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Brake System - General Information -

Lubricants, Fluids, Sealers and Adhesives

CAUTION: Do not use brake fluid ITT Super Dot 4 on 2006my vehicles onwards. Failure to follow this instruction may result in damage to the vehicle.

NOTE: Brake fluid ITT Super Dot 4 has now been superseded by Shell ESL Super Dot 4 which is the Jaguar recommended brake fluid. Shell ESL Super Dot 4 can be used on all model years.

Item	Specification
Brake fluid	Shell ESL Dot 4

Brake Lining and Disc Specifications

Item	Specification
Front brake pad material nominal thickness	13 mm (0.51 in)
Front brake pad material minimum thickness	2 mm (0.08 in)
Rear brake pad material nominal thickness	10.8 mm (0.43 in)
Rear brake pad material minimum thickness	2 mm (0.08 in)
Front brake disc diameter - 3.0L petrol, 3.0L diesel and 4.2L	326 mm (12.8 in)
Front brake disc diameter - 3.0L diesel and 5.0L naturally aspirated	355 mm (14.0 in)
Front brake disc diameter - 5.0L supercharged	380 mm (15.0 in)
New front brake disc nominal thickness - 3.0L petrol 3.0L diesel and 4.2L	30 mm (1.18 in)
New front brake disc nominal thickness - 3.0L diesel and 5.0L naturally aspirated	32 mm (1.26 in)
New front brake disc nominal thickness - 5.0L supercharged	36 mm (1.42 in)
Worn front brake disc minimum thickness - 3.0L petrol and 4.2L	28 mm (1.14 in)
Worn front brake disc minimum thickness - 3.0L diesel and 5.0L naturally aspirated	30 mm (1.18 in)
Worn front brake disc minimum thickness - 5.0L supercharged	34 mm (1.34 in)
Rear brake disc diameter - all vehicles except 5.0L supercharged	326 mm (12.8 in)
Rear brake disc diameter - 5.0L supercharged	376 mm (14.8 in)
New rear brake disc nominal thickness - all vehicles except 5.0L supercharged	20 mm (0.79 in)
New rear brake disc nominal thickness - 5.0L supercharged	26 mm (1.02 in)
Worn rear brake disc minimum thickness - all vehicles except 5.0L supercharged	18 mm (0.72 in)
Worn rear brake disc minimum thickness - 5.0L supercharged	24 mm (0.94 in)
Maximum front brake disc runout (installed)	0.075 mm (0.003 in)
Maximum rear brake disc runout (installed)	0.09 mm (0.004 in)
Maximum front hub face runout (installed)	0.015 mm (0.0006 in)
Maximum rear hub face runout (installed)	0.025 mm (0.0009 in)
Front brake caliper piston diameter - all vehicles except 5.0L supercharged	60 mm (2.36 in)
Front brake sliding caliper double piston diameter - 5.0L supercharged	42 mm (1.66 in)
Rear brake caliper piston diameter	45 mm (1.77 in)
Front brake caliper bleed screw - 3.0L petrol and 4.2L	8 Nm (6 lb-ft)
Front brake caliper bleed screw - 3.0L diesel and 5.0L	14 Nm (10 lb-ft)
Rear brake caliper bleed screw	14 Nm (10 lb-ft)

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Brake System - General Information - Brake System

Diagnosis and Testing

Principle of Operation

For a detailed description of the brake system, refer to the relevant Description and Operation sections in the workshop manual. REFER to:

Front Disc Brake (206-03, Description and Operation),
Front Disc Brake (206-03, Description and Operation),
Front Disc Brake (206-03, Description and Operation),
Rear Disc Brake (206-04, Description and Operation),
Rear Disc Brake (206-04, Description and Operation),
Rear Disc Brake (206-04, Description and Operation),
Parking Brake (206-05 Parking Brake and Actuation, Description and Operation),
Parking Brake (206-05 Parking Brake and Actuation, Description and Operation),
Parking Brake (206-05 Parking Brake and Actuation, Description and Operation),
Hydraulic Brake Actuation (206-06 Hydraulic Brake Actuation, Description and Operation),
Hydraulic Brake Actuation (206-06 Hydraulic Brake Actuation, Description and Operation),
Hydraulic Brake Actuation (206-06 Hydraulic Brake Actuation, Description and Operation),
Brake Booster (206-07 Power Brake Actuation, Description and Operation),
Brake Booster (206-07 Power Brake Actuation, Description and Operation),
Brake Booster (206-07, Description and Operation).

Inspection and Verification

Visually examine the front and rear wheel and tire assemblies for damage such as uneven wear patterns, tread worn out or sidewall damage. Verify the tires are the same size, type and, where possible, same manufacturer. Replace the damaged wheel or excessively worn tire.

Wheels and tires must be cleared of any foreign matter and tire pressures adjusted to the correct specification.

If the tires exhibit uneven wear or feathering, the cause must be corrected. Check the steering and suspension components for damage or wear and, if necessary, check and adjust front wheel alignment. REFER to: (204-00 Suspension System - General Information)

Specifications (Specifications),
Front Toe Adjustment (General Procedures).

Visual Inspection

Mechanical	Electrical
• Brake master cylinder • Brake caliper piston(s) • Brake discs • Wheel bearings • Brake pads • Power brake booster • Brake pedal linkage • Brake booster vacuum hose • Tires • Debris	• Parking brake actuator • Parking brake module • Parking brake switch • Damaged or corroded wiring harness • Brake master cylinder fluid level switch

Road Test

Carry out a road test to compare actual vehicle braking performance with the performance standards expected by the driver. The ability of the test driver to make valid comparisons and detect performance deficiencies will depend on experience.

The driver should have a thorough knowledge of brake system operation and accepted general performance guidelines to make good comparisons and detect performance concerns.

An experienced brake technician will always establish a route that will be used for all brake diagnosis road tests. The roads selected will be reasonably smooth and level. Gravel or bumpy roads are not suitable because the surface does not allow the tires to grip the road equally. Crowned roads should be avoided because of the large amount of weight shifted to the low set of wheels on this type of road. Once the route is established and consistently used, the road surface variable can be eliminated from the test results.

Before a road test, obtain a complete description of the customer concerns or suspected condition. From the description, the technician's experience will allow the technician to match possible causes with symptoms. Certain components will be tagged as possible suspects while others will be eliminated by the evidence. More importantly, the customer description can reveal unsafe conditions which should be checked or corrected before the road test. The description will also help form the basic approach to the road test by narrowing the concern to specific components, vehicle speed or conditions.

Begin the road test with a general brake performance check. Keeping the description of the concern in mind, test the brakes at different vehicle speeds using both light and heavy pedal pressure. To determine if the concern is in the front or rear braking system, use the brake pedal and then use the parking brake control. If the condition (pull, vibration, pulsation) occurs only with the parking brake, the concern is in the rear brake system.

If the concern becomes evident during this check, verify it fits the description given before the road test. If the concern is not evident, attempt to duplicate the condition using the information from the description.

If a concern exists, use the Symptom Chart in order to isolate it to a specific sub-system and condition description. From this description, a list of possible sources can be used to further narrow the cause to a specific component or condition.

Symptom Chart

Symptom	Possible Cause	Action
Brakes noisy	• Brake pads • Brake discs	GO to Pinpoint Test A.
Vibration when brakes are applied	• Wheels/tires out of balance • Wheel hub nuts loose • Brake caliper mounting bolts loose • Brake pads • Foreign material/scratches/corrosion on brake disc contact surfaces • Excessive brake disc thickness variation • Excessive brake disc runout • Wheel bearing wear or failure • Suspension bushing wear or failure • Steering bushing wear or failure	GO to Pinpoint Test B.
The brakes pull or drift	• Tire pressures/wear • Brake calipers • Brake pads • Brake discs • Wheel alignment adjustment • Wheel bearing • Suspension bushings and ball joints	GO to Pinpoint Test C.
The pedal feels spongy	• Air in brake hydraulic system • Leak in hydraulic system • Brake booster/master cylinder • Brake pads	GO to Pinpoint Test D.
The pedal goes down fast	• Air in brake hydraulic system • Leak in hydraulic system • Brake booster/master cylinder • Brake pads	GO to Pinpoint Test E.
The pedal goes down slowly	• Air in brake hydraulic system • Brake booster/master cylinder	GO to Pinpoint Test F.
Excessive brake pedal effort required	• Brake pads • Brake booster	GO to Pinpoint Test G.
Brake lockup during light brake pedal force	• Brake pads • Brake calipers	GO to Pinpoint Test H.
Brakes drag	• Parking brake control applied/malfunction • Seized parking brake cables • Seized brake caliper slide pins • Seized brake caliper • Brake booster • Pedal gear	GO to Pinpoint Test I.
Excessive/Erratic brake pedal travel	• Hydraulic system • Brake pads Brake • discs • Hub and bearing assembly	GO to Pinpoint Test J.
The red brake warning indicator is always on	• Fluid level • Brake master cylinder fluid level sensor • Parking brake control	Fill the system to specification. Check for leaks. Install a new brake master cylinder fluid reservoir as required. REFER to: Brake Fluid Reservoir (206-06 Hydraulic Brake Actuation, Removal and Installation).

Symptom	Possible Cause	Action
	• Electrical circuit	For parking brake control and circuit tests. REFER to: Parking Brake (206-05, Diagnosis and Testing).
Slow or incomplete brake pedal return	• Brake pedal binding • Brake booster/master cylinder	GO to Pinpoint Test K.

Pinpoint Tests

PINPOINT TEST A : BRAKES NOISY	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: INSPECT BRAKE PADS	
	1 Inspect the condition of the front and rear brake pads. Check for damage to any anti-squeal shims.
	Are the brake pads OK? **Yes** GO to A2. **No** Clean/install new front and rear brake pads as required. REFER to: Brake Pads - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-04, Removal and Installation). Re-test vehicle for brake noise.
A2: INSPECT BRAKE DISCS	
	1 Inspect the brake discs for excessive corrosion, wear or disc thickness variation.
	Does excessive corrosion, wear or disc thickness variation exist? **Yes** Install new front and rear brake discs and brake pads as required. REFER to: Brake Pads - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-04, Removal and Installation), Brake Disc - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Disc - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Disc (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Disc - Vehicles With: High Performance Brakes (206-04, Removal and Installation). Re-test vehicle for brake noise. **No** No action required, vehicle is OK.

PINPOINT TEST B : VIBRATION WHEN BRAKES ARE APPLIED	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: ROAD TEST VEHICLE	
	1 Road test the vehicle between 40-80 km/h (25-50 mph) without applying brakes.
	Is the vibration present? **Yes** For noise vibration and harshness tests. REFER to: Noise, Vibration and Harshness (NVH) (100-04 Noise, Vibration and Harshness, Diagnosis and Testing). **No** GO to B2.
B2: CHECK FOR BRAKE VIBRATION	
	1 Road test the vehicle between 40-80 km/h (25-50 mph) with light and medium application on the brake pedal.
	Is a vibration present? **Yes** Check the brake caliper mounting bolts and wheel hub nuts and tighten to specification as required. Check the balance of all road wheels and tires and repair as required. Check the brake discs for excessive wear, runout, thickness variation or cracks. Install new brake discs and brake pads as required. GO to B3. **No** No action required, vehicle is OK.
B3: IS VIBRATION STILL PRESENT UNDER BRAKE APPLICATION?	
	1 Road test the vehicle between 40-80 km/h (25-50 mph) with light and medium application on the brake pedal.

	Is a vibration present? **Yes** Check for wear or failure of steering gear bushings. Check for wear or failure of steering gear ball joints. Check for wear or failure of front wheel bearings, suspension bushings and ball joints. Check for wear or failure of rear wheel bearings, suspension bushings and ball joints. Refer to relevant section in workshop manual and install new components as required. **No** No action required, vehicle is OK.

PINPOINT TEST C : THE BRAKES PULL OR DRIFT	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
C1: ROAD TEST VEHICLE	
	1 Road test the vehicle and apply the brake pedal.
	Does the vehicle pull or drift? **Yes** GO to C2. **No** No action required, vehicle is OK.
C2: INSPECT TIRE CONDITION/PRESSURE	
	1 Check for excessive tire wear or incorrect pressures.
	Are the tires at the correct pressure and in good condition? **Yes** GO to C3. **No** Adjust the tire pressures or install new tires if excessively worn. Re-test the system for normal operation.
C3: CHECK CALIPERS	
	1 Check the disc brake caliper pistons and pins for binding, leaking or sticking.
	Do the disc brake caliper pistons and pins bind, leak or stick? **Yes** Rectify sticking pins and install new brake calipers as required. REFER to: Brake Caliper - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Caliper - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Caliper (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Caliper - Vehicles With: High Performance Brakes (206-04, Removal and Installation). Re-test the system for normal operation. **No** GO to C4.
C4: INSPECT BRAKE DISCS	
	1 Check the brake discs for excessive damage, thickness variation or runout. REFER to: Brake Disc Runout Check (206-00 Brake System - General Information, General Procedures).
	Does excessive damage or runout exist? **Yes** Install new brake discs and brake pads as required. Re-test the system for normal operation. **No** GO to C5.
C5: INSPECT THE FRONT HUB AND WHEEL BEARING ASSEMBLY	
	1 Check the front hub and wheel bearing assembly.
	Are the wheel bearings OK? **Yes** GO to C6. **No** Install new wheel bearings as required. REFER to: Front Wheel Bearing and Wheel Hub - V6 3.0L Petrol (204-01 Front Suspension, Removal and Installation). Re-test the system for normal operation.
C6: CHECK SUSPENSION BUSHINGS AND BALL JOINTS.	
	1 Check all suspension bushings and ball joints.
	Are the suspension bushings and ball joints OK? **Yes** GO to C7. **No** Install new front suspension bushings and ball joints as required. Install new rear suspension bushings and ball joints as required. Refer to the relevant section in the workshop manual.
C7: CHECK VEHICLE ALIGNMENT	
	1 Check the vehicle alignment. REFER to: Front Subframe - 2.7L Diesel (502-00, Removal and Installation), Front Subframe - V6 3.0L Petrol (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation), Front Subframe - 4.2L (502-00, Removal and Installation).

	Is the alignment within specification? **Yes** No action is required, vehicle is OK. **No** Adjust the alignment as required. REFER to: Front Subframe - 2.7L Diesel (502-00, Removal and Installation), Front Subframe - V6 3.0L Petrol (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation), Front Subframe - 4.2L (502-00, Removal and Installation).

PINPOINT TEST D : THE PEDAL FEELS SPONGY	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
D1: CHECK FOR SPONGY PEDAL (ENGINE OFF)	
	1 Check for a firm brake pedal.
	Is the brake pedal effort and brake pedal travel normal? **Yes** No action is required, vehicle is OK. **No** GO to D2.
D2: CHECK BRAKE PEDAL RESERVE (ENGINE OFF)	
	1 Pump the brake pedal 10 times and hold on the final application.
	Does the brake pedal feel firm on final application? **Yes** GO to D3. **No** Bleed the brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures).
D3: CHECK BRAKE PEDAL RESERVE (ENGINE ON)	
	1 With engine running at idle speed.
	2 Apply the brake pedal lightly three or four times.
	3 Wait 15 seconds for the vacuum to recover.
	4 Push down on the brake pedal until it stops moving downward or an increased resistance to the brake pedal travel occurs.
	5 Hold the brake pedal in the applied position while increasing the engine speed to 2000 revs/min.
	6 Release the accelerator pedal.
	Does the brake pedal move downward as the engine speed returns to idle? **Yes** GO to D4. **No** Check the vacuum to brake booster.
D4: CHECK BRAKE FLUID LEVEL	
	1 Check the brake master cylinder reservoir fluid level.
	Is the fluid level OK? **Yes** Bleed the brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures). Re-test the system for normal operation. **No** Check for leaking brake system and rectify as required. Add fluid and bleed the brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures). Re-test the system for normal operation.

PINPOINT TEST E : THE PEDAL GOES DOWN FAST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
E1: ROAD TEST VEHICLE	
	1 Road test the vehicle and apply the brake pedal.
	Is the brake pedal effort and brake pedal travel normal? **Yes** No action required, vehicle is OK. **No** GO to E2.
E2: CHECK BRAKE PEDAL TRAVEL-PRESSURIZE SYSTEM	
	1 Pump the brake pedal rapidly (five times).
	Does the brake pedal travel build up and then hold? **Yes** Bleed the brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures). Re-test the system for normal operation. **No** GO to E3.
E3: CHECK FOR BRAKE SYSTEM LEAKS	

	1 Check for external brake system leaks. For additional information, refer to brake master cylinder component test in this section.
	Is there a leak present? **Yes** Repair as necessary, add fluid and bleed brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures). Re-test the system for normal operation. **No** No action required, system is OK.

PINPOINT TEST F : THE PEDAL GOES DOWN SLOWLY	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
F1: ROAD TEST VEHICLE - CHECK BRAKE PEDAL OPERATION	
	1 Check if the condition occurs during actual stopping application by applying the brake pedal while the vehicle is moving.
	Does the condition occur when the vehicle is moving? **Yes** GO to F2. **No** GO to F3.
F2: CHECK FOR BRAKE SYSTEM LEAKS	
	1 Check for external brake system leaks. For additional information, refer to brake master cylinder component test in this section.
	Are there any external brake system leaks? **Yes** Rectify as necessary. Add fluid and bleed the brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures). Re-test the system for normal operation. **No** GO to F3.
F3: CARRY OUT A BRAKE MASTER CYLINDER BYPASS TEST	
	1 Test for brake master cylinder bypass condition. Refer to Brake master cylinder component test in this section.
	Has a concern been identified? **Yes** Install a new brake master cylinder, add fluid and bleed the brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures). Re-test the system for normal operation. **No** No action required, system is OK.

PINPOINT TEST G : EXCESSIVE BRAKE PEDAL EFFORT	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
G1: CHECK BRAKE PADS	
	1 Check the brake pads for wear, contamination, correct installation, damage and type.
	Has a concern been identified? **Yes** Correctly install or install new brake pads as required. REFER to: Brake Pads - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-04, Removal and Installation). Re-test the system for normal operation. **No** GO to G2.
G2: CHECK VACUUM	
	1 Disconnect the vacuum hose from the brake booster.
	2 Connect a vacuum/pressure tester to the vacuum hose.
	3 Run the engine at normal operating temperature.
	4 Record the vacuum reading.
	Is the reading 40.5 kPa (12 in-Hg) or greater? **Yes** GO to G3. **No** Locate and rectify the source of low vacuum. Re-test the system for normal operation.
G3: INSPECT SYSTEM	
	1 Switch the engine off.
	2 Reconnect the vacuum hose.

	3 Inspect the brake booster, rubber grommet, and all vacuum plumbing for cracks, holes, damaged connections, or missing clamps.
	4 Pump the brake pedal several times to exhaust the vacuum. Push down on the brake pedal and hold.
	Does the brake pedal move down when the engine is started? **Yes** Vacuum system is OK. **No** GO to G4.
G4: CHECK POWER BRAKE BOOSTER VALVE	
	1 Check the brake booster valve. For additional information, refer to Brake Booster component test in this section.
	Is the power brake booster valve OK? **Yes** Check the brake booster. For additional information, refer to Brake Booster component test in this section. Install a new brake booster as required. REFER to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation), Brake Booster - RHD (206-07, Removal and Installation). Re-test the system for normal operation. **No** Install a new brake booster valve. Re-test the system for normal operation.

PINPOINT TEST H : BRAKE LOCKUP DURING LIGHT BRAKE PEDAL FORCE	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
H1: TEST BRAKE LOCKUP	
	1 Road test the vehicle and apply the brake pedal lightly.
	Do the brakes lockup? **Yes** GO to H2. **No** No action required, vehicle is OK.
H2: INSPECT BRAKE PADS	
	1 Inspect brake pads for contamination, correct installation, damage and type.
	Has a concern been identified? **Yes** Correctly install or install new brake pads as required. REFER to: Brake Pads - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Pads - Vehicles With: High Performance Brakes (206-04, Removal and Installation). Re-test the system for normal operation. **No** GO to H3.
H3: INSPECT BRAKE CALIPERS	
	1 Inspect brake calipers for binding, leaking or sticking.
	Has a concern been identified? **Yes** Correctly install or install new brake calipers as required. REFER to: Brake Caliper - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Caliper - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Caliper (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation), Brake Caliper - Vehicles With: High Performance Brakes (206-04, Removal and Installation). Re-test the system for normal operation. **No** No action required, vehicle is OK.

PINPOINT TEST I : BRAKES DRAG	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
I1: ROAD TEST VEHICLE	
	1 Road test the vehicle and apply the brakes.
	Are the brakes functioning correctly? **Yes** No action required, vehicle is OK. **No** GO to I2.
I2: CHECK BRAKE CALIPERS	
	1 Check the front and rear calipers pistons and pins for binding, leaking or sticking.

	Do the disc brake caliper pistons and pins bind, leak or stick? **Yes** Inspect the brake calipers and parking brake cables. Install new components as required. Re-test the system for normal operation. **No** GO to I3.
I3: CHECK BRAKE BOOSTER	
	1 Check the brake booster connecting rod alignment and travel.
	Is the connecting rod OK? **Yes** Vehicle is OK. **No** Install a new brake booster as required. REFER to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation), Brake Booster - RHD (206-07, Removal and Installation). Re-test the system for normal operation.

PINPOINT TEST J : EXCESSIVE/ERRATIC BRAKE PEDAL TRAVEL	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
J1: TEST ON ROUGH ROAD	
	1 Road test the vehicle on rough road conditions.
	2 Apply the brakes slowly.
	Is the brake pedal effort and brake pedal travel normal? **Yes** No action required, vehicle is OK. **No** GO to J2.
J2: CHECK BRAKE FLUID LEVEL	
	1 Check the brake master cylinder reservoir fluid level.
	Is the fluid level OK? **Yes** GO to J3. **No** Check brake master cylinder reservoir sealing points. For additional information, refer to Brake master cylinder component test in this section. Add brake fluid and bleed the brake system. REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures). Re-test the system for normal operation.
J3: CHECK BRAKE PEDAL RESERVE	
	1 Run engine at idle speed.
	2 Apply the brake pedal lightly three or four times.
	3 Wait 15 seconds for the vacuum to replenish.
	4 Push down on the brake pedal until it stops moving downward or an increased resistance to the brake pedal travel occurs.
	5 Hold the brake pedal in the applied position while increasing the engine speed to 2000 revs/min.
	6 Release the accelerator pedal.
	Does the brake pedal move downward as the engine speed returns to idle? **Yes** GO to J4. **No** Check the vacuum to the brake booster.
J4: CHECK THE FRONT WHEEL BEARING ASSEMBLY	
	1 Check the front wheel bearing assembly.
	Are the front wheel bearings loose/damaged? **Yes** Tighten to specification or install a new front wheel bearing as required. REFER to: Front Wheel Bearing and Wheel Hub - V6 3.0L Petrol (204-01 Front Suspension, Removal and Installation). Re-test the system for normal operation. **No** Check the front brake discs for thickness variances.

PINPOINT TEST K : SLOW OR INCOMPLETE BRAKE PEDAL RETURN	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
K1: CHECK FOR BRAKE PEDAL RETURN	
	1 Run the engine at idle while making several brake applications.
	2 Pull the brake pedal rearward with approximately 44.5 N (10lb) force.
	3 Release the brake pedal and measure the distance to the toe board.
	4 Make a hard brake application.
	5 Release the brake pedal and measure the brake pedal to toe board distance. The brake pedal should return to its original position.

	Does the brake pedal return to its original position? **Yes** No action required, vehicle is OK. **No** GO to K2.
K2: CHECK FOR BRAKE PEDAL BINDING	
	1 Disconnect the brake booster from the brake pedal. Check the brake pedal to ensure free operation.
	Is the brake pedal operating freely? **Yes** Install a new brake booster as required. REFER to: Brake Booster (206-07 Power Brake Actuation, Removal and Installation), Brake Booster - RHD (206-07, Removal and Installation). Re-test the system for normal operation. **No** Repair or install new brake pedal. Re-test the system for normal operation.

Component Tests

Brake Booster

1. Check all hoses and connections. All unused vacuum connectors should be capped. Hoses and their connections should be correctly secured and in good condition with no holes and no collapsed areas. Inspect the valve on the brake booster for damage.

2. Check the hydraulic brake system for leaks or low fluid.

3. With the automatic transmission in PARK, stop the engine and apply the parking brake. Pump the brake pedal several times to exhaust all vacuum in the system. With the engine switched off and all vacuum in the system exhausted, apply the brake pedal and hold it down. Start the engine. If the vacuum system is operating, the brake pedal will tend to move downward under constant foot pressure. If no motion is felt, the vacuum booster system is not functioning.

4. Remove the vacuum hose from the brake booster. Manifold vacuum should be available at the brake booster end of the hose with the engine at idle speed and the automatic transmission in PARK. Make sure that all unused vacuum outlets are correctly capped, hose connectors are correctly secured and vacuum hoses are in good condition. When it is established that manifold vacuum is available to the brake booster, connect the vacuum hose to the brake booster and repeat Step 3. If no downward movement of the brake pedal is felt, install a new brake booster.

5. Operate the engine for a minimum of 10 seconds at a fast idle. Stop the engine and allow the vehicle to stand for 10 minutes. Then, apply the brake pedal with approximately 89 N (20lb) of force. The pedal feel (brake application) should be the same as that noted with the engine running. If the brake pedal feels hard (no power assist), install a new valve and then repeat the test. If the brake pedal still feels hard, install a new brake booster. If the brake pedal movement feels spongy, bleed the brake system.
   REFER to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures).

Brake Master Cylinder

Usually, the first and strongest indicator of anything wrong in the brake system is a feeling through the brake pedal. In diagnosing the condition of the brake master cylinder, check pedal feel as evidence of a brake concern. Check for brake warning lamp illumination and the brake fluid level in the brake master cylinder reservoir.

Normal Conditions

The following conditions are considered normal and are not indications that the brake master cylinder is in need of repair.

- Modern brake systems are designed to produce a pedal effort that is not as hard as in the past. Complaints of light pedal efforts should be compared to the pedal efforts of another vehicle of the same model and year.
- The fluid level will fall with brake pad wear.

Abnormal Conditions

Changes in the brake pedal feel or brake pedal travel are indicators that something could be wrong in the brake system. The diagnostic procedure and techniques use brake pedal feel, warning indicator illumination and low brake fluid level as indicators to diagnosing brake system concerns. The following conditions are considered abnormal and indicate that the brake master cylinder is in need of repair:

NOTE: Prior to carrying out any diagnosis, make sure the brake system warning indicator is functional.

- Brake pedal goes down fast. This could be caused by an external or internal leak.
- Brake pedal goes down slowly. This could be caused by an internal or external leak.
- Brake pedal is low or feels spongy. This condition may be caused by no fluid in the brake master cylinder, reservoir cap vent holes clogged or air in the hydraulic system.
- Brake pedal effort is excessive. This may be caused by a bind or obstruction in the pedal/linkage, a faulty non-return valve, booster or insufficient booster vacuum.
- Rear brakes lock up during light pedal force. This may be caused by damaged brake pads, a partially applied parking brake, a damaged ABS sensor or bearing failure.
- Brake pedal effort erratic. This condition could be caused by the brake booster or incorrectly installed brake pads.
- Brake warning indicator is on. This may be caused by low fluid level or float assembly damaged.

Non Pressure Leaks

Any reduced fluid volume in the brake master cylinder reservoir may be caused by two types of none pressure external leaks.

Type 1: An external leak may occur at the brake master cylinder reservoir cap because of incorrect positioning of the gasket and cap. Reposition cap and gasket.

Type 2: An external leak may occur at the brake master cylinder reservoir mounting seals. Repair such a leak by installing new seals and make sure that the brake master cylinder reservoir retaining bolt is correctly installed.

Published: 01-Jul-2014

Brake System - General Information - Brake Disc Runout Check

General Procedures

Check

1. Remove the wheel and tire.
   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

2. Install all the wheel nuts and tighten equally to 20 Nm (15 lb.ft).
   - Make sure that the brake disc is fully seated against the hub face.

3. Install a dial test indicator gauge and holding fixture to a suitable mounting point.

4. NOTE: If the runout is outside specification, check the hub face runout.

   Using the dial test indicator, measure the inner and outer faces of the brake disc. For additional information, refer to: (206-00 Brake System - General Information)
   Specifications - 3.0L NA V6 - AJ27 (Specifications),
   Specifications - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol (Specifications).
   1. Position the gauge so that it contacts the disc 10 mm (0.4 in) from the outer edge.
   2. Slowly rotate the hub/disc assembly. Note the reading.

5. If a front hub runout check is required, remove the front brake disc. For additional information, refer to:
   Brake Disc - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: Standard Brakes (206-03B Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: High Performance Brakes (206-03B Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

6. If a rear hub runout check is required, remove the rear brake disc. For additional information, refer to:
   Brake Disc (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: High Performance Brakes (206-04B Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: Standard Brakes (206-04B Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).

7. NOTE: The hub surface should be free from dirt and corrosion. Do not use abrasive cloths to clean hub faces.

   Using the dial test indicator, measure the hub face runout.
   1. Position the gauge so that it contacts the mounting tube between the stud and the chamfer.
   2. Slowly rotate the hub and note the runout. For additional information, refer to the specification chart.
   - If the front hub runout exceeds the specifications, install a new hub, brake disc and recheck. For additional information, refer to: (204-01 Front Suspension)
     Front Wheel Bearing and Wheel Hub - V6 3.0L Petrol (Removal and Installation),

Front Wheel Bearing and Wheel Hub - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol (Removal and Installation).

- If the rear hub runout exceeds the specifications, install a new hub, brake disc and recheck.
  For additional information, refer to: Rear Wheel Bearing (204-02 Rear Suspension, Removal and Installation).

8. If the front hub face is within specification, install a new brake disc. For additional information, refer to:
   Brake Disc - Vehicles With: Standard Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: Standard Brakes (206-03B Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation),
   Brake Disc - Vehicles With: High Performance Brakes (206-03B Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).
   If the rear hub face is within specification, install a new disc.

9. Install the wheel and tire.
   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

Published: 11-May-2011

Brake System - General Information - Brake System Bleeding

General Procedures

CAUTIONS:

The brake fluid reservoir must remain full with new, clean brake fluid at all times during bleeding.

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

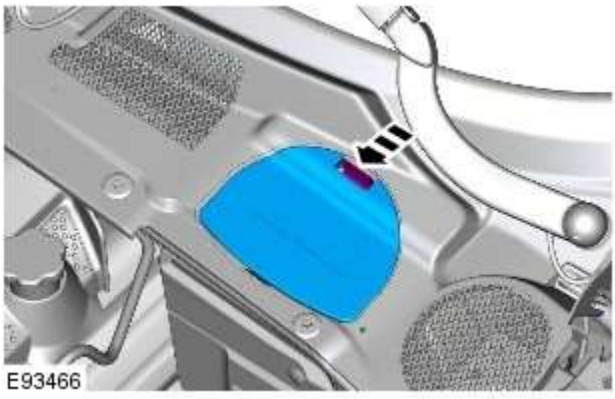
NOTE:

All vehicles

1. 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.

2. Check that the brake fluid lines are secure and that there are no signs of a brake fluid leak. If a brake fluid leak is detected, investigate and rectify the cause of the leak before bleeding the brakes.

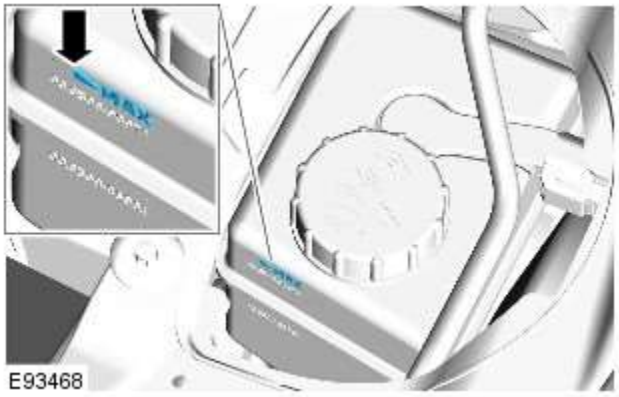


3. Remove the brake master cylinder cover.
   - Carefully release the clip.

4. WARNING: Do not allow dirt or foreign liquids to enter the reservoir. Use only new brake fluid of the correct specification from airtight containers. Do not mix brands of brake fluid as they may not be compatible.

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

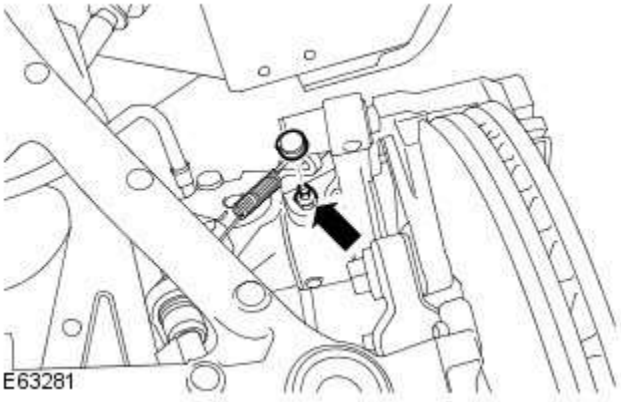
   Remove the brake fluid reservoir cap.



5. Fill the brake fluid reservoir to the MAX mark.

All vehicles

6. Install the bleed tube to the right hand rear brake caliper bleed screw and immerse the free end of the bleed tube in a bleed jar, containing a small quantity of approved brake fluid.
    - Remove the bleed screw caps.



7. Loosen the bleed screw by one-half to three-quarters of a turn.

8. CAUTION: The brake fluid reservoir must remain full with new, clean brake fluid at all times during bleeding.

NOTE: If the bleed tube used, does not have a one way valve the bleed screw will need to be closed before the brake pedal is returned to the rest position. Then opened again and the procedure repeated for each pedal application.

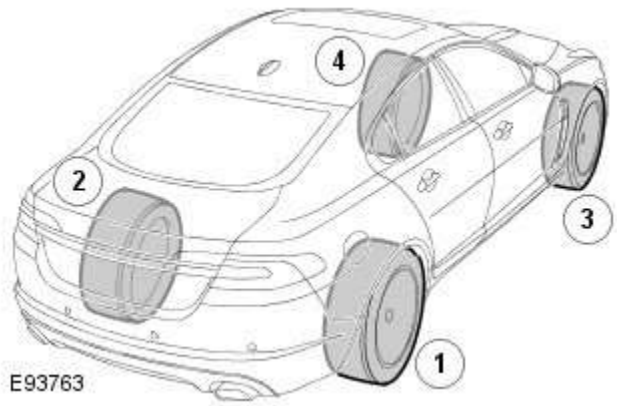
With assistance, depress the brake pedal steadily through its full stroke and allow it to return to the rest position. Repeat the procedure until brake fluid, clean and air-free flows into the bleed jar.

9. CAUTION: Make sure the bleed screw cap is installed after bleeding. This will prevent corrosion to the bleed screw.

With the brake pedal fully depressed, tighten the bleed screw.
    - Vehicles with standard brakes: Tighten the front caliper bleed screw to 8 Nm.
    - Vehicles with high performance brakes: Tighten the front caliper bleed screw to 14 Nm.
    - Tighten the rear bleed screw to 14 Nm.

10. Fill the brake fluid reservoir to the MAX mark.

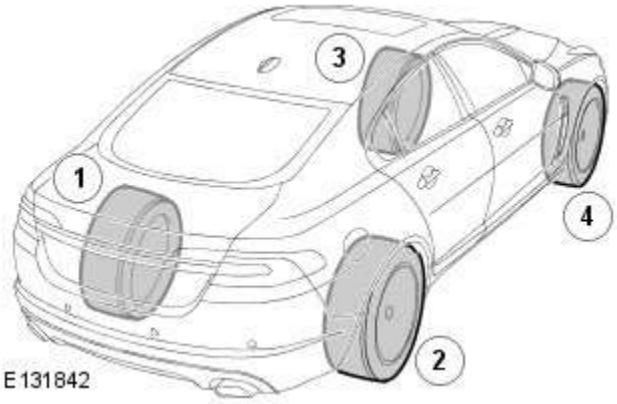
Left-hand drive vehicles



11. WARNING: Braking efficiency may be seriously impaired if an incorrect bleed sequence is used.

    Repeat the brake bleeding procedure for each brake caliper, following the above sequence.

Right-hand drive vehicles



12. WARNING: Braking efficiency may be seriously impaired if an incorrect bleed sequence is used.

    Repeat the brake bleeding procedure for each brake caliper, following the above sequence.

All vehicles

13. Fill the brake fluid reservoir to the MAX mark.

14. Apply the brakes and check for leaks.

15. Install the brake fluid reservoir cap.

16. Install the brake master cylinder cover.
    - Carefully secure the clip.

Published: 17-Feb-2012

Brake System - General Information - Front Brake Disc Runout Check - With Wheel On Vehicles With: High Performance Brakes

General Procedures

1. NOTES:

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

   RH illustration shown, LH similar

   All measurements must taken with the wheel installed.

2. WARNING: Make sure to support the vehicle with axle stands.

   Raise the front of the vehicle.

3. Mount the DTI Dial Test Indicator (DTI) gauge to the bolt as shown with tool 100-053.

4. Make sure the DTI is securely mounted.


E141871

5. Position the DTI probe 5 mm from the outer edge of the disc.
    - Zero DTI and rotate road wheel one complete revolution to measure disc runout.


E141872

6. Position the DTI probe in the centre of the disc.
    - Zero DTI and rotate road wheel one complete revolution to measure disc runout.

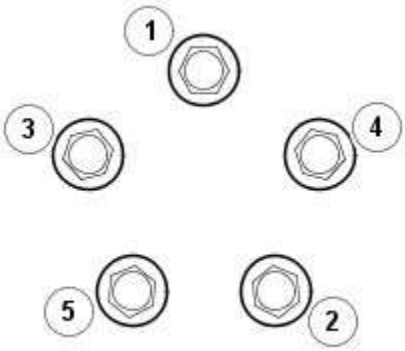

E141873

7. Position the DTI probe 5 mm from the inner edge of the disc.
    - Zero DTI and rotate road wheel one complete revolution to measure disc runout.

8. NOTE: **The disc runout limit is 0.075 mm.**

   If the disc runout exceeds the limit check the hub drive flange and bearing runout.
   For additional information, refer to: Front Wheel Bearing and Wheel Hub Runout Check - Vehicles With: High Performance Brakes (204-00 Suspension System - General Information, General Procedures).

9. If hub runout is within the limit replace the brake disc.



E74593

10. Install the wheel.
    - Tighten the road wheel nuts in sequence as shown above to the following:
    - Stage 1: 4 Nm.
    - Stage 2: 60 Nm.
    - Stage 3: 125 Nm.

11. Re-check the disc runout as detailed above.

12. Remove DTI and install the bait. 90 Nm.

Published: 27-Feb-2012

Brake System - General Information - Rear Brake Disc Runout Check - With Wheel On

General Procedures

1. NOTES:

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

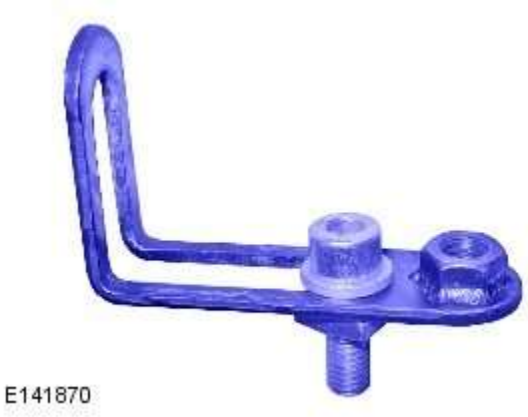
   RH illustration shown, LH similar.

   All measurements must be taken with the wheel installed.

2. WARNING: Make sure to support the vehicle with axle stands.

   Raise the rear of the vehicle.

3. Modify tool 100-053 with an M8 bolt and nut as shown.



E141870

4. Mount the DTI Dial Test Indicator (DTI) gauge on the tool as shown.

E141869

5. Securely mount the DTI on the bottom calliper mounting bolt, a spacer washer maybe required under the tool.

6. Position the DTI probe 5 mm from the outer edge of the disc.
    - Zero DTI and rotate road wheel one complete revolution to measure disc runout.


E141946

7. Position the DTI probe in the centre of the disc.
    - Zero DTI and rotate road wheel one complete revolution to measure disc runout.

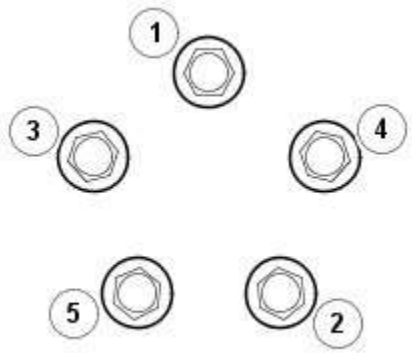

E141947

8. Position the DTI probe 5 mm from the inner edge of the disc.
    - Zero DTI and rotate road wheel one complete revolution to measure disc runout.

9. NOTE: **The disc runout limit is 0.09 mm.**

    If the disc runout exceeds the limit check the hub drive flange and bearing runout.
    For additional information, refer to: Rear Wheel Bearing and Wheel Hub Runout Check - Vehicles With: High Performance Brakes (204-00 Suspension System - General Information, General Procedures).

10. If hub runout is within the limit replace the brake disc.



E74593

11. Install the wheel.
    - Tighten the road wheel nuts in sequence as shown to the following:
    - Stage 1: 4 Nm.
    - Stage 2: 60 Nm.
    - Stage 3: 125 Nm.

12. Re-check the disc runout as detailed above.


E141948

13. Remove DTI and install the bolt. 103 Nm.

Published: 30-Jul-2014

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol -

Description	Nm	lb-ft	lb-in
Brake caliper anchor plate retaining bolts	115	85	-
Brake caliper retaining bolts	58	43	-
Brake hose retaining bolt	42	31	-

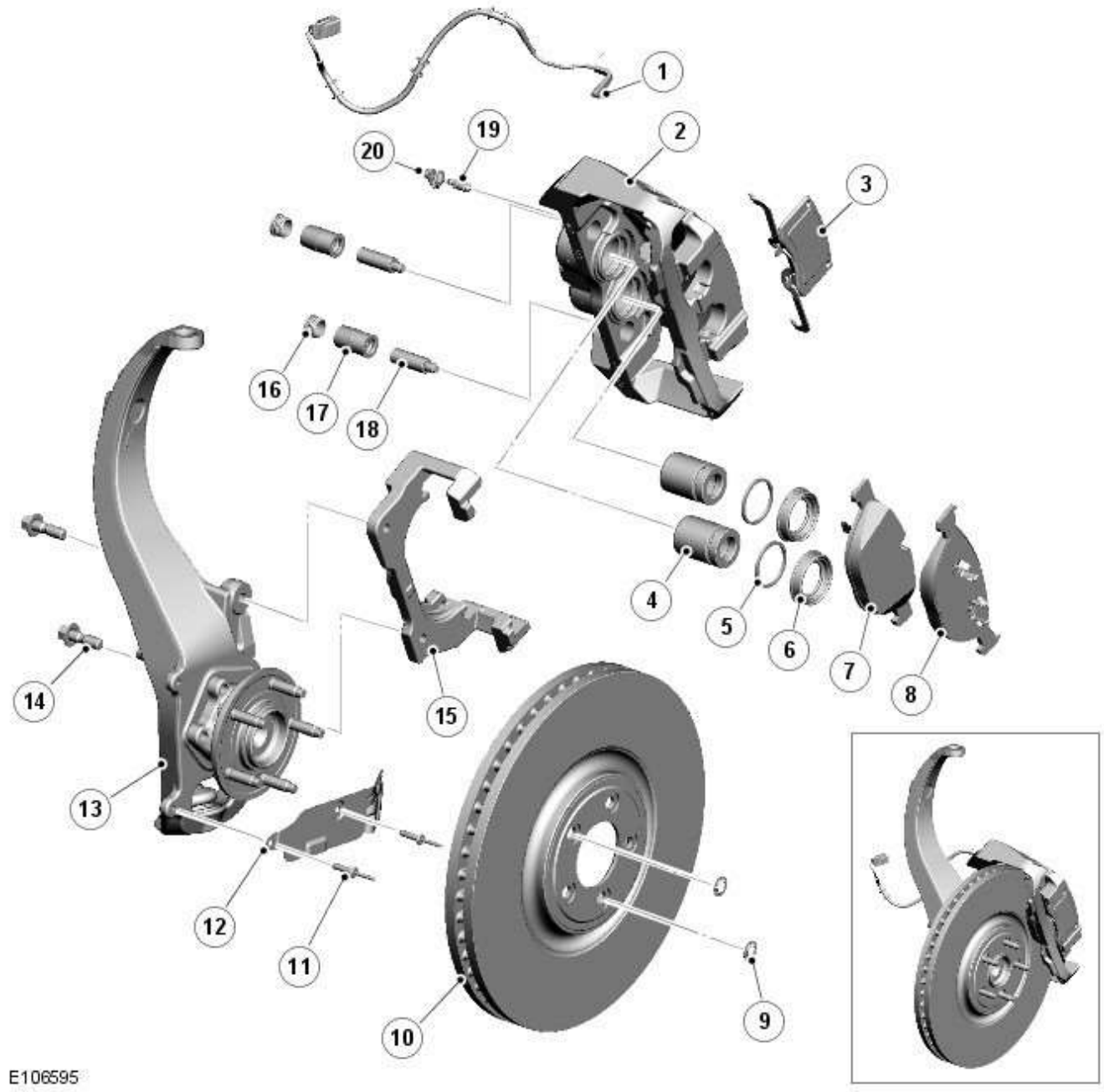
Published: 11-May-2011

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Front Disc Brake - Component Location

Description and Operation

NOTE: LH (left-hand) installation shown, RH (right-hand) installation similar.

Performance Brakes - 5.0L Supercharger V8 Vehicles



Item	Description
1	Brake pad wear sensor
2	Caliper body
3	Anti-rattle spring
4	Piston (2 off)
5	Piston seal (2 off)
6	Piston dust cover (2 off)
7	Inboard brake pad
8	Outboard brake pad
9	Retaining washer (2 off)
10	Brake disc
11	Rivet (2 off)
12	Heat shield
13	Front wheel knuckle/hub and bearing assembly
14	Caliper bolt (2 off)
15	Caliper carrier
16	Guide pin dust cover (2 off)
17	Guide pin bush (2 off)
18	Guide pin (2 off)
19	Bleed screw
20	Bleed screw dust cap

Published: 11-May-2011

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Front Disc Brake - Overview

Description and Operation

OVERVIEW

Performance Brakes - 5.0L Supercharger V8 Vehicles

The performance front braking system features ventilated brake discs with dual piston sliding calipers. The discs are 380 mm (14.96 in.) diameter x 36 mm (1.42 in.) thick.

The brake disc is manufactured from cast iron. The disc is retained on the wheel hub by two retaining washers and the wheel nuts.

A brake pads wear sensors is fitted to the LH front brake.

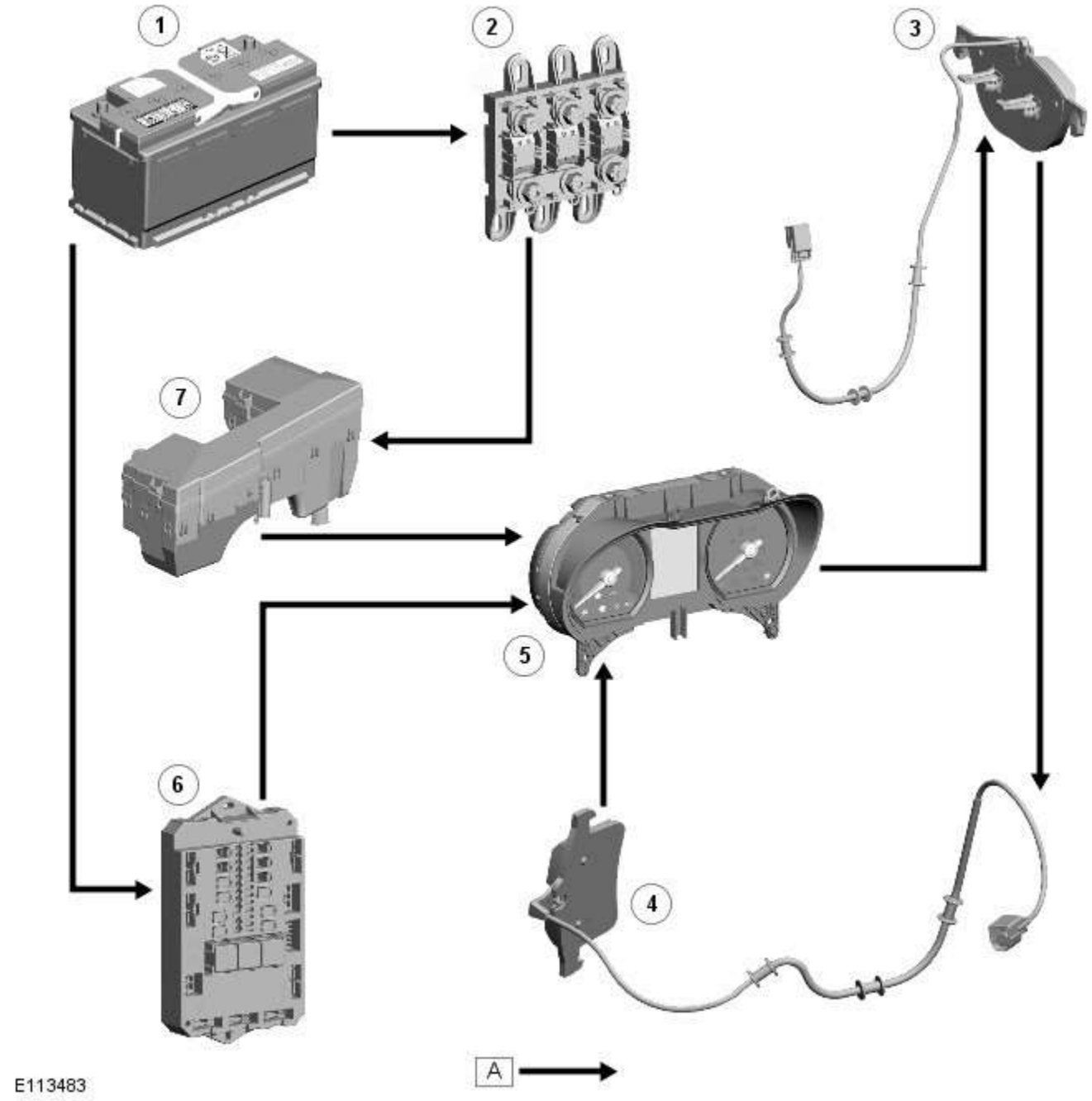
Published: 11-May-2011

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Front Disc Brake - System Operation and Component Description

Description and Operation

Control Diagram

NOTE: **A** = Hardwired



Item	Description
1	Battery
2	Megafuse (250 A)
3	Front brake pad wear sensor
4	Rear brake pad wear sensor
5	Instrument cluster
6	CJB (central junction box)
7	Power distribution box

System Operation

BRAKE CALIPERS

When hydraulic pressure is supplied to the caliper, the pistons extend to force the inner pad against the brake disc. The caliper reacts and slides along two guide pins to bring the outer pad into contact with the brake disc.

BRAKE PAD WEAR SENSORS

When a brake pad incorporating a brake pad wear sensor is approximately 75% worn, the sensor wire within the pad material is worn through and the brake pad wear sensor goes open circuit. When the instrument cluster detects the open circuit, it illuminates the amber LED (light emitting diode) in the brake warning indicator, displays an appropriate warning in the message center and sounds a warning chime.
Refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

 NOTE: A new pad wear sensor lead must be fitted whenever the brake pads are changed, irrespective of the brake pad warning sensor being triggered.

Component Description

BRAKE CALIPERS

Each caliper is mounted within a fixed carrier that is secured to the front wheel knuckle with two bolts. The inboard brake pad of the LH (left-hand) brake incorporates a wear sensor.

Each outboard brake pad is installed with a pressed steel anti-rattle spring. On SC (supercharger) vehicles, a badge with the 'R' symbol is formed on the anti-rattle spring.

BRAKE PAD WEAR SENSORS

The brake pad wear sensor is wired in series with a wear sensor on the RH (right-hand) rear brake and the instrument cluster. If the thickness of one of the brake pads connected to a wear sensor decreases to a predetermined limit, the instrument cluster illuminates the brake warning indicator.

Published: 02-May-2013

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Caliper Vehicles With: High Performance Brakes

Removal and Installation

Removal

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

NOTE: Removal steps in this procedure may contain installation details.

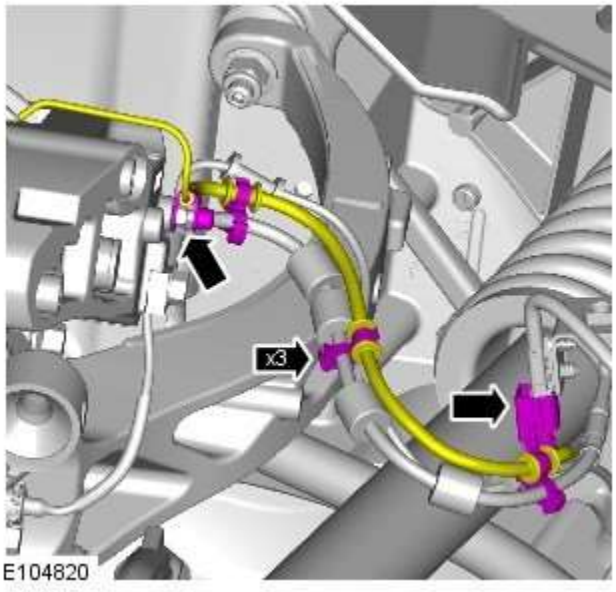
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

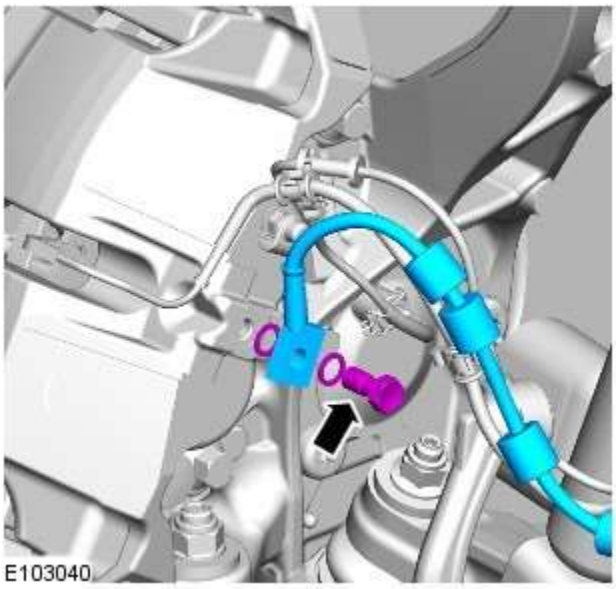
   Raise and support the vehicle.

2. Remove the left-hand front wheel and tire.

   Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3.





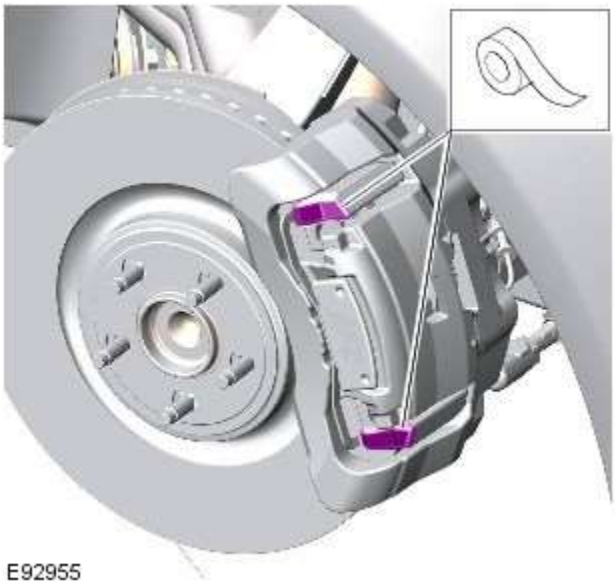
4. CAUTION: Always plug any open connections to prevent contamination.

   NOTES:

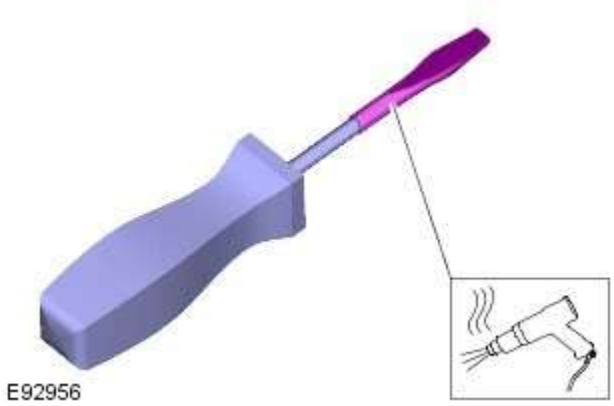
   To prevent the loss of brake fluid, using the special tool apply the brake pedal and set to 40mm (1.6 in) below the rest position.

   Left-hand shown, right-hand similar.

   Remove and discard the two sealing washers.



5. NOTE: Left-hand shown, right-hand similar.



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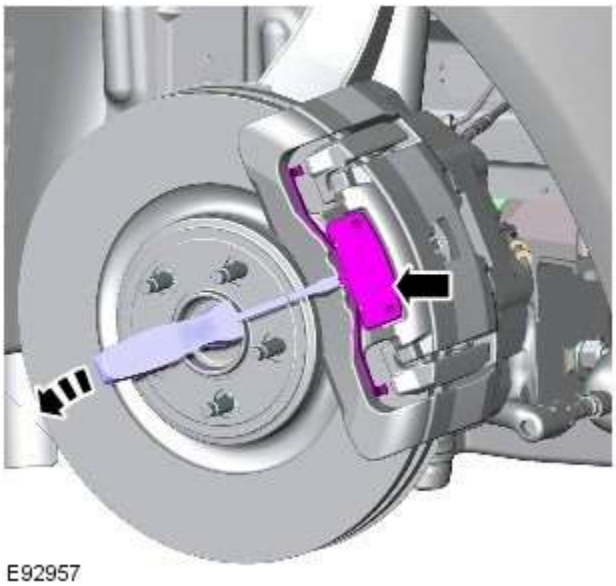
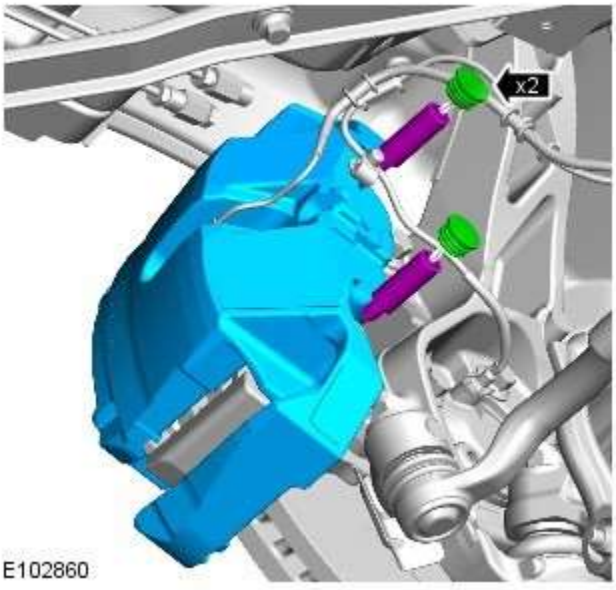

E92957

7. CAUTION: Removal of the clips is a delicate procedure, damage will occur if any force is used.

NOTE: Left-hand shown, right-hand similar.

- Lever the anti-rattle spring in the center of the spring until either side is released.

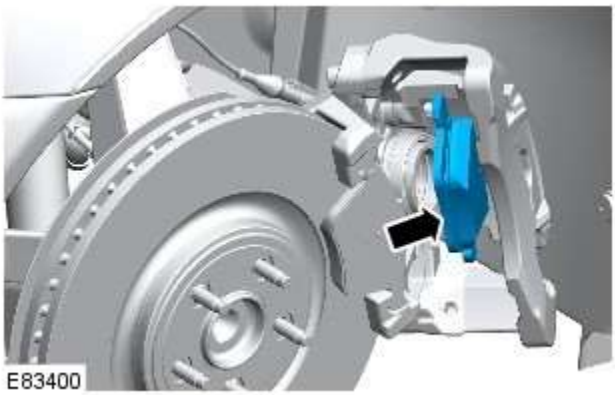


E102860

8. WARNING: If the brake caliper piston seal is damaged a new brake caliper must be installed.

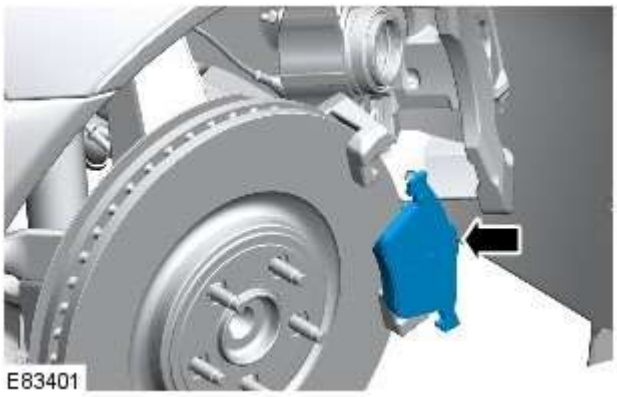
CAUTION: Do not allow the brake caliper to hang on the brake hose.

NOTE: Left-hand shown, right-hand similar.


E83400

9. NOTE: Left-hand shown, right-hand similar.

- Release the clip.



10. NOTE: Left-hand shown, right-hand similar.

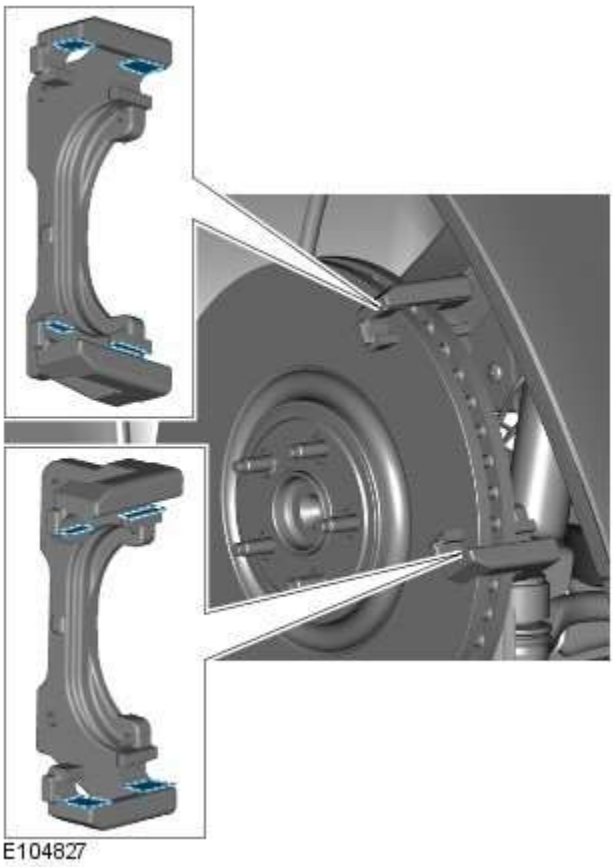
Installation

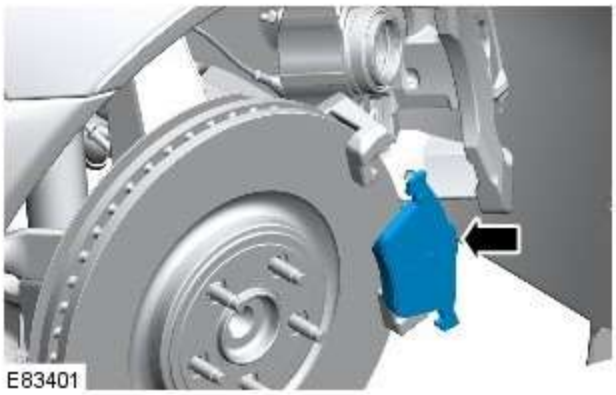
1. WARNING: Do not use compressed air to clean brake components. Dust from friction materials can be harmful if inhaled.

   CAUTION: As the piston is pushed back into the caliper housing, the brake fluid level in the reservoir will rise. Do not allow the reservoir to overflow.

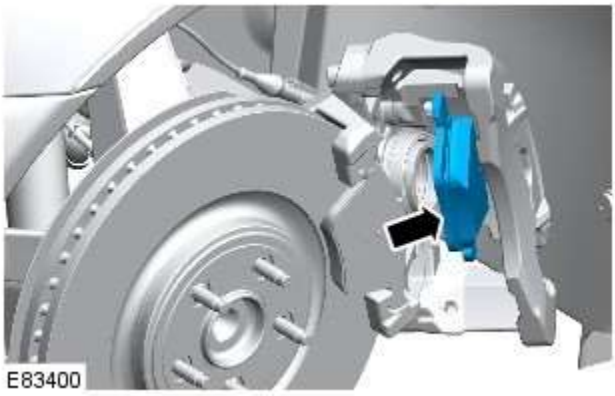
   Press the piston into the caliper housing.

2.
   - Apply grease C2C-39930 to the areas indicated.

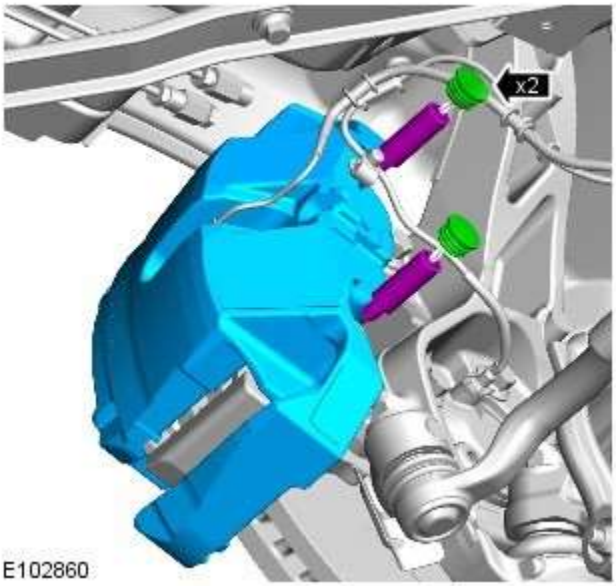




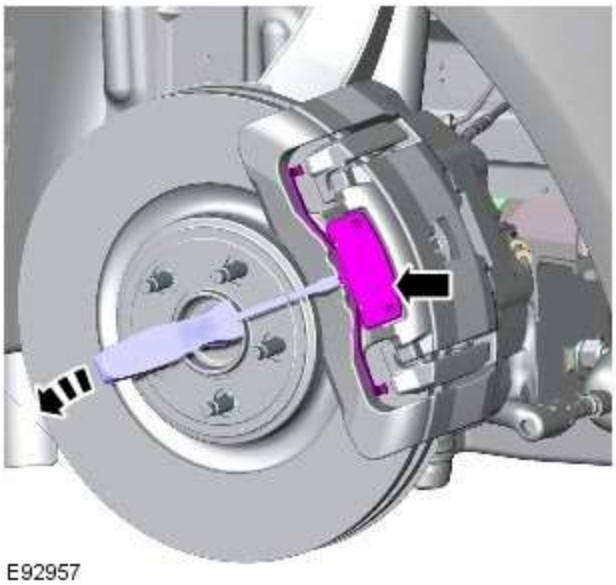
3. NOTE: Left-hand shown, right-hand similar.



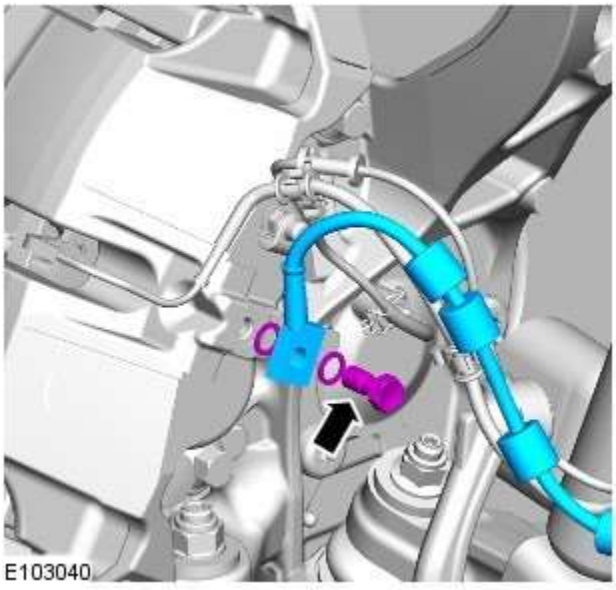
4. NOTE: Left-hand shown, right-hand similar.



5. NOTE: Left-hand shown, right-hand similar.
   - *Torque:* 58 Nm


E92957

6. NOTE: Left-hand shown, right-hand similar.
   - Secure the bottom arm of the anti-rattle spring under the bottom anchor bracket of the caliper.
   - Compress the upper spring arm into the correct position, under the upper anchor bracket, whilst retaining the logo plate.
   - Using the screw-driver, tap the central locating tag into the locked position.


E103040

7. CAUTIONS:

   Always plug any open connections to prevent contamination.

   Make sure new sealing washers are installed.

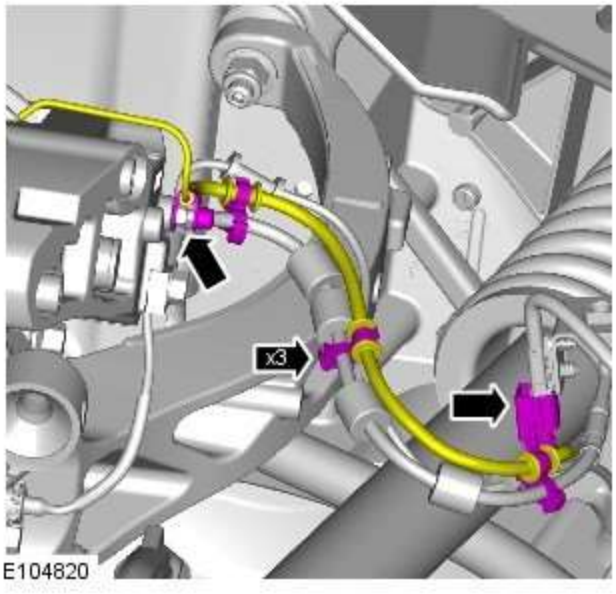
   NOTES:

   To prevent the loss of brake fluid, using the special tool apply the brake pedal and set to 40mm (1.6 in) below the rest position.

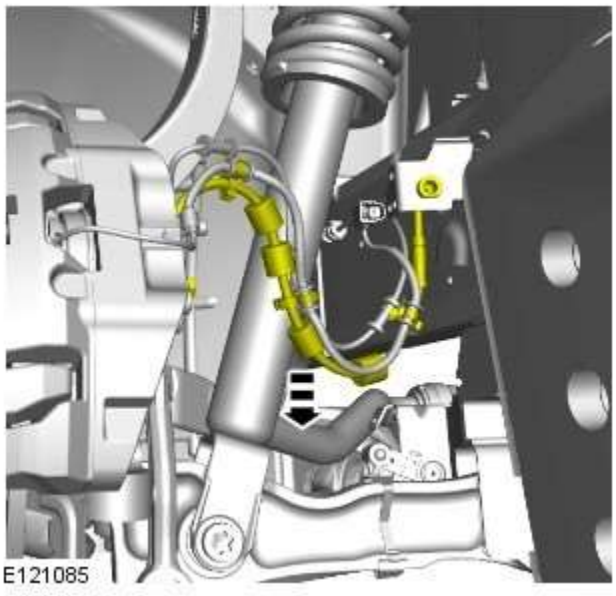
   Left-hand shown, right-hand similar.

   Torque: 42 Nm

8.



9. CAUTIONS:



Make sure that the road wheels are in the straight ahead position.

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

Make sure that the brake hose is not twisted and is correctly located.

- Pull downwards at the position shown.

10. Refer to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures).

11. Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

Published: 11-May-2011

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Disc Vehicles With: High Performance Brakes

Removal and Installation

Removal

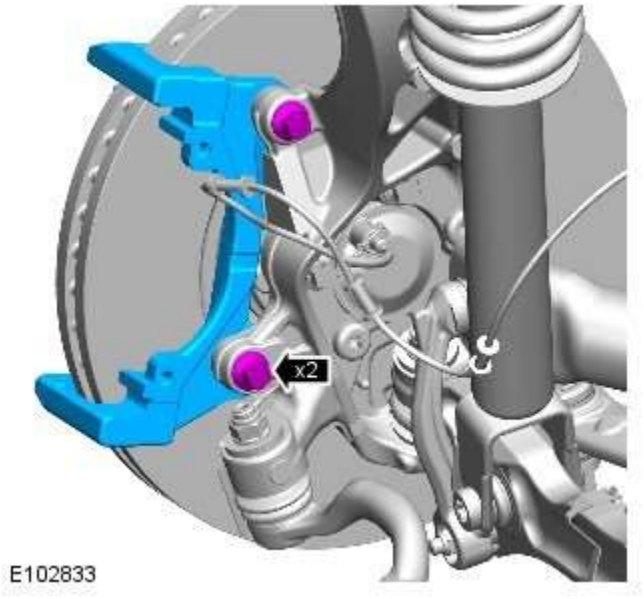
CAUTION: Brake discs must be renewed in pairs.

NOTE: Removal steps in this procedure may contain installation details.

1. 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.

2. Refer to: Brake Pads - Vehicles With: High Performance Brakes (206-03B Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).



3. *Torque:* 115 Nm

4.
   - Remove the 2 clips.
   - Clean the components mating faces.

5. Repeat the above procedure on the opposite side.

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Pads Vehicles With: High Performance Brakes

Removal and Installation

Removal

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

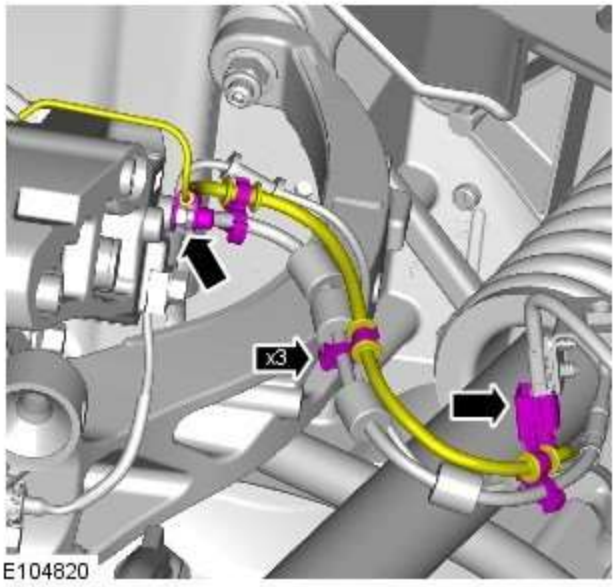
NOTE: Removal steps in this procedure may contain installation details.

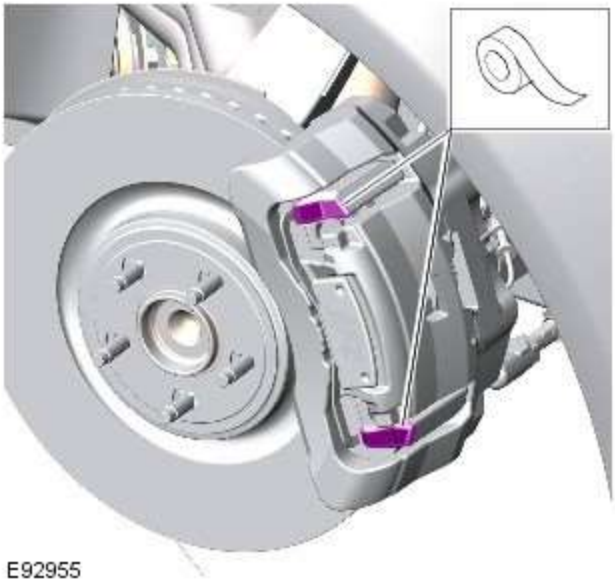
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

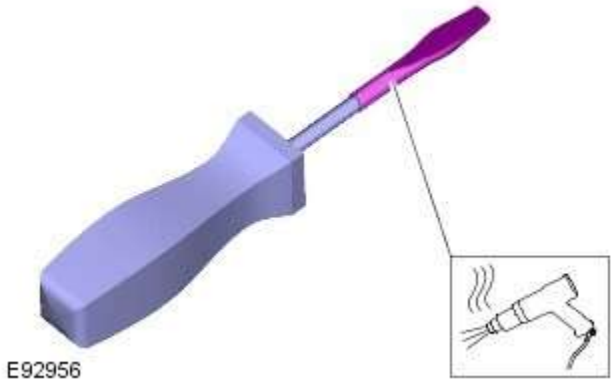
3.





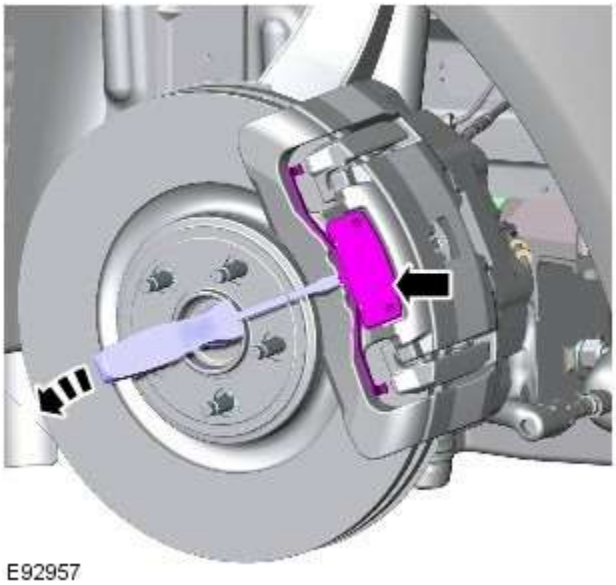
E92955

4. NOTE: Left-hand shown, right-hand similar.



E92956

5.

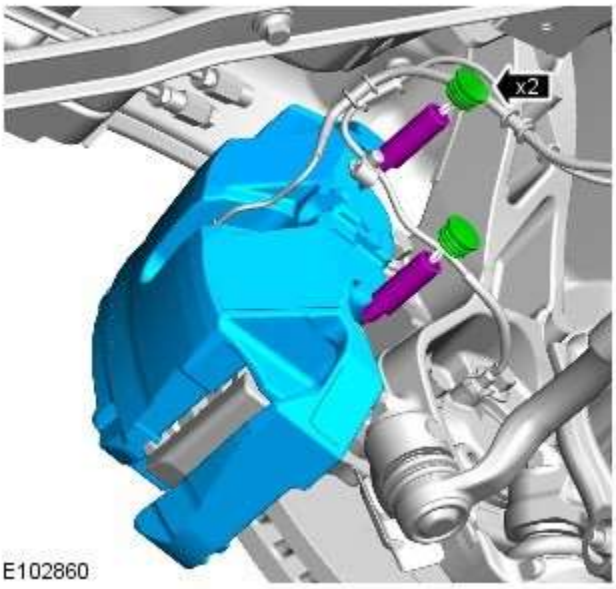


E92957

6. CAUTION: Removal of the clips is a delicate procedure, damage will occur if any force is used.

NOTE: Left-hand shown, right-hand similar.

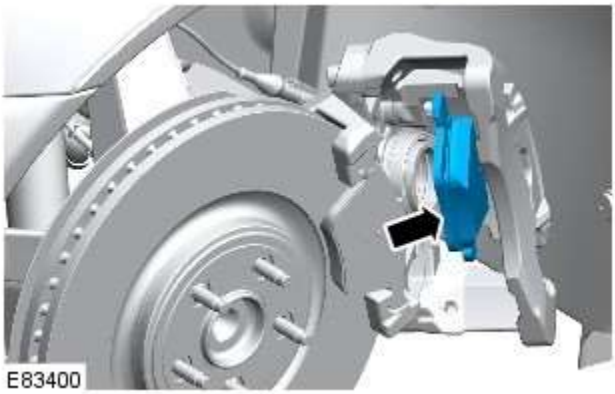
- Lever the anti-rattle spring in the center of the spring until either side is released.



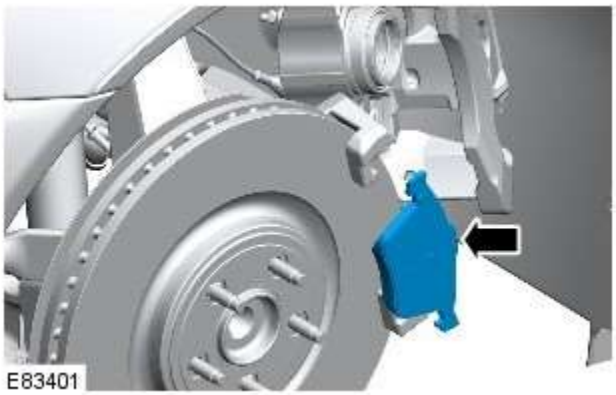
7. WARNING: If the brake caliper piston seal is damaged a new brake caliper must be installed.

   CAUTION: Do not allow the brake caliper to hang on the brake hose.

   NOTE: Left-hand shown, right-hand similar.

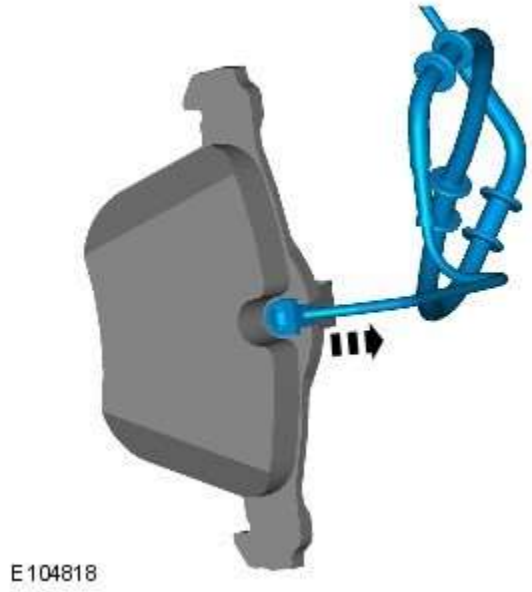


8. NOTE: Left-hand shown, right-hand similar.
   - Release the clip.



9. NOTE: Left-hand shown, right-hand similar.

10.



11. Repeat the above procedure on the opposite side.

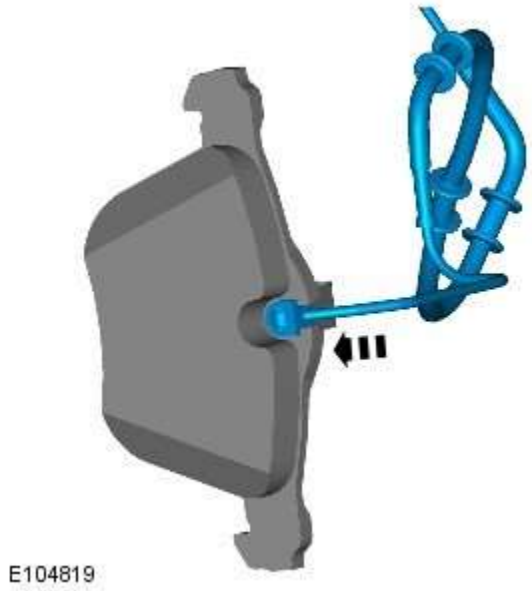
Installation

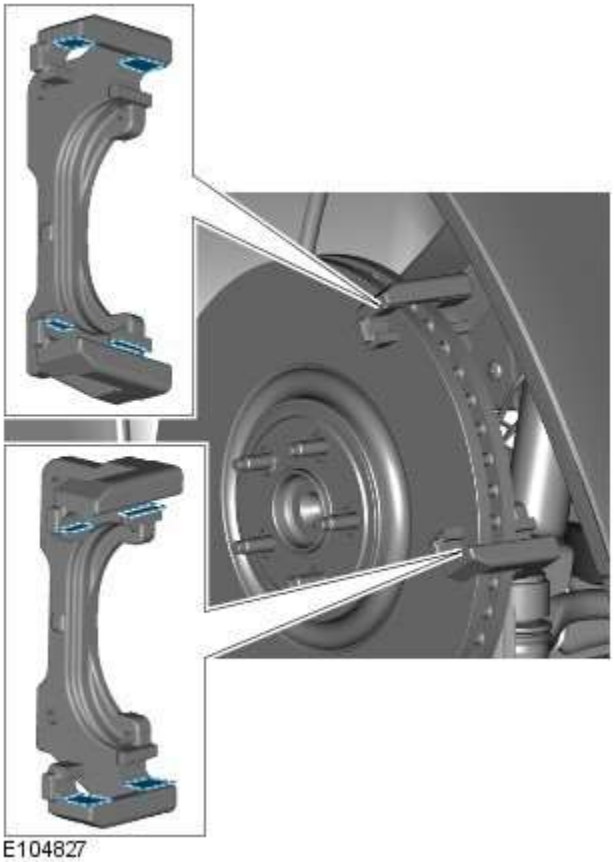
1. WARNING: Do not use compressed air to clean brake components. Dust from friction materials can be harmful if inhaled.

   CAUTION: As the piston is pushed back into the caliper housing, the brake fluid level in the reservoir will rise. Do not allow the reservoir to overflow.

   Press the piston into the caliper housing.

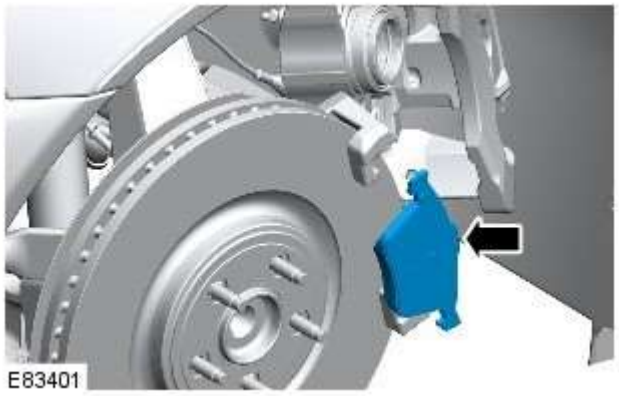
2.



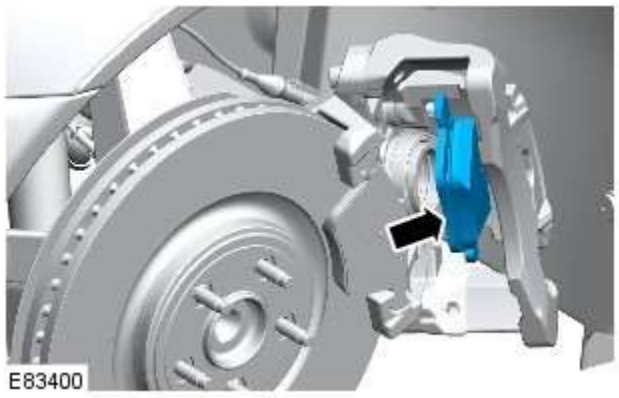

E104827

3.

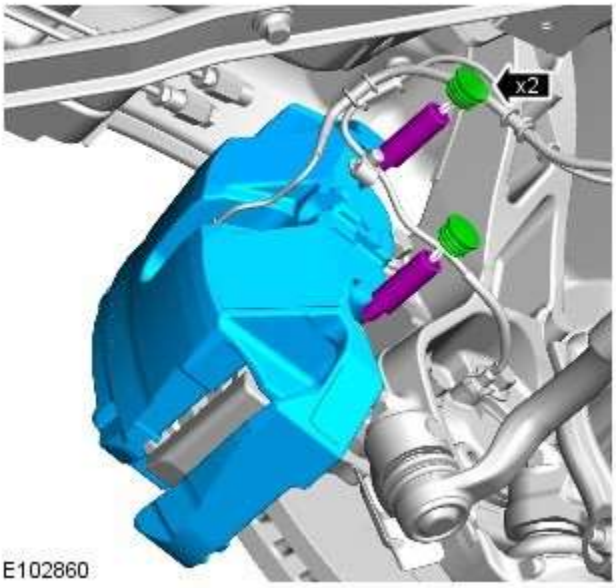
- Apply grease C2C-39930 to the areas indicated.


E83401

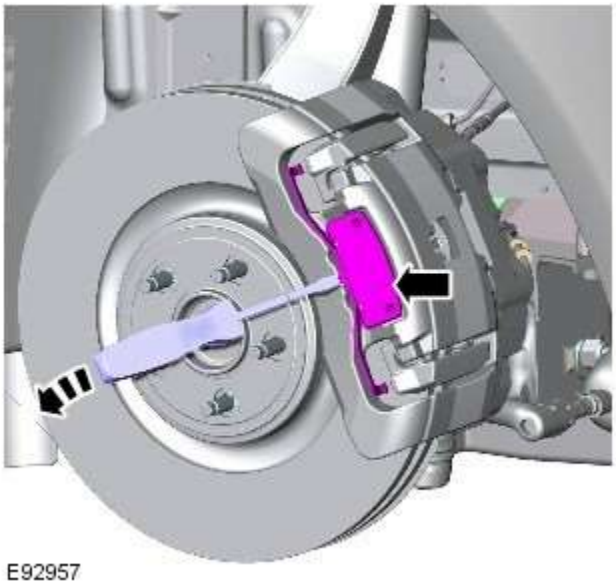
4. NOTE: Left-hand shown, right-hand similar.


E83400

5. NOTE: Left-hand shown, right-hand similar.

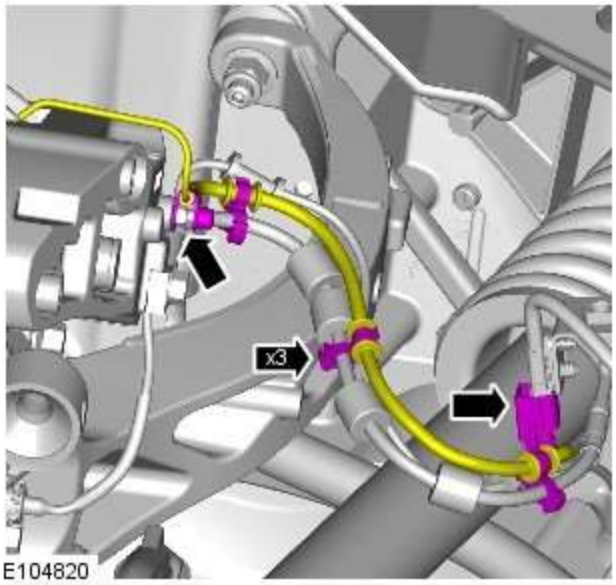


6. NOTE: Left-hand shown, right-hand similar.
   - *Torque:* 58 Nm



7. NOTE: Left-hand shown, right-hand similar.
   - Secure the bottom arm of the anti-rattle spring under the bottom anchor bracket of the caliper.
   - Compress the upper spring arm into the correct position, under the upper anchor bracket, whilst retaining the logo plate.
   - Using the screw-driver, tap the central locating tag into the locked position.

8.



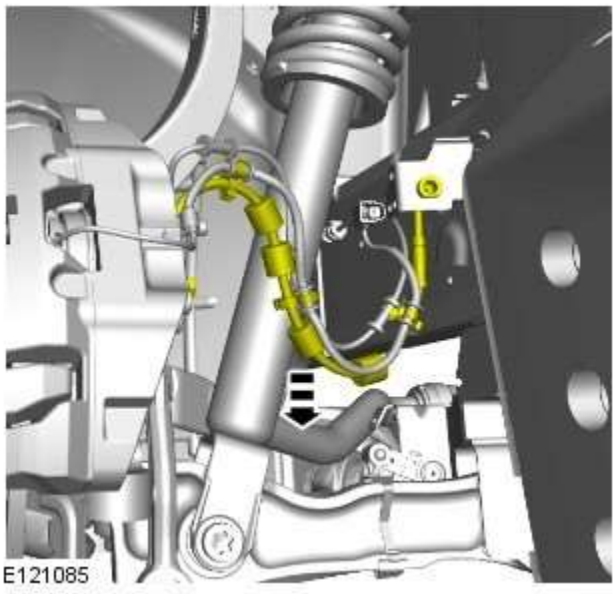
9. CAUTIONS:

Make sure that the road wheels are in the straight ahead position.

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

Make sure that the brake hose is not twisted and is correctly located.

- Pull downwards at the position shown.



10. Repeat the above procedure on the opposite side.

11. Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

Published: 11-May-2011

Front Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Disc Shield Vehicles With: High Performance Brakes

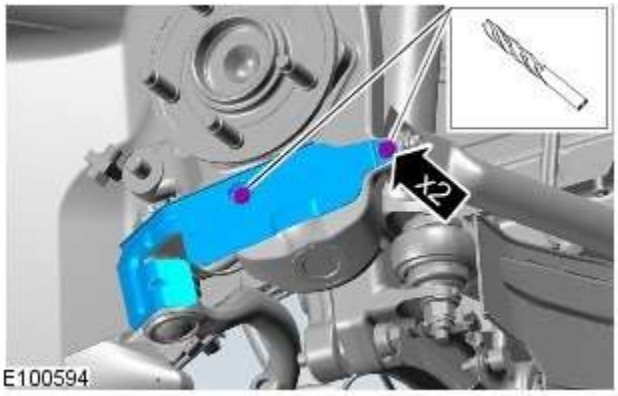
Removal and Installation

Removal

1. WARNING: Make sure to support the vehicle with axle stands.

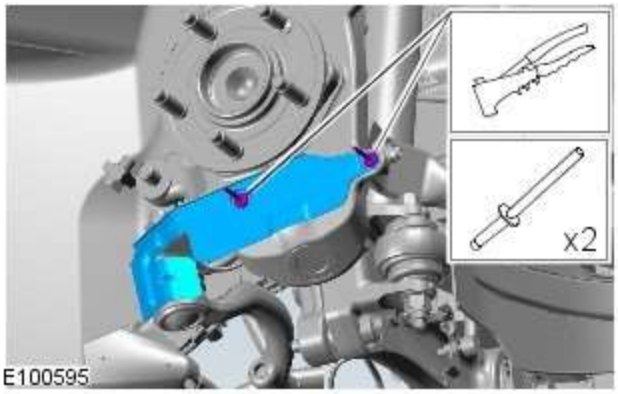
   Raise and support the vehicle.

2. Remove the front brake disc.
   For additional information, refer to: Brake Disc - Vehicles With: High Performance Brakes (206-03A Front Disc Brake - V6 3.0L Petrol, Removal and Installation).



3. Remove the brake disc shield.
   - Remove the 2 rivets.

Installation



1. To install, reverse the removal procedure.
   - Install the rivets.

Published: 30-Jul-2014

Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol -

Torque Specifications

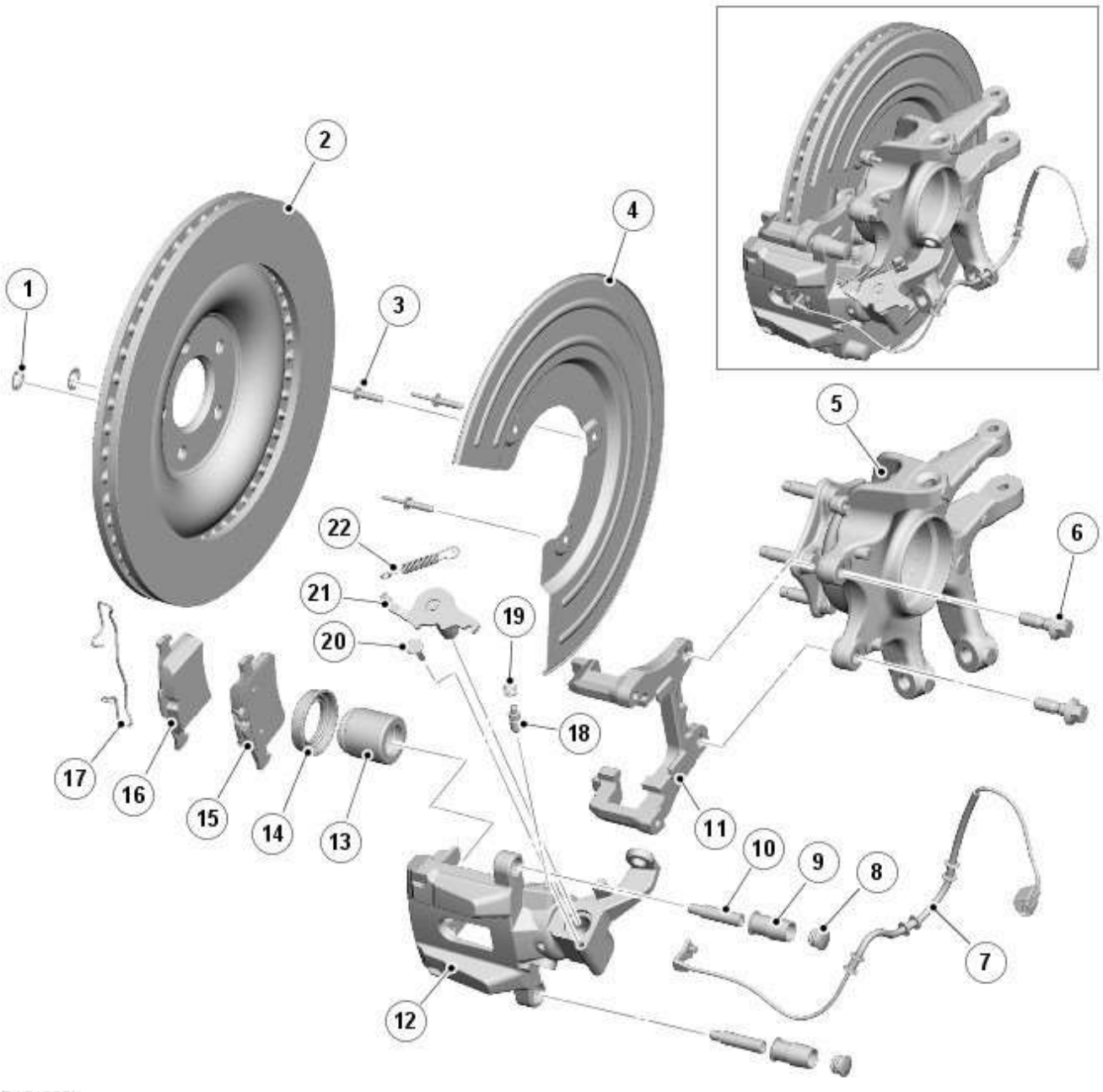
Description	Nm	lb-ft	lb-in
Brake hose to brake caliper	42	31	-
Brake caliper anchor plate	103	76	-
Brake caliper retaining bolts	28	21	-
Brake caliper logo badge retaining bolts - Vehicles with high performance brakes	10	7	-

Published: 11-May-2011

Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Rear Disc Brake - Component Location

Description and Operation

Performance Brakes - 5.0L Supercharger V8



Item	Description
1	Retaining washer (2 off)
2	Brake disc
3	Rivet (3 off)
4	Brake dust shield
5	Rear wheel knuckle/hub and bearing assembly
6	Caliper carrier bolt (2 off)
7	Brake pad wear sensor
8	Guide pin dust cover (2 off)
9	Guide pin bush (2 off)
10	Guide pin (2 off)
11	Caliper carrier
12	Brake caliper housing
13	Piston
14	Piston dust cover
15	Inboard brake pad and shim
16	Outboard brake pad
17	Anti-rattle spring
18	Bleed screw
19	Bleed screw dust cap
20	Knurled pin
21	Parking brake lever
22	Parking brake return spring

Published: 11-May-2011

Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Rear Disc Brake - Overview

Description and Operation

OVERVIEW

The standard and performance rear braking systems feature ventilated brake discs and aluminum, single piston, sliding calipers. The brake discs are:

- 326 mm (12.83 in.) diameter x 20 mm (0.79 in.) thick on standard brakes (the same as on base brakes).
- 376 mm (14.8 in.) diameter x 26 mm (1.02 in.) thick on performance brakes.

The brake disc is manufactured from cast iron. The brake disc is retained on the wheel hub by two washers and the wheel nuts.

A brake pad wear sensor is fitted to the RH (right-hand) rear brake.

Also incorporated into each rear brake caliper carrier is the parking brake mechanism.
Refer to: Parking Brake (206-05 Parking Brake and Actuation, Description and Operation).

After any work on the rear brakes, the parking brake must be re-calibrated.
Refer to: Parking Brake (206-05 Parking Brake and Actuation, Description and Operation).

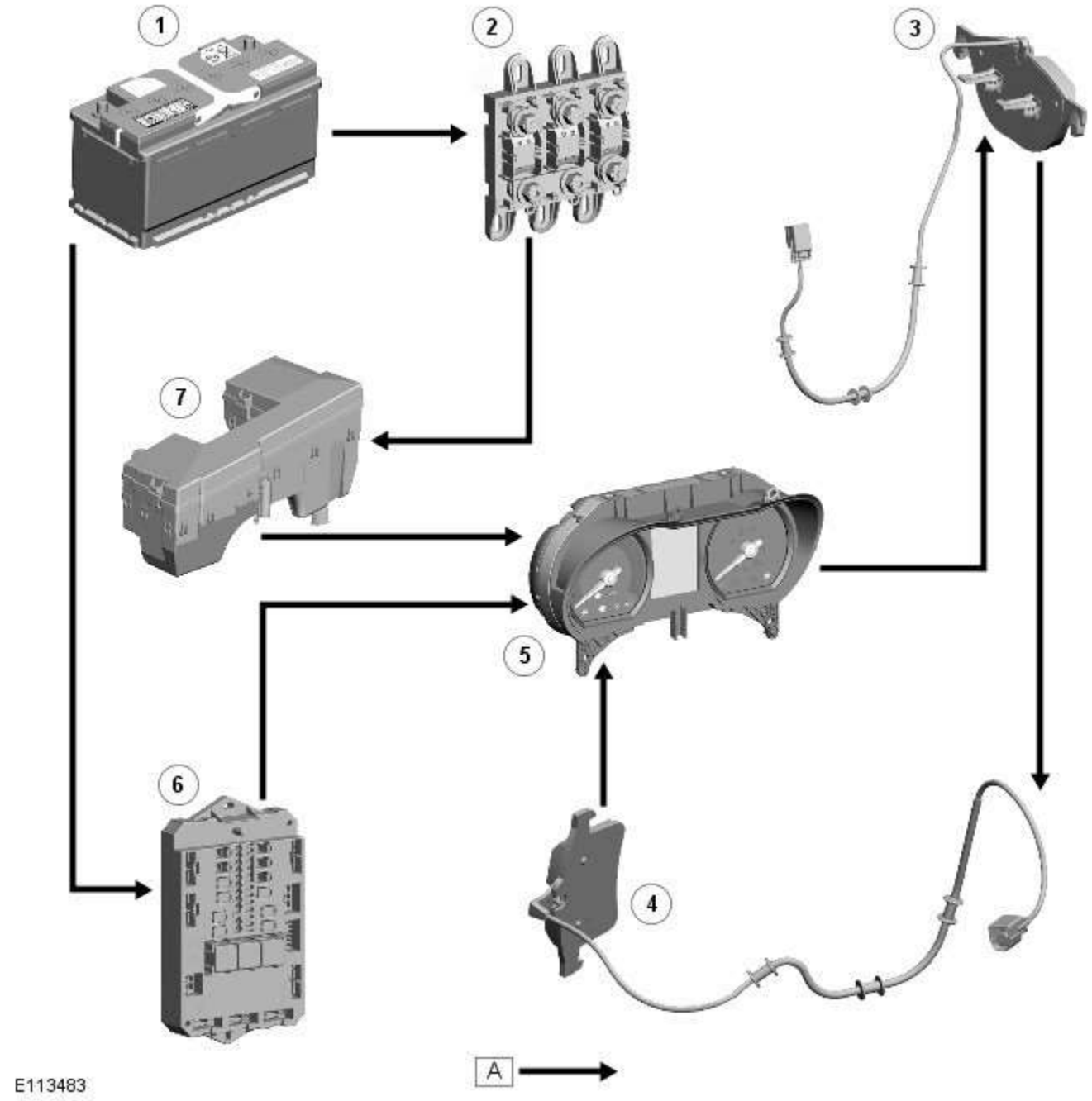
Published: 11-May-2011

Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Rear Disc Brake - System Operation and Component Description

Description and Operation

Control Diagram

NOTE: **A** = Hardwired



Item	Description
1	Battery
2	Megafuse (250 A)
3	Front brake pad wear sensor
4	Rear brake pad wear sensor
5	Instrument cluster
6	CJB (central junction box)
7	Power distribution box

System Operation

BRAKE CALIPERS

When hydraulic pressure is supplied to the caliper, the pistons extend to force the inner pad against the brake disc. The caliper reacts and slides along two guide pins to bring the outer pad into contact with the brake disc.

BRAKE PAD WEAR SENSORS

When a brake pad incorporating a brake pad wear sensor is approximately 75% worn, the sensor wire within the pad material is worn through and the brake pad wear sensor goes open circuit. When the instrument cluster detects the open circuit, it illuminates the amber LED (light emitting diode) in the brake warning indicator, displays an appropriate warning in the message center and sounds a warning chime.
Refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation).

NOTE: A new pad wear sensor lead must be fitted whenever the brake pads are changed, irrespective of the brake pad warning sensor being triggered.

Component Description

BRAKE CALIPERS

Each caliper is mounted within a fixed carrier that is secured to the rear wheel knuckle with two bolts. Each outboard brake pad is installed with a wire anti-rattle spring.

The brake calipers on SC (supercharger) vehicles are painted and also include a logo badge, secured with two screws, which must be removed in order to change the brake pads.

The inboard brake pad of the RH (right-hand) brake incorporates a wear sensor.

BRAKE PAD WEAR SENSORS

The brake pad wear sensor is wired in series with a wear sensor on the LH (left-hand) front brake and the instrument cluster. If the thickness of one of the brake pads connected to a wear sensor decreases to a predetermined limit, the instrument cluster illuminates the brake warning indicator.

Published: 02-Oct-2012

Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Caliper Vehicles With: High Performance Brakes

Removal and Installation

Removal

WARNING: Failure to release the tension and calibrate the electric parking brake during rear parking brake related service procedures, could cause the parking brake to function incorrectly or become inoperative.

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

NOTE: Removal steps in this procedure may contain installation details.

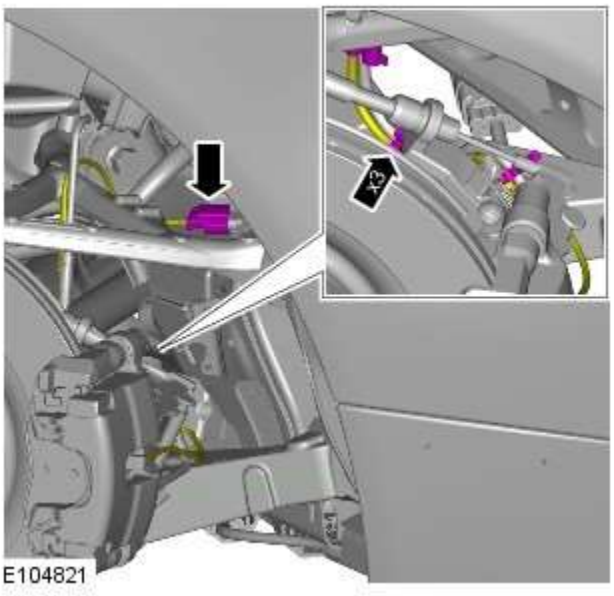
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

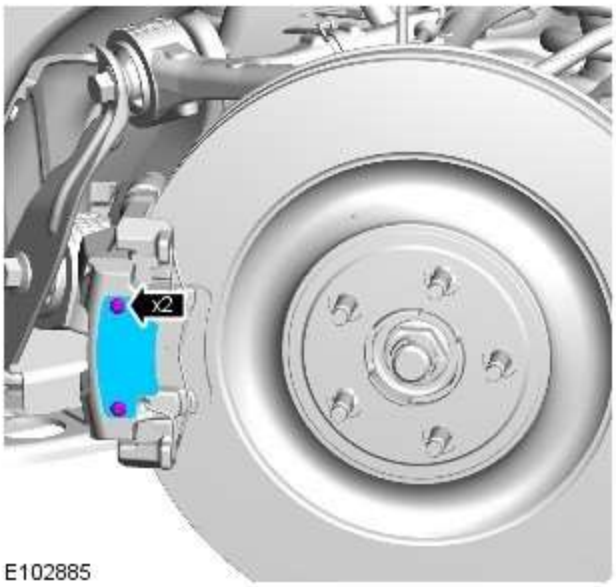
   Raise and support the vehicle.

2. Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

3. Refer to: Parking Brake Cable Tension Release (206-05 Parking Brake and Actuation, General Procedures).

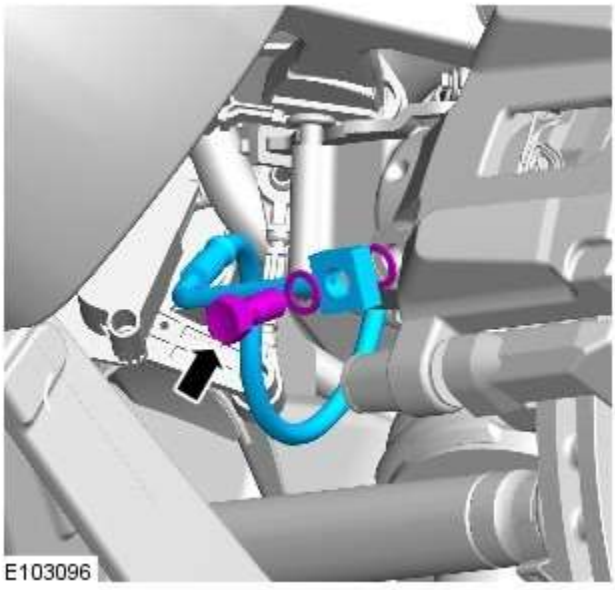
4.





5. NOTE: Left-hand shown, right-hand similar.

   Torque: 10 Nm



6. CAUTIONS:

   Always plug any open connections to prevent contamination.

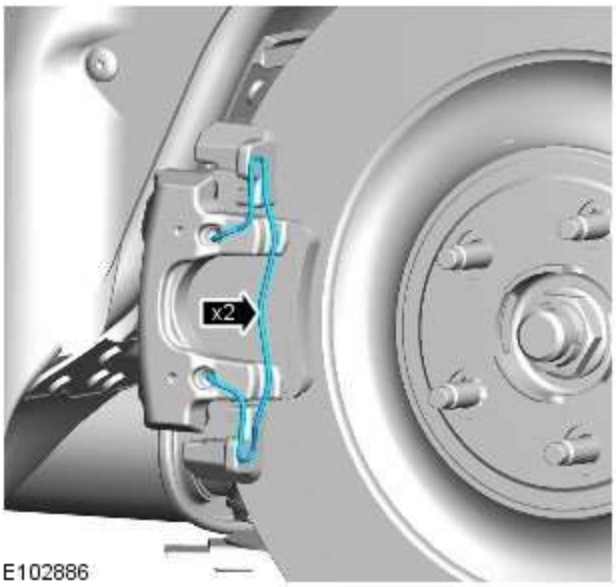
   If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

   NOTES:

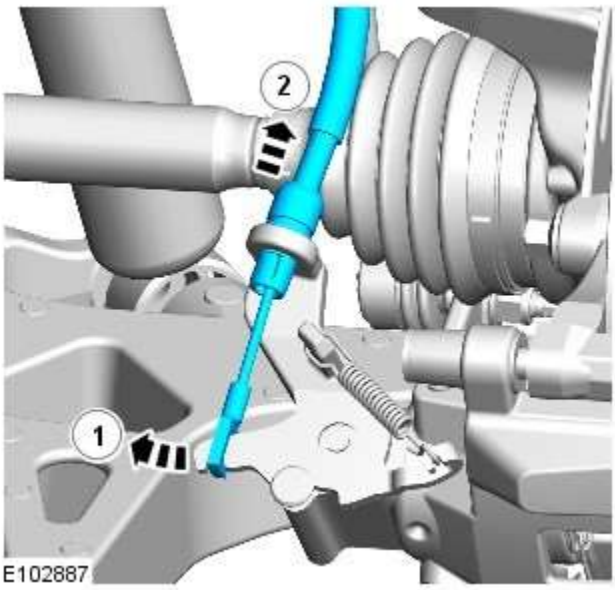
   To prevent the loss of brake fluid, using the special tool apply the brake pedal and set to 40mm (1.6 in) below the rest position.

   Left-hand shown, right-hand similar.

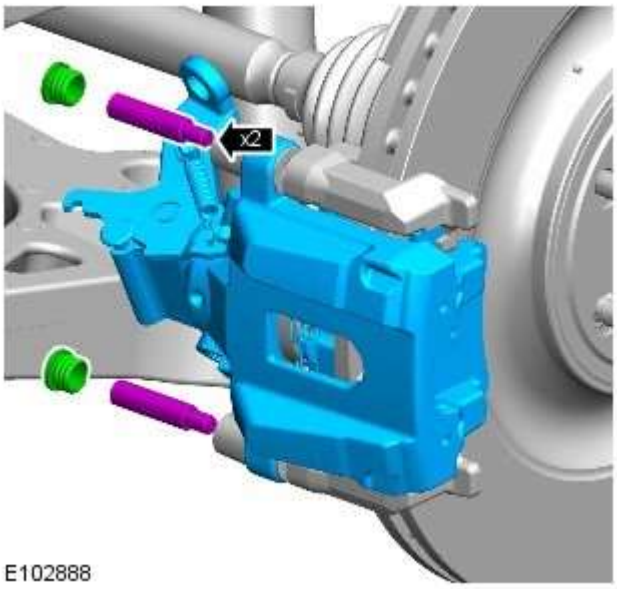
   Torque: 42 Nm



7. NOTE: Left-hand shown, right-hand similar.
   - Release the 2 clips.



8. NOTE: Left-hand shown, right-hand similar.
   - Release the clip.



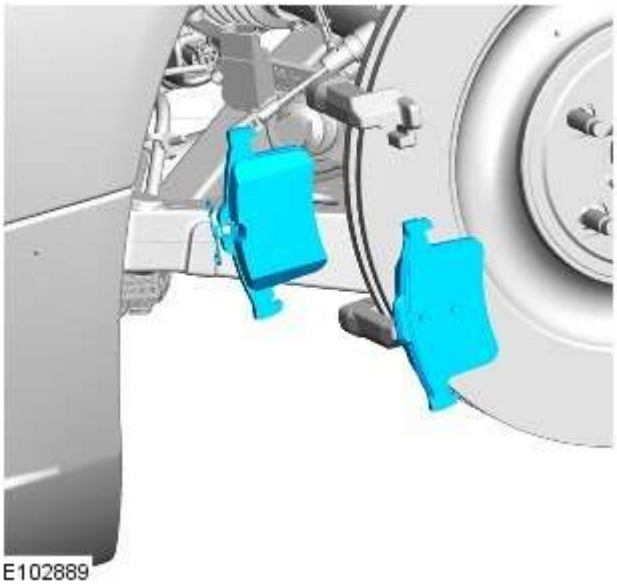
E102888

9. WARNING: If the brake caliper piston seal is damaged a new brake caliper must be installed.

   CAUTION: Do not allow the brake caliper to hang on the brake hose.

   NOTE: Left-hand shown, right-hand similar.

   Torque: 28 Nm


E102889

10. NOTE: Left-hand shown, right-hand similar.

Installation

1. To install, reverse the removal procedure.
2. Refer to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures).

Published: 11-May-2011

Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Disc Vehicles With: High Performance Brakes

Removal and Installation

Removal

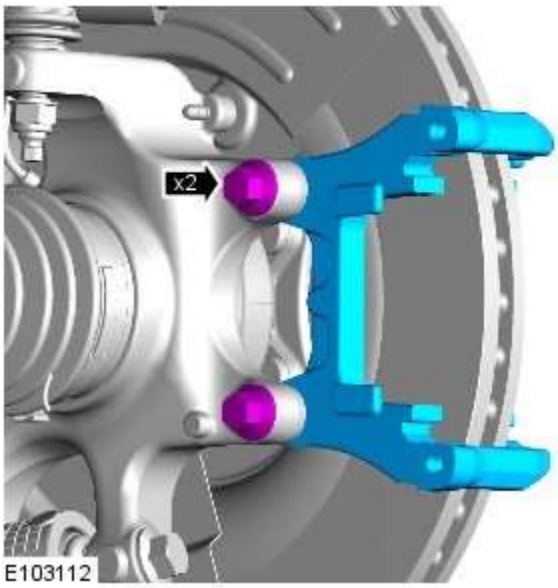
CAUTION: Brake discs must be renewed in pairs.

NOTE: Removal steps in this procedure may contain installation details.

1. 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.

2. Refer to: Brake Pads - Vehicles With: High Performance Brakes (206-04B Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol, Removal and Installation).



3.

- *Torque:* 103 Nm

4.

- Remove the 2 clips.
- Clean the components mating faces.

Installation

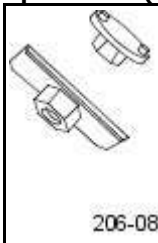
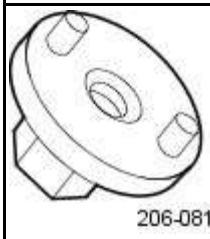
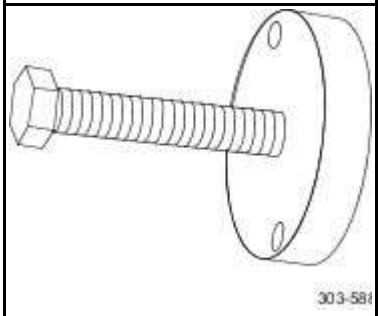
1. To install, reverse the removal procedure.

Published: 11-May-2011

Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Pads Vehicles With: High Performance Brakes

Removal and Installation

Special Tool(s)

	206-080 Brake caliper piston retractor tool
	206-081 Brake caliper piston retractor tool
	303-588 Remover, Crankshaft Pulley/Damper

Removal

WARNINGS:

Failure to release the tension and calibrate the electric parking brake during rear parking brake related service procedures, could cause the parking brake to function incorrectly or become inoperative.

Do not allow dirt or foreign liquids to enter the reservoir. Use only new brake fluid of the correct specification from airtight containers. Do not mix brands of brake fluid as they may not be compatible.

Brake pads must be renewed in axle sets only, otherwise braking efficiency may be impaired.

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

NOTES:

Only extraction bolt from special tool 303-588 is used.

Removal steps in this procedure may contain installation details.

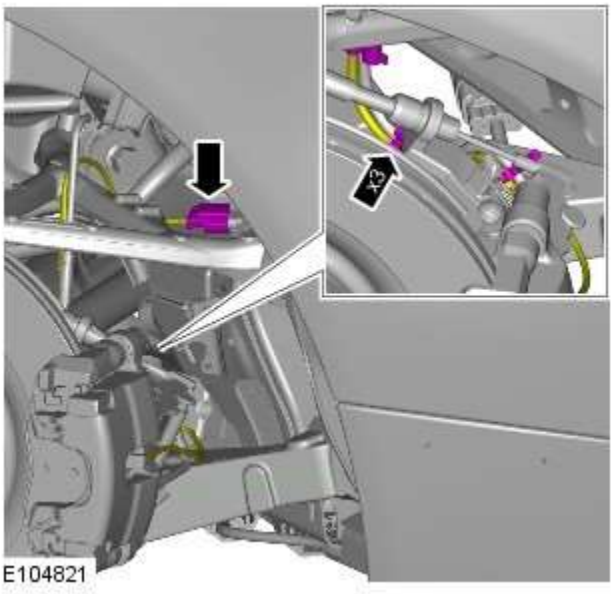
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Refer to: Wheel and Tire (204-04, Removal and Installation).

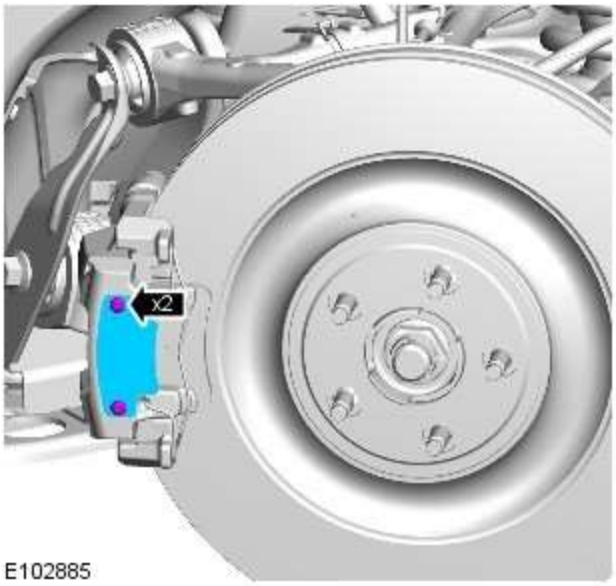
3. Refer to: Parking Brake Cable Tension Release (206-05, General Procedures).

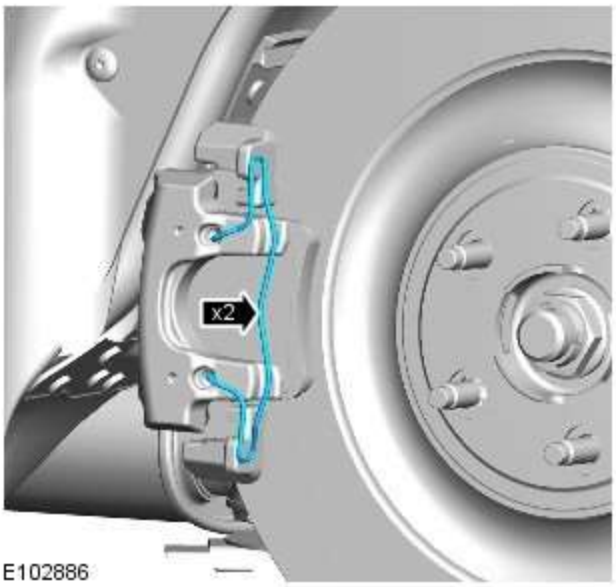
4.



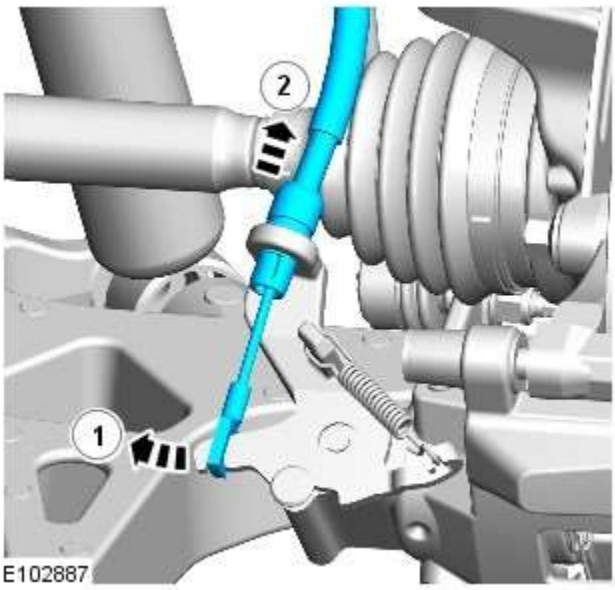
5. NOTE: Left-hand shown, right-hand similar.

Torque: 10 Nm

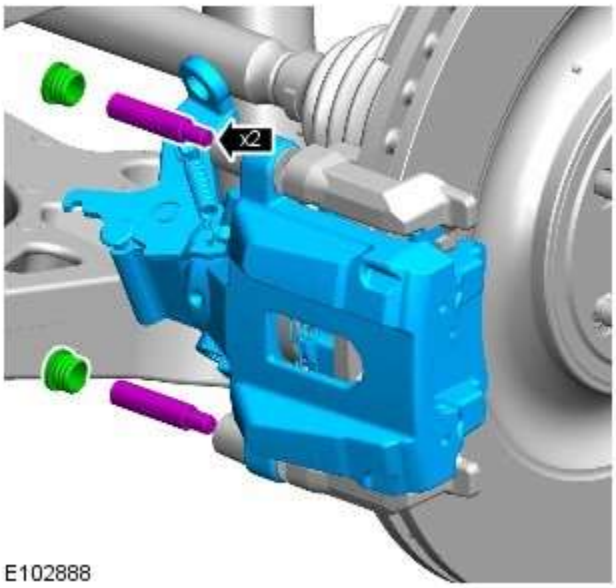




6. NOTE: Left-hand shown, right-hand similar.
   - Release the 2 clips.



7. NOTE: Left-hand shown, right-hand similar.
   - Release the clip.



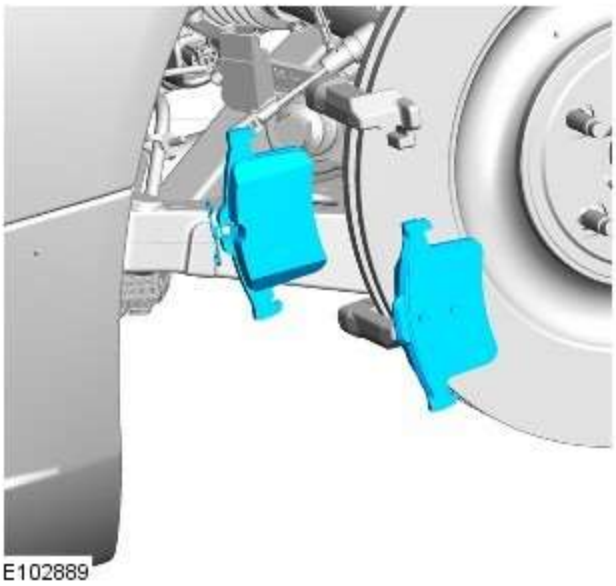
E102888

8. WARNING: If the brake caliper piston seal is damaged a new brake caliper must be installed.

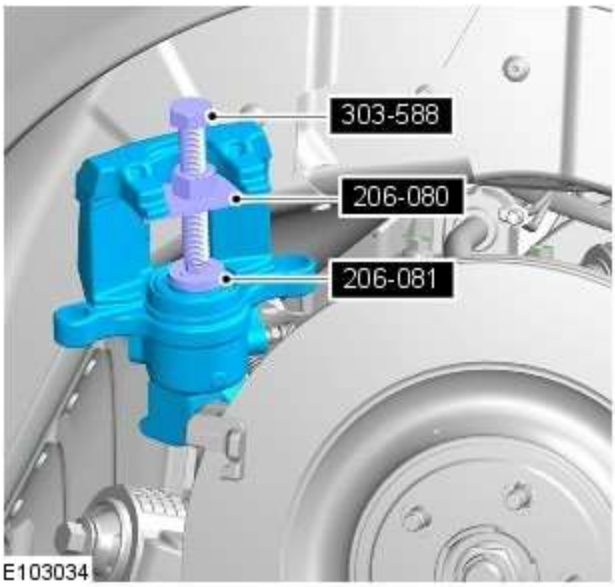
   CAUTION: Do not allow the brake caliper to hang on the brake hose.

   NOTE: Left-hand shown, right-hand similar.

   Torque: 28 Nm


E102889

9. NOTE: Left-hand shown, right-hand similar.



10. NOTE: Left-hand shown, right-hand similar.
    - *Special Tool(s):* 303-588
    - *Special Tool(s):* 206-080
    - *Special Tool(s):* 206-081
    - Using the special tools, fully retract the brake caliper piston.

11.

12. Repeat the above procedure on the opposite side.

Installation

1. NOTE: The brake pad wear sensor retaining tang must be installed to the sensor prior to installation to the brake pad.

2. To install, reverse the removal procedure.

3. Repeat the above procedure on the opposite side.

Published: 11-May-2011

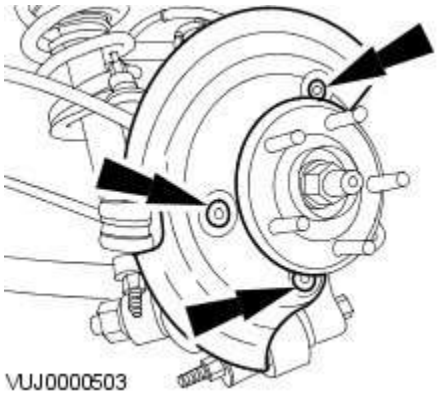
Rear Disc Brake - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol - Brake Disc Shield

Removal and Installation

Removal

WARNING: Make sure to support the vehicle with axle stands.

1. Raise and support the body.
2. Remove the brake disc.
   For additional information, refer to: Brake Disc (206-04A Rear Disc Brake - V6 3.0L Petrol, Removal and Installation).



3. Remove the brake disc shield.
   - Drill out the 3 rivets

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Parking Brake and Actuation -

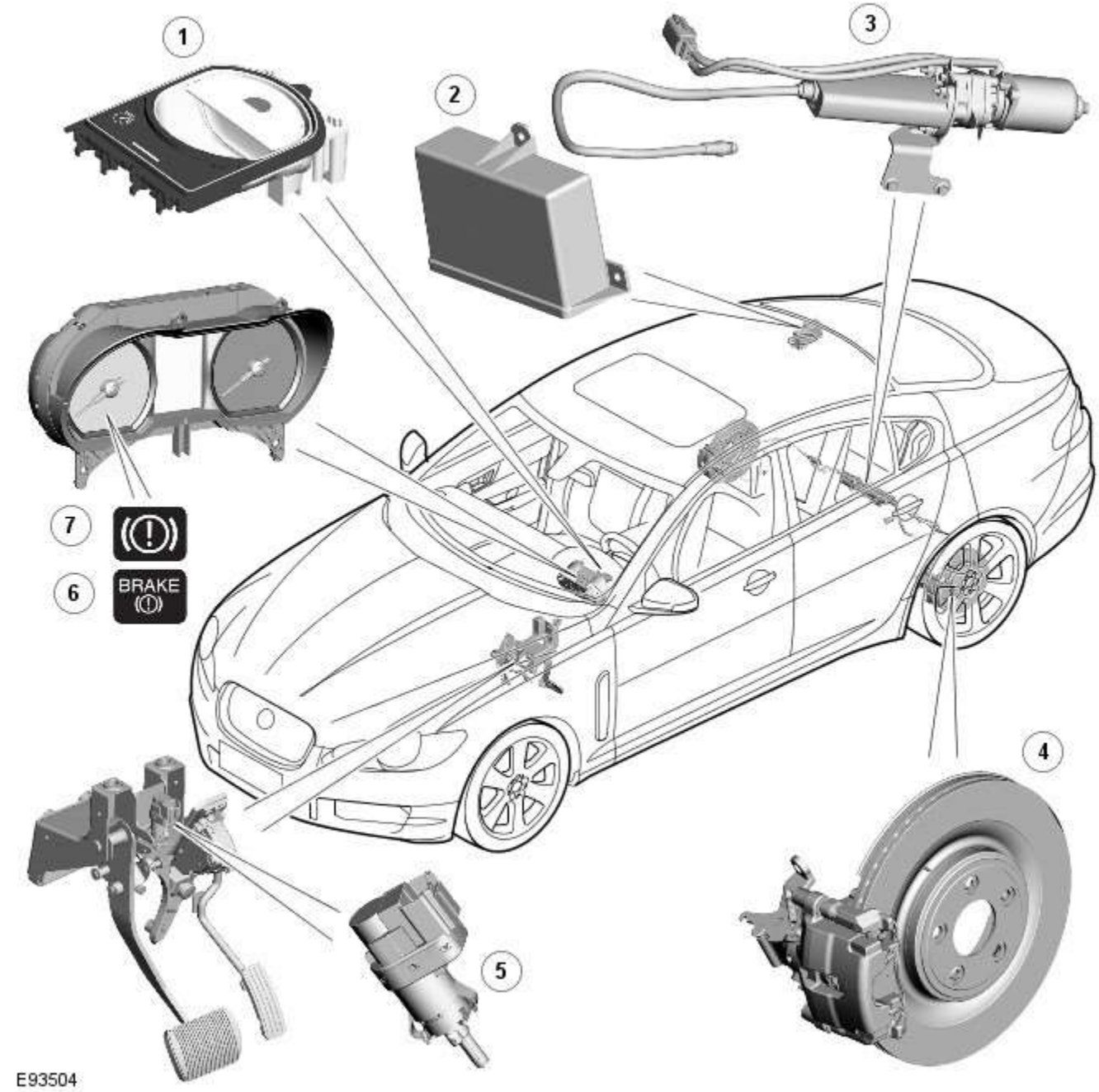
Description	Nm	lb-ft	lb-in
Parking brake module retaining bolts	4	-	35
Parking brake release actuator retaining bolts	20	15	-

Published: 11-May-2011

Parking Brake and Actuation - Parking Brake - Component Location

Description and Operation

Component Location



Item	Description
1	Parking brake switch
2	EPB (electronic parking brake) module
3	Parking brake actuator
4	Caliper and disc assemblies (2 off)
5	Stoplamp switch
6	Brake warning indicator - NAS vehicles
7	Brake warning indicator (all except NAS (North American Specification) vehicles)

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Parking Brake and Actuation - Parking Brake - Overview

Description and Operation

Overview

The parking brake is an electrically actuated system that operates on the rear brake calipers. Two cables are connected to the rear brake calipers, and act directly on the same pistons used for normal, hydraulic rear brake actuation.
Refer to: Rear Disc Brake (206-04, Description and Operation).

The parking brake is controlled by the EPB (electronic parking brake) module. In response to commands from the driver through the parking brake switch, the EPB module controls operation of the parking brake actuator. The actuator adjusts the tension of the brake cables to apply and release the rear brake calipers. Features of the parking brake include:

- Manual apply.
- Manual release.
- Automatic release.

A service mode is also available and must be activated using the Jaguar approved diagnostic system. This allows the decoupling of the components and prevention of damage to the actuator. When in service mode all switch functions will be inhibited.

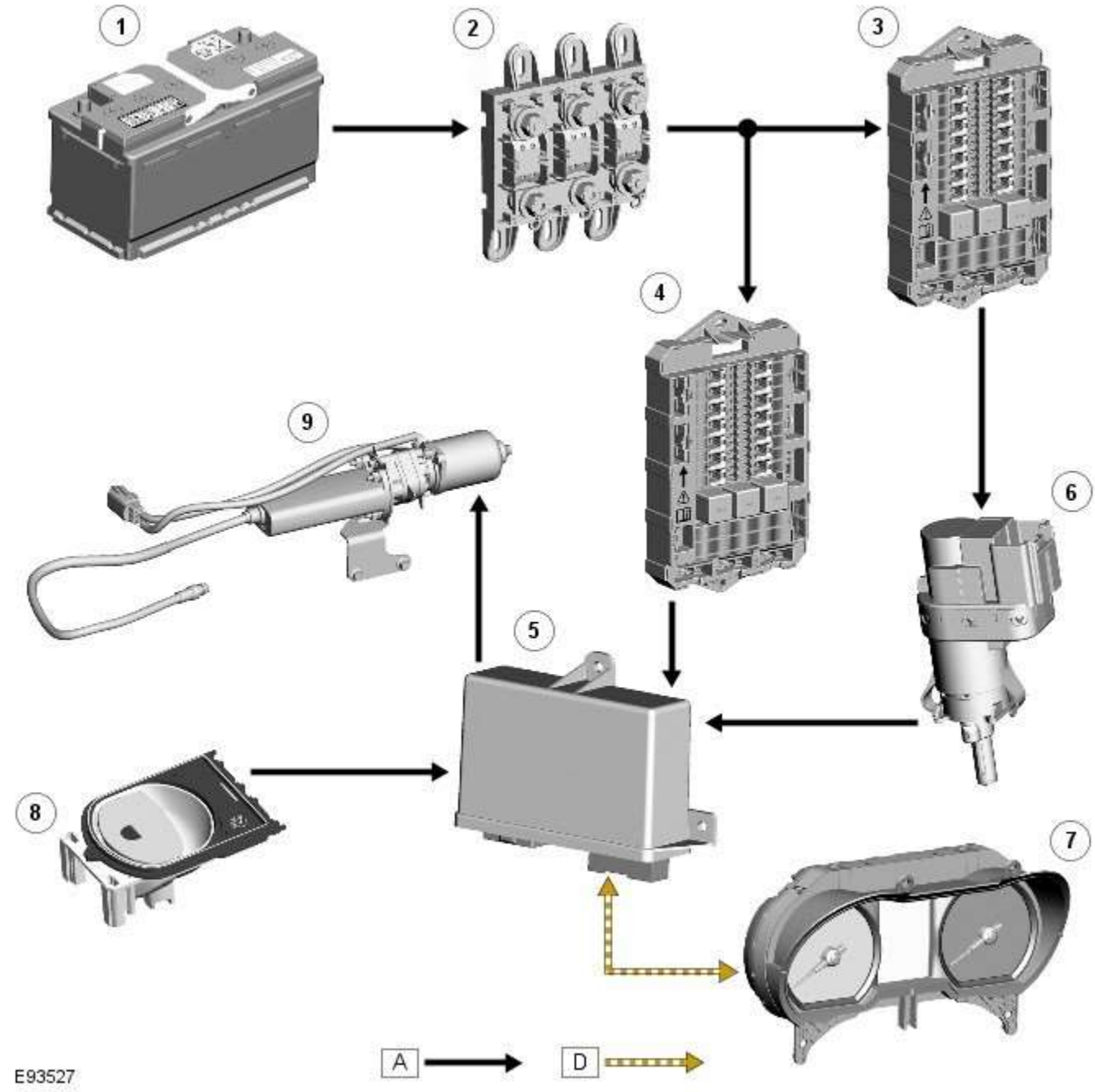
Published: 11-May-2011

Parking Brake and Actuation - Parking Brake - System Operation and Component Description

Description and Operation

Control Diagram

NOTE: **A** = Hardwired; **D** = High speed CAN (controller area network) bus.



Item	Description
1	Battery
2	BJB (battery junction box)
3	CJB (central junction box)
4	RJB (rear junction box)
5	EPB module
6	Stoplamp switch

7	Instrument cluster
8	Parking brake switch
9	Parking brake actuator

System Operation

Static Apply

The EPB module receives a vehicle speed signal from the ABS (anti-lock brake system) module on the high speed CAN bus. If the parking brake switch is pulled to the 'Apply' position and vehicle speed is less than 2 mph (3 km/h), the EPB module will instigate its 'Static Apply' mode and drive the actuator to apply full parking brake force to the rear wheels.

The EPB module monitors the current drawn by the actuator and compares this to information held within its configuration software to determine when full braking force has been applied.

Dynamic Apply

There are two 'Dynamic Apply' modes; low speed dynamic and high speed dynamic. The low speed dynamic mode operates at speeds between 2 mph (3 km/h) and 20 mph (32 km/h). The high speed dynamic mode operates at speeds above 20 mph (32 km/h).

If the parking brake switch is pulled up to the 'Apply' position and vehicle speed is within the low speed dynamic range, the EPB module drives the actuator to apply full parking brake force to the rear wheels.

If the parking brake switch is pulled up to the 'Apply' position and vehicle speed is within the high speed dynamic range, the EPB module will apply braking force to the rear wheels at a slower rate until full braking load is reached or the switch is released. The rate with which braking force is applied is controlled by the EPB module, which monitors both current drawn by the actuator and positional information from the actuator hall sensor and compares this to information held within its configuration software.

Drive Away Release

The EPB module will initiate its 'Drive Away Release' function and automatically release the parking brake if the following conditions are detected:

- The engine is running.
- Drive , or reverse is selected.
- Positive throttle movement is detected.

The EPB module receives messages of gear selector position and throttle angle over the high speed CAN bus from the TCM (transmission control module) and the ECM (engine control module) respectively.

Release from Park

The EPB module will initiate its 'Release from Park' function and automatically release the parking brake if the gear selector is moved from Park to any position except Neutral.

Repairs

Before carrying out any work on the parking brake system, the Jaguar approved diagnostic system must be connected and the 'parking brake unjam' routine run. The routine can be found in the 'Vehicle Configuration' area, under the 'Set-up and Configuration' menu. After any work has been carried out on the parking brake, the system will require resetting.

 CAUTION: Do not use the 'Emergency Release' tool to allow work to be carried out on the parking brake. Work can only be carried out on the parking brake system after the 'parking brake unjam' routine has been run.

Resetting

If the electrical supply is disconnected from the EPB module, the actuator will loose its position memory. On battery re-connection and ignition on, 'APPLY FOOT AND PARK BRAKE' will be displayed in the instrument cluster message center indicating the parking brake requires resetting.
Refer to: Parking Brake (206-05, Diagnosis and Testing).

Operating Voltages

The EPB module will only operate the actuator if the power supply from the battery is between 9 V and 16 V. At any voltage within this range, the actuator is able to fully tighten and release the brake cables. If the power supply falls outside of the range, a fault code is stored in the EPB module and can be retrieved using the Jaguar approved diagnostic system.

Component Description

Parking Brake Switch

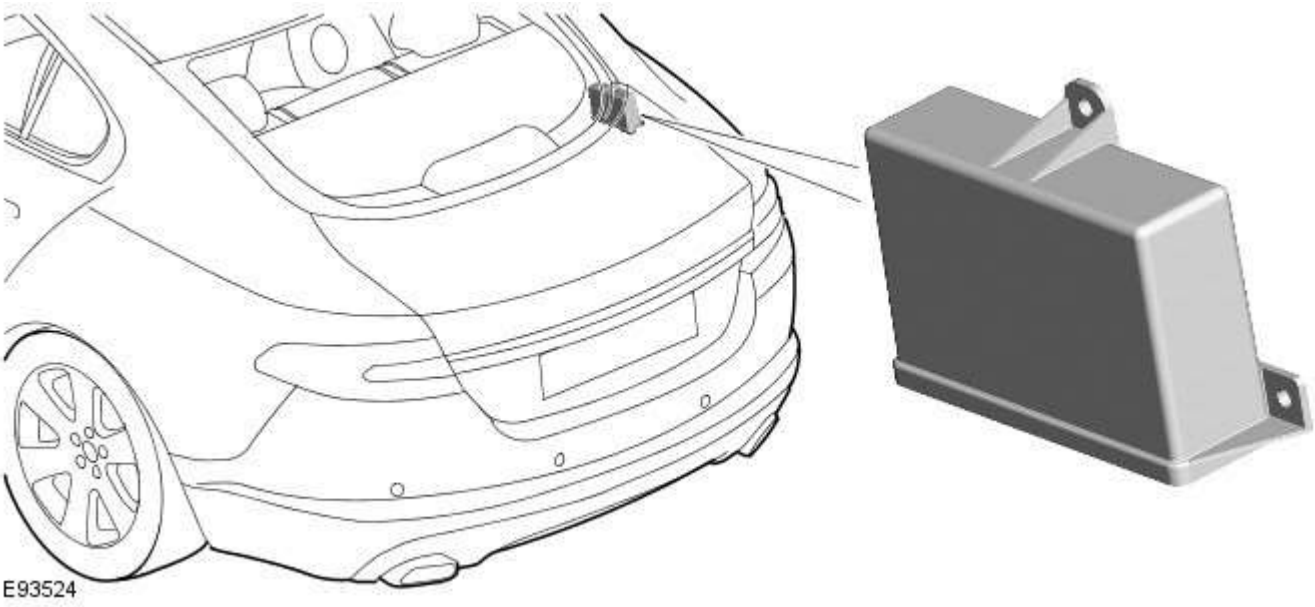
E93523

The parking brake switch is mounted in the floor console, rearward of the rotary gear selector. The switch has 3 states:

- Apply: When the switch is pulled up to apply the parking brake.
- Release: When the switch is pushed down to release the parking brake.
- Neutral: The central default position. The switch returns to this position regardless of parking brake status.

The parking brake switch contains a pair of micro-switches for both the apply and release actions. The EPB module provides an individual hardwired electrical feed to each of the four micro-switches plus a single ground connection, allowing it to constantly monitor switch status.

EPB Module

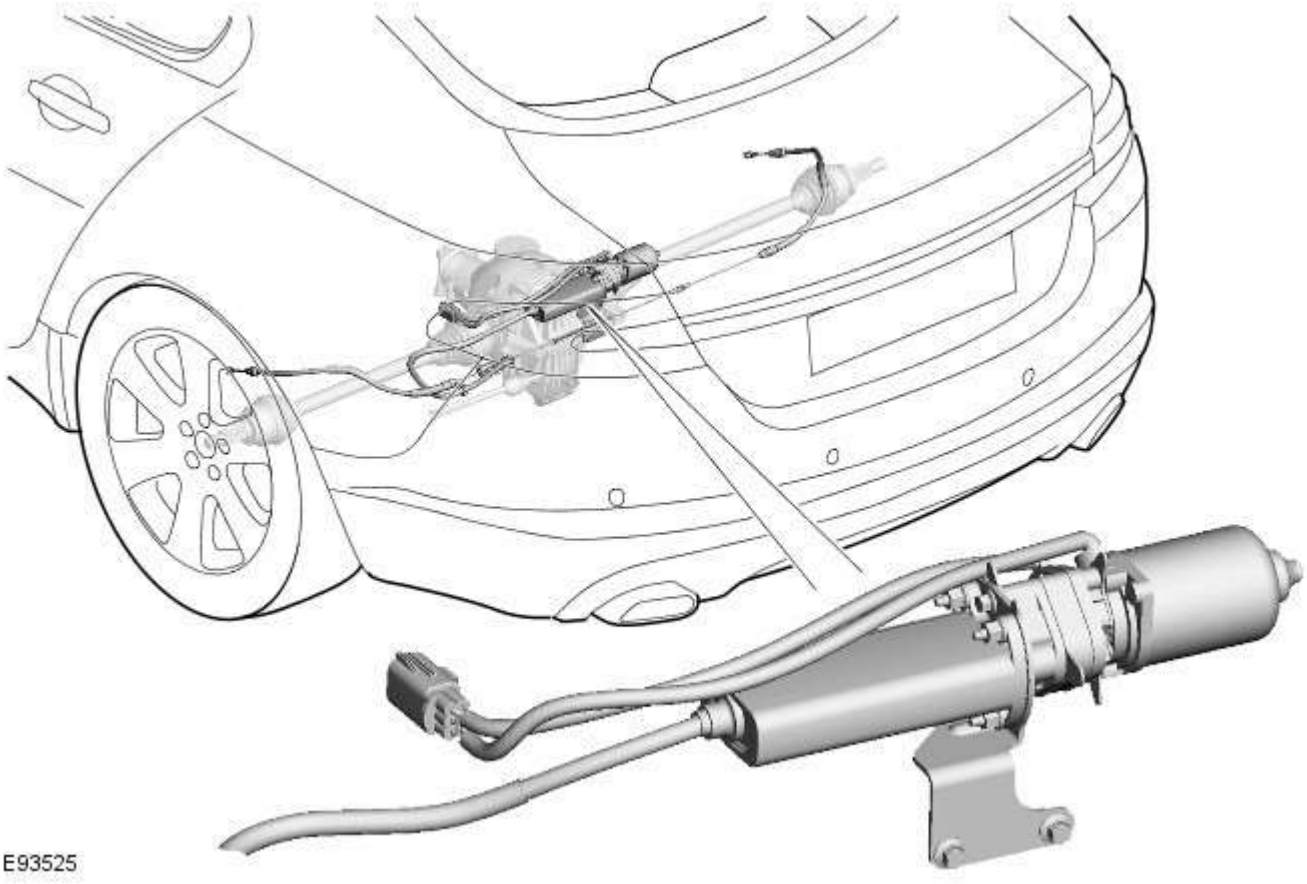


E93524

The EPB module is mounted in the luggage compartment on the RH (right-hand) side quarter panel and is connected to the vehicles electrical wiring by two multiplugs. The EPB module is also connected to the high speed CAN bus, allowing it to communicate with other vehicle systems.

The EPB module monitors the condition of the parking brake switch through a series of hardwired electrical connections and controls operation of the parking brake actuator accordingly.

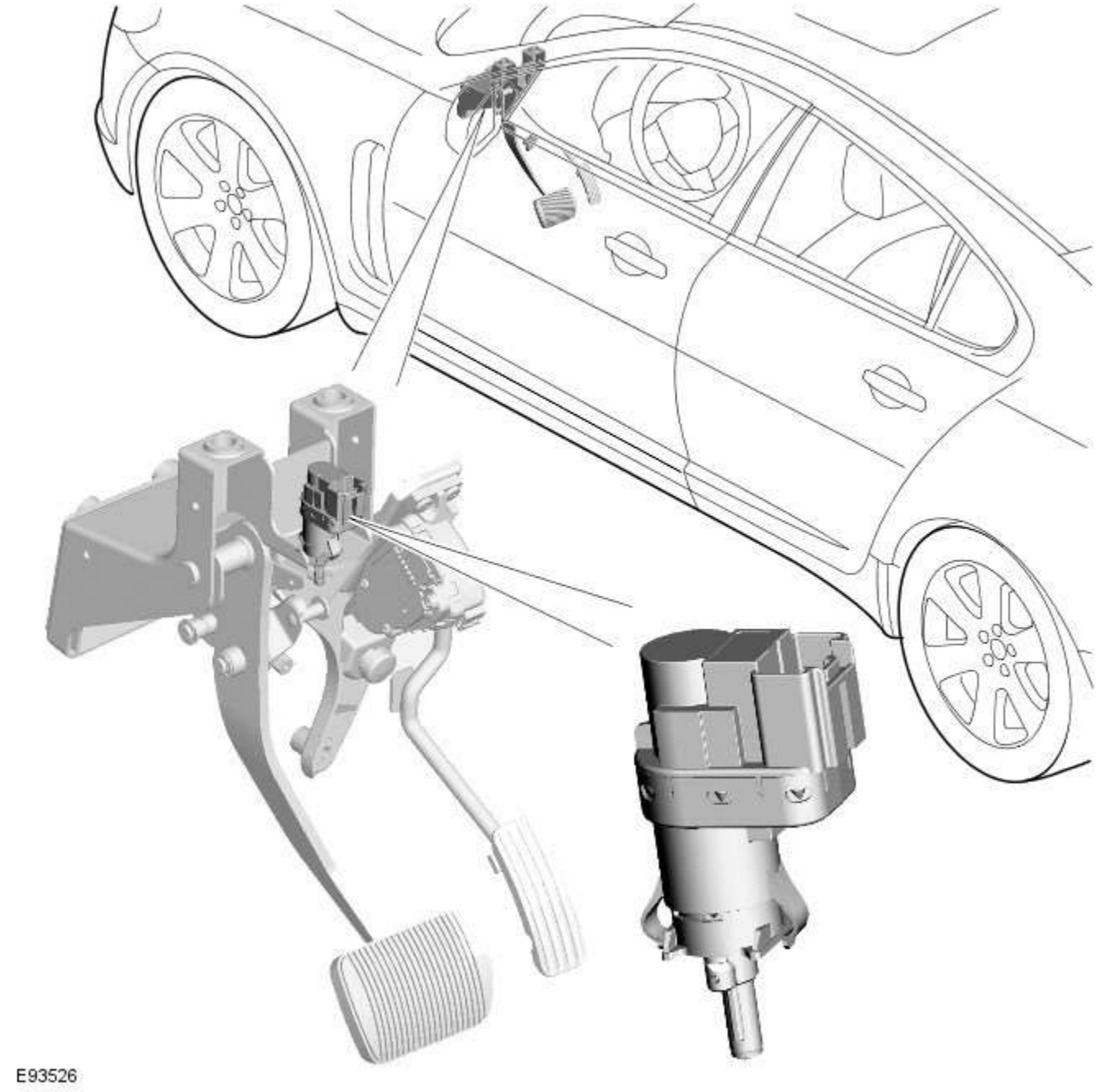
Parking Brake Actuator



The parking brake actuator is mounted on the rear cross beam, underneath the vehicle. Operation of the actuator is controlled by the EPB module in response to parking brake switch requests from the driver.

A Hall sensor is located within the actuator and provides positional information back to the EPB module. The principle function of the Hall sensor is to ensure the actuator fully releases the parking brake when a static release request is made. The signal provided by the Hall sensor is compared to configuration information contained within the EPB module software to determine when a full release has been carried out.

Stoplamp Switch



E93526

The stoplamp switch is mounted on the brake pedal box. One of the prerequisites for releasing the parking brake is that the foot brake is applied. The EPB module is able to determine the position of the footbrake by monitoring the status of the stoplamp switch via a hardwired electrical connection.

The stoplamp switch also forms part of:

- The ABS.
  Refer to: Anti-Lock Control - Stability Assist (206-09 Anti-Lock Control - Stability Assist, Description and Operation).
- The speed control system. For additional information, refer to:
  Speed Control (310-03A, Description and Operation),
  Speed Control (310-03B, Description and Operation),
  Speed Control (310-03C, Description and Operation).

Instrument Cluster

Depending on market specification, the instrument cluster may contain a red and an amber brake warning indicator, or only a red brake warning indicator. The functionality of the warning indicators is shown in the table below.

Indicator	Status	Details
Red	Illuminated	Parking brake applied
Red	Flashing	Parking brake electrical failure
Amber	Illuminated	Parking brake electrical failure

If a parking brake failure warning indicator is active, the message 'CANNOT APPLY PARK BRAKE' or 'PARK BRAKE FAULT' will also appear in the instrument cluster message center. If the vehicle is moving with the parking brake applied, the message 'PARK BRAKE ON' will appear in the message center accompanied by a chime from the instrument cluster.
Refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

Published: 12-May-2014

Parking Brake and Actuation - Parking Brake

Diagnosis and Testing

Principle of Operation

For a detailed description of the Parking Brake operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: (206-05 Parking Brake and Actuation)

Parking Brake (Description and Operation),
Parking Brake (Description and Operation),
Parking Brake (Description and Operation).

Parking Brake Calibration

The parking brake system must be calibrated whenever the battery has been disconnected or has been in a state of discharge, or repairs have been carried out to the rear service or parking brake system.

NOTE: If new rear brake pads have been installed, pressure must be applied to the brake pedal a minimum of five times prior to calibration of the parking brake system.

To calibrate the parking brake system:

1. Place gear selector lever in 'P' Park position.
2. Release parking brake cable tension to service position.
   REFER to: Parking Brake Cable Tension Release (206-05 Parking Brake and Actuation, General Procedures).
3. Set the ignition status to 'ON'.
4. Apply and hold the footbrake then pull up the parking brake switch.
5. To release the parking brake, apply and hold the footbrake then release and press down the parking brake switch.

Inspection and Verification

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 tested and/or the donor vehicle.

1. Verify the customer concern.
2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Mechanical	Electrical
• Parking brake cable • Parking brake actuator • Brake caliper • Brake pads • Stabilizer bar drop link caps	• Fuse(s) • Wiring harness/electrical connectors • Check for bent/corroded pins • Parking brake switch • Parking brake module

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 check the system for any logged Diagnostic Trouble Codes (DTCs) and proceed to the DTC Index , alternatively, verify the customer concern and refer to the Symptom Chart.

Symptom Chart

Symptom	Possible Cause	Action
The parking brake will not engage or release (with no parking brake warning message)	• Cables fouled, trapped or damaged • Cables incorrectly routed or installed • Rear lining wear • Service brake incorrectly adjusted following lining change • Caliper malfunction	• Check the rear and primary cables for correct installation and damage • Inspect the rear brake linings for wear • Re-calibrate the parking brake, refer to the calibration procedure • Check the rear service brake for correct installation and operation

Symptom	Possible Cause	Action
The parking brake will not engage or release (with parking brake warning message)	• Cables fouled, trapped or damaged • Cables incorrectly routed or installed • Rear lining wear • Actuator malfunction • Caliper malfunction	• Check the rear and primary cables for correct installation and damage • Inspect the rear brake linings for wear • Re-calibrate the parking brake, refer to the calibration procedure • Check the rear service brake for correct installation and operation
No communication with the parking brake module	• Fuse • Module off Bus • CAN network error • Parking brake module fault	• Check fuses • Ensure battery is fully charged and in serviceable condition. Check battery voltage at parking brake module • Check CAN network using manufacturer approved diagnostic system
'Park brake Fault' displayed on message center with associated warning lamps	• Parking brake system fault	• Check the parking brake module for DTCs and refer to DTC Index
Brakes drag	• Parking brake not re-calibrated after battery has been disconnected or has been in a state of discharge, or repairs have been carried out to the rear service or parking brake system • Service brake system fault	• Re-calibrate parking brake, refer to the calibration procedure • Check the service brake for correct operation

DTC Index

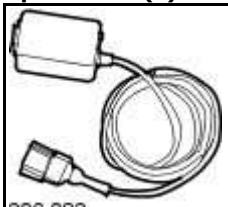
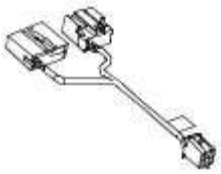
For a list of diagnostic trouble codes that could be logged on this vehicle, please refer to Section 100-00.
REFER to: Diagnostic Trouble Code (DTC) Index - DTC: Electric Parking Brake (PBM) (100-00 General Information, Description and Operation).

Published: 11-May-2011

Parking Brake and Actuation - Parking Brake Cable Tension Release

General Procedures

Special Tool(s)

 206-082	Electric parking brake release tool 206-082. Only to be used for EMERGENCY brake release
 E69907	Electric parking brake release tool link lead 206-082-01. Only to be used for EMERGENCY brake release

WARNING: Failure to release the tension and calibrate the electric parking brake during rear parking brake related service procedures, could cause the parking brake to function incorrectly or become inoperative.

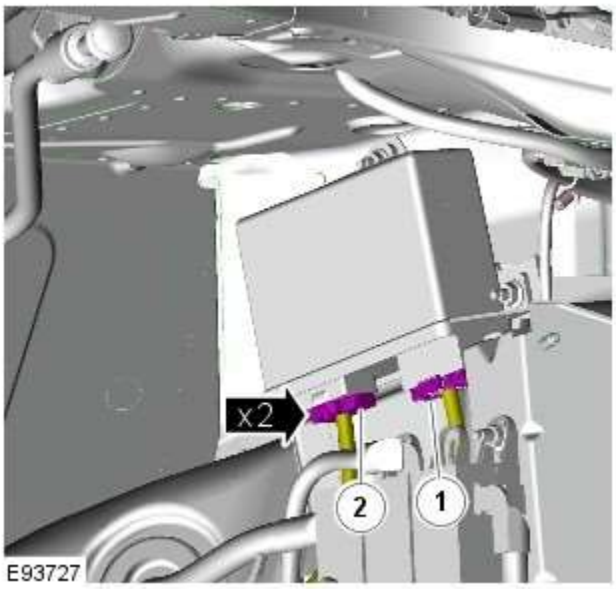
1. WARNING: Always use Jaguar approved diagnostic equipment to release the cable tension, when carrying out repair operations on the electric park brake which require cable tension release.

   Connect the Jaguar approved diagnostic equipment to release the electric parking brake cable tension.
   - Follow the on-screen instructions.

2. WARNING: The procedure below should only be used in emergency situations, to release the electric park brake. All calibration of the parking brake system will be lost, and the parking brake will need to be re-calibrated to function correctly.

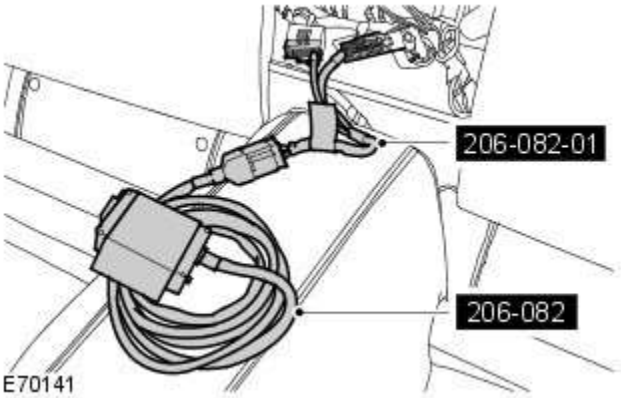
   NOTE: The tools shown must only be used in the event of an emergency.

   Remove the RH loadspace trim panel.
   For additional information, refer to: Loadspace Trim Panel RH (501-05 Interior Trim and Ornamentation, Removal and Installation).



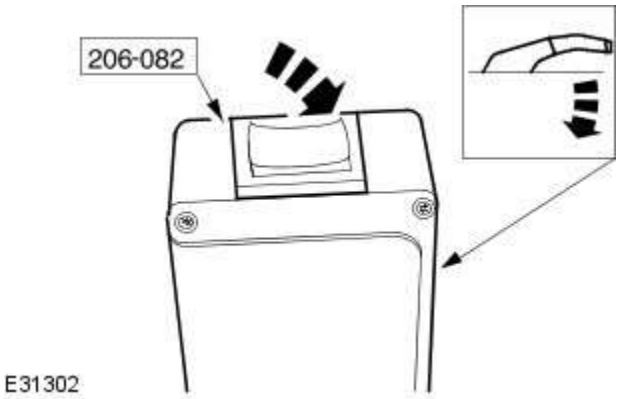
3. WARNING: Failure to follow this instruction may result in a diagnostic trouble code (DTC) being generated.

   Disconnect the 2 electrical connectors from the parking brake module, in the sequence illustrated.



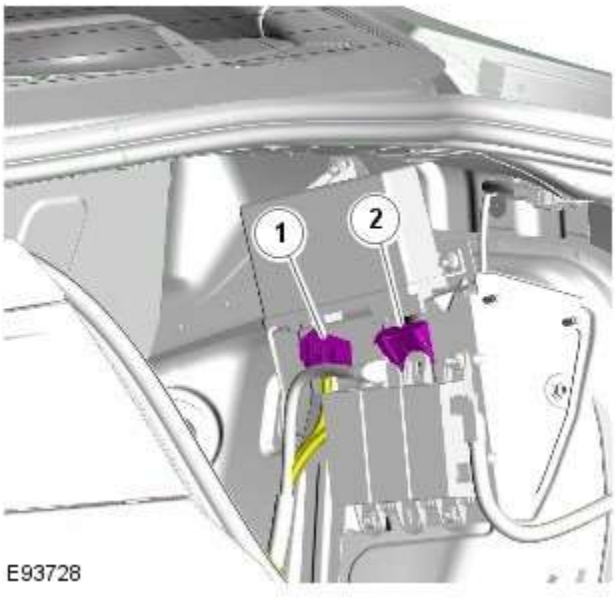
4. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

   Connect the special tool to the parking brake module.



5. Release the parking brake cable tension.
   - An audible 'click', signals complete parking brake cable tension release.

6. Remove the special tool and carry out any necessary repairs on the system.



7. Connect the electrical connectors in the sequence shown.

8. Install the RH loadspace trim panel.
   For additional information, refer to: Loadspace Trim Panel RH (501-05 Interior Trim and Ornamentation, Removal and Installation).

9. WARNING: Calibrate the electric park brake using Jaguar approved diagnostic equipment. If Jaguar approved diagnostic equipment is not available disconnect the battery for approximatly 30 seconds , the vehicle will then prompt the driver to carry out the calibration procedure as per the vehicle hand book on re-connection.

   Calibrate the electric park brake.

Published: 12-Jun-2013

Parking Brake and Actuation - Parking Brake Cable LH TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol

Removal and Installation

Removal

WARNING: Failure to release the tension and calibrate the electric parking brake during rear parking brake related service procedures, could cause the parking brake to function incorrectly or become inoperative.

NOTE: Removal steps in this procedure may contain installation details.

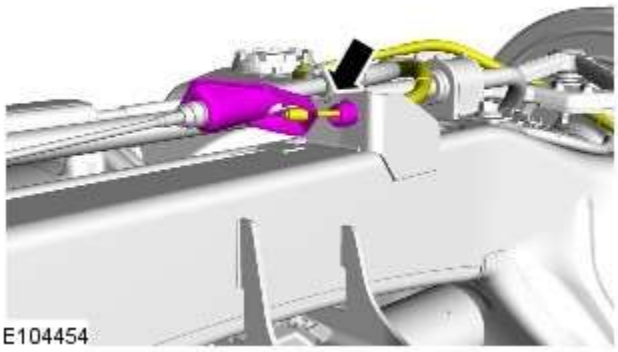
1. Refer to: Parking Brake Cable Tension Release (206-05 Parking Brake and Actuation, General Procedures).

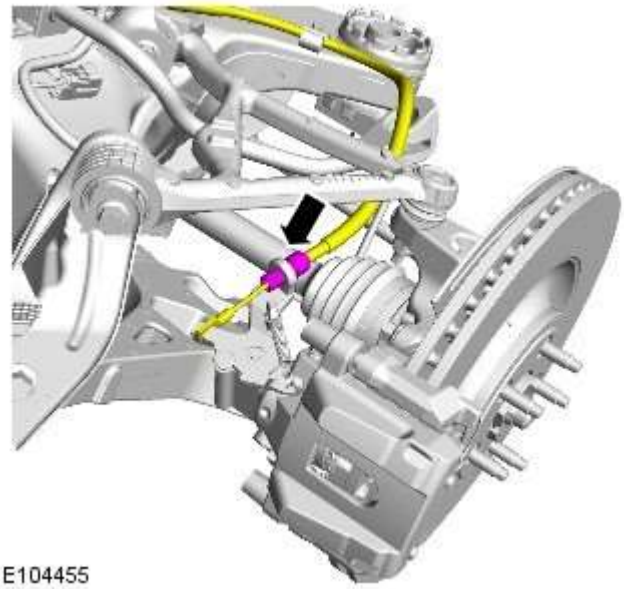
2. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

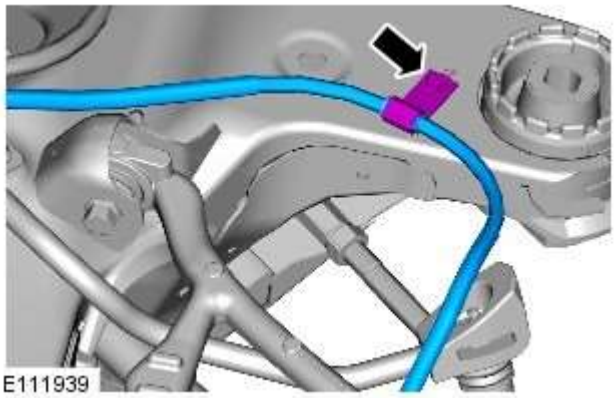
3. Refer to: Rear Subframe - TDV6 3.0L Diesel (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).
   Refer to: Rear Subframe - V8 5.0L Petrol/V8 S/C 5.0L Petrol (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

4.




E104455

5. NOTE: Note the fitted position.


E111939

6. *Torque:* 20 Nm

Installation

1. To install, reverse the removal procedure.

Published: 12-Jun-2013

Parking Brake and Actuation - Parking Brake Cable RH TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol

Removal and Installation

Removal

WARNING: Failure to release the tension and calibrate the electric parking brake during rear parking brake related service procedures, could cause the parking brake to function incorrectly or become inoperative.

NOTE: Removal steps in this procedure may contain installation details.

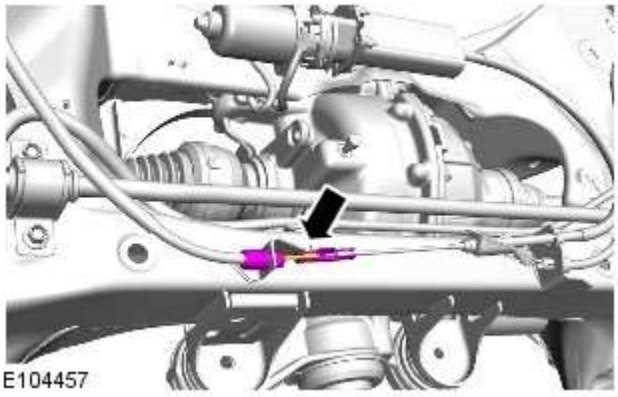
1. Refer to: Parking Brake Cable Tension Release (206-05 Parking Brake and Actuation, General Procedures).

2. WARNING: Make sure to support the vehicle with axle stands.

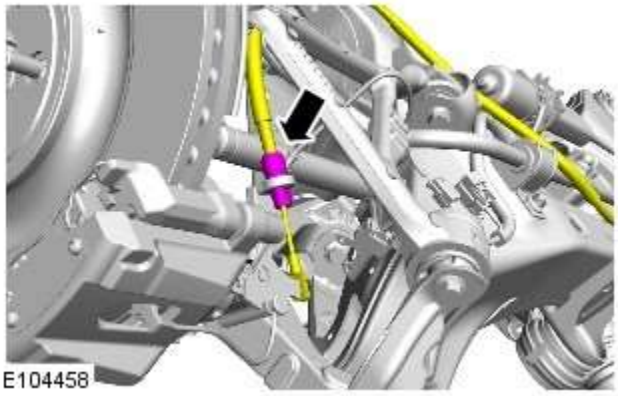
   Raise and support the vehicle.

3. Refer to: Rear Subframe - TDV6 3.0L Diesel (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).
   Refer to: Rear Subframe - V8 5.0L Petrol/V8 S/C 5.0L Petrol (502-00 Uni-Body, Subframe and Mounting System, Removal and Installation).

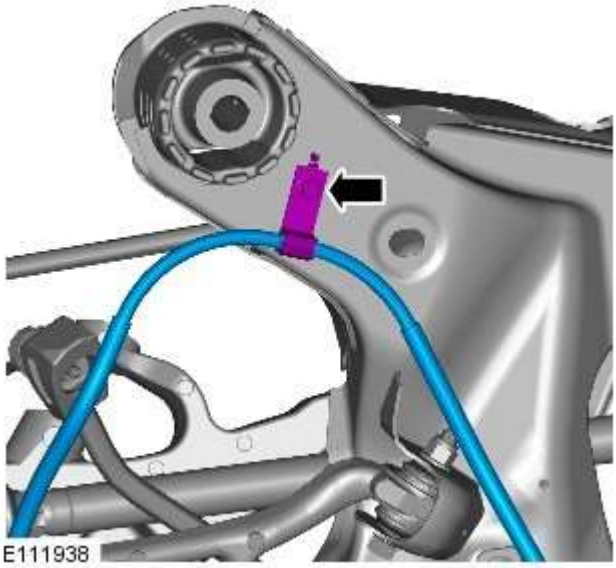
4.


E104457

5. NOTE: Note the fitted position.


E104458

6. *Torque:* 20 Nm



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Parking Brake and Actuation - Parking Brake Module

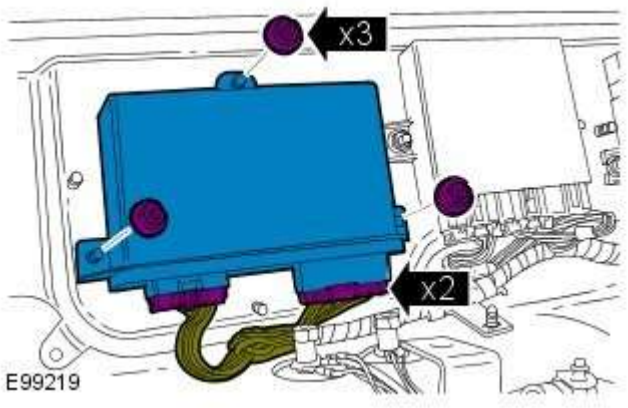
Removal and Installation

Removal

NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Refer to: Loadspace Trim Panel RH (501-05 Interior Trim and Ornamentation, Removal and Installation).



3. *Torque:* 4 Nm

Installation

1. To install, reverse the removal position

2. Configure the electronic parking brake (EPB) using the diagnostic tool.

Published: 12-Jun-2013

Parking Brake and Actuation - Parking Brake Switch

Removal and Installation

Removal

NOTES:

The parking brake switch is part of the transmission control switch (TCS) assembly and therefore can not be serviced separately.

Removal steps in this procedure may contain installation details.

1. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Refer to: Transmission Control Switch (TCS) (307-05A Automatic Transmission/Transaxle External Controls - V6 3.0L Petrol, Removal and Installation).

Installation

1.  CAUTION: Make sure that all diagnostic trouble codes (DTCs) have been removed after the road test.

   To install, reverse the removal procedure.

Published: 06-May-2014

Parking Brake and Actuation - Parking Brake Release Actuator

Removal and Installation

Removal

WARNING: Failure to release the tension and calibrate the electric parking brake during rear parking brake related service procedures, could cause the parking brake to function incorrectly or become inoperative.

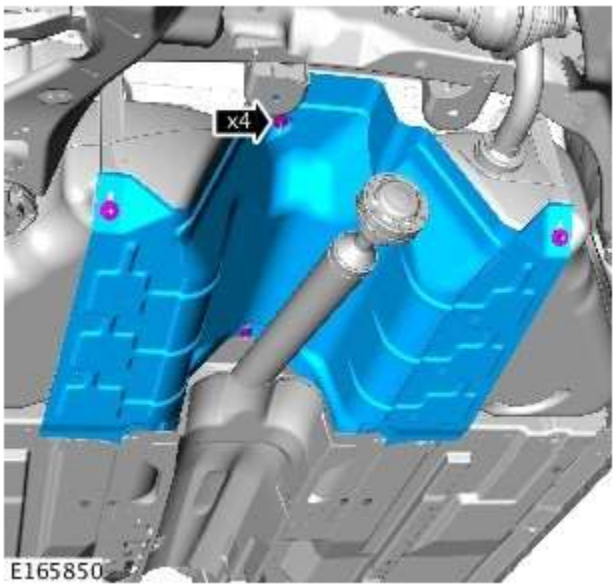
1. Refer to: Parking Brake Cable Tension Release (206-05 Parking Brake and Actuation, General Procedures).

2. WARNING: Make sure to support the vehicle with axle stands.

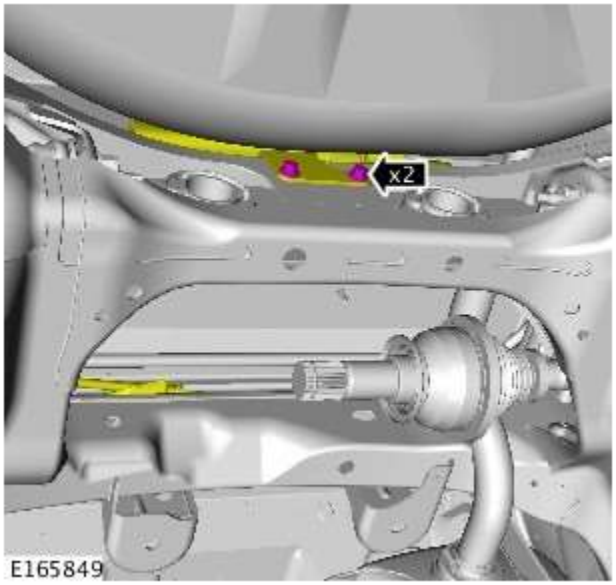
   Raise and support the vehicle.

3. Remove the differential case.

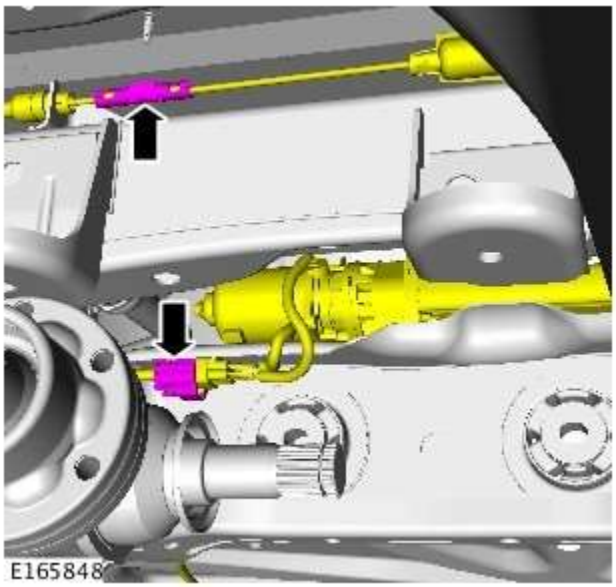
   Refer to: Differential Case - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol (205-02 Rear Drive Axle/Differential, Removal and Installation).
   Refer to: Differential Case - TD4 2.2L Diesel/TDV6 3.0L Diesel (205-02, Removal and Installation).



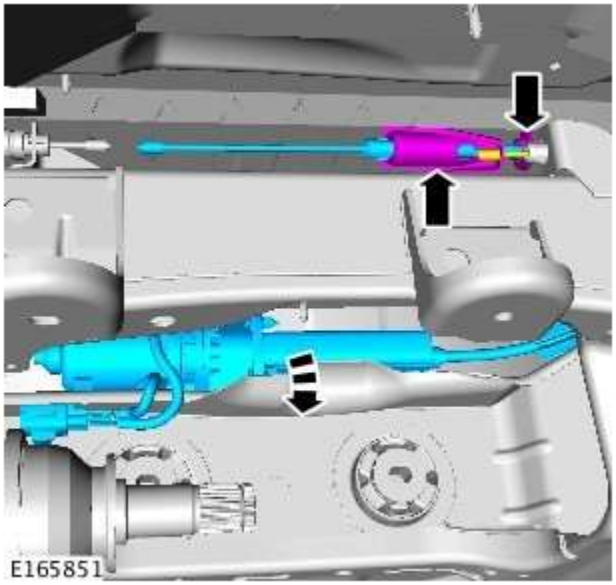
4. *Torque:* 7 Nm



5. *Torque:* 20 Nm



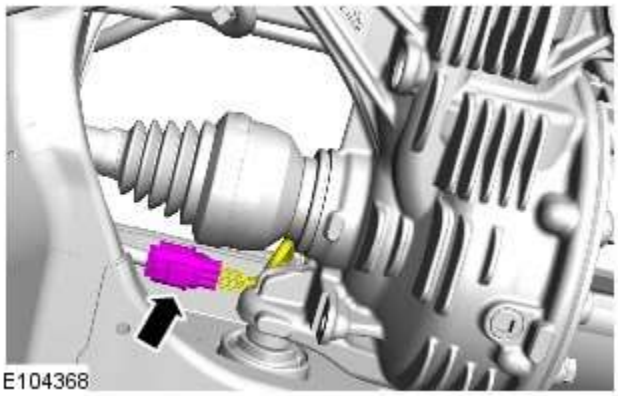
6.



7.

Installation

1. To install, reverse the removal procedure.



2. CAUTION: Make sure the wiring harness is correctly routed to avoid contact with the halfshaft. Failure to follow this instruction may result in damage to the component.

3. CAUTION: Calibrate the electric park brake using Jaguar approved diagnostic system. If the Jaguar approved diagnostic system is not available disconnect the battery for approximately 30 seconds, the vehicle will then prompt the driver to carry out the calibration procedure as per the vehicle hand book on re-connection.

   Calibrate the electric parking brake (EPB) using the diagnostic tool.

Published: 11-May-2011

Hydraulic Brake Actuation -

Lubricants, Fluids, Sealers and Adhesives

CAUTION: Do not use brake fluid ITT Super Dot 4 on 2006my vehicles onwards. Failure to follow this instruction may result in damage to the vehicle.

NOTE: Brake fluid ITT Super Dot 4 has now been superseded by Shell ESL Super Dot 4 which is the Jaguar recommended brake fluid. Shell ESL Super Dot 4 can be used on all model years.

Item	Specification
Brake fluid	Shell ESL Dot 4

Torque Specifications

Description	Nm	lb-ft	lb-in
Brake master cylinder to brake booster retaining nuts.	25	18	-
HCU to brake master cylinder brake tubes	17	13	-
Brake master cylinder reservoir retaining bolts	4	-	35

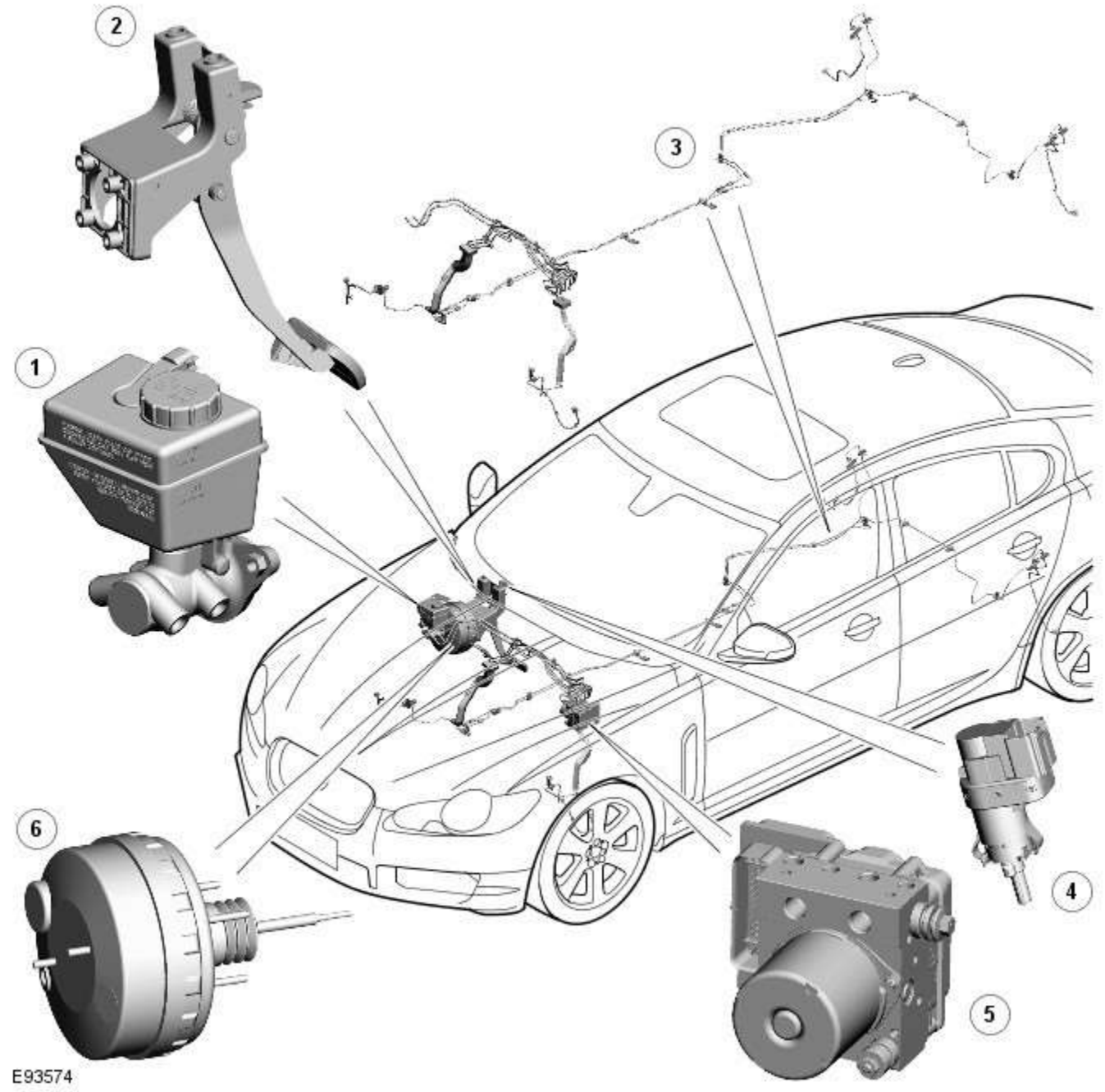
Published: 11-May-2011

Hydraulic Brake Actuation - Hydraulic Brake Actuation - Component Location

Description and Operation

NOTE: RHD (right-hand drive) installation shown, LHD (left-hand drive) installation similar.

Component Location



Item	Description
1	Brake master cylinder and fluid reservoir
2	Brake pedal
3	Brake pipes
4	Stoplamp switch
5	ABS (anti-lock brake system) module/ HCU (hydraulic control unit)
6	Brake booster

Published: 11-May-2011

Hydraulic Brake Actuation - Hydraulic Brake Actuation - Overview

Description and Operation

Overview

The hydraulic brake system is a diagonally split dual line system. The system consists of a brake pedal, vacuum brake booster, brake master cylinder assembly, HCU (hydraulic control unit), hydraulic pipes and brake hoses.

Brake pipes from the master cylinder supply pressure to the brake calipers at the four corners of the vehicle via the HCU. Braided steel hoses are used to connect the brake pipes to the front and rear brake calipers.

Published: 11-May-2011

Hydraulic Brake Actuation - Hydraulic Brake Actuation - System Operation and Component Description

Description and Operation

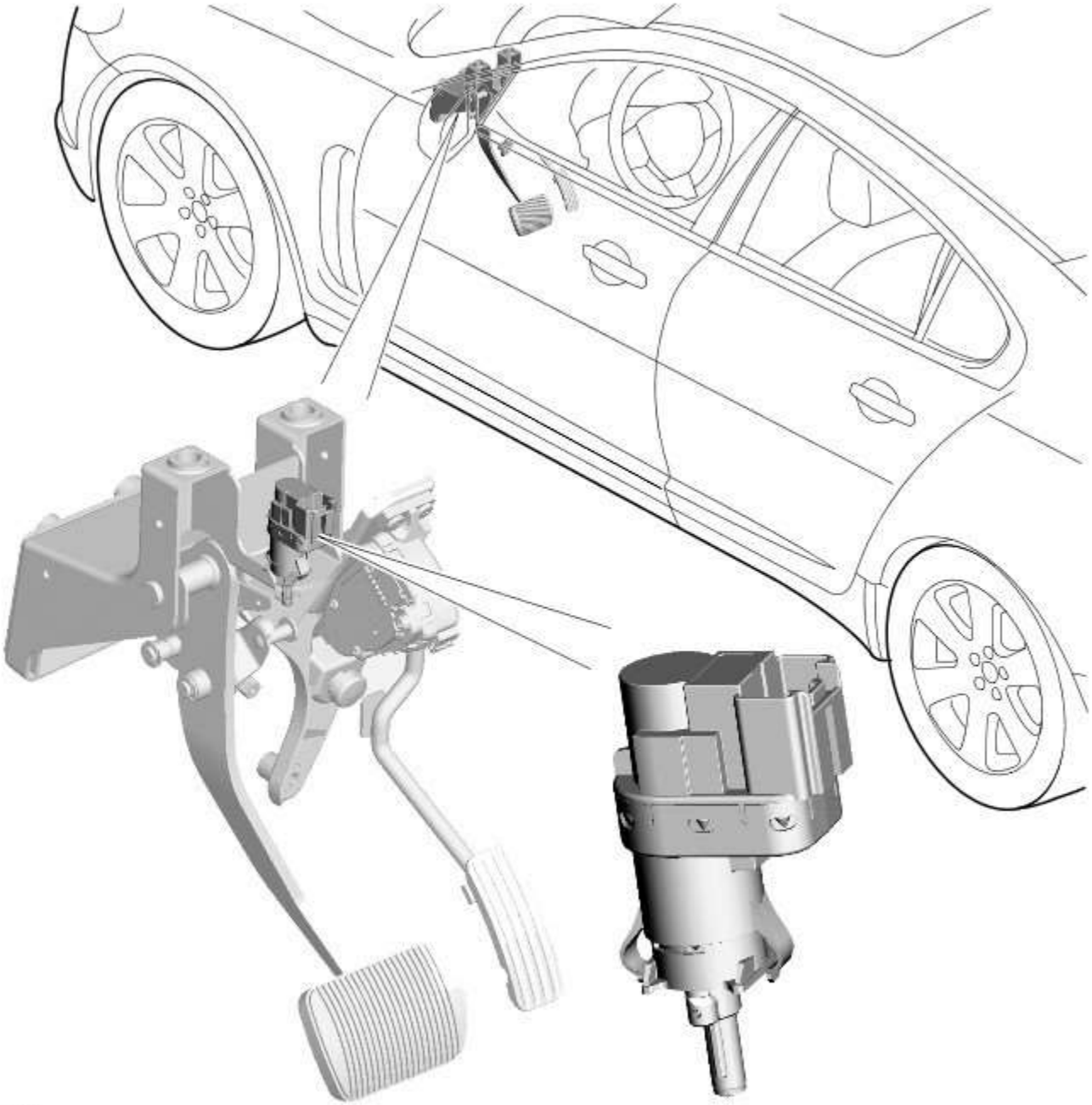
System Operation

When the brake pedal is pressed, the front push rod in the brake booster pushes the master cylinder primary piston along the bore of the housing. This produces pressure in the primary pressure chamber which, in conjunction with the primary spring, overcomes the secondary spring and simultaneously moves the secondary piston along the bore. The initial movement of the pistons away from the piston stops closes the primary and secondary center valves in the master cylinder. Further movement of the pistons then pressurizes the fluid in the primary and secondary chambers and thus the brake circuits. The fluid in the chambers behind the pistons is unaffected by the movement of the pistons and can flow unrestricted through the inlet ports between the chambers and the reservoir.

Pressurized fluid enters the HCU (hydraulic control unit), which is mounted on the front of the ABS (anti-lock brake system) module. The HCU modulates the supply of pressurized fluid to the brakes under control of the ABS module.
Refer to: Anti-Lock Control - Stability Assist (206-09 Anti-Lock Control - Stability Assist, Description and Operation).

Component Description

Brake Pedal

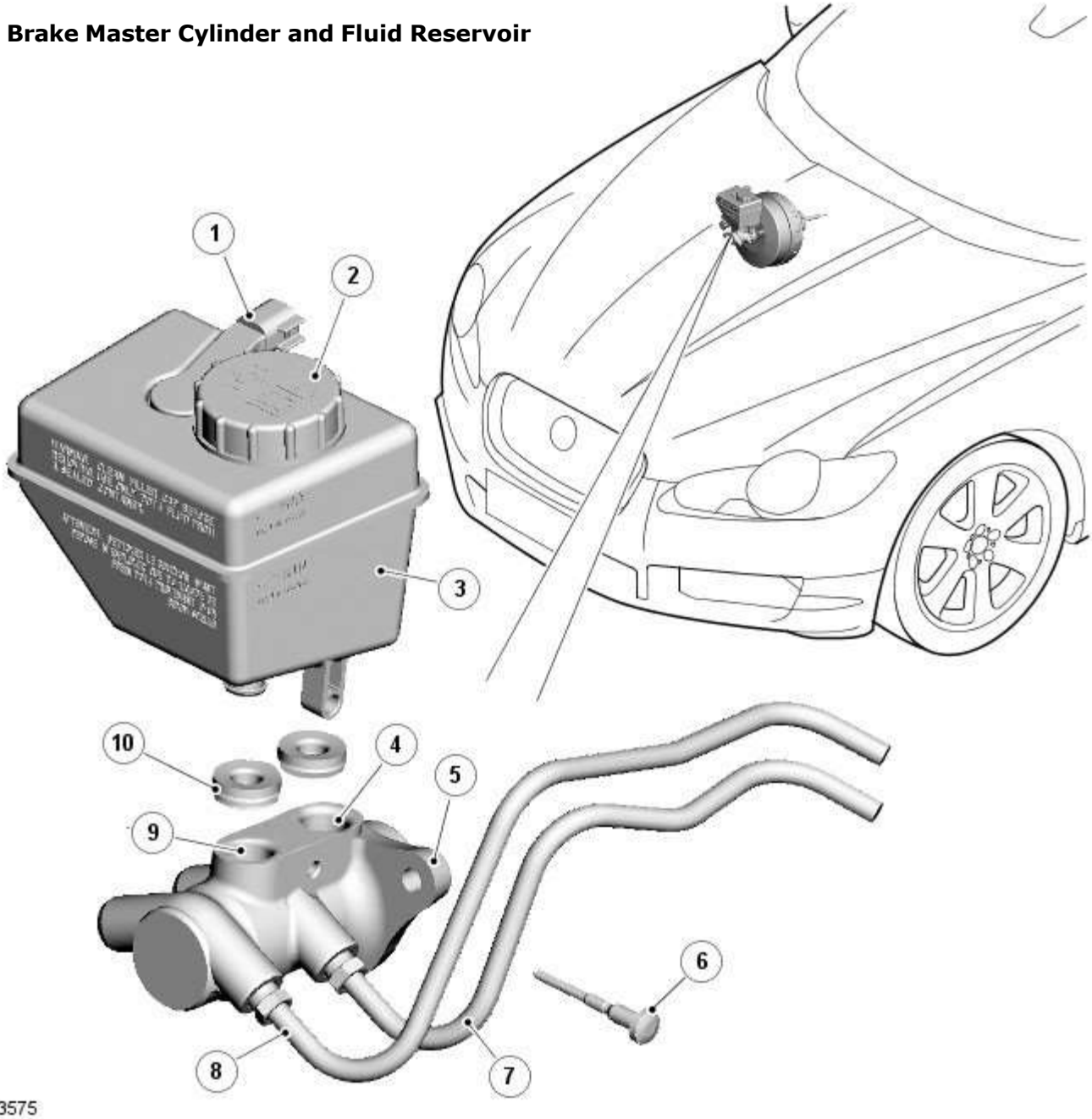


E93526

The brake pedal is mounted to a bracket attached to the rear side of the engine bulkhead. The bracket also contains the accelerator pedal. A clevis pin connects the brake pedal to the input push rod of the brake booster and master cylinder assembly.

The stoplamp switch is mounted in the brake pedal bracket and is operated by the brake pedal.

Brake Master Cylinder and Fluid Reservoir



E93575

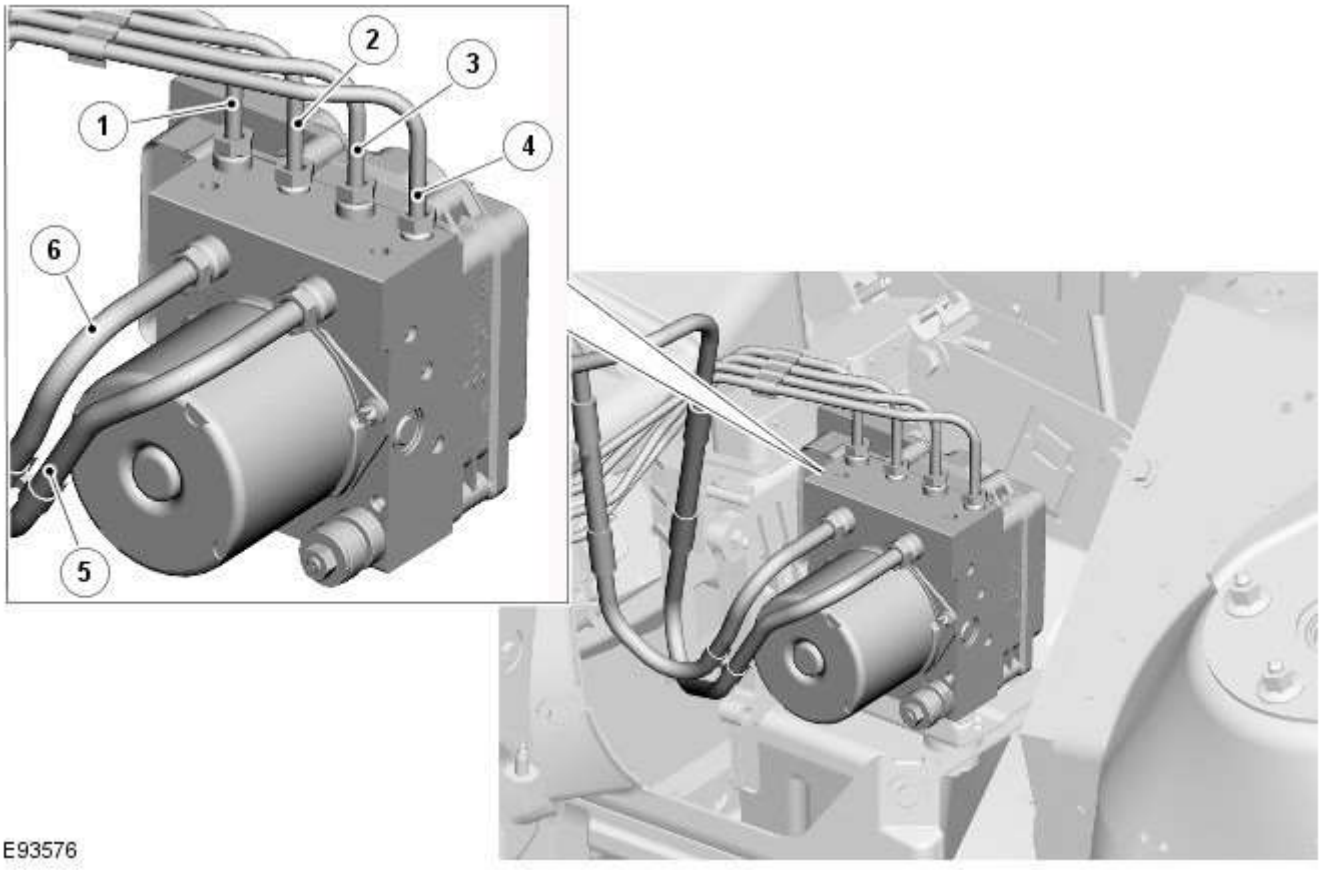
Item	Description
1	Brake fluid level switch electrical connector
2	Brake fluid reservoir cap
3	Brake fluid reservoir
4	Primary circuit inlet port
5	Brake master cylinder
6	Torx bolt
7	Primary circuit outlet
8	Secondary circuit outlet
9	Secondary circuit inlet port
10	Reservoir to master cylinder seal (2 off)

The brake booster and master cylinder assembly is fitted in the engine compartment. The brake master cylinder housing consists of two hydraulic chambers containing two pistons in tandem. The primary piston (adjacent to the brake booster) produces pressure for the primary braking circuit and this pressure acts on the secondary piston and hence creates pressure in the secondary circuit. A brake fluid reservoir is mounted on top of the master cylinder to provide a supply of brake fluid to the brake system. The reservoir cap is fitted with a brake fluid level switch.

Brake Fluid Level Switch

The brake fluid level switch is located in the fluid reservoir and is hardwired to the instrument cluster. When the level of fluid in the reservoir reaches a predetermined low level, the switch contacts close and provide a signal feed back to the instrument cluster. On receipt of the signal, the brake fluid red warning indicator will illuminate and 'BRAKE FLUID LOW' will be displayed in the message center.

ABS Module



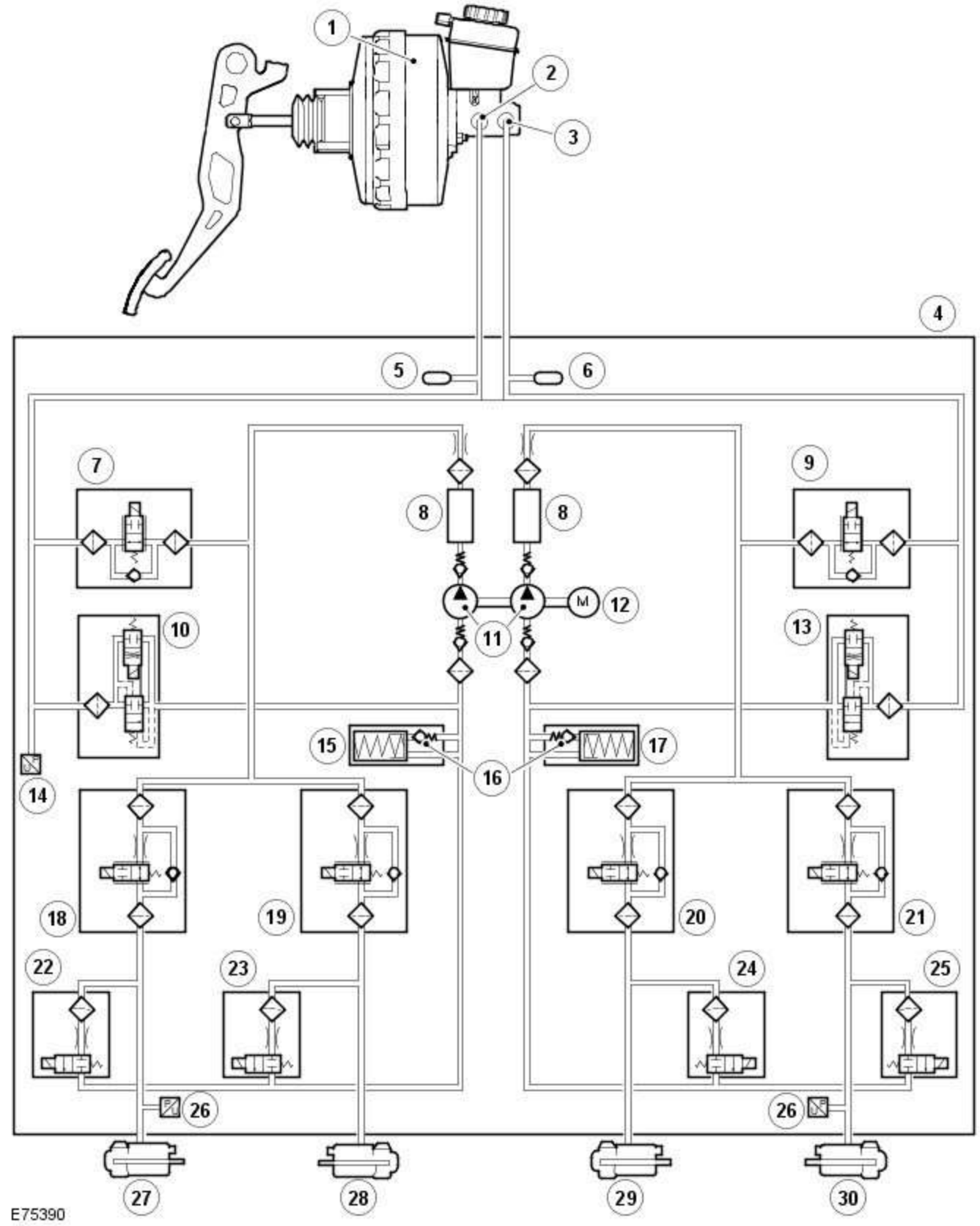
Item	Description
1	LH (left-hand) front brake
2	RH (right-hand) rear brake
3	LH rear brake
4	RH front brake
5	Primary circuit inlet port
6	Secondary circuit inlet port

The ABS module is located in the passenger side, rear engine bay and incorporates the HCU. The HCU is a four channel unit that modulates the supply of hydraulic pressure to the brakes under control of the ABS module.

The primary and secondary outlets of the master cylinder are connected to the primary and secondary circuits within the HCU. The primary circuit in the HCU has separate outlet ports to the RH front and LH rear brakes. The secondary circuit in the HCU has separate outlet ports to the LH front and RH rear brakes.

CAUTION: The ABS module and the HCU are a single unit and must not be separated.

HCU Schematic Diagram



Item	Description
1	Brake booster
2	Primary circuit
3	Secondary circuit
4	HCU

5	Pulsation damper
6	Pulsation damper
7	Separation valve
8	Damping chambers
9	Separation valve
10	Shuttle valve
11	Hydraulic pumps
12	Motor
13	Shuttle valve
14	Pressure sensor - all vehicles
15	Low pressure accumulator
16	Check valve
17	Low pressure accumulator
18	Inlet valve
19	Inlet valve
20	Inlet valve
21	Inlet valve
22	Outlet valve
23	Outlet valve
24	Outlet valve
25	Outlet valve
26	Pressure sensors - vehicles fitted with adaptive speed control only
27	RH front brake
28	LH rear brake
29	RH rear brake
30	LH front brake

Published: 11-May-2011

Hydraulic Brake Actuation - Hydraulic Brake Actuation

Diagnosis and Testing

For additional information.
REFER to: Brake System (206-00 Brake System - General Information, Diagnosis and Testing).

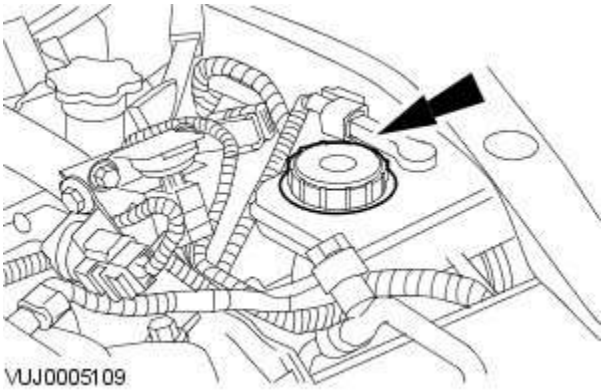
Published: 11-May-2011

Hydraulic Brake Actuation - Brake Fluid Reservoir

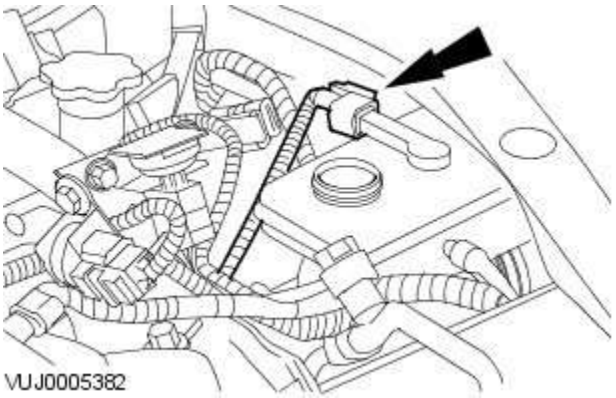
Removal and Installation

Removal

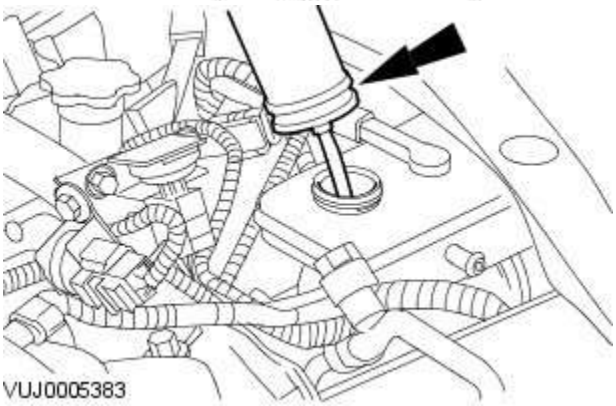
CAUTION: If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.



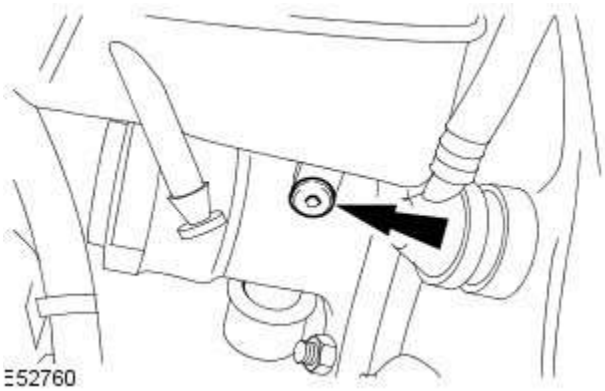
1. Remove the brake fluid reservoir cap.



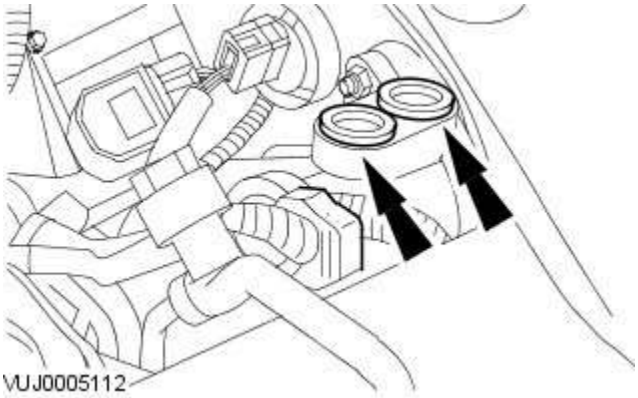
2. Disconnect the brake fluid level electrical connector.



3. Using a suitable suction device drain the brake fluid resrvoir.

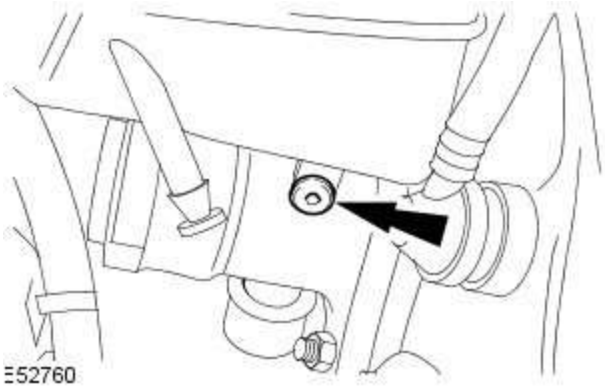


4. Remove the brake fluid reservoir.



5. Remove and discard the O-ring seals.
    - Remove and discard the O-ring seals.

Installation



1. To install, reverse the removal procedure.
    - Tighten to 8 Nm.
    - Fill the brake fluid reservoir to the MAX mark.

Published: 11-May-2011

Hydraulic Brake Actuation - Brake Master Cylinder

Removal and Installation

Removal

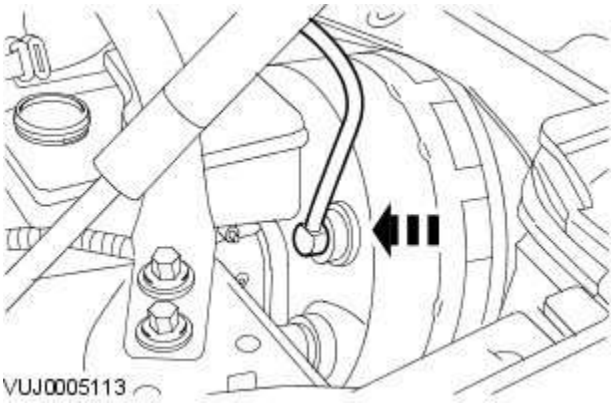
1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

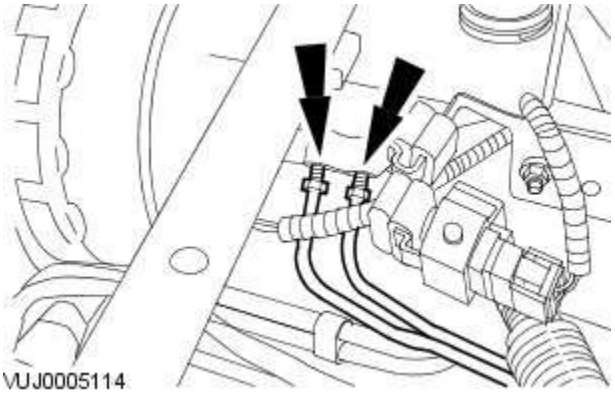
2. Remove the cowl vent screen.
   For additional information, refer to: Cowl Vent Screen (501-02 Front End Body Panels, Removal and Installation).

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

   Remove the brake fluid reservoir.
   For additional information, refer to: Brake Fluid Reservoir (206-06 Hydraulic Brake Actuation, Removal and Installation).

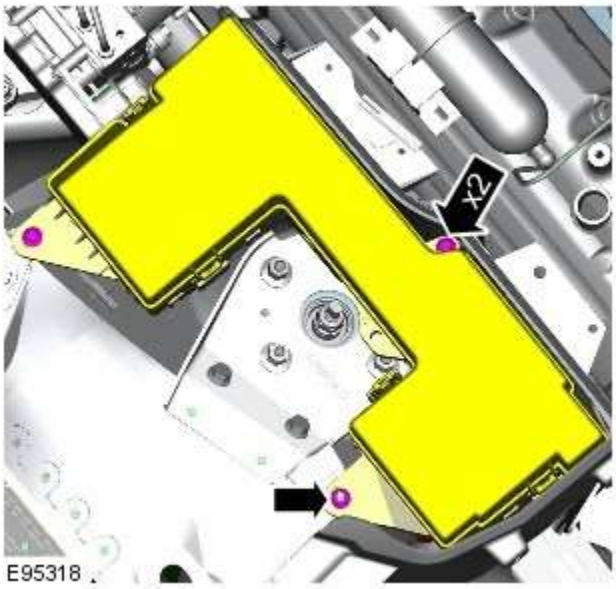


4. Remove the brake booster vacuum line from the brake vacuum pump.

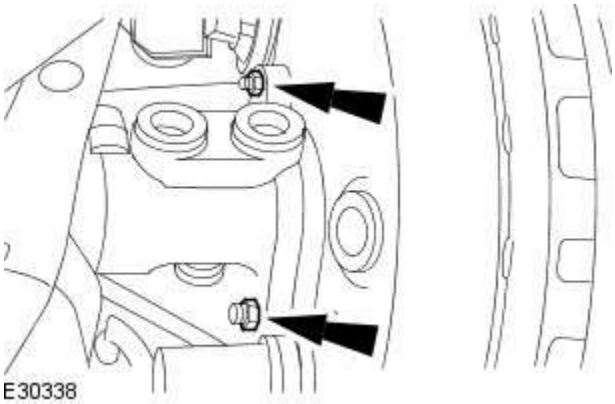


5. CAUTION: Make sure that all openings are sealed. Use new blanking caps.

   Disconnect the master cylinder brake pipes.

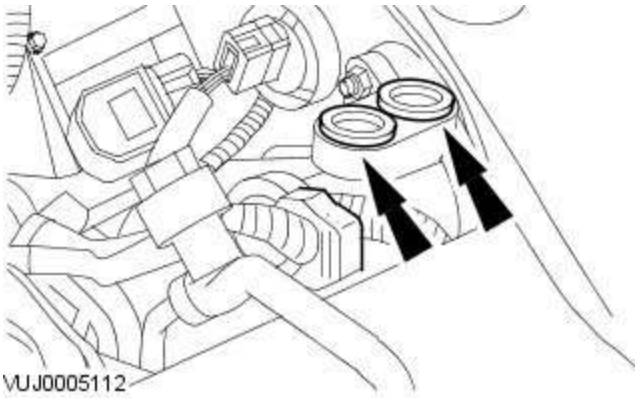


6. Release the fuse box.

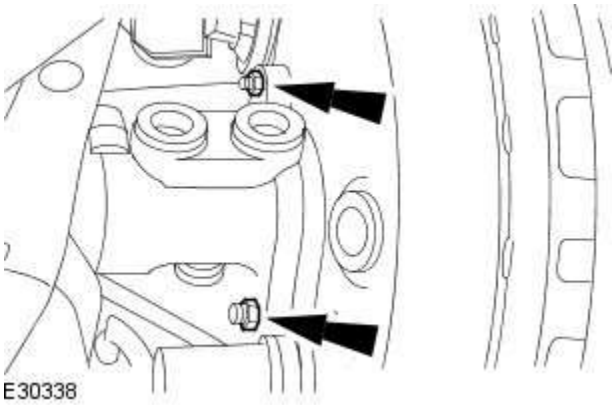


7. Remove the brake master cylinder.

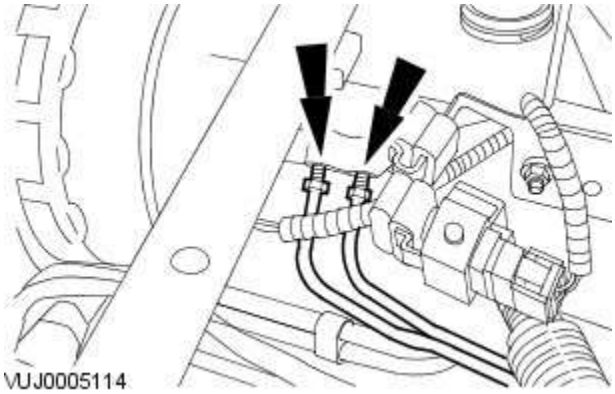
Installation



1. To install, reverse the removal procedure.
   - Install new O-ring seals.



2. Tighten to 25 Nm.



3. Tighten to 17 Nm.

4. Bleed the brake system.
   For additional information, refer to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures).

Published: 11-May-2011

Power Brake Actuation -

Torque Specifications

Description	Nm	lb-ft	lb-in
Brake booster retaining nuts - all vehicles	25	18	-
Exhaust gas recirculation valve coolant pipe - vehicles with 3.0L Diesel	9	-	80
Brake vacuum pump nut - vehicles with 3.0L Diesel	23	17	-
Brake vacuum pump threaded stud - vehicles with 3.0L Diesel	13	10	-
Brake vacuum pump bolts - vehicles with 3.0L Diesel	23	17	-
Brake vacuum pump bolts - vehicles with 5.0L	12	9	-

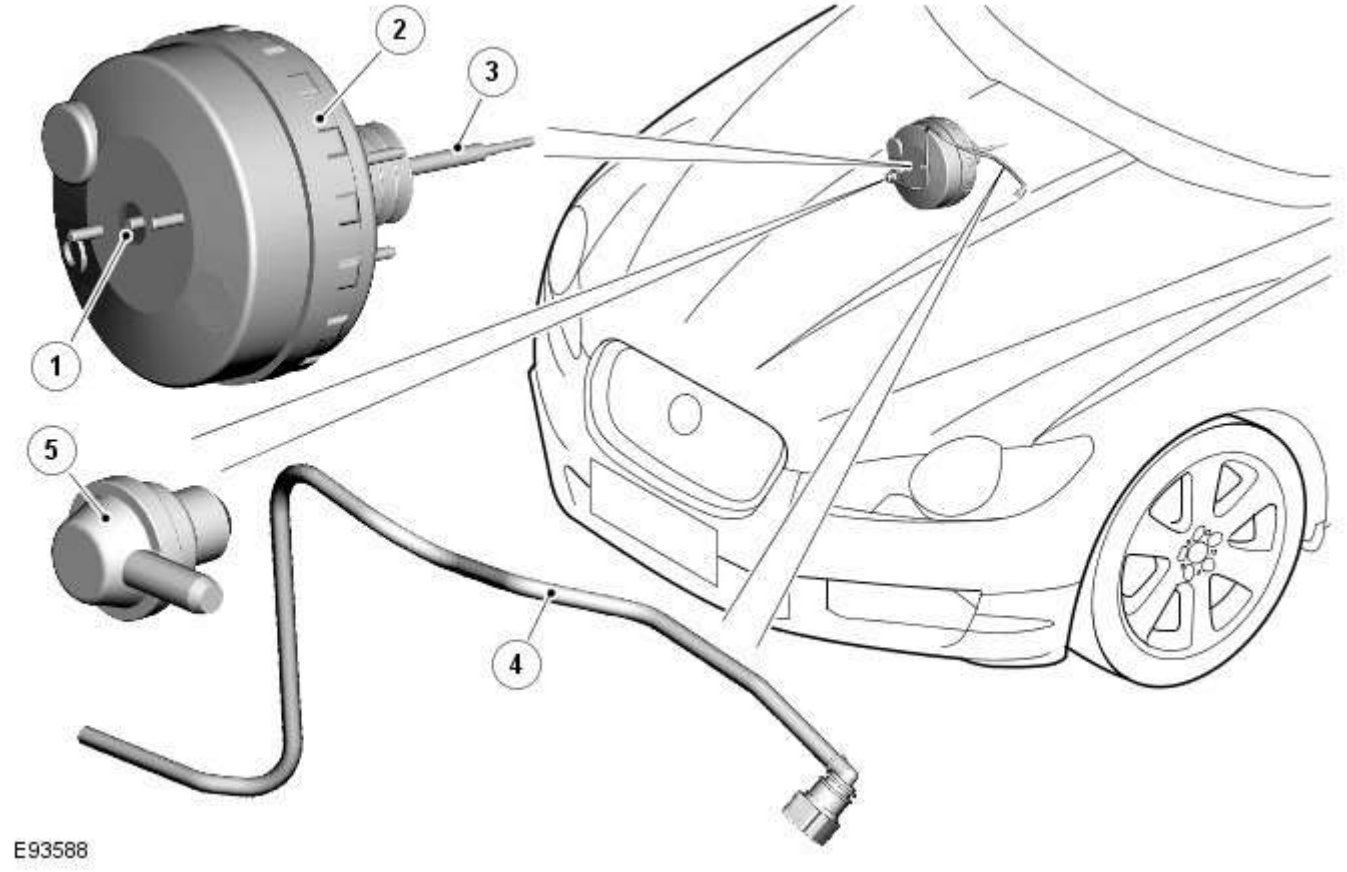
Published: 11-May-2011

Power Brake Actuation - Brake Booster - Component Location

Description and Operation

NOTE: RHD (right-hand drive) installation shown, LHD (left-hand drive) installation similar.

Component Location



Item	Description
1	Output pushrod
2	Brake booster
3	Input pushrod
4	Vacuum pipe
5	Non return valve

Published: 11-May-2011

Power Brake Actuation - Brake Booster - Overview

Description and Operation

Overview

Power assistance for the braking system is provided by a vacuum brake booster. The unit increases the input load by a ratio of 6.2 : 1 and is secured to the driver's side of the engine compartment bulkhead by four studs and nuts.

The booster and master cylinder assembly is fitted in the engine compartment. A two piece plastic vacuum pipe connects the brake booster to the inlet manifold to provide the necessary vacuum to the booster. The connection into the brake booster has a non return valve to maintain the vacuum level in the booster and also prevent fuel vapor from entering the brake booster.

The input push rod within the brake booster is connected to the brake pedal lever. Initially, any effort applied by the driver is increased by pedal ratio which is transferred to the input push rod. This load is further increased by the booster. The increased load is applied to the primary piston of the master cylinder via the output pushrod of the booster. Hydraulic pressure in the master cylinder is then applied to the brakes.

Refer to: Hydraulic Brake Actuation (206-06 Hydraulic Brake Actuation, Description and Operation).

Published: 11-May-2011

Power Brake Actuation - Power Brake System

Diagnosis and Testing

For additional information.
REFER to: Brake System (206-00 Brake System - General Information, Diagnosis and Testing).

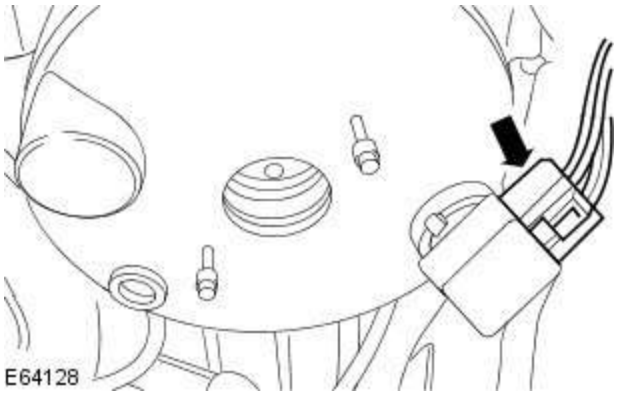
Published: 11-May-2011

Power Brake Actuation - Brake Booster

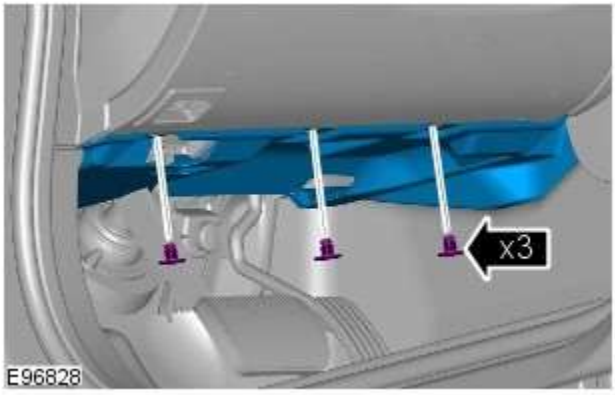
Removal and Installation

Removal

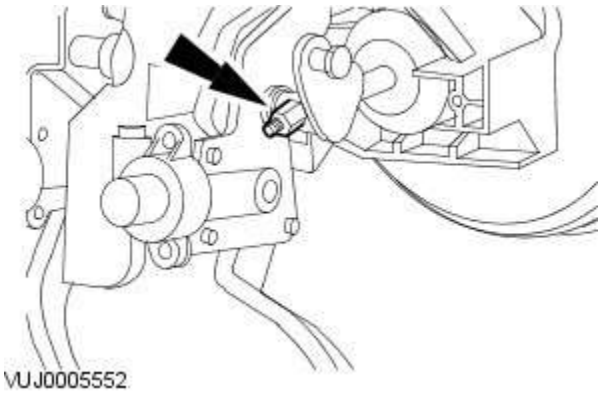
1. Remove the brake master cylinder.



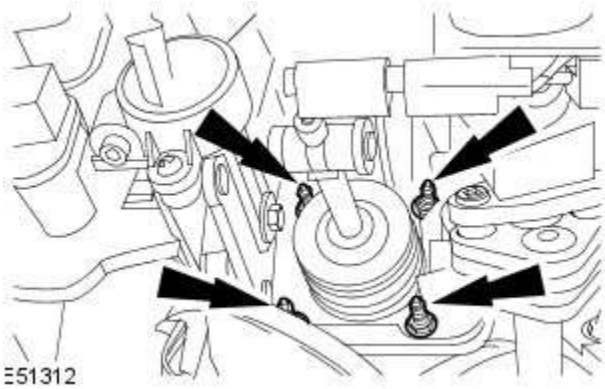
2. Disconnect the brake booster vacuum electrical connector.



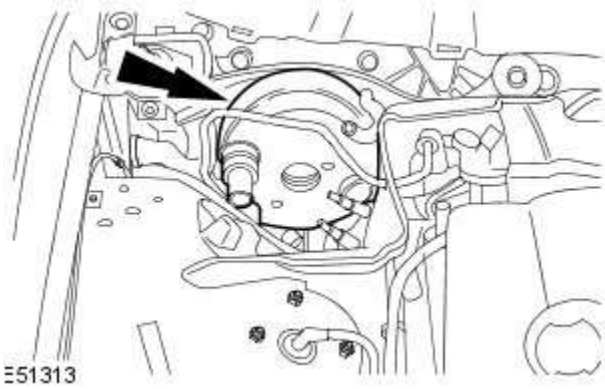
3. Remove the lower trim panel.



4. Remove the retaining nut.

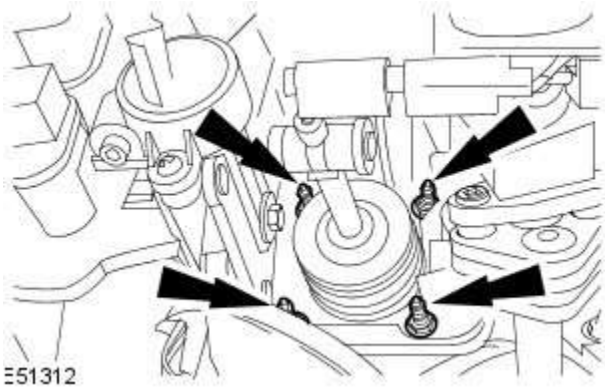


5. Remove the brake booster retaining nuts.



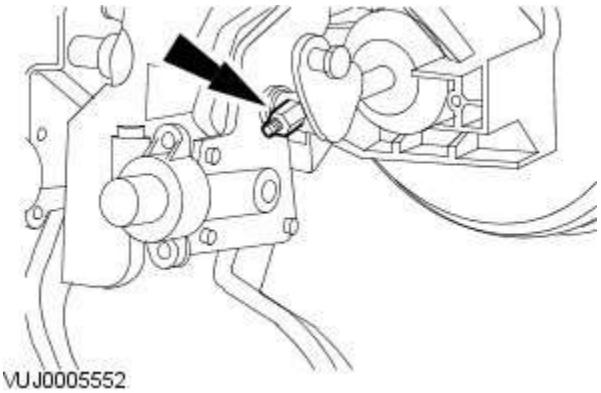
6. Remove the brake booster.

Installation



1. NOTE: Replace the brake booster/pedal box gasket.

   To install, reverse the removal procedure.
   - Tighten to 25 Nm.



2. Tighten to 3 Nm.

Published: 08-Oct-2012

Power Brake Actuation - Brake Vacuum Pump V8 5.0L Petrol/V8 S/C 5.0L Petrol

Removal and Installation

Removal

CAUTION: Make sure that all openings are sealed. Use new blanking caps.

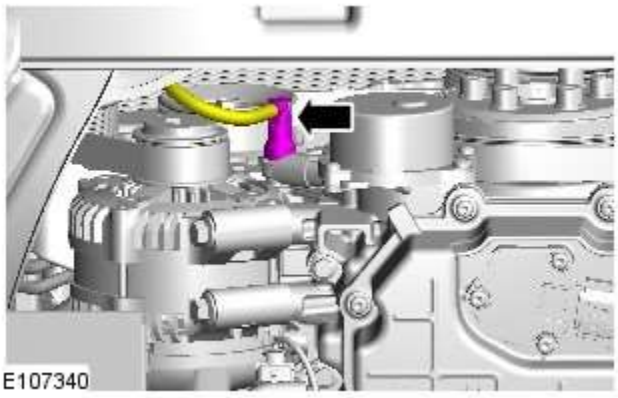
NOTE: Removal steps in this procedure may contain installation details.

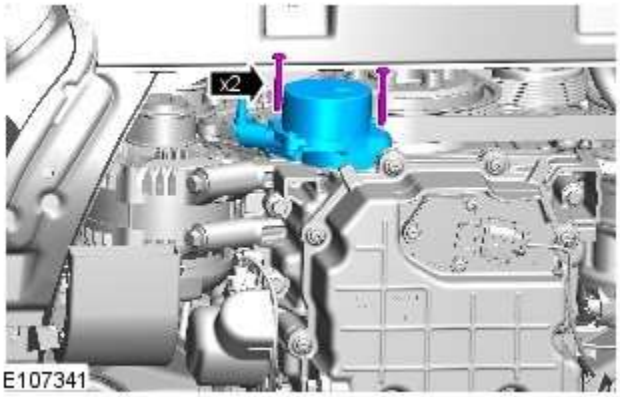
1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

2. Refer to: Engine Oil Draining and Filling (303-01, General Procedures).

3.





4. CAUTION: Be prepared to collect escaping oil.

   Torque: 12 Nm

E147623

5. NOTE: Remove and discard the O-ring seal.

Installation

1. NOTE: Install a new O-ring seal. To install reverse the removal procedure.

2. Start engine and check the brake booster operation.

Published: 11-May-2011

Anti-Lock Control - Stability Assist -

Lubricants, Fluids, Sealers and Adhesives

Item	Specification
Brake fluid	Shell ESL Dot 4

Torque Specifications

Description	Nm	lb-ft	lb-in
Brake master cylinder primary pressure transducer	30	22	–
Brake tubes to hydraulic control unit (HCU)	17	13	–
Rear wheel speed sensor retaining bolt	6	–	53
Yaw rate sensor and accelerometer retaining nuts	7	–	62
Hydraulic control unit (HCU) retaining bolts	8	–	71
Steering wheel rotation sensor retaining screws	4	–	35
Steering column to lower shroud retaining screws	3	–	27

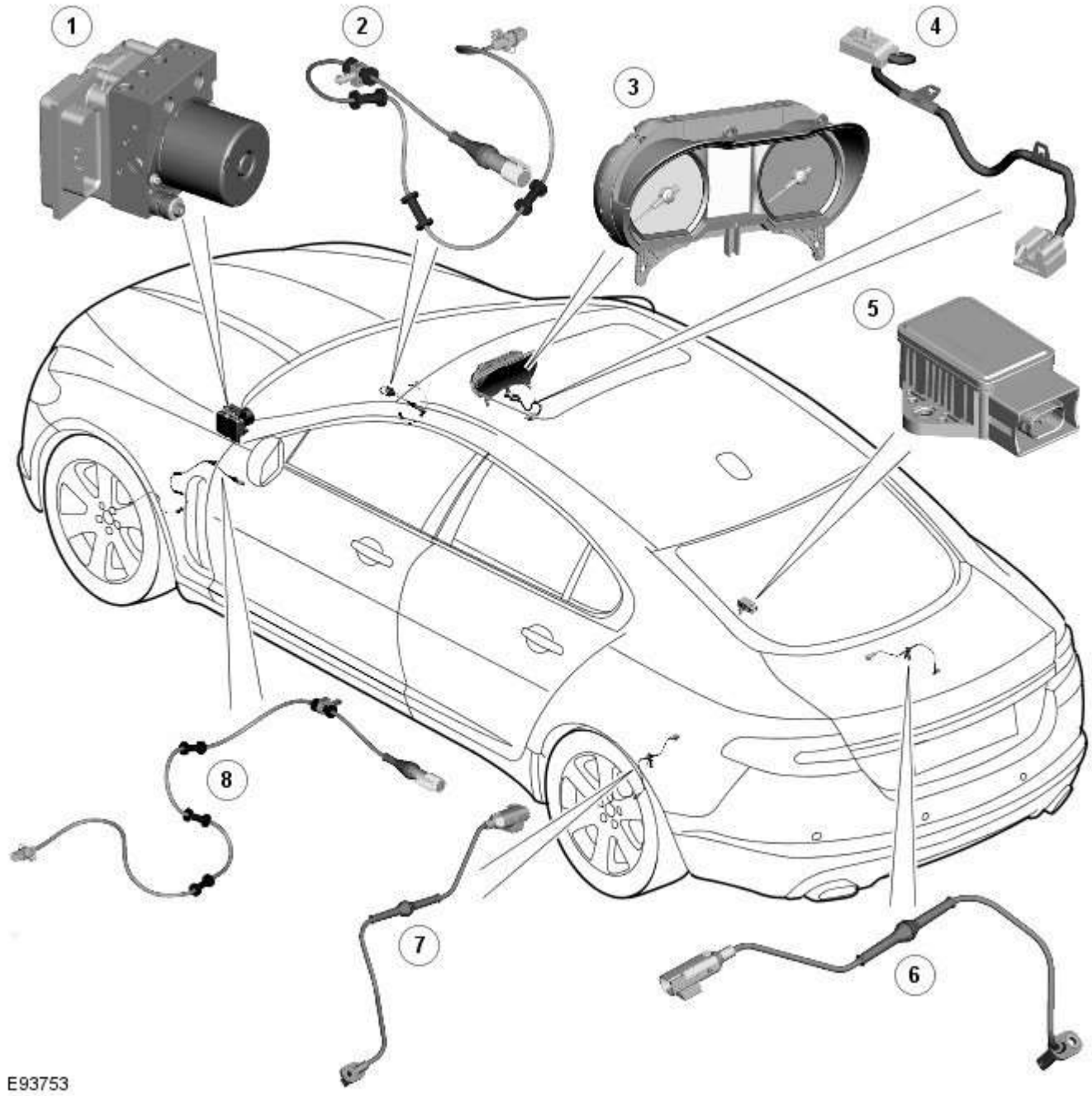
Published: 02-Sep-2011

Anti-Lock Control - Stability Assist - Anti-Lock Control - Stability Assist - Component Location

Description and Operation

NOTE: RHD (right-hand drive) installation shown, LHD (left-hand drive) installation similar.

Component Location



Item	Description
1	ABS (anti-lock brake system) module
2	RH (right-hand) front wheel speed sensor
3	Instrument cluster
4	Steering angle sensor
5	Yaw rate and lateral acceleration sensor
6	RH rear wheel speed sensor
7	LH (left-hand) rear wheel speed sensor
8	LH front wheel speed sensor

Published: 11-May-2011

Anti-Lock Control - Stability Assist - Anti-Lock Control - Stability Assist - Overview

Description and Operation

Overview

The ABS (anti-lock brake system) and DSC (dynamic stability control) system features a Bosch modulator, which is an integrated four-channel HCU (hydraulic control unit) and ABS module. The unit is located in the rear of the engine compartment on the passenger side, and is installed in the brake hydraulic circuit between the brake master cylinder and the four brake calipers.

The ABS module is connected to the high speed CAN (controller area network) bus, and actively interacts with other vehicle system control modules and associated sensors to receive and transmit current vehicle operating information.

When required, the ABS module will actively intervene and operate the HCU during braking or vehicle maneuvers to correct the vehicle attitude, stability, traction or speed. During incidents of vehicle correction, the ABS module may also request the ECM (engine control module) to control engine power in order to further stabilize and correct the vehicle.

To provide full system functionality, the ABS and DSC system comprise the following components:

- DSC switch.
- Four wheel speed sensors.
- Steering angle sensor.
- Yaw rate and lateral acceleration sensor.
- Stoplamp switch.
- Instrument cluster indicator lamps.
- Integrated ABS module and HCU.
- Brake booster vacuum sensor (3.0L vehicles only).

Two variants of ABS module are available, Bosch ESP®8.1 and Bosch ESP®plus8.1. The Bosch ESP®plus8.1 system is fitted to vehicles with ACC (adaptive cruise control) and incorporates a new feature to Jaguar known as 'electronic brake prefill'.

Electronic brake prefill, senses any rapid throttle lift off, activating a small brake hydraulic pressure build-up of approximately 3 to 5 bar (43.5 to 72.5 lbf/in²) in anticipation of the brakes being applied. This application produces a quicker brake pedal response and consequently slightly shorter stopping distances. When the ECM detects rapid throttle lift off it signals the ABS module which controls the HCU to apply a low brake pressure to assist in a quicker brake application.

NOTE: All vehicles with ACC are supported by the Bosch ESP®plus8.1 system.

The ABS provides the following brake functions that are designed to assist the vehicle or aid the driver:

- ABS.
- DSC, including Trac DSC.
- CBC (corner brake control).
- EBD (electronic brake force distribution).
- ETC (electronic traction control).
- EBA (emergency brake assist).
- EDC (engine drag-torque control).
- Understeer control.
- Electronic brake prefill (vehicles with ACC only).
- Brake vacuum assist (3.0L vehicles only).

All the brake functions listed are automatically active when the ignition is in power mode and the engine is running. The DSC system can be selected to off using the DSC switch.

WARNING: Although the vehicle is fitted with DSC, it remains the drivers responsibility to drive safely according to the prevailing conditions.

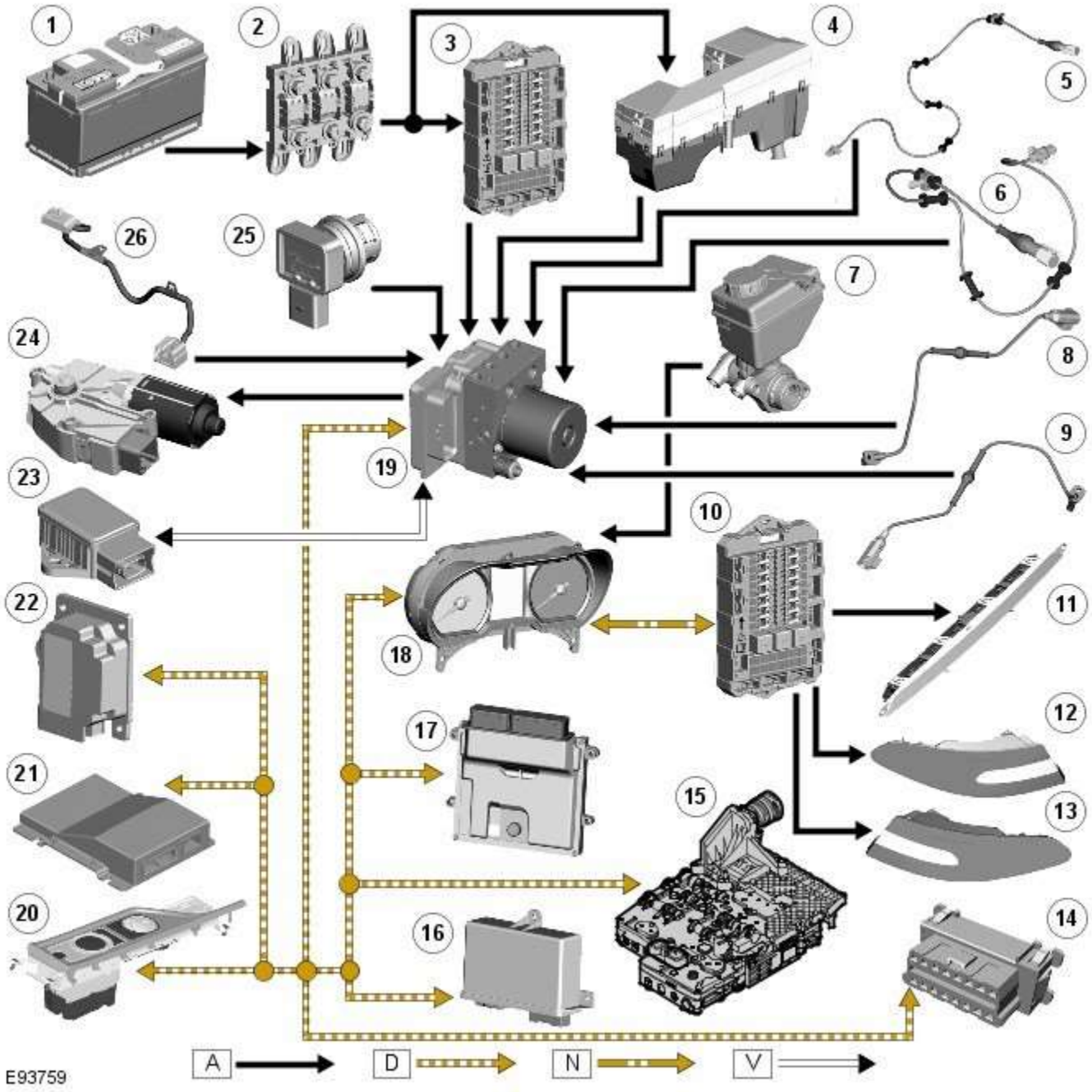
Published: 11-May-2011

Anti-Lock Control - Stability Assist - Anti-Lock Control - Stability Assist - System Operation and Component Description

Description and Operation

Control Diagram

NOTE: **A** = Hardwired; **D** = High speed CAN (controller area network) bus; **N** = Medium speed CANCAN bus; **V** = Private CAN bus.



Item	Description
1	Battery
2	BJB (battery junction box) (250 A megafuse)
3	CJB (central junction box)
4	EJB (engine junction box)
5	LH (left-hand) front wheel speed sensor

6	RH (right-hand) front wheel speed sensor
7	Brake fluid level switch
8	LH rear wheel speed sensor
9	RH rear wheel speed sensor
10	RJB (rear junction box)
11	High mounted stop lamp
12	LH stop lamp
13	RH stop lamp
14	Diagnostic socket
15	TCM (transmission control module)
16	Electronic parking brake module
17	ECM (engine control module)
18	Instrument cluster
19	ABS (anti-lock brake system) module
20	JaguarDrive selector module
21	Adaptive damping control module
22	Adaptive speed control module
23	Yaw rate and lateral acceleration sensor
24	Roof opening panel motor/module
25	Brake booster vacuum sensor (3.0L vehicles only)
26	Steering angle sensor

System Operation

Anti-Lock Brake System

ABS controls the speed of all road wheels to ensure optimum wheel slip when braking at the adhesion limit. The wheels are prevented from locking to retain effective steering control of the vehicle.

The brake pressures are modulated separately for each wheel. Rear brake pressures are controlled to maintain rear stability on split friction surfaces.

Dynamic Stability Control

DSC (dynamic stability control) uses brakes and powertrain torque control to assist in maintaining the yaw stability of the vehicle. While the ignition is energized the DSC function is permanently enabled, unless selected off using the DSC switch.

DSC enhances driving safety in abrupt maneuvers and in under-steer or over-steer situations that may occur in a bend. The ABS module monitors the yaw rate and lateral acceleration of the vehicle, steering input and individual wheel speeds, then selectively applies individual brakes and signals for powertrain torque adjustments to reduce under-steer or over-steer conditions.

In general:

- In an under-steer situation the inner wheels are braked to counteract the yaw movement towards the outer edge of the bend.
- In an over-steer situation the outer wheels are braked to prevent the rear end of the vehicle from pushing towards the outer edge of the bend.

The ABS module monitors the tracking stability of the vehicle using inputs from the wheel speed sensors, the steering angle sensor, and the yaw rate and lateral acceleration sensor. The tracking stability is compared with stored target data. Whenever the tracking stability deviates from the target data, the ABS module intervenes by applying the appropriate control strategy.

The following interactions occur in an intervention situation:

- High speed CAN signal to the ECM, to reduce engine torque.
- Application of braking to the appropriate corner of the vehicle.

Trac DSC

TracDSC is an alternative setting of DSC with reduced system interventions. With TracDSC engaged, traction may be somewhat increased, although stability may be reduced compared to normal DSC. TracDSC is intended for use only on dry tarmac, by suitably experienced drivers and should not be selected for other surfaces or by drivers with insufficient skill and training to operate the vehicle safely with the TracDSC function engaged.

The less restrictive TracDSC setting may be preferred, for example, by expert drivers engaged in high performance driving on dry Tarmac surfaces such as tracks and circuits.

Switching between DSC and Trac DSC:

- Press and hold the DSC switch for less than 10 seconds.
- The message center will temporarily display either **Trac DSC** or **DSC ON**.
- The warning indicator in the instrument panel will illuminate while Trac DSC is selected.
- The warning indicator will flash when DSC or Trac DSC is active.

NOTE: If cruise control is engaged, it will automatically disengage if DSC activates.

Refer to: Speed Control (310-03 Speed Control - 2.7L V6 - TdV6, Description and Operation).

Corner Brake Control

CBC (corner brake control) influences the brake pressures, below and within DSC and ABS thresholds, to counteract the yawing moment produced when braking in a corner. CBC produces a correction torque by limiting the brake pressure on one side of the vehicle.

Electronic Brake Force Distribution

EBD (electronic brake force distribution) limits the brake pressure applied to the rear wheels. When the brakes are applied, the weight of the vehicle transfers forwards, reducing the ability of the rear wheels to transfer braking effort to the road surface. This may cause the rear wheels to slip and make the vehicle unstable.

EBD uses the ABS braking hardware to automatically optimize the pressure to the rear brakes, below the point where ABS is normally invoked.

NOTE: Only the rear brakes are controlled by the EBD function.

Electronic Traction Control

ETC (electronic traction control) attempts to optimize forward traction by reducing engine torque, or by applying the brake of a spinning wheel until traction is regained.

ETC is activated if an individual wheel speed is above that of the vehicle reference speed (positive slip) and the brake pedal is not pressed. The brake is applied to the spinning wheel, allowing the excess torque to be transmitted to the non-spinning wheel through the drive line. If necessary, the ABS module also sends a high speed CAN bus message to the ECM to request a reduction in engine torque.

When the DSC function is selected off using the DSC switch, the braking and engine torque reduction features are both disabled, except when the JaguarDrive control is in winter mode. When the JaguarDrive control is in winter mode, selecting the DSC function off retains the braking and engine torque reduction features, but reduces intervention levels compared to DSC and Trac DSC modes.

Emergency Brake Assist

EBA (emergency brake assist) assists the driver in emergency braking situations by automatically increasing the applied braking effort. The ABS module invokes EBA when:

- The brake pedal is rapidly pressed.
- The brake pedal is pressed hard enough to bring the front brakes into ABS operation.

When the brake pedal is rapidly pressed, the ABS module increases the hydraulic pressure to all of the brakes until the threshold for ABS operation is reached. This action applies the maximum braking effort for the available traction. The ABS module monitors for the sudden application of the brakes, using inputs from the brake pedal switch and from the pressure sensor within the HCU (hydraulic control unit). With the brake pedal pressed, if the rate of increase of hydraulic pressure exceeds the predetermined limit, the ABS module invokes emergency braking.

When the brake pedal is pressed hard enough to bring the front brakes into ABS operation, the ABS module increases the hydraulic pressure to the rear brakes up to the ABS threshold.

EBA operation continues until the driver releases the brake pedal, sufficiently for the hydraulic pressure in the HCU to drop below a threshold value stored in the ABS module.

Engine Drag-Torque Control

EDC (engine drag-torque control) prevents wheel slip caused by any of the following: A

- sudden decrease in engine torque when the accelerator is suddenly released.
- A downshift using the Jaguar sequential shift function on automatic transmission vehicles.

When the ABS module detects the onset of wheel slip without the brakes being applied, the ABS module signals the ECM via the high speed CAN bus to request a momentary increase in engine torque.

Understeer Control

Understeer Logic Control is a proactive system which monitors the vehicle for understeer by comparing signals from the yaw rate and lateral acceleration sensor with signals from the steering angle sensor and wheel speed sensors.

When the ABS module detects the onset of understeer, the ABS module signals the ECM via the high speed CAN bus to request a decrease in engine torque. At the same time the ABS module will control the HCU to apply brake pressure to the relevant wheels to correct the understeer.

Electronic Brake Prefill (Vehicles With ACC Only)

Electronic brake prefill (Bosch ESP®plus8.1), senses any rapid throttle lift off, activating a small brake hydraulic pressure build-up of approximately 3 to 5 bar (43.5 to 72.5 lbf/in²) in anticipation of the brakes being applied.

This application produces a quicker brake pedal response and consequently slightly shorter stopping distances. The system supports vehicles with ACC (adaptive cruise control).

When the ABS module detects rapid throttle lift off (from the signals received from the ECM over the high speed CAN bus), it controls the HCU to apply a low brake pressure to assist in a quicker brake application.

Brake Vacuum Assist (3.0L Vehicles Only)

Operation of Brake Vacuum Assist generally occurs at the beginning of an ignition cycle when brake booster vacuum levels are low; refer to Brake Booster Vacuum sensor, below.

Brake vacuum assist operation will be recognized by the driver experiencing a vibrating brake pedal and slight modulator noise. This will be similar to that experienced when ABS system is operating.

As the engine warms up, Brake Vacuum Assist operation will become less frequent. However, it can be become more active when vacuum levels are low due to driving at high-altitudes, or during frequent heavy-braking.

Noise levels during Brake Vacuum Assist may vary with initial system activity being the loudest observed. In some circumstances initial activity may be interpreted as a 'thump' noise, particularly if there is no immediate and significant Brake Vacuum Assist functionality.

In this circumstance system behavior is normal and should not be a cause for fault investigation.

Component Description

Dynamic Stability Control Switch

Item	Description
1	DSC switch

The DSC switch is mounted in the floor console adjacent to the JaguarDrive selector.

DSC becomes active whenever the engine is running. A momentary press of the switch allows the driver to toggle between the standard DSC settings and the optimized 'Trac DSC' settings. The message 'Trac DSC' or 'DSC on' will temporarily be displayed in the instrument cluster message center. The amber DSC warning indicator in the instrument cluster remains illuminated while 'Trac DSC' is selected.

The DSC can be switched off by pressing and holding the switch for more than 10 seconds.

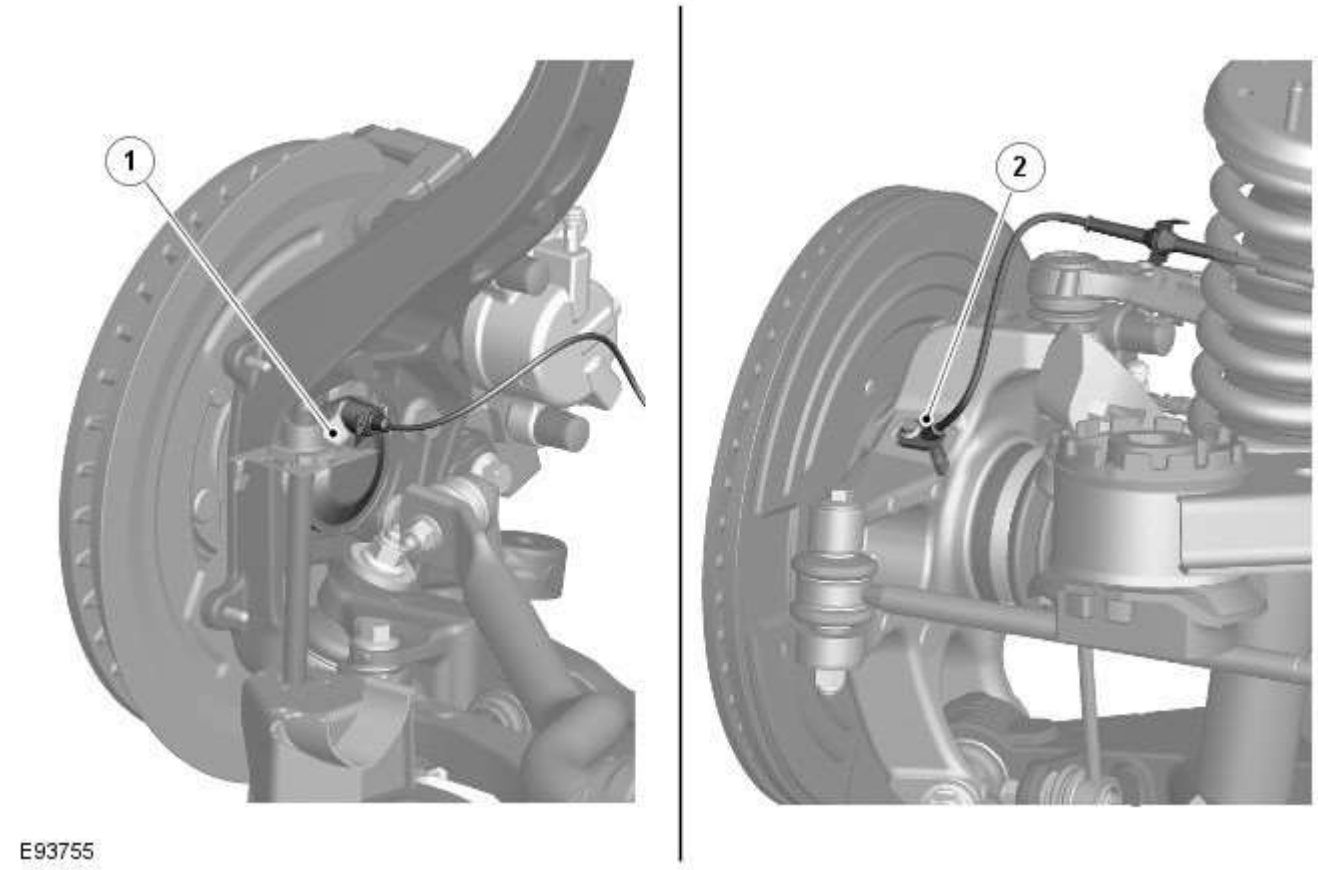
In each case the message 'DSC OFF' will be displayed in the instrument cluster message center to confirm DSC has been switched off. The amber DSC warning indicator in the instrument cluster will remain illuminated. The system can be switched back on again by simply pressing and releasing the switch. The message 'DSC ON' will then temporarily appear in the instrument cluster message center to confirm the system is on.

NOTE: Switch requests may be delayed if the switch is pressed while a DSC operation is taking place. The switch request will be displayed in the instrument cluster but the ABS module will not initiate any stability changes until it is safe to do so.

If a fault is detected with the DSC switch, the ABS module defaults to the 'DSC ON' setting and any switch requests are ignored.

WARNING: It is recommended that when using snow chains, Trac DSC is switched off and JaguarDrive control winter mode is selected.

Wheel Speed Sensors



Item	Description
1	Front wheel speed sensor
2	Rear wheel speed sensor

An active wheel speed sensor is installed in each wheel hub to provide the ABS module with a rotational speed signal from each road wheel. The head of each front wheel speed sensor is positioned close to a magnetic encoder ring incorporated into the inboard seal of the wheel bearing. The head of each rear wheel speed sensor is positioned close to a magnetic encoder ring incorporated into the rear wheel bearing assembly. Each encoder ring contains 46 north and south poles. A fly lead connects each sensor to the vehicle harness.

The wheel speed sensors each have a signal and a return connection with the ABS module. When the ignition is ON the ABS module supplies a signal feed to the wheel speed sensors and monitors the return signals. Any rotation of the road wheels induces current fluctuations in the return signals, which are converted into individual wheel speeds and overall vehicle speed by the ABS module.

The ABS module broadcasts the individual wheel speeds and the vehicle speed on the high speed CAN bus for use by other

systems, although vehicle speed information to the roof opening panel motor/module is a hardwired connection.

If a wheel speed sensor fault is detected by the ABS module, 'ABS FAULT' will be displayed in the instrument cluster message center and an amber warning indicator will illuminate.
Refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

As the wheel speed sensors are active devices, a return signal is available when the road wheels are not rotating. This enables the ABS module to check the condition of the speed sensors while the vehicle is stationary.

Steering Angle Sensor

The steering angle sensor measures the steering wheel angle and the rate of change of the steering wheel angle. These measurements are received by the ABS module and broadcast on the high speed CAN bus for use by other systems.

The steering angle sensor is mounted on the steering column upper shroud mounting bracket, immediately behind the multifunction switches, and is secured by 2 screws. A fly lead connects the sensor to the passenger compartment wiring harness via a 4 pin multiplug.

The sensor is housed in a 'U' shaped plastic casing and contains two offset LED (light emitting diode)s facing two detectors.

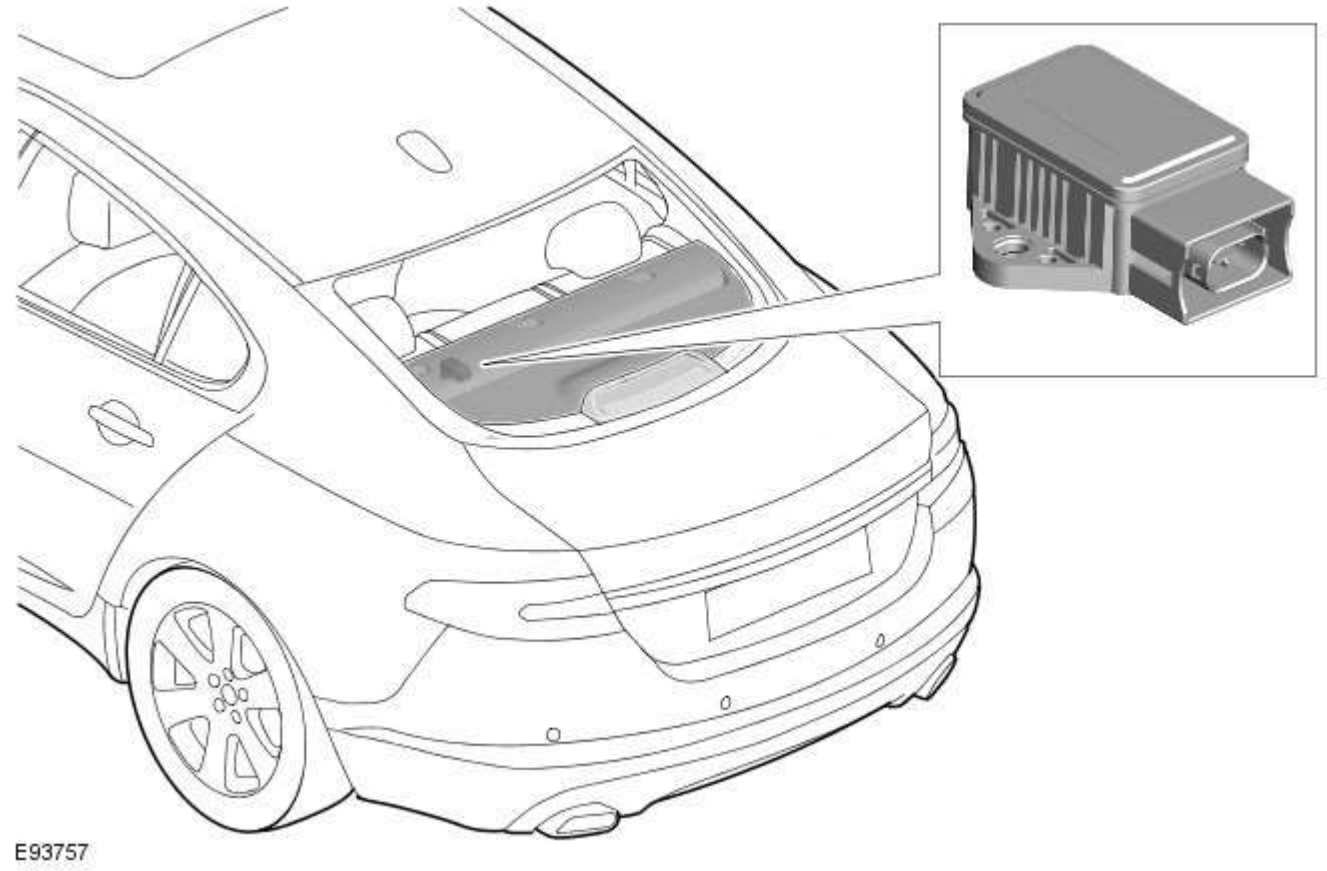
An encoder ring is mounted on the inner steering column shaft and intersects the LEDs and detectors. The encoder ring contains 60 slots which break and restore the light beams between the LEDs and the detectors as the steering wheel is

rotated. The ABS module is able to determine the direction of rotation of the steering wheel by monitoring when the light beams change state. The LEDs and detectors are mounted in such a way that only one beam will change state, either to broken or restored, at any one time.

The center (straight ahead) position of the steering wheel has to be learned by the ABS module every time the ignition is switched ON. The steering angle sensor is unable to determine the center position so inputs from the yaw rate and lateral acceleration sensor and wheel speed signals are also used by the ABS module to help it perform this process. If extreme weather conditions are present, for example ice causing extreme wheel spin or understeer/oversteer, the ABS module may not be able to determine the center position of the steering wheel. In this situation 'DSC NOT AVAILABLE' will be displayed in the instrument cluster message center and the amber warning indicator will illuminate.
Refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

'DSC NOT AVAILABLE' will also be displayed if the ABS module detects a steering angle sensor fault. The amber warning indicator will illuminate until the fault is rectified.

Yaw Rate and Lateral Acceleration Sensor

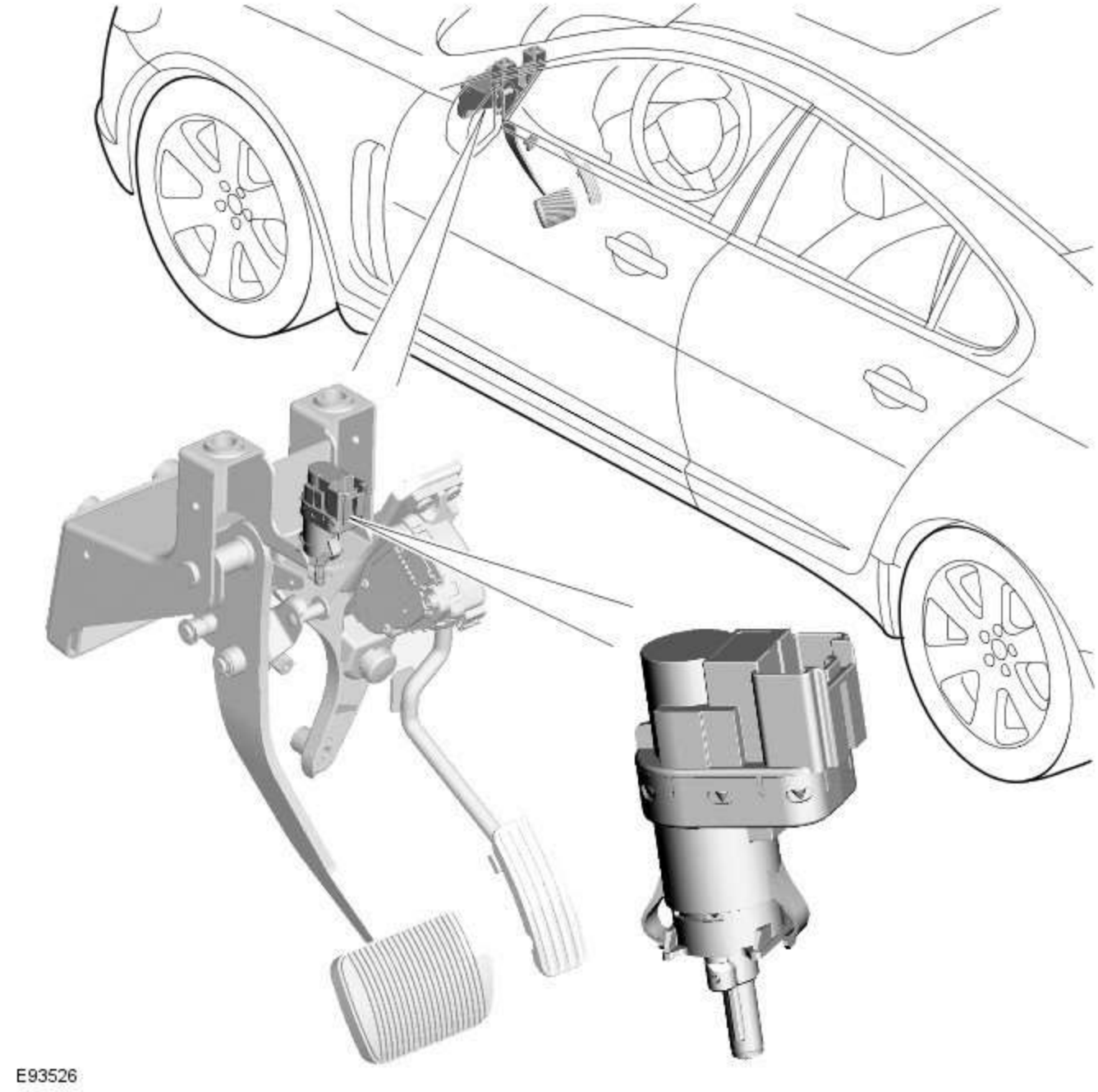


The yaw rate and lateral acceleration sensor is mounted on the rear parcel shelf. The sensor is secured by two screws and connects to the vehicle wiring via a four pin multiplug.

When the ignition is ON, the sensor receives a power feed from the CJB. The ground path for the sensor is located behind the left hand rear seat back. The sensor measures the yaw rate and lateral acceleration of the vehicle, providing values to the ABS module via a dedicated, private high speed CAN bus connection. The ABS module broadcasts these values on the high speed CAN bus for use by other systems.

If a sensor fault is detected by the ABS module, 'DSC NOT AVAILABLE' will be displayed in the instrument cluster message center and the amber warning indicator will illuminate.
Refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

Stoplamp Switch



E93526

The stoplamp switch is mounted on the brake pedal box and is connected to the vehicle harness via a four pin multiplug.

When the brake pedal is pressed, the switch contacts close. This allows a hard wired signal feed to be sent to the ECM. A stoplamp switch status message is then sent from the ECM to the ABS module on the high speed CAN bus. The ABS module is then able to control braking force accordingly in conjunction with the HCU.

NOTE: The stoplamp switch also forms part of the speed control system.

For additional information, refer to:

Speed Control (310-03 Speed Control - 2.7L V6 - TdV6, Description and Operation),
Speed Control (310-03 Speed Control - 3.0L NA V6 - AJ27, Description and Operation),
Speed Control (310-03 Speed Control - 4.2L NA V8 - AJV8/4.2L SC V8 - AJV8, Description and Operation).

Instrument Cluster Warning Indicators

E93782

Item	Description
1	ABS warning indicator (USA only)
2	ABS warning indicator (Canada and Mexico only)
3	ABS warning indicator (all except USA, Canada and Mexico)
4	DSC warning indicator
5	Brake warning indicator (USA only)
6	Brake warning indicator (all except USA)

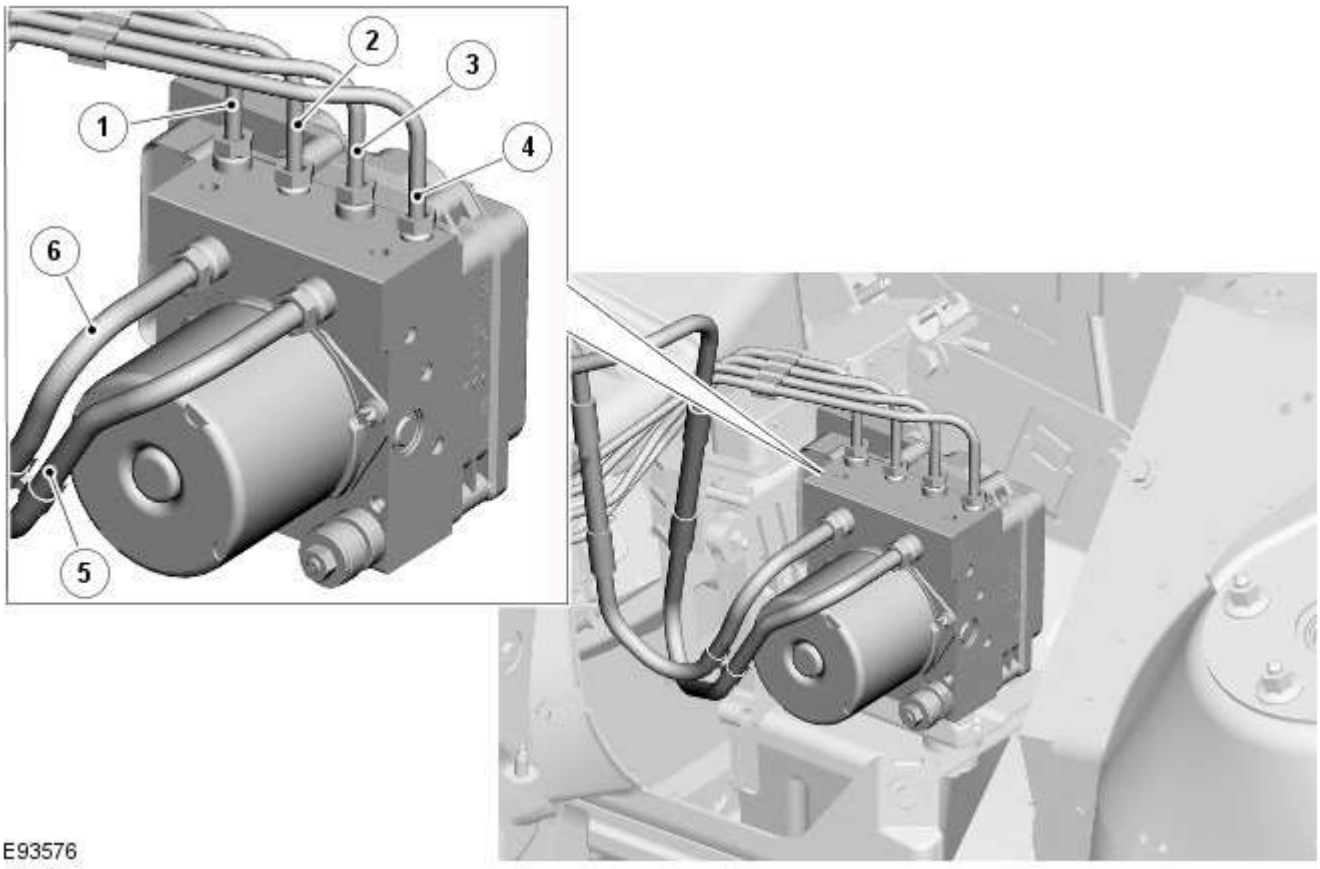
The instrument cluster and message center contains warning indicators and warning messages to display the operating status of the anti-lock control - stability assist functions. The warning indicators and messages provide a visual notification of either a system warning or information indication to the driver. There are three warning indicators on the instrument cluster, which vary dependant on market, and several types of message relating to the anti-lock control - stability assist functions. The DSC OFF message is accompanied by an audible warning.

The following anti-lock control - stability assist warning indicators are installed in the instrument cluster:

- An amber ABS warning indicator.
- A red brake warning indicator.
- An amber DSC warning indicator.

Refer to: Instrument Cluster (413-01 Instrument Cluster, Description and Operation) / Information and Message Center (413-08 Information and Message Center, Description and Operation).

ABS Module



Item	Description
1	LH front brake
2	RH rear brake
3	LH rear brake
4	RH front brake
5	Primary inlet
6	Secondary inlet

The ABS module is located in the passenger side, rear engine bay and incorporates the HCU. The module is mounted on the rear face of the HCU, which it uses to control all braking and stability functions by modulating hydraulic pressure to the individual wheel brakes.

Two types of ABS modules are available; one for vehicles with standard Speed Control, one for vehicles fitted with Adaptive Speed Control.

If an ABS modulator fault is detected, 'ABS FAULT' will be displayed in the instrument cluster message center and the amber warning indicator will illuminate.
Refer to: Information and Message Center (413-08 Information and Message Center, Description and Operation).

CAUTION: The ABS module and the HCU comprise a single unit and must not be separated.

Hydraulic Control Unit

The HCU is a four channel unit, secured to a mounting bracket located in the passenger side, rear engine bay. The HCU modulates the supply of hydraulic pressure to the brakes under the control of the ABS module.
Refer to: Hydraulic Brake Actuation (206-06 Hydraulic Brake Actuation, Description and Operation).

Published: 09-Jul-2014

Anti-Lock Control - Stability Assist - Anti-Lock Control - Stability Assist

Diagnosis and Testing

Principle of Operation

For a detailed description of the Anti-Lock Control - Stability Assist system, refer to the relevant Description and Operation sections in the workshop manual. REFER to: (206-09 Anti-Lock Control - Stability Assist)

Anti-Lock Control - Stability Assist (Description and Operation),
Anti-Lock Control - Stability Assist (Description and Operation),
Anti-Lock Control - Stability Assist (Description and Operation).

Inspection and Verification

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 tested and/or the donor vehicle.

1. Verify the customer concern.
2. Confirm if the Anti-Lock Brake System (ABS) warning light was illuminated, or still is.

NOTE: An intermittent fault may allow the warning light to go off. This does not necessarily mean the fault is not present. Some warnings will appear to clear when the ignition is cycled. This is often because the warning has flagged as a result of one of the vehicle's on-board diagnostic routines having run to detect the fault. If the same routine is not run when the ignition status is set to **ON**, the warning will not re-flag until the routine does run.

3. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection

Mechanical	Electrical
• Brake fluid level • Vacuum system • Wheel speed sensor installation • Wheel speed sensor air gap • Magnetic pulse wheel(s) (damaged/contaminated) • Steering angle sensor • Yaw rate sensor and accelerometer cluster installation • Incorrect wheel or tire size	• Warning light operation • Fuses • Wheel speed sensors • Connectors/Pins • Harnesses • Steering wheel rotation sensor • Yaw rate sensor and accelerometer cluster • Booster pressure sensor • Hydraulic Control Unit (HCU)

4. If an obvious cause for an observed or reported concern is found, correct the cause (if possible) before proceeding to the next step.
5. If the cause is not visually evident check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

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: Diagnostic Trouble Code (DTC) Index - DTC: Anti-Lock Braking System (ABS) (100-00 General Information, Description and Operation).

Published: 11-May-2011

Anti-Lock Control - Stability Assist - Anti-Lock Brake System (ABS) Module

Removal and Installation

Removal

1. NOTE: The anti-lock braking system (ABS) module mounted to the hydraulic control unit (HCU) cannot be serviced separately. If the ABS module requires replacement, the unit must be replaced as a complete assembly.

   Remove the HCU.
   For additional information, refer to: Hydraulic Control Unit (HCU) (206-09, Removal and Installation).

Installation

1. Install the HCU.
   For additional information, refer to: Hydraulic Control Unit (HCU) (206-09, Removal and Installation).

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Anti-Lock Control - Stability Assist - Front Wheel Speed Sensor

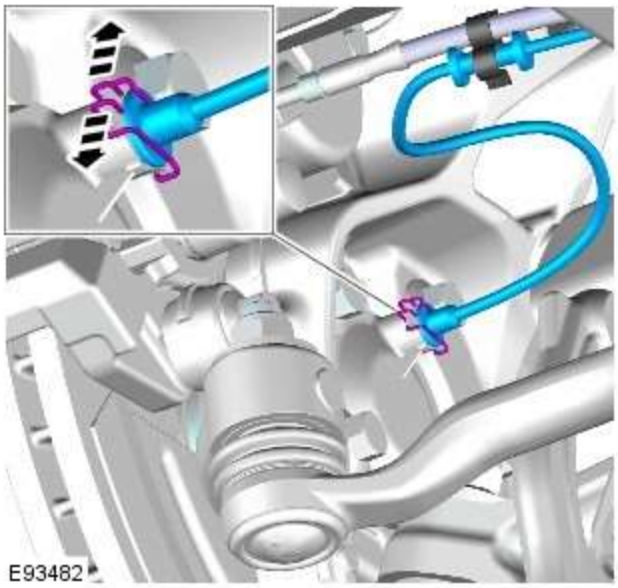
Removal and Installation

Removal

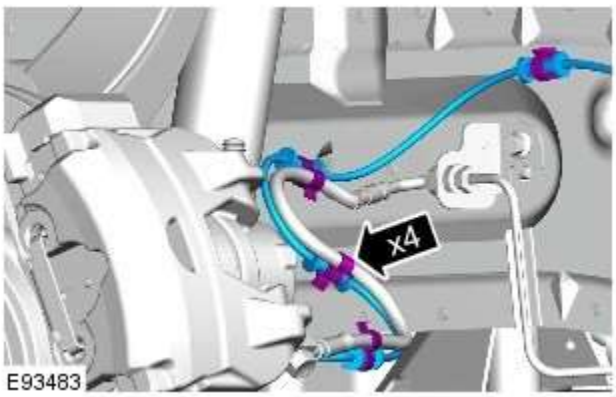
1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

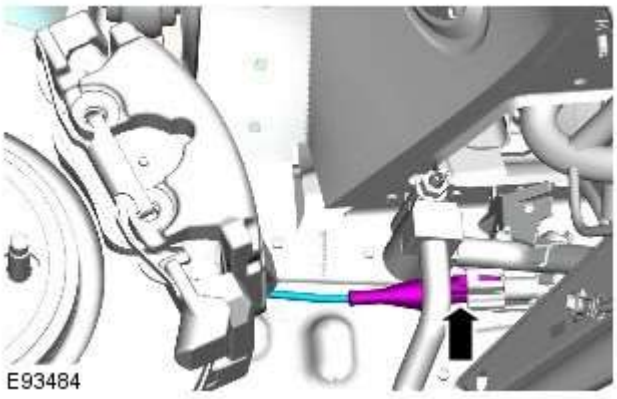
2. Refer to: Fender Splash Shield (501-02 Front End Body Panels, Removal and Installation).



3. NOTE: LH illustration shown, RH is similar.



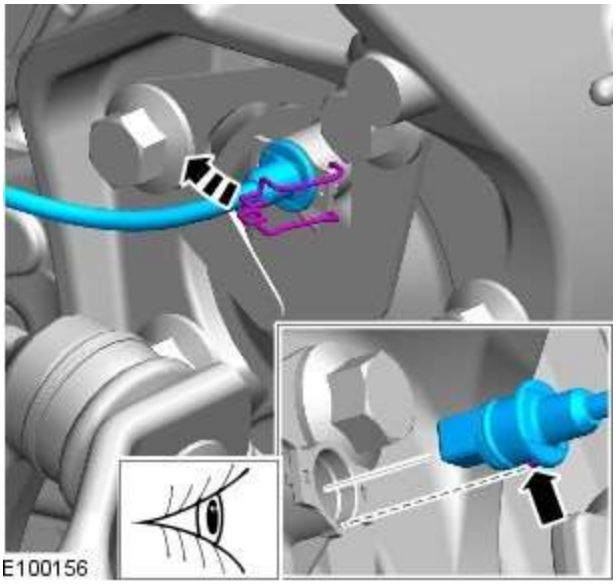
4. NOTE: LH illustration shown, RH is similar.



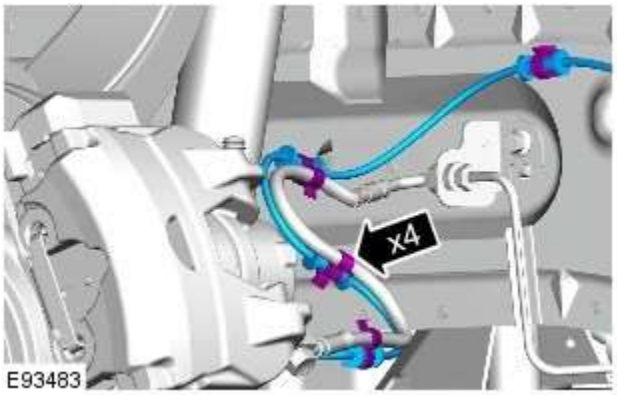
5. CAUTION: Note the fitted position of the component prior to removal.

NOTE: LH illustration shown, RH is similar.

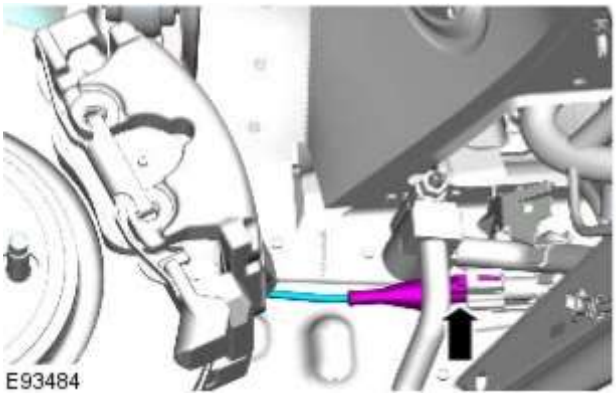
Installation



1. NOTE: LH illustration shown, RH is similar.



2. NOTE: LH illustration shown, RH is similar.



3. **NOTE:** LH illustration shown, RH is similar.

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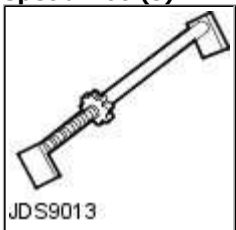
Anti-Lock Control - Stability Assist - Hydraulic Control Unit (HCU)

Removal and Installation

Special Tool(s)

	Brake pedal hold down tool JDS9013

Removal

All vehicles

1. Disconnect the battery ground cable.
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

Left-hand drive vehicles

2. Remove the secondary bulkhead RH panel.
   For additional information, refer to: Secondary Bulkhead Panel RH - 3.0L NA V6 - AJ27 (501-02 Front End Body Panels, Removal and Installation).

Right-hand drive vehicles

3. Remove the secondary bulkhead LH panel.
   For additional information, refer to: Secondary Bulkhead Panel LH - 3.0L NA V6 - AJ27 (501-02 Front End Body Panels, Removal and Installation).

All vehicles

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

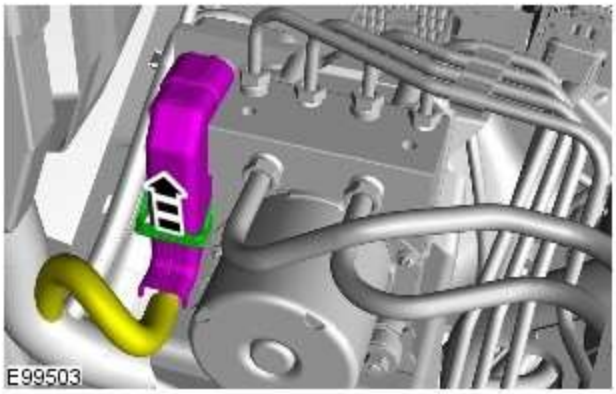
   Raise and support the vehicle.

5. Connect brake bleed pipes and bottles to the left-hand front and the left-hand rear brake caliper bleed nipples and loosen the brake caliper bleed nipples.

6. NOTE: To prevent the loss of brake fluid, using the special tool apply the brake pedal and set to 40mm (1.6 in) below the rest position.

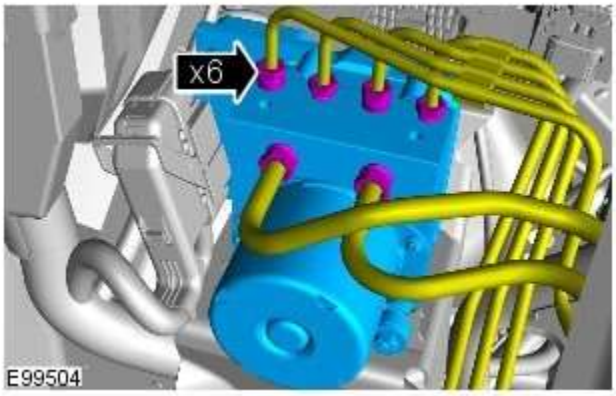
   Using the special tool, press and hold the brake pedal.

7. Remove the bleed pipes and bottles.
   - Tighten the left-hand front brake caliper bleed nipple.
     1. For vehicles with supercharger: Tighten to 14Nm.
     2. For vehicles without supercharger: Tighten to 8 Nm.
   - Tighten the left-hand rear brake caliper bleed nipple.
     1. All vehicles: Tighten to 14 Nm.
   - Disconnect and remove the brake bleed pipes and bottles.
   - Install the bleed nipple dust caps.



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

   Disconnect the hydraulic control unit (HCU) electrical connector.



9. CAUTIONS:

   Make sure that all openings are sealed. Use new blanking caps.

   If brake fluid is spilt on the paintwork, the affected area must be immediately washed down with cold water.

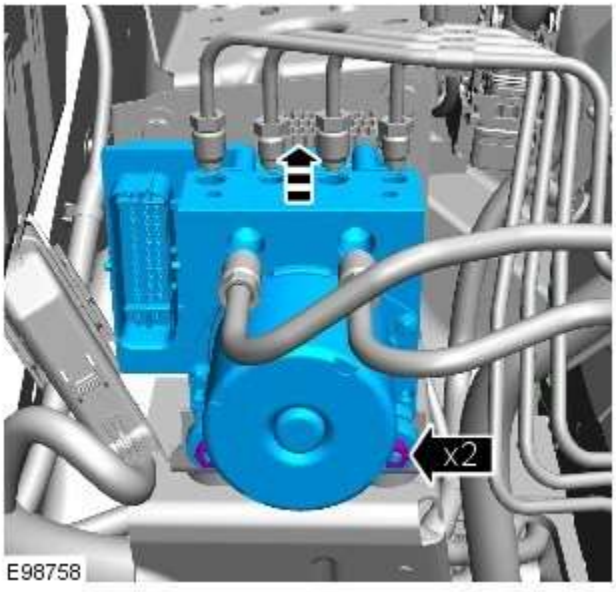
   NOTES:

   Some fluid spillage is inevitable during this operation.

   Note the position of the components prior to removal.

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

   Disconnect the 6 brake pipe unions.

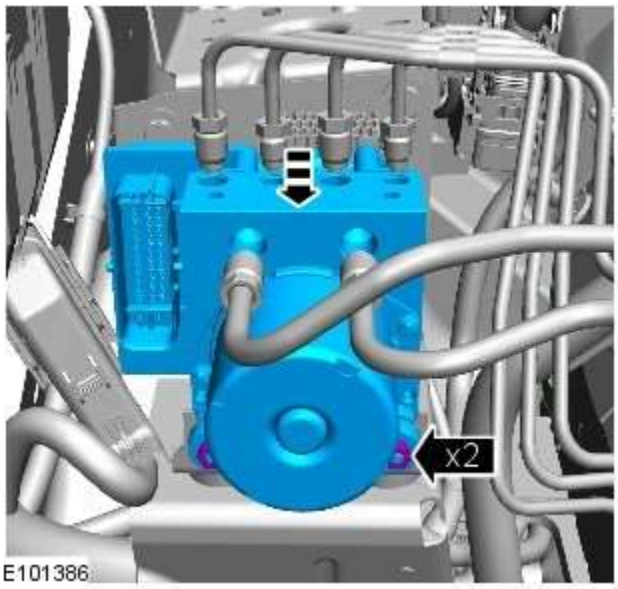


10. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

    Remove the HCU.
    - Loosen but do not remove the 2 nuts.
    - Lift and remove the HCU.

Installation

All vehicles



1. CAUTION: If accidentally dropped or knocked install a new hydraulic control unit (HCU) and module.

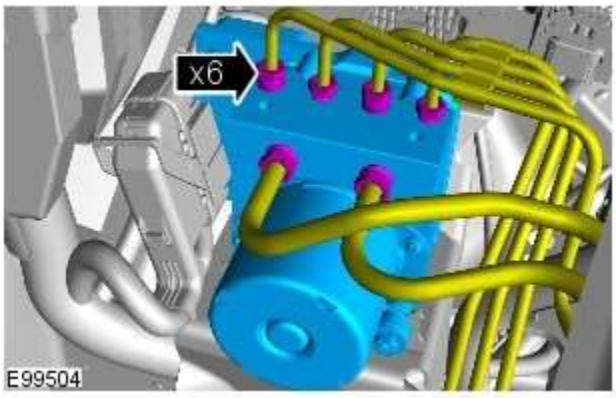
   NOTES:

   Make sure the HCU locating grommet is correctly seated in the bracket before installing the ABS module.

   Make sure the HCU locating pin is correctly located in the grommet, and the 2 isolators are fully seated in the bracket slots.

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

   Install the HCU to the retaining bracket.
   - Tighten to 8 Nm.



2. CAUTIONS:

   Make sure that the area around the component is clean and free of foreign material.

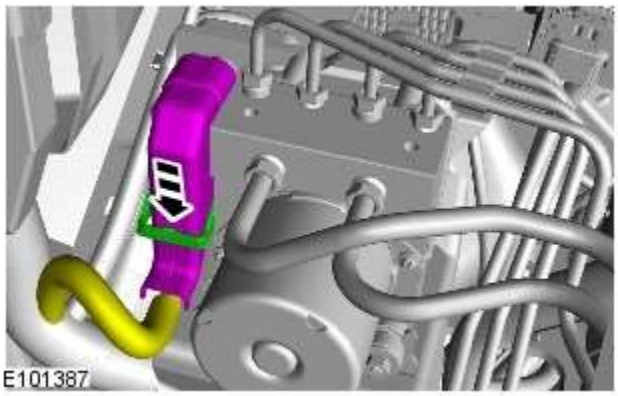
   Make sure that these components are installed to the noted removal position.

   NOTES:

   Remove and discard the blanking caps.

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

   Connect the brake pipe unions.
   - Tighten to 17 Nm.



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

   Connect the HCU electrical connector.

4. Remove the special tool.

5. Bleed the brake system.
   For additional information, refer to: Brake System Bleeding (206-00 Brake System - General Information, General Procedures).

Left-hand drive vehicles

6. Install the secondary bulkhead RH panel.
   For additional information, refer to: Secondary Bulkhead Panel RH - 3.0L NA V6 - AJ27 (501-02 Front End Body Panels, Removal and Installation).

Right-hand drive vehicles

7. Install the secondary bulkhead LH panel.
   For additional information, refer to: Secondary Bulkhead Panel LH - 3.0L NA V6 - AJ27 (501-02 Front End Body Panels, Removal and Installation).

All vehicles

8. Connect the battery ground cable.
   For additional information, refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

9. Using the diagnostic tool, configure the new HCU.

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Anti-Lock Control - Stability Assist - Rear Wheel Speed Sensor

Removal and Installation

Removal

NOTES:

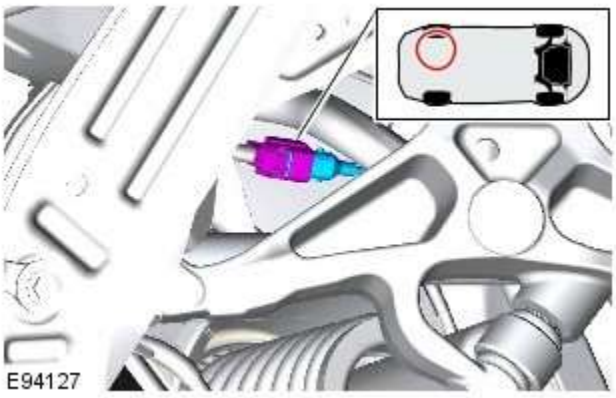
Removal steps in this procedure may contain installation details.

The ignition must be switched off.

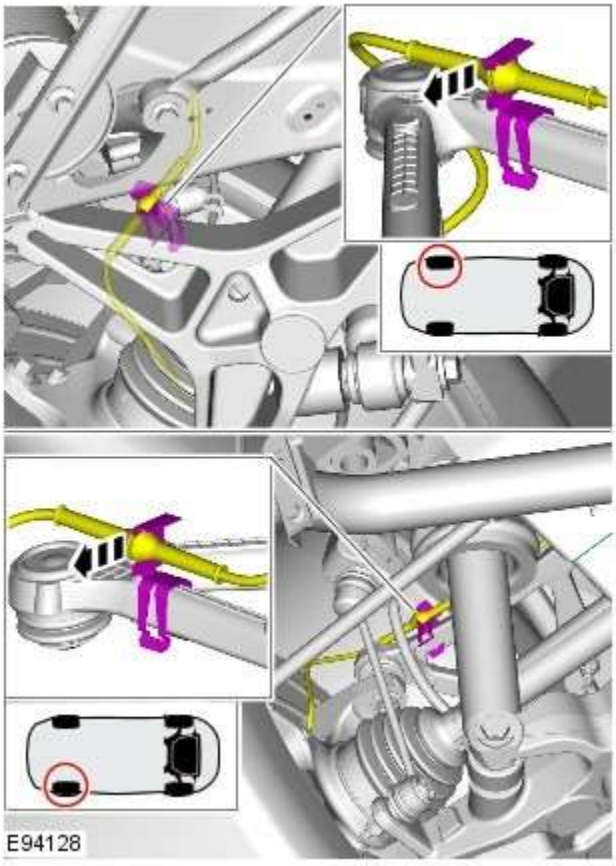
Some variation in the illustrations may occur, but the essential information is always correct.

1. 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.



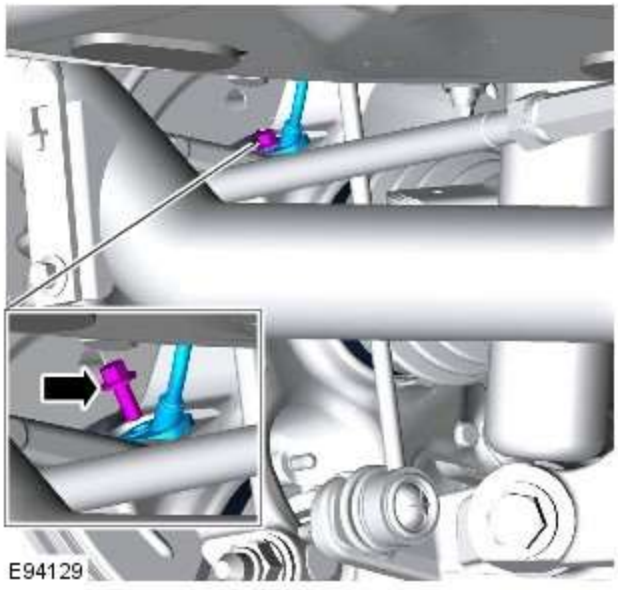
2. Disconnect the wheel speed sensor electrical connector.



3. CAUTION: Make sure that the harness retaining bracket is not removed. Failure to follow this instruction may result in damage to the harness.

   NOTE: Note the orientation of the clip.

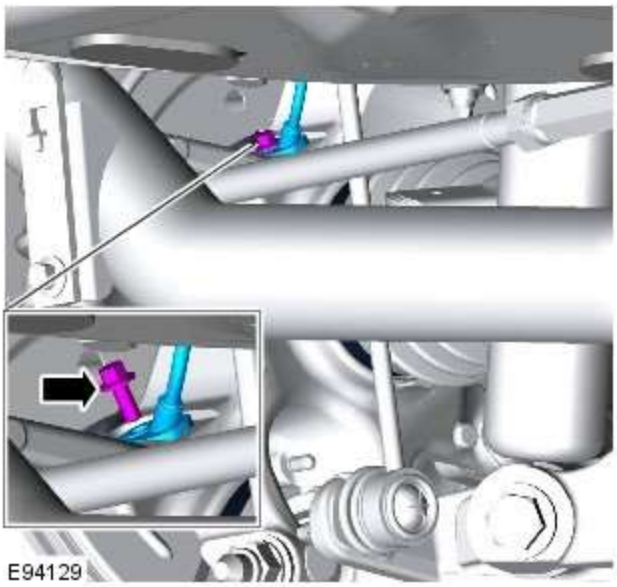
   Release the wiring harness grommet.



4. CAUTION: Note the fitted position of the component prior to removal.

   Remove the wheel speed sensor.
   - Remove the retaining bolt.
   - Release the wheel speed sensor.

Installation



1. NOTE: Make sure that the component is installed to the position noted on removal.

   To install, reverse the removal procedure.
   - Tighten to 6 Nm.

Published: 11-May-2011

Anti-Lock Control - Stability Assist - Steering Wheel Rotation Sensor

Removal and Installation

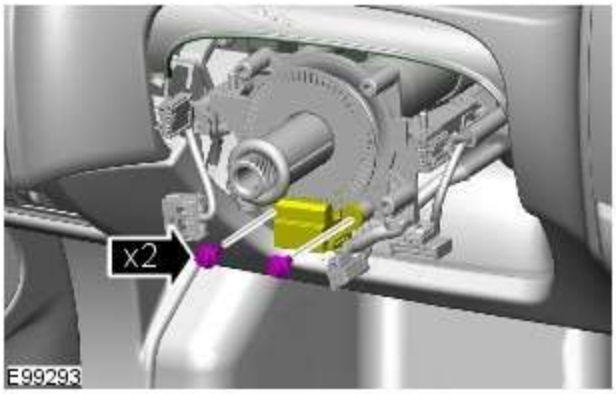
Removal

NOTE: Removal steps in this procedure may contain installation details.

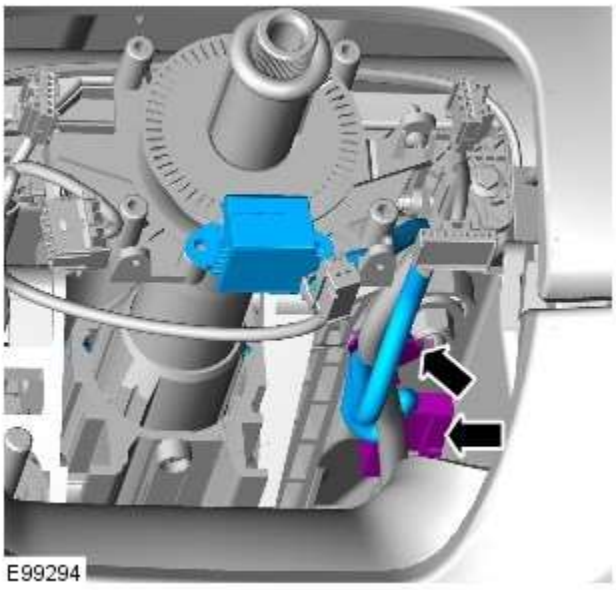
1. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Refer to: Clockspring (501-20B Supplemental Restraint System, Removal and Installation).

3.



4.



Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Anti-Lock Control - Stability Assist - Yaw Rate Sensor and Accelerometer

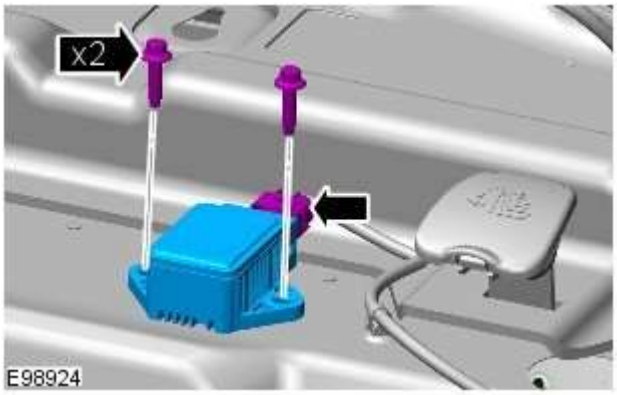
Removal and Installation

Removal

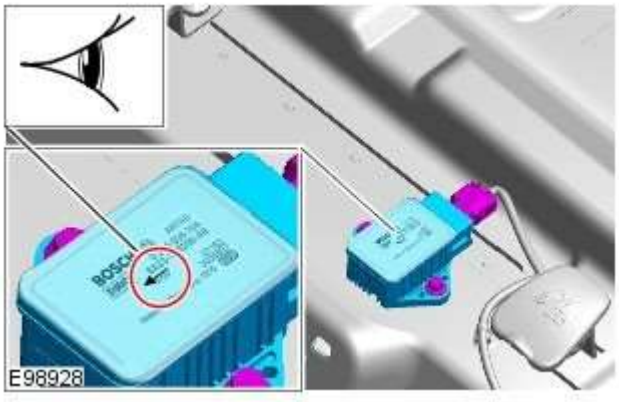
NOTE: Removal steps in this procedure may contain installation details.

1. Refer to: Battery Disconnect and Connect (414-01 Battery, Mounting and Cables, General Procedures).

2. Refer to: Parcel Shelf (501-05 Interior Trim and Ornamentation, Removal and Installation).



3. *Torque:* 6 Nm



4. CAUTION: Make sure that all diagnostic trouble codes (DTCs) have been removed after the road test.

   NOTE: Make sure that this component is installed to the noted removal position.

Installation

1. To install, reverse the removal procedure.