

# DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

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# DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

## 1. DISCLAIMER

This procedure represents one method of installation on a specific vehicle and is shared/posted for **\*\*REFERENCE ONLY\*\***. Only use the latest version. **This procedure requires \*\*CAUTION\*\* as it involves heavy loads and stored potential energy that could cause serious personal injury and/or vehicle damage if mechanical disassembly and/or assembly is performed improperly.** Use extreme caution and all applicable safety processes when working on your vehicle. This procedure is based on a collection of other DIYs as referenced in the Reference Section below, as well as ISTA.

## 2. SCOPE

The intent of this document is to create a single DIY based on a list of other referenced DIYs and to become familiar with the full tool list, part list, and procedure prior to project start. This DIY describes installation of Dinan's Performance Spring Set with Supplemental Ride Quality & Handling Kit for a 2013 E70 X5M.

## 3. TOOLS & CONSUMABLES – REFERENCE ONLY†

ITEM	PART NUMBER	DESCRIPTION	MFG/VENDOR	APPLICATION
3.1		$\frac{3}{8}$ , $\frac{1}{2}$ -Drive Ratchets	Craftsman, Wera	VARIOUS
3.2		Sockets (mm): 10, 13, 16, 17, 18, 21, 22	Wera	VARIOUS
3.3		Hex Allen Socket or Bit 5mm	Wera	Engine Trim Removal
3.4		Metal Pry Tool	Any	Upper Control Arm
3.5	DK20	Hydraulic Jack, 4400lb, 19.49" HT Max	AC Hydraulics	Lifting
3.6	3000N-GS1	Jack Stands, 6600lb each	AC Hydraulics	Lifting
3.7	(optional)	Rhino Ramps, 6000lb each	Rhino Ramps	Lifting
3.8	BMWJACKPADSLVR1	BMW Floor Jack Pad Adapters	Burger Motorsport	Jack Stand to OEM Jack Pad
3.9		Wheel Chocks: 1 pair minimum		Lifting
3.10	001286SCH01A	Wheel Hanger M14x1.25	Schwaben	Wheel Install/Hub Alignment
3.11	2235TiMAX	$\frac{1}{2}$ -Drive Impact Wrench	Ingersoll Rand	Wheels/Lower Control Arm
3.12		Impact Sockets (mm): 17, 21	Gearwrench	Wheels/Lower Control Arm
3.13		Box/Open End Wrench 16mm, 18mm, 21mm	Gearwrench	Upper Control Arm, Sway Bar Endlink
3.14	B8800117	Steering Knuckle Expanding Tool	Bavarian Autosport	Spring Strut Holder
3.15	Weight = 100lbs	5" + Vice [ <i>stout, to hold spring compressor</i> ]	Allied Brand	Spring Compressor
3.16	013845SCH01A	Strut Spring Compressor	Schwaben	Coil Spring Replacement
3.17	003046SCH01A-01	Strut Nut Socket Tool, 18mm	Schwaben	Strut Disassembly
3.18		Hex Allen Wrench, 6mm	Craftsman	Strut Disassembly
3.19	8002C, 8780C	$\frac{1}{2}$ -Drive Ratchet Koloss w/Extension	Wera	24.5" Breaker Bar
3.20		Torx Driver or Socket: T35, T40	Craftsman	Swaybar Endlinks, Trunk Rails

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3.21		Wooden Block(s), various		Differential Lifting, Hub Support
3.22	MAC5200	Air Compressor, 6.5cfm+, Milton High Flow Fittings and 3/8" ID EPDM Hose	Makita/Milton	Impact Tools
3.23		Mallet		Upper Control Arm
3.24	1501MRMH	¼-Drive CDI* Torque Wrench (2.8Nm-15.3Nm) 5Nm, 8Nm	CDI	Torque
3.25	1002NMRMHSS	¾-Drive CDI* Torque Wrench (10Nm – 100Nm) 28Nm, 34Nm, 48Nm, 56Nm, 81Nm	CDI	Torque
3.26	2003NMRMHSS	½-Drive CDI* Torque Wrench (40-200Nm) 100Nm, 140Nm, 165NM	CDI	Torque
3.27	T-9	Corrosion Protection Spray	Boeshield	Consumable
3.28	09127	Copper Anti-seize Paste	Permatex	Consumable
3.29	CB-4	Bio Chainbrite Degreaser	Park Tool	Consumable
3.30		WD-40		Consumable
3.31		Pliers	Craftsman	Brake Line Grommet
3.32		Crescent Wrench	Craftsman	Strut Disassembly
3.33		Tethering Rope		Swivel Bearing
†Tool details listed for reference only, or use equivalent.				
*IF investing in a Torque Wrench, consider mfg/models that can be calibrated by any local calibration lab.				

#### 4. DINAN STAGE 1 SUSPENSION PARTS Rev.A\*

ITEM	SECTION REF	PART NUMBER	DESCRIPTION	QTY
4.1	-	D100-0915	†Dinan Performance Spring Set	1
4.1.A	8.j.iv	N/A	● Spring, Front Left	1
4.1.B	8.j.iv	N/A	● Spring, Front Right	1
4.2	-	D193-7101A	††Dinan Supplemental Ride Quality & Handling Kit	1
4.2.A	8.j.iv.5	N/A	● Bump Stop, Front Left	1
4.2.B	8.j.iv.5	N/A	● Bump Stop, Front Right	1
4.2.C	9.j	N/A	● Bump Stop, Rear Left	1
4.2.D	9.j	N/A	● Bump Stop, Rear Right	1
4.3	9.k.vi	D113-0010	Sensor Rod Assemblies	2
*There have been two versions of Stage 1 Suspension. Rev.- consisted of (2) Front Springs (1) Front Shock Mount Kit, (1) Rear Shock Mount Kit, (1) Sensor Rod Kit				
†Dinan Performance Spring sets should be installed with the corresponding Ride Quality and Handling Kit (Dinan Bump Stops) to achieve the advertised ride height performance and ride quality.				
††Alternatively, F10M5 Competition Bump Stops are equivalent (Qty.4, 31-33-7-847-472).				

#### 5. OEM REPLACEMENT PARTS, REQUIRED (Grey Txt Items, Replace if Damaged)

ITEM	SECTION REF	PART NUMBER	DESCRIPTION	QTY	SOCKET
<b>FRONT AXLE COMPONENTS:</b>					
5.1	8.f.ii.1	33-32-6-760-374	Self-Locking Collar Nut, M12x1, 5-10-ZNS3 [stabilizer link to swivel bearing]	2	18mm

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5.2	8.f.iv	37-10-6-789-678	Hex Nut with Flange, M12x1.5, 5-10-ZNS3 [stabilizer bar to stabilizer link]	2	N/A
5.3	8.f.iv	37-11-6-859-654	Stabilizer Link, Front, Right	1	N/A
5.4	8.f.iv	37-11-6-859-653	Stabilizer Link, Front, Left	1	N/A
5.5	8.g.ii.3.a	33-32-6-760-376	<b>Self-Locking</b> Collar Nut, M10-10-ZNS3 [upper control arm to swivel bearing]	2	16mm
5.6	8.g.ii.4	07-11-9-905-862	Hex Bolt, M10x60-10.9 [upper control arm to swivel bearing]	2	16mm
5.7	8.h.iii.1	31-10-6-768-934	Hex Screw with Collar, M12X1,5X50-10.9 [Spring strut holder to strut assembly]	2	16mm
5.8	8.h.v.1	33-30-6-787-062	Combination Nut, M14x1.5-10 ZNNIV [spring strut holder to lower control arm]	2	21mm
5.9	8.h.v.2	07-11-9-906-898	Hexagon Screw with Flange, M14x105-10.9 [Spring strut holder to lower control arm]	2	21mm
5.10	8.i.iii.1	31-31-6-771-889	Hex Nut with Flange, M8-10-ZNS3 [strut assembly to strut tower]	6	13mm
5.11	8.j.iv.2.a	31-33-6-857-002	Spring Pad, Lower [strut assembly]	2	N/A
5.12	8.j.iv.6.a	31-33-6-857-001	Spring Pad, Upper [strut assembly]	2	N/A
5.13‡	8.j.iv.10.a	32-21-6-769-539	<b>Self-Locking</b> Hex Nut M12x1.5-05-ZNS3 [strut assembly]	2	18mm <sup>§</sup>
<b>REAR AXLE COMPONENTS:</b>					
5.14	9.g.ii.1	31-10-6-769-434	Hexagon screw with flange M14X1,5X103 [shock absorber to control arm]	2	21mm
5.15	9.h.i.1	33-30-6-760-587	Hex nut with flange M10-10 ZNS3 [shock absorber to luggage strut tower]	6	16mm
5.16	9.h.i.3	33-53-6-870-723	Sealing Grommet, after 06/2014	2	N/A
5.17‡	9.i.ii.1	32-21-6-769-539	<b>Self-locking Hex Nut</b> M12x1.5-05 ZNS3 [shock absorber assembly]	2	18mm <sup>§</sup>
5.18	9.c.iv.1.a	51-47-1-911-992	Expanding Rivet D=8mm	9	N/A
5.19	9.k.vi.4	07-12-9-905-817	<b>Self-Locking Hex Nut</b> M6-8-ZNNIV SI [ride height sensor to jointed rod]	4	10mm
<p><i>Note: Fasteners used in this DIY, but not listed in this table, are not OEM required replacement unless damaged, per ISTA.</i></p> <p><i>* All prices are approximate as of Feb.2021; Shown pricing totals \$141.20 without optional parts.</i></p> <p><i>‡ These two line items use the same Part Number for front and rear axle; pair needed for Front and Rear axle each.</i></p> <p><i>§ Strut Nut Removal Socket</i></p>					

### 6. TORQUE TABLE

ITEM	SECTION REF	LOCATION/COMPONENT(S)	SIZE	TORQUE (Nm)	AXLE
6.1	7.e.iv.2	Battery>IBS Connector	M6 Nut	5	Front
6.2	8.d.viii	Wheel Bolts	M14 Bolt	140	Both
6.3	8.f.ii.2	Stabilizer Link > Swivel Bearing	M12 Nut	100	Front

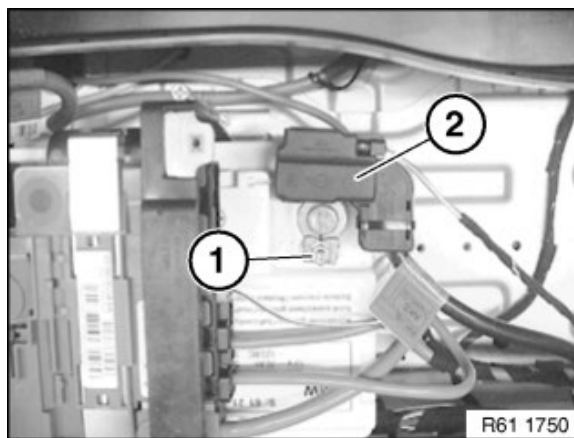
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6.4	8.g.ii.3.b	Swivel Bearing > Upper Control Arm	M10 Nut	56	Front
6.5	8.h.iii.2	Spring Strut Holder > Strut Assy	M12 Bolt	81 <sup>n</sup>	Front
6.6	8.h.v.3	Spring Strut Holder > Lower Control Arm	M14 Bolt/Screw	165 <sup>n</sup>	Front
6.7	8.i.iii.2	Strut Tower > Spring Strut Assy	M8 Nut	28	Front
6.8	8.j.iv.10.b	Spring Strut Assy	M12 Nut	48	Front
6.9	9.g.ii.2	Shock Absorber Assy > Control Arm	M14 Screw	165 <sup>n</sup>	Rear
6.10	9.h.i.2	Shock Absorber Assy > Strut Tower	M10 Nut	56	Rear
6.11	9.i.ii.2	Shock Absorber Assembly	M12 Nut	34	Rear
6.12	9.k.vi.5	Sensor Rod > Stabilizer Bar	M6 Nut	8	Rear

<sup>n</sup> While in Normal Position, see Section 7.f

### 7. GENERAL INSTALLATION NOTES

- VEHICLE: 2013 BMW X5M, May 2013 build, with EDC Suspension
- INSTALLATION is the same for Left and Right front/rear suspension and is the reverse of removal
- TORQUE VALUES listed in this procedure are REFERENCE ONLY directly from ISTA
- PART NAMING – Become familiar with the provided Axle Overview images and component names, as those are the names used throughout this DIY.
- DISCONNECT NEGATIVE BATTERY Cable prior to project start [FIGURE.R61 1750]
  - NOTE: Do not under any circumstances pull or lever off intelligent battery sensor (IBS) (2) from the vehicle battery by force.
  - Release M6 Nut of battery earth lead using 10mm socket.
  - Remove battery earth leads and IBS (2) from vehicle battery and secure isolated at side.



- Reconnect battery after project finish:
    - Position the IBS (2) on the vehicle battery.
    - Install Torque of M6 Nut for IBS fastening is 5Nm
- f. NORMAL POSITION:
- Some connections in this DIY require torquing fastener in 'normal position', which is understood to be suspension under normal load. Follow ISTA for BMW procedure and details defining 'normal position'. For this DIY, 'normal position' is followed as recommended in this video, originally posted on xbimmers forum: [https://www.youtube.com/watch?v=P\\_2UcXRc-9c&feature=emb\\_logo](https://www.youtube.com/watch?v=P_2UcXRc-9c&feature=emb_logo)

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### g. OEM DIAGNOSTIC EQUIPMENT

- i. As indicated by ISTA, some special equipment may be required for some instructions listed, however the following are not outlined in detail within this DIY, except as listed here. Consider as needed:
  1. Four Wheel Alignment (diagnostic system needed)
  2. Headlight Adjustment (diagnostic system needed)
  3. Ride Height Calibration (diagnostic system needed) – In most cases this is not required. The adjustable Dinan Sensor Rods are provided in lieu of a ride height calibration. Ride Height Calibrations only involves adjusting the rear ride height and is performed with diagnostic equipment.
  4. Vertical acceleration sensor adjustment (diagnostic system needed):

## 8. FRONT AXLE DIY

### a. NOTES:

- i. Instructions are the same for both sides.
- ii. Set the steering to straight ahead.
- iii. Use consumables (anti-seize, corrosion protection, degreaser, etc.), throughout DIY to clean and protect components as removed.
- iv. Prior to start, consider recording rear axle ride height; hub to fender flares, while on a level surface, engine ON and no occupants.

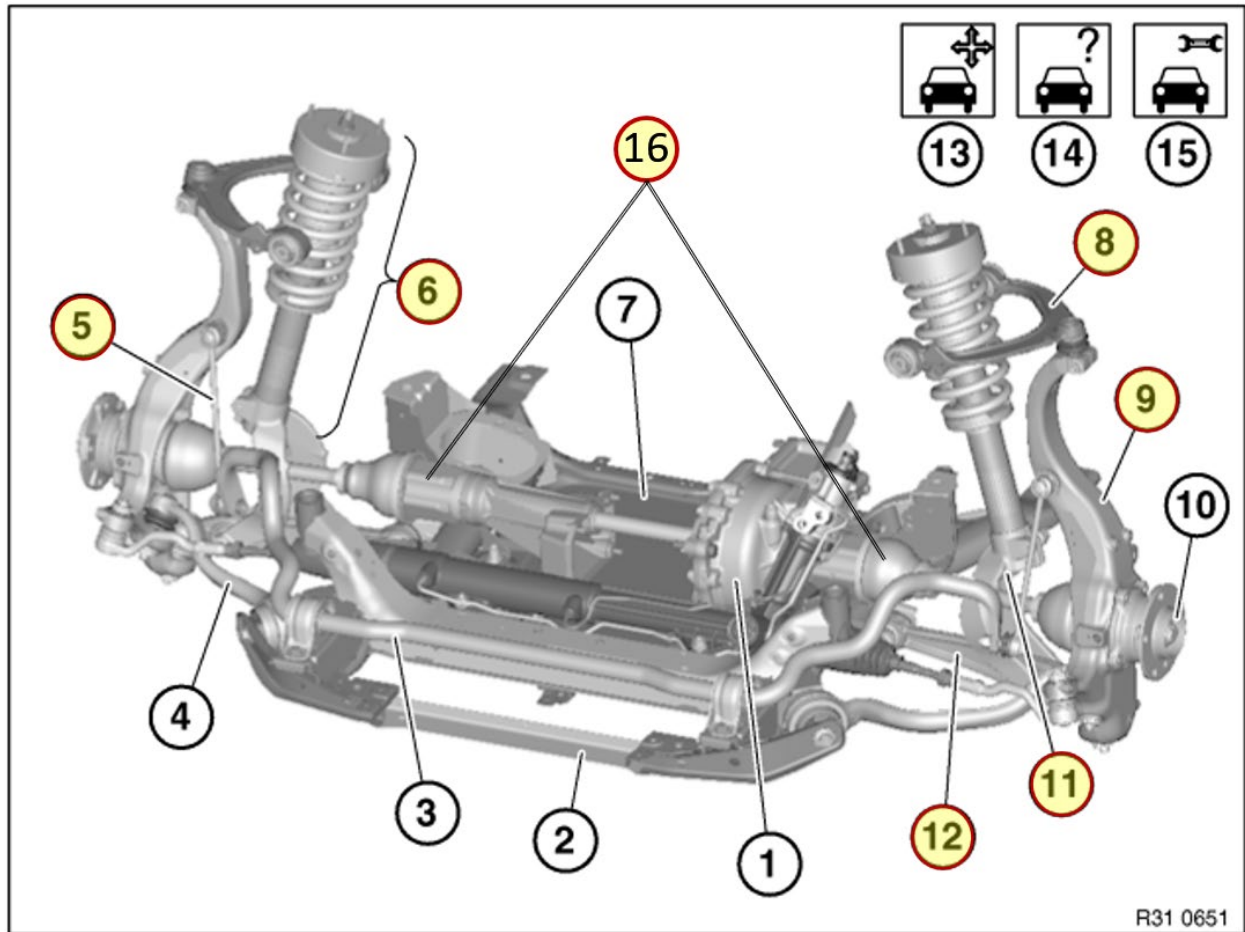
PRE-INSTALLATION	MEASUREMENT (inches)
Front Left:	
Front Right:	



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

### b. FRONT AXLE OVERVIEW:

#### i. BMW Front Axle Suspension Components:



[Safety precautions and general information](#)

1	<a href="#">Overview of front differential/output shafts</a>	11	<a href="#">Spring strut holder</a>
2	<a href="#">Front axle support</a>	12	<a href="#">Lower control arm / rubber mount</a>
3	<a href="#">Stabiliser</a>	13	<a href="#">Adjustment work</a>
4	<a href="#">Tension strut / rubber mount</a>	14	<a href="#">Testing</a>
5	<a href="#">Stabilizer link</a>	15	<a href="#">Troubleshooting</a>
6	<a href="#">Layout of spring strut shock absorber (strut assembly)</a>		
7	<a href="#">Reinforcement plate</a>	16	<a href="#">Output Shaft</a>
8	<a href="#">Upper control arm</a>		
9	<a href="#">Swivel bearing</a>		
10	<a href="#">Wheel bearing</a>		

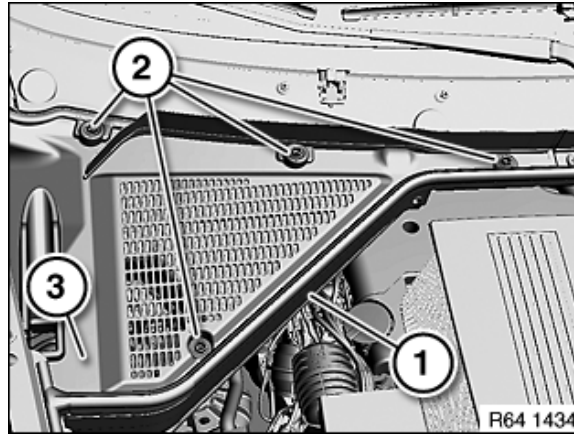
### c. REMOVE ENGINE TRIM TO ACCESS FRONT STRUT TOP MOUNTING BOLTS

#### i. Remove Right Microfilter Housing Grated Cover (3) [FIGURE.R64 1434]

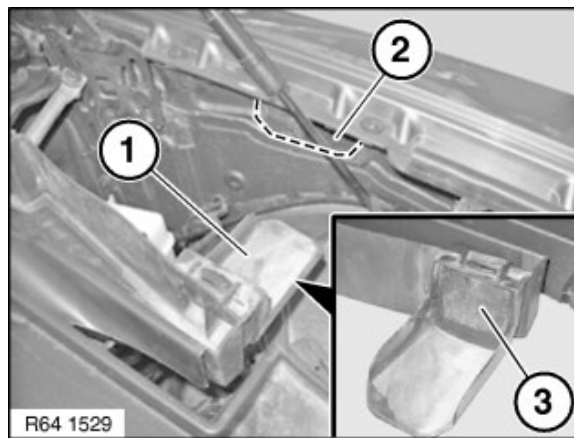
1. Using 13mm socket, unlock four rotary ¼-turn catches (2) and remove Microfilter Housing Grated Cover.



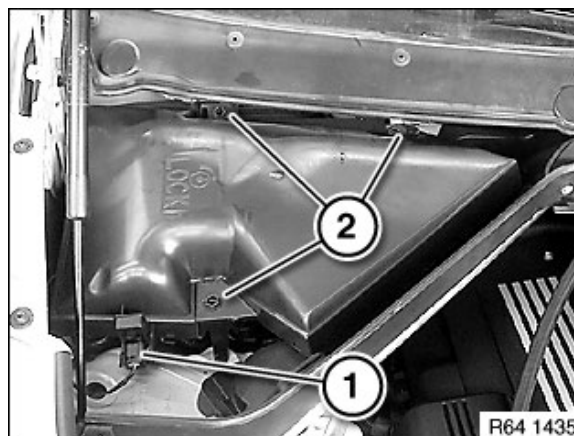
## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



2. Upon Installation ensure water gutter (1) is correctly seated in guide (2). Make sure Flap (3) moves freely. If necessary, clean to remove excess dirt. [FIGURE.R64 1529]



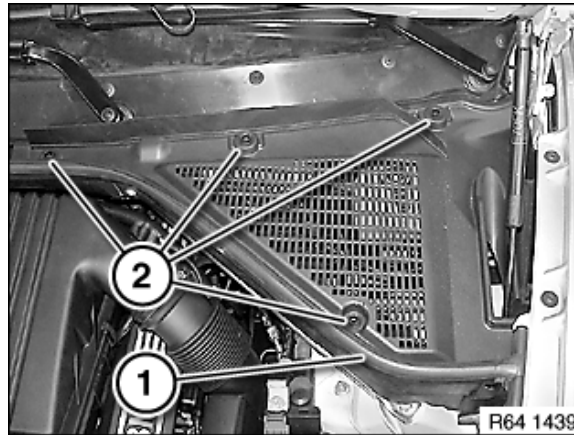
- ii. Remove Microfilter Housing Assembly [FIGURE.R64 1435]
  1. Disconnect single Expanding Rivet (1) with pry tool.
  2. Using 13mm socket, unlock three rotary ¼-turn catches (2)
  3. Remove Microfilter Housing Assembly with microfilters. Consider replacing microfilters if not replaced in last 2 years.



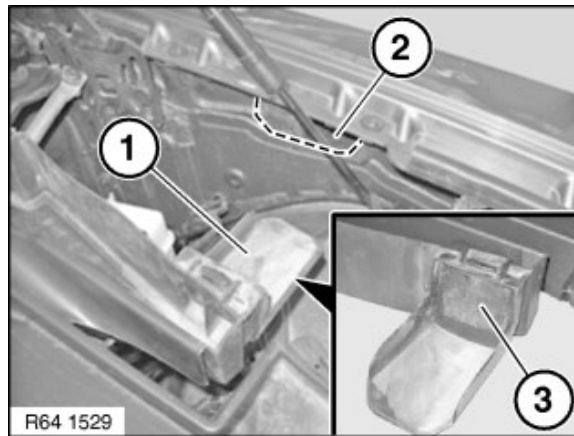
## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

### iii. Remove Left Microfilter Housing Grated Cover (1) [FIGURE.R64 1439]

1. Using 13mm Socket, unlock four rotary ¼-turn catches (2) and remove Microfilter Housing Grated Cover.



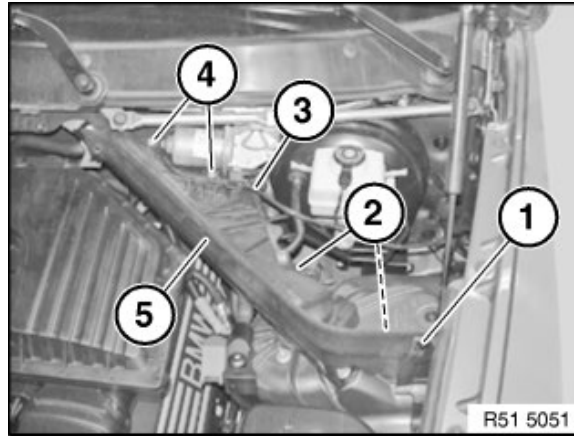
2. Upon Installation ensure water gutter (1) is correctly seated in guide (2). Make sure Flap (3) moves freely. If necessary, clean to remove excess dirt.



### iv. Loosen Left Compartment Partition Wall (5) [FIGURE.R51 5051]

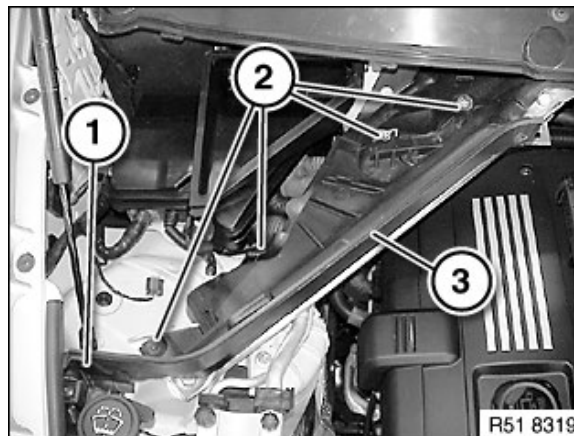
1. Remove Expansion Rivet (1) using pry tool
2. Remove Screws (4) (Qty.2) using 6mm Hex Allen wrench or socket
3. Remove Bolts (2) (Qty.2) using 10mm socket
4. Compartment Partition Wall is now loose enough to provide access to three strut tower nuts holding from strut assembly
5. If removing left Compartment Partition Wall (5) completely, unclip connecting line (3)

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



v. Loosen Right Compartment Partition Wall (3) [FIGURE.R51 8319]

1. Remove Expansion Rivet (1) using pry tool
2. Remove Screws (2) (Qty.2) using 6mm Hex Allen wrench or socket
3. Remove Bolts (2) (Qty.2) using 10mm socket
4. Compartment Partition Wall is now loose enough to provide access to three strut tower nuts holding from strut assembly

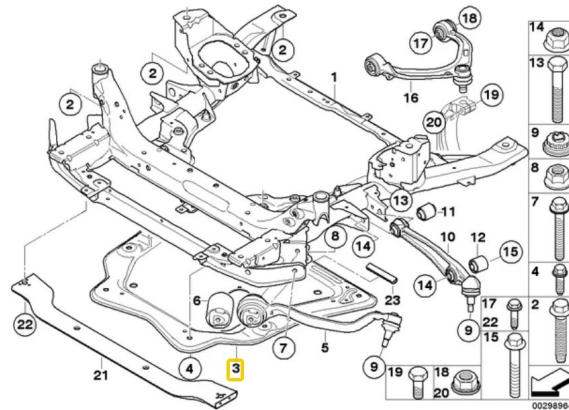


vi. Engine trim installation is reverse of disassembly.

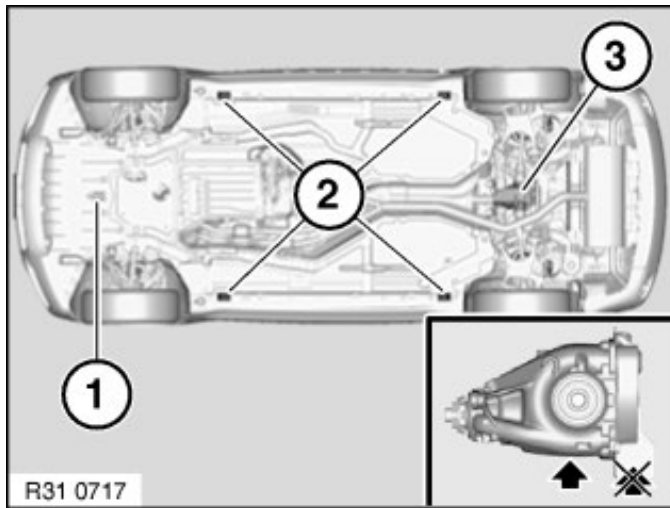
d. JACK FRONT VEHICLE AND REMOVE FRONT WHEELS

- i. **CAUTION!** Use extreme safety and caution when performing lifting activities as they can result in severe injury and/or damage to vehicle. Perform due diligence to research and understand safest method for lifting your vehicle. The following is for REFERENCE ONLY.
- ii. Ensure the reinforcement plate (31-10-6-788-727) has not been removed from vehicle. Item 3 in image below:

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

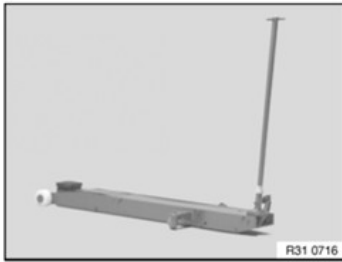


- iii. Jack front of vehicle, with hydraulic jack, using vehicle jacking point at front center of vehicle (1) noted in diagrams below [FIGURE.R31 0717]:



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## 00 .. ... Raising vehicle with trolley jack



Observe the following trolley-jack-related instructions:

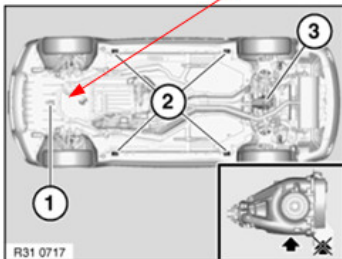
1. Only trolley jacks sold or approved by BMW, with a rubber plate on their mounting, may be used!
2. Trolley jacks must be regularly serviced and always checked for functional reliability before they are used!
3. Check the rubber plate on the trolley jack prior to each use, replacing if necessary.



### Important!

All-wheel drive vehicles may only be raised with the reinforcement plate fitted on the front axle!

Raising directly on the front axle support without reinforcement plate is not permissible!



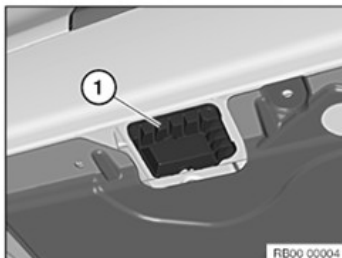
### Warning!

The vehicle may be raised with a trolley jack only at the following mounting point!

- 1 Car jacking point
- 2 Side car jacking points

### 3 Rear axle final drive

Note: It is not permitted to raise the vehicle at the rear differential cover!



### Risk of damage!

Jacking point (1) must be present!

Align the rubber plate on the trolley jack to the jacking point (1) in such a way that there is no contact to adjacent components and that they are therefore not damaged.

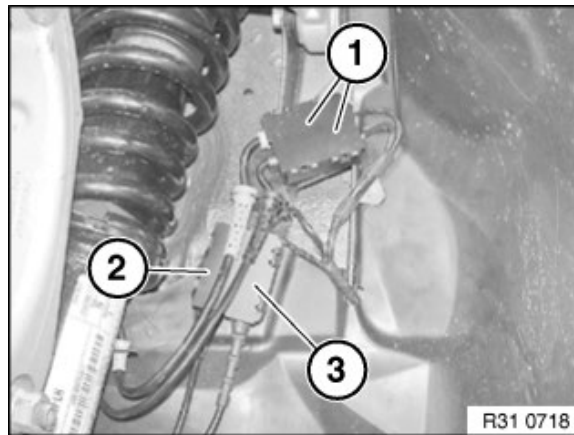
- iv. Use chocks, jack stands, and BMW Floor Jack Pad Adapters as needed to secure the lifted front axle
- v. Remove front wheels using **Wheel Hanger M14x1.25** and place under the vehicle behind each jack stand for additional safety.
  1. Removing Wheel Bolts
    - a. If already lifted, use **impact wrench** and **17mm socket** to remove wheel bolts
    - b. If not lifted, break loose 17mm bolts, then remove after vehicle lifted.
- vi. Carefully lower **hydraulic jack** ensuring jack stands are supporting the load.
- vii. Maintain hydraulic jack in position as backup
- viii. **Upon installation torque M14 Wheels Bolts to 140Nm**

## e. PREPARATION – FRONT AXLE



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

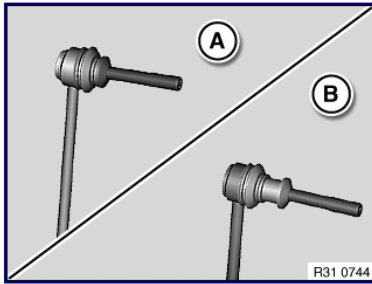
- i. Place wooden block on the hydraulic jack and support wheel hub from under the lower control arm. See Section 7.f NORMAL POSITION: for lower control arm support area.
  1. Using hydraulic jack, lift the lower control arm to a position that relieves tension on the sway bar (aka: stabilizer) and allows easy stabilizer link bolt removal.
  2. **NOTE: At all times, take care to monitor each cable in the vicinity to ensure they are not in tension.**
- ii. Using pliers, uncouple (friction fit) hydraulic brake line grommets from spring strut shock absorber (strut assembly) brake line bracket by pulling locking plate up.
- iii. Uncouple brake hose and, on left side, brake pad wear sensor cable.
- iv. Disconnect (friction fit) cable connectors, 1-3 below [FIGURE.R31 0718], to untether strut assembly for removal.
  1. Remove all connectors/cables in vicinity to facilitate smooth removal of strut assembly
  2. Some connections are not keyed, take note of connections, routing, and their position within the connector boxes.
  3. From the connection boxes, follow the routing back and uncouple grommets as necessary to 1) avoid causing tension as suspension drops and 2) facilitate removal of strut assembly
  4. Use compressed air to clean connectors before reassembly



- f. RELEASE STABILIZER LINK from SWIVEL BEARING:
  - i. NOTES:
    1. There are differences between the active stabilizer link and conventional stabilizer link.

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

### 31 35 005 Removing and installing/replacing push rod (stabiliser link) for left/right stabiliser

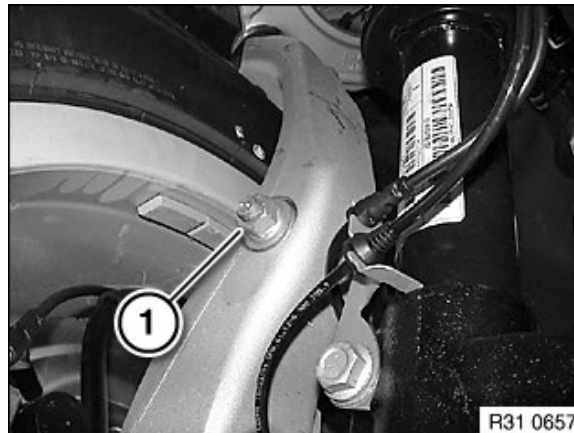


#### Important!

Observe [safety instructions](#) for raising the vehicle  
Do not mix up anti-roll bar links

- A. Stabiliser link for conventional stabiliser
- B. Stabiliser link for active stabiliser

- ii. Loosen stabilizer link M12 nut (1) using 18mm socket. If torqued properly, stem should not rotate until nut tension is broken. Once broken, use the T35 Torx socket to hold stem and remove nut remainder of way with ratcheting box end wrench. [FIGURE.R31 0657].
  - 1. Requires new M12 Self-Locking Collar Nut upon installation
  - 2. Install Torque for sway bar stabilizing link on M12 Nut is 100Nm
- iii. Adjust wheel hub height, supported by hydraulic jack, to remove stabilizer link from swivel bearing.

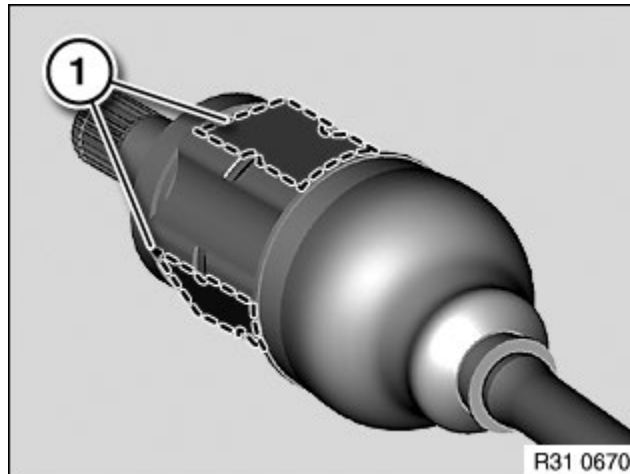


- iv. Check stabilizer link plastic strapping, **replace if compromised** (See BOM Items 5.3, 5.4).
- g. DISCONNECT SWIVEL BEARING from UPPER CONTROL ARM:
  - i. IMPORTANT (ISTA) NOTE: To be able to lower the swivel bearing far enough, it is necessary to align the output shaft so that one of the marked surfaces (1) points upwards [FIGURE.R31 0670].
    - 1. At a specific angle, from in front of the rotor disc, you can partially see the end of the drive shaft where it attaches to the final drive. It appears like an orange (slightly oxidized) block with no markings, but it does have indentations as shown. The block rotates with the rotation of the rotor disc and hub. I rotated the hub and aligned the indentations so that they faced forward. The wheel hanger was then threaded onto the disc rotor to make notation of the orientation needed. In this configuration the suspension can be lowered enough to completely remove the strut holder, and subsequently the strut assembly.



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

2. When the swivel bearing is disconnected, it will naturally fall outward away from the wheel well. If it moves sufficiently outward, then the drive shaft may uncouple from the final drive. IF at this point, the hub/rotor is rotated, the drive shaft will not go back into the final drive. You will know this is the case when you cannot align the swivel bearing to the upper control arm. Just rotate the hub/rotor to the position where it was originally aligned prior to uncoupling or repeat output shaft alignment step above. This is why it is recommended to mark the disc rotor position with the wheel hanger or equivalent, as stated above.



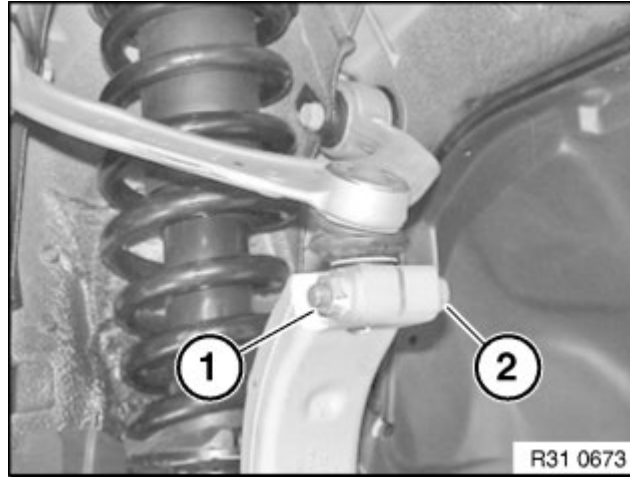
### ii. Disconnect Swivel Bearing from Upper Control Arm

1. NOTE: Uncoupling this connection will allow the swivel bearing and hub/rotor assembly to naturally lean outward in an unwieldy manner. Consider using rope to secure the swivel bearing to the upper control arm as needed. The rope must be secure, but loose enough to allow the lower control arm to drop fully without putting the rope in significant tension.
2. Maintain suspension support with hydraulic jack as with stabilizer link removal from above.
3. Slacken M10 **Self-Locking Nut** (1) using 16mm socket and 16mm box end wrench [FIGURE.R31 0673]
  - a. Requires new M10 Self-Locking Collar Nut upon installation
  - b. Install Torque for upper control arm on M10 Nut is 56Nm
4. Remove hex bolt (2) (replace if damaged with E70 X5M p/n: 07-11-9-905-862) and disconnect upper control arm from swivel bearing.
5. Lower the hydraulic jack as needed to uncouple the connection. Else consider using a mallet to carefully tap under the upper control arm to facilitate removal.
6. Installation Notes:
  - a. Maintain both bearing surfaces clean and oil free; Apply degreaser and clean.
  - b. Note insertion direction of hex bolt. Hex bolt inserts in direction of forward travel.
  - c. Bolt must rest correctly in groove of ball joint stud. NOTE: the upper flange of the ball joint stud does not sit completely flush to the swivel bearing, expect to

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

see an approx. 1mm gap. You'll know when you have it down fully seated when the bolt easily passes through. Cleaning both the stud and socket with degreaser should help with assembly.

- d. Once the upper control arm stud is inserted, use the hydraulic lift to help hold the connection until bolt is installed. The upper control arm provides no counterforce so you should expect the connection to ideally be a slip fit after fully cleaned.



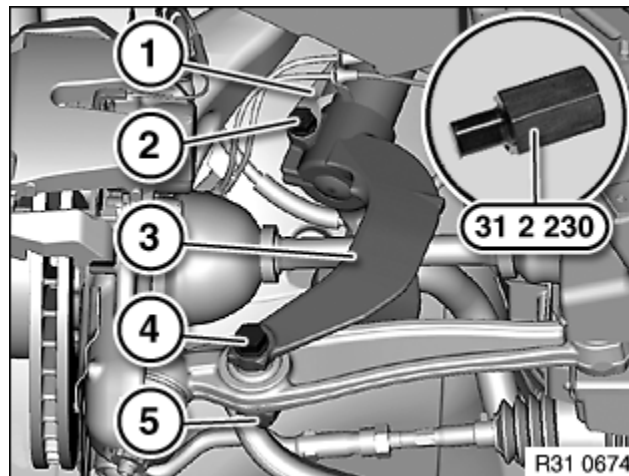
### h. DISCONNECT SPRING STRUT SHOCK ABSORBER ASSEMBLY FROM SPRING STRUT HOLDER

- i. Note: Lower hydraulic jack to lowest position. Once the spring strut holder is removed, the strut assembly may fully extend, if not already. Also ensure rope holding swivel bearing is not over-tensioned.
- ii. See figure R31 0674 below.
- iii. Release M12 Bolt (2) and corresponding cable holder bracket (1) using 18mm socket. Remove Bolt.
  - 1. Requires new M12 Bolt upon installation
  - 2. Install Torque to Spring Strut on M12 Bolt is 81Nm, in normal position.
  - 3. Note: ISTA states "Tighten down first bolt (4) and then bolt (2) in normal position". However, when you go to the ISTA torque table 31-12 Trailing Arms and Struts, it only cites that spring strut holder to lower control bolt be torqued in normal position. It is interpreted that the former statement is most accurate. Once the suspension is loaded, the strut will settle in the spring strut holder, then torque the lower control arm bolt, and finally torque the strut holder bolt.
- iv. If needed, use Steering Knuckle Expanding Tool to spread collar and loosen strut within connection.
- v. At the lower control arm, release M14 Bolt (4) and Nut (5) using 21mm socket and 21mm box/open end wrench. Remove Bolt. Hydraulic jack may need to be adjusted to facilitate bolt removal.
  - 1. Requires new Self-Locking Combination Nut upon installation
  - 2. Requires new M14 Bolt upon installation
  - 3. Install Torque to Lower Control Arm on M14 Bolt is 165Nm, in normal position

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

### 4. Notes:

- a. The tension strut (31-12-6-791-395) partially blocks the nut (5) at the lower control arm. However, bolt (4) may be broken loose without supporting the nut (5). Once broken, use a 21mm open/box end wrench to support the nut as the bolt is removed.
- b. ISTA states "Tighten down first bolt (4) and then bolt (2) in normal position". However, when you go to the ISTA torque table 31-12 Trailing Arms and Struts, it only cites that spring strut holder to lower control arm bolt be torqued in normal position. It is interpreted that the former statement is most accurate. Once the suspension is loaded, the strut assembly will settle in the spring strut holder, then torque the lower control arm bolt, and finally torque the spring strut holder bolt.
- vi. Ensuring the spring strut holder (3) is not obstructed by the lower control arm, separate the spring strut holder (3) from the strut assembly. You may find you need to keep the expanding tool in position when trying to remove strut. You may also find you have to push strut assembly inward to facilitate removal. Some lubrication may help (WD40), however clean both surfaces with degreaser once disassembled. Area must be kept dry upon installation.
- vii. Remove spring strut holder (3) taking care not to damage output shaft. Clean as needed.

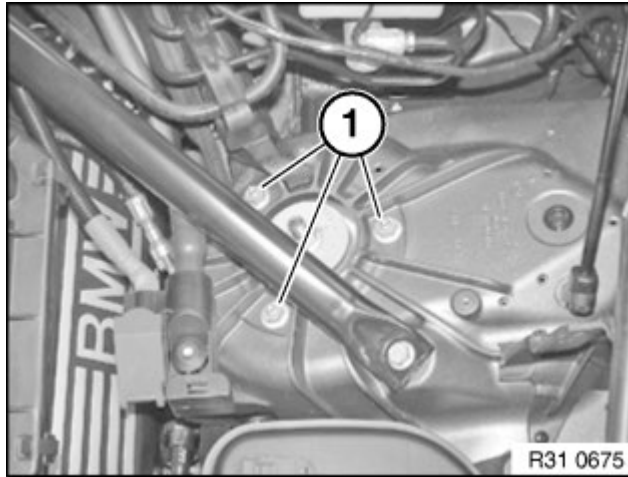


### viii. Installation Notes [FIGURE.R31 0674]:

1. Keep spring strut holder to strut assembly connection clean and free from oil and grease. Use degreaser to clean area.
  2. Version with Vertical Dynamics Management (VDM): Align spring strut holder by way of gap into strut alignment pin on strut assembly. See exploded strut assembly image below.
  3. Note insertion direction of bolt (4). Bolt inserts in direction of forward travel.
  4. Tighten down first bolt (4) and then bolt (2) in normal position.
- i. DISCONNECT SPRING STRUT SHOCK ABSORBER ASSEMBLY FROM ENGINE BAY
- i. Secure strut assembly from falling out

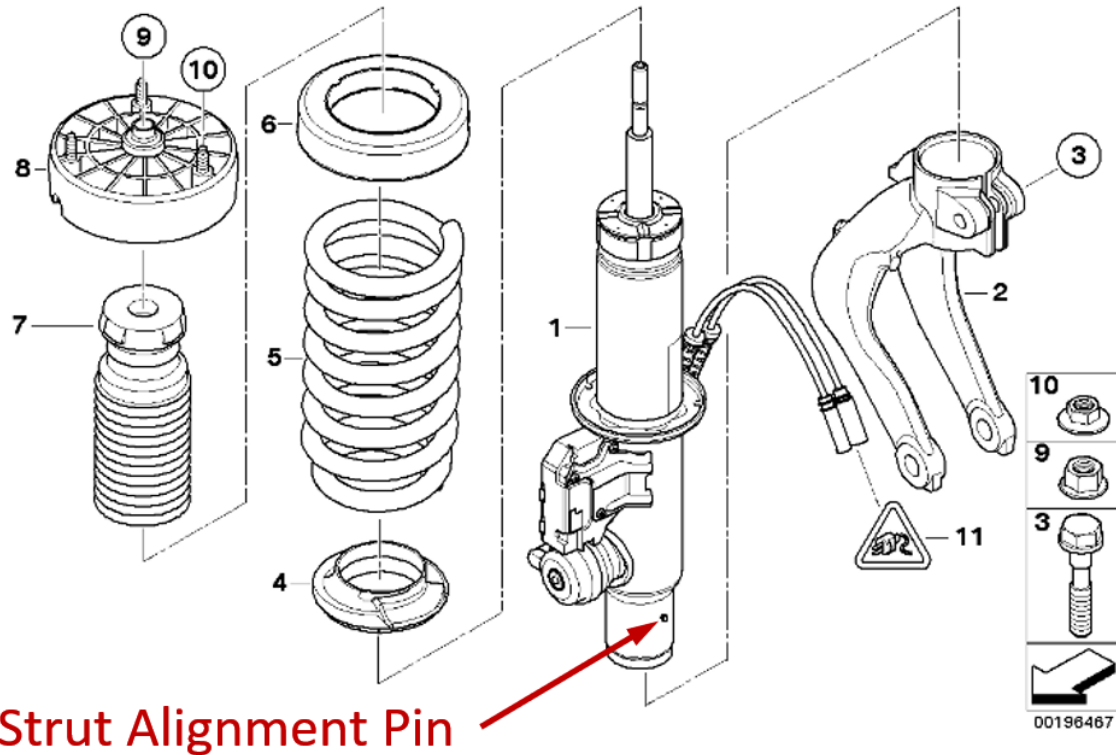
## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- ii. Ensure VDM connectors are disconnected and are not taking weight of strut assembly, see Section 8.e.iv – disconnect cable connectors.
- iii. Remove three M8 Nuts (1) from body strut housing using 13mm socket. [FIGURE.R31 0675]
  - 1. Requires new M8 Self-Locking Collar Nuts upon installation
  - 2. Install Torque of strut assembly to engine bay M8 Nuts is 28Nm
- iv. Remove strut assembly downwards out of wheel well.



- j. REMOVE AND REPLACE COIL SPRING from SPRING STRUT SHOCK ABSORBER ASSEMBLY
  - i. STRUT ASSEMBLY OVERVIEW:
    - 1. **CAUTION: Avoid risk of damage to shock absorber internals and do not use impact wrench**
    - 2. **CAUTION: Do not compress coil spring to full extent possible!**
    - 3. **BMW fasteners to be refreshed, per diagram below: 9, 10, 7, 6, 4, and 3.**

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



### ii. COMPRESS COIL SPRING

1. Prior to compression, take photos of the OEM configuration of the strut assembly for future reference. Specifically, the position of components (8), (6), (4) relative to the strut alignment pin on the strut (1) [exploded image above].
2. Compress Coil Spring (5) using Strut Spring Compressor and Vice per manufacturer's instructions, until stress on shock absorber piston rod is relieved.



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

*^Schwaben Spring Compressor Image from ECS Tuning*

### iii. DISASSEMBLE STRUT ASSEMBLY

1. While OEM spring is compressed, remove M12 Nut (9) using 18mm Strut Nut Socket and 6mm Allen Hex Wrench.
  - a. Both versions (A and B) of strut nut sockets below were helpful, but both are not required.
  - b. For nut removal and installation, version B worked best using a box end wrench and 6mm bit with extension and ratchet.
  - c. Using solely version "A" to remove the strut nut can be cumbersome and tedious because you have to reset each half turn (or less). And when near fully tight, the standard Allen Wrench no longer fits in the well.
  - d. Using version "A" to torque the strut nut allowed a labeled 6mm bit to be put in place and observed during torquing to ensure no movement of the shaft.
  - e. Using version "B" to torque the strut nut will require a 21mm socket.

A

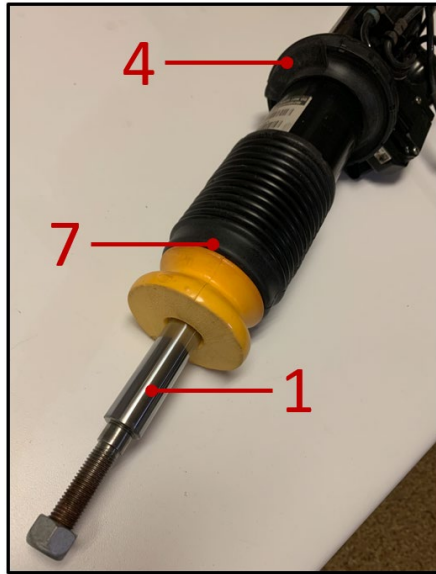


B



2. Remove support bearing flange (8) and upper spring pad (6).
3. Slowly relieve tension on coil spring using Strut Spring Compressor tool, per manufacturer's instructions.
4. Separate coil spring (5) from shock absorber (1) assembly
5. Remove auxiliary damper (7) as one piece (note: Dinan bump stop shown below).
6. Remove lower spring pad (4) from shock absorber for replacement.

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



### iv. REASSEMBLE STRUT ASSEMBLY

1. NOTE: These steps vary depending on whether you are installing the Dinan Springs or the OEM springs. Unless otherwise noted, this procedure is intended to install Dinan Springs. Any reference to “code” or “coding” in this section is not intended to imply diagnostic vehicle coding. Instead, it is in reference to the ISTA procedure for orienting the upper spring pads.
2. Install new lower spring pad (4) onto shock absorber. Note: the position is temporary as it will be reoriented below.
  - a. Requires new Lower Spring Pad upon installation
3. Use new Dinan Coil Spring (BOM ITEMS 4.1.A/4.1.B) in lieu of OEM front spring (5) and position on spring compressor tool.
4. Position the shock absorber into the Dinan front coil spring.
5. Install front Dinan auxiliary damper (BOM ITEMS 4.2.A/4.2.B) in lieu of OEM auxiliary damper (7).

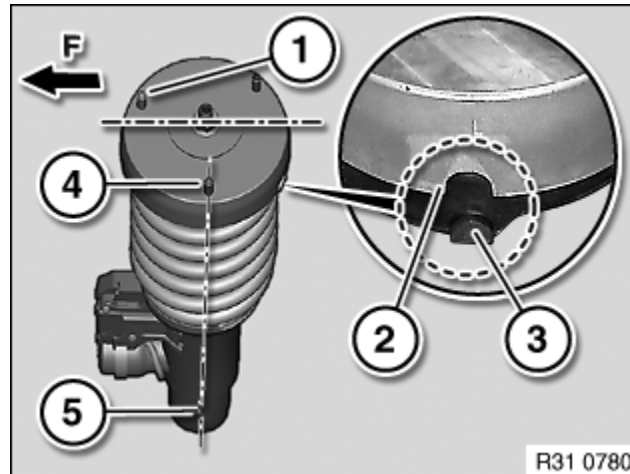


## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



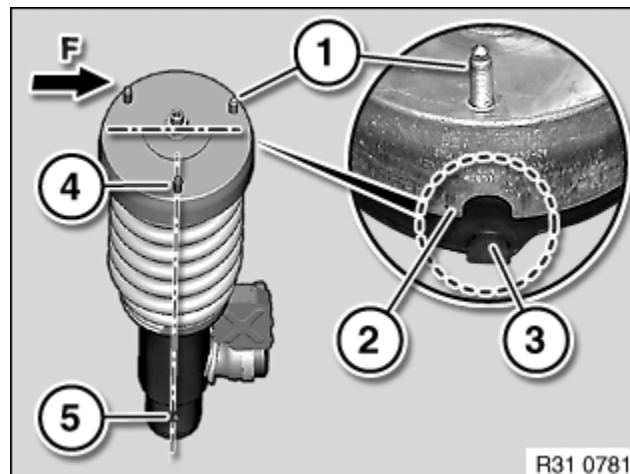
6. Install new upper spring pad (6) into bearing flange (8), properly oriented per ISTA pad orientation/coding instructions below.
  - a. Requires new Upper Spring Pad upon installation
7. DINAN SPRING ORIENTATION
  - a. Because the Dinan spring is shorter, the orientation of the spring in the strut assembly will be different than with the OEM spring assembly.
  - b. In general, assuming the upper spring pad is correctly coded/oriented, insert the Dinan coil spring end in the upper spring pad, then adjust/rotate the lower spring pad to fit the Dinan coil spring end. The orientation of the strut assembly (1), bearing flange (8), and upper spring pad (6) should be oriented per the ISTA instructions below. The Dinan spring on the upper spring pad is positioned with spring end terminating/aligning with the key coding tab on the upper spring pad. As a result, the lower spring pad (4) must be rotated so that the lower part of the spring end terminates on the lower pad spring stop.
8. OEM UPPER SPRING PAD ORIENTATION (REF ONLY)
  - a. The following instructions were pulled from ISTA based on a specific VIN for a 2013 E70 X5M with EDC.
  - b. LEFT Spring Strut Assembly ONLY (!IMPORTANT!), Figure R31 0780:
    - i. Stud bolt (1) above recess (2) must point in direction of travel (F)
      1. *This is the orientation of the bearing flange*
    - ii. Key (coding) (3) of spring pad must be seated in recess (2) opposite stud bolt (1)
      1. *This is the orientation of the upper spring pad in the bearing flange*
    - iii. Versions with VDM: Stud bolt (4) must be flush with positioning pin (5)

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



c. RIGHT Spring Strut Assembly ONLY (!IMPORTANT!), Figure R31 0781

- i. Stud bolt (1) above recess (2) must point in direction of travel (F)
  1. *This is the orientation of the bearing flange*
- ii. Key (coding) (3) of spring pad must be seated in recess (2) below stud bolt (1)
  1. *This is the orientation of the upper spring pad in the bearing flange*
- iii. Versions with VDM: Stud bolt (4) must be flush with positioning pin (5)



d. FWIW - REFERENCE ONLY:

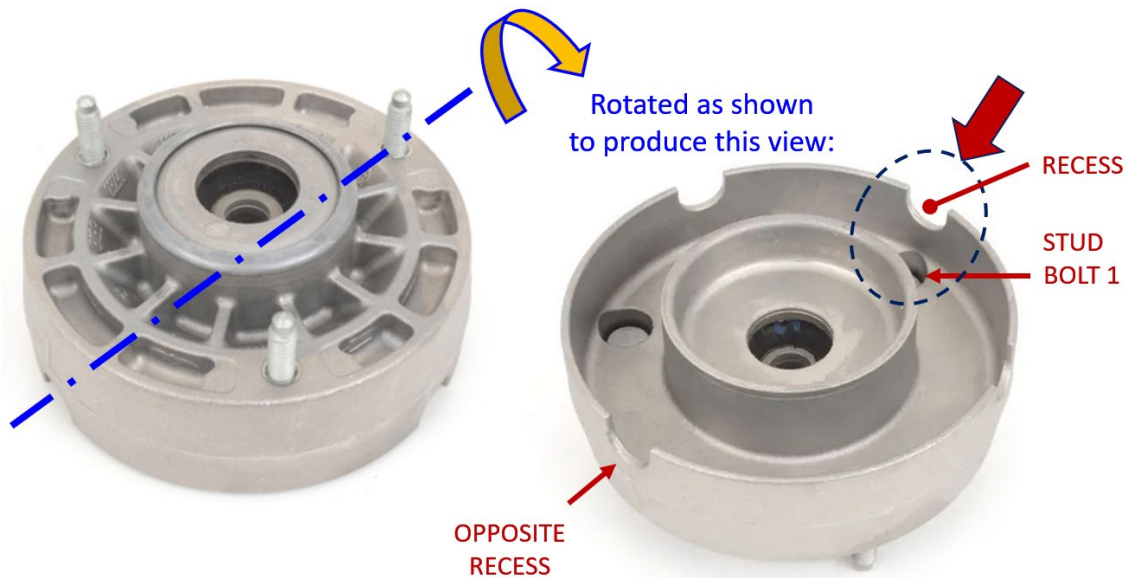
- i. At all times follow above ISTA instructions for spring pad and bearing flange orientation. It appears bmw marks all strut assembly components with a blue line indicating how the stock components should be oriented upon reassembly. My blue line on the flange bearing was offset from the stud, but I came to believe the offset distance was representative of the slot allowance in the strut tower. With aftermarket springs, I found that aligning stud (4) to pin (5) (per ISTA) was a challenge. There is some tolerance for misalignment, but it's tight and doing it wrong you can put tension in the spring strut holder and/or

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

strut tower. I did iterative test fits to ensure I was properly aligned to the alignment plane (cross sectional plane, perpendicular to view from 4 to 5 in FIGURE R31 0780 or 0781). Once the strut assembly is completely assembled, test fit in the vehicle by mounting to strut tower and fit checking against the spring strut holder. Align the spring strut holder to the lower control arm and see if the clamping gap in the spring strut holder aligns with the strut alignment pin. If it does not, and you will know, iteratively remove and adjust. To do this I compressed the springs just enough to allow rotation of the strut housing (and pin) as needed while coil spring and flange bearing remained fixed. You want to rotate the strut in one direction only, that is in the direction where the lower spring pad is locked in place by the lower coil spring end. This results in the strut housing rotating separately from the lower spring pad. However, this procedure assumes you start rotating with the alignment pin located well before the alignment plane. Once the pin passes the alignment plane, you cannot reverse the rotation because the lower spring pad will move with the strut housing creating an unwanted gap between lower spring pad and coil spring end. Be conservative and rotate a little bit at a time and fit check. It took less than 10 minutes to remove, compress coil spring, adjust, and check fitment.

- ii. If your factory blue alignment line is not on the bearing flange or you're installing a new bearing flange, then you'll find yourself more involved with figuring out the orientation of the bearing flange. However, do not rely solely on the blue line to orient as all vehicles are different. Rely on ISTA instructions. In case you didn't initially catch it, like me, the key phrase in the instruction is "Stud bolt (1) above recess (2)...", which are the features indicated by the large arrow in the image below, "...must point in the direction of travel (F)" for both sides. Given this, then the right side (passenger) spring pad key coding goes under stud bolt 1 and on the left side the spring pad key coding goes under the recess opposite stud bolt 1. Because each stud bolt *appears* to have an 'opposite' recess, you could accidentally install the left side bearing flange in other orientations resulting in similar results as the ISTA instructions. However, best to orient per the ISTA instructions to be accurate.

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



9. Compress coil spring using strut spring compressor, per manufacturer's instructions.
  - a. **CAUTION: Do not compress coil springs to full extent!**
  - b. Compress until it is apparent that the support bearing flange (8) can be mounted with strut nut.
10. While coil springs compressed, and with spring orientation and strut components set, tighten M12 Nut (9) using 18mm Socket Strut Nut and 6mm Allen Hex Wrench.
  - a. Requires new M12 Self-Locking Hex Nut upon installation
  - b. Install Torque of strut assembly M12 Nut is 48Nm
  - c. NOTE: Prior to torquing ensure the lower spring pad is in place against the lower coil spring end. Ensure the upper coil spring end is in place with the upper spring pad key coding. Ensure the strut alignment pin is aligned to Stud 4. When tightening or torquing the M12 strut nut, it is possible for the upper spring pad to rotate, thus requiring disassembly and correcting. With the strut nut fully seated on the bearing flange I relieved the coil spring enough to clamp the upper spring pad in place so that when torquing, the upper spring pad does not move.
11. Decompress coil spring using strut spring compressor, per manufacturer's instructions.
  - a. Slowly relieve tension on coil spring.
12. After installation, vehicles with Vertical Dynamics Management may require carrying out vertical acceleration sensor adjustment; This requires diagnostic equipment. Helpful video reference that provides VDM basics as they troubleshoot a VDM satellite:  
<https://www.youtube.com/watch?v=4sAFyert0gl>
- k. REINSTALL SPRING STRUT SHOCK ABSORBER ASSEMBLY
  - i. Installation of strut assembly is reverse of removal, given installation notes provided in this section or in Checklist below.

### 9. REAR AXLE DIY

- a. NOTES:

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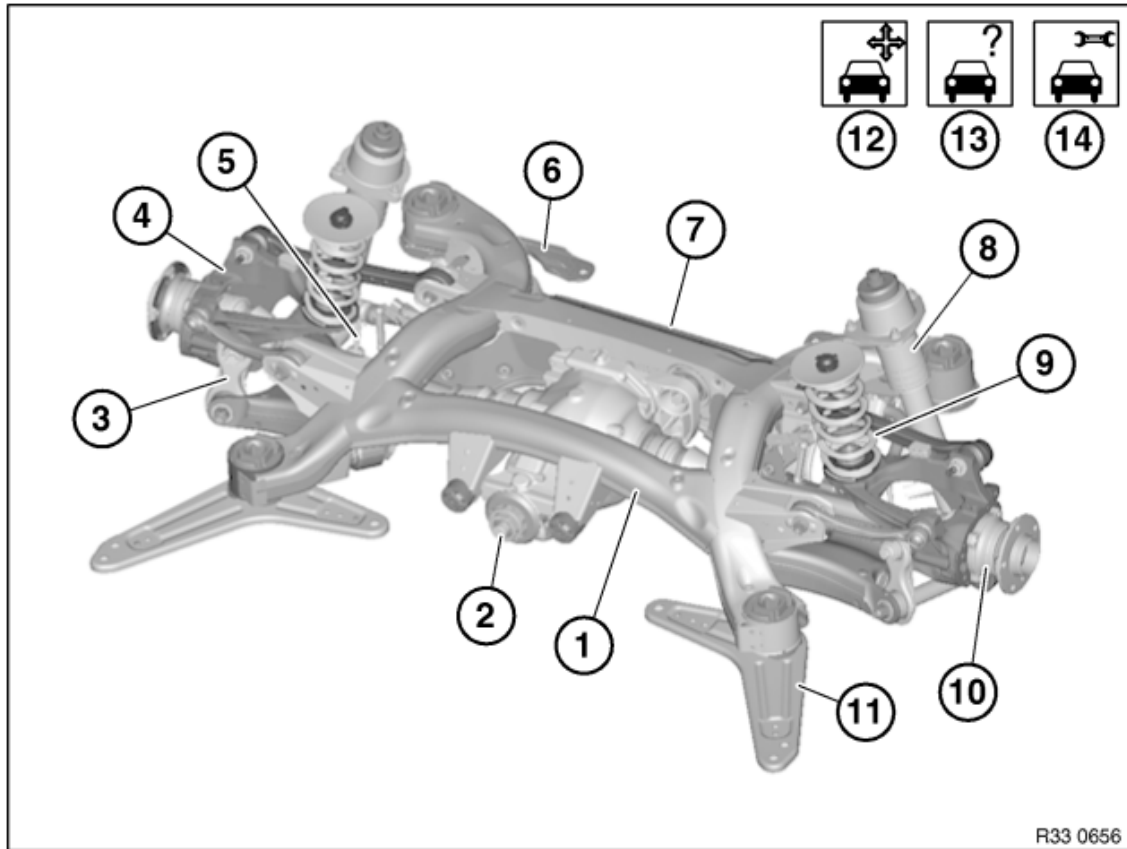
- i. Instructions are the same for both sides.
- ii. Set the steering to straight ahead.
- iii. Use consumables (anti-seize, corrosion protection, degreaser, etc.), throughout DIY to clean and protect components as removed.
- iv. Prior to start, record rear axle ride height; hub to fender flares, while on a level surface, engine on and no occupants.

PRE-INSTALLATION	MEASUREMENT (inches)
Rear Left:	
Rear Right:	

### b. REAR AXLE OVERVIEW:

- i. BMW Rear Axle Suspension Components:

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



[Safety precautions & general information](#)

- 1 [Overview\\_rear axle carrier with rubber mount](#) 11
- 2 [Overview of rear differential/output shafts](#) 12
- 3 [Overview of steering links](#) 13
- 4 [Wheel carrier](#) 14
- 5 [Stabilizer link](#)
- 6 [Compression strut\\_rear](#)
- 7 [Stabilizer / rubber mount](#)
- 8 [Shock absorber / support bearing](#)
- 9 [Coil spring](#)
- 10 [Wheel bearing / drive flange](#)

[Compression strut\\_front](#)

[Adjustment work](#)

[Troubleshooting](#)

[Testing](#)

[Overview\\_ride-height control system](#)

[Overview\\_Dynamic Drive](#)

[Overview\\_vertical dynamics management](#)

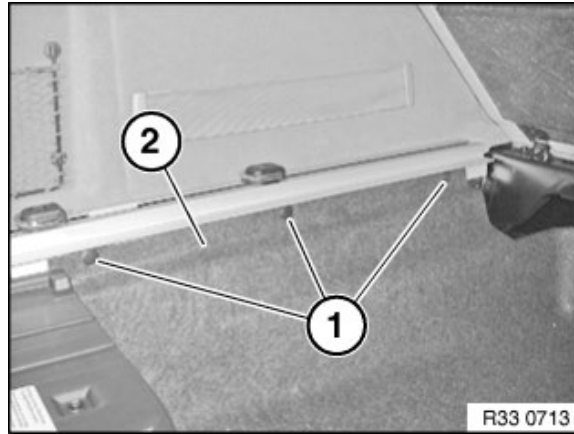
[Overview\\_Dynamic Performance Control](#)

### c. REMOVE TRUNK TRIM TO ACCESS REAR STRUT TOP MOUNTING BOLTS

- i. NOTE: Following only applicable for non-third row seat vehicles. For third row seat vehicles, likely seats must be removed.
- ii. Raise rear hatch and lift spring loaded carpeted trunk floor, else remove trunk floor.
- iii. Remove Plastic Battery Cover (10mm socket)
- iv. Remove Luggage Compartment Well:
  1. Remove expanding clamps (1)
    - a. [Upon installation, replace broken expanding rivets](#)
    - b. NOTE: Do not use the luggage compartment well (felt/plastic covering) to pull expanding clips out of Storage Rails, this may cause damage to the luggage compartment well. Use a **pry tool** to remove expanding rivets.



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



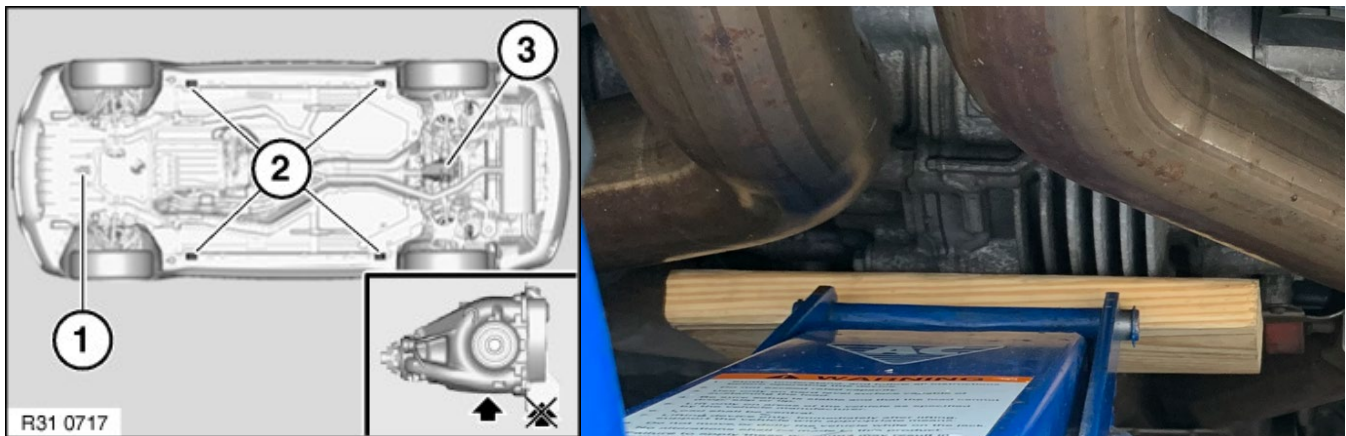
2. Remove luggage compartment well (2) to one side.

- v. In vehicles without third row seats, access should be sufficient to remove strut nuts, however removing storage rails and/or side panels may be necessary if more room is needed. Storage rails can be removed by unbolting Qty.3 Torx bolts per side (T-40 Socket).

### d. JACK REAR VEHICLE AND REMOVE REAR WHEELS

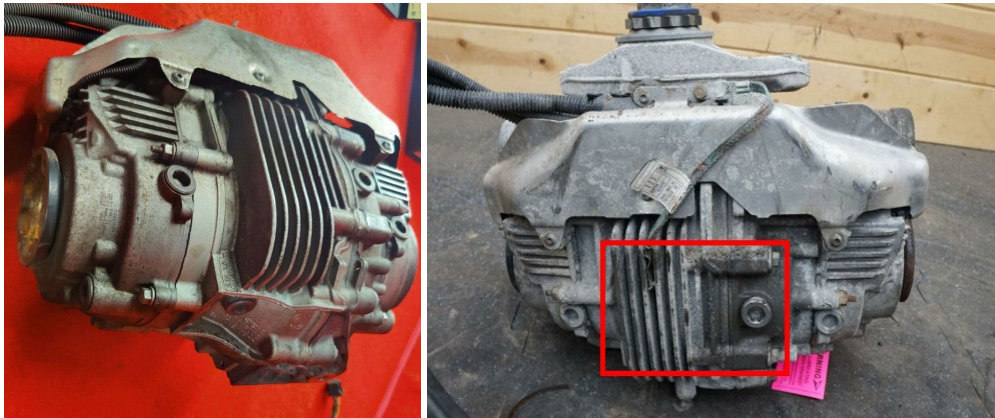
- i. **CAUTION! Use extreme safety and caution when performing lifting activities as they can result in severe injury and/or damage to vehicle. Perform due-diligence to research and understand safest method for lifting your vehicle. The following is for REFERENCE ONLY.**
- ii. Jack rear of vehicle, with hydraulic jack, using vehicle jacking point at rear center of vehicle (3) noted in ISTA diagram below:

1. NOTE: Wood block shown is a hardwood, consider 2x4 otherwise.





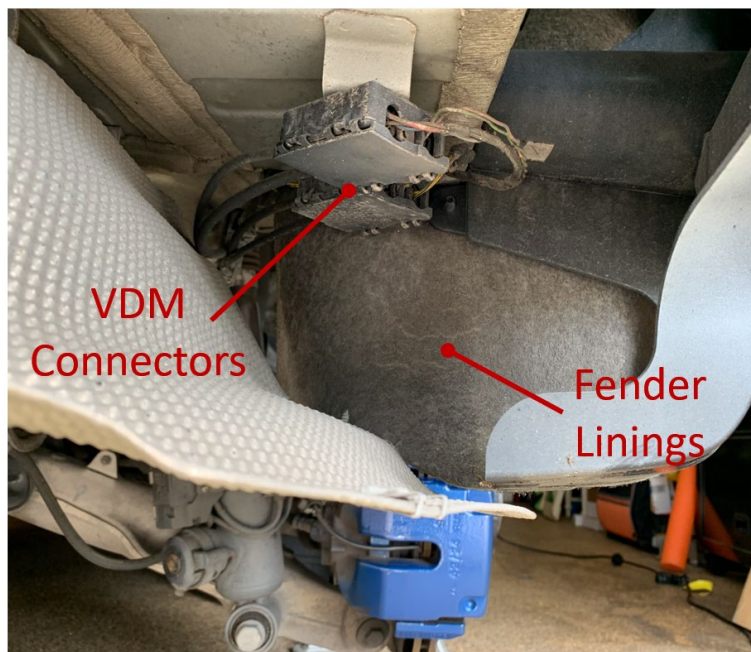
## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



- iii. Use chocks, jack stands, and BMW Floor Jack Pad Adapters to secure the lifted rear axle
- iv. Remove rear wheels using Wheel Hanger M14x1.25 and place under the vehicle in front of each jack stand for additional safety
  - 1. Removing Wheel Bolts
    - a. If already lifted, use impact wrench to remove 17mm wheel bolts
    - b. If not lifted, break loose 17mm bolts, then remove after vehicle lifted.
- v. Carefully lower hydraulic jack ensuring jack stands are supporting the load.
- vi. Maintain hydraulic jack in position as backup
- vii. Upon installation torque M14 Wheels Bolts to 140Nm.
- e. PREPARATION – REAR AXLE
  - i. Support wheel hub with hydraulic jack via wooden blocks under control arm
    - 1. Using hydraulic jack support the control arm to a position that relieves tension on the Strut to Lower Control Arm bolt. IF your vehicle does not have self-leveling suspension (EDC), then ISTA recommends to tension rear coil spring on each side worked.

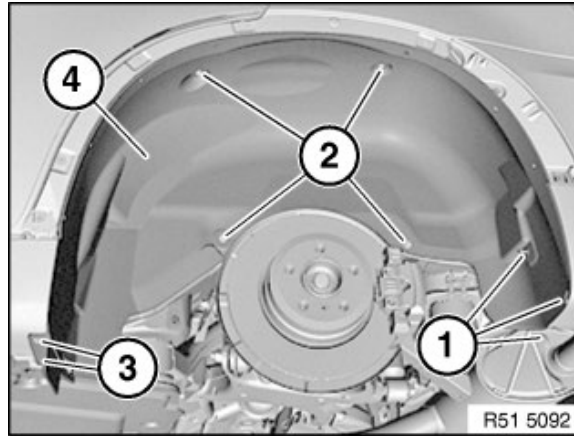
## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- ii. For vehicles with self-leveling suspension, ISTA recommends deactivating and draining air spring/suspension system. **CAUTION! Do not set down a vehicle on its wheels if it has empty air springs.** This DIY did not follow this step, however it may reduce stress on the air bags with suspension fully lowered. This is also helpful if you plan to install new air bag suspension. The following link provides an effective way to perform this step if required:  
<https://www.youtube.com/watch?v=7WXxrl5QFdk>
  - iii. Using pliers, uncouple (friction fit) hydraulic brake line grommets from strut brake line bracket by pulling locking plate up.
- f. DISCONNECT VDM PLUG CONNECTORS
- i. Partially detach rear wheel fender linings for access to Connector Plug boxes.
    - 1. Coincidentally, for this DIY, the rear bumper had already been removed which provided easy access to the VDM Plug Connectors without detaching rear wheel fender linings. Connector boxes shown clearly below with easy access. With rear bumper removed, the remainder of the cable routing can be accessed via the wheel well without needing to remove fender linings.

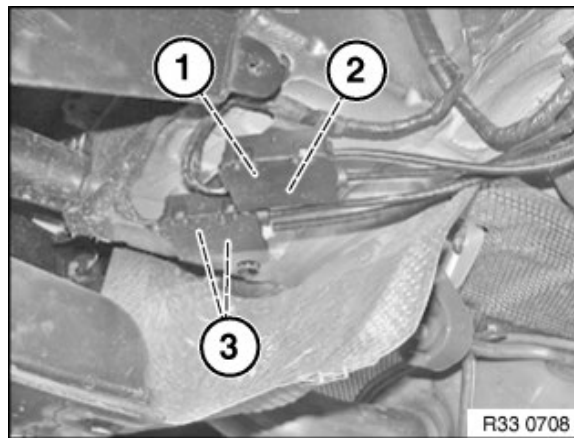


- ii. For fender lining removal, release up to 9 shown fastening elements.

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



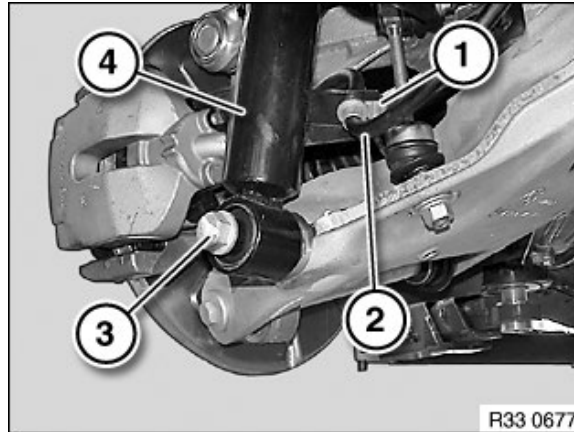
- i. Disconnect both plug connections (3) and expose lines up to shock absorber. Note for reference: brake pad wear sensor plug connection (1) and pulse sensor plug connection (2).
  - a. A couple of these connectors did not appear to be keyed. Take photos or note which connectors go where.
  - b. This part is tedious, but go slowly so as not to damage fragile clips that hold cable routing.



### g. DISCONNECT SHOCK ABSORBER FROM CONTROL ARM

- i. Release clamp (1) and remove brake hose (2) from shock absorber (4).
  - 1. Installation Note: When installing the shock absorber, ensure that the holder for the brake hose (2) points to the middle of the vehicle. Ensure correct fit in guide. Retainer must be felt and heard to snap into place.

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

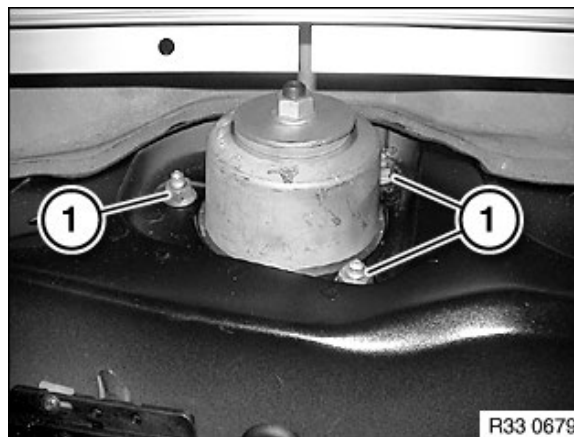


- ii. Release and remove M14 Bolt (3) using 21mm Socket, but first ensure shock absorber is secure from falling out if luggage compartment nuts are already removed.

1. Requires new M14 Bolt upon installation
2. Install Torque on shock absorber to control arm M14 Bolt is 165Nm with suspension in normal load
3. Installation Notes: Before tightening screw/bolt connection, check that shock absorber pin is correctly positioned in swinging arm. Bolt must not be used as a fitting aid when installing the shock absorber. Slowly use the hydraulic jack via the hub to raise control arm as necessary to align with shock absorber to install bolt unloaded.

### h. DISCONNECT SHOCK ABSORBER FROM LUGGAGE COMPARTMENT STRUT TOWER

- i. Remove Nuts (1) using 16mm Socket and taking care not to allow shock absorber to fall down from underneath

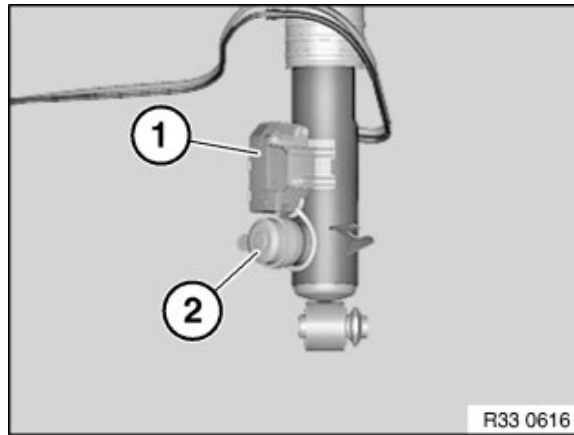


1. Requires new M10 Nut upon installation
2. Install Torque on M10 Self-Locking Nut is 56Nm
3. Requires new Sealing Grommet upon installation
4. Record photos capturing relative position of shock absorber to support bearing flange.

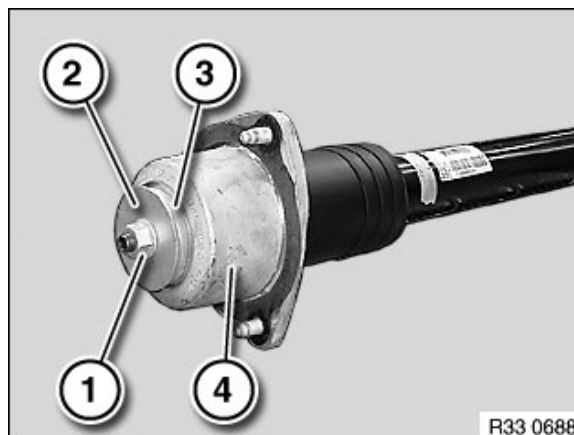
### i. DISASSEMBLE SHOCK ABSORBER ASSEMBLY

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- i. NOTE: Take care not to damage shock absorber control unit (1) and control valve (2) as found on vehicles with Vertical Dynamics Management.



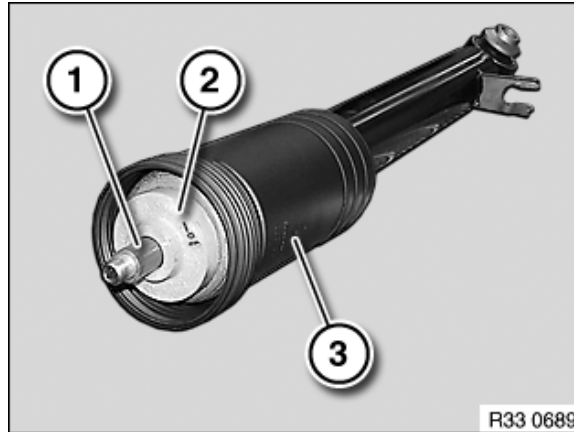
- ii. Using 18mm Strut Nut Socket Tool and 6mm Allen Wrench, loosen M12 Nut (1)
  - 1. Requires new M12 Nut upon installation
  - 2. Install Torque on Support Bearing Flange to Shock Absorber M12 Nut is 34Nm
  - 3. Installation Notes: Insert support bearing upper section (3) correctly in support bearing flange (4).
- iii. Remove joint seat (2), support bearing upper part (3) and support bearing flange (4)



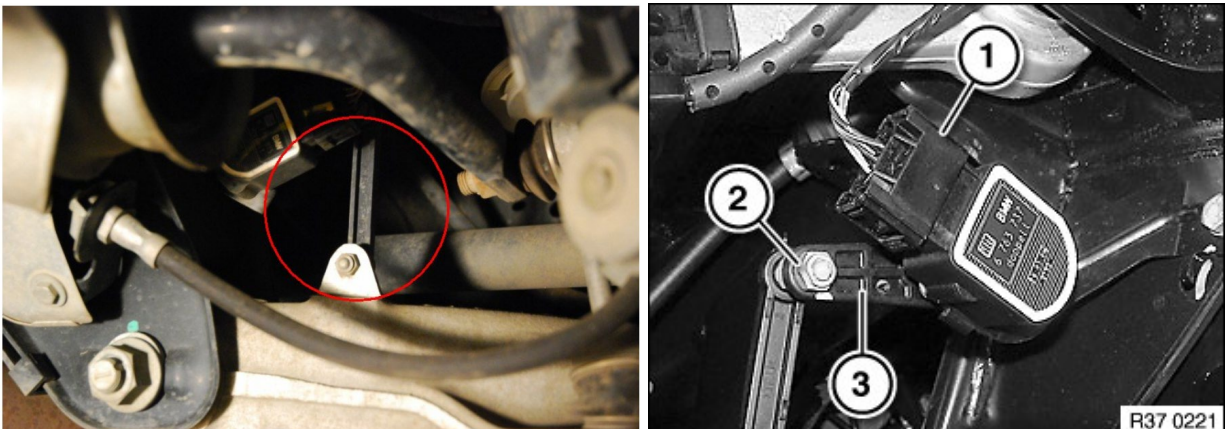
- j. REPLACE AUX ABSORBER with DINAN BUMP STOP, REASSEMBLE
  - i. Remove spacer sleeve (1) with support bearing lower section (2)
    - 1. Installation Notes: Insert support bearing upper section (3) correctly in support bearing flange (4)
  - ii. Replace Auxiliary Absorber with Dinan Bump Stop (BOM Item 4.2.C and 4.2.D)



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M



- iii. Reassemble shock absorber assembly in reverse order as described in Section 9.i - DISASSEMBLE SHOCK ABSORBER ASSEMBLY
- k. INSTALL DINAN SENSOR RODS IN LIEU OF OEM
  - i. Install using Dinan's Installation Instructions
  - ii. Locate Sensor Rods (AKA jointed rods) beneath rear axle:

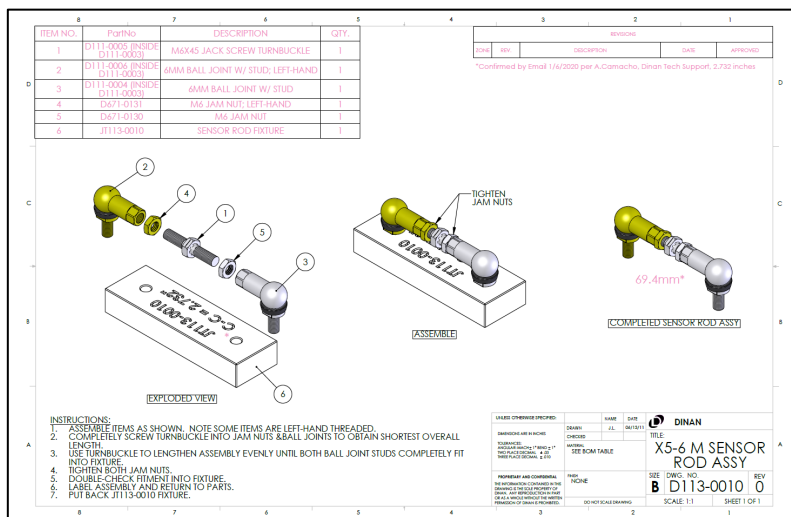


- iii. Disconnect Ride Height Sensor Plug Connection (1) (Not necessary if you first remove the lower connection, but gives you more room)
- iv. Release nut (2) using 10mm Socket at Ride Height Sensor Lever (3)
- v. Release nut at Sway Bar and disconnect jointed rod



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- vi. Install Dinan Sensor Rods (BOM Item 4.3) in reverse order from disassembly of OEM Sensor Rods
  1. The nut is 10mm, however you must use a wrench on the backside to keep the stud from turning. On the Dinan rod sensors I received, you needed two different wrenches per rod. One stud needed an 8mm wrench and the other appears to need an 8.5mm wrench...I was able to use a 9mm.
  2. Dinan Sensor Rods are preset a length to lower the rear to Dinan's spec ride height, approximately  $\frac{3}{4}$ ". However, Dinan Sensor Rods arrived with different lengths...
    - a. Per Dinan Drawing D113-0010 and Tech Support: Center to Center Length = 2.732" (69.4mm)
    - b. Per drawing, create the simple test fixture to confirm and help with ride height adjustments
      - i. Practice turnbuckle adjustment to understand how resulting input affects rod sensor length
    - c. Both left and right rod sensor heights shall be equal length when installed



3. Sensor Lever (3) must point from ride-height sensor to respective rear wheel.
4. Requires new M6 Self-Locking Nut upon installation
5. Install Torque on ride height sensor to jointed rod M6 Nut is 8Nm
- vii. Adjusting Ride Height, after installation, per Dinan Instructions:
  1. [Not Dinan Instruction] Consider allowing springs to settle for a few days if possible prior to adjusting ride height.
  2. Ignition must be OFF and vehicle secure when adjusting sensor rods.
  3. Alignments are done with full fuel tanks and no weights inside the vehicle.
  4. Each sensor rod has left and right-hand threads. Loosen the jam nuts and rotate the center turnbuckle to adjust the rod length
    - a. Lengthening the rod will raise the car
    - b. Shortening the rod will lower the car
  5. The adjustment is very sensitive – do not adjust turnbuckle by more than 1 or 2 flats
  6. Adjust both left and right rods by the same amount
  7. Tighten the jam nuts after adjustment
  8. Take the car for a short drive and allow the air spring system to automatically adjust

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

9. Measure the ride height and repeat if necessary
  - a. Car must be securely parked on level surface with engine ON
10. It does take time for the air spring system to settle on a final ride height. You may want to take several measurements and test drives and average the results.

### Tire Pressures:

- Front = stock
- Rear = stock

### Sway Bars:

- Front = N/A
- Rear = N/A

### Shock Settings:

- Front = N/A
- Rear = N/A

### Stage I:

Front:		Tol.
Camber	-0.5°	± 0.4°
Caster	7.6°	± 0.5°
Total Toe	0.23°	± 0.07°
Rear:		
Camber	-1.7°	± 0.08°
Total Toe	0.17°	± 0.07°

## 10. FINISHING THE INSTALL

- a. Confirm all components for Front and/or Rear Axle have been installed and fasteners have been properly torqued.
- b. Mount wheels and lower the vehicle in reverse order of raising. **Torque wheels M14 Bolts to 140Nm.**
- c. Install Engine Trim in reverse order of disassembly.
- d. Install Trunk Trim in reverse order of disassembly.
- e. Reconnect negative battery cable in reverse order of disassembly.
- f. On vehicles with BMW Active Front Steering (AFS), set Steering Angle:
  - i. Start Engine
  - ii. Turn steering wheel left to full lock.
  - iii. Turn steering wheel right to full lock.
  - iv. Turn steering wheel to central position.
  - v. Turn off Engine
  - vi. Turn On Ignition navigate to Check Control for messages
- g. After test drive, allow air system to level and take multiple measurements of ride height on a level surface. Engine ON, level surface, and no occupants. NOTE: If possible, allow Dinan coil springs to settle a few days prior to ride height adjustments.

FINAL	OEM (inches)	MEASURE A (inches)	MEASURE B (inches)	MEASURE C (inches)
Front Left:				
Front Right:				
Rear Left:				
Rear Right:				

- h. Consider the following Diagnostics as needed:
  - i. Perform 4-wheel computerized alignment

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- ii. Headlight Adjustment
- iii. Ride Height Calibration – Not required. In most cases this is not required. The adjustable Dinan Sensor Rods are provided in lieu of a ride height calibration. Ride Height Calibrations only involves adjusting the rear ride height and is performed with diagnostic equipment.
- iv. Vertical acceleration sensor adjustment
- i. END.

# DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

## 11. CHECKLIST

### a. DISCLAIMER:

**This Checklist only lists highlights and is for REFERENCE ONLY. It serves only as backup to help ensure major steps have been addressed. See DIY for details and only use the latest version. This procedure represents one method of installation on a specific vehicle and is shared/posted for **\*\*REFERENCE ONLY\*\***. This procedure requires **\*\*CAUTION\*\*** as it involves heavy loads and stored potential energy that could cause serious personal injury and/or vehicle damage if mechanical disassembly and/or assembly is performed improperly. Use extreme caution and all applicable safety processes when working on your vehicle. This procedure is based on a collection of other DIYs as referenced in the Reference Section of the DIY, as well as ISTA.**

### b. CHECKLIST NOTES:

- i. 2013 E70 X5M
- ii. Checklist based on a complete and consecutive Dinan Spring Kit install from front to rear axle.
- iii. NORMAL POSITION TORQUE: As required and defined by ISTA, place vehicle in 'normal position'. For those fastenings called out to be torqued in normal position, note that the rear fasteners in this DIY can be accessed with the wheels mounted and vehicle on the ground. For the front axle, this is not easily the case. There is a method recommended by a third party used and referenced in the full DIY that simulates 'normal position'.

### c. PRE-INSTALLATION (*Prior to Jacking*)

- i. ☐ (optional) Record ride height for reference
- ii. ☐ (optional) Fold mirrors to decrease obstructions around vehicle
- iii. ☐ Position vehicle with steering straight ahead
- iv. ☐ Ensure emergency brake is OFF
- v. ☐ In trunk, disconnect negative battery cable. [10mm Socket; M6 Nut 5Nm]
- vi. ☐ In trunk, for vehicles without third row seating, lift trunk lid and remove carpet trim to access rear strut top mounting bolts. [pry tool]
- vii. ☐ In engine bay, remove left and right microfilter grated housing covers and right microfilter housing assembly. [13mm Socket]
- viii. ☐ In engine bay, loosen left and right partition walls and rotate toward vehicle center for access to front strut housing. [pry tool; 5mm Hex Allen; 10mm Socket]
- ix. ☐ Jack vehicle, place jack stands, and remove wheels. If jacking one axle at a time, use wheel chocks as necessary. [Hydraulic Jack; Jack Pads; Chocks; 17mm Socket; Wheel Hangar; M14 Nut 140Nm]
- x. ☐ Place removed wheels under vehicle side skirts as additional safety backup.

### d. FRONT AXLE

- i. ☐ Rotate hub/disc rotor so that concave indentions point in vehicle forward direction or OEM marked surfaces point upwards.

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- ii. ☐ Mark rotor/hub orientation so that if the driveshaft uncouples from the final drive and the rotor/hub is unknowingly rotated, you know the approx. orientation of the hub to reinsert driveshaft.
- iii. ☐ Remove hydraulic brake line clamp with pliers and uncouple grommet/line from strut brake line bracket. [Pliers]
- iv. ☐ LEFT SIDE ONLY, uncouple (friction fit) brake pad wear sensor cable from strut brake line bracket.
- v. ☐ Decouple EDC connectors and cables to allow untethered strut removal from vehicle. Blue connector sits above black connector. Consider removing other cable/connectors in vicinity to help facilitate smoother strut assembly removal.
- vi. ☐ Support lower control arm with hydraulic jack and wooden block(s) as needed.
- vii. ☐ Remove stabilizer link from swivel bearing by removing M12 nut. Adjust hydraulic jack as needed to unload sway bar for link removal. Use socket and breaker bar to first loosen nut, then proceed with wrench and Torx socket. Note bolt insertion is in direction of forward travel. [18mm Box End Wrench; T35 Torx Socket]
- viii. ☐ Disconnect swivel bearing from upper control arm by removing M10 bolt and nut. Adjust hydraulic jack as needed to facilitate bolt removal. Note bolt insertion is in direction of forward travel. Bearing surfaces to remain clean and oil free; [16mm Socket; 16mm Box End Wrench]
- ix. ☐ Tether swivel bearing as it becomes unwieldy and naturally leans outward and can disconnect drive shaft from final drive. [Rope]
- x. ☐ Remove spring strut holder to strut assembly M12 bolt. Note bolt insertion is in direction of forward travel. Bearing surfaces to remain clean and oil free. [18mm Socket]
- xi. ☐ At lower control arm disconnect spring strut holder by removing M14 Bolt and Nut. Adjust hydraulic jack as needed to facilitate bolt removal. Note bolt insertion is in direction of forward travel. [21mm Socket; 21mm Box/Open End Wrench]
- xii. ☐ With Suspension in lowest position, separate spring strut holder from strut assembly and remove spring strut holder from area. Use steering knuckle expanding tool to unclamp strut from strut holder as needed. [Knuckle Expanding Tool]
- xiii. ☐ In engine bay strut tower, with strut assembly supported from beneath, remove three M8 nuts at strut tower. [13mm Socket]
- xiv. ☐ Remove strut assembly downwards and out of wheel arch. Record photos capturing relative position of OEM components for future assembly of stock configuration.
- xv. ☐ Using Spring Compressor Tool per manufacturer instructions and slowly compress OEM coil spring and remove M12 Strut Nut. Then slowly decompress OEM Coil Spring for spring removal. [18mm Strut Nut Socket Tool; 6mm Allen Wrench]
- xvi. ☐ On bench, place Dinan auxiliary pads and new strut components onto strut assembly. Orient upper spring pads to ISTA key coding specifications.
- xvii. ☐ Using Spring Compressor Tool per manufacturer instructions, with strut assembly and Dinan coil spring properly oriented per ISTA, slowly compress Dinan coil spring until strut nut can be installed and torqued. After strut nut is installed, slowly decompress Dinan coil spring. [18mm Strut Nut Socket Tool; 6mm Allen Wrench; 21mm Box End Wrench or Crescent; M12 Nut 48Nm]

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- xviii. ☐ Insert strut assembly with Dinan coil spring into strut tower and install three new M8 nuts but do not tighten yet. Only install to ensure strut assembly is supported.
- xix. ☐ Insert spring strut holder onto strut assembly via strut alignment pin and position spring strut holder onto lower control arm.
- xx. ☐ Install spring strut holder to lower control arm M14 bolt and nut. Tighten but do not torque yet as that will be done under 'normal position'. [21mm socket; 21mm open end wrench]
- xxi. ☐ Install spring strut holder to strut assembly M12 bolt. Hand-tighten (snug) but do not fully torque yet as strut assembly will need to settle into spring strut holder at 'normal position'. [18mm Socket; Knuckle Expanding Tool]
- xxii. ☐ Install M12 nut for stabilizer link to swivel bearing. If needed adjust hydraulic jack to unload sway bar for link installation. Tighten but do not torque yet. [18mm Box End Wrench; T35 Torx Socket]
- xxiii. ☐ Install upper control arm to swivel bearing M10 nut and torque. [16mm Socket; 16mm Box End Wrench; M10 Nut 56Nm]
- xxiv. ☐ Torque stabilizer link M12 nut. [18mm Socket; M12 Nut 100Nm]
- xxv. ☐ Tighten and torque strut tower M8 nuts. [13mm Socket; M8 Nuts 28Nm]
- xxvi. ☐ Install EDC Connectors and route cables.
- xxvii. ☐ Install brake line clamp and LEFT SIDE ONLY brake pad wear sensor cable.
- xxviii. ☐ Place vehicle in 'normal position' per ISTA. This may need to be done after rear axle complete and rear wheels on the ground. Consider using hydraulic jack, position jack stands under lower control arm and load suspension to mimic 'normal position'.
- xxix. ☐ First torque lower control arm to spring strut holder M14 bolt in 'normal position'. [21mm Socket; 21mm Box End Wrench; M14 Bolt 165Nm in Normal Position]
- xxx. ☐ Then torque spring strut holder to strut assembly M12 nut in 'normal position'. [16mm Socket; M12 Bolt 81Nm, Torque in Normal Position]
- xxxi. ☐ If needed, for rear axle work, return vehicle to nominal lifted configuration using hydraulic jack and jack stands.
- xxxii. Front Axle Complete.

### e. REAR AXLE

- i. ☐ Partially detach rear wheel fender linings (or remove rear bumper) and disconnect VDM cable routing and plugs at connector box to allow strut removal from vehicle.
- ii. ☐ Remove hydraulic brake line clamp with pliers and uncouple grommet/line from strut brake line bracket.
- iii. ☐ Remove M14 bolt connecting shock absorber to control arm. But first support wheel hub or control arm with hydraulic jack to unload bolt and then remove. (21mm Socket)
- iv. ☐ Supporting strut assembly from underneath to prevent it from falling out, remove three M10 nuts from strut tower in luggage compartment. A new sealing grommet is recommended at installation. (16mm Socket)
- v. ☐ On bench, disassemble strut assembly by removing M12 nut. (18mm Strut Nut Socket Tool; 6mm Allen Wrench)



## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

- vi. ☐ Replace OEM auxiliary pad with Dinan auxiliary pad, install new components, and reassembly strut assembly. Torque M12 Nut. (18mm Strut Nut Socket Tool; 6mm Allen Wrench; M12 Nut 34Nm)
  - vii. ☐ Insert strut assembly into strut tower and install three new M10 nuts and torque. (16mm Socket; M10 Nut 56Nm)
  - viii. ☐ Adjust hydraulic jack as needed to insert M14 bolt into lower control arm and strut assembly. Tighten in place, but do not torque yet as torquing requires vehicle to be in 'normal position'.
  - ix. ☐ Reconnect EDC connectors and route cables. Re-install fender linings (or bumper).
  - x. ☐ Install brake line clamp
  - xi. ☐ Remove OEM sensor rods. (10mm Socket; 8mm and 8.5mm Box End Wrench)
  - xii. ☐ Install Dinan Sensor Rods that have been each set to a length of 69.4mm/2.732" (M6 Nut 8Nm)
  - xiii. ☐ Mount front and rear wheels and lower the vehicle in reverse order of raising (17mm Socket; M14 Nuts 140Nm)
  - xiv. ☐ Torque lower control arm to strut assembly M14 bolt. (21mm Socket; M14 Bolt 165Nm in Normal Position)
  - xv. Rear Axle Complete.
- f. FINISHING INSTALLATION
- i. ☐ Confirm Torque of all Fastenings
  - ii. ☐ Install Engine Trim in reverse order of disassembly
  - iii. ☐ Install Trunk Trim in reverse order of disassembly
  - iv. ☐ Reconnect negative battery cable in reverse order of disassembly
  - v. ☐ On vehicles with BMW Active Front Steering (AFS), set Steering Angle:
    - 1. Start Engine
    - 2. Turn steering wheel left to full lock.
    - 3. Turn steering wheel right to full lock.
  - vi. Consider performing as needed (diagnostic system needed):
    - 1. ☐ Perform 4-wheel computerized alignment
    - 2. ☐ Headlight Adjustment
    - 3. ☐ Ride Height Calibration (*not required with Dinan Sensor Rods*)
    - 4. ☐ Vertical acceleration sensor adjustment
  - vii. NOTE: If possible, allow Dinan coil springs to settle a few days prior to ride height adjustments.
- g. CHECKLIST END.

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

### 12. REFERENCES (THANKS TO...)

- a. REALOEM
- b. XRatedM: <https://www.xbimmers.com/forums/showthread.php?t=1823145>
- c. Sophisticated Redneck: <https://www.xbimmers.com/forums/showthread.php?t=1801906>
- d. XBimmers/0-60 Motorsports: <https://www.xbimmers.com/forums/showthread.php?t=1543027>
- e. XBimmers/Jandref321:  
<https://www.xbimmers.com/forums/showthread.php?t=1388331&highlight=strut+removal>
- f. XBimmers/SYT\_Shadow: <https://www.xbimmers.com/forums/showthread.php?t=1348757>
- g. Bimmerfest/SeanC: <https://www.bimmerfest.com/forums/showthread.php?t=975637>
- h. Xoutpost/King: <https://xoutpost.com/bmw-sav-forums/x5-e70-forum/64225-lowering-x5-e70-h-r-springs-installation-lots-pics.html>

## DIY INSTALLATION OF DINAN PERFORMANCE SPRING SET INTO E70 X5M

### 13. IMAGES

