

Doing The Sombrero Dance In Your '63-'78 Corvette

BY JOHN HINCKLEY

Ever heard or felt a "sombrero bushing" fail? No, we're not talking about a Mexican hat dance. Sombrero bushings are the two bushings that isolate the '63-'78 differential crossmember from the frame.

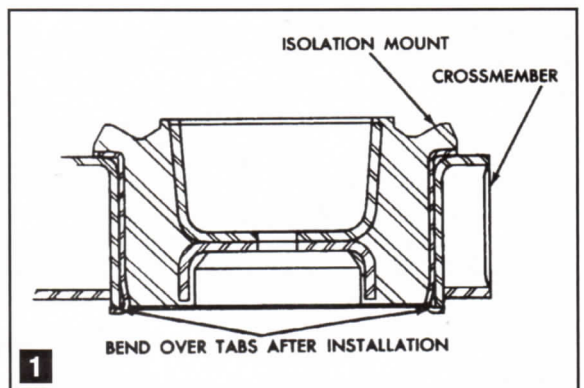
I was cruising down I-75 one afternoon, top down, on my first drive after taking my '67 out of its annual six-month winter hibernation, when I heard and felt a really loud "BANG!" from behind the driver's seat. It was loud enough that I pulled off on the shoulder and looked underneath to check it out. I didn't see anything broken or adrift anywhere, so I continued home without incident or any strange noises to get the car up on my lift.

What Happened: Close inspection on the lift showed that the "sombrero" bushing had failed where the driver's side of the differential crossmember attaches to the frame. The upper flange on the outer shell of the bushing

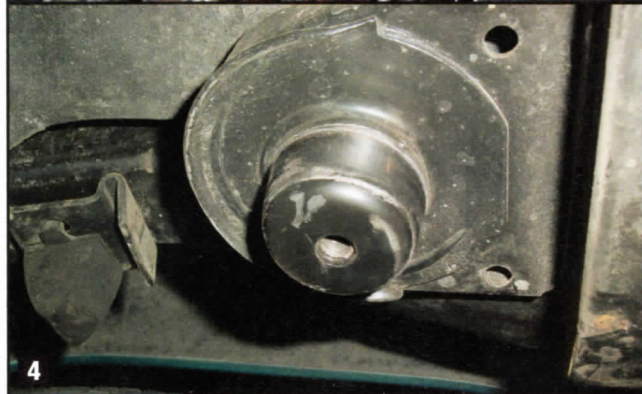
had sheared off, which allowed the crossmember to slide up and ground out solid against the frame. The bang I heard and felt was the sound of the top of the crossmember hitting the frame when the bushing failed.

Sombreros? They get their name from the sombrero-shaped stampings that fit into the top of the isolation bushings on the crossmember. The bushings are a press-fit in the crossmember from the top, with

bent-over tabs on the bottom to retain them. Each bushing carries half of the weight of the rear end of the car, with the "sombrero" on the frame pushing down on the center of the bushing, and the differential crossmember pushing up on the flange



1 Cross section of the "sombrero" bushing installed in the crossmember; the flange at the top of the bushing's outer shell had rusted through and sheared off.



2 Photo of the failed bushing showing how the crossmember moved upward against the frame when the flange at the top front of the bushing sheared off. This was the “BANG” I heard and felt when it failed.

3 Rick Parks with his “super pry bar” that makes quick work of popping the bushings free of the sombrero formations on the frame.

4 One of the sombrero-shaped formations welded to the frame; the vertical bushing through-bolt engages the weld-nut in the center.

at the top of the bushing’s outer shell. The rubber portion of the bushing isolates the crossmember from the frame. Mine were original, and had lasted 40 years and 90,000 miles; no doubt far beyond their original design expectation.

The Fix: Not wanting to tie the car up on my home lift for an extensive rear end teardown, with the weather finally breaking I called fellow Michigan NCRS chapter member Werner Meier, retired GM engineer and owner of Masterworks Automotive Services in Madison Heights (www.mwauto.com), and drove the car into his shop several days later to have the bushings replaced.

Technician Rick Parks was ready to go when I arrived, and the car went up on a 2-post lift. I had already removed the spare tire carrier before I left home. There are two ways to approach this job – the long way and the short way.

The long way is shown in the Chassis Service Manual, and involves dropping part of the exhaust system, removing the spring, half-shafts, camber strut rods, diff nose snubber bushings, and prop shaft in

order to drop the crossmember and then separate it from the differential housing; this is the traditional method, and generally requires re-setting rear camber after reassembly of all the components.

Rick has developed his own short way, and we decided to go with it. He removed the tailpipe extensions and loosened the clamps at the joints where the exhaust pipes meet the muffler inlets to get some added clearance below the spring, and disconnected the outer ends of the half-shafts from the spindle flanges.

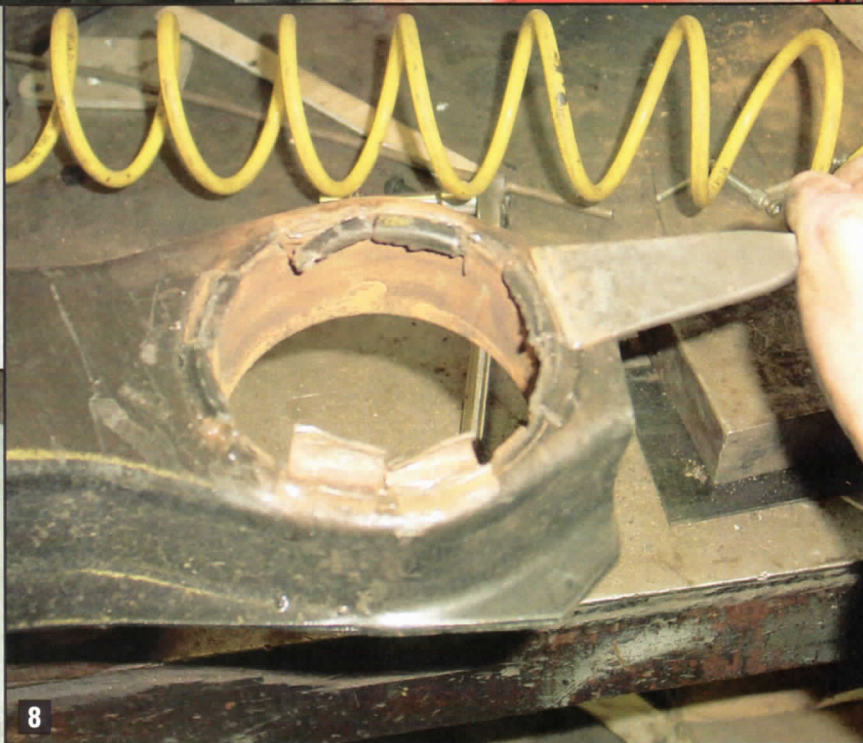
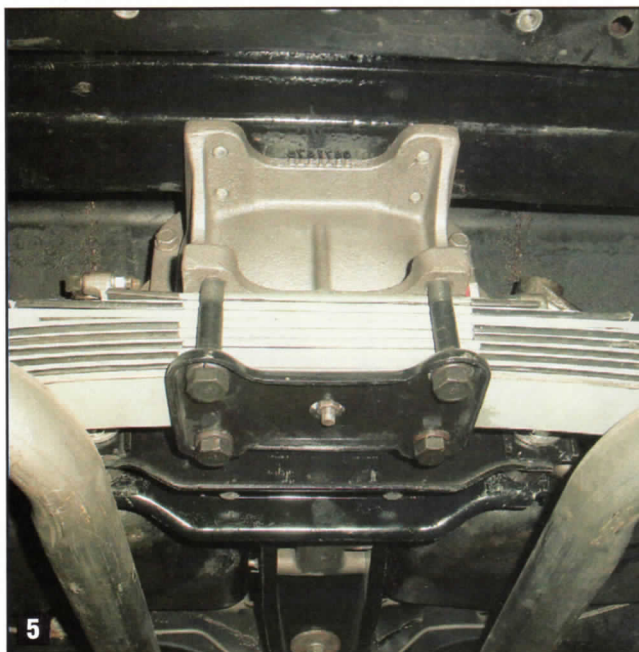
With the diff supported on a transmission jack under the spring plate, he removed the sombrero bushing bolt on each side and used his 5½-foot “super pry bar” to pop the bushings loose from the “sombrero” formations on the frame. Then he lowered the diff on the jack a few inches, and went in from the front side of the crossmember with a flat ratchet air wrench and special socket, and removed the four bolts that attach the diff cover to the crossmember. With those four bolts removed, Rick lowered the diff a bit more and slid the crossmember out above it, ready to work on the bushings.

Rick set the crossmember up on plates in the hydraulic press, and used a punch slightly smaller in diameter than the outer sleeve of the bushing to press out the center sleeve and rubber isolator as a unit, shearing the rubber bond to the outer sleeve at the same time. This leaves just the outer sleeve to deal with.

On the bench, Rick used an air chisel to open the bent-over retaining tabs on the bottom of the outer sleeves and cut them out of the crossmember and then worked the holes in the crossmember to make sure they were round, smooth and free of burrs to ease installation of the new bushings.

New Bushing Installation: The crossmember went back in the press, with the new bushing squarely positioned in the opening, and a square plate was used to press the bushings all the way into the crossmember, with their upper flanges firmly seated against the surface. A ball peen hammer was used to bend over the retaining tabs on the bottom of the bushings and seat them flat on the crossmember. These tabs serve no stressed function, as

TECHNICAL RIDE RESTORATION



5 You can see the ends of the four bolts at the top that secure the diff rear cover to the bushing crossmember. Rick's method permits removing them to pull the crossmember without complete disassembly of the rear suspension.

6 Setup for pressing the old bushing center sleeve and rubber isolator out of the bushing's outer shell; removal of the outer shell is a bench job.

7 This is a top view of the center sleeve after pressing it out of the bushing; the rubber isolator came with it,

but is shredded in the process.

8 With the guts pressed out, the bushing's outer sleeve tabs are bent up and the sleeve is cut out of the crossmember with an air chisel.

9 Pieces of the outer sleeve after being cut out of the crossmember.

10 After chiseling out the sleeve, the openings in the crossmember are worked to remove any burrs that would complicate installation of the new bushings.

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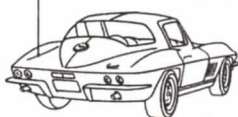
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11 Top view of the new bushing; the "well" in the center sleeve is the part that mates metal-to-metal with the sombrero formation on the frame when the through-bolt is torqued. Note the flange at the top, which was the failure point on the old bushing, and the "tabs" at the bottom, which will be bent over after pressing the bushing into the crossmember.

12 Press setup for installing the new bushings. Note the steel plate used on top of the bushing to ensure even pressure and a straight-in assembly. With the new bushing fully seated in the crossmember, it will go to the bench to bend and seat the tabs that retain it at the bottom.

13 The crossmember inverted on the bench, showing the protruding tabs that must be bent over to retain the bushing. A stout hammer is used to bend over the retaining tabs against the bottom of the crossmember — half are done in this photo.

14 The sombrero formation is cleaned up and ready for crossmember installation. Don't cross-thread the weld-nut or knock it loose — the body has to come off the frame to repair it.

15 Anti-seize applied to the top of the bushing's steel inner sleeve prior to crossmember installation, simplifies seating to the sombrero formation on the frame and makes future disassembly much easier.

16 Aligning the crossmember to the sombrero formation on the frame prior to raising the differential with the transmission jack.



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17 The crossmember and new bushings back in place, through-bolts torqued, ready for another 40 years and 90,000 miles.

the crossmember is always pushing up on the bushing – they just keep the bushing's outer sleeve from working loose in the hole in the crossmember.

The surfaces on the sombrero formations on the frame were cleaned up, and the mating female steel formations in the top of the bushings were coated with anti-seize to ease installation (and disassembly if required in the future for other major

service). The crossmember was slid into position above the diff, and the four diff attaching bolts were installed using the same air tool and socket used earlier to remove them. Then the transmission jack under the diff was raised, the bushings were centered on the sombrero formations on the frame, and a spinner jackstand was used on each side in addition to the transmission jack to press the crossmember up in place and seat

the bushings on the sombreros. The single attaching bolt was installed through each bushing and torqued, and the jackstand and transmission jack were removed.

The outer half-shafts were reattached to the spindle flanges (and the French locks were bent over), the tailpipe extensions were reinstalled, and the exhaust pipe-to-muffler joint clamps were tightened after repositioning the pipes just below the spring.

The car then went out for a test drive to check for any noises. The entire process only took 2½ hours from start to finish, will never have to be done again (at least not in my lifetime), and rear camber didn't have to be reset, as the adjustments weren't disturbed. ■

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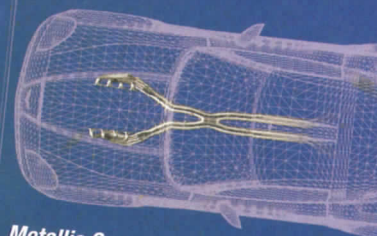
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