

Rear Shocks Replacement—Modern Version

For BMW Isetta 600 — by Gary Rannefeld

When I learned of the price for the original type of rear shock absorber from Germany, I set out to see if I could adapt a less costly U.S. shock absorber to my 600. I had heard rumors of a Monroe shock absorber that was supposed to be a “good fit” for the 600 rear shocks, but when I obtained the actual dimensions from Monroe, it turned out not to be suitable.

I then sent Monroe the dimensions of my original rear shocks and asked for their closest match. What came back was remarkably close (but not perfect), but it does require a small modification or two to work in the 600.

Monroe Part Number 32235 is what I used. When I went looking for this shock, I learned that it is ***identical*** in every aspect to a NAPA Part Number 94085. In other words the NAPA box contains a Monroe shock, right down to the paint and Monroe part number. The NAPA shock sells for a little over \$30.00 each in California.

The main modification required to the Monroe/NAPA shock is that the stud on top (Monroe calls this a stem.) must be threaded more of the way down (3/8-16 NC) and the excess stud length removed to match the stud length on the original shock. Since the rubber mounting bushing sits on the flat top of the original 600 shock, I added a close-fitting heavy fender washer to the stud to provide a similar flat surface and measured the new stud length up from there. Other than the use of a 3/8-16 NC nut (instead of metric) to install the top of the shock in the car, the modified stud should be made to look similar to the original with a small pair of flats at the very end for keeping the stud from turning as the nut is tightened.

I reused the original BMW rubber bushings at the top of each shock.



Top of an original rear shock (black) next to a new Monroe shock; a heavy fender washer was placed on the stud of the *modified* Monroe shock to make a flat surface for original BMW rubber bushing.

The eyelet on the bottom of the new shock (Monroe calls this a loop.) requires only the use of the steel bushing from the original BMW shock. Take it out of the old shock and insert it into the rubber eyelet bushing on the new shock. It should fit perfectly. The use of a little rubber lube during installation allows the new bushing to slip easily into the mounting bracket on the BMW rear suspension.

When the car is lifted so that a rear wheel leaves the ground, a properly designed shock absorber limits the suspension travel for a couple of reasons as follows:

1. It prevents the rear spring from moving out of its proper position top and bottom.
2. It prevents excessive misalignment of the rear axle that might damage the flexible couplers (rubber donuts).

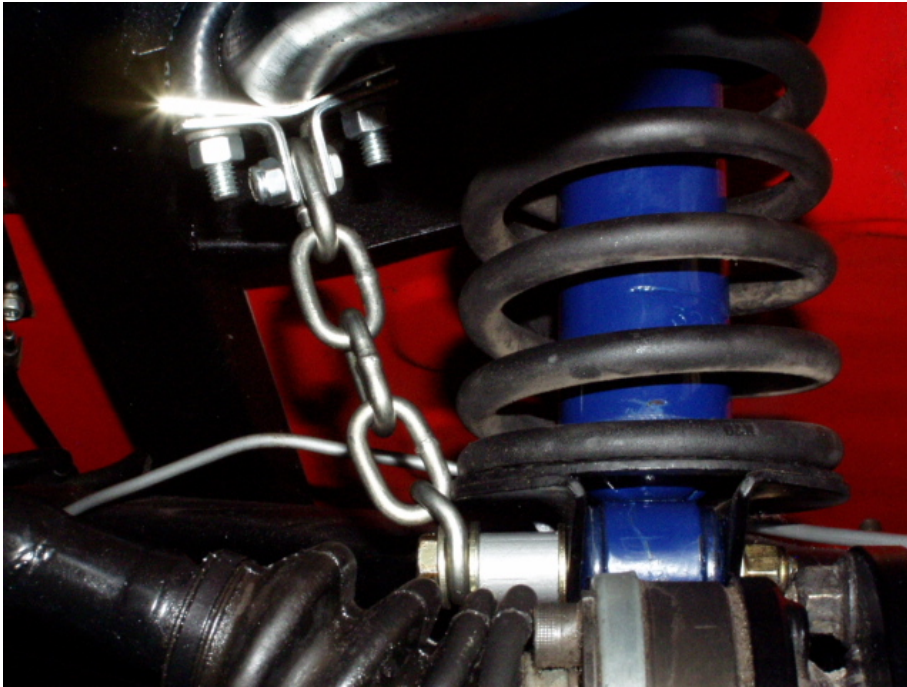
Unfortunately this particular Monroe/NAPA shock allows perhaps 3/4" more suspension travel than the original shock when installed as above. Since I am not using the original rubber donut setup (more about that below), I cannot provide precise information about the use of these Monroe/NAPA shocks with rubber donuts. But I suspect that you will want to look closely at the additional stress that more suspension travel might place on the donuts and consider following the modification I made to my 600 below. Of course the additional suspension travel occurs only when the car is lifted off the ground or if the wheel were to leave the ground while driving.

[As an aside, I intend to write a future article about my conversion from the original 600 rubber donut arrangement to a VW constant velocity joint/axle setup. You can see it in the first picture below. This rear axle type was offered by VW starting about 1968 in the air-cooled beetle and its use on my BMW has eliminated all concerns about broken donuts, axles flying around and maintenance.]

With my Volkswagen CV joint conversion in my 600, I found the extra rear suspension travel allowed by the Monroe shock installation above wouldn't allow the CV joint and axle to be reassembled. In other words the small amount of extra suspension travel would have required the CV joint to flex at an angle beyond what it was designed for. I have no experience with the rubber donuts and I suppose it's possible that they can tolerate this small amount of additional flexation and stretching. Normally the only time when this additional suspension travel and stress will occur is when the car is lifted for service (or when you are pretending the car is a skateboard by driving off a ramp), so maybe all is OK if you are using donuts. But I would check and see what everything looks like as the wheel rotates when it is lifted off the ground.

My philosophy, where practical, is not to permanently modify my 600 unless there is no other way to achieve some desired improvement. I think I have met that standard here; no drilling or welding on the BMW was required and everything can be removed if desired.

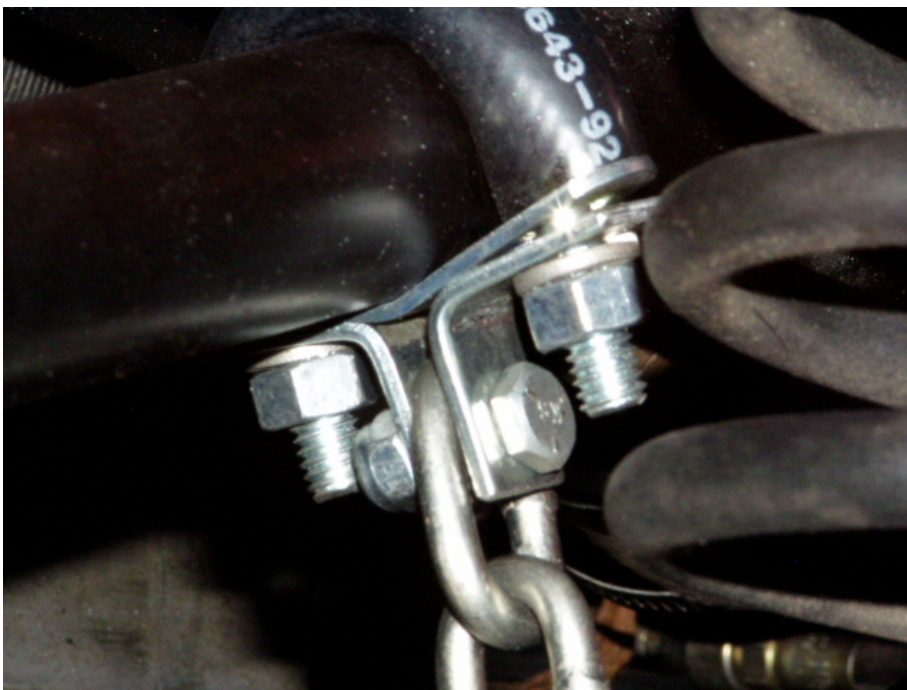
To provide a positive stop for the rear suspension, I attached a short piece of chain between the bottom of the shock and the strut that is mounted between the frame and the rear bumper as shown below.



Bottom of rear shock with longer bolt to allow chain to clear bottom of spring.

The new bolt that attaches the bottom of the shock to the spring pad is 3/8-16 NC x 3.5" long. Be sure to use at least a Grade 5 bolt and hard washers to capture the bottom chain link. I used a short piece of 3/8" pipe for a sleeve to position the bottom link of the chain out from under the spring.

Next is a better view of the chain connection to the strut. This assembly uses a 5/16" U-bolt, a pair of brackets and, again, a 1/4" Grade 5 bolt with self-locking nut.



5/16" U-bolt covered with a piece of 3/8" hose to prevent slipping; horizontal bolt is 1/4" Grade 5.

The number and size of chain links, and the position of the above assembly on the strut, will determine the maximum travel of the rear suspension after everything is installed. A little trial and error is required here because of the variety of chain available. I used some 1/4" chain that I already had on hand; I've seen other 1/4" chain that is somewhat different.

The finished assembly should limit the rear suspension travel to no more than the original shock allowed. I suggest adding the chain assembly to one side of the car first. That way you will be able to measure the original travel and adjust your materials and the position of the U-bolt clamp to match the original maximum travel.

In normal service the chain links are not in use and the suspension moves as it always has. Only when the wheel is lifted from the ground does this chain assembly go to work to limit the travel of the suspension.

Final Note: If anyone knows of a low-cost, commonly available shock that would work better in this application, please let me know. Before Monroe's help, I went through literally hundreds of shock absorber dimensions on factory data sheets without success. I finally arrived at the one I used with the help from Monroe. The only real issue with the one I used—an issue that may only apply to my use of Volkswagen CV joints—is that the internal design of this shock allows a little too much travel when fully extended.

Note: My thanks to Bill Rogers of South Carolina for all his help and encouragement with my BMW 600 project. As this article was written, Bill's Isetta website is <http://www.isettadoc.com>. For questions or comments about this article, please contact me at Rannefeld@aol.com.