

**H&R COILOVER INSTALLATION FOR**  
***E36 BMW M3***  
***Revision 2.0***

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## **DISCLAIMERS:**

I am in no way associated with H&R or any vendors mentioned in this write up. This write up is intended to complement any information that can be found in the Bentley/Haynes etc. manuals regarding the installation of suspension systems on an E36 BMW.

When I prepared for this install, I was unable to find a complete and thorough write-up, and that is what I am hoping to provide with this document.

The steps listed here follow the exact install that I followed. Your results may vary and you may find ways to improve the process. If you have comments or feedback e-mail me at vw8vgti@hotmail.com and I will be more than happy to update this for the next guy/gal.

Also if you have any questions feel free to contact me. Many folks provided me with useful information during this project and I hope that I can pass along the wisdom.

## **BACKGROUND:**

In the fall of 1999 I had the pleasure of purchasing a 97 BMW M3. I had always been in awe of the car after hearing many publications rave about its handling prowess and silky smooth drivetrain. I never imagined that I would own a car of this caliber, but that all changed when I made one fatal mistake. I allowed a dealer to hand me the keys for a test drive. Actually, I didn't want to drive the car, but a friend I had along with me, without my prior knowledge, asked that I be allowed to drive the car. End of story. I now drive an Alpine White M3 and can't wait to make that last payment.

I quickly realized that the M3 was much more car than I would probably ever be driver. Although I enjoy autocrossing and various other driving events, the M3 has made me realize how far I have to go in the driving skills department. Things happen in a hurry for the uninitiated. I have driven many high powered sports cars, but none have ever moved me or involved me like the M3. I can't see ever being without one again.

Upon purchase, my car had just over 30,000 pampered miles. Not a scratch inside or out. This was my first BMW and I was pretty unfamiliar with them in general. After joining the E36M3 digest, I learned much, and unavoidably changed much on the car. Hence this write-up.

Through talking to others, it became apparent that the stock suspension on an E36 M3 is generally shot at around 30,000 miles. Pretty disappointing in a \$40,000 car, but somewhat common none the less. Lets just look at it as an "opportunity." ☺

At the time of this install my car had 51,000 miles on it and things had started to feel a little floaty and sloppy at times. This prompted me to start shopping for suspension upgrades. As always, everyone has an opinion, and there are a few "common" setups out there, but the thing that brought me to the H&R coilover kit was the fact that they are engineered as a set. No mixing and matching various companies products. As a somewhat anal mechanical engineer myself, this engineered "system" seemed appealing, and heck, those front struts do look cool. My only concern was the ride. I have a dedicated autocross/track car, so the M3 is the fair-weather daily driver and I wasn't about to ruin the streetability of the car. Many horror stories abound and I was concerned about the impending purchase. But with the pushing of a few informed souls, I took the plunge. I figured if the ride was that bad, somebody was going to get a really good deal on a slightly used coilover set. Check out the impressions section to see if anything is for sale. ☺

On to the install...

## TOOLS NEEDED:

This is a list of the tools I used for the install.

- 1/2drive ratchet and sockets in metric sizes (13, 16, 17, 18, 19, 22mm should probably be all that you need)
- 1/2drive impact wrench (the more torque capacity the better!!!!)
- Air compressor
- 1/2drive extensions (helpful in the tight spots, 6" should suffice)
- Snap ring pliers (if you don't have a set, a cheap Autozone version will suffice for the limited use)
- Small punch
- Hammer or other blunt instrument for "persuading"
- Channel-Lock pliers
- Set of metric allen wrenches
- Small slotted screwdriver
- Stubby phillips screwdriver
- 16mm cone wrench (available at any reputable bike shop...more on this later)
- Spring compressors (after many suspension swaps, I finally bought my own instead of renting. Got a set from Harbor Freight for \$10)
- Torque wrench
- Hydraulic floor jack
- Two (2) jackstands required (Four (4) preferred, explanation to follow)

## ADDITIONAL PARTS NEEDED:

- E46 rear shock mounts (RSM) or equivalent. I would highly recommend replacing your RSM's during this install. This is a known weak point with the E36's and you already have things apart.

The E46 mounts are stiffer and should provide a longer service life.

- Z3 reinforcement rings - I added these for some additional support of the rear shock tower area. Not needed if you have a rear stress bar.

Below are the part numbers and approximate prices for the RSM's/ Z3 reinforcements and necessary hardware.

<b>E46 Rear Shock Mounts</b>	<b>(2 required)</b>	<b>#33 52 6 754 096</b>	<b>\$18.40/ea</b>
<b>Self-Locking Collar Nut</b>	<b>(4 required)</b>	<b>#31 33 1 092 887</b>	<b>\$0.55/ea</b>
<b>Washer Gasket</b>	<b>(2 required)</b>	<b>#33 52 1 128 734</b>	<b>\$0.43/ea</b>
<b>Z3 Reinforcement Plates</b>	<b>(2 required)</b>	<b>#51 71 8 413 359</b>	<b>\$14.40/ea</b>

- Bearing grease
- Anti-seize
- Red Loctite or equivalent
- Brake parts cleaner
- Penetrating oil
- New strut bolts and such. This is not absolutely necessary, but I wish I had done this from the start. I'm going to get some from the dealer and swap them out, so save yourself the headache.

## TORQUE SPECS AT A GLANCE:

I had a quick reference available during the install that I thought was helpful

Component	Torque (ft-lb)
wheels to hub	75
sway bar end link to strut	44
steering arm to strut housing	80
strut assembly to strut tower	16
upper strut mount to strut shaft	32
shock absorber to rear trailing arm	57
shock absorber to upper mount	10
shock absorber upper mount to body	17

### BASELINING:

To determine a reference point for where the car sits stock, I referred to the Bentley manual. Below are the stock ride height figures for the car.

INITIAL RIDE HEIGHT - BENTLEY	
LF	RF
22.05"	22.05"
LR	RR
21.26"	21.26"

You can also measure the current height of your car by taking a tape measure and measuring the distance from the fender to the lower wheel lip at 12 o'clock at each wheel. By measuring to the wheel lip instead of the ground, you will eliminate any error caused by uneven tire wear. Then just compare to your final measurements to determine the change in ride height.



### INSTALLATION STEPS:

## **PART I. REAR SUSPENSION**

First things first. To remove the rear shocks, it is necessary to basically tear the trunk out of the car. Although this sounds bad, it really isn't. I had people tell me it would take 2 hours to get the trunk ready for the install, but it took me a whole 20 minutes, tops. I would suggest doing these next couple of steps the night before the install. You don't want to have to climb in the car and be grabbing the carpet and seats with greasy hands.

- 1.** To start, get in the back seat and gently pry up on the rear speaker covers with your fingers (no tools required) while pulling them towards you. They should come out relatively easily.



- 2.** Once the speaker grilles are removed you will see two (2) Phillips head screws that need to be removed. Use a short screwdriver to maneuver around the rear glass.
- 3.** Once the screws are removed the speaker will be resting on a single spring clip that needs to be depressed to remove the speaker from the rear deck. It may be necessary to use a small screwdriver to "persuade" the clip. Be careful to not puncture the rear speakers in the process.
- 4.** Once the clip is released, unplug the wire plug from the speakers and the speakers are free.
- 5.** With the speakers now out of the way, move back to the trunk. Remove the carpeted tire cover and utility tray that is above the battery on the passenger side.
- 6.** If your car has the factory CD changer, this is the point where you will want to remove it. Otherwise, move on to the next step.

Remove the carpeted changer cover if you have it, to gain access to the mounting. There are three (3) 13mm fasteners that hold the CD changer in place. Two will be readily visible parallel to the face of the changer and one will be farther towards the back seat attaching to the rear deck. With these removed, simply unplug the two wiring harnesses and remove the changer.

7. Next remove the two plastic panels that line opposite sides of the trunk floor. The panel on the passenger side has a 13mm nut and a small plastic screw attaching it to the floor while the driver's side uses two (2) 13mm nuts. Once removed, return the hardware to the studs so you don't have to keep track of them.
8. Remove the plastic cases that cover the rear of the taillights by twisting the access knobs.
9. Now we can begin to move the carpet away from the rear shock mounts. Reach up high at the corners of the trunk near the taillights and give the carpet a tug. It is merely a press fit into the corner, so as soon as you find an edge, you can begin removing it. You do not have to completely remove the carpet, just pull it back far enough to get at the insulation covering the RSM's. Whatever you do, do not listen to anyone who tells you to remove the back seats. I was amazed at how complicated people were trying to make this!!!!



Below is a picture of the passenger side with all plastic and carpet removed. When pulling the carpet back on the passenger side, you will have to pass the manual release chord for the gas filler door through the slit in carpet. Don't forget about passing this back through when you reinstall. Also pass the plugs for the CD changer if necessary.



10. On the passenger side there is a small plastic shield that covers the battery cable as it snakes towards the front of the car. It is retained by two (2) 13mm plastic nuts. Undo these and remove this panel from the trunk.

11. With everything removed, gently pull back the insulation from the rear shock towers to get access to the RSM's. You will now have a mass of carpet and insulation meeting at the middle of the trunk, but you have plenty of room to work.



12. Now that we have the trunk disassembled, we need to get the rear of the car up in the air. If you do not have a jacking adapter for the factory jacking points, it can be interesting finding somewhere to jack the car and still have a location for jack stand placement. Hopefully I don't have to say anything about the necessity of jack stands.

The best way that I have found to get the rear of the M3 up in the air is to use a large floor jack under the rear sub frame. Center the jack under the differential and watch to make sure that both sides are rising evenly. Once in the air, place a jack stand under each of the rear "hockey pucks" and lower the car down onto them.



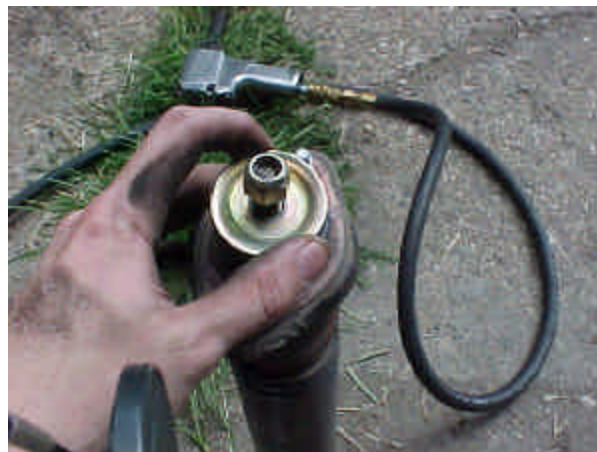
**13.** With the rear up in the air, and the wheels removed, you can now tear into the rear shocks.



Begin by supporting the rear hub assembly with a jack and removing the lower 18mm shock bolt. The jack will prevent the suspension from flopping into your lap when you release the shock.



- 14.** With the lower bolt removed, move to the trunk and remove the two (2) 13mm nuts that hold the rear shocks to the shock towers. The rear shocks are now free to be removed.
- 15.** With the rear shocks out, we have to transfer the large rear washer from the old shocks to the new shocks. This is the only part that you will be re-using, assuming that you are using new RSM's.



Just remove the upper 17mm nut and transfer the washer to the new parts pile.

- 16.** When assembling the new rear shocks, the sequence is:
  - Slide new RSM onto shock shaft
  - Place new paper gasket onto RSM
  - Slide large washer onto the top of RSM
  - Tighten top 17mm nut to 10 ft-lb

Go ahead and pre-assemble the new rear shocks and we will move onto changing out the springs.

- 17.** This is the only part of the install where it may be necessary to have another set of hands. In order to remove the rear springs, you must lower the rear trailing arm enough to remove tension from the spring and also far enough to pop the spring off of the upper centering nub. I did not remove the rear sway bar links for this install, and this will be the tension that you have to work against. You can do this step by yourself with some prying and brute force, but if you have some one who can lend you a hand for 5 minutes it will be much easier. Have the other person merely push down on the top of the brake rotor with their foot. They won't need to push very far, and be careful not to over-extend the inner CV joints by pressing the assembly down too far. Once your helper has applied pressure to the rotor, reach in and wiggle and coax the old spring out of it perch.

The Bentley manual will have you removing the half-shafts for this, but this is totally unnecessary. It isn't ideal to extend your CV joints in this manner, but as long as you don't go crazy, you aren't going to damage anything.

Here is a picture of what it will look like with the rear shocks and spring removed. Notice the upper nub, and the hole at the base of the lower perch where we will be installing the rear height adjusters.



- 18.** When installing the new springs it is probably a good idea to re-use the upper rubber spring pad to reduce any potential road noise. This is the pad with the hole in it seen below. The old spring will have both an upper and lower pad, but you will not be able to use the lower one in conjunction with the height adjuster.



The new springs are definitely shorter!



**19.** Now its time to install the rear height adjusters. You will probably want to grease all the threads in the assembly to keep them from welding themselves together over time.



The rear adjuster can be tricky to install. In the picture above we see the adjuster itself. It threads into the pair of collars that sandwich the lower spring perch as seen below.



Before installing the adjuster, make sure you clean out the lower spring perch. There will be plenty of road crud in there that will keep the adjuster collars from seating properly.

The lower collar, shown to the far right in the previous picture, was difficult to get into place below the spring perch. It interfered with the half-shaft and could not be installed with the suspension a full droop. In order to get it into place, place a jack under the rear trailing arm and jack the arm up until the rear rotor is centered in the wheel-well as seen below.



This will provide enough clearance for you to slide the collar into place around the half-shaft. With the lower collar passing through the spring perch, thread the upper collar on and sandwich the whole thing down. I used a couple of Channel-Lock pliers to tighten the collars. You don't need a lot of torque on these. Once you have them tightened down, use a 3mm allen wrench to tighten the set screw. The picture below shows the base in place in the spring perch.



Finally, thread the main adjuster through the collars and install the snap ring once adjuster is threaded through the spring perch. Installing the snap ring took some patience as the half-shafts are in the way again.

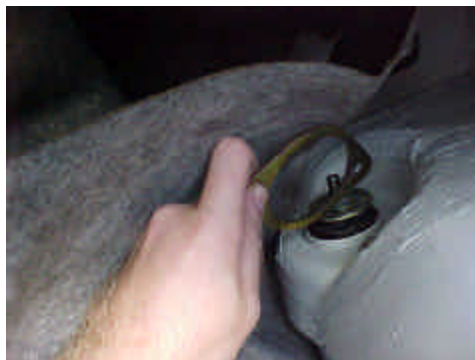
Here is what the finished product will look like from below. Notice how close we are to the half-shaft? The adjusted moves away from the half-shaft when the suspension is loaded, but it is still pretty close. I don't think it would be possible to use an allen wrench in there to adjust it, but I found an easier way to adjust things that I will share later.



Thread the adjusted down to a desired starting location. Halfway down would probably be a good initial spot, so you can go up or down to suit your needs. This put me a little higher than stock initially.

- 20.** Now we can finish up the rear suspension by installing the new rear shocks. I installed the shocks by loosely threading the lower shock bolt into the trailing arm and then aligning the upper studs as I raised the trailing arm with a jack. This will get everything in place for attaching the RSM's to the shock towers.

Before putting the two (2) 13mm nuts on the RSM's studs slip the Z3 reinforcement plate on.



With the plates installed, go ahead tighten down the 13mm nuts to 17 ft-lb. Below is what the RSM's look like installed in the car.



**21.** Tighten the lower shock bolts to 57 ft-lb and the rear is done.



Put the rear wheels back on and lets move to the front.

## PART II. FRONT SUSPENSION

1. To get the front of the car in the air, I used the factory jack to raise the car and I then placed jack stands under the front plastic “hockey pucks.”
2. Begin by pulling the brake lines, brake wear sensors, and the ABS sensors out of their brackets on the factory strut. Also remove the wires from the plastic retaining clip on the front face of the strut. The wires actually loop all the way around the strut. Be careful, because this clip is probably going to be brittle from the brake heat it has to endure.

Once the wires are out of the clip, simply unscrew it and transfer it to the new strut.



3. Next, remove the 16mm bolt that holds the sway bar end link to the strut.



This ended up being the hardest part of the entire install for me. The nut that you see here just would not budge. After a good hour soaking in penetrating oil and much frustration, she finally gave up.

To remove these nuts, you must place a thin wrench on two small flats on the shaft of the end link just behind the bracket on the strut shown above. If you don't, the entire shaft will just spin inside the link. I purchased a 16mm cone wrench as suggested by others, because a typical open-end wrench will be

too thick to get to the flats. Well, because my driver's side nut was frozen, I pretty much destroyed the small cone wrench during the battle. It worked fine on the passenger side, but I finally had to resort to a thin adjustable wrench on the frozen one.

Hopefully your results will be better, but regardless, you will need a thin wrench of some sort to get at the flats. If you have the time, it may be worth grinding down a cheap open-end wrench just for this.

I was really surprised I had any trouble, because my car doesn't see winter, and rarely sees rain, so most of my projects have been pretty trouble free as far as fasteners go.

4. Now its time to tackle the three (3) main lower strut bolts. They are all 18mm. The bottom two have thread lock applied to them from the factory, and I was warned that these would be a pain to get out. I was also told that the typical impact wrench would probably not touch these. I was using a typical \$150 Craftsman ½ drive impact wrench for this project rated at 400 ft-lb. in the reverse direction. To be safe I had reserved a heavy-duty impact wrench from the local tool rental shop for \$20 as it was suggested that I have at least 600 ft.-lb. capacity available.

Well, the night before the install and, before I shelled out the \$20 for the rental, I gave these bad boys a shot with my Craftsman. They came out, no problem. Your results may vary, but I ended up saving myself \$20. Just something to think about.

Anyway, back to the removal. Go ahead and remove the upper 18mm bolt first. You will need to put a wrench or ratchet on the opposite side as this is a bolt with a nut. Below is a picture of this bolt on the new strut.



On my car, once I had the nut removed, I had to use a small punch and hammer to tap the bolt out.

Before removing the lower bolts, it's a good idea place a support under the lower control arm to support all of the weight you are about to unload. I shoved an additional jack stand under here.

Once you have a support, remove the remaining two (2) bolts and lower the control arm etc. onto the support.



For this install I did **NOT** remove the caliper or rotor. Although heavy, once supported, I had no problems working around them.

I did pass some heavy wire through the upper steering knuckle bolt hole and then tied the assembly to the control arm through the existing holes. You want to do this to make sure that the hub does not flop over and put tension on the brake line.

5. Next move into the engine compartment to finish removing the struts. Use a small screwdriver to pop off the strut bearing covers to expose the three (3) 13mm nuts that hold the strut to the strut towers. Reach into the fender well and grab the strut as you remove these nuts. With these removed, the strut is free to come out.

Careful with the wires, because you are going to have to do some snaking to get the strut free. I lowered the strut onto the control arm, and pushed the wires up as far on the strut as I could. I then picked up the strut and slowly rotated it while adjusting the wire position until I was able to get the strut hat out of the fender well. I was then able to slide the wires off the bottom of the strut and remove the whole assembly.

6. Next comes the part that I wished I had documentation on before I started. My kit came with no instructions, which didn't really concern me, as I had done previous suspension installs. However, it can be unclear as to what to re-use from the old struts.

Take the old strut and stand it up on end. Place spring compressors on either side of the spring and tighten them down until you have removed all of the tension from the strut bearing. Remove the 22mm nut from the top of the spring (see note) and pull the strut bearing off of the strut shaft.

**(NOTE:** If you do not have an impact wrench for this install, you will need to tackle this top nut a little differently. The nut is recessed inside of the strut bearing and there is a 6mm hex opening machined into the top of the shaft. You will need to purchase a cheap 22mm deep well socket that will reach the nut. You must then grind a flat on either side of the socket. This will allow you to have a location to place a wrench on the socket and rotate it, as you pass a 6mm allen wrench through the center to hold the shaft stationary. You gotta' love air tools!!!)

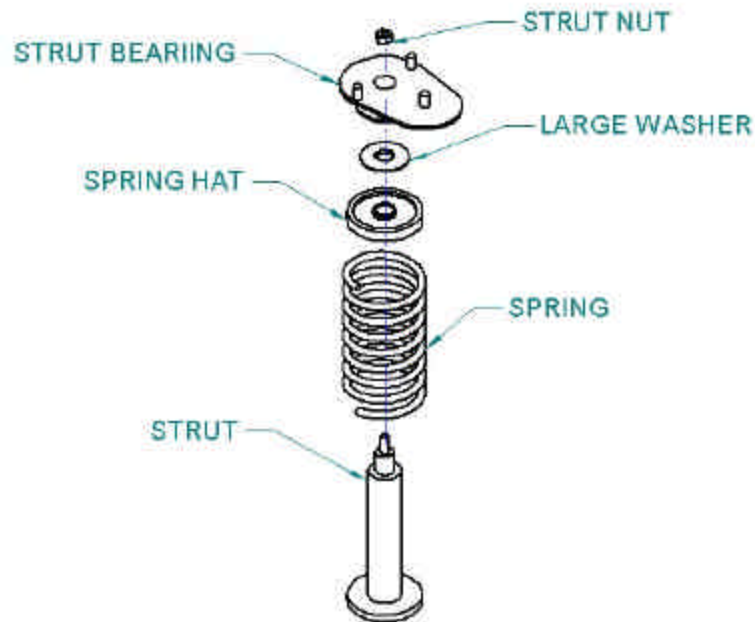
There will be a large washer on top of the spring hat that you will need to keep. Along with the strut bearing, the **ONLY** other part you will be using from the old struts is the large (~2" in diameter) washer that you removed from on top of the spring hat. The washer itself is concave so pay attention to how you assemble it. On my car, it was installed with the concave portion orientated towards the top of the strut. Looks like a mushroom, for lack of a better description. Make sure you pay attention to how it is oriented on your car as you disassemble your struts.

Disregard all the other parts and don't think about them!!!

7. Next, go ahead and slip the new spring onto the new strut and place the spring compressors on either side. Compress the springs until you can place the new spring hat on top of the spring, slide the washer on, then the strut bearing, and still be able to thread on the new 19mm nut on top of it all.

Thread the 19mm **ALL THE WAY DOWN UNTIL IT BOTTOMS** on the strut shaft. If you do not get this threaded all the way down, the front end of the car will sound like it is going to fall off upon test drive...ask me how I know. I'm really not sure how you are supposed to properly torque this nut, as a torque wrench will just spin the shaft, and I didn't want to clamp down on the new shaft either. The torque spec is 32ft-lb. so that should give you the idea that you don't have to really kill this one. I just gave it a quick zip with the impact wrench.

Once the nut is in place, remove the spring compressors slowly to seat the springs on the new spring hat. Below is a picture of the assembly process.



Here is the masterpiece that you will get:



8. Now that we have the front struts assembled, it time to start putting things back together. Installation is the reverse of removal but I would like to mention one problem area that I came into.

When inserting the upper steering knuckle into the slot in the strut, the fit is tight. This is the area where the upper strut bolt passes through. You may need to take a large screwdriver and open the slot on the strut just a little bit to make it easier. Use a jack under the control arm to raise the assembly up to meet the strut and then insert the steering knuckle tab into the strut. Pass the bolt through to hold everything in place.

Make sure that you use some red Locktite on the lower strut bolts upon assembly. Tighten the three main strut bolts to 80 ft-lb. Then tighten the upper three strut nuts to 16 ft-lb.

As soon as you are done snaking and routing the wires around the strut and tightening everything down, its time to move onto the adjustment phase.

Below are some pictures of the completed front installation:





### **POST INSTALLATION ADJUSTMENT:**

After you have everything reassembled and tightened to spec, set the car down and take a look at how it is sitting. You may want to slowly take the car around the block just to get the suspension to settle out a little. My car looked a little jacked up in the rear when I set it down initially. After a quick spin around the block everything looked a little more normal.

Next, I made some quick measurements to see where I was sitting compared to the baseline numbers from the Bentley manual. Below is how I came out after some trial and error.

<b>FINAL RIDE HEIGHT</b>	
<b>LF</b>	<b>RF</b>
22.25"	22.25"
<b>LR</b>	<b>RR</b>
21.25"	21.25"

As you can see, I came out supposedly higher than stock according to the Bentley manual, but in reality the car is 1-1.25" lower all the way around than before. I am not sure where the discrepancy comes in, but the car is significantly lower than stock. I still have almost 3/8" adjustment at each corner if I would want additional lowering.

I was mainly concerned with getting rid of the unsightly front wheel gap that my car had, and as seen in the following before and after photos, I was easily able to accomplish this.

The front struts are easy to adjust. Just use the supplied spanner wrenches to adjust the position of the collars on the threaded portion of the shaft. I also greased these threads to keep them from seizing up.

The rear adjusters take a little creativity. Since the half-shafts are pretty much blocking the access to the hex opening from below, you have to find a better way of adjusting things. It was suggested to remove the lower shock bolt and remove the rear springs to get at the adjusters from the top again. I found that I was able to merely jack the car up, remove the wheel, and twist the springs to vary the height of the adjusters. Just grab hold of the either side of the spring and twist.

On my car, there was enough friction between the spring and the adjuster that they would turn together. This method worked great, and required no disassembly. Hopefully this will work for you. At most, you should just have to remove the lower shock bolt and droop the suspension, and then try rotating the spring.

More than anything, I was just happy to get rid of most of the front wheel gap on my car. For whatever reason, my car seemed to sit higher in the front end than most M3's I had seen. I guess that is just production variance for you. Anyway, I am happy with the new stance of the car. It looks much more aggressive and purposeful.

## **IMPRESSIONS:**

Basically, OH MY GOODNESS. I can't believe how bad my stock suspension was!!!! After removing my stock shocks and struts I was able to quickly see why things were getting so "floaty." I was able to easily compress the shocks and struts with minimal hand pressure. Definitely toast.

The H&R kit is phenomenal. It is definitely the best mod that I have done to the car yet. This is how the car should have come from the factory. No compromise, just serious performance.

And don't believe all this talk of a rough ride. Utter non-sense. Anyone who tells you this kit is not streetable is just getting old. Either that, or they have no business driving a high performance automobile. The ride is definitely stiffer, but in NO MEANS harsh. This is hard to explain to people without giving them a ride. There is a definite difference between stiff and harsh.

I truly believe this suspension soaks up large bumps much better than the stock suspension ever did. In every situation, the car feels so much more planted and controlled. Even traveling in straight line feels better. I noticed a very minimal increase in road noise, but that is just being nit picky to try and find some negativity. Personally, I have not picked up any rattles or such from the increase in stiffness. Turn in is very crisp and the car communicates so much better through the steering wheel. If you are even considering this kit, just go ahead and do it. You will NOT regret it.

Like I said, if you have any questions, feel free to contact me. I'll be more than happy to answer any questions about the install or anything else regarding the kit.

Good luck and happy motoring!!! Keep it safe.

## **RESOURCES:**

**<http://www.turnermotorsport.com/>** - I got a great deal on the coilovers from Turner. Definitely check their prices

**<http://www.pacificbmw.com/mainindex.htm>** - I purchased the RSM's/Z3 reinforcements and all related hardware for \$55 shipped!!! By far the best deal I found.

**[http://members.nbc.com/\\_XMCM/uberjeph/index.html](http://members.nbc.com/_XMCM/uberjeph/index.html)** - Has a good picture of how to remove the top nut on the factory struts if you do not have access to an impact wrench.

**BEFORE AND AFTER PHOTOS:**



Passenger's Side before installation.



Passenger's Side After Installation.



Initial Ride Height



Driver's Side After Installation



Front Wheel Gap Before Installation



Front Wheel Gap After Installation



Rear Wheel Gap Before Installation



Rear Wheel Gap After Installation



Passenger Side After Install



Front Ground Clearance Before Installation



Front Ground Clearance After Installation