

## Suspension Upgrade Procedure for '99+ Cobra

H&R Super Sport springs, Bilstein dampers, and Maximum Motorsports sway bar end links, steering rack bushings and caster/camber plates were installed on an '01 SVT Cobra using the procedures detailed in this document. No applicability of these procedures to other year/model cars or other suspension products is expressed or implied.

### Suspension Upgrade Procedure General Outline

#### REAR (each side)

1. Remove stock spring
2. Remove stock shock
3. Install new H&R spring
4. Install new shock

#### FRONT (each side)

1. Remove stock spring
2. Remove stock strut
3. Remove stock C/C plate per MM C/C Plates documentation
4. Install MM C/C plate per MM C/C Plates document
5. Install new H&R spring
6. Install new strut

#### FRONT (optional)

1. Replace stock front sway bar end links with MM polyurethane end link set
2. Replace stock steering rack bushings with MM aluminum bushings per MM Bushing Swap document

### Preparation

Before doing anything else, open the trunk of the car and remove all the trunk's interior trim pieces as follows:

1. Pull out the bottom trim piece. It just pulls out without any tools.
2. Remove the rear trim piece. It is held in place with 4 plastic push-in trim retainers surrounding the latch area and two twist-on threaded retainers near the tail light assemblies.

3. Remove the trim piece under the rear deck. It is secured by 4 push-in plastic retainers along the hinge side of the trunk opening.
4. Now, you can finally remove the two trim pieces you really need to get out – the two side trim pieces. Remove the push-on retainers on the undersides of their top sections and pull them out after all the other trim pieces have been removed.

Now you're ready to put the car up on jack stands. Proceed as detailed below:

1. Block the rear wheels and raise the front of the car with a suitable floor jack placed under the center of the K-member just high enough to partially unload the front tires.
2. Loosen the lug nuts on both front wheels, and continue raising the front of the car as high as possible.
3. Place a jack stand under the subframe on each side, behind each front wheel, and lower the car onto the jack stands.
4. Raise one side of the rear with the floor jack placed under the rear subframe, ahead of the IRS just high enough to partially unload the rear tire.
5. Loosen the lug nuts on the rear wheel on that side and continue raising the rear of the car as high as possible.
6. Place a jack stand under the rear subframe, just ahead of the floor jack, and lower the car onto the jack stand.
7. Repeat steps 4 through 6 on the other side. The car should now be resting securely on the four jack stands.
8. Remove all the lug nuts and wheels.

Okay. Now you're ready to get busy with the actual suspension upgrade.

### **Rear Spring and Shock Upgrade**

Follow these steps to replace the car's rear springs and shocks:

1. Note the location of each spring's bottom pigtail in its spring perch and the location of the spring's top and bottom rubber isolators. You'll need to install the new spring exactly the same way.
2. Place the floor jack under one of the rear lower control arms and tie one end of a strong safety rope around the back side of one of that spring's coils. Then, secure the other end of the rope to a suitable chassis or suspension component behind the coil. Leave enough slack in the rope for the spring to be removed from its perch in the lower control arm, but not

enough slack to permit the spring to rearrange your face if something lets go and the spring tries to jump out at you. THIS STEP IS EXTREMELY IMPORTANT TO YOUR PERSONAL WELFARE!!! DON'T SKIP IT!

3. Insert a suitable spring compressor into the spring and jack up the lower control arm to compress the spring until the rear subframe begins to lift from the jack stand supporting it. This will compress the spring a bit to facilitate its complete compression.
4. Using the spring compressor, compress the spring until the tool or the spring bottoms out. (NOTE: I used a spring compressor – part number 27035 – that I borrowed from Auto Zone. This tool works okay for removing the stock springs, but I DO NOT recommend it for installing the H&R springs, because it's a PITA getting the tool between the tightly wound upper coils of the H&R springs and an even bigger PITA getting it out once you have the new spring positioned. It was all I had, so I made it work.)



Figure 1 Stock rear spring on spring compressor

5. Lower the control arm just enough to unload the lower shock bolt. Then, remove the bolt.
6. Remove the nut from top of the shock. (You did leave the trunk open, didn't you?). Then, remove the shock, noting the orientations of the bushings and cup washers on its shaft for future reference, and continue lowering the control arm until the compressed spring can be removed.

You should not have to disconnect the toe-in rod ends, sway bar, or either knuckle joint to get the old springs out or the new ones in, but your luck may vary. If you end up disconnecting any of these, use red LocTite on all threads during reassembly.

7. After removing the stock spring, remove its top and bottom isolators and note the shape of the spring ends, match the new spring top and bottom and install the rubber isolators on the new spring exactly as they were on the stock spring. As shown below, the unloaded length of an H&R Super Sport spring is only about  $\frac{1}{2}$  inch shorter than the stock spring, so you will certainly need to compress the new spring before installing it in the car.



Figure 2 Rear stock spring left and H&R Super Sport right

8. Install the spring compressor on the new spring, and compress the spring enough to enable the spring and its isolators to be positioned in the spring perches on the car.
9. Position the spring. Then, raise the lower control arm enough to secure the spring in place.
10. Tie one end of a strong safety rope around the back side of one of that spring's coils. Then, secure the other end of the rope to a suitable chassis or suspension component behind the coil. Leave enough slack in the rope to enable you to completely lower the control arm again, but no more than that. **THIS STEP IS EXTREMELY IMPORTANT FOR YOUR PERSONAL WELFARE!!! DON'T SKIP IT!**

11. Alternately loosen the spring compressor and lower the jack a bit at a time until the control arm is once again completely lowered. (Don't worry. The spring isn't going to fall out.)
12. Remove the spring compressor from the spring.
13. Next, install a cup washer and bushing on the shaft of a new rear shock. Then insert the top of the shaft through the mounting hole in the trunk.
14. Install the shock's top bushing and washer, and then thread the shock's top nut onto the shaft, and tighten it down until the top bushing is deformed slightly into a doughnut shape.
15. Raise the lower control arm enough to align the lower shock bushing with its mounting holes in the control arm, and insert the lower shock bolt.
16. Install and tighten the nut on the lower shock bolt.



Figure 3 Driver side with new spring and shock installed

17. Lower the car back down onto the jack stand, and reinstall the wheel and lug nuts.
18. Move to the other side of the car, and repeat the above steps.

### **Front Spring, Strut, and C/C Plate Upgrade**

The procedures for replacing the front springs and struts are similar to those required for the rear, except that a spring compressor will probably not be needed. You should perform each side's C/C plate upgrade after removal of the stock spring and strut, but before installation of the replacement units.

1. Note the location of each spring's bottom pigtail in its spring perch and the location of the spring's top and bottom rubber isolators. You'll need to install the new spring exactly the same way.
2. Remove the upper front sway bar nuts, cup washers, and grommets from BOTH sides, and rotate the sway bar up and out of the way. If you are upgrading the sway bar end links at this time, remove the entire end link assemblies, taking note of the relative positions and orientations of the various cup washers and grommets.
3. Place the floor jack under one of the front lower control arms and tie one end of a strong safety rope around the back side of one of that spring's coils. Then, secure the other end of the rope to a suitable chassis or suspension component behind the coil. Leave enough slack in the rope for the spring to be removed from its perch in the lower control arm, but not enough slack to permit the spring to rearrange your face if something lets go and the spring tries to jump out at you. **THIS STEP IS EXTREMELY IMPORTANT TO YOUR PERSONAL WELFARE!!! DON'T SKIP IT!**
4. Straighten a wire coat hanger for use as a caliper hanger. Then, remove the brake caliper from the rotor (two bolts on the back face of the caliper), and hang it from the chassis, inside the fender well in such a manner as to present minimal stress to its brake line.
5. Slide the ABS sensor cable upper grommets off their bracket at the frame rail to provide adequate slack in the cable for lowering the control arm.
6. Remove the large nut securing the ABS sensor cable lower bracket to the upper strut bolt, and move the bracket and cable aside.
7. Jack up the lower control arm slightly to take the preload off the strut. Then, remove the strut's shaft nut from the top of the strut
8. Remove the nuts on the two bolts at the bottom of the strut, and then slide the bolts out of the strut.
9. Slide the strut down and out of the car.



10. Completely lower the jack and the control arm very slowly.

NOTE: It should be unnecessary to disconnect the tie-rod ends in order to get enough lower control arm travel to remove the stock springs.

11. The stock spring must be wedged out of its lower perch, but it should come out without your needing to use a compressor. Just give it a series of quick tugs with a pry bar, and it should pop right out. What's left of your front suspension should now look something like the front suspension in the figure below.

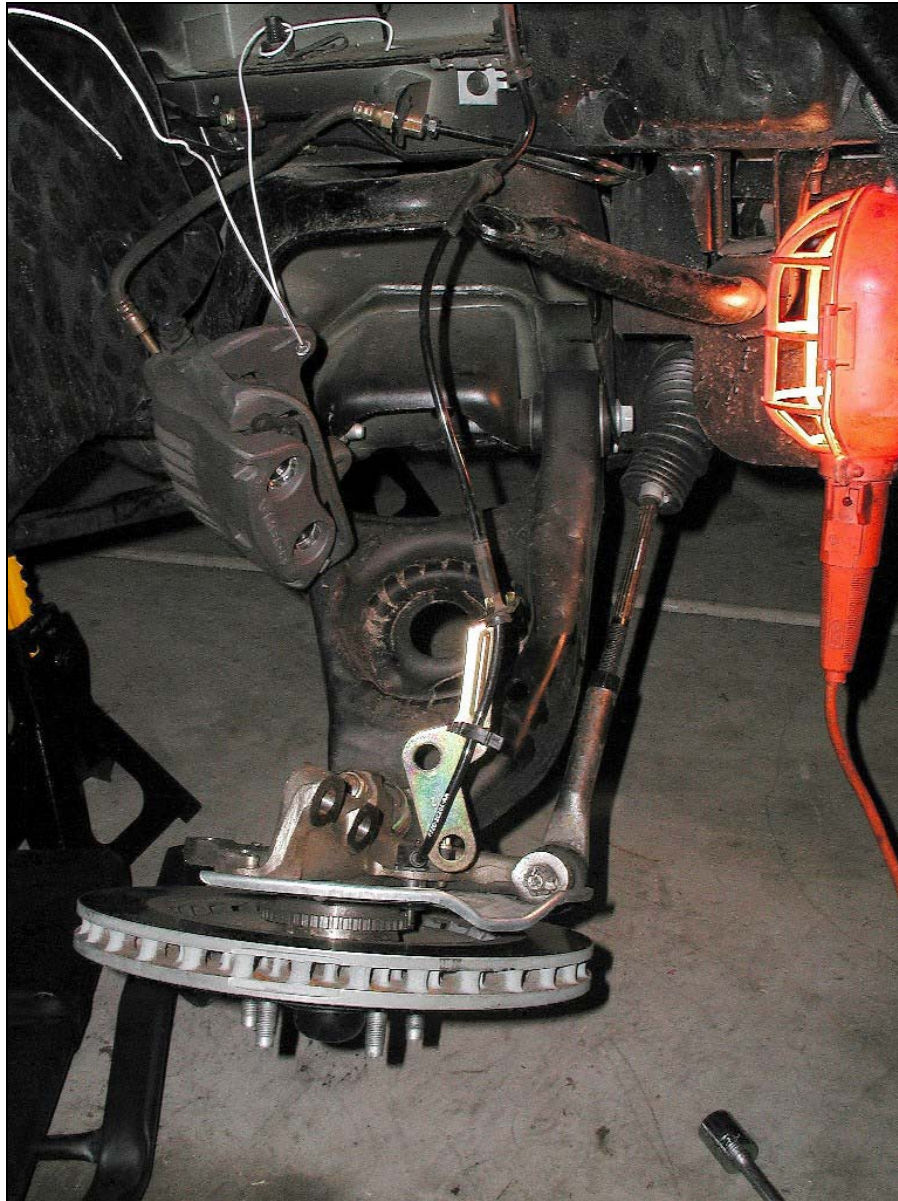


Figure 4 Passenger side front with spring and strut removed

12. Follow the instructions provided with your camber/caster plates to replace the stock C/C plate with the upgraded unit.

The instructions provided with the Maximum Motorsports units are so good that I wouldn't even consider trying to improve on them. The one thing I recommend you do that is not mentioned in the MM instructions is to protect all the components in the fender well against falling metal shavings when drilling the 4<sup>th</sup> hole in the strut tower. A large sheet of plastic is ideal.

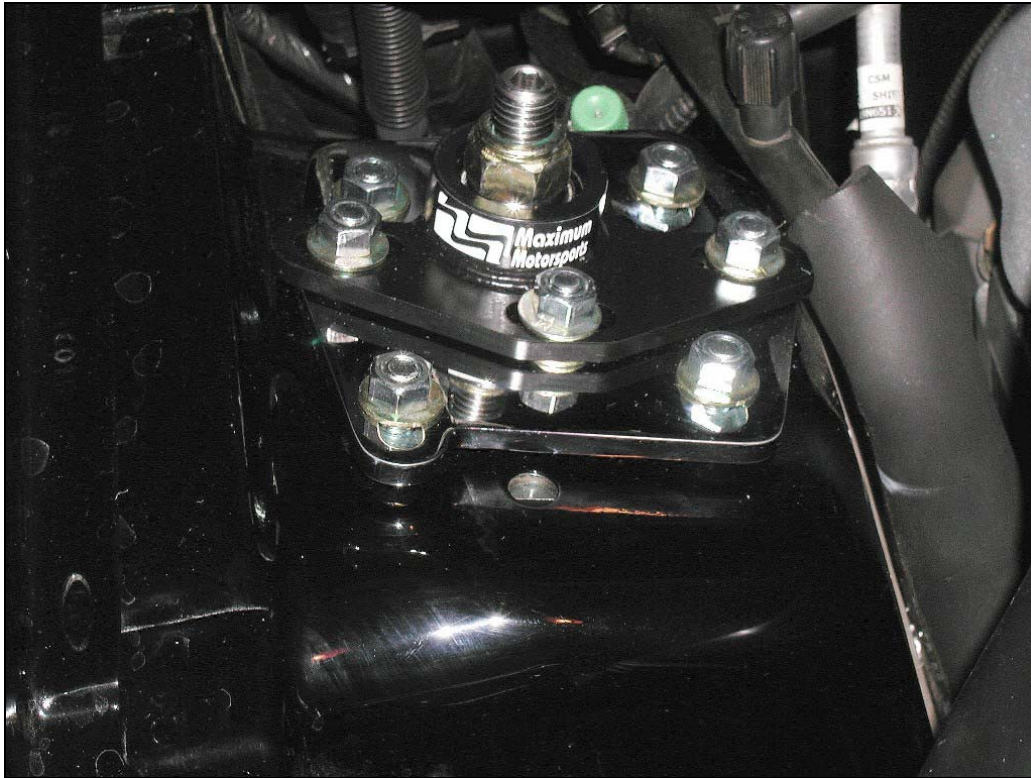


Figure 5 New passenger-side MM caster/camber plate installed on strut tower

13. Transfer the stock front spring isolators over to the new spring or install new polyurethane isolators, if available.

The slip-on isolator at the bottom of the spring is a tight fit since the spring coil diameter is larger than the stock spring, so lubricate the spring with some Sil-Glyde or other silicone-based lubricant.





**Figure 6 Front stock spring and isolators at left, H&R Super Sport w/ MM poly isolators at right (both inverted for balance)**

14. Install the spring in the same orientation that the stock spring was in before it was removed. Be certain to get the orientation of the spring's pigtail in the lower spring perch correct.

NOTE: You will probably have to apply some pressure to the top of the lower control arm with your foot in order to get the spring to slide into place on the lower spring perch, but the unloaded height of a front H&R Super Sport is about 1½ inches shorter than height of the stock spring it is replacing, so it should go in without too much drama.

15. Insert the shaft of the new strut through the spherical bearing of the new C/C plate. Then, thread the new self-locking nut onto the shaft and tighten it. Bilstein struts have Allen key recesses in their tops. If you're installing Bilsteins, you'll need to use an Allen wrench to prevent the strut shaft from turning as you tighten the nut.
16. Raise the lower control arm with the floor jack until the strut bolt holes line up with the holes in the lower strut bracket. Then, reinstall the bottom strut bolts and their nuts, and tighten the nuts.
17. Reinstall the lower ABS sensor cable bracket wire loom on the upper strut bolt. Then, thread and tighten its retaining nut.

18. Slip the two upper ABS sensor cable grommets into their original positions in the upper sensor cable bracket.
19. Using a utility knife, scrape very carefully along the edge of the rotor to remove any accumulated debris and burrs that might score the brake pads. Then, reinstall the brake caliper, and carefully thread and tighten its bolts.
20. After performing the above procedures on the other side, swing the front sway bar back down over the sway bar end links and reinstall the upper front sway bar nuts, cup washers, and grommets on both sides. If you are upgrading the sway bar end links at this time, install the entire new end link assemblies. Ensure that you maintain the relative positions and orientations of the various cup washers and grommets of the original assemblies. Your front end should now look similar to the one shown in the figure below.



Figure 7 Passenger side front with new components installed

21. If you are replacing the stock steering rack bushings as part of this suspension upgrade procedure, now is the time to perform that procedure. Since the procedure varies from brand to brand, and since the Maximum Motorsports aluminum bushings that I installed came with excellent printed instructions, I will not waste time detailing that procedure here.



Figure 8 Installed MM aluminum steering rack bushing

22. Reinstall the front wheels and lug nuts. Put the car back down on the floor by reversing the sequence of steps above for placing it on the jack stands. Then, torque the lug nuts on all four wheels to 89 lbs-ft.
23. Reinstall the trunk liner panels in reverse order of removal.
24. Drive the car conservatively at first, listening for any unusual noises. With the Bilsteins and H&R Super Sports the car will be about 1½ inches lower all the way around than it was with the stock springs and dampers, so be especially cautious at speed bumps.
25. After giving the new components a few days to settle, have a four-wheel alignment performed by a reliable shop.

## Addendum

I want to caution you again that if you end up with the same 1-1/2" drop all the way around that I did (or more), you'll want to be VERY cautious at all those mondo speed bumps that are scattered around shopping center parking lots. With JBA headers on my car, I encounter some mild scraping of the heat shields of my cats on the worst of them. If you don't have headers, you may not encounter this problem, but forewarned is forearmed.

Also, after you've finished your suspension upgrade, you may hear what sounds like the whole bottom of the car banging into the pavement, and some really loud, nasty scraping sounds when you're out hot-footing the car down a road with large dips. I did, and I was so concerned when this happened to me that I immediately pulled over and checked under the car for bent/scraped metal, but I couldn't find any, which puzzled me.

Now, I know what it was, and I can tell you DON'T BE ALARMED if this happens to you. I have subsequently discovered that the sound was all caused by the rubber/plastic chin spoiler that hangs down under the front bumper, ahead of the K-member.

There's a quick and easy fix for the problem - took me about 10 minutes. The chin spoiler is attached to a sheet metal cross member behind the bumper by 6 plastic push-in fasteners (2 on its front face and 4 its the bottom) similar to some of the ones used to attach the trim pieces inside the trunk. Since I have a special trim fastener removal tool that I picked up at the auto parts store for a couple bucks, it's easy for me to pop those fasteners off, which is what I did. Then, I used a straight edge and a utility knife with a fresh blade to remove the bottom 1" of material from the spoiler.

After I reinstalled the shortened spoiler on the car, I drove it over the same road, at the same speeds, and through the same dips where I had experienced the heart-rending noise, and - sure enough - the drama didn't occur. Problem solved. Just thought I'd better give you a head's up.

## Torque Specs per Ford '01 Service Manual

<b>Fasteners</b>	<b>Torque Specs</b>
Top Rear Shock Nuts	30 lbs-ft
Bottom Rear Shock Bolts	98 lbs-ft
Top Front Strut Nuts	74 lbs-ft
Bottom Front Strut Bolts	148 lbs-ft
C/C Plate Nuts	30 lbs-ft
Front Lower ABS Sensor Cable Bracket Nuts	21 lbs-ft
Front Sway Bar End Link Bushing Nuts	14 lbs-ft



## **Project Tool List**

- Jack stands (set of 4) and floor jack
- Assorted ratchets & extensions
- Metric standard sockets
- Metric deep sockets
- Pliers and or channel-locks
- Hammer
- Rubber Mallet
- Spring compressor
- Utility knife (for removal of rotor burrs and debris)
- Safety rope (for removal/installation of springs)
- Wire coat hanger (for brake caliper retention)
- Very large flat head screwdriver (for removal of stock struts)
- Large Allen wrench (for installation Bilstein struts)
- Breaker bar (for removal of large suspension bolts)
- Pry bar (for removal of stock front springs)
- Drill and bit set, including a 13/32" bit (for installation of MM C/C plates)

## **Project Supplies**

- Sil-Glyde lubricant
- Red Loctite