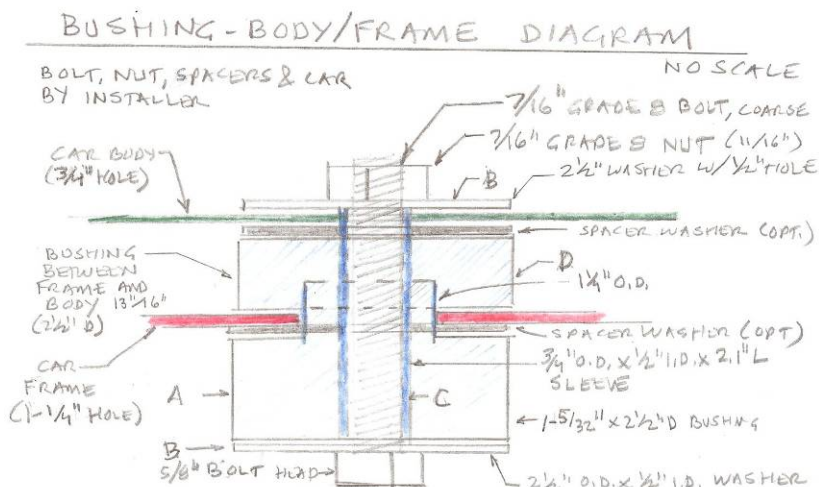


## REPLACING BODY TO FRAME BUSHINGS ON A 1970 CADILLAC

The process of replacing the body to frame bushings started out like many other vintage Cadillac repair projects, the original parts were not available and no mechanic or body shop would perform this work for me. One of my two 1970 Cadillacs required body to frame bushing replacement because the visible bushings in the rear were almost completely deteriorated, and you could spin the rubber donut component that is supposed to be under immense compression and immovable. After considerable research to no avail, the best plan that I could formulate was to remove a single bushing and try to purchase a universal replacement bushing on the Internet. Then I would procure several samples, select the best replacement, buy a set of 14, and install them myself.

Generally if your car is over 40 years old it is not a bad idea to replace the bushings and all rubber parts if the car is enjoyed by driving it. To determine if your car requires body to frame bushing replacement, inspect the rear four bushings, as those seem to be the most vulnerable to wear. Fortunately they are by far the easiest to inspect - no need to even jack up the car. The rubber should be in place and pliable. Rubber wears due to age, use, storage conditions, exposure to sun, exposure to elements, and number of wheel cycles (mileage). If the rubber is missing or deteriorated, it should be replaced. Use a 5/8" socket and check to make sure the bolts are tight. If they spin easily the bolts may be broken, and this is a sure fire indicator that the replacement of the bushings is warranted. The bolts can be severely compromised without your knowledge. During my replacement process, several bolts were deteriorated down to 3/16" diameter (quite a reduction on a 7/16" bolt).

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### Universal Mount Sets/Isolators

Mount material is made of **HYPER-FLEX™** polyurethane, for use as isolator mounts on applications such as obsolete body mounts, kit cars, truck beds, tool boxes and many other similar applications. (See diagram for specific parameters.) Two complete mounts per set- 4 metal washers, 2 metal sleeves, 4 polyurethane bushings. See illustrations for dimensions.

Part Dimensions

Part Number

94102

8.4102 is best for applications which require a higher degree of insulation. Softer than the bushing set listed above. Universal transmission mounts, motor mounts, cab & body mounts, restorations, "daily driver vehicles", custom body & kit cars. Can also be used for compressors, tool boxes, generators, independent engines, etc.

The diagram illustrates the assembly of the 94102 bushing. It shows a cross-section of a vehicle frame with a bolt passing through a hole. The assembly consists of a top washer (2 1/2" DIA. W/ 1/2" HOLE), a sleeve (2 1/2" LGS), a bushing (2 1/2" O.D. X 1 3/4" I.D.), a recommended plate (thickness .14" hole .006" - .14"), another bushing (2 1/2" O.D. X 1 3/4" I.D.), and a bottom washer (2 1/2" DIA. W/ 1/2" HOLE). Handwritten labels A, B, C, and D point to the bushing, sleeve, top washer, and bottom washer respectively. Below the diagram is a photograph of the components: a stack of three bushings, a single bushing with a sleeve, and several washers.

2 1/2" DIA. W/ 1/2" HOLE

WASHER

2 1/2" LGS

SLV

2 1/2" O.D. X 1 3/4" I.D.

BUSHING

RECOMMENDED PLATE  
THICKNESS .14"  
HOLE .006" - .14"

2 1/2" O.D. X 1 3/4" I.D.

BUSHING

2 1/2" DIA. W/ 1/2" HOLE

WASHER

2 1/2" DIA. W/ 1/2" HOLE

ENERGY SUSPENSION INC.

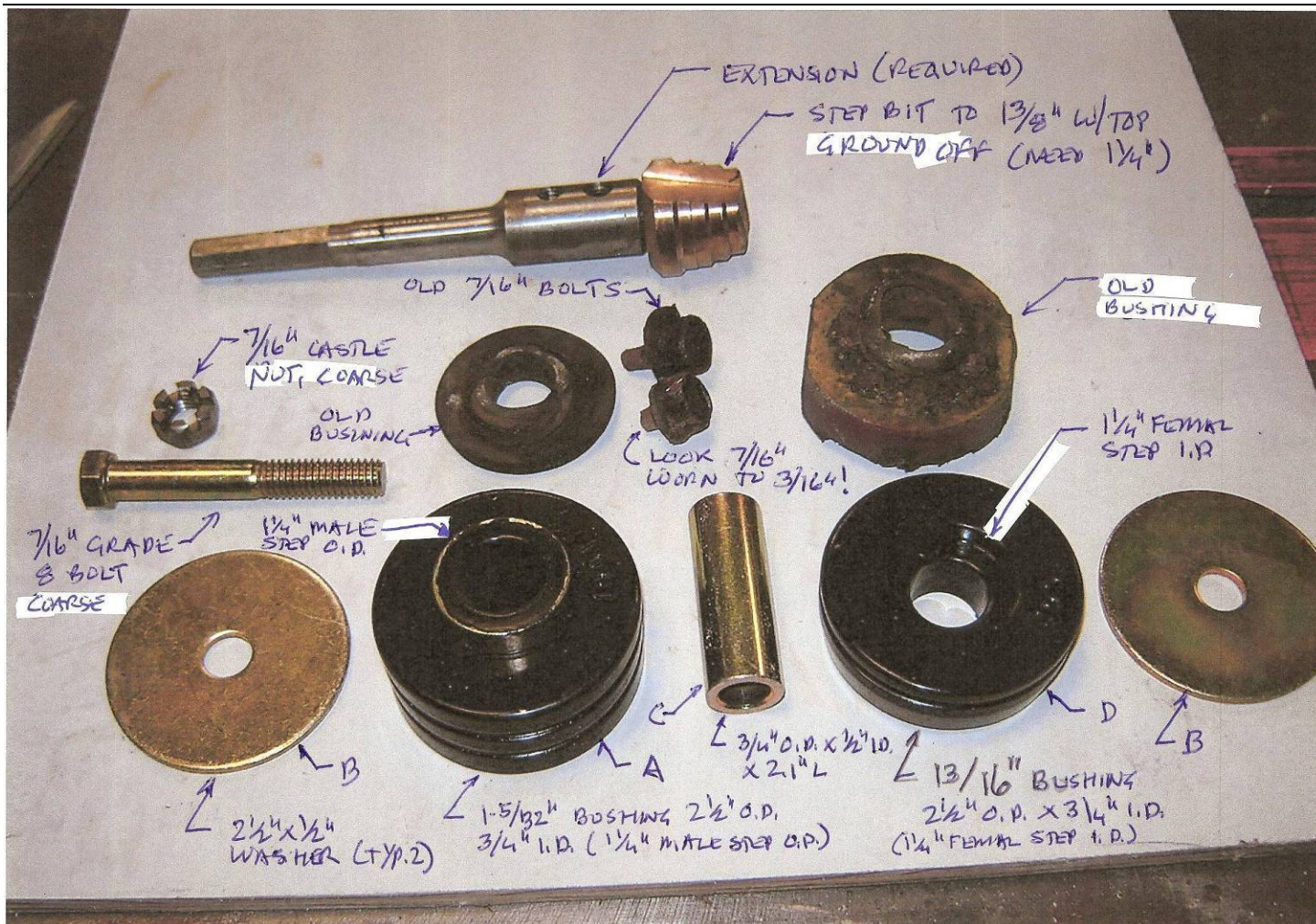
Performance. All Day. Every Day.

**My diagram of the assembly and the manufacturer's data from the Internet**





# Cadillac & LaSalle Club Potomac Region Caddie Chronicle March 2011



Everything discussed in the article including bad bushings, new bushings, etc...

Frame to body mechanical connections are a critical part of the automobile, and this article is just a description of what I did. I'm not a mechanic, but an engineer. This article does not express an engineering opinion nor endorse a particular product. Unfortunately this process is not described in the 1970 Cadillac Shop Manual. Consequently, I had to develop a reliable method. This article is written so you may not have to re-invent the wheel and to give you courage. I was worried about my body panel or door alignments, but there are absolutely no issues. There are no shims required. I think that the standard body to frame bushings assembly without shims started in GM cars in 1965 when the chassis were all re-designed with perimeter box frames in lieu of "X" style frames.



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To remove a bushing the body must be separated from the frame by a half inch. Sounds simple but it is not. The good news is that the parts and tools to perform this work are inexpensive, as the cost was about \$200. However the labor and learning curve was extensive. This is a good winter project. It might require two or three weekends (It took 30 hours the first time, 18 hours the second time). This is a two man job. It would be extremely difficult for one person. During the entire bushing replacement procedure the car will be jacked up or otherwise not able to be driven.

Before starting, invest in a step drill bit with extension (Northern Tool on-line has them), because the frame openings are 1-3/16" internal diameter and the bushings may require a slightly larger diameter hole, mine were 1-1/4" diameter. Also purchase grade 8 bolts, 7/16" coarse threads. Since you may need different lengths, consider buying four 3" length bolts, six at 3½", four at 4" and a matching quantity of 7/16" nuts and washers, grade 8. Unfortunately, you should work through the process below to step 6, before you procure your replacement bushings.

#### **THE PROCESS**

1. Loosen the bolts on the "rag" joint between the steering column and steering gear which is easily accessible under the hood on the driver's side. Don't forget to re-tighten when you are all finished with the job. The steering column is connected to the body and the steering gear is bolted to the frame. The frame and body will be separated and you will wreck your steering gear if you do not do this.
2. Remove the bolts from the driver's side of the car on the body to frame bushings. This is no easy task-more on this later.
3. Loosen, but do not remove the bolts on the passenger side. Again, this is not easy. Do not remove all of the bolts on both sides or you could risk misalignment of the body and frame. Always maintain at least one side of the car with all bolts and nuts fastened at least finger tight without exception.
4. The frame should be able to be separated from the body now on the driver's side a minimum of a ½".
5. Use two floor jacks and a long 2 x 4 and jack-up the body under the rocker panel and the body should lift off the frame. I found that only portions did and you have to concentrate on one part at a time. Start in the back. You can use one jack at the rocker and another right at the bushing being replaced. Often a pry-bar is required too. Once the bolt is removed and the ½" separation occurs, the old bushing can be removed. Remove the old bushing.
6. Use the removed bushing as a sample for replacement. The height between the body and frame seems critical because the front fender is bolted to the frame and the door is bolted to the body. A change in height of the frame from the body could misalign the doors and front fenders. The hood hinges are bolted to both the frame and body. The height of the bushing for my car was 13/16". The replacement bushings that I selected were Energy Suspension Polyurethane 9.4102G in black for the project. Red is available, and the color has no impact on performance. Polyurethane is far superior to rubber and is highly recommended.





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7. Use the step bit and enlarge the frame hole opening if required. I had to increase the hole diameter from 1-3/16" to 1-1/4".
8. Install the new bushing. Then install all the bushings on the driver's side, but don't tighten the bolts completely (finger tight). The bushings I used installed upside down, and this created an unusually thick bottom bushing component, which was acceptable.
9. Install spacer washers if the frame and body thickness are not equal to the thickness designed by the manufacturer, usually 1/4" (that is if your frame is 1/8" thick and body is 1/16" thick and it is engineered for 1/4" thickness for both body and frame, then a 1/16" thick washer is required to make up the difference). This step has nothing to do with the body/frame alignment, but rather to insure the bushing is properly compressed.
10. The four front bushings each employ a through bolt with standard nut. Only a castle nut with cotter pin on top of the first bolt will keep the nut from loosening. Double nuts, lock washers and the like do not work, believe me I tried everything. This is not difficult because after you drill the bolt and re-install, you can install washer spacers between the first nut and castle nut to get the right position for the cotter pin. The nuts are accessible by opening the hood.
11. On some cars, a rubber compression only with no bolt is used centered between the wheels. Replace this too. Since the original has a step and the replacement may not, a small bolt and large washer may be required to keep the bushing from moving.
12. Now attend to the passenger side and remove all the bolts. Repeat the process. It will be much easier because you will have already completed the driver's side (learned how). Tighten these bolts according to the manufacturer's specifications (until you taste bile, usually when the interior sleeve is butted against the two washers and no further compression of the bushing can occur).
13. Go back to the driver's side and tighten those bolts.
14. Re-tighten the steering rag joint. If you forget this, it may still steer, but not a good idea.
15. Drive the car a couple hundred miles over normal roads (not just a long highway trip), and then make sure all the bolts are still tight.

The difficult aspects of this project are obtaining the 1/2" separation to remove the old bushings and removing the old bolts. Here are several other points to consider:

1. The eight (four per side) rear bolts are screwed into a square metal nut that is held in place by a tack welded piece of sheet metal. Often the tack weld fails and the square nut spins or the bolt breaks. If this happens, then you need to cut the sheet metal body above to access the square nut. There are four of these on each side in the back. The bushings above the rear axle seem to be well preserved and will not be an issue. The four below the trunk can be the most problematic. The worst is the one below the rear seat.
  - A. To access a square nut that is spinning or the bolt has broken, drill a pilot hole from below 1/8" up through the body to find out where you are. Use the 1/8" hole to help position where to drill your 3" diameter metal hole saw. The body mounts are a piece of 1/16" thick metal separated from the body by about a half inch and so when you cut this hole you will not ruin the body mount.



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- B. After the hole is cut, you can remove the sheet metal bracket with a cold chisel and make this a through bolt application similar to the front bushings with a castle nut. After the installation is completed, manufacture a patch panel from 20 gauge galvanized sheet metal and fasten with sheet metal screws. Paint the patch panel and it will look very professional.
2. Sometimes it is difficult to attain that ½" clearance separation from the body to frame (in addition to the 13/16" already maintained). A large digging bar may be required to be used as a pry bar. Sometimes when you jack up the body the frame goes up too.
  3. There are also three minor body to frame bushings in front that seem to hold up much better than the others and except for accessing them (under radiator, battery, and coolant reservoir), they are child's play to replace after you have replaced the major bushings that are the subject of this article.

Since the bushing replacement, the car no longer rattles and the doors close much nicer. The suspension control arm bushings front and rear were already replaced, so there was no concern about rattles in suspension. The project went so well on the 1970 Cadillac that had suffered severe bushing deterioration; that I decided to replace them on my other 1970 Cadillac. I have driven one of



**Mission accomplished: replaced bushing**

these two cars over 4,000 miles since bushing replacement with no problems; therefore I consider the job a success. It is a real pleasure driving a 40 year old Cadillac Convertible with smooth like new rattle free ride quality.