

From 2001 - Igor Kessel

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Feb 07 (73) Suspension revisited - Part I (Toolz)

PDF file showing how upper camber plates need to be modified  
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Original PDF file showing modification  
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Folks,

Over the last week I have finally sorted out my suspension and weeded out all of the bugs.

I am planning on doing a series of posts that might be of interest to anyone with the similar to mine set-up, or planning to do any other lowering set-up for that matter. Here's the first post.

1. As you all know, if you lower an UrS you'll screw up the Camber. In case of my Eibach/Bilstein the actual Camber maxed out at  $-1.4^{\circ}$  symmetrically left to right. I have noticed that the inner edges of my 245/40/17 SP8000 on the 8" wide A1Avantgardes were wearing out. Mind you, this was not happening with the 225/50/16 SP8000 on the 7.5" Momo Arrows off my wife's A4 installed on my S6. Hmmm... Anyway, I needed to measure my Camber before and after doing the planned

corrections. I needed a Camber gauge. Well, as always, I didn't have one so I decided to build my own.

I went to Sears and bought a 3 foot long Aluminium angle, 1" x 1" x 1/8" thick. I also bought a carpenter's steel rule 12" x 12" at 90°, two little carpenters "quick-grips" and a digital Smart Level. I cut a 17" long piece out of the 3 foot long Aluminium angle, so that it could be rested on the edges of the 16" Avus rim. I drilled a few holes and tapped a few threads in both parts and mounted the carpenter's steel rule in the centre of the 17" long piece of the Aluminium angle. After calibrating the Smart Level first, I measured the horizontal slope of the floor in my garage to account for the systematic error. It had turned out to be only 0.1°. I then disassembled the Smart Level and mounted the central digital part on the ruler, at 90° to the Aluminium angle. This device has become a reasonably accurate (1st place after the decimal point) yet very repeatable "McGuiver" Camber gauge. It could be mounted on the side of the wheel rim with the two little carpenter's "quick-grips".

Feb 07 (102) Suspension revisited - Part II (Toolz)

## Part II

2. As you know, Bilstein shox are of the inverted tube design and as such have a very large DIA moving shaft (~46mm). Therefore they come with their own top screw-on strut caps with built-in oil seals. This cap replaces the OEM cap with the hex recess for the OEM Audi tool. The Bilstein cap has two 8mm wide slots instead and comes with a wimpy flat key that fits into those slots. The key goes in through the side in between the spring loops and has a 1/2" square hole on the protruding end. This key is utter garbage. I destroyed two of them on the first attempt. First - mine, then - Stefan's when we were later doing the identical to mine Eibach/Bilstein install in his car. Besides, this key is very inconvenient to use coz you need to remove the dust boot first; and you can only do a 1/8 of a turn at a time. And you can't really use a torque wrench on it too.

Last week I tried to use this key to remove the caps after 1.5 years of sitting on the struts. No friggin' way. Had to go to Sears and buy a pipe wrench

and whack the hell out of it with a BFH before the cap would yield. I needed to fabricate a proper tool for screwing the caps back onto the strut towers afterwards.

Fortunately Sears sells a tie rod end removal tool which looks like a 40cm long black pipe with a 1/2" square on one end and a funnel-like opening on the other, into which the Bilstein cap fits PERFECTLY. As if it were made for it. But the real icing on the cake were the two 5/16" slots cut in the opposite sides of that "funnel". I bought a piece of 5/16" square key stock, cut it in two with a diamond wheel (man, was the material

hard!) and welded the bits into the slots. The tool fits the cap like a glove (5/16" = 8mm approx.), can be dropped into the strut tower through the top and enables the Bilstein shock removal in under a minute.

I do not know the p/n of this particular Sears tool coz it was given to me by a friend who had bought it a long time ago, but I am sure you will be able to find it.

3. Another tool that you will need is a regular spring compressor. Any Pep Toys would lend it to you free of charge. I have fabricated my own a long time ago. Mine utilises two conical bearings under the compression nuts so that the nuts are very easy to turn coz you are not fighting the friction.

4. In order to remove the front springs you NEED to hang both wheels out in the air

as not to fight the torsional resistance of the stabiliser bar. In my case even this measure was not enough. I was alone in the garage, in a desperat

need of an extra pair of hands and was looking for a way to press the half axle down to the subframe while I would be removing the compressed spring from under the front fender. I came up with a simple one man solution. I took the OEM Audi screw jack (yeah, the suicidal one with which your car came from the factory :-), shoved it in-between the half axle and the upper body longitudinal member and easily lowered the strut until the half axle hit the subframe. After which I was able to remove the spring with ease.

Feb 08 (57) car height  
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rundeeep\_32@yahoo.com wrote:

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> I was wondering if anyone could tell me the height of their cars with  
> their lowering springs installed. I am looking specifically for the  
> height of an Eibach sprung car and the heights of stock sprung cars  
> through the model years.

This info and much more will be coming in my "Suspension revisited" -  
Part III and IV. Stay tuned.

> Please take measurements from the ground to the fender lip, using the  
> wheel center as an axis.

It is best to measure from the lip to the wheel centre rather than to  
the ground level, Ed. In this case the measurement is tyre-invariant.

Feb 10 (175) Suspension revisited - Part III (Front top mounts)  
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Part III

Modifying the front top mounts.

Folks,

first measure the horizontal slope of the floor of your garage with the  
Smart Level described in Part I and write it down. Measure both the  
front and the rear Camber with the gauge described in Part I and write  
them down. I am assuming that you have all the proper tools, including  
the special ones described in Part I and Part II.

Put the front of your car on two jack stands. Do not EVER work on  
a car supported by a jack alone! Remove both front wheels, both  
front shocks and both front springs.

There are two mounting parts in the top of the front strut: a large  
round plate with three M10 studs and three M12 studs (hereinafter called  
PLATE) and the smaller triangular shock mount with three elongated 12mm  
slots (hereinafter called MOUNT). Remove the PLATE from the car.



As I stated before, if you lower an UrS you'll screw up the front Camber beyond factory adjustment. In case of my Eibach/Bilstein the actual Camber maxed out at  $-1.4^{\circ}$  symmetrically left to right. Hence the need for modification of the front top mounts.

If you just grind the slots in the MOUNT a little longer it will not give you the needed adjustment range coz the MOUNT will be hitting the inner edge of the PLATE. I used the brilliant idea suggested by Peter Blaser:

"There isn't any camber problem at all. All you have to do is modify \*BOTH\* top plates. You take out the black one which bolts to the frame, knock out all six studs, and redrill them so that the black plate sits as far outboard of the centre line as possible. Then tap the studs back in."

I would like to make one important correction. Although you do need to redrill and re-press all 6 studs at  $180^{\circ}$ , you only should offset the outer 10mm studs outward by 4 to 5mm. The inner 12mm studs should remain on the original bolt circle. If you offset the 12mm studs along with the 10mm ones, they will negate the gain obtained by moving the 10mm studs outward. See the illustration Fig.2. I've done it wrong the first time around and only discovered the error when I mounted the PLATE back into the fender. Fortunately the round PLATE has four sides to it, so I flipped it  $90^{\circ}$  and redrilled all six studs one more time, this time in the correct fashion.

I have drawn two pictures for your convenience; the link is provided below. I have saved both drawings in the PDF format coz it was the only way to preserve the original dimensions. When printing make sure to uncheck the "Fit To Page" option, otherwise the drawings will shrink. For some reason Acrobat distorts large circles, but fortunately it leaves the crucial dimensions between the hole's centres intact. Please verify the dimensions after printing.

Fig. 1 shows the PLATE before redrilling. I marked several crucial dimensions so that you could verify that the picture did not get distorted between my drawing it in SmartDraw and your printing it off the Internet.

Fig. 2 shows the modified PLATE and does not have dimensions on it as to avoid overloading the drawing with unneeded details.

I suggest the following procedure.

a) Print Fig. 1 and Fig. 2 and physically verify that the dimensions on your print are correct.

b) On Fig. 2 punch out all BLACK A and B (OEM) holes with the 10mm and 12mm hollow punches respectively.

c) Stick a few pieces of double sided Scotch onto the PLATE in a few strategic places.

d) Carefully fish Fig. 2 over the OEM studs through the punched out holes. e) Remove the remaining backing from the pieces of the double sided Scotch and stick Fig. 2 onto the PLATE.

f) Centre punch the new holes A1 and B1.

g) Drill small pilot holes in positions A1 and B1. I used a 1/16" bit. Remove the drawing Fig. 2 from the PLATE.

h) Screw some used nuts onto the OEM studs and punch them out of the PLATE with a BFH.

i) Ream the A1 holes to 11/32" and the B1 holes to 10.5mm, gradually increasing the DIA of each subsequent bit by small increments. Use grease on the drill bits. The PLATE is made out of steel approx. 4mm thick so be patient.

j) Feed an OEM stud through the new hole and press it into the PLATE in a vise until the knurled neck of the stud is home. I broke my own vise so I had to use an alternative method. I would grab the head of the stud with a vise grip to prevent it from spinning and would press it into the new hole in the PLATE by tightening a nut with a wrench over the stud.

In addition you can expand the slots in the MOUNT by grinding them a little longer to gain a few more millimeters of adjustment.

Mount the PLATE into the inner fender with three NEW(!) locking nuts and torque them to spec. Note that now the Dimple is on the INSIDE of the car.

Compress the lowering spring with the spring compressor and install it onto the strut, observing the proper orientation on the perch.

Compress the new shock absorber a few times and let it release as to remove the air pockets. Drop the shock absorber into the strut tube. In case of Bilstein feed the new cap over the shaft and torque it to spec (I think Bilstein recommends 140 Nm) with the tool described in Part II.

A tip: put some anti-seize on the threads of the Bilstein cap.

Another tip: now is a good time to replace the rubber dust boot (called by Audi a "SPRING SEAT" 431-412-175-D). Mine was torn in one place. It cost me only ~\$8/ea. with my discount and should be replaced as a preventive measure coz its replacement requires the MOUNT removal and as such screws up the costly quattro alignment, currently ~\$230 at my dealer.

Re-install the MOUNT over the PLATE, push it all the way AWAY from the centre of the car and torque it with three NEW(!) locking nuts to spec. Install the new top locking nut provided with the new shock and torque it to spec.

Repeat all of the above for the second top mount.

Feb 12 Suspension revisited - Part IV (Replacing the rear springs and shocks)

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#### Part IV

Replacing the rear springs and/or shocks.

The rear suspension is much easier to do. It does not require any special tools (except for the spring compressor) and does not affect the alignment. This means that you can do it separately from the front at a later time should the need arise.

Remove the top three 13mm and the lower one 19mm locknuts and pull the strut assembly out. Make sure not to disturb the ABS sensors in the hub or you ABS will protest the sensor misalignment the next time you start up the car.

Secure the strut assembly in the vise and compress the spring. Undo the

top locknut with a box wrench while keeping the shaft from rotating with an Allen key.

Unlike the front strut the rear one is integral. The spring sits on the perch which is fed over the shock absorber tube. Carefully disassemble the strut, taking notes of the ORIENTATION of the dimples and spring stops in both the lower and the upper perches in reference to the shock position in the body of the car. Otherwise you may end up with a different ride height left to right.

Keep in mind that Bilstein has recently stopped cutting additional adjustment grooves into which the steel ring for the lower perch goes. The one remaining groove drops the car equipped with Eibach springs 10mm more in the back than in the front.

You can address this issue in two ways. Either have a machine shop cut several additional adjustment grooves in the body of the shock above the existing groove or use a spacer ring. A set of two 50mm DIA x 12mm rings are available from Eibach for ~\$30.

Reassemble the strut by putting the new spring onto the new shock using the existing bottom and top mounting perches and secure them with a NEW(!) top locknut. Keep in mind that a lowering spring requires a shorter shock, otherwise the shock will not be working in its optimal range or worse yet may even break.

Mount the strut into the car using all NEW(!) locknuts. Repeat the above for the other side.

Feb 18 (138) Suspension revisited - Part V (The results)

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Part V  
The Results.

Folks,

By now you should have done all four corners of your suspension so now it is time to lower your car onto the garage floor. If you lower the car off the four jack stands directly onto the floor you are likely to put strain on the suspension components, which in turn will throw your