainer cups can easily be done by one person in a few hours.

The swaging is performed in three steps. First, the steel swage with the smaller radius nose is used, followed by the steel swage with the larger radius nose, followed lastly by the flat steel swage. During each of the three steps the central bolt is tightened until no more deformation of the retainer flange is seen. Note that in Fig. 7 the box wrench used to hold the upper nut of the swaging tooling is positioned against a 2 x 4 placed under the rotor. The forward end of the 2 x 4 (not shown) abuts against the kick-up area of the car's frame. This setup allows the swaging to be performed by one person. Most people will find that it takes two hands and a breaker bar (not shown) to tighten the swaging bolt during each of the three tightening steps of the swaging process.

The swaging tooling is available on a 10-day loan in exchange for $20 to cover the cost of postage and depreciation. If interested, please contact the first author via e-mail. Any questions related to the jacking and blocking system should be directed to the second author.

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