

Power Brake Actuation -**Sealant**

Application	Land Rover Part No.
Brake vacuum pump - 2.7 Litre engine	8510302

General Specifications

Item	Specification
Brake booster type	Twin chamber 228 and 254 mm (9.0 and 10.0 in)
Boost ratio	7:1
Brake vacuum pump make and type:	
V6 - 2.7 litre diesel engine	Bosch 240cc SWP
V6 - 4.0 litre and V8 - 4.4 litre petrol engine	Hella UP28

Torque Specifications

Description	Nm	lb-ft
Brake booster nut	23	17
Brake master cylinder nuts	26	19
M12 brake pipe unions	16	12
M14 brake pipe unions	18	13
Brake pedal buffer bolts	10	7
Brake vacuum pump nuts - 4.0 and 4.4 litre engines	5	4
Brake vacuum pump bolts - 2.7 litre engine	23	17
Brake vacuum pump retaining stud - 2.7 litre engine	13	10
Brake vacuum pump retaining nut - 2.7 litre engine	13	10
High pressure fuel supply line retaining bolt - 2.7 litre engine	10	7
* Exhaust cross-over pipe nuts 2.7 litre engine	22	16
Exhaust cross-over pipe support bracket bolts - 2.7 litre	25	18
Exhaust manifold heatshield bolt - 2.7 litre	10	7

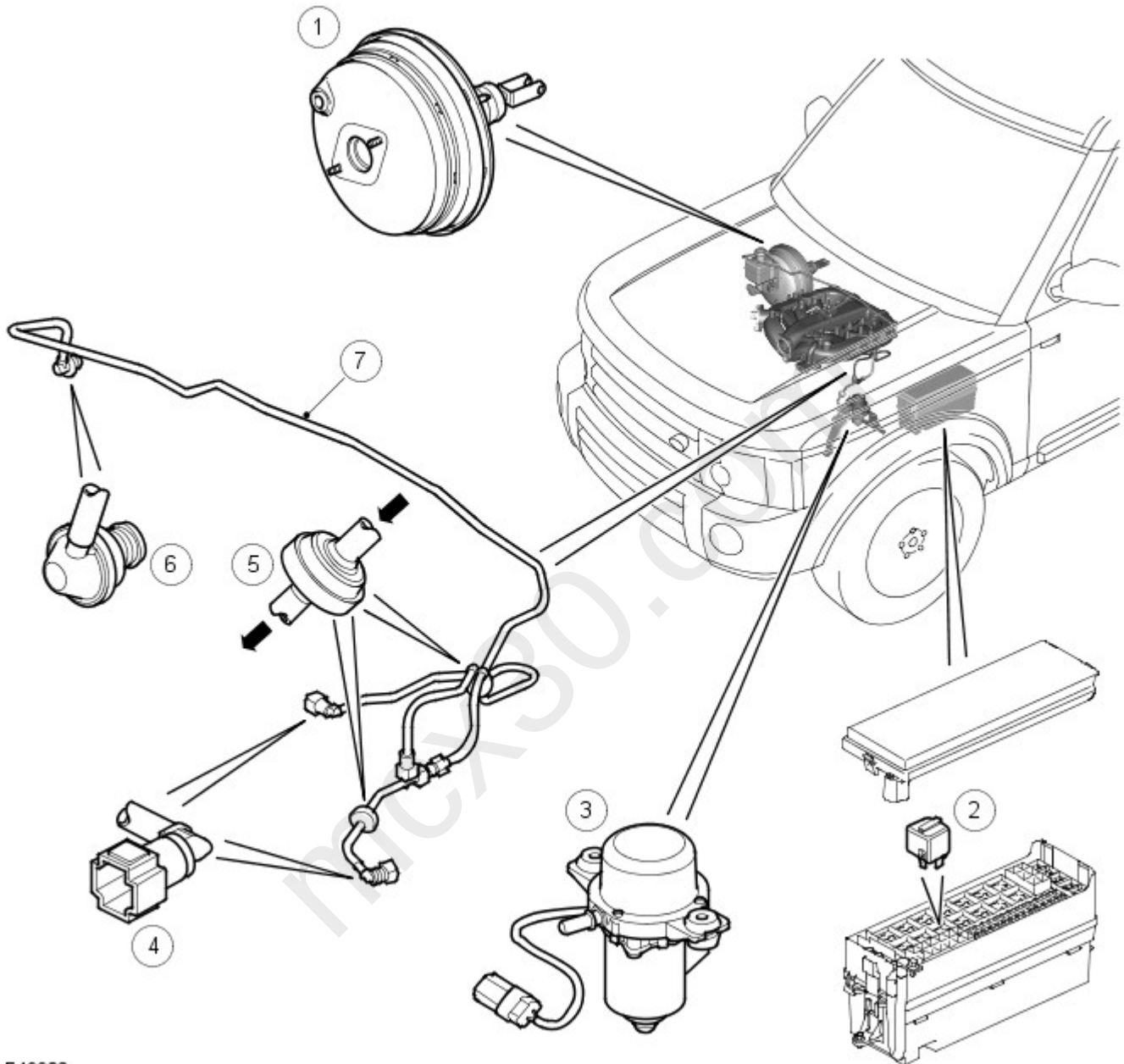
*** New nuts must be fitted**

Power Brake Actuation - Brake Booster

Description and Operation

COMPONENT LOCATIONS - 4.0L

• NOTE: RHD shown, LHD similar

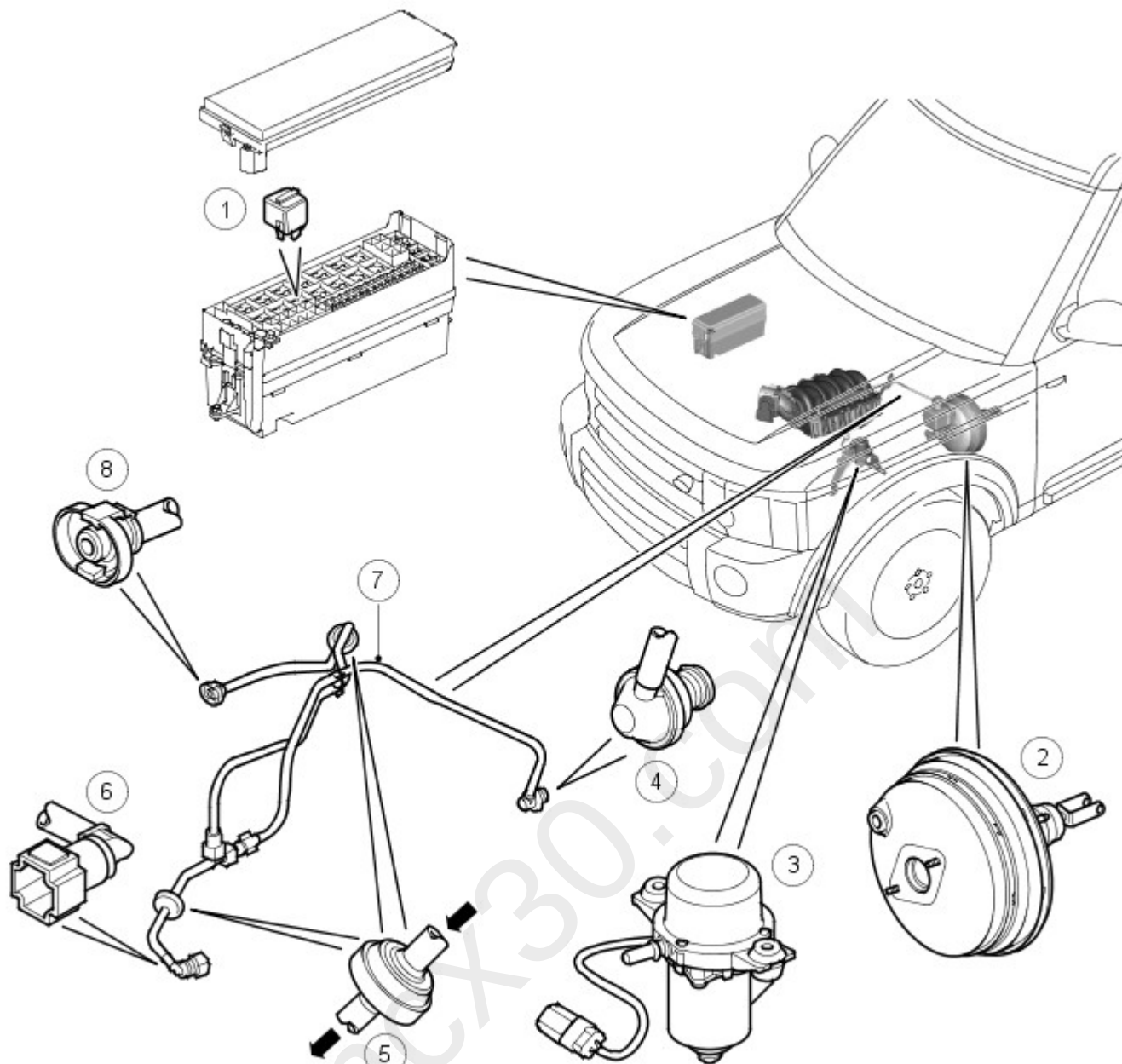


E49902

Item	Part Number	Description
1	-	Brake booster
2	-	Vacuum pump relay
3	-	Vacuum pump
4	-	Vacuum pipe connections to vacuum pump and inlet manifold
5	-	Check valve
6	-	Vacuum pipe connection to brake booster
7	-	Vacuum pipes

COMPONENT LOCATIONS - 4.4L

• NOTE: LHD shown, RHD similar

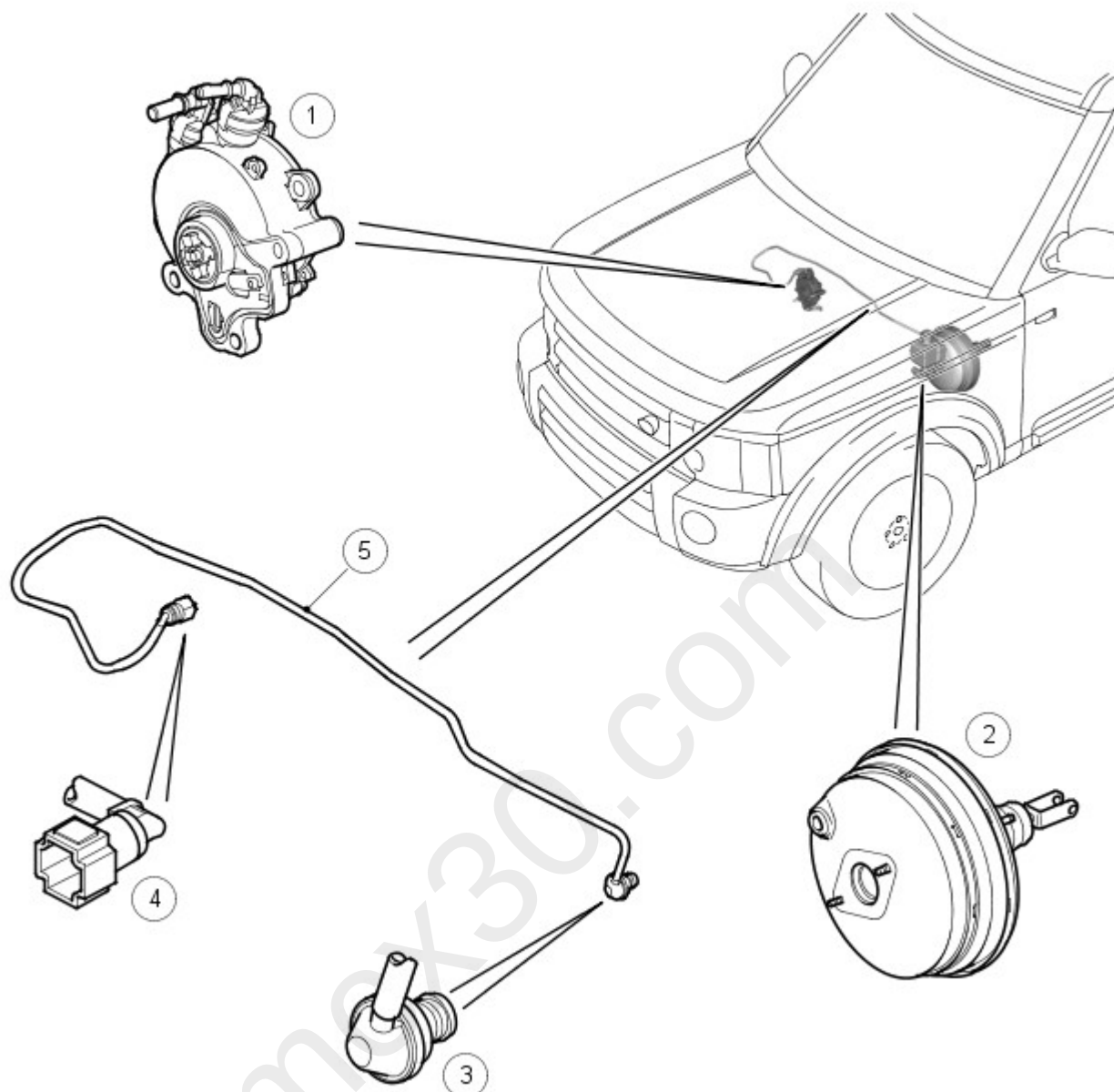


E49903

Item	Part Number	Description
1	-	Vacuum pump relay
2	-	Brake booster
3	-	Vacuum pump
4	-	Vacuum pipe connection to brake booster
5	-	Check valve
6	-	Vacuum pipe connection to vacuum pump
7	-	Vacuum pipes
8	-	Vacuum pipe connection to inlet manifold

COMPONENT LOCATIONS - 2.7L DIESEL

• NOTE: LHD shown



E49904

Item	Part Number	Description
1	-	Vacuum pump
2	-	Brake booster
3	-	Vacuum pipe connection to brake booster (includes check valve)
4	-	Vacuum pipe connection to vacuum pump
5	-	Vacuum pipes

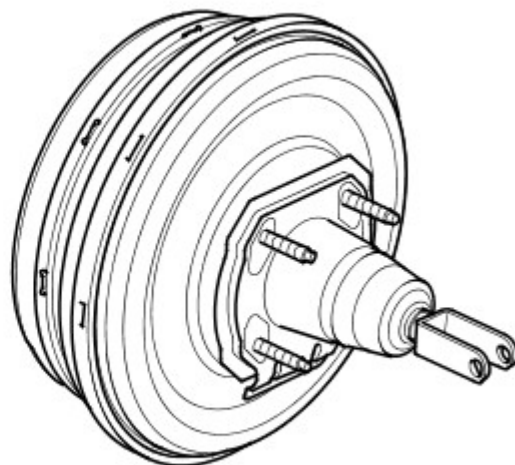
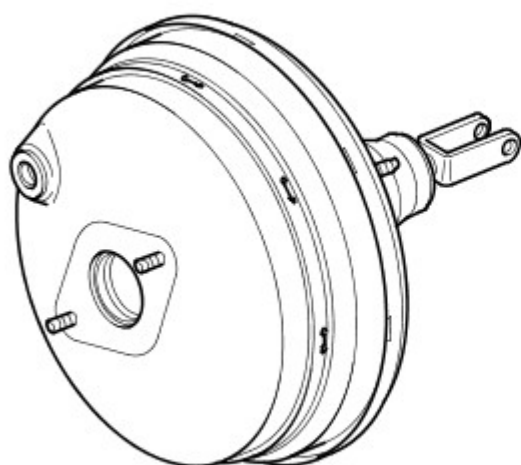
GENERAL

Power assistance for the brakes is provided by a vacuum operated brake booster. On petrol models, the vacuum is produced by the intake manifold and an electric vacuum pump. On diesel models, the vacuum is produced by an engine driven vacuum pump.

VACUUM PIPES

Plastic vacuum pipes connect the brake booster to the vacuum source. Check valves are incorporated into the vacuum pipes. On petrol models there are two in-line check valves, to maintain the vacuum in the brake booster when the throttle is open and the vacuum pump is not running, and prevent fuel vapor entering the brake booster. On diesel models there is a single check valve integrated into the vacuum pipe connection with the brake booster, to maintain the vacuum in the brake booster when the vacuum pump is operating at less than the optimum.

BRAKE BOOSTER

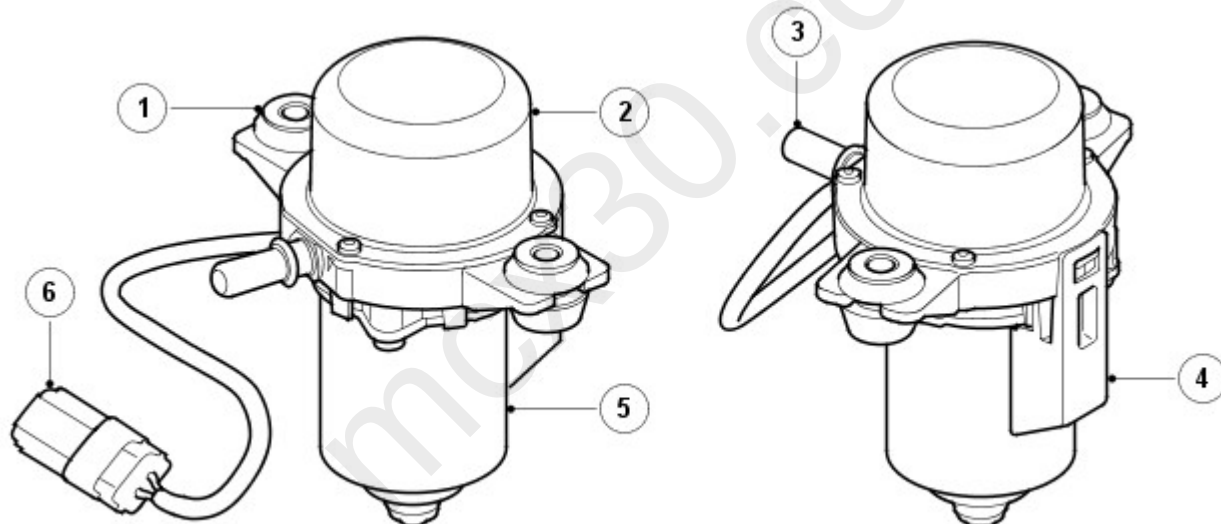


E49905

The brake booster is installed in the driver side of the engine compartment, on the engine bulkhead.

The brake booster is a dual diaphragm unit with a boost ratio of 8.0 : 1 and 28 bar loop-in in all engine variants. The input push rod is connected to the brake pedal. The output push rod locates in the primary piston of the brake master cylinder. A vacuum pipe, installed in a grommet in the front face of the housing, connects the brake booster to the intake manifold and electric vacuum pump (petrol models) or the engine driven vacuum pump (diesel models).

VACUUM PUMP (4.0L AND 4.4L)



E49906

Item	Part Number	Description
1	-	Anti-vibration mount
2	-	Pump cover
3	-	Vacuum pump inlet
4	-	Rubber shroud for exhaust port
5	-	Motor cover
6	-	Electrical connector

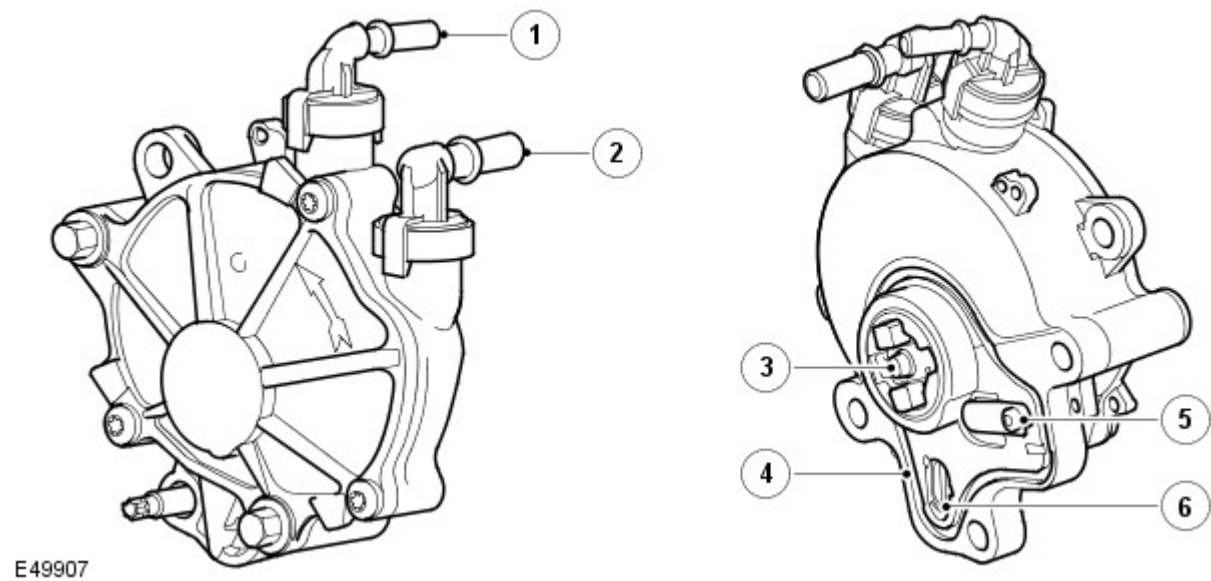
On petrol models the electric vacuum pump supplements the main vacuum supply from the engine manifold.

The vacuum pump is installed on a mounting bracket in the front left corner of the engine compartment. Two anti-vibration mounts on the vacuum pump are located on studs on the mounting bracket and secured with nuts.

The vacuum pump consists of a radial vane pump driven by an electric motor. The rotor and vanes of the pump are made from a self-lubricating carbon based material. A stub pipe is installed in the inlet of the pump to provide a connection point for the vacuum pipe from the brake booster. A second stub pipe, which is covered by a rubber shroud, is installed in the outlet from the pump.

Operation of the vacuum pump is controlled by the Engine Control Module (ECM), which uses the brake vacuum pump relay in the Battery Junction Box (BJB) to switch power to the vacuum pump. The ECM controls the time for which the vacuum pump is switched on and has in-built safeguards to protect the pump from overuse, e.g. continuous running is not allowed so a minimum delay time is specified between applications.

VACUUM PUMP (2.7L DIESEL)



Item	Part Number	Description
1	-	Vacuum connection (not used)
2	-	Vacuum connection for brake booster
3	-	Drive dog
4	-	Seal
5	-	Oil inlet port
6	-	Oil return/air vent

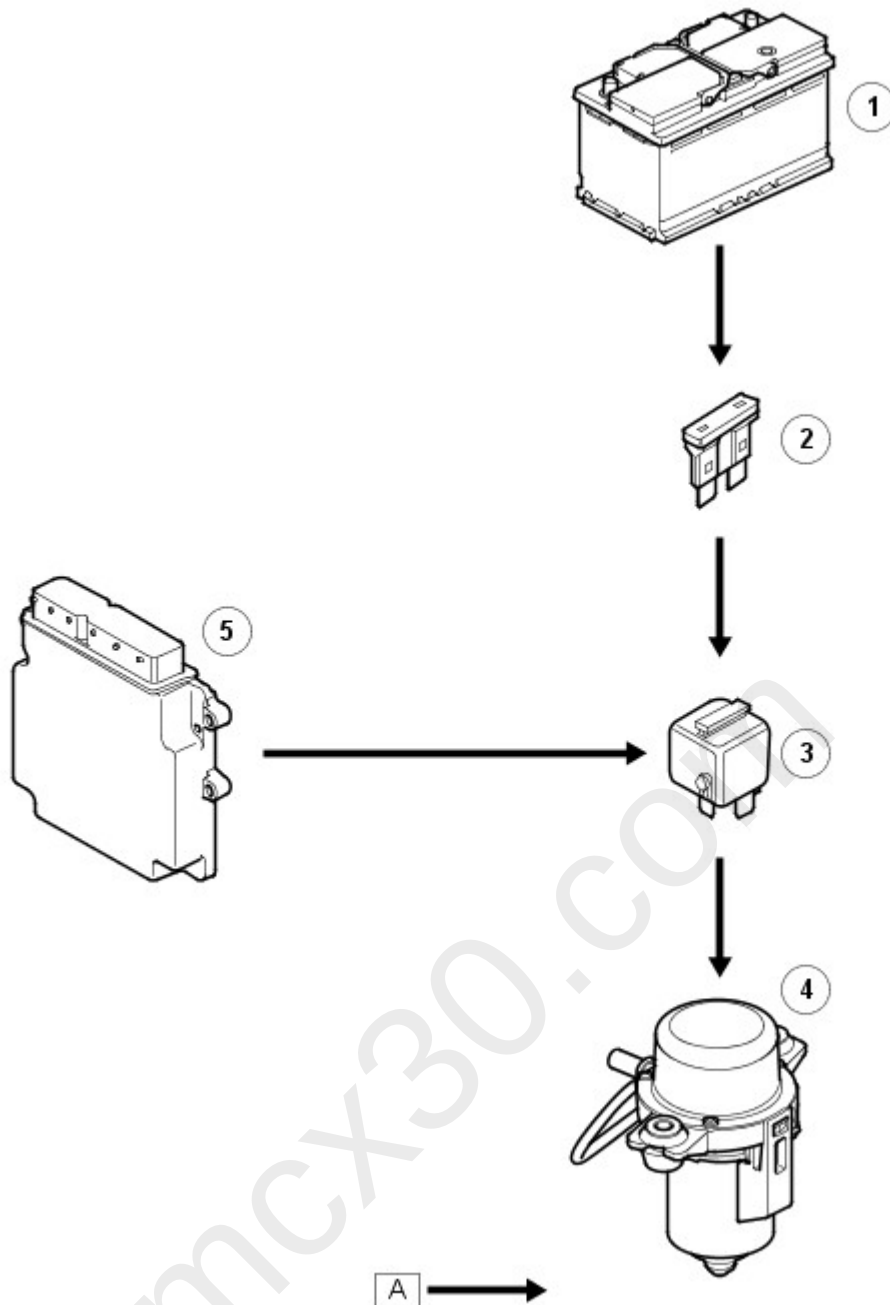
A vacuum pump is installed on diesel models as the air inlet system does not produce sufficient vacuum for satisfactory operation of the brake booster.

The vacuum pump is a radial vane pump which is attached to the rear of the RH cylinder head and driven at half engine speed by the exhaust camshaft. The vacuum pipe from the brake booster connects to an elbow on the rim of the vacuum pump.

The vacuum pump is lubricated and cooled by engine oil supplied to a port in the front face of the vacuum pump from a gallery in the cylinder head. The oil return is through a vent in the front face of the pump into a drain cavity in the cylinder head. Air extracted from the brake booster is vented into the drain cavity with the returning engine oil.

VACUUM PUMP CONTROL DIAGRAM (4.0L AND 4.4L)

- NOTE: A = Hardwired connection



E49908

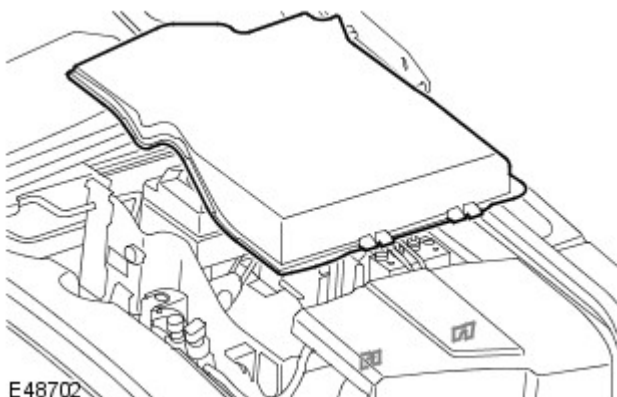
Item	Part Number	Description
1	-	Battery
2	-	Fuse 24E, battery junction box
3	-	Vacuum pump relay
4	-	Vacuum pump
5	-	Engine control module

Power Brake Actuation - Brake Booster

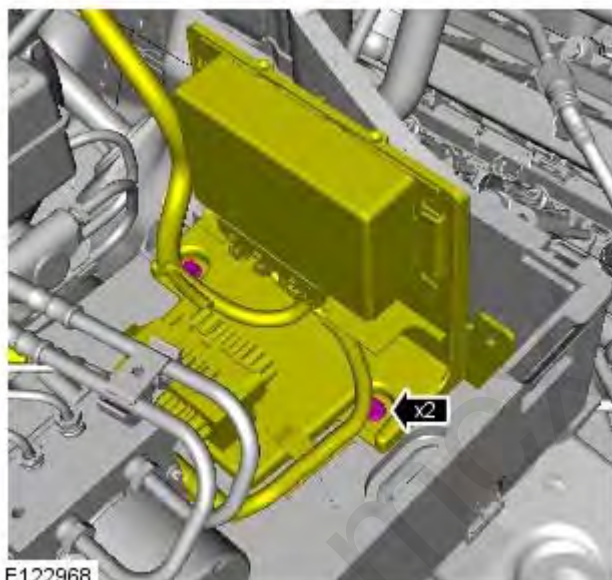
Removal and Installation

Removal

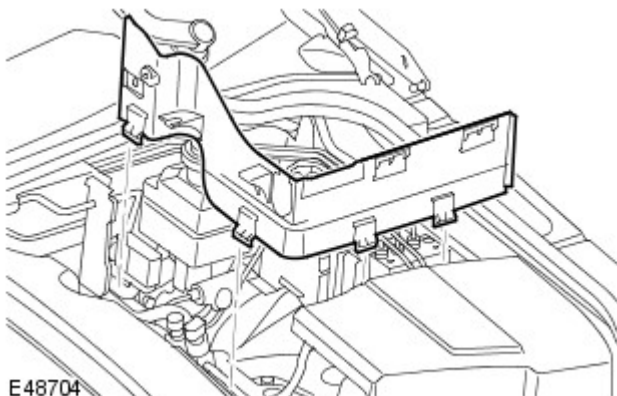
1. Pump the brake pedal until the brake vacuum assistance is exhausted.
2. Remove the auxiliary battery cover.
 - Release the 2 clips.

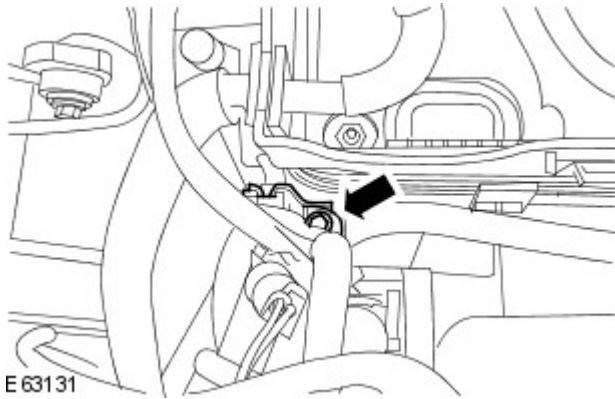


3. If installed, remove the auxiliary battery.
4. Detach the automatic transmission module bracket and position it to one side.
 - Remove the 2 bolts.



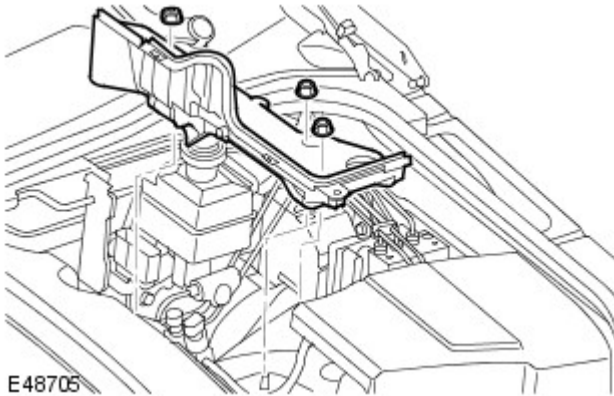
5. Remove the auxiliary battery compartment side wall.
 - Release the four clips.





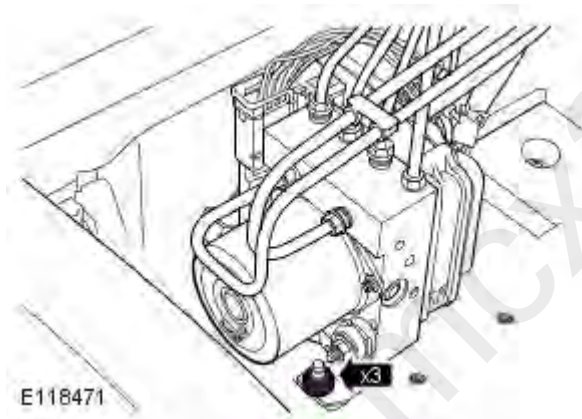
6. Release the Air Conditioning (A/C) pipes.

- Remove the retaining screw.



7. Remove the auxiliary battery tray.

- Remove the 3 bolts.



8. Release the Anti-lock Brake System (ABS) module.

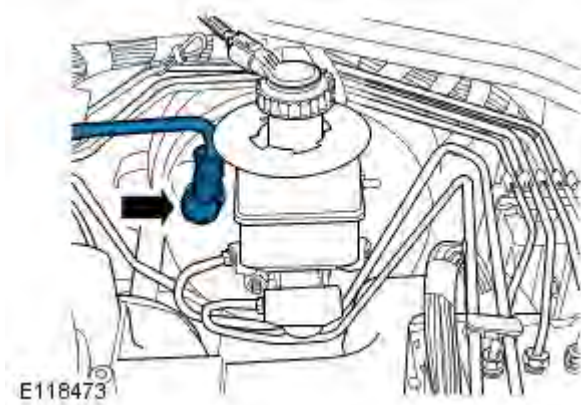
- Remove the 3 nuts.
- Release the brake tubes from the clip.

9. Disconnect the low brake fluid warning indicator switch electrical connector.

10. ⚠ CAUTION: Brake fluid will damage paint finished surfaces. If spilled, immediately remove the fluid and clean the area with water.

Position an absorbent cloth to collect fluid spillage.

11. Disconnect the brake booster vacuum hose from the brake booster.



12. CAUTIONS:

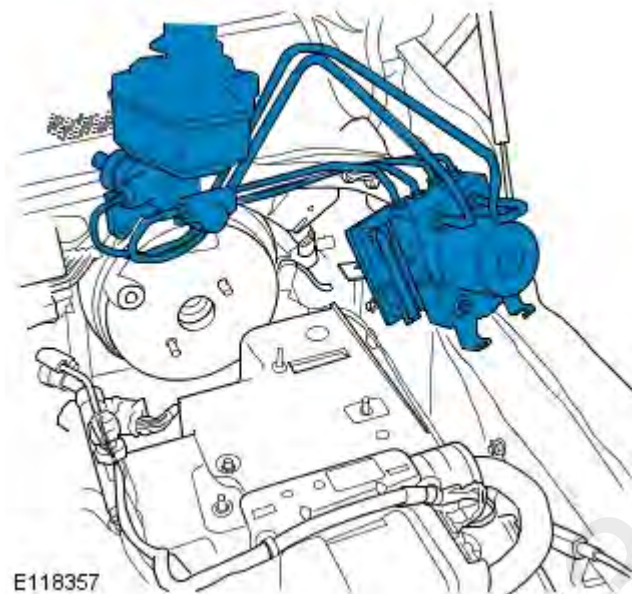
 Make sure that excessive force is not used. Failure to follow this instruction may result in damage to the vehicle.

 Make sure the wings and trim panels are covered and protected, failure to follow this instruction may result in damage to the vehicle.

 Make sure the brake pipes are not damaged when displacing the brake master cylinder and ABS module. Failure to follow this instruction may result in damage to the vehicle.

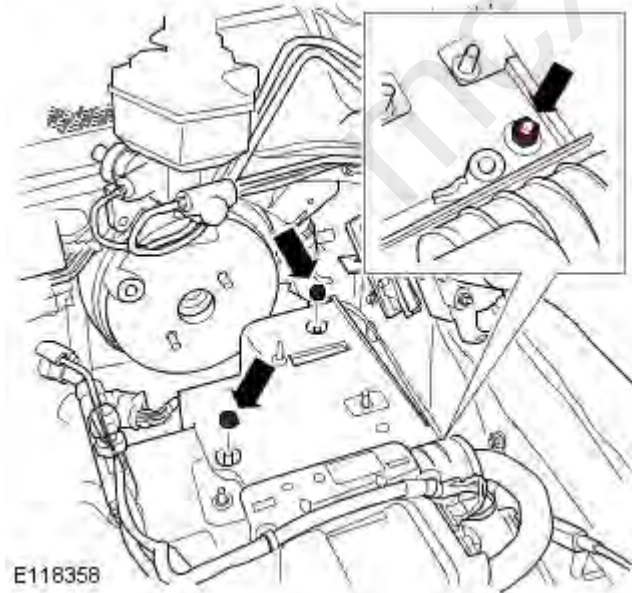
Displace the brake master cylinder and ABS module as a complete assembly.

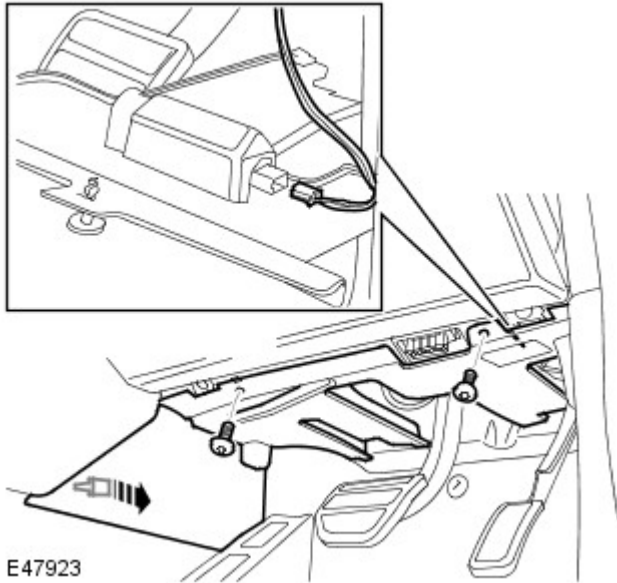
- Remove the 2 nuts.
- Discard the master cylinder seals.



13. Remove the outer plenum base.

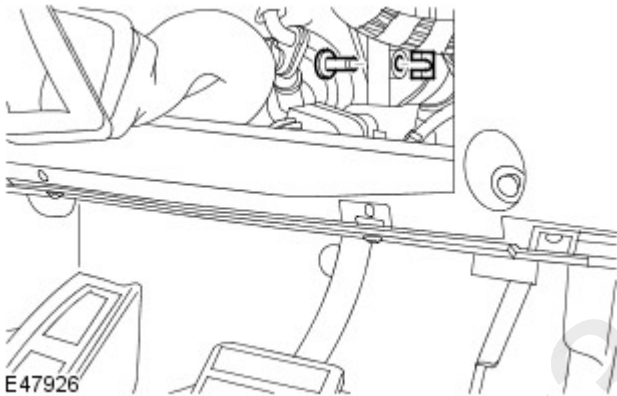
- Remove the 3 nuts.





14. Remove the driver side closing trim panel.

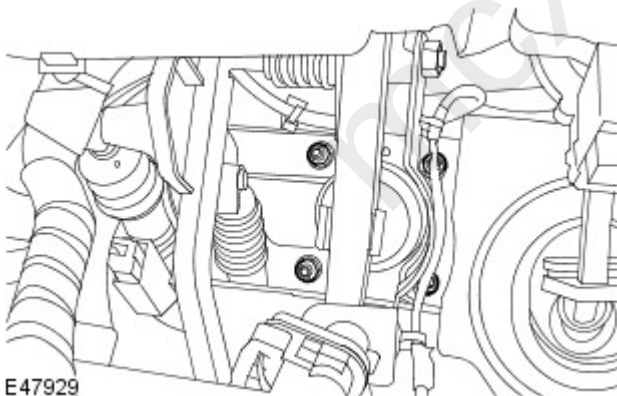
- Release the clip.
- Remove the 2 screws.
- Disconnect the electrical connector.



15. NOTE: The cover is shown removed for clarity.

Remove the brake booster push rod clevis pin.

- Remove the retaining clip.



16. Remove the brake booster.

- Remove the 4 nuts.

Installation

1. Install the brake booster.

- Tighten the nuts to 23 Nm (17 lb.ft).

2. Install the brake booster push rod clevis pin.

- Install the retaining clip.

3. Connect the brake booster vacuum hose.

4. Install the outer plenum base.

- Carefully lift the anti-lock brake system modulator for access.

- Install the 3 nuts.

5.  **CAUTION:** Make sure the master cylinder is correctly aligned.

- **NOTE:** Install new seals and nuts.

Install the the brake master cylinder and ABS module.

- Tighten the nuts to 23 Nm (17 lb.ft).

6. Secure the anti-lock brake system modulator.

- Install the 3 nuts.
- Secure the brake tubes to the clip.

7. Connect the low brake fluid warning indicator switch electrical connector.

8. Install the auxiliary battery tray.

- Install the 3 bolts.

9. Install the auxiliary battery compartment side wall.

- Secure with the four retaining clips.

10. Secure the A/C pipes.

- Install the retaining screw.

11. Secure the automatic transmission module bracket

- Install the 2 bolts.

12. If installed, install the auxiliary battery.

13. NOTE: This step is to check the tightness of the retaining nuts after the initial tighten to make sure that torque has not relaxed.

Check the brake booster retaining nuts.

- Tighten the nuts to 23 Nm (17 lb.ft).

14. Install the closing trim panel.

- Connect the electrical connector.
- Secure the clip.
- Tighten the screws.

15. Start engine and check the brake booster operation.

Power Brake Actuation - Brake Vacuum Pump TDV6 2.7L Diesel

Removal and Installation

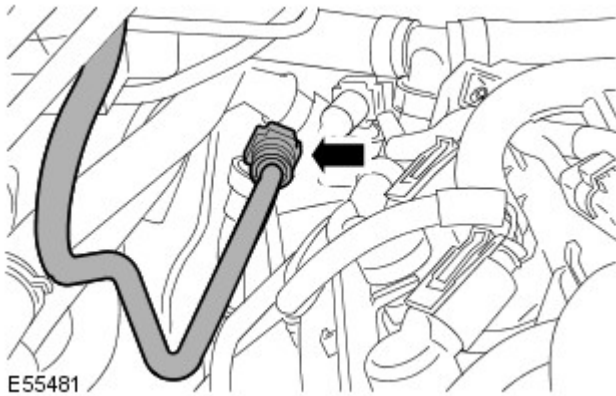
Removal

1. Disconnect the battery ground cable.
For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).
2. Remove the engine cover.
For additional information, refer to: [Engine Cover - 2.7L V6 - TdV6](#) (501-05 Interior Trim and Ornamentation, Removal and Installation).



CAUTION: Always plug any open connections to prevent contamination.

Disconnect the brake booster vacuum line from the brake vacuum pump.



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4. **WARNING:** Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

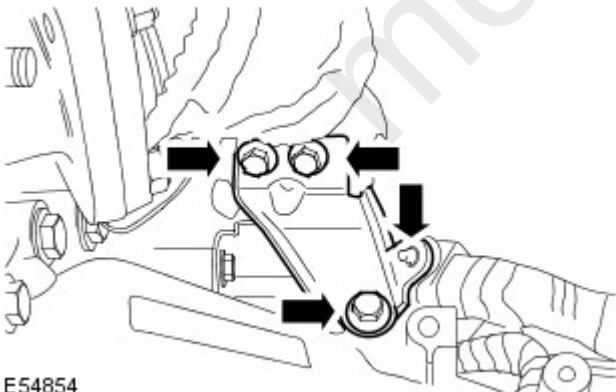
Raise and support the vehicle.

5. Remove the exhaust system. For additional information, refer to: (309-00A Exhaust System - TDV6 2.7L Diesel)

[Exhaust System - Vehicles Without: Diesel Particulate Filter \(DPF\)](#) (Removal and Installation),
[Exhaust System - Vehicles With: Diesel Particulate Filter \(DPF\)](#) (Removal and Installation).

6. Lower the rear of the transmission for access.
7. Remove the exhaust cross-over pipe LH support bracket.

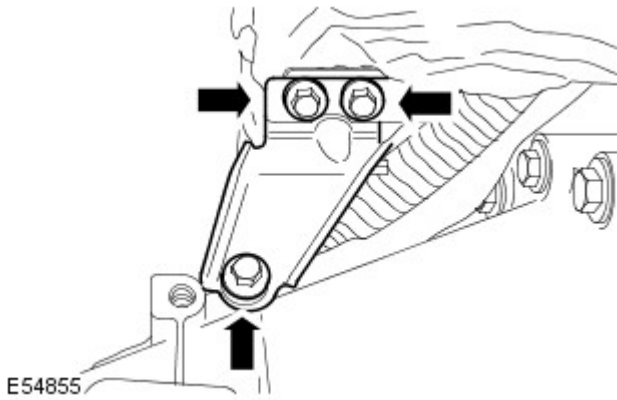
- Release the wiring harness.
- Remove the 3 bolts.



E54854

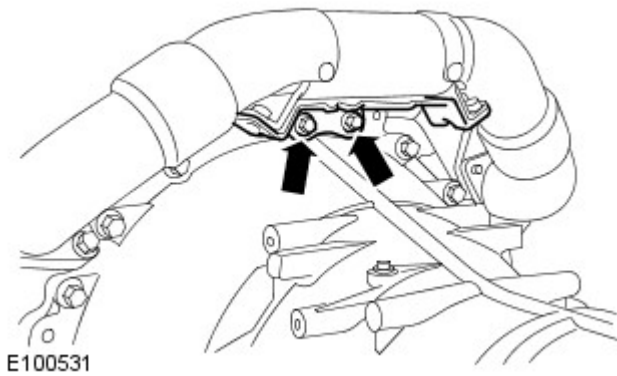
8. Remove the exhaust cross-over pipe RH support bracket.

- Remove the 3 bolts.



9. Remove the exhaust cross-over pipe center support bracket.

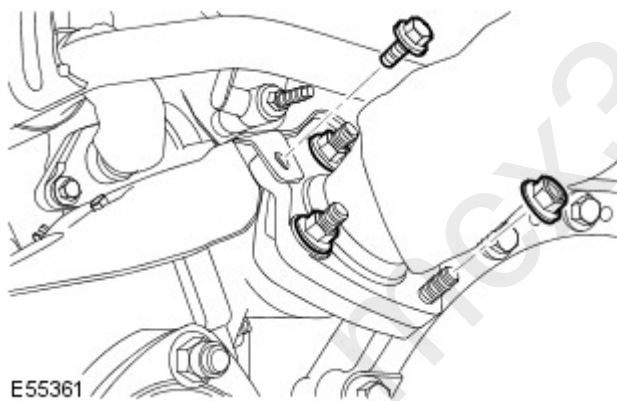
- Remove the 2 bolts.



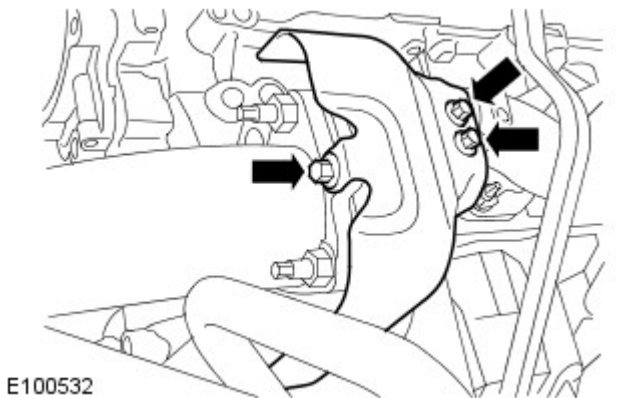
10.  **CAUTION:** Take care when handling the cross-over pipe as damage to the insulating material may occur.

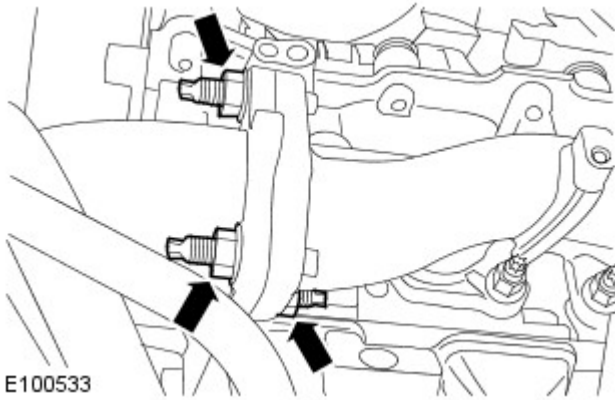
Release the exhaust cross-over pipe from the turbocharger.

- Remove the turbocharger heat shield bolt.
- Remove and discard the 3 nuts.



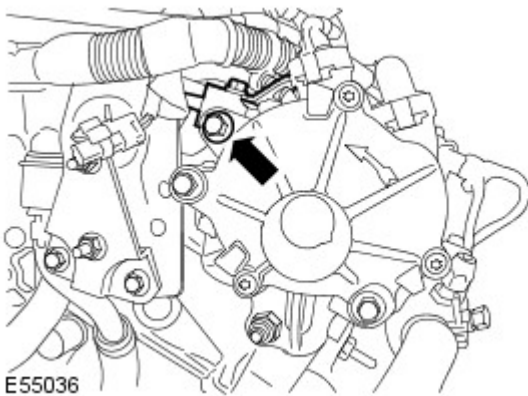
11. Remove the RH exhaust manifold heat shield.





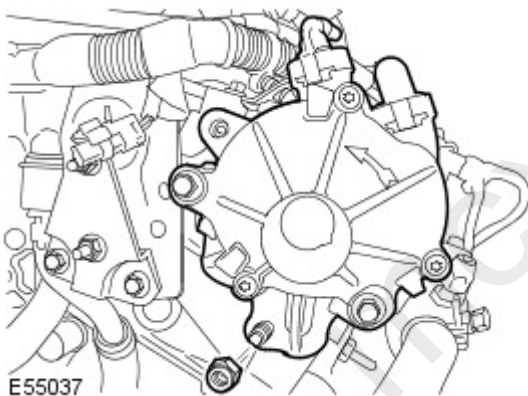
12. Remove the exhaust cross-over pipe.

- Remove and discard the 3 nuts.
- Remove and discard the 2 gaskets.

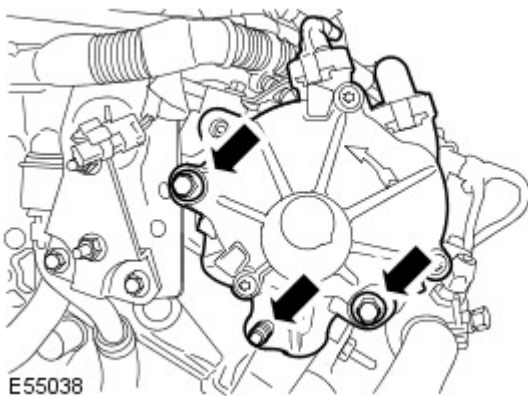


13. Release the high-pressure fuel supply line.

- Remove the bolt.



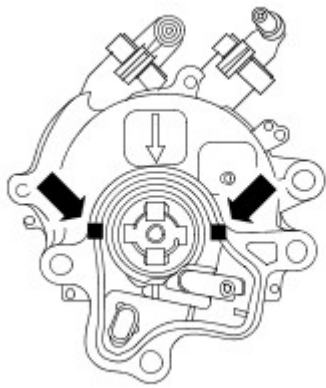
14. Remove the brake vacuum pump nut.



15. Remove the brake vacuum pump.

- Remove the stud.
- Remove the 2 bolts.

Installation



E56076

1. ⚠ CAUTION: Extreme care is required during assembly so that the sealant is not smeared. If the sealant is smeared, the mating faces must be cleaned and new sealant must be applied.

Apply sealant to the two places shown.

- Make sure the vacuum pump seal is clean and dry.
- Make sure that the dogs on the vacuum pump are aligned with the camshaft.
- Apply a 2mm square of Loctite 518 sealant in the 2 places shown.
- Install the brake vacuum pump immediately after applying the sealant.
- The brake vacuum pump should be fitted directly to the engine without smearing the sealant.

2. Install the brake vacuum pump.

- Install the 2 bolts.
- Tighten the bolts to 23 Nm (17 lb.ft).

3. Install the brake vacuum pump stud.

- Tighten to 13 Nm (10 lb.ft).

4. Install the brake vacuum pump nut.

- Tighten to 13 Nm (10 lb.ft).

5. Secure the high-pressure fuel supply line.

- Tighten the bolt to 10 Nm (7 lb.ft).

6. Install 3 new exhaust manifold studs.

- Tighten the 3 studs to 13 Nm (10 lb. ft).

7. Install 3 new turbocharger studs.

- Tighten the 3 studs to 13 Nm (10 lb. ft).

8. ⚠ CAUTION: Take care when handling the cross-over pipe as damage to the insulating material may occur.

Install the exhaust cross-over pipe.

- Clean the component mating faces.
- Install 2 new gaskets.
- Install 6 new nuts
- Tighten the 6 nuts to 24 Nm (18 lb. ft).

9. Install the exhaust cross-over pipe center support bracket.

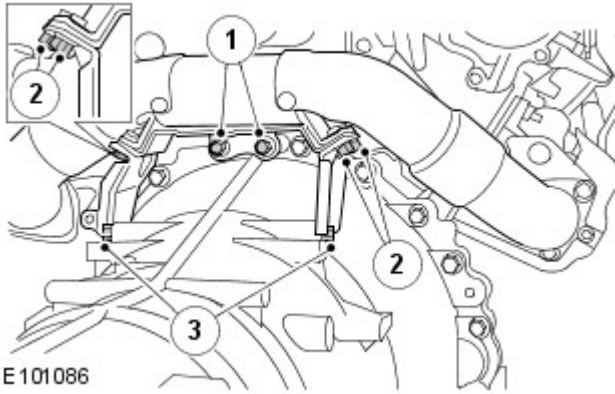
- Loosely install the 2 bolts.

10. Install the exhaust cross-over pipe RH support bracket.

- Loosely install the 3 bolts.

11. Install the exhaust cross-over pipe LH support bracket.

- Loosely install the 3 bolts.



12. Tighten the exhaust cross-over pipe mounting bracket bolts in the following sequence.

- Tighten the 2 bolts marked 1 to 10 Nm (7 lb.ft).
- Undo the 2 bolts by 90 degrees.
- Tighten the 2 bolts marked 3 to 10 Nm (7 lb.ft).
- Undo the 2 bolts by 90 degrees.
- Tighten the 4 bolts marked 2 to 25 Nm (18 lb.ft).
- Tighten the 2 bolts marked 1 to 25 Nm (18 lb.ft).
- Tighten the 2 bolts marked 3 to 25 Nm (18 lb.ft).
- Attach the wiring harness.

13. Install the RH exhaust manifold heat shield.

- Tighten the 3 bolts to 10 Nm (7 lb.ft).

14. Install the turbocharger heat shield.

- Tighten the bolt to 10 Nm (7 lb.ft).

15. Install the exhaust system. For additional information, refer to: (309-00A Exhaust System - TDV6 2.7L Diesel)

[Exhaust System - Vehicles Without: Diesel Particulate Filter \(DPF\) \(Removal and Installation\)](#),
[Exhaust System - Vehicles With: Diesel Particulate Filter \(DPF\) \(Removal and Installation\)](#).

16.  **CAUTION:** Always plug any open connections to prevent contamination.

Connect the brake booster vacuum line to the brake vacuum pump.

17. Install the engine cover.

For additional information, refer to: [Engine Cover - 2.7L V6 - TdV6](#) (501-05 Interior Trim and Oramentation, Removal and Installation).

18. Connect the battery ground cable.

For additional information, refer to: [Specifications](#) (414-00 Battery and Charging System - General Information, Specifications).

Power Brake Actuation - Brake Vacuum PumpTDV6 3.0L Diesel

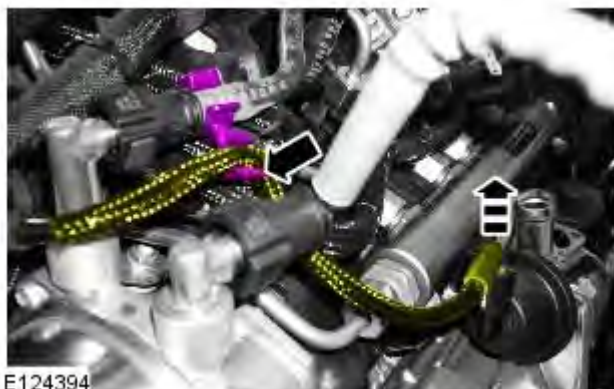
Removal and Installation

Removal

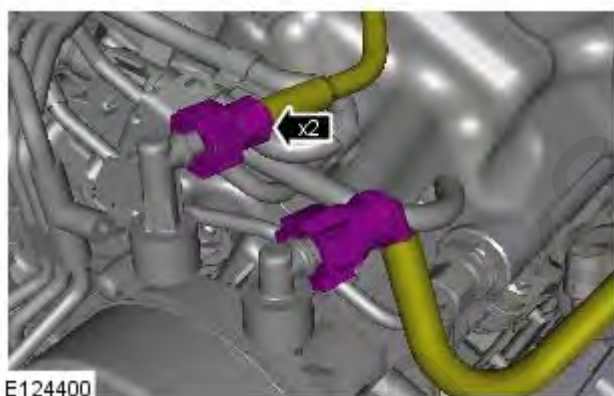
- NOTE: Removal steps in this procedure may contain installation details.
- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

1. Refer to: [Body - TDV6 3.0L Diesel/TDV6 2.7L Diesel](#) (502-02 Full Frame and Body Mounting, Removal and Installation).

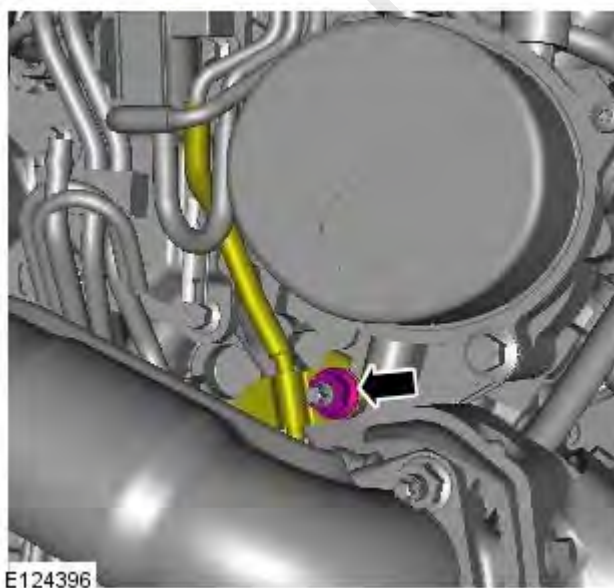
2.

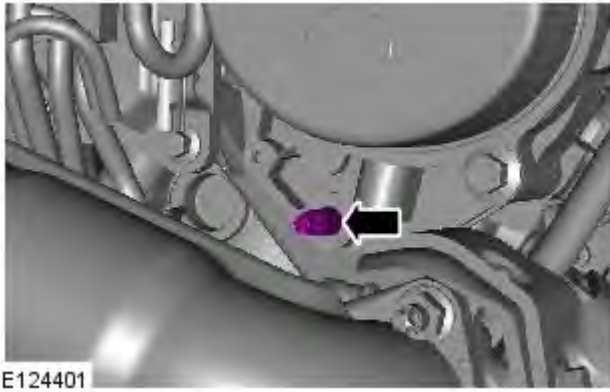


3.

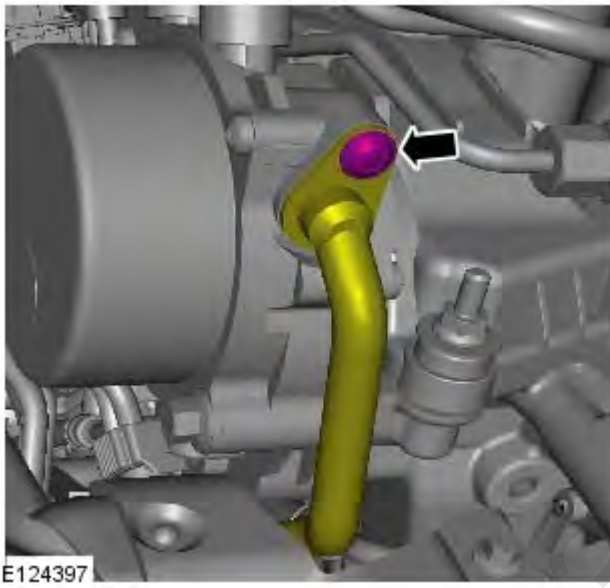


4. Torque: 23 Nm



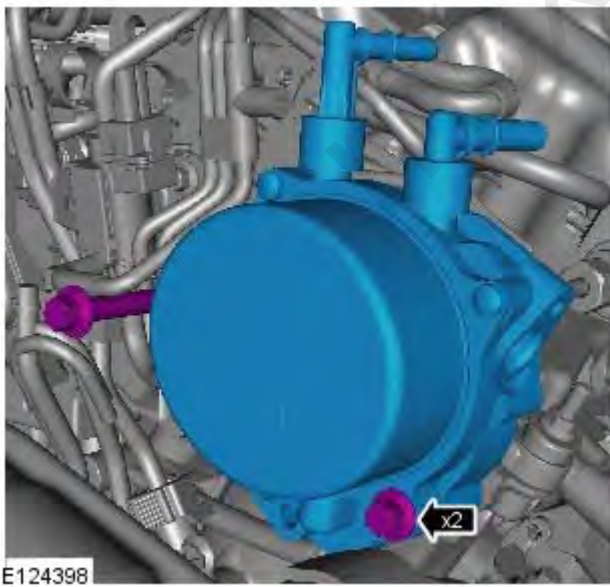


5. Torque: 13 Nm



6. **6.** NOTE: Discard the O-ring seal.

Torque: 10 Nm



7. Torque: 23 Nm

8.



E124399

Installation



E116820

1. **1.** NOTE: Install a new gasket.

- NOTE: Install a new O-ring seal.

- NOTE: Apply silicone gasket sealant or equivalent meeting Land Rover specification.

- NOTE: The application of sealant must be 10 mm square in two places. Install the brake vacuum pump immediately after applying the sealant.

- NOTE: The brake vacuum pump should be fitted directly to the engine without smearing the sealant.

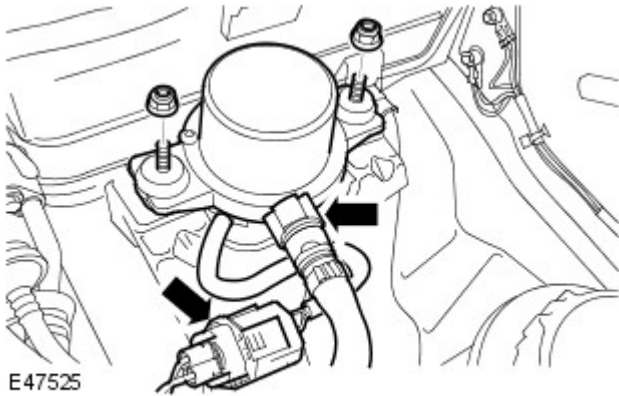
- NOTE: Make sure that the drive coupling is aligned with camshaft coupling.

To install, reverse the removal procedure.

Power Brake Actuation - Brake Vacuum Pump V6 4.0L Petrol

Removal and Installation

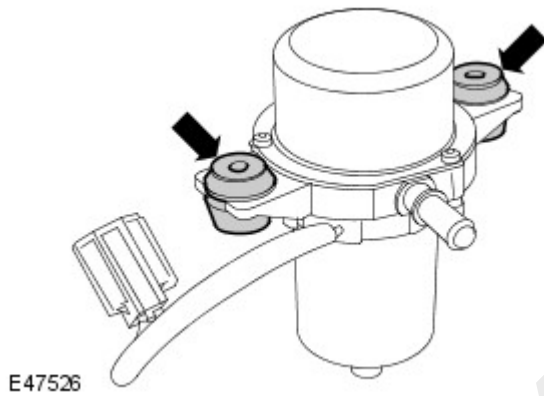
Removal



1.  **CAUTION:** Always plug any open connections to prevent contamination.

Remove the brake vacuum pump.

- Release and disconnect the electrical connector.
- Disconnect the vacuum line.
- Remove the 2 nuts.



2. **NOTE:** Do not disassemble further if the component is removed for access only.

Remove the 2 rubber insulators.

Installation

1. To install, reverse the removal procedure.

- Tighten the nuts to 5 Nm (4 lb.ft).

Power Brake Actuation - Brake Vacuum Pump V8 5.0L Petrol

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: [Engine Undershield](#) (501-02 Front End Body Panels, Removal and Installation).
3. Refer to: [Engine Oil Draining and Filling](#) (303-01D Engine - V8 5.0L Petrol, General Procedures).

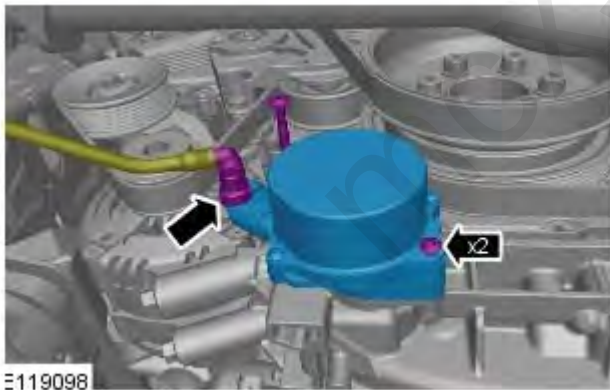
4.



5. **NOTE:** Discard the seal.

- NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Torque: 12 Nm



Installation

1. **NOTE:** Install a new seal.
To install, reverse the removal procedure.