



Technical Presentation Friction Costs when Replacing a Full Frame

January 24, 2013

2001 Ford F150 Barrier Crash Test



INSURANCE INSTITUTE
FOR HIGHWAY SAFETY

2011 Ford F150 Barrier Crash Test



CrashNet1



CrashNet1

This video was compiled
and edited from public
domain resources.



What does Range Rover say about repairs, welding or frame component on their BOF vehicles?



- A. Minor Pulling without heat
- B. Minor Pulling with controlled heat (977° / 90 sec)
- C. Pulling to the rear section of the frame
(lower strength metals used in the rear)
- D. Welding cracks less than 50mm (2 inches)
- E. Welding for bracket replacement only
- F. None of the above.







September 10, 2012

European Motor Car Works, Inc
2923 Tech Center
Santa Ana, CA 92705

To whom it may concern:

Below is Land Rover Engineering's policy regarding service repairs to the chassis/frame on Land Rover LR3/LR4 and Range Rover Sport vehicles.

It is important to understand that the main rails of the chassis/frame of the LR3/LR4 and Range Rover Sport vehicles are "Hydro-formed" from high-strength steel as is the vast majority of the rest of the frame. The application of heat or any welding for the purposes of repairs to the chassis/frame will have a detrimental effect on the strength and properties of the chassis/frame.

- There is no approved method of heating and straightening the chassis/frame or welding on the LR3/LR4 or Range Rover Sport chassis. The chassis rails substantially harden during the hydro-forming process. Any deformation from a collision is likely to be "set" and **will not** straighten.
- If heat is applied, the metal's structure would be altered and could potentially lead to premature failure/fracture and will have a detrimental effect on the crash performance of the vehicle.

Currently the only approved repairs to the chassis/frame are:

- welded rear cross member & bumper beam
- bolted-on cross members
- radiator support uprights

Regards,

**Rear bumper
Reinforcement**

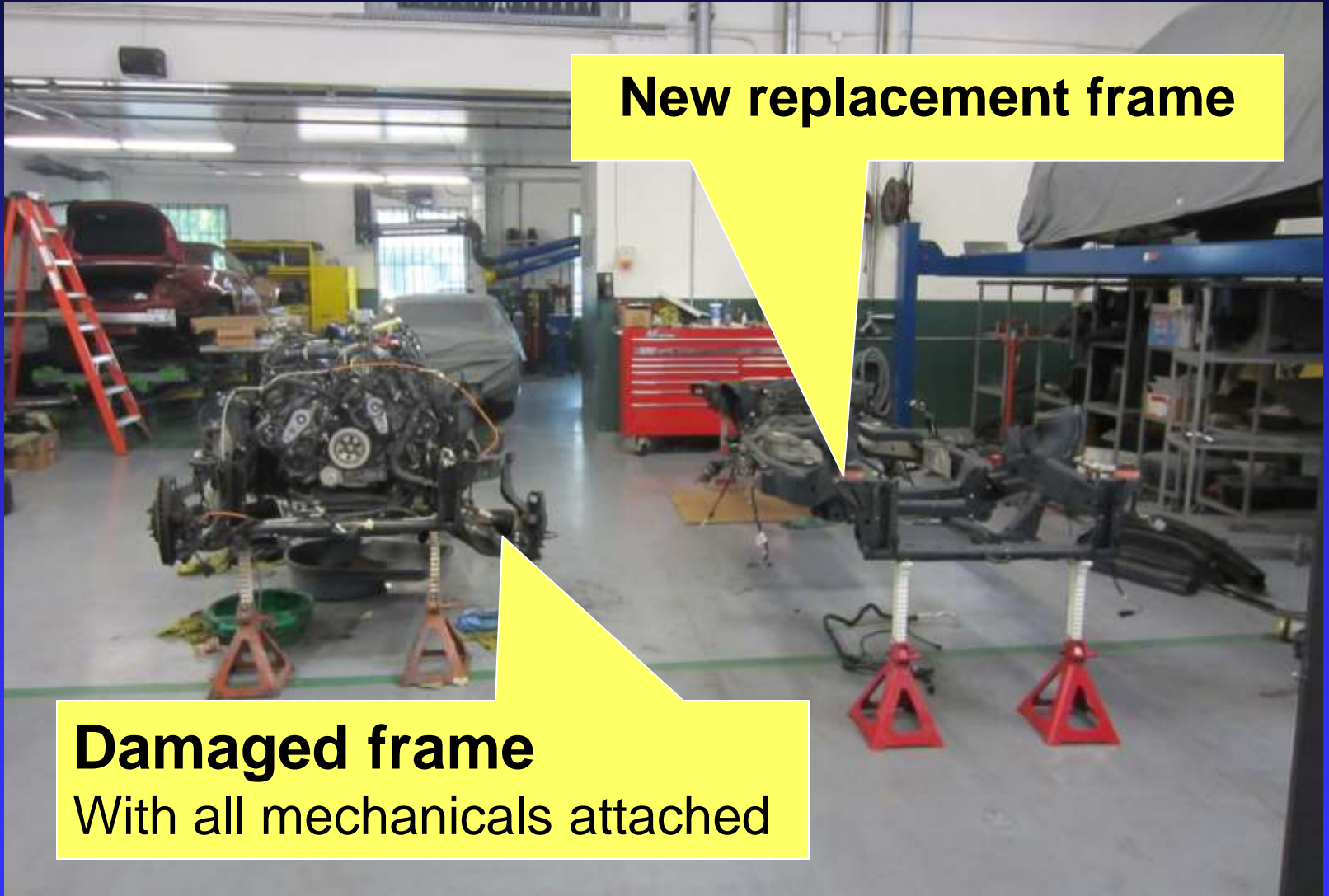


Note the welds

Body of Range Rover with frame removed sitting on a hoist.



Both frames sitting side by side



New replacement frame

Damaged frame

With all mechanicals attached

6



Frame

Frame Assembly R&R

Included Operations

- Remove and install:
 - Front and rear bumpers
 - Front sheet metal as an assembly
 - Body assembly
 - Pickup bed
 - Mechanical assemblies (example: engine, transmission, suspension, fuel tank, differential and components)
- Remove and install or replace:
 - Engine mounts/absorbers
 - Wiring and/or wiring harness if necessary

NOTE: It may be necessary to transfer parts from the damaged frame to the used frame assembly. This cannot be determined until you see the used frame assembly. The additional time needed for this operation must be estimated.

Mitchell

Wheel
Mouldings, nameplates, etc.

- Transfer or replace labels, decals, or warnings

Not Included Operations

- Overhaul assemblies or replace parts of assemblies that are transferred
- Remove and install or replace:
 - Welded or riveted assemblies of the frame (see Note)
 - Optional accessories (example: auxiliary lamps and fuel tanks, brush guard, lift kit, bed liner, trailer hitch, trailer connector)
- Wheel alignment
- Adjust control linkage
- Bleed brakes if necessary
- Evacuate and recharge Air Conditioning if so equipped and necessary
- Refrigerant recovery if necessary



Left Front Suspension



Are the times for removing the torsion arm & upper control arm included in the removal process, if it is necessary to remove them to remove the drive axle?

Upper Control Arm

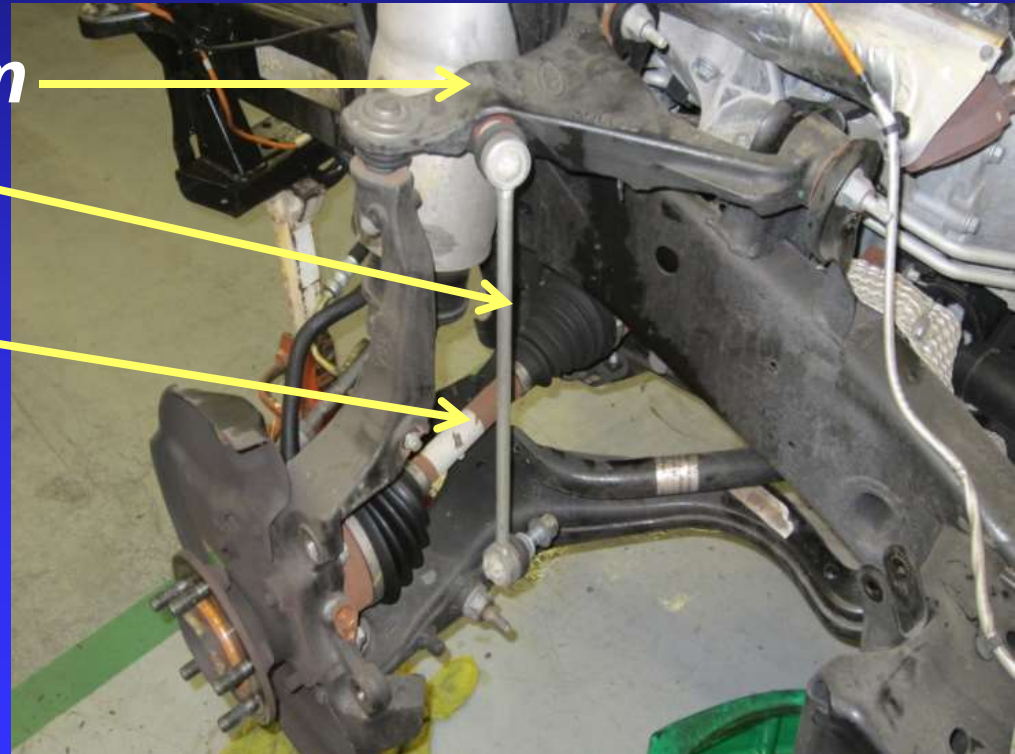
Torsion Arm Link

Drive Axle

A. Yes

B. No

C. Don't Know



Upper Control Arm and Torsion Rod Disconnected.





Rear Air Shock absorber



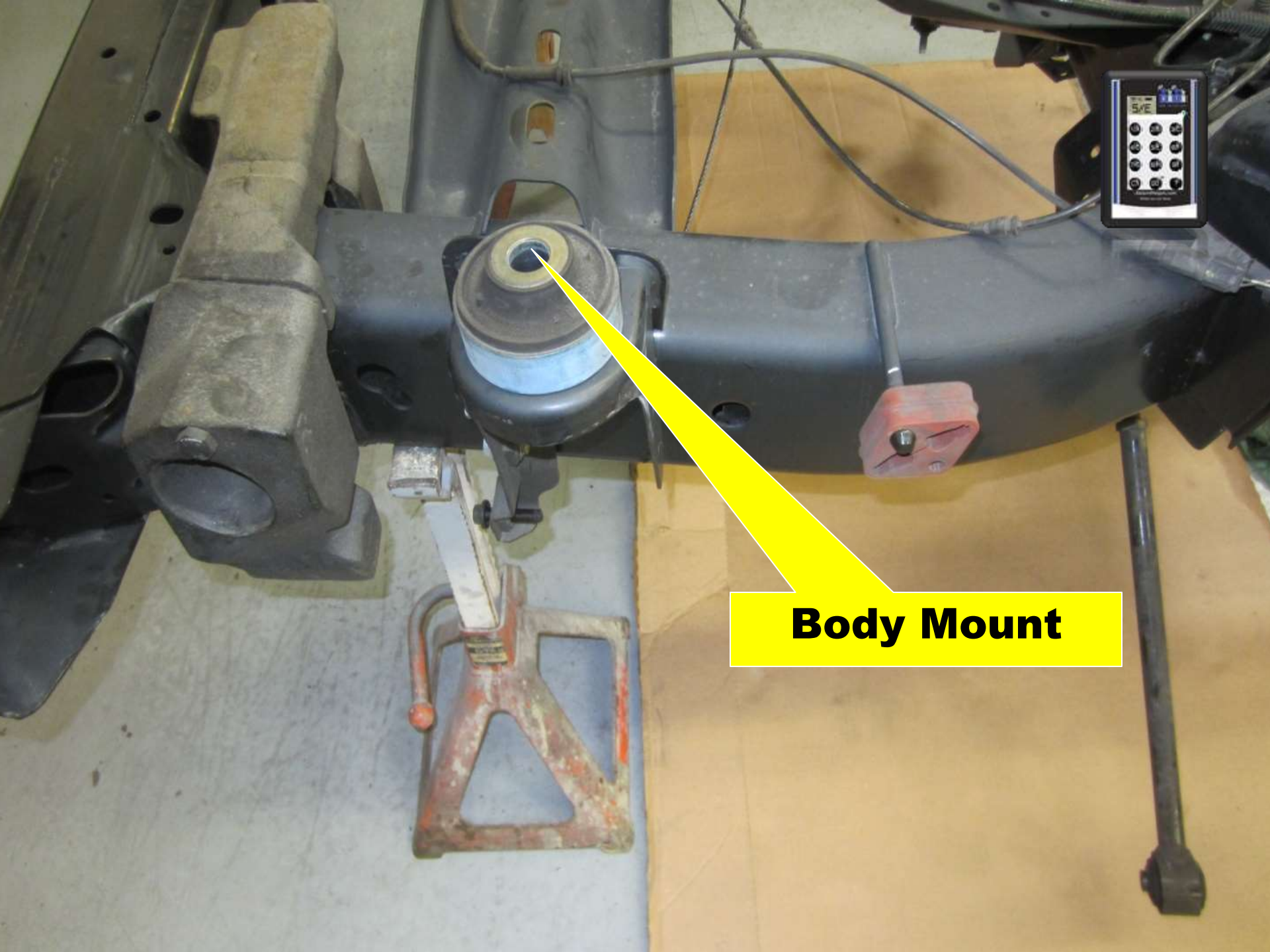
R&I of the Rear Air Actuated Shock Absorber included or not included?

- A. Yes
- B. No
- C. Don't Know





Body Mount





Are the Body Mounts included
or not included operations?



- A. Yes
- B. No
- C. Not sure







Rear Wheel Drive Assembly is an included Operation or not included operation?



- A. Included
- B. Not Included
- C. Not sure





**Drive
Axle**



**Rear
Differential**



Rear Drive Wheel Components Included or Not Included operations?



- A. Included
- B. Not Included
- C. Not sure





320 (105)

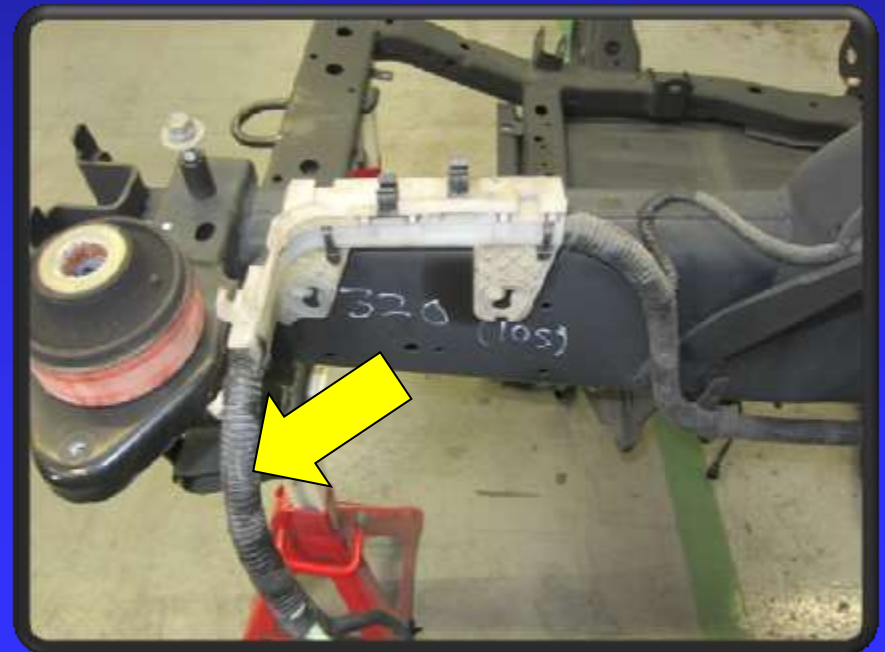
**Ride Height Control
Wire Loom**

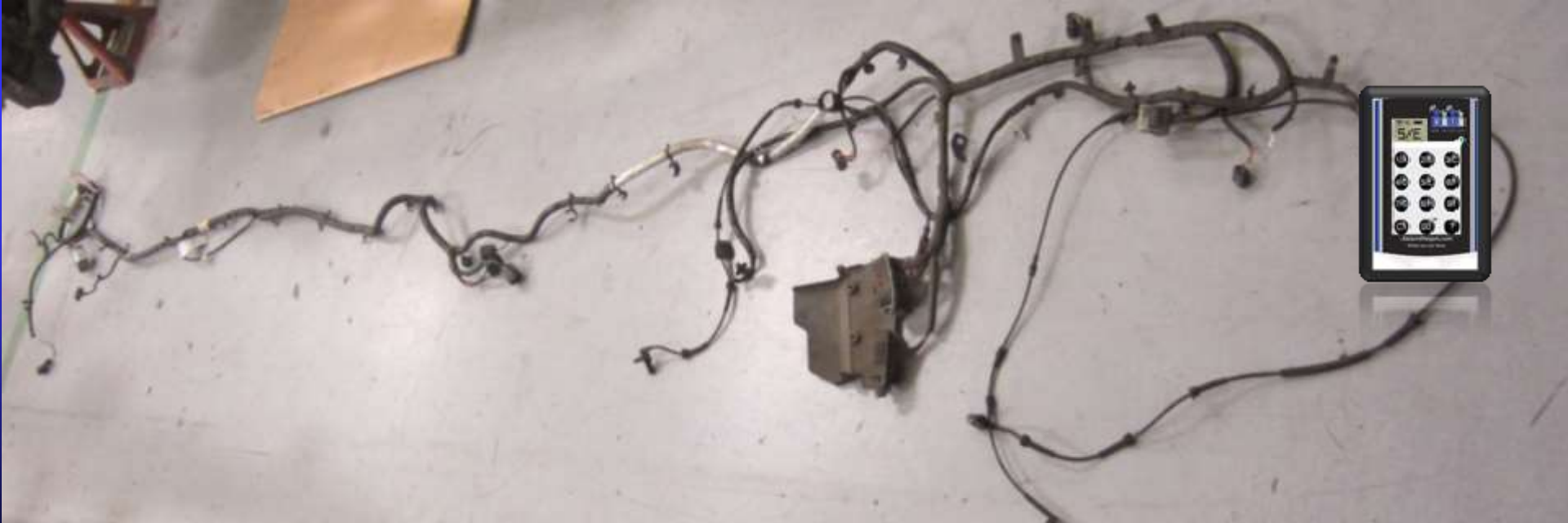


Wire Harness for Ride height control system – Included or Not included?



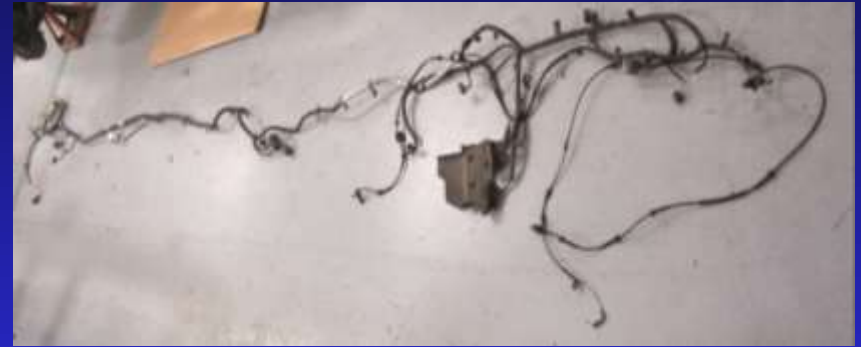
- A. Yes
- B. No
- C. Not sure







Question—Which wire loom is Mitchell referencing in their “P” pages?

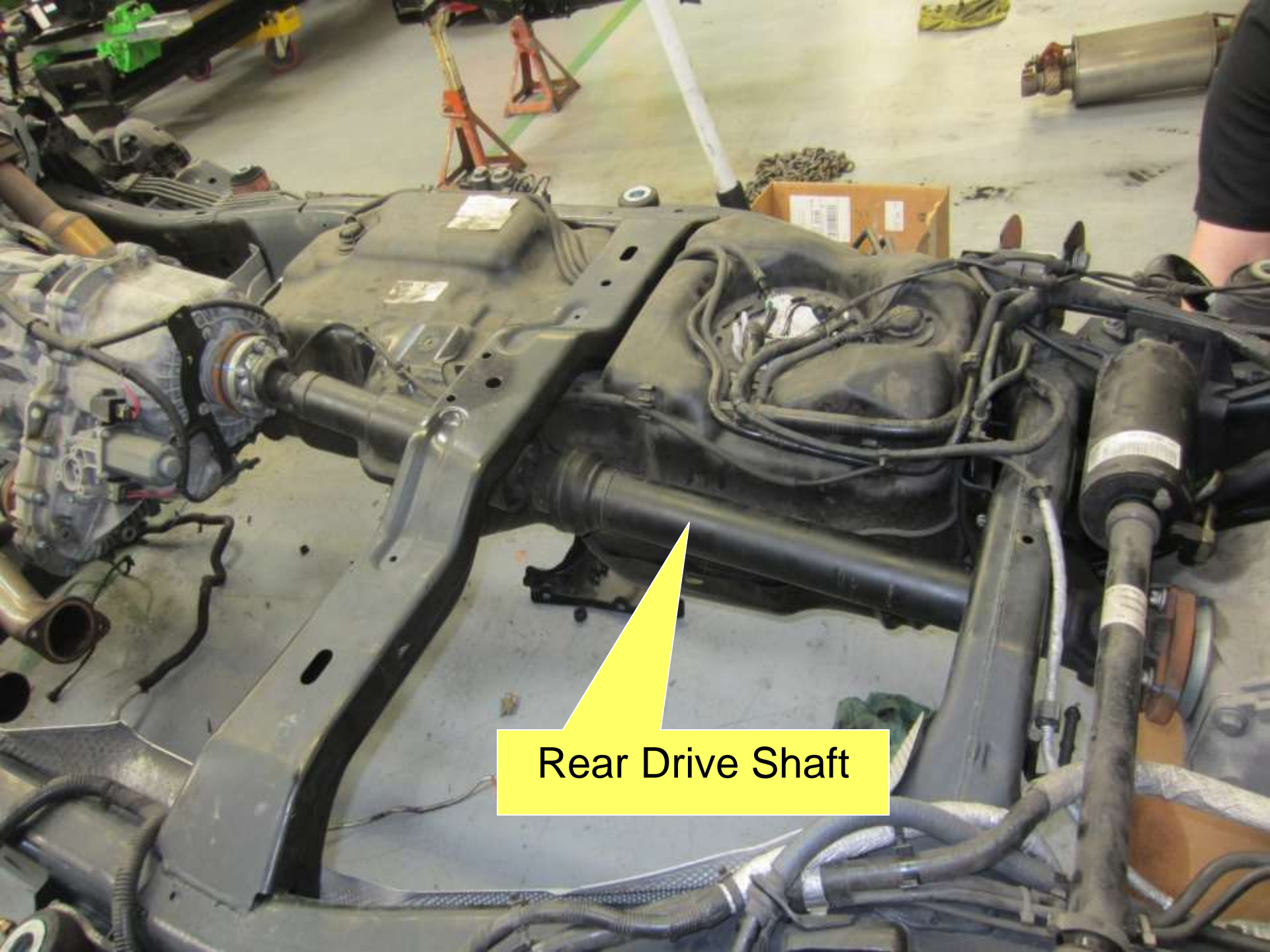


- A. Engine to Body**
- B. Attached to the frame**
- C. All Wire Looms**





Brake Caliper



Rear Drive Shaft



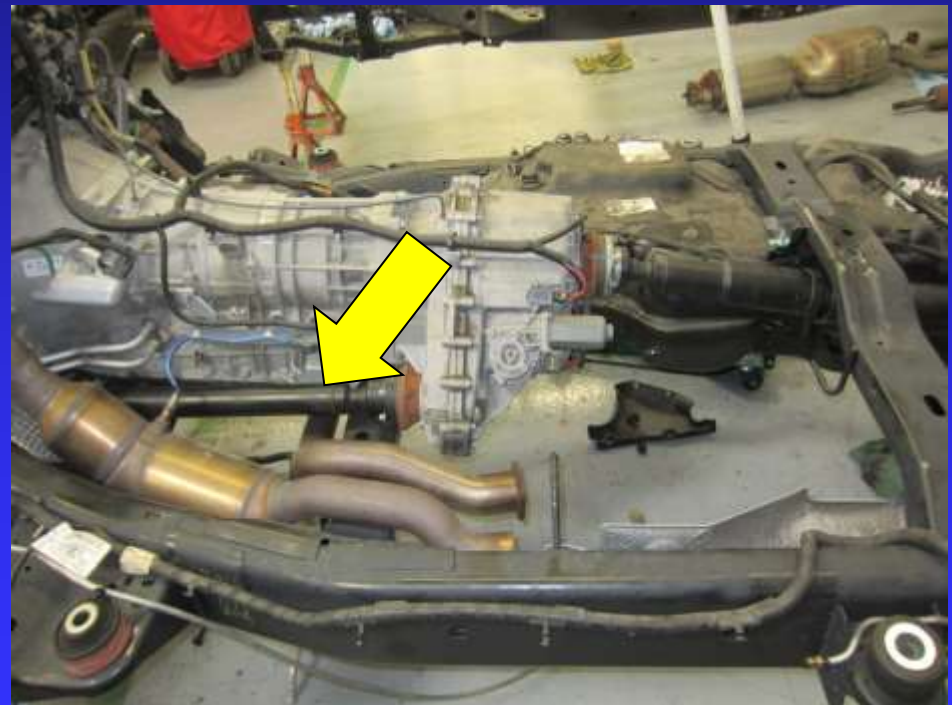
**Front wheel
drive
Shaft on 4
wheel
Drive vehicle**

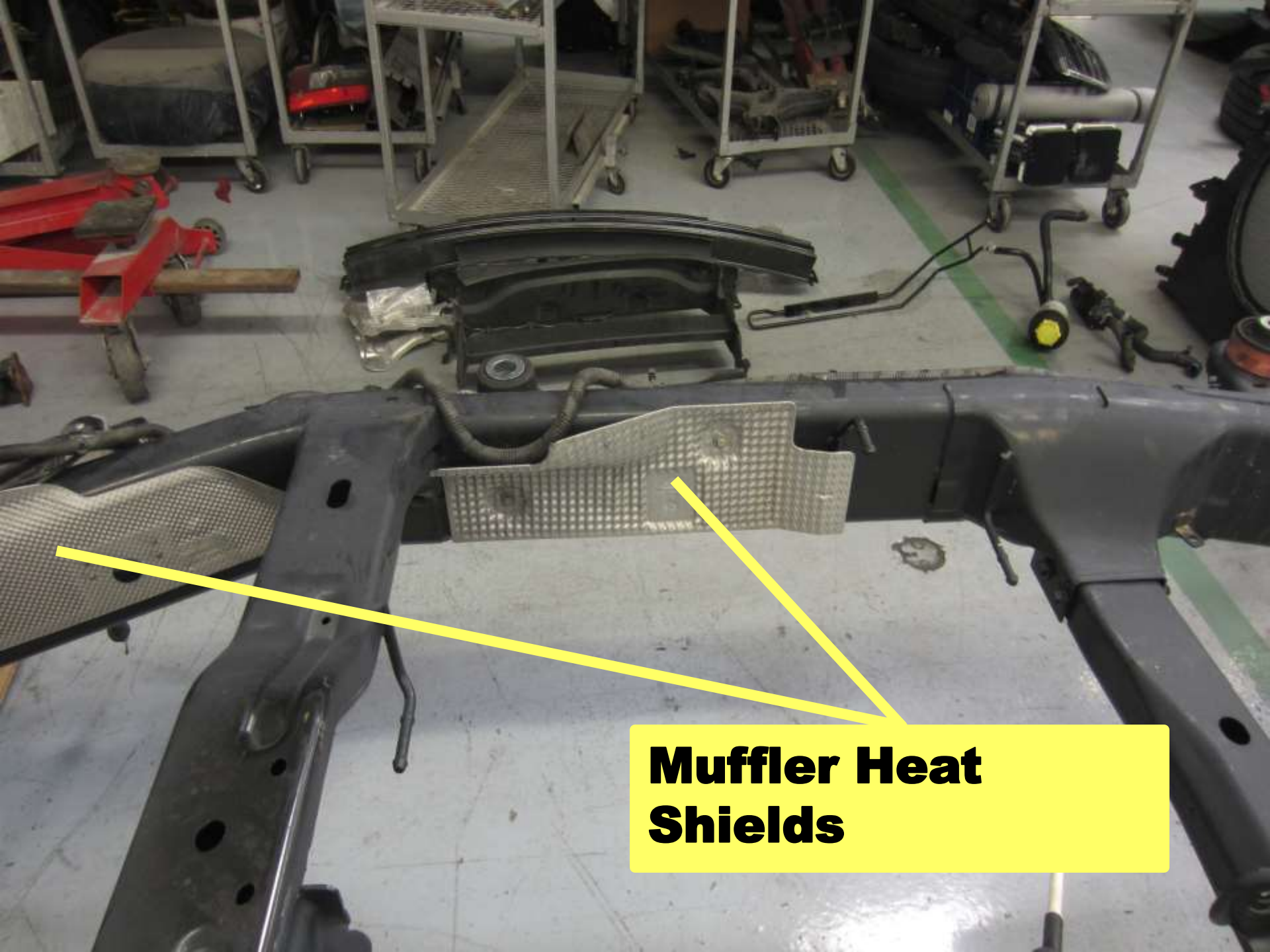


**Front drive shaft included
with the rear differential on a
4 wheel drive vehicle?**



- A. Yes**
- B. No**
- C. Not sure**

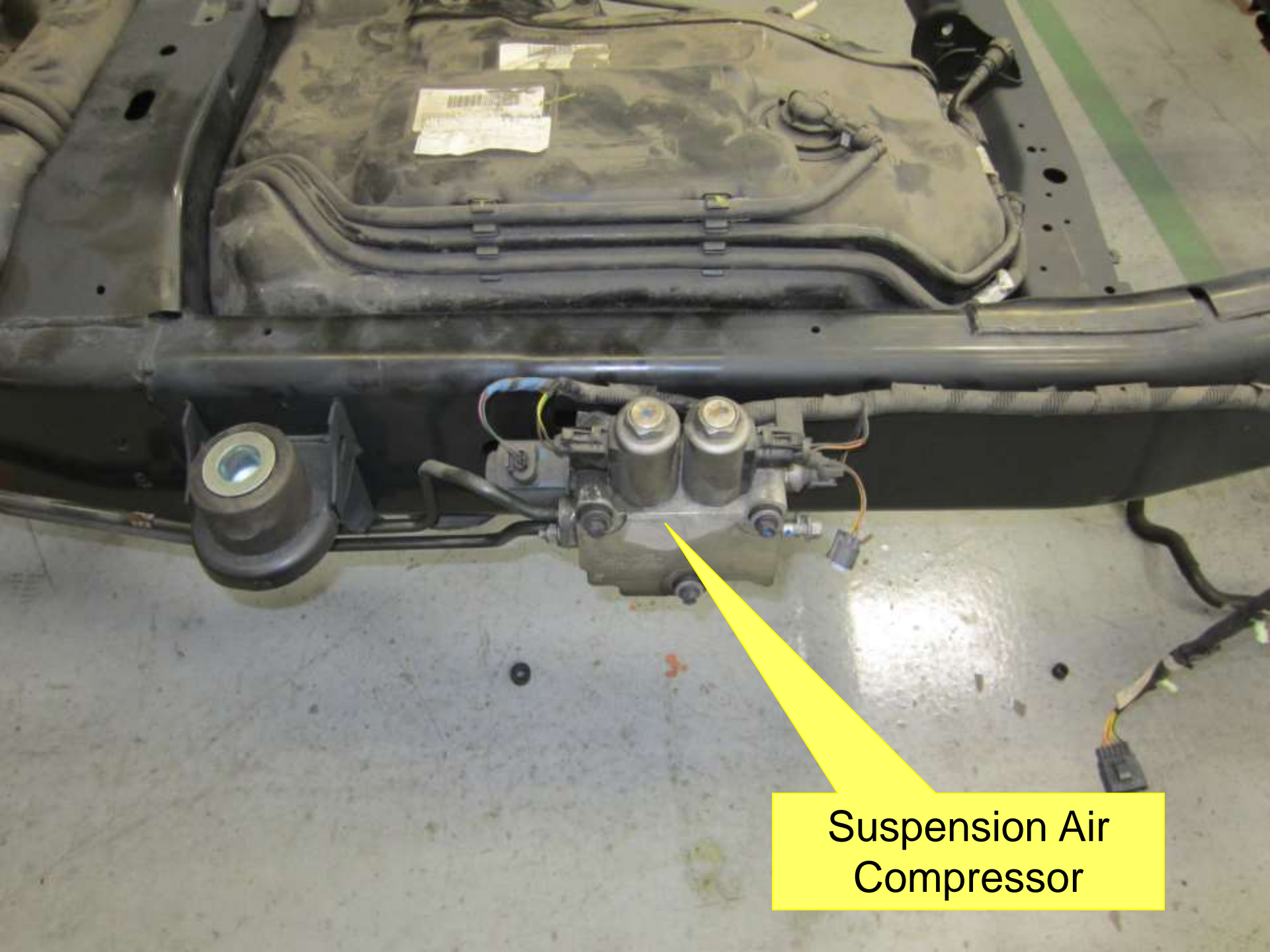




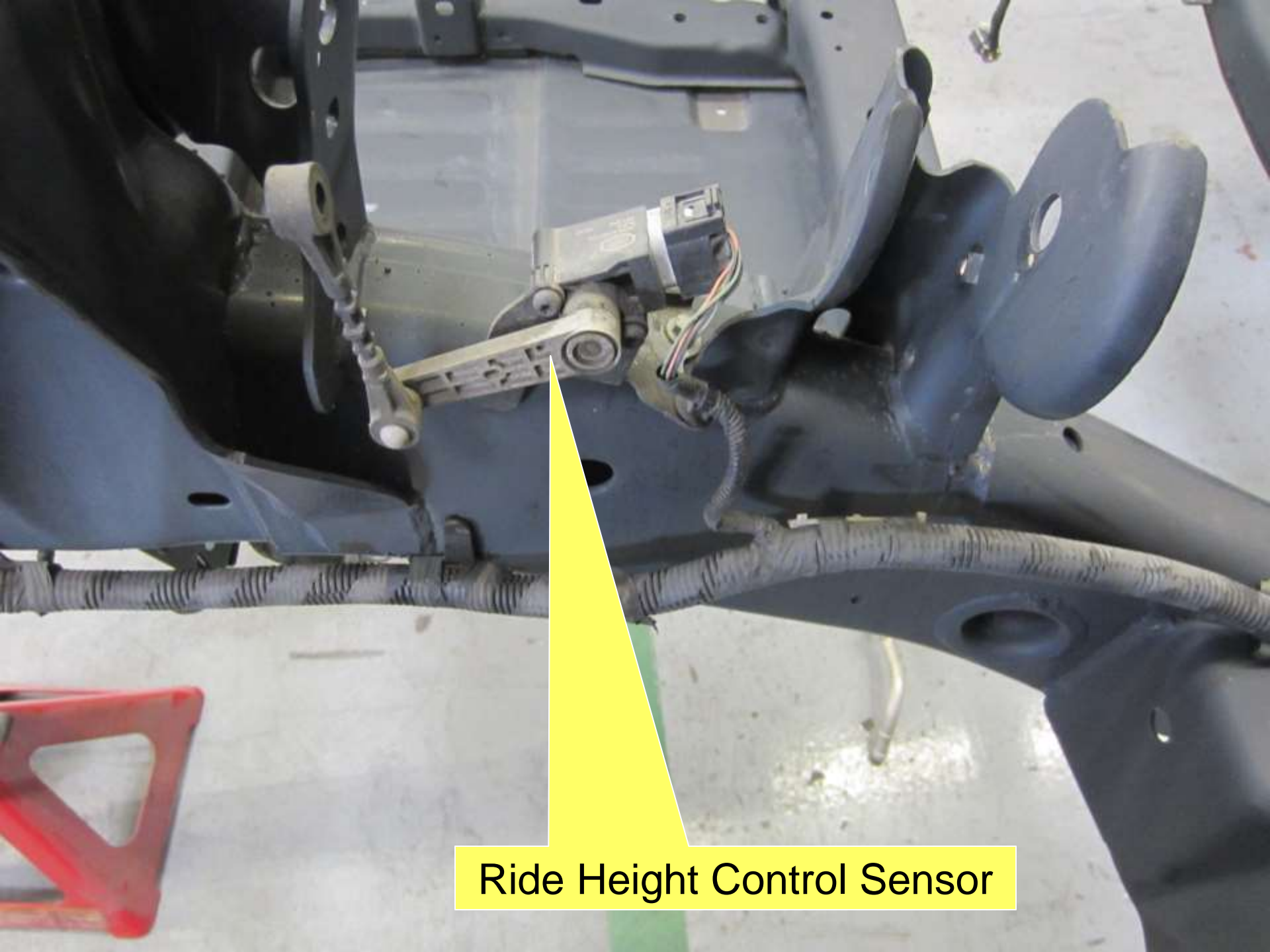
Muffler Heat Shields

A photograph of a vehicle's rear hydraulic sway bar assembly. The image shows a complex arrangement of metal components, including a central hydraulic cylinder, various linkages, and a coil spring. A yellow callout box with a pointer identifies the main horizontal bar as the "Rear Hydraulic Sway Bar". The assembly is mounted on a vehicle chassis, with a concrete floor visible in the background.

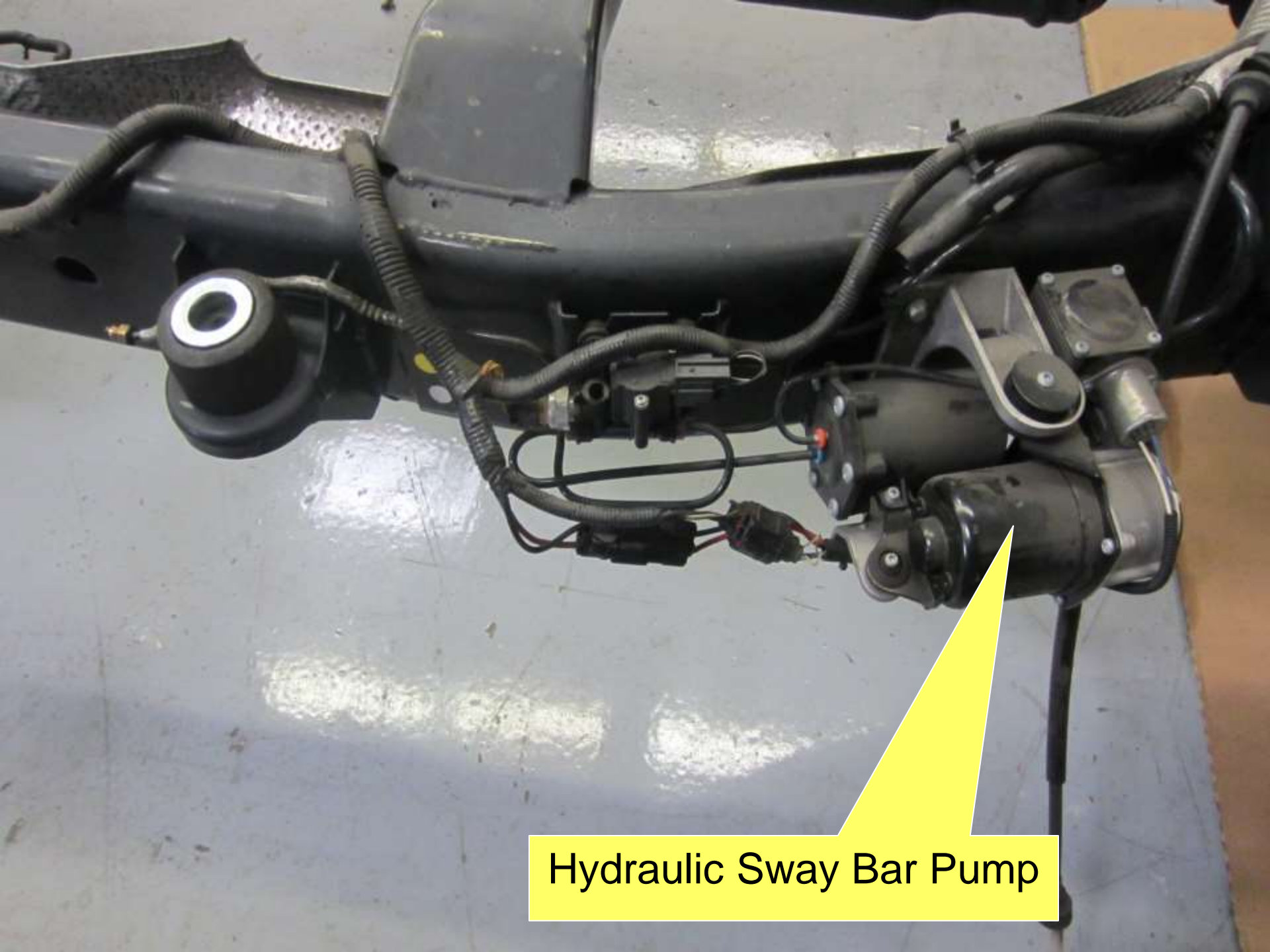
Rear Hydraulic Sway Bar



Suspension Air
Compressor



Ride Height Control Sensor

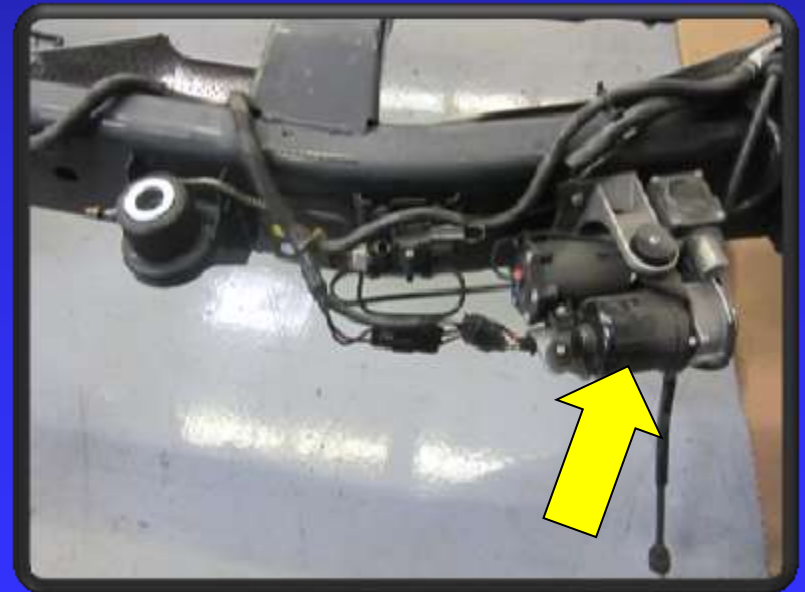


Hydraulic Sway Bar Pump

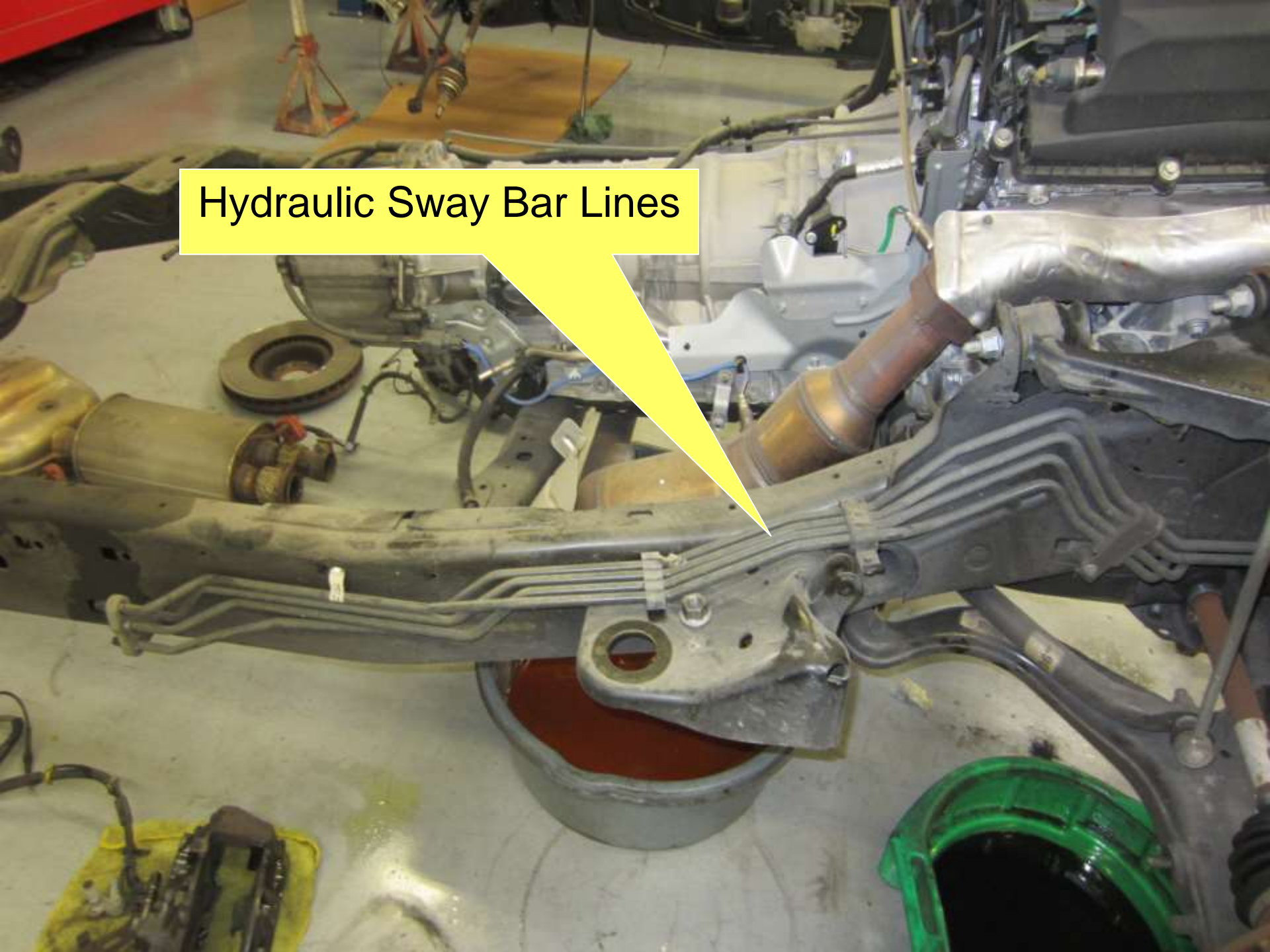
Did you know this part needs to be filled by the dealer only? The procedure requires a scan tool that is only available to Range Rover Dealers.



- A. I did know
- B. I did not know



Hydraulic Sway Bar Lines





2 Lines go to the front hydraulic sway bars, 2 go to the rear sway bar and 2 go to the pump.





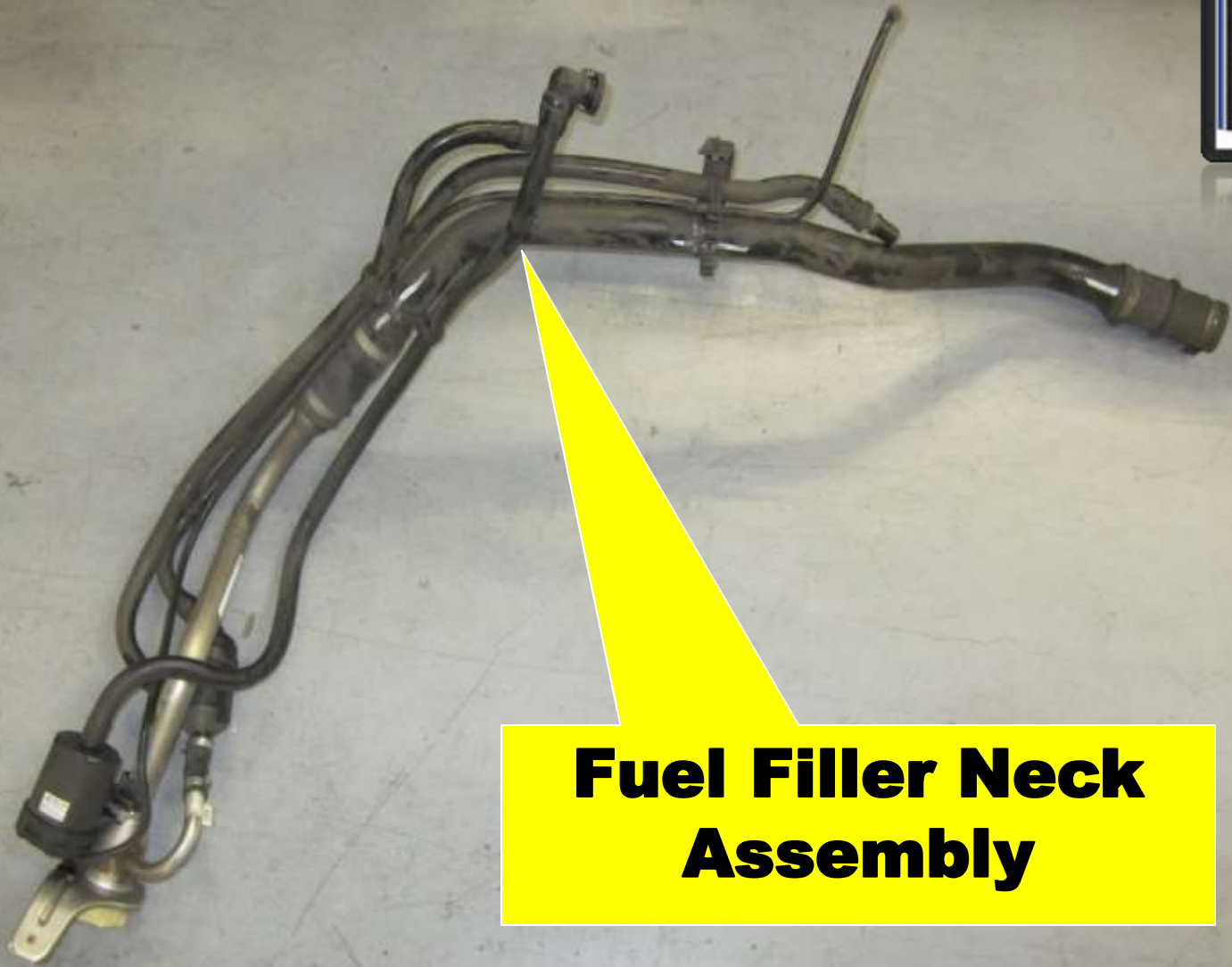
Catalytic Converter



Is the Catalytic converter an included operation with the muffler system?

- A. Yes**
- B. No**
- C. Not sure**





**Fuel Filler Neck
Assembly**



Is this part of the fuel tank assembly or is it a separate part?




- A. Part of the assembly**
- B. Separate part and operation**
- C. I have No idea**






Rear tie rod



Is the R&I of the rear tie rod an included operation or not included operation?



- A. Included
- B. Not Included





New Frame



all mechanicals attached

