Published: 27-Aug-2013

Suspension System - General Information -

Vehicle Ride Height

NOTE: All figures are at "Kerb" height - For additional information, refer to Vehicle Ride Height below.

Description		Measurement	
Description	**Front/Rear**	**Kerb mm (inch)**	**Tolerance mm (inch)**
Vehicles without supercharger	Front	388 (15.28)	±12 (0.5)
	Rear	391 (15.39)	±12 (0.5)
Vehicles with supercharger	Front	385 (15.16)	±12 (0.5)
	Rear	384 (15.12)	±12 (0.5)
Vehicles with All wheel drive	Front	404 (15.90)	±12 (0.5)
	Rear	391 (15.39)	±12 (0.5)

- Ride height is measured from the centre of the wheel to the apex of the wheel arch, through the wheel centre line.
- Kerb - with all fluids at full and a full tank of fuel, no occupants/luggage.
- Tires must be inflated to normal pressure -
  For additional information, refer to: Specifications (204-04 Wheels and Tires, Specifications).

Wheel Alignment - Front Camber

NOTE: *1 Camber Balance = left-hand camber - right-hand camber.

Description		Left-hand		Right-hand		Balance*1	
Markets	**Degrees/Minutes**	**Nominal**	**Tolerance**	**Nominal**	**Tolerance**	**Nominal**	**Tolerance**
All right-hand drive and Japan	Degrees/Minutes	-0° 36'	±45'	-0° 12'	±45'	-0° 24'	±45'
	Decimal Degrees	-0.6°	±0.75°	-0.2°	±0.75°	-0.4°	±0.75°
USA, Canada, Mexico and Dominican Republic (Federal)	Degrees/Minutes	-0° 12'	±45'	-0° 33'	±45'	0° 21'	±45'
	Decimal Degrees	-0.2°	±0.75°	-0.55°	±0.75°	0.35°	±0.75°
Rest of world	Degrees/Minutes	-0° 12'	±45'	-0° 24'	±45'	0° 12'	±45'
	Decimal Degrees	-0.2°	±0.75°	-0.4°	±0.75°	0.2°	±0.75°
Vehicles with All wheel drive	Degrees/Minutes	-0° 11'	±45'	-0° 32'	±0.45'	21'	±45'
	Decimal Degrees	-0.19°	±0.75°	-0.54°	±0.75°	0.35°	±0.75°

Wheel Alignment - Front Caster

NOTE: *2 Caster Balance = left-hand caster - right-hand caster.

Description		Left-hand		Right-hand		Balance*2	
Markets	**Degrees/Minutes**	**Nominal**	**Tolerance**	**Nominal**	**Tolerance**	**Nominal**	**Tolerance**
All right-hand drive and Japan	Degrees/Minutes	6° 53'	±45'	6° 20'	±45'	0° 33'	±45'
	Decimal Degrees	6.88°	±0.75°	6.33°	±0.75°	0.55°	±0.75°
USA, Canada, Mexico and Dominican Republic (Federal)	Degrees/Minutes	6° 36'	±45'	6° 45'	±45'	-0° 8'	±45'
	Decimal Degrees	6.61°	±0.75°	6.74°	±0.75°	-0.14°	±0.75°
Rest of world	Degrees/Minutes	6° 36'	±45'	6° 36'	±45'	0° 0'	±45'
	Decimal Degrees	6.61°	±0.75°	6.61°	±0.75°	0°	±0.75°
Vehicles with All wheel drive	Degrees/Minutes	6° 2'	± 45'	6° 11'	± 45'	- 9'	± 45'
	Decimal Degrees	6.04°	±0.75°	6.19°	± 0.75°	-0.15°	± 0.75°

Wheel Alignment - Front Toe

Description		Total Toe	
Markets	**Degrees/Minutes**	**Nominal**	**Tolerance**
All right-hand drive and Japan	Degrees/Minutes	0° 13'	±12'
	Decimal Degrees	0.22°	±0.20°
USA, Canada, Mexico and Dominican Republic (Federal)	Degrees/Minutes	0° 13'	±12'
	Decimal Degrees	0.22°	±0.20°
Rest of world	Degrees/Minutes	0° 13'	±12'
	Decimal Degrees	0.22°	±0.20°
Vehicles with All wheel drive	Degrees/Minutes	16'	± 12'
	Decimal Degrees	0.27°	± 0.20°

Wheel Alignment - Rear Camber (Vehicles without supercharger)

Description		Left-hand		Right-hand	
Markets	**Degrees/Minutes**	**Nominal**	**Tolerance**	**Nominal**	**Tolerance**
All Markets	Degrees/Minutes	-0° 47'	±45'	-0° 47'	±45'
	Decimal Degrees	-0.78°	±0.75°	-0.78°	±0.75°

Wheel Alignment - Rear Camber (Vehicles with supercharger)

Description		Left-hand		Right-hand	
Markets	**Degrees/Minutes**	**Nominal**	**Tolerance**	**Nominal**	**Tolerance**
All Markets	Degrees/Minutes	-0° 59'	±45'	-0° 59'	±45'

Description		Left-hand		Right-hand	
Markets	Degrees/Minutes	Nominal	Tolerance	Nominal	Tolerance
	Decimal Degrees	-0.98°	±0.75°	-0.98°	±0.75°
Vehicles with All wheel drive	Degrees/Minutes	- 53'	± 45'	- 53'	± 45'
	Decimal Degrees	-0.89°	± 0.75°	-0.89°	± 0.75°

Wheel Alignment - Rear Toe

Description		Left-hand		Right-hand		Total Toe	
Markets	Degrees/Minutes	Nominal	Tolerance	Nominal	Tolerance	Nominal	Tolerance
All Markets	Degrees/Minutes	0° 5'	±8'	0° 5'	±8'	0° 10'	±12'
	Decimal Degrees	0.083°	±0.14°	0.083°	±0.14°	0.17°	±0.20°
Vehicles with All wheel drive	Degrees/Minutes	5'	± 8'	5'	± 8'	9'	± 12'
	Decimal Degrees	0.08°	± 0.14°	0.08°	± 0.14°	0.15°	± 0.20°

Wheel Alignment - Rear Thrust Angle

NOTE: *5 Rear Thrust Angle = (left-hand toe - right-hand toe) ÷ 2.

Markets		Rear Thrust Angle*5	
Markets	Degrees/Minutes	Nominal	Tolerance
All Markets	Degrees/Minutes	0° 0'	±8'
	Decimal Degrees	0°	±0.14°
Vehicles with All wheel drive	Degrees/Minutes	0° 0'	±8'
	Decimal Degrees	0°	±0.14°

General Specifications

Item	Specification
Clear Vision	
Clear vision (negative value is counterclockwise)	0° ± 3°
Ball Joint Radial Play	
Lower ball joint — maximum	0.8 mm (1/32 in)
Upper ball joint — maximum	0.8 mm (1/32 in)

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Suspension System - General Information - Suspension System

Diagnosis and Testing

Principle of Operation

For a detailed description of the suspension system, refer to the relevant Description and Operation section of the workshop manual. REFER to:

Front Suspension (204-01 Front Suspension, Description and Operation),
Front Suspension (204-01 Front Suspension, Description and Operation),
Front Suspension (204-01 Front Suspension, Description and Operation),
Rear Suspension (204-02 Rear Suspension, Description and Operation),
Rear Suspension (204-02 Rear Suspension, Description and Operation),
Rear Suspension (204-02 Rear Suspension, Description and Operation).

Inspection and Verification

1. Verify the customer concern by carrying out a road test on a smooth road. If any vibrations are apparent, refer to section 100-04 Noise, Vibration and Harshness.
2. Visually inspect for obvious signs of damage and system integrity.

Visual Inspection Chart

Mechanical
• Damaged tires • Wheel bearing(s) • Loose or damaged front or rear suspension components • Loose, damaged or missing suspension fastener(s) • Incorrect spring usage • Damaged or sagging spring(s) • Damaged or leaking shock absorber(s) • Damaged or leaking strut(s) • Worn or damaged suspension bushing(s) • Loose, worn or damaged steering system components • Damaged axle components

3. If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the next step.
4. If the fault is not visually evident, verify the symptom and refer to the following Symptom Chart.

Symptom Chart

Symptom	Possible Sources	Action
Crabbing	* Incorrect rear thrust angle.	* Check the rear toe adjustment. REFER to: Rear Toe Adjustment (204-00 Suspension System - General Information, General Procedures).
	* Front or rear suspension components.	* Inspect the front and rear suspension systems. Repair or install new suspension components as necessary.
	* Drive axle damaged.	* Install a new rear drive axle/differential. REFER to: Axle Assembly - V6 3.0L Petrol (205-02 Rear Drive Axle/Differential, Removal and Installation).
Drift/Pull	* Unequal tire pressure.	* Check and adjust the tire pressures. Inspect the tire for excessive wear. REFER to: Specifications (204-04 Wheels and Tires, Specifications).
	* Incorrect wheel alignment.	* Check and adjust the wheel alignment. REFER to: (204-00 Suspension System - General Information) Front Toe Adjustment (General Procedures), Rear Toe Adjustment (General Procedures), Camber and Caster Adjustment (General Procedures).
	* Tires.	* Check and adjust the tire pressures. Inspect the tire for excessive wear. REFER to: Specifications (204-04 Wheels and Tires, Specifications).
	* Unevenly loaded or overloaded vehicle.	* Notify the customer of incorrect vehicle loading.
	* Damaged steering components.	* Check the steering system.
	* Brake drag.	* Check the brakes. REFER to: Brake System (206-00 Brake System - General Information, Diagnosis and Testing).

Front Bottoming or Riding Low	* Coil springs.	* Check the ride height. Install new springs as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
Incorrect Tire Wear	* Incorrect tire pressure (rapid center rib or inner and outer edge wear).	* Check and adjust the tire pressure. Inspect the tire for excessive wear. REFER to: Specifications (204-04 Wheels and Tires, Specifications).
	* Excessive front or rear toe (rapid inner or outer edge wear).	* Check and adjust the wheel alignment. REFER to: (204-00 Suspension System - General Information) Front Toe Adjustment (General Procedures), Rear Toe Adjustment (General Procedures), Camber and Caster Adjustment (General Procedures).
	* Excessive negative or positive camber (rapid inner or outer edge wear).	* Check and adjust the wheel alignment. REFER to: (204-00 Suspension System - General Information) Front Toe Adjustment (General Procedures), Rear Toe Adjustment (General Procedures), Camber and Caster Adjustment (General Procedures).
	* Tires out of balance (tires cupped or dished).	* Balance the tires.
Rough ride	* Spring(s)	* Check and install new spring(s) as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
Shimmy or Wheel Tramp	* Loose wheel nut(s).	* Check and tighten the wheel nuts to specification. REFER to: Specifications (204-04 Wheels and Tires, Specifications).
	* Loose front suspension fasteners.	* Check and tighten the suspension fasteners to specification. REFER to: Specifications (204-00 Suspension System - General Information, Specifications).
	* Front wheel bearing(s).	* Check the wheel bearings.
	* Worn or damaged suspension component bushing.	* Check and install new components as necessary.
	* Wheel/tires.	* Check the wheels/tires. Balance or install new wheel/tires as necessary. REFER to: Wheels and Tires (204-04 Wheels and Tires, Diagnosis and Testing).
	* Loose, worn or damaged ball joint(s).	* Check the Ball Joint(s).
	* Loose, worn or damaged steering components.	* Check and install new components as necessary.
	* Front wheel alignment.	* Check and adjust the wheel alignment. REFER to: (204-00 Suspension System - General Information) Front Toe Adjustment (General Procedures), Rear Toe Adjustment (General Procedures), Camber and Caster Adjustment (General Procedures).
	* Shock absorber(s).	* Check and install new shock absorber(s) as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
	* Spring(s).	* Check and install new springs as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
Poor self center action of the steering	* Ball joints.	* Check the Ball Joints.
	* Steering components.	* Check and install new components as necessary.
Steering wheel off-center	* Unequal front or rear toe settings.	* Check and adjust the wheel alignment. REFER to: (204-00 Suspension System - General Information) Front Toe Adjustment (General Procedures), Rear Toe Adjustment (General Procedures), Camber and Caster Adjustment (General Procedures).
	* Steering components.	* Check and install new components as necessary.
Sway or roll	* Overloaded, unevenly or incorrectly loaded vehicle.	* Notify the customer of incorrect vehicle loading.
	* Loose wheel nut(s).	* Check and tighten the wheel nut(s) to specification. REFER to: Specifications (204-04 Wheels and Tires, Specifications).
	* Coil spring(s).	* Check and install new coil springs as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation),

		Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
	* Loose front stabilizer bar or rear stabilizer bar.	* Check and tighten the stabilizer bar to specification. REFER to: Specifications (204-01 Front Suspension, Specifications), Specifications (204-02 Rear Suspension, Specifications).
	* Worn lower suspension arm stabilizer bar insulators.	* Install new lower suspension arm stabilizer bar as necessary. REFER to: Front Stabilizer Bar - 2.7L Diesel (204-01, Removal and Installation), Front Stabilizer Bar - V6 3.0L Petrol (204-01 Front Suspension, Removal and Installation), Front Stabilizer Bar - 4.2L (204-01, Removal and Installation), Rear Stabilizer Bar (204-02 Rear Suspension, Removal and Installation).
	* Shock absorber(s).	* Check and install new shock absorber(s) as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
Vehicle Leans to One Side	* Unevenly loaded or overloaded vehicle.	* Notify the customer of incorrect vehicle loading.
	* Front or rear suspension components.	* Inspect the front and rear suspension systems. Repair or install new suspension components as necessary.
	* Shock absorber(s).	* Check and install new shock absorber(s) as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
	* Coil spring(s).	* Check and install new spring(s) as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
	* Incorrect ride height. Lateral tilt out of specification.	* Check the ride height. Install new spring(s) as necessary. REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation), Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
Vibration/Noise	* Tires/wheels. * Wheel bearings. * Wheel hubs. * Brake components. * Suspension components. * Steering components.	* Check and install new components as necessary.
Wander	* Unevenly loaded or overloaded vehicle.	* Notify the customer of incorrect vehicle loading.
	* Ball joint(s).	* Check the Ball Joint(s).
	* Front wheel bearing(s).	* Check the wheel bearings.
	* Loose, worn or damaged suspension components.	* Check and install new suspension components as necessary.
	* Loose suspension fasteners.	* Check and tighten the suspension fasteners to specification. REFER to: Specifications (204-00 Suspension System - General Information, Specifications).
	* Steering components.	* Check and install new steering components.
	* Wheel alignment (excessive total front toe-out).	* Check and adjust the wheel alignment. REFER to: (204-00 Suspension System - General Information) Front Toe Adjustment (General Procedures), Rear Toe Adjustment (General Procedures), Camber and Caster Adjustment (General Procedures).

Component Tests

Ball Joint Inspection

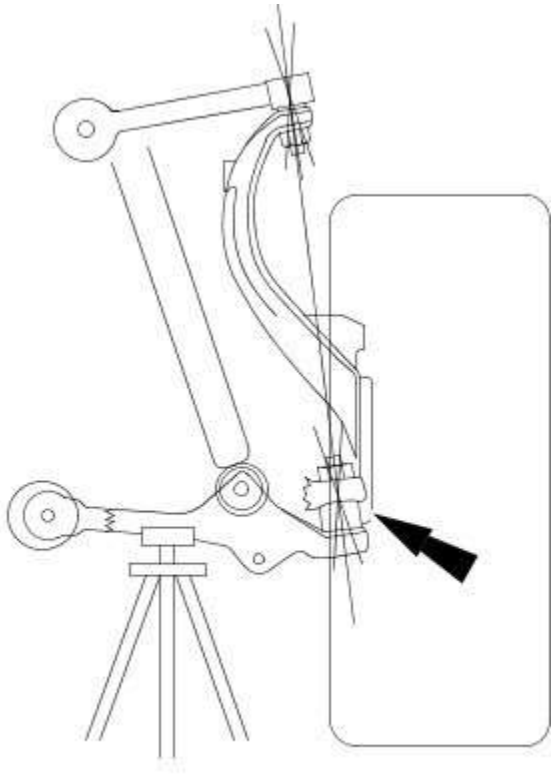
NOTE: The front suspension is shown in the following procedures. The inspection of the rear suspension upper ball joint is similar.

1. Raise and support the vehicle. REFER to: (100-02 Jacking and Lifting) Jacking (Description and Operation), Lifting (Description and Operation).

2. Prior to carrying out any inspection of the ball joints, inspect the front wheel bearings.

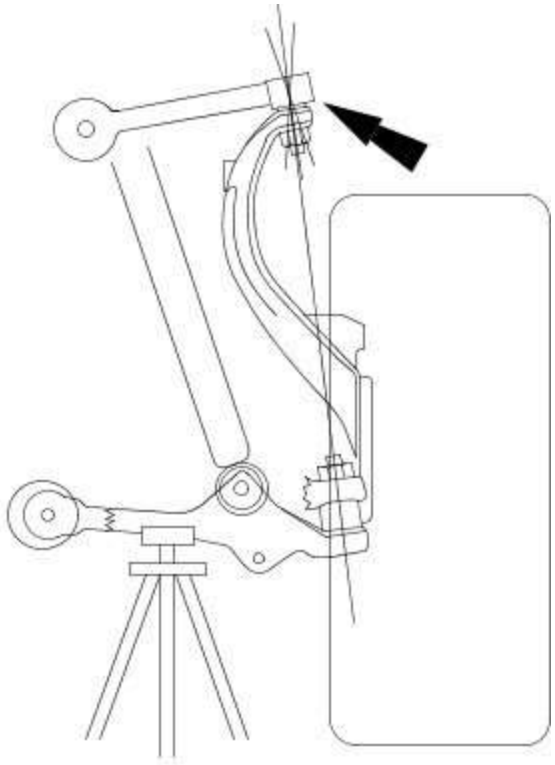
3. CAUTION: The safety stand beneath the suspension lower arm must only support the weight of the suspension and not the full weight of the vehicle. Failure to follow this instruction may result in damage to the components.

   Position a safety stand beneath the front suspension lower arm or rear suspension lower arm to be tested.



VUJ0005101

4. While an assistant pulls and pushes the top and bottom of the tire, observe the relative movement between the ball joint and the front suspension lower arm. Any movement at or exceeding the specification indicates a worn or damaged ball joint. Install a new wheel knuckle as necessary.
   REFER to: Wheel Knuckle (204-01 Front Suspension, Removal and Installation).



VUJ0005100

5. While an assistant pulls and pushes the top and bottom of the tire, observe the relative movement between the ball joint and the front suspension upper arm or rear suspension upper arm. Any movement at or exceeding the specification indicates a worn or damaged ball joint. Install a new upper arm as necessary. REFER to: (204-01 Front Suspension) Upper Arm LH (Removal and Installation), Upper Arm RH (Removal and Installation).
6. Remove the safety stand.
7. Lower the vehicle.

Published: 16-Oct-2013

Suspension System - General Information - Camber and Caster Adjustment

General Procedures

NOTES:

The camber and caster adjustment for the left-hand side is shown, the procedure for adjusting the right-hand side is similar.

This procedure must be carried out using a 4-post ramp.

Adjustments to the camber will affect the toe settings. Therefore, the camber and toe may need to be adjusted at the same time to achieve the correct settings.

Adjustments to the camber may affect the caster settings. Therefore, the caster will need to be checked, and adjusted as necessary.

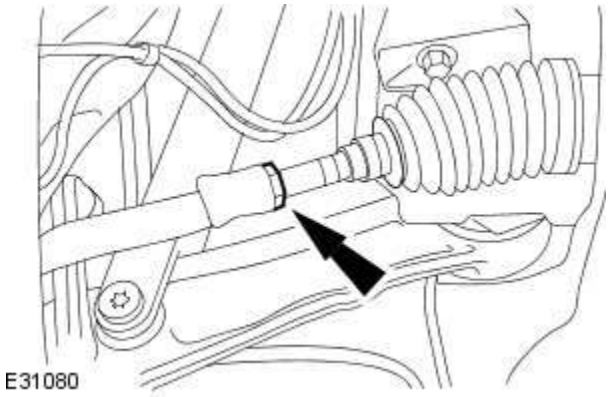
All vehicles

1. Vehicles with air suspension.
   For additional information, refer to: Air Suspension Manual Tight Tolerance Setting Mode (204-05, General Procedures).

2. Check the rear toe adjustment.
   For additional information, refer to: Rear Toe Adjustment (204-00 Suspension System - General Information, General Procedures).
   Adjust as necessary.

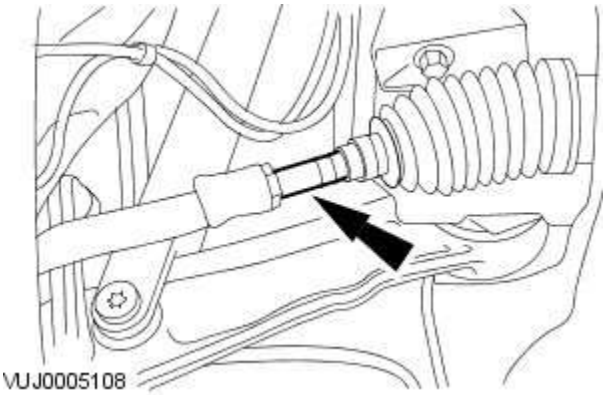
3. Check the front toe adjustment.
   For additional information, refer to: Front Toe Adjustment (204-00 Suspension System - General Information, General Procedures).
   Adjust as necessary.

4. Check the camber and caster settings. Follow the equipment manufacturer's instructions.


E31080

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

   Loosen the tie-rod end lock nut.
   - Clean and lubricate the lock nut and tie-rod threads.


VUJ0005108

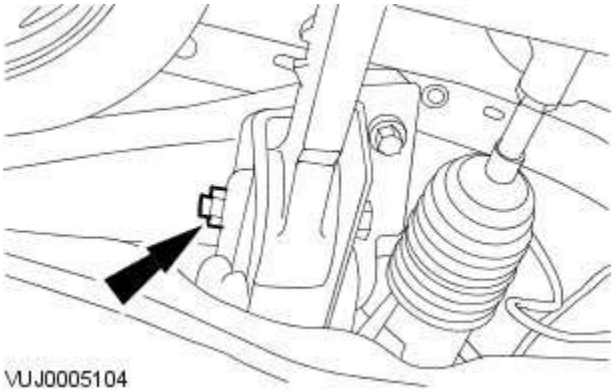
6. NOTES:

   Do not allow the tie-rod end or steering gear boot to twist when the tie-rod is rotated.

   Left-hand, shown right-hand similar.

   Rotate the tie-rod to adjust the toe.

Vehicles requiring camber adjustment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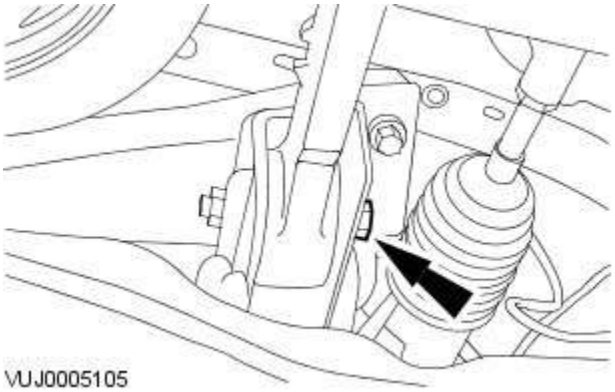
7. NOTE: Left-hand shown, right-hand similar.

   Loosen the rear lower arm lock nut.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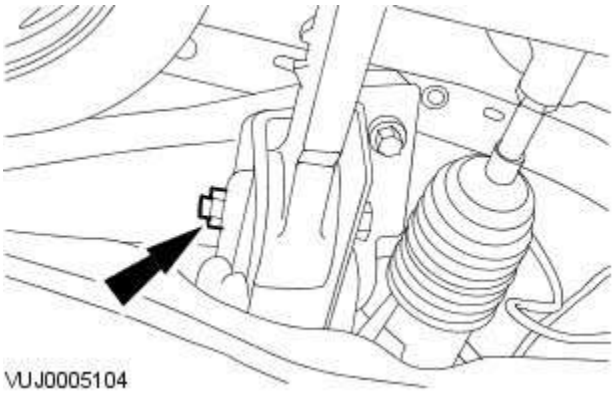
8. NOTE: Left-hand shown, right-hand similar.

   Rotate the camber adjustment cam bolt to adjust the camber.

9. Check the camber and toe settings. Follow the equipment manufacturer's instructions. Adjust as necessary.



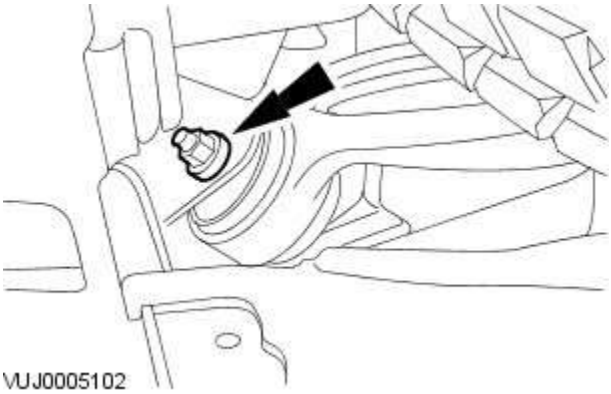
10. NOTES:

Make sure the camber adjustment cam bolt does not rotate.

Left-hand shown, right-hand similar.

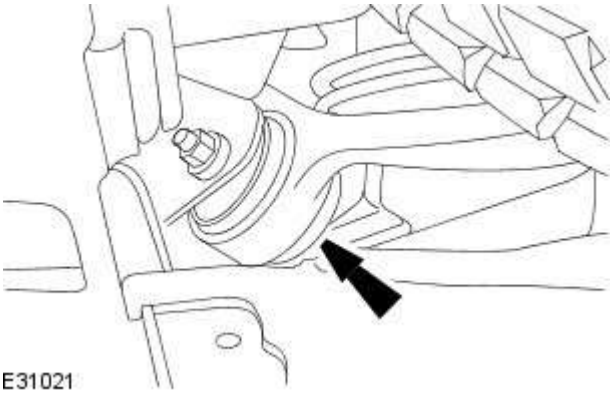
Tighten the rear lower arm lock nut.
- Tighten to 175 Nm.

Vehicles requiring caster adjustment



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

Loosen the front lower arm lock nut.

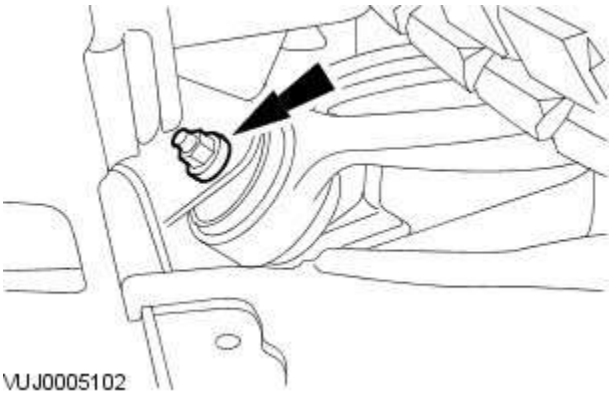


12. NOTES:

Adjustments to the caster will affect the toe settings. Therefore, the caster and toe may need to be adjusted at the same time to achieve the correct settings.

Left-hand shown, right-hand similar.

Rotate the caster adjustment cam bolt to adjust the caster.

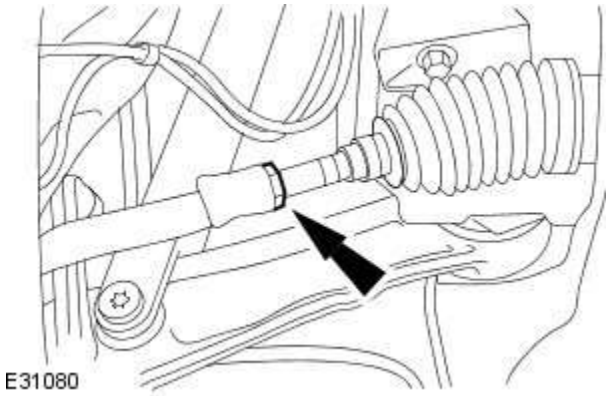


13. NOTES:

Make sure the caster adjustment cam bolt does not rotate.

Left-hand shown, right-hand similar.

Tighten the caster adjustment cam bolt lock nut.
- Tighten to 175 Nm.



14. NOTES:

    Make sure the tie-rod or tie-rod end does not rotate.

    Left-hand shown, right-hand similar.

    Tighten the tie-rod end lock nut
    - Tighten to 55 Nm.

15. NOTE: Make sure that all fixings are torqued to the correct specification.

    Check the caster and toe settings. Follow the equipment manufacturer's instructions. Adjust as necessary.

Published: 16-Oct-2013

Suspension System - General Information - Four-Wheel Alignment

General Procedures

CAUTIONS:

Make sure the vehicle is on a flat level surface.

Make sure the tire pressures are within specification.

Make sure that only the manufacturers' recommended four wheel alignment equipment is used.

Make sure the steering is in the straight ahead position.

1. For wheel alignment information, refer to the suspension specification section.
   For additional information, refer to: Specifications (204-00 Suspension System - General Information, Specifications).

2. Check the tie rod ends, suspension joints, wheel bearings and wheels and tires for damage, wear and free play.
   - Adjust or repair any worn, damaged or incorrectly adjusted components.

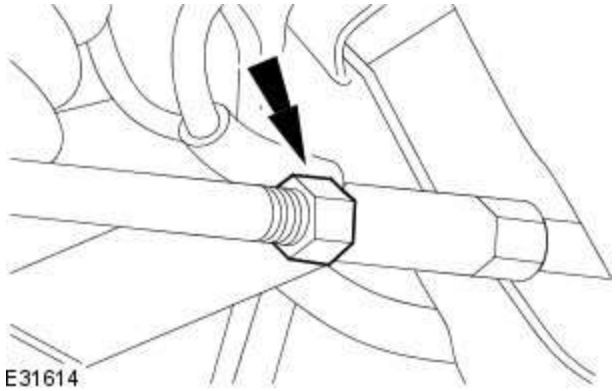
3. Check and adjust tire pressures.

4. Position the vehicle on a calibrated, level, vehicle lift.

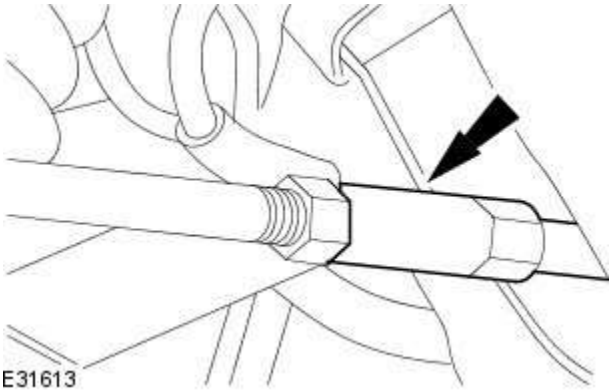
5. Vehicles with air suspension.
   For additional information, refer to: Air Suspension Manual Tight Tolerance Setting Mode (204-05, General Procedures).

6. Release the vehicle parking brake.

7. Using only four-wheel alignment equipment approved by Jaguar, check the wheel alignment.



8. NOTE: LH illustration shown, RH is similar. To adjust, loosen the toe link locknuts.



9. CAUTION: Do not allow the gaiter to twist.

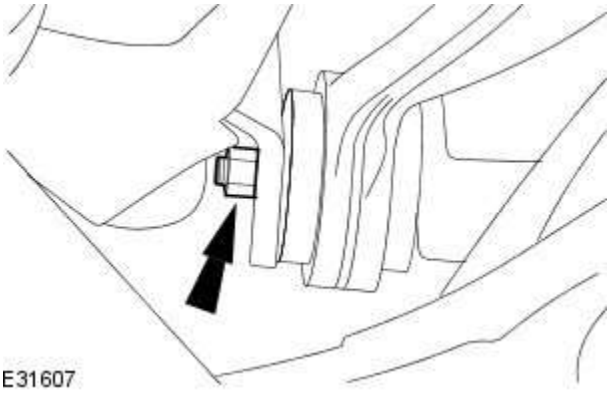
   NOTES:

   Both tie rods must be rotated by an equal amount.

   LH illustration shown, RH is similar.

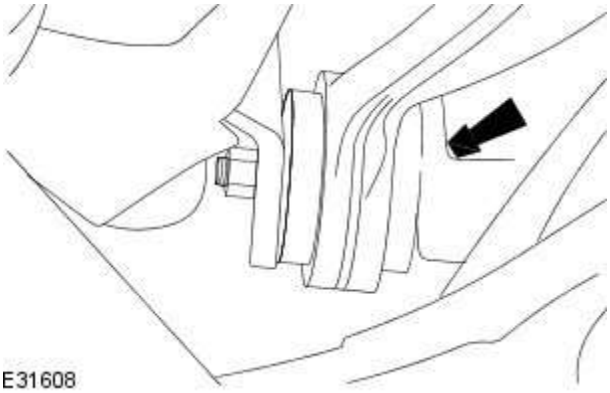
   Adjust the rear toe.

10. Tighten the toe link locknuts to 55 Nm (40 lb.ft).



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

    To adjust the caster, loosen the front lower arm lock nuts.

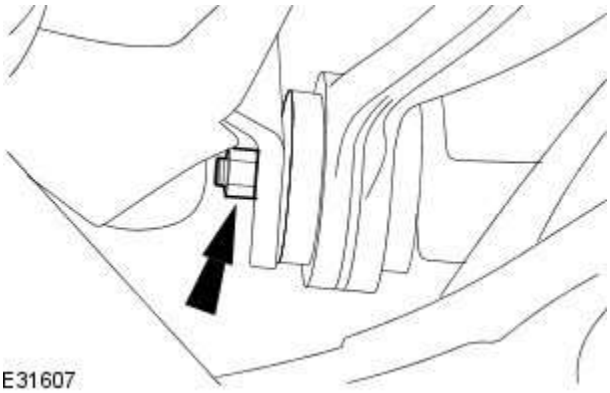


12. NOTE: LH illustration shown, RH is similar.

    Rotate the caster adjustment cam bolt.

13. CAUTION: Make sure the caster adjustment bolt does not rotate while the lock nut is being tightened.

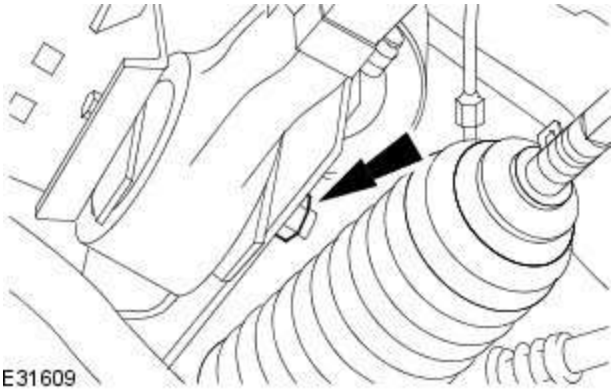
    Tighten the caster adjustment cam bolt nut.
    - Tighten the nut and bolt to 175 Nm (129 lb.ft).



14. CAUTION: Adjustments made to the camber setting will affect the front toe setting. Therefore , the camber and toe may need to be adjusted at the same time.

NOTE: LH illustration shown, RH is similar.

To adjust the camber, loosen the rear lower arm lock nuts.



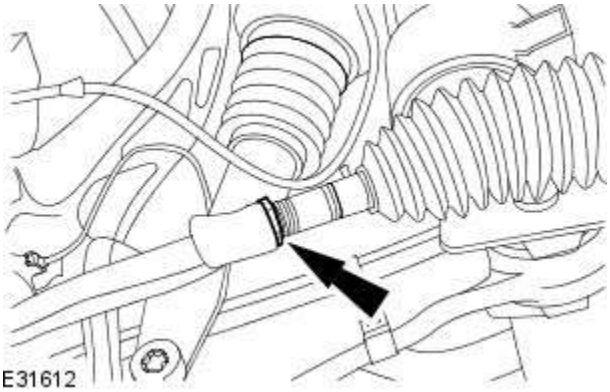
15. NOTE: LH illustration shown, RH is similar.

Rotate the camber adjustment cam bolt.

16. CAUTION: Make sure the camber adjustment bolt does not rotate while the lock nut is being tightened.

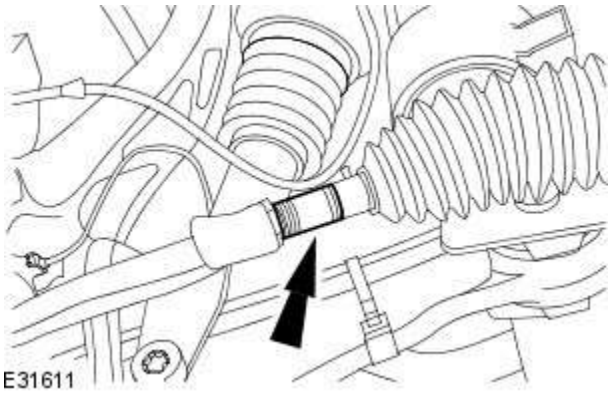
Tighten the camber adjustment cam bolt nut.

- Tighten the nut and bolt to 175 Nm (129 lb.ft).



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

To adjust, loosen the tie rod end lock nuts.



18. CAUTION: Do not allow the gaiter to twist.

    NOTES:

    Both tie rods must be rotated by an equal amount.

    LH illustration shown, RH is similar.

    Adjust the front toe.

19. Tighten the tie rod end lock nuts to 55 Nm (40 lb.ft).

20. Using only four-wheel alignment equipment approved by Jaguar, check the wheel alignment.

Published: 16-Oct-2013

Suspension System - General Information - Front Toe Adjustment

General Procedures

CAUTIONS:

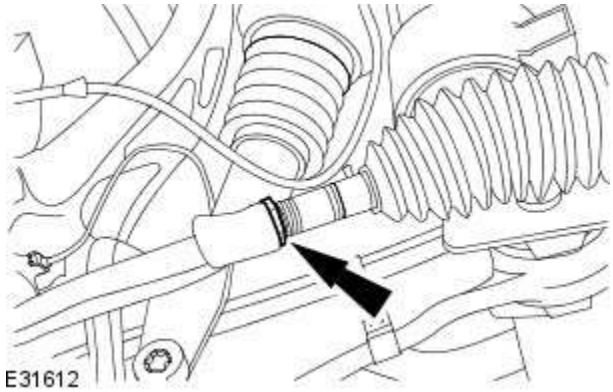
Make sure the vehicle is on a flat level surface.

Make sure the tire pressures are within specification.

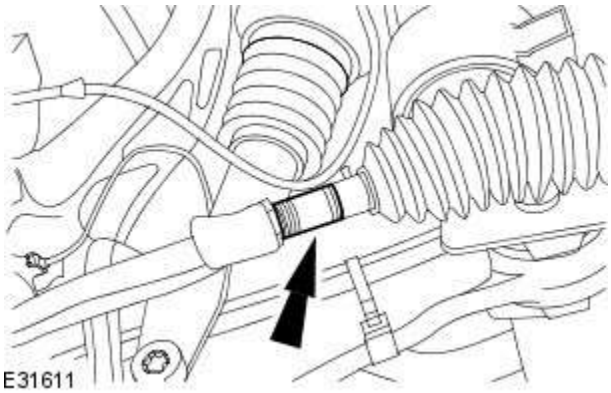
Make sure that only the manufacturers' recommended four wheel alignment equipment is used.

Make sure the steering is in the straight ahead position.

1. For wheel alignment information, refer to the suspension specification section.
   For additional information, refer to: Specifications (204-00 Suspension System - General Information, Specifications).
2. Check the tie rod ends, suspension joints, wheel bearings and wheels and tires for damage, wear and free play.
   - Adjust or repair any worn, damaged or incorrectly adjusted components.
3. Check and adjust tire pressures.
4. Position the vehicle on a 4 post lift.
5. Release the vehicle parking brake.
6. Vehicles with air suspension.
   For additional information, refer to: Air Suspension Manual Tight Tolerance Setting Mode (204-05, General Procedures).
7. For additional information, refer to: Air Suspension Manual Tight Tolerance Setting Mode (204-05, General Procedures).
8. Using only four-wheel alignment equipment approved by Jaguar, check the wheel alignment.



9. NOTE: LH illustration shown, RH is similar. To adjust, loosen the tie rod end lock nuts.



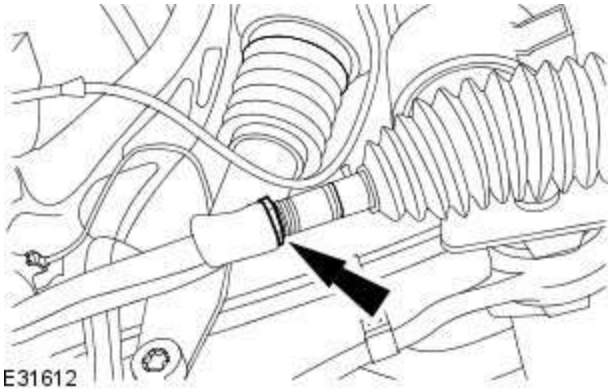
10. CAUTION: Do not allow the gaiter to twist.

    NOTES:

    Both tie rods must be rotated by an equal amount.

    LH illustration shown, RH is similar.

    Adjust the front toe.



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

    Tighten the tie rod end lock nuts to 55 Nm.

12. Using only four-wheel alignment equipment approved by Jaguar, check the wheel alignment.

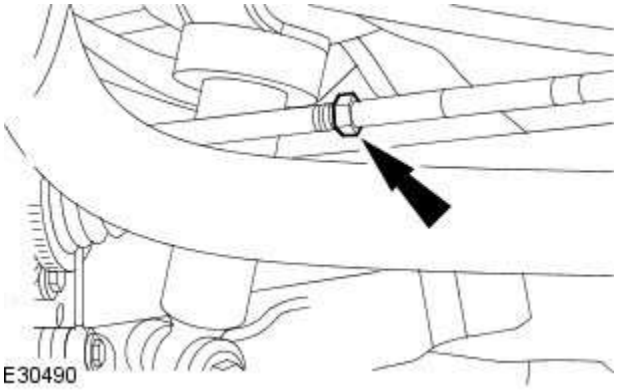
Published: 16-Oct-2013

Suspension System - General Information - Rear Toe Adjustment

General Procedures

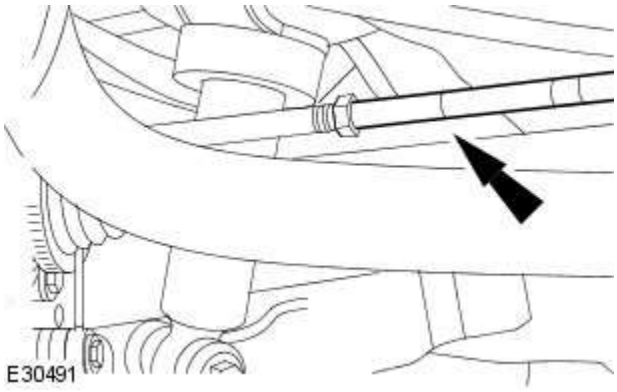
1. Vehicles with air suspension.
   For additional information, refer to: Air Suspension Manual Tight Tolerance Setting Mode (204-05, General Procedures).

2. Check the toe settings. Follow the equipment manufacturer's instructions.

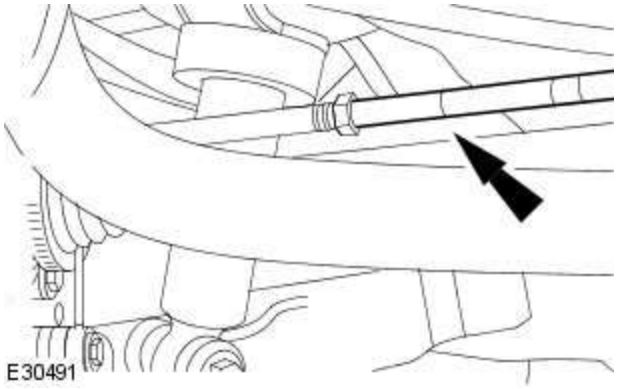


3. NOTE: Left-hand, shown right-hand similar.

   Loosen the lock nut.
   - Clean and lubricate the lock nut and toe link threads.



4. Rotate the toe link to adjust the toe settings.



5. Tighten the lock nut.

6. Check the toe settings. Follow the equipment manufacturer's instructions.

Published: 14-Feb-2012

Suspension System - General Information - Front Wheel Bearing and Wheel Hub Runout Check Vehicles With: High Performance Brakes

General Procedures

NOTES:

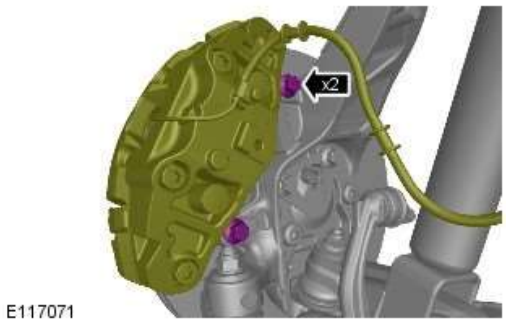
Some variation in the illustrations may occur, but the essential information is always correct.

RH illustration shown, LH similar.

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

   Raise the front of the vehicle.

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



E117071

3. Remove the 2 brake caliper support bolts.
   - Push the brake caliper pistons back to release the pads from the disc.
   - Detach the brake caliper and position to one side with suitable tie strap.

E83394

4. Remove the disc.
   - Remove the 2 clips.


E142472

5. Mount special tool 100-053 on the lower caliper support bracket as shown.
   - A spacer washer may be required under the tool.
   - Use the brake caliper support bolt and suitable nut.


E142472

6. Position the Dial Test Indicator (DTI) gauge probe on the hub flange as shown.

7. Zero DTI and rotate the hub one complete revolution to measure hub runout. hub runout must not exceed 0.015 mm.

8. If the hub runout exceeds the limit, install a new hub and bearing.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).

9. If the hub runout is within the limit install the removed components.

10. tighten the brake caliper bolts to 115 Nm.

Published: 27-Feb-2012

Suspension System - General Information - Rear Wheel Bearing and Wheel Hub Runout Check

General Procedures

NOTES:

RH illustration shown, LH similar.

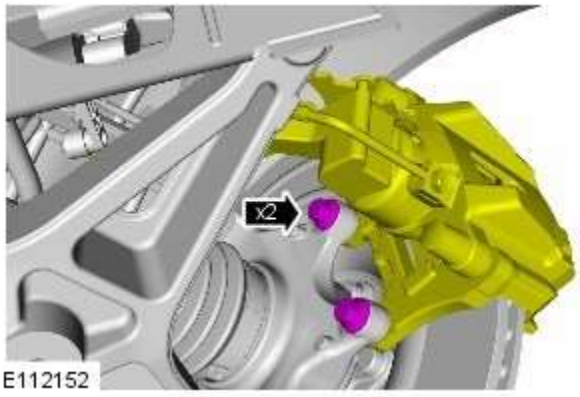
Some variation in the illustrations may occur, but the essential information is always correct.

It is recommended that the DTI is capable of measurements of 0.005 mm.

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

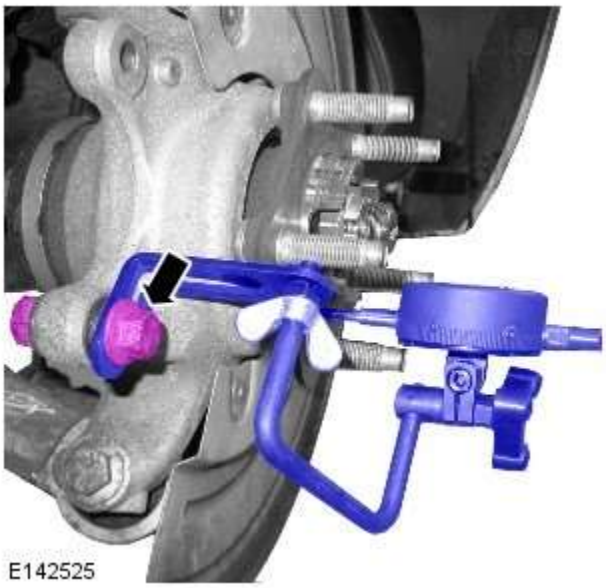
   Raise the rear of the vehicle.

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

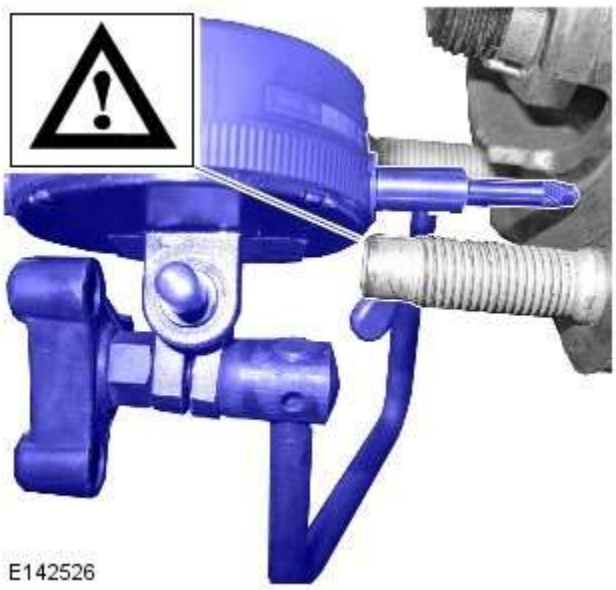


3. Remove the 2 brake caliper support bolts.
   - Push the brake pads back to release the brake caliper from the disc.
   - Detach the brake caliper and position to one side with suitable tie strap.

4. Remove the disc.
   - Remove the 2 clips.


E142525

5. Mount special tool 100-053 on the lower caliper support bracket as shown.
    - A spacer washer may be required under the tool.
    - Use the brake caliper support bolt and suitable nut.


E142526

6. CAUTION: Take care not to contact the studs.

   Position the Dial Test Indicator (DTI) gauge probe on the hub flange as shown.

7. Zero DTI and rotate the hub one complete revolution to measure hub runout. Hub runout must not exceed 0.025 mm.

8. If the hub runout exceeds the limit, install a new hub and bearing. For additional information, refer to: Rear Wheel Bearing (204-02 Rear Suspension, Removal and Installation).

9. If the hub runout is within the limit install the removed components.

10. Tighten the brake support caliper bolts to 103 Nm.

Published: 11-May-2011

Front Suspension -

Torque Specification

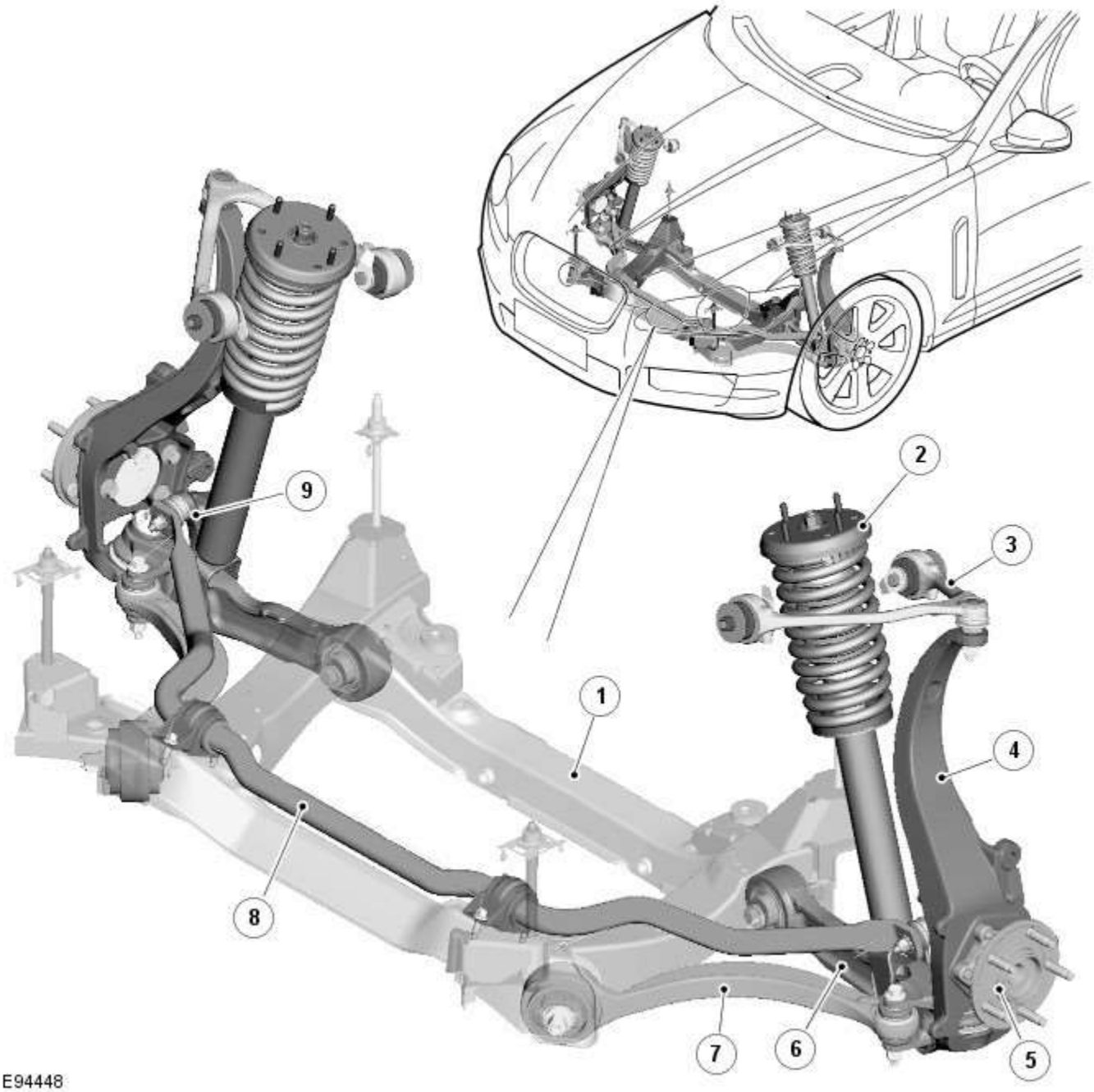
Description	Nm	lb-ft	lb-in
Steering gear to subframe retaining bolts	100	74	-
Toe link ball joint to wheel knuckle retaining nut	133	98	-
Stabilizer bar link to stabilizer bar retaining nut	43	32	-
Stabilizer bar link to lower arm retaining nut and bolt	70	52	-
Stabilizer bar clamp to subframe retaining bolts	55	41	-
Rear lower arm to wheel knuckle ball joint retaining nut	75	55	-
Rear lower arm to subframe retaining nut and bolt	175	129	-
Front lower arm to subframe retaining nut and bolt	175	129	-
Front lower arm to rear lower arm retaining nut and bolt	Stage 1 - 60 Stage 2 - 135 degrees	Stage 1 - 44 Stage 2 - 135 degrees	-
Upper arm ball joint to wheel knuckle retaining nut	90	66	-
Upper arm to body retaining nuts and bolts	47	35	-
Shock absorber and spring assembly upper mounting to body retaining nuts	28	20	-
Shock absorber and spring assembly to lower arm retaining nut and bolt	175	129	-
Shock absorber and spring assembly upper mounting retaining nut (without adaptive damping)	50	37	-
Shock absorber and spring assembly upper mounting retaining nut (with adaptive damping)	27	20	-
Wheel hub and bearing assembly to wheel knuckle retaining bolt	90	66	-
Wheel and tire to wheel hub retaining nuts	125	92	-

Published: 11-May-2011

Front Suspension - Front Suspension - Component Location

Description and Operation

COMPONENT LOCATION



Item	Description
1	Subframe
2	Spring and damper assembly
3	Upper control arm
4	Wheel knuckle
5	Wheel hub and bearing assembly
6	Lower lateral control arm
7	Lower forward control arm
8	Stabilizer bar
9	Stabilizer bar link

Published: 11-May-2011

Front Suspension - Front Suspension - Overview

Description and Operation

OVERVIEW

The front suspension is a fully independent design assembled on a non-isolated subframe. The wheel knuckle attaches to the wishbone type upper and lower control arms.

The stabilizer bar attaches to the front of the subframe and varies in shape depending on the engine variant.

The spring and damper assemblies are located between the lower control arm and the front suspension housing in the inner wing. Dependant on vehicle model there are three types of coil spring and damper available:

- a standard oil passive damper (All models except supercharged),
- an adaptive damper, also known as Computer Active Technology Suspension (CATS) on 4.2L supercharged vehicles up to 2010MY,
  Refer to: Vehicle Dynamic Suspension - 4.2L (204-05, Description and Operation).
- a continuously variable adaptive damper, also known as Adaptive Dynamics System on 5.0L supercharged vehicles from 2010MY.
  Refer to: Vehicle Dynamic Suspension - V8 5.0L Petrol/V8 S/C 5.0L Petrol (204-05 Vehicle Dynamic Suspension, Description and Operation).

Published: 20-Jun-2011

Front Suspension - Front Suspension - System Operation and Component Description

Description and Operation

System Operation

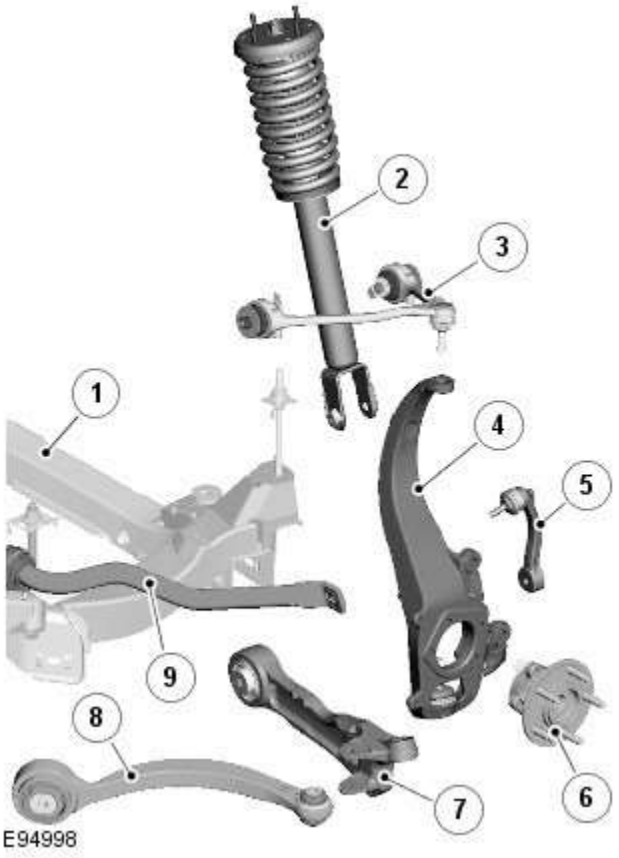
The front suspension is a fully independent design assembled on a non-isolated subframe mounted by four bolts to the vehicle body. This rigid mounting arrangement provides the driver with optimum steering feel and facilitates towards the vehicle's sporty dynamic suspension.

The suspension arrangement is a double-wishbone type with the length ratio between the upper and lower wish-bone control arms calculated to minimize track and camber changes.

An adaptive damping system is available on specified models. For additional information refer to Vehicle Dynamic Suspension 4.2L or 5.0L.

Component Description

COMPONENTS



Item	Description
1	Subframe
2	Spring and damper assembly
3	Upper control arm
4	Wheel knuckle
5	Stabilizer bar link
6	Wheel hub and bearing assembly
7	Lower lateral control arm
8	Lower forward control arm
9	Stabilizer bar

Upper Control Arm

The forged-aluminum upper control arm is a wishbone design and connects to the vehicle body through two plain bushes, and links to the swan neck wheel knuckle by an integral ball joint. The upper control arm is inclined to provide anti-dive characteristics under heavy braking, while also controlling geometry for vehicle straight-line stability.

Lower Control Arm

The forged aluminum lower control arms are of the wishbone design; the arms separate to allow for optimum bush tuning:

- The rear lateral control arm is fitted with a bush at its inner end which locates between brackets on the subframe. The arm is secured with an eccentric bolt which provides the adjustment of the suspension camber geometry. The outer end of the control arm has a tapered hole which locates on a ball joint fitted to the wheel knuckle. An integral clevis bracket on the forward face of the lateral control arm allows for the attachment of the forward control arm. A bush is fitted below the clevis bracket to provide for the attachment of the stabilizer bar link. A cross-axis joint is fitted to a cross-hole in the control arm to provide the location for the clevis attachment of the spring and damper assembly.
- The forward control arm is fitted with a fluid-block rubber bush at its inner end which locates between brackets on the subframe. The arm is secured with an eccentric bolt which provides adjustment of the castor and camber geometry. The outer end of the control arm is fitted with a cross-axis joint and locates in the integral clevis bracket on the lateral control arm.

Wheel Knuckle

The cast aluminum wheel knuckle is a swan neck design and attaches to the upper control arm and lower lateral control arm. The lower lateral control arm locates on a non serviceable ball-joint integral with the wheel knuckle. The lower boss on the rear of the knuckle provides for the attachment of the steering gear tie-rod ball joint.

The wheel knuckle also provides the mounting locations for the:

- wheel hub and bearing assembly
- the wheel speed sensor (integral to the wheel hub and bearing assembly)
- brake caliper and disc shield.

Stabilizer Bar

The stabilizer bar is attached to the front of the subframe with bushes and mounting brackets. The pressed steel mounting brackets locate over the bushes and are attached to the cross member with bolts screwed into threaded locations in the subframe. The stabilizer bar has crimped, 'anti-shuffle' collars pressed in position on the inside edges of the bushes. The collars prevent sideways movement of the stabilizer bar.

The stabilizer bar is manufactured from 32mm diameter tubular steel on supercharged models and 31mm diameter tubular steel on diesel and normally aspirated models and has been designed to provide particular characteristics in maintaining roll rates, specifically in primary ride comfort.

Each end of the stabilizer bar curves rearwards to attach to a ball joint on a stabilizer link. Each stabilizer link is secured to a bush in the lower lateral arm with a bolt and locknut. The links allow the stabilizer bar to move with the wheel travel providing maximum effectiveness.

The only difference between the front stabilizer bars, in addition to the diameter, is in the shape to accommodate engine variant:

- a slightly curved bar, between bush centers, for V6 diesel (31 mm dia) and V8 gasoline supercharged (32 mm dia),
- a straight bar, between bush centers, for V6 and V8 normally aspirated gasoline engines (31 mm dia).

Spring and Damper Assembly

The spring and damper assemblies are located between the lower lateral arm and the front suspension housing in the inner wing. Dependant on vehicle model there are three types of coil spring and damper available:

- a standard oil passive damper (All models except supercharged),
- an adaptive damper, also known as Computer Active Technology Suspension (CATS) on 4.2L supercharged vehicles up to 2010MY, For additional information refer to Vehicle Dynamic Suspension 4.2L.
- a continuously variable adaptive damper, also known as Adaptive Dynamics System on 5.0L supercharged vehicles from 2010MY. For additional information refer to Vehicle Dynamic Suspension 5.0L.

The dampers are a monotube design with a spring seat secured by a circlip onto the damper tube. The damper's lower spherical joint is an integral part of the lateral lower control-arm, and the damper takes the form of a clevis-end, which straddles the spherical joint.

The damper piston is connected to a damper rod which is sealed at its exit point from the damper body. The threaded outer end of the damper rod locates through a hole in the top mount. A self locking nut secures the top mount to the damper rod. The damper rod on the adaptive damper has an electrical connector on the outer end of the damper rod.

Supercharged 4.2L vehicles up to 2010MY: The adaptive damper functions by restricting the flow of hydraulic fluid through internal galleries in the damper's piston. The adaptive damper has a solenoid operated valve, which when switched allows a greater flow of hydraulic fluid through the damper's piston. This provides a softer damping characteristic from the damper. The adaptive damper defaults to a firmer setting when not activated. The solenoid is computer controlled and can switch between soft and hard damping settings depending on road wheel inputs and vehicle speed.

Supercharged 5.0L vehicles from 2010MY: The variable damper functions by adjustment of a solenoid operated variable orifice, which opens up an alternative path for oil flow within the damper. When de-energized the bypass is closed and all the oil flows

through the main (firm) piston. When energized the solenoid moves an armature and control blade, which work against a spring. The control blade incorporates an orifice which slides inside a sintered housing to open up the bypass as required. In compression, oil flows from the lower portion of the damper through a hollow piston rod, a separate soft (comfort) valve, the slider housing and orifice and into the upper portion of the damper, thereby bypassing the main (firm) valve. In rebound the oil flows in the opposite direction

The damper rod is fitted with a spring aid which prevents the top mount making contact with the top of the damper body during full suspension compression and also assists with the suspension tune.

The spring rate of the coil springs can differ between models and are color coded for identification. The coil spring locates on a spring packer and a lower spring seat which is located on the damper body. The spring locates in an upper spring seat which is located on the underside of the top mount. The majority of the roll stiffness is provided by the springs rather than the stabilizer bar as this arrangement allows for a natural frequency of roll and consequently a consistent suspension ride.

India-Specific Spring and Damper Assembly Spacers

E137439

Front and rear spring and damper assemblies are fitted with spacers to raise ride height in India-specific vehicles. The front and the rear spacers are the same, their color is black.

Published: 17-May-2012

Front Suspension - Front Suspension

Diagnosis and Testing

Principle of Operation

For a detailed description of the suspension system, refer to the relevant Description and Operation section of the workshop manual.REFER to: (204-01 Front Suspension)

Front Suspension (Description and Operation),
Front Suspension (Description and Operation),
Front Suspension (Description and Operation).

Inspection and Verification

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

Visual Inspection

Mechanical
• Damaged suspension dampers

3. If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the next step
4. If the fault is not visually evident, verify the symptom and refer to the following Symptom Chart

Symptom Chart

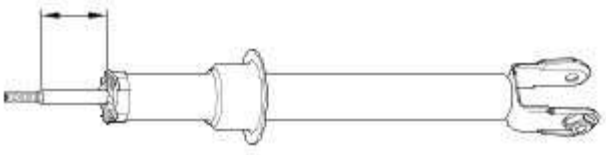
Symptom	Possible Cause	Action
Evidence of fluid on suspension damper	• Fluid on damper from an external source • Fluid leaking from damper	• Damper not faulty, do not renew • GO to Pinpoint Test A.

PINPOINT TEST A : DAMPER FLUID LEAK DIAGNOSIS	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
A1: ASSESS LEAK	
NOTES: Residual oil left over from the damper assembly process may create oil staining on the damper tube. This will not affect the function of the damper.	
Slight seepage is considered normal.	
	1 Assess the extent of the oil leakage
	Is the leakage serious enough to indicate that the damper seal has failed? **Yes** GO to Pinpoint Test B. **No** Damper not faulty, do not renew.

PINPOINT TEST B : CONFIRM LEAK	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
B1: ROAD TEST	
	1 Clean all traces of oil from the damper
	2 Drive the vehicle over a speed bump or similar ten times
	Is any fluid visible on the outside of the damper? **Yes** GO to Pinpoint Test C. **No** Damper not faulty, do not renew.

PINPOINT TEST C : DAMPER STICKOUT TEST	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
C1: DAMPER STICKOUT TEST	

NOTE: If a significant quantity of fluid has leaked out of the damper, the dividing piston will be displaced upwards in the tube by the pressure of the gas below it. This will limit the downward travel of the piston.

	1 Remove the suspension strut assembly REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation).
	2 Remove the spring
	3 Remove the bump stop
	4 Push the damper piston fully into the damper tube
 E144894	**5** Measure and record the stickout dimension (the distance between the damper tube cap and the piston rod shoulder)
	Is the stickout dimension greater than 12.0mm? **Yes** Damper unserviceable. Install a new suspension damper. Enclose a record of the stickout dimension with the returned part. **No** Damper serviceable. Re-assemble and re-install the suspension strut REFER to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation).

Published: 09-Oct-2012

Front Suspension - Front Shock Absorber

Removal and Installation

Removal

NOTES:

Fuse box release only required on removal of the RH front shock absorber.

Expansion tank release only required for supercharged variant removal of the LH front shock absorber.

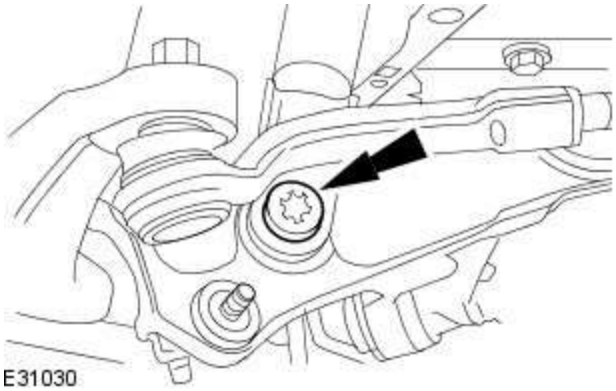
All vehicles

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

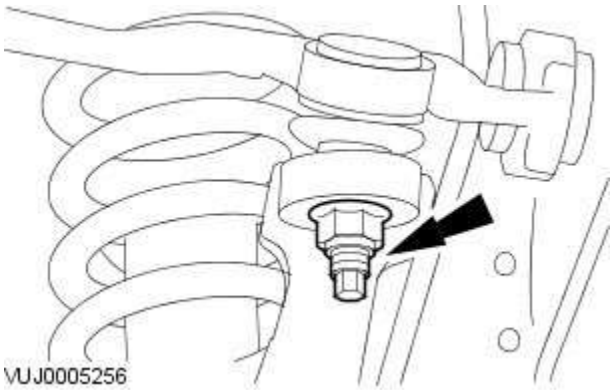
   Raise and support the vehicle.

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

3. Remove the front stabilizer bar link.
   For additional information, refer to: Front Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation).



4. Release the front shock absorber from the lower arm.



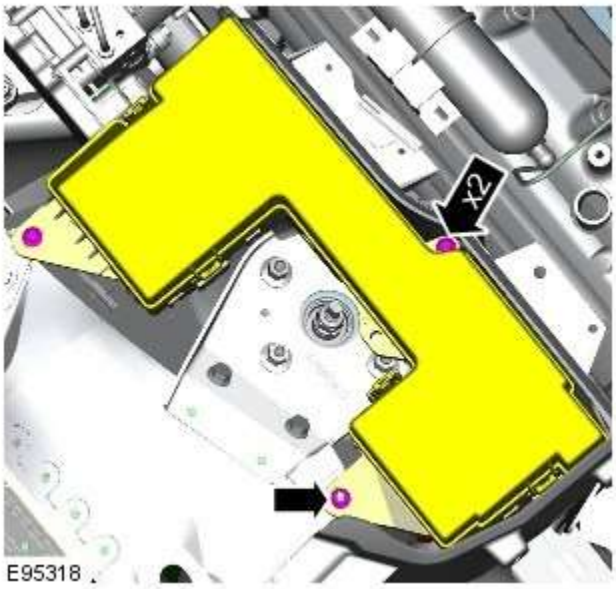
5. CAUTIONS:

   Make sure the wheel knuckle is supported. Failure to follow these instructions may result in damage to the vehicle.

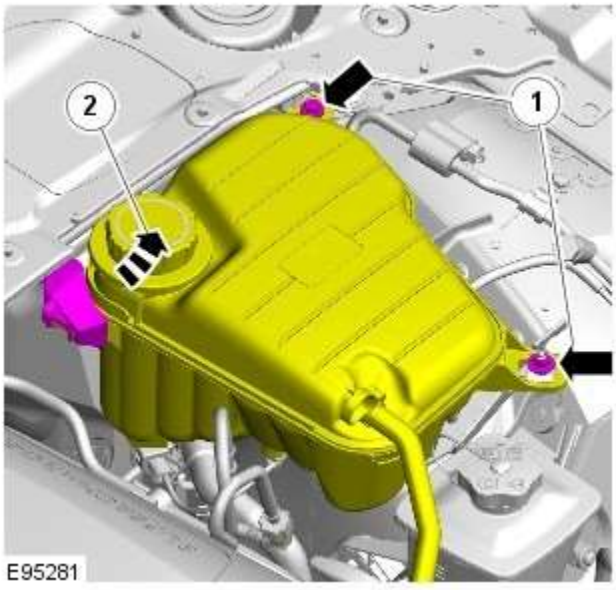
   Use an Allen key to prevent the ball joint rotating whilst removing the nut.

   Disconnect the upper arm from the wheel knuckle.

6. Lower the vehicle.

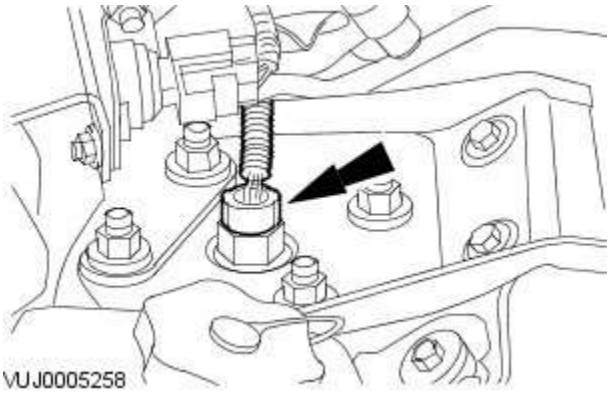


7. Release the fuse box.
    - Remove the 2 bolts and 1 nut.
    - Position the fuse box aside for access to the inboard retaining nut.



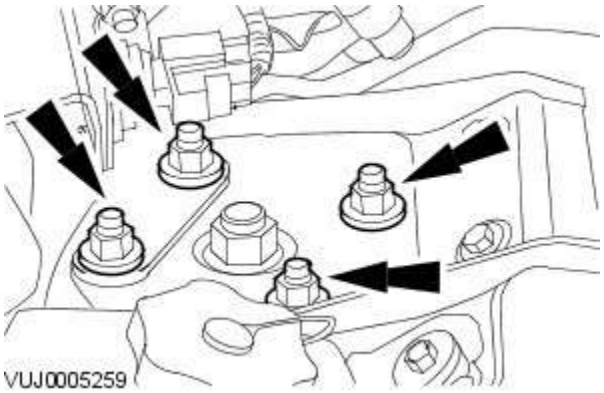
8. Release the coolant expansion tank for access.

Vehicles with supercharger



9. Disconnect the front shock absorber electrical connector.

All vehicles

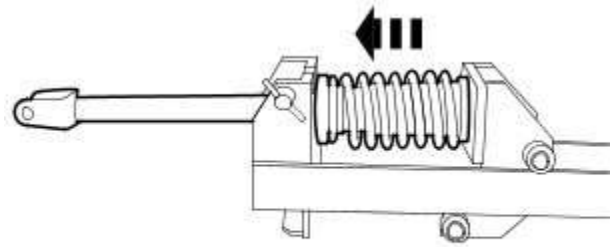


10. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

    Remove the front shock absorber and spring assembly.

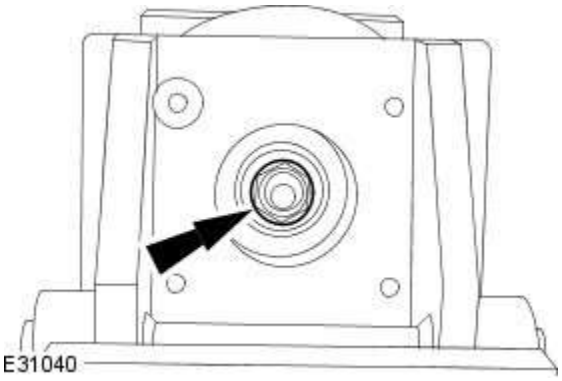
11. NOTE: Do not disassemble further if the component is removed for access only.

    Install the front shock absorber and spring assembly in the spring compressor.

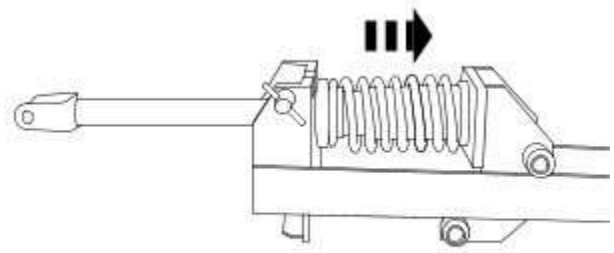


12. WARNING: The spring is under extreme tension, care must be taken at all times. Failure to follow these instruction may result in personal injury.

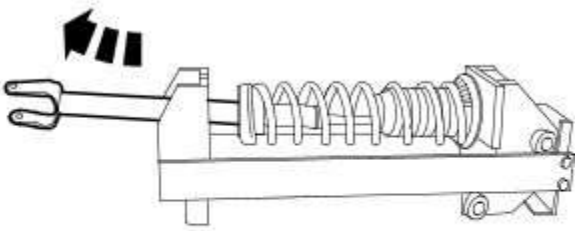
    Compress the spring.



13. Remove the front shock absorber retaining nut



14. Carefully release the spring tension.

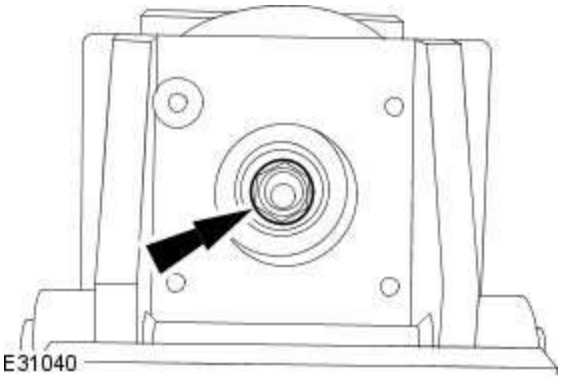


E31042

15. Remove the front shock absorber.

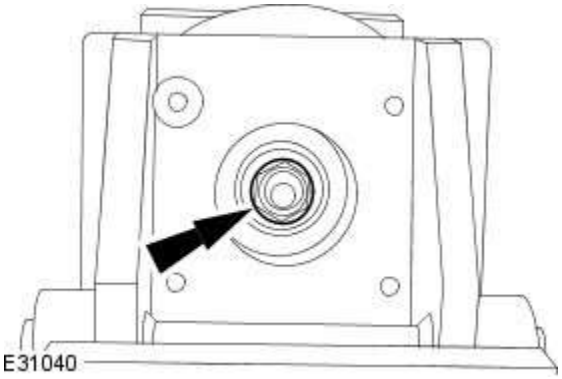
Installation

All vehicles



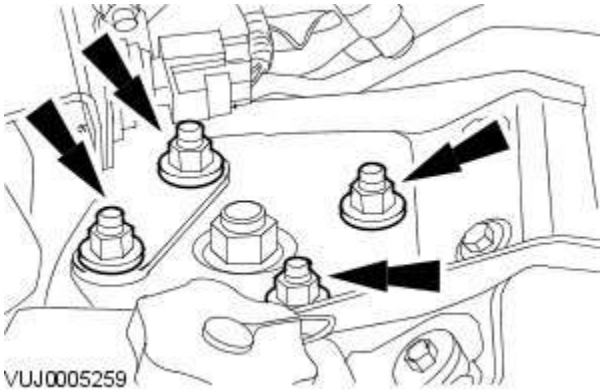
E31040

1. Vehicles without adaptive damping: Tighten the nut to 50 Nm.



E31040

2. Vehicles with adaptive damping: Tighten the nut to 27 Nm.

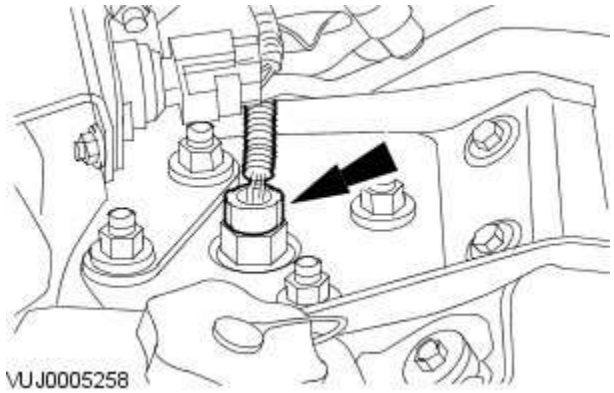


VUJ0005259

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

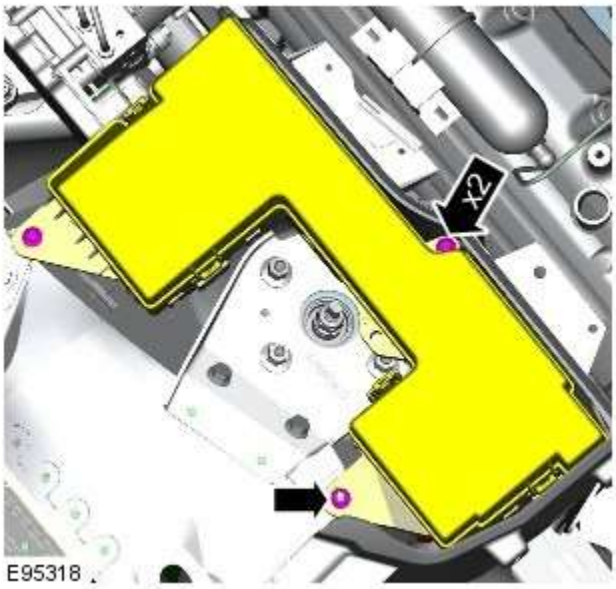
   Install the front shock absorber and spring assembly.
   - Tighten the nuts to 27 Nm.

Vehicles with supercharger

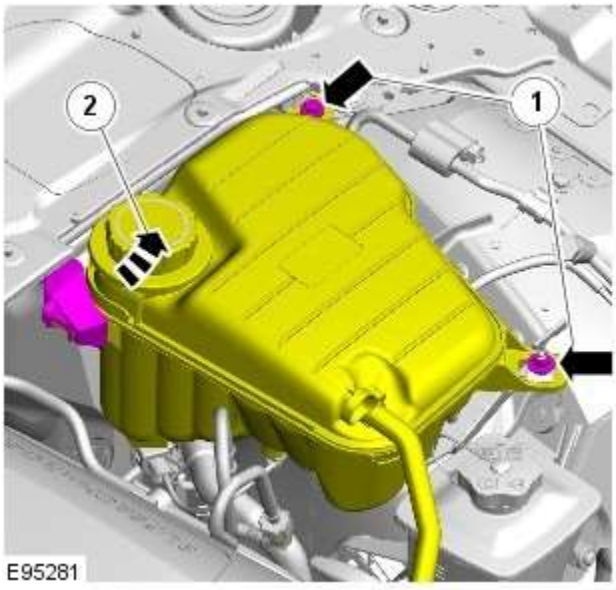


4. Connect the front shock absorber electrical connector.

All vehicles

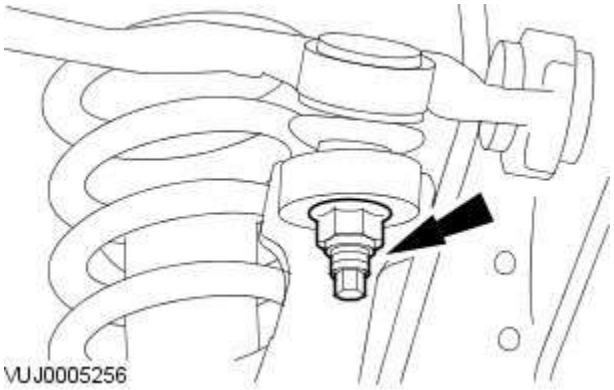


5. Secure the fuse box.



6. Secure the coolant expansion tank.
   - Tighten to 10 Nm.

7. Raise the vehicle.

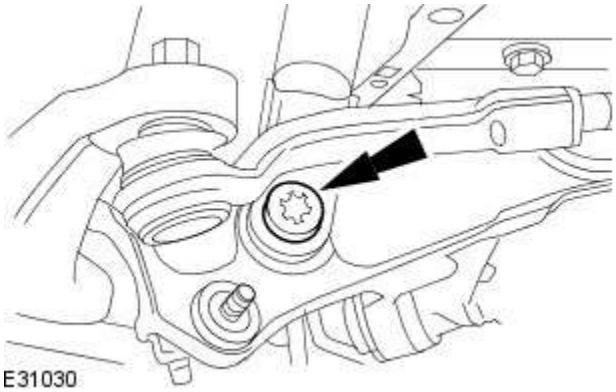


8. CAUTIONS:

   Use an Allen key to prevent the ball joint rotating whilst installing the nut.

   Make sure the wheel knuckle is supported. Failure to follow these instructions may result in damage to the vehicle.

   Secure the upper arm to the wheel knuckle.
   - Tighten the nut to 90 Nm.



9. Connect the front shock absorber and spring assembly to the lower arm.
   - Tighten the bolt to 175 Nm.

10. Install the front stabilizer bar link.
    For additional information, refer to: Front Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation).

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

12. Lower the vehicle.

Published: 11-May-2011

Front Suspension - Front Lower Arm

Removal and Installation

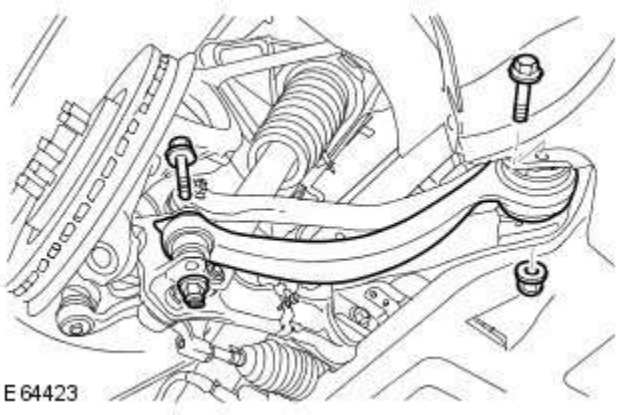
Removal

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 air deflector.
   For additional information, refer to: Air Deflector (501-02 Front End Body Panels, Removal and Installation).

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



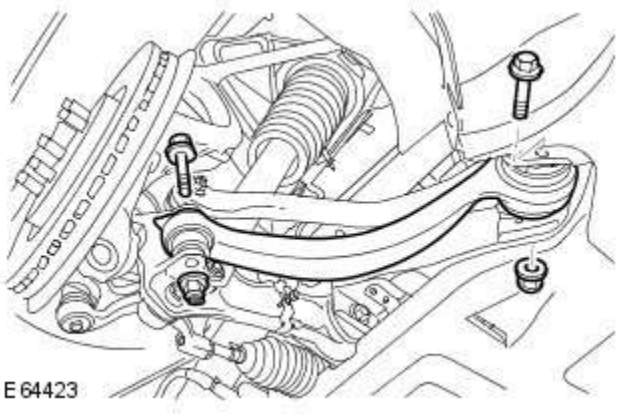
4. NOTES:

   Note the fitted position.

   RH illustration shown, LH is similar

   Release the front lower arm.
   - Remove the 2 bolts and discard the nuts.

Installation

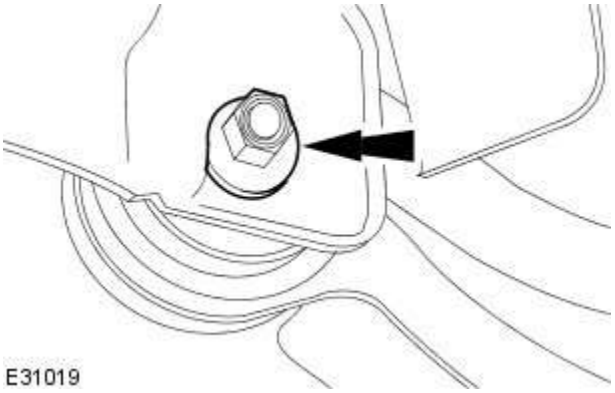


1. NOTE: RH illustration shown, LH is similar

   Install the front lower arm.
   - Install the bolt and tighten the new nut to 60 Nm + 135 degrees.
   - Install the front lower arm inner retaining nut and bolt, but do not fully tighten at this stage.

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

3. Lower the vehicle.



4. CAUTION: The final tightening of the front lower arm inner retaining nut and bolt must be carried out with the vehicle on its wheels

   Tighten the 14mm bolt to 175 Nm.

5. Install the air deflector.
   For additional information, refer to: Air Deflector (501-02 Front End Body Panels, Removal and Installation).

6. Lower the vehicle.

7. Using only four-wheel alignment equipment approved by Jaguar, check the wheel alignment, and adjust if required.

Published: 11-May-2011

Front Suspension - Rear Lower Arm

Removal and Installation

Special Tool(s)

	Ball joint splitter 204-327

Removal

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

   Raise the vehicle on a 4 post lift.

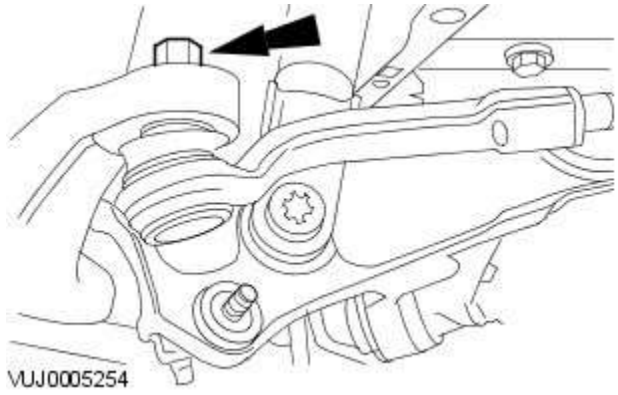
2. Remove the engine undertray.
   For additional information, refer to: Air Deflector (501-02 Front End Body Panels, Removal and Installation).

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

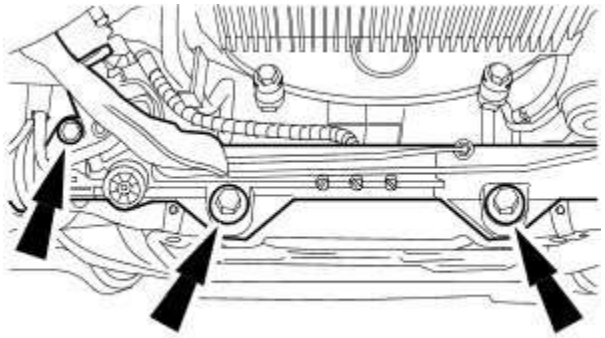
   Raise and support the body.

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

5. Remove the stabilizer bar link.
   For additional information, refer to: Front Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation).

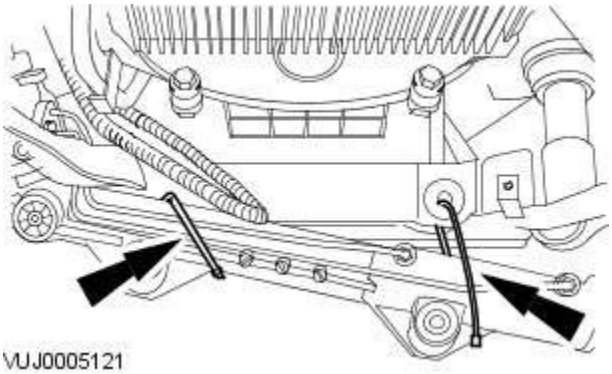


6. Release the tie rod.



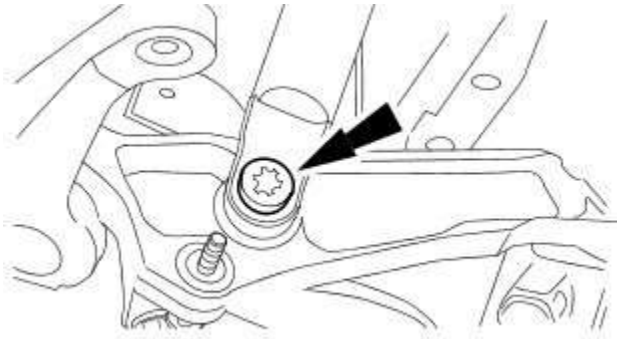
VUJ0005142

7. Release the steering gear.



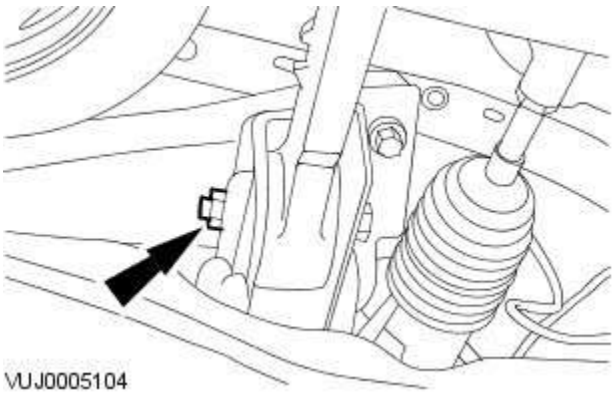
VUJ0005121

8. Secure the steering gear.



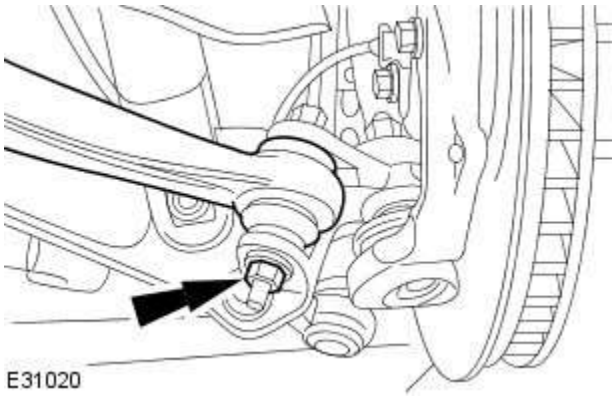
VUJ0005255

9. Release the shock absorber and spring assembly.



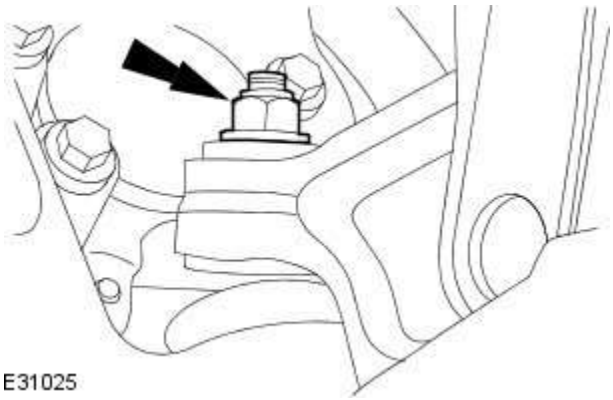
VUJ0005104

10. Remove the rear lower arm inner bolt.



E31020

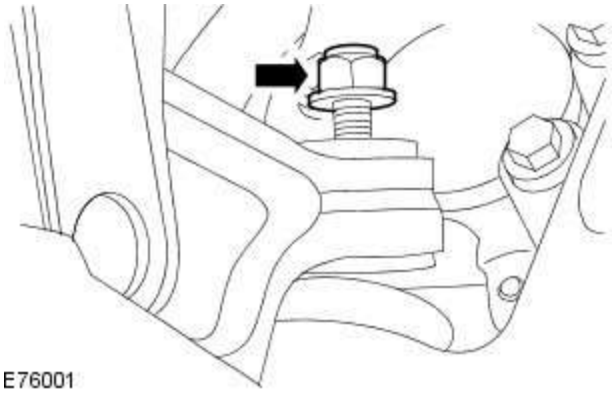
11. Release the front lower arm.
    - Remove and discard the nut and bolt.



E31025

12. CAUTION: Prevent the rear lower arm ball joint ball pin hexagon from rotating. Failure to follow this instruction may result in damage to the lower ball joint boot.

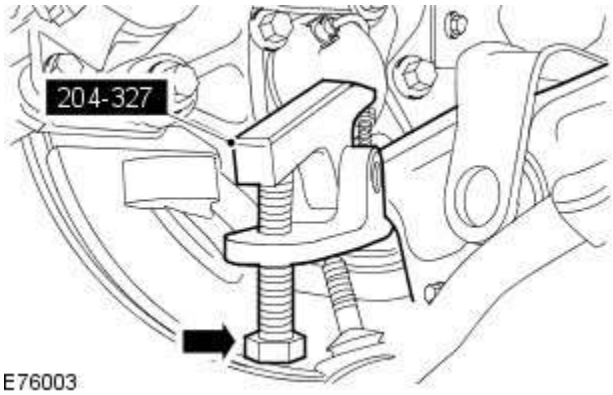
    Loosen the rear lower arm ball joint retaining nut.



E76001

13. CAUTION: Prevent the rear lower arm ball joint ball pin hexagon from rotating. Failure to follow this instruction may result in damage to the lower ball joint boot.

    Adjust the rear lower arm ball joint retaining nut until the ball joint thread cannot be seen.



E76003

14. WARNING: Make sure the special tool is supported while carrying out the operation. Failure to follow this instruction may result in personal injury.

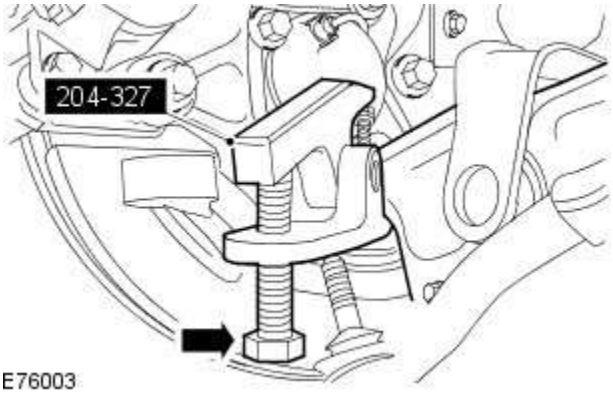
    CAUTIONS:

    Make sure the special tool is supported while carrying out the operation. Failure to follow this instruction may result in damage to the special tool.

    Make sure the special tool is correctly located and the lower ball joint boot is not damaged while carrying out the operation. Failure to follow this instruction may result in damage to the component.

    Using the special tool, release the rear lower arm ball joint from the wheel knuckle lower pivot.
    - Tighten the special tool adjusting bolt to a maximum of

60 Nm.
- If the rear lower arm ball joint releases from the wheel knuckle lower pivot, using no more than 60 Nm on the special tool adjusting bolt, proceed to step 13.
- If the rear lower arm ball joint does not release from the wheel knuckle lower pivot, using no more than 60 Nm on the special tool adjusting bolt, proceed to step 12.



E76003

15. WARNING: Make sure the special tool is supported while carrying out the operation. Failure to follow this instruction may result in personal injury.

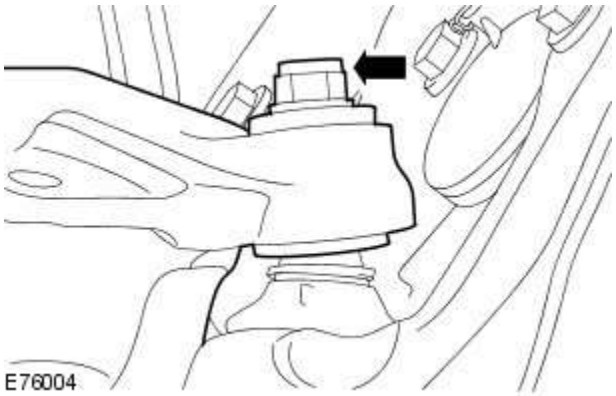
CAUTIONS:

Make sure the special tool is supported while carrying out the operation. Failure to follow this instruction may result in damage to the special tool.

Make sure the special tool is correctly located and the lower ball joint boot is not damaged while carrying out the operation. Failure to follow this instruction may result in damage to the component.

NOTE: Do not carry out this step if the rear lower arm ball joint released from the wheel knuckle lower pivot in step 12.

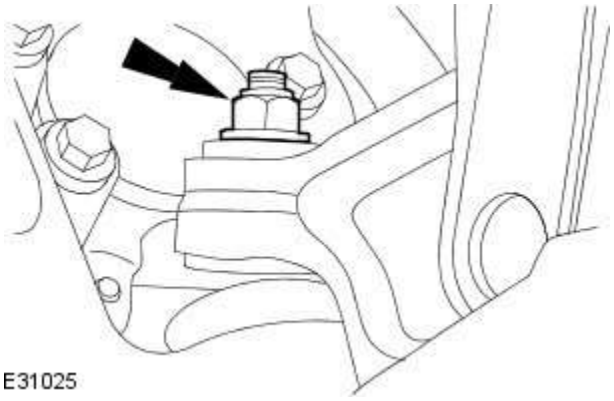
Using the special tool, release the rear lower arm ball joint from the wheel knuckle lower pivot.
- Tighten the special tool adjusting bolt to a maximum of 60 Nm.
- Strike the top surface of the special tool directly above the rear lower arm ball joint at the point indicated using a copper mallet.


E76004

16. CAUTION: Prevent the rear lower arm ball joint ball pin hexagon from rotating. Failure to follow this instruction may result in damage to the lower ball joint boot.

Remove the rear lower arm.
- Remove and discard the retaining nut.

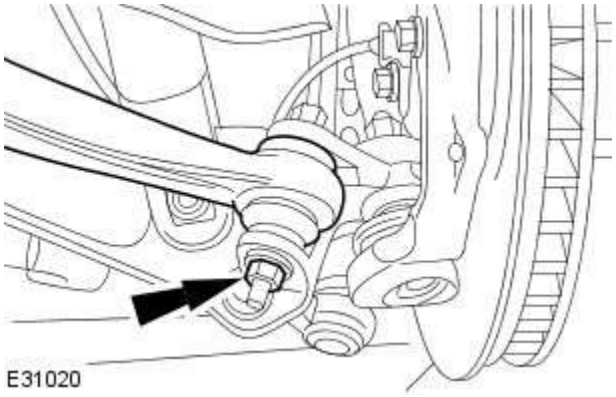
Installation


E31025

1. WARNING: Make sure that a new lower arm ball joint nut is installed.

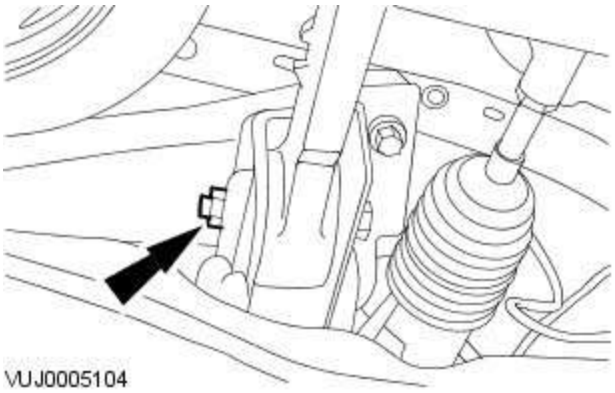
   CAUTION: Prevent the rear lower arm ball joint ball pin hexagon from rotating. Failure to follow this instruction may result in damage to the lower ball joint boot.

   Install the rear lower arm.
   - Tighten the nut to 92 Nm.

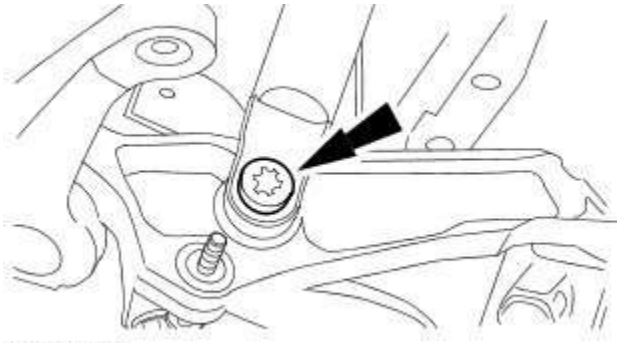

E31020

2. NOTE: Install a new retaining nut and bolt.

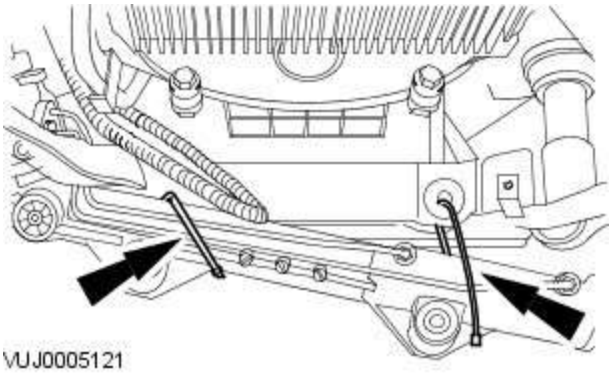
   Secure the front lower arm.
   - Stage 1: Tighten to 60 Nm.
   - Stage 2: Tighten to a further 135 degrees.


VUJ0005104

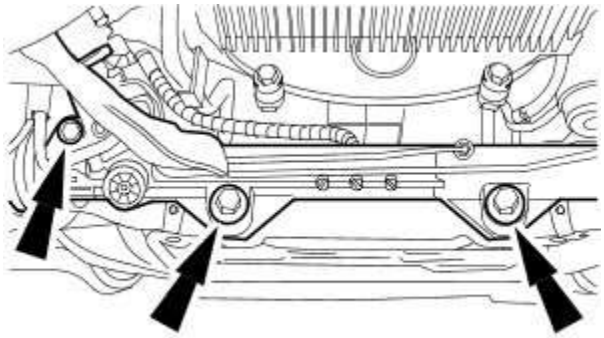
3. Secure the rear lower arm.
   - Install the rear lower arm inner retaining nut, but do not tighten fully at this stage.


VUJ0005255

4. Install the shock absorber and spring assembly.
   - Tighten the bolt to 175 Nm.


VUJ0005121

5. Remove and discard the retaining straps.


VUJ0005142

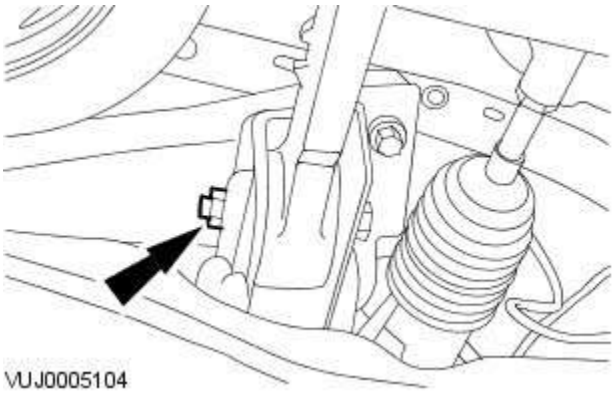
6. Install the steering gear.
   - Tighten the bolts to 100 Nm.

7. Secure the tie rod end.
   - Tighten the nut to 55 Nm.

8. Install the stabilizer bar link.
   For additional information, refer to: Front Stabilizer Bar Link (204-01 Front Suspension, Removal and Installation).

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

10. Lower the body.


VUJ0005104

11. CAUTION: The final tightening of the upper arm must be carried out with the vehicle on it's wheels.

    Tighten to 175 Nm.

12. Install the engine undertray.
    For additional information, refer to: Air Deflector (501-02 Front End Body Panels, Removal and Installation).

13. Using only four-wheel alignment equipment approved by Jaguar, check

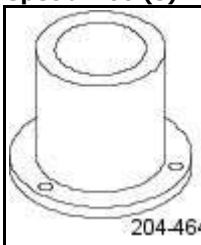
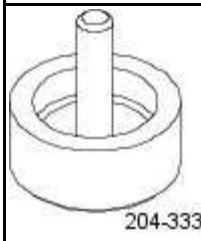
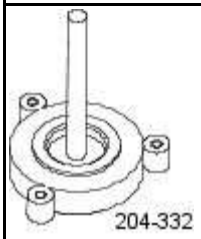
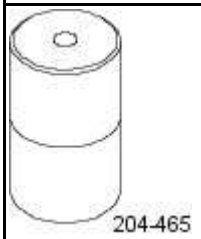
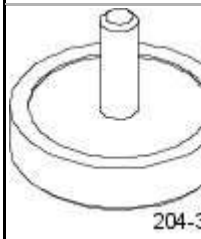
and adjust the wheel alignment.
For additional information, refer to: Camber and Caster Adjustment (204-00 Suspension System - General Information, General Procedures).

Published: 11-May-2011

Front Suspension - Rear Lower Arm Bushing

Removal and Installation

Special Tool(s)

 204-464	Rear lower arm bushing remover and installer 204-464
 204-333	Rear lower arm bushing remover 204-333
 204-332	Rear lower arm bushing installer 204-332
 204-465	Rear lower arm bushing installer 204-465
 204-334	Rear lower arm bushing installer 204-334

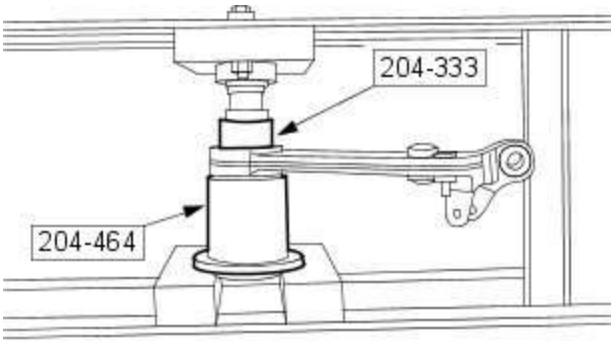
Removal

CAUTION: Nuts and bolts must be tightened with the weight of the vehicle on the suspension.

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.

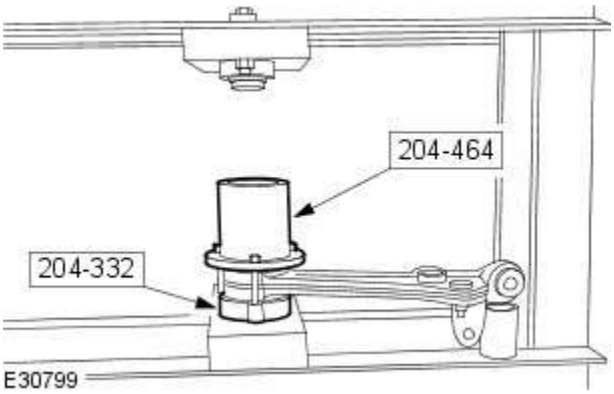
2. Remove the rear lower arm.
   For additional information, refer to: Rear Lower Arm (204-01 Front Suspension, Removal and Installation).



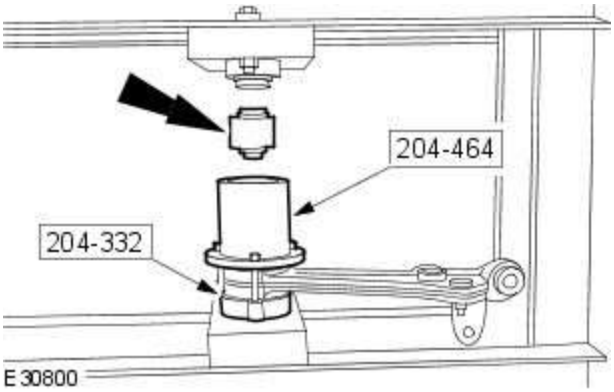
3. NOTE: Note the fitted position.

   Using the special tools, remove and discard the lower arm rear bushings.

Installation

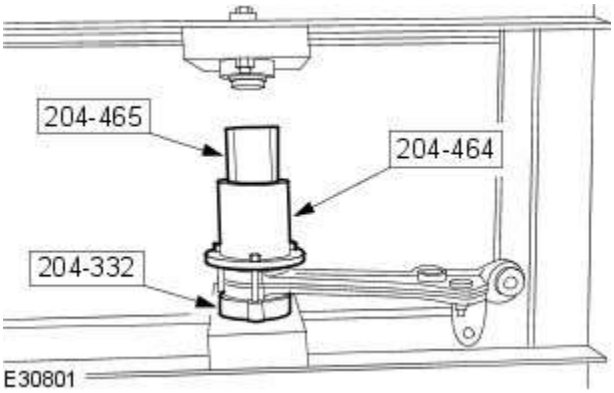


1. Install the special tools to the rear lower arm.
   - Tighten the bolts.

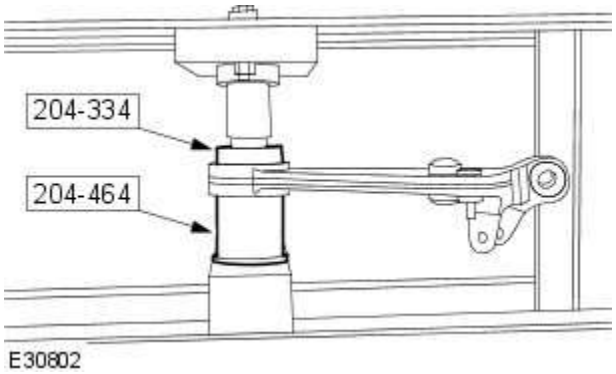


2. NOTE: Align to the position noted on removal.

   Position the bushing in the special tool.



3. Using the special tools, partially install the lower arm bushing.



4. Change the special tools, then complete installation of the bushing.

5. Install the rear lower arm.
   For additional information, refer to: Rear Lower Arm (204-01 Front Suspension, Removal and Installation).

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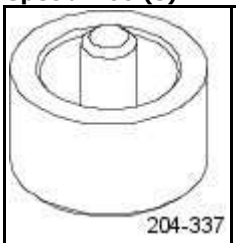
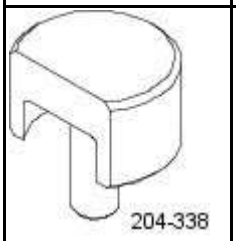
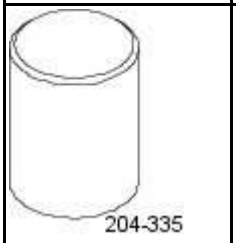
Front Suspension - Shock Absorber Bushing

Removal and Installation

Special Tool(s)

	Replacer support-bush 204-337
	Replacer-bush 204-338
	Remover-bush 204-336
	Remover support-bush 204-335

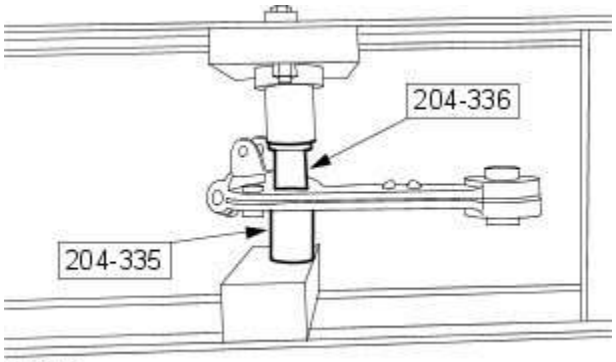
Removal

CAUTION: Nuts and bolts must be tightened with the weight of the vehicle on the suspension.

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

   Raise the vehicle on a 4 post lift.

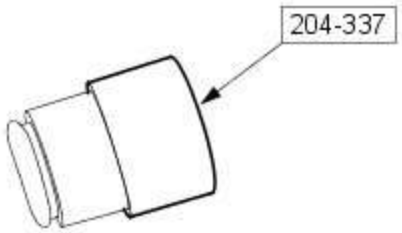
2. Remove the rear lower arm.
   For additional information, refer to: Rear Lower Arm (204-01 Front Suspension, Removal and Installation).



E30779

3. NOTE: Take note of the fitted position of the bush. Using the special tools, remove the shock absorber bushing.

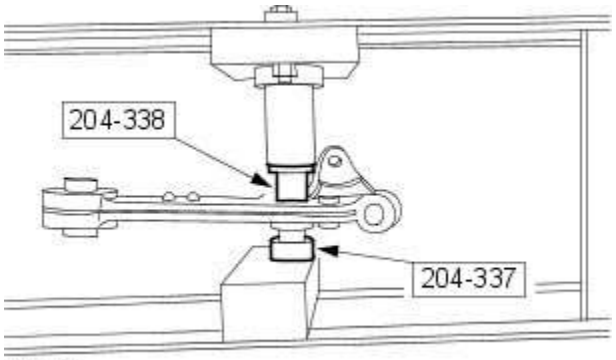
Installation



E30781

1. NOTE: Make sure the shock absorber bushing boot is correctly located into the special tool.

   Install the bushing into the special tool.



E30782

2. NOTE: Align to the position noted on removal.

   Using the special tools, install the shock absorber bushing.

3. Install the rear lower arm.
   For additional information, refer to: Rear Lower Arm (204-01 Front Suspension, Removal and Installation).

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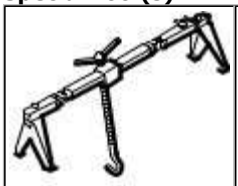
Front Suspension - Front Stabilizer Bar V8 5.0L Petrol/V8 S/C 5.0L Petrol

Removal and Installation

Special Tool(s)

 303-021	303-021 Engine support bracket

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. 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.

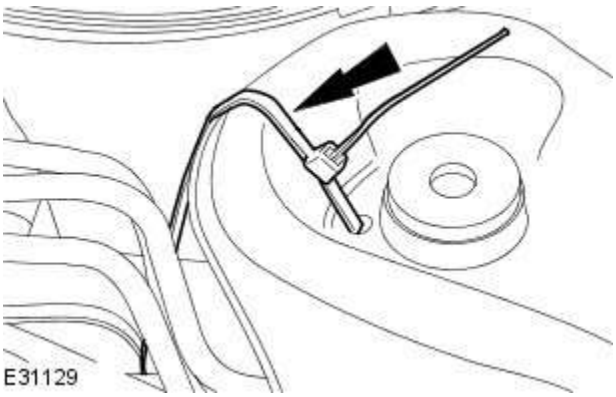
3. Refer to: Air Conditioning (A/C) System Recovery, Evacuation and Charging (412-00 Climate Control System - General Information, General Procedures).

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

5. Refer to: Air Deflector (501-02 Front End Body Panels, Removal and Installation).

6. Refer to: Front Wheel Bearing and Wheel Hub - TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol (204-01 Front Suspension, Removal and Installation).

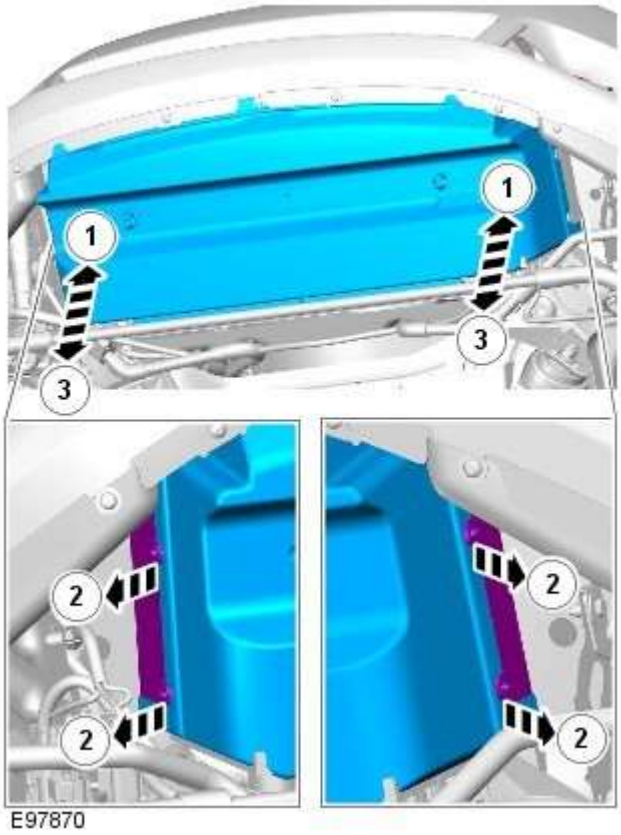
7. Refer to: Engine Cover - V8 5.0L Petrol/V8 S/C 5.0L Petrol (501-05 Interior Trim and Ornamentation, Removal and Installation).



8.
   - Secure the radiator assembly.

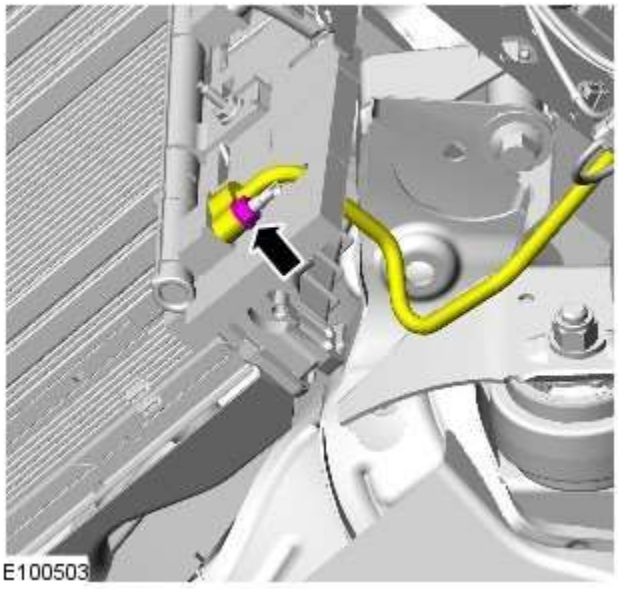
9.

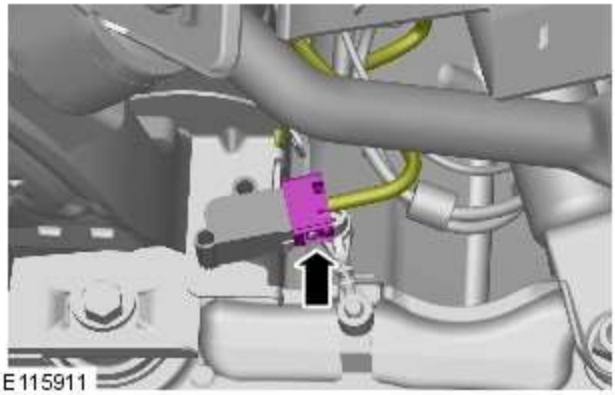
- Raise and support the vehicle.



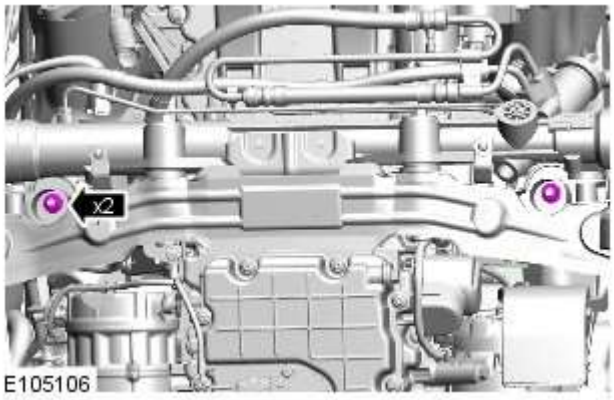
E97870

10. *Torque:* 8 Nm


E100503

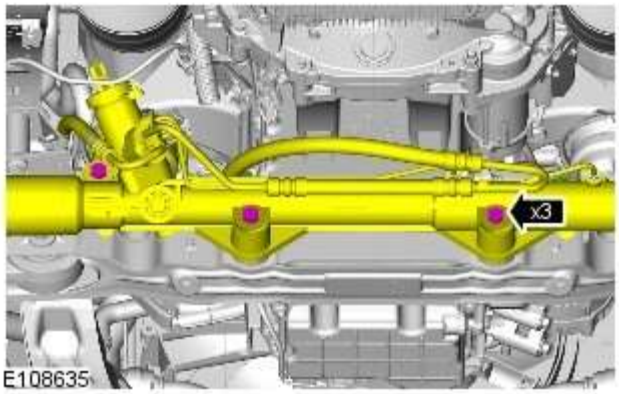


11. NOTE: LH illustration shown, RH is similar.



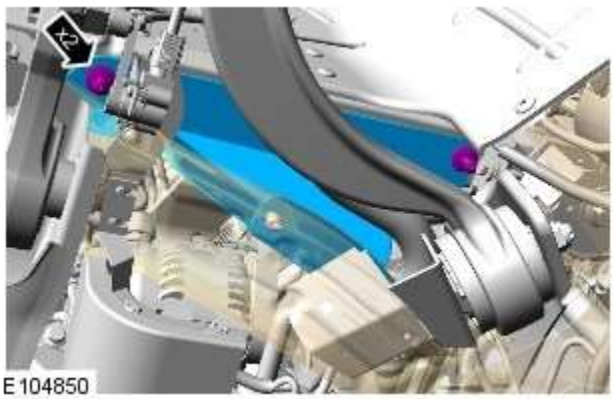
12. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Torque: 45 Nm



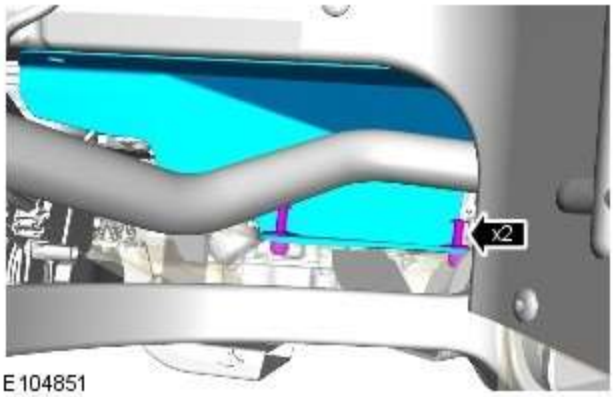
13. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

Torque: 100 Nm



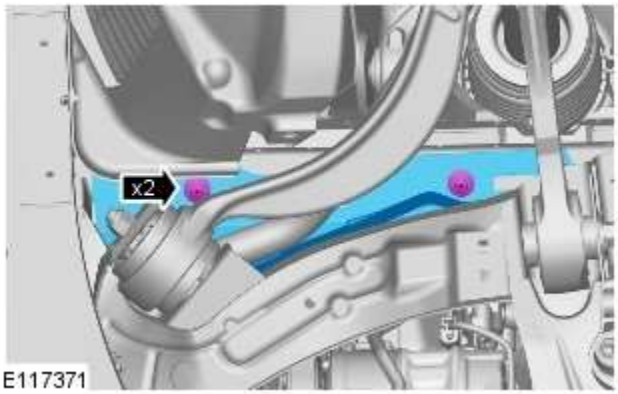
14.

15.



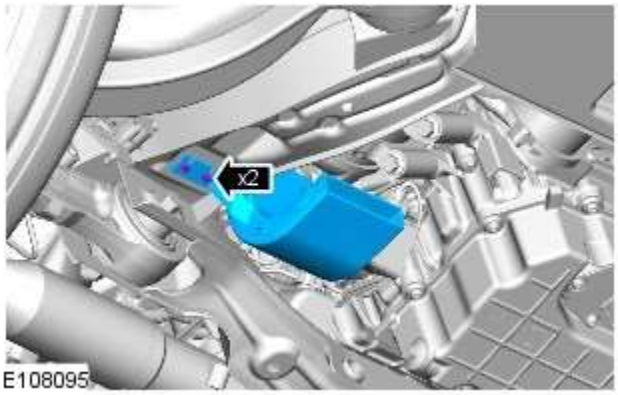
E104851

16.



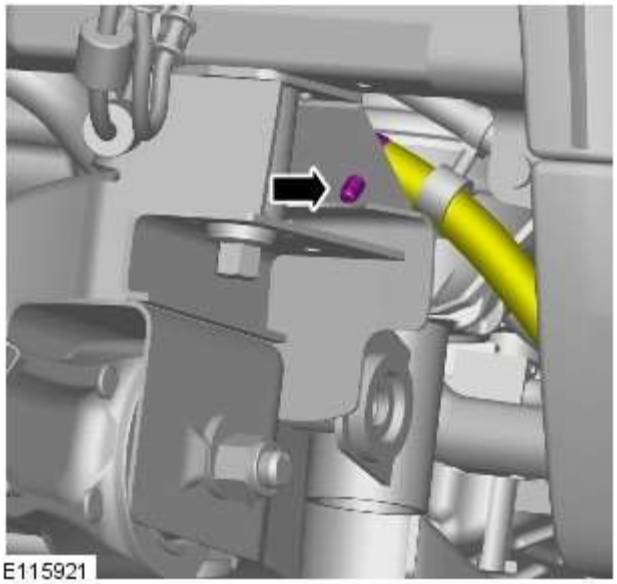
E117371

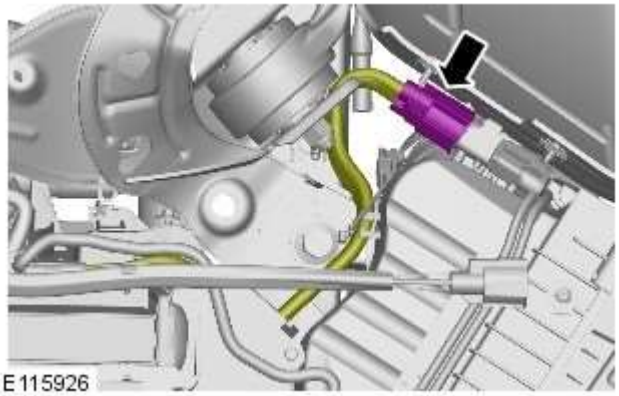
17.



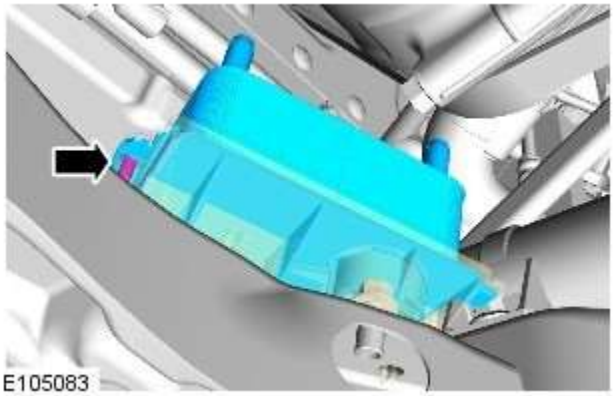
E108095

18.



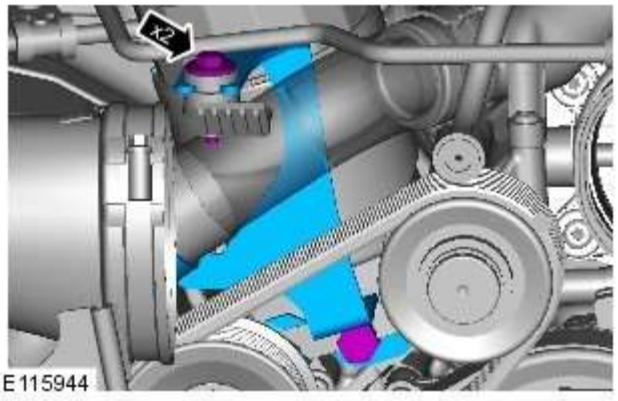


19. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

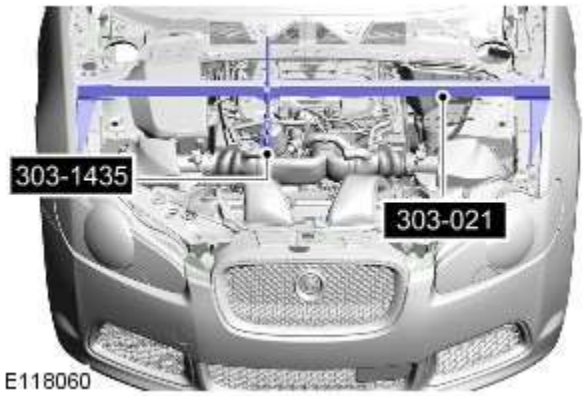


20. *Torque:* 5 Nm

21. Lower the vehicle.



22. *Torque:*
    M6 9 Nm
    M10 40 Nm



23. CAUTIONS:

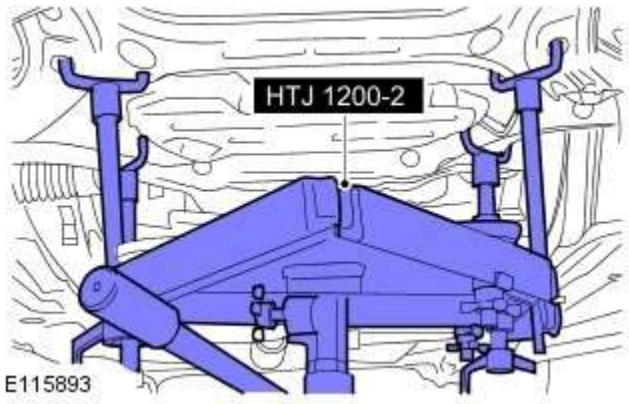
    Support the engine on a jack. The angle may need to be adjusted during this procedure.

    Make sure to protect the paintwork.

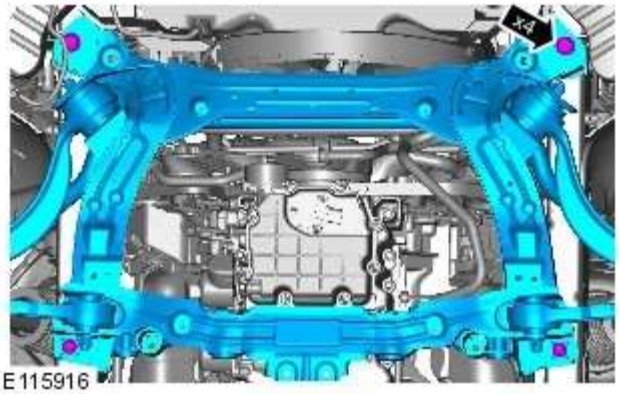
    Special Tool(s): 303-021

24. 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.

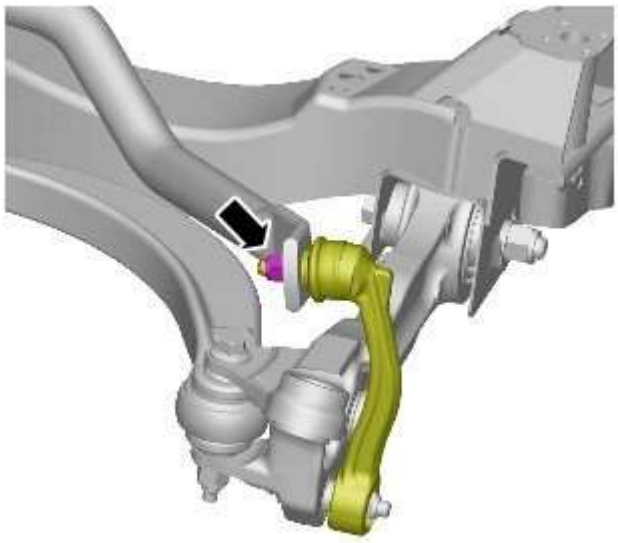


25.



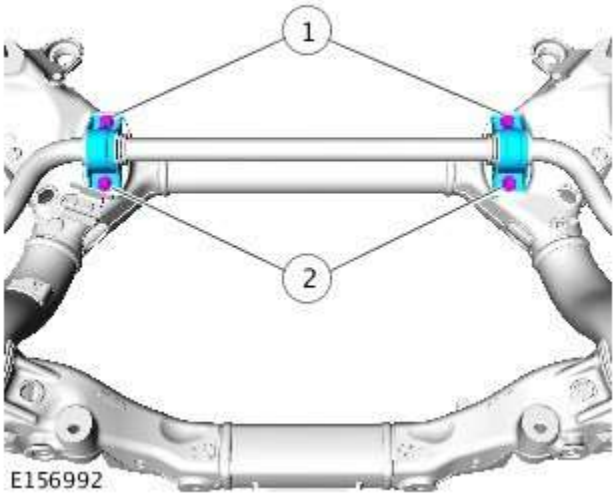
E115916

26.


E118885

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

Torque: 43 Nm

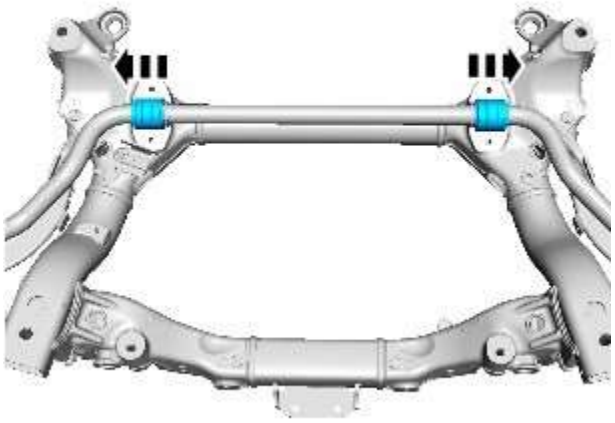


E156992

28. During installation tighten the bolts in the following sequence.

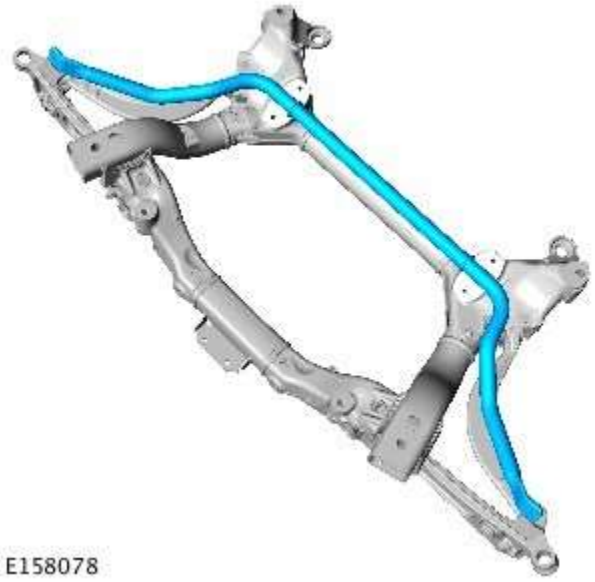
Torque:
Bolt 1 55 Nm
Bolt 2 55 Nm
Bolt 1 55 Nm

29.



E154239

30.



E158078

Installation

1. To install, reverse the removal procedure.
2. Refer to: Camber and Caster Adjustment (204-00 Suspension System - General Information, General Procedures).

Published: 11-May-2011

Front Suspension - Front Stabilizer Bar Link

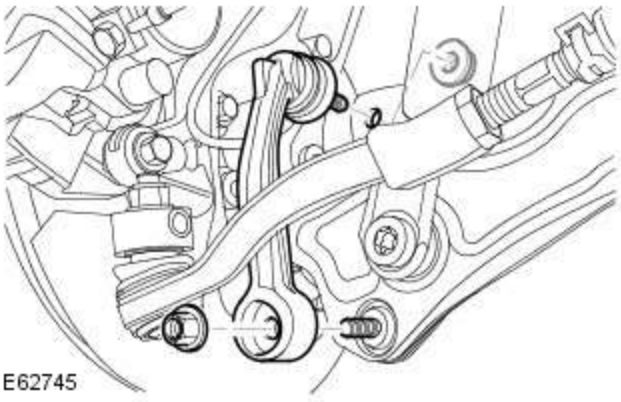
Removal and Installation

Removal

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.

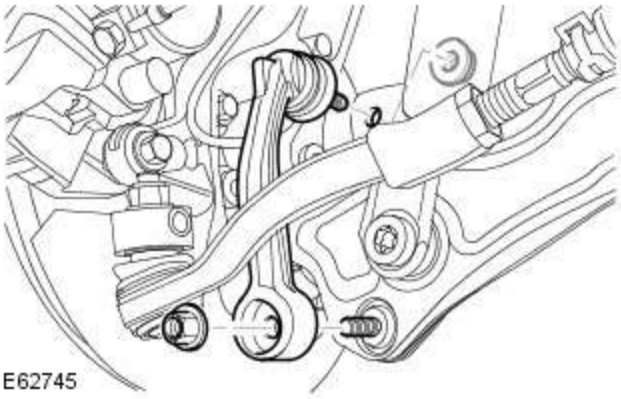
2. Remove the front wheel and tire.
   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).



3. NOTE: Use an additional wrench to prevent the ball joint rotating.

   Remove the front stabilizer bar link.
   - Remove and discard the 2 nuts.

Installation



1. NOTE: Use an additional wrench to prevent the ball joint rotating.

   Install the front stabilizer bar link.
   - Tighten the upper nut to 47 Nm.
   - Tighten the lower nut to 70 Nm.

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

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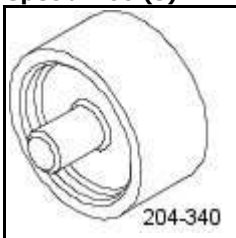
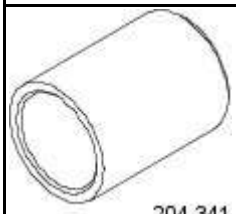
Front Suspension - Stabilizer Bar Link Bushing

Removal and Installation

Special Tool(s)

	Bush installer 204-340
	Bush remove 204-342
	Support 204-341
	Support 204-339

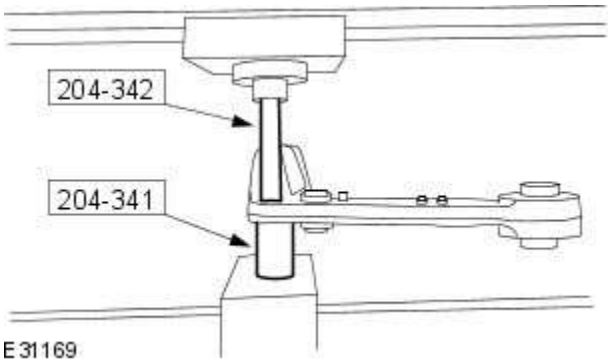
Removal

CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

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

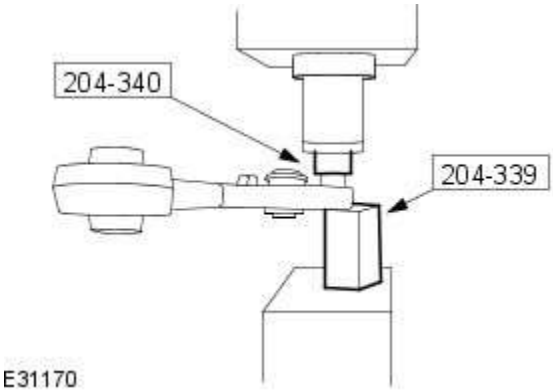
   Raise the vehicle on a 4 post lift.

2. Remove the rear lower arm.
   For additional information, refer to: Rear Lower Arm (204-01 Front Suspension, Removal and Installation).



3. Using the special tools, remove and discard the stabilizer bar link bushing.

Installation



1. NOTE: Apply water to lubricate the bushing.

   Using the special tools, install the stabilizer bar link bushing.

2. Install the rear lower arm.
   For additional information, refer to: Rear Lower Arm (204-01 Front Suspension, Removal and Installation).

Published: 11-May-2011

Front Suspension - Upper Arm LH

Removal and Installation

Removal

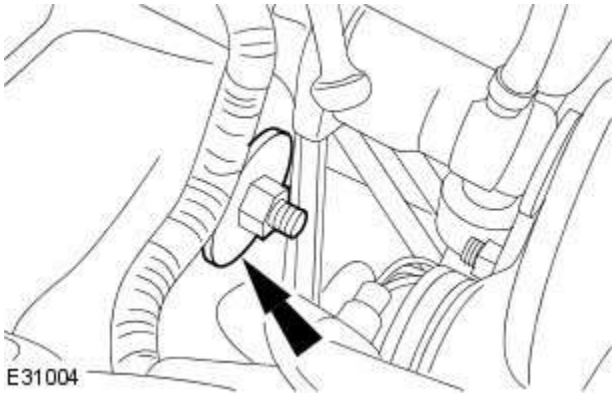
1. WARNING: Do not work on or under a vehicle supported only by a jack. Always support the vehicle on safety stands.

   Raise and support the vehicle.

2. Remove the front shock absorber.
   For additional information, refer to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation).

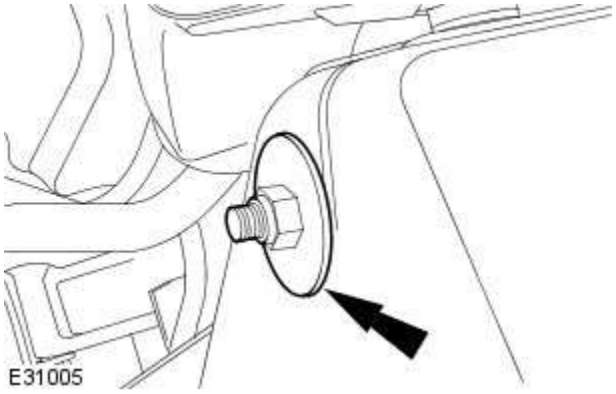
3. Remove the secondary bulkhead panel LH.
   For additional information, refer to: Secondary Bulkhead Panel LH - 3.0L NA V6 - AJ27 (501-02 Front End Body Panels, Removal and Installation).

4. Remove the air cleaner.
   For additional information, refer to: Air Cleaner (303-12A, Removal and Installation) /
   Air Cleaner (303-12B Intake Air Distribution and Filtering - V6 3.0L Petrol, Removal and Installation) /
   Air Cleaner (303-12C, Removal and Installation) /
   Air Cleaner LH (303-12D, Removal and Installation).



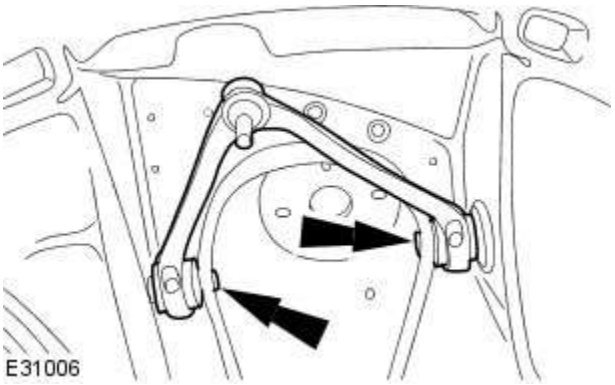
5. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

   Remove the upper arm retaining nut.



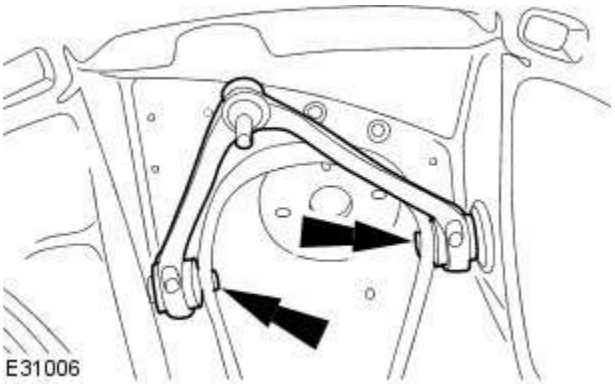
6. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

   Remove the upper arm retaining nut.

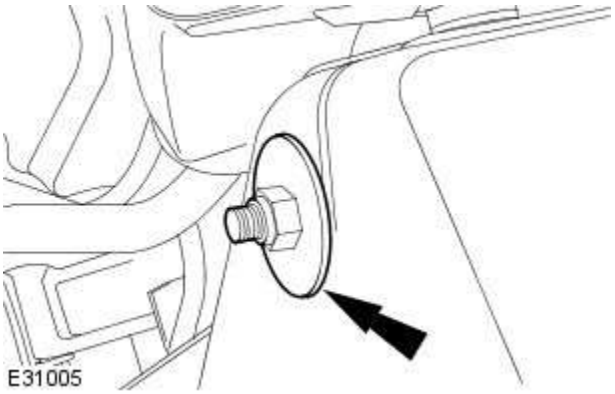


7. Remove the upper arm.

Installation

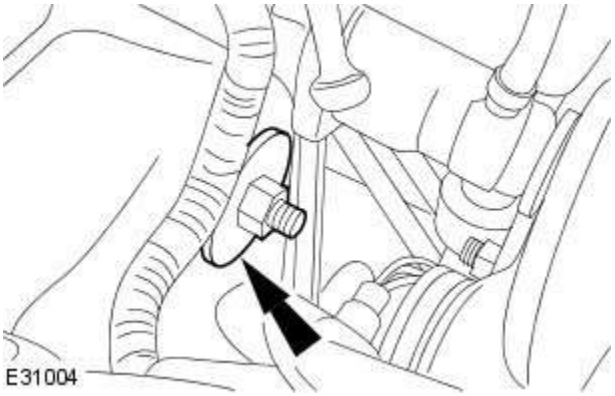


1. Install the upper arm.



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

   Install the upper arm retaining nut, but do not tighten fully at this stage.

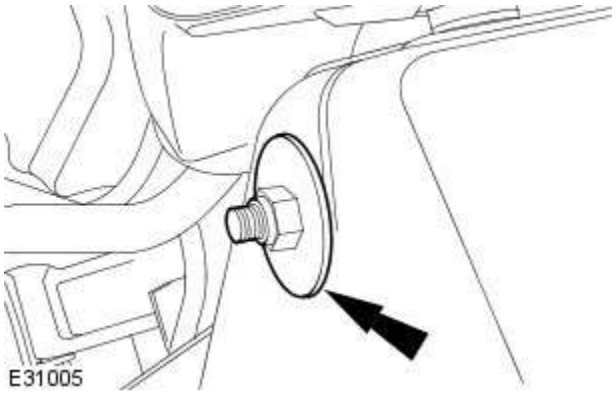


3. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

   Install the upper arm retaining nut, but do not tighten fully at this stage.

4. Install the front shock absorber.
   For additional information, refer to: Front Shock Absorber (204-01 Front

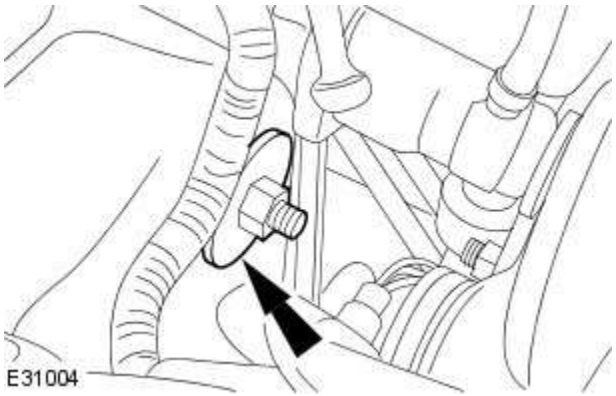
Suspension, Removal and Installation).



5. CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

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

   Tighten to 47 Nm.



6. CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

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

   Tighten to 47 Nm.

7. Install the air cleaner.
   For additional information, refer to: Air Cleaner (303-12A, Removal and Installation) /
   Air Cleaner (303-12B Intake Air Distribution and Filtering - V6 3.0L Petrol, Removal and Installation) /
   Air Cleaner (303-12C, Removal and Installation) /
   Air Cleaner LH (303-12D, Removal and Installation).

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

Published: 11-May-2011

Front Suspension - Upper Arm RH

Removal and Installation

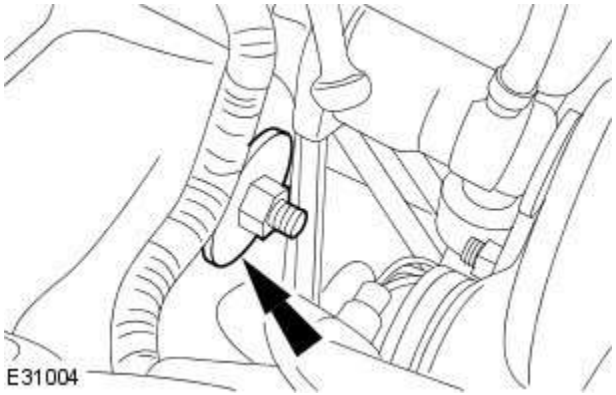
Removal

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.

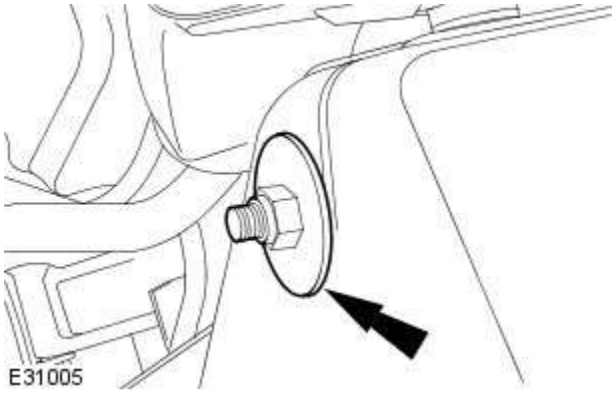
2. Remove the front shock absorber.
   For additional information, refer to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation).

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



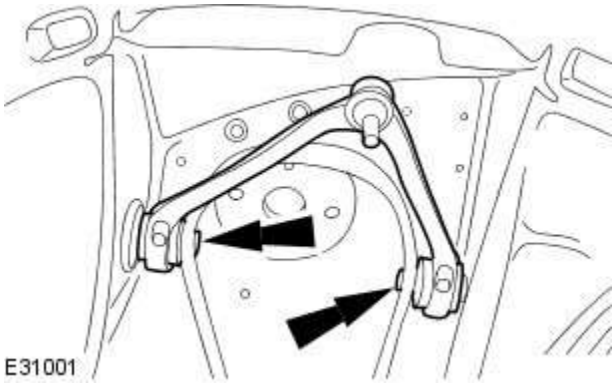
4. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

   Remove the upper arm retaining nut.



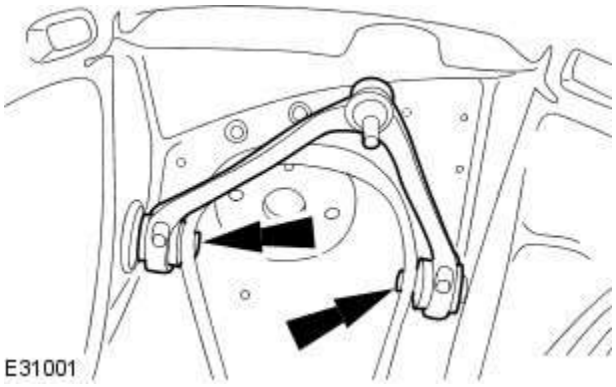
5. NOTE: Some variation in the illustrations may occur, but the essential information is always correct.

   Remove the upper arm retaining nut.

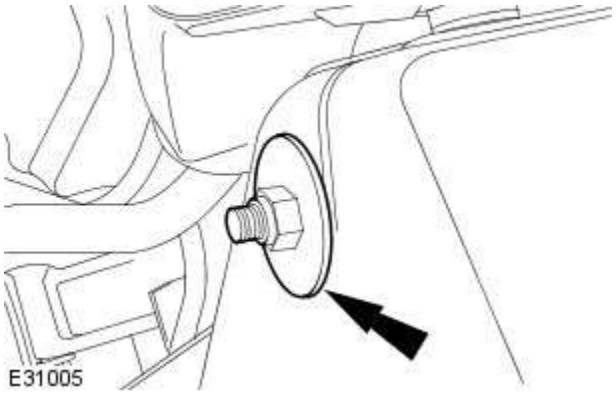


6. Remove the upper arm.

Installation

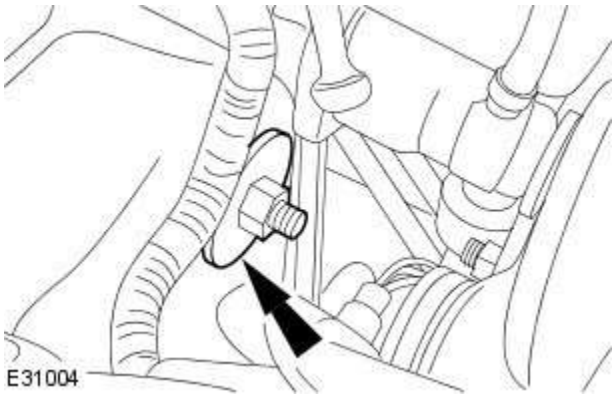


1. Install the upper arm.



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

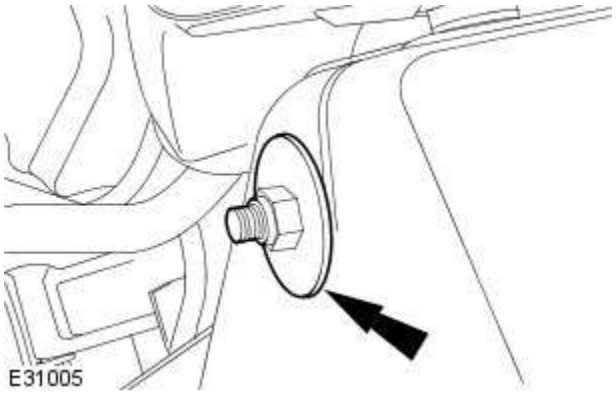
   Install the upper arm retaining nut, but do not tighten fully at this stage.



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

   Install the upper arm retaining nut, but do not tighten fully at this stage.

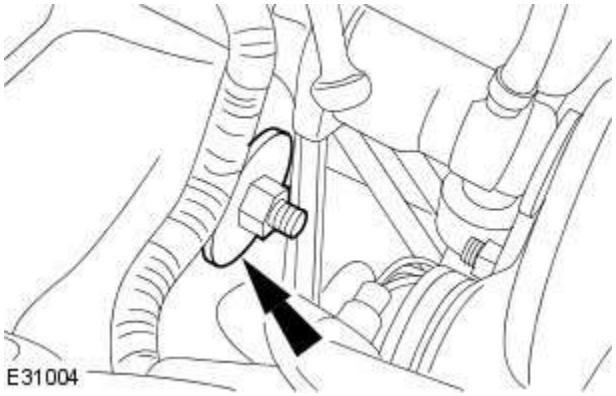
4. Install the front shock absorber.
   For additional information, refer to: Front Shock Absorber (204-01 Front Suspension, Removal and Installation).



5. CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

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

   Tighten to 47 Nm.



6. CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

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

   Tighten to 47 Nm.

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

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Front Suspension - Front Wheel Bearing and Wheel Hub TDV6 3.0L Diesel /V8 5.0L Petrol/V8 S/C 5.0L Petrol

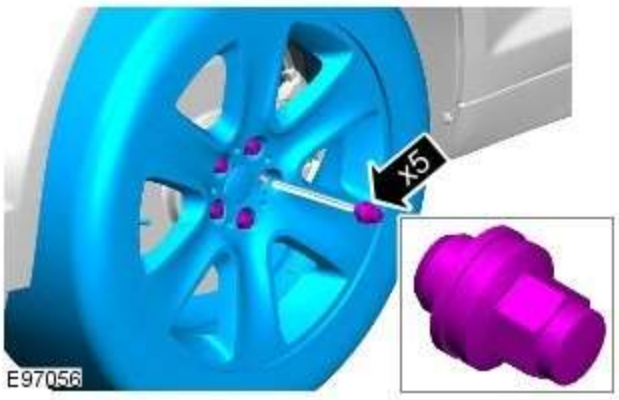
Removal and Installation

Removal

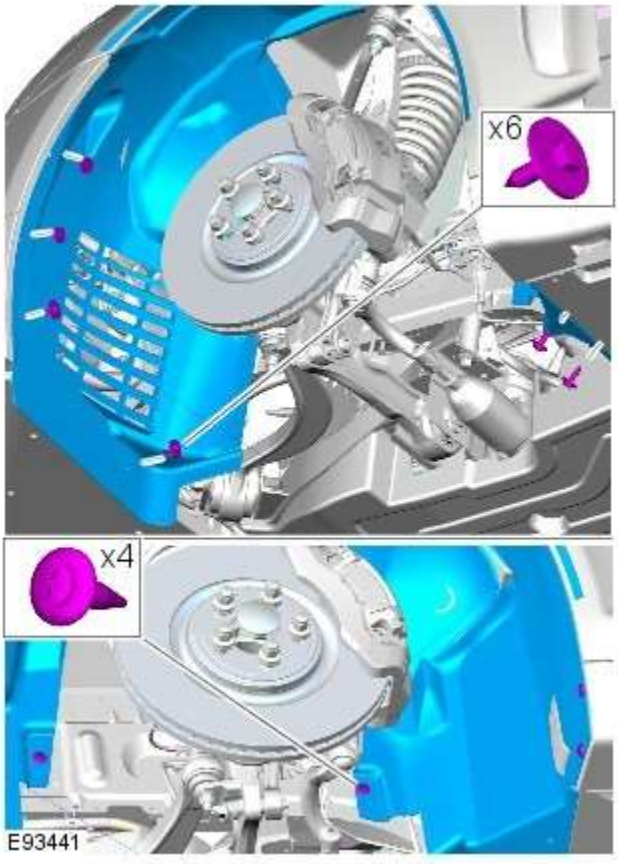
NOTE: Removal steps in this procedure may contain installation details.

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

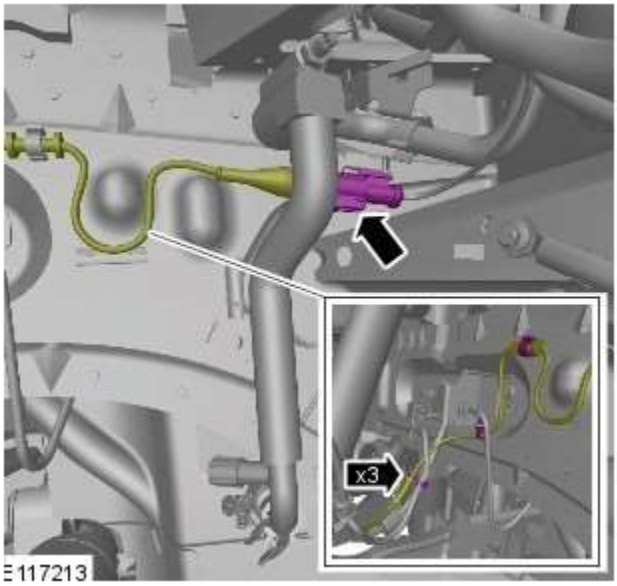
   Raise and support the vehicle.



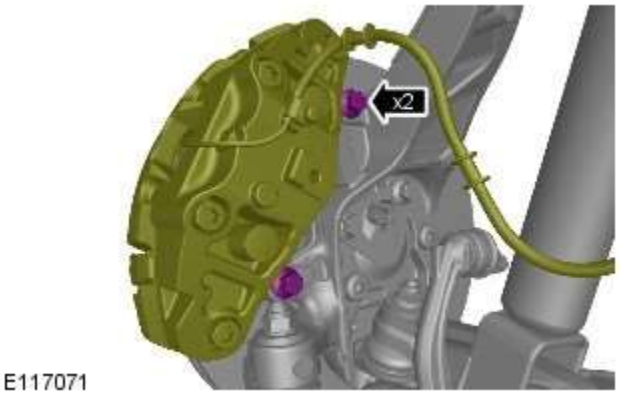
2. *Torque:* 125 Nm



3. *Torque:* 10 Nm



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



5. CAUTION: Discard the bolts.

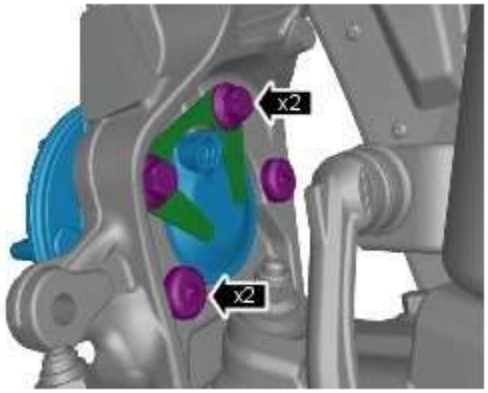
NOTES:

LH illustration shown, RH is similar.

Secure with cable ties.

Torque: 115 Nm

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



E117072

7. CAUTIONS:

Discard the bolts.

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

Do not attempt to release the wheel hub by hitting it with a hammer directly, loosen the wheel hub retaining bolts partially before applying an even amount of force to the head of each bolts to release the wheel hub from the wheel knuckle. Failure to follow this instruction may cause damage to the component.

NOTES:

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

LH illustration shown, RH is similar.

Install the components to their original fitted positions.

Torque: 90 Nm

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Front Suspension - Wheel Knuckle

Removal and Installation

Special Tool(s)

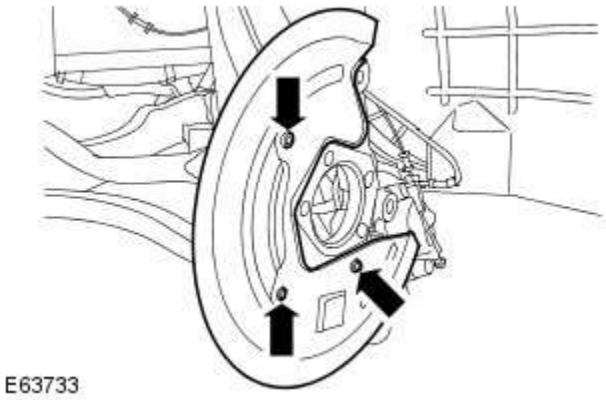
 E63732	Ball joint splitter 204-327

Removal

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

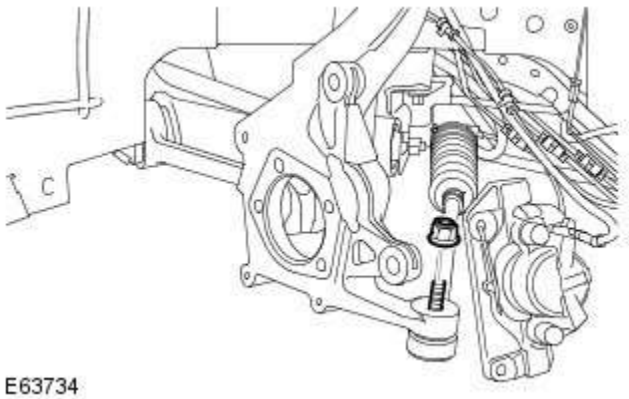
   Raise and support the vehicle.

2. Remove the hub assembly.
   For additional information, refer to: Front Wheel Bearing and Wheel Hub - V6 3.0L Petrol (204-01 Front Suspension, Removal and Installation).


E63733

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

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

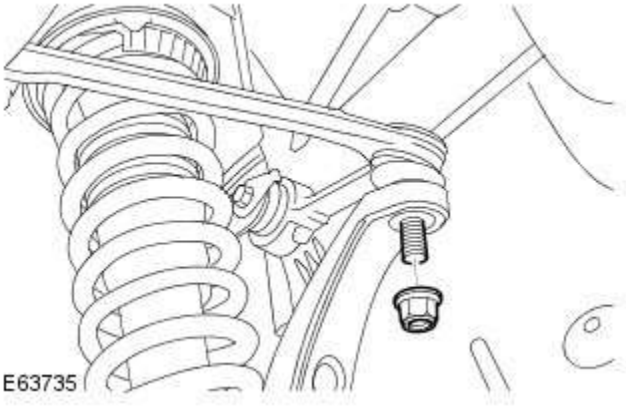

E63734

4. NOTES:

   LH illustration shown, RH is similar.

   Use an additional wrench to prevent the ball joint rotating.

   Disconnect the steering gear tie rod end ball joint.
   - Remove and discard the tie rod end retaining nut.

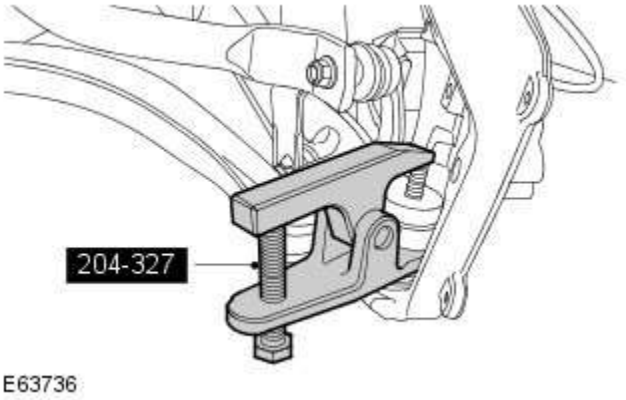


5. NOTES:

   Use an additional wrench to prevent the ball joint rotating.

   LH illustration shown, RH is similar.

   Disconnect the upper arm from the wheel knuckle.
   - Remove and discard the nut.



6. CAUTION: Make sure the ball joint seal is not damaged. A damaged seal will lead to the premature failure of the joint.

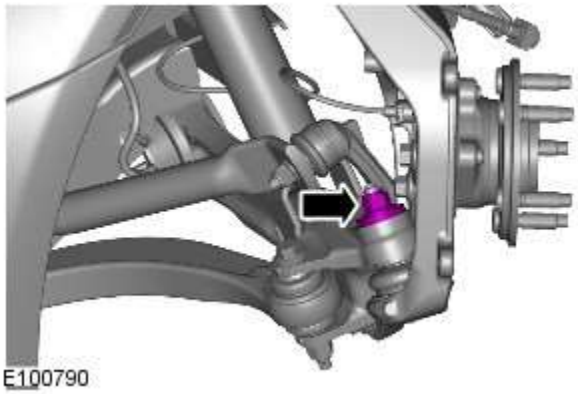
   NOTES:

   Use an additional wrench to prevent the ball joint rotating.

   LH illustration shown, RH is similar.

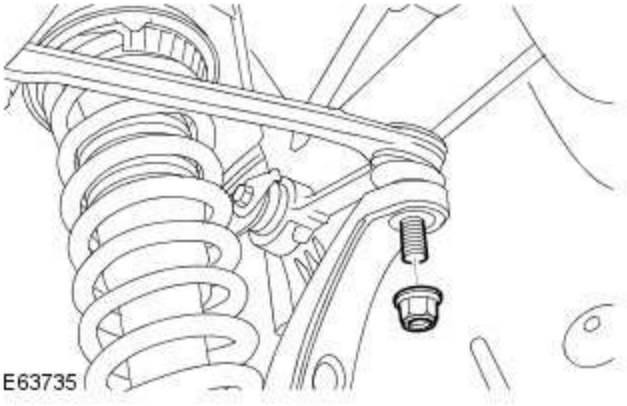
   Remove the wheel knuckle.
   - Remove and discard the nut.
   - Using the special tool, release the ball joint from the lower suspension arm.

Installation



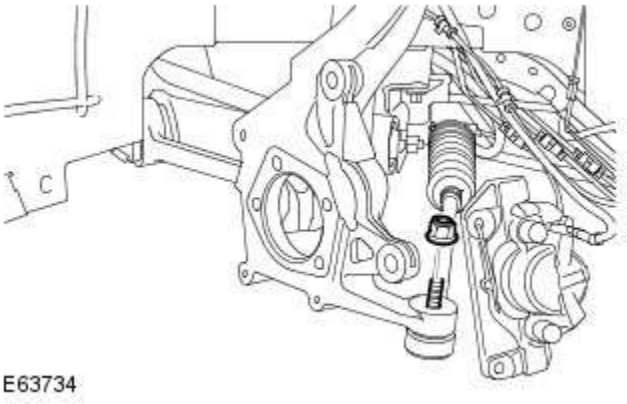
1. NOTE: Use an additional wrench to prevent the ball joint rotating.

   Install the wheel knuckle.
   - Clean the component mating faces.
   - Tighten the nut to 92 Nm.



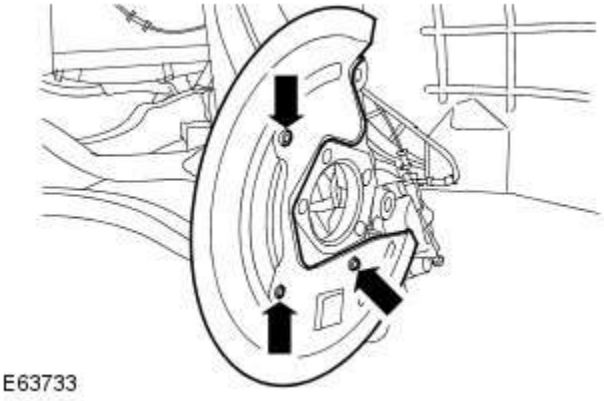
2. NOTE: Use an additional wrench to prevent the ball joint rotating.

   Connect the upper arm and wheel knuckle.
   - Tighten the nut to 90 Nm.



3. NOTE: Use an additional wrench to prevent the component from rotating.

   Connect the tie-rod end ball joint.
   - Tighten the nut to 133 Nm.



4. Install the brake disc shield.
   - Install the rivets.

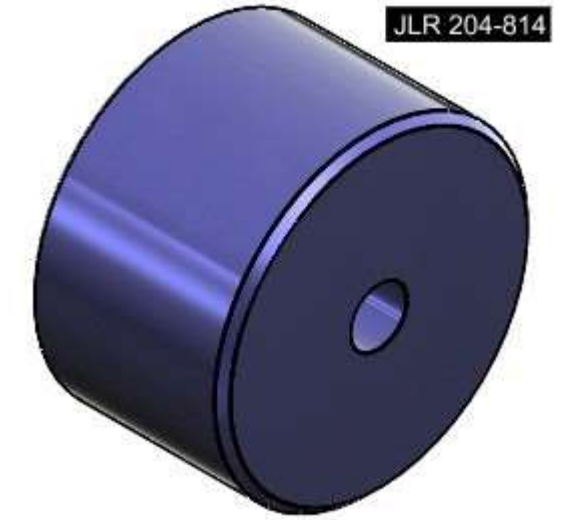
5. Install the hub assembly.
   For additional information, refer to: Front Wheel Bearing and Wheel Hub - V6 3.0L Petrol (204-01 Front Suspension, Removal and Installation).

Published: 19-Nov-2013

Front Suspension - Front Lower Arm Bushing

Removal and Installation

Special Tool(s)

 E152493	JLR-204-813 Remover/Installer, Lower Arm Bush
 E152494	JLR-204-814 Remover/Installer, Lower Arm Bush

 E152495	JLR-204-815 Remover/Installer, Lower Arm Bush

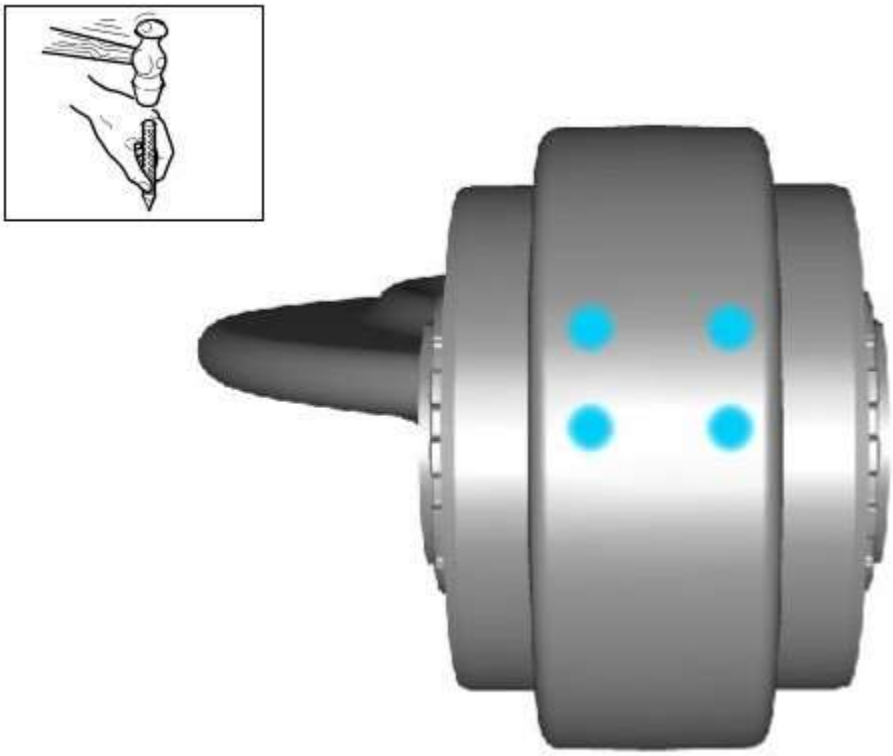
General Equipment

Center punch
Hydraulic press

Removal

NOTE: Removal and installation of the bush requires the use of a press.

1. **Visually inspect the lower arm for signs of a center punch mark. If four marks are located on the lower arm in the area illustrated, install a new front lower arm.**

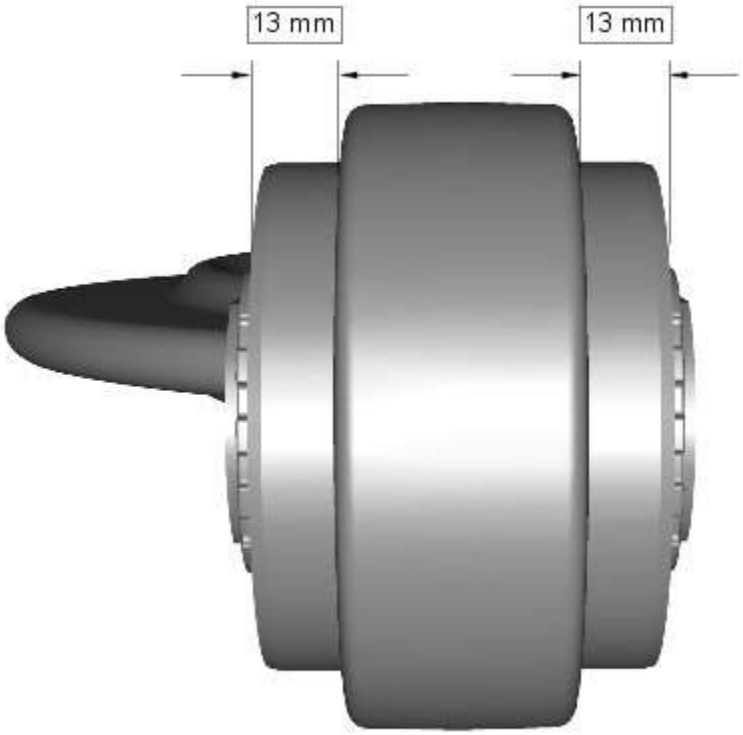


E154276

2. Only continue with the procedure below if there is less than four marks on the lower front arm.

   Refer to: Front Lower Arm (204-01 Front Suspension, Removal and Installation).

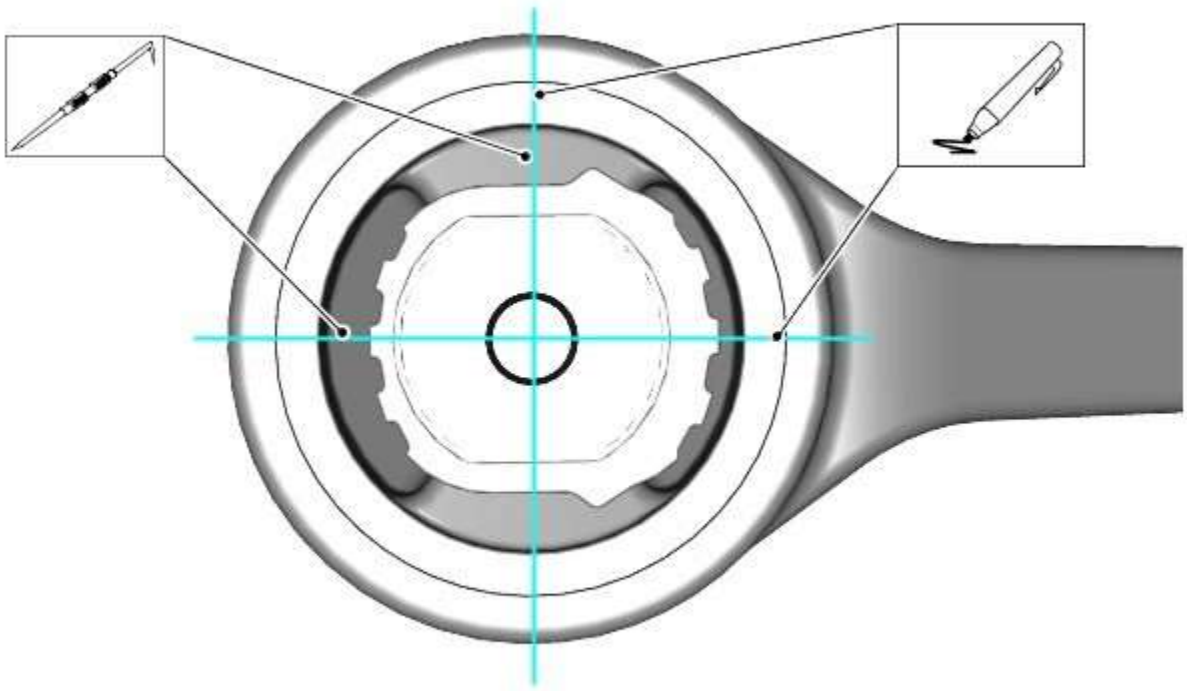
3. Measure and note the value both sides of the bush as illustrated prior to removal.



E154199

4. CAUTION: Note the orientation of the bush prior to removal.

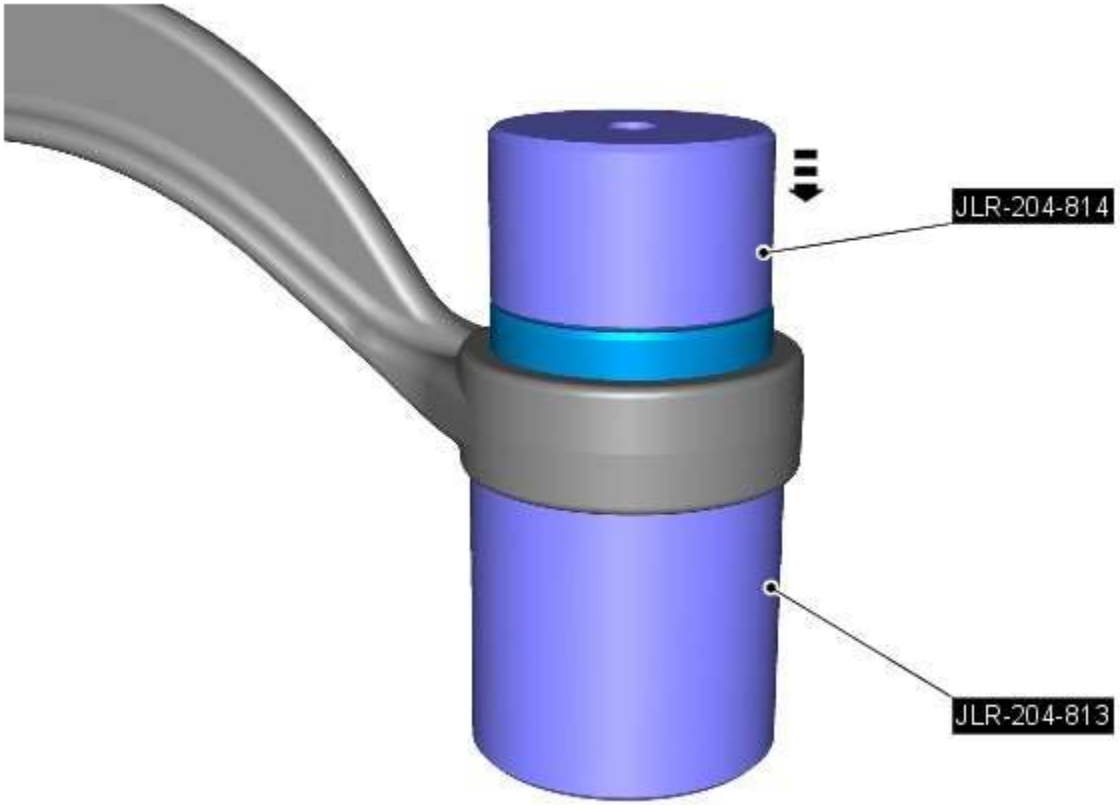
   Using suitable marking tools, mark the bush and lower arm prior to removal.



E154197

5. Using the special tools, remove the bush.

Special Tool(s): JLR-204-813, JLR-204-814
General Equipment: Hydraulic press

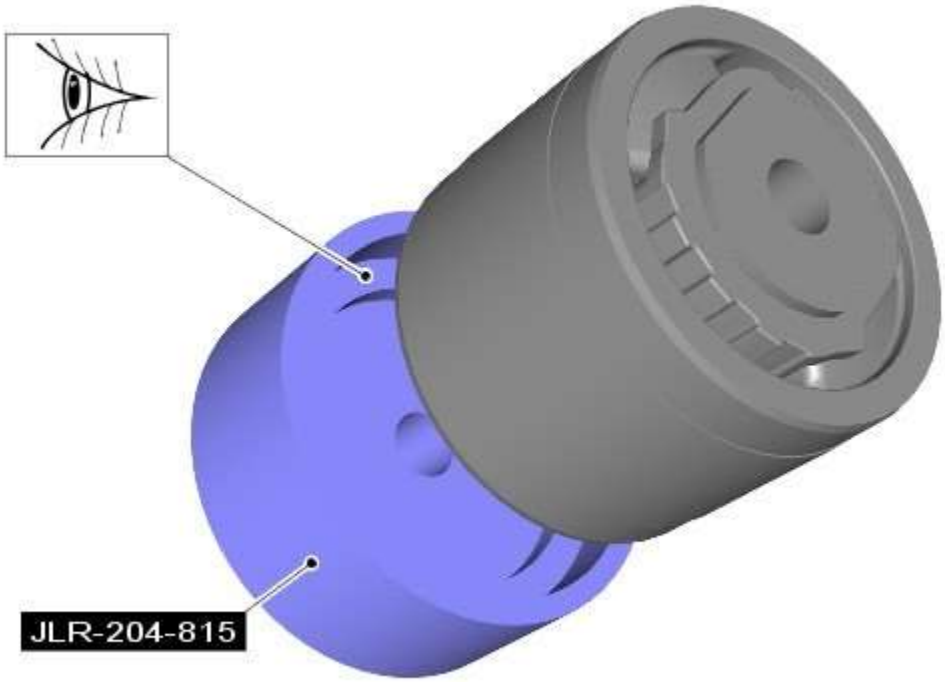


E154200

Installation

1. NOTE: Make sure that the bush is correclty seated in the special tool.

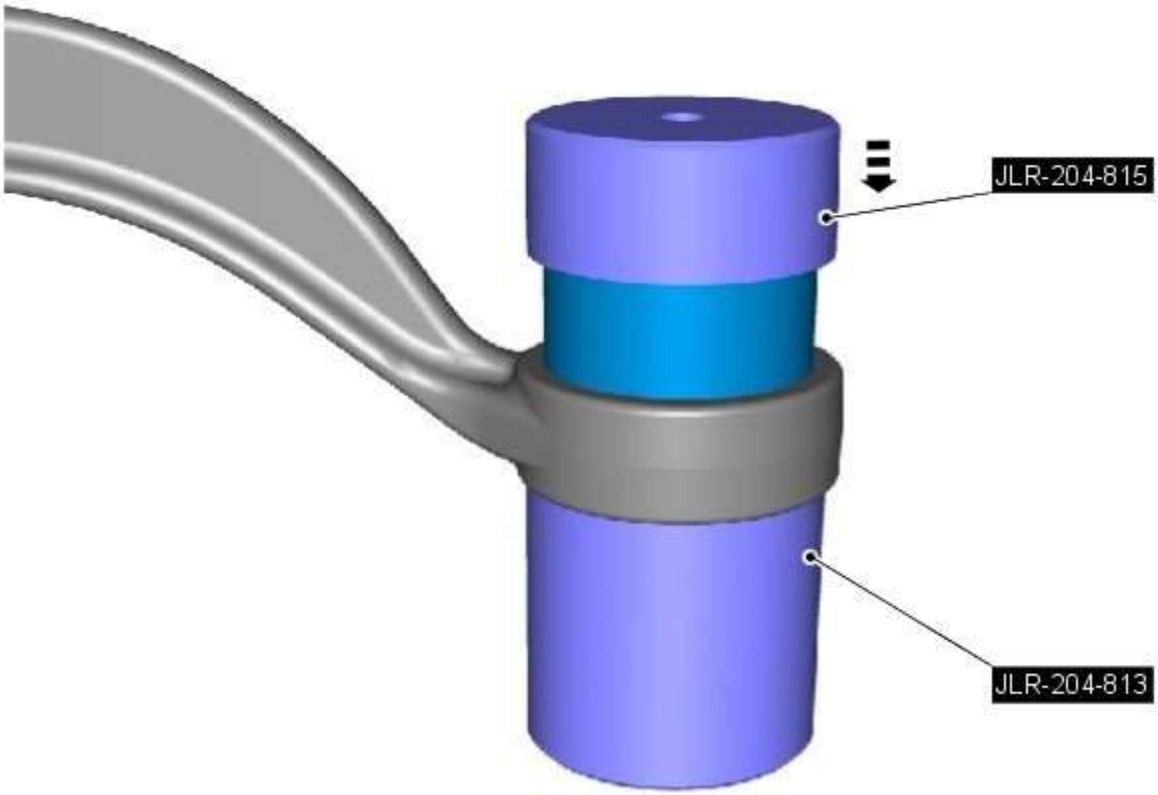
   Special Tool(s): JLR-204-815



E154196

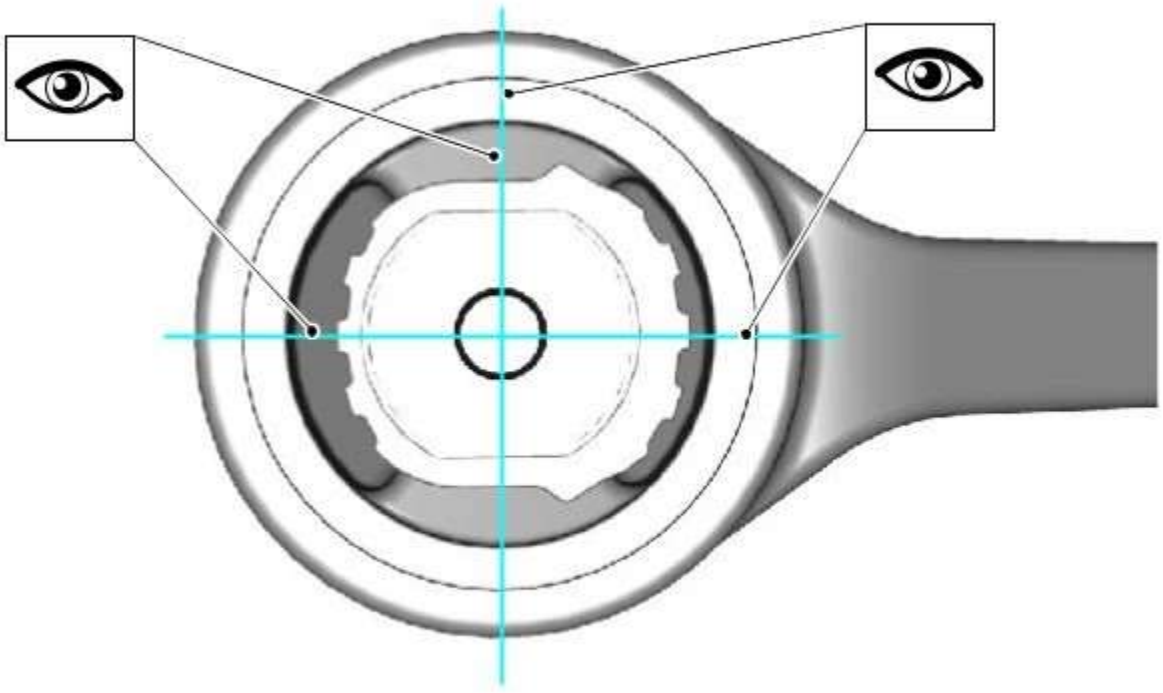
2. Using the special tools, remove the bush.

Special Tool(s): JLR-204-813, JLR-204-815
General Equipment: Hydraulic press



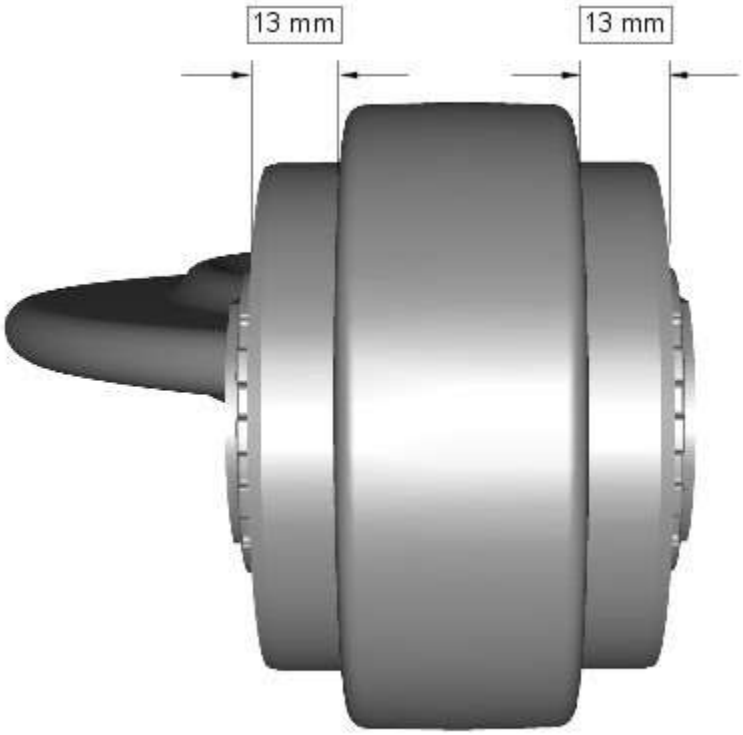
E154198

3. Make sure that the bush has been installed to the noted removal position.



E154277

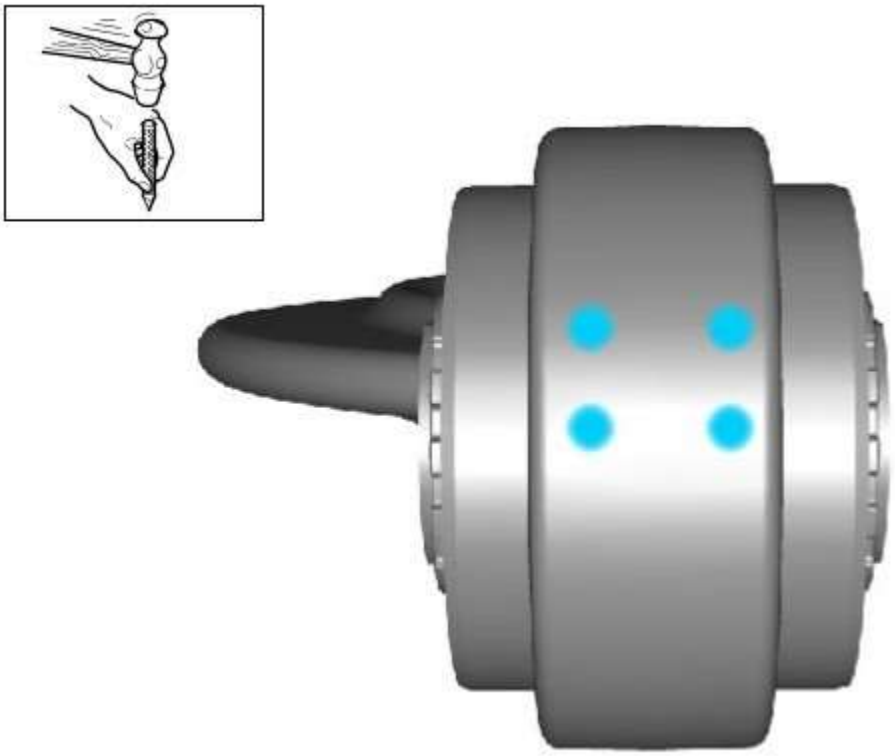
4. Make sure that measurement taken prior to removal is still correct.



E154199

5. **Mark the front lower arm with a center punch, once the procedure has been completed.**

   General Equipment: Center punch



E154276

6. Refer to: Front Lower Arm (204-01 Front Suspension, Removal and Installation).

Published: 11-May-2011

Rear Suspension -

Torque Specifications

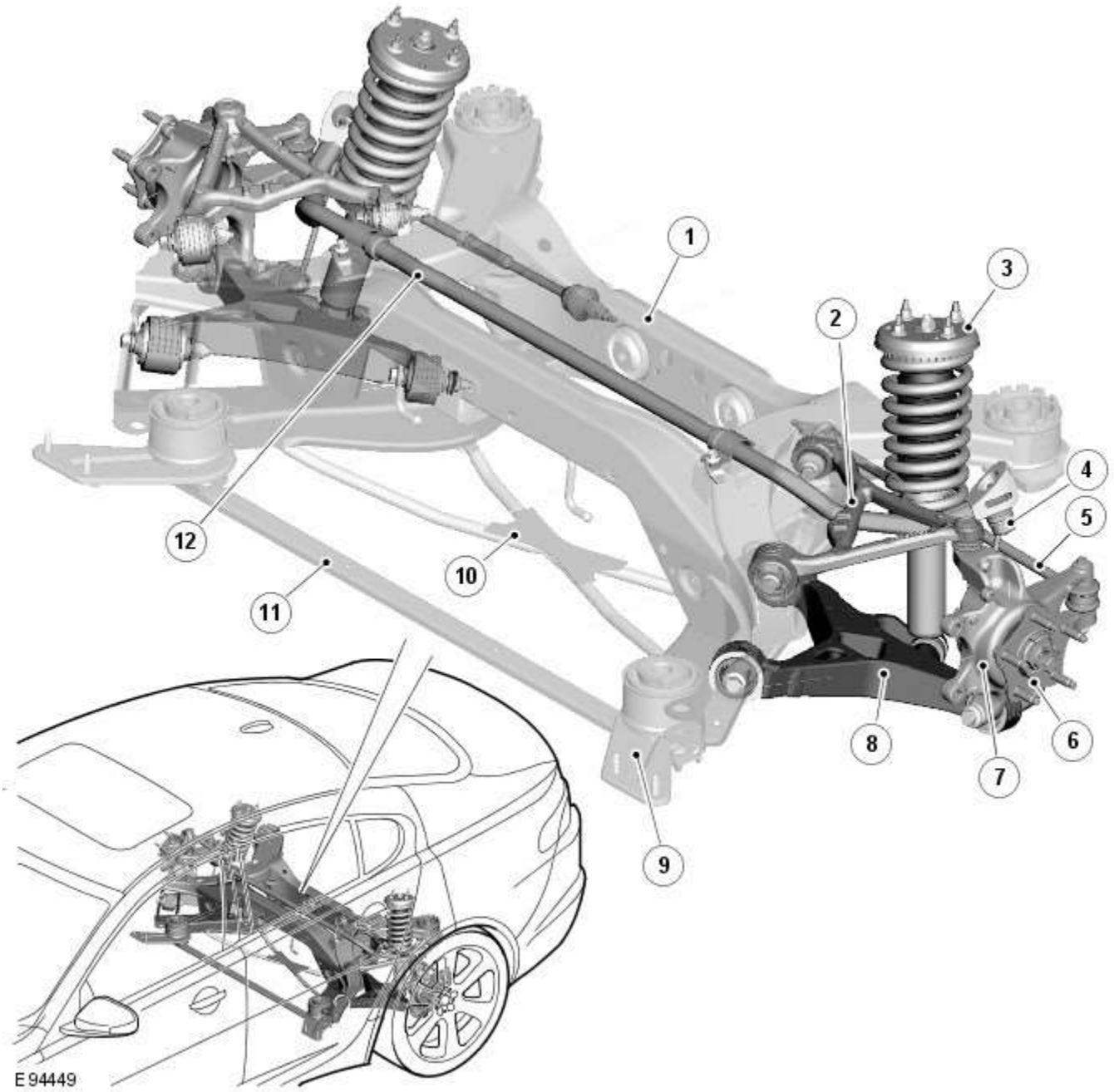
Description	Nm	lb-ft	lb-in
Halfshaft outer constant velocity joint retaining nut	300	221	-
Lower arm to wheel knuckle retaining nut and bolt	190	140	-
Lower arm to subframe retaining nut and bolt	192	142	-
Lower arm to subframe retaining bolt	192	142	-
Upper arm ball joint to wheel knuckle retaining nut	96	71	-
Upper arm to subframe retaining nut and bolt	115	85	-
Toe link to subframe ball joint retaining nut	90	66	-
Toe link to wheel knuckle retaining nut and bolt	63	46	-
Toe link setting nut	55	41	-
Shock absorber and spring assembly upper mounting to body retaining nuts	28	21	-
Shock absorber and spring assembly upper mounting retaining nut (without adaptive damping)	50	37	-
Shock absorber and spring assembly upper mounting retaining nut (with adaptive damping)	27	20	-
Shock absorber to lower arm retaining bolt	133	98	-
Stabilizer bar link to stabilizer bar retaining nut	48	35	-
Stabilizer bar clamp to subframe retaining bolt	55	41	-
Stabilizer bar link to lower arm retaining nut	48	35	-
Wheel and tire to wheel hub retaining nuts	125	92	-

Published: 11-May-2011

Rear Suspension - Rear Suspension - Component Location

Description and Operation

COMPONENT LOCATION



Item	Description
1	Subframe
2	Upper control arm
3	Spring and damper assembly
4	Stabilizer bar link
5	Toe link
6	Wheel hub and bearing assembly
7	Wheel knuckle
8	Lower control arm
9	Shear bracket

10	Cross brace
11	Single brace
12	Stabilizer bar

Published: 11-May-2011

Rear Suspension - Rear Suspension - Overview

Description and Operation

OVERVIEW

The double wishbone type rear-suspension is a fully independent design assembled on a steel subframe; large diameter bushes isolate the subframe from the vehicle's body.

A toe-link located between the wheel knuckle and the subframe is used to adjust the toe angle of the rear wheels.

The wheel knuckle attaches to the upper and lower control arms, and the coil spring and damper assembly is located between the lower control arm and the vehicle body.

Dependant on vehicle model there are three types of coil spring and damper available:

- a standard oil passive damper (All models except supercharged),
- an adaptive damper, also known as Computer Active Technology Suspension (CATS) on 4.2L supercharged vehicles up to 2010MY, For additional information refer to Vehicle Dynamic Suspension 4.2L.
- a continuously variable adaptive damper, also known as Adaptive Dynamics System on 5.0L supercharged vehicles from 2010MY. For additional information refer to Vehicle Dynamic Suspension 5.0L.

Published: 20-Jun-2011

Rear Suspension - Rear Suspension - System Operation and Component Description

Description and Operation

System Operation

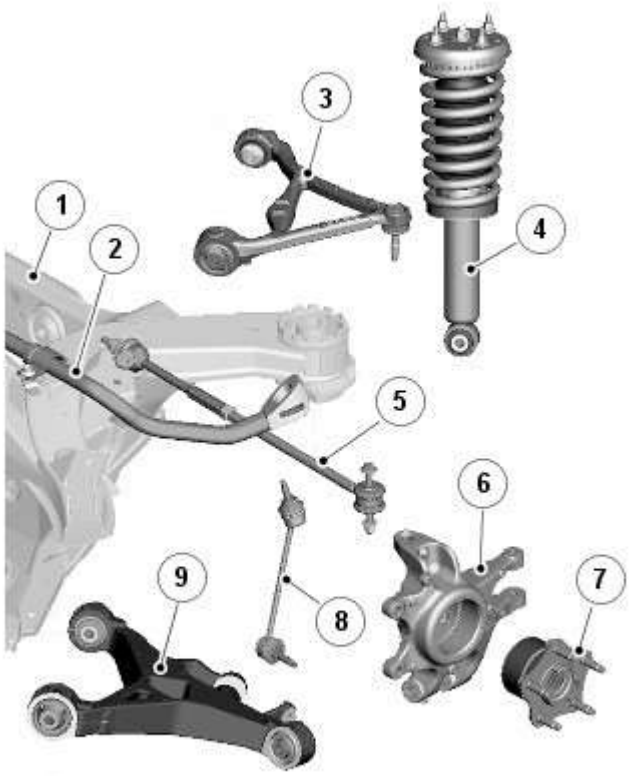
The double wishbone type rear-suspension is assembled on a fabricated high-grade steel subframe. Large diameter mounting bushes are used to isolate the subframe from the vehicle's body; the front bushes are hydrabushes, the rear are voided rubber.

To achieve optimum suspension refinement a cross-brace is used to increase the torsional stiffness of the subframe. The single brace attached to the shear brackets helps to reduce the transmission of road noise.

An adaptive damping system is available on specified models. For additional information refer to Vehicle Dynamic Suspension 4.2L or 5.0L.

Component Description

COMPONENTS



E94999

Item	Description
1	Subframe
2	Stabilizer bar
3	Upper control arm
4	Spring and damper assembly
5	Toe link
6	Wheel knuckle
7	Wheel hub and bearing assembly
8	Stabilizer bar link
9	Lower control arm

Upper Control Arm

The cast aluminum upper control arm locates to the subframe via one cross-axis joint and one plain rubber bush, and links to

the aluminum wheel knuckle via an integral ball-joint.

Lower Control Arm

The aluminum lower arm locates to the subframe via one cross-axis joint and one plain rubber bush, and to the wheel knuckle via a second plain rubber bush.

The rear of the control arm has mounting points for the damper and the stabilizer link.

Toe-Link

The toe-link is located between the wheel knuckle and brackets on the subframe.

The toe-link comprises an inner rod with integral axial ball joint. The inner ball joint has a threaded spigot which locates in a bracket on the subframe and is secured with a locknut. The rod has an internal thread which accepts the outer rod.

The outer rod has a cross-axis joint at its outer end which is located in a clevis on the wheel knuckle, and is secured with a bolt and locknut.

The length of the toe-link can be adjusted by rotating the inner rod. This allows for adjustment of the toe angle for the rear wheel. Once set the inner rod can be locked in position by tightening a locknut on the outer rod against the inner rod.

Wheel Knuckle

The cast aluminum wheel knuckle attaches to:

- the upper control arm via a ball-joint located in the arm,
- the lower control arm via a plain rubber bush located in the arm,
- the toe-link via a cross-axis joint located in the toe link.

The wheel knuckle also provides the mounting locations for the:

- wheel hub assembly,
- wheel bearing,
- wheel speed sensor,
- brake caliper,
- and disc shield.

Stabilizer Bar

The solid construction stabilizer bar and bushes have been designed to provide particular characteristics in maintaining roll rates, specifically in primary ride comfort. There are six derivatives of rear stabilizer bar, with different diameters, to support the various powertrains:

- V6 gasoline - 12.7 mm solid bar
- V8 4.2L and 5.0L gasoline - 13.6 mm solid bar
- V6 2.7L diesel -14.5 mm solid bar
- V6 3.0L diesel - 14.5 mm solid bar
- V6 3.0L diesel with Adaptive Damping – 16mm tubular
- V8 4.2L gasoline supercharged – 16mm tubular
- V8 5.0L gasoline supercharged
  - SV8 - 17mm tubular
  - XFR - 18mm tubular

The stabilizer bar is attached to the top of the subframe with two bushes and mounting brackets. The stabilizer bar has crimped, 'anti-shuffle' collars pressed in position on the inside edges of the bushes. The collars prevent sideways movement of the stabilizer bar.

Each end of the stabilizer bar curves rearward to attach to a ball joint on each stabilizer link. Each link is attached via a second ball joint to a cast bracket on the lower control arm. The links allow the stabilizer bar to move with the wheel travel providing maximum effectiveness.

Spring and Damper Assembly

The spring and damper assembly are attached to cast brackets on the lower control arms and to the vehicle body by four studs secured by locking nuts. Dependant on vehicle model there are three types of coil spring and damper available:

- a standard oil passive damper (All models except supercharged),
- an adaptive damper, also known as Computer Active Technology Suspension (CATS) on 4.2L supercharged vehicles up to 2010MY, For additional information refer to Vehicle Dynamic Suspension 4.2L.
- a continuously variable adaptive damper, also known as Adaptive Dynamics System on 5.0L supercharged vehicles from 2010MY. For additional information refer to Vehicle Dynamic Suspension 5.0L.

The dampers are a monotube design with a spring located by a circlip onto the damper tube. The lower end of the damper has a spherical joint which locates in the lower control arm and is secured with a bolt.

The damper piston is connected to a damper rod which is sealed at its exit point from the damper body. The threaded outer end of the damper rod locates through a hole in the top mount. A self locking nut secures the top mount to the damper rod. The damper rod on the adaptive damper has an electrical connector on the outer end of the damper rod.

Supercharged 4.2L vehicles up to 2010MY: The damper functions by restricting the flow of hydraulic fluid through internal galleries in the damper's piston. The adaptive damper has a solenoid operated valve, which when switched allows a greater flow of hydraulic fluid through the damper's piston. This provides a softer damping characteristic from the damper. The adaptive damper defaults to a firmer setting when not activated. The solenoid is computer controlled and can switch between soft and hard damping settings depending on road wheel inputs and vehicle speed.

Supercharged 5.0L vehicles from 2010MY: The variable damper functions by adjustment of a solenoid operated variable orifice, which opens up an alternative path for oil flow within the damper. When de-energized the bypass is closed and all the oil flows through the main (firm) piston. When energized the solenoid moves an armature and control blade, which work against a spring. The control blade incorporates an orifice which slides inside a sintered housing to open up the bypass as required. In compression, oil flows from the lower portion of the damper through a hollow piston rod, a separate soft (comfort) valve, the slider housing and orifice and into the upper portion of the damper, thereby bypassing the main (firm) valve. In rebound the oil flows in the opposite direction

The damper rod is fitted with a spring aid which prevents the top mount making contact with the top of the damper body during full suspension compression and also assists with the suspension tune.

The spring rate of the coil springs can differ between models and are color coded for identification. The coil spring locates on a spring packer and a lower spring seat which is located on the damper body. The spring locates in an upper spring seat which is located on the underside of the top mount. The majority of the roll stiffness is provided by the springs rather than the stabilizer bar as this arrangement allows for a natural frequency of roll, providing a consistent suspension ride.

India-Specific Spring and Damper Assembly Spacers

E137440

Front and rear spring and damper assemblies are fitted with spacers to raise ride height in India-specific vehicles. The front and the rear spacers are the same, their color is black.

Published: 22-May-2012

Rear Suspension - Rear Suspension

Diagnosis and Testing

Principle of Operation

For a detailed description of the suspension system, refer to the relevant Description and Operation section of the workshop manual.REFER to: (204-02 Rear Suspension)

Rear Suspension (Description and Operation),
Rear Suspension (Description and Operation),
Rear Suspension (Description and Operation).

Inspection and Verification

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

Visual Inspection

Mechanical
• Damaged suspension dampers

3. If an obvious cause for an observed or reported condition is found, correct the cause (if possible) before proceeding to the next step
4. If the fault is not visually evident, verify the symptom and refer to the following Symptom Chart

Symptom Chart

Symptom	Possible Cause	Action
Evidence of fluid on suspension damper	• Fluid on damper from an external source • Fluid leaking from damper	• Damper not faulty, do not renew • GO to Pinpoint Test A.

PINPOINT TEST A : DAMPER FLUID LEAK DIAGNOSIS

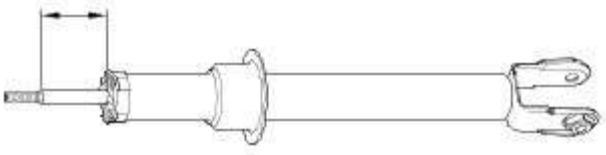
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: ASSESS LEAK	
NOTES: Residual oil left over from the damper assembly process may create oil staining on the damper tube. This will not affect the function of the damper.	
Slight seepage is considered normal.	
	1 Assess the extent of the oil leakage
	Is the leakage serious enough to indicate that the damper seal has failed? **Yes** GO to Pinpoint Test B. **No** Damper not faulty, do not renew.

PINPOINT TEST B : CONFIRM LEAK

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: ROAD TEST	
	1 Clean all traces of oil from the damper
	2 Drive the vehicle over a speed bump or similar ten times
	Is any fluid visible on the outside of the damper? **Yes** GO to Pinpoint Test C. **No** Damper not faulty, do not renew.

PINPOINT TEST C : DAMPER STICKOUT TEST

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
C1: DAMPER STICKOUT TEST	

NOTE: If a significant quantity of fluid has leaked out of the damper, the dividing piston will be displaced upwards in the tube by the pressure of the gas below it. This will limit the downward travel of the piston.	
	1 Remove the suspension strut assembly REFER to: Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).
	2 Remove the spring
	3 Remove the bump stop
	4 Push the damper piston fully into the damper tube
 E144894	**5** Measure and record the stickout dimension (the distance between the damper tube cap and the piston rod shoulder)
	Is the stickout dimension greater than 12.0mm? **Yes** Damper unserviceable. Install a new suspension damper. Enclose a record of the stickout dimension with the returned part. **No** Damper serviceable. Re-assemble and re-install the suspension strut REFER to: Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).

Published: 11-May-2011

Rear Suspension - Lower Arm

Removal and Installation

Removal

NOTES:

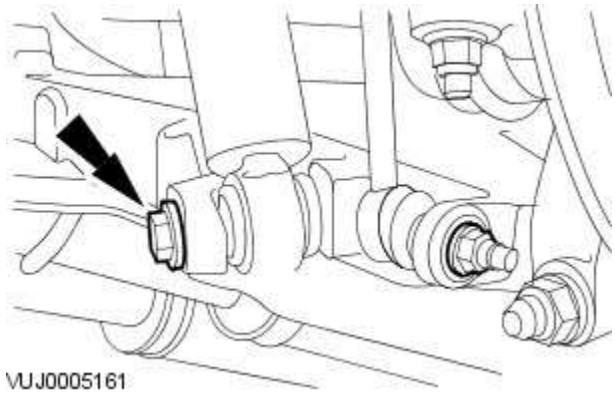
Before commencing work on the vehicle ensure the park brake is in the off position.

LH shown RH similar.

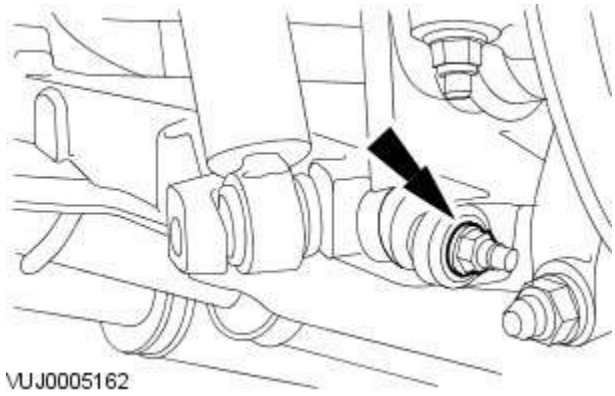
1. WARNING: Make sure to support the vehicle with axle stands.

   Raise the vehicle.

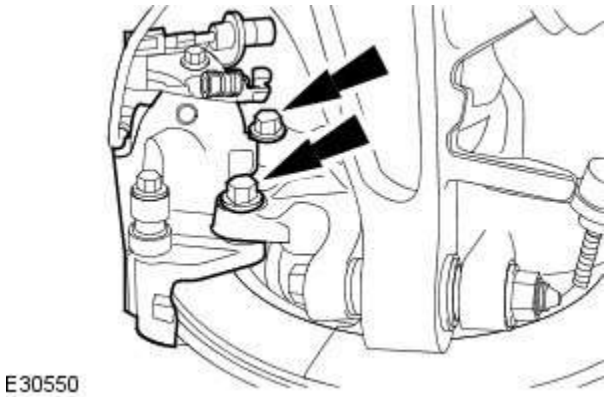
2. Remove the wheel and tire.
   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).


VUJ0005161

3. Release the shock absorber and spring assembly from the lower arm.


VUJ0005162

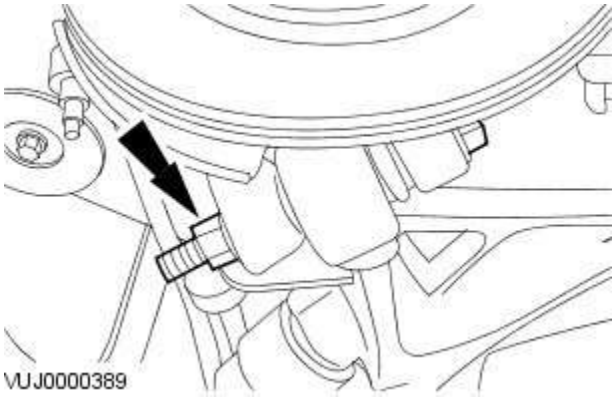
4. Release the rear stabilizer bar link.


E30550

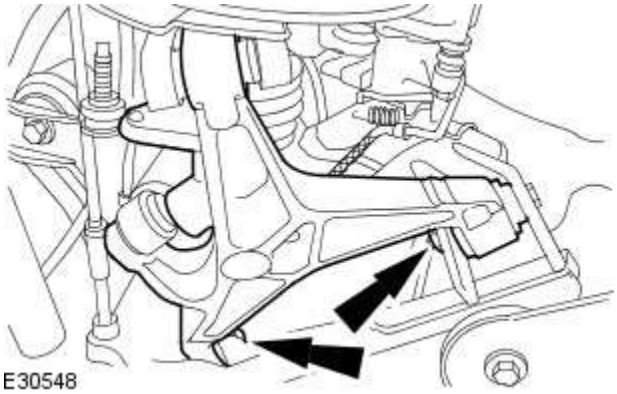
5. CAUTION: Do not allow the brake caliper to hang on the brake hose.

   NOTE: Make sure that new bolts are installed.

   Release the rear brake caliper and tie aside.

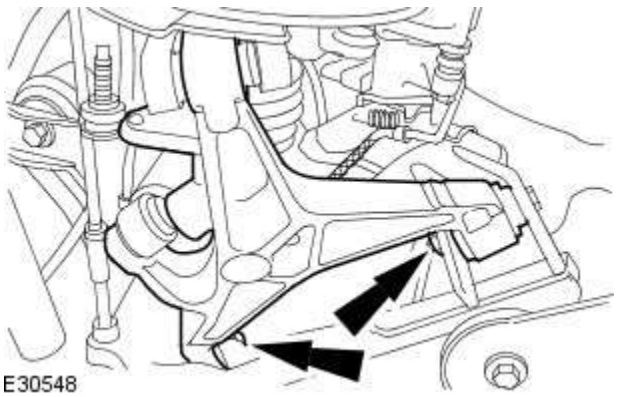

VUJ0000389

6. Release the lower arm from the wheel hub assembly.


E30548

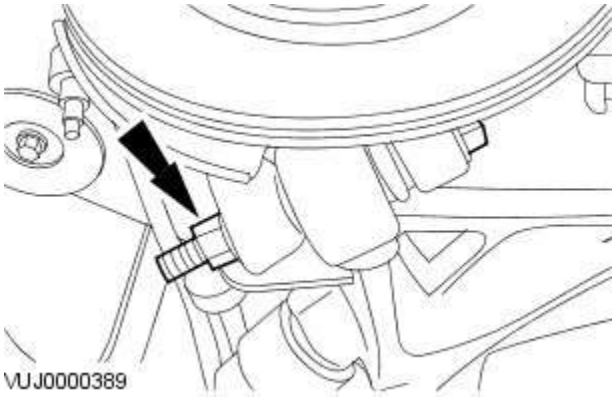
7. Remove the lower arm.

Installation


E30548

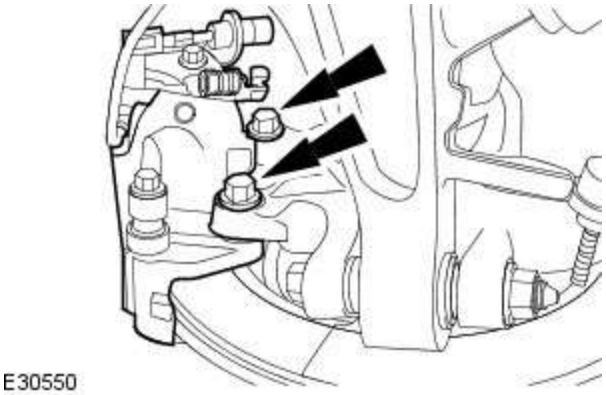
1. CAUTION: Nuts and bolts must be tightened with the weight of the vehicle on the suspension.

   Install the lower arm.


VUJ0000389

2. CAUTION: Nuts and bolts must be tightened with the weight of the vehicle on the suspension.

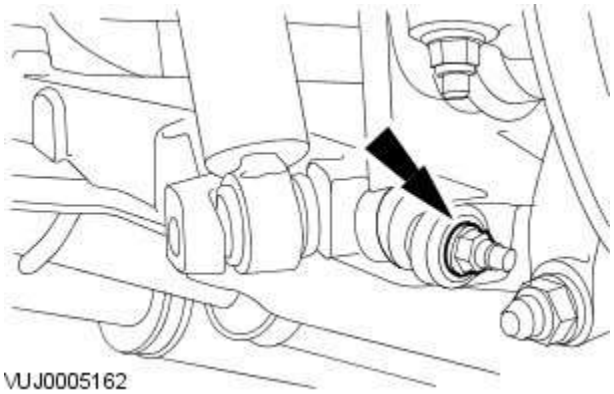
   Secure the lower arm to the wheel hub assembly.


E30550

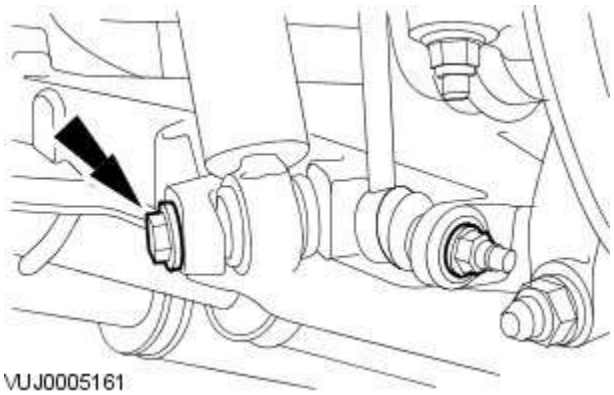
3. CAUTION: Do not allow the brake caliper to hang on the brake hose.

   NOTE: Make sure that new bolts are installed.

   Secure the rear brake caliper.
   - Tighten the bolts to 103 Nm.


VUJ0005162

4. Secure the rear stabilizer bar link.
   - Tighten the nut to 48 Nm.

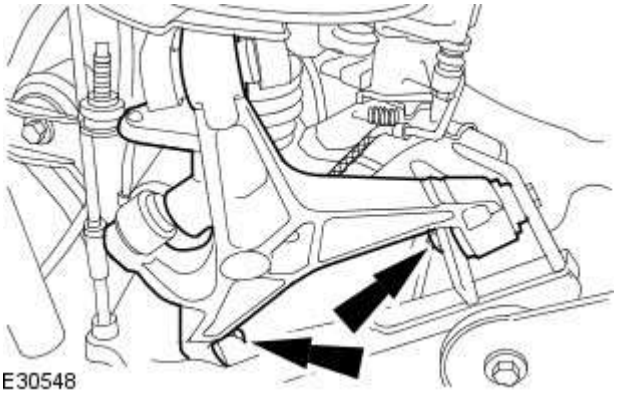

VUJ0005161

5. CAUTION: Nuts and bolts must be tightened with the weight of the vehicle on the suspension.

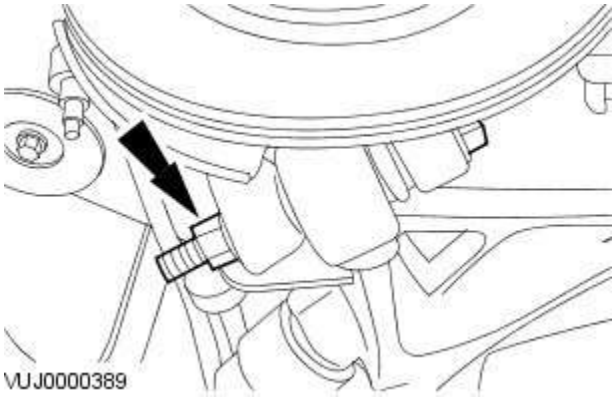
   Secure the shock absorber and spring assembly to the lower arm.

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

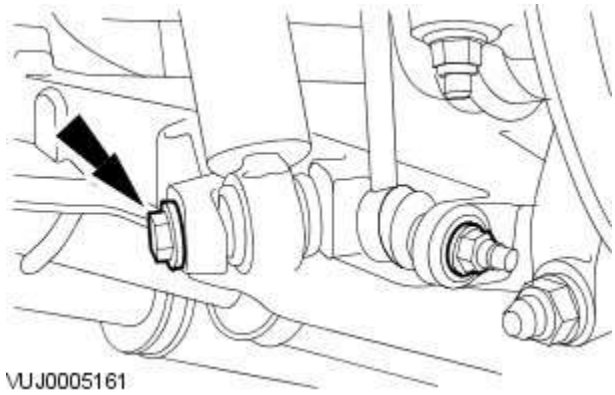
7. Lower the vehicle.



8. Tighten to 175 Nm.



9. Tighten to 190 Nm.



10. Tighten to 133 Nm.

Published: 11-May-2011

Rear Suspension - Shock Absorber and Spring Assembly

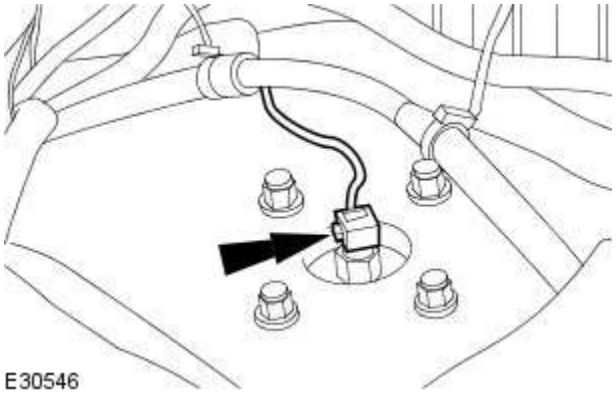
Removal and Installation

Removal

All vehicles

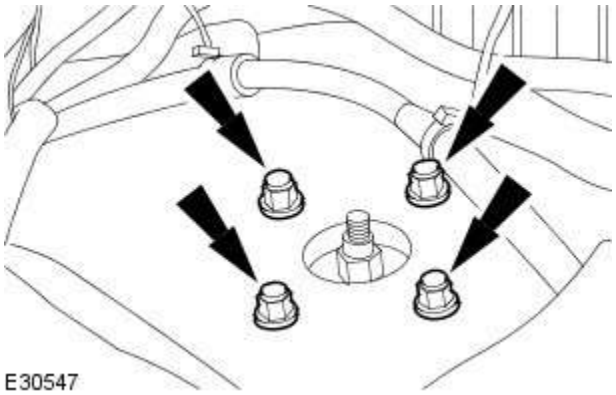
1. Remove the luggage compartment side trim panel.
   For additional information, refer to: Loadspace Trim Panel LH (501-05 Interior Trim and Ornamentation, Removal and Installation).

Vehicles with active damping


E30546

2. Disconnect the active suspension damper electrical connector.

All vehicles

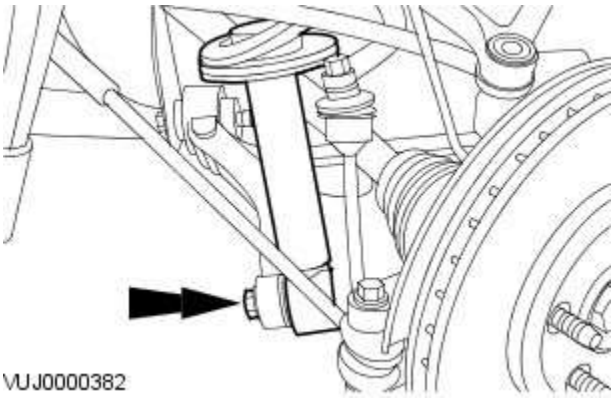

E30547

3. Remove the shock absorber and spring assembly top mount nuts. TORQUE: 28 Nm

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

   Raise the vehicle.

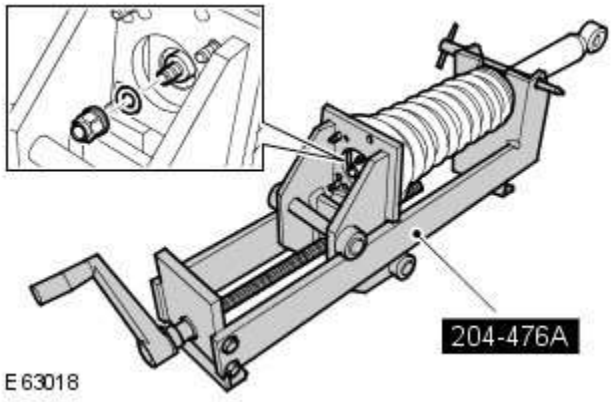
5. Remove the wheel and tire.
   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).



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

   Remove the shock absorber and spring assembly. TORQUE: 133 Nm

Vehicles with active damping



7. WARNINGS:

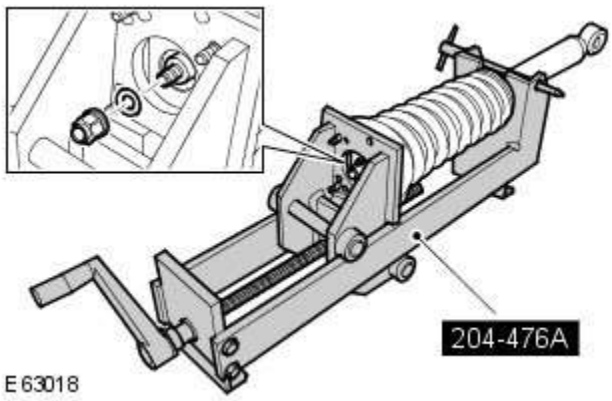
   Make sure the shock absorber is secured by fully inserting the locking pin in to the special tool. Failure to follow these instructions may result in personal injury.

   As the spring is under extreme tension care must be taken at all times. Failure to follow these instructions may result in personal injury.

   Make sure that a new nut is installed.

   Using the special tool, compress the suspension spring to remove the shock absorber.
   - Compress the spring.
   - Remove the nut. TORQUE: 27 Nm

Vehicles without active damping



8. WARNINGS:

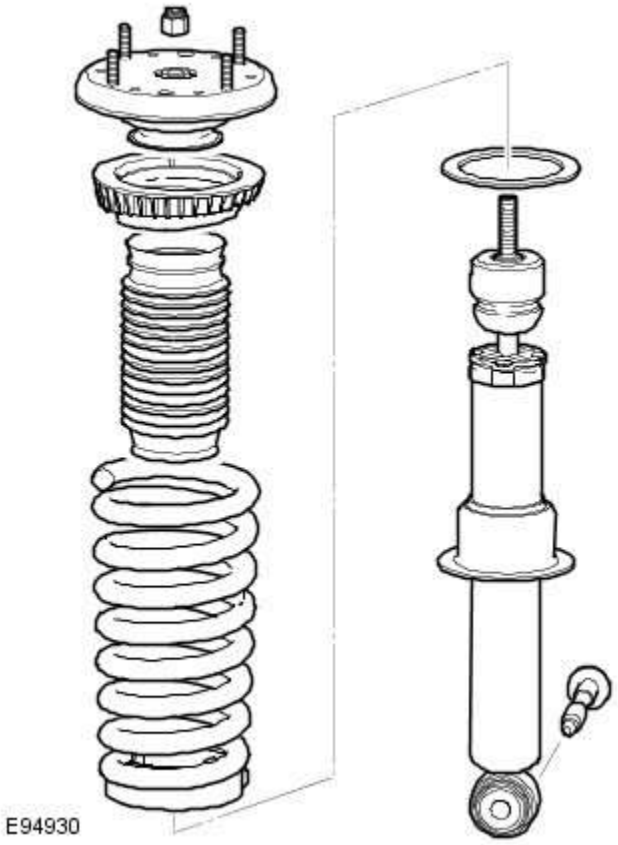
   Make sure the shock absorber is secured by fully inserting the locking pin in to the special tool. Failure to follow these instructions may result in personal injury.

   As the spring is under extreme tension care must be taken at all times. Failure to follow these instructions may result in personal injury.

   Make sure that a new nut is installed.

   Using the special tool, compress the suspension spring to remove the shock absorber.
   - Compress the spring.
   - Remove the nut. TORQUE: 50 Nm

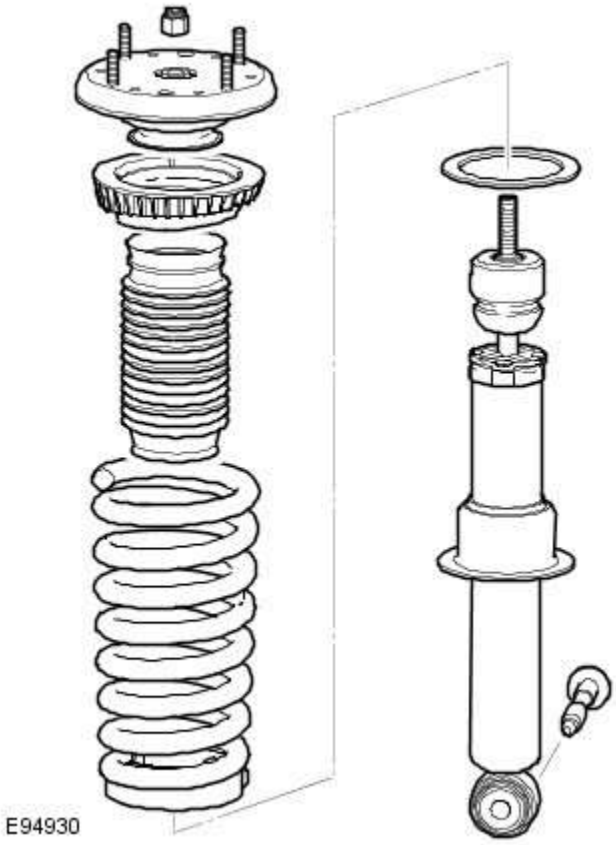
9. Remove the shock absorber rod components.



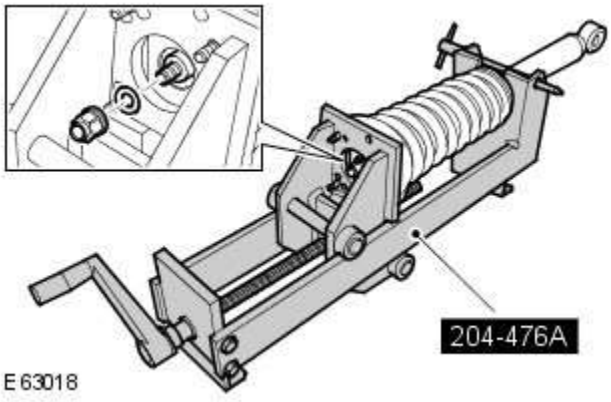
Installation

All vehicles

1. Install the shock absorber rod components.



Vehicles with active damping



2. WARNINGS:

Make sure the shock absorber is secured by fully inserting the locking pin in to the special tool. Failure to follow these instructions may result in personal injury.

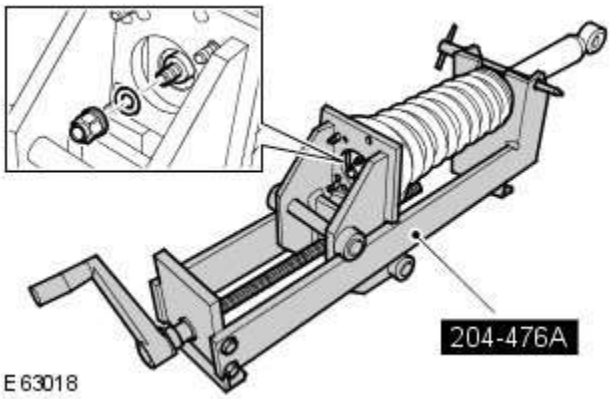
As the spring is under extreme tension care must be taken at all times. Failure to follow these instructions may result in personal injury.

Make sure that a new nut is installed.

Using the special tool, compress the suspension spring to install the shock absorber.

- Compress the spring.
- Tighten the nut to 27 Nm.

Vehicles without active damping



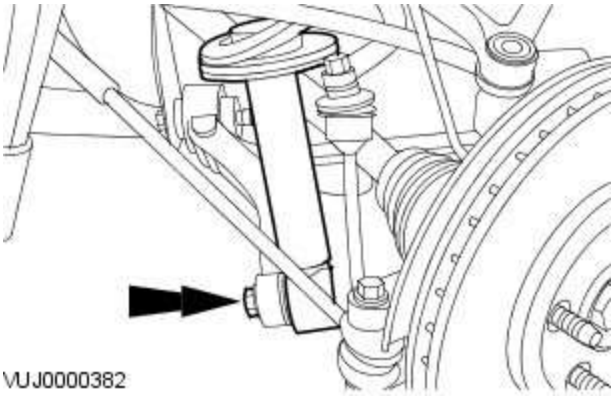
3. WARNINGS:

   Make sure the shock absorber is secured by fully inserting the locking pin in to the special tool. Failure to follow these instructions may result in personal injury.

   As the spring is under extreme tension care must be taken at all times. Failure to follow these instructions may result in personal injury.

   Make sure that a new nut is installed.

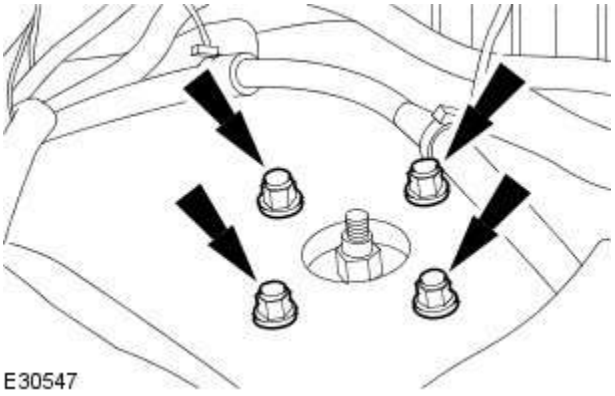
   Using the special tool, compress the suspension spring to install the shock absorber.
   - Compress the spring.
   - Tighten the nut to 50 Nm.



4. Install the shock absorber and spring assembly.
   - Tighten to 133 Nm.

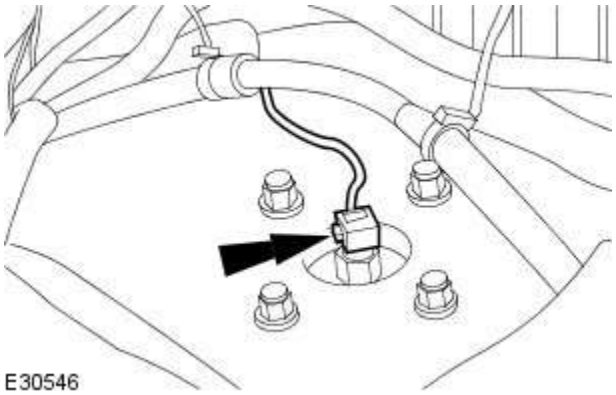
5. Install the wheel and tire.
   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

All vehicles



6. Install the shock absorber and spring assembly top mount nuts.
   - Tighten to 28 Nm.

Vehicles with active damping



7. Connect the active suspension damper electrical connector.

All vehicles

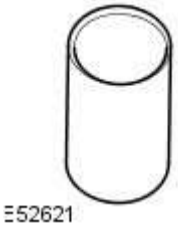
8. Install the luggage compartment side trim panel.
   For additional information, refer to: Loadspace Trim Panel LH (501-05 Interior Trim and Ornamentation, Removal and Installation).

Published: 23-Apr-2014

Rear Suspension - Shock Absorber Lower Bushing

Removal and Installation

Special Tool(s)

 E52622	Bushing Remover / Installer 204-335
 E52621	Bushing remover 204-533
 E52620	Bushing installer 204-534

Removal

1. WARNING: Failure to follow this instruction may cause damage to the vehicle.

   Mark the orientation of the shock absorber in relation to the lower suspension arm.

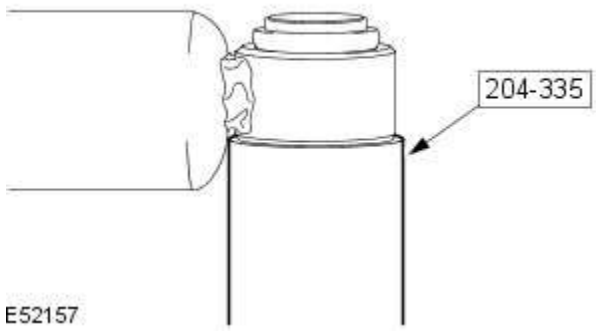
2. Remove the shock absorber and spring assembly. For additional information, refer to: Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).

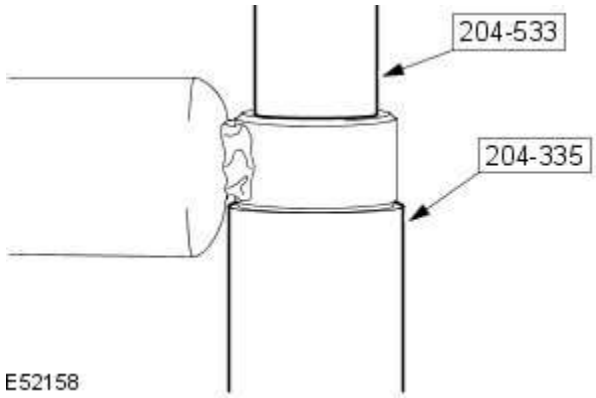
3. NOTES:

   Place the shock absorber with the recessed side facing upwards.

   With assistance make sure the special tool is aligned.

   Using the special tool, support the shock absorber.



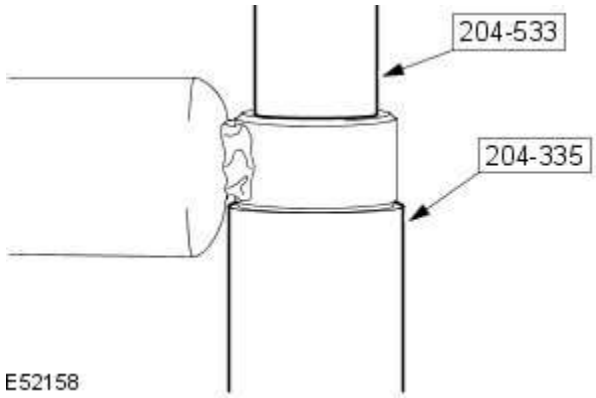


4. NOTES:

   Position the special tool onto the recessed side of the bush.

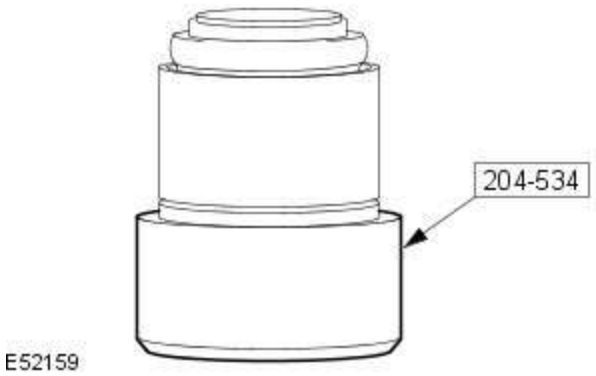
   With assistance make sure the special tool is aligned.

   Position and align the special tool to the shock absorber bushing.



5. Using the special tools, carefully remove the bushing from the shock absorber.

Installation

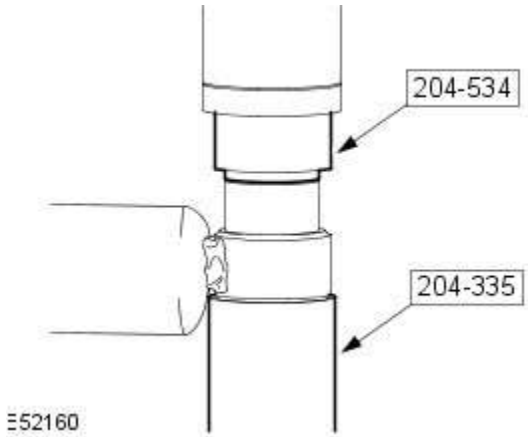


1. NOTES:

   Make sure the bush is clean and free from oil or grease.

   Use a suitable lubricant to allow the bush to locate into the special tool.

   Locate the new bushing in the special tool.



2. WARNING: Failure to follow this instruction may cause damage to the vehicle.

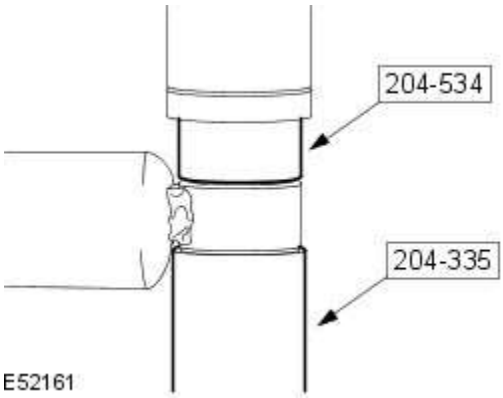
   NOTES:

   Make sure the shock absorber is clean and free from oil or grease and is not damaged prior to pushing in the new bush.

   Make sure the bush is installed following the same direction as removal.

   Make sure correct alignment is maintained.

   Using the special tools, align the bushing to the shock absorber.



3. NOTE: Make sure correct alignment is maintained.

   Slowly push the bush into the shock absorber until the tool reaches the stop.

4. Install the shock absorber and spring assembly.
   For additional information, refer to: Shock Absorber and Spring Assembly (204-02 Rear Suspension, Removal and Installation).

Published: 06-Jun-2013

Rear Suspension - Rear Stabilizer Bar

Removal and Installation

Special Tool(s)

	Powertrain Assembly Jack, HTJ 1200-2

Removal

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

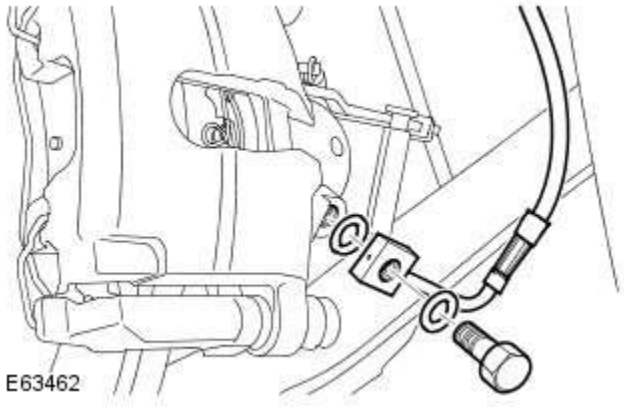
2. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

3. Remove both rear wheels and tires.
   For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

4. Drain the fuel tank.
   For additional information, refer to: Fuel Tank Draining (310-00 Fuel System - General Information, General Procedures).

5. Remove the exhaust system.
   For additional information, refer to: Front Muffler (309-00B Exhaust System - V6 3.0L Petrol, Removal and Installation).



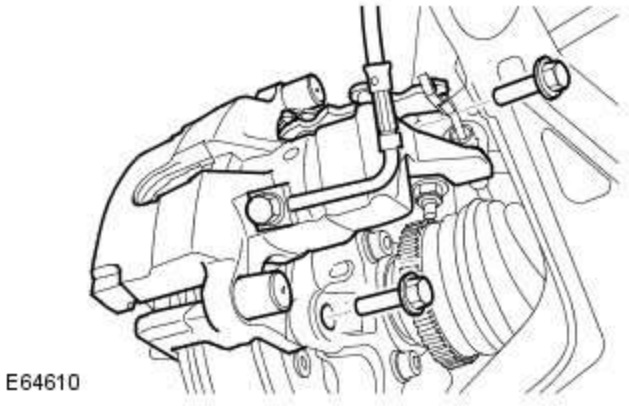
6. CAUTION: Always plug any open connections to prevent contamination.

   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.

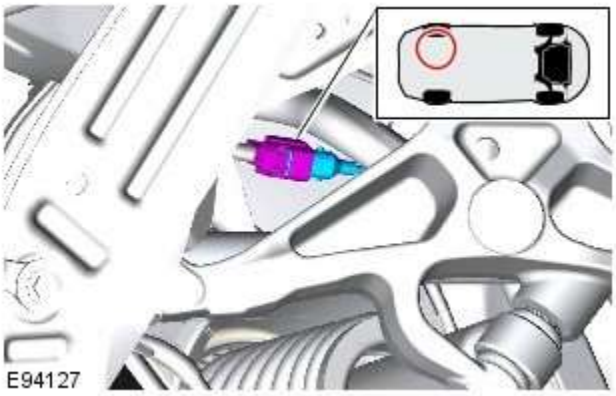
   RH illustration shown, LH is similar.

   Disconnect the brake hose from the brake caliper.
   - Using the special tool, press and hold the brake pedal.
   - Remove and discard the two sealing washers.



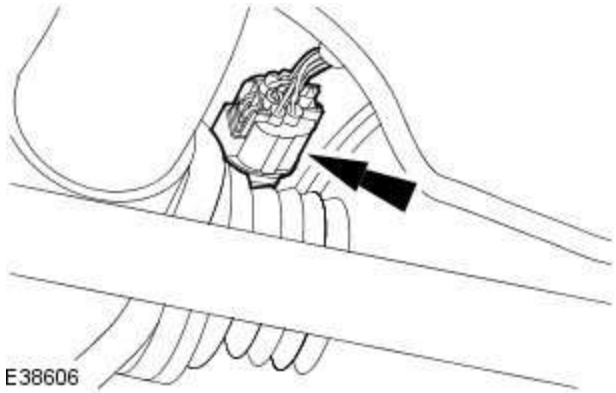
7. NOTE: Left-hand shown, right-hand similar.

   Release the brake caliper.
   - Remove and discard the 2 bolts.
   - Tie the brake caliper aside.

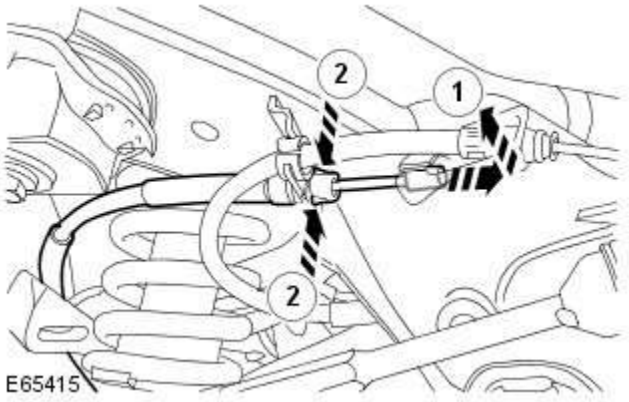


8. NOTE: Left-hand shown, right-hand similar.

   Disconnect the rear wheel speed sensor.

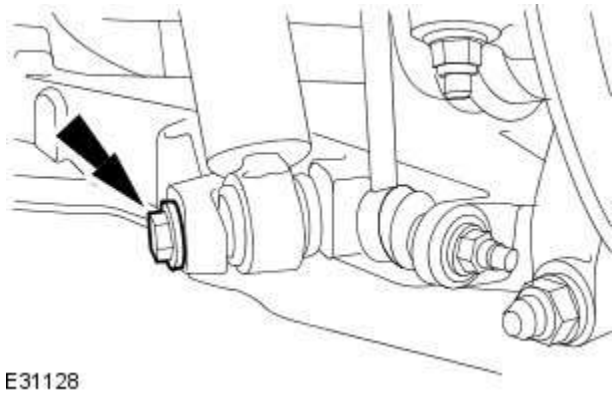


9. Disconnect the electronic parking brake actuator electrical connector.



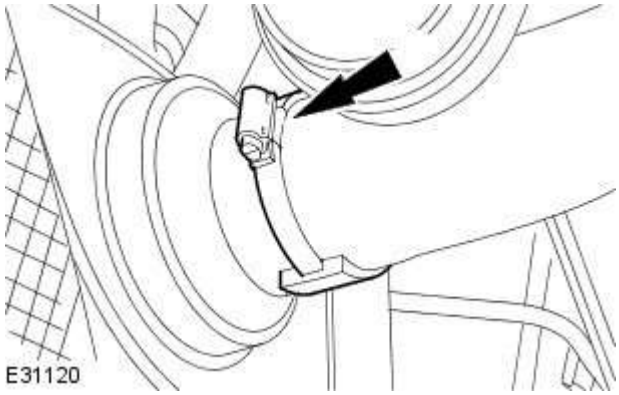
10. NOTE: Left-hand shown, right-hand similar.

    Disconnect both parking brake cables from the rear brake calipers.

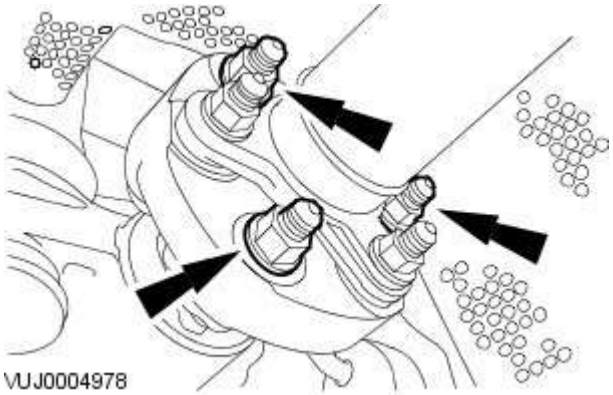

E31128

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

Detach the shock absorber.


E31120

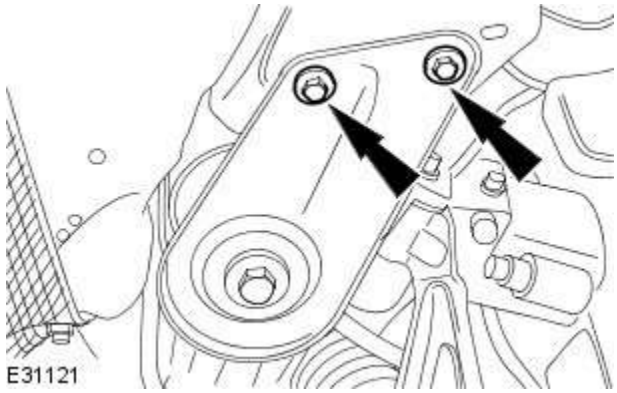
12. Detach the fuel filler hose.


VUJ0004978

13. CAUTION: Under no circumstances must the flexible coupling (or its fixings) be loosened or removed from the driveshaft.

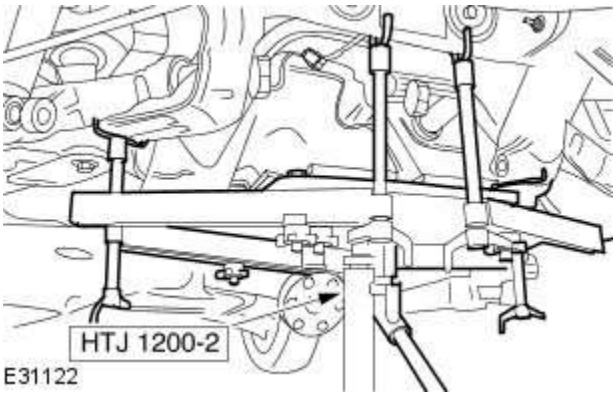
Detach the driveshaft from the rear drive axle flange.

- Mark the position of the driveshaft in relation to the rear drive axle flange.
- Mark the position of the balance nut in relation to the rear drive axle flange. (if fitted).
- Mark the position of each nut and bolt in relation to the driveshaft flexible joint.


E31121

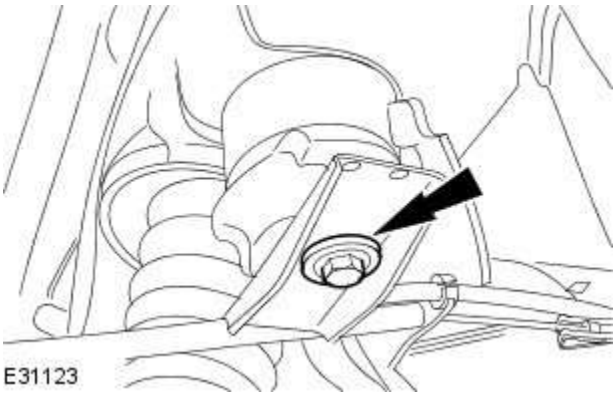
14. NOTE: Left-hand shown, right-hand similar.

Remove the rear subframe reinforcement plate retaining bolts.



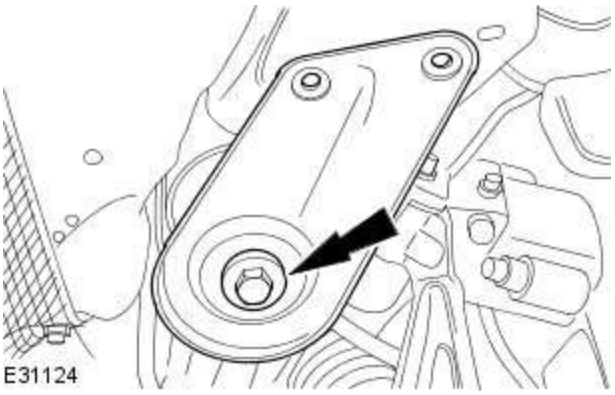
E31122

15. Install the special tool to support the rear subframe.


E31123

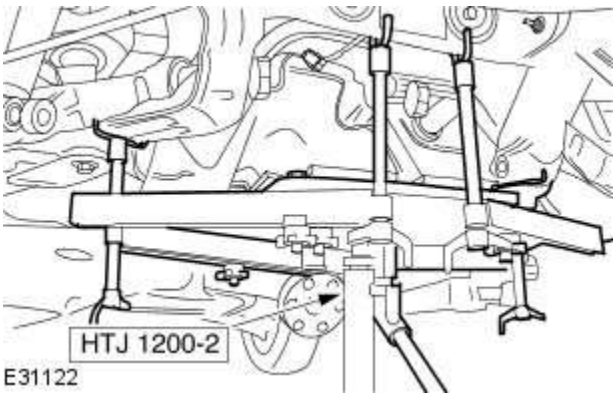
16. NOTE: Left-hand shown, right-hand similar.

Remove the rear subframe rear retaining bolt.


E31124

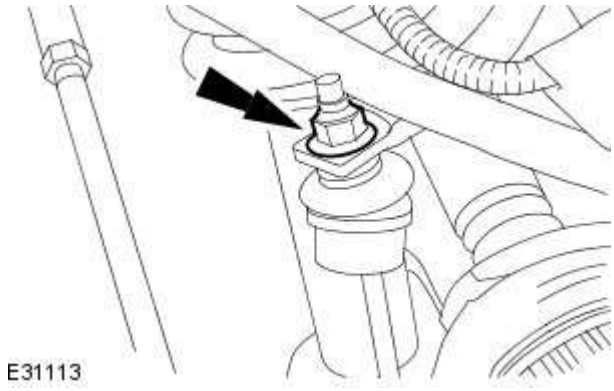
17. NOTE: Left-hand shown, right-hand similar.

Remove the rear subframe front retaining bolt.

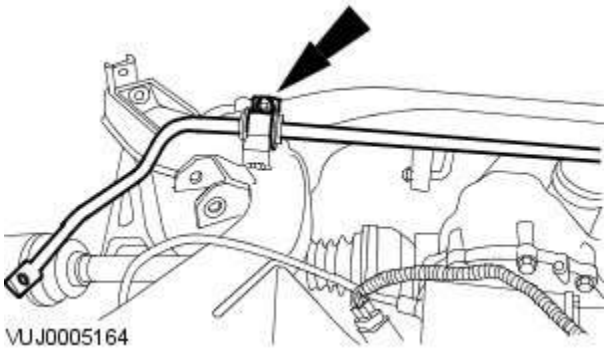


E31122

18. Remove the rear subframe.

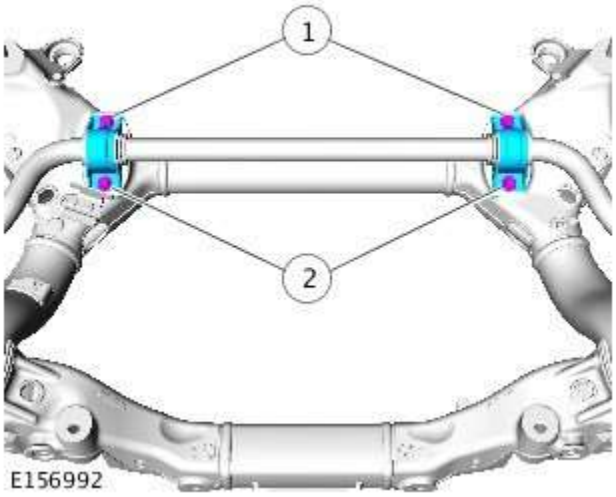


19. Remove the stabilizer bar link nuts.

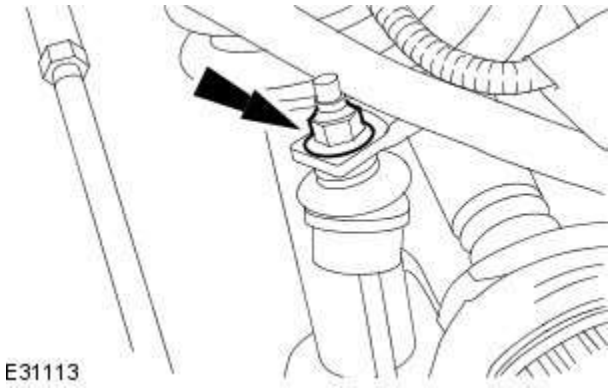


20. Remove the rear stabilizer bar.
    - Remove the stabilizer bar bushings.

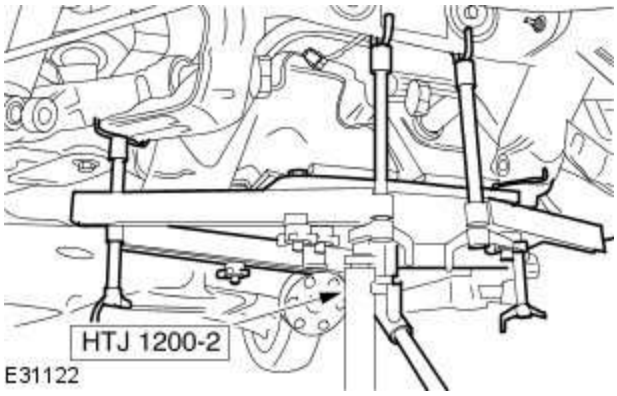
Installation



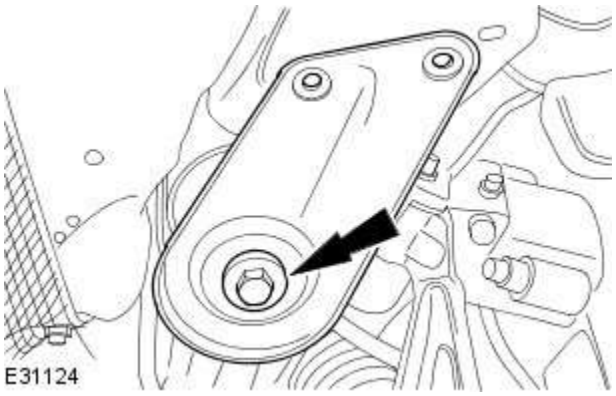
1. During installation tighten the bolts in the following sequence.
    - Bolt 1: 55 Nm.
    - Bolt 2: 55 Nm.
    - Bolt 1: 55 Nm.



2. Install new nuts to the stabilizer bar links.
   - Tighten to 48 Nm.

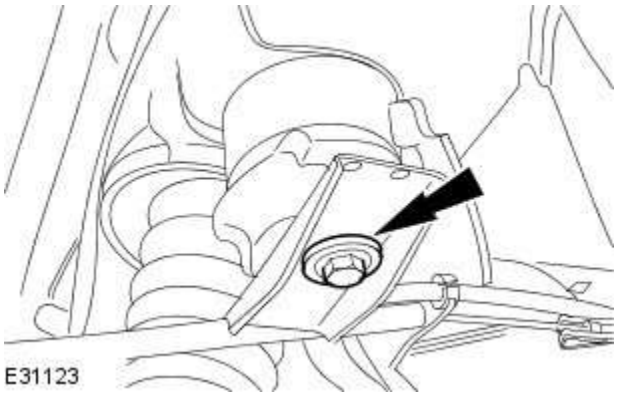


3. Install the rear subframe.

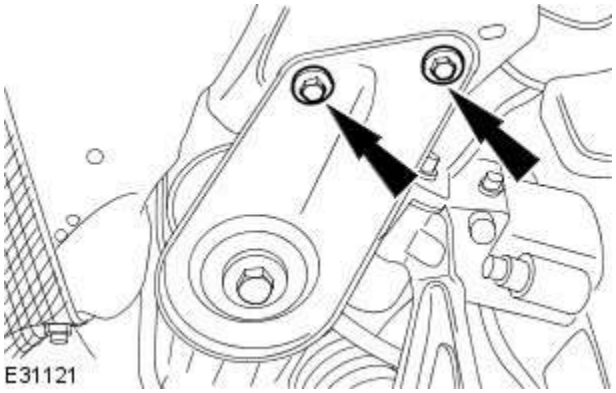


4. NOTE: Left-hand shown, right-hand similar.

   Loosely install the rear subframe front bolt.

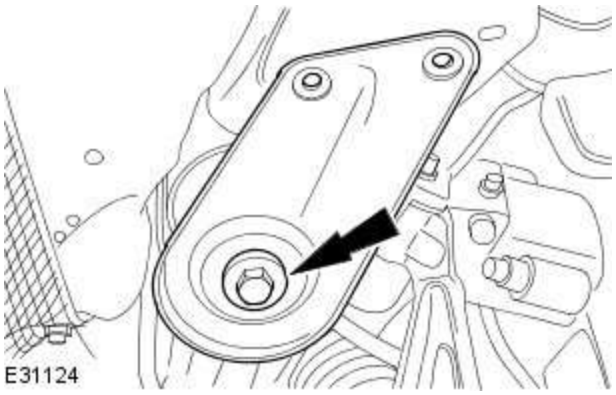


5. Loosely install the rear subframe rear bolt.

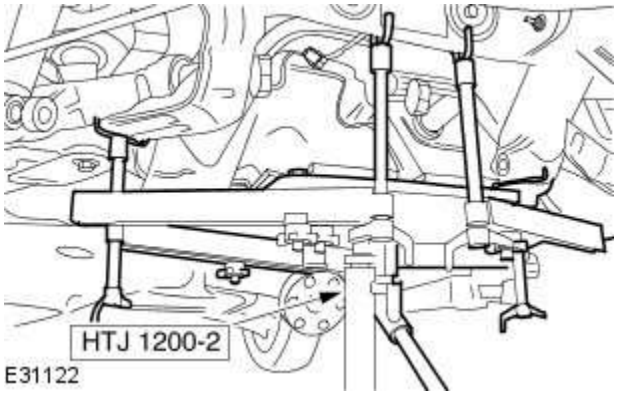


6. NOTE: Left-hand shown, right-hand similar.

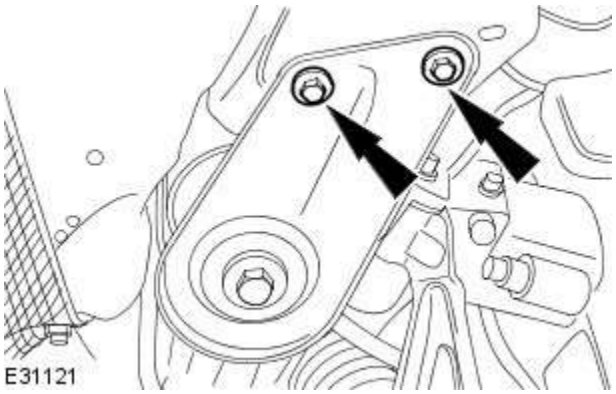
   Loosely install the rear subframe reinforcement plate bolts.



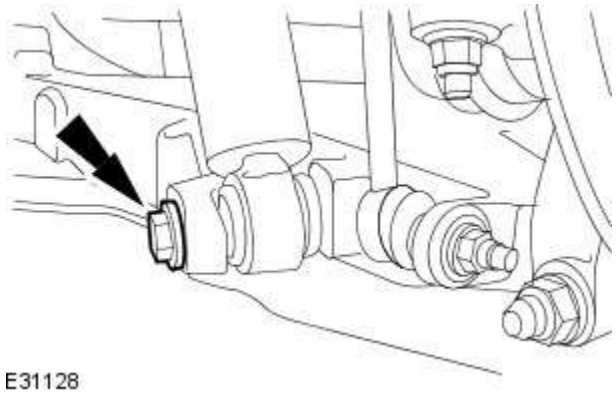
7. Tighten the subframe bolts.
   - Tighten to 80 Nm + 240°.



8. Remove the special tool.

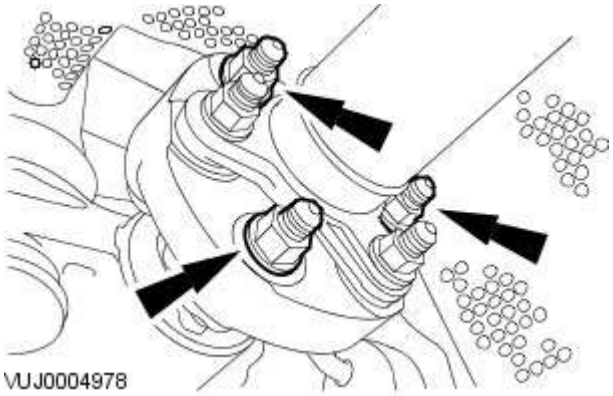


9. Tighten the rear subframe reinforcement plate retaining bolts.
   - Tighten to 47 Nm.


E31128

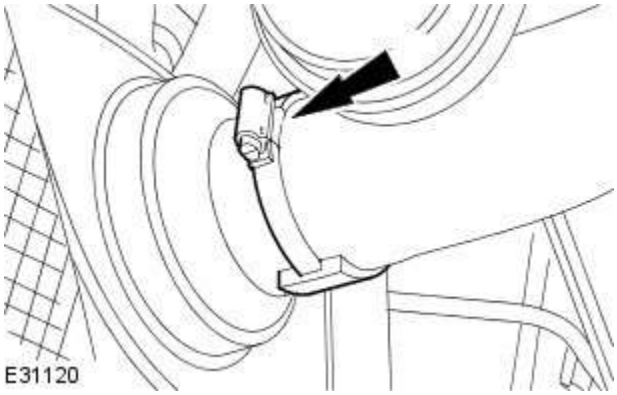
10. NOTE: Left-hand shown, right-hand similar.

Install the shock absorber.
- Tighten to 133 Nm.

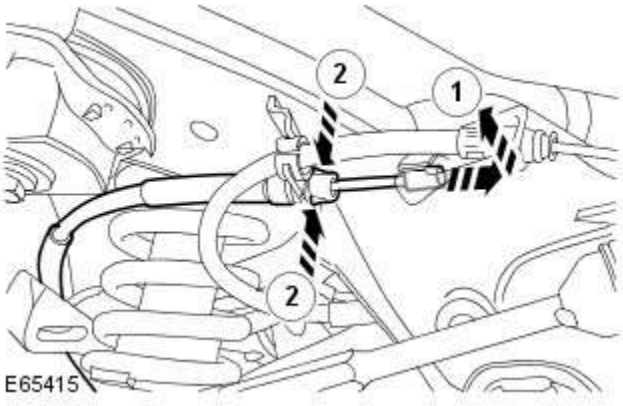

VUJ0004978

11. NOTE: Install the components to their original fitted positions.

Attach the driveshaft to the rear drive axle flange.

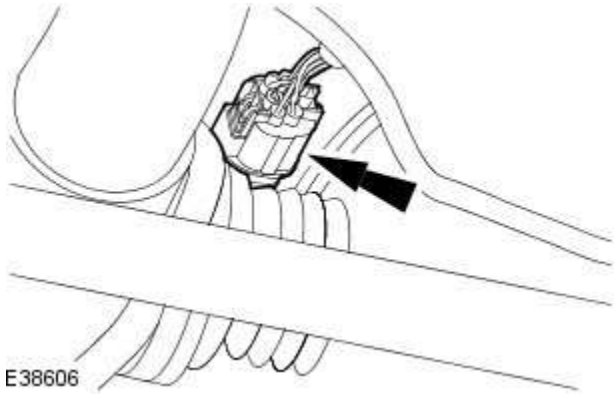

E31120

12. Attach the fuel filler hose to the fuel tank.

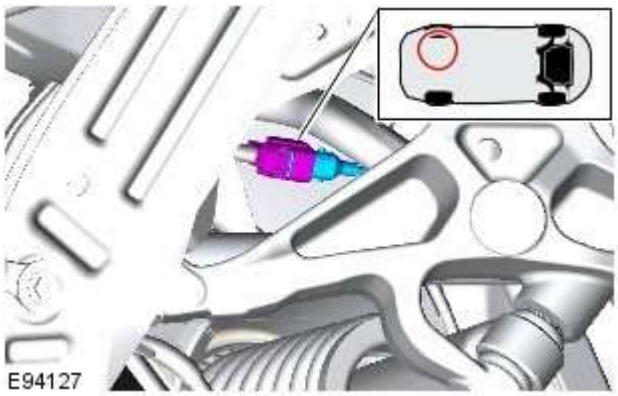


E65415

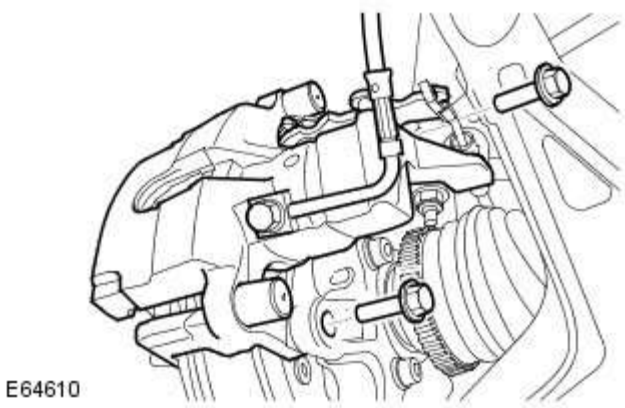
13. Connect both park brake cables to the rear brake calipers.



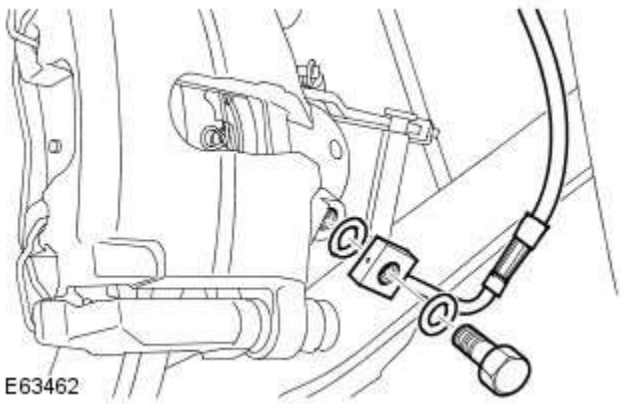
14. Connect the parking brake actuator electrical connector.



15. Connect the wheel speed sensor electrical connector.



16. Install the brake caliper.
    - Tighten the bolts to 103 Nm.



17. Connect the brake hose to the brake caliper.
    - Install new sealing washers.
    - Tighten the union to 38 Nm.

18. Install the exhaust system.
    For additional information, refer to: Front Muffler (309-00B Exhaust System - V6 3.0L Petrol, Removal and Installation).

19. Refill the fuel tank.
    For additional information, refer to: Fuel Tank Draining (310-00 Fuel System - General Information, General Procedures).

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

21. Install the rear wheels and tires.
    For additional information, refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).

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

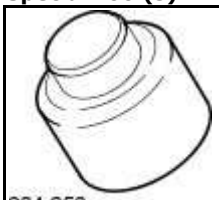
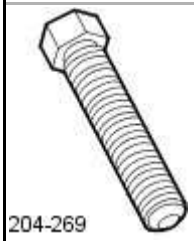
23. Using only four-wheel alignment equipment approved by Jaguar, check and adjust the wheel alignment.
    For additional information, refer to: Camber and Caster Adjustment (204-00 Suspension System - General Information, General Procedures).

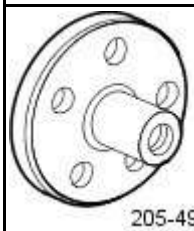
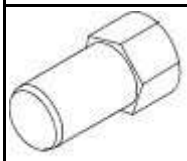
Published: 12-Jun-2013

Rear Suspension - Rear Wheel Bearing

Removal and Installation

Special Tool(s)

 204-250	204-250 Wheel bearing install and removal tool
 204-269	204-269 Flange remover forcing screw
 E117832	204-305 Remover, Wheel Bearing
 204-725 E101989	204-725 Support Tool, Wheel Hub
 204-726 E101990	204-726 Remover/Installer, Wheel Bearing
 E117751	204-727A Installer, Wheel Bearing

 E117752	204-791 Installer, Wheel Bearing
 205-491	205-491 Hub puller
 20549101	205-491-1 Adapter nuts

Removal

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

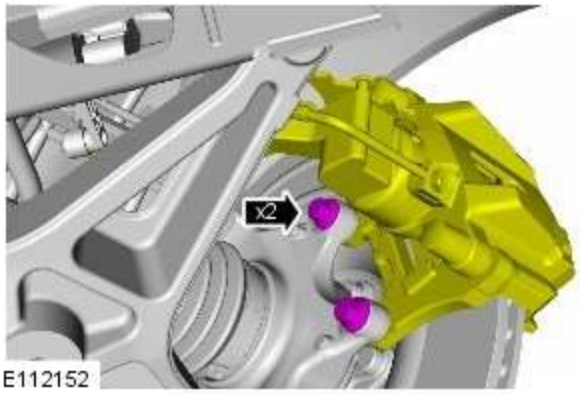
   Raise and support the vehicle.

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

3.

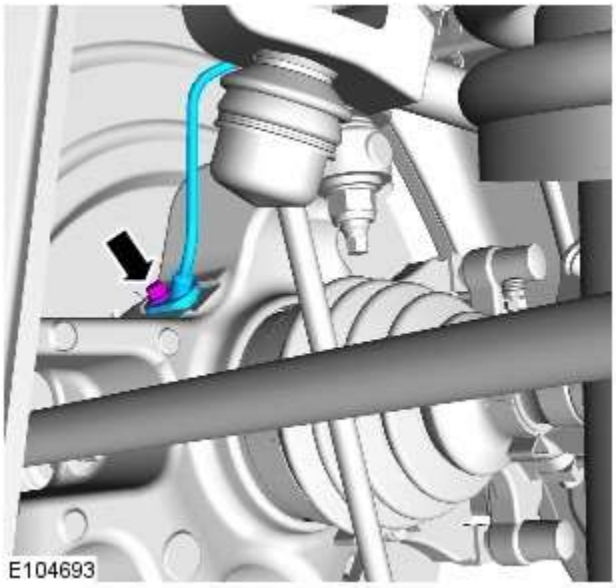

E112151

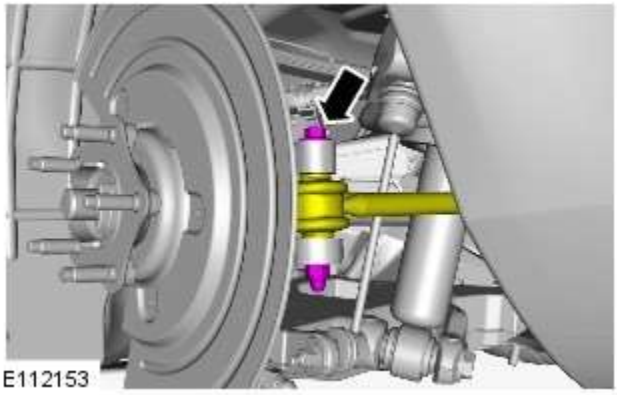
4.



5.

6.





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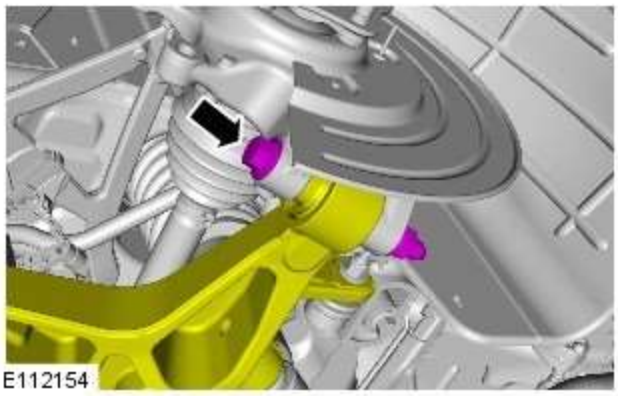

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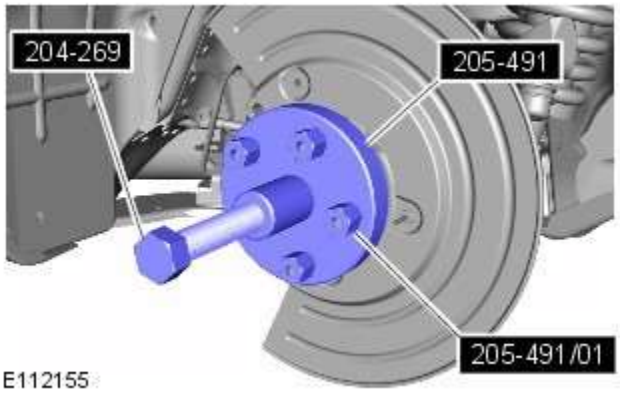


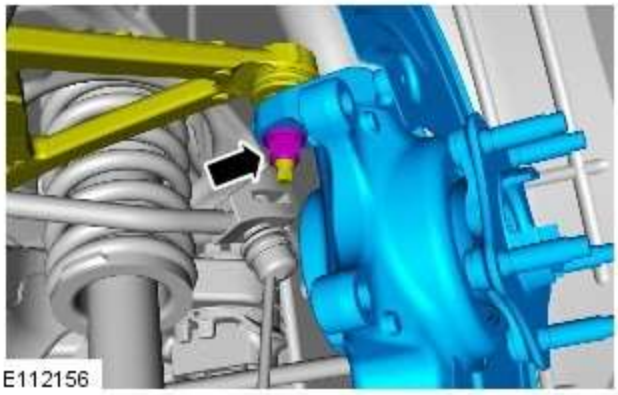
9.

CAUTION: Do not use a hammer to detach the halfshaft from the hub assembly, failure to follow this instruction may result in damage to the halfshaft.

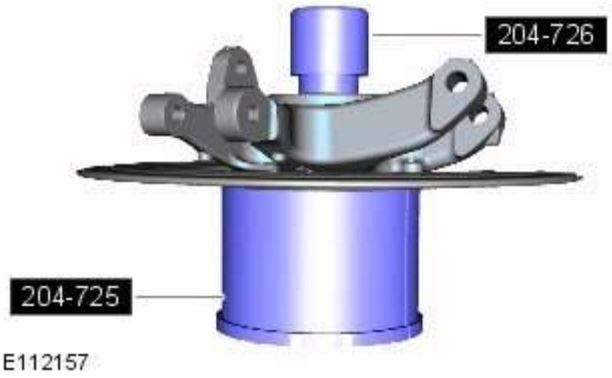
Special Tool(s): 205-491, 205-491-1, 204-269

NOTE: Use an additional wrench to prevent the component from rotating.

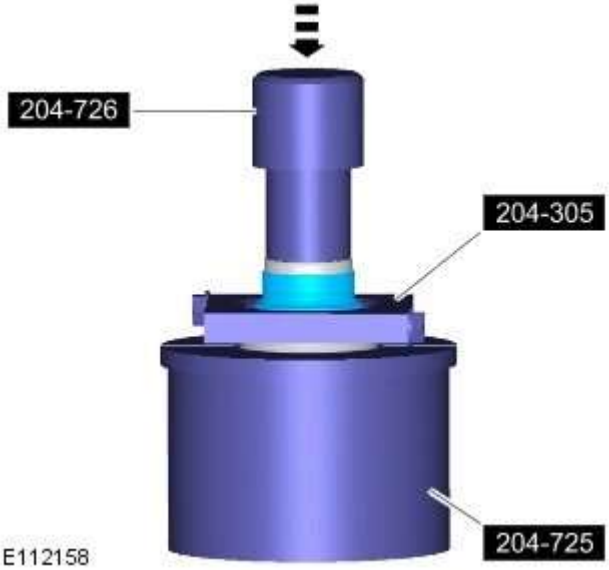
10.



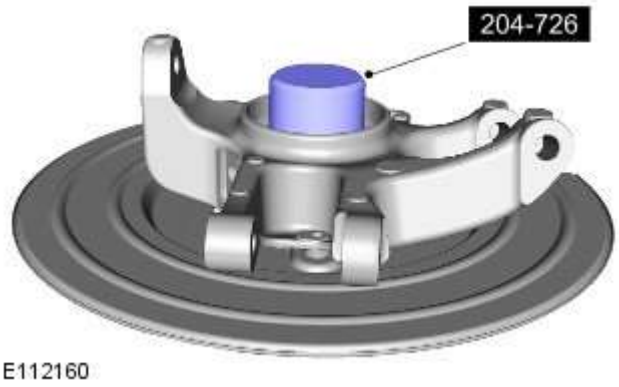
11. *Special Tool(s):* 204-726, 204-725



12. *Special Tool(s):* 204-305, 204-726, 204-725

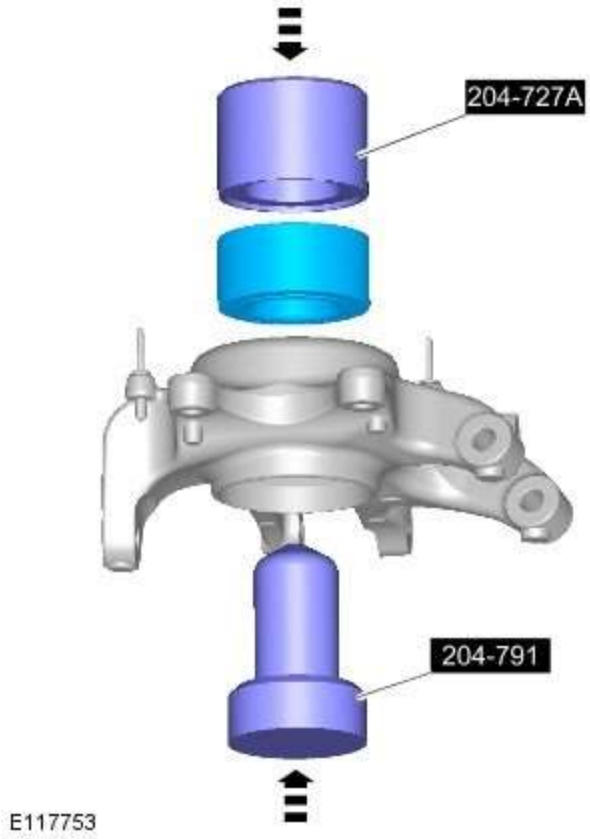


13.



14. *Special Tool(s):* 204-726

Installation



1. NOTES:

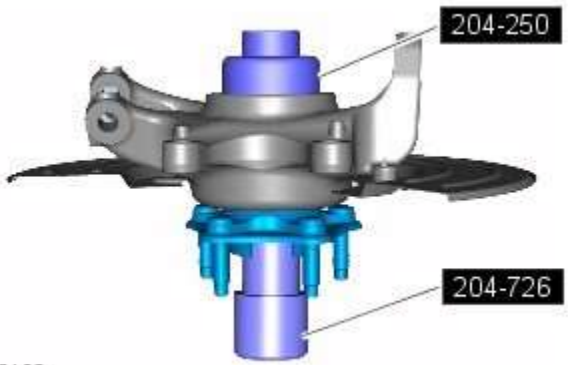
   Make sure bearing is installed in correct direction, encoder ring incorporated into the inboard seal of the wheel bearing.

   Make sure correct alignment of the bearing is maintained when installing into the hub carrier.

   Special Tool(s): 204-727A, 204-791


E112159

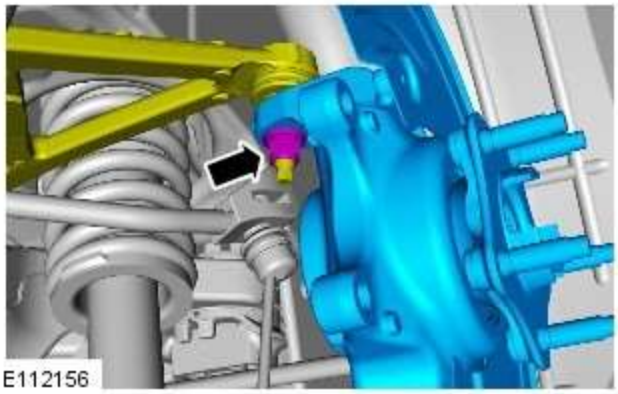
2.



E112162

3. NOTE: Make sure the correct alignment of the drive flange is maintained when installing into the hub carrier and bearing assembly.

Special Tool(s): 204-726, 204-250


E112156

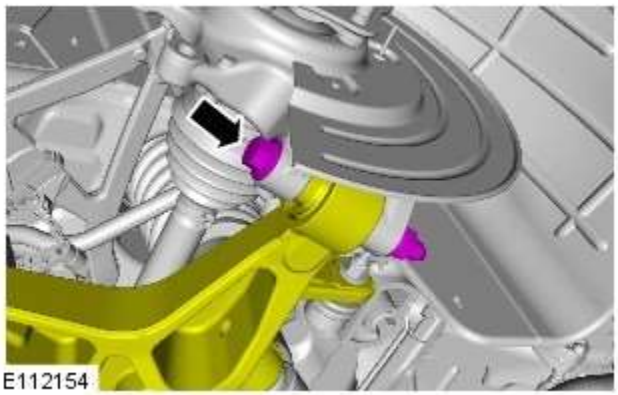
4. CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

Torque: 90 Nm


E112151

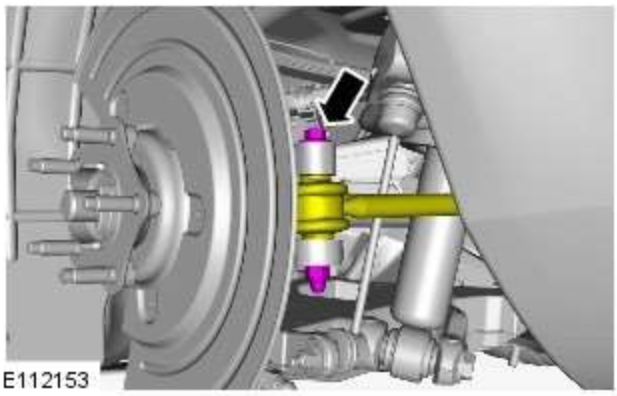
5. CAUTION: Install the halfshaft nut finger tight.

NOTE: The wheel hub nut is not tightened at this stage.



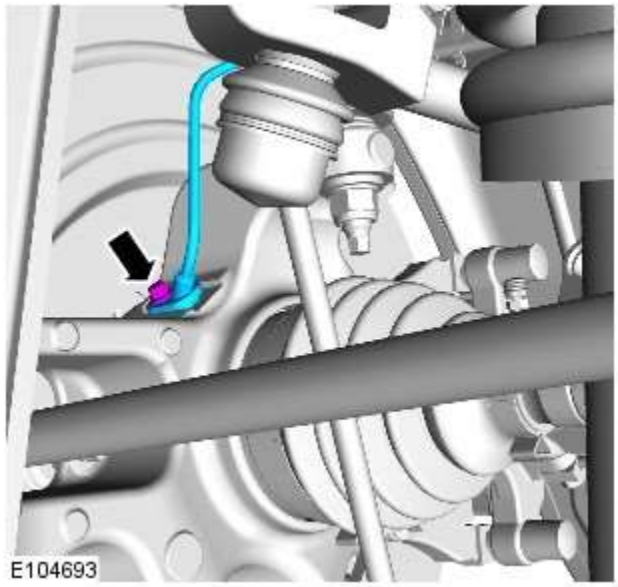
6. CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

   Torque: 150 Nm



7. CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

   Torque: 55 Nm

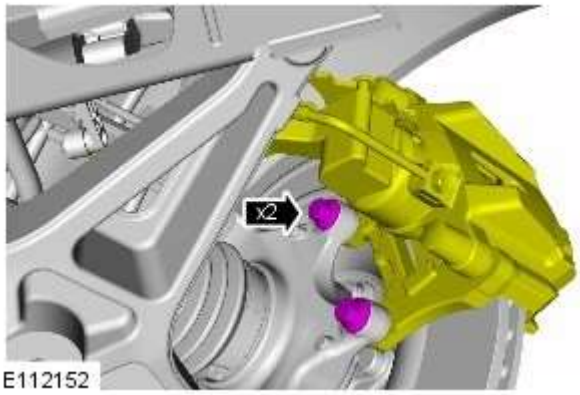


8. *Torque:* 6 Nm

9.

E83394

10. *Torque:* 103 Nm



E112152

11. CAUTION: Do not use air tools to install the nut. Failure to follow this instruction may result in damage to the component.

Torque: 300 Nm


E112151

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

Published: 18-Dec-2012

Rear Suspension - Upper Arm

Removal and Installation

Removal

CAUTION: The final tightening of the suspension components must be carried out with the vehicle on its wheels.

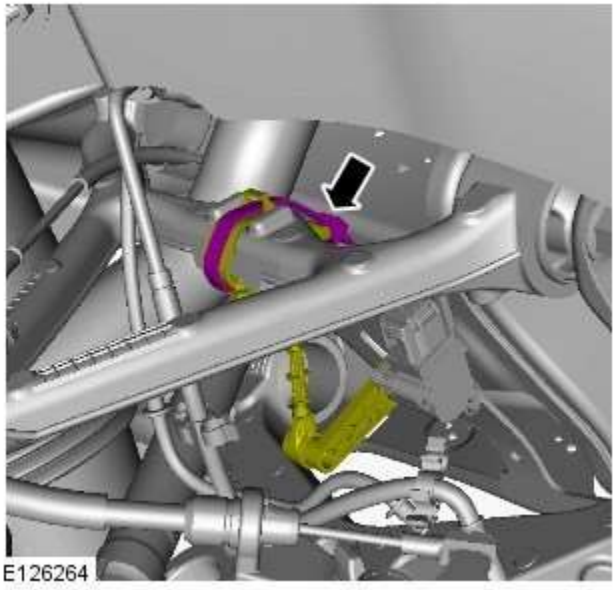
NOTES:

Removal steps in this procedure may contain installation details.

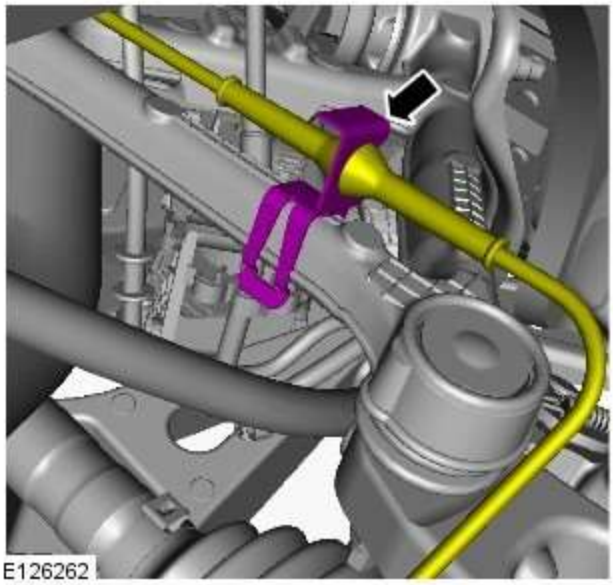
RH illustration shown, LH is similar.

1. Raise and lower the vehicle on a 4 post ramp.
2. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.
3. Refer to: Wheel and Tire (204-04 Wheels and Tires, Removal and Installation).
4. Refer to: Shock Absorber and Spring Assembly (204-02, Removal and Installation).
5.



6.



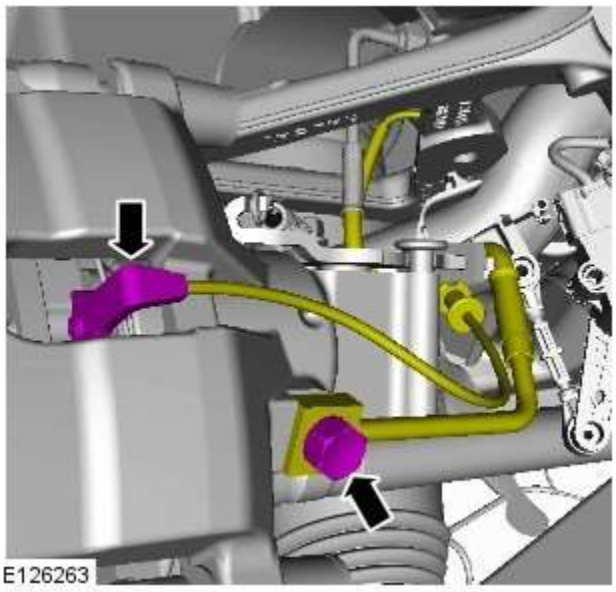
7. CAUTIONS:

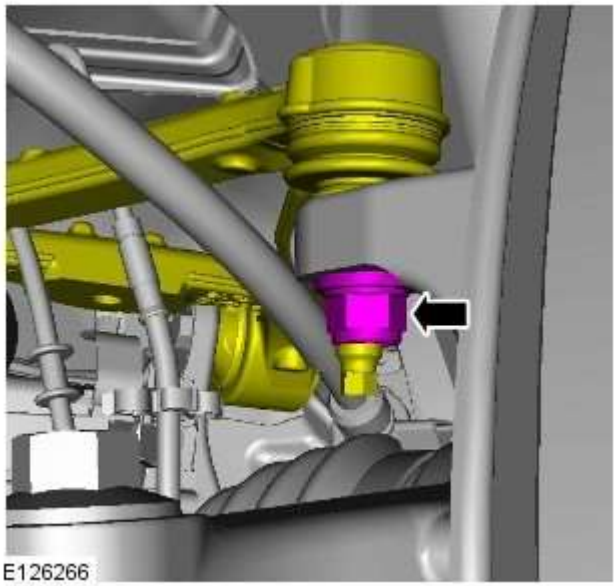
Be prepared to collect escaping fluids.

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

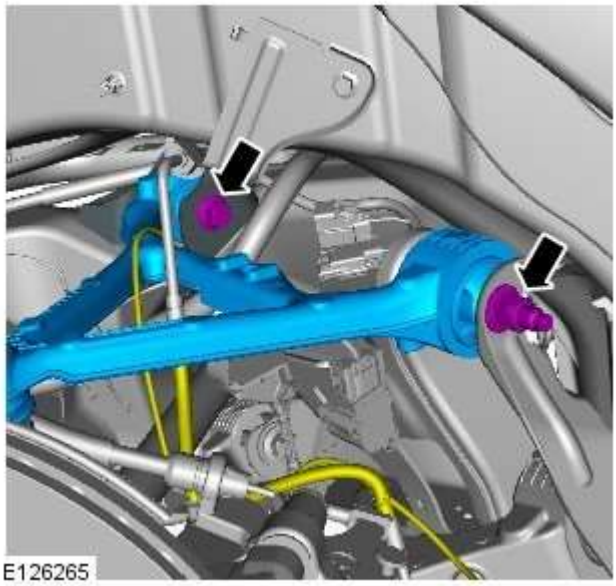
Make sure that all openings are sealed. Use new blanking caps.

Torque: 38 Nm




E126266

8. *Torque:* 96 Nm


E126265

9. *Torque:* 115 Nm

Installation

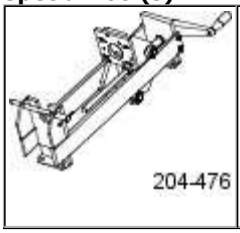
1. To install, reverse the removal procedure.
2. Refer to: Brake System Bleeding (206-00, General Procedures).

Published: 11-May-2011

Rear Suspension - Shock Absorber and Spring Assembly

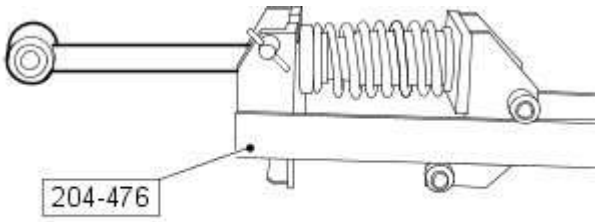
Disassembly and Assembly

Special Tool(s)

	Compressor, Coil Spring 204-476

Disassembly

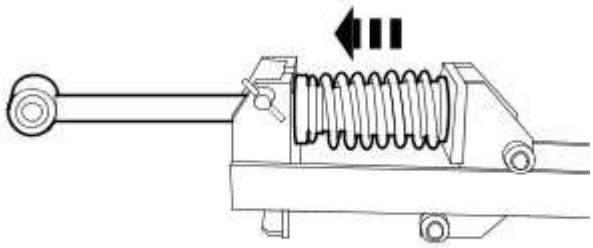
1. Remove the shock absorber and spring assembly.
   For additional information, refer to Shock Absorber and Spring Assembly in this section.



E31044

2. WARNING: Make sure the shock absorber is secured by fully inserting the locking pin in to the special tool. Failure to follow these instructions may result in personal injury.

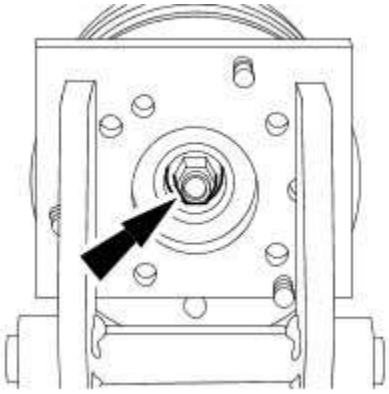
   Install the shock absorber and spring assembly to the special tool as shown.



E31046

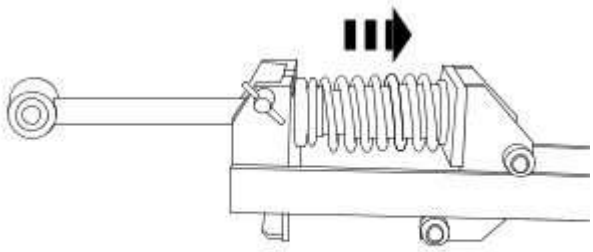
3. WARNING: AS THE SPRING IS UNDER EXTREME TENSION CARE MUST BE TAKEN AT ALL TIMES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

   Clamp the road spring.



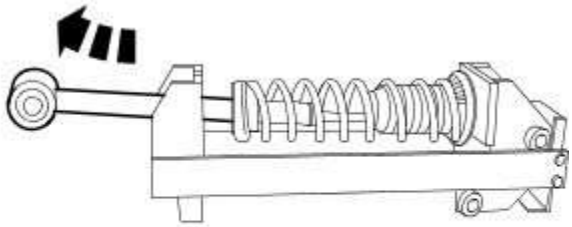
E43414

4. Remove the shock absorber retaining nut.
   - Remove and discard the retaining nut.



E31045

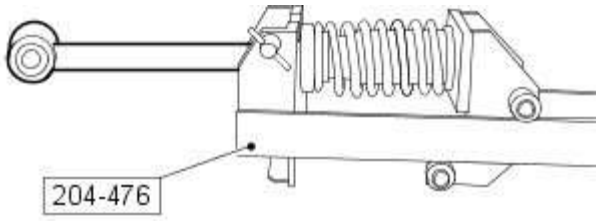
5. Release the road spring.



E31047

6. Remove the shock absorber.

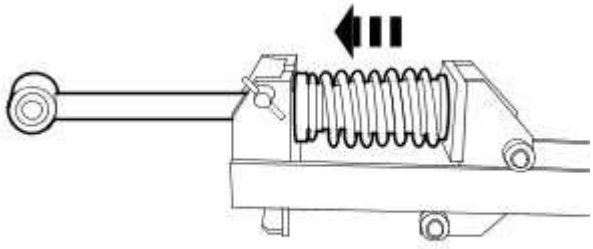
Assembly



E31044

1. CAUTION: Make sure the spring ends butt correctly against the spring seats.

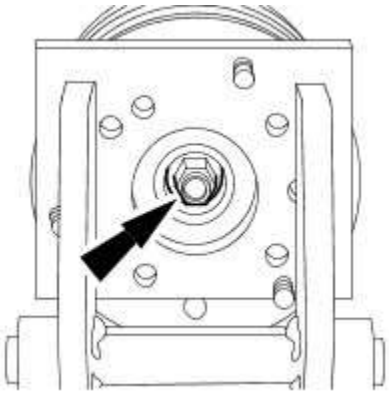
   Install the shock absorber and spring assembly to the special tool.



E31046

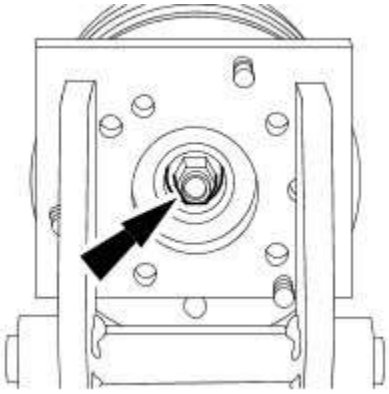
2. WARNING: AS THE SPRING IS UNDER EXTREME TENSION CARE MUST BE TAKEN AT ALL TIMES. FAILURE TO FOLLOW THESE INSTRUCTIONS MAY RESULT IN PERSONAL INJURY.

   Clamp the road spring.



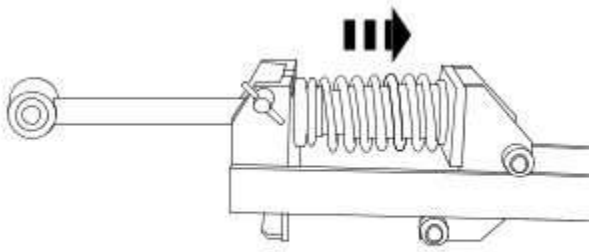
E43414

3. Vehicles without adaptive damping.
   - Install a new retaining nut.
   - Tighten to 50 Nm.



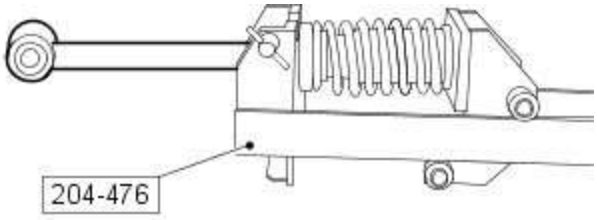
E43414

4. Vehicles with adaptive damping.
   - Install a new retaining nut.
   - Tighten to 27 Nm.



E31045

5. Release the road spring.



E31044

6. Remove the shock absorber and spring assembly from the special tool.

Published: 11-May-2011

Wheels and Tires -

Torque Specifications

Description	Nm	lb/ft	lb/in
Wheel nuts	125	92	-

Tire Pressures

Summer Tyres (ROW)		Up to 100 mph	Over 100 mph
235/55R17 99W	Front	2.3 bar (34 lbf/in²)	2.3 bar (34 lbf/in²)
	Rear	2.3 bar (34 lbf/in²)	2.3 bar (34 lbf/in²)
245/45R18 100 W&Y X/L	Front	2.1 bar (31 lbf/in²)	2.6 bar (38 lbf/in²)
	Rear	2.1 bar (31 lbf/in²)	2.6 bar (38 lbf/in²)
245/40R19 98 Y X/L	Front	2.1 bar (31 lbf/in²)	2.5 bar (36 lbf/in²)
	Rear	2.1 bar (31 lbf/in²)	2.5 bar (36 lbf/in²)
235/35R20 97Y X/L	Front	2.3 bar (34 lbf/in²)	2.3 bar (34 lbf/in²)
	Rear	-	-
285/30R20 99y X/L	Front	-	-
	Rear	2.3 bar (34 lbf/in²)	2.3 bar (34 lbf/in²)

Tire Pressures

All Season Tyres (USA & Canada)		0 mph - 121 mph
245/45R18 96H	Front	2.1 bar (31 lbf/in²)
	Rear	2.1 bar (31 lbf/in²)
245/40R19 94H	Front	2.4 bar (35 lbf/in²)
	Rear	2.4 bar (35 lbf/in²)

Wheel Specification

Wheel Type	Wheel Size
Libra	7.5 x 17
Cygnus	8.5 x 18
Venus	8.5 x 18
Auriga	8.5 x 19
Carelia	8.5 x 19
Volans (front)	8.5 x 20
Volans (rear)	9.5 x 20
Selena	8.5 x 20

Tires and Fitment

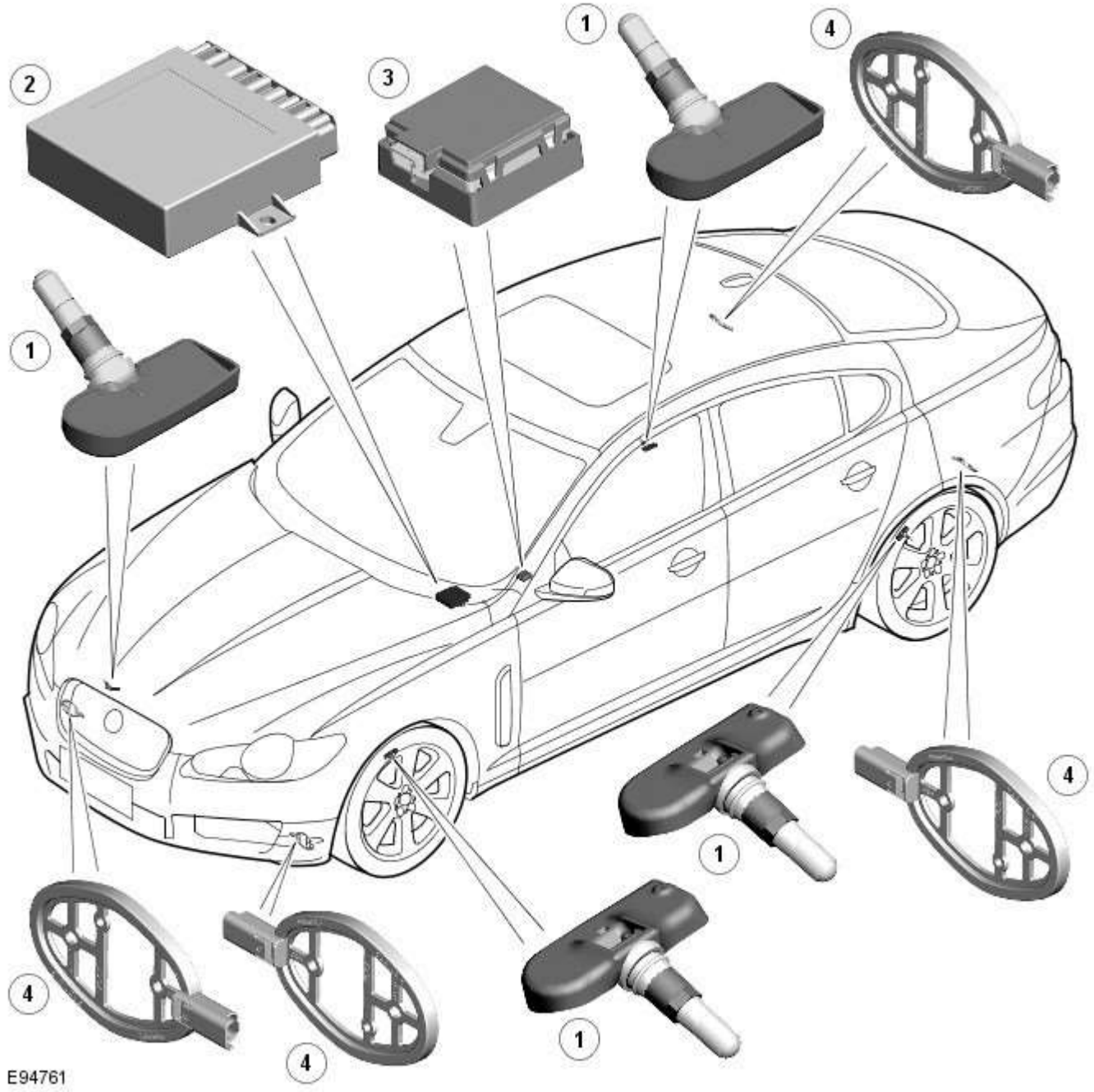
Description	Wheels Type	Tire Type
Vehicles with 2.7L Diesel and 3.0L engine	Libra	235/55R17 99W Pirelli P7
	Cygnus	245/45R18 100W Dunlop SP01
Vehicles without supercharger	Cygnus	245/45R18 100W Dunlop SP01
Vehicles without supercharger (ROW)	Venus	245/45R18 100Y Pirelli PZero
	Carelia	245/40R19 98Y Dunlop SP01
	Auriga	245/40R19 98Y Dunlop SP01
Vehicles without supercharger (ROW) and vehicles with supercharger (USA & Canada)	Cygnus	245/45R18 96H Continental ProContact
	Auriga	245/40R19 96H Continental ProContact
Vehicles with supercharger	Volans (front)	255/35R20 97Y Pirelli PZero
	Volans (rear)	285/30R20 99Y Pirelli PZero

Published: 11-May-2011

Wheels and Tires - Wheels and Tires - Component Location

Description and Operation

Tire Pressure Monitoring System (TPMS) Component Location



Item	Description
1	Tire pressure sensor
2	Tire pressure monitoring system module
3	Tire pressure receiver
4	Tire pressure monitoring system initiator

Published: 25-May-2012

Wheels and Tires - Wheels and Tires - Overview

Description and Operation

OVERVIEW

A number of alloy wheel designs are available ranging from 17 to 20 inch in diameter. A Tire Pressure Monitoring System (TPMS) is used to monitor the air pressure in each tire and inform the driver if the pressure falls below predetermined thresholds.

All wheels are of cast construction in aluminum alloy with the choice of wheel design dependant on the vehicle trim level and engine derivative.

On normally aspirated petrol models and all diesel models a 4J X 18 inch temporary spare wheel is supplied as standard, supercharged petrol models are supplied with a 4Jx19 inch temporary spare wheel. In some major European markets an Instant Mobility System is offered as an alternative to the spare wheel. The Instant Mobility System is capable of providing a temporary repair and tire inflation to a puncture of up to 6mm in diameter in the tread area of the tire. A puncture in the tire wall cannot be repaired using the system.

The vehicle jack and accessories are stored in the spare wheel-well in the luggage compartment.

Tire Changing

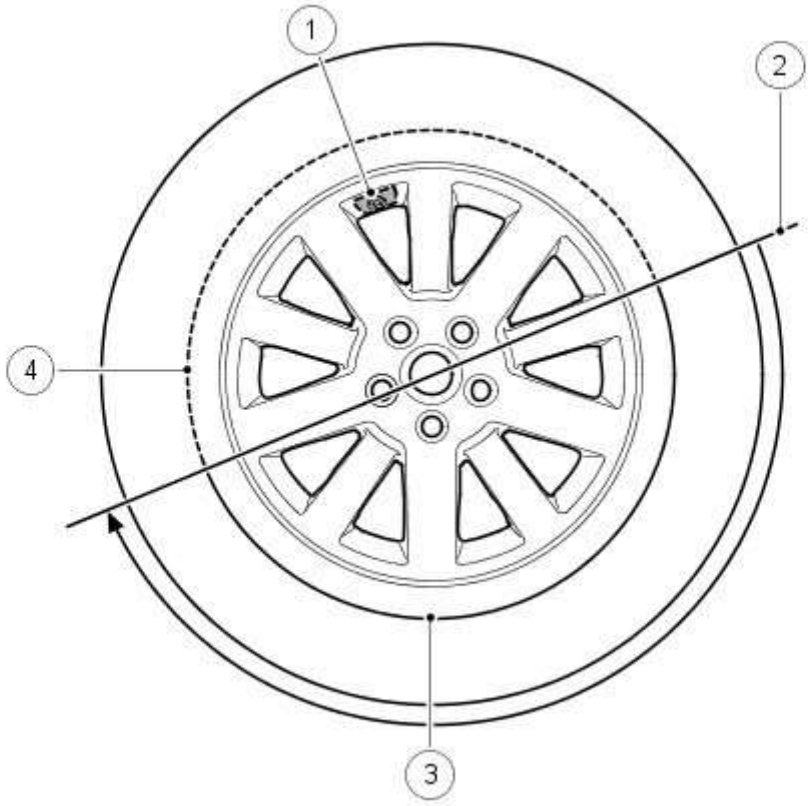
WARNINGS:

 Tires must be inflated to the recommended pressures when the tires are cold (ambient temperature) only. Refer to label on the 'B' pillar for recommended tire pressures. If the tires have been subjected to use or exposed to direct sunlight, move the vehicle into a shaded position and allow the tires to cool before checking or adjusting the pressures.

 Valve stem seal, washer nut, valve core and cap should be replaced at every tire change. Valve stem seal, washer and nut must be replaced if the valve retention nut is loosened. Sensor units and nuts must be fitted using correct torque figures and associated profile. Damage to the vehicle and consequently injury to the vehicle's occupants may result if these instructions are not adhered to.

 NOTE: The TPMS valve should be serviced using the suitable service kit, each time the tyre is dismounted, to ensure an air tight seal. Attention should be made to the detail of fitting this kit.

Vehicles fitted with TPMS can be visually identified by an external metal locknut and valve of the tire pressure sensor on the road wheels. Vehicles without TPMS will have rubber tire valve.



E45549

Item	Description
1	Tire valve and pressure sensor
2	Tire fitting/removal tool initial start position
3	High tire and bead tension area
4	Low tire and bead tension area

When removing the tire, the bead breaker must not be used within 90 degrees of the tire valve in each direction on each side of the tire.

When using the tire removal machine, the fitting arm start position must be positioned as shown in the tire changing illustration for each side of the tire. The wheel can then be rotated through 180 degrees in a counter-clockwise direction. This will relieve tension from the tire bead allowing the remaining 180 degrees of the tire to be manually pulled from the rim.

When refitting the tire, position the fitting arm as shown. Rotate the tire and take care that the bead on the low tension side of the tire does not damage the sensor.

Run-Flat Tires

Run-flat tires are not available on vehicles from 2011MY.

TREAD Act - NAS Only

Vehicles supplied to the North American markets must comply with the legislation of the Transport Recall Enhancement, Accountability and Documentation (TREAD) act. Part of the requirement of the TREAD act is for the vehicle to display a label which defines the recommended tire inflation pressure, load limits and maximum load of passengers and luggage weight the vehicle can safely carry. This label will be specific to each individual vehicle and will be installed on the production line. The label is positioned on the driver's side 'B' pillar on NAS vehicles and the inside rear face of the LH door on Canadian specification vehicles.

This label must not be removed from the vehicle. The label information will only define the specification of the vehicle as it came off the production line. It will not include dealer or owner fitted accessory wheels and tires of differing size from the original fitment.

If the label is damaged or removed for body repair, it must be replaced with a new label specific to that vehicle. A new label is requested from Jaguar parts and will be printed specifically for the supplied VIN of the vehicle.

Tire Pressure Monitoring System (TPMS)

The Tire Pressure Monitoring System (TPMS) is a driver assistance system which assists the driver to maintain the tire pressures at the optimum level. TPMS is standard fitment on NAS vehicles and an optional fitment in other markets. TPMS

provides the following benefits:

- Maintain optimal fuel consumption.
- Maintain ride and handling characteristics.
- Reduce the risk of rapid tire deflation - which may be caused by under inflated tires.
- Comply with legislation requirements in relevant markets.

 CAUTION: TPMS is not intended as a replacement for regular tire pressure and tire condition checks and should be considered as additional to good tire maintenance practices.

The TPMS measures the pressure in each of the vehicle's tires and issues warnings to the driver if any of the pressures deviate from defined tolerances. The space saver spare wheel is not monitored.

 NOTE: TPMS is not designed to warn the driver of a tire 'blow-out', as due to the short duration of a 'blow-out', it is not possible to give the driver sufficient warning that such an event is occurring. The design of the TPMS is to assist the driver in keeping the tires at the correct pressure, which will assist to reduce the likelihood of a tire 'blow-out' occurring.

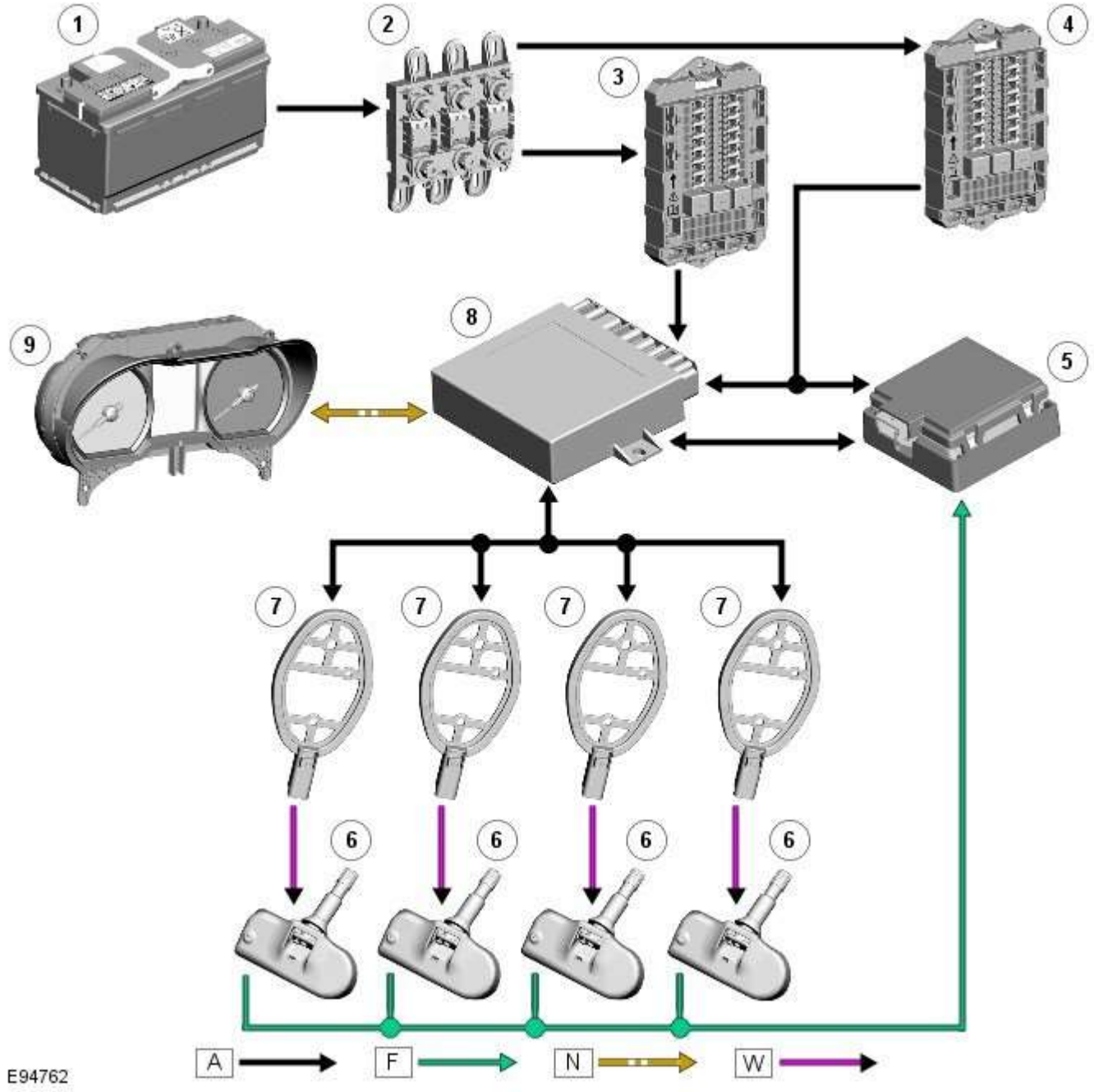
Published: 11-May-2011

Wheels and Tires - Wheels and Tires - System Operation and Component Description

Description and Operation

Control Diagram

NOTE: **A** = Hardwired; **F** = RF Transmission; **N** = Medium speed CAN bus; **W** = LF Transmission



Item	Description
1	Battery
2	Megafuse (250A)
3	CJB (central junction box)
4	RJB (rear junction box)
5	TPMS receiver
6	Tire pressure sensors

7	Initiators
8	TPMS module
9	Instrument cluster

System Operation

Tire Pressure Monitoring System (TPMS)

The controlling software for the Tire Pressure Monitoring System (TPMS) is located within a Tire Pressure Monitoring System Module. The software detects the following:

- When the tire pressure is below the recommended low pressure value - under inflated tire.
- The location of the tire on the vehicle that is below the recommended pressure.
- Malfunction warning.

The TPMS system comprises:

- Tire pressure monitoring system module located below the right-hand front seat.
- Tire pressure receiver located near the gear shifter within the floor console.
- Two front initiators positioned forward of the wheels and behind the fender splash shields.
- Two rear initiators positioned rearward of the wheels and assembled on dedicated brackets located behind the fender splash shields.
- Four sensors, each sensor is integral with a tire valve and located within the tire; the space saver spare wheel is not fitted with a sensor.

The four initiators are hard wired to the TPMS module. The initiators transmit 125 KHz Low Frequency (LF) signals to the tire pressure sensors which respond by modifying the mode status within the Radio Frequency (RF) transmission. The 315 or 433 MHz RF signals are detected by the tire pressure receiver which is connected directly to the TPMS module. The received RF signals from the tire pressure sensors are passed to the TPMS module and contain identification, pressure, temperature and acceleration information for each wheel and tire.

The TPMS module communicates with the instrument cluster via the medium speed CAN bus to provide the driver with appropriate warnings. The TPMS module also indicates status or failure of the TPMS or components.

Tire Location and Identification

The TPMS can identify the position of the wheels on the vehicle and assign a received tire pressure sensor identification to a specific position on the vehicle, for example front left, front right, rear left and rear right. This feature is required because of the different pressure targets and threshold that could exist between the front and rear tires.

The wheel location is performed automatically by the TPMS module using an 'auto-location' function. This function is fully automatic and requires no input from the driver. The TPMS module automatically re-learns the position of the wheels on the vehicle if the tire pressure sensors are replaced or the wheel positions on the vehicle are changed.

The TPMS software can automatically detect, under all operating conditions, the following:

- one or more new tire pressure sensors have been fitted
- one or more tire pressure sensors have stopped transmitting
- TPMS module can reject identifications from tire pressure sensors which do not belong to the vehicle
- two 'running' wheels on the vehicle have changed positions.

If a new tire pressure sensor is fitted on any 'running' wheel, the module can learn the new sensor identification automatically through the tire learn and location process.

The tire-learn and location process is ready to commence when the vehicle has been stationary or traveling at less than 12 mph (20 km/h) for 15 minutes. This is known as 'parking mode'. The learn/locate process requires the vehicle to be driven at speeds of more than 12 mph (20 km/h) for 15 minutes. If the vehicle speed reduces to below 12 mph (20 km/h), the learn process timer is suspended until the vehicle speed increases to more than 12 mph (20 km/h), after which time the timer is resumed. If the vehicle speed remains below 12 mph (20 km/h) for more than 15 minutes, the timer is set to zero and process starts again.

Low Pressure Monitoring

The tire low pressure sensor transmits by RF (315 MHz or 433 MHz depending on market) signal. These signals contain data which corresponds to tire low pressure sensor identification, tire pressure, tire temperature, acceleration and tire low pressure sensor mode.

Each time the vehicle is driven, the tire pressure monitoring system module activates each LF antenna in turn. The corresponding tire low pressure sensor detects the LF signal and responds by modifying the mode status within the RF transmission.

The system enters 'parking mode' after the vehicle speed has been less than 20 km/h (12.5 miles/h) for 12 minutes. In parking mode the tire low pressure sensors transmit a coded signal to the tire pressure monitoring system module once every 13 hours. If the tire pressure decreases by more than 0.06 bar (1 lbf/in^2) the tire low pressure sensor will transmit more often as pressure is lost.

As each wheel responds to the LF signal from the tire pressure monitoring system module, it is assigned a position on the vehicle and is monitored for the remainder of that drive cycle in that position.

When the vehicle has been parked for more than 15 minutes and then driven at a speed of more than 20 km/h (12.5 miles/h), the antennas fire in turn for 6 seconds on all except North American Specification (NAS) vehicles or for 18 seconds on NAS only vehicles in the following order:

- Front left
- Six second pause (for the tire pressure monitoring system module to detect a response from the tire low pressure sensor)
- Front right
- Six second pause
- Rear right
- Six second pause
- Rear left
- Six second pause.

Each tire low pressure sensor responds in turn so the tire pressure monitoring system module can establish the tire low pressure sensor positions at the start of the drive cycle. This process is repeated up to three times but less if the tire low pressure sensor positions are already known in the tire pressure monitoring system module.

This process is known as 'Auto Location' and takes:

- three to five minutes on all except North American specification vehicles to complete, and
- seven to eight minutes on North American specification vehicles to complete.

During this period the tire low pressure sensors transmit at regular intervals:

- once every 5 seconds on all except North American specification vehicles, and
- once every 15 seconds on North American specification vehicles.

For the remainder of the drive cycle the tire low pressure sensors transmit once every 60 seconds or if a change in tire pressure is sensed until the vehicle stops and the tire pressure monitoring system returns to parking mode.

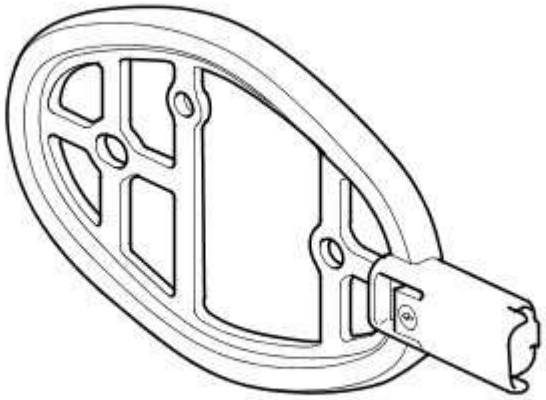
Once the wheel position is established, the antennas stop firing and do not fire again until the vehicle has been parked for more than 15 minutes. The signal transmissions from each tire low pressure sensor continue at one minute intervals whilst the vehicle is being driven. This transmission is to monitor the tire pressure. The warning occurs at 25% deflation and comprises the low tire pressure warning indicator and an appropriate message displayed in the instrument cluster message center. The message center will also display additional information about the position of the affected wheel(s).

Spare Tire Monitoring

Tire pressure sensors are not fitted to the space saver spare wheel and therefore the spare wheel is not monitored.

Component Description

Initiator

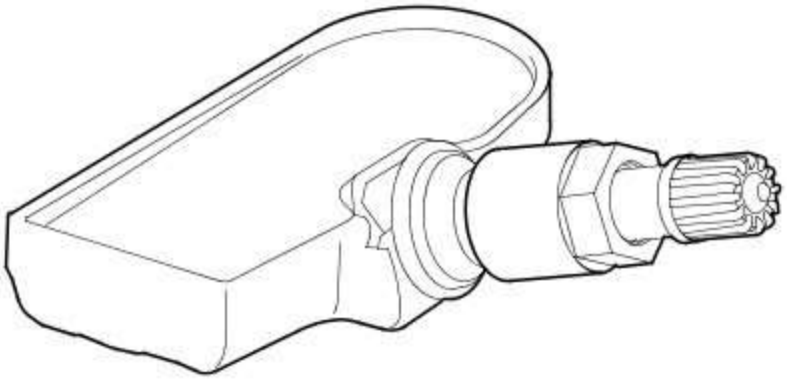


E45552

Each initiator has a connector which connects to the vehicle body harness. The initiator is a passive, LF transmitter. The initiators transmit their signals which are received by the tire pressure sensors, prompting them to modify their mode status.

The TPMS module energizes each initiator in turn using LF drivers. The corresponding tire pressure sensor detects the LF signal and responds by modifying the mode status within the RF transmission.

Tire Pressure Sensor



E45553

The TPMS uses active tire pressure sensors which are located on each wheel, inside the tire cavity. The sensor incorporates the tire valve and is secured in the wheel by a nut on the outside of the wheel. The sensor contains a Printed Circuit Board which houses a PTC (positive temperature coefficient)sensor, a Piezo pressure sensor, a radio receiver and transmitter and a lithium battery.

The tire pressure sensors use the PTC sensor and the Piezo sensor to periodically measure the pressure and temperature of the air inside the tire. The data is transmitted by RF data signals at either 315 MHz or 433 MHz dependant on market requirements.

The RF transmission from the sensor contains a unique identification code in its transmission data. This allows the TPMS to identify the wheel on the vehicle. If the sensor is replaced on a wheel, the new sensor identification will be learnt through the learn and location process.

The tire pressure sensor can also detect when the wheel is rotating. In order to preserve battery power, the sensor uses different transmission rates when the wheel is stationary or moving.

NOTE: For important information regarding the removal and fitting of tire pressure sensors and associated valves, see the Tire Changing section.

Instrument Cluster Indications

E94763

Item	Description
1	Low tire pressure warning indicator
2	Message center

The warning indications to the driver are common on all vehicles fitted with TPMS. The driver is alerted to system warnings by a low tire pressure warning indicator in the instrument cluster and an applicable text message in the message centre.

The TPMS module passes system status information to the instrument cluster on the medium speed CAN bus. The instrument cluster converts this data into illumination of the warning indicator and the display of an appropriate message.

When the ignition is switched on, the warning indicator is illuminated for 3 seconds for a bulb check.

 NOTE: If the vehicle is not fitted with the TPMS, the warning indicator will not illuminate.

The instrument cluster checks, within the 3 second bulb check period, for a CAN bus message from the TPMS. During this time the TPMS performs internal tests and CAN bus initialization. The warning indicator will be extinguished if the TPMS module does not issue a fault message or tire pressure warning message.

If a TPMS fault warning message is detected by the instrument cluster at ignition on, the warning indicator will flash for 72 seconds after the 3 second bulb check period and then remain permanently illuminated.

If a tire pressure warning message is detected by the instrument cluster at ignition on, the warning indicator will extinguish briefly after the 3 second bulb check period, before re-illuminating to indicate a tire pressure warning.

The following table shows the warning indicator functionality for given events:

Event	Instrument Cluster Indications
Low pressure warning limit reached in one wheel	Warning indicator illuminated. 'CHECK TYRE PRESSURE' message displayed and applicable tire highlighted on display.
Low pressure warning limit reached in one or more wheels in low speed mode (only if programmed or learning)	Warning indicator illuminated. 'CHECK ALL TYRE PRESSURES' message displayed.
TPMS fault	Warning indicator flashes for 72 seconds and is then permanently illuminated. The flash sequence repeats after ignition on cycle. 'TYRE PRESSURE SYSTEM FAULT' message displayed.
No transmission from a specific tire pressure sensor or Specific tire pressure sensor fault	Warning indicator flashes for 72 seconds and is then permanently illuminated. The flash sequence repeats after ignition on cycle. 'TYRE NOT MONITORED' message displayed.
No transmission from more than one tire pressure sensor or more than one tire pressure sensor fault	Warning indicator flashes for 72 seconds and is then permanently illuminated. The flash sequence repeats after ignition on cycle. 'TYRE PRESSURE SYSTEM FAULT' message displayed.
CAN (controller area network) signals missing	Warning indicator flashes for 72 seconds and is then permanently illuminated. The flash sequence repeats after ignition on cycle. 'TYRE PRESSURE SYSTEM FAULT' message displayed.
Vehicle enters high speed mode (only available in certain markets)	Warning indicator illuminated. 'TYRE PRESSURE LOW FOR SPEED' message displayed.

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Wheels and Tires - Wheels and Tires

Diagnosis and Testing

Principle of Operation

For a detailed description of the wheels and tires, refer to the relevant Description and Operation section in the workshop manual. REFER to: (204-04 Wheels and Tires)

Wheels and Tires (Description and Operation),
Wheels and Tires (Description and Operation),
Wheels and Tires (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 complaint. As much information as possible should be gathered from the driver to assist in diagnosing the cause(s). Confirm which of the following two warning types (A or B) exist for the Tire Pressure Monitoring System when the ignition status is switched from 'OFF' to 'ON'
   - **(A) Check Tire Pressure Warnings.** A low tire pressure warning will **continuously** illuminate the low tire pressure warning lamp. This warning may be accompanied by a text message such as CHECK TIRE PRESSURE (refer to owner literature). The manufacturer approved diagnostic system does NOT need to be used. Diagnostic Trouble Codes (DTCs) are not generated with this type of warning. To extinguish this warning it is essential that, with the ignition 'ON', all vehicle tires (including the spare) are to be set to the correct pressure as stated in the vehicle handbook or as indicated on the placard label in the passenger/driver door aperture. **It is not necessary to drive the vehicle to clear 'check tire pressure' warnings - just changing the tire pressure causes the tire low pressure sensor to transmit new data.**

     NOTES:

     The tire pressures should be set by:

     - Using a calibrated tire pressure gauge
     - With 'cold' tires (vehicle parked in the ambient temperature for at least one hour, not in a garage with an artificial ambient temperature)

     If the tire pressure warning does not clear within two minutes, it is likely that the gauge is not correctly calibrated or the tires are 'warm'. Carry out the following steps until the warning has cleared:

     - Increase the tire pressures by 3psi
     - Wait a further two minutes
     - When the tires are at ambient temperature and a **calibrated** gauge is available, reset the tire pressures to the correct pressure.

     Tire pressure adjustments are part of routine owner maintenance. Tire pressure adjustments that are required due to a lack of owner maintenance are not to be claimed under vehicle warranty.

   - **(B) System Fault Warnings.** When a system fault is detected, the low tire pressure warning lamp will flash for approximately 75 seconds prior to being continuously illuminated. Visually inspect for obvious signs of damage and system integrity. Check for the presence of tire low pressure sensors on all four wheels (note: a tire low pressure sensor has a metal valve stem rather than a rubber one).
2. Check for Diagnostic Trouble Codes (DTCs) and refer to the DTC Index.

NOTE: If the tester fails to communicate with the Tire Pressure Monitoring System module, the following actions are recommended:

- Remove the Tire Pressure Monitoring System power supply fuse, inspect and re-install (if intact). Test to see if communications have been re-established.
- Remove the Tire Pressure Monitoring System ignition fuse (if applicable), inspect and re-install (if intact). Test to see if communications have been re-established.
- With ignition status set to 'ON', refer to the electrical circuit diagrams and check Tire Pressure Monitoring System module for power, ignition and ground supplies .
- Carry out CAN network integrity test using the manufacturer approved diagnostic system.

DTC Index

CAUTION: When probing connectors to take measurements in the course of the pinpoint tests, use the adaptor kit, part number 3548-1358-00

NOTES:

 If the control module or a component is suspect and the vehicle remains under manufacturer warranty, refer to the Warranty Policy and Procedures manual (section B1.2), or determine if any prior approval programme is in operation, prior to the installation of a new module/component.

 Generic scan tools may not read the codes listed, or may read only five digit codes. If this is the case, match the five digits from the scan tool to the first five digits of the seven digit code listed to identify the fault (the last two digits give extra information read by the manufacturer-approved diagnostic system).

 When performing voltage or resistance tests, always use a digital multimeter (DMM) accurate to three decimal places, and with an up-to-date calibration certificate. When testing resistance, always take the resistance of the DMM leads into account.

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

 If DTCs are recorded and, after performing the pinpoint tests, a fault is not present, an intermittent concern may be the cause. Always check for loose connections and corroded terminals.

DTC	Description	Possible Cause	Action
C1A56-31	Left Front Tire Pressure Sensor and Transmitter Assembly-no signal	• Missing, incompatible or defective tire low pressure sensor or radio frequency receiver	GO to Pinpoint Test F.
C1A56-68	Left Front Tire Pressure Sensor and Transmitter Assembly-event information	• Information only - vehicle exposed to extreme temperature environment and/or tire low pressure sensor low battery voltage event	No action required.
C1A56-91	Left Front Tire Pressure Sensor and Transmitter Assembly-parametric	• Tire low pressure sensor has reported out of range information for pressure, temperature or acceleration	Replace defective tire low pressure sensor. Refer to the relevant section of the workshop manual.
C1A56-93	Left Front Tire Pressure Sensor and Transmitter Assembly-no operation	• No tire low pressure sensor can be localized at this position due to an initiator or tire low pressure sensor malfunction	GO to Pinpoint Test G.
C1A57-11	Left Front Initiator-circuit short to ground	• Left front initiator circuit is short to ground	GO to Pinpoint Test B. Refer to Pinpoint test B1
C1A57-12	Left Front Initiator-circuit short to battery	• Left front initiator circuit is short to power	GO to Pinpoint Test B. Go to Pinpoint test B2
C1A57-13	Left Front Initiator-circuit open	• Left front initiator circuit open	GO to Pinpoint Test B. Go to Pinpoint test B9
C1A58-31	Right Front Tire Pressure Sensor and Transmitter Assembly-no signal	• Missing, incompatible or defective tire low pressure sensor or radio frequency receiver	GO to Pinpoint Test F.
C1A58-68	Right Front Tire Pressure Sensor and Transmitter Assembly-event information	• Information only - vehicle exposed to extreme temperature environment and/or tire low pressure sensor low battery voltage event	No action required.

DTC	Description	Possible Cause	Action
C1A58-91	Right Front Tire Pressure Sensor and Transmitter Assembly-parametric	• Tire low pressure sensor has reported out of range information for pressure, temperature or acceleration	Replace defective tire low pressure sensor. refer to the relevant section of the workshop manual.
C1A58-93	Right Front Tire Pressure Sensor and Transmitter Assembly-no operation	• No tire low pressure sensor can be localized at this position due to an initiator or tire low pressure sensor malfunction	GO to Pinpoint Test G.
C1A59-11	Right Front Initiator-circuit short to ground	• Right front initiator circuit is short to ground	GO to Pinpoint Test C. Go to Pinpoint test C1
C1A59-12	Right Front Initiator-circuit short to battery	• Right front initiator circuit is short to power	GO to Pinpoint Test C. Go to Pinpoint test C2
C1A59-13	Right Front Initiator-circuit open	• Right front initiator circuit open	GO to Pinpoint Test C. Go to Pinpoint test C9
C1A60-31	Left Rear Tire Pressure Sensor and Transmitter Assembly-no signal	• Missing, incompatible or defective tire low pressure sensor or radio frequency receiver	GO to Pinpoint Test F.
C1A60-68	Left Rear Tire Pressure Sensor and Transmitter Assembly-event information	• Information only - vehicle exposed to extreme temperature environment and/or tire low pressure sensor low battery voltage event	No action required.
C1A60-91	Left Rear Tire Pressure Sensor and Transmitter Assembly-parametric	• Tire low pressure sensor has reported out of range information for pressure, temperature or acceleration	Replace defective tire low pressure sensor, refer to the relevant section of the workshop manual.
C1A60-93	Left Rear Tire Pressure Sensor and Transmitter Assembly-no operation	• No tire low pressure sensor can be localized at this position due to an initiator or tire low pressure sensor malfunction	GO to Pinpoint Test G.
C1A61-11	Left Rear Initiator-circuit short to ground	• Left rear initiator circuit short to ground	GO to Pinpoint Test D. Go to Pinpoint test D1
C1A61-12	Left Rear Initiator-circuit short to battery	• Left rear initiator circuit short to power	GO to Pinpoint Test D. Go to Pinpoint test D2
C1A61-13	Left Rear Initiator-circuit open	• Left rear initiator circuit open	GO to Pinpoint Test D. Go to Pinpoint test D9
C1A62-31	Right Rear Tire Pressure Sensor and Transmitter Assembly-no signal	• Missing, incompatible or defective tire low pressure sensor or radio frequency receiver	GO to Pinpoint Test F.
C1A62-68	Right Rear Tire Pressure Sensor and Transmitter Assembly-event information	• Information only - vehicle exposed to extreme temperature environment and/or tire low pressure sensor low battery voltage event	No action required.

DTC	Description	Possible Cause	Action
C1A62-91	Right Rear Tire Pressure Sensor and Transmitter Assembly-parametric	• Tire low pressure sensor has reported out of range information for pressure, temperature or acceleration	Replace defective tire low pressure sensor, refer to the relevant section of the workshop manual.
C1A62-93	Right Rear Tire Pressure Sensor and Transmitter Assembly-no operation	• No tire low pressure sensor can be localized at this position due to an initiator or tire low pressure sensor malfunction	GO to Pinpoint Test G.
C1A63-11	Right Rear Initiator-circuit short to ground	• Right rear initiator circuit short to ground	GO to Pinpoint Test E. Go to Pinpoint test E1
C1A63-12	Right Rear Initiator-circuit short to battery	• Right rear initiator circuit short to power	GO to Pinpoint Test E. Go to Pinpoint test E2
C1A63-13	Right Rear Initiator-circuit open	• Right rear initiator circuit open	GO to Pinpoint Test E. Go to Pinpoint test E9
C1A64-68	Spare Wheel Tire Pressure Sensor and Transmitter Assembly-event information	• Information only - vehicle exposed to extreme temperature environment and/or tire low pressure sensor low battery voltage event	No action required.
C1A64-91	Spare Wheel Tire Pressure Sensor and Transmitter Assembly-parametric	• Tire low pressure sensor has reported out of range information for pressure, temperature or acceleration	Replace defective tire low pressure sensor, refer to the relevant section of the workshop manual.
C1A64-93	Spare Wheel Tire Pressure Sensor and Transmitter Assembly-no operation	• Missing, incompatible or defective tire low pressure sensor or radio frequency receiver	GO to Pinpoint Test H.
C1D19-11	External Receiver Data Line-circuit short to ground	• Tire pressure monitoring system radio frequency receiver or data line circuit is short to ground	GO to Pinpoint Test A.
C1D19-12	External Receiver Data Line-circuit short to battery	• Tire pressure monitoring system radio frequency receiver or data line circuit is short to power	GO to Pinpoint Test I.
C1D19-87	External Receiver Data Line-missing message	• Radio Frequency reception blocked • Tire pressure monitoring system radio frequency receiver faulty • Tire pressure monitoring system radio frequency receiver or data line circuits open circuit • Missing, incompatible or defective tire low pressure sensors	GO to Pinpoint Test J.
U0010-88	Medium Speed CAN Communication Bus-bus off	• CAN bus fault	Carry out CAN network integrity tests. Refer to the electrical wiring diagrams and check CAN network for short, open circuit.
U0140-00	Lost communication with body control module-no sub type information	• CAN bus fault • Central Junction Box fault	Refer to the electrical wiring diagrams and check Central Junction Box power and ground supplies for short, open circuit. Carry out CAN network integrity tests.

DTC	Description	Possible Cause	Action
U0142-00	Lost Communication With Body Control Module "B" -no sub type information	• CAN bus fault • Auxiliary Junction Box fault	Refer to the electrical wiring diagrams and check Auxiliary Junction Box power and ground supplies for short, open circuit. Carry out CAN network integrity tests.
U0155-00	Lost Communications With Instrument Panel Cluster (IPC) Control Module-no sub type information	• CAN bus fault • Instrument cluster fault	Refer to the electrical wiring diagrams and check instrument cluster power and ground supplies for short, open circuit. Carry out CAN network integrity tests.
U0164-00	Lost Communication With HVAC Control Module-no sub type information	• CAN bus fault • Climate control module fault	Refer to the electrical wiring diagrams and check climate control module power and ground supplies for short, open circuit. Carry out CAN network integrity tests.
U0300-00	Internal Control Module Software Incompatibility-no sub type information	• Incompatible tire pressure monitoring system module for vehicle CAN network	Check correct tire pressure monitoring system module is installed to vehicle specification, otherwise suspect the Auxiliary Junction Box.
U0415-00	Invalid Data Received From Anti-Lock Brake System (ABS) Control Module-no subtype information	• Invalid data received from the Anti-Lock Braking System Control Module • CAN bus fault • Anti-Lock Braking System fault	Check Anti-Lock Braking System control module and Instrument Cluster for related DTCs and refer to the relevant DTC Index. Carry out CAN network integrity tests.
U0424-00	Invalid Data Received From HVAC Control Module-no sub type information	• HVAC control module fault	Check climate control module for related DTCs and refer to relevant DTC Index.
U1A14-49	CAN Initialisation Failure-internal electronic failure	• Tire pressure monitoring system module fault	Install a new tire pressure monitoring module. Refer to the new module/component installation note at the top of the DTC Index.
U3000-55	Control Module-not configured	• Tire pressure monitoring system configuration data is invalid	Check and amend the car configuration file.
U3000-87	Control Module-missing message	• Tire pressure monitoring system configuration data not received	Check the Auxiliary Junction Box for related DTCs and refer to the relevant DTC Index. Carry out CAN network integrity test.
U3002-81	Vehicle Identification Number - invalid serial data received	• Tire pressure monitoring system module and vehicle VIN mis-match	NOTE: This DTC indicates that the tire pressure monitoring system module is not the original part installed to the vehicle at the factory/dealer and could have been substituted. Refer to the note above the DTC index about replacing components which may remain under manufacturer warranty. Re-install the original or a new tire pressure monitoring system control module.

Component Tests

Wheels and Tires

For wheel and tire specification information (pressures, torques, etc).

When replacing wheels or tires, local legislation regarding health and safety must be complied with.

If the vehicle has a Tire Pressure Monitoring System installed, only Jaguar approved wheels and tires should be used. If the wheel and tire size is changed (for example from R18 to R20) the Tire Pressure Monitoring System module should be updated with the correct pressure information appropriate to the new wheel and tire set. Update the Tire Pressure Monitoring System module using the Jaguar approved diagnostic system.

As a general guideline, only replace tires in pairs or as a set, and only with tires of equivalent size and specification.

Confirm the symptoms of the customer complaint.

As much information as possible should be gathered from the driver to assist in diagnosing the cause(s).

1. Before a road test, carry out a basic inspection to make sure the vehicle is safe and legal to drive.

Basic inspection

- Correct tire inflation
- Legal tire tread depth

- Cuts/Bulges in tire sidewall(s)
- Tire ply separation
- Embedded objects
- Wheel rim damage
- Correct tire installation (specification, direction of rotation, etc)
- Any obvious distortion of the tire (flat/high spots)
- Worn/Damaged steering or suspension components

Road test

If the results of the basic inspection are acceptable, carry out a road test to confirm the symptoms.

To reproduce the symptoms, test the vehicle on similar roads to those on which the fault occurs and at similar speeds (provided it is legal to do so).

If the vibration or noise can be reproduced, note the speed at which it occurs and see if it is possible to drive through the symptom, meaning, is it possible to alter the fault by driving faster or slower than the speed at which it occurs?

If it **is** possible, it is likely that the fault is caused by an imbalance in the wheel or tire.

If the vibration or noise gets worse as the vehicle speed increases, it is likely that the fault is caused by distortion in the wheel or tire, or worn or damaged components.

Distortion checks

Check for distortion by raising the vehicle so that the wheels are free and placing an axle stand or similar fixed object next to each wheel in turn.

If the stand is placed at the tread of the tire, the tire can be checked for ovality by turning the wheel by hand and checking for high or low spots where the gap between the tread and the stand increases or reduces.

If the stand is placed next to the wheel rim or tire sidewall, the wheel and tire can be checked for run-out in a similar way.

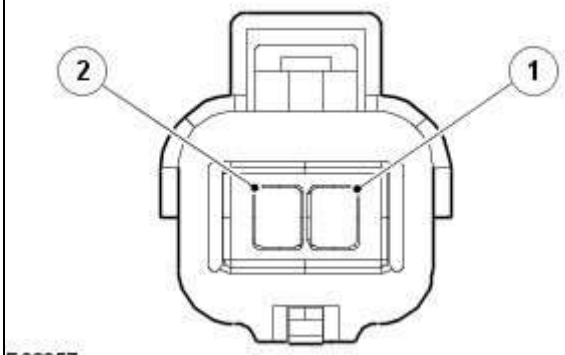
Pinpoint Tests

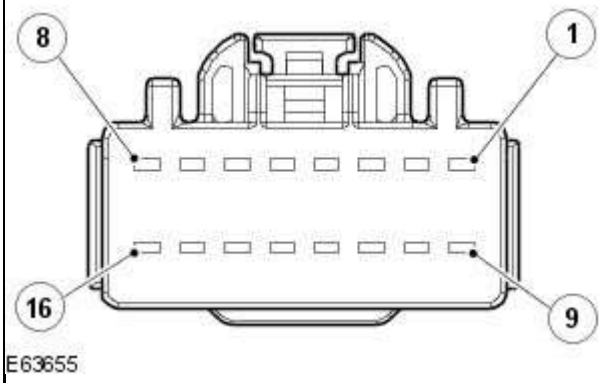
PINPOINT TEST A : C1D1911 TIRE PRESSURE MONITORING SYSTEM EXTERNAL RECEIVER DATA LINE CIRCUIT SHORT TO GROUND

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
A1: C1D1911 VERIFY EXTERNAL RECEIVER DATA LINE CIRCUIT SHORT TO GROUND	
	1 Ignition off.
	2 Disconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.
	3 Measure the resistance between **C3MC45, harness side**: Pin 1 — **Battery**: Negative terminal
	Is the resistance less than 5 Ohms? **Yes** GO to A2.GO to A2. **No** GO to A3.GO to A3.
A2: C1D1911 CHECK THE EXTERNAL RECEIVER DATA LINE CIRCUIT FOR SHORT CIRCUIT TO GROUND	
	1 Disconnect the Tire Pressure Monitoring System Control Module electrical connector, C3MC39B.
	2 Measure the resistance between **C3MC45, harness side**: Pin 1 — **Battery**: Negative terminal
	Is the resistance less than 5 Ohms? **Yes** REPAIR the short circuit in wiring harness. **No** GO to A4.GO to A4.
A3: C1D1911 CHECK THE TIRE PRESSURE MONITORING SYSTEM EXTERNAL RECEIVER FOR SHORT CIRCUIT TO GROUND	
	1 Reconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.
	2 Using manufacturer approved diagnostic system run On Demand Self Test **(0x0202)**.
	Is the DTC C1D1911 set? **Yes** Replace Tire Pressure Monitoring Receiver. **No** Investigate possible cause of intermittent failure.
A4: C1D1911 CHECK THE TIRE PRESSURE MONITORING SYSTEM CONTROL MODULE FOR SHORT CIRCUIT TO GROUND	
	1 Reconnect the Tire Pressure Monitoring System Control Module electrical connector, C3MC39B.
	2 Reconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.

	3 Using manufacturer approved diagnostic system run On Demand Self Test **(0x0202)**.
	Is the DTC C1D1911 set? **Yes** Replace Tire Pressure Monitoring System Control Module. **No** Investigate possible cause of intermittent failure.

PINPOINT TEST B : LEFT FRONT LOW FREQUENCY INITIATOR CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
B1: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND	
	1 Ignition off.
	2 Disconnect the left hand front low-frequency initiator electrical connector, C1MC40.
 E63657	
	3 Measure the resistance between: **C1MC40, harness side** — **Battery** Pin 2 — Negative terminal
	Is the resistance less than 10,000 ohms? **Yes** GO to B5. **No** GO to B2.
B2: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER	
	1 Measure the resistance between: **C1MC40, harness side** — **Battery** Pin 2 — Positive terminal
	Is the resistance less than 10,000 ohms? **Yes** GO to B6. **No** GO to B3.
B3: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND	
	1 Measure the resistance between: **C1MC40, harness side** — **Battery** Pin 1 — Negative terminal
	Is the resistance less than 10,000 ohms? **Yes** GO to B7. **No** GO to B4.
B4: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER	
	1 Measure the resistance between: **C1MC40, harness side** — **Battery** Pin 1 — Positive terminal
	Is the resistance less than 10,000 ohms? **Yes** GO to B8. **No** GO to B9.
B5: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE	

	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	
	2 Measure the resistance between:

C1MC40, harness side	Battery
Pin 2	Negative terminal

Is the resistance less than 10,000 ohms?

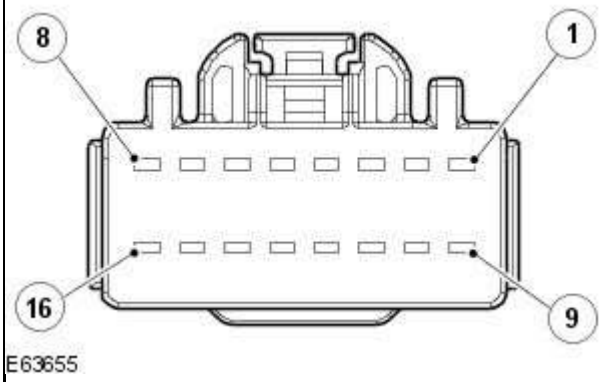
Yes

REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

B6: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	
	2 Measure the resistance between:

C1MC40, harness side	Battery
Pin 2	Positive terminal

Is the resistance less than 10,000 ohms?

Yes

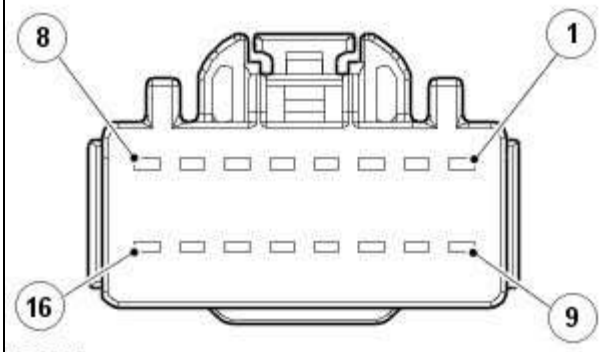
REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

B7: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.



2 Measure the resistance between:

C1MC40, harness side	Battery
Pin 1	Negative terminal

Is the resistance less than 10,000 ohms?

Yes

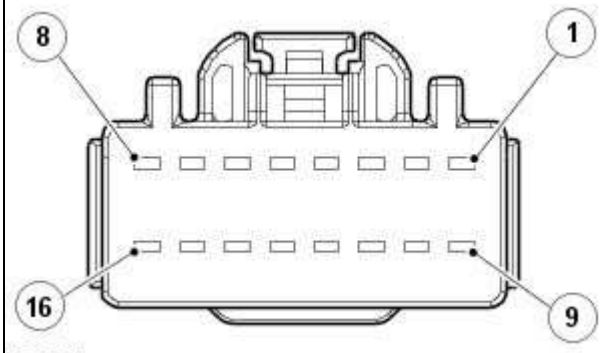
REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

B8: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.



2 Measure the resistance between:

C1MC40, harness side	Battery
Pin 1	Positive terminal

Is the resistance less than 10,000 ohms?

Yes

REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

B9: CHECK THE INITIATOR CIRCUIT FOR HIGH RESISTANCE

1 Measure the resistance between:

C3MC39A, harness side	C1MC40, harness side
Pin 14	Pin 2

Is the resistance greater than 5 ohms?

Yes

REPAIR the high resistance circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

GO to B10.

B10: CHECK THE INITIATOR CIRCUIT FOR HIGH RESISTANCE

1 Measure the resistance between:

C3MC39A, harness side	C1MC40, harness side
Pin 13	Pin 1

Is the resistance greater than 5 ohms?

Yes

REPAIR the high resistance circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new left hand front low-frequency initiator. REFER to: Tire Pressure Monitoring System (TPMS) Front Antenna (204-04 Wheels and Tires, Removal and Installation).

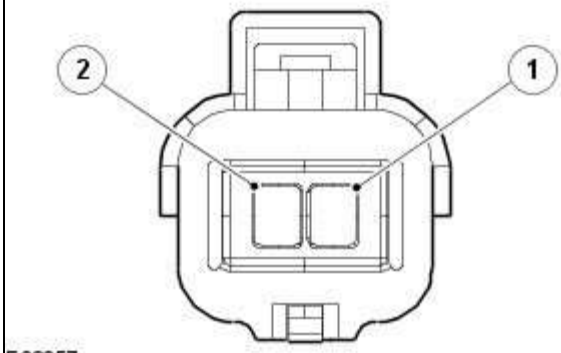
PINPOINT TEST C : RIGHT FRONT LOW FREQUENCY INITIATOR CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS

C1: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1 Ignition off.

2 Disconnect the right hand front low-frequency initiator electrical connector, C1MC41.



3 Measure the resistance between:

C1MC41, harness side	Battery
Pin 2	Negative terminal

Is the resistance less than 10,000 ohms?

Yes

GO to C5.

No

GO to C2.

C2: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER

1 Measure the resistance between:

C1MC41, harness side	Battery
Pin 2	Positive terminal

Is the resistance less than 10,000 ohms?

Yes

GO to C6.

No

GO to C3.

C3: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND

1 Measure the resistance between:

C1MC41, harness side	Battery
Pin 1	Negative terminal

	Is the resistance less than 10,000 ohms? **Yes** GO to C7. **No** GO to C4.

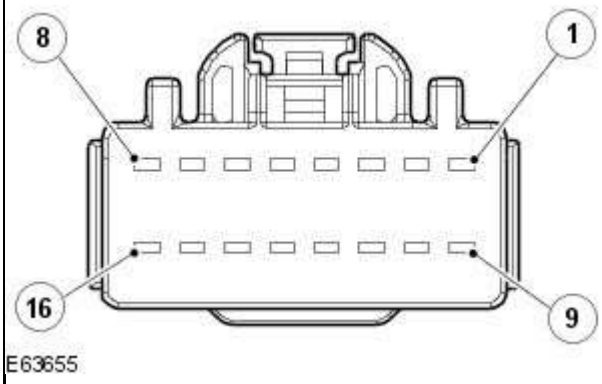
C4: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER

	1 Measure the resistance between:

C1MC41, harness side	Battery
Pin 1	Positive terminal

	Is the resistance less than 10,000 ohms? **Yes** GO to C8. **No** GO to C9.

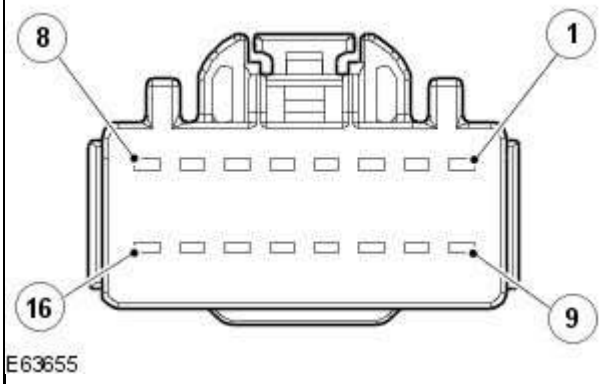
C5: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	2 Measure the resistance between:

C1MC41, harness side	Battery
Pin 2	Negative terminal

	Is the resistance less than 10,000 ohms? **Yes** REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification. **No** INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

C6: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	2 Measure the resistance between:

C1MC41, harness side	Battery
Pin 2	Positive terminal

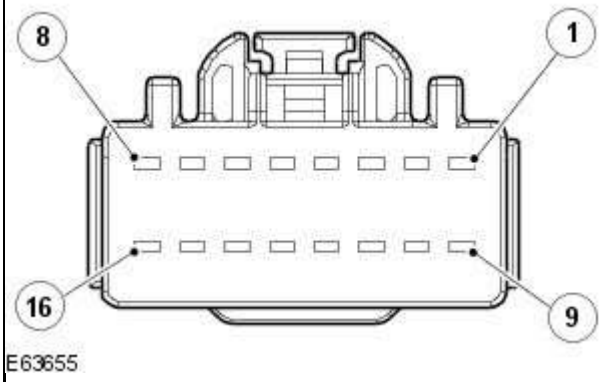
	Is the resistance less than 10,000 ohms? **Yes** REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification. **No** INSTALL a new Tire Pressure Monitoring System module. REFER to:

Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

C7: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.

2 Measure the resistance between:



E63655

C1MC41, harness side	Battery
Pin 1	Negative terminal

Is the resistance less than 10,000 ohms?

Yes

REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

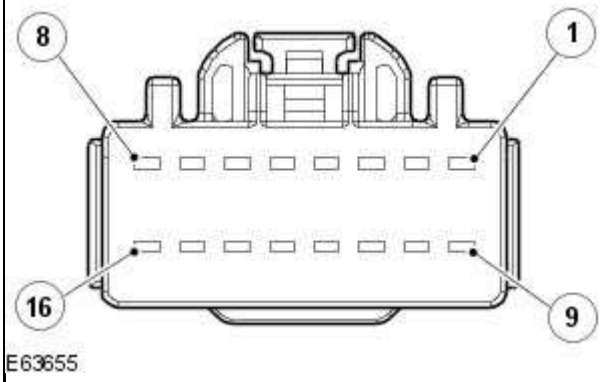
No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

C8: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.

2 Measure the resistance between:



E63655

C1MC41, harness side	Battery
Pin 1	Positive terminal

Is the resistance less than 10,000 ohms?

Yes

REPAIR the short circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

C9: CHECK THE INITIATOR CIRCUIT FOR HIGH RESISTANCE

1 Measure the resistance between:

C3MC39A, harness side	C1MC41, harness side
Pin 16	Pin 2

Is the resistance greater than 5 ohms?

Yes

REPAIR the high resistance circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to

confirm rectification.

No

GO to C10.

C10: CHECK THE INITIATOR CIRCUIT FOR HIGH RESISTANCE

1 Measure the resistance between:

C3MC39A, harness side	C1MC41, harness side
Pin 15	Pin 1

Is the resistance greater than 5 ohms?

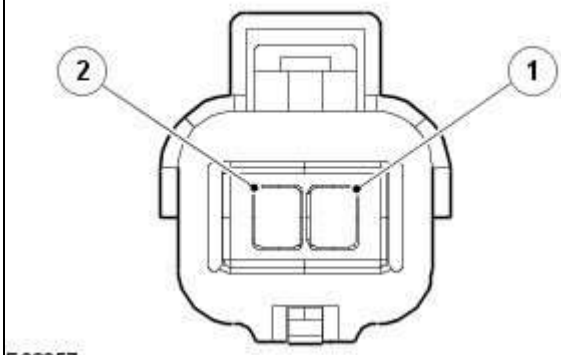
Yes

REPAIR the high resistance circuit. This circuit contains intermediate connector, C13-B. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

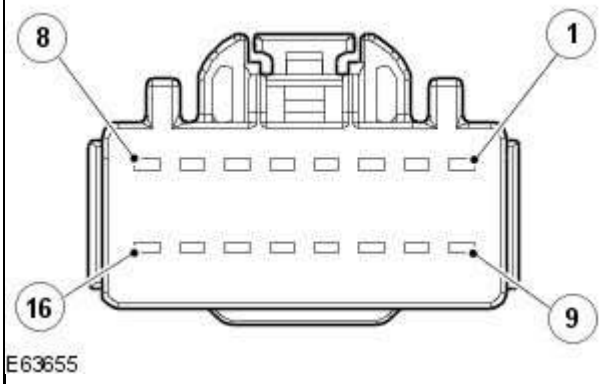
INSTALL a new right hand front low-frequency initiator. REFER to: Tire Pressure Monitoring System (TPMS) Front Antenna (204-04 Wheels and Tires, Removal and Installation).

PINPOINT TEST D : LEFT REAR LOW FREQUENCY INITIATOR CIRCUIT

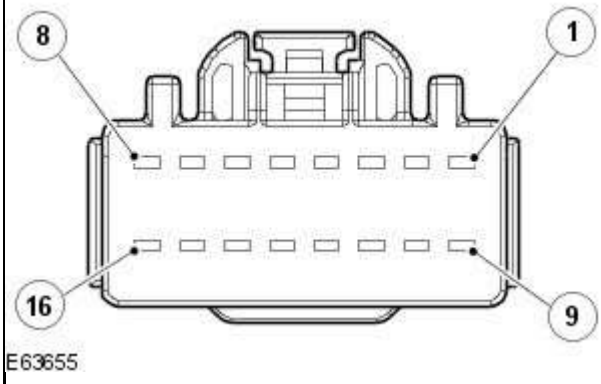
TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
D1: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND	
	1 Ignition off.
	2 Disconnect the left hand rear low-frequency initiator electrical connector, C4MC42.
 E63657	**3** Measure the resistance between: **C4MC42, harness side** — **Battery** Pin 2 — Negative terminal
	Is the resistance less than 10,000 ohms? **Yes** GO to D5. **No** GO to D2.
D2: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER	
	1 Measure the resistance between: **C4MC42, harness side** — **Battery** Pin 2 — Positive terminal
	Is the resistance less than 10,000 ohms? **Yes** GO to D6. **No** GO to D3.
D3: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND	
	1 Measure the resistance between: **C4MC42, harness side** — **Battery** Pin 1 — Negative terminal
	Is the resistance less than 10,000 ohms? **Yes** GO to D7. **No** GO to D4.
D4: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER	

	1 Measure the resistance between:

C4MC42, harness side	Battery
Pin 1	Positive terminal

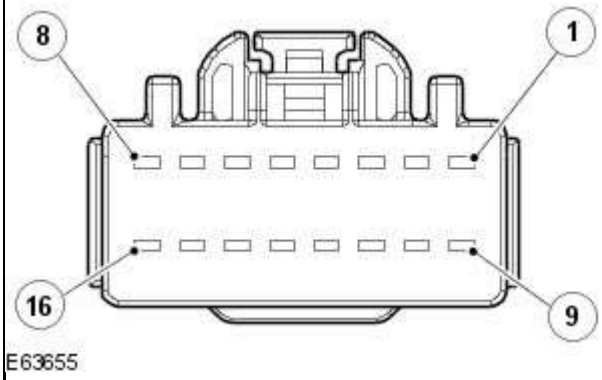
	Is the resistance less than 10,000 ohms? **Yes** GO to D8. **No** GO to D9.
D5: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE	
	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	2 Measure the resistance between:

C4MC42, harness side	Battery
Pin 2	Negative terminal

	Is the resistance less than 10,000 ohms? **Yes** REPAIR the short circuit. This circuit contains intermediate connector, C44-W. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification. **No** INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).
D6: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE	
	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	2 Measure the resistance between:

C4MC42, harness side	Battery
Pin 2	Positive terminal

	Is the resistance less than 10,000 ohms? **Yes** REPAIR the short circuit. This circuit contains intermediate connector, C44-W. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification. **No** INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).
D7: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE	
	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.



2 Measure the resistance between:

C4MC42, harness side	Battery
Pin 1	Negative terminal

Is the resistance less than 10,000 ohms?

Yes

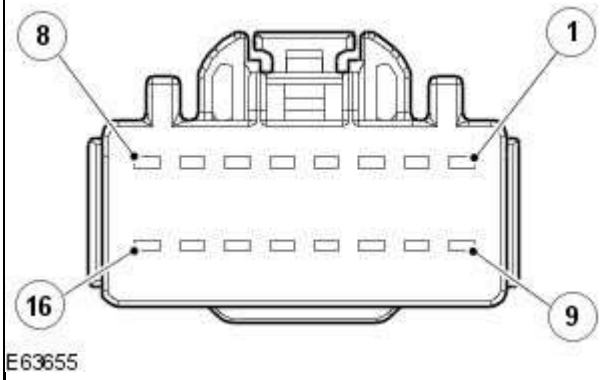
REPAIR the short circuit. This circuit contains intermediate connector, C44-W. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

D8: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.



2 Measure the resistance between:

C4MC42, harness side	Battery
Pin 1	Positive terminal

Is the resistance less than 10,000 ohms?

Yes

REPAIR the short circuit. This circuit contains intermediate connector, C44-W. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

D9: CHECK THE INITIATOR RETURN CIRCUIT FOR HIGH RESISTANCE

1 Measure the resistance between:

C3MC39A, harness side	C4MC42, harness side
Pin 6	Pin 2

Is the resistance greater than 5 ohms?

Yes

REPAIR the high resistance circuit. This circuit contains intermediate connector, C44-W. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

GO to E1.

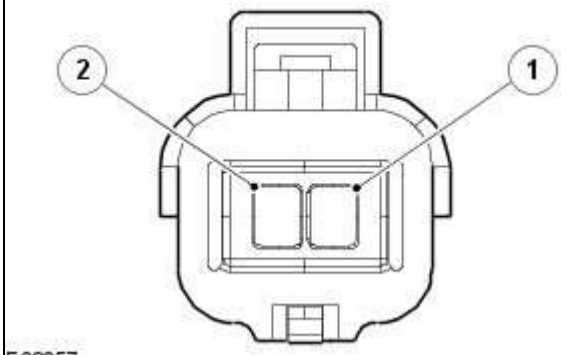
D10: CHECK THE INITIATOR CIRCUIT FOR HIGH RESISTANCE

	1 Measure the resistance between:

C3MC39A, harness side	C4MC42, harness side
Pin 5	Pin 1

	Is the resistance greater than 5 ohms? **Yes** REPAIR the high resistance circuit. This circuit contains intermediate connector, C44-W. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification. **No** INSTALL a new rear left hand low-frequency initiator. REFER to: Tire Pressure Monitoring System (TPMS) Rear Antenna (204-04 Wheels and Tires, Removal and Installation).

PINPOINT TEST E : RIGHT REAR LOW FREQUENCY INITIATOR CIRCUIT

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
E1: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND	
	1 Ignition off.
	2 Disconnect the right hand rear low-frequency initiator electrical connector, C4MC43.
 E63657	3 Measure the resistance between:

C4MC43, harness side	Battery
Pin 2	Negative terminal

	Is the resistance less than 10,000 ohms? **Yes** GO to E5. **No** GO to E2.
E2: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER	
	1 Measure the resistance between:

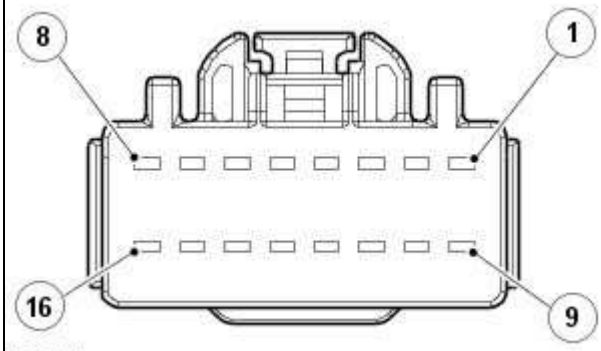
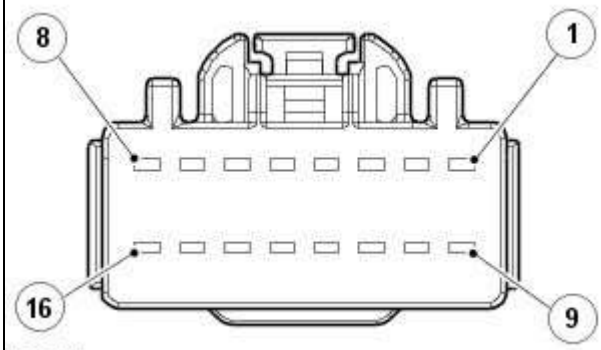
C4MC43, harness side	Battery
Pin 2	Positive terminal

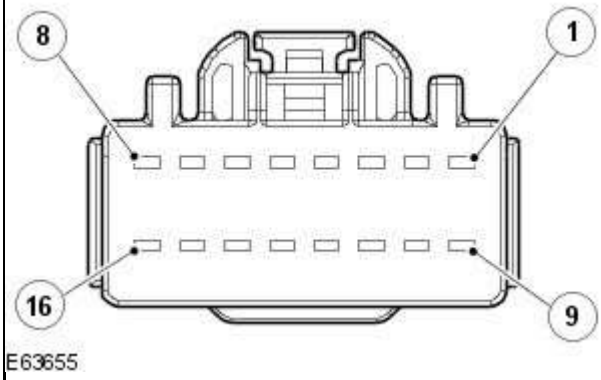
	Is the resistance less than 10,000 ohms? **Yes** GO to E6. **No** GO to E3.
E3: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO GROUND	
	1 Measure the resistance between:

C4MC43, harness side	Battery
Pin 1	Negative terminal

	Is the resistance less than 10,000 ohms? **Yes** GO to E7. **No** GO to E4.
E4: CHECK THE INITIATOR CIRCUIT FOR SHORT CIRCUIT TO POWER	
	1 Measure the resistance between:

C4MC43, harness side	Battery
Pin 1	Positive terminal

	Is the resistance less than 10,000 ohms? **Yes** GO to E8. **No** GO to E9.
E5: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE	
	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	**2** Measure the resistance between: **C4MC43, harness side** — **Battery** Pin 2 — Negative terminal
	Is the resistance less than 10,000 ohms? **Yes** REPAIR the short circuit. This circuit contains intermediate connector, C44-Y. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification. **No** INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).
E6: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE	
	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.
 E63655	**2** Measure the resistance between: **C4MC43, harness side** — **Battery** Pin 2 — Positive terminal
	Is the resistance less than 10,000 ohms? **Yes** REPAIR the short circuit. This circuit contains intermediate connector, C44-Y. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification. **No** INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).
E7: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE	
	1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.



2 Measure the resistance between:

C4MC43, harness side	Battery
Pin 1	Negative terminal

Is the resistance less than 10,000 ohms?

Yes

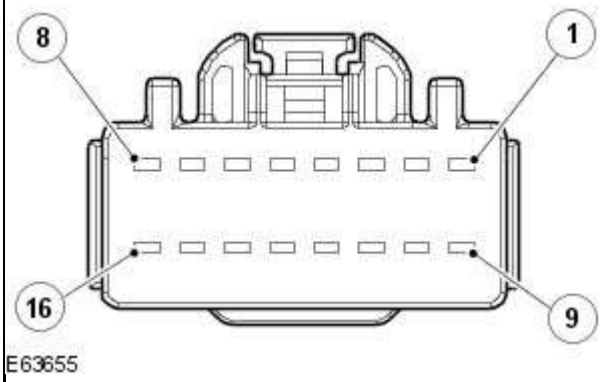
REPAIR the short circuit. This circuit contains intermediate connector, C44-Y. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

E8: CHECK WHETHER THE SHORT CIRCUIT IS IN THE HARNESS OR THE MODULE

1 Disconnect the Tire Pressure Monitoring System module connector, C3MC39A.



2 Measure the resistance between:

C4MC43, harness side	Battery
Pin 1	Positive terminal

Is the resistance less than 10,000 ohms?

Yes

REPAIR the short circuit. This circuit contains intermediate connector, C44-Y. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new Tire Pressure Monitoring System module. REFER to: Tire Pressure Monitoring System (TPMS) Module (204-04 Wheels and Tires, Removal and Installation).

E9: CHECK THE INITIATOR CIRCUIT FOR HIGH RESISTANCE

1 Measure the resistance between:

C3MC39A, harness side	C4MC43, harness side
Pin 8	Pin 2

Is the resistance greater than 5 ohms?

Yes

REPAIR the high resistance circuit. This circuit contains intermediate connector, C44-Y. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

GO to E10.

E10: CHECK THE INITIATOR CIRCUIT FOR HIGH RESISTANCE

	1 Measure the resistance between:

C3MC39A, harness side	C4MC43, harness side
Pin 7	Pin 1

Is the resistance greater than 5 ohms?

Yes

REPAIR the high resistance circuit. This circuit contains intermediate connector, C44-Y. For additional information, refer to the wiring diagram. Clear the DTC and run an On Demand Self Test (ODST) using the manufacturer approved diagnostic system to confirm rectification.

No

INSTALL a new rear right hand low-frequency initiator. REFER to: Tire Pressure Monitoring System (TPMS) Rear Antenna (204-04 Wheels and Tires, Removal and Installation).

PINPOINT TEST F : MISSING, INCOMPATIBLE OR DEFECTIVE RUNNING TIRE LOW PRESSURE SENSOR OR RECEIVER

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
F1: CHECK FOR CORRECT WHEEL AND TIRE ASSEMBLY AND TIRE LOW PRESSURE SENSOR	
	1 Establish that a full size running wheel and tire assembly has a tire low pressure sensor installed. As a visual confirmation, a tire low pressure sensor has a metal valve stem rather than a rubber one and cannot be installed to a mini/space saver spare wheel.
	Is a full size wheel and tire assembly with tire low pressure sensor installed? **Yes** GO to F2. **No** Install the correct wheel and tire assembly or tire low pressure sensor, of correct frequency, in accordance with that defined in the manufacturer approved diagnostic system new tire low pressure sensor application.
F2: CHECK FOR ADDITIONAL DTCS	
	1 Remove the Tire Pressure Monitoring System power supply fuse and re-install it. Clear DTCs and leave the vehicle stationary for 15 minutes, then drive it at a speed greater than 15.5 mph (25 kph) continuously for at least 10 minutes. (Note: If the vehicle speed drops below this value, the drive time to complete the test will need to be increased.) The use of the manufacturer approved diagnostic system, and the datalogger signal 'Tire pressure monitor system status – learn mode status' will verify the completion of the test when the value returns to 'Inactive'.
	2 Check for additional DTCs C1A5631, C1A5831, C1A6031, C1A6231, with identical time stamps.
	Have all four DTCs logged with identical time stamps in the tire pressure monitoring system module? **Yes** Replace the tire pressure monitoring system radio frequency receiver. REFER to: Tire Pressure Monitoring System (TPMS) Receiver (204-04 Wheels and Tires, Removal and Installation). **No** GO to F3.
F3: VERIFY THE POSITION OF THE DEFECTIVE TIRE LOW PRESSURE SENSOR	
	1 Check tire pressure monitoring system DTCs.
	Are any C1AXX31 DTCs logged? **Yes** Install the correct tire low pressure sensor, of correct frequency, in accordance with that defined in the manufacturer approved diagnostic system new tire low pressure sensor application, to the position identified by the logged DTC. REFER to: Tire Low Pressure Sensor (204-04 Wheels and Tires, Removal and Installation). **No** No further action is required. (Note: The use of the manufacturer approved diagnostic system, and the datalogger signal 'Tire pressure monitor system status – learn completed successfully' will verify the successful completion of the test.)

PINPOINT TEST G : LOCALIZATION FAILURE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
G1: CHECK FOR ADDITIONAL DTCS	
	1 Check for additional DTCs: C1A5711, C1A5712, C1A5713. C1A5911, C1A5912, C1A5913, C1A6111, C1A6112, C1A6113, C1A6311, C1A6312, C1A6313.
	Are any of the DTCs listed above also logged? **Yes** Refer to the DTC Index and remedial actions. **No** GO to G2.
G2: CHECK FOR ADDITIONAL DTCS	

	1 Check for additional DTCs: C1A5631, C1A5831, C1A6031 or C1A6231
	Is a C1A5631, C1A5831, C1A6031 or C1A6231 DTC also logged? **Yes** Refer to the DTC Index and remedial actions. **No** GO to G3.
G3: CHECK INITIATOR INSTALLATION	
	1 Check for correct installation of Initiator. REFER to: (204-04 Wheels and Tires) Tire Pressure Monitoring System (TPMS) Front Antenna (Removal and Installation), Tire Pressure Monitoring System (TPMS) Rear Antenna (Removal and Installation).
	Is the Initiator correctly installed? **Yes** GO to G4. **No** Rectify as required. REFER to: (204-04 Wheels and Tires) Tire Pressure Monitoring System (TPMS) Front Antenna (Removal and Installation), Tire Pressure Monitoring System (TPMS) Rear Antenna (Removal and Installation).
G4: CHECK FOR SHORT CIRCUIT IN INITIATOR HARNESS	
	1 Locate and remove module blue connector L.
	2 Measure the resistance across the relevant initiator circuits within the blue connector.
	Is the resistance less than 1 Ohm? **Yes** A value of less than 1 Ohm indicates a short circuit, rectify the short circuit as required. **No** Install the correct tire low pressure sensor, of correct frequency, in accordance with that defined in the manufacturer approved diagnostic system new tire low pressure sensor application, to the position identified by the logged DTC. REFER to: Tire Low Pressure Sensor (204-04 Wheels and Tires, Removal and Installation).

PINPOINT TEST H : SPARE TIRE LOW PRESSURE SENSOR NO OPERATION	
TEST CONDITIONS	**DETAILS/RESULTS/ACTIONS**
H1: ESTABLISH THE TYPE OF SPARE WHEEL AND TIRE ASSEMBLY INSTALLED	
	1 Establish the type of spare wheel and tire assembly Installed.
	Is the spare wheel a mini/space saver type? **Yes** Tire low pressure sensors are not installed to mini/space-saver spare wheels. Tire low pressure sensors are installed to full size spare wheels only. The DTC is to be ignored and no repair action is required. **No** GO to H2.
H2: ESTABLISH THAT THE SPARE WHEEL HAS A TIRE LOW PRESSURE SENSOR INSTALLED	
	1 Establish that the spare wheel has a tire low pressure sensor installed, considering the following additional information: • a) As a visual confirmation, the tire low pressure sensor has a metal valve stem rather than a rubber one.
	Is a tire low pressure sensor installed? **Yes** GO to H3. **No** A new spare tire low pressure sensor should be installed. Note: Refer to the note above the DTC index about replacing components which may remain under manufacturer warranty. Refer to the relevant section of the workshop manual.
H3: CONFIRM OPERATION OF THE SPARE WHEEL PRESSURE SENSOR	
	1 Deflate the spare tire, in close proximity to the vehicle, until it is completely deflated.
	2 Complete an ignition cycle to ignition on and verify that the instrument cluster reports a spare tire pressure warning for approximately 20 seconds.
	3 Re-inflate the spare tire, in close proximity to the vehicle, to the recommended spare tire pressure.
	4 Complete an ignition cycle to ignition on and verify that the instrument cluster no longer reports a spare tire pressure warning.
	Does the instrument cluster continue to report a spare tire pressure warning? **Yes** GO to H4. **No** No repair action is required. It is possible that the customer may have placed items in the vehicle's luggage compartment that prevented correct RF reception.
H4: VERIFY THAT THE SPARE TIRE LOW PRESSURE SENSOR ID HAS BEEN CORRECTLY PROGRAMMED TO THE MODULE	
	1 Remove tire low pressure sensor. Record the 8 character hexadecimal ID written on the casing.
	2 Use the approved diagnostic system to read the spare tire sensor ID from the module. Refer to the relevant procedure in the workshop manual.
	3 Compare the IDs from steps 1 & 2.

	Do the IDs match? **Yes** Replace the spare tire low pressure sensor. Refer to the relevant installation section in the workshop manual. The identification for the sensor must be programmed into the tire pressure monitoring system module using the manufacturer approved diagnostic system. The identification code is provided on a label with the complete assembly and is also printed on the casing of each sensor. **No** Program the spare tire sensor ID, recorded in step 1, to the module using the approved diagnostic system. The identification code is provided on a label with the complete assembly and is also printed on the casing of each sensor. Repeat test to ensure correct operation.GO to H3.

PINPOINT TEST I : C1D1912 TIRE PRESSURE MONITORING SYSTEM EXTERNAL RECEIVER DATA LINE CIRCUIT SHORT TO POWER

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
I1: C1D1912 VERIFY EXTERNAL RECEIVER DATA LINE CIRCUIT SHORT TO POWER	
	1 Ignition off.
	2 Disconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.
	3 Measure the resistance between **C3MC45, harness side** — **Battery** Pin 1 — Positive terminal
	Is the resistance less than 5 Ohms? **Yes** GO to I2. **No** GO to I3.
I2: C1D1912 CHECK THE EXTERNAL RECEIVER DATA LINE CIRCUIT FOR SHORT CIRCUIT TO POWER	
	1 Disconnect the Tire Pressure Monitoring System Control Module electrical connector, C3MC39B.
	2 Measure the resistance between **C3MC45, harness side** — **Battery** Pin 1 — Positive terminal
	Is the resistance less than 5 Ohms? **Yes** REPAIR the short circuit in wiring harness. **No** GO to I4.
I3: C1D1912 CHECK THE TIRE PRESSURE MONITORING SYSTEM EXTERNAL RECEIVER FOR SHORT CIRCUIT TO POWER	
	1 Reconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.
	2 Using manufacturer approved diagnostic system run On Demand Self Test **(0x0202)**.
	Is the DTC C1D1912 set? **Yes** Replace Tire Pressure Monitoring Receiver. **No** Investigate possible cause of intermittent failure.
I4: C1D1912 CHECK THE TIRE PRESSURE MONITORING SYSTEM CONTROL MODULE FOR SHORT CIRCUIT TO POWER	
	1 Reconnect the Tire Pressure Monitoring System Control Module electrical connector, C3MC39B.
	2 Reconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.
	3 Using manufacturer approved diagnostic system run On Demand Self Test **(0x0202)**.
	Is the DTC C1D1912 set? **Yes** Replace Tire Pressure Monitoring System Control Module. **No** Investigate possible cause of intermittent failure.

PINPOINT TEST J : C1D1987 TIRE PRESSURE MONITORING SYSTEM EXTERNAL RECEIVER DATA LINE MISSING MESSAGE

TEST CONDITIONS	DETAILS/RESULTS/ACTIONS
J1: C1D1987 VERIFY EXTERNAL RECEIVER DATA LINE MISSING MESSAGE	
	1 Using manufacturer approved diagnostic system run On Demand Self Test (0x0202).
	Is the DTC C1D1987 set? **Yes** GO to J2. **No** GO to J5.
J2: C1D1987 CHECK EXTERNAL RECEIVER DATA LINE CIRCUIT	

1 Ignition off.

2 Disconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.

3 Disconnect the Tire Pressure Monitoring System Control Module electrical connector, C3MC39B.

4 Measure the resistance between

C3MC45, harness side	C3MC39B, harness side
Pin 1	Pin4

Is the resistance less than 5 ohms?

Yes

GO to J3.

No

REPAIR the high resistance/open circuit in wiring harness.

J3: C1D1987 CHECK EXTERNAL RECEIVER

1 Reconnect the Tire Pressure Monitoring System Control Module electrical connector, C3MC39B.

2 Reconnect the Tire Pressure Monitoring System Receiver electrical connector, C3MC45.

3 Using manufacturer approved diagnostic system run On Demand Self Test **(0x0202)**.

Is the DTC C1D1987 set?

Yes

Replace Tire Pressure Monitoring Receiver.GO to J4.

No

Investigate possible cause of intermittent failure.

J4: C1D1987 CHECK TIRE PRESSURE MONITORING SYSTEM CONTROL MODULE

1 Using manufacturer approved diagnostic system run On Demand Self Test **(0x0202)**.

Is the DTC C1D1987 set?

Yes

Replace Tire Pressure Monitoring System Control Module.

No

Test is complete. No further action is required.

J5: C1D1987 CHECK WHEELS HAVE TIRE SENSORS INSTALLED

NOTE: As a visual check, a tire low pressure sensor has a metal valve stem rather than a rubber one and cannot be installed to a mini/space saver spare wheel.

1 Check that all full size running wheel and tire assemblies have tire low pressure sensors installed.

Is a full size wheel and tire assembly with tire low pressure sensor installed to all running wheel positions?

Yes

GO to J6.

No

If agreed with the customer install correct tire low pressure sensors in accordance with that defined in the manufacturer approved diagnostic system new tire low pressure sensor application, as required.
(Note: Confirm why the vehicle has non-Tire Pressure Monitoring System wheel & tire assemblies installed before installing tire low pressure sensors, which are not to be claimed under vehicle warranty.)

J6: C1D1987 CHECK TIRE SENSOR COMPATIBILITY TO TIRE PRESSURE MONITORING SYSTEM RECEIVER

1 Remove tire low pressure sensor from 1 wheel.

2 Verify the tire low pressure sensor part number from the information on the casing.

Is the tire low pressure sensor the correct part for the vehicle?

Yes

Replace Tire Pressure Monitoring Receiver.Carry out the following to verify repair.
Remove the Tire Pressure Monitoring System power supply fuse and re-install it. Clear DTCs and leave the vehicle stationary for 15 minutes, then drive it at a speed greater than 15.5 mph (25 kph) continuously for at least 10 minutes.
(Note: If the vehicle speed drops below this value, the drive time to complete the test will need to be increased. The use of the manufacturer approved diagnostic system, and the datalogger signal 'Tire pressure monitor system status – learn mode status' will verify the completion of the test when the value returns to 'Inactive'.)

No

Install the correct tire low pressure sensor, of correct frequency, in accordance with that defined in the manufacturer approved diagnostic system new tire low pressure sensor application, to the position(s) identified.
(Note: Confirm why the vehicle has incorrect Tire Pressure Monitoring System wheel & tire assemblies installed before installing tire low pressure sensors, which are not to be claimed under vehicle warranty.)

Published: 11-May-2011

Wheels and Tires - Tire Low Pressure Sensor

Removal and Installation

Removal

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

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

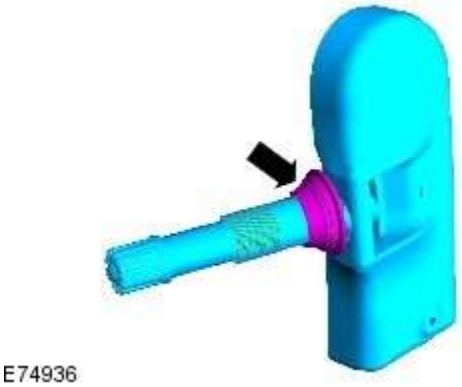
   Raise and support the vehicle.

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

3. Remove the tire from the wheel, release the tire bead from the rim 180 degrees from the valve.

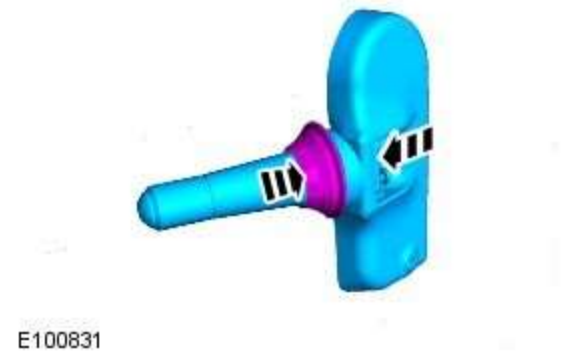

E74935

4.


E74936

5.
   - Discard the tire valve and retaining nut.

Installation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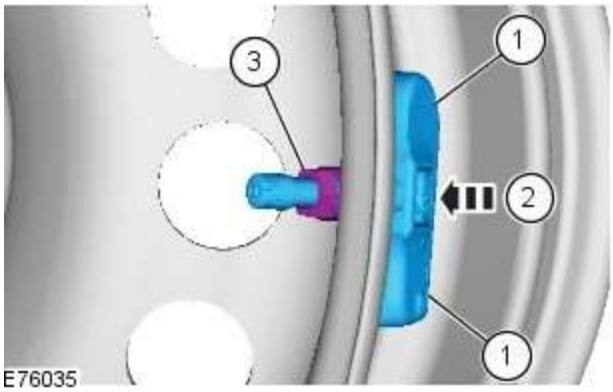
1. CAUTIONS:

   Make sure that the seal is correctly located.

   Make sure that new components are installed.

   Install the washer and seal, making sure the valve remains pressed fully onto its seat.



E76035

2. WARNINGS:

   Make sure that any corrosion or dirt is removed from the mating surfaces.

   Make sure that a new tire valve, valve core, seal, washer, cap and retaining nut is installed.

   CAUTIONS:

   Use lint free cloth.

   Only use moderate force when installing the sensor.

   NOTE: Only tighten the nut finger tight at this stage.

   - Install the tire low pressure sensor and support the sensor body in position.
   - Support the back of the valve stem in order to prevent rotation to the tire low pressure sensor body.
   - Gently push the nut towards the center of the wheel. Tighten the nut.

     Torque: 8 Nm

3. Install the tire and balance the wheel.

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

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

   Lower the vehicle.

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Wheels and Tires - Tire Pressure Monitoring System (TPMS) Front Antenna

Removal and Installation

Removal

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

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

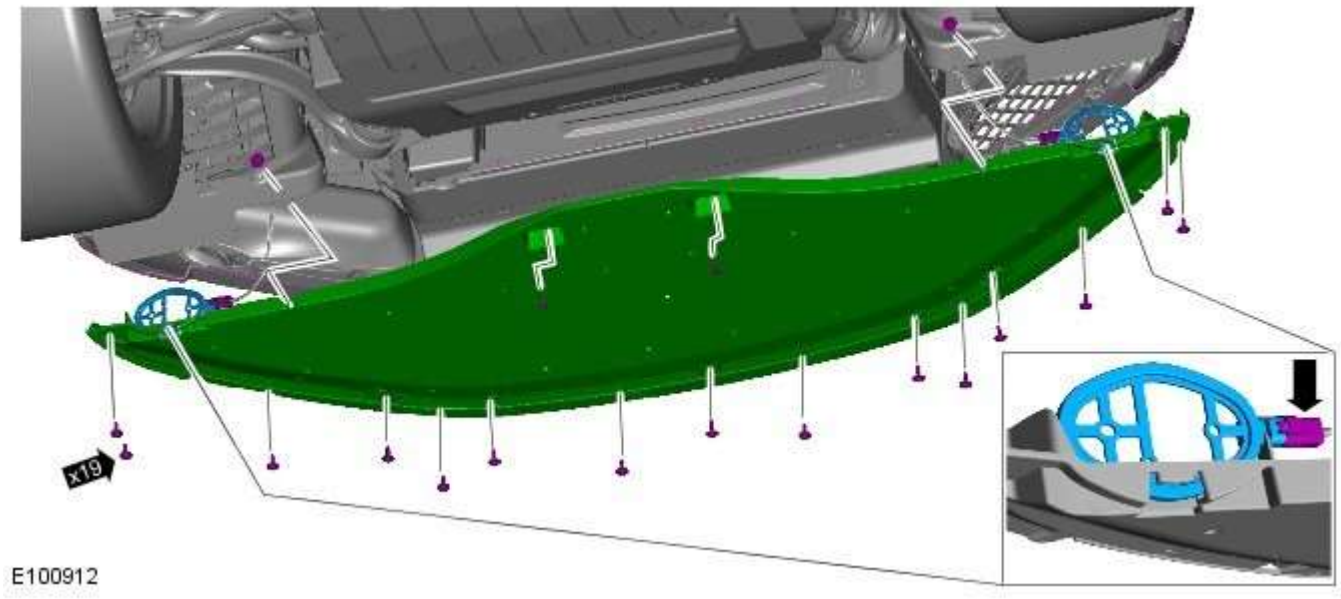
   Raise and support the vehicle.

2. NOTES:

   This step requires the aid of another technician.

   Lower the radiator splash shield enough to access the tire pressure monitoring system front antenna.

   Note the position of the component before removal.



Installation

1. CAUTION: Make sure that the component is secured in the retainer.

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

   To install, reverse the removal procedure.

Published: 11-May-2011

Wheels and Tires - Tire Pressure Monitoring System (TPMS) Rear Antenna

Removal and Installation

Removal

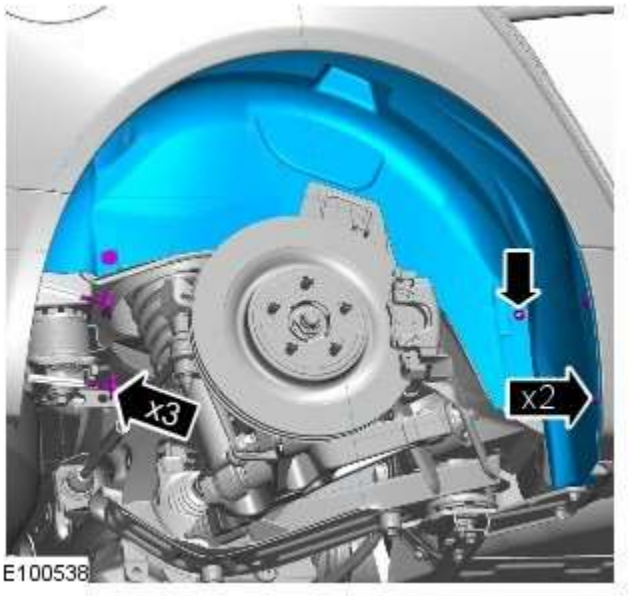
NOTE: Removal steps in this procedure may contain installation details.

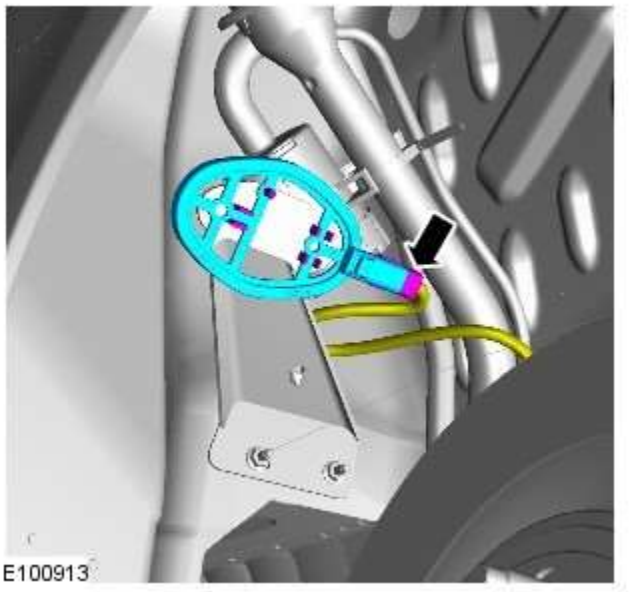
1. WARNING: Make sure to support the vehicle with axle stands.

   Raise and support the vehicle.

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

3.





4. NOTE: Note the position of the component before removal.

Installation

1. CAUTION: Make sure that the component is secured in the retainer.

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

   To install, reverse the removal procedure.

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Wheels and Tires - Tire Pressure Monitoring System (TPMS) Module

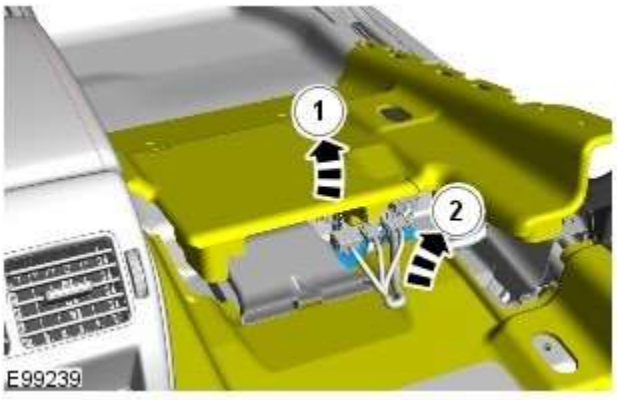
Removal and Installation

Removal

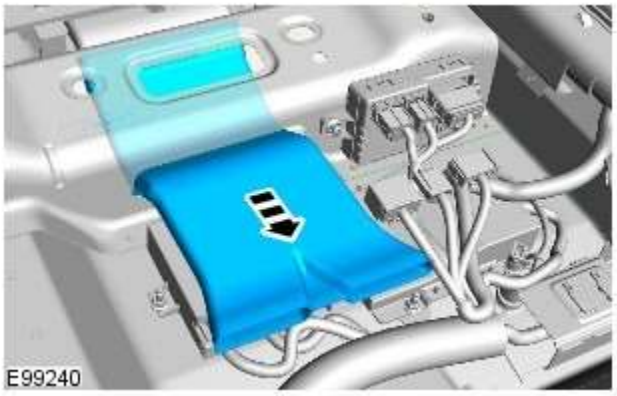
NOTE: Removal steps in this procedure may contain installation details.

1. Switch the igntion off.
2. Remove the right-hand front seat.

   Refer to: Front Seat (501-10 Seating, Removal and Installation).
3. Refer to: B-Pillar Lower Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).

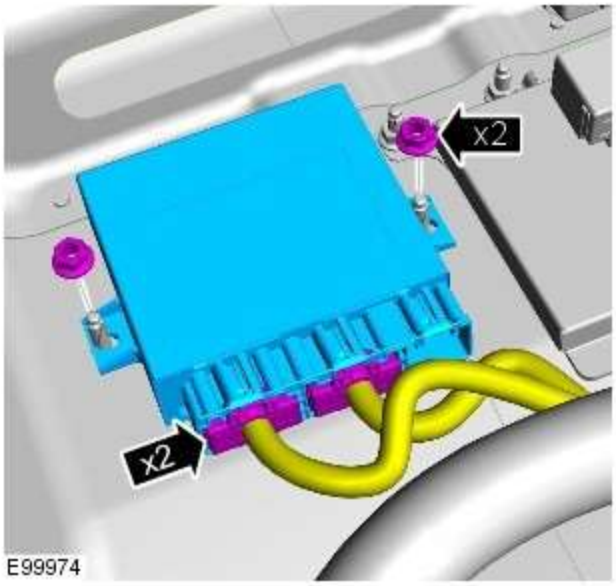


4. Detach and reposition the floor covering.



5.

6.



Installation

1. To install, reverse the removal procedure.

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Wheels and Tires - Tire Pressure Monitoring System (TPMS) Receiver

Removal and Installation

Removal

NOTES:

Removal steps in this procedure may contain installation details.

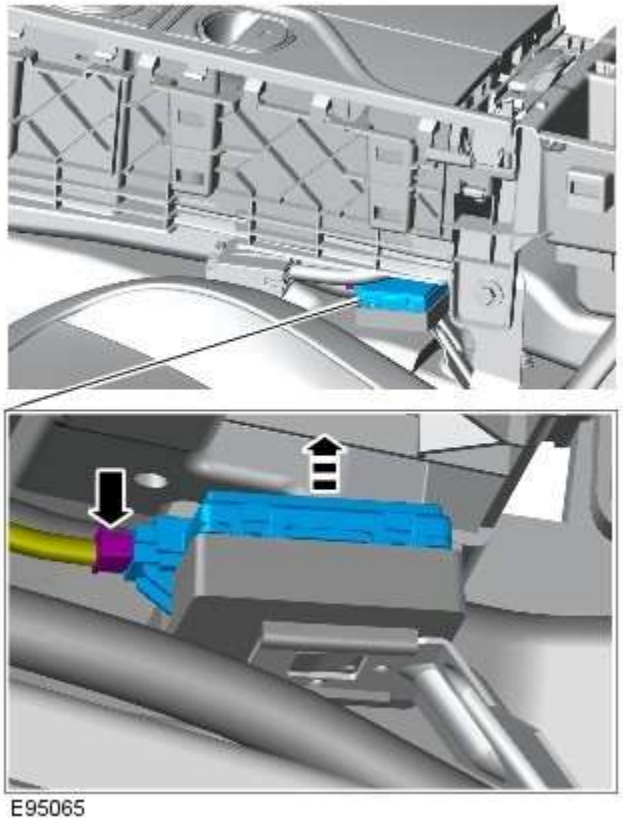
The tire pressure monitoring system receiver is installed in the same location on both LHD and RHD vehicles.

1. Switch the ignition off.
2. Remove the left-hand floor console side trim panel.

   Refer to: Floor Console Side Trim Panel (501-12 Instrument Panel and Console, Removal and Installation).

3.

4.


E95065

Installation

1. To install, reverse the removal procedure.
2. Configure the tire pressure monitoring system using the diagnostic tool.

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Wheels and Tires - Wheel and Tire

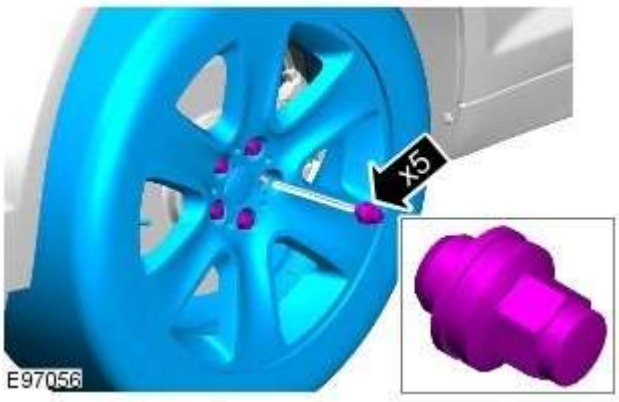
Removal and Installation

Removal

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

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

   Raise and support the vehicle.



2. *Torque:* 125 Nm

Installation

1. CAUTION: Apply a small amount of grease to the hub and wheel mating surfaces before installation. Make sure the grease does not come into contact with the vehicles braking components and the wheel stud threads. Failure to follow these instructions may result in personal injury.

   To install, reverse the removal procedure.

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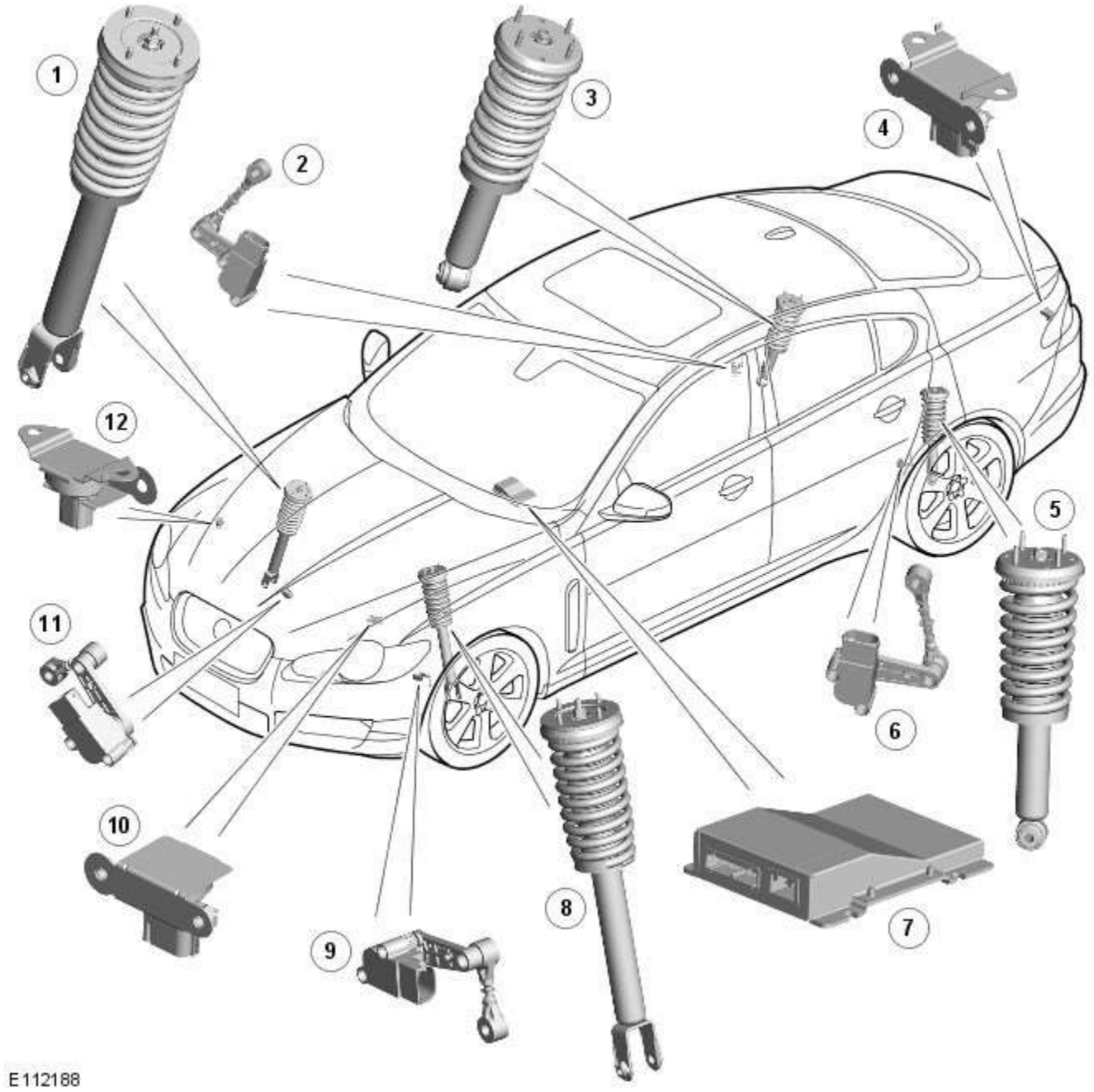
Vehicle Dynamic Suspension - Vehicle Dynamic Suspension V8 5.0L Petrol/V8 S/C 5.0L Petrol - Component Location

Description and Operation

Component Location - Supercharged Vehicles from 2010MY



Item	Description
1	RH (right-hand) front-spring and damper assembly
2	RH rear suspension height sensor
3	RH rear-spring and damper assembly
4	Rear vertical accelerometer
5	LH (left-hand) rear-spring and damper assembly
6	LH rear suspension height sensor
7	Adaptive damping module
8	LH front-spring and damper assembly

9	LH front suspension height sensor
10	LH front vertical accelerometer
11	RH front suspension height sensor
12	RH front vertical accelerometer

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Vehicle Dynamic Suspension - Vehicle Dynamic Suspension V8 5.0L Petrol/V8 S/C 5.0L Petrol - Overview

Description and Operation

OVERVIEW

Adaptive Dynamics - Supercharged Vehicles from 2010MY

The adaptive dynamics system, is an electronically controlled suspension system which constantly adjusts the damping characteristics of the suspension dampers in reaction to the existing driving conditions. The adaptive dynamics system is available on specified models.

The system is controlled by an Adaptive Damping Module (ADM), located beneath the right-hand front seat. The module receives signals from three dedicated vertical accelerometers; two at the front of the vehicle and one at the rear, which, together with four suspension height sensors, determine the state of the body and wheel motions. In addition to these inputs, further signals from other vehicle electronic system components to determine vehicle state and driver inputs are monitored by the adaptive damping module. These combined signals are used by the adaptive damping module to continuously adjust the damping characteristics of each of the suspension dampers in reaction to the current driving conditions to give the optimum body control and vehicle ride.

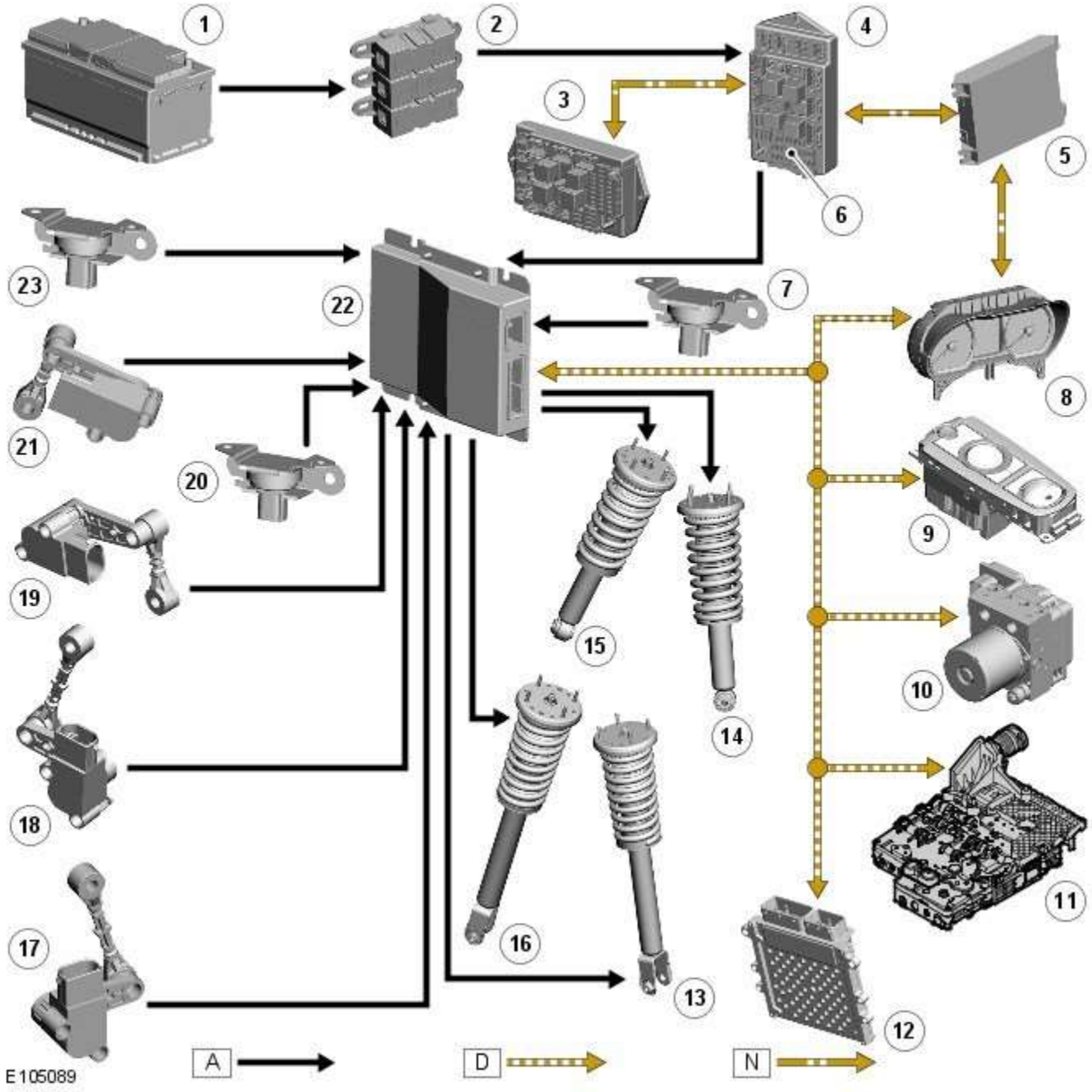
Published: 11-May-2011

Vehicle Dynamic Suspension - Vehicle Dynamic Suspension V8 5.0L Petrol/V8 S/C 5.0L Petrol - 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) (Megafuse (250 A)
3	AJB (auxiliary junction box)
4	CJB (central junction box)
5	ATC (automatic temperature control) module
6	Fuse 36 (10 A) - from delayed power-off relay

7	Rear accelerometer
8	Instrument cluster
9	JaguarDrive selector module
10	ABS (anti-lock brake system) module
11	TCM (transmission control module)
12	ECM (engine control module)
13	RH (right-hand) rear damper
14	RH front damper
15	LH (left-hand) front damper
16	LH rear damper
17	LH rear suspension height sensor
18	RH rear suspension height sensor
19	LH front suspension height sensor
20	RH front accelerometer
21	RH front suspension height sensor
22	Adaptive damping module
23	LH front accelerometer

System Operation

PRINCIPLES OF OPERATION

The adaptive damping module uses a combination of information from other system modules and data from the accelerometers and suspension height sensors to measure the vehicle and suspension states and driver inputs. Using this information, the adaptive damping module applies algorithms to control the dampers for the current driving conditions.

The adaptive damping module receives signals on the high speed CAN bus from the following system components:

- Brake Pressure - ABS module.
- Brake Pressure Quality Factor - ABS module.
- Car Configuration Parameters - AJB.
- Center Differential Range Actual - ECM.
- Engine Speed - ECM.
- Engine Speed Quality Factor - ECM.
- Engine Torque Flywheel Actual - ECM.
- Engine Torque Flywheel Actual Quality Factor - ECM.
- Gear Position Target - TCM.
- Lateral Acceleration - ABS module.
- Power Mode (Ignition Signal) - CJB.
- Power Mode Quality Factor - CJB.
- Roll Stability Control Mode - ABS module.
- Steering Wheel Angle - ABS module.
- Steering Wheel Angle Speed - ABS module.
- Steering Wheel Angle Status - ABS module.
- Terrain Mode Requested - JaguarDrive selector.
- Torque Converter Slip - TCM.
- Vehicle Information Parameters HS - AJB
- Vehicle Speed - ABS module.
- Vehicle Speed Quality Factor - ABS module.
- Front Left Wheel Speed - ABS module.
- Front Left Wheel Speed Quality Factor - ABS module.
- Front Right Wheel Speed - ABS module.
- Front Right Wheel Speed Quality Factor - ABS module.
- Rear Left Wheel Speed - ABS module.
- Rear Left Wheel Speed Quality Factor - ABS module.
- Rear Right Wheel Speed Quality Factor - ABS module.
- Rear Right Wheel Speed - ABS module.

The adaptive damping module also outputs information on the high speed CAN bus for use by other systems as follows:

- Fault Message - instrument cluster.
- Terrain Mode Change Status - JaguarDrive selector.
- Terrain Mode - JaguarDrive selector.

The adaptive damping module monitors the input signals and operates the damper solenoids. The input signals are used in control modes and a force required for each damper for that mode is calculated. An arbitration mode monitors the force requirements from each mode and apportions a force to a damper. The force is converted to the appropriate current and sent to the damper.

The control modes are as follows:

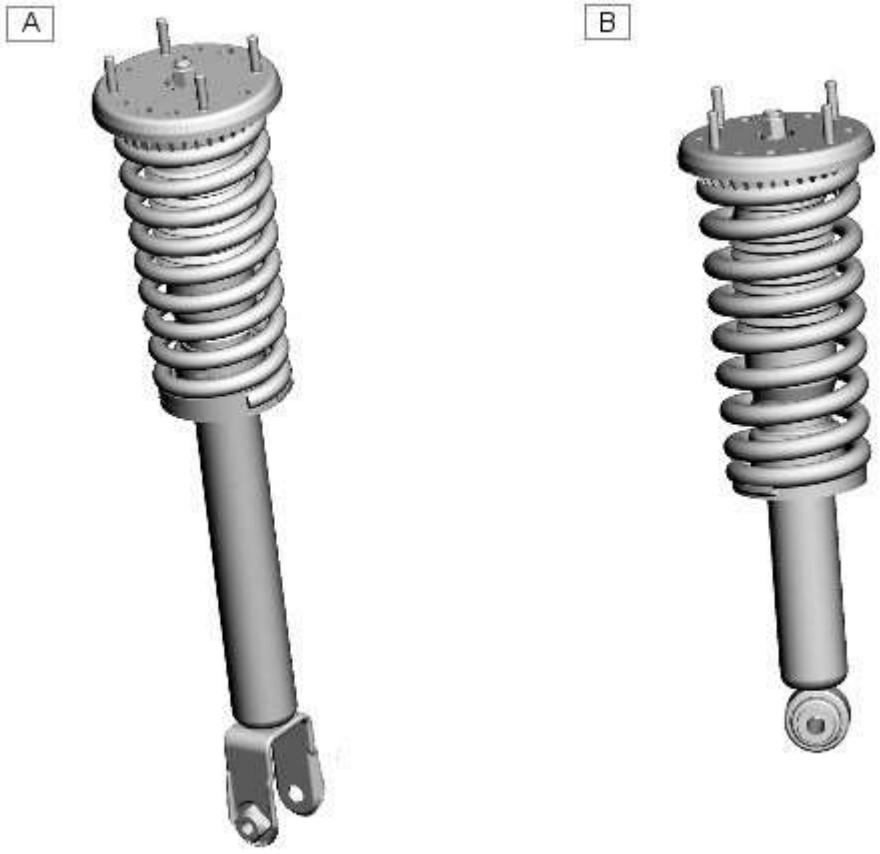
- Body Control − Uses CAN and accelerometer inputs. Calculates road induced body motions 100 times a second and sets each damper to the appropriate level to maintain a flat and level body.
- Roll Rate Control − Uses CAN inputs. Predicts vehicle roll rate due to driver steering inputs 100 times a second and increases damping to reduce roll rate.
- Pitch Rate Control − Uses CAN inputs. Predicts vehicle pitch rate due to driver throttle and braking inputs 100 times a second and increases damping to reduce pitch rate.
- Bump Rebound Control − Uses suspension height sensor and CAN inputs. Monitors the position of the wheel 500 times a second and increases the damping rate as the damper approaches the end of its travel.
- Wheel Hop Control − Uses suspension height sensor and CAN inputs. Monitors the position of the wheel 500 times a second and detects when the wheel is at its natural frequency and increases the dampingto reduce vertical wheel motion.

Under normal road conditions when the vehicle is stationary with the engine running, the dampers are set to the firm condition to reduce power consumption.

The adaptive damping module receives its power supply via a relay and fuse in the CJB. The relay remains energized for a period of time after the ignition is off. This allows the adaptive damping module to record and store any DTC (diagnostic trouble code) relating to adaptive dynamics system faults.

Component Description

DAMPERS



Item	Description
A	Front spring and damper assembly
B	Rear spring and damper assembly

The 'Adaptive Dynamics' dampers are monotube, nitrogen gas and oil filled units, manufactured by Bilstein. The dampers are continuously variable, which allows the damping force to be electrically adjusted when the vehicle is being driven. The variable dampers provide the optimum compromise between vehicle control and ride comfort.

The dampers have an electrical connector on the end of the piston rod, in the center of the top mount (the dampers look identical to those on the Computer Active Technology Suspension (CATS) system of 4.2L supercharged vehicles, but have a different part number).

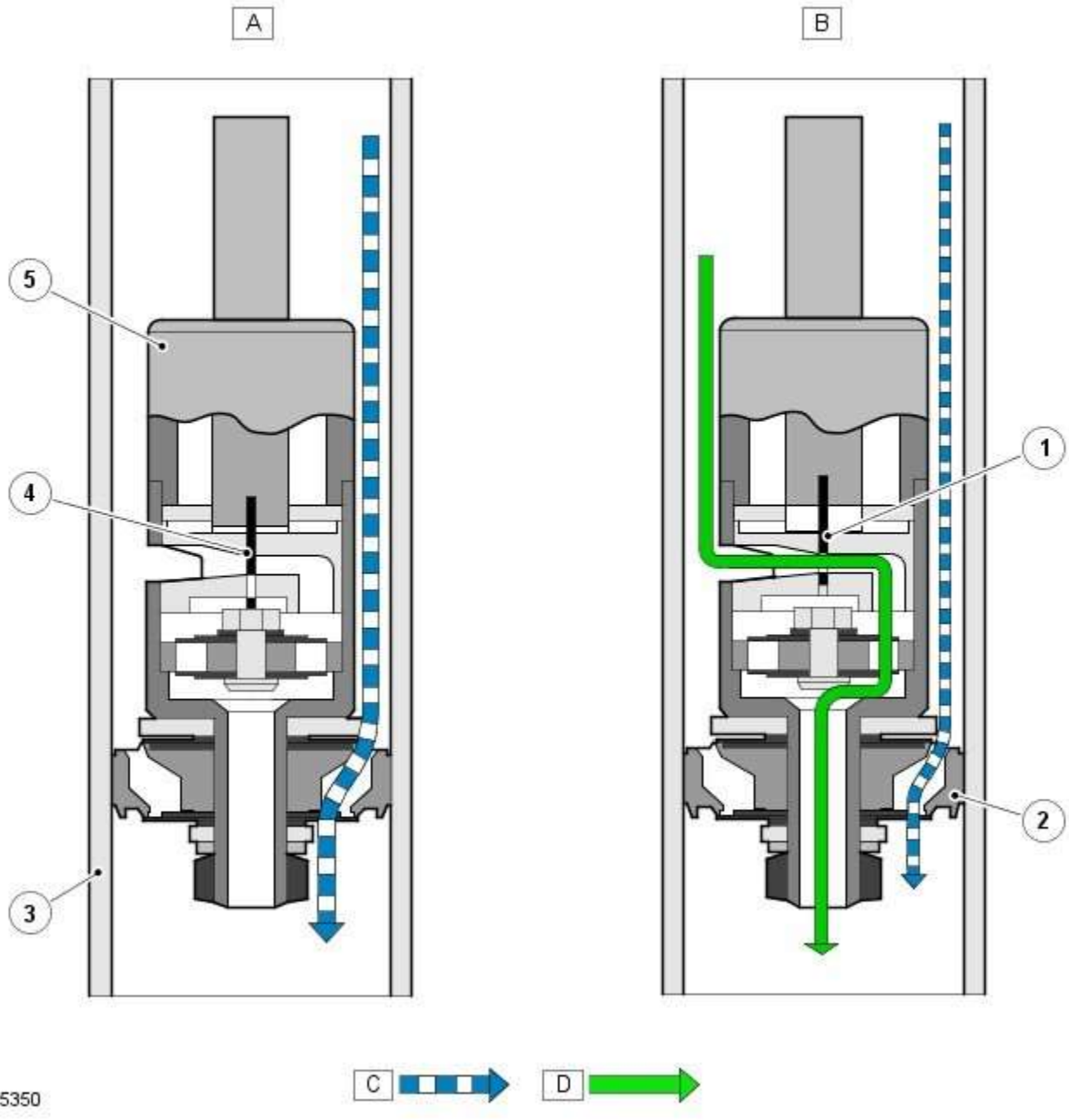
In each damper, the continuous damping adjustment is achieved by a solenoid operated variable orifice, which opens up an alternative path for oil flow within the damper. When de-energized the bypass is closed and all the oil flows through the main (firm) piston. When energized, the solenoid moves an armature and control blade, which work against a spring. The control blade incorporates an orifice which slides inside a sintered housing to open up the bypass as required. In compression, oil flows from the lower portion of the damper through a hollow piston rod, a separate soft (comfort) valve, the slider housing and orifice and into the upper portion of the damper, thereby bypassing the main (firm) valve. In rebound the oil flows in the

opposite direction.

In the firm setting, oil flows through the main (firm) valve only, but when the bypass is opened by any amount the oil flows through both valves in a pressure balance. When fully energized the solenoid moves the armature and therefore the slider to the maximum extension and opens the orifice completely. The damper operates continuously between these two boundary conditions.

The solenoid in each damper is operated by a 526 Hz PWM (pulse width modulation) signal from the adaptive damping module. When fully energized, the adaptive damping module applies a 1.5 A current to operate the damper in the soft setting. When de-energized (0.0 A) the damper is in the firm setting. The current varies continuously as required to increase and decrease the damping individually in each of the dampers.

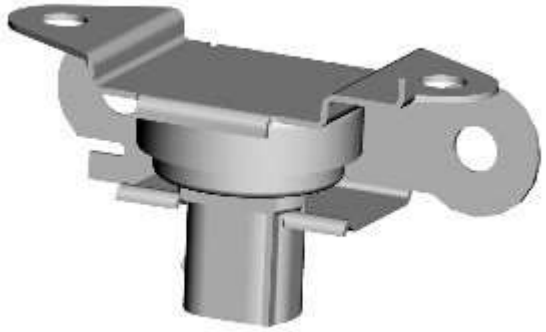
Sectioned Views of Damper Operating States



Item	Description
A	Firm setting
B	Soft setting
C	Main oil flow
D	Bypass oil flow
1	Bypass valve (open)

2	Main piston
3	Tube
4	Bypass valve (closed)
5	Piston and rod assembly

ACCELEROMETERS



E105087

Three accelerometers are used in the adaptive dynamics system. The accelerometers are located as follows:

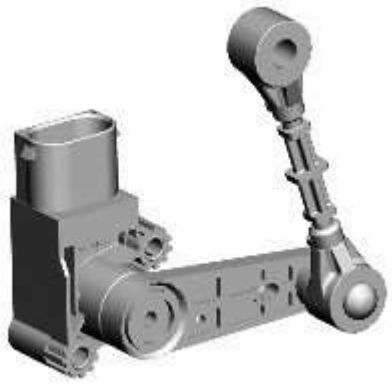
- One each on the rear edge of the radiator support panel.
- One in the luggage compartment, in the rear LH corner adjacent to the rear lamp assembly.

The accelerometers measure acceleration in the vertical plane and output a corresponding analogue signal to the adaptive damping module. The algorithms in the adaptive damping module calculate the heave, pitch and roll motions of the vehicle, which are used by the module to control road induced body modes.

Each accelerometer is connected to the adaptive damping module via three wires, which supply ground, 5 V supply and signal return.

The sensing element comprises a single parallel plate capacitor, one plate of which moves relative to the other dependant on the force (acceleration) applied. This causes the capacitance to change as a function of applied acceleration. This capacitance is compared with a fixed reference capacitor in a bridge circuit and the signal is processed by means of a dedicated integrated circuit to generate an output voltage that varies as a function of applied acceleration. The sensors output a signal voltage of approximately 1 V/g ± 0.05 V/g.

SUSPENSION HEIGHT SENSORS



E105088

Four suspension height sensors are used in the adaptive dynamics system, two for the front suspension and two for the rear suspension. A front suspension height sensor is attached to each side of the front subframes and connected by a sensor arm and sensor link to the related lower lateral arm of the front suspension. A rear suspension height sensor is attached to each side of the rear subframe and connected by a sensor arm and sensor link to the related upper control arm of the rear suspension. On each suspension height sensor, the sensor arm and sensor link convert linear movement of the suspension into rotary movement of the sensor shaft.

The sensors are also used for the static dynamic headlamp leveling system on vehicles fitted with xenon headlamps.

The suspension height sensors measure suspension displacement at each corner of the vehicle and output a corresponding analogue signal to the adaptive damping module. The algorithms in the adaptive damping module calculate the position, velocity and frequency content of the signals and use the results for wheel control.

Each suspension height sensor is connected to the adaptive damping module via three wires, which supply ground, 5 V supply

and signal return.

The sensing element consists of an array of Hall effect devices arranged to measure the direction of the magnetic field of a small magnet attached to the end of the sensor shaft. As the sensor shaft rotates, so do the lines of magnetic flux from the magnet. The signals from the Hall effect elements are processed by means of a dedicated integrated circuit to generate an output voltage that varies as the sensor shaft is rotated. The sensor has a measurement range of ± 40° around its nominal position and the nominal sensitivity is 57 mV/° of shaft rotation.

ADAPTIVE DAMPING MODULE

E105086

The adaptive damping module is installed on the floor pan, below the RH front seat.

System Fault Message

The adaptive damping module has a high speed CAN connection to the instrument cluster. If a fault is detected by the adaptive damping module, a message is sent to the instrument cluster and the message 'ADAPTIVE DYNAMICS FAULT' is displayed. The adaptive damping module also logs an appropriate DTC. The adaptive damping module can be interrogated using an approved Jaguar diagnostic system.

When a fault is detected, the adaptive damping module implements a strategy based on the type of fault. If there is an electrical power fault, or the adaptive damping module cannot control the dampers, they default to the firm condition. If a sensor fails that only affects one or more control modes then an intermediate damper setting is used as the lower threshold and the remaining working modes can demand higher damping as required.

Published: 09-Jul-2014

Vehicle Dynamic Suspension - Vehicle Dynamic Suspension

Diagnosis and Testing

Principle of Operation

For a detailed description of the adaptive damping system operation, refer to the relevant Description and Operation section of the workshop manual. REFER to: (204-05 Vehicle Dynamic Suspension)

Vehicle Dynamic Suspension - V8 5.0L Petrol/V8 S/C 5.0L Petrol (Description and Operation),

Inspection and Verification

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

Visual Inspection

Mechanical	Electrical
• Coil spring(s) • Shock absorber(s) • Accelerometer(s) installation • Height sensor(s) installation	• Fuse(s) • Wiring harness/electrical connectors • Accelerometer(s) • Adaptive Damping Control Module • Height sensor(s)

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 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: Adaptive Damping Module (SUMB) (100-00 General Information, Description and Operation).

Published: 11-May-2011

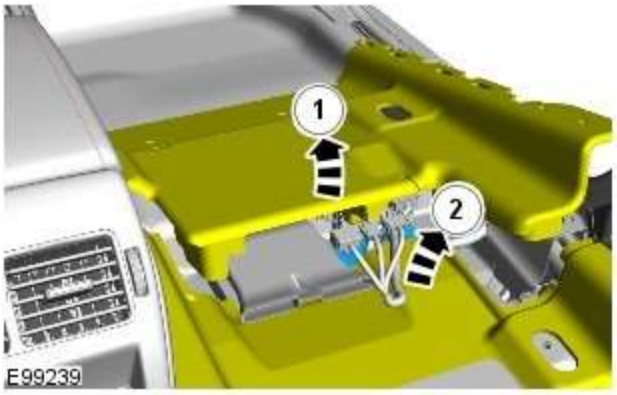
Vehicle Dynamic Suspension - Adaptive Damping Module

Removal and Installation

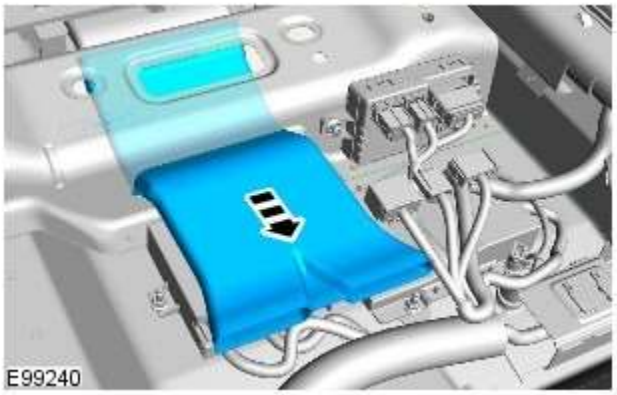
Removal

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

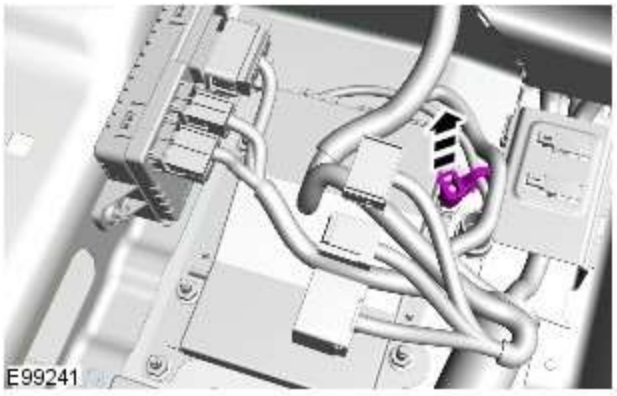
1. Refer to: Front Seat (501-10 Seating, Removal and Installation).
2. Refer to: B-Pillar Lower Trim Panel (501-05 Interior Trim and Ornamentation, Removal and Installation).
3. Detach and reposition the floor covering.

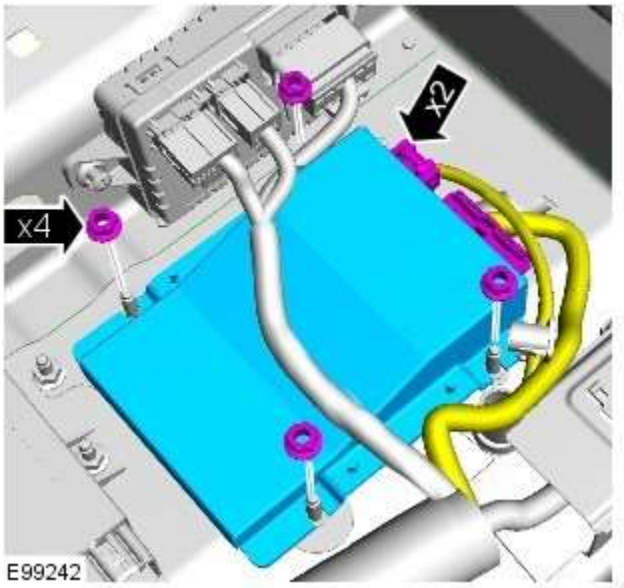


4.



5.





- *Torque:* 5 Nm

6.

Installation

1. To install, reverse the removal procedure.

Published: 11-May-2011

Vehicle Dynamic Suspension - Front Suspension Vertical Accelerometer

Removal and Installation

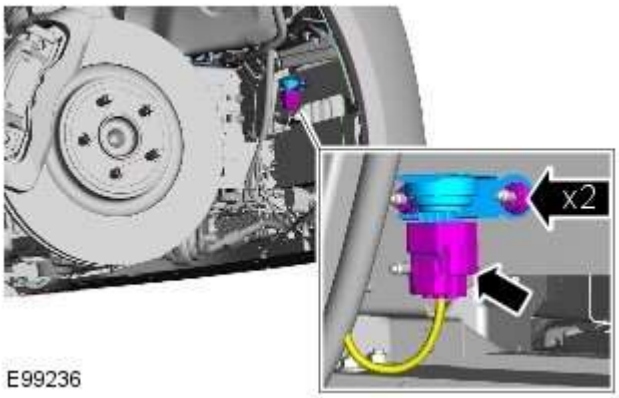
Removal

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



3. CAUTION: The accelerometer is an extremely delicate component and can easily be rendered unserviceable. Never use an accelerometer which has been dropped or subjected to mistreatment of any type.

   - *Torque:* 5 Nm

Installation

1. CAUTION: The accelerometer is an extremely delicate component and can easily be rendered unserviceable. Never use an accelerometer which has been dropped or subjected to mistreatment of any type.

   To install, reverse the removal procedure.

Published: 11-May-2011

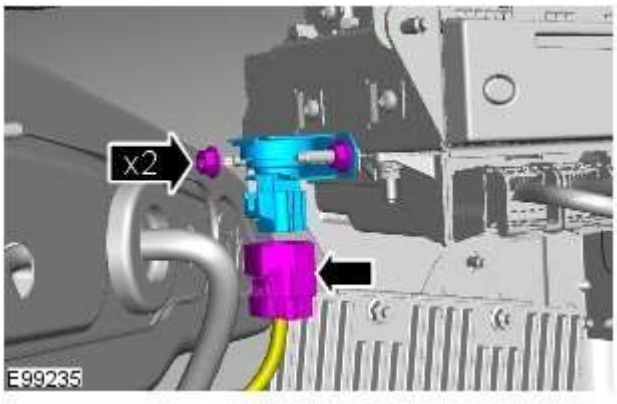
Vehicle Dynamic Suspension - Rear Suspension Vertical Accelerometer

Removal and Installation

Removal

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

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



2. CAUTION: The accelerometer is an extremely delicate component and can easily be rendered unserviceable. Never use an accelerometer which has been dropped or subjected to mistreatment of any type.
   - *Torque:* 5 Nm

Installation

1. CAUTION: The accelerometer is an extremely delicate component and can easily be rendered unserviceable. Never use an accelerometer which has been dropped or subjected to mistreatment of any type.

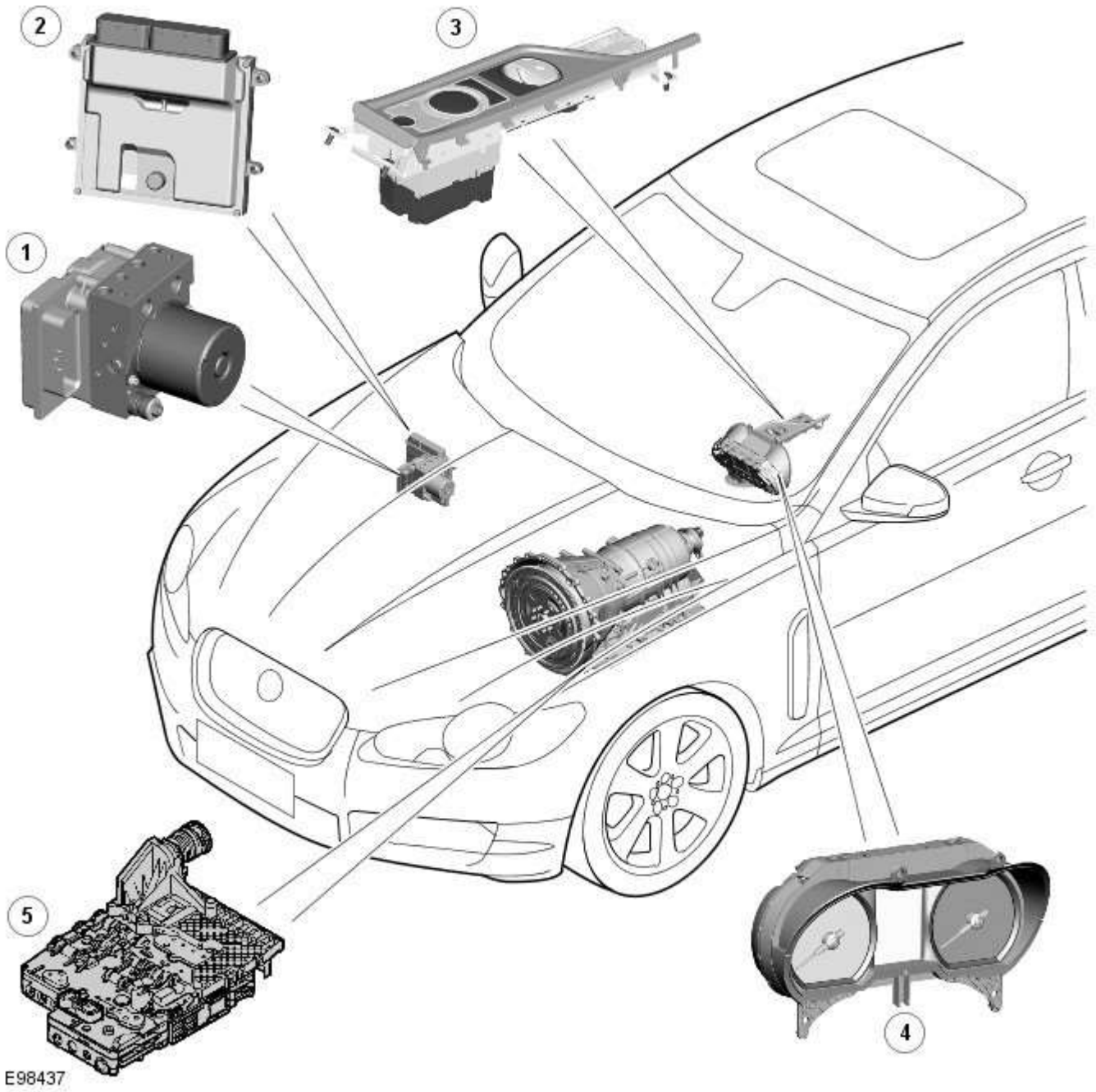
   To install, reverse the removal procedure.

Published: 11-May-2011

Ride and Handling Optimization - Ride and Handling Optimization - Component Location

Description and Operation

COMPONENT LOCATION



Item	Description
1	ABS (anti-lock brake system) module
2	ECM (engine control module)
3	JaguarDrive Control selection buttons
4	Instrument cluster
5	TCM (transmission control module)

Published: 11-May-2011

Ride and Handling Optimization - Ride and Handling Optimization - Overview

Description and Operation

OVERVIEW

JaguarDrive Control is a selectable vehicle optimisation system, designed to fine-tune the driving characteristics of the vehicle by accommodating different driving conditions or driving styles. The system allows the performance envelope of the vehicle to be stretched and prevents the necessity for a single, compromised configuration for all conditions. JaguarDrive Control increases the vehicle's abilities by changing the characteristics of engine mapping, transmission shifts and stability and traction interventions. The software for the JaguarDrive control is incorporated in the JaguarDrive selector module.

 NOTE: The JaguarDrive Control system is a co-ordinating system only. It CANNOT generate a fault in one of the participating sub-systems. All participating subsystems should be FULLY diagnosed before assuming a fault with JaguarDrive Control. Replacing the JaguarDrive selector module should not be done until all other options have been exhausted.

Published: 11-May-2011

Ride and Handling Optimization - Ride and Handling Optimization - System Operation and Component Description

Description and Operation

System Operation

JAGUARDRIVE CONTROL OPERATION

Engine Management System

The Engine Management System (EMS) varies the accelerator pedal maps to change the amount of torque per percentage of pedal travel. The EMS can also change the accelerator pedal response to control the allowed torque change relative to the speed of pedal travel.

Each driving mode uses a combination of operating parameters for each sub-system. Changing between driving modes initiates a different set of operating characteristics, which will be noticeable to the driver. The driver will notice differences in engine response when, for example, the accelerator pedal is held in a constant position and the driving mode is changed from Winter to Dynamic, the driver will notice the torque and engine speed increase. Similarly, if the mode is changed from Normal or Dynamic to Winter the driver will notice a reduction in torque and engine speed.

 NOTE: The change in torque and engine speed can take approximately 30 seconds and care must be taken not to confuse the JaguarDrive Control system operation with an EMS fault.

Transmission Control

The TCM (transmission control module) changes the shift maps for the JaguarDrive Control mode selected. This changes the shift points providing early or late upshifts and downshifts. For example, on slippery surfaces in Winter mode the transmission will select 2nd gear for starting from a standstill on a flat surface to minimize wheel slip.

Anti-lock Braking System Control

The ABS (anti-lock brake system) module controls several vehicle functions and adjusts the operating parameters of these functions to optimize the selected JaguarDrive Control mode. Traction control uses different slip/acceleration thresholds to improve traction and vehicle composure. For example, the system sensitivity is increased on slippery surfaces to reduce wheel spin.

If TracDSC is selected or DSC is switched off, then subsequently the JaguarDrive Control mode is changed, DSC is automatically switched back on (or to TracDSC for Dynamic mode).

The stability control uses different threshold values for the selected mode, reducing the requirement for the driver to change the DSC system mode for optimum performance in various driving scenarios.

Incorrect Mode Usage

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

- The active mode icon is continually displayed in the instrument cluster message center
- In any special mode, when the ignition has been in the off position continuously for more than 6 hours, the JaguarDrive Control system defaults to the special modes off (DSC on).

Selection of an inappropriate mode for the conditions will not endanger the driver or immediately cause damage to the vehicle. Continued use of an inappropriate mode may reduce the life of some components. The driver may notice a different vehicle response, with the engine and transmission responses being different than in the special modes off.

Driver Information

The instrument cluster contains a message center, which displays vehicle information to the driver. The message center contains the JaguarDrive Control mode icons, which display the currently selected mode. If no symbol is displayed, no special mode is selected and the system is in special modes off.

Any required changes to the subsystems are also passed to the driver in the form of warning illumination in the instrument cluster or appropriate messages in the message center, DSC off for example.

In Dynamic mode when the transmission is in manual mode, the gear information is displayed in amber when the appropriate engine speed is reached for optimum sporty change point.

DIAGNOSTICS

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

The JaguarDrive Selector module and rotary control should only be investigated if there are no apparent faults in any of the sub-systems. If a fault in a sub-system is subsequently corrected, the JaguarDrive Control system will function normally after an ignition on and off cycle.

JaguarDrive Control Sub-System Faults

If a fault occurs in a sub-system, the driver is alerted by the illumination of a warning indicator and/or an appropriate message for that sub-system in the instrument cluster message center. No JaguarDrive Control message will be shown when a failed sub-system displays its own message.

When a sub-system fault is present and the driver attempts to select a different JaguarDrive Control mode or at the next ignition on cycle, a message 'WINTER MODE FAULT' or 'DYNAMIC MODE FAULT' will appear in the message center. This generally implies that the JaguarDrive Control system has a fault, but only because a sub-system fault is preventing its operation. This message will be displayed once per ignition cycle, but is repeated if a further selection is made by the driver using the JaguarDrive Control buttons or at the next ignition on cycle.

 NOTE: The message 'WINTER MODE FAULT' or 'DYNAMIC MODE FAULT' can also in very rare circumstances be generated by a fault in the JaguarDrive Control module.

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

The sub-system control modules can detect a fault with the CAN (controller area network) bus signal from the transmission selector module. If a fault in the JaguarDrive Control system is detected, the sub-system control modules will operate in the 'special modes off' setting. The sub-system control modules will record a fault code for a failure of the JaguarDrive Control CAN signal. These faults can be retrieved using the Jaguar approved diagnostic tool and will provide useful information to indicate investigation of the JaguarDrive Selector module or the CAN bus network.

JaguarDrive Control System or Control Module Fault

If a fault occurs in the JaguarDrive Control system, all button icon LED (light emitting diode)'s will be turned off (background illumination will remain on) and pressing of the JaguarDrive Control buttons is ignored. The instrument cluster message center will display a message 'WINTER MODE FAULT' or 'DYNAMIC MODE FAULT' when the fault occurs, if the fault is present and the driver attempts to select a special mode (if the control module is able to do this) or at the next ignition on cycle.

The JaguarDrive Control buttons and control module (JaguarDrive Selector module) are an integral unit. If a fault occurs in either component, the whole unit will require replacement, however, this is extremely unlikely.

CAN Bus Faults

If a CAN bus fault exists and prevents JaguarDrive Control system operation, all of the JaguarDrive Control button icon LED's will be illuminated and rotation pressing of the JaguarDrive Control buttons is ignored.

If the instrument cluster does not receive a JaguarDrive Control system CAN bus message from the JaguarDrive Control module, the message 'SPECIAL MODE UNAVAILABLE' will be displayed when the fault occurs and will be repeated at every ignition on cycle.

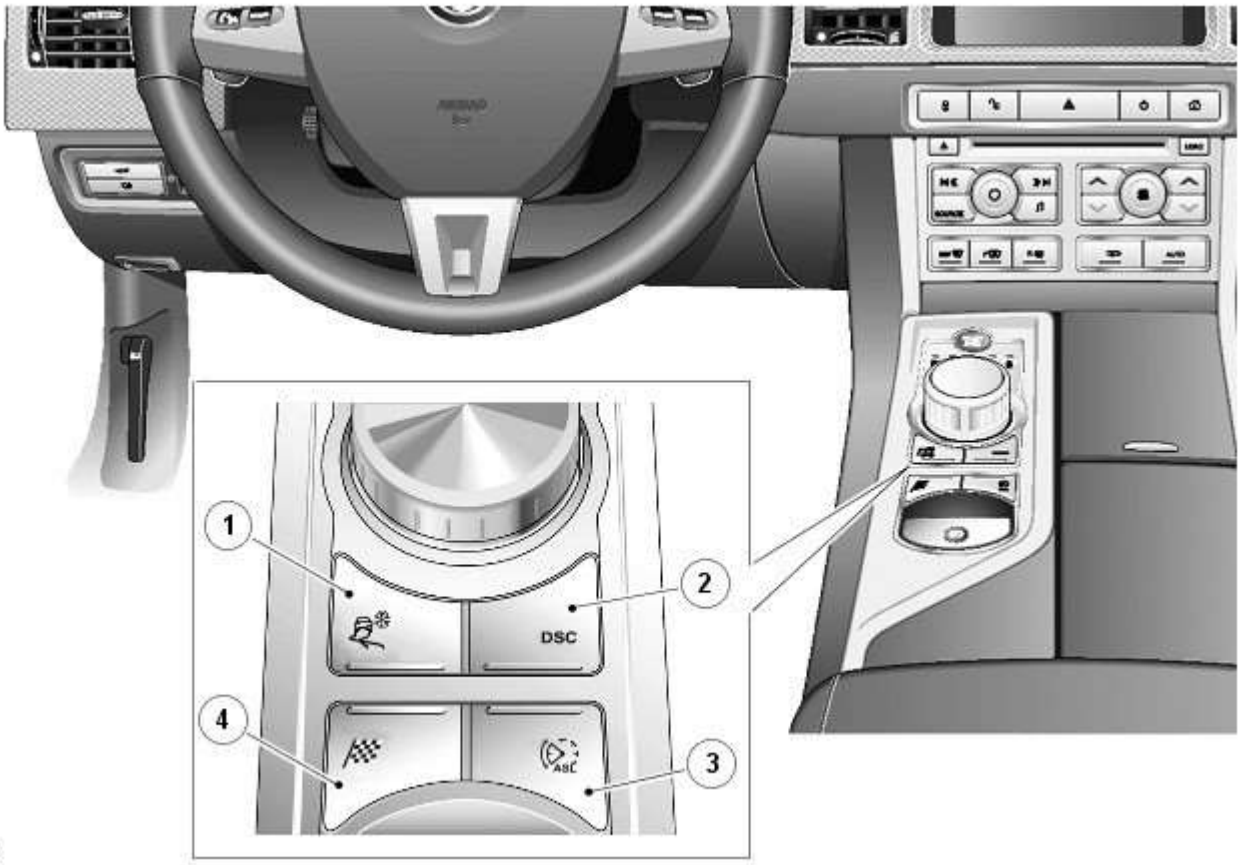
User Error

A special mode change while DSC or ABS is active (this includes ABS cycling) may be misinterpreted as a system fault.

Component Description

JAGUARDRIVE CONTROL DESCRIPTION

JAGUARDRIVE CONTROLS



Item	Description
1	Winter mode button
2	DSC/TracDSC mode button
3	ASL (automatic speed limiter) - Reference only, not part of JaguarDrive system
4	Dynamic mode (Supercharged models only)

The system is controlled by buttons adjacent to the JaguarDrive Selector located on the floor console. The buttons allow the selection of one of the following 3 modes:

- Special modes off
- Winter mode
- Dynamic mode (Supercharged models only).

The instrument cluster will display the selected JaguarDrive Control mode in the message center.

The JaguarDrive Control system uses a combination of a number of vehicle sub-systems to achieve the required vehicle characteristics for the mode selected. The following sub-systems make up the JaguarDrive Control system:

- The Engine Management System (EMS)
- Automatic transmission
- Brake system.

The JaguarDrive Control software is stored in the JaguarDrive Selector module located below the JaguarDrive selector. The module detects the selection made using the buttons and transmits a signal on the high speed CAN bus, which is received by each of the sub-system control modules.

Each of the affected sub-system control modules contain software, which applies the correct operating parameters to their controlled system for the JaguarDrive Control mode selection made.

Each sub-system control module also provides a feedback for the selected mode so that the JaguarDrive Control software can check that all systems have changed to the correct operating parameters.

NOTE: The JaguarDrive Control system is a co-ordinating system only. It CANNOT generate a fault in one of the participating sub-systems. All participating sub-systems should be FULLY diagnosed before assuming a fault with JaguarDrive Control. Replacing the JaguarDrive Selector module should not be done until all other options have been exhausted.

Winter Mode

To activate winter mode, press the winter mode button briefly (not less than 300 ms) to activate or de-activate the mode.

NOTE: Winter mode cannot be active at the same time as dynamic mode (Supercharged models only).

When active the winter mode icon and message appear in the instrument cluster message center to confirm the activation.

Dynamic Stability Control (DSC)

Press the DSC mode button briefly (not less than 300 ms) to switch between DSC and TracDSC. The instrument cluster message center will display either 'DSC ON' or 'TRAC DSC' depending on which selection is made. When TracDSC is selected, the DSC warning lamp in the instrument cluster is illuminated and the DSC button is illuminated.

DSC can be manually switched off by pressing the DSC mode button for more than 10 seconds. Confirmation is given by a chime from the instrument cluster, 'DSC OFF' is displayed in the instrument cluster message center and the DSC warning lamp in the instrument cluster is illuminated.

NOTE: DSC is operational at all times when the engine is running unless manually switched off.

Dynamic Mode (Supercharged models only)

To activate Dynamic mode, press the button briefly. The dynamic mode and DSC buttons are illuminated. 'Dynamic Mode Confirmed' message is displayed in the instrument cluster message center and the DSC off warning lamp in the instrument cluster is illuminated (due to automatic selection of TracDSC in Dynamic mode).

NOTE: Dynamic mode cannot be active at the same time as winter mode.

Once activated, TracDSC is automatically selected. In gearbox Sport mode, the driver has full control over the transmission shift points and the TCM will not intervene to prevent engine overspeed (for example; upshifts are inhibited in gearbox sport mode when Dynamic mode is selected). In this setting, the gear indicator in the instrument cluster will turn amber at high rev's to indicate an appropriate manual upshift point.