# Volkswagen MK4
# Golf, Jetta, New Beetle, 337/20AE
# Suspension Refresh Kit Installation

# INTRODUCTION

## Volkswagen MK4 Suspension Refresh Kits

Age and mileage takes its toll on original suspension components. Although your car may still seem to drive just fine, if it has higher miles on it, you've undoubtedly lost the crisp, tight handling of a new suspension. The solution is simple. Install one of our suspension refresh kits and put your handling right back where it should be. It's a job you'll be able to complete in a weekend, but it'll go quicker than that if you have previous experience. Plan accordingly based on your experience level. Our Volkswagen MK4 Suspension Refresh Kits are available in Stage 1, Stage 2, or Stage 3, for different requirements and levels of performance. Before you begin, be sure to read and familiarize yourself with these instructions so you know what will be involved in this installation. Thank you for looking to ECS Tuning for all your performance and repair needs. We appreciate your business!

## ECS Difficulty Gauge


1 - Easy Pro - 4

**2 - Moderate** Advanced - 3

| Stage 1: ES#248444 Basic Refresh | Stage 2: ES#248440 Upgraded Refresh | Stage 3: ES#259954 Performance Refresh |
|---|---|---|
| • Outer Tie Rod Ends<br>• Front lower control arm bushings<br>• Front lower ball Joints<br>• Front upper strut mounts and bearings<br>• All required hardware and torque to yield bolts | • Audi TT/R32 upgraded control arm bushings<br>• Outer tie rod ends<br>• Inner tie rod ends<br>• Front lower ball joints<br>• Steering Rack Boots<br>• Front upper strut mounts and bearings<br>• All required hardware and torque to yield bolts | • ECS lower control arm kit with pre-installed polyurethane bushings<br>• Outer tie rod ends<br>• Inner tie rod ends<br>• Front lower ball joints<br>• Steering Rack Boots<br>• Front upper strut mounts and bearings<br>• All required hardware and torque to yield bolts |

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Regardless of the kit that you are installing, begin your installation on Page 15. Look for the road signs and follow them depending on your individual kit.

## Symbols:

The following symbols may be used throughout these instructions indicating special attention:

**FORK IN THE ROAD:** When there are different options within any given kit, we will direct you to the proper page and step to continue.


**YIELD:** Pause for a moment to double check component installation before you continue. Ignoring this can cost you time later during the installation.

**CAUTION:** Pay close attention to these warnings and instructions. Difficult installation, personal injury or component damage may occur if ignored.


**STOP:** The upcoming steps require specific preparation and/or assistance in the interest of safety. Please read ahead in the instructions and prepare before continuing.

# THE PROJECT

Today we're going to install a suspension refresh kit on a MK4 Volkswagen. We're going to install our Stage 3 kit which includes our lower control arms with pre-installed polyurethane bushings. Most of this installation can be completed with basic tools, but if you're installing a Stage 1 or 2 kit, the lower control arm bushings will have to be removed and installed using a hydraulic press. Since most of us don't have one of those at home, you'll have to take the control arms to a shop that will be able to do that for you.

All three of our refresh kits come with front suspension strut mounts and bearings, which means you'll be removing the struts. If your struts are leaking or simply getting up there in age, this is the perfect time to order replacements and install them while your doing the work. It won't take any additional time now, but it will certainly save you time down the road.

Something else you may want to look at - your front sway bar end links and bushings. We don't include them in the kits because quite often they've already been replaced, but if yours haven't, you can bet they're getting worn out. The sway bar links will be disconnected during the job, and when you're working on the tie rod ends, you'll have a little more room to access the sway bar bushings, and it's always easier when you have more room.

Don't forget that an alignment is an absolute necessity after you complete the installation. Be sure and schedule one with a qualified repair facility.

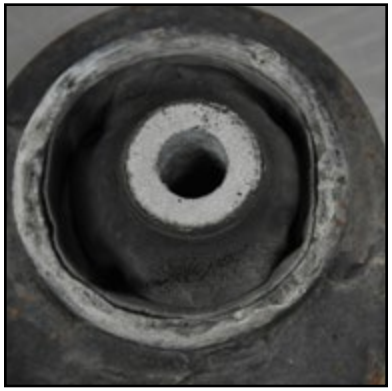
The tools? Most of what's required for this job are standard hand tools, but you'll also need a coil spring compressor for the struts, a spindle housing spreader and a strut nut socket, as well as a 1/2" drive 30mm 12-point socket. Many of these are available on our website if you don't have them, and we've listed them all for you on Page 12.

Now I know we've already said this, but if you haven't done this type of work before, it's a big help if you read through these instructions first. There are a few tricky things you will run across and reading them will give you an overall idea of the work flow, plus you might recognize some potential problem areas, allowing you to be prepared for them.

Before you begin, take a few minutes and unpack all of your components. Check them off of the list for your kit. This will allow you to double check that you have received everything you need and also familiarize yourself with the individual components. One final thing - you'll see that the first thing we do is raise the vehicle on a lift, then remove the wheels using an impact. The entire job can be completed without air tools if you don't have any, and you'll be able to support the car on jack stands if you don't have a lift. Just remember to loosen the lug nuts first when the vehicle is still on the ground.

# THE PROJECT

The car we've chosen for todays project is a MK4 Jetta Wagon that's just about to roll over 200,000 miles. It was starting to make a few noises over bumps, and overall feeling a little loose. Here are some of the components we removed, and with our refresh kit, it's like a whole new car!



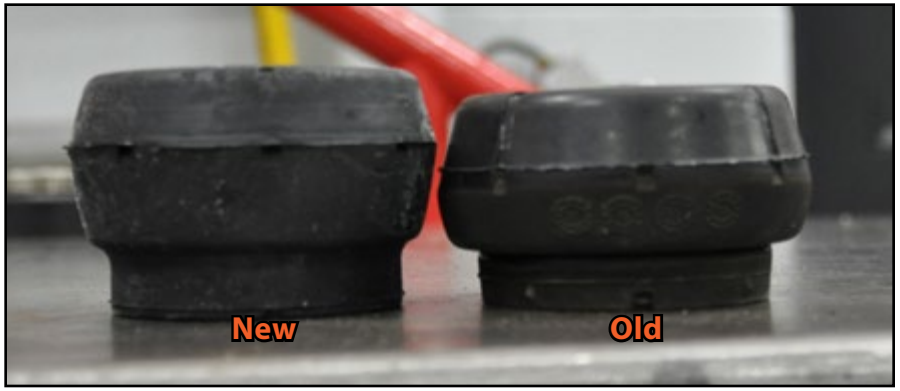
Control arm bushings collapsed off center and separating from the outer cage

Rusted away and weakened bolts and fasteners


Upper strut mounts worn off center

Torn tie rod and ball joint boots

Worn out, torn sway bar bushings




Collapsed upper strut mounts

Lower Control Arm Vertical Bushings

M12 x 70 Lower Control Arm (Vertical) Bolts

M12 x 1.5 Lower Control Arm (Vertical) Nuts

Upper Strut Mounts

Upper Strut Mount Nuts

Upper Strut Bearings

Outer Tie Rod End Locking Nuts

Outer Tie Rod Ends

☐ 
Lower Control Arm Horizontal Bushings

☐ 
M12 x 82 Lower Control Arm (Horizontal) Bolts

☐ 
M12 x 78 Strut to Steering Knuckle Bolts

☐ 
M12 x 1.5 Strut to Steering Knuckle Nuts

☐ 
Lower Ball Joint Bolts

☐ 
Lower Ball Joint Retainer Plates

☐ 
Lower Ball Joint Washers

☐ 
Lower Ball Joints

LH Tie Rod Assembly

RH Tie Rod Assembly

Upper Strut Mounts (2)

Upper Strut Mount Nuts (2)

Upper Strut Bearings (2)

Steering Rack Boots (2)

Inner and Outer Steering Rack Boot Clamps

LH Lower Ball Joint and Hardware

☐ 
Lower Control Arm Horizontal Bushings

☐ 
M12 x 82 Lower Control Arm (Horizontal) Bolts

☐ 
M12 x 78 Strut to Steering Knuckle Bolts

☐ 
M12 x 1.5 Strut to Steering Knuckle Nuts

☐ 
Lower Control Arm Vertical Bushing - Upgrade

☐ 
M12 x 1.5 Lower Control Arm (Vertical) Nuts

☐ 
M12 x 70 Lower Control Arm (Vertical) Bolts

☐ 
RH Lower Ball Joint and Hardware

LH Tie Rod Assembly

RH Tie Rod Assembly

Upper Strut Mounts (2)

Upper Strut Mount Nuts (2)

Upper Strut Bearings (2)

Steering Rack Boots (2)

Inner and Outer Steering Rack Boot Clamps

LH Lower Ball Joint and Hardware

☐ 

LH Lower Control Arm with Polyurethane Bushings

☐ 

M12 x 82 Lower Control Arm (Horizontal) Bolts

☐ 

M12 x 78 Strut to Steering Knuckle Bolts

☐ 

M12 x 1.5 Strut to Steering Knuckle Nuts

☐ 

RH Lower Control Arm with Polyurethane Bushings

☐ 

M12 x 1.5 Lower Control Arm (Vertical) Nuts

☐ 

M12 x 70 Lower Control Arm (Vertical) Bolts

☐ 

RH Lower Ball Joint and Hardware

# REQUIRED TOOLS

Note: The tools required for each step will be listed by the step number throughout these instructions.

**Standard Tool Recommendations:** We recommend that you have a standard automotive repair tool set before beginning this installation. The following list outlines the basic tools and sets that will be used during this installation as well as most automotive service procedures. Tools with a hyperlink are available on our website.

- Protecta-Sockets (for lug nuts) ES#2221243
- 3/8" Drive Ratchet ES#2765902
- 3/8" Drive Torque Wrench ES#2221245
- 3/8" Drive Deep and Shallow Sockets ES#2763772
- 3/8" Drive Extensions ES#2804822
- Hydraulic Floor Jack ES#240941
- Torx Drivers ES#11417
- 1/2" Drive Deep and Shallow Sockets ES#2839106
- 1/2" Drive Ratchet
- 1/2" Drive Extensions
- 1/2" Drive Torque Wrench ES#2221244
- 1/2" Drive Breaker Bar ES#2776653
- Crows Foot Wrenches
- Hook and Pick Tool Set ES#2778980
- 1/4" Drive Ratchet ES#2823235
- 1/4" Drive Deep and Shallow Sockets ES#2823235
- 1/4" Drive Extensions ES#2823235
- Plier and Cutter Set ES#2804496
- Flat and Phillips Screwdrivers ES#2225921
- Jack Stands ES#2763355
- Ball Pein Hammers
- Pry Bar Set ES#1899378
- Bench Mounted Vise
- Punch and Chisel Set
- Hex Bit (Allen) Wrenches and Sockets ES#11420
- Thread Repair Tools ES#1306824
- Open/Boxed End Wrench Set ES#2765907

**Specialty Tool Requirements:** The following specialty tools are not considered part of a standard tool set and are required specifically for the installation of the MK4 Suspension Refresh Kit. Tools with a hyperlink are available on our website.

- M14 x 1.5 Wheel Hanger ES#2636260
- 1/2" Drive 30mm 12 Point Socket
- Spindle Housing Spreader ES#3894
- Coil Spring Compressor ES#1306817
- Ear Type Clamp Pliers ES#2748884
- Strut Nut Socket: 21mm ES#2652181

# SHOP SUPPLIES AND MATERIALS

**Standard Shop Supply Recommendations:** We recommend that you have a standard inventory of automotive shop supplies before beginning this or any automotive repair procedure. The following list outlines the basic shop supplies that we like to keep on hand. Shop supplies with a hyperlink are available on our website.

- Hand Cleaner/Degreaser - Click Here
- Pig Mats - for protecting your garage floor and work area from spills and stains - Click Here
- Spray detailer - for rapid cleaning of anything that comes into contact with your paint such as brake fluid - Click Here
- Micro Fiber Towels - for cleaning the paint on your car - Click Here
- Latex Gloves - for the extra oily and dirty jobs - Click Here
- Medium and High Strength Loctite Thread lock compound - to prevent bolts from backing out - Click Here
- Anti-Seize Compound - to prevent seizing, galling, and corrosion of fasteners - Click Here
- Aerosol Brake/Parts Cleaner - for cleaning and degreasing parts
- Shop Rags - used for wiping hands, tools, and parts
- Penetrating oil - for helping to free rusted or stuck bolts and nuts
- Mechanics wire - for securing components out of the way
- Silicone spray lube - for rubber components such as exhaust hangers
- Paint Marker - for marking installation positions or bolts during a torquing sequence
- Plastic Wire Ties/Zip Ties - for routing and securing wiring harnesses or vacuum hoses
- Electrical tape - for wrapping wiring harnesses or temporary securing of small components

# INSTALLATION NOTES

- **RH** refers to the ***passenger side*** of the vehicle.
- **LH** refers to the ***driver side*** of the vehicle.
- Always use the proper torque specifications.
- If applicable to this installation, torque specifications will be listed throughout the document and at the end as well.
- Please read all of these instructions and familiarize yourself with the complete process **BEFORE** you begin.

# GENERAL PREPARATION AND SAFETY INFORMATION

ECS Tuning cares about your health and safety. Please read the following safety information. This information pertains to automotive service in general, and while it may not pertain to every job you do, please remember and share these important safety tips.

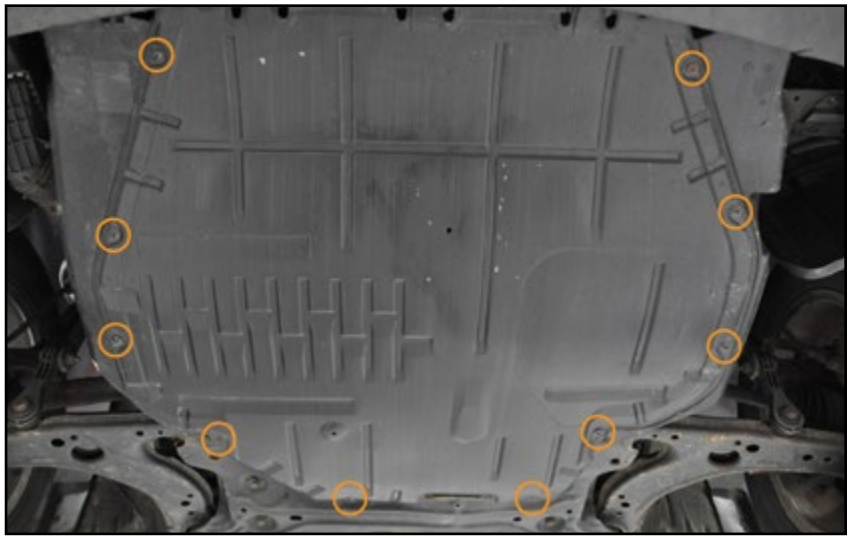
- Park your car in a safe, well lit, level area.
- Shut the engine off and remove the key from the ignition switch.
- Make sure any remote start devices are properly disabled.
- **ALWAYS** wear safety glasses.
- Make sure the parking brake is applied until the vehicle is safely lifted and supported.
- If using an automotive lift, be sure and utilize the factory specified lift points. Lifting a vehicle in an incorrect location can cause damage to the suspension/running gear.
- When lifting a vehicle using a jack, always utilize the factory specified lift points. Lifting a vehicle in an incorrect location can cause damage to the suspension/running gear. **ALWAYS** support the vehicle with jack stands.
- **ALWAYS** read and follow all safety information and warnings for the equipment you are using.

**Never get underneath a vehicle that is supported only by a jack. Always make sure that the vehicle is securely supported on jack stands.**

# REFRESH KIT INSTALLATION

## Step 1: T25 Torx

Safely raise and support the vehicle. Remove the lower insulation panel or skid plate, whichever you have installed. The original equipment insulation panel, as shown here, is held on by ten torx screws located around the perimeter.



**TECH TIP**

Leave the key in the ignition so the steering wheel remains unlocked during the installation.

## Step 2: Lug Cap Tool or Small Angled Pick Tool

Remove the lug bolt caps on the front wheels. The factory tool hooks them in the center to pull them off, or you can use a small angled pick.

If you're missing any, replacement caps are available on our website as ES#5993. They're a nice touch to finish things off.

# REFRESH KIT INSTALLATION - CONTROL ARMS

## Step 3: 17mm Protecta-Socket, Wheel Hanger

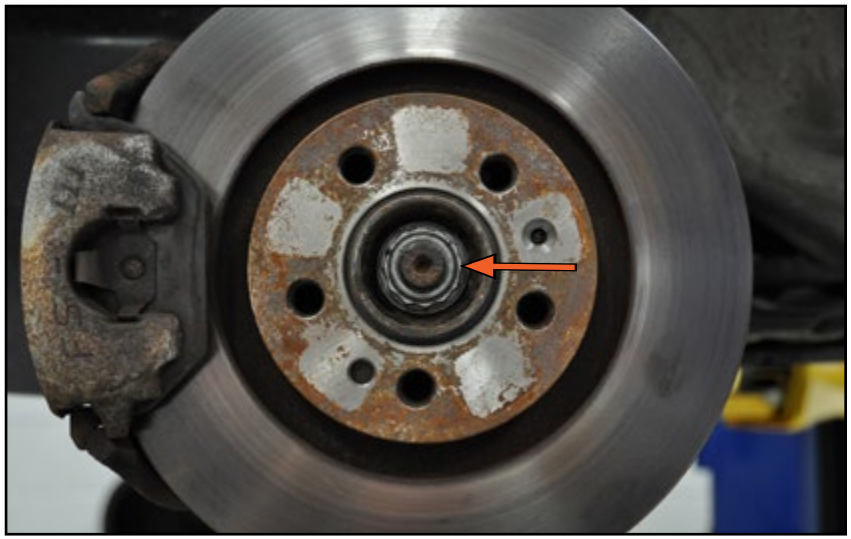
Remove both front wheels. Here we are using a Protecta-Socket so we do not accidentally damage the finish on the wheels and a wheel hanger to support the wheel when we remove the lug bolts.

**NOTE**

This vehicle is no longer equipped with the locking lugs that came from the factory, so we are using an impact wrench on all bolts. If your vehicle has locking lug bolts, be sure to loosen them by hand with the vehicle on the ground.

## Step 4: 30mm 12 Point Socket

Remove the outer CV nut on each side. You can use an impact wrench for this, or a long breaker bar. If using a breaker bar, you can partially thread in two lug bolts and lever a pry bar in between them to keep the drive hub from turning.

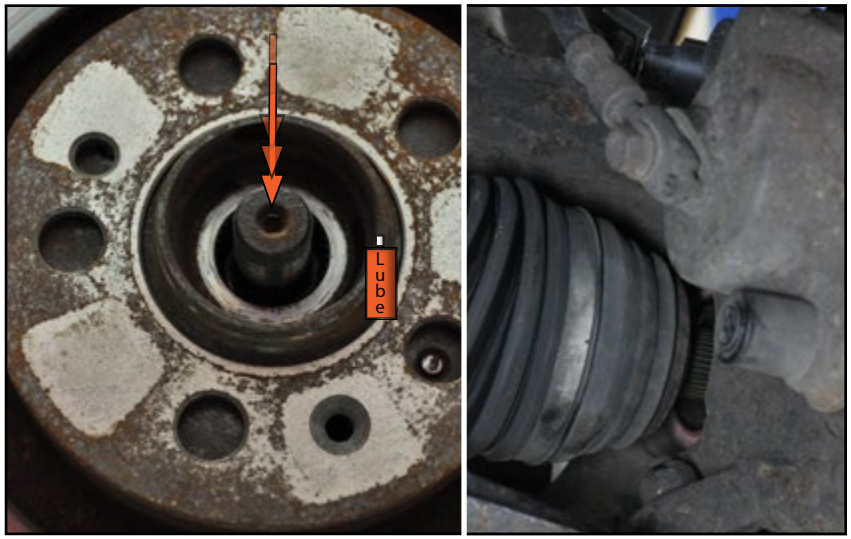


**NOTE**

Some vehicles may have a bolt securing the outer CV joint instead of a nut.

Large Punch, Ball Pein Hammer

With the nut removed, gently drive each outer CV joint back slightly into the drive hub. The object here is only to loosen the CV joint in the drive hub. The two are splined together and normally they will slide in and out with ease, however sometimes light rust will cause them to stick in place. It is also helpful to spray penetrating oil into the center of the drive hub.




As shown in the picture on the right, you should only drive the CV joint slightly inward. When you can see in between the joint and bearing as you can here, you can then spray penetrating oil on the inside as well.

Spray penetrating oil through the access hole on the bottom of each control arm onto the back side of the front sway bar link bolts.

# REFRESH KIT INSTALLATION - CONTROL ARMS

**Step 7:** 16mm Socket, Ratchet

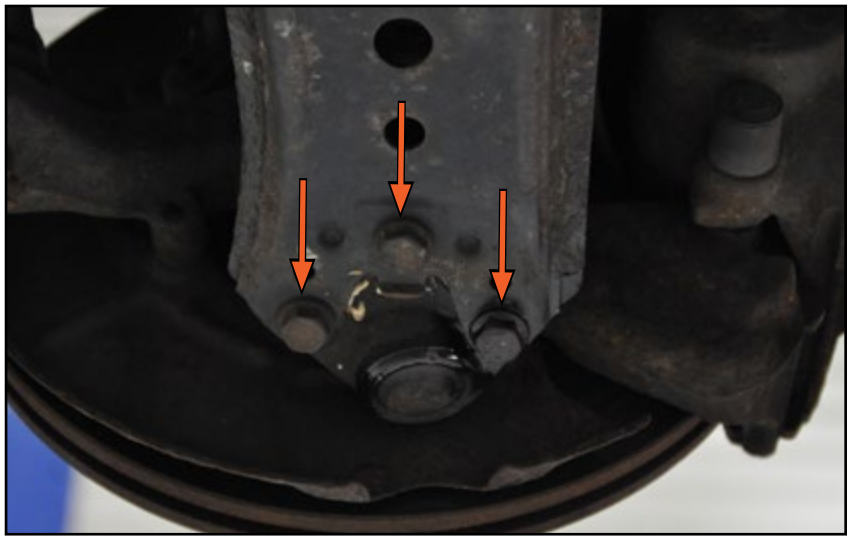
Remove the bolts securing the front sway bar links to the lower control arms. If they are stuck, take your time and work them back and forth, using additional penetrating oil as necessary, until you are able to remove them with ease.

**NOTE**

Ours is not, but your vehicle may be equipped with a level sensor on the LH lower control arm. If so, remove it at this time.

**Step 8:** 13mm Socket, Ratchet

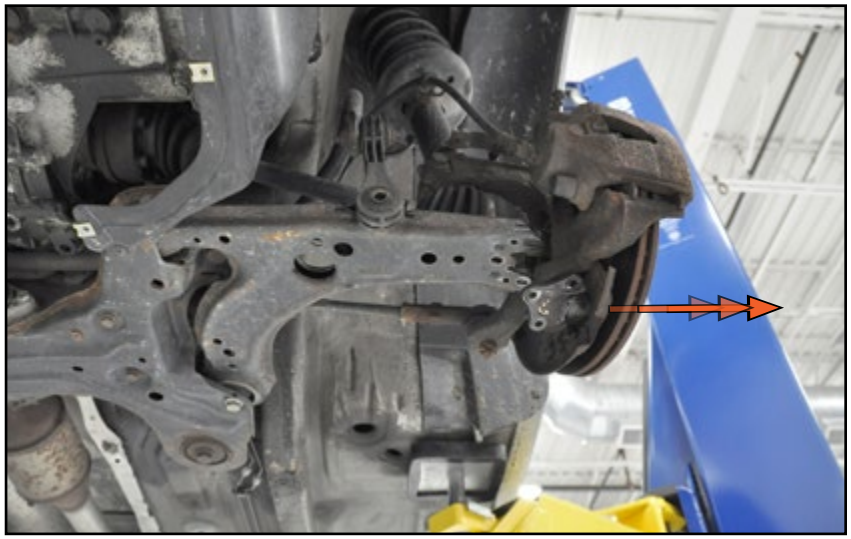
Remove the three lower ball joint bolts on each side.



# REFRESH KIT INSTALLATION - CONTROL ARMS

## Step 9:

Pull outward on each steering knuckle and slide the lower ball joints out of the control arms. With the CV joints free in drive hub, they will slide out with ease.

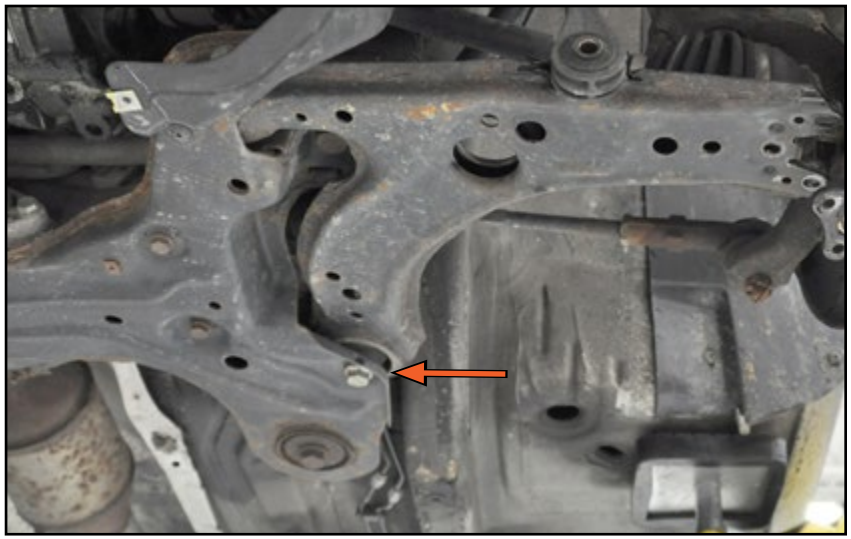


**TECH TIP**

If you pull the steering knuckle out far enough, the CV joint will slide completely out of the drive hub, however It is best to allow the CV joint to remain resting in the hub. If the CV shaft drops down or is extended too far, the inner CV joint may come apart, and the complete shaft will have to be removed to reassemble the joint.

## Step 10: 18mm Socket, Ratchet

Remove the vertical control arm mounting bolt on each side. There is a nut on the top of each one that can be easily accessed and held with a shallow socket on the end of a ratchet.



**NOTE**

The front and rear control arm bushings are referred to as "horizontal" and "vertical" bushings as a result of the installation positions of their respective bolts.

# REFRESH KIT INSTALLATION - CONTROL ARMS

**Step 11:** 18mm Socket, Ratchet

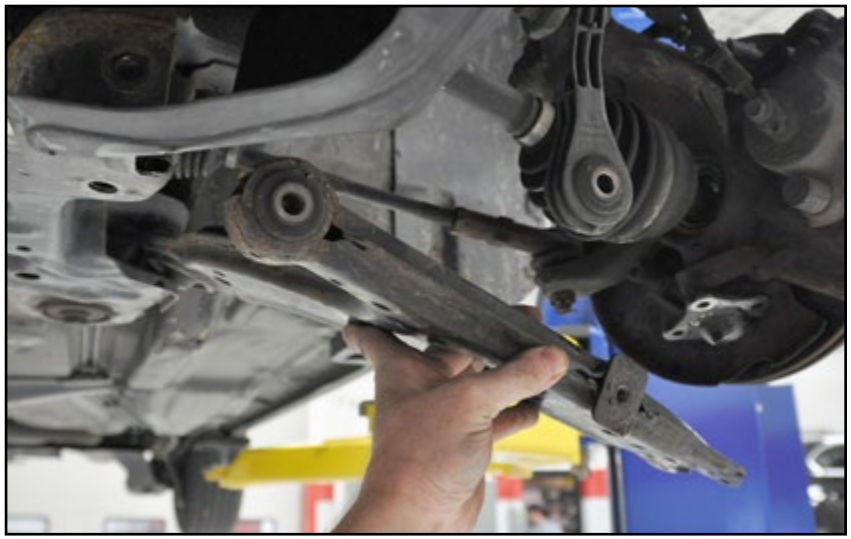
Remove the horizontal control arm bolt on each side.

**NOTE**

On vehicles equipped with an automatic transmission, you will have to unbolt the pendulum or "dog bone" mount at the subframe and swing the engine forward to be able to remove the LH horizontal bolt.

**Step 12:**

Slide the lower control arms out of the subframe.



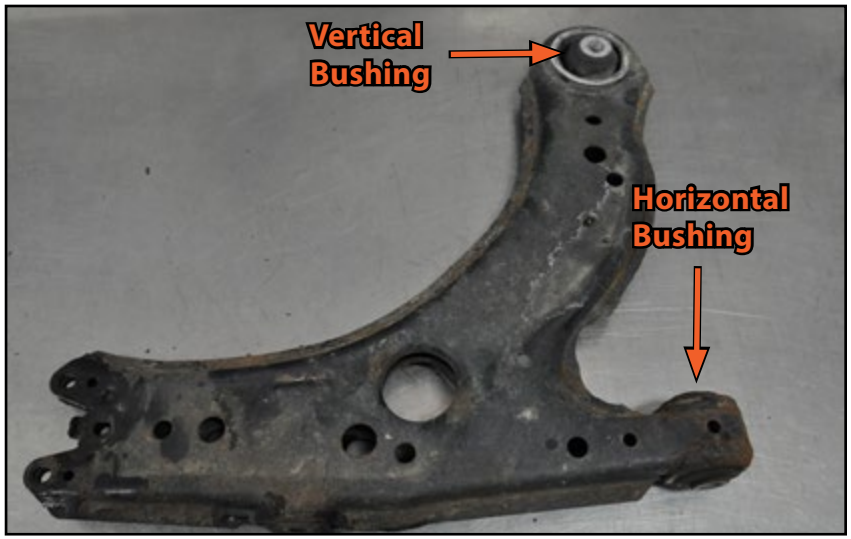
# REFRESH KIT INSTALLATION - CONTROL ARMS

## Step 13:

Be sure that the outer CV joints are still resting in the drive hub so the inner joint does not come apart.

## Step 14:

If you are installing a Stage 1 or Stage 2 kit, you will need to press out the original bushings and press in the new. If you do not have the tools or equipment for this, most automotive repair shops should be able to do this for you. This is the perfect time to drop them off while you continue with the rest of the work.



Small Angled Pick

Now we're going to install the two new ball joints, but you'll have to move the CV shafts off to the side for access. Be sure and secure them up with mechanics wire so the inner joint does not come apart.

The first thing you want to do here is clean any dirt out of the top of the ball joint stud using a small pick, and lubricate the threads as well.


18mm Boxed End Wrench, Ball Pein Hammer

Loosen the ball joint nut with a wrench. The steering knuckle will tend to move around and turn making it difficult to loosen the nut, however a quick, sharp blow with a hammer on the end of the wrench should do the job.

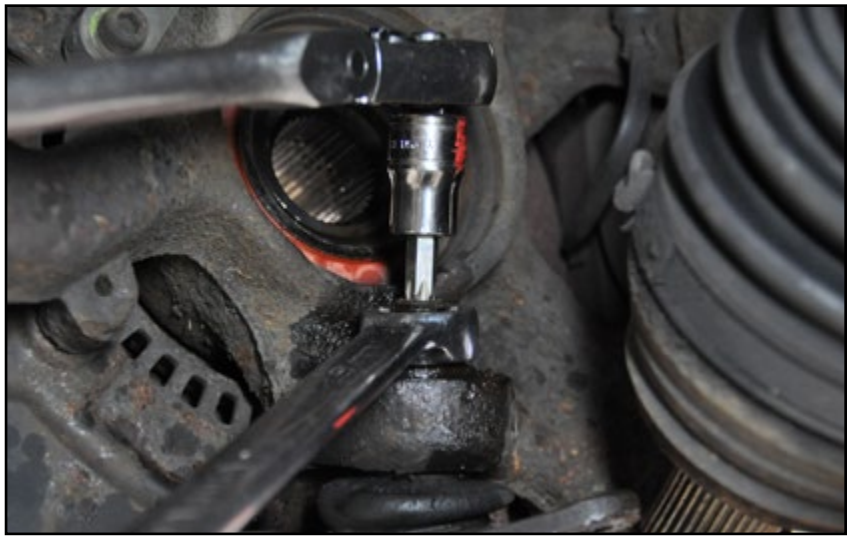
**TECH TIP**

If you've got them, an impact wrench with an impact swivel socket will usually make short work of removing these nuts.

# REFRESH KIT INSTALLATION - BALL JOINTS

## Step 17: T45 Torx, 18mm Wrench, Ratchet

Unthread and remove the ball joint nuts. You may have to hold the ball joint studs with a Torx socket inserted in the top as shown in order to keep them from spinning in the steering knuckle.

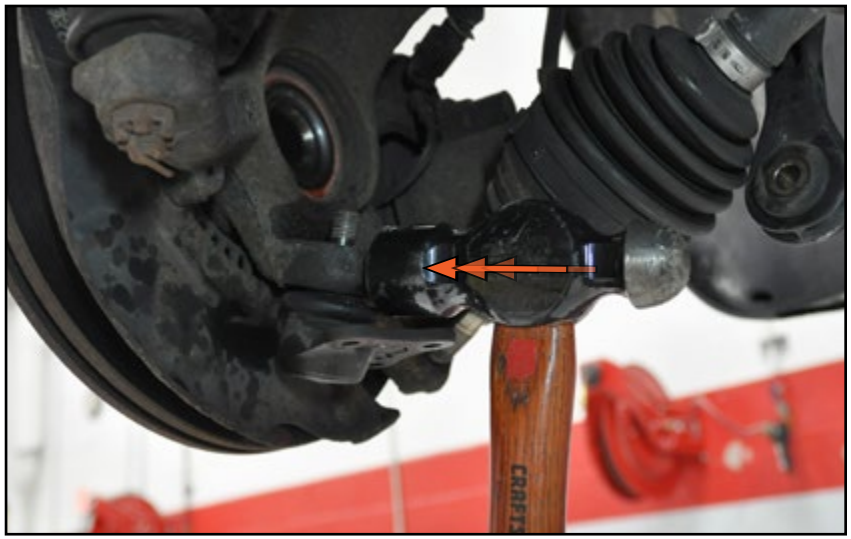


**TECH TIP**

If you've got them, an impact wrench with an impact swivel socket will usually make short work of removing these nuts.

## Step 18: Ball Pein Hammer

If the ball joint stud loosened when removing the nut, the ball joint will come right out. If it is still stuck in steering knuckle, you can remove it using a ball joint or "pickle" fork, but an even easier method for removal is to hit the steering knuckle directly on the crown of the casting with a quick, sharp blow from a ball pein hammer. Use at least a 32oz hammer so it's got some weight behind it. One solid hit is all it usually takes and the ball joint will "pop" right out.



# REFRESH KIT INSTALLATION - BALL JOINTS

**Step 19:**

Remove the old ball joints and clean the tapered ball joint seat in the steering knuckle.

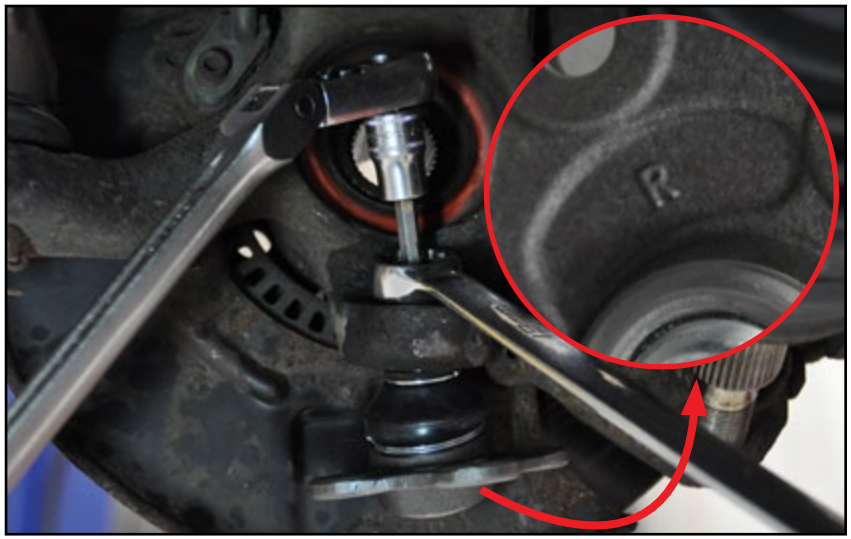
**Step 20:** 6mm Hex Bit Socket, 19mm Wrench, Torque Wrench

Install the new ball joints into place.

The LH and RH ball joints are different. They will be stamped “L” or “R” on the bottom with their location.

As you tighten the new ball joint nuts, you will have to hold the stud to keep it from turning. Many of the new ball joints will require a 6mm hex bit and 19mm wrench to reinstall instead of the original T45 and 18mm.

Finally, torque the ball joint nuts to 45 Nm (33 Ft-lbs).



# REFRESH KIT INSTALLATION - STRUT MOUNTS

**Step 21:** T25 Torx

OK, it's time for the strut mounts, and we're going to leave the control arms off for now to give us a little more room for strut removal.

On the LH side only, remove the screw holding the brake pad warning harness bracket to the strut, and pull the bracket away from the strut.

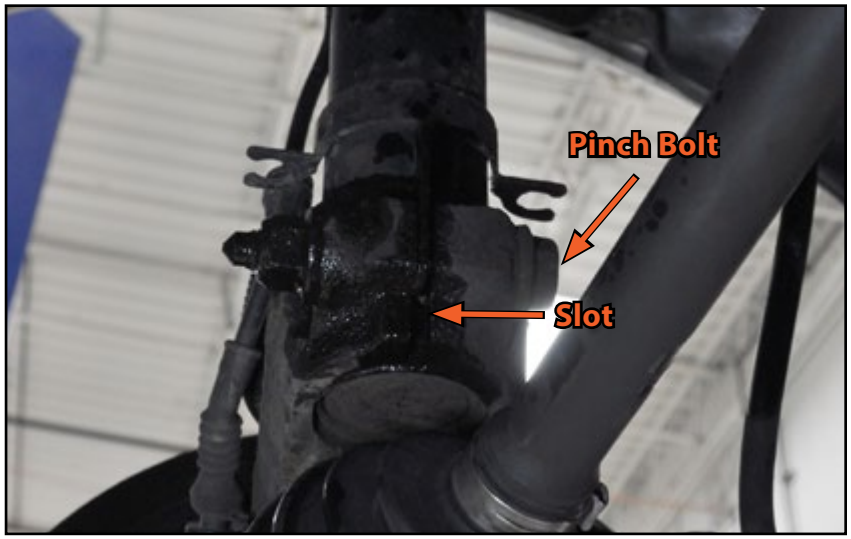
**Step 22:**

Pull the ABS/brake warning harness out of the retainers on the side of each front strut (arrows).

# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 23: 18mm Socket, Ratchet

Remove the pinch bolt holding each strut into the steering knuckle (viewed from the back here). Don't worry if it's stuck and you have to hammer it out, we've included new ones with the kit.




**NOTE**

Note the slot in the back of the steering knuckle, it'll be important in just a few minutes.

## Step 24: Hydraulic Jack

Starting on one side, place a jack underneath the brake rotor and raise it just until it meets the rotor. Make sure the jack has a rubber pad on it to protect the rotor.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

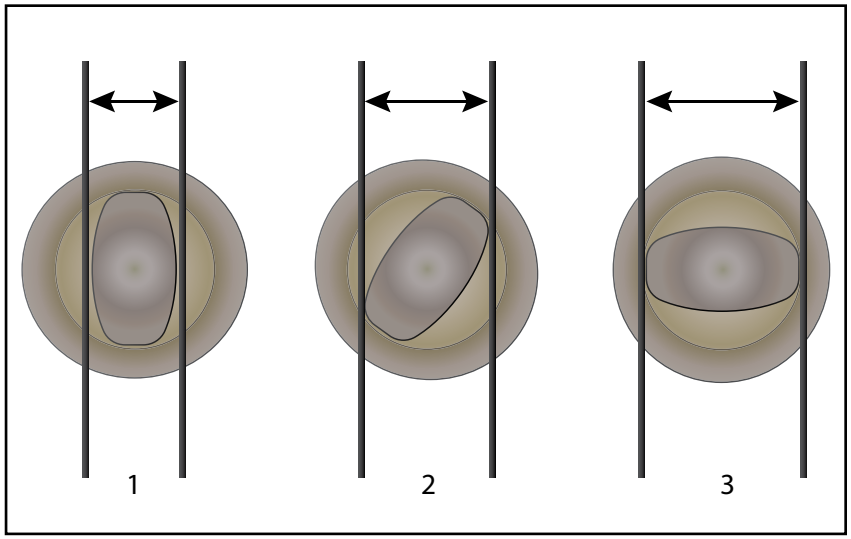
## Step 25:

Familiarize yourself with how the spindle housing spreader works. It has an elongated bit with the long sides radiused so it will rotate easily in the slot of the steering knuckle. The short sides are cut flat so they will "lock" in place and hold the slot in the spread open position.

1. Insert the spreader into the slot in the back of the steering knuckle.

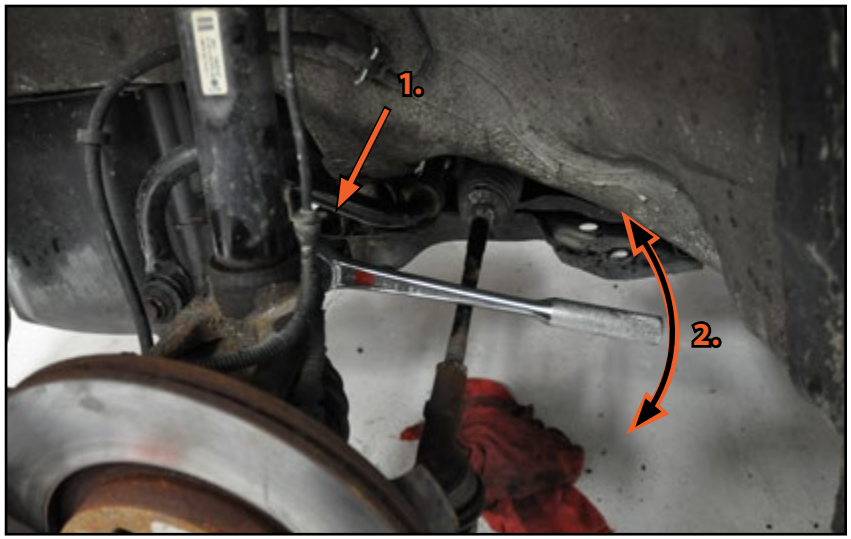
2. Rotate the spreader (either direction) with a 1/2" ratchet and you will feel increased tension as it begins to spread the slot.

3. Continue to rotate it slowly (total rotation will be 90 degrees) until you feel the flat sides "lock" in place. You can release tension and it will stay in place with the slot in the spread open position.




## Step 26: Spindle Housing Spreader, 1/2" Drive Ratchet

Insert the spindle housing spreader into the slot in the back of the steering knuckle. Turn the spreader until it "locks" in place, holding the slot in the spread open position.



# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 27:

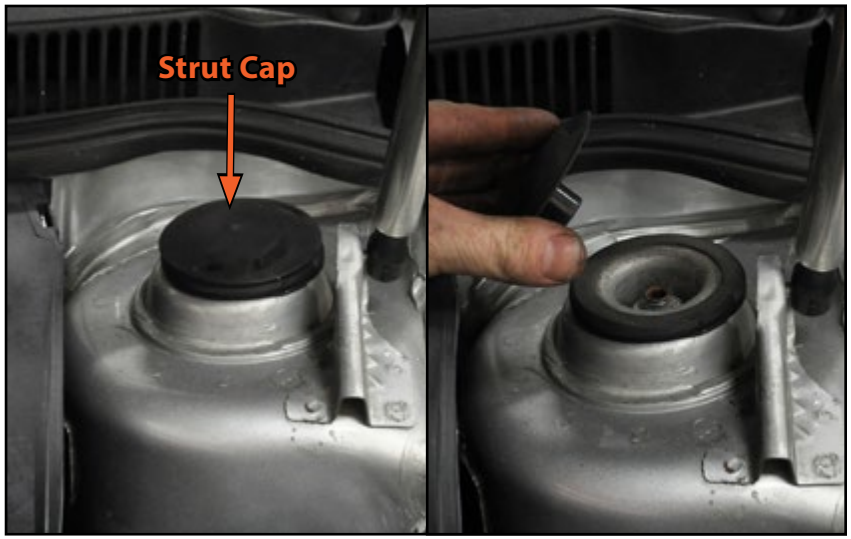
Leaving the spindle housing spreader in place, lower the jack slowly until the steering knuckle slides down off of the strut.

**NOTE**

You may have to tap the knuckle lightly with a hammer to get it to slide off the strut.

## Step 28:

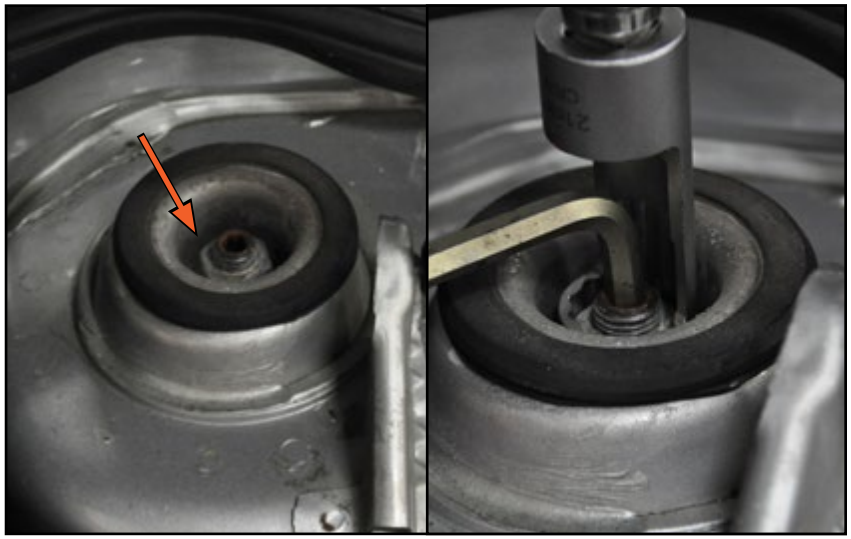
Under the hood, remove the strut cap by pulling it up and off.



# REFRESH KIT INSTALLATION - STRUT MOUNTS

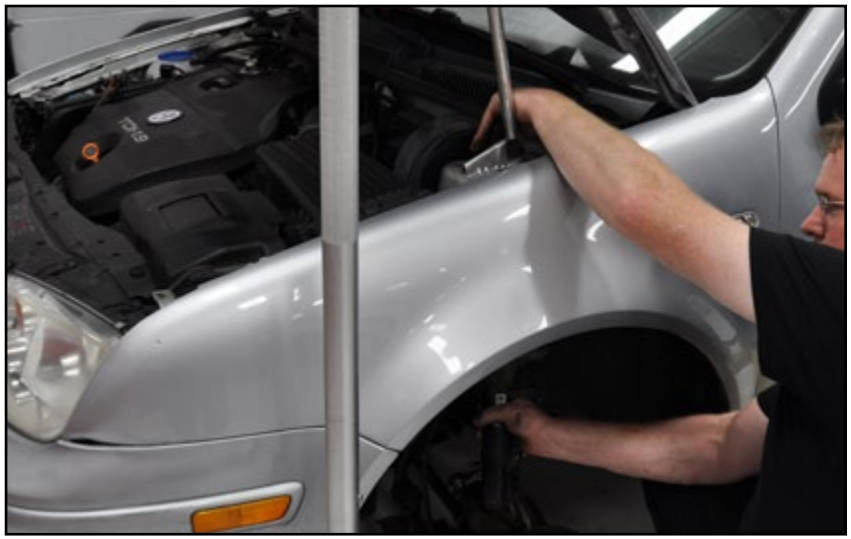
**Step 29:** 7mm Hex Wrench, 21mm Strut Nut Socket

Loosen the upper strut cap nut. Do not completely remove it, but leave it on just a few threads. You will need to hold the strut rod with a hex wrench while loosening the nut with a strut nut socket.



**Step 30:**

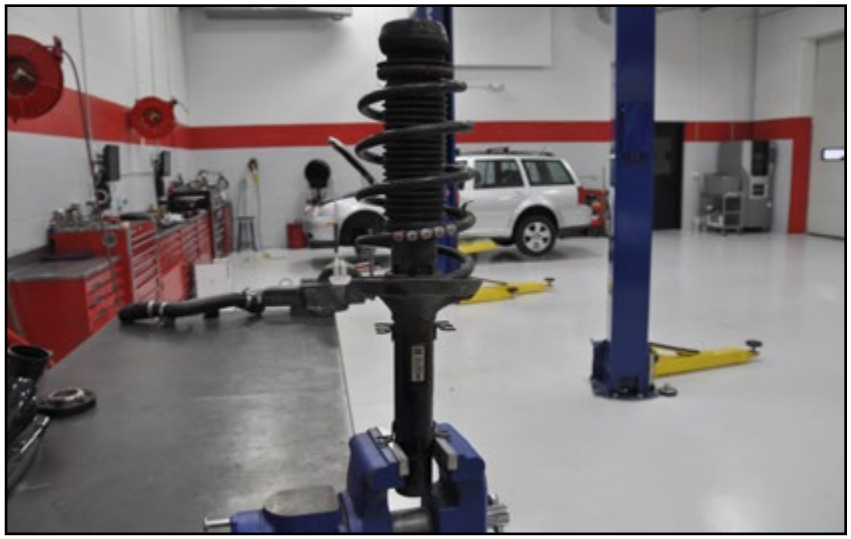
Remove the strut from the car using the following method: Hold the strut with one hand, reach over the fender and remove the upper strut cap nut, then lower the strut out.



# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 31:

Lightly clamp the strut in a vise. Do not over tighten the vise or you will risk distorting the strut housing.

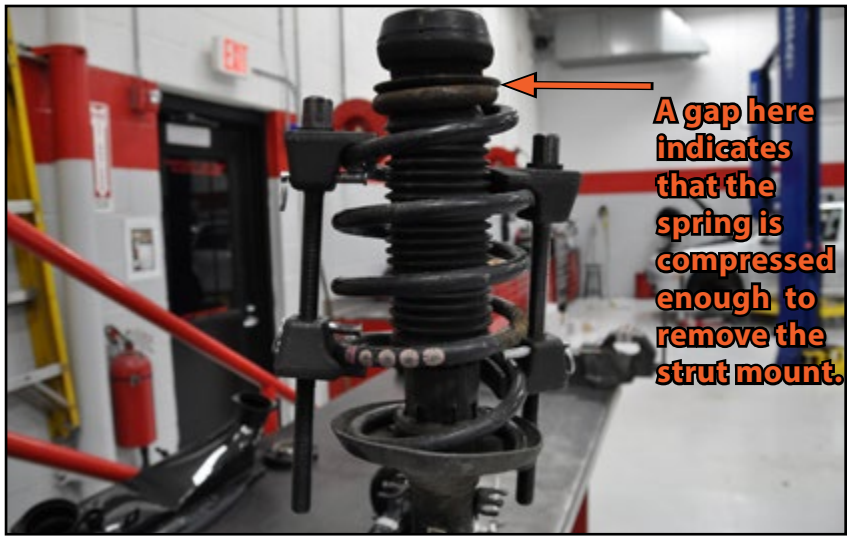


**CAUTION**

Use caution while compressing a coil spring. Be sure to utilize all tool safety features and wear proper safety equipment. Read ahead and make sure you have all tools near by so you can work efficiently through these steps.

## Step 32: Coil Spring Compressor

Install a coil spring compressor and compress the spring just until it begins to pull away from the upper spring seat.



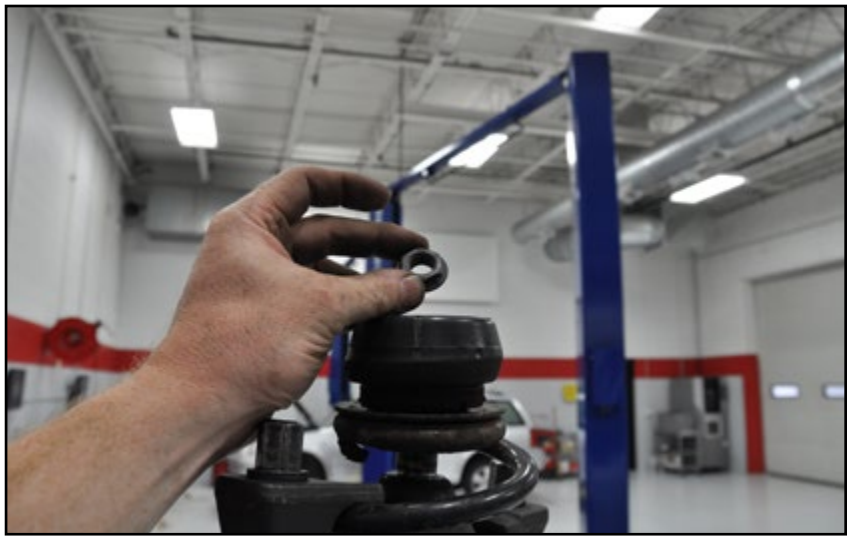
# REFRESH KIT INSTALLATION - STRUT MOUNTS

**Step 33:** 7mm Hex Bit, 21mm Strut Nut Socket

Loosen the upper strut mount nut. You'll have to use the same method used in step 29 for the cap nut.

**Step 34:**

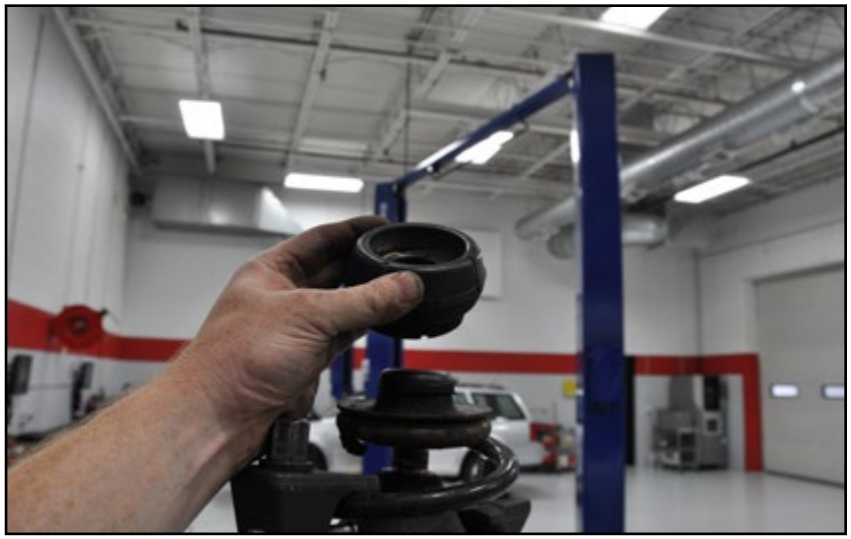
Remove the upper mount nut.



# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 35:

Lift off the old upper strut mount.

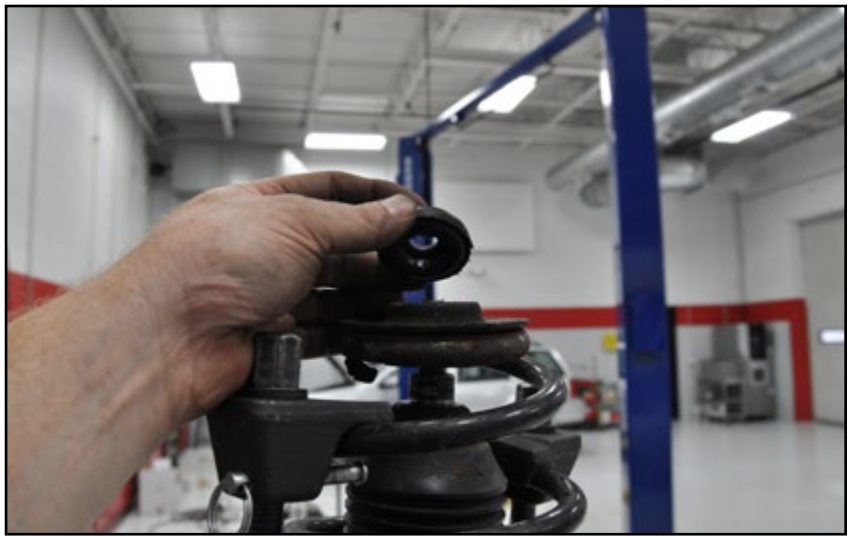


## Step 36:

Lift off the old upper strut bearing.

**NOTE**

It is possible that the upper strut bearing will be stuck and come off with the mount.

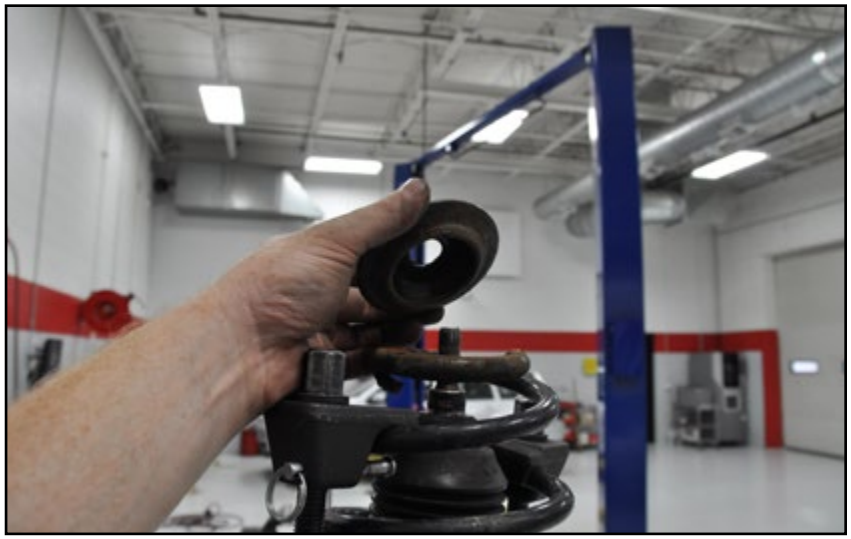


If you are only replacing the upper strut mount and bearing, skip to step 47 on Page 38. If you are going to install new struts, continue with step 37 on the next page.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

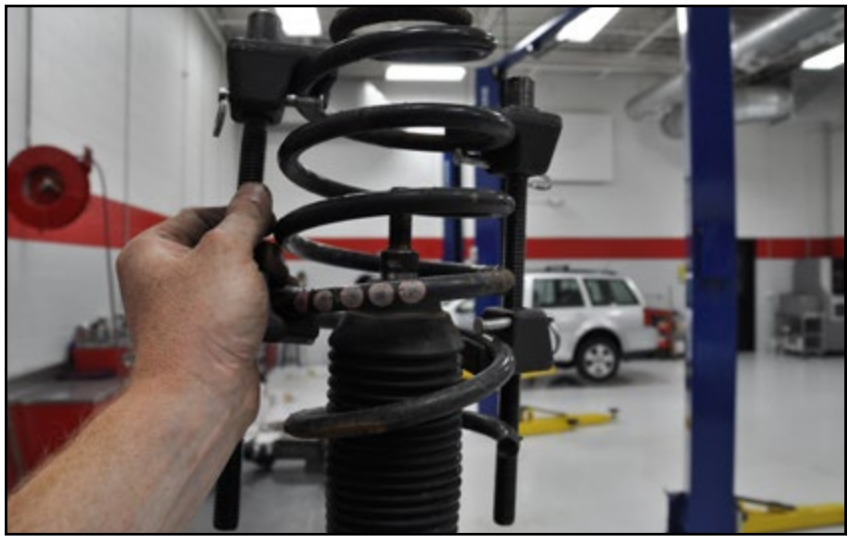
**Step 37:**

Lift off the upper spring seat.



**Step 38:**

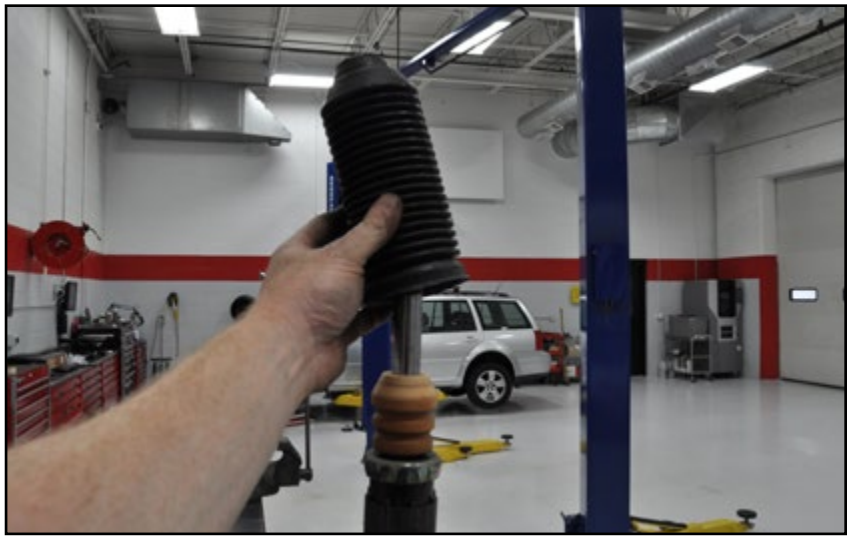
Lift off the coil spring.



# REFRESH KIT INSTALLATION - STRUT MOUNTS

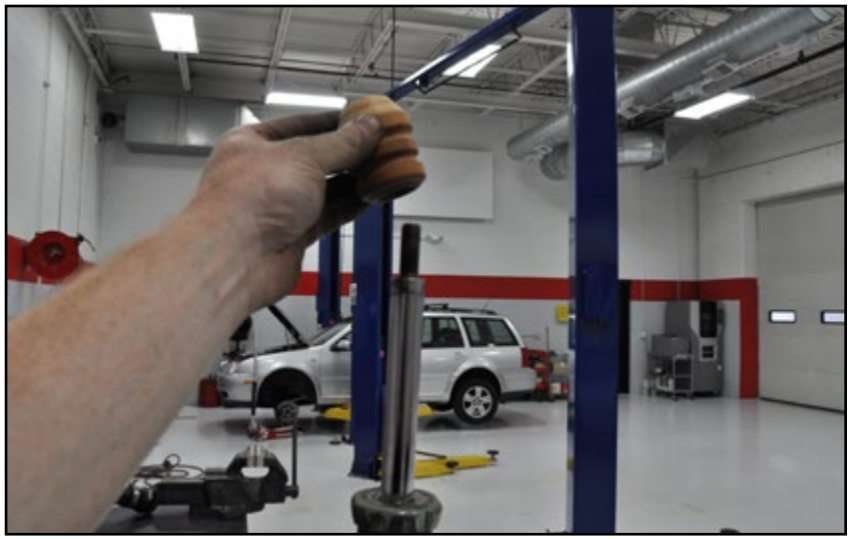
## Step 39:

Lift off the dust shield.



## Step 40:

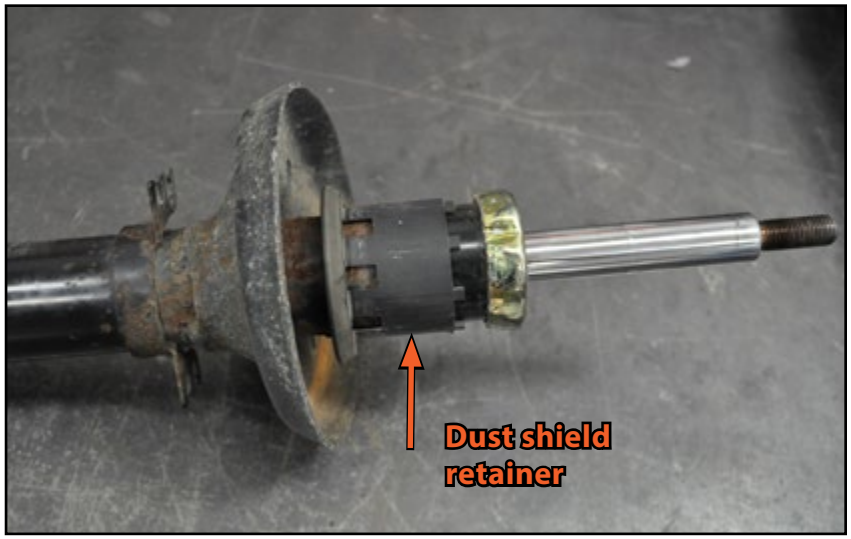
Pull the bump stop off the shock rod.



# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 41:

Remove the lower dust shield retainer from the original strut. You may have to cut this with a razor knife to be able to remove it, you generally will not be able to slide it over the crimped shock cap.



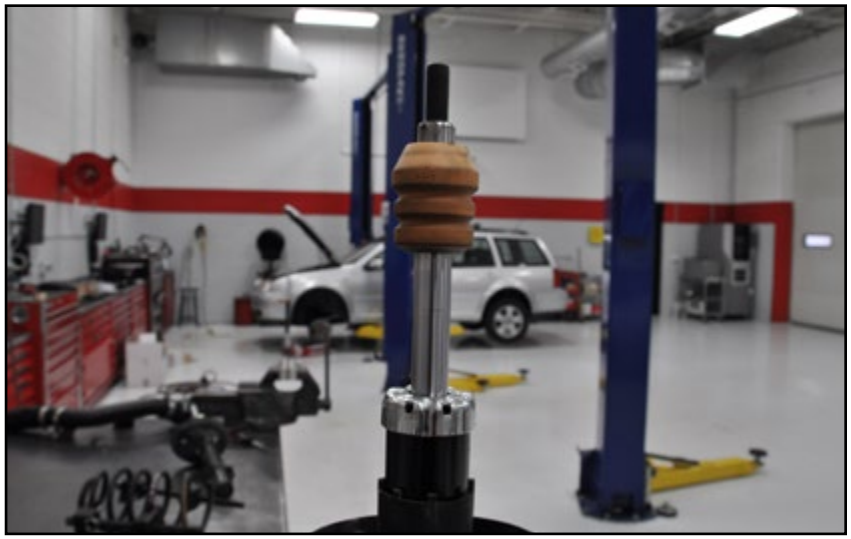

## Step 42:

Install the lower dust shield retainer onto the new strut. Secure it with cable ties if necessary.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 43:

Push the bump stop onto the new shock rod.



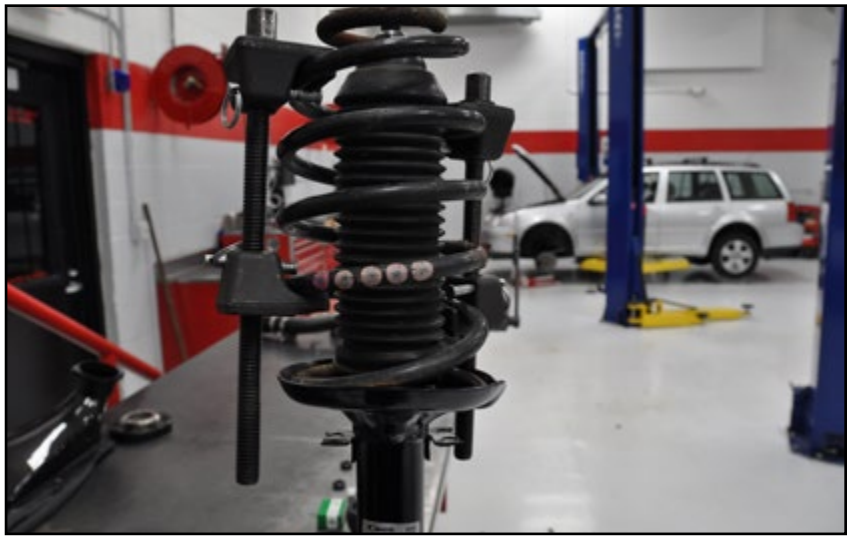
## Step 44:

Place the dust shield over the new shock rod and clip it into place on the lower dust shield retainer.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

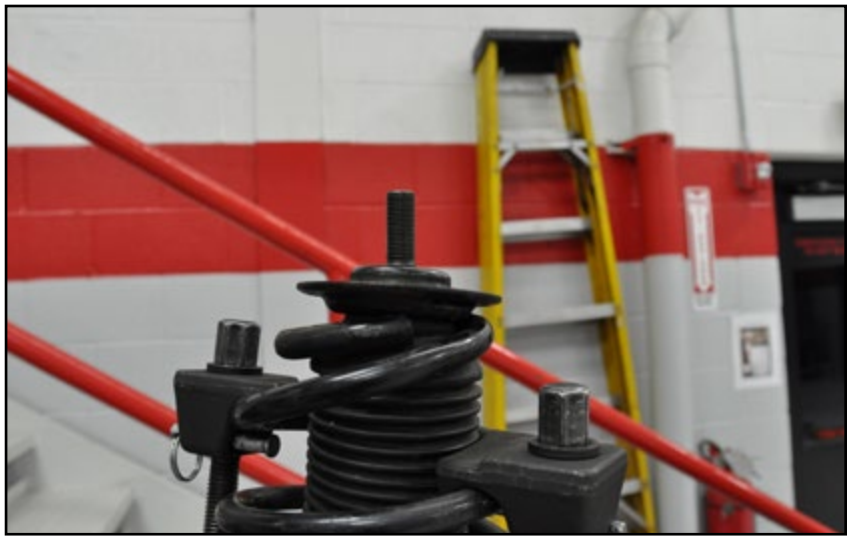
## Step 45:

Place the coil spring onto the new strut housing, making sure it is indexed properly in the lower spring seat (the lower spring seat has a contoured stop for the end of the coil spring).



## Step 46:

Place the upper spring seat over the shock rod.



**NOTE**

On a standard shock absorber (non gas charged), the shock rod may slide down and you may have to pull it upwards so you can install the upper seat and mount. It is normal for it to continuously slide down, so you may have to pull it up and hold it up during assembly.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 47:

Place the new upper strut bearing onto the spring seat. Make sure it is correctly installed. The top of the bearing has a smooth radius and the bottom of the bearing has visible “teeth”.

## Step 48:

Place the new upper strut mount over the shock rod.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

**Step 49:** 6mm Hex Bit, 21mm Strut Nut Socket, Torque Wrench

Install the new upper strut mount nut and torque it to 60 Nm (44 Ft-lbs).
Remove the coil spring compressor.

**NOTE**

The required hex bit is a different size on many replacement shock absorbers.

**Step 50:**

Position the strut back into place in the car.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

## Step 51:

Loosely install the strut cap nut, but do not tighten it at this time. (Leaving it loose makes it much easier to slide the steering knuckle back onto the strut).

## Step 52:

Slowly jack up the steering knuckle until the strut is fully seated.

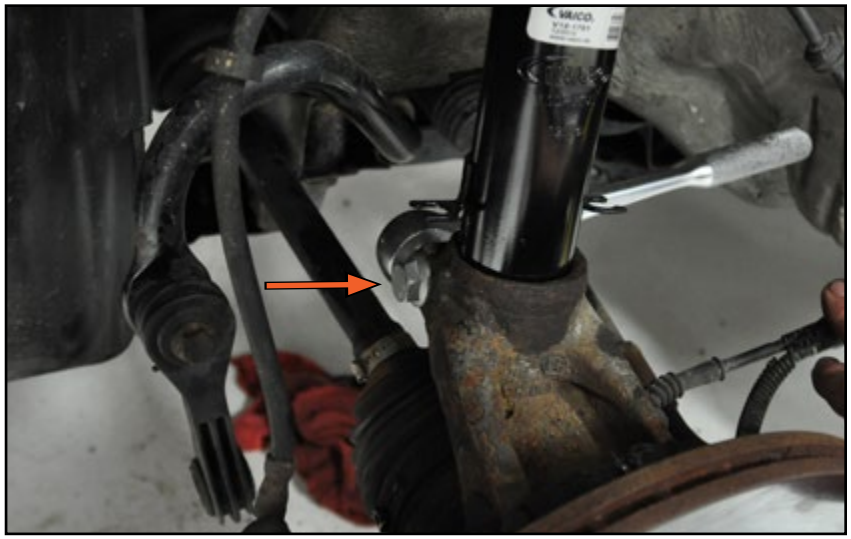
As shown in the inset photo, each strut has a tab on the back that must be lined up and slip into the slot of the steering knuckle. The strut is fully seated in the knuckle when the bolt hole in the tab is aligned with the hole in the knuckle and the bolt can be inserted.

The spindle housing spreader should still be installed, and the strut should slide easily into the knuckle. You may have to adjust the position of the knuckle to properly align it with the strut until it slides easily in place.

# REFRESH KIT INSTALLATION - STRUT MOUNTS

**Step 53:**

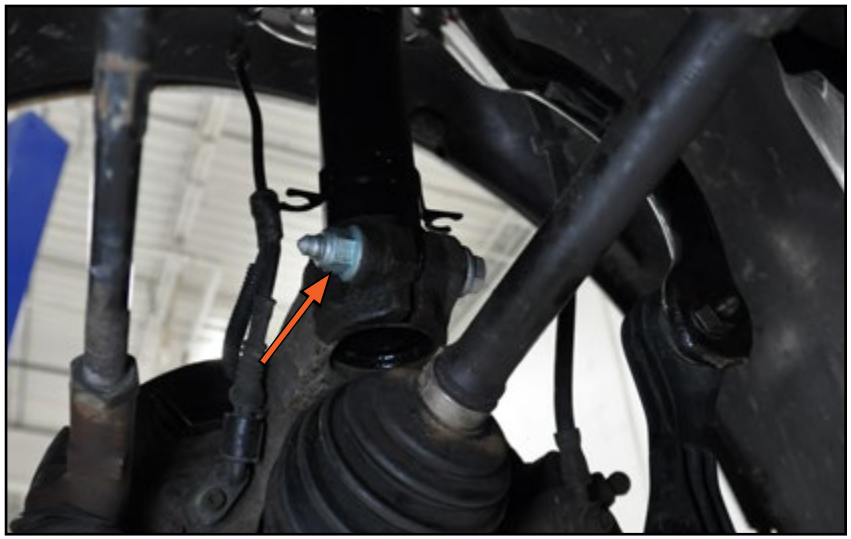
Slide the new M12 x 78 steering knuckle bolt into place.



**Step 54:** 18mm Socket, 18mm Wrench, Torque Wrench

Remove the spindle housing spreader, install the new nut on the steering knuckle bolt, and torque the nut to 60 Nm (44 Ft-lbs) + 90 Degrees.

Lower the hydraulic jack, then repeat this procedure for the other strut, beginning with step 24 on Page 26.



**TECH TIP**

If you are unfamiliar with this type of torque spec, please refer to Torquing Tips on page 59.

6mm Hex Bit, 21mm Strut Nut Socket, Torque Wrench

Torque the cap nuts to 60 Nm (44 Ft-lbs), and install the strut caps.

Perform the following:

- [ ] Reattach the ABS and brake warning harnesses to the mounts on the struts.
- [ ] If you haven't already, slide the outer CV joints back into the drive hubs.

Now it's time to install the new control arms, or the original ones with the new bushings installed. We are installing new ones with polyurethane bushings, but the procedure is the same for both. Begin by sliding them back into place in the subframe.

**NOTE**

The control arms are the same and can be installed on either side.

18mm Socket, Ratchet

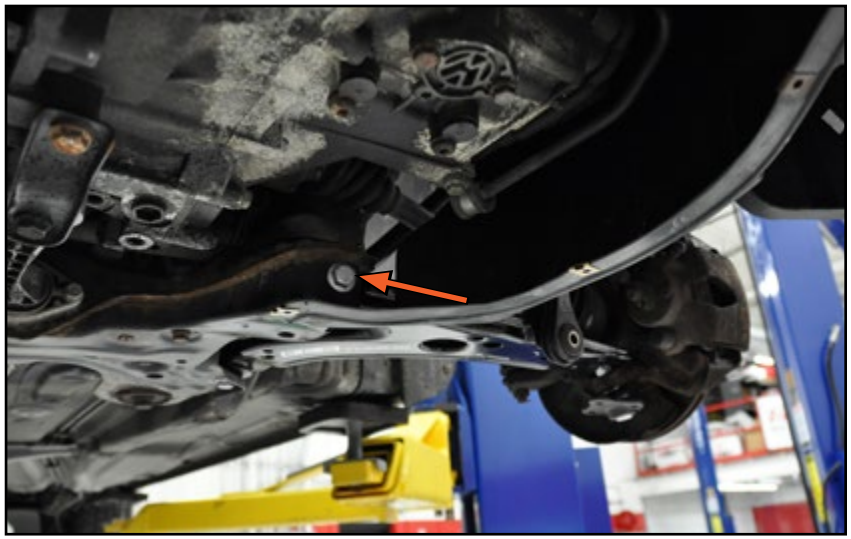
Line up the rear (vertical) mounting holes and install the new bolts and nuts included with the kit. Do not tighten them at this time.

**TECH TIP**

A tapered punch can be inserted into the center of the bushing to help align it with the hole in the subframe.

18mm Socket, Ratchet

Line up the front (horizontal) mounting holes and install the bolts. Thread them in until they are fully seated but do not tighten them at this time.



☐ If you unbolted the pendulum mount for automatic transmission equipped vehicles, reinstall it at this time and torque the bolts to 25 Nm (18 Ft-lbs).

# REFRESH KIT INSTALLATION - CONTROL ARMS

**Step 59:**

Slide the lower ball joints into the control arms and line up the holes.

**Step 60:** 13mm Socket, Torque Wrench

On each side, install the three new ball joint bolts included with the kit. The retainer sits on top of each control arm, and a washer should be placed under the head of each bolt. Torque the bolts to 20 Nm (14 Ft-lbs) + 90 degrees.

18mm Sockets, Ratchet, Torque Wrench

Torque both of the vertical control arm bolts to 70 Nm (52 Ft-lbs) + 90 Degrees.

☐ If equipped, reinstall the level sensor on the LH control arm.

Install the outer CV nuts (or bolts) and torque them to the proper specification listed below:

CV Joint (Nut):

1. Torque initially to 200 Nm (147 Ft-lbs).
2. Loosen 1/2 turn
3. Rotate drive hub 180 Degrees
4. Torque the CV nut to 50 Nm (36 Ft-lbs) + 60 degrees

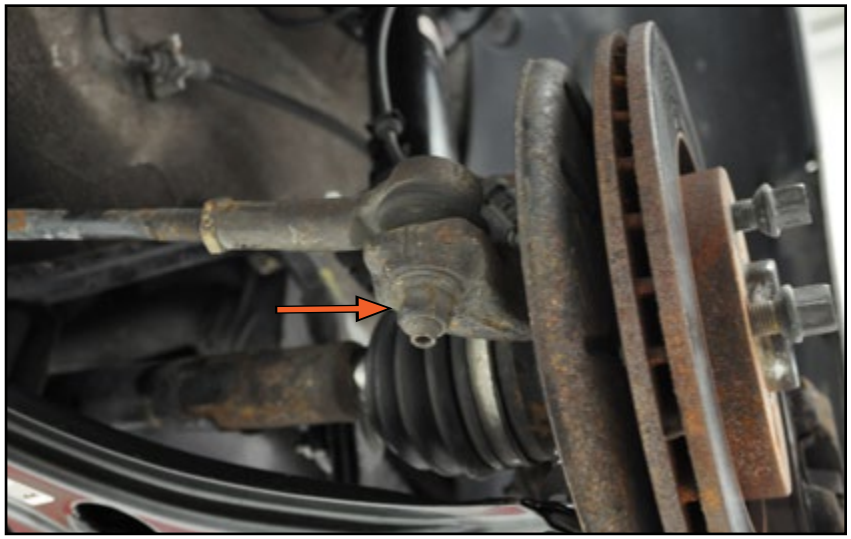
CV Joint (Bolt):

1. Torque initially to 250 Nm (184 Ft-lbs) + 90 degrees.
2. Loosen 1/2 turn
3. Rotate drive hub 180 Degrees
4. Torque the CV bolt to 250 Nm (184 Ft-lbs) + 90 degrees

# REFRESH KIT INSTALLATION - TIE RODS

**Step 63:** 18mm Socket or Wrench, Ratchet, Impact

Remove both outer tie rod end nuts. These are easy to get to so if you have an impact wrench, it should "zip" them right off. If you are removing them by hand, you may have to hold the center stud as we did with the ball joints.



**NOTE**

The LH and RH outer tie rod ends are different. Note the installation positions. The RH (Passenger side) is shown here

**Step 64:** Tie Rod/Ball Joint Fork, Ball Pein Hammer

Turn the wheel so the tie rod end is all they way toward the side you're working on. This will give you the most access for removal.

Separate the tie rod ends from the steering knuckle. If you have a tie rod or "pickle" fork, you can use it - or - striking the steering knuckle with a hammer using the same method used to remove the ball joints in step 18 will also cause the tie rod ends to "pop" right out.

# REFRESH KIT INSTALLATION - TIE RODS

## Step 65:

Now we're going to remove the outer tie rod ends from the inners. They are held in place by a lock nut.


**TECH TIP**

Before removing the tie rod ends, measure the exposed threads on the inner tie rod and note it down for both sides. When reinstalling the new outer tie rod ends, thread them on to this same location. While this by no means takes place of an alignment, it is a good practice because it will not only make the alignment easier, but also allow you to safely move the vehicle a short distance.

## Step 66: 19mm, 22mm Open/Boxed End Wrenches

Hold the tie rod end stationary and loosen the lock nut.

**NOTE**

These tie rod ends usually look pretty clean and innocent, but they can be difficult, so if you're having trouble, it's not uncommon. You may have to get these hot.....***very*** hot, with an oxyacetylene torch before you will be able to loosen and remove them.

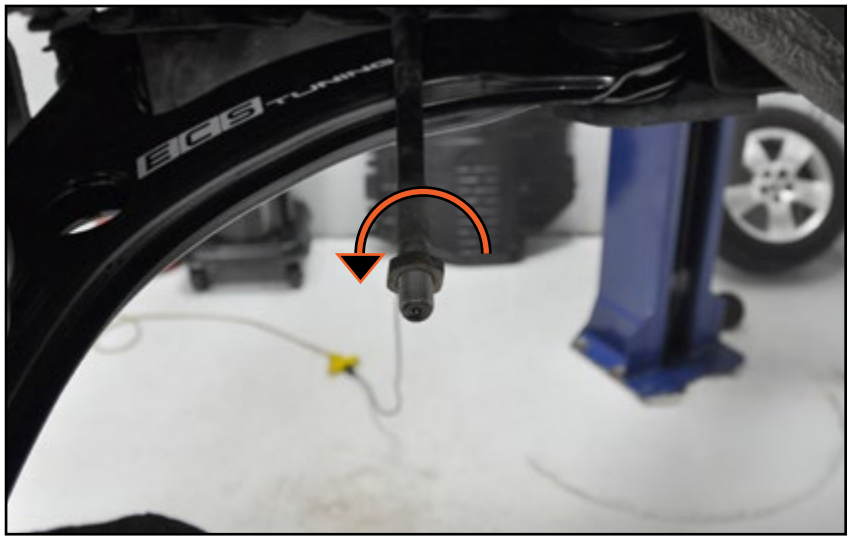
# REFRESH KIT INSTALLATION - TIE RODS

## Step 67:

Once you've loosened the lock nut, unthread the outer tie rod end from the inner.

## Step 68: 13mm, 22mm Open/Boxed End Wrenches

Now remove the lock nut from the inner tie rod end.



Choose the option that matches your installation:

1. If you are installing a stage 1 kit with tie rod ends only and you are replacing the sway bar bushings and links, skip to step 81 on Page 55.

2. If you are installing a stage 1 kit with tie rod ends only and you ***are not*** replacing the sway bar bushings and links, skip to step 77 on Page 53.

3. If you are installing a stage 2 or 3 kit with complete tie rods, proceed with step 69 on the next page.

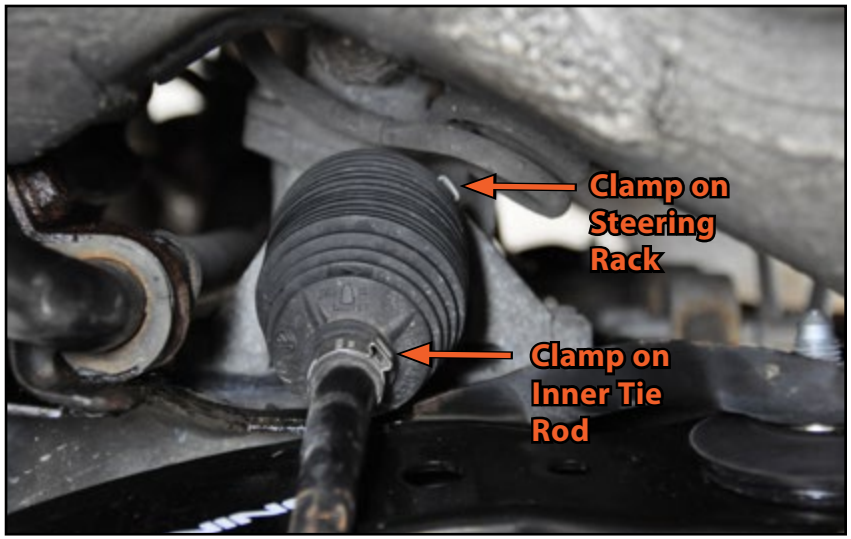
# REFRESH KIT INSTALLATION - TIE RODS

**Step 69:** 13mm Socket, Ratchet

The inner tie rod boots have to be removed next, but the RH (passenger) side boot is blocked by a heat shield on the steering rack. Remove the four fasteners and lift off the heat shield.


**Step 70:** Side Cutters

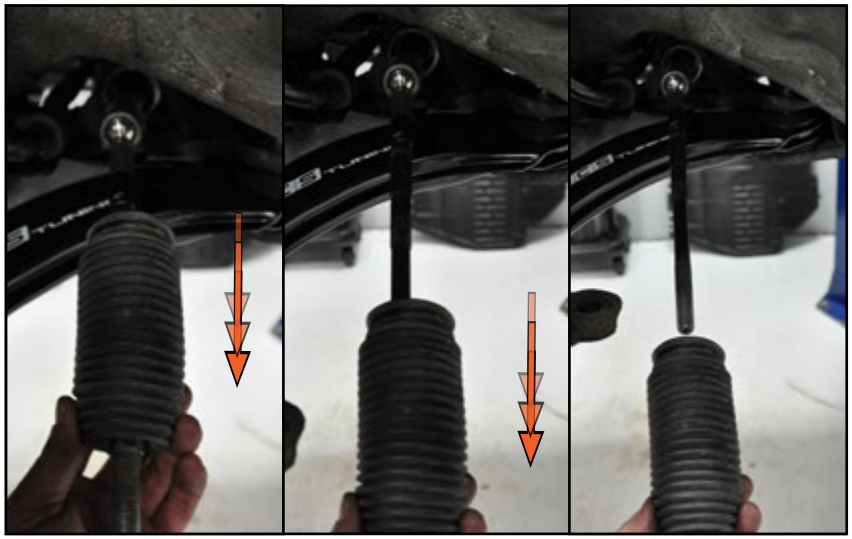
Two clamps hold each inner tie rod boot in place, one holding the boot to the steering rack, one holding the boot to the inner tie rod. These clamps are a crimp style of clamp that cannot be reused. Cut them both off of each side. Sharp side cutters will make this easy by snipping them at the crimp. Clearance is a little tight but there is enough room to get the job done.



# REFRESH KIT INSTALLATION - TIE RODS

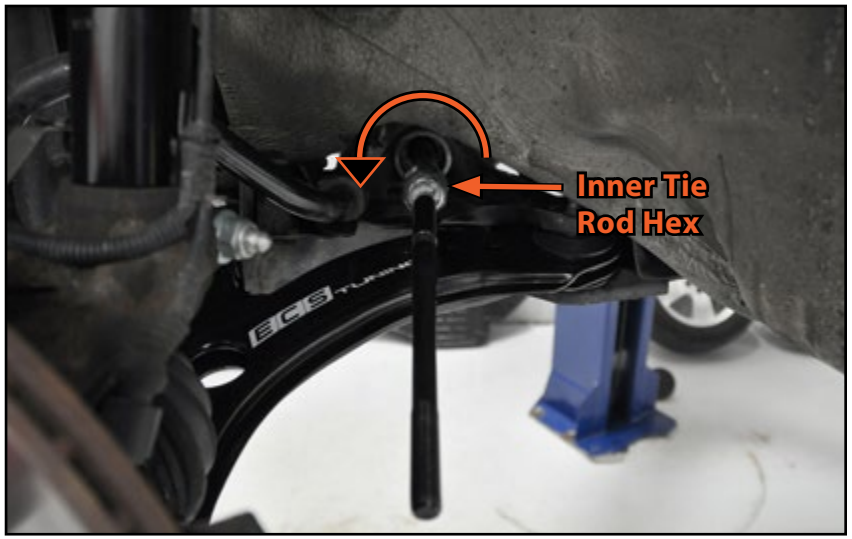
## Step 71:

Pull both inner tie rod boots straight out and off of the rack and inner tie rod.



## Step 72: Inner Tie Rod Tool or Crescent Wrench

Remove the inner tie rods by loosening them at the rack and unthreading them. You can use an inner tie rod end tool if you have one, but if not, a large wrench, even a crescent wrench, will do the job. They will come loose easily.




1. If you are replacing your sway bar bushings and links, skip to step 81 on Page 55 and do so at this time.

2. If you are not replacing your sway bar bushings and links, continue with step 73 on the next page.

# REFRESH KIT INSTALLATION - TIE RODS

## Step 73: Inner Tie Rod Tool or Crescent Wrench

Install the new inner tie rod(s) onto the steering rack. The torque specification for these is 75 Nm (55 Ft-lbs). If you are using a tie rod tool, you will be able to torque them, if not you will have to tighten them by hand.

**NOTE**

The new tie rods come assembled. You will have to remove the outer tie rod end and lock nut prior to installing the inner tie rod ends.

## Step 74:

Place one of the new inner tie rod boot clamps onto the a boot as shown.

# REFRESH KIT INSTALLATION - TIE RODS

## Step 75:

Slide the inner tie rod boot(s) over the inner tie rod and onto the steering rack.

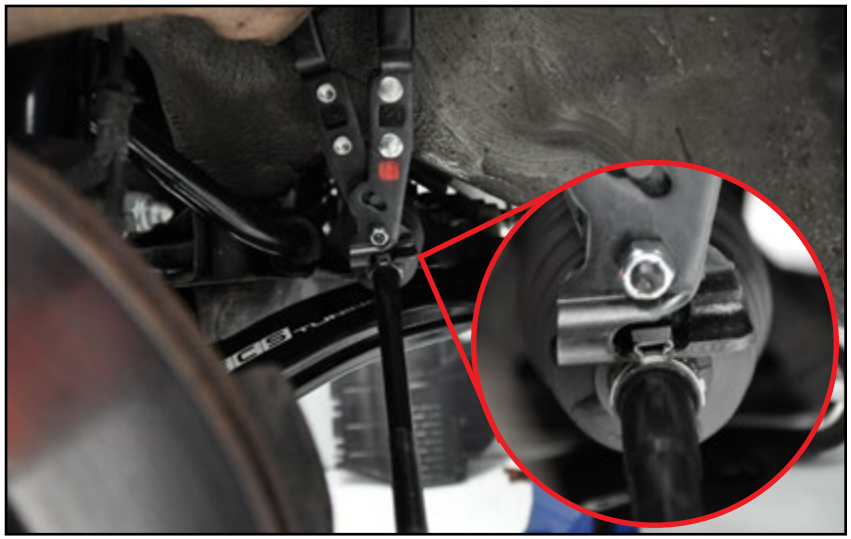
**NOTE**

Each inner tie rod has a short turn down - about 1/2" long - that is the seat for the end of the inner tie rod boot.

## Step 76: Ear Type Clamp Pliers

Slide the outer end of the boot(s) along the tie rod until you feel the end seat itself in the turn down (see step 75).

Install the outer tie rod boot clamps into place. Crimp all four clamps to secure the boots, using ear type clamp pliers.



This type of clamp is very easy to install and crimp when using the correct pliers, however when there is not enough room to get the pliers onto the clamp, it can be very difficult. If you cannot access the clamp, an alternative, short of lowering the subframe, is to use a traditional worm style of band clamp in its place.

# REFRESH KIT INSTALLATION - TIE RODS

**Step 77:**

Thread the new lock nuts onto the inner tie rods. Set them as close as possible to their original position. (See step 65).

**Step 78:** 22mm Wrench, 19mm Crow's Foot, Torque Wrench

Thread the new outer tie rod ends onto the inner tie rod and seat them against the lock nuts. Torque the lock nuts to 50 Nm (37 Ft-lbs).

When installing the outer tie rod ends and performing an alignment, be sure the inner tie rod boot does not get twisted. These boots are a harder type of plastic and, even with the clamps installed, will normally slide around the tie rod without twisting, but always make sure this does not occur.

**NOTE**

The LH and RH outer tie rod ends are different. Note the installation positions. The LH (Drivers side) is shown here in its correct installation position.

# REFRESH KIT INSTALLATION - TIE RODS

## Step 79: 18mm Socket, Torque Wrench

Install the outer tie rod ends into the steering knuckles and torque the nuts to 45 Nm (33 Ft-lbs). In order the thread the nuts on, you may have to hold the center stud as we did with the ball joints.

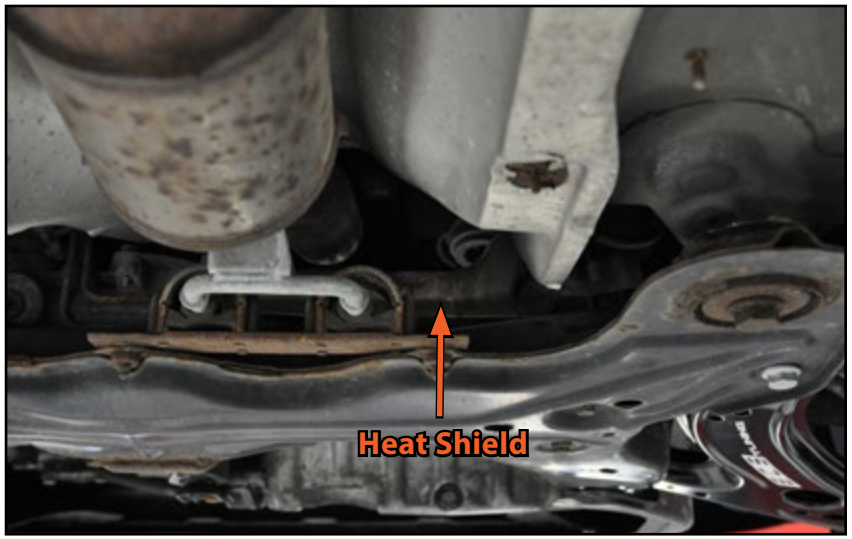
Choose the option that matches your installation:

1. If you are installing a stage 1 kit with tie rod ends only, skip to step 87 on Page 58.

2. If you are installing a stage 2 or 3 kit with complete tie rods, proceed with the next step.

## Step 80: 13mm Socket, Ratchet

Reinstall the heat shield on the RH side of the steering rack.




Skip to step 87 on Page 58.

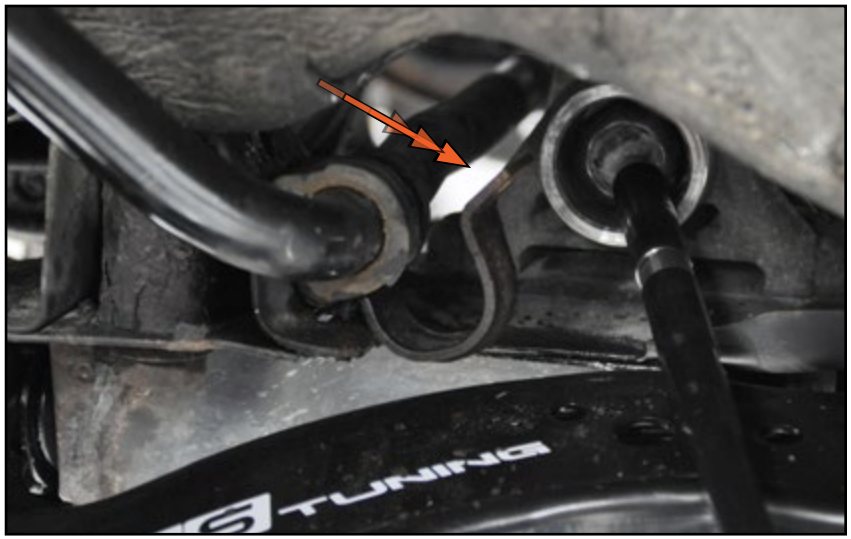
# REFRESH KIT INSTALLATION - SWAY BAR

**Step 81:** 13mm Socket, Ratchet

With the tie rods removed, you have more room to work when replacing the sway bar bushings. Begin by removing the securing bolt for both sway bar bushing clamps.

**Step 82:**

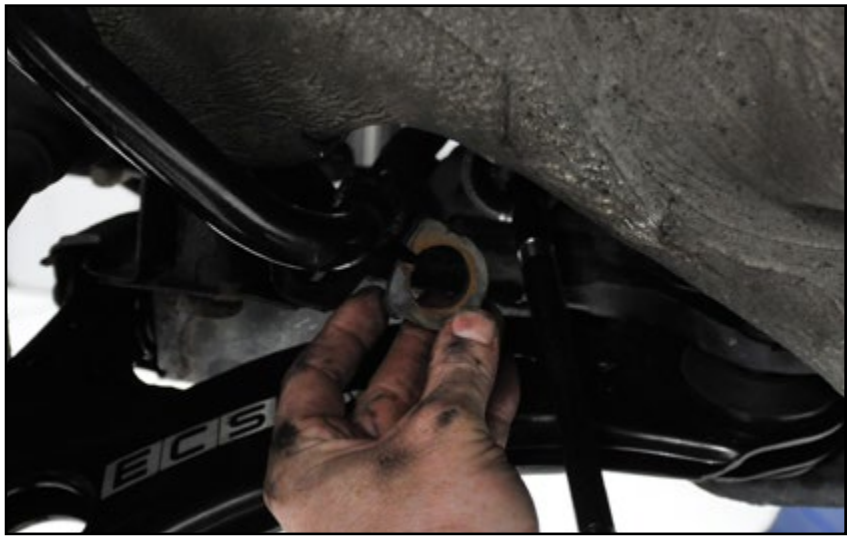
Pivot the sway bar clamps rearward and unhook them.



# REFRESH KIT INSTALLATION - SWAY BAR

## Step 83:

Pull the old sway bar bushings off of the sway bar.



## Step 84:

Clean any old residue from the sway bar, then Install the new sway bar bushings into place. Note the position of the more prominent “bump” on the new bushings, this should be located on the bottom.


**TECH TIP**

It is very important to clean any rust from the sway bar where the bushings are located. It is common for the rust to be built up under the paint. Scrape or chip away this buildup or you will not be able to get the new bushing installed.

# REFRESH KIT INSTALLATION - SWAY BAR

**Step 85:** 13mm Socket, Torque Wrench

Reinstall the sway bar clamps on each side and torque the bolts to 25 Nm (18 Ft-lbs).

**NOTE**

You will have to squeeze the clamp down tightly to reinstall the bolt. A large pair of groove joint pliers can help with this, along with patience and persistence.

**Step 86:** 16mm Socket, Torque Wrench

If you are installing new sway bar links, unbolt them from the sway bar, then install the new links.
If you are reusing your original links, reinstall the bolts in the lower control arms.
Do not tighten any of the bolts at this time.

Choose the option that matches your installation:

1. If you are installing a stage 1 kit with tie rod ends only, skip to step 77 on Page 53.

2. If you are installing a stage 2 or 3 kit with complete tie rods, proceed with step 73 on Page 51.

# REFRESH KIT INSTALLATION

## Step 87:

Most suspension bushings require that they are torqued with the vehicle at ride height. To attain "ride height", use the following method: Jack up the suspension underneath the ball joint just until it begins to lift the car.

If you have not previously done so, reinstall the sway bar link bolts in the lower control arm. Torque all of the sway bar link bolts to 15 Nm (11 Ft-lbs) + 90 degrees.

Torque the front control arm horizontal bolts to 70 Nm (52 Ft-lbs) + 90 degrees.

## Step 88:

Install the lower insulation panel.

Install and torque the wheels to 120 Nm (89 Ft-lbs).

***Your refresh kit installation is complete! You are now ready for a 4-wheel alignment, then it's time to enjoy your new suspension!***

# TORQUING TIPS

## Torque to Yield or "Stretch" Bolts

Many bolts will have a torque specification listed in the format - xx Nm (xx Ft-lbs) + xx degrees. These bolts are torque to yield bolts, commonly referred to as "stretch" bolts. The correct procedure for torquing these bolts is:

*Stage One* - Torque the bolt(s) to the initial Nm or Ft-lb specification. If there is more than one, be sure to torque them in the correct sequence.
*Stage Two* - Tighten or "stretch" the bolt(s) the additional specified number of degrees. If there is more than one, be sure to follow the correct sequence.

***Note*** - Some bolts may have two or more stages of torquing before the final stage of "stretching" the bolts.

When torquing more than one bolt in a specified sequence, be sure to mark each fastener with paint *immediately* after performing the final stage or "stretching" of the bolts. This will ensure that you keep track of which bolts have already been "stretched".

All Torque to Yield bolts should only be used once and should be replaced each time they are removed. If they are reused, they will not be able to achieve the proper clamping force with the specified torque.

## Lubrication

Torque specifications are always listed for a dry fastener (***no*** lubrication) unless specified otherwise.

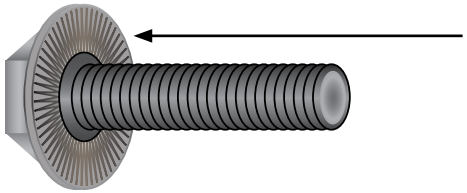
Some fasteners require lubrication on the threads -or- on the contact surface while torquing. These fasteners will be listed with the specific location and type of lubrication required. Always follow manufacturers recommendations exactly.

Lubricating a fastener that is intended to be installed dry and then torquing it to factory specifications will increase the clamping force and stress on the fastener and components, which can result in damage or failure.

Do not lubricate the threads of any fastener unless it is specifically recommended by the manufacturer.

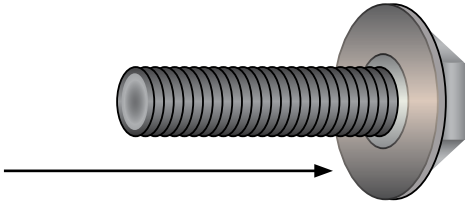
## Ribbed vs. Non-Ribbed Bolts

Ribbed and Non-Ribbed bolts in the same location generally require a different torque specification.



A ribbed bolt is identified by the ribs on the contact surface

A non-ribbed bolt is identified by the smooth contact surface



# TORQUE SPECIFICATIONS

| | | |
|---|---|---|
| Ball Joint to Control Arm | 20 Nm (14 Ft-lbs) + 90 degrees | (Page 44) |
| Ball Joint to Steering Knuckle | 45 Nm (33 Ft-lbs) | (Page 24) |

CV Joint (Bolt):
1. Torque initially to 250 Nm (184 Ft-lbs) + 90 degrees.
2. Loosen 1/2 turn
3. Rotate drive hub 180 degrees
4. Torque the CV bolt to 250 Nm (184 Ft-lbs) + 90 degrees

CV Joint (Nut):
1. Torque initially to 200 Nm (147 Ft-lbs).
2. Loosen 1/2 turn
3. Rotate drive hub 180 degrees
4. Torque the CV nut to 50 Nm (36 Ft-lbs) + 60 degrees

| | | |
|---|---|---|
| Horizontal Control Arm Bolts | 70 Nm (52 Ft-lbs) + 90 degrees | (Page 58) |
| Inner Tie Rod to Steering Rack | 75 Nm (55 Ft-lbs) | (Page 51) |
| Pendulum Mount at Subframe | 25 Nm (18 Ft-lbs) | (Page 43) |
| Steering Knuckle to Strut | 60 Nm (44 Ft-lbs) + 90 degrees | (Page 41) |
| Strut Cap Nut | 60 Nm (44 Ft-lbs) | (Page 42) |
| Strut Mount Nut | 60 Nm (44 Ft-lbs) | (Page 39) |
| Sway Bar Clamp | 25 Nm (18 Ft-lbs) | (Page 57) |
| Sway Bar Link | 15 Nm (11 Ft-lbs) + 90 degrees | (Page 58) |
| Tie Rod Lock Nut | 50 Nm (37 Ft-lbs) | (Page 53) |
| Toe Rod to Steering Knuckle | 45 Nm (33 Ft-lbs) | (Page 54) |
| Vertical Control Arm Bolts | 70 Nm (52 Ft-lbs) + 90 degrees | (Page 45) |
| Wheel Bolts | 120 Nm (89 Ft-lbs) | (Page 58) |

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# Your MK4 Suspension Refresh Kit Installation is complete!

## These instructions are provided as a courtesy by ECS Tuning

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