RIDE AND HANDLING OPTIMIZATION

SPECIFICATIONS

Lubricants, Fluids, Sealers and Adhesives

	SPECIFICATIONS
Dynamic Response Fluid	Texaco Cold Climate Fluid 33270

Capacities

	LITERS
Capacity	2.7 Litres (4.75 pints) (2.85 US quarts)

General Specification

System pressure	Variable between 3-180 bar dependant on lateral acceleration

Torque Specifications

ITEM	NM	LB-FT	LB-IN
Dynamic Response actuator bleed screw	15	11	-
M10	48	35	-
M8	25	18	-

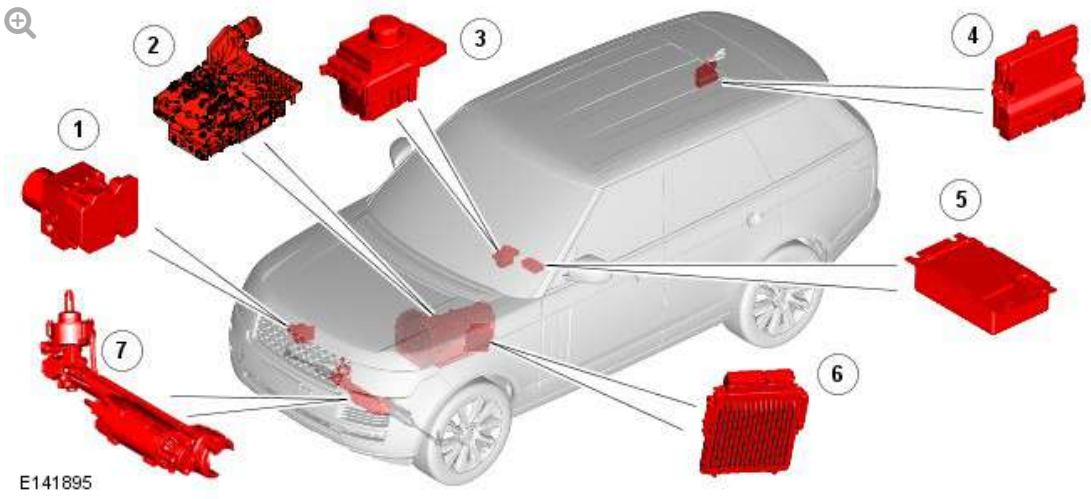
Dynamic Response Hydraulic Pump Pressure High Hose	10	7	-
* Front actuator pipes to valve block nuts	22	16	-
* Rear actuator pipes to valve block nuts	22	16	-
Valve block mounting bolts	9	-	
Valve block mounting stud	16	12	-
Dynamic Response fluid pipe securing bracket nuts/bolts	10	7	-
Fluid lines to actuator banjo bolts	22	16	-
Fluid lines to cooler bolts	9	7	-
* Stabilizer bar link nut	185	136	-
Front stabilizer bar to body clamp bolts	110	81	-
Rear stabilizer bar to body clamp bolt	110	81	-
Dynamic Response module	10	75	-
Upper Accelerometer	7	-	-
Lower Accelerometer	7	-	-
Front dynamic stabilizer bar support bracket to subframe bolts *			
M12 bolts			
Stage 1	90	66	
Stage 2	Then a further 180 degrees	Then a further 180 degrees	Then a further 180 degrees
M12 bolts			
Stage 1	140	103	
Stage 2	Then a further 120 degrees	Then a further 120 degrees	Then a further 120 degrees

2016.0 RANGE ROVER (LG), 204-06

RIDE AND HANDLING OPTIMIZATION

DESCRIPTION AND OPERATION

TERRAIN RESPONSE



ITEM	DESCRIPTION
1	ABS module
2	Transmission control module
3	Terrain Response Switchpack
4	Integrated Suspension Control Module (ISCM)
5	Transfer Box Control Module
6	Engine control Module (ECM)
7	Power Steering Control Module (PSCM)

OVERVIEW

The Terrain Response® system allows the driver to select a program which aims to provide the optimum settings for traction and performance for the prevailing terrain conditions. The system cannot be switched off. The default 'general program' is an active program that covers all general driving conditions. Seven specific terrain programs are selectable to cover all terrain surfaces.

The system is controlled by a Terrain Response® switchpack. The Terrain Response® switchpack allows the selection of one of the following seven programs:

- Dynamic program
- General program (special programs off)
- Grass, Gravel, Snow program
- Mud-Ruts program
- Sand program
- Rock Crawl program
- Automatic program

The instrument cluster displays the selected program in the message center excluding 'Automatic program'.

The Terrain Response® system uses a combination of a number of vehicle sub-systems to achieve the required vehicle characteristics for the terrain selected. The following sub-systems are used in the Terrain Response® system:

- Transfer Case Control Module
- Transmission Control Module
- Engine Control Module

- Power Steering Control Module
- ABS Module
- Integrated Suspension Control Module

DESCRIPTION

Each sub-system operates in different ways in relation to the selected Terrain Response® program to achieve the optimum traction, stability and ease of control for the terrain encountered.

ENGINE MANAGEMENT SYSTEM

The ECM changes the accelerator pedal maps to modify the amount of torque per percentage of pedal travel.

Each Terrain Response® program uses a combination of operating parameters for each sub-system. Changing between terrain programs initiates a different set of operating characteristics which will be noticeable to the driver, for example; if the accelerator pedal is held in a constant position and the terrain program is changed from Grass/Gravel/Snow to Sand, the driver will notice the torque and engine speed increase. If the terrain program is changed from Sand to Grass/Gravel/Snow, the driver will notice a reduction in torque and engine speed.

TRANSMISSION CONTROL

The TCM changes the shift maps for the Terrain Response® program selected. This changes the shift points providing early or late upshifts and downshifts when compared to general program.

For example, in the sand program, the transmission will perform later upshifts and earlier downshifts to maintain a higher engine speed.

Sport mode is only available when general program is selected. Sport mode is disabled in all Terrain Response® special programs. When S (sport) is selected on the transmission selector in a Terrain Response® special program, the transmission will select Command Shift™. Sport mode will not

be available.

TRANSFER CASE AND REAR DIFFERENTIAL CONTROL

The Transfer case electronically controlled differential and the rear electronically controlled differential (if fitted) are treated as one system. The electronic rear differential is an optional fitment on vehicles fitted with the Terrain Response® system. The differential control has two operating strategies; pre-emptive and reactive.

The pre-emptive strategy anticipates and predicts the locking torque value required for each differential to minimize slip and maximize stability. Each Terrain Response® program has a different threshold and input criteria for the pre-emptive strategy. The pre-emptive strategy improves vehicle traction and composure by avoiding wheel spin. This is achieved by anticipating the amount of differential lock required for the program selected. For example, a high locking torque would be applied for rock crawl or slippery surfaces.

The reactive strategy varies the amount of locking torque in response to the actual slip level and the dynamic behavior of the vehicle. Each Terrain Response® program has a different threshold and input for the reactive strategy. The reactive strategy improves vehicle traction and composure by eliminating any wheel spin which has occurred after the pre-emptive strategy was applied. The locking response applied is applicable to the terrain program selected, for example, very sensitive on slippery surfaces to provide maximum traction and minimize surface damage.

The locking torque calculations use various signals from other subsystems, for example, engine torque, throttle position, selected gear, steering angle, vehicle speed, lateral acceleration, yaw behavior.

The Dynamic Stability Control function of the ABS system can override the Terrain Response® differential control and reduce any applied locking torque during DSC action.
For additional information, refer to: Braking Control System (206-11 Brake Controls, Description and Operation).

ABS SYSTEM CONTROL

The ABS module controls several functions and adjusts the operating parameters of these functions to optimize the selected Terrain Response® program.

TRACTION CONTROL

Traction control uses different slip/acceleration thresholds to improve traction and vehicle composure. For example, the system sensitivity is increased on slippery surfaces such as wet grass or snow to reduce wheel spin. If wheel spin was allowed in these circumstances, loss of traction may result from surface damage (wet grass) or the car being unable to move (snow) due to wheel spin.

DYNAMIC STABILITY CONTROL

If DSC is switched off (with the DSC switch) when using a Terrain Response® special program, if the special program is subsequently changed for a different program, DSC is automatically switched back on.

DSC uses different threshold values for the selected Terrain Response® program to minimise DSC intervention, removing the requirement for the driver to disable the DSC system in order to reduce engine intervention which is sometimes induced in extreme off-road conditions. In extreme sand conditions, there may be an additional benefit of disabling the DSC function using the DSC switch in addition to selecting the sand program.

In the mud/ruts program the DSC system is calibrated to tolerate a higher yaw threshold. This allows a greater differential between the actual and desired wheel turning behavior before DSC intervenes. This allows the DSC system to ignore the effect of ruts 'jarring' the car or adjusting the front wheel steering angle.

The ABS system can alter the balance between engine and brake intervention.

HILL DESCENT CONTROL (HDC)

HDC is automatically switched on or off and target speeds are adjusted in

response to the Terrain Response® program selected. The responsiveness of the HDC function is also increased where required.

Automatic selection of HDC aims to assist the driver by switching the system on or off when it is of most benefit. HDC is only automatically switched on when the mud/ruts program is selected. HDC is automatically switched on when the following programs are selected:

- Mud-Ruts program (high range selected)
- General program (low range selected)
- Grass, Gravel, Snow program (low range selected)
- Mud-Ruts program (low range selected)
- Rock Crawl program (low range selected)
- Automatic program (low range selected)
- Mud-Ruts program (low range selected)

ADAPTIVE DYNAMICS CONTROL SYSTEM

In dynamic program, the suspension delivers tighter body control, with flatter handling and sharper responses.

POWER STEERING SYSTEM CONTROL

The power steering module changes the steering maps for the Terrain Response® program selected. This will change the active steering (self-centering) and active damping functions of the steering system when compared to special programs off. For example, in sand program the steering will exhibit greater self-centering torque to overcome the increased drag when driving in deep soft sand. This is to reduce the overall driving efforts and provide improved road-wheel feedback characteristics when used in such conditions.

INCORRECT PROGRAM USAGE

Selection of an inappropriate program is discouraged in the following ways:

- The Terrain Response® control module 'locks out' certain functions in

some programs, for example:

- Cruise control is only available with the general program or grass/gravel/snow program.
- Sport mode is deactivated in all special Terrain Response® programs. The vehicle will automatically select Command Shift™ when the vehicle is in a Terrain Response® special program.

Selection of an inappropriate program for the terrain conditions will not endanger the driver or cause damage to the vehicle. Continued use of an inappropriate program may reduce the life of some components. The driver may notice reduced vehicle response, with the engine and transmission being less responsive than in general program. Also, in some programs, HDC will remain on, signified by illumination of the HDC indicator in the instrument cluster.

DRIVER INFORMATION

The message center in the instrument cluster contains the Terrain Response® program icons which display the currently selected program. No symbol is displayed when auto program off is selected.

Any required changes to the sub-systems are also passed to the driver in the form of indicator illumination in the instrument cluster or appropriate messages in the message center, HDC OFF for example.

In certain operating conditions, the Terrain Response® system also displays advice or warning messages to ensure the driver is using the vehicle to its full potential, for example, steering angle is displayed in the message center to avoid driving in deep ruts with steering lock applied.

DIAGNOSTICS

The Terrain Response® control module stores information on detected Terrain Response® faults and CAN (controller area network) errors which can be interrogated using approved diagnostic equipment. The Terrain Response® sub-systems and the instrument cluster also store information relating to CAN errors from the Terrain Response® control module.

The control module also stores the distance traveled and time elapsed for the individual programs which can also be retrieved using approved diagnostic equipment. This information aids diagnosis of the Terrain Response® system and also provides an indication of Terrain Response® system abuse by the driver which can lead to premature component failure. This information can also be used to check customer concerns, for example, high fuel consumption which may be due to continued use of a certain program.

TERRAIN RESPONSE® SYSTEM FAULT DIAGNOSTICS

Terrain Response® relies on the correct functionality of the sub-systems. If one of the sub-systems develops a fault, the Terrain Response® system will not function, even though the fault is not in the Terrain Response® system.

It is not possible for the Terrain Response® control module to cause any fault behavior (warning indicator illumination or message generation) in any of the sub-systems. Illumination of a sub-system warning indicator and/or a sub-system related message will never be associated with a Terrain Response® control module or Terrain Response® system fault.

The Terrain Response® switchpack should only be investigated if there are no apparent faults in any of the sub-systems. If a fault in a sub-system is subsequently corrected, the Terrain Response® system will function normally after an ignition cycle.

TERRAIN RESPONSE® SUB-SYSTEM FAULTS

When a fault occurs in a sub-system, the driver is alerted by the illumination of a warning indicator and/or an appropriate message for that sub-system in the instrument cluster message center. There will be no warning of a Terrain Response® system fault.

When a sub-system fault is present and the driver attempts to select a different Terrain Response® program, or at the next ignition mode 2 (on), the message 'TERRAIN RESPONSE SPECIAL PROGRAMS NOT AVAILABLE' will appear in the message center. This implies that the Terrain Response® system has a fault, but only because a sub-system fault is preventing its

operation. This message will be displayed for 5 seconds per power mode 6 (ignition on) occurrence, but is repeated if a further selection is made by the driver using the Terrain Response® switchpack or at the next power mode 6 occurrence. When a sub system fault is present , the Terrain Response® switchpack will show a general program as selected.

NOTE:

The message 'TERRAIN RESPONSE SPECIAL PROGRAMS NOT AVAILABLE' can also be generated by a fault in the Terrain Response® switchpack or control module. Refer to the following information for details of switchpack or control module faults.

It is not possible for the Terrain Response® control module to cause any fault behavior (warning indicator illumination or message generation) in any of the sub-systems. Illumination of a sub-system warning indicator and/or a sub-system related message will never be associated with a Terrain Response® control module or Terrain Response® system fault.

TERRAIN RESPONSE AUTO2® SWITCHPACK AND CONTROL MODULE FAULTS

If a fault occurs in the Terrain Response® switchpack, the amber LED (light emitting diode) in all of the switchpack icons are turned off and program selections are ignored. The instrument cluster message center displays the message 'TERRAIN RESPONSE SPECIAL PROGRAMS NOT AVAILABLE' when the fault occurs, if the fault is present and the driver attempts to select a special program (if the control module is able to do this) or at the next ignition cycle.

If a CAN fault exists and prevents Terrain Response® system operation, general program only is illuminated. When the driver tries to select another program they will get the system fault message.

If the instrument cluster does not receive a Terrain Response® system CAN message from the Terrain Response® control module, the message

'TERRAIN RESPONSE SPECIAL PROGRAMS NOT AVAILABLE' will be displayed when the fault occurs and will be repeated at every ignition mode 2 (on).

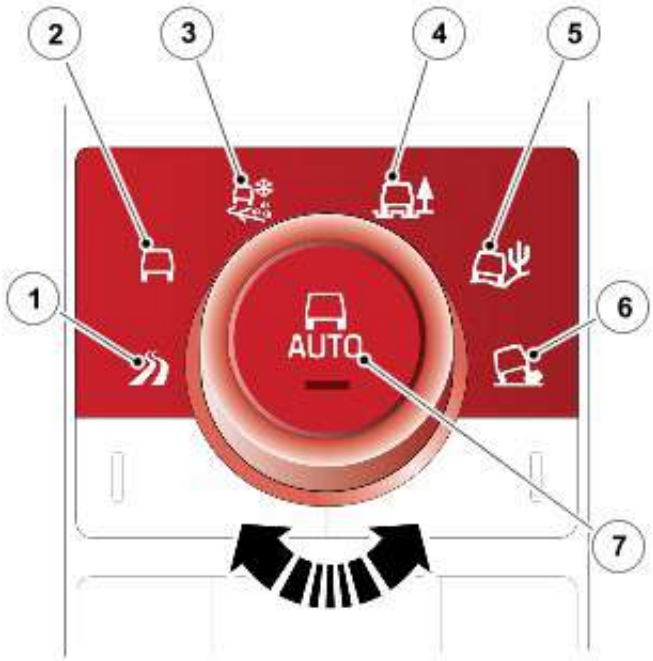
USER ERROR

The following incorrect usage of the system may be misinterpreted as a system fault:

- Engine not running - Program changes and driver advisory messages are only available with the engine running.
- Special program change attempted with DSC or ABS active (this includes ABS cycling which is operational when HDC is being used on slippery or loose surfaces).
- Special program change attempted with overheat condition present on the active on-demand coupling.

COMPONENT DESCRIPTION

TERRAIN RESPONSE® SWITCHPACK AND CONTROL MODULE



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ITEM	DESCRIPTION
1	Dynamic program
2	General
3	Grass, Gravel or Snow
4	Mud-Ruts
5	Sand
6	Rock Crawl
7	Automatic

The switchpack is installed in the floor console immediately behind the gear selector. Each program is denoted by a symbol that represents the related terrain. Programs are selected using the rotary control switch to illuminate the required program indicator.

The switchpack is connected to the vehicle wiring with a harness connector

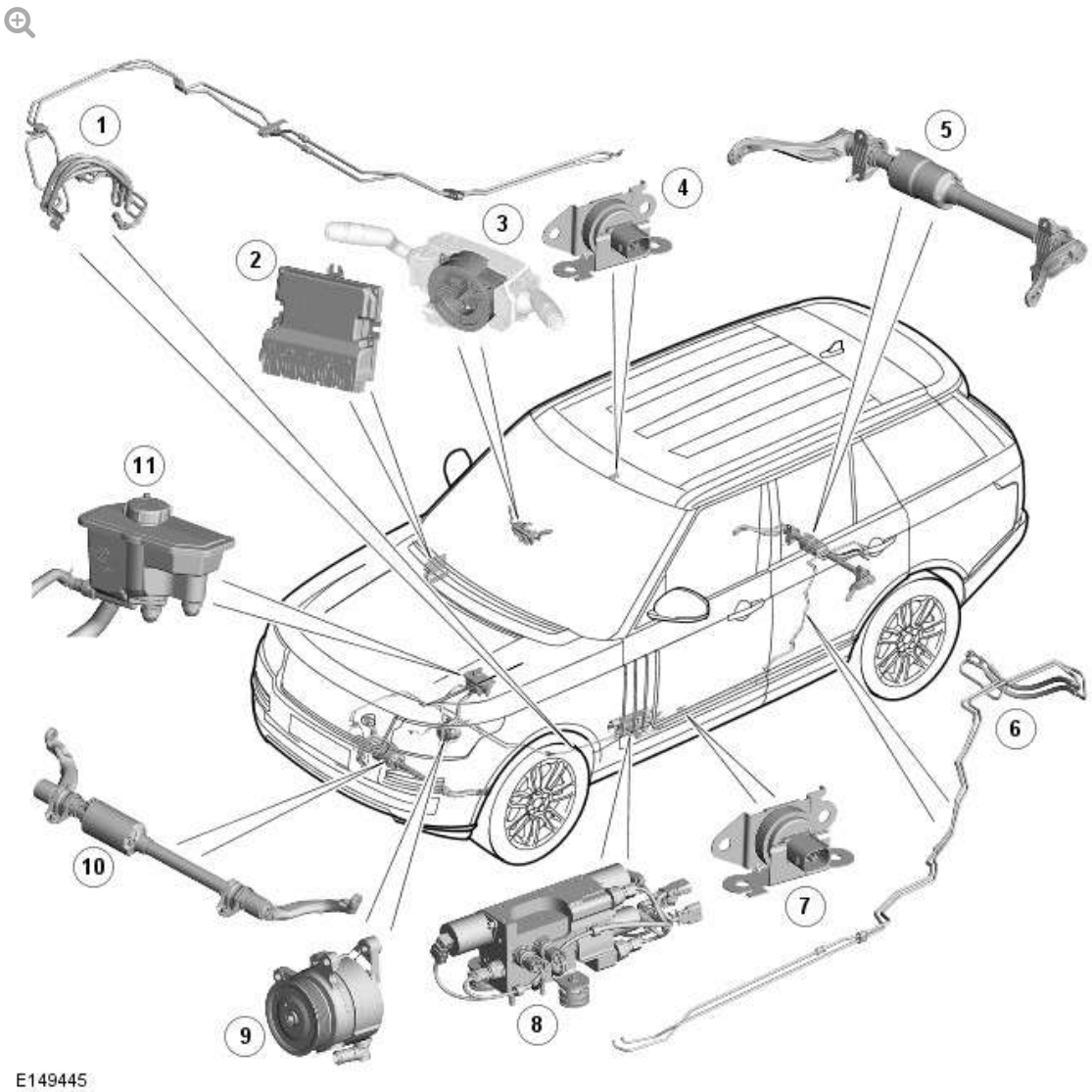
that contains connections for the illumination supply, ignition supply, ground, and high speed CAN bus (positive and negative).

2016.0 RANGE ROVER (LG), 204-06

RIDE AND HANDLING OPTIMIZATION

DESCRIPTION AND OPERATION

DYNAMIC RESPONSE



ITEM	DESCRIPTION
1	Hydraulic pipes forward of dynamic response valve block
2	Dynamic response control module
3	Steering wheel angle sensor
4	Accelerometer - upper
5	Stabilizer bar and dynamic response actuator - rear
6	Hydraulic pipes reward of dynamic response valve block
7	Accelerometer - lower
8	Dynamic response valve block
9	Dynamic response hydraulic pump
10	Stabilizer bar and dynamic response actuator - front
11	Dynamic response fluid reservoir

OVERVIEW

In operation the two-channel Dynamic Response System maintains the attitude of the vehicle body when cornering. The system is both electrically and hydraulically operated and controlled by the Dynamic Response Control Module located on the driver's side 'A' post, behind the instrument panel.

The Dynamic Response System uses a two-channel operation to independently control the front and rear axles. This system transforms vehicle handling and occupant comfort by dramatically reducing the amount of body lean during cornering.

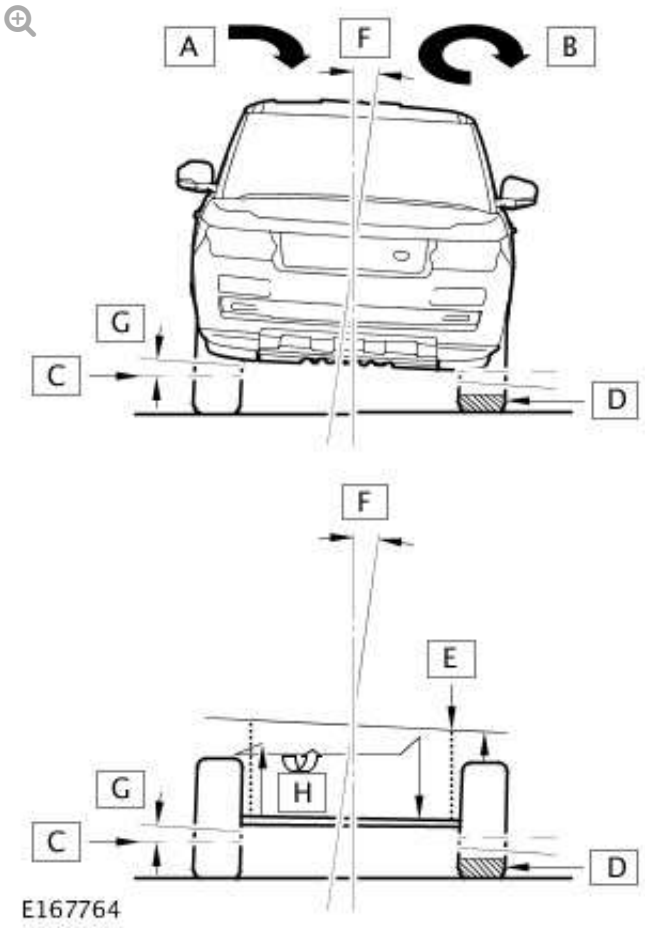
The latest two channel technology has allowed the system to be tuned to deliver increased low-speed agility, along with enhanced control and stability at speed.

A new comfort mode feature improves ride comfort at low speed by detecting and eliminating the body rock induced by uneven road surfaces.

If the system detects off-road conditions, the control module also reduces the level of roll compensation, to allow greater wheel articulation therefore increasing the contact with the terrain and improving comfort. This is done as a function of road roughness and vehicle speed.

The following illustrations demonstrate the difference in body angle between a vehicle fitted with conventional ‘passive’ stabilizer bars and a vehicle fitted with the Dynamic Response System.

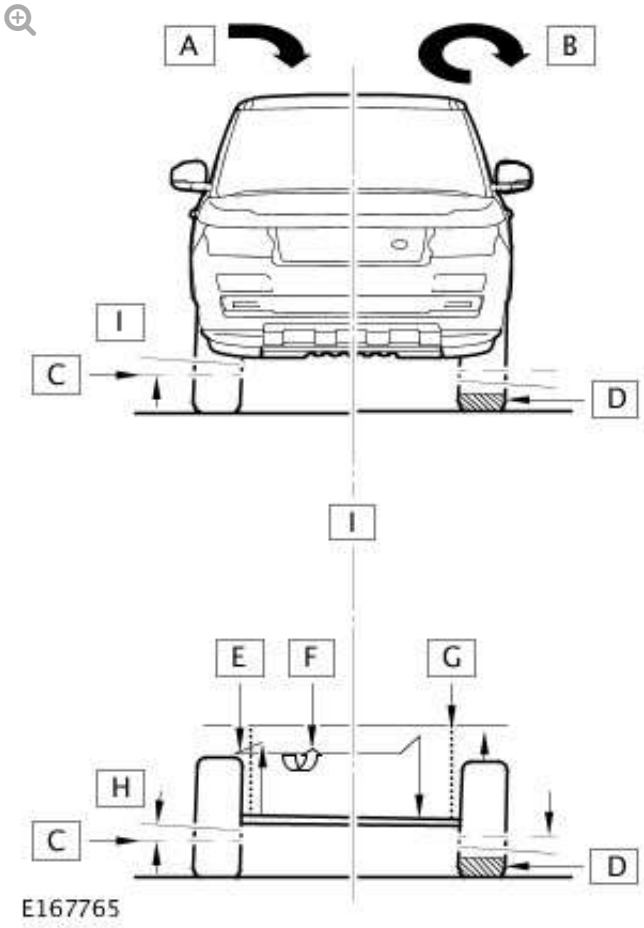
Conventional 'Passive' Stabilizer Bar



ITEM	DESCRIPTION
A	Direction of travel - Right hand bend
B	Direction of travel - Right hand bend
C	Axle roll
D	Tire squash

E	Dampers
F	Body roll angle
G	Drive line roll angle
H	Direction of stabilizer bar twist

Dynamic Response System



ITEM	DESCRIPTION
A	Direction of travel - Right hand bend
B	Body roll
C	Axle roll
D	Tire squash
E	Stabilizer bar
F	Direction of stabilizer bar twist

G	Dampers
H	Drive line roll angle
I	Reduced body roll with Dynamic Response System

With the same cornering forces applied a 'passive' system will have a greater roll-angle than a vehicle fitted with a Dynamic Response System. The Dynamic Response System allows minimal roll up to 0.4g then progressive roll thereafter.

The Dynamic Response System is also able to modify the handling balance of the vehicle, that is the understeer/oversteer characteristics, by applying a different pressure to both the front and rear stabilizer bar actuators. This provides a more agile vehicle at lower speeds, while providing a more composed feel at high speed.

The system also acts to reduce roll accelerations due to uneven road surfaces. The Dynamic Response System can detect when the vehicle is being driven off-road and if the vehicle is travelling at 25 mph (40 km/h) or less. In these circumstances the Dynamic Response Control Module will reduce the roll compensation. In circumstances when driving on side-slopes of more than 11 degrees the Dynamic Response System will switch to a 'locked bars' condition at slow speed. The 'locked bars' condition will allow the stabilizer bars to operate in a similar manner as conventional 'passive' stabilizer bars.

CAUTION:

The Dynamic Response hydraulic system is extremely sensitive to the ingress of dirt and debris. The smallest amount can cause the system to become unserviceable. It is imperative that the following precautions are observed:

- Dynamic Response components are thoroughly cleaned externally before work commences
- All opened pipe and component ports are capped immediately
- All fluid is stored in clean containers.

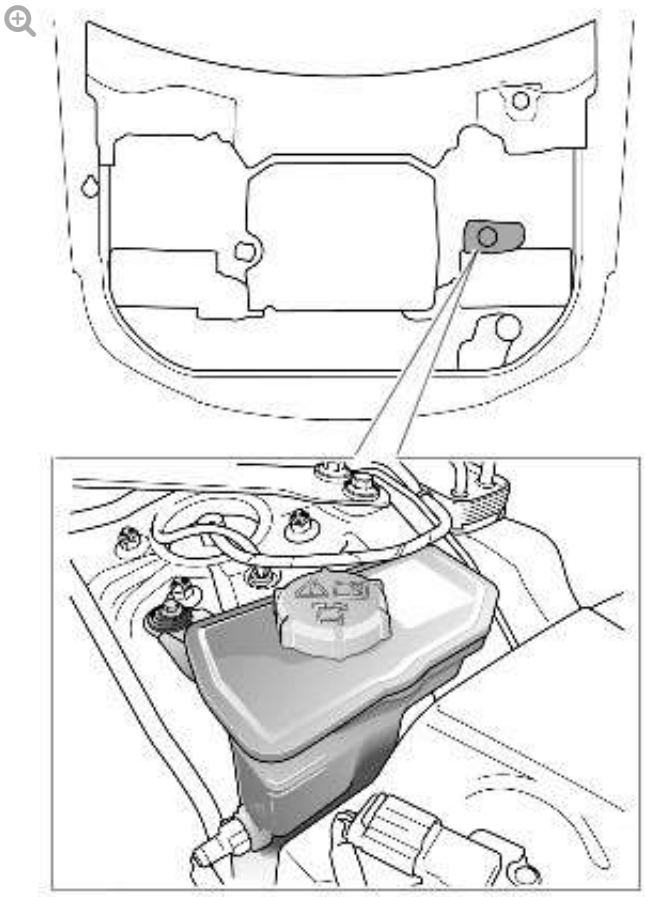
DESCRIPTION

Fluid Reservoir and Filter

The fluid reservoir and system filter is located in the front left hand side of the engine compartment. The reservoir is attached to the suspension tower.

The reservoir is a molded plastic container with a breathable cap.

Dynamic response fluid reservoir


E149446

Two connections on the bottom of the reservoir provide for connection of the feed pipe to the pump and the return pipe from the valve block.

The reservoir contains the main filter for the system which acts on the fluid returning from the valve block; a coarse nylon-mesh filter removes particulate matter from the fluid before it is drawn into the pump. The filter/reservoir assembly must be changed at the intervals defined on the vehicle service schedule and if a system hydraulic component is replaced.

Upper and lower fluid level marks are molded onto the reservoir body.

Dynamic Response Hydraulic Pump

The Dynamic Response Hydraulic Pump is located on the left hand side of the engine. The pump is attached to a mounting bracket above the air conditioning compressor. The pump is driven by the auxiliary drive belt from the crankshaft.

The engine driven hydraulic pump supplies a constant hydraulic flow to the

valve block.

Dynamic response hydraulic pump

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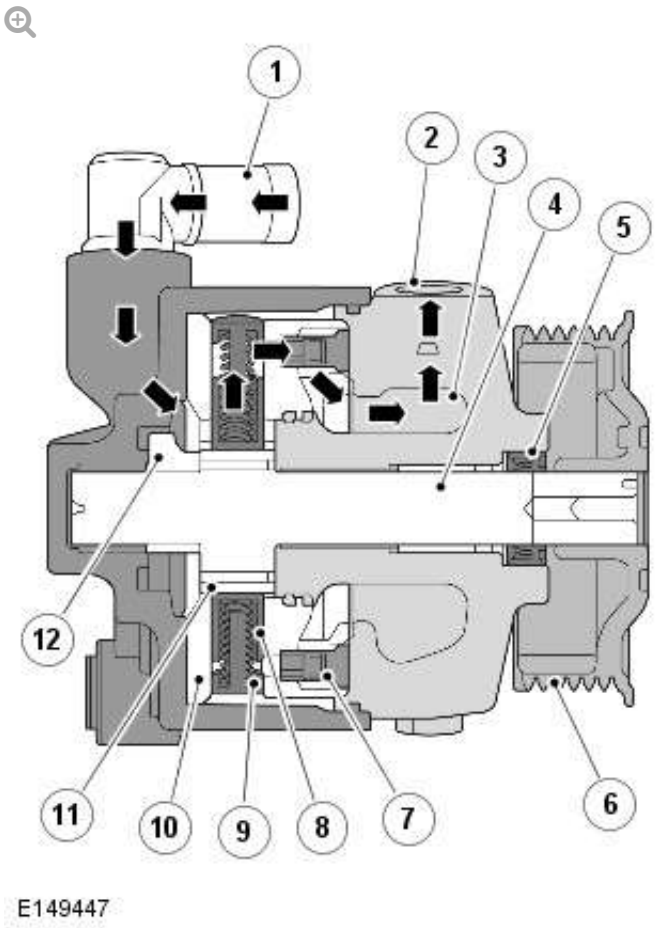
Dynamic Response Hydraulic Pump Internals



E149447

ITEM	DESCRIPTION
1	Inlet port

2	Outlet port
3	Silencer volume
4	Shaft
5	Shaft seal
6	Pulley
7	Discharge valve
8	Piston
9	Piston spring
10	Cylinder housing
11	Cam ring
12	Counter balance

The hydraulic pump is driven at approximately 1.7 times crankshaft speed by the auxiliary drive belt.

The pump is a radial piston type which can deliver an almost constant flow rate of fluid across the engine speed-range.

It has eight pistons located in bores in a cylinder block. A balanced central shaft which has an eccentric cam operates the pistons as the shaft rotates, the shaft driven by a balanced pulley.

The cam acts against each piston in turn, and pushes it outward, moving the fluid above the piston. The pressure created by the fluid flow from the bore opens a spring loaded discharge valve. When the valve opens, the pressurized fluid flows, via the silencer volume area of the pump housing, to the outlet port. The silencer volume assists with damping out operating noise from the pump. When the piston reaches its full stroke, the flow reduces and the discharge valve closes under spring pressure.

As the cam moves away from the piston, a spring pushes the piston down the bore, creating a vacuum above the piston. As the piston moves down the bore, ports in the piston are exposed and connect with the fluid inlet

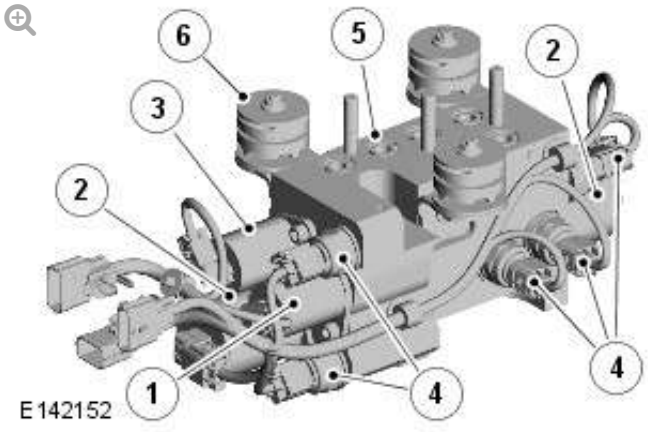
port. The vacuum draws fluid into the piston filling the piston and the chamber above it. As the piston is again pushed upwards, the ports in the piston are closed off by the bore and the pressurized fluid opens the discharge valve and flows to the outlet port.

The above sequence is applied to each of the eight pistons for every revolution of the shaft and cam. When the engine is running the sequence occurs rapidly creating a constant flow of fluid. The fluid flow varies with engine speed and the rotational speed of the shaft up to its maximum value at 1000rpm. The pressure applied to the actuators, created by the flow from the pump, is controlled by the valves in the valve block.

The pump has a displacement of 6cm3/rev and an operational pressure of 180 bar (2610 lbf/in2). The pump output flow ranges from 6.5 l/min (1.7 US Gallons/min) at idle to 10 l/min (2.64 US Gallons/min) at 1000 rev/min and above.

Dynamic Response Valve Block

The valve block is located below the left hand sill of the body and is secured via a bracket with four bolts to the body. Three rubber bushes isolate the valve block from the bracket to prevent hydraulic noise from transmitting through the body.



ITEM	DESCRIPTION
1	Pressure control valve

2	Proportional directional control valve
3	Safety control valve
4	Pressure sensor
5	Hydraulic ports
6	Isolator mounts

The valve block controls hydraulic pressure to each actuator through two solenoid-operated proportional directional control valves. A solenoid-operated pressure control valve regulates the required pressure in the system. All three solenoid valves are controlled by signals received from the Dynamic Response Control Module. Five pressure transducers monitor the pressure generated by the Pressure Control Valve (PCV) and the pressure in the individual actuator lines.

The valve block also contains a Safety Control Valve which is closed when the vehicle is stationary and open when the vehicle is moving.

All solenoids are non-serviceable except the Safety Control Valve; failure of the other solenoids requires replacement of the individual valve assemblies.

The Pressure Sensors screw into the valve block and are sealed by a cone seat, the sensors are serviceable. The Pressure Sensor measures the hydraulic pressure and returns a signal to the Dynamic Response Control Module.

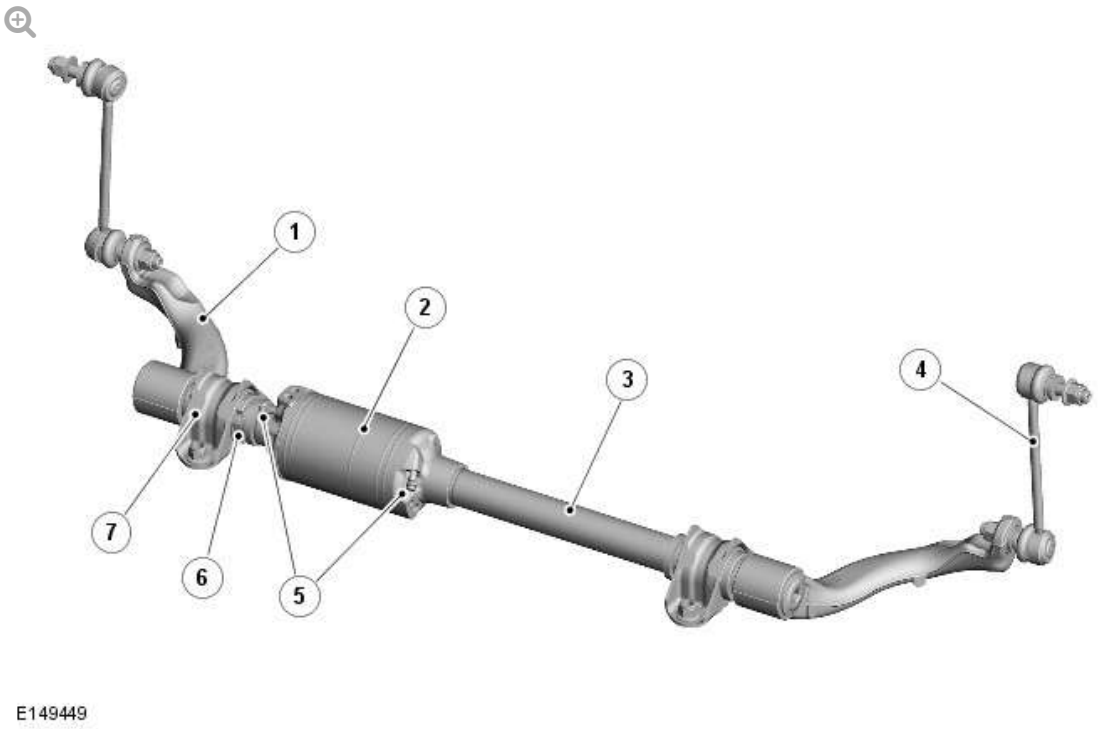
The valve block also contains a Pressure Relief Valve which protects the system in the event of a stuck PCV or PCV power supply short to battery Voltage.

Six ports are located on the underside of the valve block. Each port is fitted with a seal pack which contains two 'o' rings and backing rings. The pipes locate and seal in the seal packs and are secured to the valve block with a keeper plate, collets, studs and nuts. These seal packs are serviceable.

STABILIZER BARS AND DYNAMIC RESPONSE ACTUATORS

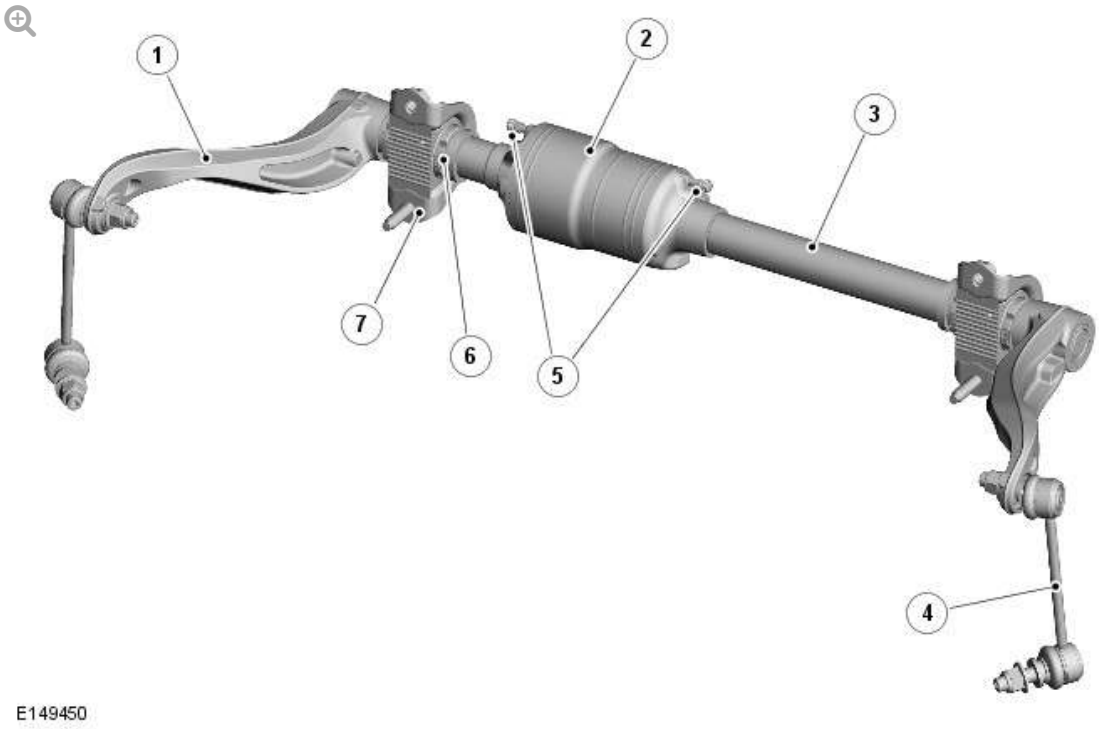
Two stabilizer bars with integral hydraulic actuators are used for the Dynamic Response System. The actuators apply a hydraulically generated force or rotational torque to the stabilizer bar to oppose lateral forces caused by the vehicle cornering.

Front Stabilizer Bar and Dynamic Response Actuator



ITEM	DESCRIPTION
1	Cast lever arms
2	Dynamic response actuator
3	Torsion bar
4	Stabilizer link
5	Bleed screws
6	Bush
7	Bracket

Rear Stabilizer Bar and Dynamic Response Actuator



ITEM	DESCRIPTION
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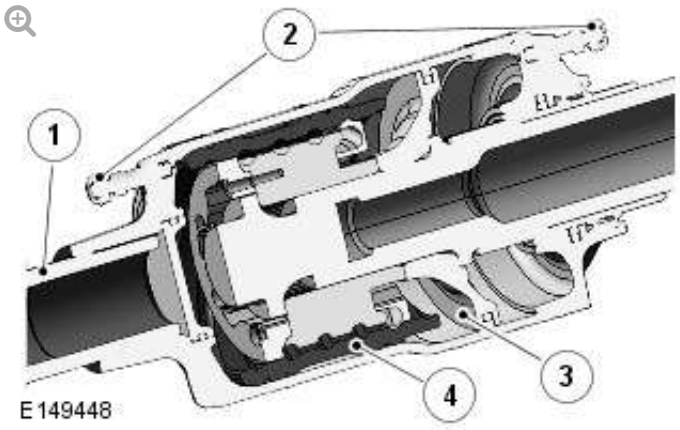
Dynamic Response Actuator



ITEM	DESCRIPTION
1	Stabilizer bar
2	Air bleed-port screws
3	Piston
4	Ball screw

The front and rear actuator assemblies are similar in their construction.

Each actuator has a piston which is attached to the inner part of a rota-linear ball screw, which is splined to one half of the stabilizer bar. The outer part of the ball-screw is welded into a housing which is attached to the other half of the stabilizer bar. As pressure is applied to one side of the piston or the other, the ball screw converts the linear force applied to the piston into a rotational torque between the two halves of the stabilizer bar.

Two hydraulic connections provide for the attachment of the hydraulic pipes from the valve block. The connections provide hydraulic flow to each side of the actuator piston.

Each stabilizer bar is made from a cast steel arm attached to a 40mm (1.57in) diameter steel tube.

The actuator assembly and the stabilizer bars are not serviceable items. Only the stabilizer bar attachment bushes, brackets and stabilizer links are

serviceable components.

The front and rear stabilizer links are not handed and common to those used on passive cars. The front stabilizer bar and actuator is attached the front subframe forward of the front wheels. Two serviceable, split rubber bushes are fitted to the stabilizer bar and are located in clamp brackets. Each bracket is secured to the subframe with two bolts.

The rear stabilizer bar and actuator is attached to rear subframe, rearward of the rear wheels. Two rubber bushes are fitted to each stabilizer bar and are located in clamp brackets. The front and rear bushes and brackets are not interchangeable.

On both the front and rear stabilizer bars, roll correction force is transmitted to the suspension arm via ball jointed stabilizer bar links. The front links are attached to the front damper unit and the rear links are attached to the rear lower arm.

System Pipes

Fluid is moved through the Dynamic Response System via a series of six pipes and hoses. The pipes are mounted on brackets at strategic points to provide quiet operation of the system.

The pipes connecting the pump, reservoir and actuators are one-piece components. If the pipes require replacement during service, the pipes are supplied as either a front or rear bundle. Actuator pipes can be split at the tube nut to aid removal.

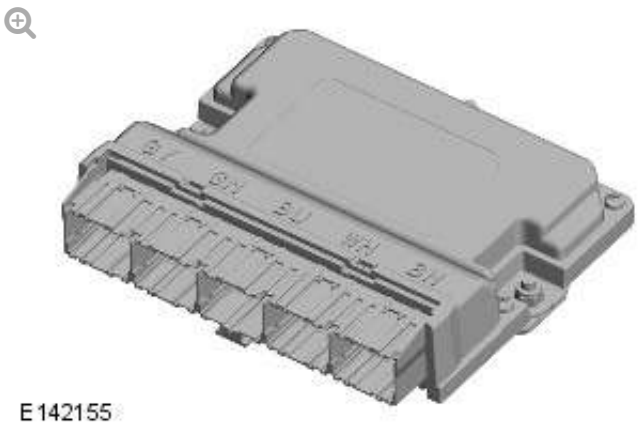
The flexible hose which supplies pressure from the pump to the high pressure pipe is fitted with attenuators. The attenuators comprise of tuned lengths of PTFE pipe and restrictors within the flexible hose. The attenuators damp pressure pulsations in the hydraulic fluid produced by the pump, reducing noise and strain on components downstream. The attenuator is integral with the high pressure hose and cannot be serviced separately.

A cooler is fitted in the primary circuit to maintain fluid temperature within an acceptable working range.

CAUTION:

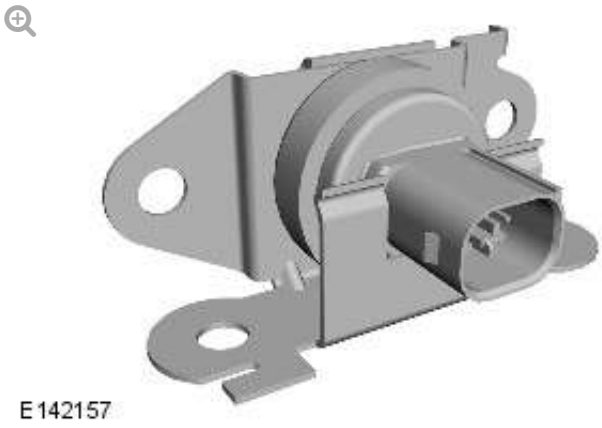
Under no circumstances during repairs should clamps be used on the high pressure hose or the front and rear actuator feed pipes to prevent fluid loss. The use of clamps will damage the pipes and hoses leading to premature failure.

Dynamic Response Control Module



The Dynamic Response Control Module is located on the driver's side 'A' post, below the instrument panel. The Dynamic Response Control Module is secured to a bracket with three nuts. Three connectors are located on the lower face of the Dynamic Response Control Module and allow for the connection of the harness connectors. The three connectors supply power, ground, signal and sensor information to and from the Dynamic Response Control Module for control of the Dynamic Response System.

Accelerometers



Two accelerometers are used, an upper and a lower. Both accelerometers are identical in their construction. The lower accelerometer is secured to the underside of the vehicle floor, on the left hand inner sill panel, below the front door. The upper accelerometer is secured to a bracket on the body roof panel, in a central position at the top of the windscreen.

The lower accelerometer is the primary sensor used to measure lateral acceleration of the vehicle for roll control. The upper accelerometer is used by the Dynamic Response Control Module for roll correction and fault detection in conjunction with the lower accelerometer.

The lower accelerometer is the primary sensor used to measure lateral acceleration of the vehicle for roll control. The upper accelerometer is used by the Dynamic Response Control Module for roll correction and fault detection in conjunction with the lower accelerometer.

Each accelerometer is a capacitive acceleration sensor and operates on a 5 volt supply from the Dynamic Response Control Module. The upper and lower accelerometers can measure acceleration in the range of ±1.11 g and return an output to the Dynamic Response Control Module of between 0.5 and 4.5 volt. Failures of an accelerometer are recorded by the Dynamic Response Control Module and can be retrieved using Land Rover approved diagnostic equipment.

OPERATION

The Dynamic Response Control Module receives a power supply from the main relay in the EJB (engine junction box).

Vehicle lateral acceleration is sensed by two accelerometers. Signals from these together with the steering angle sensor and vehicle speed are transmitted to the Dynamic Response Control Module.

An engine speed signal is transmitted to the Dynamic Response Control Module from the ECM (engine control module) via the high-speed CAN (controller area network) powertrain bus. The engine speed signal is used by the Dynamic Response Control Module to detect that the engine is running and hydraulic pressure for the Dynamic Response System is available.

A road speed signal is transmitted to the Dynamic Response Control Module from the ABS (anti-lock brake system) module on the high-speed CAN powertrain bus. A steering-angle signal is transmitted on the high-speed CAN chassis bus from the steering angle sensor. The Dynamic Response Control Module uses the steering angle signal to improve system response and uses steering angle and road speed signals to calculate lateral movement.

When reverse gear is selected and reverse wheel-rotation is transmitted on the high-speed CAN powertrain bus, the Dynamic Response System reverts to a 'locked bars' condition by closing the Safety Control Valve. This condition is maintained until reverse gear is deselected and a forward wheel-rotation message is transmitted on the CAN bus.

The Dynamic Response Control Module receives an ignition on signal on the high-speed CAN powertrain bus. The ignition signal provides an input into the Dynamic Response Control Module to inform the control module that the ignition is on. The control module initiates a 250 millisecond start time which is used to prevent functions operating when the software routines are being initialized.

When the "ignition on" CAN signal is removed, the Dynamic Response Control Module senses that the ignition has been switched off. The control

module remains powered for a 60 second period to allow fault information and adaptive values to be stored in the memory.

The values and fault information are read by the control module when the ignition is next switched on. The module is permanently powered by a direct feed from the fuse box and operation is controlled by a hardwired ignition signal. The Dynamic Response control module is connected on the high-speed CAN powertrain bus to the diagnostic socket which allows diagnostic interrogation of the control module. The diagnostic socket allows for the connection of a Land Rover approved diagnostic equipment to read any stored fault codes in the control module. The control module can also be updated with revised software should a software update be required.

The Dynamic Response control module supplies a control current to the Pressure Control Valve and Proportional Direction Control Valves in the valve block. The currents supplied are determined by a number of input signals from the upper and lower accelerometers, road speed, steering angle etc. The Proportional Directional Control Valves controls the hydraulic pressure supplied to the actuators proportional to the current supplied by the control module, to a level determined by the calibration in the control module.

The Dynamic Response control module supplies a current to the Safety Valve to hold it open during normal operation when the vehicle is moving.

The pressure transducer located in the valve block receives a 5 volt current from the control module. The transducer measures the hydraulic pressures in the range of 0 to 200 bar (0 to 2900 lbf/in2) and returns a linear output voltage to the control module dependent on the hydraulic pressure.

The Dynamic Response control module supplies a 5 volt current to each of the accelerometers. Each accelerometer is capable of measuring lateral acceleration in the range of ± 1.11 g. An analogue input to the control module of between 0.5 and 4.5 volt relative to the lateral acceleration sensed is returned by each accelerometer. The control module processes the two signals received, together with the steering angle and vehicle speed

signals, to produce a 'pure' lateral acceleration signal which is then used as the main control signal for the Dynamic Response System.

When system faults are detected, the control module issues a message on the CAN bus which is received by the instrument cluster. The instrument cluster then illuminates Dynamic Response warning indicator as follows:

- Minor faults - warning indicator illuminated in an amber color with an applicable message in the message center.
- Major faults - warning indicator illuminated in a flashing red color with an applicable message in the message center and an audible warning.

The message will instruct the driver to stop the vehicle immediately or drive with caution. Two messages relating to Dynamic Response are displayed in the instrument cluster message center:

- SUSPENSION FAULT, VEHICLE LEAN, WHEN CORNERING.
- SUSPENSION FAULT, STOP SAFELY, STOP ENGINE.

FAILURE MODES

In the event of a control module failure the system will 'fail-safe' to a 'locked bars' condition. Prolonged cornering forces will allow a progressive increase in roll angle due to hydraulic leakage through the actuators and valve block. Failures of the system are relayed to the driver by an audible warning chime and a message displayed in the instrument cluster message center. Faults are recorded by the control module and can be retrieved using approved Land Rover diagnostic equipment.

When the ignition switch is switched on, the warning indicator is illuminated for two seconds to check functionality.

A Land Rover approved diagnostic system must also be used to perform a bleeding procedure after repair or maintenance operations have been performed on the secondary circuit, and also to perform an hydraulic system response test to confirm correct operation has been re-established. This is to ensure that the system is completely free from air. Trapped air in the

system can significantly reduce system performance and result in fault codes being set.

Failures where the vehicle can still be driven safely are indicated by the Dynamic Response warning indicator in the instrument cluster illuminating continuously in an amber color. The amber indicator will remain illuminated until the ignition is switched off. For all faults, the warning indicator will only illuminate again if the fault is still present. Additionally the following message will be displayed:

- SUSPENSION FAULT Vehicle Lean When Cornering

Failures which require the driver to stop the vehicle immediately are indicated by the Dynamic Response warning indicator flashing in a red color and an audible warning. This will also be accompanied by the following message displayed in the message center:

- SUSPENSION FAULT Stop Safely and Quickly Stop Engine

All faults are recorded by the control module and can be retrieved using a Land Rover approved diagnostic system. The diagnostic system provides a description of the fault, possible causes and corrective action to rectify the fault. The control module can fail to one of two states; 'locked bars' or 'reduced operation'.

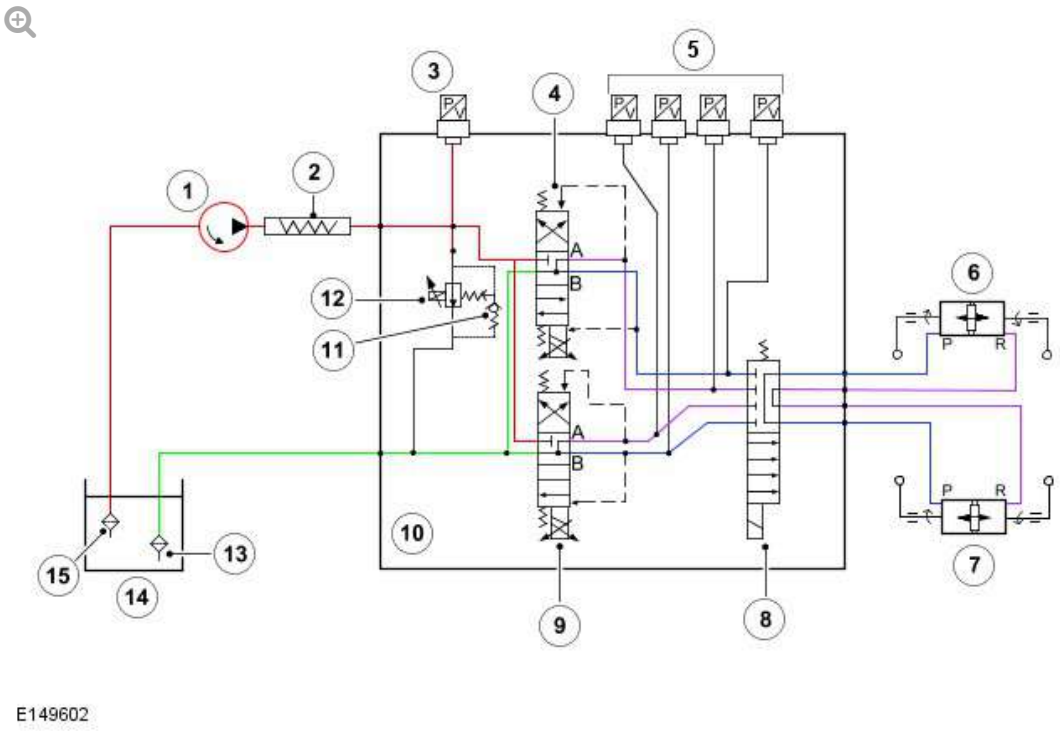
The 'locked bars' condition means that pump flow is directed through the valve block and returns to the reservoir. The Safety Valve is close, trapping the fluid in the actuators. The fluid can flow from one actuator to the other via the valve block. The stabilizer bars will perform similar to a conventional stabilizer bar, resisting roll but still allowing suspension articulation.

The 'reduced operation' condition means that the system can still operate, but one of the input signals is not being received and so the system performance is not optimum.

If the steering angle sensor develops a fault or is out of calibration, there is a possibility that the dynamic response control module will record a fault

code. IDS should be used to check for fault codes and the adaptive data should be cleared by resetting the fault codes in the control module after the steering angle sensor has been recalibrated.

HYDRAULICS



ITEM	DESCRIPTION
1	Dynamic response hydraulic pump
2	High-pressure attenuator
3	Pressure control valve, pressure sensor
4	Proportional Directional Control Valve – front
5	Actuator feed pressure sensors
6	Front actuator
7	Rear actuator
8	Safety valve
9	Proportional Directional Control Valve – rear
10	Valve block

11	Pressure relief valve
12	Pressure control valve
13	Return filter
14	Reservoir
15	Suction filter

Vehicle Not Moving

When the engine is running and the vehicle is not moving, the Safety Valve is closed, locking fluid in each side of the actuator piston. The hydraulic pump draws fluid from the reservoir and passes it at low pressure to the valve block.

Because the Safety Valve is closed, the fluid it is directed through the Pressure Control Valve to the reservoir.

The Pressure Control Valve is open fully to allow the full flow to pass to the reservoir without an increase in system pressure. The Safety Valve will remain closed until the control module detects a requirement to operate.

Vehicle Moving and Turning Left

When the vehicle is turning left, the steering sensor detects steering angle and the accelerometers detect the cornering forces applied. These signals are transmitted to the control module. The control module determines that an opposing force must be applied to the stabilizer bars to counter the cornering forces. The control module supplies a current to the correct coil of the front and rear Proportional Directional Control Valves. Simultaneously, a current is supplied from the control module to the Pressure Control Valve which operates to restrict the flow of fluid returning to the reservoir.

The restriction causes the hydraulic pressure in the system to rise and the pressure is sensed by the pressure transducers which send a signal to the control module. The control module determines from the inputs it receives what pressures are required and adjusts the pressures accordingly.

The pressures in the system are applied to the piston of each actuator, applying a force to the stabilizer bar and minimizing the cornering effect on the vehicle and maintaining the vehicle attitude. The fluid displaced from the other side of the piston is returned to the reservoir via the valve block.

As the cornering force is removed when the vehicle straightens up, the control module modulates the Proportional Directional Control Valves and opens the Pressure Control Valve to reduce the pressure in the system. The fluid bleeds from the actuator back into the system as the cornering force is reduced, removing the force applied to the stabilizer bar.

Vehicle Moving and Turning Right

When the vehicle is turning right, the steering sensor detects steering angle and the accelerometers detect the cornering forces applied. These signals are transmitted to the control module. The control module determines that an opposing force must be applied to the stabilizer bars to counter the cornering forces. The control module supplies a current to the correct coil of the front and rear Proportional Directional Control Valves. Simultaneously, a current is supplied from the control module to the Pressure Control Valve which operates to restrict the flow of fluid returning to the reservoir.

The restriction causes the hydraulic pressure in the system to rise and the pressure is sensed by the pressure transducers which send a signal to the control module. The control module determines from the inputs it receives what pressures are required and adjusts the pressures accordingly.

The pressures in the system are applied to the piston of each actuator, applying a force to the stabilizer bar and minimizing the cornering effect on the vehicle and maintaining the vehicle attitude. The fluid displaced from the other side of the piston is returned to the reservoir via the valve block.

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reduced, removing the force applied to the stabilizer bar.

Vehicle Moving in a Straight Line

The control module is constantly monitoring the signals received and operates the Proportional Directional Control Valves and Pressure Control Valve to maintain the vehicle attitude when the vehicle is moving. When the vehicle comes to rest the Safety Valve will remain open for 15 seconds to allow for any air suspension leveling operations to be performed prior to closure.

Off-Road Driving

Off-road detection is achieved by the control module by monitoring the signals from the upper and lower accelerometers for varying degrees of body movement. Off-road driving generates differing signals to the accelerometers which in turn produce differing outputs due to their vertical separation and the location of the roll center of the vehicle.

The two signals are passed through a filter to remove any offset caused by the vehicle leaning or the terrain. The control module then uses this signal to calculate the percentage of road roughness.

Below 25 mph (40 km/h) the percentage of road roughness calculated is used by the control module to limit the operation of the Dynamic Response System. At speeds above 25 mph (40 km/h) the system disables the percentage road roughness signal and full Dynamic Response System assistance is restored. The system is completely inoperative at speeds below 2 mph (3 km/h).

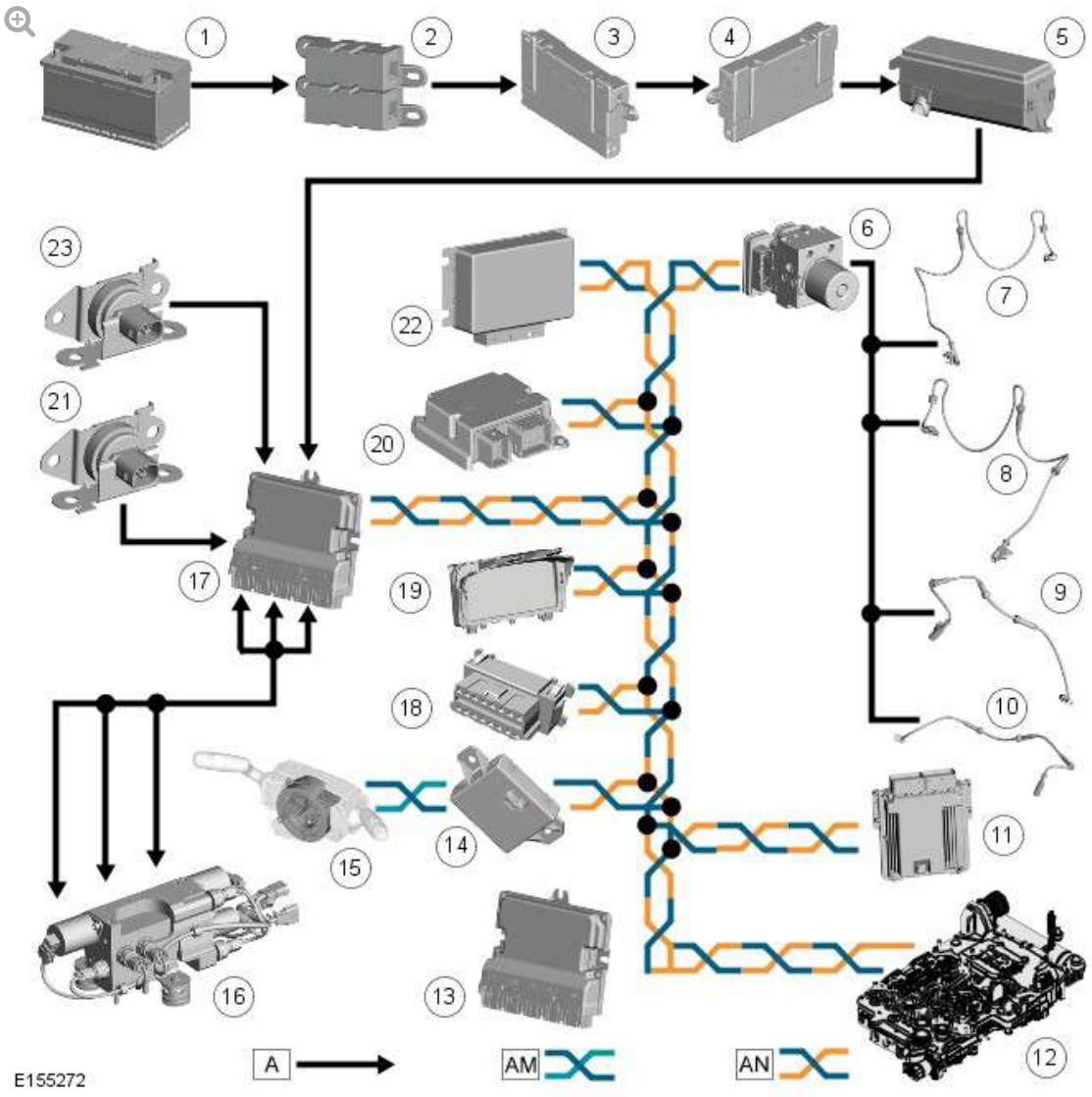
Side Slope Detection

The control module uses side slope detection when the upper and lower accelerometers detect an average acceleration of more than ± 0.2 g or 11 degrees of side slope and a road speed of less than 25 mph (40 km/h).

When side slope is detected, the Safety Valve is closed to provide a 'locked

bars' condition. This condition increases stability and gives a constant vehicle response. As the road speed increases up to 25 mph (40 km/h), the level of average lateral acceleration must also increase and be maintained for the system to recognize that the vehicle is on a side slope. If the side slope angle is steep and the road speed is low, the control module will detect the side slope in a short time.

CONTROL DIAGRAM



ITEM	DESCRIPTION
	A = Hardwired; AM = High Speed CAN (controller area network) Chassis bus; AN = High Speed CAN (controller area network) Powertrain bus
1	Battery

2	Battery junction box- 2
3	Battery junction box
4	Auxiliary junction box
5	Engine junction box
6	ABS module
7	Wheel speed sensor
8	Wheel speed sensor
9	Wheel speed sensor
10	Wheel speed sensor
11	Engine control module
12	Transmission control module
13	Integrated suspension control module
14	Gateway module
15	Steering angle sensor integrated with clockspring
16	Dynamic response valve block
17	Dynamic response control module
18	Diagnostic socket
19	Instrument cluster
20	Restraints control module (incorporating the yaw rate lateral acceleration sensor)
21	Accelerometer – lower
22	Transfer case control module
23	Accelerometer – upper

RIDE AND HANDLING OPTIMIZATION

DIAGNOSIS AND TESTING

PRINCIPLES OF OPERATION

Ride and handling optimization incorporates the terrain response system which links a number of modules around the vehicle to give the best combination of settings in the different systems

For a detailed description of the ride and handling system and operation, refer to the relevant description and operation section of the workshop manual.
REFER to: Ride and Handling Optimization (204-06 Ride and Handling Optimization, Description and Operation).

INSPECTION AND VERIFICATION

WARNING:

Before carrying out a road test, make sure the vehicle is safe to do so. Failure to follow this instruction may result in personal injury

CAUTION:

Diagnosis by substitution from a donor vehicle is **NOT** acceptable. Substitution of control modules does not guarantee confirmation of a fault and may also cause additional faults in the vehicle being checked and/or the donor vehicle

NOTE:

Check and rectify basic faults before beginning diagnostic routines involving pinpoint tests

1. Verify the customer concern

2. Visually inspect for obvious signs of mechanical or electrical damage

Visual Inspection

MECHANICAL	ELECTRICAL
▪ Tire condition, pressures, etc ▪ Driveline components (correct installation, damage, etc) ▪ Engine components (correct installation, damage, etc) ▪ Transmission components (correct installation, damage, etc) ▪ Suspension components (correct installation, damage, etc) ▪ Dynamic response system fluid level/condition, pipes, reservoir, etc ▪ Dynamic response hydraulic pump ▪ Drive belt condition ▪ Hoses ▪ Dynamic response valve block ▪ Accelerometers (correct fitment, etc)	▪ Fuses ▪ Harnesses/Connectors ▪ Terrain response switchpack ▪ Integrated suspension control module ▪ Engine control module ▪ Transmission control module ▪ Transfer case control module ▪ ABS control module ▪ Rear differential control module ▪ Dynamic response control module ▪ CAN circuits ▪ Upper accelerometer

	▪ Lower accelerometer ▪ Steering angle sensor module ▪ Instrument cluster

3. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step
4. If the cause is not visually evident, verify the symptom and refer to the symptom chart, alternatively check for DTCs and refer to the DTC index

SYMPTOM CHART

Because the overall function of the system is dependent on sub-systems, it is possible to misinterpret displays in the message centre as being terrain response faults when they are actually a result of a fault in one of the sub-systems

Refer to the table below for help in deciding when to investigate terrain response faults and when the fault is likely to be in a sub-system

SYMPTOM	DESCRIPTION	POSSIBLE CAUSES	ACTION
Message centre display indicating a sub-system fault	The message centre indicates to the driver that a fault has occurred and in which sub-system	▪ Any sub-system fault supported by the message centre	For details of the available messages, refer to the relevant section of the workshop manual. Carry out a complete vehicle DTC read and follow the diagnostic routine(s) indicated
Message centre display: **System fault special programs not available**, terrain response switch operation	This message will display when a sub-system fault has occurred if the driver attempts to change the special program, and at each ignition on cycle for 5 seconds until the fault is rectified	▪ Any sub-system fault supported by the message centre	For details of the available messages, refer to the relevant section of the workshop manual. Carry out a complete vehicle DTC read and follow the diagnostic routine(s) indicated

normal			
Message centre display: **System fault special programs not available**, **ALL** terrain response switch LEDs illuminated	CAN circuit errors	▪ CAN circuit: short circuit to ground ▪ CAN circuit: short circuit to power ▪ CAN circuit: high resistance	Carry out a complete vehicle DTC read and follow the diagnostic routine(s) indicated
Special program changes not available	User error	▪ Engine not running ▪ Rock crawl selected with transfer box in high range ▪ Special program change attempted with ABS or dynamic stability control active ▪ Special program change attempted with an overheat condition present in the centre or rear differential	Refer to the relevant section of the workshop manual. Make sure that the driver is familiar with the correct operation of the system

SYMPTOM CHART

SYMPTOM	POSSIBLE CAUSES	ACTION
Poor on-center response	▪ System bleed required ▪ Roll bar bushes ▪ Steering angle sensor offset ▪ Control module adaptive data	Carry out the manual bleed procedure. REFER to: **Active Stabilization System Bleeding** (204-06 Ride and Handling Optimization, General Procedures). Check the roll bar bushes. Check and calibrate the steering angle sensor, clear the adaptive data after calibration. Run hydraulic self-test routine and check response
Asymmetrical response	▪ Steering angle sensor offset ▪ Accelerometer calibration ▪ System bleed required	Check and calibrate the steering angle sensor, clear the adaptive data after calibration. Calibrate the accelerometers using the approved diagnostic system. Carry out the manual bleed procedure. REFER to: **Active Stabilization System Bleeding** (204-06 Ride and Handling Optimization, General Procedures). Run hydraulic self-test routine and check response
Excessive roll	▪ System bleed required ▪ Roll bar bushes ▪ Stabilization links	Carry out the manual bleed procedure. REFER to: **Active Stabilization System Bleeding** (204-06 Ride and Handling Optimization, General Procedures). Check the roll bar bushes and stabilization links. Run hydraulic self-test routine and check response
Powered roll-rock	▪ Harness faults ▪ Valve block fault ▪ Control module adaptive data ▪ Accelerometer fault	Check for DTCs indicating any of the possible causes are present. Run hydraulic self-test routine and check response
Oversteer or understeer	▪ Stabilization links ▪ System actuators	Check the stabilization links and the system actuators. Run hydraulic self-test routine and check response

DTC INDEX

For a list of diagnostic trouble codes (DTCs) that could be logged on this vehicle, please refer to section 100-00. REFER to: (100-00 General Information)

Diagnostic Trouble Code Index - DTC: Dynamic Response Control Module (DRM) (Description and Operation),
Diagnostic Trouble Code Index: Terrain Response Switchpack (Description and Operation).

RIDE AND HANDLING OPTIMIZATION

ACTIVE STABILIZATION SYSTEM BLEEDING (G1551263)

GENERAL PROCEDURES

60.60.13	ACTIVE CORNERING ENHANCEMENT (ACE) - SYSTEM BLEED	ALL DERIVATIVES	1.3	USED WITHINS

SPECIAL TOOL(S)

204-591-01

Dynamic Response Bleed Bottle

JLR-204-591-03

Adaptor, Dynamic Response Bleed Bottle

CHECK

CAUTION:

Dynamic response system (DRS) components are manufactured to very precise tolerances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in foreign matter ingress to the DRS.

NOTES:

- The first part of this procedure should be carried out if the following components have been removed: suction hose, pump, high pressure hose, cooler, cooler return to reservoir. The full procedure is required if the following components have been removed: front or rear valve block to actuator pipe assemblies, or the valve block. It is possible to bleed only the front or rear of the system if only a stabilizer bar has been removed.

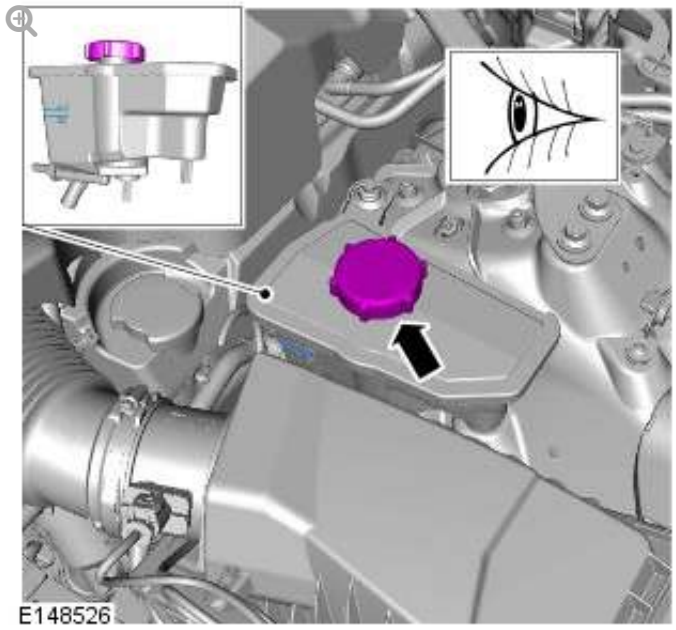
  If the vehicle has had low fluid level and there is a possibility that the car has been driven in this condition, then air is likely to have moved into the secondary circuit and a full system bleed is required.

  Within the special application for DRS in SDD here are 2 routines for bleed.

  - 1. Manual bleed is the primary function that should be used in conjunction with the bleed bottle. Its function is to open the safety control valve (SCV) and proportional direction controls valves (PDCV) so that fluid can flow through the valve block to the actuators.
  - 2. Auto bleed can be used to displace air that is trapped within the valves/valve block that has not been displaced by the manual bleed process, it will not remove air from the actuator or actuator pipes.
  - For front actuator removal or replacement use Steps 1-11, 14-19, 24-25 and 27-31.
  - For rear actuator removal or replacement use Steps 1-9, 14-15 and 20-31.

- Primary circuit bleed:

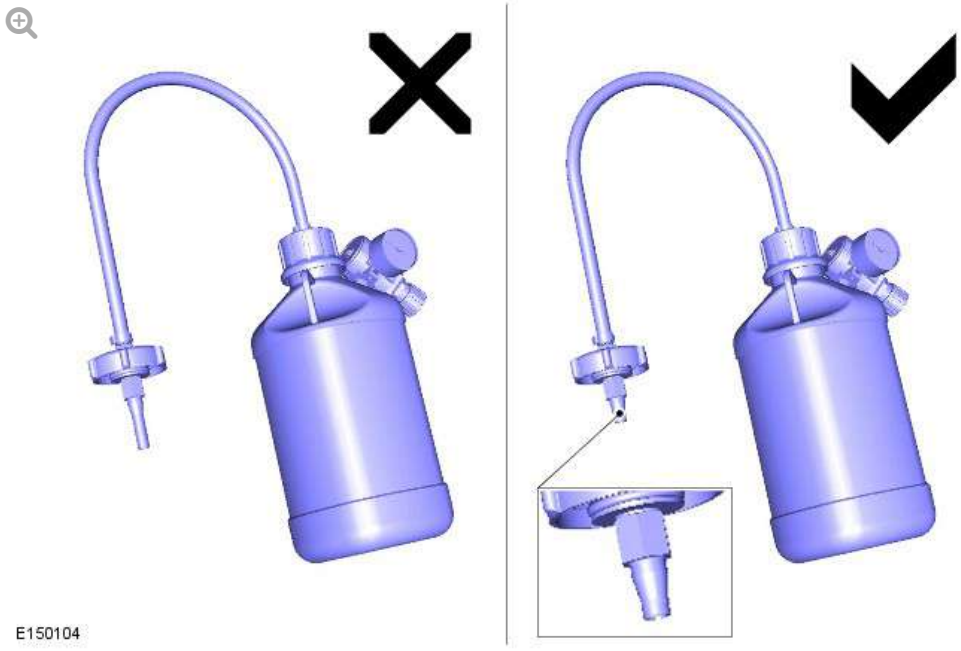
1.



Check and top-up the dynamic response system fluid reservoir. Then squeeze the suction hose (feed hose to pump from reservoir) several times to displace air that may be trapped under the fine mesh of the reservoir suction side filter.

ADJUSTMENT

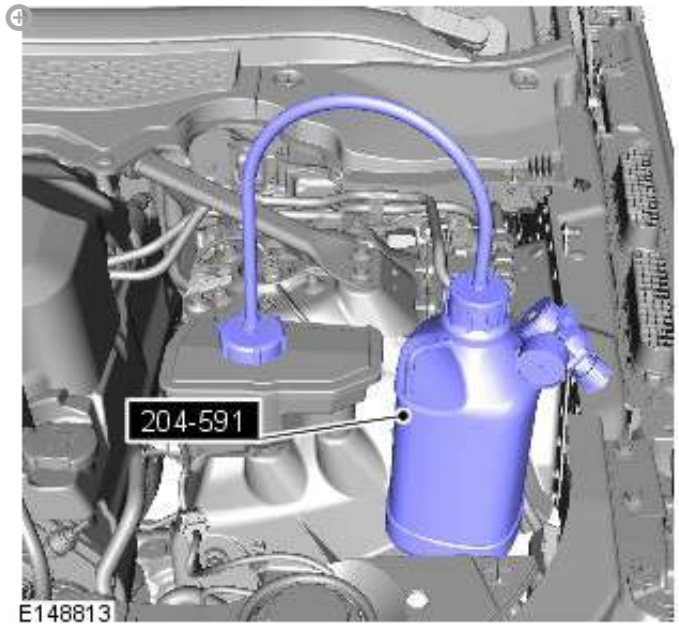
2.



Install the new adaptor to the Dynamic response bleed bottle.

3. **NOTE:**

> Install the special tool to the dynamic response reservoir. Section 2 to 4 is only required if the reservoir has been drained and or pump /suction hose has been changed.



1. Completely fill the reservoir with fluid.
2. Make sure the pressure regulator on the special tool is turned OFF.
3. Fill the special tool bottle approximately three-quarters full with fluid.
4. Connect the special tool to a suitable workshop air supply.
5. Using the special tool pressure regulator, carefully increase the air pressure to approx. 0.3 - 0.7 Bar (5 - 10 PSI).
   Special Tool(s): 204-591-01, JLR-204-591-03

4. Start engine and run for 1 minute.

5. **WARNING:**

> The special tool is still pressurised when the source air pressure is removed. Release air pressure within special tool slowly before removing. Remove the special tool from the dynamic response system reservoir.

6. Check that there is fluid circulating in the reservoir and stop engine. Then squeeze the suction hose (feed hose to pump from reservoir) several times to displace air that may be trapped under the fine mesh of the reservoir suction side filter.

7. Run the engine, stopping and starting several times. Each time allow the air bubbles to settle out of the fluid in the reservoir and then squeeze the suction hose to release any trapped air. This is to encourage any air trapped in the primary circuit to be expelled by the reservoir. For suction hose, pump, high pressure hose, cooler, cooler return to reservoir, the removal and installation process is now complete. Make sure that the fluid level is set to maximum line and move to step 33 Hydraulic self-test, otherwise move to step 7.

8. **WARNING:**

> Make sure to support the vehicle with axle stands.

Raise and support the vehicle.

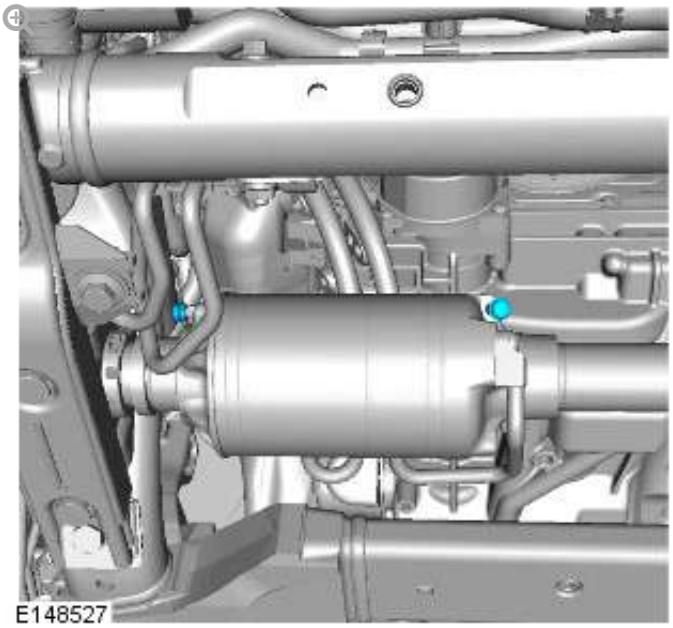
9. **NOTE:**

> Follow manual bleed procedure where the following components have been removed: Valve block, front or rear valve block to actuator pipe assemblies, or actuator.

For secondary circuit bleed steps 1 to 7 must have been completed first, install / re-attach the special tool as per step 2 of adjustment.

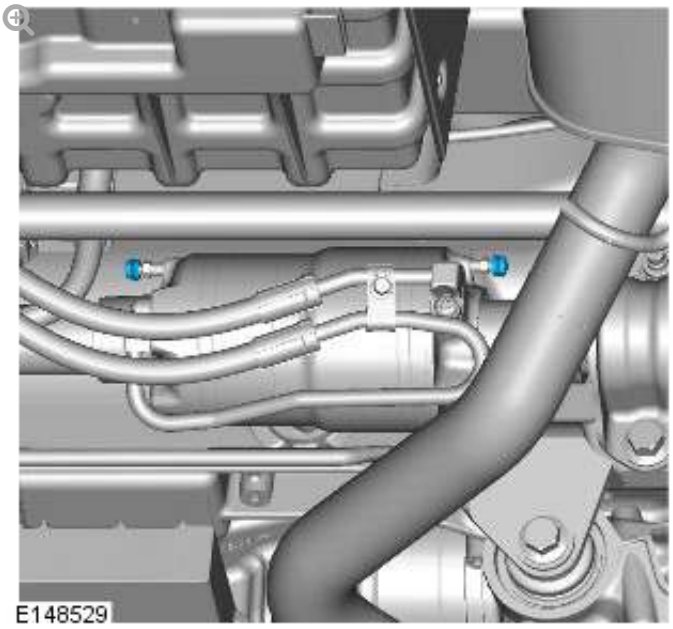
10. Attached approved diagnostic tool and navigate to dynamic response special application manual bleed.

11. Refer to: Engine Undershield (501-02 Front End Body Panels, Removal and Installation).

12. 

Remove the front bleed screw covers.

13.



Remove the rear bleed screw covers.

14. For valve block or pipe removal and replacement, open all four actuator bleed screws by half a turn.

15. Start manual bleed in approved diagnostic tool, this will open the safety control valve (SCV) and move the proportional direction control valves (PDCV) to the correct position.

16.

CAUTION:

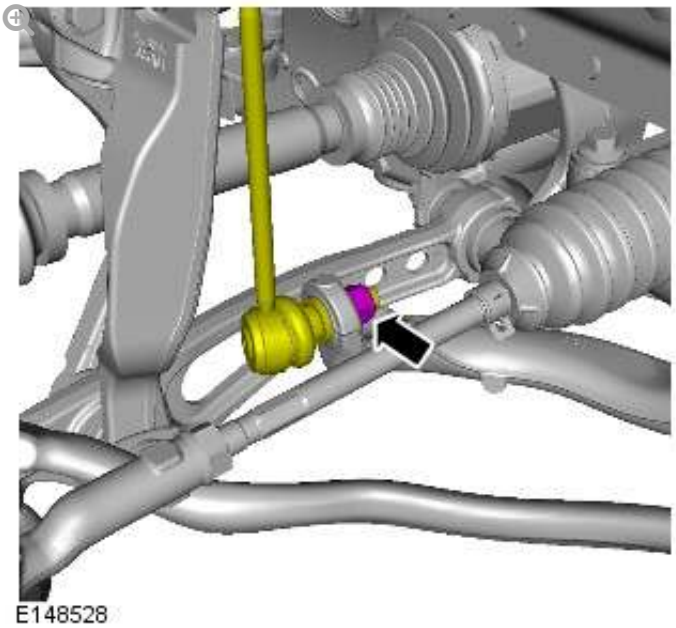
The dynamic response bleed tool fluid reservoir must remain full with new, clean fluid, at all times during bleeding.

Bleed the dynamic response system until a flow of clean, air-free fluid, is being pumped into all four bleed jars and close bleed screws.

17.

NOTE:

RH side only



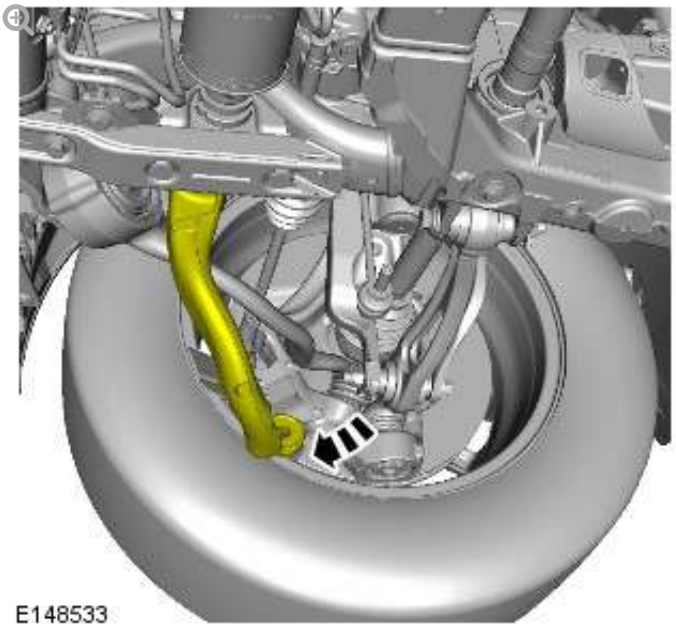
E148528

Bleed front actuator:

18.

NOTE:

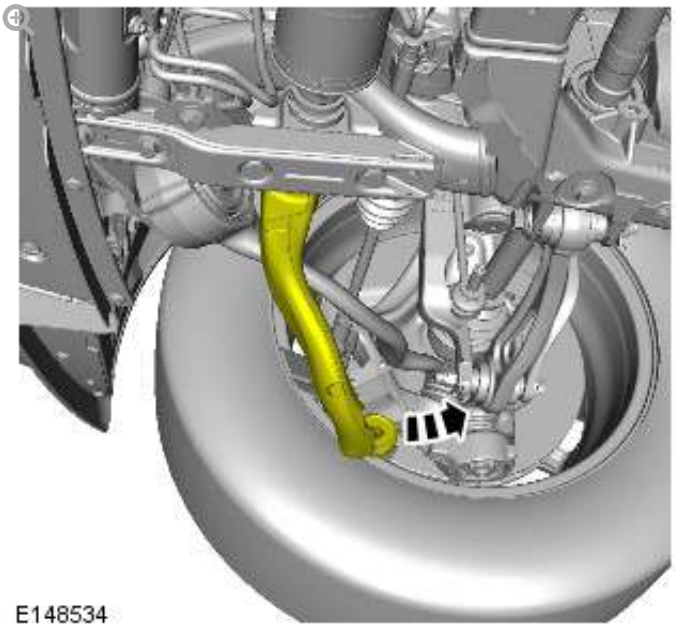
RH side only



E148533

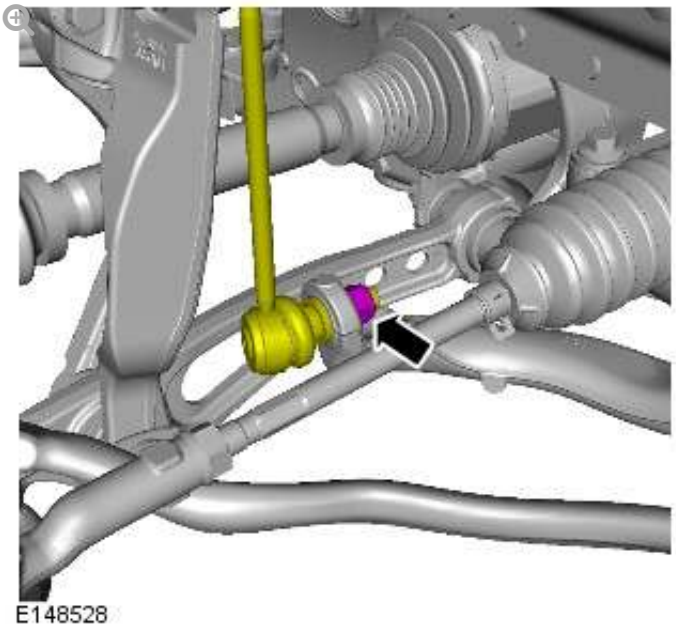
Open right bleed screw and stroke right arm fully down. Allow fluid to run for a further 5 seconds. Close bleed screw.

19.



Open left bleed screw and stroke right arm fully up. Allow fluid to run for a further 5 seconds. Close bleed screw.

20.

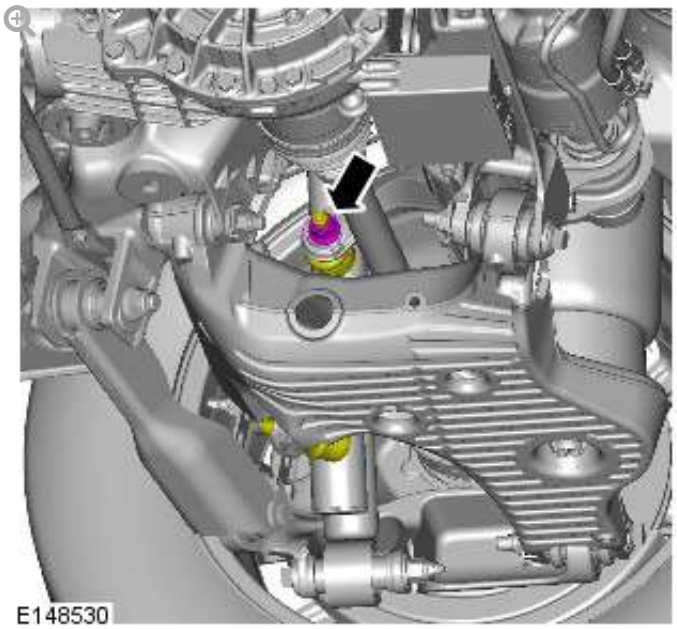


Torque: **185 Nm**

21.

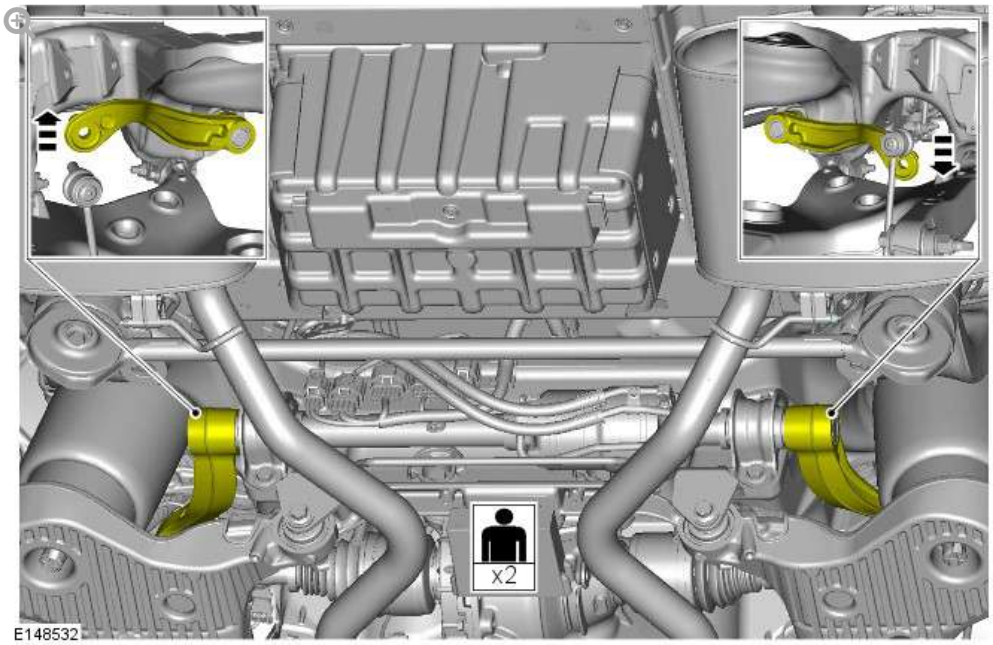
NOTES:

- The drop link fixing removal must be carried out on both sides.
- RH illustration shown, LH is similar.



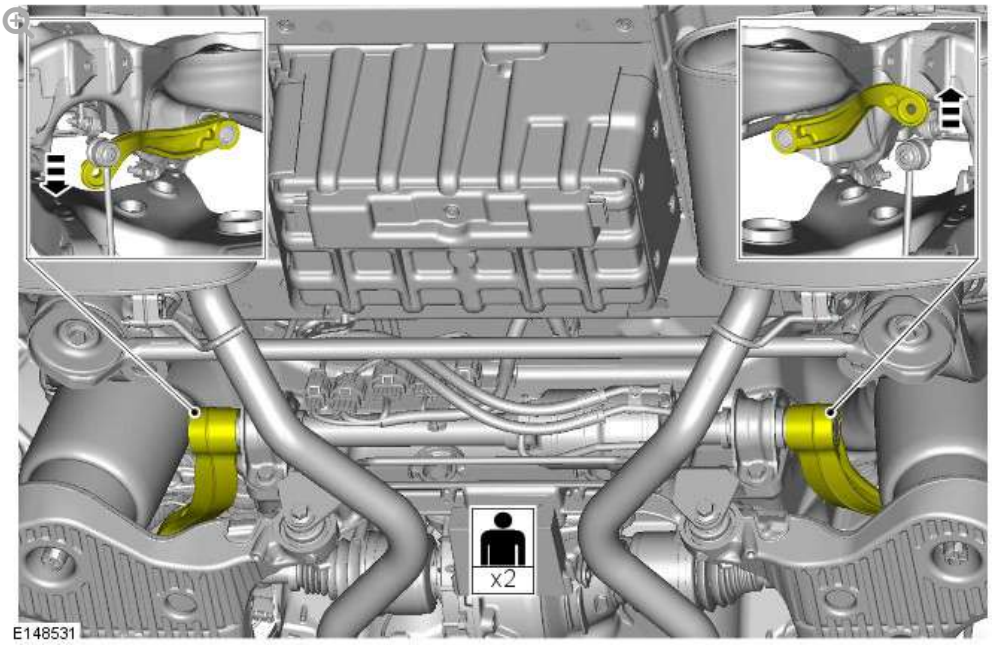
Bleed rear actuator:

22.



Open right bleed screw and right arm fully down and left arm up. Allow fluid to run for a further 5 seconds. Close bleed screw.

23.

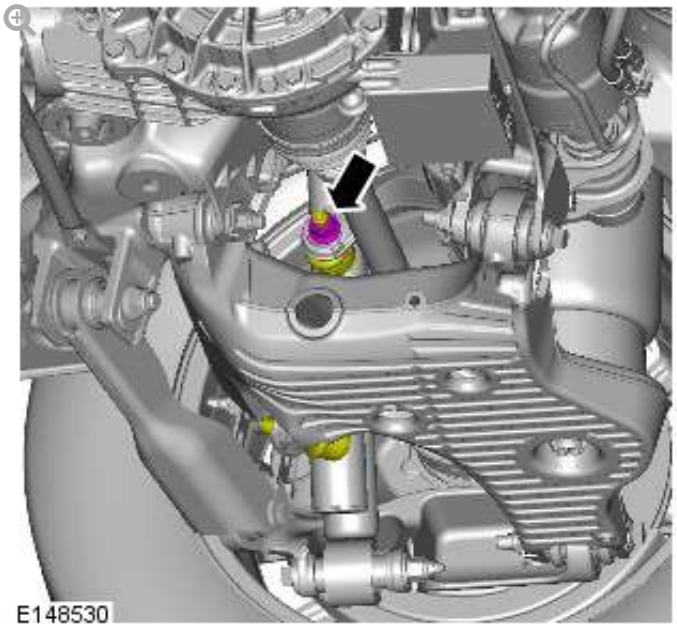


Open left bleed screw and right arm fully up and left arm down. Allow fluid to run for a further 5 seconds. Close bleed screw.

24.

NOTES:

- RH illustration shown, LH is similar.
- The step must be carried out on both sides.



Torque: **185 Nm**

25. **WARNING:**

> The special tool is still pressurised when the source air pressure is removed. Release air pressure within special tool slowly before removing. Remove the special tool from the dynamic response system reservoir.

Stop the manual bleed in approved diagnostic tool and check the bleed.

26. **1.** Check front bleed:

2. Disconnect only one front stabilizer link. Stroke the arm up and down free play travel should be less than ±10mm. If greater than ±10mm travel observed and/or spongy feeling a system re-bleed will be required.

27. **1.** Check rear bleed:

2. Disconnect only one rear stabilizer link. Stroke the arm up and down free play travel should be less than ±10mm. If

greater than ±10mm travel observed and/or spongy feeling a system re-bleed will be required.

28. Repeat steps 14-23 if required.

29. Torque front and rear stabilizer links to the required torque. Tighten the bleed screw to 15 Nm.

30. Install the bleed screw covers.

31. Refer to: Engine Undershield (501-02 Front End Body Panels, Removal and Installation).

32. Make sure that the fluid level is set to maximum line.

33. If the valve block has been replaced run the auto bleed procedure from within SDD to release air that may be trapped in the block. This requires the engine to be running. Using SDD clear pressure sensor adaptive data.

34. Using approved diagnostic tool carry out hydraulic system response test to confirm correct system operation.

35. Drive the vehicle for approximately 15 minutes performing manoeuvres which energise the system and include wheel inputs.

RIDE AND HANDLING OPTIMIZATION

ACTIVE STABILIZATION SYSTEM FLUID LEVEL CHECK

(G1590647)

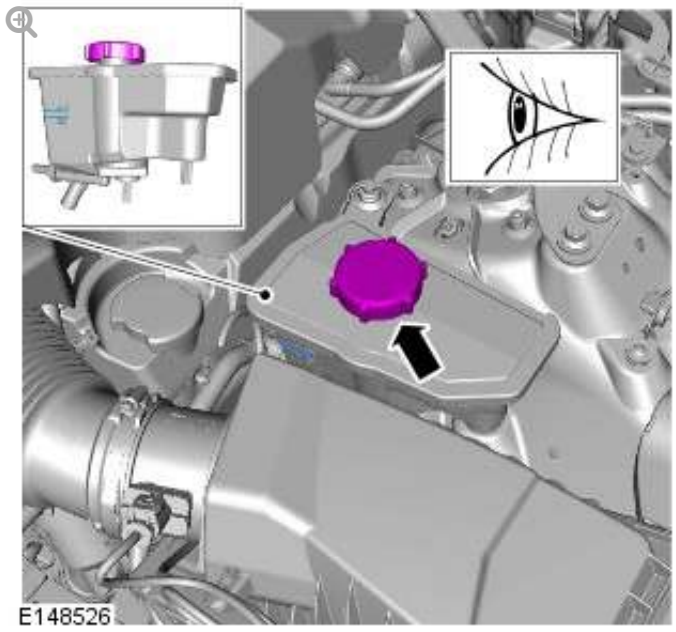
GENERAL PROCEDURES

CHECK

NOTE:

The fluid level should be set to the “MAX” line with the fluid at 20°C.

1.



1. With the fluid temperature at normal operating temperature 50-70°C the level may be 10-15mm above this mark. Topping up at normal operating temperature should take account of this. Do not remove fluid to achieve the “MAX” level when the fluid is at normal operating temperature.
2. The fluid level should be checked with engine off and engine on, any significant drop (more than 5mm) indicates trapped air in the system.

RIDE AND HANDLING OPTIMIZATION

DYNAMIC RESPONSE MODULE (G1561057)

REMOVAL AND INSTALLATION

REMOVAL

CAUTIONS:

- Extreme cleanliness must be exercised when handling this component.
- It is imperative that no damage is caused to the electrical connectors or the module.
- Do not touch the electrical connectors.
- If accidentally dropped or knocked install a new module.

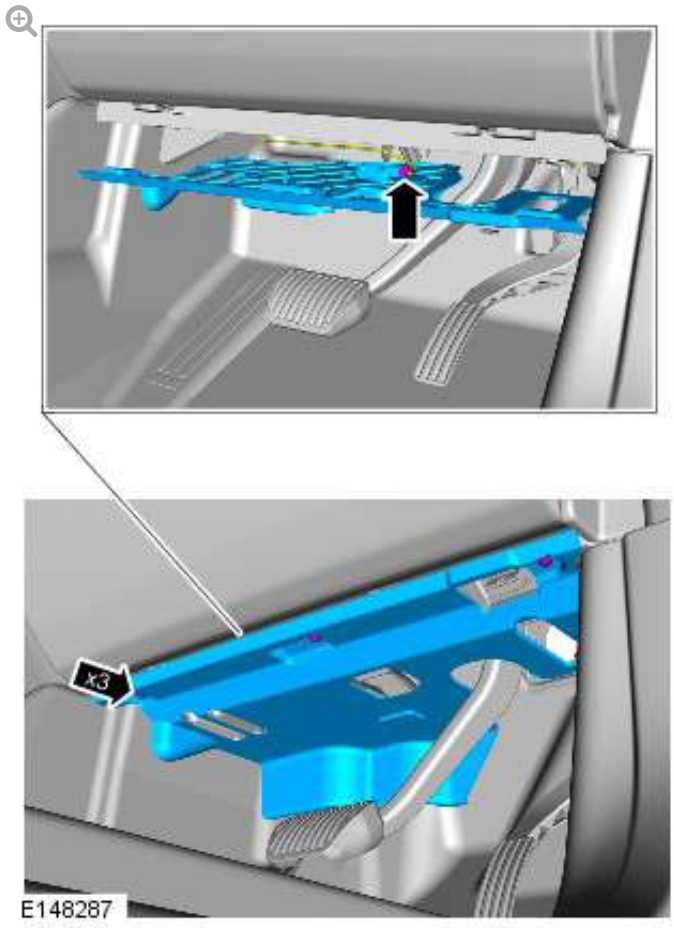
NOTES:

- Some variation in the illustrations may occur, but the essential information is always correct.
- Removal step in this procedure may contain installation details.

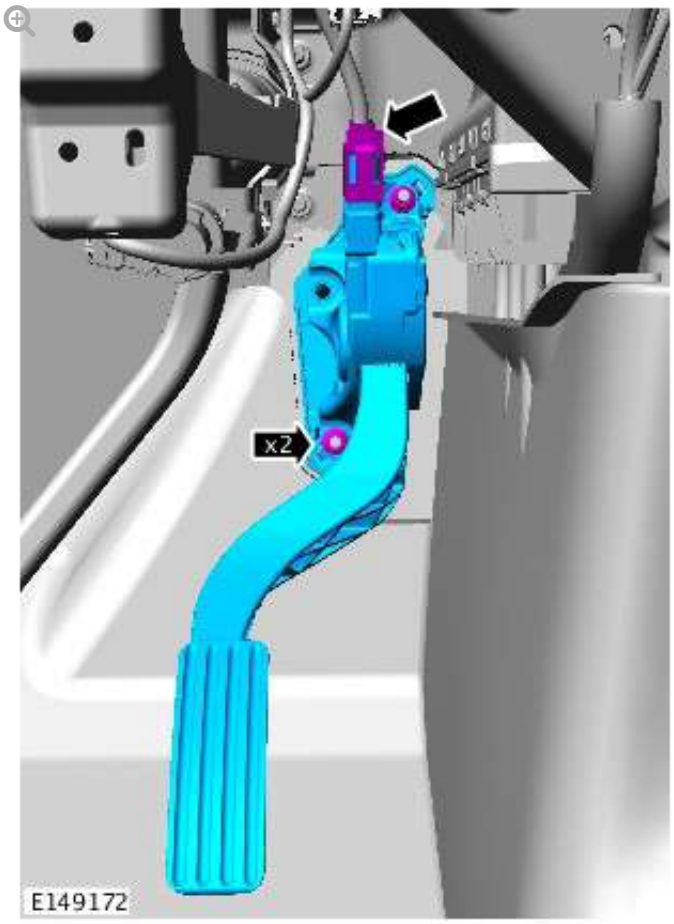
1. Disconnect the battery ground cable

Refer to: Specifications (414-01 Battery, Mounting and Cables, Specifications).

2.

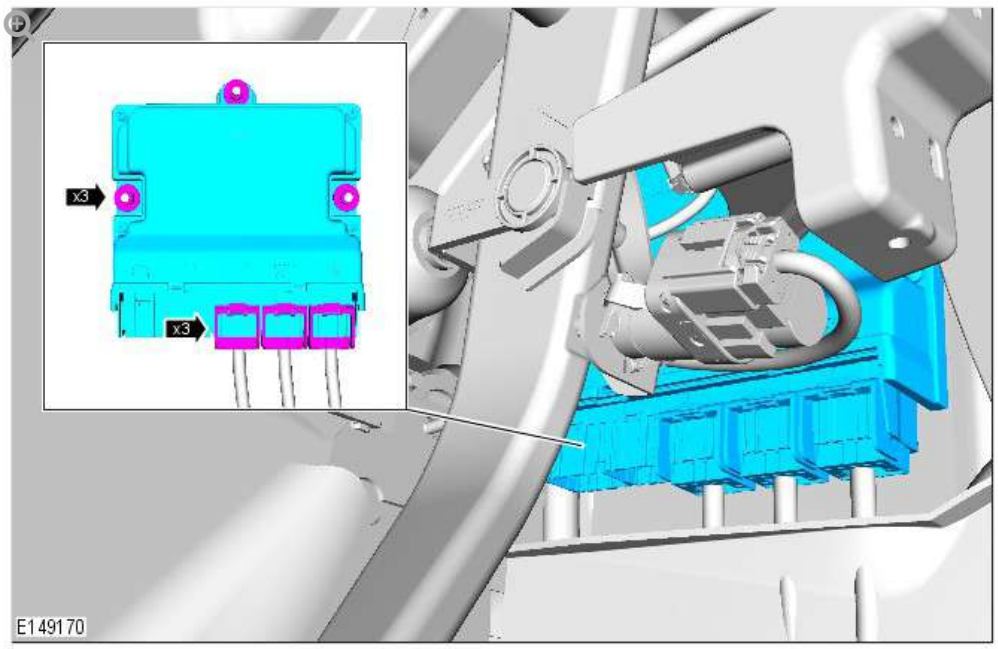


3.



Torque: **10 Nm**

4.



Torque: **10 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. Configure the dynamic response control module using the diagnostic tool.

RIDE AND HANDLING OPTIMIZATION

FLUID RESERVOIR (G1561126)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)

204-591-01

Dynamic Response Bleed Bottle

JLR-204-591-03

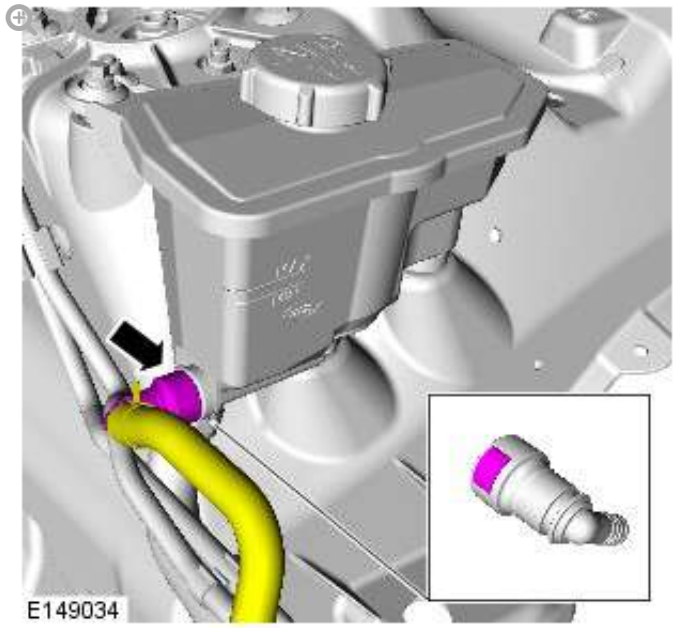
Adaptor, Dynamic Response Bleed Bottle

REMOVAL

1. Using a suitable suction device drain the fluid reservoir.

2. **CAUTION:**

> Be prepared to collect escaping fluids.

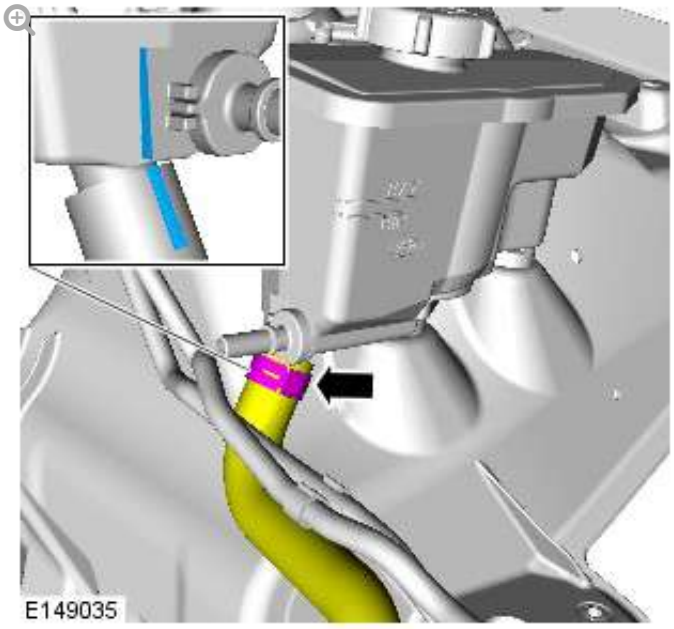


3. **CAUTION:**

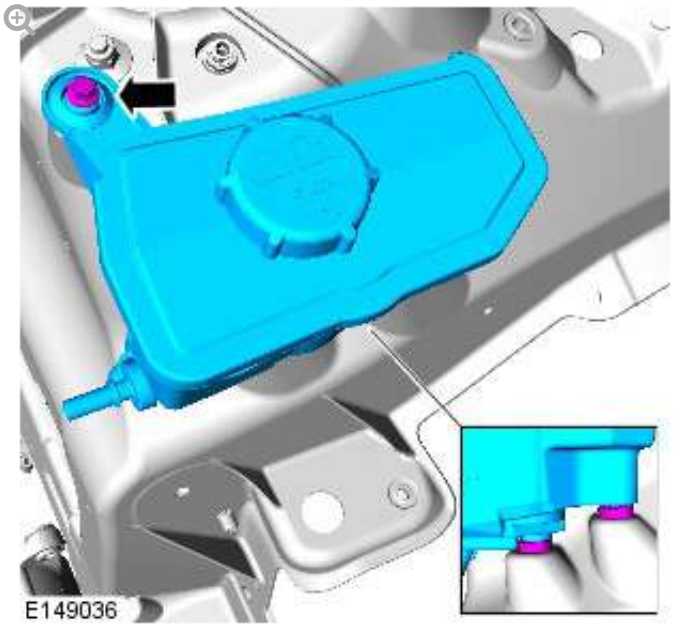
> Be prepared to collect escaping fluids.

NOTE:

> Note the orientation of the component prior to removal.



4.

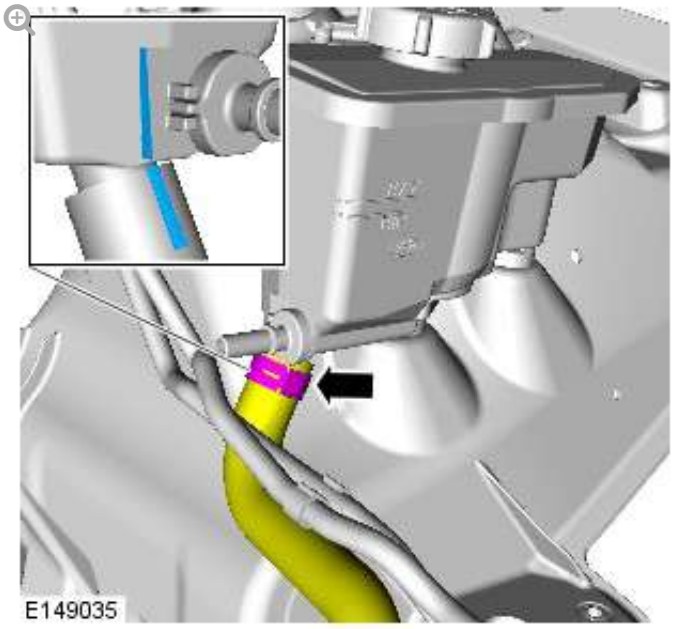


INSTALLATION

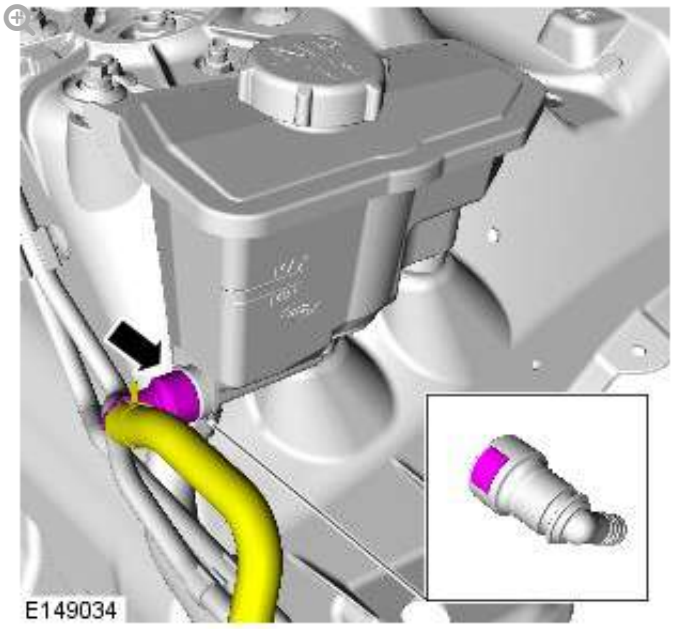
1.

NOTE:

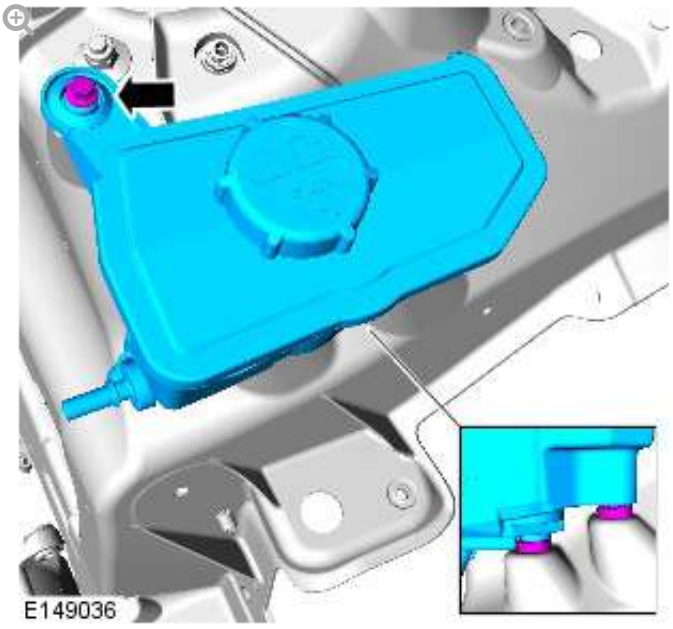
Install in the orientation noted in the removal procedure.



2.

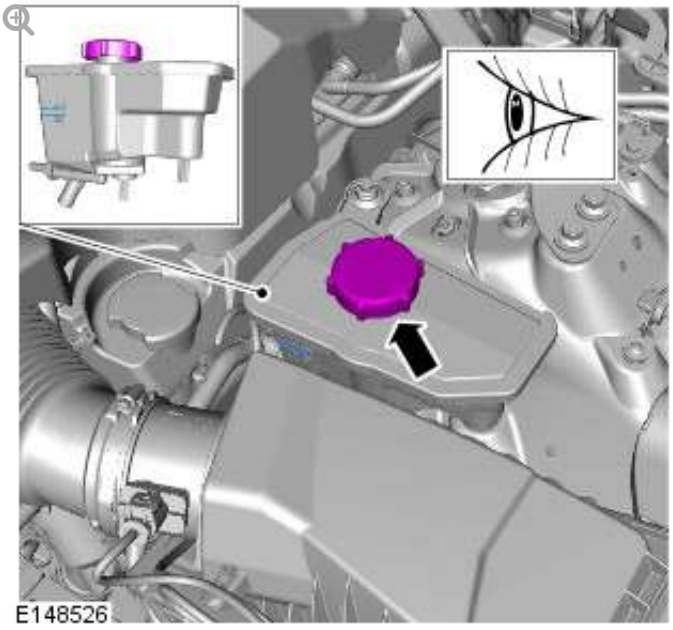


3.



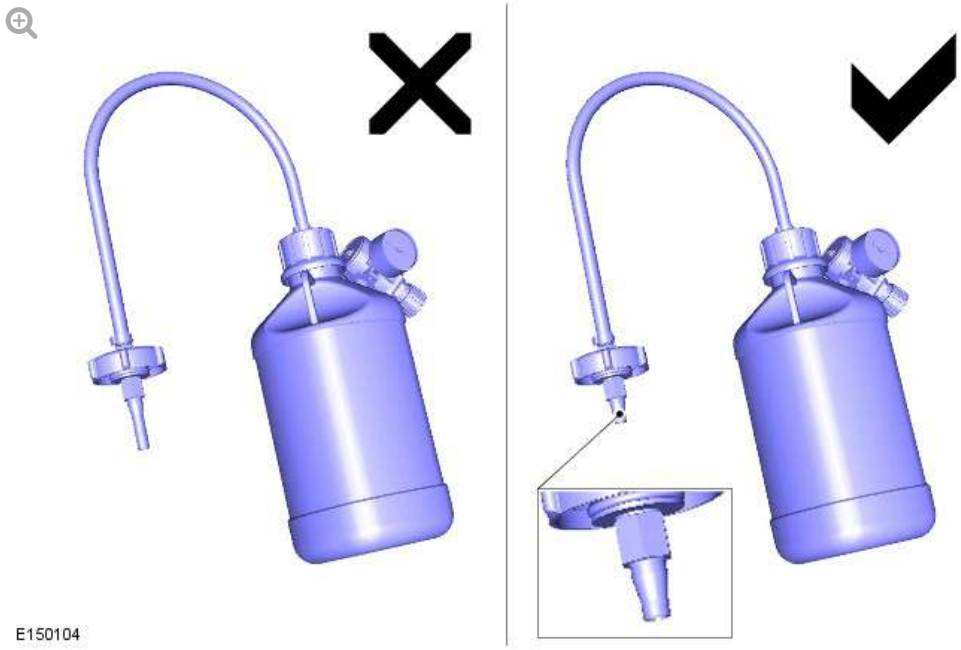
Torque: **5 Nm**

4.



Check and top-up the dynamic response system fluid reservoir.

5.



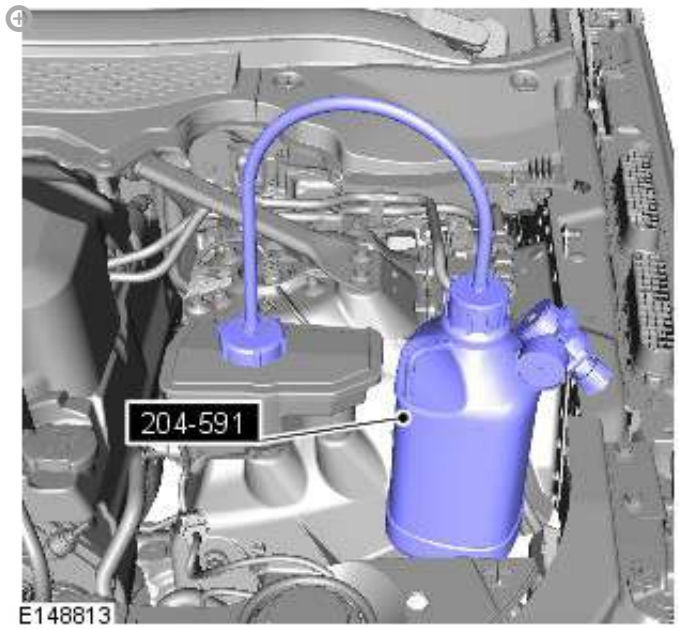
Install the new adaptor to the Dynamic response bleed bottle.

Special Tool(s): JLR-204-591-03

6.

NOTE:

Install the special tool to the dynamic response reservoir.



Special Tool(s): 204-591-01

7. Completely fill the reservoir with fluid.

8. Make sure the pressure regulator on the special tool is turned OFF.

9. Fill the special tool bottle approximately three-quarters full with fluid.

10. Connect the special tool to a suitable workshop air supply.

11. Using the special tool pressure regulator, carefully increase the air pressure to approx. 5 - 10 PSI / 0.3 - 0.7 kPa

12. Start engine and run for 1 minute.

13. Check that there is fluid circulating in the reservoir.

14. **WARNING:**

    The special tool is still pressurised when the source air pressure is removed. Release air pressure within special tool slowly before removing. Remove the special tool from the dynamic response system reservoir.

    Remove the special tool and fill the reservoir to the maximum line.

RIDE AND HANDLING OPTIMIZATION

FRONT STABILIZER BAR (G1561058)

REMOVAL AND INSTALLATION

60.10.01	STABILIZER BAR - RENEW	3000 CC, TDV6, DIESEL	11.9	USED WITHINS	+

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Engine Undershield (501-02 Front End Body Panels, Removal and Installation).

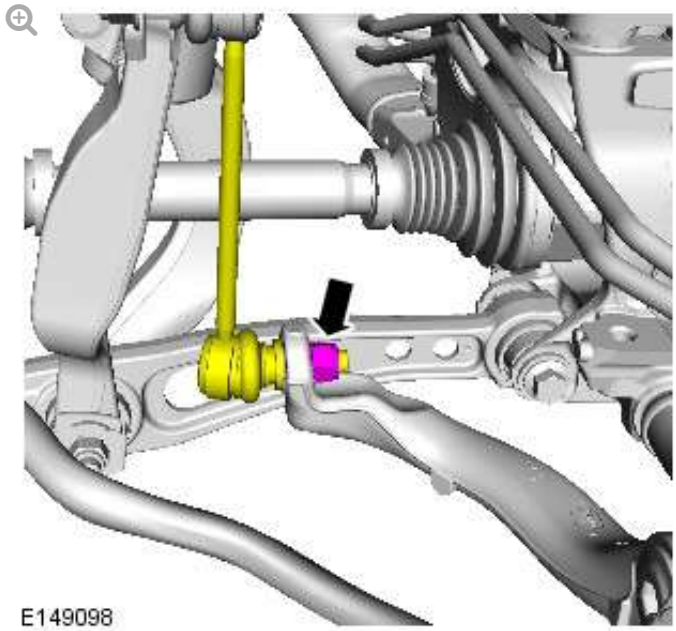
3.

CAUTION:

Use a wrench on the hexagon provided to prevent the ball joint rotating.

NOTES:

- RH illustration shown, LH is similar.
- The step must be carried out on both sides.



Torque: **185 Nm**

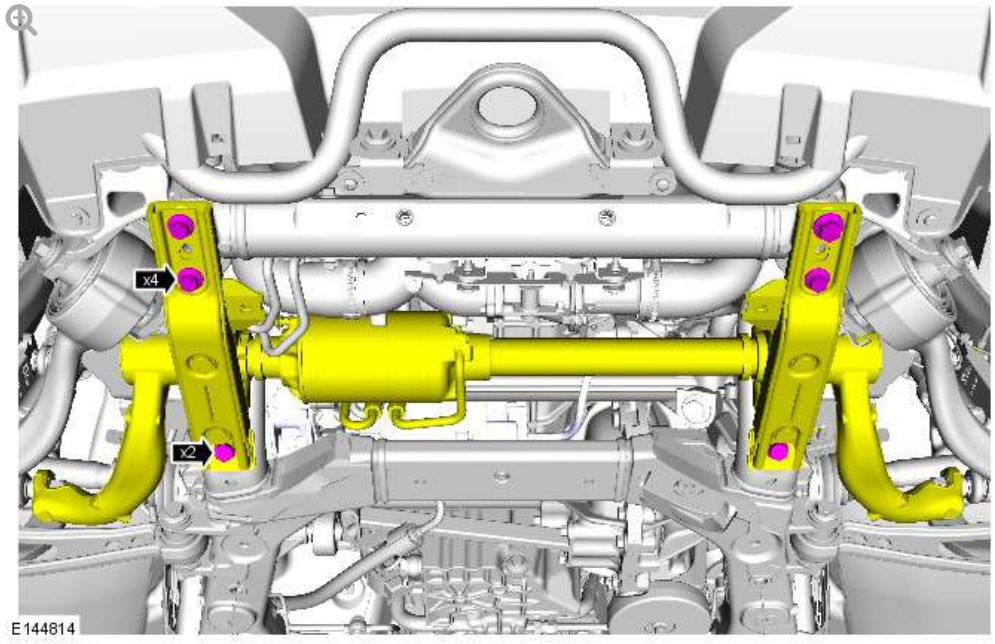
4.

CAUTION:

Fixings must be started by hand to avoid damaging the threads.

NOTE:

Make sure that new bolts are installed.



Install all the bolts finger tight then tighten in the sequence below:

Torque:

M12 bolts

Stage 1: **90 Nm**

Stage 2: **180°**

M14 bolts

Stage 1: **140 Nm**

Stage 2: **120°**

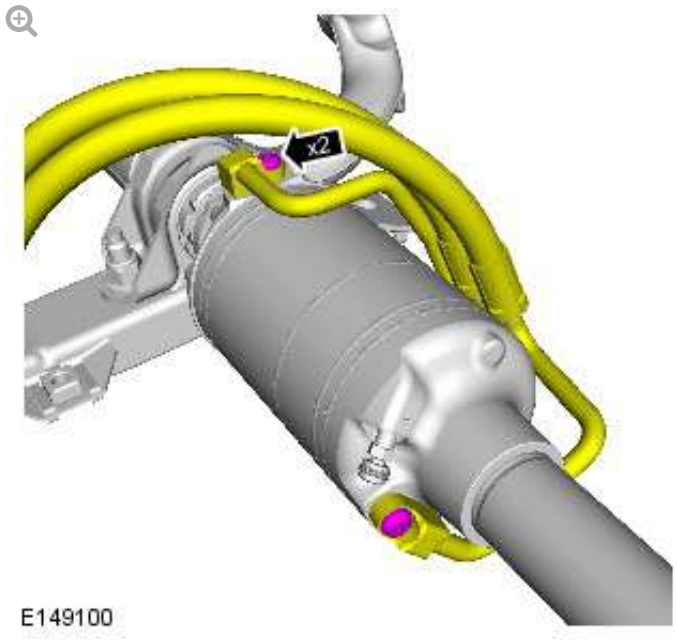
5.

CAUTION:

Be prepared to collect escaping fluids.

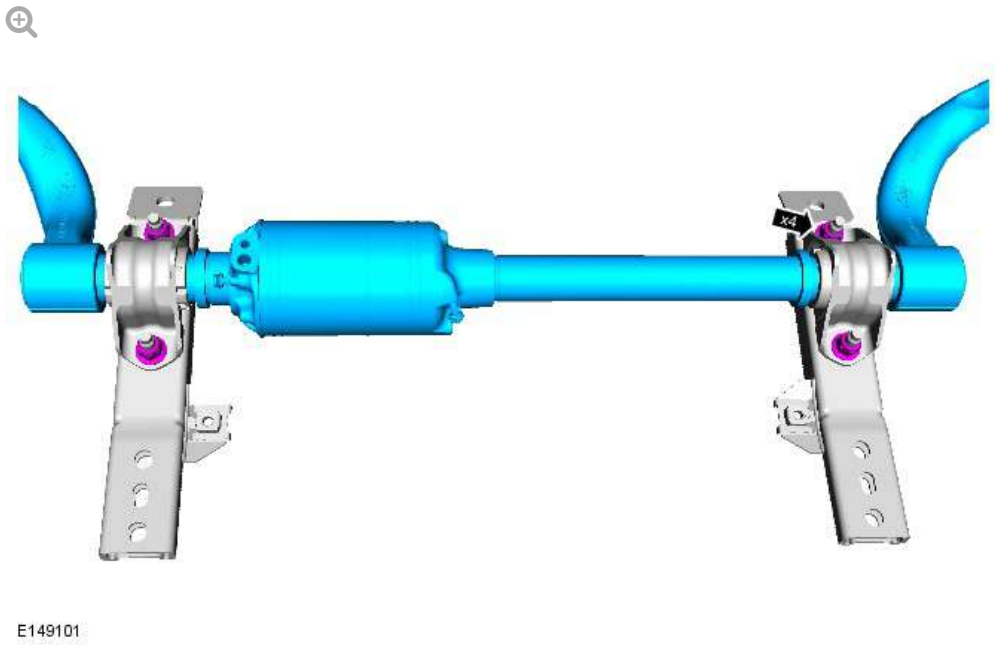
NOTE:

New O-ring seal is be installed.



Torque: **22 Nm**

6.



Torque: **110 Nm**

INSTALLATION

CAUTION:

The bush must be installed without any additional lubricant. Failure to follow this instruction may cause damage to the component.

1. To install, reverse the removal procedure.

2. Refer to: Active Stabilization System Bleeding (204-06 Ride and Handling Optimization, General Procedures).

RIDE AND HANDLING OPTIMIZATION

FRONT STABILIZER BAR BUSHING (G1561059)

REMOVAL AND INSTALLATION

60.10.05	MOUNTING RUBBERS - STABILIZER BAR - SET - RENEW	ALL DERIVATIVES	0.5	USED WITHINS	+

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Engine Undershield (501-02 Front End Body Panels, Removal and Installation).

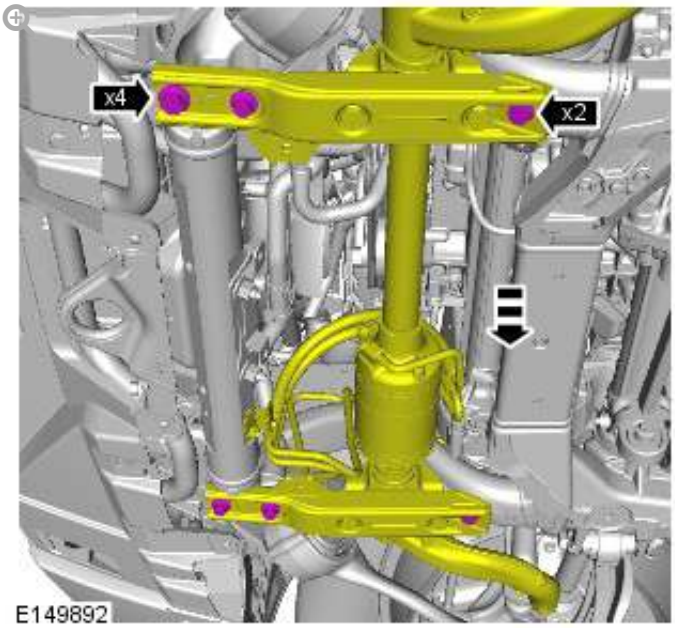
3.

CAUTION:

Make sure that new bolts are installed.

NOTE:

Support the dynamic response front actuator to make sure the hydraulic hoses are not strained.



Torque:

M14

Stage 1: **140 Nm**

Stage 2: **120°**

M12

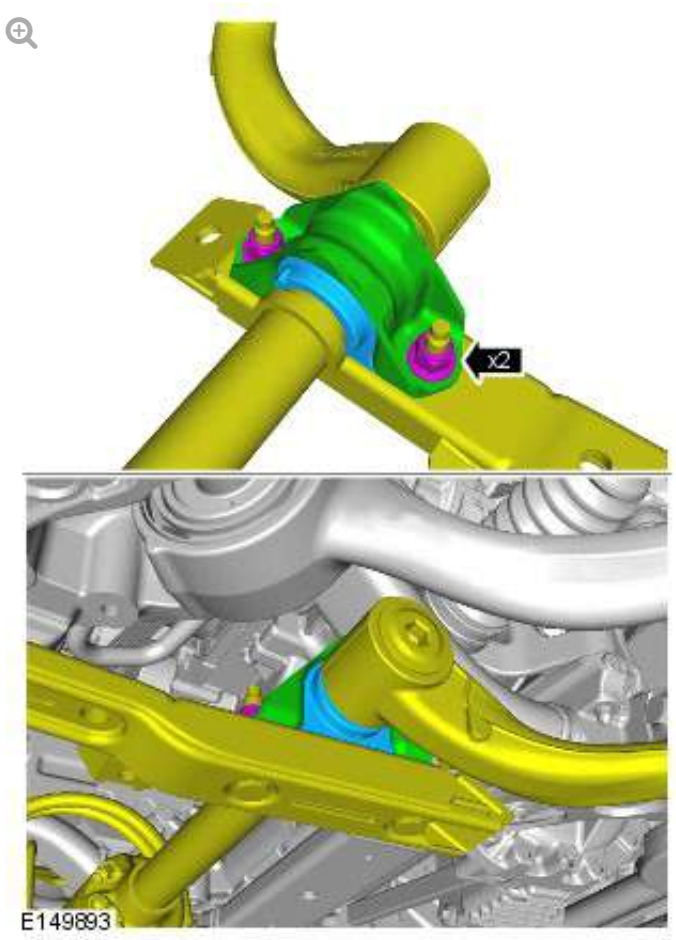
Stage 1: **90 Nm**

Stage 2: **180°**

4.

NOTES:

- LH illustration shown, RH is similar.
- The step must be carried out on both sides.
- Make sure the new bushes are installed in the correct orientation.



Torque: **110 Nm**

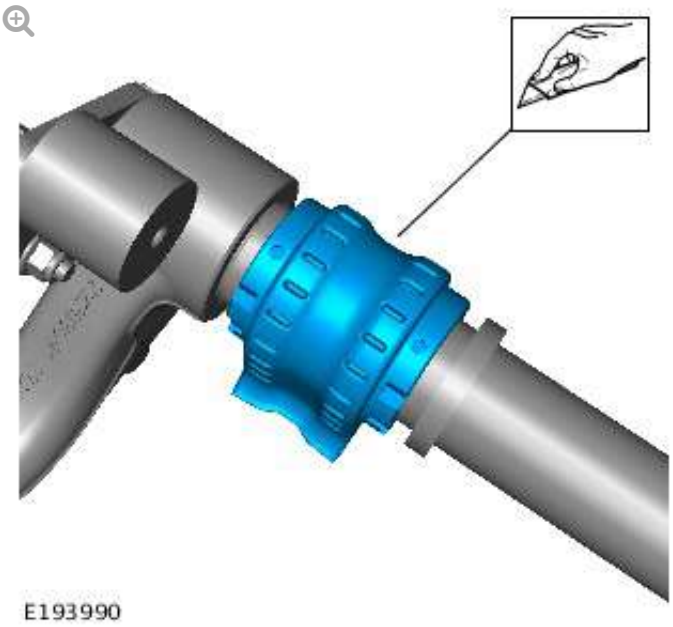
5.

CAUTION:

Make sure the stabilizer bar is not damaged or scratched when cutting the bush.

NOTES:

- LH illustration shown, RH is similar.
- This step is for bushes that have been fitted to the stabilizer bar without a split.



Using a suitable cutting tool, cut and remove the bush from the stabilizer bar.

INSTALLATION

1.

CAUTIONS:

- The bush must be installed without any additional lubricant. Failure to follow this instruction may cause damage to the component.
- Nuts must be tightened with vehicle at normal ride height.
- Make sure that all the component mating faces are clean and free from scratches.

To install, reverse the removal procedure.

RIDE AND HANDLING OPTIMIZATION

LOWER ACCELEROMETER

(G1563458)

REMOVAL AND INSTALLATION

60.60.03	ACCELEROMETER - ACTIVE CORNERING ENHANCEMENT (ACE) - LOWER - RENEW	ALL DERIVATIVES	0.7	USED WITHINS	+

REMOVAL

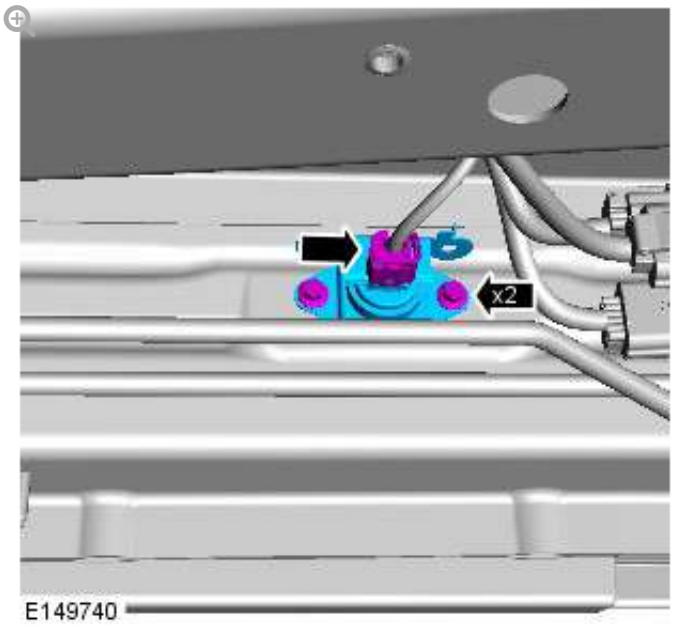
NOTE:

Removal procedure may contain installation details.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-01 Battery, Mounting and Cables, Specifications).

2. Refer to: Rear Rocker Panel Moulding - Standard Wheel Base (501-08 Exterior Trim and Ornamentation, Removal and Installation).

3.



Torque: **7 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. Using the Land Rover approved diagnostic system, calibrate the Accelerometers.

RIDE AND HANDLING OPTIMIZATION

REAR STABILIZER BAR (G1561060)

REMOVAL AND INSTALLATION

64.35.08	STABILIZER BAR - RENEW	3000 CC, TDV6	1.3	USED WITHINS	+
64.60.50	STABILIZER BAR - ACE - REAR - RENEW	ALL DERIVATIVES	1.5	USED WITHINS	+

REMOVAL

1. **NOTE:**

   Removal steps in this procedure may contain installation details.

2. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

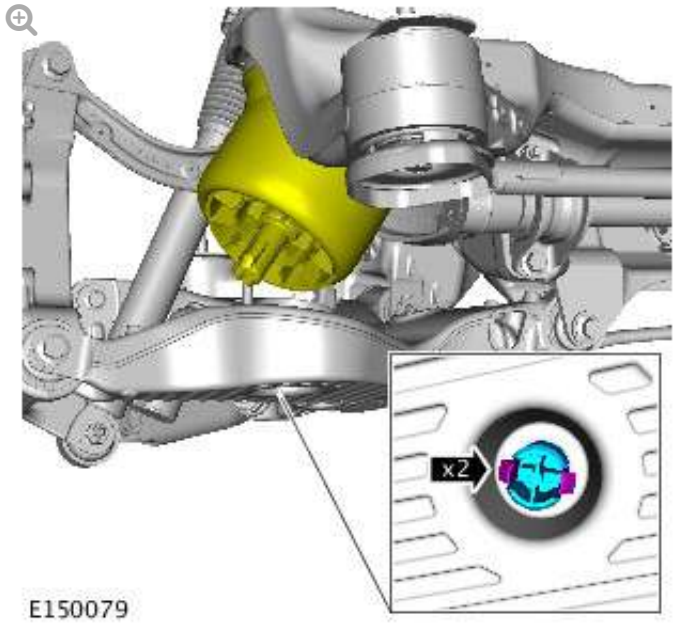
3. Depressurize the rear air springs

Refer to: Air Suspension System Depressurize and Pressurize (204-05 Vehicle Dynamic Suspension, General Procedures).

4.

NOTES:

- LH illustration shown, RH is similar.
- The step must be carried out on both sides.



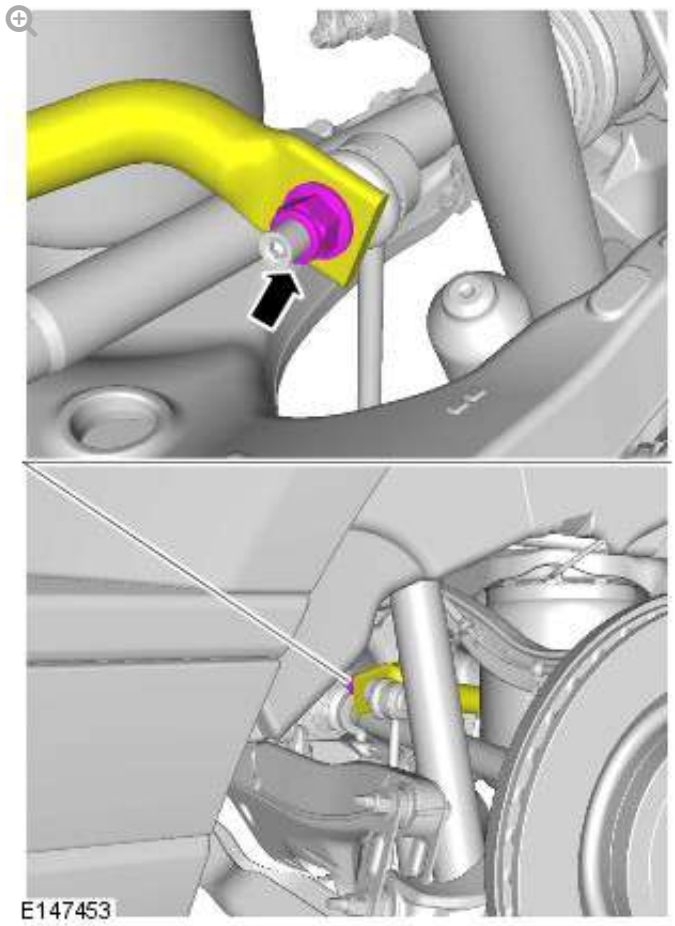
5.

CAUTION:

Use a wrench on the hexagon provided to prevent the ball joint rotating.

NOTES:

- LH illustration shown, RH is similar.
- The step must be carried out on both sides.

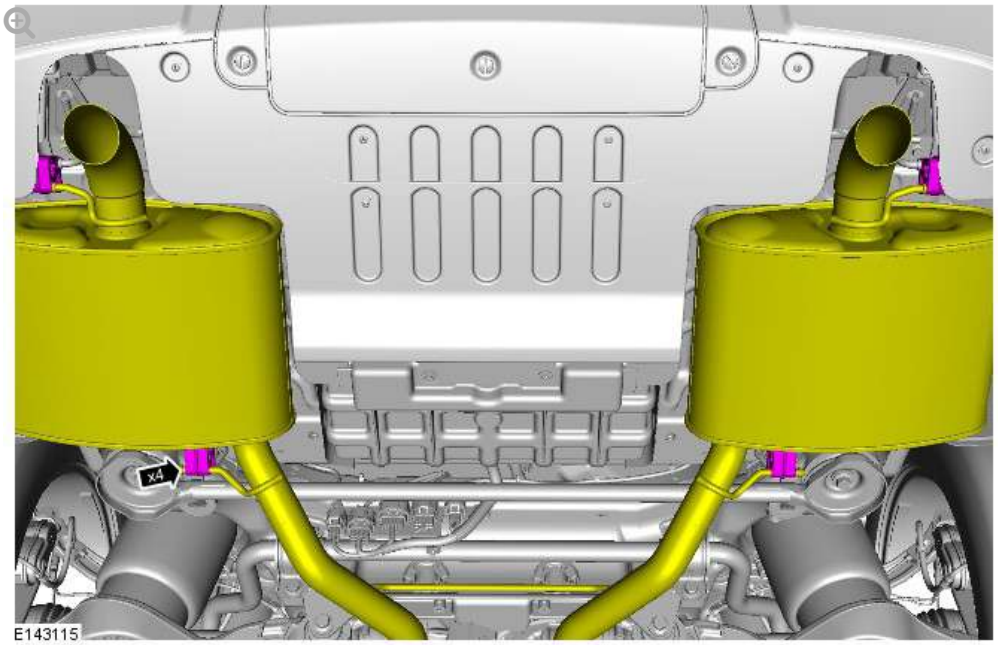


Torque: **185 Nm**

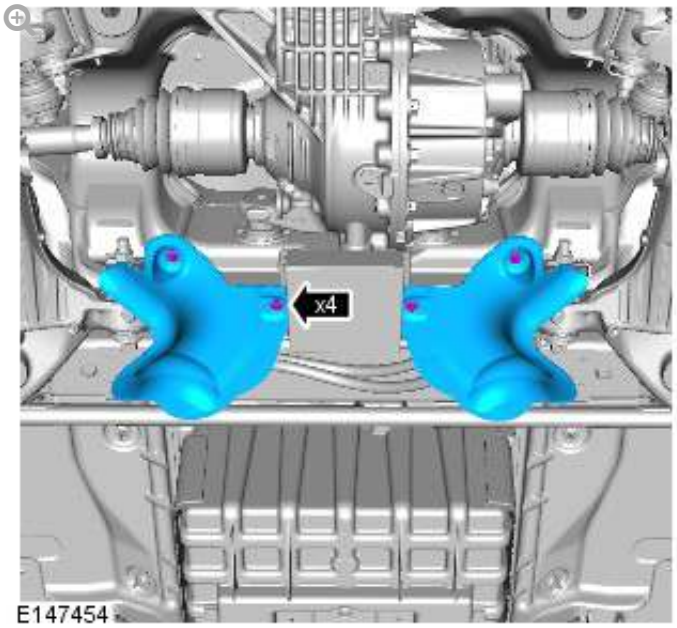
6.

CAUTION:

Make sure that the exhaust system is supported with suitable retaining straps.



7.

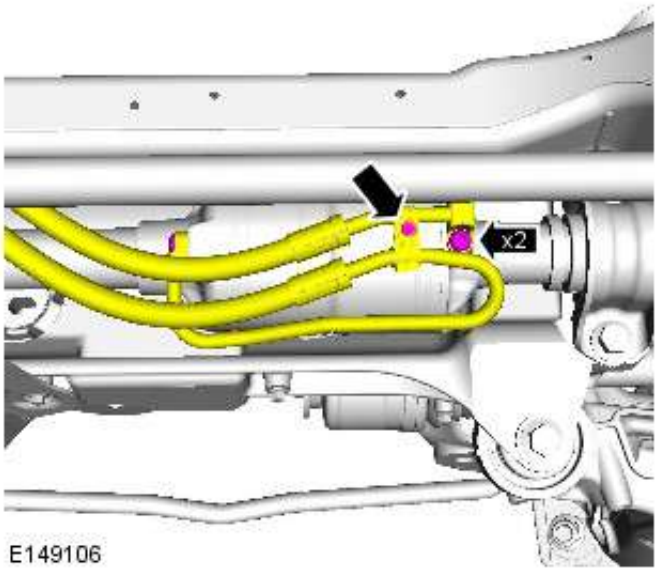


Torque: **10 Nm**

8.

CAUTIONS:

- Be prepared to collect escaping fluids.
- A new O-ring seal is to be installed.

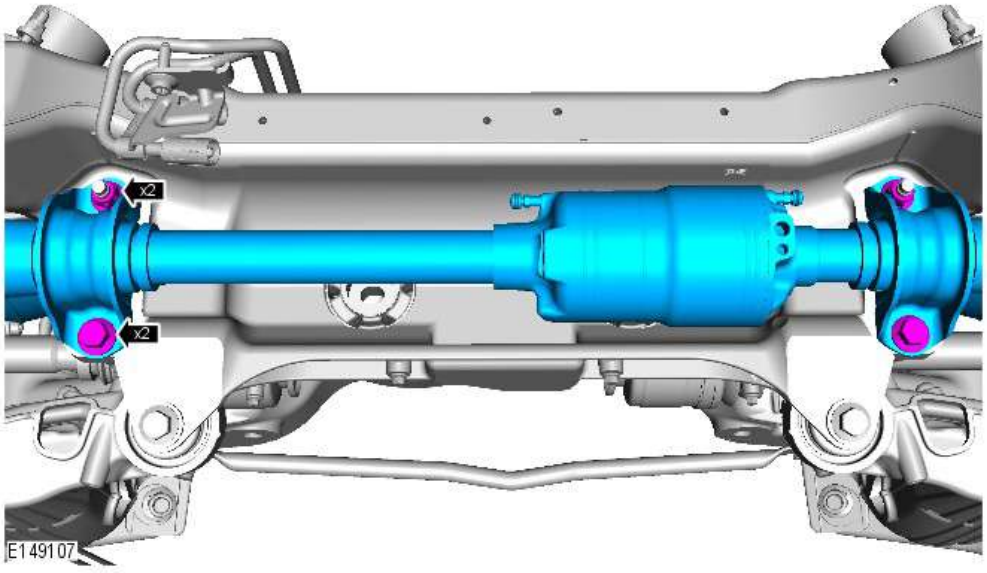


Torque:

Banjo bolt **22 Nm**

Bolt **9 Nm**

9.



Torque: **110 Nm**

INSTALLATION

1. **CAUTION:**

   The bush must be installed without any additional lubricant. Failure to follow this instruction may cause damage to the component.

   To install, reverse the removal procedure.

2. Refer to: Active Stabilization System Bleeding (204-06 Ride and Handling Optimization, General Procedures).

RIDE AND HANDLING OPTIMIZATION

REAR STABILIZER BAR BUSHING (G1561061)

REMOVAL AND INSTALLATION

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

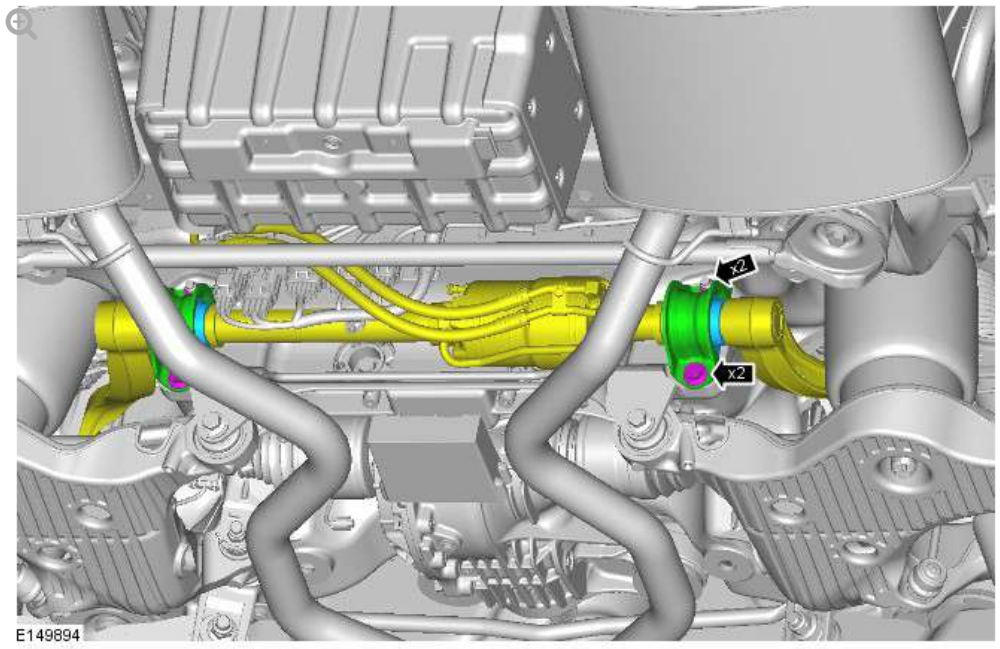
2.

CAUTIONS:

- The bush must be installed without any additional lubricant. Failure to follow this instruction may cause damage to the component.
- Nuts and bolts must be tightened with vehicle at normal ride height.

NOTES:

- Support the dynamic response rear actuator to make sure the hydraulic hoses are not strained.
- Make sure the new bushes are installed in the correct orientation.
- Make sure that all the component mating faces are clean.



Torque: **110 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

RIDE AND HANDLING OPTIMIZATION SWITCH (G1508978)

REMOVAL AND INSTALLATION

86.65.11	SWITCH - TERRAIN RESPONSE™ - RENEW	ALL DERIVATIVES	1	USED WITHINS	+

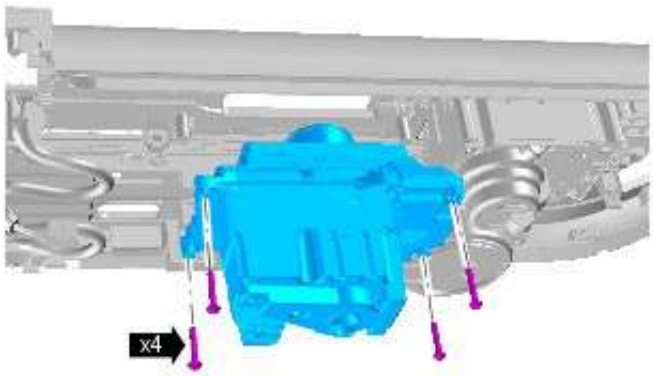
REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

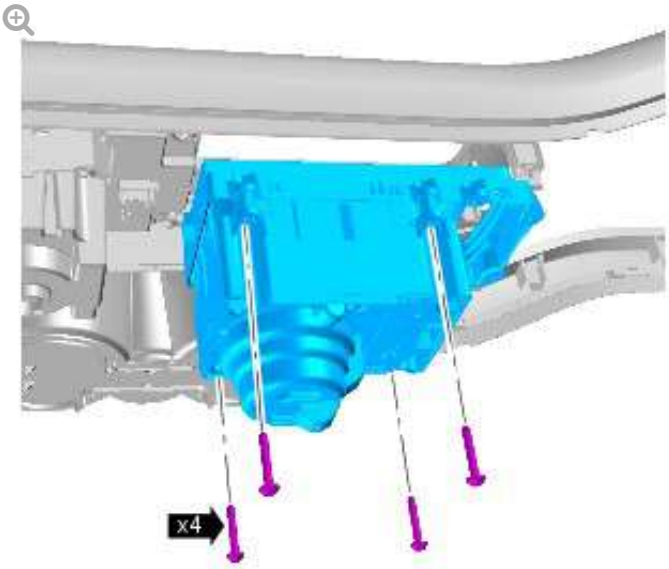
1. For additional information, refer to: Parking Brake Switch (206-05, Removal and Installation).

2.



E147759

3.



E147756

INSTALLATION

1. To install, reverse the removal procedure.

RIDE AND HANDLING OPTIMIZATION

UPPER ACCELEROMETER

(G1563459)

REMOVAL AND INSTALLATION

60.60.02	ACCELEROMETER – ACTIVE CORNERING ENHANCEMENT (ACE) – UPPER – RENEW	ALL DERIVATIVES	0.2	USED WITHINS	+

REMOVAL

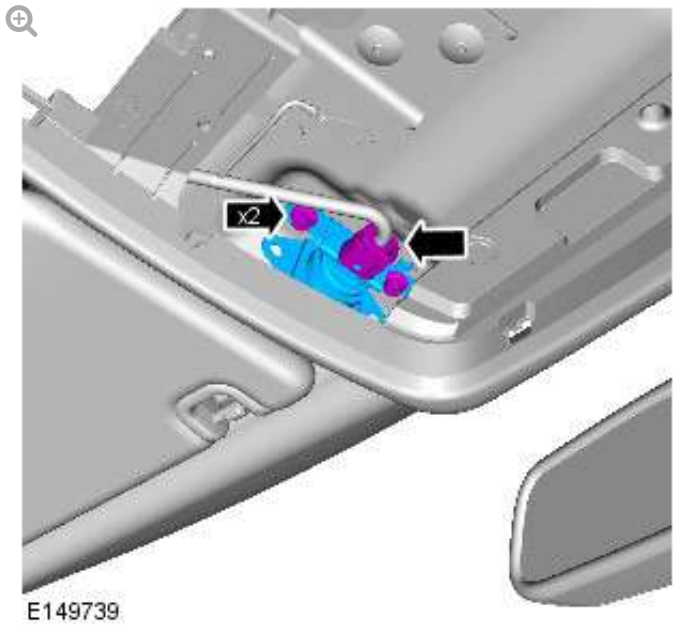
NOTE:

Removal procedure may contain installation details.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-01 Battery, Mounting and Cables, Specifications).

2. Refer to: Overhead Console (501-12A Instrument Panel and Console - Standard Wheel Base, Removal and Installation).

3.



Torque: **7 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. Using the Land Rover approved diagnostic system, calibrate the Accelerometers.

RIDE AND HANDLING OPTIMIZATION

VALVE BLOCK (G1700216)

REMOVAL AND INSTALLATION

60.60.20	VALVE BLOCK – ACTIVE CORNERING ENHANCEMENT (ACE) – RENEW	ALL DERIVATIVES	2.7	USED WITHINS	+

REMOVAL

CAUTIONS:

- Dynamic Response system components are manufactured to very precise tolerances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in foreign matter ingress to the dynamic response system.
- Make sure that all openings are sealed. Use new blanking caps.

NOTE:

Removal steps in this procedure may contain installation details.

All vehicles

1. Disconnect the battery ground cable.

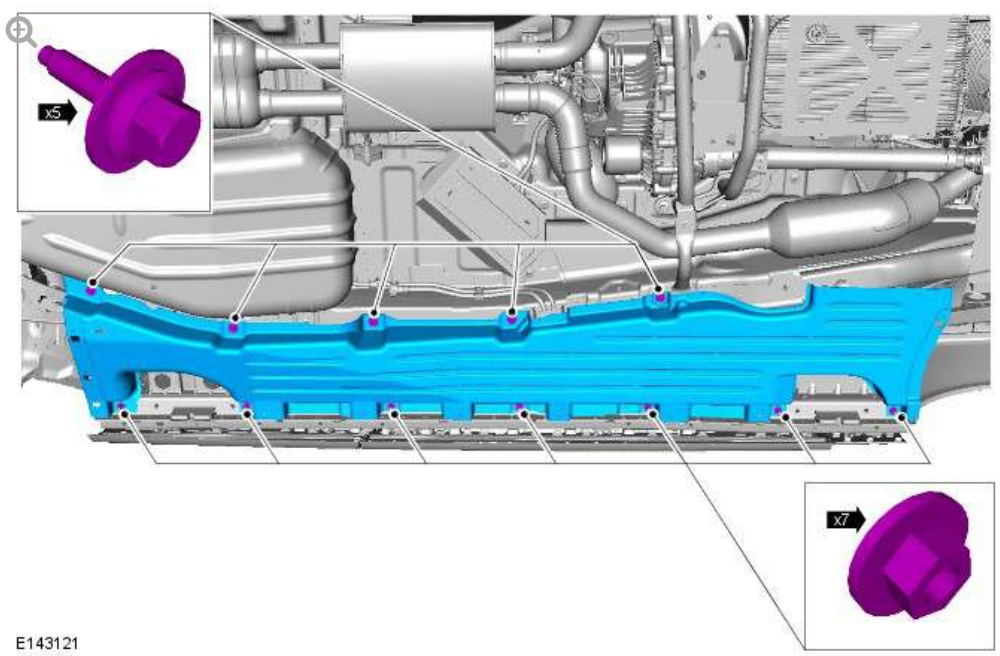
2. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Refer to: Rear Rocker Panel Moulding - Standard Wheel Base (501-08 Exterior Trim and Ornamentation, Removal and Installation).
   Refer to: Rear Rocker Panel Moulding - Long Wheel Base (501-08 Exterior Trim and Ornamentation, Removal and Installation).

Short wheelbase

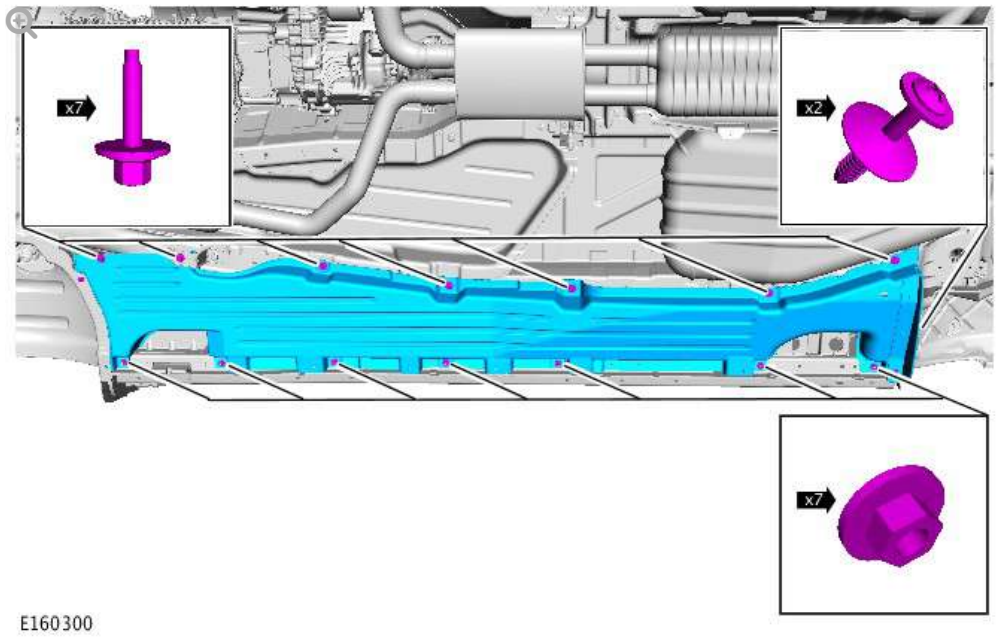
4. 

Long wheelbase

5.

NOTE:

RH illustration show, LH similar.



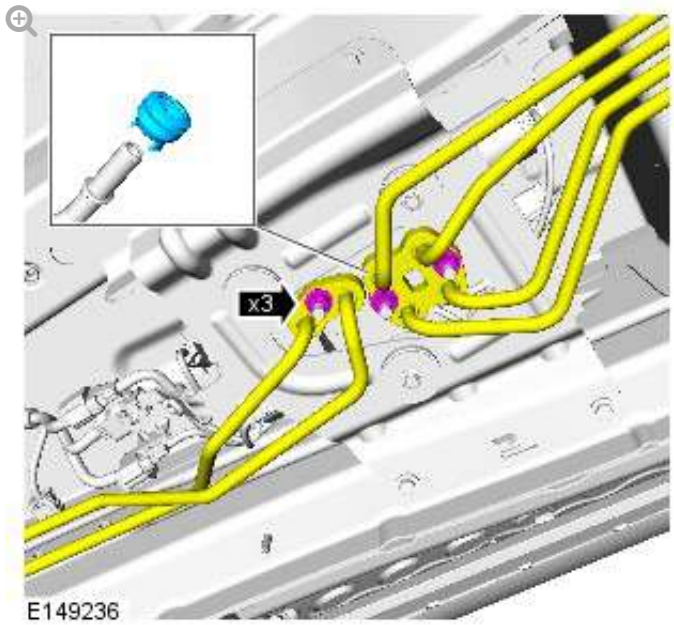
E160300

All vehicles

6.

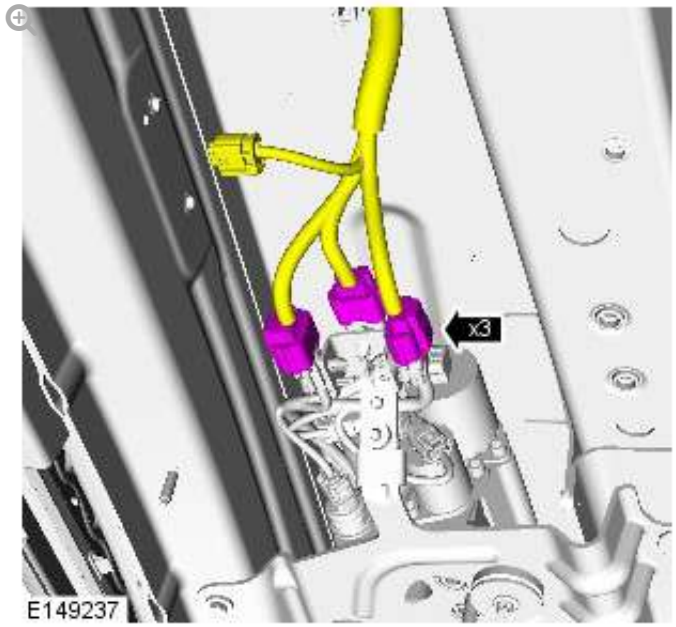
CAUTION:

Be prepared to collect escaping fluids.

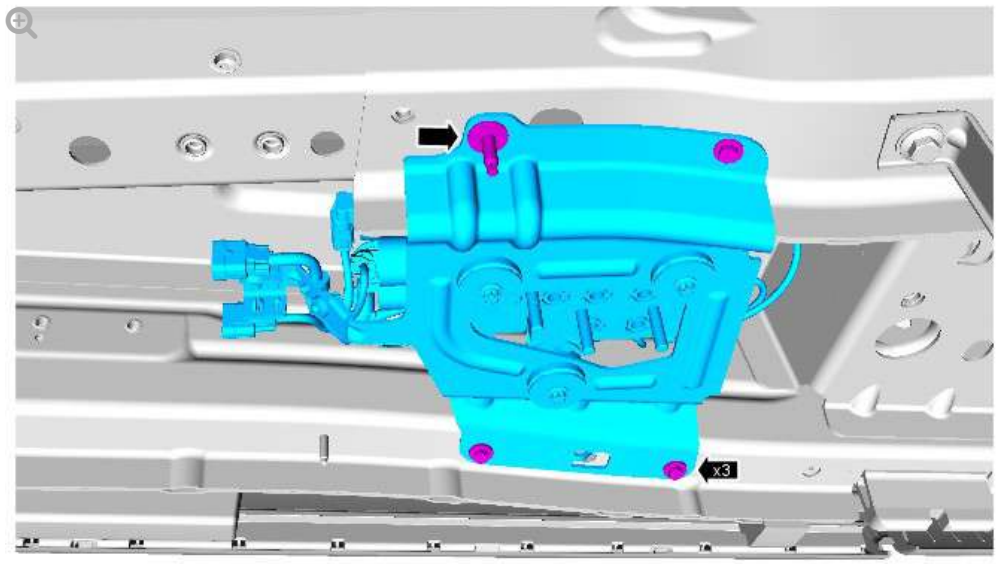


Torque: **22 Nm**

7.



8.



E149238

9.

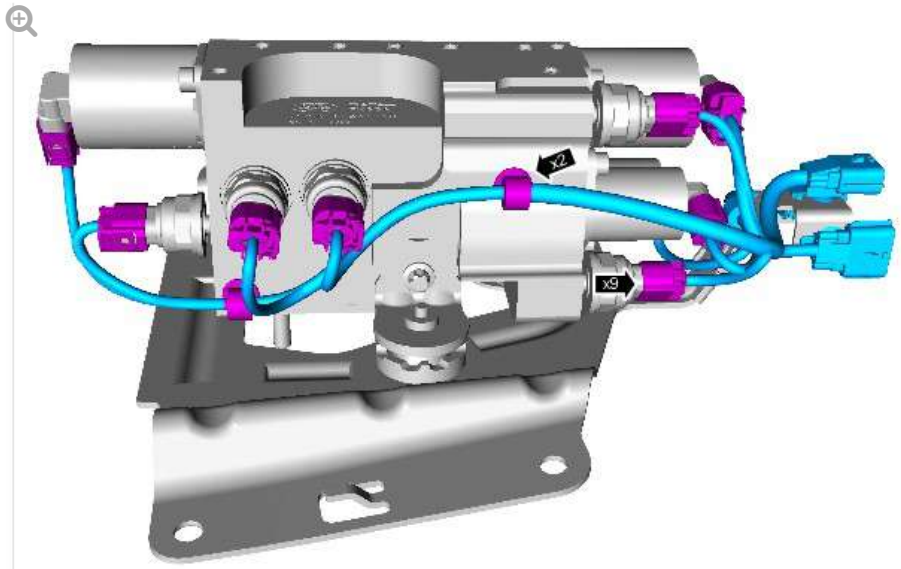
NOTE:

Do not disassemble further if the component is removed for access only.

10.

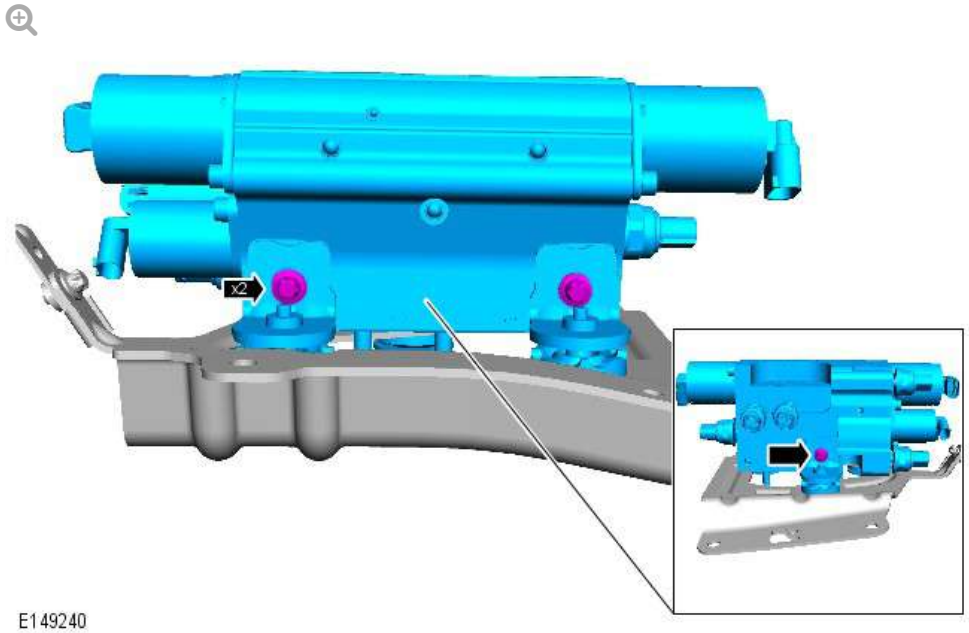
NOTE:

Note the orientation of the electrical connectors and wiring harness.



E149239

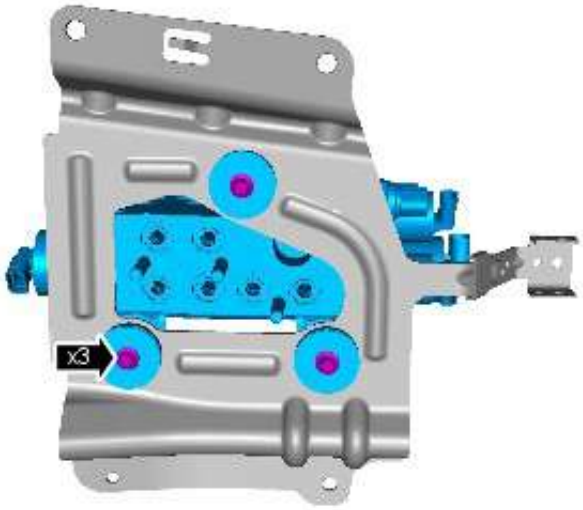
11.



E149240

Torque: **10 Nm**

12.



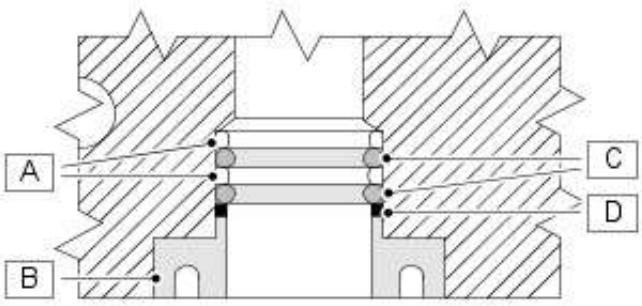
E150759

Torque: **10 Nm**

13.

NOTE:

Install new O-ring seals.



E58627

- A: Backing rings (white)
- B: Outer clamping ring
- C: O-ring seals
- D: Outer backing ring (Black)

INSTALLATION

1. To install, reverse the removal procedure.

2. Refer to: Active Stabilization System Bleeding (204-06 Ride and Handling Optimization, General Procedures).

RIDE AND HANDLING OPTIMIZATION

VALVE BLOCK TO FRONT STABILIZER BAR ACTUATOR PIPE ASSEMBLY (G1700217)

REMOVAL AND INSTALLATION

REMOVAL

WARNING:

Be prepared to collect escaping fluid.

CAUTIONS:

- Dynamic Response system components are manufactured to very precise tolerances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in foreign matter ingress to the dynamic response system.
- Make sure that all openings are sealed. Use new blanking caps.

NOTE:

Removal steps in this procedure may contain installation details.

All vehicles

1. Remove the battery ground cable.
   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

2. **WARNING:**

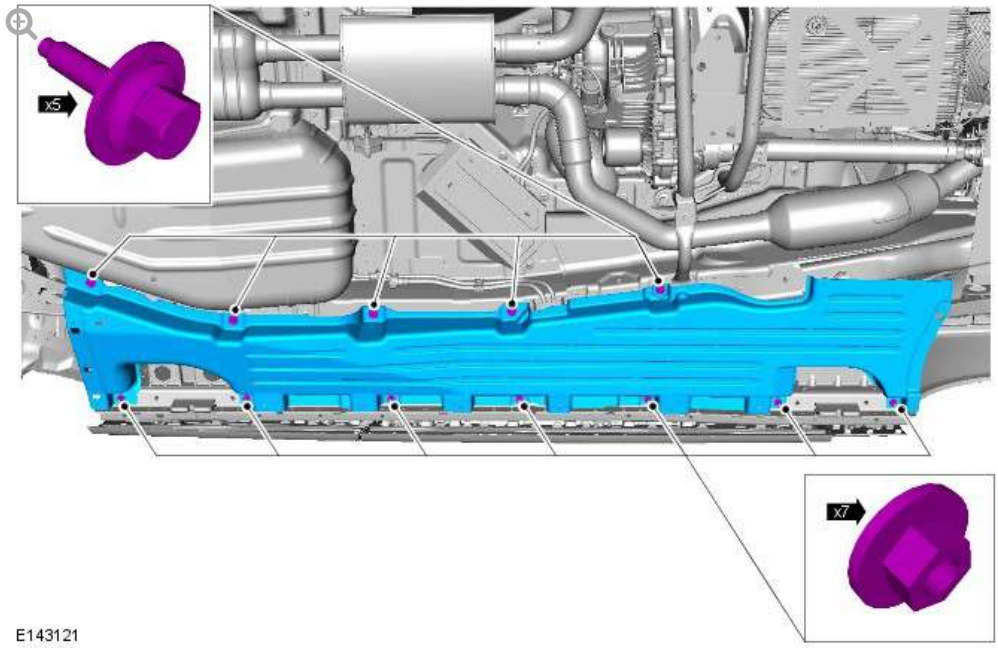
   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Refer to: Front Subframe - V8 N/A 5.0L Petrol/V8 S/C 5.0L Petrol (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).
   Refer to: Front Subframe - TDV8 4.4L Diesel (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

Short wheelbase

4.



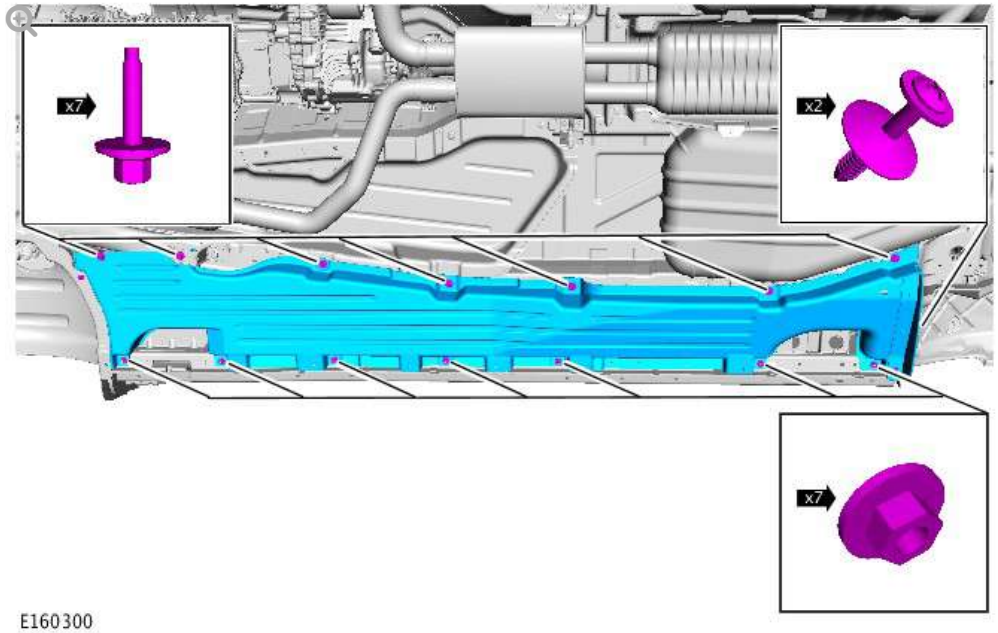
Torque: **9 Nm**

	Long wheelbase

5.

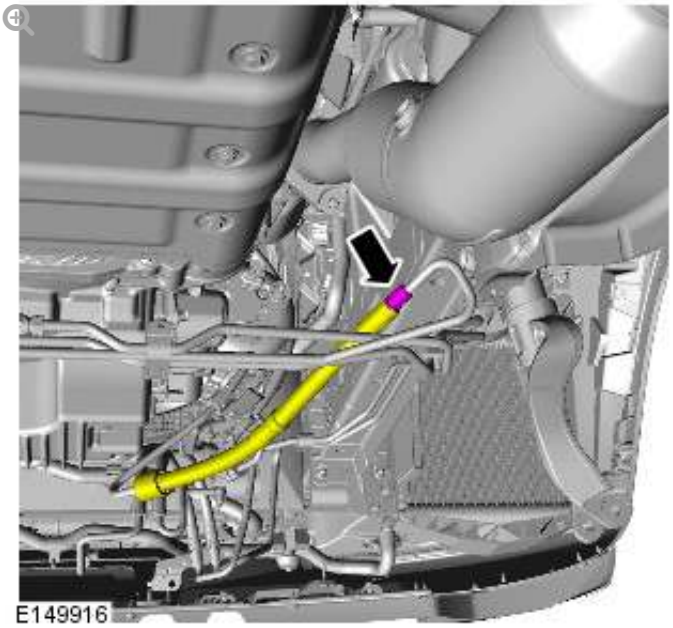
CAUTION:

RH illustration shown, LH is similar.

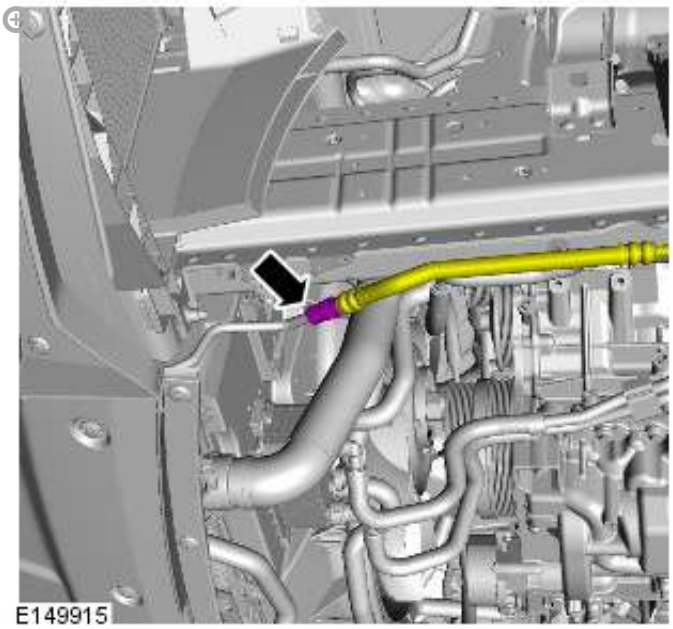


All vehicles

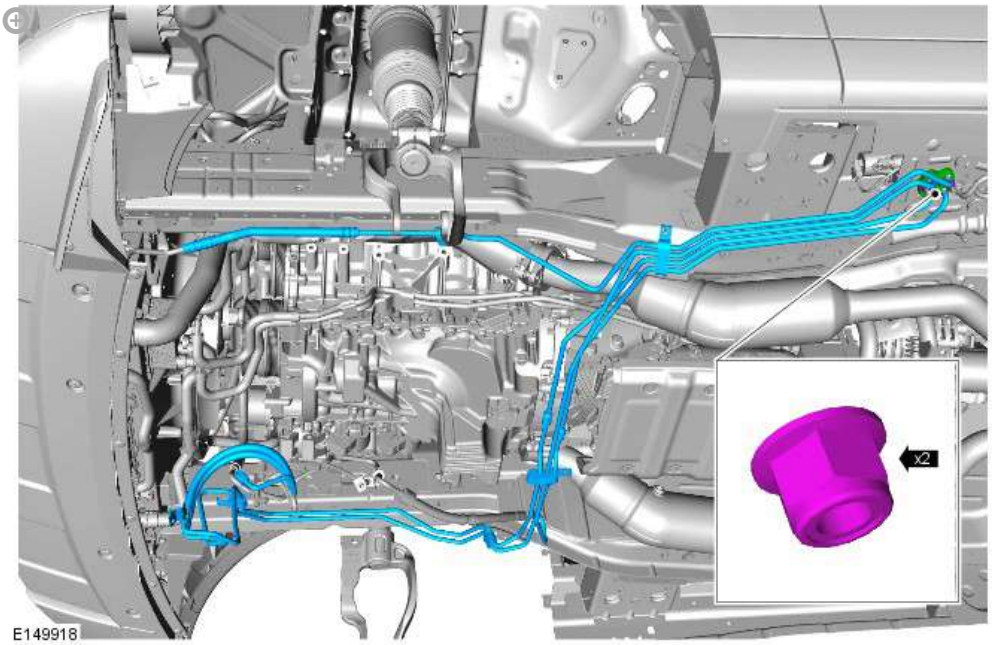
6.



7.



8.



Torque: **9 Nm**

INSTALLATION

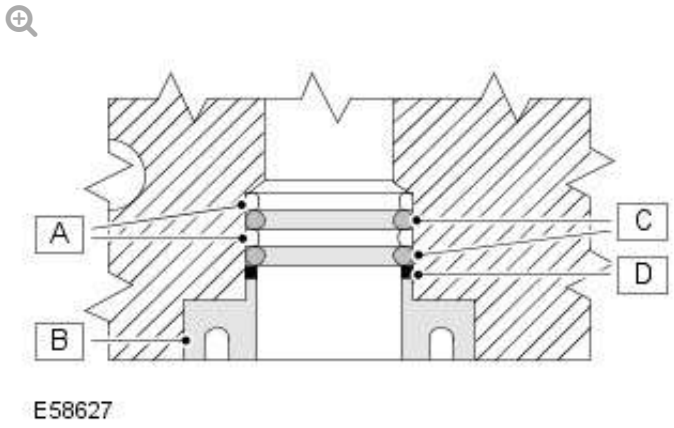
1.

CAUTION:

Install new O-ring seals.

NOTE:

Check the valve block O-rings and plastic spacer washers are correctly installed.



1. A: Backing rings (white)
2. B: Outer clamping ring
3. C: O-ring seals
4. D: Outer backing ring (black)

2. To install reverse the removal procedure.

3. Refer to: Active Stabilization System Bleeding (204-06 Ride and Handling Optimization, General Procedures).

RIDE AND HANDLING OPTIMIZATION

DYNAMIC RESPONSE HYDRAULIC PUMP PRESSURE HOSE (G1561064)

REMOVAL AND INSTALLATION

SPECIAL TOOL(S)

204-591-01

Dynamic Response Bleed Bottle

JLR-204-591-03

Adaptor, Dynamic Response Bleed Bottle

REMOVAL

WARNING:

Be prepared to collect escaping fluid.

CAUTIONS:

- Dynamic Response system components are manufactured to very precise tolerances. It is therefore essential that absolute cleanliness is observed when working with these components. Always install blanking plugs to any open orifices or lines. Failure to follow this instruction may result in foreign matter ingress to the dynamic response system.
- Make sure that all openings are sealed. Use new blanking caps.

NOTES:

- Some illustrations may show the engine removed for clarity.
- RHD shown, LHD is similar.

	All vehicles

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

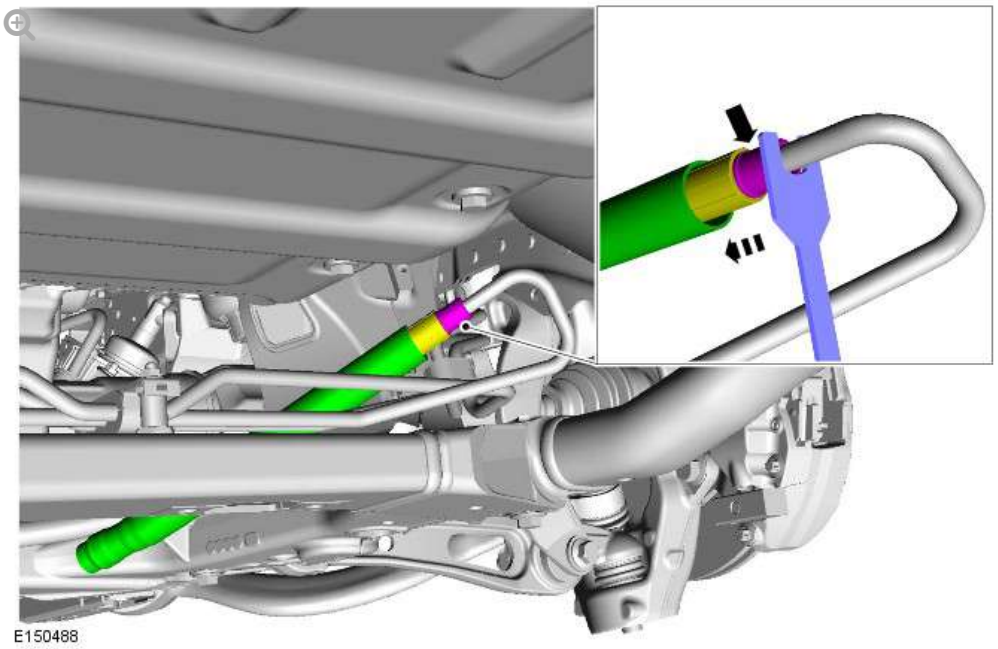
   Raise and support the vehicle.

2. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).

3. Refer to: Engine Undershield (501-02 Front End Body Panels, Removal and Installation).

4. **NOTE:**

   Using a suitable tool, disconnect the high-pressure line.

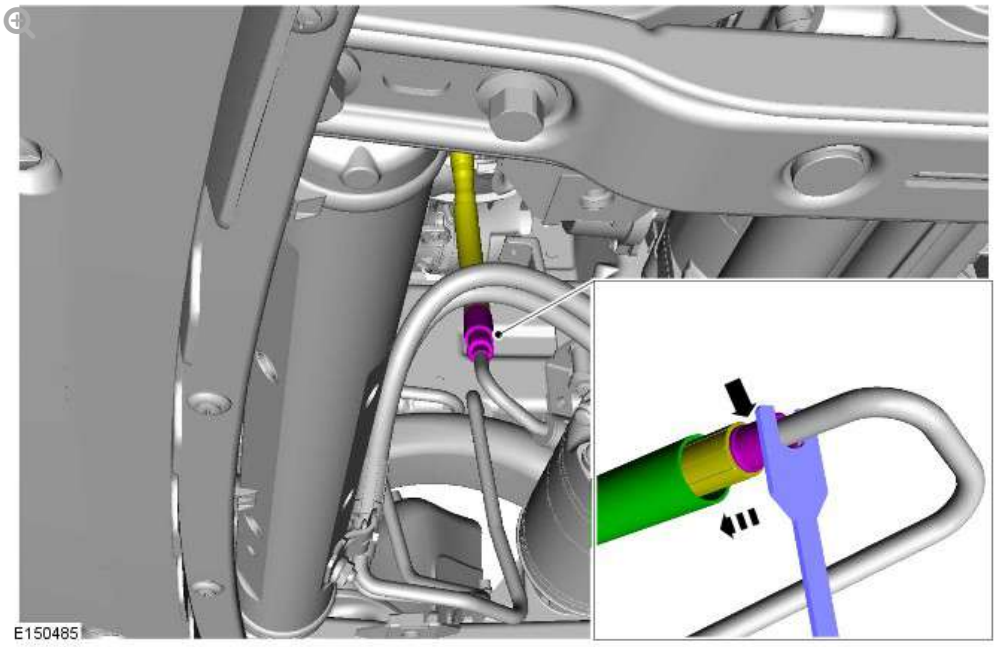


Vehicles with 5.0L engine

5.

NOTE:

Using a suitable tool, disconnect the high-pressure line.

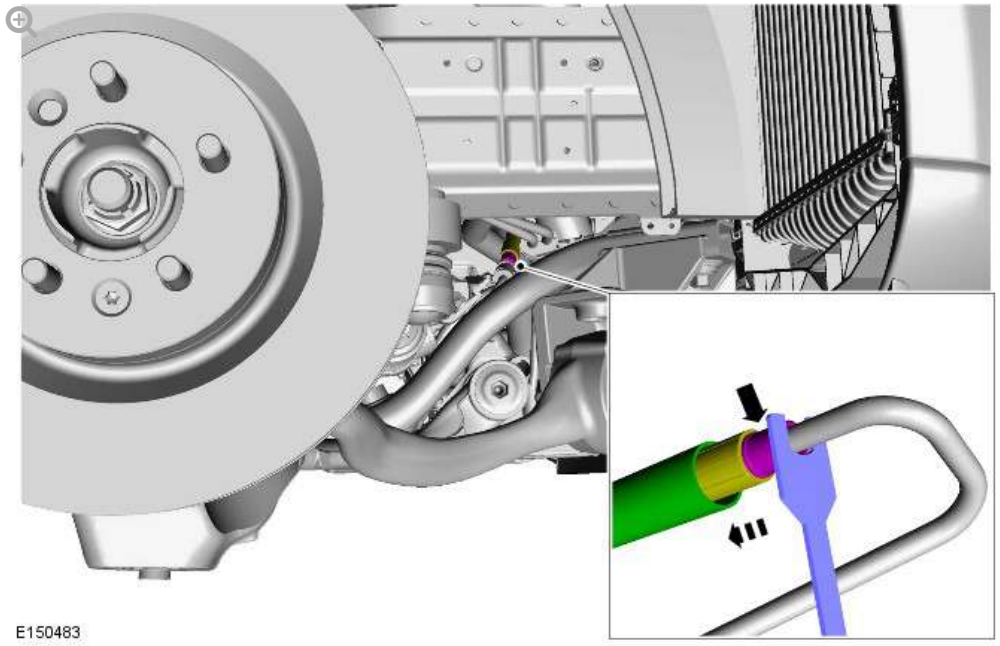


Vehicles with 4.4L diesel engine

6.

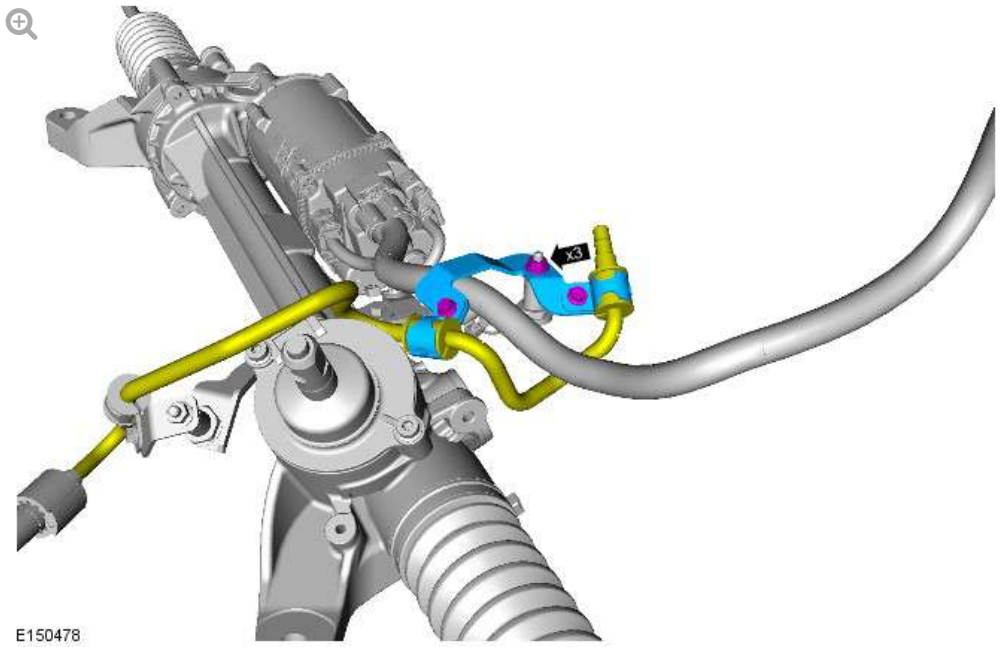
NOTE:

Using a suitable tool, disconnect the high-pressure line.



E150483

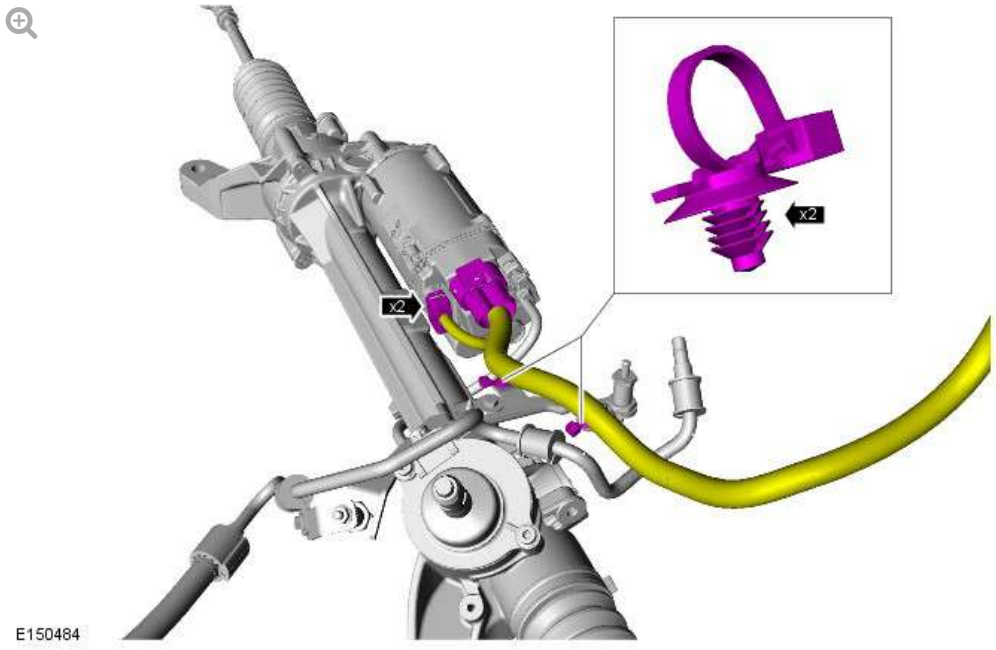
7.



E150478

All vehicles

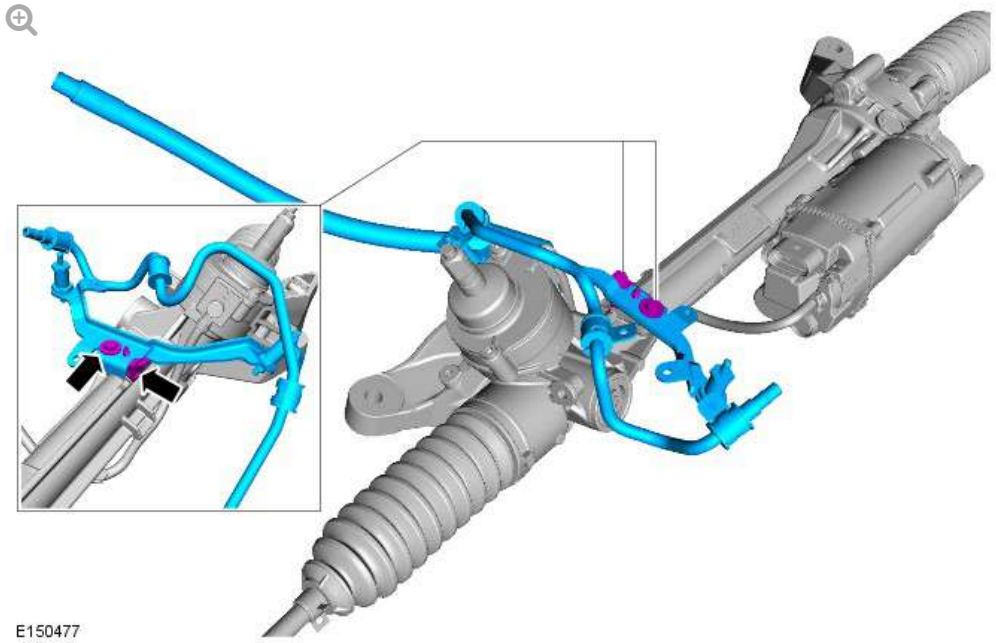
8.



9.

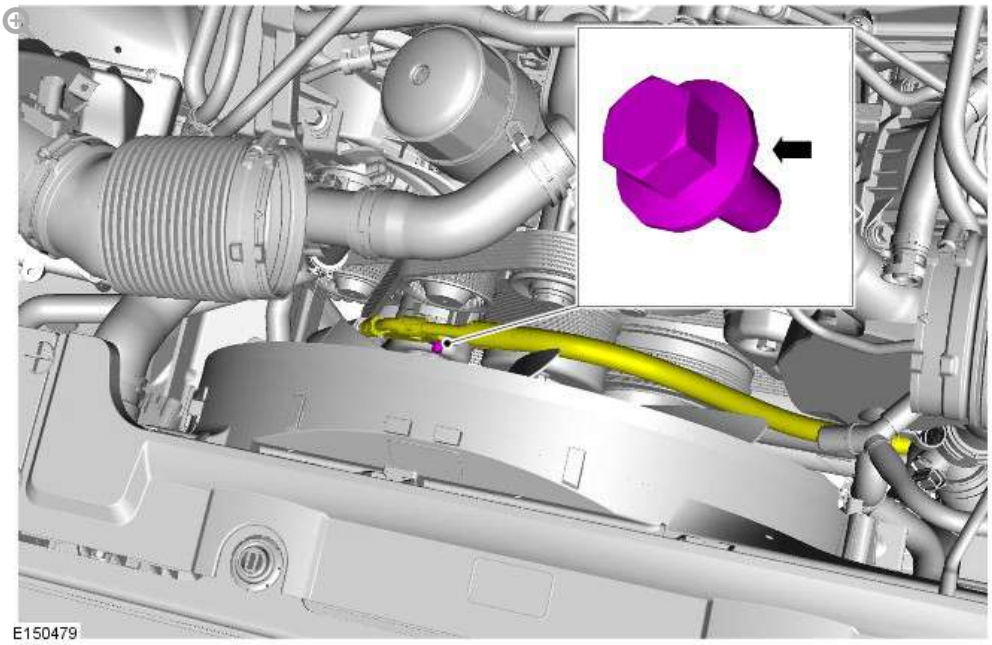
CAUTION:

Make the components are aligned as shown.

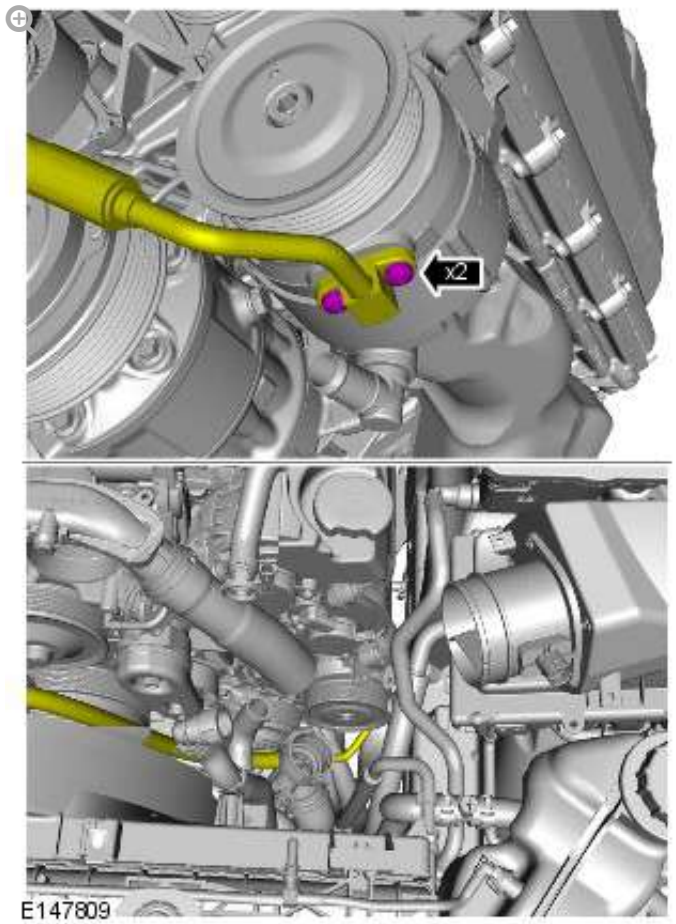


Vehicles with 5.0L engine

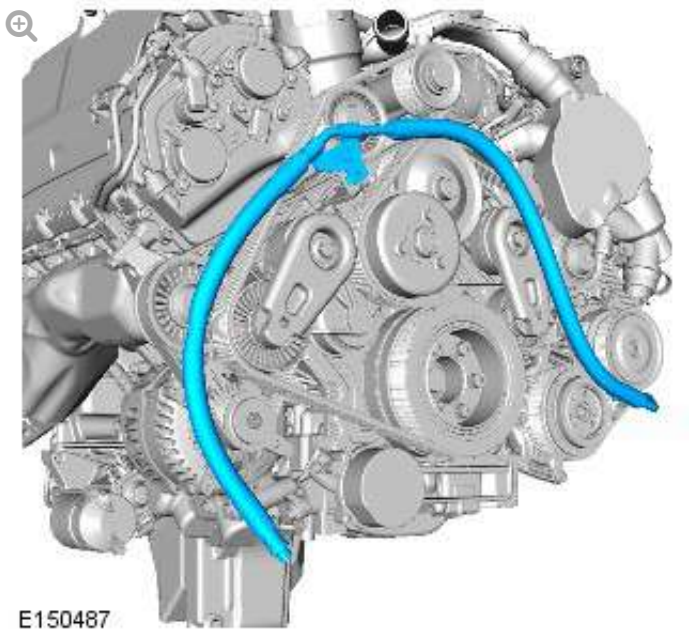
10. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12D Intake Air Distribution and Filtering - V8 S/C 5.0L Petrol, Removal and Installation).

11. 

12.



13.

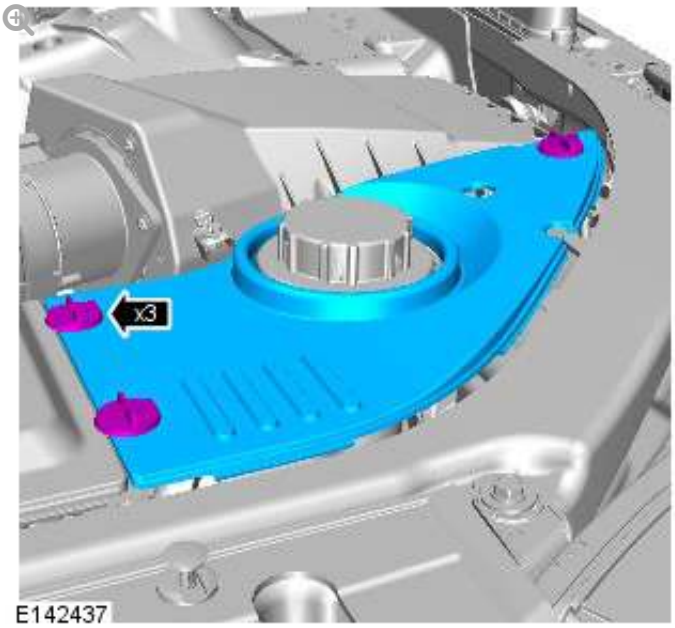


	Vehicles with 4.4L diesel engine

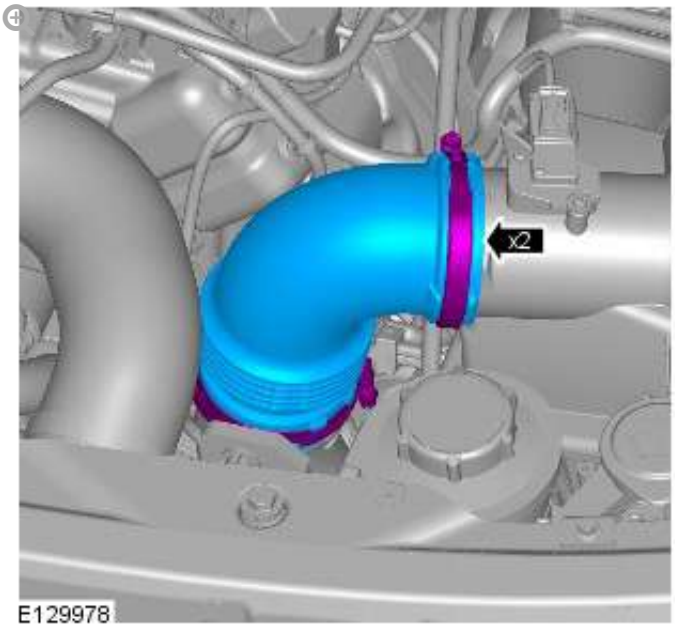
14. Refer to: Engine Cover - 4.4L V8 - TdV8 (501-05 Interior Trim and

Ornamentation, Removal and Installation).

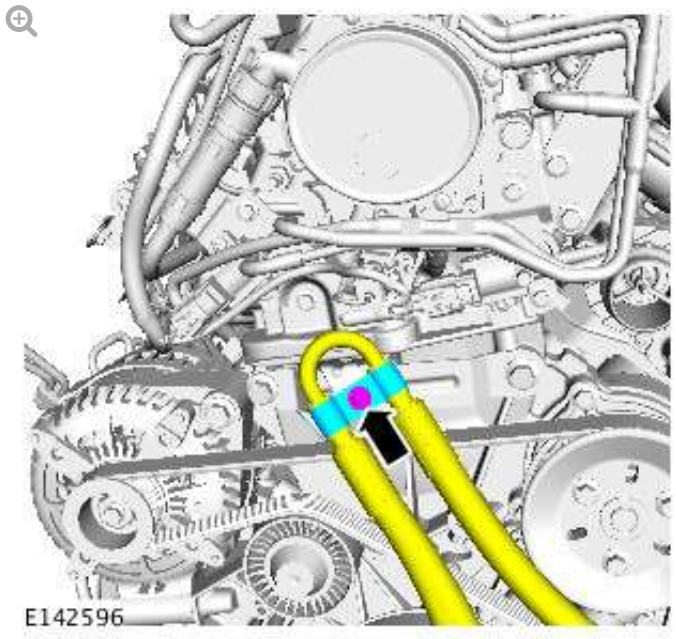
15.



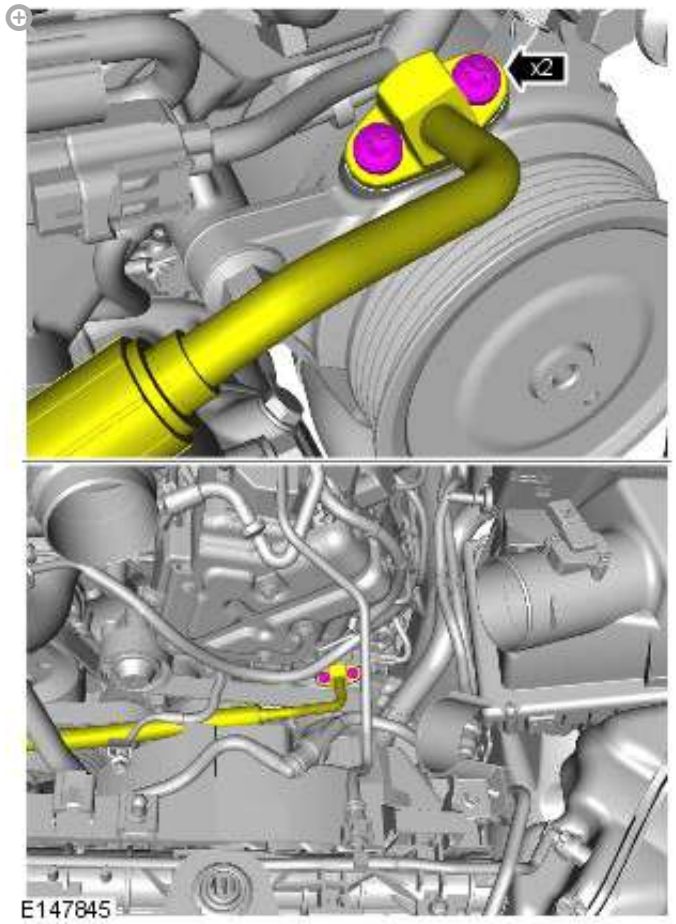
16.



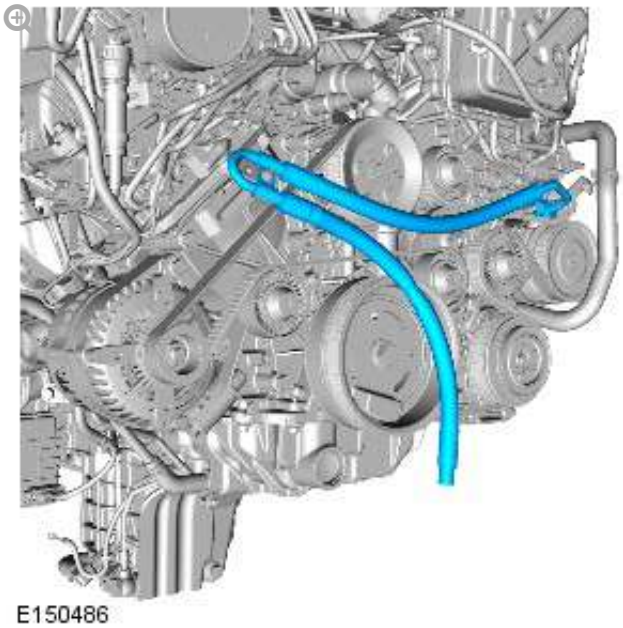
17.



18.



19.

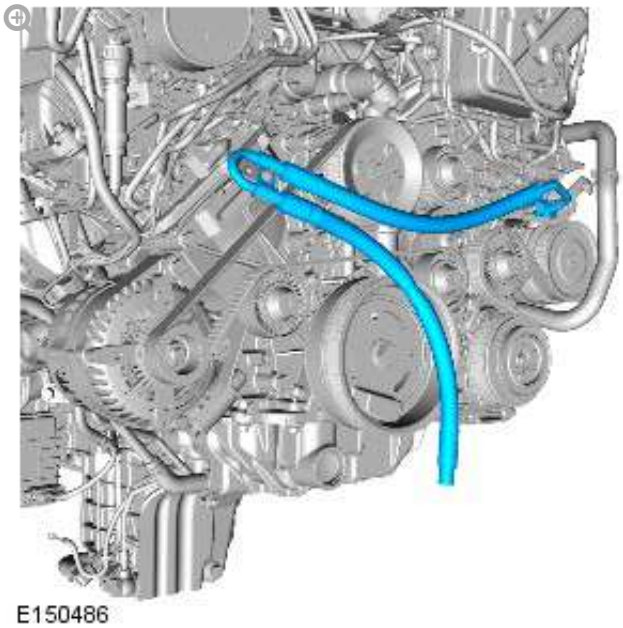


E150486

INSTALLATION

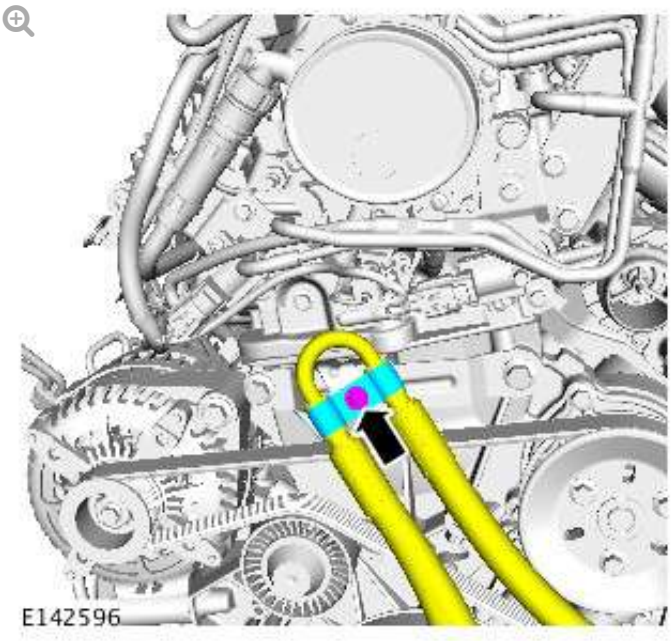
Vehicles with 4.4L diesel engine

1.



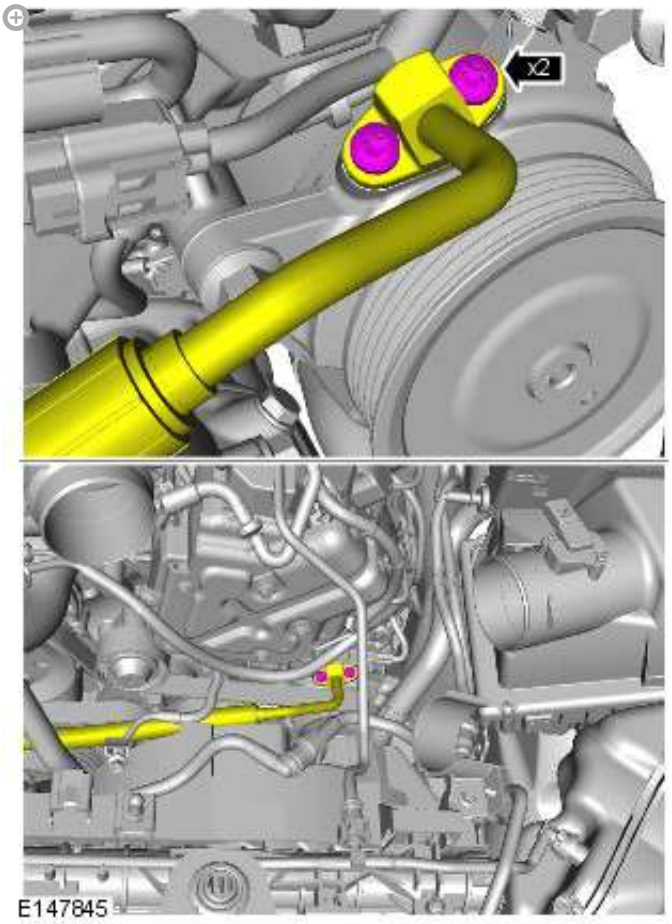
E150486

2.



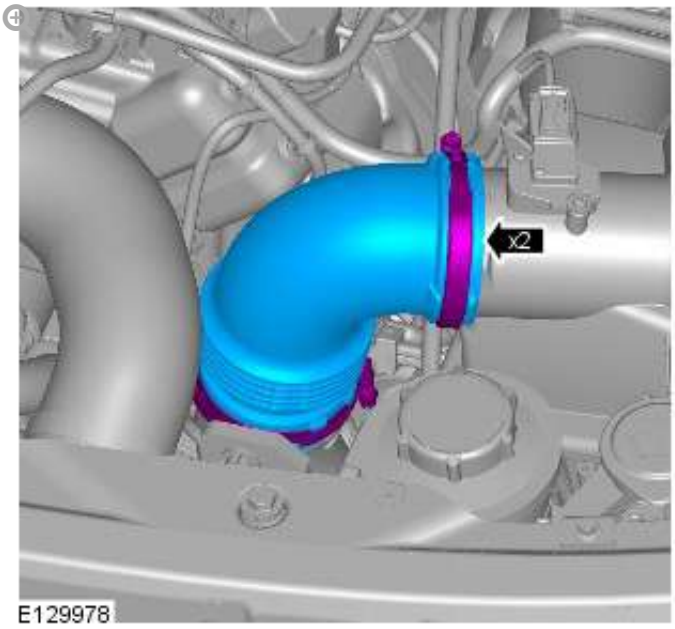
Torque: **10 Nm**

3.

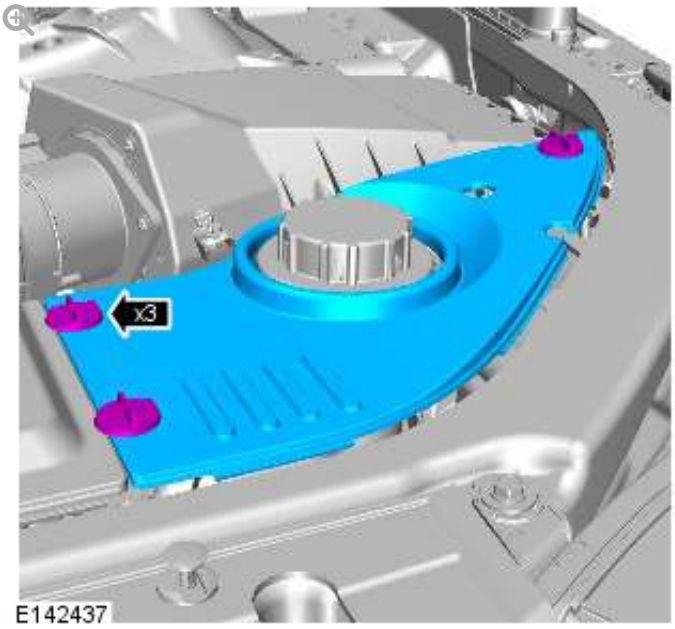


Torque: **10 Nm**

4.



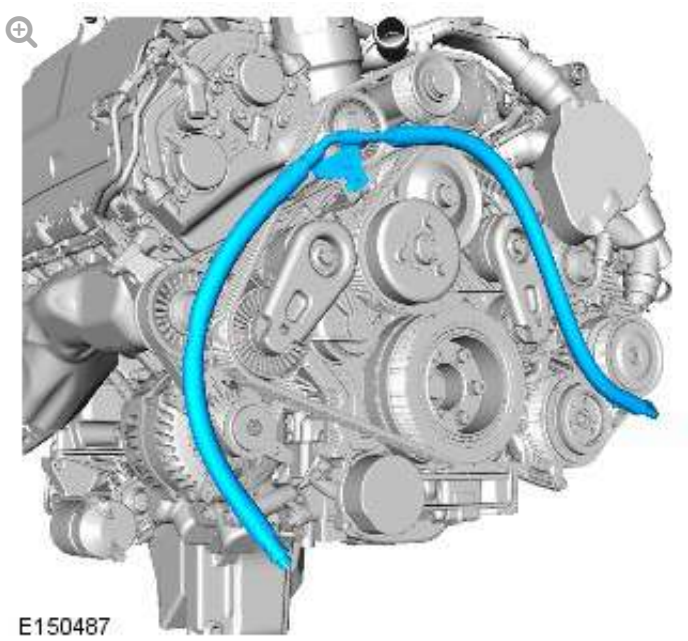
5.



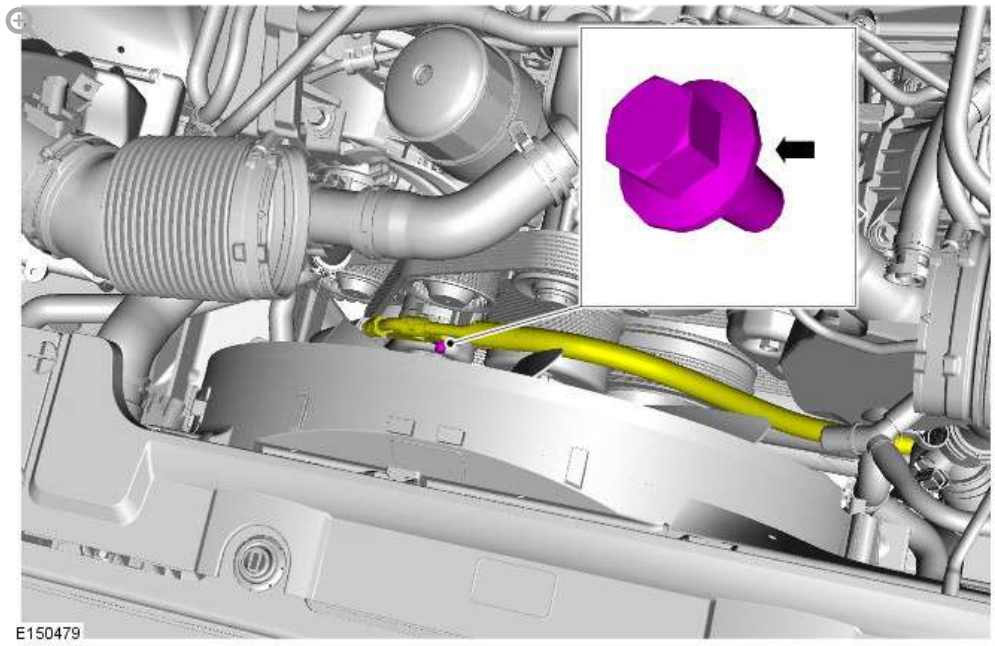
6. Refer to: Engine Cover - 4.4L V8 - TdV8 (501-05 Interior Trim and Ornamentation, Removal and Installation).

	Vehicles with 5.0L engine

7.

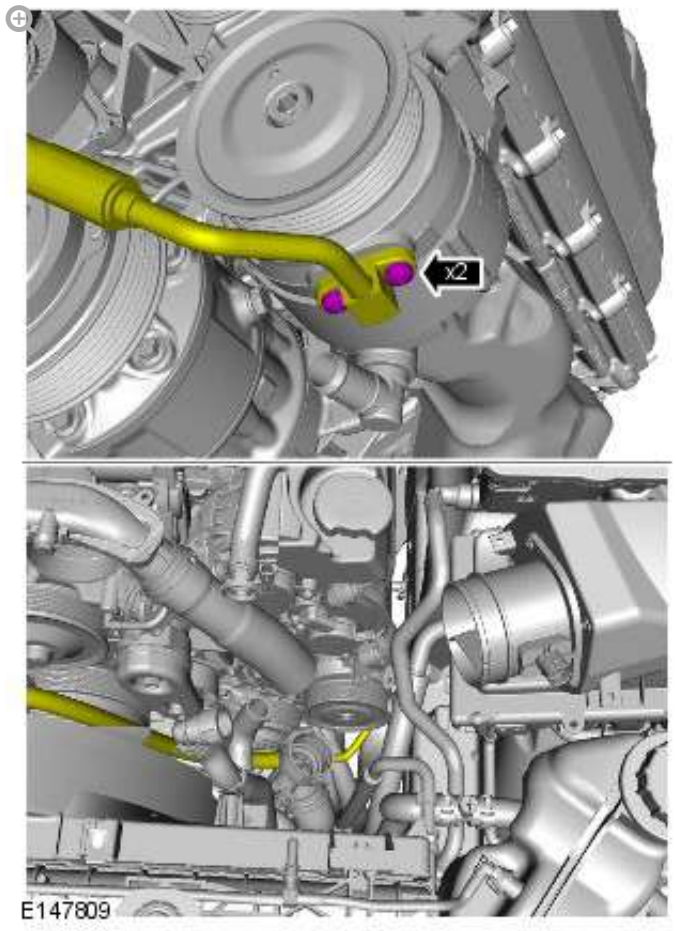


8.



Torque: **10 Nm**

9.



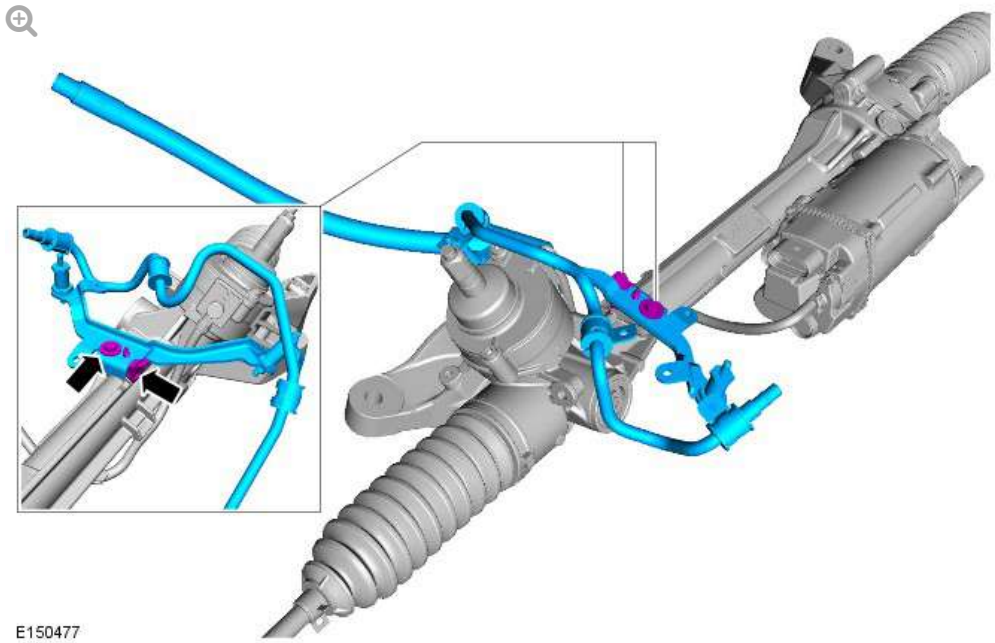
Torque: **10 Nm**

10. Refer to: Air Cleaner Outlet Pipe T-Connector (303-12D Intake Air Distribution and Filtering - V8 S/C 5.0L Petrol, Removal and Installation).

ℹ	All vehicles

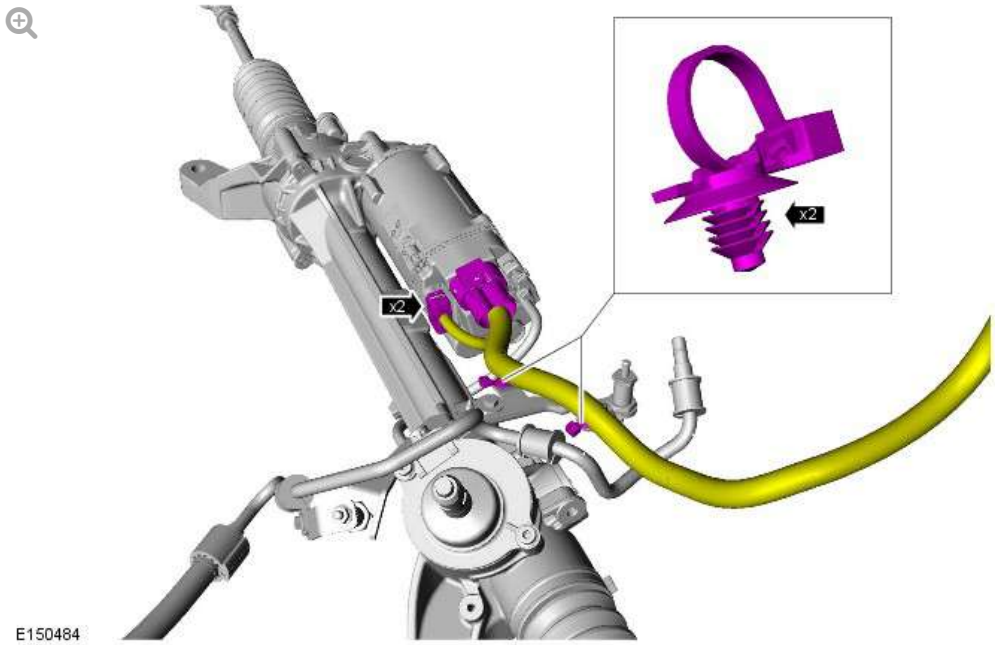
11. **CAUTION:**

Make the components are aligned as shown.



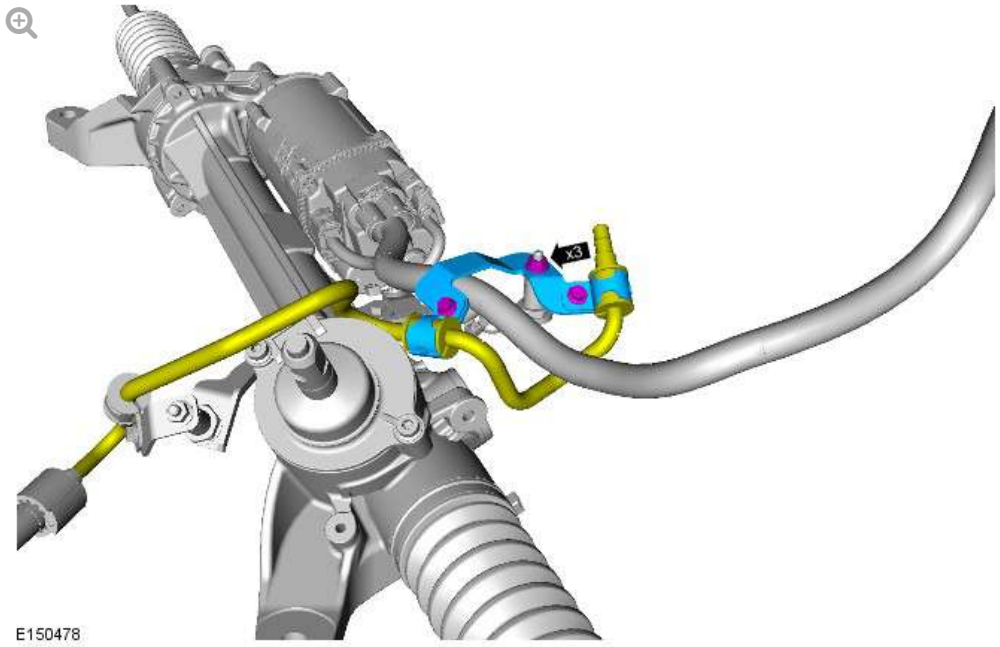
Torque: **10 Nm**

12.



Vehicles with 4.4L diesel engine

13.

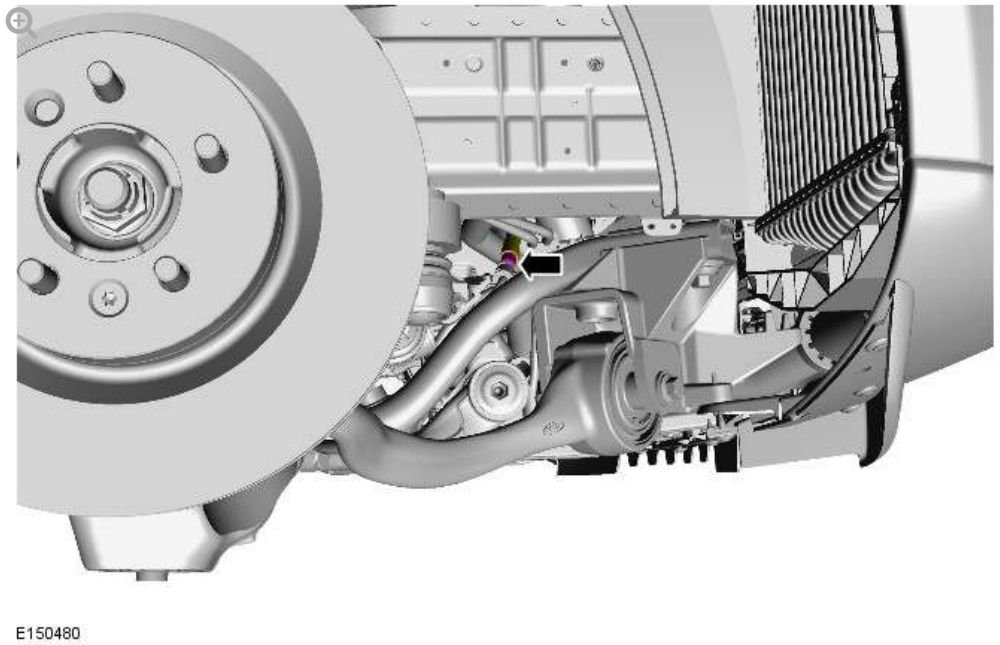


Torque: **10 Nm**

14.

NOTE:

Pull on the two halves of the high-pressure line connector to make sure the latch has fully engaged.



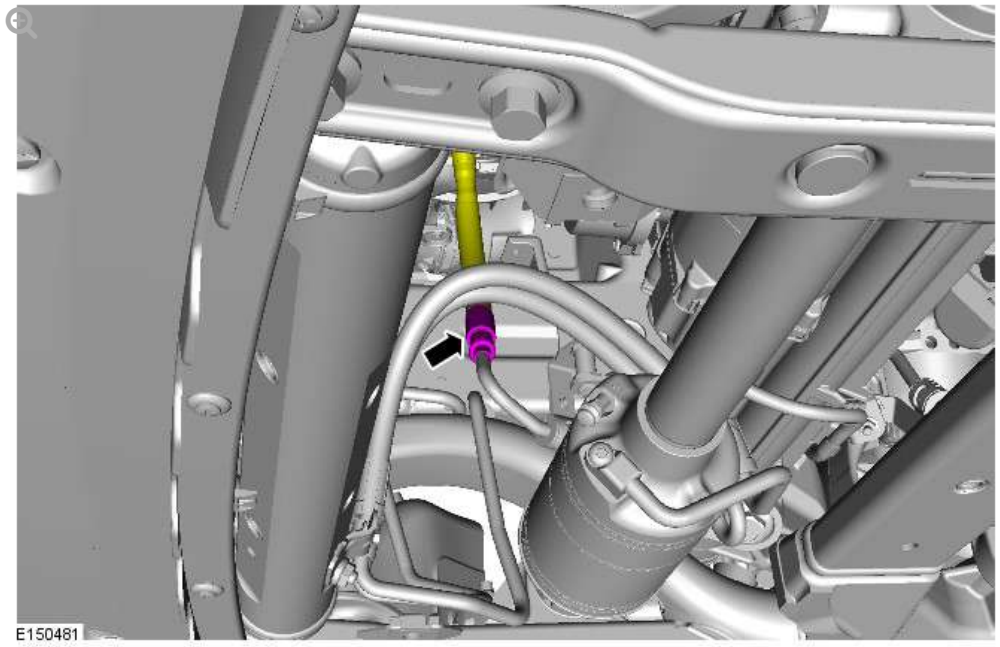
Support both sides of quick connection, when connecting high-pressure line.

Vehicles with 5.0L engine

15.

NOTE:

Pull on the two halves of the high-pressure line connector to make sure the latch has fully engaged.



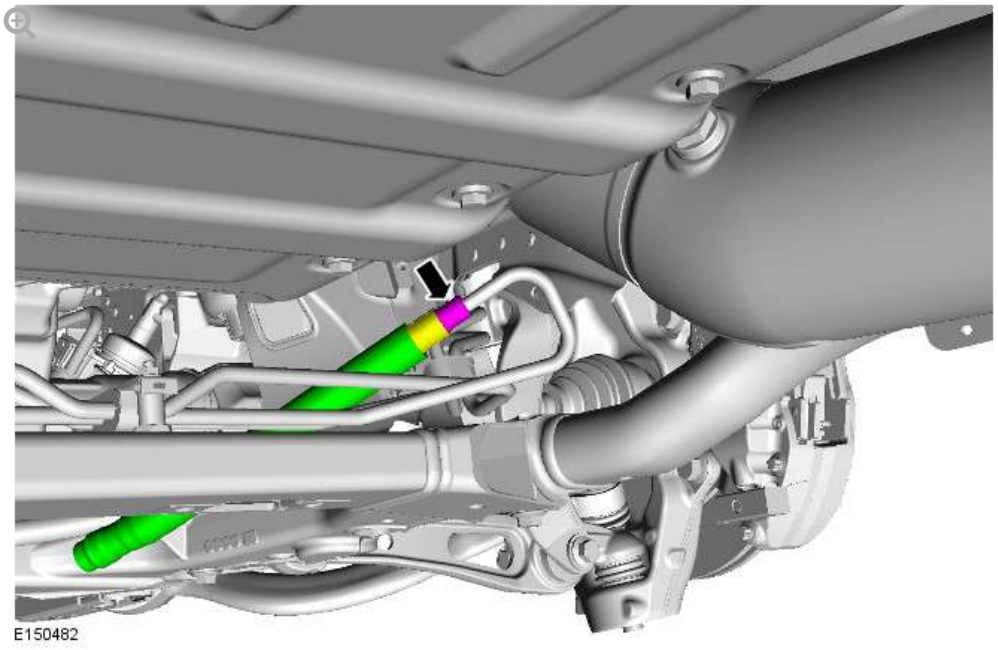
Support both sides of quick connection, when connecting high-pressure line.

All vehicles

16.

NOTE:

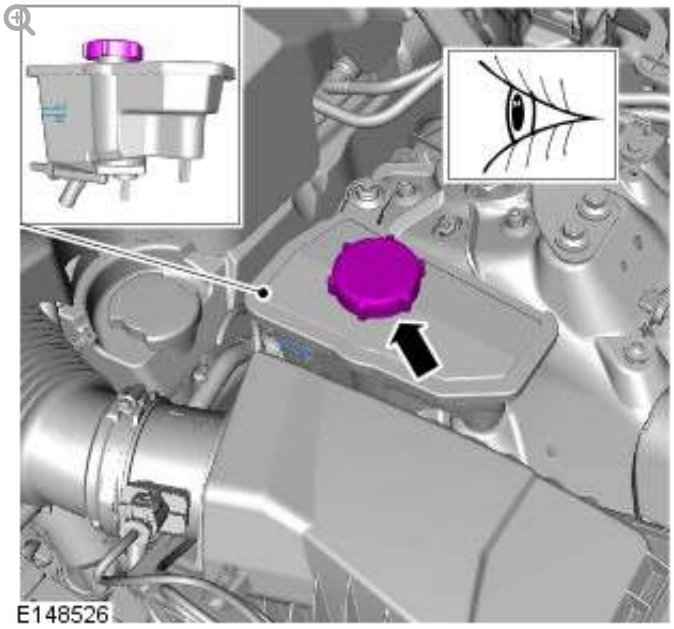
Pull on the two halves of the high-pressure line connector to make sure the latch has fully engaged.



Support both sides of quick connection, when connecting high-pressure line.

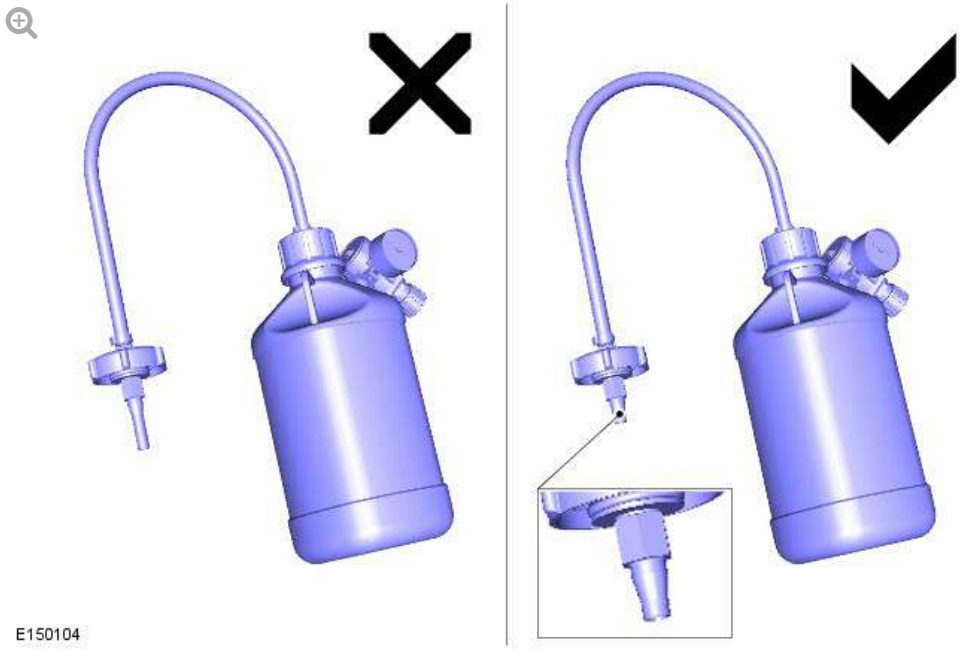
17. Refer to: Engine Undershield (501-02 Front End Body Panels, Removal and Installation).

18. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).

19. 

Check and top-up the dynamic response system fluid reservoir.

20.

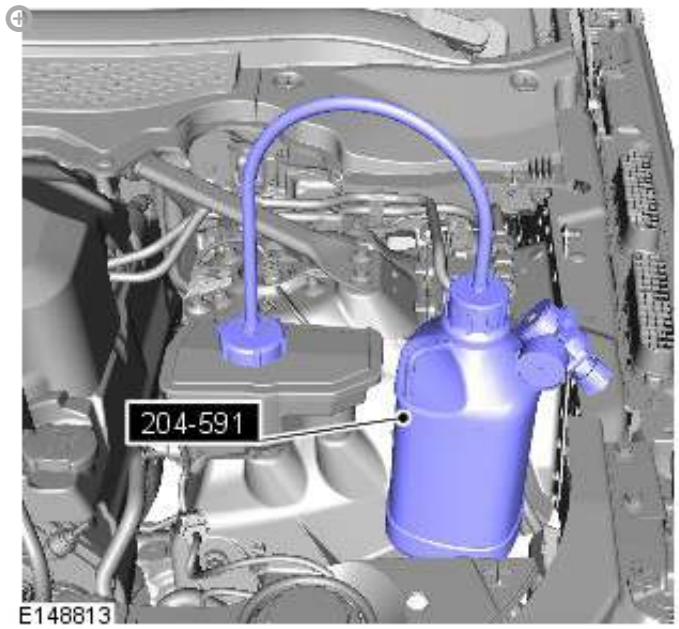


Install the new adaptor to the Dynamic response bleed bottle.

21.

NOTE:

Install the special tool to the dynamic response reservoir.

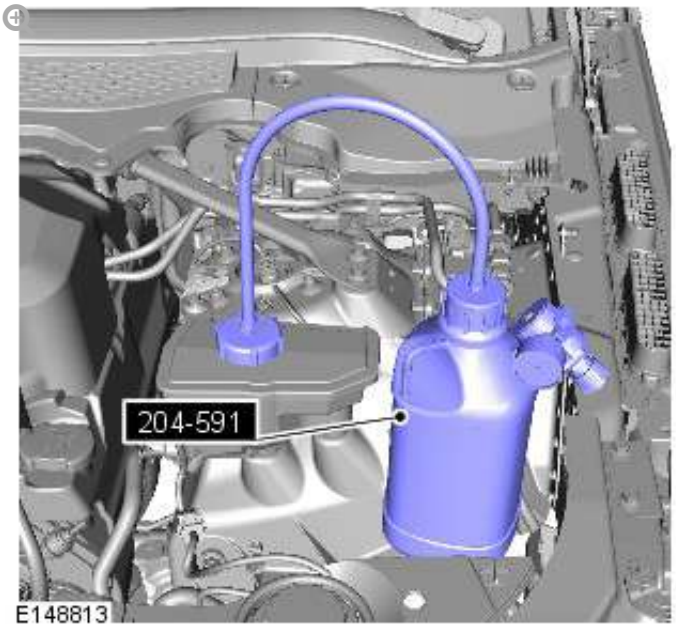


1. Completely fill the reservoir with fluid.
2. Make sure the pressure regulator on the special tool is

turned OFF.

3. Fill the special tool bottle approximately three-quarters full with fluid.
4. Connect the special tool to a suitable workshop air supply.
5. Using the special tool pressure regulator, carfully incrase the air pressure to approx. 5 - 10PSI / 0.3 - 0.7kPa
   Special Tool(s): 204-591-01, JLR-204-591-03

22.



Start engine and run for 1 minute.

23.

WARNING:

> The special tool is still pressurised when the source air pressure is removed. Release air pressure within special tool slowly before removing.

Remove the special tool from the dynamic response system reservoir.

24. Check that there is fluid circulating in the reservoir.

25. Run the engine for 5 minutes, stopping and starting several times. This is to encourage any air trapped in the primary circuit to be expelled by reservoir.

26. Check and top-up dynamic response fluid reservoir.

RIDE AND HANDLING OPTIMIZATION

VALVE BLOCK TO REAR STABILIZER BAR ACTUATOR PIPE ASSEMBLY (G1561065)

REMOVAL AND INSTALLATION

REMOVAL

NOTE:

Removal steps in this procedure may contain installation details.

1. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Rear Subframe (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

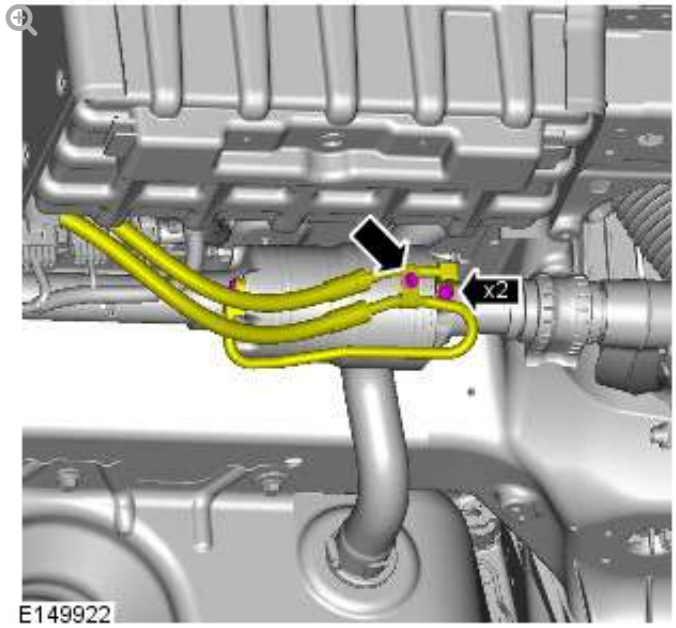
3.

CAUTIONS:

- Be prepared to collect escaping fluids.
- Make sure that all openings are sealed. Use new blanking caps.

NOTE:

Install new O-ring seals.



Torque:

M6 **9 Nm**

M8 Torx **22 Nm**

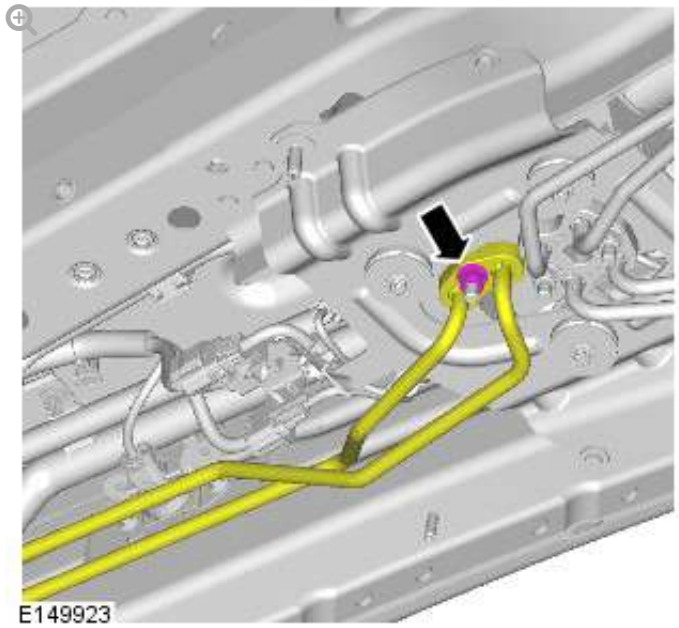
4.

CAUTIONS:

- Be prepared to collect escaping fluids.
- Make sure that all openings are sealed. Use new blanking caps.

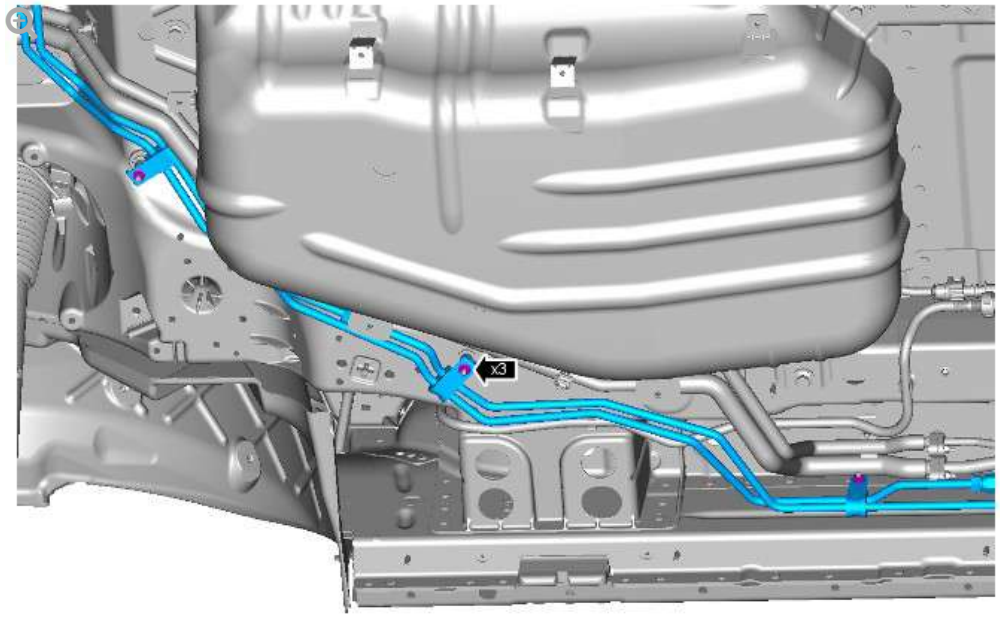
NOTE:

Install a new O-ring seal.



Torque: **22 Nm**

5.



E149924

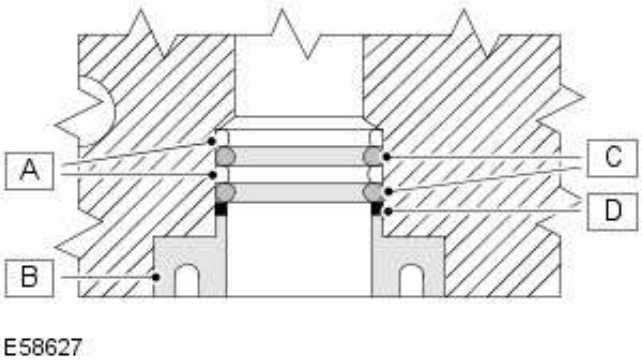
Torque: **10 Nm**

INSTALLATION

1.

NOTE:

Check the valve block O-rings and plastic spacer washers are correctly installed.



E58627

1. A: Backing rings (white)

2. B: Outer clamping ring

3. C: O-ring seals
4. D: Outer backing ring (Black)

2. Refer to: Active Stabilization System Bleeding (204-06 Ride and Handling Optimization, General Procedures).
3. To install, reverse the removal procedure.

PUBLISHED: 12-SEP-2012
2015.0 RANGE ROVER (LG), 204-06

RIDE AND HANDLING OPTIMIZATION

FLUID PUMP - TDV8 4.4L DIESEL (G1551259)

REMOVAL AND INSTALLATION

60.60.10	PUMP - ACTIVE CORNERING ENHANCEMENT (ACE) - RENEW	4400 CC, TDV8	2.1	USED WITHINS

REMOVAL

CAUTION:

Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-00 Battery and Charging System - General Information, Specifications).

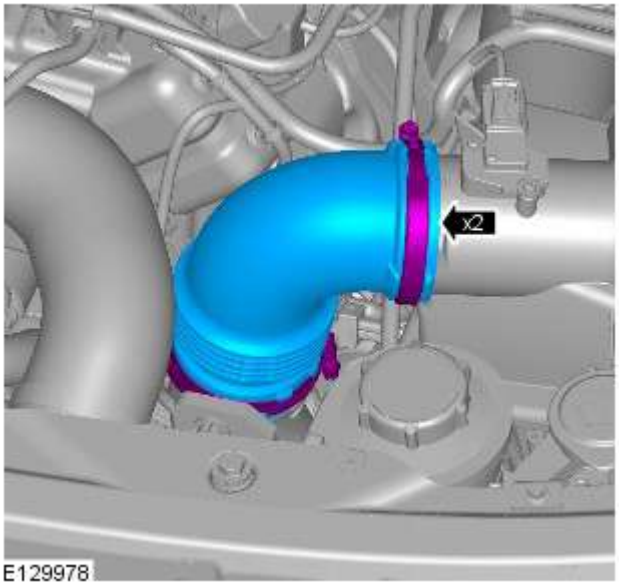
2. **WARNING:**

   Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

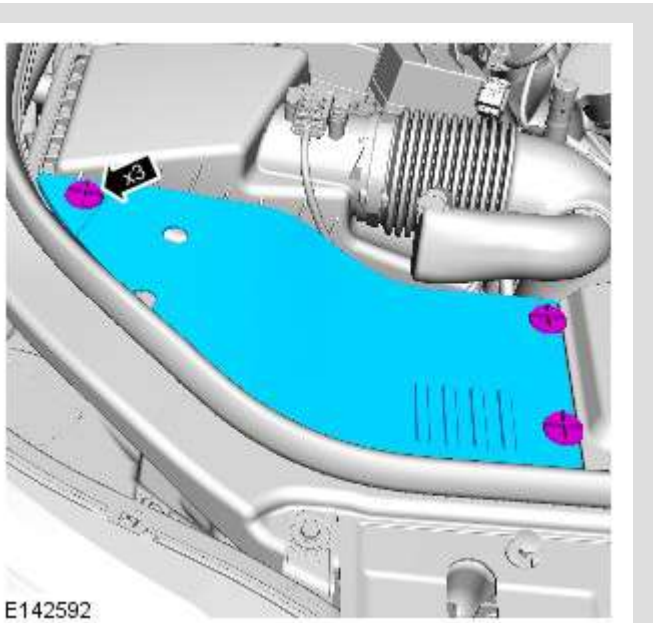
3. Refer to: Engine Cover - 4.4L V8 - TdV8 (501-05 Interior Trim and Ornamentation, Removal and Installation).

4.



Torque: **3.5 Nm**

5.



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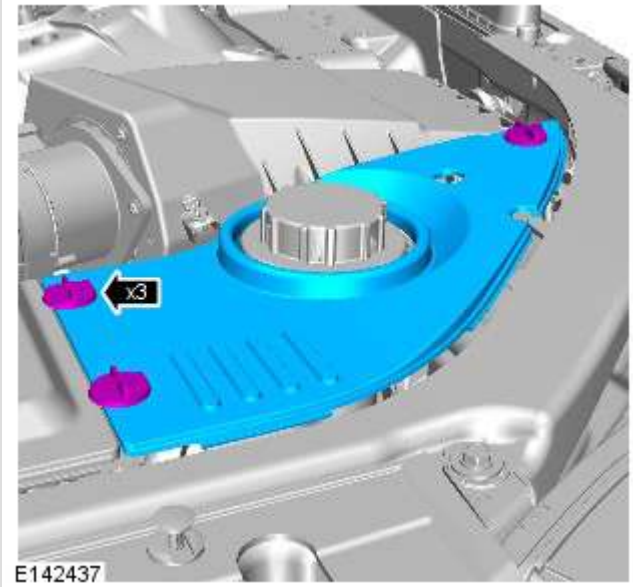

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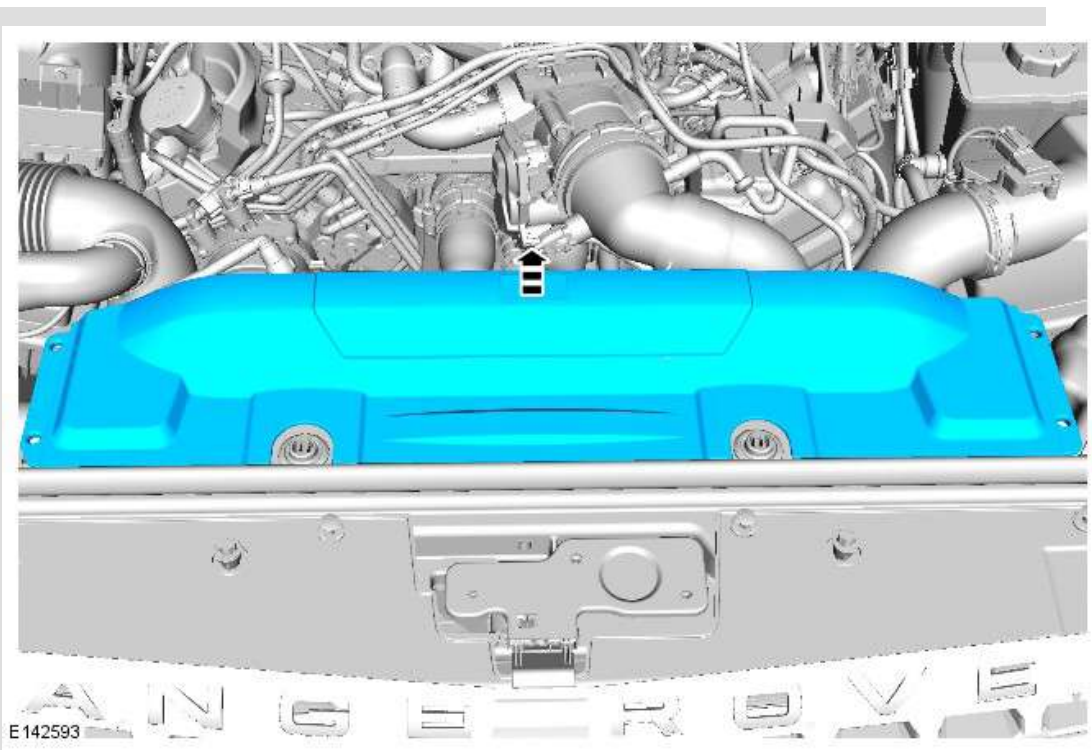

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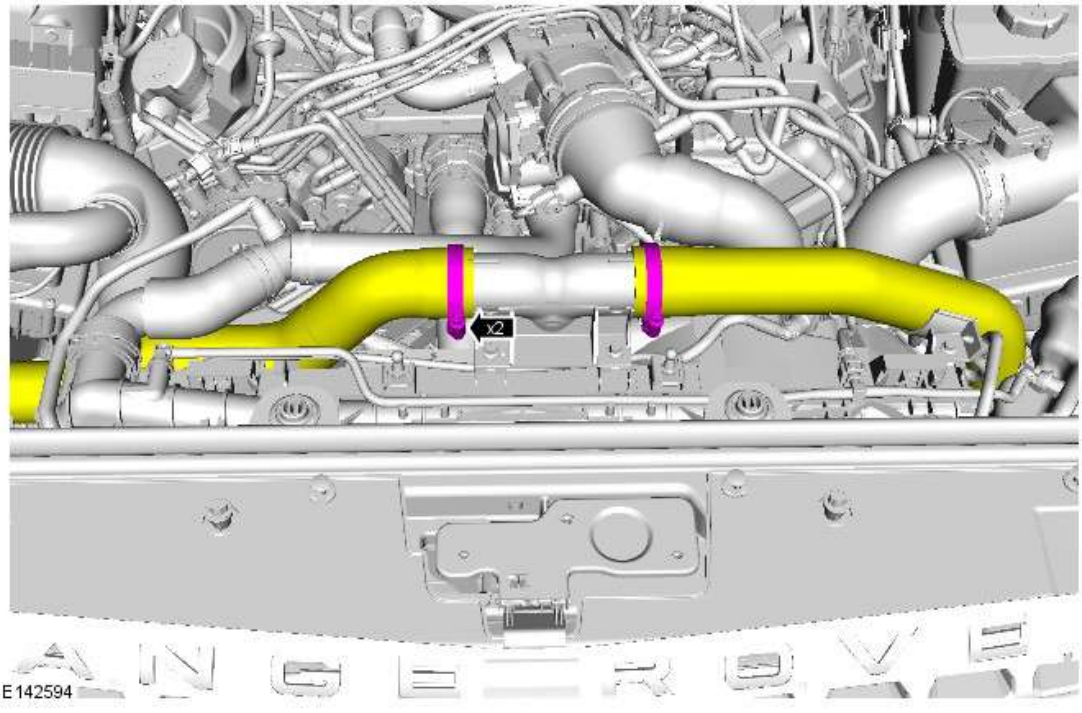

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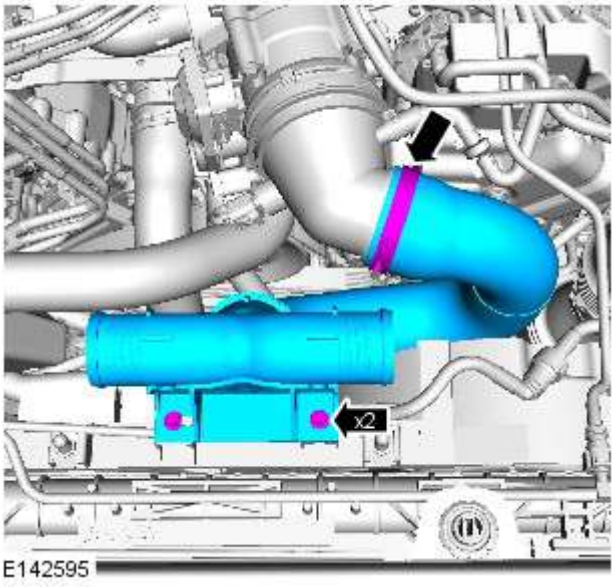
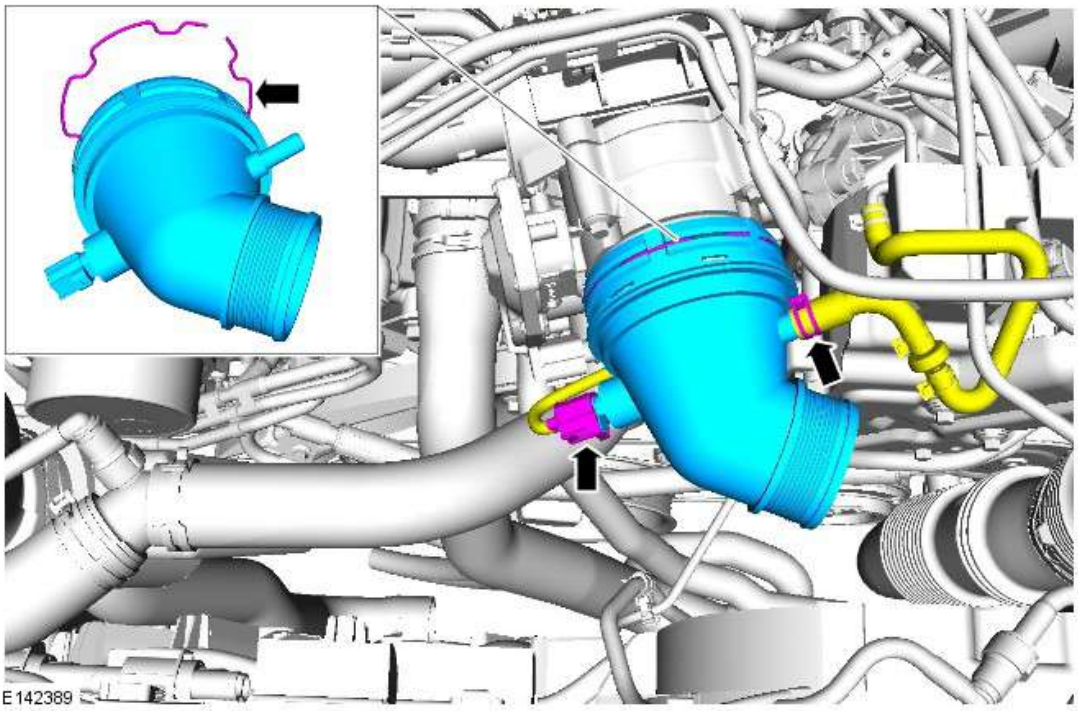


Torque: **10 Nm**

10.



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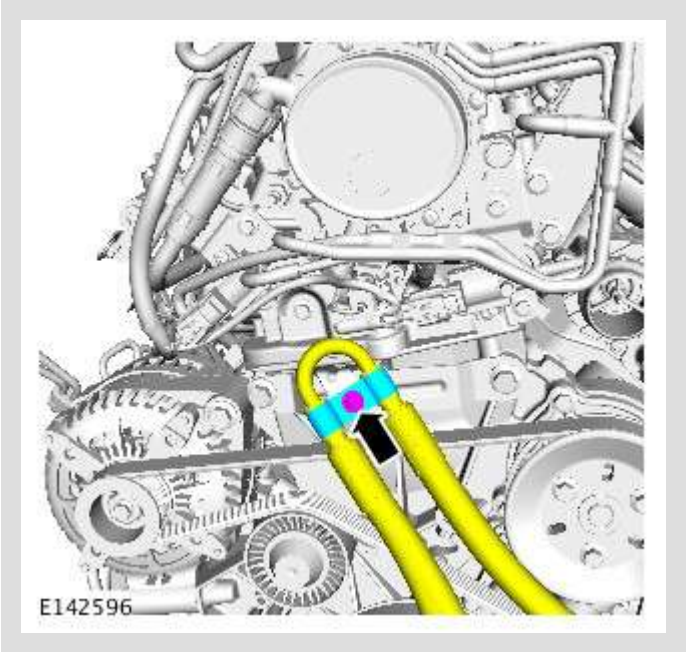
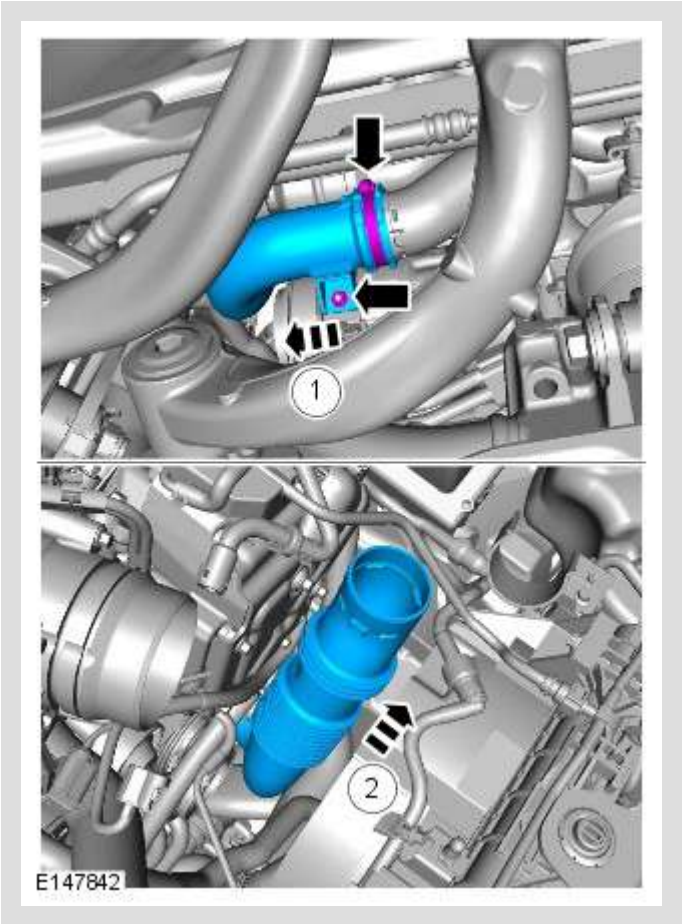


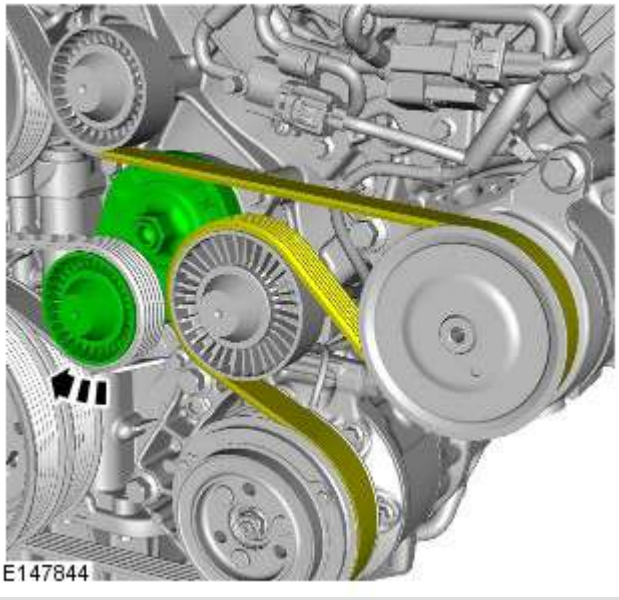
Torque: **10 Nm**

12.



Torque: **10 Nm**

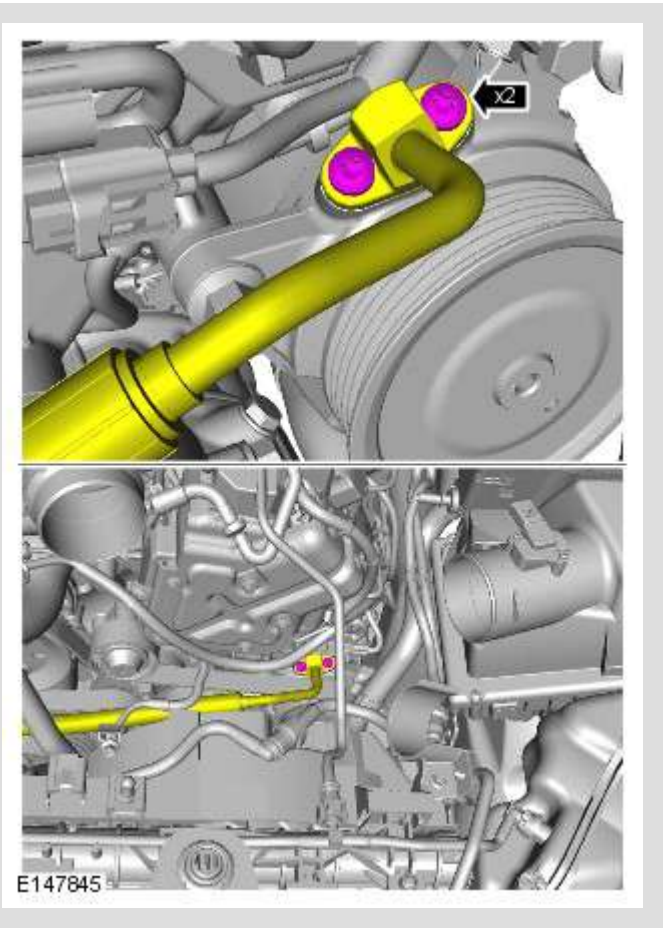
13.



14.

CAUTION:

Be prepared to collect escaping fluids.

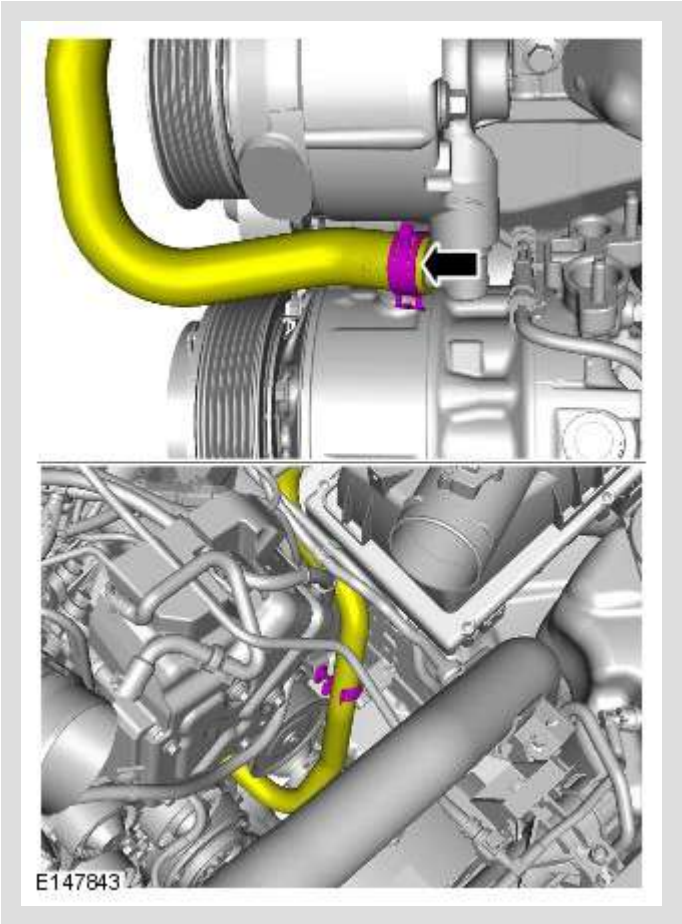


Torque: **10 Nm**

15.

CAUTION:

Be prepared to collect escaping fluids.



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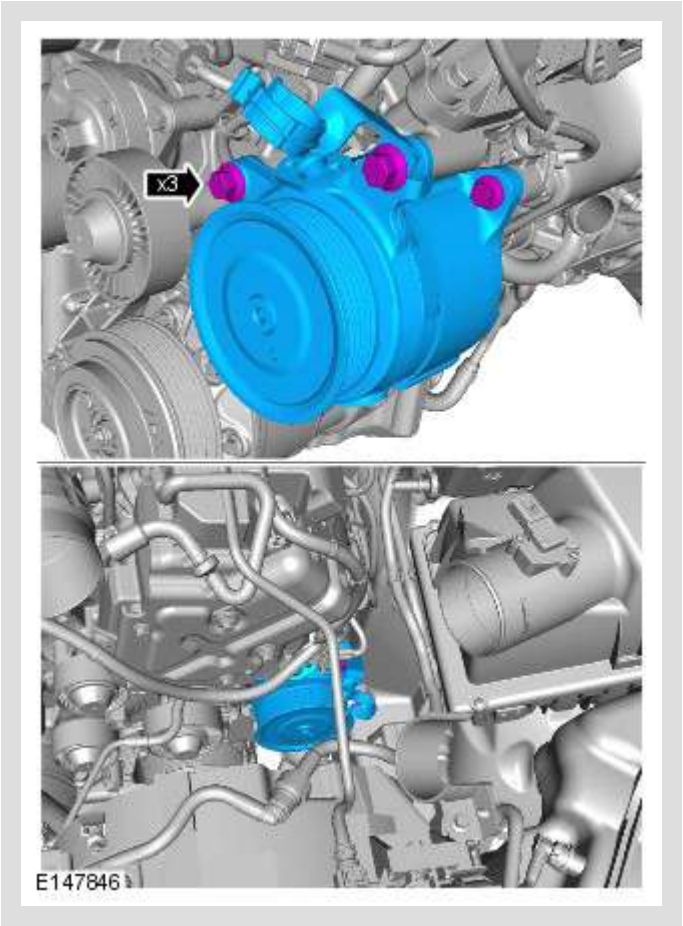


Torque:

M10 **48 Nm**

M8 **25 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. Refer to: Active Stabilization System Bleeding (204-06 Ride and Handling Optimization, General Procedures).

PUBLISHED: 04-AUG-2012
2014.0 RANGE ROVER (LG), 204-06

RIDE AND HANDLING OPTIMIZATION

FLUID PUMP - V8 N/A 5.0L PETROL/V8 S/C 5.0L PETROL (G1551265)

60.60.10	PUMP - ACTIVE CORNERING ENHANCEMENT (ACE) - RENEW	5000 CC, AJ V8, SUPERCHARGED	2.2	USED WITHINS

REMOVAL

CAUTION:

Before disconnecting or removing components, ensure the area around the joint faces and connections are clean. Plug open connections to prevent contamination.

NOTE:

Removal steps in this procedure may contain installation details.

1. Disconnect the battery ground cable.
   Refer to: Specifications (414-00, Specifications).

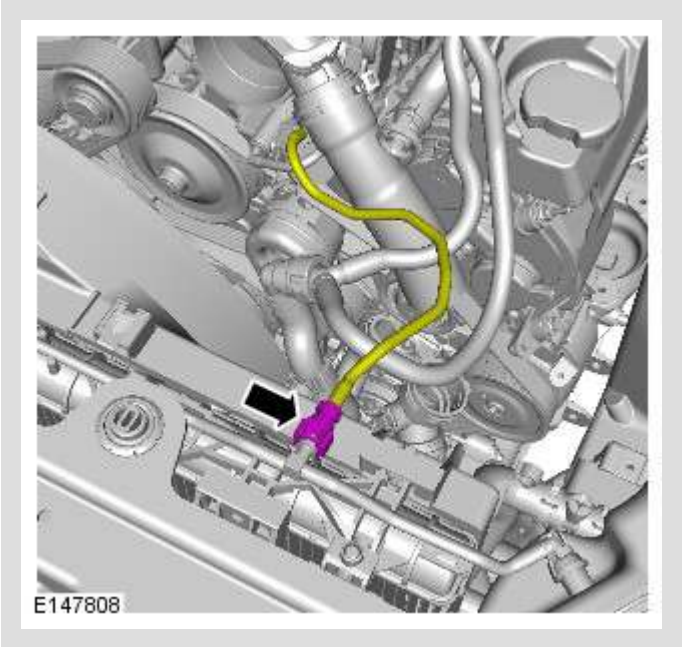
2. **WARNING:**

   Make sure to support the vehicle with axle stands.

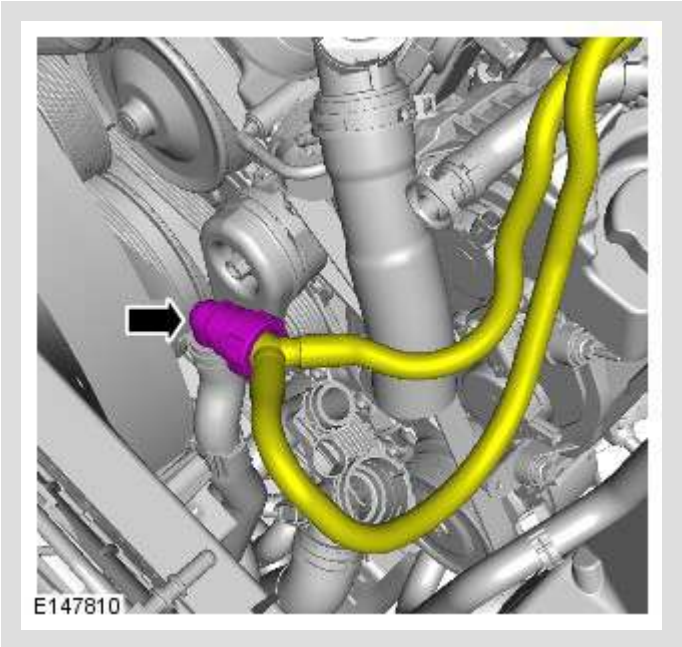
   Raise and support the vehicle.

3. Refer to: Thermostat Housing - V8 S/C 5.0L Petrol (303-03, Removal and Installation).

4.



5.



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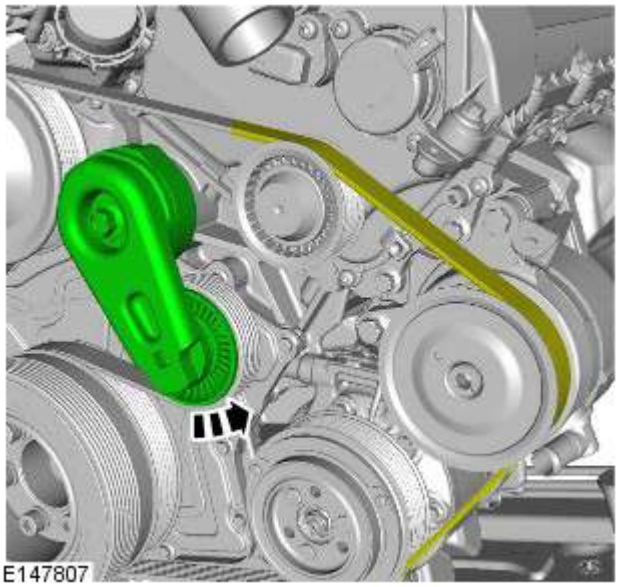
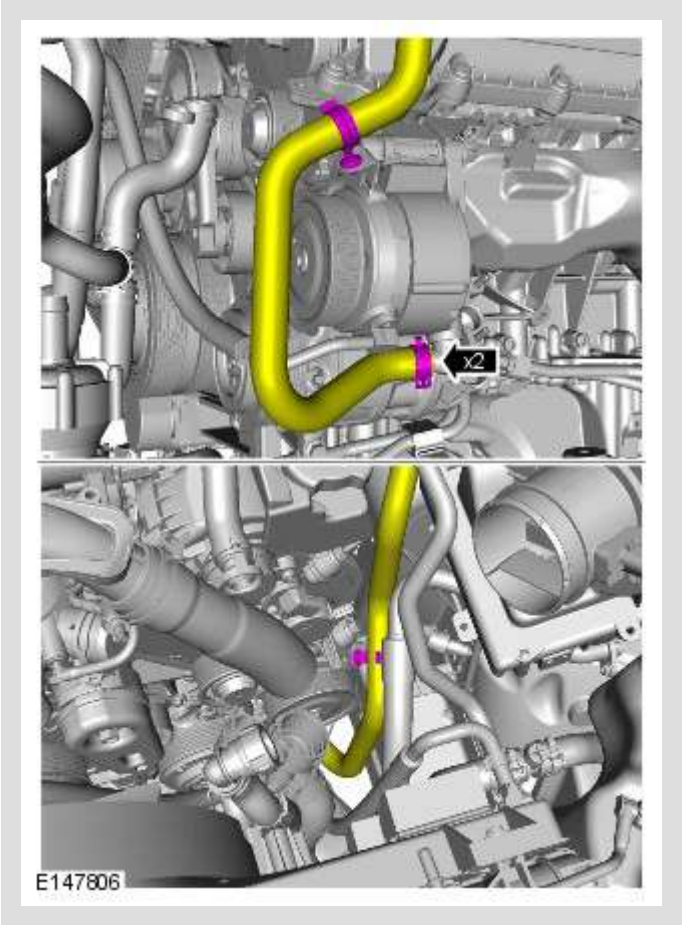


7.

CAUTION:

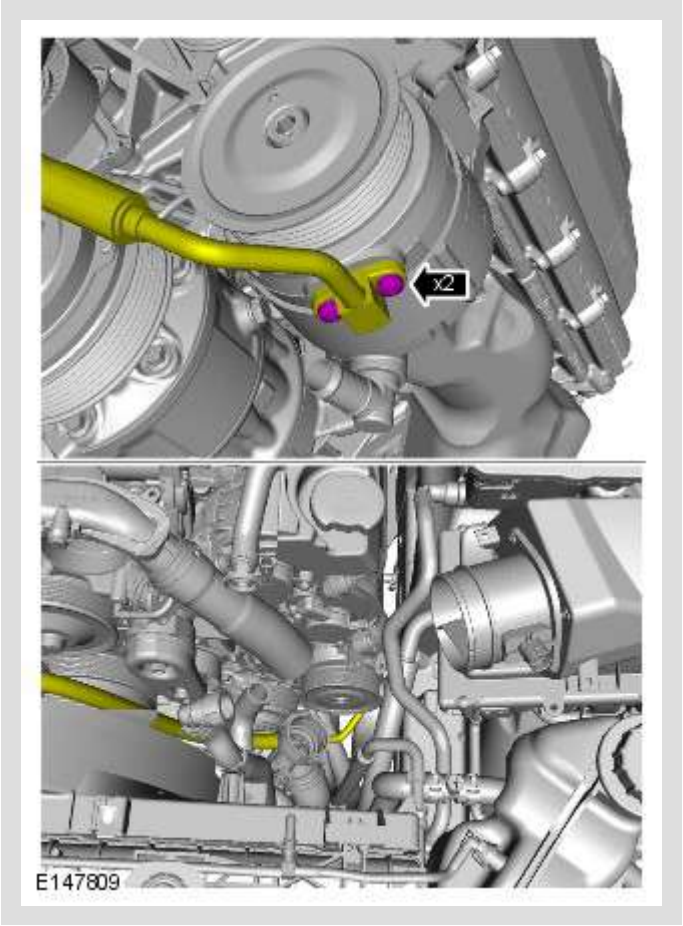
Be prepared to collect escaping fluids.



8.

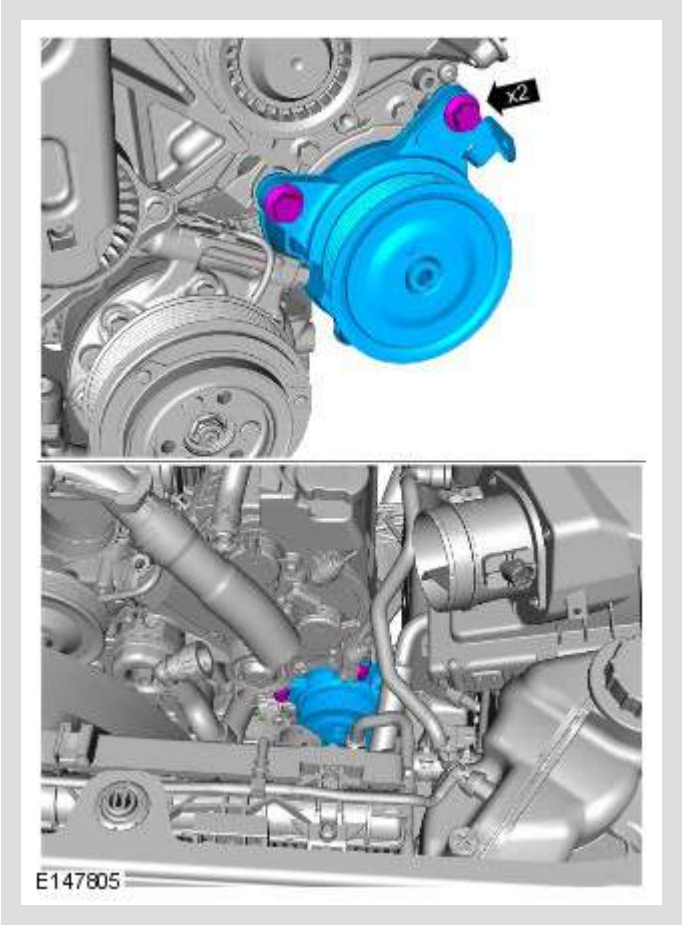
CAUTION:

Be prepared to collect escaping fluids.



Torque: **10 Nm**

9.



Torque: **48 Nm**

INSTALLATION

1. To install, reverse the removal procedure.

2. Refer to: Active Stabilization System Bleeding (204-06, General Procedures).